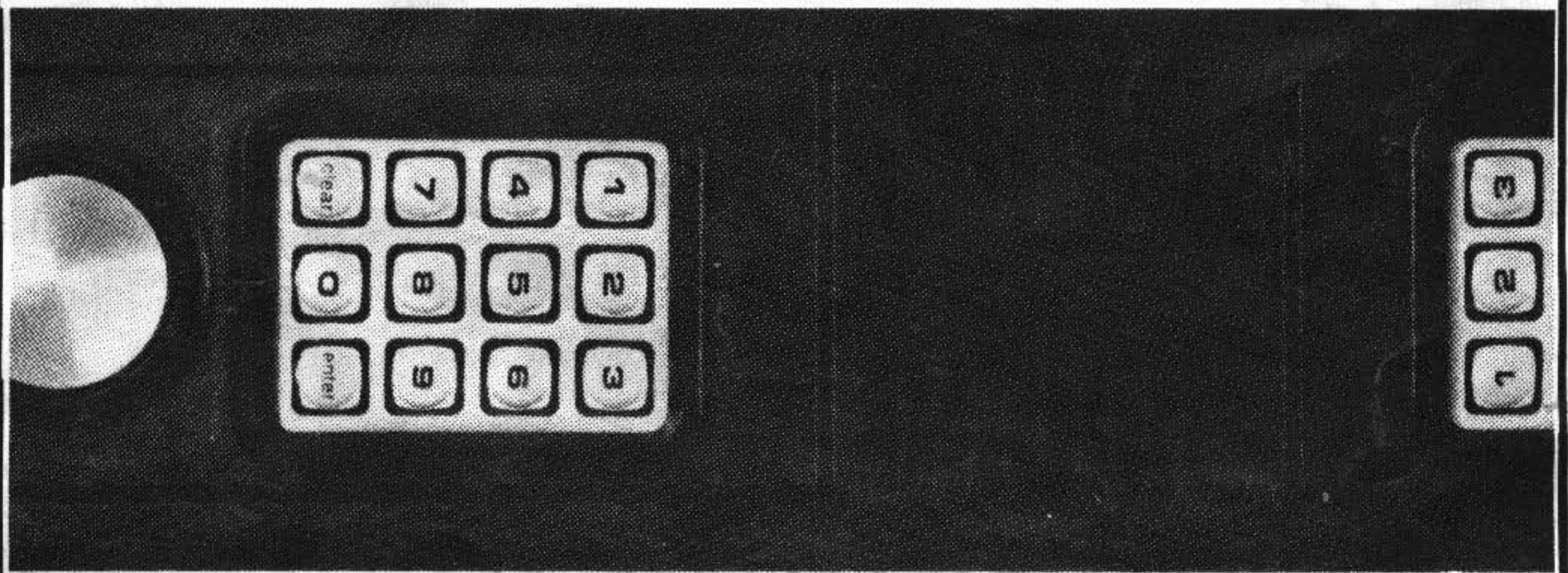


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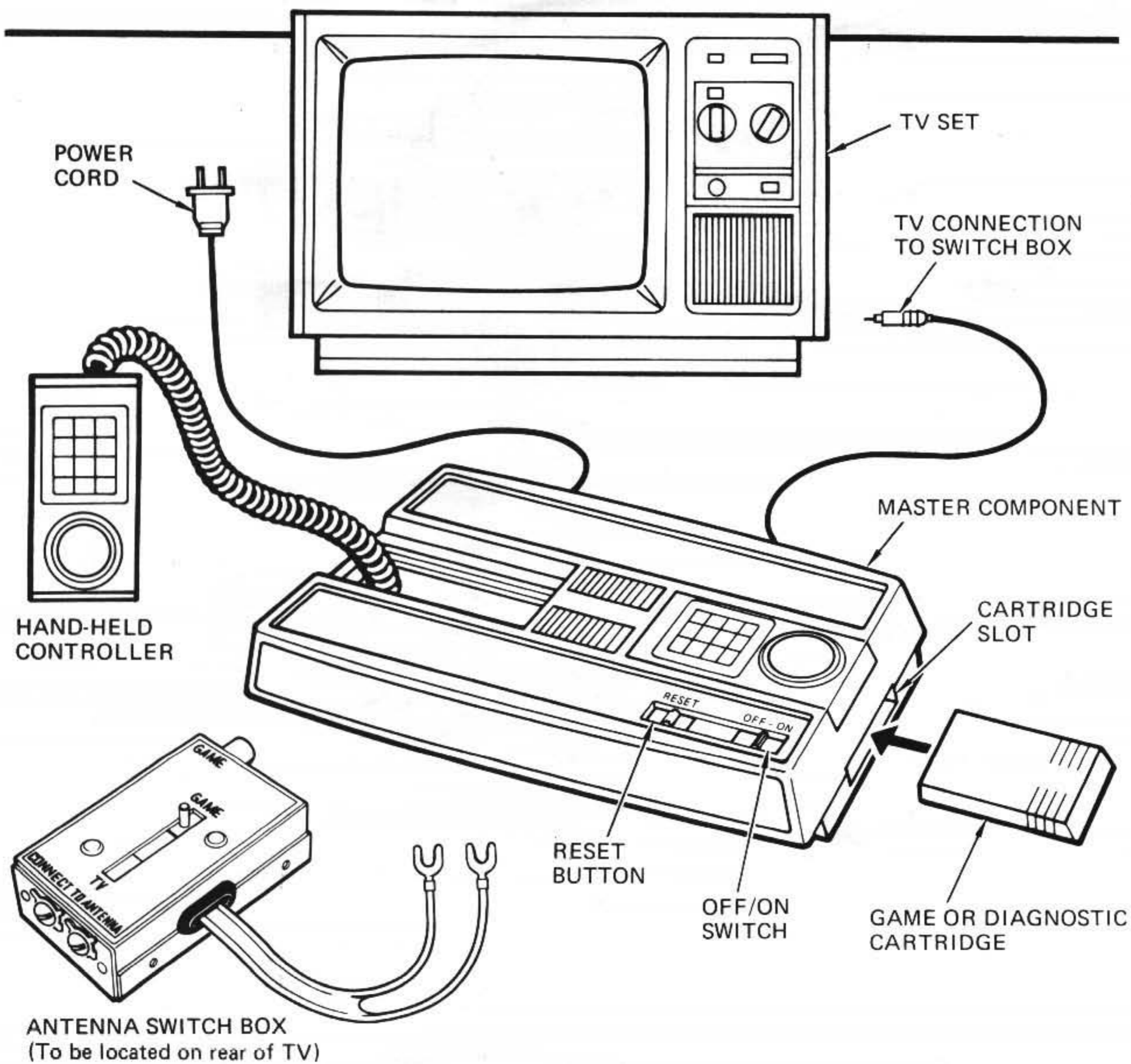
MASTER COMPONENT

SERVICE MANUAL



INTELLiVISION™
Intelligent Television

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THESE INSTRUCTIONS HAVE BEEN DESIGNED TO HELP YOU PERFORM SERVICE ON THE MASTER COMPONENT AS EFFICIENTLY AS POSSIBLE. PERFORM ALL TEST AND REPLACEMENT WORK IN THE SEQUENCE SHOWN, AND **ALWAYS** VERIFY YOUR OWN WORK WITH THE DIAGNOSTIC ROUTINE DESCRIBED IN SECTION I.

DIAGNOSTIC ROUTINE

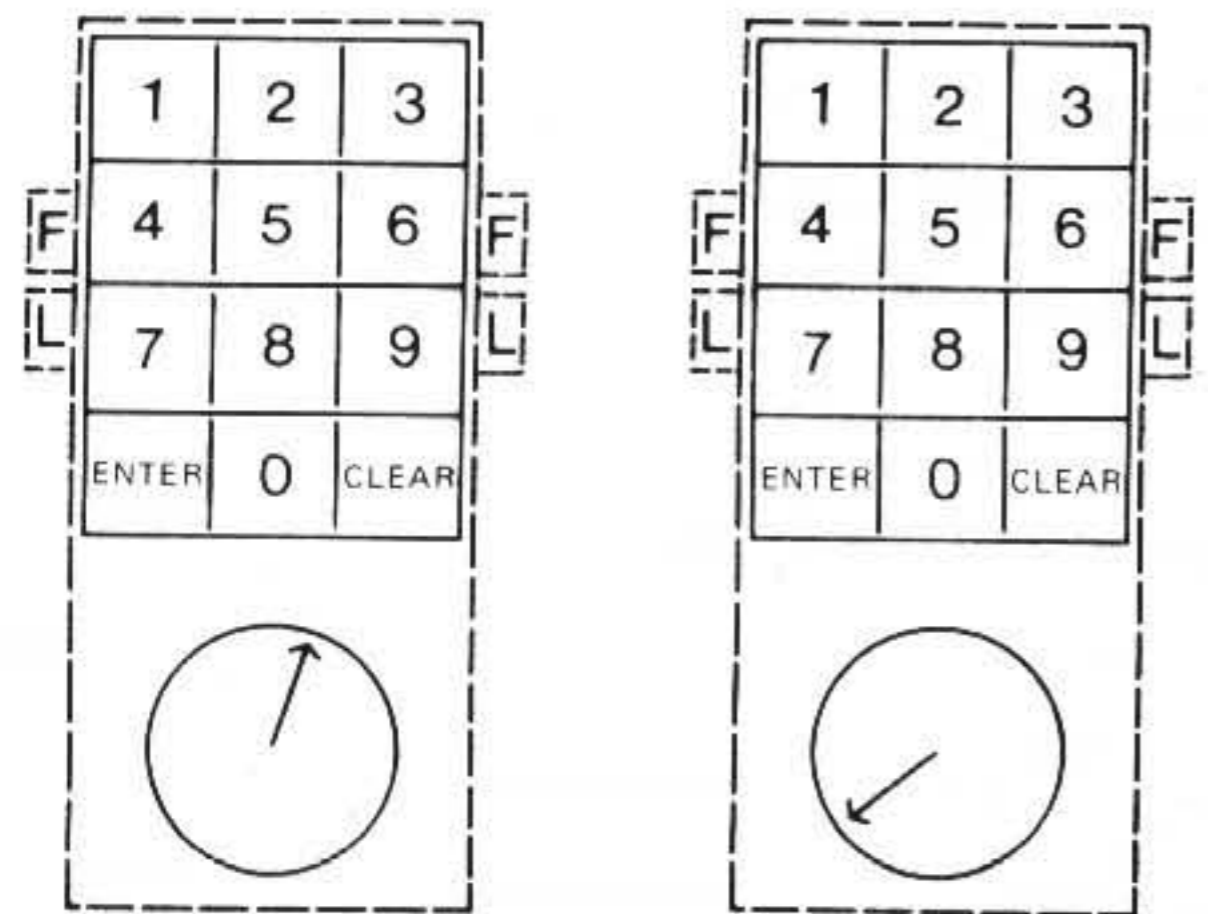
Follow this procedure until you find a malfunction. Then refer to the **PRELIMINARY CHECKLIST** and **TROUBLESHOOTING** and locate the problem or condition. Follow

instructions to correct the fault. Before reassembling the Master Component, go through this **DIAGNOSTIC ROUTINE** again.

