

SPIRIT

Instruction Manual

GOTTIEB®

6-13

 **Gottlieb**

AMUSEMENT GAMES

165 W. Lake Street Northlake, IL 60164
(312) 562-7400 Telex 72-8463

A Columbia Pictures Industries Company



SPRINT

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FINAL EDITION
APPLICABLE TO ALL GAMES
NOT HAVING THE LETTER "S"
IN THEIR SERIAL NUMBER

SPIRIT (GAME #673)
INSTRUCTION MANUAL

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SPIRIT PROMS

GAME PROM 673

SOUND PROMS 673/S1, 673/S2

SYSTEM 80A

Gottlieb's enhanced System 80 Program, System 80A, will permanently replace System 80 in future games.

System 80A has improved bookkeeping and self test capabilities, permits the use of seven digit displays and allows for greater coin/credit combination flexibility. The control boards' ROM memory chips, U2 and U3, have been reprogrammed for System 80A. They have also been socketed. In doing so, the control board can be used for either system by simply using the appropriate set of ROM memory chips.

The part numbers of each set are as follows:

SYSTEM	U2 PART NO.	U3 PART NO.	SOCKET PART NO.
80	XO-362	XO-363	XO-529
80A	XO-326	XO-327	XO-529

The ROMS are labeled as follows:

SYSTEM	U2	U3
80	R3273-12	R3272-12
80A	XO-326	XO-327

I. INSTALLATION

A. SET-UP

1. Bolt the legs to the cabinet.
2. Open the cabinet door and loosen the front moulding locking arm.
3. Remove the moulding from the playfield.
4. Slide the cabinet glass forward and remove it.
5. Raise the playboard, slide it forward and rest it on its supports.
6. From the inside of the cabinet, remove the binding strap from the power cord. Feed the cord to the outside of the cabinet through the black plastic line cord housing.
7. Place the lightbox atop the pedestal and engage the holding bracket.
8. Unlock the lightbox and remove the backglass.
9. Loosen and lower the shipping bracket at the top center of the lightbox insert panel.
10. Lift the insert; then swing it out.
11. Secure the lightbox to the cabinet with the bolts and washers provided.
12. Connect all cables in the lightbox.

B. CHECK-OUT

1. Check that all cables are clear of moving parts.
2. Check for any loose wires.
3. Check switches for loose solder or other foreign matter.
4. Be certain all fuses are firmly seated.
5. Check transformers for any foreign matter across terminals.
6. Be sure transformer wiring corresponds to the supply voltage.
7. Check the setting of the normally open tilt switch on the underside of the

playfield. One blade should be free-floating with a weight on the end.

8. Reassemble and level the game.
9. The plumb-bob tilt can be adjusted by loosening the wing nut and raising the plumb-bob to increase its sensitivity, or lowering it to decrease its sensitivity.

The ball-roll tilt can be adjusted by loosening the front screw or raising the tilt bracket to increase sensitivity, or lowering it to decrease its sensitivity.

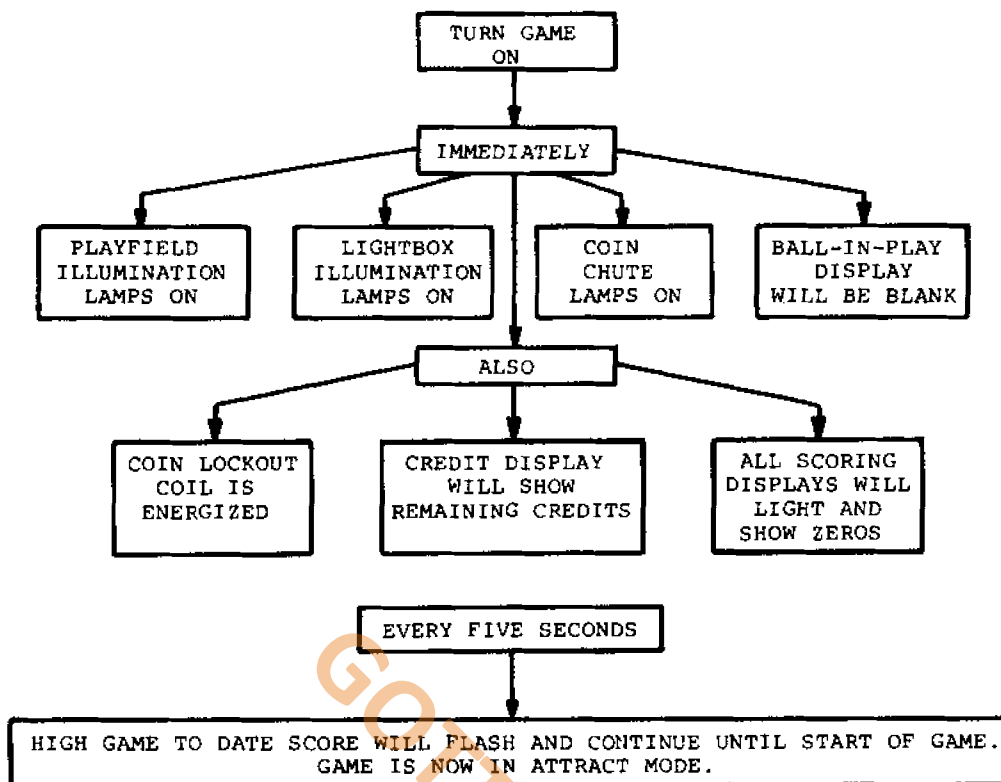
10. With the line cord unplugged, drop a coin into one of the chutes. It should be rejected.
11. Plug the game into a properly grounded 3-wire receptacle **ONLY!**
12. Refer to Section VI to make all necessary game adjustments.

C. UPPER PLAYFIELD REMOVAL

1. Lift the main playfield and position it so that its supports are seated on the front edge of the cabinet.
2. The front left and right sides of the upper playfield are each attached to a slotted bracket with a slotted hexagon head screw. Loosen these two screws only enough so that the playfield can be lifted from the brackets.
3. Located on the underside of the upper part of the ramp is an indexing tab which properly aligns the ramp with the upper playfield. Bend back this tab and lift the upper portion of the ramp away from the upper playfield.
4. Lift the front end of the upper playfield to gain access to the playfield's three plugs.
5. Disconnect A9P1/J1, A9P2/J2, and A9P3/J3.
6. Pull the upper playfield forward until its support brackets, located at the rear of the playfield, clear their slots.
7. The upper playfield can now be removed from the main playfield.

II. INITIALIZATION, III. GAME OPERATION

II. INITIALIZATION



III. GAME OPERATION

A. GAME START

All three balls must be in the ball return trough to start a game.

1. Insert coins into coin chute.
 - a. Coin chute tune is played.
 - b. Total credits are displayed in status display.
2. Press Credit Button to start game.
 - a. Credit tune is played.
 - b. Total credits displayed decrease by one.
3. All playfield features reset.
4. The first player score display flashes 2 zeros.
5. When the ball is released to the shooter, the playfield-controlled lamps flash.

B. FIRST PLAYER

1. First player's score display flashes two zeros.
2. The other player's displays are now blank.
3. A "1" appears on the ball-in-play display.
4. When the ball enters the outhole, any bonus earned is scored.

C. ADDITIONAL PLAYERS

1. Additional players are indicated by 2 zeros (not flashing) in each corresponding player's display.
2. After the maximum number of players are added, or no more

III. GAME OPERATION

credits remain, the Credit Button has no effect.

3. Additional players can be added anytime the first player's ball is still in play. If the Credit Button is pressed after the first player's first ball has entered the outhole, all players' scores will be erased with the first player's score display showing a flashing zero, indicating a new game only for the first player.

D. EXTRA BALLS

1. When the SHOOT AGAIN lamp is lit, neither the player-up nor the ball-in-play display changes when the ball enters the outhole.
2. Only one extra ball per ball-in-play is given.

E. TILT MODE

1. Tilting the game results in a loss of ball in play.
2. When the game is tilted, all the playfield lamps go off.
3. All accumulated bonus and bonus multipliers are lost.

F. SLAM MODE

1. If the normally closed slam switch (located inside front door) is opened, the

entire game is ended for all players.

2. The GAME OVER lamp comes on.
3. The entire switch matrix is inactive for three seconds.
4. All coins will be rejected if dropped into any coin chute during the three-second delay.
5. If the match feature exists (dependent on Switch #26), a replay can be won even if the game is slammed.
6. Game returns to the attract mode.

G. GAME OVER

1. When the last ball enters the outhole, the GAME OVER lamp continually flashes.
2. A random number appears in the ball-in-play display. If this number matches the last two digits in any player's score, a replay (dependent on Switch #27) is awarded.
3. HGTD is periodically flashed in all players' displays. When a score higher than this is achieved, an award (dependent on Switches #23 and #24) is given.
4. All of the target banks will reset.

IV. GAME PLAY AND SCORING

MULTIBALL PLAY

- 2-ball multiball is achieved when zero or one hole is occupied and the ball enters the open "STARGATE" to the top center hole.
- 3-ball multiball is achieved when two holes are occupied and the ball enters the open "STARGATE" to the top center hole, or when balls are in all three capture locations.
- Playfield scoring during multiball is 2X (2-ball) or 3X (3-ball).
- When only one ball is left in play, return rollover lights turn off and rotation sequence for capture holes lights returns.

STARGATE

- Completing spot targets 1 through 4 lights green X.
- Shooting green X when lit opens "STARGATE" (not during Multiball).
- Ball Save targets also open "STARGATE" when lit.

BONUS MULTIPLIER

- Completing three top left rollovers, advances multiplier.
- Shooting blue X (right rollunder) advances multiplier when lit.

SPECIAL

- Spelling S-P-I-R-I-T by completing drop target banks lights both banks for "SPECIAL".
- Completing either bank, when lit, awards "SPECIAL".
- The number of "SPECIALS" awarded, equals the number of balls on the playfield.

EXTRA BALL

- Completing spot targets' sequence (3 hits each) lights B-A-L-L.
- Awarded when both targets are hit when B-A-L-L is lit.

RIGHT FLIPPER

- Rotates top left rollover lane lights.

UPPER PLAYFIELD

DROP TARGETS

- Score 4000 points and adds bonus.
- Completing the sequence advances S-P-I-R-I-T, resets bank, and awards "SPECIAL" when lit.

SPOT TARGET

- Score 1000 points when both lamps are off, and flash both lamps alternately.
- Score 5000 points when both lamps are flashing, and turn on left lamp.
- Score 10,000 points when right lamp is flashing, and turn on right lamp.
- Score 5000 points when both lamps are on.

ROLLUNDER

- Score 1000 points

100 POINT SWITCH

- Score 100 points.

MAIN PLAYFIELD

DROP TARGETS

- Score 2000 points and add bonus.
- Completing the sequence advances S-P-I-R-I-T, resets bank, and awards "SPECIAL" when lit.

BALL SAVE TARGETS

- Score 2000 points unlit.
- Score 4000 points and open "STARGATE" when lit (if not in Multiball).

IV. GAME PLAY AND SCORING

SPOT TARGET

- Score 1000 points when both lamps are off, and flash both lamps alternately.
- Score 5000 points when both lamps are flashing, and turn on left lamp.
- Score 10,000 points when right lamp is flashing, and turn on right lamp.
- Score 5000 points when both lamps are on.

SPOT TARGETS

#1 through #4

- Score 1000 points unlit.
- Score 5000 points, and add bonus when lit.
- Completing the sequence lights roundabout (green X) and resets the target lights.

ROUNDABOUT

- Score 2000 points unlit.
- Score 10,000 points and open "STARGATE" when lit (if first ball is in play).

POP BUMPER

- Score 1000 points when lit.
- Score 10,000 points when flashing.

RIGHT ROLLUNDER

- Score 10,000 points unlit.
- Score 50,000 points and advance multiplier when lit.

TOP LEFT ROLLOVERS

- Score 1000 points unlit.
- Score 5000 points when lit.
- Flash pop bumper for 15 switch closures of center rollover only.

- Completing the sequence advances the multiplier and resets the lights.

TOP CENTER HOLE

- Score 20,000 points and close "STARGATE".

HOLE KICKERS

- Score 5000 points unlit.
- Score 10,000 points and capture ball when lit.
- Enter 3-ball Multiball if all three hole kickers have captured balls.

LEFT AND RIGHT OUTLANE ROLLOVERS

- Score 100 points unlit.
- Score 1000 points and light blue X when lit.

LEFT AND RIGHT RETURN ROLLOVERS

- Score 1000 points unlit.
- Score 20,000 points when lit.

SHOOTER LANE SWITCH

- Release ball in top center hole when entering 2-ball Multiball.

10 POINT SWITCHES

- Score 10 points.
- Rotate Ball Save target and outside rollover lane lights.
- Rotate capture light around the unoccupied capture hole locations.
- Toggle return rollovers when in Multiball.
- Close "STARGATE" after 15 switch closures.

V. SOUND/SPEECH

The Sound/Speech Board installed in this game has not been programmed for speech and will produce sounds only.

Please note that the voice chip (U14) is not being used and its socket is vacant.

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VI. GAME ADJUSTMENTS

A. CONTROL BOARD SWITCH ADJUSTMENTS

NOTE: The following switch adjustments pertaining to system 80A only. There are 32 switches on the control board which permit adjustment of the game parameters. These switches are contained in four packages of eight switches each, as shown below.

COIN CHUTE COMBINATIONS SYSTEM 80A

SWITCHES					COIN CHUTE ADJUSTMENTS	
S1	S2	S3	S4	S5		
S9	S10	S11	S12	S13		
S17	S18	S19	S20	S21		
					Left Coin Chute	
					Right Coin Chute	
					Center Coin Chute	
					CREDITS/COINS	
OFF	OFF	OFF	OFF	OFF	1/1	
OFF	OFF	OFF	OFF	ON	2/1	
OFF	OFF	OFF	ON	OFF	3/1	
OFF	OFF	OFF	ON	ON	4/1	
OFF	OFF	ON	OFF	OFF	5/1	
OFF	OFF	ON	OFF	ON	6/1	
OFF	OFF	ON	ON	OFF	7/1	
OFF	OFF	ON	ON	ON	8/1	
OFF	ON	OFF	OFF	OFF	9/1	
OFF	ON	OFF	OFF	ON	10/1	
OFF	ON	OFF	ON	OFF	1/2	
OFF	ON	OFF	ON	ON	2/2	
OFF	ON	ON	OFF	OFF	3/2	
OFF	ON	ON	OFF	ON	4/2	
OFF	ON	ON	ON	OFF	5/2	
OFF	ON	ON	ON	ON	6/2	
ON	OFF	OFF	OFF	OFF	7/2	
ON	OFF	OFF	OFF	ON	8/2	
ON	OFF	OFF	ON	OFF	9/2	
ON	OFF	OFF	ON	ON	10/2	
ON	OFF	ON	OFF	OFF	1/3	
ON	OFF	ON	OFF	ON	2/3	
ON	OFF	ON	ON	OFF	1/4	
ON	OFF	ON	ON	ON	3/4	
ON	ON	OFF	OFF	OFF	1/5	

* All of the above do not give credits until the last coin is inserted.

SWITCHES 6, 7 AND 8 _____ SPARES

SWITCH 14 _____ COIN CHUTE 1 & 2 CONTROL
ON Same
OFF Separate

SWITCHES
15 16 _____ MAXIMUM CREDITS
OFF OFF 8
OFF ON 10
ON OFF 15
ON ON 25

SWITCH 22 _____ PLAYFIELD SPECIAL
ON Extra Ball
OFF Special

SWITCHES
23 24 _____ HIGH GAME TO DATE AWARDS
OFF OFF None
OFF ON None
ON OFF 2 Replay
ON ON 3 Replay

SWITCH 25 _____ BALLS/GAME
ON 3
OFF 5

SWITCH 26 _____ MATCH
ON On
OFF Off

SWITCH 27 _____ REPLAY LIMIT
ON 1
OFF No Limit

SWITCH 28 _____ NOVELTY
ON Yes
OFF Normal

SWITCH 29 _____ GAME MODE
ON Extra Ball
OFF Replay

SWITCH 30 _____ 3RD COIN CHUTE CREDIT CONTROL
ON Add 9
OFF No Effect

SWITCHES
31 32 _____ NOT USED

ADDITIONAL COIN CHUTE COMBINATIONS CREDIT INCENTIVES

ALL OF THE BELOW CANNOT HAVE 9 CREDITS ADDED BASED ON SWITCH 30

SWITCHES										TOTAL COIN/ TOTAL CREDIT	
S1	S2	S3	S4	S5							
S9	S10	S11	S12	S13							
S17	S18	S19	S20	S21							
					Left Coin Chute						
					Right Coin Chute						
					Center Coin Chute						
					COIN/CREDIT GIVEN	COIN/CREDIT GIVEN	COIN/CREDIT GIVEN	COIN/CREDIT GIVEN	COIN/CREDIT GIVEN		
ON	ON	OFF	OFF	ON	1st/1	2nd/2				=	2/3
ON	ON	OFF	ON	OFF	1st/0	2nd/1	3rd/1	4th/1		=	4/3
ON	ON	OFF	ON	ON	1st/0	2nd/1	3rd/0	4th/2		=	4/3
ON	ON	ON	OFF	OFF	1st/1	2nd/1	3rd/1	4th/2		=	4/5
ON	ON	ON	OFF	ON	1st/1	2nd/2	3rd/1	4th/3		=	4/7
ON	ON	ON	ON	OFF	1st/1	2nd/2	3rd/2	4th/2		=	4/7
ON	ON	ON	ON	ON	1st/0	2nd/0	3rd/1	4th/0	5th/1	=	5/2

VI. GAME ADJUSTMENTS

B. SOUND ADJUSTMENTS

The speaker output is controlled by the potentiometer mounted on the fuse/knocker panel.

Turning the potentiometer counter clockwise will decrease the volume. Turning it clockwise will increase the volume.

The potentiometer is accessible through the front door.

IMPORTANT: Each of the potentiometers installed on the sound/speech board have been factory adjusted. The potentiometer settings should never be changed except when performing the recommended calibration procedure.

SWITCH BANK (SB1) SETTINGS:

SB1-1	USED IN SELF-TEST ONLY.
SB1-2	NOT USED.
SB1-3	SB1-4 Attract Mode
OFF	OFF Disabled
ON	OFF Every 10 Seconds.
OFF	ON Every 2 Minutes.
ON	ON Every 4 Minutes.
SB1-5	ON Background Sound enabled.
	OFF Background Sound disabled.
SB1-6	NOT USED.
SB1-7	NOT USED.
SB1-8	NOT USED.

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VII. BOOKKEEPING AND SELF TEST

The circuitry in this game helps the operator perform many bookkeeping and Self/Test functions. These functions are accessed by the Self/Test Switch inside the front door and information is displayed on the players' and credit displays. Bookkeeping is listed in Steps 16 through 20. Section VII, A details the Bookkeeping system, while Section VII, B details the Self/Test operation. The Flow Chart in Section VII, D gives the general order and function of both Bookkeeping and Self/Test steps.

A. BOOKKEEPING SYSTEM 80A

- See Flow Chart for Bookkeeping Assignments.
- Bookkeeping Steps (01-15) are displayed in the credit display and the 3rd and 4th player's score display.
- Information for the particular bookkeeping step displayed will appear in the 1st player's score display.
- All bookkeeping information is checked against itself to insure that it is correct. If any data is invalid or bad, that information will flash while it is displayed.

I. STEPPING THROUGH BOOKKEEPING

1. Press the SELF-TEST button inside the front door.
Double zeros (00) should appear in the designated bookkeeping step displays.
2. Press the SELF-TEST button again. Step 01 and its information will be displayed.
3. Pressing the SELF-TEST button will increment the bookkeeping step number and the appropriate information will be displayed.

NOTE: . If the SELF-TEST button is not pressed within 60 seconds of

each step, the game will return to the attract mode.

Pressing the SELF-TEST button after Step 15 will start the SELF-TEST function (Step 16-20). At this point Bookkeeping cannot be reentered by pressing the SELF-TEST button. To reenter, turn the game OFF/ON, open the slam switch, close a tilt switch, or wait 60 seconds. The game will return to the attract mode. Then press the SELF-TEST button.

4. To exit from Bookkeeping at any time:

- a. Wait 60 seconds or
- b. Turn power OFF/ON or
- c. Open slam switch or
- d. Close a tilt switch.

II. HOW TO SET BOOKKEEPING INFORMATION TO ZERO

1. For a Particular Bookkeeping Step

- a. Advance Bookkeeping so the step to be zeroed is displayed.
- b. Press the replay button. Notice all zeros will appear in the 1st player's display.
- c. Press the SELF-TEST button. This will enter zeros into memory. Note: If the SELF-TEST button is not pressed, the bookkeeping memory will retain its information.

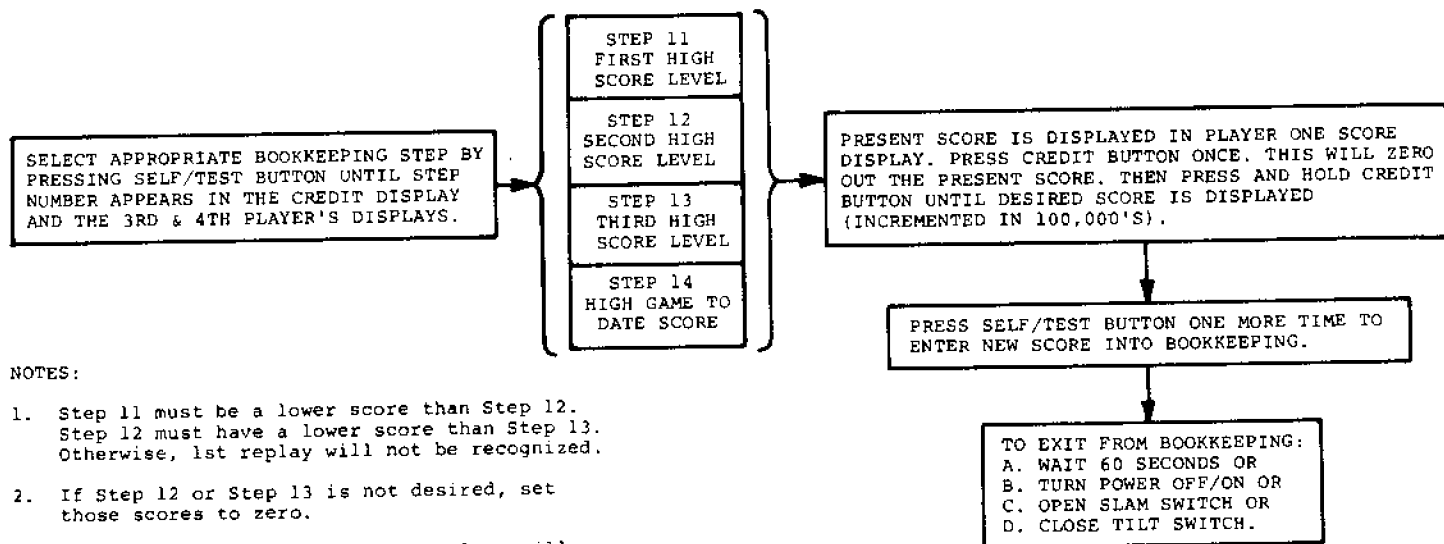
2. Zeroing All Bookkeeping Steps Except #11, 12, 13 and 14.

