



STERN

ELECTRONICS, INC.

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Orbitor I - Patents Pending



FLIPPERSPILL.COM

WARNING: THIS EQUIPMENT GENERATES, USES, AND CAN RADIATE RADIO FREQUENCY ENERGY AND IF NOT INSTALLED AND USED IN ACCORDANCE WITH THE INSTRUCTION MANUAL, MAY CAUSE INTERFERENCE TO RADIO COMMUNICATIONS. AS TEMPORARILY PERMITTED BY REGULATION IT HAS NOT BEEN TESTED FOR COMPLIANCE WITH THE LIMITS FOR CLASS A COMPUTING DEVICES PURSUANT TO SUBPART J OF PART 15 OF FCC RULES, WHICH ARE DESIGNED TO PROVIDE REASONABLE PROTECTION AGAINST SUCH INTERFERENCE. OPERATION OF THIS EQUIPMENT IN A RESIDENTIAL AREA IS LIKELY TO CAUSE INTERFERENCE IN WHICH CASE THE USER AT HIS OWN EXPENSE WILL BE REQUIRED TO TAKE WHATEVER MEASURES MAY BE REQUIRED TO CORRECT THE INTERFERENCE.

SECTION 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 that wiring of transformer corresponds 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 (normally open) tilt switch:

1. Plumb bob tilt on left side of cabinet near front door.

STATIC DISCHARGE CAUTION

Integrated circuit chips can be damaged by static discharge from the body. Before touching chips, discharge body by touching any ground path.

SECTION 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 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 tone (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" display 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 Buttons and flipper End of Stroke 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.** Note: On this game, when in switch test, rotor wheel is energized. To check rotor wheel switch closure, momentary stop wheel.
6. GAME LEVELS AND BOOKKEEPING FUNCTIONS: - Pressing the Self-Test button seventeen 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.

PLAYFIELD SWITCH ADJUSTMENTS

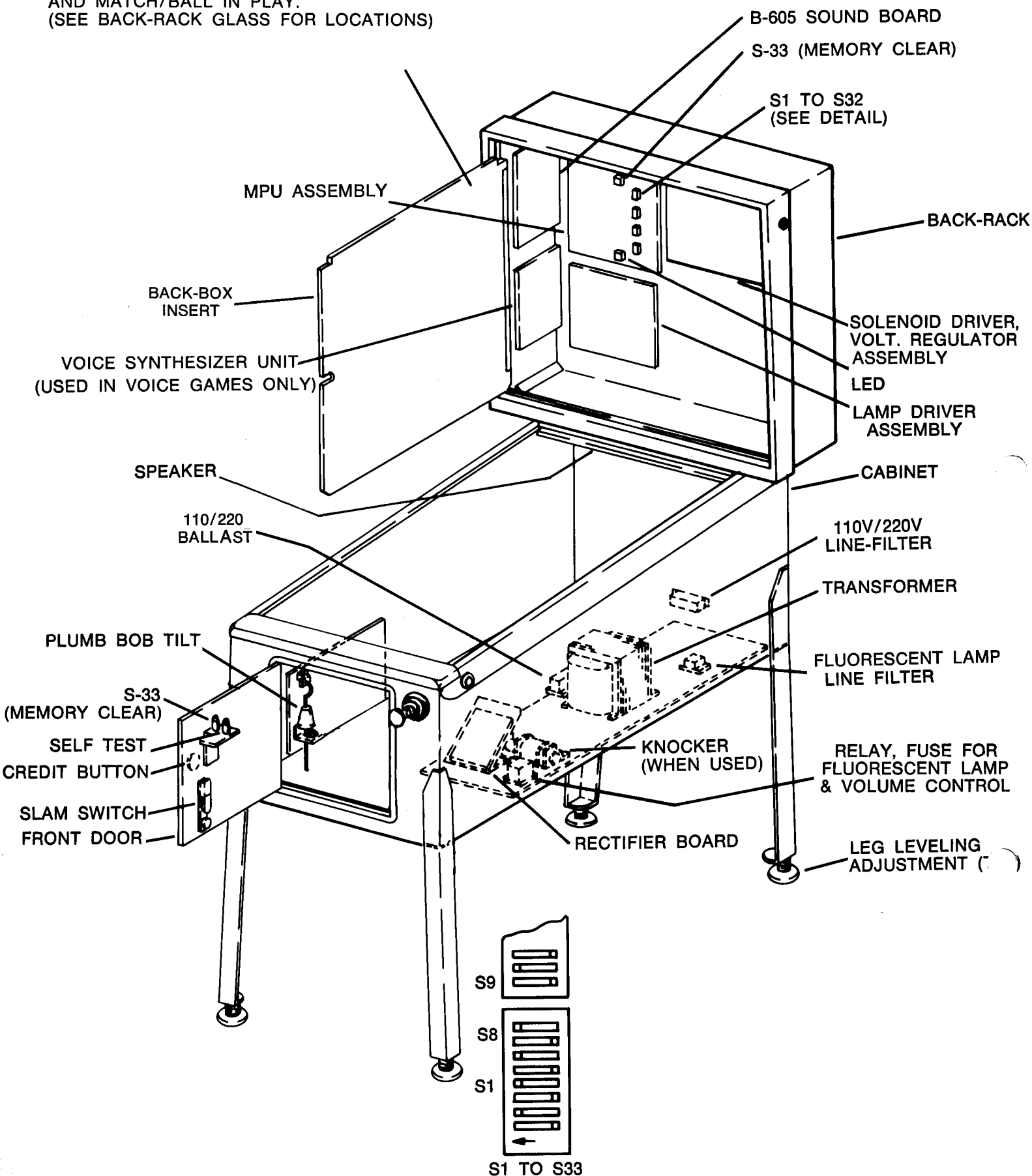
All contact switches should be adjusted to have a gap $1/16$ " in the open position, and have .010" overtravel closed. All contact switches (except for flipper buttons & flipper end of stroke switches) are gold plated to resist corrosion and, **SHOULD NOT BE FILED OR BURNISHED.** If contacts have dirt 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.

CLEAN AND WAX THE 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.

DISPLAY DRIVER ASSEMBLIES
1ST, 2ND, 3RD & 4TH PLAYERS, CREDITS
AND MATCH/BALL IN PLAY.
(SEE BACK-RACK GLASS FOR LOCATIONS)



ELECTRONIC PIN BALL GAME

SECTION III. GENERAL GAME OPERATION

PLACE BALL INTO PLAYFIELD BY OUTHOLE:

COIN GAME. 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 lamps will flash in a programmed attract mode, "HIGH SCORE" lamp is lit, player displays flash high score to date, "HIGH SCORE" lite goes off & previous played scores are flashed. 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 inoperative 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 ** 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), or minimum adjusted time is played. At this time the "Game Over" lamp becomes lit. A random "Match" number appears and the "Match" lamp becomes lit. If the match number is the same as the last two digits in the player's score a free game can be 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 is not advanced for extra ball play. Bonus score is added to the player's score, the bonus is reset to ** and the bonus multiplier earned is restored (memory) or reset (*) before the game moves the extra ball for play.

At the end of the game, a "High Score" is flashed on all players' scores. If the "High Score" 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 go "dead". Bonus score is not added. Note: the spinner motors remain active until the ball drains in the outhole. 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 lamps go out and the game becomes "dead" through a built-in delay circuit. The purpose of the time delay circuit is to discourage abuse of the machine. After the delay, the "Game Over" lamp lights, and the game is ready for play. The time delay occurs any time one of the slam switches is made to contact.

There is a slam switch on the front door, 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.

**Bonus starts at 0.

See back box adjustments.

SECTION IV. SELF TEST AND BOOKKEEPING FUNCTIONS

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

TABLE 4-1. SELF TEST FUNCTIONS

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	Switch test - switch I.D. number appears on display when it is manually closed. (Flashing O if all cabinet switches are open and all balls moved from the outhole to the shooter position.)

TABLE 4-2. BOOKKEEPING FUNCTIONS

TEST SWITCH PUSH NUMBER	BALL/MATCH DISPLAY	DESCRIPTION	DISPLAYS
6th	01	1st Level (High Score)	
7th	02	2nd Level (High Score)	
8th	03	3rd Level (High Score)	
9th	04	Current High Game Threshold	
10th	05	Current Credits	00 to 99
11th	06	Total Plays	00 to 9999999
12th	07	Total Replays	00 to 9999999
13th	08	Total times high score is passed	00 to 9999999
14th	09	Number of coins thru Chute No. 3	00 to 9999999
15th	10	Number of coins thru Chute No. 2	00 to 9999999
16th	11	Number of coins thru Chute No. 1	00 to 9999999
17th	12	Total balls played	00 to 9999999
18th	13	Total Extra Balls Awarded	00 to 9999999
19th	14	Total Playfield Special Awards	00 to 9999999
20th	15	Total Level 1 Passed	00 to 9999999
21st	16	Total Level 2 Passed	00 to 9999999
22nd	17	Most time on Ball	00 to 9999999

SECTION V. FRONT DOOR GAME ADJUSTMENTS:

HIGH SCORE FEATURE ADJUSTMENTS:

This game is designed to award an (Optional) Extra Ball or "Free Game" at the set score level.

Any level from 10,000 to 9,990,000 can be set, as desired. It is 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), by pressing S33 on the MPU assembly in the back box or the memory clear switch on the front door and then hold the credit button in. Release the credit button when the desired score appears. Note that the level changes 10,000 points at a time. If the number (00) is left on the displays, the 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 Score to Date" is beat. **For the recommended, factory preset level, see below.**

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 Adjustments, 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 can be turned off by positioning the correct MPU switches.

RECOMMENDED SETTING

ORBITOR

3 BALLS

1ST LEVEL PASSED	600,000	1 CREDIT
2ND LEVEL PASSED	1,100,000	1 CREDIT
3RD LEVEL PASSED		
4TH LEVEL PASSED	1,500,000	HIGH SCORE TO DATE

5 BALLS

1ST LEVEL PASSED	1,500,000	1 CREDIT
2ND LEVEL PASSED	2,000,000	1 CREDIT
3RD LEVEL PASSED		
4TH LEVEL PASSED	2,500,000	HIGH SCORE TO DATE

GAME ADJUSTMENTS

A. Back Box Game Adjustments:

Each game has thirty-two switches located on the MPU module, located in the back box, that allows game 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, time per game, and background sound 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.**

TABLE 7-2. MPU SWITCH/GAME ADJUSTMENTS

		NONE	X BALL	100K	REPLAY			ON	OFF
32		OFF	ON	OFF	ON	32		←	←
31	Special Award	OFF	ON	OFF	ON	31		←	←
30	Special Limit					30		1/Game	1/Ball
29	Reset the Multiplier Lights					29		YES	NO
28	Coin Chute #3					28	See Catalog Or Label On Side Of Cabinet		
27						27			
26						26			
25						25			
24	Extra Ball					24		YES	NO
23	Add-A-Ball					23		ON	OFF
22	Add-A-Ball Limit					22		5	3
21	Match Feature					21		ON	OFF
20	Display Credits					20		ON	OFF
19	Awarded	10	15	25	40 CREDITS	19		←	←
18	Maximum Credit	OFF	ON	OFF	ON	18		←	←
17	Talking					17		YES	NO
16	High Game	0	1	2	3	16		←	←
15	To Date	OFF	ON	OFF	ON	15		←	←
14	Green Timing	90	120	150	180 SECOND	14		←	←
13	Special (Sec.)	OFF	ON	OFF	ON	13		←	←
12	Coin Chute #2					12	See Catalog Or Label On Side Of Cabinet		
11						11			
10						10			
9						9			
8	Background Sound					8		ON	OFF
7	Balls Per Game					7		5	3
6	High Score Feature					6		Replay	X-Ball
5	100th Game: Free Credit					5		YES	NO
4	Coin Chute #1					4	See Catalog Or Label On Side Of Cabinet		
3						3			
2						2			
1						1			

SECTION VII. CREDIT/COIN AND GAME ADJUSTMENTS

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:

TABLE 7-1. CREDITS/COIN ADJUSTMENTS

MPU SWITCHES				
CHUTE No. 1 (BLU) (NEXT TO HINGE)	4	3	2	1
	12	11	10	9
	28	27	26	25
CHUTE No. 2 (BRN-WHITE) (CENTER)				
CHUTE No. 3 (RED-WHITE) (NEXT TO LOCK)				
OFF	OFF	OFF	OFF	 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	10
ON	OFF	OFF	OFF	14

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

DIP SWITCH CONTROLLED

TOP SPECIAL

Lights when 7X Bonus Multiplier is achieved. To collect, ball must go through spinner and light second "R" in ORBITOR in the same shot.

EXTRA BALL

Lights when 5X Bonus Multiplier is achieved. To collect, ball must go through spinner and light "T" in ORBITOR in the same shot.

100th QUARTER FEATURE (OPTIONAL)

Awards free game on every 100th game.

TIME ON ONE BALL

Display on Match/Credit, shows time on one ball and high time to date. Beating high time awards Special.

RIGHT BANK SPECIAL

Light Orbitor to light special then hit middle drop target to collect.

NOT DIP SWITCH CONTROLLED

MULTI-BALL

Releases ball when 7 top drop targets are down.

LEFT AND RIGHT SIDE GATES

Side gates will drop Orbitor drop target in order.

ADVANCE BONUS MULTIPLIER

- * —By dropping top 7 drop target bank
- By lighting "O", "B", "T" and "R"
- By lighting "R", "I" and "O"
- By dropping left or right drop target bank

SPINNER

Scores 1,000 pts. advance to 3,000, 6,000, 9,000 pts. by upper left target on playfield, or lighting all drop targets lights.

ROTOR WHEEL

Scores 1,000 pts. when hit.

MINIMUM GAME FEATURE

Awards free ball until minimum time of game is used up.

BALLS FOR GAME:

NO. OF BALLS PER GAME
3
5

MPU SWITCH 7
OFF
ON

ADD-A-BALL (Memory):

This adjustment can store in memory 3 or 5 "Add-A-Balls."

ADD-A-BALL (Memory):
3
5

MPU SWITCH 22
ON
OFF

CREDIT DISPLAY:

CREDIT DISPLAY
YES
NO

MPU SWITCH 20
ON
OFF

AWARDED MAXIMUM CREDITS:

In answer to public demand, we at "STERN" are trying to give the players what they want—MORE playfield excitement. In order to do this, additional features are NEEDED.

In an effort to do so, we have added a coil on the playfield and eliminated the "COIN LOCK OUT COIL."

This Stern game has a new feature not used in any previous Stern pinball: Coins will be accepted and credit for the amount of coins inserted.

There are no MPU switches to limit the amount of credits given as in older Stern pinballs (it is even possible to attain 99 credits). There are, however, two (2) MPU SWITCHES THAT WILL LIMIT THE AMOUNT OF REPLAYS AWARDED. These two switches can be set for a limit of 10, 15, 25, and 40 replays. If the amount of credits shown in the credit/match window is greater than the MPU switches are set for, no replay credit will be awarded.

AWARDED MAXIMUM CREDITS

10
15
25
40

MPU SWITCHES
18 **19**
OFF OFF
ON OFF
OFF ON
ON ON

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" for setting levels.)

AWARD
Extra Ball
Replay

MPU SWITCH 6
OFF
ON

EXTRA BALL: LITES AT 5X**EXTRA BALL**

YES
NO

MPU SWITCH 24

ON
OFF

SPECIAL AWARD:**TOP SPECIAL,
RT. BANK & HIGH TIME**

No Award
Extra Ball
100,000 Points
Replay

MPU SWITCHES

31	32
OFF	OFF
OFF	ON
ON	OFF
ON	ON

GREEN SHOOT AGAIN TIME:

This feature assures the player of a minimum playing time.

SPECIAL

90 Seconds
120 Seconds
150 Seconds
180 Seconds

MPU SWITCHES

13	14
OFF	OFF
ON	OFF
OFF	ON
ON	ON

RESET THE MULTIPLIER LIGHTS TO 1X:

On advancing to the next ball number.

YES
NO

MPU SWITCH 29

ON
OFF

SPECIAL LIMIT:

1/Game
1/Ball

MPU SWITCH 30

ON
OFF

HIGH GAME TO DATE FEATURE:

The game is designed to award up to 3 free games when "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

No Free Game

1 Free Game

2 Free Games

3 Free Games

MPU SWITCHES

15

16

OFF

OFF

ON

OFF

OFF

ON

ON

ON

MATCH FEATURE:

When the "Match Feature" is ON, a random number appears in the ten's digit of the "Match/Ball in Play" window and the word "Match" is illuminated. If the number matches the ten's digit in a player's score, a free game is awarded. The "Match Feature" creates an incentive to play.

MATCH

ON

OFF

MPU SWITCH 21

ON

OFF

100th GAME FREE CREDIT:

Every 100th game the game will award one free game.

