

Gottlieb's

FORCE II

INSTRUCTION MANUAL



Gottlieb
AMUSEMENT GAMES

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Provided by: Peter Koch

FORCE II

INSTRUCTION MANUAL

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FORCE II PROMS

GAME #661

ARE MARKED AS FOLLOWS:

GAME PROM 1 IS 661/1
GAME PROM 2 IS NOT USED
SOUND PROM IS 661

INSERT PROMS WITH
INDENT NOTCH UP

CONTROL BOARD
#PB03-D107-001

FORCE II

SWITCH NUMBER	SWITCH ASSIGNMENT	SCORING	FUNCTION
00	#1 TOP DROP TARGET	5000	ADD 1 BONUS
01	TOP UPPER LEFT ROLLOVER	3000	SCORE PTS. FOR EACH LEFT LIT DROP TARGET. ADD 1 BONUS
02	BLUE SPOT TARGET	3000	ADD 1 BONUS W/L LITES RIGHT DROP TARGET BANK AND LITES BALL LAUNCHERS
03	#1 RIGHT DROP TARGET	500, 5000 10,000	ADD 1 BONUS
04	RUBBERS (8)	30	—
10	#2 TOP DROP TARGET	5000	ADD 1 BONUS
11	TOP LOWER LEFT ROLLOVER	3000	SCORE PTS. FOR EACH RIGHT LIT DROP TARGET
12	LEFT OUT ROLLOVER	10,000	W/L ADVANCE MULTIPLIER
13	#2 RIGHT DROP TARGET	500, 5000 10,000	ADD 1 BONUS
20	#3 TOP DROP TARGET	5,000	ADD 1 BONUS
21	#1 LEFT DROP TARGET	500, 5000 10,000	ADD 1 BONUS
22	RETURN ROLLOVER	5,000	W/L ADVANCE MULTIPLIER
23	#3 RIGHT DROP TARGET	500, 5000 10,000	ADD 1 BONUS
30	#4 TOP DROP TARGET	5,000	ADD 1 BONUS
31	#2 LEFT DROP TARGET	500, 5000 10,000	ADD 1 BONUS
32	BALL KICKER ROLLOVER	5,000	KICKS BALL, SPOTS AND SCORES RIGHT DROP TARGET. W/L LAUNCHES SECOND BALL AND DOES NOT SPOT TARGET
33	#4 RIGHT DROP TARGET	500, 5000	ADD 1 BONUS
40	RED ROLLOVER	5,000	LITES RED SPOT TARGET
41	#3 LEFT DROP TARGET	500, 5000 10,000	ADD 1 BONUS
42	RIGHT OUT ROLLER	10,000	W/L ADVANCE MULTIPLIER
43	#5 RIGHT DROP TARGET	500, 5000 10,000	ADD 1 BONUS
50	WHITE ROLLOVER	5000	LITES WHITE SPOT TARGET AND LEFT RETURN ROLLOVER
51	#4 LEFT DROP TARGET	500, 5000 10,000	ADD 1 BONUS
52	UPPER POP BUMPERS (2)	1000	—
53	RED SPOT TARGET	3000	LITES LEFT DROP TARGET BANK, LITES 2ND BALL LAUNCHERS
60	BLUE ROLLOVER	5000	LITES BLUE SPOT TARGET
61	#5 LEFT DROP TARGET	500, 5000 10,000	ADD 1 BONUS
62	LOWER POP BUMPER	1000	—
63	OUTHOLE ROLLOVER	—	SCORES BONUS
70	SPIN TARGET	1000	—
71	WHITE SPOT TARGET	3000	LITES 2ND BALL LAUNCHERS
72	HOLE KICKER	5000	KICKS BALL, SPOTS AND SCORES LEFT DROP TARGET. W/L (GREEN) LAUNCHES 2ND BALL AND DOES NOT SPOT TARGET, W/L RED AWARDS SPECIAL.
73	TROUGH ROLLOVER	—	BALL RELEASE

I. INSTALLATION

To assemble the game, first bolt the legs to the cabinet. Feed the line cord through the slot provided in the pedestal. Place the lightbox atop the pedestal and engage the holding brackets.

To remove glass, insert key and unlock. Lift glass up and swing bottom out. Loosen and lower the shipping bracket at top center of lightbox insert panel. Lift panel up and then swing out. Secure lightbox to cabinet with the four bolts and washers provided.

Connect all cables and secure with cable clamps provided. Inspect the following **before** plugging in line cord:

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. Be certain all fuses are firmly seated.
5. Check the transformers for foreign matter across the terminals.
6. Be sure that the transformer wiring corresponds to the supply voltage.
7. 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 plum-bob tilt (on left side of cabinet near front door) to the sensitivity desired.

II. WIRING AND CONNECTOR INFORMATION

The following lists provide wire color and function information for each wire of each connector in the game.

Wire colors are shown as numbers. Use the chart below to convert to colors.

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

For example, 688 is a BLUE-SLATE-SLATE striped wire.

Printed Circuit Board connectors are shown as AX-JX.

Use the following chart to determine which printed circuit board applies:

- | | |
|----|-------------------------|
| A1 | Control Board |
| A2 | Power Supply |
| A3 | Driver Board |
| A4 | Score Displays (4) |
| A5 | Status Display |
| A6 | Sound Board |
| A8 | Pop Bumper Driver Board |

For example, A3-J3 is connector J3 on the driver board.

There are eight male/female cable connectors in the game. These are shown as A7-JX/PX.

III. GAME ADJUSTMENTS

A. CONTROL BOARD SWITCH ADJUSTMENTS

There are 32 switches on the control board which permit adjustment of the game parameters. These switches are contained in four packages of eight switches each, as shown below:

S1—S8	S9—S16	S17—S24	S25—S32
-------	--------	---------	---------

SWITCHES
S1 S2 S3 S4 _____ **COIN CHUTE ADJUSTMENTS**
S5 S6 S7 S8 _____ Left Chute
S9 S10 S11 S12 _____ Right Chute
S9 S10 S11 S12 _____ Center Chute
NOTE: FOR GERMAN GAMES ONLY, switches S5-S8 adjust the center chute and switches S9-S12 adjust the right 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*
ON ON OFF OFF 2/4*
ON ON OFF ON 2/5*
ON ON ON OFF 1/1 and 2/3
ON ON ON ON 3/1*

*NO CREDITS UNTIL LAST COIN IS INSERTED.

SWITCH 13 _____ **EXTRA CREDITS**
ON Adds 9 credits to center coin chute setting
OFF No effect

NOTE: FOR GERMAN GAMES ONLY, Switch 13 adds 9 credits to the right coin chute setting, when ON.

SWITCH 14 _____ **COIN CHUTE CONTROL**
ON Left and Right Chutes Same
OFF Left and Right Chutes Separate
NOTE: FOR GERMAN GAMES ONLY, Switch 14 controls the left and center coin chutes.