TURN ALL AUTOMATIC COLOR CIRCUITS TO MANUAL POSITION.

1. Connect the Master Component to TV, plug in power cord, set the Antenna Switch Unit to **TV** and determine that the set works correctly on broadcast stations. If there is any problem, refer to the **PRELIMINARY CHECKLIST**.

2. Set the Antenna Switch Unit to **GAME**. Insert the Test Cartridge (# 1718) in Master Component. Set **OFF/ON** Switch to **ON** and press **RESET**. Compare the image on the screen with Figure 1.



WHITE	WHITE	BLACK	BLUE	RED	TAN	DK GREEN	LT GREEN	YELLOW	WHITE	GRAY	BLUE	ORANGE	BROWN	MAGEN	LT BLU	YEL GRN	PURPLE	WHITE	WHITE
-------	-------	-------	------	-----	-----	----------	----------	--------	-------	------	------	--------	-------	-------	--------	---------	--------	-------	-------

FIGURE 1

3. Press each key on both Hand Controllers in turn. As you do, each corresponding square in the TV picture should turn from yellow to white. The right Hand Controller will affect the **left** image and vice versa.

Press top buttons on both Controllers and watch for yellow-to-white change in **pairs** of boxes marked "F." Press each lower button to see this change in **each** box marked "L" and "R."

4. Press rim of each Disc and slide your finger around a complete circle, observing that an arrow points in 16 different directions. Check colors for **similarity** only, not accuracy.

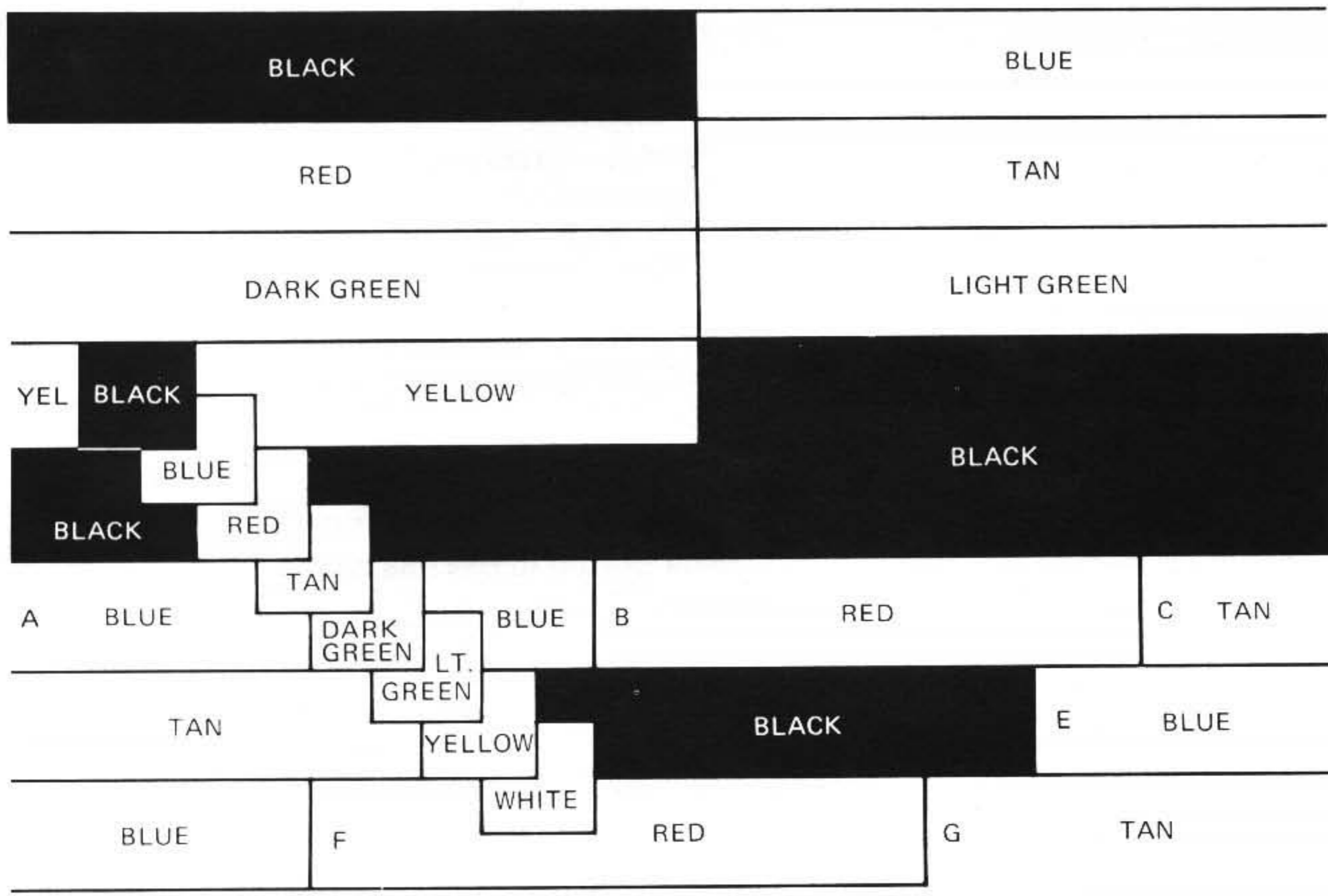
5. Start the automatic test sequence by pressing keys **1** and **9** **simultaneously**. You should hear these sounds:

- A) A high note stepping down through 5 octaves (repeated 3 times).
- B) Random noise (hissing), starting at high volume and diminishing until silenced.
- C) A single tone starting at high volume and diminishing in steps.
- D) Two gunshots, one at full and the other at half volume.

If **all** these sounds are heard as described, press the **CLEAR** key. If **any** part of this test failed, press the **ENTER** key. (Press key between sequences)

NOTE: See page 7 for failure mode from "A to X"

6. The next automatic test presents a series of patterns ending as shown in Figure 2. If colors and definition are satisfactory, press **CLEAR**. If unsatisfactory, press **ENTER**.



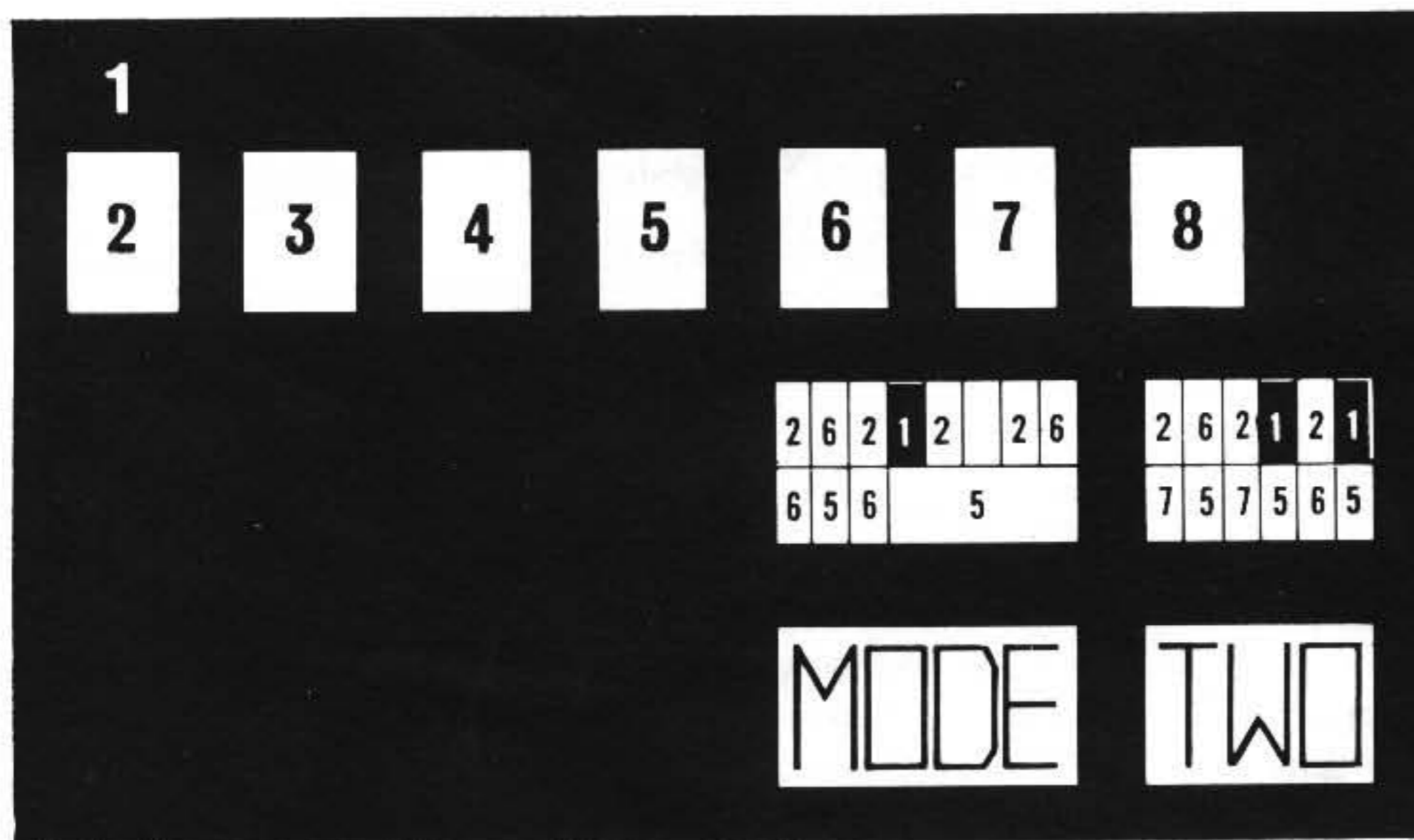
CLEAR = OK

ENTER = BAD

FIGURE 2

7. The next automatic test presents patterns of colored squares, and the flashing words "MODE TWO," as shown in Figure 3. If this picture passes the test, press CLEAR. If it is unsatisfactory press ENTER.

NOTE: Be careful to press correct button, either CLEAR or ENTER. Check color for similarity only, not accuracy.



- COLOR CHECK
1. BLACK
 2. BLUE
 3. RED
 4. TAN
 5. DARK GREEN
 6. LIGHT GREEN
 7. YELLOW
 8. WHITE

FIGURE 3

8. The last test alternately flashes the patterns "F/B" and "VIS." Press CLEAR for pass or ENTER for fail. This test will end with either picture shown in Figure 4.