AWARD

YES

NO

MPU SWITCH 5

ON

OFF

ADD-A-BALL:

ON

OFF

MPU SWITCH 23

ON

OFF

TALKING:

YES

NO

MPU SWITCH 17

ON

OFF

PARTS LIST ORBITOR

MISCELLANEOUS

	PART NUMBER
Transformer (Domestic or Export)	16B-6
Transformer & Rectifier Board	B438-4
Bulbs, #44	8A-101
U1	E165-U1 OR 25
U2	E165-U2 OR 25
U5	E165-U5 OR 25
U6	E165-U6 OR 25
U9 Voice E-Prom	E165-U9
U10 Voice E-Prom	E165-U10

ASSEMBLY COILS

Drop Target Bank (1)	B-24-1600
3 Drop Target Bank (2)	B-27-2300
Flippers (2)	J-25-475/34-4500
Ball Ejector Release (1)	J-28-2300
Ball Trap (1)	N-26-1200
Knocker (1)	N-26-1200
Drop Target (7)	C1-31-1600

MODULES

Optic Bds. (2)	A-2119
Lamp Driver	B-431
Display Driver	A-645
Match, Ball in Play Display & Playfield Bonus Timer	A-434
Solenoid Driver/Voltage Regulator	B-432
MPU (FOR E PROM SEE MISCELLANEOUS ABOVE)	C-602
Rectifier Board	A-430
Sound Module	C-605
Voice Synthesizer Unit (E PROM SEE MISCELLANEOUS ABOVE)	A-720

PLAYFIELD PARTS

SEE PLAYFIELD DIAGRAM

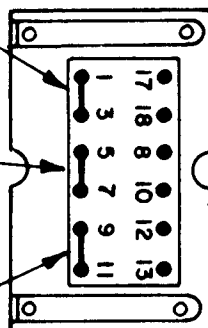
FIGURE 8-1. STERN 16B-6 TRANSFORMER WIRING CONNECTION INSTRUCTIONS

115/120V., 50/60 Cycle Input.
Varistor - Soldered to Line Filter on Back 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



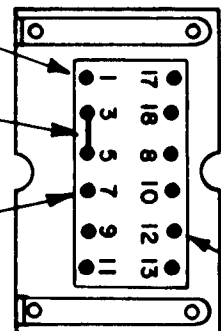
220/240V., 50/60 Cycle Input.
Varistor - Soldered to Line Filter on Back of Cabinet
Must be Stern Part No. 25A-18-2.

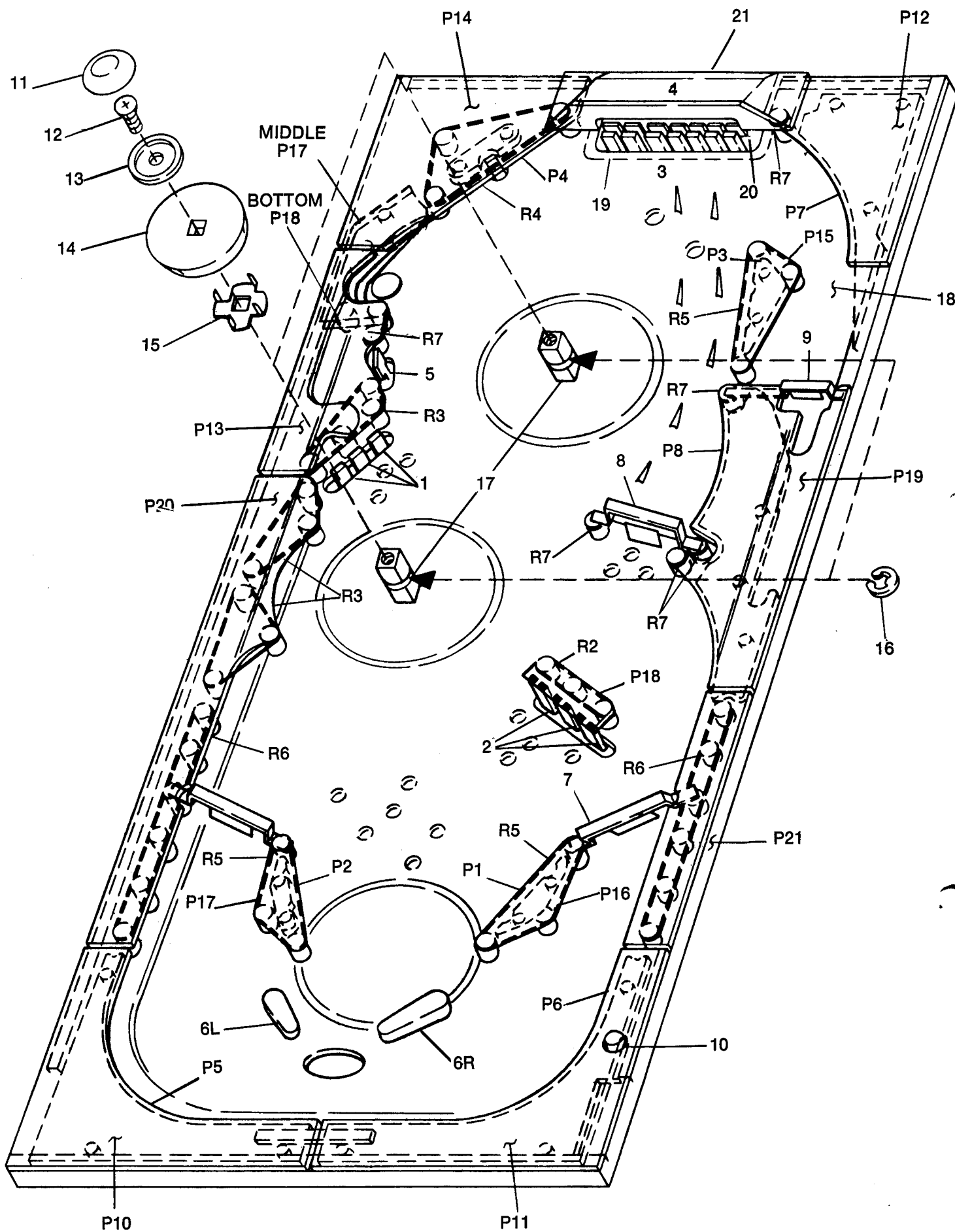
Solder Heavy Red Wire
To Lug 1

Solder Lugs 3 & 5
Together

240V
Solder Heavy Yellow
Wire To Lug 7

220V
Solder Heavy Yellow
Wire To Lug 12





ORBITOR PLAYFIELD PARTS LIST

RUBBER RINGS

R1-7A-120-175	R4-7A-120-300
R2-7A-120-200	R5-7A-120-500
R3-7A-120-250	R6-7A-135

PLAYFIELD PLASTIC ASSEMBLIES

A-2161 THRU A-2164
(P1 THRU P4)
C-2156 AND C-2157
(P5 AND P6)
C-2159 AND C-2160
(P7 AND P8)

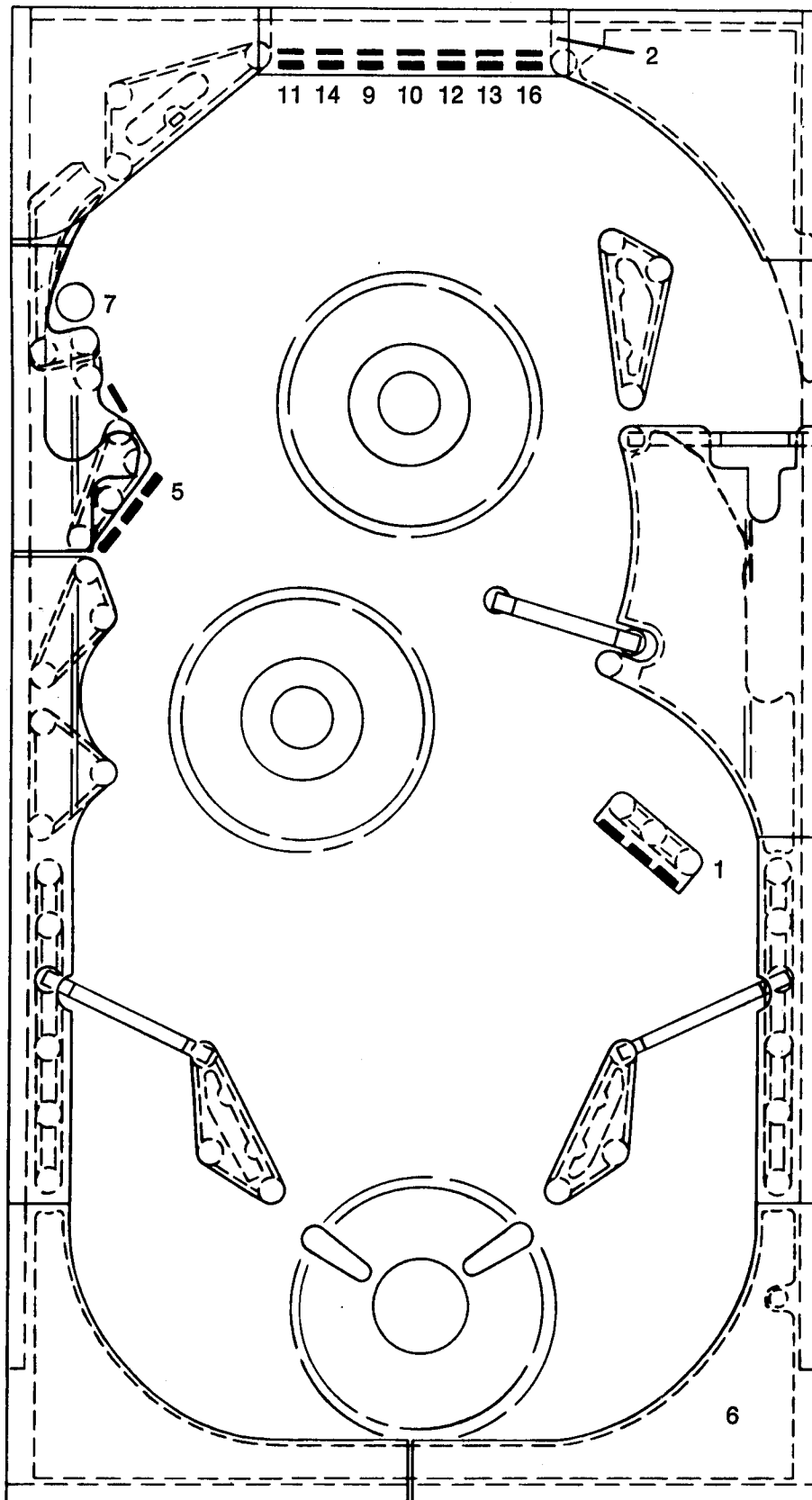
PLAYFIELD PLASTIC SHIELDS

13C-165-1 THRU -4
(P10 THRU P13)
13C-165-9 THRU 18
(P14 THRU P21)

OTHER PARTS AND ASSEMBLIES

1. 3-Bank Drop Target
D-2140-3-A1 (Left)
2. 3-Bank Drop Targets
D-2140-3-B1 (Right)
4B-195-3Y (Targets Only)
3. 7-Bank Drop Target
D-2184-7A (Top)
4B-195-3B (Targets Only)
4. Stand-up Target Assembly B-2186
5. Stand-up Target Assembly B-2192
6. Flipper Assemblies
B-634-5LY and B-634-5RY
(Lt. and Rt.)
7. Lane Gate Assembly A-2181
8. Spin Target Assembly A-563-4
9. Up-ramp Gate Assembly A-2216
10. Ball Shooter Light Indicator
A-890
11. Screw Cap 4A-463
12. 1/4 - 20x1/2" Flat Hd. Screw
31B-249
13. Screw Cap Washer 3A-213
14. Motor Wheel 7A-147
15. Drive Cleat 1A-2098
16. Retaining Ring 17A-104-37
17. Motor Assemblies C-2152
(Clockwise) or C-2153
(Counterclockwise)
18. Clear Playfield 4D-440
19. Sub-strate 4D-441
20. Marquee 13C-54
21. Light Housing B-2182

ORBITOR
SOLENOIDS

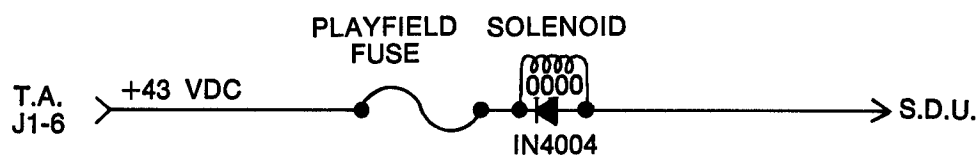


SOLENOID NOT ON PLAYFIELD

- 3. KNOCKER
- 15. FLIPPER ENABLE RELAY
- 18. ROTOR WHEEL ENABLE RELAY
ON LOWER BOARD

TABLE 8-3. ORBITOR SOLENOID IDENTIFICATION

I.D. NUMBER	TRANS. NUMBER	SDU JACK	WIRE COLOR	DESCRIPTION
1	Q1	J2-9	G-O	Right Drop Target
2	Q2	J2-4	G-BLU	Top Drop Target
3	Q3	J2-5	G-B	Knocker
4	Q4	J1-5	N/U	N/U
5	Q5	J2-10	G-Y	Left Drop Target
6	Q6	J2-11	G-R	Outhole
7	Q7	J2-12	R-Y	Multi-Ball Holder
8	Q8	J5-10	N/U	N/U
9	Q9	J5-9	R-BLU	Drop Target "B"
10	Q10	J5-15	O-W	Drop Target "I"
11	Q11	J5-14	O-B	Drop Target "O ₂ "
12	Q12	J5-13	O-G	Drop Target "T"
13	Q13	J5-12	B-Y	Drop Target "O ₁ "
14	Q14	J5-11	B-G	Drop Target "R ₁ "
15	Q15	J1-8, 9	8G, 9-0	Flipper Enable Relay
16	Q16	J5-8	G-W	Drop Target "R ₂ "
17	Q17	N/U	N/U	N/U
18	Q18	J2-15	R-W	Rotor Wheel Enable Relay
19	Q19	J2-8	N/U	N/U



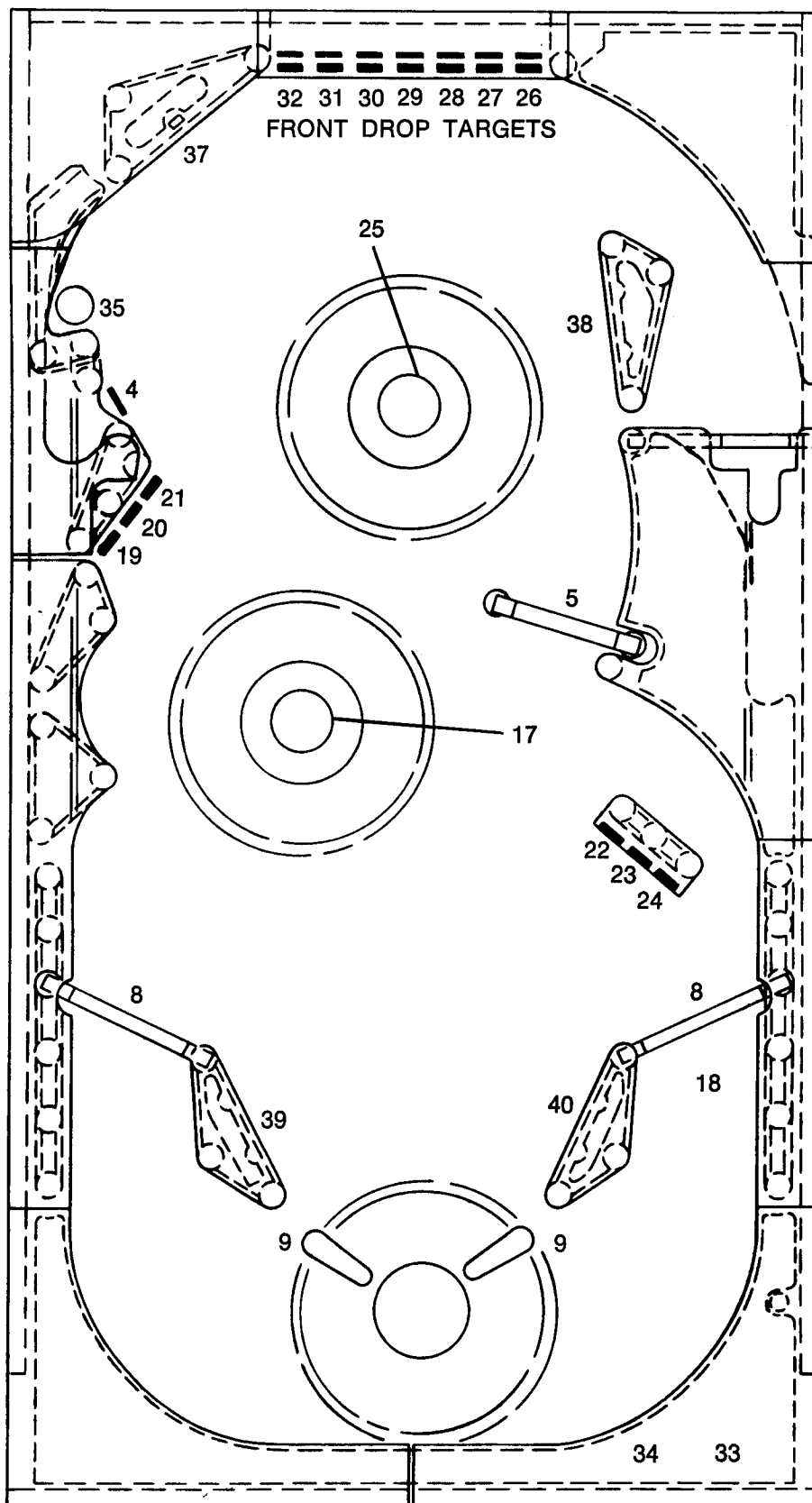
ORBITOR

SWITCHES

BACK STAND UP TARGETS

16 15 14 13 12 11 10

32 31 30 29 28 27 26
FRONT DROP TARGETS



SWITCHES NOT ON PLAYFIELD

- | | |
|----------------------|------------------|
| 1. LEFT COIN CHUTE | 6. CREDIT BUTTON |
| 2. CENTER COIN CHUTE | 7. TILT |
| 3. RIGHT COIN CHUTE | |

