

Raven



Premier
Technology



INSTRUCTION MANUAL

RAVEN

(GAME #702)

INSTRUCTION MANUAL

Applicable for all games.

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RAVEN

GAME PROMS:

702/PROM 1

702/PROM 2

SOUND PROMS:

702/DROM 1

702/YROM 1

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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

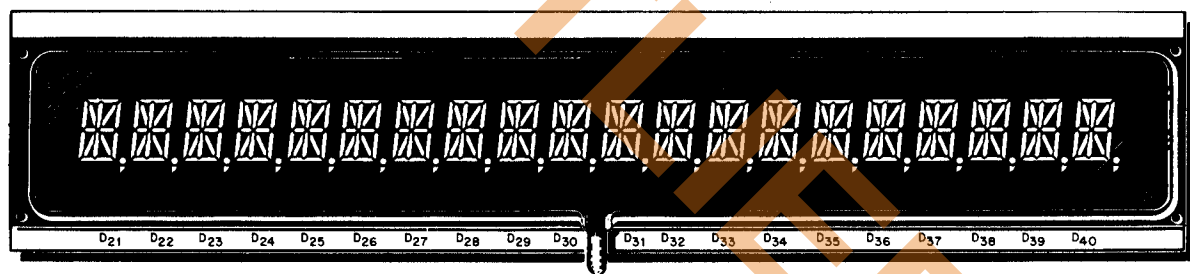


FIGURE 1A.

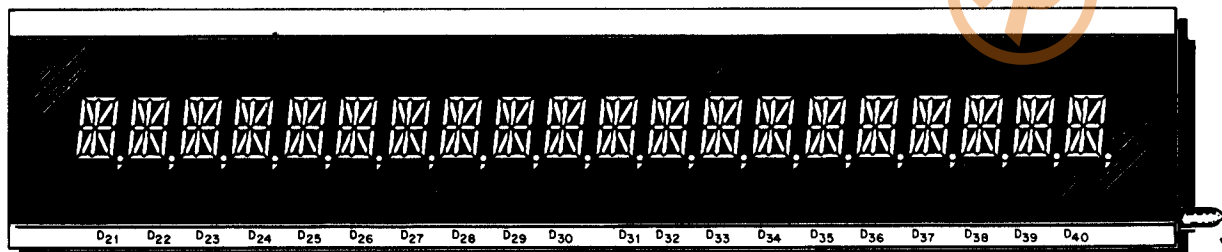


FIGURE 1B.

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.

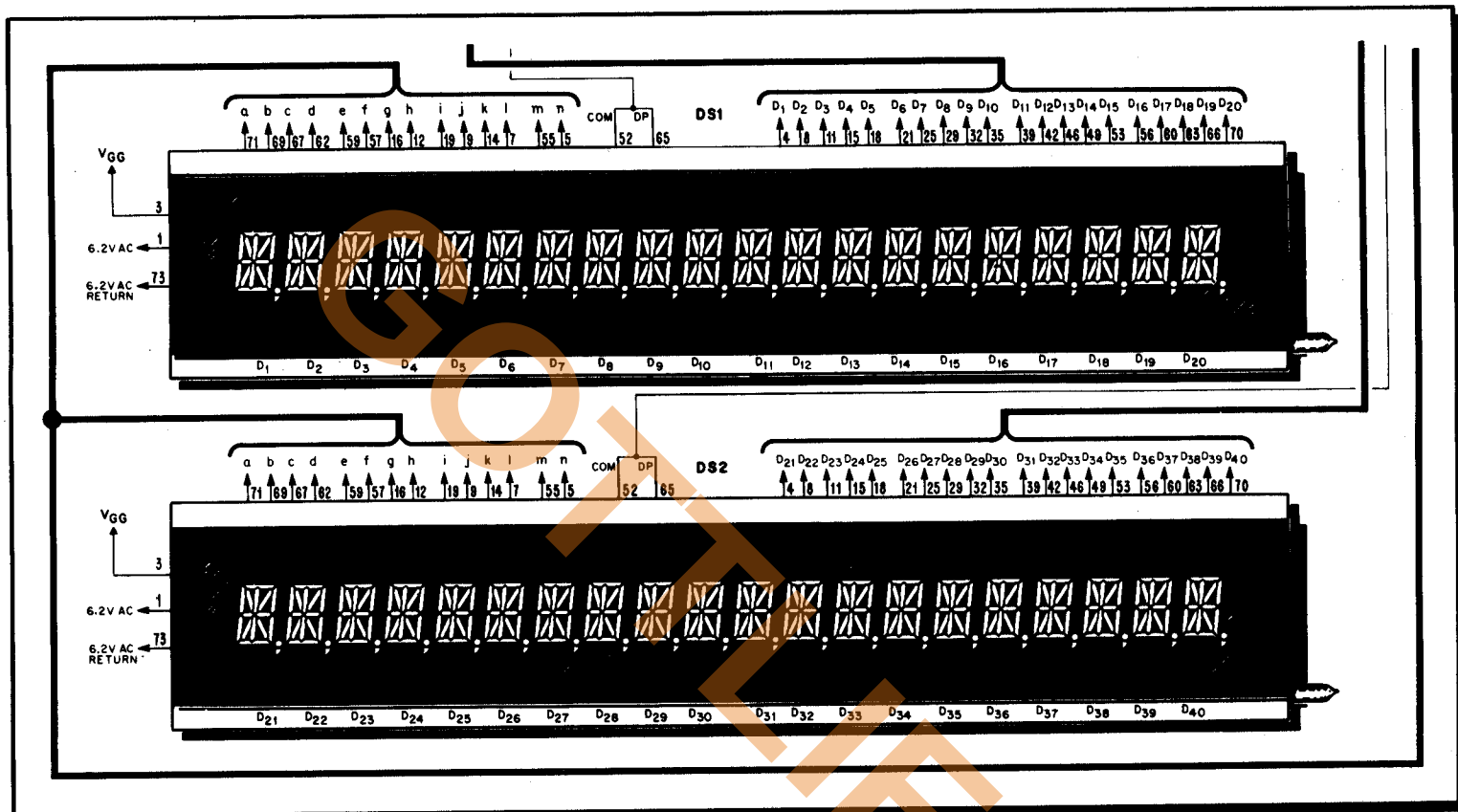


FIGURE 2.

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) and game Prom (PROM 1) 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.

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."

A-22670

I. INSTALLATION

A. SET-UP

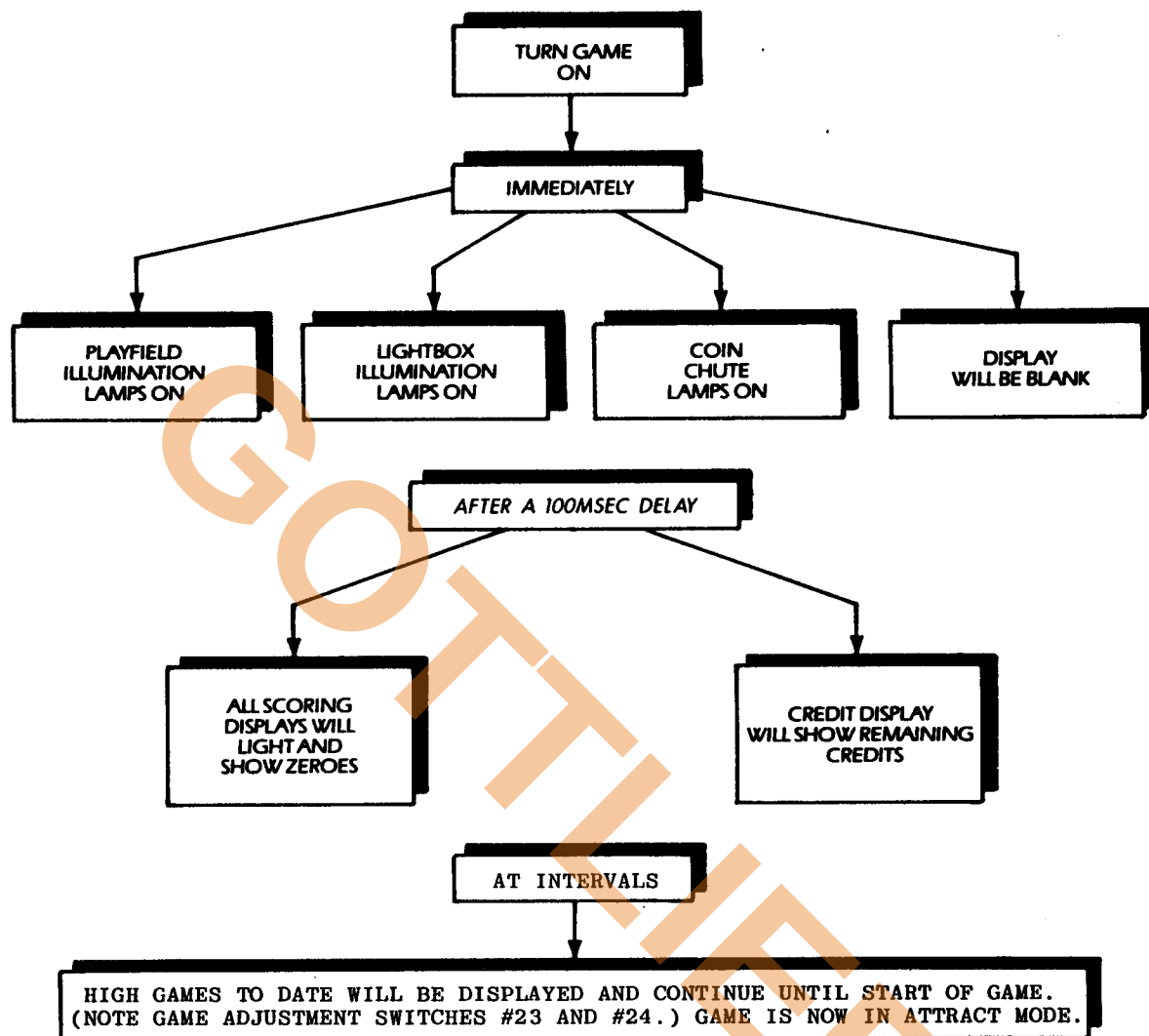
1. Bolt the legs to the cabinet.
2. Lift lightbox into an upright position. Be sure none of the cables are crimped in between the lightbox and cabinet.
3. Engage the snap in the rear of the lightbox to the cabinet.
4. To remove the lightbox backglass and gain servicing access to the electronics panel, 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

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

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 player's 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



HOW TO PLAY

TOP ROLLOVERS

- SCORE 1000 UNLIT.
- SCORE 5000 AND ADD BONUS WHEN LIT.
- COMPLETING THE SEQUENCE ADVANCES THE MULTIPLIER, LOWERS THE RAMP, AND RESETS THE SEQUENCE

TOP SPOT TARGETS

- SCORE 1000 UNLIT.
- SCORE 10,000 AND ADD BONUS WHEN FLASHING.
- COMPLETING SEQUENCE STARTS LAMPS STROBING AND LIGHTS SPECIAL IF THE CORRECT NUMBER OF SNIPERS HAVE BEEN HIT (BASED ON SWITCH #32).
- SCORE 10,000, ADD BONUS, LOWER RAMP, AND RESET SEQUENCE WHEN LIT WHILE STROBING.
- AWARD SPECIAL WHEN LIT WHILE STROBING IF SPECIAL IS LIT.
- (5 BALL) SCORE 500 UNLIT.
- (5 BALL) SCORE 5000 WHEN FLASHING.

BOTTOM SPOT TARGETS

- SCORE 1000 UNLIT.
- SCORE 10,000 AND ADD BONUS WHEN FLASHING.
- COMPLETING TARGET SEQUENCE (BASED ON SWITCH #31) RESETS A RANDOM SNIPER.
- SCORE 10,000, ADD BONUS, ADVANCE EXTRA BALL LAMPS, AND RESET SEQUENCE WHEN LIT WHILE STROBING.
- AWARD EXTRA BALL WHEN "EXTRA" AND "BALL" LAMPS ARE LIT.
- (5 BALL) SCORE 500 UNLIT.
- (5 BALL) SCORE 5000 WHEN FLASHING.

ROLLOVER DROP TARGETS (SNIPERS)

- SCORE 50,000 AND START STROBING THE BOTTOM SPOT TARGET LAMPS.

LEFT AND RIGHT SIDE ROLLOVERS

- SCORE 50,000.
- ADVANCE MULTIPLIER, RAISE THE RAMP, AND LIGHT OPPOSITE ROLLOVER WHEN LIT.

IV. GAME PLAY AND SCORING

RIGHT FLIPPER SWITCH

- ROTATE TOP ROLLOVER LAMPS.

ROLLUNDER AND ROLLOVER BUTTON

- SCORE 3000.

SPINNER

- SCORE 1000 UNLIT.
- SCORE 10,000 WHEN FLASHING.
- RUN HELICOPTER MOTOR UNTIL SPINNER STOPS.

LEFT AND RIGHT RETURN ROLLOVERS

- SCORE 1000 AND FLASH SPINNER FOR A TIME PERIOD.

LEFT AND RIGHT OUTSIDE ROLLOVERS

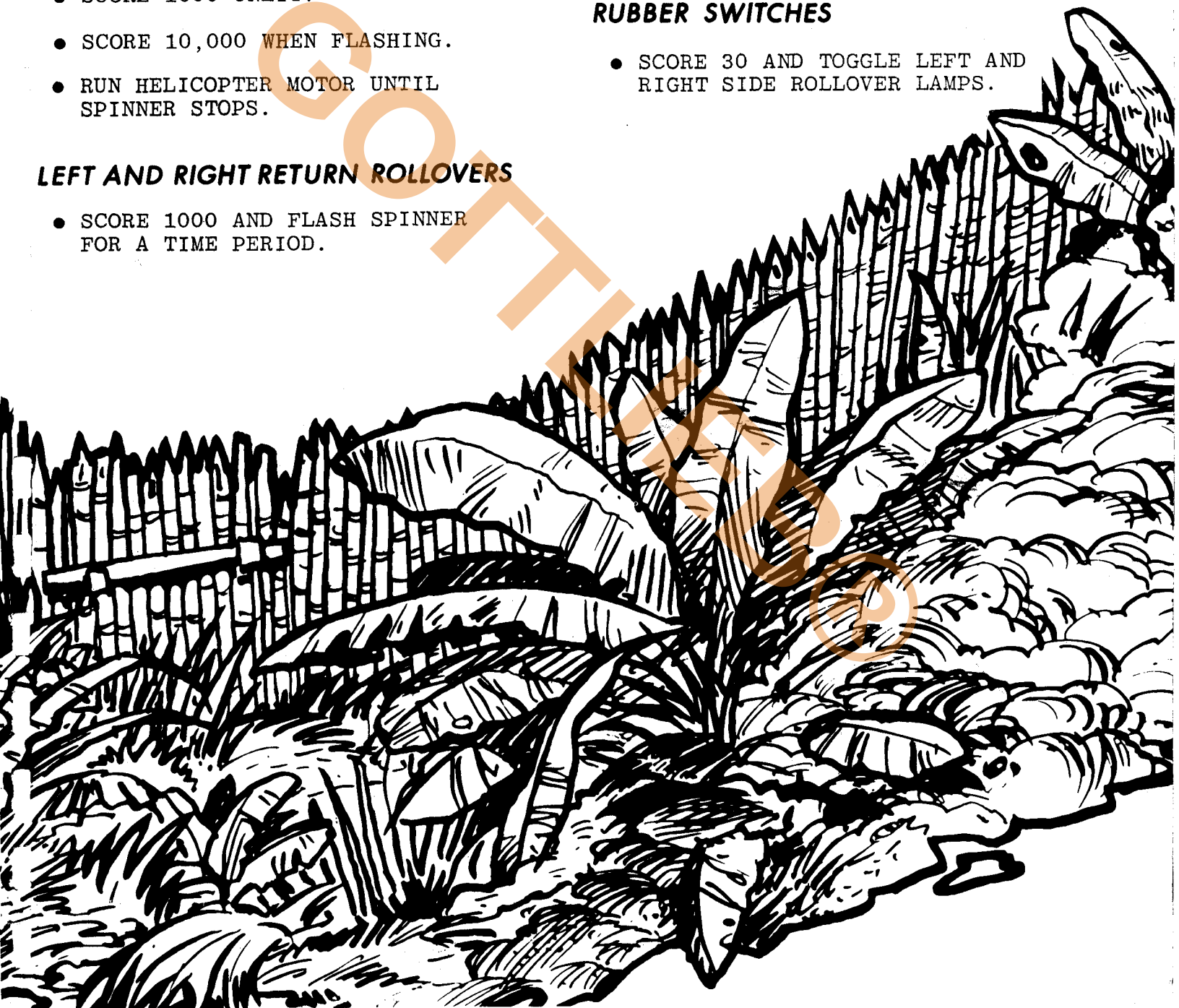
- SCORE 10,000.

POP BUMPERS

- SCORE 1000 AND TOGGLE LEFT AND RIGHT SIDE ROLLOVER LAMPS.
- (5 BALL) SCORE 500.

RUBBER SWITCHES

- SCORE 30 AND TOGGLE LEFT AND RIGHT SIDE ROLLOVER LAMPS.



V. SOUND, VI. GAME ADJUSTMENTS

V. SOUND

The Sound Board installed in this game has been programmed for sound only.

VI. GAME ADJUSTMENTS

A. CONTROL BOARD SWITCH ADJUSTMENTS

NOTE: The following switch adjustments pertaining to **SYSTEM 80B** 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 80B					COIN CHUTE ADJUSTMENTS
SWITCHES					
S1	S2	S3	S4	S5	Left Coin Chute
S9	S10	S11	S12	S13	Right Coin Chute
S17	S18	S19	S20	S21	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.

SWITCH 6 HIGH GAMES TO DATE CONTROL
ON Reset High Games #2-#5 on Power Off
OFF No Effect

SWITCH 7 ATTRACT MODE SOUND
ON Enabled
OFF Disabled

ADDITIONAL COIN CHUTE COMBINATIONS CREDIT INCENTIVES

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

SWITCHES					Left Coin Chute	Right Coin Chute	Center Coin Chute	COIN/CREDIT GIVEN	COIN/CREDIT GIVEN	COIN/CREDIT GIVEN	COIN/CREDIT GIVEN	COIN/CREDIT GIVEN	TOTAL COIN/ TOTAL CREDIT
S1	S2	S3	S4	S5									
S9	S10	S11	S12	S13									
S17	S18	S19	S20	S21									
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

SWITCH 8 SPARE

SWITCH 14 COIN CHUTE LEFT AND RIGHT CONTROL
ON Same
OFF Separate

SWITCHES 15 16 MAXIMUM CREDITS
OFF OFF 8
OFF ON 10
ON OFF 15
ON ON 20

SWITCH 22 PLAYFIELD SPECIAL
ON Extra Ball
OFF Special

SWITCHES 23 24 HIGHEST GAME TO DATE AWARDS
OFF OFF None (Not Displayed)
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

SWITCH 31 SNIPER RESET CONTROL
ON Completing either 3 left or 3 right bottom spot
targets enables snipers
OFF Completing all 6 bottom spot targets enables
snipers

SWITCH 32 SPECIAL CONTROL
ON Any 3 snipers hit enables special (Liberal)
OFF All 4 snipers hit enables special (Conservative)

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

On.....Background Enable

Off.....Background Disabled

Position 2.....Not Used

Position 3.....Off

Position 4.....On

C. POST ADJUSTMENTS

There are no liberal/conservative post adjustments in this game.

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

- a. Advance Bookkeeping so the step to be zeroed is displayed.
- b. Press the credit button. Notice information replaced by zeros. Note: Step 6 (Replay Percentage) cannot be zeroed using the credit button.

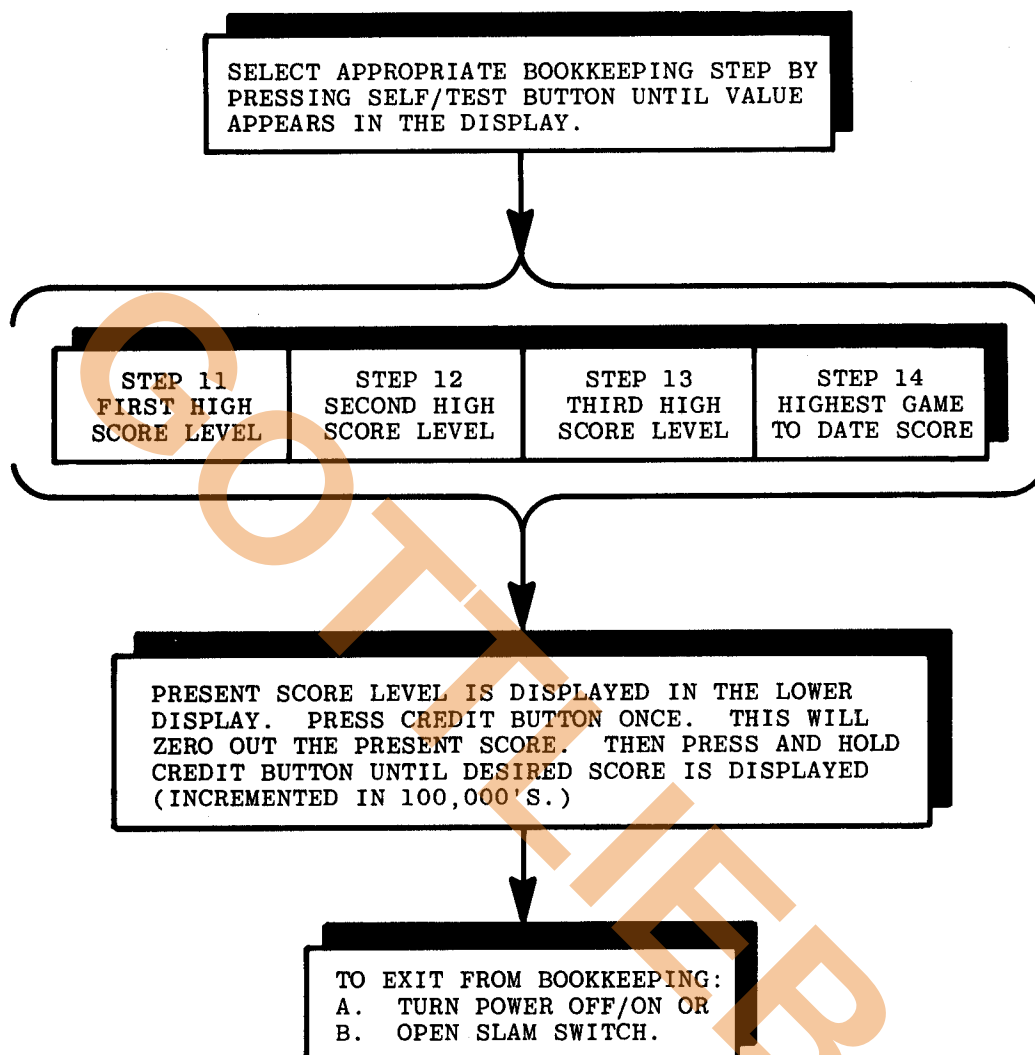
2. Zeroing All Bookkeeping Steps Except #11, 12, 13 and 14.

