HIGH SPEED ™

INSTRUCTION MANUAL

Williams® W
ELECTRONICS GAMES, INC.

HIGH SPEED (System-11) ROM Summary

IC	DESCRIPTION	TYPE	IDENTIFIER	BOARD	PART NUMBER
Game ROM 2	8K x 8 ROM	2764	U26	CPU	A-5343-541-5
Game ROM 1	256K x 8 ROM	27256	U27	CPU	A-5343-541-1
Sound ROM 1	256K x 8 ROM	27256	U21	CPU	A-5343-541-3
Sound ROM 2	256K x 8 ROM	27256	U22	CPU	A-5343-541-2
Background (B/G) Sound ROM	256K x 8 ROM	27256	U4	B/G Sound	A-5343-541- 4

NOTICE

To order a replacement ROM from your authorized WILLIAMS ELECTRONICS GAMES distributor, specify: (1) part number (if available); (2) ROM label color; (3) ROM level (number) on the label; (4) which game the ROM is used in.

Sol. No.	Function	Solenoid Type	Wire [1] Color	Connections CPU Bd.	Connections Playfield/ Cabinet	Driver Trans.	Solenoid Part No.
01	Outhole	Controlled	Gry-Brn	1P11-1	8P3-1	Q33	AE-23-800-01
02	Ball Release	Controlled	Gry-Red	1P11-3	8P3-2	Q25	AE-23-800-03
03	Eject Hole	Controlled	Gry-Orn	1P11-4	8P3-3	Q32	AE-23-800-03
04	Police Light Relay	Controlled	Gry-Yel	1P11-5	Backbox	Q24	5580-10883-00
05	Flasher No. 2 (Left Blue)	Controlled	Gry-Grn	1P11-6	8P3-5	Q31	#63 flashlamps
06	Flasher No. 3 (Right Blue)	Controlled	Gry-Blu	1P11-7	8P3-6	Q23	#63 flashlamps
07	Left Hideout Relay	Controlled	Gry-Vio	1P11-8	8P3-7	Q30	AE-24-900-02
08	Right Hideout Relay	Controlled	Gry-Blk	1P11-9	8P3-8	Q22	AE-24-900-02
09	Flasher No. 1 (Left Red)	Controlled	Brn-Blk	1P12-1	8P3-9	Q17	#63 flashlamps
10	Insert Board Flashers	Controlled	Brn-Red	1P12-2	9P1-7	Q9	#63 flashlamps
11	General Illumination Relay	Controlled	Brn-Orn	1P12-4	3P7-1	Q16	5580-09555-00
12	Flasher No. 4 (Right Red)	Controlled	Brn-Yel	1P12-5	8P3-12	Q8	#63 flashlamps
13	Ramp Gates	Controlled	Brn-Grn	1P12-6	8P3-13	Q15	AL-23-800-01
14	Kickback (Left Outlane)	Controlled	Brn-Blu	1P12-7	8P3-14	Q7	AE-24-900-01 & Relay
15	Knocker	Controlled	Brn-Vio	1P12-8	Backbox	Q14	AE-23-800-02
16	Coin-Lockout Relay	Controlled	Brn-Gry	1P12-9	7P1-7,7P2-4	Q6	404603-2 [2]
17	Left Kicker	Special #1	Blu-Brn	1P19-7	8P3-17	Q75	AE-23-800-03
18	Right Kicker	Special #2	Blu-Red	1P19-4	8P3-18	Q71	AE-23-800-03
19	Right Jet Bumper	Special #3	Blu-Orn	1P19-3	8P3-19	Q73	AE-23-800-03
20	Lower Left Jet Bumper	Special #4	Blu-Yel	1P19-6	8P3-20	Q69	AE-23-800-03
21	Upper Left Jet Bumper	Special #5	Blu-Grn	1P19-8	8P3-21	Q77	AE-23-800-03
22	Top Playfield Flashers	Special #6	Blu-Blk	1P19-9	8P3-22	Q79	#63 flashlamps
-	Upper Flipper	-	(Blk-Yel)		(7J1-19,8P3-33) [3]	-	FL23/600-30/2600-50VDC
-	Right Flipper	-	Orn-Vio (Blu-Vio)	1P19-1	7P1-20 (7J1-21,8P3-34) [3]	-	FL23/600-30/2600-50VDC
-	Left Flipper	-	Orn-Gry (Blu-Gry)	1P19-2	7P1-23 (7J1-24,8P3-32) [3]	-	FL23/600-30/2600-50VDC

Notes:
1. Wire colors, except flipper Orn-Vio and Orn-Gry, are ground connections (to coil terminal with unbanded end of diode). Flipper Orn-Vio and Orn-Gry wires connect from CPU Board to flipper switch.   2. Solenoid 16 has a Coinco part number.
3. Connections shown in parentheses are from flipper switch to flipper coil.

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IMPORTANT NOTES ON AUTOMATIC REPLAY
PERCENTAGING

1. The replay percentage specified in adjustment #1 refers only to Credits (or Extra Balls) won by beating the game's replay score. (The count of which may be read in audits 8 and 9.) The **TOTAL** Free Play will be **10% or 15% higher** with the addition of Match, Special, and High Score To Date credits. The **TOTAL** Free Play is shown as audits 6 and 7.

2. Automatic Replay Percentaging also applies, when Extra Balls are awarded instead of Credits.

3. If more than 1 replay level is specified (in adjustment 3), then the game uses the sum of all replays earned (from all levels) when computing the percentage and for determining changes in the replay level.

4. The game will not change the replay score level by more than 100,000 points every 500 plays. If the game is far from the optimum level, it will take several thousand plays until an appropriate score is reached. If you detect that this is the situation, it may be appropriate to make a large change in the "Replay Start" value. The game will then start at this newly specified value and work toward the percentage specified in adjustment 1.

5. The game seeks a **Current** replay percentage as specified in adjustment #1. It will **not** try and compensate for past performance.

6. Any change of adjustments 1 (Replay Percent) or 2 (Replay Start) will cause the Automatic Replay Percentaging system to **start from scratch** using the newly specified value(s). Other than large changes in the starting value (as described in note 4), the operator should let the system work its way toward the correct replay score. If fixed replay score(s) are desired, set adjustment 1 to show the words "Fixed Replay" in the displays. Then use adjustments 2 through 5 to set the Fixed Replay Score Level(s).

7. Progress of the Automatic Replay Percentaging system may be monitored by examining audits 40 through 44.

8. The Automatic Replay Percentaging system makes a change of -100,000, or 0, or +100,000 points to the First Replay level every 500 plays. The term "change" (used from now on) will refer to the event of 500 plays having been counted (even if a change of 0 points is made on that event). Audit counter 40 (Aut. Pct. Data 1) shows the number of "changes" that have been made.

9. Audit counter 41 (Aut. Pct. Data 2) is the number of plays since the last "change".

10. Audit counter 42 (Aut. Pct. Data 3) is the number of times a replay score has been beaten since the last "change".

11. Audit counter 43 (Aut. Pct. Data 4) is the number of times a replay score was beaten during the 500 plays **before** the last "change".

12. Audit counter 44 (Aut. Pct. Data 5) is the number of times a replay score was beaten in the 500 plays before those recorded in audit 43; i.e., each time a change occurs, Aut. Pct. Data 4 is copied into Aut. Pct. Data 5.

13. When a change occurs (i.e., Aut. Pct. Data 2 reaches 500), the new replay score (if change is non-zero) is computed, but does not go into effect until the next time the game is powered up. This is so that the replay score will not change on a player in-between games.

14. The replay score(s) are shown in the backglass displays during the Attract Mode, and during game play if a player presses **and holds** either flipper.

15. Clearing the audit totals or coin counters does not affect the Automatic Replay Percentaging data.

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- Game Play
- Game Status Displays
- Game Adjustment Procedure
- Game Pricing
- Test/Diagnostic Procedures

HIGH SPEED (System-11) ROM Summary

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Background (B/G) Sound ROM	256K x 8 ROM	27256	U4	B/G Sound	A-5343-541-4

NOTICE
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CONNECTOR IDENTIFICATION

WILLIAMS ELECTRONICS GAMES uses a special technique to identify connectors. Each plug or jack receives a prefix number (which identifies the circuit board), a letter, and a number. J-designations refer to the male part of a connector. P-designations refer to the female part of a connector. For example, 1J1 designates jack 1 of board 1 (a CPU Board jack); 3P6 designates plug 6 of board 3 (a Power Supply Board plug).

Identifying the specific pin number of a connector involves a hyphen, which separates the pin number from the plug or jack designation. For example, 1J1-3 refers to pin 3 of jack 1 on board 1.

HIGH SPEED CIRCUIT BOARDS

All HIGH SPEED Circuit Boards are in the backbox. They are accessible by removing the backbox glass, unlatching the insert board, and swinging it open.

CPU BOARD. The System-11 CPU Board (p/n D-10880) must be equipped with the ROMs specified in the HIGH SPEED (System-11) ROM Summary. For this ROM complement, jumpers W1, W3, W4, W5, and W7 should be connected. Jumper W7 is cut/removed for West German games.

BACKGROUND SOUND BOARD. The Background Sound Board is p/n C-11029.

DISPLAY BOARDS. The Alphanumeric Display Board is p/n D-10877. Two of the 7-digit Player Score Displays (SPEEDER 1, SPEEDER 2) are p/n C-10866. The SPEEDER 3 and 4 Displays are p/n C-8364. The 2-digit Credit, 2-digit MATCH (also Ball-in-Play) Display is p/n C-8365.

POWER SUPPLY BOARD. The Power Supply Board is p/n D-8345 (equipped with a relay).

The prefix numbers for HIGH SPEED System-11 circuit boards are listed below:

1	-	CPU Board	9	-	Insert Board
2	-	(not assigned)	10	-	(not assigned)
3	-	Power Supply Board	11	-	B/G Sound
4	-	Alphanumeric Display Board	12	-	(not assigned)
5	-	Slave Display Board	13	-	(not assigned)
6	-	Backbox	14	-	(not assigned)
7	-	Cabinet	15	-	Flipper Power Supply
8	-	Playfield			

HIGH SPEED GAME CONTROL LOCATIONS

The On-Off switch is on the bottom of the cabinet near the right front leg.

The Volume Control is on the left inner wall of the cabinet on the tilt mechanisms board. It is accessible by opening the coin box door.

The Credit switch is a pushbutton to the left of the coin door on the cabinet exterior.

GAME ADJUSTMENT/DIAGNOSTIC SWITCHES. HIGH SPEED allows the operator to program virtually all game adjustments, obtain bookkeeping information, and diagnose problems, using only three switches mounted on the inside of the coin door and the Credit buttom beside the coin door.

ADVANCE, AUTO-UP/MANUAL-DOWN, and HIGH-SCORE RESET are the switches located on the inside of the coin door. Refer to the Game Status Displays text and the Text/Diagnostic Procedures for details concerning their operation.

The Memory Protect switch is on the inside frame of the coin door. This interlock switch must be open to clear bookkeeping totals and to make game adjustments. It automatically opens, when the coin door opens.

The CPU Diagnostic switch (SW 2) is the lower switch (of the two switches mounted on the left edge of the CPU Board) near a large, socketed microprocessor chip. This switch initiates the Memory Chip Test explained in the Diagnostic Procedures.

The Sound Diagnostic switch (SW 1) is the upper switch of the two mounted on the left edge of the CPU Board. This switch initiates the Sound Section Test. Refer to the Diagnostic Procedures.

PINBALL GAME ASSEMBLY INSTRUCTIONS

1. Open the shipping container; remove all cartons, parts, and other items, and set them aside.
2. Place cabinet on a support and attach rear legs, using leg bolts (provided in the cash box).
3. Attach the front legs, using leg bolts.
4. Reach into the cabinet and backbox and check the mating of the interconnecting cables, matching several wire colors at each connector.

CAUTION

Ensure that the interconnecting cables are free to move (not kinked or pinched). Be careful not to damage wires at any stage of the assembly process.

5. Raise the hinged backbox into position. Take care to prevent damage to rotating beacon on top of backbox, both now and during any further movements of the game. Secure the backbox with mounting bolts through the bottom holes into the threaded fasteners in the cabinet.
6. Extend the rear leg levelers to approximately 2/3 length below the leg bottom. Remove the cabinet from its support and place it on the floor.
7. Remove the playfield cover glass to permit accurate measurement of the playfield level and pitch. Level (side-to-side) the playfield (preferably measured ON the playfield surface), and firmly tighten the nut on each leg leveler shaft to maintain this level setting, as shown in Figure 1.
8. Adjust the front leg levelers for proper playfield level (side-to-side) _and_ playfield pitch angle (incline) of approximately 6 degrees. (Again, it is recommended that these measurements be made ON the playfield, not the cabinet nor the playfield cover glass.) Tighten the nut on each leg leveler shaft to maintain this setting.

CAUTION

Playfield pitch angle adjustments can affect the operation of the ball-roll tilt and the plumb bob tilt, inside the cabinet. The operator should adjust these tilt mechanisms for proper operation, after completion of the desired playfield pitch angle setting.

