

Ali

MANUAL

© 1980 Stern

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	SWITCH 16	SWITCH 15
Novelty	OFF	OFF
1 Free Game	OFF	ON
2 Free Games	ON	OFF
3 Free Games	ON	ON

ATTRACT MODE SOUND (Approx. every 2 min.)

The sound during attract mode can be controlled as follows:

	SWITCH 17
Flashing Lites Only	OFF
Flashing Lites and Sound	ON

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	SWITCHES 19	18
10	OFF	OFF
15	OFF	ON
25	ON	OFF
40	ON	ON

CREDIT DISPLAY:

CREDIT DISPLAY	SWITCH 20
YES	ON
NO	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.

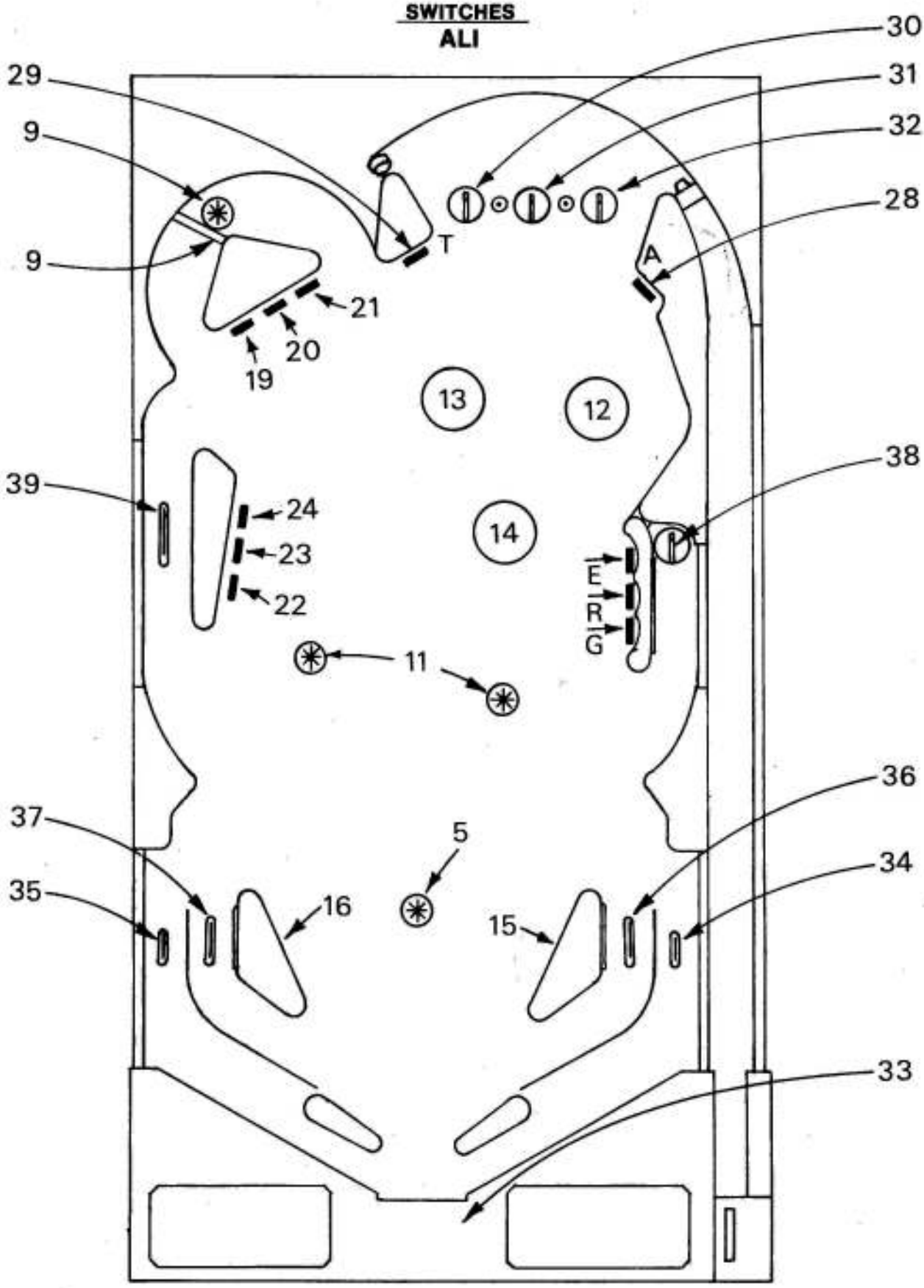
MATCH	SWITCH 21
ON	ON
OFF	OFF

SPECIAL REPLAY LIMIT:

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

REPLAYS	SWITCH 22
1 Per Ball	OFF
Once on stays on for rest of game.	ON

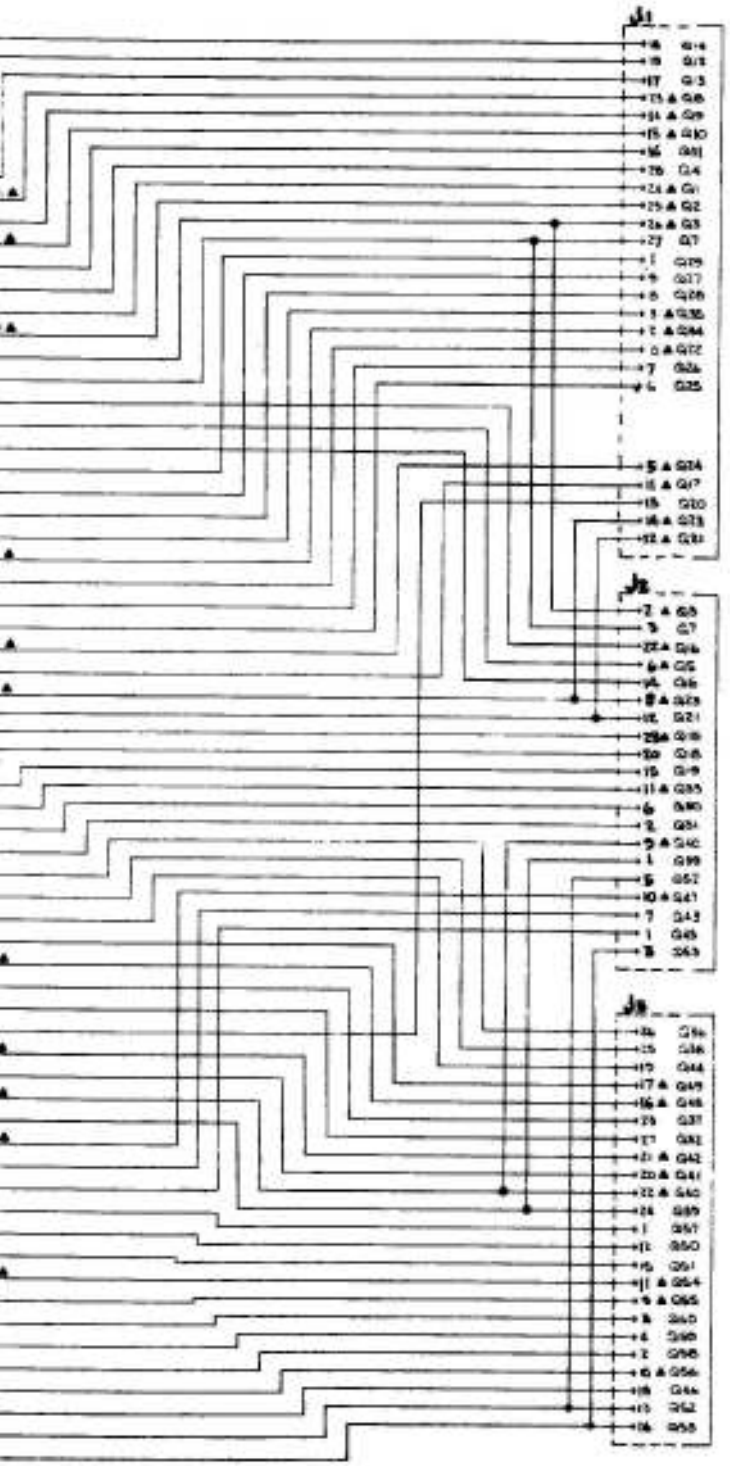
SWITCHES
ALI



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

12B-431$-119

SHEET #1 OF 3



DESCRIPTION	WIRE COLOR	JACK-A LOA-	PIN NO.
"A"	BLU-R	J2	14
"L"	B-BLU	J2	15
"I"	R-BLU	J2	2
ARCH "G"	BRN-B	J1	18
ARCH "R"	BLU-R	J1	1
ARCH "E"	B-W	J3	26
ARCH "A"	G-R	J3	1
ARCH "T"	GREY-G	J1	19
ARCH "E"	O-R	J3	12
ARCH "S"	GREY	J1	9
ARCH "T"	R-Y	J3	25
"G"	PUR	J1	17
"R"	G-B	J1	8
"E"	B-R	J3	19
"A"	W-B	J3	15
"T"	GREY-B	J1	23
"S"	R-G	J1	3
"ZZ"	Y-BLU	J3	17
BONUS-2,000	PUR-Y	J2	8
BONUS-4,000	GREY	J2	9
BONUS-6,000	B-Y	J2	5
BONUS-8,000	GREY-G	J2	11
BONUS-10,000	W-Y	J2	12
BONUS-20,000	PUR-B	J2	4
BONUS-2X	B-G	J3	21
BONUS-3X	GREY-B	J3	10
BONUS-4X	PUR-B	J1	25
BONUS-5X	B-O	J1	11
EXTRA BALL, LEFT	R-BLU	J3	18
EXTRA BALL, RIGHT	W-O	J3	20
GAME OVER	GREY-W	J2	11
HIGH SCORE TO DATE	GREY-O	J2	22
LEFT BANK TARG. 4,000	GREY-Y	J1	15
LEFT BANK TARG. 6,000	GREY-BLU	J1	10
LEFT BANK TARG. 8,000	W-GREY	J3	23
LEFT BANK TARG. 10,000	GREEN	J3	3
MATCH	GREY-Y	J2	1
OUT-LANE (RIGHT)	BLU-W	J2	6
OUT-LANE (LEFT)	Y-B	J2	20
SHOOT AGAIN INSERT	GREY-R	J2	21
SHOOT AGAIN	GREY-R	J1	26
TILT	GREY-B	J2	10
TOP BANK TARG. 5,000	GREY-O	J1	14
TOP BANK TARG. 10,000	PUR-W	J1	2
TOP BANK TARG. 15,000	R-B	J3	16
TOP BANK TARG. 20,000	W-R	J3	9
TOP HOLE, SPECIAL	Y-BLU	J2	16
TOP SAUCER 5,000	Y-W	J2	7
TOP SAUCER 10,000	B-W	J2	3
200 "G"	BLACK	J1	16
400 "R"	Y-G	J1	7
600 "S"	O-W	J3	27
800 "E"	R-W	J3	4
R.O.B. 1000	B-BLU	J1	26

		SCALE:	PART MUST BE FREE OF BURRS
		DATE	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 ± 30' unless otherwise specified.

STERN ELECTRONICS INC.

1725 DIVERSEY BLVD. CHICAGO 60614

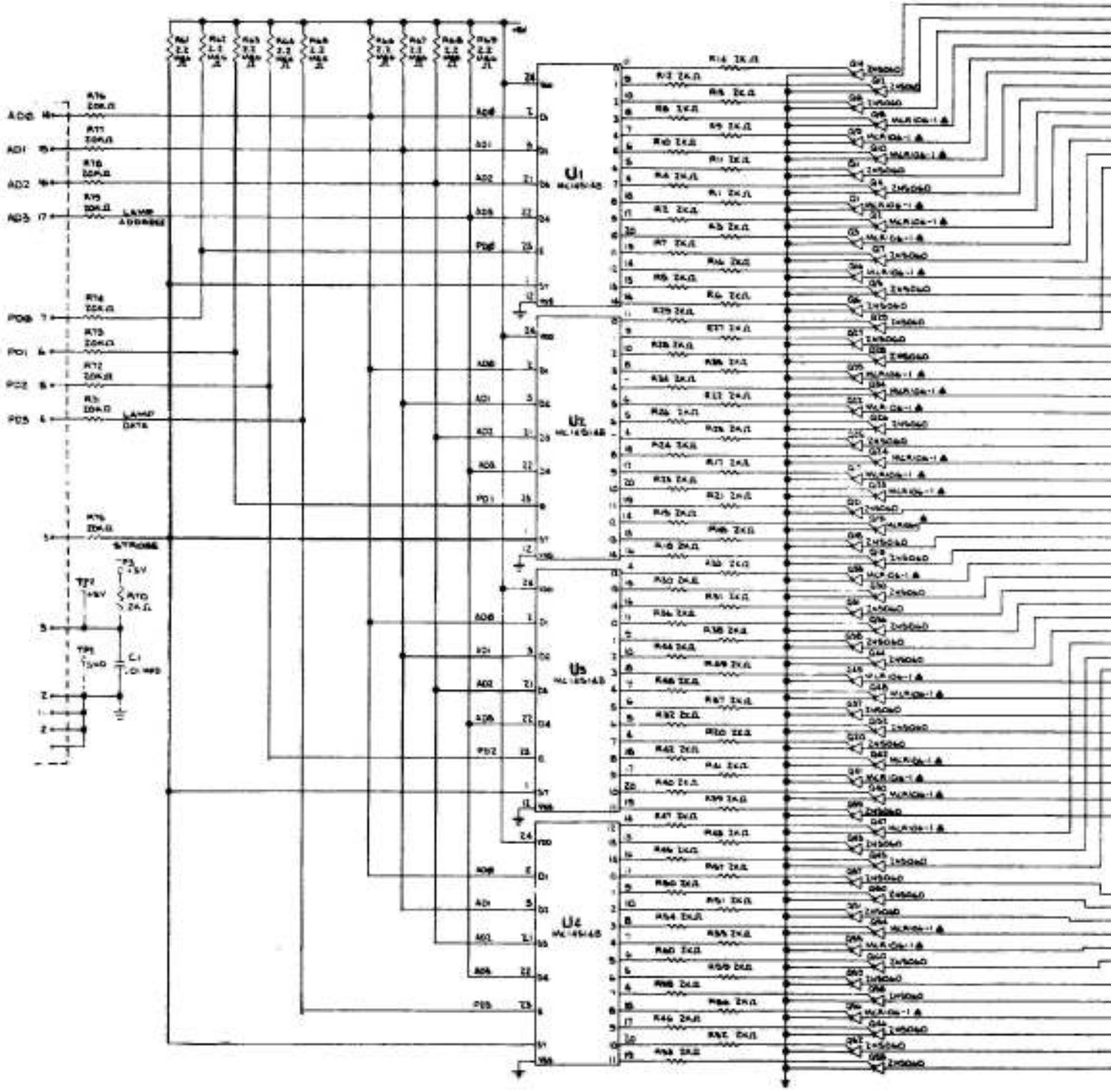
LAMP DRIVER SCHEMATIC

FOR -ALI-

DRN. C.W.	DATE	AMT
MAT	FIN.	APPR.

