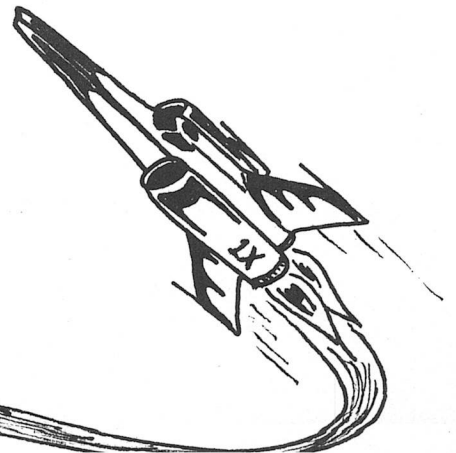
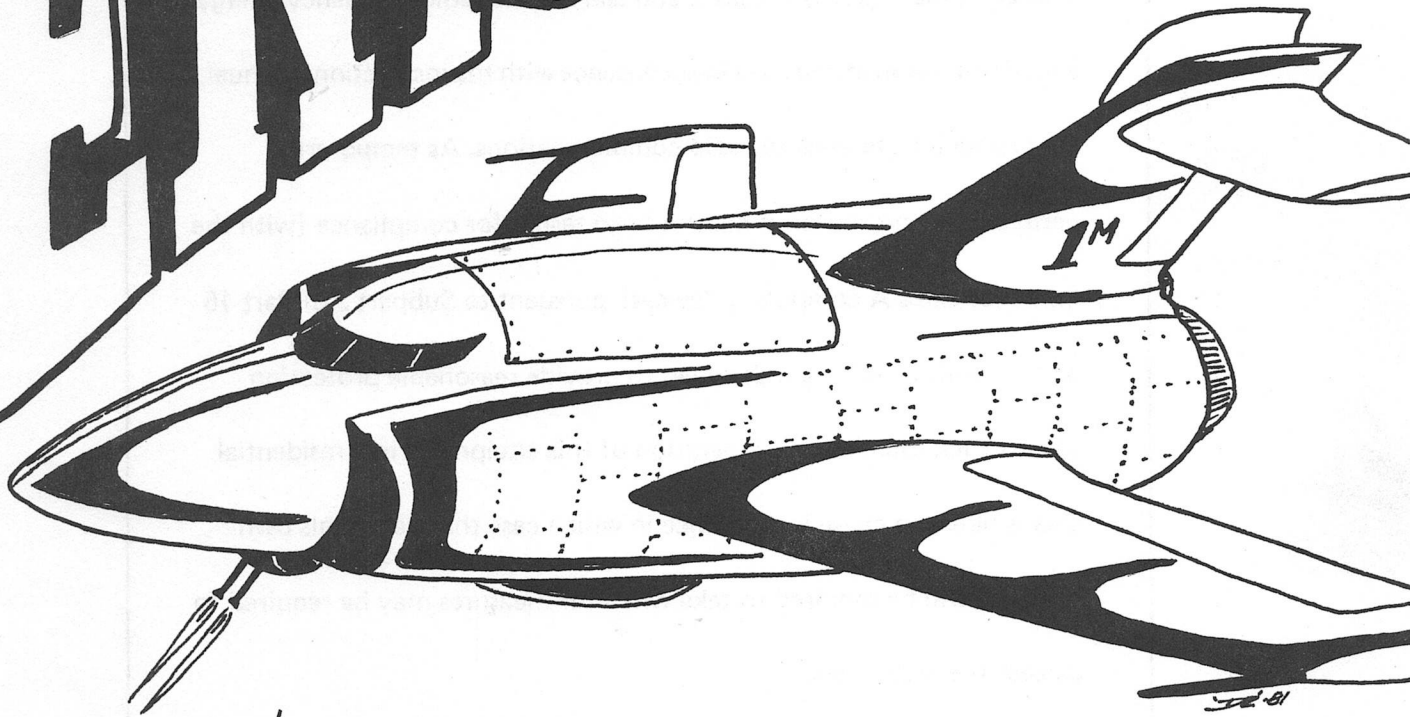


GamePlan, inc.

312-628-8200

ENIGMA II



02-30079A

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 [with the limits for Class A computing devices] 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.

1.0 INTRODUCTION

ENIGMA II is a 19", color, one or two player game, designed to capture and maintain player interest. It has a joystick for horizontal ship movement and thrust and fire buttons. The thrust button allows for vertical ship movement either to avoid bombs or to re-fuel. The fire button allows the player to destroy attacking aliens.

1.1 UNPACKING INSPECTION

To ensure the equipment incurred no damage in shipment, inspect the container prior to acceptance from the carrier. If no immediate cabinet damage is evident, perform the following visual inspection:

1. Open the rear of the game with the appropriate packaged key.
2. Examine each major and electrical component thoroughly for scrapes, broken or missing parts and loose or missing screws.
3. Check for loose cable connectors.
4. Visually verify that all the integrated circuit devices (IC's) plugged into sockets are properly seated and that no IC pins are bent or misaligned.

If you find any damage during this inspection, file a claim with the freight carrier, and send a complete report of the damage to Game Plan Inc.

1.2 INSTALLATION

Planning the location of the game should involve both physical and electrical consideration. Physical considerations concern the placement of the equipment with respect to clearances, AC cable and environmental conditions such as ventilation, temperature, weight support and accessibility (although your game has the durability to endure nearly every type of physical hazard). Electrical considerations include availability of the correct voltage and frequency.

In planning this installation, consideration must also be given to working space required for personnel involved with operation or maintenance of this system.

NOTE: The cabinet must be within six feet of an AC outlet. Be certain that a ground jack or terminal is available at the outlet.

CAUTION: DO NOT remove the AC ground prong from the plug.

- A. Install 4 provided levelers to bottom of cabinet and level cabinet.
- B. The power is controlled by a switch located on top of the cabinet plug into A.C. only 115 volt 60 cycle.

CAUTION:

1. Do not install this game in places directly exposed to sunlight or excessive heat, to prevent rising internal temperatures.
2. High voltage runs the monitor. Therefore only persons familiar with safety measures should make any adjustments.
3. As with any solid state games the power should be turned off before replacing any parts or disconnecting any plugs.
4. Always take boards to distributor for repair, do not attempt to make any repairs with volt-ohmmeter or other test equipment as the internal voltage of such equipment may damage the circuitry.

1.3 PRELIMINARY CHECKOUT PROCEDURE

After properly installing ENIGMA II we suggest checking it's operation in the following procedure:

1. Plug the AC jack into the AC outlet.
2. Allow one to two minutes for CRT to warm up.
3. Observe the TV monitor display to assure the correct attract mode is present on the screen, as explained in Section 2.2.
4. If the ENIGMA II display is incorrect, correct immediately.
5. Insert a quarter into the coin slot.
6. Continue to play the game and verify that all screen images are displayed, once again, described in the Normal Operation procedure.

If repairs are necessary, contact your distributor or Game Plan Inc.

2.0 GAME DESCRIPTION

The following paragraphs describe the video images, sound effects, game strategy.

2.1 RESET MODE

Whenever power is applied (or momentarily interrupted), or the slam switch is activated the game does the following:

FIRST

1). Puts up test pattern and then goes into the attract mode.

SECOND

2). Erases any credits and sets or resets all scores to zero.

2.2 ATTRACT MODE

After power-up ENIGMA II, automatically cycles thru a sequence of video images that make up the attract mode. This consists of simulated first (1st) screen and Score Menu, simulated second (2nd) screen, and Score Menu simulated third (3rd) screen and Score Menu.

2.3 COIN INPUT MODE

At all times, while power is on, regardless of the game conditions or the operator options, the computer will accept a coin input, generate a unique sound, and increment the coin counter.

2.4 GAME START MODE

The computer scans the game-start switches only during the attract and game over modes and only then if the credit-count is not zero. When a start-switch is activated, the computer compares the operator selected credit option against the credit-count and ignores the switch if enough credits are not available. If there are sufficient credits, the computer subtracts the price of the selected game, resets the player scores to zero, generates the game-in play (GIP) sound, and displays the GIP message.

2.5 SINGLE PLAYER GAME

The game-play sequence in ENIGMA II consists of 3,4,5,or 6 turns (operator selectable) beginning with 16 or 32 aliens on the first screen, first turn (operator selectable), and skill level 1 thru 6 (operator selectable) Each turn lasts as long as the player can skillfully maneuver his ship to avoid destruction while destroying aliens. When he loses a ship, the GIP message, reappears (stating whose turn it is) accompanied by the (GIP) sound, while the computer re-draws the remaining fuel (bottom of screen and displays the total number of ships left below the players score (upper left hand portion of the screen.)After the last ship is lost or fuel has been used the game-over message is displayed. NOTE: a player loses his ship via the following:

1. Being hit by a bomb dropped from an alien, bombs cannot be shot down and must be avoided.
2. When a bomb explodes, if the players ship is in the blast area, the round ends.
3. Being hit, directly by an alien, causes the player to lose a ship, the alien will re-appear on the next turn-all aliens must be destroyed using the fire button.
4. Aliens when reaching the bottom level, will leave a bomb and move back up, this bomb and its blast area must be avoided.
5. Thrusting into an alien, alien bomb, stars, etc.
6. During the docking maneuver missing the docking port will cause the players ship to explode.

