

HUSTLE

MANUFACTURED BY

Gremlin
Industries, inc.

OWNER'S MANUAL

HUSTLE
OPERATING INSTRUCTIONS
AND
SERVICE MANUAL

GREMLIN INDUSTRIES, INC.
8401 Aero Dr.
San Diego, CA. 92123
June 30, 1977

"HUSTLE"

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INTRODUCTION

HUSTLE 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 VOID 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 HUSTLE 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 HUSTLE has been arranged so that the insertion of a quarter through 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 pins to the video logic board.

WARRANTY/FACTORY SERVICE INFORMATION

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

All electronic components/connectors for one (1) year except:

1. Transformers - 90 days
2. Fuses/Lamps - No Warranty

The Warranty covers defects/failure 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. No merchandise may be returned to the factory without prior authorization.

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.

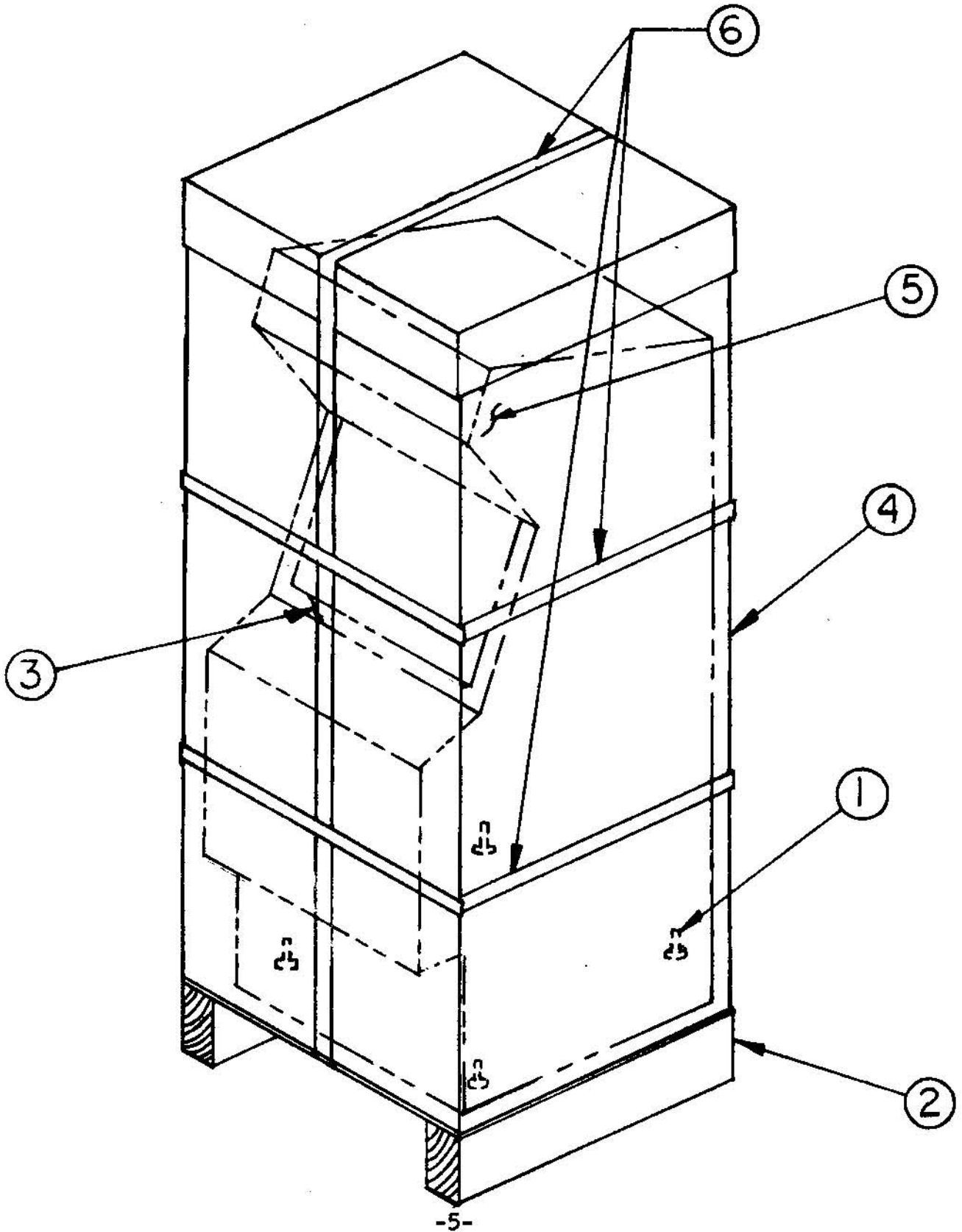
REPACKAGING INSTRUCTIONS

Should it be necessary to ship this game, the following instructions are provided for game crating.

- A) If the original shipping bolts (REF 1) have been discarded, obtain four 5/16-18 x 1 3/4 hex head bolts with 5/16 flat washer. Lay game on its side and attach skid (REF 2).
- B) Place game upright. Tape game keys to upper flange of operator's panel (REF 3). Crate the game using appropriate shock-absorbent packing material (REF 4). Include padding on all four corners of the game (REF 5).
- C) After crating is completed, secure package with strapping (REF 6).

NOTE: If the game is to be shipped to GREMLIN INDUSTRIES for service or repair, attach a tag identifying the distributor and indicate the service or repair to be accomplished; include the full serial number of the game.

REPACKAGING INSTRUCTIONS



GAME CONCEPT

HUSTLE

HUSTLE is a one or two player video game which challenges players' reaction time as they attempt to build up a high score. The object of the game is to maneuver a moving arrow into targets which appear randomly on the screen. Each arrow is accompanied by a "tail", which can be used to block the opponent from scoring targets.

TARGETS -

The targets appear randomly on the playfield. The position of a target, the value of a target, the time a target stays on the screen, and the time before a target appears are all unpredictable. There are never more than two targets on the screen at any time.

To add to the unpredictability, some targets appear with a value of "???". These are mystery targets, and can have a value from -900 points to +900 points. Players go after the mystery targets at their own risk since the only way to determine whether or not a mystery target is positive or negative is to hit the target. Whenever a target is scored, the game pauses while the appropriate player's score is tallied. Two distinctive sounds accompany the scoring, depending on whether the target score is positive or negative. All non-mystery targets (which are all positive), and all mystery targets (which have positive values) are scored with an attention-getting "warble" sound. All mystery targets which prove to be negative are scored with a distinctive "penalty" sound.

CRASHES -

A crash (accompanied by a loud boom sound) occurs whenever a player hits anything other than a target. The three obstacles a player might hit are one of the screen boundaries, the other player's tail, or his own tail. Whenever a crash occurs, the opponent scores 400 points PLUS all target values on the screen. If any mystery targets are on the screen during a crash, their values are revealed, and they are awarded to the opponent. All mystery targets whose values are revealed as the result of a crash are scored positive for the opponent.

GAME SPEED -

The game begins with the players moving at a moderate pace. Every time a target is scored, the pace picks up slightly. After ten targets have been scored without a crash, the pace stays at a maximum rate. Whenever a crash occurs, the pace reverts to its initial moderate value, and increases with each score, as before.

GAME CONCEPT (Cont'd.)

TAIL LENGTH -

Whenever a crash occurs, both players' tails grow longer. The game plays quite differently as it progresses. At the beginning of a game, both players have short tails and are highly maneuverable. At this stage the game is a "foot race" to score the targets. As players crash and tails get longer, a blocking strategy is added to the race for the targets. This constantly changing nature of the game is designed to provide long-lasting appeal, and insure a long earning history.

SINGLE PLAYER -

HUSTLE has been designed to be just as exciting for one player as it is for two. A single player plays against himself, and not against "the computer".

The single player game is initiated by simply pressing the ONE PLAYER START button instead of the TWO PLAYER START button after inserting a coin. The controls for one player are located on the right side of the control panel. The game plays the same as for two players, with these exceptions:

1. There is a single arrow and tail, instead of two.
2. Crashes are scored as PENALTY points, with the same score as in the two player game. That is, a crash scores 400 plus all on-screen targets into the PENALTY score.
3. At the end of the game, the PENALTY points are subtracted from the player's score.

The object of the single player game is to rack up as many points as possible. The game action is the same as the two player game, with the lengthening tail and the accelerating pace.

FREE GAMES -

For areas of the country where free games are legal, HUSTLE can be set to award free games for scores of 11,000; 13,000; 15,000 or 17,000 points. The game is shipped with the free game option disabled. If free games are legal in your area, it is highly recommended that you enable them---they provide an extremely powerful incentive to play the game, and thus increase your earnings.

Free games are awarded only in the single player game, since the two player game could give free games any time two players cooperated to give one of the players a very high score.

It is not possible to win two free games in a row (i.e. no free games on free games).

GAME CONCEPT (Cont'd.)

FREE GAMES - (Cont'd.)

Whenever free games are enabled, the message " SCORE XX000 POINTS FOR FREE GAME" appears on the screen just after the ONE PLAYER START button is pressed. The XX will be 11, 13, 15, or 17 depending on how you jumper the game (see OPERATING INSTRUCTIONS). This message is displayed for about 5 seconds, and then the single player game begins. Whenever a free game is won, the message FREE GAME! is momentarily displayed on the screen, followed by the message PRESS START. If at this point ONE PLAYER START is pressed, the free game score message will not be displayed before the game starts, since a second consecutive free game will not be awarded. It is also possible to press the TWO PLAYER START after a free game is awarded and play a two player game.

GAME TIME -

The top margin of the game contains the word TIME, with a two digit timer above it. The game starts with a time value of 90, and decrements to 0, at which time the game is over. The timer actually counts player moves rather than "ticking" once per second. Also, the timer stops during all scoring. These effects produce a repeatable game time of about 2 minutes.

It is possible to shorten the game time to about 1-1/2 minutes by changing an internal jumper. In this case, the timer still begins at 90, but it "ticks" faster.

COINS -

HUSTLE is set to play either the one or two player game for a single coin (both games take approximately the same time). An internal option allows game play for two coins, three coins or four coins. If this option is enabled, the message "MORE COINS" appears each time a coin is inserted, until the proper number is inserted. At this time, the message "PRESS START" appears. Our location tests indicate that the single coin mode (as shipped) will maximize your income, so no adjustment should be necessary.

ANTI-CHEAT -

HUSTLE contains a feature which will not give game credits if the coin switch is manually depressed, or if the coin door is slammed. In checking out the game, you must actually insert a coin to get things started--flicking the coin switch will not always start the game.

OPERATOR OPTIONS

HUSTLE is shipped with the following preset options:

1. FREE GAME option disabled.
2. Game length approximately 2 minutes.
3. One coin per play.

If free games are legal in your area, it is highly recommended that the game be set for free games. A single jumper inside the game sets the free game score at 11,000; 13,000; 15,000 or 17,000 points.

Our location tests indicate that most games should initially be set at 11,000 or 13,000. It is a good idea to start with 11,000, and after 1-2 weeks, increase to 13,000. Only in high skill areas such as college recreation areas should the free game score be set for 15,000. 17,000 should be used only if the game has been mastered by many people.

DO NOT set the free game score too high to start--this will turn off many beginning players.

To enable freegame option diagram, follow these instructions:

1. Disconnect power and remove the back from the game.
2. Locate the large printed circuit board (mounted on the horizontal shelf).
3. At the rear of the circuit board is a row of connectors. These connectors are arranged in four groups of ten pins. The right hand connector has no receptacle on it--only ten pins with a wire jumper. This jumper sets the free game option as shown in the figures in Diagram #2.

OPERATOR OPTIONS (Contd.)

4. Remove the jumper from pin 1 and plug it into pin 7, 8, 9, or 10, depending on the desired free game score. To disable free games, place the jumper on pin 1.

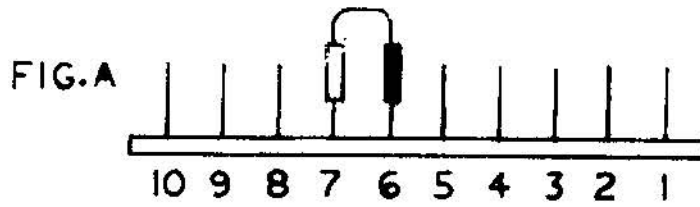
The game length and number of coins per play are jumpered in a similar manner. For details refer to the cabinet wiring schematic at the rear of the manual. The jumper wires required to activate these options are taped to the appropriate connector harnesses.

Whenever HUSTLE is not being played, an advertisement sequence is initiated. Targets continuously appear and disappear from the screen to attract attention. To avoid patron confusion, the words "Game Over" appear while the advertising is in progress.