SWITCHES
15 16 _____ **MAXIMUM CREDITS**
OFF OFF 8
OFF ON 10
ON OFF 15
ON ON 25

SWITCH 17 _____ **BALLS PER GAME**
ON 3
OFF 5

SWITCH 18 _____ **MATCH FEATURE**
ON ON
OFF OFF

SWITCH 19 _____ **REPLAY LIMIT**
ON Limits each player to one replay per game.
OFF No replay limit

SWITCH 20 _____ **NOVELTY MODE**
ON Playfield SPECIAL and EXTRA BALL features award 50,000 points and 5 knocks. High score, high game to date and match features disabled.
OFF Normal game mode.
NOTE: SWITCH 20 overrides SWITCH 21.

SWITCH 21 _____ **GAME MODE**
ON Extra Ball
OFF Replay
NOTE: IF SWITCH 21 is ON, the high game to date and match awards are disabled.

SWITCH 22 _____ **PLAYFIELD SPECIAL**
OFF Awards Extra Ball
ON Awards Special

SWITCHES
23 24 _____ **HIGH GAME TO DATE**
OFF OFF Not displayed—no award
OFF ON Displayed—no award
ON OFF Displayed—awards 2 replays
ON ON Displayed—awards 3 replays

SWITCH 25 _____ **SOUND WHEN SCORING?**
ON Yes
OFF No

SWITCH 26 _____ **REPLAY BUTTON TUNE?**
ON Yes
OFF No

SWITCH 27 _____ **COIN SWITCH TUNE?**
ON Yes
OFF No

SWITCH 28 _____ **CREDITS DISPLAYED?**
ON Yes
OFF No

SWITCH 29 _____ **TILT PENALTY**
ON Ball in play only
OFF Game over

SWITCH 30 _____ **ATTRACT FEATURES**
ON ON
OFF OFF

SWITCH 31 _____ **NOT USED**

SWITCH 32
ON CONSERVATIVE
OFF LIBERAL

LIBERAL-CONSERVATIVE ADJUSTMENT

Switch 32 in the Conservative position disables replay when score exceeds one million.
Switch 32 in the Liberal position allows one replay every time score reaches a million points.

B. ELECTRONIC SOUND ADJUSTMENTS

There are two switches on the SOUND BOARD which allow variation:

SWITCH S1

MUST REMAIN IN OFF POSITION

SWITCH S2

OFF	NO ATTRACT TUNE
ON	ATTRACT TUNE PLAYED EVERY 6 MINUTES

The volume control is on the bottom panel in the cabinet and is accessible from the front door opening.

Switch S3 is a test switch. Pushing S3 will generate a short tune if switches S1 and S2 are in opposite states. No tune will be played if switches S1 and S2 are in the same state. This enables the operator to test the condition of both switches and to verify that the audio-output portion of the sound board is functional.

C. PLAYFIELD ADJUSTMENTS

The lower left kicking rubber may be adjusted by changing its upper post position allowing conservative play.

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 the relays will pulse and the score displays will light and show all zeros. The credit display will show the number of credits remaining and the ball in play display will be blank. If the credits fail to light, turn off the game and inspect the front door slam switch. It is normally closed.

Five seconds after the score displays light, they will flash the High Game to Date score for one second. This cycle continues until the game is started. A number of playfield lights controlled by the MPU will be flashed to create an attract mode.

Insert coins into each chute 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 replay button to reset the game; the ball should now be at the shooter. The first player score reads zero and flashes, indicating that that player is now scoring. The other player displays are blank and a one appears on the ball in play display. Additional players are indicated by a zero showing in each corresponding player display. After the maximum number of players has been added, or when the credit display reads zero, the replay button has no effect.

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. When the Shoot Again light is lit neither the player designation (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 any player's score a replay is awarded. At this time a High Game to Date score is periodically flashed in all player displays. When a score higher than this is achieved, an award dependent on switches 23 and 24 is given.

Tilting the game results in a penalty depending on the setting of switch 29. There is a normally closed switch on the front door. If this switch opens from pounding on the front door, the entire game is ended. The Game Over light comes on and for three seconds the entire switch matrix is inactive.

Additional players can be added at any time the first ball is still in play.

V. BOOKKEEPING AND SELF-TEST

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 play/test button on the front door 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 game returns to the attract mode.

STEP NUMBER	INFORMATION SHOWN
----------------	-------------------

00	NONE
----	------

01	TOTAL COINS THROUGH LEFT COIN CHUTE
----	-------------------------------------

02	TOTAL COINS THROUGH RIGHT COIN CHUTE
----	--------------------------------------

NOTE: IF CONTROL BOARD SWITCH 14 IS ON, STEPS 01 AND 02 ARE ADDED TOGETHER AND DISPLAYED IN STEP 01.

03	TOTAL COINS THROUGH CENTER COIN CHUTE
----	---------------------------------------

NOTE: FOR GERMAN GAMES ONLY, STEP 02 DISPLAYS TOTAL COINS THROUGH CENTER COIN CHUTE AND STEP 03 DISPLAYS TOTAL COINS THROUGH RIGHT COIN CHUTE.

04	TOTAL PLAYS
----	-------------

05	TOTAL REPLAYS
----	---------------

06	GAME PERCENTAGE
----	-----------------

(Replays ÷ total plays)

NOTE: IF STEP 06 IS RESET, STEPS 04 AND 05 MUST ALSO BE RESET.

07	EXTRA BALLS
----	-------------

08	TILTS
----	-------

09	SLAMS
----	-------

10	Number of times High Game to Date has been incremented to reach its present value.
----	--

11	First High Score level
----	------------------------

12	Second High Score level
----	-------------------------

13	Third High Score level
----	------------------------

14	High Game to Date score
----	-------------------------

15	Average playing time per game
----	-------------------------------

PLAYER 1 shows minutes

PLAYER 2 shows seconds

NOTE: IF STEP 15 IS RESET, STEP 04 MUST ALSO BE RESET.

All bookkeeping information is checked against itself to insure that it is correct. If the data changes for any reason, such as a dead battery, that information will be flashing while it is displayed.

The data in any bookkeeping step may be reset to zero while it is displayed by pressing the replay button on the front door. The play/test button must then be pressed to enter the zero into memory.

TO CHANGE HIGH SCORE LEVELS OR HIGH GAME TO DATE SCORE:

1. Press the play/test button on the front door to advance to step 11. (1st high score level).
2. Reset the score by pressing the replay button on the front door.
3. Release the replay button then hold it in again. This causes the score to advance by 10,000's. Hold in the replay button until the desired score is shown.

Enter the new score into memory by pressing the play/test button and advancing to the next step.

To return to the attract mode at any time, actuate the slam switches, tilt switches, on-off power switch, or wait sixty seconds.

SELF-TEST FEATURES:

The self-test routine begins with STEP 16. To bypass the bookkeeping functions and advance directly to self-test, press the Replay button in STEP 00.

STEP NUMBER

16

LAMP TEST

Relays and coin lockout coil are pulsed, then all controlled lamps are turned on in sequence.