TABLE 8-2. ORBITOR SWITCH IDENTIFICATION

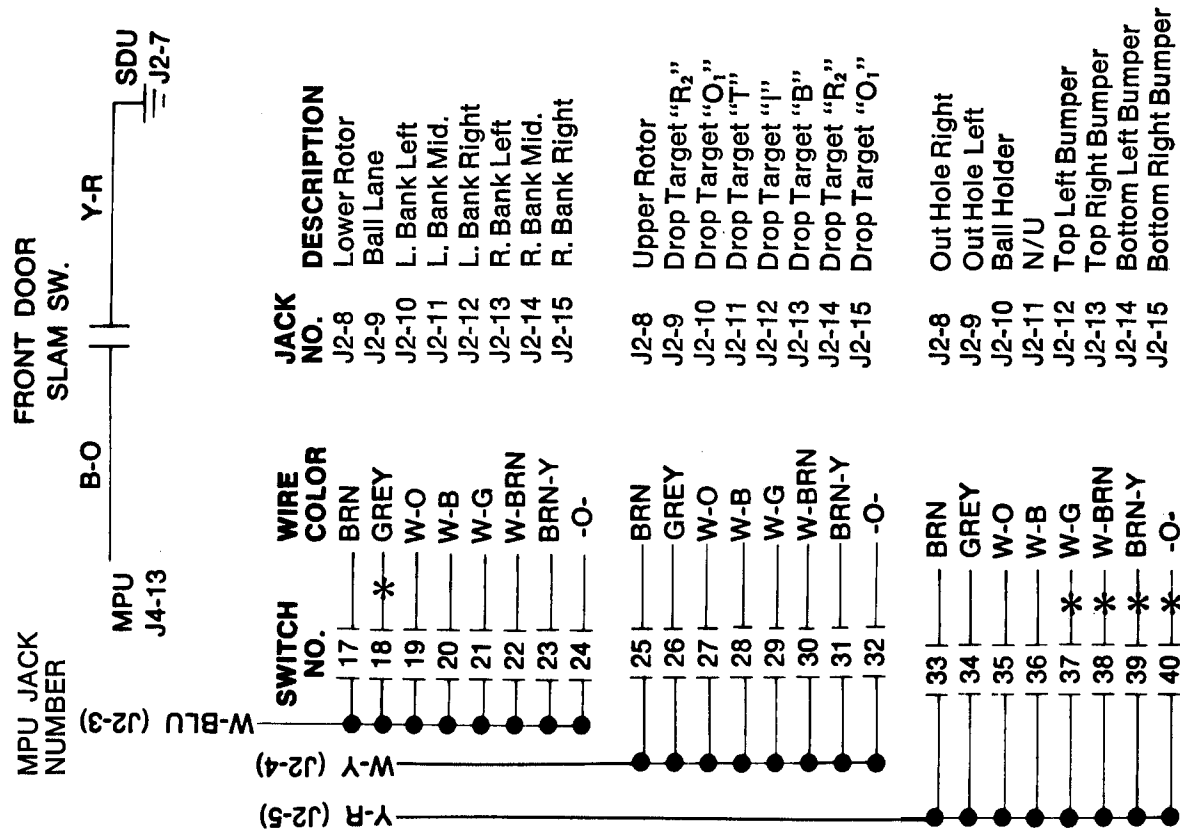
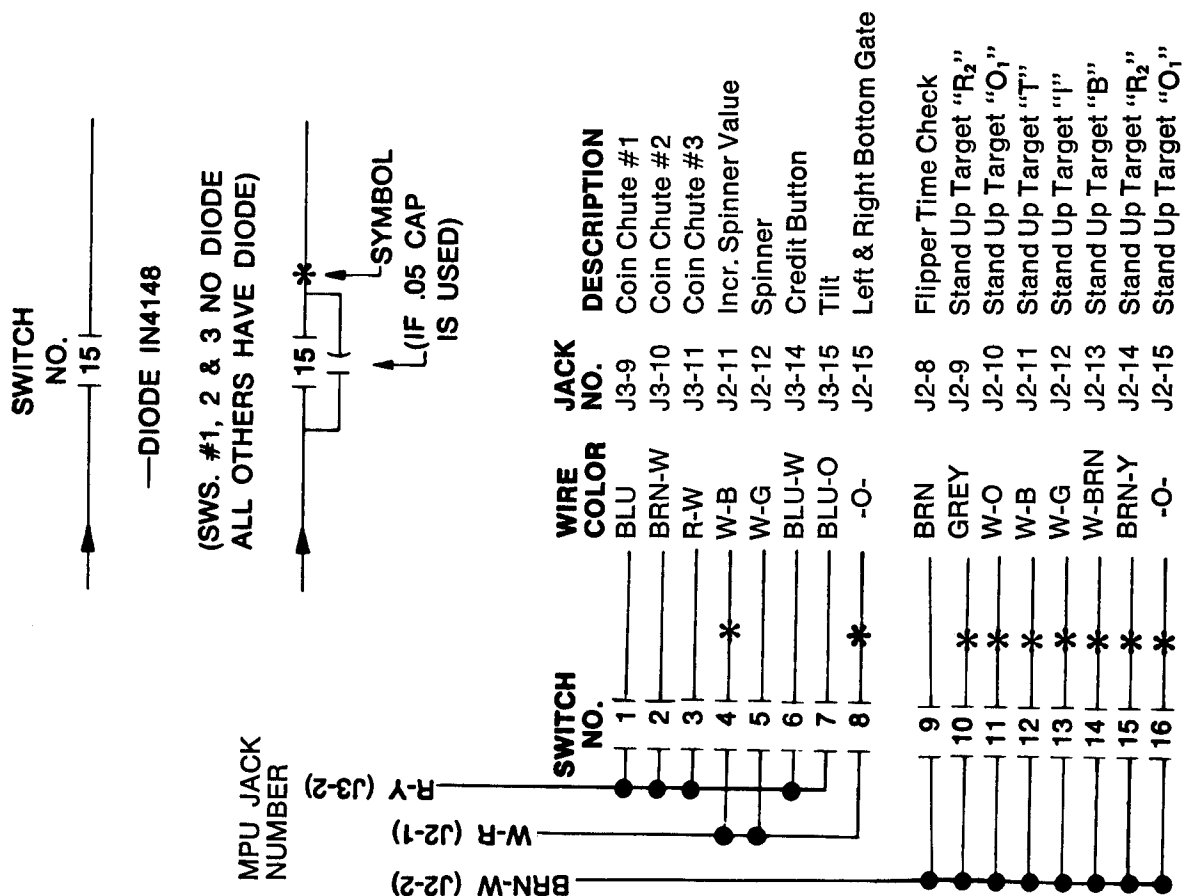


TABLE 8-4. MPU-200 JUMPER COMBINATIONS

The MPU-200 can be converted to use 25A Roms or E-Proms or any combination of Roms or E-Proms. Below are listed the jumpers needed for each memory chip.

U1 ROM Stern #25A- E9 to E8 E28 to E26		E-PROMS (paper on top) E9 to E10 E28 to E27	U5 ROM E19 to E20 E29 to E31		E-PROM E19 to E21 E29 to E30
U2 ROM E5 to E1 E2 to E6		E-PROM E5 to E7 E2 to E3	U6 ROM E13 to E12 E25 to E22		E-PROM E13 to E14 E25 to E23

The MPU-200 can be down graded to act as a MPU-100 (Rom's Only) following are jumper modifications:

- Remove - E32 - E33
- Remove - E34 - E35

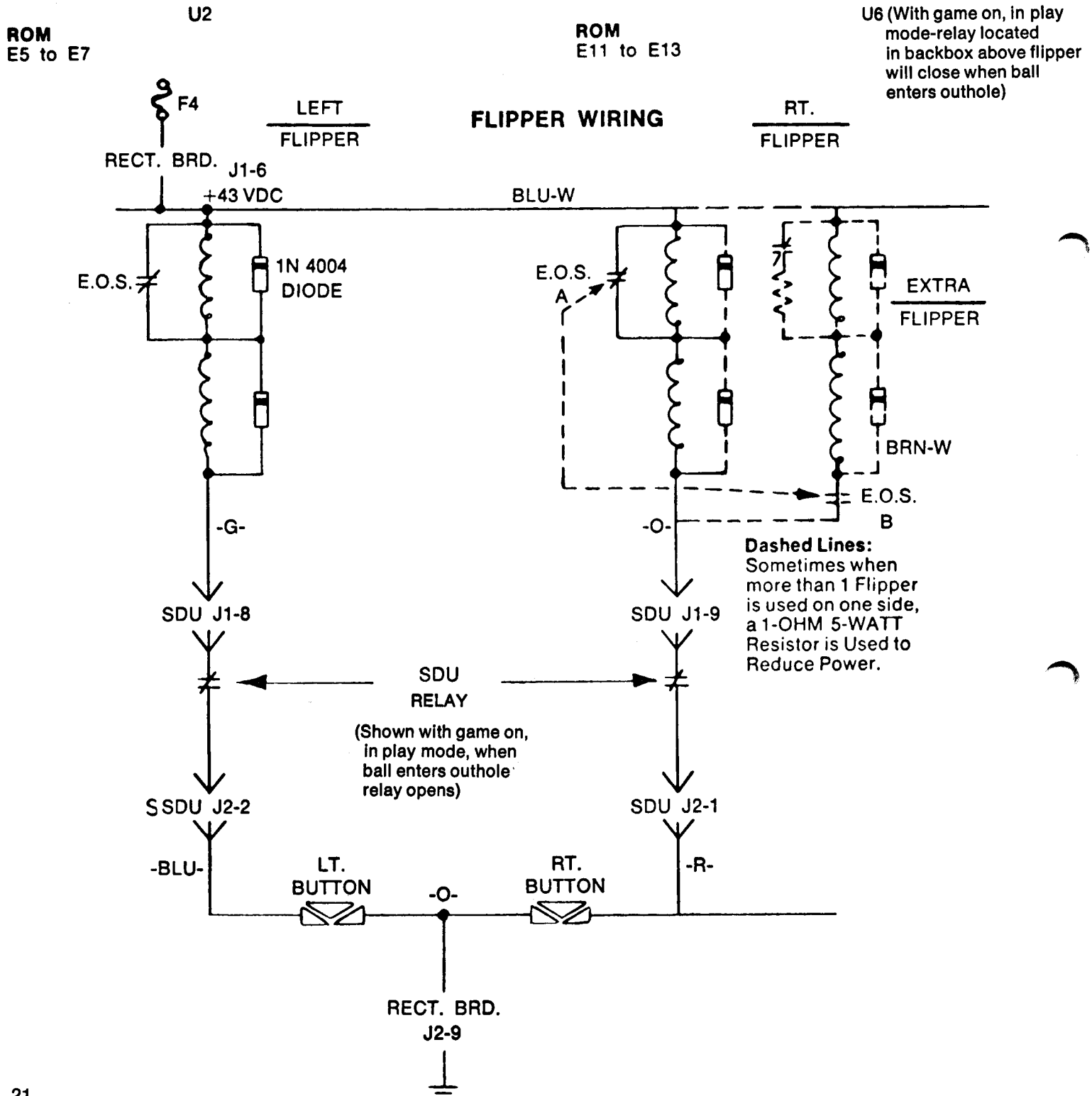
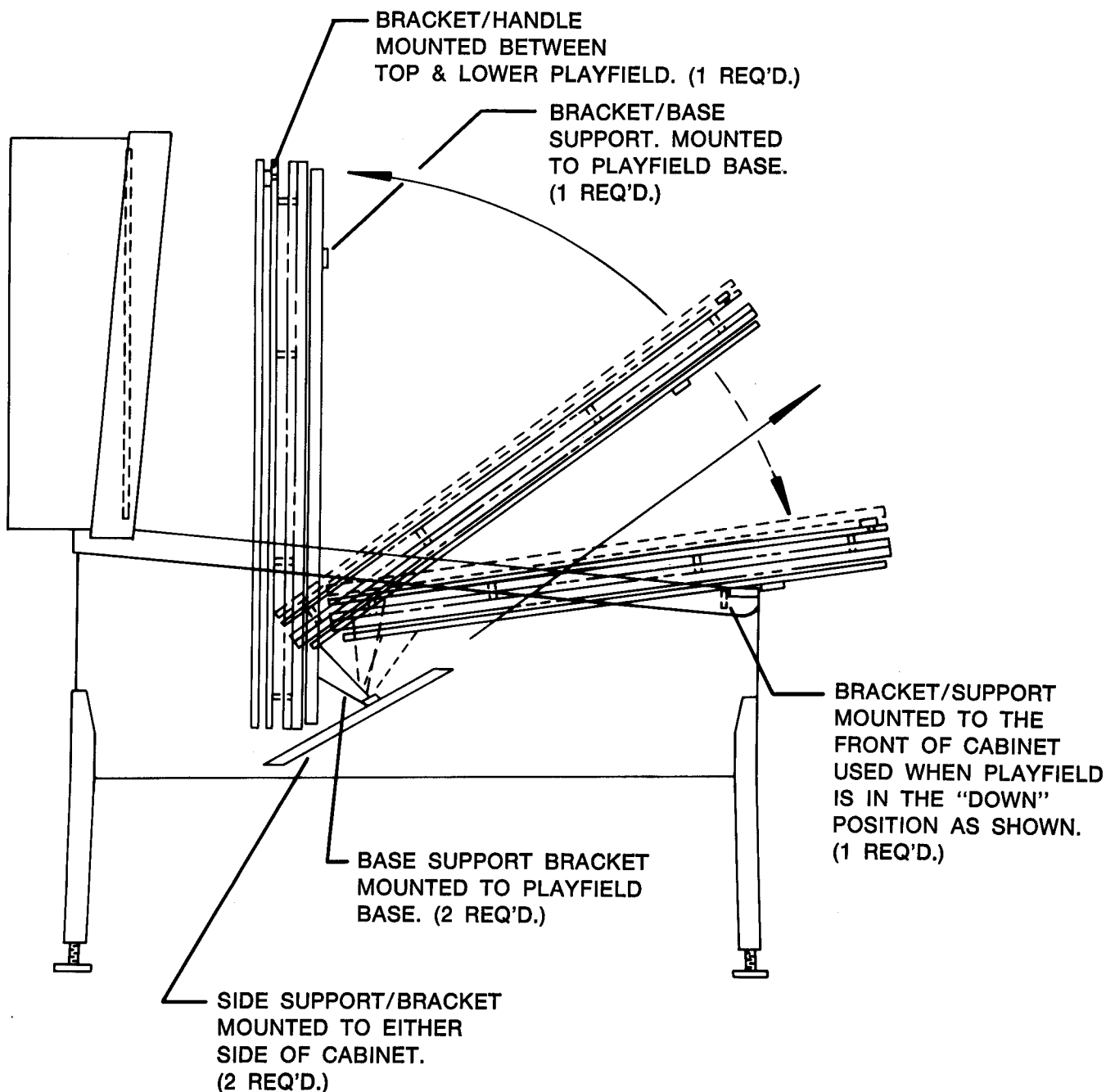
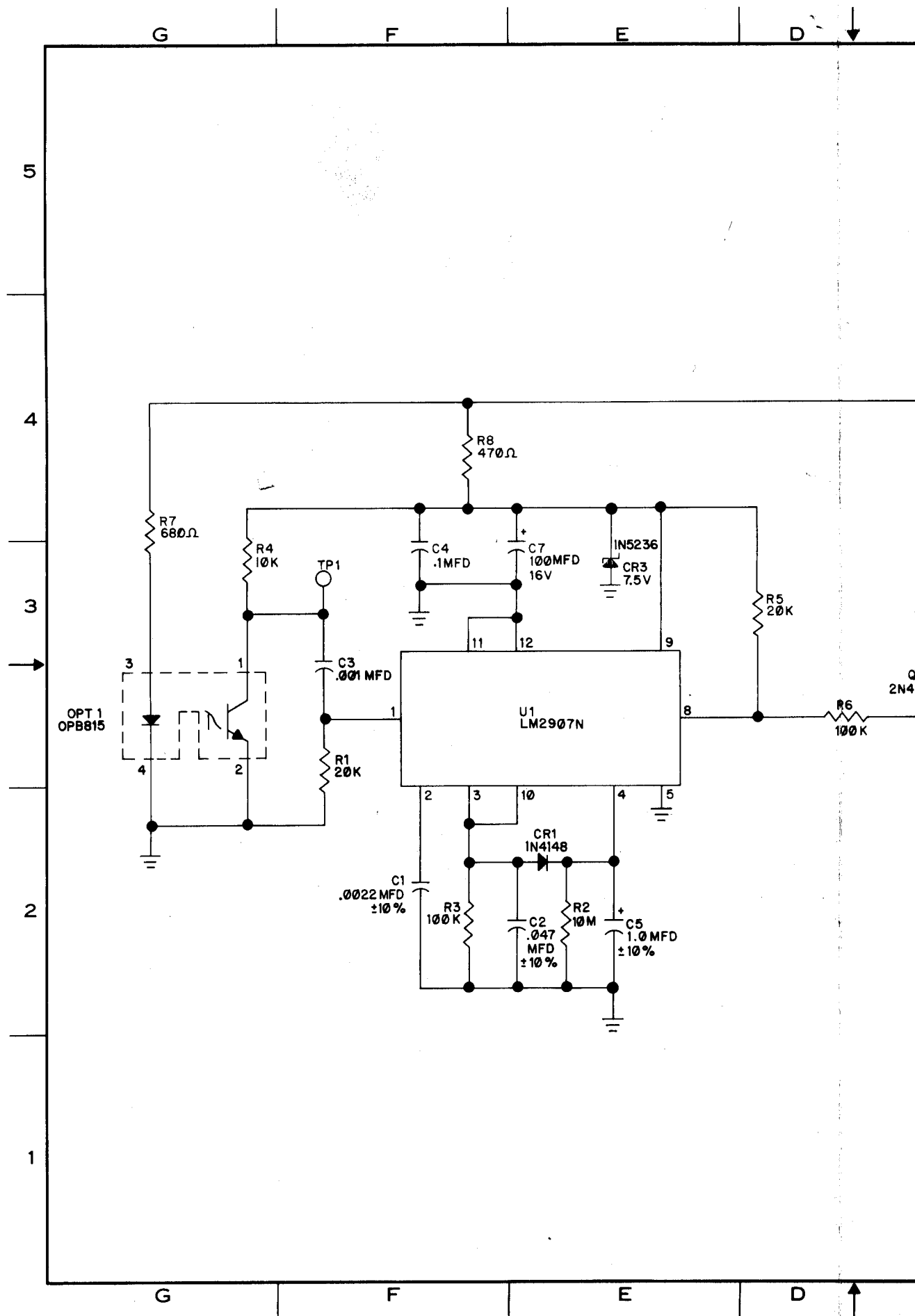