PART A



FAILURE IN INDICATED PARTS

→ OR
PART B

CLOCK →



Pass Pass Pass

FINAL TEST IMAGE

FIGURE 4

If the "FAILURE IN INDICATED PARTS" picture is displayed, refer to Failure Modes, Page 7.

If "PASS-PASS-PASS" is the result of this Routine, refer to Section -7, -2 Page 19.

9. This Diagnostic Routine can be repeated — from the beginning — any time. Just press RESET button.

PRELIMINARY CHECKLIST

Before you refer to the TROUBLESHOOTING Section which follows, look at this list of possible

quick solutions. Then, if any problem persists, you should be able to find it in TROUBLESHOOTING.

Turn OFF/ON Switch to ON and press RESET. With the Test Cartridge still inserted, go through the DIAGNOSTIC ROUTINE and check for these problems:

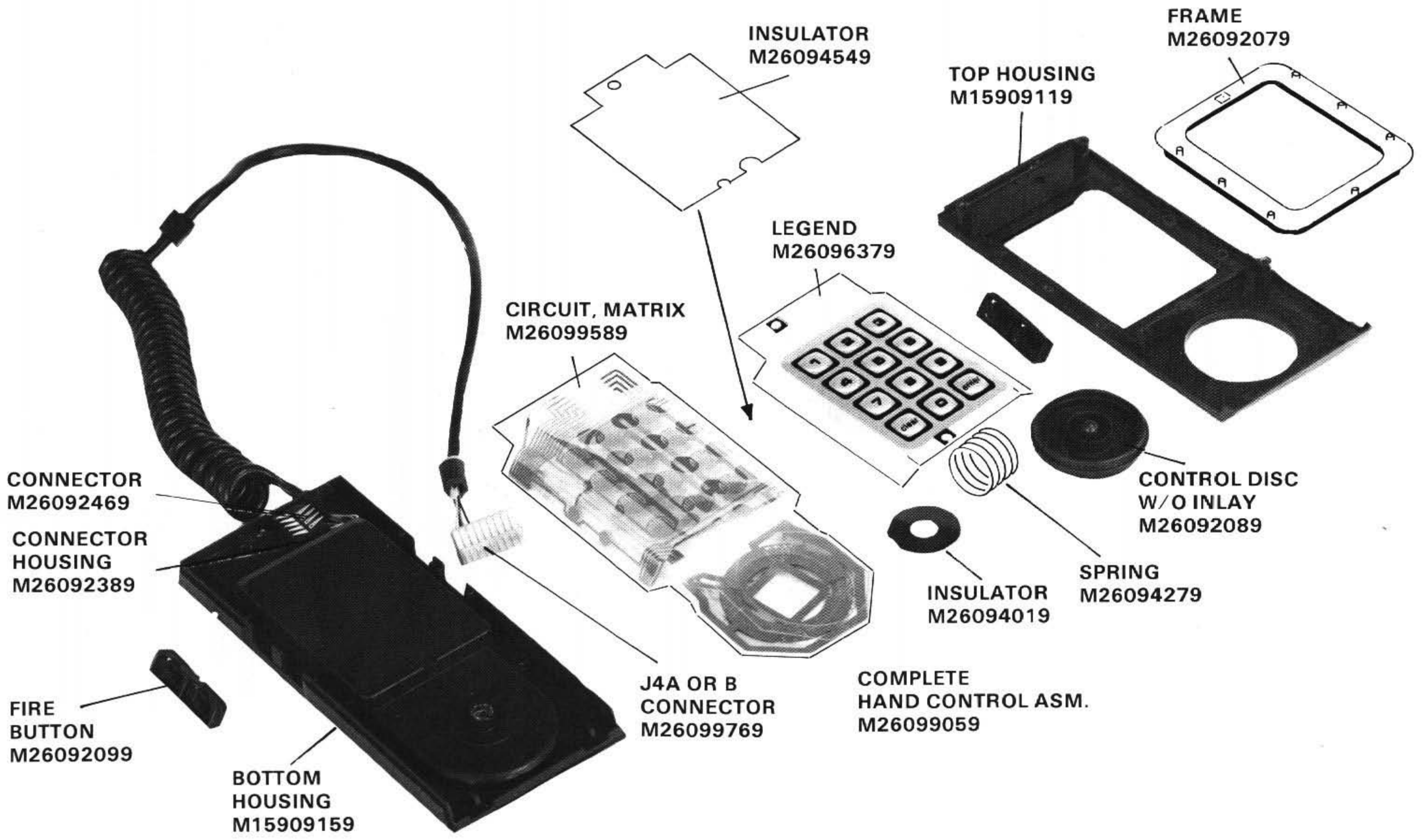
PROBLEM	POSSIBLE SOLUTION
SCREEN IS BLANK	— Press any key on either Hand Controller key pad to recover picture.
NO TV PROGRAMS	— Check connection of twin lead wire from Antenna Switch Unit to VHF terminals on TV. — Make sure Antenna Switch Unit is set at TV. — Make sure that antenna leads are attached.
BUZZING OR DISTORTED SOUND	— Adjust TV fine tuning controls. — If there is broadcast interference on Channels 3 & 4, from a strong signal, disconnect VHF wires from Antenna Switch Unit. (These wires must be reconnected for broadcast viewing.)
NO GAME SOUND EFFECTS	— Turn up TV volume control.
NO TEST IMAGE, OR WHITE-GRAY SCREEN	— Check all connections, including power plug. — Make sure: — Cartridge is properly inserted. — TV tuner is set on Channel 3 or 4, and matches switch on bottom of Master Component. — Antenna Switch Unit is set at GAME. — Antenna cable is properly plugged into Switch Box. — Power switch is ON. — Antenna leads are securely connected to Antenna Switch Unit.

PROBLEM	POSSIBLE SOLUTION
EITHER SIDE OF TEST IMAGE NOT VISIBLE	— Check horizontal hold control setting.
TEST IMAGE NOT DISTINCT, AS IF FROM WEAK SIGNAL	— Adjust fine tuning, brightness, and contrast controls. — Check for loose connections at antenna terminals or Antenna Switch Unit.
TEST IMAGE BLURRED, WOBBLY, OR NO COLOR	— Adjust fine tuning, brightness and contrast. — If there is broadcast interference on Channels 3 & 4, from a strong signal, disconnect VHF wires from Antenna Switch Unit. (These wires must be reconnected for broadcast viewing.)

FAILURE MODES AND PROBABLE CAUSES

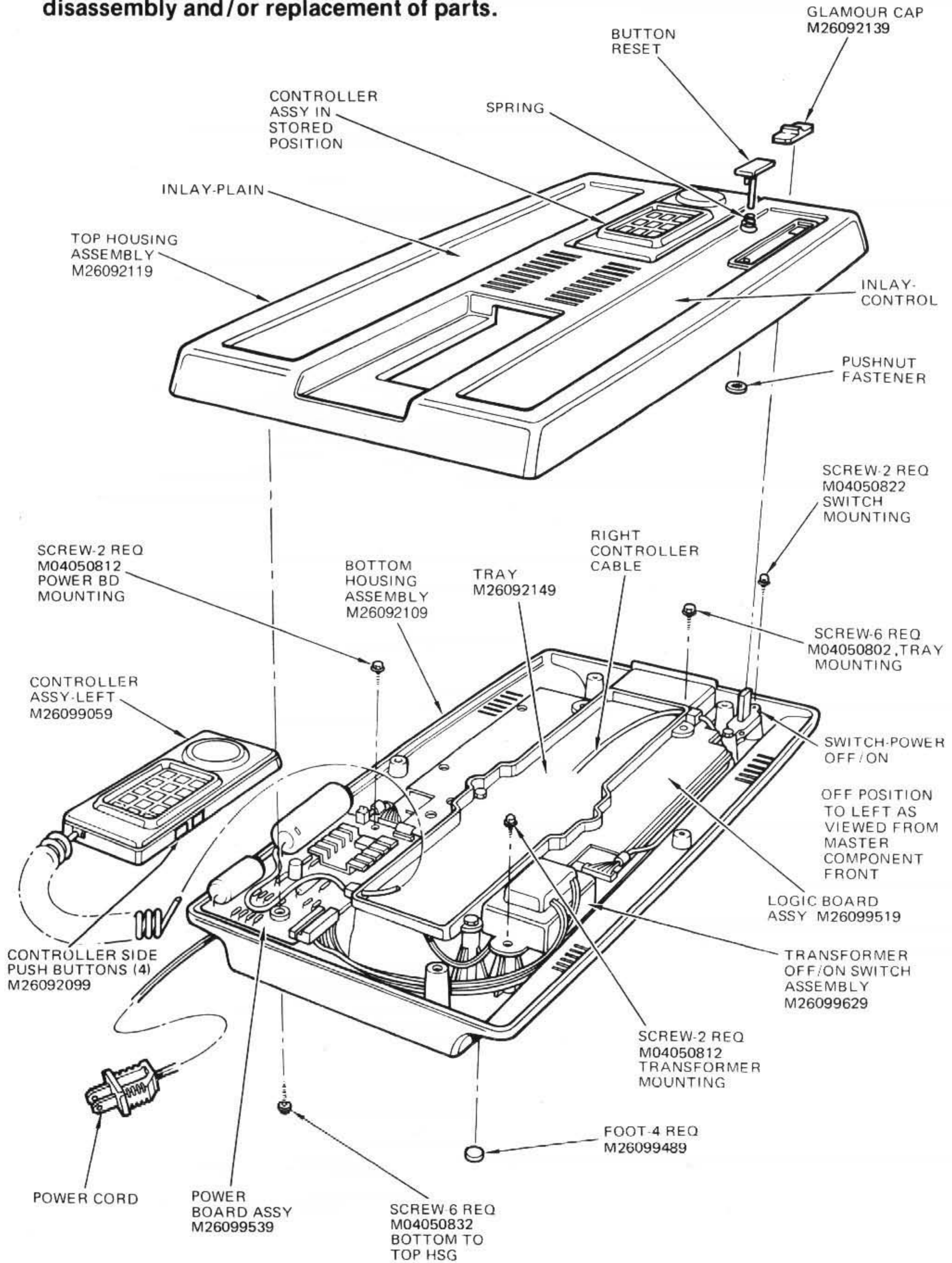
(Press Key Between Sequences)

Failure @ A	Check or replace U5 or U7
Failure @ B	Check or replace U9
Failure @ C	Check or replace U3
Failure @ D	Check or replace U4
Failure @ E	Check or replace U7 or U8
Failure @ F	Check or replace U5 or U6 or U7
Failure @ G	Check or replace U2 or U12
Failure @ H	Check or replace U12
Failure @ J	Check or replace U6
Failure @ W	Check or replace U4
Failure @ X	Check or replace U6
Failure @ Y	Check or replace U4
Failure @ Z	Check or replace U4



EXPLODED VIEW - CONTROLLER

Unit should be unplugged prior to attempting disassembly and/or replacement of parts.



