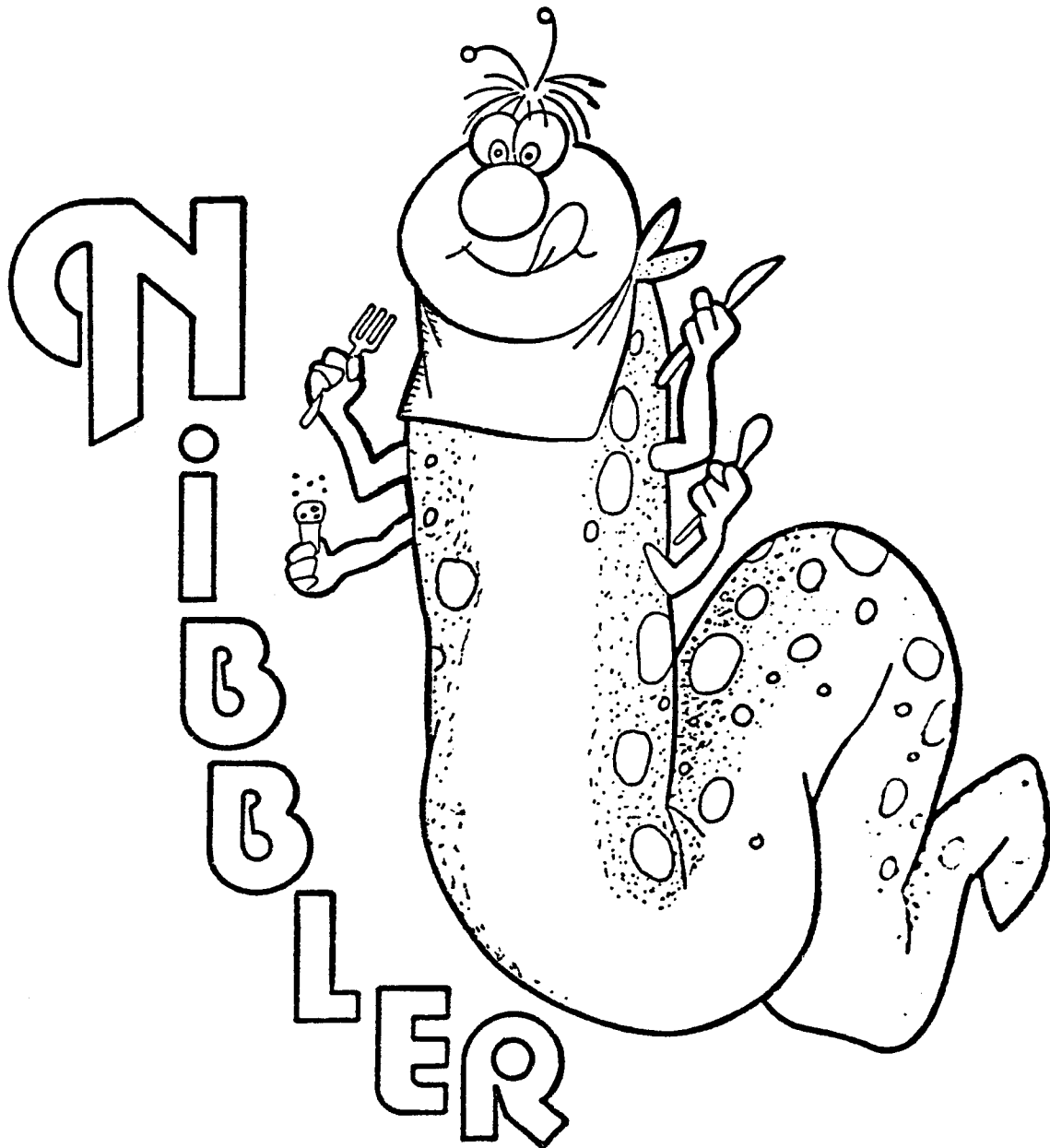


ROCKWELL MODEL G-208



SERVICE MANUAL
and
PARTS CATALOG

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INTRODUCTION

HOW TO OPERATE NIBBLER

Nibbler is an exciting maze game.

The object of the game is to nibble all the bonus objects in the maze without nibbling the Nibbler.

The mazes and bonus objects are varied so that 32 waves must be completed to see all patterns.

Each wave is faster and more difficult than the preceding wave.

The game continues at maximum difficulty after the 32nd wave.

RECEIVING AND INSTALLATION (VIDEO GAMES)

RECEIVING INSPECTION

Your game was shipped in ready-to-play condition. However, after removal of the shipping carton, a brief visual examination is suggested.

Naturally, you'll want to make note of any physical damage to the game cabinet and its external components for freight claim purposes. Considering the quality of the shipping carton, any damage to the exterior would indicate possible interior damage as well.

The interior of the game should also undergo a brief examination for: loose mounting hardware (check to be sure that the major components are still securely mounted); disconnected or loose wires, cables or harnesses; electronic devices loose in their sockets; etc.

At this time the game serial number should be logged. Please remember that the game serial number will be required if you need service from your distributor.

ELECTRICAL REQUIREMENTS

A good earth ground is essential for the proper operation of this game or for that matter any electronic device. Problems with instability and erratic operation of computer-type devices can usually be traced to an ineffective ground system. Therefore, plug the game into a properly wired 3 prong outlet. If a 3 prong to 2 prong AC adaptor must be used, an alternate method of grounding the third prong must be used.

INITIAL ADJUSTMENTS

When the game is connected to AC power, one of the game sounds may be heard. This is normal.

The audio level (volume) can be easily adjusted. This is achieved by rotation of the volume control located on the coin door. The audio level should compete with other machines "on the floor" to maximize play time.

OPERATOR OPTIONS

The option switches allow you to select how many credits per coin, how many chances to play per game & bonus scoring. If your machine DOES NOT have multiple pricing capability, refer to page 2-2. If it DOES have multiple pricing capability, skip 2-2 and refer to page 2-3.

CREDIT BUTTON. When you push this button you can increase credits without affecting the counter. It's the red button on the coin door.

WARNING

This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. As temporarily permitted by regulation it has not been tested for compliance pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

"NIBBLER" OPTION SWITCHES
(LOCATED ON GAME BOARD)

CHANGE OF DIP SWITCH								
DESCRIPTION	8P. DIP SWITCH POSITION (DS1)							
NIBBLERS	SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8
3	OFF	OFF						
4	ON	OFF						
5	OFF	ON						
6	ON	ON						
NIBBLER PAUSE AT CORNERS			OFF					
UPRIGHT				OFF				
COCKTAIL				ON				
DIAGNOSTICS OFF					OFF			
DIAGNOSTICS ON					ON			
FREE PLAY						ON		
COINAGE								
1 COIN / 1 PLAY							OFF	OFF
2 COINS / 1 PLAY							ON	OFF
2 COINS / 3 PLAYS							OFF	ON
4 COINS / 3 PLAYS							ON	ON

NORMAL SETTING: 3 NIBBLERS PER PLAYER
1 COIN / 1 PLAY

NORMAL SWITCH SETTINGS: ALL SWITCHES OFF
--

TURN OFF POWER TO GAME BEFORE CHANGING SWITCH POSITIONS
NEW SWITCH POSITIONS BECOME EFFECTIVE ON POWER UP

NIBBLER DIAGNOSTICS

On power-up, the diagnostic program (which is inside the game software) first checks that it can read and write to the RAM, and calculates sumchecks for the PROMs which are compared against values stored in software. The diagnostics are run regardless of the setting of the diagnostic dip switch (switch 5); the use of the switch will be described later.

If RAM IC13 is bad, the program may not be able to run at all, in which case a low oscillating sound is made (until the power is turned off).

If IC13 is OK, the program then checks the rest of the RAMs and PROMs and displays the results. If any of the RAM is bad (status = FAIL), the display will be messed up, but may still be readable.

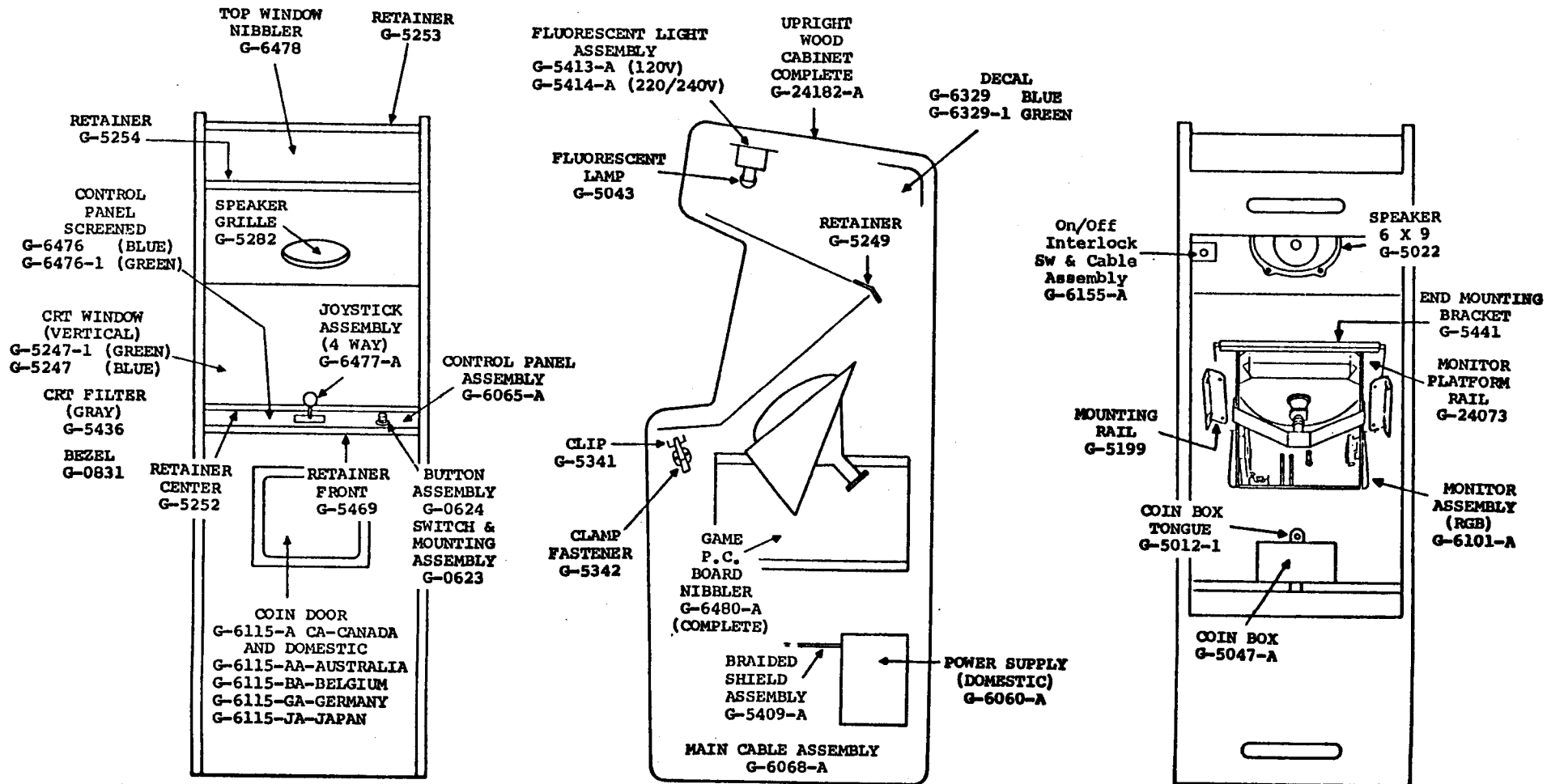
If the diagnostic program won't work, then either PROM IC10 or IC14 is bad. If the diagnostic program works but indicates that any IC has failed, the game may work (but probably won't work well). Note that IC14 does not get a sumcheck, but if the diagnostic program works, and the letters and numbers on the CRT look OK (and IC67 and 68 are OK), then IC14 is OK.

After displaying the status of the RAMs and PROMs, the screen is then filled with a grid pattern for aligning the CRT. Now, if the diagnostic dip switch is OFF, the program goes immediately to the game. There are no further diagnostics.

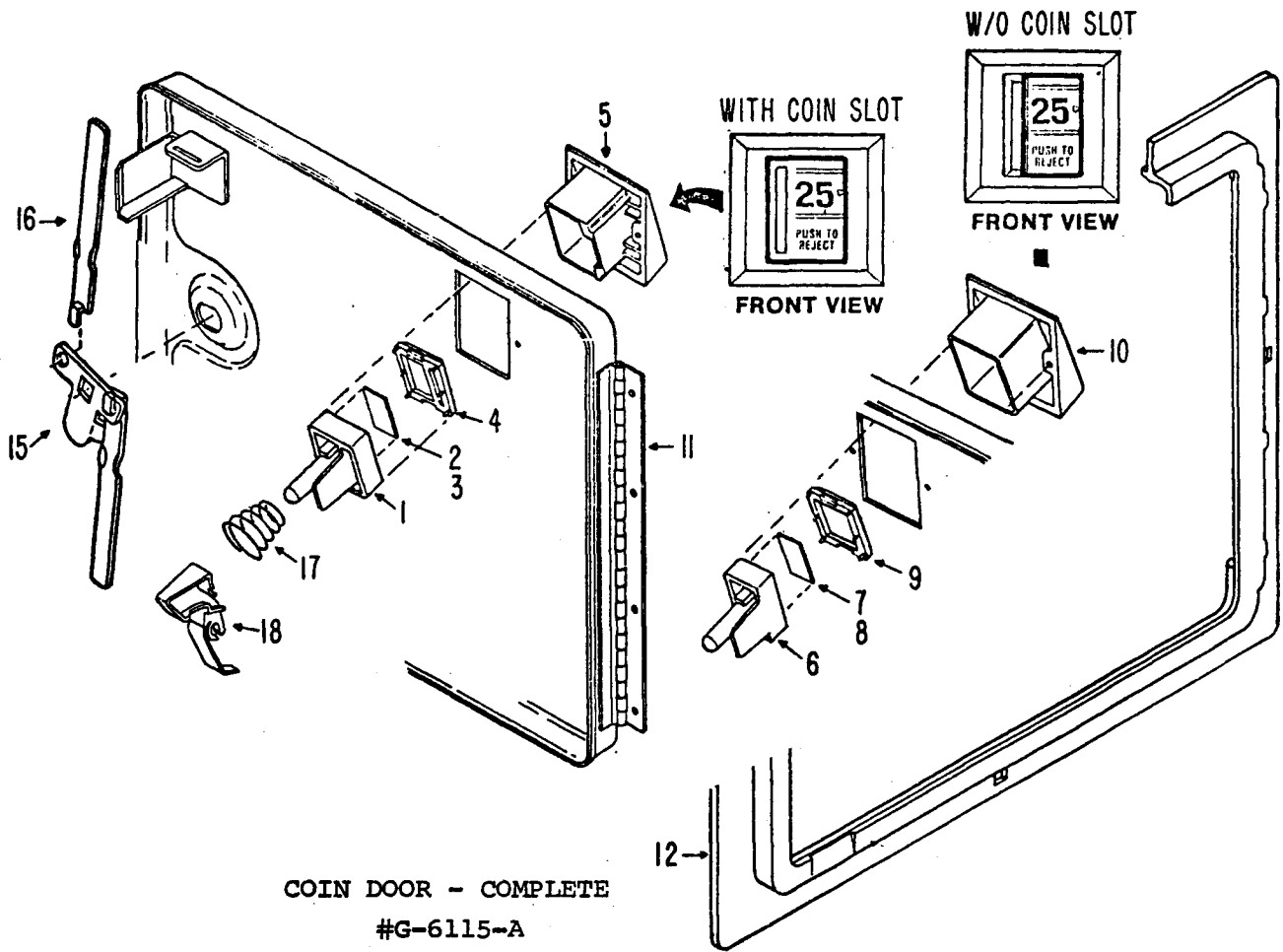
If the diagnostic dip switch is ON, the grid pattern stays on the screen until one of the following buttons is pushed:

- 1 player start: the program goes immediately to the game; there are no further diagnostics, and the dip switch will have no affect until the power is turned off and back on again.
- 2 player start: the diagnostics are re-run from the beginning; by keeping this button pushed, it is possible to continuously repeat the diagnostics.

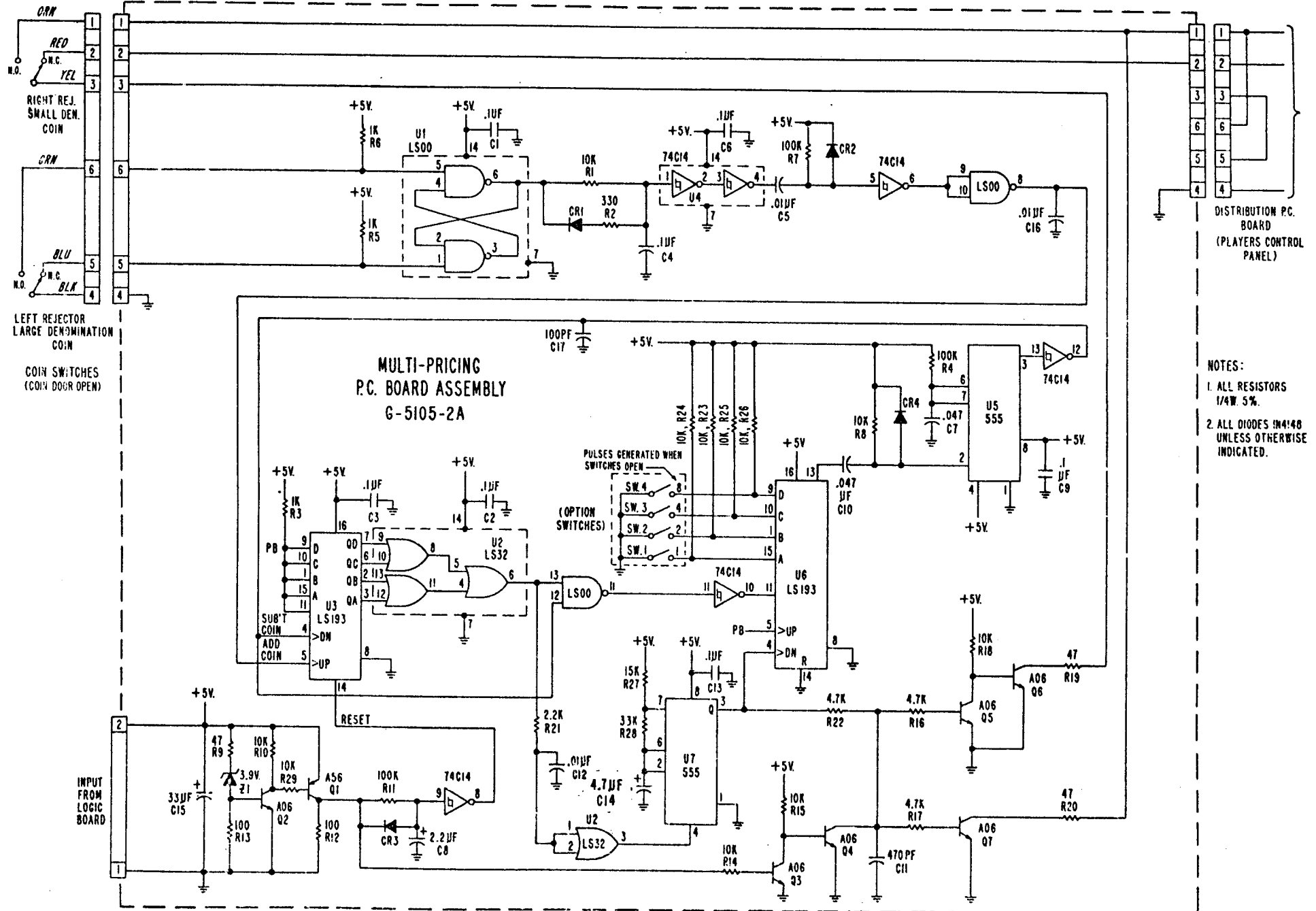
Further Note: If the dip switch is ON, it is possible to retain the screen which gives the results of the diagnostics by pushing the joystick down before the grid is written (on a cocktail table, use the player 1 joystick). Otherwise the information is only visible for about 2 seconds. If the dip switch is OFF, it is NOT possible to retain this information; the game will enter the attract mode regardless of the buttons (until credits are entered).



