

Gottlieb's **ROLLER DISCO**



SOLID STATE
**INSTRUCTION
MANUAL**

D. Gottlieb & Co. 
A Columbia Pictures Industries Company

165 W. Lake Street • Northlake, Illinois 60164
Phone: 312/562-7400 Telex: 72-8463

Price **\$3.00**

ROLLER DISCO

USES PROM MARKED

“R”

INSERT GAME PROM WITH
INDENT NOTCH UP

SEE SECTION IX FOR DISCUSSION OF PROM
USED ON ELECTRONIC SOUND BOARD

I. INSTALLATION

To assemble the game, first bolt the legs to the cabinet. Place the lightbox atop the pedestal and inset the four #8 x 3/4 hex-head screws into the back of the pedestal. Open the lightbox and secure it to the cabinet with the long lightbox bolts. Connect all cables and gently but fully insert the connectors onto the printed circuit boards. Be sure to touch only the edges of the boards.

Inspecting the following items before plugging in the line cord may prevent future trouble:

1. Check that cables are clear of moving parts.
2. Look for any disconnected wires.
3. Check switches for loose solder or other foreign matter.
4. Check the soldering generally for cold joints.
5. Be certain all fuses are firmly seated.
6. Check the transformers for foreign matter across the terminals.

7. Be sure that the transformer wiring corresponds to the supply voltage.

8. Check the setting of the tilt switch on the underside of the playfield. One blade of this switch is free-floating with a weight on the end.

After levelling the machine, adjust the plumb-bob tilt (on left side of cabinet near front door) to the sensitivity desired.

II. GAME ADJUSTMENTS

A. Playfield Adjustments

Posts controlling access to the left and right outlanes can be adjusted. See page 8. The "conservative" (easier entry) position decreases playing time and scoring while the "liberal" position has the opposite effect.

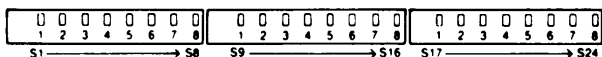
The game is shipped with adjustable posts in the position found to be suitable for the greatest number of players. Therefore the posts should not be changed unless the need is clearly evident.

NOTE: TOUCHING THE STATIC-SENSITIVE MOS COMPONENTS ON THE CPU CONTROL BOARD CAN DAMAGE THEM, MAKING THE GAME INOPERATIVE AND INVALIDATING THE WARRANTY.

CAUTION: IF GAME WAS SUBJECTED TO EXTREME COLD, ALLOW GAME TO WARM UP TO ROOM TEMPERATURE BEFORE PLUGGING IN LINE CORD.

B. Lightbox Adjustments

There are 24 switches on the Control Board (A1) which permit adjustment of the game parameters. These switches are contained in three packages of eight switches each, as shown below.



WARNING: TURN OFF POWER BEFORE MAKING ADJUSTMENTS!

SWITCHES				COIN CHUTE ADJUSTMENTS
S1	S2	S3	S4	#1 Coin Chute
S5	S6	S7	S8	#2 Coin Chute

				Coins/Credits
OFF	OFF	OFF	OFF	1/1
OFF	OFF	OFF	ON	1/2
OFF	OFF	ON	OFF	1/3
OFF	OFF	ON	ON	1/4
OFF	ON	OFF	OFF	1/5
OFF	ON	OFF	ON	1/6
OFF	ON	ON	OFF	1/7
OFF	ON	ON	ON	1/8
ON	OFF	OFF	OFF	1/9
ON	OFF	OFF	ON	2/1
ON	OFF	ON	OFF	2/2
ON	OFF	ON	ON	2/3 Note 1
ON	ON	OFF	OFF	2/4
ON	ON	OFF	ON	2/5
ON	ON	ON	OFF	2/3 Note 2
ON	ON	ON	ON	3/1 Note 3

Note 1: No credits until second coin is deposited.

Note 2: First coin gives one credit. Second coin gives two credits provided that no score is made between first and second coin. If scoring occurred, second coin becomes a "first" coin, giving one credit.

Note 3: No credit until third coin is deposited.

SWITCH 9	BALLS PER GAME
ON	3
OFF	5

SWITCH 10	MATCH FEATURE
ON	IN
OFF	OUT

SWITCH 11	(See Note A)	GAME MODE
ON		REPLAY
OFF		EXTRA BALL

SWITCH 12	TILT EFFECT
ON	BALL IN PLAY ONLY
OFF	GAME OVER

SWITCH 13	CREDITS DISPLAYED?
ON	YES
OFF	NO

SWITCH 14	CREDIT BUTTON TUNE?
ON	YES
OFF	NO

SWITCH 15	} NOT USED—MAY BE ON OR OFF
SWITCH 16	

SWITCHES		MAXIMUM CREDITS
17	18	
OFF	OFF	5
OFF	ON	8
ON	OFF	10
ON	ON	15

SWITCH 19	(See Note B)	COIN CHUTE CONTROL
ON		CHUTES SAME
OFF		CHUTES SEPARATE

SWITCH 20	TONES WHEN SCORING?
ON	YES
OFF	NO

SWITCH 21	HIGH GAME TO DATE DISPLAYED?
ON	YES
OFF	NO

SWITCH 22	BEATING HIGH GAME TO DATE AWARDS.
ON	3 REPLAYS
OFF	NO REPLAYS

SWITCH 23	COIN SWITCH TUNE?
ON	YES
OFF	NO

SWITCH 24—NOT USED—MAY BE ON OR OFF

Note A: IF SWITCH 11 IS OFF, SWITCHES 10 AND 22 HAVE NO EFFECT; THE MATCH FEATURE IS DISABLED AND NO REPLAYS ARE AWARDED FOR BEATING HIGH GAME TO DATE.

Note B: WHEN SWITCH 19 IS ON, SWITCHES 5-8 HAVE NO EFFECT; SWITCHES 1-4 CONTROL BOTH COIN CHUTES.

III. ROLLER DISCO

GAME FEATURES (3 BALL)

The A-B-C-D rollovers light the advance multiplier rollovers. (The A and D rollovers are tied together.) Hitting a lit advance multiplier rollover increases the bonus multiplier or scores 15,000 additional points when the multiplier is a 5X. Completing the A-B-C-D sequence lights the special target.

Completing either drop target bank resets and lights that bank for increased scoring. Completing both drop target banks lights both of the extra ball targets.

The pop bumpers score 1000 points.

FEATURE CHANGES FOR 5 BALL OPERATION ARE:

The extra ball targets lights alternately.

The pop bumpers score 100 points.

IV. GAME OPERATION

With the line cord unplugged drop a coin into one of the chutes. It should be rejected. Plug the line cord *only* into a properly-grounded 3-wire receptacle of the correct voltage. Turn on the game by pressing the main switch located on the cabinet bottom near the front right corner.

After a five-second delay all score displays will light and read zeros. The credit display will show the number of credits remaining and the ball in play display will show "70." If the credits fail to light, turn off the game and inspect the normally closed switch on the ball-roll assembly and on the front door. Turn on the game; if the problem remains, refer to Section VI. (Troubleshooting).

Five seconds after the score displays light, they will flash "High Game to Date" score for one second. This cycle continues until the game is started. All playfield lights controlled by the micro-processor will be off.

Insert one or more coins and note that the correct number of credits are added on the credit display according to the information on the coin entrance plate. Press the credit button to reset the game; the ball should now be at the shooter. The first player score reads "0" and flashes, indicating that that player is now scoring. The other player displays are blank and a "1" appears on the ball-in-play display.

Additional players are indicated by a "0" showing in each corresponding player display. Thus if there are three players, a "0" will show in the first three player displays. After the fourth player has been added (or when the credit display reads "0"), the credit button has no effect.

The game features are described in Section III. When the ball enters the outhole, the bonus is scored, the ball is kicked to the shooter, and the display of the player now scoring begins to flash and continues to flash until a score is made. All playfield features reset after each ball. When the "Shoot Again" light is lit, neither the player designation (the flashing display) nor the ball-in-play display changes when the ball enters the outhole. Only one extra ball per ball in play can be given.

The number of balls per game is adjustable. When the last ball enters the outhole, the "Game Over" and "Number to Match" lights come on. A random number appears in the ball-in-play display and if this number matches the last two digits in the player's score, a replay is added to the credit display. At this time a "High Game to Date" score is periodically flashed in all four player displays. When this score is achieved, three replays are given. This feature is adjustable.

