

SUPPLEMENTAL ADDENDUM

ATTACHED TO AND A PART OF ALL
SYSTEM 80B ALPHANUMERIC DISPLAY
GAME INSTRUCTION MANUALS

DISPLAY BOARD(A4)

1. THE ALPHANUMERIC DISPLAY BOARD(A4) IN THIS GAME MAY BE DIFFERENT THAN THE ONE AS ILLUSTRATED ON PAGE(S) 34 AND 35-36.
2. THE DIFFERENT DISPLAY BOARD (A4), PART NO. MA-644F, CONTAINS DISPLAYS DS1 AND DS2, PART NOS. XO-870.
3. THE DISPLAY BOARDS AS AN ASSEMBLY ARE INTERCHANGEABLE; HOWEVER, THE DISPLAY(S) DS1 AND DS2 ARE NOT INTERCHANGEABLE FROM ONE ASSEMBLY TO ANOTHER.
4. TO QUICKLY DETERMINE WHICH DISPLAY BOARD (A4) IS USED IN THIS GAME, OBSERVE THE LOCATION OF THE VACUUM EXHAUST TIP.

FIGURE 1A. DISPLAY BOARD (A4), (MA-644), DISPLAY(S) XO-840
FIGURE 1B. DISPLAY BOARD (A4), (MA-644F), DISPLAY(S) XO-870



FIGURE 1A.

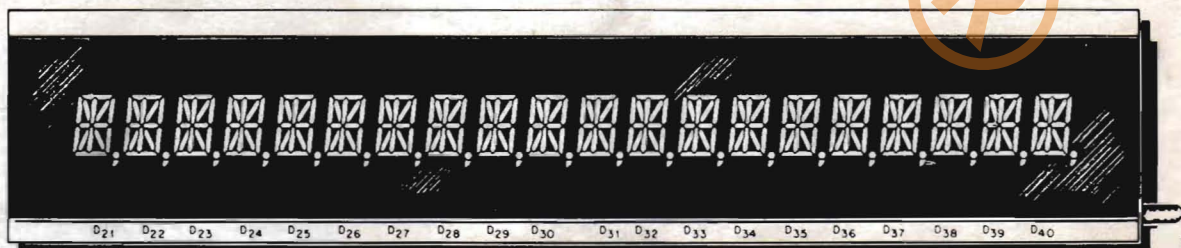


FIGURE 1B.

5. THE DIFFERENT DISPLAYS, XO-840 AND XO-870, ARE ELECTRICALLY EQUIVALENT. HOWEVER, THE PINOUT NUMBERING SEQUENCES ARE DIFFERENT. FIGURE 2 ILLUSTRATES THE SCHEMATIC PORTION OF MA-644F UTILIZING THE XO-870 DISPLAYS.

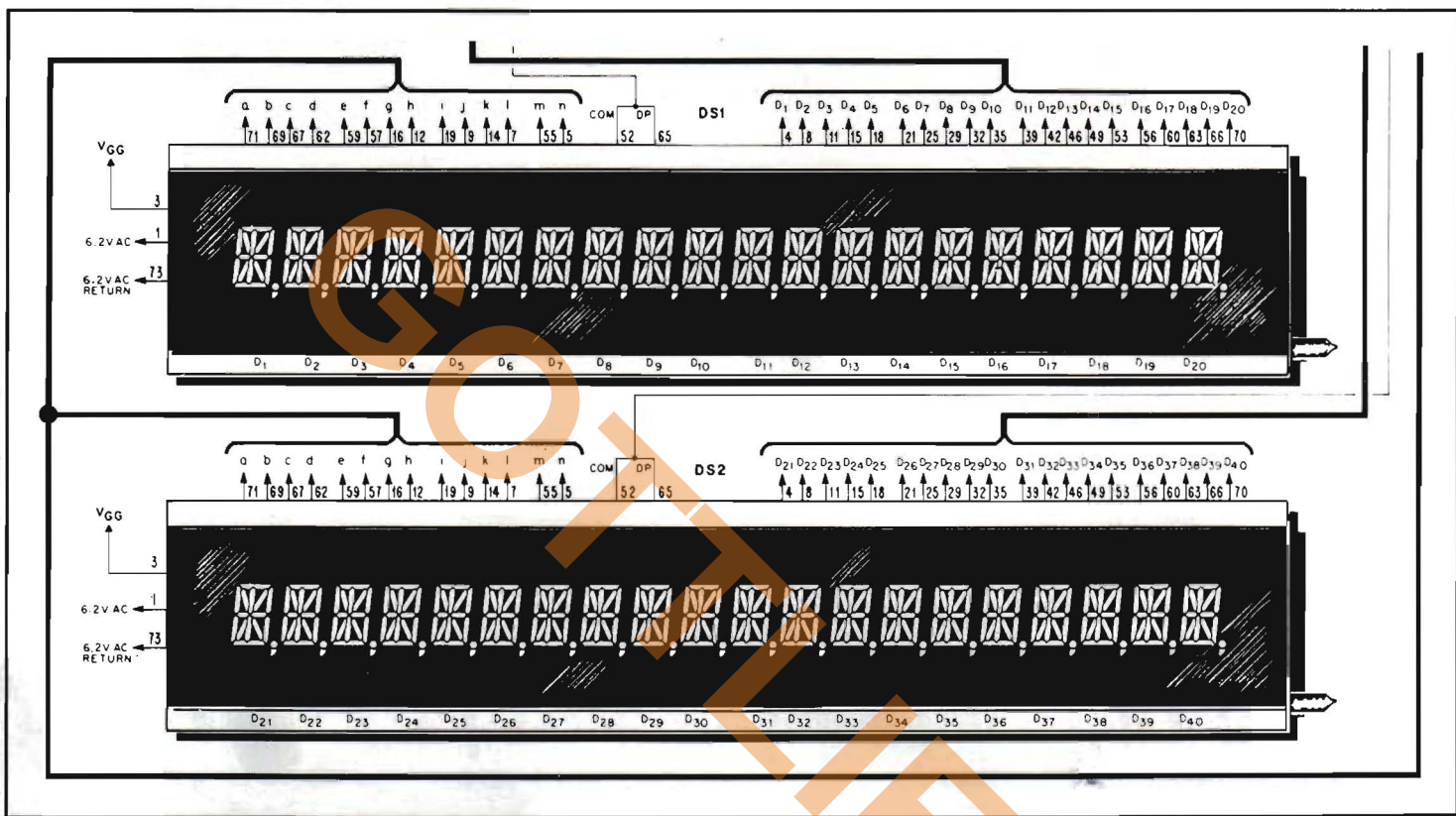


FIGURE 2.

SYSTEM 80B OVERVIEW

System 80B contains three new circuit boards. These are the Alphanumeric Display, the Power Supply, and the Control Board Piggyback which is attached to the Control Board. The Alphanumeric Display takes the place of the Four and Seven Digit Displays used in System 80A games. The new Power Supply takes the place of the System 80A Power Supply. The Control Board Piggyback takes the place of ROMS (U2-U3) used in System 80A games.

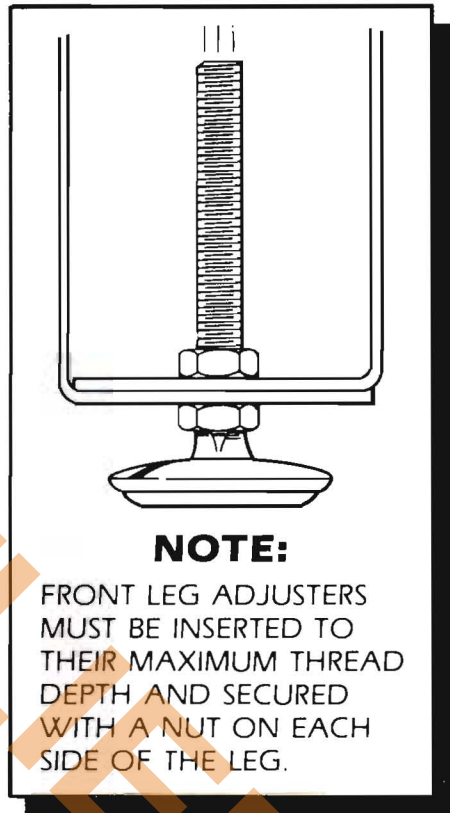
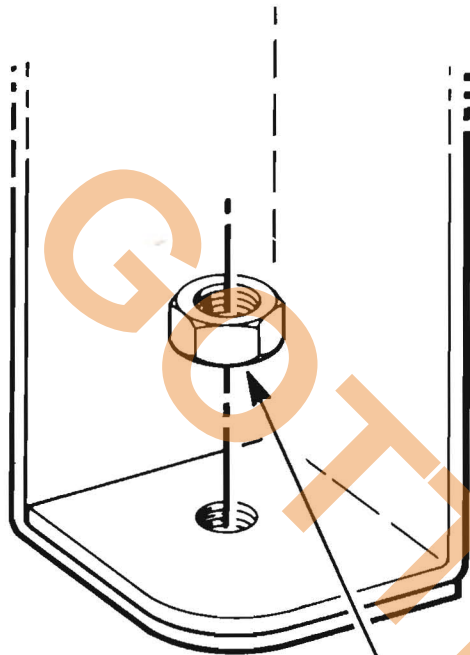
Some of the new features of System 80B are:

- 1) Capability to display messages.
- 2) Enhanced bookkeeping and self-test.
- 3) Players can enter their initials if they achieve a high score.
- 4) Top five high scores are displayed in the attract mode.
- 5) Automatic Replay percentaging.

WARNING: This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference."

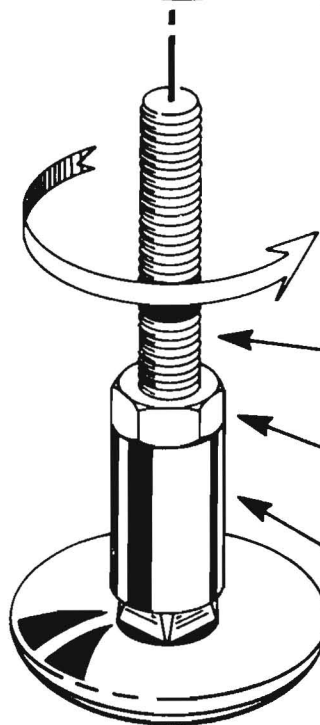
SET-UP PROCEDURE

TO ADJUST PLAYFIELD PITCH ANGLE (6°)
(REAR LEGS ONLY)



NOTE:

FRONT LEG ADJUSTERS
MUST BE INSERTED TO
THEIR MAXIMUM THREAD
DEPTH AND SECURED
WITH A NUT ON EACH
SIDE OF THE LEG.



4. TIGHTEN LOCKING NUT.
3. ATTACH ASSEMBLY TO LEG.
2. FASTEN NUT TO SLEEVE.
1. INSERT 1" SLEEVE
(PART NO. 25317)

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I. INSTALLATION

A. SET-UP

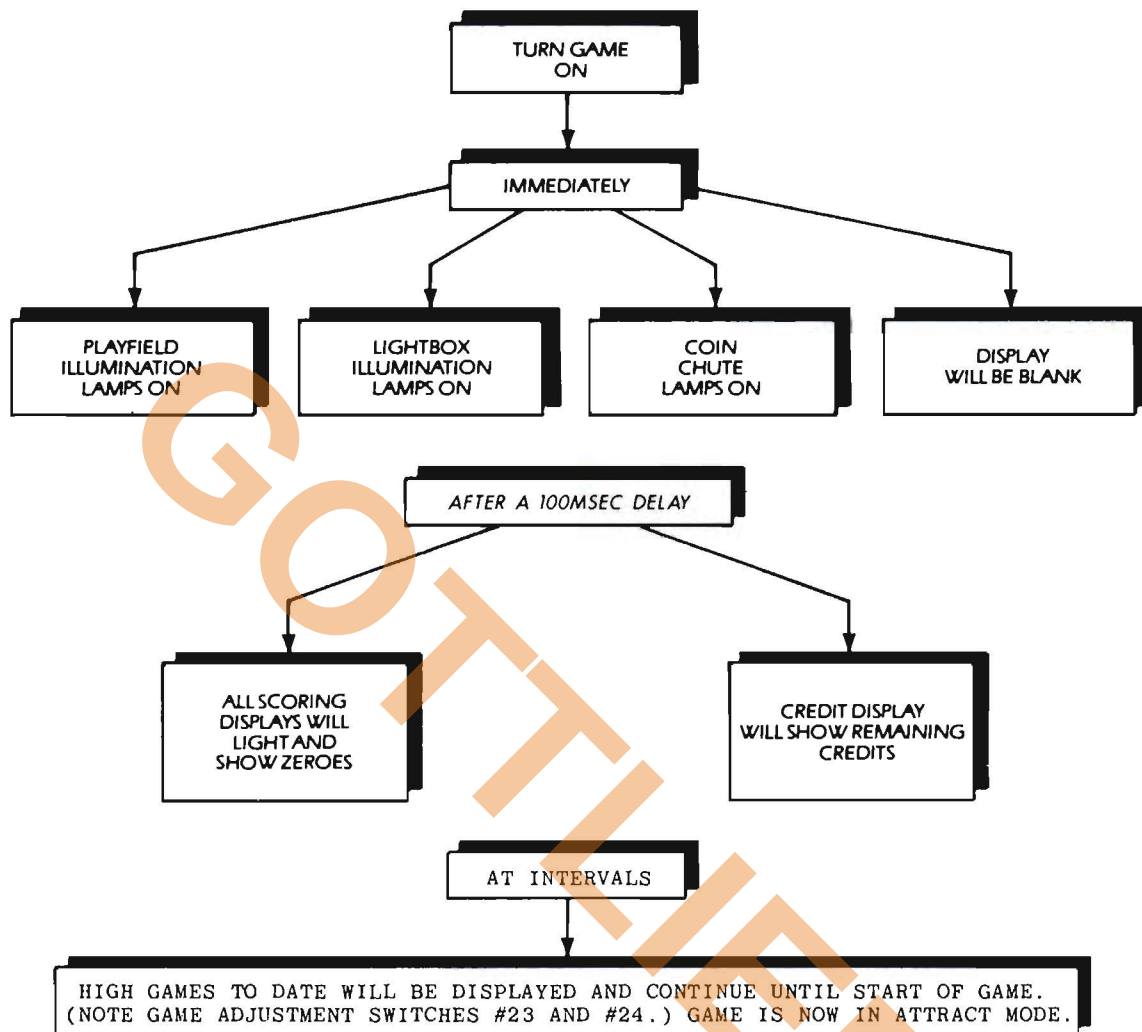
1. Bolt the legs to the cabinet.
2. Lift lightbox into an upright position. Be sure none of the cables are crimped in between the lightbox and cabinet.
3. Engage the snap in the rear of the lightbox to the cabinet.
4. To remove the lightbox backglass and gain servicing access to the electronics panel, fluorescent lamp assembly, speaker and the alphanumeric display board, proceed as follows:
Unlock the lightbox, grasp the backglass lift trim, lift the backglass up and out carefully and set aside.
To remove the speaker/alphanumeric display panel, grasp the upper portion of the panel, lift up about 1/2", swivel the top of the panel downwards and bring towards you, set down on the cabinet side mouldings. The acrylic display panel cover will also become detached at this stage.
5. Secure the lightbox to the cabinet with the bolts and washers provided.
6. Open the cabinet door and loosen the front moulding locking arm.
7. Remove the moulding from the playfield.
8. Slide the cabinet glass toward you and remove it.
9. Raise the playboard, slide it forward and rest it on its support.
10. Unravel and straighten out the power line cord located at the rear of the pinball cabinet.
11. Proceed to "B. CHECK-OUT".

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 transformer for any foreign matter across terminals.
6. Be sure that the Transformer Panel power input connector A12J7, 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. Lower the playfield into the cabinet. Using the leg adjusters, level the playfield and set the pitch. Recommended pitch is $5-1/2^{\circ}$ - 6° , SEE ILLUSTRATION AT LEFT.
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 and raising the tilt bracket to increase sensitivity, or lowering it to decrease its sensitivity.
10. Reinstall the cabinet glass, front moulding and the lightbox assembly.
11. Plug the line-cord into a properly grounded 3-wire receptacle ONLY!
12. Refer to Section VI to make all necessary game adjustments.
13. CAUTION If this game has been subjected to extreme cold, allow to warm up to room temperature.

II. INITIALIZATION, III. GAME OPERATION

II. INITIALIZATION



III. GAME OPERATION

A. GAME START

The ball 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 the center of the lower 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 two zeros.

B. FIRST PLAYER

1. First player's score display flashes two zeros.
2. The other player's displays are now blank.
3. The ball-in-play is displayed in the center of the upper display.

III. GAME OPERATION

4. When the ball enters the outhole, any bonus earned is scored.

C. ADDITIONAL PLAYERS

1. Additional players are indicated by two zeros (not flashing) in each corresponding player's display.
2. After the maximum number of players are added, or no more credits remain, the Credit Button has no effect.
3. Additional players can be added anytime during the first ball in play.

D. EXTRA BALLS

1. When the SHOOT AGAIN lamp is lit, neither the player-up nor the ball-in-play 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 entire switch matrix is inactive for three seconds.
3. If the match feature exists (dependent on Switch #26), a replay can be won even if the game is slammed.
4. Game returns to the attract mode.

G. GAME OVER

1. A random match 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 #26) is awarded.
2. The High Games To Date are periodically displayed, dependent on Switches #23 and #24. When the Highest Game To Date is beaten, an award (dependent on Switches #23 and #24) is given.
3. All of the drop targets will reset (when used).

IV. GAME PLAY AND SCORING

TOP "A" ROLLOVER

- Unlit-Scores 500 points.
- Lit-Scores 5000 points.
Scores 3000 points
(5 ball).
Adds 1 bonus.
- Turns off "A" rollover lamp.
- Lights left hole value lamp.
- Lights left pop bumper.

BOTTOM "A" ROLLOVER

- Same as Top "A" Rollover.

TOP "B" ROLLOVER

- Unlit-Scores 500 points.
- Lit-Scores 5000 points.
Scores 3000 points
(5 ball).
Adds 1 bonus.
- Turns off "B" rollover lamp.
- Lights center hole value lamp.
- Lights center pop bumper.

BOTTOM "B" ROLLOVERS (2)

- Same as Top "B" Rollover.

TOP "C" ROLLOVER

- Unlit-Scores 500 points.
- Lit-Scores 5000 points.
Scores 3000 points
(5 ball).
Adds 1 bonus.

- Turns off "C" rollover lamp.
- Lights right hole value lamp.
- Lights right pop bumper.

BOTTOM "C" ROLLOVER

- Same as Top "C" Rollover.

OUTLANE ROLLOVERS

- Score 5000 points.
- Score 3000 points (5 ball).
- Add 1 bonus.

SPOT TARGETS (4)

- Unlit-Score 500 points.
- Lit-Score 5000 points.
Score 3000 points
(5 ball).
Add 1 bonus.
Alternate special lights
when lit (5 ball).

Note: Two of the four spot targets are lit (3 ball). One of the four spot targets is lit (5 ball). The lights are toggled (rotated on 5 ball) by the 10 point switches, 100 point switches, lit pop bumpers and the spot targets themselves.

POP BUMPERS (3)

- Unlit-Score 100 points.
- Lit-Score 1000 points.

IV. GAME PLAY AND SCORING

100 POINT SWITCHES

- Score 100 points.
- Toggle spot target lights.
- Rotate spot target lights (5 ball).
- Alternate Special lights when lit (5 ball).

- Completing A-B-C and the right drop target bank lights the right hole for Special.
- Completing A-B-C and both drop target banks lights one hole for Special (5 ball).

Note: Special lamps are alternated by the spot targets, pop bumpers, 10 point switches and 100 point switches (5 ball).

10 POINT SWITCHES

- Score 10 points.
- Toggle spot target lights.
- Rotate spot target lights (5 ball).
- Alternate Special lights when lit (5 ball).

HOLES (2)

- Scores 10,000 points.
- Scores additional 10,000 points for each lit lamp.
- Awards Special when lit.

DROP TARGETS

- Score 5000 points.
- Score 3000 points (5 ball).
- Add 1 bonus.

Note: Target banks reset only after both banks have been dropped. Once both banks are dropped, only the center targets reset. Center targets then score 50,000 points each and reset when both are dropped.

EXTRA BALL

- Completing A-B-C lights the Extra Ball lamp above the Top "B" Rollover.
- The Extra Ball is awarded when completing the Top "B" Rollover when the Extra Ball lamp is lit.

BONUS

- Bonus is collected at the outhole only.
- Completing A-B-C lights the 2X multiplier. The 2X multiplier is automatically lit on the last ball only. Completing A-B-C on the last ball lights the 3X multiplier. Maximum bonus is 190,000 points.

SPECIAL (1 PER BALL)

- Completing A-B-C and the left drop target bank lights the left hole for Special.

V. SOUND

VI. GAME ADJUSTMENTS

$$= 5/2$$

SWITCH 32 _____ **NOT USED**

ON
OFF

VI. GAME ADJUSTMENTS

B. SOUND ADJUSTMENTS

The speaker(s) output is controlled by the potentiometer mounted on a bracket located inside the cabinet next to the front door hinge.

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

SWITCH BANK SETTINGS:

DIP SWITCH

Position 1.....	Not Used
Position 2.....	Not Used
Position 3.....	Off
Position 4.....	On

C. POST ADJUSTMENTS

The inner lexan posts at the mouth of the left and right outlanes can be repositioned for liberal/conservative play. The smaller opening produces a more liberal game play.

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.

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 80B

- See Flow Chart for Bookkeeping Assignments (1-15).

I. STEPPING THROUGH BOOKKEEPING

1. Press the SELF-TEST button inside the front door.

"TEST MODE" should appear in the upper display.

2. Press the SELF-TEST button again. Step 1 and its information will be displayed.
3. Pressing the SELF-TEST button will increment the bookkeeping step number and appropriate information will be displayed.

Pressing the SELF-TEST button after Step 15 will start the SELF-TEST function (Step 16-21). At this point Bookkeeping cannot be re-entered by pressing the SELF-TEST

button. To reenter, turn the game OFF/ON or open the slam switch. The game will return to the attract mode. Then press the SELF-TEST button.

4. To exit from Bookkeeping at any time:

- a. Turn power OFF/ON or
- b. Open slam switch.

II. HOW TO SET BOOKKEEPING INFORMATION TO ZERO

1. For a Particular Bookkeeping Step

Applicable only to:

- Step 1 - Left chute coins
- Step 2 - Right chute coins
- Step 3 - Center chute coins

- a. Advance Bookkeeping so the step to be zeroed is displayed.
- b. Press the credit button. Notice information replaced by zeros.