Assuming a 4 ship, 16 first screen aliens, with a beginning skill level of 2. Play begins with the player score 000000 and 3 ships displayed immediately below it. When the fuel gauge is completely filled the ship displayed right above it will react to the controls-left-right, thrust and fire, 16 aliens will be displayed and begin moving left to right irregularly, some decending, some dropping thin bombs, which have no blast area. The player uses his joystick to move his ship left or right to avoid the bombs while firing upward to destroy the attackers. NOTE: rapid fire causes the ships shots to have a limited range and use more fuel.

Whenever a player destroys an attacker a distinctive sound is heard and his score is increased if an alien reaches the bottom and lays a bomb and then retreats the bomb will be detonated by other alien bombs and must be avoided, only one bomb of this type will be on the bottom lever these bombs by holding the thrust button down, causing the ship to lift off and by using the joystick the ship can jump over these bombs, remembering that thrusting uses up fuel.

When all the aliens in the first round have been destroyed a tune is played and a completely different group of aliens is displayed in the second round, 16 big bugs, when one of these creatures are hit, 2 things happen a big bomb is released and the big bug is replaced by a winged alien which attacks the players ship by diving toward it, sometimes laying down a surface bomb.

When the player loses a ship the round is over. The computer displays the G-I-P message and re-draws the screen with the remaining correct number of aliens and re-displays the remaining fuel left. If the player before the end of the game should get thru the 2nd screen, the 3rd screen will appear with 12 rectangles, these rectangles cannot be shot, but

2.5 SINGLE PLAYER GAME

Con't

they house aliens which swoop and dive in short attack the players' ship. Should the player be skillful enough to complete this round the next round is a starfield with a large cruiser slowly moving across the top while raining bombs, each time the cruiser is hit in the mid-ship a bomb is released, on the fourth (4th) hit, the cruiser explodes, then the re-fueling ship appears and the player must dock with this ship to get a full fuel tank, while avoiding colliding with any stars, using the thrust button, and the joystick. One pass across the top, or crashing into the fuel ship causes the round to end. If successful the 1st round will then re-appear with 32 aliens at the next skill level. So in this game the next level would be three (3). Every five (5) screens shifts the skill level automatically all of these features make ENIGMA II challenging to the player and profitable for the operator.

The game is over when all the ships have been destroyed or fuel used up.

2.6 TWO-PLAYER MODE

The play of ENIGMA II in a two-player game is identical to single-play with the players alternating turns. On the Upright Version, the players use one common set of controls. On the cocktail version there are two sets of controls on opposite sides of the table. The computer activated control alternately between 1 and 2 flip-flops the screen image so that it is oriented to the player in control.

The GIP message, which appears after each turn, clearly indicates which player is up this allows time for the players to position themselves at the controls, but is brief enough to avoid unnecessary "dead-time".

2.7 GAME OVER MODE

After the players have lost their last ship the game over message is displayed and the attract mode begins. If there are credits left or a coin is inserted, the attract mode will be interrupted by pressing the start button.

3.0 OPERATOR OPTIONS

The standard options for ENIGMA II are

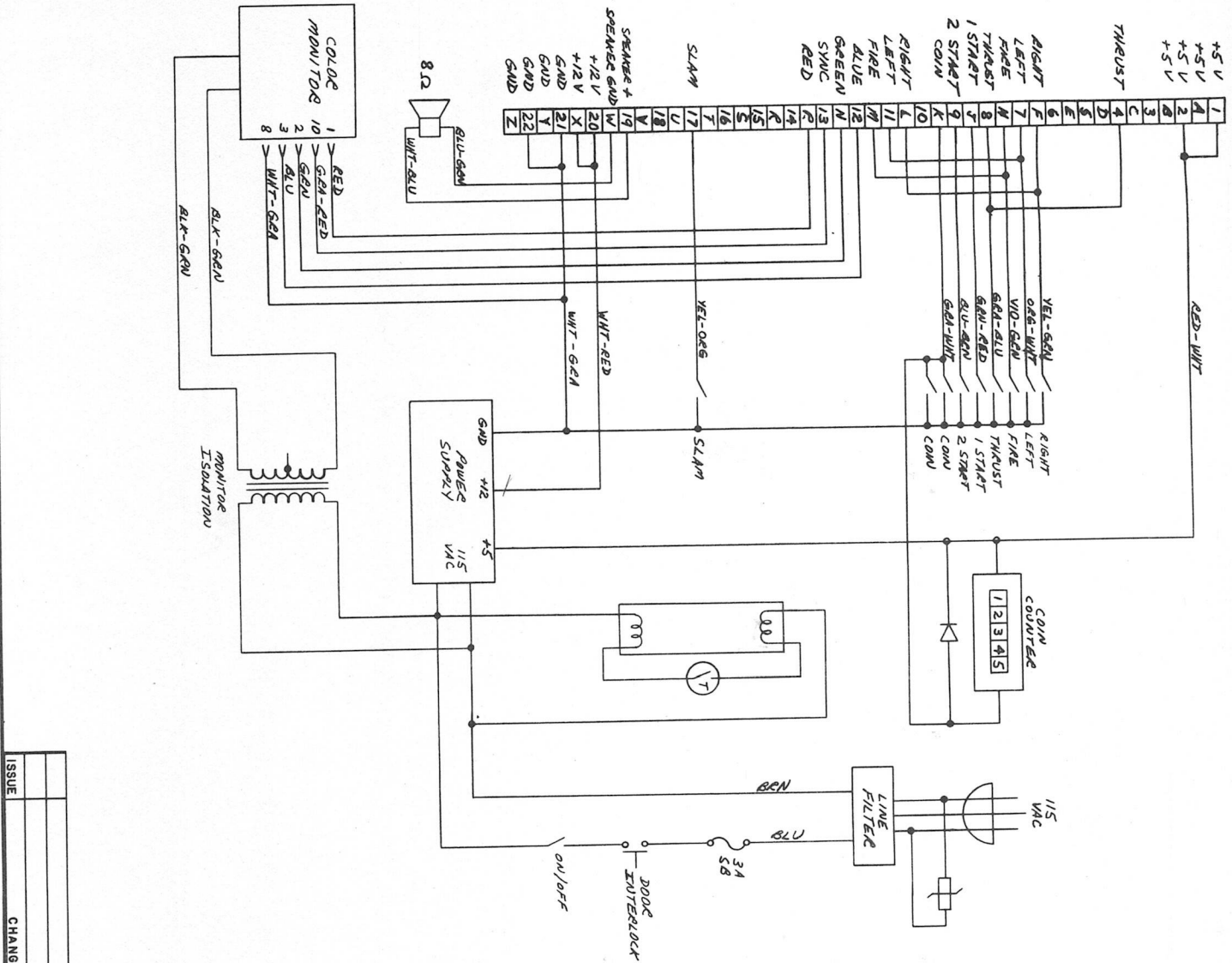
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3		ON		ON
4		OFF		ON
5		ON		OFF
6		OFF		OFF

