

USING ROM

25A-E-1 (U1)
25A-E-2 (U2)

25A-E-3 (U5)
25A-E-4 (U6)



STERN

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I. INSTALLATION

Assemble the game as follows:

Bolt legs to cabinet. Using flat washers under bolt heads, bolt back box to cabinet. Feed cable connectors and ground braid through cable port in back box. Screw ground braid to braid in back box. Insert connectors so they are completely seated on printed circuit board assemblies.

On all games there are some items that must be checked after shipment. Making these visual inspections may avoid time consuming work later. Minor troubles caused by abusive handling in shipment are unavoidable. Cable connectors may be loosened, switches (especially tilt switches) may go out of adjustment. Plumb bob tilt switches should always be adjusted after game is set on location and leg levelers are adjusted.

Visual inspections before plugging in line cord:

1. Check wiring of transformer to correspond to location voltage.
2. Check the transformer for any foreign material shorting across wiring lugs.
3. Check that fuses are firmly seated and making good contact.
4. Check wire on coils for proper soldering. Cold solder connections may not show up in factory inspection, but vibration in shipment may break contact.
5. Check switches for loose solder or other foreign material that may have come loose in shipment and could cause shorting of contacts.
6. Check for any wires that may have become disconnected.
7. Check that all cable connectors are completely seated on printed circuit board assemblies.
8. Check that cables are clear of all moving parts.

Check adjustment of the two (normally open) tilt switches:

1. Plumb bob tilt on left side of cabinet near front door.
2. Ball tilt above plumb bob tilt. Insert the smaller ball (gold 15/16" dia.) into the ball tilt assembly, and adjust the bracket so the ball will roll free to contact the switch blade, if front of cabinet is raised.

NOTE

TO PROTECT SOLID STATE COMPONENTS
BEFORE TOUCHING ANY COMPONENT IN THE
BACK BOX, DISCHARGE ANY POSSIBLE STATIC
BUILD-UP BY TOUCHING ANY GROUND
CIRCUIT, e.g. SIDE ARMOR, GROUND BRAID.

II. ROUTINE MAINTENANCE ON LOCATION

Self tests, which are programmed into the design of the game, are very helpful. As with any solid state piece of equipment the three prong grounding receptacle is an important piece part of the game, that must not be tampered with and must be used properly.

MPU MODULE SELF-TEST:

During power-up, the MPU assembly tests itself, which can visibly be seen by the flashing of a LED on the board. When the game is turned on, the LED will flash, have a pause, flash again, a longer pause, then flash five more times and then will be dimly lit. Accompanying each flash is one note (total of seven), this indicates proper MPU game operation conditions.

GAME SELF-DIAGNOSTIC TESTS:

Pressing the Self-Test button inside the coin door activates the game into its self-diagnostic test.

1. BURN IN TEST - all outputs tested.
2. FEATURE LAMPS - All feature lamps will flash on and off continuously, determining any burnt lamps.
3. DISPLAYS - Each digit on all displays will cycle from 0 thru 9, then a number 8 will shift left to right. This test will recycle continuously.
4. SOLENOIDS - Each solenoid will be energized, one at a time, in a continuous sequence. (Holding both flipper buttons "in" during this test will cause the flipper coils to be energized). The number appearing on the Player Score displays is the same as the number assigned to the solenoid and also the same transistor number on the SDU board. The sound of a solenoid pulling-in as a number appears indicates proper operation providing transistor is being used, the absence of a solenoid sound shows a fault. If sound is absent, see Solenoid I.D. page in book for help in Solenoid Identification. *After the solenoids are tested, the game sounds are tested.
5. SWITCHES - The MPU will look at each switch assembly for stuck contacts. *(Flipper Button Switches are not included). If there are any stuck, the lowest number encountered is flashed on the Player Score displays. The number remains until the fault is corrected. See Switch I.D. page in book for help in switch identification. Other numbers may follow if more stuck contacts are present. If there are no stuck switches, the "Match/Ball in Play" display flashes '0'. DO NOT BURNISH OR FILE GOLD PLATED SWITCH CONTACTS.
6. GAME LEVELS AND BOOKKEEPING FUNCTIONS: - Pressing the Self-Test button eighteen more times causes the MPU to step thru the game levels and bookkeeping functions and finally to repeat the power-up test. To bypass these functions, turn the game off, then on. The game is now ready to play, after the MPU Self-Test.

CONTACT SWITCH ADJUSTMENTS

All contact switches should be adjusted to have a gap $1/16''$ in the open position, and have $.010''$ overtravel closed. All contact switches (except for flipper buttons & flipper end of stroke switches) are gold plated to resist corrosion and, **SHOULD NOT BE FILED OR BURNISHED**. If contacts have dirt or dust on them, a clean piece of paper should be used to clean them, by closing the contacts and wiping gently.

FLIPPER BUTTON & FLIPPER SWITCHES ONLY. Tarnish or pitted contacts can be corrected with a contact file followed by a burnishing tool. Severely pitted contact must be replaced as an assembly.

PLAYFIELD

Stern playfields have a durable long life playing finish. Its life expectancy, as well as playing appeal can be greatly extended by periodic cleaning. Inspect and hand polish the ball with a clean cloth. A chipped ball must be replaced, as it will ruin the finish on the playfield. (DO NOT USE WATER IN LARGE QUANTITIES, HIGHLY CAUSTIC CLEANERS, ABRASIVE CLEANERS OR CLEANING PADS ON THE PLAYFIELD SURFACE.

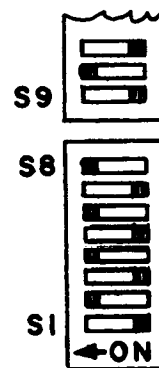
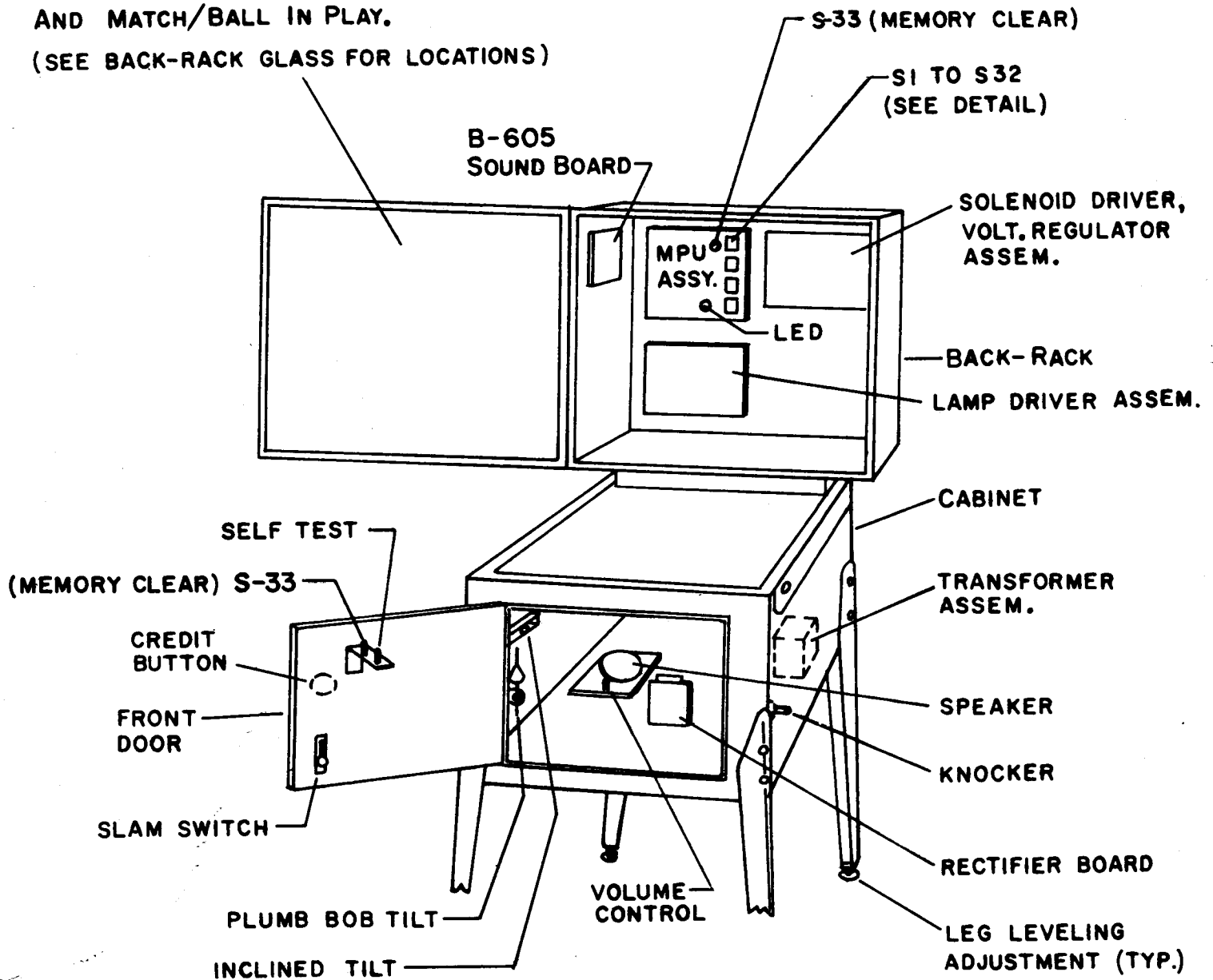
ELECTRONIC PIN BALL GAME

Figure 1

DISPLAY DRIVER ASSEM'S:-

1ST, 2ND, 3RD & 4TH PLAYERS, CREDITS
AND MATCH/BALL IN PLAY.

(SEE BACK-RACK GLASS FOR LOCATIONS)



DETAIL S1-S32
MPU ASS'Y.

III. GENERAL GAME OPERATION

PLACE BALL INTO PLAYFIELD BY OUTHOLE:

COIN GAME. Coin should be rejected. Plug in line cord. (For proper game operation grounding circuit must be used). Move power ON-OFF toggle switch at bottom right front corner of cabinet to "ON" position. Seven singular tones will be heard to indicate game-readiness. Feature lites will flash in a programmed attract mode, "HIGH SCORE" lite is lit, player displays flash high score to date, "HIGH SCORE" lite goes off, previous played scores are flashed, "Coin lock-out coil" is energized and game is ready for play. Coin Game. The game should accept the coin and post credits for coins accepted (*). Pressing the credit button on the door will reset drop targets and cause the outhole kicker to move the ball to the shooter lane. The first player display will flash 00.

One player is registered each time the credit button is pressed (one to four can play). The credits are reduced by one each time the credit button is pressed until the credits are reduced to zero. (Credit button is in-operative after 4 players are registered). Shooting the ball initiates play.

When the ball enters the outhole, the bonus score is added to the player's score. The player-up and/or ball in play on the back box is advanced one position. The bonus score starts at 0 points. The outhole kicker moves the ball to the shooter lane and play is resumed. This continues until each player has played the allowable number of balls per game (3 or 5). At this time the "Game Over" light becomes lit. A random "Match" number appears and the "Match" light becomes lit. If the match number is the same as the last two digits in the player's score a free game is awarded (*).

Extra ball won during the course of the game is played immediately after the players regular ball enters the outhole. The player-up and/or ball in play is not advanced for extra ball play. Bonus score is added to the player's score, the bonus is reset to 0 and the bonus multiplier earned is restored (memory) before the game moves the extra ball for play.

At the end of the game, a "High Game" is flashed on all players scores. If the "High Game" is beat, this feature* can award up to 3 free games.

Tilting while playing the game results in loss of the ball in play. The flippers, thumper-bumper, etc., go "dead". Bonus score is not added. The purpose of the tilt penalty is to discourage the player from jostling the machine in an attempt to prolong play. Game action becomes normal after the outhole kicker moves the ball to the shooter lane.

Slamming the machine results in the loss of the game. All feature lights go out and the game becomes "dead" through a built-in time delay circuit. The purpose of the time delay circuit is to discourage abuse of the machine. After the delay, the "Game Over" light lites and the game is ready for play. The time delay occurs anytime one of the slam switches is made to contact.

There is a slam switch on the front door, one on the tilt board and one on the playfield. (Any number of slam switches could be installed by the operator, to meet his individual requirement). The switch should be adjusted to have approximately 1/16" gap between the contacts. The weighted blade should be adjusted to attain the desired sensitivity. Decreasing gap between contacts will make the switch more sensitive. Opening the gap will reduce sensitivity.

*Some tunes and features can be disabled by operator if so desired. ***See back box adjustments.***

IV. SELF TEST AND BOOKKEEPING FUNCTIONS

The game is designed to help the operator perform certain diagnostic tests as well as accounting functions as follows:

IV.A. SELF TEST

TEST SWITCH PUSH NUMBER	BALL/MATCH DISPLAY	DESCRIPTION
1st		Burn in test - all outputs tested
2nd		Lamp test - all feature lamps on and off
3rd		Display test-all digits display 0000000 thru 9999999 then an 8 shifts from left to right
4th		Solenoid test - continuous sequence of solenoids pulsed with solenoid driver transistor, "Q" number displayed
5th	Flashing O if all switches open	Switch test - switch I.D. No. displays if closed

IV.B. BOOKKEEPING FUNCTIONS

TEST SWITCH PUSH NUMBER	BALL/MATCH DISPLAY	DESCRIPTION	DISPLAYS
6th	01	1st Threshold (High Score)	
7th	02	2nd Threshold (High Score)	
8th	03	3rd Threshold (High Score)	
9th	04	Current High Game Threshold	
10th	05	Current Credits	00 to 40
11th	06	Total Plays	00 to 999999
12th	07	Total Replays	00 to 999999
13th	08	Total times high score is passed	00 to 999999
14th	09	Number of coins thru Chute No. 2	00 to 999999
15th	10	Number of coins thru Chute No. 1	00 to 999999
16th	11	Number of coins thru Chute No. 3	00 to 999999
17th	12	Total balls played	00 to 999999
18th	13	Total Extra Balls Awarded	00 to 999999
19th	14	Total Playfield Special Awards	00 to 999999
20th	15	N/U	00 to 999999
21st	16	Total level 1 passed	00 to 999999
22nd	17	Total level 2 passed	00 to 999999
23rd	18	Total level 3 passed	00 to 999999

V. FRONT DOOR GAME ADJUSTMENTS:

HIGH SCORE FEATURE ADJUSTMENTS:

The game is designed to award an extra ball or a free game (option) at three score levels. (See High Score Feature in game book). The recommended levels are on the score card on the game.

Any level from 10,000 or 9,990,000 can be set, as desired. It is also possible to reset or turn off (00) any or all of the levels, if desired.

1. Push and release Self-Test button at one second intervals six times or until number 01 appears on the Match/Ball in Play display.
2. The number on the Player Score Displays is the first score level*. It can be increased, if desired, by holding the credit button in. To decrease the score level, reset to '00', and then hold the credit button in. Release the credit button when the desired High Score appears. Note that the level changes 10,000 points at a time. If the number '00' is left on the displays, the high score feature is eliminated for that level.
3. Repeat steps 1 and 2 for the second and third high score levels. The number '02' and '03' on the Match/Ball-in-Play display are for the second and third levels, respectively.