9. Move the game into the desired location; recheck the level and pitch angle of the playfield.
10. Verify that three balls are installed in the game.
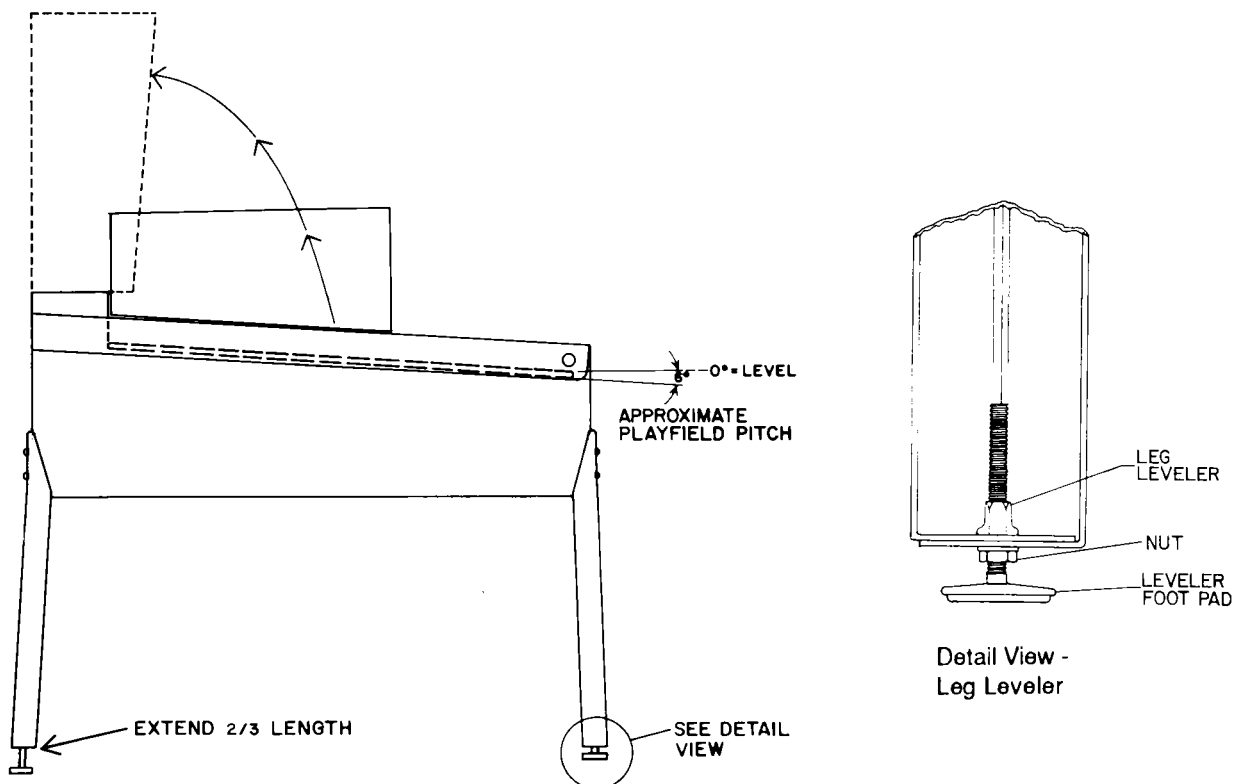11. Clean and re-install the playfield cover glass. Prepare the game for player operation.

Figure 1. Pinball Assembly, Playfield Pitch Angle, and Leg Leveler Details.

GAME OPERATION

<div style="text-align:center">(WARNING)</div>

After assembly and installation at its site location, this game must be plugged into a properly
grounded outlet to prevent shock hazard, and to assure proper game operation. DO NOT
use a 'cheater' plug to defeat the ground pin on the line cord. DO NOT cut off the ground pin.

POWERING UP. With the coin door closed, plug the game in, and turn it ON, using the On-Off switch. In nor-
mal operation, the player 1 (SPEEDER 1) score display and the lower two 2-digit displays (Credits and BALL IN
PLAY/MATCH) initially all show 00. The GAME OVER indicator blinks. Then, the game goes into the Attract
Mode (Playfield and backbox lamps flashing, sounds being heard, etc.).

CAUTION

HIGH SPEED's System 11 game program has a new capability to aid the operator and service per-
sonnel: At game Turn-On (and also when the operator is beginning the Test/Diagnostic Procedures),
a display now signals when a switch has NOT been actuated during ball play for a lengthy period of
time. Up to three switches can be displayed during this switch problem reporting activity. Moreover,
HIGH SPEED compensates the game play requirements affected by each disabled switch to allow
'nearly normal' play. This helps keep *HIGH SPEED* earning good profits! More information is avail-
able in the Diagnostic Procedures text describing the Switch Testing.

ATTRACT MODE*. Playfield and backbox lamps blink; the rotating beacon flashes occasionally.   All player
score displays (SPEEDER 1, SPEEDER 2, etc.) exhibit a series of displays informing the player concerning:

    A. Recent highest scores*;
    B. A "custom message" ("RUN THE LIGHT ... AND GET AWAY ... AT HIGH SPEED")*;
    C. The score to achieve to obtain a Replay award*;
    D. The "Hideout Jackpot" point value*.

These displays (or variations of them) reappear occasionally, accompanied by sounds and music, until a player
initiates game play by inserting a coin or, when credits are available, pressing the Credit button.

CREDIT POSTING. Insert coin(s).   A sound is heard for each coin, and the Credits display shows the
number of credits purchased. Even if the number of maximum allowable credits* is exceeded by coin purchase
or high score, credits are posted correctly. However, the coin-lockout coil then de-energizes, until the number
of remainig credits is less than the maximum. No more credits may be purchased (and coins are rejected), while
the coin-lockout coil is de-energized.

STARTING A GAME. Press the Credit button once. A startup sound plays, and the amount shown in the
Credit display decreases by one. Player display SPEEDER 1 flashes (until the first playfield switch is actuated),
and the BALL IN PLAY display shows 1. Additional players may enter the game by pressing the Credit button
once for each player, before the end of play on the first ball.

TILT. Actuating the Slam Tilt switch inside the cabinet ends the current game; *HIGH SPEED* then proceeds to
the Game Over Mode. With the actuation of the ball-roll or playfield tilt switches, or the third closure* of the
plumb bob tilt switch, the player loses the remaining play of that ball, but can complete the game.

END OF GAME. All earned scores and bonuses are awarded. If a player's final score exceeds a specified
value, the player receives a designated award for achieving the current highest score. A random digit set*
appears in the MATCH display. Credit* may be awarded, when the last two digits of any player's score display
(SPEEDER 1 through SPEEDER 4) match the random digits of the MATCH display. Match, high score, and game
over sounds are made, as appropriate.

GAME OVER MODE. The GAME OVER indicator lights. The SPEEDER 1 and SPEEDER 2 displays show
GAME OVER . Then, the high scores flash on the appropriate player score displays. The game proceeds to the
Attract Mode.

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* - operator-adjustable feature

HIGH SPEED GAME PLAY

The driver runs a red light and suddenly sirens shriek, lights flash, an APB is issued, and the police chase is on! Flying over ramps and careening down freeways, the getaway is fast and furious as the speedster races for the hideout! Only at *HIGH SPEED* will he make it in time and grab the jackkpot waiting there!

Completing the stoplight target sequence by making all 3 greens, then the 3 yellows, and finally the 3 reds turns the traffic light red. Running the red by speeding up the ranp twice starts multi-ball™, the police chase, and the getaway! The police light flashes, sirens blare, and the police call out an APB!

The driver can make it to the hideout by taking the ramp during multi-ball™! All scoring with multi-ball™ goes into the jackpot as well as toward the player's score! Making the ramp shot with 2 or more balls in play collects the hideout jackpot which, for a super-exciting first time, builds up not only from player to player, but from game to game!

A fast escape onto the Santa Monica or Bay Shore Freeway, when lit, lights progressively the flipper return lane, then the spinners for 1000 each, followed by the hold bonus feature, and finally, extra ball!

Making the 1 through 6 targets, when lit, advances the ramp value from 50,000 to 250,000 and lights the kickback to keep the ball alive! A diverting gate feature on the ramp sends the ball to either of 2 catapults or directly back to the playfield.

The rotating police light on top of the backbox, the revving of the engine whenever the flippers are hit, police car radio messages, shierking sirens, and thrilling chase music all underscore the excitement and realism of the chase!

HIGH SPEED GAME STATUS DISPLAYS

HIGH SPEED utilizes a new format for the display of information concerning the game's bookkeeping and game play feature adjustment. Basically, three classes of information now become available to the game owner/operator: Id (Identification); Au (Audit); Ad (Adjustment). Each of the underscored two-letter abbreviations for these classes appears in the Credits display, while the system microprocessor for the *HIGH SPEED* game is displaying the items within each class in the status display mode.

Identification Information--Id
With the game turned on, the coin door open, and the AUTO-UP switch in the Up position, the operator can press the ADVANCE switch once, briefly. HIGH SPEED's displays immediately change from the Attract Mode to the Game Status Display Mode. This is evident by the following display, shown in columnar form. The column headings refer to the various backbox displays. (Display SPEEDER 3 does not appear in the listing because it remains blank):

SPEEDER 1	SPEEDER 2	SPEEDER 4	Credits	BALL IN PLAY/ MATCH
HIGH	SPEED	541 L- *	Id	00

* - 1 indicates initial ROM revision level; 2, 3, etc. for later revisions.

The game is named in the SPEEDER 1 and 2 displays. The game's identification number and the ROM revision level appears in the SPEEDER 4 display. The Credits display shows the status display mode in abbreviated form, *Id.* The BALL IN PLAY/MATCH display shows the status display mode item for this particular display.

Audit Information--Au
While the AUTO-UP switch remains in the Up position, the operator can press the ADVANCE switch once, briefly, to begin the backbox displays of Audit (sometimes called "bookkeeping") Information. More audit entries than ever are now available. Calculation of the various factors is no longer necessary because the *HIGH SPEED* System 11's game program now performs all the mathematical factor computations. This information is intended to aid the owner/operator in evaluating how the game is performing in each location, by providing knowledge about which game features are receiving the most play. With this information, the owner/operator can determine whether adjusting the game features to other settings will contribute to increased game earnings.

The operator can press the ADVANCE button once to view each Audit Information display item. To proceed more rapidly through this information, the operator only has to press and hold the ADVANCE button. If a desired item is passed, the operator can use the MANUAL-DOWN switch position with the ADVANCE button to back up to the desired item.

The *HIGH SPEED Audit Table* lists the 44 items of the Audit Information portion of the *HIGH SPEED* Game Status Displays. Presentation of the displays is similar to that for the Identification Information; however, the SPEEDER 1 and SPEEDER 2 displays are combined as a descriptive phrase. In light type below the column headings appear the respective backbox displays where the information appears. Because the SPEEDER 4 display contains information which depends on game play, only a few example entries are shown in the table. The Credits display shows *Au* for all 44 audit items, so its entry is omitted from the tabular listing. Detection of erroneous data affecting any of the counters used in these audit items causes the message, ERROR, to be displayed in the SPEEDER 3 display, during display of any audit item associated with that particular counter. (The program does not analyze the cause of the error; it merely alerts the operator of the error's existence by the message.)

HIGH SPEED Audit Table

Audit Item (MATCH)	Descriptive Phrases (SPEEDER 1 and 2 Displays)	Audit Factor [1] Value (SPEEDER 4)
01	Left Coins (chute next to coin door hinge)	432
02	Center Coins	0
03	Right Coins	398
04	Paid Credits	830
05	Total Plays	
06	Total Free (Total Free Plays)	
07	Percent Free (% Free Plays)	
08	Replay Awards	
09	Percent Replay (% Replay Awards)	
10	Special Awards	
11	Percent Special (% Special Awards)	
12	Match Awards	
13	HSTD (High Score to Date) Credits	
14	Percent HSTD (% HSTD Credits)	
15	Extra Balls	
16	Percent Ex. Ball (% Extra Balls)	
17	Av. Ball Time (Average Time in Seconds)	
18	Min. of Play (Minutes of Play)	
19	Balls Played	
20	Replay 1 Awards	
21	Replay 2 Awards	
22	Replay 3 Awards	
23	Replay 4 Awards	
24	1 Playr Games	
25	2 Playr Games	
26	3 Playr Games	
27	4 Playr Games	
28	Burn in Cycles	
29	Yellow Lit (# of games when lit)	
30	Red Lit (# of games when lit)	
31	Multi Balls (# of Multi-Balls played)	
32	Jackpot Won (# of times won)	
33	Special Lit (# of times lit)	
34	Freeway E.B. (Extra Ball) Lit (# of times lit)	
35	Ramp Shot (# of times made with flipper)	
36	Jackpot E.B. Lit (# of times lit after J'pot)	
37	Kickbak Fired (# of times)	
38	A-Mode Cycles (# of times Attract Mode)	
39	H. S. Reset Counter	
40	Aut. Pct. Data 1	
41	Aut. Pct. Data 2	
42	Aut. Pct. Data 3	
43	Aut. Pct. Data 4	
44	Aut. Pct. Data 5	

NOTE:
1. The numbers shown in this column for Items 1 through 4 are examples.
   Entries for all items depend on the amount of play; thus, they will vary
   from location to location.