Tilting the machine results in the loss of the ball in play or the entire game, depending upon the Tilt Reset adjustment. With this adjustment "on," the game comes on again when the ball enters the outhole, and play

resumes. There is a normally-closed switch on the front door and one in the ball-roll assembly. If either of these switches opens from raising the front of the cabinet or pounding the front door, the entire game is ended. The "Game Over" light comes on and for three seconds the coin chute switches and replay button are inactive. This prevents accidental closing of these switches from residual vibration.

V. BOOKKEEPING FUNCTIONS AND SELF-TESTING

The circuitry in this game helps the operator perform many bookkeeping functions. The information is shown one step at a time on the first player score display while the step number is shown in the credit display. Pressing the button on the inside of the front door (the play/test button) begins the bookkeeping and advances it to the next step each time the button is pressed. If the button is not pressed within sixty seconds of each step, the machine returns to normal playing condition.

The data in any bookkeeping step may be reset to zero while it is displayed by pressing Switch Button #25 on A1, the CPU control board in the lightbox. Then the play/test button must be pressed to enter the zero.

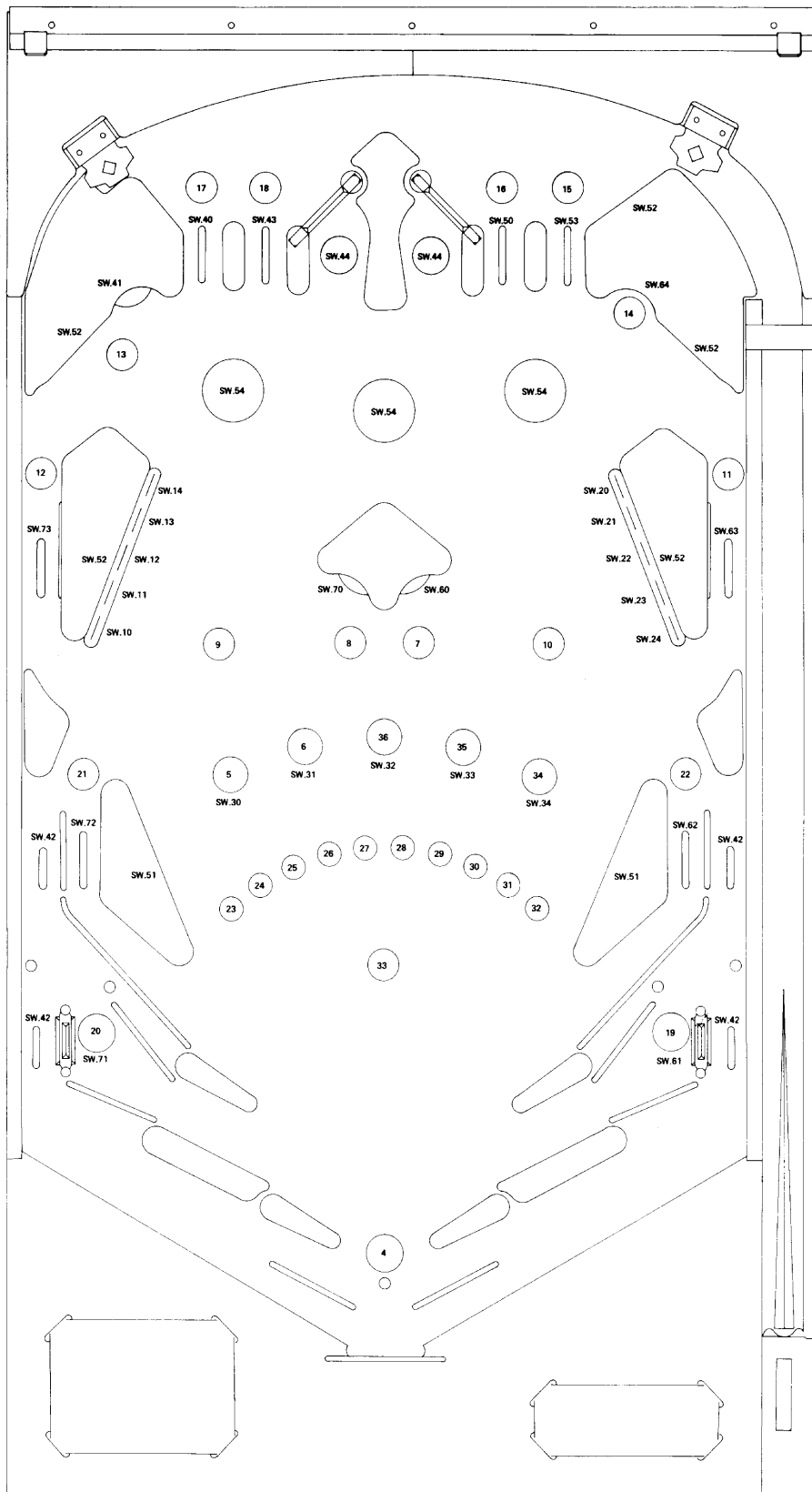
NOTE:

RESET ALL DROP TARGETS BEFORE STARTING SELF/TEST.

STEP (Credit Display)	INFORMATION SHOWN (First Player Display)
0	Total coins through #1 coin chute (left chute).
1	Total coins through #2 coin chute.*
2	Total plays.
3	Total replays given.
4	Number of times anti-cheat switches on front door and on ball-roll assembly have opened.
5	Total extra balls.
6	Number of tilts.
7	First high score replay.
8	Second high score replay.
9	Third high score replay.
10	Current "High Game to Date" score.
11	Display test: All digits in first and third player displays step "0" through "9."**
12	Display test: All digits in second and fourth player displays step "0" through "9."**
13	Self-test: All CPU-controlled lights come on for five seconds. Each solenoid is energized one at a time. All closed switches noted by a code number in ball-in-play display.

*If chutes are adjusted to be the same, coins deposited in either chute add only to the #1 chute total.

**If button is not pressed within two 0-9 cycles, machine returns to normal playing condition.



SWITCH MATRIX AND LAMP LOCATION

SW. MATRIX NUMBER	SWITCHES ON MATRIX SWITCH FUNCTION
SW.00	Test Button (On Front Door)
SW.01	#1 Coin Chute (On Front Door)
SW.02	#2 Coin Chute (On Front Door)
SW.03	Replay Button (On Front Door)
SW.04	Tilt Switches
SW.10	#1 Drop Target
SW.11	#2 Drop Target
SW.12	#3 Drop Target
SW.13	#4 Drop Target
SW.14	#5 Drop Target
SW.20	#6 Drop Target
SW.21	#7 Drop Target
SW.22	#8 Drop Target
SW.23	#9 Drop Target
SW.24	#10 Drop Target
SW.30	1X Rollover Button
SW.31	2X Rollover Button
SW.32	3X Rollover Button
SW.33	4X Rollover Button
SW.34	5X Rollover Button
SW.40	"A" Rollover
SW.41	Hole
SW.42	Bottom Rollover
SW.43	"B" Rollover
SW.44	Top Rollover Button
SW.50	"C" Rollover
SW.51	Kicking Rubber (2)
SW.52	10 Point (5)
SW.53	"D" Rollover
SW.54	Pop Bumper (3)
SW.60	Right Extra Ball Target
SW.61	Right Bottom Rollover Button
SW.62	Right Return Rollover
SW.63	Right Side Rollover
SW.64	Special Target
SW.70	Left Extra Ball Target
SW.71	Left Bottom Rollover Button
SW.72	Left Return Rollover
SW.73	Left Side Rollover

CPU CONTROLLED LAMPS

LAMP NUMBER	LAMP FUNCTION
1	Game Over Relay (Lamp in Lightbox)
2	Tilt Relay (Lamp in Lightbox)
3	High Game to Date (Lamp in Lightbox)
4	Same Player Shoots Again (Playfield and Lightbox)
5	1X Bonus
6	2X Bonus
7	Right Extra Ball
8	Left Extra Ball
9	Left Drop Target
10	Right Drop Target
11	Right Side Rollover
12	Left Side Rollover
13	Score Bonus W/L
14	Special
15	"D" Rollover
16	"C" Rollover
17	"A" Rollover
18	"B" Rollover
19	Right Bottom Rollover Button
20	Left Bottom Rollover Button
21	Left Return Rollover
22	Right Return Rollover
23	1000 Bonus
24	2000 Bonus
25	3000 Bonus
26	4000 Bonus
27	5000 Bonus
28	6000 Bonus
29	7000 Bonus
30	8000 Bonus
31	9000 Bonus
32	10,000 Bonus
33	20,000 Bonus
34	5X Bonus
35	4X Bonus
36	3X Bonus

TO CHANGE REPLAY SCORES OR "HIGH GAME TO DATE" SCORE:

- 1) Press the play/test button on the front door at one-second intervals to advance to step 7 (first high score replay).
- 2) Reset the display by pressing Switch Button #25 on A1, the CPU control board.
- 3) Press the replay button. This causes the display to advance by 10,000's. Hold in the replay button until the desired replay score is shown.
- 4) The new score is entered by advancing to the next function by pressing the play/test button.