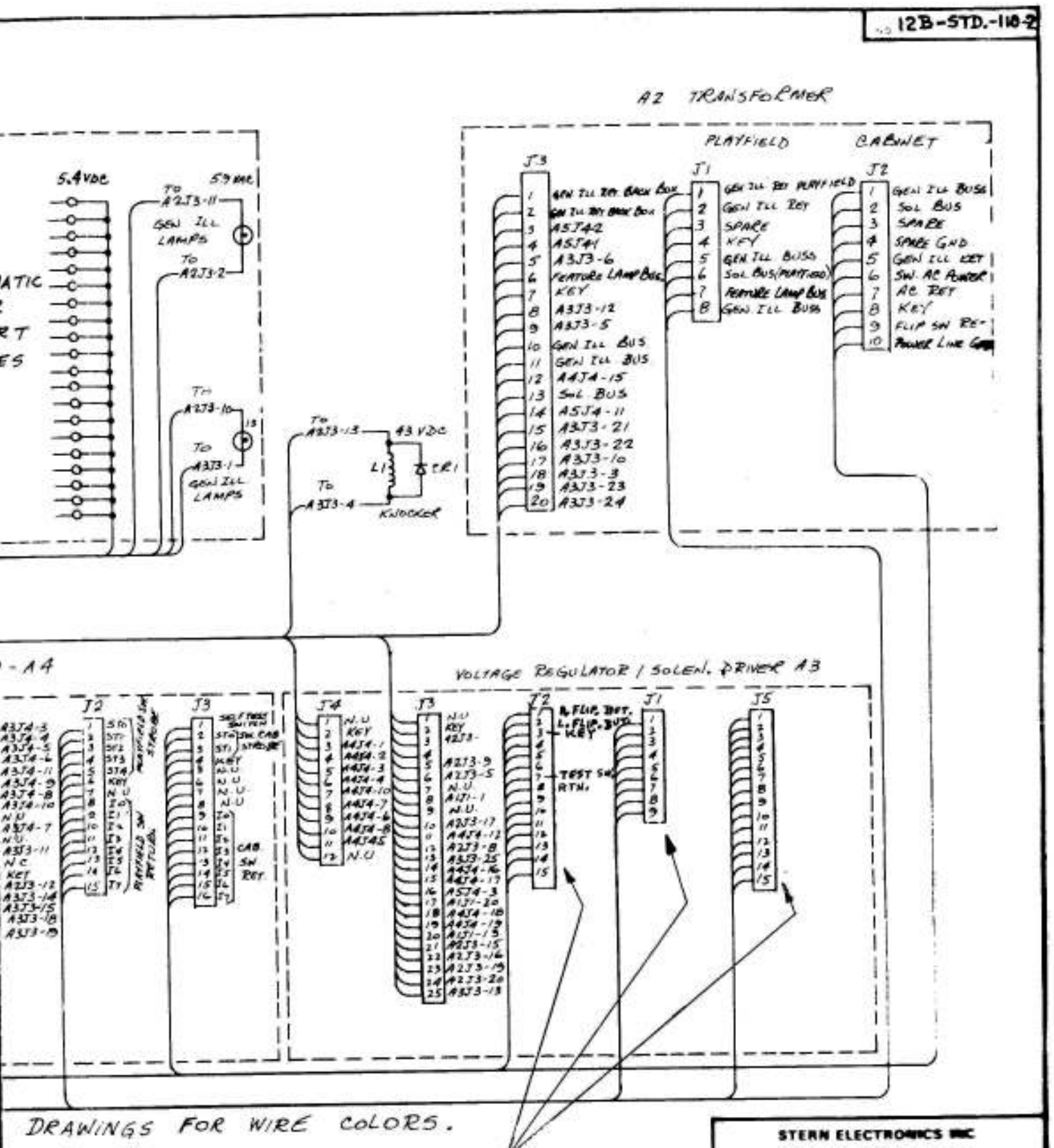
NOTES:

1. ▲ INDICATES MLR1Ck-1 TRANSISTOR.
2. THIS DOCUMENT FOR LDA-100 REV. A AND LDA-REV. B SINGLE SIDED P.C. BOARDS.

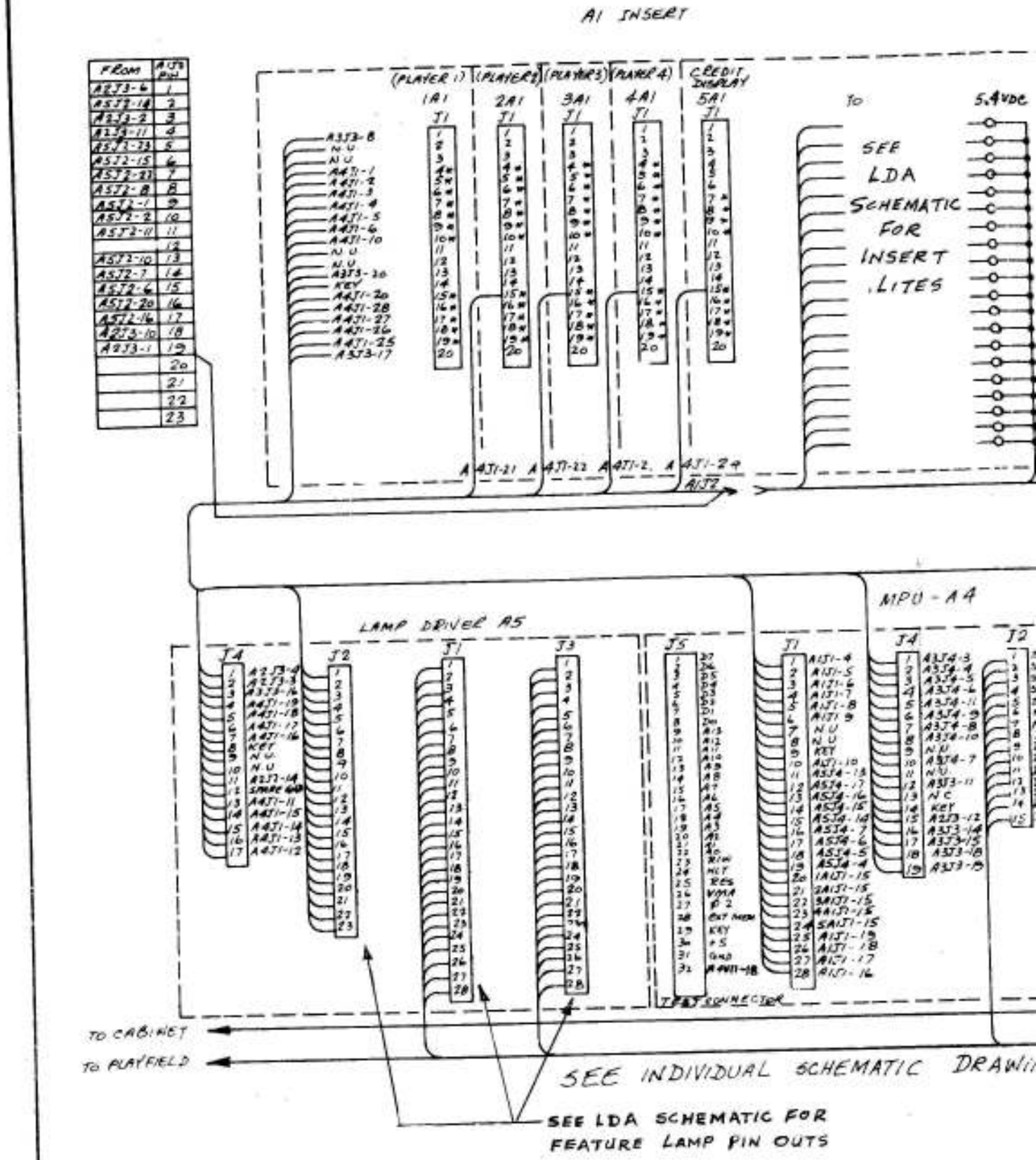


ISSUE	CHANGE	DA

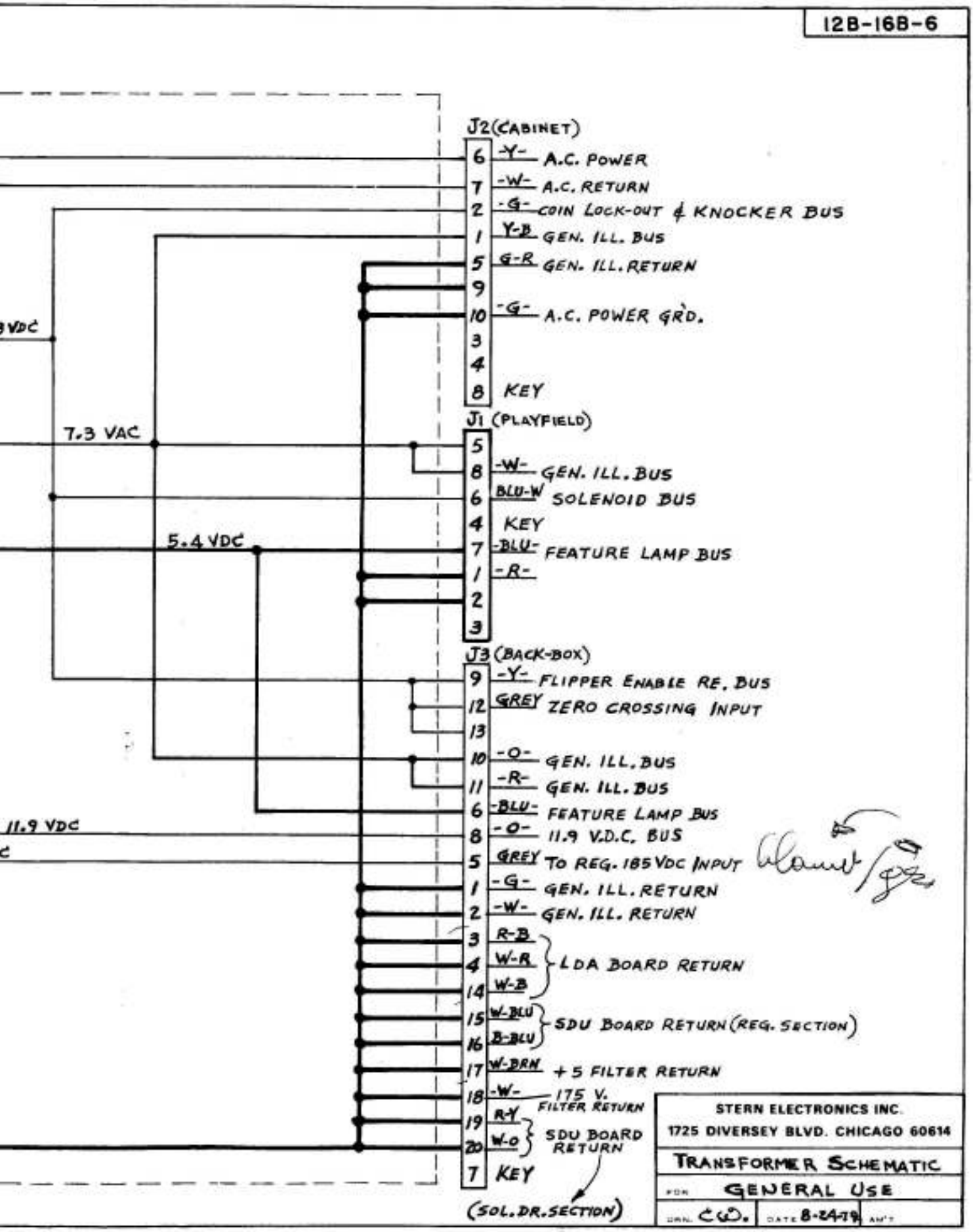
12B-4315-119



STERN ELECTRONICS INC
1725 DIVERSEY BLVD CHICAGO
WIRING DIAGRAM
SIZE
DWG.
APP'D


A1 INSERT
FROM
A3J3 PIN
A2J3-6 1
A5J2-14 2
A2J3-2 3
A2J3-11 4
A5J2-13 5
A5J2-15 6
A5J2-21 7
A5J2-8 8
A5J2-1 9
A5J2-2 10
A5J2-11 11
12
A5J2-10 13
A5J2-7 14
A5J2-6 15
A5J2-20 16
A5J2-16 17
A2J3-10 18
A2J3-1 19
20
21
22
23
(PLAYER 1)
(PLAYER2)
(PLAYER3)
(PLAYER 4)
CREDIT DISPLAY
1A1 J1
2A1 J1
3A1 J1
4A1 J1
5A1 J1
A3J3-8
N.U
N.U
A4J1-1
A4J1-2
A4J1-3
A4J1-4
A4J1-5
A4J1-6
A4J1-10
N.U
N.U
A3J3-20
KEY
A4J1-20
A4J1-28
A4J1-27
A4J1-26
A4J1-25
A3J3-17
A4J1-21
A4J1-22
A4J1-2
A4J1-24
A1J2
To
5.4VDC
SEE LDA SCHEMATIC FOR INSERT LITES
LAMP DRIVER A5
MPU - A4
J4
J2
J1
J3
J5
J1
J4
J2
TEST CONNECTOR
TO CABINET
TO PLAYFIELD
SEE INDIVIDUAL SCHEMATIC DRAWI
SEE LDA SCHEMATIC FOR FEATURE LAMP PIN OUTS