HIGH GAME TO DATE FEATURE:

The game is designed to award up to 3 free games (option) when "High Game to Date" is beat. For the recommended, factory present level, see game book.

It is recommended that the level, which will build with game play, be periodically reset to the factory recommended level to encourage game play. The adjustment procedure is the same as for the High Score Feature Adjustment, Steps 1 and 2. Continue pushing the Self-Test button until the number '04' appears on the Match/Ball-in-Play display and then do Step 2.

Any level from '00' to 9,990,000 can be set as described. It is to be noted that '00' does not turn off the feature, as it does on High Score feature. The feature is turned off by positioning switches to the "off" position.

*Can be quickly set to '00' by pressing S33 on the MPU assembly in the back box or front door.

	RECOMMENDED SETTING	
	3 BALL	5 BALL
1st Level —	580,000	1,020,000
2nd Level —	920,000	1,660,000
3rd Level —		
High Score To Date	1,400,000	2,000,000

STERN 16B-6 TRANSFORMER WIRING CONNECTION INSTRUCTIONS

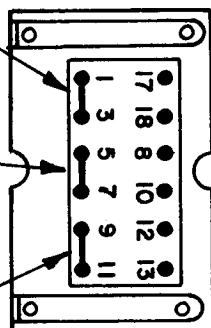
115/120V., 50/60 Cycle Input.

Varistor - Soldered to Line Filter on Left Side of Cabinet
Must Be Stern Part No. 25A-18-1.

Solder Lugs 1 & 3
Together. Solder Heavy
Red Wire To Lug 1

120V
Solder Lugs 5 & 7
Together. Solder Heavy
Yellow Wire To Lug 5

115V
Solder Lugs 9 & 11
Together. Solder Heavy
Yellow Wire To Lug 9



220/240V., 50/60 Cycle Input.

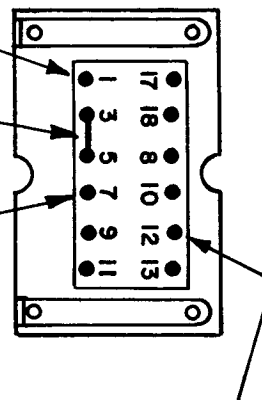
Varistor - Soldered to Line Filter on Left Side of Cabinet
Must Be Stern Part No. 25A-18-2.

Solder Heavy Red Wire
To Lug 1

Solder Lugs 3 & 5
Together

240V
Solder Heavy Yellow
Wire To Lug 7

220V
Solder Heavy Yellow
Wire To Lug 12



VI. FEATURE OPERATION & SCORING

BONUS SCORE FEATURE:

Game starts with "0" bonus. The bonus is advanced 1000 points each time one of the DROP TARGETS are hit

Center

Top

Bottom

(Switches 21, 22, 23, 24)

(29,30,31,32)

(38,39,40)

or when any of the STAND-UP targets (Switches 17, 18, 19 and 20) are lit and hit. The bonus is advanced 3000 points for each OUT LANE (Switches 34 and 35) and RUN-WAY ROLL-OVER BUTTON (Switch 25). Maximum bonus is 39,000 points times multiplier.

Bonus multiplier is advanced when INCREASE X lite by DROP TARGET bank is on and all targets are hit. Maximum bonus multiplier is 7X.

When the ball enters the OUTHOLE (Switch 33), the bonus score (times the multiplier) is collected. The bonus resets to "0" points and the bonus multiplier earned up to 5X is carried over from ball to ball (memory). When 6X or 7X (adjustable by switch 8 on the MPU-On 6X, Off 7X) is reached, bonus is reset to 3X and can be advanced again.

SPECIAL:

SPECIAL can be awarded by means of 3 switches on the playfield: the run-way roll-over button (switch 25), and two out-lanes (switches 34 & 35).

Adjustments for SPECIAL are as follows:

		MPU SWITCH	
Light Comes On	{ When 6X is reached	# 8 On	
	When 7X is reached.....	# 8 Off	/
Light & Switch Adjustment	{ Run-way roll-over button on all the time, outlanes alternate	# 17 On	
	All three alternate	# 17 Off	/
Number of Times Awarded	{ One per game	# 22 On	/
	One per ball	# 22 Off	/
Award	{ No Award	# 31 Off	# 32 Off /
	Extra Ball	# 31 Off	# 32 On
	100,000	# 31 On	# 32 Off
	Replay	# 31 On	# 32 On /

EXTRA BALL:

EXTRA BALL can be awarded by means of 2 return lane switches (36 & 37) on the playfield.

		MPU SWITCH	
Can be awarded at one, two or three HIGH SCORE (THRESHOLD) LEVELS		# 6 Off	(See NOTE)
SPECIAL feature on game		# 31 Off	# 32 On
When 1, 2, and 3 blue "LIGHTS EXTRA BALL" are lit (hitting all targets down on all 3 drop targets with one ball) then EXTRA BALL return lanes can be adjusted as follows:			
NO AWARD		# 23 Off	# 24 Off
Left, both off, right, both off, (repeat)		# 23 On	# 24 Off
Alternating		# 23 Off	# 24 On
Both lanes on/off		# 23 On	# 24 On

NOTE: With Switch 6 OFF and Switch 29 OFF, only 1 EXTRA BALL per ball in play.

With Switch 6 OFF and Switch 29 ON, 3 or 5 EXTRA BALLS can be stored in memory.

(SW-#4) TOP ROLL-OVER BUTTON

Scores 10 points or scores 1000 points for each lit loop lite. When all loop lites are lit (10 total) and all three drop targets have been hit once, 2 X loop value lites.

(SW-#5) SPINNING TARGET

Scores 200 points plus 200 for each lit lite (maximum 1,000 points).

(SWS-#9, 10 & 14) THUMPERS

Scores 1000 points on 3 ball, 100 points on 5 ball. Changes position of SPECIAL and EXTRA BALL lite when lit (Adj.).

(SWS-#12 & 13) SLINGSHOTS

Scores 10 points and changes position of SPECIAL and EXTRA BALL lite when lit. (Adj.)

(SWS-#17, 18, 19 & 20) STAND UP TARGETS

Score 100 points, scores 1000 points and advance bonus by 1000 points when lit.

Center

Top

Bottom

(SWS-#21, 22, 23, 24 - 29, 30, 31, 32 - 38, 39, 40) DROP TARGETS

Each target scores 1000, advances the bonus by 1000, spots a lite in the loop plus scores 1000 for each lit lite in loop up to a maximum of 10,000. When **all targets in each bank** are hit, the blue ADVANCE LOOP VALUE lite transfers to the corresponding blue LIGHTS EXTRA BALL lite at lower left of playfield (Adj.), then each target scores loop value only (maximum 10,000 points). When all three ADVANCE LOOP VALUE lites are transferred, the 2X LOOP VALUE lites up.

When the INCREASE X lite is lit and **all targets are hit** in that bank, the bonus multiplier is advanced by one.

After ADVANCE LOOP VALUE LITE HAS BEEN COMPLETED (all targets down in a bank) and targets are hit down again leaving only one standing, the SCORE LIT BONUS VALUE lite comes on. Hitting the single target standing awards lites bonus plus 1000.

(SW-#25) RUN-WAY ROLL-OVER BUTTON

Scores 5000 and advances bonus 3000, awards SPECIAL when lit.

(SWS-#34 & 35) OUTLANES

Scores 5000 points and advances bonus by 3000 points. Awards SPECIAL when lit.

(SWS-#36 & 37) RETURN LANES

Scores 500 points. Awards EXTRA BALL when lit.

VII. CREDIT/COIN AND GAME ADJUSTMENTS

A. Playfield Post Adjustments:

Posts that control left and right outlane openings on playfield can be moved to make access to outlanes conservative or liberal for ball to enter. (See Fig. 3).

Conservative entry will decrease playing time and scoring.

Liberal entry will increase playing time and scoring.

B. Back Box Game Adjustments:

Each game has thirty-two switches located on the MPU module, located in the back box, that allows play to be customized to the location. (See Fig. 1). Credits per coin, maximum credits, credit display, balls (3 or 5) per game, match feature, high game feature, special award, maximum extra balls and background are selectable by means of switches. The switches are contained in four-sixteen lead packages numbered S1-8, S9-16, S17-24, and S25-32 for easy identification. The "On" position is marked on the assembly. TURN OFF POWER BEFORE MAKING ADJUSTMENTS. MAKE ADJUSTMENTS BEFORE TURNING POWER BACK ON.

SEAWITCH SWITCH ASSIGNMENT

32	}	Special Award
31		
30		Maximum Added Extra Balls
29		Minimum Added Extra Balls
28	}	Coin Chute No. 3
27		
26		
25		
24	}	Extra Ball Alternation
23		
22		Special Replay Limit
21		Match Feature
20		Credit Display
19	}	Max Credits
18		
17		Special Alternation
16	}	High Game To Date Feature
15		
14		Background Sound
13		Not Used
12	}	Coin Chute No. 1
9		
8		Special on (6X, 7X or 7X)
7		Ball Per Game (3 or 5)
6		High Score Feature
5		Not Used
4	}	Coin Chute No. 2
1		

CREDITS/COIN ADJUSTMENTS:

The credits given are selectable by means of MPU switches. Sixteen credit ratios are available. The MPU switch settings and resultant credits/coin are as follows:

CREDITS/COIN ADJUSTMENTS SWITCHES

SWITCH No. 3 (RED-WHITE)	28	27	26	25		
SWITCH No. 2 (BRN-WHITE)	4	3	2	1		
SWITCH No. 1 (BLU)	12	11	10	9	CREDITS	COIN
OFF	OFF	OFF	OFF	OFF	1	1
OFF	OFF	OFF	ON		2	
OFF	OFF	ON	OFF		3	
OFF	OFF	ON	ON		4	
OFF	ON	OFF	OFF		5	
OFF	ON	OFF	ON		6	
OFF	ON	ON	OFF		7	
OFF	ON	ON	ON		8	
ON	OFF	OFF	OFF		14	

				CREDITS	COINS	SEQUENCE OF CREDITS PER COIN			
						1	2	3	4
ON	OFF	OFF	ON	1	2	0	1		
ON	OFF	ON	OFF	3	2	1	2		
ON	OFF	ON	ON	5	2	0	5		
ON	ON	OFF	OFF	7	2	0	7		
ON	ON	OFF	ON	3	4	0	1	0	2
ON	ON	ON	OFF	5	4	1	1	1	2
ON	ON	ON	ON	7	4	1	2	1	3

If two or three coin chutes are adjusted the same for multiple coins, credits will increase as if dropped in same chute.

Credit sequence will reset when:

- 1) credit button is pressed
- 2) any points are scored

GAME ADJUSTMENTS

HIGH SCORE FEATURE:

The game is designed to award an Extra Ball or Free Game at one, two or three high score levels. See Front Door Game Adjustments:

AWARD

Extra Ball
Replay

SWITCH 6

OFF (Works with #29 and #30)
ON

BALL PER GAME:

No. of BALLS PER GAME

3
5

SWITCH 7

OFF
ON

SPECIAL on, BONUS RESET:

Allows adjustment when SPECIAL lite is to come on and when BONUS MULTIPLIER is reset to 3X.

SPECIAL on
BONUS resets to 3X

7X
6X or 7X

SWITCH 8

OFF
ON

BACKGROUND SOUND:

The background sound during game play can be controlled as follows:

SOUND

OFF
ON

SWITCH 14

OFF
ON

HIGH GAME TO DATE FEATURE:

The game is designed to award up to 3 free games as an option of high score to date is beat. Each time this happens, the winning score becomes the new high game score to beat. This score is displayed on all 4 player score displays at the end of each game as an incentive to play.

AWARD

Novelty

1 Free Game

2 Free Games

3 Free Games

SWITCH

16

OFF

OFF

ON

ON

15

OFF

ON

OFF

ON

ALTERNATING SPECIAL LITE

Allows RUN-WAY SPECIAL lite to stay on or alternate with outlane SPECIAL lites.

RUN-WAY SPECIAL lite always on
Alternating RUN-WAY SPECIAL lite

SWITCH 17

ON

OFF

MAXIMUM CREDITS:

The Maximum credits accepted by the machine limits the number of games that can be accumulated by coining, by winning replays or both. The maximum number of credits are adjustable by means of switches 18, and 19. Four credit limits are available. Switch settings are listed below:

MAXIMUM CREDITS

10

15

25

40

SWITCHES

19

OFF

OFF

ON

ON

18

OFF

ON

OFF

ON

CREDIT DISPLAY:

CREDIT DISPLAY

YES

NO

SWITCH 20

ON

OFF

MATCH FEATURE:

When the MATCH FEATURE is On, a random number appears in the "MATCH/BALL in PLAY" window and the word MATCH is illuminated. If the number matches the tens digit in a player's score a free game is awarded. The MATCH feature creates an incentive to play.

MATCH

ON

OFF

SWITCH 21

ON

OFF

NO. OF SPECIALS

The number of specials made per game can be limited as follows:

REPLAYS

1 Per Ball

1 Per Game

SWITCH 22

OFF

ON

PLAYFIELD EXTRA BALL

Controls liting of EXTRA BALL on playfield as follows:

Completely off
Left on, both off,
right on, both off, repeat
Alternate
Both on, both off

SWITCHES

23	24
OFF	OFF
ON	OFF
OFF	ON
ON	ON

MINIMUM ADDED EXTRA BALLS

Allows only one EXTRA BALL to be stored in memory or to work with Switch 30.

Only 1 stored in memory.
Works with Switch 30.

SWITCH 29

OFF
ON

EXTRA BALL (WITH MEMORY)

With Switch 6 turned Off and Switch 29 On, number of EXTRA BALLS that can be stored in memory can be adjusted as follows:

3 maximum
5 maximum

SWITCH 30

OFF
ON

SPECIAL AWARD:

Award received when "Special" lite is lit.