To eliminate entirely one or more replay scores, set step 7, 8, or 9 at zero (as in #2 above), then press the play/test button to enter the value.

The switches and solenoids are checked in Step 13 in the order given in the following lists. A faulty solenoid or a closed switch that should be open will not stop the test sequence; the code number of the component will be shown in the ball-in-play display. The machine returns to the normal playing condition at the end of the test. It will do also if a tilt switch is closed, if an anti-cheat switch is opened, or if the power is interrupted.

SOLENOID NUMBER	SOLENOID
1	Outhole
2	Knocker
3	Tens
4	Hundreds
5	Thousands
6	Kickout Hole
7	Left Target Bank Reset
8	Right Target Bank Reset

VI. TROUBLE-SHOOTING GUIDE

Trouble-shooting the solid-state pinball game on location includes inspection and repair of the electro-mechanical devices and wiring, and inspection and replacement of printed circuit boards. Repair of printed circuit boards on location, while possible, is best done in a properly equipped shop.

Before replacing the control board (A1) or the driver board (A3), measure the voltages on the power supply (A2) after first disconnecting the two connectors A2J2 and A2J3. Before replacing any printed circuit board, check all connectors, crimp connections, and wire continuity.

WARNING! TURN OFF POWER BEFORE REMOVING ANY WIRE CONNECTORS OR REPLACING ANY PRINTED CIRCUIT BOARDS. ALL CONNECTORS MUST BE RECONNECTED BEFORE TURNING POWER ON AGAIN.

Basic game troubleshooting involves determining that the game powers up 5 seconds after power is turned on. If the 5 second delay does not occur, check the TILT and SLAM (anti-cheat) switches. Cycle the game through the self-test procedures described in SECTION V and observe any malfunctions. Detailed troubleshooting procedures and diagrams are in the Solid-State Pinball Game Service Manual.

VII. ROUTINE MAINTENANCE

After a successful completion of the self-test, check the playfield for dirt or particles. The playfield should be cleaned frequently with a non-abrasive wax-based cleaner. Any of the polishes made specifically for use on pinball machine playfields may be used. Make certain that kicker fulcrums and all pivot points receive a drop of fine oil. The pop bumper cup switches, the drop target shanks and the discs of Vari-targets should be lightly coated with White Lube, a special Gottlieb lubricant available at distributors.

When the playboard is clean and all components are working properly, start the game and try each feature. Make certain each rollover operates, that each pop bumper scores and kicks correctly and that in general everything works as it should. If an intermittent or dirty switch is found, clean the points by pressing them together with a piece of paper or a business card between them, moving the card back and forth.

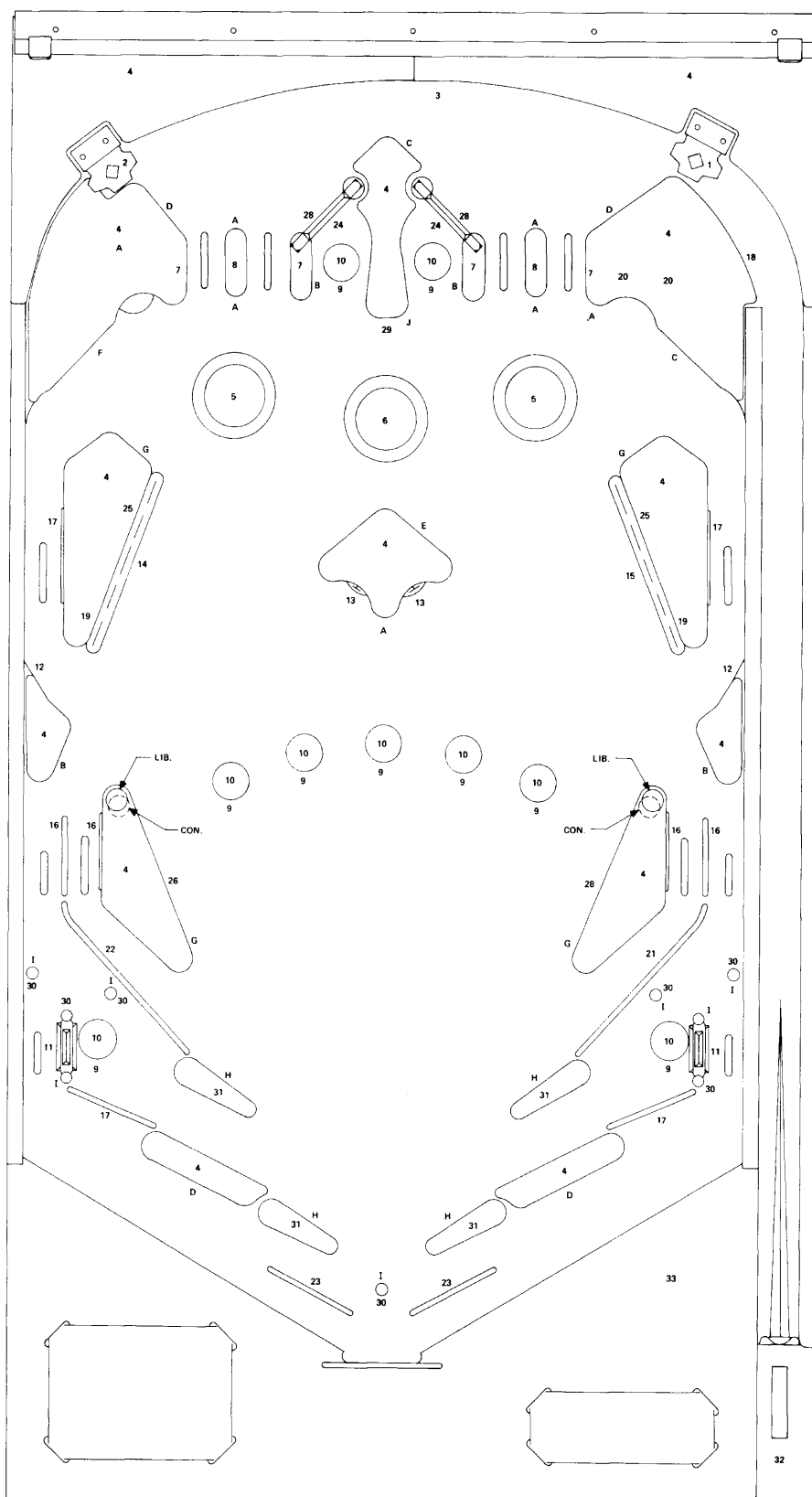
WARNING: DO NOT FILE, BURNISH OR IN ANY WAY ABRASE GOLD-PLATED SWITCH CONTACTS.

The only switches whose points may be burnished are the pop bumper cup switches, the rubber-actuated switches on kicking rubber units, and the flipper button switches.

