

comotio

The word 'comotio' is written in a bold, rounded, sans-serif font. The letters are filled with a dark red color and have a white outline. Above the final 'o', there is a stylized upward-pointing arrow, also in dark red with a white outline.

MANUFACTURED BY

Gremlin
Industries, inc.

OWNER'S MANUAL

CoMOTION
OPERATING INSTRUCTIONS
AND
SERVICE MANUAL

GREMLIN INDUSTRIES, INC.
8401 Aero Drive
San Diego, CA. 92123
JUNE 20, 1977

TABLE OF CONTENTS

	<u>PAGES</u>
I. <u>GENERAL INFORMATION:</u>	
Introduction	- 1
Important Notes	- 2
Warranty/Factory Service Information	- 3
Uncrating and Set-up Instructions	- 4 - 5
II. <u>OPERATION:</u>	
Game Concept/Operation	- 6 - 8
System Description	- 9 - 10
System Block Diagram	- 11
Character Generation Circuitry Diagram	- 12
Tone Generator Diagram	- 13
III. <u>MAINTENANCE:</u>	
Factory/Assistance/Equipment	- 14
Maintenance Procedures	- 15 - 18
Key Wave Forms Diagram	- 19
Character Code Table	- 20
Parts List (CoMOTION I, II & IIA)	- 22 - 25
Schematics	
Motorola 19" Monitor Manual	

GENERAL INFORMATION

INTRODUCTION:

CoMOTION is an electronic game that makes extensive use of digital integrated circuitry and television monitor circuitry. This manual assumes the maintenance technician possesses a general knowledge of solid state circuitry, TTL digital integrated circuitry and T.V. monitor concepts. Any individual NOT knowledgeable in these areas SHOULD NOT attempt repair of the electronic portion of this game. IT SHOULD BE NOTED THAT ANY ATTEMPT TO REPAIR THE GAME IN THE FIELD WITHOUT THE EXPRESS CONSENT OF THE FACTORY WILL IMMEDIATELY V O I D THE WARRANTY!!

IMPORTANT NOTES:

NEVER replace any components with anything other than exact replacement parts. (See Parts List located on Service Schematics.)

NEVER remove circuit boards/connections while power is on.

DO NOT replace the fuse with anything other than the proper value. A blown fuse indicates an overload condition within the game. Replacing the fuse with a higher value can cause severe damage to internal components if an overload occurs.

ALWAYS consult the manual before attempting repairs.

CORRESPONDENCE regarding this game should be addressed to:

GREMLIN INDUSTRIES, INC.

8401 Aero Drive

San Diego, California 92123

(714) 277-8700

IMPORTANT NOTES

An important service note is posted in the CoMOTION game and is repeated here for emphasis:

IF AT ANY TIME THE T.V. SCREEN SHOWS A MEANINGLESS DISPLAY OR THE GAME OTHERWISE MALFUNCTIONS, SIMPLY DROP A COIN INTO THE COIN MECHANISM. THIS SHOULD CORRECT THE PROBLEM. IF NOT, THE GAME REQUIRES SERVICE.

The circuitry in CoMOTION has been arranged so that the insertion of a quarter thru the coin mechanism will reset the system. This clears up temporary problems caused by power line disturbances, static, etc.

SERVICE TECHNICIAN NOTE:

The system reset circuitry described above requires that the coin counter is attached to the system. If there is a coin counter problem and no replacement is available, the game will function properly if a 10K Ohm resistor is connected across the coin counter input pins to the video logic board.

WARRANTY/FACTORY SERVICE INFORMATION

WARRANTY:

CoMOTION is under factory warranty (parts and labor) for the following time periods:

- A. All electronic components/connectors for one (1) year except:
1. Transformers - 90 days.
 2. Fuses/Lamps - No Warranty
 3. Control Push Button Switches - 90 days.

This Warranty covers defects/failures under normal use.

FACTORY SERVICE:

Should an assembly become defective, contact your local distributor. Factory authorization to return the assembly will be issued with transportation charges prepaid. If decided upon by factory representative an advance replacement will be made.

The assembly will be repaired and returned, transportation charges prepaid, if still in Warranty and no advance replacement made.

If the assembly is found to be damaged by misuse, improper attempts at repair or abuse, it will be repaired and returned with transportation and repair charges billed.

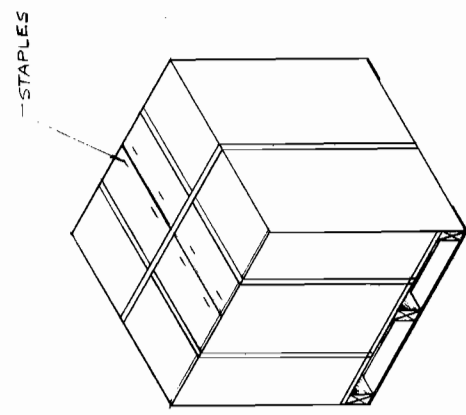
Out of Warranty assemblies, if returned to the factory with transportation charges prepaid, will be repaired and returned with transportation and repair charges billed.

In the instance of a defect of an assembly manufactured by other than GREMLIN INDUSTRIES, INC., every effort will be made to assist the customer in obtaining satisfaction from the original manufacturer.

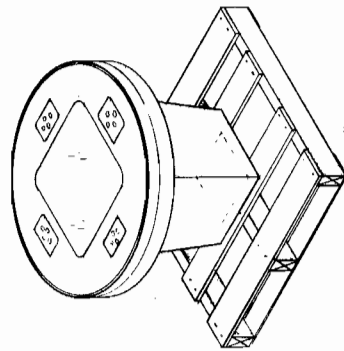
4 3 2 1

REVISIONS		DATE	APPROVED
ZONE	LTR	DESCRIPTION	
		INITIAL RE. ERIC	3-11-77
			UCG

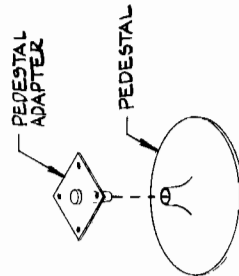
D C B A



STEP 1
 CUT AND REMOVE SHIPPING BANDS. REMOVE ALL STAPLES TO PREVENT DAMAGE TO CABINET. OPEN TOP OF CONTAINER AND REMOVE PACKING AND PEDESTAL. LIFT CONTAINER UP AND OFF GAME.

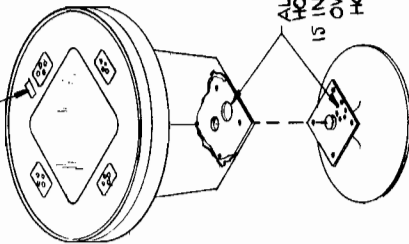


STEP 2
 REMOVE (2) 1/4" SHIPPING BOLTS THAT SECURE GAME TO PALLET. (DISCARD BOLTS). LIFT GAME UP AND REMOVE PEDESTAL ADAPTER.



STEP 3
 INSTALL PEDESTAL ADAPTER WITH TAPERED COLUMN DOWN INTO PEDESTAL AS SHOWN.

KEYS TO GAME TAPED TO TOP OF CABINET.



ALIGN VENT HOLES (IF FAN HOLES) IS INSTALLED PLACE OVER VENT HOLES

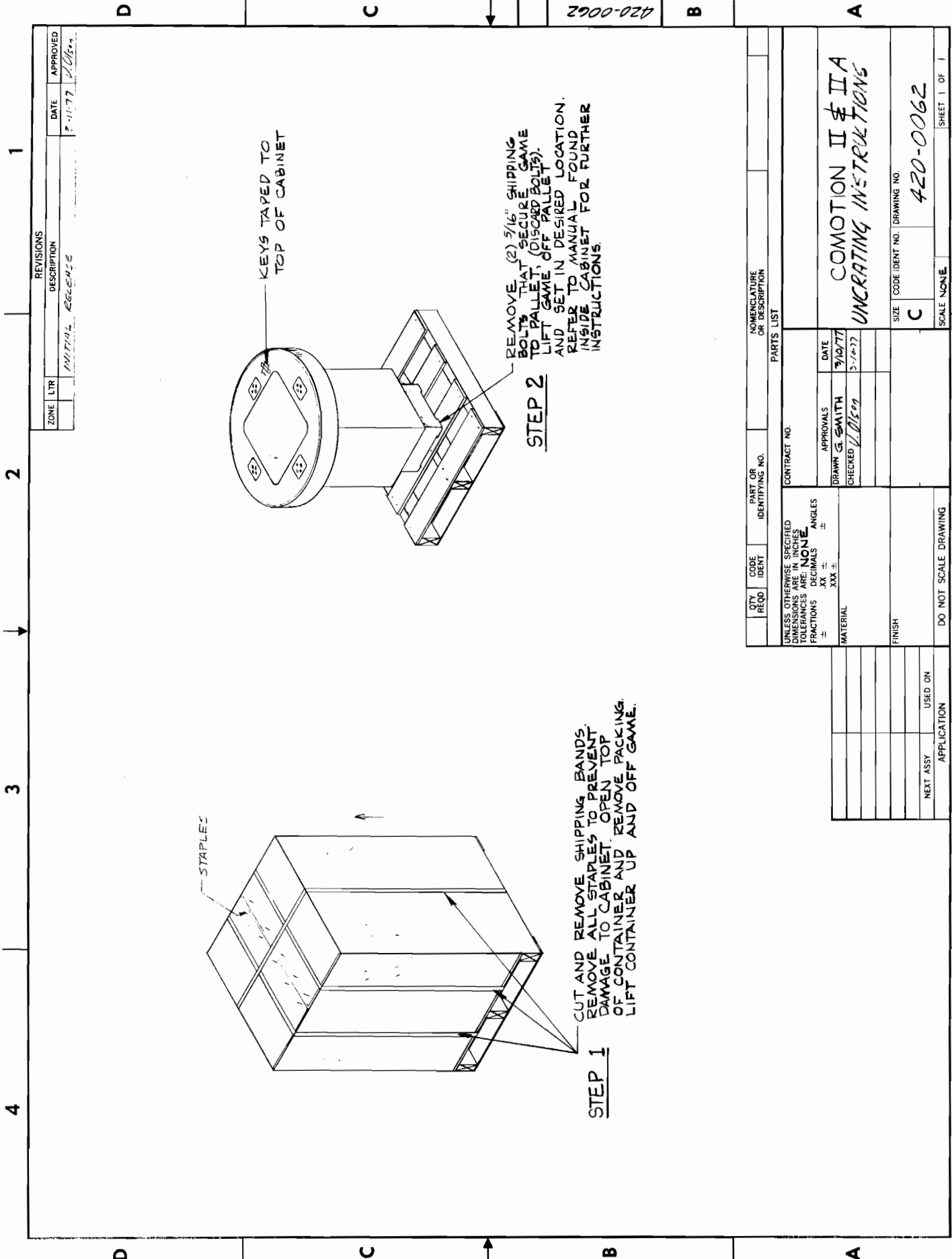
STEP 4
 LOWER GAME AND CENTER ON PEDESTAL MAKING SURE VENT HOLES ALIGN WITH HOLES IN PEDESTAL ADAPTER. SECURE WITH (4) 1/4 X 1" BOLTS (PACKED INSIDE CABINET). SET IN DESIRED LOCATION. REFER TO MANUAL FOR FURTHER INSTRUCTION.

QTY REQD	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION
PARTS LIST			
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: NONE FRACTIONS .XX ± DECIMALS .XXX ± ANGLES ±		CONTRACT NO.	
MATERIAL		DRAWN G. SMITH	DATE 3/10/77
FINISH		CHECKED J. J. S. / 507	DATE 3/11/77
NEXT ASSY		DO NOT SCALE DRAWING	
APPLICATION		SIZE	CODE IDENT NO. DRAWING NO.
		C	420-0061
		SCALE	NONE
		SHEET	OF
		1	1

Gresham Industries, Inc.
 2800 Bridge, Culverton 92628

COMOTION I & IA
 UNCRATING INSTRUCTIONS

4 3 2 1



STEP 1
 CUT AND REMOVE SHIPPING BANDS.
 REMOVE ALL STAPLES TO PREVENT
 DAMAGE TO CABINET. OPEN TOP
 OF CONTAINER AND REMOVE PACKING.
 LIFT CONTAINER UP AND OFF GAME.

STEP 2
 REMOVE (2) 5/16" SHIPPING
 BOLTS THAT SECURE GAME
 TO PALLET. (DISCARD BOLTS).
 LIFT GAME OFF PALLET
 AND SET IN DESIRED LOCATION.
 REFER TO MANUAL FOUND
 INSIDE CABINET FOR FURTHER
 INSTRUCTIONS

REVISIONS		DATE	APPROVED
ZONE	LTR	INITIAL	RELEASE
		8-11-77	V. Usher

QTY REQD	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	PARTS LIST
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCES ARE: FRACTIONS .XX ± DECIMALS .XXX ± ANGLES ±				
MATERIAL				
FINISH				
DO NOT SCALE DRAWING				
NEXT ASSY USED ON APPLICATION				
CONTRACT NO.				
DRAWN BY		SMITH	DATE	3/10/77
CHECKED BY		V. Usher	DATE	3-10-77
APPROVALS				
COMOTION II \$ IIA UNCRATING INSTRUCTIONS				
SIZE			CODE IDENT NO.	DRAWING NO.
C				420-0062
SCALE				NONE
SHEET				1 OF 1

OPERATION

I. GAME CONCEPT -

CoMOTION is a two, three or four player game of elimination in which each player controls the direction of a maneuverable arrow on the face of a video screen.

The perimeter of the screen is constructed as a wall with images which resemble bricks.

Each player utilizes his push buttons to maneuver his arrow. As it moves, the arrow leaves behind a "trail" of brick images, which form a continuous wall.

Each time a player crashes, one of his arrow counters is eliminated. When a player has exhausted his supply of arrow counters, he is eliminated from the remaining rounds of the game.

The object of the game is to avoid crashing into any of three possible obstacles. They are:

1. The perimeter walls
2. The brick "trails" left behind by any of the players including your own.
3. Any other player(s) arrow(s) including the "dead" arrows from non-participating player(s).

Each player is allotted a preset number of crashes (three to four). The number of crashes allotted each player is represented by the number of arrow counters appearing opposite his push buttons on the screen. The arrow counters appear in the perimeter walls of the game and are located in front of each player on the screen. Each time a player crashes, one of his arrow counters is eliminated. When a player has exhausted his supply of arrow counters, he is eliminated from the remaining rounds of the game.

II. OPERATION -

CoMOTION is equipped with four sets of player controls. The player controls are four push buttons which correspond to the arrow directions: Up, Right, Down and Left.

The arrows move alternately at a fixed rate, (until there is a crash, at which time game speed is accelerated) approximately once per second.

To change the direction of his arrow, a player momentarily depresses the push button which corresponds to the desired direction. The arrow will move in the new direction until changed again. A player's reaction time is important as turns must be made at precise moments during play.

As the arrows move, a series of tones are generated. Every player direction for each arrow produces a different pitch. There are sixteen different tones in all, four for every player.

As a result, there is an audible change anytime a player makes a turn. After each round, the screen is cleared. The remaining players are positioned at their starting locations on the screen, and the next round begins.

Whenever CoMOTION is not being played, an advertising sequence is initiated. The game plays itself to attract attention. While advertising is in action, the message "INSERT 25¢ FOR 2 PLAYERS, 50¢ FOR FOUR PLAYERS, THEN PRESS START" appears on the screen.

Anytime a player's arrow crashes with any of the obstacles, there is an audible explosion and accompanying flashing image appears on the screen at the point of impact. Whenever there is a crash, the following things happen:

1. One arrow counter of the player who crashes into the obstacle is removed. Anytime two players crash into one another, both players lose one arrow counter.
2. All of the obstacle bricks left behind by the player(s) who crashed are removed from the screen, and play resumes for the remaining players at a higher speed.

III. OPERATION - (Cont'd.)

3. If a brick "trail" is hit, a hole is left in the trail at the position where the player crashed.

The game proceeds for a series of "rounds" in which players eliminate themselves until one (or none) of them is left. The case where no players are left in a "round" occurs when two remaining players crash into each other.

The winner of the game is the player who has at least one arrow counter remaining, while all other players have none. It is possible for the game to end with "No Winner". This occurs when only two players are left in the game, each of which has one arrow counter remaining and they crash into each other.

E-Z Adjust TM Control Panel - CoMOTION has three adjustments, all of which are located on the back of the coin door. These three controls are:

1. VOLUME CONTROL -

Set to desired volume for boom and tones during the game. This also effects advertising boom volume if boom switch is "ON".

2. BOOM SWITCH -

Switch to "ON" position if boom is desired during advertising.

3. GAME END SWITCH -

Switch to desired game ending score. (3-4)

SYSTEM DESCRIPTION:

I. SEE SYSTEM BLOCK DIAGRAM

II. MICROPROCESSOR -

The game microprocessor is a Model 8080A and it functions as the Central Processing Unit (CPU) in the system. The CPU (1) is synchronized by a clock circuit which provides frequencies required by the CPU and the Video Timing Logic (14).

Address Bus (4) selects the memory addresses to be accessed by the CPU. It is routed to three subsystems:

1. Read Write Memory (6): A random Access Memory (Ram) used to form a first in/last out (stack) memory. Used to perform subroutine calls and returns, also used for temporary data storage during program execution.
2. Read Only Memory (Rom) (7): Stores program instructions for the CPU.
3. Address Multiplexer (8): Selects either CPU addresses or addresses from the Video Timing Logic. Used to address the Video Refresh Memory (9).

Data Bus (5) carries data to and from the CPU. It receives data from Read Write Memory, Read Only Memory, Video Refresh Memory and Input Ports (12). The Bus transmits data to Read Write Memory, Output Ports and Video Refresh Memory. The Input Ports accept player control data (19). The Output Port (13) initiates sound control and activates any external logic and indicators needed by the game.

Timing and Control Logic (11) generates synchronizing signals to keep system operation synchronized to the CPU. It controls:

1. Memory Read
2. Memory Write
3. Input Port Read
4. Output Port Write

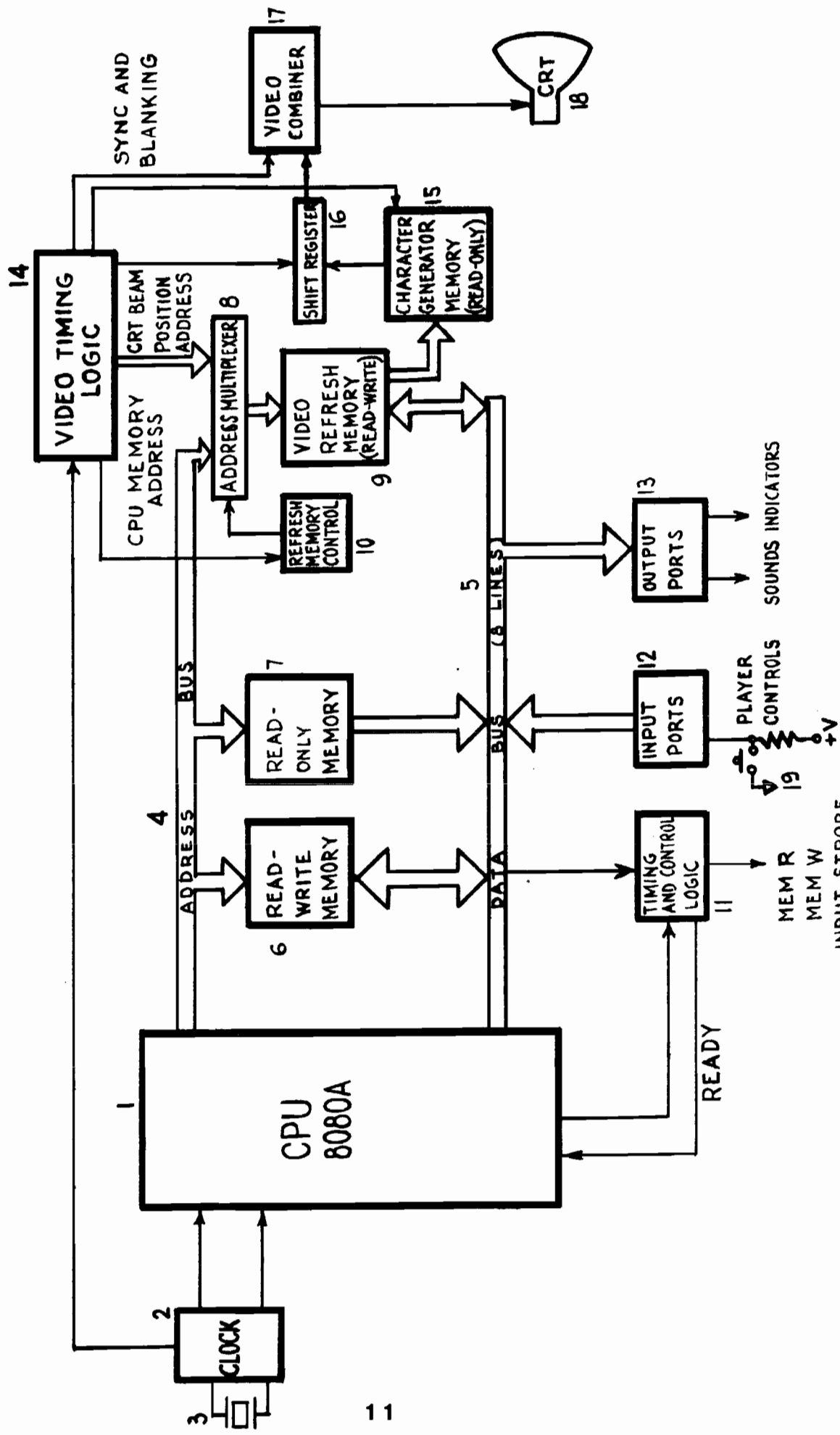
II. MICROPROCESSOR - (Cont'd.)