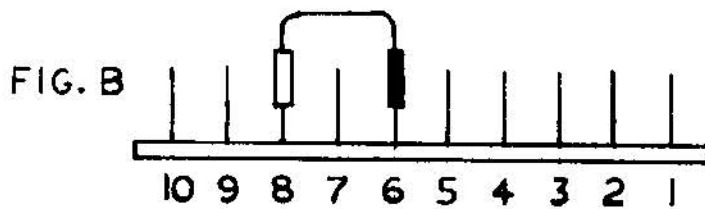
E-Z Adjusttm Control Panel - HUSTLE has one adjustment which is located on the back of the coin door:

VOLUME CONTROL - Set to desired volume for boom and tones during the game.

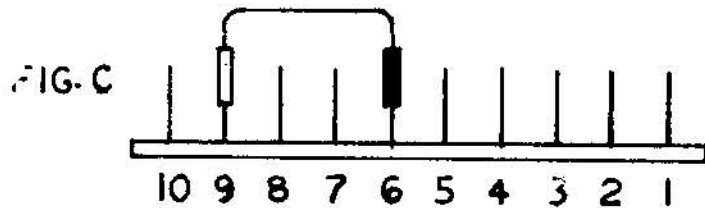
FREE GAME OPTION DIAGRAM



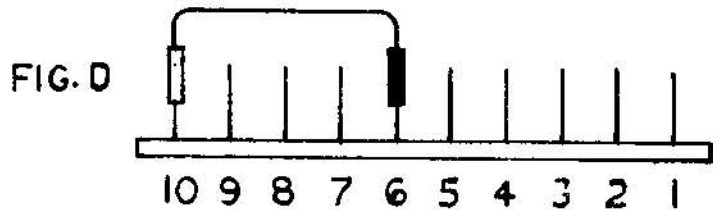
FREE GAME
AT 17,000 POINTS



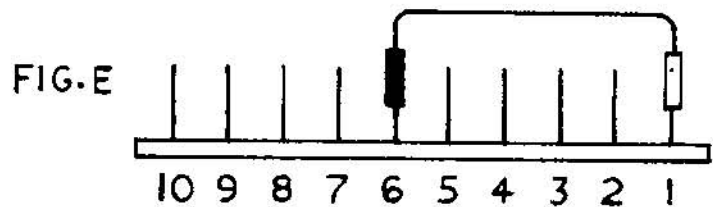
FREE GAME
AT 15,000 POINTS



FREE GAME
AT 13,000 POINTS



FREE GAME
AT 11,000 POINTS



NO FREE GAMES

SYSTEM DESCRIPTION

1. SEE SYSTEM BLOCK DIAGRAM (Fig. 3)

2. 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 and synchronized to the CPU. It controls:

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

SYSTEM DESCRIPTION (Cont.d)

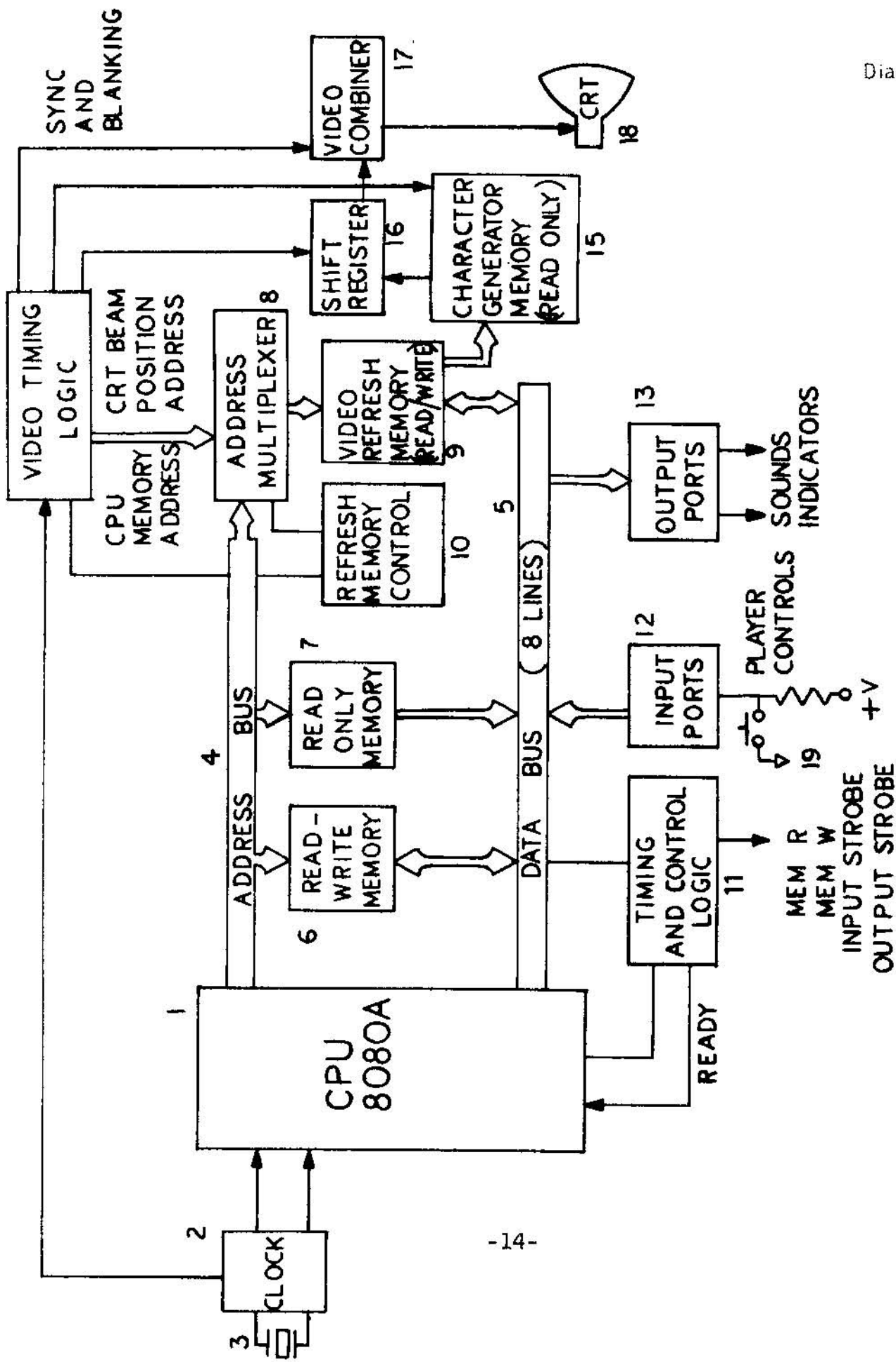
The remaining elements in Figure 1 convert CPU system information into a video display format. The T.V. monitor (18) uses a standard 525 scan line system.

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.

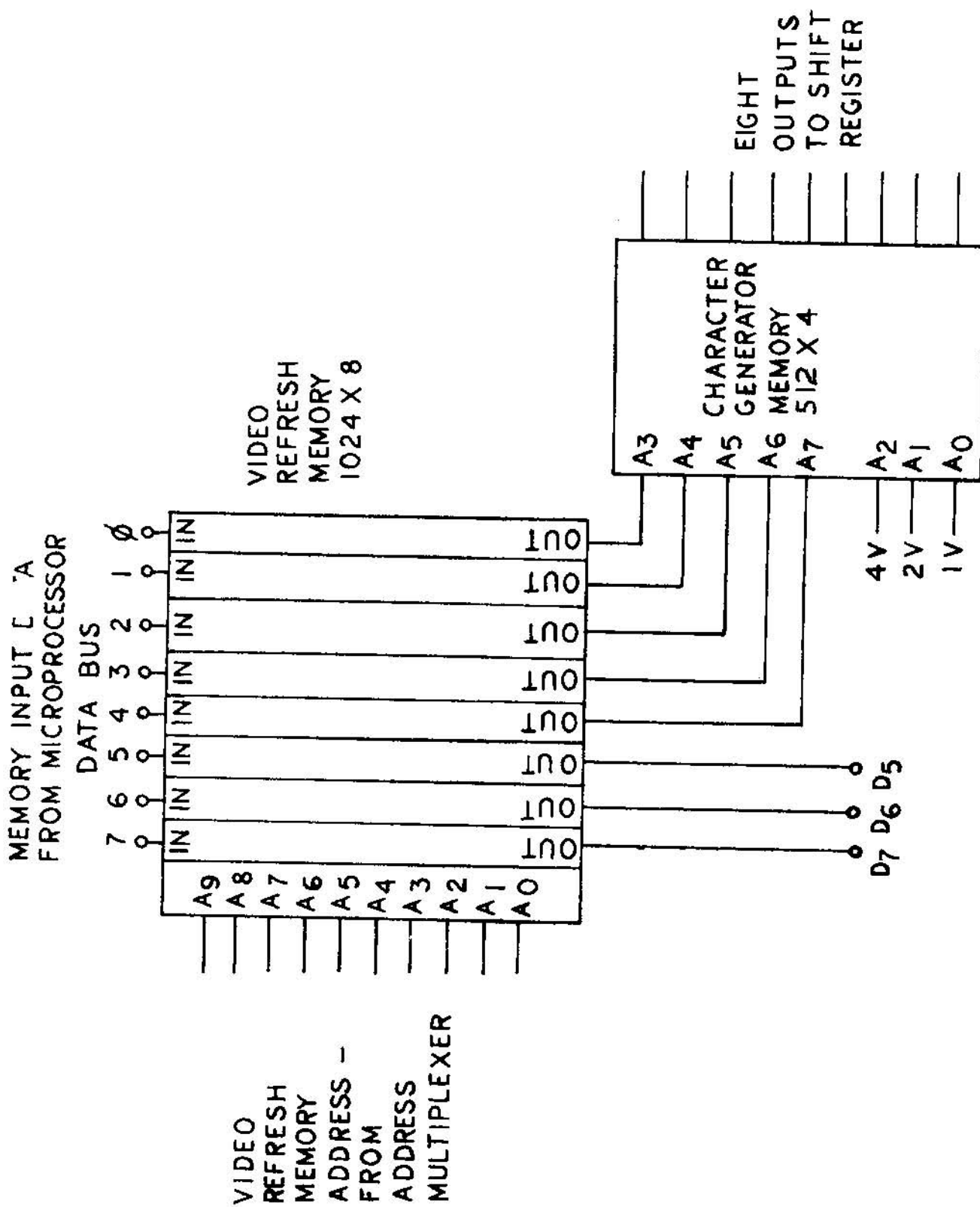
Character Generator Memory (15) provides a means for Video Refresh Memory to select 64 dots for each 8 word access. Each image, on the display, has the dimensions of 8 dots high, and 8 dots wide. Shift register (16) develops this into a video signal. (See Fig. 2)

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. (See Fig. 3) This generator also produces the "warble" sound heard during scoring.