(These are the replay level and high game to date scores)

- a. Go to Step #15.
- b. Press the credit button. Step 15 data will zero.
- c. Press the SELF-TEST button.
- d. Zeroing is complete.

VII. BOOKKEEPING AND SELF TEST

III. HOW TO RESET HIGH SCORE LEVELS OR HIGH GAME TO DATE SCORES



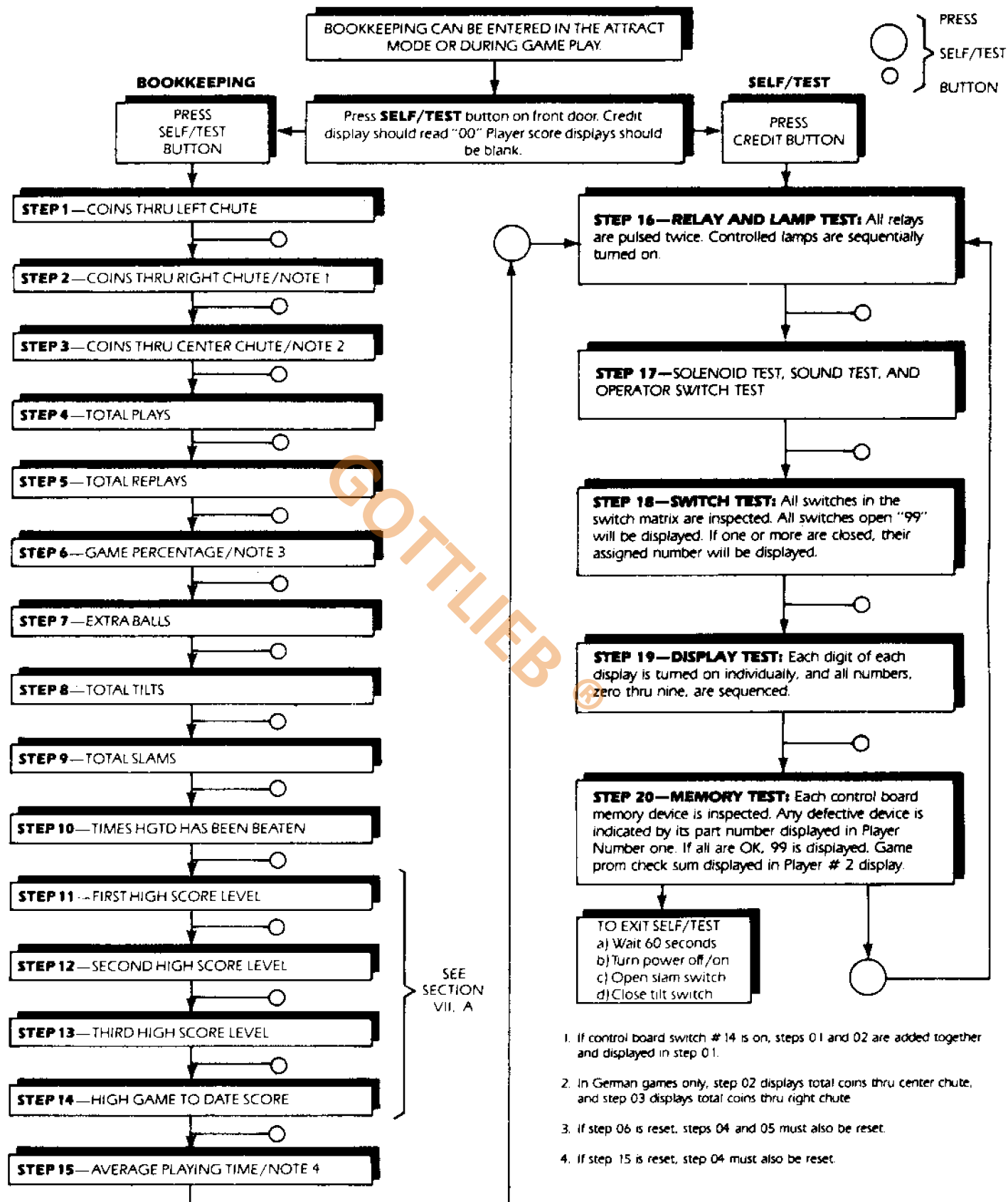
NOTES:

1. Step 11 must be a lower score than Step 12.
Step 12 must have a lower score than Step 13.
Otherwise, 1st replay will not be recognized.
2. If Step 12 or Step 13 is not desired, set those scores to zero.
3. If Step 11 is set to zero, no replays will be awarded, no matter what the settings are for Step 12 and Step 13.

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VII. BOOKKEEPING AND SELF TEST

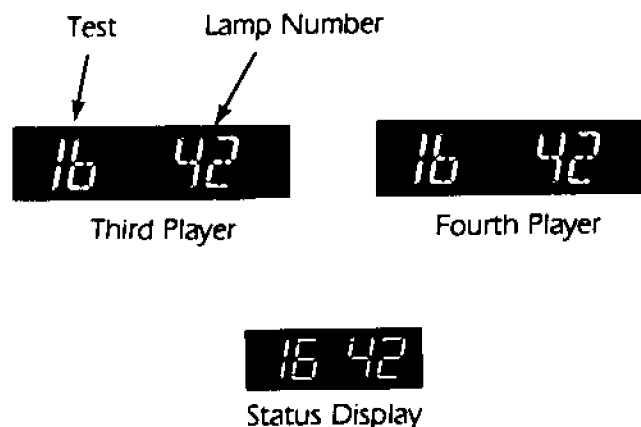
B. FLOW CHART



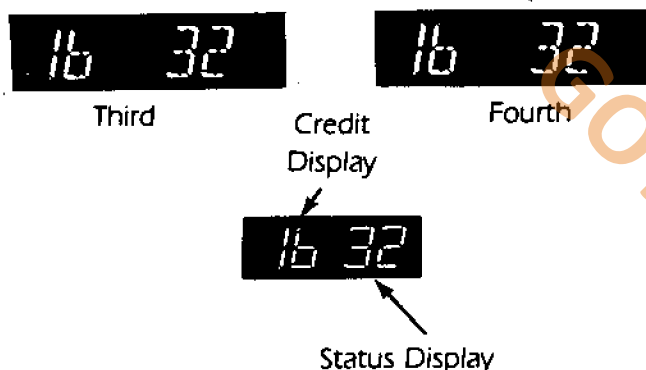
VII. BOOKKEEPING AND SELF TEST

C. SELF/TEST

- Steps 16 through 20 are SELF/TEST or game tests the operator can use for quick troubleshooting.
 - All the tests are explained in the flow chart.
 - Each test can be repeated by pressing the replay button on the front door. This starts the test for another 60 seconds.
 - If the SELF/TEST button or the replay button is not pressed within 60 seconds, the game will return to the attract mode.
- Test information is displayed in the third and fourth player score displays and the status display.



EXAMPLE:



STEP 16—RELAY AND LAMP TEST

- a. Relay Test-All relays are pulsed twice in the following order:

		A3 Driver Board Transistor Assignment (See Schematic)
Q (Game Over) Relay	-	A3J3 PIN #A Q1
T (Tilt) Relay	-	A3J3 PIN #B Q2
Coin Lockout Relay	-	A3J5 PIN #2 Q3

- b. Lamp Test-Lamps are sequentially strobed. Lamp assignment numbers appear in the third and fourth player's score display and the status display.

Lamp number (L9, L16, etc.) can be referenced to the Driver Board Schematic where the specific transistor for each lamp can be identified.

To repeat test, push the credit button. To advance to test # 17, push the Self/Test Button.

STEP 17—SOLENOID TEST, SOUND TEST, OPERATOR SWITCH TEST.

- a. Solenoid Test-Each solenoid on the playfield is sequentially pulsed. The solenoid number displayed identifies which solenoid is being tested. The following chart lists solenoid assignments.

NUMBER DISPLAYED	ASSIGNMENT	A3 DRIVER BOARD TRANSISTOR ASSIGN. SEE SCHEMATIC
Sol. 1	3 Bank	Q60
Sol. 2	Left Bottom Hole	Q57/Q58
Sol. 3	Not Used	---
Sol. 4	Not Used	---
Sol. 5	3 Bank (Upper Playfield)	Q61/Q62
Sol. 6	Center Top Hole	Q63/Q64
Sol. 7	Not Used	---
Sol. 8	Knocker	Q53
Sol. 9	Outhole	Q59

- b. Sound Test-Immediately after the solenoid test, the sound enable signals (inputted to the A6 Sound Board) will be tested in the following order:

VII. BOOKKEEPING AND SELF TEST

SOUND NUMBER ENABLE DISPLAYED

S16 17 (combination S1 & S16)
S8 8
S2 2
S4 4
S1 1

A3 DRIVER BOARD TRANSISTOR ASSIGN. SEE SCHEMATIC

A3J2 PIN 9
A3J5 PIN 7
A3J5 PIN 5
A3J5 PIN 1
A3J5 PIN 6

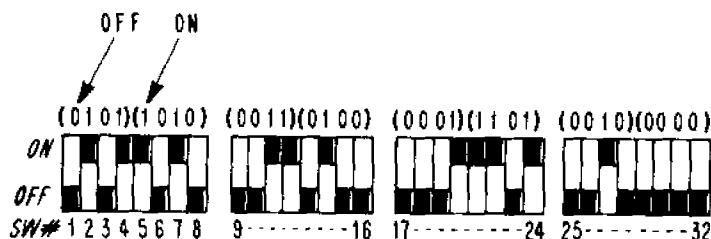
- c. The first and second player's score displays show hexadecimal representative of the operator switch positions. Converting hexadecimal to binary will give the switch positions in binary form.

CONVERSION TABLE

0 = OFF 1 = ON

DISPLAYED HEXIDECIMAL	DECIMAL	BINARY
0	0	0000
1	1	0001
2	2	0010
3	3	0011
4	4	0100
5	5	0101
6	6	0110
7	7	0111
8	8	1000
9	9	1001
A	10	1010
B	11	1011
C	12	1100
D	13	1101
E	14	1110
F	15	1111
BLANK		

EXAMPLE:



DISPLAYED

SW 1-8 SW 9-16
5C 34
First Player

SW 17-24 SW 25-32
1E 20
Second Player

Checking Switches

- 1) Switch all odd number switches to the ON position, and all even switches to the OFF position. Display should show:

CC CC
First Player Second Player

- 2) Switch all even numbered switches to the ON position and all odd switches to the OFF position. Display should show:

55 55
First Player Second Player

To repeat test #17, push the credit button.

To advance to test #18, push the Self/Test switch.

STEP 18—SWITCH TEST

18 67
Third Player Fourth Player
Credit Display
Status Display

- 1) All switches open. 99 will be displayed. (Note: The slam switch is not part of the switch test (normally closed).

- 2) Switch(es) closed. Designated number(s) will be sequentially displayed. The last switch number will remain displayed, unless test is repeated.

VII. BOOKKEEPING AND SELF TEST, VIII. OPTIONS

VII. BOOKKEEPING AND SELF TEST

STEP 19—DISPLAY TEST: Each digit of each display is individually turned on, and numbers zero through nine are sequenced.

- Test number is not displayed.

NOTE: On the second and fourth player displays only, the least significant digits are strobed first. Then the most significant digits and the remaining digits are sequentially strobed. This is normal operation.

STEP 20—MEMORY TEST - Each control based memory device is checked. If all are good, a 99 will be displayed.

If a memory chip located on the A1 Control Board is defective, a corresponding number in the following chart will be displayed.

NUMBER DISPLAYED

99
5 10 1
2332-1
2332-2
6532-1
6532-2
6532-3
27 16*

CHIP ASSIGNMENT/ DESCRIPTION

All Memory Good
Z5 Bookkeeping Ram
U2 Background Rom
U3 Background Rom
U4 Ram
U5 Ram
U6 Ram
Prom 1 Game E Prom

Player #2 displays the check sum for the game prom in hexadecimal. Refer to the conversion Table for interpretation.

To repeat test #20, push the credit button. To advance to Step #16, push the Self/Test button.

* James Bond (658) and later System 80 games up to and including Haunted House will display 764 1-1 for a bad 27 16 game prom.

VIII. OPTIONS

There are no liberal or conservative adjustments for this game.

IX. GENERAL INFORMATION

A. PRINTED CIRCUIT BOARDS ARE DESIGNATED AS FOLLOWS:

A1 - Control Board
A2 - Power Supply
A3 - Driver Board
A4 - Bonus Displays
A5 - Status Display
A6 - Sound/Speech Board
A7 - Sound/Speech Power
Supply
A8 - Pop Bumper Driver Boards
A11 - Auxiliary Lamp Driver
Board
A14 - 7-Digit Display
A24 - Reset Board

B. WIRE COLORS ARE SHOWN AS NUMBERS:

0 Black
1 Brown
2 Red
3 Orange
4 Yellow
5 Green
6 Blue
7 Purple
8 Slate
9 White

For example, 688 is a BLUE-SLATE-SLATE striped wire.

Printed circuit board connectors will be labeled AX-JX. For example, A3-J4 is the connector J4 on the driver board (A3).

C. FUSES

BOTTOM CABINET FUSES

F1	Sound/Speech Power Supply	12VAC	1/2 Amp
F2	Power Supply	10VAC	5 Amp SLO-BLO
F3	Displays	60VAC	1/4 Amp SLO-BLO
F4	Solenoids	25VAC	8 Amp SLO-BLO
F5	Controlled Lamps	8VAC	7 1/2 Amp
F6	Playboard Illumination	6.3VAC	7 1/2 Amp
F7	Lightbox Illumination	6.3VAC	10 Amp
F8	Sound/Speech Power Supply	+24VDC	1 Amp SLO-BLO
F9	Primary Power	115VAC	5 Amp SLO-BLO
		230VAC	2 1/2 Amp SLO-BLO

PLAYFIELD FUSES

F10	Outhole, 3 Bank	1 Amp SLO-BLO
F11	3 Bank (Upper Playfield), Left Top Hole	1 Amp SLO-BLO
F12	Right Bottom Hole	1 Amp SLO-BLO
F13	Ball Release	1 Amp SLO-BLO
F14	Stargate	2 Amp SLO-BLO
F15	Left Bottom Hole, Center Top Hole	2 Amp SLO-BLO
F16	Pop Bumper	2 Amp SLO-BLO

IX. GENERAL INFORMATION

D. COIL CHART

SOLENOID COILS					
PART NUMBER	GENERAL USAGE	RESISTANCE (OHMS)	NUMBER OF TURNS	WIRE GAUGE	WRAPPER COLOR
A-1496	KICKING TARGET KICKING RUBBERS POP BUMPERS	2.95	635	#23	Yellow
A-4893	UP KICKER POP BUMPERS BALL KICKER	2.1	535	#22	Red
A-5194	UP KICKER GONG KICKING TARGETS	4.5	780	#24	Blue
A-5195	CONTACT KICKER KNOCKER HOLE KICKER	12.3	1305	#26	White
A-16570	HOLE KICKER, OUTHOLE	15.5	1450	#27	Green
A-17875	FLIPPERS	2.8/40.0	560/1100	#24/31	Yellow
A-17891	5 BANK RESET	3.35	850	#22	White
A-18102	3 BANK RESET, 7 BANK RESET USES 2	9.0	1430	#24	Red
A-18318	4 BANK RESET	6.7	1130	#24	Orange
A-19300	BALL KICKER	7.8	1075	#25	Orange
A-20095	SUPER FLIPPER	1.55/35.5	450/900	#22/31	Red
A-21741	UP KICKER	2.5	575	#23	Orange
RELAY COILS					
A-16890	Q, T, AND COIN LOCKOUT RELAYS	231.0	4000	#35	Orange
A-20558	GATE RELAY	156.0	3400	#34	White
A-18642	MEMORY/ DROP TARGETS	58.0	1590	#33	White

* Coils may vary from game to game. Check game manual for exact coil usage.

E. SOUND/SPEECH BOARD (A6) TEST

1. Game must be in game over mode to initiate test.
2. Pressing the test button on the sound/speech board will initiate test.
3. After the test button has been pressed the sound/speech board must correctly reproduce all of the speeches listed in section 5. If not the board is defective.

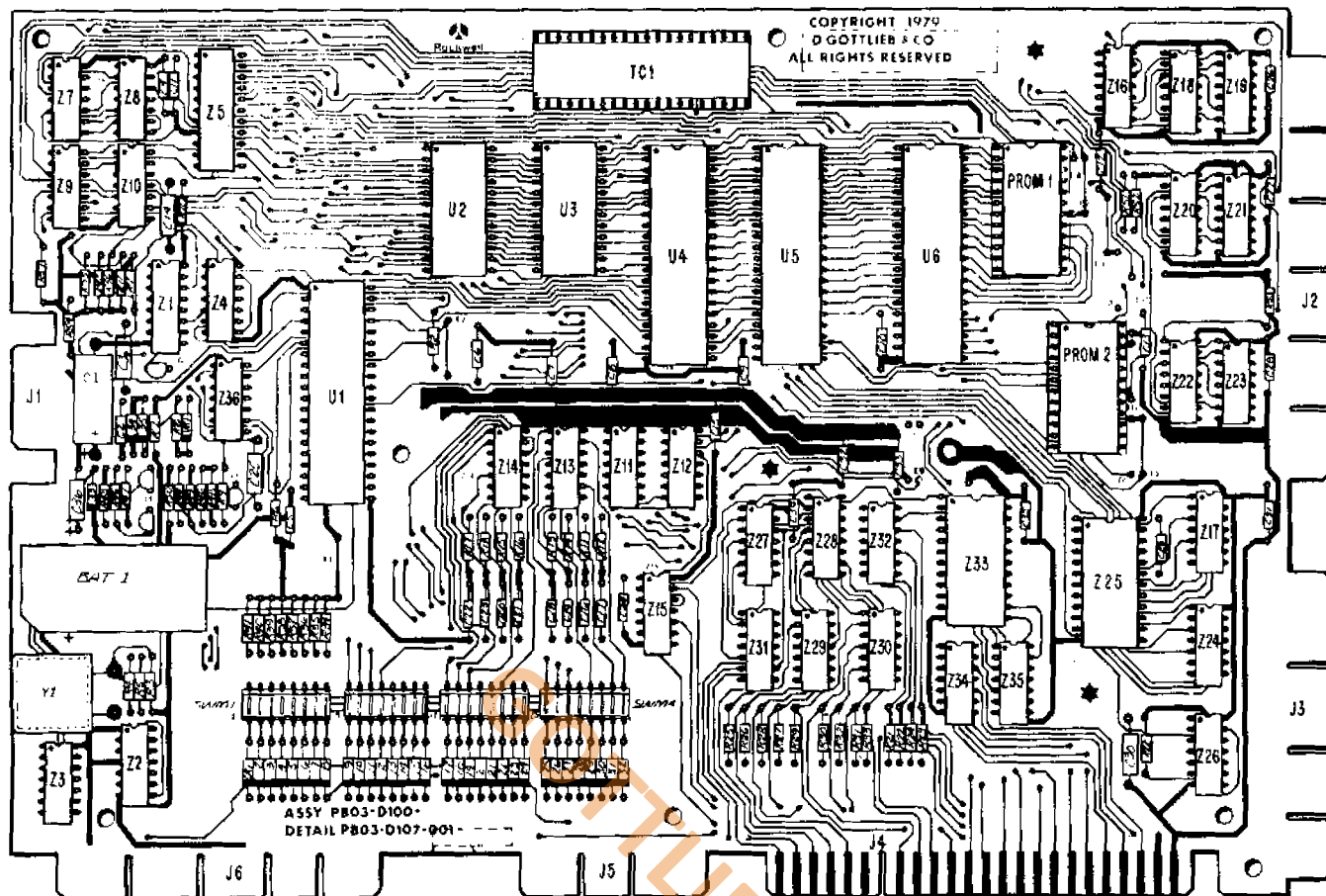
X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS

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X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS

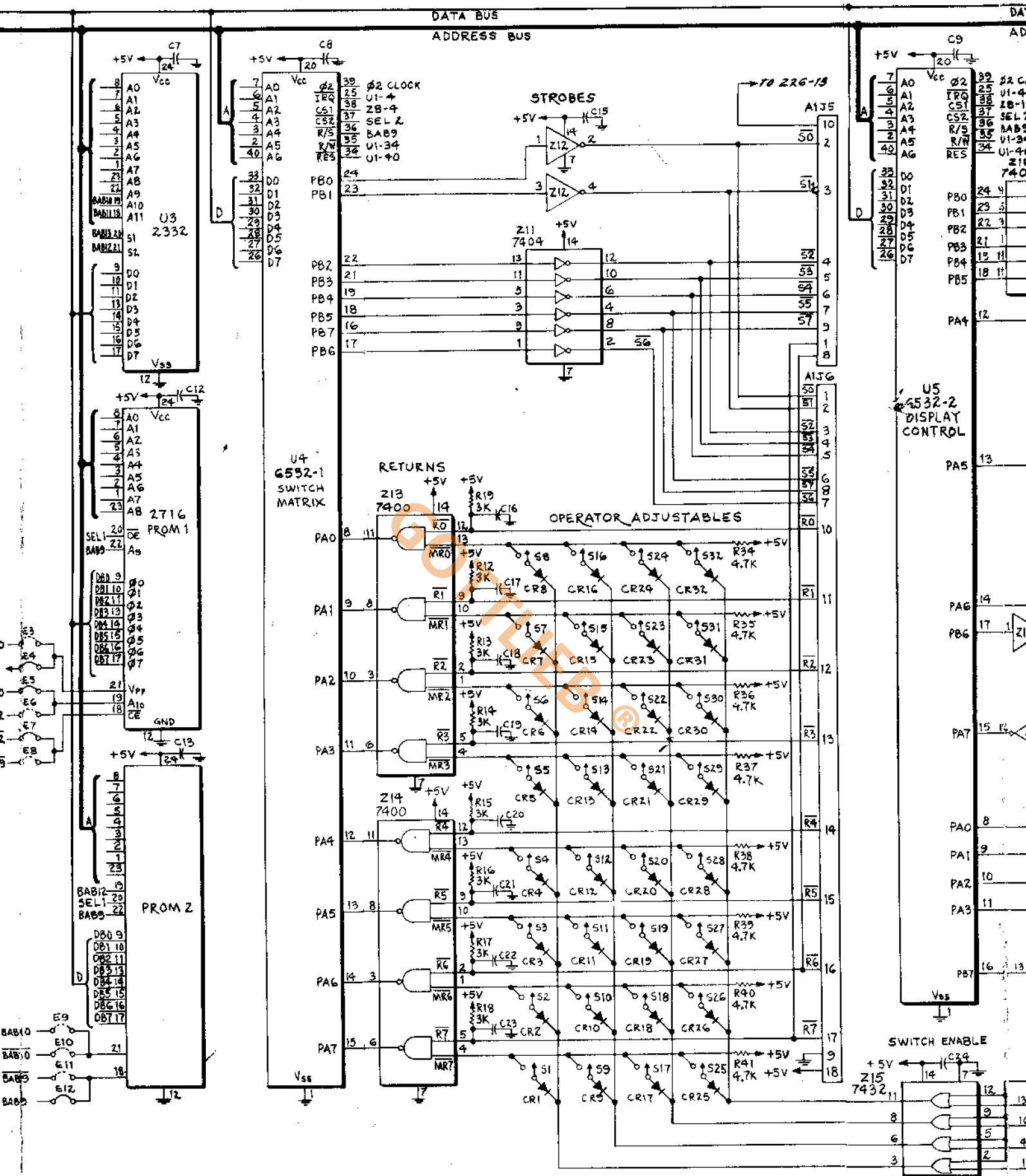
CONTROL BOARD (A1) COMPONENT LOCATION

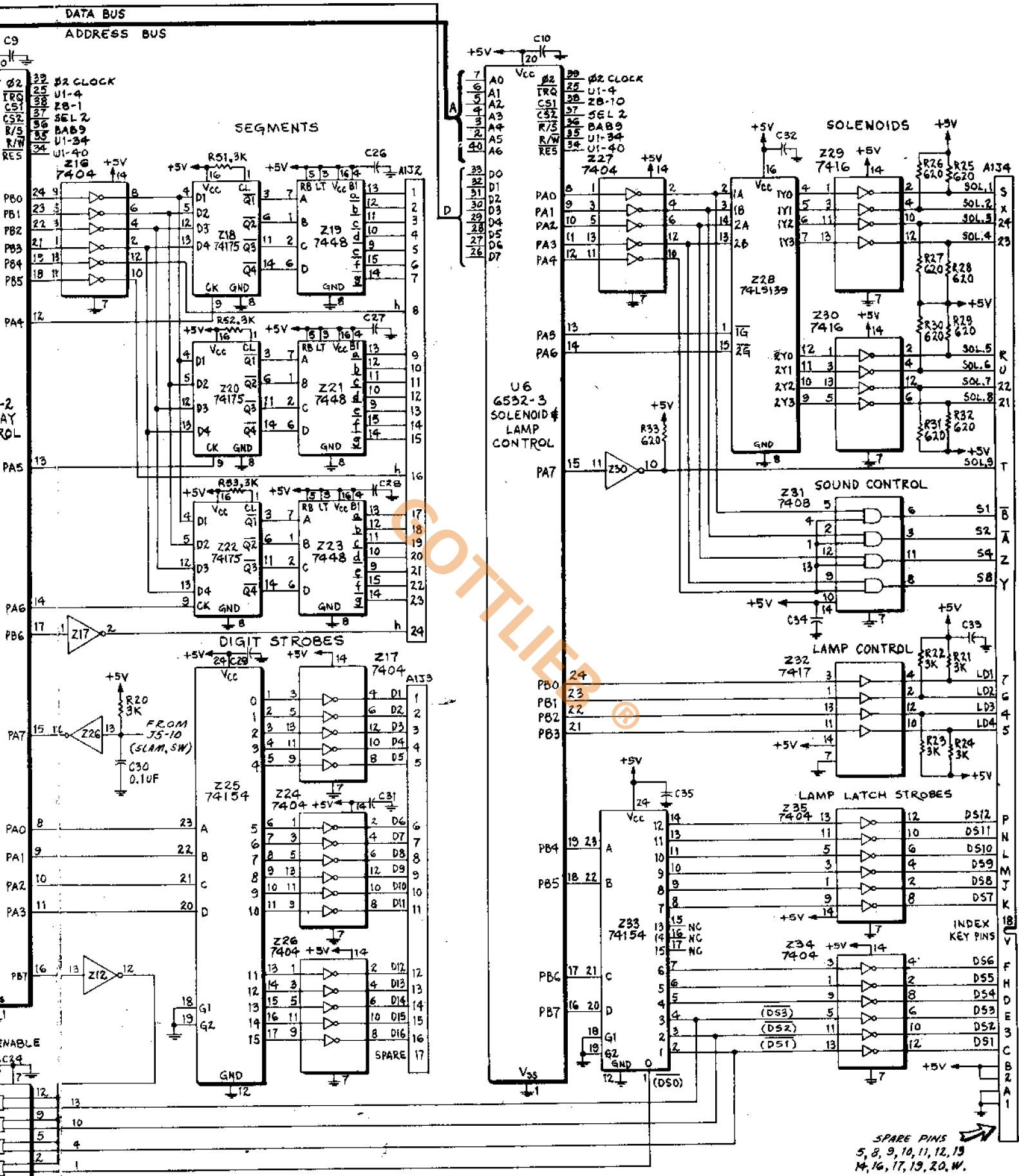


CONTROL BOARD (A1) PARTS LIST

REFERENCE	DESCRIPTION	PART NUMBER	REFERENCE	DESCRIPTION	PART NUMBER
Bat. 1	Battery-3.6V 326R10-002	XO-458	U3	ROM R3272-12	XO-362
C1	Capacitor, 100 mfd., 10V	XO-211	U4, U5, U6	PRIOT R6532-18	XO-361
C2, C4-C13,	Capacitor, 01 mfd., 50V	XO-229	VR1	Diode-3.0V, 5% 1N5225B or 1N5987B	XO-269
C15-C24, C26-			Y1	Crystal, 3.579545 MHZ	XO-456
C29, C31-C35			Z1	IC-Cmos-Dual 1 Shot SCL4528BE	XO-414
C3, C14, C25,	Capacitor, .1 mfd., 50V	XO-230	Z2	IC-Dual Flip Flop SN7474N	XO-423
C30			Z3, Z11, Z12,	IC-Hex Inverter SN7404N	XO-402
C36	10 mfd., 10V, TNT-AX CAP	XO-209	Z16, Z17, Z24,		
CR1-CR35	Diode, GP 1N4148	XO-261	Z26, Z27, Z34,		
Q1, Q4	Transistor-PNP MPS-A70	XO-309	Z35		
Q2, Q3	Transistor, NPN (Motorola) 2N4400	XO-313	Z4	IC-Cmos-Quad 2 Input	
R1, R6, R11-R24,	Resistor, 3.0K ohm, 5%, 1/4W	XO-23		"And" SCL4081BE	XO-401
R42, R45, R46,			Z5	IC-Static Ram S5101-L	XO-356
R48, R51-R57			Z7	IC-Hex Inverter SN74LS04N	XO-418
R2, R34-R41	Resistor, 4.7K ohm, 5%, 1/4W	XO-7	Z8	IC-2 Input "Nor" SN7402N	XO-421
R3, R43, R49	Resistor, 5.6K ohm, 5%, 1/4W	XO-19	Z9, Z13, Z14	IC-2 Input "Nand" SN7400N	XO-420
R4, R5, R44	Resistor, 2.0K ohm, 5%, 1/4W	XO-14	Z10	IC-Open Collector Inverter SN74LS05N	XO-411
R7	Resistor, 62 ohm, 5%, 1/4W	XO-3	Z15	IC-2 Input "Or" SN7432N	XO-407
R8, R50	Resistor, 180 ohm, 5%, 1/4W	XO-24	Z18, Z20, Z22	IC-"D" Flip Flop SN74175N	XO-410
R9	Resistor, 1K ohm, 5%, 1/4W	XO-5	Z19, Z21, Z23	IC-4 to 7 Decoder SN7448N	XO-408
R10	Resistor, 2.7M ohm, 5%, 1/4W	XO-13	Z25, Z33	IC-4-16 Decoder SN74154N	XO-409
R25-R33	Resistor, 620 ohm, 5%, 1/4W	XO-4	Z28	IC-2 to 4 Decoder SN74LS139N	XO-419
R47	Resistor, 24K ohm, 5%, 1/4W	XO-10	Z29, Z30	IC-Hex Inverter-OC/HV SN7416N	XO-405
SW1-SW4	Dip Switch 1008-692	XO-505	Z31	IC-2 Input "And" SN7408N	XO-404
TC1	Socket, 40 Pin 640379-3	XO-530	Z32	IC-Hex Buffer-OC SN7417N	XO-406
U1	CPU R6502-13	XO-360	Z36	IC-Cmos SCL4069B	XO-424
U2	ROM R3272-12	XO-363		Socket 24 Pin 640361-3	XO-529

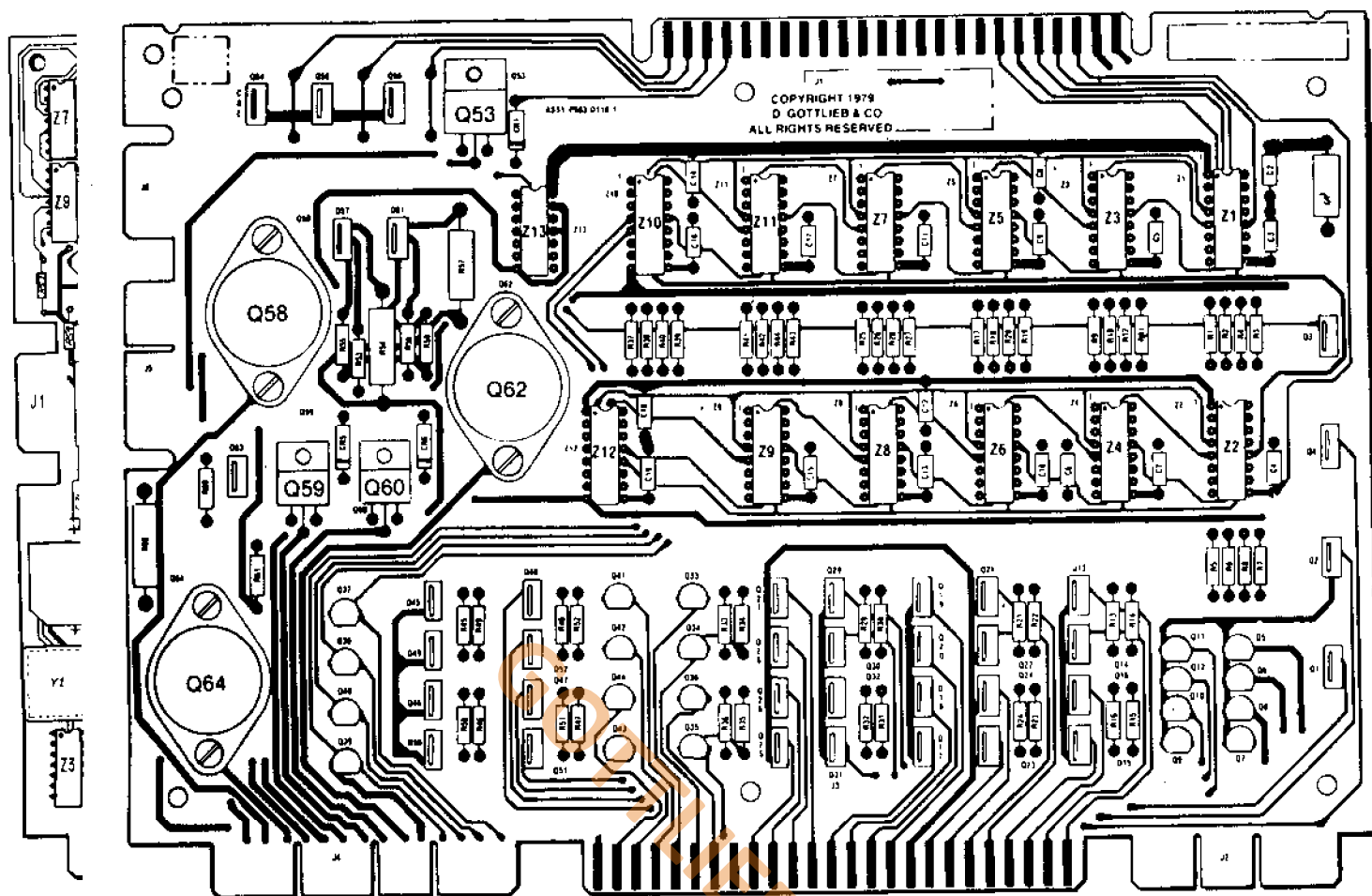
X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS





X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS

DRIVER BOARD (A3) COMPONENT LOCATION



REFERE

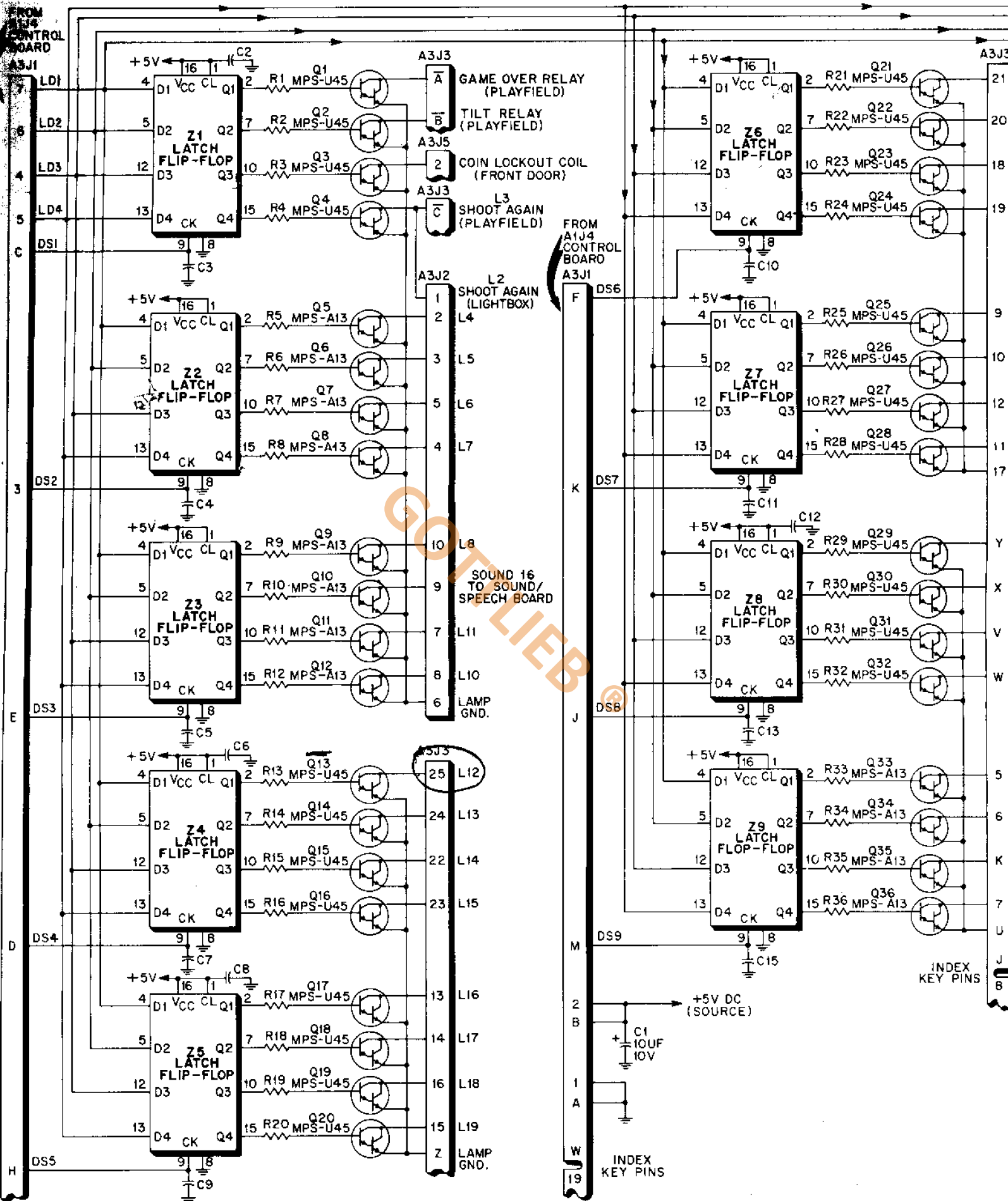
Bat 1
C1
C2, C4-C
C15-C2
C29, C
C3, C14,
C30
C36
CR1-CR3
Q1, Q4
Q2, Q3
R1, R6, R
R42, R4
R48, R5
R2, R34
R3, R43,
R4, R5, I
R7
R8, R50
R9
R10
R25-R33
R47
SW1-SW4
TC1
U1
U2

DRIVER BOARD (A3) PARTS LIST

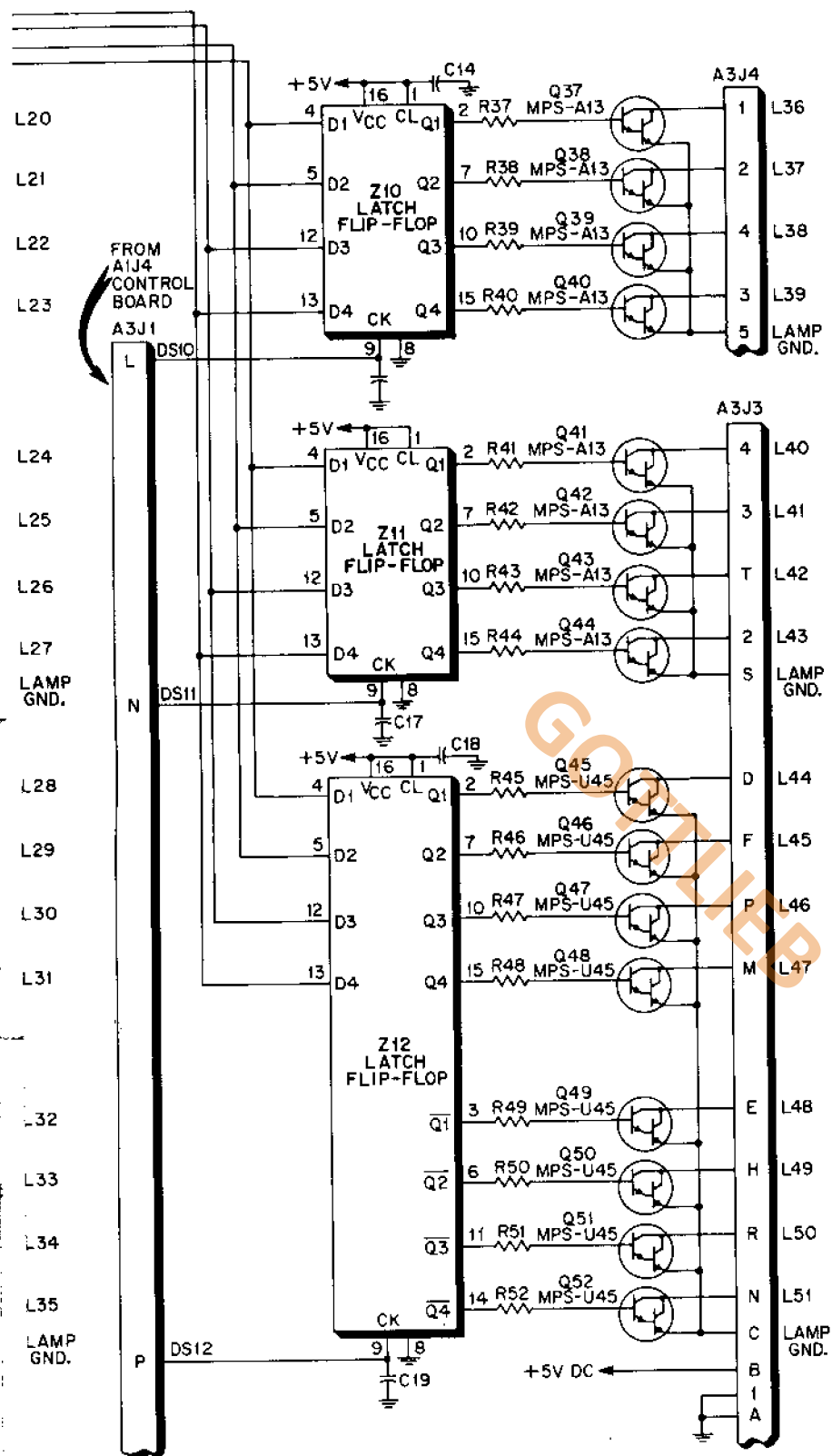
REFERENCE	DESCRIPTION	PART NUMBER
C1	Capacitor, 10 mfd., 10V Tantalum	XO-209
C2-C19	Capacitor, 01 mfd., 50V Ceramic	XO-229
CR1-CR6	Diode—Silicon 1N4148	XO-261
R1-R53, R61, R55, R56, R58, R59	Resistor 1.0K ohm, 5%, 1/4W	XO-5
R54, R57, R60	Resistor, 91 ohm, 5%, 1W	XO-158
Q1-Q4, Q13- Q32, Q45-Q52, Q54-Q57, Q63	Transistor, NPN, Darlington MPS-U45	XO-306
Q5-Q12, Q33-Q44	Transistor, NPN, Darlington MPS-A13	XO-304
Q53, Q59, Q60	Transistor, NPN, Darlington 2N6043	XO-303
Q58, Q62, Q64	Transistor, NPN, 2N3055	XO-301
Z1-Z12	IC-Quad "D" Latch Flip Flop SN74175N	XO-410
Z13	IC-Hex Inverter SN7404N	XO-402
	Insulator-Thermalloy 43-03-4	XO-512

NOTE:

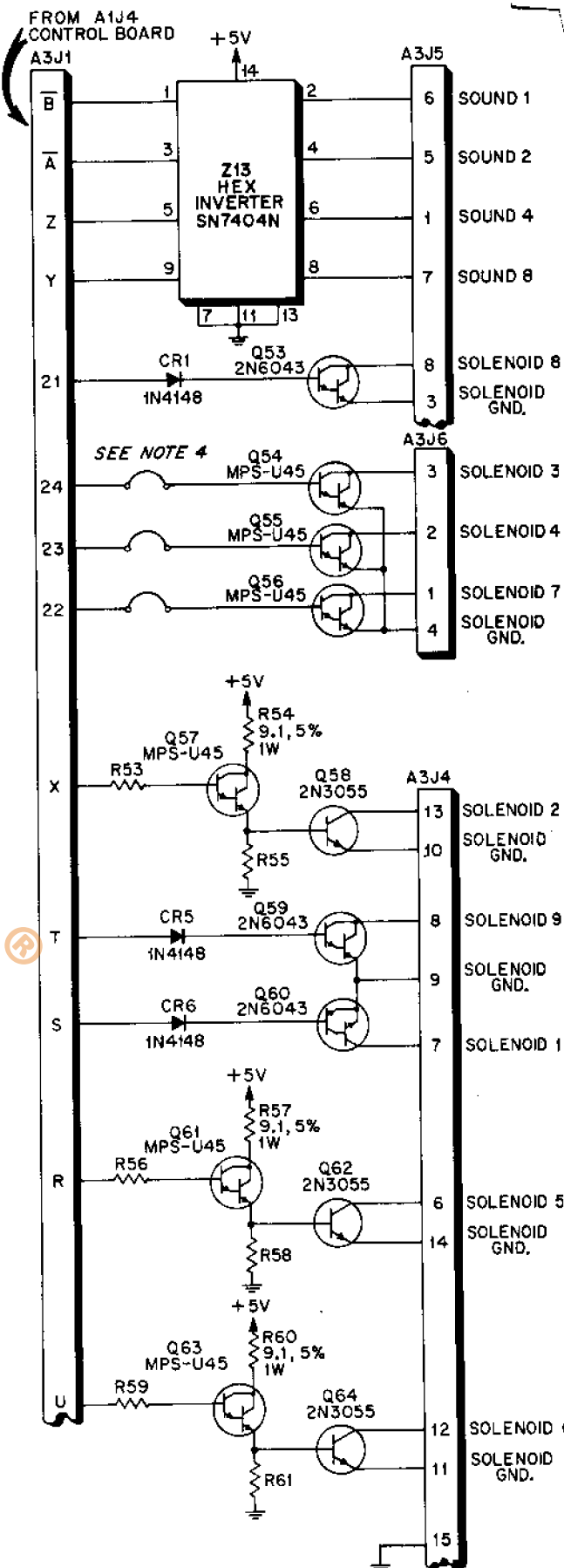
1. JUMPER WIRES REPLACED DIODES CR2, CR3 AND CR4 FOR SYSTEM 80A GAMES.
2. TRANSISTOR TYPES MPS-U45 AND NDS-U45 ARE INTERCHANGEABLE.