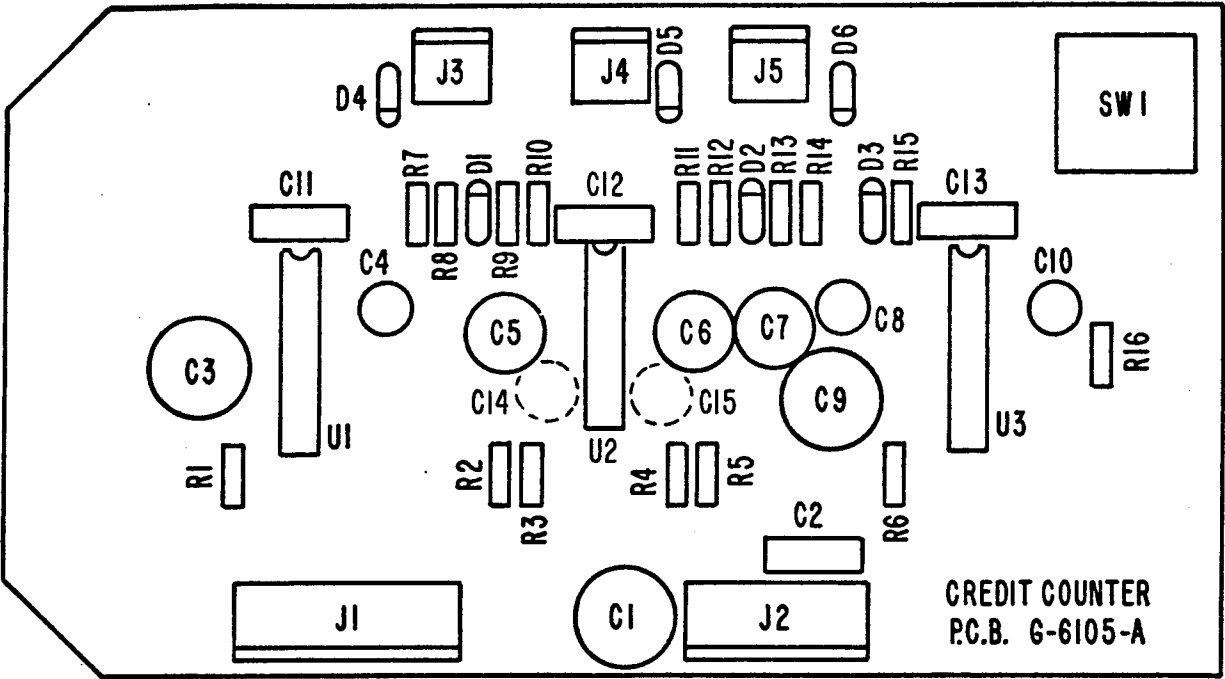
G-208 NIBBLER Cabinet Parts



ITEM NO.	PART NO.	DESCRIPTION
		Coin Return Button (with Coin Slot)
1	G-6102	Coin Return Button (Red)
2	G-6088	25¢ Price Decal
3	G-6089	Token Decal
4	G-6103	Coin Return Button Cover (Red)
5	G-6104	Coin Button Housing
		Coin Return Button (w/o Coin Slot)
6	G-6111	Coin Return Button (Ornate)
7	G-6088	25¢ Price Decal
8	G-6089	Token Decal
9	G-6112	Coin Return Button Cover (Orange)
10	G-6113	Coin Button Housing
		COMMON PARTS
11	G-6241	Coin Door (includes Hinge) - 2 Coin
12	G-6242	Door Frame (Die Cast)
13	G-6243	Switch
14	G-6246	25¢ Acceptor (5301-10)
15	G-6247	Pivot Arm
16	G-6248	Locking Arm (2)
		SPECIAL PARTS (Service Original Doors)
17	G-6249	Spring
18	G-6239	Coin Return Lever (New Style)



- NOTES:
1. ALL RESISTORS 1/4W. 5%.
 2. ALL DIODES IN4148 UNLESS OTHERWISE INDICATED.



CREDIT COUNTER P.C. BOARD ASSEMBLY
G-6105-A

ITEM NO.	PART NO.	DESCRIPTION	REF. DES.	MFGR. PART NO.
1	G-0812	Rectifier	D1, D2, D3, D4, D5, D6	IN4003
2	51289	Resistor 1/4W 5%	R2, R9, R12, R14	100 OHM
3	51564	Resistor 1/4W 5%	R3, R4, R5, R8, R10, R11, R13, R15	1K OHM
4	49269	Resistor 1/4W 5%	R1, R6	27K OHM
5	49268	Resistor 1/4W 5%	R7, R16	33K OHM
6	49146	Capacitor, Tantalum 25V	C4, C5, C6, C7, C10	2.2 MFD
7	53339	Capacitor, Tantalum 15V	C3, C9	4.7 MFD
8	52561	Capacitor, Tantalum 15V	C8	10 MFD
9	51988	Capacitor, Electrolytic 25V	C1	47 MFD
10	33762	Capacitor, Disc 1000V	C2	470 MMFD
11	53299	Capacitor, Monolythic 50V	C11, C12, C13	.1 MFD
12	52720	14 Contact Solder Dip Socket	U2	
13	52724	16 Contact Solder Dip Socket	U1, U3	
14	G-5136	2 Circuit Pin Header	J3, J4, J5	
15	G-5137	5 Circuit Pin Header	J2	
16	G-5459	6 Circuit Pin Header	J1	
17	G-6116	Quad 2-Input Nand Gate	U1	74LS03
18	G-6058	Dual Monostable Multivibrator	U1, U3	74221
19	52725-2	Key Switch - Single Contact - Red	SW1	
20	G-6106	Credit Counter P.C. Board		
21	G-0940	Capacitor, Ceramic Disc 50V	C14	.001 MFD
22	G-0940	Capacitor, Ceramic Disc 50V	C15	.001 MFD

GENERAL INFORMATION
AND PERIODIC MAINTENANCE

Your video game contains the same basic building blocks as any other video game.

THE POWER SUPPLY provides all the necessary voltages for the CPU, audio section, monitor and fluorescent light. Always unplug the game before replacing a fuse.

THE CENTRAL PROCESSING UNIT (CPU) is the "brain" of the game. It senses when a coin is dropped in the coin meter, and gives credit. It then reads what is happening at the operator controls, interprets and computes to make the game play according to what buttons the player pushes. It tells the monitor what to draw on the screen. And it tells the audio section when to make appropriate sound effects.

THE AUDIO SECTION generates all the sound effects for the game and powers the loudspeaker.

THE COLOR MONITOR is the picture tube. It draws pictures on the tube screen according to the instructions it receives from the CPU.

THE MAIN WIRING HARNESS carries power from the power supply to the CPU, audio section and monitor. It connects to each section through the Molex plugs. NEVER CONNECT OR DISCONNECT THE MOLEX POWER PLUGS UNLESS THE GAME IS UNPLUGGED.

PERIODIC MAINTENANCE - The only Periodic Maintenance required is an occasional cleaning. The very high voltage used on the picture tube attracts dust that gradually degrades picture quality. To clean: unplug game and let sit for at least 5 minutes to let voltages "bleed-off".

To clean the face of the picture tube and associated plastic parts, remove the control panel by loosening clamps on each side of panel on inside of cabinet. These clamps are accessible thru coin door. Remove the plexiglas window being careful not to scratch clear or painted areas. Window, gray filter and picture tube may now be cleaned with a mild solution of dish detergent. Dry all parts and reassemble.

REPLACEMENT PARTS LIST FOR WELLS-GARDNER COLOR MONITOR

These are Wells-Gardner parts with Wells-Gardner part numbers. Please order these parts from them.

2701 N. Kildare Ave., Chicago, Il. 60639

⚠ ★ SAFETY CRITICAL PARTS LIST

This receiver contains circuits and components included specifically for safety purposes. For continued protection no changes should be made to the original design and components shown in shaded areas of schematic, or ⚠ ★ on parts list should be replaced with exact factory replacement parts. The use of substitute parts may create a shock, fire, x-radiation or other hazard. Service should be performed by qualified personnel only.

MAIN BOARD (MQ-29)

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
RESISTORS			CAPACITORS		
R605	203X9014-584	1k Ohm, ± 5%, 1W M.O.	△ C601	203X1800-451	0.1 uF, 125V, ± 20% MM
R606	204X1425-021	470 Ohm, ± 10%, 5W W.W.	△ C603	202X7810-214	2200 pF, 125V Ceramic
△ ★ R607	204X1450-508	2.7k Ohm, ± 10%, 5W W.W.	C608	203X0220-043	330 uF, 200V Electrolytic
R608	203X9014-603	1.2k Ohm, ± 5%, 1W M.O.	C605	203X1205-165	.0068 uF, 600V, ± 10% PP
R610	203X6500-246	22 Ohm, ± 5%, 1/8W Carbon	C607	203X0040-020	10 uF, 160V Electrolytic
R611	203X6700-562	1k Ohm, ± 5%, 1/2W Carbon	C608	203X0040-052	47 uF, 160V Electrolytic
R612	340X3471-944	470 Ohm, ± 10%, 1/2W Carbon	C609	202X7050-366	.0033 uF, 500V, ± 10% Ceramic
R613	203X9010-757	1.2k Ohm, ± 5%, 1W M.O.	C610	202X7050-483	.01 uF, 500V, ± 10% Ceramic
R614	203X5202-320	680k Ohm, ± 5%, 1/2W Comp.	C611	202X8140-022	100 pF, 3KV, ± 10% Ceramic
R615	203X5602-156	270k Ohm, ± 5%, 1/2W Comp.	C612	203X1201-047	.022 uF, 200V, ± 10% PP
R616	203X6500-741	2.7k Ohm, ± 5%, 1/8W Carbon	C613	203X0015-035	220 uF, 25V Electrolytic
R617	203X6501-088	68k Ohm, ± 5%, 1/8W Carbon	C614	203X0015-006	33 uF, 25V Electrolytic
R620	203X6500-508	270 Ohm, ± 5%, 1/8W Carbon	C615	203X1201-288	0.39 uF, 200V, ± 10% PP
R622	203X6500-689	1.5k Ohm, ± 5%, 1/8W Carbon	C616	202X8065-499	47 pF, 500V Ceramic
R624	203X6205-843	1k Ohm, ± 5%, 1/2W Carbon	C617	203X0025-019	1 uF, 50V Electrolytic
R630	203X5601-906	68k Ohm, ± 5%, 1/2W Carbon	C618	202X8000-577	82 pF, 50V, ± 5% Ceramic
R631	203X9015-087	2.2 Ohm, ± 10%, 5W M.O.	C619	203X0025-019	1 uF, 50V Electrolytic
R632	340X8111-731	110 Ohm, ± 5%, 5W Carbon	C620	203X1107-038	0.1 uF, 100V, ± 10% Mylar
R632	340X8121-731	120 Ohm, ± 5%, 5W Carbon	C621	202X9040-155	0.1 uF, 1.5KV, ± 20% Paper
R634	203X6000-002	2.2 Ohm, ± 5%, 1/8W Carbon	C622	203X0020-099	1000 uF, 35V Electrolytic
R635	203X9014-842	12k Ohm, ± 5%, 1W M.O.	C623	203X0015-053	470 uF, 25V Electrolytic
R636	203X6500-645	1k Ohm, ± 5%, 1/8W Carbon	C624	203X0015-021	100 uF, 25V Electrolytic
R640	203X6500-762	3.3k Ohm, ± 5%, 1/8W Carbon	C625	203X0040-020	10 uF, 160V Electrolytic
R641	203X6501-002	33k Ohm, ± 5%, 1/8W Carbon	C626	202X7050-009	100 pF, 500V, ± 10% Ceramic
R642	203X6500-927	15k Ohm, ± 5%, 1/8W Carbon	C627	202X8065-461	39 pF, 500V, ± 10% Ceramic
R643	203X5602-648	3.9M Ohm, ± 5%, 1/2W Comp.	C628	202X7000-327	2200 pF, 50V, ± 10% Ceramic
R646	203X6500-468	180 Ohm, ± 5%, 1/8W Carbon	★ C629	203X1270-470	6900 pF, 1.5KV, ± 5% PP
R647	340X5150-841	15 Ohm, ± 10%, 2W Carbon	C630	202X7810-214	2200 pF, 125V Ceramic
R648	340X2225-934	2.2M Ohm ± 5%, 1/4W Carbon	C632	203X0005-029	470 uF, 6.3V Electrolytic
			C633	203X0315-033	2.2 uF, 50V Electrolytic
			C634	202X8000-164	6 pF, 50V, ± 0.5 pF Ceramic
			C637	202X8105-014	3 pF, 2 kV, ± 0.5 pF Ceramic
			C638	342X5632-040	.056 uF, 10% Mylar
*For Model K4603 Only					
SEMICONDUCTORS			MISCELLANEOUS		
TR601	200X3189-304	Transistor, 2SC1893	△ F601	204X7120-062	Fuse (UL/CSA) 3A-125
X601	201X3130-109	Rectifier, (SI) RM-2AV 600V	J607	206X5003-960	Socket, 6 Pin
X605	200X8130-171	Diode (HS) SB-2CGL 1200V min.	P602	204X9600-260	Plug, 3 Pin (GT)
X606	201X2010-144	Diode (SI) IS2473-772	P603	204X9600-254	Plug, 3 Pin (NM)
X607	201X2100-119	Diode (HS) RC-2V 0.8 US	P604	204X9600-298	Plug, 4 Pin (NM)
X608	201X2130-234	Diode (HS) RU-2V	P606	204X9600-351	Plug, 6 Pin (NM)
X609	201X2130-234	Diode (HS) RU-2V	P607	204X9600-380	Plug, 6 Pin (GT)
X610	66X0023-009	Rectifier, Power (SI) 500V PIV	P608	204X9600-254	Plug, 3 Pin (NM)
X611	66X0023-009	Rectifier, Power (SI) 500V PIV	P610	204X9600-249	Plug, 2 Pin (GT)
			P611	204X9600-670	Plug, 2 Pin (NM)
			TH601	201X011-034	Thermistor
			TH602	201X022-007	Varistor
TRANSFORMERS & COILS					
△ L601	201X6000-112	Coil, Line Filter R-3			
L602	201X4600-042	Coil, Filter, 10 uH			
L603	201X4100-024	Coil, Peaking, 22 uH			
L607	201X4710-134	Coil, R-F Choke			
T601	201X9500-337	Transformer, Audio Output			
T602	201X1300-080	Transformer, Hor. Drive			
T603	202X1210-191	Transformer, Side PC			
L702	9A2795-001	Horiz. Size			

VERT/HOR BOARD (MT/QJ)

