COMPUTER SPACE
INSTRUCTIONS

1. Check for shipping damage.
2. Check that wires are firmly connected to the TV (see diagram on trouble-shooting guide) and that the grey power plug is connected to the TV circuit board.
3. Plug in the unit and defeat the interlock. (CAUTION: The back of the TV has high voltages.) The panel lights should come on, and after a brief warm-up time the TV screen should show starlit space with two flying saucers moving about.
4. TV Adjustments. The unit has been factory-adjusted but some TV control adjustments may be necessary due to changes caused by vibration in transit. Remember that this is a normal G. E. portable television and is no harder to adjust than any home receiver.

Volume on/off is located on the lower right front of the TV, accessable from the back door with some difficulty. Sound (beeps, missile scream, rocket thrust, and explosions) is on only during game play.

Brightness control is located on the lower center front of the TV and should be adjusted so the background is black and stars and saucers are bright (use a hand mirror to observe results).

Contrast control is located on the lower left front of the TV and should be adjusted for desired star brightness.

Horizontal hold is a white nylon knob on the back of the set at the right. To adjust it, turn on the test pattern switch on the computer box. If diagonal bars are seen, adjust until lock is obtained (the wider the bars are the closer to lock you are). Once in lock, adjust the hook (distortion) out of the top of the TV screen.

Vertical hold is the center long black knob on the back of the TV set and locks the picture from a vertical roll; it can also be used for up/down adjustment.

Vertical size (short knob to right of vertical hold) and vertical lin (short knob to left of vertical hold): These two knobs should be adjusted to make a checker-board pattern of test squares of equal size on all parts of the TV screen.

Once the set is properly adjusted while at operating temperature it should not require further adjustment until the tubes have weakened 75%, a period of time calculated to be about 2 years.

5. Cabinet care. The color is part of the fiberglass and can be restored to new condition through the use of soap and water. Deep scratches may be rubbed out with an abrasive cleanser or fine wet sandpaper. Major repair to the fiberglass may be made with a repair kit sold in most auto shops and Sears stores; Nutting Associates also stocks these repair kits. Major repair seems an unlikely prospect, however, due to the strength and resilience of fiberglass, stronger than wood in both cases.
6. TV maintenance. As a matter of routine, the TV should be removed once a year for screen cleaning. The TV is most easily removed by taking out the four screws connecting the metal brackets to the cabinet back, springing in the brackets and lifting the set out.

7. Brain (computer) unit. The brain unit has three option switches and a time adjustment control which can be changed using a flat blade screwdriver. Because of the extremely high reliability of integrated circuits the brain unit should be considered the least likely source of malfunction in all instances.

GAME OPERATION

Attract mode: Two saucers fly in formation on a star-filled background; sound is off.

Game on: Saucers begin to fire missiles and a rocket image appears. The rocket is equipped with a missile which may be guided after firing using the rotate controls.

Extended play mode: The background becomes white with black numbers, saucers and stars and a black border around the screen. Extended play is awarded if the rocket has made more hits than the saucers at the end of the time limit or if the saucer resets itself.

OPERATING SUGGESTIONS

For hostile locations, space is provided in the bottom of the cabinet for additional weight. Lighter color cabinets (yellow) do slightly better in dark bar type locations, while metalflake colors are better for arcade and well lit spots. If excessive vibration occurs it may become necessary to tape the controls of the TV to keep them from drifting out of adjustment. In no instance has 2/25¢ play increased receipts in test locations.

--//--

It was our object in Computer Space to design an amusement machine which would appeal to adults as well as children. From collection reports around the country we have exceeded our expectations. It was also our object to create a new standard of reliability using the latest technology. We believe that this goal has been met also. Computer Space requires operators to have no more fear of replacing a bad tube than of replacing a bad relay.

If I can help answer any question concerning this machine, please do not hesitate to call me personally.

Nolan K. Bushnell
Chief Engineer
NUTTING ASSOCIATES, Inc.
(415) 961-9373

1. TEST PATTERN ON
   _____ Adjust out top hook
   _____ Vertical centering and size

2. TEST PATTERN OFF, EXTENDED PLAY YES, 2/25¢ YES.
   _____ Brightness just below background illumination
   _____ Contrast for small bright stars
   _____ Volume full
   _____ Tape control knobs

3. REWORK COIN CHUTE.
   _____ Check panel for tight fit
   _____ Run quarter through rejector with plunger depressed several times
   _____ Run coin through and start game; note coin counter
   _____ Check that second game is free

4. INSPECT TO MAKE SURE:
   _____ Wires are tight
   _____ TV bracket is tight
   _____ TV card is taped in
   _____ TV has adequate clearance
   _____ Final settings are:

Game time 1.5 min	_____
2/25¢ play NO	_____
Test pattern OFF	_____
Extended play YES	_____

5. CHECK THAT THE FOLLOWING ARE INCLUDED:
   _____ GE insert
   _____ Trouble-shooting guide
   _____ Instruction sheet

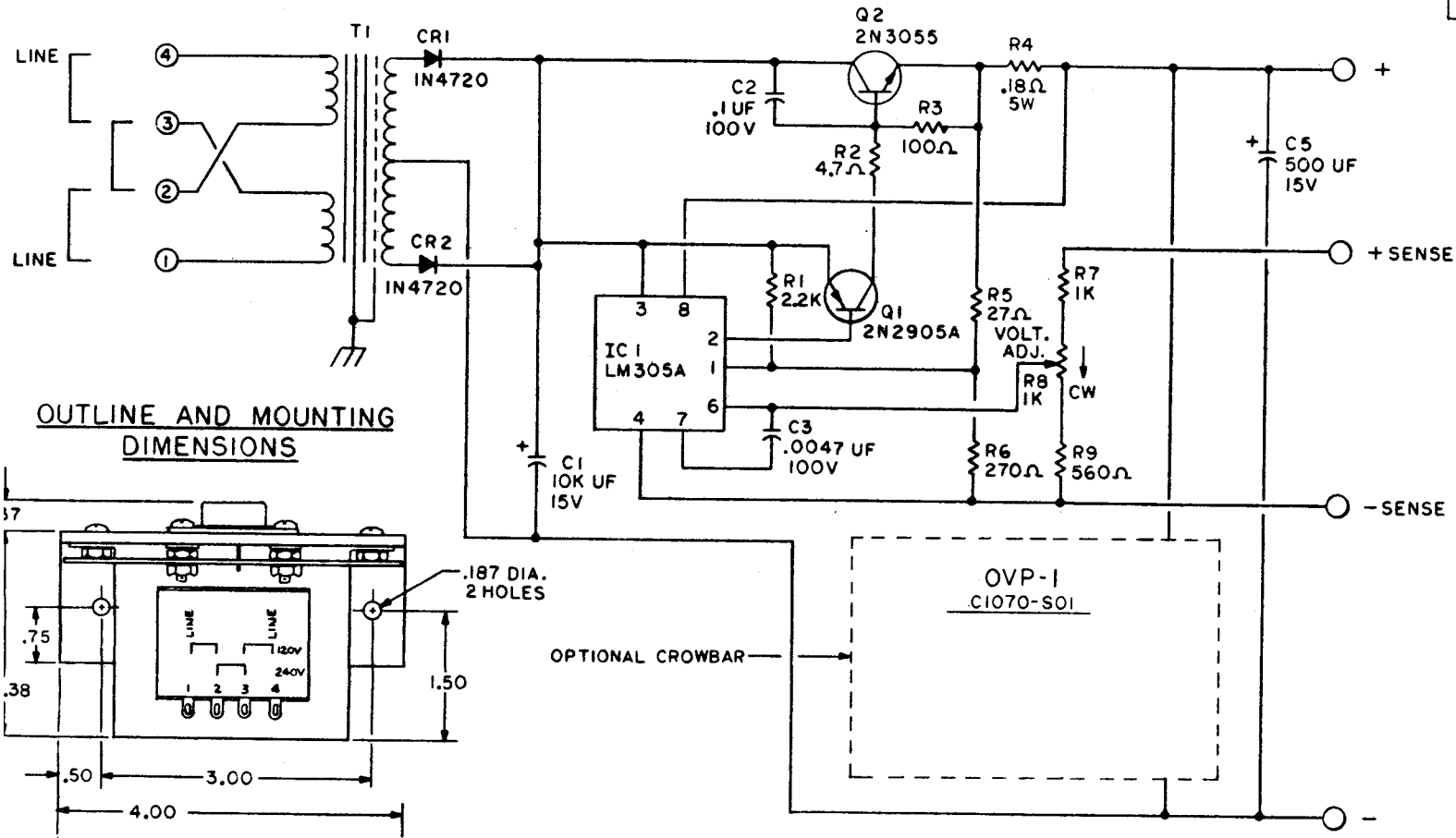
Serial numbers _____
(unit-tube-brain box) (color)

Date _____

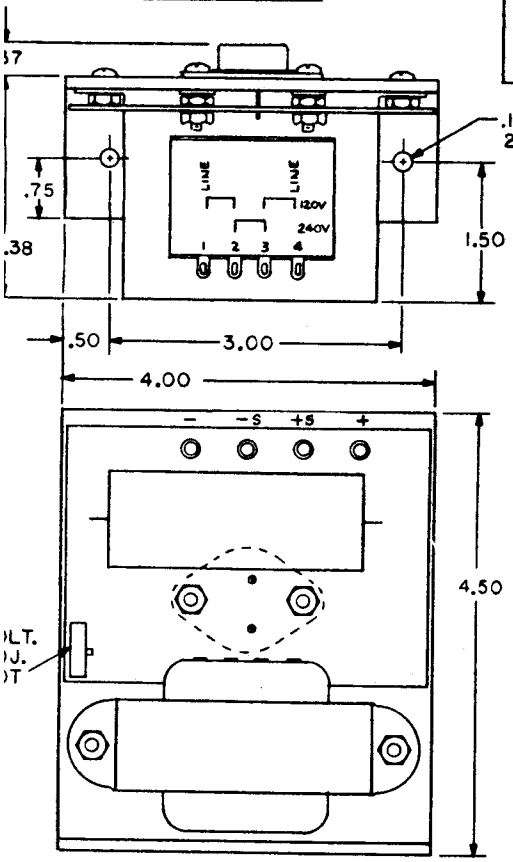
Inspected by _____

NOTE: Please write remarks or comments on back of this sheet.

[A] DELETED OBSOLETE OVP & CALLED OUT FOR NEW OVP-1 C1070-S01 WE. 8-23-72



OUTLINE AND MOUNTING DIMENSIONS



CAUTION : READ NOTES BELOW BEFORE OPERATING

1. FOR 120V OPERATION JUMPER 1 TO 2 AND 3 TO 4 ON T1 ; FOR 240V OPERATION JUMPER 2 TO 3. APPLY LINE POWER TO 1 AND 4
2. POWER SUPPLY DESIGN ALLOWS FOR CONTINUOUS OPERATION UNDER FULL LOAD AND HIGH LINE CONDITIONS AT 55°C AMBIENT IN FREE AIR ENVIRONMENT. IF AIR FLOW IS RESTRICTED, THE CASE TEMP. OF 2N3055 TRANSISTOR ON HEAT SINK SHOULD BE MONITORED UNDER PARTICULAR WORST CASE CONDITION. MAXIMUM ALLOWABLE TEMP. IS 155°C
3. CROWBAR FACTORY ADJUSTED AT 6V
4. CAUTION : IF REMOTE SENSING IS NOT DESIRED CONNECT JUMPER BETWEEN + AND + SENSE AND - AND - SENSE TERMINALS. IF REMOTE SENSING IS DESIRED DO NOT INSTALL JUMPERS, BUT CONNECT + SENSE TO + AT LOAD END OF LINE, AND - SENSE TO - AT LOAD END OF LINE.
5. RECOMMENDED EXTERNAL FUSING : .5A FOR 120V OPERATION
   .25A FOR 240V OPERATION

SPECIFICATIONS

LOAD REGULATION : .1%
(0 TO FULL LOAD)

LINE REGULATION : .1% FOR 120/240 ± 10 % (SEE NOTE 1)

NOISE AND RIPPLE : .1%

OVERVOLTAGE PROTECTION AVAILABLE (SEE NOTE 3)

REMOTE SENSING (SEE NOTE 4)

OPERATING TEMP. : 0 - 55°C
(SEE NOTE 2)

ELEXON INC.
SANTA ANA, CALIF.

SCALE —	APPROVED BY	DRAWN BY L.K.
DATE 2-15-71		REVISED

POWER SUPPLY 5V, 3A

MODEL OLV 15-5

DRAWING NUMBER C1055-S01

PRE-INSTALLATION INSPECTION FOR ONE- OR TWO-PLAYER COMPUTER SPACE

1. Check for loose, broken or missing components. Correct if these conditions exist before proceeding further.

2. Check door interlock switch for proper operation.

3. Apply power to unit and check +5VDC power supply for proper voltage level. To insure proper operation of unit the DC voltage level should be set at +5V($\pm$ 0.2V)DC.