C DIAGRAMS, PARTS LISTS

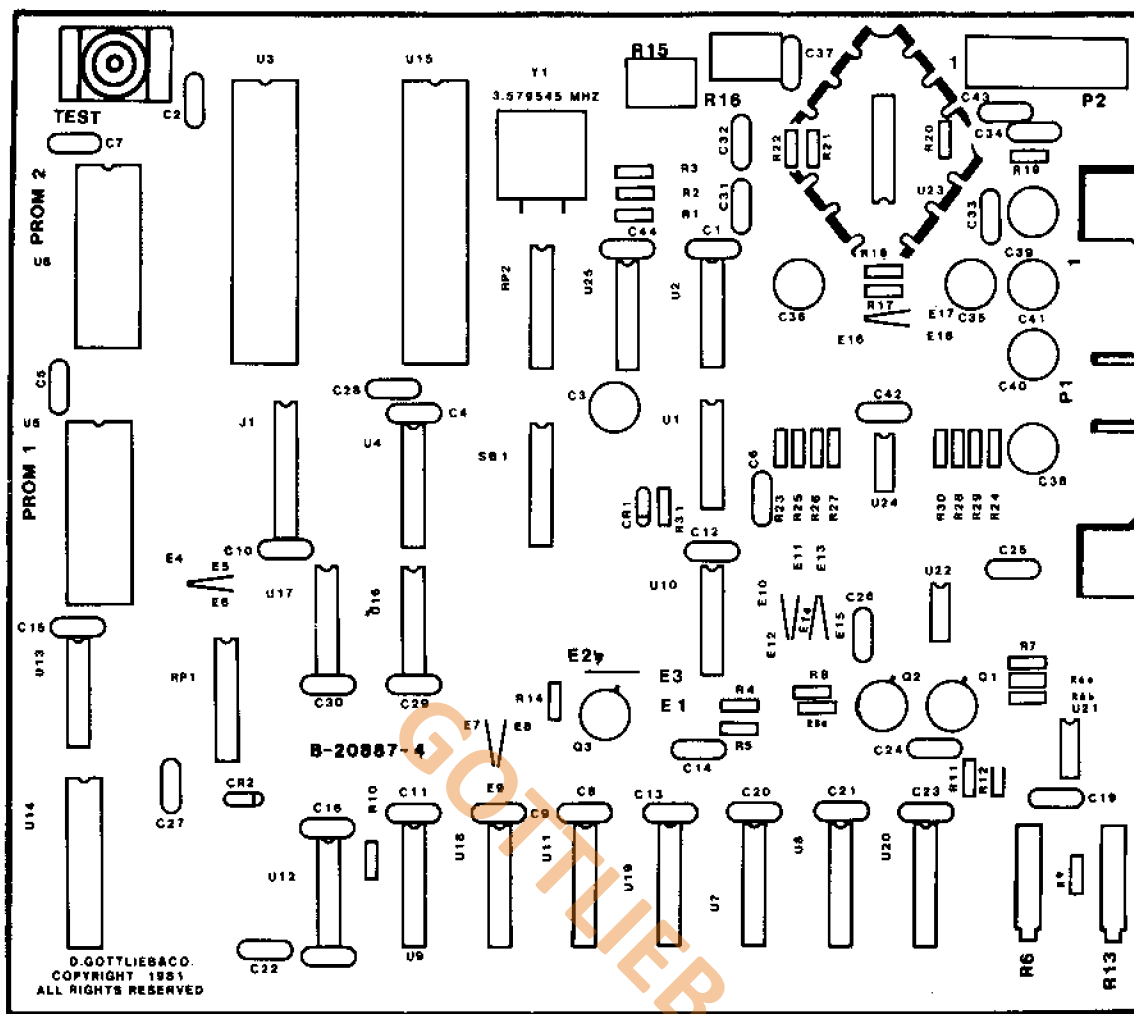


NOTE: UNLESS OTHERWISE INDICATED;
 1. RESISTORS ARE 1000 OHM, $\pm 5\%$, 1/4W.
 2. CAPACITORS ARE .01UF, $\pm 20\%$, 50V.
 3. INTEGRATED CIRCUITS ARE SN74175N.
 4. JUMPER WIRES REPLACED DIODES CR2, CR3 AND CR4 FOR SYSTEM 80A GAMES.
 5. TRANSISTOR TYPES MPS-U45 AND NDS-U45 ARE INTERCHANGEABLE.



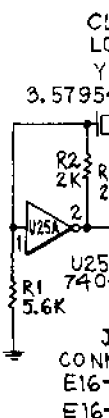
X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS

SOUND/SPEECH BOARD (A6) COMPONENT LOCATION

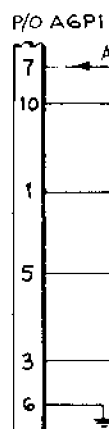


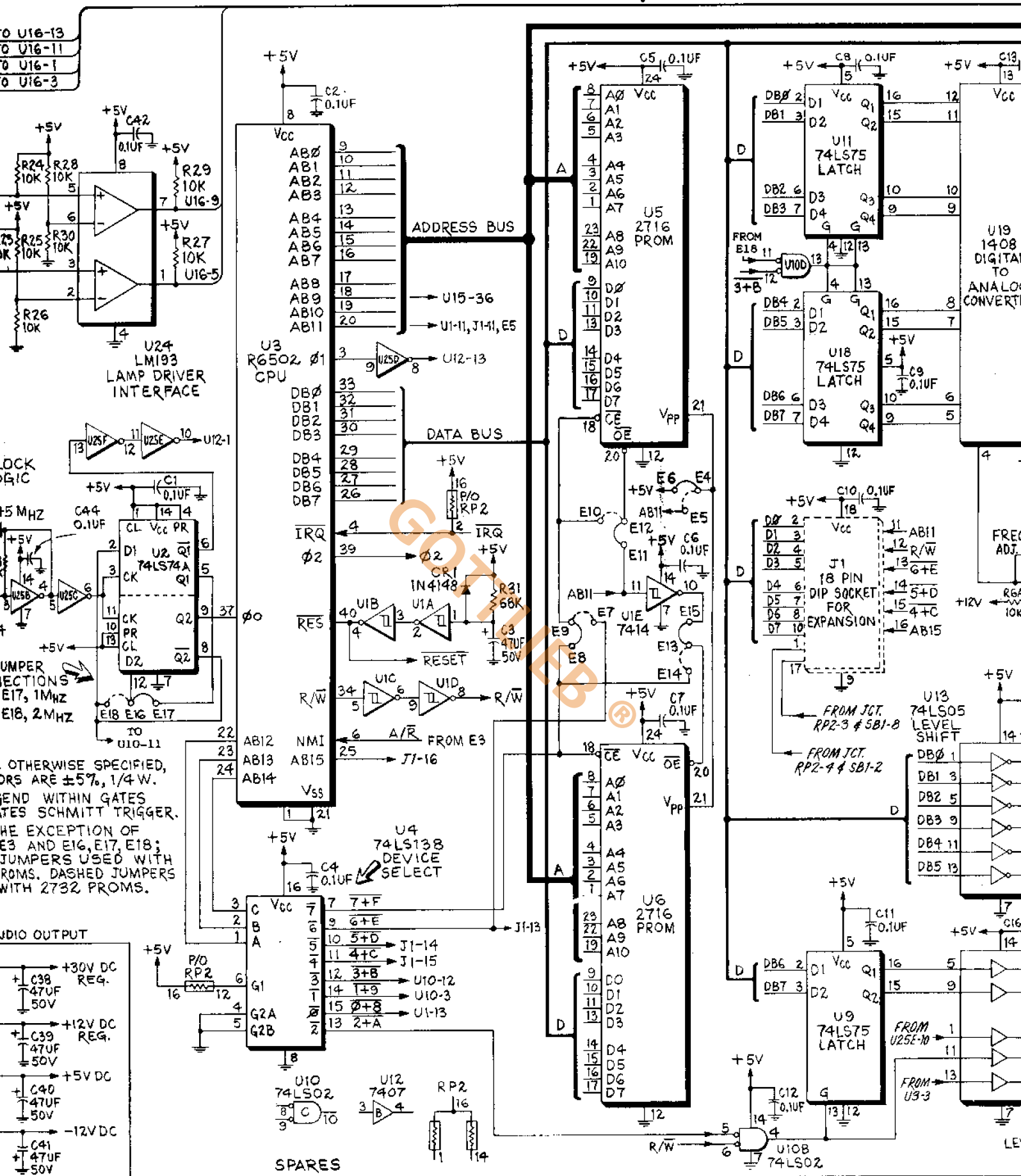
SOUND/SPEECH BOARD (A6) PARTS LIST

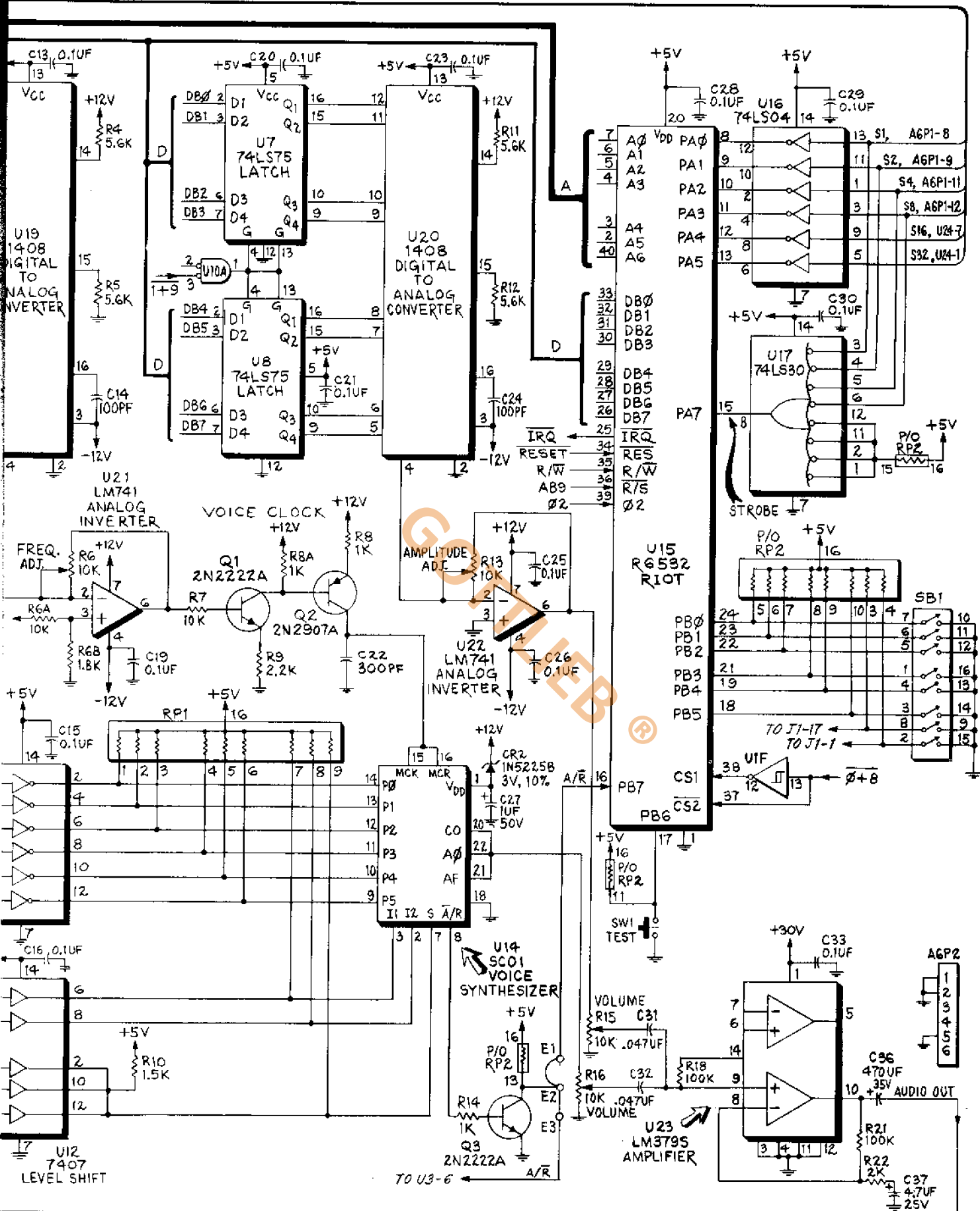
REFERENCE	DESCRIPTION	PART NUMBER	REFERENCE	DESCRIPTION	PART NUMBER
C1, C2, C4-C13, C15, C16, C19, C20, C21, C23, C25, C26, C28-C30, C33, C42, C44, C31-C32, C37, C3, C38-C41, C14, C24, C22, C27, C36, CR1, CR2, Q1, Q3, Q2, R1, R4, R5, R11, R12, R2, R3, R6, R13, R6A, R7, R23-R30, R8, R8A, R14, R6B, R9, R10	Sound/Speech Assembly Capacitor, 0.1uF, 25V Capacitor, .047uF, 25V Capacitor, 4.7uF, 35V Capacitor, 47uF, 50V Capacitor, 100PF Capacitor, 300PF Capacitor, 1uF, 50V Capacitor, 470uF, 35V Diode, 1N4148 Diode, Zener, 1N5225B Transistor, NPN, 2N2222A Transistor, PNP, 2N2907A Resistor, 5.6K ohm, 5%, 1/4W Resistor, 2K ohm, 5%, 1/4W Potentiometer, 10K Resistor, 10K ohm, 5%, 1/4W Resistor, 1K ohm, 5%, 1/4W Resistor, 1.8K ohm, 5%, 1/4W Resistor, 2.2K ohm, 5%, 1/4W Resistor, 1.5K ohm, 5%, 1/4W	MA-216 XO-248 XO-222 XO-291 XO-210 XO-223 XO-283 XO-217 XO-284 XO-261 XO-269 XO-320 XO-321 XO-19 XO-14 XO-108 XO-18 XO-5 XO-37 XO-27 XO-20	R15, R16, R18, R21, R22, R31, RP1, RP2, SB1, SW1, U1, U2, U3, U4, U5, U6, U7-U9, U11, U18, U10, U12, U13, U14, U15, U16, U17, U19, U20, U21, U22, U23, U24, U25, Y1	Potentiometer, 10K ohm Resistor, 100K ohm, 5%, 1/4W Resistor, 2K ohm 5%, 1/4W Resistor, 3.3K ohm, 5%, 1/4W Resistor, Dip Switch, Dip Switch, Momentary Pushbutton IC, 7414 IC, SN74LS74N CPU, R6502-13 IC, SN74LS138N EPROM, 2716 IC, SN74LS75 IC, SN74LS02N IC, SN7407N IC, Inverter, SN74LS05N Voice Chip, SC01 RR10T, R6532-18 IC, SN74LS04N IC, SN74LS30N Converter, PMI, 1408A-6P IC, LM741CP IC, LM379S IC, Dual Comparitor, LM193 Inverter, 7404 Crystal, 3.579545MHZ Socket 22 Pin Dip Socket 24 Pin (2) Socket 40 Pin (2)	XO-109 XO-45 XO-14 XO-38 XO-168 XO-505 XO-515 XO-397 XO-434 XO-360 XO-437 PR-53 XO-394 XO-428 XO-384 XO-411 XO-468 XO-361 XO-418 XO-432 XO-416 XO-393 XO-395 XO-396 XO-402 XO-456 XO-467 XO-529 XO-530



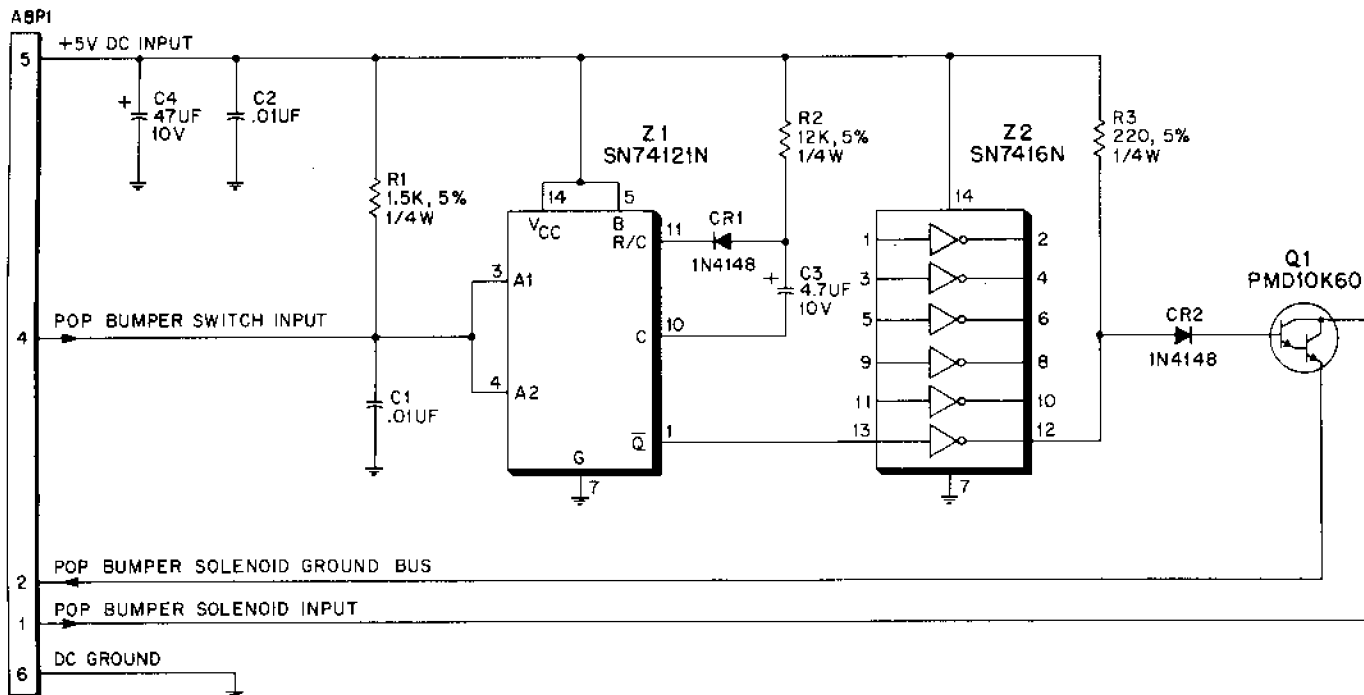
NOTES:
1. UNLESS INDICATED
2. U LEAD INDICATED
3. WITH T
E1, E2, E16, E16





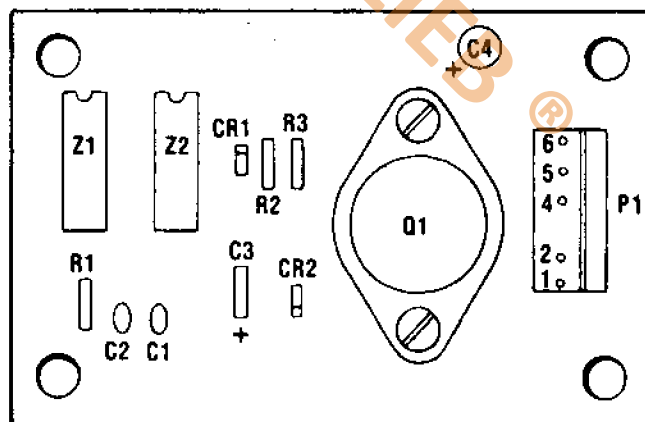


X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS



D. GOTTLIEB & CO.			
TITLE POP BUMPER DRIVER BOARD (A8)			
USED ON			
DESIGNED BY	APPROVED BY	DATE	D-20923
8/22/81	3/8/81	2-9-81	

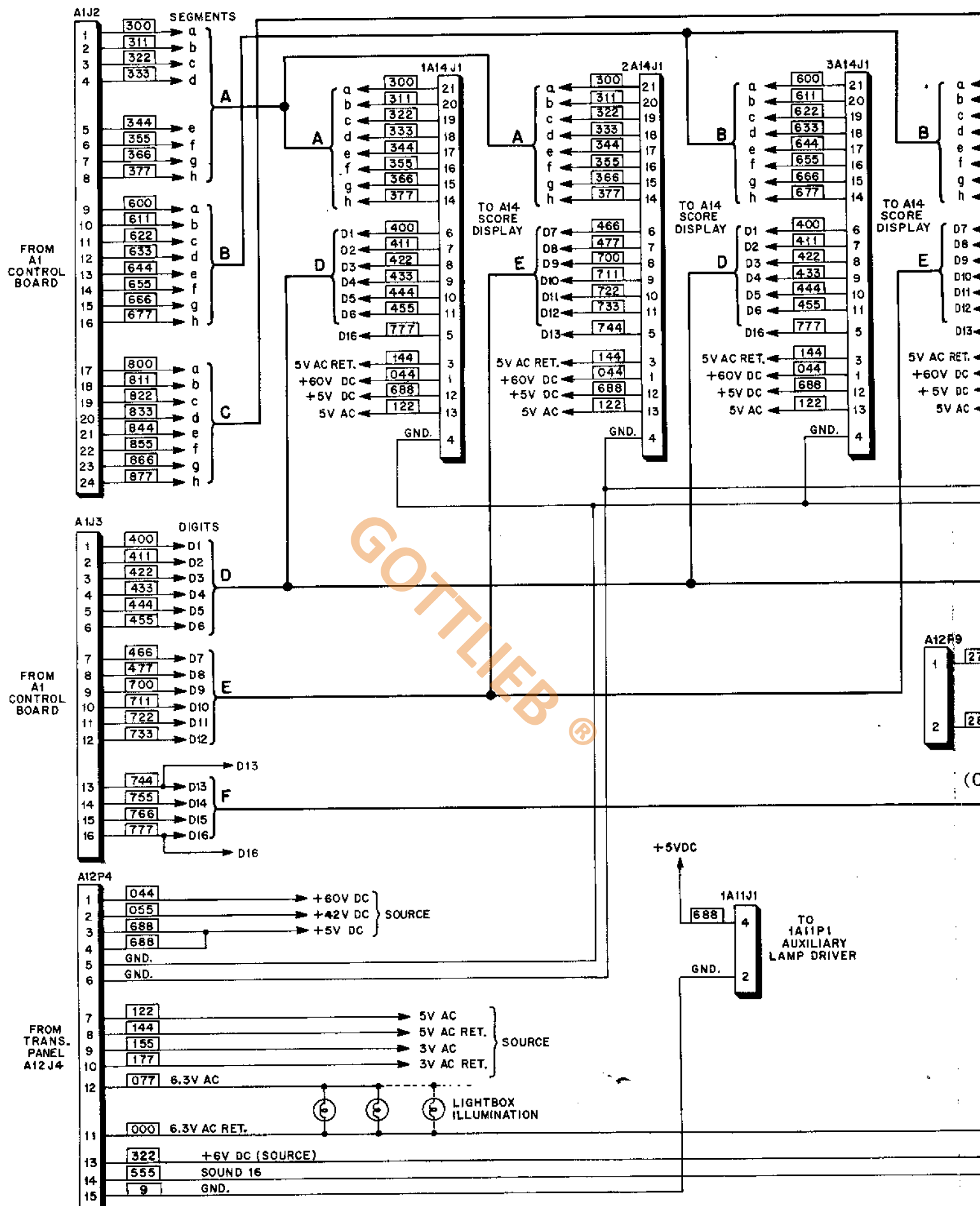
POP BUMPER DRIVER BOARD (A8) COMPONENT LOCATION