The remaining elements in the System Block Diagram convert (CPU) system information into a video display format. The T.V. monitor (18) uses a standard 525 scanline system.

Video Refresh Memory (9) stores information from the CPU which is read out as the CRT beam sweeps across the screen. It is addressed from two sources as controlled by Address Multiplexer (8). During vertical sweep retrace of the CRT, the Video Refresh Memory is addressed by the CPU so information can be updated. During scan time, Video Refresh Memory is addressed by Video Timing Logic (14). Refresh Memory Control (10) insures that address demands from Video Timing Logic and the CPU never occur simultaneously.

Character Generator Memory (15) provides a means for Video Refresh Memory to select 64 dots for each 8 word access. Each image, on the display, will have the dimensions of 8 dots high, and 8 dots wide. Shift register (16) develops this into a video signal. (Page 12.)

A tone Generator is driven by Output Ports (13). The CPU controls the frequency of the tone by loading a number (0-255) into the Output Ports (13). A direction change by a player will cause the CPU to load a different number into the Output Port, changing the tone. (Page 13.)

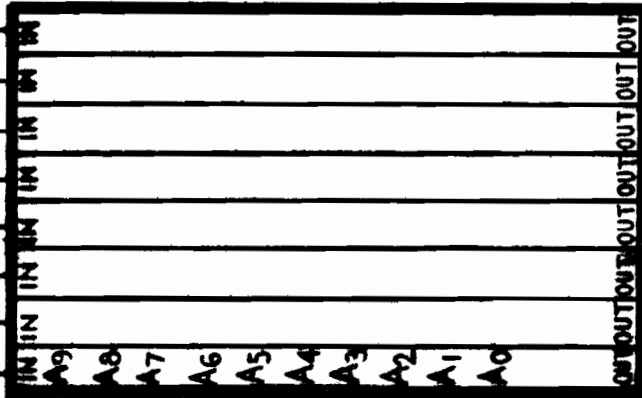


SYSTEM BLOCK DIAGRAM

MEMORY INPUT DATA
FROM MICROPROCESSOR

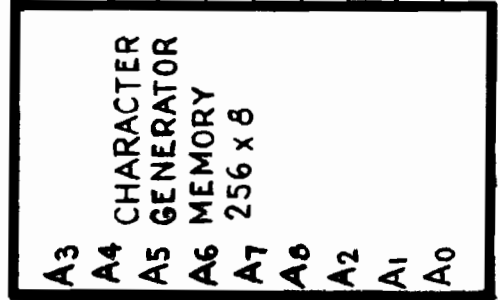
DATA BUS

7 6 5 4 3 2 1 0

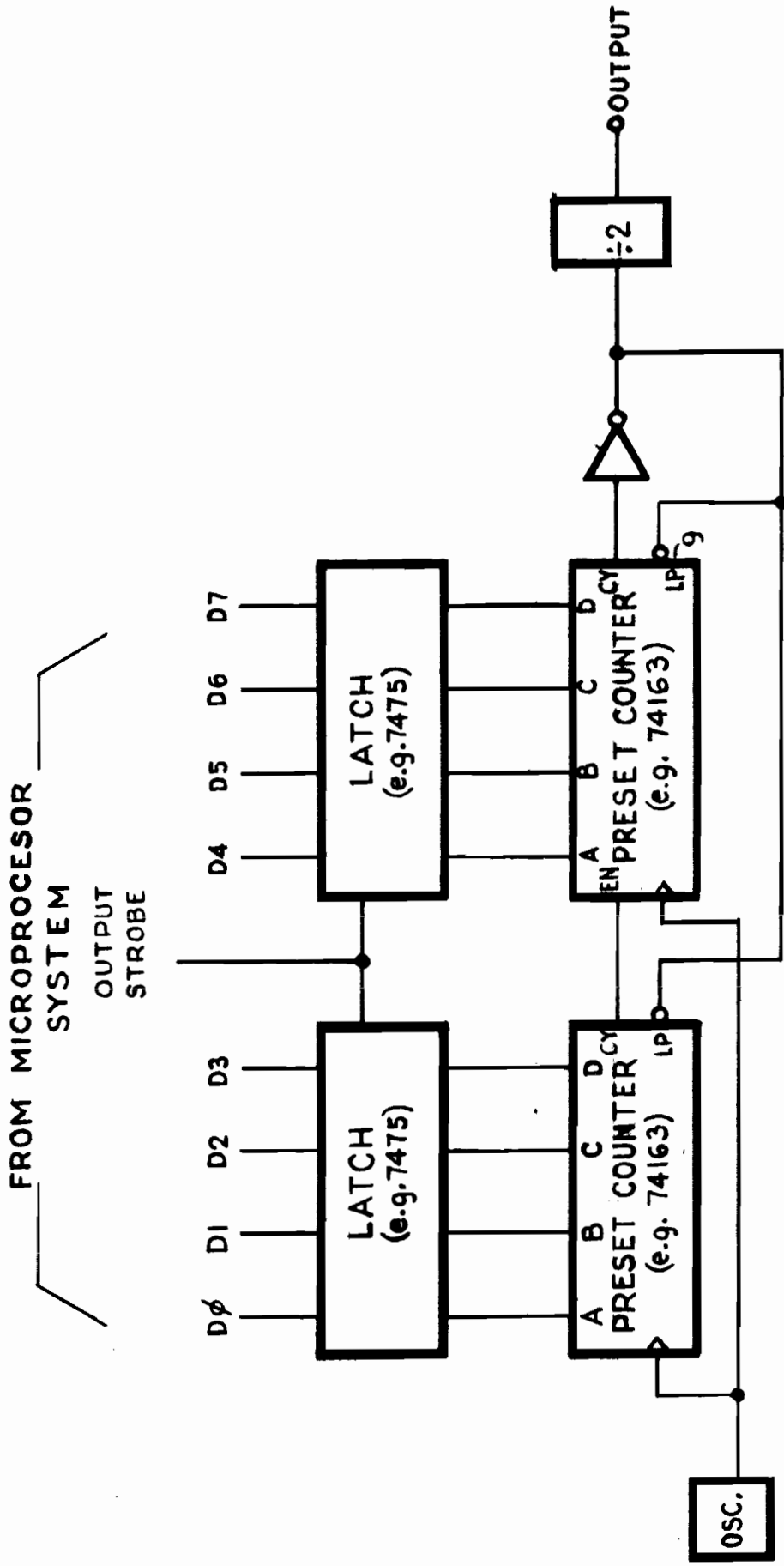


VIDEO
REFRESH
MEMORY
ADDRESS -
FROM
ADDRESS
MULTIPLEXOR

VIDEO
REFRESH
MEMORY
1024 x 8



EIGHT
OUTPUTS
TO SHIFT
REGISTER



TONE GENERATOR

MAINTENANCE

FACTORY ASSISTANCE:

TECHNICAL HELP IS AVAILABLE FROM THE GREMLIN FACTORY. IF A PROBLEM OCCURS WHICH CANNOT BE EASILY RESOLVED BY YOUR DISTRIBUTOR, A PHONE CALL OR LETTER TO THE FACTORY WILL BRING ATTENTION TO YOUR PROBLEM BY A TRAINED REPRESENTATIVE.

NOTE: IF AT ANY TIME THE T.V. SCREEN SHOWS A MEANINGLESS DISPLAY OR THE GAME OTHERWISE MALFUNCTIONS, DROP A COIN IN THE COIN MECHANISM. THIS SHOULD CORRECT THE PROBLEM. IF NOT, THE GAME REQUIRES SERVICE.

EQUIPMENT: THE FOLLOWING IS A RECOMMENDED LIST FOR ANYONE ATTEMPTING TO SERVICE CoMOTION.

1. Oscilloscope - 50 Mhz or wider band width
2. DVM (Digital Volt Meter)
3. OHM Meter
4. Logic Probe
5. Solder Station - in most cases a digital IC can only take about 300* of heat for 10 seconds. (a 75 watt soldering iron is much higher). Recommended wattage should be 40 watts or less.
6. Jumpers
7. Replacement parts including game programs:
1024 x 4 prom 316-0007 and 316-0008, 316-0009,
and 316-0010.

MAINTENANCE PROCEDURES:

COMOTION POWER SUPPLY MALFUNCTION:

1. Remove Output Connectors
2. Initial Tests: (GND lead to C-18 negative terminal located off board.)
 - a. +9 at "+" of C-18
 - b. +19v at C-6 (4700 mfd)
 - c. -19v at C-5 (4700 mfd)
 - d. -12v at pin 11
 - e. +12v at pin 12
 - f. +5v at pins 18-20
 - g. zero v (GND) at pins 14-16
3. If adjustments are required, attach meter ground to pins 14, 15 or 16 or equivalent local ground and:
 - a. +5v adjust - input lead to pins 18, 19, 20 and adjust R-9 for +5.0 to +5.1 VDC.
 - b. +12v adjust - input lead to pin 12 and adjust R-10 for +11.5 to +12.1 VDC.
 - c. -12v adjust - input lead to pin 11 and adjust R-10 for -11.5 to -12.1 VDC
4. If initial test is good, attach output connectors to Video Logic Board. Repeat Step 2.
 - a. If readings differ from those previously taken, a loading problem exists on the Video Logic Board.

No -12VDC or 5VDC on the Video Logic Board: (Power Supply Normal)

Video Logic Board Schematic (VLBS) (SH. 2). CHECK U-65, C-29 for open/short. CHECK R-40, C-12, .D-2 (VLBS) (SH. 1).

CoMOTION POWER SUPPLY MALFUNCTION: (Cont'd.)

No +12VDC at CPU: (Power Supply Normal)

(VLBS) (SH. 2). CHECK U-65, C-28. (VLBS) (SH. 1) CHECK C-23, C-25.

VIDEO LOGIC BOARD MALFUNCTION:

No Ø1, Ø2 CLOCKS: (Ref. Fig. 4A)

(VLBS, (SH. 1). CHECK U-32 pins 1 and 3 for 20.79 MHZ. CHECK U-31 pins 14, 13, 12, and 11 for 150 nsec sinewave. CHECK U-17 pins 1, 3, 4, and 10. CHECK latch network U-18 and U-8. CHECK high voltage outputs of U-30 pins 3 and 6. If not present, remove driver transistor. Should U-30 now show output, replace driver transistor, if still not present replace U-30. U-45 could load down Ø1 clock.

No Coin Start:

(VLBS) (SH. 1) CHECK output U-9 pin 6. If signal not present, lift U-10 pin 5. Should signal return, replace U-10. If still not present, check output of U-8 pin 3. CHECK D-8 pull up diode and C-18. CHECK U-14. U-32 could be shorting signal to Q₃ and Q₄.

Screen Flashes: (Similar to COIN START clear)

Power Interrupt Board bad (Q-3, U-2). Wires on coin box leading to Antenna of power Interrupt are intermittent. Wires on +VAC from power supply open/intermittent. Power Interrupt Board not secure on TP3 and TP4.

No Coin Meter Action:

(VLBS) (SH. 1) Signal from U-8 pin 11 feeds current limiter R-27 to Q₄. Saturated Q₄ turns high current transistor Q₅. Either Q₄ or Q₅ faulty, will inhibit meter.

No Player Control:

(VLBS) (SH. 1) Input accepted through U-12 and U-13 via data lines when strobe IND2 signal is generated through U-18 from U-45 and U-51 (status latch). CHECK U-18 pin 11, U-45 pin 8, U-45 pin 11, U-51 pin 10 for strobe pulse.

VIDEO LOGIC BOARD MALFUNCTION: (Cont'd.)

No Game Time Select:

(VLBS) (SH. 1). Input accepted through U-10 and U-11 via data lines when strobe IND1 signal is generated through U-18 from U-45 and U-51. CHECK U-18 pin 3, U-45 pin 8, U-45 pin 11, U-51 pin 10 for strobe pulse.

Meaningless Display on Screen: (Inserting coin does not correct problem)

Possible areas:

1. A program malfunction
 - a. Check ROM sockets, U-2, U-3, U-4 and U-5.
 - b. Power Interrupt Board bad (Q-3, U-2)
 - c. Power Interrupt Board not properly secure on TP3 and TP4.
2. A data transfer malfunction
 - a. Test the CPU Data Bus by ensuring proper voltage levels. Pullup resistors are used to make memory outputs compatible with the 8080A. High State Logic on the Data Bus should be 3.3v minimum. For involved problems in this area contact GREMLIN INDUSTRIES.

Characters on Screen not correct: (Wrong image behaves normally)

(VLBS) (SH. 2). Use character generator code table to isolate possible bad RAM (U-35, U-36, U-37, U-38, U-39, U-40, U-41, or U-42). Also probable are U-22, U-23 (data buffers), U-24, U-25, U-26 (multiplexers), U-29 and U-43 (character Proms) and U-49 (shift register).

No Video: (Ref. Fig. 4B, 4C, 4D)

(VLBS) (SH. 2) CHECK U-54, U-53 circuitry for H reset. U-52 pin 1, clock for horizontal scan. U-55, U-58 provides timing for vertical blanking.

VIDEO LOGIC BOARD MALFUNCTION: (Cont'd.)

Bad Video:

(VLBS) (SH. 2) Bad video could be vertical roll or horizontal sliding. CHECK U-55 pin 12 and U-56 pin 4 of horizontal or vertical generators. CHECK U-63 pins 12 and 13 for vertical and horizontal blanking. U-64 develops sync pulses.

Monitor Malfunction:

Refer to Motorola Service Manual (File VP 12). This manual included with CoMOTION schematics.

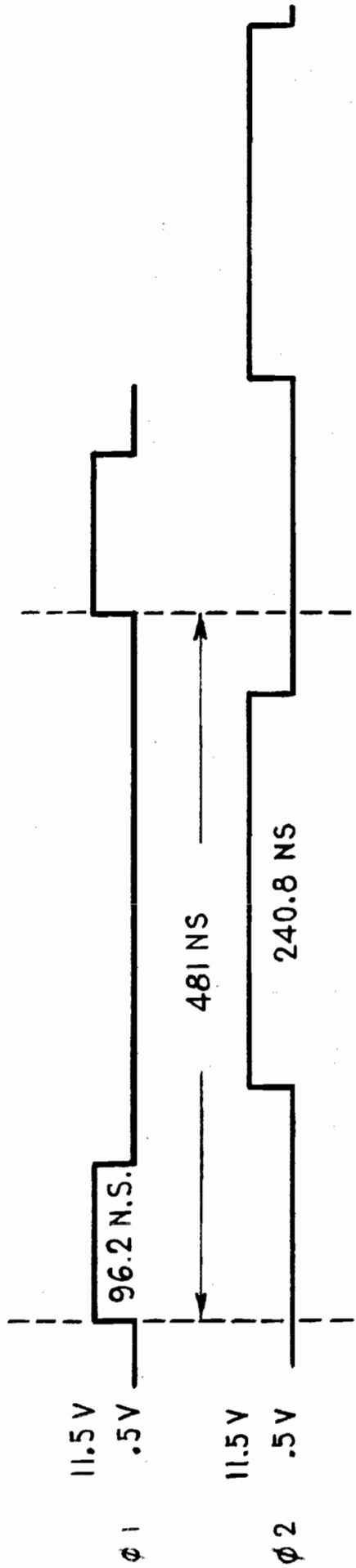
Audio Tones; Sour/None:

(VLBS) (SH. 2). U-68, U-61, U-62, U-66, U-67, U-60 comprise tone generator. Amplifier on Power Supply Board (U-4, Q₅, Q₃, Q₈, Q₉). Could also be problem area.

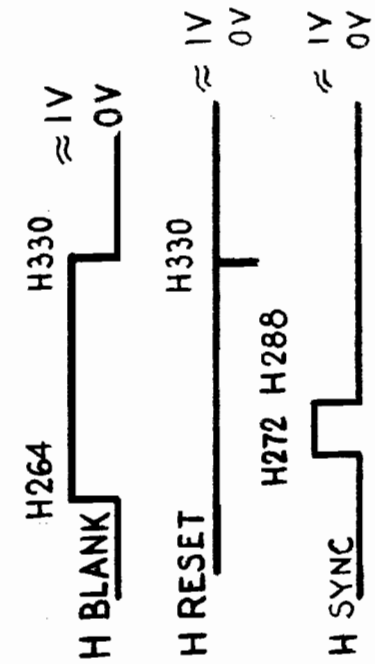
Boom; Sour/None:

(VLBS) (SH. 1, SH. 2). D-6, Q₁₀, Q₉, Q₁₁, U-5, Q₇, Q₈, Generates Boom. Amplifier section on Power Supply Board (U-4, Q₅, Q₃, Q₈, Q₉), also probable.