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

- a. Go to Step #15.
- b. Press the credit button. A message will be displayed.
- c. Zeroing is complete.

VII. BOOKKEEPING AND SELF TEST

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

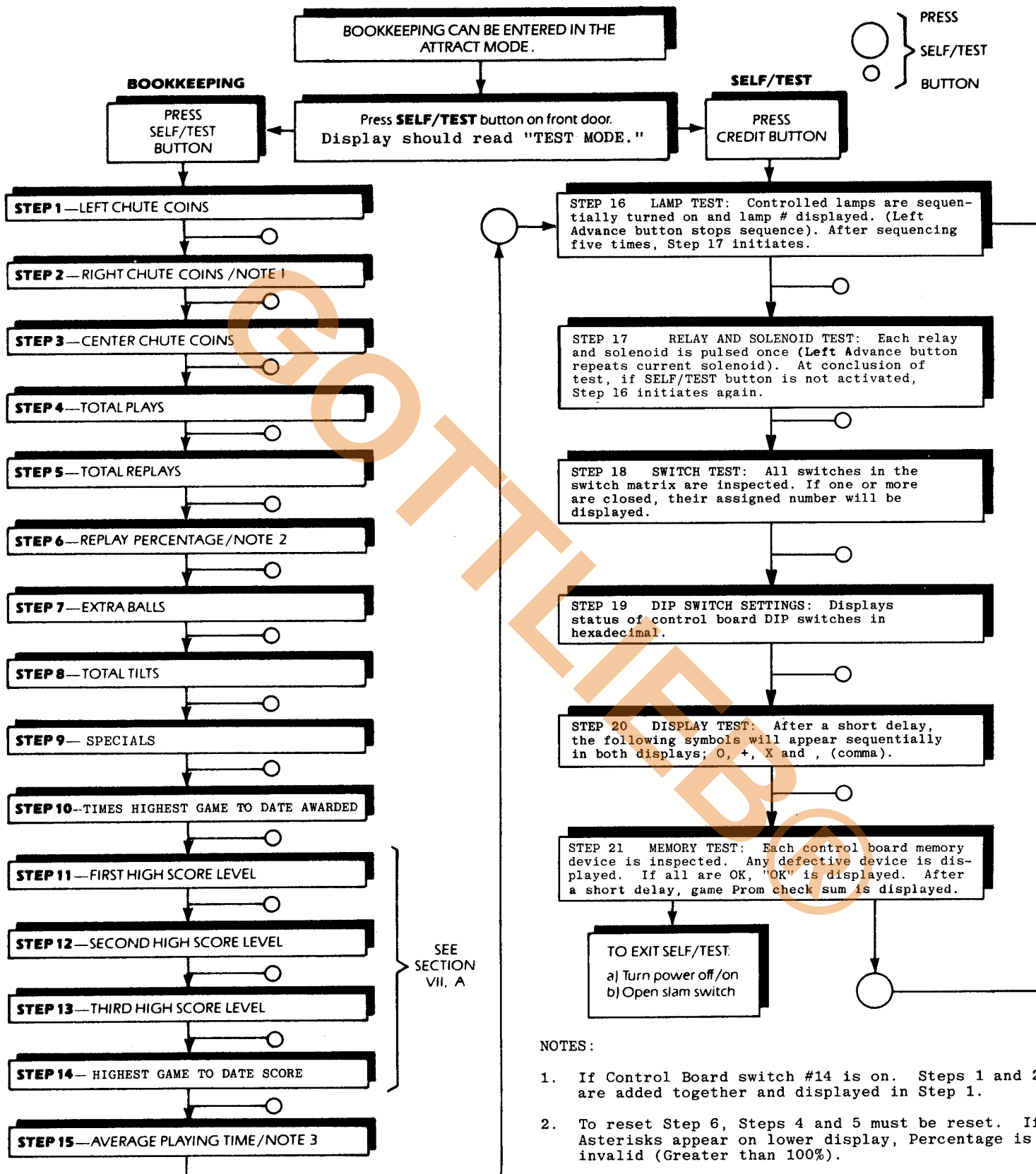


NOTES:

1. Step 11 must be a lower score than Step 12.
Step 12 must have a lower score than Step 13.
Otherwise, 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.

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. To reset Step 6, Steps 4 and 5 must be reset. If Asterisks appear on lower display, Percentage is invalid (Greater than 100%).
3. If step 15 is reset, Steps 1 thru 10 are also reset. If Asterisks appear on lower display, Time is invalid (Greater than 16½ minutes per game).

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

- a. 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

- a. 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-A(Q1)
T (Tilt) Relay.....A3J3 PIN-B(Q2)
(Any other relays which may be used).

- b. 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	Top Left Bank Reset	Q60
Sol.2	Top Left Bank Trip	Q57/Q58
Sol.3	Not Used	Q54
Sol.4	Q2 Driver	Q55
Sol.5	Bot.Left Bank Reset	Q61/Q62
Sol.6	Bot.Left Bank Trip	Q63/Q64
Sol.7	Q3 Driver	Q56
Sol.8	Knocker Assembly	Q53
Sol.9	Outhole	Q59

STEP 18—SWITCH TEST

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

STEP 19—DIP SWITCH SETTINGS

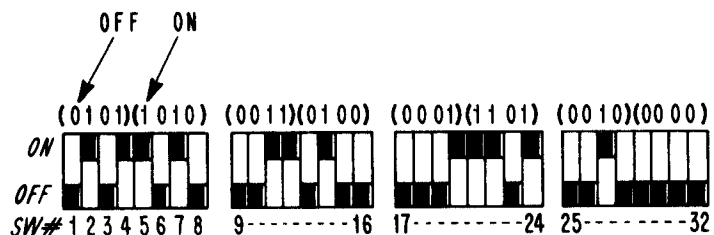
- a. The status of the Control Board (A1) switches appears in the lower display.

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

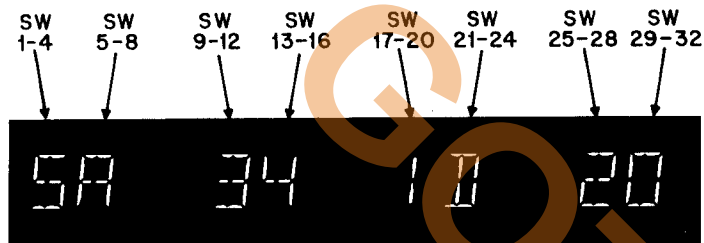
VII. BOOKKEEPING AND SELF TEST

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

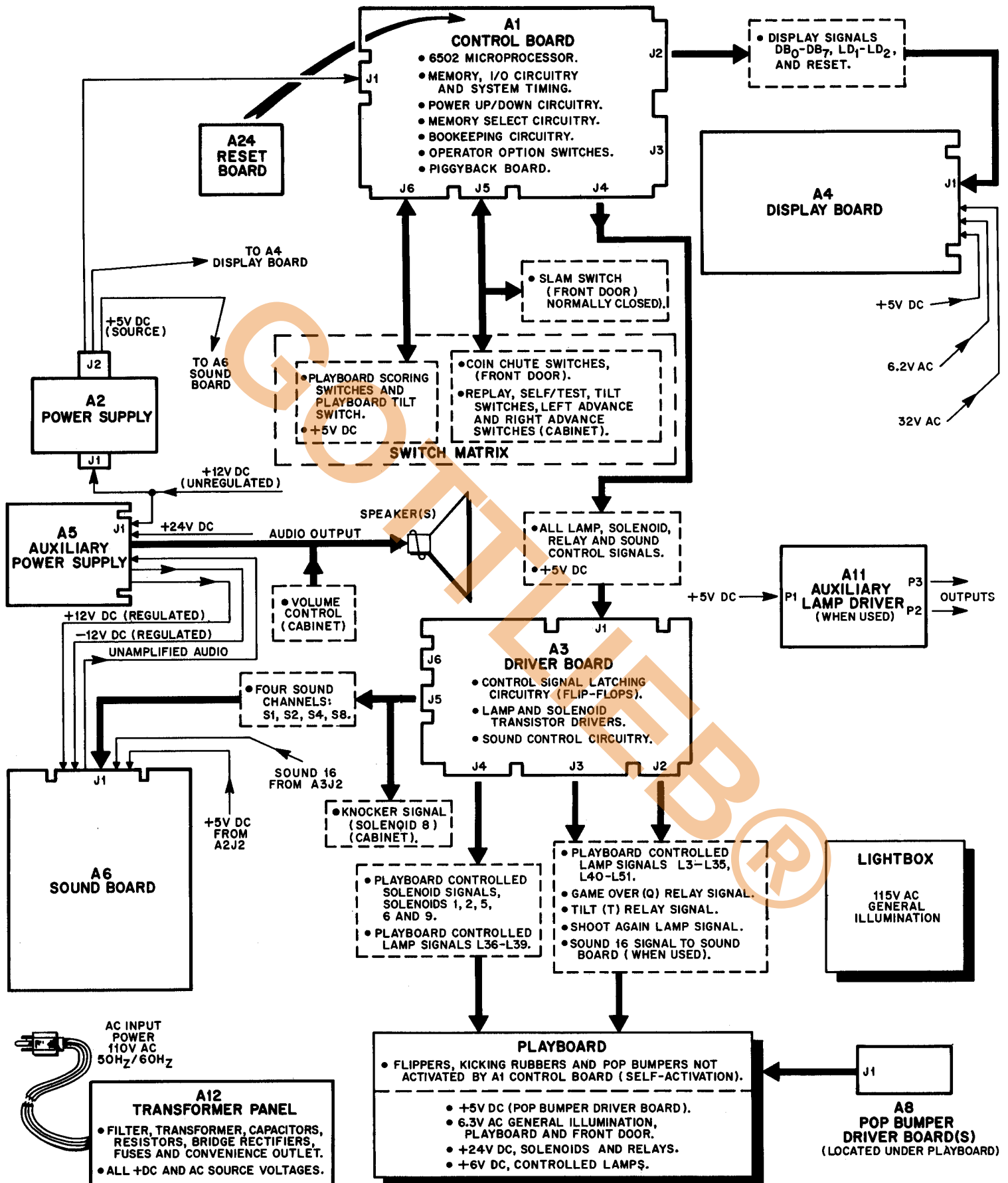


FIGURE 1. SYSTEM 80B BLOCK DIAGRAM

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.

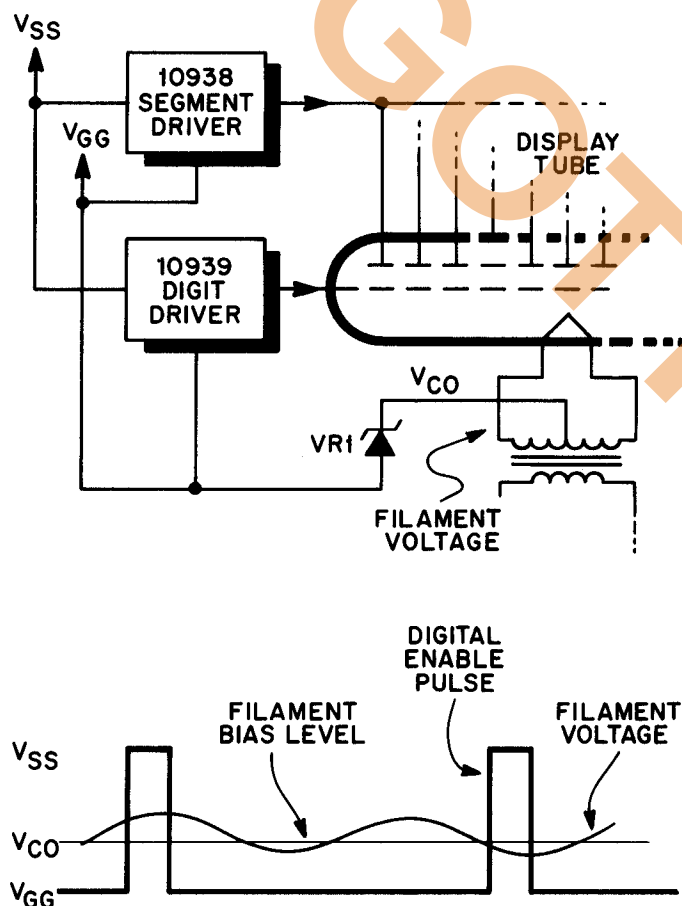


FIGURE 2. BASIC DRIVE CIRCUIT

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 two input code latches A3 and B2, one for each microprocessor system. 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 latches (A3 and B2). A positive edge at pin 11 causes A3 and B2 to latch the data at their inputs. A2 pin 8 is also connected to the clock inputs of two flip flops, A4 pin 3 and A4 pin 11. When A2 pin 8 goes high, both flip flops are clocked, setting both $\bar{Q}$ outputs low. The $\bar{Q}$ outputs, A4 pin 6 and pin 8, are connected to both of the 6502's active low interrupt request lines, T3 and N1, pin 4. The $\bar{Q}$ outputs of A4 will stay low until the associated 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 accomodate different types of RAM. JP1 and JP3 should be connected if HM6116's or 2158A's are used. JP2 and JP4 should be connected if 2158B'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.

INPUT PORT

Input Port B3 reads the test switch SW1 and two option switches, DIP switches 1 and 2. Pressing test switch SW1 will produce a tone.

MAIN SUMMER

The main summer consists of R13 through 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 Boards
A8 - Pop Bumper Driver Boards
A11- Auxiliary Lamp Driver
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 Violet
8 Gray
9 White

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

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	....	15 Amp
F6	Playboard Illumination.....	6.3V AC	....	7-1/2 Amp
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
F20	Input Line	110V AC	....	8 Amp SLO-BLO
		220V AC	....	4 Amp SLO-BLO

PLAYBOARD FUSES

F9	Outhole.....	1 Amp SLO-BLO
F10	Top Left Bank Reset, Top Left Bank Trip, Top Right Bank Reset, Top Right Bank Trip.....	1 Amp SLO-BLO
F11	Bottom Left Bank Reset, Bottom Left Bank Trip, Bottom Right Bank Reset, Bottom Right Bank Trip...	1 Amp SLO-BLO
F12	Top Left Pop Bumper.....	2 Amp SLO-BLO
F13	Top Right Pop Bumper.....	2 Amp SLO-BLO
F14	Bottom Left Pop Bumper.....	2 Amp SLO-BLO
F15	Bottom Right Pop Bumper.....	2 Amp SLO-BLO
F16	Ramp.....	2½ 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	O, 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

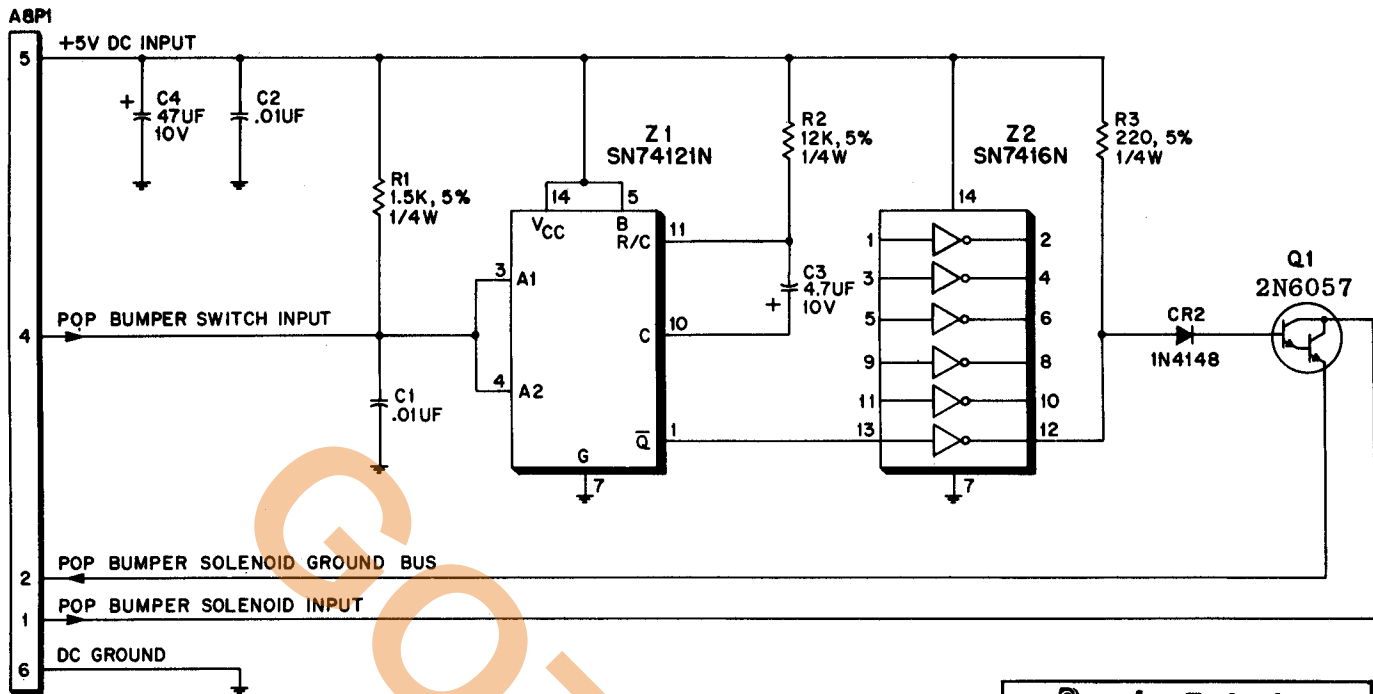
*Coils may vary from game to game. Check game manual for exact coil usage.

X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS

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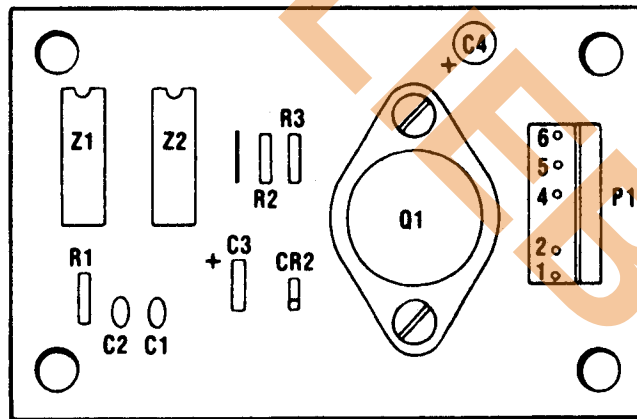
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X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS



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

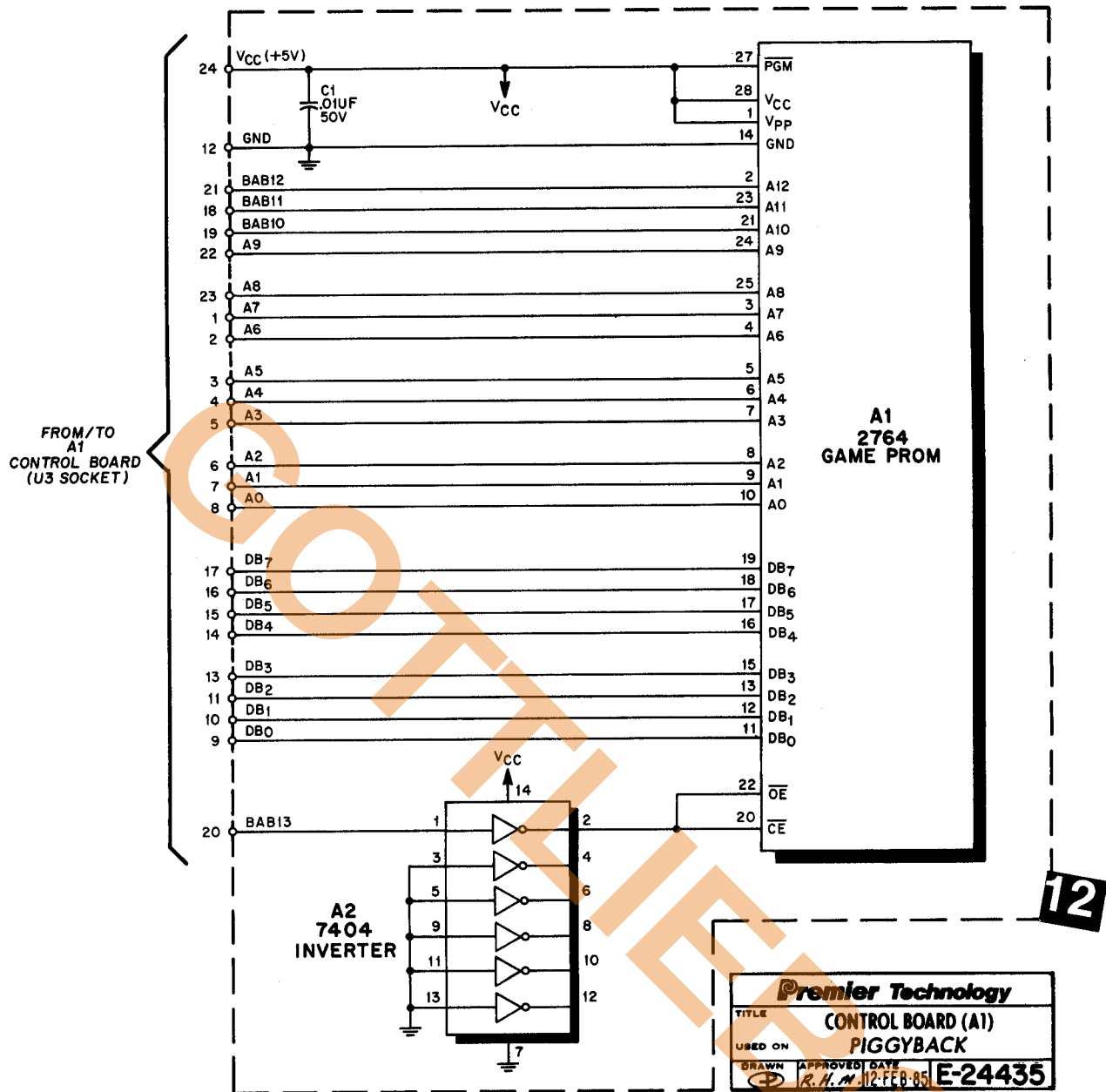
POP BUMPER DRIVER BOARD (A8) COMPONENT LOCATION