4. Check whether instruction lights are on. If not, replace lamp(s).

5. Actuate coin switch to check coin counter for proper operation. If coin counter does not advance, check trouble-shooting guide.

6. Apply test pattern to TV and check TV for horizontal and vertical linearity. Adjust if required.

7. Check TV for proper contrast and brightness. Adjust if required.

8. Press start game switch and check operation of unit in single-player mode for proper operation. If not, see trouble-shooting guide.

9. Actuate coin switch again, press two-player select button, then press game start switch. Check unit in two-player mode for proper operation. In this mode of operation at the count of 99 the game should switch to standby operation, which is single-player operation. If not, see trouble-shooting guide.

NUTTING ASSOCIATES, Inc. April 1973

TWO-PLAYER COMPUTER SPACE TROUBLE-SHOOTING GUIDE

Nutting Associates' Two-Player Computer Space game has been designed for easy servicing by using modular assemblies rather than requiring the repair of discrete components. Servicing is done by "removing and replacing" and does not require a technician trained in electronics.

Computer Space Two-Player is made up essentially of five sub-assemblies: TV set, power supply, computer (brain box), joystick control board (mounted on front panel) and control panel. This is the order in which trouble-shooting should be conducted.

First check the TV adjustments in accordance with numbers 6 and 7 of the preinstallation instructions which came with the game. Once the TV set is properly adjusted it is much easier to check the other components.

Secondly, the power supply should be checked under full load when connected to the computer. The output voltage should be 4.8 to 5.2 volts DC. If it has an AC component or is low in voltage, the power supply should be replaced. Do not attempt power supply repairs; an improperly serviced power supply could damage the computer and cause expensive repairs.

In checking the computer, first check the connections between the printed circuit boards and their respective connectors to make sure that the PC boards are seated properly in the connectors. The PC boards are checked next to see that they have not slipped out of the plastic guides on the computer frame and are not touching each other or the metal frame.

If all the above checks out, then the problem probably centers in the computer. We have designed the computer to be serviced by simply removing the faulty PC board and replacing it with a good board. The faulty board is sent back to the factory for exchange. Exchange repairs are charged only on the basis of necessary repairs, and not for the whole board. When the faulty board is returned it will assist us in repairing it if the failure mode is written on a piece of tape or tag and affixed to the board. If you are unable to isolate the problem, then we recommend that the complete computer be returned to the factory for exchange.

TWO-PLAYER COMPUTER SPACE -- Some Typical Failure Symptoms

Sync Star Board

Purpose: To generate horizontal and vertical scan and sync, generate stars, scoring and time, and control start and stop game functions, explosions.

Typical failure symptoms:

- No or improper timing, count or score
- No game start or continuous game
- No extended play in one-player mode
- No horizontal or vertical hold
- Bad stars
- No collision or missile hits
- Improper explosion sequence
- No two-player mode
- Extended play in two-player mode

Motion Board

Purpose: To generate saucer motion, saucer missile motion and image, saucer direction control, player 1 rocket motion, player 1 rocket missile motion and image, player 2 rocket motion, player 2 rocket missile motion and image, determination of 1 or 2 player operation.

Typical failure symptoms:

- Jerky, excessively fast or jumpy motion of any object
- No images at all
- Missile always in flight
- Distorted rocket image
- No two-player mode
- No one-player mode

A-Memory Board

Purpose: To generate player 1's rocket image, saucer image, rocket rotation, sound generation, +12VDC for sound circuitry, rocket missile directional control, rocket thrust indication, rocket speed command generation, rocket directional control, end of game command.

Typical failure symptoms:

Odd-shaped rocket or saucer
Erratic rocket rotation
No or distorted sound
Unpredictable rocket missile flight
Incorrect rocket thrust control
Continuous game

B-Memory Board

Purpose: Player 2's rocket image generation, rocket rotation, rocket missile directional control, rocket thrust indication, rocket speed command generation, video circuitry, coin counter circuitry.

Typical failure symptoms:

Odd-shaped rocket
Erratic rocket rotation
No or weak video
Unpredictable rocket missile flight
Incorrect rocket thrust control
Coin counter does not advance

Joy Stick Board

Purpose: To generate thrust, rotation and hyperspace commands for each player position.

Typical failure symptoms:

No thrust
No rotation in either or both directions
No hyperspace*

* Defined as the ability of the rocket to disappear.

+5V Power Supply

Purpose: To provide +5VDC to integrated circuits and video circuitry.

Typical failure symptoms: Weak video and any or all of the previously described failure symptoms.

+12VDC Power Supply, located on the A-Memory Board

Purpose: To provide +12VDC audio circuitry and coin counting circuitry.

Typical failure symptoms: No or weak audio and coin counter will not advance.

TWO-PLAYER COMPUTER SPACE PLAYER CONTROLS

J1 = Sync
J2 = Motion
J3 = "A" Memory
J4 = "B" Memory
JS-2 = Joystick PC bd

Key	Function	Board/Key	IC/Pin Number
PLAYER 1:			
4 top 6	CW rotation (right)*	J3 17	F6-10, E6-5
3 top 4	CCW rotation (left)*	J3 18	E5-4, E6-6
A top 2	Thrust*	J3 20	F3-5, 10, 13, sound circuitry
	"Missile fire" switch	J2 5	G1-9, F1-9
PLAYER 2:			
13 top 8	CW rotation (right)*	J4 15	F6-10, E6-5
M bottom 11	CCW rotation (left)*	J4 16	E5-4, E6-6
10 top 10	Thrust*	J4 S	F3-5, 10, 13
	"Missile fire" switch	J2 6	F1-1, G1-12
	1 or 2 plays for a quarter	J1 8	B5-4
	Free game	J1 6	A4-4
	Start switch	J1 4 2	B6-13 N/O A6-1 N/C
	1- or 2-player select switch	J1 N P	A2-8 Diode Q10
	Coin microswitch	J1 7	Compac relay, C5-13

* JS-2 Joystick PC board.

TWO-PLAYER COMPUTER SPACE
J1 SYNC STAR BOARD OUTPUTS

J2 = Motion Board
J3 = "A" Memory Board
J4 = "B" Memory Board

Connector Key #	Output	Function	To Board #	Via Key #	To IC and Pin #
3	A5-6	Audio gate	same		A6-2, B4-5
			J2	Y	G3-9
			J3	23	R48, Base Q12
5	E4-11	Normal/Hyper space	J4	19	H3-2, 13, J2-2, 3
9	C2-12	Time units/50	same		B1-11, C5-11
			J3	N	A5-5
12	F6-3	Saucer out and B- rocket enable	same		E6-5, 12
			J3	9	F4-9, C5-2, 10, 1? 74151-7
			J4	M	E1-12
15	G6-10	Hyper space	same		H6-9, J6-9
			J4	21	Cathode of "stars diode
16	H6-15	Normal space	same		G6-11
			J4	25	Anode of diode; normal space ckt
17	B6-3	Hyper numbers video out	same		G6-13
			J4	20	Cathode of No. diode
18	G6-12	Normal numbers video out	J4	24	Anode of diode; normal space ckt
20	G6-4	Clock out	J2	X	F4-3, 5, 13
B	F2-2	Explosion	J3	26	Through 1K ohm to base Q6
C	C2-1	Time/10	same		B1-14, C1-11
			J3	M	A5-4
F	E4-8	Sync out	J4	27	Through 1K ohm to base Q7
H	D4-5	B- spin	J4	17	F6-13
J	E5-11	Normal missile video	same		C5-1
			J4	26	Anode of diode; normal space

Two-Player Computer Space
J1 Sync Star Board Outputs
Page 2

Connector Key #	Output	Function	To Board # /	Via Key # /	To IC and Pin #
K	C5-2	Hyper video out	J4	22	Cathode of missile diode
L	D4-9	A- spin	same		E5-5
			J3	19	F6-13
N	A2-8	One or Two Player select sw			1- or 2-player select switch
P	1- or 2-player sw				Anode of diode connected to base Q10
R	Collector Q10		J2	25	J3-5
T	F6-8	Rocket enable*	same		E6-3, 6
			J3	14	Rocket enable
U	D3-14	Blanking out	same		E5-2, J6-10, F5-6, G5-4, Key V
			J4	18	J3-1, H3-1
V	D3-14	Count enable	same		E5-2, J6-10, F5-6, G5-4, Key U
			J2	18	E2-10, E3-10, E4-10, E5-10
W	E4-3	Test pattern out	S1		Test pattern swit
X	E2-1	Time units/2	same		C1-1, 12
			J3	K	A5-1
Y	E2-12	Time units/20	same		B1-1, 12
			J3	L	A5-2

* Enables rocket after the explosion.

TWO-PLAYER COMPUTER SPACE
J3 "A" MEMORY BOARD OUTPUTS

J1 = Sync Star Board
J2 = Motion Board
J4 = "B" Memory Board

Connector Key #	Output	Function	To Board #	Via Key #	To IC and Pin #
16	J2-1	Video out	J4	N	E5-1
24		Audio out, audio section	TV audio		
P	A5-6	1 or 2, literally, reset	J2	AA	G4-1
T	F5-4	Missile up/down enable	J2	8	F3-12, C3-3
U	F5-1	Missile left/right enable	J2	9	F3-9, E3-3
V	H5-11	2^1, A-vertical velocity*	same		H6-4, 10
			J2	DD	H4-13
W	H5-6	2^0, A-vertical velocity*	same		H6-2, 12
			J2	21	H4-3
X	H5-3	2^2, A-vertical velocity*	same		H6-1, 13
			J2	22	H4-10
Y	H4-7	Up/down, A-vertical velocity	same		H5-1, 4, 13, H6-5, H2-1
			J2	W	F5-5
Z	J5-8	Missile up/down	same		H3-5, H2-13
			J2	10	F3-11
AA	J5-11	Up/down thrust, A-speed 2^1*	same		J6-4, 10
			J2	19	J4-13
BB	J5-6	Up/down thrust, A-speed 2^0*	same		J6-2, 12
			J2	20	J4-3
CC	J5-3	Up/down thrust, A-speed 2^2*	same		J6-1, 13
			J2	23	J4-10
DD	J4-7	Right/left, A-horizontal velocity	same		J5-1, 4, 13, J6-5, H2-3
			J2	V	F5-3
EE	E3-14	Missile right/left	same		J3-5
			J2	11	F3-8

* Because of the different directions the rocket may take, left/right and up/down signals may appear at horizontal as well as vertical velocity circuits.

TWO-PLAYER COMPUTER SPACE
J4 "B" MEMORY BOARD OUTPUTS

J1 = Sync Star Board
J2 = Motion Board
J3 = "A" Memory Board

Connector Key #	Output	Function	To Board #	Via Key #	To IC and Pin #
5	E1-13	Rocket video	same	6	C4-2
28	Emitter Q8 thru 10 ohm resistor	Video out	TV Video		
P	E6-1	Rocket "B" turn sounds	J3	15	Audio section
T	F5-4	Missile "B" up/down enable	J2	1	A1-11
U	F5-1	Missile "B" right/left enable	J2	4	A1-2
V	H5-11	2^1, B vertical velocity*	same J2	 13	H6-4, 10 H5-13
W	H5-6	2^0, B vertical velocity*	same J2	 14	H6-2, 12 H5-3
X	H5-3	2^2, B vertical velocity*	same J2	 17	H6-1, 13 H5-10
Y	H4-7	B up/down	same J2	 Z	H5-1, 4, 13, H6-5 H2-1 G5-2
Z	J5-8	Missile up/down	same J2	 3	H3-5, H2-13 A1-14
AA	J5-11	Up/down thrust, speed 2^1, B*	same J2	 EE	J6-4, 10 J5-13
BB	J5-6	Up/down thrust, speed 2^0, B*	J2	15	J5-3
CC	J5-3	Up/down thrust, speed 2^2, B*	same J2	 16	J6-1, 13 J5-10
DD	J4-7	Right/left	same J2	 CC	J5-1, 4, 13, J6-5, H2-3 G5-11
EE	E3-14	Missile right/left	same J2	 2	J3-5, E3-14 A1-5

* Because of the different directions the rocket may take, left/right and up/down signals may appear at horizontal as well as vertical velocity circuits.

