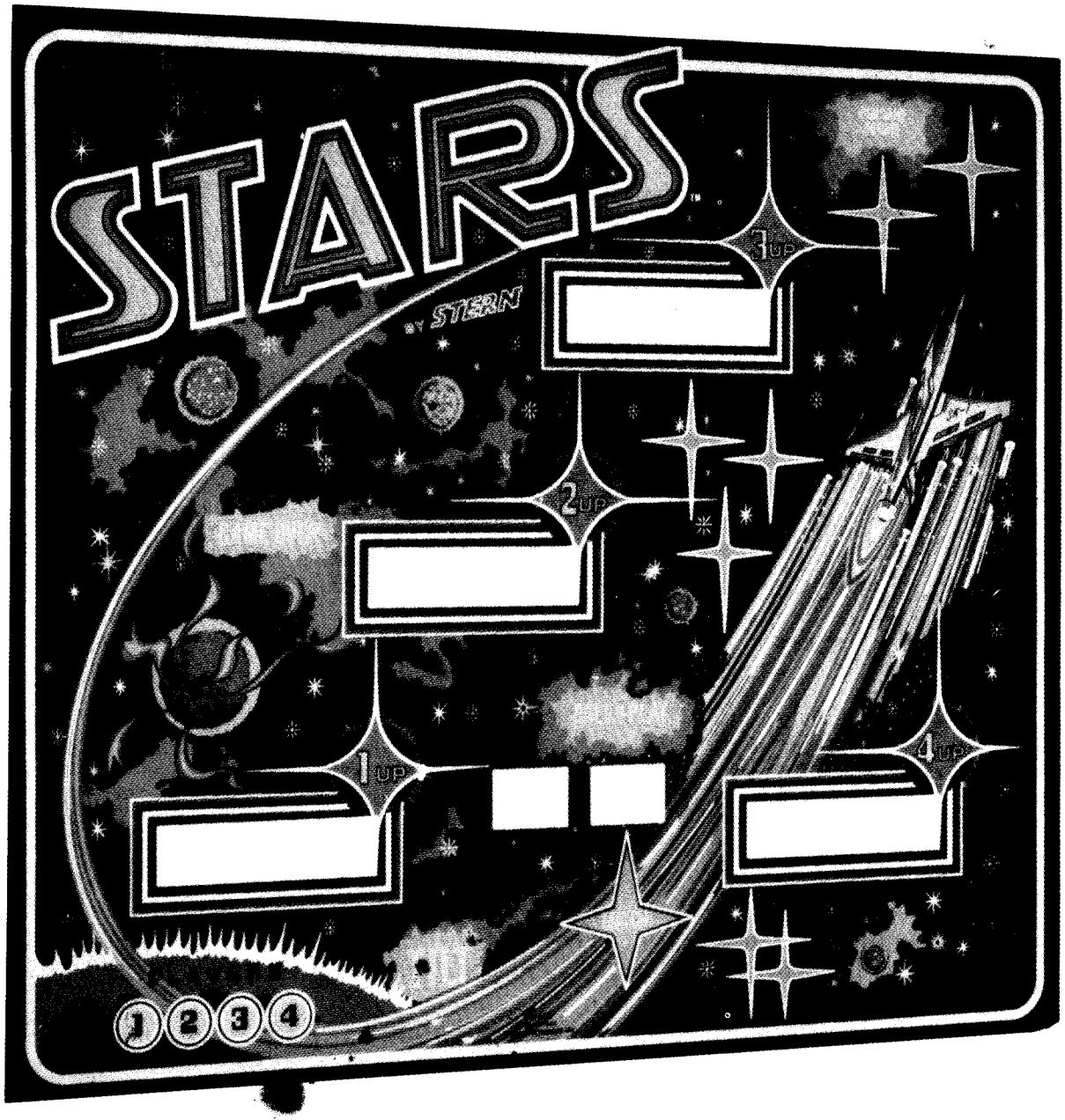
CAT. NO.
12G-5-103



by STERN

STERN ELECTRONICS, INC.
1725 Diversey Parkway, Chicago, Illinois 60614
(312) 935-4600, Telex 25-4657

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"STARS" CAT. NO. 12G-5-103 CORRECTIONS

Page 1. Check adjustment of the three (normally open) tilt switches: Line 2 - (15/16" dia), should read **(gold 15/16" dia.)**

Page 3. This page is - **Figure 2.**

Page 4. Bonus score 10,000 points listed in three places should read **1,000 points.**

Third paragraph should read as follows - Shooting the ball initiates play. Rebound switches score 10 points. **Thumper-bumper scores 100 points in 5 ball, 1000 points in 3 ball.**

Page 6. Bonus Score Feature: **The bonus score would also advance one step when one of the 5 stationary "Star" targets are hit.**

Page 7. Credit/coin Adjustments: Should read as follows - **The #1 Coin chute (next to hinge) is adjustable to give 1 or 2 games per coin (Sw #16).**

Page 8. **Add Adjustment 6A.**

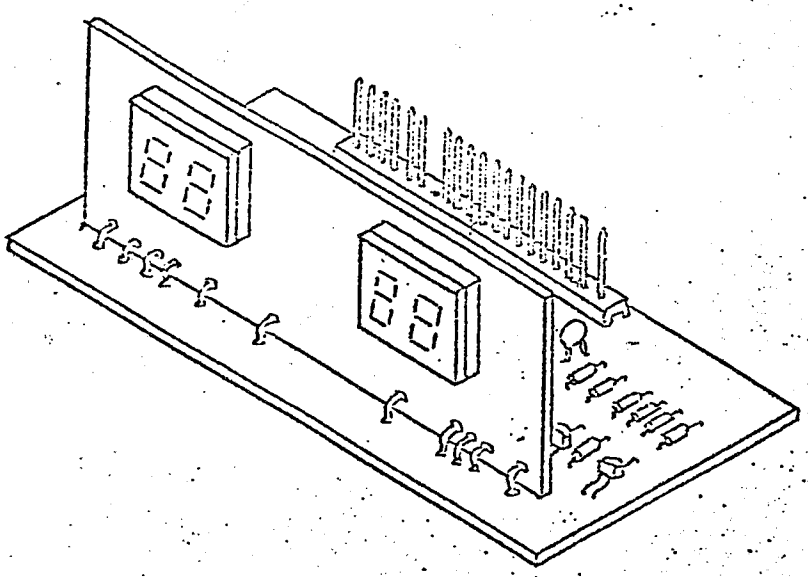
#1 Coin Chute Adjustment:

Credit/Coin	Switch 16
1/Coin	OFF
2/Coin	ON

Page 10. MPU Switch Adjustment #16 should read: **Coint Chute #1.**

Last paragraph, last lines should read as follows: The feature is turned off by positioning switch **15** to the "Off" position.

*Can be quickly set to '00' by pressing S33 on the MPU assembly in the back box. See figure 3.



NOTE:

THE DISPLAY MODULE ASSEMBLY USED FOR THE MATCH/CREDIT DISPLAY MAY BE REPLACED WITH THE SIX (6) DIGIT DISPLAY MODULE ASSEMBLY ,USED IN THE PLAYERS SCORE POSITION.

ALSO THIS MODULE MAY BE USED AS A REPLACEMENT FOR THE SIX (6) DIGIT DISPLAY MODULE PREVIOUSLY USED IN THE MATCH/CREDIT POSITION.

NO. B-431-5-103

READS

J1

18	SPECIAL WITH YELLOW STAR (BRN-B)
19	SPECIAL WITH WHITE STAR (GREY-G)
17	1K BONUS (PUR)
23	5K BONUS (BLU-W)
14	9K BONUS (R-B)
15	STAR-YELLOW (-R-)
16	STAR-AMBER (O-B)
28	2 ADVANCE BONUS (BLU-Y)
24	
25	DOUBLE BONUS FEATURE (BRN-O)
26	SAME PLAYER SHOOTS AGAIN (G-W)
27	400 #1 SPINNER (BRN-BLU)
1	SPECIAL WITH PURPLE STAR (BLU-R)
9	
8	2K BONUS (G-B)
3	6K BONUS (R-G)
2	10K BONUS (GREY-O)
10	SPECIAL WITH GREEN STAR (G-R)
7	LEFT & RIGHT OUT LANE (B-Y)
5	LEFT & RIGHT RETURN LANE (BLU-O)
11	TRIPLE BONUS FEATURE (B-O)
13	
4	
12	400 #2 SPINNER (G-Y)

TO PLAYFIELD

J2

21	
13	
22	BALL IN PLAY (BRN-BLU)
16	PLAYER #1 (Y-G)
14	PLAYER UP 1 (W-Y)
8	MATCH (GREY-Y)
12	
23	HIGHEST SCORE (GREY-O)
20	PLAYER #2 (Y-W)
15	PLAYER UP 2 (Y-BLU)
11	GAME OVER (GREY-W)
6	PLAYER #3 (B-W)
2	PLAYER UP 3 (BLU)
9	
4	
5	
3	
10	TILT (GREY-B)
7	PLAYER #4 (GREY-R)
1	PLAYER UP 4 (BRN)

TO BACK BOX

J3

26	SPECIAL WITH AMBER STAR (-B-)
25	
19	3K BONUS (Y-G)
17	7K BONUS (Y-W)
16	
23	STAR-PURPLE (O-R)
27	
21	
20	WOW FEATURE (PUR-B)
22	7000 RIGHT (PUR-Y)
24	DOUBLE BONUS (R-Y)
1	STAR-GREEN (B-W)
12	
15	4K BONUS (GREY-Y)
11	8K BONUS (W-GREY)
9	
3	STAR-WHITE (BRN-R)
4	
2	
10	
18	SPECIAL FEATURE (R-BLU)
13	7000 LEFT (Y-B)
14	TRIPLE BONUS (PUR-W)

TO PLAYFIELD

SHOULD READ

J1

18	SPECIAL WITH PURPLE STAR (BRN-B)
19	SPECIAL WITH AMBER STAR (GREY-G)
17	1K BONUS (PUR)
23	5K BONUS (BLU-W)
14	9K BONUS (R-B)
15	STAR-PURPLE (-R-)
16	STAR-YELLOW (O-B)
28	2 ADVANCE BONUS (BLU-Y)
24	
25	DOUBLE BONUS FEATURE (BRN-O)
26	SAME PLAYER SHOOTS AGAIN (G-W)
27	400 #1 SPINNER (BRN-BLU)
1	SPECIAL WITH GREEN STAR (BLU-R)
9	
8	2K BONUS (G-B)
3	6K BONUS (R-G)
2	10K BONUS (GREY-O)
10	SPECIAL WITH WHITE STAR (B-W)
7	LEFT & RIGHT OUT LANE (B-Y)
5	LEFT & RIGHT RETURN LANE (BLU-O)
11	TRIPLE BONUS FEATURE (B-O)
13	
4	
12	400 #2 SPINNER (G-Y)

TO PLAYFIELD

J2

21	
13	
22	BALL IN PLAY (BRN-BLU)
16	PLAYER #1 (Y-G)
14	PLAYER UP 1 (W-Y)
8	MATCH (GREY-Y)
12	
23	HIGHEST SCORE (GREY-O)
20	PLAYER #2 (Y-W)
15	PLAYER UP 2 (Y-BLU)
11	GAME OVER (GREY-W)
6	PLAYER #3 (B-W)
2	PLAYER UP 3 (BLU)
9	
4	
5	
3	
10	TILT (GREY-B)
7	PLAYER #4 (GREY-R)
1	PLAYER UP 4 (BRN)

TO BACK BOX

J3

26	SPECIAL WITH YELLOW STAR (-B-)
25	
19	3K BONUS (Y-G)
17	7K BONUS (Y-W)
16	
23	STAR-GREEN (O-R)
27	
21	
20	WOW FEATURE (PUR-B)
22	7000 RIGHT (PUR-Y)
24	DOUBLE BONUS (R-Y)
1	STAR-WHITE (G-R)
12	
15	4K BONUS (GREY-Y)
11	8K BONUS (W-GREY)
9	
3	STAR-AMBER (BRN-R)
4	
2	
10	
18	SPECIAL FEATURE (R-BLU)
13	7000 LEFT (Y-B)
14	TRIPLE BONUS (PUR-W)

TO PLAYFIELD

BURRS

s of plus
ceptions:
nus .005:
nus .001.

STERN ELECTRONICS INC.
1725 DIVERSEY BLVD. CHICAGO 60614

LAMP DRIVER SCHEMATIC

FOR STARS SOLID STATE

DRN. C.W.	DATE 9-21-77	AM'T
MAT	FIN.	APPR.