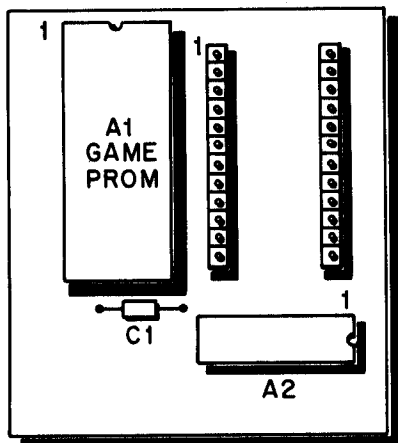
POP BUMPER DRIVER BOARD (A8) PARTS LIST

REFERENCE	DESCRIPTION	PART NUMBER
	POP BUMPER DRIVER BOARD	A-19741
C1, 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
CR2	Diode 1N4148	XO-261
P1	Connector 09-65-1061	XO-868
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, Darlington 2N6057	XO-311
Z1	IC SN74121N	XO-417
Z2	IC SN7416N	XO-405

X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS



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

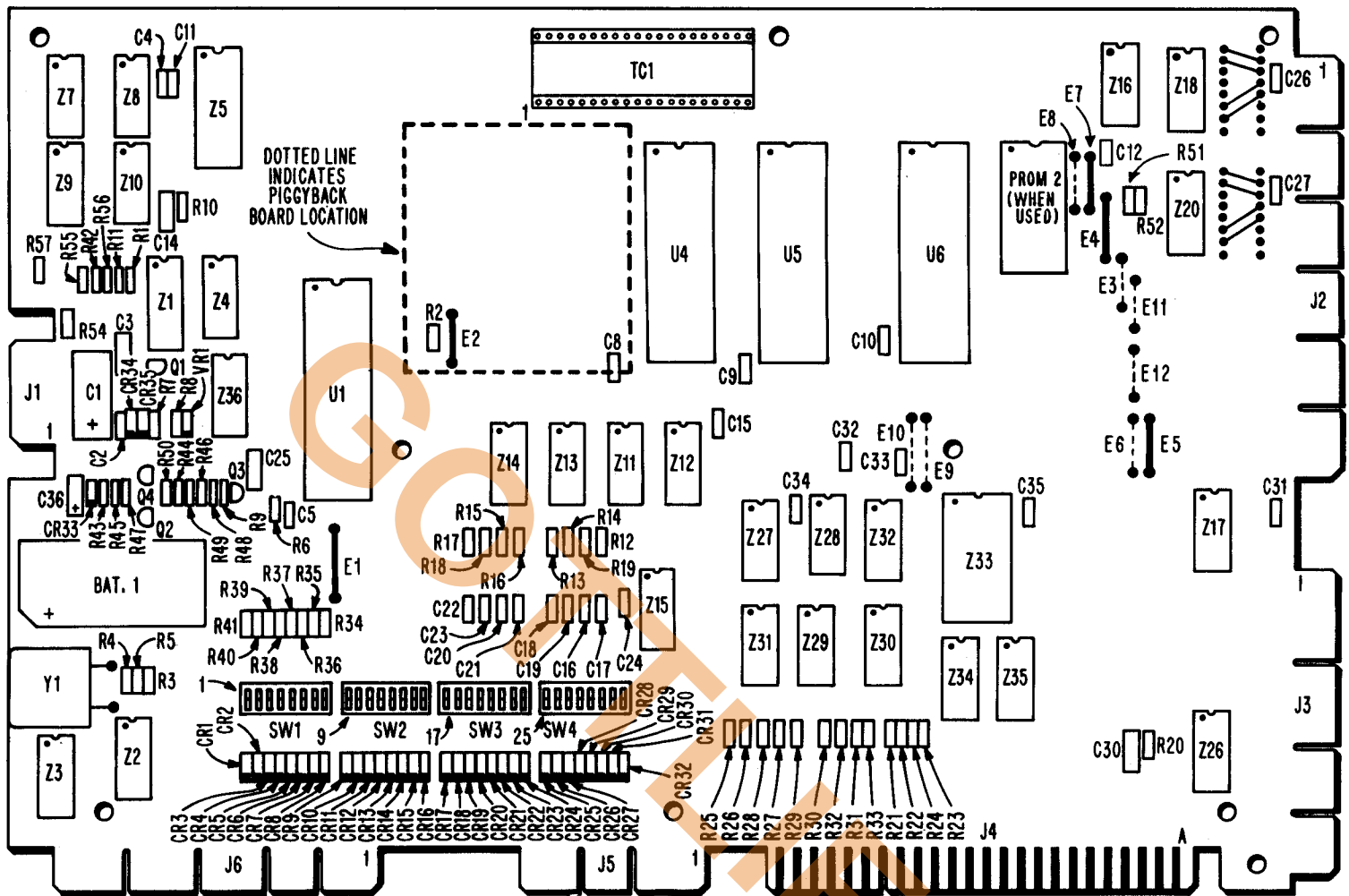


**CONTROL BOARD (A1),
PIGGYBACK
PARTS LIST**

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



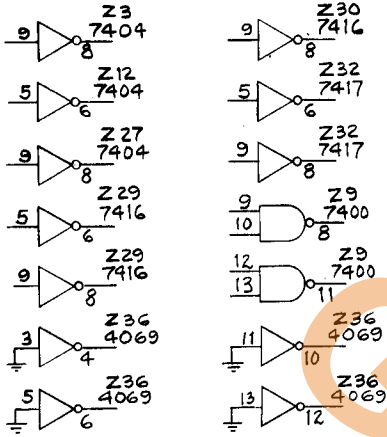
CONTROL BOARD (A1) PARTS LIST

REFERENCE	DESCRIPTION	PART NUMBER	REFERENCE	DESCRIPTION	PART NUMBER
	CONTROL BOARD	MA-774			
Bat. 1	Battery-3.6V 326R10-002	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 R6502-13	XO-360
C15-C24,			U4, U5, U6	PRIOT R6532-18	XO-361
C26, C27,			VR1	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

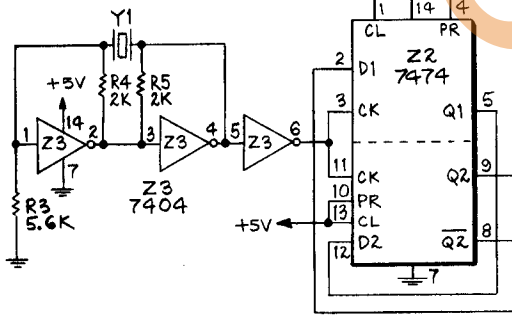
CONTROL BOARD (A1), PIGGYBACK MA689

NOTE: UNLESS OTHERWISE INDICATED;
 1. RESISTORS ARE $\pm 5\%$, 1/4W.
 2. CAPACITORS ARE .01UF, 50V.
 3. DIODES ARE TYPE IN4148.
 4. REF. DESIGNATION Z6 NOT USED.

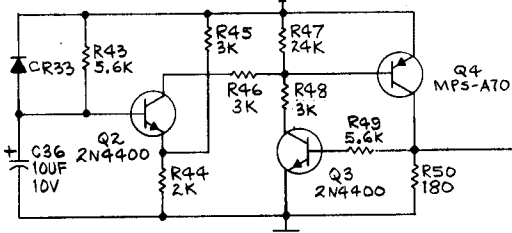
SPARE GATES



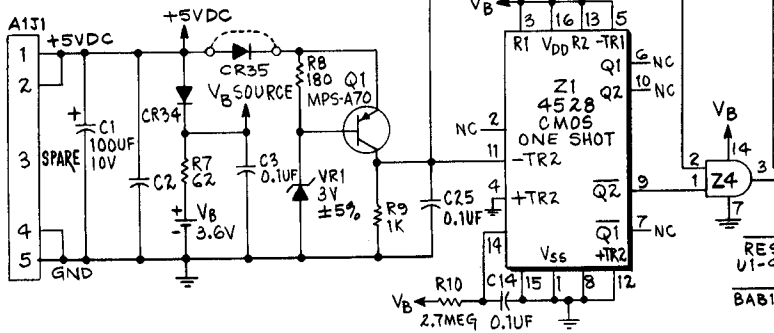
CLOCK LOGIC



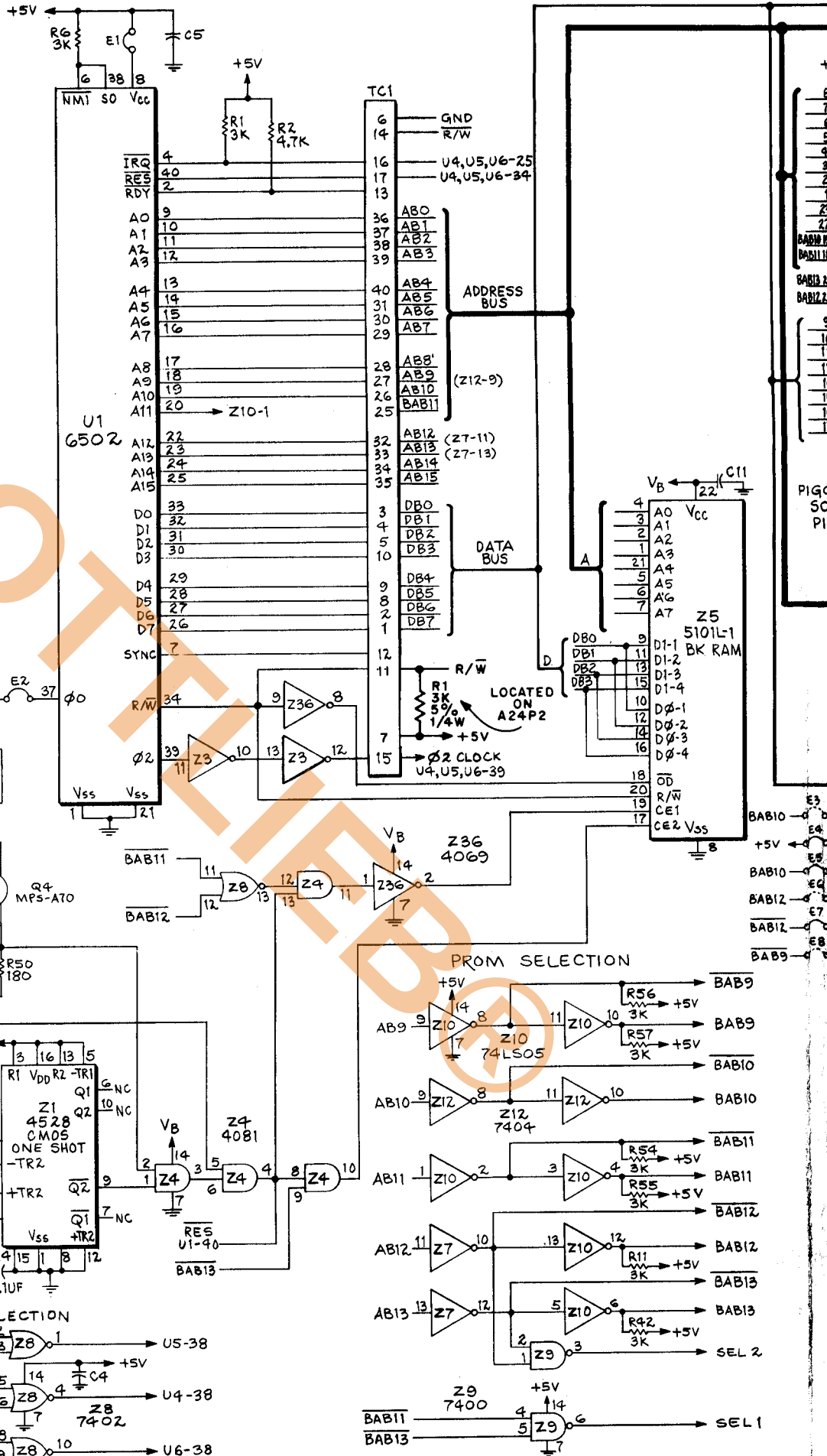
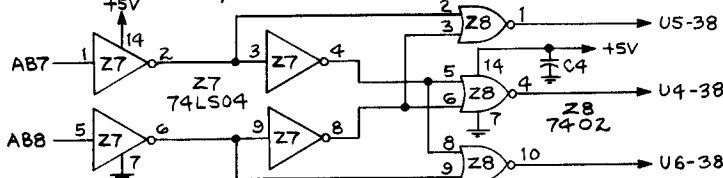
DELAY CIRCUIT



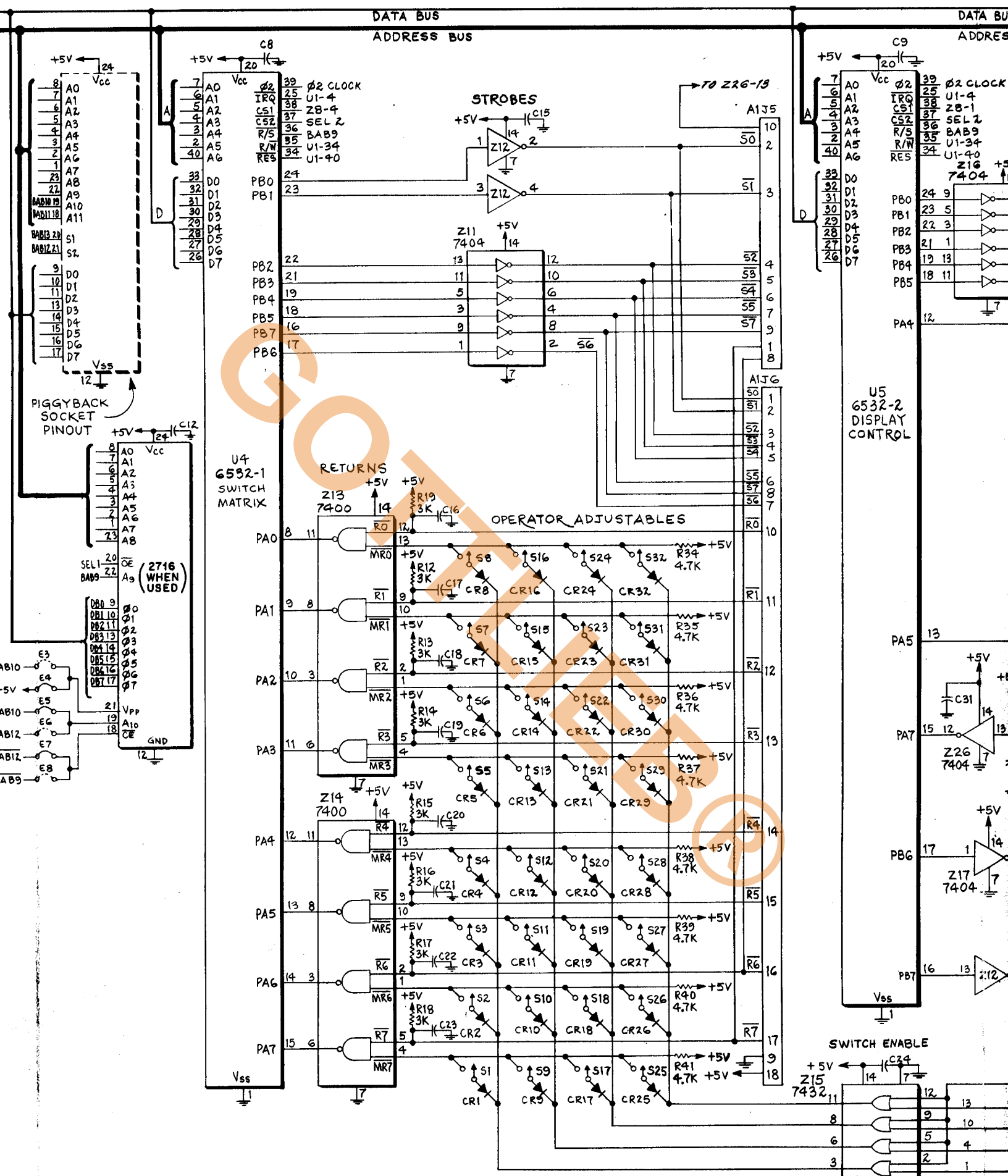
UP/DOWN MEMORY PROTECT LOGIC



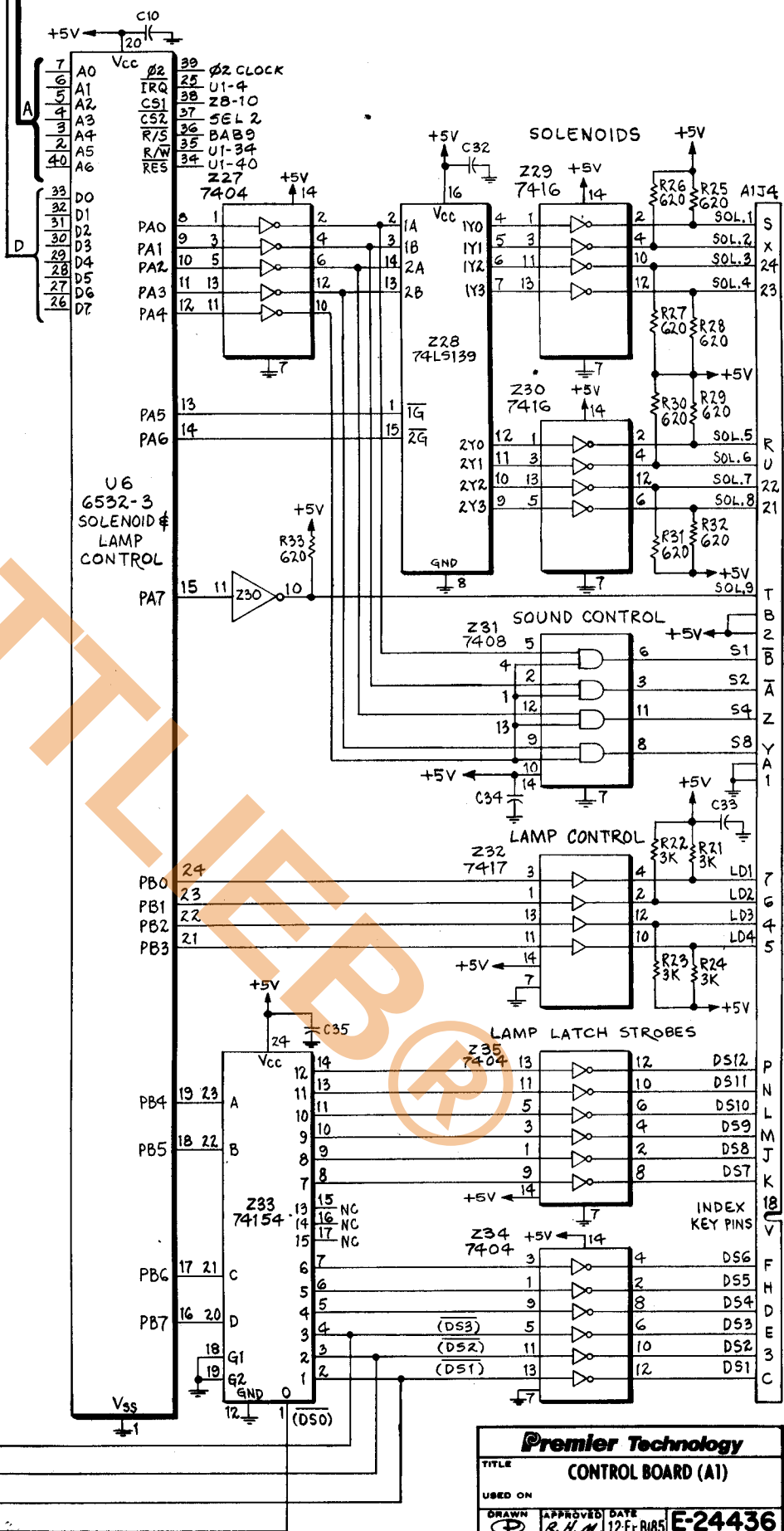
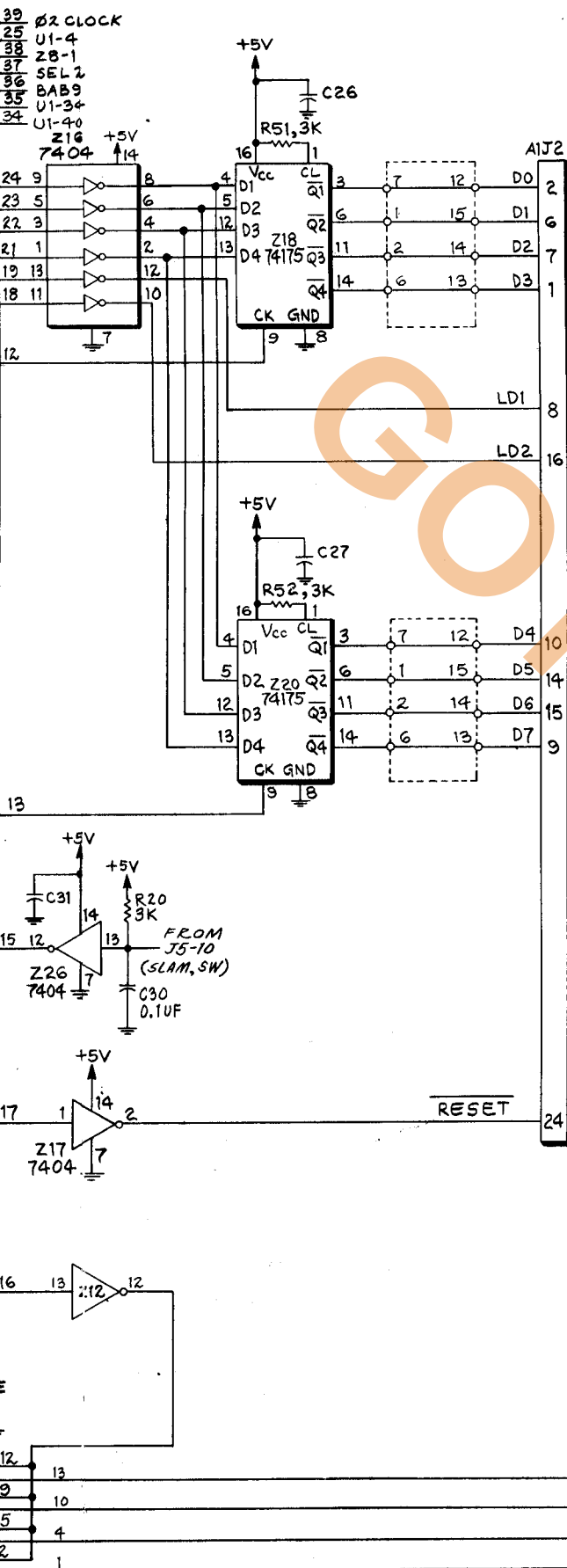
INPUT/OUTPUT DEVICE SELECTION