12B-16B-6

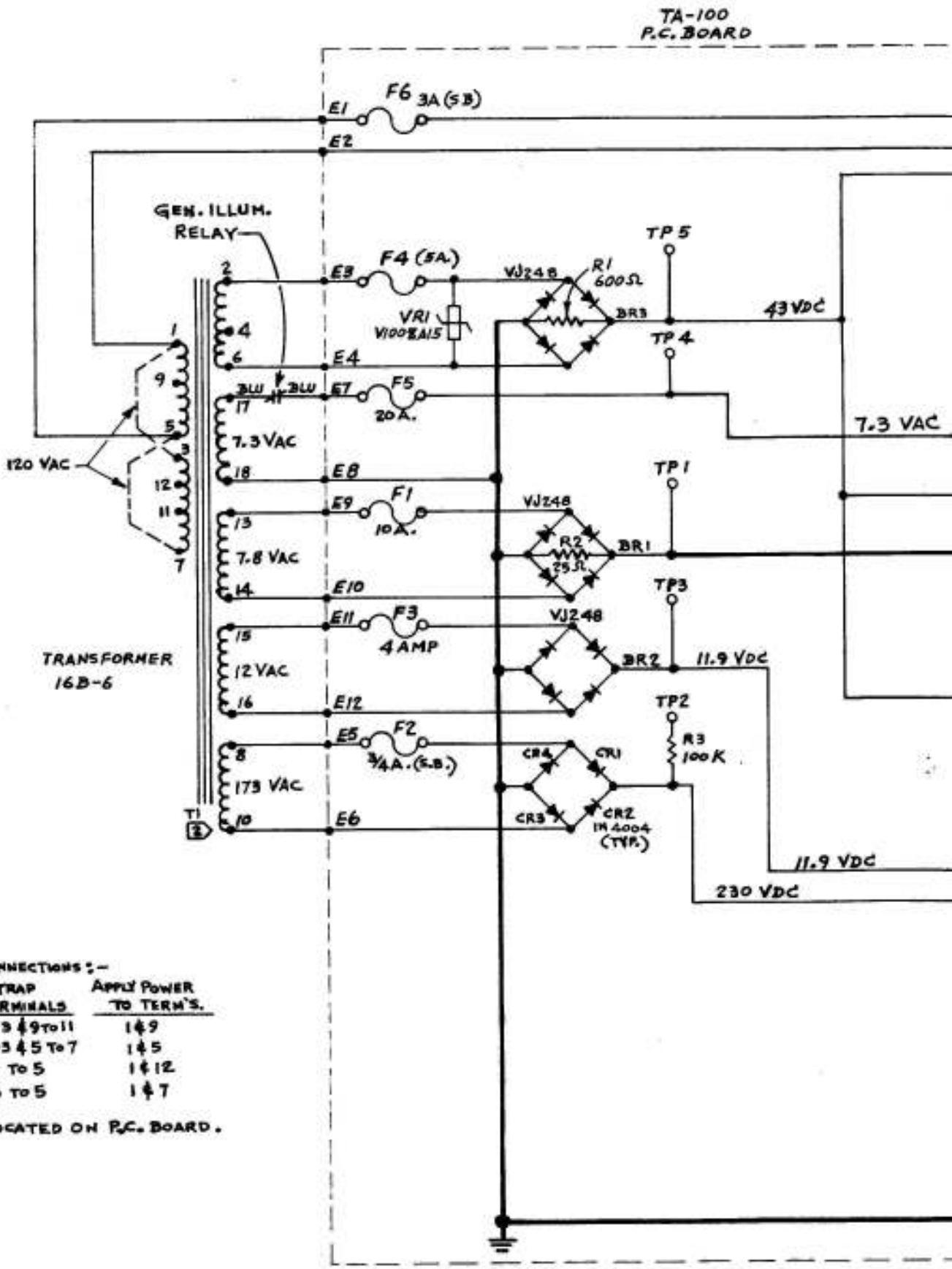


STERN ELECTRONICS INC.
1725 DIVERSEY BLVD. CHICAGO 60614

TRANSFORMER SCHEMATIC

FOR GENERAL USE

DRN. CW. DATE 8-24-78 APP'D

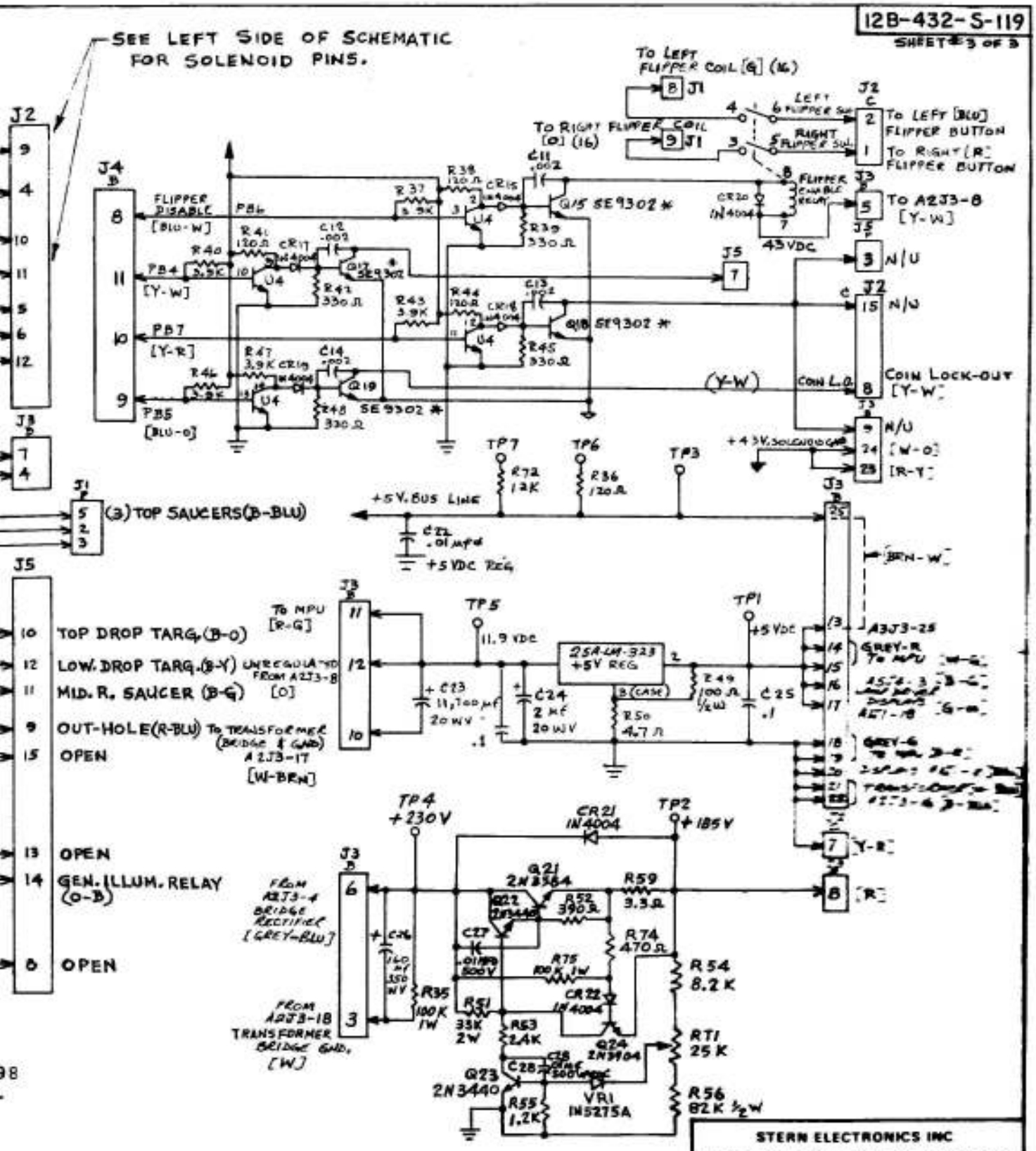


NOTES:

1. POWER LINE CONNECTIONS :-

AC LINE VOLTAGE	STRAP TERMINALS	APPLY POWER TO TERM'S.
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

(2) T1 IS NOT LOCATED ON P.C. BOARD.



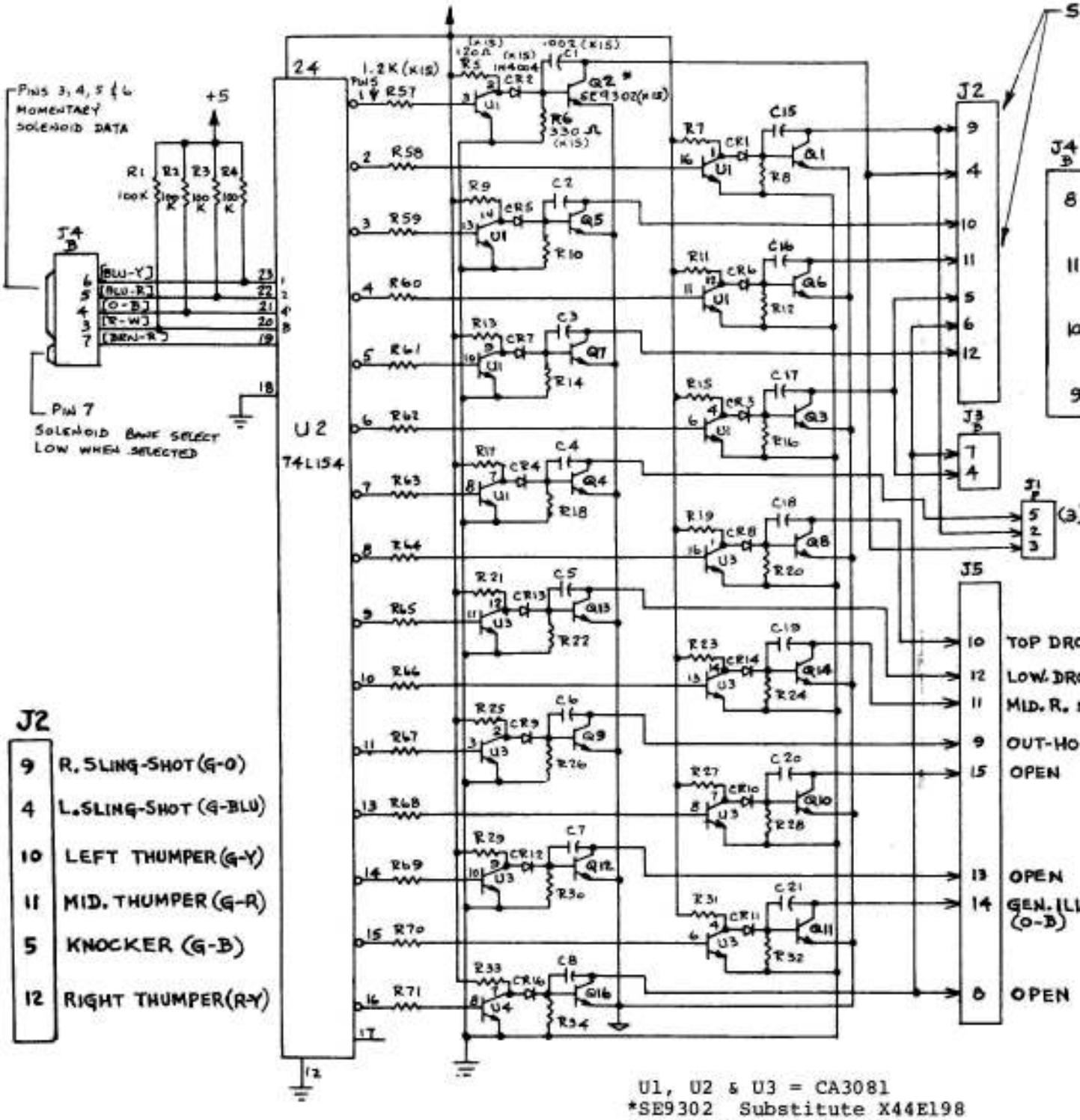
		SCALE:	PART MUST BE FREE OF BURRS
		DATE	Unless otherwise specified, all fractional dimensions carry tolerances of plus and minus .010. All decimal dimensions plus and minus .005. Exceptions: Drilled holes plus .003 minus .001. Die casting fractional plus and minus .005; Decimal plus and minus .003. Decimal dimensions on tools plus and minus .001. Angles ± 30' unless otherwise specified.

STERN ELECTRONICS INC
1725 DIVERSEY BLVD. CHICAGO 60614

SOLENOID DRIVER VOLTAGE REGULATOR SCHEMATIC

FOR -ALI- SOLID STATE

DWN. C.W. DATE 6-1-80



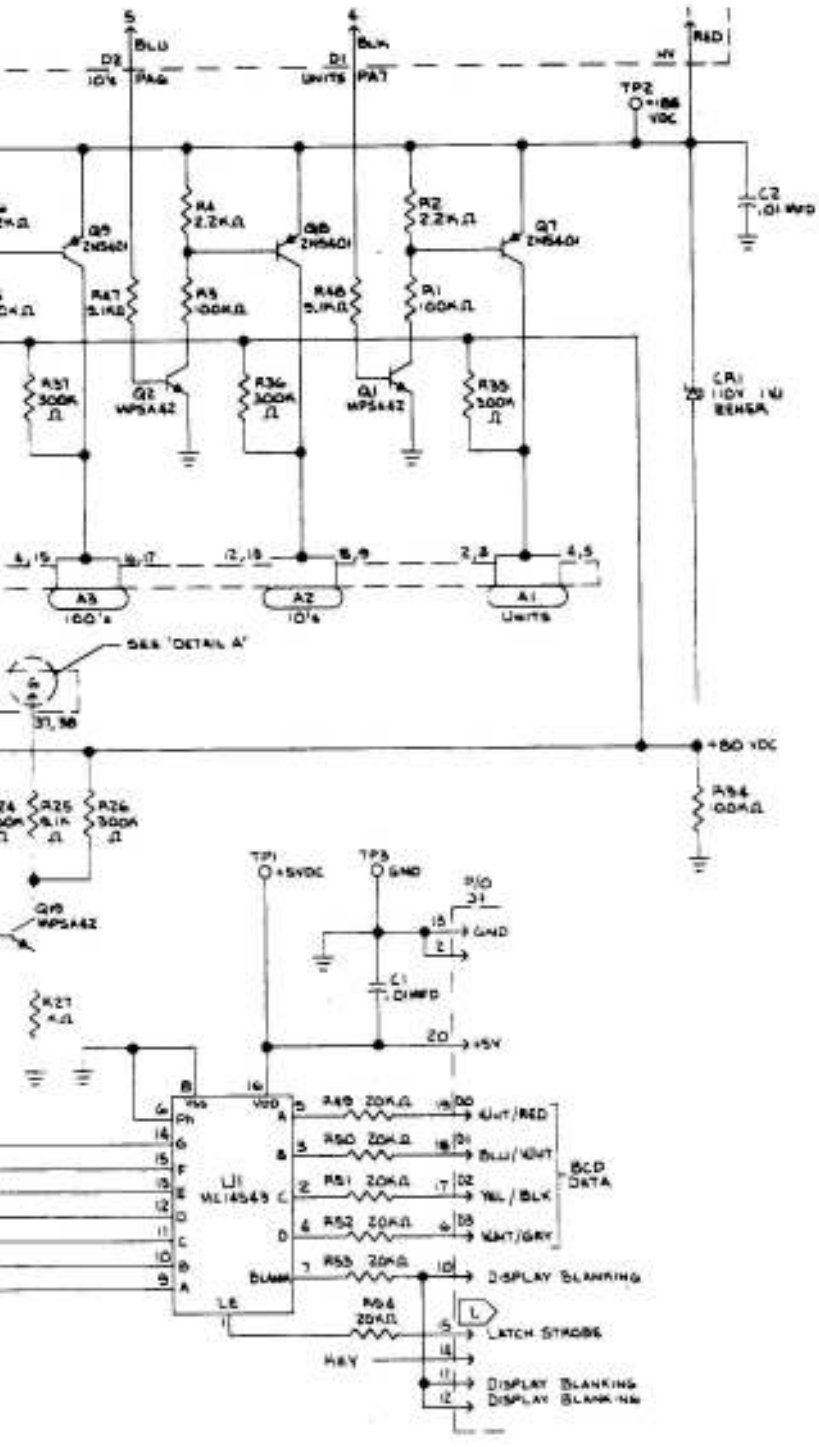
J2	
9	R. SLING-SHOT (G-O)
4	L. SLING-SHOT (G-BLU)
10	LEFT THUMPER (G-Y)
11	MID. THUMPER (G-R)
5	KNOCKER (G-B)
12	RIGHT THUMPER (R-Y)

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

ISSUE	CHANGE

12B-432-S-119

NO. 12B-434-S1



		SCALE:	PART MUST BE FREE OF BURRS	STERN ELECTRONICS INC. 1725 DIVERSEY BLVD. CHICAGO 60614
		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 ± 30' unless otherwise specified.		SCHEMATIC, DISPLAY - P.C. BOARD
	DATE			FOR GEN. USE
				DRN. LD. DATE 5-25-79 APP'D.
				MAT FIN.