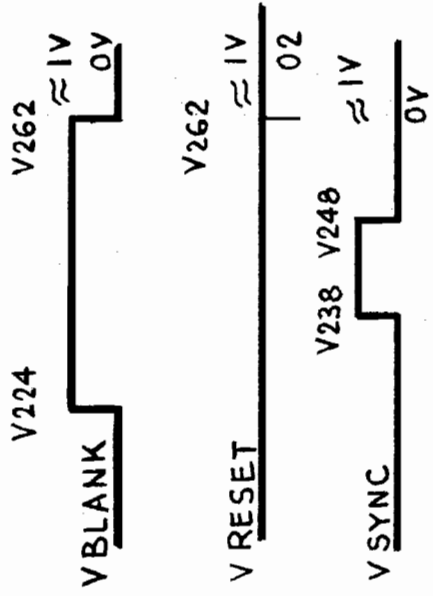
(A)



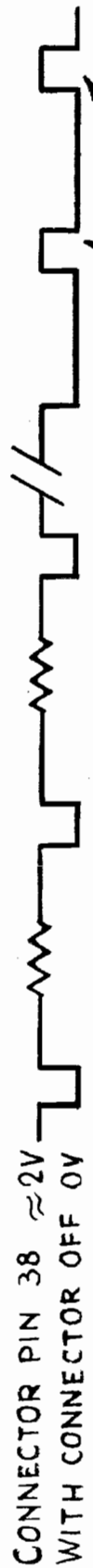
(B)



(C)



(D)



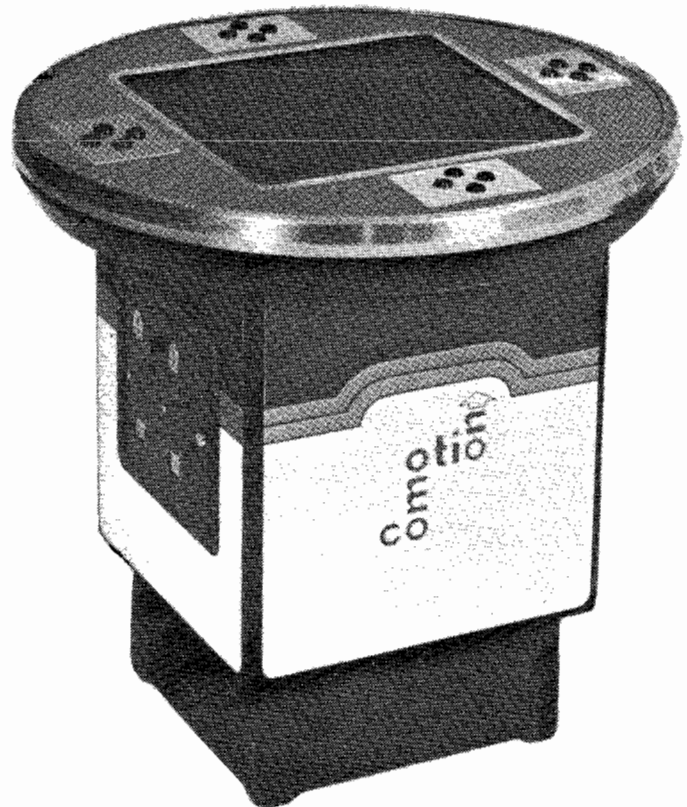
4 INVERTED HORIZ. DURING Y BLANK

CHARACTER CODE TABLE

I.C. (U#)							I.C. (U#)						
37	38	39	40	41	42		37	38	39	40	41	42	
0	0	0	0	0	0	┌	0	1	0	0	0	0	F
0	0	0	0	0	1	└	0	1	0	0	0	1	H
0	0	0	0	1	0	└	0	1	0	0	1	0	I
0	0	0	0	1	1	┘	0	1	0	0	1	1	L
0	0	0	1	0	0	—	0	1	0	1	0	0	N
0	0	0	1	0	1		0	1	0	1	0	1	O
0	0	0	1	1	0	(BLANK)	0	1	0	1	1	0	P
0	0	0	1	1	1	(BLOW UP)	0	1	0	1	1	1	R
0	0	1	0	0	0	↑	0	1	1	0	0	0	S
0	0	1	0	0	1	→	0	1	1	0	0	1	T
0	0	1	0	1	0	↓	0	1	1	0	1	0	W
0	0	1	0	1	1	←	0	1	1	0	1	1	Y
0	0	1	1	0	0	(BLANK)	0	1	1	1	0	0	Z
0	0	1	1	0	1	A	0	1	1	1	0	1	4
0	0	1	1	1	0	C	0	1	1	1	1	0	5
0	0	1	1	1	1	E	0	1	1	1	1	1	6



comotion I
2,3,4 PLAYER SITDOWN



comotion II
2,3,4 PLAYER STANDUP

PARTS LIST FOR
CoMOTION I -- (708-000)

<u>DESCRIPTION</u>	<u>QUANTITY USED</u>	<u>PART NUMBER</u>
Access door assembly	1	252-0037
Base assembly	1	265-0001
Bracket, cash box	1	252-0015
Bracket, pivot	1	250-0089
Cabinet top assembly	1	252-0028
Cash box	1	220-0013
Chassis hanger	1	250-0045
Chassis hanger	1	250-0044
Clamp, storage rod	1	250-0090
Coin mechanizm	1	220-0030
Cover, cash box	1	220-0016
Frame, glass	1	280-0029
Glass table top	1	275-0003
Guide pin assembly	1	280-0038
Hinge	2	250-0053
Hinge assembly	1	280-0034
Light bracket	1	250-0063
Light window	1	253-0019
Lock assembly	1	220-0023
Lock catch plate	1	250-0047
Monitor	1	200-0002
Monitor support	1	250-0043
Monitor support	1	250-0042
Monitor support	2	250-0041
Monitor support	2	250-0040
Operator switch assembly	2	808-0004
Operator switch assembly	2	808-0002
Pedestal	1	140-0008
Pedestal adapter	1	250-0039
Reinforcing plate	1	250-0039
Retainer clip	1	250-0049

CoMOTION I PARTS LIST:(Cont'd.)

<u>DESCRIPTION</u>	<u>QUANTITY USED</u>	<u>PART NUMBER</u>
Retainer, door latch	1	250-0050
Retainer, rod	1	250-0088
Rod	1	250-0091
Sealant, foam	1	320-0022
Sealant, foam	4	320-0021
Sealant, foam	3	320-0020
Table shroud	1	253-0017
Trim ring assembly	1	265-0006

PARTS LIST FOR

CoMOTION II and CoMOTION IIA
(708-0002 and 708-0004)

<u>DESCRIPTION</u>	<u>QUANTITY USED</u>	<u>PART NUMBER</u>
Access door assembly	1	252-0038
*Base assembly	1	265-0002
**Base assembly	1	265-0003
Bracket, pivot	1	250-0089
Cabinet tip assembly	1	252-0029
**Cash box	1	220-0039
*Cash box body	1	220-0012
*Cash box cover	1	220-0016
Chassis hanger	1	250-0045
Chassis hanger	1	250-0044
Clamp, storage, rod	1	250-0090
*Coin mechanism	1	220-0030
**Coin mechanism	1	220-0026
Color screen, table	1	253-0018
**Frame, coin mechanism	1	220-0026
Glass table top	1	275-0003
Guide pin assembly	1	280-0038
Hinge, ass'y., access door	1	280-0034
Hinge, top	2	250-0067
Lock ass'y.	1	220-0023
Lock catch	1	250-0098
**Lock, door, mech., coin	1	220-0027
**Mech., coin, dual	1	220-0017
Monitor	1	200-0002
Monitor support	1	250-0043
Monitor support	1	250-0042
Monitor support	2	250-0041
Monitor support	2	250-0040
Operator switch assembly	2	808-0004
Operator switch assembly	2	808-0002
Operator switch plate	4	250-0036
Reinforcing plate	1	250-0046
Retainer, clip door	1	250-0049

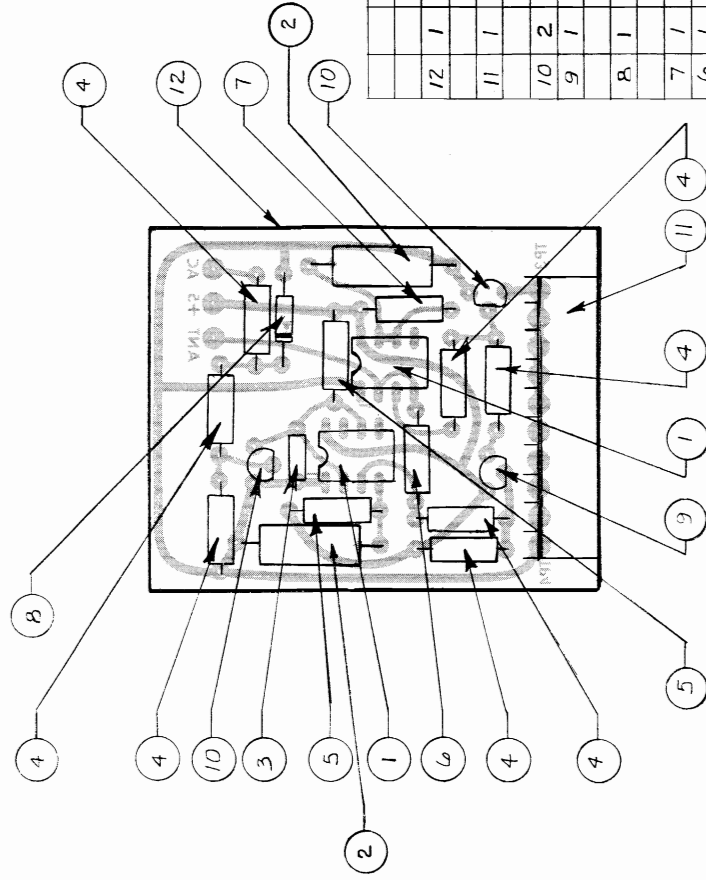
CoMOTION II AND IIA PARTS LIST: (Cont'd.)

<u>DESCRIPTION</u>	<u>QUANTITY USED</u>	<u>PART NUMBER</u>
Retainer, door latch	1	250-0050
Retainer, rod	1	250-0088
Rod	1	250-0091
Sealant, foam	1	320-0022
Sealant, foam	4	320-0021
Sealant foam	3	320-0020
Shadow mask	1	253-0015
Switch actuator	1	250-0064
Table shroud	1	253-0017
Trim ring assembly	1	265-0006

The primary difference between CoMOTION II and CoMOTION IIA is the coin boxes. CoMOTION II uses the COIN MECH coin box and CoMOTION IIA uses the U.S. Billiards coin box.

* USED FOR CoMOTION II ONLY.

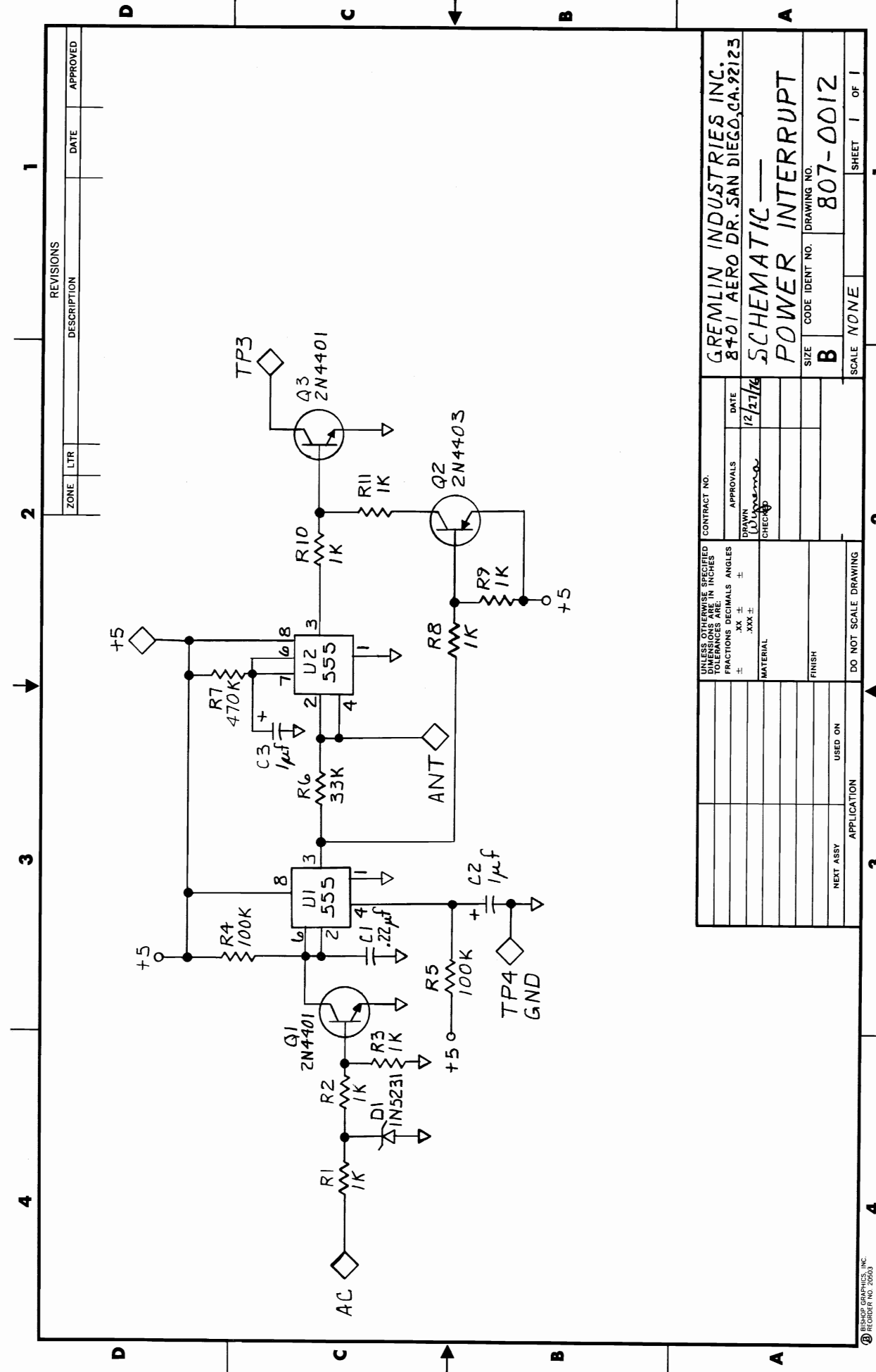
** USED FOR CoMOTION IIA ONLY.



12	1	170-0073	P. C. BOARD
11	1	212-0017	CONN FEMALE 10PIN RT ANGLE
10	2	482-0014	TRANSISTOR 2N4401
9	1	482-0006	TRANSISTOR 2N4403
8	1	481-0008	DIODE ZENER IN5231
7	1	471-0474	RES. 470K OHM 1/2 W 5%
6	1	471-0333	RES. 33K OHM 1/2 W 5%
5	2	471-0104	RES. 100K OHM 1/2 W 5%
4	7	471-0102	RES. 1K OHM 1/2 W 5%
3	1	152-0002	CAP. F. .22M 100V C1
2	2	150-0009	CAP. E. 1M 50V
1	2	314-0001	IC TIMER NESS5

GREMLIN INDUSTRIES INC.
 8401 AERO DR. SAN DIEGO, CA. 92123
 POWER INTERRUPT ASSY
 PARTS OVERLAY

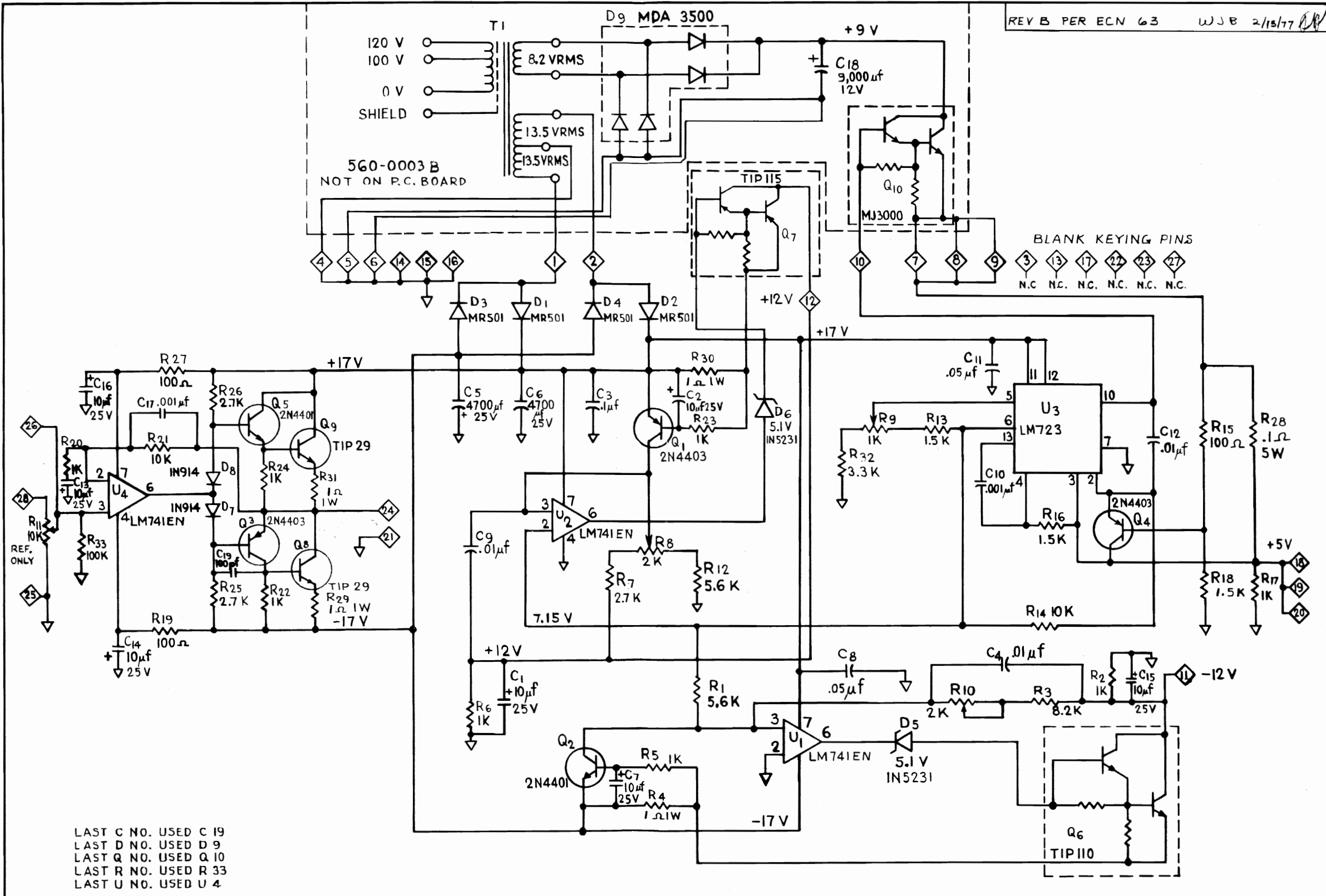
807-0012



ZONE	LTR	DESCRIPTION	DATE	APPROVED

UNLESS OTHERWISE SPECIFIED TOLERANCES ARE:		CONTRACT NO.	APPROVALS	DATE
±	FRACTIONS DECIMALS ANGLES	8401 AERO DR. SAN DIEGO, CA. 92123	(Signature)	12/27/76
±	.XX ±	SCHEMATIC —		
±	.XXX ±	POWER INTERRUPT		
	MATERIAL	SIZE	CODE IDENT NO.	DRAWING NO.
	FINISH	B	807-0012	807-0012
	USED ON	SCALE	NONE	SHEET 1 OF 1
	APPLICATION			

REV B PER ECN 63 WJB 2/18/77



560-0003 B
NOT ON P.C. BOARD

BLANK KEYING PINS
3 N.C. 13 N.C. 17 N.C. 22 N.C. 23 N.C. 27

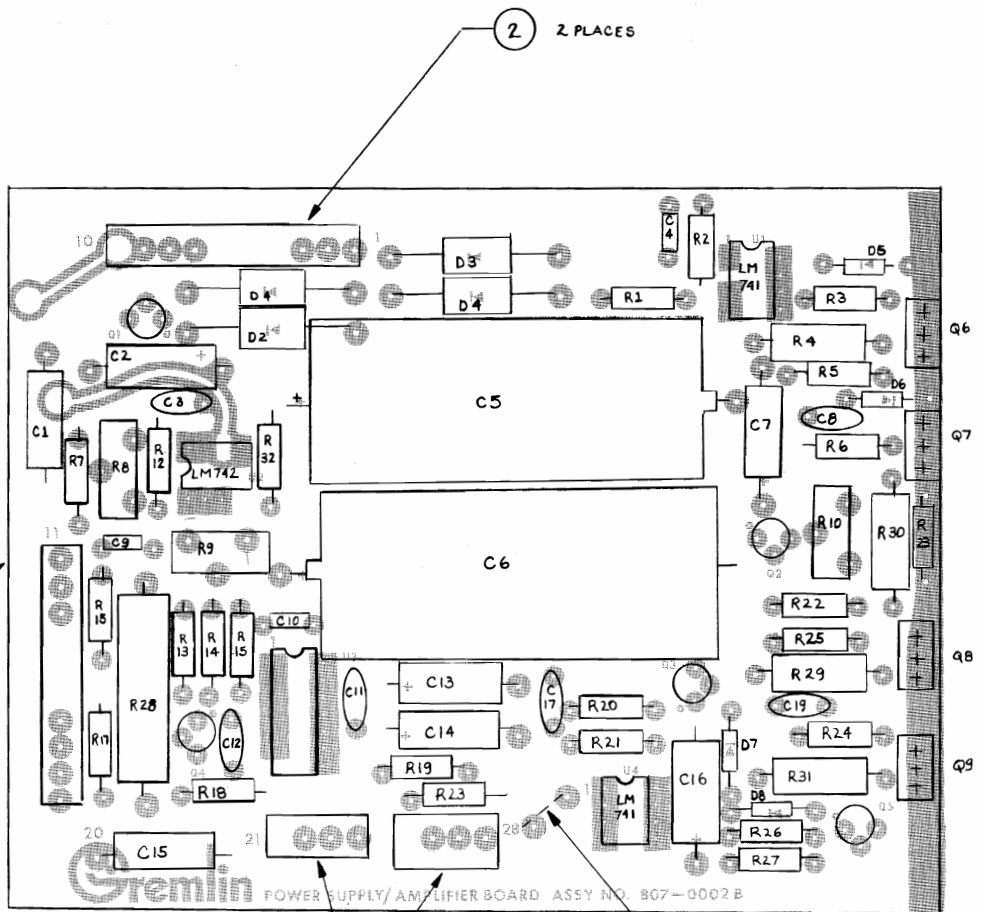
LAST C NO. USED C 19
LAST D NO. USED D 9
LAST Q NO. USED Q 10
LAST R NO. USED R 33
LAST U NO. USED U 4