17

SOLENOID TEST

Each controlled solenoid is pulsed while its number appears on the status display.

SOLENOID ASSIGNMENTS

NUMBER

FUNCTION

- | | |
|---|----------------------------|
| 1 | Outhole |
| 2 | Top Target Bank Reset |
| 3 | Left Coin Chute counter* |
| 4 | Right Coin Chute counter* |
| 5 | Right Target Bank Reset |
| 6 | Left Target Bank Reset |
| 7 | Center Coin Chute counter* |
| 8 | Knocker |
| 9 | Trough |

*Coin counters are optional and are **NOT** pulsed during SOLENOID TEST.

NOTE: FOR GERMAN GAMES ONLY, SOLENOID #4 is assigned to the **center** coin chute counter and SOLENOID #7 is assigned to the **right** coin chute counter.

18

SWITCH TEST

All switches on the switch matrix are inspected. If all switches are open, 99 is displayed on the status display. If one or more switches are closed, their numbers will appear on the status displays.

CAUTION: TURN POWER OFF BEFORE MAKING ANY SWITCH ADJUSTMENTS!

19

DISPLAY TEST

Each digit of each display is turned on individually and all numbers 0-9 are sequenced.

20

MEMORY TEST

Each control board memory device is inspected. Any defective devices are indicated by part number on the PLAYER 1 score display. If all memory devices are okay, 99 is displayed on the status display.

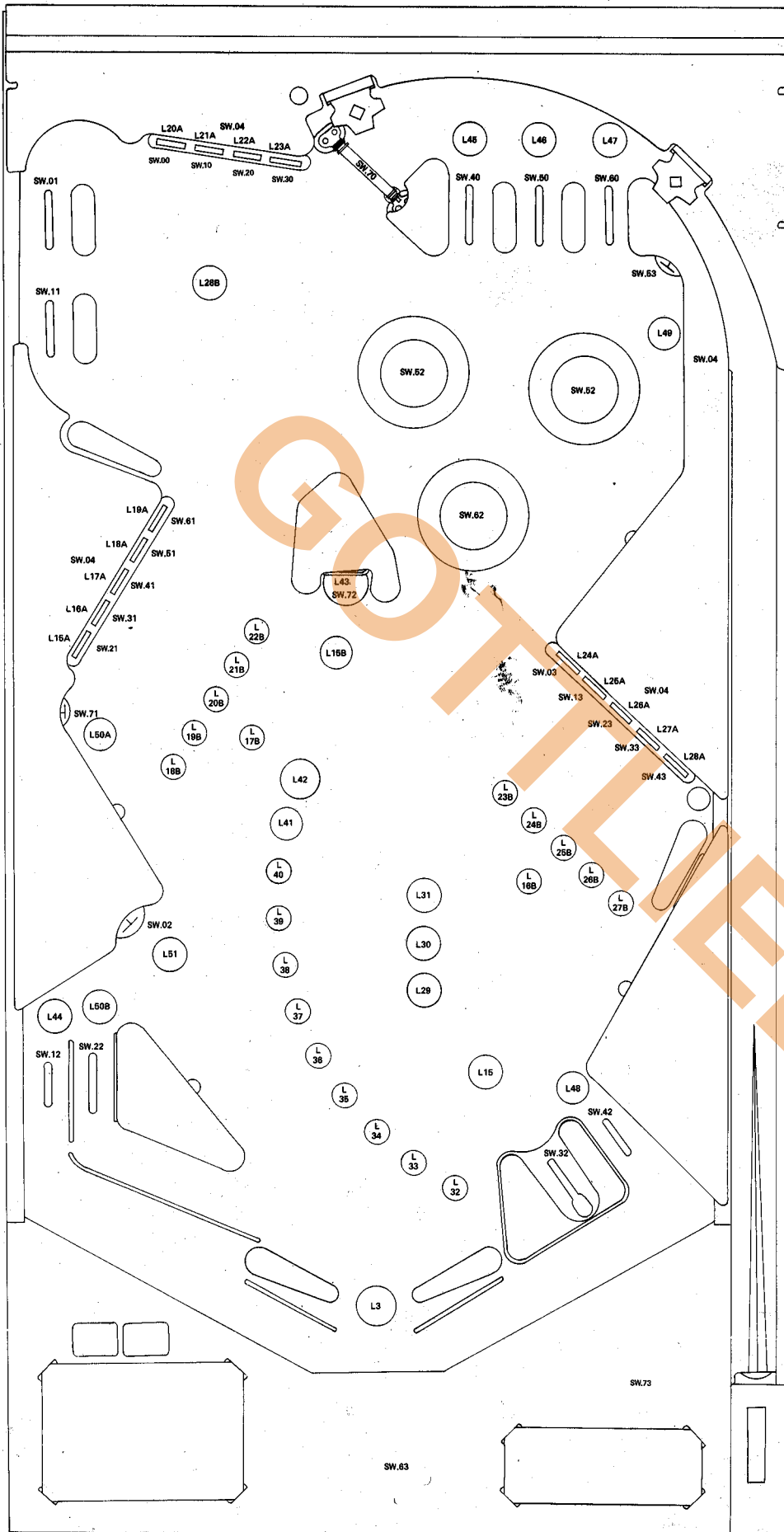
Any of the tests in steps 16 through 20 may be repeated any number of times by pressing the replay button immediately after the test is completed.

VI. OPTIONAL ELECTRO-MECHANICAL COIN COUNTERS

Electro-mechanical coin counters may be installed on the bottom board, if desired. Directly behind the seven position fuse block, solder lugs are provided which will connect the counters to the electronic circuitry.

1. Position the counter and secure it to the bottom board. Mounting holes are spotted in the bottom board for most standard 24 volt counters.
2. **CAUTION:** A 1N4004 diode must be connected across each counter with the cathode end connected to the solder lug with the RED-BLACK-BLACK wire.
3. Connect one counter lead to each of the two solder lugs provided for each counter.
4. The counter should increment once when the respective coin chute switch is closed.