<u>GAME</u>		3
U/R		ON
T/T		OFF

<u>COINAGE</u>		4
1 COIN- 1 PLAY		ON
2 COINS-1 PLAY		OFF

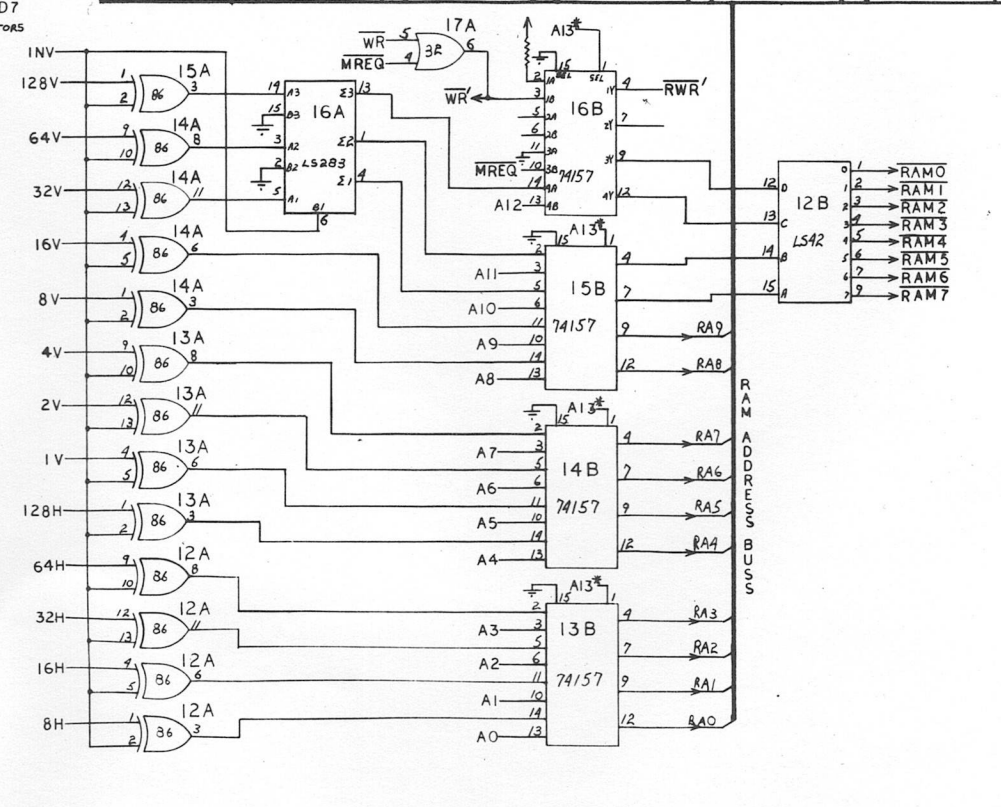
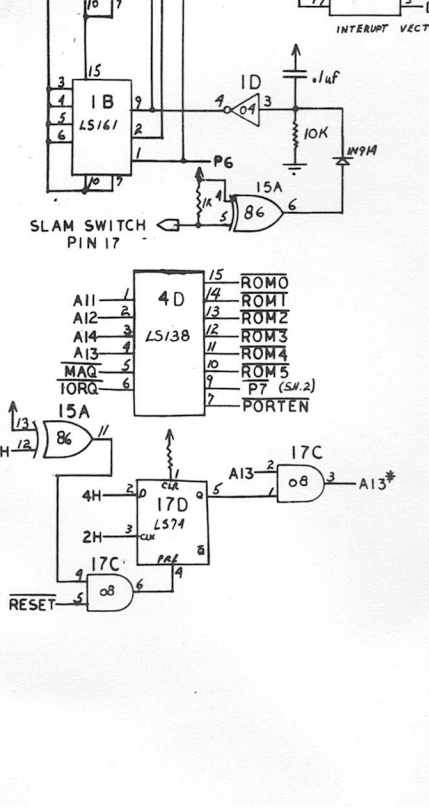
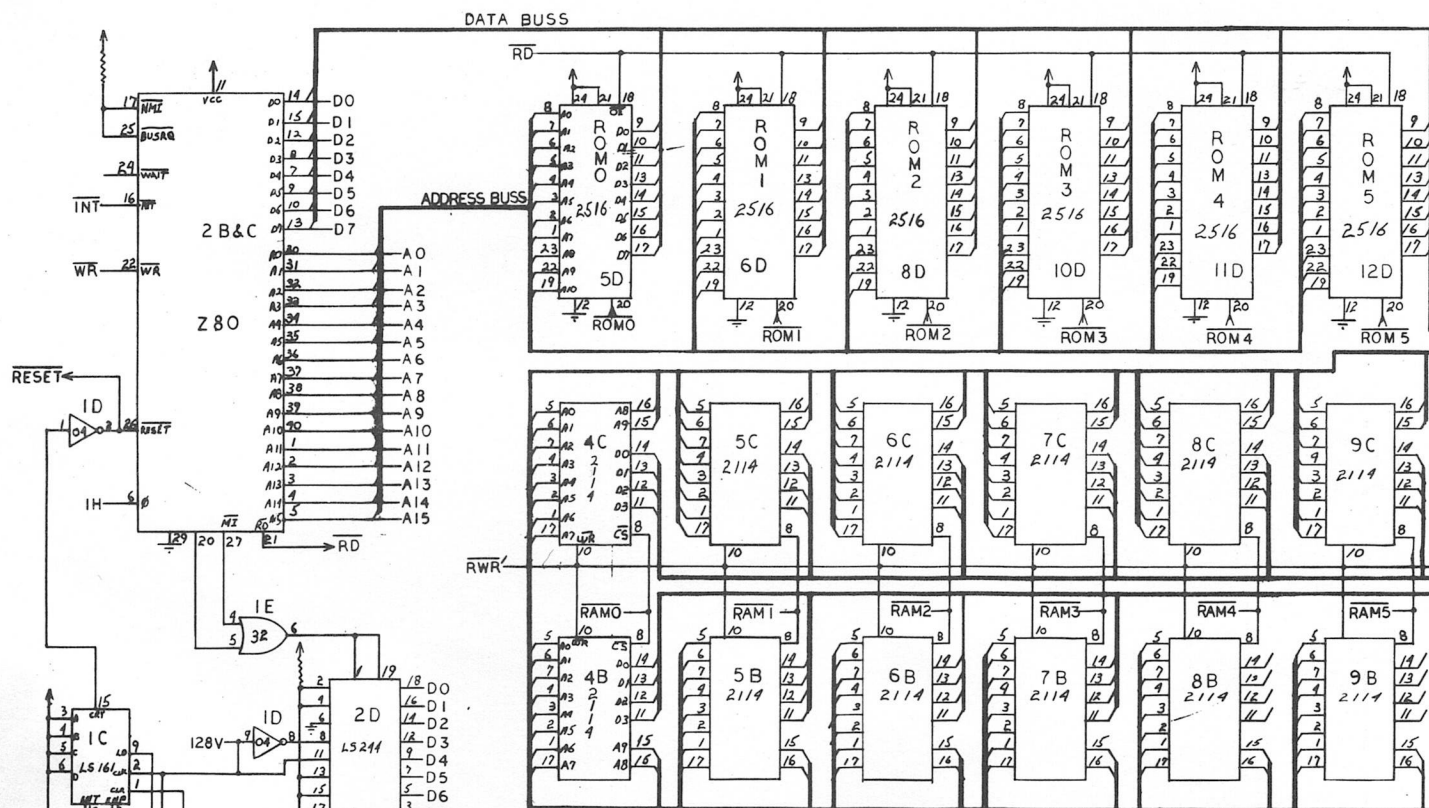
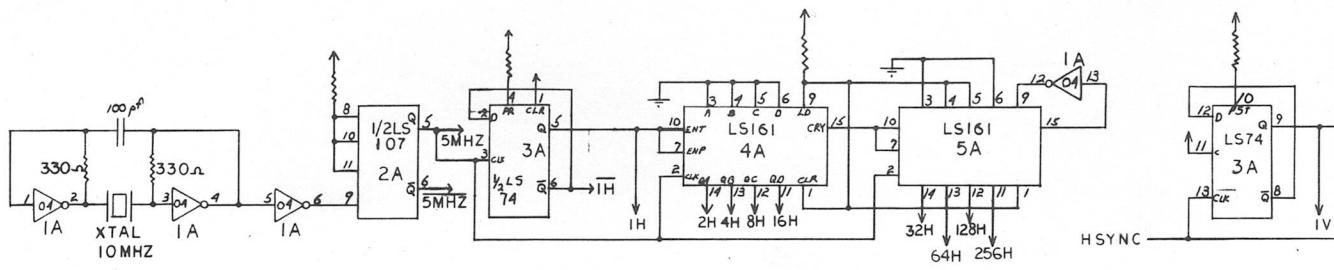
<u>NUMBER OF INVADERS 1st. SCREEN 1st. ROUND</u>	<u>SW</u>	<u>5</u>
16 INVADERS		OFF
32 INVADERS		ON

<u>SKILL LEVEL</u>	<u>SW</u>	<u>6</u>	<u>-</u>	<u>7</u>	<u>-</u>	<u>8</u>
1		OFF		ON		OFF
2		OFF		ON		ON
3		OFF		OFF		OFF
4		OFF		OFF		ON
5		ON		OFF		OFF
6		ON		OFF		ON