2. Zeroing All Bookkeeping Steps

Except Auto-Percentaging setting (Step 6), Replay Levels (Steps 11-13), and Highest Game To Date Score (Step 14).

- a. Go to Step 15 (average playing time).
- b. Press the credit button. The message "Bookkeeping Cleared" will be displayed.
- c. Zeroing is complete.

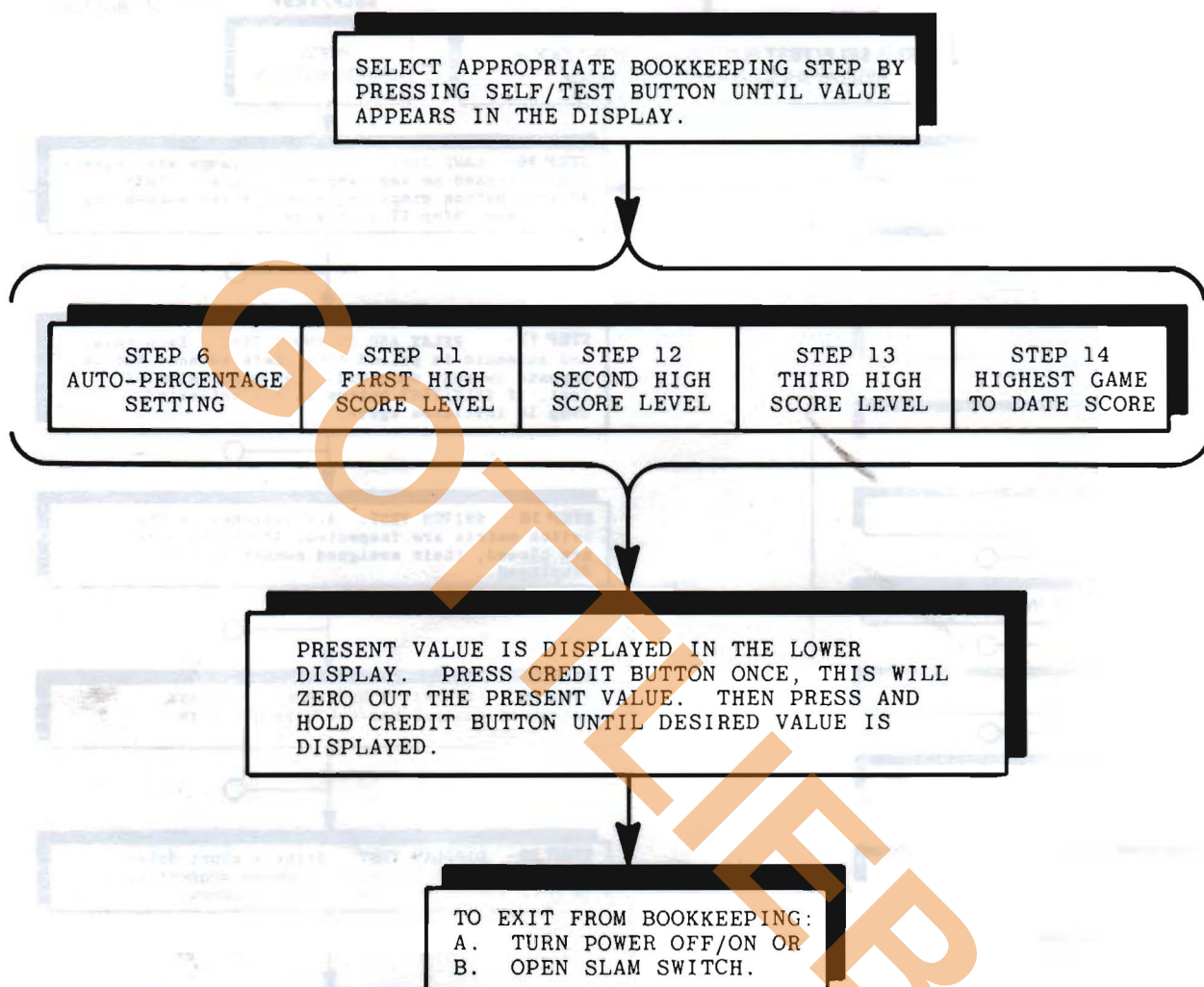
HOW TO USE AUTOMATIC REPLAY PERCENTAGING

Move Control Board switch #8 to the on position to enable Auto-Percentaging. Set the desired percent payout while in Step 6 of bookkeeping (See Page 9). When Auto-Percentaging is enabled, only the first High Score Replay Level is used. The second and third levels are ignored.

Periodically the first Replay Level will be adjusted by 100,000 points at a time. After 10,000 games have been played, the Total Plays (Step 4), Total Replays (Step 5), and Game Time (Step 15) bookkeeping values are reset to 0 (Refer to Page 10).

VII. BOOKKEEPING AND SELF TEST

III. HOW TO SET/RESET AUTO-PERCENTAGE SETTING, HIGH SCORE LEVELS OR HIGH GAME TO DATE SCORES.

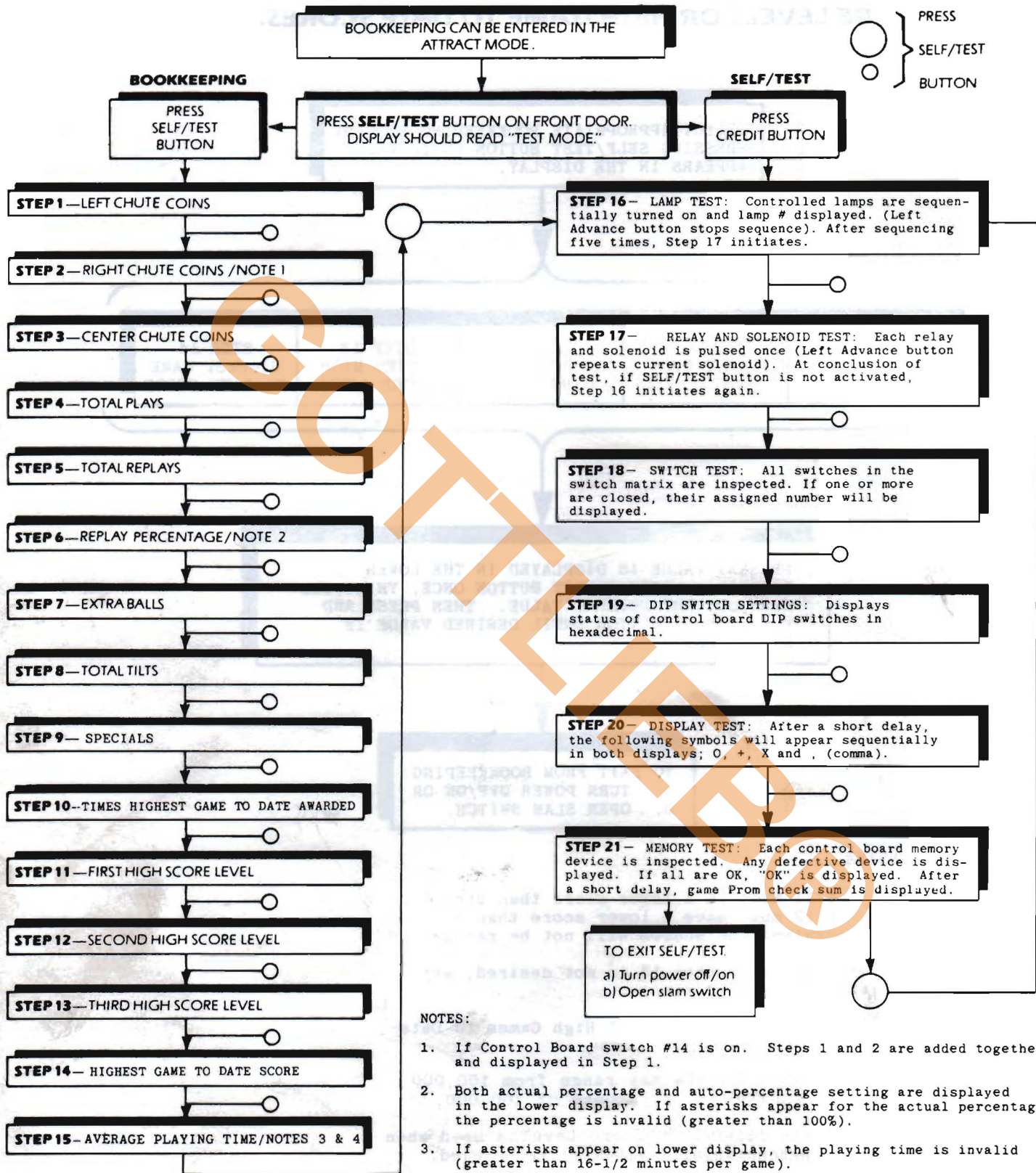


NOTES:

1. Step 11 must be a lower score than Step 12. Step 12 must have a lower score than Step 13. Otherwise, the scores will not be recognized.
2. If Step 12 or Step 13 is not desired, set those scores to zero.
3. If Step 14 is reset, all High Games to Date scores are reset.
4. High Score Levels may range from 100,000 to 9,900,000 in increments of 100,000.
5. Only the first High Score Level is used when auto-percentaging (switch 8) is enabled.

VII. BOOKKEEPING AND SELF TEST

B. FLOW CHART



NOTES:

1. If Control Board switch #14 is on. Steps 1 and 2 are added together and displayed in Step 1.
2. Both actual percentage and auto-percentage setting are displayed in the lower display. If asterisks appear for the actual percentage, the percentage is invalid (greater than 100%).
3. If asterisks appear on lower display, the playing time is invalid (greater than 16-1/2 minutes per game).
4. Pressing the credit button during this step will reset all book-keeping information except:
 - Step 6 - Auto-percentage setting
 - Steps 11 thru 13 - Replay levels
 - Step 14 - Highest game to date

VII. BOOKKEEPING AND SELF TEST

C. SELF/TEST

- Steps 16 through 21 are SELF/TEST or game tests the operator can use for quick troubleshooting.
- All the tests are explained in the flow chart.
- To advance to the next test, press the SELF/TEST switch.
- Each test can be repeated by pressing the credit button.

STEP 16—LAMP TEST

- Lamp Test-Lamps are sequentially strobed. Lamp assignment numbers appear in the lower display.

The Left Advance button stops lamp sequencing for repeated flashing of active lamp. (Single Step Mode).

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

STEP 17—RELAY AND SOLENOID TEST

- Relay Test-All relays are pulsed in the following order with their corresponding lamp driver number appearing in the lower display.

The left advance button stops sequencing for repeated activation of relay or solenoid. (Single Step Mode).

A3 Driver Board Transistor
Assignment (See Schematic)

Q (Game Over) Relay.....A3J3 PIN- $\bar{A}$ (Q1)
T (Tilt) Relay.....A3J3 PIN- $\bar{B}$ (Q2)
(Any other relays which may be used).

- 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	Rt. Bank Trip	Q60
Sol.2	Lt. Bank Trip	Q57/Q58
Sol.3	Not Used	Q54
Sol.4	Not Used	Q55
Sol.5	Lt. Bank Reset	Q61/Q62
Sol.6	Rt. Bank Reset	Q63/Q64
Sol.7	Not Used	Q56
Sol.8	Knocker	Q53
Sol.9	Outhole	Q59

STEP 18—SWITCH TEST

- If all switches are open, "ALL SWITCHES OPEN" appears in the lower display. (Note: Slam switch is not part of this test.)
- If any switch(es) are closed, their corresponding matrix location will appear sequentially in the lower display.

STEP 19—DIP SWITCH SETTINGS

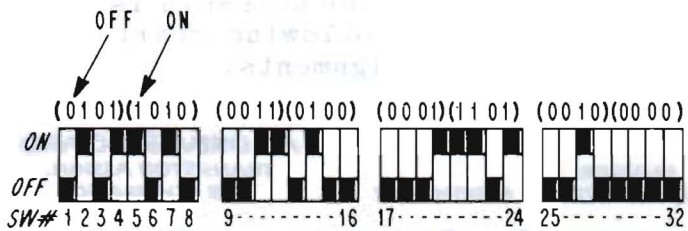
- The status of the Control Board (A1) switches appears in the lower display.

DISPLAYED HEXADECIMAL	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

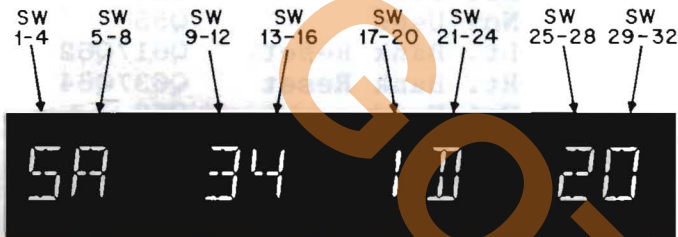
VII. BOOKKEEPING AND SELF TEST

CONTROL BOARD (A1) SWITCHES

EXAMPLE

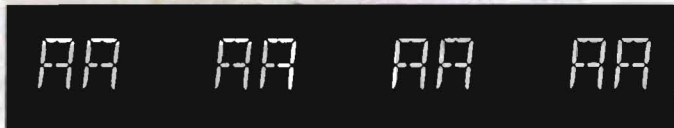


DISPLAYED



Checking Switches

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



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



STEP 20—DISPLAY TEST

After a short delay, the following characters will appear sequentially in all digit positions; O, +, X and , (comma).

STEP 21—MEMORY TEST

Each control based memory device is checked. If all are good, an "OK" will be displayed.

If a memory chip located on the A1 Control Board is defective, its number will be displayed. If no devices are found to be defective, "OK" is displayed in the lower display. Then after a short delay the Game Prom check sum will be displayed.

VIII. THEORY OF OPERATION

This section will cover only the differences between System 80A and System 80B. Figure 1 is a block diagram indicating the interconnections between the modules of System 80B.

A. CONTROL BOARD (A1)

The Piggyback Board eliminates the need for the ROMS (U2-U3) and the game prom (PROM 1) used in System 80A. The new game prom for each game is a 2764 EPROM labeled with the game number. This device is plugged into the Piggyback Board which is soldered into the Control Board.

The use of the Alphanumeric Display eliminates the need for Z19, Z21, Z22, Z23, Z24, Z25 (System 80A Display Control), and connector A1J3. The Control Board transmits information to the Display Board via a data bus (DATA 0 - DATA 7) and control lines (LD1, LD2, and RESET) from A1J2 to 1A4J1. The state of the LD1 and LD2 lines determine whether the upper or lower display tube receives the information on the data bus.

B. POWER SUPPLY (A2)

The new Power Supply develops a regulated +5V DC only and supplies it to the Control Board (VCC), Display Board (VSS), and Sound Board (VCC).

C. DISPLAY BOARD (A4)

This board takes the place of the four and seven digit displays used in System 80A games. During game play the upper display contains the scores of players one and two along with the ball in play (center). The lower display contains the scores of players three and four along with the amount of credits remaining (center). During Game Over the display information alternates between the scores from the previous game and the current High Games To Date.

The Display Board incorporates two vacuum fluorescent display tubes and three display controllers (U1-U2-U3). Each tube consists of a filament, grids (digits), and anodes (segments). U1 controls the digits of the upper display tube. U2 controls the digits of the lower display tube. U3 controls the segments of both tubes. When power is supplied to the game, the Control Board sends a negative going reset pulse to the base of Q1. This resets the display system. The digit information is multiplexed using an internal clock in U1 to control the refresh rate. This makes it appear as if all the digits are being enabled at once.

VIII. THEORY OF OPERATION

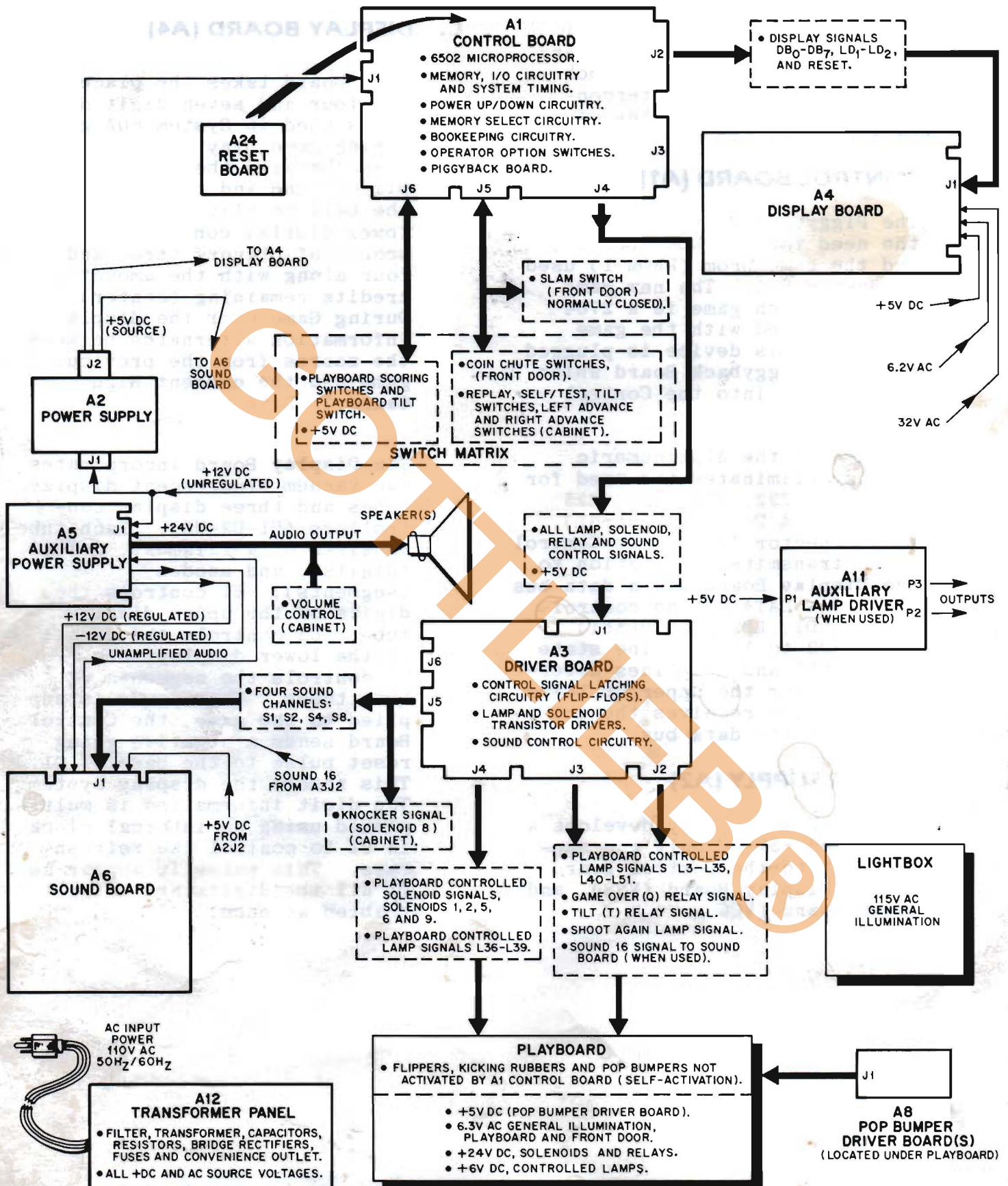


FIGURE 1. SYSTEM 80B BLOCK DIAGRAM

VIII. THEORY OF OPERATION

The Display Board is supplied with 32V AC from the transformer panel. Voltages VGG, VDD, and VCO are then developed from this input. The transformer panel also supplies 6.2V AC to the display tube filaments.

The filaments are biased 7.5V DC above VGG (VCO) by the zener diode VR1. Figure 2 shows the basic drive circuitry and waveform for a single digit and segment of the display.

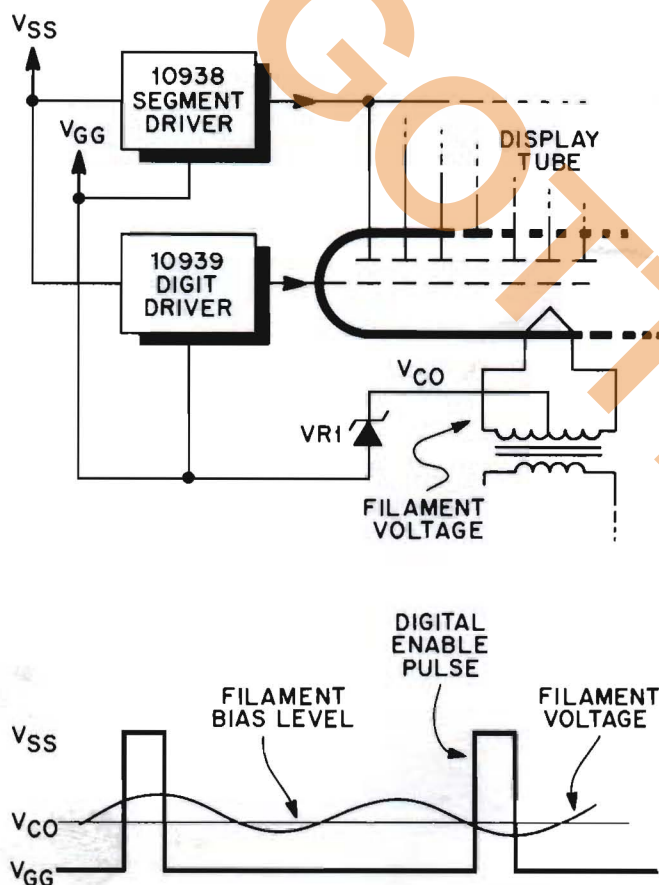


FIGURE 2. BASIC DRIVE CIRCUIT

D. SOUND BOARD (A6)

The MA-766 Sound Board consists of two 6502 microprocessor systems, a dual DAC, an L.P.C. speech generator, two programmable sound generators, input ports to receive commands from

the game Control Board, and a low level audio output, which is sent to the MA-767 Auxiliary Power Supply Board for amplification.

The Sound Board requires three supply voltages: +5V DC, +12V DC and -12V DC. In addition a power up reset signal is required from the Control Board.

SYSTEM CLOCK

A 4 MHz oscillator is configured with R11, R12, C14, C15, C21, XTAL-1 and T1. R21 and C22 are optional. This 4 MHz clock is divided by 4 to a 1 MHz clock for both processors' clock input, pin 37 of N1 and T3. A 2 Mhz clock from S1 pin 14 is sent to the two AY-3-8913 Programmable Sound Generator, H4 and K4, pin 20. A 250 KHz signal from S1 pin 11 is the clock for the programmable timer section consisting of N5, H5, T5 and K5, pin 2.