VII. SWITCH MATRIX AND LAMP LOCATION ASSIGNMENT



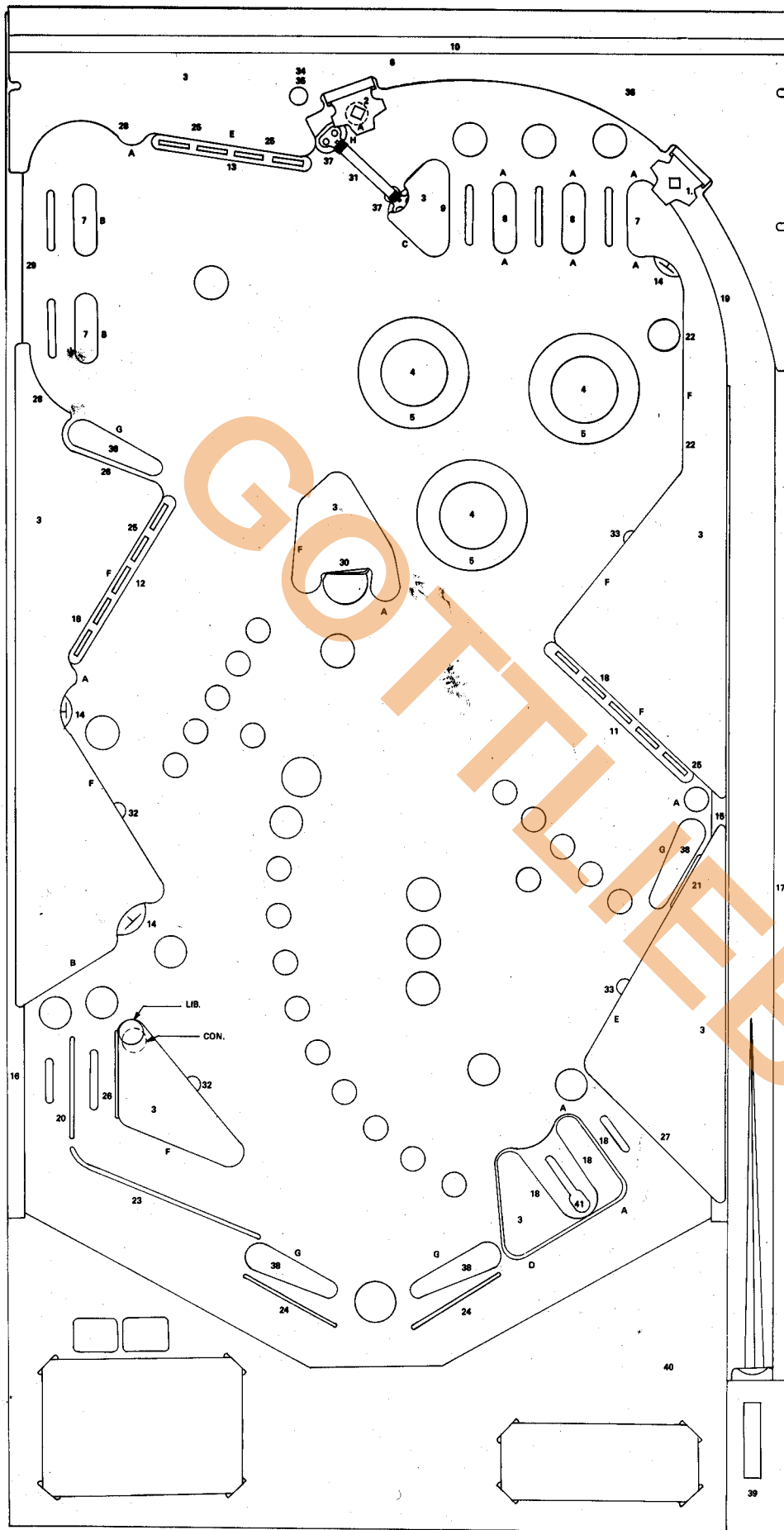
SWITCH MATRIX AND LAMP LOCATION SWITCHES ON MATRIX

SW. MATRIX NUMBER	SWITCH ASSIGNMENT
00	#1 Top Drop Target.
01	Top Upper Left Rollover.
02	Blue Spot Target.
03	#1 Right Drop Target.
04	30 Point. (8)
10	#2 Top Drop Target.
11	Top Lower Left Rollover.
12	Left Out Rollover.
13	#2 Right Drop Target.
20	#3 Top Drop Target.
21	#1 Left Drop Target.
22	Return Rollover.
23	#3 Right Drop Target.
30	#4 Top Drop Target.
31	#2 Left Drop Target.
32	Ball Kicker Rollover.
33	#4 Right Drop Target.
40	Red Rollover.
41	#3 Left Drop Target.
42	Right Out Rollover.
43	#5 Right Drop Target.
50	White Rollover.
51	#4 Left Drop Target.
52	Upper Pop Bumper. (2)
53	Red Spot Target.
60	Blue Rollover.
61	#5 Left Drop Target.
62	Lower Pop Bumper.
63	Outhole Rollover.
70	Spin Target.
71	White Spot Target.
72	Hole Kicker.
73	Trough Rollover.

CPU CONTROLLED LAMPS

LAMP NUMBER	LAMP ASSIGNMENT
0	Game Over Relay. (Located under Playfield)
1	Tilt Relay. (Located under Playfield)
2	Coin Lockout Coil. (Located on Front Door)
3	Same Player Shoots Again. (Lightbox and Playfield)
4	1st Player.
5	2nd Player.
6	3rd Player.
7	4th Player.
10	High Game To Date.
11	Game Over.
L15A	#1 Left Drop Target.
L15B	Green When Lit. Hole Kicker.
L15C	Green When Lit. Ball Kicker.
L16A	#2 Left Drop Target.
L16B	Blue When Lit. Blue Drop Target Bank.
L17A	#3 Left Drop Target.
L17B	Red When Lit. Red Drop Target Bank.
L18A	#4 Left Drop Target.
L18B	White 5000—#1 Red Drop Target.
L19A	#5 Left Drop Target.
L19B	White 5000—#2 Red Drop Target.
L20A	#1 Top Drop Target.
L20B	White 5000—#3 Red Drop Target.
L21A	#2 Top Drop Target.
L21B	White 5000—#4 Red Drop Target.
L22A	#3 Top Drop Target.
L22B	White 5000—#5 Red Drop Target.
L23A	#4 Top Drop Target.
L23B	White 5000—#1 Blue Drop Target.
L24A	#1 Right Drop Target.
L24B	White 5000—#2 Blue Drop Target.
L25A	#2 Right Drop Target.
L25B	White 5000—#3 Blue Drop Target.
L26A	#3 Right Drop Target.
L26B	White 5000—#4 Blue Drop Target.
L27A	#4 Right Drop Target.
L27B	White 5000—#5 Blue Drop Target.
L28A	#5 Right Drop Target.
L28B	Extra Ball.
L29	1X.
L30	2X.
L31	3X.
L32	1000.
L33	1000.
L34	1000.
L35	1000.
L36	1000.
L37	1000.
L38	1000.
L39	1000.
L40	1000.
L41	10,000.
L42	20,000.
L43	Special.
L44	Yellow When Lit. Left Outside Rollover.
L45	RED—Red Rollover.
L46	WHITE—White Rollover.
L47	BLUE—Blue Rollover.
L48	Yellow When Lit. Right Outside Rollover.
L49	Red When Lit. Red Spot Target.
L50A	White When Lit. White Spot Target.
L50B	Yellow When Lit. Return Rollover.
L51	Blue When Lit. Blue Spot Target.