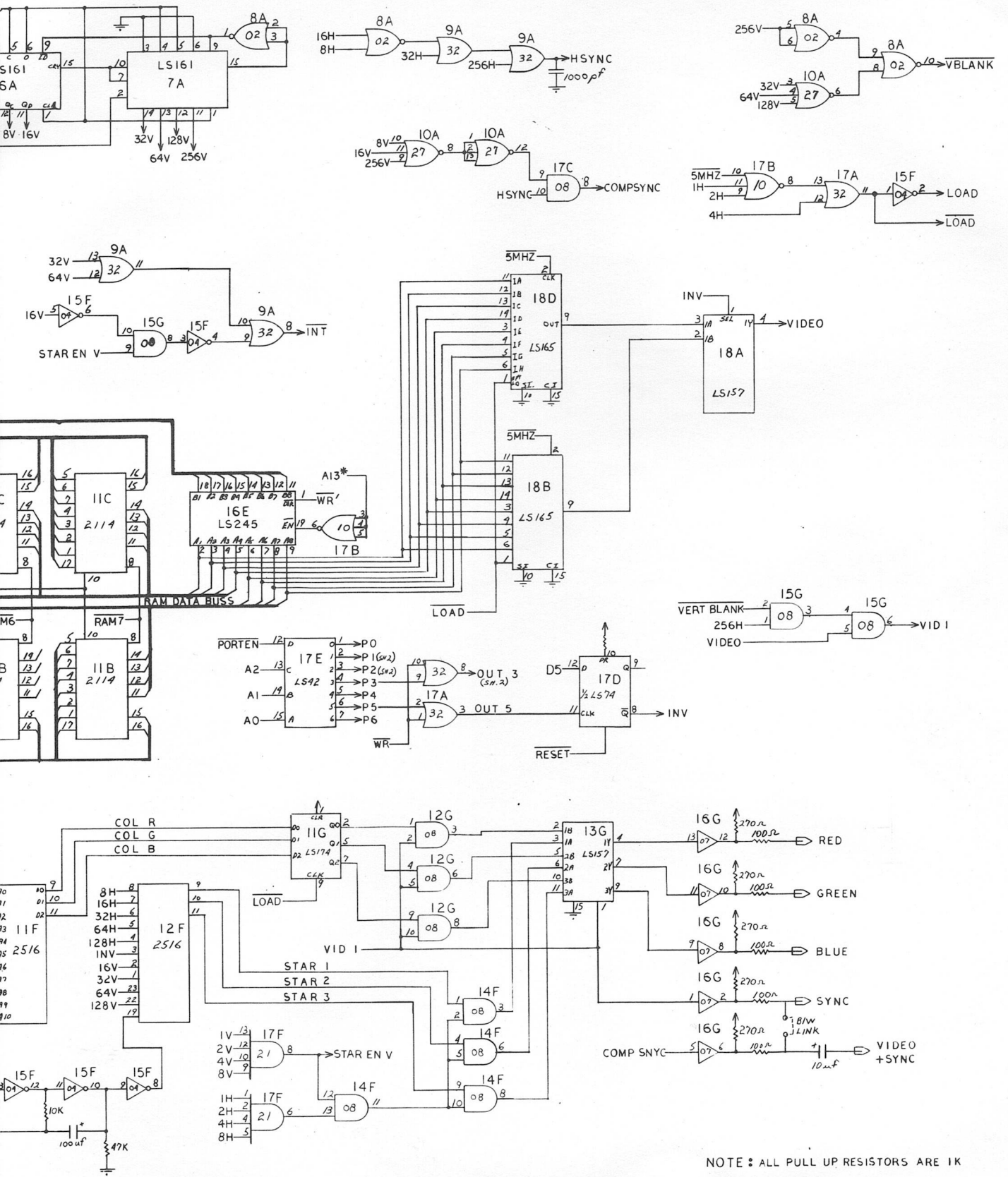


ISSUE	CHANGE	DATE

Used On	GAME PLAN Inc.
PARTS MUST BE CLEAN AND FREE OF BURNS	1315 W. Fullerton Ave Addison, ILL. 60101
Tolerances Unless Specified	
Fractional	± .015
Decimal	± 1/2
Screw Threads	Class 2
Scale	1/8" = 1"
Finish	As Shown
Drawn By	EM/STW
App. By	
Drawing Number	02-70109C
Part	EM/STW CABINET

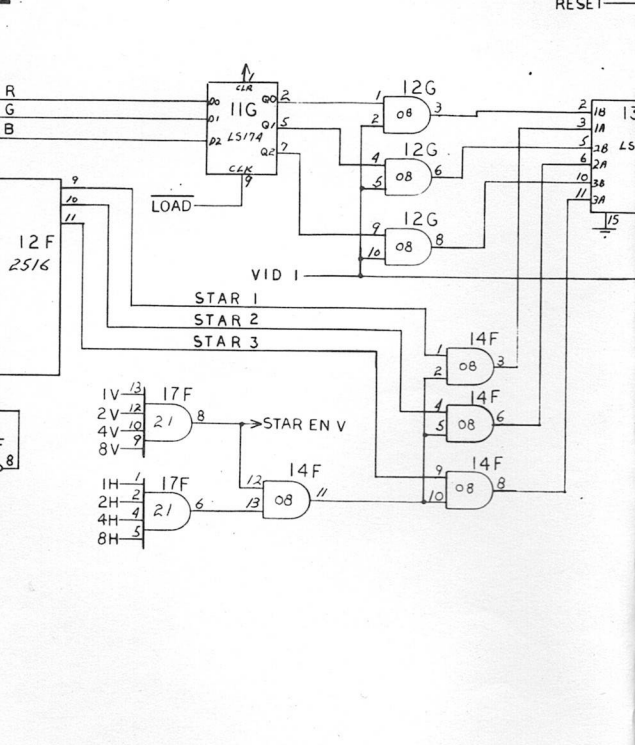
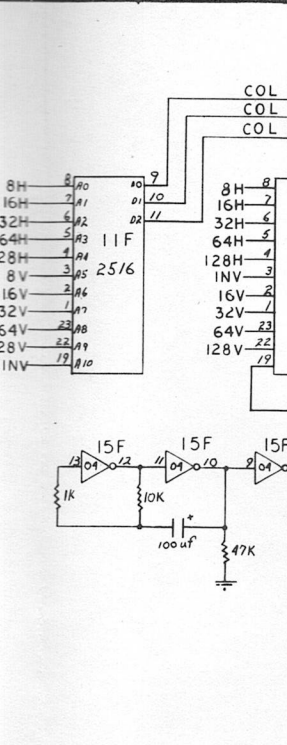
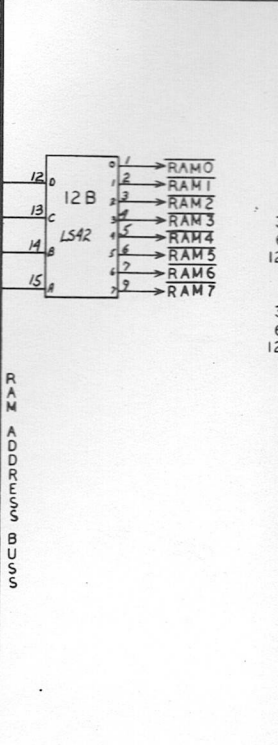
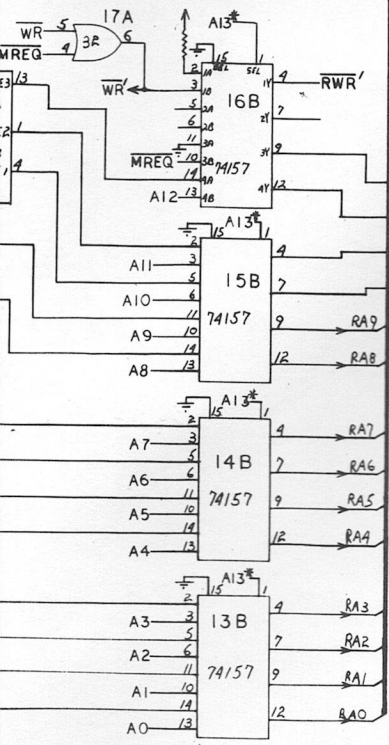
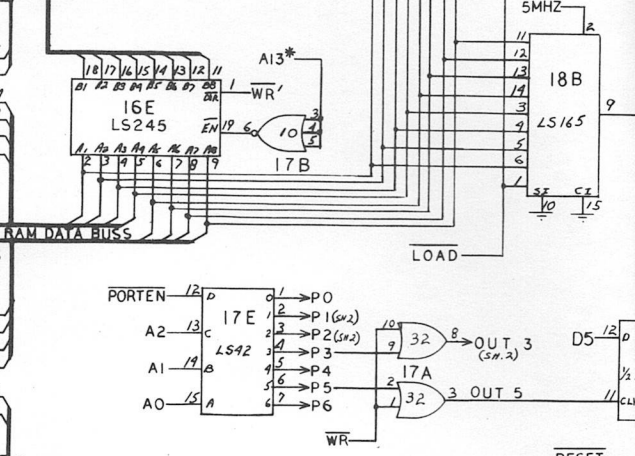
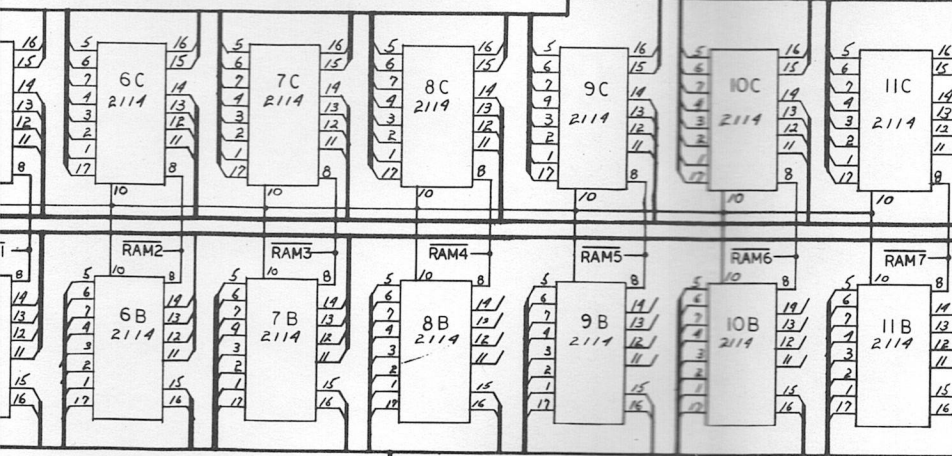
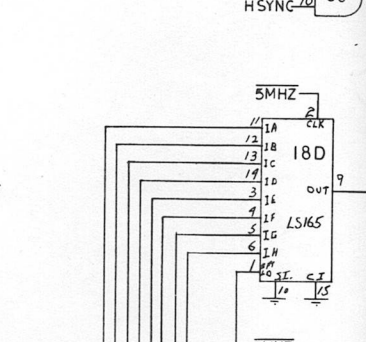
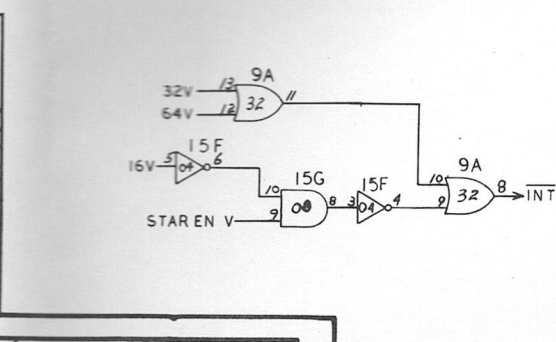
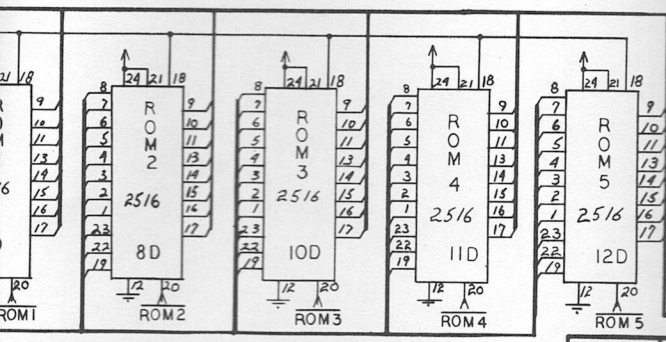
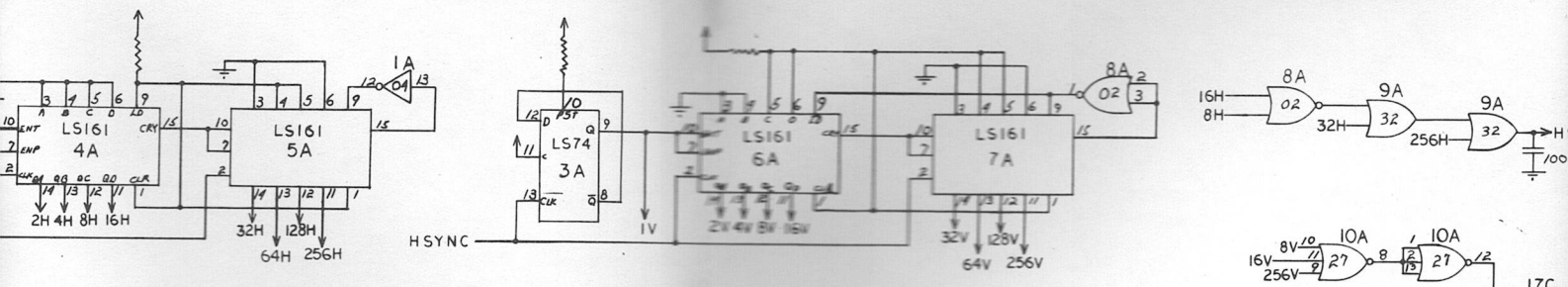