WELLS-GARDNER PARTS...ORDER FROM THEM...SEE PAGE 6-9

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
RESISTORS			CAPACITORS (CONT.)		
R301	203X6500-628	820 Ohm, ± 5%, 1/8W Carbon	C313	203X0025-087	47 uF, 50V Electrolytic
R302	203X6500-902	12k Ohm, ± 5%, 1/8W Carbon	C315	203X0015-082	10 uF, 25V Electrolytic
R303	203X6500-927	15k Ohm, ± 5%, 1/8W Carbon	C316	203X1100-220	3300 uF, 50V, ± 10% Mylar
R304	203X6500-886	10k Ohm, ± 5%, 1/8W Carbon	C317	202X8000-616	100 pF, 50V, ± 10% Ceramic
R305	203X6501-241	330k Ohm, ± 5%, 1/8W Carbon	C351	202X7000-281	1500 pF, 50V, ± 10% Ceramic
R306	203X6500-645	1k Ohm, ± 5%, 1/8W Carbon	C352	202X7000-247	1000 pF, 50V, ± 10% Ceramic
R307	203X6500-689	1.5k Ohm, ± 5%, 1/8W Carbon	C353	203X1100-573	0.022 uF, 50V, ± 10% Mylar
R308	203X6500-724	2.2k Ohm, ± 5%, 1/8W Carbon	C355	203X1100-858	0.1 uF, 50V, ± 10% Mylar
R310	203X6501-285	470k Ohm, ± 5%, 1/8W Carbon	C356	203X0015-105	4.7 uF, 25V Electrolytic
R311	203X6501-065	56k Ohm, ± 5%, 1/8W Carbon	C357	203X1201-013	0.015uF, 200V ± 10% PP
R312	203X6501-126	100k Ohm, ± 5%, 1/8W Carbon	C358	203X1201-034	0.018 uF, 200V, ± 10% PP
R313	203X6001-326	10k Ohm, ± 5%, 1/8W Carbon	C359	203X0040-013	4.7 uF, 160V Electrolytic
R314	203X6501-044	47k Ohm, ± 5%, 1/8W Carbon	C360	202X7000-482	0.01 uF, 50V, ± 10% Ceramic
R315	203X6500-628	820 Ohm, ± 5%, 1/8W Carbon	C361	203X1100-509	0.015 uF, 50V, ± 10% Mylar
R316	203X6500-420	120 Ohm, ± 5%, 1/8W Carbon	C362	203X0025-058	10 uF, 50V Electrolytic
R317	203X6206-441	2.2 Ohm, ± 5%, 1/2W Carbon	C363	203X1205-487	0.01 uF, 630V, ± 10% PP
R319	203X6500-169	100 Ohm, ± 5%, 1/8W Carbon	C364	202X7000-482	0.01 uF, 50V, ± 10% Ceramic
R320	203X6500-927	15k Ohm, ± 5%, 1/8W Carbon			
R321	203X6700-509	560 Ohm, ± 5%, 1/2W Carbon			
R322	203X9100-121	22 Ohm, ± 5%, 2W M.O.			
R323	203X6500-689	1.5K Ohm, ± 5%, 1/8W Carbon			
R324	203X6500-988	27k Ohm, ± 5%, 1/8W Carbon	TR301	200X4082-614	Transistor, 2SA826Q
R325	203X6500-326	47 Ohm, ± 5%, 1/8W Carbon	TR302	200X3174-006	Transistor, 2SC1740Q
R328	203X6500-628	820 Ohm, ± 5%, 1/8W Carbon	TR303	200X3174-006	Transistor, 2SA1740Q
R330	203X6500-886	10k Ohm, ± 5%, 1/8W Carbon	TR304	200X3174-006	Transistor, 2SC1740Q
R331	203X6501-209	220k Ohm, ± 5%, 1/8W Carbon	TR305	200X4049-081	Transistor, 2SA490YLBGLI
R351	203X6500-724	2.2k Ohm, ± 5%, 1/8W Carbon	TR306	200X3162-538	Transistor, 2SC1625YLBGLI
R352	203X6500-927	15k Ohm, ± 5%, 1/8W Carbon	TR307	200X3174-014	Transistor, 2SC1740R
R353	203X6500-944	18k Ohm, ± 5%, 1/8W Carbon	TR308	200X3174-006	Transistor, 2SC1740Q
R354	203X6500-783	3.9k Ohm, ± 5%, 1/8W Carbon	TR351	200X4085-415	Transistor, 2SA854Q
R355	203X6500-902	12k Ohm, ± 5%, 1/8W Carbon	TR352	200X3172-208	Transistor, 2SC1722BKS
R356	203X6500-561	470 Ohm, ± 5%, 1/8W Carbon	TR353	200X3174-006	Transistor, 2SC1740Q
R357	203X6500-724	2.2k Ohm, ± 5%, 1/8W Carbon	TR354	200X4082-614	Transistor, 2SA826Q
R358	203X6500-666	1.2k Ohm, ± 5%, 1/8W Carbon	X301	201X2010-144	Diode, (SI) IS2473-T72
R359	203X6501-088	68k Ohm, ± 5%, 1/8W Carbon	X302	201X2010-144	Diode, (SI) IS2473-T72
R360	203X5500-471	27 Ohm, ± 5%, 1/4W Comp.	X303	200X8000-026	Diode, (GE), IN60TVGL
R361	203X6000-998	1.2k Ohm, ± 5%, 1/8W Carbon	X304	200X8010-165	Diode (SI) ISS81
R363	203X6500-666	1.2k Ohm, ± 5%, 1/8W Carbon	X305	201X2010-165	Diode (SI) ISS81
R364	203X9014-988	47k Ohm, ± 5%, 1W M.O.	X306	201X2010-165	Diode (SI) ISS81
R365	203X6700-989	56k Ohm, ± 5%, 1/2W Carbon	X307	200X8010-102	Diode (SI) MA26W
R366	203X6001-148	3.3k Ohm, ± 5%, 1/8W Carbon	X308	200X8010-094	Diode (SI) IS2473
R367	340X2222-734	2.2k Ohm, ± 5%, 1/2W Carbon	X351	201X2010-144	Diode (SI) IS2473-T72
R368	203X6500-785	3.9k Ohm, ± 5%, 1/8W Carbon	X352	201X2010-144	Diode (SI) IS2473-T72
R369	203X6500-762	3.3k Ohm, ± 5%, 1/4W Carbon	X353	201X2010-144	Diode (SI) IS2473-T72
R370	302X6100-961	1k Ohm, ± 5%, 1/4W Carbon	X354	201X2010-144	Diode (SI) IS2473-T72
R371	203X6104-751	2.7k Ohm, ± 5%, 1/4W Carbon	X355	200X8220-851	Diode (Zener) RD10EBI
VR301	204X2122-093	Varistor, 250K Ohm, Vert. Hold	X366	200X8100-130	Diode (HS) RU-1 0.3 US
VR302	204X2114-065	Varistor, 20K Ohm, Vert. Size			
VR351	204X2114-059	Varistor, 50K Ohm, Hor. Hold			

SEMICONDUCTORS

CAPACITORS

C301	203X1100-928	0.15 uF, 50V, ± 10% Mylar
C302	203X1100-573	0.022 uF, 50V, ± 10% Mylar
C304	203X1100-858	0.1 uF, 50V, ± 10% Mylar
C306	203X0025-026	2.2 uF, 50V, Electrolytic
C307	203X1100-928	0.15 uF, 50V, ± 10% Mylar
C309	203X1100-858	0.1 uF, 50V, ± 10% Mylar
C310	203X0010-011	22 uF, 16V Electrolytic
C311	203X0020-099	1000 uF, 35V Electrolytic
C312	202X7000-469	0.0082 uF, 50V, ± 10% Ceramic

J301	204X9300-958	Socket, 6 Pin
J302	204X9300-958	Socket, 6 Pin
P301	204X9601-195	Plug, 6 Pin
P302	204X9601-195	Plug, 6 Pin
TH301	201X0000-534	Thermistor

TRANSFORMERS & COILS

L351	201X5200-091	Coil, Horiz. Osc.
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POWER BOARD (MV)

RESISTORS

R501	204X1725-052	180 Ohm, ± 10%, 15W WW
R502	203X6000-608	100 Ohm, ± 5%, 1/8W Carbon
R503	203X6000-960	1k Ohm, ± 5%, 1/8W Carbon
R504	203X6000-879	560 Ohm, ± 5%, 1/8W Carbon
R505	203X9014-965	39k Ohm, ± 5%, 1W M.O.
R506	203X6500-842	6.8k Ohm, ± 5%, 1/8W Carbon
R551	203X6500-420	120 Ohm, ± 5%, 1/8W Carbon
VR501	204X2050-001	Varistor Vert. Adj.

CAPACITORS

C501	203X0040-020	10 uF, 160V Electrolytic
C502	202X7000-281	1500 pF, 50V, ± 10% Ceramic

C503	203X0010-011	22 uF, 16V Electrolytic
C551	203X0005-046	220 uF, 10V Electrolytic

SEMICONDUCTORS

TR501	200X3174-006	Transistor, 2SC1740Q
★ TR502	200X3145-404	Transistor, 2SC1454
TR551	200X3172-305	Transistor, 2SC1723
X501	201X2230-042	Diode, (SI) Zener EQB01-06V
X502	201X2010-144	Diode, (SI) IS2473-T72

MISCELLANEOUS

J501	204X9300-958	Socket, 6 Pin
P501	204X9601-195	Plug, 6 Pin
TH501	201X0000-618	Thermistor

INTERFACE BOARD

MODEL K4675

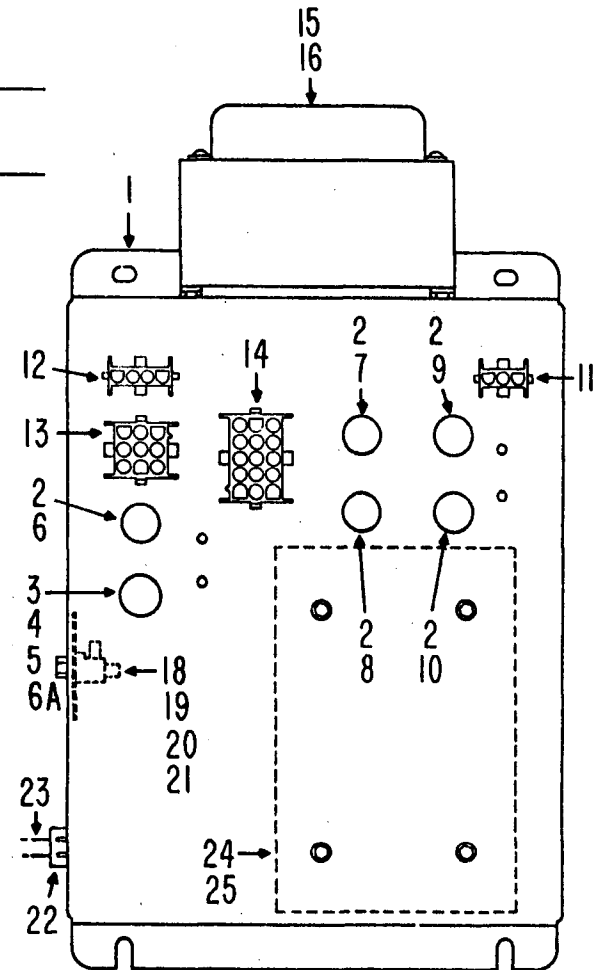
WELLS-GARDNER PARTS...ORDER FROM THEM...SEE PAGE 4-1

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
RESISTORS			CAPACITORS		
R201	340X3910-934	1/2W 5% 91 Ohm	C201	45X0524-038	16V 1000mf
R202	340X2223-934	1/4W 5% 22K Ohm	C202	45X0524-053	16V 470mf
R203	340X3102-934	1/2W 5% 1K Ohm	C203	349X2232-109	100V .022mf
R204	340X2101-934	1/4W 5% 100 Ohm	C204	80X0099-020	680pf
R205	340X2104-934	1/4W 5% 100K Ohm	SEMICONDUCTORS		
R206	340X3331-944	1/2W 10% 330 Ohm	TR201	86X0113-001	Transistor NPN
R207	340X2222-934	1/4W 5% 2.2K Ohm	TR202	86X0113-001	Transistor NPN
R208	340X2222-934	1/4W 5% 2.2K Ohm	TR203	86X0113-001	Transistor NPN
R209	340X2104-934	1/4W 5% 100K Ohm	TR204	86X0066-001	Transistor PNP
R210	340X2101-934	1/4W 5% 100 Ohm	TR205	86X0066-001	Transistor PNP
R211	340X2471-934	1/4W 5% 470 Ohm	TR206	86X0066-001	Transistor PNP
R212	340X2471-934	1/4W 5% 470 Ohm	TR207	86X0113-001	Transistor NPN
R213	340X2471-934	1/4W 5% 470 Ohm	TR208	86X0113-001	Transistor NPN
R214	340X2151-934	1/4W 5% 150 Ohm	TR209	86X0113-001	Transistor NPN
R215	340X2151-934	1/4W 5% 150 Ohm	TR210	86X0113-001	Transistor NPN
R216	340X2151-934	1/4W 5% 150 Ohm	X201	66X0046-001	Diode, Silicon
R217	340X2101-934	1/4W 5% 100 Ohm	X202	66X0046-001	Diode, Silicon
R218	340X3102-934	1/4W 5% 1K Ohm	X203	66X0046-001	Diode, Silicon
R219	340X3102-934	1/2W 5% 1K Ohm	X204	66X0046-001	Diode, Silicon
R220	340X3681-934	1/2W 5% 680 Ohm	ZD201	66X0040-019	Diode, Zener
R221	340X3271-934	1/2W 5% 270 Ohm	MISCELLANEOUS		
R222	340X3271-934	1/2W 5% 270 Ohm	J201	204X9300-958	Socket, 6 Pin
R223	340X2104-934	1/4W 5% 100K Ohm	J202	204X9300-958	Socket, 6 Pin
R224	340X3102-934	1/2W 5% 1K Ohm	J203	206X5019-207	Socket, 4 Pin
R225	340X2822-934	1/2W 5% 8.2K Ohm	P201	204X9601-195	Plug, 6 Pin
R226	340X2822-934	1/2W 5% 8.2K Ohm	P202	204X9601-195	Plug, 6 Pin
R227	340X2822-934	1/2W 5% 8.2K Ohm	P203	204X9600-845	Plug, 4 Pin
			P204	6A393-003	Plug, 3 Pin
			P205	6A0393-006	Plug, 6 Pin

POWER SUPPLY ASSEMBLY

G-6060-A

ITEM NO.	PART NO.	DESCRIPTION
1	G-6063-A G-6071-A	Power Supply Chassis Weld Assembly Power Supply Chassis Weld Assembly Canada only
2	49250	Shock Safe Fuseholder
3	G-5403-A	Fuseholder Assembly - Canada only
4	44935	Snap-in Steel Clip - Canada only
5	ST-9843	Tapered Caplug #5 - Red
6	ST-3090	3 Amp 250V Slo-Blo Fuse
6A	44930	Fusetron GMQ 3.2A Fuse (F1) Canada only
7	ST-9631	5 Amp 250V Slo-Blo Fuse
8	ST-4332	1 Amp 250V Slo-Blo Fuse
9	ST-4323	0.8 Amp 250V Slo-Blo Fuse
10	ST-10703	0.5 Amp 250V Slo-Blo Fuse
11	ST-10589	3 Circuit Universal Socket Housing
12	ST-10588	4 Circuit Universal Socket Housing
13	ST-10570	9 Circuit Universal Socket Housing
14	ST-10500	15 Circuit Universal Socket Housing
15	G-6059-A G-6059-CA	Power Transformer Assembly Power Transformer Assembly Canada only
16	ST-8722	10-32 Hex Flg Whiz-Lock Nut
17	ST-10062	8-36 X 5/16 M.S. Brass - Green Iridite
18	49007	Input Terminal Insulator
19	47827	3 Pole Input Terminal
20	ST-4518	6-32 X 1/2 Mach. Screw
21	ST-8715	6-32 Nut, Hex Flange - Serrated
22	ST-10762	Universal Strain Relief
23	G-5357 G-5377 G-5378-A G-5376	3 Conductor Cord & Plug - Domestic, Canada 3 Conductor Cord & Plug - Australia 3 Conductor Cord & Plug - England Cordset - Germany, Belgium, France
24	G-6062-A	Switching Regulator MC014A
25	ST-8267	8-32 X 1/4 Tapping Screw



NIBBLER

PARTS LIST

G-208

OVERALL ASSEMBLY

ITEM NO.	PART NO.	DESCRIPTION
1	G-6455-A	Cabinet Assembly
2	G-6479-A	Control Panel Assembly
3	G-6100-A	Monitor Assembly - Complete
4	G-6480-A	Game P.C. Board Assembly
5	G-6060-A	Power Supply - Complete - Domestic
6	G-6482	Parts Catalog

CABINET ASSEMBLY - NIBBLER

G-6455-A

1	G-24182-A	Cabinet - Wood
2	G-6329	Rock-Ola Decal - Blue
	G-6329-1	Rock-Ola Decal - Green
3	G-6115-A	Coin Door - Complete - Canada & Domestic
	G-6115-AA	Coin Door - Complete - Australia
	G-6115-BA	Coin Door - Complete - Belgium
	G-6115-FA	Coin Door - Complete - France
	G-6115-GA	Coin Door - Complete - Germany
	G-6115-JA	Coin Door - Complete - Japan
4	G-6108-A	Counter #1 - Complete (Single Price)
5	G-6109-A	Counter #1 & #2 - Complete (Multi-Price)
6	G-5419-A	Counter Assembly Only
7	G-6072-A	Coin Switch Cable
8	G-5092-A	Braided Shield - Short
9	G-5693	Bracket - Volume Control
10	G-5694	Potentiometer (Small)
11	G-5664	Pointer Knob
12	G-5454	Bracket - Volume Control
13	G-5422	Potentiometer (Large)
14	33463	Pointer Knob
15	G-6105-A	Credit Counter P.C.B. Only (w/o Brkt)
16	ST-10539	Circuit Board Support (5/8")
17	ST-3340-D	10-24 X 1 1/4 Carriage Bolt - Blk Ox
18	ST-4813	.203 I.D. X 1/2 O.D. X .032 Fl. Washer - Z.P.
19	ST-8724-D	10-24 Hex Flg Whiz Lock Nut - Blk Ox
20	G-5282	Speaker Grille - Blk
21	G-5022	Speaker - 6 X 9
22	G-5199	Mounting Rail - 19"
23	ST-1443-D	1/4-20 X 1 1/4 Carriage Bolt - Blk Ox
24	ST-301	1/4 Int. Lock Washer
25	ST-1376	1/4-20 Wingnut
26	G-6060-A	Power Supply - 120V. Note Suffixes -CA Canada, -EA England, -AA Australia, -GA Germany, Belgium, France
27	G-5012-1	Tongue Brkt - C.B.
28	G-5048-A	Coin Box & Handle Assy
29	G-5014	Coin Box Cover
30	G-5439	Retainer - P.C.B. (Runner - R.H. Top)
31	ST-9741	8 X 1/2 Hex Flg (Type A) Z.P.
32	G-6100-A	Monitor - 19" Raster - Complete (w/Guard & Cable)
33	G-6101-A	Monitor - 19" Raster (Monitor only)
34	G-5428-A	Monitor Power Cable Assy
35	G-5638	Guard - CRT

CABINET ASSEMBLY - NIBBLER

G-6455-A

ITEM NO.	PART NO.	DESCRIPTION
36	G-24073	Monitor Platform Rail (Wood)
37	G-5441	End Mounting Bracket
38	ST-10904	10-32 X 1 Hex Flg Swageform - Z.P.
39	ST-3340-D	10-24 X 1 1/4 Carriage Bolt - Blk Ox
40	ST-3139	.203 I.D. X 5/8 O.D. X .031 Fl. Wshr - Z.P.
41	ST-8724-D	10-24 Hex Flg Whiz Lock Nut - Blk Ox
42	G-0831	Bezel - CRT (Blk)
43	G-5436	CRT Filter - Gray
44	G-5413-A	Light Assembly - 120V
	G-5414-A	Light Assembly - 220/240V
45	ST-3341-D	8-32 X 1 Carriage Bolt - Blk Ox
46	ST-8721	8-32 Hex Flg Whiz Lock Nut - Z.P.
47	49557	Ballast Plate
48	49554-2	Ballast Insulator
49	11556	14-15-20 Watt Starter (FS-2)
	49301	Insulated Starter 20 Watt 220/240V
50	G-5043	Fluorescent Lamp (F15T12) CW 15 Watt
51	G-6478	Top Window - Nibbler
52	G-5254	Retainer - Inner Top (Blk)
53	G-5253	Retainer - Top (Blk)
54	ST-10753-D	8 X 5/8 Pan Hd. Box Dr. (Type A) Blk Ox
55	G-5342	Clamp Fastener (Cabinet)
56	G-6479-A	Control Panel - G-208 - Complete
57	G-6476	Control Panel - Screened - Blue
	G-6476-1	Control Panel - Screened - Green
58	G-0623	Switch & Mtg. Assembly
59	G-0624	Button Assembly - Long
60	G-5341	Control Panel Clip
61	G-6477-A	Joystick Assembly - 4 Way
62	G-5433	Cover Plate - Joystick - Blue
	G-5433-1	Cover Plate - Joystick - Green
63	G-6067-A	Control Panel Cable Assy
64	G-5469	Retainer - Front (Blk)
65	G-5252	Retainer - Center (Blk)
66	G-5249	Retainer - Rear
67	G-5247	CRT Window - Vertical (Blue)
	G-5247-1	CRT Window - Vertical (Green)
68	G-5031-1	Price Card - 25¢
	G-5032-1	Price Card - Germany
	G-5033-1	Price Card - Belgium
	G-5034-1	Price Card - France
	G-5037-1	Price Card - England
69	G-6155-A	On/Off Interlock Sw. Cable Assembly -A (Canada and Domestic - 120V) White Plug -EA (England - 240V) Green Plug -GA (Germ - Belg - France - 220V) Blue Plug
70	G-5663	Game P.C.B. Bracket
71	G-6480-A	Game P.C.B. (Complete) 2 Boards (see breakdown of individual boards)
72	G-5409-A	Braided Shield Assembly
73	G-6068-A	Main Cable Assembly (Cab)
74	G-5257-2A	Back Door Assembly - Complete - Blue
	G-5257-1A	Back Door Assembly - Complete - Green
75	G-24085-2A	Back Door Assembly - Blue (Wood Only)
	G-24085-1A	Back Door Assembly - Green (Wood Only)
76	G-5126	Lock Bracket
77	ST-10760	Lock, Cam Bolts & Keys