AWARD

No Award
Extra Ball
100,000 Points
Replay

SWITCHES

31	32
OFF	OFF
OFF	ON
ON	OFF
ON	ON

PARTS LIST SEAWITCH

MISCELLANEOUS

PART NUMBER

Transformer (Domestic or Export)	16B-6
Transformer & Rectifier Board	B-438-2
Bulbs, #44	8A-101
U1	25A-E-1
U2	25A-E-2
U5	25A-E-5
U6	25A-E-6

ASSEMBLY COILS

Coin Lockout	C-36-5300
Flipper L & R (Bottom Two)	J-25-475/34-4500
Flipper L & R (Top Two)	J-25-600/34-4500
Knocker	N-26-1200
Outhole Kicker (1)	JX-26-1100
Thumper Bumper (3)	J-26-1200
Slingshots (2)	J-27-1700
Drop Target Reset (3)	B-27-2300

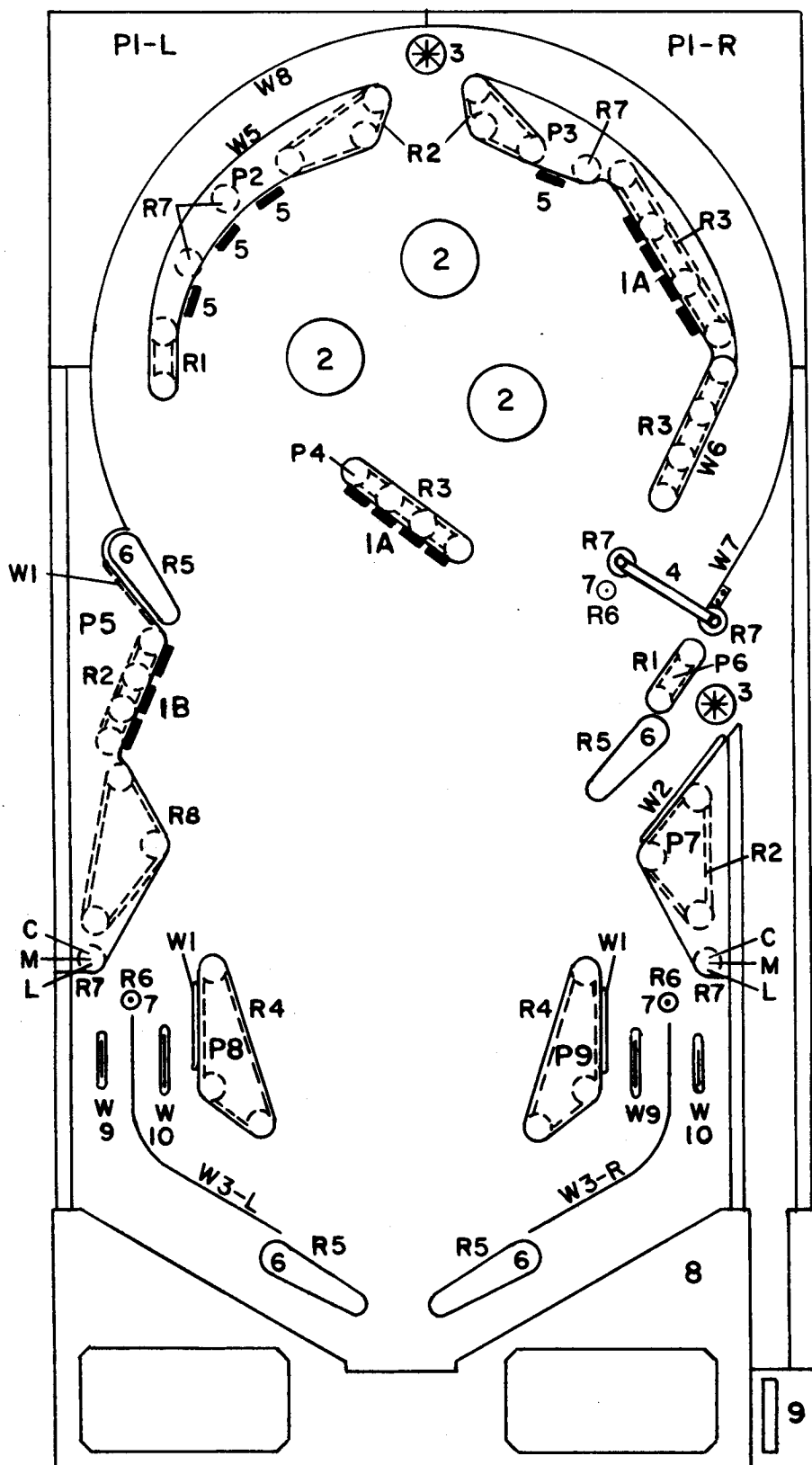
MODULES

Lamp Driver	B-431
Display Driver (4)	A-645
Match/Ball in Play Display	A-434
Solenoid Driver/Voltage Regulator	B-432-FJ
MPU (FOR ROMS SEE MISCELLANEOUS ABOVE)	C-602
Rectifier Board	A-430
Sound Module	C-605

PLAYFIELD PARTS

SEE PLAYFIELD DIAGRAM

PLAYFIELD CHART SEAWITCH



POST ADJUSTMENT:

C-CONSERVATIVE
M-MEDIUM
L-LIBERAL

RUBBER RINGS

R1-7A-120-125
R2-7A-120-150
R3-7A-120-225
R4-7A-120-275
R5-7A-121
R6-7A-125
R7-7A-135
R8-7A-120-200

BALL GUIDES & ROLL-OVERS

W1-6A-101	W6-C-666
W2-6A-101-F	W7-A-667
W3-6A-263	W8-C-670
W4-B-604	W9-A-149
W5-C-664	W10-A-383

PLAYFIELD PLASTIC SHIELDS

TOP ARCH SET 13C-123-IR & IL
PLAYFIELD SET 13A-123-2 To - 9
(P1 To P9)

OTHER PARTS & ASSEMBLIES

1A-4-BANK DR. TARGET D-580-4B
(TARGETS ALONE 13A-20-2)
1B-3-BANK DR. TARGET D-580-3A
(TARGETS ALONE 13A-20-2)
2 - THUMPER CAP 13A-37
3 - ROLL-OVER BUTTON 4B-275
4 - SPIN. TARGET ASSEM. A-563-13
TARGET & WIRE ONLY 14A-7-12
5 - TARGET ASSEMBLY A-649-BL
6 - FLIPPER & SHAFT ASS'Y. A-449-Y
7 - BALL GUIDE POST 2A-200
8 - INSTRUCTION PLATE 14B-3-3
9 - SHOOTER GAUGE 14A-2-6

SEAWITCH

SWITCH IDENTIFICATION

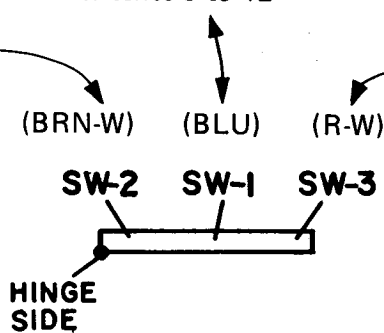
SELF TEST DISPLAY NUMBERS

SWITCH NO.	SWITCH LOCATION		SWITCH NO.	SWITCH LOCATION
1	Coin Chute	} SEE DRW'G. BELOW	21	Center Bank Target (No. 1)
2	Coin Chute		22	Center Bank Target (No. 2)
3	Coin Chute		23	Center Bank Target (No. 3)
4	Top Roll-Over Button		24	Center Bank Target (No. 4)
5	Spinning Target		25	Runway Roll-Over Button
6	Credit Button		26	No Used
7	Tilts		27	Not Used
8	Slam & Vib. Tilts		28	Not Used
9	Top Thumper		29	Top Right Bank Target (No. 1)
10	Left Thumper		30	Top Right Bank Target (No. 2)
11	Not Used		31	Top Right Bank Target (No. 3)
12	Left Sling-Shot		32	Top Right Bank Target (No. 4)
13	Right Sling-Shot		33	Out-Hole
14	Right Thumper		34	Left Out-Lane
15	Not Used		35	Right Out-Lane
16	Not Used		36	Left Return Lane
17	Stand-Up Target (Top Right)		37	Right Return Lane
18	Stand-Up Target (Top Left)		38	Left Bank Target (No. 1)
19	Stand-Up Target (Top Left Mid.)		39	Left Bank Target (No. 2)
20	Stand-Up Target (Top Left Low.)		40	Left Bank Target (No. 3)

Controlled By MPU
Switches 1 to 4

Controlled By MPU
Switches 9 to 12

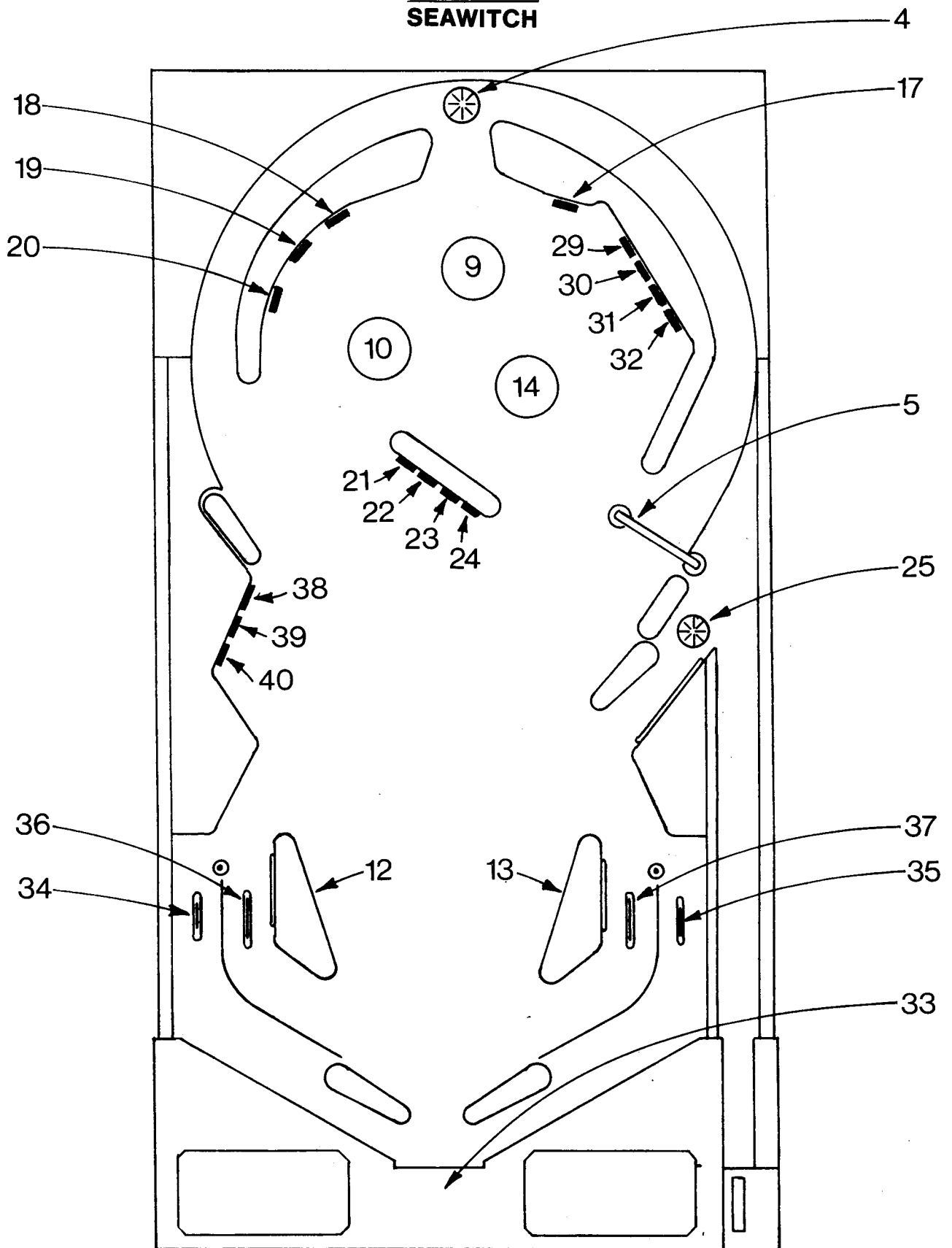
Controlled By MPU
Switches 25 to 28



FRONT DOOR

NOTE: FLIPPER BUTTON CABINET SWITCHES DO NOT APPEAR ON TEST

**SWITCHES
SEAWITCH**



SWITCHES NOT ON PLAYFIELD:

- | | |
|------------------|--------------|
| 1 * LEFT CHUTE | 7 ROLL-TILT |
| 2 * CENTER CHUTE | 7 PENDULUM |
| 3 * RIGHT CHUTE | 8 TILT BOARD |
| 6 CREDIT BUTTON | 8 DOOR |

