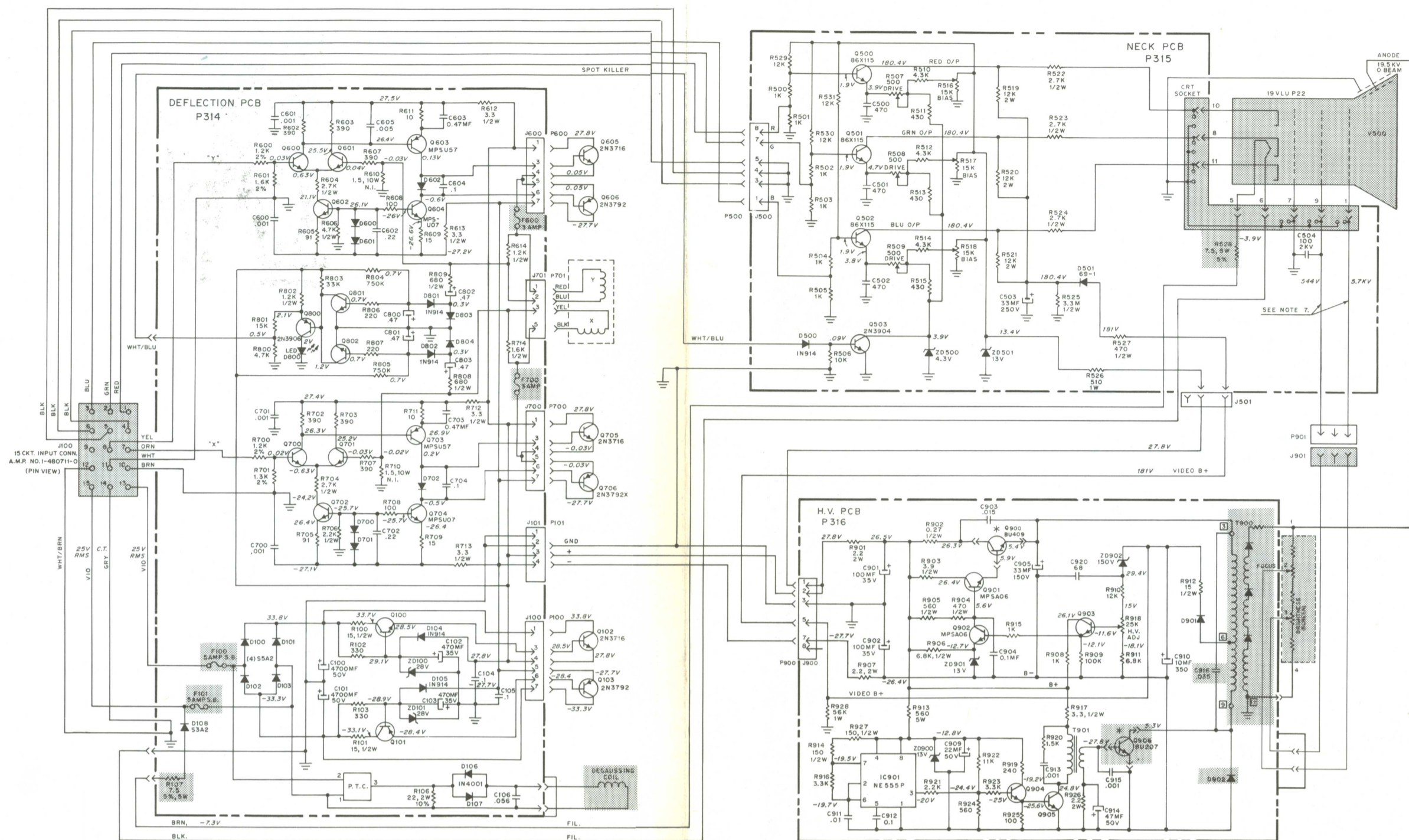
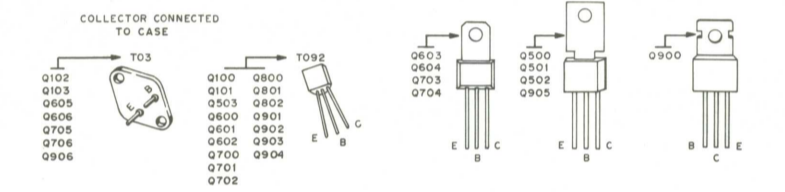