INPUT CODE LATCH SYSTEM

Eight input lines from the Control Board come in on A6P1 and are pulled up by S1P1 and sent to the input code latch A3. A2, pin 8, becomes a logic high when any of it's inputs are low. This output is connected to pin 11 of the input code latch A3. A positive edge at pin 11 causes A3 to latch the data at its input. A2 pin 8 is also connected to the clock input of flip flop A4 pin 11. When A2 pin 8 goes high, the flip flop is clocked setting the $\bar{Q}$ output low. The $\bar{Q}$ output, A4 pin 8, is connected to the 6502's active low interrupt request line N1, pin 4. The $\bar{Q}$ outputs of A4 will stay low until the 6502 reads its input port therefore clearing the interrupt.

NOTE: DIP Switch 3 should remain off and DIP Switch 4 should remain on. This prevents the S4 input from generating an interrupt.

VIII. THEORY OF OPERATION

SYSTEM RAM

The sound board is designed to accommodate different types of RAM. JP3 should be connected if HM6116's or 2158A's are used. JP4 should be connected if 2158B's or B's are used.

RESET

The Sound Board receives an external reset signal from A1J2 pin 24. This active low reset signal is pulled up by R34 and sent to G5, pin 1 (2-input AND gate). However, if a manual reset is desired, pushing switch SW2 will reset the processor.

MAIN SUMMER

The main summer consists of R16 and R17 and B1, pins 12, 13 and 14. B1 pin 14 is the main output from the Sound Board, at A6P1 pin 18, and will swing plus or minus 5V peak to peak.

IX. GENERAL INFORMATION

A. PRINTED CIRCUIT BOARDS ARE DESIGNATED AS FOLLOWS:

A1 - Control Board
 A2 - Power Supply
 A3 - Driver Board
 A4 - Display Board
 A5 - Auxiliary Power Supply
 A6 - Sound Board
 A7 - Diode Board
 A8 - Pop Bumper Driver Board
 A24- Reset Board

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

B. WIRE COLORS ARE SHOWN AS NUMBERS:

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

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

C. FUSES

TRANSFORMER PANEL FUSES

F1	Sound/Speech Power Supply (A6)...	12V AC	....	1/2 Amp
F2	Power Supply (A2).....	10V AC	....	6-1/4 Amp SLO-BLO
F3	Display.....	32V AC	....	1/4 Amp SLO-BLO
F4	Solenoids (+24V DC).....	28V AC	....	8 Amp SLO-BLO
F5	Controlled Lamps.....	8V AC	....	5 Amp SLO-BLO
F6	Playboard Illumination.....	6.3V AC	....	8 Amp SLO-BLO
F7	Lightbox Illumination.....	115V AC	....	1/2 Amp SLO-BLO
F8	Primary Power.....	110V AC	....	5 Amp SLO-BLO
		220V AC	....	2-1/2 Amp SLO-BLO
F9	Display Filament.....	6.2V AC	....	1 Amp
F9A	Display Filament.....	6.2V AC	....	1 Amp
F20	Input Line.....	110V AC	....	8 Amp SLO-BLO
		220V AC	....	4 Amp SLO-BLO

PLAYBOARD FUSES

F10	Outhole	1 Amp SLO-BLO
F11	Left and Right Target Banks	2 Amp SLO-BLO
F12	Left and Right Hole Kickers	2 Amp SLO-BLO
F13	Right Pop Bumper	2 Amp SLO-BLO
F14	Center Pop Bumper	2 Amp SLO-BLO
F15	Left 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 POP BUMPERS	4.5	780	#24	Blue
A-5195	CONTACT KICKER KNOCKER HOLE KICKER	11.6	1305	#26	White
A-16570	HOLE KICKER, OUTHOLE	15.5	1450	#27	Green
A-17875	FLIPPERS	2.8/40	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
A-24161	INTERMEDIATE FLIPPER	2.2/40	520/1050	#23/31	Blue
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
A-19508	MEMORY/ DROP TARGETS	35.0	1250	#32	YELLOW

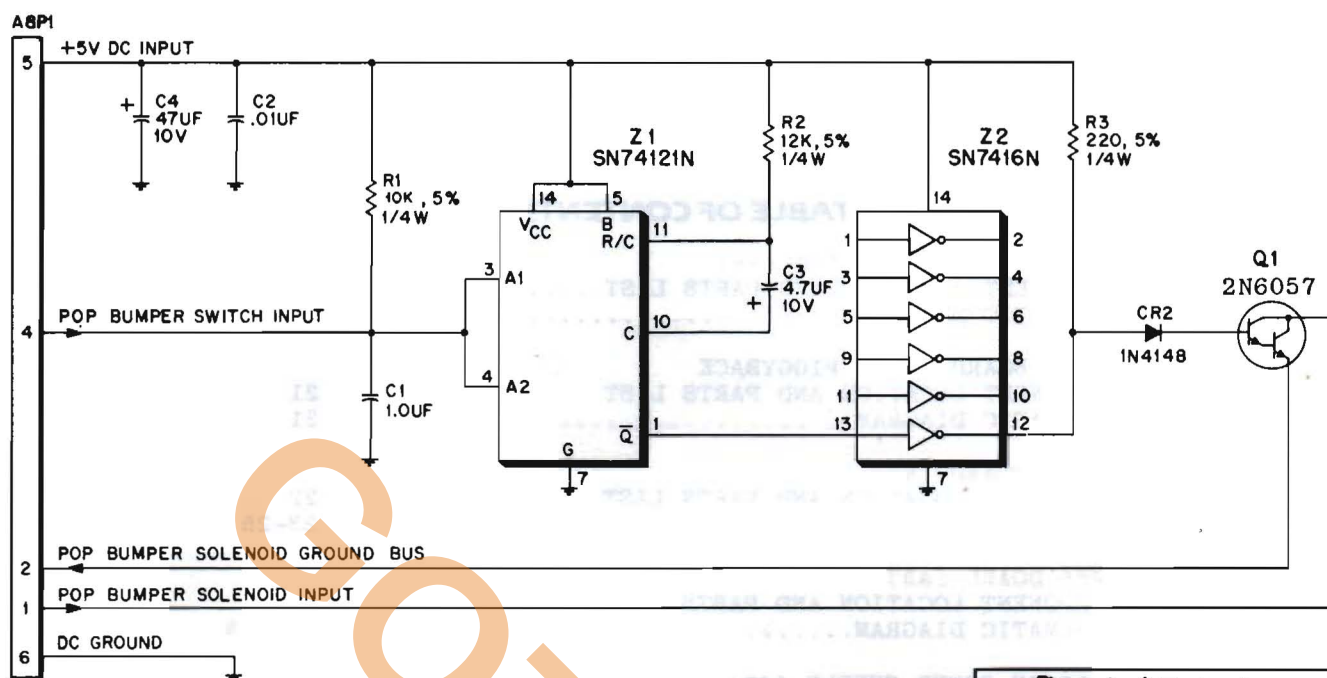
*Coils may vary from game to game. Check game manual for exact coil usage.

X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS

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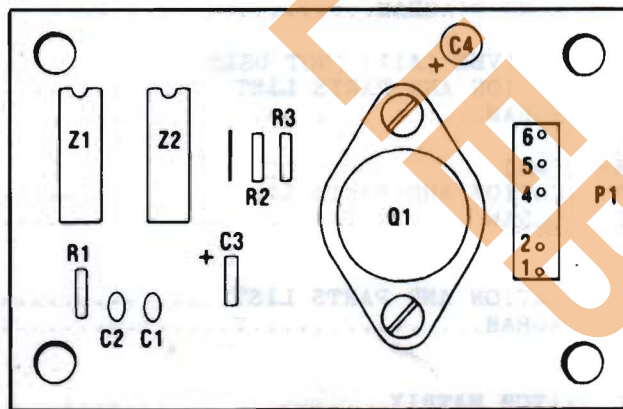
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X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS



Premier Technology			
TITLE POP BUMPER DRIVER BOARD (A8)			
USED ON			
DRAWN	APPROVED	DATE	D-20923
P	AC	10-4-82	

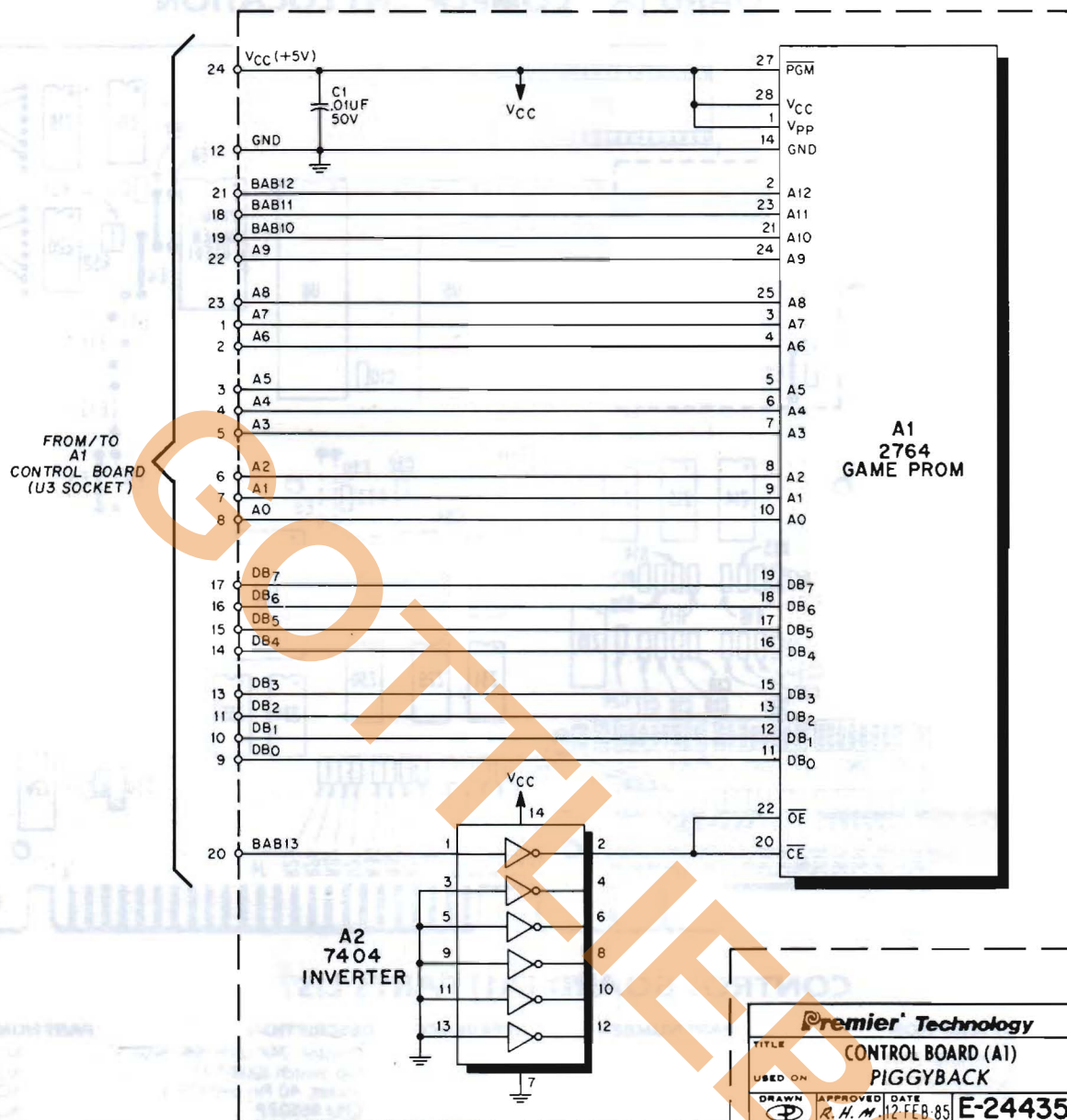
POP BUMPER DRIVER BOARD (A8) COMPONENT LOCATION



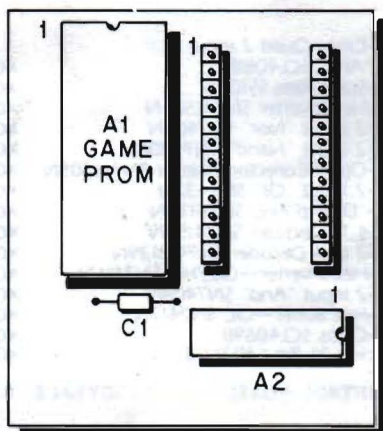
POP BUMPER DRIVER BOARD (A8) PARTS LIST

REFERENCE	DESCRIPTION	PART NUMBER
	POP BUMPER DRIVER BOARD	A-19741
C1	Capacitor, 1 UF, 50V, Non-Polarized	XO-294
C2	Capacitor, .01 UF, 100V	XO-202
C3	Capacitor, 4.7 UF, 10%, 10V	XO-226
	Tantalum, Axial	XO-227
C4	Capacitor, 47 UF, 10V	XO-261
CR2	Diode 1N4148	XO-879
P1	Connector	XO-18
R1	Resistor, 10K ohm, 1/4W, 5%	XO-9
R2	Resistor, 12K ohm, 1/4W, 5%	XO-21
R3	Resistor, 220 ohm, 1/4W, 5%	XO-311
Q1	Transistor, Darlington 2N6057	XO-417
Z1	IC SN74121N	XO-405
Z2	IC SN7416N	

X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS



**CONTROL BOARD (A1),
PIGGYBACK
COMPONENT LOCATION**

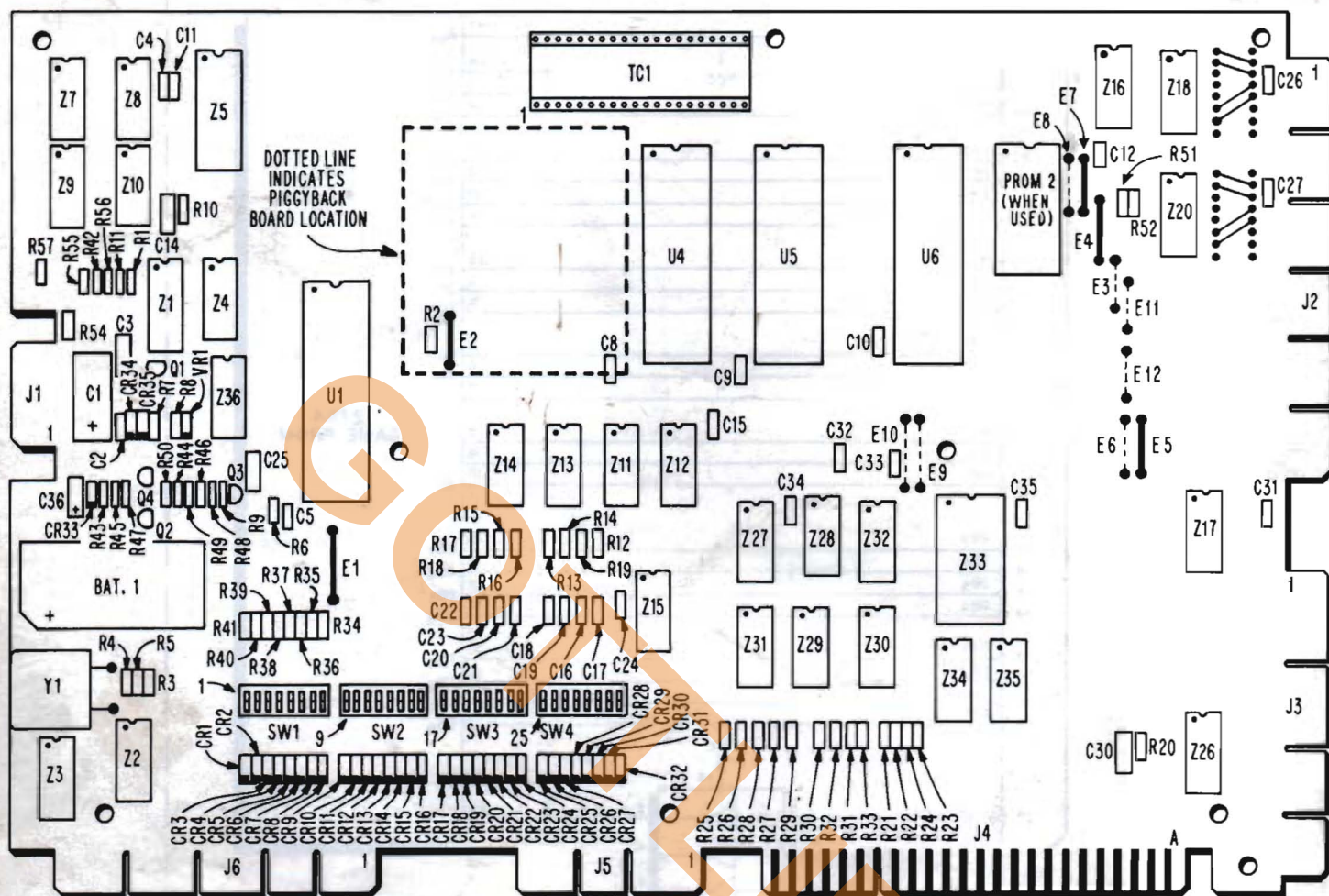


**CONTROL BOARD (A1),
PIGGYBACK
PARTS LIST**

REFERENCE	DESCRIPTION	PART NUMBER
A1	Control Board (A1), Piggyback	MA689
A2	Game Prom, 2764	XO-489
C1	IC, 7404 Inverter	XO-402
	Capacitor, .01uF, +80% -20%, 50V	XO-229
	Socket, 28 Pin	XO-536

X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS

CONTROL BOARD (A1) COMPONENT LOCATION



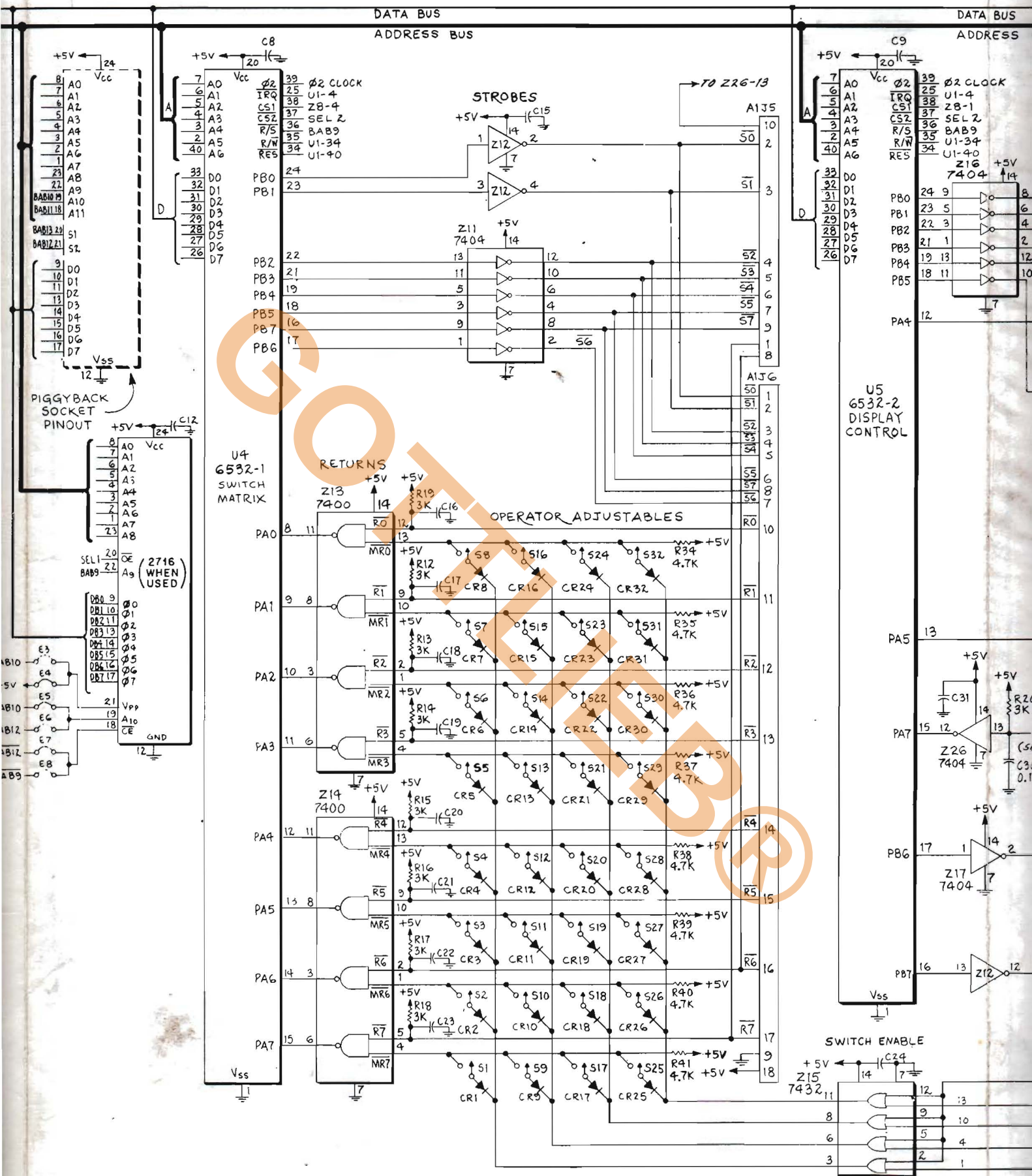
CONTROL BOARD (A1) PARTS LIST

REFERENCE	DESCRIPTION	PART NUMBER	REFERENCE	DESCRIPTION	PART NUMBER
	CONTROL BOARD	MA-774			
Bat 1	Battery-3.6V NI-CAD	XO-458	R47	Resistor, 24K ohm, 5%, 1/4W	XO-10
C1	Capacitor, 100 mfd., 10V	XO-211	SW1-SW4	Dip Switch 1008-692	XO-505
C2, C4, C5,	Capacitor, .01 mfd., 50V	XO-229	TC1	Socket, 40 Pin 640379-3	XO-530
C8-C12,			U1	CPU R6502P	XO-360
C15-C24,			U4, U5, U6	PRIOT R6532P	XO-361
C26, C27,			VRI	Diode-3.0V, 5% IN5225B or IN5987B	XO-269
C31-C35			Y1	Crystal, 3.579545 MHZ	XO-456
C3, C14, C25,	Capacitor, .1 mfd., 50V	XO-230	Z1	IC-Cmos-Dual 1 Shot SCL4528BE	XO-414
C30			Z2	IC-Dual Flip Flop SN7474N	XO-423
C36	10 mfd., 10V, TNT-AX CAP	XO-209	Z3, Z11, Z12,	IC-Hex Inverter SN7404N	XO-402
CR1-CR35	Diode, GP IN4148	XO-261	Z16, Z17,		
Q1, Q4	Transistor-PNP MPS-A70	XO-309	Z26, Z27, Z34,		
Q2, Q3	Transistor, NPN (Motorola) 2N4400	XO-313	Z35		
R1, R6	Resistor, 3.0K ohm, 5%, 1/4W	XO-23	Z4	IC-Cmos-Quad 2 Input "And" SCL4081BE	XO-401
R11-R24			Z5	IC-Static Ram S5101-L	XO-356
R42, R45,			Z7	IC-Hex Inverter SN74LS04N	XO-418
R46, R48,			Z8	IC-2 Input "Nor" SN7402N	XO-421
R51, R52,			Z9, Z13, Z14	IC-2 Input "Nand" SN7400N	XO-420
R54-R57			Z10	IC-Open Collector Inverter SN74LS05N	XO-411
R2, R34-R41	Resistor, 4.7K ohm, 5%, 1/4W	XO-7	Z15	IC-2 Input "Or" SN7432N	XO-407
R3, R43, R49	Resistor, 5.6K ohm, 5%, 1/4W	XO-19	Z18, Z20	IC-"D" Flip Flop SN74175N	XO-410
R4, R5, R44	Resistor, 2.0K ohm, 5%, 1/4W	XO-14	Z33	IC-4-16 Decoder SN74154N	XO-409
R7	Resistor, 62 ohm, 5%, 1/4W	XO-3	Z28	IC-2 to 4 Decoder SN74LS139N	XO-419
R8, R50	Resistor, 180 ohm, 5%, 1/4W	XO-24	Z29, Z30	IC-Hex Inverter-OC/HV SN7416N	XO-405
R9	Resistor, 1K ohm, 5%, 1/4W	XO-5	Z31	IC-2 Input "And" SN7408N	XO-404
R10	Resistor, 2.7M ohm, 5%, 1/4W	XO-13	Z32	IC-Hex Buffer-OC SN7417N	XO-406
R25-R33	Resistor, 620 ohm, 5%, 1/4W	XO-4	Z36	IC-Cmos SCL4069B	XO-424
				Socket 24 Pin 640361-3	XO-529