8H
16H
32H
64H
128H
8
16
32
64
128
IN



NOTE: ALL PULL UP RESISTORS ARE 1K

Used On	GAME PLAN Inc. 1515 W. Fullerton Ave Addison ILL. 60101		
PARTS MUST BE CLEAN AND FREE OF BURRS	Scale	Finish	Drawn By <i>GRU</i>
Tolerances Unless Specified	Date 10-16-81	Amt	App. By
Fractional ----- ± 015	Mat'l	Drawing Number 02-70108 CD	
Decimal ----- ± 005	ENIGMA III		SHEET 1 OF 2
Angles ----- ± 1/2	PCB SCHEMATIC		
Screw Threads --- Class 2	ISSUE	CHANGE	DATE



ISSUE	CHANGE

ALSO IMPORTANT TO READER SAFETY INFORMATION

WARNING: This equipment is designed to be used only with the specified power source. The use of any other power source may result in damage to the equipment and may be a fire hazard. The user should read the instructions carefully before using the equipment.

READ CAREFULLY BEFORE USING

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MONITOR SERVICE INSTRUCTIONS

WARNING: This equipment is designed to be used only with the specified power source. The use of any other power source may result in damage to the equipment and may be a fire hazard. The user should read the instructions carefully before using the equipment.

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REPLACEMENT PARTS LIST

★ 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
R603	340X3334-944	330k Ohm, ± 10%, 1/2W Carbon
R605	203X9014-584	1k Ohm, ± 5%, 1W M.O.
R606	204X1425-021	470 Ohm, ± 10%, 5W W.W.
★ R607	204X1450-508	2.7k Ohm, ± 10%, 5W W.W.
R608	203X9014-603	1.2k Ohm, ± 5%, 1W M.O.
R610	203X6500-246	22 Ohm, ± 5%, 1/8W Carbon
R611	203X6700-562	1k Ohm, ± 5%, 1/2W Carbon
R612	340X3471-944	470 Ohm, ± 10%, 1/2W Carbon
R613	203X9010-757	1.2k Ohm, ± 5%, 1W M.O.
R614	203X5202-320	680k Ohm, ± 5%, 1/2W Comp.
R615	203X5602-156	270k Ohm, ± 5%, 1/2W Comp.
R616	203X6500-741	2.7k Ohm, ± 5%, 1/8W Carbon
R617	203X6501-088	68k Ohm, ± 5%, 1/8W Carbon
R620	203X6500-508	270 Ohm, ± 5%, 1/8W Carbon
R622	203X6500-689	1.5k Ohm, ± 5%, 1/8W Carbon
R624	203X6205-843	1k Ohm, ± 5%, 1/2W Carbon
R630	203X5601-906	68k Ohm, ± 5%, 1/2W Carbon
R631	203X9015-087	2.2 Ohm, ± 10%, 5W M.O.
R632	340X8121-731	120 Ohm, ± 5%, 5W Carbon
R634	203X6000-002	2.2 Ohm, ± 5%, 1/8W Carbon
R635	340X3682-944	6.8k Ohm, ± 5%, 1/2W Carbon
R636	203X6500-645	1k Ohm, ± 5%, 1/8W Carbon
R640	203X6500-762	3.3k Ohm, ± 5%, 1/8W Carbon
R641	203X6501-002	33k Ohm, ± 5%, 1/8W Carbon
R642	203X6500-927	15k Ohm, ± 5%, 1/8W Carbon
R643	203X5602-648	3.9M Ohm, ± 5%, 1/2W Comp.
R646	203X6500-468	180 Ohm, ± 5%, 1/8W Carbon
R647	340X5150-841	15 Ohm, ± 10%, 2W Carbon
R648	340X2225-934	2.2M Ohm ± 5%, 1/4W Carbon
R649	340X3182-944	1.8k Ohm, ± 10%, 1/2W Carbon
R650	340X3271-944	270 Ohm, ± 10%, 1/2W Carbon
R651	340X5241-743	240 Ohm, ± 10%, 2W Carbon
R652	340X3682-944	6.8k Ohm, ± 10%, 1/2W Carbon

SEMICONDUCTORS

Ref. No.	Part No.	Description
TR601	200X3189-304	Transistor, 2SC1893
X601	201X3130-109	Rectifier, (SI) RM-2AV 600V
X602	66X0023-009	Rectifier, Power (S1) 500V PIV
X603	66X0023-009	Rectifier, Power (S1) 500V PIV
X604	66X0023-009	Rectifier, Power (S1) 500V PIV
X605	200X8130-171	Diode (HS) SB-2CGL 1200V min.
X606	201X2010-144	Diode (SI) IS2473-772
X607	201X2100-119	Diode (HS) RC-2V 0.8 US
X608	201X2130-234	Diode (HS) RU-2V
X609	201X2130-234	Diode (HS) RU-2V
X610	66X0023-009	Rectifier, Power (SI) 500V PIV
X611	66X0023-009	Rectifier, Power (SI) 500V PIV
X612	66X0023-009	Rectifier, Power (S1) 500V PIV