NOTES:

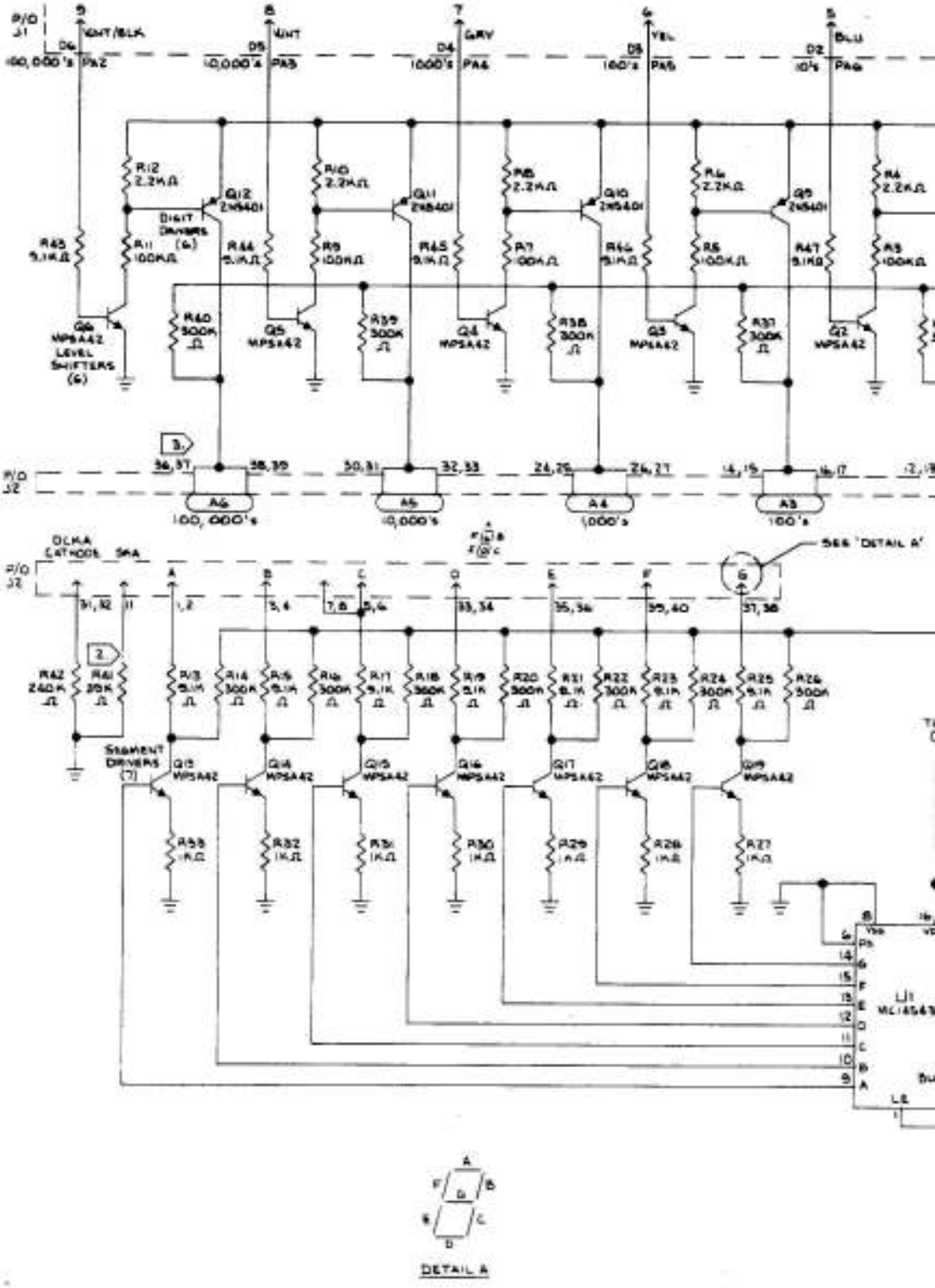
1. PIN 15 — WIRE COLOR

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 DISPLAY TERMINAL #	PANTEK DISPLAY TERMINAL

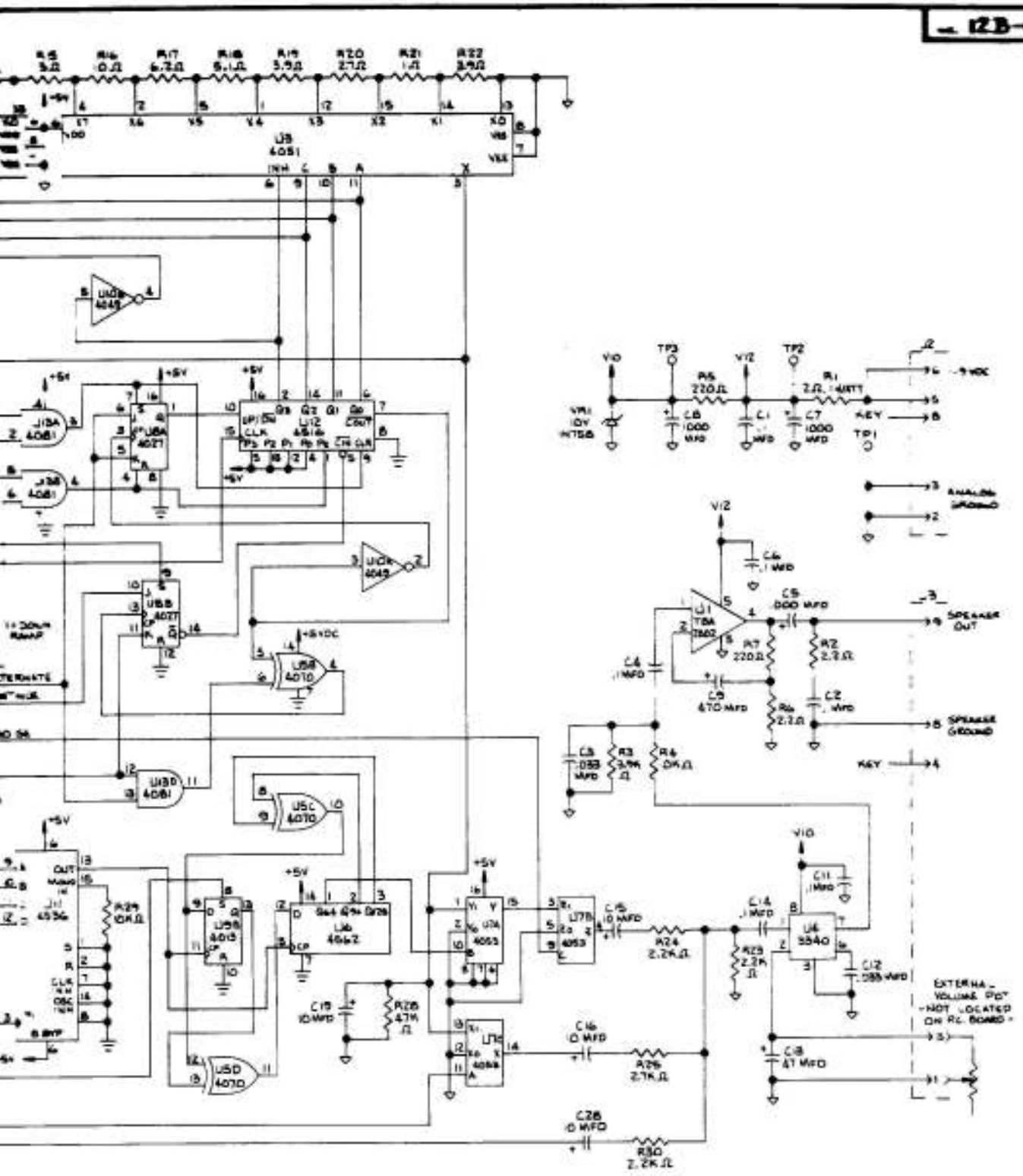


DETAIL A

ISSUE	CHANGE	DATE

NO. 12B-434-S1

DIETZGEN NO. 1996M ASEPROOF



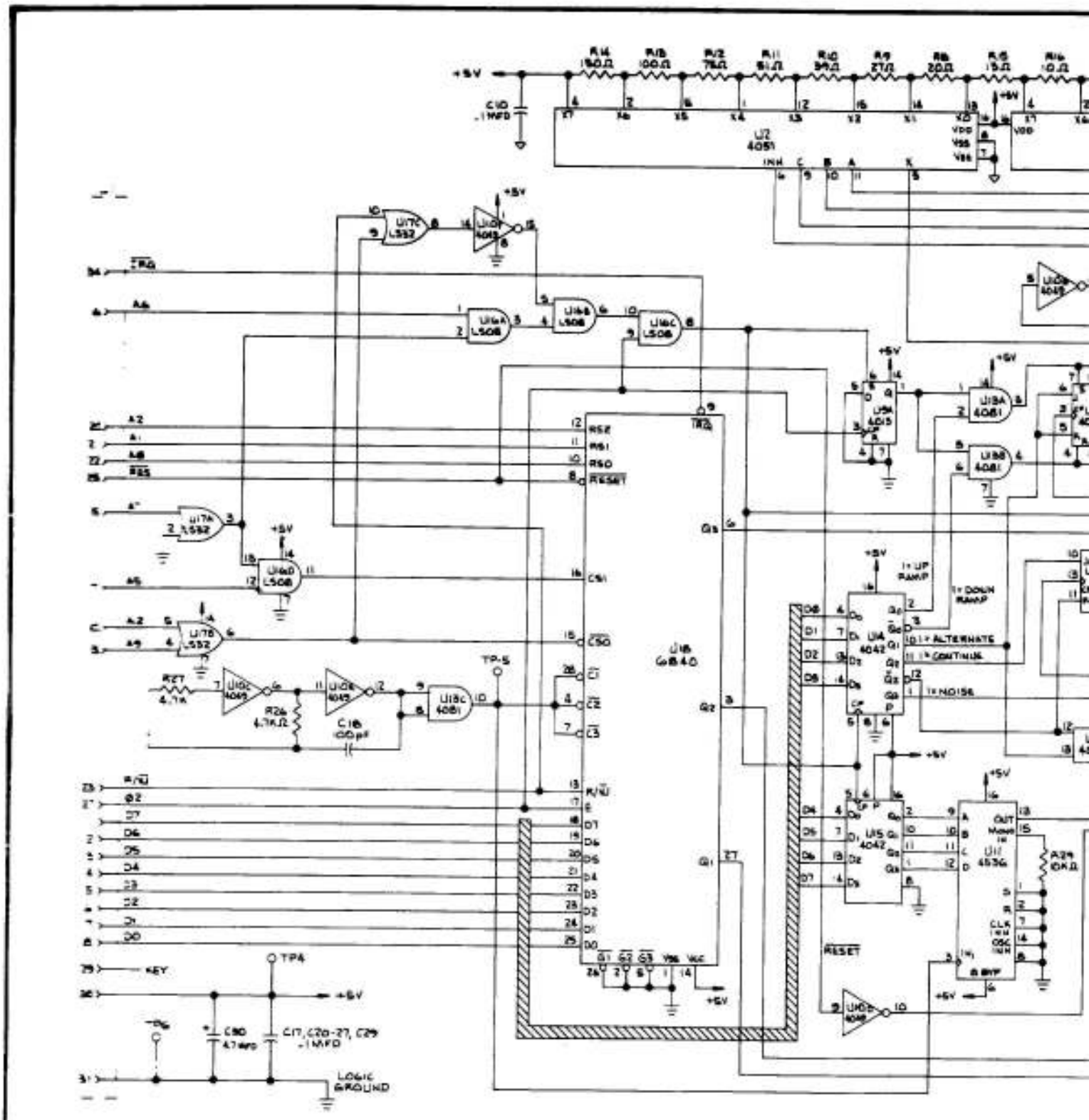
		SCALE:	PART MUST BE FREE OF BURRS
			Unless otherwise specified, all fractional dimensions carry tolerances of plus and minus .010: All decimal dimensions plus and minus .005. Exceptions: Drilled holes plus .003 minus .001. Die casting fractional plus and minus .005: Decimal plus and minus .003. Decimal dimensions on tools plus and minus .001. Angles ±30' unless otherwise specified.
	DATE		

STERN ELECTRONICS INC.
1725 DIVERSEY BLVD. CHICAGO 60614

SCHEMATIC, ELECTRONIC SOUNDS

FOR SOLID STATE

DRN. E.S.	DATE 8-21-79	AM'T
MAT	FIN.	APPR.

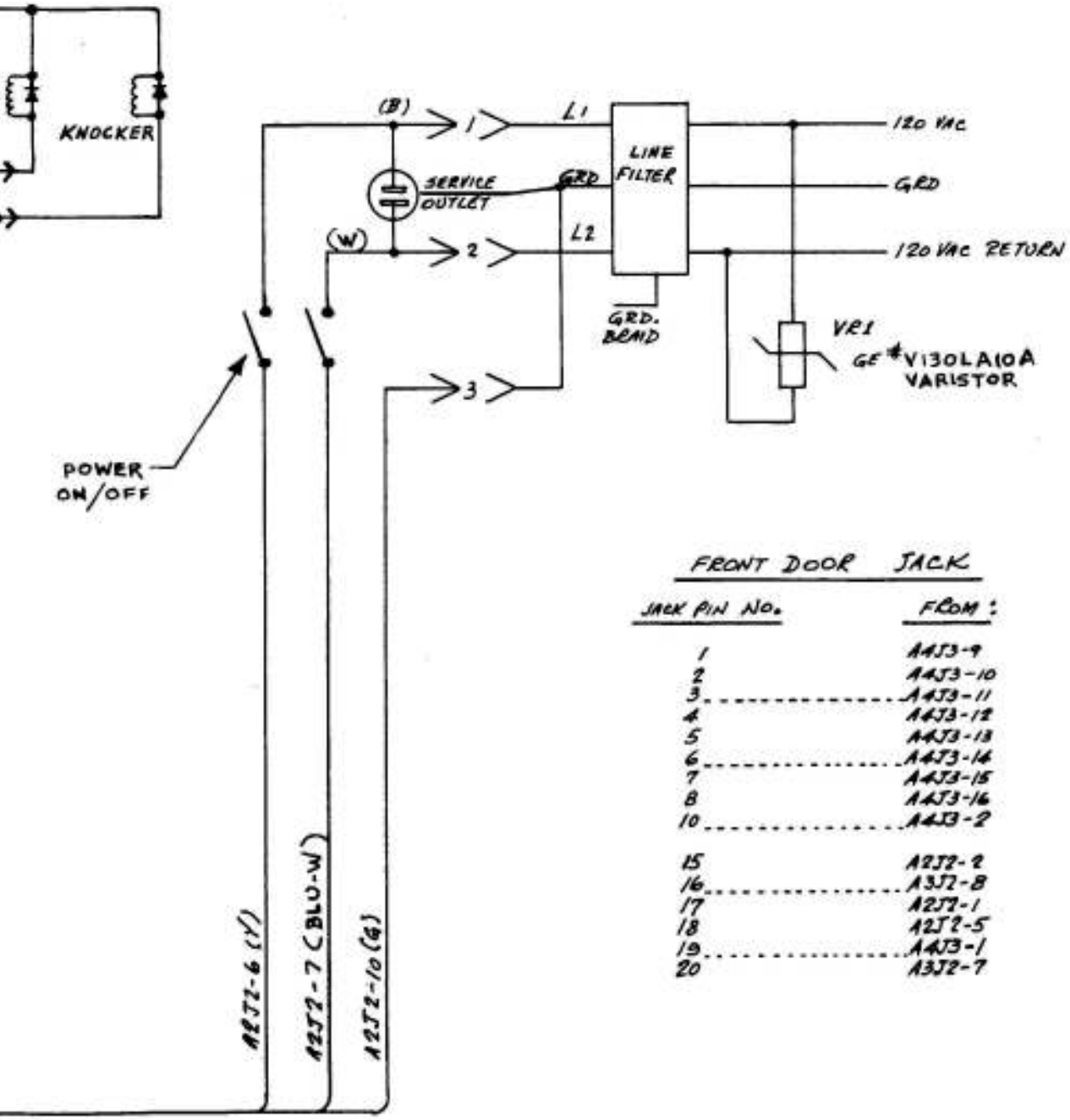


ISSUE	CHANGE

12B-605-S

DIETZGEN NO. 1996 ASEPROOF

12B-434-S-119



FRONT DOOR JACK

JACK PIN NO.	FROM:
1	A4J3-9
2	A4J3-10
3	A4J3-11
4	A4J3-12
5	A4J3-13
6	A4J3-14
7	A4J3-15
8	A4J3-16
10	A4J3-2
15	A2J2-2
16	A3J2-8
17	A2J2-1
18	A2J2-5
19	A4J3-1
20	A3J2-7