VIII. SERVICE AND PARTS

A-9430	Plunger Link
A-18354	Assembly Ball Striker Arm
A-18356	Assembly of Track Frame and Studs
B-18358	Ball Return Fence
C-18359	Ball Return Fence
A-18549	Ball Return Plunger
C-18638	Complete Ball Return Unit (Less Fences)
A-18687	Assembly of Plunger and Link
A-18688	Assembly Rollover Wire, Switch and Bracket
A-18702	Assembly of Coil Stop Bracket

NOTE: Roller Disco Uses Prom Marked "R"



PLAYBOARD INFORMATION

RUBBER RINGS

A—A-10217	(7)
B—A-10219	(4)
C—A-10220	(2)
D—A-10221	(4)
E—A-10222	(1)
F—A-10223	(1)
G—A-10224	(4)
H—A-13151	(4)
I—A-15705	(9)
J—A-17493	(1)

PARTS LIST

1. A-19645 Ball Gate Right.
 2. A-19646 Ball Gate Left.
 3. D-19655 Arched Rod.
 4. D-19738 Plastic Shield Set.
 5. Green Pop Bumper A-13905 and A-16883 Cap in Purple. (2)
 6. Orange Pop Bumper A-13905 and A-16883 Cap in Purple.
 7. A-9393 Yellow Plastic Guide Rail. (4)
 8. A-9394 Yellow Plastic Guide Rail. (2)
 9. D-11966 Red Rollover Insert. (9)
 10. D-11968 White Rollover Button. (9)
 11. C-15647 White Rollover Guide. (2)
 12. B-15551 Metal Flat Rail. (2)
 13. A-17385 Plastic Target. (2)
 14. 5 Pos. Drop Target Bank, R-O-LL-E-R Stamped in Green.
 15. 5 Pos. Drop Target Bank, D-I-S-C-O Stamped in Green.
 16. A-3722 Ball Guide Rail. (4)
 17. A-4832 Ball Guide Rail. (4)
 18. A-4833 Ball Guide Rail. (1)
 19. A-6612 Ball Guide Rail. (2)
 20. A-6931 Ball Guide Rail. (2)
 21. A-12570 Ball Guide Rail. (1)
 22. A-13584 Ball Guide Rail. (1)
 23. A-13798 Ball Snubber Rail. (2)
 24. A-17299 Rollunder Gate. (2)
 25. A-18070 Ball Guide Rail. (2)
 26. A-15836 Kicking Rubber.
 27. A-15838 Kicking Rubber.
 28. A-17300 Rollunder Shield. (2)
 29. C-17492 White Siamese Post.
 30. A-14792 Mini Post Screw. (9)
 31. C-13150 White Flipper. (4)
 32. C-9767 Ball Shooter Gage.
 33. E-18940 Card Holder.
- C-11561 Clear Plastic Post 1" High (47)
C-11562 Clear Plastic Post 1 3/16" High (6)

LIB.=LIBERAL.
CON.=CONSERVATIVE.

IX. ELECTRONIC SOUND

A. DESCRIPTION

The electronic sound circuitry produces tunes in response to the following conditions: TILT switch closure, coin switch closure, credit button closure, and GAME OVER. In addition, tones or sounds are produced by scoring switches and by carry generation from 10's to 100's and 100's to 1000's. Either tones or sounds are selectable with SWITCH S1.

An attract mode tune will play every six minutes when the game is idle, if SWITCH S2 is off.

All tunes, tones, and sounds will be

generated sequentially when the TEST SWITCH, S3 is closed.

Volume is controlled by adjusting the potentiometer on the electronic sound circuit board.

The component location diagram indicates the location of all available adjustments (SECTION IX-E).

PROM U4 is programmed with specific sounds for each game and is marked with the same letter as the game PROM on the control board, plus the letters SND. PROM U4 must be inserted with the indent notch down.

B. TROUBLE-SHOOTING

Press TEST SWITCH S3 to test the electronic sound circuitry.

Check voltages at points indicated on the schematic diagram.

Check that PROM U4 is installed properly. The sound circuitry will not operate without a PROM.

Check edge connector A7 for secure connection.

C. PARTS LIST AND CABLE CONNECTORS

CONNECTOR A7

PIN	WIRE COLOR	FUNCTION
1	—	Spare
2	—	Spare
3	077	Game Over thru A6-P5-Pin 13
4	244	100 Point
5	255	1000 Point
6	311	10 Point
7	177	Tilt thru A6-P5-Pin 14
8	066	Output
9	444	AC Input
10	411	AC Input
11	*54	Ground
12	—	Spare Ground

All wires #22 gauge unless specified *(18 gauge)

C. PARTS LIST AND CABLE CONNECTORS

PARTS LIST

RESISTORS

7		2.7K OHM, ¼W. 5% (R1-R7)
1		2.7 OHM, ¼W. 5% (R9)
1		6.8K OHM, ¼W. 5% (R10)
1		430 OHM, ½W. 5% (R11)
1		2.7M OHM, ¼W. 5% (R12)
1		1.8M OHM, ¼W. 5% (R13)
1		22.1K OHM, ¼W. 1% (R14)
1		10K OHM, ¼W. 5% (R15)
1		5.6K OHM, ¼W. 5% (R16)
1		270K OHM, ¼W. 5% (R17)
1	X201R 253B	25K OHM, ¼W. 10% Potentiometer (Pot. 1) CTS

CAPACITORS

5	C321C103MIR5CA	0.01 MFD, 100 V. 20% (C1-C5) KEMET
1	501D108F025QS	1,000 MFD, 25V. Min. (C6) SPRAGUE
1	5030476F035NB	47 MFD, 25V. Min. (C7) SPRAGUE
2	503D477F035QE	470 MFD, 25V. Min. (C8-C9) SPRAGUE
4	C331C104MIR5CA	0.1 MFD, 100V. 20% (C10-C13) KEMET
1	561CC0GBD102AE100J	10 PFD, 1000V. 5% (C14) NPO Type SPRAGUE
1	563CY5SJA250AG473M	0.047 MFD, 25V. 20% (C15) SPRAGUE
1	562CX5EBA251AE101M	100 PFD, 250V. 20% (C20)
1		0.0033 MFD, 50V. 20% (C16) KCK
1	501D106F035LL	10 MFD, 25V. Min. (C19) SPRAGUE

