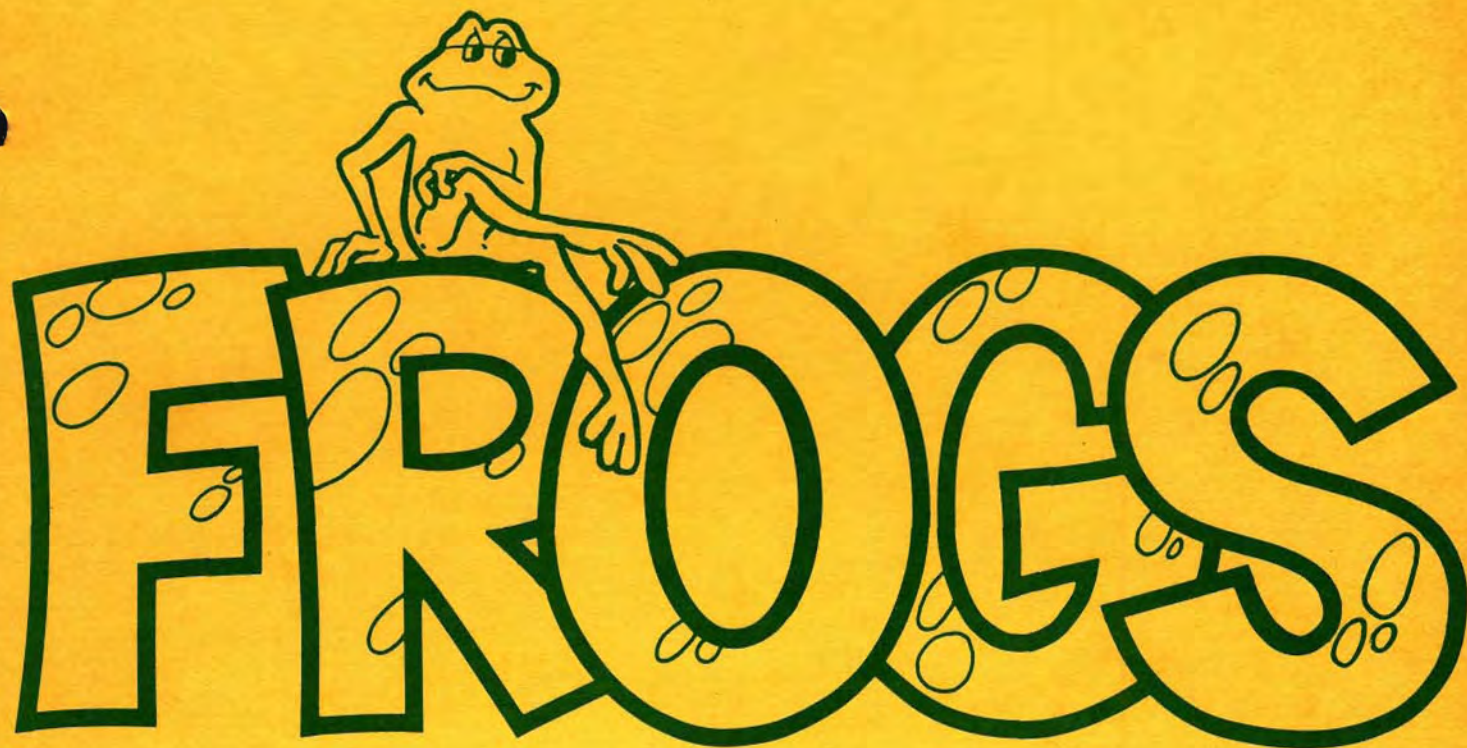




PART NO.
721-0001

MANUFACTURED BY

Gremlin[®]
Industries, inc.

OWNER'S MANUAL

FROGS

OPERATING INSTRUCTIONS

AND

SERVICE MANUAL

GREMLIN INDUSTRIES, INC.

8401 AERO DRIVE

SAN DIEGO, CA 92123

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INTRODUCTION

This 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, microprocessor, 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 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 NOTE

An important service note is posted in this 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 this game 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:

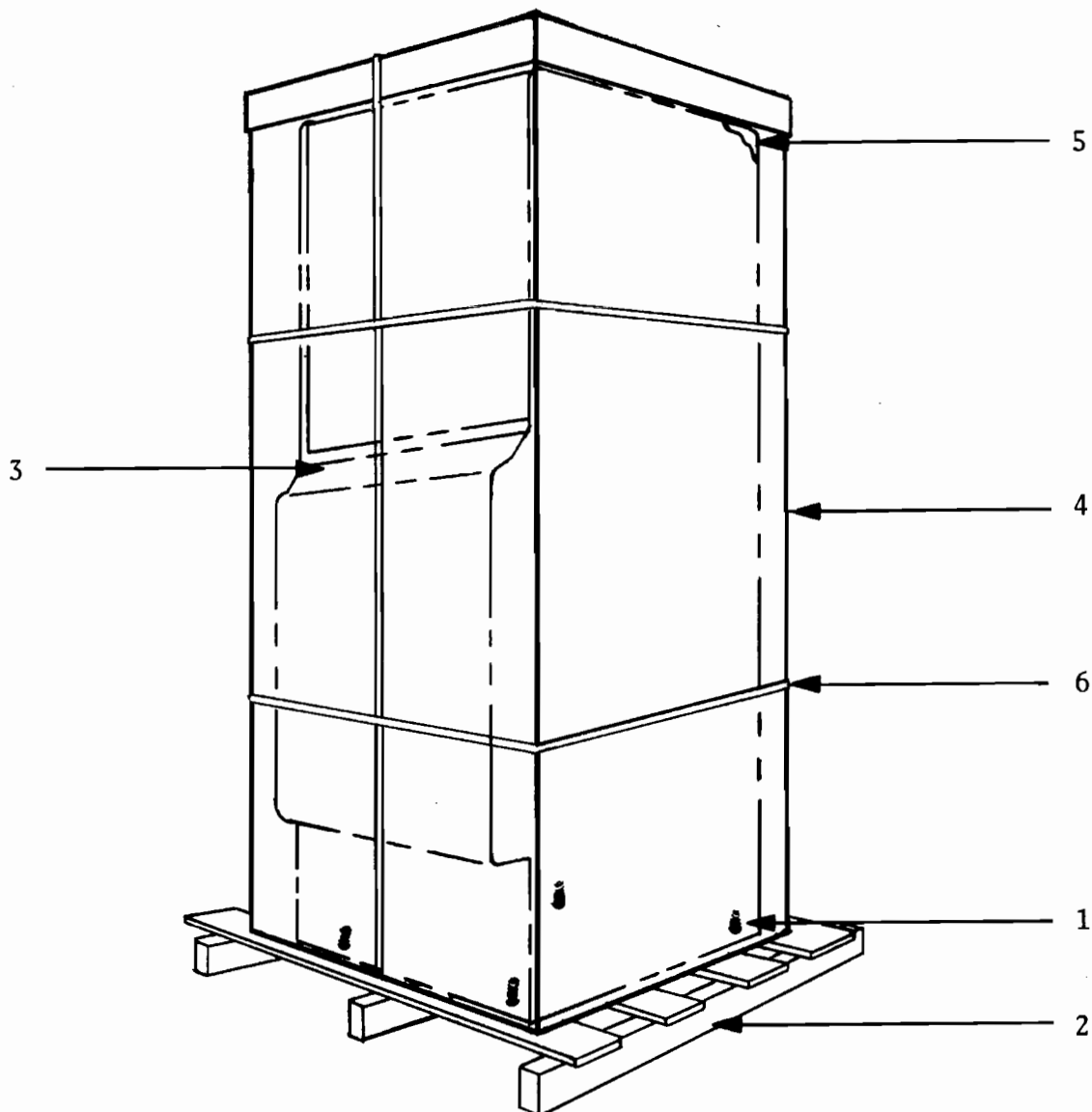
The system reset circuitry described above requires that the coin counter is attached to the system. If there is a coin counter problem and no replacement is available, the game will function properly if a 10K 0hm resistor is connected across the coin counter input pins to the video logic board.

REPACKAGING INSTRUCTIONS

Should it be necessary to ship this game, follow the instructions below for game recrating:

- A) If the original shipping bolts have been discarded (Ref.1), obtain four 5/16-18x1 3/4" hex head bolts with 5/16" flat washers. Carefully lay the 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). After crating is completed, secure package with strapping (Ref.6).

NOTE: If the game is to be shipped to GREMLIN for service or repair, attach a tag identifying the distributor and indicate the service or repair to be made; include the full serial number of the game. GAME MUST BE SHIPPED PREPAID.



GAME CONCEPT AND OPERATION

FROGS is a unique single-player video game in which the player controls a frog to catch as many insects as possible in the time allotted. Points are awarded each time the frog catches one of the insects. The setting for FROGS is a colorful scene depicting a marshy area, complete with a pond, lily pads, and tall grasses.

FROG:

The frog appears, at the start of the game, on his lily pad. He hops either to the left or right, or jumps up off his pad. The player controls these motions with a single joystick on the control panel. With the joystick, the player maneuvers the frog either right or left for rapid positioning. In this way, the player can take advantage of all possible shots. The player must be careful to keep the frog from hopping or jumping off the left or right edge of the lily pad. If he is not, the frog splashes into the water. When this happens, the player loses about 4 seconds of time, after which the frog reappears on this lily pad. Also, like a real frog, this one can't turn around in mid-air after it has jumped.

The tongue button makes the frog's tongue shoot out to catch an insect. The tongue can be ejected only after the frog has jumped up for an insect, or when the frog is coming down from a jump. The frog, then, can catch a bug on the way up or on the way down from his jump.

INSECTS:

The words "CATCH DRAGONFLY FOR FREE GAME" are displayed on the screen before the game starts. When the game begins, one butterfly appears. At a score of 100, two butterflies show up. Then, at a score of 600, the first fly appears; and at 800, the second fly. As a player's score increases, more insects appear on the screen. This feature makes game play self-adjusting for all player skill levels. During a game, no more than two butterflies, or two flies move across the screen. When a butterfly is caught, the player gains 100 points; 500 points are awarded for a fly.

The butterfly moves at a random height back and forth across the screen. The fly also moves randomly, but it stops for a moment, then darts off around the screen. The dragonfly appears only when 10 seconds are left in the game. A player must have a score of at least 600 for the dragonfly to appear during these last 10 seconds. It will reappear during the final 10 seconds, after it has been caught. When it is caught the first time, the player wins a free game, and is awarded 1000 points. If the player catches it again during these last seconds, he gains another 1000 points. If the free game feature is disconnected, the dragonfly appears; and, if caught, it awards the 1000 points, but not the free game. During game advertising, the message "GAME OVER" flashes to draw the patron's attention to it.

GAME CONCEPT AND OPERATION (Cont'd)

FREE GAME:

When the player catches the dragonfly the first time, the game action freezes briefly and a long 'croak' sound occurs, accompanied by a flashing "FREE GAME" message at the bottom of the screen. The game then resumes for the remaining amount of time. When time runs out, the message "FREE GAME-PUSH TONGUE BUTTON TO START" appears. At this time, the previous game's score is retained for the player to note. The player simply pushes the tongue button and the free game begins.

The words "CATCH DRAGONFLY FOR FREE GAME" appear on the screen only if the free game feature is connected. This will let the operator know at a glance if the feature has been activated, without opening the game cabinet to check. Only one free game is awarded for each paid game, and no additional games are awarded on a free game. The dragonfly does not appear during the free game.

SCORING:

The score is recorded at the top of the screen, along with the "TIME" and "TOP SCORE" displays. The "TOP SCORE" is kept on during advertising and adds incentive to attempt to beat it. "TOP SCORE" always starts at 500, even after the game has been unplugged and plugged back in.