EXPLODED VIEW - CONSOLE

DISASSEMBLY INSTRUCTIONS

SECTION IV:

NOTE

Retain replaced Logic Boards and Power Supply Boards for return shipment in replacement component packing materials.

A. CONSOLE DISASSEMBLY

Be sure unit is unplugged before starting to disassemble it.

- (1) Turn Console upside down and loosen (6) Phillips head screws.
- (2) Turn Console right-side up, allow the (6) screws to fall out, and pull up the OFF/ON glamour cap to remove. **DO NOT** try to remove the **RESET** button.
- (3) Remove top case and slip Hand Controllers through openings.

NOTE: When re-assembling Console, replace Hand Controller tray first. Refer to Figure 4-1 for position of Controller wires.

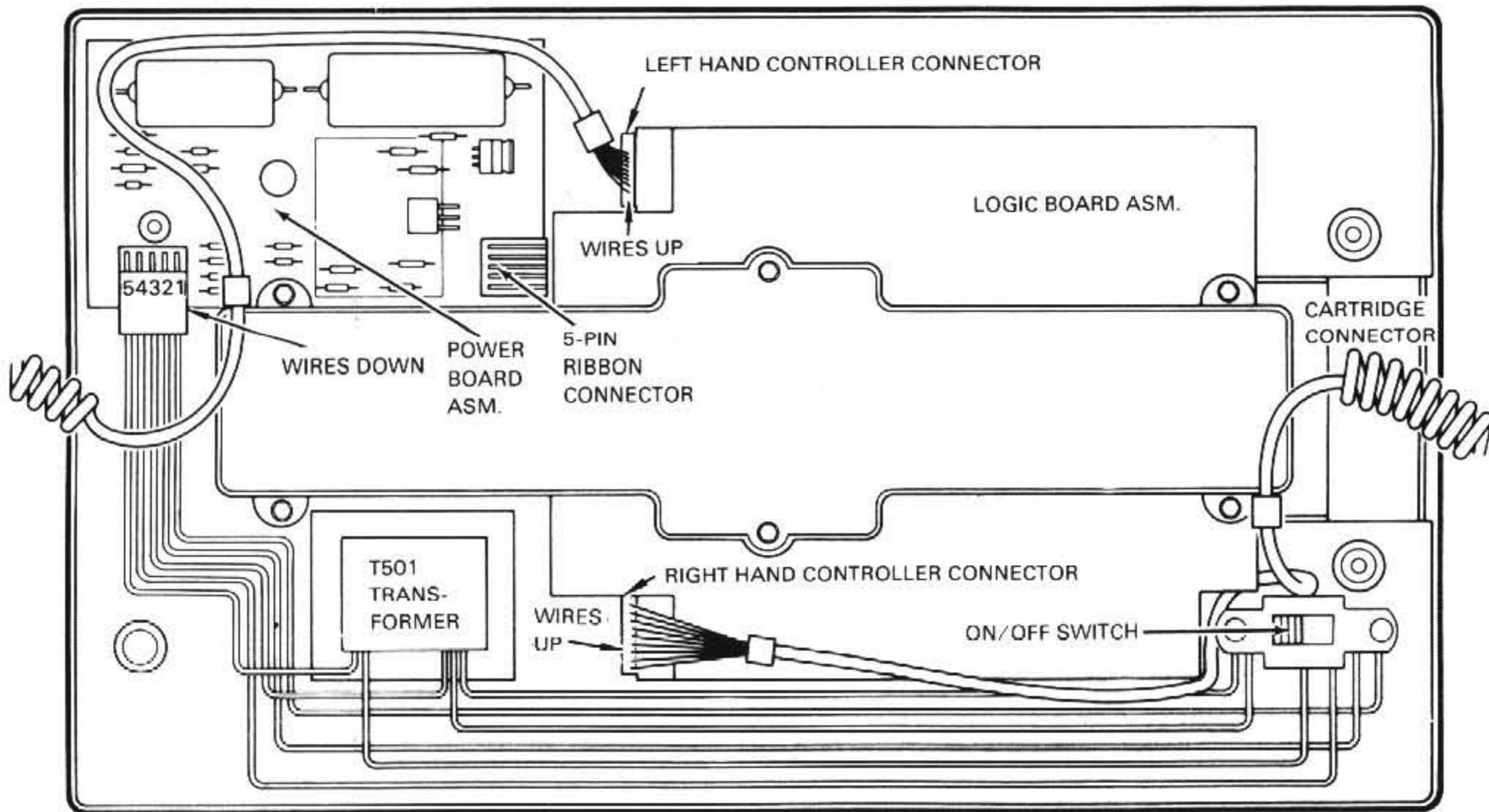


FIGURE 5 CONSOLE LAYOUT

DISASSEMBLY INSTRUCTIONS-CONTINUED

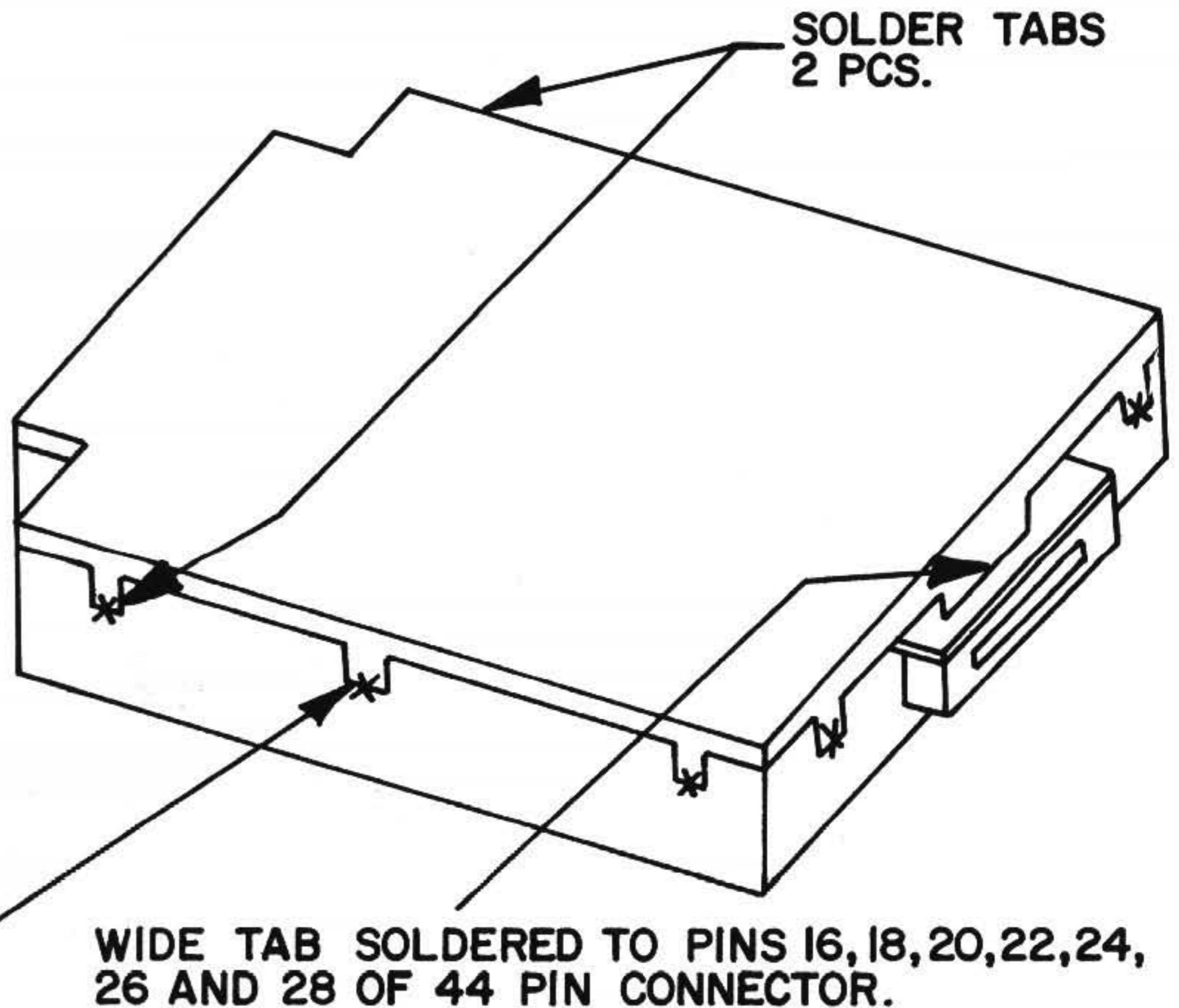
B. LOGIC BOARD OR HAND CONTROLLER REPLACEMENT

- (1) Follow Console Disassembly procedure — steps (1) through (3).
- (2) Remove (6) hex-head screws from Hand Controller tray, and remove the tray.
- (3) Disconnect Switch Box cable from console and remove any game cartridge.
- (4) Carefully disconnect the 5-pin ribbon connector from Power Supply Board.

**The Logic Board and metal shields go together.
DO NOT try to separate them.**

- (5) Lift Logic Board straight up. Carefully disconnect Hand Controllers (if a problem exists in just one Controller, it is not necessary to remove both of them). When replacing Connectors to Logic Board, the wires coming from Connectors must face **upward** (see Page 10).

FIGURE 6
LOGIC BOARD ASM.



**TOP SHIELD TABS MUST OVERLAP BOTTOM SHIELD
TABS. TACK SOLDER TOP SHIELD TO BOTTOM SHIELD
AT POINTS INDICATED.**

DISASSEMBLY INSTRUCTIONS-CONTINUED

C. POWER SUPPLY BOARD REPLACEMENT

- (1) Remove (6) hex-head screws from Hand Controller tray. Remove the tray.
- (2) Carefully disconnect the 5-pin ribbon connector from the Power Supply Board **and** the 5-pin Transformer connector from the pins on the Power Supply Board.
- (3) Remove (2) hex-head screws from the Power Supply Board and replace the Board (but not the Hand Controller tray — yet).

★ SAFETY PRECAUTION ★

FIBER INSULATOR(S) MUST BE PROPERLY REPLACED UNDER POWER SUPPLY BOARD. IF UNIT WAS EQUIPPED WITH TWO INSULATORS, BE SURE THAT BOTH ARE REPLACED TO SATISFY UL REQUIREMENTS.

D. TRANSFORMER ASSEMBLY REPLACEMENT

NOTE: Unplug Master Component before attempting parts replacement.