Diagram #3



SYSTEM BLOCK DIAGRAM



CHARACTER GENERATION CIRCUITRY

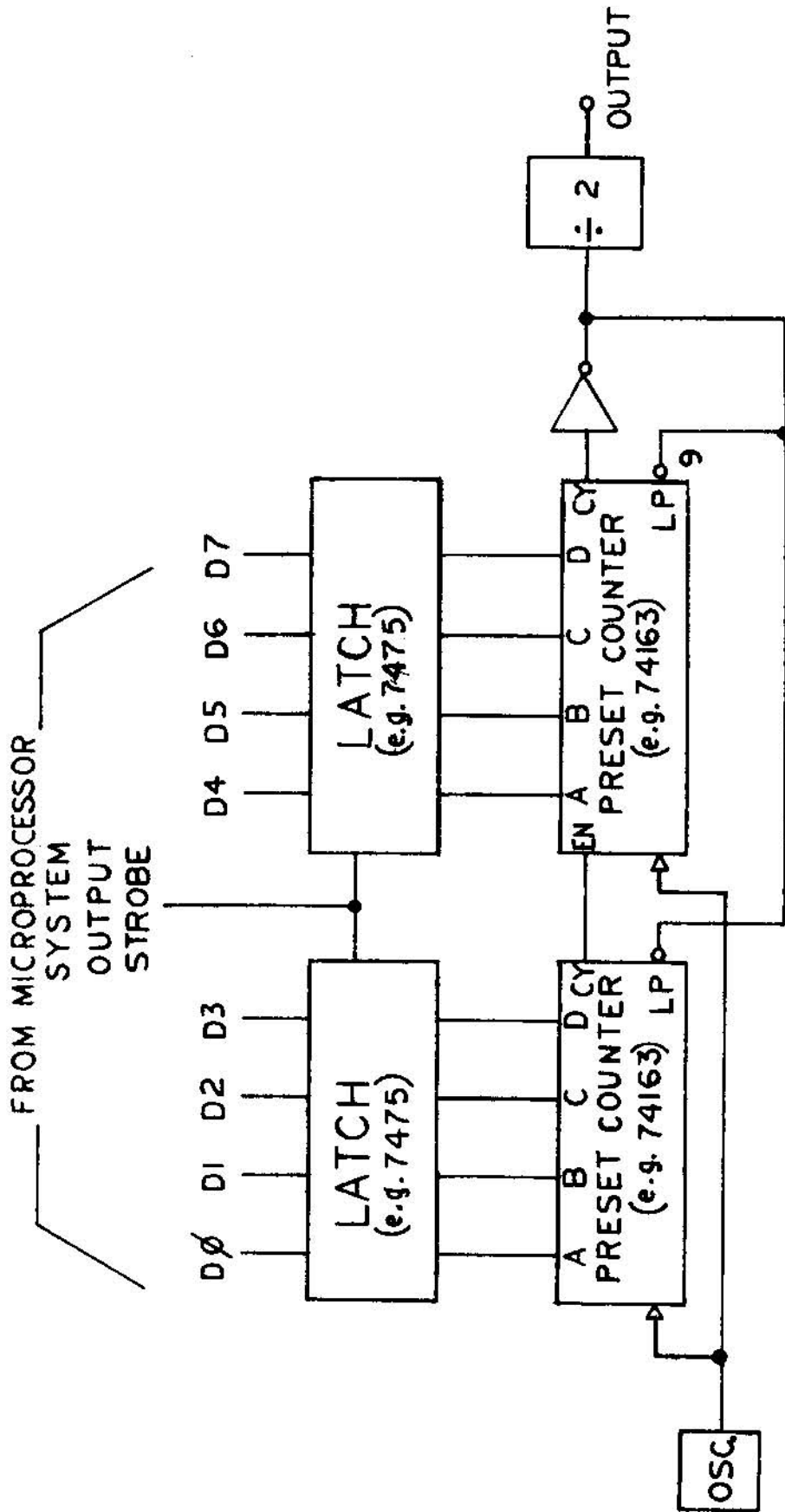


Diagram #5

TONE GENERATOR
FIG.5

FACTORY ASSISTANCE & EQUIPMENT

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 PROBELM 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 HUSTLE.

1. Oscilloscope - 50 mhz or wider band width
2. DVM (Digital Volt Meter)
3. OHM Meter
4. Logic Probe
5. Solder Station - 75 Watt or less
6. Jumpers
7. Replacement parts including game programs:
1024 x 4 proms 316-0016, 316-0017, 316-0018, and
316-0019

SYMPTOMS/CAUSES

HUSTLE POWER SUPPLY MALFUNCTIONS:

1. Remove Output Connectors
2. Initial Tests: (GND lead to C-18 negative terminal located off board.)
 - a. +9v 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 +5.1VDC
 - b. +12v adjust - input lead to pin 12 and adjust R-8 for 11.5 to -12.1VDC
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).

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

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

SYMPTOMS/CAUSES (Cont'd.)

No Ø1, Ø2 CLOCKS: (Ref. Fig. 4A)

(VLBS), (SH. 1). CHECK U-32 pins 1 and 3 for 20.79MHZ. 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 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.

No Coin Meter Action:

(VLBS) (SH. 1). Signal from U-8 pin 11 feeds current limiter R-27 to Q₄. Saturated Q₄ turns on 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.

No Game Time Select:

(VLBS) (SH. 1). Input accepted through U-11 via data lines when strobe IND 1 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)

There are two probable areas:

1. A program malfunction -
 - a. CHECK PROM sockets, U-2, U-3, U-4 and U-5

SYMPTOMS/CAUSES (Cont'd.)

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-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, 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 scan. U-64 develops sync pulses.

Monitor Malfunction:

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

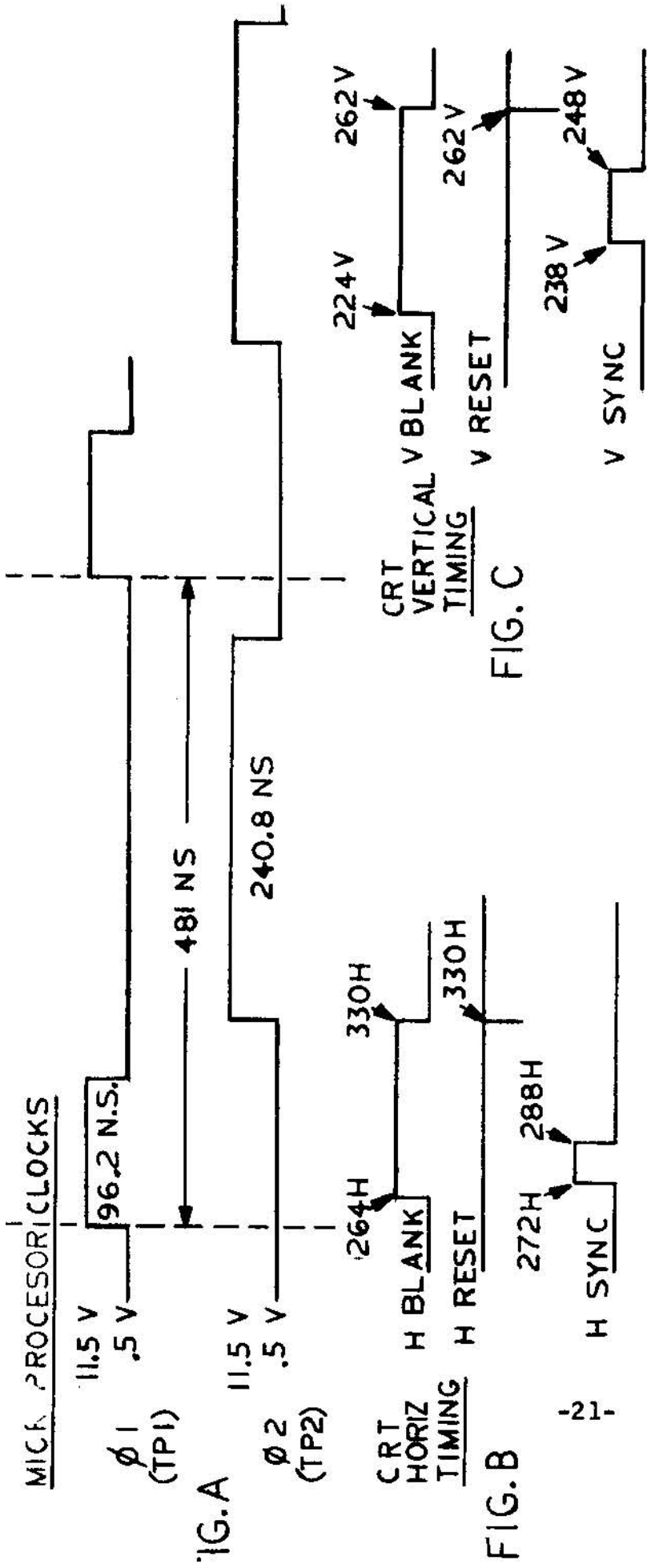
Audio Tones; Sour/None:

(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:

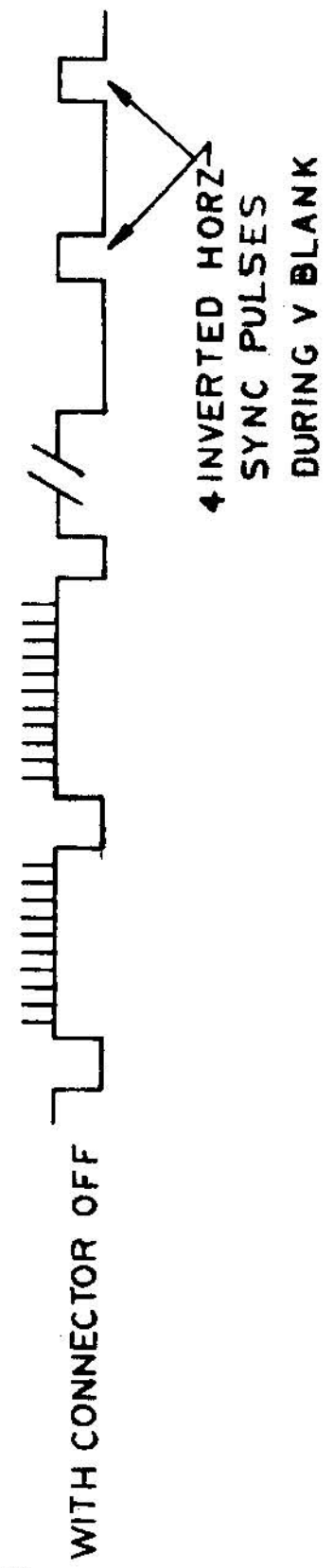
(VLBS) (SH. 1, SH. 2). D-6, Q₁₀, Q₉, Q₁₁, U-5, Q₇, Q₈. Generates Boom.

Amplifier section on Power Supply Board (U-4, Q₅, Q₃, Q₈, Q₉), also probable.



VIDEO OUTPUT

FIG. D



KEY WAVEFORMS

C H A R A C T E R C O D E T A B L E

I.C. (U#)							I.C. (U#)						
37	38	39	40	41	42		37	38	39	40	41	42	
0	0	0	0	0	0	(SPACE)	1	1	0	0	0	0	∅
0	0	0	0	0	1	?	1	1	0	0	0	1	1
0	0	0	0	1	0	—	1	1	0	0	1	0	2
0	0	0	0	1	1	///	1	1	0	0	1	1	3
0	0	0	1	0	0	■	1	1	0	1	0	0	4
0	0	0	1	0	1	■	1	1	0	1	0	1	5
0	0	0	1	1	0	■	1	1	0	1	1	0	6
0	0	0	1	1	1	■	1	1	0	1	1	1	7
0	0	1	0	0	0	◆	1	1	1	0	0	0	8
0	0	1	0	0	1	◆	1	1	1	0	0	1	9
0	0	1	0	1	0	◆	1	1	1	0	1	0	(NOT USED)
0	0	1	0	1	1	◆	1	1	1	0	1	1	□
0	0	1	1	0	0	◇	1	1	1	1	0	0	///
0	0	1	1	0	1	◇	1	1	1	1	0	1	▬
0	0	1	1	1	0	◇	1	1	1	1	1	0	!
0	0	1	1	1	1	◇	1	1	1	1	1	1	⋯

SMALL

CHARACTER CODE TABLE

I.C. (U#)							I.C. (U#)						
37	38	39	40	41	42		37	38	39	40	41	42	
1	0	0	0	0	0	A	1	1	0	0	0	0	∅
1	0	0	0	0	1	C	1	1	0	0	0	1	1
1	0	0	0	1	0	E	1	1	0	0	1	0	2
1	0	0	0	1	1	F	1	1	0	0	1	1	3
1	0	0	1	0	0	□	1	1	0	1	0	0	4
1	0	0	1	0	1	□	1	1	0	1	0	1	5
1	0	0	1	1	0	□	1	1	0	1	1	0	6
1	0	0	1	1	1	□	1	1	0	1	1	1	7
1	0	1	0	0	0	G	1	1	1	0	0	0	8
1	0	1	0	0	1	I	1	1	1	0	0	1	9
1	0	1	0	1	0	L	1	1	1	0	1	0	S
1	0	1	0	1	1	M	1	1	1	0	1	1	T
1	0	1	1	0	0	N	1	1	1	1	0	0	V
1	0	1	1	0	1	O	1	1	1	1	0	1	Y
1	0	1	1	1	0	P	1	1	1	1	1	0	(NOT USED)
1	0	1	1	1	1	R	1	1	1	1	1	1	(NOT USED)

LARGE

HUSTLE PARTS LIST

<u>DESCRIPTION</u>	<u>QTY USED</u>	<u>PART NUMBER</u>
ASSY, COIN COUNTER	1	807-0011
CONN, CRIMP LOCK	2	211-0005
CONN, KEY POLARIZING	1	211-0007
CONN, FEM 10 PIN	1	211-0016
COUNTER, DIGITAL	1	220-0008
ASSY, CONTROL BLOCK	1	813-0004
CONN, CRIMP COINBOX	6	211-0001
CONN, CRIMP LOCK	10	211-0005
CONN, KEY, POLARIZING	4	211-0007
CONN, SPADE LUG 1/4"	1	211-0019
SOLDER LUG #10	1	211-0027
CONN, FEM 4 PIN BLK	2	212-0005
CONN, FEM 10 PIN	1	212-0016
KNOB, VOL CONTROL	1	240-0001
SWITCH BRACKET	1	250-0031
ASSY, HUS OPER. SWITCH	1	813-0002
CONN CRIMP LOCK	11	211-0005
CONN, KEY, POLARIZING	1	211-0007
CONN, SPADE LUG 1/4"	1	211-0019
CONN SPADE LUG #10	1	211-0027
SWITCH ASSY WICO	10	212-0016
CONN, FEM 10 PIN	1	510-0023
ASSY, HUS VIDEO LOGIC	1	813-0001
ASSY, JUMPER HARNESS	1	807-0006
CONN, CRIMP LOCK	16	211-0005
CONN, KEY, POLARIZING	4	211-0007
CONN, FEM 10 PIN	2	212-0016
ASSY, JUNCTION BOX	1	807-0009
BOX, JUNCTION	1	140-0016

HUSTLE PARTS LIST (Cont'd.)