NIBBLER
 GAME P.C. BOARD ASSEMBLY
 G-6480-A

ITEM NO.	PART NO.	DESCRIPTION	REQ'D
1	G-6486-A	SK-7 P.C. Board Assembly	1
2	G-6487-A	SK-8 P.C. Board Assembly	1
3	G-6145-A	50 Conductor Ribbon Cable Assembly	2

SK-7 P.C. BOARD ASSEMBLY
 G-6486-A

ITEM NO.	PART NO.	DESCRIPTION	REF. DES.	MFGR. PART NO.
1	G-6121	Octal Buffer, Invert	IC1, IC2, IC3, IC4	74LS244
2	G-0686	Exclusive Or	IC5	74LS86
3	G-6124	4 To 16 Decoder/ Demultiplexer	IC6	74LS154
4	G-0960-48	Game Program No. 1	IC7	2732
5	G-0960-49	Game Program No. 2	IC8	2732
6	G-0960-50	Game Program No. 3	IC9	2732
7	G-0960-51	Game Program No. 4	IC10	2732
8	G-0960-52	Game Program No. 5	IC12	2732
9	G-0960-53	Game Program No. 6	IC14	2732
10	G-0960-54	Game Program No. 7	IC15	2732
11	G-0960-55	Game Program No. 8	IC16	2732
12	G-0960-56	Game Program No. 9	IC17	2732
13	G-6129	CPU	IC11	6502
14	G-6128	1024 X 8-Bit Static Ram	IC13	4118
15	G-6127	Monostable Multivibrator	IC18	74121
16	51991	Timer	IC19	555
17	G-6126	Hex Inverter	IC20	74LS05
18	G-6117	Quad Bus Buffer Gate	IC21	74LS125
19	G-0679	Hex Inverter	IC22, IC27, IC39, IC40	74LS04
20	G-0678	Nor Gate	IC23	74LS02
21	G-0681	Nand Gate	IC24	74LS10
22	53706	Dual D Latch	IC25	74LS74
23	G-0690	Binary Counter	IC26	74LS163
24	G-6120	Octal Bus Driver Invert	IC28, IC29, IC30	74LS240
25	G-6012	Octal D Type Flip-Flop	IC31, IC32, IC33, IC34	74LS273
26	G-6125	Dual 2-4 Line Decoder	IC35	74LS155
27	G-0677	Quad 2-Input Nand Gate	IC36, IC42	74LS00
28	G-6020	Quad Analog Switch	IC37, IC47, IC55	4066
29	G-0697	Dual 4 Bit Counter	IC41, IC48, IC49, IC54	74LS393
30	52560	Dual Timer	IC43	556
31	G-0683	Or Gate	IC44	74LS32
32	G-6181	Sound Generator	IC45	SN76477
33	G-6142	Lower Power Quad Oper. Amplifier	IC46	LM324

SK-7 P.C. BOARD ASSEMBLY

G-6486-A

ITEM NO.	PART NO.	DESCRIPTION	REF. DES.	MFGR. PART NO.
34	G-0959-44	Sound Program No. 1	IC52	2716
35	G-0959-45	Sound Program No. 3	IC53	2716
36	G-6008	4 Bit Binary Counter	IC38, IC56, IC57, IC58, IC59, IC60, IC61	74LS161
37	52358	Resistor 1/4 Watt 5%	R1, R2, R3, R4, R5, R6, R14	2.2K OHM
38	51291	Resistor 1/4 Watt 5%	R7, R46, R57, R58, R59	22K OHM
39	50966	Resistor 1/4 Watt 5%	R8, R52	100K OHM
40	53982	Resistor 1/4 Watt 5%	R9, R10	220 OHM
41	52563	Resistor 1/4 Watt 5%	R11	560 OHM
42	53863	Resistor 1/4 Watt 5%	R12	1.8K OHM
43	51294	Resistor 1/4 Watt 5%	R13, R56	47K OHM
44	51564	Resistor 1/4 Watt 5%	R15, R23, R30, R31, R32, R35	1K OHM
45	51568	Resistor 1/4 Watt 5%	R16, R17, R18, R19, R20, R21	5.1K OHM
46	49264	Resistor 1/4 Watt 5%	R22, R29, RA3, RA4, RA5, RA6	470 OHM
47	50968	Resistor 1/4 Watt 5%	R24	150K OHM
48	51293	Resistor 1/4 Watt 5%	R28, R49, R61 Thru R70, R84	10K OHM
49	51292	Resistor 1/4 Watt 5%	R33, R55	4.7K OHM
50	52380	Resistor 1/4 Watt 5%	R36	18K OHM
51	51571	Resistor 1/4 Watt 5%	R37	6.8K OHM
52	53838	Resistor 1/4 Watt 5%	R39, R40	150 OHM
53	52348	Resistor 1/4 Watt 5%	R41, R83	15K OHM
54	49268	Resistor 1/4 Watt 5%	R47, R53	33K OHM
55	53593	Resistor 1/4 Watt 5%	R48, R50, R54	470K OHM
56	53883	Resistor 1/4 Watt 5%	R51	1.5 MEG OHM
57	52734	Resistor 1/4 Watt 5%	R60	1 MEG OHM
58	53978	Resistor Pack	RA1, RA2	1K OHM X 8
59	53892	Capacitor, Electrolytic 25V	C1, C2, C3	1000 MFD
60	G-6173	Capacitor, Electrolytic 16V	C53	47 MFD
61	G-6169	Capacitor, Electrolytic 16V	C57	100 MFD
62	G-6174	Capacitor, Film 25V	C52	.1 MFD
63	G-6178	Capacitor, Film 50V	C25	.033 MFD
64	G-0940	Capacitor, Disc 50V	C4, C32, C33, C34, C35, C51	.001 MFD
65	53994	Capacitor, Disc 50V	C6, C41, C42, C45	.01 MFD
66	G-6176	Capacitor, Disc 50V	C54, C55	470 PF
67	G-6177	Capacitor, Disc 50V	C40	220 PF
68	53993	Capacitor, Disc 50V	C46	2200 PF
69	G-6137	Capacitor, Disc 25V	C8 Thru C23, C31, C37, C39, C48, C50, C56 All PC	.1 MFD

SK-7 P.C. BOARD ASSEMBLY

G-6486-A

ITEM NO.	PART NO.	DESCRIPTION	REF. DES.	MFGR. PART NO.
70	G-0805	Capacitor, Tantalum 35V	C5	.47 MFD
71	52561	Capacitor, Tantalum 16V	C7	10 MFD
72	G-6179	Capacitor, Tantalum 16V	C29, C30	22 MFD
73	52359	Capacitor, Tantalum 35V	C24, C38	1 MFD
74	G-0811	Signal Diode	D1, D2, D3	IN914
75	G-6166	Crystal, 11.289 MHZ	X-TAL	
76	G-6167	Trim Control	VR1	1K OHM
77	G-6168	Heat Sink		
78	G-6021	Audio Amplifier		MB3712
79	52722	24 Contact Solder Dip Skt		
80	53711	40 Contact Solder Dip Skt		
81	G-6171	20 Circ. Right Angle Header w/Extractor		
82	G-6172	50 Circ. Right Angle Header w/Extractor	CN1, CN2	
83	ST-10945	P.C. Board Support (5/8")		
84	G-0940	Capacitor, Disc 50V	PIN U To Z	1000 PF

SK-8 P.C. BOARD ASSEMBLY

G-6487-A

ITEM NO.	PART NO.	DESCRIPTION	REF. DES.	MFGR. PART NO.
1	G-6016	Octal D Flip-Flop	IC1, IC2, IC52, IC55, IC59, IC60	74LS374
2	G-6120	Octal Bus Driver, Invert.	IC3	74LS240
3	G-0689	Quad 2 To 1 Multiplexer	IC4, IC21, IC22, IC23, IC24, IC25, IC26, IC28, IC56, IC57, IC58, IC64	74LS157
4	G-6122	CRT Controller	IC5	HD46505SP
5	G-0708-04	Color Matrix PROM "B6"	IC6	6331-1J
6	G-0708-05	Color Matrix PROM "F5"	IC7	6331-1J
7	G-0679	Hex Inverter	IC8, IC30	74LS04
8	G-6013	4 Bit Adder	IC9, IC10, IC11, IC15, IC20	74LS283
9	G-0686	Quad 2-Input Exclusive Or	IC12, IC13, IC14, IC27	74LS86
10	53706	Dual D Latch	IC16	74LS74
11	G-6009	Hex D-Type Flip-Flop	IC17, IC18, IC29, IC39, IC53	74LS174
12	G-0680	Quad 2-Input And Gate	IC19, IC54	74LS08
13	G-0681	Triple 3-Input Nand Gate	IC31, IC42, IC62, IC63	74LS10
14	G-6019	RAM - 1K X 4	IC32, IC33, IC34, IC35, IC36, IC37	2114
15	G-6005	1 Of 8 Decoder/ Demultiplexer	IC38, IC49	74LS138
16	G-0683	Quad 2-Input Or Gate	IC40	74LS32
17	G-6117	Quad Bus Buffer Gate	IC41	74LS125
18	G-6121	Octal Buffer, Invert.	IC43, IC44, IC45, IC46, IC47, IC48, IC76, IC77, IC78, IC79	74LS244
19	G-0960-57	Background PROM	IC50	2732
20	G-0960-58	Background PROM	IC51	2732
21	G-0687	Dual J-K Flip-Flop	IC61	74LS107
22	G-6119	8 Bit Shift Register	IC65, IC66, IC74, IC75	74LS166
23	G-0688	8 To 1 Multiplexer	IC69, IC70	74LS151
24	G-6118	Quad Exclusive Or Gate	IC71	74LS136
25	G-0678	Quad 2-Input Nor Gate	IC72	74LS02
26	G-0677	Quad 2-Input Nand Gate	IC73	74LS00
27	G-6123	RAM 2K X 8	IC67, IC68	MSM 2128
28	49264	Resistor 1/4W 5%	R1, R2, R3, R5, R8, R10, R13, R16, R18	470 OHM
29	53982	Resistor 1/4W 5%	R4, R9, R11, R12, R17, R19	220 OHM
30	51564	Resistor 1/4W 5%	R6, R7, R14, R15, R21, R24	1K OHM

SK-8 P.C. BOARD ASSEMBLY

G-6487-A

ITEM NO.	PART NO.	DESCRIPTION	REF. DES.	MFGR. PART NO.
31	51289	Resistor 1/4W 5%	R20	100 OHM
32	53978	Resistor Pack	RA1, RA2	1K OHM X 8
33	G-6137	Capacitor, Disc 25V	PC	.1 MFD
34	53327	Capacitor, Disc 63V	Back Side	100 PF
35	51303	6 Station Dip Switch SPST	DS2	
36	51304	8 Station Dip Switch SPST	DS1	
37	52724	16 Contact Solder Dip Socket	IC6, IC7	
38	52723	18 Contact Solder Dip Socket	IC32, IC33, IC34, IC35, IC36, IC37	
39	52722	24 Contact Solder Dip Socket	IC50, IC51, IC67, IC68	
40	53711	40 Contact Solder Dip Socket	IC5	
41	G-6172	50 Circuit Header	SN1, SN2	
42	ST-10943	P.C. Board Support		

SECTION 5

BASIC TROUBLESHOOTING

GENERAL

Be careful - certain components of monitor utilize high voltage

Solid-State Control Panel

Turn off power before changing components

Do not use VOM on P.C. Board as use may damage P.C. Board components

When attaching connectors, be sure to observe polarity

K4600 COLOR MONITOR SAFETY INFORMATION

WARNING:

An isolation transformer must be used between the AC supply and the AC plug of the monitor before servicing or testing is performed since the chassis and the heat sink are directly connected to one side of the AC line, which could present a shock hazard. The chassis of the monitor should NEVER be connected to ground. Before servicing is performed, read all the precautions labeled on the CRT and chassis.

WARNING:

Parts which influence x-ray radiation in horizontal deflection, high voltage circuits and picture tube etc. are indicated by ★ in the parts list for replacement purposes. Use only the type shown in the parts list.

WARNING:

For continued safety replace safety critical components only with manufacturer recommended parts. These parts are identified by shading and by Δ on the schematic diagram.

For replacement purposes, use the same type or specified type of wire and cable, ensuring that the positioning of the wires is followed (especially for high voltage and power supply circuits). Use of alternative wiring or positioning could result in damage to the monitor or in a shock or fire hazard.

The picture tube used employs integral implosion protection and should be replaced with a tube of the same type number for continued safety.

IMPORTANT: In the event that game exhibits erratic behavior, i.e. resetting in the middle of a game, or failure to power op, **CHECK THE FUSES!**

SECTION 5

BASIC TROUBLESHOOTING (CONT'D)

When handling the CRT, shatterproof goggles should be worn after completely discharging the high voltage circuit. DO NOT lift the picture tube by the neck.

PERFORMANCE AND OPERATING DATA

Apply a suitable power source to the monitor through an isolation transformer.

Apply a suitable signal source to the monitor PCB by means of P205.

Set up controls.

All controls are preset at the factory, but may be adjusted to suit program material.

1. SUPPLY

Voltage 108 VAC - 132 VAC

Frequency 50 Hz - 60 Hz

Note: Apply supply voltage through an isolation transformer with 1 Amp. capability.

2. HIGH VOLTAGE (EHT)

For 19"V models 25.5 ± 0.8 K.V. at 0 Beam

Note: Condition for above 1 (beam) = 0
A.C. = 120V

3. SERVICE SET-UP CONTROLS

A. V. Adjustment VR501 set for 127V DC

B. Vertical Size Cont = VR302

C. Vertical Hold Cont = VR301

D. Horizontal Hold Cont = VR351

E. Horizontal Width Cont = L702

F. Focus Control = VR702

G. Screen Control = VR406

H. Video Drive Controls - Red Drive = VR401

Green Drive = VR402

I. CRT Cut Off Controls - Red Cutoff = VR403

Green Cutoff = VR404

Blue Cutoff = VR405

SECTION 5

BASIC TROUBLESHOOTING (CONT'D)

COLOR MONITOR SERVICE INSTRUCTIONS

FOCUS

Adjust the Focus control (VR702), located on the HV unit (T701), for maximum over-all definition and fine picture detail.

+127V ADJUSTMENT (See Fig. 1)

The +127V adj. control (VR501) is adjusted at the factory. However, if readjustment should be required, proceed as follows.

1. Operate monitor for at least 15 minutes at 120V AC line.
2. Connect Positive lead of V.T.V.M. to blue lead of TR502 negative lead to chassis ground.
3. Adjust VR501 to obtain +127V reading.
4. After adjustment VR501 must be locked with a sealing varnish.

CIRCUIT PROTECTION

A 3.0A pigtail fuse, mounted on the Main Board has been provided to protect the Power Output Circuit.

HORIZONTAL OSC. ALIGNMENT

(See Fig. 2)

A warm-up period of at least five minutes should be allowed before alignment is carried out. Set VR351 to center position. Adjust L351 after grounding R328 plug. (TP32 of Vert/ Horiz. P.C. Board) through a 1 μ F/50V capacitor. Adjust L351 to obtain normal picture.

After adjustment, remove 1 μ F/50V capacitor.

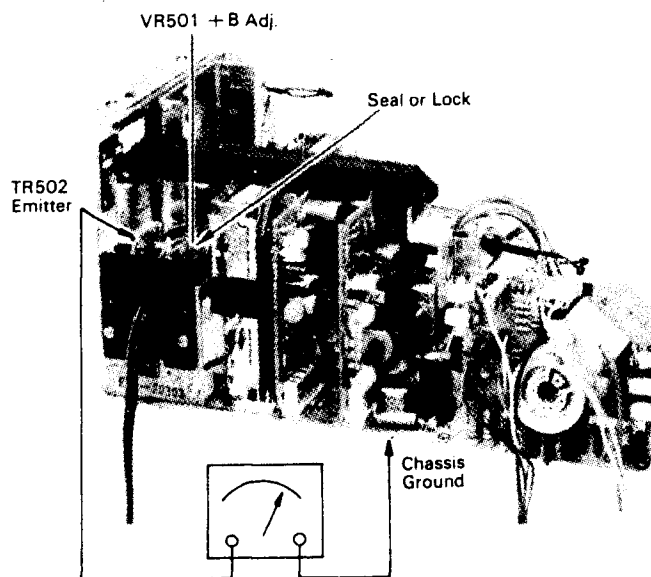


FIGURE 1

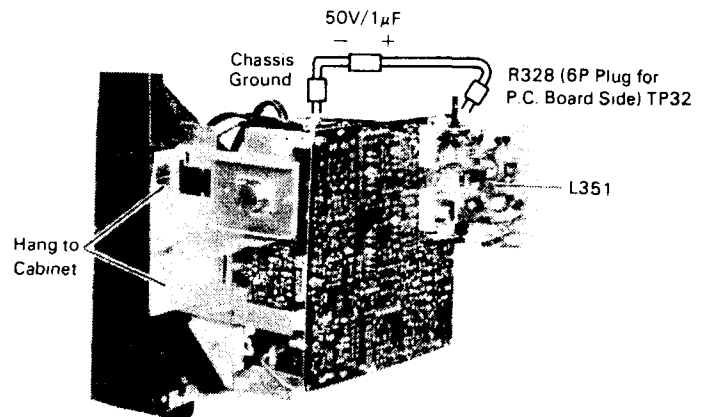


FIGURE 2

SECTION 5

BASIC TROUBLESHOOTING (CONT'D)

COLOR MONITOR SERVICE INSTRUCTIONS

BLACK LEVEL CONTROL ADJUSTMENT

This control has been set at the factory and should not need further attention. If however when the game is connected a slight adjustment of VR201 may be necessary to obtain the proper black level (the black portion of the picture just extinguished).