X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS



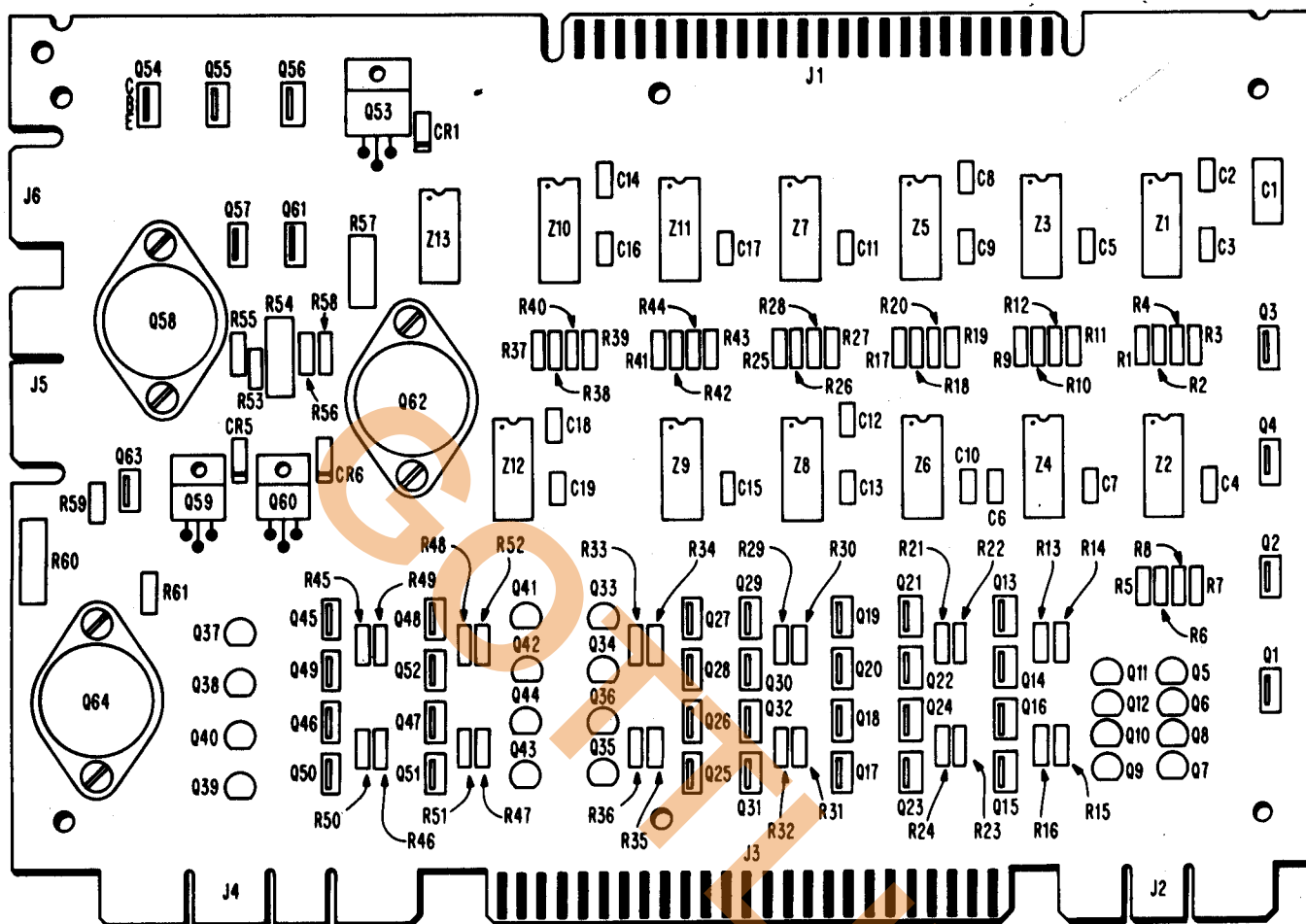
DATA BUS
ADDRESS BUS



Premier Technology			
TITLE CONTROL BOARD (A1)			
USED ON			
DRAWN P	APPROVED R.H.N.	DATE 12-1-85	E-24436

X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS

DRIVER BOARD (A3) COMPONENT LOCATION

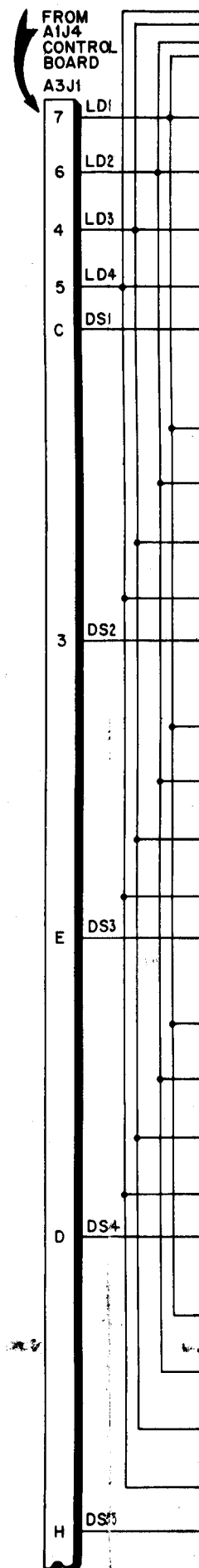


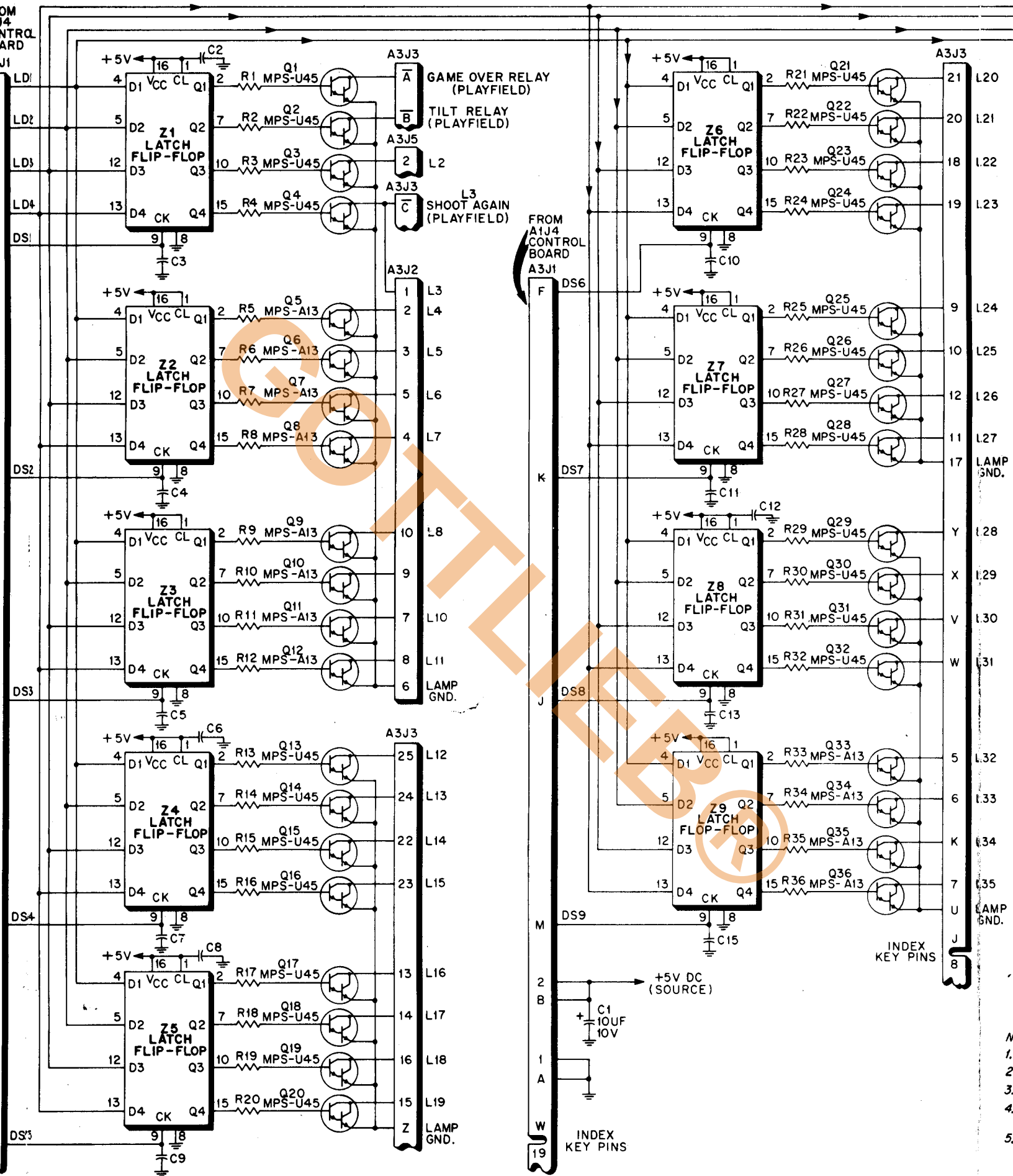
DRIVER BOARD (A3) PARTS LIST

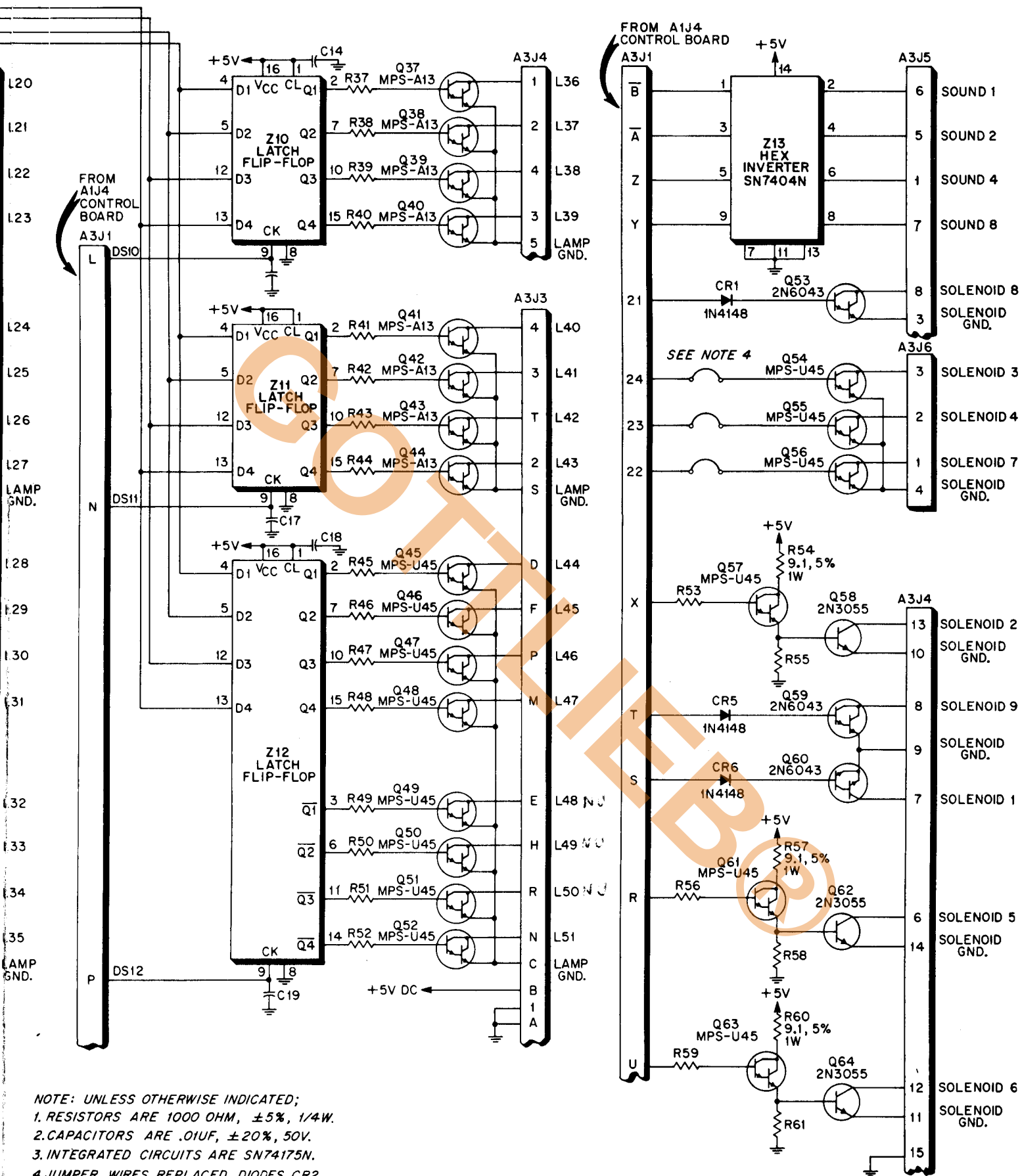
REFERENCE	DESCRIPTION	PART NUMBER
	DRIVER BOARD	MA-295
C1	Capacitor, 10 mfd., 10V Tantalum	XO-209
C2-C19	Capacitor, 01 mfd., 50V Ceramic	XO-229
CR1-CR6	Diode—Silicon 1N4148	XO-261
R1-R53, R61,	Resistor 1.0K ohm, 5%, 1/4W	XO-5
R55, R56, R58, R59		
R54, R57, R60	Resistor, 91 ohm, 5%, 1W	XO-158
Q1-Q4, Q13-	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 80A AND 80B GAMES.
2. TRANSISTOR TYPES MPS-U45 AND NOS-U45 ARE INTERCHANGEABLE.





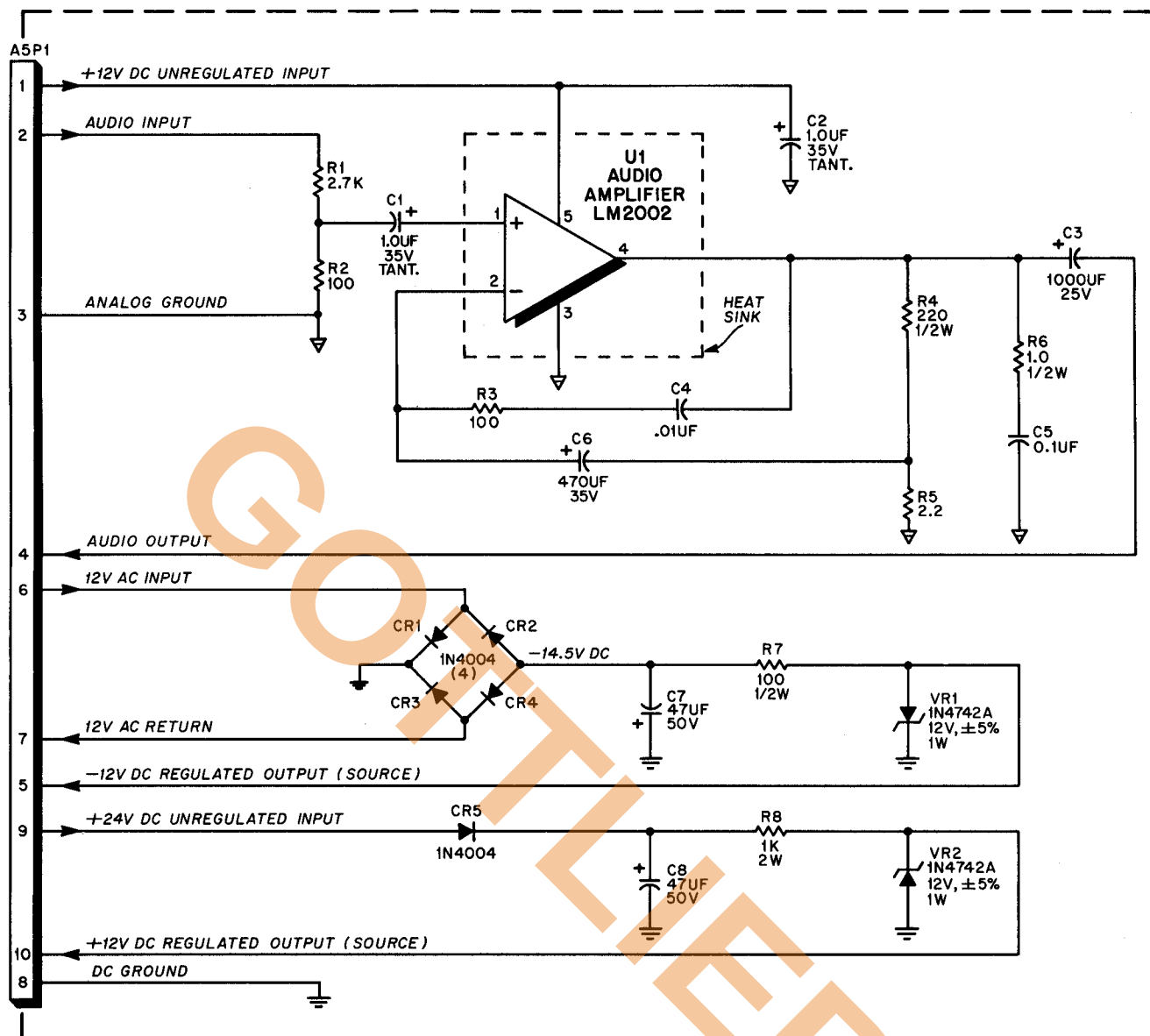


- NOTE: UNLESS OTHERWISE INDICATED;
 1. RESISTORS ARE 1000 OHM, $\pm 5\%$, 1/4W.
 2. CAPACITORS ARE .01UF, $\pm 20\%$, 50V.
 3. INTEGRATED CIRCUITS ARE SN74175N.
 4. JUMPER WIRES REPLACED DIODES CR2, CR3 AND CR4 FOR SYSTEM 80A AND 80B GAMES.
 5. TRANSISTOR TYPES MPS-U45 AND NDS-U45 ARE INTERCHANGEABLE.

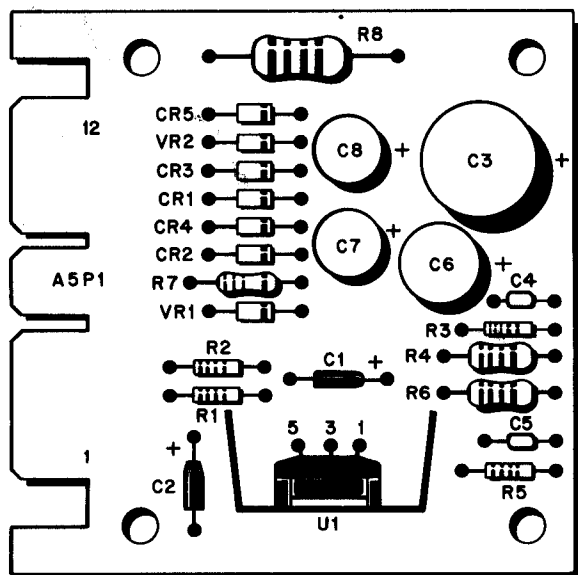
SERVICE NOTES

GO TILLER®

X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS



AUXILIARY POWER SUPPLY (A5) COMPONENT LOCATION



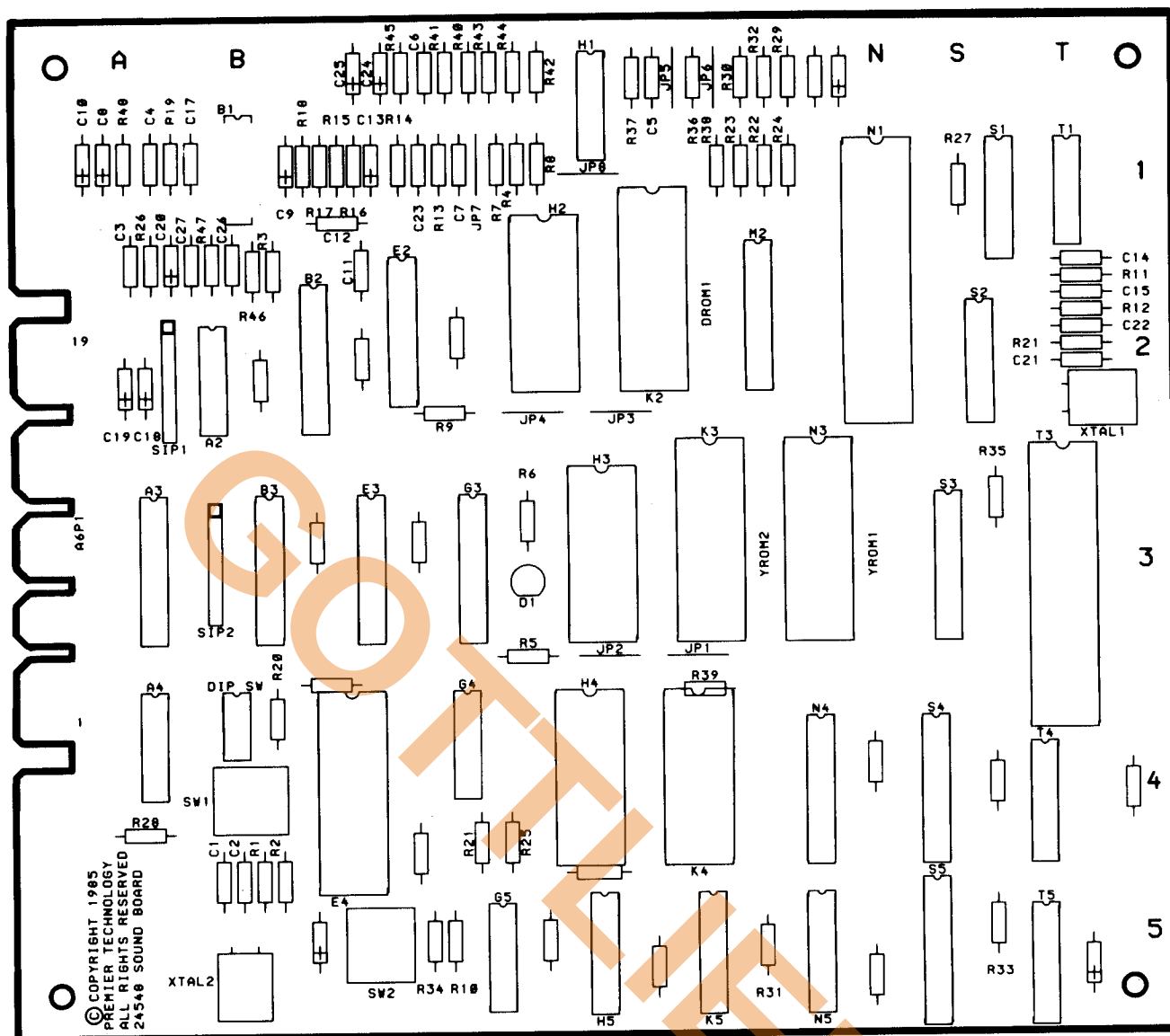
Premier Technology			
TITLE AUXILIARY POWER SUPPLY (A5)			
USED ON			
DRAWN	APPROVED DATE	E-24715	
R.H.M.	9 OCT 85		