BURRS

s of plus
ceptions:
nus .005:
nus .001.

STERN ELECTRONICS INC.
1725 DIVERSEY BLVD. CHICAGO 60614

LAMP DRIVER SCHEMATIC

FOR STARS SOLID STATE

DRN. C.W.	DATE 9-21-77	AM'T

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 service 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. See figure 1.
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 adustment of the three (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 (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.
3. Panel tilt on bottom of playfield panel.

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.

FIGURE 1

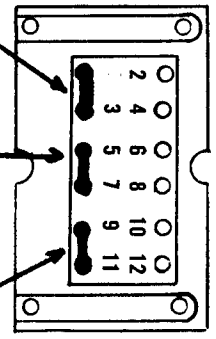
STERN 16B-3 TRANSFORMER WIRING CONNECTION INSTRUCTIONS

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



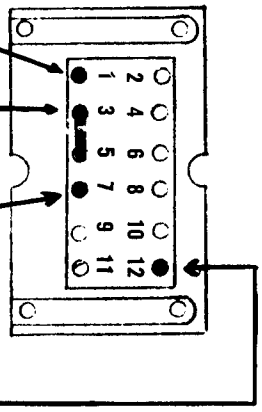
220/240V., 50/60 Cycle Input.
Varistor - Soldered to Line Filter on Left Side of Cabinet
Must be Stern Part No. 25A-18-2.

Solder Heavy Red Wire To Lug 1

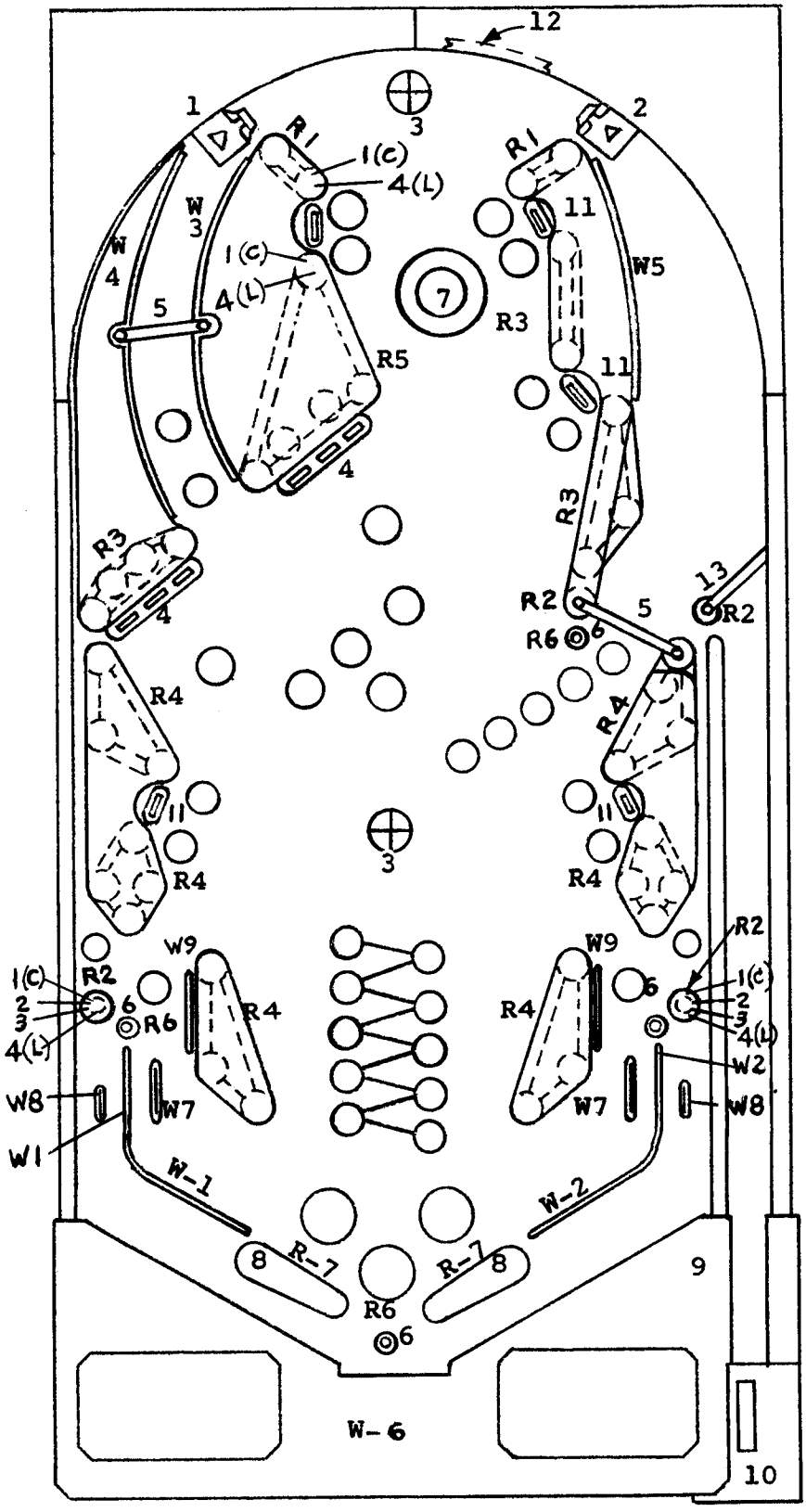
Solder Lugs 3 & 5 Together

240V
Solder Heavy Yellow Wire To Lug 7

220V
Solder Heavy Yellow Wire To Lug 12



STARS Playfield Chart



RUBBER RINGS

R1	7A-120-100	1" DIA.
R2	7A-120-031	5/16" DIA.
R3	7A-120-150	1-1/2" DIA.
R4	7A-120-200	2" DIA.
R5	7A-120-250	2-1/2" DIA.
R6	7A-125	
R7	7A-121 W	Flipper

GUIDE WIRE & ROLL OVER WIRE

W1	6A-219
W2	6A-220
W3	A-473
W4	A-474
W5	6A-215
W6	A-150
W7	A-149
W8	A-383
W9	6A-101

PLAYFIELD PLASTIC SHIELDS

TOP ARCH SET 13C-102-1L & M
STARS SET 13C-103-1 to 7

MISCELLANEOUS PARTS

1. BALL GATE, LEFT A-104-L
2. BALL GATE, RIGHT A-104-R
3. ROLL OVER BUTTON ASS'Y A-181
4. BANK TARGET ASS'Y D-393-3
5. SPIN TARGET ASS'Y B-102-2
6. BALL GUIDE POST 2A-200
7. THUMPER CAP 13A-12
8. FLIPPER & SHAFT A-192
   FLIPPER 4B-122-W
9. INSTRUCTION PLATE 14B-1-2
10. SHOOTER GUAGE 14B-2-2
11. TARGET ASS'Y A-461
12. TOP ARCH RAIL 1B-107
13. BALL GATE ASS'Y A-471

1 (C) CONSERVATIVE

4 (L) LIBERAL

II. 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. The game will play a tune to announce game-readiness. Drop targets are reset, scores are reset to zero, alternating with the "High Game to Date", and the game is ready for play. Coin Game. The game should accept the coin and post credits* for coins accepted (adjustable). Pressing the credit button on the door will cause the outhole kicker to move the ball to the shooter lane. The 1st player-up lite becomes lit. A tune* is played to announce play-readiness. The bonus score is at 10,000 points.

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 player's are registered.

Shooting the ball inititates play. Rebound switches score 10 points. Thumper-bumpers, when not lit, score 100 points.

When the ball enters the outhole, the bonus score is added to the players score. The player-up and/or ball in play on the back box is advanced one position. The bonus score starts at 10,000 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 (adjustable). 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 player's regular ball enters the outhole. The player-up and/or ball in play are not advanced for extra ball play. Bonus score is added to the player's score and the bonus is set to 10,000 points before the game moves the extra ball for play.

At the end of the game, a "High Game to Date" is alternately flashed with all player scores. If the "High Score to Date" is beat, this feature* can award 3 free games.

Tilting the game results in loss of the ball in play. The flippers, thumper-bumpers, etc., go "dead". Bonus points are not scored. 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 readiness tune is played. 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 weighed 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.*

III. BOOKKEEPING FUNCTIONS

The game is designed to help the operator perform certain accounting functions. The game can display the number of total plays and replays (free games)*. It can display the number of coins inserted into each coin chute. Each bookkeeping function is displayed on all player score displays simultaneously. An identification number 05 to 11 appears on the Match/Ball-in-Play window as follows:

DESCRIPTION	
Current Credits	= 05 00000 to 000040
Total Plays (Played & Free Games)	= 06 00000 to 999999
Total Replays (Free Games)	= 07 00000 to 999999
Total Times "High Score to Date" is beat	= 08 00000 to 999999
Coins Dropped Thru Coin Chute 2"	= 09 00000 to 999999
Coins Dropped Thru Coin Chute 1"	= 10 00000 to 999999
Coins Dropped Thru Coin Chute #3**	= 11 00000 to 999999

The game displays the first bookkeeping entry if the Self-Test Button (See Fig. 3) on the inside of the front door is pushed and released nine times at one second intervals. The number 05 now appears in the "Match/Ball-in Play" window. Current credits appear on all player score displays. Each additional press of the button causes the next entry to be displayed.

After the data in each bookkeeping register is recorded, it can be set to zero simply by pressing switch button S33, located on the MPU module in the back box. (See Fig. 3). Any or all registers can be cleared by alternating between the Self-Test button and the switch button on the MPU module. The operator is given this option as a possible convenience and can elect to use or not use it as needed.

Pressing the button once more with the eleventh entry displayed causes the game to play the power-up tune and light the Game-Over Light.

* Some tunes and feature can be disabled by operator if so desired. See Back Box Adjustments.

** If Coin Chute is not used in game, number displayed (if other than 00) on Player Score Displays has no significance.

IV. FEATURE OPERATION AND SCORING

BONUS SCORE FEATURE:

A bonus of 1,000 to 19,000 may be scored. The game starts with a bonus score of 1,000. The bonus score advances one step at a time, each time the ball goes over one of the two "Advance Bonus" rollover buttons and the button is lit. The two outlanes & two return lanes also advance the bonus score 3 steps when lit. The bonus is collected when the ball goes into the outhole.

DROP TARGETS FEATURE:

The drop targets are arranged in two sets of three targets each. Each target scores 500 points and advances bonus except if only the center target of either set is up, and the targets on either side are down, the center target scores 7000 points.

1st Time Down: Either set of 3 drop targets down *(Both Banks Reset). The lower double bonus lite goes out when the ball goes into the outhole and the Bonus Score is collected or

2nd Time Down: Triple Bonus is awarded (Adjustable)

1) Either sets of 3 drop targets down *(Both Banks Reset).
2) Both sets of 3 drop targets down. The lower triple bonus lite goes out when the ball goes into the outhole and the bonus score is collected.

3rd Time Down:

1) Both sets of 3 drop targets down awards WOW (extra Ball). Shoot again lite goes out and extra ball goes into the outhole and the Triple Bonus score is collected.
2) Adjustable to bypass (No Extra Ball)

4th Time Down: Both sets of 3 drop targets down awards special. (Special everytime down thereafter).

EVERYTIME all drop targets are down an additional 3,000 points is scored.

Star Target Feature: Stationary targets score 500 and add 1000 bonus everytime all five targets are hit in one ball the special lite lights are special lite changes position everytime a 500 point score is made. Hitting the target when the lit special awards special and then is adjustable.

1) go out - 1 special per ball
2) open ended - continues to move and can be made

Special Lite Feature

Adjustable to Award

1) 1 free game
2) 1 extra ball
3) 1 free game and 1 extra ball
4) 100,000 points

LEFT SPINNER FEATURE:

Spinner scores 200 points plus 400 points for each additional center drop target down - Plus 400 points lites go out when the two banks of three drop targets reset.

RIGHT SPINNER FEATURE:

Spinner scores 200 points for every star target hit. Every ball starts with one star spotted.

THUMPER BUMPER:

Thumper Bumper scores 100 points on 5 ball and 1,000 points on 3 balls.

OUTLANES & RETURN LANES:

Score 500 points when not lit, score 3,000 & 3 bonus advances when lit.

BONUS COUNTDOWN FEATURE:

Feature Adjustable

1) To countdown double and triple bonus in steps of 2,000 or 3,000 points.
2) To countdown the bonus in 1,000 steps.

* Some tunes and feature can be disabled by operator if so desired. See Back Box Adjustments.