Adjustment Information--Ad

At end of the Audit Information presentation, with the AUTO-UP switch in the Up position, the operator can press the ADVANCE button to proceed to the Adjustment Information portion of the *HIGH SPEED* Game Status Displays.

The operator can press the ADVANCE button once to view each Adjustment Information display item. To proceed more rapidly through this information, the operator only has to press and hold the ADVANCE button. If a desired item is passed, the operator can use the MANUAL-DOWN switch position with the ADVANCE button to back up to the desired item.

The *HIGH SPEED Game Adjustment Table* lists the 70 items of the Adjustment Information portion of the *HIGH SPEED* Game Status Displays. Presentation of the displays is similar to that for the Audit Information (that is, the SPEEDER 1 and SPEEDER 2 displays combine as a descriptive phrase; the light type below the column headings names the respective backbox displays where the information appears, etc.). The Credits display shows *Ad* for all 70 adjustment items, so its entry is omitted from the tabular listing.

HIGH SPEED Game Adjustment Table

Adjustment Item (MATCH)	Descriptive Phrases (SPEEDER 1 and 2 Displays)	Factory Setting (SPEEDER 4)
01	AUTO REPLAY (%) (or FIXED REPLAY SCORES) [1]	10 (%)
02	REPLAY START (or REPLAY LEVEL 1) [1]	1,400,000
03	REPLAY LEVELS (or REPLAY LEVEL 2) [1]	01
04	(REPLAY LEVEL 3) [1]	OFF
05	(REPLAY LEVEL 4) [1]	OFF
06	REPLAY AWARD	Credit
07	SPECIAL AWARD	Credit
08	MATCH FEATURE	On
09	BALLS / GAME	03
10	TILT WARNING	03
11	MAXIMUM EX. BALL	04
12	MAXIMUM CREDITS	30
13	HIGHEST SCORES	On
14	BACKUP HI. SCR 1	4,000,000
15	BACKUP HI. SCR 2	3,500,000
16	BACKUP HI. SCR 3	3,000,000
17	BACKUP HI. SCR 4	2,500,000
18	HI. SCR1 CREDITS	03
19	HI. SCR2 CREDITS	01
20	HI. SCR3 CREDITS	01
21	HI. SCR4 CREDITS	01
22	H. S. RESET EVERY (6,000 PLAYS) [2]	
23	FREE PLAY	NO
24	U.S.A. 1 COINAGE (1 COIN 1 PLAY) [2,3]	
25	LEFT UNITS	01
26	CENTER UNITS	04
27	RIGHT UNITS	01
28	UNITS/ CREDIT	01
29	UNITS/ BONUS	00
30	MINIMUM UNITS	00
31	FREEWAY START (3-BALL 50,000) [2]	
32	FREEWAY MEMORY	Regular
33	EJ. HOLE SPOTS (3-BALL YES) [2]	
34	RAMP SPOTS	YES
35	LIGHT SPECIAL (3-BALL Regular) [2]	
36	SPECIAL MEMORY	NO
37	POLICE LIGHT	ON
38	KICKBAK MEMORY	EASY
39	LIGHT FREEWAY	Regular

HIGH SPEED Game Adjustment Table (Continued)

Adjustment Item (MATCH)	Descriptive Phrases (SPEEDER 1 and 2 Displays)	Factory Setting (SPEEDER 4)
40	RMP. BON. MEMORY	NO
41	EX. BALL MEMORY	YES
42	STPLITE TARGETS	Regular
43	FREEWAY TIMER	Regular
44	SIREN STYLE	U S A
45	A-MODE PO. LITE	YES
46	A-MODE STARTER	YES
47	A-MODE SOUND	YES
48	GAME OV. MUSIC	YES
49	CUSTOM MESSAGE [4]	On
50	SW. ALARM KNOCKER	YES
51	UNUSED ADJUST	
52	UNUSED ADJUST	
53 [5]	INSTALL GERMAN 1 [6]	
54 [5]	INSTALL GERMAN 2 [6]	
55 [5]	INSTALL GERMAN 3 [6]	
56 [5]	INSTALL GERMAN 4 [6]	
57 [5]	INSTALL GERMAN 5 [6]	
58 [5]	INSTALL GERMAN 6 [6]	
59 [5]	INSTALL ADDABALL	NO
60 [5]	INSTALL 5-BALL	NO
61 [5]	INSTALL NOVELTY	NO
62 [5]	INSTALL EX. EASY	NO
63 [5]	INSTALL EASY	NO
64 [5]	INSTALL MEDIUM	NO
65 [5]	INSTALL HARD	NO
66 [5]	INSTALL EX. HARD	NO
67	AUTO BURN IN	NO
68	CLEAR COINS	NO
69	CLEAR AUDITS	NO
70	INSTALL FACTORY	NO

NOTES:

1. Automatic Replay percentage value range is adjustable from 5 to 50%, via the Credit button. Item 02 permits changing the factory setting value for Replay Start Level (valid for next 500 games played). Item 03 permits setting up to four replay levels, with values as detailed in text describing item 03.

   For Fixed Replay Scores, set Auto Replay value to 1 less than 5(%) via the Credit button. Go to items 02, 03, 04, and 05 to install their replay level scores. Turn off any replay score level by setting 00 as its value.

2. Phrase in parentheses is Factory Setting. Phrase appears in SPEEDER 3 and 4 displays. Press Credit button to change setting of item 22, or the game pricing of item 24.

3. To change country OR coinage setting, press Credit button to obtain 16 Standard settings, followed by a Custom Setting. The Custom Setting activates items 25 through 30. When a Standard Setting is used, items 25 through 30 are set automatically, and cannot be changed.

4. To install Custom Message, press flipper button for alphabet and special characters. Press Credit button for next message letter or character.

5. Special Preset Adjustment, whose effects are noted in the Game Adjustment text.

6. Refer to *Pricing Table* and text describing these items.

GAME ADJUSTMENT PROCEDURE

Adjustment Items 01 through 70

The coin door must be open to access the Game Adjustment/Diagnostic switches. All readings and adjustments require operation of these coin door switches. Some adjustments utilize the Credit button; some also use the flipper button(s). Additional text describing the game adjustment items follows this procedure.

1. Use AUTO-UP and press ADVANCE. The Credits display indicates Ad. The BALL IN PLAY/MATCH display initially indicates 01. The SPEEDER 1 and SPEEDER 2 player score displays indicate AUTO REPLAY. The SPEEDER 3 display shows PERCENT. If the factory setting has not been changed, the SPEEDER 4 display shows 10, indicating the setting of a 10% replay percentage.

2. To reach a higher item number (in the BALL IN PLAY/MATCH display), use AUTO-UP and press ADVANCE. To return to a previous item number, use MANUAL-DOWN and press ADVANCE.

3. With the desired item number (refer to the *HIGH SPEED Game Adjustment Table*) showing in the BALL IN PLAY/MATCH display, increase the value shown in the SPEEDER 4 display by using AUTO-UP and pressing the Credit button. Repeat this step for each item, until all adjustments have been made.

   For example, the operator may desire to zero the values associated with certain items listed in the *HIGH SPEED Audit Table*. To zero the first four items (concerning the coin chutes and the total coins), the operator can proceed to item 68, Clear Coins, and press the Credit button to obtain the YES option. The operator then presses the ADVANCE button and notes the "COINS CLEARED" display, which verifies that the entry values for items 01 through 04 of the Audit Items are now reset to zero.

4. To proceed through the entire adjustments series, press *and hold* ADVANCE, until item 70 shows in the BALL IN PLAY/MATCH display. From item 70, you can: (A) return to the <u>Game-Over Mode</u>; (B) restore factory settings and zero audit (bookkeeping) totals. Perform either of the following, as desired:

   A. To reach <u>Game-Over Mode</u>, use AUTO-UP and press ADVANCE once. *HIGH SPEED* now goes to the <u>Game-Over Mode</u>.

   B. To restore factory settings, zero all audit (bookkeeping) totals, *and* return to <u>Game-Over Mode</u>, use AUTO-UP or MANUAL-DOWN to display item 70 in the BALL IN PLAY/MATCH display. Press the Credit button to display the YES option in the SPEEDER 4 display. Using AUTO-UP, press ADVANCE once. *HIGH SPEED* now zeroes ALL audit totals and changes ALL game adjustments back to those originally selected as Factory Settings. It then shows the operator a message ("FACTORY SETTING") that this has occurred. (A problem in the Memory Protection circuit or closing the coin door will cause the message "ADJUST FAILURE" to appear.) Press ADVANCE once more to return to the <u>Game-Over Mode</u>.

Details of Adjustment Items 01 through 70

01 Auto Replay (or Fixed Replay)
Of the two options, AUTO REPLAY is the <u>Factory Setting</u>. The percentage of replays automatically awarded has a Factory Setting of 10 (%). Use the Credit button to change the percentage within the range of 5 to 50 (%), with the value increasing using AUTO-UP (or decreasing using MANUAL-DOWN). The next Credit button change beyond 50, or below 5, selects the FIXED REPLAY option.

For AUTO REPLAY, Ad 02 provides the Starting Replay Level (SPEEDER 1 and 2 displays show REPLAY START). Ad 03 provides the number of replay levels (01, 02, 03, or 04). *HIGH SPEED* then proceeds to Ad 06 automatically.

For FIXED REPLAY, Ad 02 is the first replay level (REPLAY LEVEL 1). Ad 03, 04, and 05 are the other replay levels.

02 Starting Replay Level (or Replay Level 1)
For AUTO REPLAY (refer to Ad 01), the <u>Factory Setting</u> is 1,400,000. The range of settings is 800,000 through 2,000,000 (by increments of 100,000 with AUTO-UP or decrements of 100,000 with MANUAL-DOWN).

For FIXED REPLAY, the operator can enter the value to be used for the first fixed replay score level via the Credit button. The range of settings is: OFF; 100,000 through 9,900,000 (by increments of 100,000 with

02 Starting Replay Level (or Replay Level 1) (Continued)

AUTO-UP, or decrements of 100,000 with MANUAL-DOWN).

03 Replay Levels (or Replay Level 2)
For AUTO REPLAY (refer to Ad 01), the Factory Setting is 01 (one replay level). The option range is one, two, three, or four replay level(s). When the operator chooses two replay levels, HIGH SPEED automatically adjusts the second replay level to be twice the value selected for Ad 02, the starting replay level. Choosing three or four replay levels automatically adjusts their replay levels to three times or four times the Ad 02 value.

For FIXED REPLAY, the technique of value entry and the range of settings are identical to those of Ad 02.

04 (Replay Level 3)
For AUTO REPLAY, this Adjustment Item is not applicable. HIGH SPEED automatically bypasses this adjustment.

For FIXED REPLAY, the technique of value entry and the range of settings are identical to those of Ad 02.

05 (Replay Level 4)
For AUTO REPLAY, this Adjustment Item is not applicable. HIGH SPEED automatically bypasses this adjustment.

For FIXED REPLAY, the technique of value entry and the range of settings are identical to those of Ad 02.

06 Replay Award
For either AUTO REPLAY or FIXED REPLAY (Ad 01), the operator can select the form of the award automatically provided when the player exceeds any Replay Level (Automatic or Fixed). The choices are:

Credit - Reaching each replay level obtains a credit (free game). This is the Factory Setting.
Ball - Reaching each replay level obtains an extra ball.
Audit - Reaching each replay level obtains nothing to the player; it does increase the entry value of the Audit Item(s) maintaining a tally of these awards (Au 08, and Au 20 through 23, as applicable).
Coil - Reaching each replay level causes the Knocker coil to activate once per free play won (instead of awarding a credit for each level exceeded).

NOTE
A ticket dispenser or token dispenser can be activated by the Knocker coil driver to provide an alternative award for each free play achieved by the player.

07 Special Award
The operator can select the form of the award automatically provided when the player scores a Special. The choices are:

Credit - Scoring each Special, when lit, obtains a credit (free game). This is the Factory Setting. A variation to this award occurs, when the setting of Ad 06 is Coil. (This permits a ticket or token dispenser to provide the award, when applicable.)
Ball - Scoring each Special, when lit, obtains an extra ball.
Score - Scoring each Special, when lit, obtains a score advance of 250,000 points to the player.

08 Match Award
The operator can select whether the Match action occurs at completion of each game. The choices are:

On - This is the Factory Setting. The game selects a random two-digit number at end of game and compares each player's score for an identical two digits in the rightmost two positions. A matching of the two digits results in the award of a credit (or a ticket/token, if a dispenser is attached, and the setting of Ad 06 is Coil).

Off - The MATCH display is deactivated at completion of the game; no award is given.

09 Balls / Game

The operator can define a "game" by specifying the number of balls to be played. The _Factory Setting_ is 3. The range of settings is 1 through 9.

10 Tilt Warning

The operator can specify the allowable number of total actuations of the plumb bob and playfield tilt mechanisms that can occur before the game is "tilted". The range of this setting is 1 through 5. The _Factory Setting_ is 3.

11 Maximum Extra Ball

The operator can specify the maximum number of Extra Balls to be accumulated at any time. The range of this setting is 00 (which allows NO extra ball play, and displays a message, NO EX. BALL) and 1 through 9. The _Factory Setting_ is 4.