OPTIONS:

There are four options which may be activated, as necessary:

1. Game time of 60 or 90 seconds; the game is shipped with the 90 second time on.
2. One or two coin option; the game is shipped with the one coin feature.
3. Sound-off switch for advertising sound (frog splash); this sound is on, as the game is shipped. The switch is located on the inside of the coin door, for easy access.
4. Free game activated feature; the game is shipped with the free game on: YOU MUST DISCONNECT IT IF FREE GAMES ARE ILLEGAL IN YOUR AREA! (Refer to Maintenance Section of this manual for instructions.)

GAME CONCEPT AND OPERATION (Cont'd)

SOUNDS:

All the sounds in FROGS draw attention and add excitement to the game. A realistic sound accents each move by the frog and flies: the frog's hop, jump and tongue motions, the frog splashing into the water, and the flies darting around the screen. During advertising, the only sound made is the occasional splash of water, when the frog plops off the edge of his lily pad. This sound can be turned off during advertising, if desired, with the switch located inside the coin door.

MAINTENANCE

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.

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.

EQUIPMENT:

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

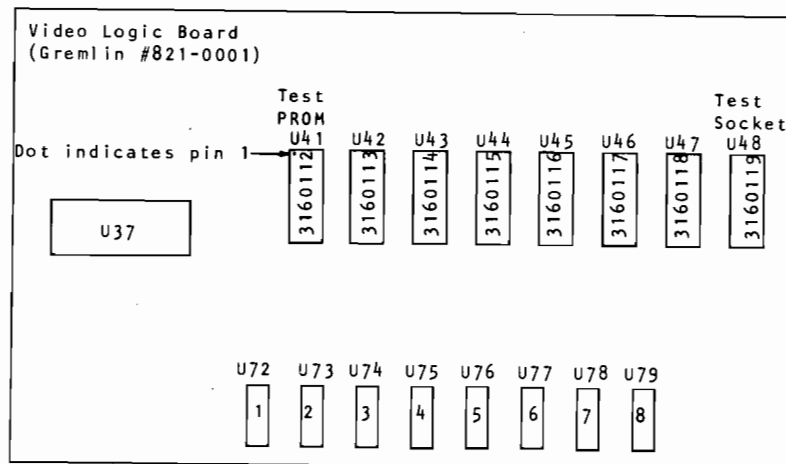
The above list is recommended for anyone attempting to service FROGS.

FROGS DIAGNOSTIC TEST

A unique Test IC in FROGS allows the technician to check a number of game elements for proper operation. Among these are: Screen memory test, switch test, switch connection test and certain IC's. The following instructions show how to run this important test:

READ THROUGH ALL THE INSTRUCTIONS BEFORE BEGINNING THE TEST!

1. Turn off game power and remove cabinet back.
2. Refer to FIGURE 1, below, to locate the IC's used in the test.
3. Remove IC's U41 and U48 (Gremlin Part #316-0112 and #316-0119, respectively). Be careful not to bend the pins.
4. Set IC #316-0119 aside.
5. Plug IC #316-0112 into the 316-0119 socket (U48). Be sure to observe the proper pin configuration and to not bend the pins. (A small dot in the upper left corner on the IC indicates pin 1; see FIG. 1).
6. Turn on game power.
7. Click the coin switch once to start the test.
8. If you see the character columns on the screen moving to the LEFT, proceed to STEP 9. This motion indicates that the memory IC's, U72 through U79, are working properly. If you see NO motion on the screen and, instead, hear a number of "zip" sounds, move directly to STEP 10, below.



(U72 to U79 Gremlin #315-0036)

FIGURE 1

FROGS VIDEO LOGIC BOARD (Top View)

Diagnostic Test, cont'd.

9. SCREEN MOVING: Now, proceed to check the switch assemblies, as follows:

a) Press the 'TONGUE' button and hold it down until the screen action stops moving. You should then hear, in the following order, these sounds:

- the hop sound
- the jump ('boing')
- the tongue ('zip')
- the capture ('croak')
- the fly ('buzz')
- (no sound)
- the splash

b) Follow the same procedure for each of the other switch actions: Hop Left, Hop Right, and Jump. After each, you should hear the same sequence of sounds listed above. Be sure to HOLD each switch position until the screen action stops and the sounds begin. (The screen should start moving again after the sounds.)

c) If, when you activate one of the switches, the screen DOES NOT STOP, there is a problem in one or more of the following areas:

- bad switch
- bad switch connection to logic board
- bad input IC, U5 or U6

d) If the screen action does stop, and, when you activate a switch, you don't hear ANY of the sounds listed above, then look for a problem with:

- a bad connection between the sound and logic boards.
- the volume control. (Is it turned up?)
- the speaker. (Is it connected properly?)
- a bad switch or switch connection.

e) If the screen stops, and, when you activate a switch, you hear only a FEW of the sounds, check these areas:

- bad sound board
- bad connection between the sound board and logic board

Diagnostic Test, cont'd.

10. SCREEN NOT MOVING: If there is no screen response when the coin switch is clicked, check to make sure the coin switch itself and its connecting wires are good. If the coin switch is OK, and again there is no screen motion after the coin switch is clicked, there is a problem with one of the IC's, U72 through U79 (Gremlin Part #315-0036). (See FIGURE 1 to locate them; they are numbered 1 through 8 on the drawing). To find out which IC isn't working, simply count the number of "zip" sounds you hear. For example, if you hear 4 "zips", you will know that IC U75 (the fourth IC from the left) needs to be replaced. Clicking the coin switch repeats the "zip" sequence. When you replace a bad IC, let the game run for a few minutes to check the new IC.

11. When all the tests have been made:

- a) Turn off the power.
- b) Put IC #316-0112 back into its original socket (U41).
- c) Put IC #316-0119 back in its socket (U48).
- d) Put the rear panel back in place.

OPTIONS AND ADJUSTMENTS

FOR FREE GAME INHIBIT:

Refer to FIGURE 1, below. To disconnect the free game feature, simply insert the pin on the end of one of the two black wires into pin 26 (position #5) of the female connector to the logic board. (These black wires are unconnected and lead out of the female connector at position #1.)

GAME TIME CHANGE:

To enable the 60 second game time instead of the 90 second time, simply insert the pin on one of the black wires, referred to above, into pin 27 (position #4) of the female connector. See FIGURE 1.

MULTIPLE COIN OPTION:

To enable the two coin feature, simply insert the pin on the black wire into pin 28 (position #3) of the connector. See FIGURE 1.

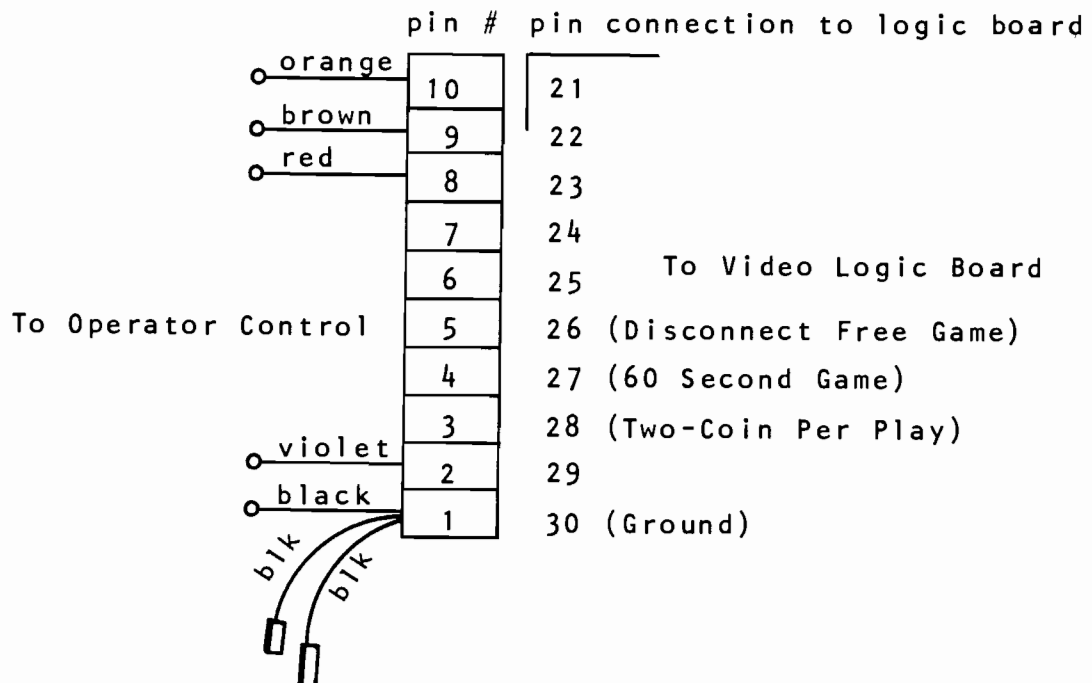


FIGURE 1- Pin Connections for Options

REPLACEMENT PARTS - FROGS

(per 10 games)

Gremlin Part Number	Description	Quantity
200-0002	Monitor, 19"	1
213-0001	24-pin IC Socket	2
213-0004	16-pin IC Socket	2
220-0019	Panel Lock	1
220-0035	Lock, Fort Lock	1
220-0066	Coin Mechanism, Single	1
220-0071	Coin Return Button	1
220-0072	Coin Return Stop	1
220-0073	Coin Box	1
240-0006	Button, Red	1
240-0089	Knob, Control Lever	1
313-0001	IC LM723	1
313-0004	IC LM741EN	1
314-0001	IC NE555	2
314-0018	IC 74LS00	1
314-0019	IC 74LS04	1
314-0040	IC 74LS125	1
314-0053	IC 74S175	1
314-0058	IC 74LS08	2
314-0062	IC 74LS74	1
314-0071	IC 74LS151	2
315-0031	IC Z80 CPU	1
315-0036	IC 4015	2
316-0042	IC PROM 32x8 SEQ	1
316-0043	IC PROM 32x8 CTL	1
316-0112	IC PROM U41	1
316-0113	IC PROM U42	1
316-0114	IC PROM U43	1
316-0115	IC PROM U44	1
316-0116	IC PROM U45	1
316-0117	IC PROM U46	1
316-0118	IC PROM U47	1
316-0119	IC PROM U48	1

Replacement Parts List, cont'd.

Part Number	Description	Quantity
390-0016	Lamp, glow	2
390-0019	Lamp, Fluorescent	1
390-0020	Lamp, Black Light	1
390-0021	Ballast, 15W	1
390-0022	Ballast, 20W	1
481-0009	Diode MDA 3500	1
482-0011	Transistor MJ3000	1
482-0013	Transistor TIP 110	1
482-0015	Transistor TIP 115	1
482-0016	Transistor TIP 29	1
510-0023	Switch Assembly W1C0	1
510-0037	Switch, Control	2
514-0001	Fuse, 2A	1
560-0003	Transformer #4-10345	1
815-0020	Game Power Supply Assembly	1
815-0022	Fluorescent Light Harness	1
821-0001	Game Computer Board	1
821-0002	Game Sound Board	1

INSTRUCTIONS
FOR
REMOVAL AND REINSTALLATION OF MONITOR

TOOLS REQUIRED:

1. Phillips screwdriver
2. Flat head screwdriver
3. Gloves
4. Small piece of masking tape
5. Safety goggles.

NOTE: Refer to game drawing number 721-0001.

INSTRUCTIONS:

1. Unplug game from line.
2. Unlock and remove rear cabinet door.
3. Carefully remove ONLY those staples holding the graphics panels (Gremlin part numbers 420-0166, -0169, -0174) to the inside of the game cabinet.
4. Remove the screws from the two side brackets holding the mirror, and take out these brackets.
5. Place small piece of masking tape on back side of mirror. When reinstalling, make sure this side faces the same direction.
6. Next, put on the gloves, and carefully lift up on the mirror and remove it from the remaining brackets. Then, remove the bottom bracket.