V. 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 Figure 2.

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 allow play to be customized to the location. See Figure 3. Credits per coin, maximum credits, credit display, balls per game, match feature, high game feature, special award and melody are selectable by means of the 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 toggle position is marked on the assembly. TURN OFF POWER BEFORE MAKING ADJUSTMENTS. MAKE ADJUSTMENTS BEFORE TURNING POWER BACK ON.

Credits/Coin Adjustments:

The #1 coin chute (next to hinge) is not adjustable and will only give 1 game per coin.

The credits given per coin are selectable by means of switches 1-5 incl. for coin chute #2 and switches 9-13 incl., for coin chute #3. Thirty-one different credit ratios are available for each coin chute. The switch settings and resultant credits/coin are listed below:

CREDITS/COIN ADJUSTMENTS

COIN CHUTE	SWITCHES					CREDITS/COIN
#2 (CENTER CHUTE)	5	4	3	2	1	
OR #3 (RIGHT CHUTE)	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.

1. **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 17, 18 and 19. Eight credits limits are available. Switch settings are listed below:

MAXIMUM CREDITS	SWITCHES 19	18	17
5	OFF	OFF	OFF
10	OFF	OFF	ON
15	OFF	ON	OFF
20	OFF	ON	ON
25	ON	OFF	OFF
30	ON	OFF	ON
35	ON	ON	OFF
40	ON	ON	ON

2. **BALL PER GAME:**

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

3. **CREDIT DISPLAY:**

CREDITS DISPLAY	SWITCH 20
YES	ON
NO	OFF

4. **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

5. **HIGH GAME TO DATE FEATURE:**

The game is designed to award 3 free games as an option if 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. Recommended setting is underlined.

HIGH SCORE TO DATE FEATURE	SWITCH 15
FREE GAMES	ON
NOVELTY	OFF

3 Ball 500,000 **5 Ball 840,000**

6. **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 features creates an incentive to play.

MATCH	SWITCH 21
ON	ON
OFF	OFF

7. MELODY OPTION:

The game is designed to play melodies to announce power-up, credit, etc. Some tunes are adjustable by Switch 8.

GAME MELODY	SWITCH 8	MELODY
POWER-UP	ON	Full Melody
"	OFF	Full Melody
COIN	ON	Full Melody
"	OFF	2 Tones Only
CREDIT BUTTON	ON	Full Melody
"	OFF	2 Tones Only
GAME OVER	ON	Full Melody
"	OFF	Full Melody

8. SPECIAL LIGHT AWARD:

Award received when hitting both sets of drop targets or rotating light on Star target. When SPECIAL light is lit can be adjusted as follows:

AWARD	SWITCHES	POSITION
FREE BALL	31	on
	32	OFF
FREE GAME	31	OFF
	32	ON
100,000 POINTS	31	OFF
	32	OFF
FREE BALL AND	31	ON
FREE GAME	32	ON

9. DROP TARGET:

Triple bonus award for hitting drop target can be adjusted as follows:

	SWITCH 24
Both Sets Of 3 Drop Targets	ON
Either Sets Of 3 Drop Targets	OFF

10. WOW!

Wow awards extra ball. This option can be adjusted as follows:

	SWITCH 26
No Extra Ball (Bypass WOW!)	OFF
Award WOW! (Extra Ball)	ON

11. BONUS COUNTDOWN:

The method of bonus countdown can be adjusted as follows:

	SWITCH 22
1000 Steps	ON
Multiple Steps	OFF

12. NUMBER OF PLAYERS:

Maximum No. of players can be adjusted as follows:

	SWITCH 25
2 PLAYERS	OFF
4 PLAYERS	ON

13. STAR SPECIAL:

The number of replays made per ball from the rotating Special lite on the star targets can be adjusted as follows:

	SWITCH 30
1 Special per ball	ON
Open Ended	OFF

MPU SWITCH ASSIGNMENT

1 Thru 5	COIN CHUTE No. 2 CENTER
6	HIGH SCORE
7	BALLS PER GAME
8	CHIME MELODY
9 Thru 13	COIN CHUTE No. 3
14	N/U
15	HIGH GAME TO DATE
16	N/U
17, 18, 19	MAXIMUM CREDITS
20	CREDIT DISPLAY
21	MATCH FEATURE
22	BONUS COUNT DOWN
23	N/U
24	TARGET SETS DOWN FOR 3X
25	2 or 4 PLAYERS
26	EXTRA BALL ENABLE
27, 28, 29	N/U
30	STAR SPECIAL SELECTION
31 & 32	SPECIAL AWARD

VI. 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 Switch 6 Function). 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 five 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 3 free games (option) when "High Game to Date" is beat. For the recommended, factory preset level, **see page 8.**

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 switch 6 to the "OFF" position.

*Can be quickly set to '00' by pressing S33 on the MPU assembly in the back box. See Figure 3.

VII. 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 a 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 once, pause, then flash six more times and go out. A tune is then played to announce game readiness. This indicates proper MPU game operating conditions.

GAME SELF-DIAGNOSTIC TESTS:

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

1. Feature lamps: All feature lamps will flash on and off continuously, determining any burnt lamps.
2. Pressing the Self-Test button again causes each digit on all displays to cycle from 0 thru 9, and repeat continuously.
3. Pressing the Self-Test button again causes each solenoid to 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. The sound of a solenoid pulling-in as a number appears indicates proper operation. The absence of a sound shows a fault. If sound is absent, see Solenoid I.D. Page for help in Solenoid identification.
4. Pressing the Self-Test button again causes the MPU to look at each switch assembly for stuck contacts.* If there are any stuck, the number of the first set encountered is flashed on the Player Score displays. The number remains until the fault is corrected. See Switch I.D. page for help in Stuck 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.

   *Flipper Button Switches are not included.
5. Pressing the Self-Test button eleven more times causes the MPU to step thru the game levels and bookkeeping functions described previously and finally to repeat the power-up test. To by-pass these functions, turn the game off, then on. The game is now ready to play, after the MPU Self-Test.

Set the game up for play, after successful completion of the Self Diagnostic Test procedure. Exercise each rollover, thumper-bumper, slingshot, etc., by hand until each switch assembly on the playfield has been checked for proper operation. If actuating a switch assembly results in intermittent or no response, clean contacts by gently closing them on a clean business card or piece of paper and wiping until they wipe clean. Regap, if necessary, to 1/16". Do not burnish or file Gold Plated Switch Contacts.

VIII CONTACT SWITCH ADJUSTMENTS

All contact switches should be adjusted to have a gap of 1/16" in the open position, and have .010" overtravel closed. All contact switches (except for flipper button & flipper end of stroke) are 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 END OF STROKE SWITCHES ONLY. Tarnish or pitted contacts can be corrected with a contact file followed by a burnishing tool. Severely pitted contacts 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.

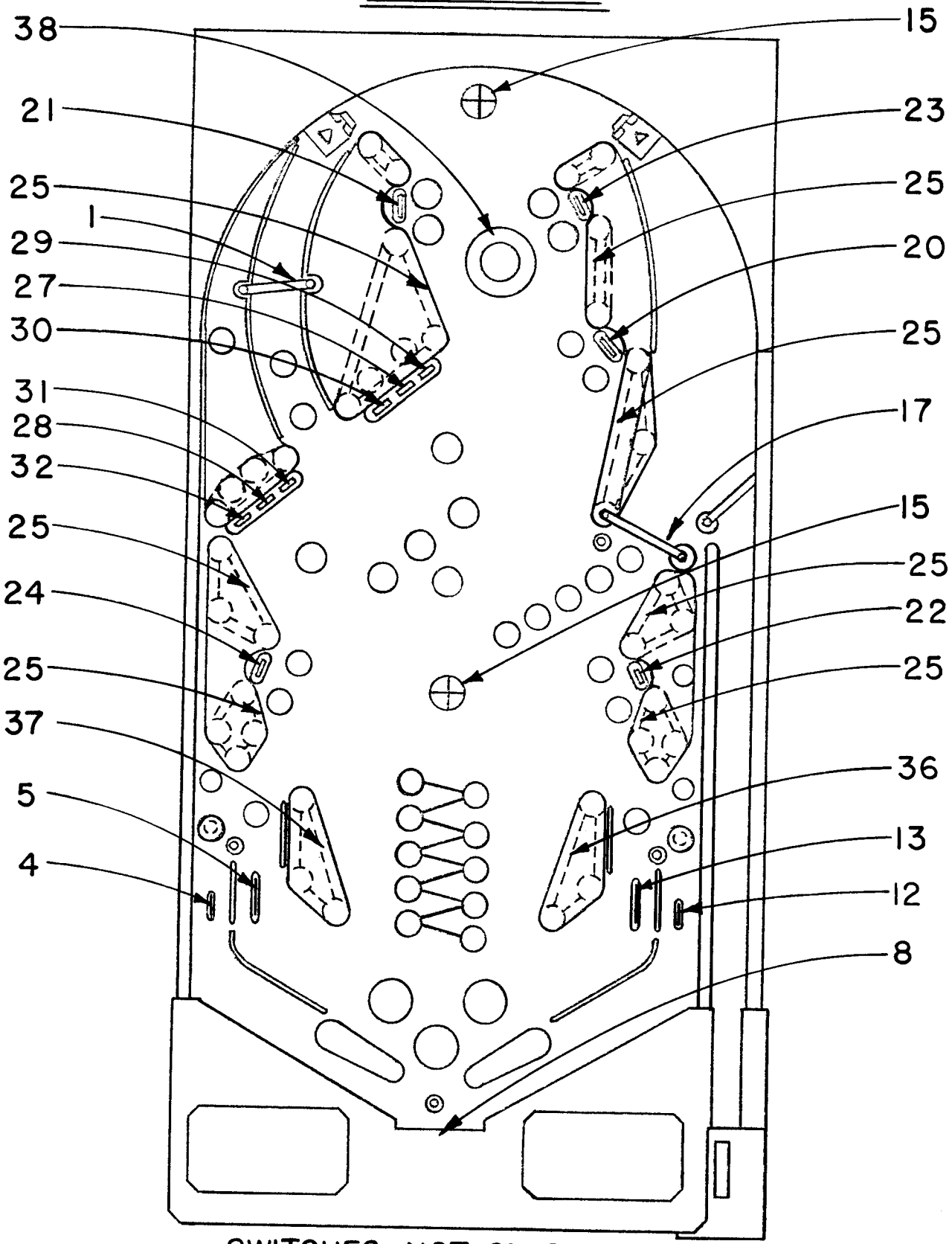
IX. SWITCH IDENTIFICATION
SELF TEST DISPLAY NUMBERS

Note: Flipper button cabinet switches do not appear on test.

SWITCH NO.	SWITCH LOCATION
1	LEFT SPINNER
2	
3	
4	LEFT OUT LANE
5	LEFT RETURN LANE
6	CREDIT BUTTON
7	TILT
8	OUTHOLE
9	COIN #3 (RT)
10	COIN #2 (CTR)
11	COIN #1 (LT)
12	RIGHT OUT LANE
13	RIGHT RETURN LANE
14	
15	ROLL - OVER (BONUS)
16	SLAM (3)
17	RIGHT SPINNER
18	
19	
20	STAR NO. 5

SWITCH NO.	SWITCH LOCATION
21	STAR NO. 4
22	STAR NO. 3
23	STAR NO. 2
24	STAR NO. 1
25	(7) 10 POINT SWITCH
26	
27	DROP TARGET NO. 5
28	DROP TARGET NO. 2
29	DROP TARGET NO. 6
30	DROP TARGET NO. 4
31	DROP TARGET NO. 3
32	DROP TARGET NO. 1
33	
34	
35	
36	RIGHT SLINGSHOT
37	LEFT SLINGSHOT
38	THUMPER BUMPER

SWITCHES



SWITCHES NOT ON PLAYFIELD:

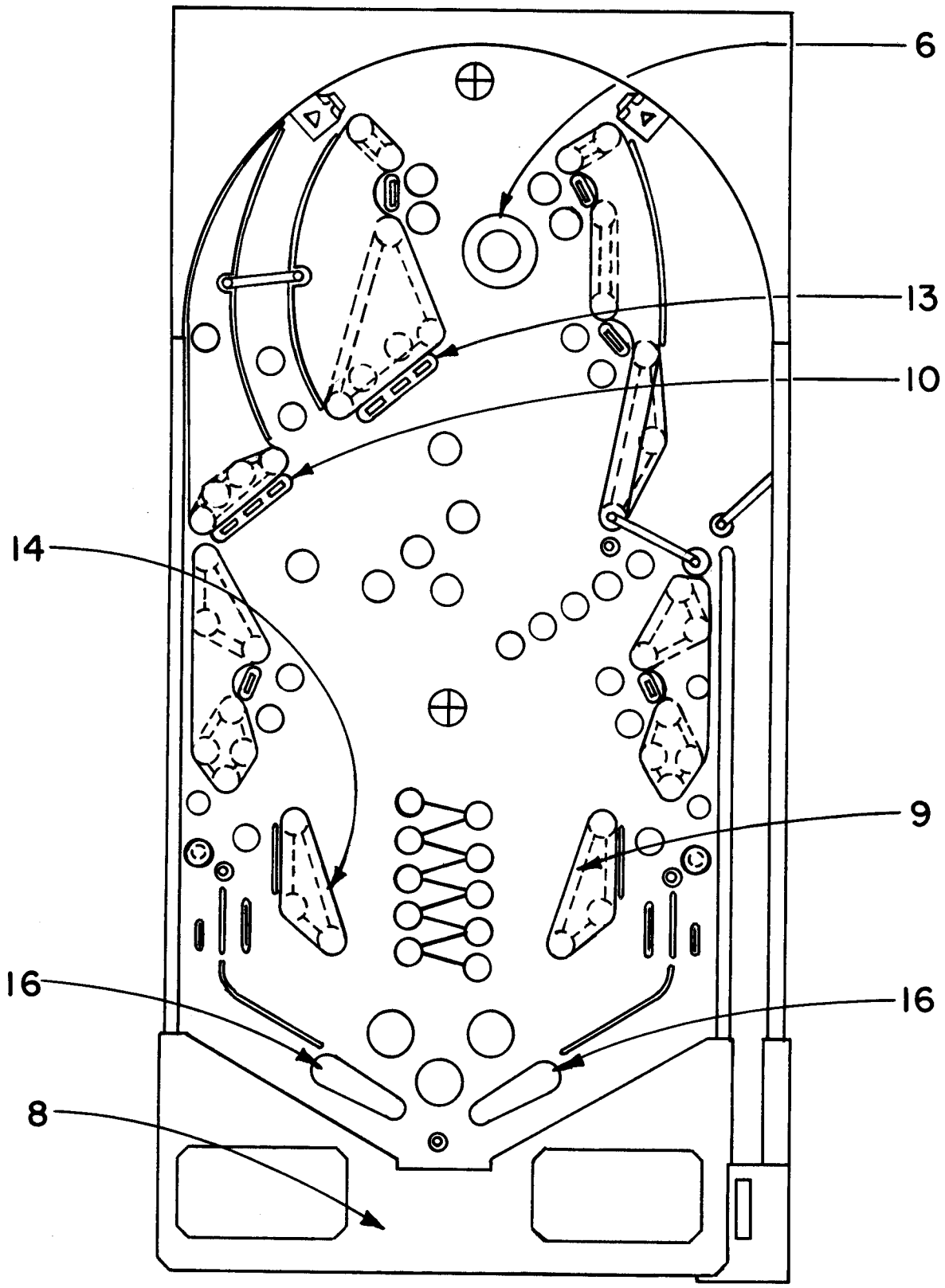
6 CREDIT BUTTON
7 ROLL TILT
7 PENDULUM
9 RIGHT CHUTE
10 CENTER CHUTE
11 LEFT CHUTE
16 PLAYFIELD VIB.
16 DOOR VIB.
16 TILTBOARD VIB.

X. SOLENOID IDENTIFICATION

SELF TEST DISPLAY NUMBERS

SOLENOID NO.	SOLENOID LOCATION
1	CHIME (10) (SMALL)
2	
3	CHIME (100)
4	
5	CHIME (1,000)
6	THUMPER
7	CHIME (10,000)
8	OUT HOLE
9	RIGHT SLINGSHOT
10	DROP TARGET RESET (LEFT)
11	
12	
13	DROP TARGET RESET (RIGHT)
14	LEFT SLINGSHOT
15	KNOCKER
16	(2) FLIPPERS & RELAY ON SOL. DRIVER P.C. BOARD
17	COIN LOCK OUT

SOLENOIDS



SOLENOIDS NOT ON PLAYFIELD

1 CHIME (10)

3 CHIME (100)

5 CHIME (1000)

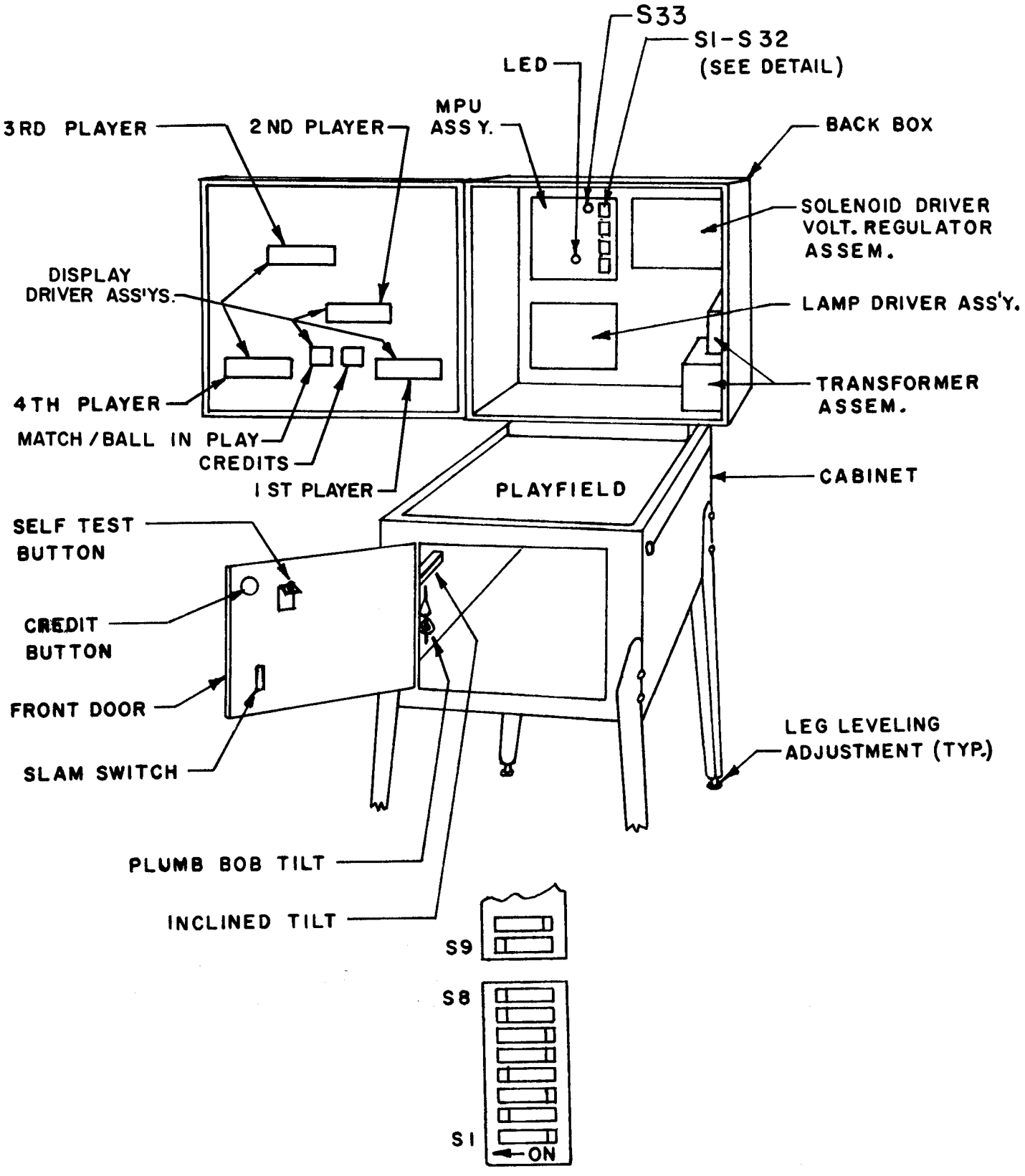
7 CHIME (10,000)

15 KNOCKER

17 LOCKOUTS

ELECTRONIC PIN GAME

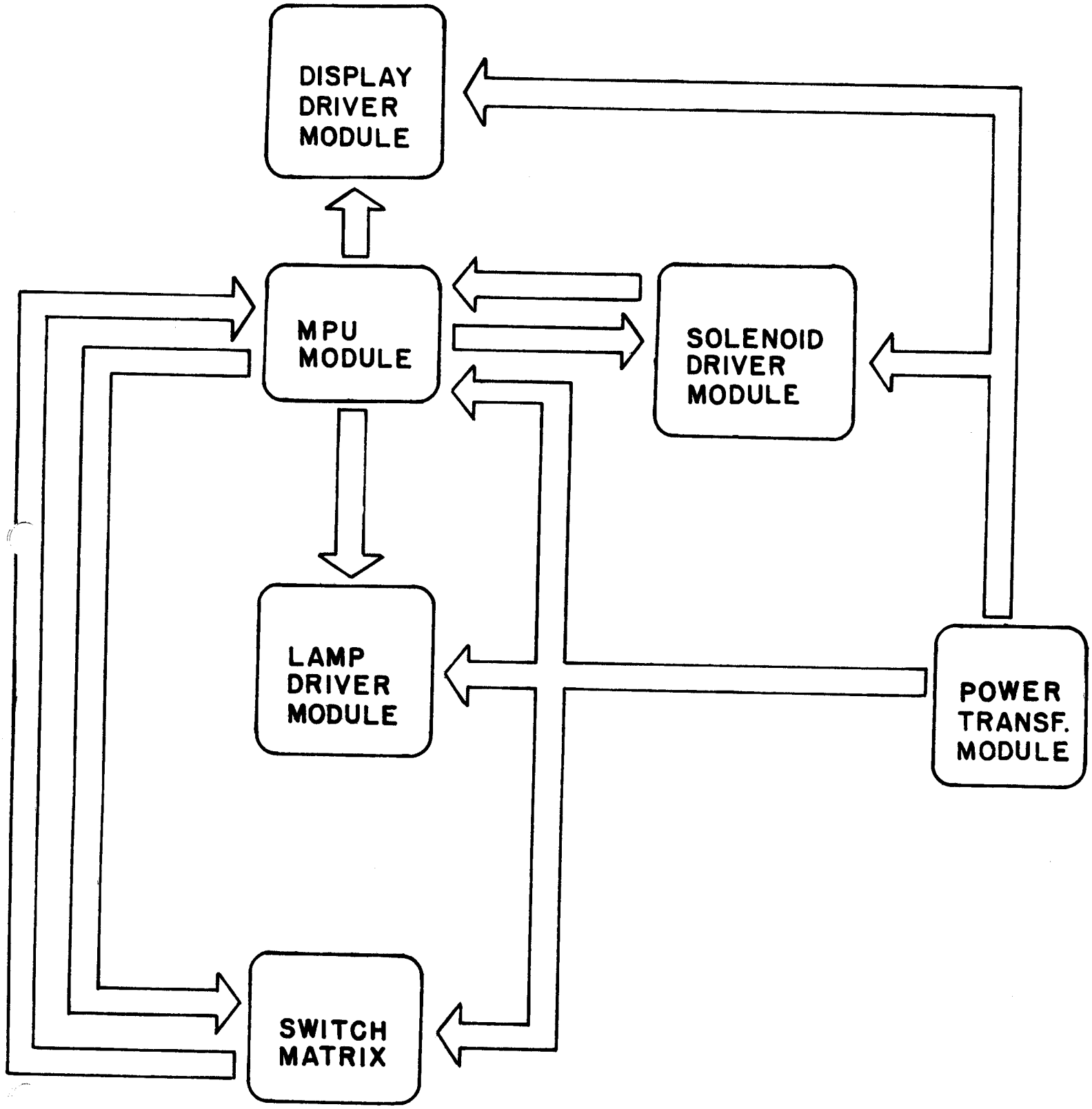
Figure 3



DETAIL S1-S32

MPU ASS'Y.