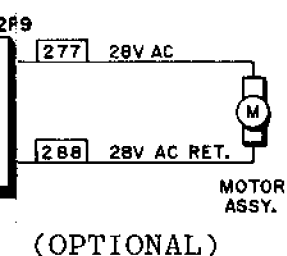
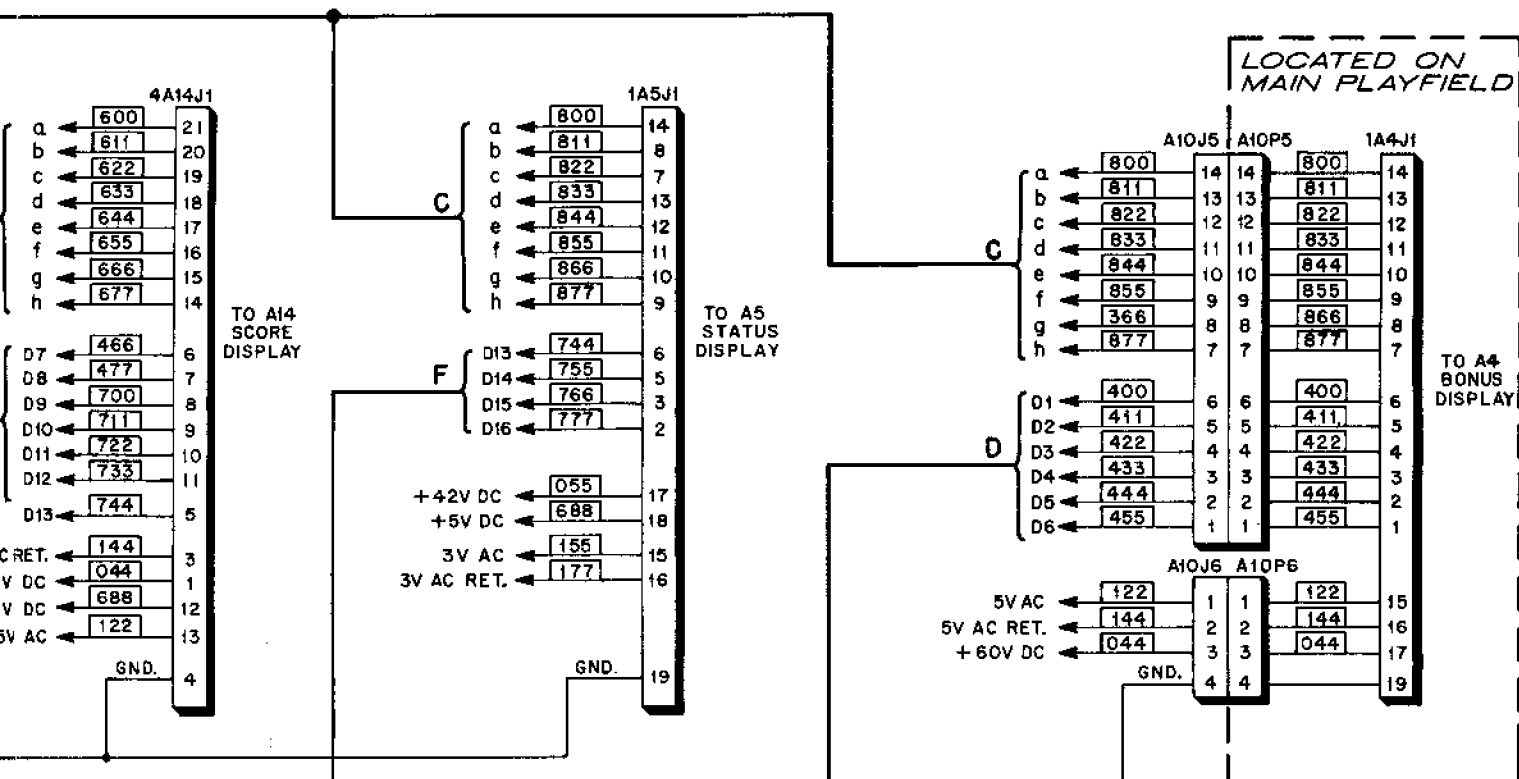


POP BUMPER DRIVER BOARD (A8) PARTS LIST

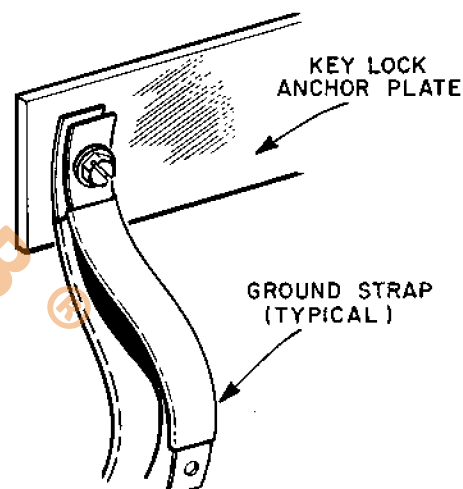
REFERENCE	DESCRIPTION	PART NUMBER
C1, C2	Capacitor, .01 mfd., 100V	XO-202
C3	Capacitor, 4.7 mfd., 10%, 10V, Tantalum, Axial	XO-226
C4	Capacitor, 47 mfd., 10V	XO-227
CR1, CR2	Diode 1N4148	XO-261
P1	Connector 09-65-1061	XO-502
R1	Resistor, 1.5K ohm, 5%, 1/4W	XO-20
R2	Resistor, 12K ohm, 5%, 1/4W	XO-9
R3	Resistor, 220 ohm, 5%, 1/4W	XO-21
Q1	Transistor-Lambda PMD10K60	XO-311X
Z1	IC SN74121N	XO-417X
Z2	IC SN7416N	XO-405X

X. WIRING AND SCHEMATIC



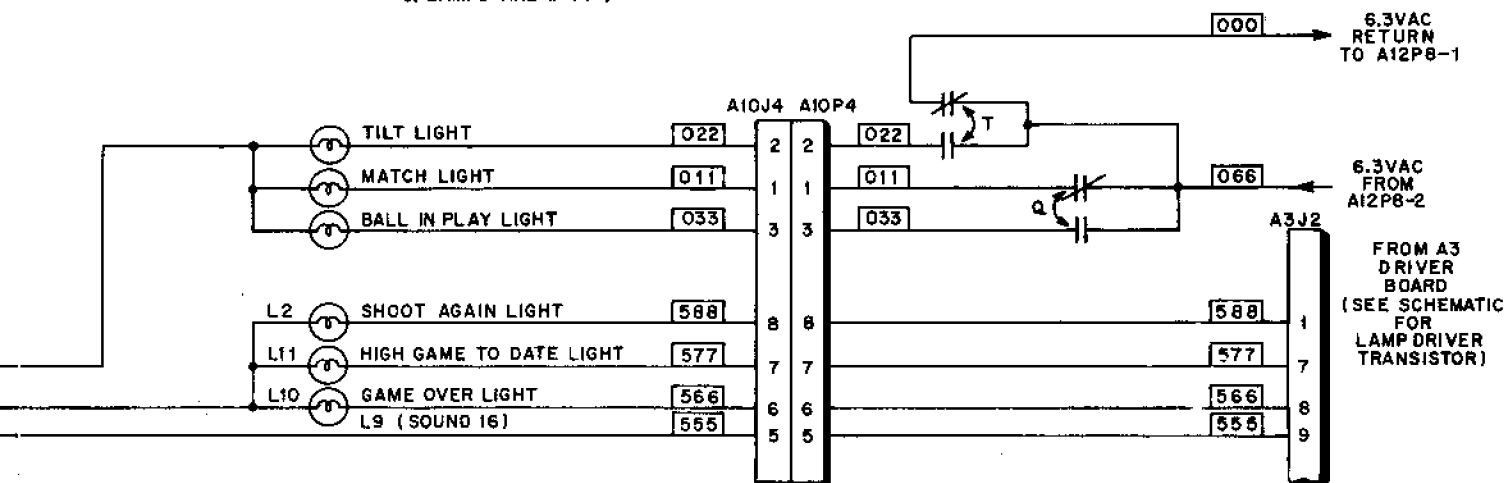


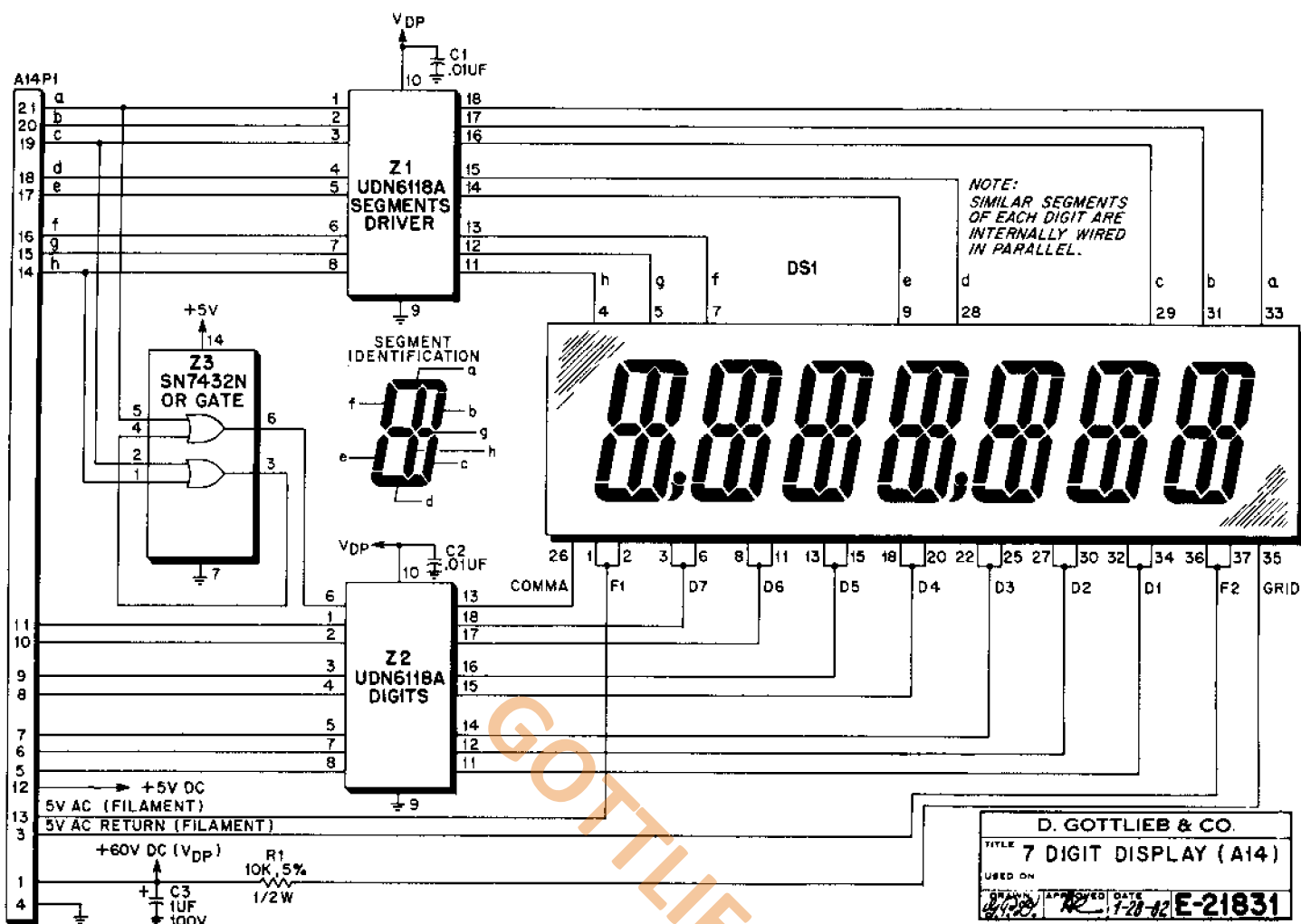
COLOR CODE			
0	BLACK	5	GREEN
1	BROWN	6	BLUE
2	RED	7	PURPLE
3	ORANGE	8	SLATE
4	YELLOW	9	WHITE



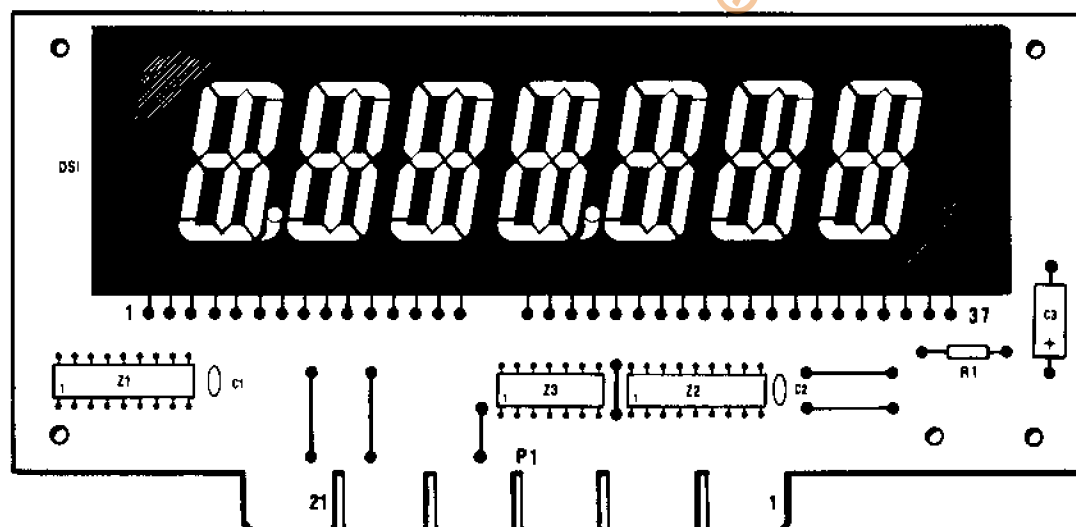
NOTE:

1. [XXX] INDICATES WIRE COLOR.
2. UNMARKED GND WIRE IS #522, 22GA.
3. LAMPS ARE #44.





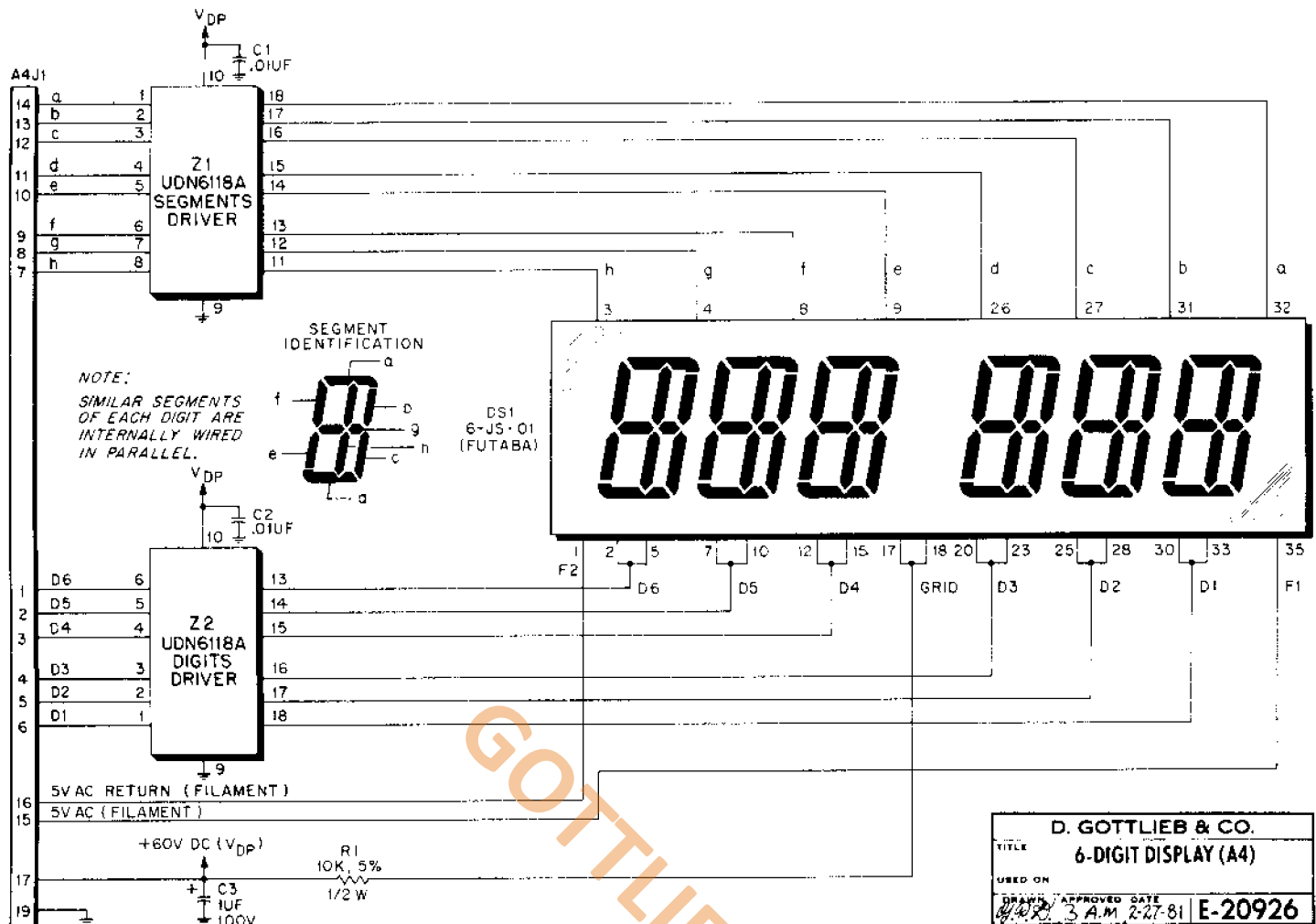
7-DIGIT DISPLAY (A14) COMPONENT LOCATION



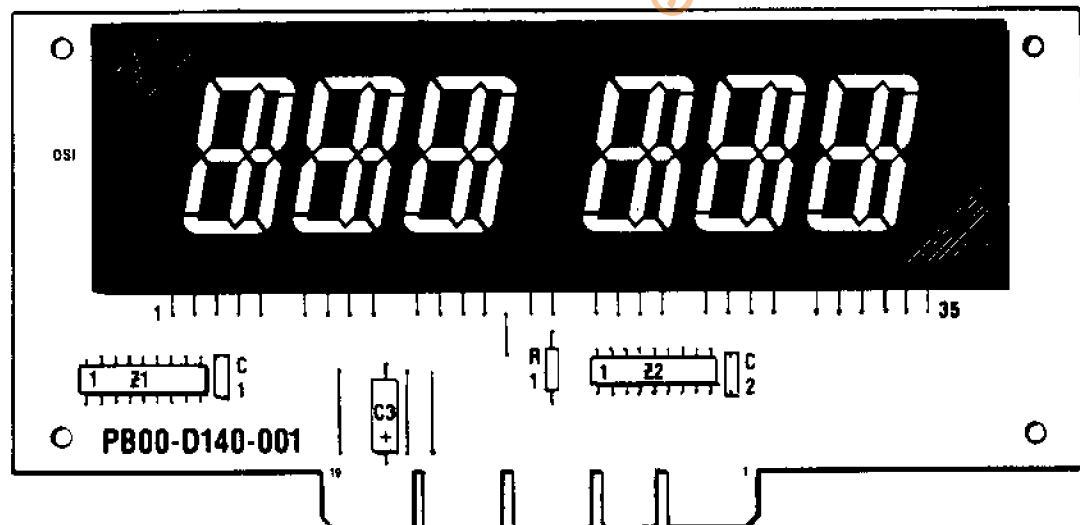
7-DIGIT DISPLAY (A14) PARTS LIST

REFERENCE	DESCRIPTION	PART NUMBER
C1, C2	Capacitor .01 mfd. 100V Kemet	XO-202
C3	Capacitor 1 mfd 100V Sprague	XO-206
DS1	7 Digit Display Tube - FUJABA	XO-477
R1	Resistor, 10K Ohm, 5%, 1/2W	XO-62
Z1, Z2	IC-Fluorescent Display Driver-Sprague	XO-415
Z3	IC Quad or Gate	XO-407