- (1) Disconnect 5-pin Ribbon Connector from Logic and Power Supply Boards.
- (2) Unscrew the Hand Controller tray and Power Supply Board.
- (3) Remove the Power Supply Board and the insulation underneath it.
- (4) Remove the 5-pin Transformer connector from Power Supply Board.
- (5) Remove (4) hex-head screws, 2 from the Transformer and 2 from the OFF/ON switch. Refer to Figure 5 for correct positioning of the switch.
- (6) Replace the Transformer Assembly, reversing the above steps. If the problem was in the Transformer DO NOT reconnect 5-pin socket connector to the Power Supply Board. Instead, refer to TROUBLESHOOTING Instruction (k) on Page 17.

IMPORTANT REMINDER

After completing any TROUBLESHOOTING or DISASSEMBLY, **always** go through the entire DIAGNOSTIC routine described in Section I before reassembling the unit.

TROUBLESHOOTING GUIDE

The purpose of this guide is to assist in locating defective components when servicing the Master Component. It should be used in conjunction with the IMI and Baseball cartridge.

Prior to analyzing defects a thorough visual inspection of all components and circuit board connections should be made. In addition the power supply should be checked visually and measured to insure all voltages are within tolerance.

EFFECT	CAUSE
SNOW ON SCREEN	<ul style="list-style-type: none">— No RF output— Voltage problem to modulator— Check phono output jack and 27 ohm resistor (in modulator)— Check RF cable— Check switch box— Check channel selector switch
WEAK VIDEO (POOR CONTRAST)	<ul style="list-style-type: none">— Replace modulator— Replace color IC U10
VIDEO SMEAR	<ul style="list-style-type: none">— Check modulator— Replace modulator— Replace color IC U10
VIDEO, NO AUDIO	<ul style="list-style-type: none">— Check 5 volt supply to Pin 1 of P3 or/and Pin 40 of U6— Check audio output U6 Pins 4, 3, or 38— Check Q3 and associated circuitry— Check audio input to modulator— Replace modulator

TROUBLESHOOTING GUIDE-CONTINUED

- AUDIO BUZZ — Check modulator sound carrier
- Check modulator frequency on both channel 3 and 4 for quieting
 - Check ferrite cores in modulator (for no cracks in the cores)
 - Check channel selector switch
 - Replace modulator

- BLANK SCREEN (AUDIO OK) — Check video input to modulator
- Check color IC U10

- BLANK SCREEN — Check video input to modulator. Make visual check of wave shape for sync and color burst. If sync and color burst is present check clock wave shapes Pin 15 or U4. Also, check for clock pulses Pin 10 and 11 of U4. Clock pulses should also appear at Pin 37 and 38 of U1.
- Check Pins 37 and 38 of U1. They should have clock pulses of 11V peak to peak and no overlap of pulses.
 - Check bus copy lines BC1 and BC2 at Pins 3 and 4 of U1, and BDIR Pin 5 and master sync Pin 2 directly after reset.
 - Note: These signals BC1, BC2, BDIR, & MS are directed to U16, U13, and U17 for coding and driving bus lines to game cartridge and return on J1 Pin 32, 34, and 36. These signals are then distributed to U3, U4, U6, and U9. Check input to these IC's to make certain signal is being received.

- FIGURES FREEZE OR WRONG SEQUENCE OF EVENTS — Check U1, and U2 by direct replacement

TROUBLESHOOTING GUIDE-CONTINUED

GAME WILL NOT START
REMAINS ON TITLE PAGE

- Hand control input line A or B hold low
- Replace hand controls
- Replace U6

NO COLOR

- Check video input to modulator
- Adjust coil in modulator (lower left corner)
- Replace modulator

WRONG COLOR

- Check color oscillator frequency adjustment C2
- Replace U10, color IC
- Replace U4, stic IC

INTERFERENCE PATTERN IN
THE PICTURE DIAGONAL
LINE MOVING ACROSS
SCREEN

- Check antenna switch box by direct replacement
- Check RF cable by direct replacement
- Check modulator RF output jack for no intermittent connection
- Replace modulator
- Replace U10, color IC
- Add ferrite beads on video input lead to modulator

Suspected defective ICs should be installed in another master component. This should duplicate the malfunction in the second unit, thus verifying the defective IC. A goose neck lamp with a 120 watt light bulb can be

placed several inches over the logic board (remove shield) to heat IC's. This will speed heat caused malfunctions. Monitor temperature so as not to over heat components. Two to three minutes should be sufficient.

TROUBLESHOOTING

SECTION III

Find the Phrase in the left-hand column below which best describes the malfunction or condition you encountered. Follow each step of the

related instructions. Then repeat the entire **DIAGNOSTIC ROUTINE** as described on Page 3.

MALFUNCTION/CONDITION

1. NO TV PROGRAMS,
NO INTELLIVISION TEST PATTERNS,
SNOWY OR WHITE-GRAY SCREEN.

SERVICE INSTRUCTIONS

1.0 Verify that TV receiver works.

1.1 Disconnect Antenna Unit assembly and replace with a good unit.

1.2 Disconnect Antenna Cable and replace with a good one.

1.3 Disassemble Master Component (See Section IV-A, Page 10).

1.4 Unplug Master Component and check OFF/ON switch for continuity.

1.5 When the Component is disassembled, perform the following test procedure:

(a) Carefully remove 5-pin ribbon connector from the Power Supply Board (see Figure 5, Page 10).

(b) Plug in Master Component and turn OFF/ON switch ON.

(c) Connect negative probe of voltmeter to Ground Test Point on the Power Supply Board. Connect positive probe to +5 Volt Test Point. Meter should read 4.7 - 5.3 VDC.

(d) With negative probe still on Ground, connect positive probe to +12 Volt Test Point. Meter should read 11.4 - 12.6 VDC.

(e) With negative probe still on Ground, connect positive probe to +16 Volt Test Point. Meter should read at least +16 VDC.

(f) Connect positive probe to Ground and negative probe to -3.3 Volt Test Point. Meter should read 3.1 - 3.5 VDC.

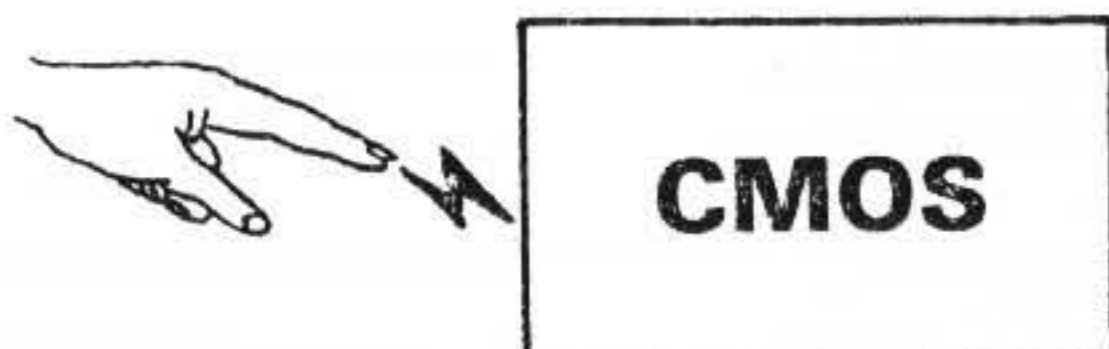
(g) If all voltages are present, replace the Logic Board (See Section IV-B, Page 11).

TROUBLESHOOTING-CONTINUED

MALFUNCTION/CONDITION

1. CONTINUED

This device contains Digital circuits using complimentary metal oxide semiconductor (C-MOS) devices which are especially vulnerable to static discharge.



IC Servicing Guidelines (Courtesy of NATESA)

1. Just before touching any component or module, touch the metal chassis to ensure your body is not statically charged.
2. When removing circuit boards or modules from the chassis, place them on a conductive surface such as aluminum foil. Do not place them directly on the floor, carpet, workbench or TV cabinet.
3. Touch the metal chassis just before picking up a module or component for insertion.
4. When removing or replacing integrated circuits, grounded tip solder irons are absolutely essential.
5. Some "solder suckers" generate up to 20,000 volts of charge when triggered and should not be used. Even when the IC being removed is known to be bad, a solder sucker can generate enough static to damage other components on the board. Anti-static solder suckers are available and are essential for IC work.
6. Replacement integrated circuits are packaged in conductive foam or with aluminum foil. Do not remove the IC from its protective package until it is ready to be used. Just before removing the IC, touch the conductive foam to the chassis or circuit board into which it will be inserted. This can be done by touching the board with one hand and the conductive package with the other.
7. Try to minimize motion when handling unpackaged integrated circuits. When seated, the simple action of lifting your feet from the floor can generate static electricity. Clothes readily generate static electricity when brushed against other objects.
8. Do not use freon propelled sprays on the circuit boards or chassis. Freon sprays can generate more than 5,000 volts of static electricity. Even when an IC is in a protective package or soldered into a circuit board, a freon propelled spray can generate static electricity which could damage internal components not directly connected to the IC pins. A short bristle brush (1/2 inch or 1.25 centimeters) with a metal handle is a safer method of clearing debris.
9. Defective components should be returned in a conducting package, not in plastic boxes or plastic envelopes. Aluminum foil is an effective packing material. Conductive plastic wrappers, envelopes, and boxes are available from a number of manufacturers.

(h) If any of the above voltages are not present, remove the 5-pin Transformer Connector from the Power Supply Board. Set VOM meter on AC, and test these voltages: (see Figure 5, Page 10)

- With probes in holes #3 and #1, meter should read 7.6 - 9.4 VAC RMS.
- With probes in holes #3 and #2, meter should read 7.6 - 9.4 VAC RMS.
- With probes in holes #4 and #5, meter should read 15.3 - 18.7 VAC RMS.

(i) If all voltages read as described in Step (h), replace the Power Supply Board (See Section IV-C, Page 12).

(j) If any voltages differ from the values in Step (h), replace the Transformer Assembly (See Section IV-D, Page 12).

(k) Refer now to Figure 8, Page 25, for diode locations. With the 5-pin Transformer Assembly connector disconnected, set VOM meter on its lowest resistance scale (or on special diode scale) and check Power Supply diodes CR1 through CR8 for opens or shorts. As you connect the probes across each diode, note the resistance reading. Then reverse probe directions and note the new resistance reading. A good diode will produce a LOW (typically <10 ohms) and a HIGH (>1 Megohm) reading.

A HIGH reading from both probe connections indicates an open diode, and two LOW readings would mean a shorted diode. **If either an open or shorted diode is found, replace the Power Supply Board (See Section IV-C, Page 12).** If all diodes are good, reconnect the 5-pin Transformer Assembly and 5-pin ribbon connectors to Power Supply Board. Verify that

TROUBLESHOOTING-CONTINUED

MALFUNCTION/CONDITION

SERVICE INSTRUCTIONS

1. CONTINUED

(K) Cont'd
replacement of the Transformer Assembly and/or Power Supply Board has corrected any supply voltage problem by repeating steps (b) through (f) above.
If voltages are correct and a known-good Logic Board has been installed but symptoms persist, the fault could be with Power Connector J3 on the Power Supply Board.