TWO-PLAYER COMPUTER SPACE
J2 MOTION BOARD OUTPUTS

J1 = Sync star board
J3 = "A" Memory board
J4 = "B" Memory board

Connector Key #	Output	Function	To Board #	Via Key #	To IC and Pin #
7	B3-15	Rocket missile video	same		F3-2, 3
			J1	14	F6-5
12	A4-8	"A" rocket enable	same		J3-13
			J1	10	E6-9
24	J3-10	Sync	same		H1-4
			J1	13	F6-1
26	B2-15	B- missile video	same		J3-9
			J1	11	F6-13
27	H2-15	Saucer movement	same		G3-2, 5, J2-4, 10 J1-3, H2-6
			J4	R	F6-4
			J3	S	F6-4
28*	G1-6 and F3-4	Missile sound out	J3	22	Audio section
B	D4-11	Vertical counts, "A" rocket enable	same		J1-6
			J3	D	A6-6, 11
C	D4-12	Vertical counts, "A" rocket enable	J3	E	B6-6, 11
D	D4-13	Vertical counts, "A" rocket enable	J3	8	C6-6, 11
E	D4-14	Vertical counts, "A" rocket enable	J3	13	D6-6, 11
F	D5-11	Vertical counts, "B" rocket enable	same		J1-8, E1-10
			J3	4	A6-3, 12
			J4	D	A6-6, 11
H	D5-12	Vertical counts, "B" rocket enable	J3	H	B6-3, 12, E6-12
			J4	8	B6-6, 11, E6-12
J	D5-14	Vertical counts, "B" rocket enable	J3	10	D6-3, 12
			J4	L	E4-11, J1-5

* See schematic; outputs are common, through appropriate circuitry, for missile sound output.

Connector Key #	Output	Function	To Board #	Via Key #	To IC and Pin #
K	D5-13	Vertical counts, "B" rocket enable	J3	R	C6-3, 12
			J4	J	C6-6, 11
L	E4-11	Horizontal counts, "A" rocket enable	same		J1-5
			J3	C	A6-5, 10
M	E4-12	Horizontal counts, "A" rocket enable	J3	J	B6-5, 10
N	E4-13	Horizontal counts, "A" rocket enable	J3	7	C6-5, 10, and through diode to 74151-15
P	E4-14	Horizontal counts, "A" rocket enable	J3	12	D6-5, 10
R	E5-11	Horizontal counts, "B" rocket enable	same		J1-9
			J3	5	A6-4, 13
			J4	C	A6-5, 10
S	E5-12	Horizontal counts, "B" rocket enable	J3	F	B6-4, 13
			J4	7	B6-5, 10
T	E5-14	Horizontal counts, "B" rocket enable	same		H3-3
			J3	11	D6-4, 13
			J4	14	D6-5, 10
U	E5-13	Horizontal counts, "B" rocket enable	J3	6	C6-4, 13
			J4	H	C6-6, 11
BB	G4-6	1 or 2, literally	same		G5-1, E1-1, A1-1
			J1	D	D5-5, 6
			J3	21	J3-2
			J4	9	H2-9

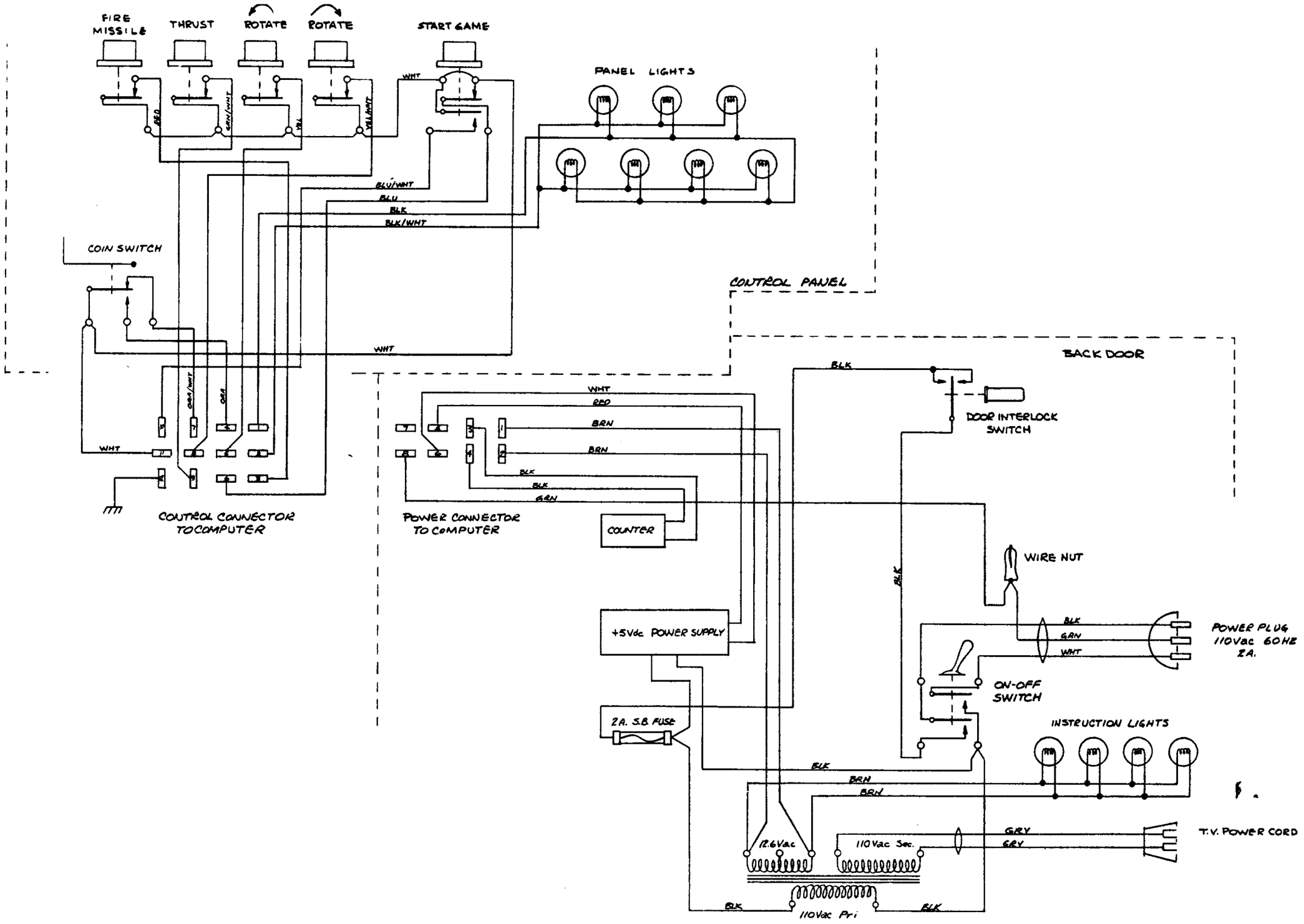
TWO - PLAYER CHASSIS WIRING

8-PIN MOLEX

PIN	WIRE	PURPOSE
1	Blk	12 vac
2	Blk	12 vac
3	Brn	coin counter
4	Brn	coin counter
5	Red	+5 VDC
6	Wht	common (signal)
7	NC	
8	NC	

24-PIN MOLEX FROM FRONT PANEL TO BRAIN BOX

PIN	WIRE	PURPOSE
1	NC	
2	NC	
3	Blk	Player 1 missle fire
4	Wht	NO side coin switch
5	Blu	Player 1 counter-clockwise rotation
6	Grn	NC side start game switch
7	Blk	NC side coin switch
8	Blk	Player 1 clockwise rotation
9	Blk	Player 1 thrust
10	Yl	NO side start game switch
11	NC	
12	NC	
13	NC	
14	NC	
15	Blk	Player 2 Clockwise rotation
16	Or	Player 2 counter-clockwise rotation
17	Red	Player 2 missle fire
18	Wht	Player 2 thrust
19	Red	Com side 2 player select switch
20	Grn	Common (signal)
21	Red	NO side 2 player select switch
22	Blu	+5 VDC
23	NC	
24	NC	



CONTROL & POWER CHASSIS WIRING,
COMPUTER SPACE
DRAWN BY TED DABNEY
NUTTING ASSOC. MNT. VIEW, CALIF

J1 POWER

1	J5-V J2-1	
2	J5-W J2-2	
3	J5-16	① IN4002
4	J5-19	
5	J3-Z	
6	J3-1 J2-11 J5-1	J5-S S7-B
7		
8	J2-12	

J2 CONTROL

1	J1-1
2	J1-2
3	J4-Y
4	J5-C
5	J3-N
6	J5-B
7	J5-21
8	J3-M
9	J3-S
10	J5-7
11	J1-6
12	J1-8

J3 MEMORY

J1-6 J4-1	1	A	J4-8
J4-K	2	B	J4-6
J4-F	3	C	J4-12
J4-N	4	D	J4-15
J4-13	5	E	J4-9
J4-L	6	F	J4-5
J4-E	7	H	J4-11
J4-M	8	J	J4-R
J4-14	9	K	J5-2
J5-5	10	L	
J4-B	11	M	J2-8
J4-18	12	N	J2-5
J4-D	13	P	J5-N
J4-3	14	R	J5-M
J4-4	15	S	J2-9
J4-J	16	T	J4-19
J4-16	17	U	J4-17
J4-2	18	V	J4-U
J5-K	19	W	J4-T
TV-AUD	20	X	J4-Y
J5-X	21	Y	J4-H
J5-L	22	Z	J1-5 J4-22

J4 MOTION

J3-1	1	A	J5-1
J3-18	2	B	J3-11
J3-14	3	C	J5-H
J3-15	4	D	J3-13
J3-F	5	E	J3-7
J3-B	6	F	J3-3
	7	H	J3-Y
J3-A	8	J	J3-16
J3-E	9	K	J3-2
J5-4	10	L	J3-6
J3-H	11	M	J3-8
J3-C	12	N	J3-4
J3-5	13	P	J5-6
J3-9	14	R	J3-J
J3-D	15	S	
J3-17	16	T	J3-W
J3-U	17	U	J3-V
J3-12	18	V	J3-X
J3-T	19	W	J5-E
J5-Y	20	X	
J5-3	21	Y	J2-3
J3-Z	22	Z	J5-22

J5 SYNC

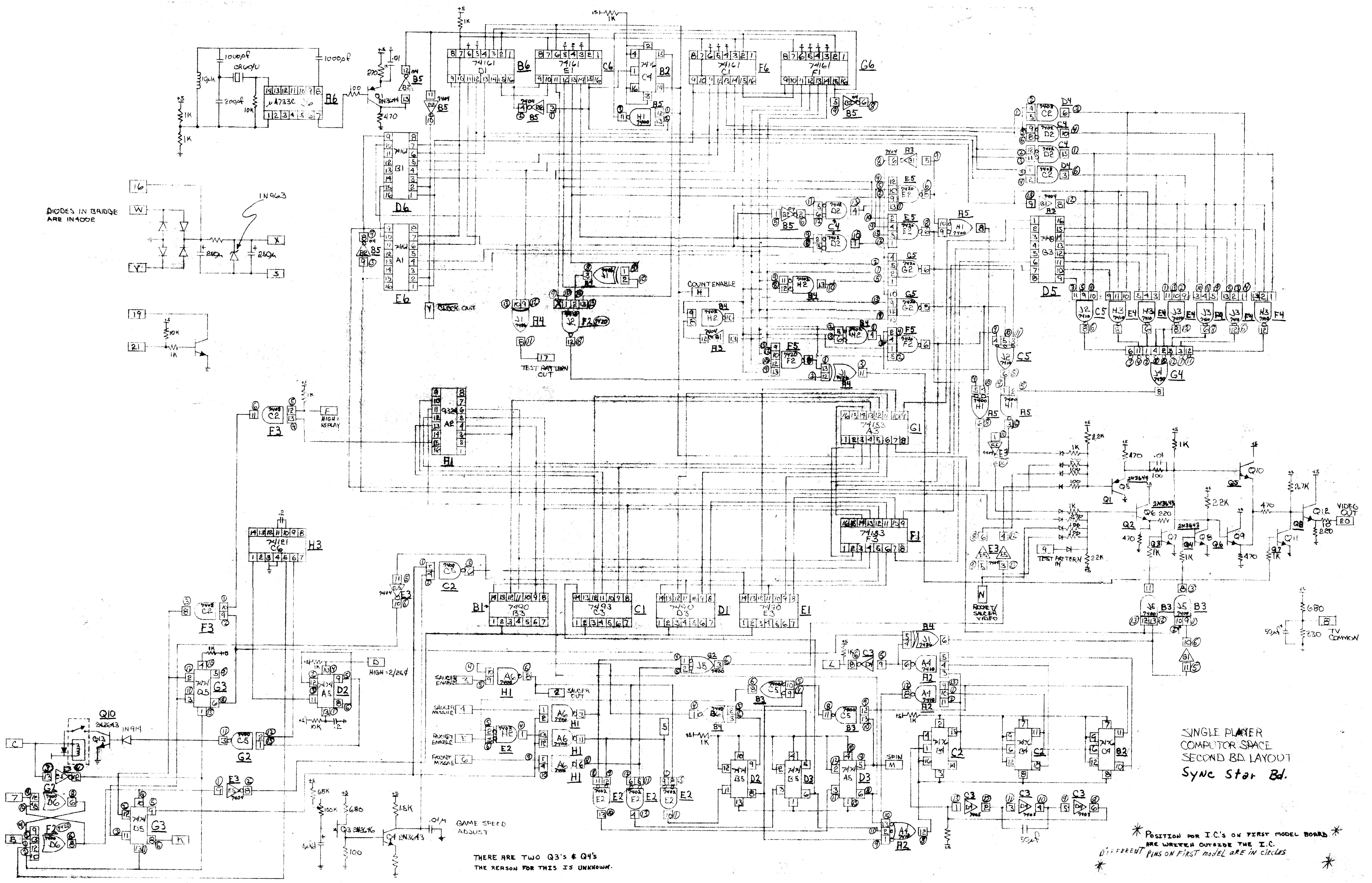
J4-A	1	A	J5-S
J3-K	2	B	J2-6
J4-21	3	C	J2-4
J4-10	4	D	S7-C
J3-10	5	E	J4-W
J4-P	6	F	S6-A
J2-10	7	H	J4-C
TV-COM	8	J	
S8-B	9	K	J3-19
	10	L	J3-22
	11	M	J3-R
	12	N	J3-P
	13	P	
	14	R	
	15	S	S7-B
① J1-3	16	T	
S8-A	17	U	
	18	V	J1-1
J1-4	19	W	J1-2
TV-VID	20	X	J3-21
J2-7	21	Y	J4-20
J4-E	22	Z	

COUNTER CHANGE

NA -

SINGLE PLAYER COMPUTER SPACE
CONNECTOR INTERCONNECTIONS

NOV 23, 1971 ~~SKD~~ -



SINGLE PLAYER
COMPUTOR SPACE
SECOND BD. LAYOUT
Sync Star Bd.