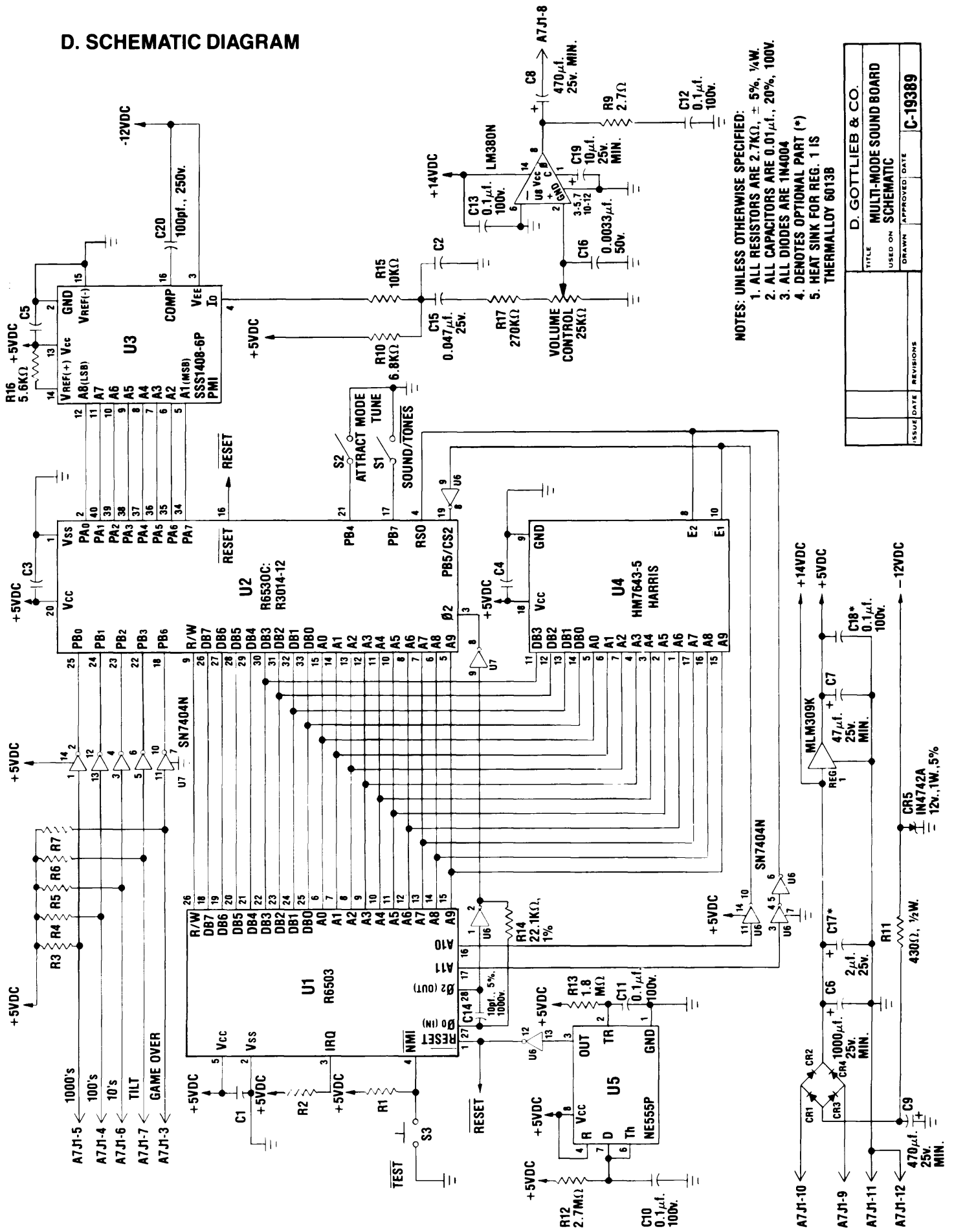
INTEGRATED CIRCUITS & SEMICONDUCTORS

1	R6503	CPU-(U1) ROCKWELL
1	R6530C: R3014-12	ROM/RAM/I/O—(U2) ROCKWELL
1	SSS1408-6P	DAC—(U3) PMI
1	HM7643-5	PROM—(U4) HARRIS
1	NE555P	Timer—(U5) T.I.
2	SN7404N	Inverter—(U6, U7) T.I.
1	LM380N	Amplifier—(U8) NATIONAL
4	1N4004	Diode (CR1-CR4)
1	1N4742A	12V., 1W. 5% Zener Diode (CR5)
1	MLM309K	5V. Regulator (Reg. 1) MOTOROLA

MISCELLANEOUS

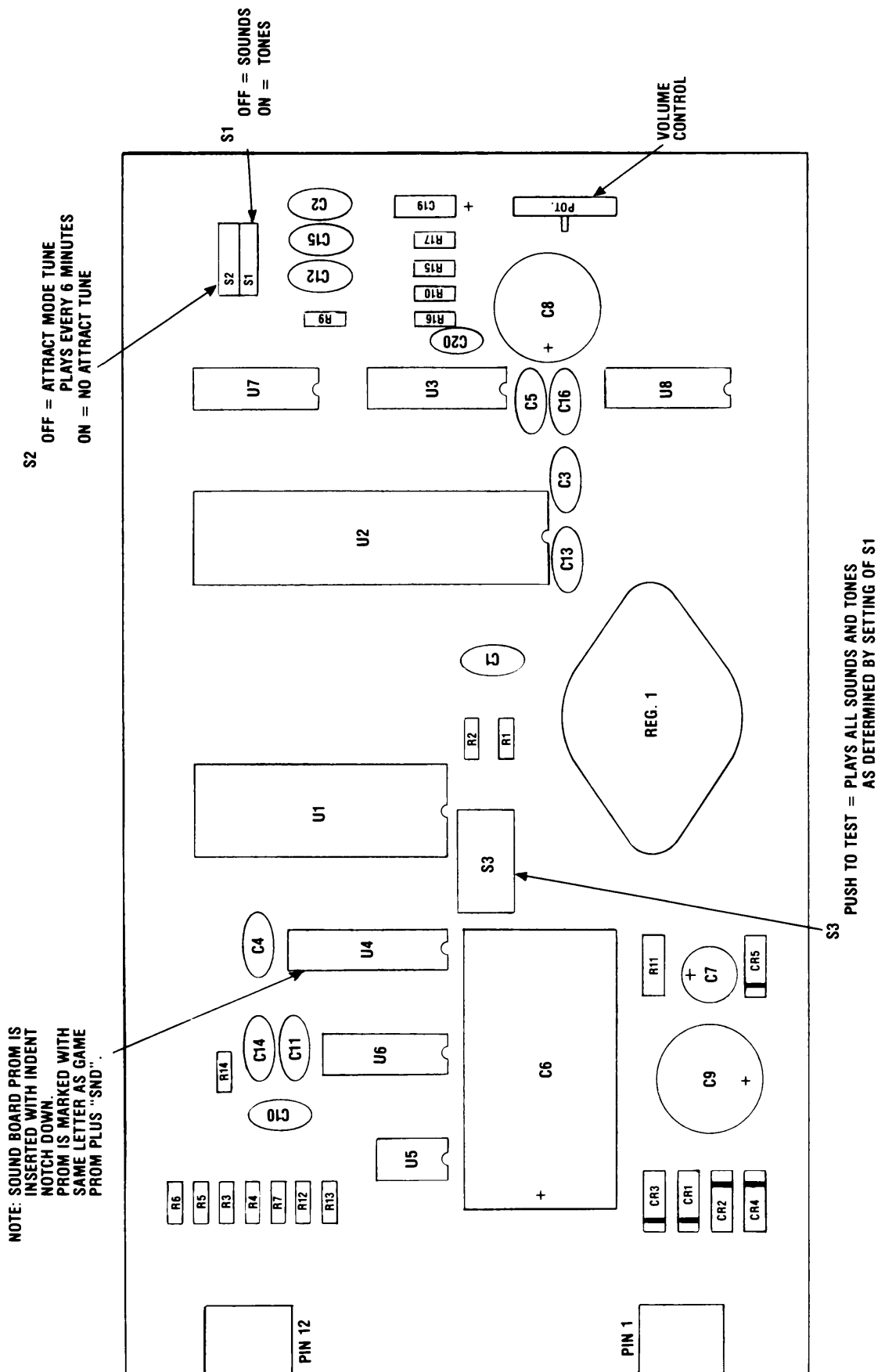
1	76SB02	2 Pos. Dip Sw. (S1, S2) GRAYHILL
1	EVQ-PAR-11K	Momentary Push Button Sw. (S3) PANASONIC
1	640359-1	Socket, 18 Pin (Prom Socket) AMP INC.
1	09-01-6121	12 Pin PCB Connector (A7-J1) MOLEX
1	#6013B	Heat Sink—THERMALLOY