GREMLIN INDUSTRIES INC.
8401 AERO DR. SAN DIEGO, CA. 92123

REVISIONS	TITLE
	SCHEMATIC BLOCKADE PWR. SUPPLY
DRAWN Joe M. CHECKED	SCALE
APPROVED	NONE
DRAWING NO.	807-00026

8 7 6 5 4 3 2 1

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
B	PERECN 63		7-6-77	KB



3	2	212-0004	CONN. MALE 4 PIN
2	2	212-0003	CONN. MALE 10 PIN
1	1	170-0058A	P.C. BOARD
Q6Q7	2	482-0016	XISTOR TIP 27
Q7	1	482-0015	XISTOR TIP 115
Q6	1	482-0013	XISTOR TIP 110
Q2 Q8	2	482-0014	XISTOR 2N4401
Q1 Q3 Q4	3	482-0006	XISTOR 2N4403
D7 D8	2	481-0006	DIODE 1N914 OR 1N4148
D9 D6	2	481-0008	DIODE ZENER 1N5231
D1-D4	4	481-0004	DIODE MR 501
C19	1	151-0002	CAP. CER. 100P 50V
C10 C17	2	151-0008	CAP. CER. .001M 50V
C8 C11	2	151-0001	CAP. CER. .05M 50V
C5 C6	2	150-0019	CAP. E. 4700M 25V
C4 C7 C12	3	151-0011	CAP. CER. .01M 50V
C3	1	151-0012	CAP. CER. .1M 50V
C1 C2 C7 C13 C14 C16	7	150-0004	CAP. E 10M 25V
R7	1	475-0004	POT. 1K TRIMMER
R8 R10	2	475-0005	POT. 2K TRIMMER
R28	1	475-0001	RES. .1 OHM 5W 3%
R19 R19 R27	3	471-0101	RES. 100 OHM 1/2W 5%
R4 R29-R31	4	472-0010	RES. 1 OHM 1W 5%
R29	1	471-0104	RES. 100K OHM 1/2W 5%
R22	1	471-0232	RES. 3.3K OHM 1/2W 5%
R14 R21	2	471-0103	RES. 10K OHM 1/2W 5%
R19 R16 R18	3	471-0152	RES. 1.5K OHM 1/2W 5%
R7 R25 R24	3	471-0272	RES. 2.7K OHM 1/2W 5%
R3	1	471-0822	RES. 8.2K OHM 1/2W 5%
R1 R10 R11 R12 R13 R22-R24	8	471-0102	RES. 1K OHM 1/2W 5%
R1 R12	2	471-0562	RES. 5.6K OHM 1/2W 5%
U3	1	313-0001	I.C. LM723
U1 U2 U4	3	313-0004	I.C. LM741 EN

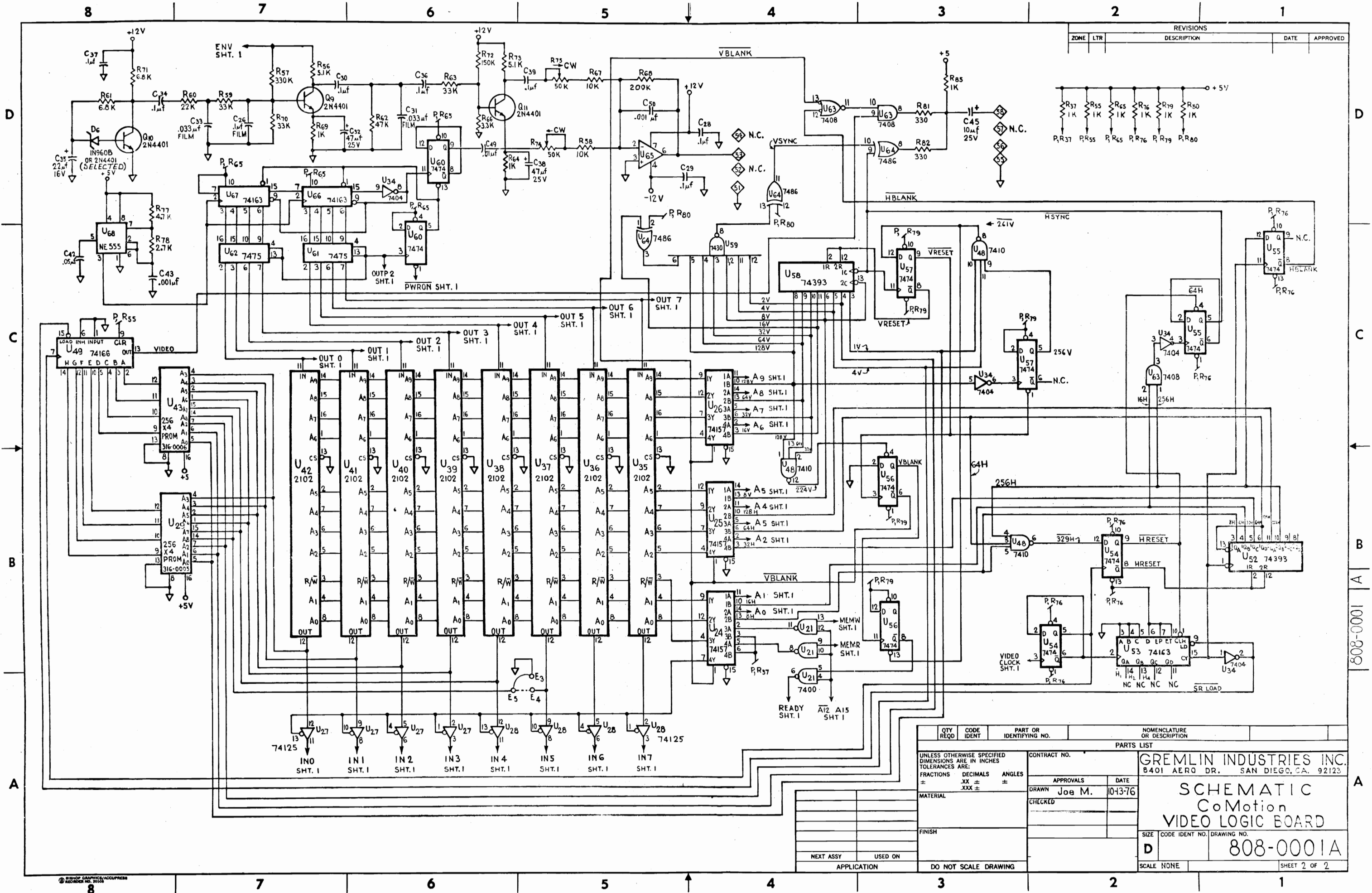
ITEM NO.	QTY	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION
PARTS LIST			
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE FRACTIONS DECIMALS ANGLES XX XXX		CONTRACT NO.	
MATERIAL		APPROVALS DATE	
FINISH		CHECKED DATE	
NEXT ASSY USED ON		APPK Wignema 7-7-77	
APPLICATION		DO NOT SCALE DRAWING	
		GREMLIN INDUSTRIES INC. 8401 PERO DR SAN DIEGO, CA. 92123	
		POWER SUPPLY/AMP. BOARD BLOCKADE PARTS OVERLAY	
SIZE	CODE IDENT NO.	DRAWING NO.	
D		807-0002B	
SCALE 2-X		SHEET 1 OF 1	

714-0001	HUSTLE
70E-0004	COMCTION IIA
70E-0002	COMCTION II
70E-0001	COMCTION I
707-0001	BLOCKADE

CMIT RII

807-0002 B

A

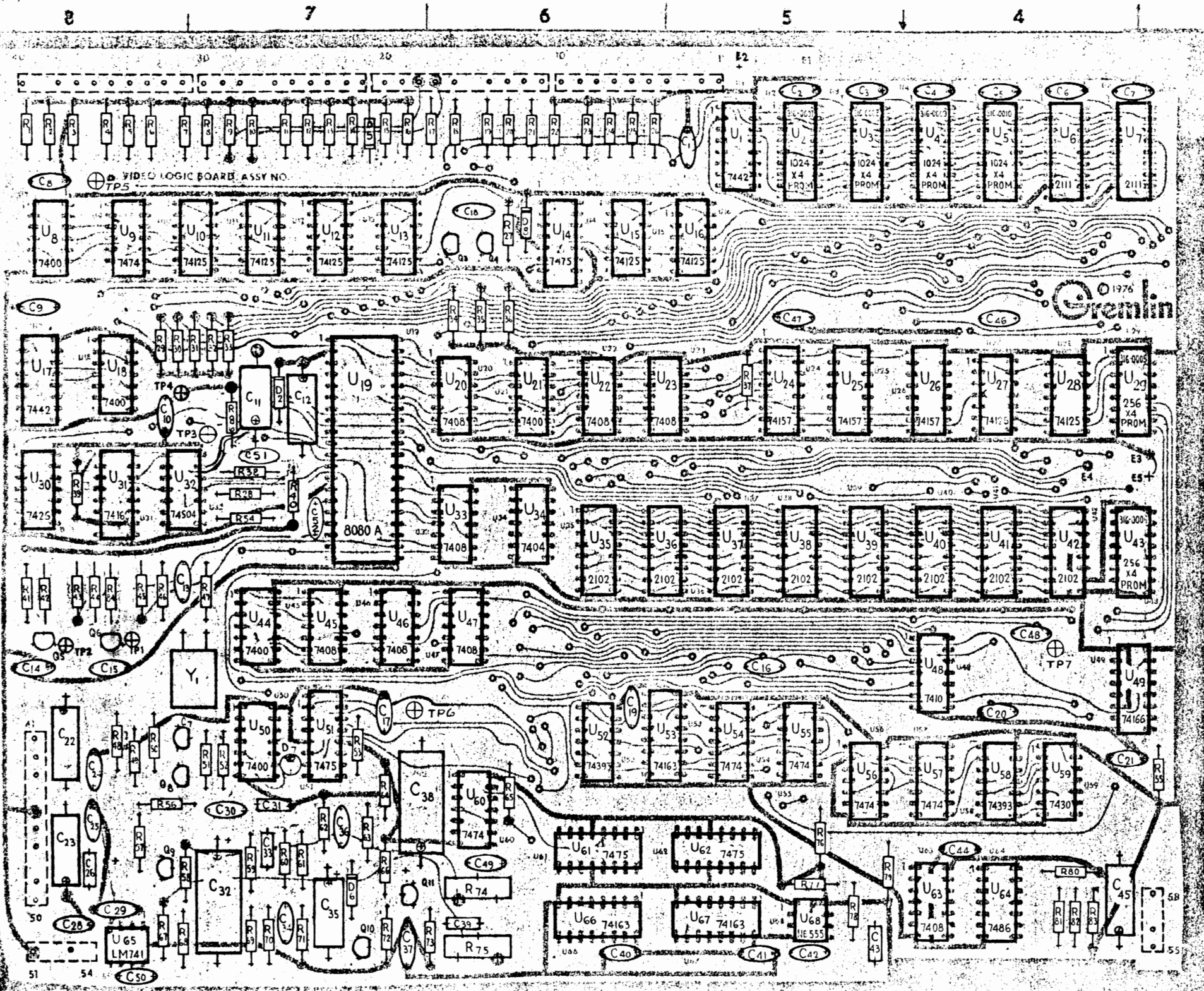


ZONE		LTR		REVISIONS		DATE	APPROVED

QTY REQD	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION
PARTS LIST			
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE:		CONTRACT NO.	
FRACTIONS	DECIMALS	ANGLES	
±	±	±	
MATERIAL		APPROVALS	DATE
FINISH		DRAWN Joe M.	10-13-76
NEXT ASSY USED ON		CHECKED	
APPLICATION		DO NOT SCALE DRAWING	
		SCALE NONE SHEET 2 OF 2	

GREMLIN INDUSTRIES INC.
 8401 AERO DR. SAN DIEGO, CA. 92123
SCHEMATIC
 CoMotion
VIDEO LOGIC BOARD
 SIZE CODE IDENT NO. DRAWING NO.
D 808-0001A

808-0001A



		REVISIONS	
ZONE	LTR	DESCRIPTION	DATE
U4	1	316 - 0006	I.C. 256X4 PROM
U5	1	316 - 0010	I.C. 1024X4 PROM
U4	1	316 - 0009	I.C. 1024X4 PROM
U3	1	314 - 0046	I.C. 74504
TP1-TP7	7	211 - 0004	TEST POINT PINS
Y1	1	230 - 0006	XTAL 20.790 MHZ CLK
U2-U5 (REF. ONLY)	4	213 - 0002	SKT. 16 PIN DUAL INLN
J6-J7	2	212 - 0004	CONN. MALE 4 PIN
J1-J5	5	212 - 0003	CONN. MALE 10 PIN
P.C.B. 1	1	170 - 0057A	P.C. BOARD B/A LOGIC
Q8	1	482 - 0006	XISTOR 2N 4403
Q4-Q7-Q9-Q11	7	482 - 0014	XISTOR 2N 4401
Q3	1	482 - 0010	XISTOR PE 8050
D7	1	390 - 0003	L.E.D. RED
D6	1	481 - 0003	DIODE ZENER IN 960B
D5	1	481 - 0001	DIODE IN 4002
D2	1	481 - 0008	DIODE ZENER IN 5231
D8	1	481 - 0006	DIODE IN 914 OR IN 4148
C50	1	151 - 0008	CAP. CER. .001 M 50 V
C49-C51	2	151 - 0011	CAP. CER. .01 M 50 V
C43	1	152 - 0007	CAP. F. .001 M 250 V
C32-C38	2	150 - 0012	CAP. E. 47 M 25 V
C31-C33	2	152 - 0015	CAP. F. .033 M 250 V
C25-C26-C34-C36-C37-C38-C39	8	151 - 0012	CAP. CER. .1 M 50 V
C27-C35-C41	3	150 - 0015	CAP. E. 22 M 16 V
C26	1	152 - 0001	CAP. F. 1 M 100 V
C19	1	151 - 0005	CAP. CER. 680 P 50 V
C12-C22-C23-C45	4	150 - 0004	CAP. E. 10 M 25 V
C29-C40-C42-C44-C46-C48	8	151 - 0001	CAP. CER. .05 M 50 V
C1-C10-C11-C13-C14-C15-C16-C17-C18-C20-C21-C24	18	151 - 0001	CAP. CER. .05 M 50 V
C52	1	151 - 0001	CAP. CER. .05 M 50 V
R74-R75	2	475 - 0008	POT. 50 K OHM CTS
R38	1	471 - 0222	RES. 22 K OHM 1/2 W 5%
R78	1	471 - 0272	RES. 27 K OHM 1/2 W 5%
R62	1	471 - 0473	RES. 47 K OHM 1/2 W 5%
R72	1	471 - 0154	RES. 150 K OHM 1/2 W 5%
R77	1	471 - 0472	RES. 47 K OHM 1/2 W 5%
R69	1	471 - 0224	RES. 220 K OHM 1/2 W 5%
R61-R71	2	471 - 0682	RES. 6.8 K OHM 1/2 W 5%
R59-R63-R66-R70	4	471 - 0333	RES. 33 K OHM 1/2 W 5%
R57	1	471 - 0334	RES. 330 K OHM 1/2 W 5%
R53	1	471 - 0101	RES. 100 OHM 1/2 W 5%
R52	1	471 - 0471	RES. 470 OHM 1/2 W 5%
R49	1	471 - 0150	RES. 15 OHM 1/2 W 5%
R48-R51-R56-R73	4	471 - 0512	RES. 51 K OHM 1/2 W 5%
R46-R47-R61-R62	4	471 - 0331	RES. 330 OHM 1/2 W 5%
R43-R45	2	471 - 0220	RES. 22 OHM 1/2 W 5%
R42-R28-R84-R84-R86	5	471 - 0221	RES. 220 OHM 1/2 W 5%
R58-R67	2	471 - 0103	RES. 10 K OHM 1/2 W 5%
R29-R36-R60	9	471 - 0223	RES. 22 K OHM 1/2 W 5%
R80-R83-R41-R44-R85	5	471 - 0102	RES. 1 K OHM 1/2 W 5%
R64-R65-R69-R76-R79	5	471 - 0102	RES. 1 K OHM 1/2 W 5%
R1-R27-R37-R39-R40-R55	32	471 - 0102	RES. 1 K OHM 1/2 W 5%
U3	1	316 - 0008	I.C. 1024 X4 PROM
U35-U42	8	315 - 0015	I.C. 2102 RAM (500 NS)
U6-U7	2	315 - 0018	I.C. 2111 RAM (500 NS)
U26	1	314 - 0001	I.C. TIMER NE 555
U65	1	313 - 0004	I.C. LM 741
U64	1	314 - 0022	I.C. 7486
U59	1	314 - 0020	I.C. 7430
U53-U66-U67	3	314 - 0038	I.C. 74163
U57-U58	2	314 - 0030	I.C. 74393
U49	1	314 - 0039	I.C. 74166
U48	1	314 - 0010	I.C. 7410
U14-U51-U61-U62	4	314 - 0021	I.C. 7475
U34	1	314 - 0015	I.C. 7404
U31	1	314 - 0032	I.C. 74160
U30	1	314 - 0031	I.C. 7426
U29	1	316 - 0005	I.C. 256 X4 PROM
U24-U26	3	314 - 0029	I.C. 74157
U20-U22-U23-U24-U25	6	314 - 0012	I.C. 7408
U19	1	315 - 0014	I.C. 8080A CPU
U10-U13-U16-U17-U28	8	314 - 0017	I.C. 74125
U9-U54-U57-U60	6	314 - 0006	I.C. 7474
U8-U18-U21-U44-U50	5	314 - 0009	I.C. 7400
U2	1	316 - 0007	I.C. 1024 X4 PROM
U1-U7	2	314 - 0011	I.C. 7442