VERTICAL SIZE (HEIGHT)

The vertical height control is a screw-driver adjustment. Location of this control is shown in Fig. 3. This control must be adjusted slowly, if necessary, until the picture or test pattern attains the correct vertical proportions.

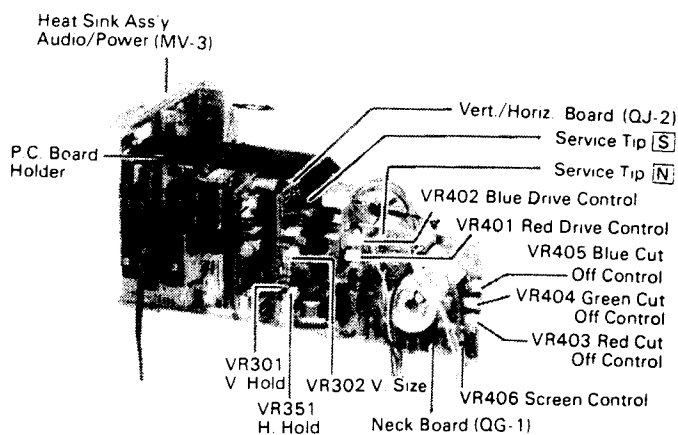


FIGURE 3

INSTALLATION AND SERVICE INSTRUCTIONS

COLOR PURITY AND VERTICAL CENTERING ADJUSTMENT

For best results, it is recommended that the purity adjustment be made in the final monitor location. If the monitor will be moved, perform this adjustment with it facing west or east. The monitor must have been operating 15 minutes prior to this procedure and the faceplate of the CRT must be at room temperature. The monitor is equipped with an automatic degaussing circuit. However, if the CRT shadow mask has become excessively magnetized, it may be necessary to degauss it with manual coil. Do not switch the coil OFF while the raster shows any effect from the coil.

SECTION 5

BASIC TROUBLESHOOTING (CONT'D)

INSTALLATION AND SERVICE INSTRUCTIONS

COLOR PURITY AND VERTICAL CENTERING ADJUSTMENT (CONT'D)

Purity Magnets are used for Color Purity and V Centering Adjustment.

Purity Adjustment procedure is as follows.

1. Remove R-G-B signal from monitor.
2. Turn Green Cut off Control (VR404) on the Neck Board fully CCW.
Turn Red and Blue Cut off Control (VR405) fully CW.
3. Pull the Deflection Yoke backward so that the Magenta belt will appear. (See Fig. 4)
4. Move the two Purity Magnets and bring the Magenta belt to the mechanical center of the screen (See Fig. 5) The vertical center position should be set VRS to $-5/64$ " (-2 MM) as shown in Fig. 6.
Insert service tip "N" on Neck circuit board to "S" on Vert./Horiz. circuit board (See Fig. 13). To check, use the Green raster at low intensity. Be sure to return the service tips to their original positions for the next check.
5. Push the Deflection Yoke forward gradually and fix it at the place where the Magenta screen becomes uniform throughout.
6. Turn Cut off Control, and Drive Control and confirm that each color is uniform.
7. If the color is not uniform, re-adjust it moving Purity Magnets slightly.
8. Move a pair of Purity Magnets at the same time (do not change the angle of the pair), and adjust the vert. center to center of screen.
9. Obtain the three colors and confirm whether white uniformity is balanced.
10. Insert the temporary wedge as shown in Fig. 5 and adjust the angle of Deflection Yoke.

STATIC CONVERGENCE ADJUSTMENT

A recently developed Deflection Yoke and Electron Guns construction has been used on this equipment in combination with In-Line Guns and Black Stripe Screen to make a barrel-type magnetic-field distribution for vertical deflection and a pin-cushion-type magnetic field for horizontal deflection with which a self-converging system can be obtained. This type is different from conventional unity-magnetic field distribution type deflection yoke. 4-Pole Magnets and 6-Pole magnets are employed for static convergence instead of a Convergence Yoke.

SECTION 5

BASIC TROUBLESHOOTING (CONT'D)

STATIC CONVERGENCE ADJUSTMENT (CONT'D)

1. A cross hatch signal should be connected to the monitor.
2. A pair of 4-Pole Convergence Magnets are provided and adjusted to converge the blue and red beams. When the Pole opens to the left and right 45° symmetrically, the magnetic field maximizes. Red and blue beams move to the left and right oppositely (See Fig. 7-a and 7-b). Variation of the angle between the tabs adjusts the convergence of red and blue vertical lines. When the both 4-Pole Convergence Magnet Tabs are rotated as a pair, the convergence of the red and blue horizontal lines is adjusted.
3. A pair of 6-Pole Convergence Magnets are also provided and adjusted to converge the magenta (red + blue) to green beams. When the Pole opens to the left and right 30° symmetrically, the magnetic field is maximized. Red and blue beams both move to the left and right (See Fig. 8-c and 8-d). Variation of the opening angle adjusts the convergence of magenta to green vertical lines. When both 6-Pole Convergence Magnet Tabs are rotated as a pair the convergence of magenta to green horizontal lines is adjusted.

PRECISE ADJUSTMENT OF DYNAMIC CONVERGENCE (See Fig. 10 and 11)

1. Feed a cross hatch signal to the monitor.
2. Insert the temporary wedge and fix Deflection Yoke so as to obtain the best circumference convergence (See Fig. 10 and 11).
NOTE:
The temporary wedges may need to be moved during adjustments.
4. Insert three rubber wedges to the position as shown in Fig. 9 to obtain the best circumference convergence.

NOTE:

- 1) Tilting the angle of the yoke up and down adjusts the crossover of both vertical and horizontal red and blue lines. (See Fig. 10 (a) and (b)).
- 2) Tilting the angle of the yoke sideways adjusts the parallel convergence of both horizontal and vertical lines at the edges of the screen. See Fig. 11-a and b.
- 3) Use three rubber wedges (thick and thin rubber wedges are used for a purpose).
- 4) The angle of each rubber wedges are shown in Fig. 9.
- 5) After three rubber wedges have been inserted, pull out the temporary wedge.
- 6) Fix the rubber wedges with chloroprene rubber adhesive.

SECTION 5

BASIC TROUBLESHOOTING (CONT'D)

BLACK AND WHITE TRACKING (With R/G.B. inputs grounded)

1. Set Black Level Control (VR201) to mid point.
2. Set Red and Blue Drive Controls (VR401 & VR402) to their mechanical center.
3. Set the G2 Screen Control (VR406) and the 3 Cut-off Controls (VR403, VR404, & VR405) to minimum (CCW).
4. Slowly turn up G2 screen control until the first faint color appears.
5. Slowly turn up the other two color cut-off controls in turn to match the first.
6. Remove ground from R/G/B/ inputs. Adjust Red and Blue Drive Controls (VR401 & VR402) for white screen.

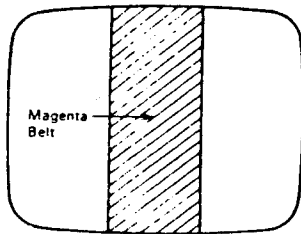


FIGURE 4

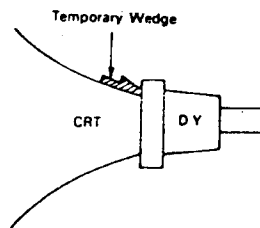


FIGURE 5

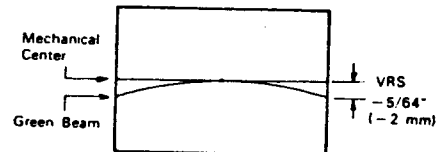
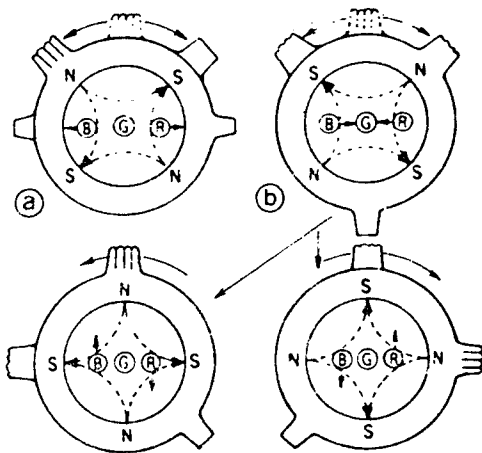
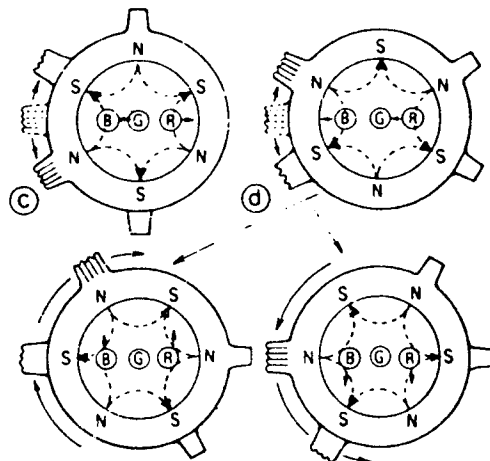


FIGURE 6



4-Pole Magnets and the Movement of Beams

FIGURE 7



6-Pole Magnets and the Movement of Beams

FIGURE 8

INSTALLATION AND SERVICE INSTRUCTIONS

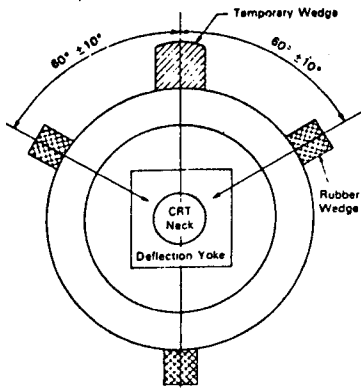
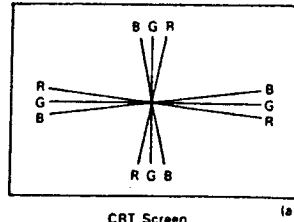
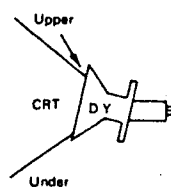


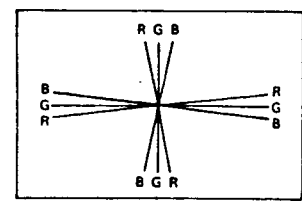
FIGURE 9



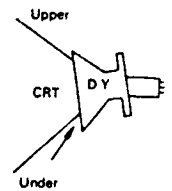
CRT Screen (a)



Insert Rubber Wedge from Upper Side

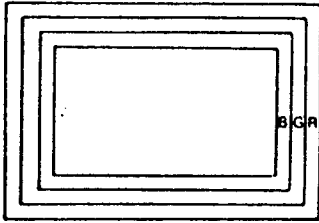


CRT Screen (b)

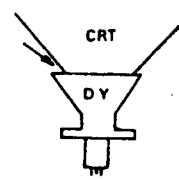


Insert Rubber Wedge from Lower Side

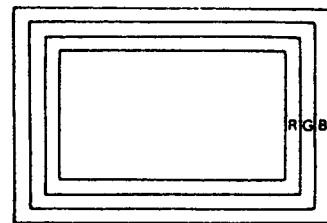
FIGURE 10



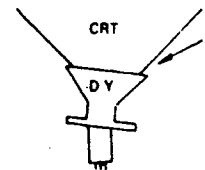
CRT Screen (a)



Insert Rubber Wedge from Left Side



CRT Screen (b)



Insert Rubber Wedge from Lower Side

FIGURE 11

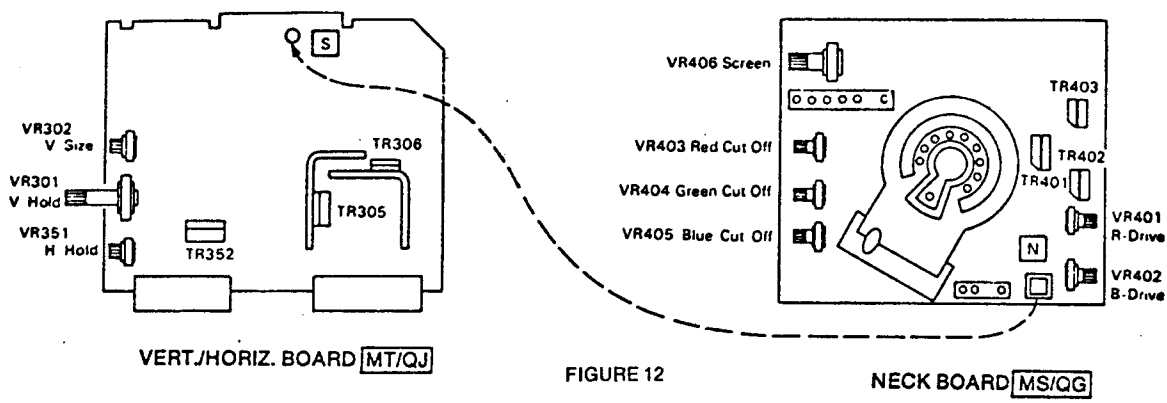
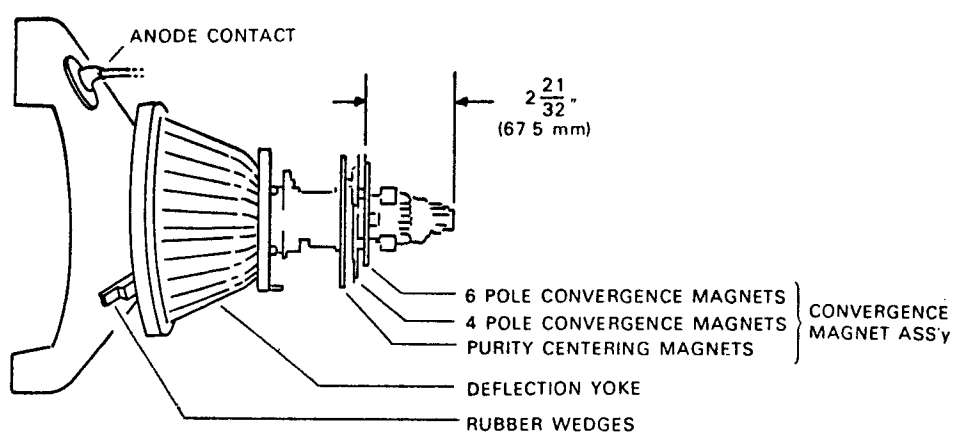
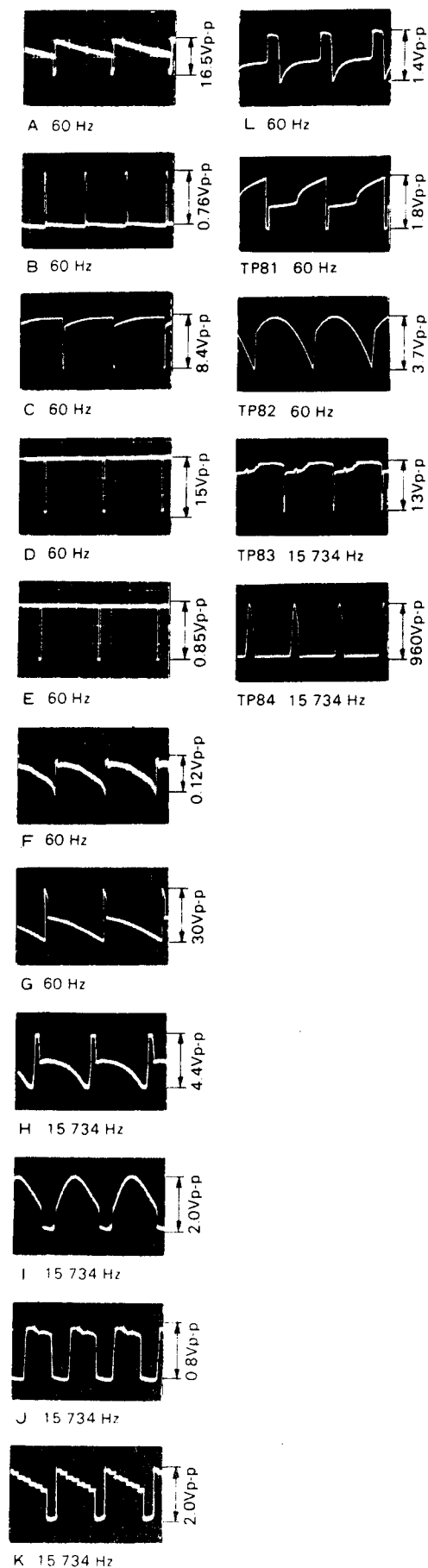







FIGURE 12

FIGURE 13.
PICTURE TUBE NECK
COMPONENTS LOCATION





Power Supply Voltage and Symbols

Symbols	Line Voltage	Working Circuit
	15V	Vert. — Drive stage ABL — Bias CRT Cut-Off
	30V	Vert. Output Side pin Trans. — Bias
	127V	Horiz. Osc. Horiz. Drive Horiz. Output
	160V	Video Output
	890V	Screen-Bias



SERVICE TECHNICIAN WARNING X-RAY RADIATION PRECAUTION:

THIS PRODUCT CONTAINS CRITICAL ELECTRICAL AND MECHANICAL PARTS ESSENTIAL FOR X-RAY RADIATION PROTECTION.

FOR REPLACEMENT PURPOSES, USE ONLY TYPE PARTS SHOWN IN THE PARTS LIST.



CAUTION: FOR CONTINUED SAFETY, REPLACE SAFETY CRITICAL COMPONENTS ONLY WITH MANUFACTURER'S RECOMMENDED PARTS.

AVERTISSEMENT: POUR MAINTENIR LE DEGRE DE SECURITE DE L'APPAREIL NE REMPLACER LES COMPOSANTS DONT LE FONCTIONNEMENT EST CRITIQUE POUR LA SECURITE QUE PAR DES PIECES RECOMMANDEES PAR LE FABRICANT.

OSCILLOSCOPE WAVEFORM PATTERN

The waveforms shown are as observed on the wide band oscilloscope with the monitor turned to a reasonably strong signal and a normal picture. The voltages shown on each waveform are the approximate peak amplitudes. The frequency accompanying each waveform indicates the repetition rate of waveform not the sweep rate of the oscilloscope.