VIII. PLAYBOARD INFORMATION



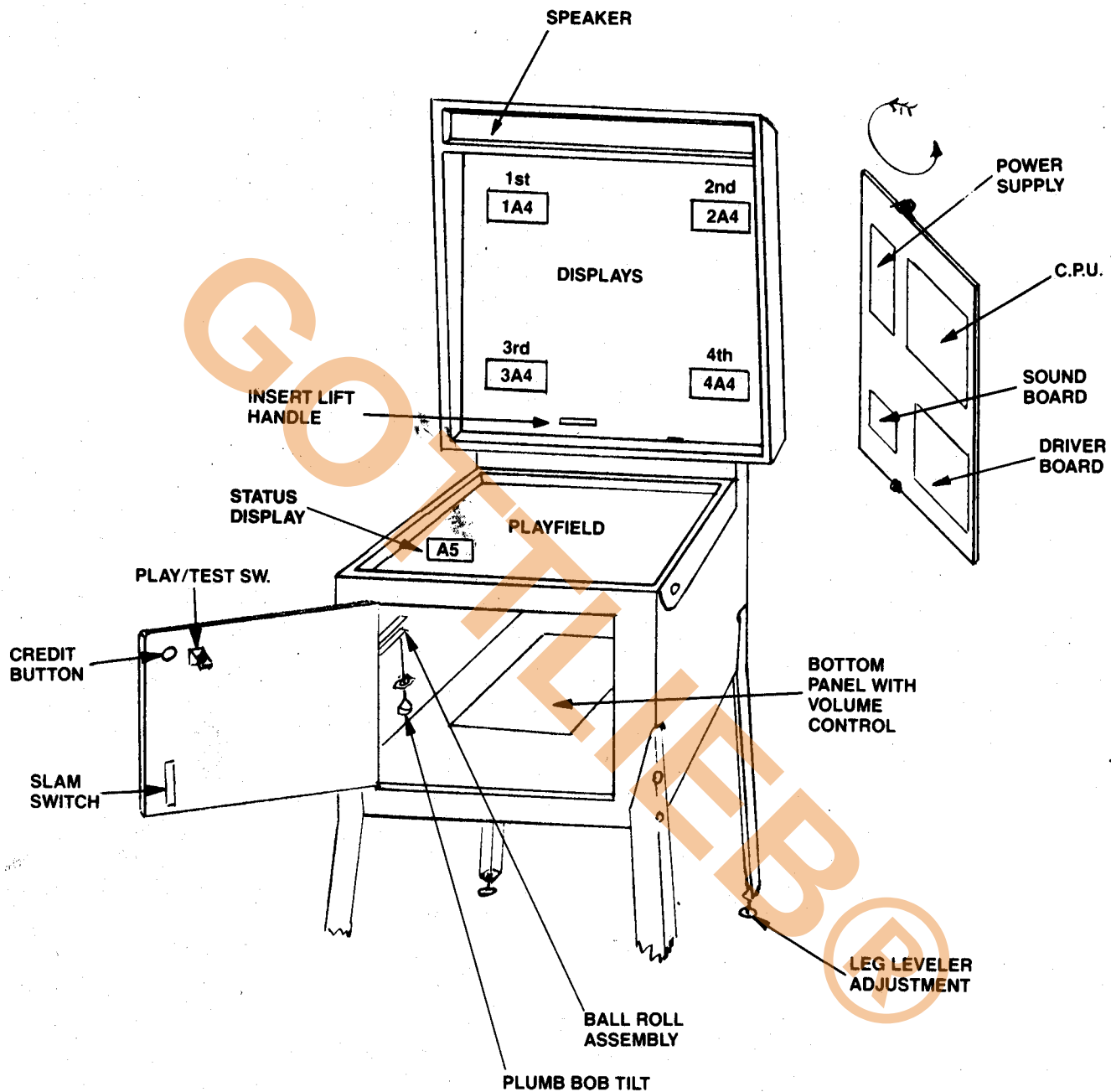
PLAYBOARD INFORMATION

RUBBER RINGS		DIA.
A—A-10217	(13)	3/8"
B—A-10219	(3)	1"
C—A-10220	(1)	1 1/2"
D—A-10221	(1)	2"
E—A-10222	(2)	2 1/2"
F—A-10223	(7)	3"
G—A-13151	(4)	
H—A-17493	(1)	7/16"