CONTROL BOARD (A1), PIGGYBACK MA689

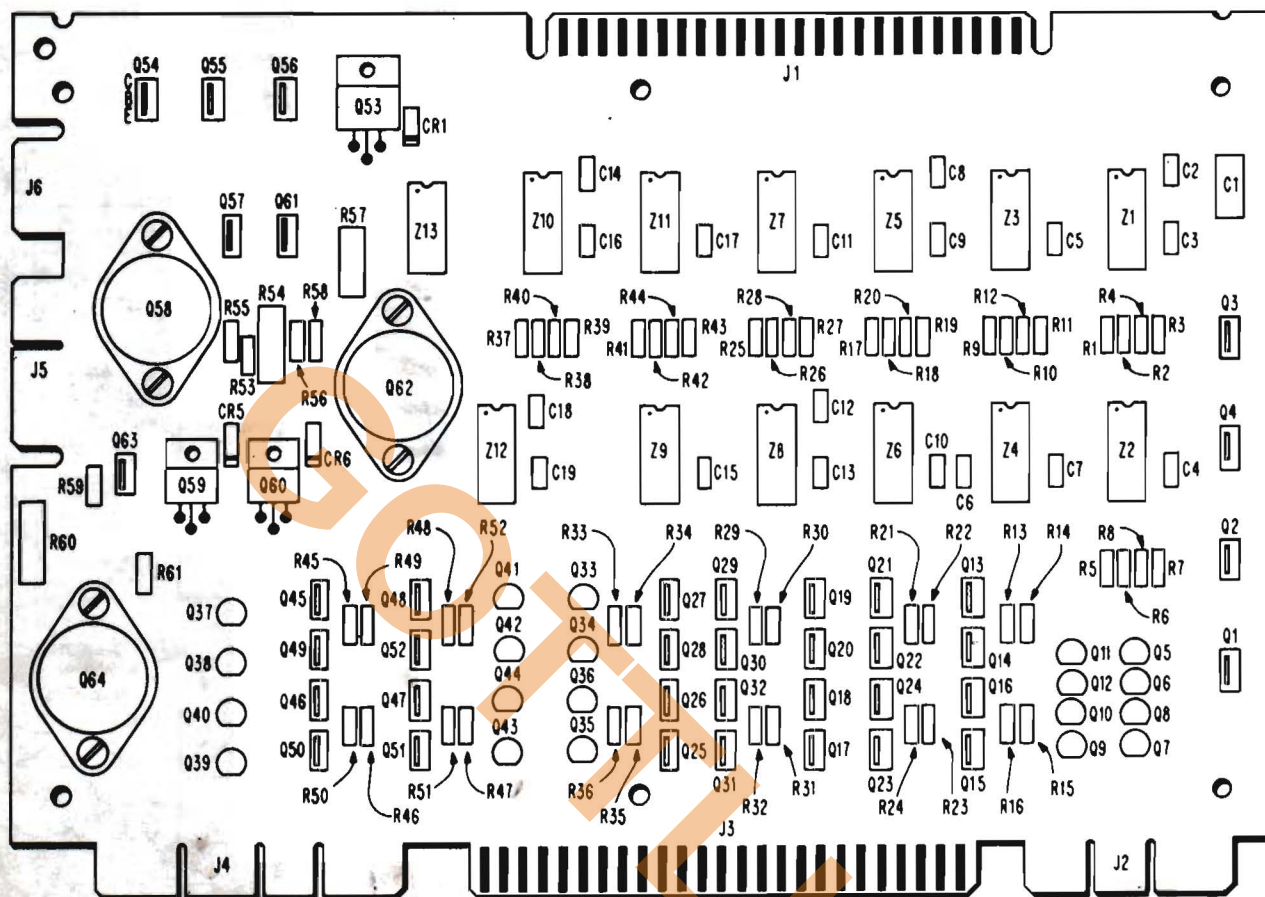
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X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS



X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS

DRIVER BOARD (A3) COMPONENT LOCATION



DRIVER BOARD (A3) PARTS LIST

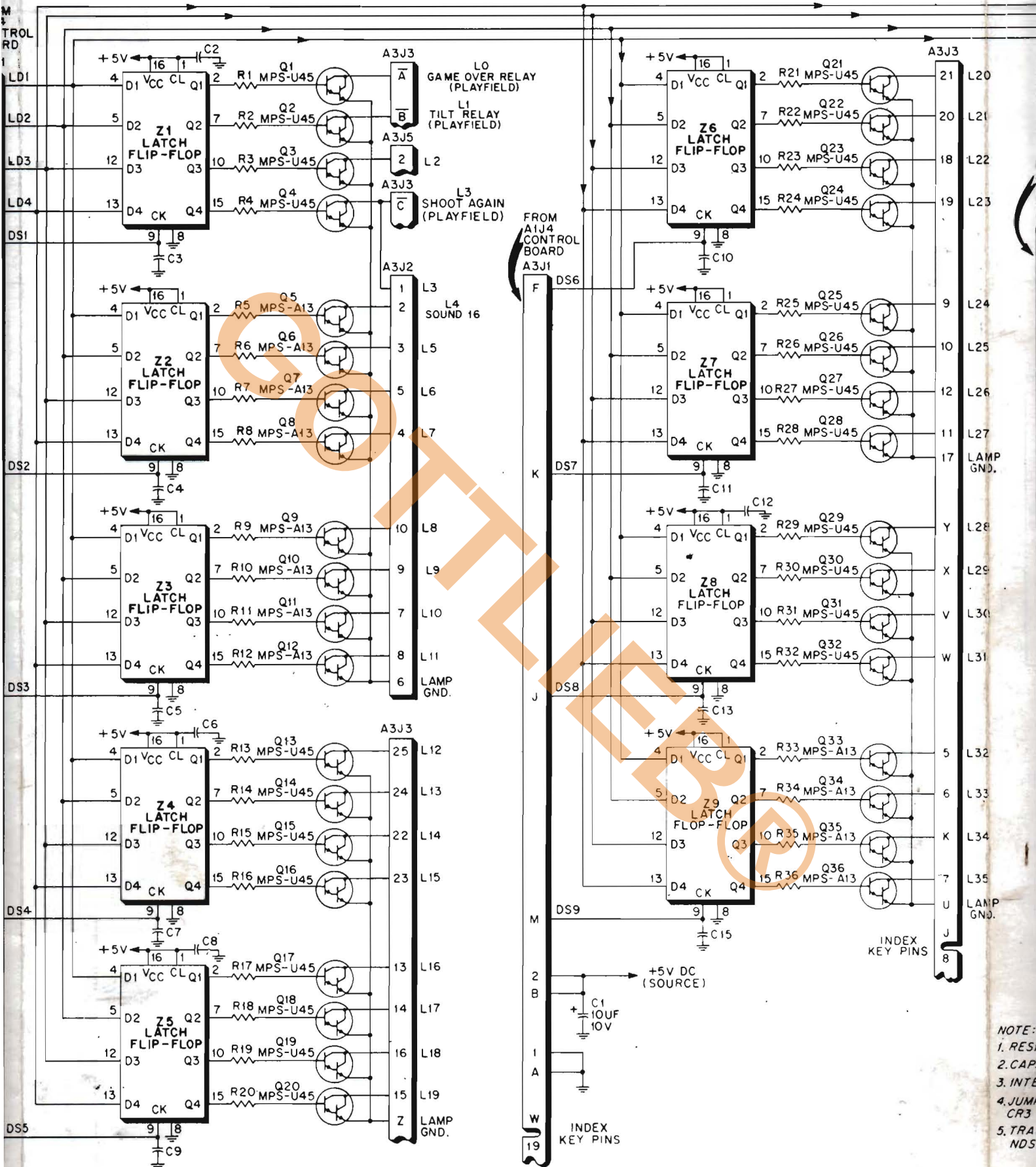
REFERENCE	DESCRIPTION	PART NUMBER
	DRIVER BOARD	MA-295
C1	Capacitor, 10 mfd. 10V Tantalum	XO-209
C2-C19	Capacitor, 01 mfd. 50V Ceramic	XO-229
CR1-CR6	Diode—Silicon 1N4148	XO-261
R1-R53, R61,	Resistor 1.0K ohm, 5%, 1/4W	XO-5
R55, R56, R58, R59		
R54, R57, R60	Resistor, 91 ohm, 5%, 1W	XO-158
Q1-Q4, Q13-	Transistor, NPN, Darlington MPS-U45	XO-306
Q32, Q45-Q52,		
Q54-Q57, Q61, Q63		
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:

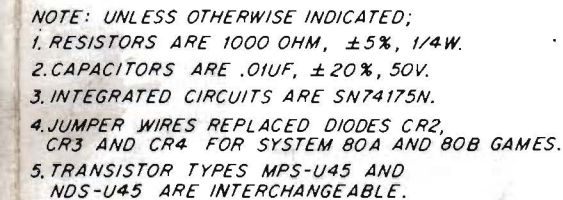
1. JUMPER WIRES REPLACED DIODES CR2, CR3 AND CR4 FOR SYSTEM BOA AND BOB GAMES.
2. TRANSISTOR TYPES MPS-U45 AND NDS-U45 ARE INTERCHANGEABLE.

FROM
A1J4
CONTROL
BOARD
A3J1

7 LD1
6 LD2
4 LD3
5 LD4
C DS1
3 DS2
E DS3
D DS4
H DS5



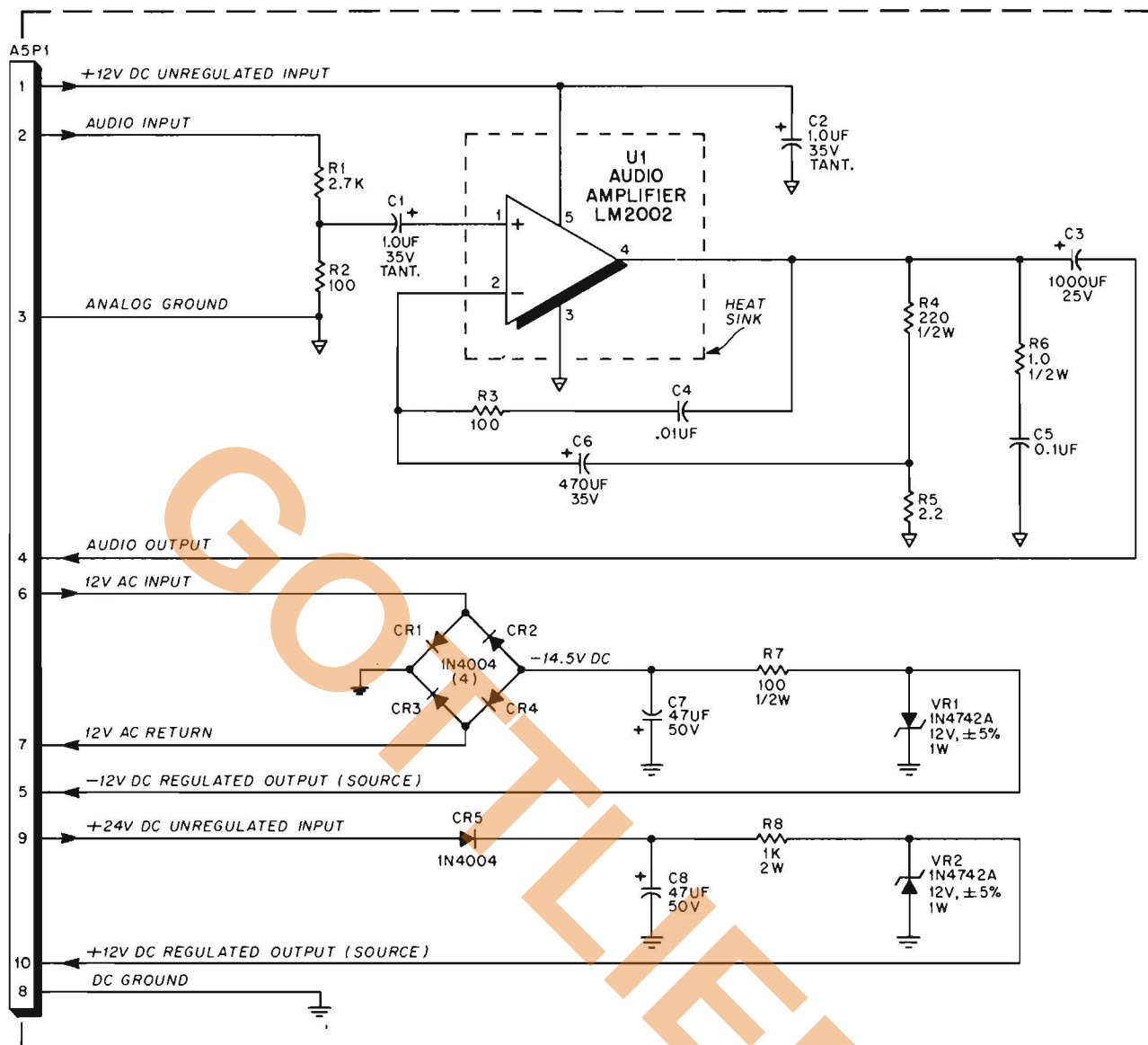
20
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AMF
IND.
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AMF
IND.



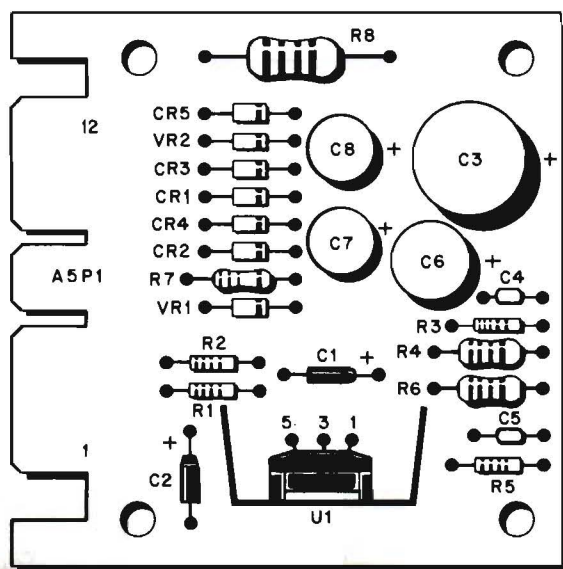
X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS

GOTTLIEB®

X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS



AUXILIARY POWER SUPPLY (A5) COMPONENT LOCATION



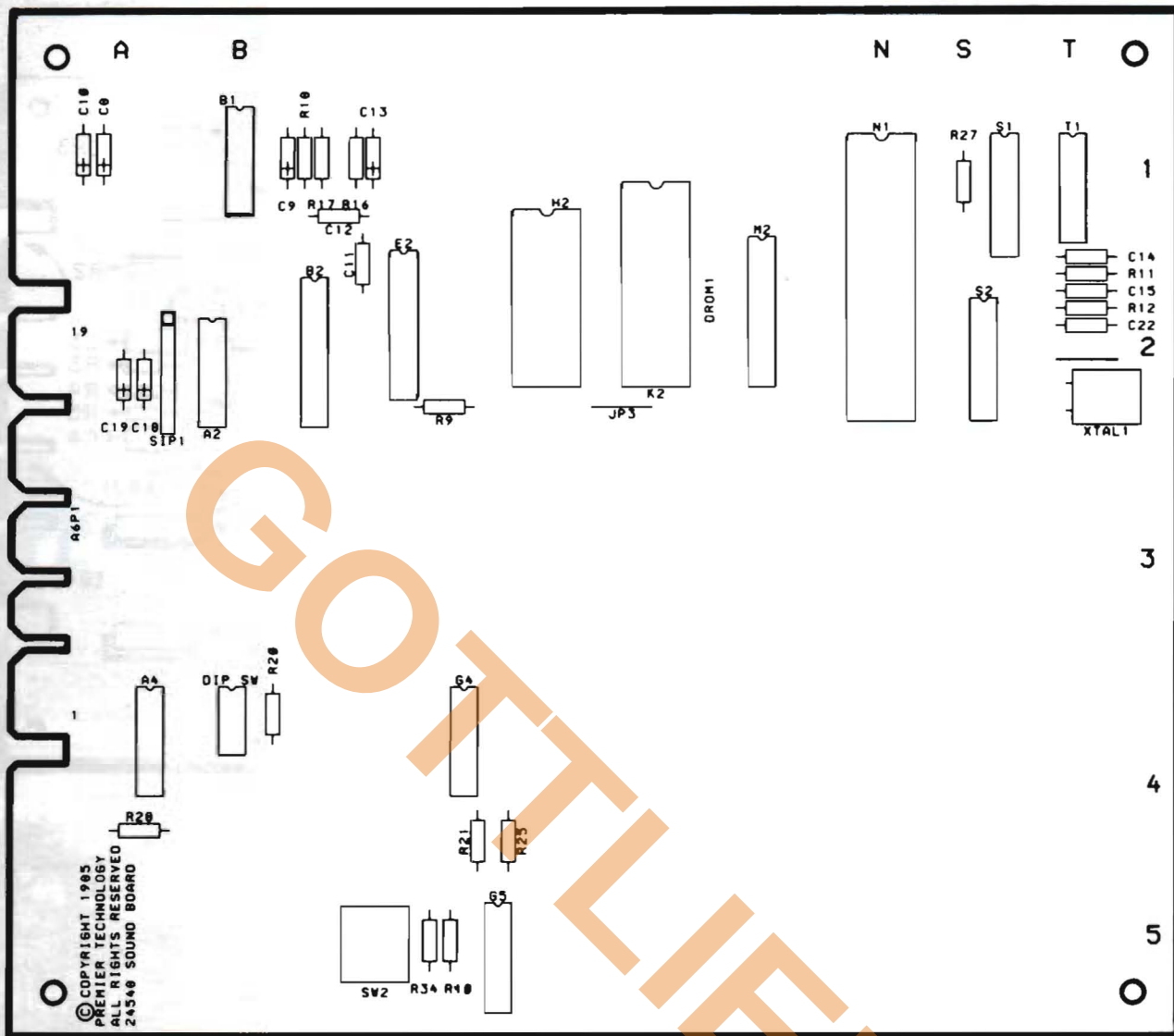
Premier Technology			
TITLE AUXILIARY POWER SUPPLY (A5)			
DRAWN ON			
APPROVED	DATE	E-24715	
R.H.M.	9 OCT 85		

AUXILIARY POWER SUPPLY (A5) PARTS LIST

REFERENCE	DESCRIPTION	PART NUMBER
C1, C2	Auxiliary Power Supply	MA-767
C3	Capacitor, 1UF, 10%, 35V, TANT	XO-715
C4	Capacitor, 1000UF, 25V	XO-874
C5	Capacitor, .01UF, +80% -20%, 50V	XO-229
C6	Capacitor, 0.1UF, +80% -20%, 50V	XO-230
C7, C8	Capacitor, 470UF, 35V	XO-284
C7, C8	Capacitor, 47UF, 50V	XO-210
CR1-CR5	Diode, 1N4004	XO-254
R1	Resistor, 2.7K Ohm, 5%, 1/4W	XO-6
R2, R3	Resistor, 100 Ohm, 5%, 1/4W	XO-28
R4	Resistor, 220 Ohm, 5%, 1/2W	XO-185
R5	Resistor, 2.2 Ohm, 5%, 1/4W	XO-595
R6	Resistor, 1 Ohm, 5%, 1/2W	XO-593
R7	Resistor, 100 Ohm, 5%, 1/2W	XO-52
R8	Resistor, 1K Ohm, 5%, 2W	XO-627
U1	Audio Amplifier, LM2002	XO-550
VR1, VR2	Diode, Zener, 1N4742A, 12V, +5%, 1W	XO-257
	Heat Sink	XO-472