TRANSFORMERS & COILS

Ref. No.	Part No.	Description
★ 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	Width Coil

Ref. No.	Part No.	Description
★ C601	203X1800-451	0.1 uF, 125V, ± 20% MM
C602	80X0096-038	2200 pF, ± 10%, Z5F
★ C603	202X7810-214	2200 pF, 125V Ceramic
C604	80X0096-038	2200 pF, ± 10%, Z5F
C608	203X0220-043	330 uF, 200V Electrolytic
C605	203X1205-165	.0068 uF, 600V, ± 10% PP
C607	203X0040-020	10 uF, 160V Electrolytic
C608	203X0040-052	47 uF, 160V Electrolytic
C609	202X7050-366	.0033 uF, 500V, ± 10% Ceramic
C610	202X7050-483	.01 uF, 500V, ± 10% Ceramic
C611	202X8140-022	100 pF, 3KV, ± 10% Ceramic
C612	203X1201-047	.022 uF, 200V, ± 10% PP
C613	203X0015-035	220 uF, 25V Electrolytic
C614	203X0015-006	33 uF, 25V Electrolytic
C615	203X1201-288	0.39 uF, 200V, ± 10% PP
C616	202X8065-499	47 pF, 500V Ceramic
C617	203X0025-019	1 uF, 50V Electrolytic
C618	202X8000-577	82 pF, 50V, ± 5% Ceramic
C619	203X0025-019	1 uF, 50V Electrolytic
C620	203X1107-038	0.1 uF, 100V, ± 10% Mylar
C621	202X9040-155	0.1 uF, 1.5KV, ± 20% Paper
C622	203X0020-099	1000 uF, 35V Electrolytic
C623	203X0015-053	470 uF, 25V Electrolytic
C624	203X0015-021	100 uF, 25V Electrolytic
C625	203X0040-020	10 uF, 160V Electrolytic
C626	202X7050-009	100 pF, 500V, ± 10% Ceramic
C627	202X8065-461	39 pF, 500V, ± 10% Ceramic
C628	202X7000-327	2200 pF, 50V, ± 10% Ceramic
★ C629	203X1270-470	6900 pF, 1.5KV, ± 5% PP
C630	202X7810-214	2200 pF, 125V Ceramic
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

MISCELLANEOUS

Ref. No.	Part No.	Description
★ F601	204X7120-062	Fuse (UL/CSA) 3A-125
J607	206X5003-960	Socket, 6 Pin
P602	204X9600-260	Plug, 3 Pin (GT)
P603	204X9600-254	Plug, 3 Pin (NM)
P604	204X9600-298	Plug, 4 Pin (NM)
P606	204X9600-351	Plug, 6 Pin (NM)
P607	204X9600-380	Plug, 6 Pin (GT)
P608	204X9600-254	Plug, 3 Pin (NM)
P610	204X9600-249	Plug, 2 Pin (GT)
P611	204X9600-670	Plug, 2 Pin (NM)
TH601	201X011-034	Thermistor
TH602	201X022-007	Varistor
J03	206X5019-207	Socket, 4 Pin
P201	204X9601-195	Plug, 6 Pin
P202	204X9601-195	Plug, 6 Pin

VERT/HOR BOARD (MT/QJ)

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
R309	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
R383	340X2222-934	2.2k Ohm, ± 5%, 1/4W Carbon	X366	200X8100-130	Diode (HS) RU-1 0.3 US
R384	340X2822-934	8.2k Ohm, ± 5%, 1/4W Carbon			
VR301	204X2122-093	Varistor, 250K Ohm, Vert. Hold			
VR302	204X2114-065	Varistor, 20K Ohm, Vert. Size			
VR351	204X2114-059	Varistor, 50K Ohm, Hor. Hold			

SEMICONDUCTORS

MISCELLANEOUS

TRANSFORMERS & COILS

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

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 (P317)

RESISTORS

R201 340X3910-934
 R202 340X3183-944
 R203 340X3102-934
 R204 340X2101-934
 R205 340X2333-934
 R206 340X3331-944
 R207 340X3102-934
 R208 340X3102-934
 R209 340X2333-934
 R210 340X2101-934

91 Ohm $\pm 5\%$, 1/2W Carbon
 18k Ohm $\pm 10\%$, 1/2W Carbon
 1k Ohm $\pm 5\%$, 1/2W Carbon
 100 Ohm $\pm 5\%$, 1/4W Carbon
 33k Ohm $\pm 5\%$, 1/4W Carbon
 330 Ohm $\pm 10\%$, 1/2W Carbon
 1k Ohm $\pm 5\%$, 1/2W Carbon
 1k Ohm $\pm 5\%$, 1/2W Carbon
 33k Ohm $\pm 5\%$, 1/4W Carbon
 100 Ohm $\pm 5\%$, 1/4W Carbon

R211 340X2331-934
 R212 340X2331-934
 R213 340X2331-934
 R214 340X2151-934
 R215 340X2151-934
 R216 340X2151-934
 R217 340X2101-934
 R218 340X3102-934
 R219 340X3102-934
 R220 340X3681-934
 R221 340X3271-934
 R222 340X3271-934
 R223 340X2104-934
 R224 340X3102-934
 R225 340X2822-934
 R226 340X2822-934
 R227 340X2822-934
 VR201 40X0590-017
 VR202 40X0592-007

330 Ohm $\pm 5\%$, 1/4W Carbon
 330 Ohm $\pm 5\%$, 1/4W Carbon
 330 Ohm $\pm 5\%$, 1/4W Carbon
 150 Ohm $\pm 5\%$, 1/4W Carbon
 150 Ohm $\pm 5\%$, 1/4W Carbon
 150 Ohm $\pm 5\%$, 1/4W Carbon
 100 Ohm $\pm 5\%$, 1/4W Carbon
 1k Ohm $\pm 5\%$, 1/2W Carbon
 1k Ohm $\pm 5\%$, 1/2W Carbon
 680 Ohm, 5%, 1/2W Carbon
 270 Ohm, 5%, 1/2W Carbon
 270 Ohm, 5%, 1/2W Carbon
 100k Ohm, 5%, 1/4W Carbon
 1k Ohm, 5%, 1/2W Carbon
 8.2k Ohm, 5%, 1/4W Carbon
 8.2k Ohm, 5%, 1/4W Carbon
 8.2k Ohm, 5%, 1/4W Carbon
 1.5k Ohm Black Level Control
 10k Ohm Horizontal Centering

CAPACITORS

C201 45X0524-038
 C202 45X0524-053
 C203 349X2232-109
 C204 80X0099-020

100 uF, 16V Electrolytic
 470 uF, 16V Lytic
 .022 uF, 10%, 100V
 680 pF, 10%, Z5F

SEMICONDUCTORS

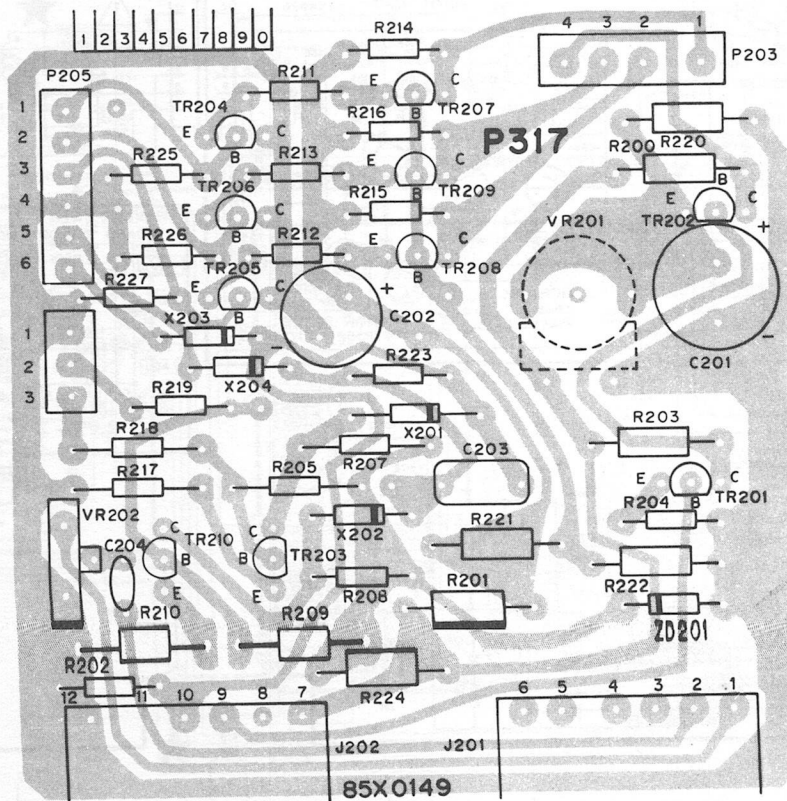
TR201 86X0121-001
 TR202 86X0121-001
 TR203 86X0121-001
 TR204 86X0066-001
 TR205 86X0066-001
 TR206 86X0066-001
 TR207 86X0121-001
 TR208 86X0121-001
 TR209 86X0121-001
 TR210 86X0121-001
 X201 66X0046-001
 X202 66X0046-001
 X203 66X0046-001
 X204 66X0046-001
 ZD201 66X0040-019