CAUTION: MIRROR HAS SHARP EDGES! IT IS ALSO FRAGILE!
HANDLE IT CAREFULLY!

7. Remove black shadow mask from top of monitor.
8. Remove four (4) outside bolts from monitor brackets.
9. Unplug the monitor connector plug.
10. Make sure the power cable is loose from all wire hold-down clips.
11. Check to be sure monitor is free from any obstructions and connections, and carefully remove monitor. It is advisable that safety goggles be worn when handling the monitor, as an added safety precaution.
12. To reinstall the monitor, simply reverse this procedure, starting with this Step and work back to Step 1.

Should you have any difficulties, please contact your Distributor or Gremlin Customer Service.

Gremilin Industries, Inc.
San Diego, California 92123

**PARTS
LIST**

TITLE

FROGS

721-0001

DWG NO

SH 1

OF 10

A

REV

7 THRU 10 ARE 'D' SIZE

DRAWN G. SMITH 6/15/78

ENGR

CHECK

APPR

LTR DATE

REVISION DESCRIPTION

DRAFT

CHECK

APPR

A

RELEASE

G.S. 6/15/78

Kell

APPR

Gremlin Industries, Inc.
San Diego, California 92123

PARTS LIST

TITLE
FROGS

721-0001
DWG NO

SH 2
OF

A
REV

ITEM NO	PART NO	QTY PER ASSY					DESCRIPTION	REF DES
1	130-0001	1					SPEAKER, GAME 6x9	
2	130-0003	1					COVER, SPEAKER 6x9	
3	140-0021	1					COVER, JUNCTION BOX	
4								
5	200-0002	1					MONITOR, VIDEO 19"	
6	220-0008	1					COUNTER, DIGITAL	
7	220-0066	2					MECH COIN SINGLE	
8	250-0286	1					TRIM, CONTROL PANEL LWR	
9	250-0285	1					FRAME, CASH DOOR	
10	220-0035	1					LOCK, FRONT LOCK	
11								
12	252-0053	1					MIRROR, RETAINER, TOP	
13								
14								
15								
16								
17								
18	250-0280	2					BRACKET, CRT	
19								
20	250-0279	2					CLAMP, CRT	
21								
22	250-0243	2					BACKET	
23	250-0244	1					PLATE, MIRROR BOTTOM	
24								
25								

Gremlin Industries, Inc.
San Diego, California 92133

PARTS
LIST

TITLE

FROGS

721-0001
DWG NO

SH 3
OF

A
REV

ITEM NO	PART NO	QTY PER ASSY					DESCRIPTION	REF DES
26	253-0061	1					RETAINER, GLASS TOP	
27	253-0062	1					RETAINER, GLASS BOT.	
28	253-0063	2					RETAINER, GLASS SIDE	
29	253-0069	1					WINDOW, FRONT	
30	275-0004	1					MIRROR, HALL	
31	420-0028	1					DECAL, S/N	
32	280-0112	2					EDGING, U-CHANNEL	
33	420-0030	1					DECAL, CAUTION 115V	
34	420-0038	2					DECAL, IMPORTANT NOTE	
35	420-0040	1					DECAL, RECYCLE	
36	420-0041	1					DECAL, S/N SMALL	
37	420-0060	1					DECAL, TIP N TELL	
38	420-0175	1					MASK, SHADOW	
39	420-0166	1					GRAPHIC PLAYFIELD CTR	
40	420-0167	1					GRAPHIC PLAYFIELD LEFT	
41	420-0168	1					GRAPHIC PLAYFIELD RIGHT	
42	420-0169	1					GRAPHIC PLAYFIELD BOT	
43	420-0172	2					GRAPHIC SIDE PANEL	
44	420-0174	1					GRAPHIC SUPPORT	
45								
46								
47								
48	250-0048	1					CLIP, SWITCH	
49	280-0014	5					CLIPS, STAND-OFF	
50								

Gremlin Industries, Inc.
San Diego, California 92113

PARTS LIST

TITLE
FROGS

721-0001
DWG NO

SH 4
OF

A
REV

ITEM NO	PART NO	QTY PER ASSY					DESCRIPTION	REF DES
51	815-0020	1					POWER SUPPLY ASSY	
52	821-0001						GAME CNTR BD ASSY	
53	821-0002						GAME SOUND BD ASSY	
54	821-0007						HARNES, POWER	
55	821-0003	1					CONTROL PANEL ASSY	
56	821-0004	1					HARNES CONTROL PANEL	
57	815-0008	1					HARNES, COIN COUNTER	
58	821-0008	1					HARNES, MONITOR	
59	815-0010	1					HARNES, SPEAKER	
60	815-0027	1					HARNES, VOLUME CONTROL	
61	815-0028	1					HARNES, COIN MECH	
62	821-0005	1					HARNES, POWER SOUND	
63	815-0030	1					FUNCTION BOX ASSY	
64		2					WASHER, FLAT #8 REG SERIES	CAD PLATE
65		4					SCREW, OVAL HD, #8-32x1 1/2" LG	CAD PLATE
66		6					NUT, WING #10-24	CAD PLATE
67		24					WASHER, FLAT #10 REG SERIES	CAD PLATE
68		22					NUT, HEX #10-24	CAD PLATE
69		14					BOLT, CARBIDE 10-24 x 2" LG	BLACK OXIDE
70		6					SCREW, MACHINE 8-32 x 2" LG	
71		4					NAIL, BRAD 18 GA x 3/4" LG	
72		6					NUT, HEX 8-32 CAD PLATE	
73		4					WASHER, LOCK SPLIT #8	REG SERIES CAD PLATE
74		8					SCREW, SH TMTL PAN HD #6x1 1/2 LG	CAD PLATE
75		5					SCREW, MACH PAN HD CR5 REC	#6-32x1 1/2 LG CAD PLATE

Gremelin Industries, Inc.
San Diego, California 92123PARTS
LISTTITLE
FROGS721-0001
DWG NOSH 5
OFA
REV

ITEM NO	PART NO	QTY PER ASSY				DESCRIPTION	REF DES
76		1				SCREW, MACH PAN HD 10-24x 1/4	CAD PLATE
77							
78	815-0016	1				FL. LIGHT ASSY	
79	821-0006	1				BLK LIGHT ASSY	
80							
81							
82							
83		4				SCREW, MACHINE CRS REC 10-24 X	1"LG CAD PLATE
84		6				BOLT, CARBIDE 10-24X 1 1/4"LG	BLACK OXIDE
85	815-0011	1				HARNESSES, POWER	
86							
87							
88							
89	420-0071	1				UNPACKING INSTRUCTIONS	
90	420-0116	1				WRAPAROUND SIDE	
91	420-0117	1				TOP COVER	
92	420-0124	4				CORNER STRIP	
93	250-0263	1				MOULDING TRIM	
94	280-0004	25				CLIP WIRE HOLD DOWN	
95	280-0005	10				CABLE TIE	
96	280-0075	2				NUT WIRE CARGE	
97	420-0173	1				MANUAL FROGS	new NO
98	420-0176	1				DECAL CARTON FROGS	new NO
99		44T				ZIP CORD	
100	815-0026	1				CABINET ASSY	

Gremilin Industries, Inc.
San Diego, California 92123

PARTS
LIST

TITLE

FROGS

DWG NO

721-0001

SH 6
OF

REV 4

ITEM
NO

PART NO

104 320-0020

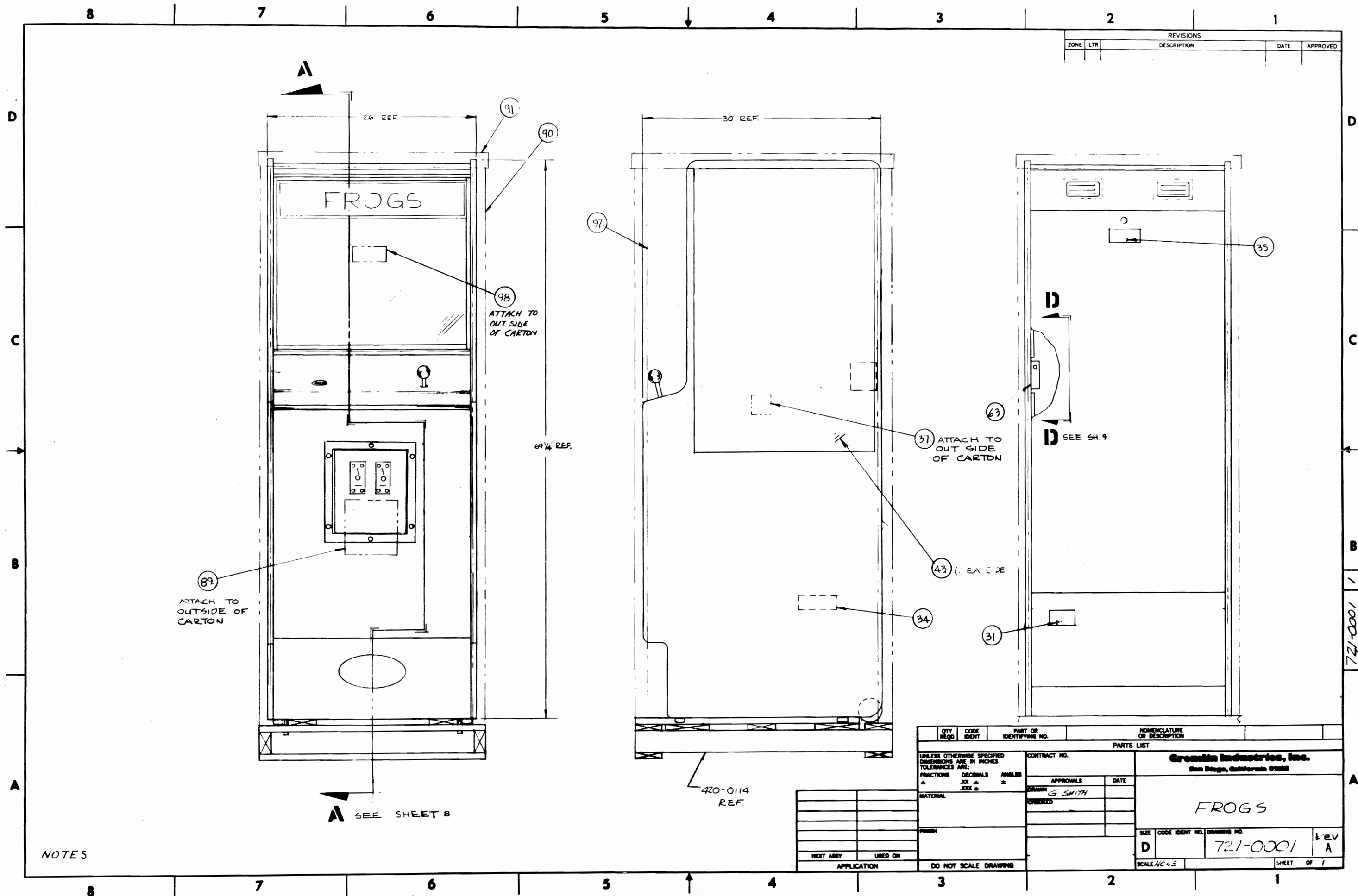
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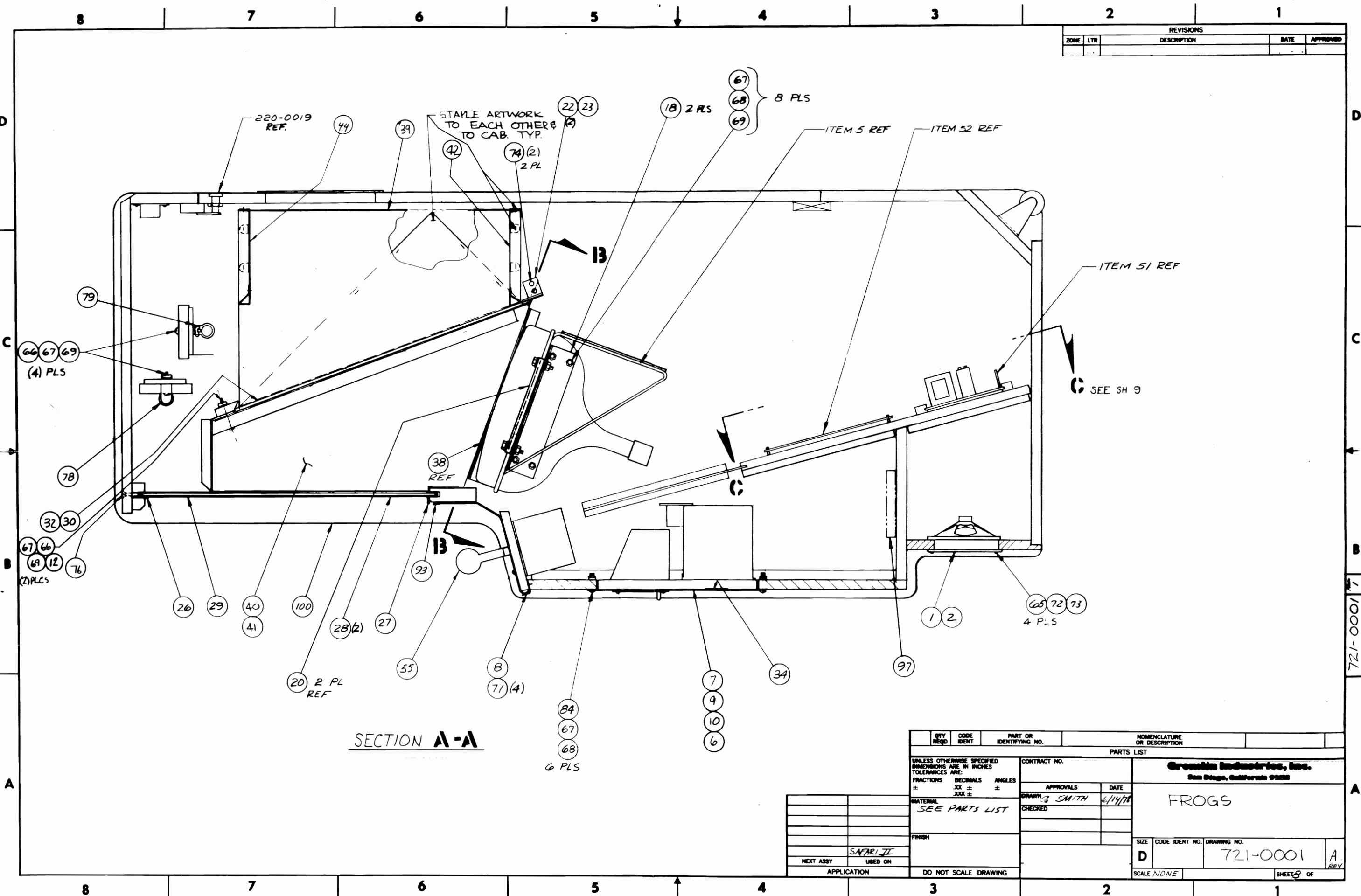
QTY PER ASSY