D. SCHEMATIC DIAGRAM

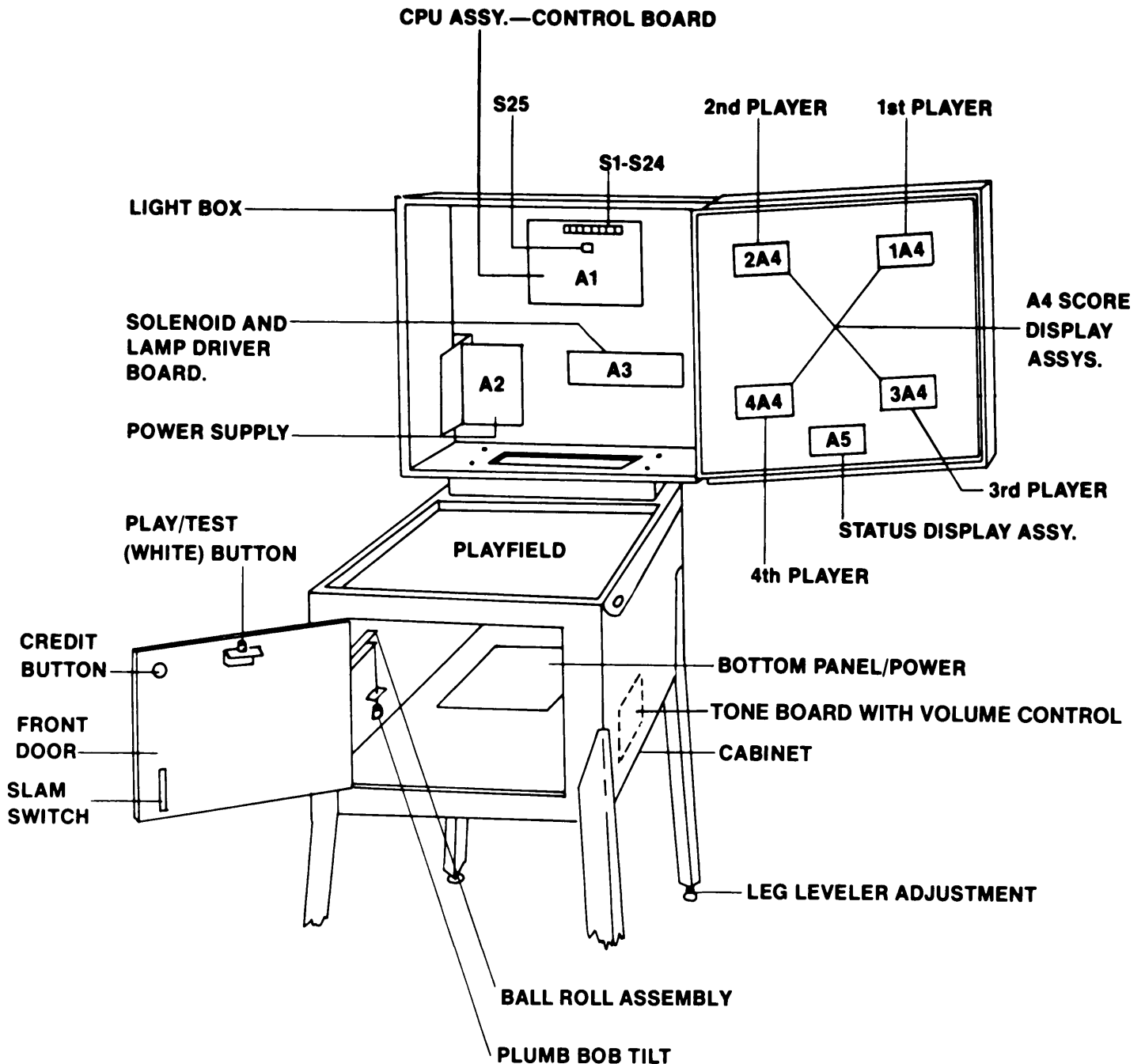


D. GOTTLIEB & CO.	
TITLE	MULTI-MODE SOUND BOARD
USED ON	SCHEMATIC
DRAWN	APPROVED DATE
ISSUE DATE	REVISIONS
	C-19389

E. COMPONENT LOCATION



COMPONENT LOCATION DIAGRAM



Color Code Chart	
0	Black
1	Brown
2	Red
3	Orange
4	Yellow
5	Green
6	Blue
7	Purple
8	Slate

NOTE: 1

> TO PLAYBOARD

>> TO LIGHTBOX

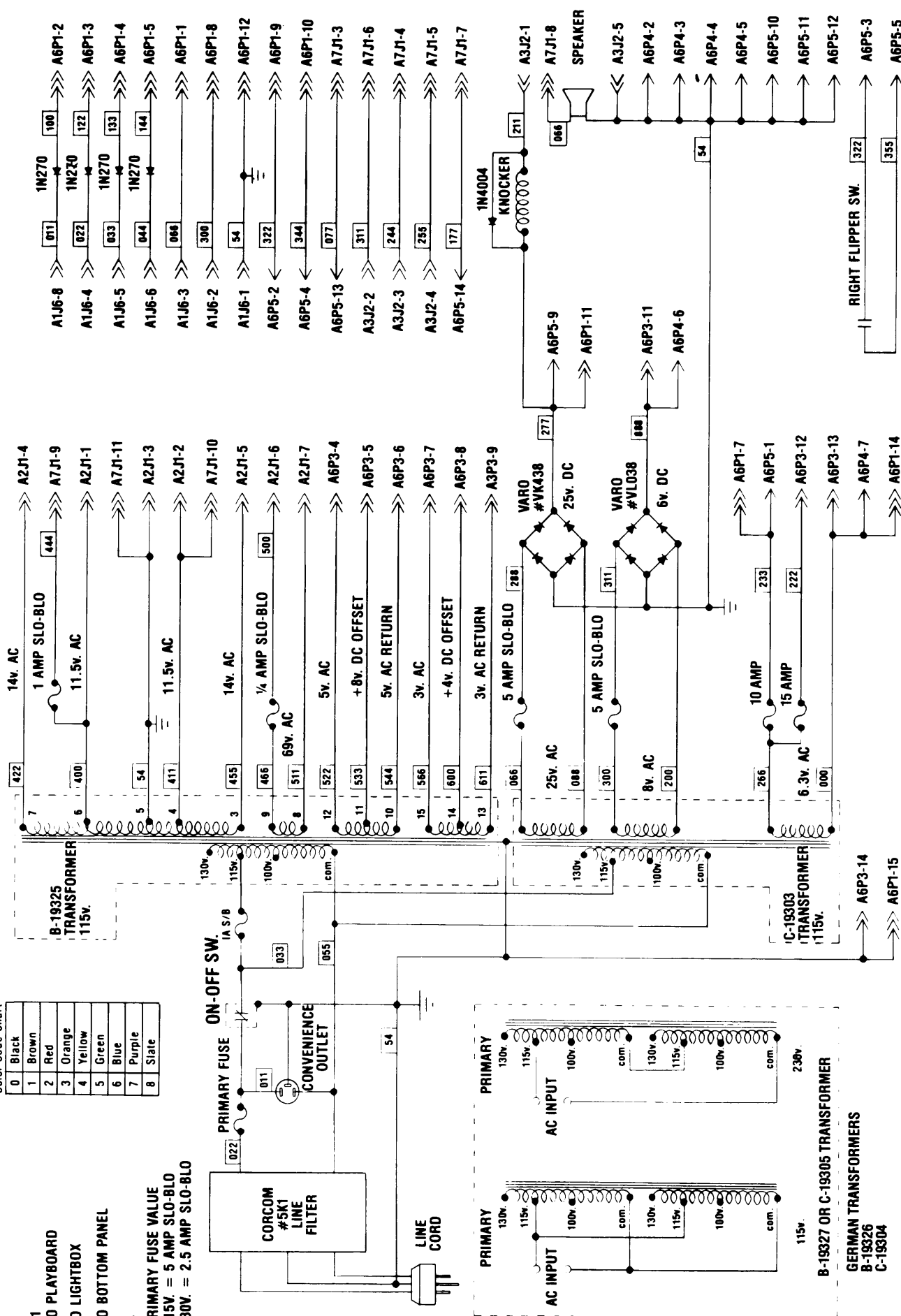
>>> TO BOTTOM PANEL

NOTE 2

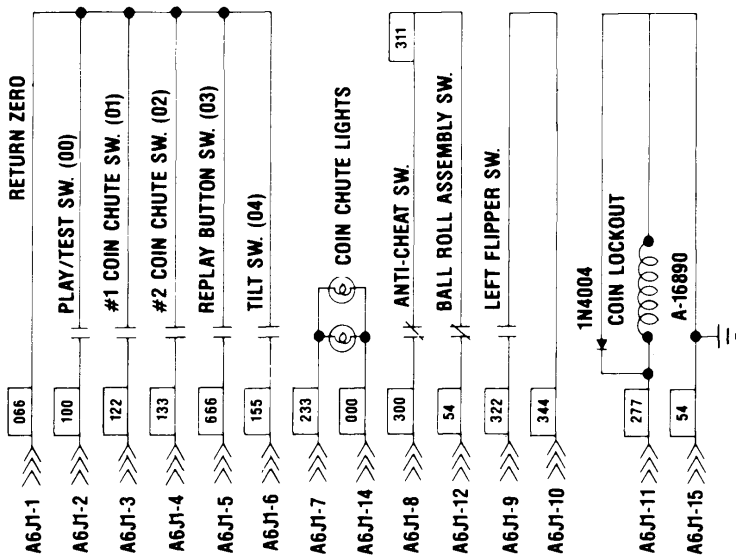
PRIMARY FUSE VALUE

115V. = 5 AMP SLO-BLO

115V. = 5 AMP SLO-BLO
230V. = 2.5 AMP SLO-BLO



			D. GOTTlieb & CO.
		TITLE	BOTTOM BOARD SCHEMATIC
		USED ON	SOLID STATE
ISSUE DATE	REVISIONS	DRAWN	APPROVED DATE
			C-19393