**Wells-Gardner Color X-Y Display Schematic
(19K6101-5617A A+)**



GENERAL NOTES:

- RESISTANCE VALUES IN OHMS (1/4 WATT, 1% TOLERANCE) UNLESS NOTED OTHERWISE. * IN OHMS IN CIRCLES.
- CAPACITANCE VALUE OF 1 OR LESS IN MICROFARADS, UNLESS NOTED OTHERWISE. * IN MICROFARADS UNLESS OTHERWISE NOTED.
- RESISTOR AND CAPACITOR VALUES NOTED ON THIS DRAWING.
- ALL DC VOLTAGES MUST BE MEASURED FROM POINT INDICATED BY SHADING. * IN EARLY PRODUCTION MODELS, VOLTAGES ARE MEASURED WITH NO SIGNAL INPUT AND CORRECTED AS IN A NORMAL OPERATING POSITION.
- CIRCLE NUMBERS INDICATE LOCATION OF WAVEFORM READINGS.
- 20100-01 USES (680040-001) ZENER DIODE IN EARLY PRODUCTION MODELS.
- USE 1/2 WATT 1% TOLERANCE WHEN MEASURING 62 OHMS OR 100 OHM VALUES.



Components identified by shading have special characteristics important to safety and should be replaced only with identical types.

**Self-Test Procedure Part 1
Operator Information Display**

The information below is displayed on the screen if you set the self-test switch to on during the attract mode. Look at the displayed numbers for SECONDS ON and SECONDS PLAYED. If these numbers run together vertically, make adjustments to the X and Y outputs of the game PCB.

To continue with self-test, rotate the control knob until the message FOR SELF TEST PRESS FIRE AND SUPERZAPPER appears on the monitor. Then press both FIRE and SUPERZAPPER. To end the operator information display, set self-test switch to off.

- To erase High Score Table:**
- Turn control knob until top line reads PRESS FIRE AND START 2 TO ZERO HIGH SCORES.
 - Press both FIRE and START 2.
 - The word ERASING appears and blinks on the screen until the entire table is erased. Wait until the word ERASING disappears before continuing with other tests.

- To erase Game Times:**
- Turn control knob until top line reads PRESS FIRE AND START 1 TO ZERO TIMES.
 - Press both FIRE and START 1.
 - The word ERASING appears and blinks on the screen until the entire table is erased. Wait until the word ERASING disappears before continuing with other tests.