DESCRIPTION

SEALANT FOAM

REF DES





Gremlin Industries, Inc.
San Diego, California 92123

PARTS
LIST

TITLE
COIN MECHANISM ASSY
(TWO SINGLE MECHANISMS)

800-0015
DWG NO

SH 1
OF 3

A
REV

DRAWN *P.D.*

1/6/78

ENGR

CHECK *Jim D. Quast*

APPR

LTR DATE

REVISION DESCRIPTION

DRAFT

CHECK

APPR

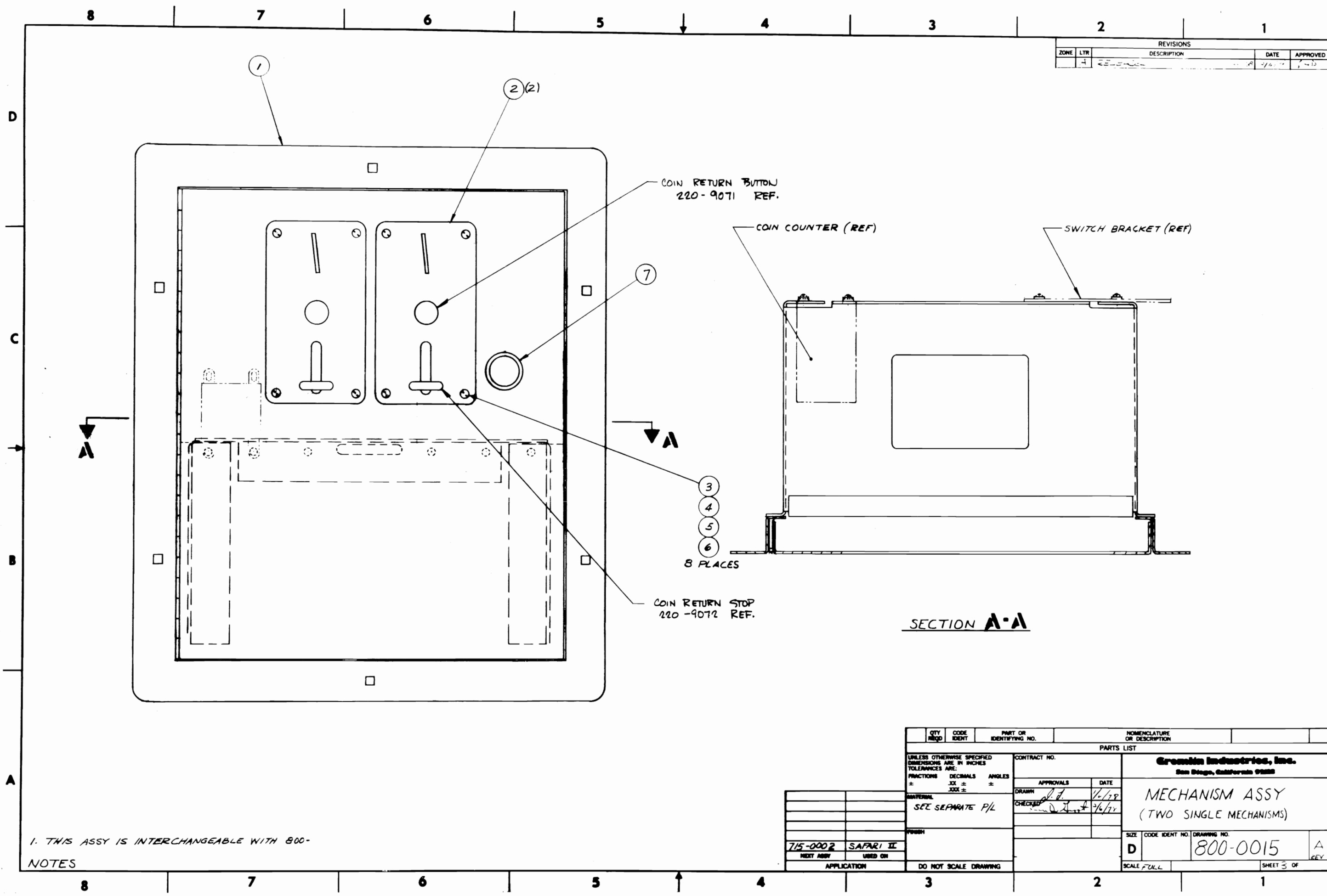
A *2/6/78*

RELEASED

2/6/78

R4D

SHEET 3 IS "D" SIZE



REVISIONS			
ZONE	LTR	DESCRIPTION	DATE
1			

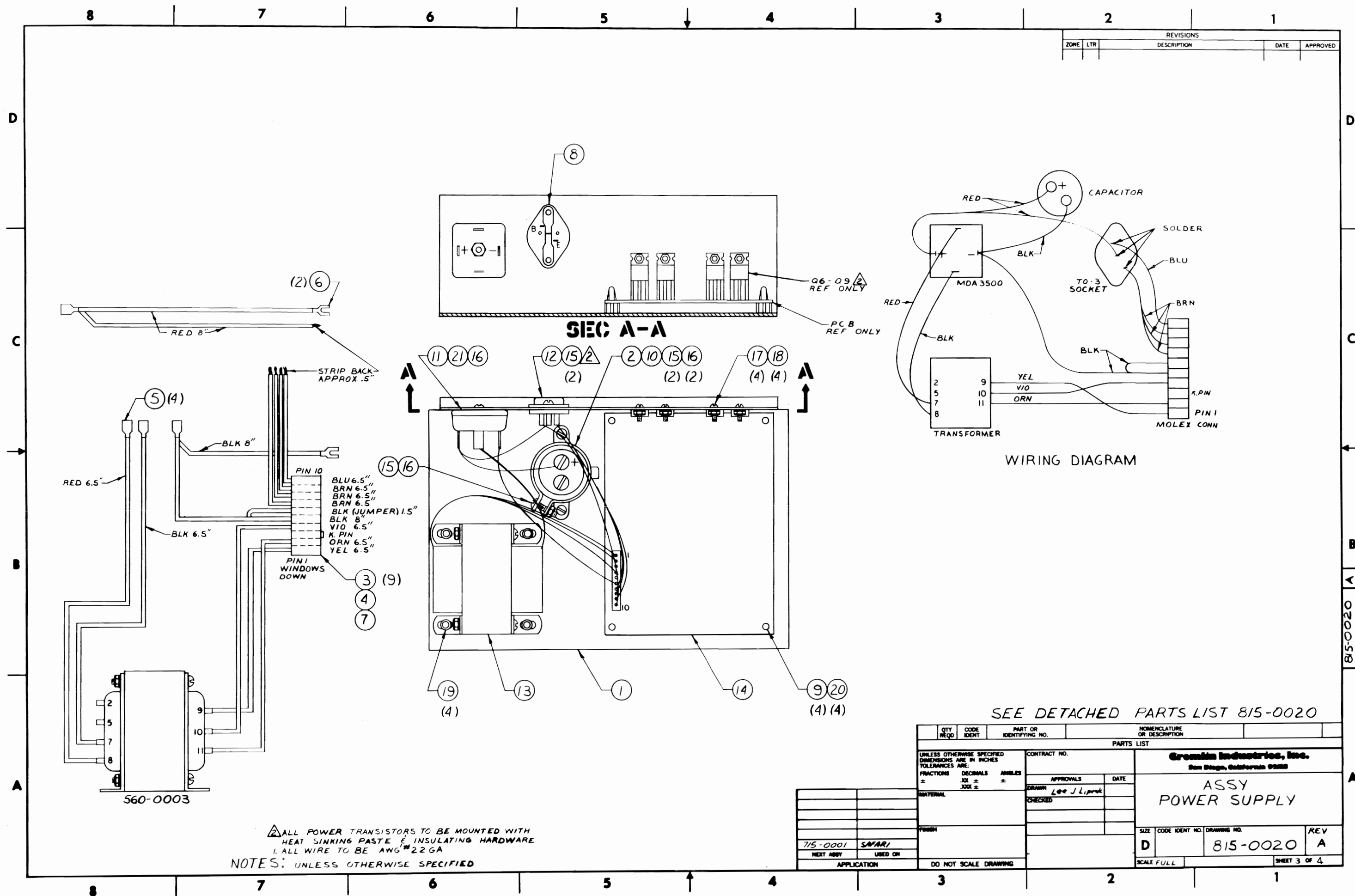
1. THIS ASSY IS INTERCHANGEABLE WITH 800-