USE EXTREME CAUTION IF YOU CHECK SUPPLY VOLTAGES AT THE J3 MATING RIBBON CONNECTOR, AS METER PROBES COULD SHORT ACROSS TERMINALS ON THE CONNECTOR AND DAMAGE THE POWER SUPPLY VOLTAGE REGULATOR.

2. TEST PATTERNS OR GAME PICTURE JUMBLED, OR UNWANTED CHARACTERS ON SCREEN

2.1 Follow Procedure 1.5 A thru K (See Section III-I, Page 16).

3. NO SOUND OR GARBLED SOUND

3.1 Make sure that TV volume is turned up, and that sounds on broadcast stations are good.

3.2 **Replace Logic Board (See Section IV-B, Page 11).**

4. BAD OFF/ON SWITCH

4.1 **Replace Transformer Assembly (See Section IV-D, Page 12).**

5. TEST CARTRIDGE DOES NOT RESPOND TO HAND-CONTROLLER(S)

5.1 **Replace Hand Controllers (See Section IV-B, Page 11).**

5.2 If Procedure 5.1 doesn't cure the problem, **replace Logic Board (See Section IV-B, Page 11).**

TROUBLESHOOTING-CONTINUED

MALFUNCTION/CONDITION

6. TEST INDICATES FAILURE
IN PARTS OTHER THAN
HAND-CONTROLLERS

7. NO APPARENT FAILURE
— ALL TESTS PASS

SERVICE INSTRUCTIONS

6.1 Replace Logic Board (See Section IV-B, Page 11).

7.1 Insert customer's game cartridge in Component and watch for: mistakes in lettering on title picture, jumbled playfield, or unwanted characters. Test with a known-good Game Cartridge. If problems continue, follow Procedure 1.5 (a) thru (k), Section III-1 Page 16. If problems do **not** appear, customer's cartridge is defective.

7.2 NOTE: FOLLOW THIS STEP FOR SHOP SERVICE ONLY:

Disconnect Master Component from TV, connect power cord, and leave unit ON for 90 minutes. Repeat Troubleshooting routines. If the result again shows no failure, the Master Component is considered to be GOOD.

IMPORTANT REMINDER

After completing any TROUBLESHOOTING or DISASSEMBLY, **always** go through the DIAGNOSTIC ROUTINE described in Section I before reassembling the unit.

REPLACEMENT PARTS LIST

Service
Part No.

Description

Mechanical Parts

M15909159	Bottom Housing - Hand Controller
M26092109	Console Base - With Feet
M26092119	Console Cover
M26092089	Control Disc - Without Inlay
M26092099	Fire Button
M26099489	Foot - Console Base
M26092079	Frame - Hand Controller Top
M26099059	Hand Controller - Complete Asm.
M26092149	Hand Controller Tray
M26094549	Insulator - Hand Controller
M26096379	Legend (Keypad with Numbers)

Service
Part No.

Description

Mechanical Parts (Continued)

M26092139	On/Off Switch Cap
M26092129	Reset Button
M04050802	Screw - Black, Hex Head
M04050832	Screw - Black, Phillips Head (Console)
M04050842	Screw - Black, Phillips Head (Hand Controller)
M04050812	Screw - Bright, Hex Head
M26094019	Spacer - Mylar
M26094279	Spring - Controller Button
M26094269	Spring - Reset Button
M15909119	Top Housing - Hand Controller

REPLACEMENT PARTS LIST-CONTINUED

Schematic Coding	Service Part No.	Description
Capacitors		
C1		20PF
C2	M67260952	5-50PF Trimmer
C3/C25		.1MFD, 50V
C26	M67260983	1MFD/50V NP Electrolytic
C27		10MFD/15V Electrolytic
C28		10MFD/15V Electrolytic
C29		.1MFD, 50V
C30		10MFD/15V Electrolytic
C31		680PF
C32		.1MFD, 50V
C33		200PF
C34/C39		.01MFD, 50V
C40	M67260984	47MFD/16V Electrolytic
C501	M67260947	10,000MFD/16V Electrolytic
C502	M67260948	100MFD/16V Electrolytic
C503	M67260974	2,200MFD/25V Electrolytic
C504/C512		1MFD, 50V

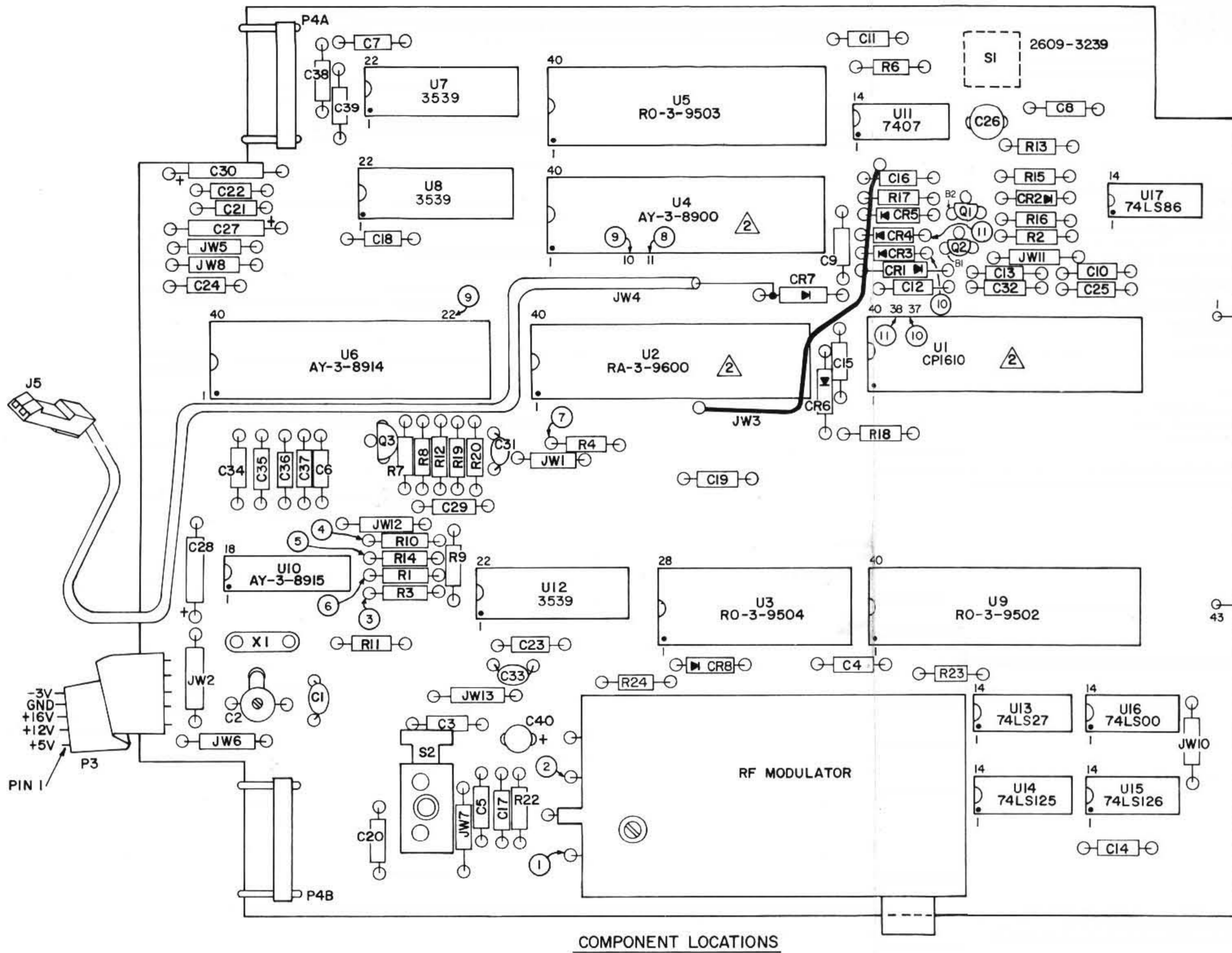
Schematic Coding	Service Part No.	Description
Resistors		
R1		2.7K, 2%
R2		68 ohm
R3		22K, 2%
R4		5.6K
R6		1K
R7		470 ohm
R8		1.2K
R9		18K, 5%
R10		22K, 2%
R11		22K, 2%
R12		4.7K
R13		5.6K
R14		5.6K, 2%
R15		10K
R16		100 ohm
R17		1K
R18		5.6K
R19		9.1K
R20		110K
R22		180 ohm
R23		300 ohm
R24		3K
R501		220 ohm, 5%, 1/4W, Carbon
R502		12 ohm, 5%, 2W, Film

Schematic Coding	Service Part No.	Description
Solid State Devices		
CR1	ECG125	1N4001 (ECG125)
CR2	M80260957	-3.3V, .4W, 5%, Zener - 1N746A
CR3		1N4148 (ECG519)
CR4		1N4148 (ECG519)
CR5		1N758A (ECG5019A)
CR6		1N4001 (ECG125)
CR7		
CR8		
CR501/CR509		1N4001 (ECG125)
Q1	M96260960	2N3906 (ECG159)
Q2	M96260960	2N3906 (ECG159)
Q3	M96260961	2N3904 (ECG123AP)
U1		CP1610
U2		RA-3-9600
U3		RO-3-9504

Schematic Coding	Service Part No.	Description
Solid State Devices (Continued)		
U4		AY-3-8900
U5		RO-3-9503
U6	M00980640	AY-3-8914 (Sound)
U7		3539 (ECG108)
U8		3539 (ECG108)
U9		RO-3-9502
U10	M00980680	AY-3-8915 (Color)
U11	M74260912	7407 Hex Buffer (ECG7407)
U12		3539 (ECG108)
U13	M74260913	74LS27 Triple 3-Input Nor Gate (ECG74LS27)
U14	M74260914	74LS125 Quad Buffer (ECG125A)
U15		74LS125 Quad Buffer (ECG125A)
U16	M74260941	74LS00 Quad 2-Input NAND (ECG74LS00)
U17	M74260979	74LS86 Quad EX-OR (ECG74LS86)
U501	M73260900	5V Regulator 7805C (ECG960)
U502	M73260901	12V Regulator 7812C (ECG950)
	M89260920	18 Pin IC Socket
	M89260922	28 Pin IC Socket
		40 Pin IC Socket
	M21260907	Heat Sink - T0220 Pkg.
	M21260986	Heat Sink - 6071 PB (Small, Notched)
	M21260987	Heat Sink - 6071B-14 (Small, No Notch)