BLOCK DIAGRAM



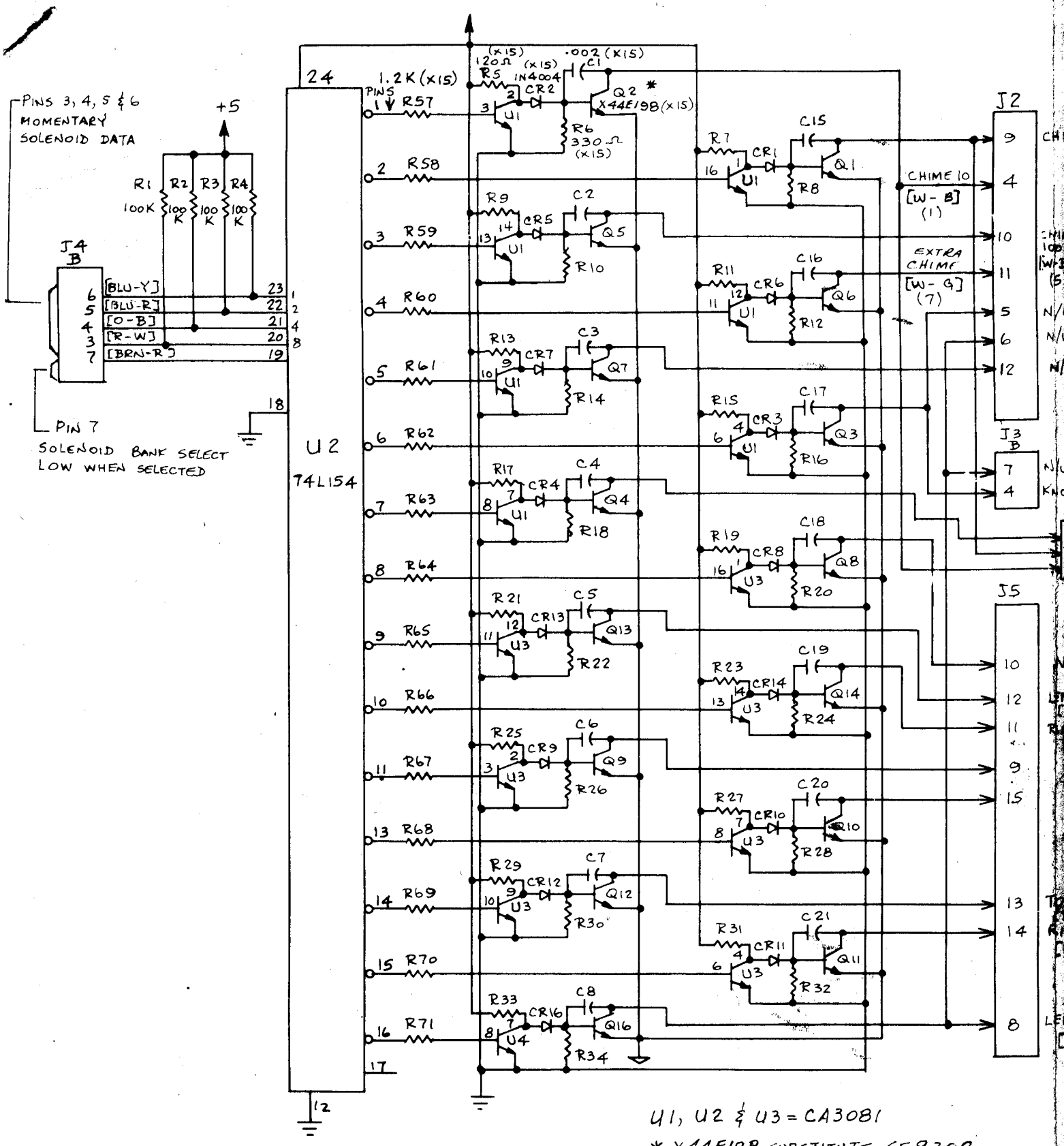
XI. PARTS LIST
GAME #103 STARS

MISCELLANEOUS	PART NUMBER
Transformer (Domestic or Export)	16B-3
Transformer & Rectifier Board	C-464
Bulbs, #44	8A-101

ASSEMBLY COILS	
Chimes (4)	N-31-2000
Coin Lockout	C-36-5500
Flipper Left & Right (2)	J-25-500/34-5050
Knocker	N-26-1200
Outhole Kicker	J-26-1200
Thumper-Bumper	J-26-1200
Sling-Shot (2)	J-26-1500
Drop Target Reset (2)	B-27-2300

MODULES	
Lamp Driver	B-431
Display Driver (4 Used)	A-434
Match/Ball-in-Play, credit display	A-472
Solenoid Driver/Voltage Regulator	B-432
MPU	C-433-103
Rectifier Board	A-430

PLAYFIELD PARTS	SEE PLAYFIELD DIAGRAM



U1, U2 & U3 = CA3081

* X44E198 SUBSTITUTE SE9302

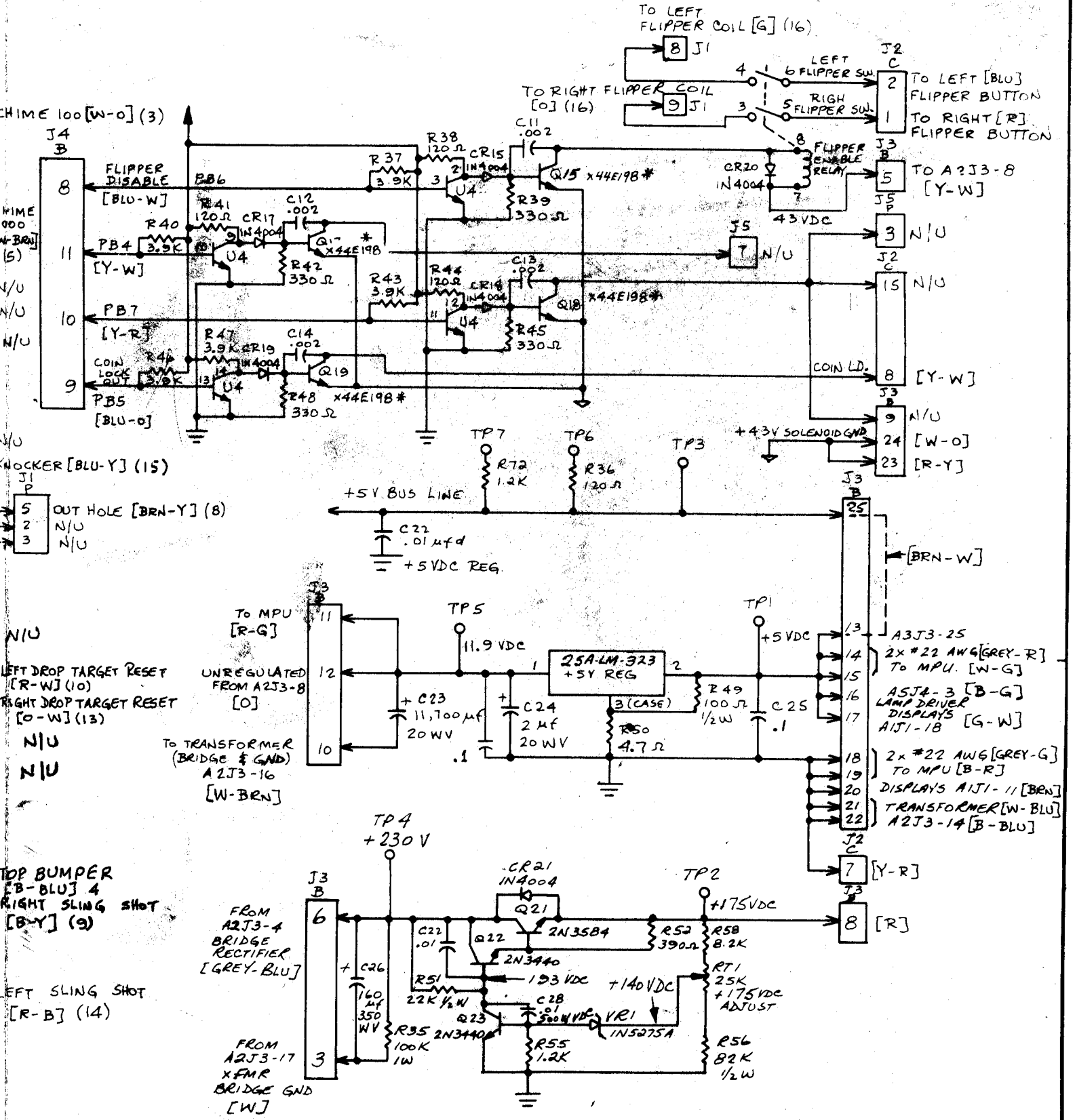
[BRN-Y] = WIRE COLOR

(8) = SOLENOID TEST DISPLAY NO.

ISSUE	CHANGE

NO. B-432-5-103

B-432-5-163



		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

SOLENOID DRIVER VOLTAGE REGULATOR SCHEMATIC

FOR STARS SOLID STATE

DRN.	DATE	AM'T
J.J.	9-20-77	
MAT	FIN.	APPR.

A1 INSERT

FROM	A1J2 PIN
A2J3-6	1
A5J2-14	2
A2J3-2	3
A2J3-11	4
A5J2-23	5
A5J2-15	6
A5J2-22	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

To 5.

A5J2-14 P.UP 1
A5J2-15 P.UP 2
A5J2-2 P.UP 3
A5J2-1 P.UP 4
A5J2-11 GAME OVER
A5J2-10 TILT
A5J2-16 PLAYER #1
A5J2-20 PLAYER #2
A5J2-6 PLAYER #3
A5J2-7 PLAYER #4
A5J2-23 HIGH SCORE
A5J2-8 MATCH
A5J2-22 BALL IN PLAY

A4J1-21 A4J1-22 A4J1-23 A4J1-24
A1J2

LAMP DRIVER A5

J4
1 A2J3-4
2 A2J3-3
3 A3J3-16
4 A4J1-19
5 A4J1-18
6 A4J1-17
7 A4J1-16
8 KEY
9 N.U.
10 N.U.
11 A2J2-14
12 SPARE GND
13 A4J1-11
14 A4J1-15
15 A4J1-14
16 A4J1-13
17 A4J1-12

J2
1 P.UP A
2 PUP-3
3 N.U.
4 N.U.
5 N.U.
6 PLAYER# 3
7 PLAYER #4
8 MATCH
9 N.U.
10 TILT
11 GAME OVER
12 N.U.
13 N.U.
14 PUP 1
15 PUP 2
16 PLAYER #1
17 N.U.
18 KEY
19 N.U.
20 PLAYER #2
21 N.U.
22 BALL IN PLAY
23 HI SCORE

J1
1 S/W POR ★
2 10K BONUS
3 6K BONUS
4
5 L ER RET. LANE
6 L ER OUT LANE
7
8 2K BONUS
9
10 S/W G ★
11 T. B. FEA.
12 400 #2 SPINNER
13
14 9K BONUS
15 STAR-YELLOW
16 STAR-AMBER
17 1K BONUS
18 S/W Y ★
19 S/W W ★
20
21
22
23 5K BONUS
24
25 D.B. FEATURE
26 SPSA
27 400 #1 SPINNER
28 2) ADV. BONUS

J3
1 STAR-GREEN
2
3 STAR-WHITE
4
5
6
7
8
9
10
11 8K BONUS
12
13 7000 LEFT
14 TRIPLE BONUS
15 4K BONUS
16
17 7K BONUS
18 SP. FEATURE
19 3K BONUS
20 WOW FEATURE
21
22 7000 RIGHT
23 STAR-PURPLE
24 DOUBLE BONUS
25
26 S/W A ★
27
28

J5
1 D7
2 D6
3 D5
4 D4
5 D3
6 D2
7 D1
8 D0
9 A13
10 A12
11 A11
12 A10
13 A9
14 A8
15 A7
16 A6
17 A5
18 A4
19 A3
20 A2
21 A1
22 A0
23 R/W
24 HLT
25 RES
26 VMA
27 Φ 2
28 EXT MEM
29 KEY
30 +5
31 GND
32 A4U11-18

TEST CONNECTOR

MPU - A4

J1
1 A1J1-4
2 A1J1-5
3 A1J1-6
4 A1J1-7
5 A1J1-8
6 A1J1 9
7 N.U
8 N.U
9 KEY
10 A1J1-10
11 A5J4-13
12 A5J4-17
13 A5J4-16
14 A5J4-15
15 A5J4-14
16 A5J4-7
17 A5J4-6
18 A5J4-5
19 A5J4-4
20 1A1J1-15
21 2A1J1-15
22 3A1J1-15
23 4A1J1-15
24 5A1J1-15
25 A1J1-19
26 A1J1-18
27 A1J1-17
28 A1J1-16

J4
1 A3J4-3
2 A3J4-4
3 A3J4-5
4 A3J4-6
5 A3J4-11
6 A3J4-9
7 A3J4-8
8 A3J4-10
9 N.U.
10 A3J4-7
11 N.U.
12 A3J3-11
13 N.C.
14 KEY
15 A2J3-12
16 A3J3-14
17 A3J3-15
18 A3J3-18
19 A3J3-19