12 Maximum Credits

The operator can specify the maximum number of credits the game can accumulate, either through game play awards or coin purchases. The range of settings is 5 through 99. The _Factory Setting_ is 30. Reaching the specified setting actuates the coin-lockout relay, preventing the purchase of additional credits by causing the coins to be rejected.

NOTE

Whenever the number of credits is less than the specified maximum credits, any credits obtained by coin purchase or game awards (High Score, Match, Replay Levels, etc.) will be accumulated even though they exceed the maximum value. Thereafter, no additional credits can be accumulated, until the credit total is reduced below the specified maximum setting.

13 Highest Scores

The operator can allow the game to maintain a record of the four highest scores achieved to date. The _Factory Setting_ is On. The optional alternative is Off, which deactivates this adjustment item.

14 Backup High Score 1

The operator can set the Backup High Score value for the first player score display (SPEEDER 1), by using the Credit button. The _Factory Setting_ is 4,000,000. The game automatically restores the value set, when the operator presses, and holds, the HIGH SCORE RESET switch, or when an automatic High Score Reset event (Ad 22) occurs.

15 Backup High Score 2

This adjustment is similar to Ad 14, except that this applies to the second player score display (SPEEDER 2). The adjustment technique is identical to Ad 14. The _Factory Setting_ is 3,800,000. It is also restored as described for Ad 14.

16 Backup High Score 3

This adjustment is similar to Ad 14, except that this applies to the third player score display (SPEEDER 3). The adjustment technique is identical to Ad 14. The _Factory Setting_ is 3,600,000. It is also restored as described for Ad 14.

17 Backup High Score 4

This adjustment is similar to Ad 14, except that this applies to the fourth player score display (SPEEDER 4). The adjustment technique is identical to Ad 14. The _Factory Setting_ is 3,400,000. It is also restored as described for Ad 14.

18 Credits for Highest Score 1

The operator can select the number of credits to be awarded, by using the Credit button, whenever a player exceeds the previous Highest Score. The range of this setting is 00 through 10. The _Factory Setting_ is 03. A variation to this award occurs, when the setting of Ad 06 is Coil. (This permits a ticket or token dispenser to provide the award, when applicable.)

19 Credits for Highest Score 2

This adjustment is similar to Ad 18, except that this applies to the player's exceeding the second highest score. The Credit button adjustment technique is the same as for Ad 18. The range of this setting is 00 through 03. The Factory Setting is 01.

20 Credits for Highest Score 3

This adjustment is similar to Ad 18, except that this applies to the player's exceeding the third highest score. The Credit button adjustment technique is the same as for Ad 18. The range of this setting is 00 through 03. The Factory Setting is 01.

21 Credits for Highest Score 4

This adjustment is similar to Ad 18, except that this applies to the player's exceeding the fourth highest score. The Credit button adjustment technique is the same as for Ad 18. The range of this setting is 00 through 03. The Factory Setting is 01.

22 Automatic High Score Reset

The operator can specify (via Credit button) that the game will provide an automatic reset of the displayed "Highest Scores", and the number of games to be played before the reset occurs. The values provided upon reset are those selected by the operator in Ad 14 through 17, the Backup High Scores. The range of this setting is Off (to disable this adjustment), and 1,000 to 99,000 games (in increments of 1,000). The Factory Setting is 6,000. (Audit item 39 displays the number of games remaining before the reset.)

23 Free Play

The operator can select (via the Credit button) whether a player can operate the game without a coin (free play) or with a coin. The optional alternatives are No (a coin is necessary) or Yes (game play is free; no coin is required). The Factory Setting is No.

24 Coinage Selections

The operator can specify (via the Credit button) any of the 16 Standard Settings for game pricing, each of which exhibits a message identifying the country and the number of coins required and the number of games that the coin requirement purchases. Choosing a Standard Setting permits the game to omit Ad 25 through 30,which are adjustments designed for a special coinage setting. The Factory Setting is U.S.A. 1 : 1 COIN 1 PLAY, as shown by the backbox display.

Following the last Standard Setting is a Custom Coinage Setting, which allows the operator to utilize Ad 25 through 30 in establishing a special coinage setting. A message, CUSTOM COINAGE, indicates that the operator can enter the appropriate values into the Ad 25 through 30 adjustment items.

The values for Ad 25 through 30 of each Standard Setting, as well as other possible values for the Custom Coinage Setting are shown in the **Pricing Table.**

25 Left Chute Coin Units

The operator can specify (via the Credit button) the number of coin units purchased by a coin passing through the left coin chute.

26 Center Chute Coin Units

The operator can specify (via the Credit button) the number of coin units purchased by a coin passing through the center coin chute.

27 Right Chute Coin Units

The operator can specify (via the Credit button) the number of coin units purchased by a coin passing through the right coin chute.

28 Units Required for Credit

The operator can define (via the Credit button) the number of coin units required to obtain 1 Credit. A coin unit counter in the game program totals the number of coin units purchased through all coin chutes prior to each game. If the total number of coin units purchased exceeds the 1 Credit factor by a multiple (or more, coin units) of the specified Units per Credit value, the Credits display shows the proper number of Credits. The coin unit counter retains any remaining coin units, until the start of a game; then, the coin unit counter is cleared (its contents are zeroed). The Factory Setting is 01.

GAME ADJUSTMENT PROCEDURE (Continued)

29 Units Required for Bonus
The operator can specify (via the Credit button) that 1 additional Credit is to be indicated in the Credits display, when a particular number of coin units are accumulated. The <u>Factory Setting</u> is 00.

30 Minimum Units Required for any Credits Posted
The operator can specify that NO Credits are to be posted (indicated in the Credits display), until the credit units counter reaches a particular value. The <u>Factory Setting</u> is 00.

31 Freeway Starting Level
The operator can choose (via the Credit button) the starting value of scoring for the Bayshore (left side) and the Santa Monica (right side) freeways. Three choices are available:

1 - For 3-Ball game, the score starting level setting is automatically 50,000 (shown in the SPEEDER 4 display); for 5-Ball game, the setting is automatically 25,000 (shown in SPEEDER 4). Using this choice allows the setting of Ad 09 (Balls/Game) to define the Freeway Starting Level. (The SPEEDER 3 display shows the Ad 09 setting.) This is the <u>Factory Setting</u>.
2 - Freeway Starting Level score is 50,000.
3 - Freeway Starting Level score is 25,000.

32 Freeway Memory
The operator can choose (via the Credit button) whether the value of the Freeway award is retained in memory from ball to ball. Three choices are available:

1 - Retain the Freeway value in memory, until the Freeway Extra Ball level is achieved, then the Freeway award is not retained in memory. The SPEEDER 4 display shows this as REGULAR. This is the <u>Factory Setting</u>.
2 - Retain the Freeway value in memory for the entire game. SPEEDER 4 shows this choice as EASY.
3 - NEVER store any Freeway award. The Freeway Starting Level is in effect at the start of each ball. SPEEDER 4 shows this choice as HARD.

33 Eject Hole Spots Stoplight Target
The operator can choose (via the Credit button) whether actuation of the Eject Hole (Santa Monica Freeway) spots a Stoplight target. Three choices are available:

1 - For 3-Ball game, the Eject Hole does spot a Stoplight target; for 5-Ball game, the Eject Hole does not spot a Stoplight target. Using this choice allows the setting of Ad 09 (Balls/Game) to define the choice selected. (The SPEEDER 3 display shows the Ad 09 setting.) (SPEEDER 4 shows this choice as YES.) This is the <u>Factory Setting</u>.
2 - Eject Hole spots a Stoplight target. (SPEEDER 4 shows this choice as YES.)
3 - Eject Hole does not spot a Stoplight target. (SPEEDER 4 shows this choice as NO.)

34 Ramp Spots Stoplight Target
The operator can choose (via the Credit button) whether making a Ramp shot spots a Stoplight target. Two choices are available:

1 - A Ramp shot does spot a Stoplight target. (SPEEDER 4 shows this choice as YES.) This is the <u>Factory Setting</u>.
2 - A Ramp shot does not spot a Stoplight target. (SPEEDER 4 shows this choice as NO.)

NOTE
For 3-Ball game, BEFORE a player's first Multi-ball™ event, Ramp shots from the ball shooter DO spot a Stoplight target, if the choice is YES. Using this choice allows the setting of Ad 09 (Balls/Game) to define this adjustment's operation.

For 5-Ball game, Ramp shots from the ball shooter NEVER spot a Stoplight target.

Moreover, after a player's first Multi-ball™ event, Ramp shots NEVER spot a Stoplight target for either 3-Ball or 5-Ball games.

GAME ADJUSTMENT PROCEDURE (Continued)

35 Light Special

The operator can choose (via the Credit button) the degree of difficulty in lighting the Special lamp. Six choices are available:

1 - For 3-Ball game, completion of the Stoplight target sequence (Green, Yellow, and then Red) for the *second* time causes the Special lamp to light; for 5-Ball game, completion of the Stoplight target sequence for the *third* time causes the Special lamp to light. Using this choice allows the setting of Ad 09 (Balls/Game) to define the choice selected. (The SPEEDER 3 display shows the Ad 09 setting.) This is the Factory Setting.

2 - Completion of the Stoplight target sequence the *first* time lights the Special lamp. (SPEEDER 4 shows this choice as EASY.)

3 - Completion of the Stoplight target sequence the *second* time lights the Special lamp. (SPEEDER 4 shows this choice as REGULAR.)

4 - Completion of the Stoplight target sequence the *third* time lights the Special lamp. (SPEEDER 4 shows this choice as HARD.)

5 - Completion of the Stoplight target sequence the *fourth* time lights the Special lamp. (SPEEDER 4 shows this choice as HARDER.)

6 - The Special lamp never lights. (SPEEDER 4 shows this choice as NO.)

36 Special Memory

The operator can choose (via the Credit button) whether the achievement of lighting the Special lamp is retained in memory from ball to ball. Two choices are available:

1 - The lighted Special lamp does NOT remain in memory from ball to ball. THE SPEEDER 4 display shows this choice as NO. This is the Factory Setting.

2 - The lighted Special Lamp remains in memory from ball to ball. (SPEEDER 4 shows this as YES.)

37 Police Light

The operator can choose (via the Credit button) whether the Police Light (rotating beacon) operates or not. Two choices are available:

1 - Police Light operates for special effects. The SPEEDER 4 display shows this choice as ON. This is the Factory Setting.

2 - Police Light does not operate. (SPEEDER 4 shows OFF.)

38 Kickback Memory

The operator can choose (via the Credit button) how the Kickback operates. Five choices are available:

1 - Kickback is always ON at start of ball. The SPEEDER 4 display shows this choice as EASY. This is the Factory Setting.

2 - Kickback is always OFF at start of ball. (SPEEDER 4 shows HARDER.)

3 - Kickback is ON at start of game and stays in memory from ball to ball. (SPEEDER 4 shows REGULAR.)

4 - Kickback is OFF at start of game and stays in memory from ball to ball. (SPEEDER 4 shows HARD.)

5 - Kickback is always ON. (SPEEDER 4 shows EASIER.)

39 Lighting Freeway Difficulty

The operator can choose (via the Credit button) the difficulty for lighting a Freeway lane. Two choices are available:

1 - Passage through a flipper return lane lights the Freeway lane on the opposite side of the playfield; passage around the Freeway loop (Bayshore and Santa Monica) also lights a Freeway lane. The SPEEDER 4 display shows this choice as REGULAR. This is the Factory Setting.

2 - Only passage through a flipper return lane lights the opposite-side Freeway lane. (SPEEDER 4 shows this choice as HARD.)

GAME ADJUSTMENT PROCEDURE (Continued)

40 Ramp Bonus Memory

The operator can choose (via the Credit button) whether the Ramp Bonus value (accumulated from Target 1 through Target 6 shots) remains in memory from ball to ball. Two choices are available:

1 - The Ramp Bonus value does NOT remain in memory from ball to ball. The SPEEDER 4 display shows this choice as NO. This is the Factory Setting.

2 - The Ramp Bonus value DOES remain in memory from ball to ball. (SPEEDER 4 shows YES.)

41 Extra Ball Memory

The operator can choose (via the Credit button) whether the lighted Eject Hole Extra Ball arrow remains in memory from ball to ball. Two choices are available:

1 - The Eject Hole Extra Ball arrow remains in memory from ball to ball. The SPEEDER 4 display shows this choice as YES. This is the Factory Setting.

2 - The Eject Hole Extra Ball arrow does NOT remain in memory from ball to ball. (SPEEDER 4 shows NO.)

42 Stoplight Target Sequence Difficulty

The operator can choose (via the Credit button) the difficulty level of the Stoplight targets. Two choices are available:

1 - Lighting NINE targets is the requirement for completion of the Stoplight target sequence. The SPEEDER 4 display shows this choice as REGULAR. This is the Factory Setting.

2 - Lighting SIX targets is the requirement for completion of the Stoplight target sequence. (SPEEDER 4 shows EASY.)

43 Freeway Timer

The operator can choose (via the Credit button) the length of time that the Freeway arrow remains lighted. Three choices are available:

1 - The Freeway arrow remains lighted for approximately 9 seconds. The SPEEDER 4 display shows this choice as REGULAR. This is the Factory Setting.

2 - The Freeway arrow remains lighted for approximately 11 seconds. (SPEEDER 4 shows EASY.)