Transistor (NPN) MPS-A20
 Transistor (NPN) MPS-A20
 Transistor (NPN) MPS-A20
 Transistor (PNP) MPS-A70
 Transistor (PNP) MPS-A70
 Transistor (PNP) MPS-A70
 Transistor (NPN) MPS-A20
 Transistor (NPN) MPS-A20
 Transistor (NPN) MPS-A20
 Transistor (NPN) MPS-A20
 Diode Silicon FDH-444
 Diode Silicon FDH-444
 Diode Silicon FDH-444
 Diode Silicon FDH-444
 Diode, Zener 6.8V, 5%, 0.5W IN5235B

J201 204X9300-958
 J202 204X9300-958
 P203 204X9600-845
 P204 6A393-003
 P205 6A0393-006

MISCELLANEOUS

Socket, 6 Pin
 Socket, 6 Pin
 Plug, 4 Pin
 Plug, 3 Pin
 Plug, 6 Pin



NECK BOARD (MS/QG)

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
RESISTORS					
R401	203X6500-709	1.8k Ohm ± 5% 1/8W Carbon	C403	202X7000-247	1000 pF, 50V, 10% Ceramic
R402	203X6500-709	1.8k Ohm ± 5% 1/8W Carbon	C404	202X7110-019	1500 pF, 2kV ± 10% Ceramic
R403	203X6500-709	1.8k Ohm ± 5% 1/8W Carbon	C405	202X7150-018	100 pF, 12kV, ± 10% Ceramic
R404	203X6500-447	150 Ohm ± 5% 1/8W Carbon	C406	202X7050-483	.01 uF, 500V, ± 10% Ceramic
R405	203X6500-481	220 Ohm ± 5% 1/8W Carbon	C407	202X7110-019	1500 pF, 2kV ± 10% Ceramic
R406	203X6500-447	150 Ohm ± 5% 1/8W Carbon	C408	202X8000-550	68 pF, 50V, ± 10% Ceramic
R407	340X2271-934	270 Ohm ± 5% 1/4W Carbon	C409	202X8000-550	68 pF, 50V, ± 10% Ceramic
R408	203X6500-508	270 Ohm ± 5% 1/8W Carbon	C410	202X8000-550	68 pF, 50V, ± 10% Ceramic
R409	203X6500-800	4.7k Ohm ± 5% 1/8W Carbon	SEMICONDUCTORS		
R410	203X6500-800	4.7k Ohm ± 5% 1/8W Carbon	TR401	200X3206-800	Transistor, 2SC2068, 2SC1514 (R output)
R411	203X6500-800	4.7k Ohm ± 5% 1/8W Carbon	TR402	200X3206-800	Transistor, 2SC2068, 2SC1514 (G output)
R412	203X9104-809	12k Ohm ± 5% 2.0W Metal Oxide	TR403	200X3206-800	Transistor, 2SC2068, 2SC1514 (B output)
R413	203X9104-809	12k Ohm ± 5% 2.0W Metal Oxide	X404	201X2100-126	Diode, IS2367 (protector)
R414	203X9104-809	12k Ohm ± 5% 2.0W Metal Oxide	X405	201X2100-126	Diode, IS2367 (protector)
R415	203X5601-313	2.7k Ohm ± 10% 1/2W Comp.	X406	201X2100-126	Diode, IS2367 (protector)
R416	203X5601-313	2.7k Ohm ± 10% 1/2W Comp.			
R417	203X5601-313	2.7k Ohm ± 10% 1/2W Comp.			
R418	203X5602-254	470k Ohm ± 10% 1/2W Comp.			
R419	203X5602-185	330k Ohm ± 10% 1/2W Comp.			
R422	203X9105-117	1.0 Ohm ± 10% 2W Metal Oxide			
R423	203X5102-155	270k Ohm ± 5% 1/4W Carbon			
VR401	204X2115-014	500 Ohm Varistor R Drive			
VR402	204X2115-014	500 Ohm Varistor B Drive			
VR403	204X2115-006	5k Ohm Varistor R Cutoff			
VR404	204X2115-006	5k Ohm Varistor G Cutoff			
VR405	204X2115-006	5k Ohm Varistor B Cutoff			
VR406	204X2000-025	1M Ohm Varistor Screen			
CAPACITORS					
C401	202X7000-247	1000 pF, 50V, 10% Ceramic	J401	206X5003-729	Socket, 5 Pin
C402	202X7000-247	1000 pF, 50V, 10% Ceramic	J402	206X5003-983	Socket, 3 Pin
			P401	204X9600-329	Plug, 5 Pin
			P402	204X9600-254	Plug, 3 Pin

★ 297X2000-072 HIGH VOLTAGE ASSEMBLY (T701)

★ R701 VR702 X701 X702 X703	204X1625-058 204X3901-125	3.3 Ohm, ± 10% 10W WW Resistor Focus Control Diode (SI HV) Diode (SI HV) Diode (SI HV)	} Part of T701
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FINAL ASSEMBLY PARTS

★ 88X-0129-506 38A5554-000 205X9800-256 ★ 202X1110-810 208X2000-946 297X2000-072 6A0397 9A2753-003	19VJTP22 Pix Tube Assy. Purity Shld/Degaussing Lateral/Purity Assembly Yoke, Deflection CRT Socket HV Unit (T701) Plug, Line Cord Degaussing Coil (L701)
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K4600 IMPORTANT SERVICE 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 the ground. Before servicing is performed, read all the precautions labelled on the CRT and chassis.

X-RAY RADIATION WARNING NOTICE

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.

PRODUCT SAFETY NOTICE

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.

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.

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 H.V. 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.

When handling the CRT, shatter-proof goggles must be worn after completely discharging the high voltage circuit. Do not lift the picture tube by the neck.

PERFORMANCE AND OPERATING DATA

1. Apply a suitable power source to the monitor through an isolation transformer.
2. Apply a suitable signal source to the monitor PCB by means of P205.
3. Set up Controls.

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

1.0 Supply

Voltage 108 VAC - 132 VAC

Frequency 50 Hz - 60 Hz

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

2.0 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

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.

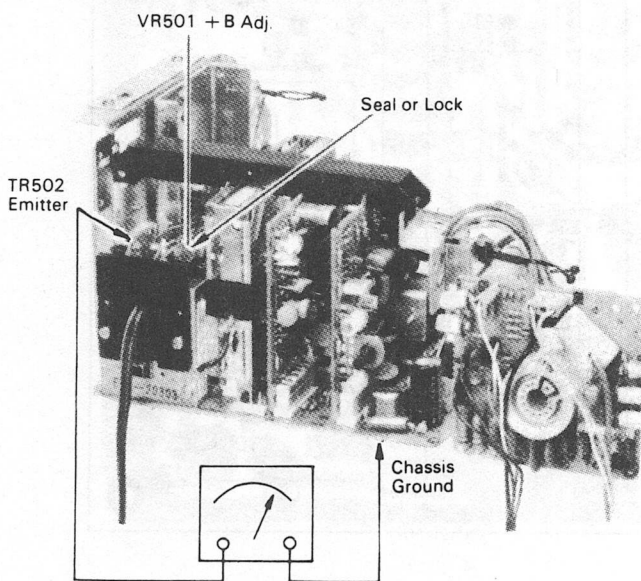


FIGURE 1

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.

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 1uF/50V capacitor. Adjust L351 to obtain normal picture.

After adjustment, remove 1uF/50V capacitor.