TO CABINET

TO PLAYFIELD

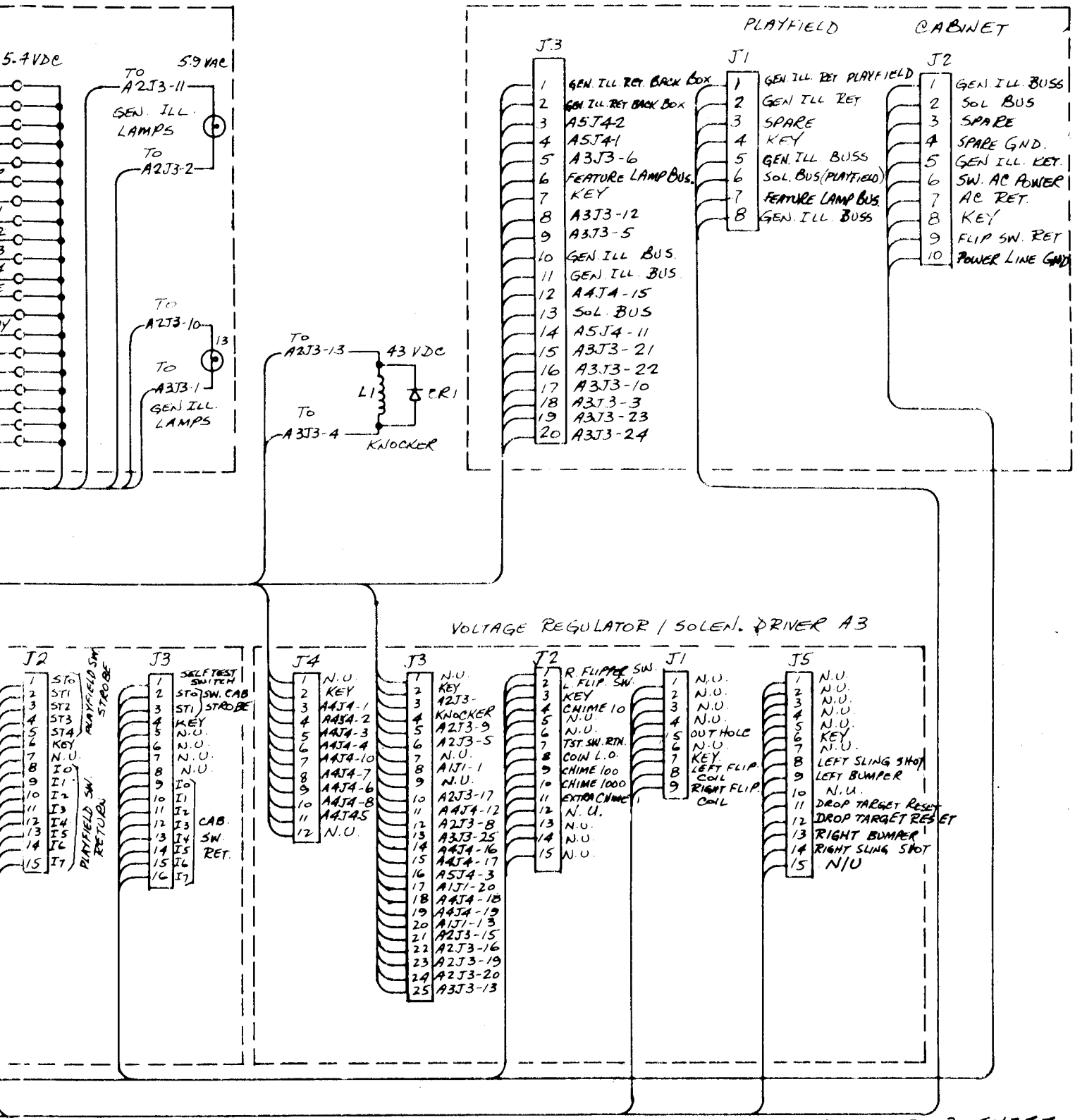
SEE INDIVIDUAL SCHEMATIC DRAW

ISSUE	CHANGE

NO. 12B-185-1

NO. 12B-185-1

A2 TRANSFORMER



VOLTAGE REGULATOR / SOLEN. DRIVER A3

WINGS FOR WIRE COLORS.

SHEET 1 OF 3 SHEET

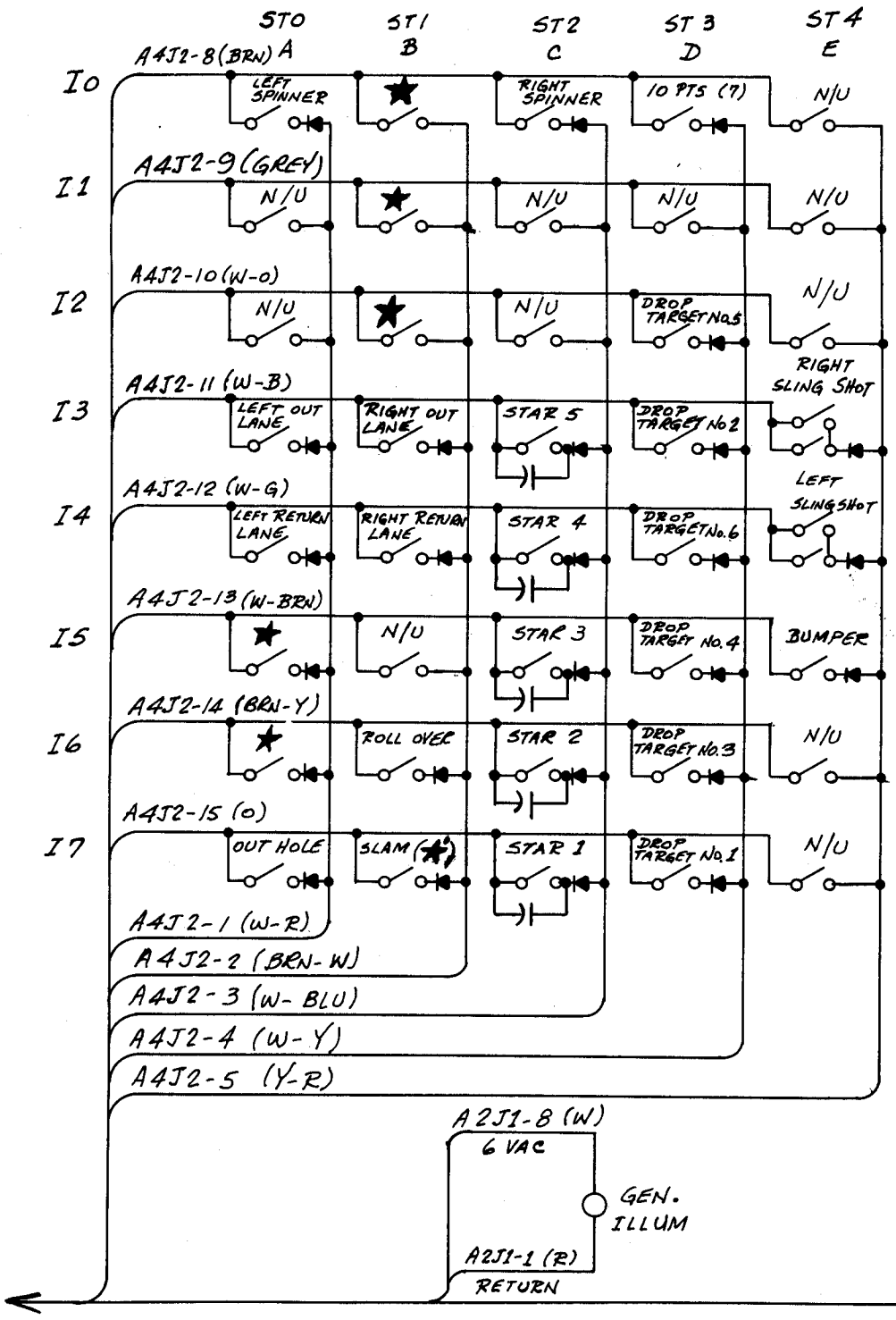
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		DATE	Unless otherwise specified, all fractional dimensions carry tolerances of plus and minus .010: All decimal dimensions plus and minus .005. Exceptions: Drilled holes plus .003 minus .001. Die casting fractional plus and minus .005: Decimal plus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

STERN ELECTRONICS INC.
1725 DIVERSEY BLVD. CHICAGO 60614

WIRING DIAGRAM

FOR STARS SOLID STATE

DRN.	DATE	AM'T
J. J.	9-21-77	
MAT	FIN.	APPR.



★ = SWITCHES USED ON CABINET & DOOR

★' = SLAM SWITCH ON TILT BOARD & DOOR

N/U = NOT USED

ALL DIODES ARE IN-4004

CAPACITORS ARE DISC .05 MF 100 V

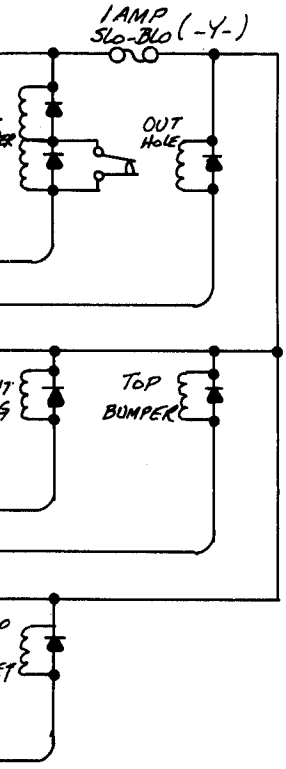
PLAYFIE

ISSUE	CHANGE

NO. 12B-185-2

DIETZGEN NO. 198M AGEPROOF

NO. 12B-185-2



	A5J1	A5J3	
BLU-Y	28		2) ADVANCE BONUS
R-Y		24	DOUBLE BONUS
BRN-O	25		DOUBLE BONUS FEATURE
B-Y	6		LEFT & RIGHT OUT LANE
BLU-O	5		LEF & RIGHT RETURN LANE
G-W	26		SAME PLAYER SHOOTS AGAIN
R-BLU		18	SPECIAL FEATURE
-B-		26	SPECIAL WITH AMBER STAR
G-R	10		SPECIAL WITH GREEN STAR
BLU-R	1		SPECIAL WITH PURPLE STAR
GREY-G	19		SPECIAL WITH WHITE STAR
BRN-B	18		SPECIAL WITH YELLOW STAR
O-B	16		STAR-AMBER
B-W		1	STAR- GREEN
O-R		23	STAR- PURPLE
BRN-R		3	STAR- WHITE
-R-	15		STAR- YELLOW
PUR-W		14	TRIPLE BONUS
B-O	11		TRIPLE BONUS FEATURE
PUR-B		20	WOW FEATURE
PURPLE	17		1K BONUS
G-B	8		2K BONUS
Y-G		19	3K BONUS
GREY-Y		15	4K BONUS
BLU-W	23		5K BONUS
R-G	3		6K BONUS
Y-W		17	7K BONUS
W-GREY		11	8K BONUS
R-B	14		9K BONUS
GREY-O	2		10K BONUS
BRN-BLU	27		400 #1 SPINNER
G-Y	12		400 #2 SPINNER
Y-B		13	7000 LEFT
PUR-Y		22	7000 RIGHT