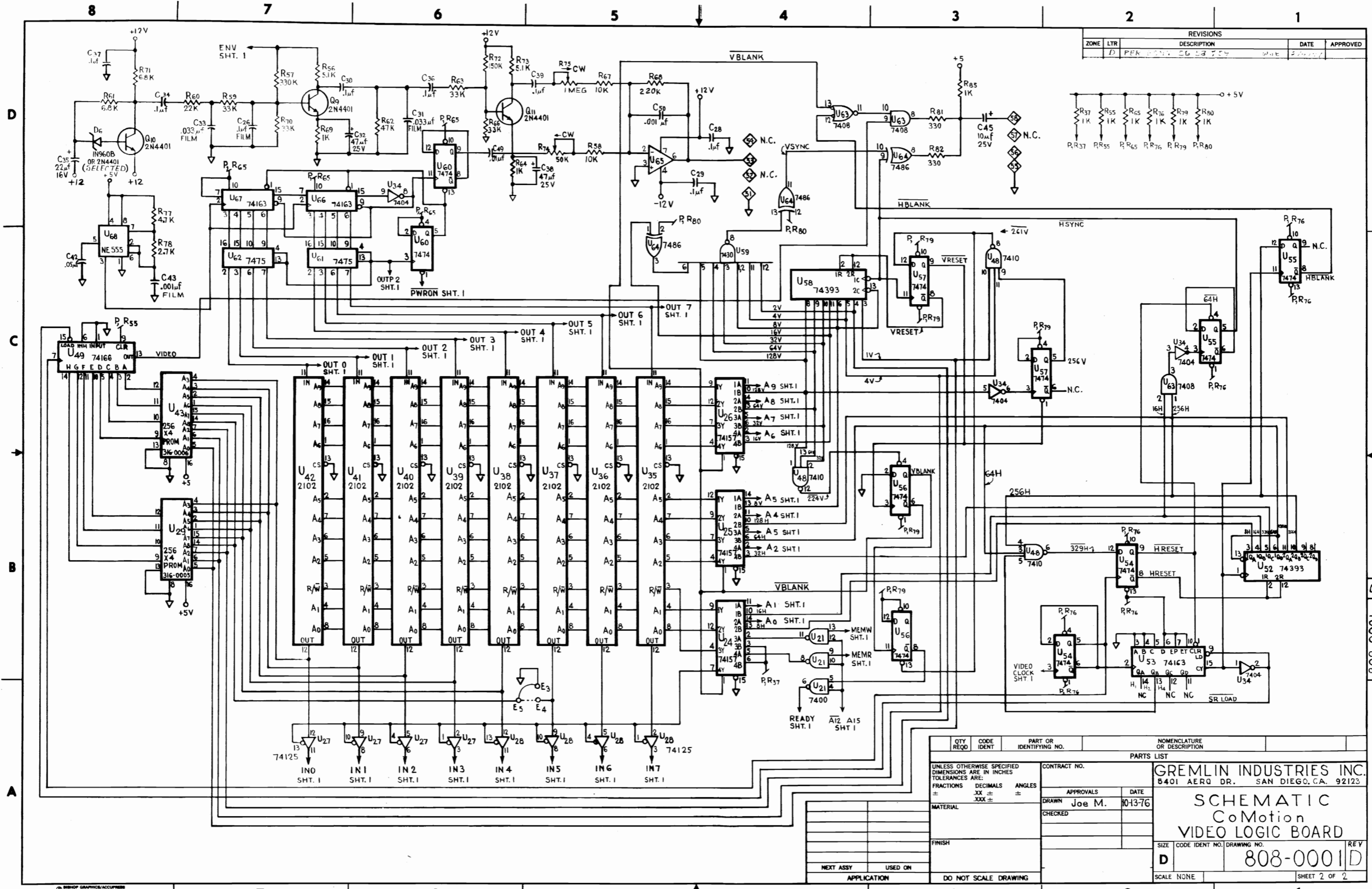
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6. DMIT Q, Q2, D1, D3, D4
5. LAST C NO. USED C 52
4. LAST D NO. USED D 8
3. LAST Q NO. USED Q 11
2. LAST R NO. USED R 86
1. LAST U NO. USED U 68

NOTES:

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE:		CONTRACT NO.		GREMLIN INDUSTRIES INC.	
FRACTIONS	DECIMALS	ANGLES		8401 AERO DR. SAN DIEGO CA. 92123	
	.XX ±	±	APPROVALS	DATE	
	.XXX ±		Joe M.	10/27/76	
MATERIAL			CHECKED		
FINISH					
NEXT ASSY	USED ON				
APPLICATION	DO NOT SCALE DRAWING				
			VIDEO LOGIC BOARD		
			CoMotion		
			PARTS OVERLAY		
SIZE	CODE	IDENT NO.	DRAWING NO.		
D			808-0001A		
SCALE 2x		SHEET 1 OF 1			

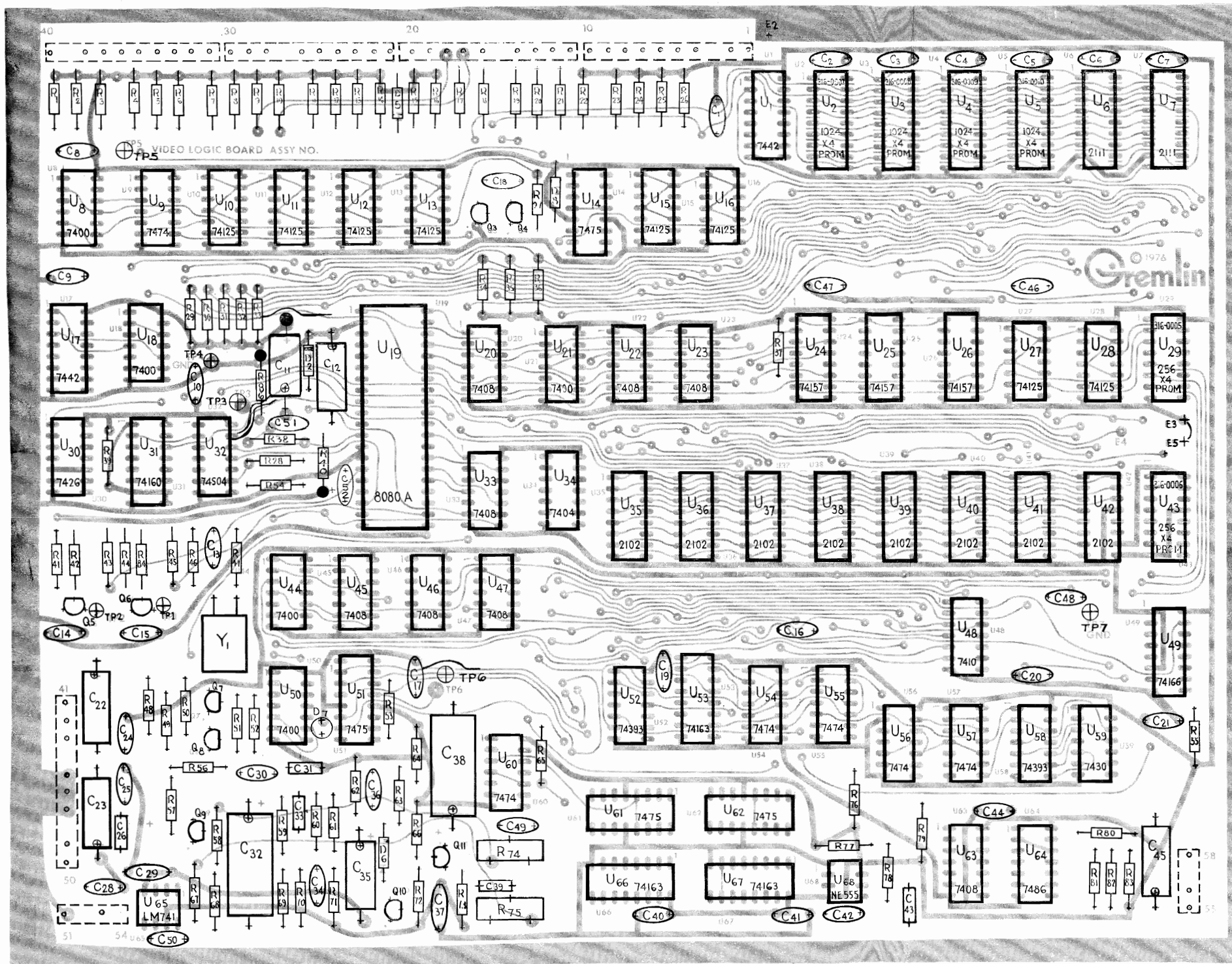
808-0001A

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
D	PER	56-52-757	10/13/76	Joe M.



QTY REQD	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION
PARTS LIST			
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE:		CONTRACT NO.	
FRACTIONS	DECIMALS	ANGLES	
±	.XX ±	±	
	.XXX ±		
MATERIAL		APPROVALS	DATE
FINISH		DRAWN Joe M.	10/13/76
NEXT ASSY		CHECKED	
USED ON		GREMLIN INDUSTRIES INC.	
APPLICATION		8401 AERO DR. SAN DIEGO, CA. 92123	
DO NOT SCALE DRAWING		SCHEMATIC	
		CoMotion	
		VIDEO LOGIC BOARD	
SCALE NONE	SIZE CODE IDENT NO. DRAWING NO.	REVISION	
	D 808-0001 D	808-0001 D	
		SHEET 2 OF 2	

808-0001



D PER ECN'S 56 58 E 59 WLB 2/4/77

U43	1	316 - 0006	I.C. 256X4 PROM
U5	1	316 - 0010	I.C. 1024X4 PROM
U4	1	316 - 0009	I.C. 1024X4 PROM
U32	1	314 - 0046	I.C. 74504
T1-T7	7	211 - 0004	TEST POINT PINS
Y1	1	230 - 0006	XTAL 20.790 MHZ CLK
U2-U5 (REF. ONLY)	4	213 - 0002	SKT. 18 PIN DUAL INLN
U6-U7	2	212 - 0004	CONN. MALE 4 PIN
U1-U5	5	212 - 0003	CONN. MALE 10 PIN
P.C.B. 1	1	170 - 0057B	P.C. BOARD B/A LOGIC
Q8	1	482 - 0006	XISTOR 2N 4403
Q4-Q7-Q9-Q11	7	482 - 0014	XISTOR 2N 4401
Q3	1	482 - 0010	XISTOR PE 8050
D7	1	390 - 0003	L.E.D. RED
D6	1	481 - 0003	DIODE ZENER IN 960 B
D5	1	481 - 0001	DIODE ZENER IN 4002
D2	1	481 - 0008	DIODE ZENER IN 5231
D8	1	481 - 0006	DIODE IN914 OR IN 4148
C52	1	151 - 0001	CAP. CER. .05 M 50 V
C50	1	151 - 0008	CAP. CER. .001 M 50 V
C49-C51	2	151 - 0011	CAP. CER. .01 M 50 V
C43	1	152 - 0007	CAP. F. .001 M 250 V
C32-C38	2	150 - 0012	CAP. E. .47 M 25 V
C31-C33	2	152 - 0015	CAP. F. .033 M 250 V
C28-C30-C34-C36-C37-C39-C48	8	151 - 0012	CAP. CER. .1 M 50 V
C27-C35-C41	3	150 - 0015	CAP. E. .22 M 16 V
C26	1	152 - 0001	CAP. F. .1 M 100 V
C13	1	151 - 0005	CAP. CER. 680 P 50 V
C12-C22-C23-C45	4	150 - 0004	CAP. E. .10 M 25 V
C25-C40-C42-C44-C46-C48	8	151 - 0001	CAP. CER. .05 M 50 V
C1-C10-C14-C17-C19-C24	18	151 - 0001	CAP. CER. .05 M 50 V
R75	1	475 - 0002	POT. 100K OHM CTS
R74	1	475 - 0008	POT. 50 K OHM CTS
R73	1	471 - 0222	RES. 2.2 K OHM 1/2 W 5%
R78	1	471 - 0272	RES. 27 K OHM 1/2 W 5%
R62	1	471 - 0473	RES. 47 K OHM 1/2 W 5%
R72	1	471 - 0154	RES. 150 K OHM 1/2 W 5%
R77	1	471 - 0472	RES. 47 K OHM 1/2 W 5%
R68	1	471 - 0224	RES. 220 K OHM 1/2 W 5%
R61-R71	2	471 - 0682	RES. 6.8 K OHM 1/2 W 5%
R59-R63-R66-R70	4	471 - 0333	RES. 33 K OHM 1/2 W 5%
R57	1	471 - 0334	RES. 330 K OHM 1/2 W 5%
R53	1	471 - 0101	RES. 100 OHM 1/2 W 5%
R52	1	471 - 0471	RES. 470 OHM 1/2 W 5%
R49	1	471 - 0150	RES. 15 OHM 1/2 W 5%
R48-R51-R56-R73	4	471 - 0512	RES. 51 K OHM 1/2 W 5%
R46-R47-R81-R82	4	471 - 0331	RES. 330 OHM 1/2 W 5%
R43-R45	2	471 - 0220	RES. 22 OHM 1/2 W 5%
R42-R28-R84-R84-R86	5	471 - 0221	RES. 220 OHM 1/2 W 5%
R58-R67	2	471 - 0103	RES. 10 K OHM 1/2 W 5%
R29-R36-R60	9	471 - 0223	RES. 22 K OHM 1/2 W 5%
R80-R83-R41-R44-R85	5	471 - 0102	RES. 1 K OHM 1/2 W 5%
R64-R65-R69-R76-R79	5	471 - 0102	RES. 1 K OHM 1/2 W 5%
R1-R27-R37-R39-R40-R50-R55	32	471 - 0102	RES. 1 K OHM 1/2 W 5%
U3	1	316 - 0008	I.C. 1024X4 PROM
U35-U42	8	315 - 0015	I.C. 2102 RAM (500 NS)
U6-U7	2	315 - 0018	I.C. 2111 RAM (500 NS)
U68	1	314 - 0001	I.C. TIMER NE 555
U65	1	313 - 0004	I.C. LM 741
U64	1	314 - 0022	I.C. 7486
U59	1	314 - 0020	I.C. 7430
U53-U66-U67	3	314 - 0038	I.C. 74163
U57-U58	2	314 - 0030	I.C. 74393
U49	1	314 - 0039	I.C. 74166
U48	1	314 - 0010	I.C. 7410
U14-U51-U61-U62	4	314 - 0021	I.C. 7475
U34	1	314 - 0015	I.C. 7404
U31	1	314 - 0032	I.C. 74160
U30	1	314 - 0031	I.C. 7426
U29	1	316 - 0005	I.C. 256X4 PROM
U24-U26	3	314 - 0029	I.C. 74157
U20-U22-U23-U25-U6-U63	8	314 - 0012	I.C. 7408
U19	1	315 - 0014	I.C. 8080A CPU
U6-U13-U15-U16-U27-U28	8	314 - 0017	I.C. 74125
U9-U54-U57-U60	6	314 - 0006	I.C. 7474
U4-U18-U21-U44-U50	5	314 - 0009	I.C. 7400
U2	1	316 - 0007	I.C. 1024X4 PROM
U1-U17	2	314 - 0011	I.C. 7442

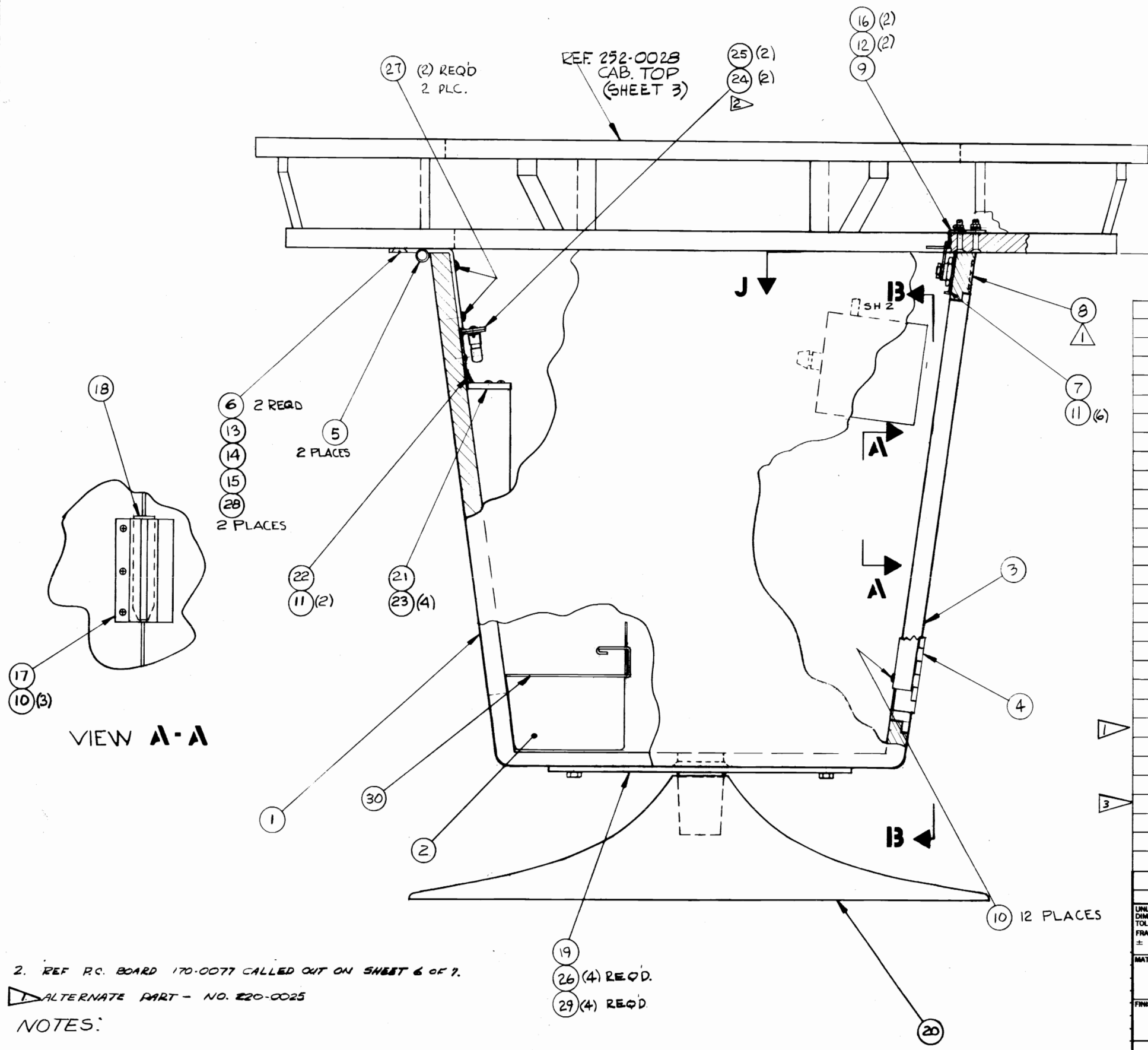
- NOTES:
- ON CONNECTOR PINS 3,15,27,39,44,48,52,54,57 ARE BLANK KEYING PINS
 - DMIT Q₁ Q₂ D₁ D₃ D₄
 - LAST C NO. USED C 52
 - LAST D NO. USED D 8
 - LAST Q NO. USED Q 11
 - LAST R NO. USED R 86
 - LAST U NO. USED U 68

NOTES:

808-0001 D

GREMLIN INDUSTRIES INC.	
8401 AERO DR. SAN DIEGO CA. 92123	
Joe M.	1027-76
VIDEO LOGIC BOARD CoMotion PARTS OVERLAY	
808-0001 REV D	
2 x	

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
IR			5-3-77	Wilson



J SH 4 (PARTS LIST CONTD ON SH 2)

QTY REQD	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	
1		220-0016	COVER, CASH BOX	30
4			TEE NUT, 1/4-20	29
2			WASHER, LOCK .28 I.D.	28
4			SCREW, SH MET, CR REC RD HD #10x.75LG	CAD PLT 27
4			BOLT, HEX 1/4-20 x 1.0 LG	CAD PLT 26
2			NUT, #6-32	25
2			SCREW, MACH, CRS RECES RD HD #6-32x.50LG	CAD PLAT 24
4			SCREW, SH MET, CRS RECES RD HD #8x.75LG	CAD PLT 23
1		250-0063	LIGHT BRACKET	22
1		253-0019	LIGHT WINDOW	21
1		140-0008	PEDESTAL	20
1		250-0039	PEDESTAL ADAPTER	19
1		250-0049	RETAINER CLIP	18
1		250-0050	RETAINER, DOOR LATCH	17
2			NUT, 10-24, CAD PLT	16
2			NUT, 1/4-20, CAD PLT	15
2			WASHER, FLT, .28 I.D.	CAD PLT 14
2			SCREW, MACH, FLT HD, CR REC 1/4-20x1.25	CAD PLT 13
2			SCREW, MACH FLT HD CR REC, #10x1.13LG	CAD. PLT. 12
11			SCREW, SH MET, RD HD, CR REC, #8x.50 LG.	CAD PLT. 11
15			SCREW, SH MET, RD HD CR REC #6x.63 LG.	CAD PLT. 10
1		250-0047	LOCK CATCH PLATE	9
1		220-0023	LOCK ASSY.	8
1		250-0046	RIENFORCING PLATE	7
4			SCREW, SH. MET, FLT HD CR. REC, #10x.75, CAD PLT.	6
2		250-0033	HINGE	5
1		280-0034	HINGE ASSY.	4
1		252-0037	ACCESS DOOR ASSY.	3
1		220-0013	CASH BOX	2
1		252-0021-1	BASE ASSY.	1