* SEE DRWG. ON SWITCH IDENTIFICATION PAGE

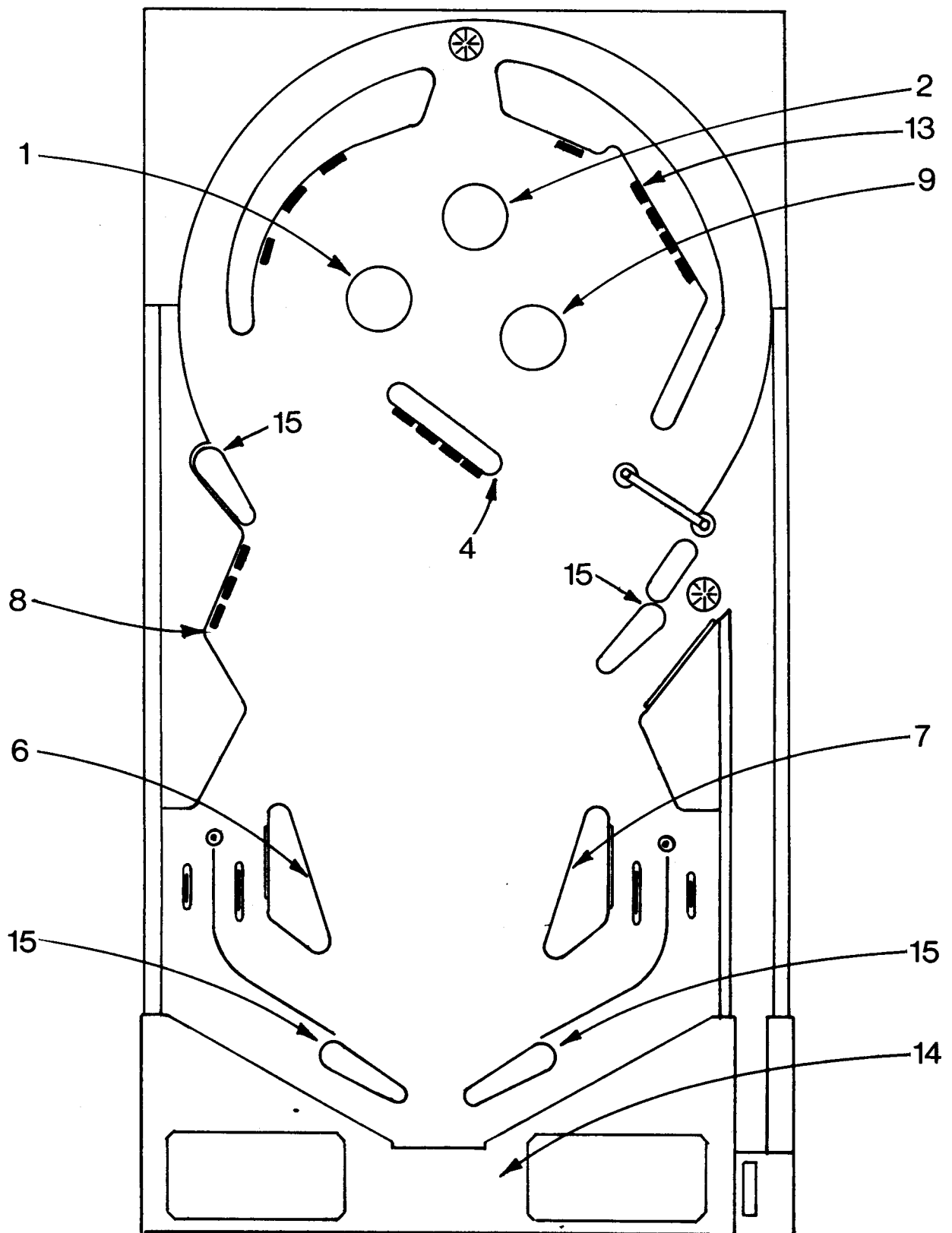
SEAWITCH

SOLENOID IDENTIFICATION

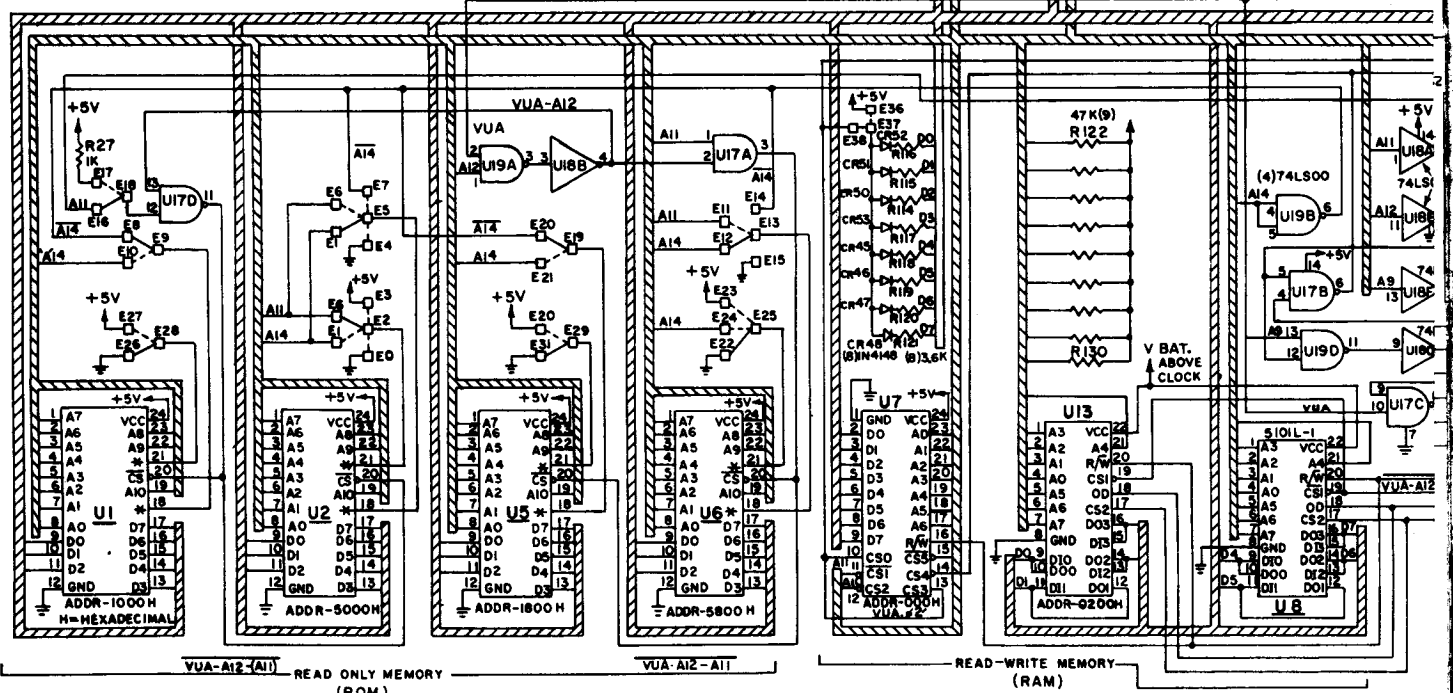
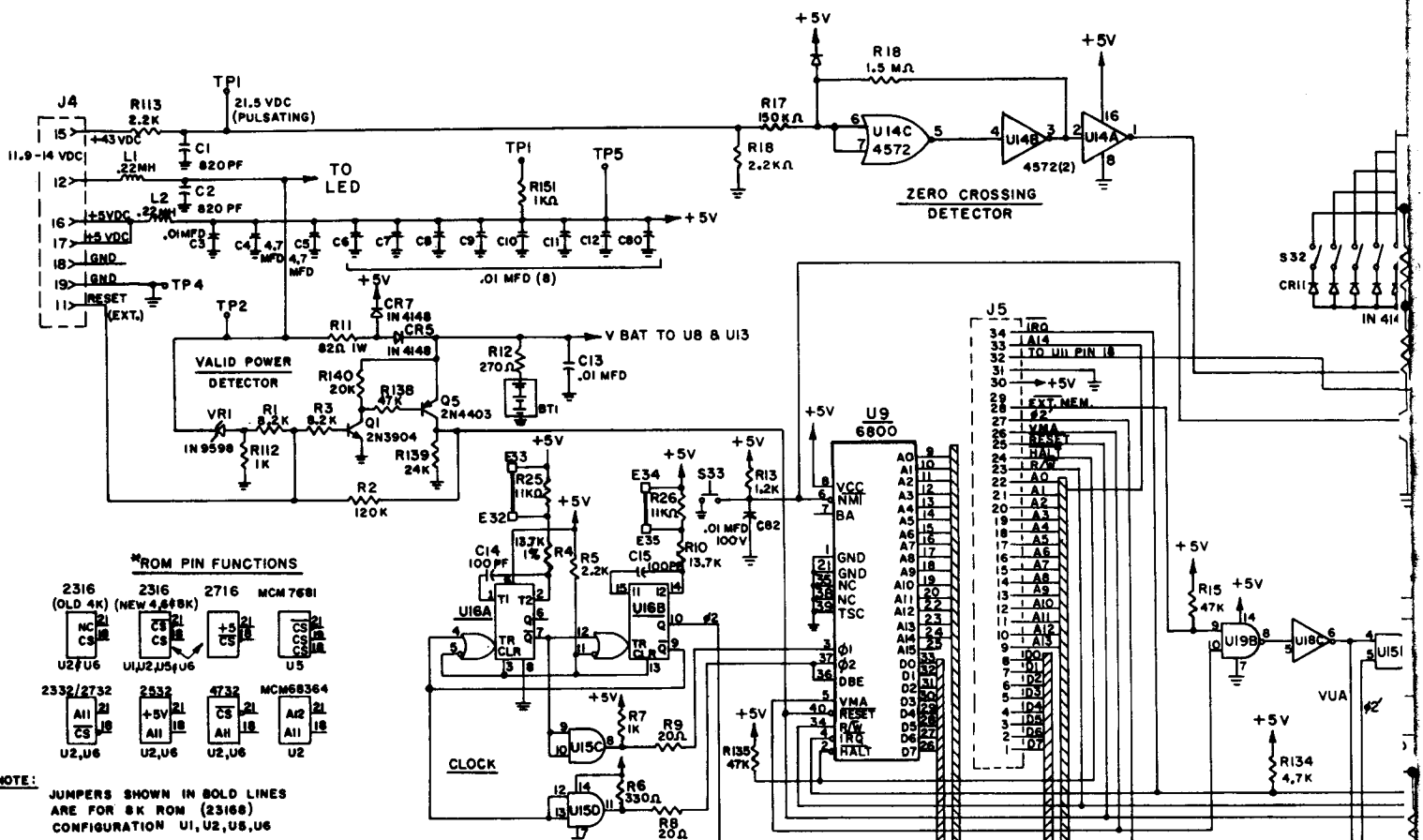
SELF TEST DISPLAY NUMBERS

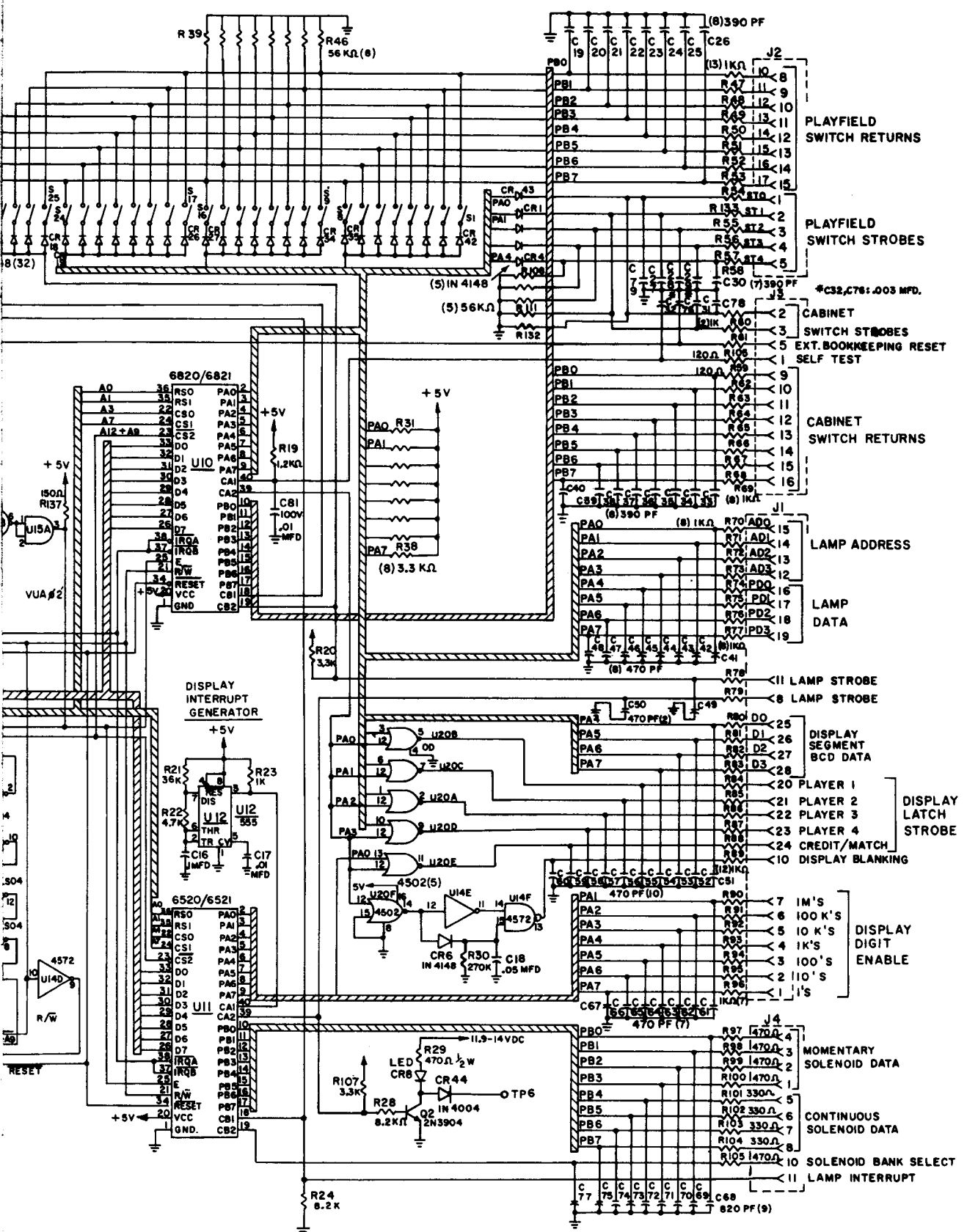
<u>SOLENOID & SDU"Q"</u> <u>TRANSISTOR NO.</u>	<u>SOLENOID LOCATION</u>
1.....	LEFT THUMPER
2.....	TOP THUMPER
3.....	KNOCKER
4.....	CENTER BANK TARGET
5.....	OPEN
6.....	LEFT SLING-SHOT
7.....	RIGHT SLING-SHOT
8.....	LEFT BANK TARGET
9.....	RIGHT THUMPER
10.....	OPEN
11.....	OPEN
12.....	OPEN
13.....	TOP RIGHT BANK TARGET
14.....	OUT-HOLE
15.....	FLIPPERS (4)
16.....	OPEN
17.....	OPEN
18.....	OPEN
19.....	COIN LOCK-OUT
20 THRU 29.....	SOUND