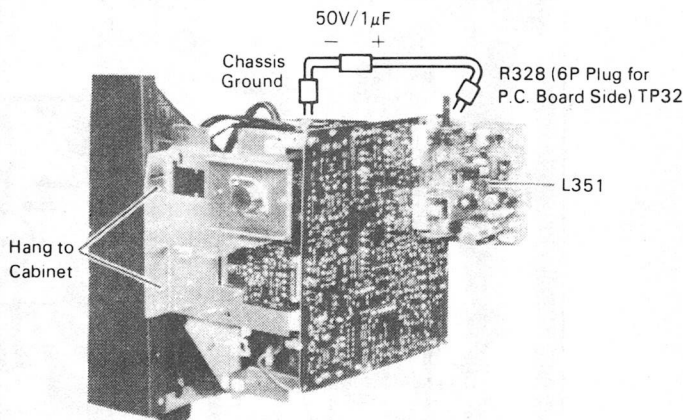


FIGURE 2

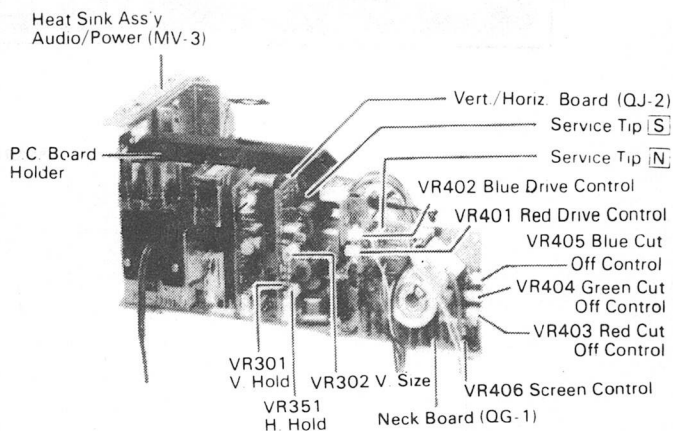
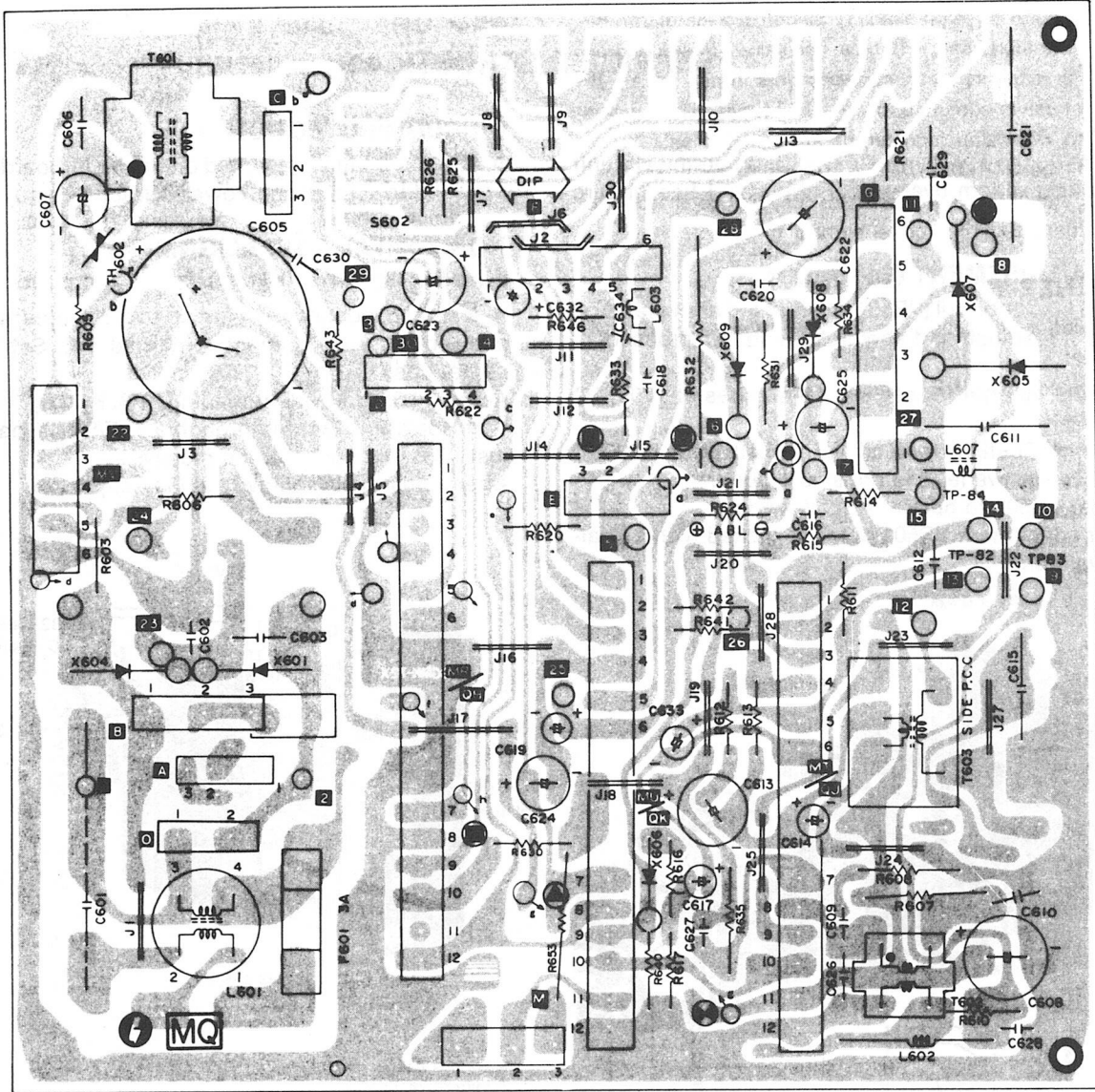


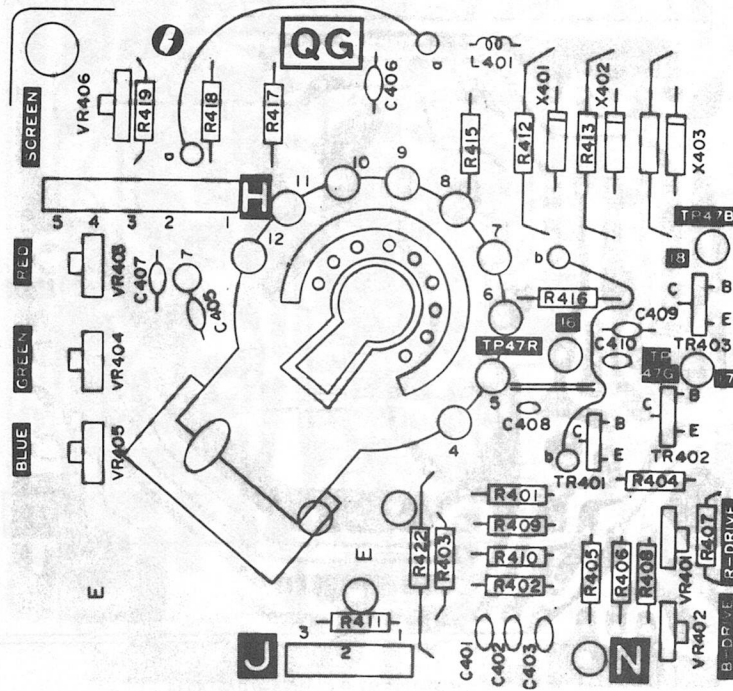
FIGURE 3

P.C. BOARD LAYOUT

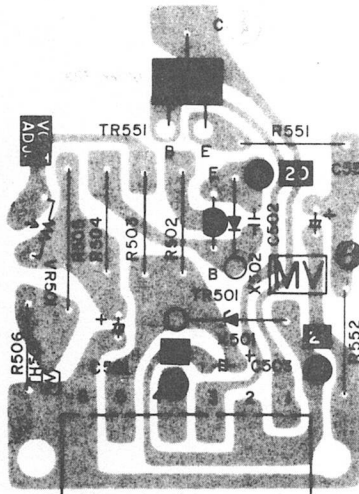


MAIN P.C. BOARD MQ-29

P.C. BOARD LAYOUT

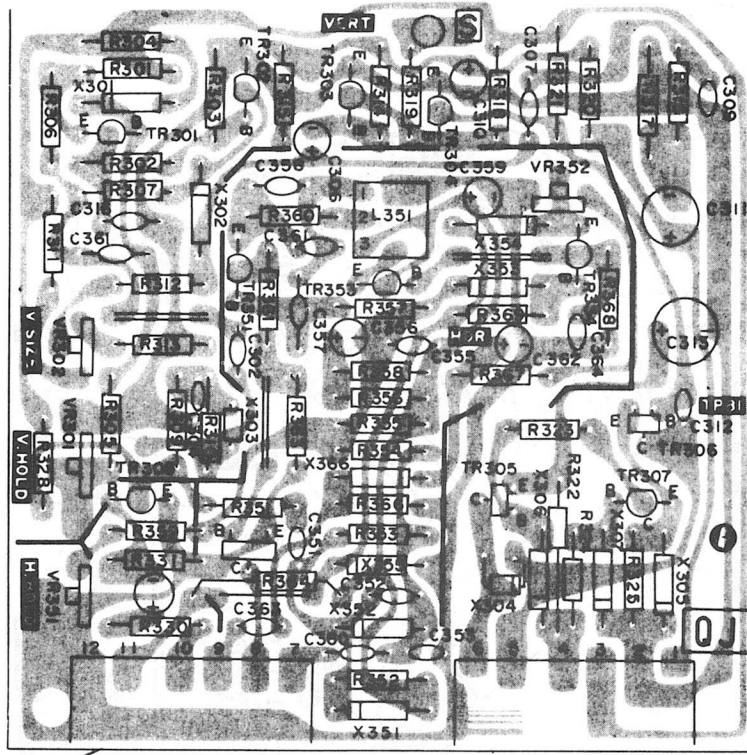


NECK P.C. BOARD MS/QG



POWER PC BOARD MV

P.C. BOARD LAYOUT



HORIZ/VERT P.C. BOARD MT/QJ