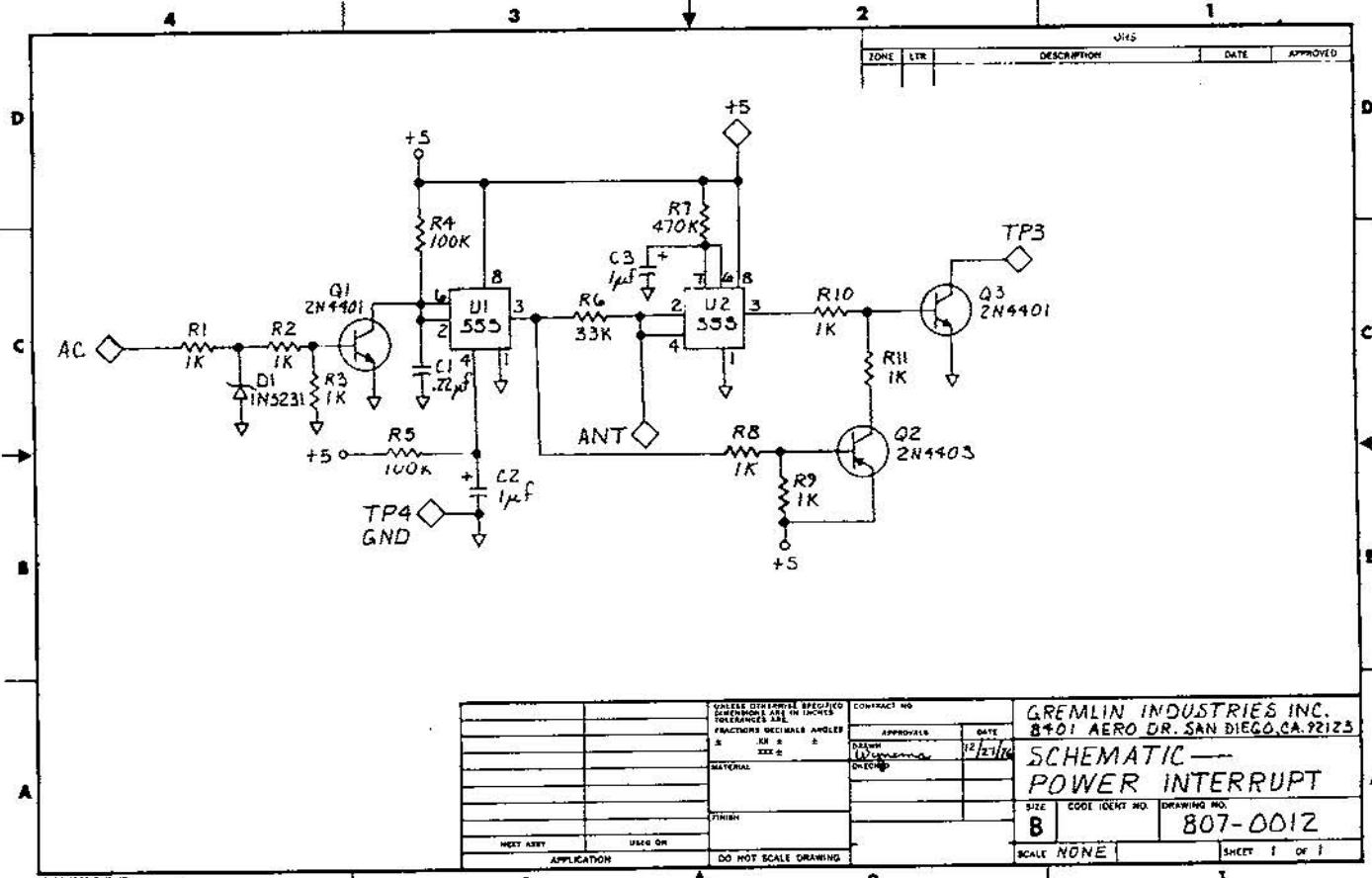
<u>DESCRIPTION</u>	<u>QTY USED</u>	<u>PART NUMBER</u>
COVER, JUNCTION BOX	1	140-0017
CONN, QUICK, 1/4" FEM	2	211-0017
CONN, SPADE LUG 1/4"	14	211-0019
CONN, QUICK 3/16" FEM	4	211-0022
BUSHING, STR/RELIEF	2	280-0007
TERMINAL STRIP 6 POS	1	280-0011
MARKER, TERM STRIP	1	280-0017
SWITCH SPDT CHERRY	1	510-0013
FUSE, 2 AMP 250V SB	1	514-0001
HOLDER, FUSE	1	514-0005
CORD, LINE, 3 COND.	1	600-0001
ASSY, MONITOR HARNESS	1	807-0005
CONN, CRIMP LOCK	2	211-0005
CONN, KEY, POLARIZING	2	211-0007
CONN, SPADE LUG 1/4"	3	211-0019
CONN, 12 PIN BLOCK	1	211-0025
CONN, PIN CRIMP, FEM	5	211-0026
CONN, FEM 4 PIN BLK	1	212-0005
ASSY, POWER INTERRUPT	1	807-0012
CAP, E, 1M50V	2	150-0009
CAP, F, .22M100V	1	152-0002
PCB POWER INTERRUPT	1	170-0073
CONN, FEM 10 PIN RT/A	1	212-0017
IC TIMER NE555	2	314-0001
RES 1K OHM ;/2W 5%	7	471-0102
RES, 100K 1/2W 5%	2	471-0104
RES, 33K 1/2W 5%	1	471-0333
RES, 470K 1/2W 5%	1	471-0474
DIODE, ZENER 1N5231	1	481-0008
XISTOR 2N4403	1	482-0006
ASSY, POWER SUPPLY	1	807-0003
ASSY, PWR SUPP/AMP B	1	807-0002

HUSTLE PARTS LIST (Cont'd.)

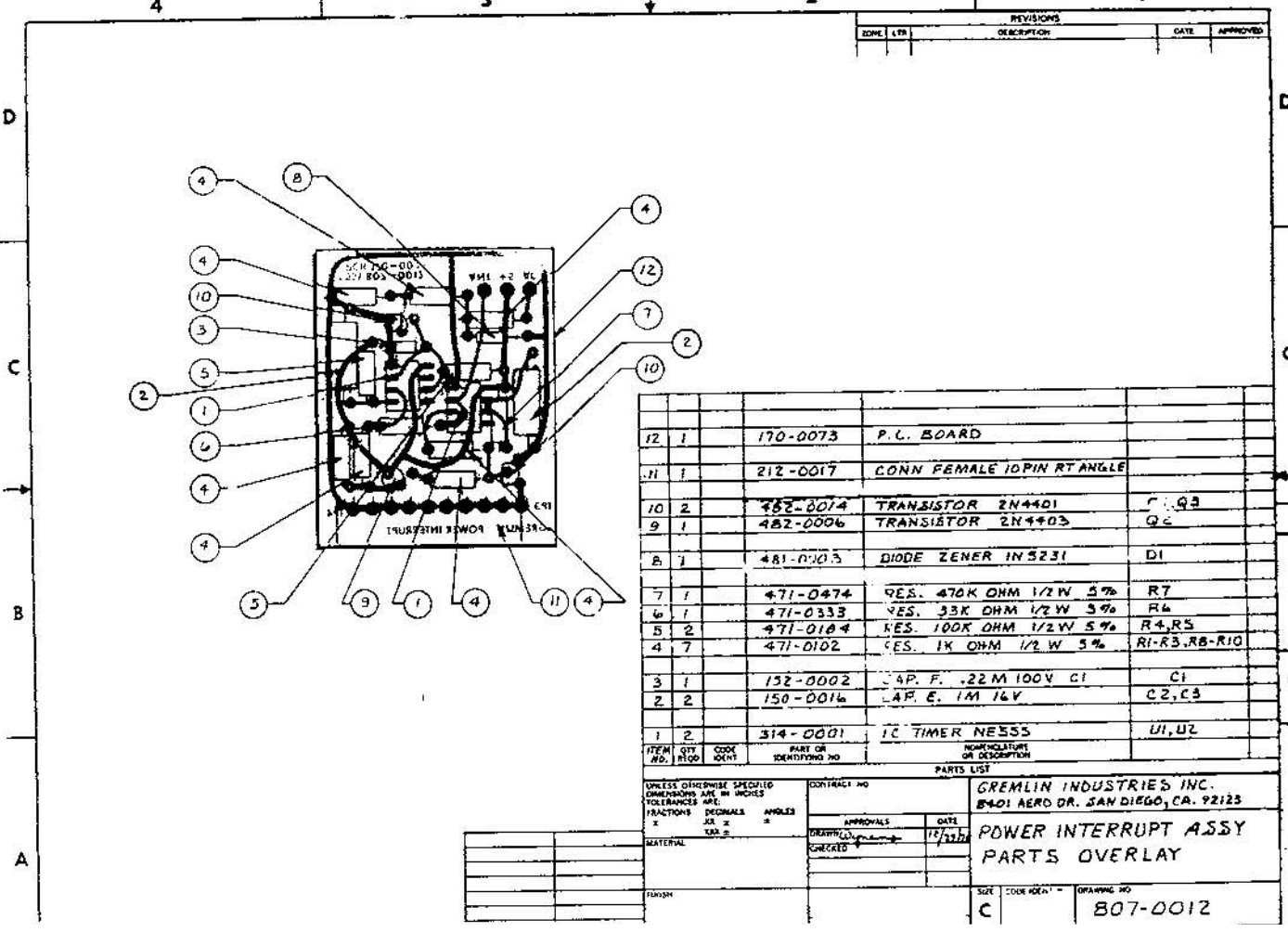
<u>DESCRIPTION</u>	<u>QTY USED</u>	<u>PART NUMBER</u>
BUSHING S/REL 3/8"	1	280-0001
BUTTON, PLUNGER WHITE	10	240-0008
CABINET, UPRIGHT	1	140-0014
CASHBOX, UPRIGHT	1	220-0012
CLIP, SWITCH	1	250-0048
CLIP, WIRE HOLDDOWN	35	280-0004
COIN MECHANISM, DUAL	1	220-0010
CORNER STRIP	4	420-0037
COVER GRAPHIC PANEL	1	253-0030
COVER, SPEAKER 6 x 9	1	130-0002
DECAL, CAUTION 115V	1	420-0030
DECAL, HUSTLE	1	420-0067
DECAL, IMPORTANT NOTE	2	420-0038
DECAL, RE-CYCLE	1	420-0040
DECAL, S/N	1	420-0028
DECAL, S/N SMALL	1	420-0041
DECAL, SERVICE	1	420-0029
DECAL, TIP N.TELL	1	420-0060
DRAWINGS, HUSTLE	1	420-0068
FEET, CABINET	4	280-0030
FIXT, LAMP FLUOR 18"	1	390-0012
FRAME, BEZEL	1	250-0032
GRAPHIC, PANEL OPTR.	1	253-0027
LAMP, FLUORESCENT, 18"	1	390-0011
LATCH, LOCK UPRIGHT	1	220-0015
LID, ASSY, COIN BOX	1	220-0016
LOCK, PANEL	1	220-0009
MANUAL, HUSTLE	1	420-0069
MASK, SHADOW CABINET	1	253-0014
MOLDING STRIP	1	250-0038
MOLDING-TRIM, LOWER	1	250-0109
MONITOR, VIDEO 19 IN	1	200-0002
MOUNT BKT COIN BOX	1	252-0014
NUT, WIRE	2	280-0010
PANEL, DISPLAY UPPER	1	253-0036
PANEL, GRAPHIC FRONT	1	253-0034
PANEL, MONITOR SCREEN	1	253-0037
PANEL, OPERATOR	1	250-0102

HUSTLE PARTS LIST (Cont'd.)