* POSITION FOR I.C.'s ON FIRST MODEL BOARD ARE WRITEN OUTSIDE THE I.C. *

DIFFERENT PINS ON FIRST model ARE IN circles

ROCKET MISSLE FIRE

COUNT ENABLE

ROCKET MISSLE VIDEO

MISSLE SOUND OUT

UP/DN ENABLE

RT/LF ENABLE

ROCKET ENABLE

ROCKET UP/DN

ROCKET RT/LF

VERT. VELOCITY

HORZ. VELOCITY

SAUCER ENABLE

SAUCER MISSLE VIDEO

MOTION BD. ONE PLAYER COMPUTOR SPACE

MEMORY BOARD SINGLE-PLAYER
COMPUTER SPACE

FRONT PANEL

PLAYER ONE

PLAYER TWO

START GAME

TWO-PLAYER SELECT

ROTATION

THRUST & HYPERSPACE

ROTATION

THRUST & HYPERSPACE

PLAYER ONE MISSLE FIRE

PLAYER TWO MISSLE FIRE

5 2 R B C 9 11 12 N

JOYSTICK BOARD

1 3 4 7 8 10 13 A D E M S

COIN SWITCH

COM. NO NC

SYNC-STAR BOARD

MOTION BOARD

24 PIN MOLEX CONN.

A-MEMORY BOARD

B-MEMORY BOARD

BRAIN BOX

COIN COUNTER

5VDC POWER SUPPLY

12VAC 60HZ

TRANS-FORMER

110VAC 60HZ

2A 3.B FUSE

DOOR INTERLOCK

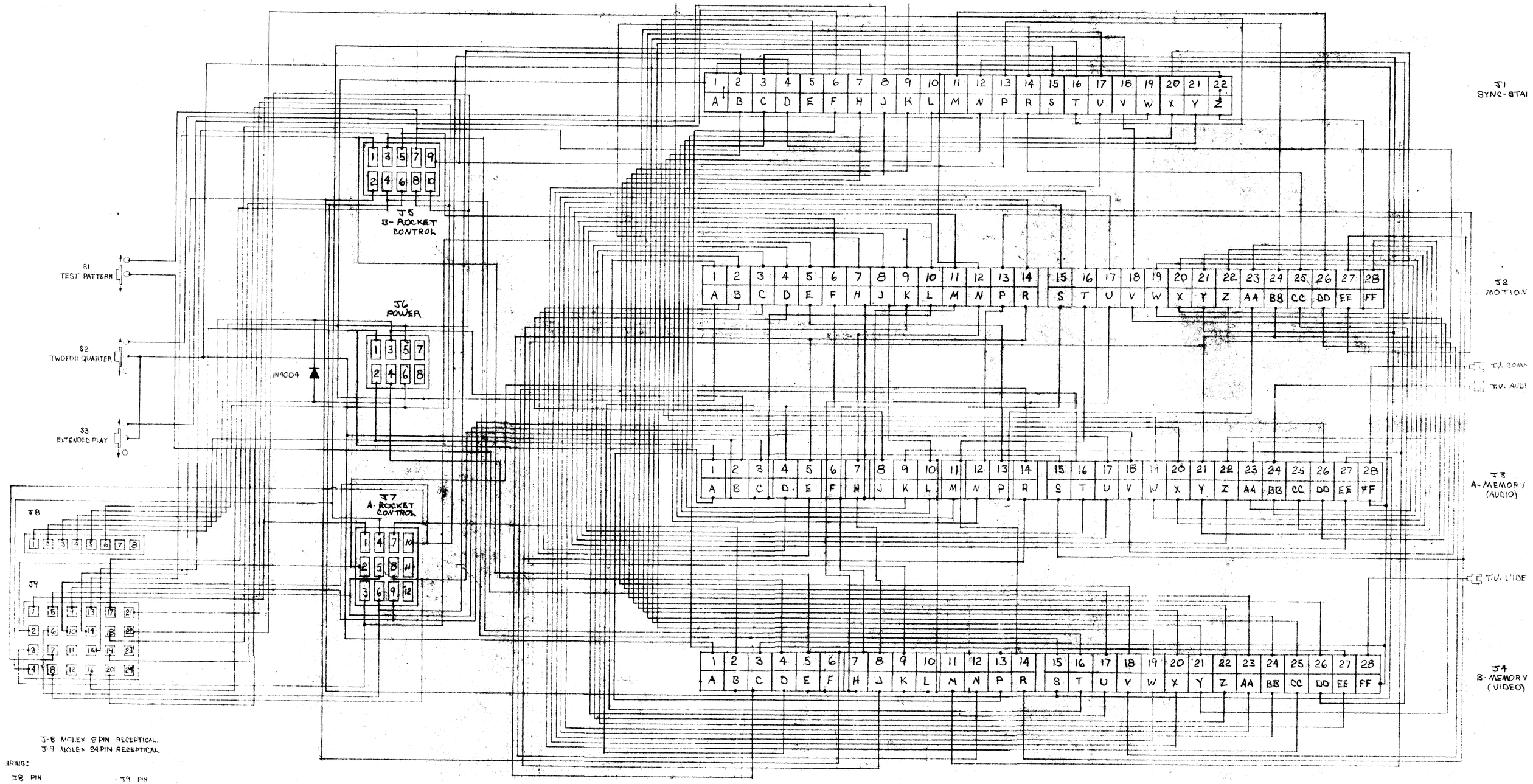
POWER SWITCH

110VAC 60HZ 2AMP

TWO-PLAYER COMPUTER SPACE CHASSIS WIRING

DRAWN BY: WALTER ANDERSON 5/11/73

NUTTING ASSOC. INC.
MT. VIEW, CA 94040



J-8 MOLEX 8 PIN RECEPTICAL
J-9 MOLEX 24 PIN RECEPTICAL

WIRING:

J8 PIN

1 - BLACK 22 GAUGE
2 - BLACK 22 GAUGE
3 - BROWN 22 GAUGE
4 - BROWN 22 GAUGE
5 - RED 18 GAUGE
6 - WHITE 18 GAUGE
7 - N.C.
8 - N.C.

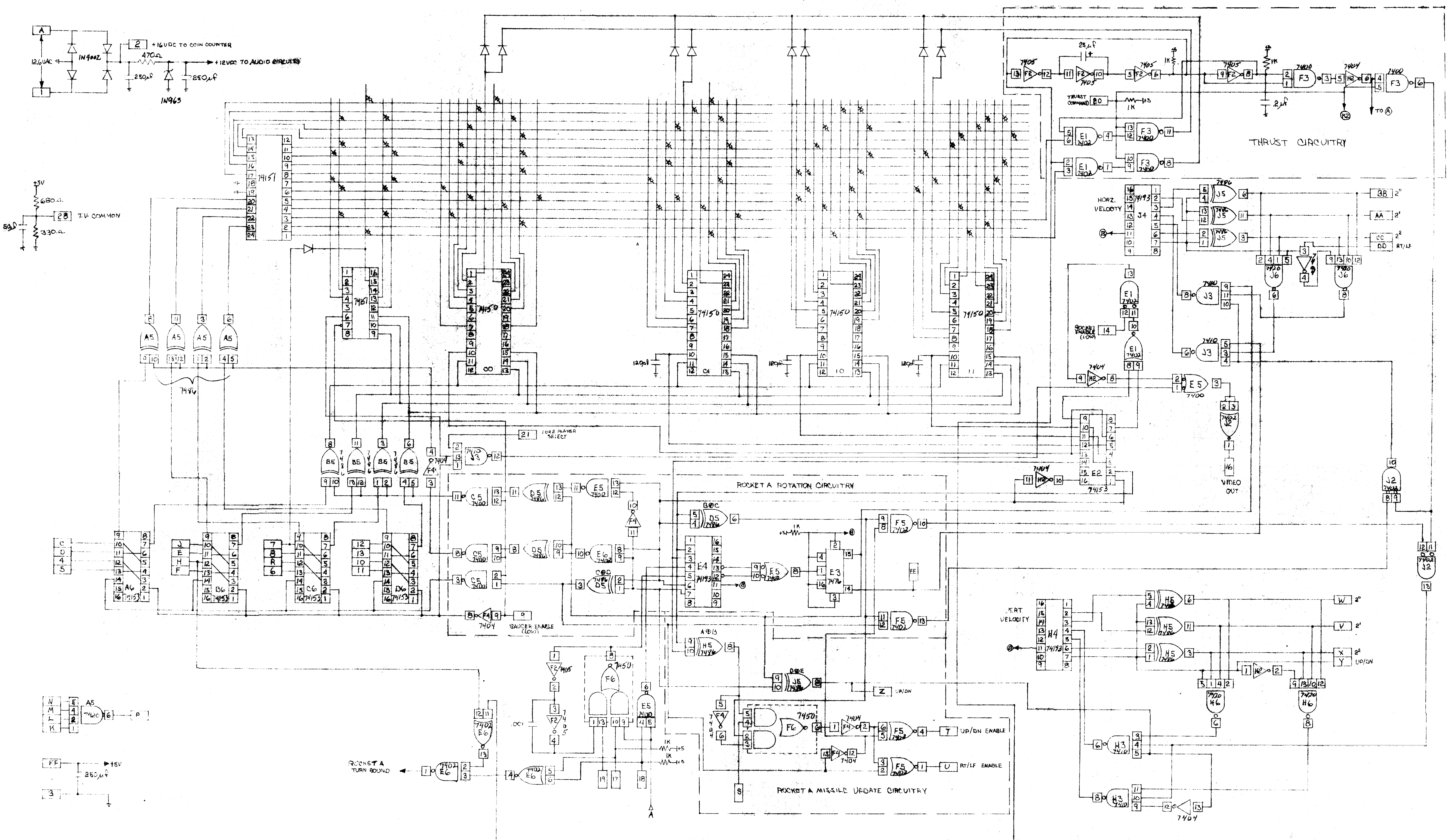
J9 PIN

1 - BLU/WHT 22 GAUGE
2 - OR/WHT 22 GAUGE
3 - YL/WHT 22 GAUGE
4 - VIO/WHT 22 GAUGE
5 - GRN/WHT 22 GAUGE
6 - BLK/WHT 22 GAUGE
7 - BLU 22 GAUGE
8 - YL 22 GAUGE
9 - OR 22 GAUGE
10 - BLU/WHT 22 GAUGE
11 - N.C.
12 - N.C.
13 - OR/WHT 22 GAUGE
14 - YL/WHT 22 GAUGE
15 - VIO/WHT 22 GAUGE
16 - GRY/WHT 22 GAUGE
17 - RED 22 GAUGE
18 - WHT 22 GAUGE
19 - OR 22 GAUGE
20 - GRN/WHT 22 GAUGE
21 - BLU 22 GAUGE
22 - BLU/WHT 22 GAUGE
23 - N.C.
24 - N.C.