AUXILIARY POWER SUPPLY (A5) PARTS LIST

REFERENCE	DESCRIPTION	PART NUMBER
	Auxiliary Power Supply	MA-767
C1, C2	Capacitor, 1uF, 10%, 35V, TANT	XO-715
C3	Capacitor, 1000uF, 25V	XO-874
C4	Capacitor, .01uF, +80% -20%, 50V	XO-229
C5	Capacitor, 0.1uF, +80% -20%, 50V	XO-230
C6	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

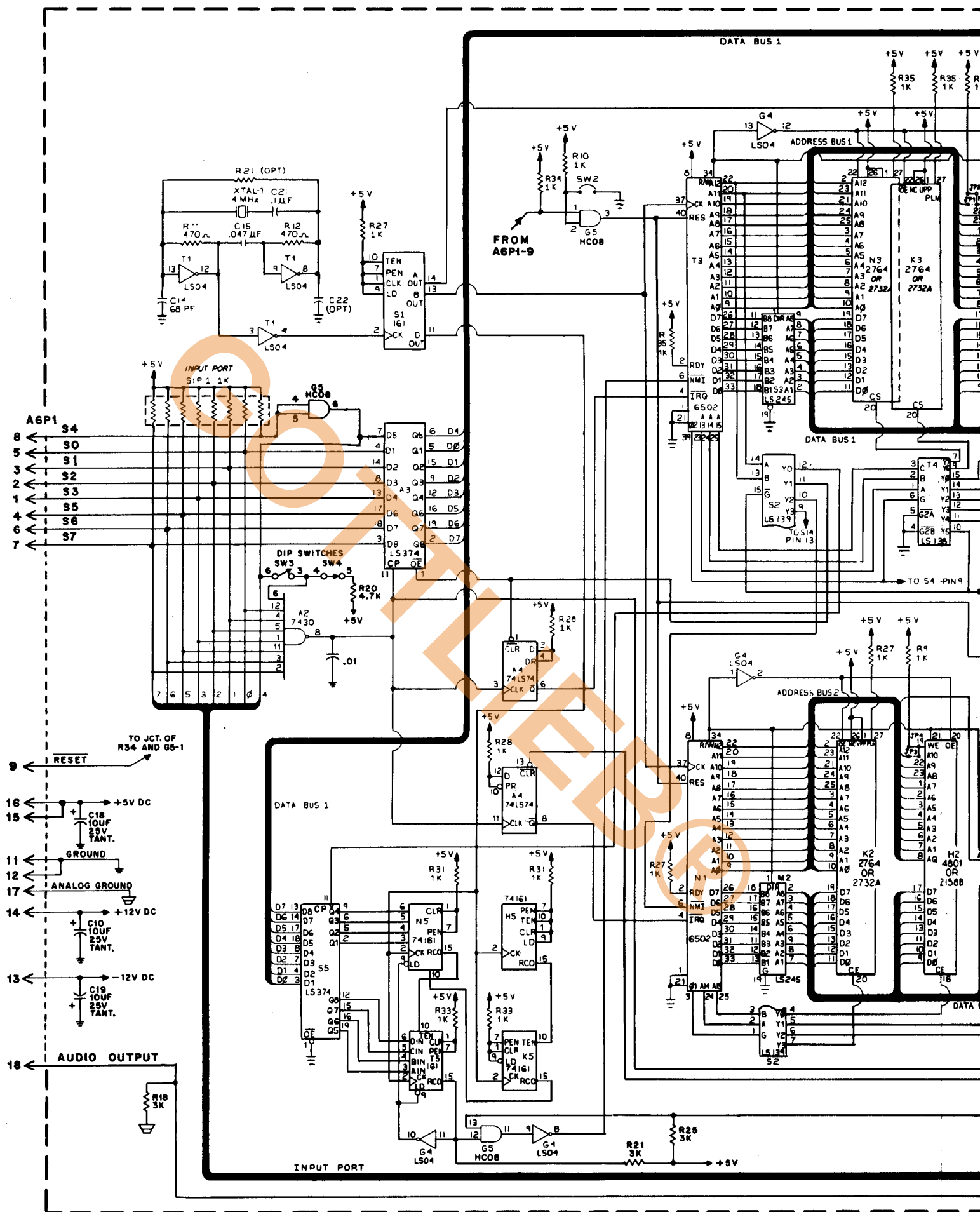
X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS

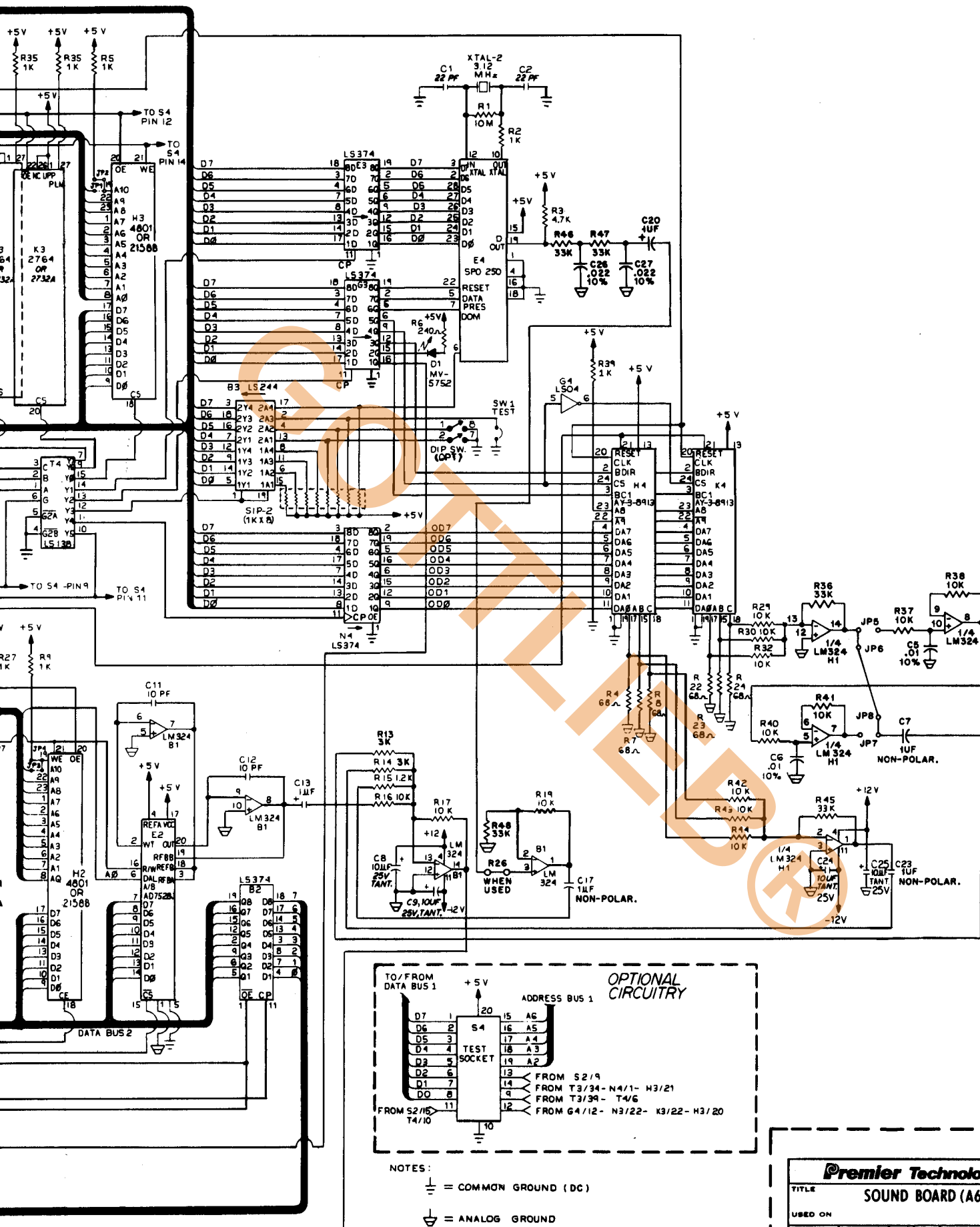
SOUND BOARD (A6) COMPONENT LOCATION

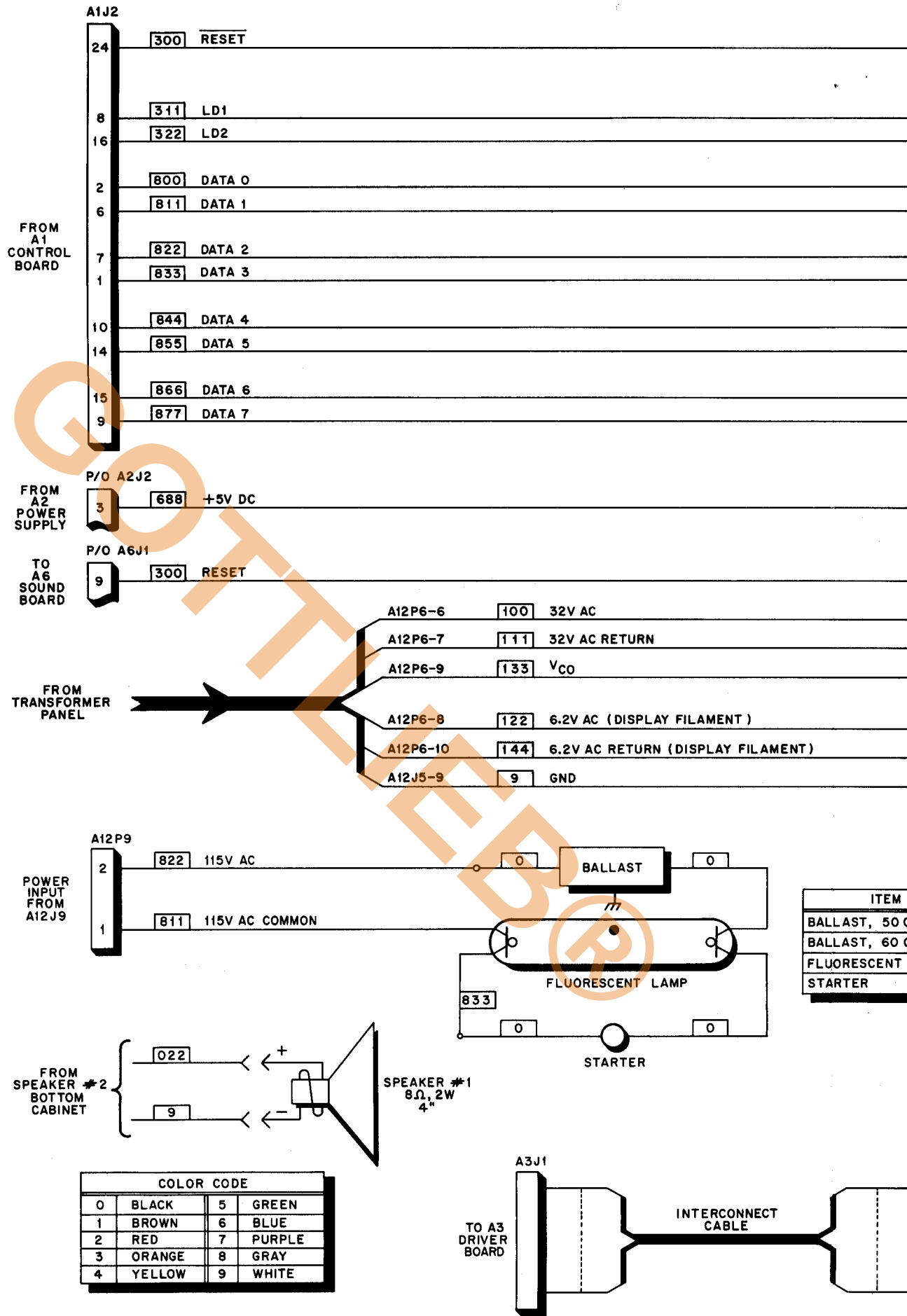


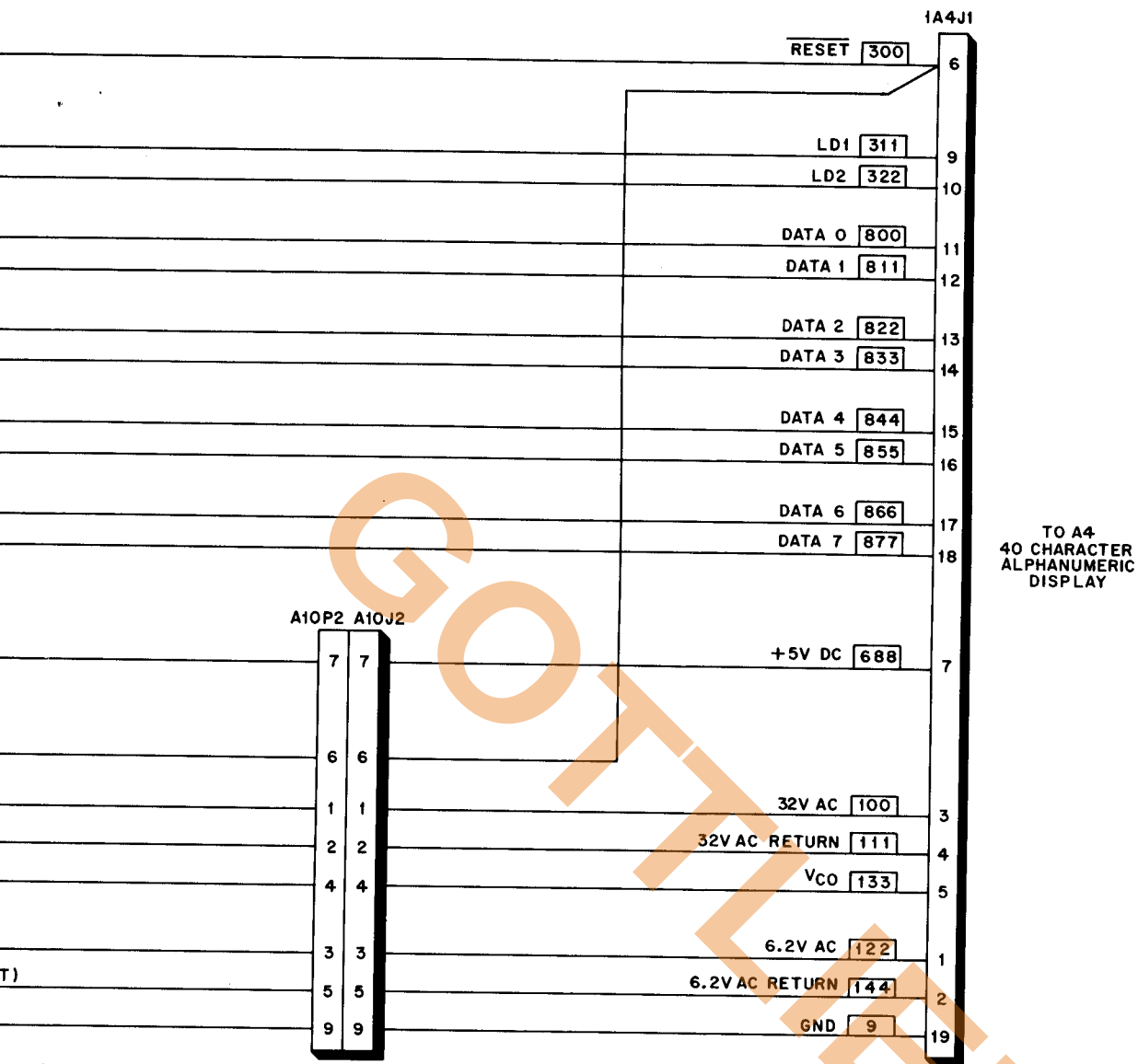
SOUND BOARD (A6) PARTS LIST

REFERENCE	DESCRIPTION	PART NUMBER	REFERENCE	DESCRIPTION	PART NUMBER
	Sound Board Assembly (A6)	MA766	R6	Resistor, 240 Ohm, 5%, 1/4W	XO-173
C1,C2	Capacitor, 22PF, 50V MONO	XO-633	R11,R12	Resistor, 470 Ohm, 5%, 1/4W	XO-35
	AX-CM, 10%		R13,R14,R18, R21,R25	Resistor, 3K Ohm, 5%, 1/4W	XO-23
C5,C6	Capacitor, .01UF, 50V	XO-696	R15	Resistor, 1.2K Ohm, 5%, 1/4W	XO-175
	AX-CM, 10%		R16,R17,R19	Resistor, 10K Ohm, 5%, 1/4W	XO-18
C7,C17,C23	Capacitor, 1UF, 50V CM-RD	XO-294	R29,R30,R32, R37,R38,R40- R44		
	Non-Polarized		R36,R45-R48	Resistor, 33K Ohm, 5%, 1/4W	XO-43
C8,C9,C10, C18,C19,C24, C25,and ALL UNMARKED	Capacitor, 10UF, 25V	XO-127	SIP1,SIP2	Resistor Pack, SIP, 1K Ohm, 9 Pin	XO-493
	TANT-AX, 10%, Polarized		SW1,SW2	Switch, Push Button, N.O.	XO-365
POLARIZED CAPACITORS			XTAL1	Crytsal, 4.0 MHZ	XO-366
C11,C12	Capacitor, 10PF, 50V AX-CM	XO-635	XTAL2	Crystal, 3.12 MHZ	XO-639
	+80%-20%		A2	7430 8-input "NAND" gate	XO-643
C13,C20	Capacitor, 1UF, 35V	XO-715	A3,B2	74LS374 Octal D-type flip flop	XO-96
	TANT-AX, 10%		A4	74LS74 Dual D-type flip flop	XO-434
C14	Capacitor, 68PF, 50V MONO	XO-636	B1,H1	LM324 Quad op-amp	XO-644
	AX-CM, 10%		B3	74LS244 Octal buffer/driver	XO-117
C15	Capacitor, .047UF, 50V MONO	XO-638	E2	AD7528J DAC	XO-647
	AX-CM, 20%		E3,G3,N4,S5	74LS374 Octal D-type flip flop	XO-96
C21,and ALL UNMARKED	Capacitor, 0.1UF, 50V	XO-230	E4	SP0250 Speech generator	XO-645
	AX-CM, +80%-20%		G4,T1	74LS04 Hex Inverter	XO-418
CAPACITORS			G5	74HC08 Quad 2-input "AND" gate	XO-872
C26,C27	Capacitor, .022UF, 50V	XO-873	H2,H3	2K x 8 RAM (6116) (20ONS)	XO-191
	AX-CM, 10%		H4,K4	AY-3-8913 Sound generator	XO-646
D1	Diode, MV5752	XO-270	H5,K5,N5, S1,T5	74161 Synchronous presettable binary counter	XO-192
DIP SW	Dip Switch, 4 Position, 8 Pin	XO-640	K2,K3,N3	2764 EProm	XO-489
R1	Resistor, 10M Ohm, 5%, 1/4W	XO-73	N1,T3	R6502-13 CPU	XO-360
R2,R5,R9	Resistor, 1K Ohm, 5%, 1/4W	XO-5	M2,S3	74LS245 Octal bus transceiver	XO-79
R10,R27,R28, R31,R33-R35, R39			S2	74LS139 Dual 1 of 4 decoder	XO-419
R3,R20	Resistor, 4.7K Ohm, 5%, 1/4W	XO-7	T4	74LS138 1 of 8 decoder/ demultiplexor	XO-437
R4,R7,R8 R22-R24	Resistor, 68 Ohm, 5%, 1/4W	XO-748		28 Pin Dip Socket (4) Jumper, 22 GA (5)	XO-536 XO-469

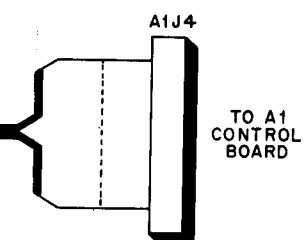








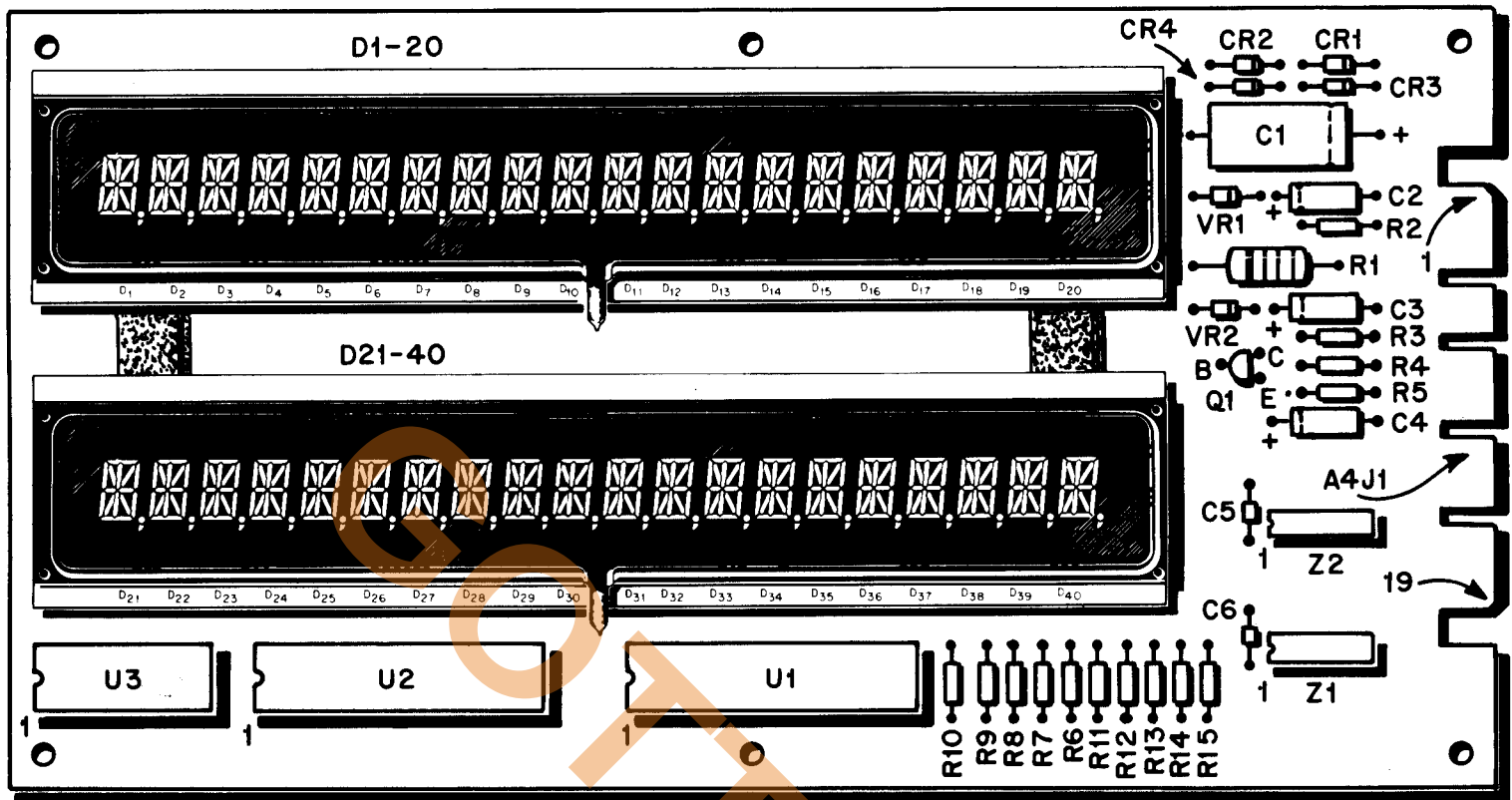
ITEM	PART NO.
BALLAST, 50 CYCLE	24672
BALLAST, 60 CYCLE	24673
FLUORESCENT LAMP	24674
STARTER	24675