If the waveforms are observed on the oscilloscope with a poor high frequency response, the corner of the pulses will tend to be more rounded than those shown and the amplitude of any high frequency pulse will tend to be less.

P.C. BOARD LAYOUT

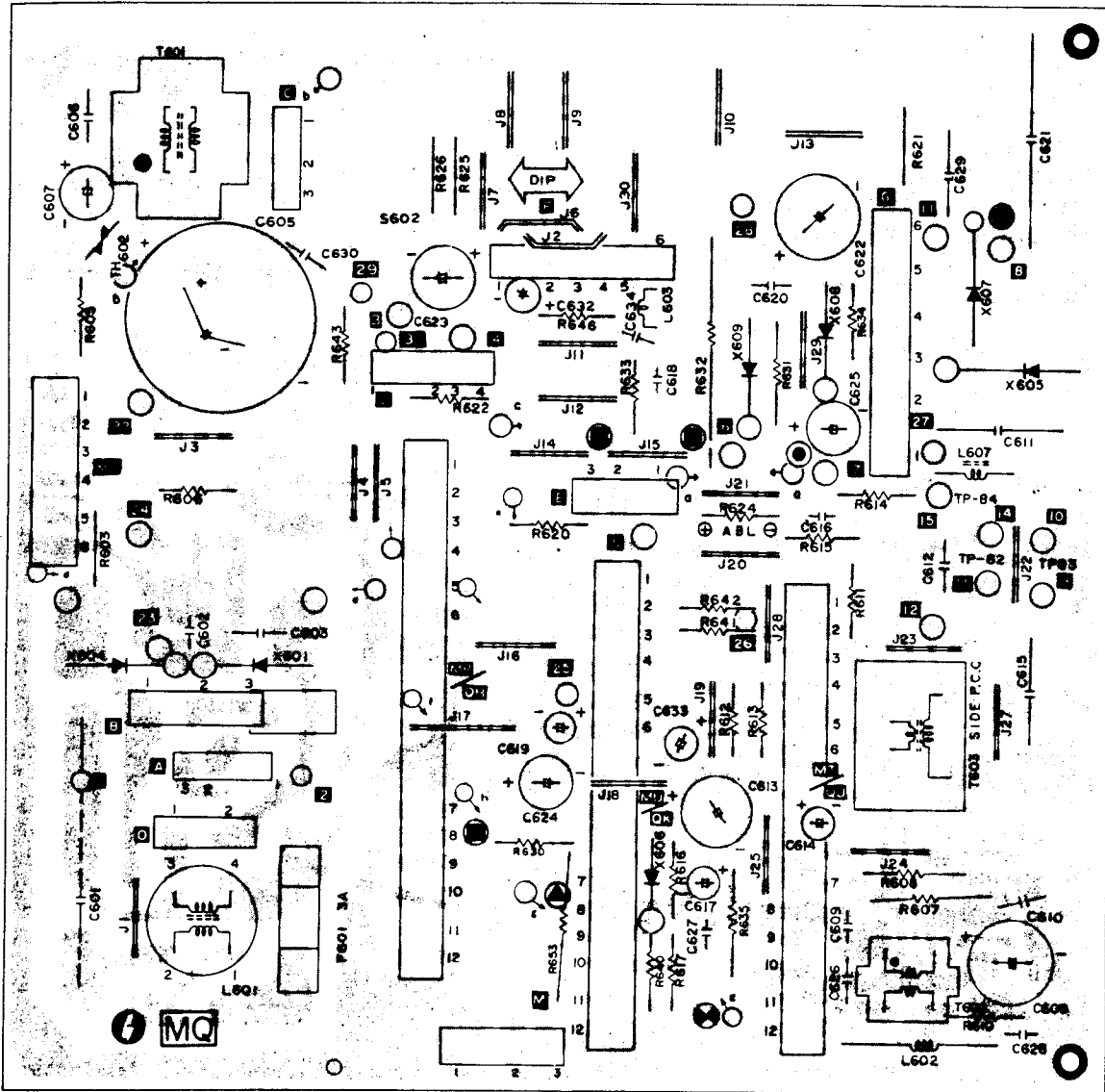


FIGURE 14. MAIN P.C. BOARD MQ-29

P.C. BOARD LAYOUT

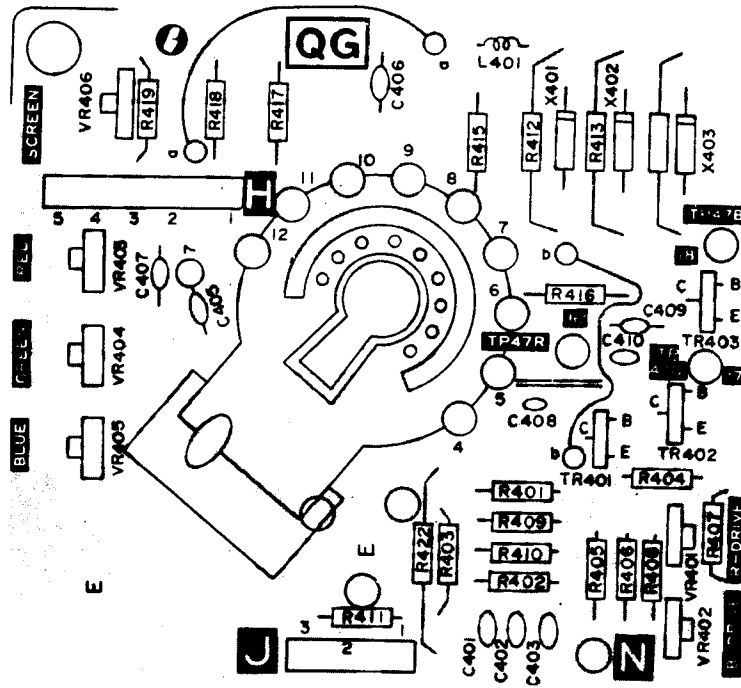


FIGURE 15. NECK P.C. BOARD MS/QG

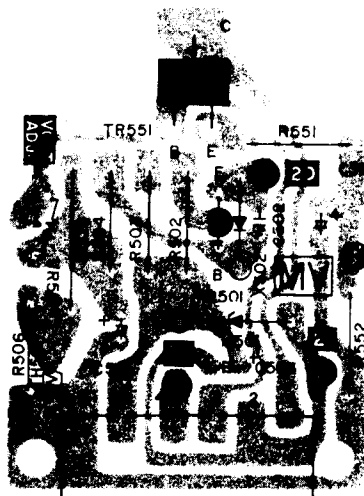


FIGURE 16. POWER PC BOARD MV

P.C. BOARD LAYOUT

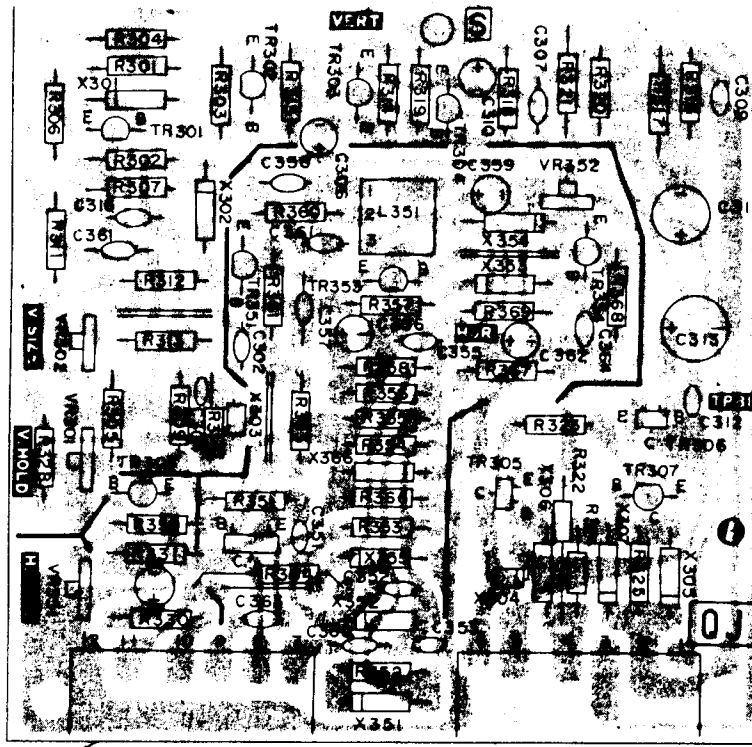
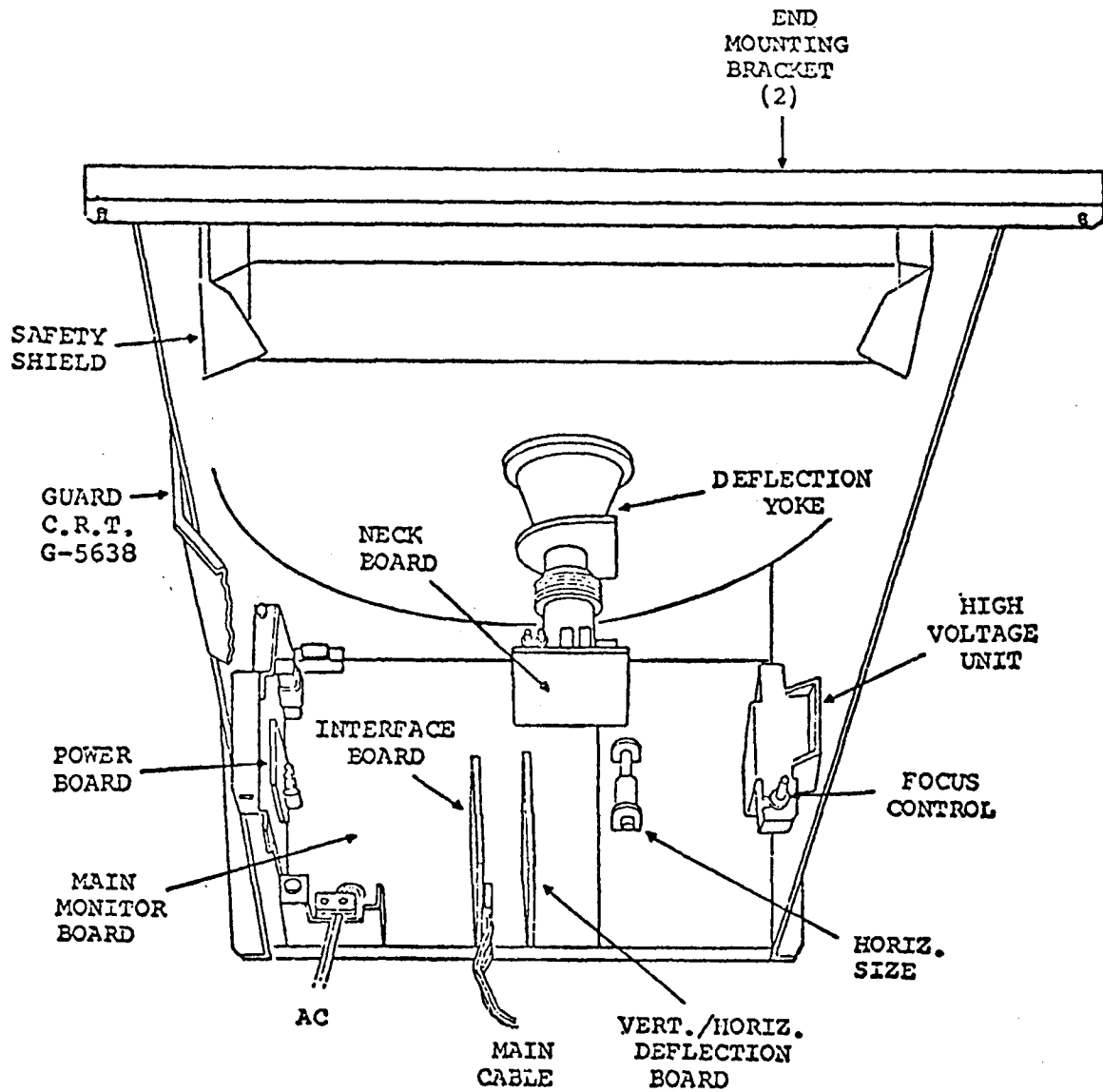