<u>DESCRIPTION</u>	<u>QTY USED</u>	<u>PART NUMBER</u>
PLATE, COIN RETENSION	1	250-0062
PLATE, LOCK STRIKE	1	250-0033
SPACER, WICO SWITCH	12	253-0031
SPEAKER, GAME 6 x 9	1	130-0001
SPRING, RETAINER	1	250-0034
TRIM, CONTROL PANEL	2	250-0106
TOP COVER	1	420-0035
WASHER, ANCHOR	1	280-0028
WRAPAROUND SIDE	1	420-0034



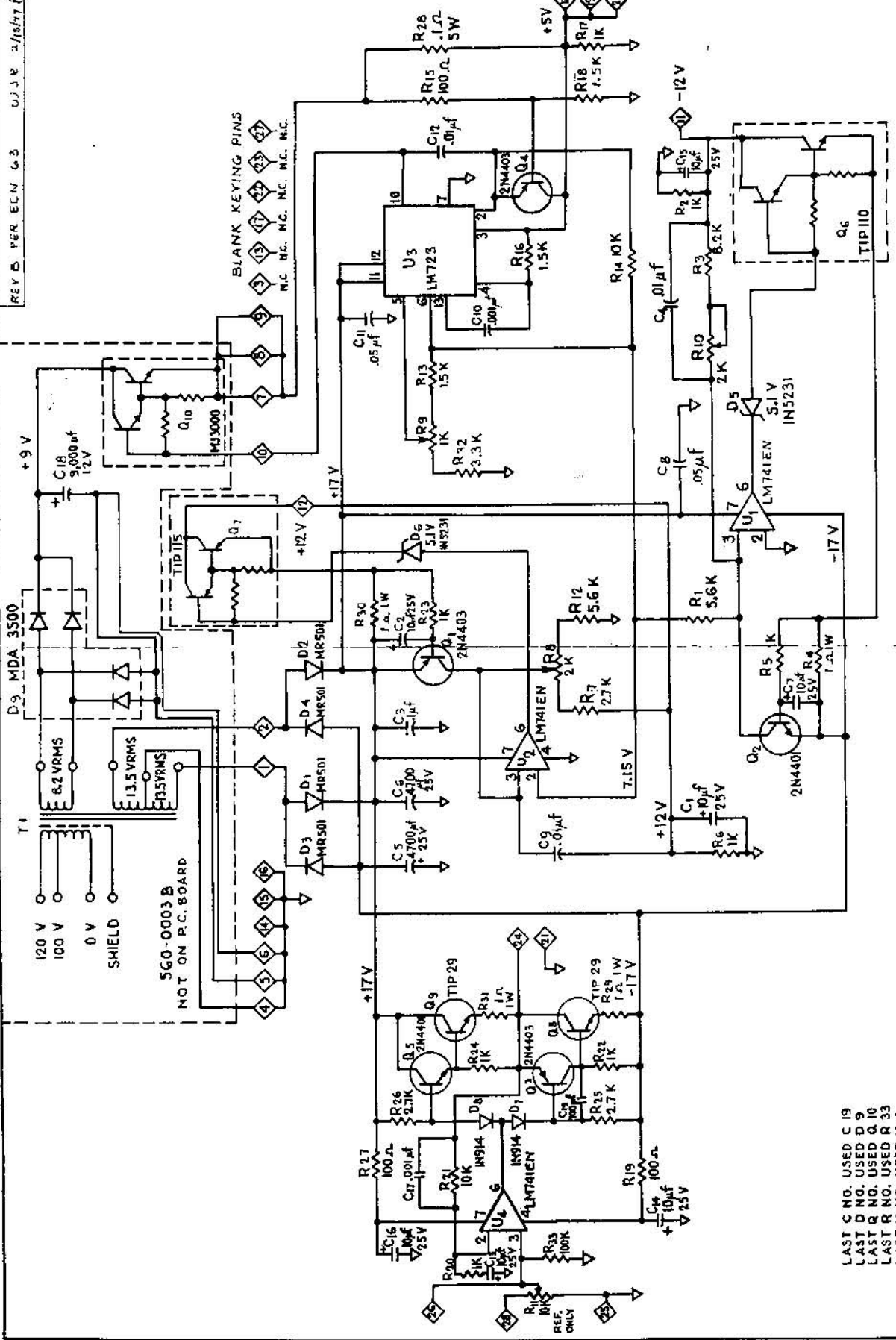
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE FRACTIONS DECIMALS ANGLES		CONTRACT NO.		DESCRIPTION		DATE		APPROVED	
		GREMLIN INDUSTRIES INC.		8401 AERO DR. SAN DIEGO, CA. 92123					
		MATERIAL		DRAWN		12/1/76			
		FINISH		CHECKED					
NEXT ASSY		USED ON		SCALE		NONE		SHEET 1 OF 1	
APPLICATION		DO NOT SCALE DRAWING		DRAWING NO.		807-0012			



UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE FRACTIONS DECIMALS ANGLES		CONTRACT NO.		DESCRIPTION		DATE		APPROVED	
		GREMLIN INDUSTRIES INC.		8401 AERO DR. SAN DIEGO, CA. 92123					
		MATERIAL		DRAWN		12/1/76			
		FINISH		CHECKED					
NEXT ASSY		USED ON		SCALE		NONE		SHEET 1 OF 1	
APPLICATION		DO NOT SCALE DRAWING		DRAWING NO.		807-0012			

ITEM NO.	QTY	DESCRIPTION	MANUFACTURER OR DESCRIPTION
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	481-0005	DIODE ZENER 1N5231
7	1	471-0474	RES. 470K OHM 1/2W 5%
6	1	471-0333	RES. 33K OHM 1/2W 5%
5	2	471-0104	RES. 100K OHM 1/2W 5%
4	7	471-0102	RES. 1K OHM 1/2W 5%
3	1	152-0002	CAP. F. .22M 100V C1
2	2	150-0016	CAP. E. 1M 16V
1	2	314-0001	IC TIMER NE555

REV B PER ECN 63 UJJB 2/15/77



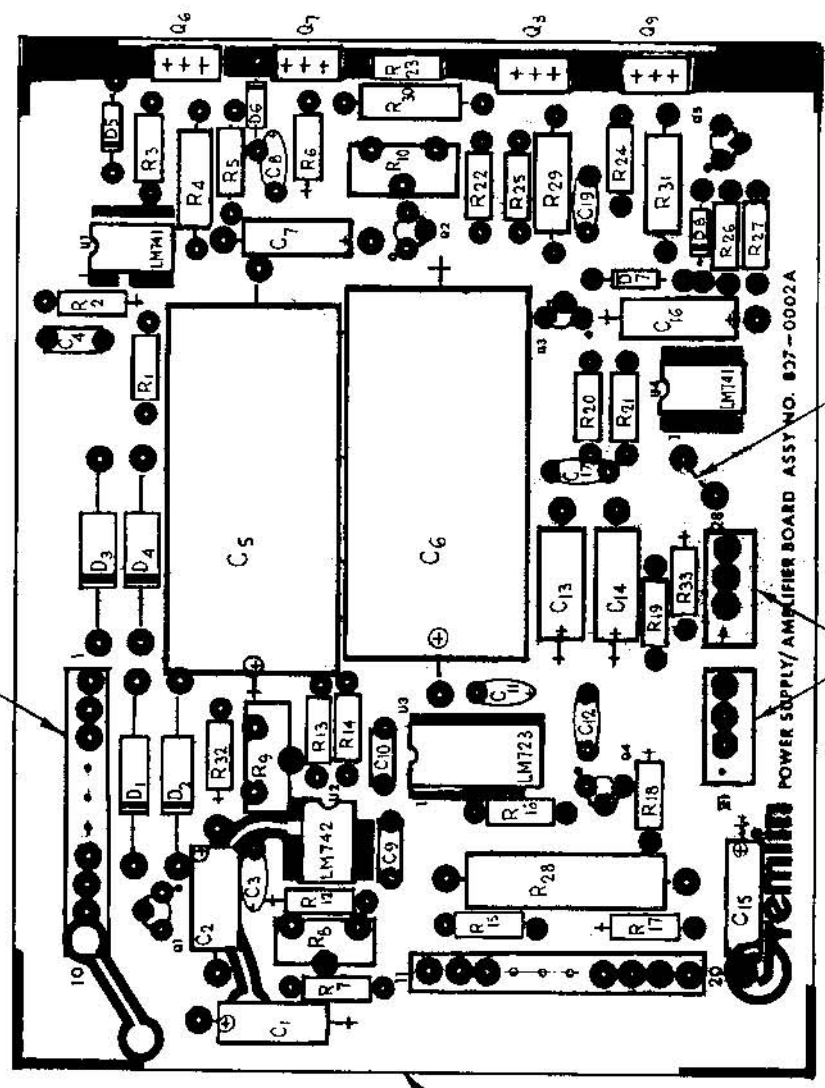
560-0003B
NOT ON P.C. BOARD

BLANK KEYING PINS
N.C. N.C. N.C. N.C. N.C. N.C.

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	
REVISED	DATE
DESIGNED BY	SCALE
DRAWN BY	APPROVED
FILE	807-0004
TITLE	SCHEMATIC
DESCRIPTION	HUSTLE PWR.SUPPLY
DATE	NONE
SCALE	807-0004

2 2 PLACES



POWER SUPPLY/AMPIER BOARD ASSY NO. 837-0002A

ITEM NO.	QUANTITY	DESCRIPTION
1	1	PCB
2	1	LM111
3	1	LM741
4	1	LM723
5	1	LM742
6	1	P28
7	1	RESISTORS
8	1	CAPACITORS
9	1	DIODES
10	1	TRANSFORMER
11	1	CONNECTORS
12	1	WELDED POINTS
13	1	WELDED POINTS
14	1	WELDED POINTS
15	1	WELDED POINTS
16	1	WELDED POINTS
17	1	WELDED POINTS
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47	1	WELDED POINTS
48	1	WELDED POINTS
49	1	WELDED POINTS
50	1	WELDED POINTS

GREMLIN INDUSTRIES
8401 AERO DR. SAN DIEGO, CA. 92126

POWER SUPPLY/AMR B0A

DATE: 2/15/77

UNIT: 807-0002

SCALE: 1:1

DRWING NO: 807-0002

REV: 1

DESIGNED BY: [Signature]

CHECKED BY: [Signature]

APPROVED BY: [Signature]

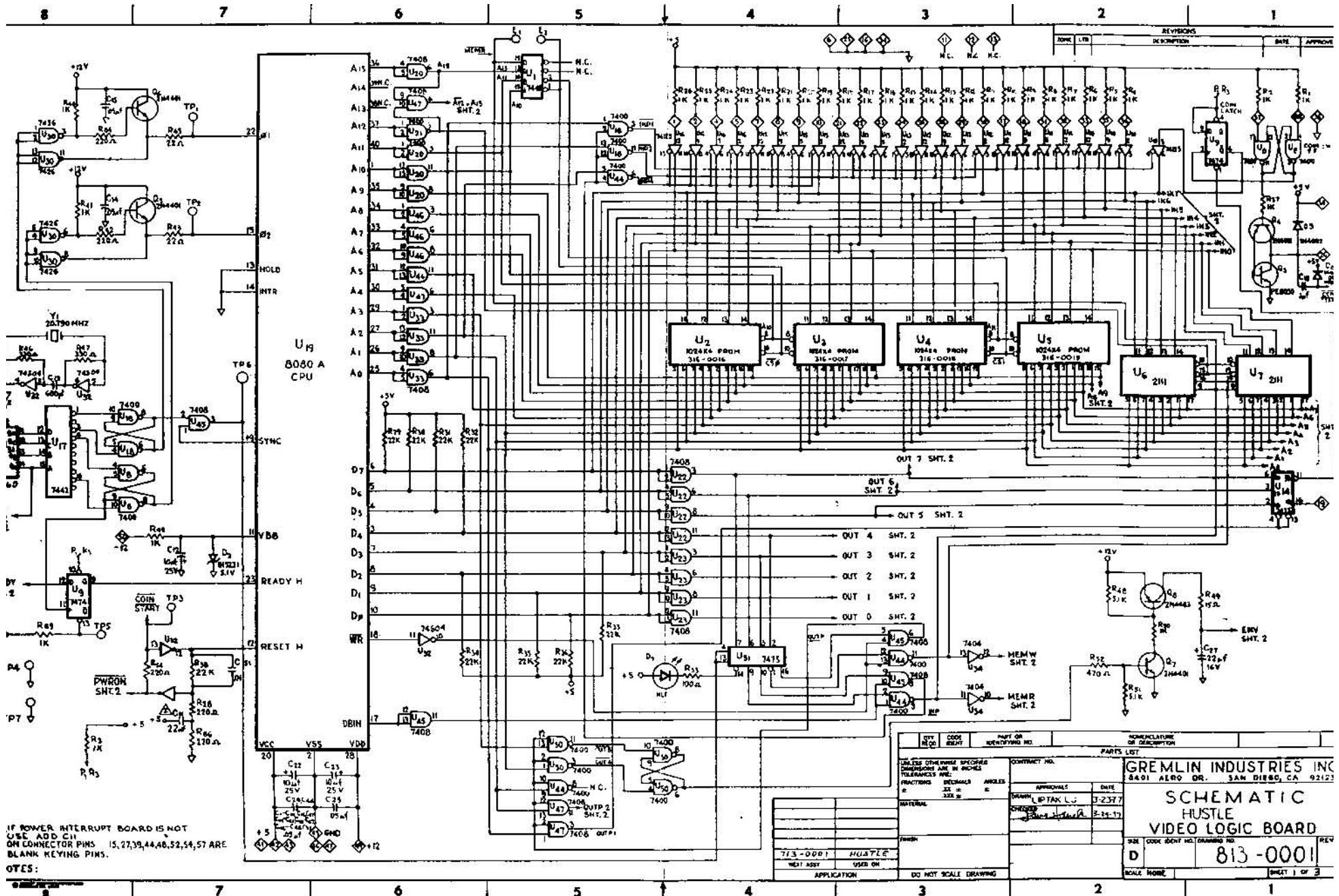
DATE: 2/15/77

SCALE: 1:1

DRWING NO: 807-0002

REV: 1

.DMIT R(1)



IF POWER INTERRUPT BOARD IS NOT USED, ADD C11 ON CONNECTOR PINS 15, 27, 39, 44, 48, 52, 54, 57 ARE BLANK KEYING PINS.