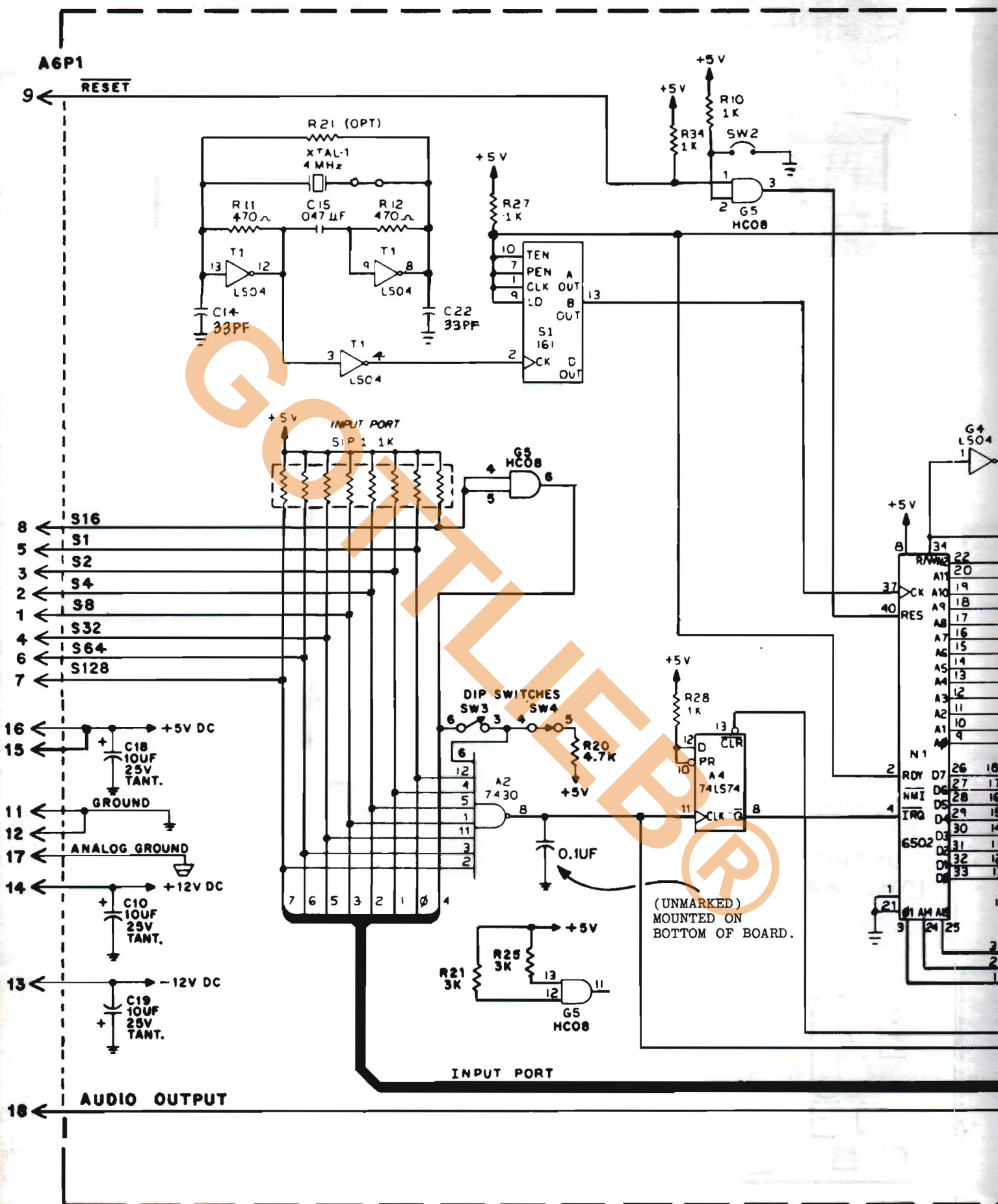
X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS

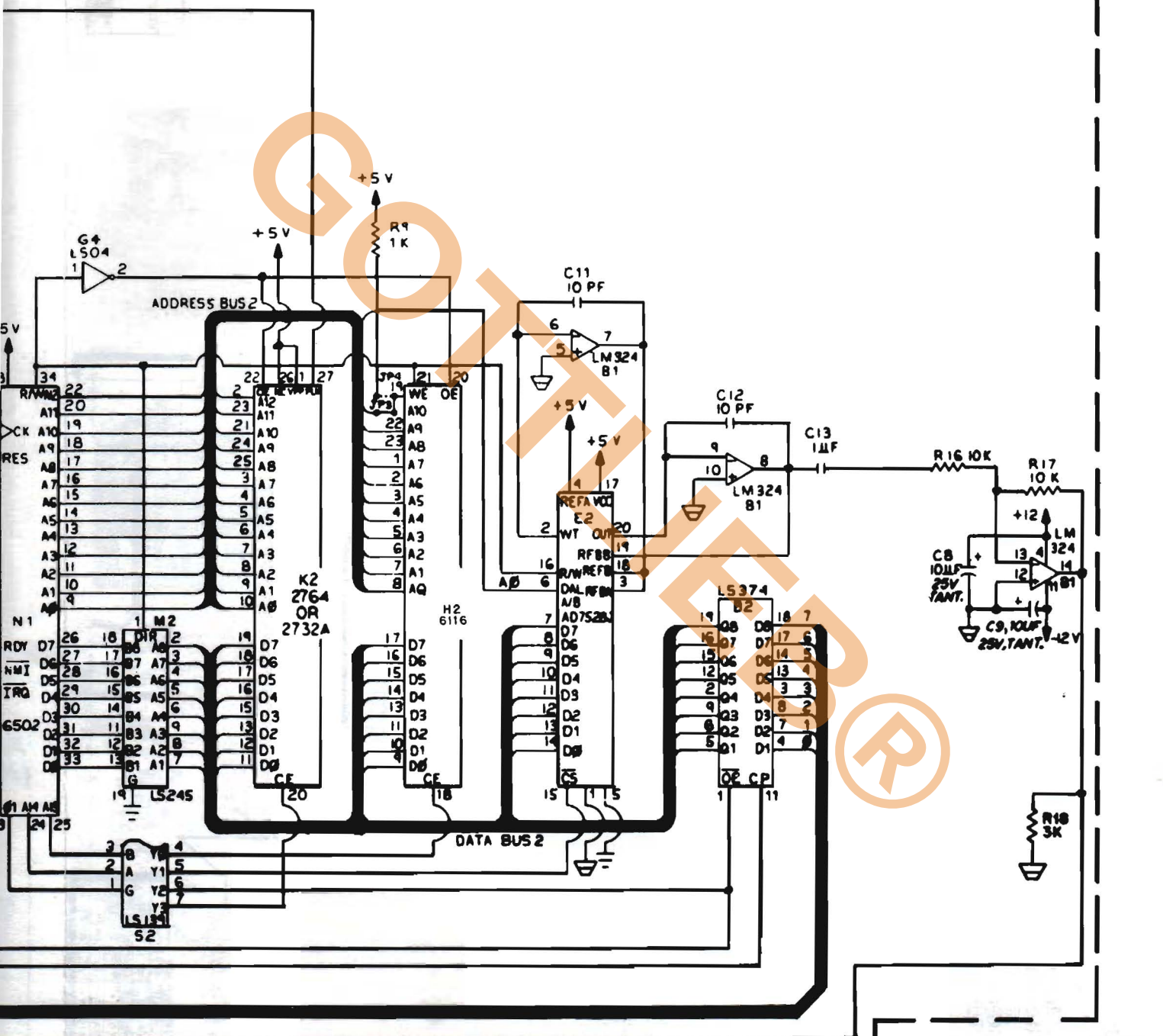
SOUND BOARD (A6) COMPONENT LOCATION



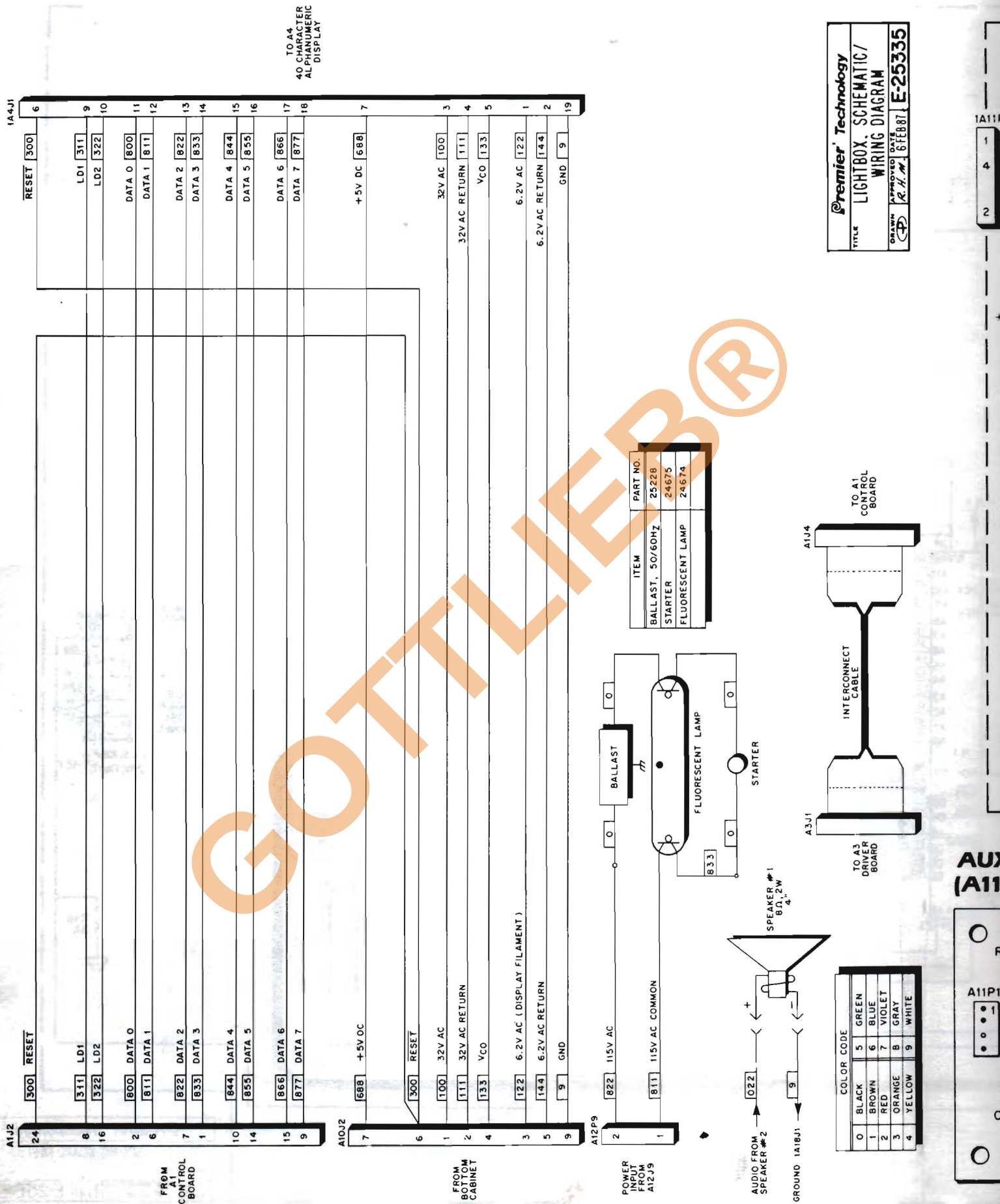
SOUND BOARD (A6) PARTS LIST

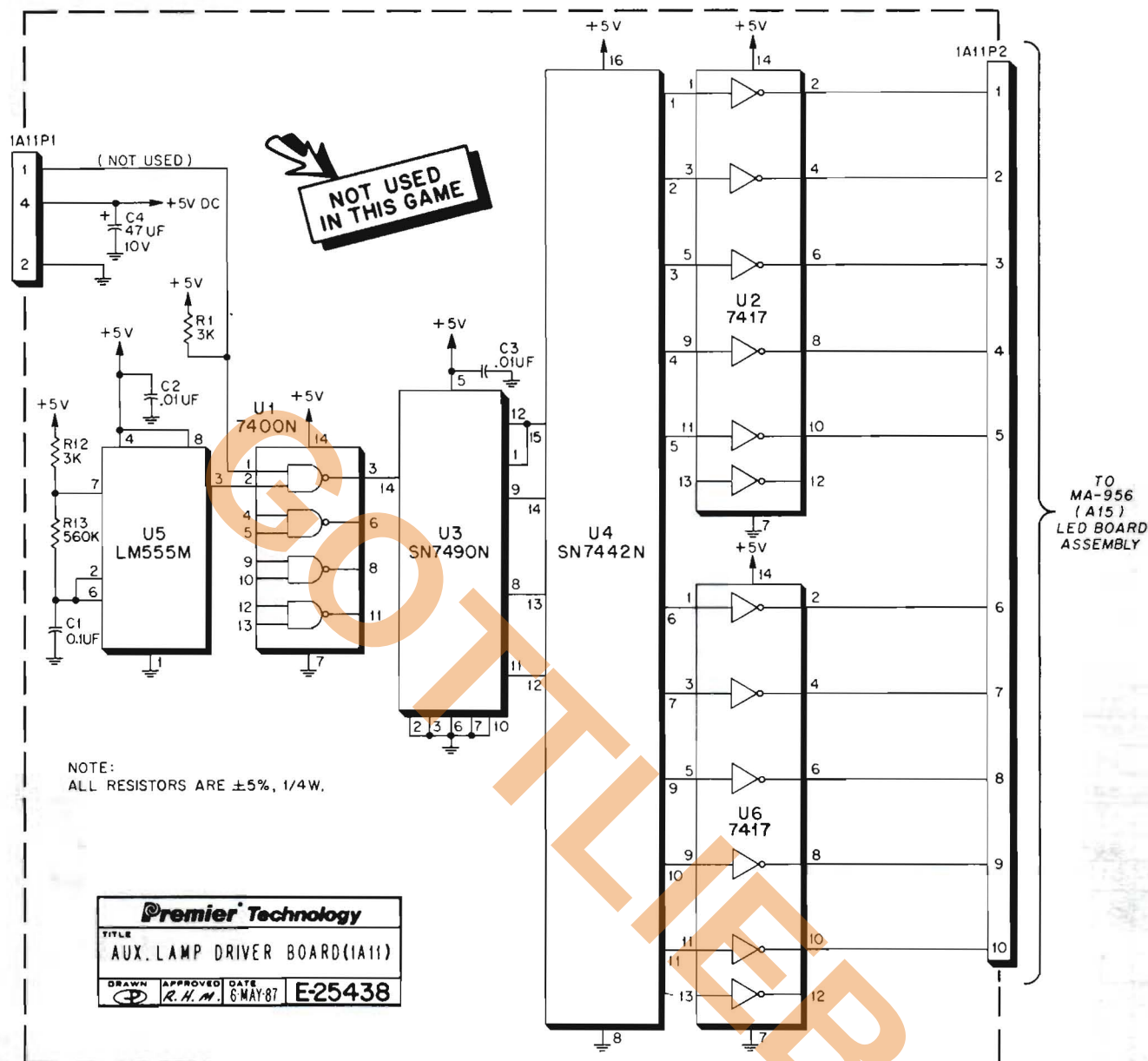
REFERENCE	DESCRIPTION	PART NUMBER
	Sound Board Assembly	MA-982
C8,C9,C10	Capacitor, 10UF, 20%, 25V	XO-127
C18,C19		
C11,C12	Capacitor, 10PF, +80%-20%, 50V	XO-635
C13	Capacitor, 1UF, 50V	XO-746
C14,C22	Capacitor, 33PF, 10%, 100V	XO-896
C15	Capacitor, .047UF, 20%, 50V	XO-638
Unmarked	Capacitor, 0.1UF, +80%-20% (Mounted On Bottom Of Board)	XO-230
DIP SW	Dip Switch, 4 Position, 8 Pin	XO-640
R9,R10,R27,	Resistor, 1K Ohm, 5%, 1/4W	XO-5
R28,R34		
R11,R12	Resistor, 470 Ohm, 5%, 1/4W	XO-35
R16,R17	Resistor, 10K Ohm, 5%, 1/4W	XO-18
R18,R21,R25	Resistor, 3K Ohm, 5%, 1/4W	XO-23
R20	Resistor, 4.7K Ohm, 5%, 1/4W	XO-7
SIP 1	Resistor Pack, 1K x 8	XO-493
SW 2	Pushbutton Switch	XO-365
A2	7430, 8 Input "NAND" Gate	XO-643
A4	74LS74, Dual D-Type Flip-Flop	XO-434
B1	LM324, Quad Op-Amp	XO-644
B2	74LS374, Octal D-Type Flip-Flop	XO-96
E2	AD 7528J, Multiplier DAC	XO-647
G4,T1	74LS04, Hex Inverter	XO-418
G5	74HC08, Quad 2 Input "AND" Gate	XO-872
H2	2K x 8 RAM, 6116, (200NSEC)	XO-191
K2	IC, (Specified Per Game)	
M2	74LS245, Octal Bus Transceiver	XO-79
N1	6502, CPU	XO-360
S1	74161, Sync. Pre-set. Binary Counter	XO-192
S2	74LS139, Dual 1 Of 4 Decoder	XO-419
XTAL 1	4.0 MHz Crystal	XO-366
	28 Pin DIP Socket	XO-536
	Jumper, 22 Gauge (2)	XO-469



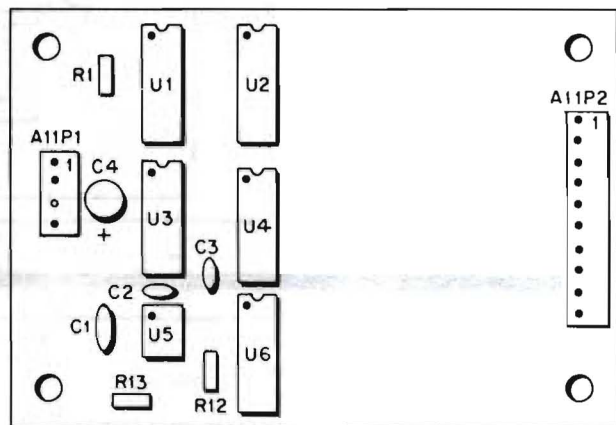


Premier Technology			
TITLE		SOUND BOARD (A6)	
USED ON			
DRAWN	APPROVED	DATE	
R.H.N.		SEP 17-87	E25627





AUXILIARY LAMP DRIVER BOARD (A11) COMPONENT LOCATION

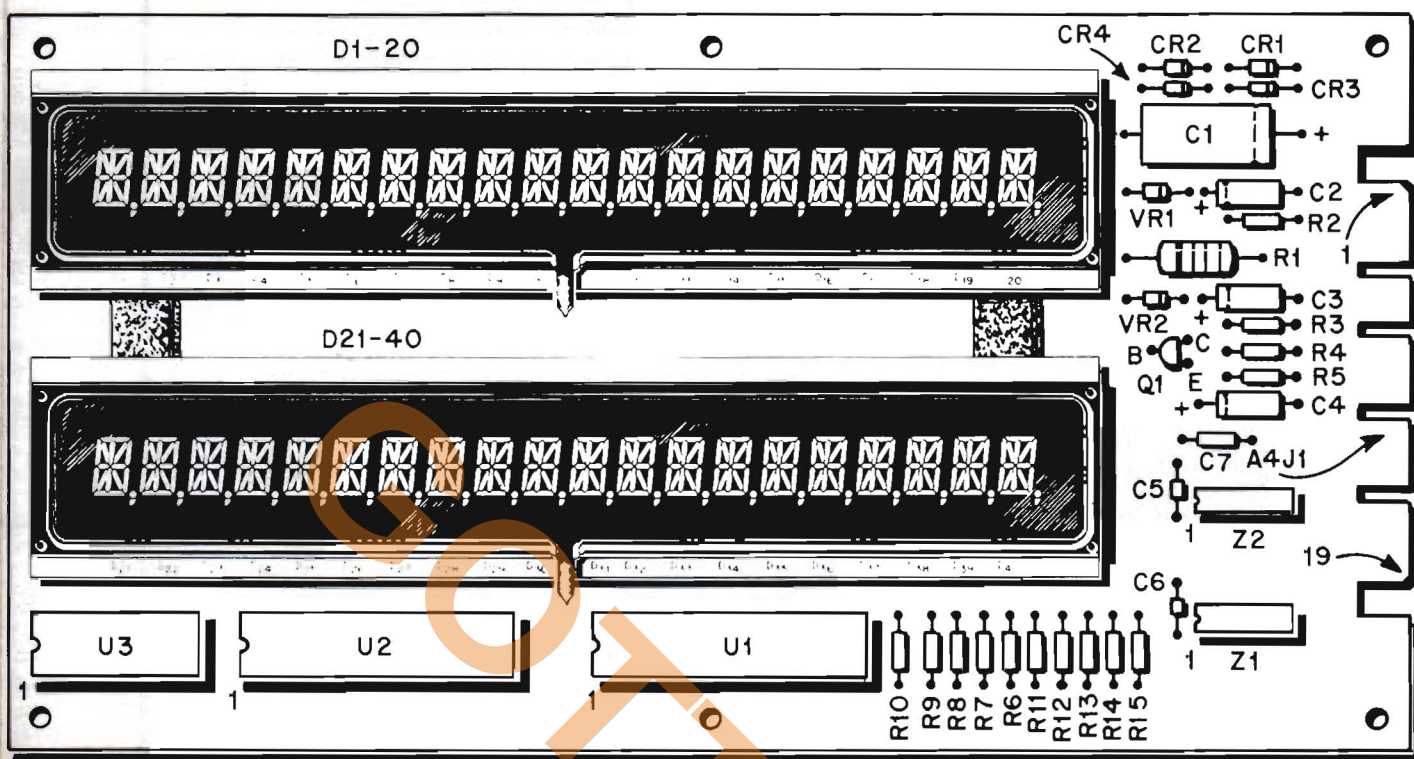


AUXILIARY LAMP DRIVER BOARD (A11) PARTS LIST

REFERENCE	DESCRIPTION	PART NUMBER
C1	Auxiliary Lamp Driver Assembly	MA-936
C2-C3	Capacitor, .1 MFD, 100V	XO-626
C4	Ceramic Radial Lead	XO-202
C4	Capacitor, .01 MFD, 100V	XO-227
C4	Capacitor, 47 MFD, 10V	XO-227
R1, R12	Electrolytic Radial Lead	XO-227
R13	Resistor, 3K Ohm, 5%, 1/4W	XO-23
U1	Resistor, 560K Ohm, 5%, 1/4W	XO-169
U2, U6	2-Input NAND, 7400	XO-420
U3	Inverter, 7417	XO-406
U4	Decade Counter, 7490	XO-425
U5	Decoder, 7442	XO-426
P2	Timer, NE555	XO-631
P1	10 Position Connector	XO-531
	4 Position Connector	XO-879
	Circuit Board Support (4)	23984