BRAIN BOX WIRING DIAGRAM - TWO PLAYER COMPUTOR SPACE

~~BRAIN~~ BY: WALTER ANDERSON 11/29/72

NA 73-124



A-MEMORY BOARD (AUDIO) NA 73-100

1 OR 2 PLAYER COMPUTER SPACE

DRAWN BY: WALTER ANDERSON 1/26/73

REV	DATE	ENG.	DESCRIPTION
A	8.7.73	M.B.	EXTENDED PLAY CKTY. MODIFIED FOR RETROFIT

HORZ. SCAN COUNTER

VERT. SCAN COUNTER

XTAL OSC.

STAR GENERATION

STARS VIDEO OUT

CLOCK OUT

COUNT ENABLE

TEST PATTERN OUT

BLANKING OUT

SYNC OUT

SCORING & TIME VIDEO GENERATION

NUMBERS VIDEO OUT

EXTENDED PLAY CKTY.

H = REPLAY

1 OR 2 PLAYER SELECT SWITCH

RELAY (SPDT 9503)

START/END GAME CIRCUITRY

GAME SPEED ADJUST

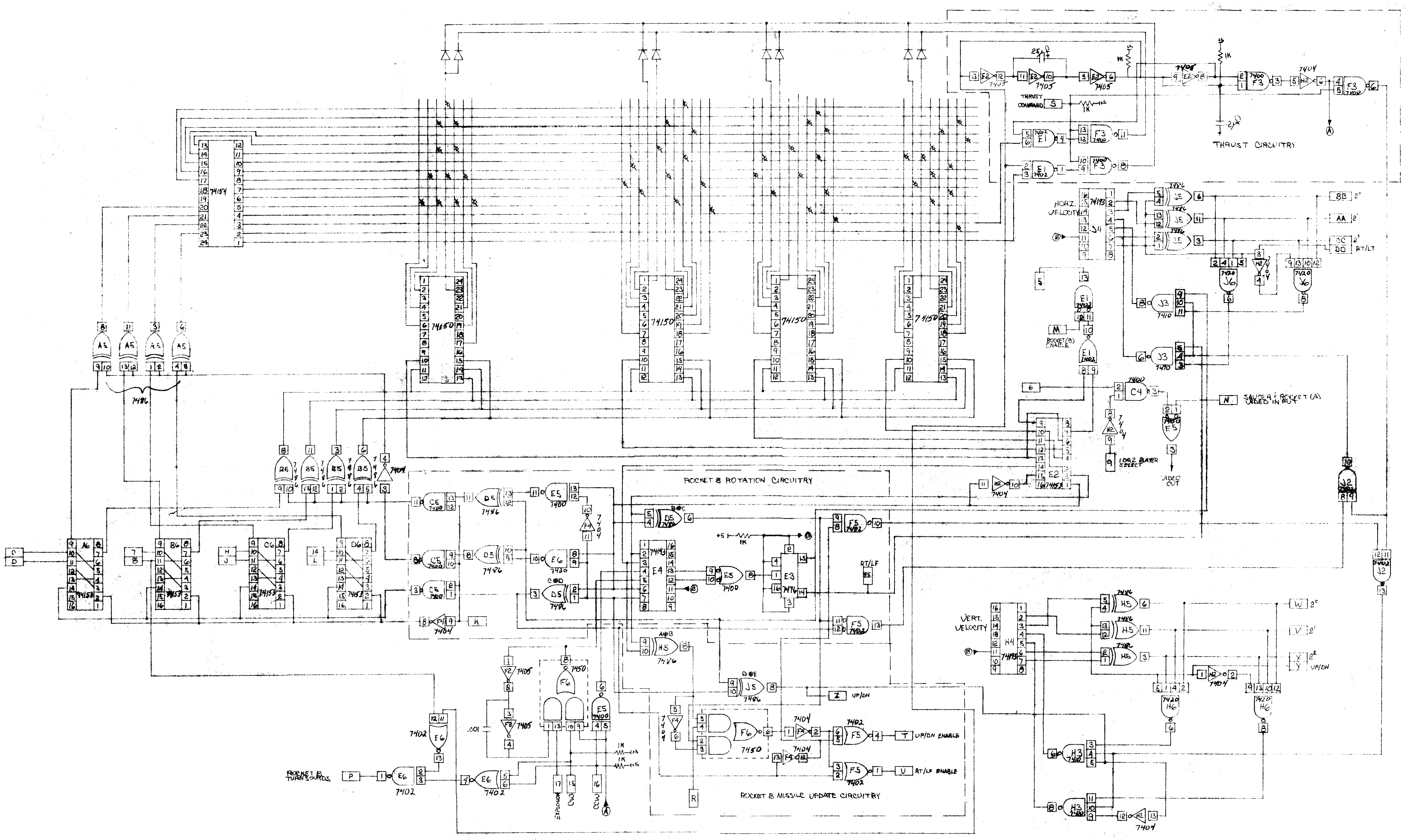
EXPLOSION CIRCUITRY

B-SPIN

A-SPIN

MISSLE VIDEO OUT

COMPUTOR SPACE ONE OR TWO PLAYER
SYNC-STAR BOARD
DRAWN BY: WALTER ANDERSON 19/10/72
NA 73-102



B-MEMORY 1OR2 PLAYER NA 73-103

COMPUTER SPACE

DRAWN BY: WALTER ANDERSON 1/29/73

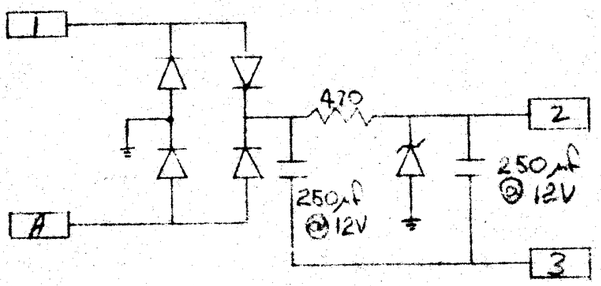
COMPUTOR SPACE ONE or TWO PLAYER
MOTION BOARD NA 73-04

DRAWN BY:
WALTER ANDERSON 20/10/72

* INPUTS COME FROM PIN 11 OF THE UNITS AND TENS COUNTER RESPECTIVELY

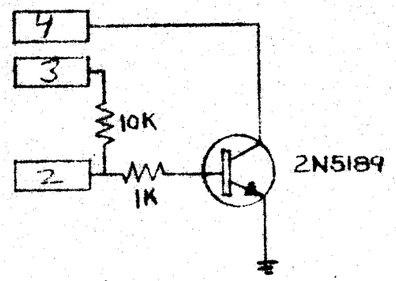
A - MEMORY - 2 PLAYER

BRIDGE DIODES - IN4002
ZENER - IN963

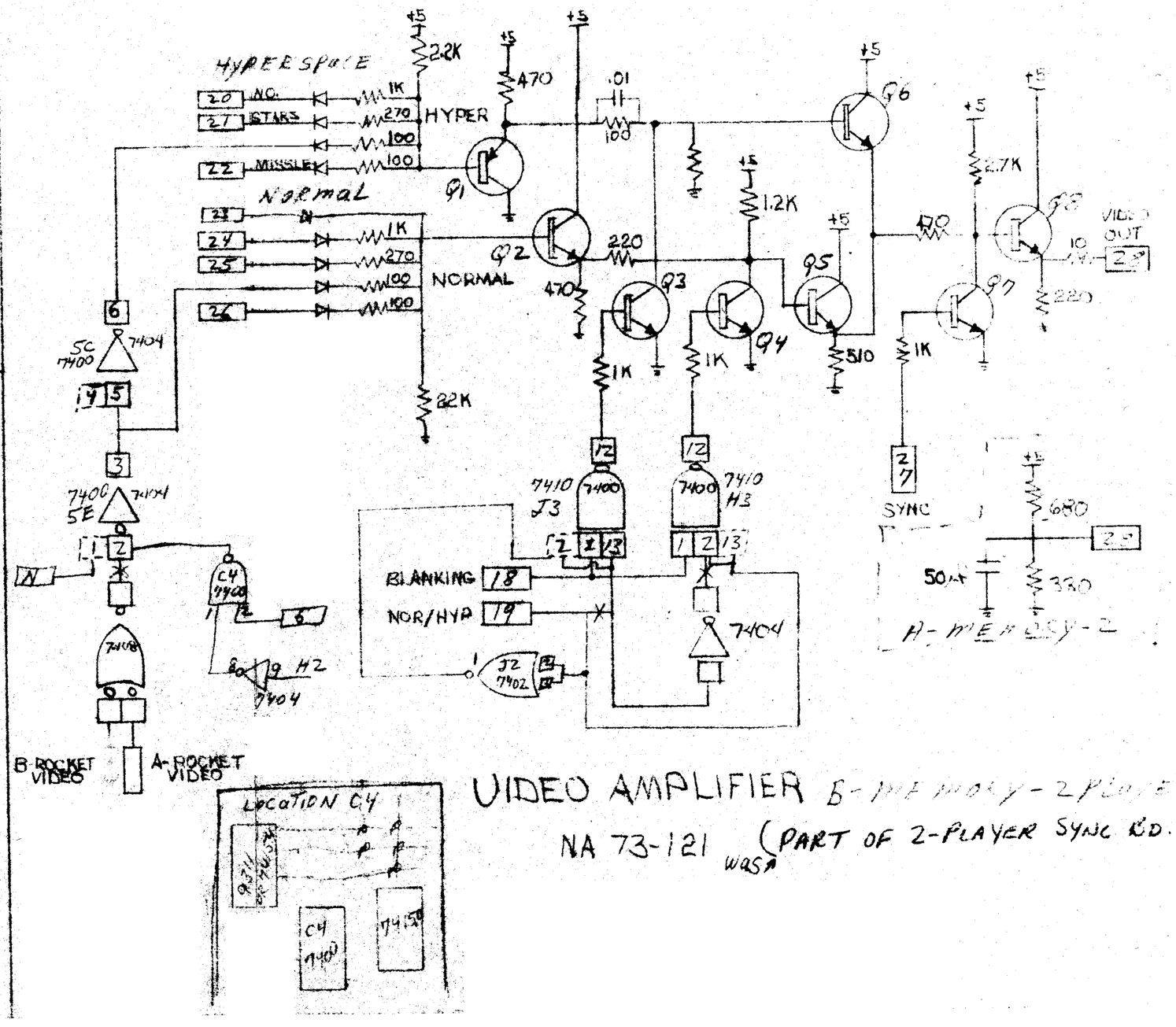


12 VDC POWER SUPPLY

B - MEMORY - 2 PLAYER



COIN COUNTER



VIDEO AMPLIFIER B - MEMORY - 2 PLAYER

NA 73-121 (PART OF 2-PLAYER SYNC BD.)
was

NOTE: THIS DWG IS PART OF A-MEMORY BOARD (2-PLAYER C.S.)

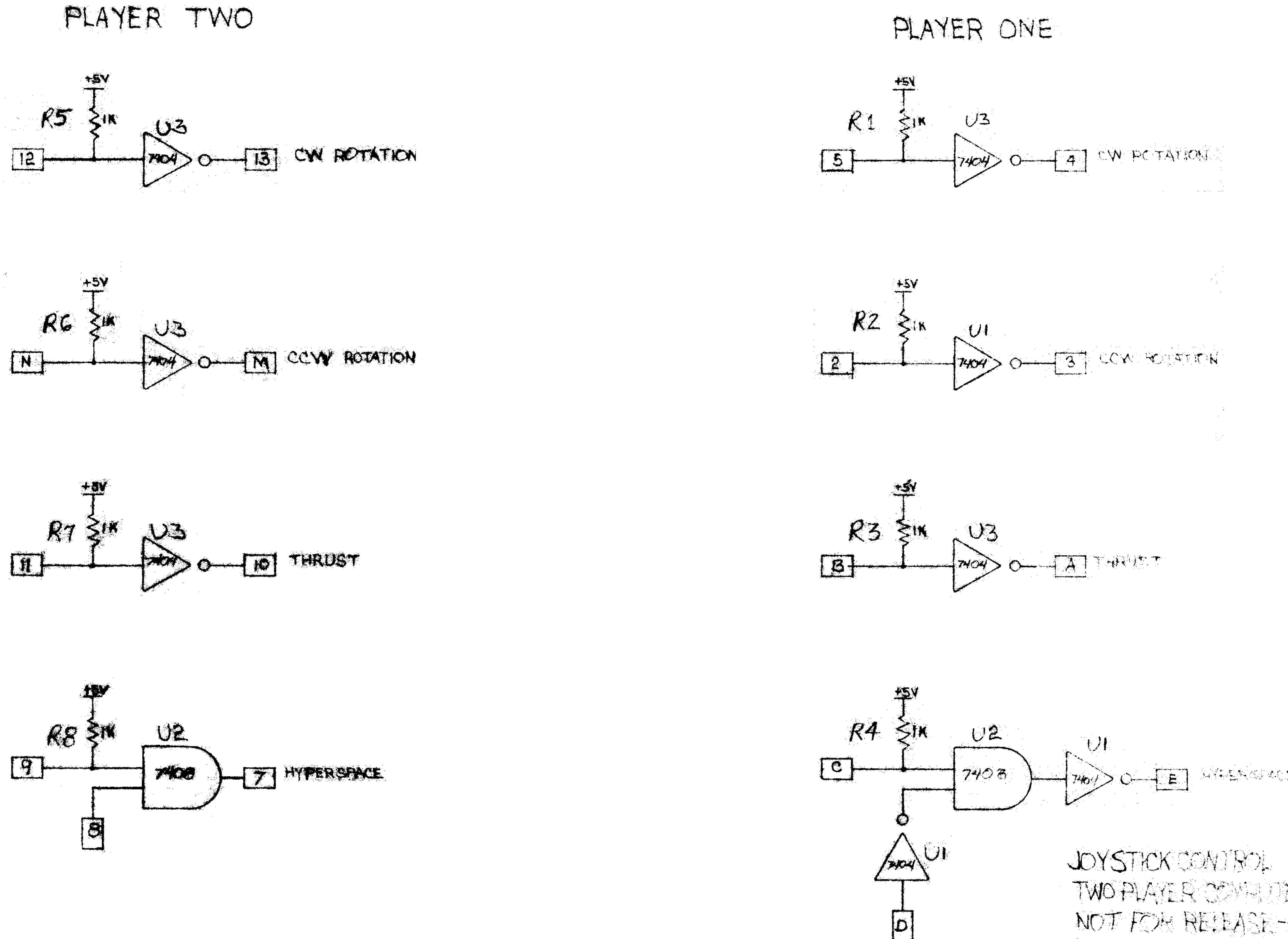
COMPUTER SPACE SOUND CIRCUITS
A-MEMORY BOARD (2-PLAYER CS)