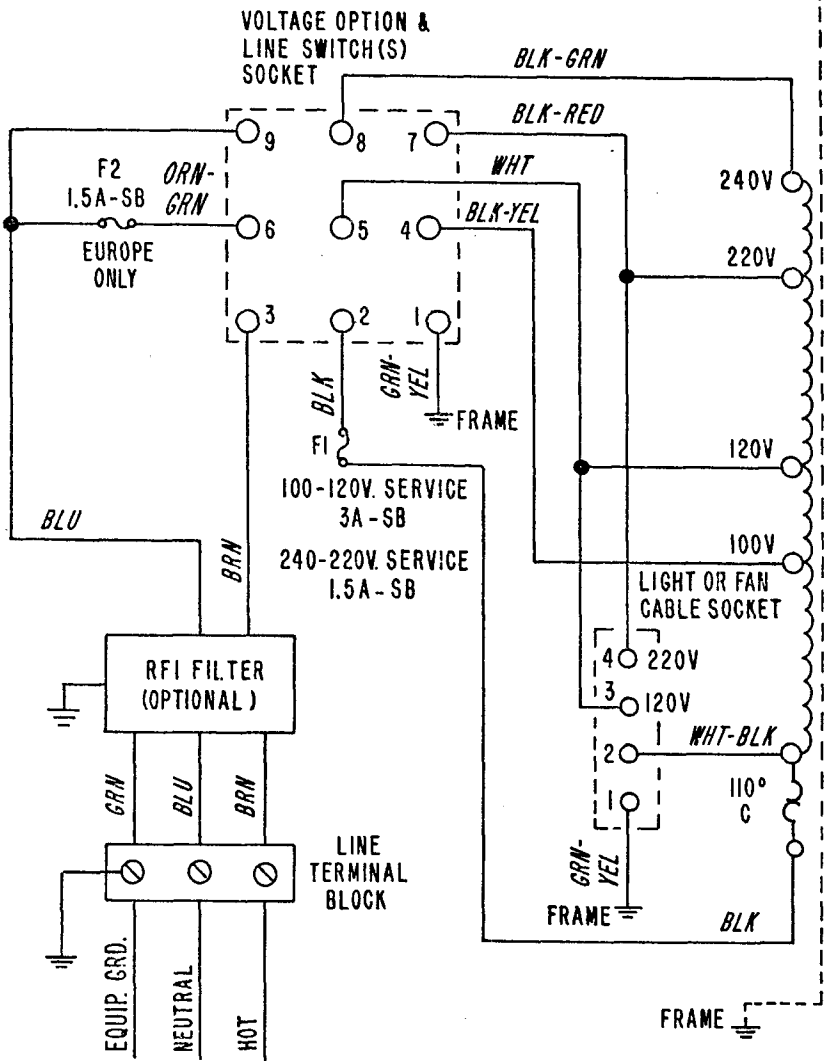
FIGURE 17. HORIZ/VERT P.C. BOARD MT/QJ

A-5

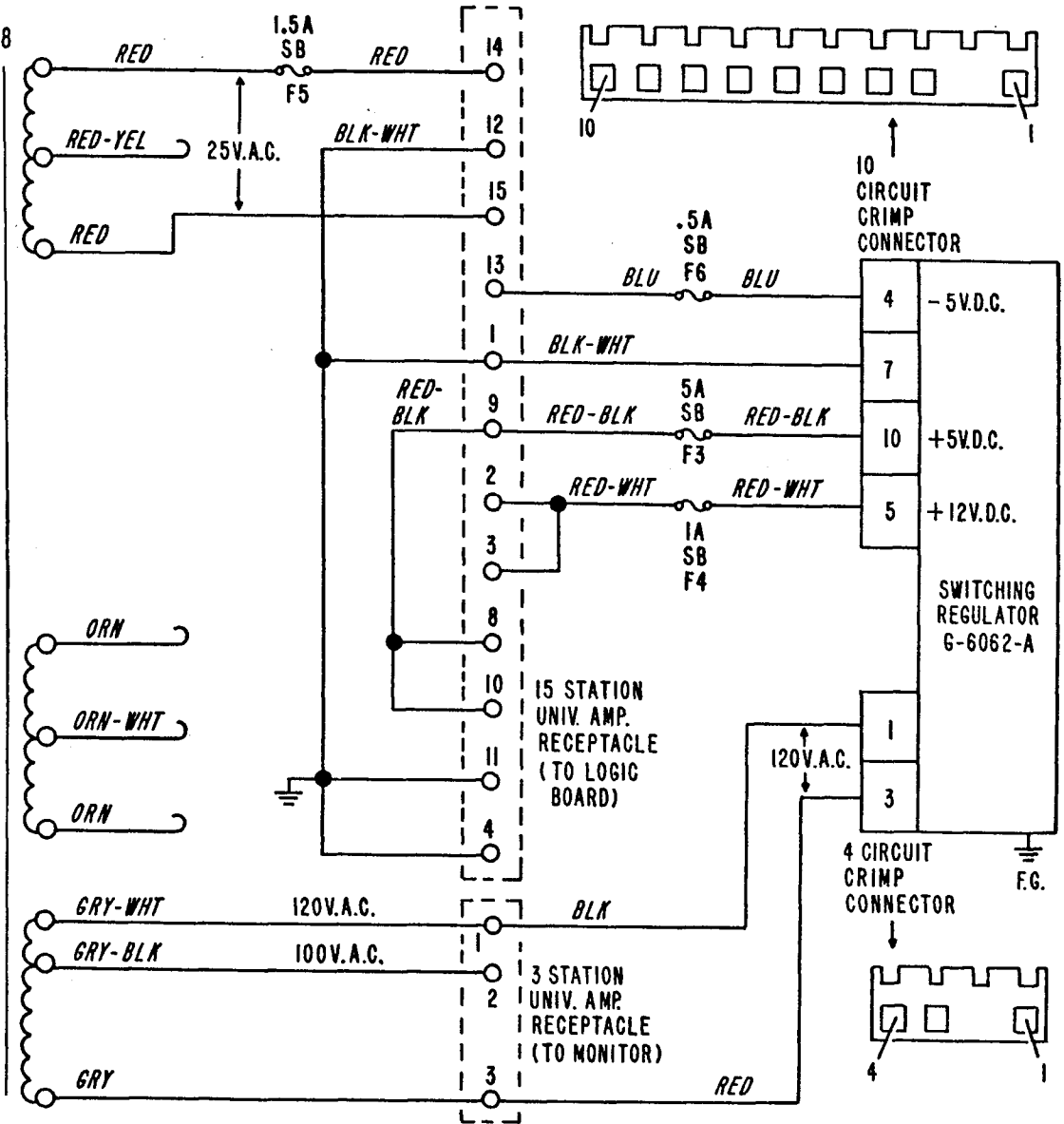


WELLS-GARDNER MONITOR ASSEMBLY

POWER SUPPLY G-6060-A

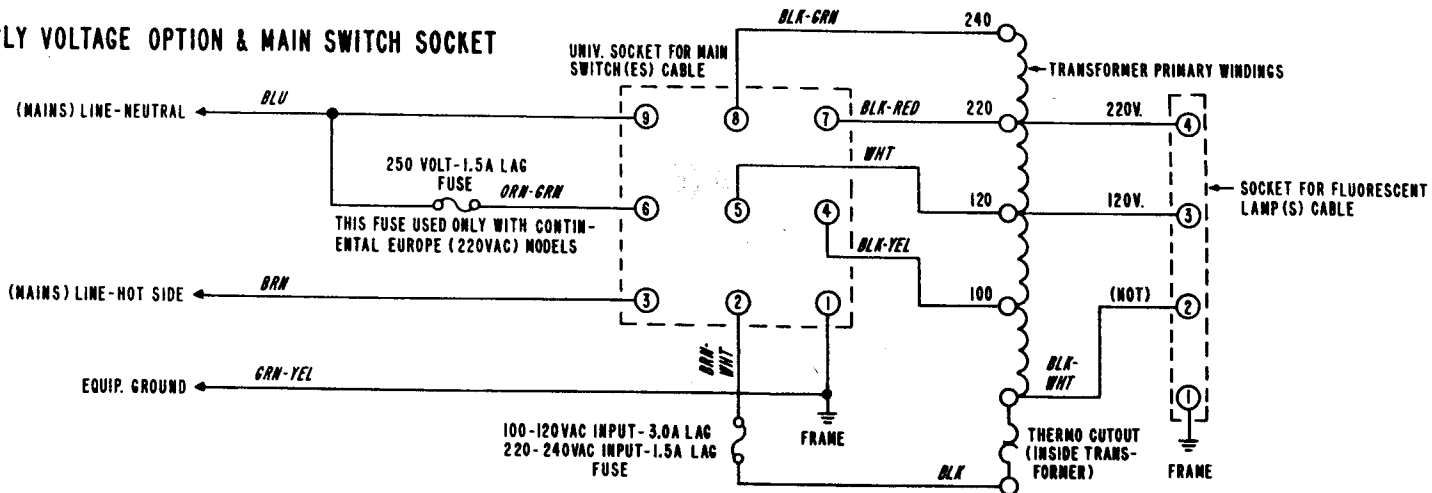


G-5438

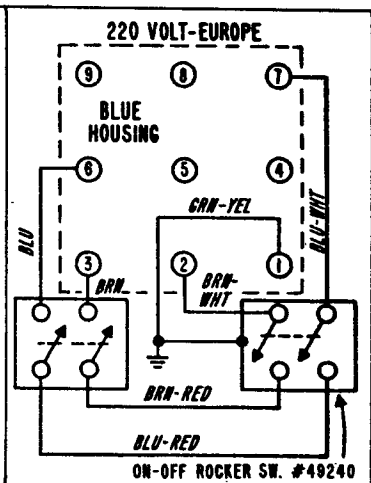
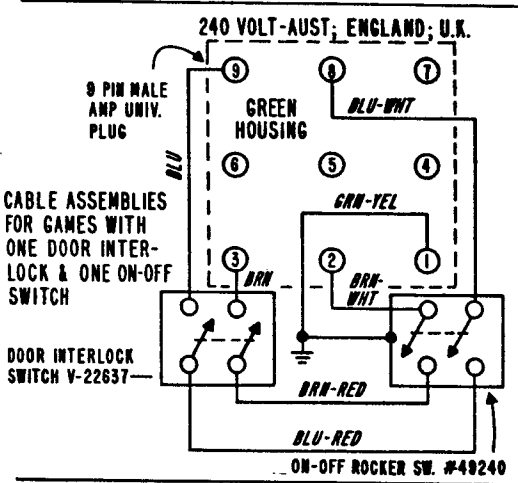


A-6

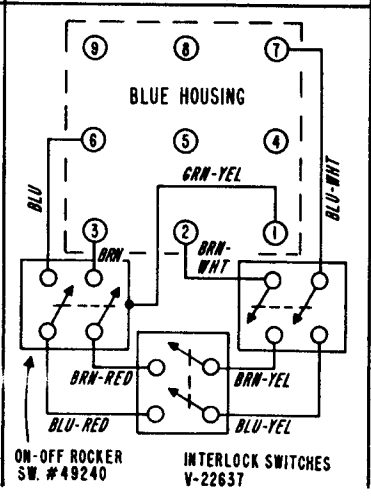
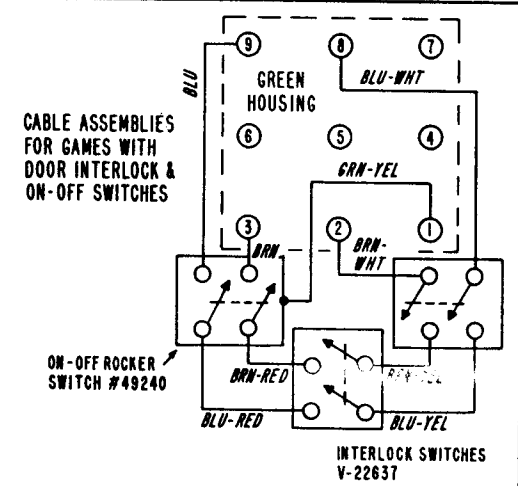
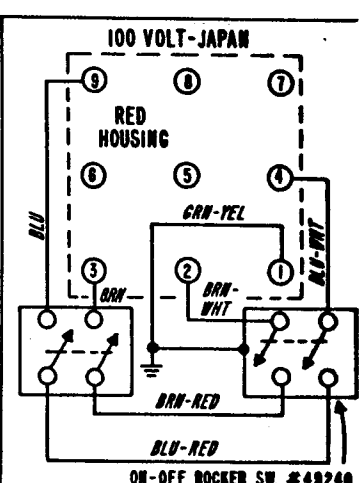
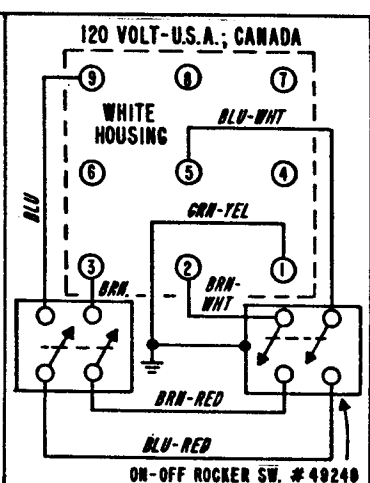
POWER SUPPLY VOLTAGE OPTION & MAIN SWITCH SOCKET



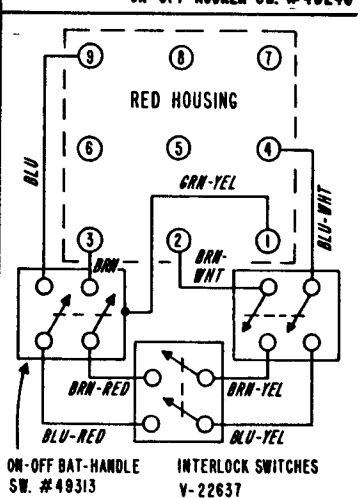
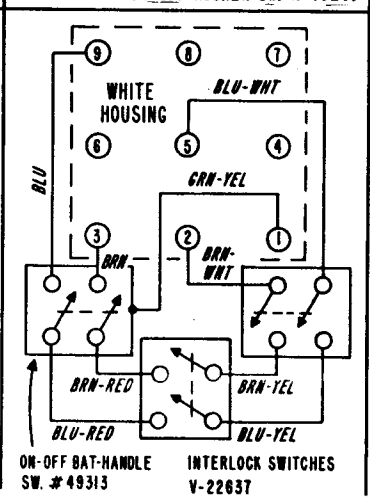
A-7



ALL WIRES #18 AWG. 1/32" WALL C.S.A. U.L. 1015



ALL SWITCHES WITH METAL BAT-HANDLE ACTUATORS TO BE CONNECTED TO GRN-YEL WIRE ON MOUNTING PLATE



JOYSTICK SWITCH ADJUSTMENTS

4 WAY - HEAVY DUTY SHAFT #G-6477-A

Switches have been adjusted at the factory to allow contact at vertical and horizontal positions only.

If necessary to readjust in the field, the following procedure should be followed:

Fig. 1. Adjust each individual switch as follows:

- 1.1 Normal rest position - Top blade should be $1/4"$ from edge of plastic cam or total of $1"$ between blades. Bend top blades to this position.
- 1.2 Check lower blade for air gap between contacts. Switches must not make contact.

Fig. 2. After adjusting all four switches, move lever against top, bottom and sides as shown in Fig. 2 and check switch action.

Fig. 3. Upper blades should make contact and deflect $1/16"$ as shown.

Fig. 4. Rotate lever at 45° angle (4 ways) and check. No two switches should make at the same time as this will interfere with the direction "Nibbler" travels. Readjust as required.

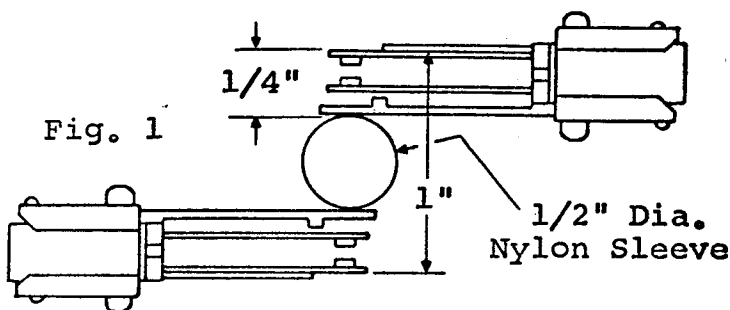
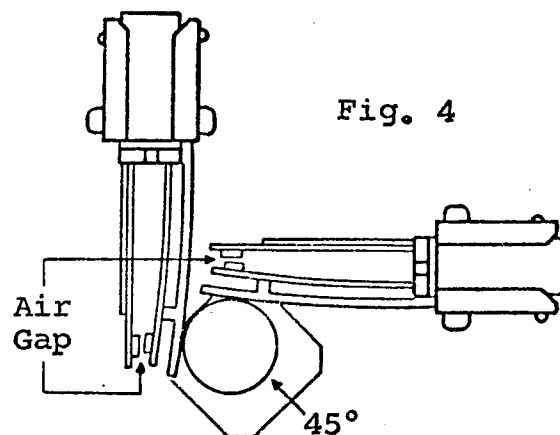
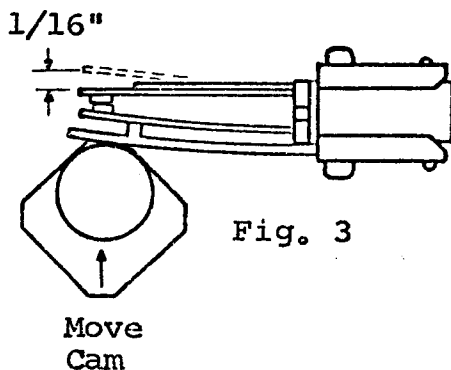
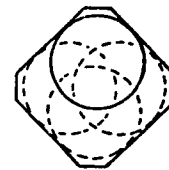
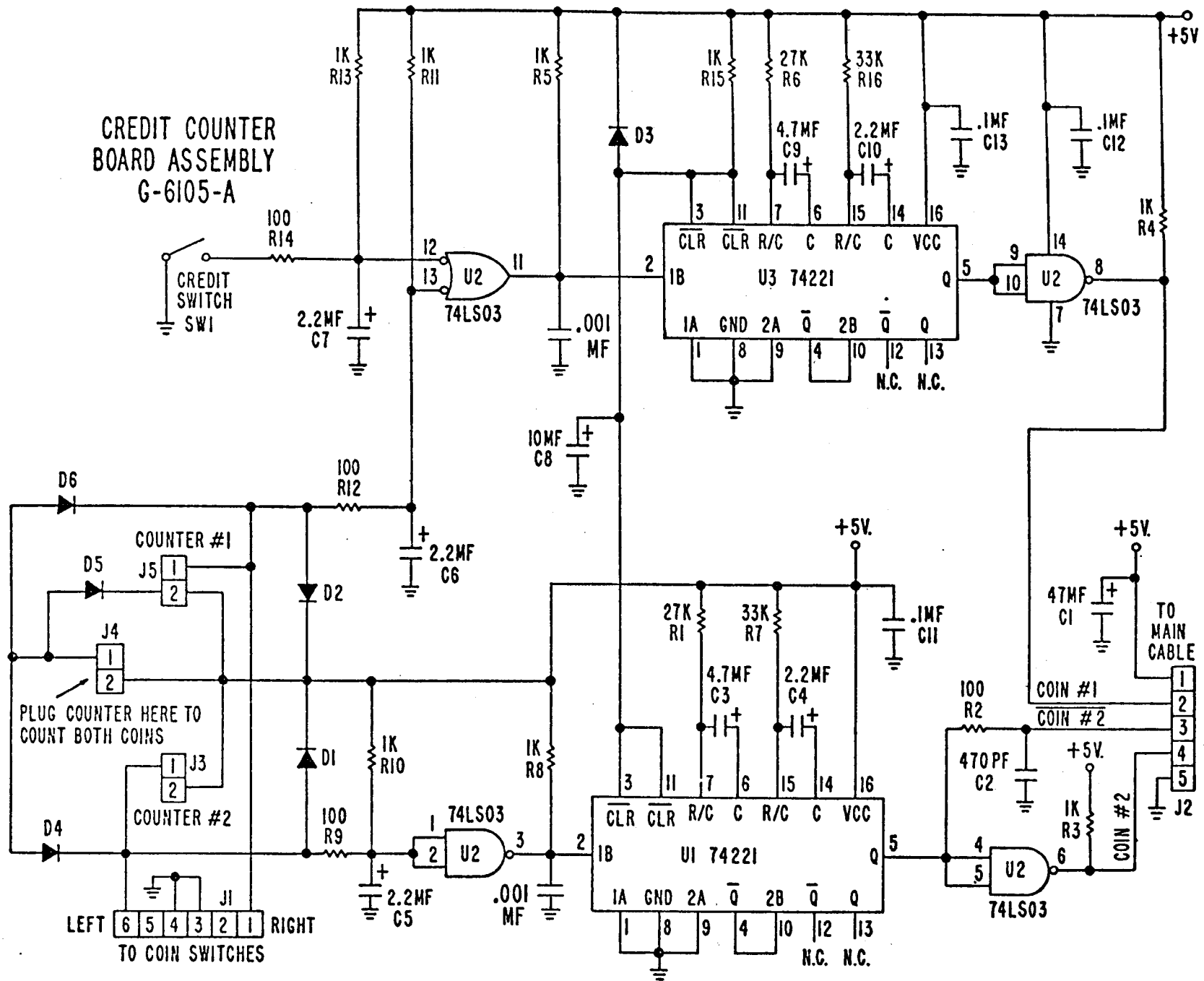
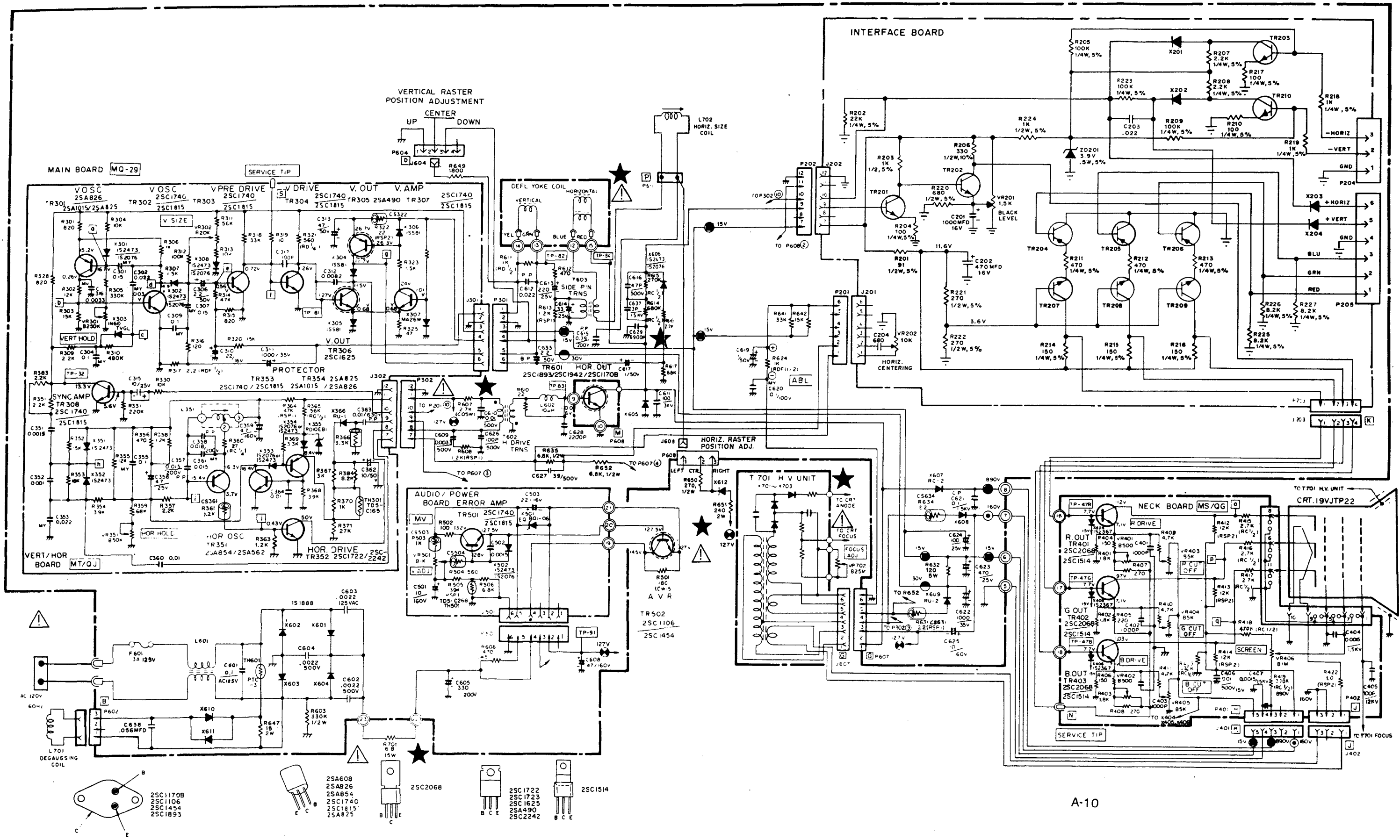