A2J1-7 (BLU) FEATURE LAMP BUS

ELD

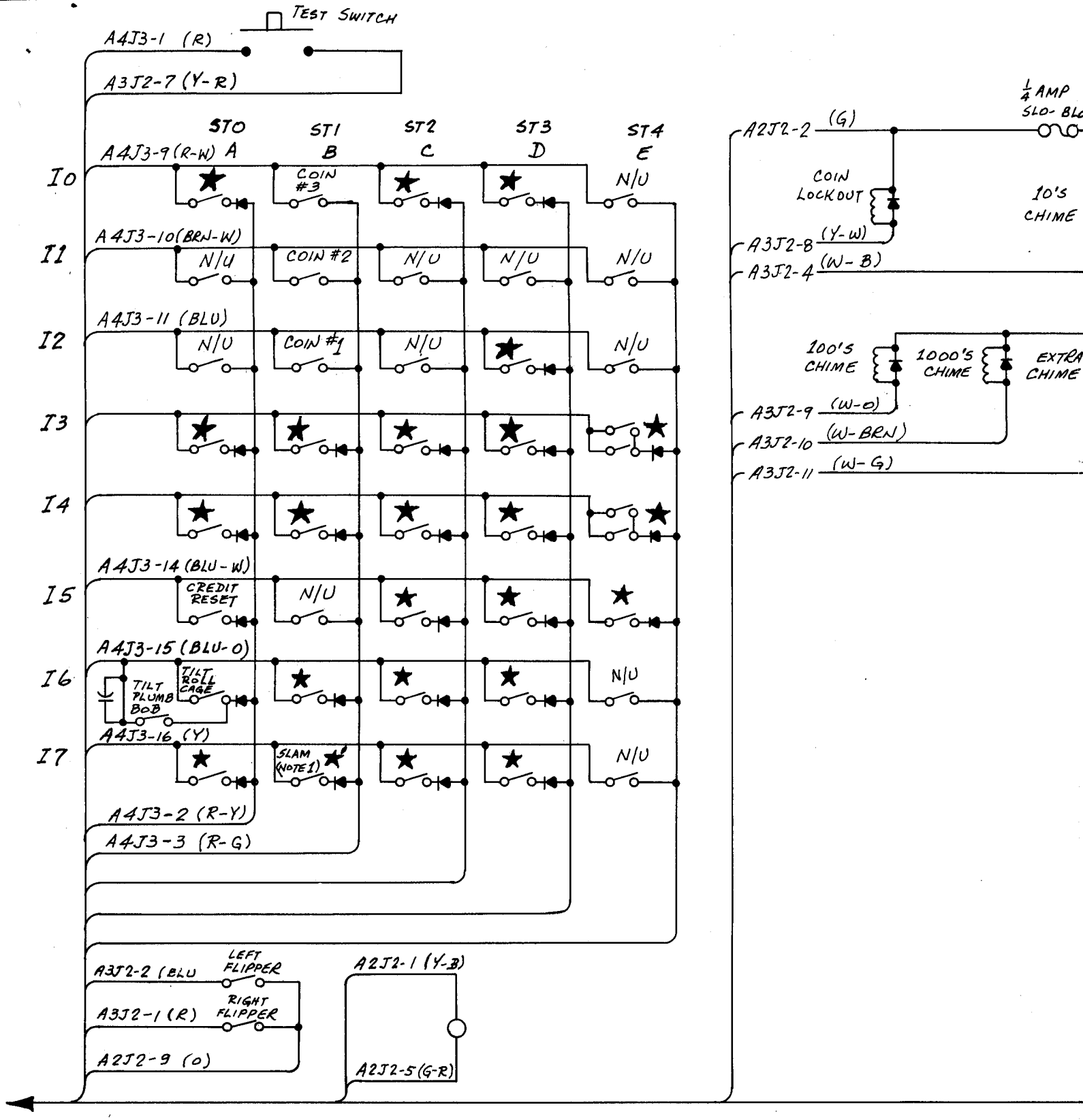
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	DATE		

STERN ELECTRONICS INC.
1725 DIVERSEY BLVD. CHICAGO 60614

WIRING DIAGRAM

FOR STARS

DRN. J.J.	1-19-78 DATE	AM'T
MAT	FIN.	APPR.



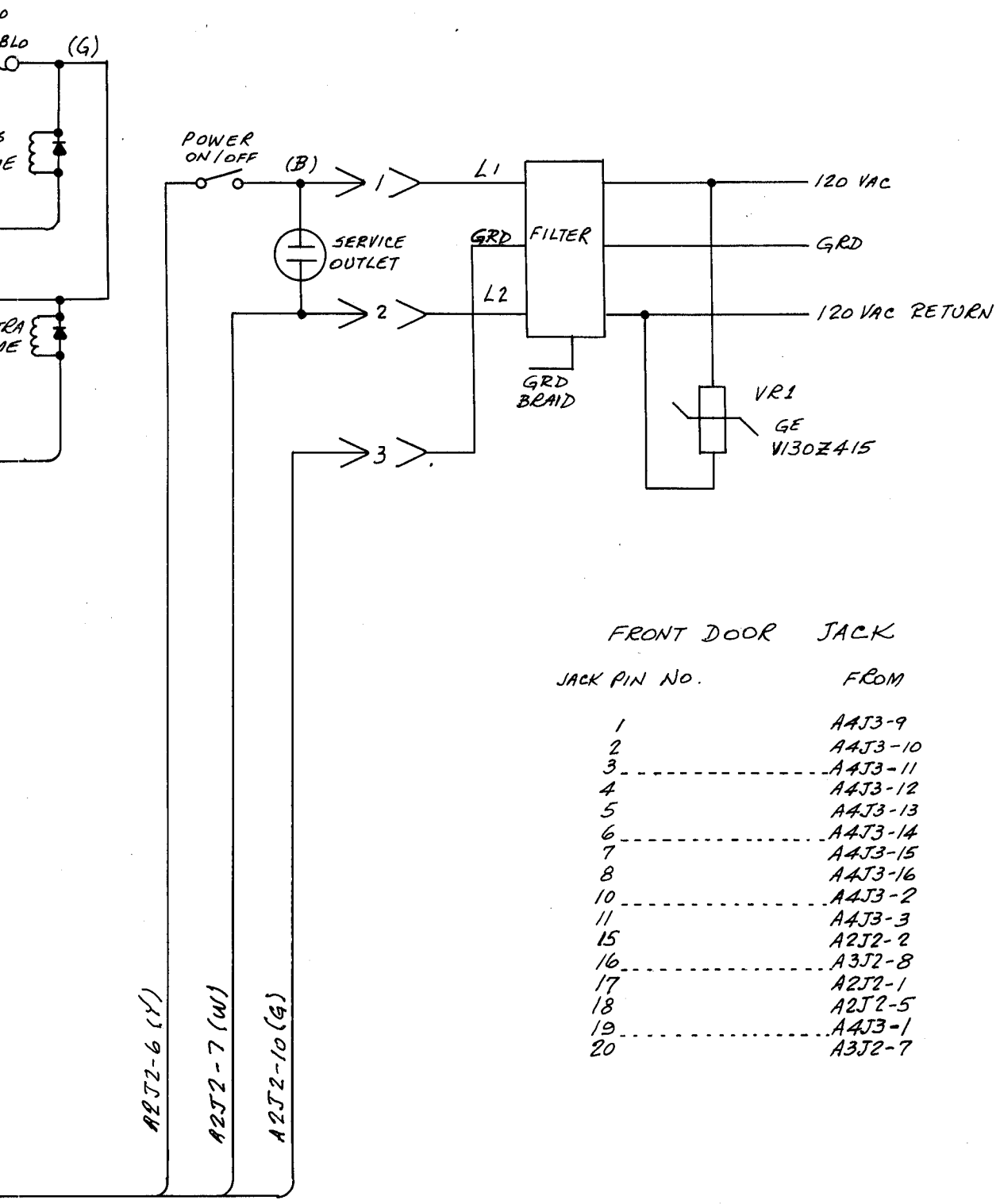
★'=SLAM SWITCH ON UNDERSIDE OF PLAYFIELD ALSO
NOTE 1 = SLAM SWITCH TILT BOARD & FRONT DOOR
★ = SWITCHES USED ON PLAYFIELD
N/U = NOT USED
ALL DIODES ARE IN-4004

ISSUE	CHANGE

NO. 12B-185-3

DIETZGEN NO. 198M AGEPROOF

NO. 12B-185-3



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
11	A4J3-3
15	A2J2-2
16	A3J2-8
17	A2J2-1
18	A2J2-5
19	A4J3-1
20	A3J2-7

		SCALE:	PART MUST BE FREE OF BURRS
	DATE		

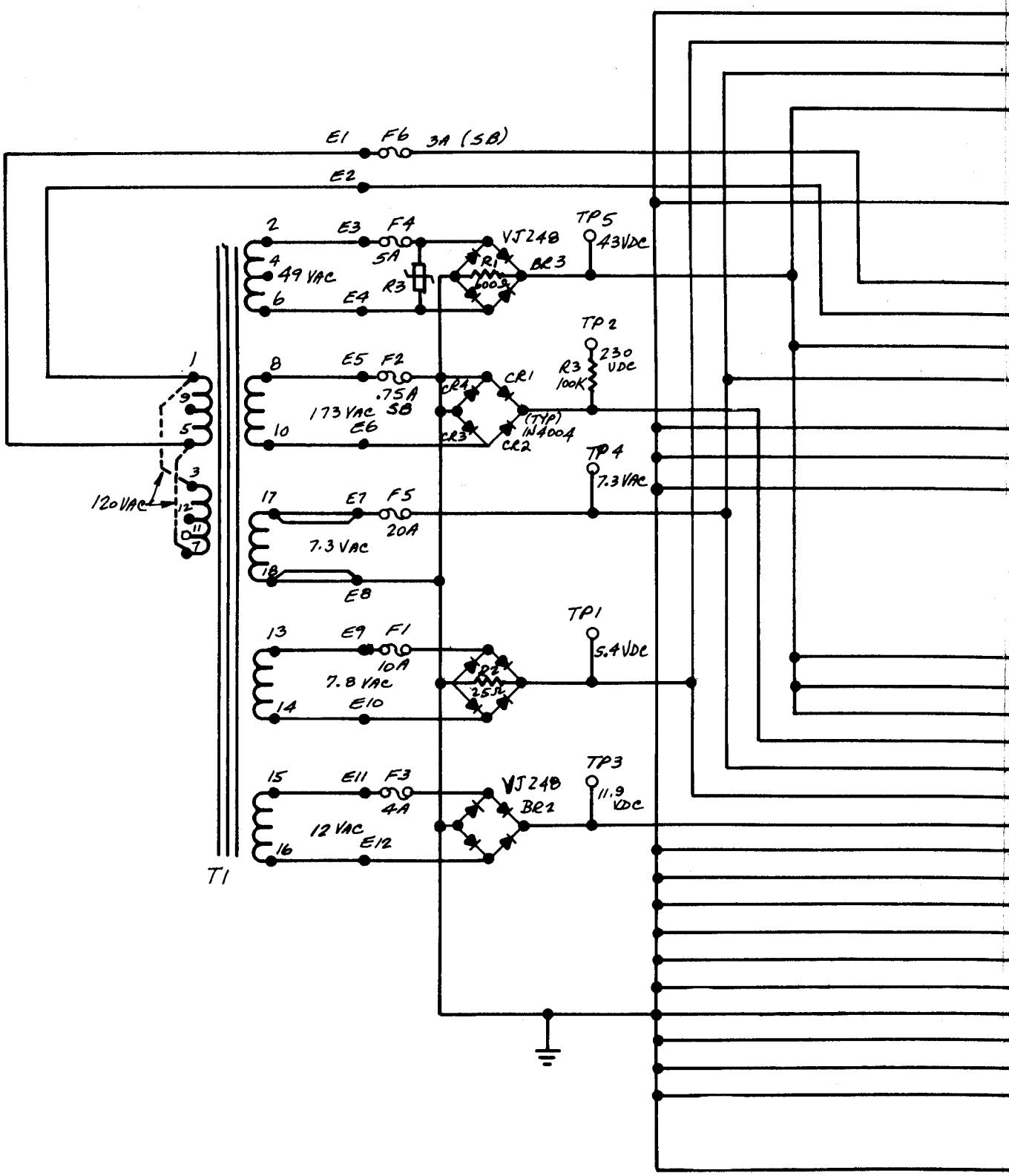
Unless otherwise specified, all fractional dimensions carry tolerances of plus and minus .010: All decimal dimensions plus and minus .005. Exceptions: Drilled holes plus .003 minus .001. Die casting fractional plus and minus .005: Decimal plus and minus .003. Decimal dimensions on tools plus and minus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