10/27/71 -- 8/3/73 UPDATED KM

NA 73-122

A
1
2
IN4002
IN4002
IN4002
IN4002
470Ω
250 μfd 50 VDC
IN963
250 μfd 50 VDC
12V.
GROUND
1
5Vac
270
250μ
27K
4.7K
+7.5Vdc SAT.
10μ
100K
Q1
Q2
80 mVac
10μ
47K
IN960 12V
100
2.2K
50μ
50μ
47K
10μ
22K
2.7K
.033μ
.033μ
22K
22K
.02
+4Vdc
.033μ
22K
270K
.033μ
Q3
150
470
50μ
1K
22K
10K
10μ
100K
2.7K
+8Vdc
50μ
10μ
Q4
47K
100
27K
50μ
270K
.5Vac
6Vac
RUMBLER
RUMBLE AMPLIFIER
"OFF" 2Vac
0Vdc
"ON" 12Vac
0Vdc
2.7K
2.7K
23
THRUST COM. (+=ON)
10K
EXP. SW.
1K
22
EXPLO. COM. (+=ON)
10K
Q5
Q6
47
4.7μf
1.2K
Q8
THRUST SWITCH
10K
Q6
47
4.7K
.02μ
270K
4.7K
.033μ
100μ
+5Vdc
6Vac
Q7
4.7K
.2μ
27K
100
EXP. GATE
.02μ
.01μ
22K
27K
Q10
100
THRUST GATE
HI PASS
47K
27K
33K
4.7K
100K
10μ
47K
Q11
BACKGROUND NOISE AMP
.1μ
27K
.033μ
100
2.7K
50μ
LO PASS
100K
22K
.2μ
100K
N5741A
5+ 11
4 7
10
3Vac NORMAL
12Vac W/EXPLOTION
22K
.2μ
24
AUDIO OUT
Q12
330K
1K
23
AUDIO GATE (+=OFF)
6.8K
OUTPUT AMPLIFIER & TONE ADDER
10K
.1μ
47K
22
MISSLE SOUNDS
47K
→ E-6-1 TURN SOUNDS
220

ALL RESISTOR ¼W, 10%
PNP 2N3644
NPN 2N3643



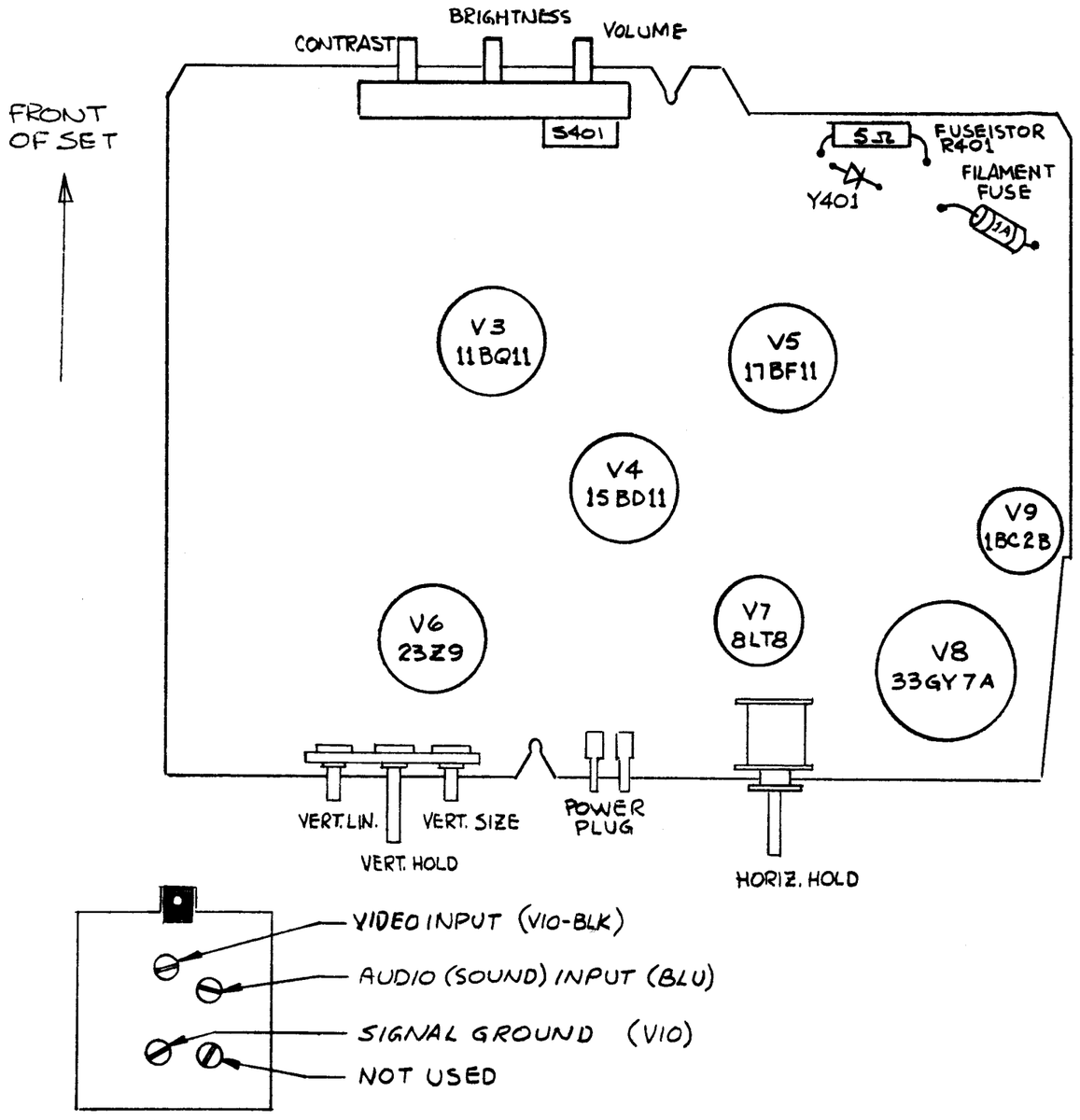
NA 73-126

JOYSTICK CONTROL SERIES B
TWO PLAYER COMPUTER SPACE
NOT FOR RELEASE-NUTTING ASSOC.
USE ONLY

[illegible]

[illegible]

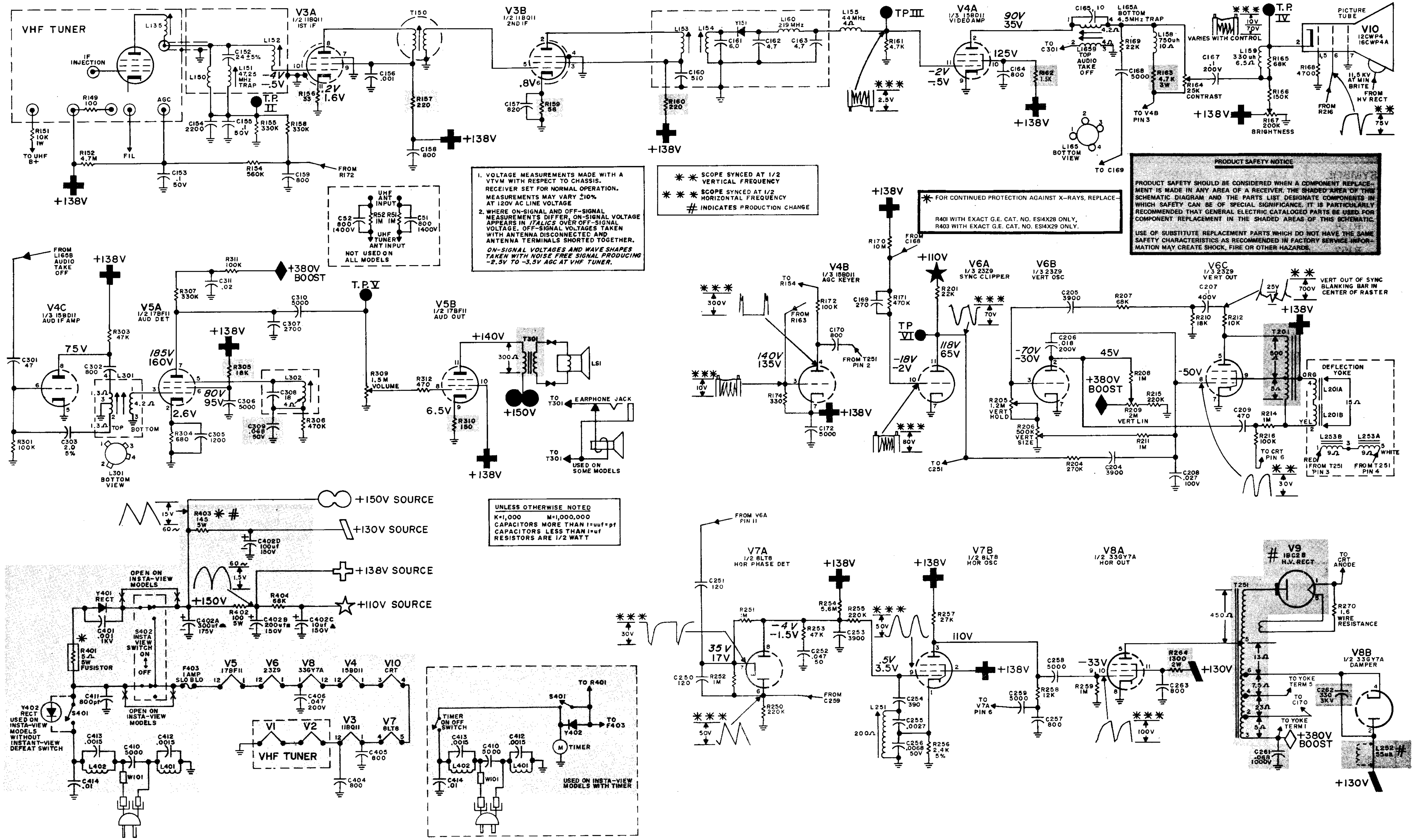
➡ CAUTION: <u>UNPLUG POWER</u> AND DISCHARGE HIGH VOLTAGE ON PICTURE TUBE BEFORE SERVICING!