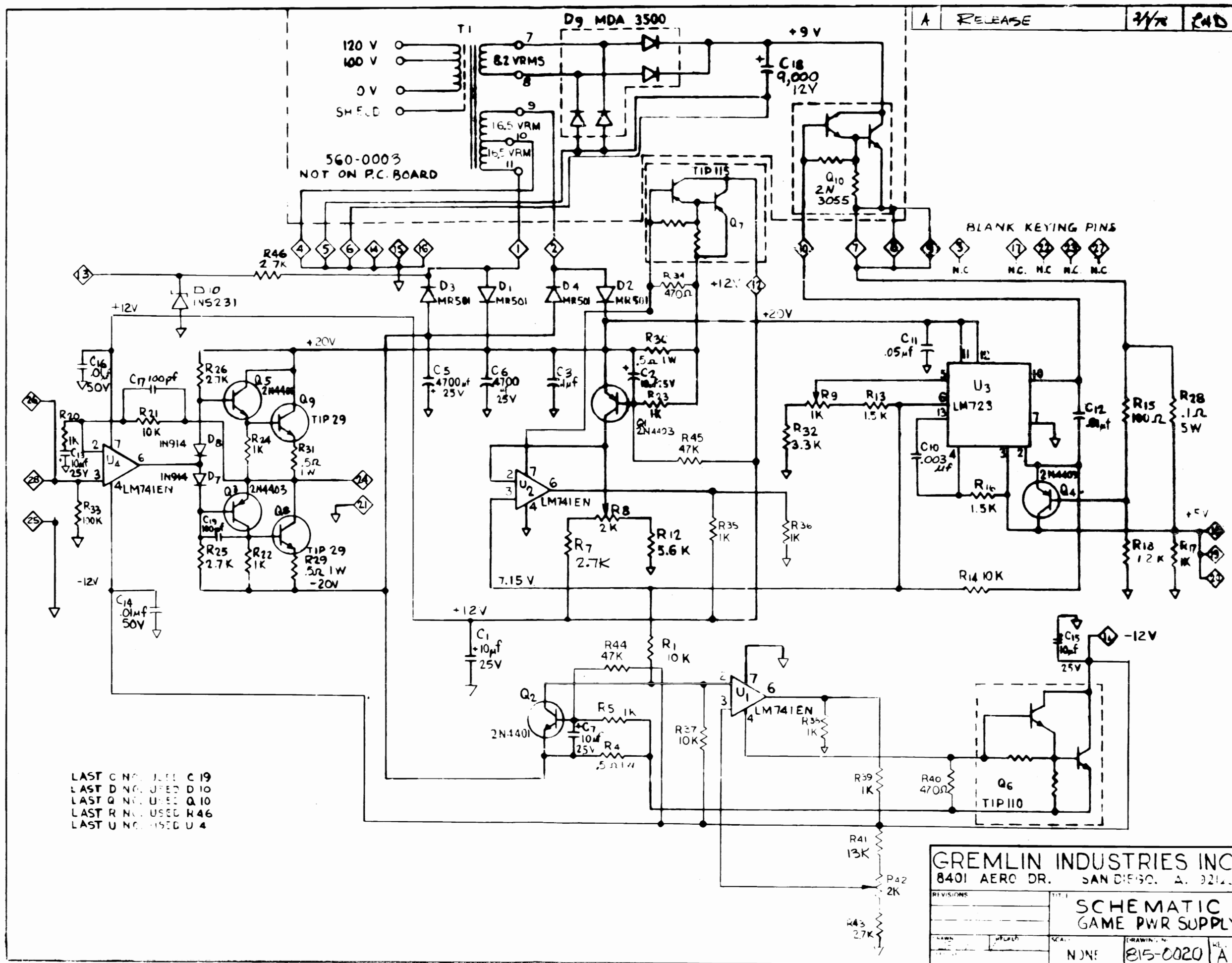
NOTES

QTY REQD	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION
PARTS LIST			
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS DECIMALS ANGLES ± .005 ± .005 ± .005		CONTRACT NO.	Grenin Industries, Inc. San Diego, California 92108
MATERIAL SEE SEPARATE P/L		APPROVALS DRAWN <i>[Signature]</i> 1/6/78 CHECKED <i>[Signature]</i> 1/6/78	MECHANISM ASSY (TWO SINGLE MECHANISMS)
FINISH		SIZE D	CODE IDENT NO. 800-0015
APPLICATION 715-0002 SAFARI II NEXT ASSY USED ON		DO NOT SCALE DRAWING	SHEET 3 OF 3

[illegible]

GREMLIN IND. INC. SAN DIEGO CA. 92123			PARTS LIST		TITLE ASSY, POWER SUPPLY		815-0020 DWG NO		SH 2 OF 3		A REV	
ITEM NO	PART NO	QTY PER ASSY						DESCRIPTION	REF DES			
1	140-0015						1	CHASSIS, POWER SUPPLY				
2	150-0022						1	CAP, 9000UF 12V				
3	211-0005						9	CONN CRIMP LOCK				
4	211-0007						1	CONN, KEY, POLARIZING				
5	211-0017						4	CONN, QUICK, 1/4" FEM				
6	211-0019						2	CONN, SPADE LUG 1/4"				
7	212-0016						1	CONN FEM 10 PIN				
8	213-0006						1	SOCKET, TO-3				
9	280-0014						4	STAND-OFFS, CLIPS				
10	.280-0056						1	CLAMP, CAP. VR4 1 1/2"				
11	481-0009						1	DIODE, MDA 3500				
12	482-0007						1	XISTOR, 2N3055				
13	560-0003						1	XFMR, MODEL 9-10345B				
14	815-0021						1	POWER SUPPLY ASSY (PCB)				
	815-0020							SCHEM. ASSY. PWR. SUPP.	(REFERENCE)			
15							5	SCREW-MACH P.HD#6-32 X.5				
16							4	NUT HEX #6-32				
17							4	SCREW-MACH RD, HD#4-40 X.37				
18							4	NUT HEX #4-40				
19							4	RIVET, POP 3/16				
20							4	SCR, MACH, HEX, WAS, HD 1/4-20 X	5/8"			
21							1	SCR, MACH, P.HD #6-32 X 1.0"				





Gremlin Industries, Inc.
San Diego, California 92123

**PARTS
LIST**

TITLE SCHEMATIC
COMPUTER GAME BOARD

821-0001
DWG NO

SH 1
OF 9
REV B

SHT 6 IS E SIZE
SHT 7,8,9 IS D SIZE

DRAWN T.E. JOHNSON
CHECK

ENGR *[Signature]*
APPR *[Signature]* 6-16-78

LTR **DATE** **REVISION** **DESCRIPTION**

A 6-6-78 RELEASED

DRAFT T.E.J. **CHECK** *[Signature]* **APPR** *[Signature]*

B 7-17-78 ADDED SOUND OUTPUT SHT 9

K.B. *[Signature]* *[Signature]*

Gremlin Industries, Inc.
San Diego, California 92123

PARTS LIST

TITLE SCHEMATIC
COMPUTER GAME BOARD

821-0001
DWG NO

SH 3
OF 9

B
REV

ITEM NO	PART NO	QTY PER ASSY				DESCRIPTION	REF DES
26	314-0001	2				I.C. NE555 DIP	U70,71
27	314-0018	3				I.C. 74LS00	U7,16,27
28	314-0019	4				I.C. 74LS04	U19,20,33,36
29	314-0040	7				I.C. 74LS125	U5,6,17,22,23,39,40
30	314-0046	1				I.C. 74504	U84
31	314-0053	4				I.C. 74S175	U64-67
32	314-0058	10				I.C. 74LS08	U12,21,24,25,49,50-52,56,57
33	314-0059	1				I.C. 74LS16	U30
34	314-0061	1				I.C. 74LS42	U28
35	314-0062	4				I.C. 74LS74	U13,15,69
36	314-0067	1				I.C. 74LS30	U32
37	314-0070	1				I.C. 74LS86	U53
38	314-0071	6				I.C. 74LS151	U58-63
39	314-0072	1				I.C. 74LS174	U55
40	314-0073	2				I.C. 74LS175	U34,35
41	314-0075	2				I.C. 74LS393	U29,31
42	314-0077	1				I.C. 74LS166	U54
43	314-0006	1				I.C. 7474	U68
44	315-0036	8				I.C. MK4015 OR TMS4027-30	U72-79
45	315-0031	1				I.C. Z80	U37
46	314-0010	1				I.C. 7410	U26
47	316-0042	1				I.C. PROM 32X8 SEQ	U83
48	316-0043	1				I.C. PROM 32X8 TTL	U82
49	316-0119	1				I.C. EPROM U48 FRG	U48
50	316-0118	1				I.C. EPROM U47 FRG	U47

Gremelin Industries, Inc.
San Diego, California 92123

PARTS LIST

TITLE SCHEMATIC
COMPUTER GAME BOARD

821-0001
DWG NO

SH 4
OF 9

REV 8

ITEM NO	PART NO	QTY PER ASSY				DESCRIPTION	REF DES
51	316-0117	1				I.C. EPROM U46 FR6	U46
52	316-0116	1				I.C. EPROM U45 FR6	U45
53	316-0115	1				I.C. EPROM U44 FR6	U44
54	316-0114	1				I.C. EPROM U43 FR6	U43
55	316-0015	1				I.C. 7404	U38
56	316-0113	1				I.C. EPROM U42 FR6	U42
57	316-0112	1				I.C. EPROM U41 FR6	U41
58	390-0003	1				LED RED	D3
59	471-0101	1				RES 100 OHM 1/2 W 5%	R63
60	471-0102	46				RES 1K OHM 1/2W 5%	R17-24, 28-34, 39, 43-47
61							52-62, 65, 69, 72-80, 82
62							B3, 88
63	471-0103	1				RES 10K OHM 1/2 W 5%	R84
64	471-0104	2				RES 100K OHM 1/2 W 5%	R85, 87
65	471-0272	8				RES. 2.7K OHM 1/2W 5%	R35-38, 48-51
66	471-0331	8				RES 330 OHM 1/2W 5%	R40-70, 71, 90-94
67	471-0333	1				RES 33K OHM 1/2W 5%	R86
68	471-0471	1				RES 470 OHM 1/2W 5%	R64
69	471-0472	1				RES 4.7K OHM 1/2W 5%	R81
70	471-0474	1				RES 470K OHM 1/2W 5%	R89
71							
72	481-0001	1				DIODE IN 4002	D2
73	481-0006	1				DIODE IN 912 / IN 4148	D1
74	482-0010	1				XSTR PE 8050	Q2
75	482-0014	2				XSTR 2N4401	Q1, 3