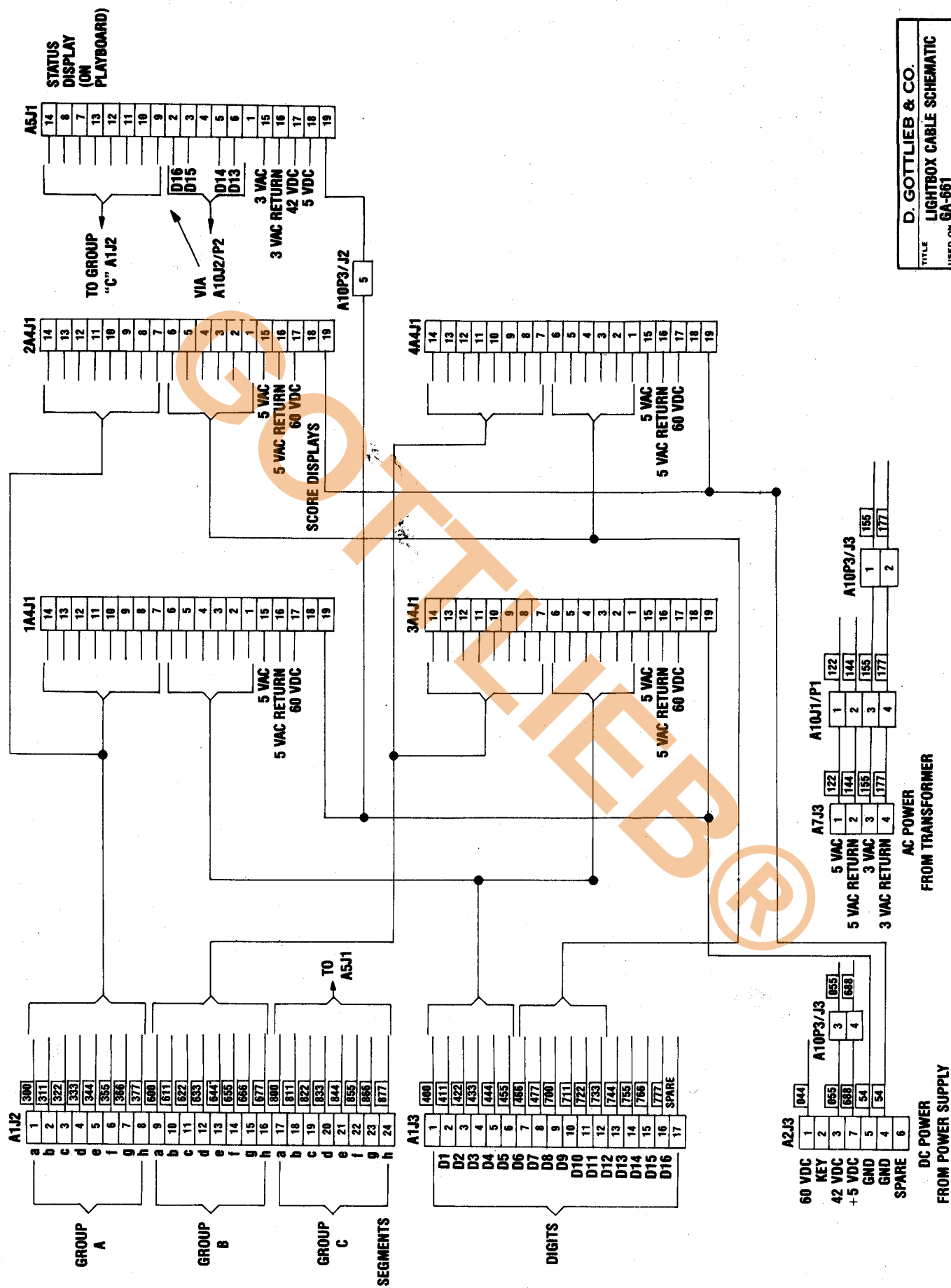
PARTS LIST

1. A-19645 Ball Gate Right.
2. A-19646 Ball Gate Left.
3. D-20361 Plastic Shield Set.
4. Black Pop Bumper A-13905 and A-20428 in Black. (3)
5. White Pop Bumper Skirt. (3)
6. C-20103 Top Arch Rod Rail.
7. A-9393 Blue Plastic Guide Rail. (3)
8. A-9394 Blue Plastic Guide Rail. (2)
9. A-9395 Blue Plastic Guide Rail.
10. D-19936 Arch Shield.
11. Right Drop Target Bank. (5 Pos.)
12. Left Drop Target Bank. (5 Pos.)
13. Top Drop Target Bank. (4 Pos.)
14. A-9383 Plastic Target. (3)
15. B-19880 Wood Rail—Center.
16. B-19881 Wood Rail—Left.
17. B-19882 Wood Rail—Right.
18. A-3722 Ball Guide Rail. (5)
19. A-4246 Ball Guide Rail.
20. A-4832 Ball Guide Rail.
21. A-6612 Ball Guide Rail.
22. A-6931 Ball Guide Rail. (3)
23. A-13584 Ball Guide Rail.
24. A-13798 Ball Snubber Rail. (2)
25. A-18070 Ball Guide Rail. (4)
26. A-17106 Ball Guide Rail. (2)
27. A-18563 Ball Guide Rail.
28. A-20362 Flat Rail Clip. (2)
29. B-20363 Metal Flat Rail.
30. A-16038 Ball Snubber.
31. B-17175 White Swinging Target.
32. A-15636 Left Kicking Rubber. (2)
33. A-15638 Right Kicking Rubber. (2)
34. B-19873 Arch Rod End Post.
35. B-19874 Arch Rod End Post Cap.
36. B-19875 Arch Rod Support Post.
37. C-17492 Siamese Post.
38. C-13150 White Jumbo Flipper. (4)
39. C-9767 Ball Shooter Gage.
40. D-20187 Card Holder.
41. A-16701 Ball Kicker.
- C-11561 Clear 1" High Post. (45)