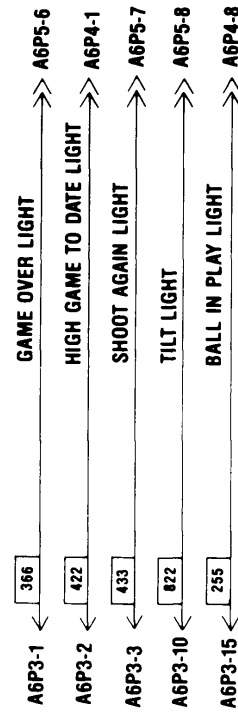
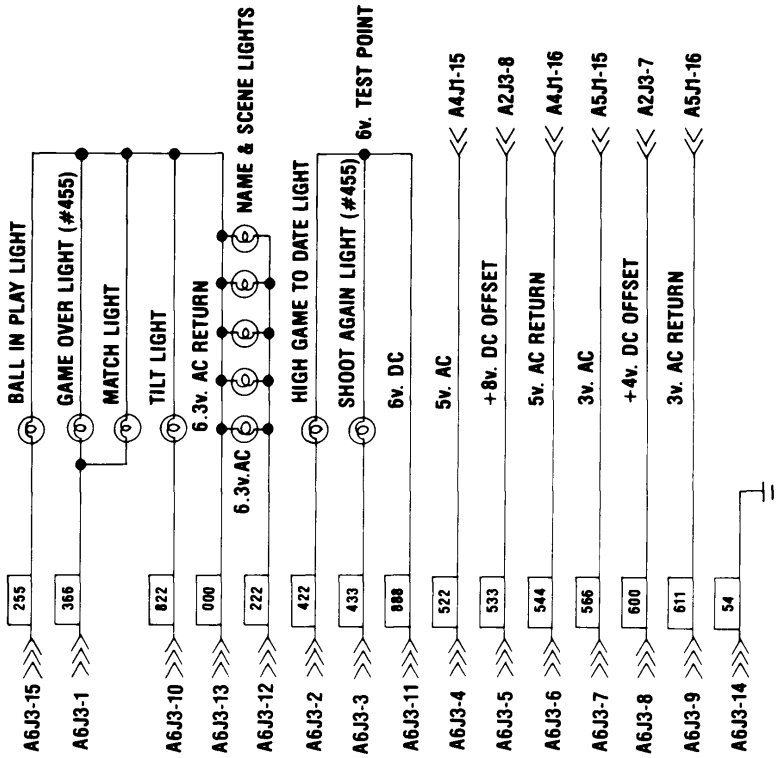


Color Code Chart

0	Black
1	Brown
2	Red
3	Orange
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5	Green
6	Blue
7	Purple
8	Slate

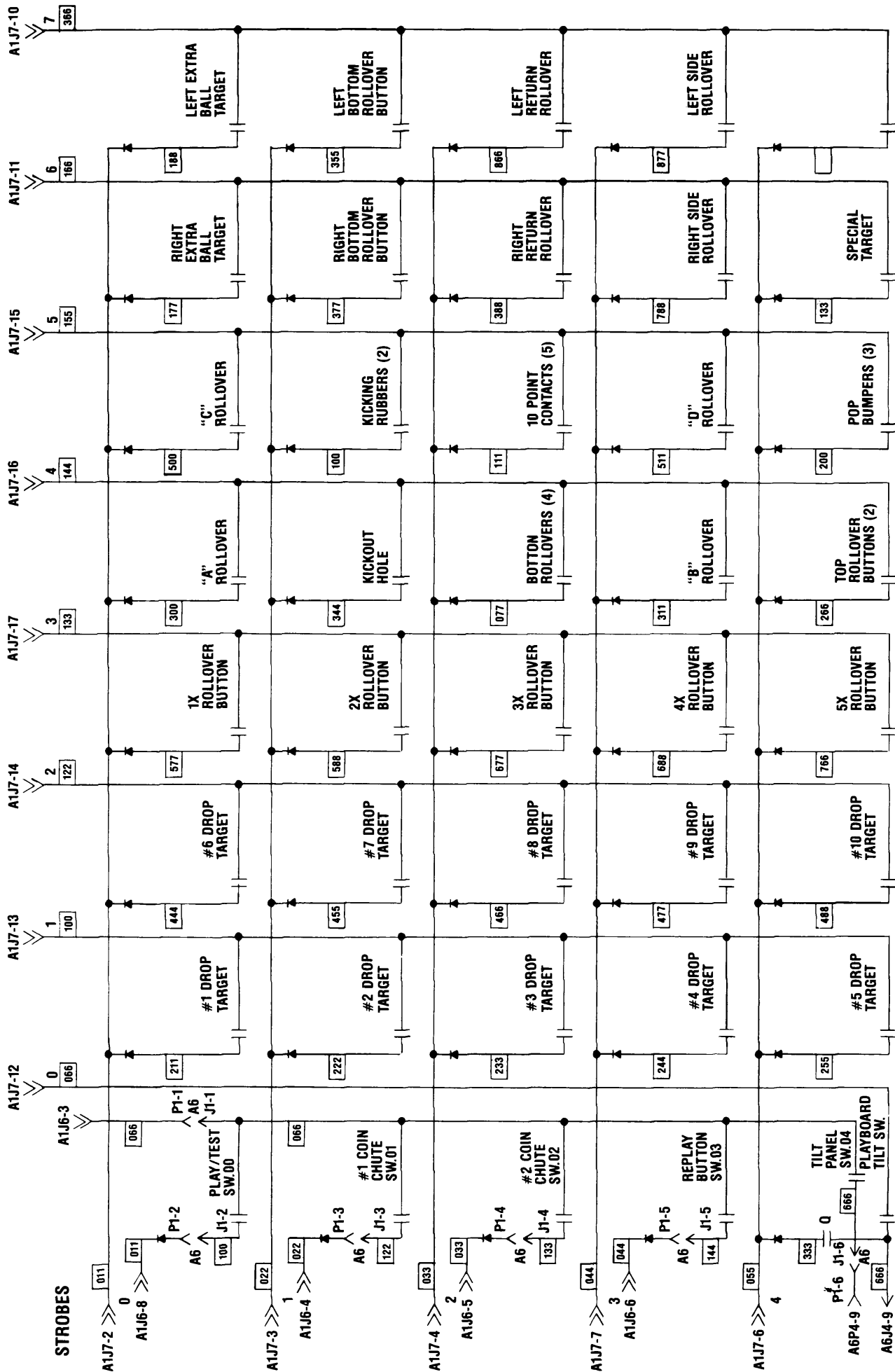
NOTE:

- > FROM PLAYBOARD
- >> FROM LIGHT BOX
- >>> FROM BOTTOM BOARD



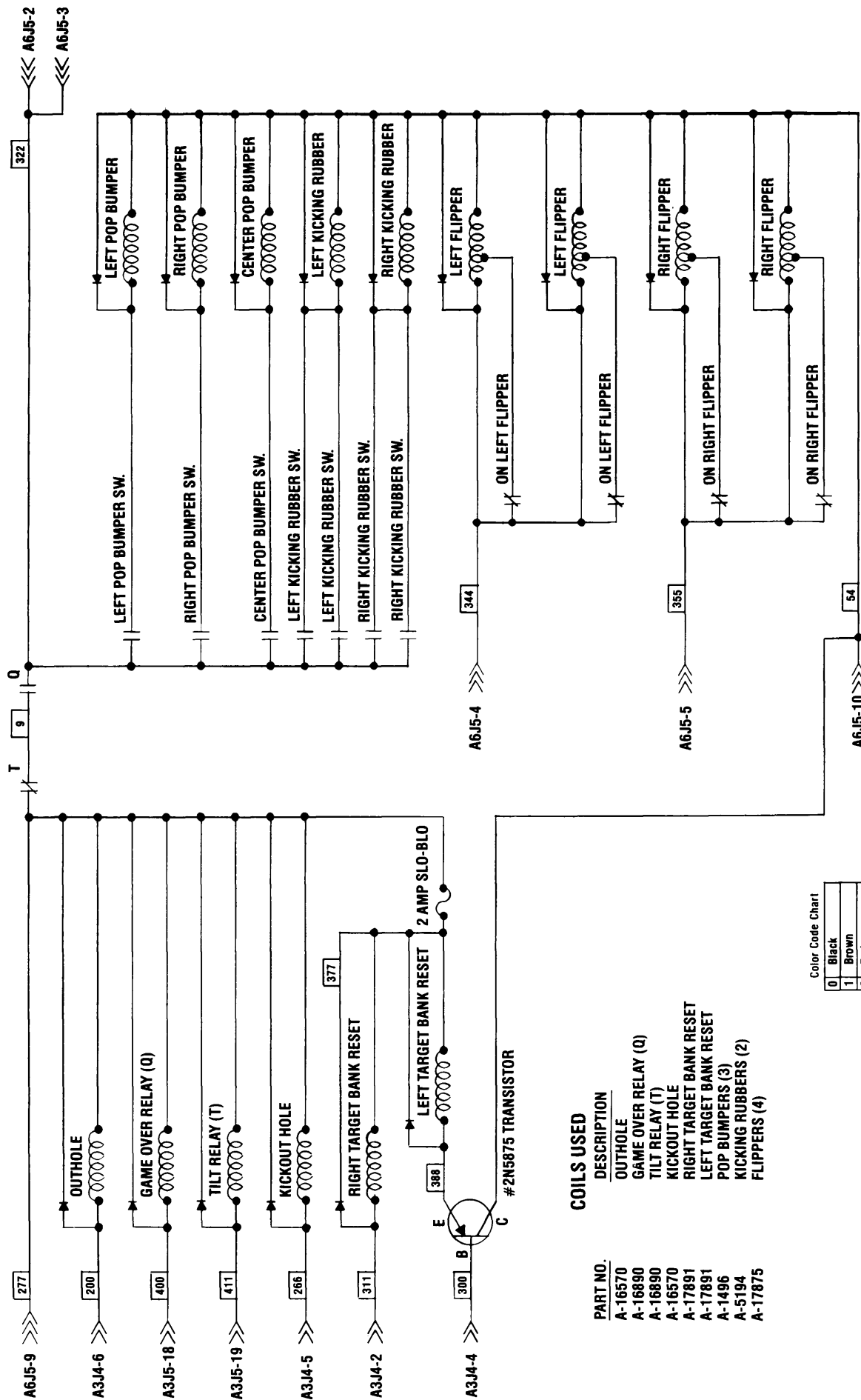
				D. GOTTLIEB & CO.	
				TITLE	
				BOTTOM BOARD & LIGHT BOX	
				USED ON	
				SCHEMATIC	
ISSUE	DATE	REVISIONS		DRAWN	APPROVED DATE
				C-19410	