X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS

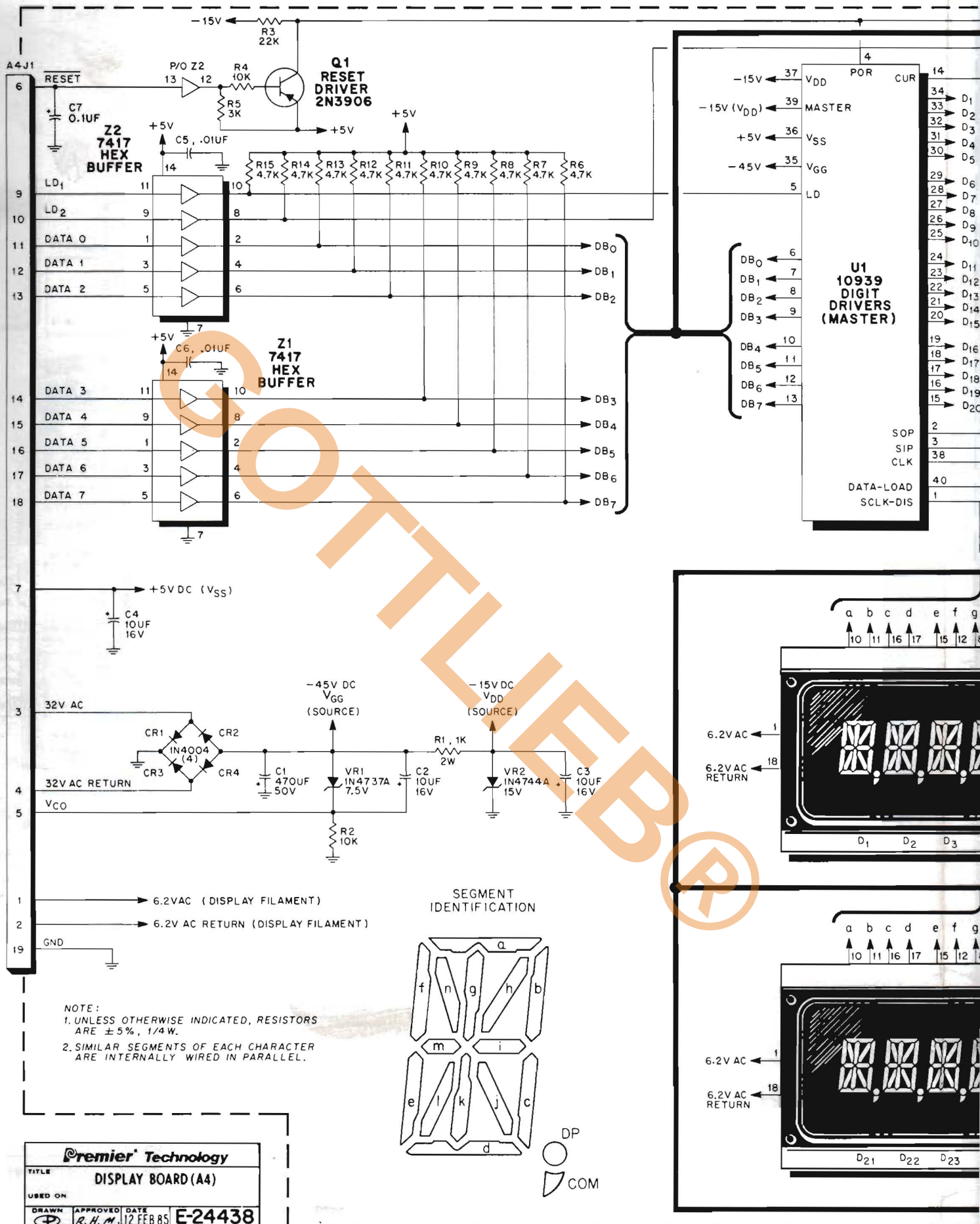
DISPLAY BOARD (A4) COMPONENT LOCATION

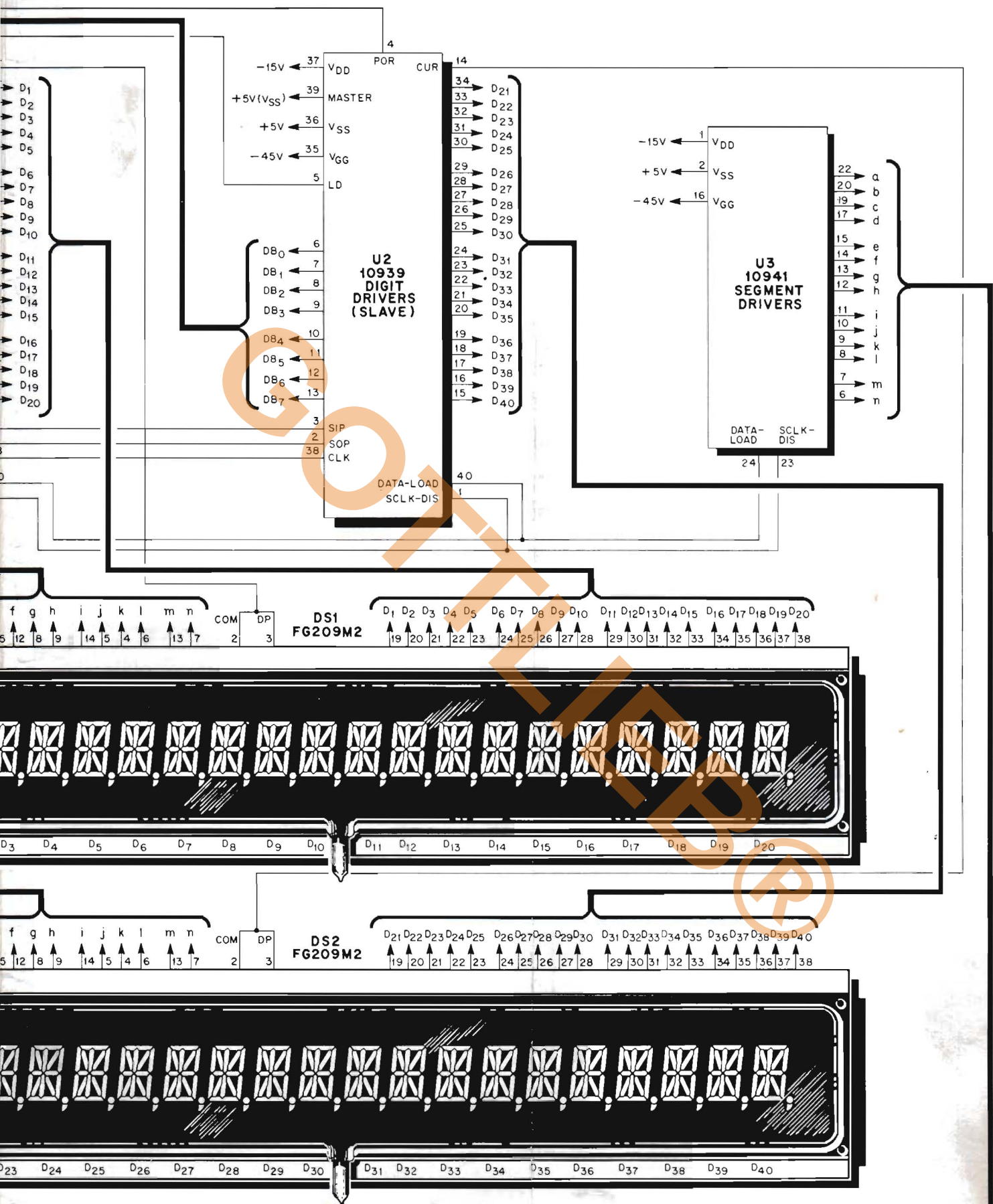


DISPLAY BOARD (A4) PARTS LIST

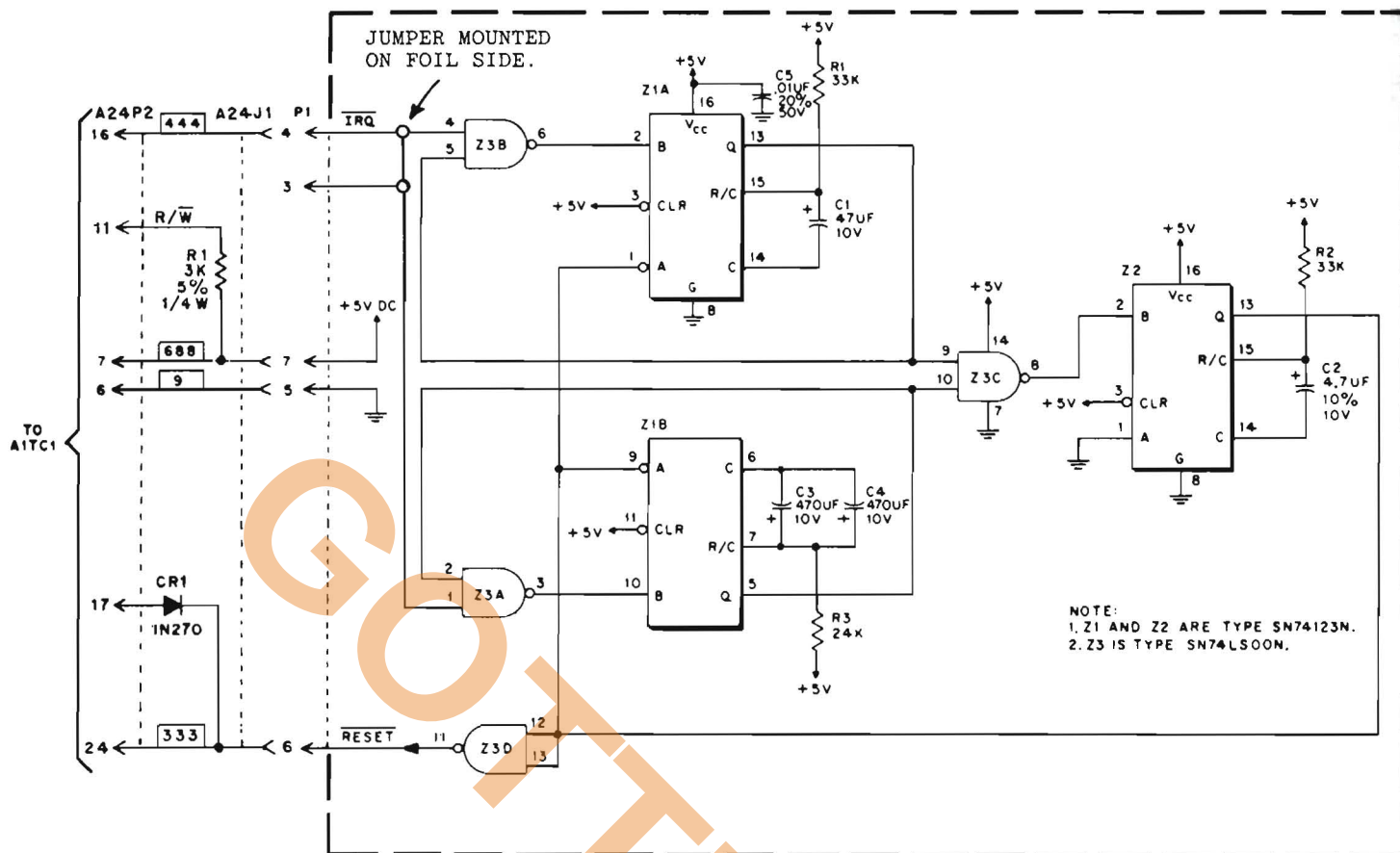
REFERENCE	DESCRIPTION	PART NUMBER
	Display Board (A4)	MA644
C1	Capacitor, 470UF, 50V	XO-847
C2, C3, C4	Capacitor, 10UF, 16V	XO-846
C5, C6	Capacitor, .01UF, +80% -20%	XO-229
*C7	Capacitor, 0.1UF, 50V	XO-230
CR1-CR4	Diode, 1N4004	XO-254
DS1, DS2	Display, Alphanumeric	XO-840
Q1	Transistor, PNP, 2N3906	XO-588
R1	Resistor, 1K, 5%, 2W	XO-627
R2, R4	Resistor, 10K, 5%, 1/4W	XO-18
R3	Resistor, 22K, 5%, 1/4W	XO-42
R5	Resistor, 3K, 5%, 1/4W	XO-23
R6-R15	Resistor, 4.7K, 5%, 1/4W	XO-7
U1, U2	IC, Digit Drivers, 10939	XO-841
U3	IC, Segment Drivers, 10941	XO-842
VR1	Diode, Zener, 1N4737A, 7.5V	XO-844
VR2	Diode, Zener, 1N4744A, 15V	XO-843
Z1, Z2	IC, Hex Buffer, 7417	XO-406
	Tape, Vinyl Foam	24127-1

*C7 IS LOCATED ON THE NON-COMPONENT
SIDE OF THE BOARD IN SOME CASES.



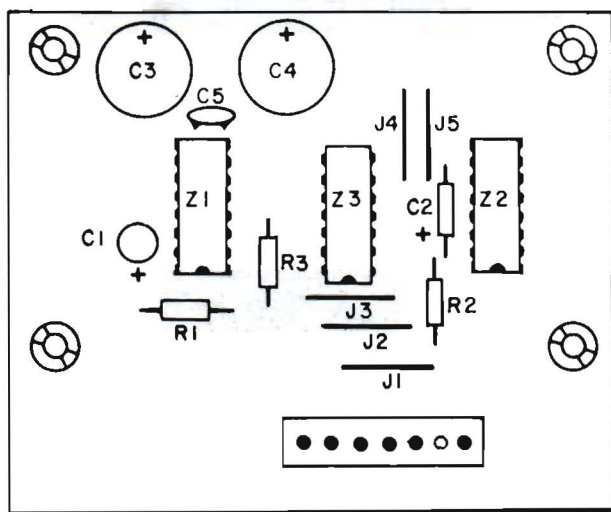


X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS



Premier Technology			
TITLE	RESET CIRCUIT BOARD		
USED ON			
DRAWN	APPROVED	DATE	C-21063
P	BAM	9.2.81	

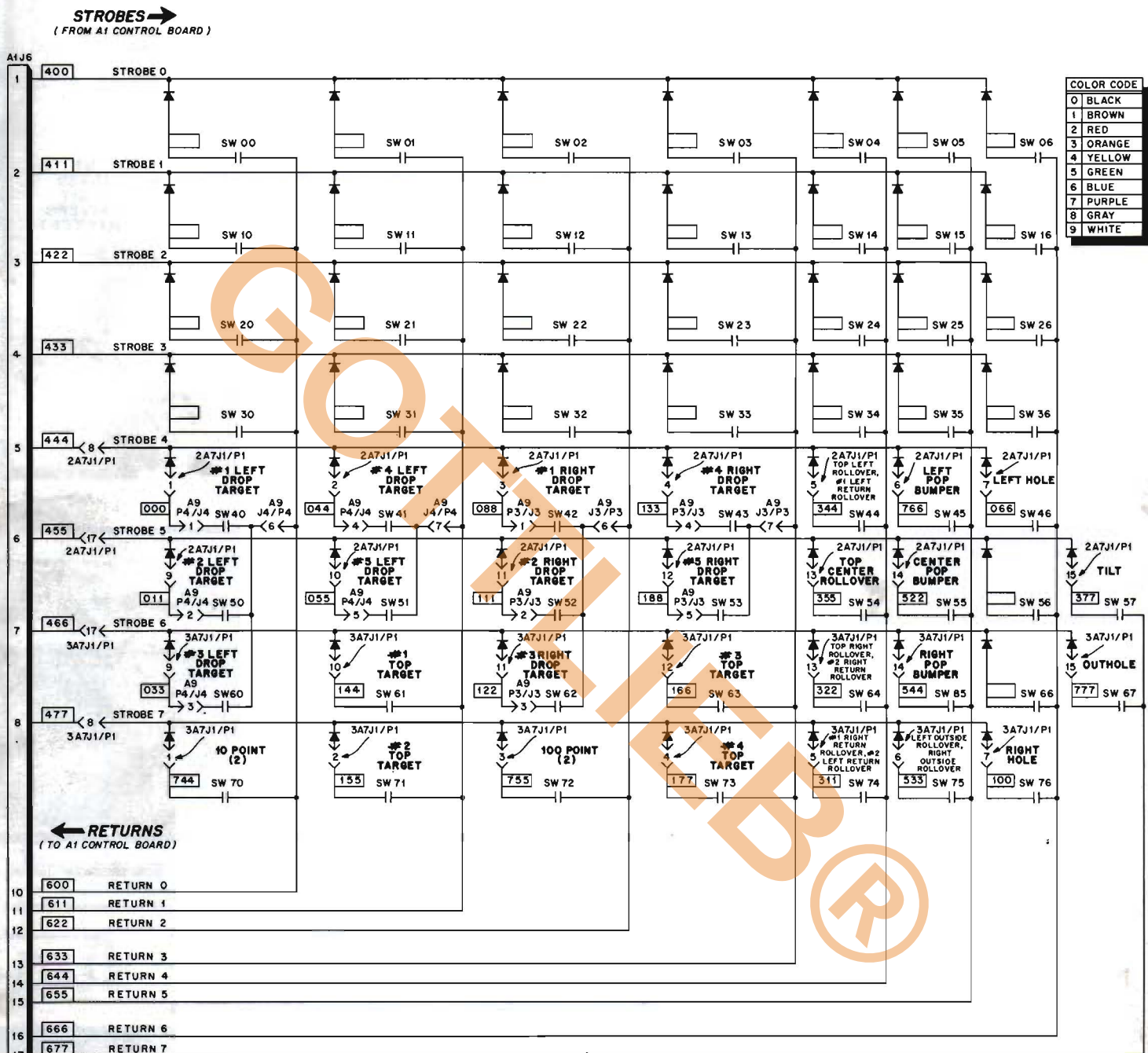
**RESET BOARD (A24)
COMPONENT LOCATION**



RESET BOARD (A24) PARTS LIST

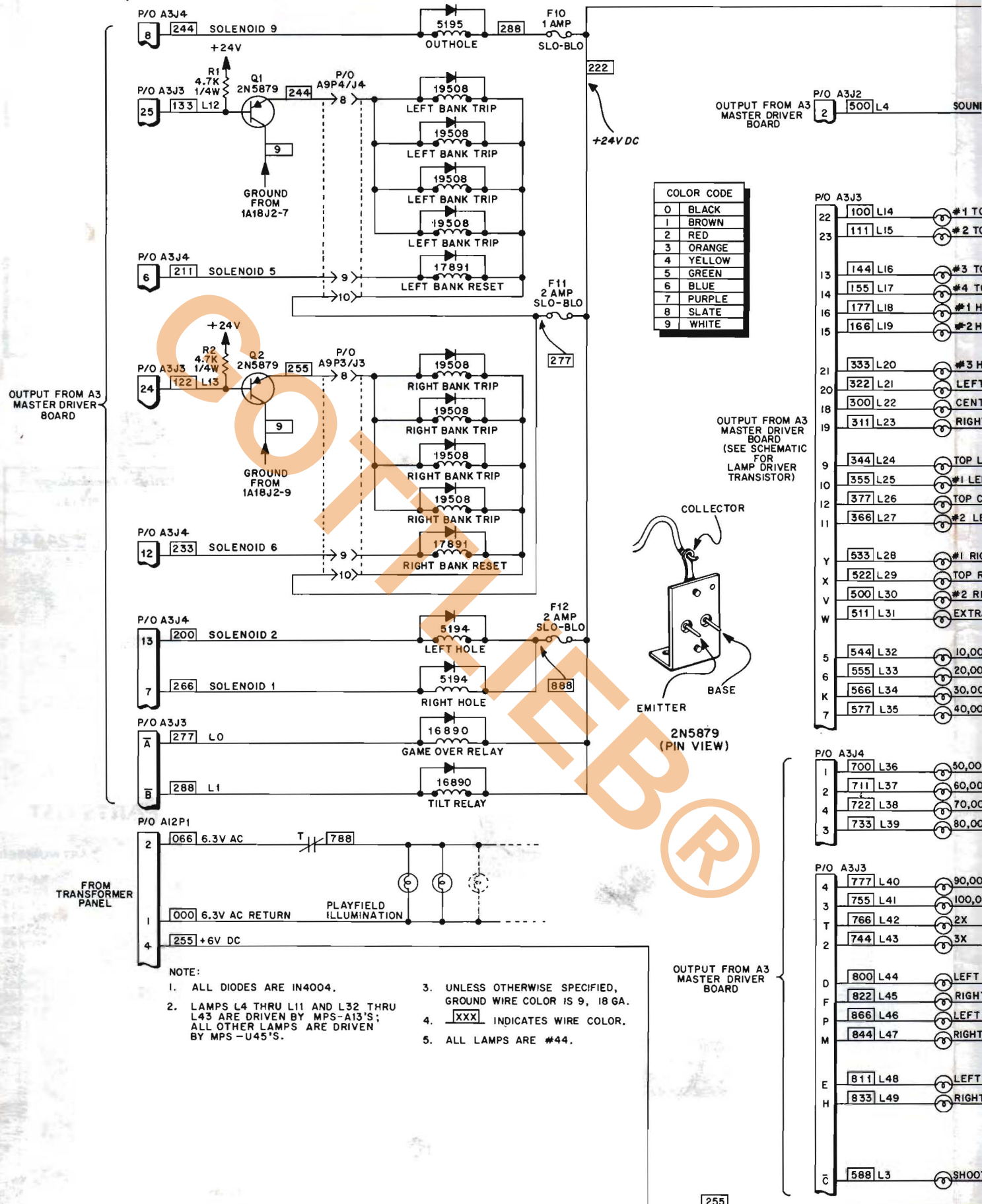
REFERENCE	DESCRIPTION	PART NUMBER
	RESET BOARD	MA-980
R1, R2	Resistor 33K ohm, 5%, 1/4W.	XO-43
R3	Resistor 24K ohm, 5%, 1/4W.	XO-10
C1	Capacitor 47 μ fd., 10V	XO-227
C2	Capacitor 4.7 μ fd., 10V.	XO-226
C3, C4	Capacitor 470 μ fd., 10V	XO-214
C5	Capacitor .01 μ fd	XO-202
Z1, Z2	IC 74123N	XO-398
Z3	IC 74LS00N	XO-427
	7 Pin Connector	XO-879
A24P2/A24J2	Cable Assembly	MA-796