Self-Test Procedure Part 2

Instruction	Test Passes	Test Fails																																							
1. Set self-test switch to on (see Figure 5). Press RESET on the PCB, or turn power off and on again.	After about 5 seconds, the monitor displays the picture below. No sounds are produced.	RAM FAILURE is indicated by a sequence of 1 to 12 tones and an R displayed in top half of screen. You will hear a short low tone and see a short flash on the LED start pushbutton for each good RAM chip, and a long high tone accompanied by a long pulse on the start pushbutton for a failing RAM chip. The test stops with the first failing RAM. To restart the sequence, press RESET on the PCB, or power game to off, then to on again. Identify the bad RAM chip with the table below. Example: four short low tones followed by a long high tone indicates failure of RAM at location M3.																																							
		<table border="1"> <thead> <tr> <th>Long High Tone</th> <th>Bad RAM Chip Location</th> <th>on Analog Vector-Generator PCB</th> </tr> </thead> <tbody> <tr><td>1st</td><td>F2</td><td></td></tr> <tr><td>2nd</td><td>P2</td><td></td></tr> <tr><td>3rd</td><td>R4</td><td></td></tr> <tr><td>4th</td><td>P4</td><td></td></tr> <tr><td>5th</td><td>M3</td><td></td></tr> <tr><td>6th</td><td>M4</td><td></td></tr> <tr><td>7th</td><td>L3</td><td></td></tr> <tr><td>8th</td><td>L4</td><td></td></tr> <tr><td>9th</td><td>K3</td><td></td></tr> <tr><td>10th</td><td>K4</td><td></td></tr> <tr><td>11th</td><td>J3</td><td></td></tr> <tr><td>12th</td><td>J4</td><td></td></tr> </tbody> </table>	Long High Tone	Bad RAM Chip Location	on Analog Vector-Generator PCB	1st	F2		2nd	P2		3rd	R4		4th	P4		5th	M3		6th	M4		7th	L3		8th	L4		9th	K3		10th	K4		11th	J3		12th	J4	
Long High Tone	Bad RAM Chip Location	on Analog Vector-Generator PCB																																							
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RAM FAILURE is indicated by a vertical pair of hexadecimal numbers on the top of the screen. The top number indicates the location of the failing ROM(s). Ignore the bottom hexadecimal number in the pair. Identify the bad ROM with the table immediately below.

Displayed No.	Bad ROM Chip Location	PCB Location
8	F1	
A	P1	
9	M/N1	
7	L/M1	Analog Vector-Generator PCB
6	K1	
5	H1	
4	F1	
3	E1	
2	D1	
1	R3	
0	N/P3*	

EAROM, Audio and Math Box Failure are indicated by a single letter in the center of the display. Identify the failure with the table below.

Displayed Letter	Failure	PCB Location
E	EAROM	C5 (Aux. PCB)
P	Audio 1	B/C2 (Aux. PCB)
Q	Audio 2	C/D2 (Aux. PCB)
R	RAM	See RAM test above
M	Math Box **	

* If this ROM is bad, you will hear a continuous low tone, and the program may be unable to display a screen image.
** Math-box failure is explained in TM-195, Tempest Troubleshooting Guide.

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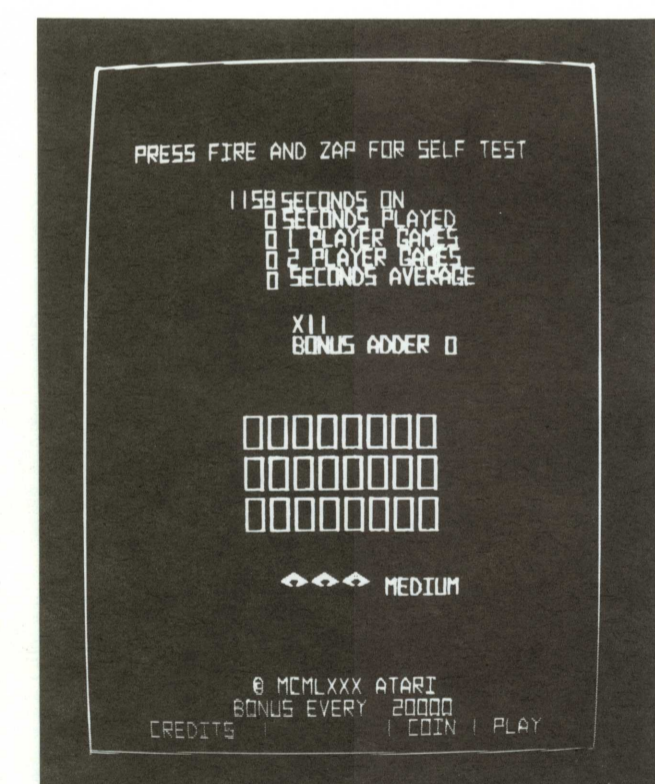
**Drawing Package Supplement
to
Tempest™/Cabaret™
Operation, Maintenance, and Service Manual**