SYMPTOM	PROBABLE CAUSE
1. NO VIDEO PICTURE OR POOR CONTRAST SOUND AND BRIGHTNESS WORK PROPERLY	V4 CONTRAST TURNED DOWN
2. NO SOUND OR LOW DISTORTED SOUND	V5 VOLUME TURED DOWN
3. NO VERTICAL DEFLECTION (BRIGHT HORIZONTAL LINE ACROSS SCREEN)	V6
4. NO PICTURE OR BRIGHTNESS SOUND WORKS PROPERLY	IN ORDER OF MOST LIKELY: V8, V7, V6. LEAST LIKELY, BUT POSSIBLE: V9, PICTURE TUBE
5. NO PICTURE, BRIGHTNESS OR SOUND	
a. IF FILAMENTS ARE LIT: (IF ONE FILAMENT IS LIT THAN ALL FILAMENTS ARE WORKING PROPERLY)	OPEN FUSISTOR (R401 5Ω) OPEN RECTIFIER (Y401)
b. IF FILAMENTS DO NOT LIGHT:	BLOWN FILAMENT FUSE
	OPEN TUBE FILAMENT (EXCEPT V9)
	POWER PLUG
	ON-OFF SWITCH

TROUBLESHOOTING GUIDE
COMPUTER SPACE DISPLAY

1/4/72 Dabney



1. VOLTAGE MEASUREMENTS MADE WITH A VTVM WITH RESPECT TO CHASSIS. RECEIVER SET FOR NORMAL OPERATION. MEASUREMENTS MAY VARY ±10% AT 120V AC LINE VOLTAGE
2. WHERE ON-SIGNAL AND OFF-SIGNAL MEASUREMENTS DIFFER, ON-SIGNAL VOLTAGE APPEARS IN *ITALICS* OVER OFF-SIGNAL VOLTAGE. OFF-SIGNAL VOLTAGES TAKEN WITH ANTENNA DISCONNECTED AND ANTENNA TERMINALS SHORTED TOGETHER.

ON-SIGNAL VOLTAGES AND WAVE SHAPES TAKEN WITH NOISE FREE SIGNAL PRODUCING -2.5V TO -3.5V AGC AT VHF TUNER.

✱✱ SCOPE SYNCED AT 1/2 VERTICAL FREQUENCY
✱✱✱ SCOPE SYNCED AT 1/2 HORIZONTAL FREQUENCY
# INDICATES PRODUCTION CHANGE

✱ FOR CONTINUED PROTECTION AGAINST X-RAYS, REPLACE–
R401 WITH EXACT G.E. CAT. NO. ESI4X28 ONLY,
R403 WITH EXACT G.E. CAT. NO. ESI4X29 ONLY.

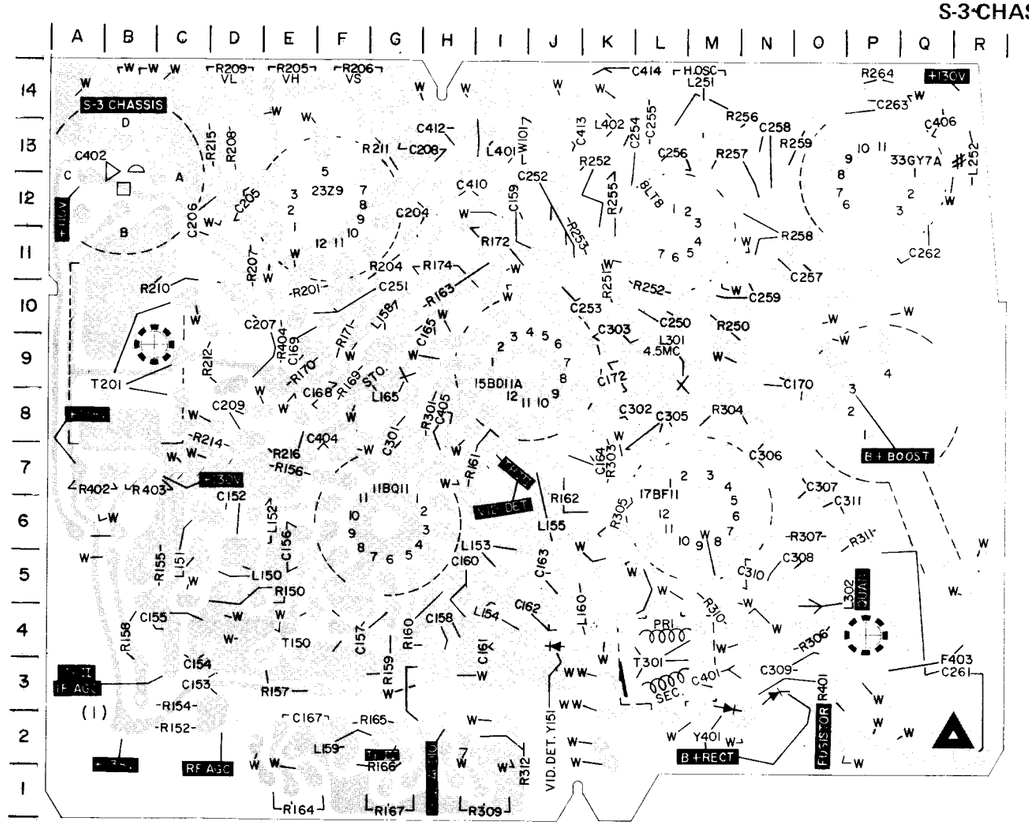
PRODUCT SAFETY NOTICE

PRODUCT SAFETY SHOULD BE CONSIDERED WHEN A COMPONENT REPLACEMENT IS MADE IN ANY AREA OF A RECEIVER. THE SHADED AREA OF THIS SCHEMATIC DIAGRAM AND THE PARTS LIST DESIGNATE COMPONENTS IN WHICH SAFETY CAN BE OF SPECIAL SIGNIFICANCE. IT IS PARTICULARLY RECOMMENDED THAT GENERAL ELECTRIC CATALOGED PARTS BE USED FOR COMPONENT REPLACEMENT IN THE SHADED AREAS OF THIS SCHEMATIC.

USE OF SUBSTITUTE REPLACEMENT PARTS WHICH DO NOT HAVE THE SAME SAFETY CHARACTERISTICS AS RECOMMENDED IN FACTORY SERVICE INFORMATION MAY CREATE SHOCK, FIRE OR OTHER HAZARDS.

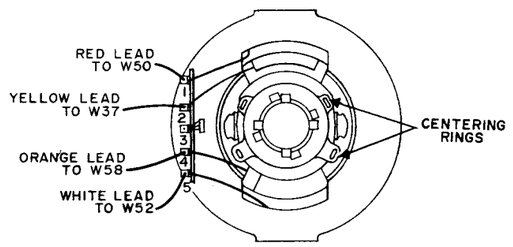
UNLESS OTHERWISE NOTED
K=1,000 M=1,000,000
CAPACITORS MORE THAN 1=uuf=pf
CAPACITORS LESS THAN 1=uf
RESISTORS ARE 1/2 WATT

MAIN CHASSIS SCHEMATIC DIAGRAM

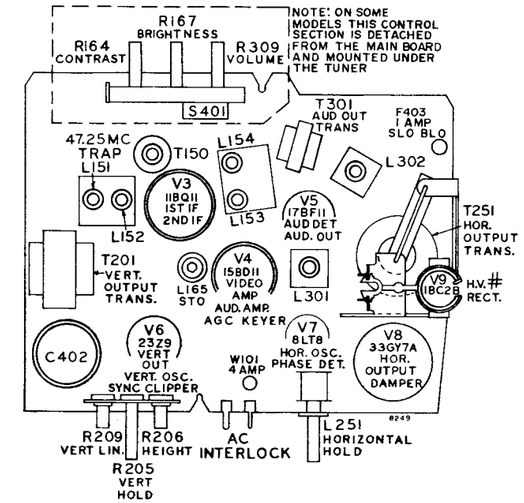


COPPER SIDE VIEW

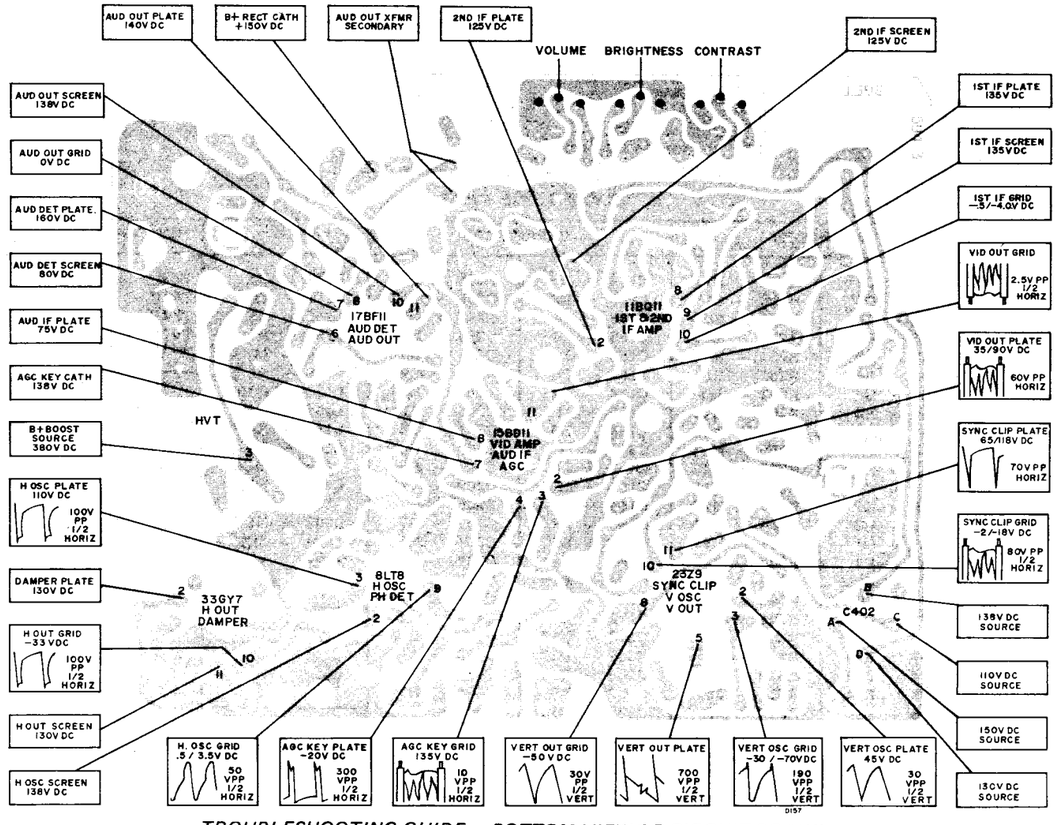
RESISTORS		CAPACITORS		COILS	TEST POINTS
R152 – C2	R214 – D7	C152 – D6	C255 – L13	L150 – D5	TP II – C3
R154 – C3	R215 – D13	C153 – D3	C256 – L13	L151 – C6	TP III – I7
R155 – C5	R216 – E8	C154 – C4	C257 – N11	L152 – E6	TP IV – G2
R156 – E7	R250 – M10	C155 – C4	C258 – N12	L153 – I5	TP V – H2
R157 – E3	R251 – K11	C156 – E6	C259 – M10	L154 – I4	TP VI – F10
R158 – B4	R252 – L10	C157 – G4	C261 – Q4	L155 – J6	
R159 – G4	R253 – J12	C158 – H4	C262 – Q11	L158 – G10	TUBES
R160 – H4	R254 – K12	C159 – J11	C263 – P14	L159 – G2	
R161 – I7	R255 – K12	C160 – H4	C301 – G8	L160 – K4	V3 – G6
R162 – J7	R256 – M13	C161 – I4	C302 – K8	L165 – G9	V4 – J9
R163 – H10	R257 – M12	C162 – J4	C303 – K9	L251 – M14	V5 – M6
R164 – E1	R258 – N11	C163 – J5	C305 – L7	L252 – R13	V6 – E12
R165 – G2	R259 – O13	C164 – J7	C306 – N7	L301 – M8	V7 – L11
R166 – G2	R264 – Q14	C165 – H9	C307 – O7	L302 – N5	V8 – P12
R167 – G1	R301 – H8	C167 – E2	C308 – N5	L401 – I13	
R169 – F9	R303 – K7	C168 – F8	C309 – O3	L402 – K13	FUSES
R170 – E9	R304 – M8	C169 – F10	C310 – N5		
R171 – F9	R305 – K6	C170 – N9	C311 – 06		F403 – R4
R172 – I11	R306 – O4	C172 – K9	C401 – N3	DIODES	W101 – J13
R174 – H10	R307 – O6	C204 – G12	C402 – B12		
R201 – E10	R309 – I1	C205 – D12	C403 – A14	Y151 – J4	
R204 – G11	R310 – M4	C206 – D12	C404 – F7	Y401 – N3	
R205 – E14	R311 – P6	C207 – D9	C405 – H7		
R206 – F14	R312 – J2	C208 – G13	C406 – Q14	TRANSFORMERS	
R207 – D11	R401 – O2	C209 – D8	C410 – I14		
R208 – D13	R402 – B7	C250 – L10	C412 – H13	T150 – F4	
R209 – D14	R403 – B7	C251 – F10	C413 – J13	T201 – C9	
R210 – C11	R404 – E9	C252 – J11	C414 – K14	T251 – P8	
R211 – G13		C253 – J10		T301 – L3	
R212 – D9		C254 – K13			