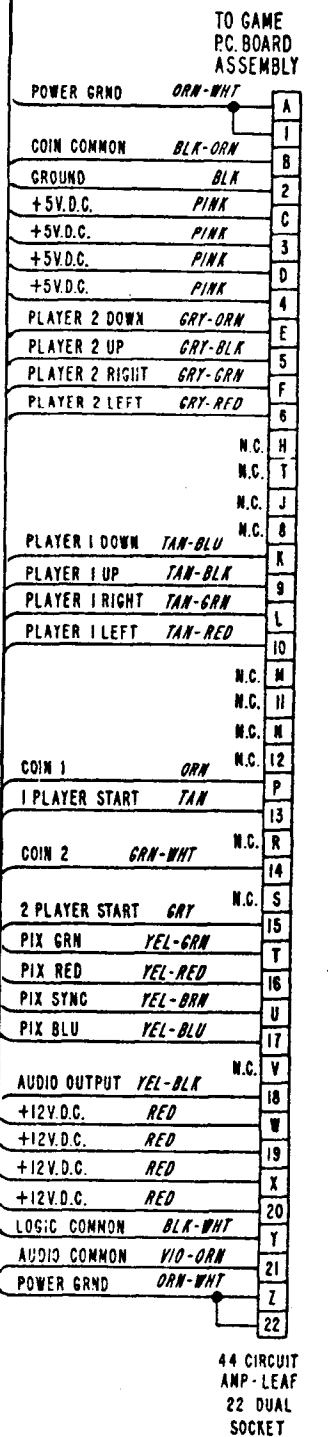
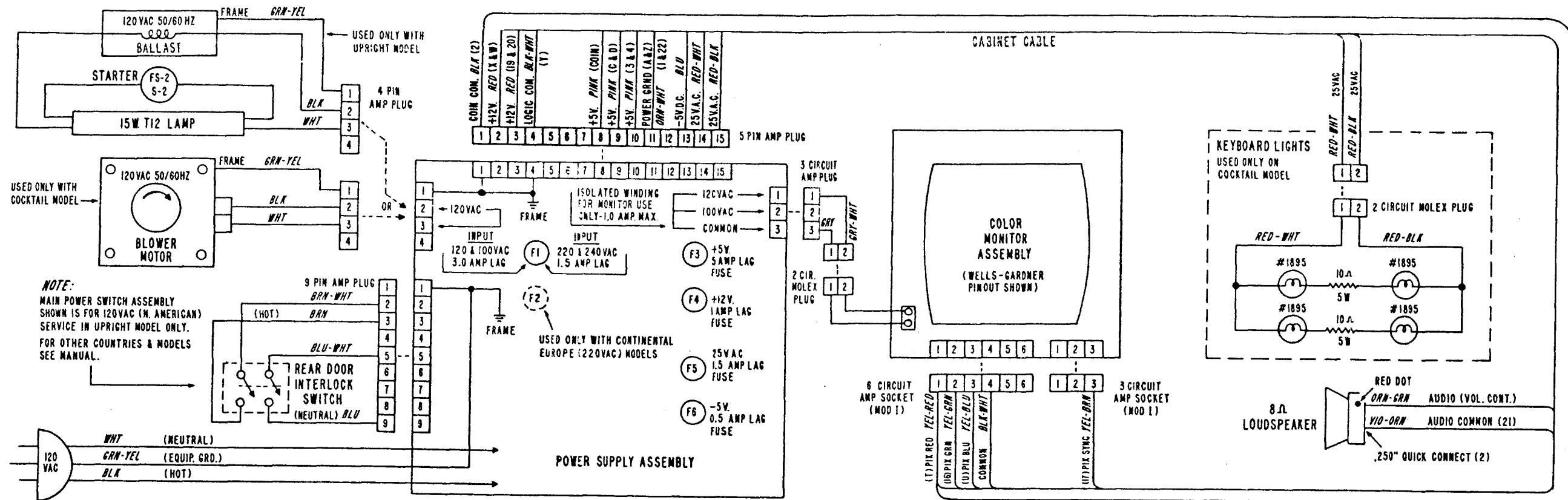
Fig. 2



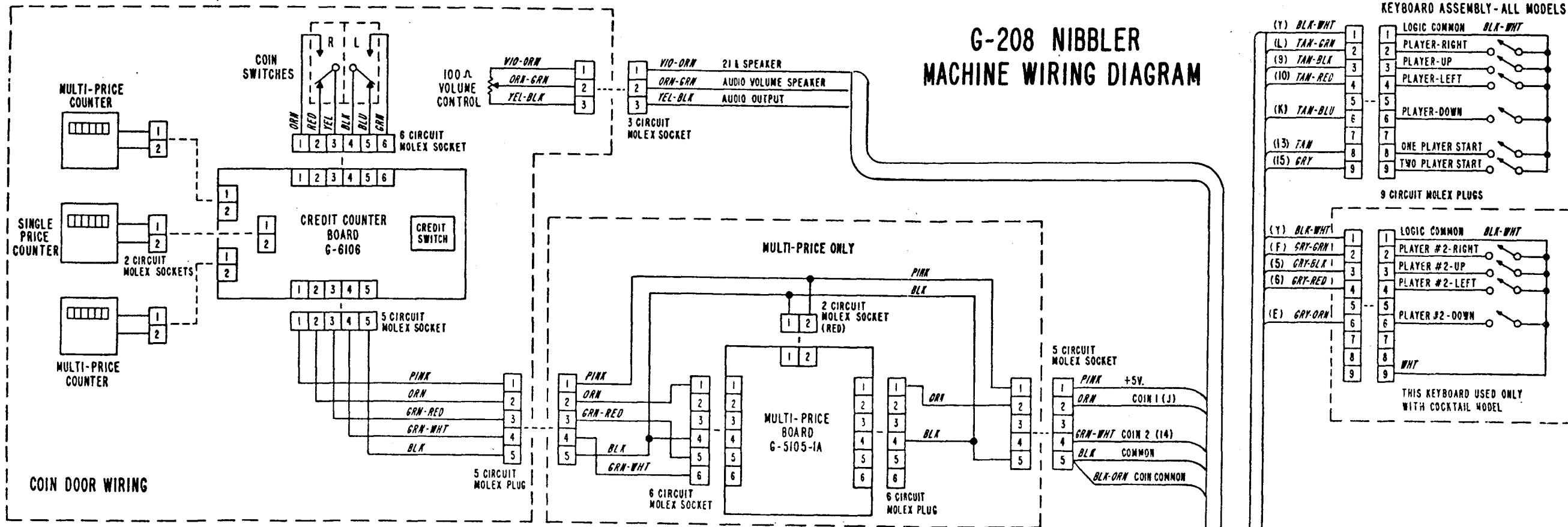
CREDIT COUNTER BOARD ASSEMBLY G-6105-A

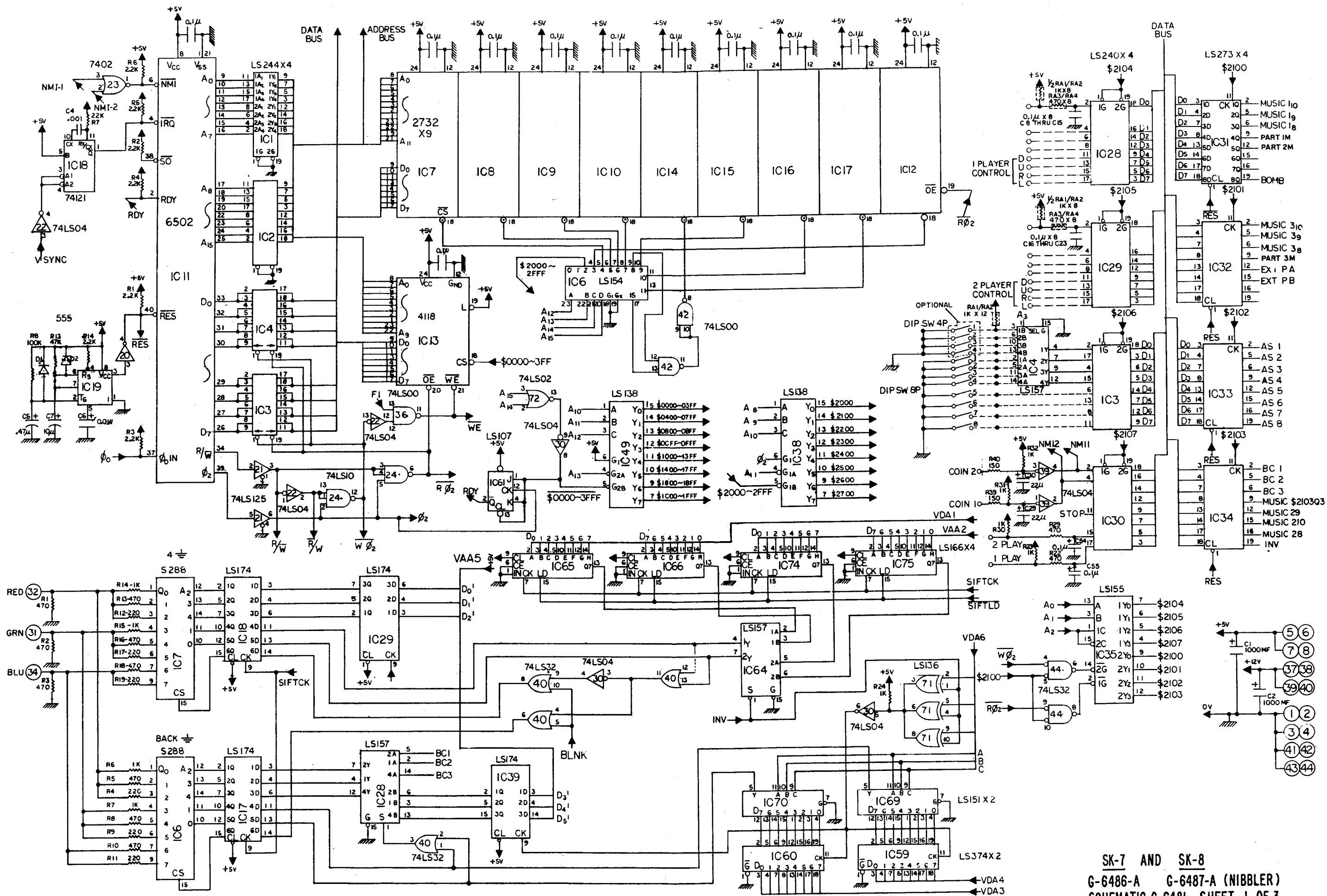




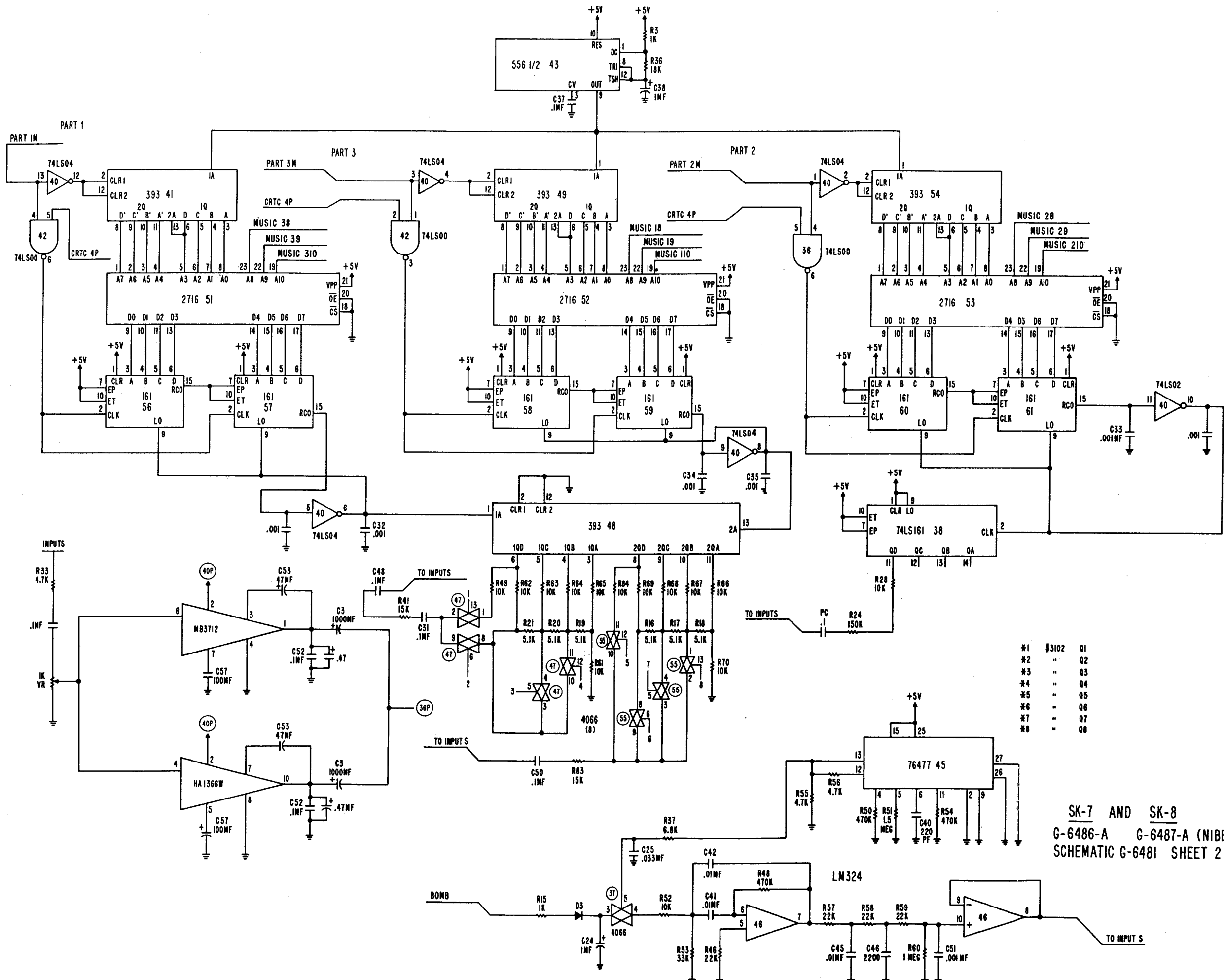


G-208 NIBBLER MACHINE WIRING DIAGRAM



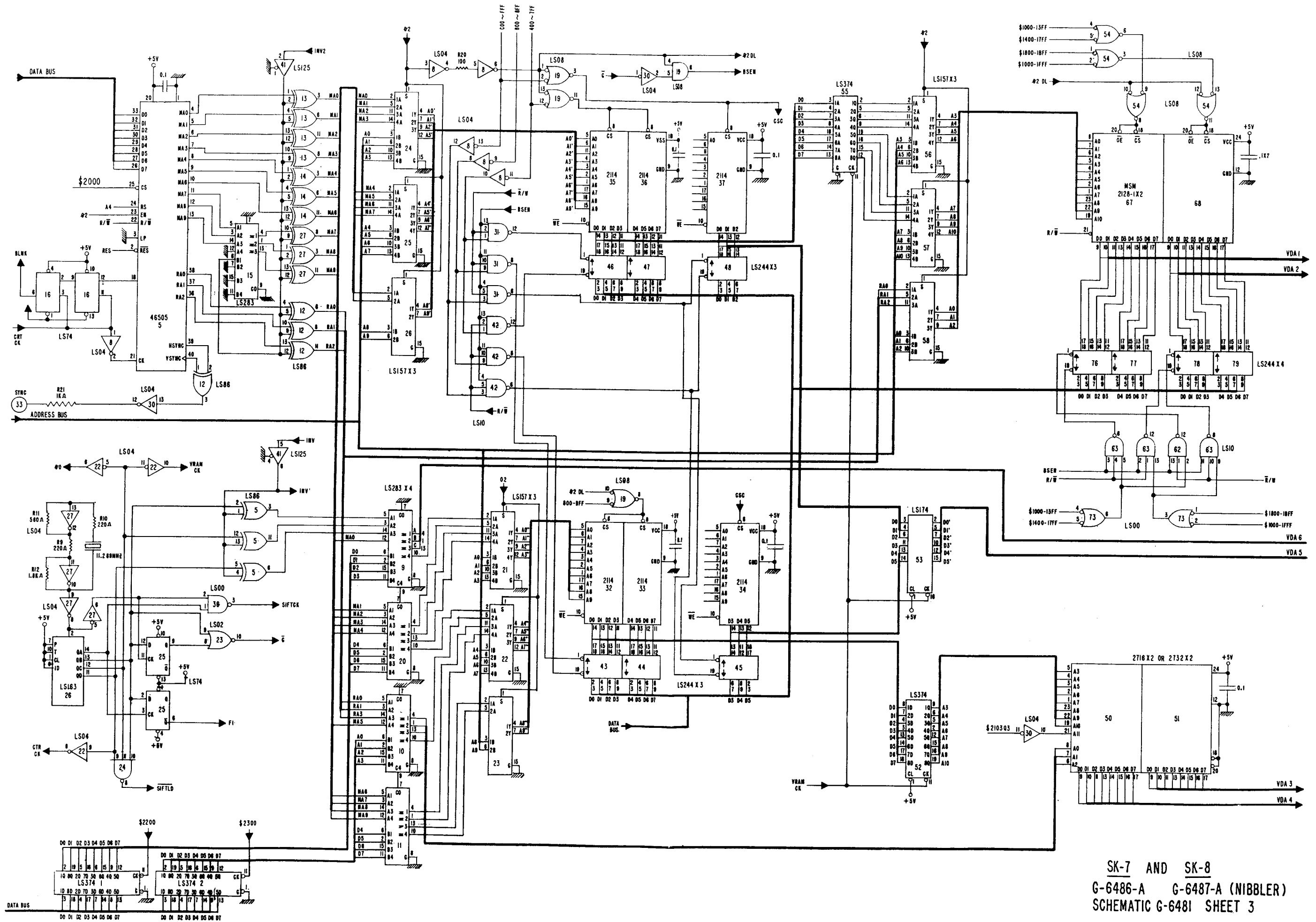


SK-7 AND SK-8
 G-6486-A G-6487-A (NIBBLER)
 SCHEMATIC G-6481 SHEET 1 OF 3



SK-7 AND SK-8
 G-6486-A G-6487-A (NIBBLER)
 SCHEMATIC G-6481 SHEET 2 OF 3

*1	#3102	Q1
*2	"	Q2
*3	"	Q3
*4	"	Q4
*5	"	Q5
*6	"	Q6
*7	"	Q7
*8	"	Q8



SK-7 AND SK-8
 G-6486-A G-6487-A (NIBBLER)
 SCHEMATIC G-6481 SHEET 3