SOLENOIDS
SEAWITCH



SOLENOIDS NOT ON PLAYFIELD:
3-KNOCKER 19-LOCKOUT

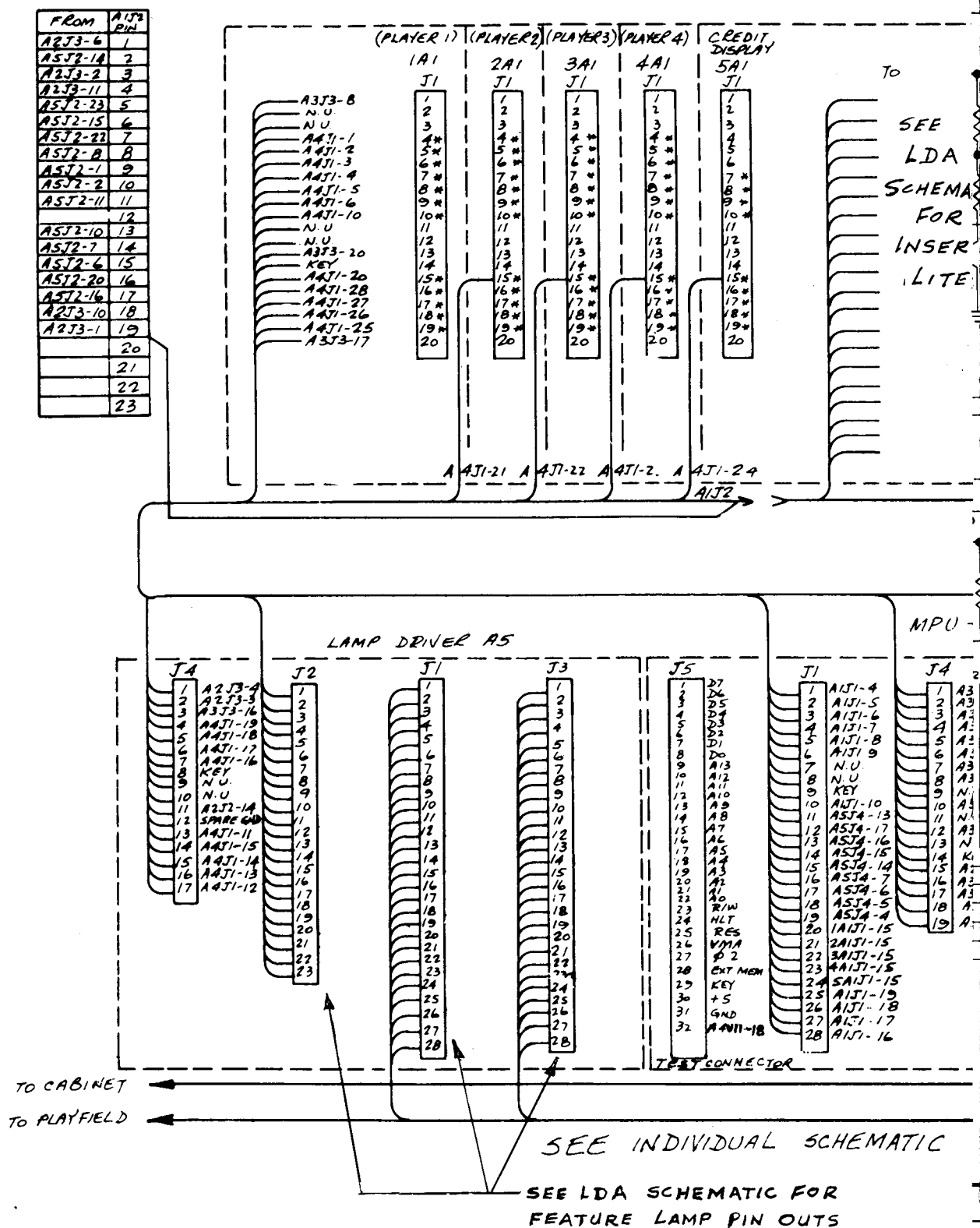


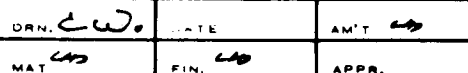


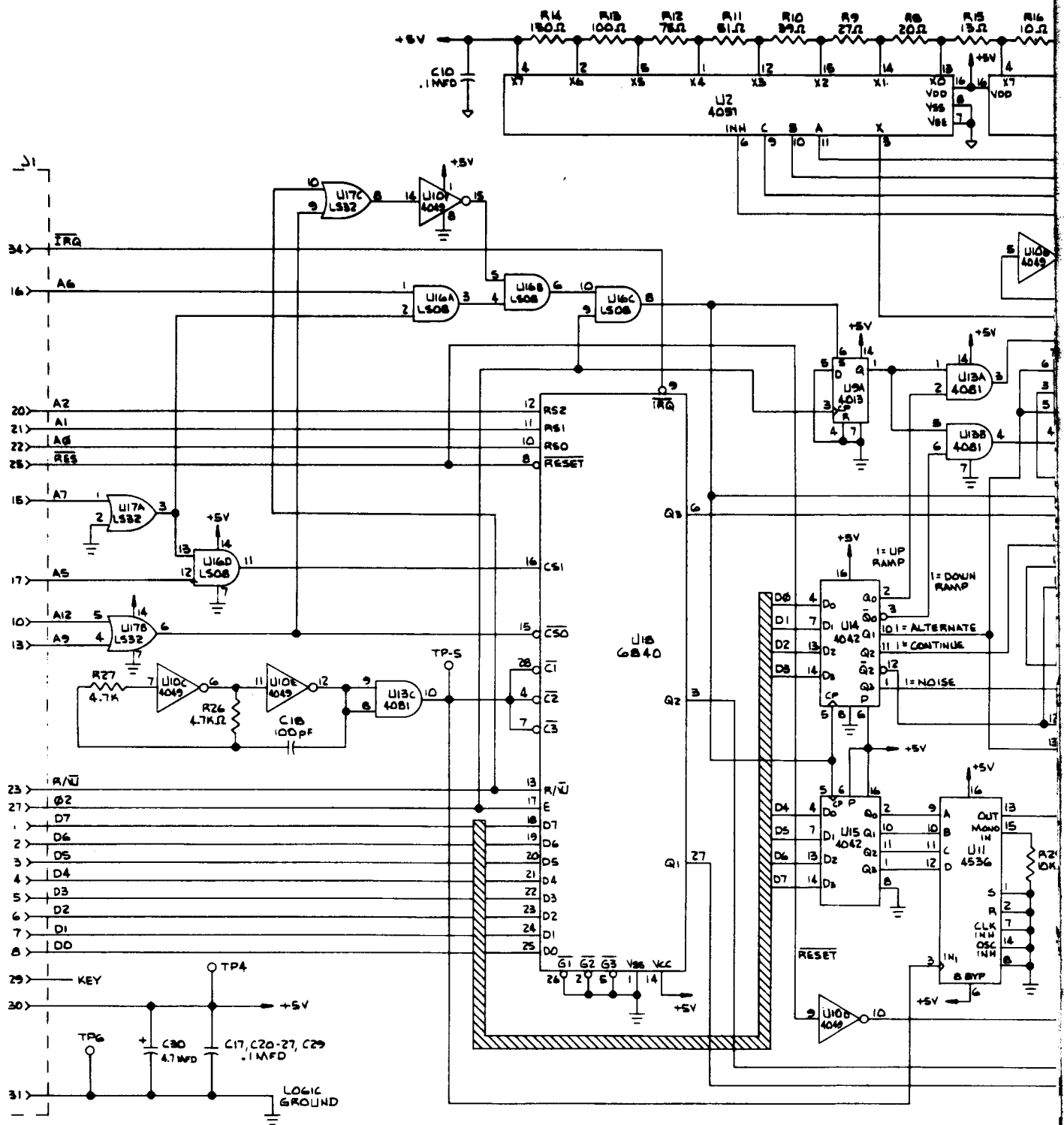
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NOTE: JUMP
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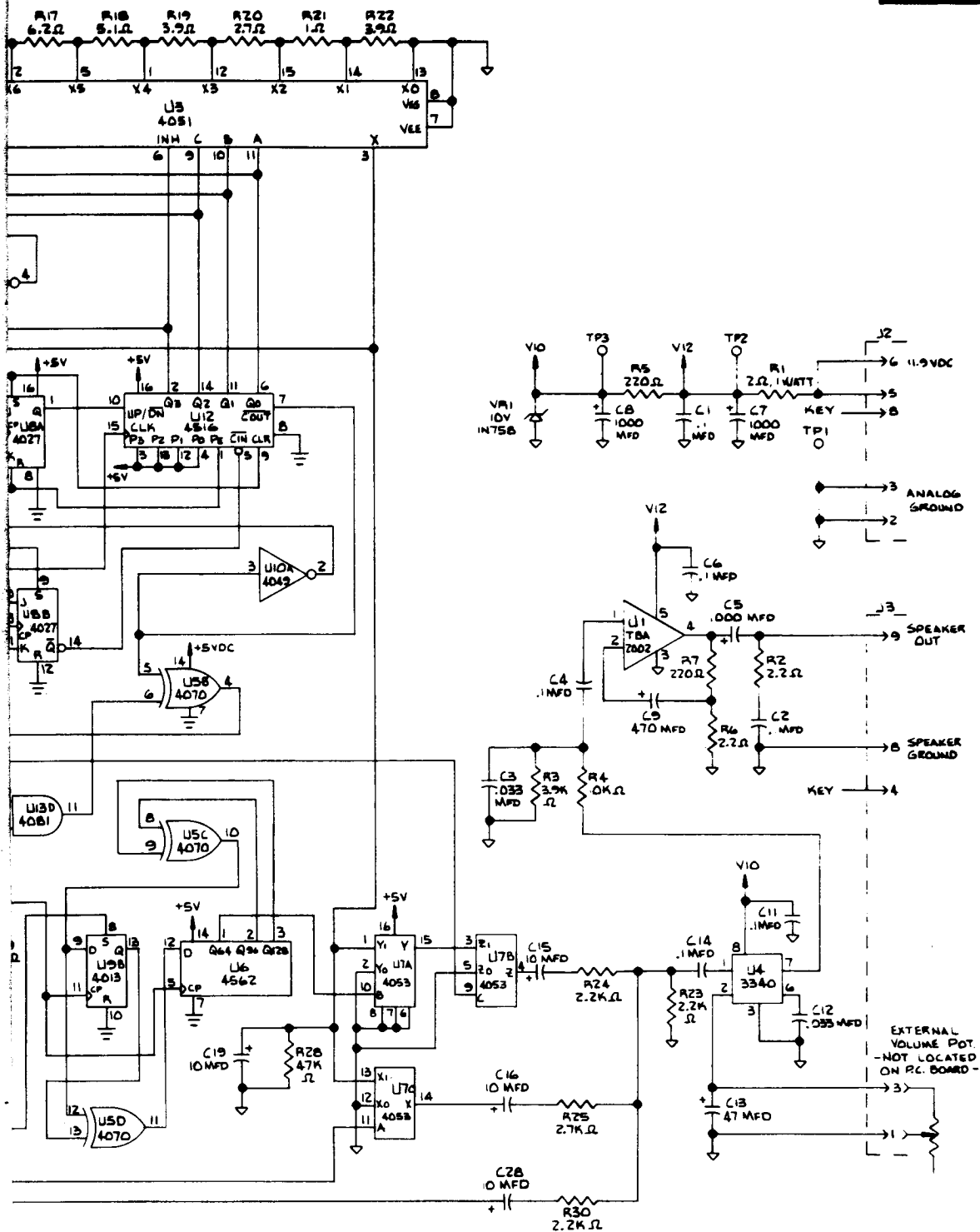




NO. 12B-605-S

DIETZEN NO. 198M AGEPROOF

ISSUE	CHANGE



STERN ELECTRONICS INC.

1725 DIVERSEY BLVD. CHICAGO 60614

SCHEMATIC, ELECTRONIC SOUNDS

FOR SOLID STATE

DRN. 2W. DATE 8-21-79 AM'T

MAT FIN. APPR.

SCALE:

PART MUST BE FREE OF BURRS

Unless otherwise specified, all fractional dimensions carry tolerances of plus and minus .010: All decimal dimensions plus and minus .005. Exceptions: Drilled holes plus .003 minus .001. Die casting fractional plus and minus .005: Decimal plus and minus .003. Decimal dimensions on tools plus and minus .001. Angles $\pm 30^\circ$ unless otherwise specified.

60614

BOARD

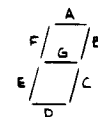
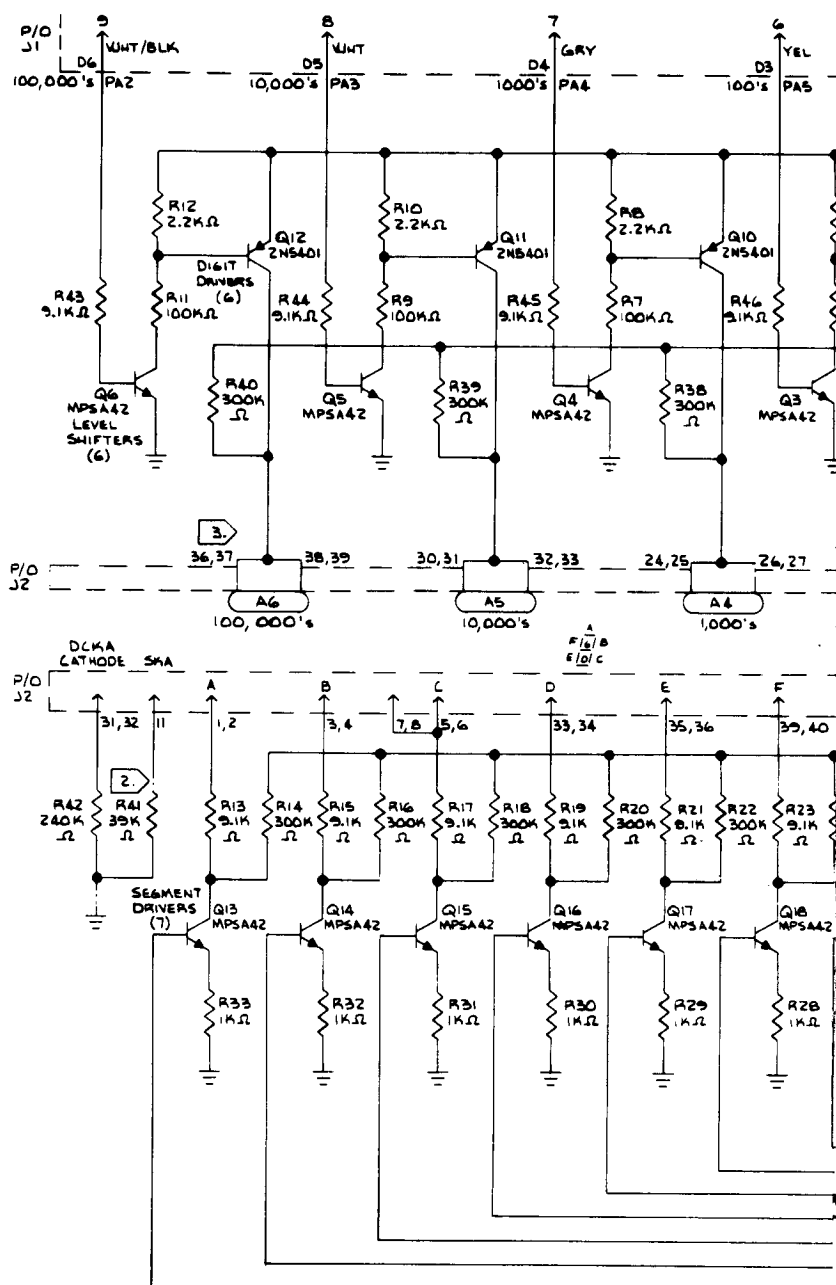
1.	PIN #	WIRE COLOR

PLAYER # 1	BLK / WHT
PLAYER # 2	YEL / RED
PLAYER # 3	ORG / BLU
PLAYER # 4	BRN / ORG
MATCH / BALL	RED / BLK

2. OMIT FOR BECKMAN DISPLAYS.

3 36, 37 DENOTES

BECKMAN PANTEK
DISPLAY DISPLAY
TERMINAL*, TERMINAL



DETAIL A

NOTES:

	<u>PIN IS</u>	<u>WIRE COLOR</u>
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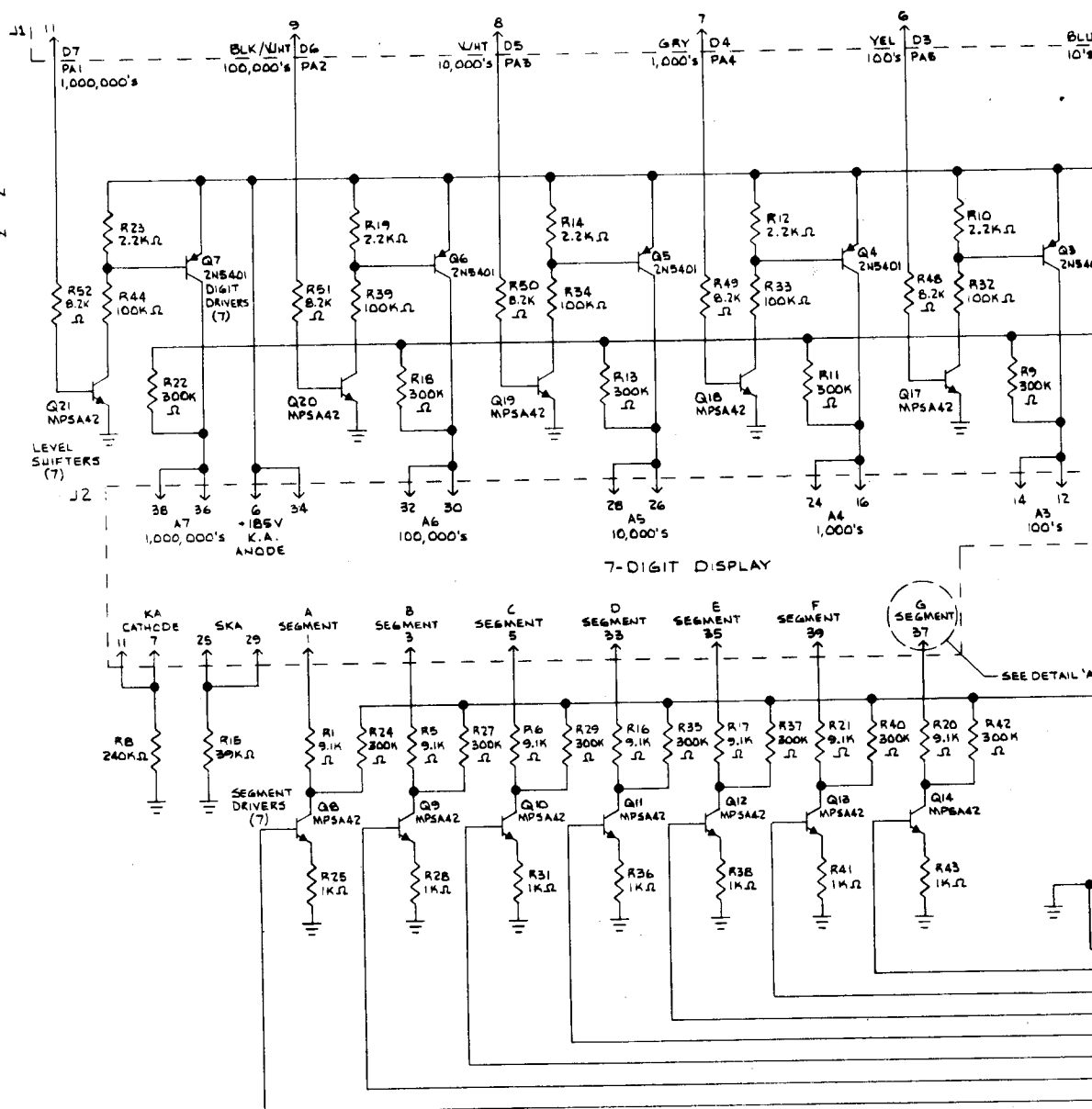
PLAYER # 1	BLK / WHT
PLAYER # 2	ORG / BLU
PLAYER # 3	RED / YEL
PLAYER # 4	BRN / ORG
MATCH / BALL	RED / BLACK