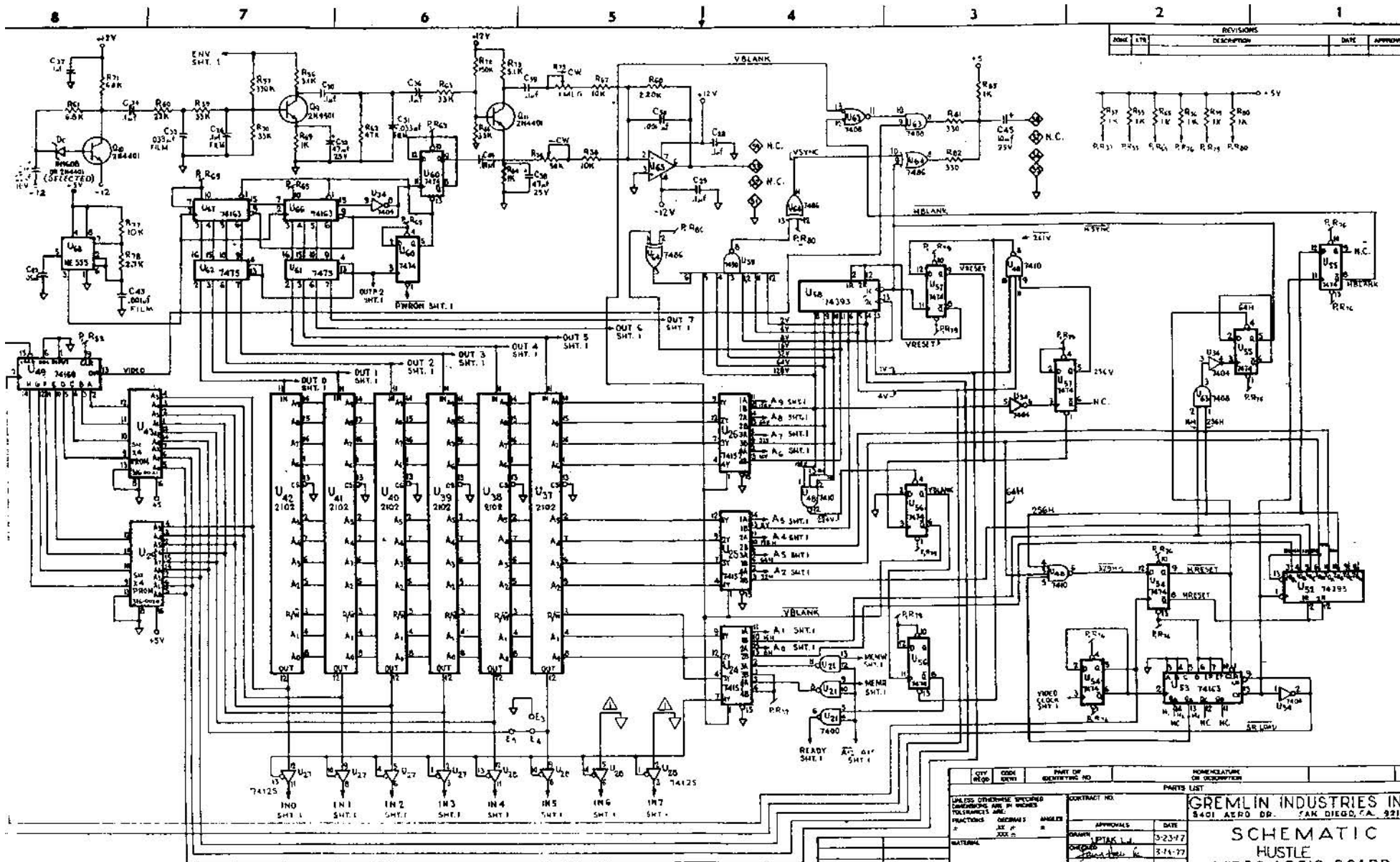
NOTES:

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

SCHEMATIC
HUSTLE
VIDEO LOGIC BOARD

REV: **D** CODE IDENT NO.: **813-0001** DRAWING NO.: **3-24-77**

SHEET 1 OF 3



REVISIONS			
REV	DATE	DESCRIPTION	APPROVED

NOTES:
 △ JUMPER AT IC PINS 9 TO 12 AT U35, U36

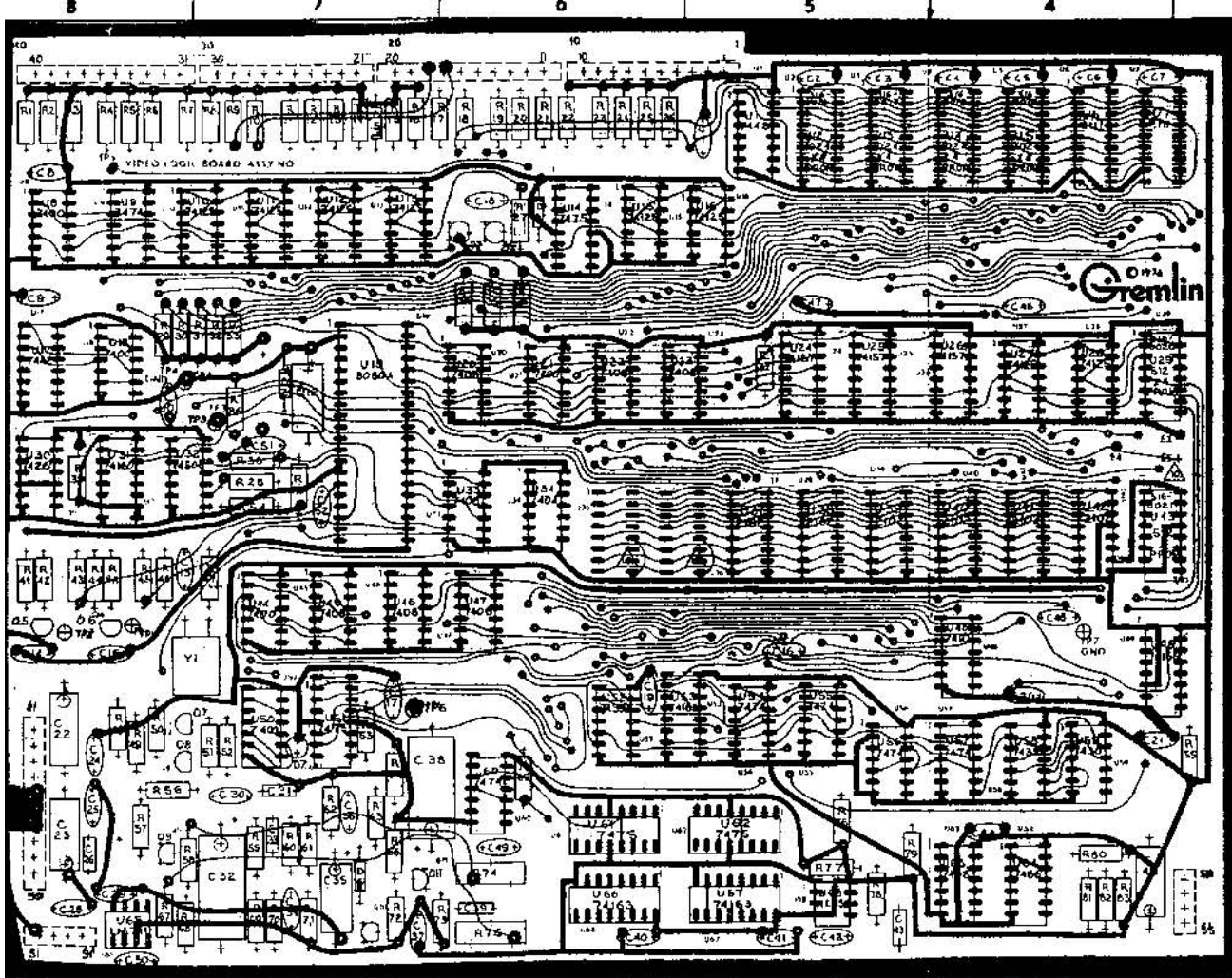
CITY	CODE	PART OF	NOMENCLATURE
(REQ)	(DEF)	(IDENTIFYING NO)	(OR DESCRIPTION)

UNLESS OTHERWISE SPECIFIED		CONTRACT NO.	
TOLERANCES ARE:	FRACCTIONS	DECIMALS	ANGLES

PARTS LIST		DATE	
QTY	DESCRIPTION		

APPLICATION		DATE	

GREMLIN INDUSTRIES IN	
8401 AERO DR. (SAN DIEGO, CA. 921)	
SCHEMATIC	
HUSTLE	
VIDEO LOGIC BOARD	
SIZE CODE	ROOT NO (DRAWING NO)
D	813-0001
SCALE	NONE
SHEET 3 OF 3	



A JUMPER WIRES AT NOTES
 B CAPACITANCE VALUES ARE IN MICRO FARADS EXCEPT C 13 NOTED AS PICO FARADS
 C RESISTANCE VALUES ARE IN OHMS (K = 1000)
 D ON CONNECTOR PINS 3, 15, 27, 39, 49, 52, 54, 67 ARE BLANK KEYING PINS
 E OMITS G1, G2, D1, D2, D3, D4, D5, D6, D7
 F LAST C NO. USED C 62
 G LAST D NO. USED D 6
 H LAST O NO. USED O 1
 I LAST A NO. USED A 6
 J LAST U NO. USED U 6

NOTES:

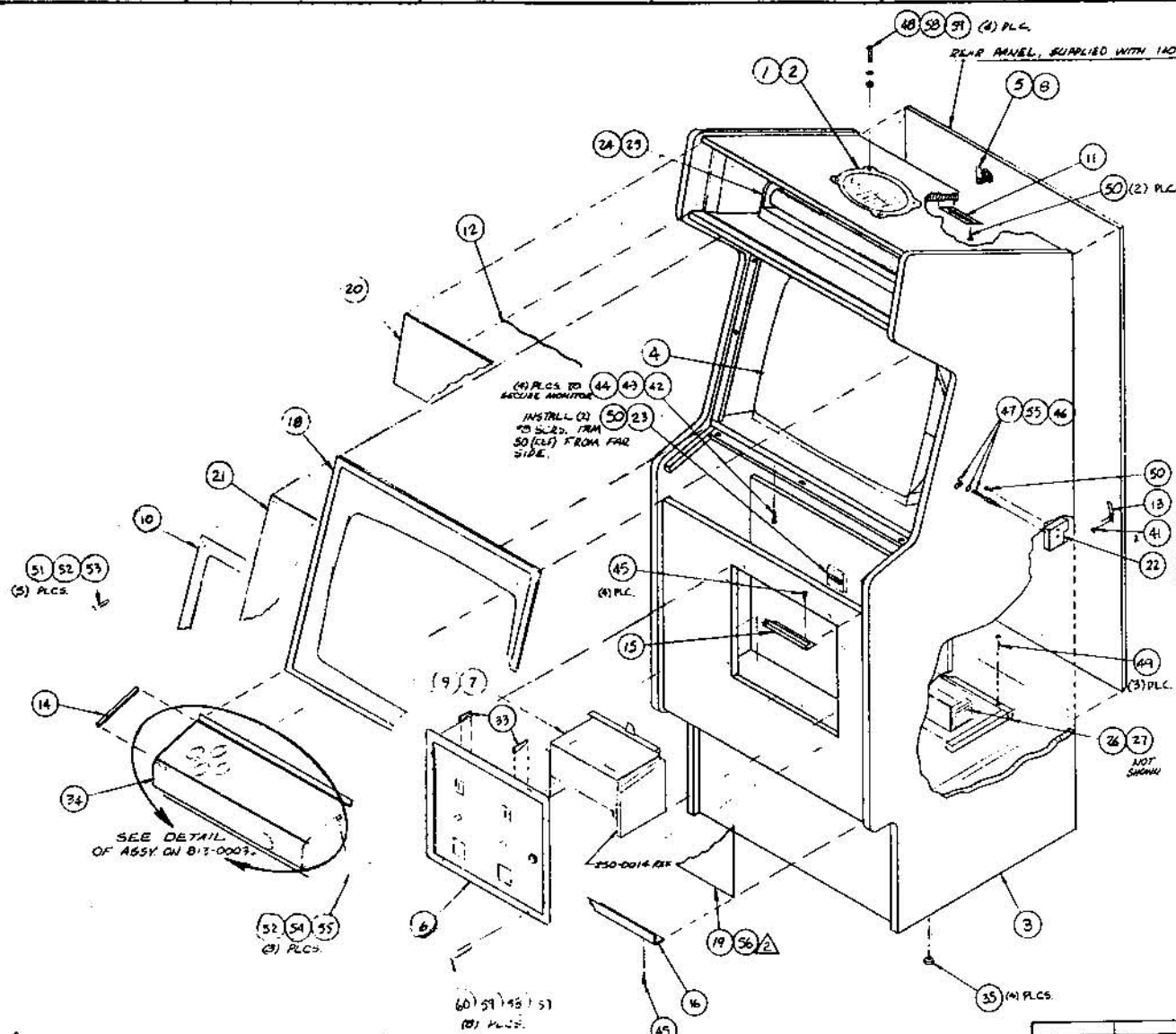
ZONE		REVISIONS	
LINE	DESCRIPTION	DATE	APPROV