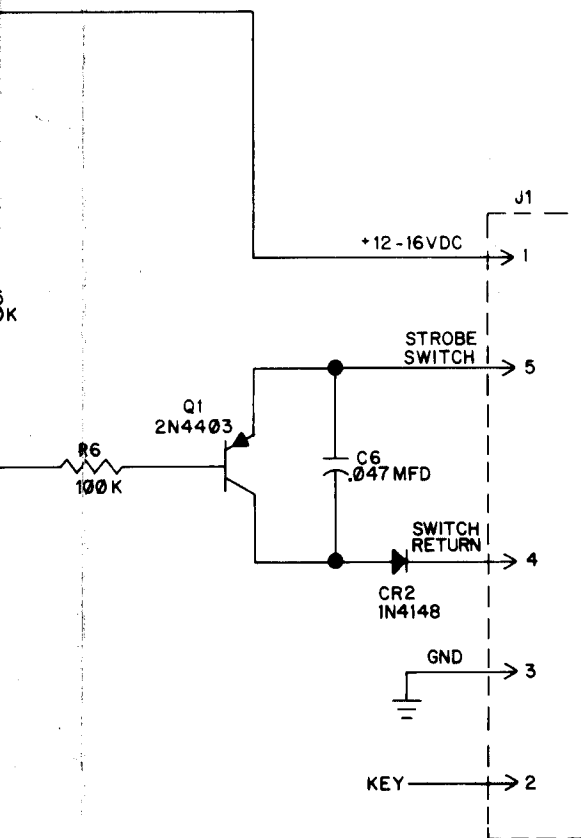
FIGURE 8-4. ADDITIONAL FLIPPER WIRING



SOLID ARROW SHOWS PLAYFIELD IN "UP" POSITION.
 DOTTED ARROW SHOWS PLAYFIELD IN "DOWN" POSITION.
 DIRECTION ARROW INDICATES HOW PLAYFIELD IS PULLED
 OUT OF CABINET FOR SERVICE EITHER UP OR DOWN.



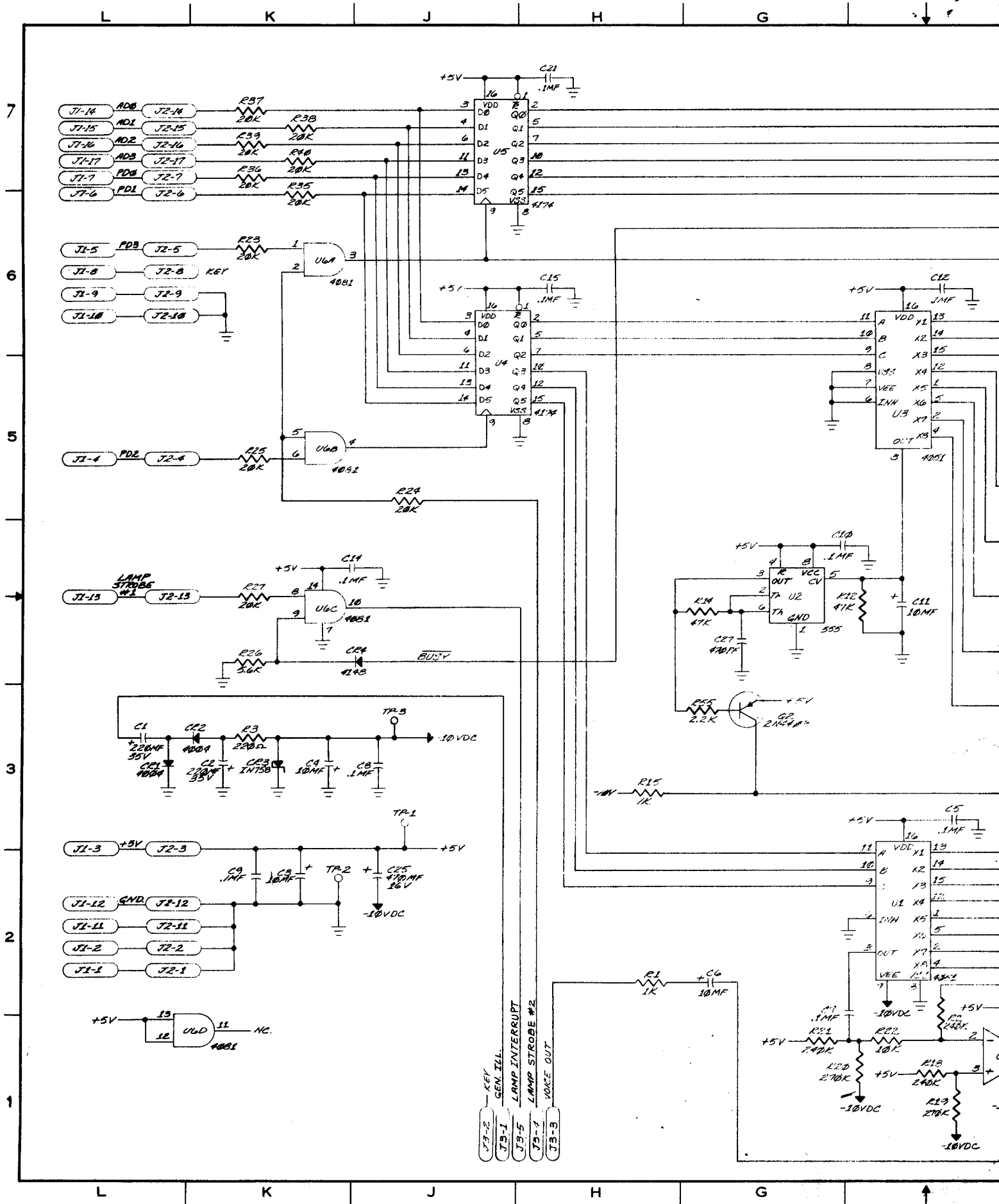
REVISIONS				
SYM	DESCRIPTION	DATE	CHK	APPRO
A	TO ISSUE E.I. 01434	PM8 1-4-82	2/1/82	2/1/82
B	CR3 ADDED, 2917 CHANGED TO 2907, TO INCORPORATE LATEST DESIGN CHANGES. E.I. 01565	2-21-82	2/21/82	2/26/82

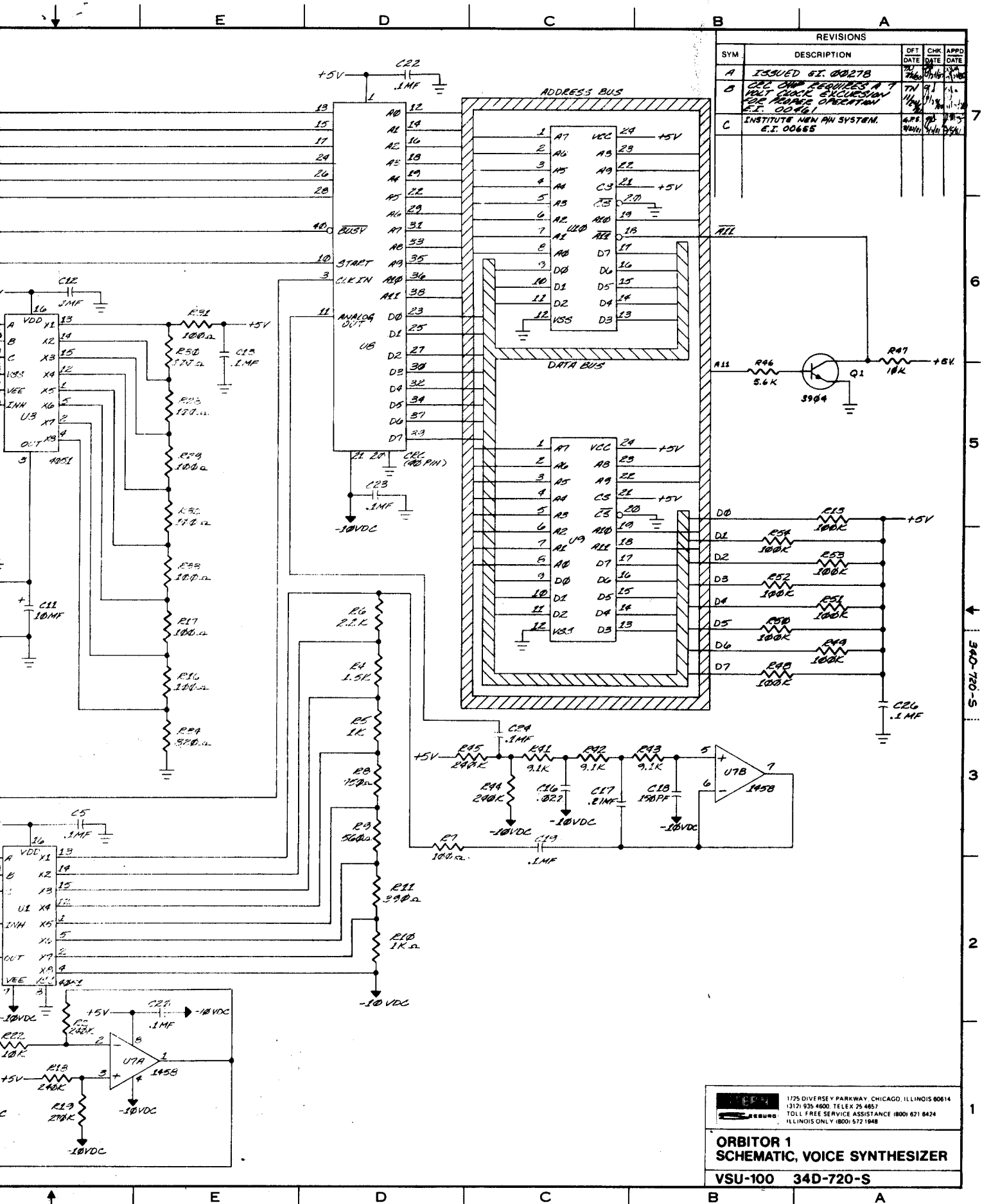


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**ORBITOR 1
SCHEMATIC, ROTOR SENSOR
P.C. BOARD**

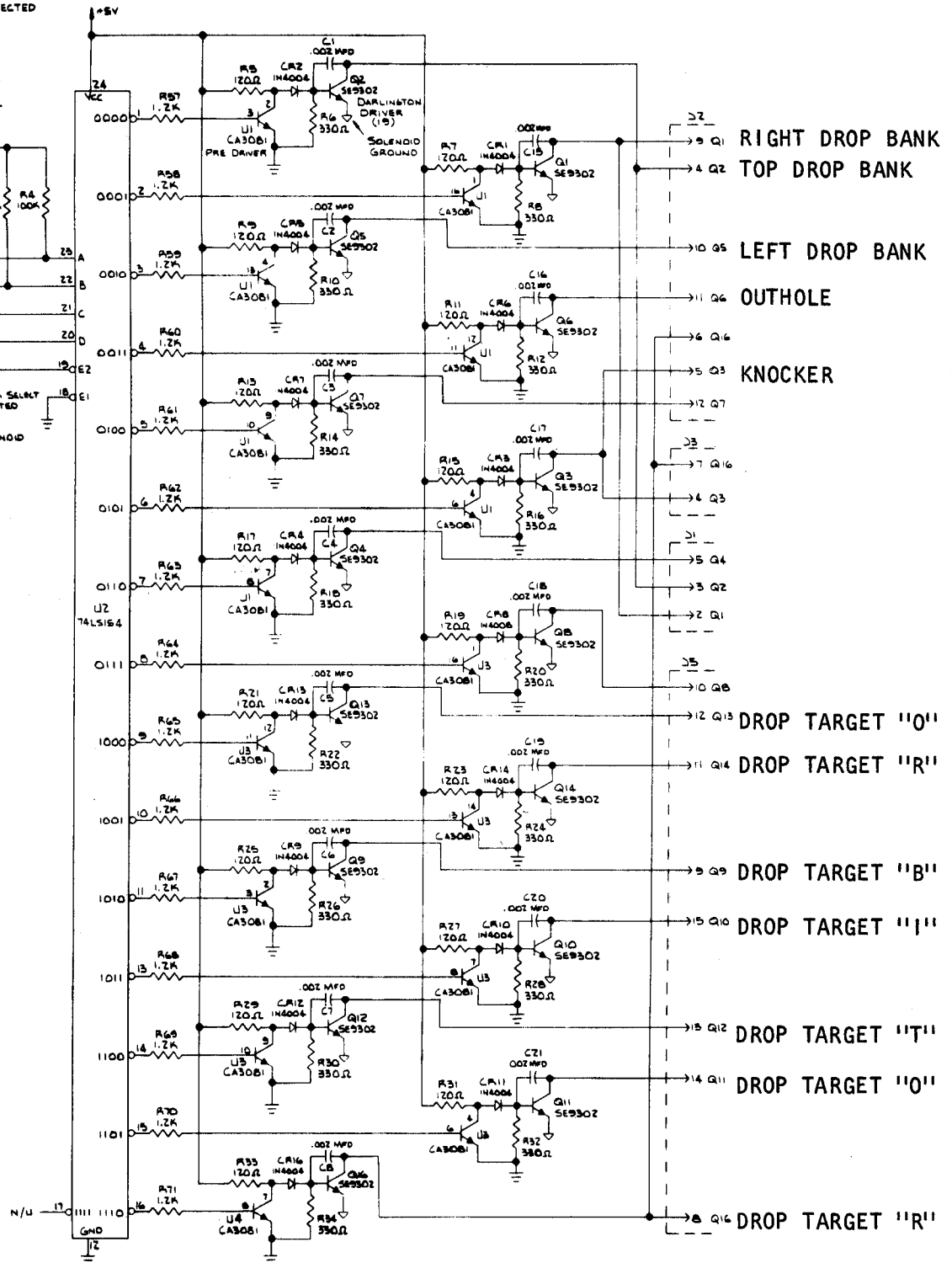
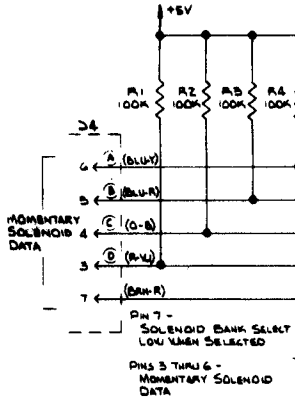
RS-100 34C-219-S





NOTES:

1. RAGE100 IS AN APPROVED ALTERNATE PART FOR TRANSISTORS Q1-Q15.
2. PIN 15 OF U1, U3, U4 IS EMITTER CONNECTED TO GROUND.
3. THE TAB ON SE9302 IS CONNECTED TO THE COLLECTOR OF THE TRANSISTOR.
4. LAST 'R' NUMBER USED R75
LAST 'C' NUMBER USED C29
LAST 'CR' NUMBER USED CR22
LAST 'U' NUMBER USED U4
LAST 'Q' NUMBER USED Q24



CONTINUOUS SOLENOID DATA

BANK
ANK
ANK

"0"
"R"