X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS



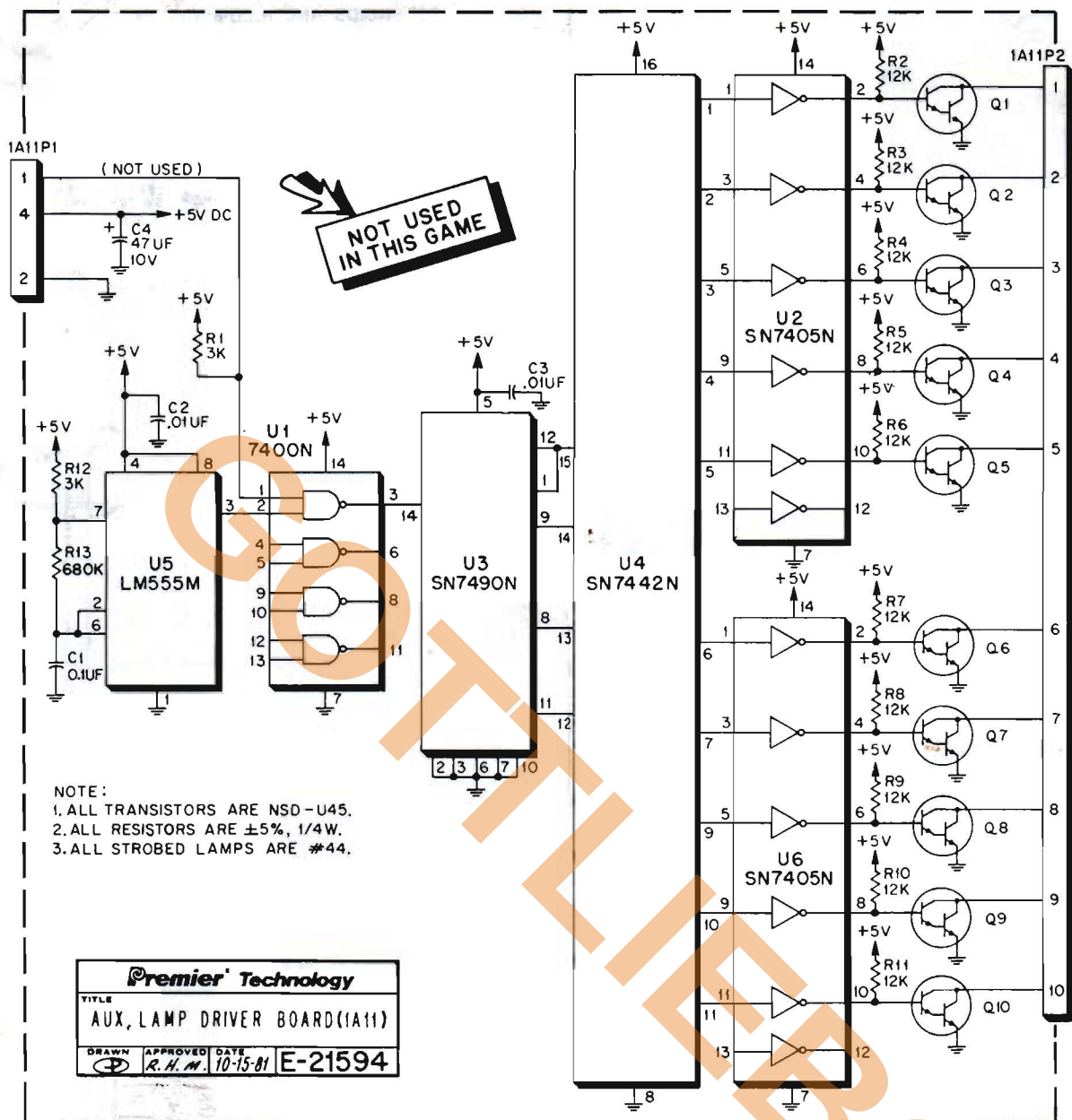
Premier Technology			
TITLE		SWITCH MATRIX	
USED ON		GAME #684C	
DRAWN	APPROVED	DATE	
R. H. M.		6-MAY-87	E-25624

PLAYBOARD "CONTROLLED" SOLENOIDS AND ILLUMINATION

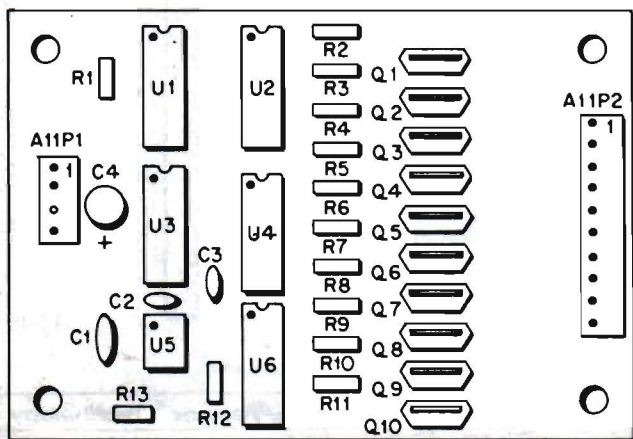




X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS



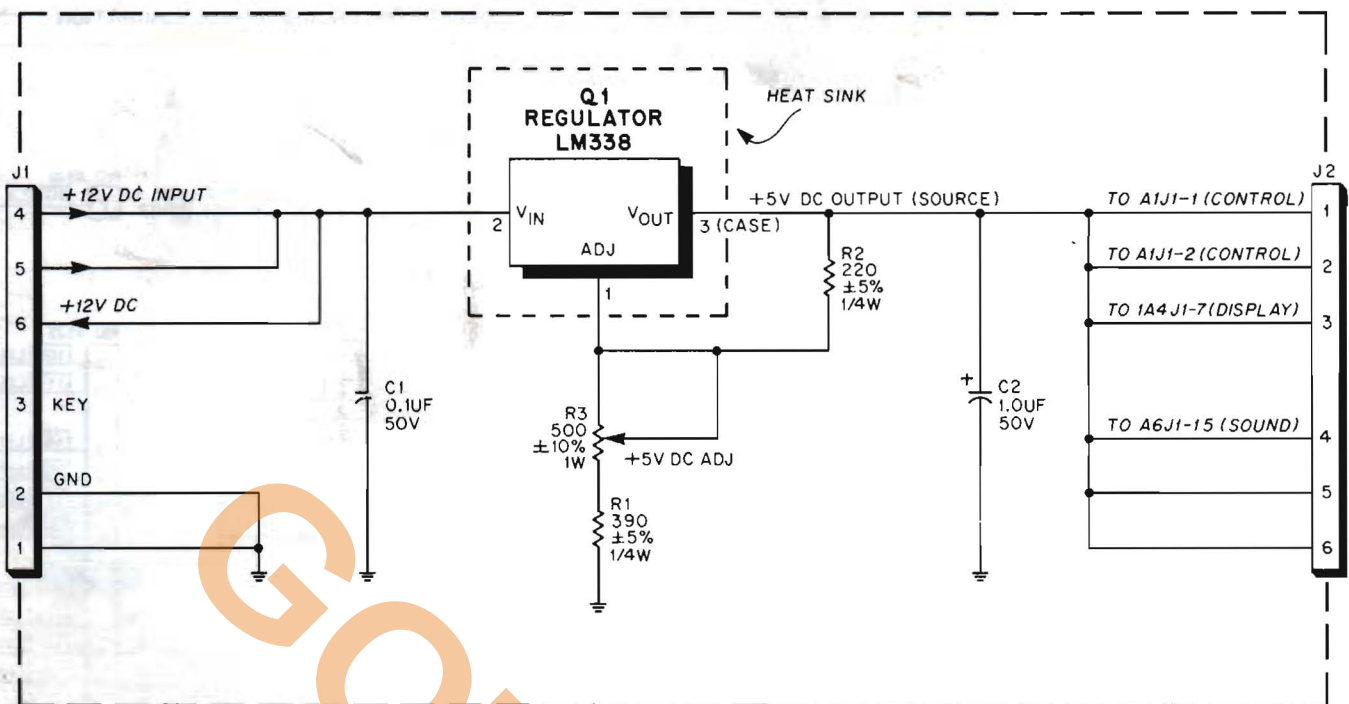
AUXILIARY LAMP DRIVER BOARD (A11) COMPONENT LOCATION



AUXILIARY LAMP DRIVER BOARD (A11) PARTS LIST

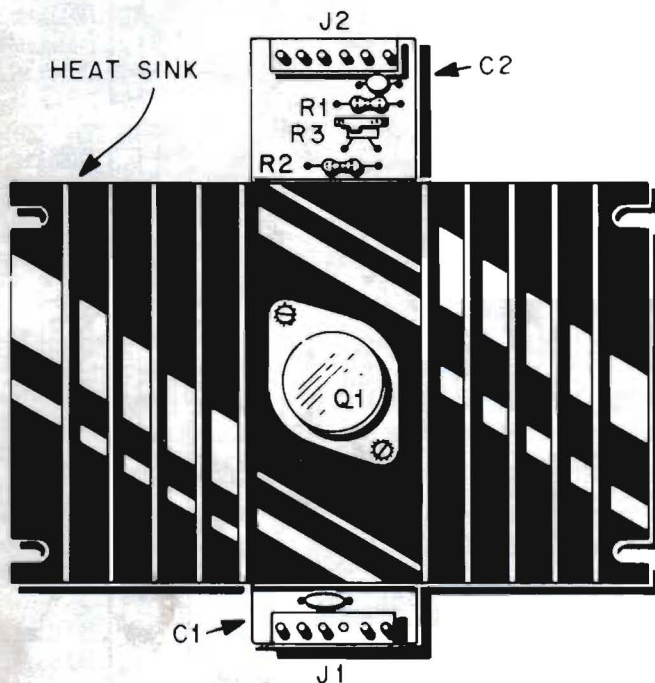
REFERENCE	DESCRIPTION	PART NUMBER
	AUXILIARY LAMP DRIVER ASSEMBLY	MA-789
C1	CAPACITOR, .1 MFD, 100V	XO-626
C2-C3	CERAMIC RADIAL LEAD CAPACITOR, .01 MFD, 100V	XO-202
C4	CAPACITOR, 47 MFD, 10V	XO-227
Q1-Q10	ELECTROLYTIC RADIAL LEAD TRANSISTOR, NSD-U45 NPN DARLINGTON	XO-146
R1, R12	RESISTOR, 3K OHM, 5%, 1/4 W	XO-23
R2-R11	RESISTOR, 12K OHM, 5%, 1/4W	XO-9
R13	RESISTOR, 680K OHM, 5%, 1/4W	XO-669
U1	I.C. 2-INPUT NAND, 7400	XO-420
U2, U6	I.C. INVERTER, 7405	XO-403
U3	I.C. DECADE COUNTER, 7490	XO-425
U4	I.C. DECODER, 7442	XO-426
U5	I.C. TIMER, NE555	XO-631
P2	10 POS. CONNECTOR	XO-879
P1	4 POS. CONNECTOR	XO-879

X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS



Premier' Technology			
TITLE		POWER SUPPLY (A2)	
USED ON			
DRAWN	APPROVED	DATE	
	R. H. M.	12 FEB 85	E-24441

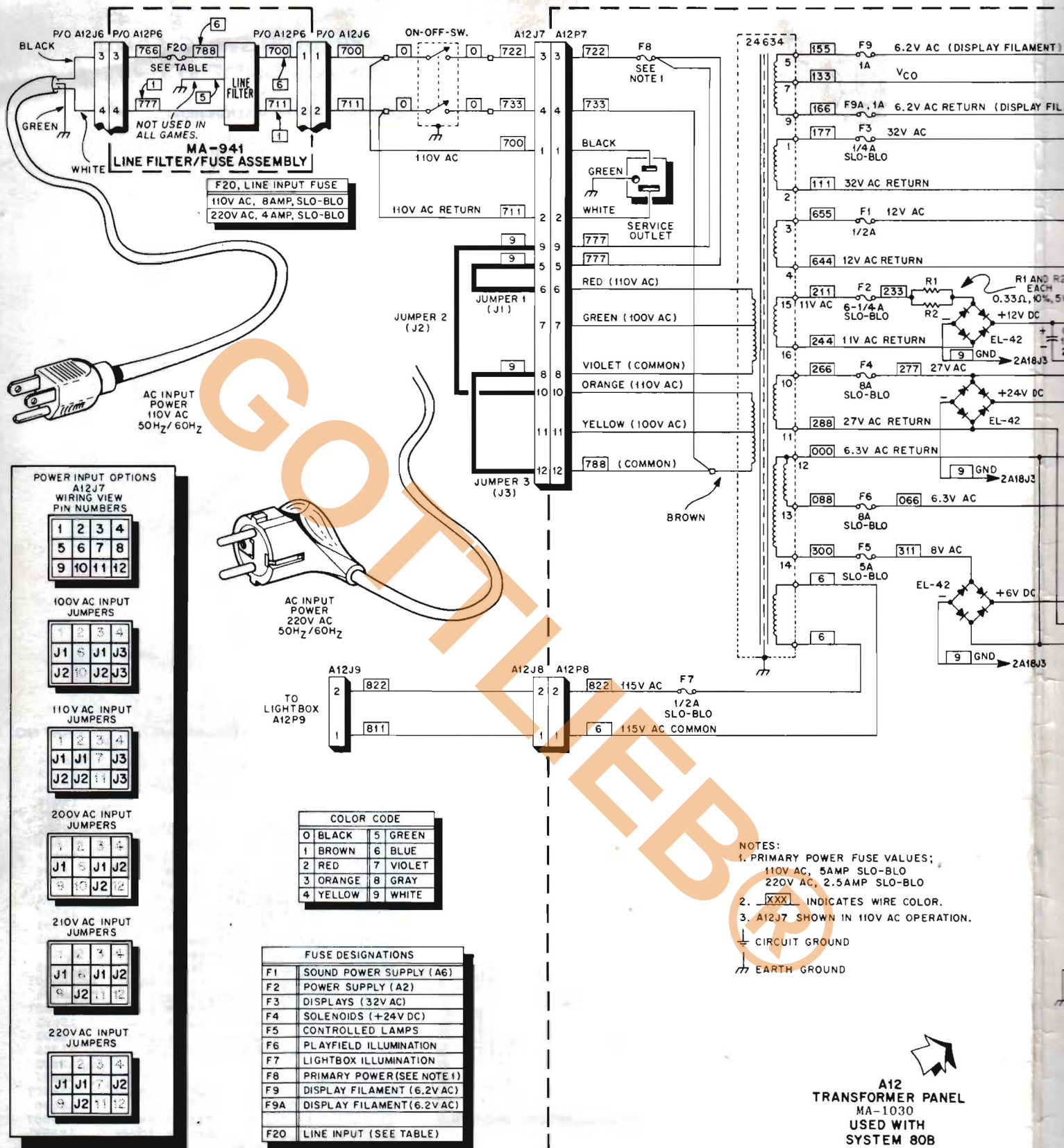
POWER SUPPLY (A2) COMPONENT LOCATION



POWER SUPPLY (A2) PARTS LIST

REFERENCE	DESCRIPTION	PART NUMBER
	Power Supply (A2)	MA-831
C1	Capacitor, 0.1uF, +80% -20%, 50V	XO-230
C2	Capacitor, 1uF, 10%, 50V	XO-217
J1, J2	Connector, 6 Pin	XO-879
Q1	Regulator, LM338, (5 Amp)	XO-839
R1	Resistor, 390 ohm, 5%, 1/4W	XO-845
R2	Resistor, 220 ohm, 5%, 1/4W	XO-21
R3	Resistor, (Pot) 500 ohm, 10%, 1W	XO-112
	Heat Sink	XO-534
	Insulator, (Regulator)	XO-522
	Insulator, (Regulator)	XO-523

X. WIRING AND SCHEMATIC





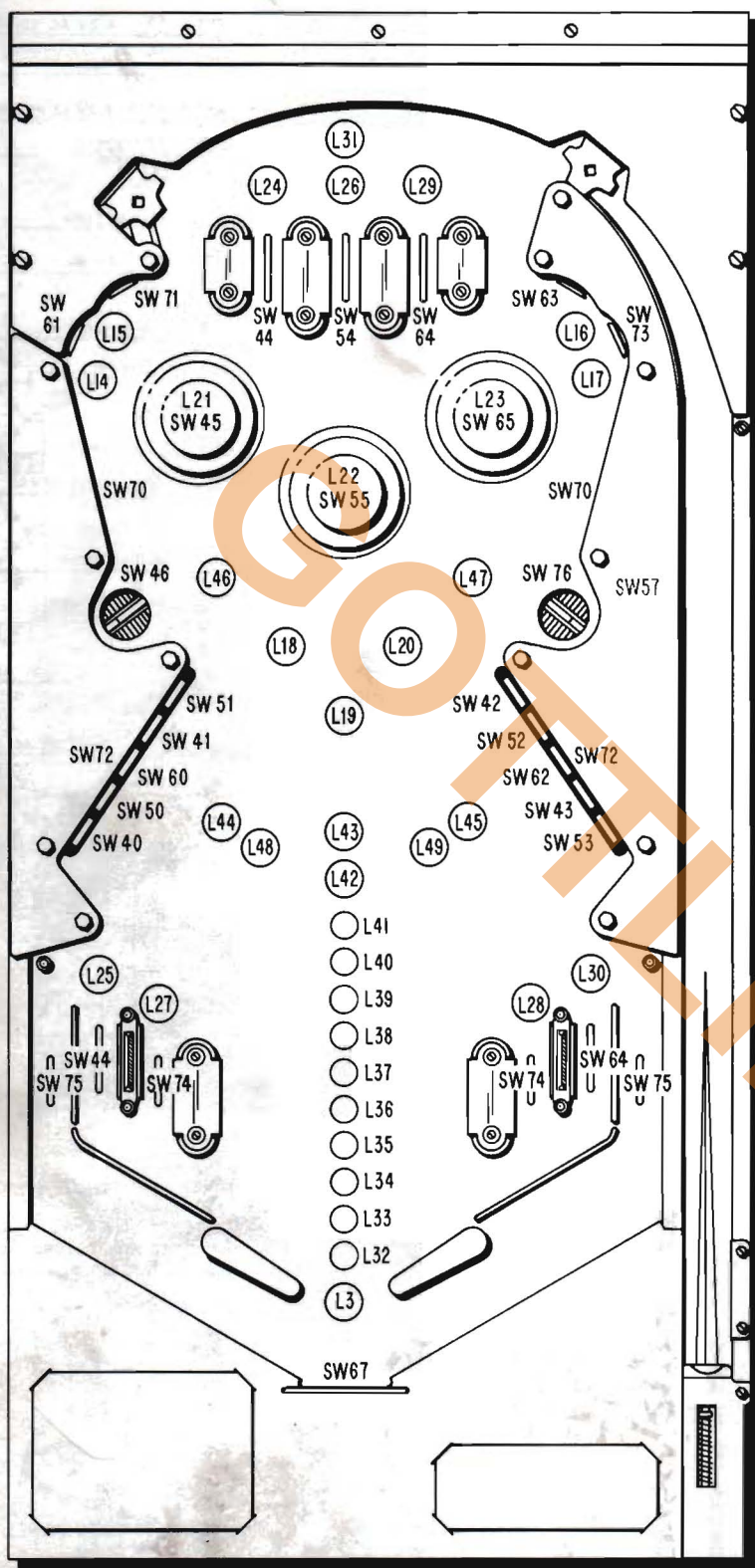
XI. PARTS INFORMATION

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XI. PARTS INFORMATION

PLAYBOARD SWITCH AND LAMP ASSIGNMENTS



LAMP NUMBER	LAMP ASSIGNMENT
L3	Shoot Again
L14	#1 Top Target
L15	#2 Top Target
L16	#3 Top Target
L17	#4 Top Target
L18	#1 Hole
L19	#2 Hole
L20	#3 Hole
L21	Left Pop Bumper
L22	Center Pop Bumper
L23	Right Pop Bumper
L24	Top Left Rollover
L25	#1 Left Return Rollover
L26	Top Center Rollover
L27	#2 Left Return Rollover
L28	#1 Right Return Rollover
L29	Top Right Rollover
L30	#2 Right Return Rollover
L31	Extra Ball
L32	10,000
L33	20,000
L34	30,000
L35	40,000
L36	50,000
L37	60,000
L38	70,000
L39	80,000
L40	90,000
L41	100,000
L42	2X
L43	3X
L44	Left 50,000
L45	Right 50,000
L46	Left Special
L47	Right Special
L48	Left 5000
L49	Right 5000

SWITCH MATRIX NUMBER	SWITCH ASSIGNMENT	PART NO.
SW 40	#1 Left Drop Target	18094
SW 41	#4 Left Drop Target	18093
SW 42	#1 Right Drop Target	18094
SW 43	#4 Right Drop Target	18093
SW 44	Top Left Rollover,	18892
	#1 Left Return Rollover	18892
SW 45	Left Pop Bumper	21352
SW 46	Left Hole	19857
SW 50	#2 Left Drop Target	18094
SW 51	#5 Left Drop Target	18093
SW 52	#2 Right Drop Target	18094
SW 53	#5 Right Drop Target	18093
SW 54	Top Center Rollover	18892
SW 55	Center Pop Bumper	21352
SW 57	Tilt (With Bracket)	9141
SW 60	#3 Left Drop Target	18095
SW 61	#1 Top Spot Target Assembly	25460T
SW 62	#3 Right Drop Target	18095
SW 63	#3 Top Spot Target Assembly	25460T
SW 64	Top Right Rollover,	18892
	#2 Right Return Rollover	18892
	Right Pop Bumper	21352
SW 65	Outhole	18892
SW 70	10 Point (2)	22227
SW 71	#2 Top Spot Target Assembly	25460T
SW 72	100 Point (2)	18096
SW 73	#4 Top Spot Target Assembly	25460T
SW 74	#1 Right Return Rollover,	18892
	#2 Left Return Rollover	18892
SW 75	Left Outside Rollover,	18892
	Right Outside Rollover	18892
SW 76	Right Hole	19857

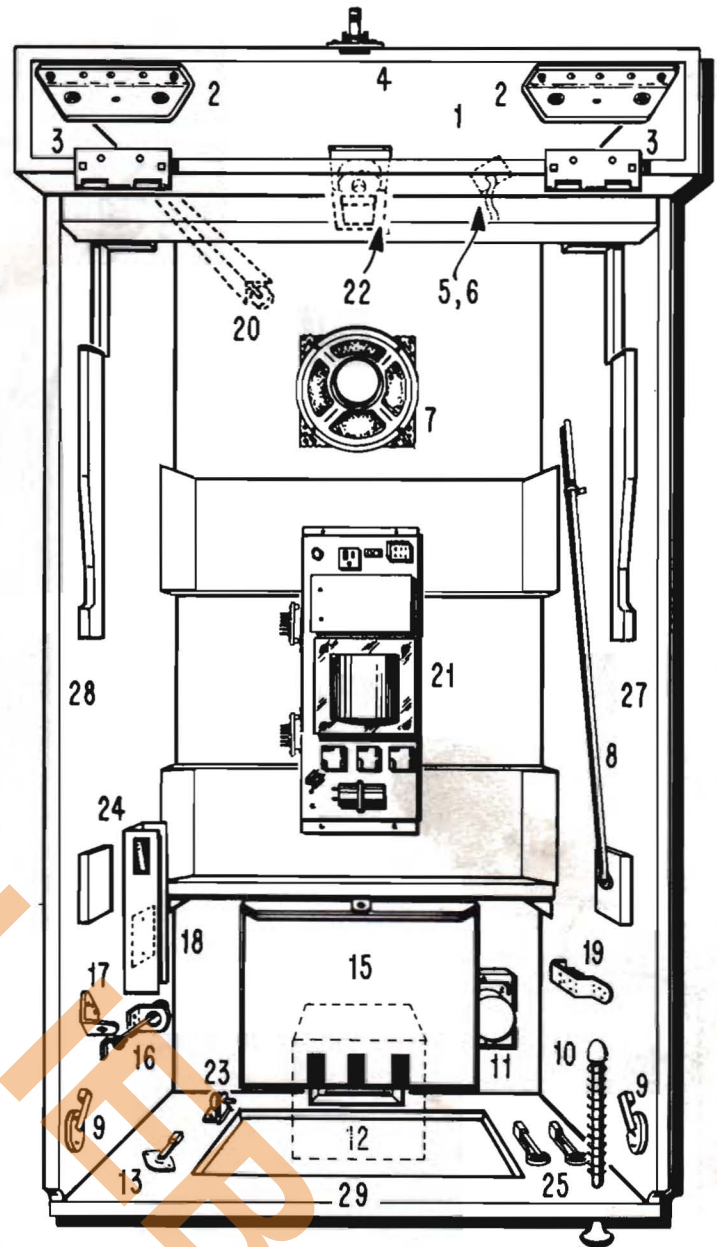
XI. PARTS INFORMATION

CABINET PARTS

ITEM DESCRIPTION

PART NO.