U1	711-0004	TELY POINT PLUG
U2-13 (RAC ONLY)	711-0004	ITAL 20780 MULT CLK
U4-7	711-0004	SST BRIN MAN JUM
U11	711-0004	CONN. MALE 4 PIN
U12	711-0004	CONN. MALE 10 PIN
U13	711-0004	CONN. MALE 10 PIN
U14	711-0004	CONN. MALE 10 PIN
U15	711-0004	CONN. MALE 10 PIN
U16	711-0004	CONN. MALE 10 PIN
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U97	711-0004	CONN. MALE 10 PIN
U98	711-0004	CONN. MALE 10 PIN
U99	711-0004	CONN. MALE 10 PIN
U100	711-0004	CONN. MALE 10 PIN

REV NO	QTY	PART NO.	MINIATURE OR DESCRIPTION
U1	1	711-0004	TELY POINT PLUG
U2-13	1	711-0004	ITAL 20780 MULT CLK
U4-7	1	711-0004	SST BRIN MAN JUM
U11	1	711-0004	CONN. MALE 4 PIN
U12	1	711-0004	CONN. MALE 10 PIN
U13	1	711-0004	CONN. MALE 10 PIN
U14	1	711-0004	CONN. MALE 10 PIN
U15	1	711-0004	CONN. MALE 10 PIN
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U98	1	711-0004	CONN. MALE 10 PIN
U99	1	711-0004	CONN. MALE 10 PIN
U100	1	711-0004	CONN. MALE 10 PIN

PARTS LIST		CONTRACT NO.		VIDEO LOGIC BOARD	
<p>UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE:</p> <p>FRACTIONS DECIMALS ANGLES</p> <p>XX ± .01 ± .015</p>				<p>Gremlin Industries, Inc.</p> <p>Box 4000, Santa Monica, Calif. 90406</p>	
<p>MATERIAL</p> <p>FINISH</p> <p>PRECIPITATION</p> <p>TEMPERATURE</p>		<p>APPROVALS</p> <p>DATE</p> <p>DATE</p> <p>DATE</p>		<p>VIDEO LOGIC BOARD</p> <p>HUSTLE</p> <p>PARTS OVERLAY</p>	
<p>APPLICATION</p> <p>DO NOT SCALE DRAWING</p>				<p>SERIAL NO. / DRAWING NO.</p> <p>813-0001</p> <p>SCALE: 1:1</p> <p>SHEET 5 OF 5</p>	

REVISIONS			
NO.	DESCRIPTION	DATE	APP.
A	INITIAL RELEASE ECN 116	4.11.77	J.P.D.
C	ITEM 5 IN 150-0018 WAS 150-0018	4.18.77	V.O.P.
D	PER ECN 116	5.4.77	J.P.D.



1	10-32 BOLT RD. HD. CARRIAGE 1 1/2" LG.
2	8-32 HEX NUT
3	10 FLAT WASHER
4	10 LOCK WASHER
5	214 ADHESIVE *XE-4673
6	10 LOCK WASHER
7	10-32 HEX NUT
8	10-24 BOLT RD. HD. CARRIAGE 1 3/4" LG.
9	10 FLAT WASHER
10	10-24 HEX NUT
11	10 RD. HD. CR. REC. SHC. NUT. SEC. 1 1/2" LG.
12	10 FLAT HD. CR. REC. WOOD SCR. 1 1/2" LG.
13	10-32 SELF DR. HD. CR. REC. 1 1/2" LG.
14	10-24 WING BOLT 2 1/2" LG.
15	10-24 WING NUT
16	10 RD. HD. CR. REC. WOOD SCR. 1 1/2" LG.
17	10 SELF DR. SHC. NUT. SEC. HEAD 1 1/2" LG.
18	10 INT.-EXT. TOOTH LOCK WASHER
19	10 CLIP NUT
20	10 RD. HD. CR. REC. SHC. NUT. SEC. 1 1/2" LG.
21	280-0080 CABINET FEET
22	819-0001 OPERATOR PANEL ASSY
23	290-0047 COIN RETURNION PLATE
24	818-0008 ASSY. COIN TRAY - W/LOCK
25	801-0006 ASSY. UPPER HARNESS
26	807-0010 ASSY. SPEAKER CABLE
27	807-0012 ASSY. POWER INTERRUPT
28	801-0004 ASSY. MONITOR HARNESS
29	813-0001 VIDEO LOCK RD. ASSY
30	807-0003 ASSY. POWER SUPPLY
31	390-0012 LAMP. FLUORESCENT 10"
32	390-0011 COIN QUARTER ASSY
33	807-0009 ASSY. JUNCTION BOX
34	251-0077 PANEL MONITOR SCREEN
35	253-0036 PANEL DISPLAY UPPER
36	253-0038 PANEL GRAPHIC FRONT
37	253-0046 HMBE, SHADOW CABINET
38	280-0007 HOLDING TRIM LOWER
39	280-0038 HOLDING TRIM UPPER
40	150-0164 TRIM CONTROL PANEL
41	250-0040 CLIP SWITCH
42	280-0034 RETAINER SPRING
43	250-0032 PLATE LOCK STRIKE
44	250-0032 BEZEL FRAME
45	220-0016 COIN BOX LID ASSY
46	220-0015 LATCH LOCK B/A
47	220-0012 CASHBOX UPRIGHT
48	200-0010 DUAL COIN MECHANISM
49	220-0009 LOCK, PANEL
50	200-0002 VIDEO MONITOR 19 IN.
51	140-0014 CABINET, B/A
52	130-0007 SPEAKER COVER 6x9
53	130-0007 SPEAKER, CHASSIS 6x9

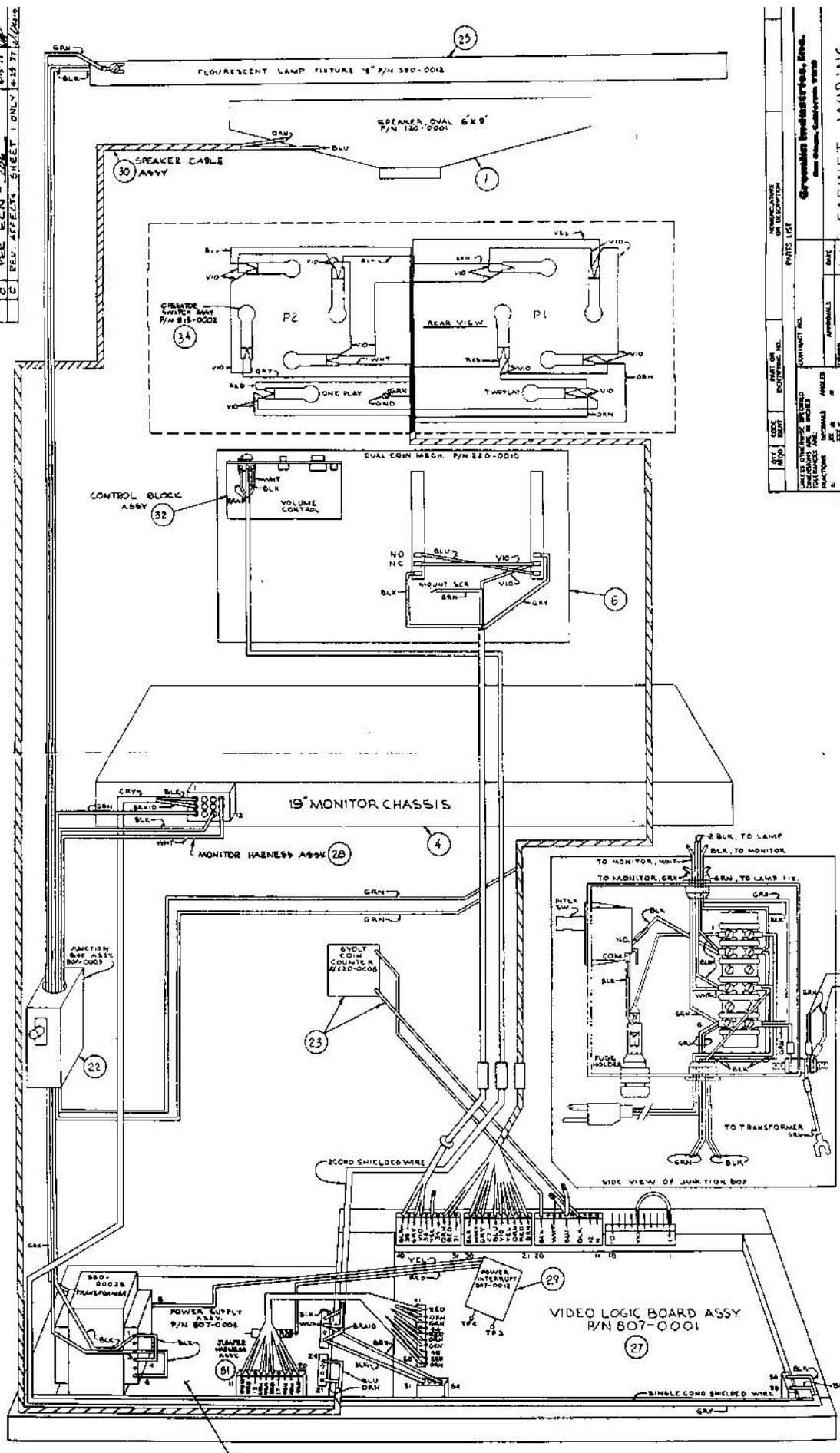
USE 3M ADHESIVE *XE-4673 TO CELENT FRONT GRAPHIC PANEL (PART 1) TO CABINET FROM (3) IN. DIST. ON BODY OF MACHINE. SEE SHEET 2 OF 3 OF THIS DWG.

NOTES.

PARTS LIST		CONTRACT NO.		Growth Industries, Inc.	
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES				San Diego, California 92122	
APPROVALS	DATE	<p>TOP ASSY. HUSTLE</p> <p>SIZE: COIL IDENT NO: DRAWING NO: 713-0001</p> <p>SCALE: NONE</p>			
APPROVED	DATE				
NATURAL					
FINISH					
NEXT APT	USED ON	DO NOT SCALE DRAWING			
APPLICATION					

REV	DATE	BY	APP'D
1	4-15-77
2
3

REV	DATE	BY	APP'D
1	4-15-77
2
3



PARTS LIST	
QTY	DESCRIPTION
1	...
1	...
1	...

DATE	BY	APP'D
...
...

PROJECT NO.	...
...	...
...	...