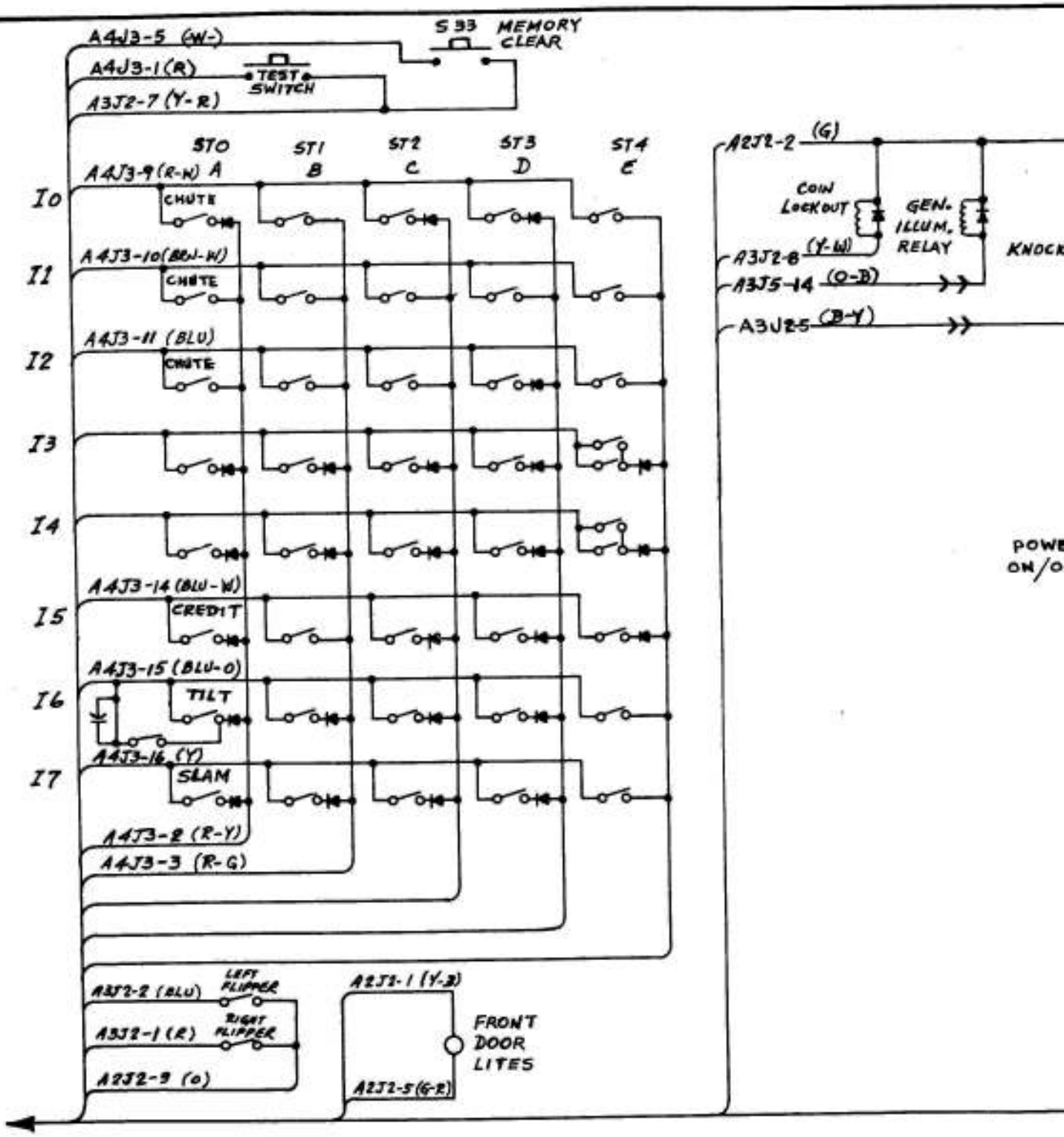
DATE	

STERN ELECTRONICS INC.
1725 DIVERSEY BLVD. CHICAGO 60614

CABINET AND FRONT DOOR WIRING

FOR STANDARD (ALL)

DRN. C.W.	DATE 2-7-80	APP'D
MAT'L	FIN.	APPR.

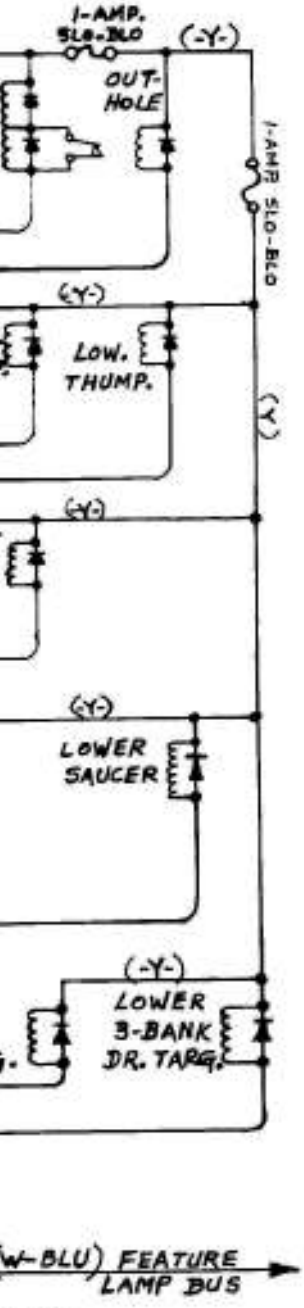


N/U = NOT USED
ALL DIODES ARE IN-4004

ISSUE	CHANGE

12B-434-S-119

DIETZGEN NO. 1996 ASEPROOF



DESCRIPTION	WIRE COLOR	JACK-A LDA	PIN NO.
"A"	BLU-R	J2	14
"L"	B-BLU	J2	15
"I"	R-BLU	J2	2
ARCH "G"	BRN-B	J1	18
ARCH "R"	BLU-R	J1	1
ARCH "E"	B-W	J3	26
ARCH "A"	G-R	J3	1
ARCH "T"	GREY-G	J1	19
ARCH "E"	O-R	J3	12
ARCH "S"	GREY	J1	9
ARCH "T"	R-Y	J3	25
"G"	PUR	J1	17
"R"	G-B	J1	8
"E"	B-R	J3	19
"A"	W-B	J3	15
"T"	GREY-B	J1	23
"S"	R-G	J1	3
"T2"	Y-Blu	J3	17
BONUS - 2,000	PUR-Y	J1	4
BONUS - 4,000	GREY	J2	9
BONUS - 6,000	B-Y	J2	5
BONUS - 8,000	GREY-G	J1	27
BONUS - 10,000	W-Y	J1	12
BONUS - 20,000	PUR-B	J2	4
BONUS - 2X	B-G	J3	21
BONUS - 3X	GREY-B	J3	10
BONUS - 4X	PUR-B	J1	25
BONUS - 5X	B-O	J1	11
EXTRA BALL, LEFT	R-BLU	J3	18
EXTRA BALL, RIGHT	W-O	J3	20
LEFT BANK TARG. 4,000	GREY-Y	J1	15
LEFT BANK TARG. 6,000	GREY-BLU	J1	10
LEFT BANK TARG. 8,000	W-GREY	J3	23
LEFT BANK TARG. 10,000	GREEN	J3	3
OUT-LANE (RIGHT)	BLU-W	J2	6
OUT-LANE (LEFT)	Y-B	J2	20
TOP BANK TARG. 5,000	GREY-O	J1	14
TOP BANK TARG. 10,000	PUR-W	J1	2
TOP BANK TARG. 15,000	R-B	J3	16
TOP BANK TARG. 20,000	W-R	J3	9
TOP HOLE, SPECIAL	Y-BLU	J2	16
TOP SAUCER 5,000	Y-W	J2	7
TOP SAUCER 10,000	B-W	J2	3
200 "G"	BLACK	J1	16
400 "R"	Y-G	J1	7
600 "S"	O-W	J3	27
800 "E"	R-W	J3	4
R.O.B. 1000	B-BLU	J1	28
SHOOT AGAIN	GREY-R	J1	26

		SCALE:	PART MUST BE FREE OF BURRS
		DATE	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 .005. Decimal dimensions on tools plus and minus .001. Angles ± 30' unless otherwise specified.

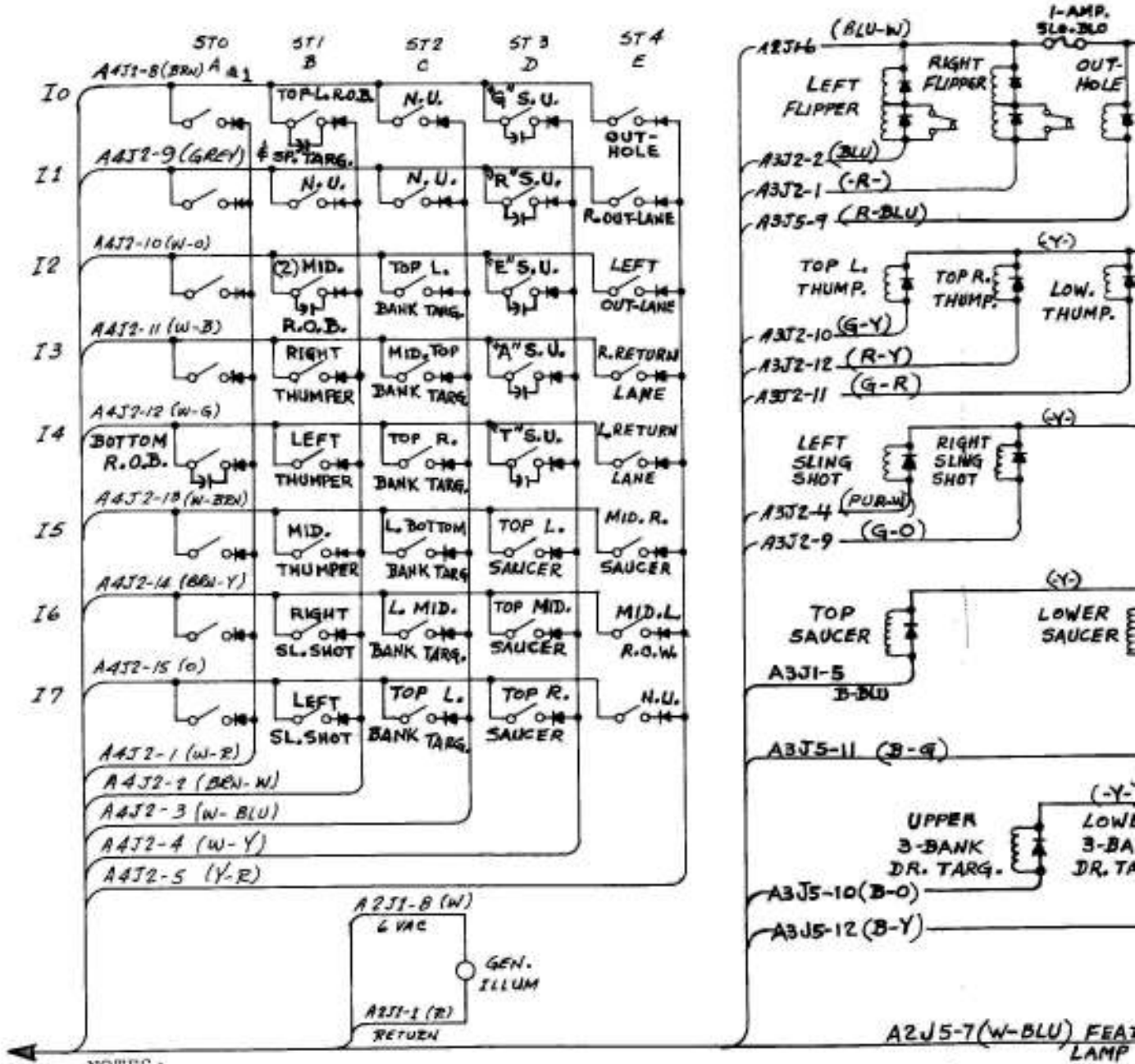
STERN ELECTRONICS INC.
1725 DIVERSEY BLVD. CHICAGO 60614

WIRING DIAGRAM

FOR -ALI-

DRN. [illegible] DATE 2-1-80

MAT [illegible]



NOTES:

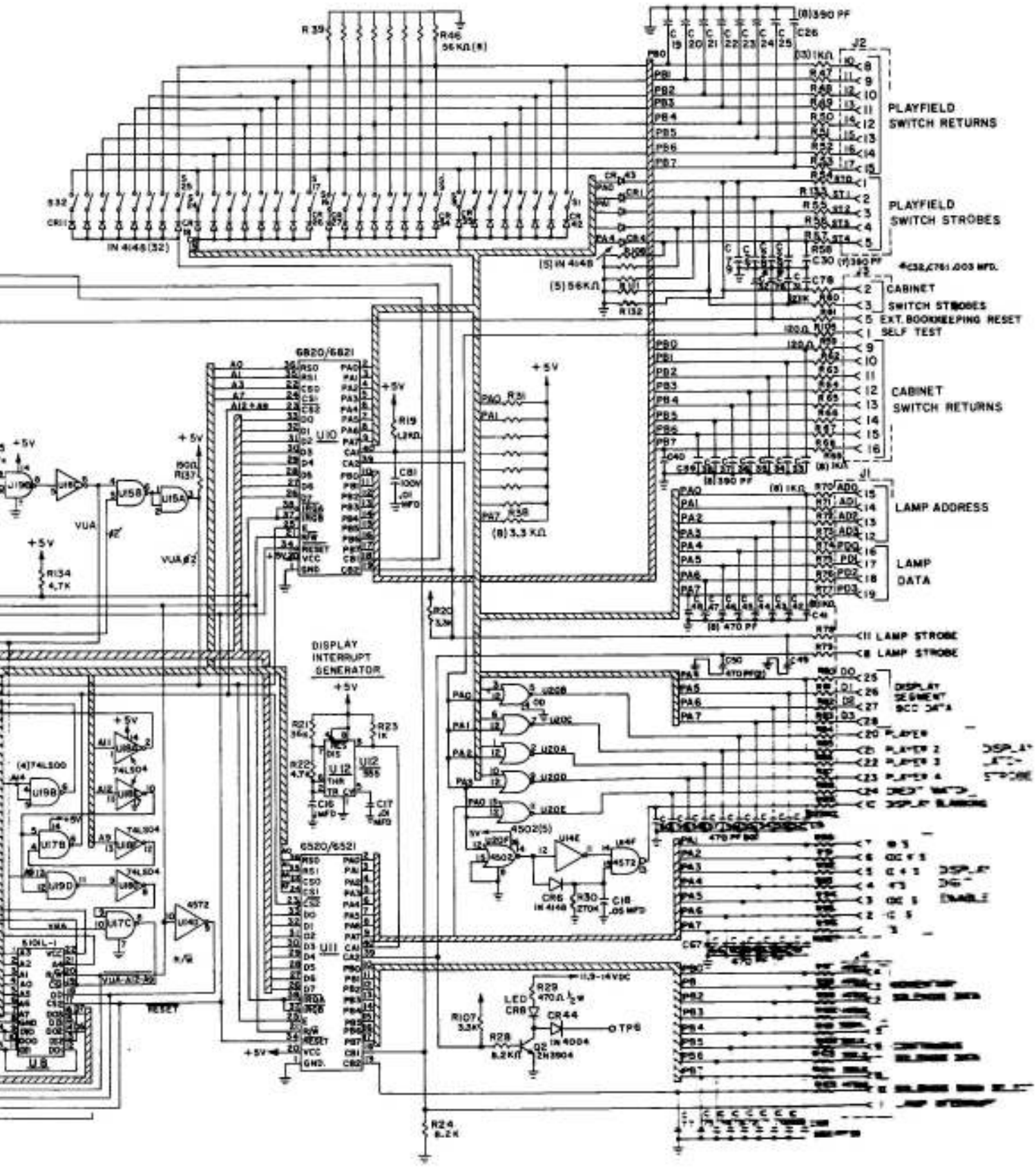
N/U = NOT USED

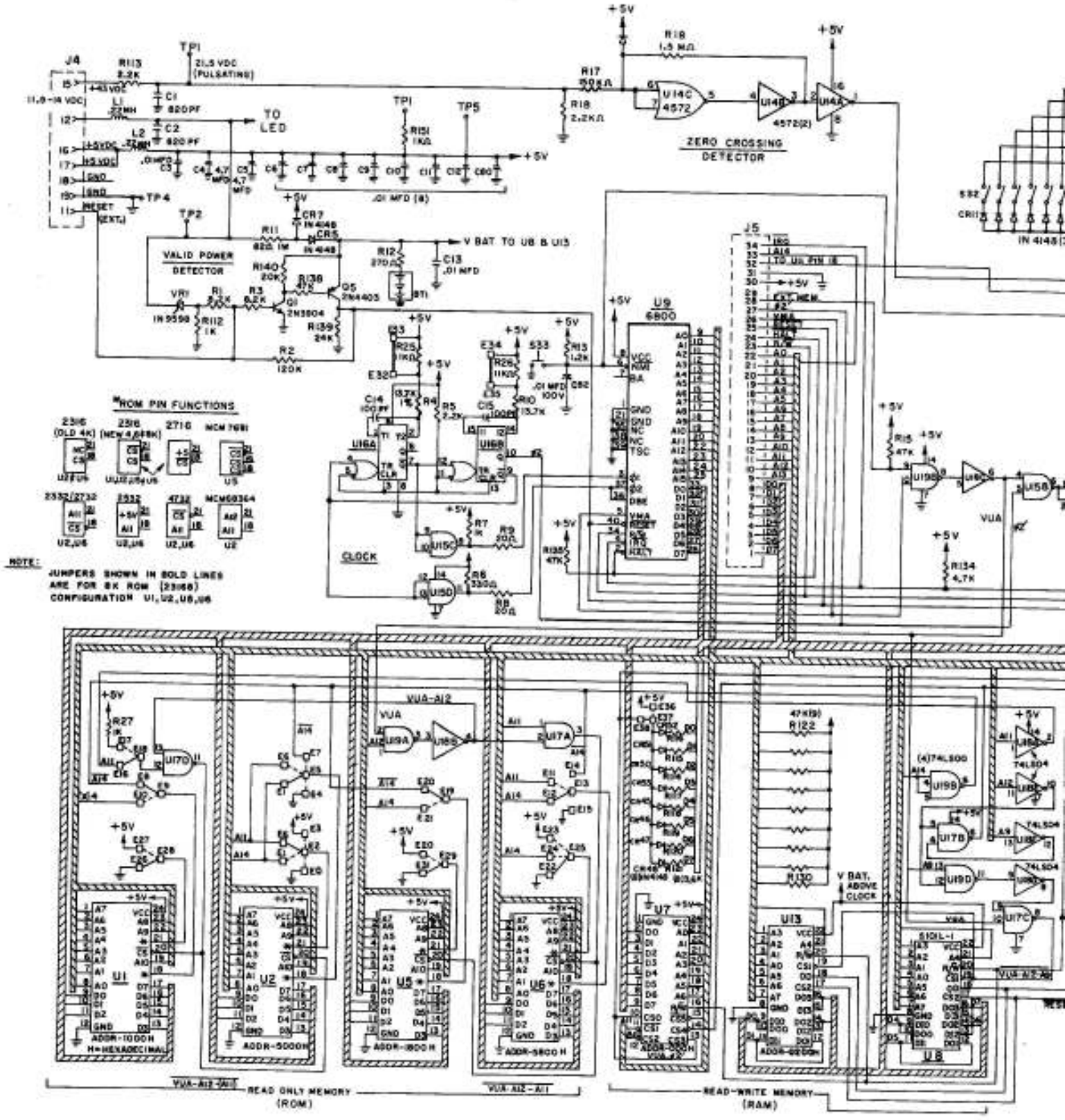
ALL DIODES ARE IN - 4004
D.T. = DROP TARGET
S.U. = STAND-UP TARGET
R.O.B. = ROLL-OVER BUTTON
SP.T. = SPINNING TARGET
R.O.W. = ROLL-OVER WIRE FORM

PLAYFIELD

ISSUE	CHANGE	DA

NO. 12B-432-S-119

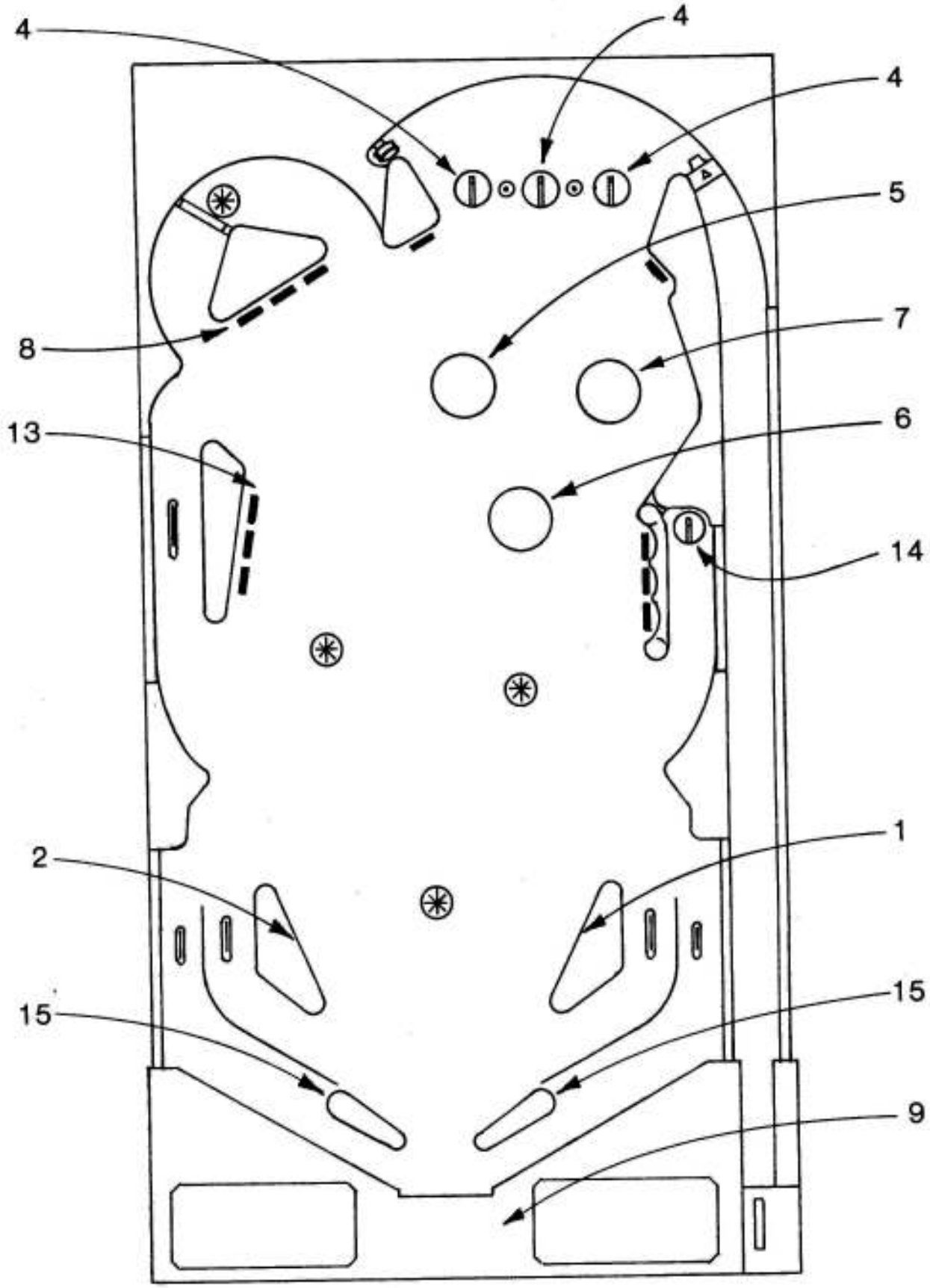

PLAYFIELD SWITCH RETURNS
PLAYFIELD SWITCH STROBES
CABINET SWITCH STROBES
EXT. BOOKKEEPING RESET
SELF TEST
CABINET SWITCH RETURNS
LAMP ADDRESS
LAMP DATA
LAMP STROBE
LAMP STROBE
DISPLAY SEGMENT BCD DATA
DISPLAY INTERRUPT GENERATOR
6820/6821
6520/6521
RESET
+5V
VUA
VUA Ø2
R/W
(5) 56KΩ
(8) 3.3 KΩ
(8) 1KΩ
(8) 390 PF
(8) 470 PF
LED CR8
CR44
IN 4004
2N3904
TP6
11.9-14 VDC



8K E-PROM 2716 (INTEL) JUMPER COMBINATIONS :-

E2-E3	E23-E25
E5-E7	E27-E28
E9-E10	E29-E30
E13-E14	E32-E33
E16-E18	E34-E35
E19-E21	

SOLENOIDS
ALI



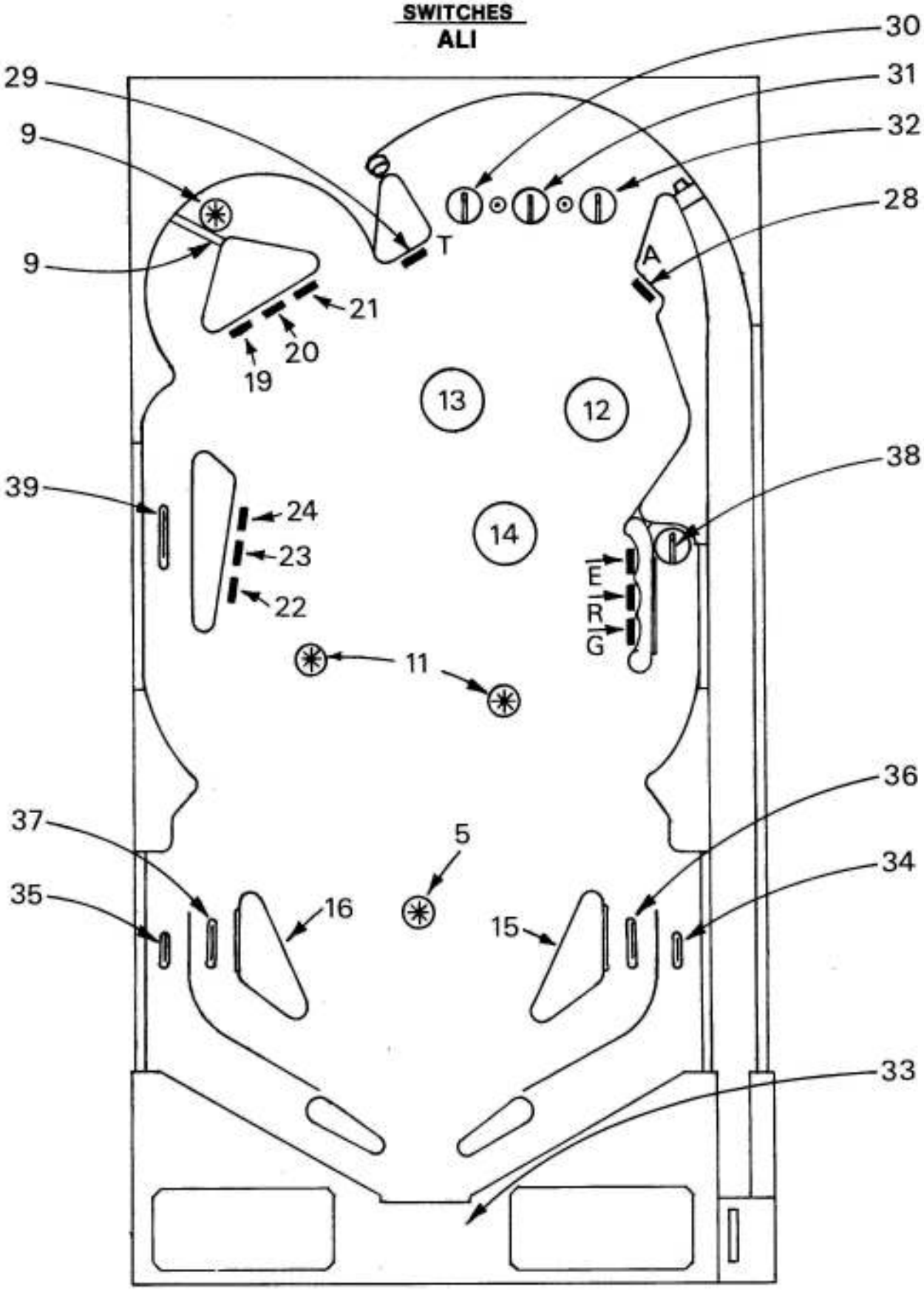
SOLENOIDS NOT ON PLAYFIELD:

3- KNOCKER 19- LOCKOUT

ALI
SOLENOID IDENTIFICATION
SELF TEST DISPLAY NUMBERS

SOLENOID NO.	SOLENOID LOCATION
1	RIGHT SLING—SHOT
2	LEFT SLING—SHOT
3	KNOCKER
4	TOP (3) SAUCERS
5	LEFT THUMPER
6	MIDDLE THUMPER
7	RIGHT THUMPER
8	LEFT BANK TARGET
9	OUT-HOLE
10	OPEN
11	GEN. ILLUM. RELAY
12	OPEN
13	LOWER BANK TARGET
14	MID. RIGHT SAUCER
15	FLIPPERS (RIGHT & LEFT)
16	OPEN
17	OPEN
18	OPEN
19	COIN LOCK-OUT
20 THRU 29	SOUND