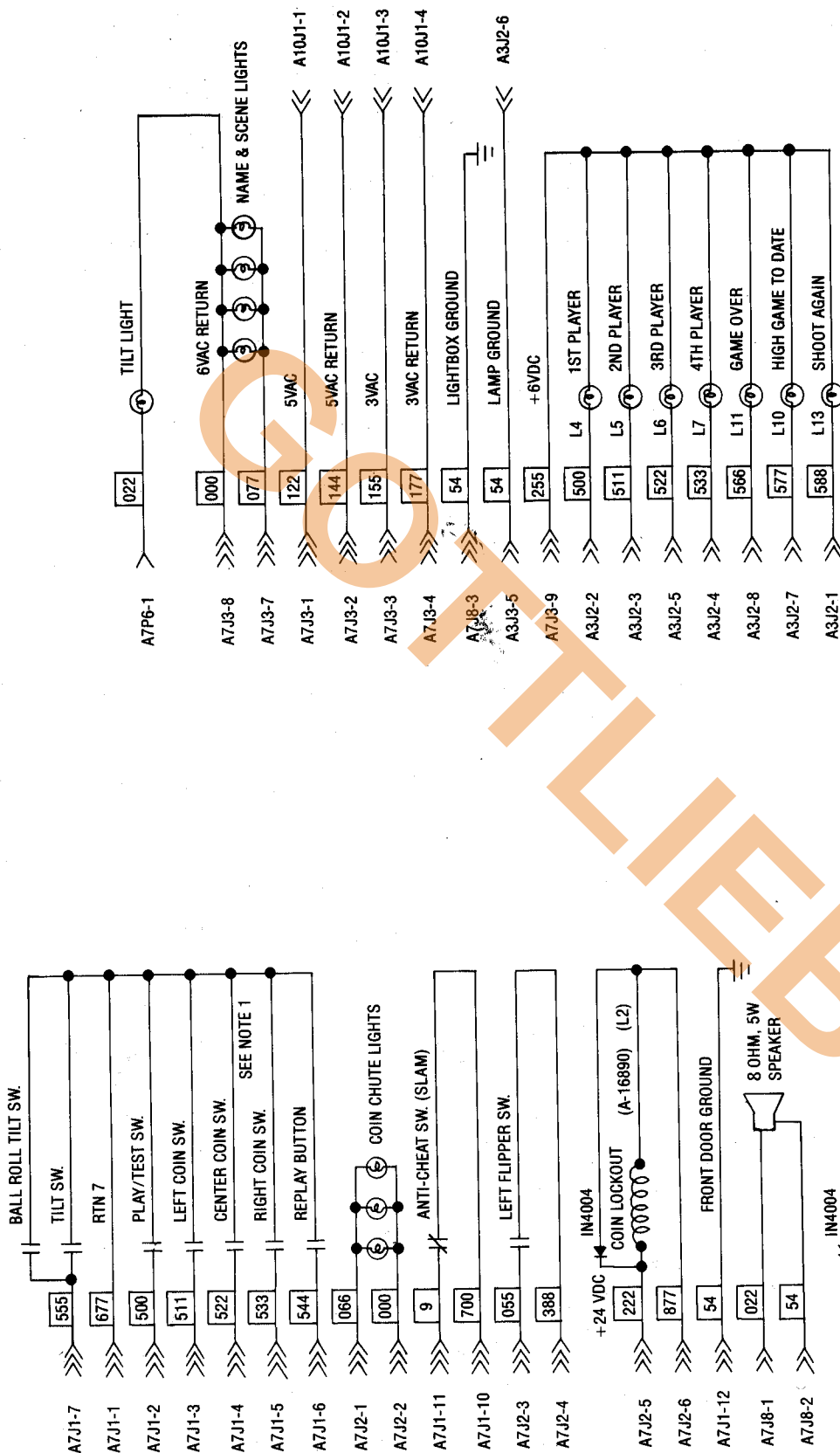
IX. A. COMPONENT LOCATION DIAGRAM



IX. B. LIGHTBOX CABLE SCHEMATIC DIAGRAM



IX. C. BOTTOM BOARD & LIGHTBOX SCHEMATIC



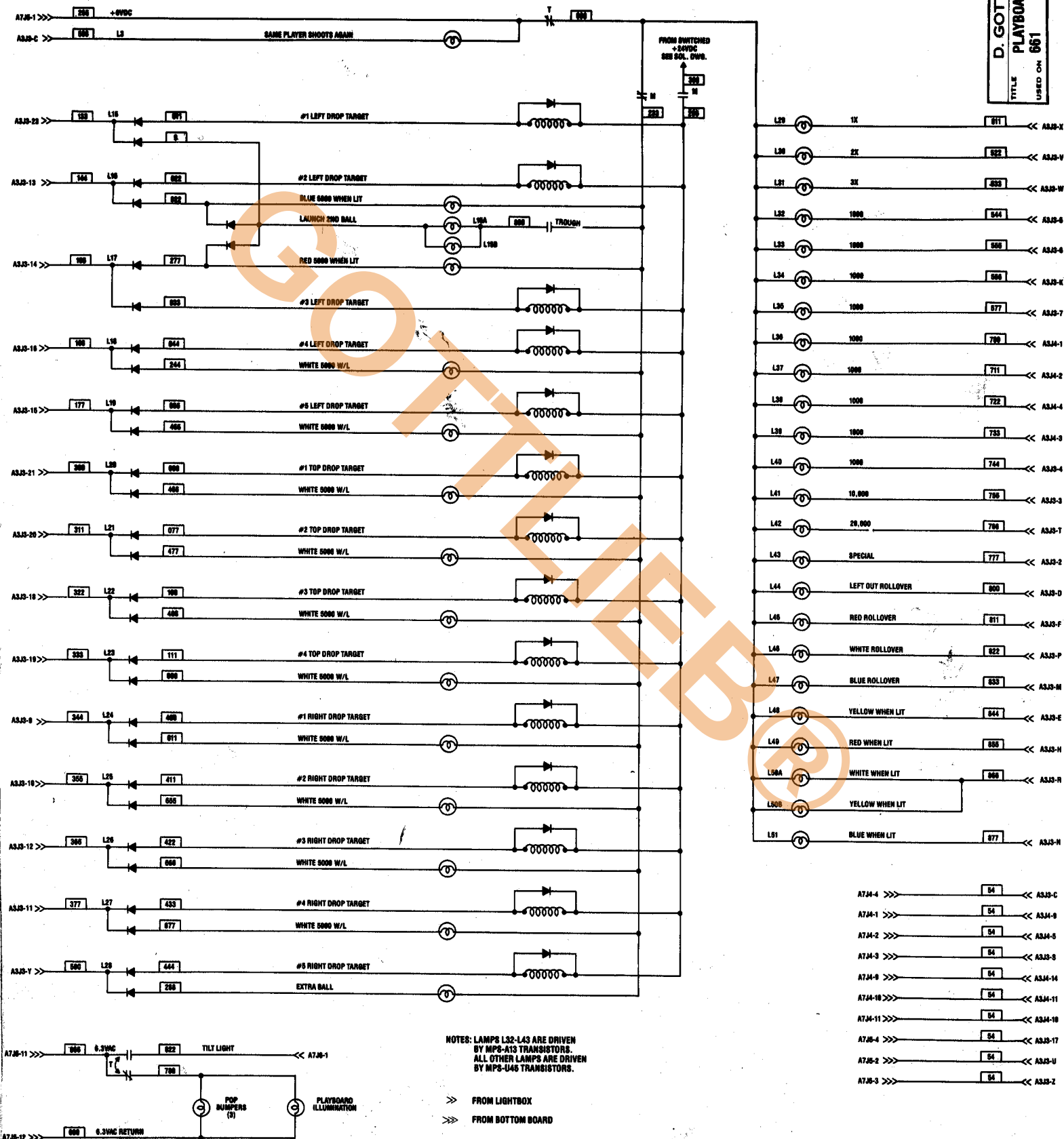
NOTE 1: REFER TO INSTRUCTION MANUAL FOR
GERMAN GAME VARIATIONS

- > FROM PLAYBOARD
- >> FROM LIGHTBOX
- >>> FROM BOTTOM BOARD

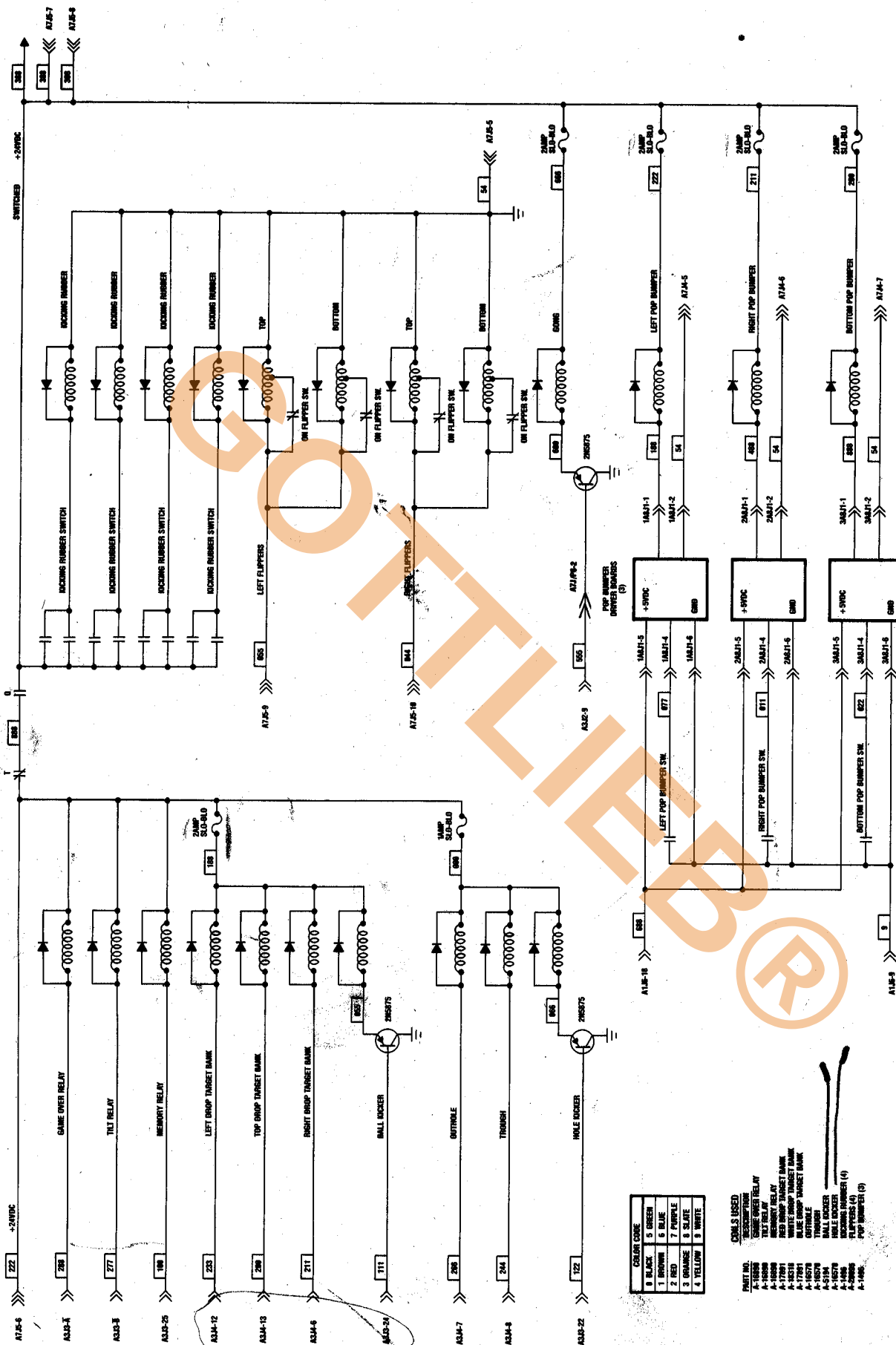
D. GOTTLIEB & CO.
TITLE
BOTTOM BOARD & LIGHTBOX
661
USED ON
SCHEMATIC