YOKE ASSEMBLY WIRING

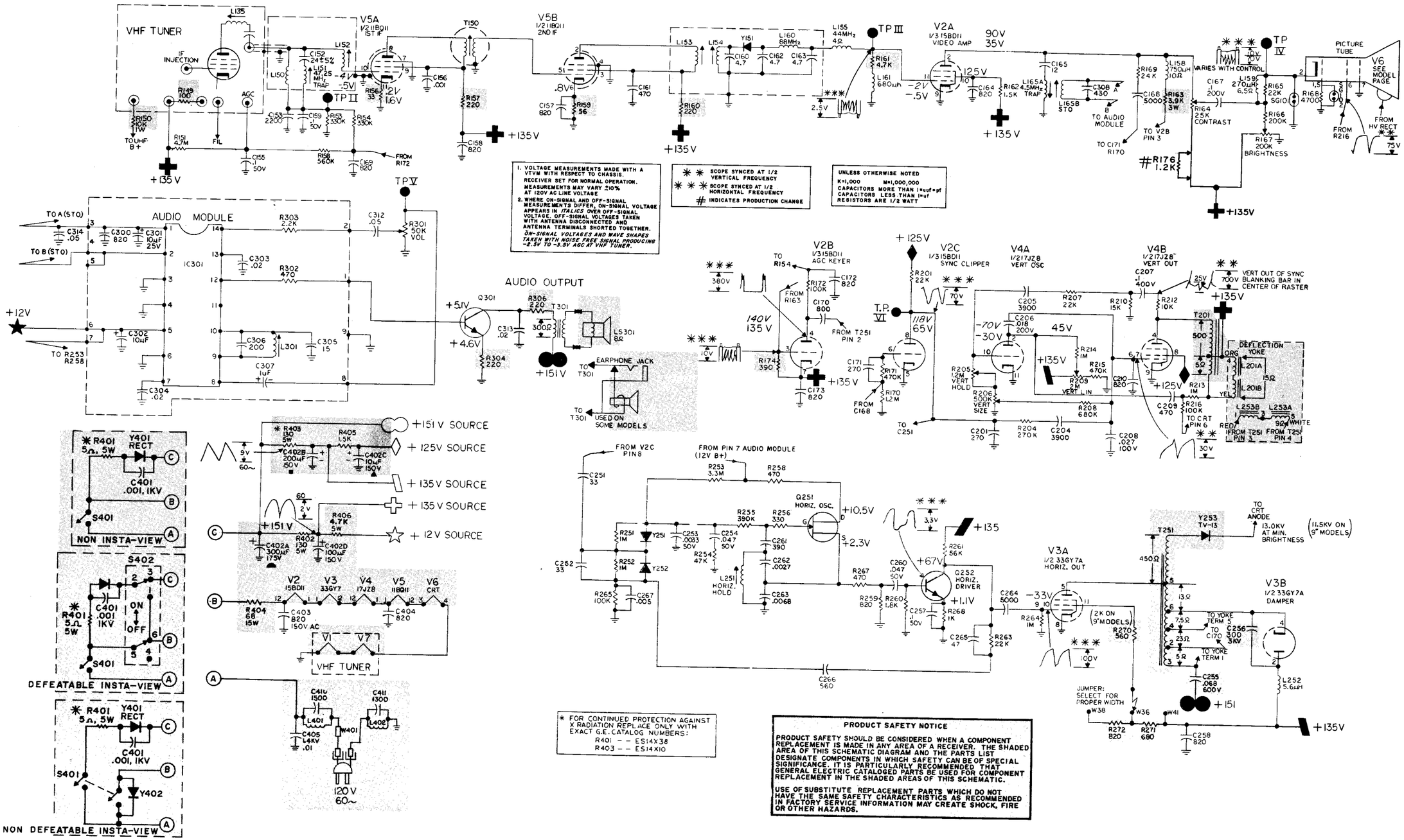


TUBE AND ADJUSTMENT LOCATIONS



TROUBLESHOOTING GUIDE – BOTTOM VIEW OF CIRCUIT BOARD

GENERAL ELECTRIC



9SF,12SF,&15SF CHASSIS SCHEMATIC DIAGRAM

PRODUCT SAFETY NOTICE

PRODUCT SAFETY SHOULD BE CONSIDERED WHEN A COMPONENT REPLACEMENT IS MADE IN ANY AREA OF A RECEIVER. THE SHADED AREAS OF THIS PARTS LIST AND THE SCHEMATIC DIAGRAM DESIGNATE COMPONENTS IN WHICH SAFETY CAN BE OF SPECIAL SIGNIFICANCE. IT IS PARTICULARLY RECOMMENDED THAT GENERAL ELECTRIC CATALOGED PARTS BE USED FOR COMPONENT REPLACEMENT IN THE SHADED AREAS OF THIS PARTS LIST.

USE OF SUBSTITUTE REPLACEMENT PARTS WHICH DO NOT HAVE THE SAME SAFETY CHARACTERISTICS AS RECOMMENDED IN FACTORY SERVICE INFORMATION MAY CREATE SHOCK, FIRE OR OTHER HAZARDS.

COMMON RESISTORS

CARBON RESISTORS, 1/2 WATT, 5% UNLESS NOTED

No deviations from resistance and wattage values may be made for replacement items in shaded areas.

SYMBOL	VALUE	SYMBOL	VALUE
R149	100, 1/2W, 10%	R213	1M, 10%
R150	10K, 1W	R214	1M, 10%
R151	4.7M, 10%	R215	470K, 10%
R153	330K	R216	100K
R154	330K	R251	1M, 10%
R156	33	R252	1M, 10%
R157	220	R253	3.3M, 10%
R158	560K, 10%	R254	47K
R159	56	R255	390K, 10%
R160	220	R256	330
R161	4.7K	R258	470
R162	1.5K	R259	820
R165	22K	R260	1.8K, 10%
R166	200K	R261	56K, 10%
R168	4.7K	R263	22K
R169	24K	R264	1M, 10%
R170	1.2M, 10%	R265	100K
R171	470K	R267	470
R172	100K	R268	1K
R174	390	R270	560 (12&15" Models)
# R176	1.2K, ¼W, 10%	R270	2K (9" Models)
R201	22K	R271	680
R204	270K	R272	820
R207	22K	R304	220
R208	680K, 10%	R306	220
R210	15K, 10%	R405	1.5K
R212	18K, 10%		

SPECIAL RESISTORS

CAT. NO.	SYMBOL	DESCRIPTION
ES14X37	R163	3.9K, 10%, 3W, Wirewound
* ES14X38	R401	5 Ohms, 10%, 10W, Wirewound
ES14X10	R402	130 Ohms, 5%, 5W, Wirewound
* ES14X10	R403	130 Ohms, 5%, 5W, Wirewound
ES14X42	R404	68 Ohms, 15W, 5%
ES14X43	R406	4.7K, 5W, 10%

POTENTIOMETERS

CAT. NO.	SYMBOL	DESCRIPTION
ES49X2	R205	Vert. Hold – 1.2m, 30%
	R206	Vert. Height – 500K, 20%
	R209	Vert. Lin. – 2m, 30%

CAPACITORS
DISC CERAMIC, 10% 500V, UNLESS NOTED

CAT. NO.	SYMBOL	DESCRIPTION
ET18X123	C152	24pf, 5%
EP18X21	C153	2200pf
EP25X29	C155	.1uf, 20%, 50V
EU22X117	C156	1000pf, SSHK
EP18X16	C157	820pf, 20%
EP18X16	C158	820pf, 20%
EP25X29	C159	.1uf, 20%, 50V
ES18X501	C160	4.7pf
EU22X90	C161	470pf, SSHK
ES18X501	C162	4.7pf
ES18X501	C163	4.7pf
EP18X16	C164	820pf. 20%
EP18X63	C165	12pf
COMMON	C167	.1uf, 20%, 200V
EP22X7	C168	5000pf
EP18X16	C169	820pf, 20%
EP18X16	C170	820pf, 20%
ET18X598	C171	270pf, N750
EP18X16	C172	820pf, 20%
EP18X16	C173	820pf, 20%
ET18X598	C201	270pf, N750
ET22X21	C204	3900pf
ES25X25	C205	.0039uf
ES18X29	C206	.018uf, 200V
EP25X40	C207	.1uf, 400V
ES20X3	C208	.027uf, 100V
EP18X11	C209	470pf
EP18X16	C210	820pf, 20%
EU18X186	C251	33pf, 5%
EU18X186	C252	33pf, 5%
ES18X58	C253	3300pf, 50V
ES25X17	C254	.047uf, 20%, 50V
ES25X26	C255	.068uf, 600V
ET18X425	C256	300pf, 4 KV
EP25X29	C257	.1uf, 50V
EP18X16	C258	820, 20%
ES25X17	C260	.047uf, 20%, 50V
ES25X24	C261	390pf
ES25X61	C262	2700pf, 125V
EP25X36	C263	.0068uf, 50V
EP22X7	C264	5000pf
EU18X537	C265	47pf, 20%
EP18X15	C266	560pf
EP22X7	C267	5000pf
ES25X23	C308	430pf, 5%, 125V
ES22X191	C312	.05uf, 50V
EP22X11	C313	.02uf
ES22X191	C314	.05uf, 50V
EP18X4	C401	1000pf, +80–20, 1000V

CAPACITORS (CONT'D)

CAT. NO.	SYMBOL	DESCRIPTION
ES18X59	C403	820pf, 20%, 150VAC
EP18X16	C404	820pf, 20%
ES22X4	C405	.01uf, 150V
EP18X37	C410	1500pf
ES18X60	C411	1300pf, 20%

ELECTROLYTIC CAPACITORS

CAT. NO.	SYMBOL	DESCRIPTION
ES31X254	C402A	300uf, 175V
	C402B	200uf, 150V
	C402C	10uf, 150V
	C402D	100uf, 150V

TRANSISTORS

CAT. NO.	SYMBOL	DESCRIPTION
ES15X92	Q251	Transistor–NPN, Silicon
ES15X93	Q252	Transistor–NPN, Silicon
EP15X16	Q301	Transistor–PNP, Silicon

DIODES

CAT. NO.	SYMBOL	DESCRIPTION
EP16X3	Y151	Diode–Germanium
ES16X27	Y251	Diode–Silicon
ES16X30	Y252	Diode–Silicon
ES57X21	Y253	HV Rect., w/Anode Clip
ES57X1	Y401	DIODE–LV Rect., Silicon

COILS AND TRANSFORMERS

CAT. NO.	SYMBOL	DESCRIPTION
ES76X48		Yoke
ES36X115	L150	Coil, Link Shunt
ES36X117	L151	47.25mc, Trap
ES36X754	L152	Coil
ES36X757	L153	Coil
ES36X116	L154	Coil
EP36X7	L155	Choke, 44mc
EU36X376	L158	Choke, 750uh, 7%, Peaking
ES36X118	L159	Choke, 270uh, 7%, Peaking
ES36X61	L160	Choke, 10uh, ±20%
EP36X19	L161	Choke, 680uh, Peaking
ES36X119	L165	Coil–Sound Take Off
ET35X51	L251	Horiz. Osc.
EU36X536	L252	Choke, 5.6uh, 10%
ES36X28	L401	Choke
ES36X28	L402	Choke
ES36X23	T150	TRANSFORMER–Video IF
ES64X6	T201	Transformer–Vert. Output
ES77X16	T251	Transformer–HVT (12&15" Models)
ES77X17	T251	Transformer–HVT (9" Models)
ES64X13	T301	Transformer–Audio Output

MISCELLANEOUS

CAT. NO.	DESCRIPTION
ES2X62	BRACKET–HV Rect., Plastic
ES1X228	BOLT–"U" HV Mtg.
ES2X60	CLIP–Resistor Retainer, R149
ES12X137	CORE–HV
EP10X52	FUSE–4 Amp, 250V, Fast Blo, W401
ES75X1	MODULE–Audio
ES8X6	PLUG–Phone Type, To Tuner
ES69X10	SHAFT–Horiz. Hold Control
ES41X4	SPARK GAP–1500V, SG102
ES34X14	SOCKET–Right & Left Module
ES34X19	SOCKET–V2, V5
EU34X116	SOCKET–V3,V4
ES34X37	SOCKET–7 Pin, CRT
ES3X7	SPACER–Coil
ES8X123	TERMINAL–Interlock, Small
ES8X124	TERMINAL–Interlock, Large

NOTE: For Cabinet, Appearance, and Front Control parts list see model pages (section 1).

For Tuner parts list see tuner pages (section 2).

*** FOR CONTINUED PROTECTION AGAINST X-RADIATION REPLACE ONLY WITH EXACT G.E. CATALOG NUMBERS:**
R401---ES14X38
R403---ES14X10

#PRODUCTION CHANGES

1. Voltage Dependent Resistor, ES13X3, used in Audio Output stage of early production receivers.
2. R176 added to receivers with serial numbers 5Z3O----- and higher.