X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS

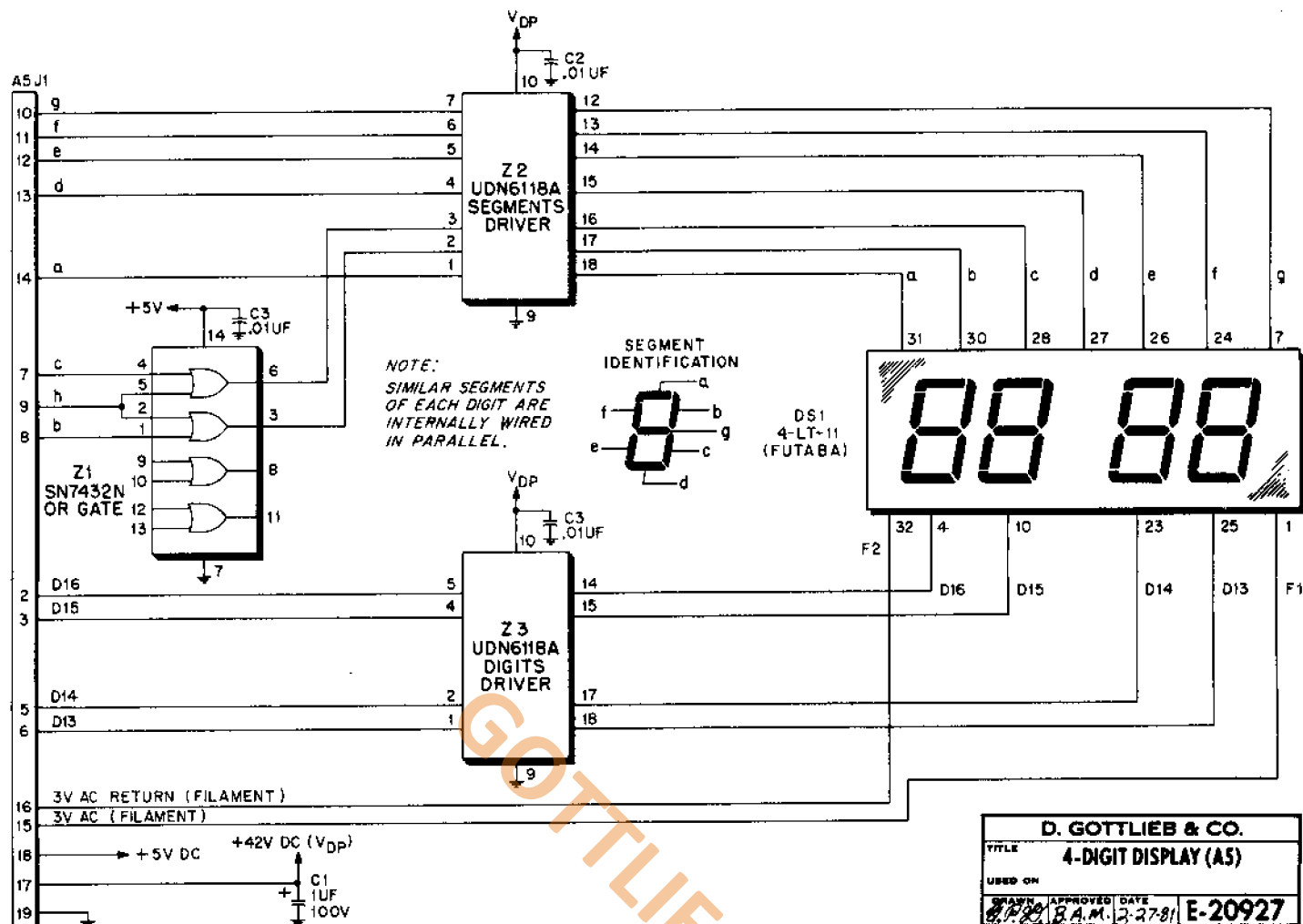


6-DIGIT DISPLAY (A4) COMPONENT LOCATION

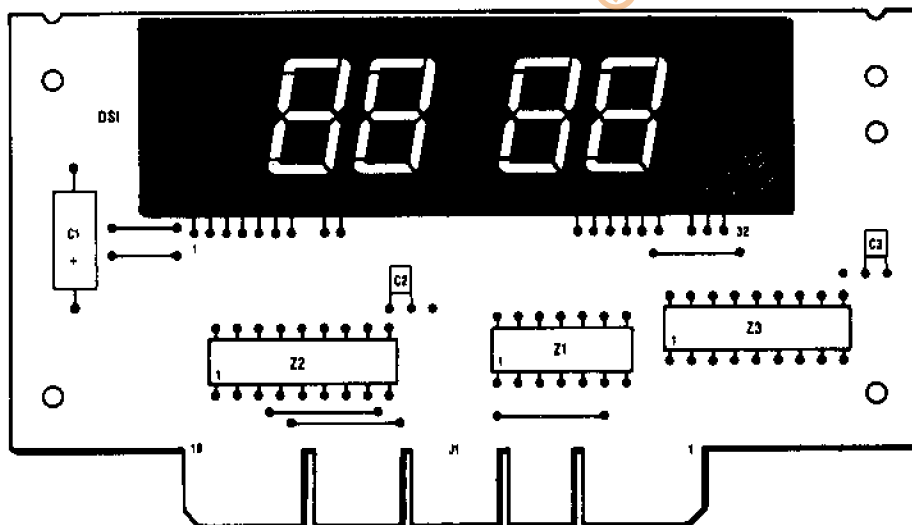


6-DIGIT DISPLAY (A4) PARTS LIST

REFERENCE	DESCRIPTION	PART NUMBER
C1, C2	Capacitor, .01 mfd., 100V Kemet C320C103MIR5CA	XO-202
C3	Capacitor, 1 mfd., 100V Sprague TE1400	XO-206
DS1	6-Digit Display Tube—Futaba 6-JS-01	XO-454X
R1	Resistor, 10K ohm, 5% RC20GFI03	XO-18
Z1, ZC	IC-Fluorescent Display Driver— Sprague	XO-415X

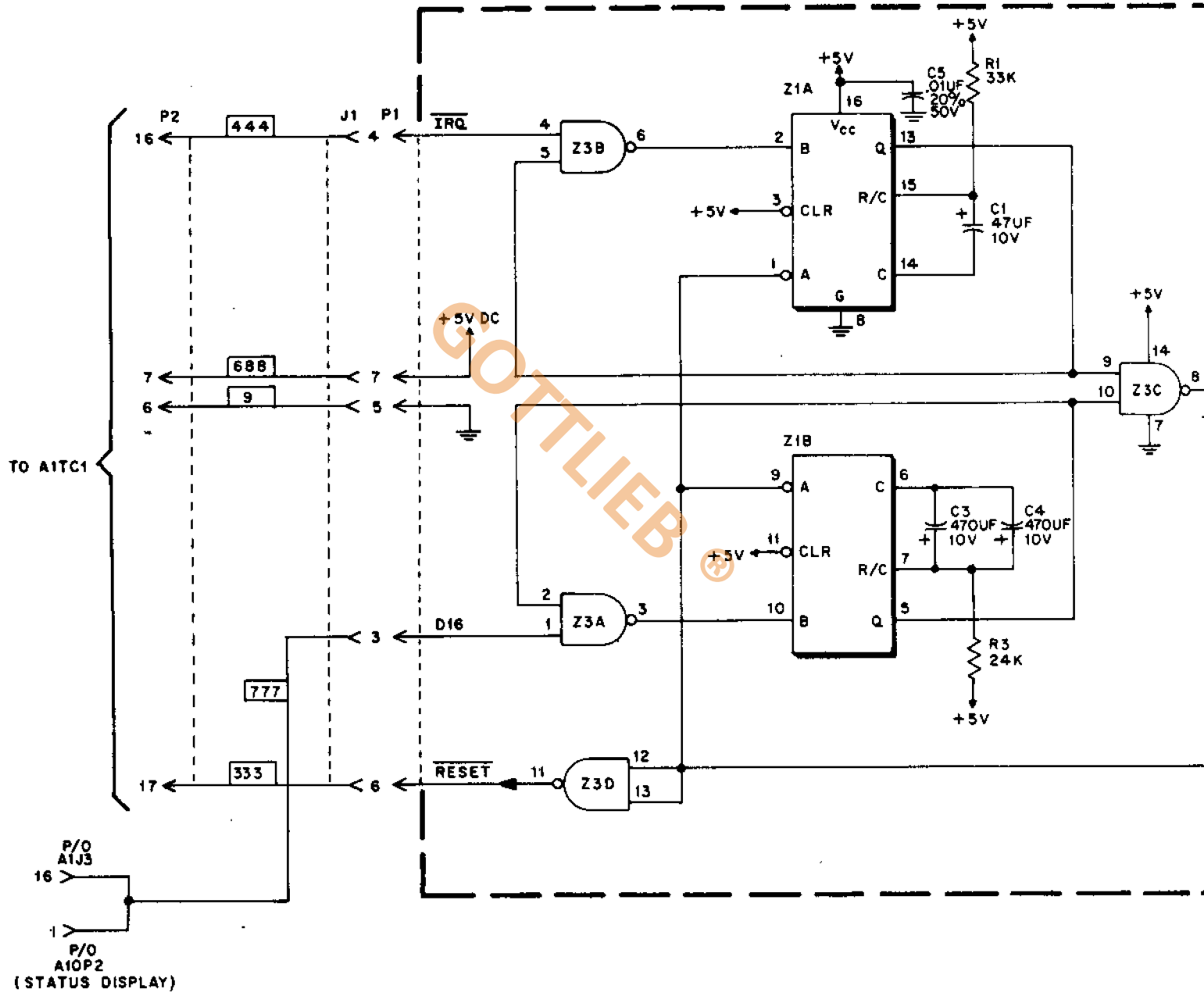


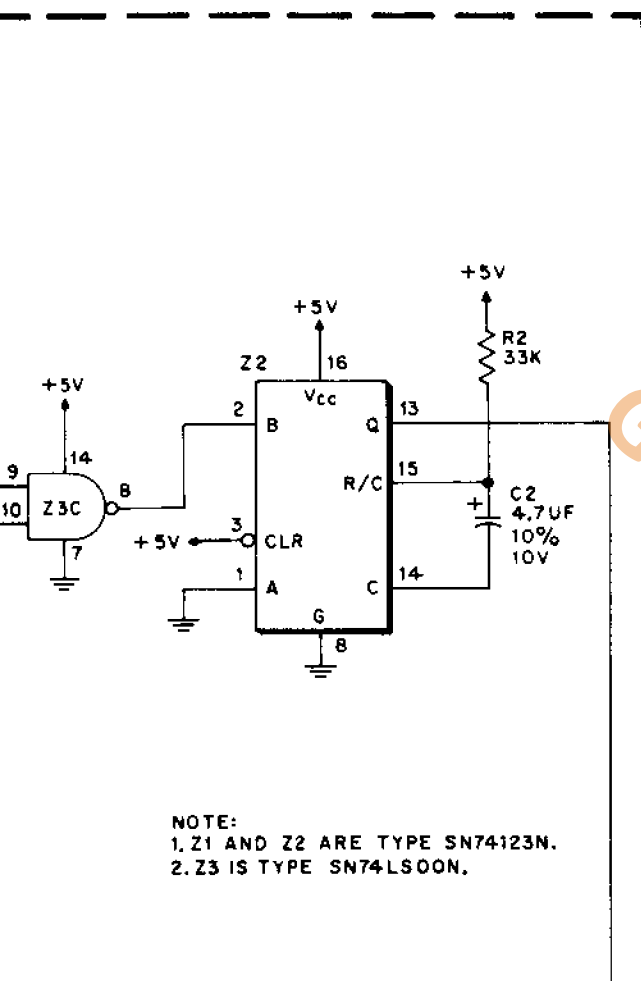
4-DIGIT DISPLAY (A5) COMPONENT LOCATION



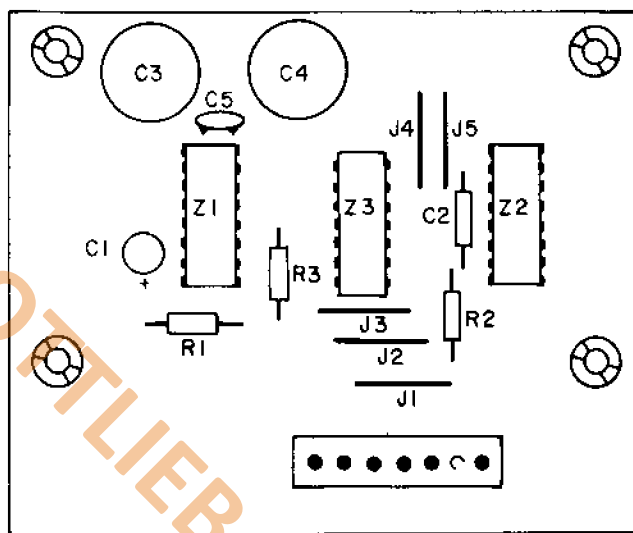
4-DIGIT DISPLAY (A5) PARTS LIST

REFERENCE	DESCRIPTION	PART NUMBER
C1	Capacitor, 1 mfd., 100V Sprague TE1400	XO-206
C2, C3	Capacitor, .01 mfd., 100V Kemet C320C103MIR5CA	XO-202
DS1	4-Digit Display Tube-Futaba 4-LT-11	XO-455X
Z1	IC-Quad or Gate—T.I. SN7432N	XO-407
Z2, Z3	IC-Fluorescent Display Driver— Sprague UD6118A	XO-415





RESET BOARD (A24) COMPONENT LOCATION

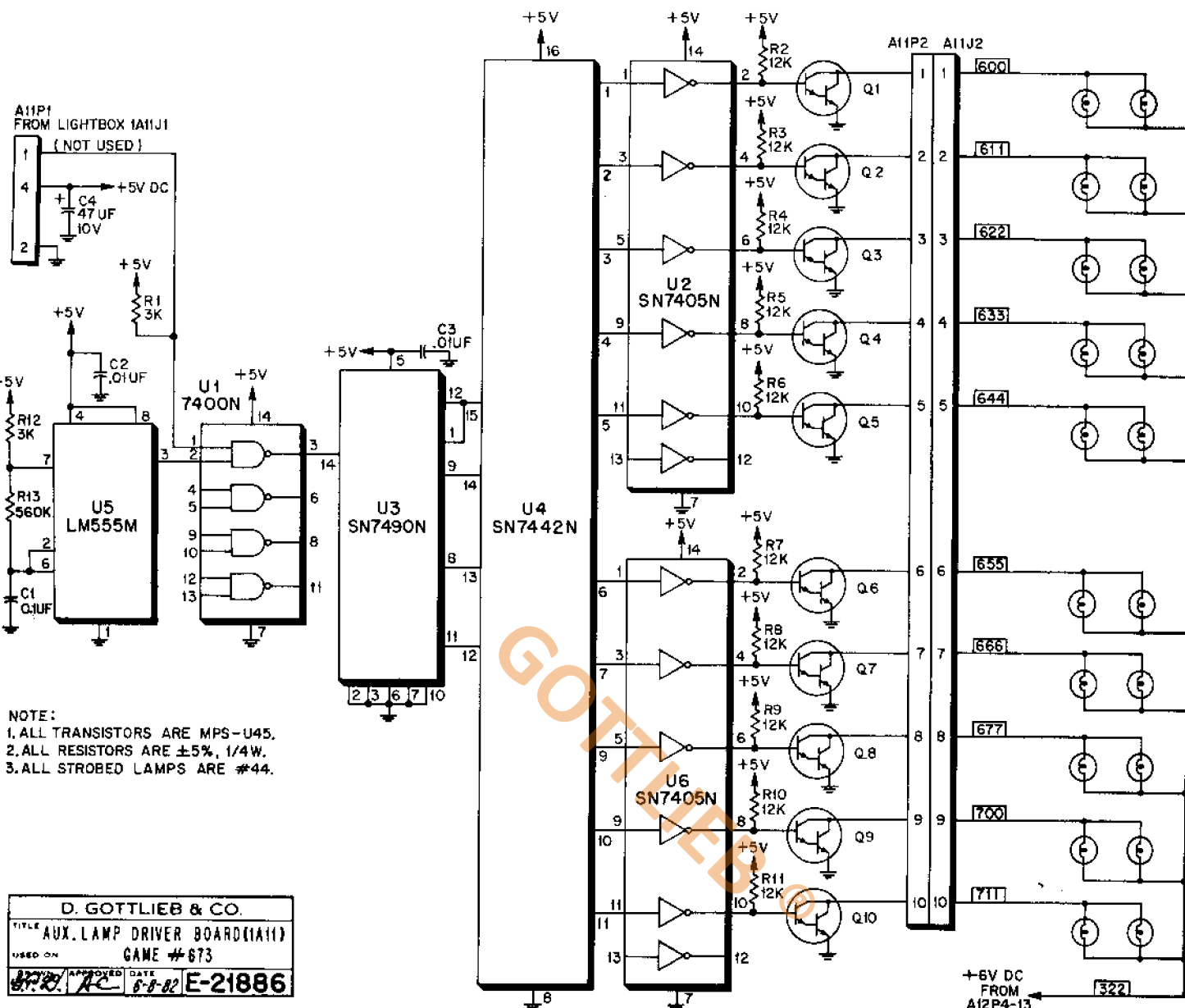


RESET BOARD (A24) PARTS LIST

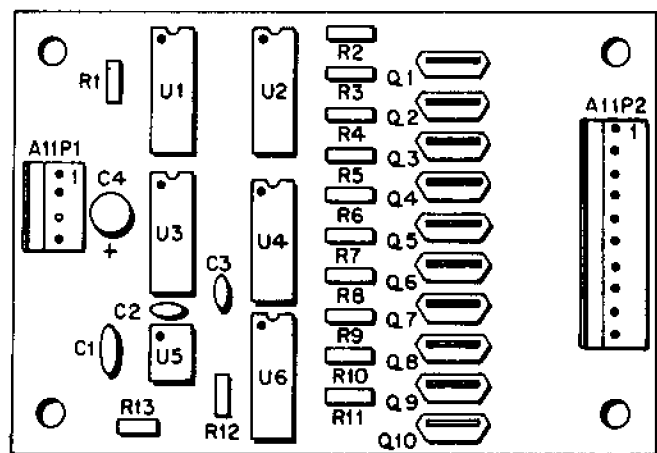
REFERENCE	DESCRIPTION	PART NUMBER
R1, R2	Resistor 33K ohm, 5%, 1/4W.	XO-43
R3	Resistor 24K ohm, 5%, 1/4W.	XO-10
C1	Capacitor 47 μ fd., 10V.	XO-227
C2	Capacitor 4.7 μ fd., 10V.	XO-226
C3, C4	Capacitor 470 μ fd., 16V	XO-214
C5	Capacitor .01 μ fd., 50V.	XO-229
Z1, Z2	IC 74123N	XO-398
Z3	IC 74LS00N	XO-427
	7 Pin Connector	XO-526

D. GOTTLIEB & CO.			
TITLE RESET CIRCUIT BOARD			
USED ON			
DRAWN BAC	APPROVED BAM	DATE 4-2-81	C-21063

X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS



AUXILIARY LAMP DRIVER BOARD (A11) COMPONENT LOCATION



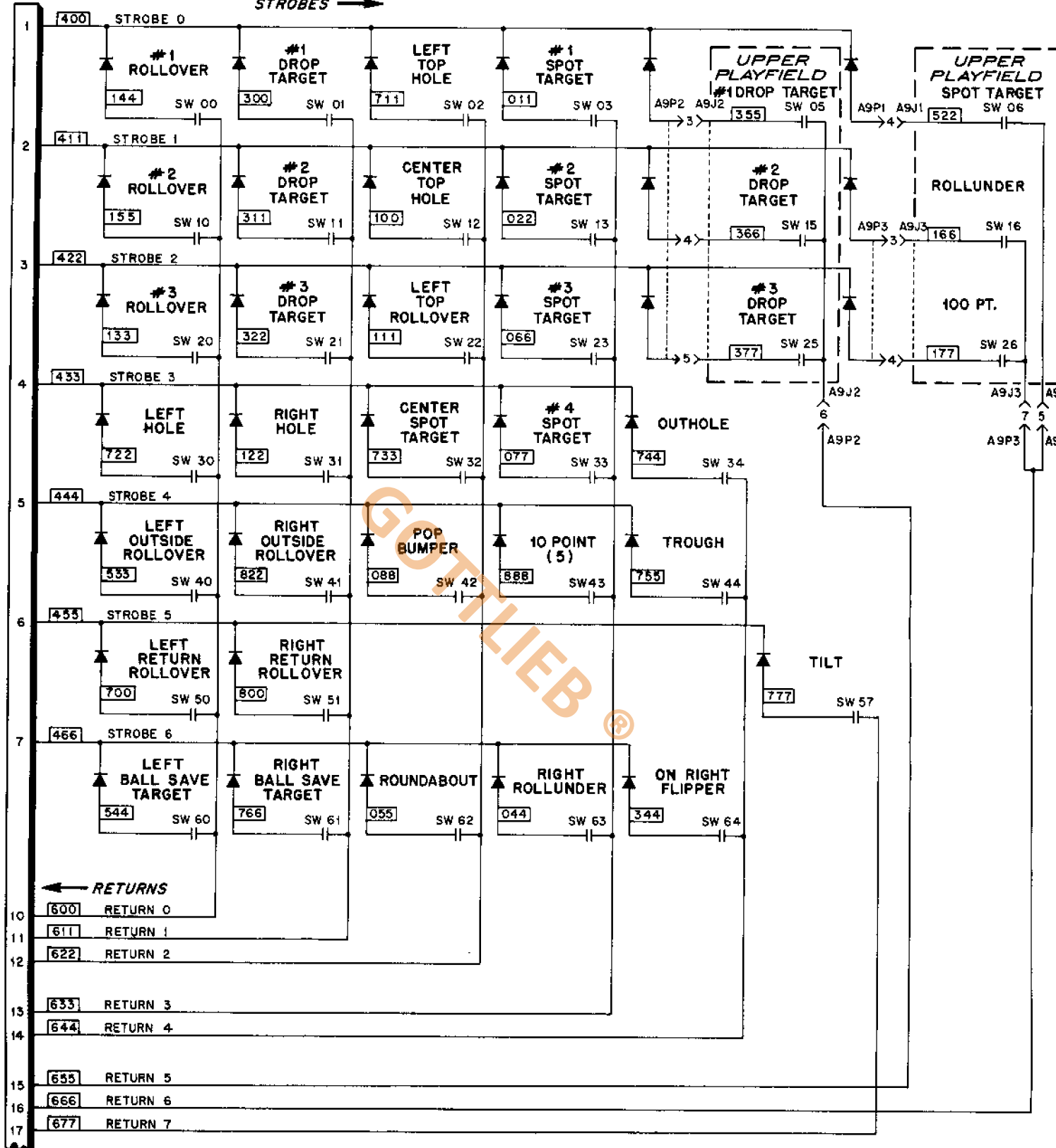
AUXILIARY LAMP DRIVER BOARD (A11) PARTS LIST

REFERENCE	DESCRIPTION	PART NUMBER
C1	Capacitor, 1 MFD, 100V, 20% Ceramic Radial Lead	XO-626
C2-C3	Capacitor, .01 MFD, 100V, 20% Ceramic	XO-202
C4	Capacitor, 47 MFD, 10V Electrolytic Radial Lead	XO-227
Q1-Q10	Transistor, NPN Darlington MPS-U45	XO-306X
R1, R12	Resistor, 3K ohm, 5%, 1/4W	XO-23
R2-R11	Resistor, 12K ohm, 5%, 1/4W	XO-9
R13	VALUE WILL VARY WITH EACH GAME.	
U1	IC 2-Input "Nand" SN7400N	XO-420
U2, U6	IC Inverter SN7405N	XO-403
U3	IC Decade Counter SN7490N	XO-425
U4	IC Decoder SN7442N	XO-426
U5	IC Timer LM555N	XO-631
P2	10 Pin Connector	XO-531
P1	4 Pin Square Connector	XO-532

X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS

A1J6 (FROM A1 CONTROL BOARD)

STROBES →



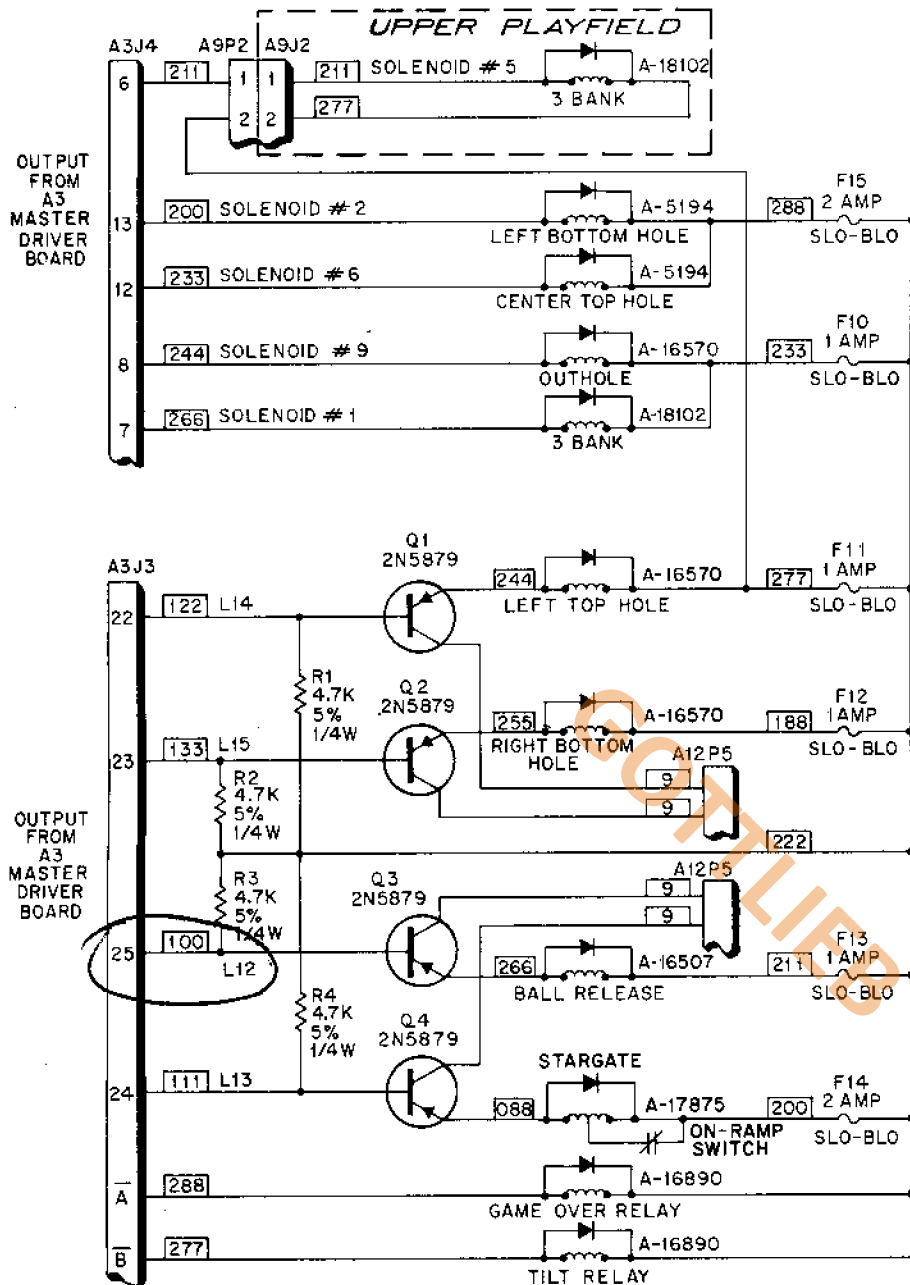
NOTE:
1. ALL DIODES ARE 1N270.
2. STROBE 7 NOT USED.