1. Cabinet	25270-684C
2. Lightbox Mounting Bracket (2)	19916
3. Butt Hinge, (Shown For Reference Only, P/O Lightbox Assy.) (2)	22734
4. "U" Bolt (P/O Lightbox)	24659
Latch Assembly (P/O Cabinet)	21969
5. Cable Assembly, Domestic (High Voltage)	MA-794
6. Line Cord (Domestic)	23365
Line Cord Cover Plate	21955
7. Speaker, 4 Ohm, 3W, 8"	EL-83
Speaker Guard	20931
8. Prop Stick, Playfield	23940
9. Flipper Switch Assembly (2)	17838-3
10. Ball Shooter Assembly	8835
11. Switch, On/Off	23799
Switch Plate (2)	18769
Switch Housing	15163
12. Front Door Assembly (Universal)	MA-688
Cable Assembly	MA-676
Slam Switch	24567
6V DC Lamp, Wedge Base	FD-2
Frame, Door	FD-13
Three Chute Door	24160
Black Button Bezel	FD-14
Entry/Reject Button	FD-15
Button Spring	FD-16
Reject Flap	FD-17
Clamp, Frame	FD-18
Flat Lock and Cam Assembly	FD-19
Base Plate with Pivot and Stud	FD-20
Microswitch Bracket	FD-21
Clear Plastic Cover for Microswitch	FD-22
Coin Microswitch with Wire	FD-23
Lampholder	FD-24
Black Reject Bezel	FD-26
13. Replay Switch Assembly	18092
15. Cashbox	25309
Cover	25315
Liner (Small) (3)	24870
Liner (Large) (2)	24871
16. Plumb Bob Tilt Switch Assembly	358
Strike Plate	MH-30
Carbon, Tilt Bob	357
Rod, Tilt	22043
Bracket	18578
17. Locator Bracket	24252
18. Diode Assembly	XO-265
Diode, 1N270 (8)	MA-12
19. Knocker Assembly	MA-352
Bell Assembly (Gong) (When Used)	4337
20. Cabinet Leg (4)	4337Y
(Black) (4) (When Used)	4337T
(Gold) (4) (When Used)	3775
Leg Bolt (8)	MH-21
3" Leg Adjuster (4)	25317
1" Sleeve (2)	FA-665
3/8-16, Jam Nut (8)	MA-1030
21. Transformer Panel Assembly	EL-42
Bridge Rectifier (3)	MA-948
Cable Assembly (Secondary)	XO-830
Capacitor, 10,000UF, 25V	EL-50
Filter, Line	EL-10
Fuse Block (8 Pos.)	23805
Fuse Cover	EL-78
Fuse Holder (F7 and F8) (2)	EL-28
Fuses	EL-29
F1, 1/2 Amp	EL-5
F2, 6-1/4 Amp, SLO-BLO	EL-26
F3, 1/4 Amp, SLO-BLO	EL-8
F4, 8 Amp, SLO-BLO	EL-26
F5, 5 Amp SLO-BLO	EL-20
F6, 8 Amp SLO-BLO	EL-8
F7, 1/2 Amp SLO-BLO	EL-21
F8, 5 Amp, SLO-BLO (110V AC)	EL-3
F9, 2.5 Amp, SLO-BLO (220V AC)	EL-3
F9A, 1 Amp	25374
Ground Bus Assembly (2)	18133
Outlet, Service	XO-154
Resistor, 0.33 Ohm, 10%	24634
5W, Wire-Wound (2)	
Transformer	



ITEM DESCRIPTION

PART NO.

22. Line Filter Assembly	MA-941
Fuse Holder	EL-78
F20, 8 Amp, SLO-BLO (110V AC)	EL-26
F20, 4 Amp, SLO-BLO (220V AC)	EL-33
Line Filter	EL-50
Line Filter (Germany)	EL-51
23. Mounting Bracket	24149
Control, Volume, 100 Ohm, 2W	XO-199
Switch, PLAY/TEST	EL-57
24. Ball Roll Tilt	
Housing and Switch Assembly	24394
Switch	24393
25. Button Holder and Switch (2)	23503
Pushbutton (2) (Black)	24293Y
26. Lightbox (Not Shown)	25181-684C
27. Right Moulding (Not Shown)	22735
(Black) (When Used)	22735Y
(Gold) (When Used)	22735T
28. Left Moulding (Not Shown)	22736
(Black) (When Used)	22736Y
(Gold) (When Used)	22736T
29. Front Moulding (Not Shown)	16951
(Black) (When Used)	16951Y
(Gold) (When Used)	16951T

XI. PARTS INFORMATION

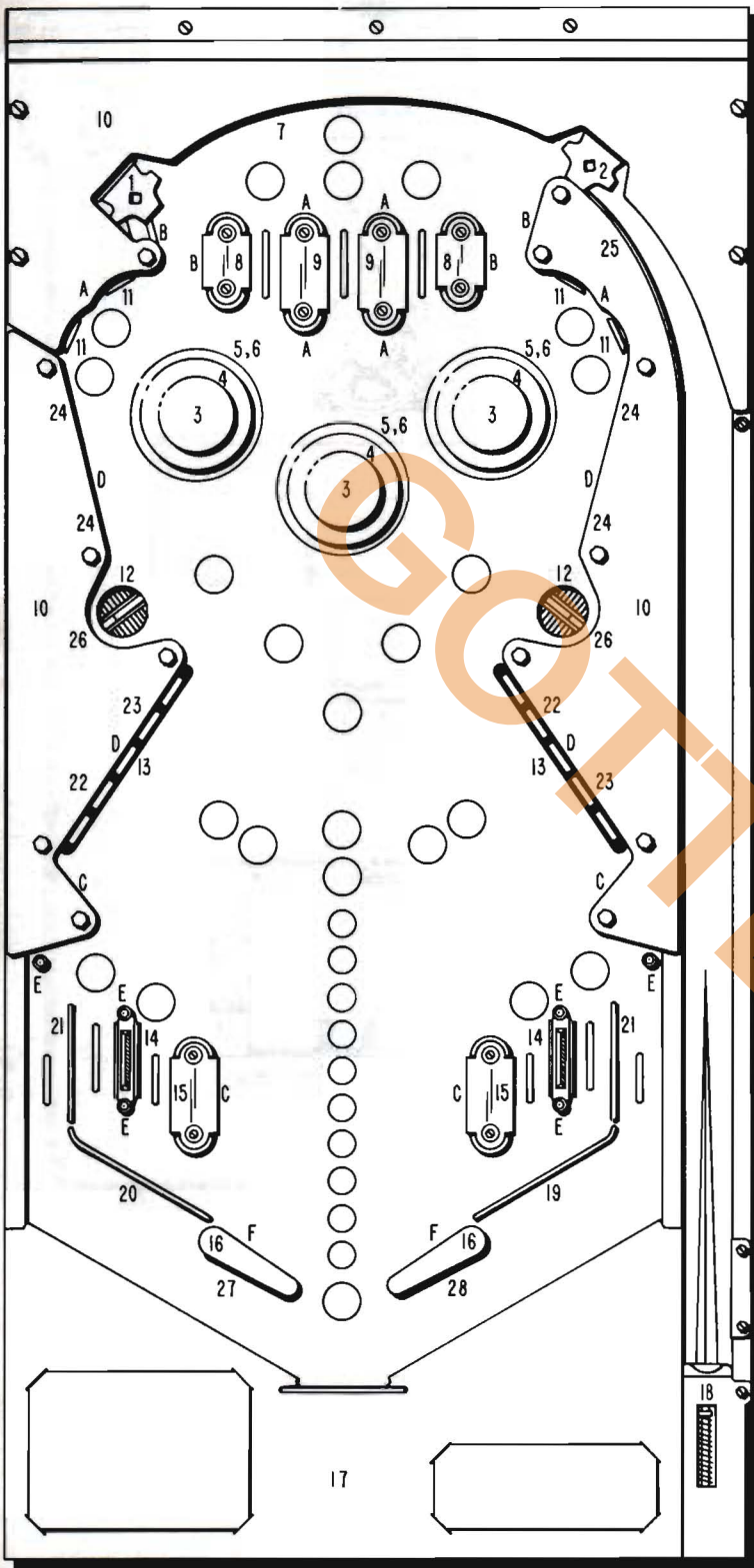
PLAYBOARD PARTS INFORMATION

RUBBER RINGS

ITEM	DESCRIPTION	PART NO.
A	5/16" (6)	10217
B	1" (6)	10219
C	1-1/2" (2)	10220
D	3-1/2" (4)	10224
E	Mini-Post (6)	15705
F	Flipper, Red (2)	13151

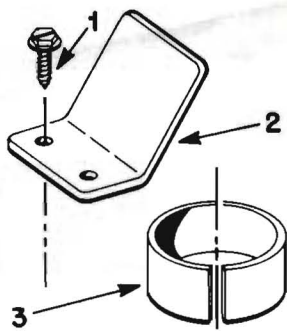
PARTS LIST

ITEM	DESCRIPTION	PART NO.
1	Arch Rebound	19646
2	Arch Gate	19645
3	Pop Bumper Cap, White (3)	10434Z
4	Pop Bumper Body, White (3)	13905
5	Pop Bumper Skirt, White (3)	10433Z
6	Pop Bumper Trim Platter (3)	8246
7	Arch Rod	22744
8	Guide Rail, White (2)	9393Z
9	Guide Rail, White (2)	9396Z
10	Plastic Shield Set	22988
11	Spot Target Assembly, Yellow (4)	25460T
12	Ball Hole Kicker Assembly (See Exploded View Illustration)	
	Left Ball Hole Kicker Assembly	MA-451A
	Right Ball Hole Kicker Assembly	MA-451
13	Target Bank Assembly (2)	MA-1003
	Target Arm, Black (2)	11905Y
	Target Arm, Yellow (8)	11905T
14	Rollover Guide, White (2)	15648Z
15	Guide Rail, White (2)	9395Z
16	Flipper, White (2)	13150
17	Cardholder	13647-684C
18	Ball Shooter Gauge	9767-684C
19	Ball Guide Rail	14571
20	Ball Guide Rail	14572
21	Ball Guide Rail (2)	4832
22	Ball Guide Rail (2)	3722
23	Ball Guide Rail (2)	17650
24	Ball Guide Rail (4)	6931
25	Ball Guide Rail	5775
26	Metal Shield (2)	5891
27	Left Flipper Assembly	MA-937
	Left Flipper Switch	17875
28	Right Flipper Assembly	MA-938
	Right Flipper Switch	17875
	Plastic Post	11561P
	Mini Post Screw	14792
	"Q" Relay Assembly	MA-23
	"T" Relay Assembly	MA-25

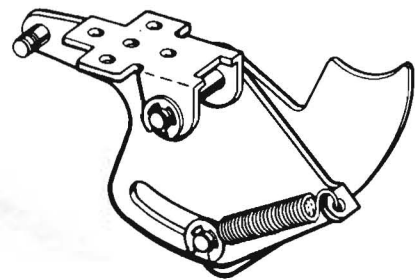


XI. PARTS INFORMATION

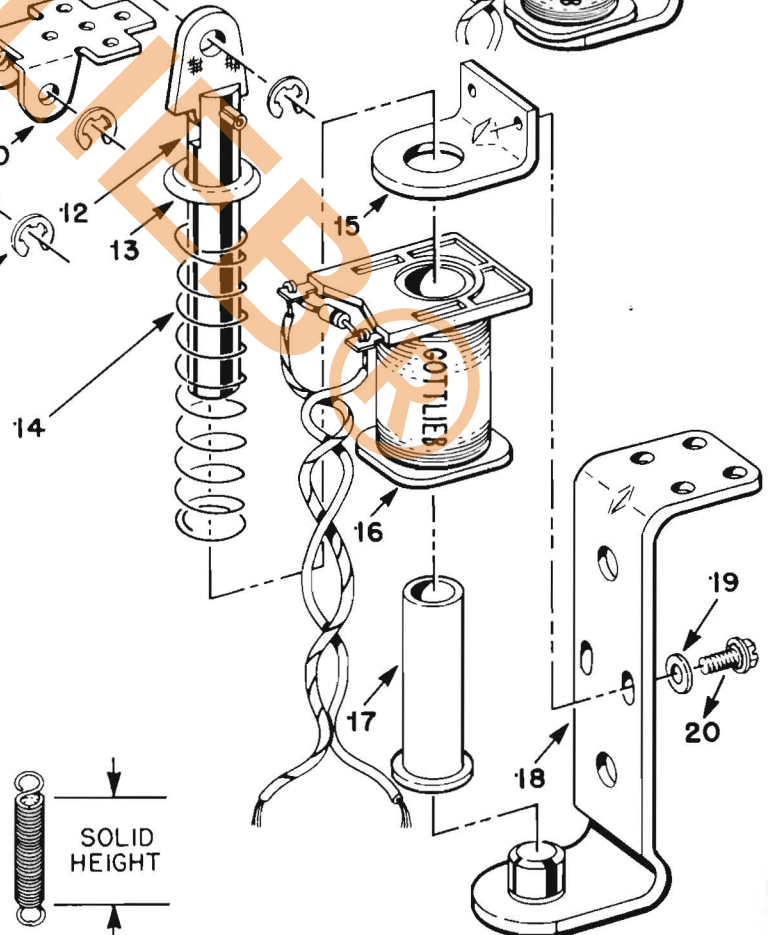
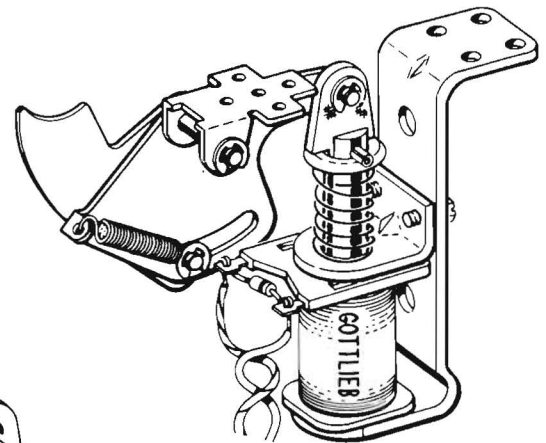
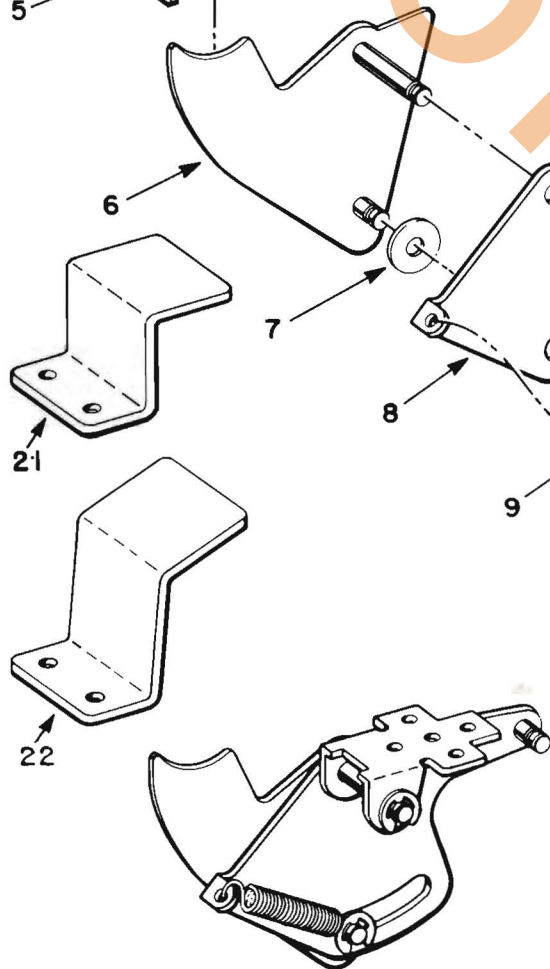
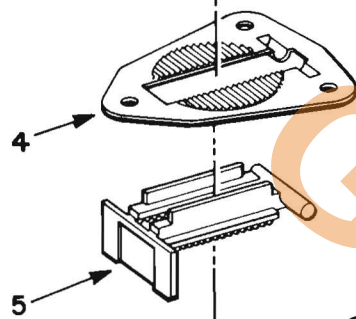
BALL HOLE KICKER PARTS



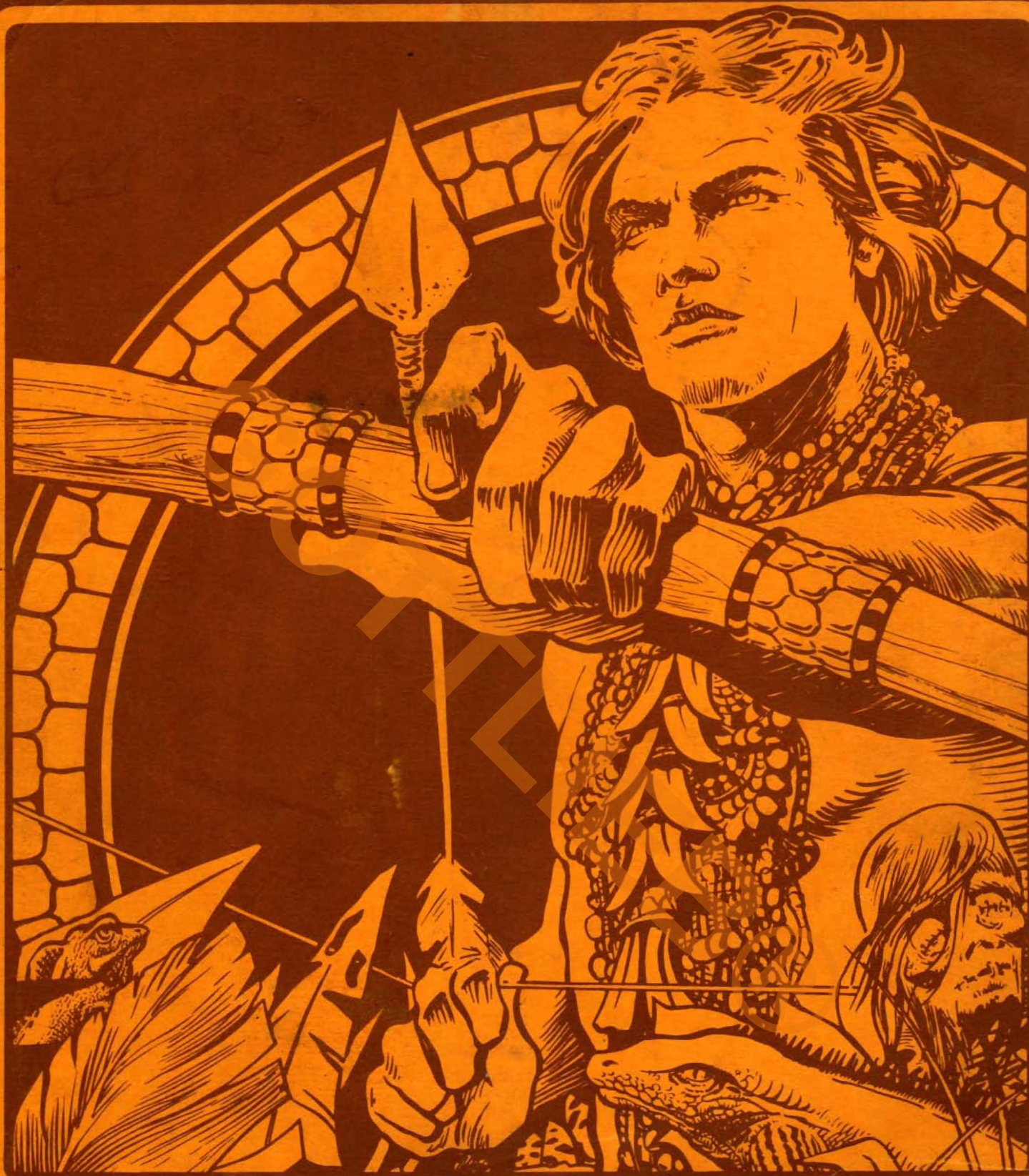
ITEM	DESCRIPTION	PART NO.
1	6 x 1/2" HWHSMS (2)	FA-270
2	Ball Snubber	16038
3	Metal Hole Liner	11151
4	Hole Base Plate	15707
5	Hole Switch Arm	15708
6	Ball Cam (See Tables)	
7	Nylon Washer	6443
8	Spring Cam (See Tables)	
9	Spring (See Tables)	
10	Fulcrum	15819
11	E-Ring (3)	FA-682
12	Link And Plunger Assy.	22234
13	Spring Retaining Washer	22233
14	Spring	1636
15	Mounting Bracket	15409
16	Coil With Diode	
17	Coil Sleeve	5064
18	Coil Stop And Mounting Bracket	20597
19	#8 Washer (2)	FA-617
20	8-32 x 5/16" HWHMS SEMS (2)	FA-67
21	Ball Snubber	21532
22	Ball Snubber	21159



ASSEMBLY WITH FULCRUM	BALL CAM	SPRING CAM (NO SPRING)	SPRING	SPRING SOLID HEIGHT
A-15827	A-15822	A-15826	A-9758	5/8"
A-15828	A-15822	A-15826	A-15598	11/16"
A-16083	A-15822	A-15826	A-8727	7/8"



ASSEMBLY WITH FULCRUM	BALL CAM	SPRING CAM (NO SPRING)	SPRING	SPRING SOLID HEIGHT
A-16045	A-16044	A-16043	A-9758	5/8"
A-16085	A-16044	A-16043	A-8727	7/8"
A-16086	A-16044	A-16043	A-15598	11/16"



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