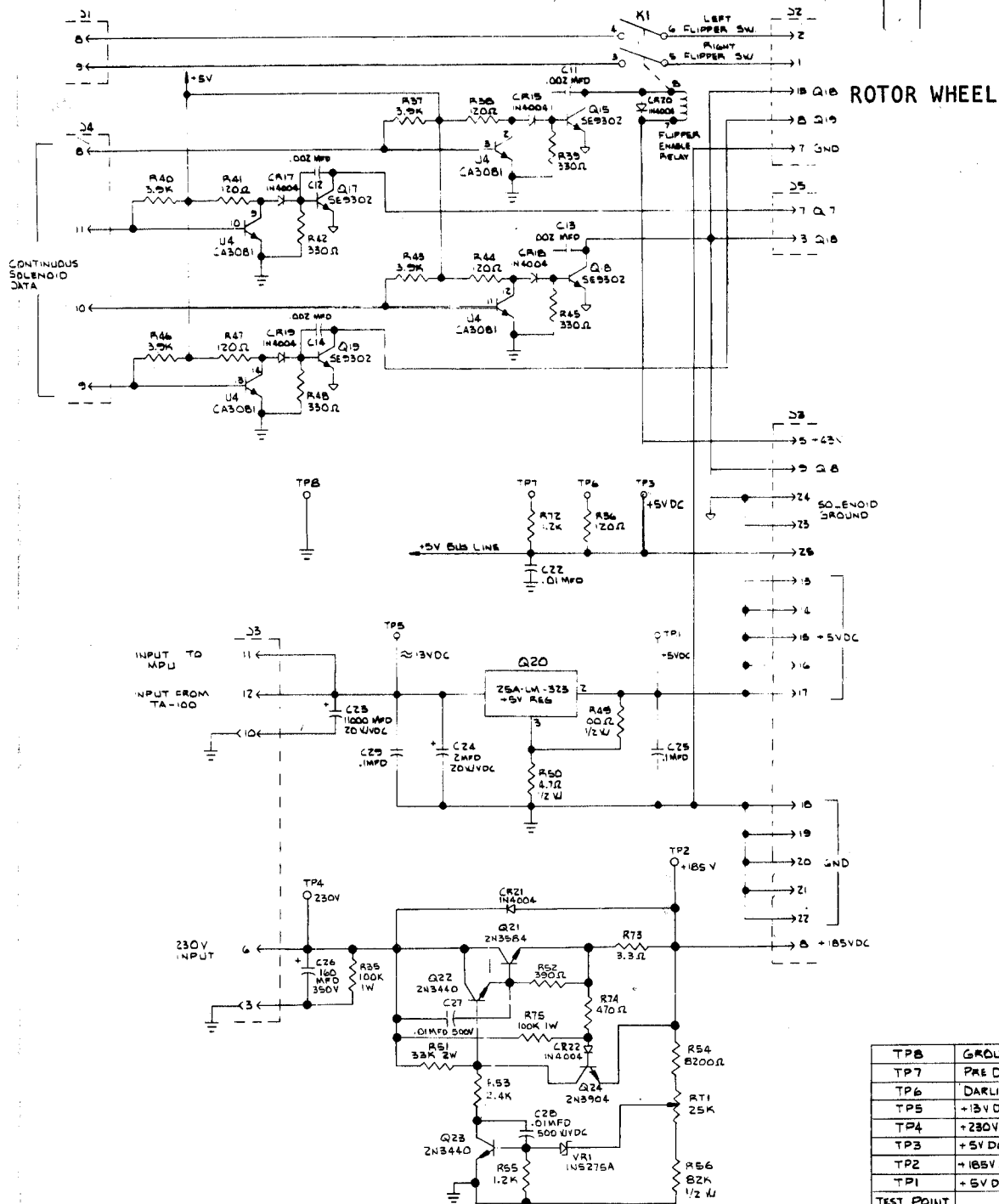
"B"

"I"

"T"

"0"

"R"



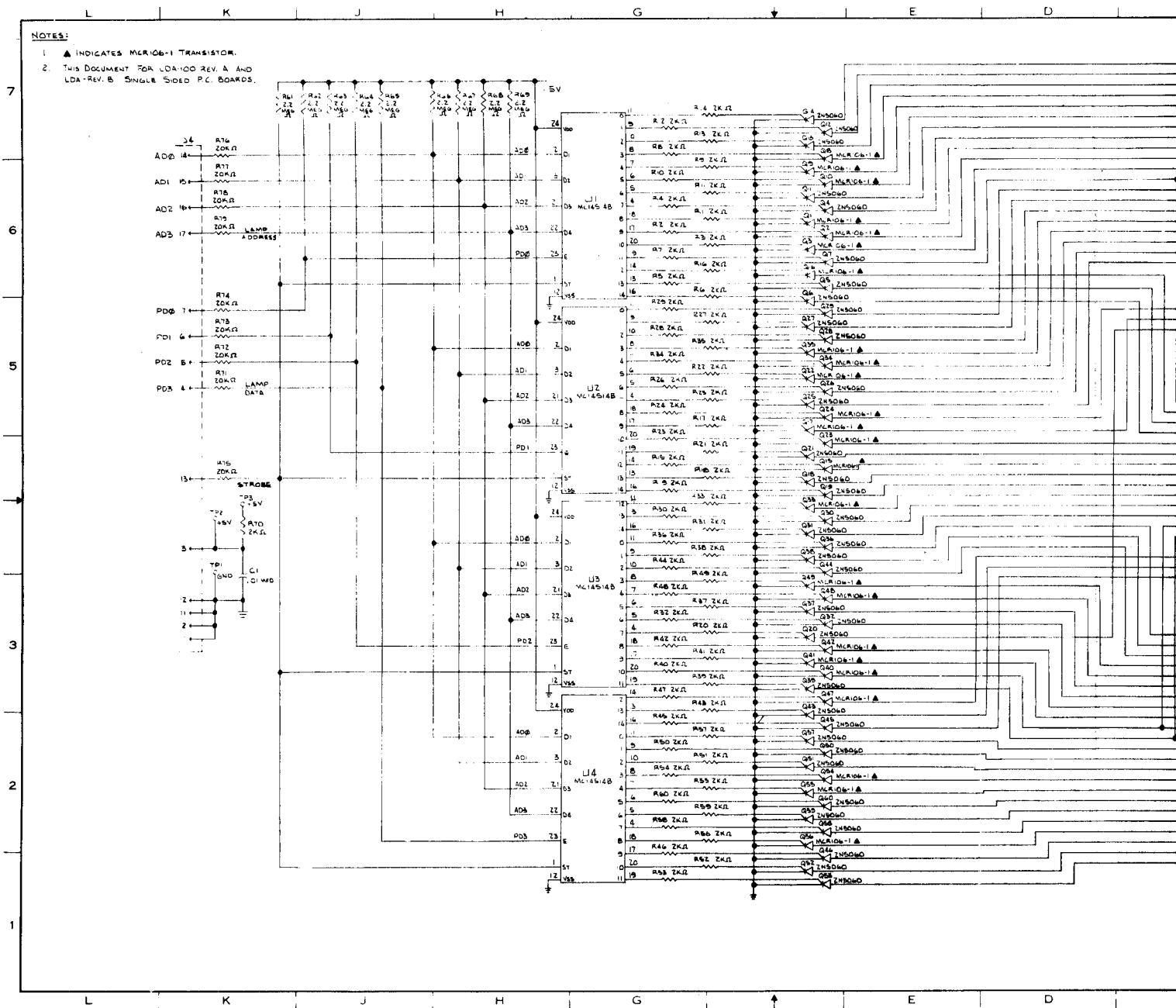
REVISIONS				
SNM	DESCRIPTION	DATE	BY	APPD
A	ISSUED, E.C.R A-009	11/2/77	W. J. H.	W. J. H.
B	DUG. CHG E.I. 00110	11/2/77	W. J. H.	W. J. H.
C	INSTITUTE NEW RH SYSTEM E.I. 00688	11/2/77	W. J. H.	W. J. H.

TP8	GROUND
TP7	PRE DRIVER BASE PROBE
TP6	DARLINGTON BASE PROBE
TP5	+13VDC Q20 UNREGULATED INPUT
TP4	+230VDC Q21 UNREGULATED INPUT
TP3	+5VDC BUS LINE
TP2	+135VDC Q21 REGULATOR OUTPUT
TP1	+5VDC Q20 REGULATOR OUTPUT
TEST POINT	CONNECTION

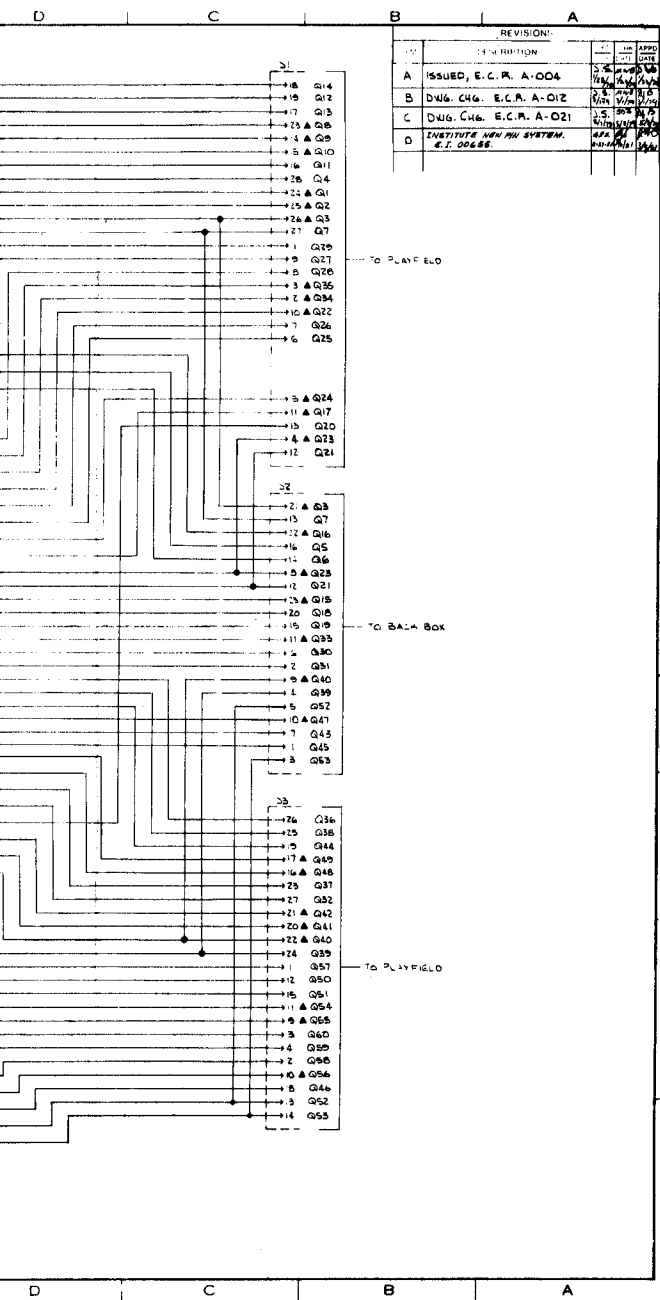
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ILLINOIS ONLY (800) 572-1948

**ORBITOR 1
SCHEMATIC, SOLENOID DRIVER
P.C. BOARD**

SPU-100 34D-432-S



ORBITOR 1



REVISION			
NO.	DESCRIPTION	DATE	BY
A	ISSUED, E.C.P. A-004	5-6-58	W.A.
B	DRUG. CHG. E.C.P. A-012	5-8-58	W.A.
C	DRUG. CHG. E.C.P. A-021	5-8-58	W.A.
D	INSTITUTE NEW PU SYSTEM. E.C. 00688	5-8-58	W.A.

DESCRIPTION	WIRE COLOR	JACK LDA	PIN NO.	TRANSISTOR	I.C.	PIN	CODE
S.U. TARGET "O"	BLU-R	J1	18	Q14	U1	11	0000
S.U. TARGET "R"	O-R	J1	1	Q29	U2	11	0000
S.U. TARGET "B"	BLU-Y	J3	26	Q36	U3	11	0000
S.U. TARGET "I"	W-BLU	J3	1	Q57	U4	11	0000
S.U. TARGET "O"	GREY-B	J1	9	Q27	U2	9	0001
S.U. TARGET "R"	R-Y	J3	25	Q38	U3	9	0001
RIGHT BANK L. DROP TARGET	BLU-W	J3	12	Q50	U4	9	0001
RIGHT BANK MID. DROP TARGET	G-R	J1	17	Q13	U1	10	0010
RIGHT BANK R. DROP TARGET	B-G	J1	8	Q28	U2	10	0010
LEFT BANK L. DROP TARGET	BLU-O	J3	19	Q44	U3	10	0010
LEFT BANK MID. DROP TARGET	W-B	J3	15	Q51	U4	10	0010
LEFT BANK R. DROP BANK	BRN-BLU	J1	23	Q8	U1	8	0011
LEFT SPECIAL BY RIGHT	R-G	J1	14	Q9	U1	7	0100
DROP BANK							
GREEN SHOOT AGAIN	Y-BLU	J1	2	Q34	U2	7	0100
SPECIAL DROP TARGET	O	J3	3	Q60	U4	6	0101
S.U. TARGET "T"	O-W	J1	19	Q12	U1	9	0001
SHOOT AGAIN (BACK BOX)	BRN-B	J2	23	Q15	U2	14	1100
3000/SPIN BY SPINNER	BRN-B	J1	24	Q1	U1	18	1000
3000/SPIN BY SPINNER	PUR-W	J1	5	Q24	U2	18	1000
3000/SPIN BY SPINNER	G-B	J3	21	Q42	U3	18	1000
MULTIPLIER 1X	O-B	J3	10	Q56	U4	18	1000
MULTIPLIER 2X	B-BLU	J1	25	Q2	U1	17	1001
MULTIPLIER 3X	B-O	J1	11	Q17	U2	17	1001
MULTIPLIER 4X	W-O	J3	20	Q41	U3	17	1001
MULTIPLIER 5X	R-BLU	J3	18	Q46	U4	17	1001
SHOOT AGAIN	GREY-R	J1	26	Q3	U1	20	1010
EXTRA BALL	GREY-R	J2	21	Q3	U1	20	1010
HIGH SCORE TO DATE	GREY-O	J2	22	Q16	U1	14	1100
GAME OVER &	GREY-W	J2	11	Q33	U3	14	1100
HIGH GAME TO DATE							
TILT	GREY-B	J2	10	Q47	U4	14	1100
100th GAME	O	J2	20	Q18	U2	13	1100
100th GAME	Y	J2	6	Q30	U3	13	1100
EXTRA BALL SPECIAL	R-W	J2	14	Q6	U1	16	1110
MATCH	GREY-Y	J2	1	Q45	U4	16	1110

NOTES:

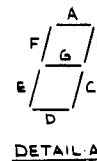
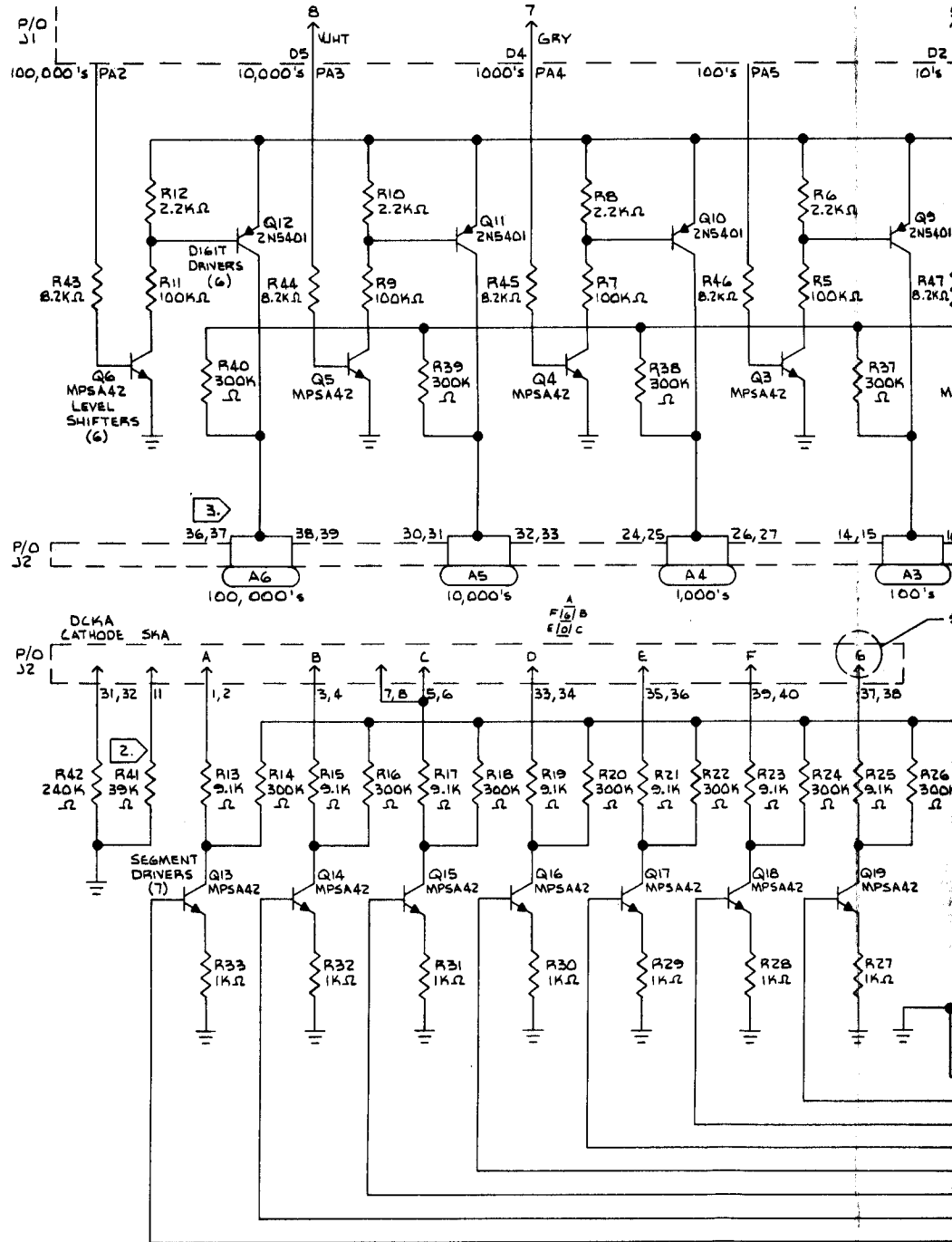
1 PIN 15 WIRE COLOR

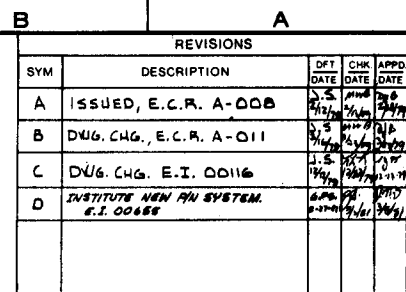
PLAYER #1	BLK / WHT
PLAYER #2	ORG / BLU
PLAYER #3	RED / YEL
PLAYER #4	BRN / ORG
MATCH/BALL	RED / BLK