COLOR CODE			
0	BLACK	5	GREEN
1	BROWN	6	BLUE
2	RED	7	PURPLE
3	ORANGE	8	SLATE
4	YELLOW	9	WHITE

D. GOTT LIEB & CO.			
TITLE	SWITCH MATRIX		
USED ON	GAME #873		
DATE	APPROVED DATE	E-21907	

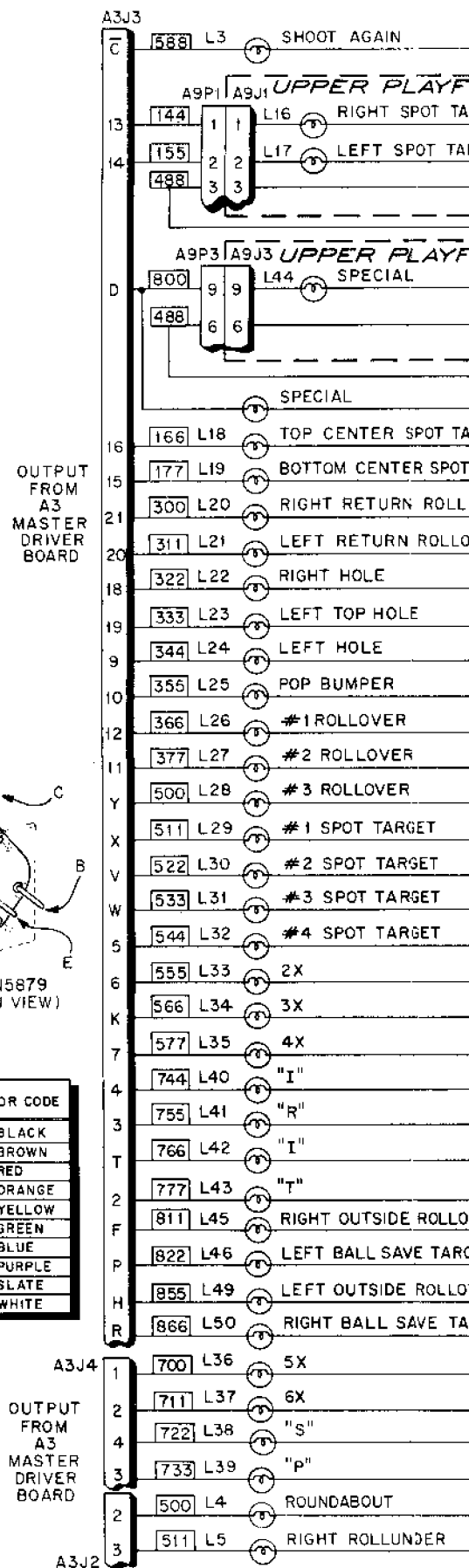
X. WIRING AND SCHEMATIC D

PLAYFIELDS "CONTROLLED" SOLENOIDS AND ILLUMINATION



NOTE:

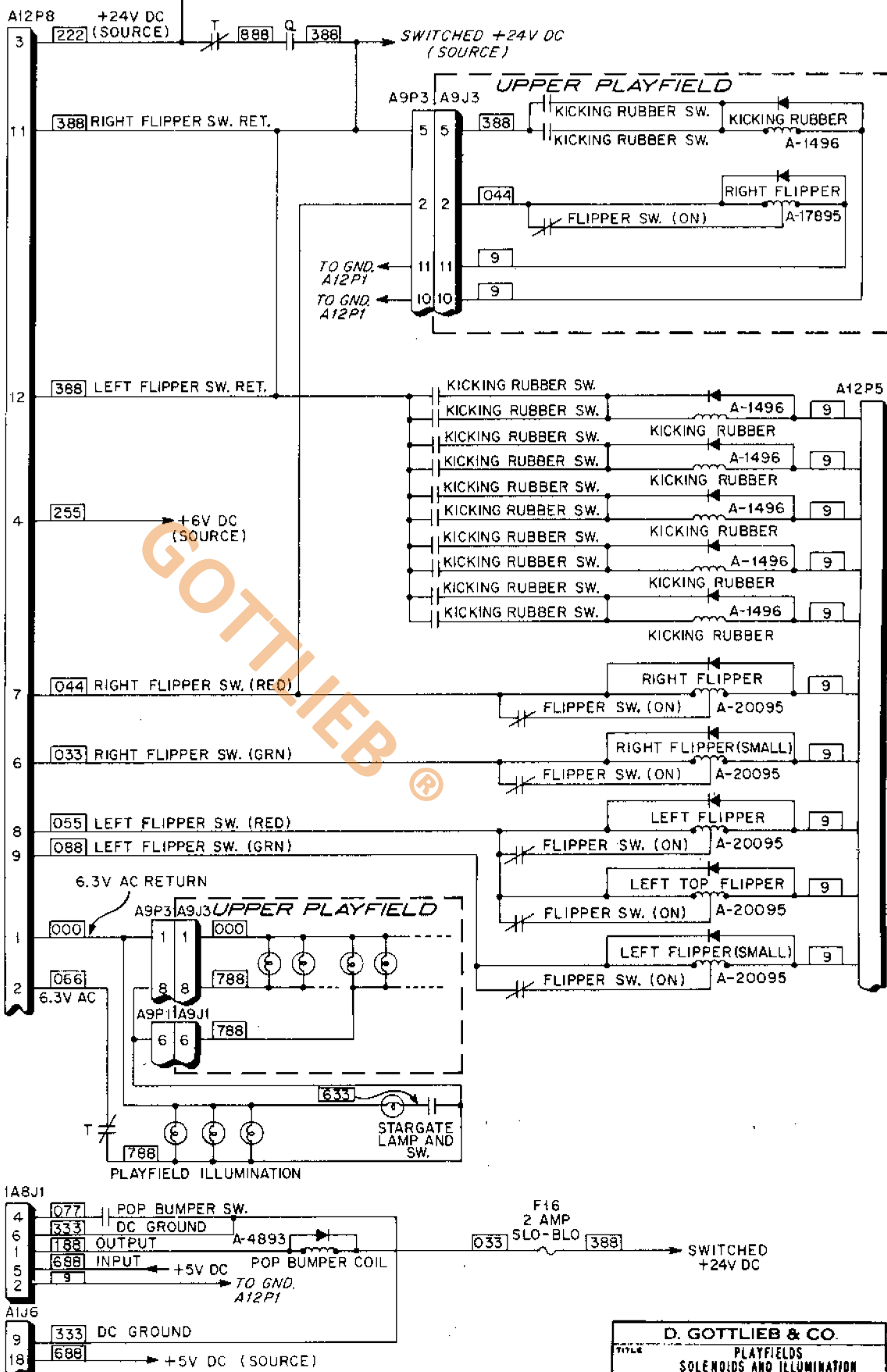
1. ALL DIODES ARE 1N4004.
2. LAMPS L32 THRU L43 ARE DRIVEN BY MPS-A13'S. ALL OTHER LAMPS ARE DRIVEN BY MPS-U45'S.
3. UNLESS OTHERWISE SPECIFIED; ALL LAMPS ARE #44. GROUND WIRE COLOR IS .9, 18GA.
4. XXX INDICATES WIRE COLOR.



PLAYFIELD "NON-CONTROLLED" SOLENOIDS AND ILLUMINATION

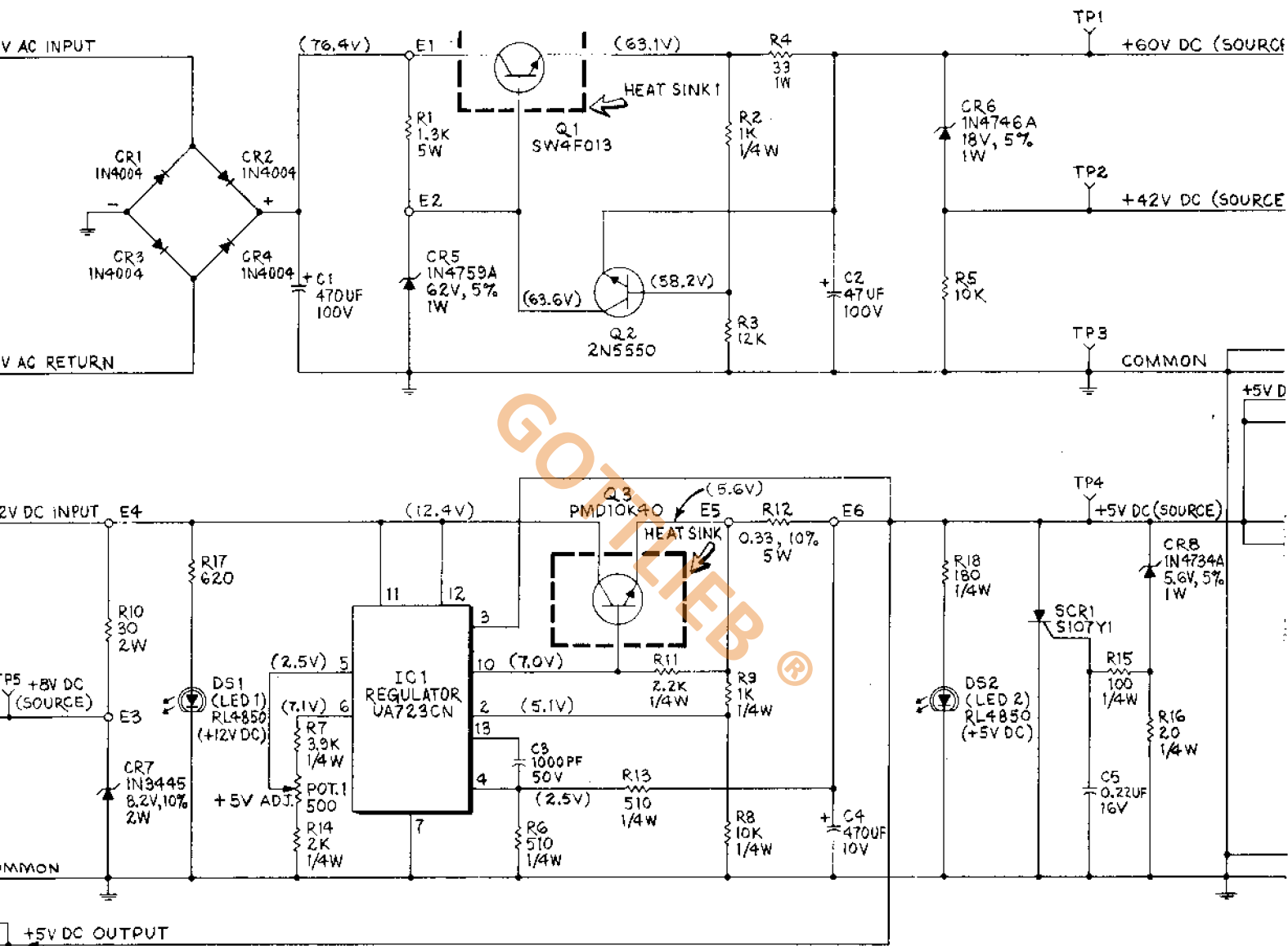
- T AGAIN
- RIGHT SPOT TARGET
- LEFT SPOT TARGET
- SPECIAL
- CENTER SPOT TARGET
- RETURN ROLLOVER
- RETURN ROLLOVER
- HOLE
- TOP HOLE
- HOLE
- UMPER
- OLLOVER
- OLLOVER
- POT TARGET
- POT TARGET
- POT TARGET
- POT TARGET
- OUTSIDE ROLLOVER
- BALL SAVE TARGET
- OUTSIDE ROLLOVER
- BALL SAVE TARGET
- ABOUT
- ROLLUNDER

OUTPUT FROM
BOTTOM
BOARD
A12J8



D. GOTTLIEB & CO.			
TITLE	PLAYFIELDS		
USED ON	SOLENOIDS AND ILLUMINATION		
DATE	GAME # 673		
APPROVED	DATE	E-21936	

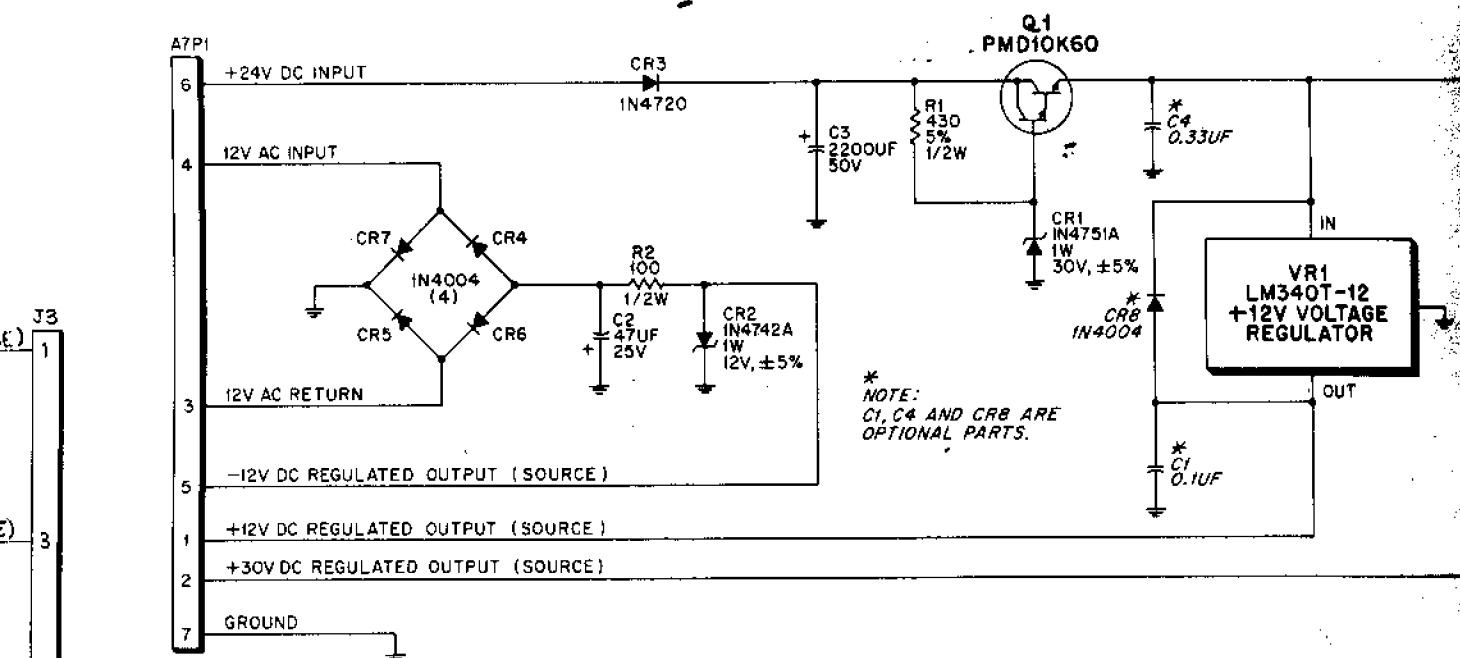
ATIC DIAGRAMS, PARTS LISTS



NOTE: UNLESS OTHERWISE SPECIFIED,
 1. RESISTORS ARE $\pm 5\%$, 1/2W.
 2. VOLTAGES ARE DC WITH RESPECT TO CIRCUIT GROUND.
 3. ALL VOLTAGES ARE AT NOMINAL LINE VOLTAGE (115V AC).

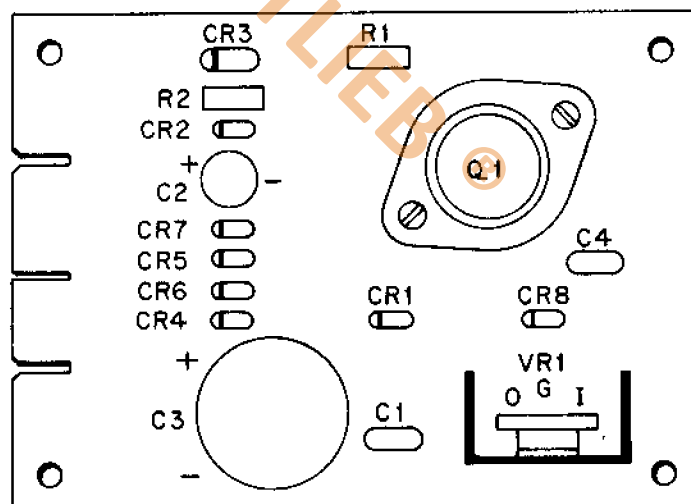
D. GOTTLIEB & CO.			
TITLE			
POWER SUPPLY (A2)			
USED ON			
DRAWN	APPROVED	DATE	E-209
BAM	BAM	2-3-81	

X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS



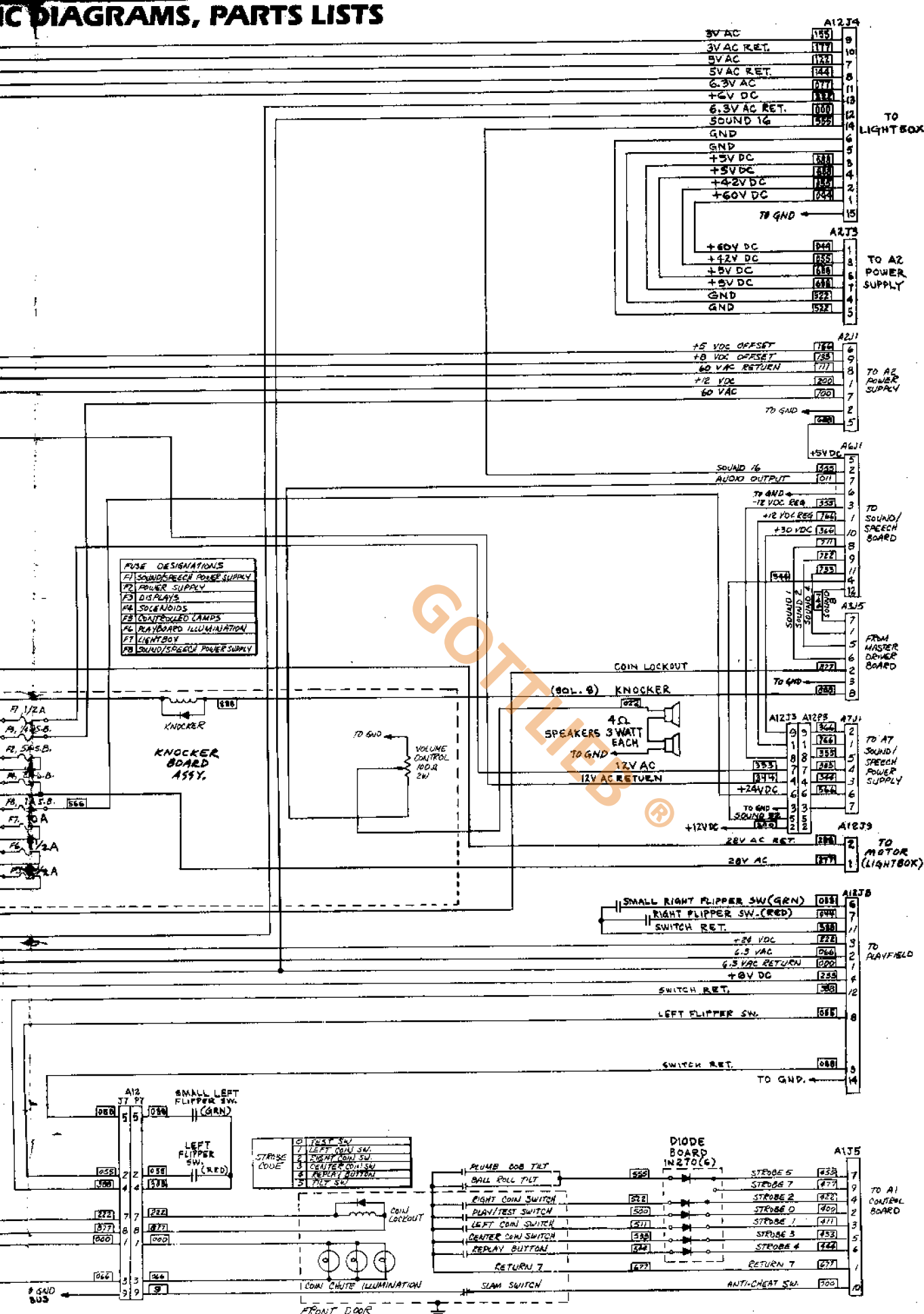
D. GOTTLIEB & CO.		
TITLE	SOUND/SPEECH BOARD POWER SUPPLY AT	
USED ON		
APPROVED DATE	8-5-81	D-21343