3 - The Freeway arrow remains lighted for approximately 6 seconds. (SPEEDER 4 shows HARD.)

44 Siren Style

The operator can choose (via the Credit button) the style of Siren Sound. Two choices are available:

1 - Siren sound style for the police chase is American. The SPEEDER 4 display shows this choice as U.S.A. This is the Factory Setting.

2 - Siren sound style for the police chase is European. (SPEEDER 4 shows EURO.)

45 Attract Mode - Police Light

The operator can choose (via the Credit button) the frequency of operation of the Police Light during the Attract Mode. Two choices are available:

1 - The Police Light operates approximately every 3-1/2 minutes during the Attract Mode. This choice requires that the adjustment allowing the Police Light to operate (Ad 37) enables it to be on. The SPEEDER 4 display shows this choice as YES. This is the Factory Setting.

2 - The Police Light does NOT operate during the Attract Mode. (SPEEDER 4 shows NO.)

46 Attract Mode - Starter

The operator can choose (via the Credit button) whether, during the Attract Mode, the automobile starter sound occurs when the Credit button is pressed. Two choices are available:

1 - The automobile starter sound IS heard. The SPEEDER 4 display shows this choice as YES. This is the Factory Setting.

2 - The automobile starter sound is NOT heard. (SPEEDER 4 shows NO.)

GAME ADJUSTMENT PROCEDURE (Continued)

47 Attract Mode - Sound
The operator can choose (via the Credit button) whether the automobile and police call sounds can be heard approximately every 3-1/2 minutes during the Attract Mode. Two choices are available:

1 - The automobile and police call sounds can be heard. The SPEEDER 4 display shows this choice as YES. This is the Factory Setting.
2 - NO Attract Mode sound can be heard. (SPEEDER 4 shows NO.)

48 Game Over Music
The operator can choose (via the Credit button) whether a 30-second musical tune or a shorter sound plays at Game Over. Two choices are available:

1 - A 30-second musical tune plays at Game Over. The SPEEDER 4 display shows this choice as YES. This is the Factory Setting.
2 - A shorter sound can be heard at Game Over. (SPEEDER 4 shows NO.)

49 Custom Message
The operator can choose (via the Credit button) whether to display a message during the Attract Mode. (When display of a message is selected, the operator can either utilize the message provided or change the message.) Three choices are available:

1 - Display a message during the Attract Mode. The SPEEDER 4 display shows this choice as ON. This is the Factory Setting. The 3-line message provided is:
      RUN THE LIGHT-   AND GET AWAY--   AT HIGH SPEED.
2 - Do NOT display a message during the Attract Mode. (SPEEDER 4 shows OFF.)
3 - The SPEEDER 4 display shows this choice as CHANGE. The operator can enter a special ("custom") message, as follows:
   A. Press ADVANCE once. The operator can now enter as many as three 14-character lines for display during the Attract Mode.
   B. Use the flipper button(s) to select each message character (alphabet, numbers, and special symbols are available). In case of error, enter a "back arrow" (just before "space") to correct, followed by correct character. For a period after any letter, use letters with periods (following the special symbols).
   C. Move to the next character via the Credit button. No entirely blank lines will be displayed.

50 SW. ALARM KNOCKER
The operator can choose (via the Credit button) whether the knocker operates, sounding an alarm to signal a switch problem, at the time of game Turn-On and at the beginning of the Test/Diagnostic Procedures. Two choices are available:

1 - The knocker sounds, signalling a switch problem, at game Turn-On and at the beginning of the Test /Diagnostic Procedures. The SPEEDER 4 display shows this choice as YES. This is the Factory Setting.
2 - The knocker does NOT sound. (SPEEDER 4 shows NO.)

51 UNUSED ADJUST
This adjustment is not used for *HIGH SPEED*.

52 UNUSED ADJUST
This adjustment is not used for *HIGH SPEED*.

GAME ADJUSTMENT PROCEDURE (Continued)

SPECIAL PRESET ADJUSTMENTS CAUTION

Adjustments 53 through 66 are Special Preset Adjustments to enable the operator to perform the setting of multiple adjustments at once. They permit the operator to: (1) modify a game for a specific area (special German coinage settings, for example, Ad 53 through 58); (2) change a group of adjustments to conform with laws of certain localities (Ad 59 through 61); and (3) to change the degree of difficulty of game play (Ad 62 through 66). A list of the preceding individual Adjustments affected accompanies each of these Special Preset Adjustments. Whenever the operator chooses to use any Special Preset Adjustment, the operator can later access any or all of the individual Adjustments affected by that Special Adjustment for subsequent changes.

A similar technique is recommended in the event of error or uncertainty concerning any Special Preset Adjustment, after the operator selects it: The operator can restore the factory setting of each individual Adjustment, then select the desired Special Preset Adjustment, and then return to any of the preceding individual adjustments to determine whether use of the Special Adjustment has had the desired effect.

The Backbox displays for each Special Preset Adjustment indicate whether the operator has selected it, by identifying the Adjustment in the SPEEDER 1 and 2 displays by name and the selection choice of NO, meaning Not Selected (this is the Factory Setting), or YES, meaning Selected, in the SPEEDER 4 display. Selection occurs by using the Credit button to choose YES and then pressing ADVANCE.

53 Install German 1

The operator can modify the game pricing selection of Standard Setting 09 in the *Pricing Table* to permit Credit Award play with 10 games for 5 DM. Individual Adjustments are affected, as follows:

Ad	Name	New Setting	Ad	Name	New Setting
24	German 1 Coinage	10 Plays/5DM	07	Special Award	Credit
18	Hi Scr 1 Credits	03	08	Match Feature	On
19	Hi Scr 2 Credits	00	14	Backup Hi Scr 1	4,000,000
20	Hi Scr 3 Credits	00	15	Backup Hi Scr 2	3,500,000
21	Hi Scr 4 Credits	00	16	Backup Hi Scr 3	3,000,000
06	Replay Award	Credit	17	Backup Hi Scr 4	2,500,000

Note: This Special Preset Adjustment is automatically installed, when the CPU Board jumper W7 is cut or removed, AND the Factory Setting is requested.

54 Install German 2

The operator can modify the game pricing selection of Standard Setting 09 in the *Pricing Table* to permit Ticket/Token operation with 10 games for 5 DM. Individual Adjustments are affected, as follows:

Ad	Name	New Setting	Ad	Name	New Setting
24	German 1 Coinage	10 Plays/5DM	07	Special Award	Ball
18	Hi Scr 1 Credits	03	08	Match Feature	On
19	Hi Scr 2 Credits	00	14	Backup Hi Scr 1	4,000,000
20	Hi Scr 3 Credits	00	15	Backup Hi Scr 2	3,500,000
21	Hi Scr 4 Credits	00	16	Backup Hi Scr 3	3,000,000
06	Replay Award	Coil	17	Backup Hi Scr 4	2,500,000

55 Install German 3

The operator can modify the game pricing selection of Standard Setting 09 in the *Pricing Table* to permit Keyset Mode operation with 10 games for 5 DM. Individual Adjustments are affected, as follows:

Ad	Name	New Setting	Ad	Name	New Setting
24	German 1 Coinage	10 Plays/5DM	15	Backup Hi Scr 2	00
18	Hi Scr 1 Credits	00	16	Backup Hi Scr 3	00
19	Hi Scr 2 Credits	00	17	Backup Hi Scr 4	00
20	Hi Scr 3 Credits	00	06	Replay Award	Audit
21	Hi Scr 4 Credits	00	07	Special Award	Score
14	Backup Hi Scr 1	00	08	Match Feature	Off

GAME ADJUSTMENT PROCEDURE (Continued)

56 Install German 4

The operator can modify the game pricing selection of Standard Setting 09 in the *Pricing Table* to permit Credit Award play with 6 games for 5 DM. Individual Adjustments are affected, as follows:

Ad	Name	New Setting		Ad	Name	New Setting
24	German 2 Coinage	6 Plays/5DM		07	Special Award	Credit
18	Hi Scr 1 Credits	03		08	Match Feature	On
19	Hi Scr 2 Credits	00		14	Backup Hi Scr 1	4,000,000
20	Hi Scr 3 Credits	00		15	Backup Hi Scr 2	3,500,000
21	Hi Scr 4 Credits	00		16	Backup Hi Scr 3	3,000,000
06	Replay Award	Credit		17	Backup Hi Scr 4	2,500,000

57 Install German 5

The operator can modify the game pricing selection of Standard Setting 09 in the *Pricing Table* to permit Ticket/Token operation with 6 games for 5 DM. Individual Adjustments are affected, as follows:

Ad	Name	New Setting		Ad	Name	New Setting
24	German 2 Coinage	6 Plays/5DM		07	Special Award	Ball
18	Hi Scr 1 Credits	03		08	Match Feature	On
19	Hi Scr 2 Credits	00		14	Backup Hi Scr 1	4,000,000
20	Hi Scr 3 Credits	00		15	Backup Hi Scr 2	3,500,000
21	Hi Scr 4 Credits	00		16	Backup Hi Scr 3	3,000,000
06	Replay Award	Coil		17	Backup Hi Scr 4	2,500,000

58 Install German 6

The operator can modify the game pricing selection of Standard Setting 09 in the *Pricing Table* to permit Keyset Mode operation with 6 games for 5 DM. Individual Adjustments are affected, as follows:

Ad	Name	New Setting		Ad	Name	New Setting
24	German 2 Coinage	6 Plays/5DM		07	Special Award	Score
18	Hi Scr 1 Credits	00		08	Match Feature	Off
19	Hi Scr 2 Credits	00		14	Backup Hi Scr 1	00
20	Hi Scr 3 Credits	00		15	Backup Hi Scr 2	00
21	Hi Scr 4 Credits	00		16	Backup Hi Scr 3	00
06	Replay Award	Audit		17	Backup Hi Scr 4	00

59 Install Add A Ball

The operator can utilize this option to delete all Free Play awards and replace them with Extra Ball awards. Individual Adjustments are affected, as follows:

Ad	Name	New Setting		Ad	Name	New Setting
06	Replay Award	Ball		19	Hi Scr 2 Credits	00
07	Special Award	Ball		20	Hi Scr 3 Credits	00
08	Match Feature	Off		21	Hi Scr 4 Credits	00
18	Hi Scr 1 Credits	00				

60 Install 5 Ball

The operator can change the game to 5-Ball play, including the changing of certain features to the recommended 5-Ball play difficulty level. Individual Adjustments are affected, as follows:

Ad	Name	New Setting		Ad	Name	New Setting
09	Balls / Game	05		33	Ej. Hole Spots	No
02	Replay Start	1,900,000		34	Ramp Spots	Yes
31	Freeway Start	25,000		35	Light Special	Hard
32	Freeway Memory	Regular				

GAME ADJUSTMENT PROCEDURE (Continued)

61 Install Novelty

The operator can remove all Free Play and Extra Ball awards. Individual Adjustments are affected, as follows:

Ad	Name	New Setting	Ad	Name	New Setting
06	Replay Award	Audit	01	Fixed Replay	
07	Special Award	Score	02	Replay Level 1	Off
08	Match Feature	Off	03	Replay Level 2	Off
18	Hi Scr 1 Credits	00	04	Replay Level 3	Off
19	Hi Scr 2 Credits	00	05	Replay Level 4	Off
20	Hi Scr 3 Credits	00	11	No Extra Ball	No
21	Hi Scr 4 Credits	00			

62 Install Extra Easy

The operator can change the game play difficulty adjustments to a combination that is extremely easy (sometines called "liberal"). Individual Adjustments are affected, as follows:

Ad	Name	New Setting	Ad	Name	New Setting
31	Freeway Start	50,000	38	Kickbak Memory	Easier
32	Freeway Memory	Easy	39	Light Freeway	Regular
33	Ej. Hole Spots	Yes	40	Rmp. Bon. Memory	Yes
34	Ramp Spots	Yes	41	Ex. Ball Memory	Yes
35	Light Special	Regular	42	Stplite Targets	Easy
36	Special Memory	Yes	43	Freeway Timer	Easy

63 Install Easy

The operator can change the game play difficulty adjustments to a combination that is slightly easier than the Factory Settings. Individual Adjustments are affected, as follows:

Ad	Name	New Setting	Ad	Name	New Setting
31	Freeway Start	50,000	38	Kickbak Memory	Easy
32	Freeway Memory	Easy	39	Light Freeway	Regular
33	Ej. Hole Spots	Yes	40	Rmp. Bon. Memory	Yes
34	Ramp Spots	Yes	41	Ex. Ball Memory	Yes
35	Light Special	Regular	42	Stplite Targets	Regular
36	Special Memory	No	43	Freeway Timer	Easy

64 Install Medium

The operator can change the game play difficulty adjustments to a combination that matches the Factory Settings. Individual Adjustments are affected, as follows:

Ad	Name	New Setting	Ad	Name	New Setting
31	Freeway Start	50,000	38	Kickbak Memory	Easy
32	Freeway Memory	Regular	39	Light Freeway	Regular
33	Ej. Hole Spots	Yes	40	Rmp. Bon. Memory	No
34	Ramp Spots	Yes	41	Ex. Ball Memory	Yes
35	Light Special	Regular	42	Stplite Targets	Regular
36	Special Memory	No	43	Freeway Timer	Regular

65 Install Hard

The operator can change the game play difficulty adjustments to a combination that is more difficult than the Factory Settings. Individual Adjustments are affected, as follows:

Ad	Name	New Setting	Ad	Name	New Setting
31	Freeway Start	25,000	38	Kickbak Memory	Regular
32	Freeway Memory	Regular	39	Light Freeway	Regular
33	Ej. Hole Spots	No	40	Rmp. Bon. Memory	No
34	Ramp Spots	Yes	41	Ex. Ball Memory	Yes
35	Light Special	Regular	42	Stplite Targets	Regular
36	Special Memory	No	43	Freeway Timer	Regular

GAME ADJUSTMENT PROCEDURE (Continued)

66 Install Extra Hard

The operator can change the game play difficulty adjustments to a combination that is much more difficult than the Factory Settings. Individual Adjustments are affected, as follows:

Ad	Name	New Setting		Ad	Name	New Setting
31	Freeway Start	25,000		38	Kickbak Memory	Harder
32	Freeway Memory	Hard		39	Light Freeway	Hard
33	Ej. Hole Spots	No		40	Rmp. Bon. Memory	No
34	Ramp Spots	Yes		41	Ex. Ball Memory	Yes
35	Light Special	Hard		42	Stplite Targets	Regular
36	Special Memory	No		43	Freeway Timer	Hard

67 Auto Burn-in

The operator can choose the YES option for this Special Preset Adjustment to perform certain automatic testing of the game, as used in the factory. It does not affect the game operation, but merely provides for a cyclic testing of most of the game's mechanisms.