RETURNS



D. GOTTLIEB & CO.	
TITLE	SWITCH MATRIX
USED ON	ROLLER DISCO
DRAWN	APPROVED DATE
ISSUE DATE	REVISIONS
C-19559	

NOTE: ALL DIODES ARE 1N270



COILS USED

PART NO.	DESCRIPTION
A-16570	OUTHOLE
A-16890	GAME OVER RELAY (Q)
A-16890	TILT RELAY (T)
A-16570	KICKOUT HOLE
A-17891	RIGHT TARGET BANK RESET
A-17891	LEFT TARGET BANK RESET
A-1496	POP BUMPERS (3)
A-5194	KICKING RUBBERS (2)
A-17875	FLIPPERS (4)

Color Code Chart

0	Black
1	Brown
2	Red
3	Orange
4	Yellow
5	Green
6	Blue
7	Purple
8	Slate
9	White

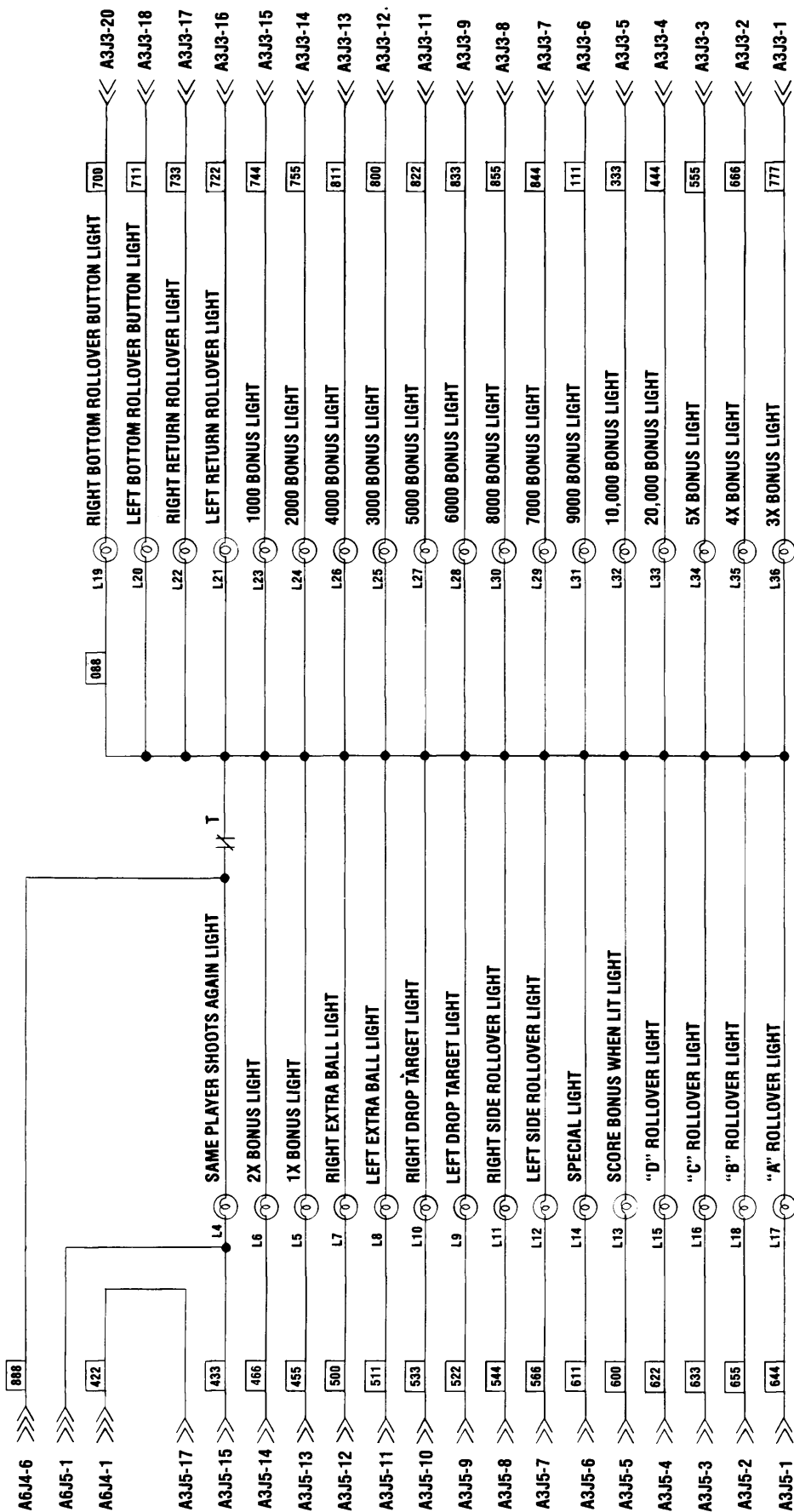
NOTE:

>>> FROM LIGHTBOX

>>> FROM BOTTOM BOARD

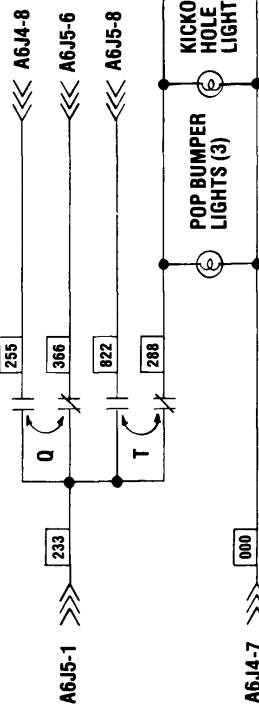
ALL DIODES ARE 1N4004

D. GOTTLIEB & CO.	
TITLE	PLAYBOARD SOLENOIDS ROLLER DISCO
USED ON	
DRAWN	APPROVED DATE
ISSUE DATE	REVISIONS
C-19557	



Color Code Chart

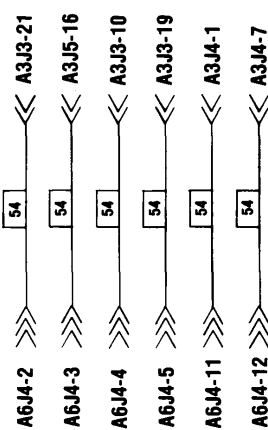
0	Black
1	Brown
2	Red
3	Orange
4	Yellow
5	Green
6	Blue
7	Purple
8	State
9	White



NOTE:

>> FROM LIGHTBOX

>>> FROM BOTTOM BOARD



D. GOTTLIEB & CO.	
TITLE	PLAYBOARD ILLUMINATION
USED ON	ROLLER DISCO
DRAWN	APPROVED DATE
ISSUE DATE	REVISIONS
	C-19558