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE:

FRACTIONS	DECIMALS	ANGLES
±	.XX ±	±
	.XXX ±	

CONTRACT NO. **Gromin Industries, Inc.**
San Diego, California 92128

APPROVALS: DRAWN J. LOBELLO 11/2/76, CHECKED Wilson 5-3-77

DATE: 5-3-77

TOP ASSY. COMOTION I

SIZE: D, CODE IDENT NO. 708-0001, DRAWING NO. 708-0001

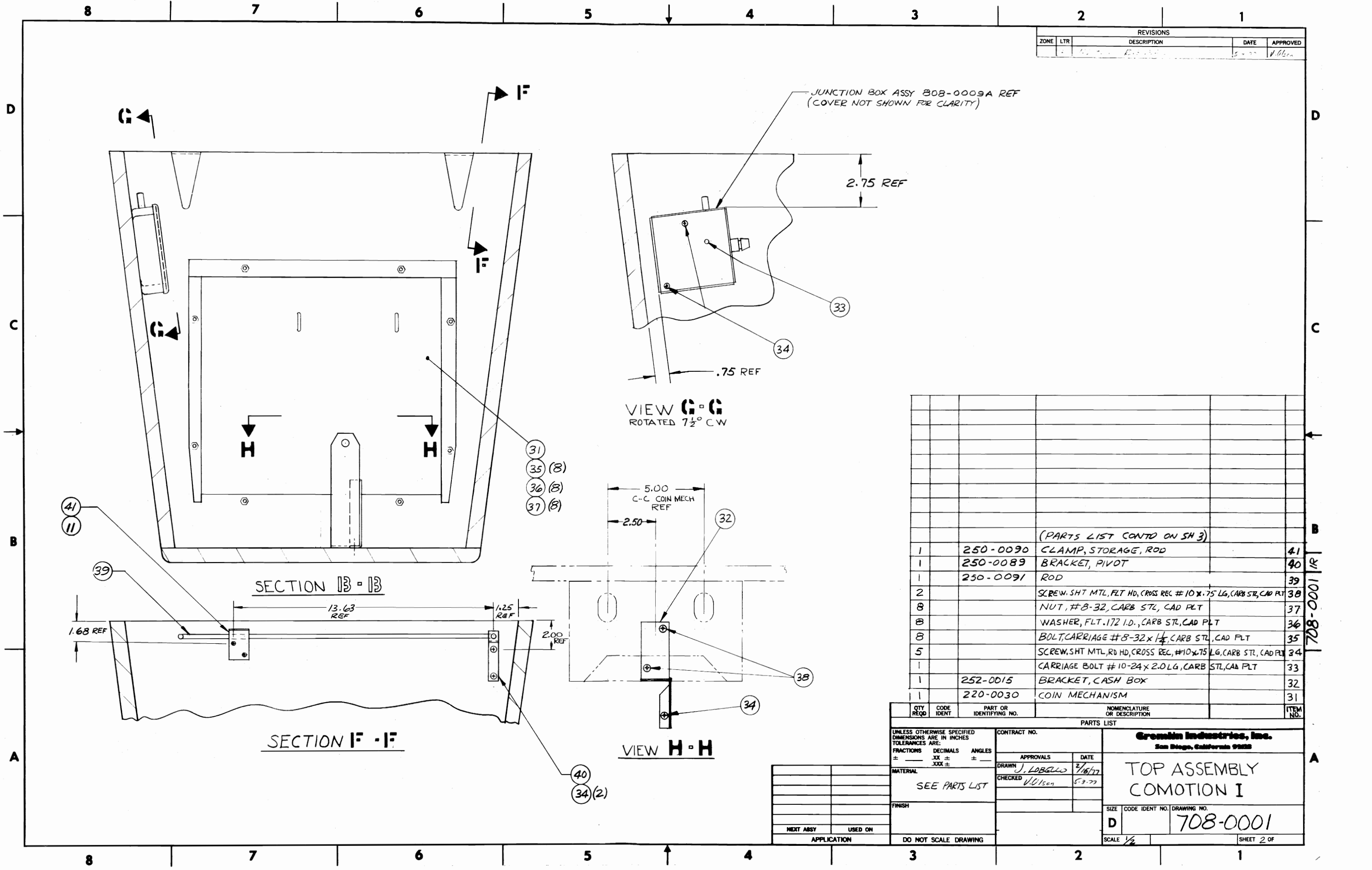
DO NOT SCALE DRAWING, SCALE 1/2, SHEET 1 OF 7

2. REF R.C. BOARD 170-0077 CALLED OUT ON SHEET 6 OF 7.

ALTERNATE PART - NO. 220-0025

NOTES:

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED



JUNCTION BOX ASSY 808-0009A REF
(COVER NOT SHOWN FOR CLARITY)

VIEW G-G
ROTATED 7 1/2° CW

SECTION B-B

SECTION F-F

VIEW H-H

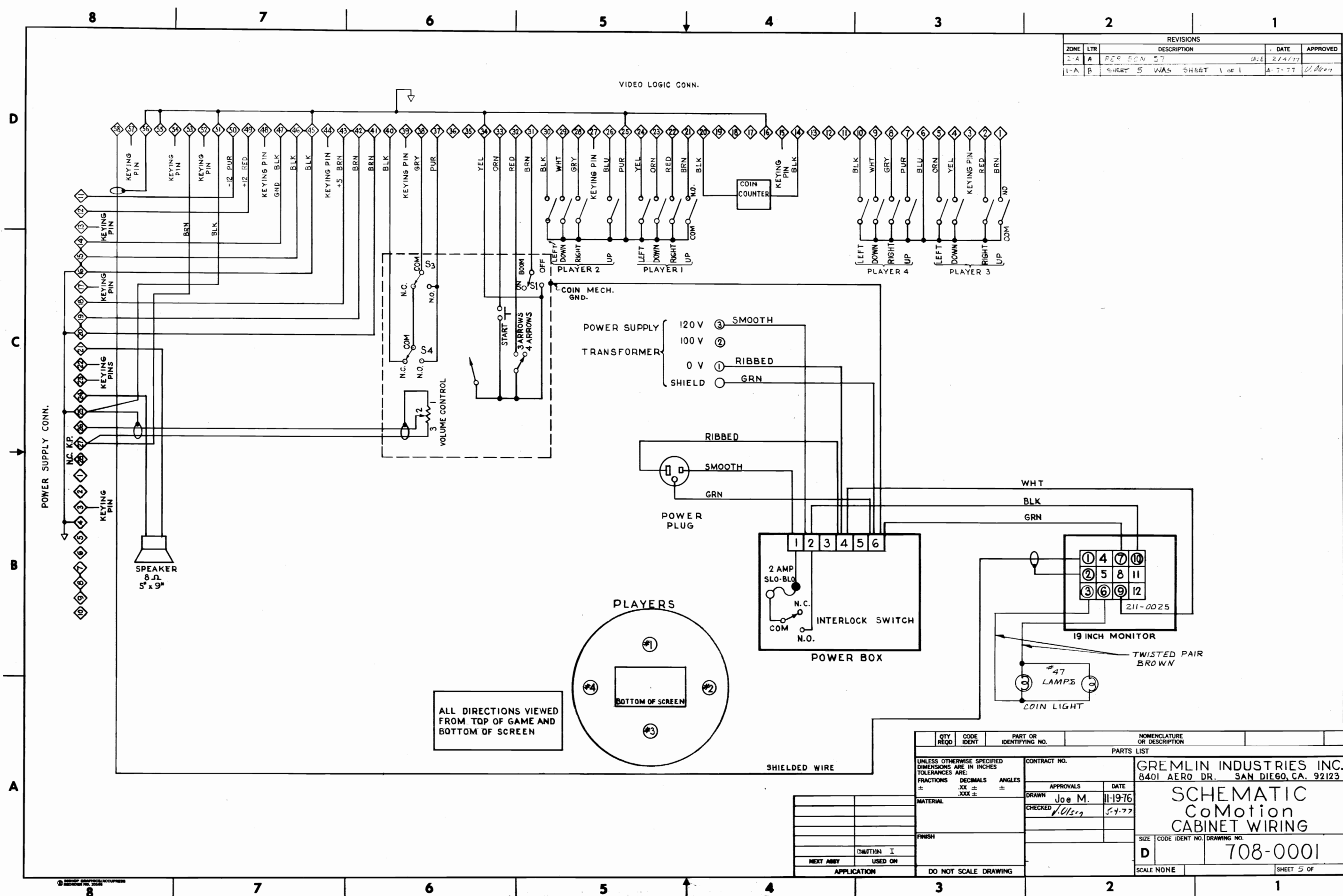
(PARTS LIST CONTD ON SH 3)

QTY REQD	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	ITEM NO.
1	250-0090		CLAMP, STORAGE, ROD	41
1	250-0089		BRACKET, PIVOT	40
1	250-0091		ROD	39
2			SCREW, SHT MTL, FLT HD, CROSS REC # 10 x .75 LG, CARB STL, CAD PLT	38
8			NUT, #8-32, CARB STL, CAD PLT	37
8			WASHER, FLT.172 I.D., CARB STL, CAD PLT	36
8			BOLT, CARRIAGE #8-32 x 1/4, CARB STL, CAD PLT	35
5			SCREW, SHT MTL, RD HD, CROSS REC, #10 x .75 LG, CARB STL, CAD PLT	34
1			CARRIAGE BOLT #10-24 x 2.0 LG, CARB STL, CAD PLT	33
1	252-0015		BRACKET, CASH BOX	32
1	220-0030		COIN MECHANISM	31

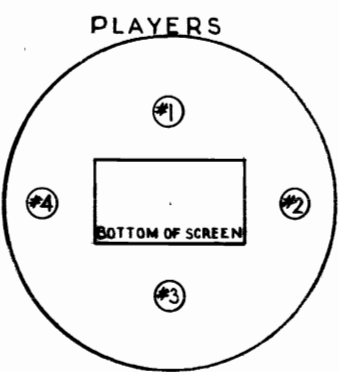
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS DECIMALS ANGLES ± — .XX ± — ± — XXX ± —		CONTRACT NO.		Grenlain Industries, Inc. San Diego, California 92128	
MATERIAL SEE PARTS LIST		APPROVALS DRAWN J. LOBGLIO CHECKED V. Olson		DATE 2/16/77 5-3-77	
FINISH		SCALE D		SIZE CODE IDENT NO. DRAWING NO. 708-0001	
NEXT ASSY USED ON APPLICATION		DO NOT SCALE DRAWING		SHEET 2 OF	

708-0001 IR

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
2-A	A	REV 50A 57	11-21-77	
1-A	B	SHEET 5 WAS SHEET 1 OF 1	4-7-77	V. Olson



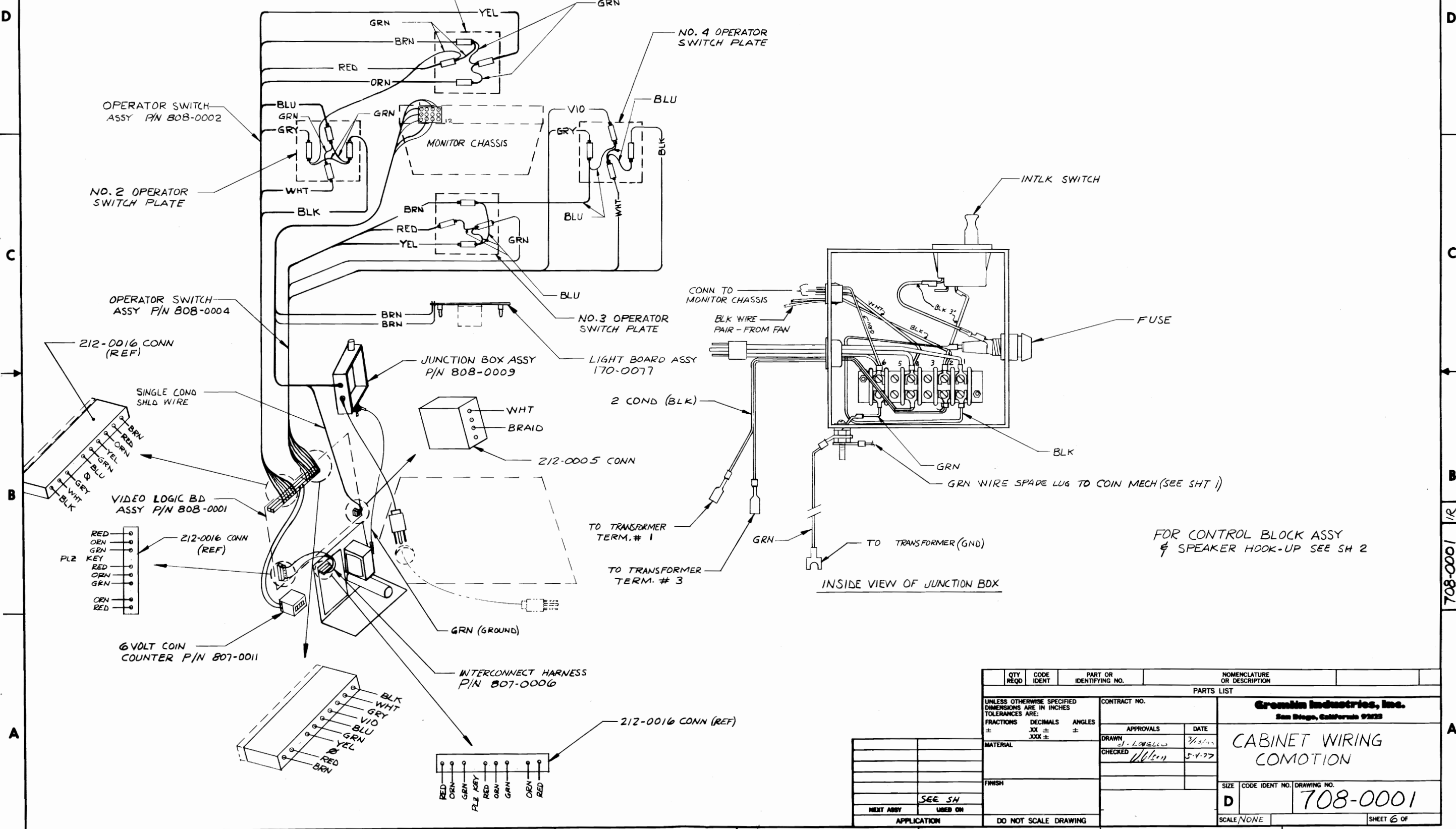
ALL DIRECTIONS VIEWED FROM TOP OF GAME AND BOTTOM OF SCREEN



QTY REQD	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION
PARTS LIST			
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE:		CONTRACT NO.	
FRACTIONS ±	DECIMALS .XX ±	ANGLES ° ±	APPROVALS
	.XXX ±		DATE
MATERIAL		DRAWN Joe M.	11-19-76
FINISH		CHECKED V. Olson	5-4-77
CAUTION I		SIZE CODE IDENT NO. DRAWING NO.	
NEXT ASSY USED ON		D 708-0001	
APPLICATION		DO NOT SCALE DRAWING	
		SCALE NONE SHEET 5 OF	

708-0001 B

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	IR	INITIAL RELEASE	5-4-77	WJL



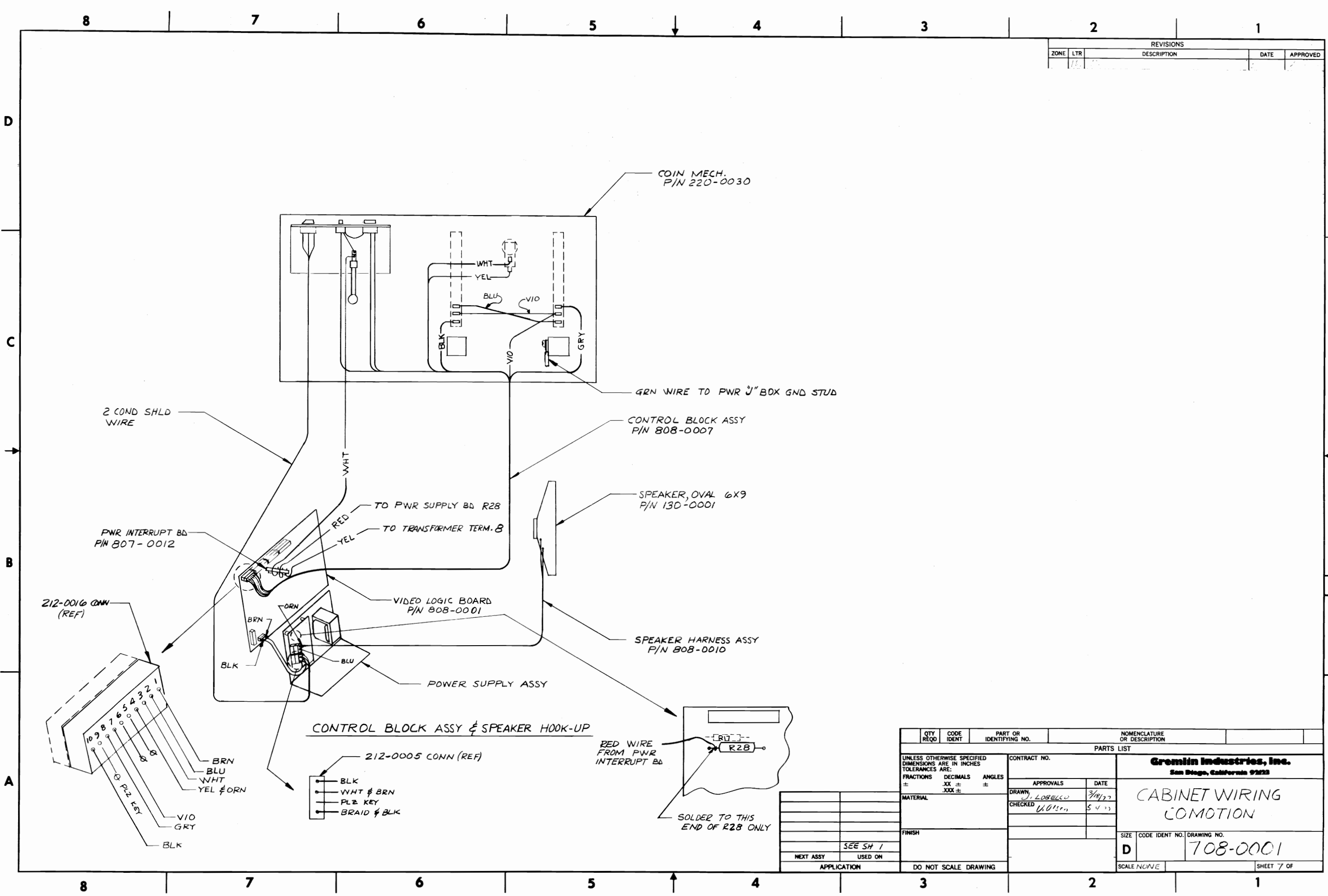
FOR CONTROL BLOCK ASSY & SPEAKER HOOK-UP SEE SH 2

INSIDE VIEW OF JUNCTION BOX

QTY REQD	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION
PARTS LIST			
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE:		CONTRACT NO.	
FRACTIONS ±	DECIMALS .XX ±	APPROVALS	DATE
ANGLES ±	.XXX ±	DRAWN <i>J. LOVELL</i>	5-4-77
MATERIAL		CHECKED <i>WJL</i>	
FINISH		SCALE NONE	
NEXT ASSY USED ON		SIZE CODE IDENT NO. DRAWING NO.	
APPLICATION		D 708-0001	
DO NOT SCALE DRAWING		SHEET 6 OF	