2 LAST 'C' NUMBER USED C2
LAST 'CR' NUMBER USED CR1
LAST 'J' NUMBER USED J2
LAST 'Q' NUMBER USED Q21
LAST 'R' NUMBER USED R58
LAST 'TP' NUMBER USED TP3
LAST 'U' NUMBER USED U1

3. ON P.C. BOARD LEGEND;

NOMENCLATURE DD IS THE ABBREVIATION
FOR DIGIT DRIVER

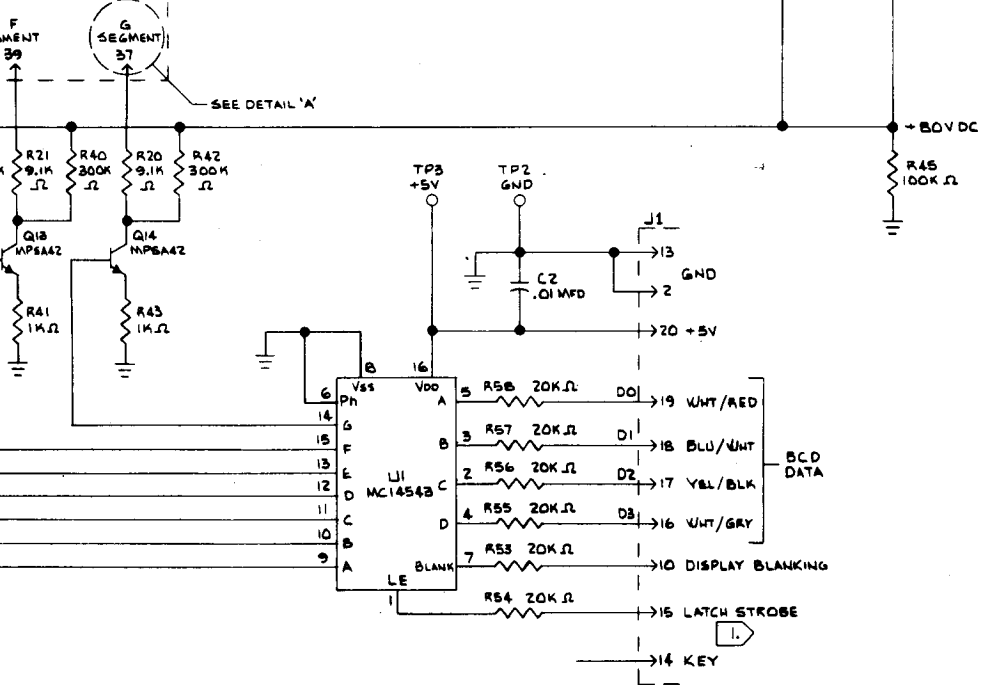
NOMENCLATURE LS IS THE ABBREVIATION
FOR LEVEL SHIFTER



ISSUE	CHANGE	DATE

NO. 12B-645-5

DIETZEN NO. 198M AGEPROOF



1725 DIVERSEY BLVD. CHICAGO 60614

SCHEMATIC, 7 DIGIT DISPLAY P.C. BD.

FOR GEN. USE

AM'T

APPENDIX

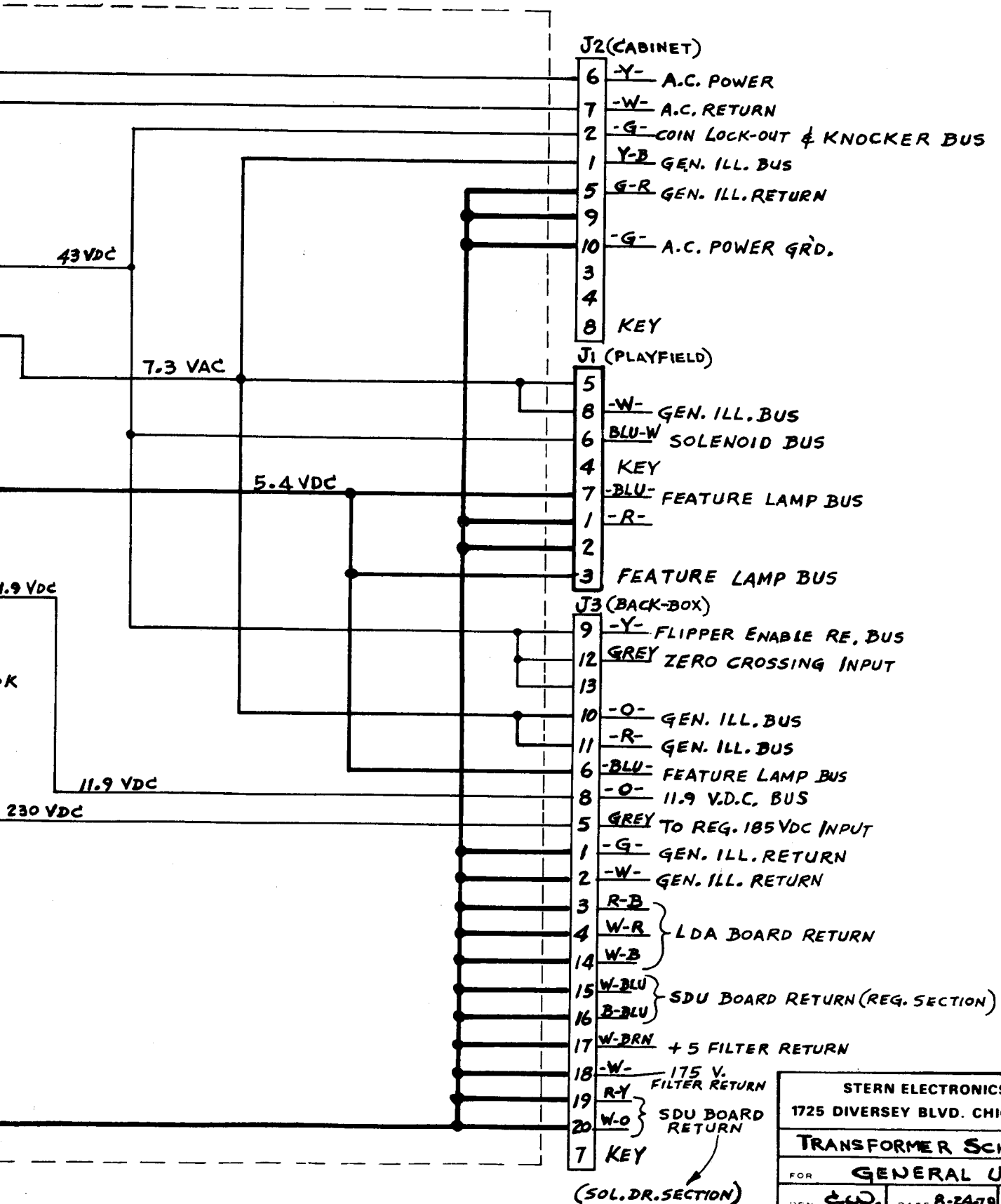
14

PART MUST BE FREE OF BURRS

Unless otherwise specified, all fractional dimensions carry tolerances of plus and minus .010: All decimal dimensions plus and minus .005. Exceptions: Drilled holes plus .003 minus .001. Die casting fractional plus and minus .005: Decimal plus and minus .003. Decimal dimensions on tools plus and minus .001. Angles $\pm 30^\circ$ unless otherwise specified.

DATA

DATA

100
BOARD

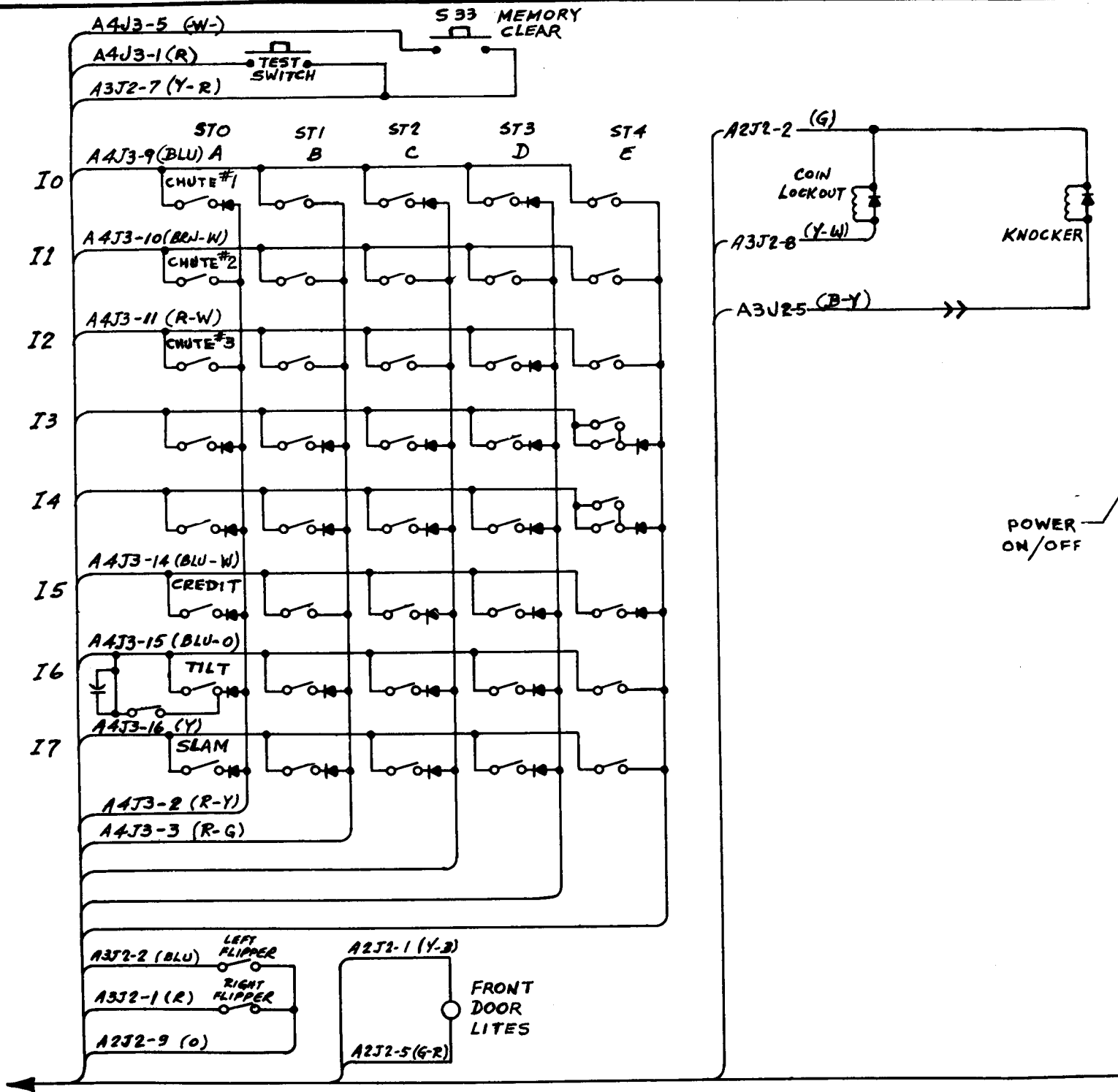
CONNECTIONS:-

WIRE	APPLY POWER TO TERM'S.
3 & 9 to 11	1 & 9
3 & 5 to 7	1 & 5
to 5	1 & 12
to 5	1 & 7

LOCATED ON P.C. BOARD.