Gremelin Industries, Inc.
San Diego, California 92123

PARTS LIST

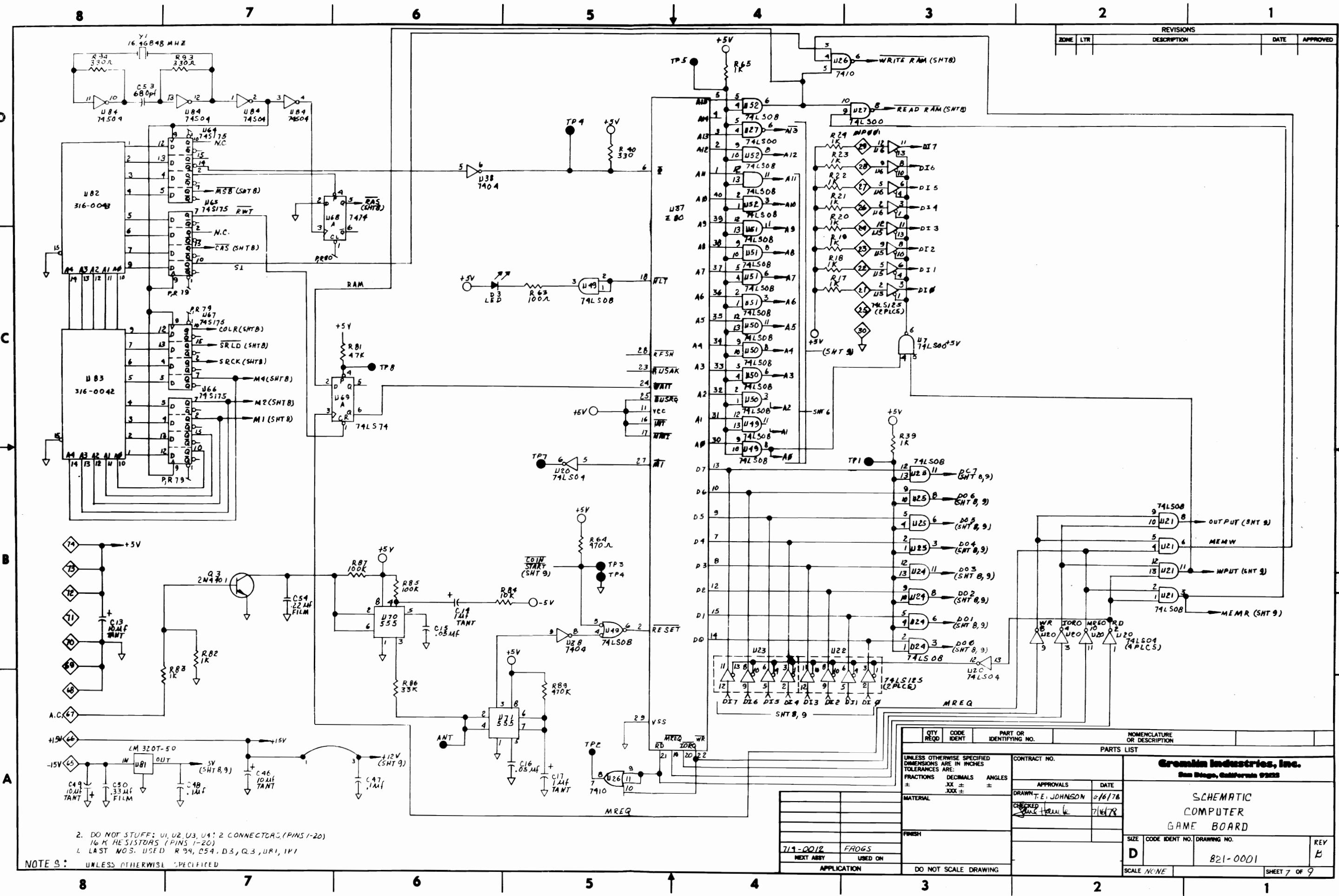
TITLE SCHEMATIC
COMPUTER GAME BOARD

B21-0001
DWG NO

SH 2
OF 9

B
REV

ITEM NO	PART NO	QTY PER ASSY					DESCRIPTION	REF DES
1	151-0001	2					CAP CER .05 μ F 50V	C15,16
2	151-0005	1					CAP CER 680pF 50V	C53
3	151-0012	40					CAP CER .1 μ F 50V	C1-12,19-26,28-35
4								37-44,47,48,51,52
5								
6	152-0002	1					CAP F. .22 μ F 100V	C54
7	152-0017	1					CAP F. .33 μ F 100V	C50
8								
9	153-0001	6					CAP TANT. 10 μ F 25V	C13,18,27,36,46,49
10	153-0002	2					CAP TANT 1 μ F 25V	C19,17
11								
12	170-0105	1					PCB CMPTR GAME BD	
13								
14	211-0004	16					CONN PIN TEST PT	TP1- TP7, GND, ANT
15	212-0004	1					CONN MALE 4 PIN	
16	212-0021	6					CONN MALE 10 PIN	
17								
18	213-0001	8					SKT 24 PIN DUAL INLN	XU41-48
19	213-0004	14					SKT 16 PIN DUAL INLN	UX64-67,72-79,82,83
20	213-0005	1					SKT 40 PIN DUAL INLN	XU37
21								
22	230-0009	1					XTAL 15.46848 MHZ	Y1
23								
24								
25	313-0023	1					I.C. LM370T-5	U81

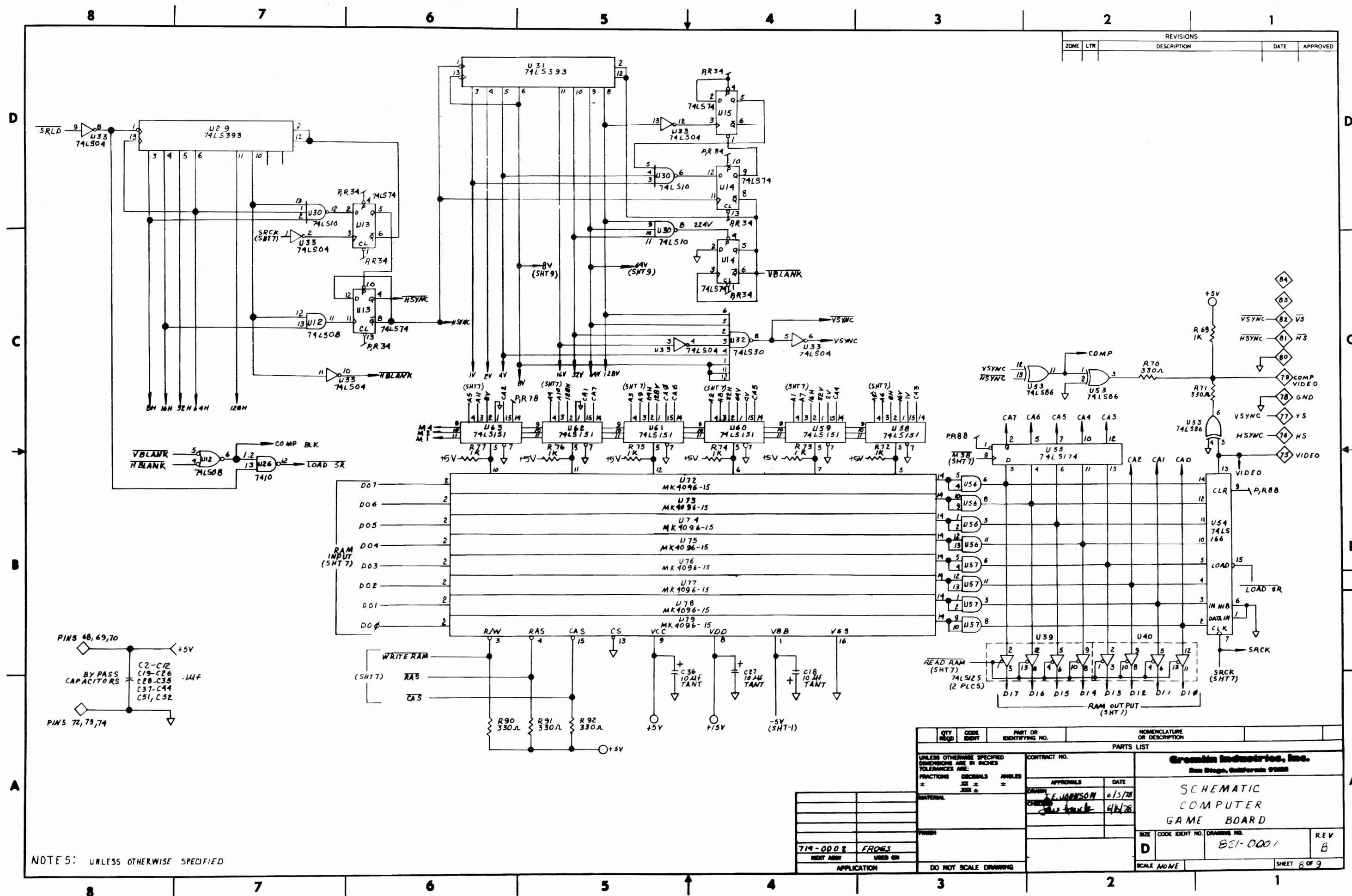


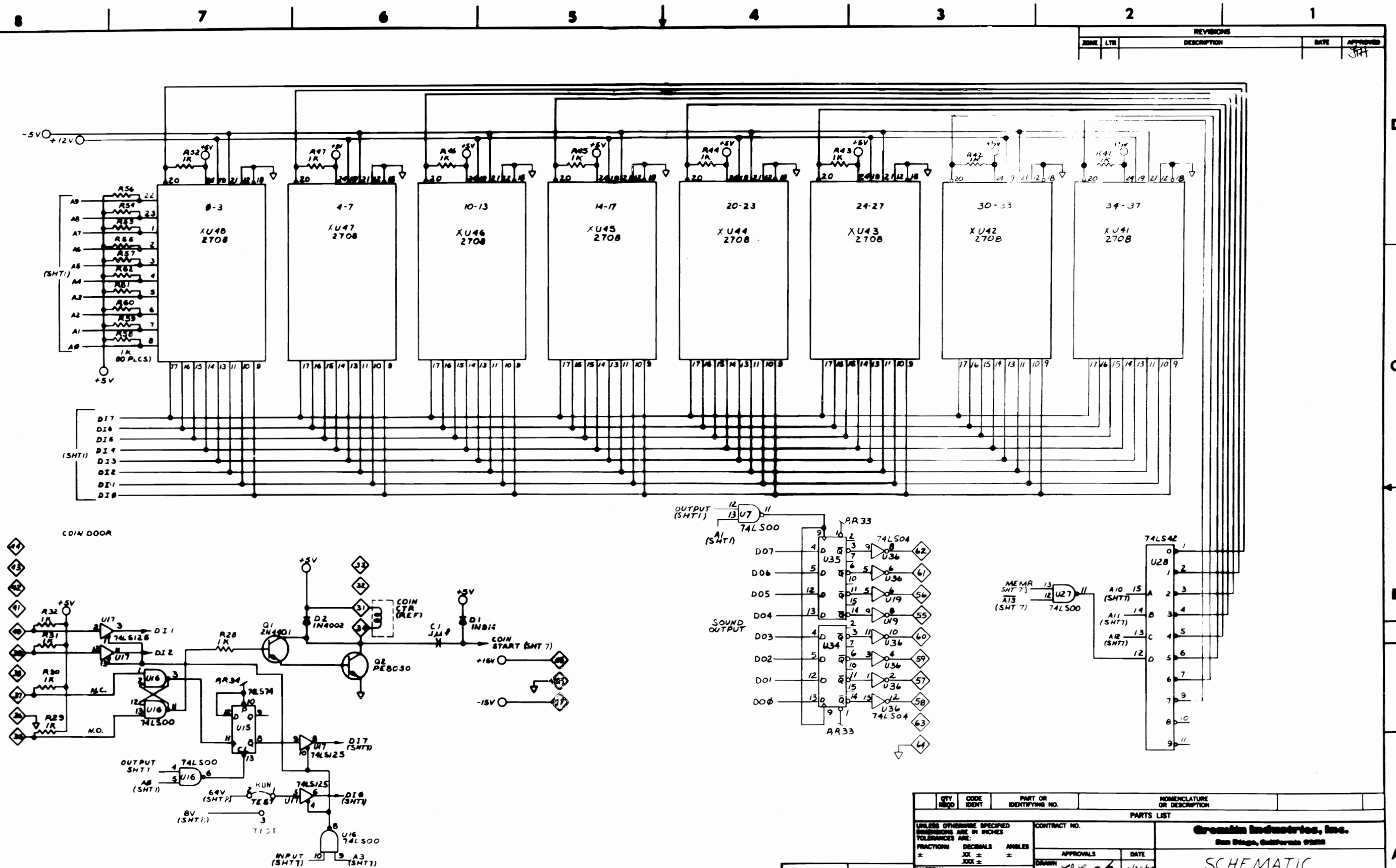
REVISIONS			
ZONE	LTR	DESCRIPTION	DATE

QTY REQD		CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	
				PARTS LIST	
				UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE:	
				FRACTIONS DECIMALS ANGLES	
				.XX ± .XXX ±	
				MATERIAL	
				FINISH	
				APPLICATION	
				DO NOT SCALE DRAWING	
				CONTRACT NO.	
				APPROVALS DATE	
				DRAWN T.E. JOHNSON 6/6/78	
				CHECKED JAMES HALL 7/4/78	
				Grimm Industries, Inc. San Diego, California 92123	
				SCHEMATIC COMPUTER GAME BOARD	
				SIZE CODE IDENT NO. DRAWING NO.	
				D 821-0001	
				SCALE N/C	
				SHEET 7 OF 9	