SWITCHES
ALI

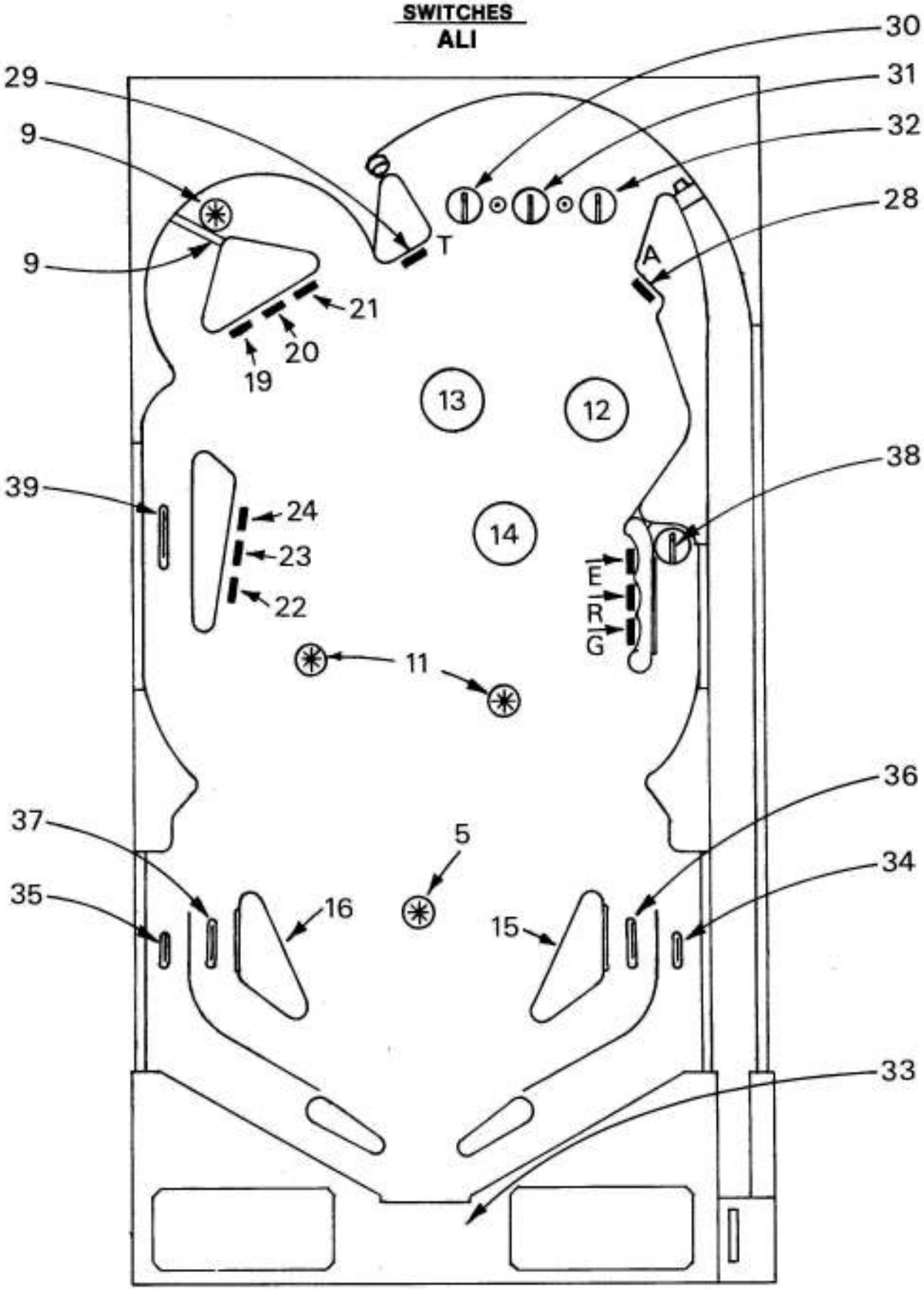


SWITCHES NOT ON PLAYFIELD:

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

SWITCHES
ALI



SWITCHES NOT ON PLAYFIELD:

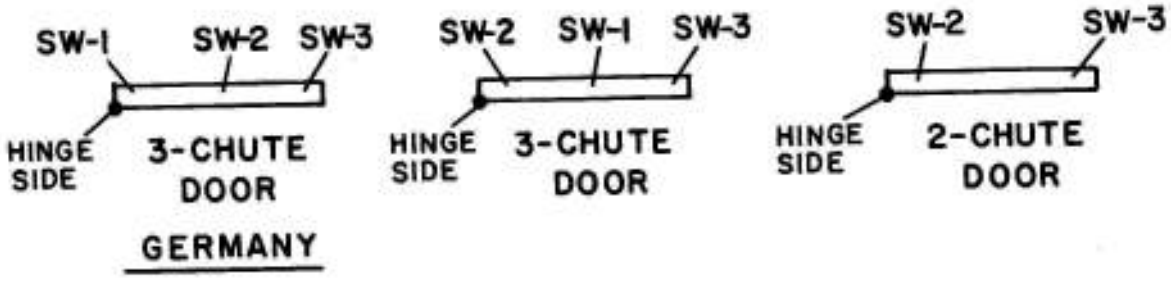
1 * LEFT CHUTE	7 ROLL-TILT
2 * CENTER CHUTE	7 PENDULUM
3 * RIGHT CHUTE	8 TILT BOARD
6 CREDIT BUTTON	8 DOOR

* SEE DRWG. ON SWITCH IDENTIFICATION PAGE

-ALI-
SWITCH IDENTIFICATION
SELF TEST DISPLAY NUMBERS

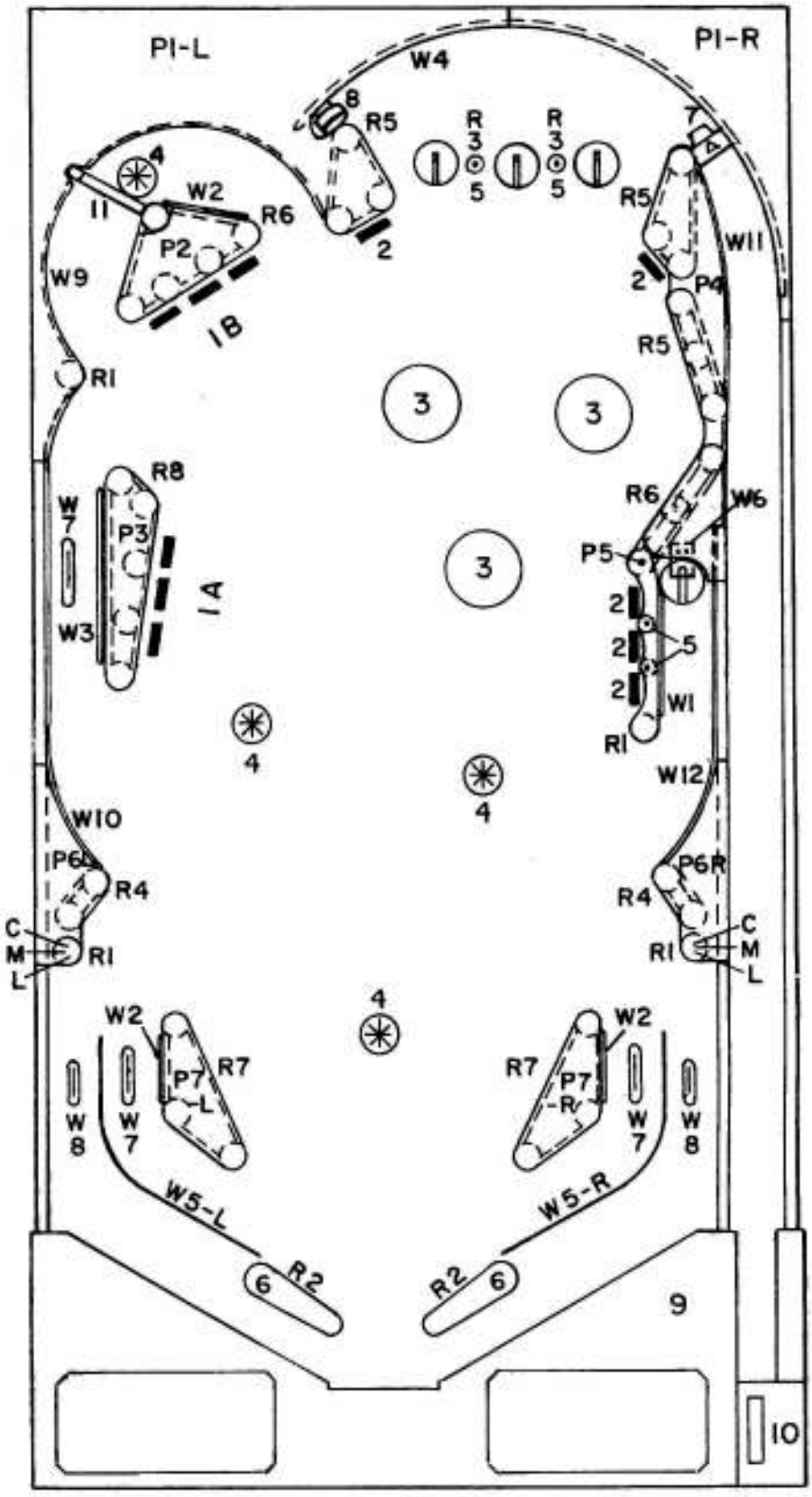
SWITCH NO.	SWITCH LOCATION
1	CHUTE (SEE DR'WG. BELOW)
2	CHUTE (SEE DR'WG. BELOW)
3	CHUTE (SEE DR'WG. BELOW)
4	NOT-USED
5	BOTTOM R.O. BUTTON
6	CREDIT BUTTON
7	TILTS
8	SLAM & VIB. TILTS
9	TOP-LEFT R.O. BUTTON
10	NOT-USED
11	TWO MIDDLE R.O. BUTTONS
12	RIGHT THUMPER
13	LEFT THUMPER
14	MIDDLE THUMPER
15	RIGHT SLING-SHOT
16	LEFT SLING-SHOT
17	NOT-USED
18	NOT-USED
19	TOP BANK, LEFT TARGET
20	TOP BANK, MID. TARGET

SWITCH NO.	SWITCH LOCATION
21	TOP BANK, RIGHT TARGET
22	LEFT BANK, BOTTOM TARGET
23	LEFT BANK, MID. TARGET
24	LEFT BANK, TOP TARGET
25	STAND-UP TARGET "G"
26	STAND-UP TARGET "R"
27	STAND-UP TARGET "E"
28	STAND-UP TARGET "A"
29	STAND-UP TARGET "T"
30	TOP LEFT SAUCER
31	TOP MIDDLE SAUCER
32	TOP RIGHT SAUCER
33	OUT-HOLE
34	RIGHT OUT-LANE
35	LEFT OUT-LANE
36	RIGHT RETURN LANE
37	LEFT RETURN LANE
38	MID. RIGHT SAUCER
39	MID. LEFT R.O. WIRE
40	NOT-USED



NOTE: FLIPPER BUTTON CABINET SWITCHES DO NOT APPEAR ON TEST

-ALI- 119
PLAYFIELD PARTS



POST ADJUSTMENT
C-CONSERVATIVE
M-MEDIUM
L-LIBERAL

RUBBER RINGS

R1-7A-120-031
RR2-7A-121-Y
R3-7A-125
R4-7A-120-100
R5-7A-120-150
R6-7A-120-200
R7-7A-120-250
R8-7A-120-300

BALL GUIDES & ROLL-OVERS

W1-6A-101-A
W2-6A-101-H
W3-6A-261
W4-6A-261
W5-6A-262
W6-1A-762
W7-A149
W8-A-383
W9-B-656
W10-B-657
W11-B-658
W12-B-659

PLASTIC SHIELDS

TOP ARCH SET 13C-119-1R & 1L
"ALI" GAME-SET 13B-119-2 to -7
(P1 to P7)

MISC. PARTS & ASSEMBLIES

1A-3-BANK DR. TARG. D-580-3E-1
(TARGETS ALONE: 13A-11-BL)
1B-3-BANK DR. TARG. D-580-3E-2
(TARGETS ALONE: 13A-20-1)
2. TARGET ASSEM. A-461-3W
3. THUMPER CAP 13A-36-1
4. ROLL OVER BUTTON 4B-275
5. BALL GUIDE POST 2A-200
6. FLIPPER & SHAFT ASS'Y. A-193
7. BALL GATE ASS'Y. A-104-R2
8. REBOUND RUBBER ASS'Y. A-105
9. INSTRUCTION PLATE 14B-3-2
10. SHOOTER GAUGE 14A-2-5
11. SPIN TARGET ASS'Y. A-563
TARGET & WIRE ONLY 14A-7-1

PARTS LIST
ALI #119

MISCELLANEOUS	PART NUMBER
Transformer (Domestic or Export)	16B-6
Transformer & Rectifier Board	B-438-2
Bulbs, #44	8A-101
U1	25A-P-29
U2	25A-P-30
U5	25A-P-31
U6	25A-P-32

ASSEMBLY COILS	
Coin Lockout	C-36-5300
Flipper L & R	J-25-500/34-4500
Knocker	N-26-1200
Outhole Kicker (1)	JX-26-1100
Saucer Eject (2)	J-28-2300
Thumper Bumper (3)	J-26-1200
Slingshots (2)	J-27-1700
Drop Target Reset (2)	B-27-2300

MODULES	
Lamp Driver	B-431
Display Driver (5)	A-434
Solenoid Driver/Voltage Regulator	B-432
MPU (FOR ROMS SEE MISCELLANEOUS ABOVE)	C-602
Rectifier Board	A-430
Sound Module	C-605

PLAYFIELD PARTS — SEE PLAYFIELD DIAGRAM

SPECIAL LIGHT

The number of Special Lites Lit at one time can be adjusted as follows:

	SWITCH 23
All 3 on at once	ON
One at time (rotating)	OFF

SPECIAL LIGHT ON

The number of times GREATEST and ALI must be made to lite special can be adjusted as follows:

	SWITCH 24
3 Ball GREATEST once, ALI once	ON
5 Ball GREATEST twice, ALI once	
3 Ball GREATEST twice, ALI once	OFF
5 Ball GREATEST twice, ALI once	

LETTER AWARD

The spotting of the letter 'T' can be Adjusted:

	SWITCH 25
Spots both T's in GREATEST (Return lane or rollover)	ON
One T per switch	OFF

EXTRA BALL:

This option can be adjusted as follows:

AWARD	SWITCH 26
No Extra Ball (Bypass)	OFF
Award Extra Ball	ON

SPECIAL AWARD:

Award received when "Special" lite is lit.

AWARD	SWITCHES 31	32
No Award	OFF	OFF
Extra Ball	OFF	ON
100,000 Points	ON	OFF
Replay	ON	ON

SWITCH NO. 1 (WIRE COLOR BLUE)

SWITCHES				CREDITS/COIN
30	29	28	27	
OFF	OFF	OFF	OFF	1/1 Coin
OFF	OFF	OFF	ON	*1/2 Coins
OFF	OFF	ON	OFF	2/1 Coin
OFF	OFF	ON	ON	2/2 Coins
OFF	ON	OFF	OFF	3/1 Coin
OFF	ON	OFF	ON	3/2 Coins
OFF	ON	ON	OFF	4/1 Coin
OFF	ON	ON	O	5/1 Coin
ON	OFF	OFF	OFF	6/1 Coin
ON	OFF	OFF	ON	7/1 Coin
ON	OFF	ON	OFF	8/1 Coin
ON	OFF	ON	ON	9/1 Coin
ON	ON	OFF	OFF	10/1 Coin
ON	ON	OFF	ON	11/1 Coin
ON	ON	ON	OFF	12/1 Coin
ON	ON	ON	ON	14/1 Coin

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	SWITCH 6
Extra Ball	OFF
Replay	ON

BALL PER GAME:

No. of BALLS PER GAME	SWITCH 7
3	OFF
5	ON

EJECT POCKET:

SWITCH 8

MUST BE OFF

NOTE: Make sure this switch is set properly if not the ball will be trapped on the playfield and will require a service call to correct.