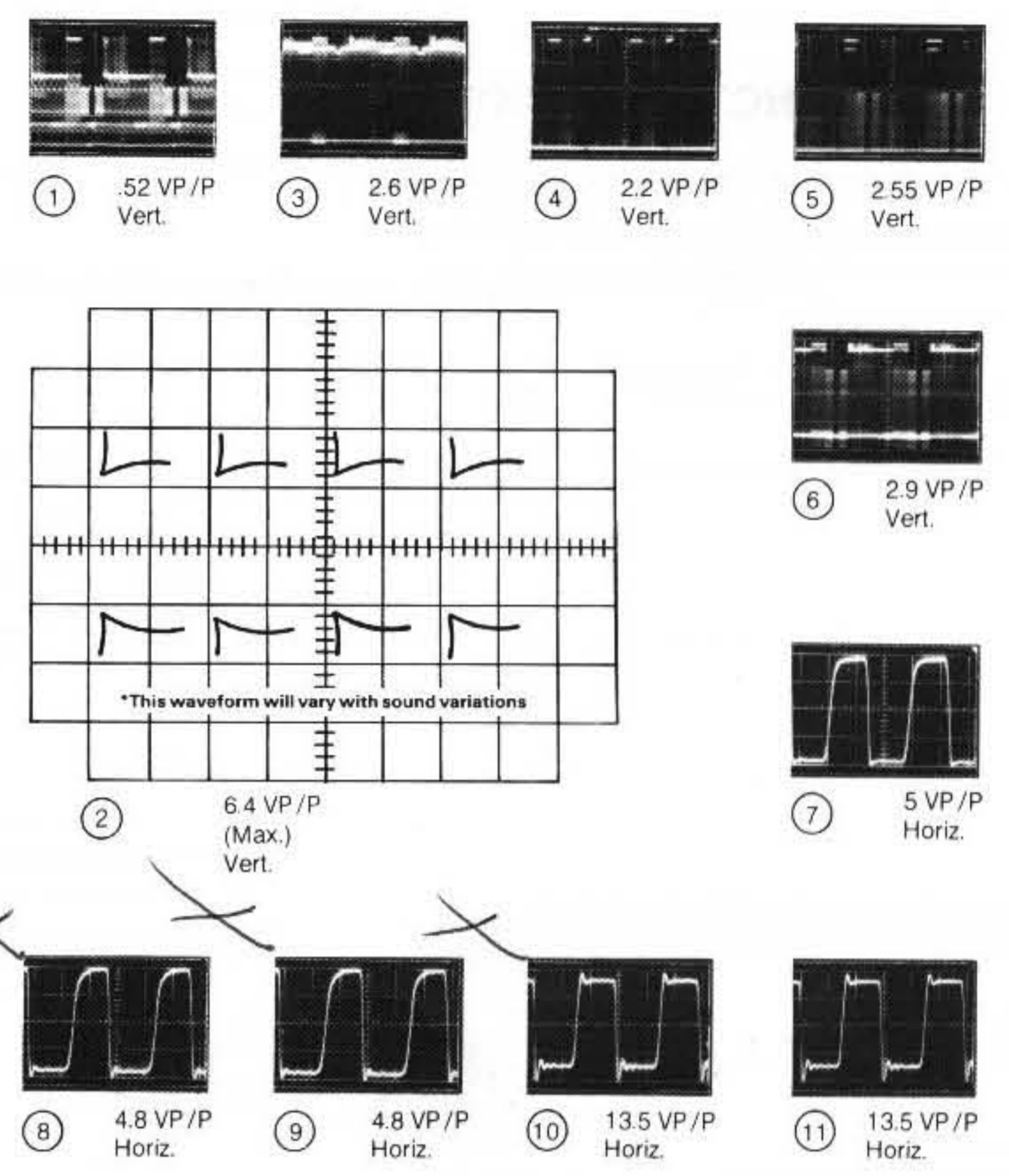
Schematic Coding	Service Part No.	Description
Miscellaneous Electrical Parts		
J5	M89260970	5-Pin Header - Ribbon Connector
P4A, P4B	M26099759	9-Pin Header - Logic Panel
P502	M26099239	5-Pin Header (Power Xfmr. Connector)
SW501	M26099559	Switch - AC On/Off
T501	M26099549	AC Power Transformer
	M26099769	9-Pin Connector - Hand Controller Cable to P4A or P4B
	M26099599	Antenna Cable Asm.
	M26099609	Antenna Switch Asm.
	M26092469	Connector, Cable - Controller End
	M26092389	Connector Housing, Cable - Controller End
	M26099519	Logic Panel Asm.
	M26099539	Power Supply Panel Asm.
	M26099629	Power Xfmr. Asm. (Incl. Line Cord & SW101)

Schematic Coding	Service Part No.	Description
Miscellaneous Parts		
B1		Ferrite Bead
B2		Ferrite Bead
RFX	M26094689	Modulator - UM1285-8
S1	M00991140	Switch - Reset
S2		Switch - Channel
X1	M76260978	7.15909MHz Crystal
J1	M26099399	44 Pin Cartridge Connector
J4		9 Pin Connector
		2 Pin Connector
		5 Pin Ribbon Connector



COMPONENT LOCATIONS

WAVEFORMS



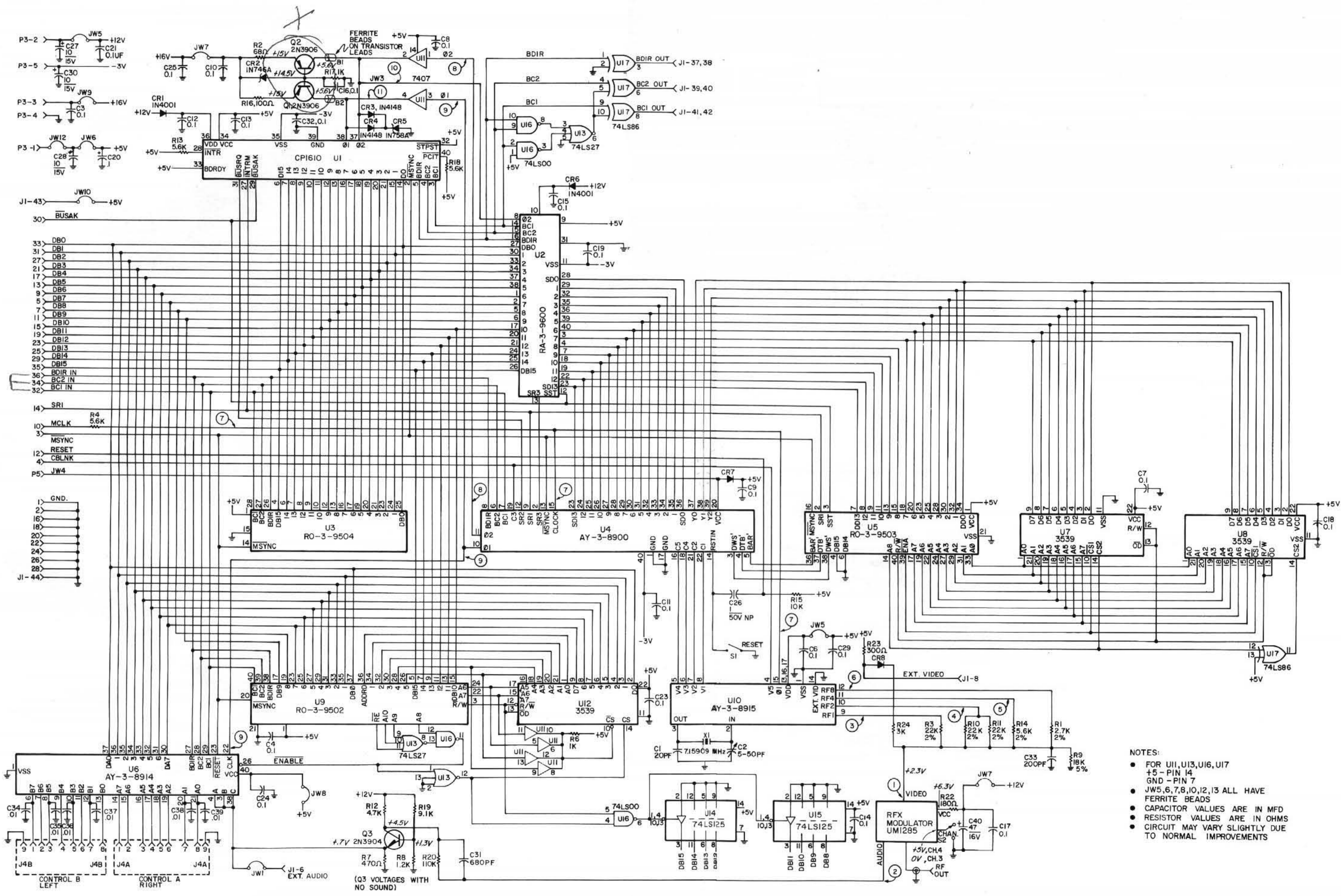
I.C. VOLTAGE CHART

Pin	U1	U2	U3	U4	U5	U6	U7	U8	U9	U10	U11	U12	U13	U14	U15	U16	U17
1	4.6	1.5	5	0	5	0	0	0	5	0	2.4	1.3	3.7	5	5	5	.9
2	5.2	1.9	0	1.4	5.3	0	1	1	4.4	**	5.6	1.7	0	0	0	1	0
3	1	.8	0	.2	4.3	.7	1.3	1.3	4.5	**	2.4	2	4.8	2.9	2.9	3.2	.9
4	.9	.9	.6	2.6	0	.7	1.3	1.3	.1	1.3	5.6	2.2	3.2	5	5	.2	.9
5	.9	1.1	0	1.3	0	0	1.3	1.3	.6	2.4	1.4	1.7	0	0	0	4.2	.17
6	.6	1.8	1.9	.8	0	4.7	1	1	3.3	1.7	.2	1.7	.17	1.9	2.9	5	.9
7	1.9	1.9	1.8	.9	.6	4.7	.9	.9	1.9	1.2	0	1.9	0	0	0	0	0
8	1.8	5.6	1.9	.9	.6	4.7	1	1	3.2	2.4	.2	1.5	1	2.9	2.9	4.8	1
9	1.9	5	1.1	5.3	1.7	4.7	.8	.8	1.8	.7	1.1	1.9	1.9	0	0	.9	1
10	1.1	11	.6	2.4	.1	4.7	3.3	3.3	3.3	.2	.2	.2	.2	5	5	.9	.17
11	.6	.3	0	2.4	1.9	4.7	0	0	1.9	.5	1.2	0	5	3	3	3.7	4.4
12	1.8	4.3	1.8	4.8	.4	4.7	4.4	4.4	1.2	1	.2	4.2	.2	0	0	.4	.5
13	1.1	1.4	1.1	5.2	1.9	4.7	4.4	4.4	1.1	5	1.9	4.2	0	5	5	.1	5
14	1.7	1	5.2	5.4	.4	4.7	.4	.4	0	0	5	.2	4.8	5	5	5	5
15	2	.9	0	2.1	9	4.7	.5	.5	.6	2.1		1.2					
16	1.9	.9	1.9	2.4	5.2	4.7	.7	.7	1.7	5		1.9					
17	1.5	.6	1.5	0	.6	4.7	.5	.5	1.8	5		1.4					
18	1.9	1.9	0	1.7	.8	4.7	.5	.5	1.2	0		1.1					
19	1.7	1.7	1.9	1.3	.6	4.7	1.2	1.2	1.1			1.2					
20	1.7	1.1	1.7	5.5	1	4.7	1.6	1.8	5.2			1.7					
21	2.2	1.9	1.7	1.2	0	4.7	1.7	1.7	0			2.3					
22	1.1	.6	0	2.4	.7	2.4	5	5	1.2			5					
23	2.1	.6	2.2	.6	.9	5.2			1.9								
24	.7	1.8	2	.6	.5	.1			1.4								
25	1.2	1.9	1.7	1.7	1	4.7			1.5								
26	0	.6	.9	1.9	0	3.7			1.9								
27	5.3	1.7	.8	1.9	1.2	.9			1.9								
28	4.7	1.8	.9	.9	1.3	.8			1.1								
29	4.3	2.4		.8	1.6	.9			1.7								
30	0	2		1	1.3	1.9			1.2								
31	4.8	0		.9	1.7	1.5			1.7								
32	5	2.3		1	1.3	1.9			1.7								
33	5	2.2		1.3	0	1.7			2.2								
34	5	1.7		5	1	1.7			2.3								
35	.3	1.3		2.4	0	2.2			2								
36	12	1		1.8	1.3	2			1.3								
37	5.6	1.7		1	2.5	1.7			1.7								
38	5.6	1.9		1.3	2	.7			.9								
39	0	.9		1.3	3.3	0			.8								
40	4.7	1		.3	4.4	5			.9								