NOTE 5: UNLESS OTHERWISE SPECIFIED

2. DO NOT STUFF: U1, U2, U3, U4: 2 CONNECTORS (PINS 1-20)
16 K RESISTORS (PINS 1-20)
1. LAST NOS. USED R 99, C 54, D 3, Q 3, U 1, 1 P 1





NOTES: UNLESS OTHERWISE SPECIFIED

Gremilin Industries, Inc.
San Diego, California 92123

PARTS
LIST

TITLE

ASSY FROGS SOUND
BOARD

821-0002
DWG NO

SH 1
OF 6

A
REV

SHOTS. 5 & 6 ARE "D" SIZE

DRAWN

J. J. F. (signature)

ENGR

CHECK

J. J. F. 6/29/78

APPR

LTR DATE

REVISION DESCRIPTION

DRAFT

CHECK

APPR

A

6/24/78

RELEASED

RP

J. J. F.

Gremelin Industries, Inc.
San Diego, California 92123PARTS
LISTTITLE
ASSY FROGS SOUND
BOARD821-0002
DWG NOSH 3
OF 6A
REV

ITEM NO	PART NO	QTY PER ASSY					DESCRIPTION	REF DES
16	471-0154	2					RES 150K 1/2W 5%	R23,65
17	471-0683	1					RES 68K 1/2W 5%	R40
18	471-0221	1					RES 220 1/2W 5%	R31
19	471-0222	2					RES 2.2K 1/2W 5%	R36,37
20	471-0223	5					RES 22K 1/2W 5%	R25,28,55,57,58
21	471-0225	1					RES 2.2M 1/2W 5%	R56
22	471-0331	1					RES 330 1/2W 5%	R33
23	471-0332	16					RES 3.3K 1/2W 5%	R1,2,3,4,5,6,7,8,9,10,11
								21,44,46,49,59
24	471-0333	2					RES 33K 1/2W 5%	R32,63
25	471-0334	1					RES 330K 1/2W 5%	R17
26	471-0393	2					RES 39K 1/2W 5%	R51,80
27	471-0471	1					RES 470 1/2W 5%	R54
28	471-0472	8					RES 4.7K 1/2W 5%	R14,16,18,20,22,24,41
								71
29	471-0473	2					RES 47K 1/2W 5%	R48,62
30	471-0474	1					RES 470K 1/2W 5%	R30
31	471-0510	5					RES 51 1/2W 5%	R26,52,66,67,70
32	471-0561	1					RES 560 1/2W 5%	R77
33	471-0563	1					RES 56K 1/2W 5%	R90
34	471-0623	1					RES 62K 1/2W 5%	R53
35	471-0821	1					RES 820 1/2W 5%	R34
36	471-0823	3					RES 82K 1/2W 5%	R43,69,88
37	471-0824	1					RES 820K 1/2W 5%	R64

San Diego, California 92123

TITLE	DATE	TIME	LOCATION	REMARKS
ASSY. FROGS SOUND				

21-0002
DWG NO

SH 4
OF 6

A
REV

ITEM NO	PART NO	QTY PER ASSY				DESCRIPTION	REF DES
38	475-0002	4				POT 1M CAR PCMTV	R 92, 93, 94, 95
39	475-0008	2				POT 50K CAR PCMTV	R 47, 96
40	482-0014	14				TRANSISTOR 2N4401	Q 1, 2, 3, 4, 5, 6, 7, 11, 12, 14, 16, 19
41	482-0006	5				TRANSISTOR 2N 4403	20, 21
42	482-0023	2				TRANSISTOR 2N 4093	Q 8, 9, 13, 15, 17
43	481-0006	9				DIODE 1N914 / 1N4148	Q 10, 18
44	170-0145	1				PCB FROG SOUND	D 1-9
45	212 - 0021	1				CONN MALE 10 PIN	
46	212 - 0022	1				CONN MALE 12 PIN	
47	471 - 0273	1				RES 27K 1/2W 5%	R 72
48	475-0006	1				POT 100K CAR PCMTV	R 91

Gremilin Industries, Inc.
San Diego, California 92123

PARTS LIST

TITLE
ASSY FROGS SOUND BOARD

821-0002
DWG NO

SH 2
OF 6

A
REV

ITEM NO	PART NO	QTY PER ASSY				DESCRIPTION	REF DES
1	151 - 0001	37				CAP CER. .05UF, 50V	C11,12,13,14,15,16,17,18,19, 20,21,26,28,33,34,35,36
							37,38,41,42,43,48,53,55,56
							59,60,61,63,64,67,68,69
							70,71,74
2	152 - 0001	12				CAP FILM .1UF 100V	C6,7,9,10,24,39,40,49,52,58
							62,65
3	152 - 0012	3				CAP FILM .047UF 200V	C3,29,73
4	152 - 0018	5				CAP FILM .01UF 250V	C45,46,50,51,54
5	152 - 0020	2				CAP FILM .47UF 100V	C31,32
6	153 - 0001	5				CAP TANT 10UF 25V	C1,2,23,30,44
7	153 - 0002	6				CAP TANT 1UF 25V	C4,5,8,27,47,72
8	153 - 0003	3				CAP TANT 2.2UF 25V	C22,57,66
9	153 - 0004	1				CAP TANT 4.7UF 25V	C25
10	313 - 0004	9				I.C. LM 741EN DIP	U8,10,11,13,14,16,17,18,20
11	314 - 0001	10				I.C. NE 555 DIP	U2,3,4,5,6,7,9,12,15,19
12	315 - 0035	1				I.C. MM 5837	U1
13	471 - 0102	5				RES 1K 1/2W 5%	R42,68,74,84,86
14	471 - 0103	13				RES 10K 1/2W 5%	R12,13,27,38,39,60,75,76,78
							79,82,85,73
15	471 - 0104	10				RES 100K 1/2W 5%	R15,19,29,35,45,50,61,81
							83,87

Gremlin Industries, Inc.
San Diego, California 92173

PARTS
LIST

TITLE
ASSY FROGS SOUND
BOARD

821-0002
DWG NO

SH 1
OF 6

A
REV

SHOTS. 5 & 6 ARE "D" SIZE

DRAWN *J. J. F.*
CHECK *J. J. F.* 6/29/78

ENGR
APPR

REVISION DESCRIPTION

DRAFT

CHECK

APPR

LTR DATE

A 6/26/78 RELEASED

RD

J. J. F.

Gremilin Industries, Inc.
San Diego, California 92173

PARTS LIST

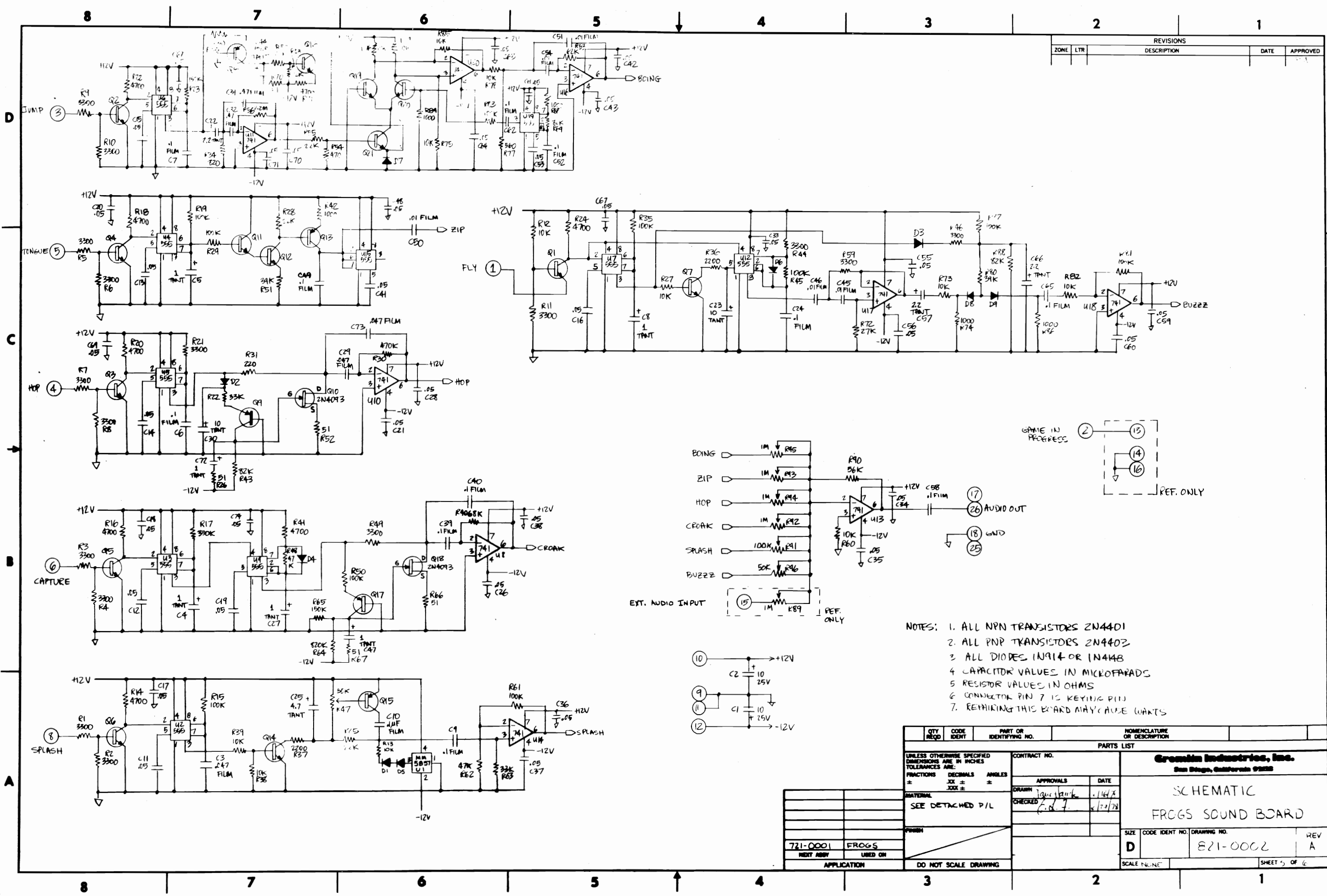
TITLE
ASSY PROGS SOUND BOARD

821-0002
DWG NO

SH 3
OF 6

A
REV

ITEM NO	PART NO	QTY PER ASSY					DESCRIPTION	REF DES
16	471-0154	2					RES 150K 1/2W 5%	R23,65
17	471-0683	1					RES 68K 1/2W 5%	R40
18	471-0221	1					RES 220 1/2W 5%	R31
19	471-0222	2					RES 2.2K 1/2W 5%	R36,37
20	471-0223	5					RES 22K 1/2W 5%	R25,28,55,57,58
21	471-0225	1					RES 2.2M 1/2W 5%	R56
22	471-0331	1					RES 330 1/2W 5%	R33
23	471-0332	16					RES 3.3K 1/2W 5%	R1,2,3,4,5,6,7,8,9,10,11
								21,44,46,49,59
24	471-0333	2					RES 33K 1/2W 5%	R32,63
25	471-0334	1					RES 330K 1/2W 5%	R17
26	471-0393	2					RES 39K 1/2W 5%	R51,80
27	471-0471	1					RES 470 1/2W 5%	R54
28	471-0472	8					RES 4.7K 1/2W 5%	R14,16,18,20,22,24,41
								71
29	471-0473	2					RES 47K 1/2W 5%	R48,62
30	471-0474	1					RES 470K 1/2W 5%	R30
31	471-0510	5					RES 51 1/2W 5%	R26,52,66,67,70
32	471-0561	1					RES 560 1/2W 5%	R77
33	471-0563	1					RES 56K 1/2W 5%	R90
34	471-0623	1					RES 62K 1/2W 5%	R53
35	471-0821	1					RES 820 1/2W 5%	R34
36	471-0823	3					RES 82K 1/2W 5%	R43,69,88
37	471-0824	1					RES 820K 1/2W 5%	R64