Premier Technology			
TITLE LIGHTBOX. SCHEMATIC/ WIRING DIAGRAM			
DRAWN	APPROVED	DATE	
	R.H.M.	9-OCT-85	E-24712

X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS

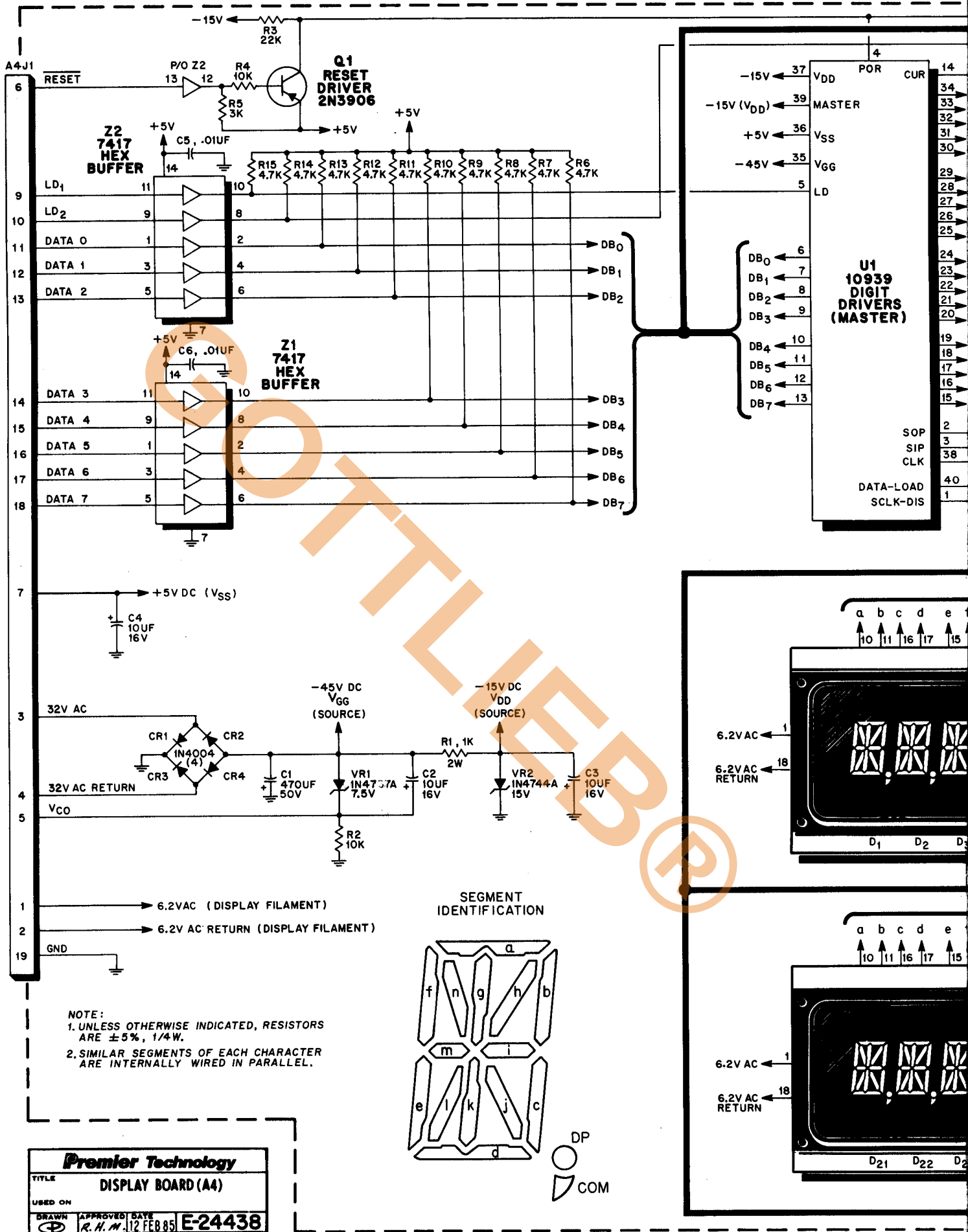
DISPLAY BOARD (A4) COMPONENT LOCATION

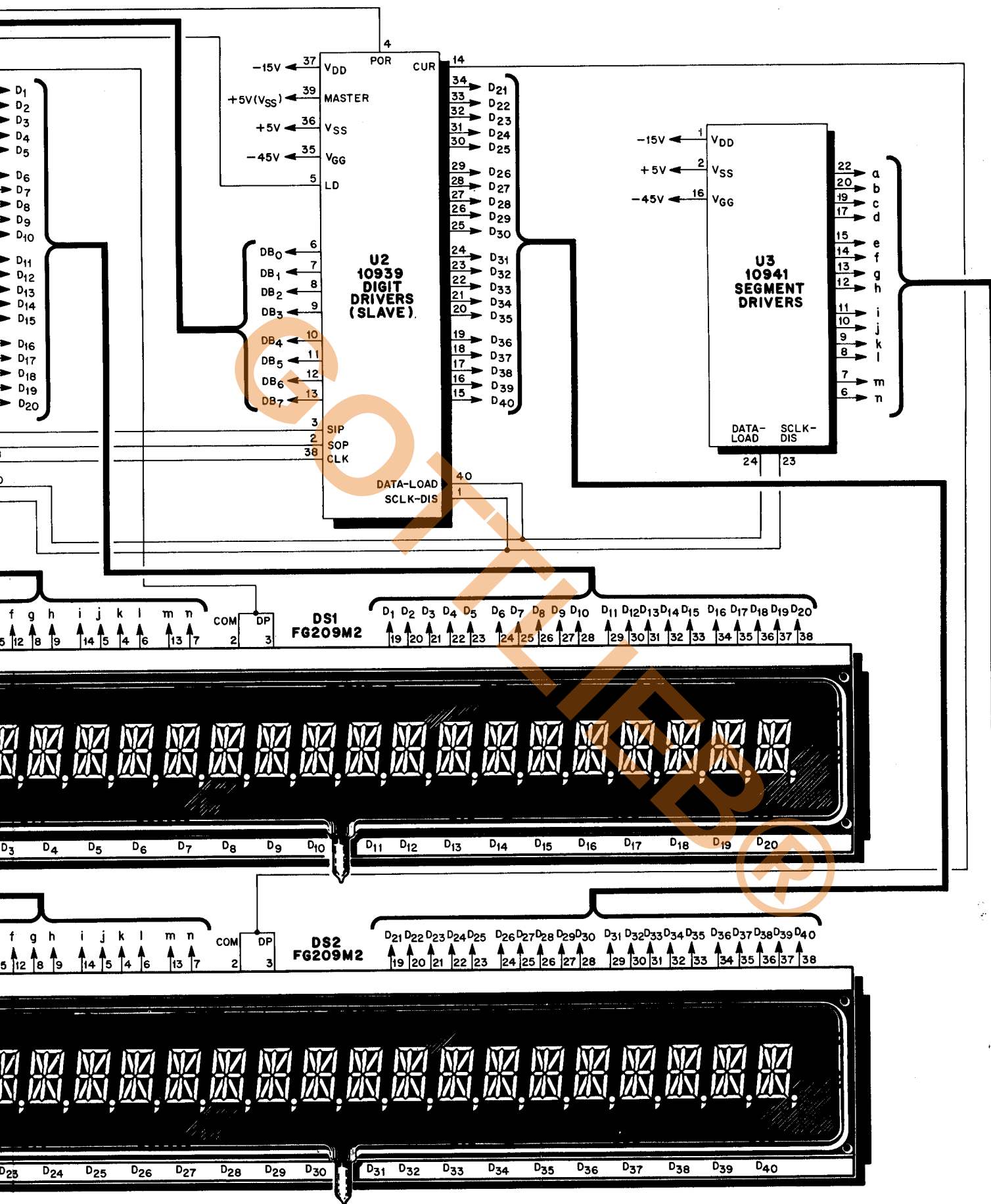


DISPLAY BOARD (A4) PARTS LIST

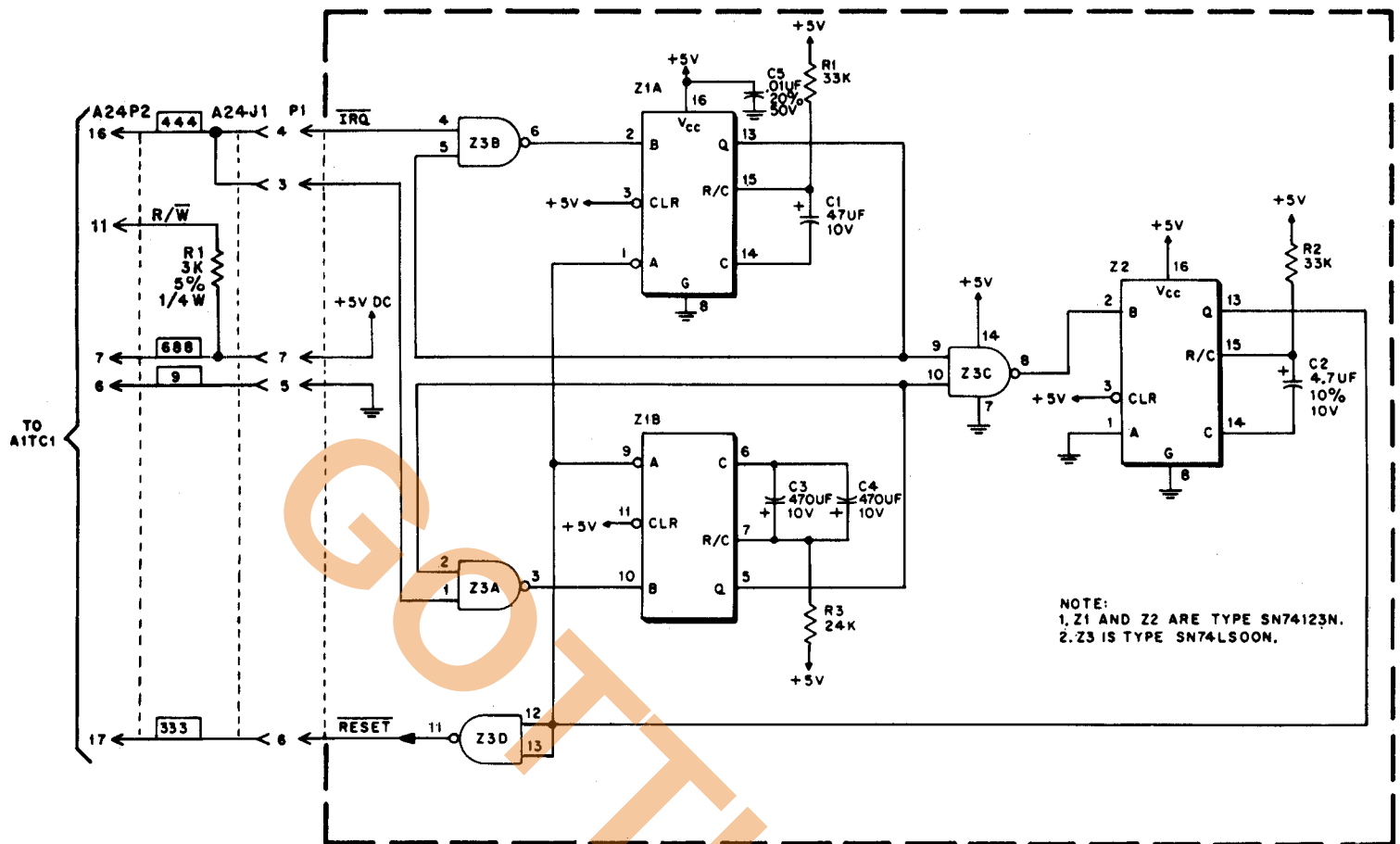
REFERENCE	DESCRIPTION	PART NUMBER
	Display Board (A4)	MA644
C1	Capacitor, 470UF, 50V	XO-847
C2, C3, C4	Capacitor, 10UF, 16V	XO-846
C5, C6	Capacitor, .01UF, +80% -20%	XO-229
CR1-CR4	Diode, 1N4004	XO-254
DS1, DS2	Display, Alphanumeric	XO-840
Q1	Transistor, PNP, 2N3906	XO-588
R1	Resistor, 1K, 5%, 2W	XO-627
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

X. WIRING AND SCHEMATIC



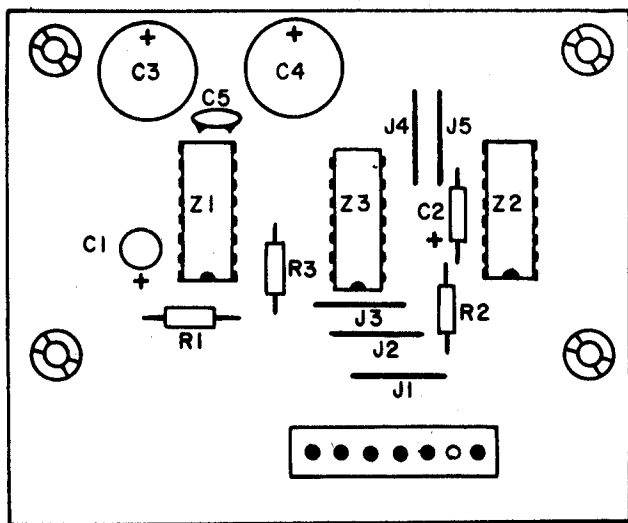


X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS



Premier Technology			
TITLE RESET CIRCUIT BOARD			
USED ON			
DRAWN	APPROVED	DATE	C-21063
BAM		4-2-81	

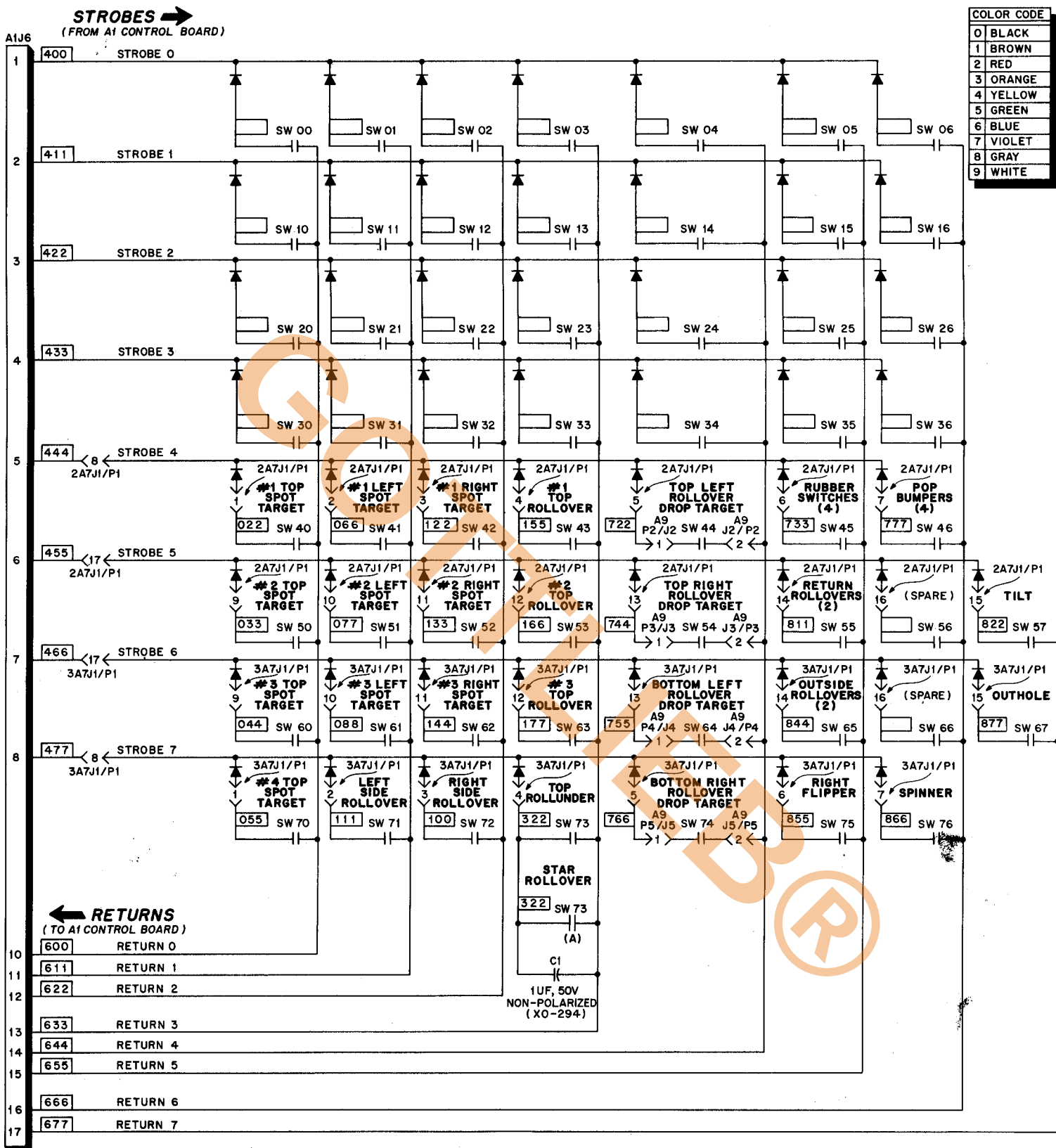
**RESET BOARD (A24)
COMPONENT LOCATION**



RESET BOARD (A24) PARTS LIST

REFERENCE	DESCRIPTION	PART NUMBER
	RESET BOARD	MA-164
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.	XO-202
Z1, Z2	IC 74123N	XO-398
Z3	IC 74LS00N	XO-427
	7 Pin Connector	XO-526

X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS



NOTE:
1. DIODES USED ARE TYPE 1N270.
2. DIODE BOARDS 2A7 AND 3A7
PART NO'S 24030.