BACKGROUND SOUND:

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

SOUND	SWITCH 14
OFF	OFF
ON	ON

CREDITS/COIN ADJUSTMENTS:

The credits given per coin are selectable by means of MPU switches. Thirty-one different credit ratios are available for two coin chutes, sixteen credit ratios are available for the third coin chute. The MPU switch settings and resultant credits/coin are as follows:

CREDITS/COIN ADJUSTMENTS

SWITCH No. 2 (BRN-WHITE) or SWITCH No. 3 (RED-WHITE)	SWITCHES 5	4	3	2	1	CREDITS/COIN
	13	12	11	10	9	
	OFF	OFF	OFF	OFF	OFF	....3/2 COINS*
	OFF	OFF	OFF	OFF	ON	3/2 COINS**
	OFF	OFF	OFF	ON	OFF	1/COIN
	OFF	OFF	OFF	ON	ON	....1/2 COINS*
	OFF	OFF	ON	OFF	OFF	2/COIN
	OFF	OFF	ON	OFF	ON	2/2 COINS
	OFF	OFF	ON	ON	OFF	... 3/COIN
	OFF	OFF	ON	ON	ON	3/2 COINS*
	OFF	ON	OFF	OFF	OFF	4/COIN
	OFF	ON	OFF	OFF	ON	....4/2 COINS*
	OFF	ON	OFF	ON	OFF	5/COIN
	OFF	ON	OFF	ON	ON	5/2 COINS*
	OFF	ON	ON	OFF	OFF	... 6/COIN
	OFF	ON	ON	OFF	ON	6/2 COINS*
	OFF	ON	ON	ON	OFF	7/COIN
	OFF	ON	ON	ON	ON	....7/2 COINS*
	ON	OFF	OFF	OFF	OFF	8/COIN
	ON	OFF	OFF	OFF	ON	8/2 COINS*
	ON	OFF	OFF	ON	OFF	... 9/COIN
	ON	OFF	OFF	ON	ON	9/2 COINS*
	ON	OFF	ON	OFF	OFF	10/COIN
	ON	OFF	ON	OFF	ON	....10/2 COINS*
	ON	OFF	ON	ON	OFF	11/COIN
	ON	OFF	ON	ON	ON	11/2 COINS*
	ON	ON	OFF	OFF	OFF	... 12/COIN
	ON	ON	OFF	OFF	ON	12/2 COINS*
	ON	ON	OFF	ON	OFF	13/COIN
	ON	ON	OFF	ON	ON	....13/2 COINS*
	ON	ON	ON	OFF	OFF	14/COIN
	ON	ON	ON	OFF	ON	14/2 COINS*
	ON	ON	ON	ON	OFF	....15/COIN
	ON	ON	ON	ON	ON	15/2 COINS*

*No credits until second coin dropped

**One credit for first coin. Two credits for second coin provided that no scoring occured between 1st and 2nd coin drops. If scoring occured, second coin gives one credit.

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 and melody 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.

ALI SWITCH ASSIGNMENT

32 31	Special Award
30 29 28 27	Coin Chute No. 1 { LFT. German CTR. U.S.A.
26	Extra Ball Bypass
25	Letter Award
24	'Special' Lites On
23	Special Light
22	Special Replay Limit
21	Match Feature
20	Credit Display
19 18	Max Credits
17	Attract Mode Sound
16 15	High Game To Date Feature
14	Background Sound
13 9	Coin Chute No. 3
8	Eject Pocket
7	Ball Per Game (3 or 5)
6	High Score Feature
5 1	Coin Chute No. 2

(SWS-#30, 31 & 32) TOP EJECT POCKET:

Score 500 Points and spot A-L-I.

1st Time A-L-I Spotted Center pocket Lites for possible 5,000 Points.

2nd Time A-L-I Spotted Center pocket Lites for possible 10,000 Points.

NOTE: Spotting A-L-I and G-R-E-A-T-E-S-T the required number of times lites center Eject Pocket for possible Special Award (Adj.)

(SWS-#34 & 35) OUTLANES:

Scores 5,000 Points and 3 Bonus Advances (6,000 pts.) Awards Special when lit (Spotting A-L-I once and G-R-E-A-T-E-S-T once Min. & Adj.)

(SWS-#36 & 37) RETURN LANES:

Scores 3,000 and one Bonus Advance (2,000 Pts.) Left return lane spotts 'S' - right return lane spotts 'T' (Adj.).

(SW-#38) SIDE EJECT POCKET:

Scores indicated Bonus and Multiplier. (After collecting Bonus & Multiplier they are restored for additional scoring).

(SW-#39) SIDE ROLL-OVER LANE:

Scores 1,000. Plus 1,000 for each letter spotted in G-R-E-A-T-E-S-T.

(SW-#9) EXTRA BALL:

Lites for possible Award after spotting G-R-E-A-T-E-S-T for 3 ball, A-L-I and G-R-E-A-T-E-S-T for 5 ball.

NOTE: This carries over from ball to ball until awarded, resets at the start of each game.

SPECIAL

Lites for spotting A-L-I and G-R-E-A-T-E-S-T the required number of times. Can be adjusted for all three places to lite together (SWS-#31, 34 & 35) or individually and to rotate.

EXTRA BALL

3 BALL — Awards EXTRA BALL when "GREATEST" is lit.

5 BALL — Awards EXTRA BALL when "ALI & GREATEST" is lit.

(SW-#5) BOTTOM ROLL-OVER BUTTON:

Scores lited value. Spots lited letter.

(SW-#9) TOP ROLL-OVER BUTTON AND SPINNER:

Scores 2,000 Points. Awards extra ball when lit.

(SW-#11) TWO MIDDLE ROLL-OVER BUTTONS:

Scores 10 Points. Advances bonus by 2,000 Points.

(SWS-#12, 13 & 14)THUMPER BUMPERS:

Scores 1,000 Points on 3 ball, 100 Points on 5 ball. Changes position of special when lit lite is on (Adj.).

(SWS-#15 & 16) SLINGSHOTS:

Scores 10 Points and changes position of special when lit lite is on (Adj.).

(SWS-#19, 20 & 21) TOP LEFT DROP TARGET:

Targets score 500 Points each. When all targets down,

3 BALL

- **1st Time** 2X lites at bottom
3X lites at top
- **2nd Time** 3X lites at bottom
4X lites at top
- **3rd Time** 4X lites at bottom
5X lites at top
- **4th Time** 5X lites at bottom

5 BALL

- **1st Time** 2X lites at top
- **2nd Time** 2X lites at bottom
3X lites at top
- **3rd Time** 3X lites at bottom
4X lites at top
- **4th Time** 4X lites at bottom
5X lites at top
- **5th Time** 5X lites at bottom

NOTE: Bonus Multiplier is retained from ball to ball.

(SWS-#22, 23 & 24) MIDDLE LEFT DROP TARGET:

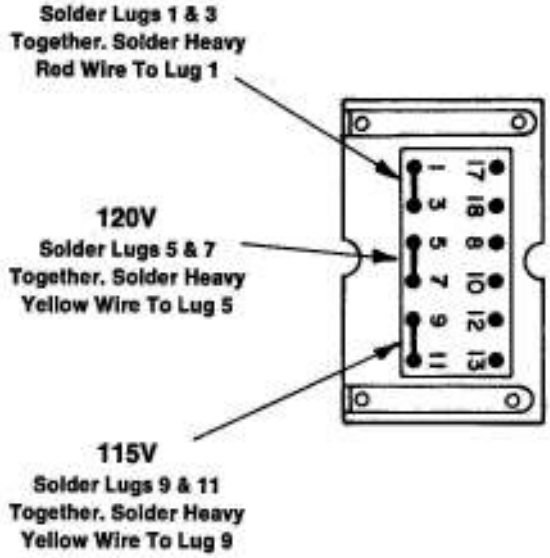
Targets score 500 Points. All targets down score lited star value plus the lited star value for each letter of "G-R-E-A-T-E-S-T" that is lit.

(SWS-#25, 26, 27, 28 & 29) STAND-UP TARGETS:

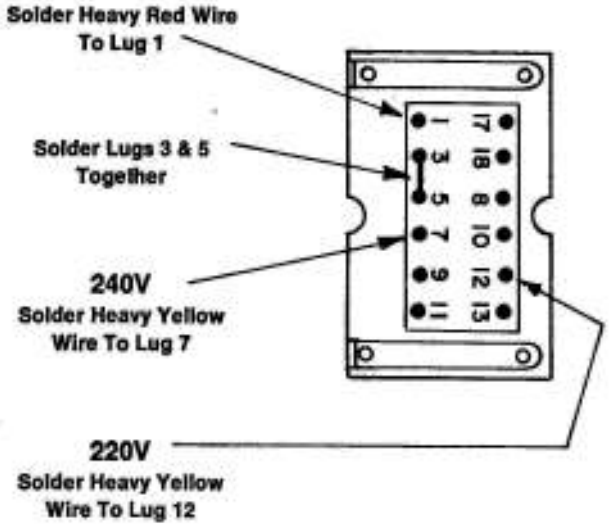
Lites corresponding letter (G-R-E-A-T-E-S-T) (T's ADJ.) Score 500 Points and advance bonus one position (2,000 pts.)

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.



220/240V., 50/60 Cycle Input.
Varistor - Soldered to Line Filter on Left Side of Cabinet
Must be Stern Part No. 25A-18-2.



VI. FEATURE OPERATION & SCORING

BONUS SCORE FEATURE:

Game starts with 2,000 pts. bonus. The bonus is advanced 2,000 pts. each time the Stationary Targets (SWS-#25, 26, 27, 28 & 29) are hit, return lanes (SWS-#36 & 37) or center roll-overs (SW-#11) are made. 3 advances are scored for each Out Lane (SWS-#34 & 35) to a maximum of 28,000 pts. time bonus multiplier.

The "Bonus Score" times any multiplier, is collected when the ball enters the side eject (SW-#38). After collecting, the bonus score and multiplier is restored.

When the ball enters the Outhole (SW-#33) the "Bonus Score" is collected. The bonus is then reset to 2,000 pts. and the bonus multiplier earned is carried over from ball to ball (memory).

Multiplier is advanced by top drop targets (SWS-#19, 20 & 21). Each time all the targets are hit the bonus multiplier is advanced.

3 BALL

1st time down, 2X lites at bottom of playfield, 3X lites at top
2nd time down, 3X lites at bottom of playfield, 4X lites at top
3rd time down, 4X lites at bottom of playfield, 5X lites at top
4th time down, 5X lites at bottom of playfield.

5 BALL

1st time down, 2X lites at top
2nd time down, 2X lites at bottom of playfield, 3X lites at top
3rd time down, 3X lites at bottom of playfield, 4X lites at top
4th time down, 4X lites at bottom of playfield, 5X lites at top
5th time down, 5X lites at bottom of playfield.

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 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.

NOTE: Only One Extra Ball Can Be Achieved Per Ball In Play.

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 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.

	RECOMMENDED SETTING	
	3 BALL	**5 BALL**
1st Level —	300,000	500,000
2nd Level —	500,000	800,000
3rd Level —	_____	_____
High Score To Date	800,000	900,000
Instruction Card	12B-2-119-22	12B-2-119-23
T (GREATEST) Setting (SW 25)	2-T's (On)	1-T (Off)

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 000000 thru 999999 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

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 2000 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 2,000 and all letters in ALI and GREATEST that have previously been made are restored, bonus multiplier earned is also 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.

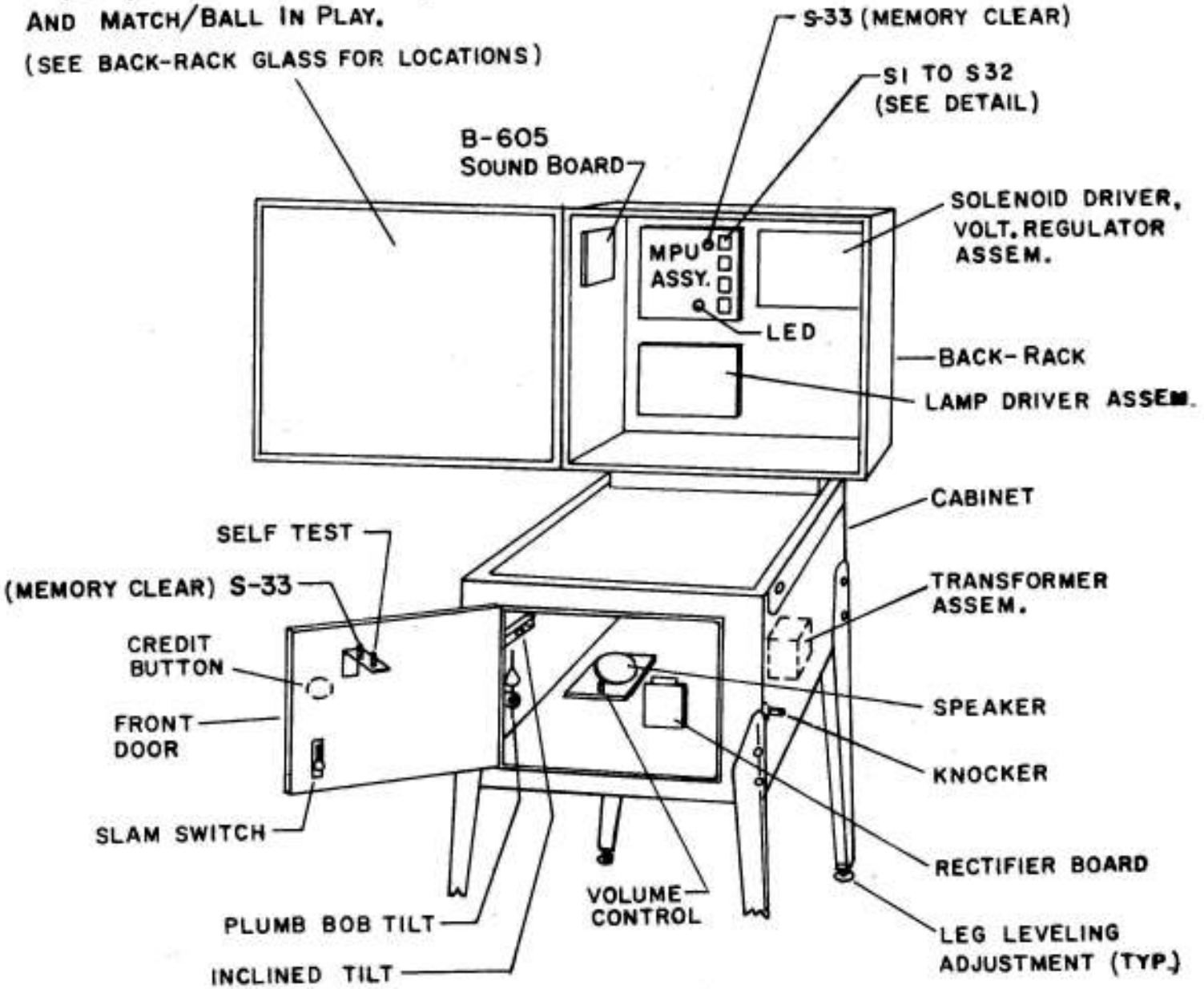
There is a slam switch on the front door, and one on the tilt board. (Any number of slam switches could be installed by the operator, to meet his individual requirement). The switch should be adjusted to have approximately 1/16" gap between the contacts. The weighted blade should be adjusted to attain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

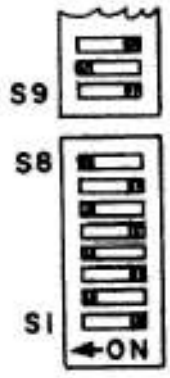
*Some tunes and features can be disabled by operator if so desired. ***See back box adjustments.***

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.

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.

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 check 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.

USING ROM

25A-ROM-P29 (U1)
25A-ROM-P30 (U2)
25A-ROM-P31 (U5)
25A-ROM-P32 (U6)



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