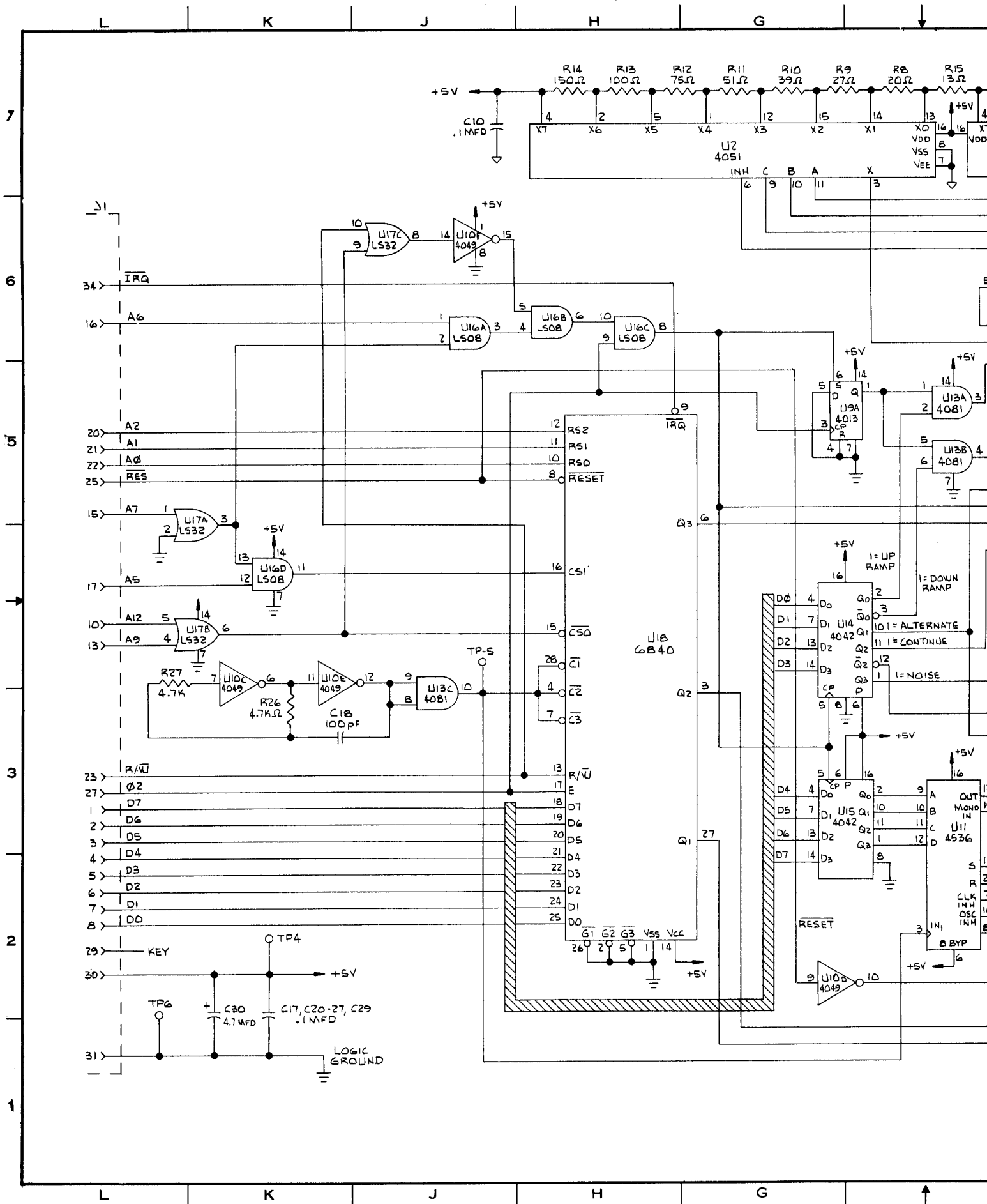
2 OMIT FOR BECKMAN DISPLAYS.

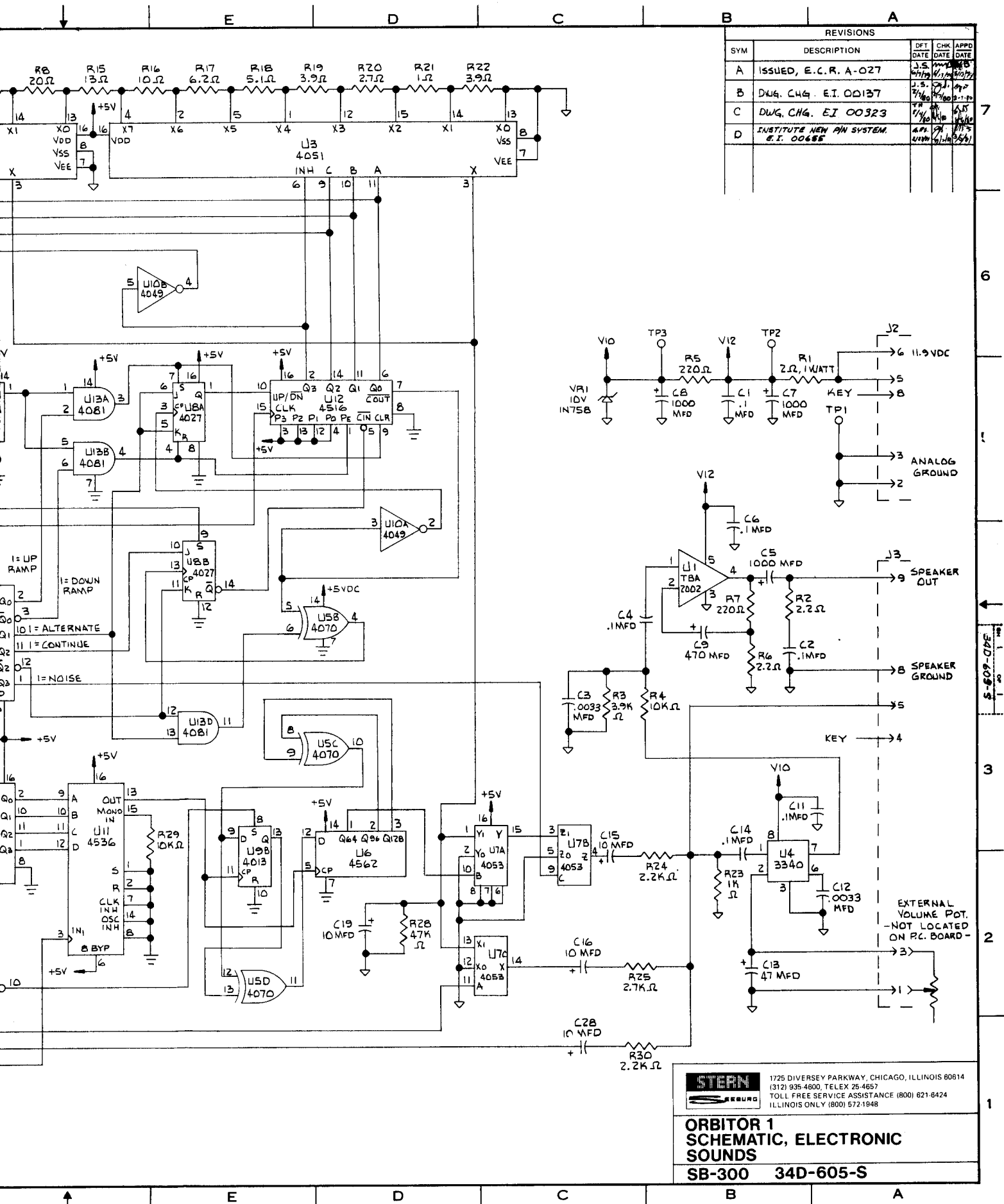
3 36, 37 DENOTES

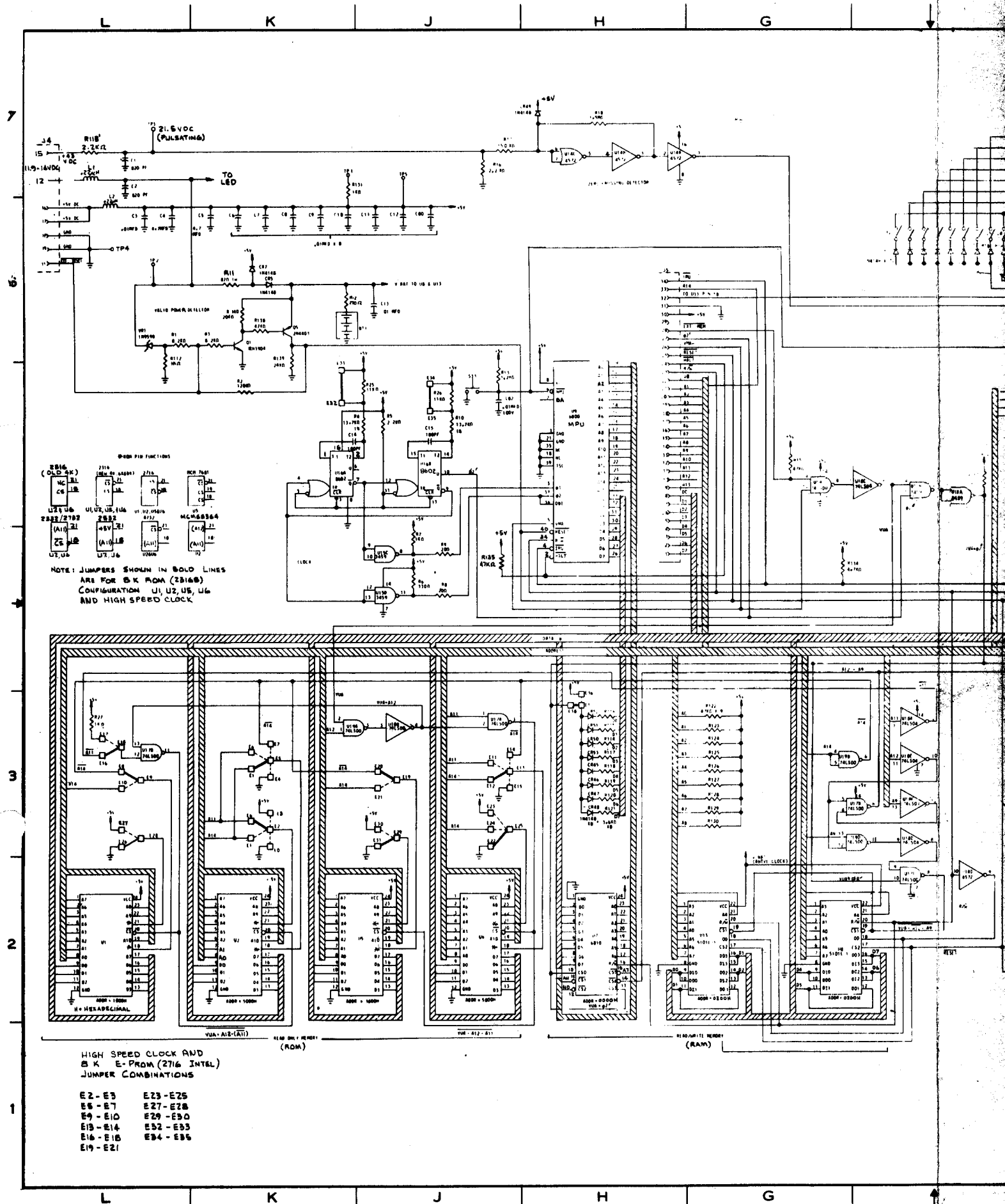
BECKMAN DISPLAY TERMINAL*	PANTEK DISPLAY TERMINAL
---------------------------------	-------------------------------





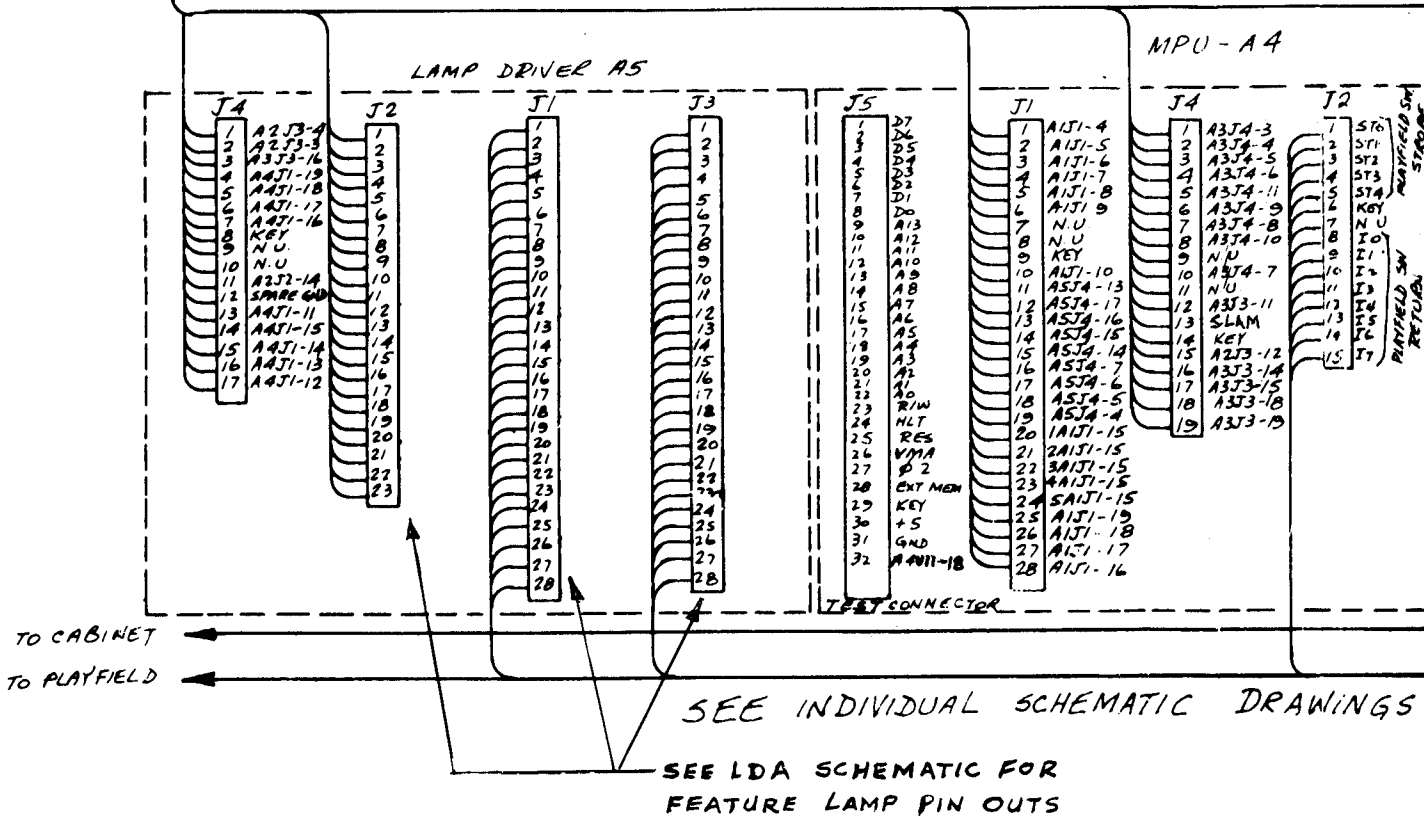
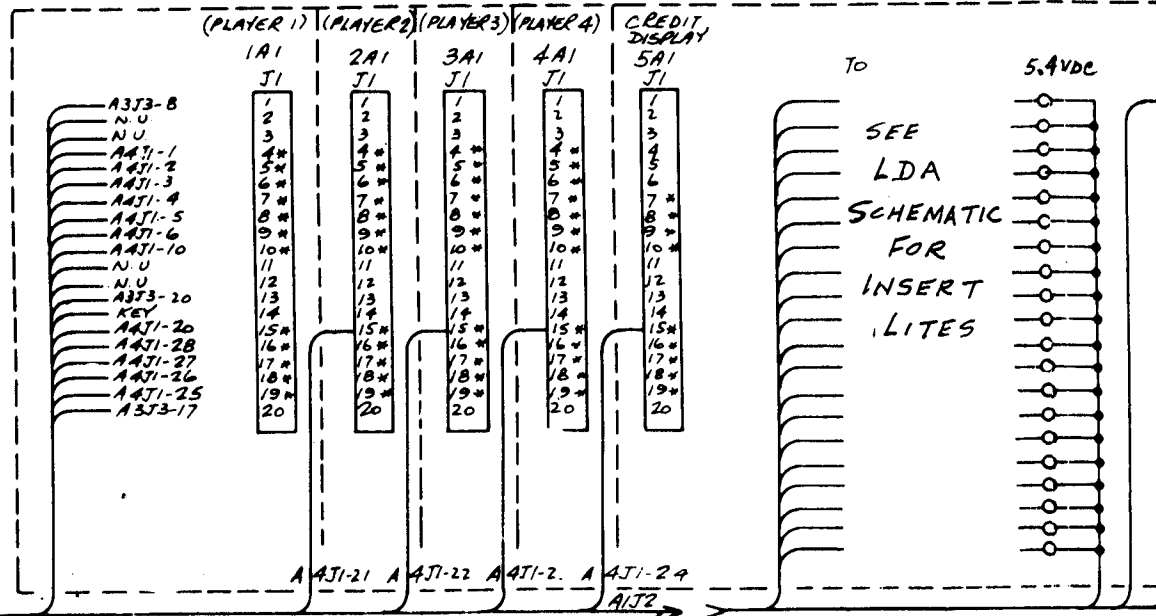