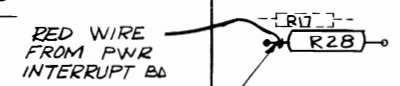
708-0001 IR

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED



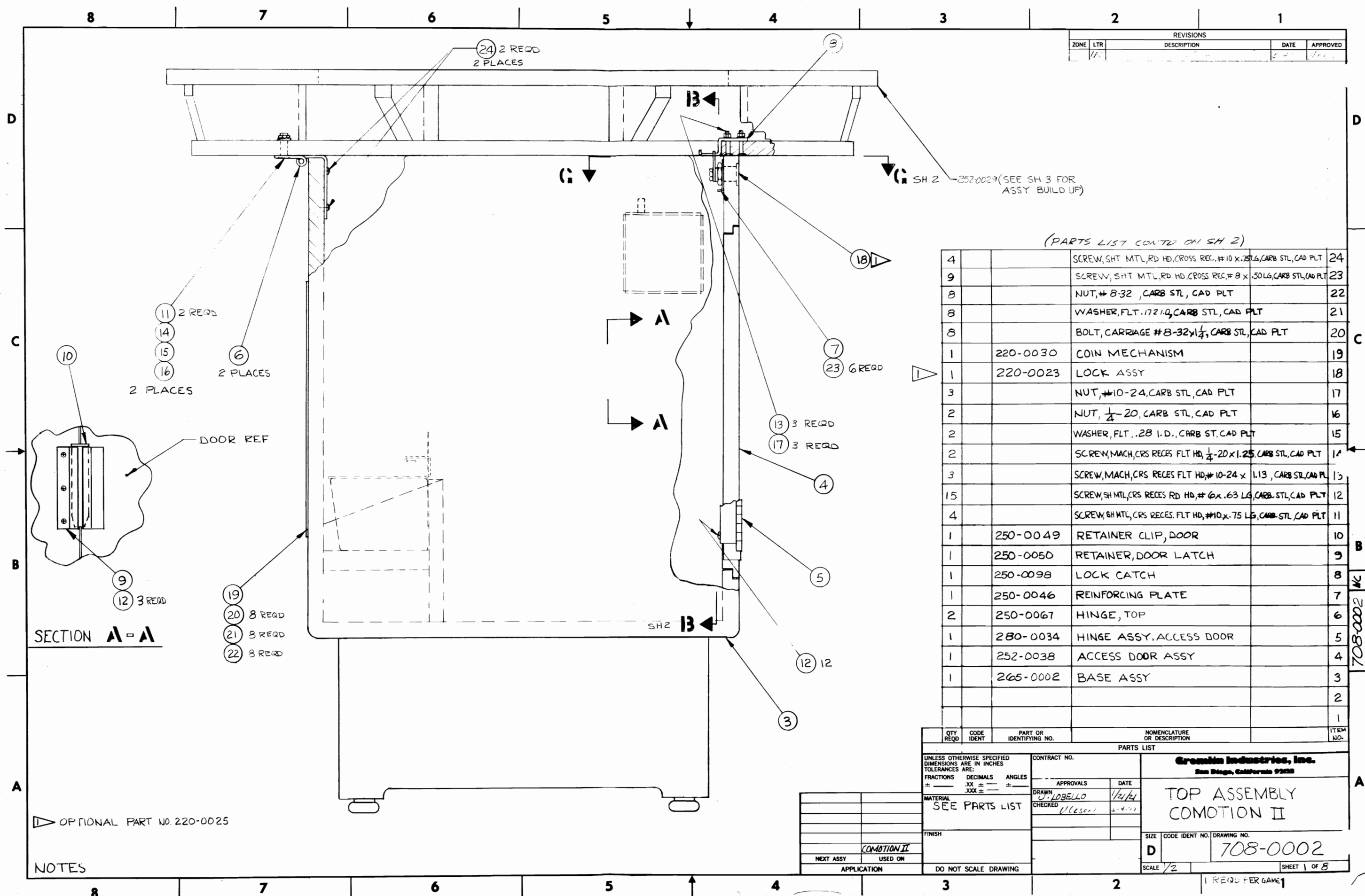
CONTROL BLOCK ASSY & SPEAKER HOOK-UP

- BLK
- WHT & BRN
- PLZ KEY
- BRAID & BLK



QTY REQD	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION
			Gremlin Industries, Inc. San Diego, California 92123
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE:			
FRACTIONS	DECIMALS	ANGLES	
±	.XX ±	±	
	.XXX ±		
MATERIAL		CONTRACT NO.	
FINISH		APPROVALS	
NEXT ASSY		DRAWN: J. LOBELLO 3/19/77	
USED ON		CHECKED: U. G. 5/4/77	
APPLICATION		DATE	
		5/4/77	
		SIZE	
		D	
		CODE IDENT NO.	
		708-0001	
		DRAWING NO.	
		708-0001	
		SCALE	
		NONE	
		SHEET 7 OF	

708-0001/R



REVISIONS			
ZONE	LTR	DESCRIPTION	DATE
1/1			

(PARTS LIST CONT'D ON SH 2)

QTY REQD	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	ITEM NO.
4			SCREW, SHT MTL, RD HD, CROSS REC, #10 x .75 LG, CARB STL, CAD PLT	24
9			SCREW, SHT MTL, RD HD, CROSS REC, #8 x .50 LG, CARB STL, CAD PLT	23
8			NUT, #8-32, CARB STL, CAD PLT	22
8			WASHER, FLT. .172 I.D., CARB STL, CAD PLT	21
8			BOLT, CARRIAGE #8-32 x 1/4, CARB STL, CAD PLT	20
1	220-0030		COIN MECHANISM	19
1	220-0023		LOCK ASSY	18
3			NUT, #10-24, CARB STL, CAD PLT	17
2			NUT, 1/4-20, CARB STL, CAD PLT	16
2			WASHER, FLT. .28 I.D., CARB ST, CAD PLT	15
2			SCREW, MACH, CRS RECES FLT HD, 1/4-20 x 1.25, CARB STL, CAD PLT	14
3			SCREW, MACH, CRS RECES FLT HD, #10-24 x 1.13, CARB STL, CAD PL	13
15			SCREW, SH MTL, CRS RECES RD HD, #6 x .63 LG, CARB STL, CAD PLT	12
4			SCREW, SH MTL, CRS RECES. FLT HD, #10 x .75 LG, CARB STL, CAD PLT	11
1	250-0049		RETAINER CLIP, DOOR	10
1	250-0050		RETAINER, DOOR LATCH	9
1	250-0098		LOCK CATCH	8
1	250-0046		REINFORCING PLATE	7
2	250-0067		HINGE, TOP	6
1	280-0034		HINGE ASSY, ACCESS DOOR	5
1	252-0038		ACCESS DOOR ASSY	4
1	265-0002		BASE ASSY	3
				2
				1

PARTS LIST			
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE:		CONTRACT NO.	
FRACTIONS ± —	DECIMALS .XX ± —	ANGLES ± —	
MATERIAL SEE PARTS LIST		APPROVALS	DATE
FINISH		DRAWN O. LOBELLO	1/24/74
NEXT ASSY COMOTION II		CHECKED	3-4-77
APPLICATION		DO NOT SCALE DRAWING	
SIZE D		CODE IDENT NO. DRAWING NO.	
SCALE 1/2		708-0002	
		SHEET 1 OF 8	

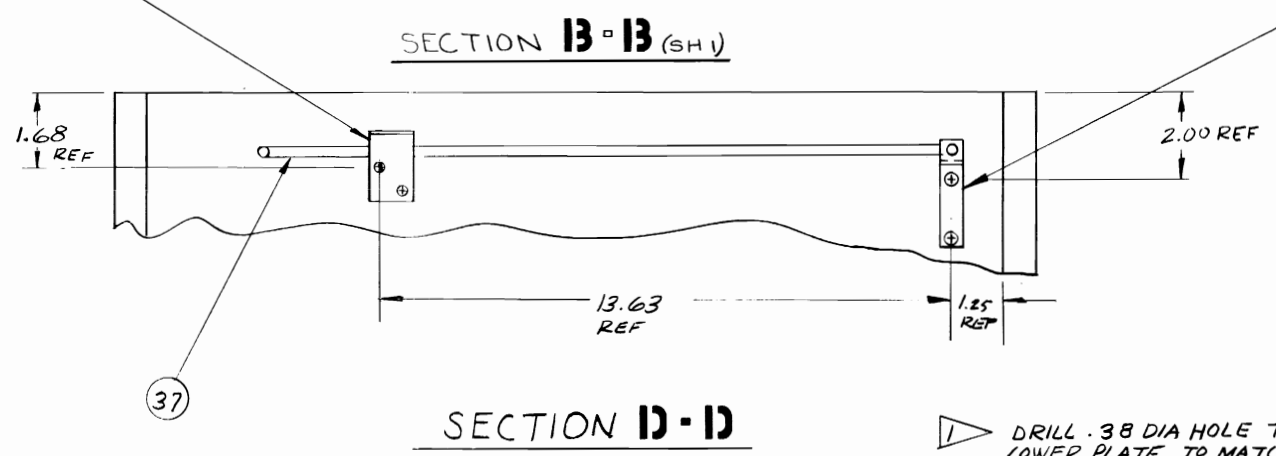
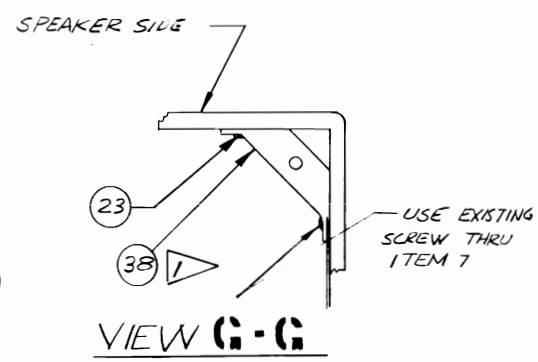
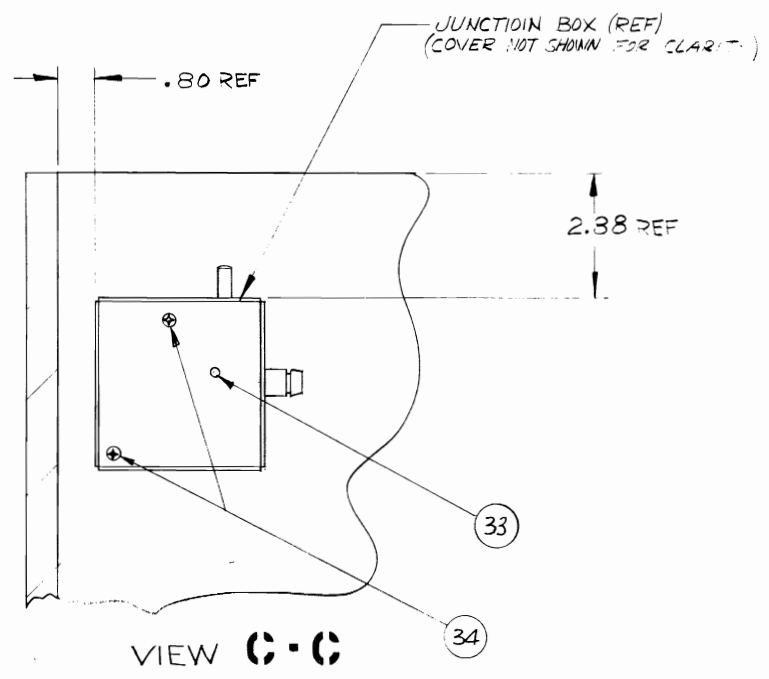
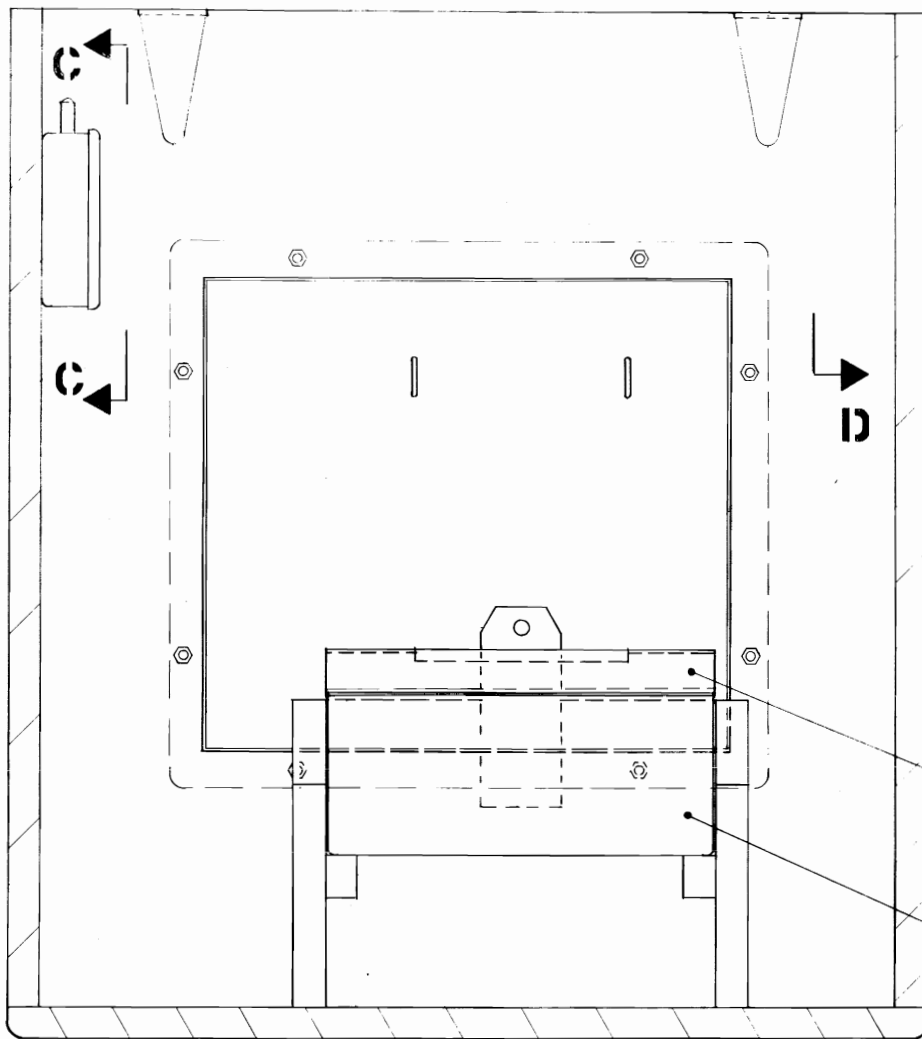
NOTES
 ▽ OPTIONAL PART NO. 220-0025

708-0002 1/4

1 REQD PER GAME

8 7 6 5 4 3 2 1

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED



NOTE: DRILL .38 DIA HOLE THRU CABINET LOWER PLATE TO MATCH GUIDE PIN.

QTY REQD	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	ITEM NO.
			(PARTS LIST CONTD ON SH 3)	
1		280-0038	GUIDE PIN ASSY	38
1		250-0091	ROD	37
1		250-0090	CLAMP, STORAGE, ROD	36
1		250-0089	BRACKET, PIVOT	35
4			SCREW, SHT MTL, RD HD, CROSS REC, #10 X .75 LG, CARB STL, CAP	34
1			CARRIAGE BOLT, #10-24 X 2.0 LG, CARB STL, CAD FLT	33
1		220-0016	CASH BOX COVER	32
1		220-0012	CASH BOX BODY	31

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE:		CONTRACT NO.		Gremlin Industries, Inc. San Diego, California 92122
FRACTIONS	DECIMALS	APPROVALS	DATE	
± —	.XX ± .04	DRAWN J. LOBELLO	2/16/77	TOP ASSEMBLY COMOTION II
± .005	.XXX ± —	CHECKED J. LOBELLO	5-4-77	
MATERIAL: SEE PARTS LIST		FINISH:		SIZE: D
NEXT ASSY: COMOTION II		USED ON:		CODE IDENT NO.: 708-0002
APPLICATION:		DO NOT SCALE DRAWING		DRAWING NO.: 708-0002
				SCALE: 1/2
				SHEET 2 OF

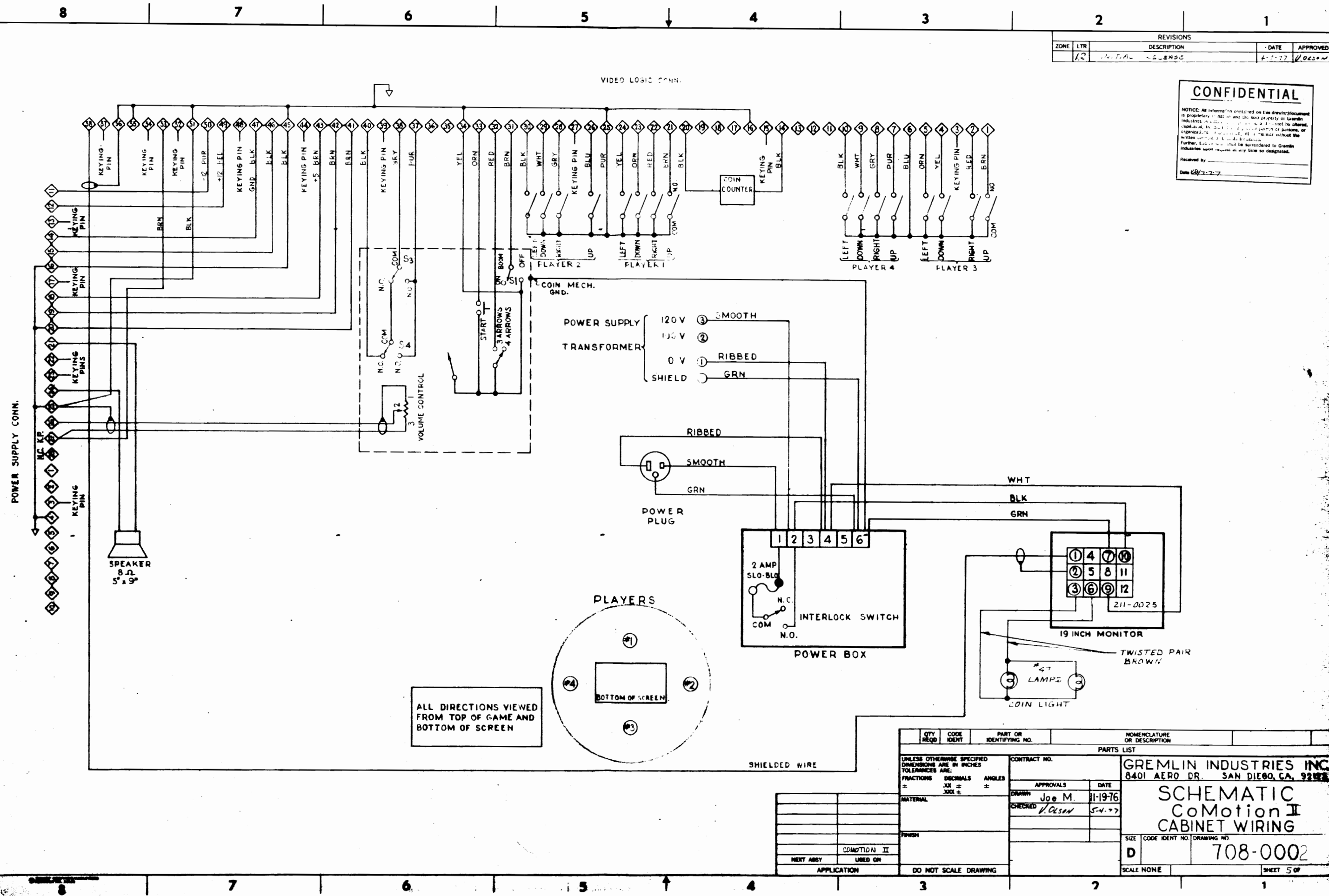
8 7 6 5 4 3 2 1

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	K2	INITIAL REVISION	4-7-77	V. OLSON