STERN ELECTRONICS INC.
1725 DIVERSEY BLVD. CHICAGO 60614

CABINET AND FRONT DOOR WIRING

FOR SOLID STATE

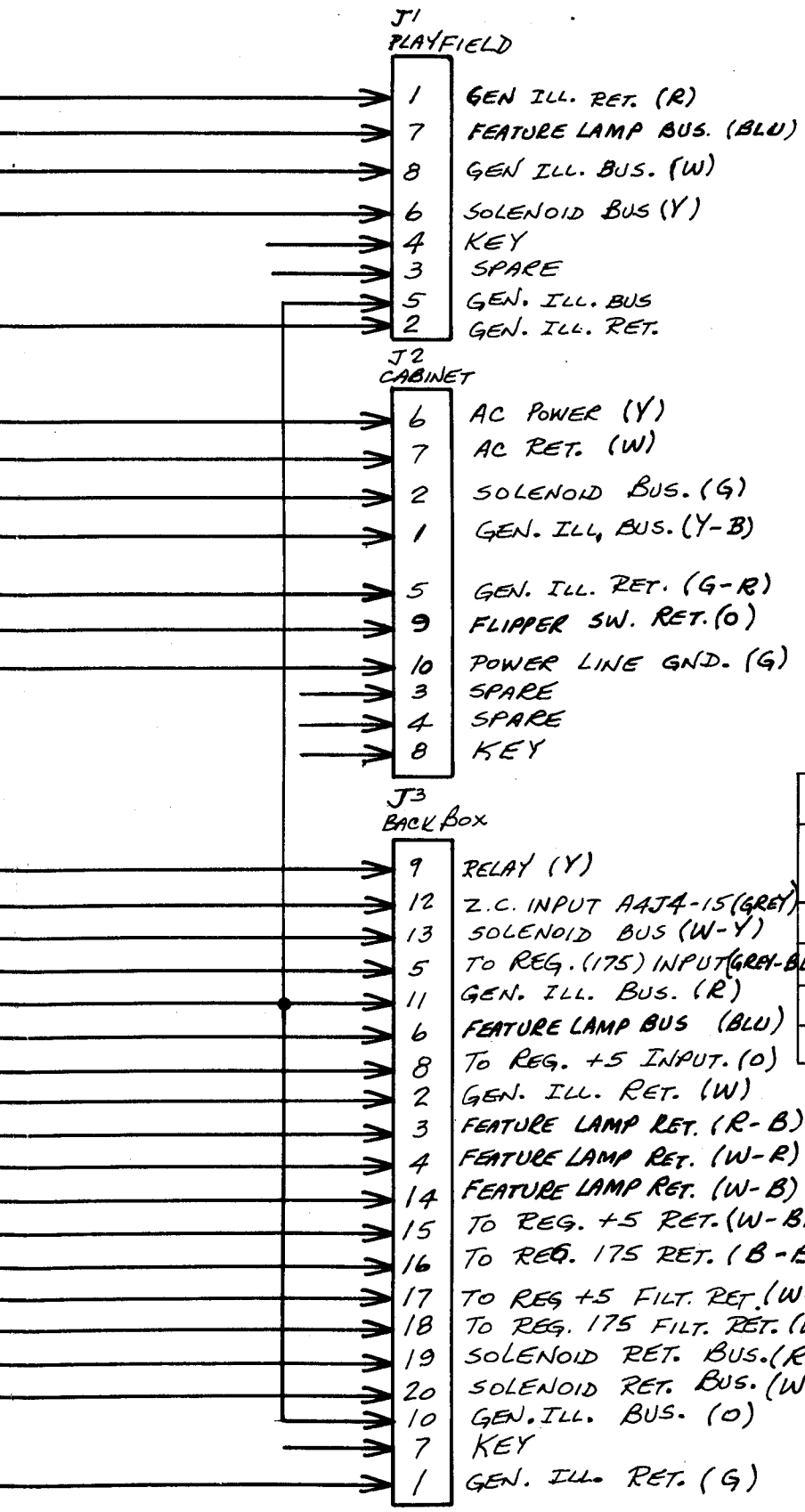
DRN.	DATE	AM'T
J.J.	1-20-77	
MAT	FIN.	APPR.



ISSUE	CHANGE

NO. 3-464-5

NO. B-464-5



ABREVIATIONS USED.

GEN ILL. = GENERAL ILLUMINATION
RET. = RETURN
GND = GROUND
REG = REGULATED
Z.C. = ZERO CROSSING

POWER LINE CONNECTIONS

AC LINE VOLTAGE	STRAP TERMINALS	APPLY POWER TO TERMINALS
115	1 TO 3 AND 9 TO 11	1 AND 9
120	1 TO 3 AND 5 TO 7	1 AND 5
220	3 TO 5	1 AND 12
240	3 TO 5	1 AND 7

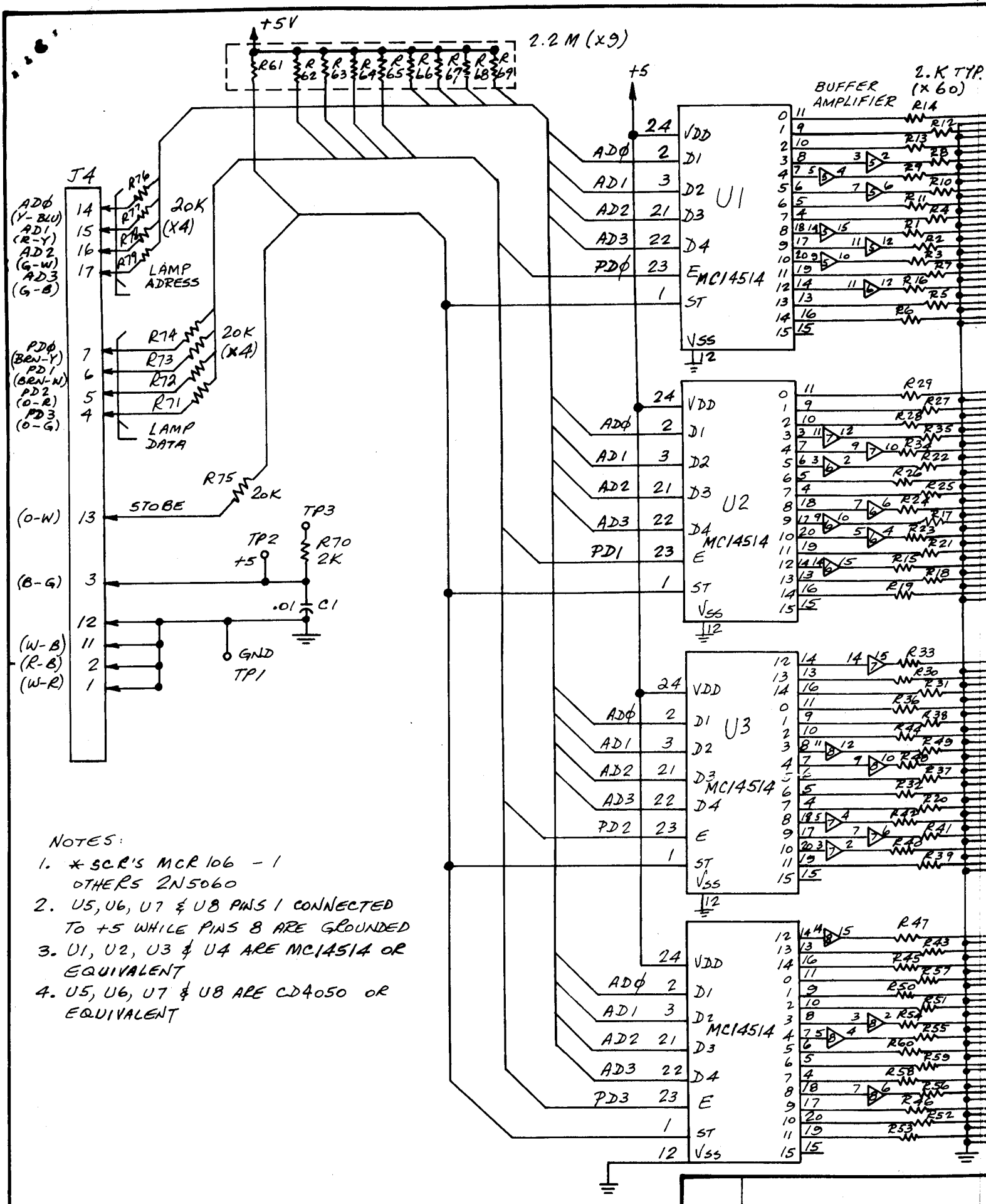
		SCALE:	PART MUST BE FREE OF BURRS
			Unless otherwise specified, all fractional dimensions carry tolerances of plus and minus .010: All decimal dimensions plus and minus .005. Exceptions: Drilled holes plus .003 minus .001. Die casting fractional plus and minus .005: Decimal plus and minus .003. Decimal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

STERN ELECTRONICS INC.
1725 DIVERSEY BLVD. CHICAGO 60614

POWER TRANSFORMER MODULE SCHEMATIC

FOR STINGRAY SOLID STATE

DRN. J.J.	9-20-77 DATE	AM'T
MAT	FIN.	APPR.



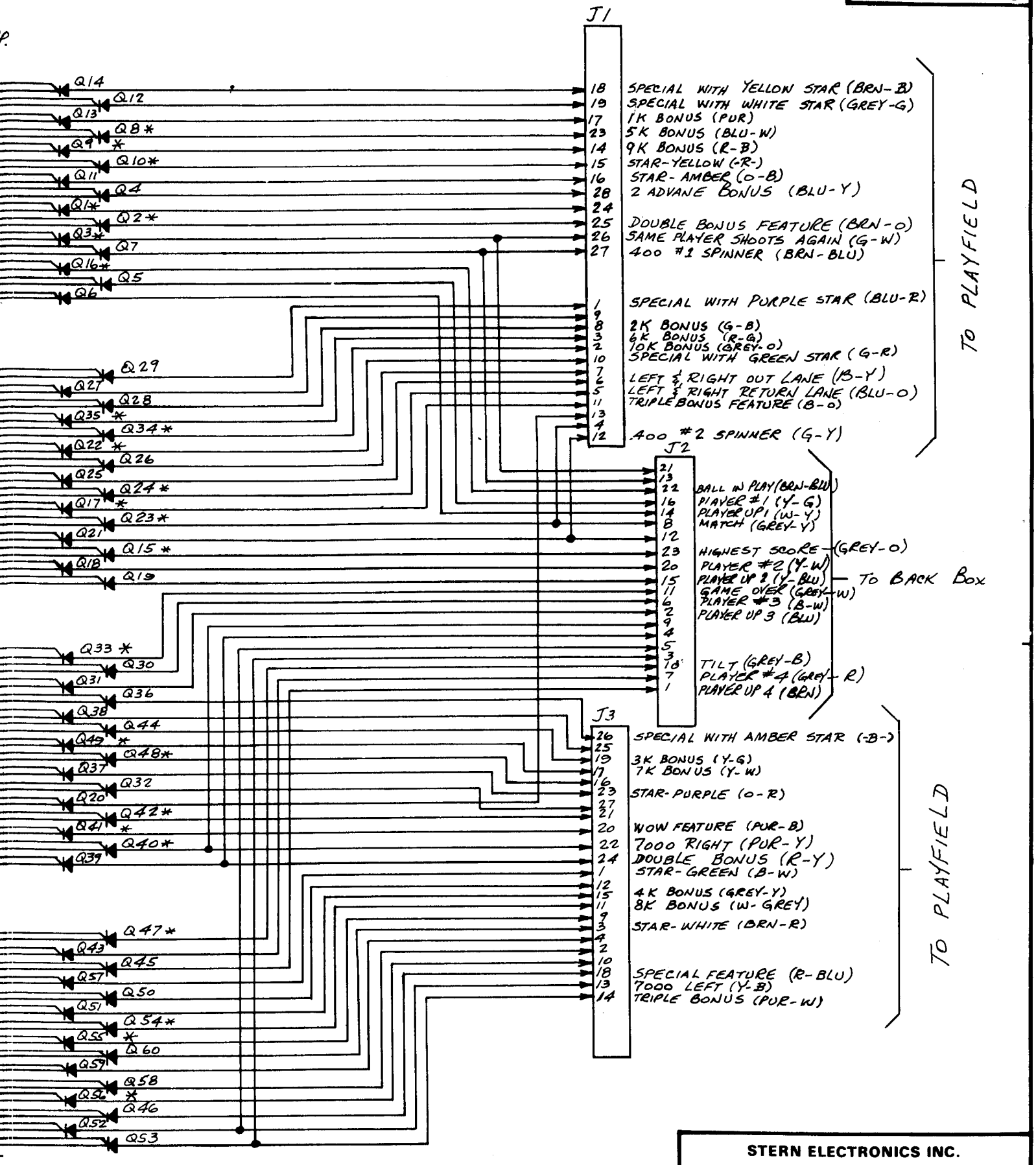
NOTES:

1. * SCR'S MCR 106 - 1
   OTHERS 2N5060
2. U5, U6, U7 & U8 PINS 1 CONNECTED TO +5 WHILE PINS 8 ARE GROUNDED
3. U1, U2, U3 & U4 ARE MC14514 OR EQUIVALENT
4. U5, U6, U7 & U8 ARE CD4050 OR EQUIVALENT

ISSUE	CHANGE

NO. B-431-S-103

NO. B-431-S-103



		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 STARS SOLID STATE

DRN. C.W.	DATE 9-21-77	AM'T
MAT	FIN.	APPR.

STARS
By
STERN ELECTRONICS, INC.