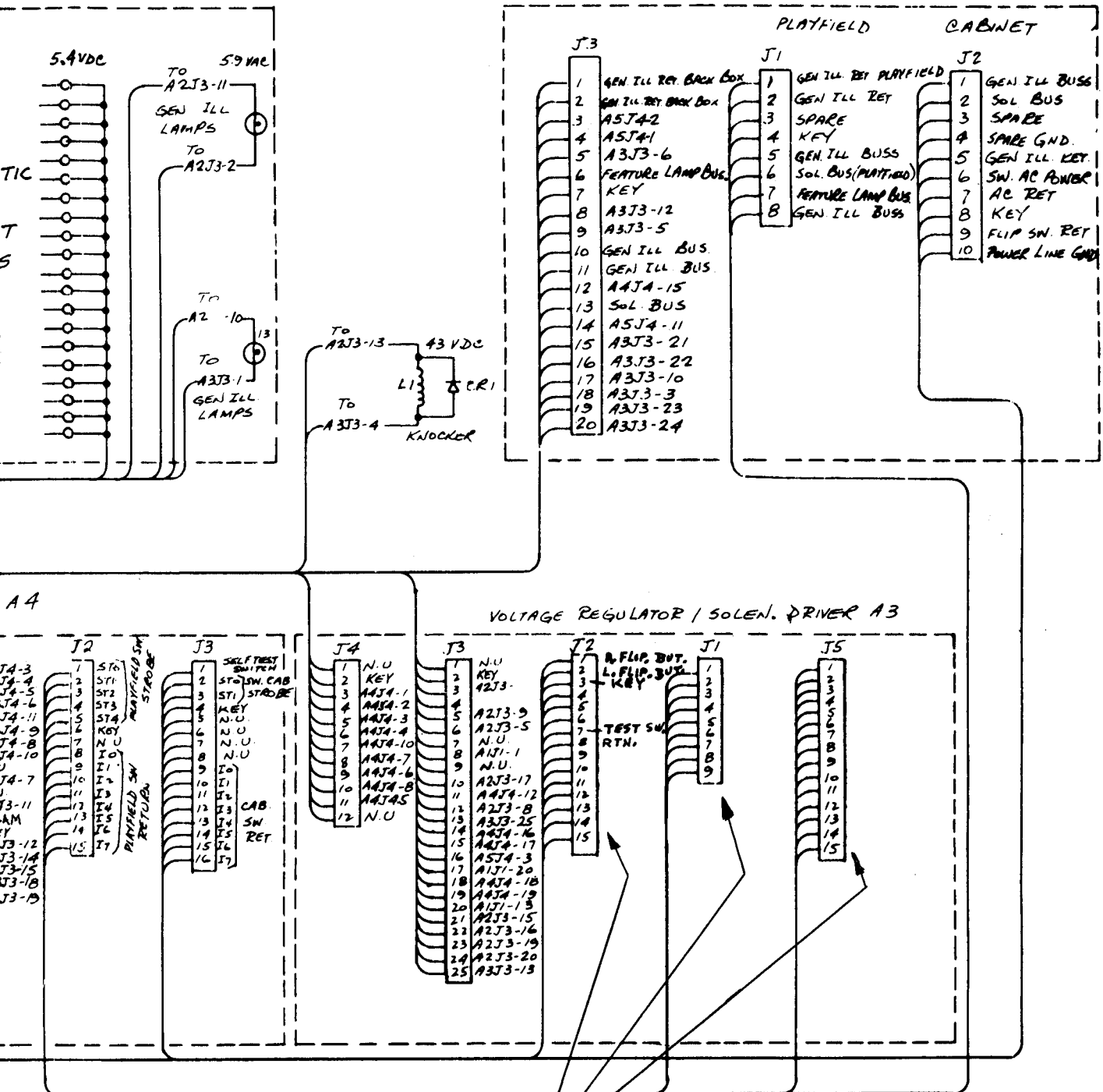


AI INSERT

FROM	A1J3 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



A2 TRANSFORMER

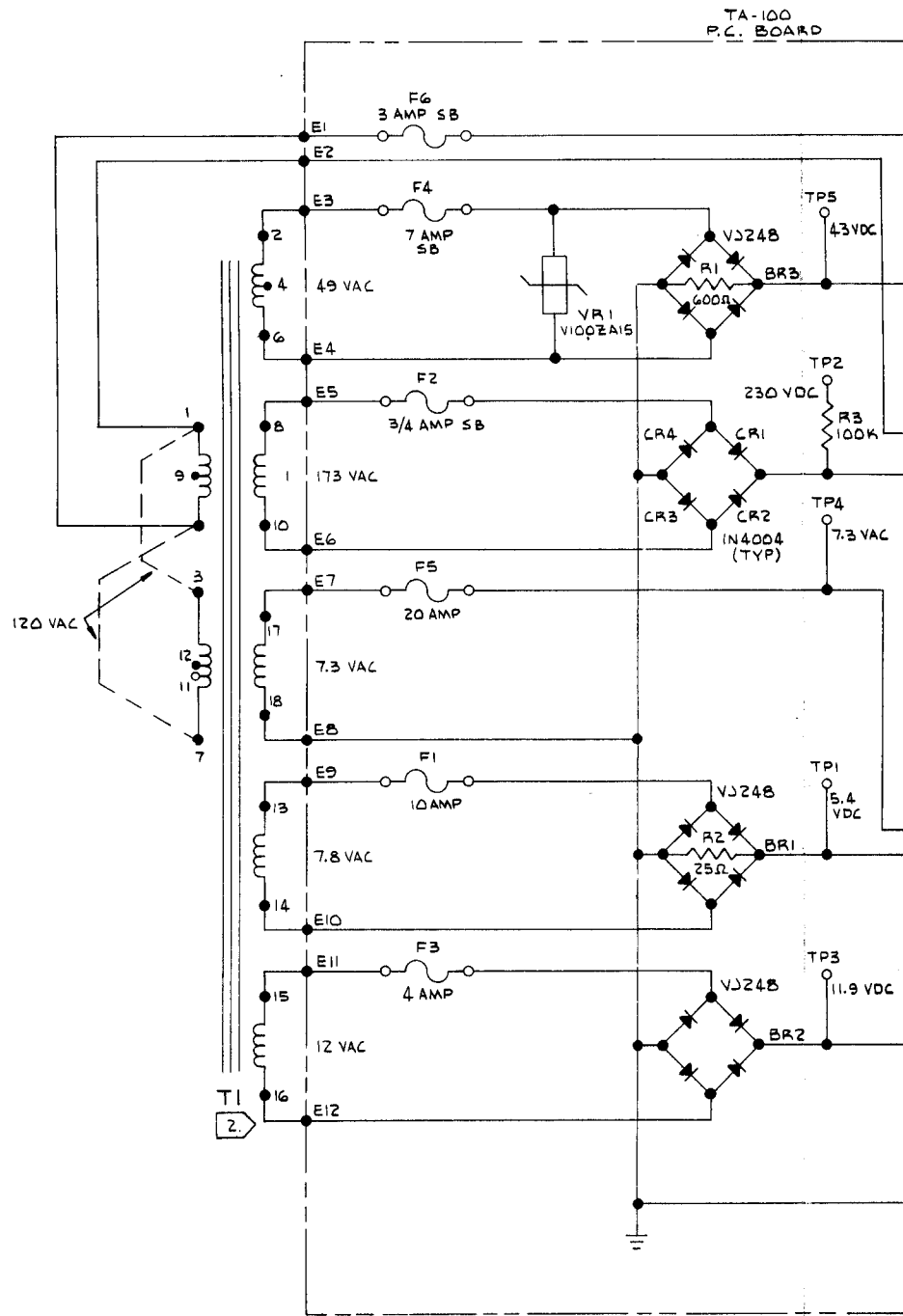


NOTES:

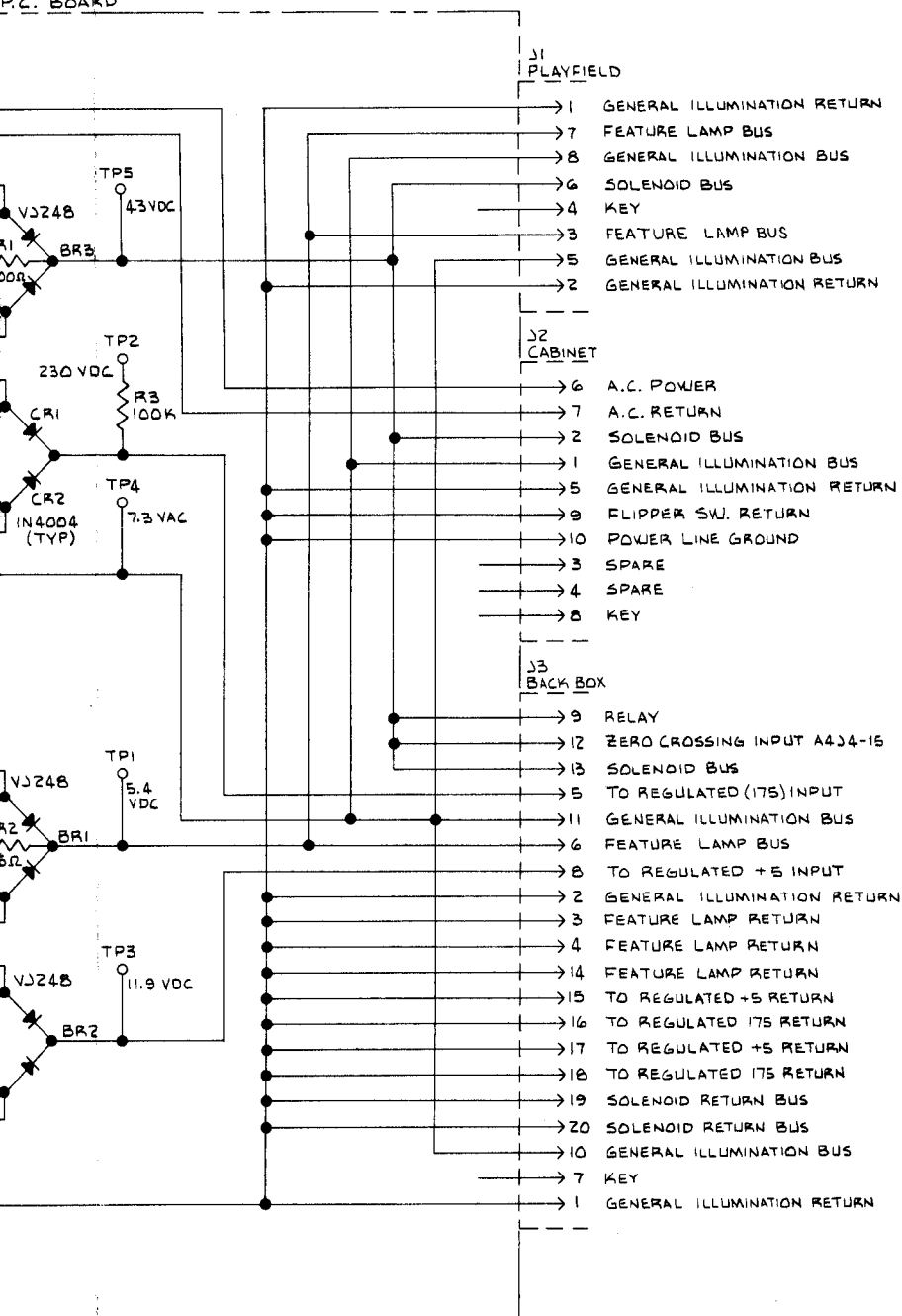
1. POWER LINE CONNECTIONS:

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

2. T1 IS NOT LOCATED ON PRINTED CIRCUIT BOARD.



TA-100
P.C. BOARD



REVISIONS				
SYM	DESCRIPTION	DFT DATE	CHK DATE	APRD DATE
B	ISSUED, E.C.R. A-015	J.S. 2/16/64	2/16/64	2/16/64
C	ADDED JUMPER BETWEEN J1 PIN 3 & 7 E.I. 00164	T.H. 2/16/64	2/16/64	2/16/64
D	F4 WAS 5 AMP, CHANGED TO 7 AMP PER E.I. 00188	J.S. 2/16/64	2/16/64	2/16/64
E	INSTITUTE NEW PIN SYSTEM E.I. 00688	J.S. 2/16/64	2/16/64	2/16/64

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**ORBITOR 1
SCHEMATIC, POWER
TRANSFORMER**
TA-100 34D-964-S

NOTES:

1. PIN IS WIRE COLOR

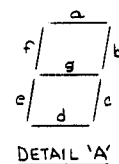
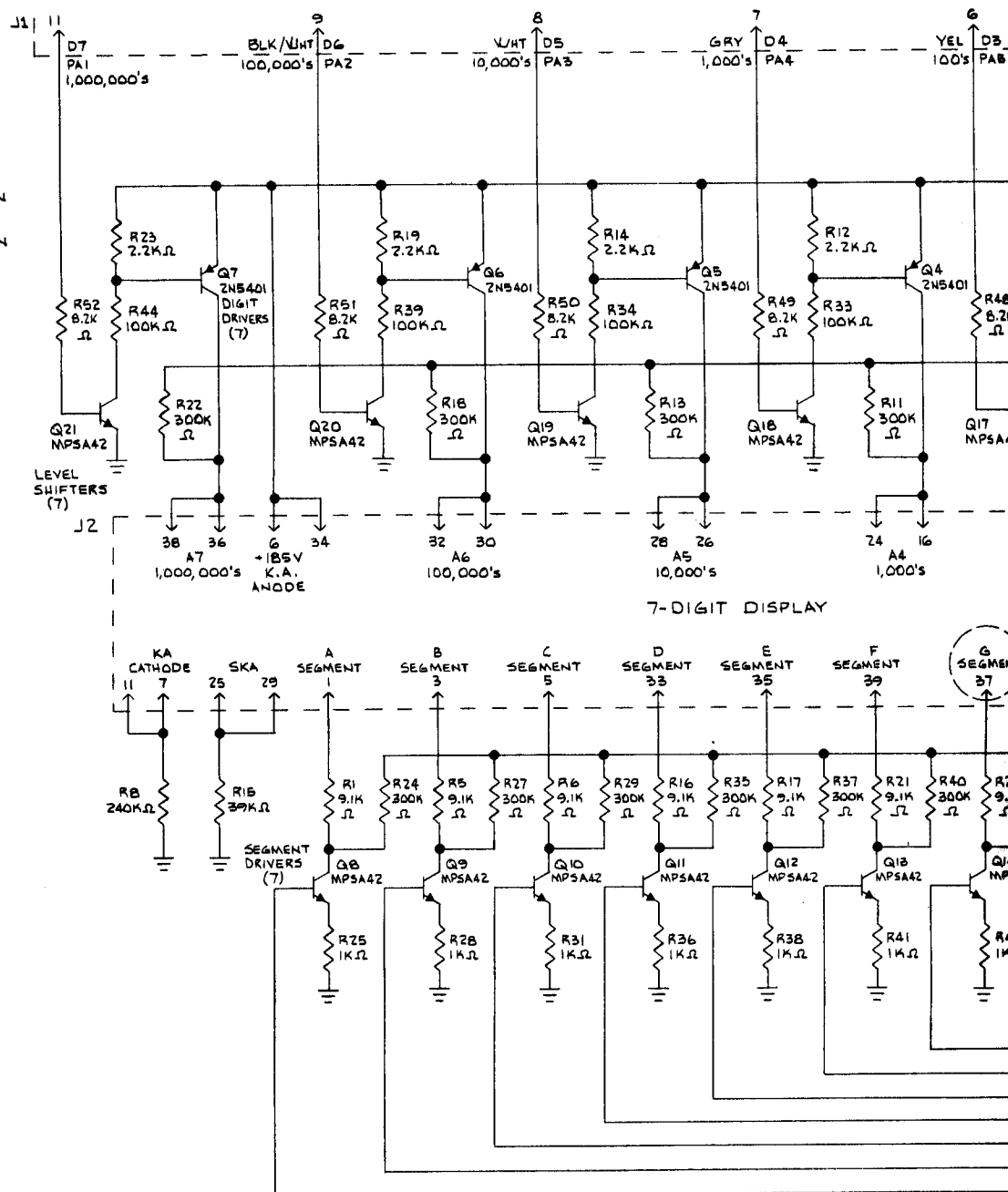
PLAYER #1 BLK/WHT
 PLAYER #2 ORG/BLU
 PLAYER #3 RED/YEL
 PLAYER #4 BRN/ORG
 MATCH/BALL RED/BLACK