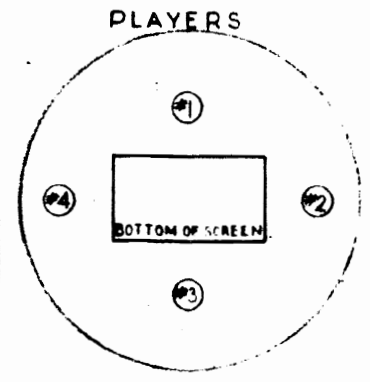
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Received by: _____
Date: 4/2/77



ALL DIRECTIONS VIEWED FROM TOP OF GAME AND BOTTOM OF SCREEN



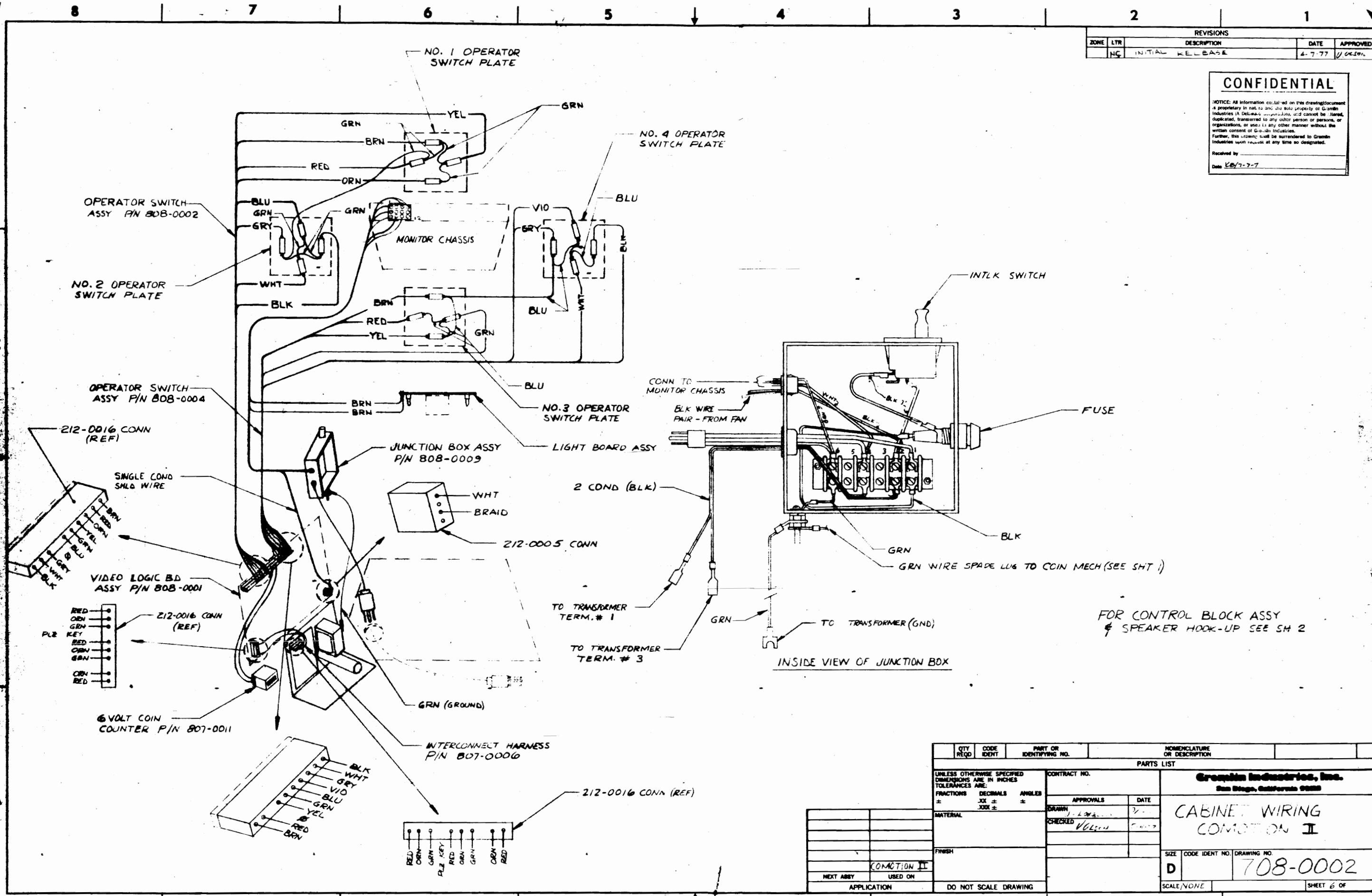
QTY REQD	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION
			PARTS LIST
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE:			GREMLIN INDUSTRIES INC 8401 AERO DR. SAN DIEGO, CA. 92121
FRACTIONS	DECIMALS	ANGLES	
±	.XX ±	±	SCHEMATIC CoMotion II CABINET WIRING
	.XXX ±		
MATERIAL			CONTRACT NO. APPROVALS: Joe M. 11-19-76 CHECKED: V. OLSON 5-4-77
FINISH			SIZE: D CODE IDENT NO.: 708-0002 DRAWING NO.:
NEXT ARMY USED ON			SCALE: NONE SHEET 5 OF
APPLICATION			DO NOT SCALE DRAWING

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
NC		INITIAL RELEASE	4-7-77	J. G. COV.

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Received by _____
Date 4/8/77



FOR CONTROL BLOCK ASSY
& SPEAKER HOOK-UP SEE SH 2

INSIDE VIEW OF JUNCTION BOX

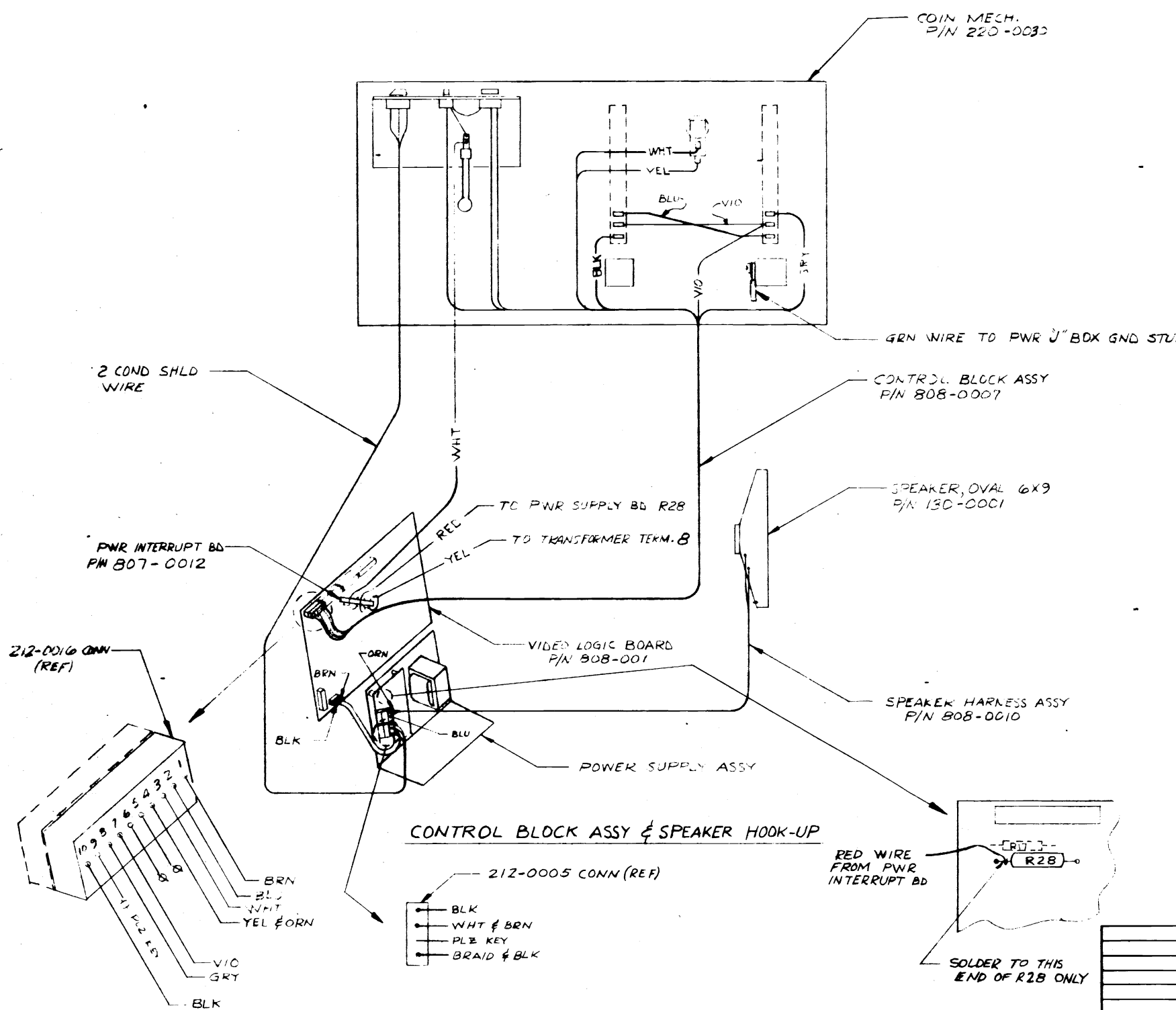
QTY REQD	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION
PARTS LIST			
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE:		CONTRACT NO.	
FRACTIONS	DECIMALS	ANGLES	APPROVALS
±	±	±	
MATERIAL		DATE	
FINISH		DRAWN	
NEXT ASSY		CHECKED	
USED ON		DATE	
APPLICATION		SCALE/NONE	
DO NOT SCALE DRAWING			<p style="text-align: center;">Grinnin Industries, Inc. San Diego, California 92108</p> <p style="text-align: center;">CABINET WIRING COMOTION II</p> <p>SIZE: D CODE IDENT NO: 708-0002 DRAWING NO: 708-0002</p> <p style="text-align: right;">SHEET 6 OF</p>

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	NC	INITIAL RELEASE	4-7-77	W. Olson

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Received by _____
Date 4/27/77



QTY REQD	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION
PARTS LIST			
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE:		CONTRACT NO.	
FRACTIONS	DECIMALS	ANGLES	APPROVALS
±	.XX ±	±	DATE
	.XXX ±		
MATERIAL		DRAWN	
FINISH		CHECKED	
NEXT ASSY		USED ON	
APPLICATION		DO NOT SCALE DRAWING	
SIZE		CODE IDENT NO. DRAWING NO.	
D		708-0002	
SCALE		SHEET 7 OF	

Gramin Industries, Inc.
San Diego, California 92123

CABINET WIRING
COMOTION II

DRAWING NO. 708-0002

SHEET 7 OF

ZONE		REVISIONS		DATE	APPROVED
LTR	DESCRIPTION	DATE	APPROVED		
NC	INITIAL RELEASE	4-7-77	VOL...		

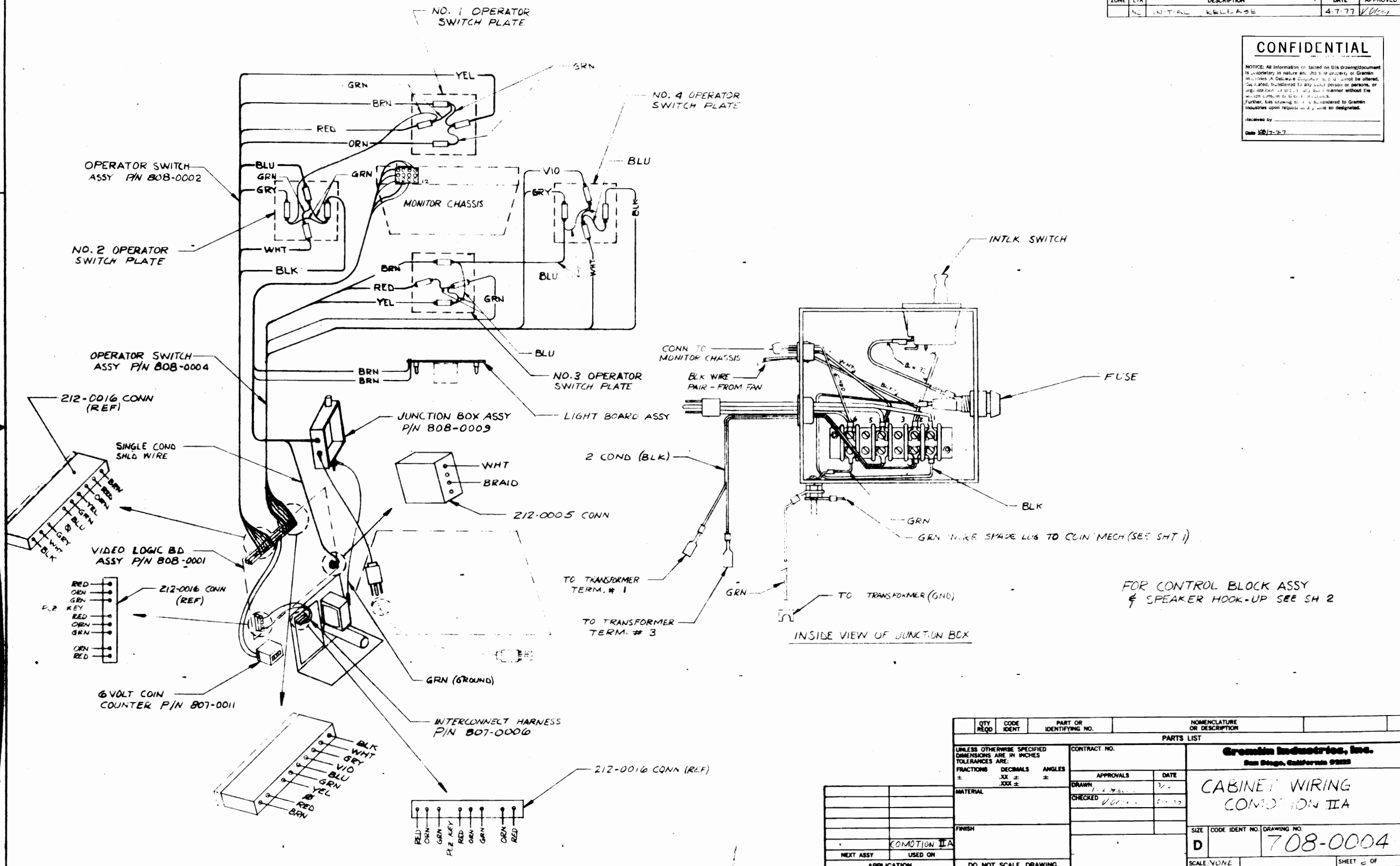
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received by _____
Date 10/2-77

D

C



FOR CONTROL BLOCK ASSY & SPEAKER HOOK-UP SEE SH 2

INSIDE VIEW OF JUNCTION BDX

QTY REQD	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION
PARTS LIST			
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE:		CONTRACT NO.	
FRACTIONS	DECIMALS	ANGLES	
±	±	±	
MATERIAL		APPROVALS	
FINISH		DATE	
NEXT ASSY USED ON		DRAWN	
APPLICATION		CHECKED	
DO NOT SCALE DRAWING		DATE	
SCALE NONE		SHEET 2 OF	

Gramin Industries, Inc.
San Diego, California 92122

CABINET WIRING
COMOTION IIA

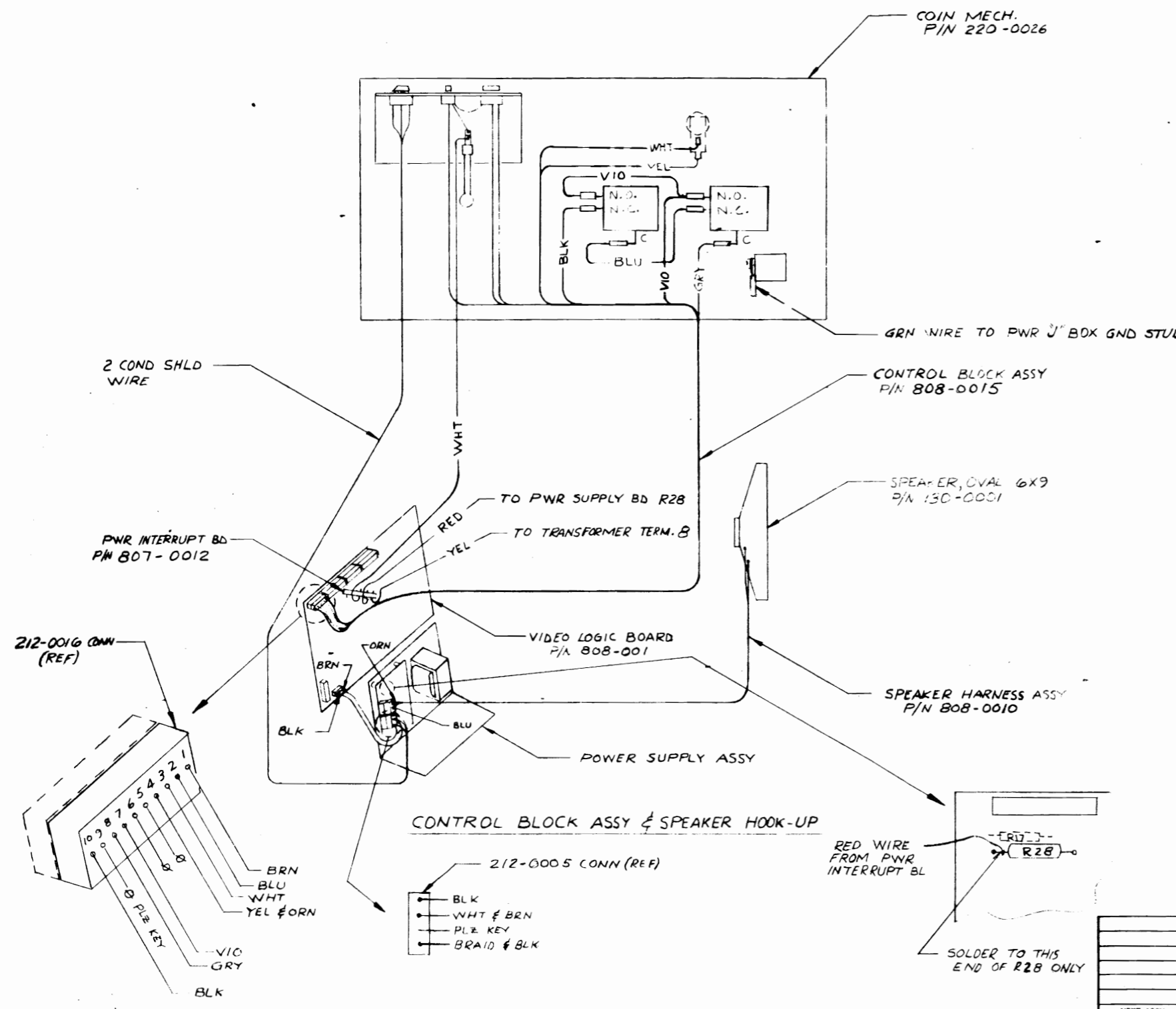
SIZE CODE IDENT NO. DRAWING NO.
D 708-0004

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	NC	INITIAL RELEASE	4-7-77	<i>[Signature]</i>

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Received by _____
Date 7-7-77



QTY REQD	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION
PARTS LIST			
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE:		CONTRACT NO.	
FRACTIONS ±	DECIMALS .XX ±	ANGLES ±	APPROVALS
	.XXX ±		DATE
MATERIAL		DRAWN <i>[Signature]</i>	
FINISH		CHECKED <i>[Signature]</i>	
NEXT ASSY USED ON		SEE 341	
APPLICATION		DO NOT SCALE DRAWING	

Gramlin Industries, Inc. San Diego, California 92123	
CABINET WIRING COMOTION II A	
SIZE	CODE IDENT NO. DRAWING NO.
D	708-0004
SCALE NONE	SHEET 7 OF

708-0004 NC