<u>AC LINE VOLTAGE</u>	<u>STRAP TERMINALS</u>	<u>APPLY POWER TO TERM'S.</u>
115	1 TO 3 & 9 TO 11	1 & 9
120	1 TO 3 & 5 TO 7	1 & 5
220	3 TO 5	1 & 12
240	3 TO 5	1 & 7

12B-16B-6A

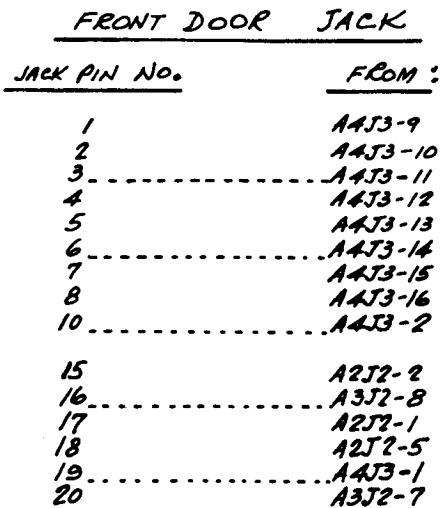


N/U = NOT USED
 ALL DIODES ARE 1N-4004

12B-432-S-121

DIETZEN NO. 190M AGEPROOF

ISSUE	CHANGE	DATE



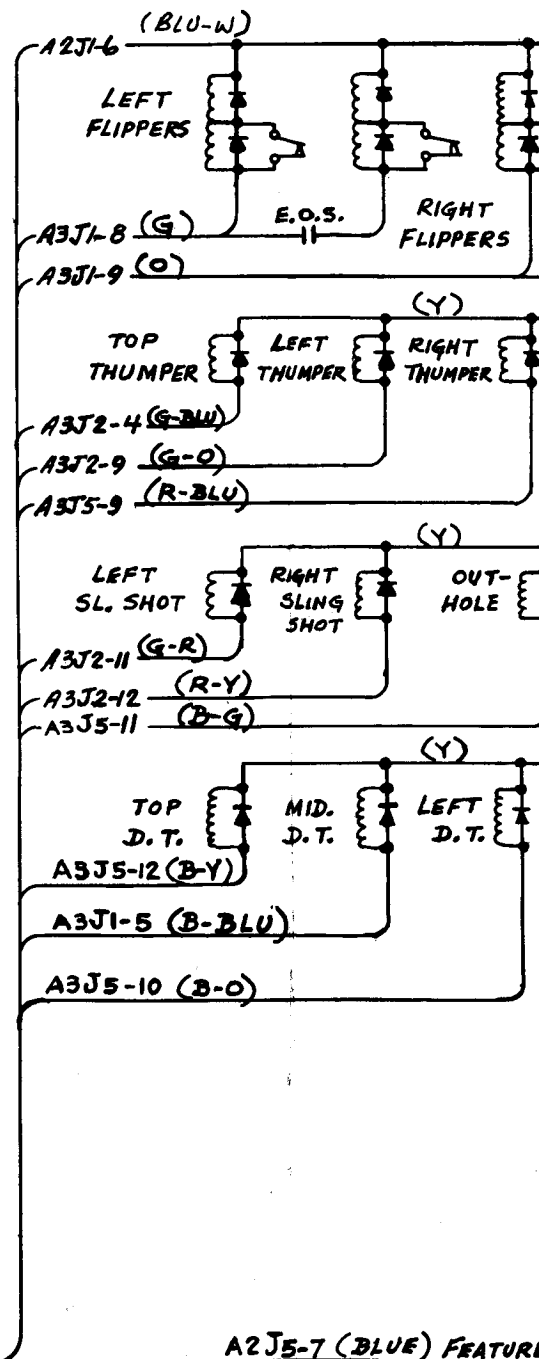
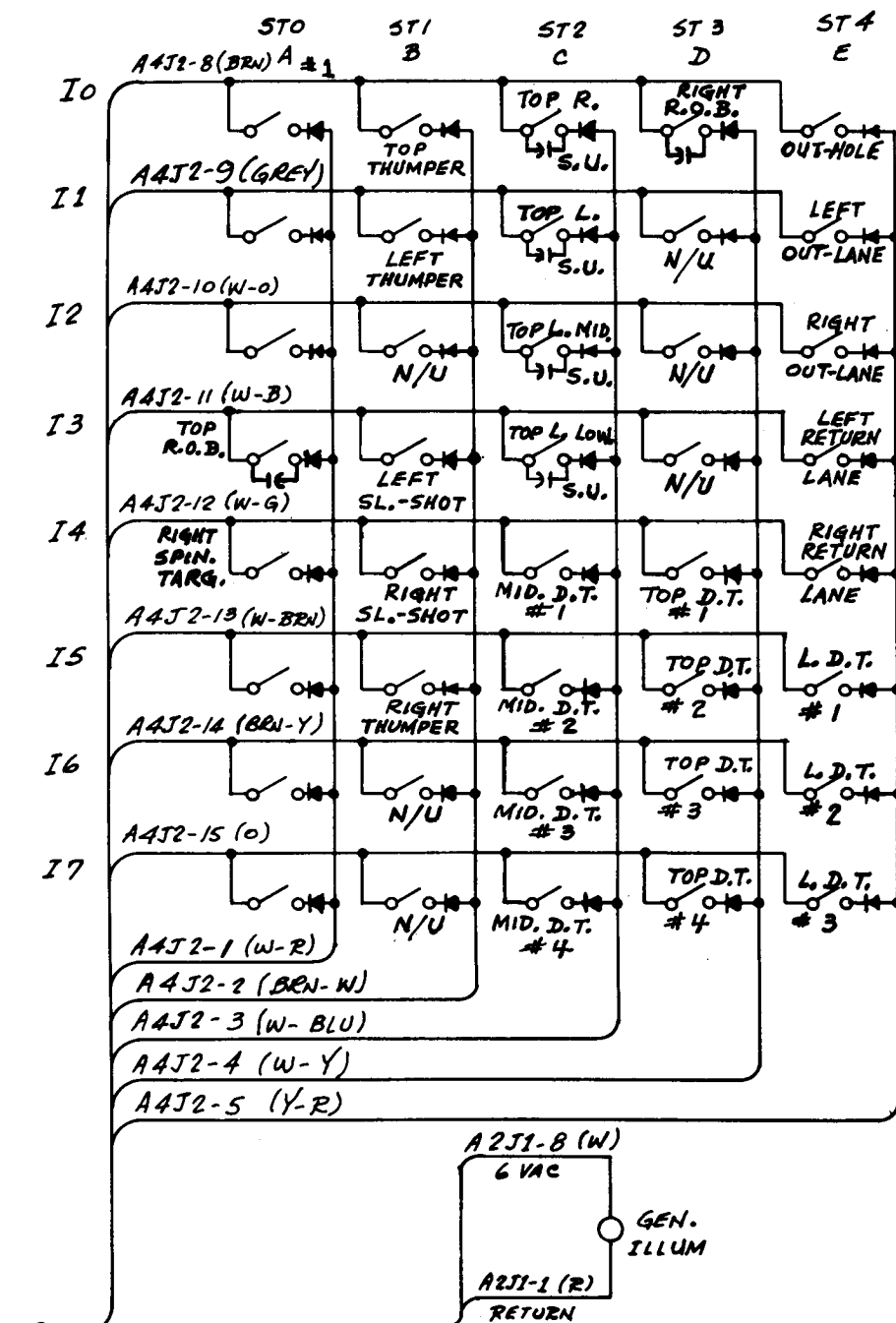
STERN ELECTRONICS INC.		
7725 DIVERSEY BLVD. CHICAGO 60614		
CABINET AND FRONT DOOR WIRING		
FOR STANDARD		
DRN. C.W.	DATE 10-16-79	AMT 22
MAT 23	FIN. 23	APPR.

DESCRIPTION	COLOR	JACK LDA	FIN NO.
BLUE LEFT SIDE.....	BROWN-B	J1	18
BLUE RIGHT SIDE	B-R	J3	19
BLUE 2nd. LEFT SIDE	BLUE-R	J1	1
BLUE 2nd. RIGHT SIDE	G-B	J1	8
BLUE 3rd, LEFT SIDE	BLACK	J3	26
BLUE 3rd. RIGHT SIDE	PURPLE	J1	17
BLUE 4th. LEFT SIDE.....	G-R	J3	1
BLUE 4th. RIGHT SIDE	O-R	J3	12
BLUE 5th. LEFT SIDE	GREY-G	J1	19
BLUE 5th. RIGHT SIDE	B-Y	J3	25
BLUE ROLL-OVER SWITCH LITE (TOP)	BROWN	J1	9
DOUBLE LOOP VALUE	BLUE-W	J1	23
BONUS--1,000.....	GREY-O	J1	14
BONUS--2,000	PURPLE-W	J1	2
BONUS--3,000	R-B	J3	16
BONUS--4,000	W-R	J3	9
BONUS--5,000	GREY-Y	J1	15
BONUS--6,000	GREY-BLUE	J1	10
BONUS--7,000.....	W-GREY	J3	23
BONUS--8,000	W-BLU	J3	3
BONUS--9,000	R-G	J1	3
BONUS--10,000	Y-BLU	J3	17
BONUS--20,000	WHITE	J3	11
BOTTOM LITE 1-EXTRA BALL	GREY-G	J2	12
BOTTOM DROP TARGET (LAST TAR.) 10,000	B-W	J2	3
DROP TARGET INCREASE (MIDDLE).....	PUR-B	J1	25
DROP TARGET INCREASE (BOTTOM)	W-Y	J2	13
LEFT SPECIAL	W-O	J3	20
LEFT RETURN	BRN-BLU	J1	24
LITE EXTRA BALL B-1	B-Y	J2	5
LITE EXTRA BALL B-2.....	GREY	J2	9
LITE EXTRA BALL B-3	PUR-BLU	J2	8
MIDDLE DROP TARGET (LAST TAR.) 10,000	R-BLU	J3	18
MIDDLE LITE 2 EXTRA BALL	B-O	J1	11
RIGHT RETURN	BLU-O	J1	5
RIGHT SPECIAL	PUR-B	J2	4
RUNWAY SPECIAL.....	YELLOW	J2	6
SPINNER, TOP	YEL-G	J3	2
SHOOT AGAIN (PLAYFIELD)	GREY-R	J1	26
SPINNER, 2nd. TOP	W-BLU	J1	13
SPINNER, 2nd. BOTTOM	BRN-R	J1	6
SPINNER BOTTOM	B-W	J1	28
STAND-UP BOTTOM.....	B-G	J1	16
STAND-UP LEFT	Y-G	J1	7
STAND-UP RIGHT	O-W	J3	27
STAND-UP TOP	R-W	J3	4
TARGET INCREASE	O-B	J2	16
TOP DROP LITE, 3-EXTRA BALL	O-G	J2	20
TOP DROP TARGET 10,000.....	BLUE-W	J2	7
1X	BLUE-R	J2	14
2X	Y-BLUE	J2	15
4X.....	R-BLUE	J2	2

A2J5-7 (BLUE) FEATURE LAMP BUS

LAYFIELD
HEMATIC
EA WITCH)

TRONICS, INC.
City Parkway, Chicago, Illinois 60614
Tel. 25-4657
Service Assistance (800) 621-6424



NOTES:

N/U = NOT USED

ALL DIODES ARE IN - 4004

D.T. = DROP TARGET

S.U. = STAND-UP TARGET

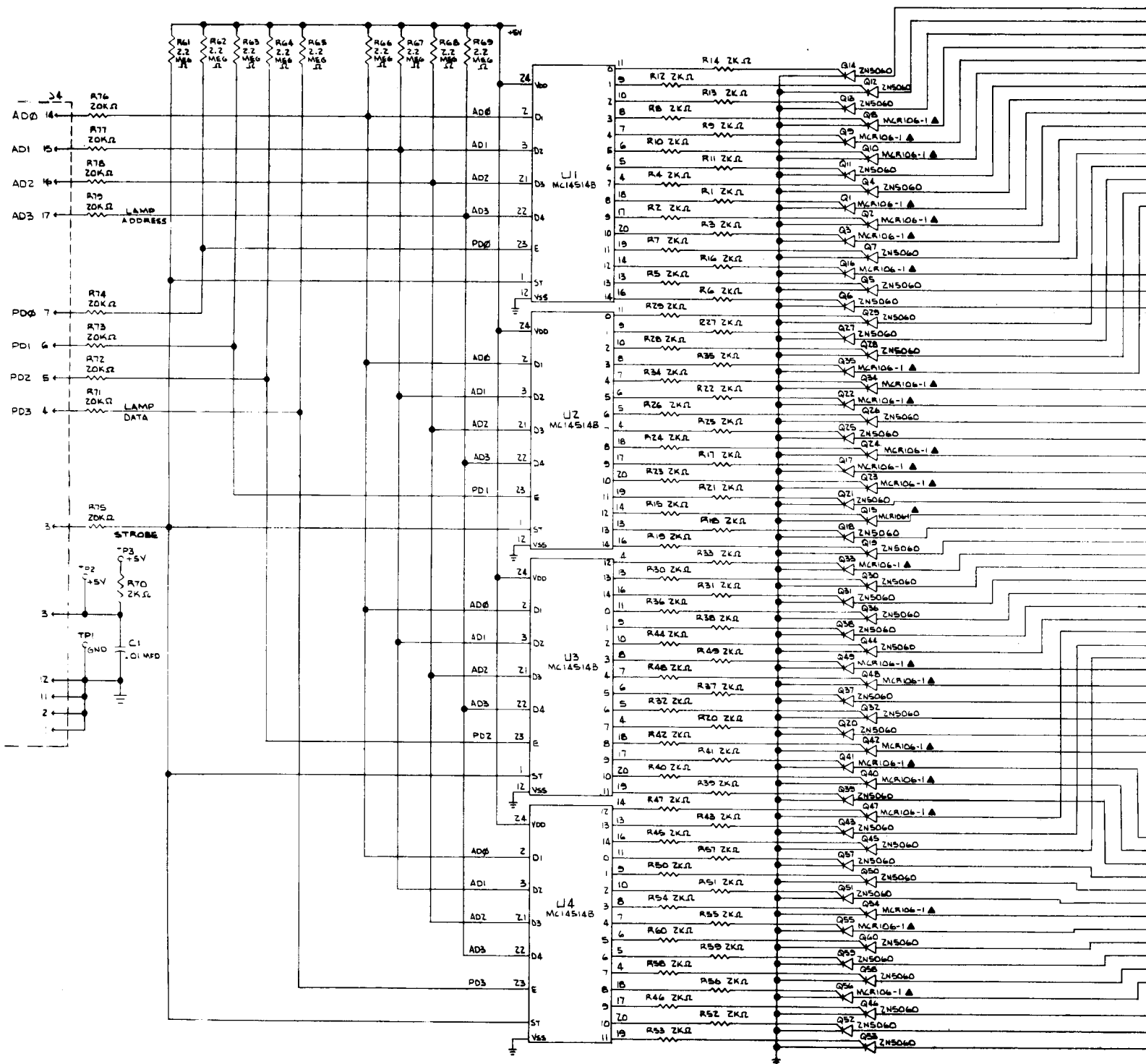
R.O.B. = ROLL-OVER BUTTON

SP.T. = SPINNING TARGET

R.O.W. = ROLL-OVER WIRE FORM

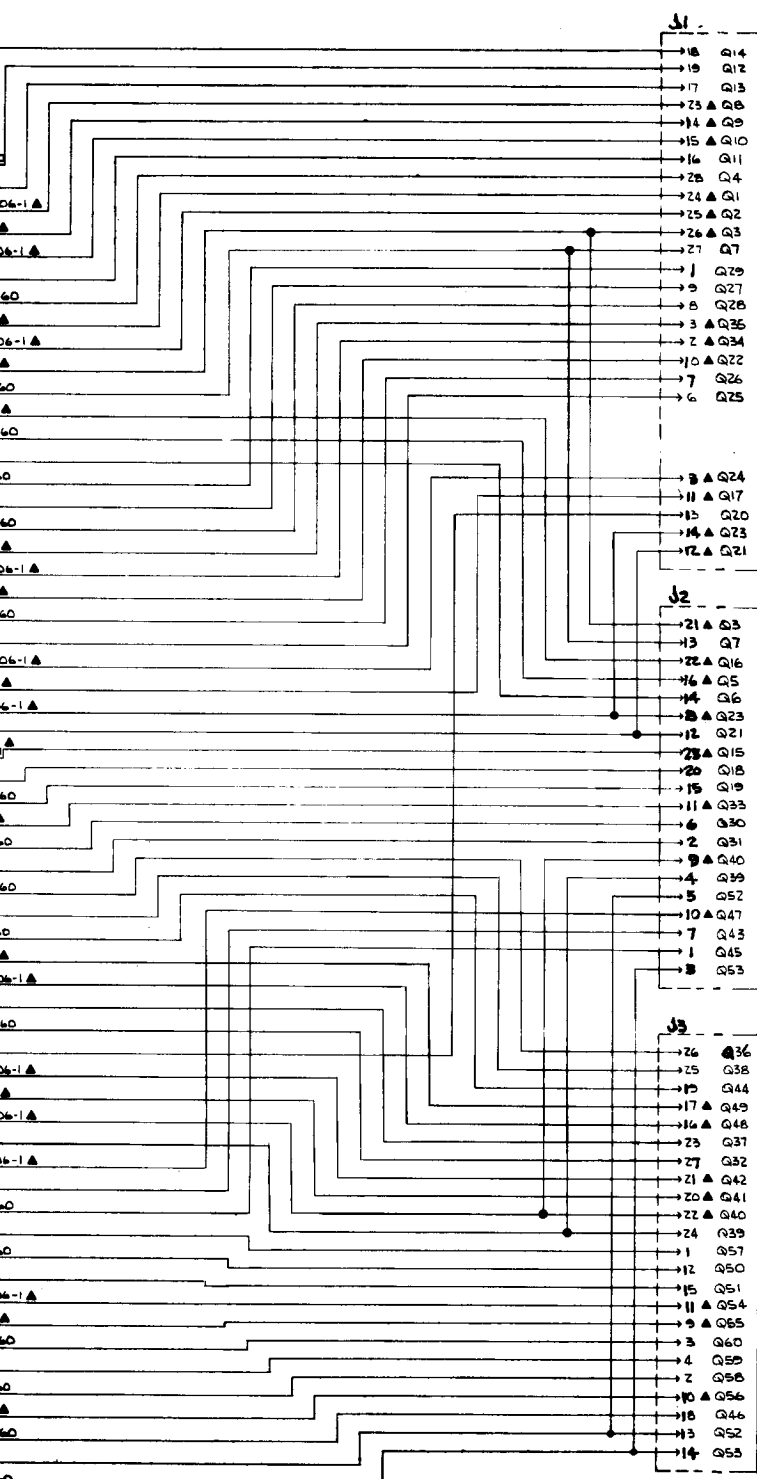
**PLAYFIELD
SCHEMATIC
(SEA WITCH)**

STERN ELECTRONICS, INC.
1725 Diversey Parkway, Chicago, Illinois 60614
(312) 935-4600, Telex 25-4657
Toll Free Service Assistance (800) 621-6424



NOTES:

1. ▲ INDICATES MCR106-1 TRANSISTOR.
2. THIS DOCUMENT FOR LDA-100 REV. A AND LDA-REV. B SINGLE SIDED P.C. BOARDS.



DESCRIPTION

DESCRIPTION	WIRE COLOR	JACK LDA	PIN NO.
BLUE LEFT SIDE	BROWN-B	J1	18
BLUE RIGHT SIDE	B-R	J3	19
BLUE 2nd. LEFT SIDE	BLU-R	J1	1
BLUE 2nd. RIGHT SIDE	G-B	J1	8
BLUE 3rd. LEFT SIDE	BLACK	J3	26
BLUE 3rd. RIGHT SIDE	PURPLE	J1	17
BLUE 4th. LEFT SIDE	G-R	J3	1
BLUE 4th. RIGHT SIDE	O-R	J3	12
BLUE 5th. LEFT SIDE	GREY-G	J1	19
BLUE 5th. RIGHT SIDE	B-Y	J3	25
BLUE ROLL-OVER SWITCH LITE (TOP)	BROWN	J1	9
DOUBLE LOOP VALUE	BLUE-W	J1	23
BONUS--1,000	GREY-O	J1	14
BONUS--2,000	PURPLE-W	J1	2
BONUS--3,000	R-B	J3	16
BONUS--4,000	W-R	J3	9
BONUS--5,000	GREY-Y	J1	15
BONUS--6,000	GREY-BLU	J1	10
BONUS--7,000	W-GREY	J3	23
BONUS--8,000	W-BLU	J3	3
BONUS--9,000	R-G	J1	17
BONUS--10,000	Y-BLU	J3	13
BONUS--20,000	WHITE	J3	11
BOTTOM LITE 1-EXTRA BALL	GREY-G	J2	12
BOTTOM DROP TARGET (LAST TAR.) 10,000	B-W	J2	3
DROP TARGET INCREASE (MIDDLE)	PUR-B	J1	25
DROP TARGET INCREASE (BOTTOM)	W-Y	J2	13
GAME OVER	GREY-W	J2	11
HIGH SCORE TO DATE	GREY-O	J2	22
LEFT SPECIAL	W-O	J3	20
LEFT RETURN	BRN-BLU	J1	24
LITE EXTRA BALL B-1	B-Y	J2	5
LITE EXTRA BALL B-2	GREY	J2	9
LITE EXTRA BALL B-3	PUR-BLU	J2	8
MATCH	GREY-Y	J2	1
MIDDLE DROP TARGET (LAST TAR.) 10,000	R-BLU	J3	18
MIDDLE LITE 2-EXTRA BALL	B-O	J1	11
RIGHT RETURN	BLU-O	J1	5
RIGHT SPECIAL	PUR-B	J2	4
RUNWAY SPECIAL	YELLOW	J2	6
SHOOT AGAIN (INSERT)	GREY-R	J2	21
SPINNER, TOP	YEL-G	J3	2
SPINNER, 2nd. TOP	W-BLU	J1	13
SPINNER, 2nd. BOTTOM	BRN-R	J1	6
SPINNER, BOTTOM	B-W	J1	28
STAND-UP BOTTOM	B-G	J1	16
STAND-UP LEFT	Y-G	J1	27
STAND-UP RIGHT	O-W	J3	7
STAND-UP TOP	R-W	J3	4
TARGETS INCREASE	O-B	J2	16
TOP DROP LITE 3-EXTRA BALL	O-G	J2	20
TOP DROP TARGET 10,000	BLU-W	J2	7
TILT	GREY-B	J2	10
1X	BLUE-R	J2	14
2X	Y-BLU	J2	15
4X	R-BLU	J2	2
SHOOT AGAIN (PLAYFIELD)	GREY-R	J1	26

STERN ELECTRONICS INC.

1725 DIVERSEY BLVD. CHICAGO 60614

LAMP DRIVER SCHEMATIC

FOR SEA WITCH

DRN. C.W.

DATE

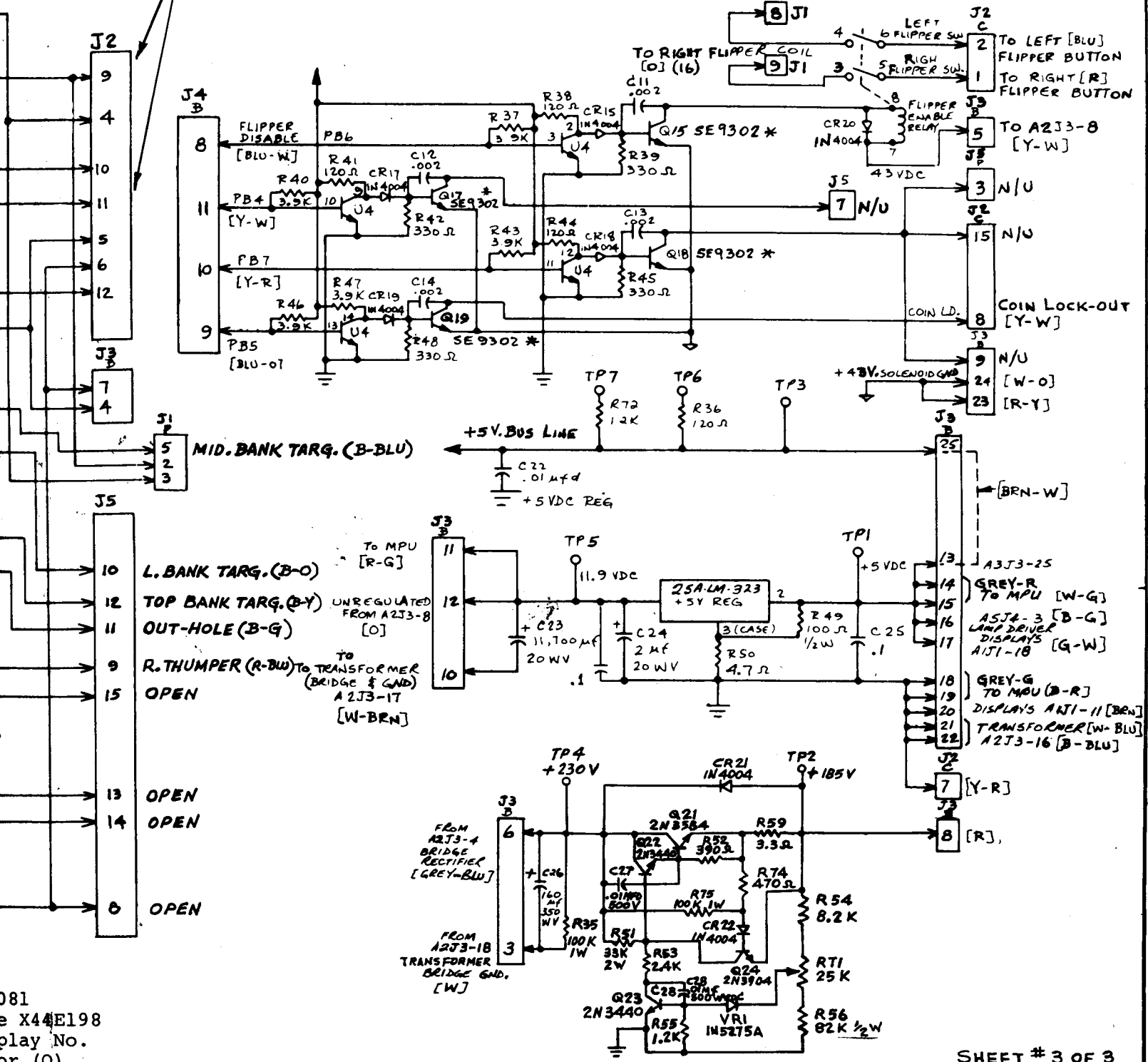
AM'T

MAT

FIN.

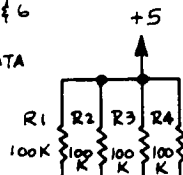
APPR.

SEE LEFT SIDE OF SCHEMATIC FOR SOLENOID PINS.

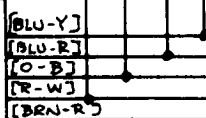


STERN ELECTRONICS INC.		
1725 DIVERSEY BLVD. CHICAGO 60614		
SOLENOID DRIVER VOLTAGE REGULATOR SCHEMATIC		
FOR SEA SWITCH		
DRN. C.W.	DATE	M.T. C.W.
MAT	FIN. C.W.	APPR.

PINS 3, 4, 5 & 6
MOMENTARY
SOLENOID DATA



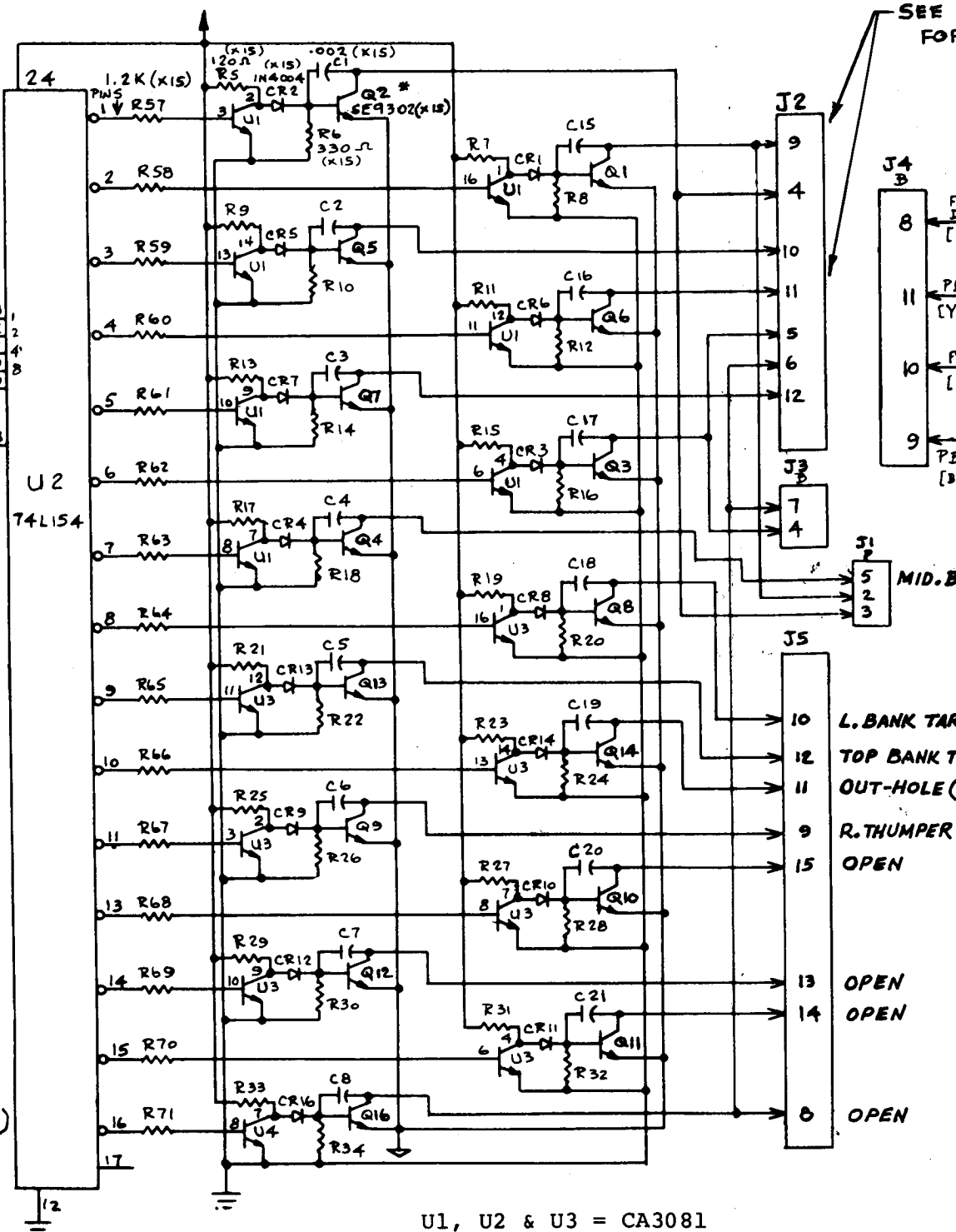
J4



PIN 7
SOLENOID BANK SELECT
LOW WHEN SELECTED

J2

- 9 LEFT THUMPER (G-O)
- 4 TOP THUMPER (G-BLU)
- 10 OPEN
- 11 L. SLING-SHOT (G-R)
- 5 KNOCKER (G-B)
- 12 R. SLING-SHOT (R-Y)



U1, U2 & U3 = CA3081
*SE9302 Substitute X44E198
Solenoid Test Display No.
is Drive Transistor (Q)
Position on SDU