SOUND/SPEECH POWER SUPPLY (A7) COMPONENT LOCATION

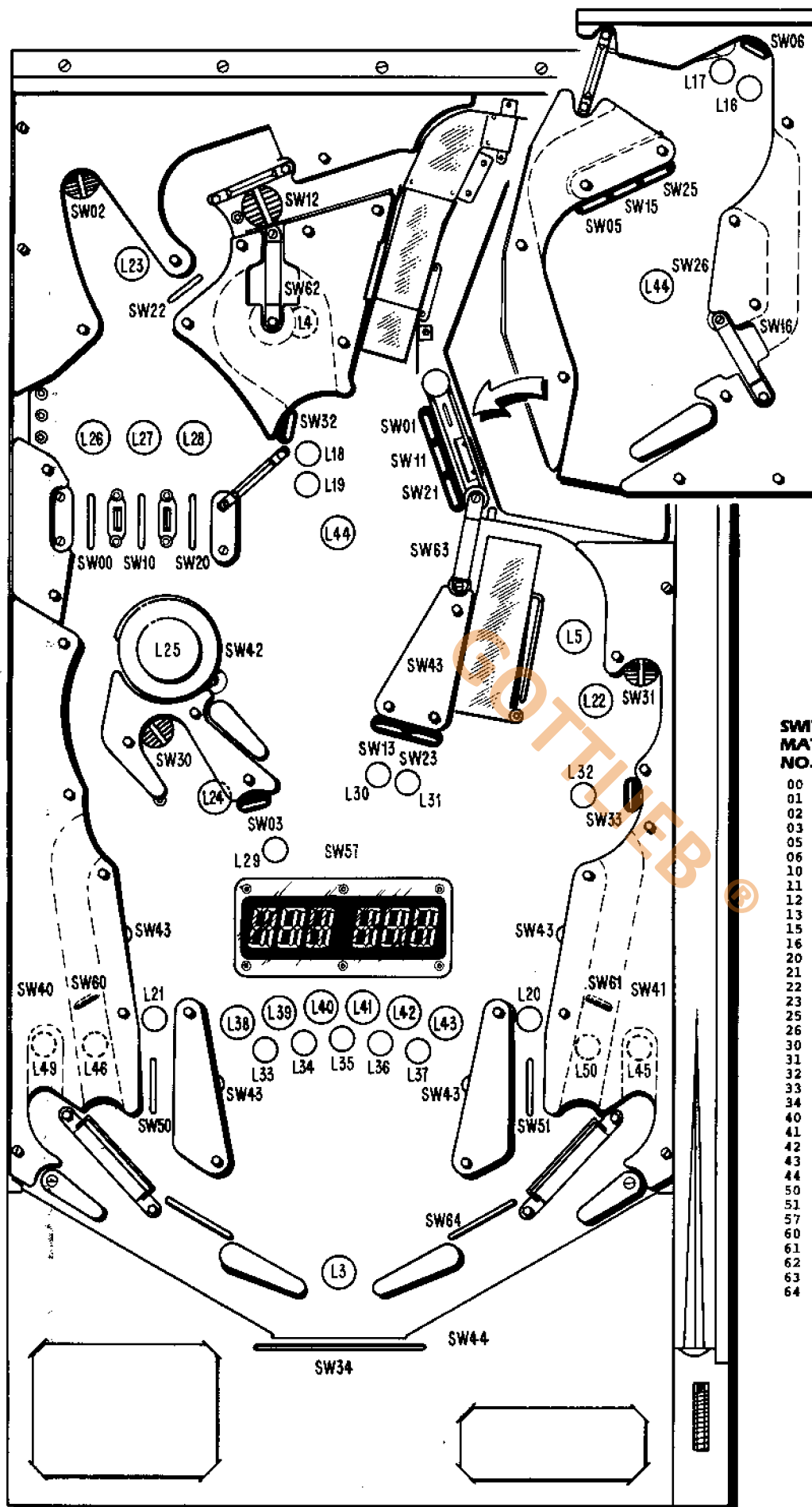


SOUND/SPEECH POWER SUPPLY (A7) PARTS LIST

REFERENCE	DESCRIPTION	PART NO.
C1	Capacitor 0.1UF, 50V	XO-230
C2	Capacitor 47UF, 25V	XO-219
C3	Capacitor 2200 UF, 50V	XO-290
C4	Capacitor 0.33 UF	XO-250
CR1	Diode, Zener 30V, 5%, 1W IN4751A	XO-271
CR2	Diode, Zener 12V, 5%, 1W IN4742A	XO-257
CR3	Diode IN4720	XO-260
CR4, CR5, CR6, CR7, CR8	Diode IN4004	XO-254
R1	Resistor 430 ohm, 5%, 1/2 Watt	XO-54
R2	Resistor 100 ohm, 5%, 1/2 Watt	XO-52
Q1	Transistor, Darlington Pair PMD10K60	XO-311
VR1	+12 Volt Voltage Regulator LM 340T-12	XO-473



X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS



PLAYBOARD SWITCH AND LAMP ASSIGNMENTS

LAMP NO.	LAMP ASSIGNMENT
L3	Shoot Again
L4	Roundabout
L5	Right Rollunder
L16	Right Spot Target
L17	Left Spot Target
L18	Top Center Spot Target
L19	Bottom Center Spot Target
L20	Right Return Rollover
L21	Left Return Rollover
L22	Right Hole
L23	Left Top Hole
L24	Left Hole
L25	Pop Bumper
L26	#1 Rollover
L27	#2 Rollover
L28	#3 Rollover
L29	#1 Spot Target
L30	#2 Spot Target
L31	#3 Spot Target
L32	#4 Spot Target
L33	2X Multiplier
L34	3X Multiplier
L35	4X Multiplier
L36	5X Multiplier
L37	6X Multiplier
L38	"S"
L39	"P"
L40	"I"
L41	"R"
L42	"T"
L43	"T"
L44	Special (2)
L45	Right Outside Rollover
L46	Left Ball Save Target
L49	Left Outside Rollover
L50	Right Ball Save Target

SWITCH NO.	SWITCH ASSIGNMENT	PART NO.
00	#1 Rollover	B-18892
01	#1 Drop Target	B-10894
02	Left Top Hole	B-19857
03	#1 Spot Target	B-20867
05	#1 Drop Target (Upper Playfield)	B-18094
06	Spot Target (Upper Playfield)	B-20867
10	#2 Rollover	B-18892
11	#2 Drop Target	B-18095
12	Center Top Hole	B-19857
13	#2 Spot Target	B-20867
15	#2 Drop Target (Upper Playfield)	B-18095
16	Rollunder (Upper Playfield)	B-21569
20	#3 Rollover	B-18892
21	#3 Drop Target	B-18093
22	Left Top Rollover	B-18892
23	#3 Spot Target	B-20867
25	#3 Drop Target (Upper Playfield)	B-18093
26	100 Pt. (Upper Playfield)	B-18079
30	Left Hole	B-19857
31	Right Hole	B-19857
32	Center Spot Target	B-20867
33	#4 Spot Target	B-20867
34	Outhole	B-18892
40	Left Outside Rollover	B-18892
41	Right Outside Rollover	B-18892
42	Pop Bumper	B-21352
43	10 Pt. (5)	B-18808
44	Trough	B-18892
50	Left Return Rollover	B-18892
51	Right Return Rollover	B-18892
57	Tilt	B-9141
60	Left Ball Save Target	B-20867
61	Right Ball Save Target	B-20867
62	Roundabout	B-21137
63	Right Rollunder	B-21137
64	On Right Flipper	B-22398

XI. PARTS INFORMATION

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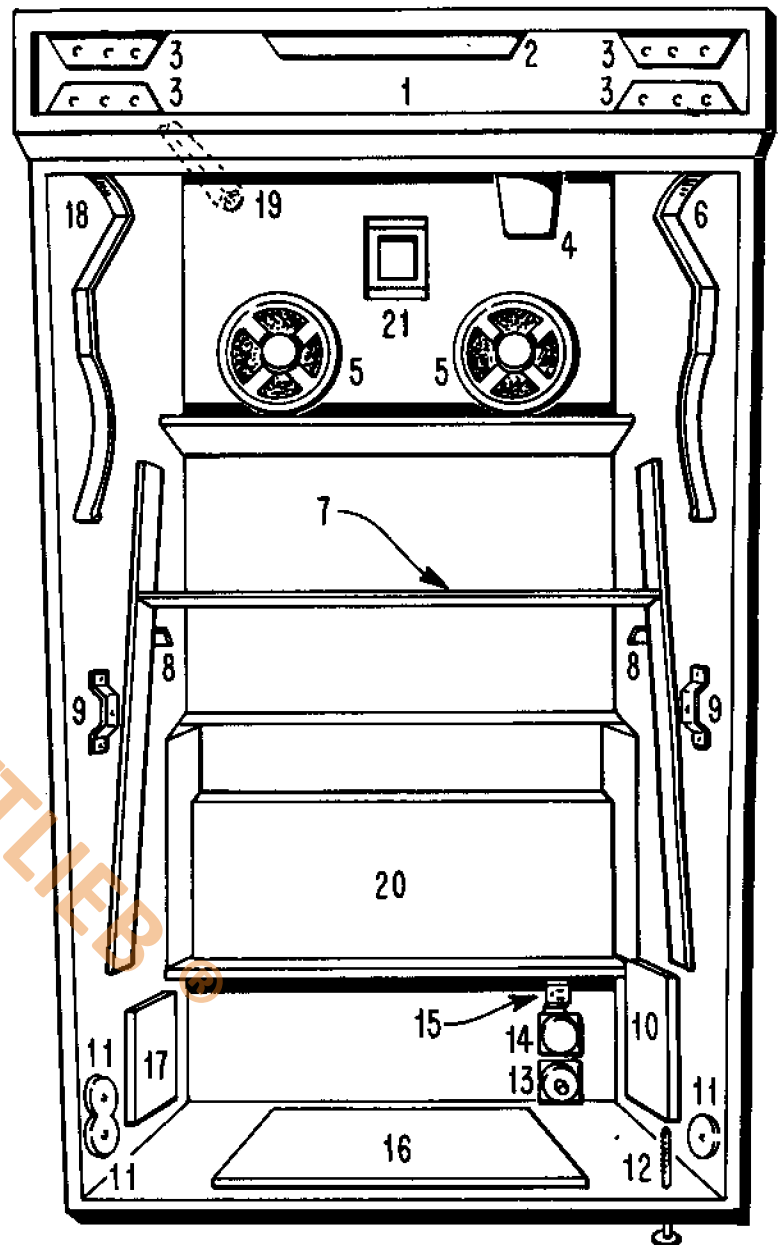
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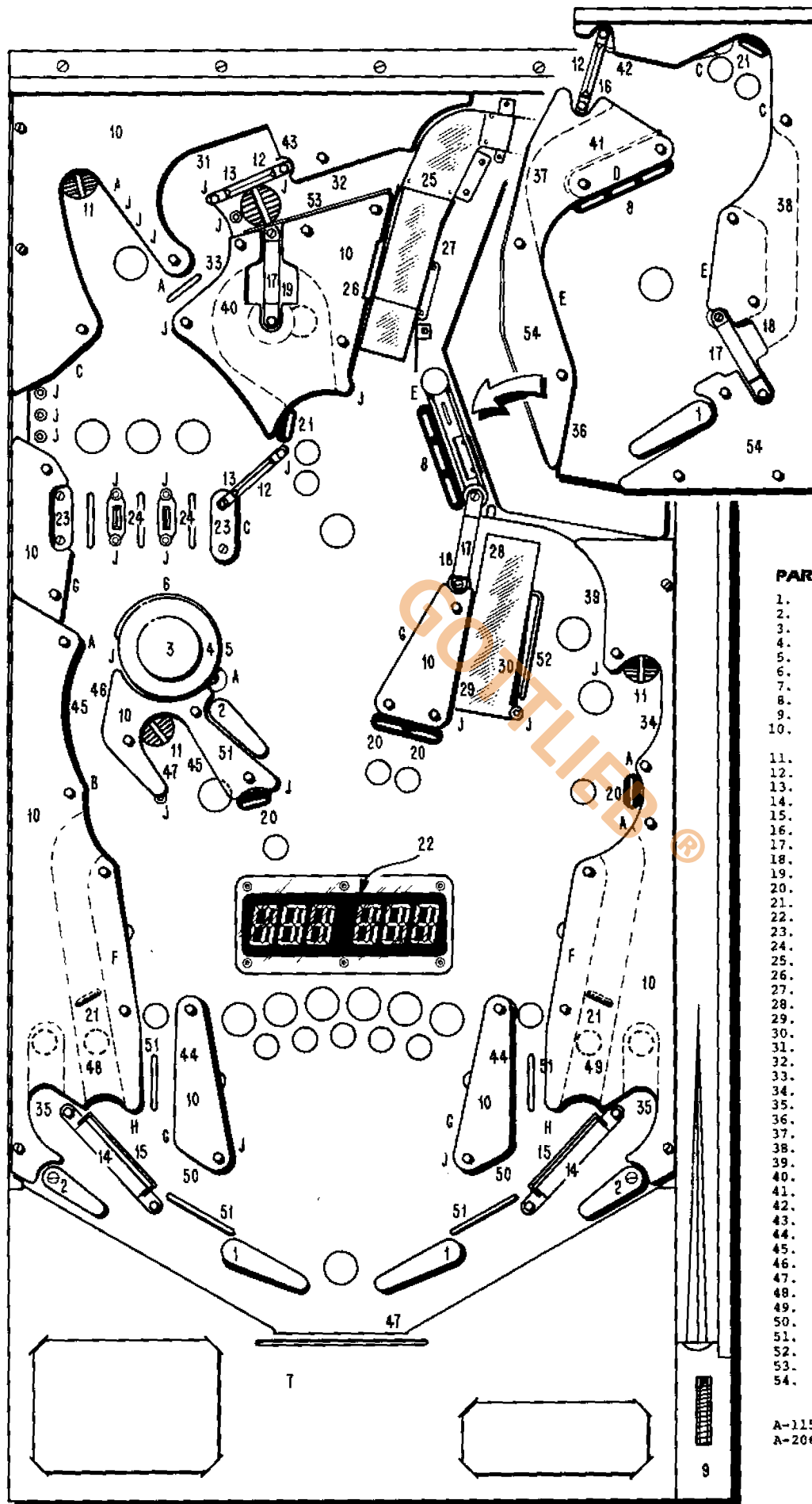
XI. PARTS INFORMATION

CABINET PARTS

ITEM	DESCRIPTION	PART NO.
1.	Cabinet	Specify Game
2.	Mold Down Angle Bracket	B-19587
3.	Lightbox Mounting Bracket (4)	A-19916
4.	Line Cord Housing	C-18534
5.	Speakers 4 Ohm (2)	EL-83
6.	Right Playboard Support	D-19932
7.	Playboard Prop	D-19604
8.	Stop Bracket	A-5024
9.	Front Rest Saddle	A-11345
10.	Knocker Board Assembly	MA-261
	Knocker	MA-12
	Pot and Mounting Bracket	MA-185
	F1, 1/4 Amp Fuse	EL-28
	F2, 5 Amp SLO-BLO Fuse	EL-8
	F3, 1/4 Amp SLO-BLO Fuse	EL-5
	F4, 8 Amp SLO-BLO Fuse	EL-26
	F5, 10 Amp Fuse	EL-23
	F6, 7 1/2 Amp Fuse	EL-22
	F7, 15 Amp Fuse	EL-25
	F8, 1 Amp SLO-BLO Fuse	EL-6
11.	Flipper Switch Assembly	B-17838
12.	Ball Shooter	B-8835
13.	Fuse Assembly	MA-186
14.	Switch	A-15401
	Switch Housing	A-15163
15.	Convenience Outlet	MA-17
16.	Front Door Assembly	Specify Game
17.	Ball Roll Tilt	MA-13
18.	Left Playboard Support	D-19931
19.	Cabinet Leg (4)	D-4337
	3" Leg Adjuster	MH-21
20.	Transformer Board Assembly	MA-266A
	Bridge Rectifier	EL-42
	Capacitor, 6800 mf, 25 Volt	XO-228
21.	Line Filter	EL-50



XI. PARTS INFORMATION



PLAYBOARD PARTS

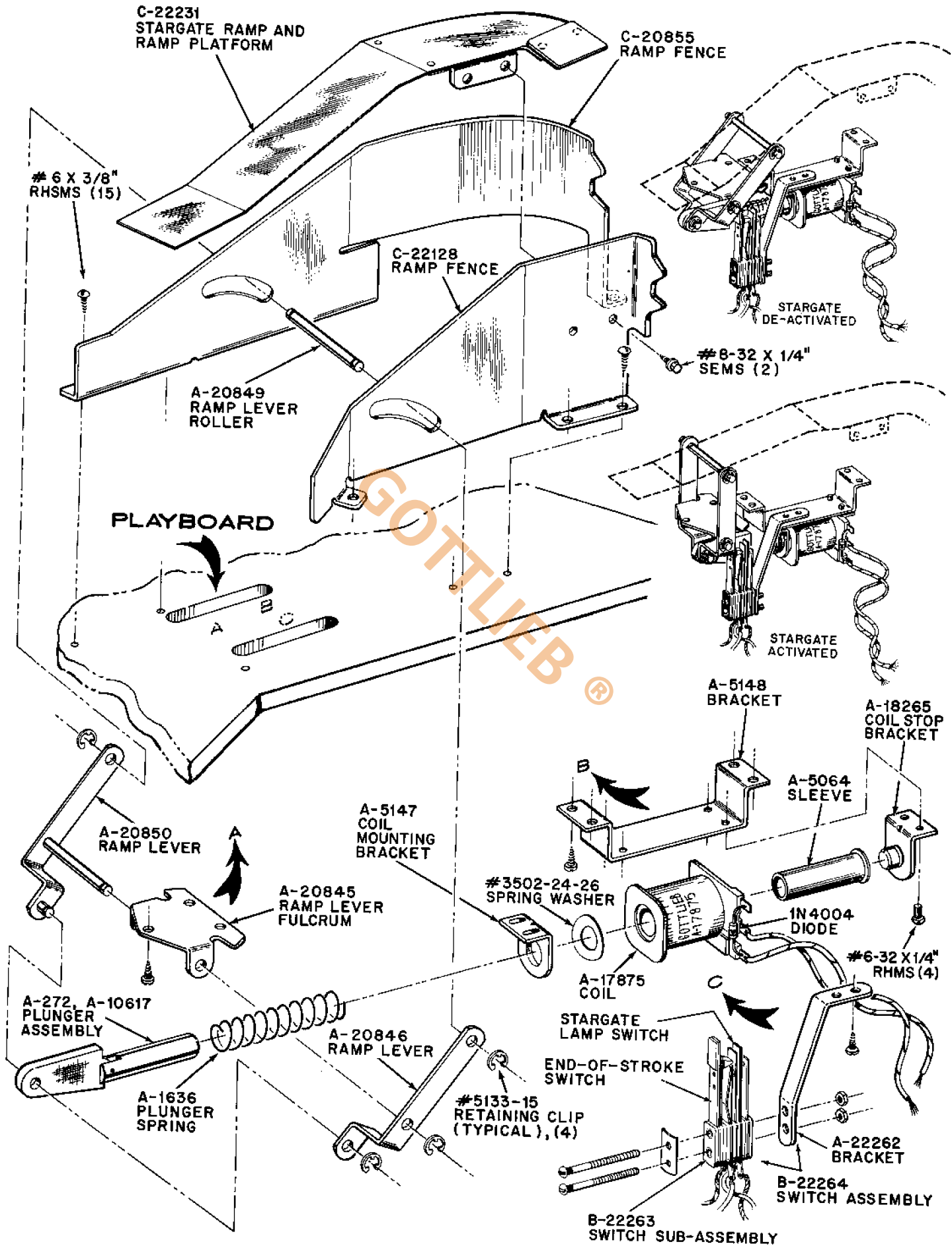
RUBBER RINGS

A	A-10217	5/16"	(6)
B	A-10218	3/4"	(1)
C	A-10219	1"	(4)
D	A-10220	1-1/2"	(1)
E	A-10221	2"	(3)
F	A-10222	2-1/2"	(2)
G	A-10223	3"	(4)
H	A-14793	Mini	(2)
J	A-15705	Mini	(24)

PARTS LIST

1.	C-13150	White Flipper, Large (3)
2.	C-11241	White Flipper, Small (3)
3.	A-22237	Pop Bumper Cap, Black
4.	A-13905	Pop Bumper Body, Black
5.	C-10433T	Pop Bumper Skirt
6.	A-22217	Pop Bumper Trim Platter
7.	B-18793	Card Holder
8.	A-22239	Drop Target Banks, Black (6)
9.	C-9767	Ball Shooter Gauge
10.	D-22163	Plastic Shield Set, Main Playfield
11.	A-16038	Ball Snubber
12.	A-17300	Shield (3)
13.	A-22112	Wireform
14.	A-1673	Shield (2)
15.	A-1674	Wireform
16.	A-21696	Wireform
17.	A-4869	Shield (3)
18.	A-22118	Wireform
19.	A-21958	Wireform
20.	A-9374T	Target, Yellow (4)
21.	A-93742	Target, White (4)
22.	A-22164	Window
23.	A-9393	Guide Rail, Single (2)
24.	C-15646	Guide Rail, Double (2)
25.	C-22231	Stargate Ramp
26.	C-20855	Stargate Ramp Fence, Left
27.	C-22128	Stargate Ramp Fence, Right
28.	B-22121	Ramp
29.	B-22122	Ramp Guide, Left
30.	B-22123	Ramp Guide, Right
31.	CD-22111	Metal Flat Rail
32.	A-22101	Metal Flat Rail
33.	A-22103	Metal Flat Rail
34.	A-22102	Metal Flat Rail
35.	C-22109	Metal Flat Rail
36.	A21158	Ball Deflector
37.	A-22100	Metal Flat Rail
38.	B-21108	Metal Flat Rail
39.	B-22106	Metal Flat Rail
40.	B-22107	Metal Flat Rail
41.	A-22117	Ball Guide Rail
42.	A-6612	Ball Guide Rail
43.	A-22115	Ball Guide Rail
44.	A-13782	Ball Guide Rail (2)
45.	A-22116	Ball Guide Rail (2)
46.	A-22114	Ball Guide Rail
47.	A-6931	Ball Guide Rail
48.	B-22119	Ball Guide Rail
49.	B-22120	Ball Guide Rail
50.	A-18070	Ball Guide Rail
51.	A-3722	Ball Guide Rail (5)
52.	A-22113	Ball Guide Rail
53.	A-13833	Ball Guide Rail
54.	D-22162	Plastic Shield Set, Mezzanine
A-11561PX	Plastic Post, 1" High (29)	
A-20635P	Support Post (23)	

XI. PARTS INFORMATION **STARGATE PARTS**



SERVICE NOTES

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