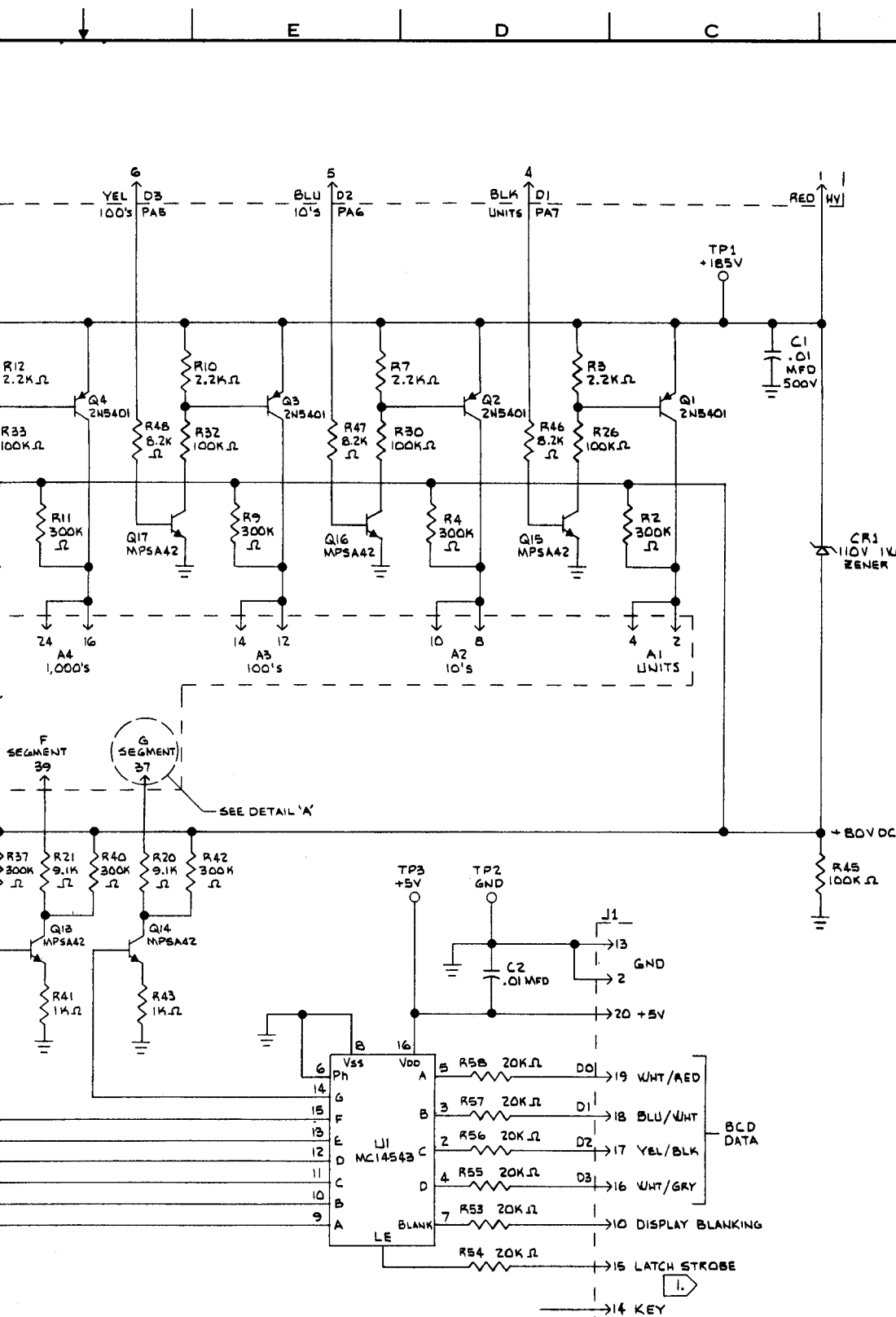
2. LAST 'C' NUMBER USED C2
 LAST 'CR' NUMBER USED CR1
 LAST 'J' NUMBER USED J2
 LAST 'Q' NUMBER USED Q21
 LAST 'R' NUMBER USED R58
 LAST 'TP' NUMBER USED TP3
 LAST 'U' NUMBER USED U1

3. ON P.C. BOARD LEGEND;

NOMENCLATURE DD IS THE ABBREVIATION FOR DIGIT DRIVER.

NOMENCLATURE LS IS THE ABBREVIATION FOR LEVEL SHIFTER.

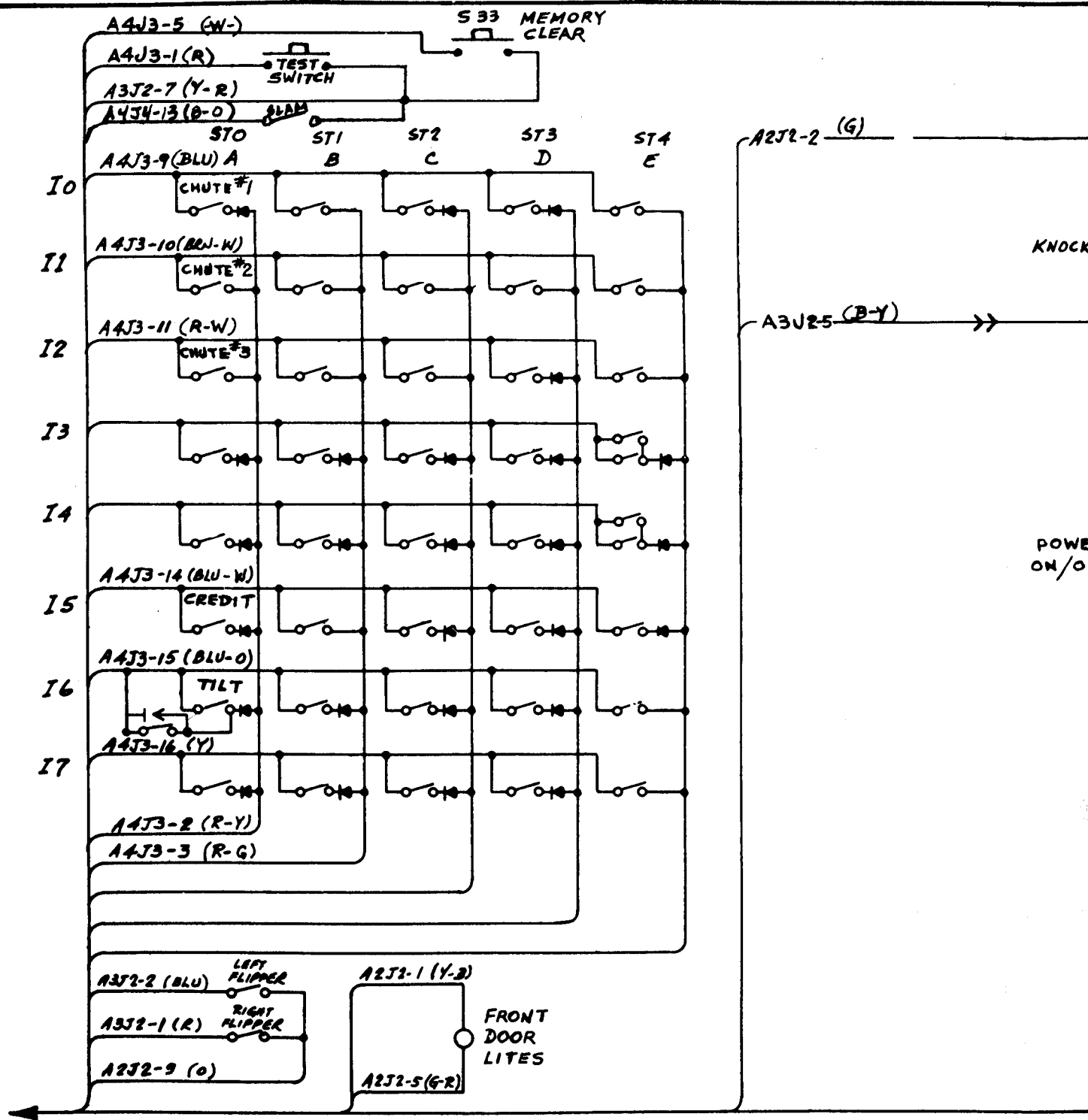




REVISIONS				
SYM	DESCRIPTION	DFT DATE	CHK DATE	APPD DATE
A	ISSUED E.I. 00111	13. 01. 1974	13. 01. 1974	13. 01. 1974
B	DWG. CHANGE E.I. 00123	13. 02. 1974	13. 02. 1974	13. 02. 1974
C	INSTITUTE NEW PIN SYSTEM E.I. 00688	13. 04. 1974	13. 04. 1974	13. 04. 1974

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ORBITOR 1
SCHEMATIC, 7-DIGIT DISPLAY
PC BOARD
DA-300 34D-645-S



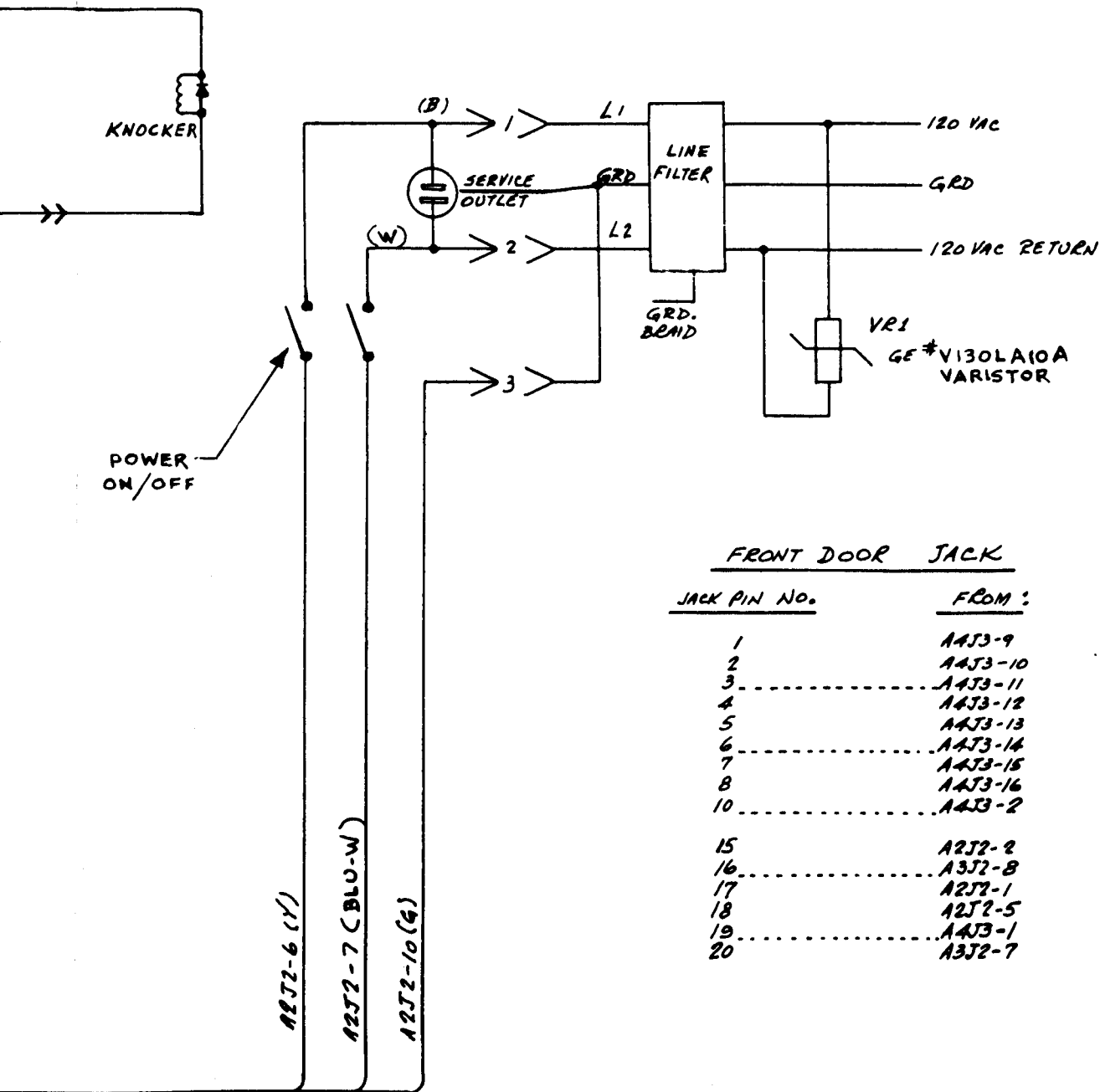
ORBITO

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

12B-432-121-1

DIETZEN NO. 100M AGEPROOF

ISSUE	CHANGE



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

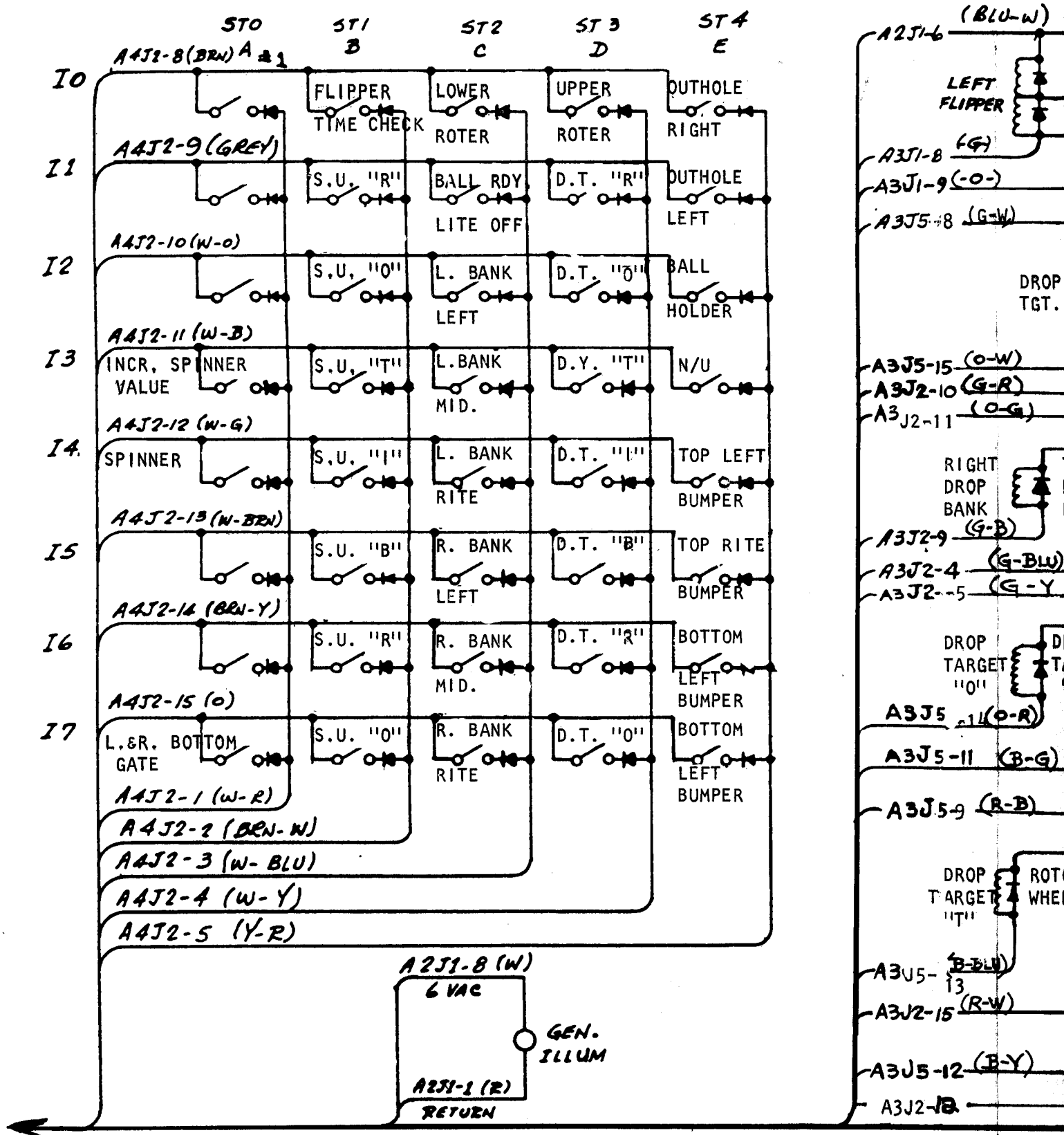
BITOR 1

NGE	DATE



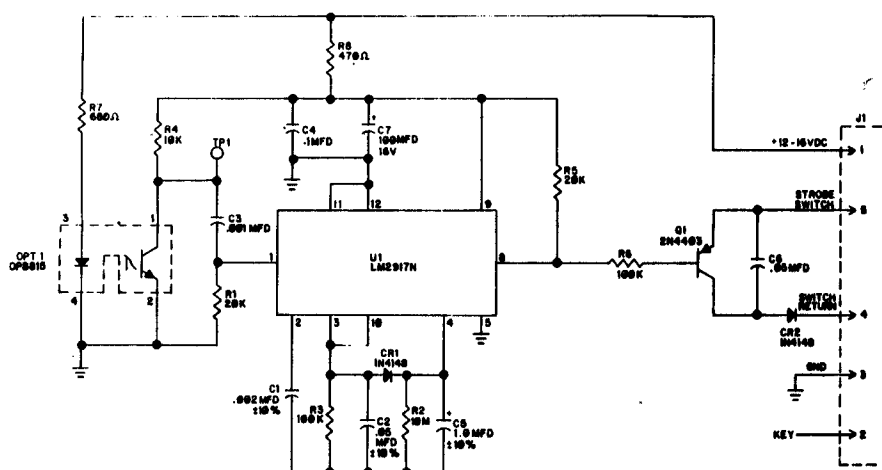
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 ILLINOIS ONLY (800) 572-1948

ORBITOR 1
CABINET AND FRONT DOOR
WIRING
STANDARD



R.O.W. = ROLL OVER WIRE
 S.U. = STAND-UP TARGET
 D.T. = DROP TARGET

PLAYFIELD **ORBITOR 1**



-A2J5-7(BLU) FEATURE LAMP BUS
-A2J5-3(BLU)



ELECTRONICS, INC.

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Illinois only (800) 572-1948