68 Clear Coins

The operator can request the clearing of the coinage audits (Au 01 through 04) by selecting (via the Credit button) the YES option, as shown in the SPEEDER 4 display. This adjustment zeroes the counters tallying the number of coins through each slot, the Paid Credits counter, and the Credits display.

After the YES option is displayed, the operator must press the ADVANCE button. The game then displays COINS CLEARED.

69 Clear Audits

The operator can request the clearing of the non-coinage audits (Au 05 through 38) by selecting (via the Credit button) the YES option, as shown in the SPEEDER 4 display. This Adjustment zeroes the counters tallying the remaining Audit factors. Please note that this does NOT affect the Automatic Replay Percentaging data nor the automatic High Score Reset counter.

After the YES option is displayed, the operator must press the ADVANCE button. The game then displays AUDITS CLEARED.

70 Install Factory

The operator can request the game to provide the normal Factory Settings to restore the game to its 'factory condition'. This Adjustment clears all Audits, resets all Game Adjustments to the respective Factory Settings, and provides a restart of the Auto Replay (Ad 01).

After the YES option is displayed, the operator must press the ADVANCE button. The game then displays FACTORY SETTING.

Closing of the coin door before appearance of the FACTORY SETTING message or a problem in the Memory Protect circuit will cause the game to display ADJUST FAILURE.

A loss of battery power or improper treatment of the Game Adjustments will cause the game to attempt to restore Factory Settings. The game announces the results of this reset process with the appropriate message, FACTORY SETTING or ADJUST FAILURE.

RESETTING THE HIGH SCORES

The challenge of exceeding the High Score (either the factory setting or a higher score by another player) is the goal of many pinball game players. To keep a pinball game challenging requires a method of resetting the High Score value for those occasions when a skilled player registers a truly excellent score. Other players note this score and may decide not to play simply because their skill is not adequate to exceed an extremely high score.

For *HIGH SPEED*, in fact, three methods of resetting the High Score values are available. The simplest method involves allowing Game Adjustment Item Ad 22 to reset the High Score values automatically after the specified number of plays designated by the operator. The second method requires pressing the High Score Reset switch on the inside of the coin door in the Attract Mode. This action simply erases the previous high score values and replaces them with the Backup High Score values. The third method establishes new values replacing the factory setting values or previous operator setting values; it requires performing the following steps:

1. Using AUTO-UP or MANUAL-DOWN, reach item Ad 14 (and items Ad 15, 16, and 17, if desired). The High Score value of the factory setting (or previous operator-adjusted setting) appears in the SPEEDER 1 display. If this value is satisfactory, go to step 4 below.

2. If you wish to increase the High Score value from that displayed in the SPEEDER 1 display, use AUTO-UP, and press the Credit button, until the desired value shows in the SPEEDER 1 display.

3. If you wish to decrease the High Score value, use MANUAL-DOWN, and press the Credit button, until the desired value shows in the SPEEDER 1 display.

4. Using AUTO-UP, press and hold down ADVANCE, until the Credits display shows Ad and the BALL IN PLAY/MATCH display shows item 70. Press ADVANCE once, to return to Game-Over Mode.

5. Press the High Score Reset switch (on coin door), and listen for the sound signifying that the score reset action is complete. Observe player score displays (SPEEDER 1, SPEEDER 2, etc.) to verify that the new High Score values are displayed.

GAME PRICING

PRICING MADE EASY. Game Adjustment Item Ad 24 allows the operator an easy method of setting the pricing functions. If the operator enters a "Standard Setting" number (from 01 to 16) into Adjustment Item 24, each of the other pricing items (25 through 30) changes to the value shown in the *Pricing Table* for that selected "Standard Setting".

CUSTOM PRICING. Adjustment Item 24 must be set to the Custom Coinage Setting (SPEEDER 1 and 2 displaying CUSTOM COINAGE) to enable the operator to enter desired custom pricing selections for Items 25 through 30, based on the *Pricing Table*. Item 25 is the left coin chute multiplier. Item 26 is the center coin chute multiplier. Item 27 is the right coin chute multiplier. Item 28 is the number of games that must be purchased before a free game is awarded.

The calculation of the ratio of Games : Price uses the ratio equation of $X : VC$, where:

X = Coin Chute Multiplier (Item 25, 26, or 27 in *Pricing Table*)
V = Value of coin
C = Coin units required for credit (Item 28).

For example, for 25¢ chutes at the factory setting, substituting values in the Games : Price ratio calculation gives $1 : 25 \times 1$, or one game for 25¢.

UNITS REQUIRED FOR BONUS CREDIT. Item 29 is the number of games that must be purchased before a free game is awarded. At the factory setting, the number in this item is 00. (This 00 means that NO free games are awarded, although purchase of more than one game at a time occurs.)

MINIMUM COIN UNITS. Item 30 determines the number of games that must be purchased before play may begin. The factory setting for this item is 00. (This 00 means that the Minimum Coin Units feature (Item 30) is disabled, by the factory setting.)

GAME PRICING (Continued)

Pricing Table

Country	Coin Chute			Games/Coin	Pricing Functions						
	Left	Center	Right		24	25	26	27	28	29	30
USA and Canada	25¢	-	25¢	1/25¢, 4/$1 [1,2]	01	01	04	01	01	00	00
				1/50¢, 2/$1 [2]	03	01	04	01	02	00	00
				2/25¢, 8/$1	00	02	00	02	01	00	00
				1/25¢, 3/50¢, 6/$1 [2]	04	01	00	01	01	02	00
				1/25¢, 5/$1	00	01	00	01	01	04	00
				1/50¢, 3/$1 [2]	02	01	00	01	02	04	00
West Germany	1 DM	2 DM	5 DM	1/1 DM, 2/2 DM, 6/5 DMark [2]	10	07	14	35	06	00	00
				1/1 DM, 3/2 DM, 9/5 DM	00	09	18	45	05	00	00
				1/2x1 DM, 1/2 DM, 3/5 DM [2]	11	03	15	06	05	00	00
				2/1 DM, 5/2 DM, 14/5 DM [2]	12	13	65	26	05	65	00
				1/1 DM, 3/2 DM, 10/5 DM [2,3]	09	09	18	45	05	00	00
				1/1 DM, 2/2 DM, 6/5 DM	00	06	12	30	05	00	00
				Ticket/Token Mode [4]							
				Keyset Mode [4]							
France	1 F	5 F	10 F	1/3x1 F, 2/5 F, 5/10 Franc [2]	13	02	10	20	05	20	00
Antilles (Netherlands)	25¢	-	1 G	1/25¢, 4/1 Guilder	00	01	01	04	01	00	00
Netherlands	25¢	-	1 G	1/25¢, 5/1 Guilder	00	01	00	05	01	00	00
Belgium	5 F	-	20 F	1/2x5 F, 2/20 Franc [2]	08	01	01	04	02	00	00
	5 F	5 F	20 F	1/2X5 F, 1/2X5 F, 2/20 F [2]	08	01	01	04	02	00	00
	5 F	20 F	20 F	1/2x5 F, 2/20 F, 2/20 F [2]	08	01	01	04	02	00	00
Spain	25 P	-	100 P	1/25 P, 5/100 Peseta [2]	15	01	00	05	01	00	00
Switzerland	1 F	2 F	5 F	1/1 F, 3/2 F, 7/5 Franc	00	02	06	14	02	00	00
	1 F	-	2 F	1/1 F, 3/2 F [2]	07	03	00	06	02	00	00
Japan	100 ¥	-	100 ¥	2/100 Yen	00	04	00	04	02	00	00
	-	100 ¥	-	2/100 ¥ [2]	16	01	04	01	02	00	00
Italy	100 L	-	100 L	1/200 Lire [2]	14	01	04	01	02	00	00
Australia	20¢	-	$1	1/2x20 ¢, 3/$1 [2]	05	01	00	06	02	00	00
United Kingdom	10 P	50 P	20 P	1/10 P, 5/50 P, 2/20 Pence	00	01	05	02	01	00	00
	10 P	50 P	10 P	1/10 P, 5/50 P [2]	06	01	05	01	01	00	00
Argentina	10¢	10¢	10¢	1/1 Token	00	01	01	01	01	00	00
Austria	5 Sch	-	10 Sch	2/5 Sch, 5/10 Schilling	00	02	00	05	01	00	00
	1 Sch	5 Sch	10 Sch	2/5x1 Sch, 2/5 Sch, 5/10 Sch	00	02	10	25	05	00	00
Chile	Token	-	Token	1/1 Token [1,2]	01	01	04	01	01	00	00
Denmark	1 Kr	5 Kr	10 Kr	1/2x1 Kr, 3/5 Kr, 7/10 Krone	00	01	06	14	02	00	00
Finland	1 Mka	-	1 Mka	1/1 Markka [1,2]	01	01	04	01	01	00	00
New Zealand	20¢	-	20¢	1/2x20¢ [2]	03	01	04	01	02	00	00
Norway	1 Kr	-	1 Kr	1/2x1 Kr, 3/5x1 Krone	00	01	00	01	02	05	00
Sweden	1 Kr	-	1 Kr	1/2x1 Krona [2]	03	01	04	01	02	00	00

Notes: 1. Factory Default. 2. Standard Setting - Adjust setting of Item 24 ONLY. 3. Default with jumper W7 cut/removed. 4. Other functions are also affected; see the explanations for Adjustment items 53 through 58.

TEST/DIAGNOSTIC PROCEDURES

WILLIAMS ELECTRONICS GAMES provides a series of diagnostic tests to aid the operator in determining game condition (that is, whether the game's features and highlights are operating satisfactorily). These tests activate virtually all the electronic and electromechanical devices comprising the game, so that the operator can readily locate a malfunctioning device or simply verify that all devices are working properly. In order, these tests deal with the music, the displays, the game sounds, the lamps, the solenoids, and the switches.

CAUTION

HIGH SPEED's System 11 game program has a new capability to aid the operator and service personnel: When the operator is beginning the Test/Diagnostic Procedures (and also at game Turn-On), a display now signals when a switch has NOT been actuated during ball play for a lengthy period of time. Up to three switches can be displayed during this switch problem reporting activity. Refer to the text on Switch Tests for additional information.

In addition to the diagnostic testing, a feature called the Auto Burn-in Mode is available. Activating this mode enables the operator to observe the game while all of the diagnostic tests, *except the switch test,* occur. This can be very helpful in locating intermittent problems.

Activating either the entire test series or one of the individual tests requires use of the Game Adjustment/ Diagnostic switches. Open the coin door for access to these switches. To proceed to the Diagnostic Tests, the operator must simply turn the game On, and set the AUTO-UP/MANUAL-DOWN switch to MANUAL-DOWN.

MUSIC TEST.
1. To initiate the Music Test, press ADVANCE. Observe that the SPEEDER 1 and 2 displays show the message, MUSIC TEST. Adjust the volume control for proper sound level for the game location.

2. Use the AUTO-UP position.

DISPLAY TEST.
1. To initiate the Display Test, press ADVANCE. Observe that SPEEDER 1 and 2 displays briefly show the message, DISPLAY TEST, and that the Credits display shows 00 (the Display Test identifier).

2. Use AUTO-UP. Observe that all displays begin a display cycle of all 0s through all 9s, one digit at a time. Verify that the proper comma segments light during display of the odd-numbered digits. Next, a special "all segments" character 'walks' from left to right across each display (SPEEDER 1, 2, 3, 4, BALL IN PLAY/MATCH, Credits).

3. To halt the display cycle, use MANUAL-DOWN. Then, press ADVANCE to step through the sequential digit display, digit by digit, and the subsequent "all segments" characters display test. Use AUTO-UP to resume cycling, and to proceed to the next test.