- NOTE:
- Maintain line at 120V, 60Hz for voltage measurements.
 - Readings to ground with DVM.
 - Test cartridge inserted, but not activated.
 - ** indicates clock killed with meter probe on this pin.
 - Volts will vary due to normal production tolerances.

- NOTES:
- DEVICES U1, U2 AND U4 INCLUDE ONE 2609-4259 HEATSINK PER DEVICE ATTACHED WITH 3220-7080 THERMAL EPOXY.
 - COMPONENT LAYOUT MAY VARY SLIGHTLY DUE TO NORMAL CIRCUIT IMPROVEMENTS.

FIGURE 7 LOGIC BOARD LAYOUT



SCHEMATIC DIAGRAM - LOGIC BOARD

MAIN POWER SUPP RIBBON 23

- NOTES:
- FOR U11, U13, U16, U17 +5 - PIN 14 GND - PIN 7
 - JW5, 6, 7, 8, 10, 12, 13 ALL HAVE FERRITE BEADS
 - CAPACITOR VALUES ARE IN MFD
 - RESISTOR VALUES ARE IN OHMS
 - CIRCUIT MAY VARY SLIGHTLY DUE TO NORMAL IMPROVEMENTS

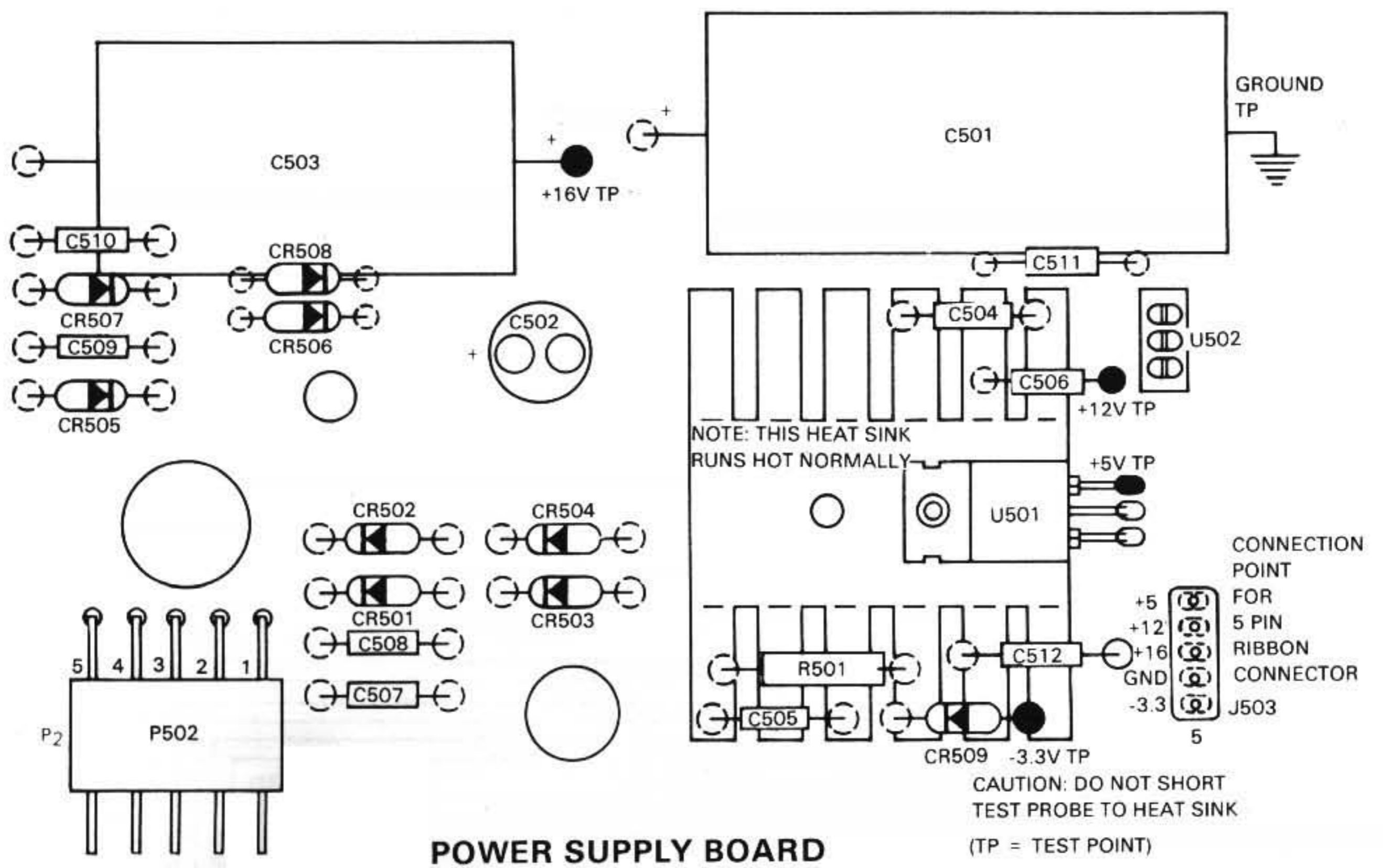
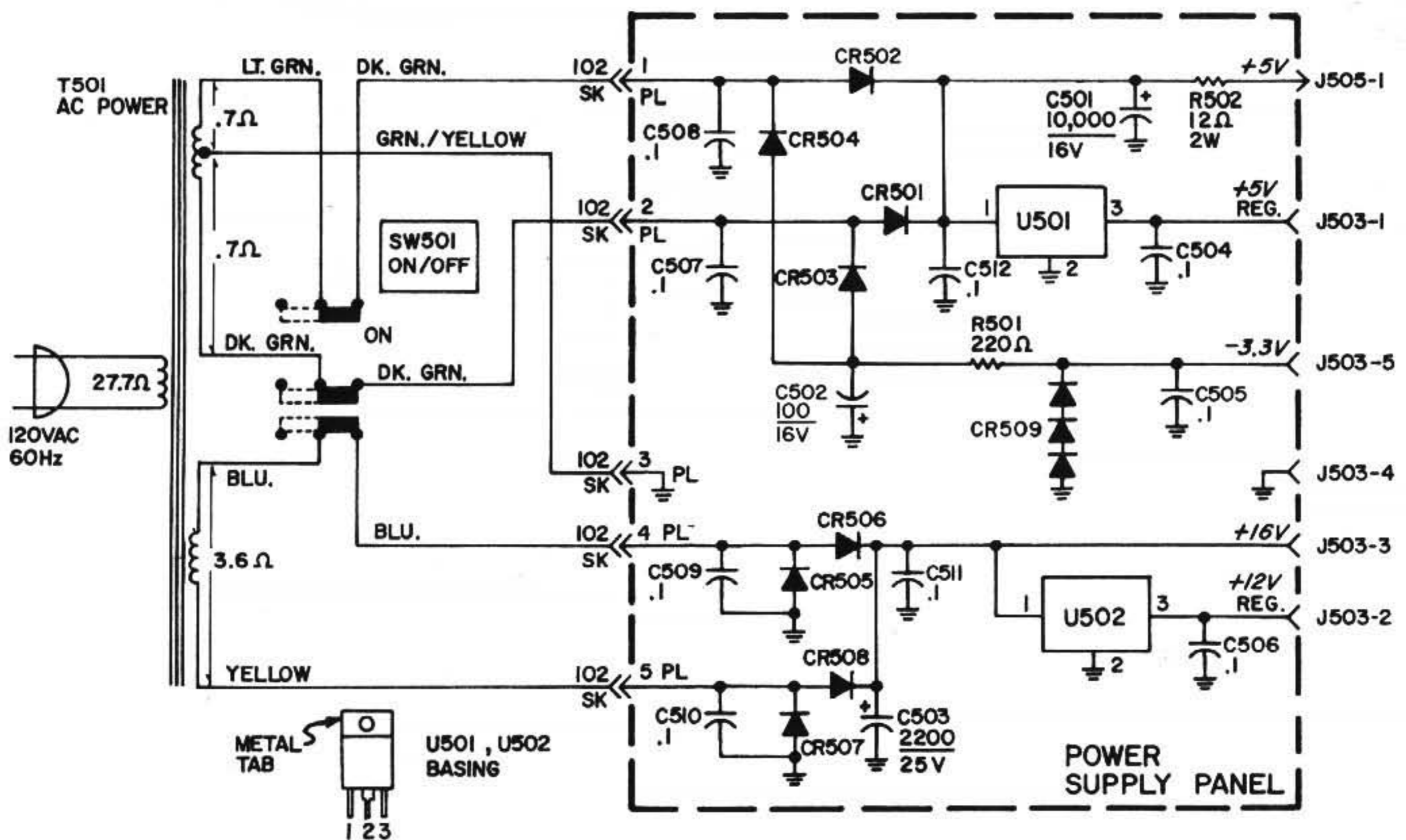


Figure 8



POWER SUPPLY SCHEMATIC

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