IX. D. ILLUMINATION SCHEMATIC DIAGRAM PAGE 1

D. GOTTLIEB & CO.
TITLE
PLAYBOARD ILLUMINATION
USED ON 661



IX. E. PLAYBOARD SOLENOIDS



COLOR CODE	
1 BLACK	5 GREEN
2 BROWN	6 BLUE
3 RED	7 PURPLE
4 ORANGE	8 SLATE
5 YELLOW	9 WHITE

CON'S USED
 A-16000 GAME OVER RELAY
 A-16001 TILT RELAY
 A-16002 MEMORY RELAY
 A-16003 LEFT DROP TARGET BANK
 A-16004 TOP DROP TARGET BANK
 A-16005 RIGHT DROP TARGET BANK
 A-16006 BALL INCHER
 A-16007 OUTRIGGER
 A-16008 THROUGH
 A-16009 HOLE INCHER
 A-16010 LEFT POP BUMPER DRIVE (3)
 A-16011 RIGHT POP BUMPER DRIVE (3)
 A-16012 BOTTOM POP BUMPER DRIVE (3)

FROM LIGHTBOX
 FROM BOTTOM BOARD
 NOTES: ALL DIODES ARE IN4004

D. GOTTLIEB & CO.
 TITLE | PLAYBOARD SOLENOIDS
 USED ON 661

IX. F. SWITCH MATRIX

STROBES

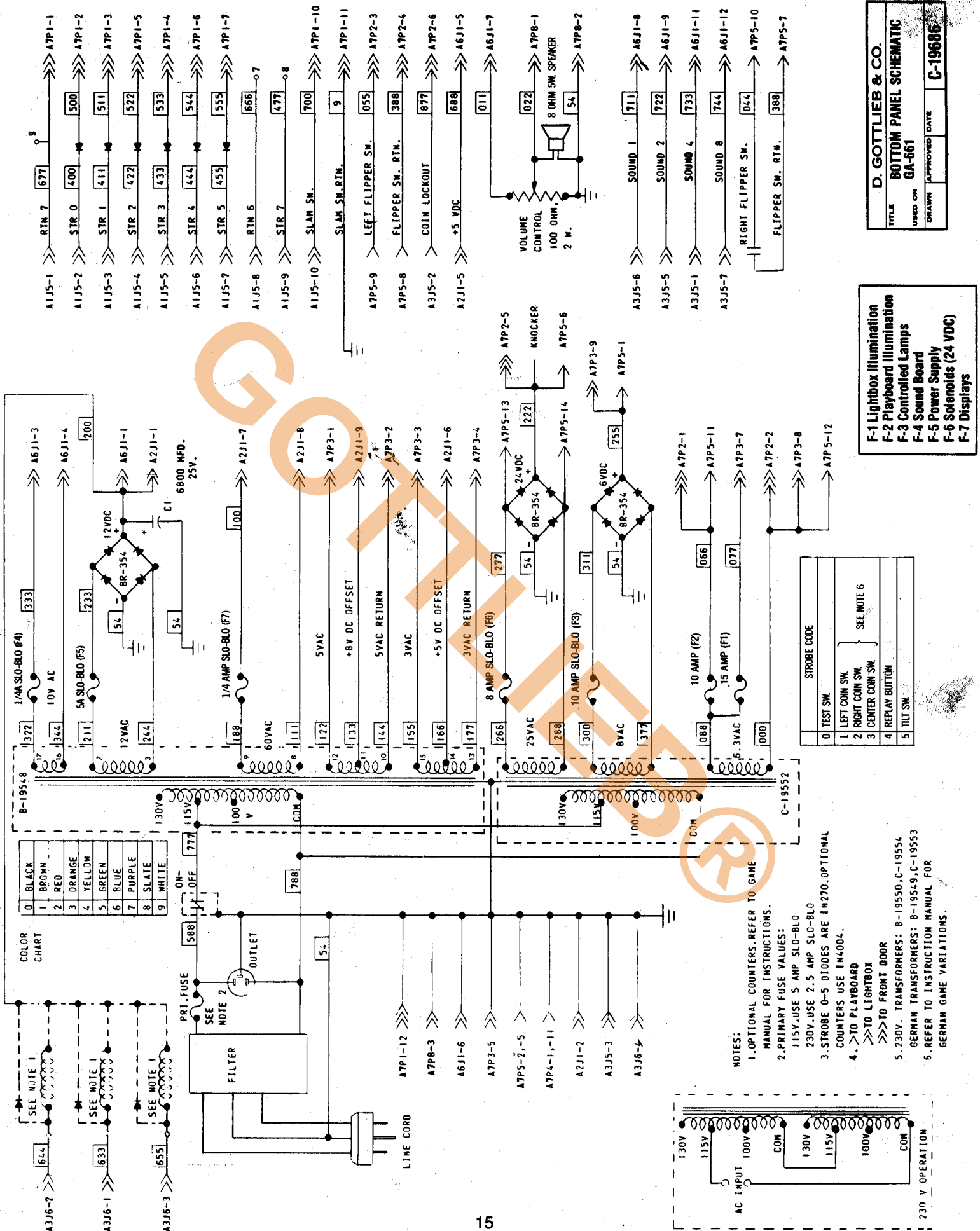


COLOR CHART	
0 BLACK	5 GREEN
1 BROWN	6 BLUE
2 RED	7 PURPLE
3 ORANGE	8 SLATE
4 YELLOW	9 WHITE

NOTE: DIODES ARE IN-270

D. GOTT LIEB & CO.
TITLE SWITCH MATRIX
USED ON 661

IX. G. BOTTOM BOARD PANEL SCHEMATIC



D. GOTTlieb & CO.
TITLE
BOTTOM PANEL SCHEMATIC
GA-661
USED ON
DRAWN
APPROVED
DATE
C-19686

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