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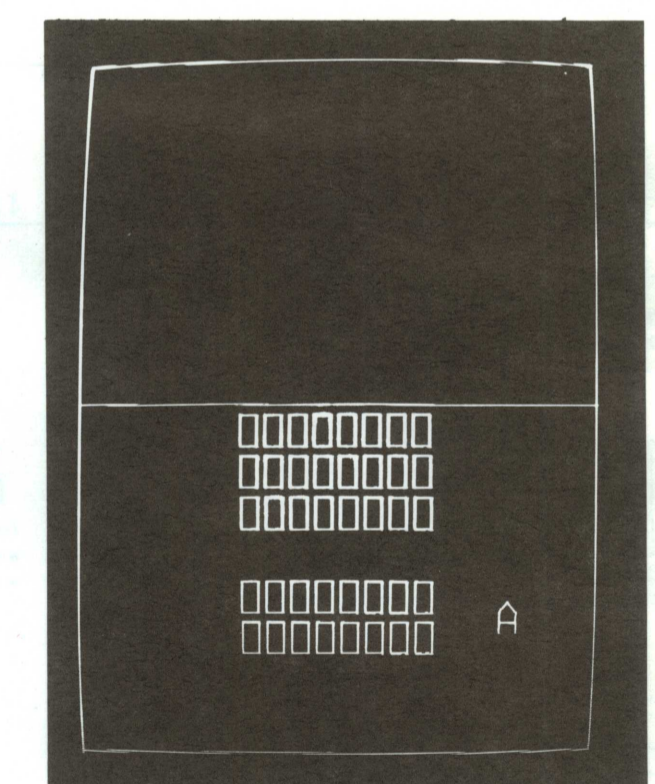
Contents of this Drawing Package

Self-Test Screens	Self-Test Procedure	19-In. Wells-Gardner Color X-Y Monitor	Sheet 1, Side A
Color X-Y Power Supply	Regulator/Audio II PCB	Tempest Upright Wiring Diagram	Sheet 1, Side B
Microprocessor	Address Decoder	Power Input	Clock
Power Reset and Watchdog Counter	ROM Memory	IRQ Counter	Memory Map
X-Y Outputs	Coin Counter and Video Invert Outputs	Coin Door and Option Switch Inputs	Color Outputs
Vector Generator: Program Counter	RAM	ROM	Data Shifter
Data Buffer	Address Selector	Vector Timer	State Machine
Auxiliary PCB: Power Inputs	Address Decoder	Math Box	
High Score Memory	Player Inputs and Audio Output		Sheet 3, Side B