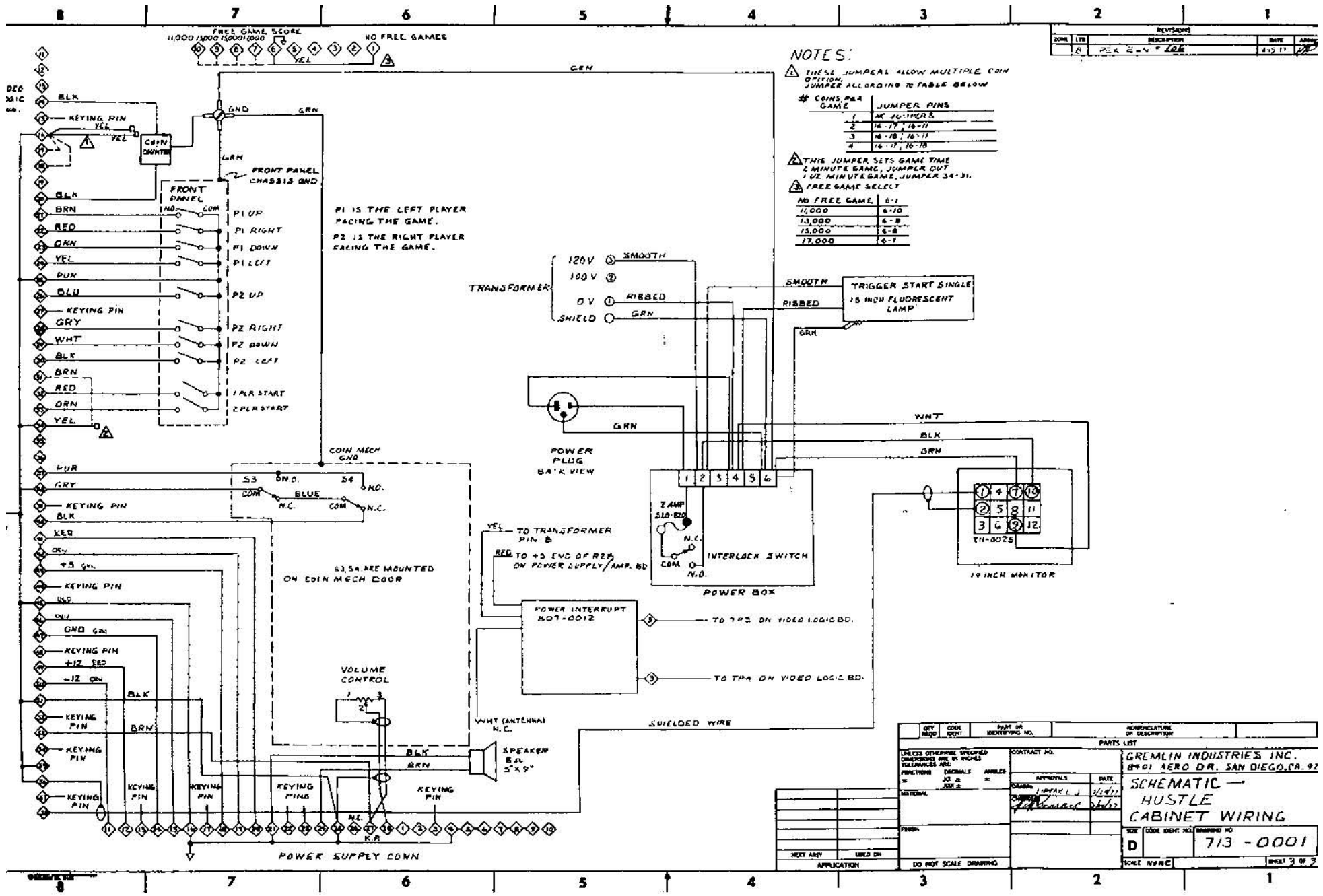
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FREEL GAME SCORE
11,000 10,000 9,000 8,000 7,000 6,000 5,000 4,000 3,000 2,000 1,000
NO FREEL GAMES

REV	DATE	DESCRIPTION	BY	APP
1	2-15-77	REV 2-1-4 + 1-2-1		

NOTES:

△ THESE JUMPER ALLOW MULTIPLE COIN OPTION, JUMPER ACCORDING TO TABLE BELOW

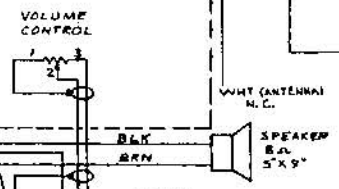
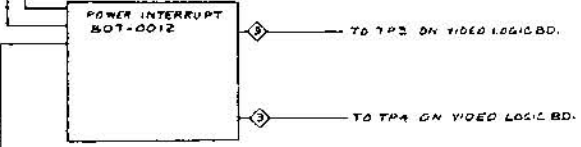
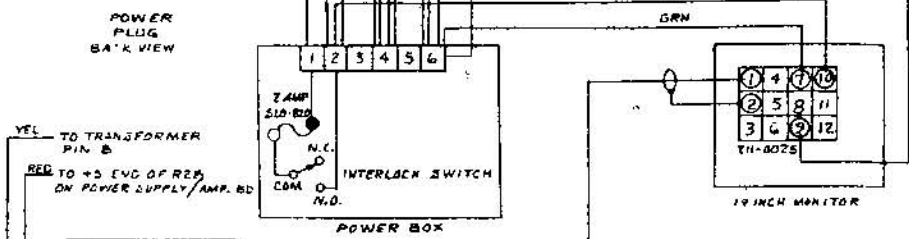
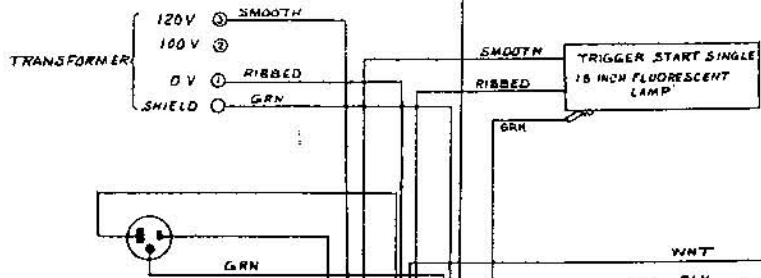
* COINS PER GAME	JUMPER PINS
1	AC JUMPER
2	16-17, 18-19
3	16-18, 16-19
4	16-17, 16-18

△ THIS JUMPER SETS GAME TIME
2 MINUTE GAME, JUMPER OUT
1/2 MINUTE GAME, JUMPER 34-31.

△ FREE GAME SELECT

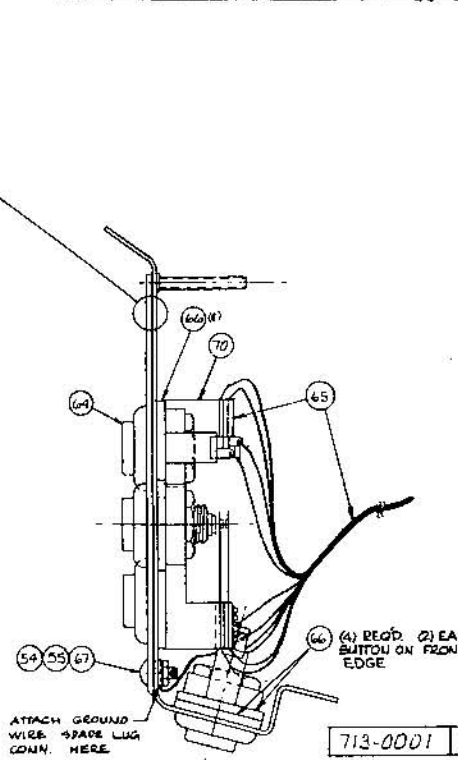
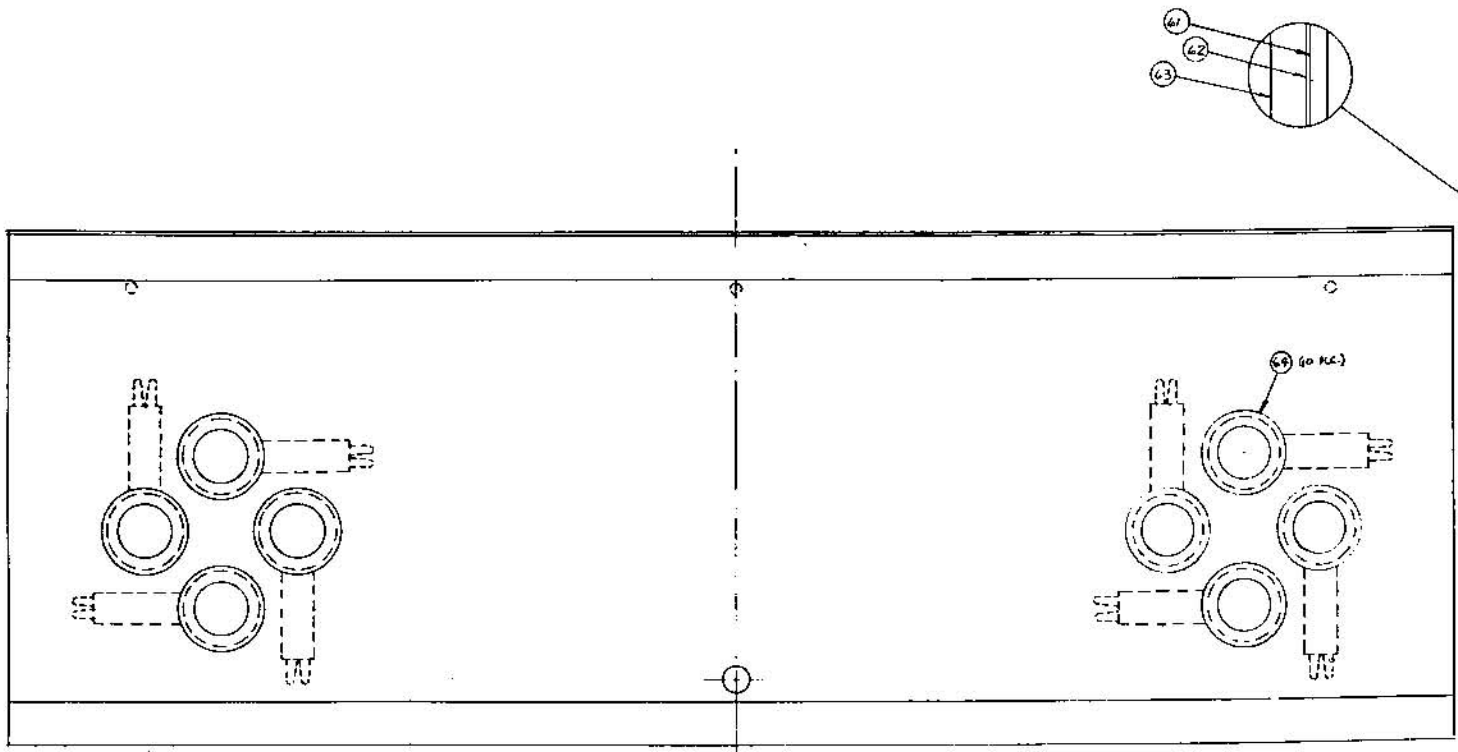
NO FREE GAME	6-1
11,000	6-10
13,000	6-8
15,000	6-8
17,000	6-7

P1 IS THE LEFT PLAYER
FACING THE GAME.
P2 IS THE RIGHT PLAYER
FACING THE GAME.



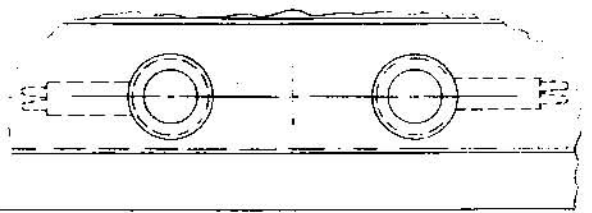
QTY REQD	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION
			GREMLIN INDUSTRIES INC. 8701 AERO DR. SAN DIEGO, CA. 92
PARTS LIST			
SCHEMATIC - HUSTLE CABINET WIRING			
CONTRACT NO.		DATE	
DRAWN: [Signature]		DATE: 1/14/77	
CHECKED: [Signature]		DATE: 1/14/77	
APPROVED: [Signature]		DATE: 1/14/77	
SCALE: N.P.A.C.		SHEET 3 OF 3	

REVISIONS				
REV	LTN	DESCRIPTION	DATE	APPROV
	AK	INITIAL RELEASE	5-19-77	[Signature]
3A	A	PER ECN # 104	5-18-77	[Signature]
	D	PER ECN # 116	5-9-77	[Signature]



PLAYER 2 (REF)

PLAYER 1 (REF)



ONE PLAY (REF) TWO PLAY (REF)

E REF.

OPERATOR PANEL ASSEMBLY DETAIL

QTY	CODE	DESCRIPTION	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION
1		290-0077		PLATE SWITCH MT.
1				BOLT, RD HD, 10-32 1/2" LG CARTRIDGE
12		253-0091		SPACER, WIGO SWITCH
1		813-0001		OPERATOR SWITCH ASSY
10		240-0098		BUTTON PLUNGER ASSY
1		285-0080		COVER, GRAPHIC PANEL
1		223-0027		GRAPHIC PANEL OPERATOR
1		290-0102		PANEL OPERATOR

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS DECIMALS ANGLES

CONTRACT NO. APPROVALS DATE

OPERATOR PANEL ASSY

713-0001 MUSTLE. USED ON

DATE: 5/29/77

SCALE: NONE

713-0001 SHEET 2 OF 4