Premier Technology

TITLE SWITCH MATRIX

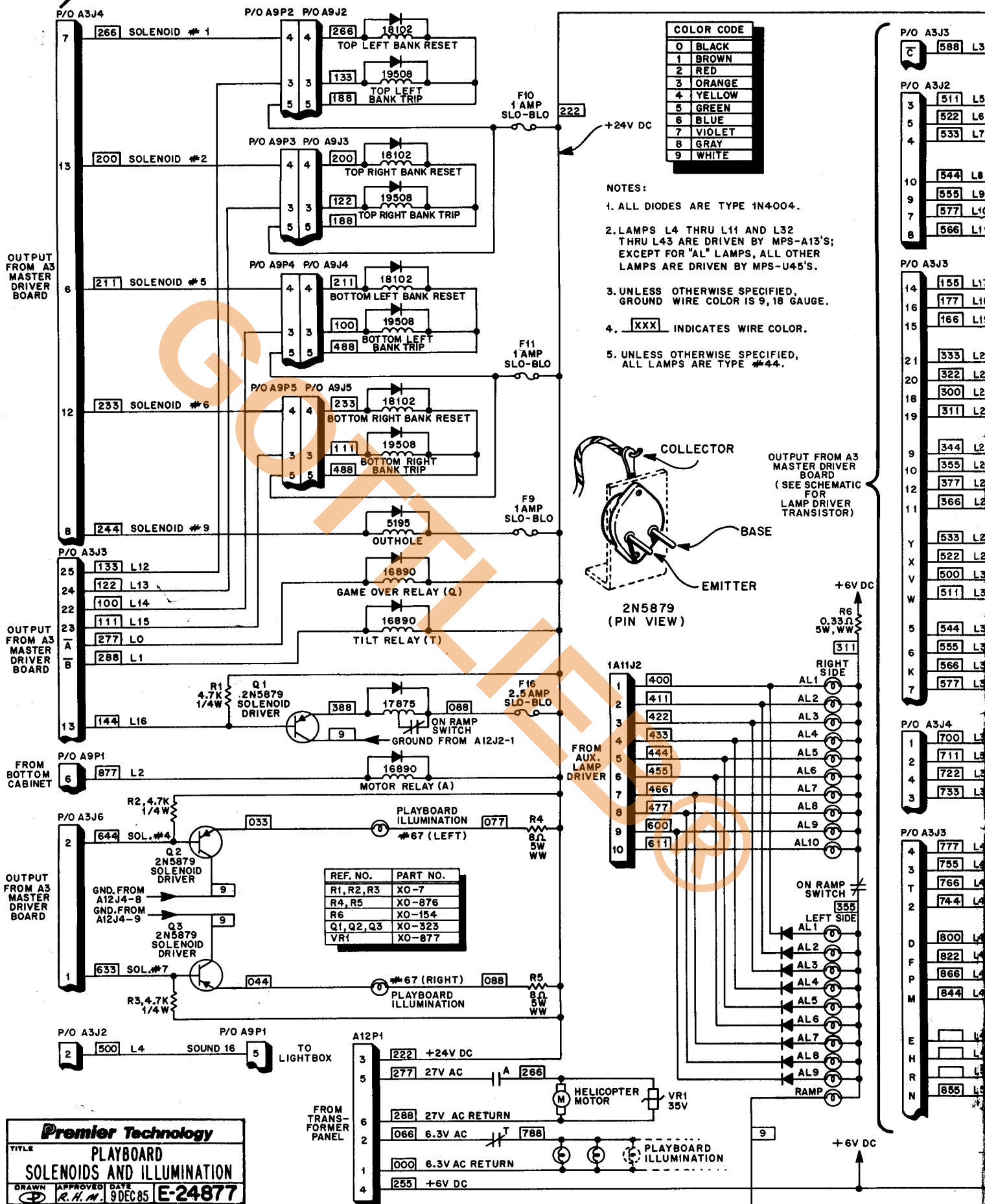
USED ON GAME #702

DRAWN APPROVED DATE

R.H.M. 9 DEC 85 E-24876

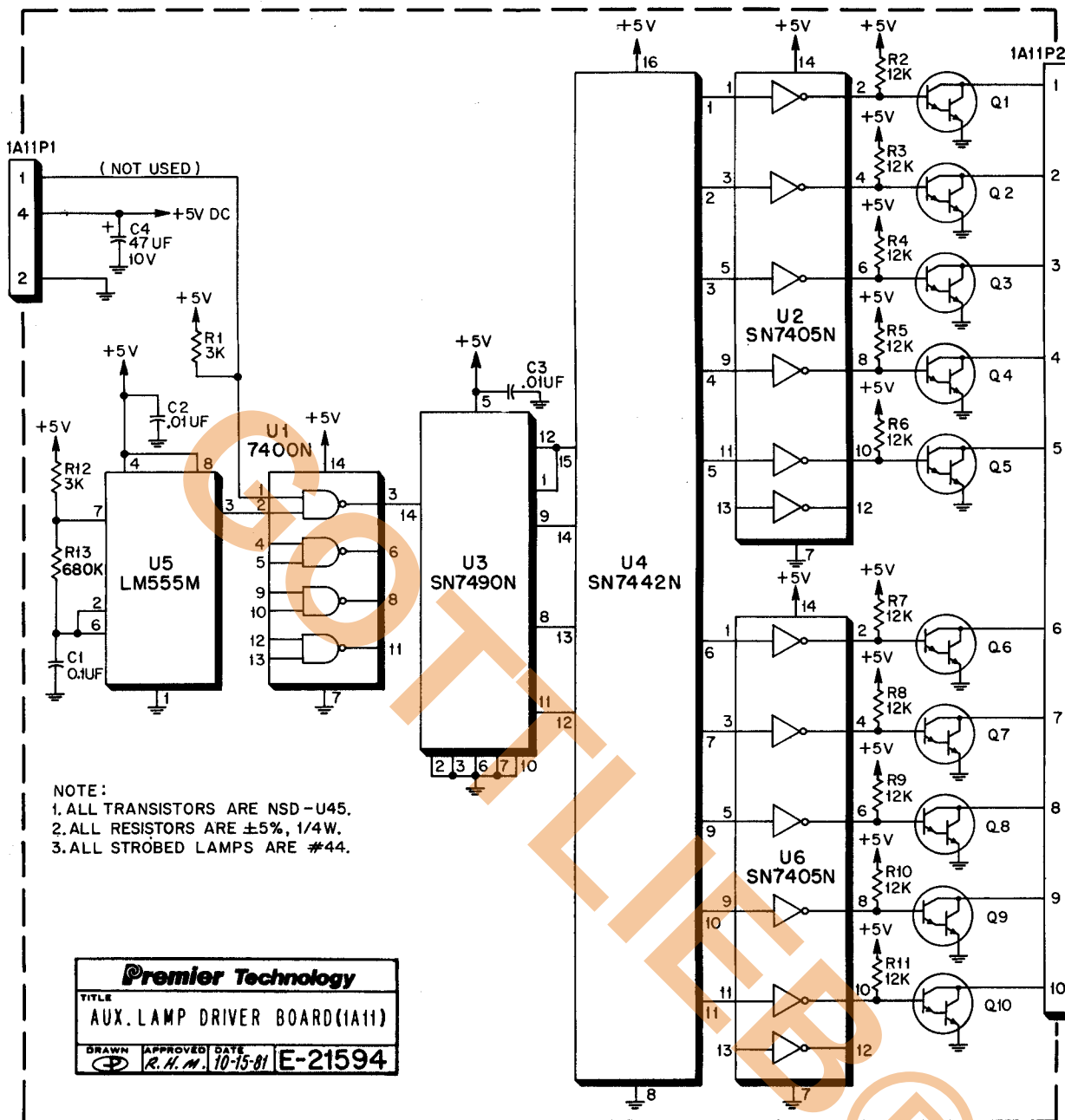
X. WIRING AND SCHEMATIC

PLAYBOARD "CONTROLLED" SOLENOIDS AND ILLUMINATION

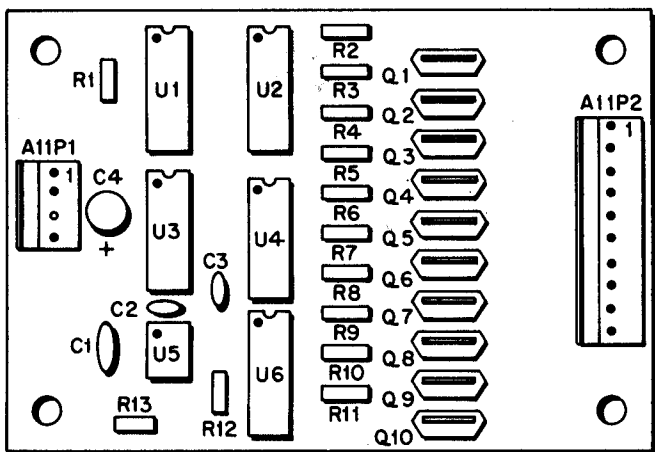




X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS



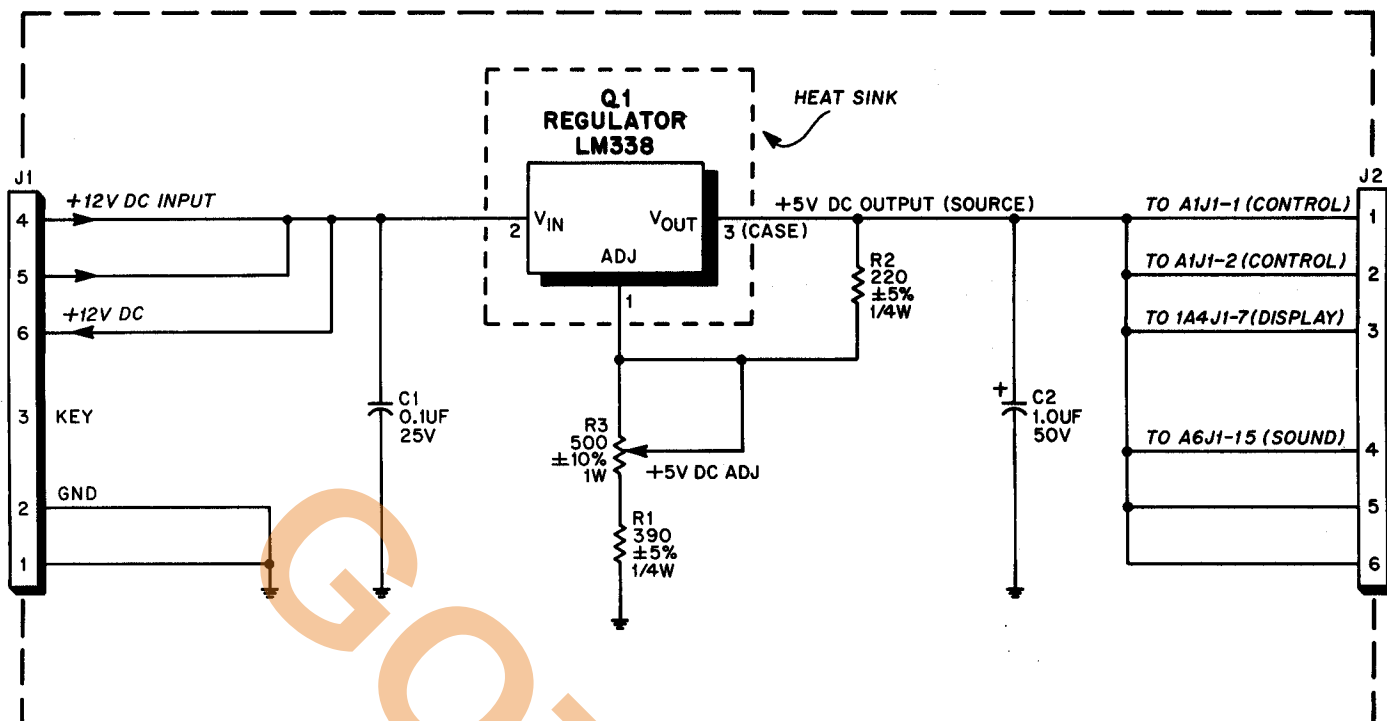
AUXILIARY LAMP DRIVER BOARD (A11) COMPONENT LOCATION



AUXILIARY LAMP DRIVER BOARD (A11) PARTS LIST

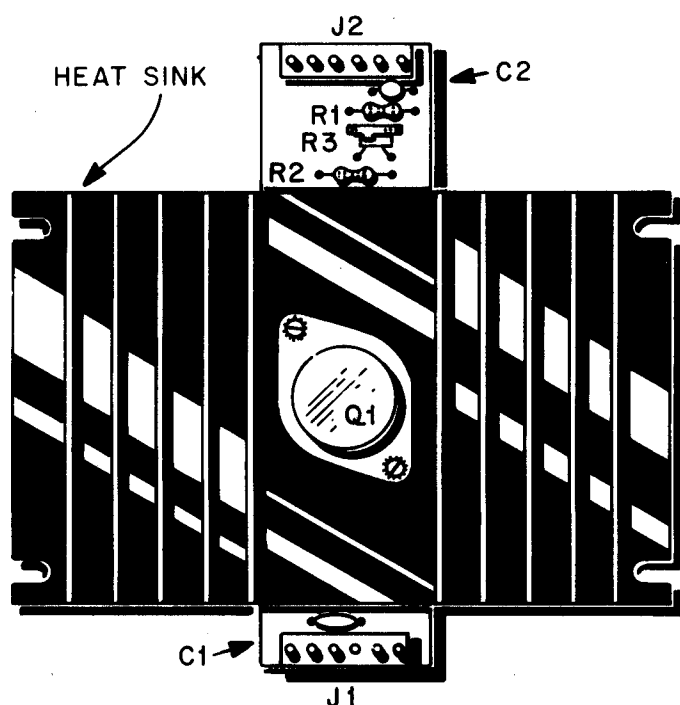
REFERENCE	DESCRIPTION	PART NUMBER
	AUXILIARY LAMP DRIVER ASSEMBLY	MA-789
C1	CAPACITOR, .1 MFD, 100V	XO-626
C2-C3	CERAMIC RADIAL LEAD CAPACITOR, .01 MFD, 100V	XO-202
C4	CAPACITOR, 47 MFD, 10V	XO-227
Q1-Q10	ELECTROLYTIC RADIAL LEAD TRANSISTOR, NSD-U45 NPN DARLINGTON	XO-146
R1, R12	RESISTOR, 3K OHM, 5%, 1/4 W	XO-23
R2-R11	RESISTOR, 12K OHM, 5%, 1/4 W	XO-9
R13	RESISTOR, 680K OHM, 5%, 1/4 W	XO-669
U1	I.C. 2-INPUT NAND	XO-420
U2, U6	I.C. INVERTER	XO-403
U3	I.C. DECADE COUNTER	XO-425
U4	I.C. DECODER	XO-426
U5	I.C. TIMER	XO-631
P2	10 POS. CONNECTOR	XO-531
P1	4 POS. CONNECTOR	XO-532

X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS



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

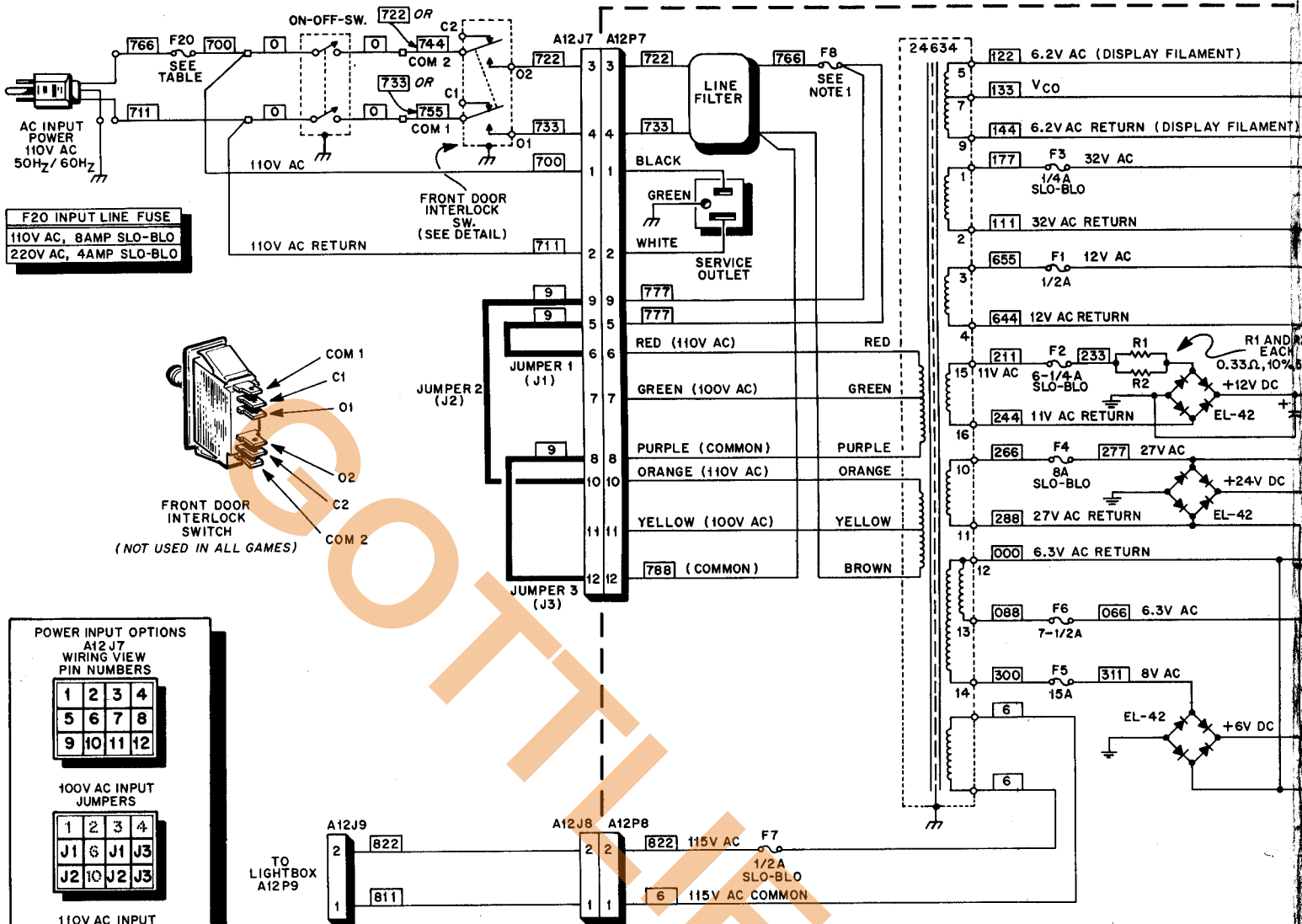
POWER SUPPLY (A2) COMPONENT LOCATION



POWER SUPPLY (A2) PARTS LIST

REFERENCE	DESCRIPTION	PART NUMBER
	Power Supply (A2)	MA-831
C1	Capacitor, 0.1uF, +80% -20%, 25V	XO-248
C2	Capacitor, 1uF, 10%, 50V	XO-217
J1, J2	Connector, 6 Pin, Molex	XO-373
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



POWER INPUT OPTIONS

A12J7 WIRING VIEW PIN NUMBERS

1	2	3	4
5	6	7	8
9	10	11	12

100V AC INPUT JUMPERS

1	2	3	4
J1	6	J1	J3
J2	10	J2	J3

110V AC INPUT JUMPERS

1	2	3	4
J1	J1	7	J3
J2	J2	11	J3

200V AC INPUT JUMPERS

1	2	3	4
J1	6	J1	J2
9	10	J2	12

220V AC INPUT JUMPERS

1	2	3	4
J1	J1	7	J2
9	J2	11	12

FUSE DESIGNATIONS

F1	SOUND POWER SUPPLY(A6)
F2	POWER SUPPLY (A2)
F3	DISPLAYS (32VAC)
F4	SOLENOIDS (+24V DC)
F5	CONTROLLED LAMPS
F6	PLAYFIELD ILLUMINATION
F7	LIGHTBOX ILLUMINATION
F8	PRIMARY POWER
F20	LINE INPUT

A12 TRANSFORMER PANEL
MA-829
USED WITH
SYSTEM 80B

Premier Technology

TITLE TRANSFORMER PANEL/CABINET
SCHEMATIC/WIRING DIAGRAM

DRAWN R.H.N. **APPROVED** DATE 9 DEC 85 **E24878**

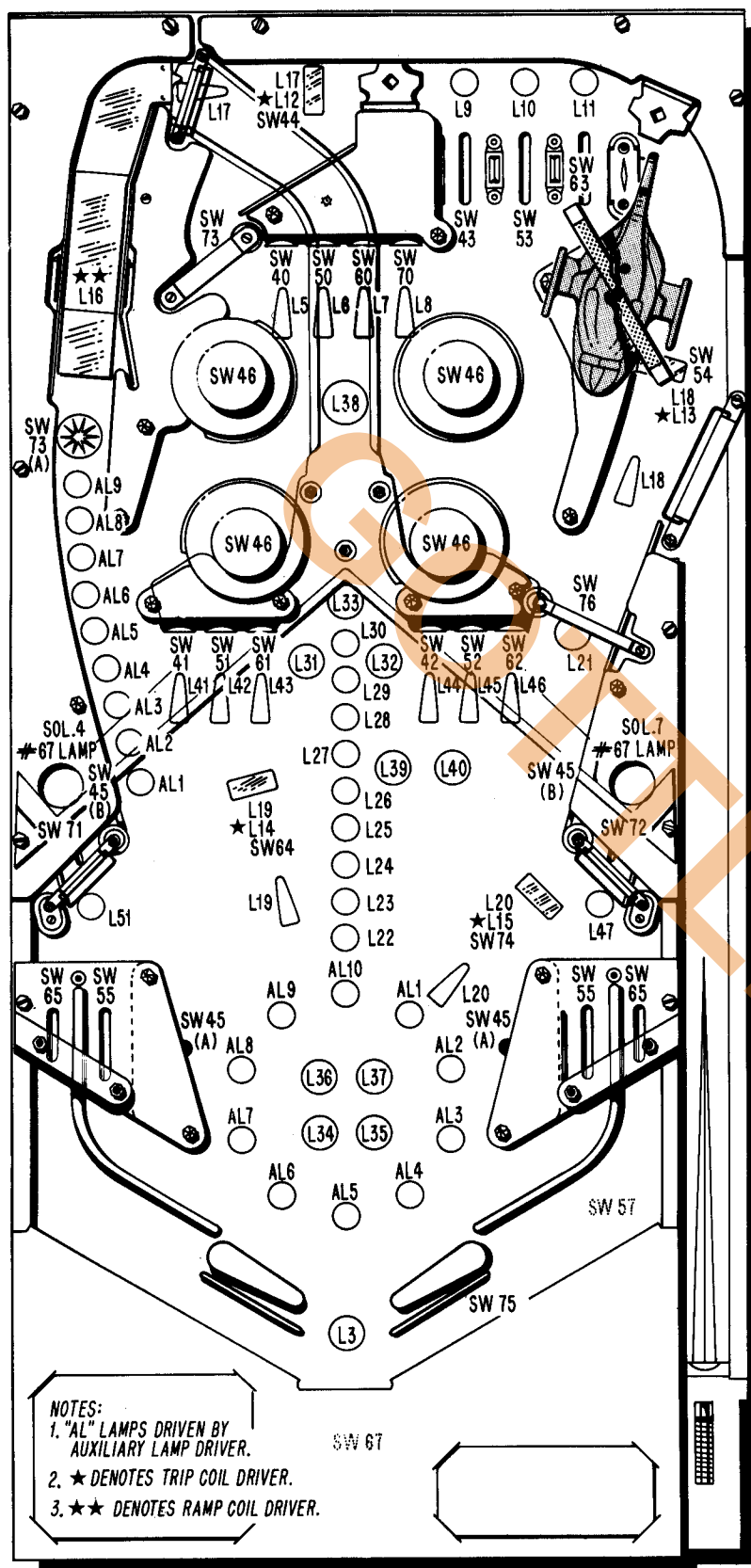


XI. PARTS INFORMATION

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RUBBER RINGS AND MISCELLANEOUS PARTS.....	50
STARGATE RAMP ASSEMBLY	
EXPLODED VIEW.....	51
HELICOPTER ASSEMBLY	
EXPLODED VIEW.....	52