REVISIONS			
ZONE	LTR	DESCRIPTION	DATE

- NOTES:
1. ALL NPN TRANSISTORS 2N4401
 2. ALL PNP TRANSISTORS 2N4403
 3. ALL DIODES 1N4148 OR 1N4148
 4. CAPACITOR VALUES IN MICROFARADS
 5. RESISTOR VALUES IN OHMS
 6. CONNECTOR PIN 7 IS KEYING PIN
 7. RETAINING THIS BOARD MAY CAUSE WANTS

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	
SEE DETACHED P/L		DRAWN	DATE
		CHECKED	
		Green Industries, Inc.	
		San Diego, California 92108	
		SCHEMATIC	
		FROGS SOUND BOARD	
		SIZE	CODE IDENT NO. DRAWING NO.
		D	821-0002
		SCALE	REV A
		SHEET 5 OF 6	

721-0001	FROGS
REPT ARBY	USED ON
APPLICATION	
DO NOT SCALE DRAWING	

8

7

6

5

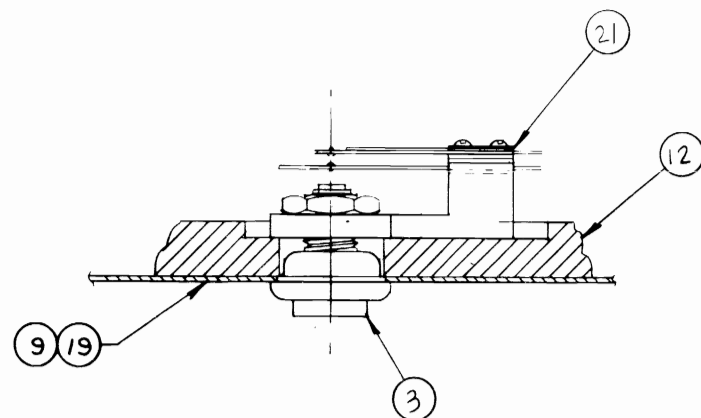
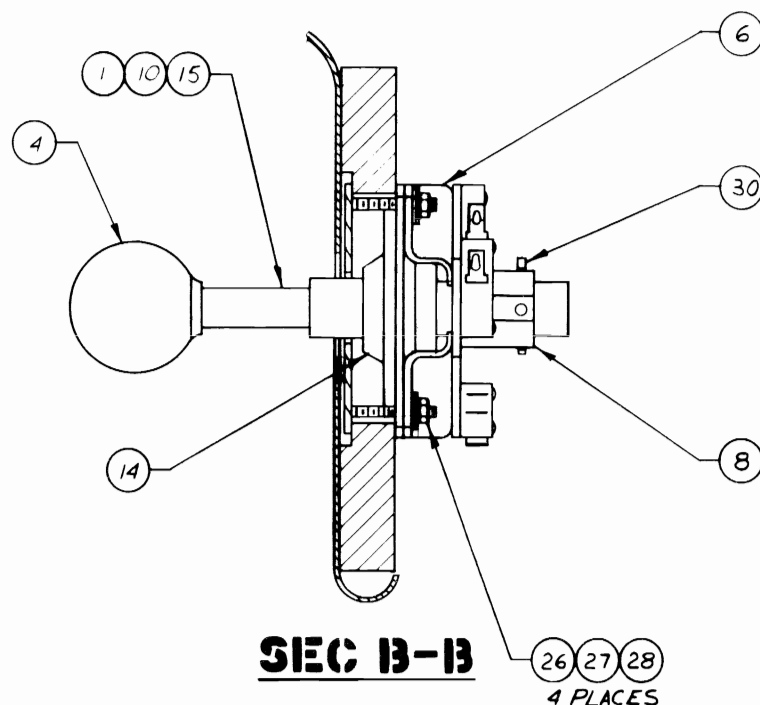
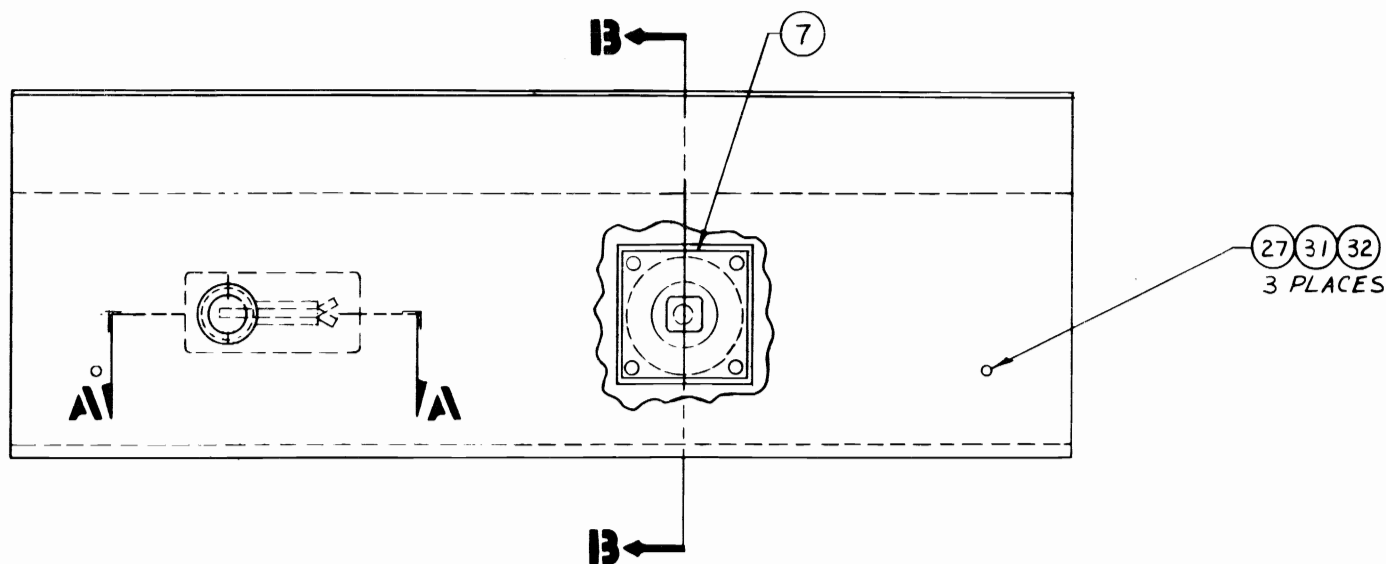
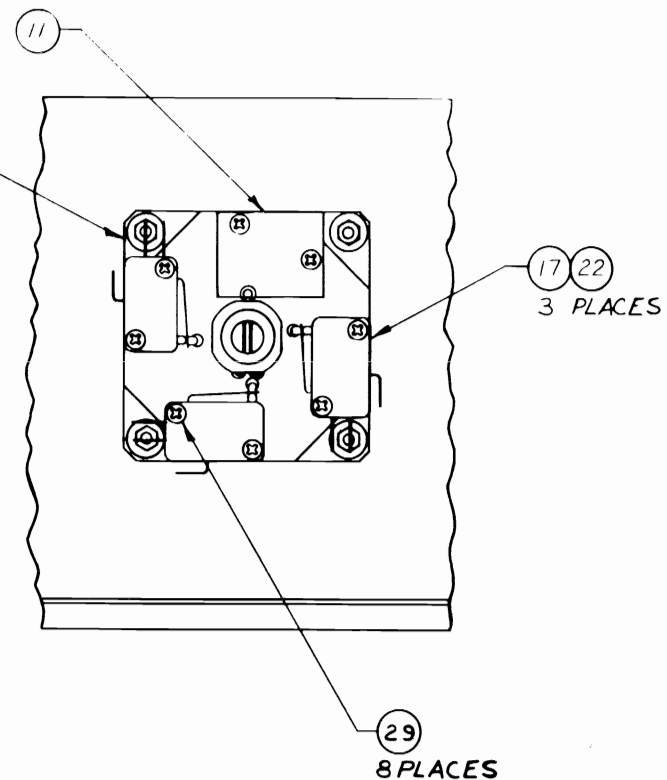
4

3

2

1

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED

**SEC A-A****SEC B-B**

NOTES:

QTY REQD	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION
PARTS LIST			
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS DECIMALS ANGLES ± .001 ± .005 ± .010 ±		CONTRACT NO.	Grimm Industries, Inc. San Diego, California 92108
MATERIAL SEE PARTS LIST		APPROVALS DRAWN <i>[Signature]</i> 4/7/70 CHECKED	ASSY CONTROL PANEL
FINISH		SIZE	CODE IDENT NO. DRAWING NO. REV
721-0001 NEXT ASSY USED ON		D	821-0003 A
APPLICATION		DO NOT SCALE DRAWING	SCALE 1/2"=1'-0" SHEET 4 OF 4

Gremlin Industries, Inc.
San Diego, California 92123

**PARTS
LIST**

TITLE
ASSY PANEL, CONTROL

821-0003
DWG NO

SH 1
OF 4
REV A

LTR DATE

REVISION DESCRIPTION

DRAWN

CHECK

ENGR

APPR

DRAFT

CHECK

APPR

A 6/29/78

RELEASE

APPR

RELEASE

APPR

Gremelin Industries, Inc.
San Diego, California 92113

PARTS
LIST

TITLE
ASSY. PANEL, CONTROL

821-0003
DWG NO

SH 3
OF 4

A
REV

ITEM NO	PART NO	QTY PER ASSY					DESCRIPTION	REF DES
26		4					NUT, HEX M4 STL. CAD. PLT.	
27		6					WASHER, LOCK, EXT TOOTH #8	STL, CAD PLT
28		4					WASHER, FLAT #8 STL, CAD PLT	
29		8					SCREW, PAN HD, CR REC, M3X18MM LG. STL, CAD PLT	
30		1					PIN, COTTER. 078 O.D. X 1" LG	
31		3					BOLT, CARRIAGE #8-32 X 1 1/2"	STL, CAD PLT
32		3					NUT HEX 8-32	
33								
34								
35								
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Gremlin Industries, Inc.
San Diego, California 92123

PARTS LIST

TITLE
ASSY. PANEL, CONTROL

821-0003
DWG NO

SH 2
OF 4

A
REV

ITEM NO	PART NO	QTY PER ASSY					DESCRIPTION	REF DES
1	220-0058	1					KEY	
2								
3	240-0006	1					BUTTON PLUGGER RED	
4	240-0089	1					KNOB	
5								
6	250-0213	1					BRACKET, SWITCH MOUNTING	
7	250-0217	1					PLATE, LOCK, 4WAY	
8	250-0227	1					HUB	
9	250-0251	1					PANEL, SUB, METAL	
10	250-0275	1					SHAFT, CONTROL LEVER	
11	250-0306	1					CONTROL STOP	
12	252-0054						PANEL, CONTROL, WOOD	
13								
14	280-0070	1					DIAPHRAM, RUBBER	
15	280-0103	1					RING SNAP 15MM	
16								
17	310-0001	3					INSULATOR	
18								
19	253-0088	1					GRAPHIC, CONTROL PANEL	
20								
21	510-0023	1					SWITCH, ASSY W/CO	
22	510-0037	3					SWITCH CONTROL	
23								
24								
25								