SOUND TEST.
1. (From Display Test) To initiate the Sound Test, press ADVANCE. Observe that the SPEEDER 1 and 2 displays show the message, SOUND TEST, and that the Credit display shows 01 (the Sound Test identifier). The BALL IN PLAY/MATCH display shows a series of test steps from 00 through 07. Verify that a different sound is heard each time the number in the BALL IN PLAY/MATCH display changes.

2. To repeatedly pulse a single sound, use MANUAL-DOWN. Verify that one particular sound repeats. Press ADVANCE to step to the next sound, which repeats until ADVANCE is pressed again. Use AUTO-UP to resume cycling the sounds, and to proceed to the next test.

LAMP TESTS.
1. All Lamps.
    (From Sound Test) To initiate the first Lamps Test, press ADVANCE. Observe that the SPEEDER 1 and 2 displays show the message, ALL LAMPS, and that the Credit display shows 02 (All Lamps Test identifier) and that all feature lamps (playfield and backbox) blink on and off. (Note, however, that the General Illumination lamps remain lighted steadily.) To locate the wiring associated with a particular lamp, refer to the *Lamp-Matrix Table.* CPU Board connections at jacks 1J6 (columns) and 1J7 (rows) are also listed in the table.

LAMP TESTS (Continued)

2. Single Lamps.

From the All Lamps test, using AUTO-UP, press ADVANCE to enable *HIGH SPEED* to initiate the Single Lamps Test. The SPEEDER 1 and 2 displays initially show the message, SINGLE LAMPS, and the Credit display shows 03. Then, the BALL IN PLAY/MATCH display shows 01 and the SPEEDER 1 and 2 displays show GAME OVER, the name of the lamp currently blinking. Press the Credit button to proceed through an ascending series of designator numbers (01 through 64), with the SPEEDER 1 and 2 displays showing the individual lamp's name. Press and hold the Credit button to proceed rapidly to the desired lamp.

HIGH SPEED Lamp-Matrix Table

[2] Two lamps in circuit.

COLUMN / ROW	1 Q66 YEL-BRN 1J7-1	2 Q64 YEL-RED 1J7-2	3 Q62 YEL-ORN 1J7-3	4 Q60 YEL-BLK 1J7-4	5 Q58 YEL-GRN 1J7-6	6 Q56 YEL-BLU 1J7-7	7 Q54 YEL-VIO 1J7-8	8 Q52 YEL-GRY 1J7-9
Q80 1 RED-BRN 1J6-1	Game Over [2] 1	Flipper Return Lanes [2] 9	Upper Left Target Bank - Red Light 17	Standup Target Arrow #1 25	Freeway Scores 75,000 33	Stoplights Light Escape (Center) 41	Bonus 5000 49	Bonus 40,000 57
Q81 2 RED-BLK 1J6-2	Match 2	Center Spinner 1000 Arrow 10	Upper Left Target Bank - Yellow Light 18	Standup Target Arrow #2 26	Freeway Scores 100,000 34	Ramp Stoplight Red Light 42	Bonus 6000 50	Bonus 50,000 58
Q82 3 RED-ORN 1J6-3	Shoot Again - Drive Again [2] 3	Extra Ball (Eject Hole) 11	Upper Left Target Bank - Green Light 19	Standup Target Arrow #3 27	Freeway Lights Extra Ball 35	Ramp Stoplight Yellow Light 43	Bonus 7000 51	Bonus 60,000 59
Q83 4 RED-YEL 1J6-5	Left Outlane Special 4	Escape (Eject Hole) 12	Left Freeway Arrow 20	Standup Target Arrow #4 28	Ramp Earns Bonus X 36	Ramp Stoplight Green Light 44	Bonus 8000 52	Bonus 5X 60
Q84 5 RED-GRN 1J6-6	Right Outlane Special 5	Lower Left Target Bank - Red Light 13	Right Freeway Arrow 21	Standup Target Arrow #5 29	Ramp Earns Ramp Bonus 37	Bonus 1000 45	Bonus 9000 53	Bonus 4X 61
Q85 6 RED-BLU 1J6-7	Ball In Play 6	Lower Left Target Bank - Yellow Light 14	Right Target Bank - Red Light 22	Standup Target Arrow #6 30	Ramp Earns Getaway 38	Bonus 2000 46	Bonus 10,000 54	Hold Bonus 62
Q86 7 RED-VIO 1J6-8	Left Spinner 1000 Arrow 7	Lower Left Target Bank - Green Light 15	Right Target Bank - Yellow Light 23	Freeway Scores 25,000 31	Ramp Earns Hideout 39	Bonus 3000 47	Bonus 20,000 55	Bonus 3X 63
Q87 8 RED-GRY 1J6-9	Right Spinner 1000 Arrow 8	Left Outlane Kickback Arrow 16	Right Target Bank - Green Light 24	Freeway Scores 50,000 32	Ramp Earns Hideout Jackpot [2] 40	Bonus 4000 48	Bonus 30,000 56	Bonus 2X 64

"On" State Logic - Special Solenoid

+5V   +5V   +5V   +34V
1J18 S.S. TRIGGER INPUT — 7402 — 2N4401 — 1J19 — TIP 122 — SPECIAL SOLENOID "ON"
LOW WHEN FLIPPERS ENABLED
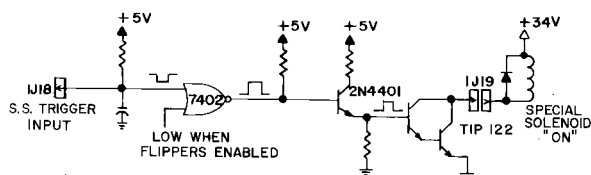
"Off" State - Special Solenoid:

The Special Switch Trigger Input goes low. Meanwhile, the PIA line remains high. The remaining signals reverse their states. *(These six solenoids aren't pulsed during the Solenoid Test. Check them manually: Press each trigger switch, or ground each switch trigger line.)*

"On" State Logic - Controlled Solenoid

+5V   +5V   +34V
FROM PIA — 7408 — 2N4401 — 1J11 OR 1J12 — CONTROLLED SOLENOID "ON"
BLANKING — TIP 122
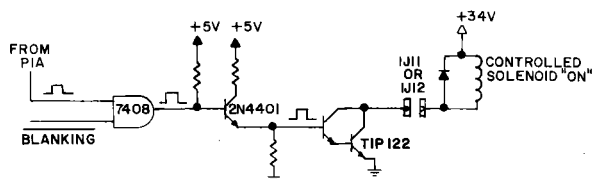
"Off" State - Controlled Solenoid:

The Enable Input (from the PIA) goes low. Meanwhile, the BLANKING signal remains high. The rest of the signals reverse their states.

TEST/DIAGNOSTIC PROCEDURES (Continued)

SOLENOID TEST.

1. (From Lamp Test) Using AUTO-UP, press ADVANCE. Observe that the SPEEDER 1 and 2 displays show the message, COIL TEST, the Credit display shows 04 (Solenoid Test identifier). Next, the BALL IN PLAY/ MATCH display shows a series of test steps from 01 through 22, while the SPEEDER 1 and 2 displays show the name of the solenoid. During each of these steps, pulsing of the respective solenoid occurs. The test cycles repeatedly, unless halted via the MANUAL-DOWN switch. Refer to the *Solenoid Table* for solenoid numbers and wiring information. CPU Board connections at 1P11, 1P12, and 1P19 are also listed in the table.

To continuously pulse a single solenoid, use MANUAL-DOWN. Press ADVANCE to sequence through the controlled and special solenoids. Use AUTO-UP to resume test cycling, and to proceed to the next test.

HIGH SPEED Solenoid Table

| Sol. No. | Function | Solenoid Type | Wire [1] Color | Connections | | Driver Trans. | Solenoid Part No. |
				CPU Bd.	Playfield/ Cabinet		
01	Outhole	Controlled	Gry-Brn	1P11-1	8P3-1	Q33	AE-23-800-01
02	Ball Release	Controlled	Gry-Red	1P11-3	8P3-2	Q25	AE-23-800-03
03	Eject Hole	Controlled	Gry-Orn	1P11-4	8P3-3	Q32	AE-23-800-03
04	Police Light Relay	Controlled	Gry-Yel	1P11-5	Backbox	Q24	5580-10883-00
05	Flasher No. 2 (Left Blue)	Controlled	Gry-Grn	1P11-6	8P3-5	Q31	#63 flashlamps
06	Flasher No. 3 (Right Blue)	Controlled	Gry-Blu	1P11-7	8P3-6	Q23	#63 flashlamps
07	Left Hideout Relay	Controlled	Gry-Vio	1P11-8	8P3-7	Q30	AE-24-900-02
08	Right Hideout Relay	Controlled	Gry-Blk	1P11-9	8P3-8	Q22	AE-24-900-02
09	Flasher No. 1 (Left Red)	Controlled	Brn-Blk	1P12-1	8P3-9	Q17	#63 flashlamps
10	Insert Board Flashers	Controlled	Brn-Red	1P12-2	9P1-7	Q9	#63 flashlamps
11	General Illumination Relay	Controlled	Brn-Orn	1P12-4	3P7-1	Q16	5580-09555-00
12	Flasher No. 4 (Right Red)	Controlled	Brn-Yel	1P12-5	8P3-12	Q8	#63 flashlamps
13	Ramp Gates	Controlled	Brn-Grn	1P12-6	8P3-13	Q15	AL-23-800-01
14	Kickback (Left Outlane)	Controlled	Brn-Blu	1P12-7	8P3-14	Q7	AE-24-900-01 & Relay
15	Knocker	Controlled	Brn-Vio	1P12-8	Backbox	Q14	AE-23-800-02
16	Coin-Lockout Relay	Controlled	Brn-Gry	1P12-9	7P1-7,7P2-4	Q6	404603-2 [2]
17	Left Kicker	Special #1	Blu-Brn	1P19-7	8P3-17	Q75	AE-23-800-03
18	Right Kicker	Special #2	Blu-Red	1P19-4	8P3-18	Q71	AE-23-800-03
19	Right Jet Bumper	Special #3	Blu-Orn	1P19-3	8P3-19	Q73	AE-23-800-03
20	Lower Left Jet Bumper	Special #4	Blu-Yel	1P19-6	8P3-20	Q69	AE-23-800-03
21	Upper Left Jet Bumper	Special #5	Blu-Grn	1P19-8	8P3-21	Q77	AE-23-800-03
22	Top Playfield Flashers	Special #6	Blu-Blk	1P19-9	8P3-22	Q79	#63 flashlamps
-	Upper Flipper	-	(Blk-Yel)		(7J1-19,8P3-33) [3]	-	FL23/600-30/2600-50VDC
-	Right Flipper	-	Orn-Vio (Blu-Vio)	1P19-1	7P1-20 (7J1-21,8P3-34) [3]	-	FL23/600-30/2600-50VDC
-	Left Flipper	-	Orn-Gry (Blu-Gry)	1P19-2	7P1-23 (7J1-24,8P3-32) [3]	-	FL23/600-30/2600-50VDC

Notes:
1. Wire colors, except flipper Orn-Vio and Orn-Gry, are ground connections (to coil terminal with unbanded end of diode). Flipper Orn-Vio and Orn-Gry wires connect from CPU Board to flipper switch. 2. Solenoid 16 has a Coinco part number.
3. Connections shown in parentheses are from flipper switch to flipper coil.

SWITCH TESTS.

1. Switch Levels.

(From Solenoid Test) To initiate the Switch Levels Test, press ADVANCE. Observe that the SPEEDER 1 and 2 displays show the message, SWITCH LEVELS, the Credit display shows 05 (Switch Levels Test identifier), and the BALL IN PLAY/MATCH display is blank, indicating that no switch is actuated.

If, however, a switch *is* actuated (possibly stuck closed), the BALL IN PLAY/MATCH display shows that switch's number, while the SPEEDER 1 and 2 displays indicate the switch's name. A sound also accompanies the displays. (This is another facet of the new *HIGH SPEED System-11* switch testing capability.) If more than one switch is closed, each switch's name and number becomes a member of a series of displays, each showing the switches' names and numbers. (In addition, either of these problems could result in the reporting of a switch problem (or problems) at game Turn-on or at the beginning of Diagnostic Tests.)

As soon as the operator opens a closed switch, its name and number are eliminated from the Switch Levels display series. For *HIGH SPEED*, switch numbers can range from 01 through 52. Refer to the *Switch-*

SWITCH TESTS (Continued).

Matrix Table for switch numbers and wiring information. CPU Board connections at jacks 1J8 (columns) and 1J10 (rows) are also listed in the table.

Row Problems. If a display of two (or more) switch numbers <u>of a row</u> occurs, although only one switch is closed, check for a short circuit between the column wires.

Multiple Switch Number Indications. Check the associated column wire for a short circuit to ground.

Column Problems. If display of two (or more) switch numbers <u>in a column</u> occurs (while only one switch is actuated), check for a short circuit between the row wires.

Use AUTO-UP to proceed to the next test.