XI. PARTS INFORMATION



PLAYBOARD SWITCH AND LAMP ASSIGNMENTS

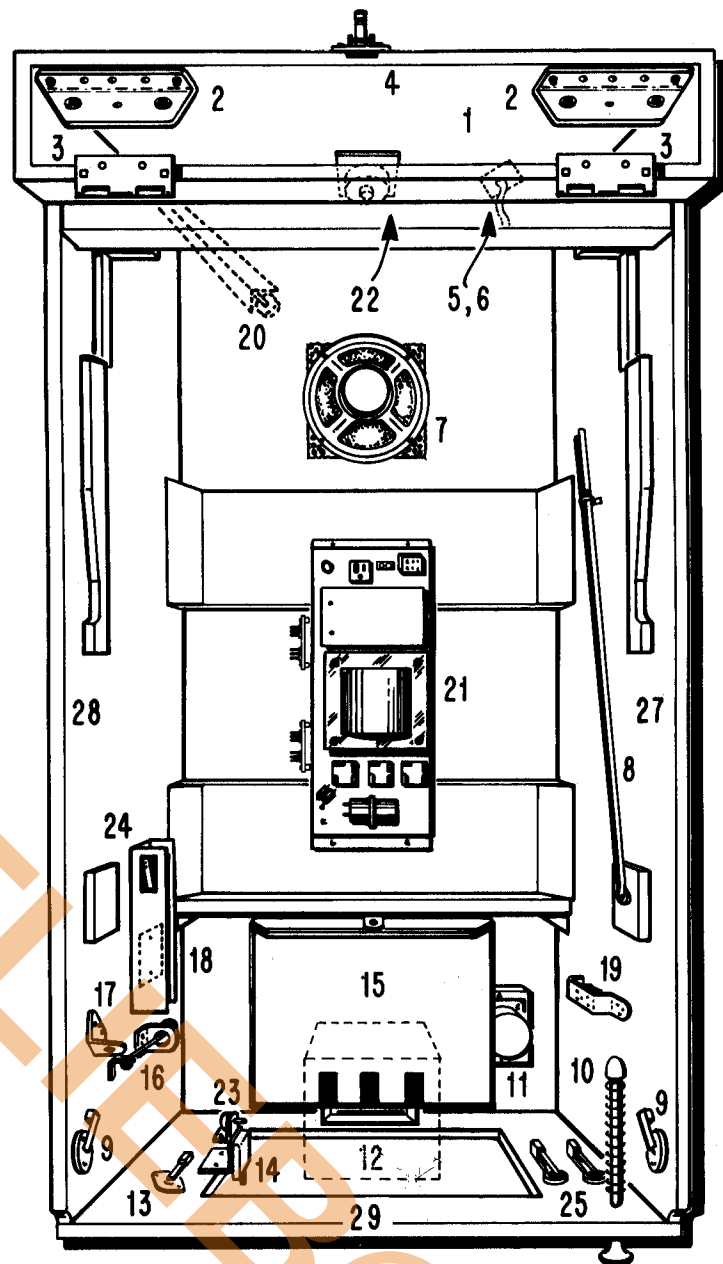
LAMP NUMBER	LAMP ASSIGNMENT
L3	Shoot Again
L5	#1 Top Spot Target
L6	#2 Top Spot Target
L7	#3 Top Spot Target
L8	#4 Top Spot Target
L9	#1 Top Rollover
L10	#2 Top Rollover
L11	#3 Top Rollover
L17	Top Left Drop Target (2 Lamps)
L18	Top Right Drop Target (2 Lamps)
L19	Bottom Left Drop Target (2 Lamps)
L20	Bottom Right Drop Target (2 Lamps)
L21	Spinner
L22	1000
L23	2000
L24	3000
L25	4000
L26	5000
L27	6000
L28	7000
L29	8000
L30	9000
L31	10,000
L32	20,000
L33	30,000
L34	1X
L35	2X
L36	4X
L37	8X
L38	Special
L39	Extra
L40	Ball
L41	#1 Left Spot Target
L42	#2 Left Spot Target
L43	#3 Left Spot Target
L44	#1 Right Spot Target
L45	#2 Right Spot Target
L46	#3 Right Spot Target
L47	Right Side Rollover
L51	Left Side Rollover

SWITCH MATRIX NUMBER	SWITCH ASSIGNMENT	PART NO.
SW 40	#1 Top Spot Target (with Bracket)	20867
SW 41	#1 Left Spot Target (with Bracket)	20867
SW 42	#1 Right Spot Target (with Bracket)	20867
SW 43	#1 Top Rollover	18892
SW 44	Top Left Rollover Target	18095
SW 45(A)	Rubber Switch (2)	
	Contact Kicker and Bracket (4)	22224
	Contact Kicker (2)	18808
SW 45(B)	Rubber Switch (with Bracket) (2)	18078
SW 46	Pop Bumpers (with Bracket) (4)	21352
SW 50	#2 Top Spot Target (with Bracket)	20867
SW 51	#2 Left Spot Target (with Bracket)	20867
SW 52	#2 Right Spot Target (with Bracket)	20867
SW 53	#2 Top Rollover	18892
SW 54	Top Right Rollover Target	18095
SW 55	Return Rollovers (2)	18892
SW 57	Tilt (with Bracket)	9141
SW 60	#3 Top Spot Target (with Bracket)	20867
SW 61	#3 Left Spot Target (with Bracket)	20867
SW 62	#3 Right Spot Target (with Bracket)	20867
SW 63	#3 Top Rollover	18892
SW 64	Bottom Left Rollover Target	18095
SW 65	Outside Rollovers (2)	18892
SW 67	Outsole (Assembly)	18688
SW 70	#4 Top Spot Target (with Bracket)	20867
SW 71	Left Side Rollover	18892
SW 72	Right Side Rollover	18892
SW 73	Top Rollunder	21137
SW 73(A)	Star Rollover	19428
SW 74	Bottom Right Rollover Target	18095
SW 75	Right Flipper	22398
SW 76	Spinner (with Bracket)	19354

XI. PARTS INFORMATION

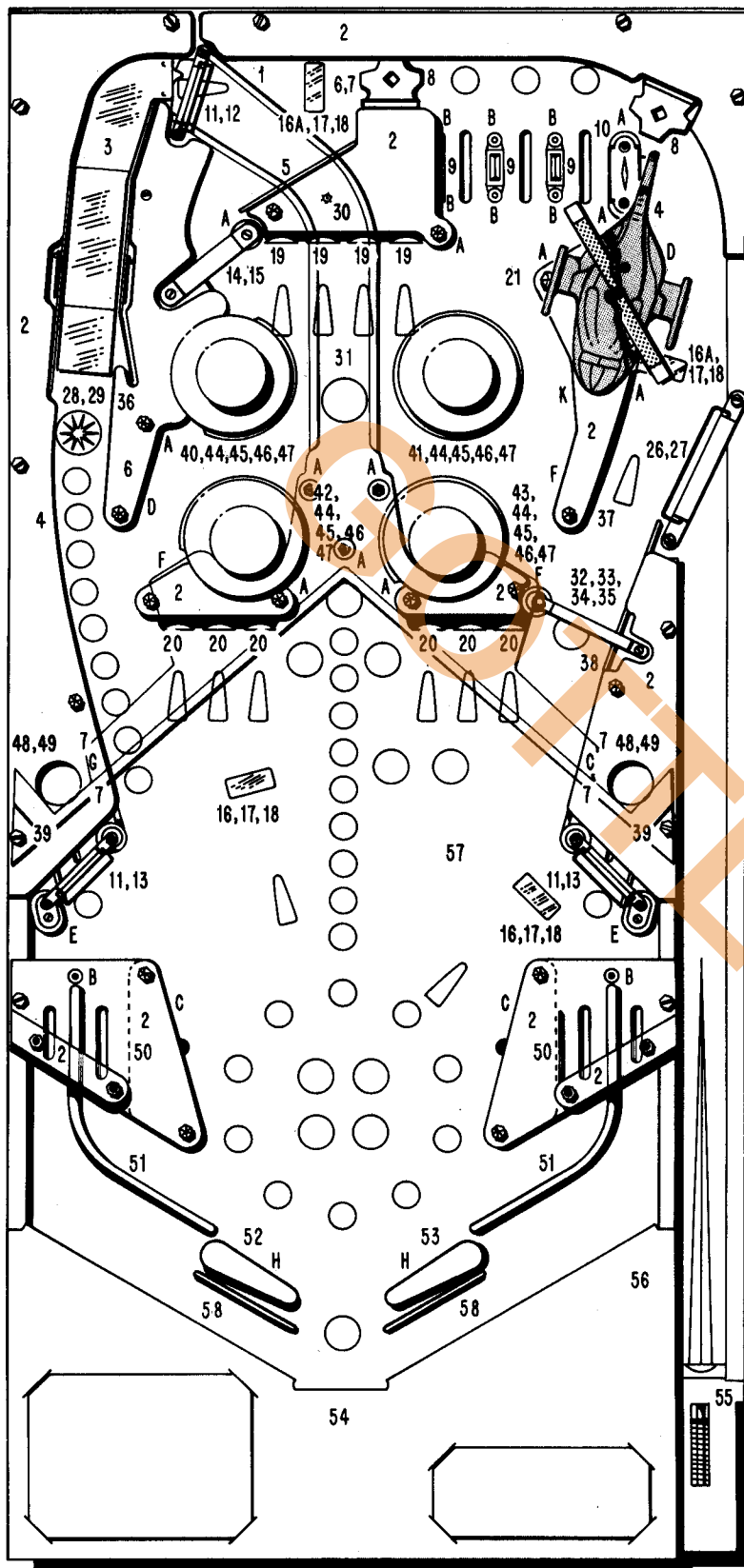
CABINET PARTS

ITEM	DESCRIPTION	PART NO.
1.	Cabinet	24928-702
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
10.	Ball Shooter Assembly	8835
11.	Switch, On/Off	23799
	Switch Plate	18769
	Switch Housing	15163
12.	Front Door Assembly (Universal)	MA-688
	Cable Assembly	MA-676
	Slam Switch	FD-12
	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
14.	Interlock Switch Assembly (When Used)	24148
	Switch	EL-66
	Switch Cover	21888
15.	Cashbox	24867
	Cover	24868
	Dividers	24869
	Locator	24151
	Lockeye Assembly	23878
	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	18578
17.	Locator Bracket	24252
18.	Diode Assembly	XO-265
	Diode, 1N270 (8)	MA-12
19.	Knocker Assembly	4337Y
20.	Cabinet Leg (4) (Black)	3775
	Leg Bolt (8)	MH-21
	3" Leg Adjuster (4)	MA-829
21.	Transformer Panel Assembly	EL-42
	Bridge Rectifier (3)	MA-812
	Cable Assembly (Secondary)	XO-830
	Capacitor, 10,000UF, 25V	EL-50
	Filter, Line	EL-12
	Fuse Block (6 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-25
	F4, 8 Amp, SLO-BLO	EL-22
	F5, 15 Amp	EL-20
	F6, 7-1/2 Amp	EL-8
	F7, 1/2 Amp, SLO-BLO	EL-21
	F8, 5 Amp, SLO-BLO (110V AC)	24542
	F8, 2.5 Amp, SLO-BLO (220V AC)	18133
	Ground Bus Assembly (2)	XO-154
	Outlet, Service	24634
	Resistor, 0.33 Ohm, 10%	EL-78
	5W, Wire-Wound (2)	EL-26
	Transformer	EL-33
22.	Fuse Holder	
	F20, 8 Amp, SLO-BLO (110V AC)	
	F20, 4 Amp, SLO-BLO (220V AC)	



ITEM	DESCRIPTION	PART NO.
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)	24645-702
27.	Front Moulding, Right (Black)	22735Y
	(Not Shown)	
28.	Front Moulding, Left (Black)	22736Y
	(Not Shown)	
29.	Front Moulding, (Black)	16951Y
	(Not Shown)	

XI. PARTS INFORMATION



PLAYBOARD PARTS INFORMATION

RUBBER RINGS

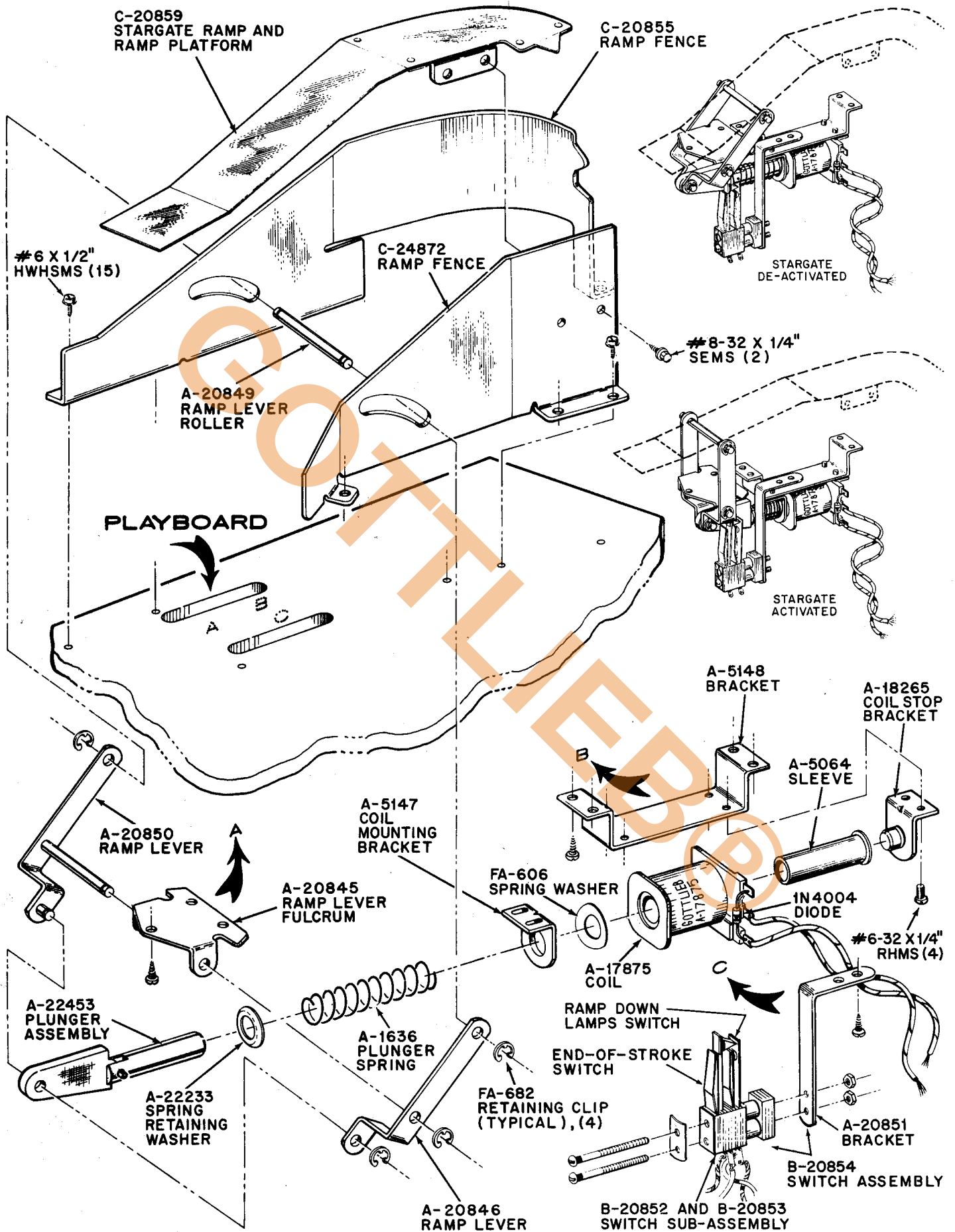
ITEM	DESCRIPTION	PART NO.
A	5/16" (11)	10217
B	Mini-Post (9)	15705
C	2-1/2" (3)	10222
D	1-1/2" (2)	10220
E	7/16" (2)	17493
F	1" (3)	10219
G	2"	10221
H	Flipper Red (2)	13151
J	3/4"	10218

PARTS LIST

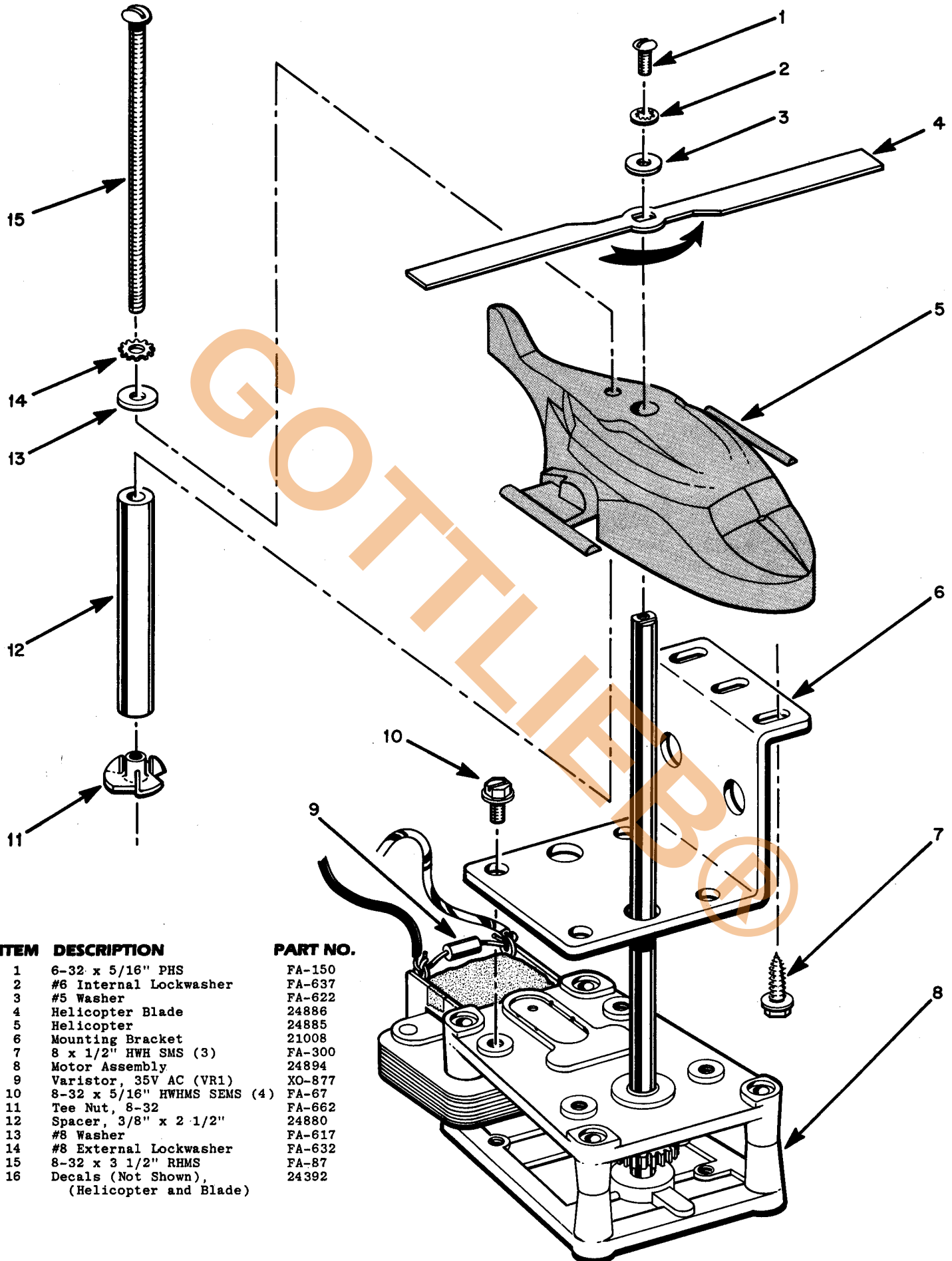
ITEM	DESCRIPTION	PART NO.
1	Flat Rail	24882
2	Plastic Shield Set	24895
3	Stargate Ramp Assembly (See Exploded View Illustration)	
4	Ball Guide Rail (2)	19331
5	Ball Guide Rail	13782
6	Ball Guide Rail (2)	17650
7	Ball Guide Rail (5)	18070
8	Arch Rebound Assembly (2)	19645
9	Rollover Guide (Green) (3)	15646S
10	Guide Rail (Green)	9393S
11	Metal Shield (3)	17300
12	Gate Wireform	17299
13	Gate Wireform (2)	22112
14	Metal Shield	4705
15	Gate Wireform	21958
16	Three Position Target Bank (Left) (2)	MA-729
16A	Three Position Target Bank (Right) (2)	MA-822
17	Target Decal (4)	24903
18	Rollover Target (4)	20892P
19	Spot Target (Yellow) (4)	24794
20	Spot Target (Red) (6)	24794
21	Helicopter (See Exploded View Illustration)	
26	Metal Shield	1673
27	Gate Wireform	1674
28	Star Rollover Insert (Red)	11966U
29	Rollover Button (White)	11968Z
30	Ramp Spacer	MP9
31	Molded Ramp	24884
32	Target Shield	14043
33	Spinning Target Assembly	24494
34	Spinning Target Rod	20406
35	Nylon Washer (2)	20407
36	Ball Guide Rail	4833
37	Ball Guide Rail	6612
38	Ball Guide Rail	18563
39	Ball Guide Rail (2)	4832
40	Pop Bumper Trim Platter	24892
41	Pop Bumper Trim Platter	8246
42	Pop Bumper Trim Platter	24891
43	Pop Bumper Trim Platter	24890
44	Pop Bumper Skirt (Yellow) (4)	10433T
45	Pop Bumper Body and Socket (Yel.) (4)	MA-243
46	Pop Bumper Cap (Yellow) (4)	10434T
47	Pop Bumper Decal (4)	24902
48	#67 Lamp (2)	LA5
49	#67 Lamp Socket (2)	24881
50	Ball Guide Rail (2)	3722
51	Ball Guide Rail (2)	23833
52	Left Flipper Unit	MA-91
53	Right Flipper Unit	MA-321
54	Card Holder	13647-702
55	Ball Shooter Gauge	9767-702
56	Ball Return Unit Assembly	21622
57	Mylar Overlay	24893
58	Ball Snubber Rail (2)	13798

"Q" Relay Assembly	MA-23
"T" Relay Assembly	MA-25
"A" Motor Relay Assembly	MA-833
Plastic Support Post (5)	20635P
1" Plastic Post (31)	11561P
Siamese Post (2)	17492
Split Post Base (3)	14487Z
Split Post Cap (3)	14488Z

XI. PARTS INFORMATION



XI. PARTS INFORMATION



ITEM DESCRIPTION

- 1 6-32 x 5/16" PHS
- 2 #6 Internal Lockwasher
- 3 #5 Washer
- 4 Helicopter Blade
- 5 Helicopter
- 6 Mounting Bracket
- 7 8 x 1/2" HWH SMS (3)
- 8 Motor Assembly
- 9 Varistor, 35V AC (VR1)
- 10 8-32 x 5/16" HWHMS SEMS (4)
- 11 Tee Nut, 8-32
- 12 Spacer, 3/8" x 2 1/2"
- 13 #8 Washer
- 14 #8 External Lockwasher
- 15 8-32 x 3 1/2" RHMS
- 16 Decals (Not Shown),
(Helicopter and Blade)

PART NO.

- FA-150
- FA-637
- FA-622
- 24886
- 24885
- 21008
- FA-300
- 24894
- XO-877
- FA-67
- FA-662
- 24880
- FA-617
- FA-632
- FA-87
- 24392



Premier Technology

759 INDUSTRIAL DRIVE
BENSENVILLE, IL 60106

(312) 350-0400

TELEX 215009 PRMR UR