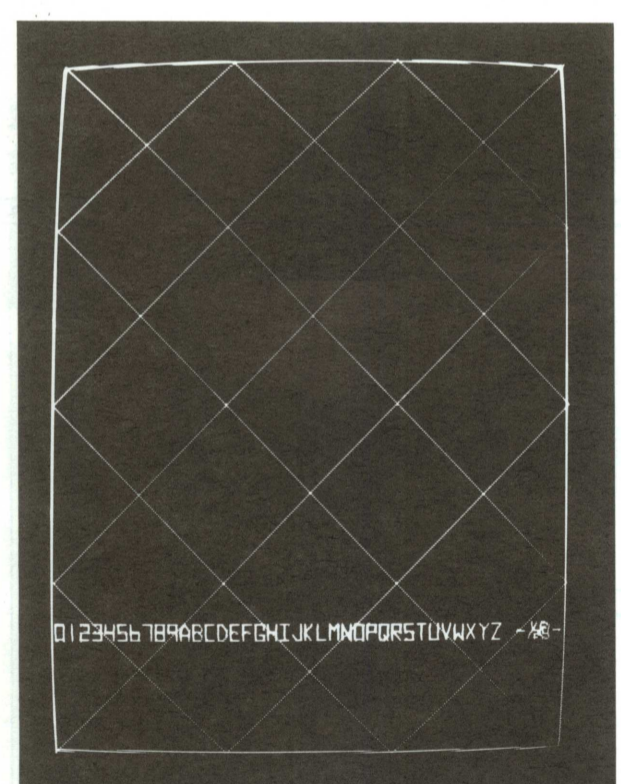
Self-Test Screens



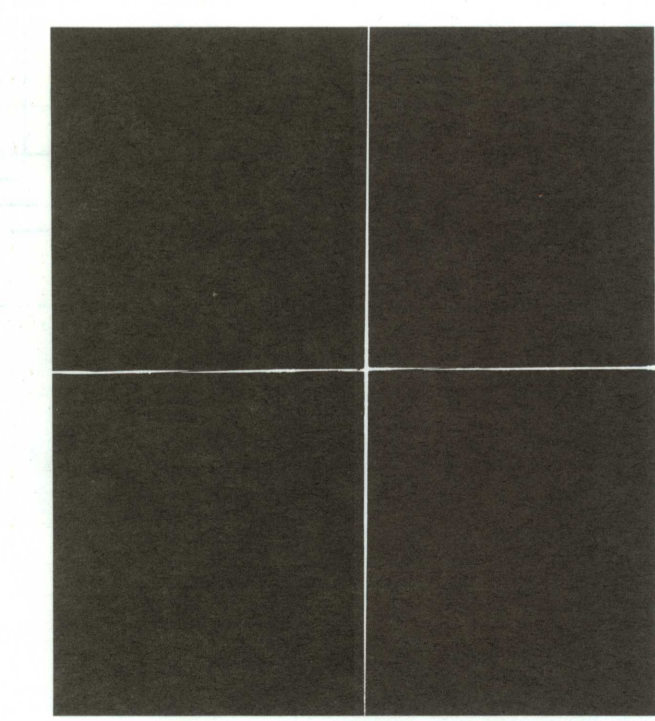
Screen #1



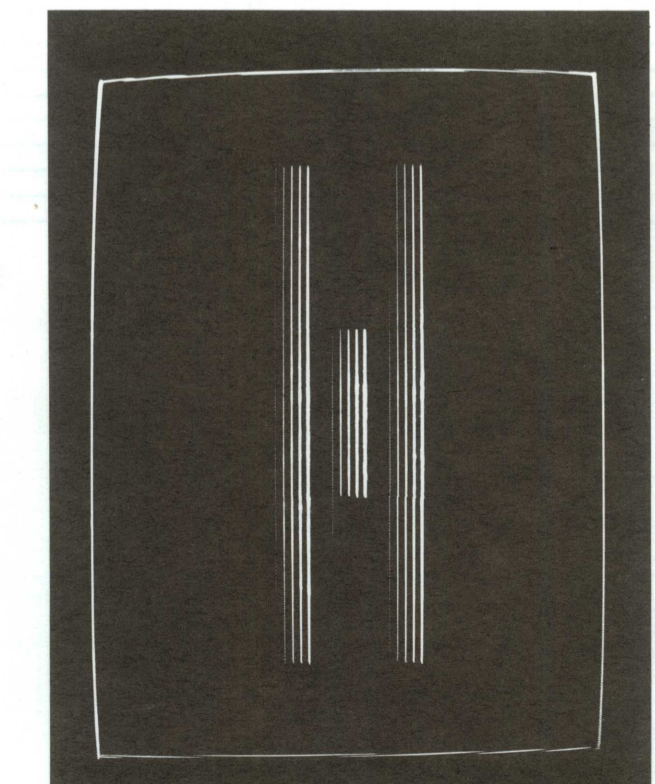
Screen #2



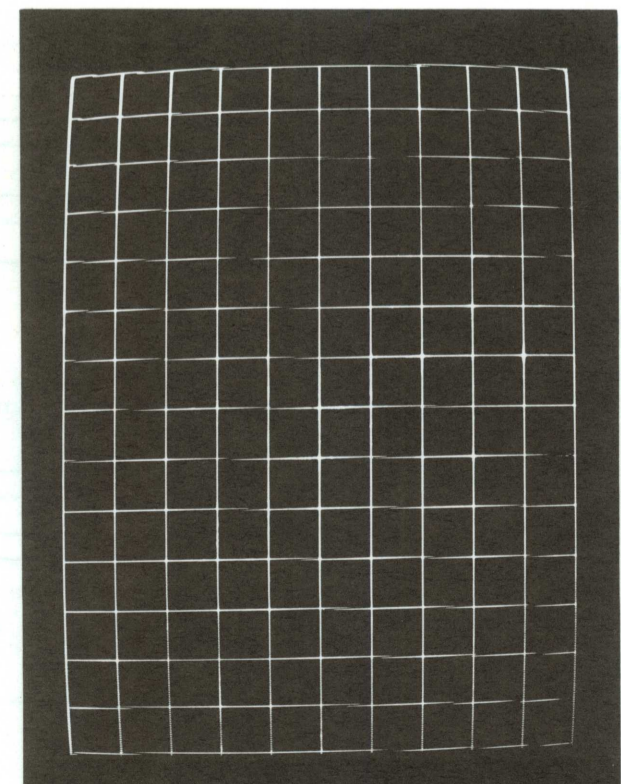
Screen #3



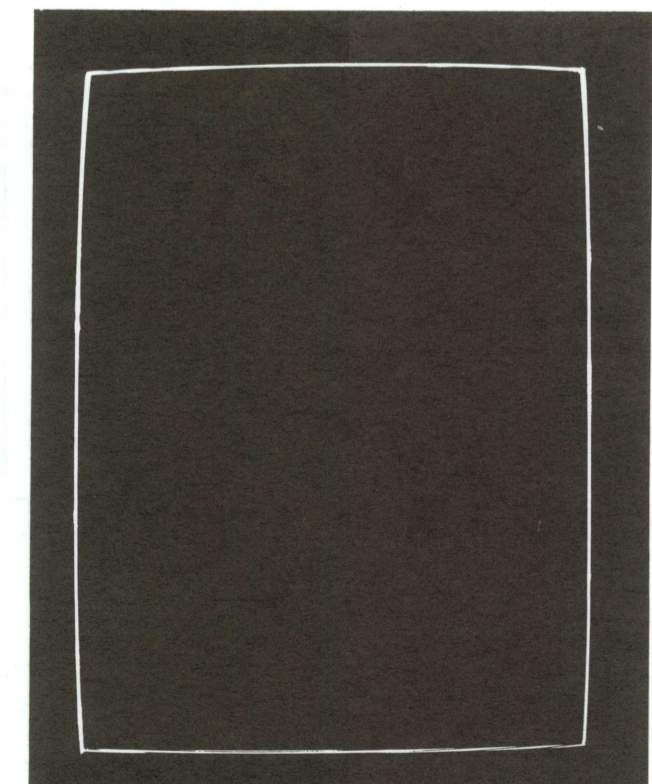
Screen #4



Screen #5



Screen #6



Screen #7

- Activate start, fire, Superzap, SLAM, and coin switches. As switch activates, you'll hear a beep and 0 changes to 1 on the screen.
- Rotate encoder wheel clockwise and counterclockwise. The right hexadecimal number on the screen will increase with counter clockwise motion, and decrease with clockwise motion.
- Observe the white frame around the outside of the screen. Each frame corner should be within 1/2-inch of each monitor bezel corner.
- Activate SLAM switch. A white cross hatch pattern appears. A character set appears at the bottom of the screen.
- Activate SLAM switch. Horizontal and vertical lines cross in the center of the screen displaying a large "plus" sign. Audio I/O 1 and 2 alternate to produce four tones.
- Activate SLAM switch. Tests purple, cyan, yellow, white, green, blue, and red for color and intensity. Displays seven groups of vertical lines, each with right line the brightest and left line the dimmest.
- Activate SLAM switch. A checkerboard pattern touches the sides and corners of the monitor. Rotate the control knob to change color.
- Activate SLAM switch. A white frame is displayed on the screen.
- When satisfied with test, set self-test switch to off position.

* Activate coin switches by inserting at least one coin in each coin slot. You will not trip the coin counters as long as you are in self-test.