HIGH SPEED Switch-Matrix Table

COLUMN / ROW	1 Q45 GRN-BRN 1J8-1	2 Q49 GRN-RED 1J8-2	3 Q44 GRN-ORN 1J8-3	4 Q48 GRN-YEL 1J8-4	5 Q43 GRN-BLK 1J8-5	6 Q47 GRN-BLU 1J8-7	7 Q42 GRN-VIO 1J8-8	8 Q46 GRN-GRY 1J8-9
WHT-BRN 1J10-9	Plumb Bob Tilt 1	Outhole 9	Upper Left Stoplight Bank - Red Target 17	StandupTarget Arrow #1 25	Upper Left Jet Bumper 33	Playfield Tilt 41	Left Kicker 49	Not Used 57
WHT-RED 1J10-8	Ball Roll Tilt 2	Ball Trough #3 (Upper Left) 10	Upper Left Stoplight Bank - Yel Target 18	Standup Target Arrow #2 26	Lower Left Jet Bumper 34	Left Ramp 42	Right Kicker 50	Not Used 58
WHT-ORN 1J10-7	Credit Button 3	Ball Trough #2 (Center) 11	Upper Left Stoplight Bank - Grn Target 19	Standup Target Arrow #3 27	Right Jet Bumper 35	Right Ramp 43	Left Star Rollover 51	Not Used 59
WHT-YEL 1J10-6	Right Coin Chute 4	Ball Trough #1 (Lower Right) 12	Left Flipper Return Lane 20	Standup Target Arrow #4 28	Ball Shooter 36	Left Spinner 44	Right Star Rollover 52	Not Used 60
WHT-GRN 1J10-5	Center Coin Chute 5	Lower Left Stoplight Bank - Red Target 13	Right Flipper Return Lane 21	Standup Target Arrow #5 29	Left Flipper Engine Revving (EOS) 37	Center Spinner 45	Not Used 53	Not Used 61
WHT-BLU 1J10-3	Left Coin Chute 6	Lower Left Stoplight Bank - Yel Target 14	Right Stoplight Bank - Red Target 22	Standup Target Arrow #6 30	Right Flipper Engine Revving (EOS) 38	Right Spinner 46	Not Used 54	Not Used 62
WHT-VIO 1J10-2	Slam Tilt 7	Lower Left Stoplight Bank - Grn Target 15	Right Stoplight Bank - Yellow Target 23	Left Outlane 31	Upper Left Hideout 39	Upper Right Hideout 47	Not Used 55	Not Used 63
WHT-GRY 1J10-1	High-Score Reset 8	Eject Hole 16	Right Stoplight Bank - Green Target 24	Right Outlane 32	Lower Left Hideout 40	Lower Right Hideout 48	Not Used 56	Not Used 64

2. **Switch Edges.**
From the Switch Levels Test, press ADVANCE. Observe that the SPEEDER 1 and 2 displays show the message, SWITCH EDGES, the Credit display shows 06 (Switch Edges Test identifier), and the BALL IN PLAY/MATCH display is blank, indicating that no switch is actuated.

This test permits the operator to test whether actuating a switch provides the proper signal to the System-11 switch testing program. When actuating a switch, the operator should see the switch's name and number (in the SPEEDER 1 and 2, and the BALL IN PLAY/MATCH displays, respectively). If no indication appears at the time the switch is actuated, the operator then knows that there is a malfunction associated with that switch.

Using this technique, the operator can test each switch appearing in the *HIGH SPEED* switch problem reporting displays (either at game Turn-on or at the beginning of the Diagnostic Tests) to determine whether the switch can be actuated. If the switch's name and number are displayed while the operator checks its operation, the operator then knows that the reported problem with that switch is NOT currently caused by a switch malfunction. The operator can then seek other causes for the reported problem, being almost cer-

TEST/DIAGNOSTIC PROCEDURES (Continued)

SWITCH TESTS (Continued).

tain now that the switch did not fail.

Among the possibilities is the fact that the players have not hit that switch because of some other problem; the operator should try to analyze what could cause the switch to be missed, and remedy that problem cause. With these new tests, switch problems are, therefore, more easily isolated.

Coin Chute Switches. During the Switch Edges test, the System-11 switch testing program energizes the coin lockout relays, to prevent testing actuations of the coin chute switches from affecting the data contained in the audit counters, thereby maintaining accurate records of the game's earnings.

3. *Playfield or CPU Board?* To determine whether a switch problem is in the playfield or the CPU Board, remove connectors 1P8 and 1P10 from the CPU Board. Begin the Switch Test. Use a jumper wire to simulate switch actuation. For example, placing a jumper between 1J10-1 and 1J8-2 should (based on the **Switch-Matix Table**) should produce an indication of switch 09 being actuated.

ENDING THE DIAGNOSTIC TESTS.

To end the Diagnostic Tests, reach the Switch Edges Test (06 in the Credits display), use AUTO-UP and press ADVANCE. The backbox displays should show the *HIGH SPEED* game's Identification Information. Use MANUAL-DOWN, and press ADVANCE to reach Adjustment Item 70 (INSTALL FACTORY). Use AUTO-UP and press ADVANCE to obtain the Attract Mode.

AUTO BURN-IN MODE.

The Auto Burn-in Mode permits the operator to check intermittent (or nonrecurring) problems associated with most portions of the game's circuitry. Repeatedly cycling through a group of tests can sometimes bring a problem, which occurs only randomly or occasionally, to exhibit itself more frequently, thereby aiding in the isolation of the problem. To activate the Auto Burn-in Mode:

1. While in the Game Adjustments, reach Ad 67 and change the Factory Setting of NO to YES, via the Credit button. Set the AUTO-UP/MANUAL-DOWN switch to AUTO-UP.

2. Press ADVANCE to start the Auto Burn-in Mode. This mode repeatedly sequences through the Music Test, the Display Test, the Sound Test, the All Lamps portion of the Lamp Test, and the Solenoid Test.

3. To halt the Auto Burn-in Mode, turn the game Off and then On. *HIGH SPEED* now starts in the Attract Mode. (If a switch problem is now reported by the displays, perform the Switch Tests again to determine the nature of the problem; then, perform necessary repairs.)

SYSTEM-11 MEMORY CHIP TEST.

A new feature is now included in the Memory Chip Test for System 11. A diagnosis of the condition of the "blanking circuit" now occurs during this testing. (The "blanking circuit" protects the displays, lamps, and solenoids against a hardware malfunction.) The test requires approximately 1.5 seconds. Display of an 8 on the CPU Board LED during the test indicates that the "blanking circuit" operation is normal; display of a 0 during the test indicates that the "blanking circuit" is NOT functioning. Following the complete Memory Chip Test, one of indications listed in the **CPU LED Indicator Codes Table** should appear. To perform the test, press the CPU Diagnostic Switch (SW 2) on the edge of the CPU Board.

CPU LED Indicator Codes Table

Code	Code Meaning
0 [1]	Test Passed (game goes to Game-Over Mode).
1	CPU Board lockup; also, check Memory Protect circuit and U25 CMOS RAM for 'stuck' bits.
2	U27 Game ROM 1 faulty. (lower ROM, CPU Bd.)
3	U26 Game ROM 2 faulty. (upper ROM, CPU Bd.)
4	Unused (see "Other or No Indications")
5	Blanking signal 'stuck'; coin door closed; Memory Protect circuit faulty; or U25 CMOS RAM faulty.
Other or No Indications [2]	System Failure: Check 5 VDC Power Supply; U26 Game ROM 2 faulty.

Notes:
1. Zero (0) displayed during Memory Chip Test (using CPU Board switch SW2) indicates that Blanking Circuit is NOT functioning.
2. Eight (8) displayed during Memory Chip Test indicates that Blanking Circuit is functioning properly.

TEST/DIAGNOSTIC PROCEDURES (Continued)

SYSTEM-11 SOUND SECTION TEST.

Press the Sound Diagnostic Switch (SW 1) on the CPU Board. Listen for the sound. The sound repeats, until the operator turns the *HIGH SPEED* game Off and On.

NO SOUND DURING THIS TEST (but sound can be heard during the Diagnostic Tests).

Check the sound-select inputs (pins 2 through 9 of U9) to see if they pulse during Sound Test 01. Also, check the -12 V supply voltage on the CPU Board. If this voltage is low (or AC ripple seems too high), perform the following checks:

1. The gray and gray-green transformer secondary wires for 18.7 VAC.
2. The CPU Board filter capacitor C26 for -12 VDC.
3. The filter capacitor C26 for excessive AC ripple (over 0.75VAC).

If the previous checks did not isolate the problem, turn the Volume Control for maximum output. Momentarily touch a powered-up AC soldering pencil on the center tap of the Volume Control.

CAUTION

DO NOT use a soldering iron over 40 watts. Note also that cordless soldering irons will NOT work for this test.

Hearing a low hum indicates that the power amplifier (U1, TDA2002), the Volume Control, and the speaker are operating satisfactorily. Not hearing a hum requires repeating the test with the Volume Control turned part way down, to determine whether the Volume Control is faulty.

Section 2

Game Parts Information

- Parts Lists and Diagrams:

  Playfield Mylars
  Playfield Parts
  Switches
  Lamps
  Solenoids & Rubber Parts
  Flipper Assemblies
  Ball Eject Assembly
  Traffic Light Assembly
  Jet Bumper & Coil Assembly
  Ramp Gate Assembly
  Kicker Assembly
  Police Light Assembly
  Ramp Assembly
  Outlane Kickback Assembly
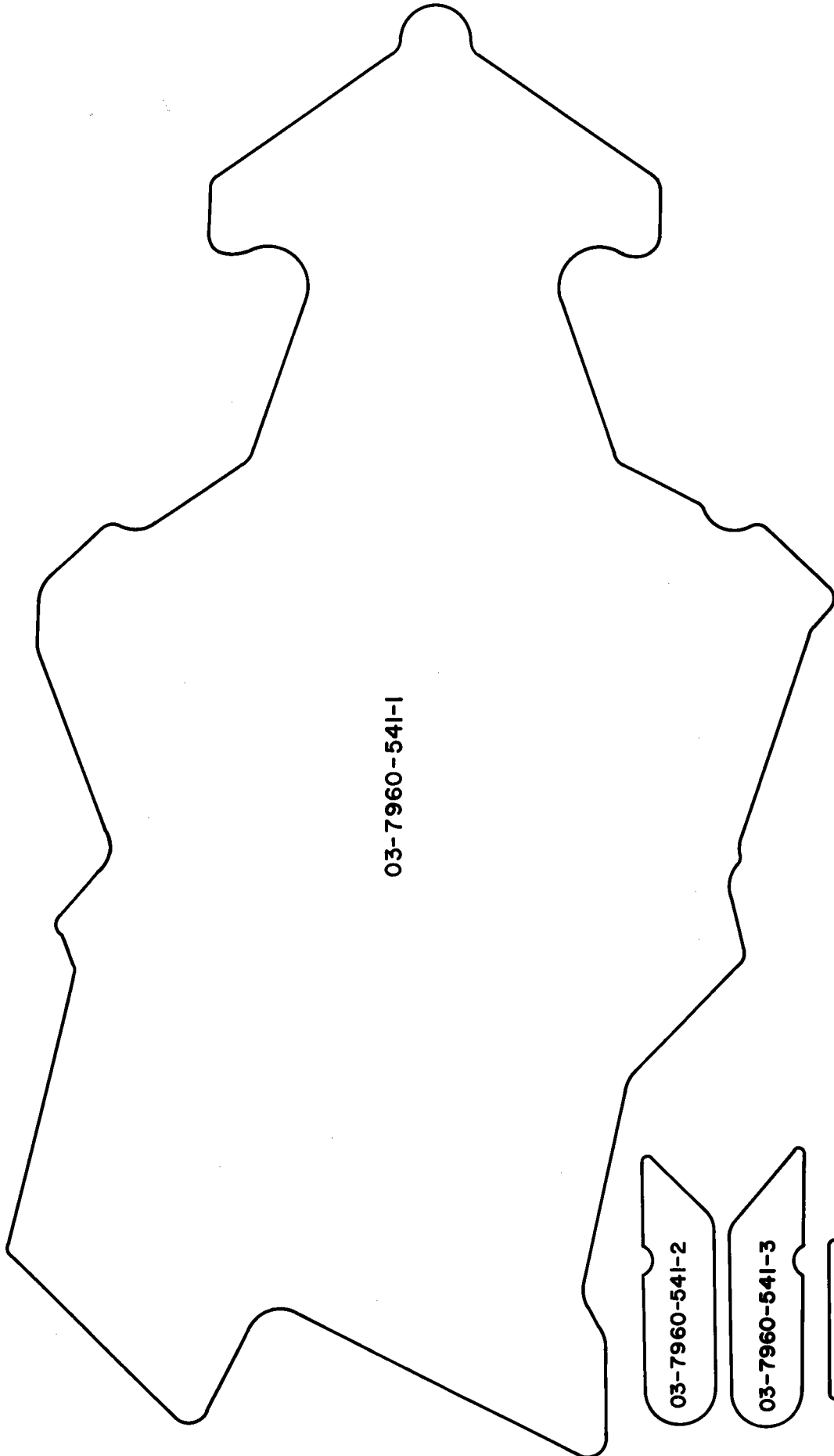
03-7960-541-1

03-7960-541-2

03-7960-541-3

03-7960-541-4

High Speed Playfield Mylars

High Speed 30

Playfield Parts
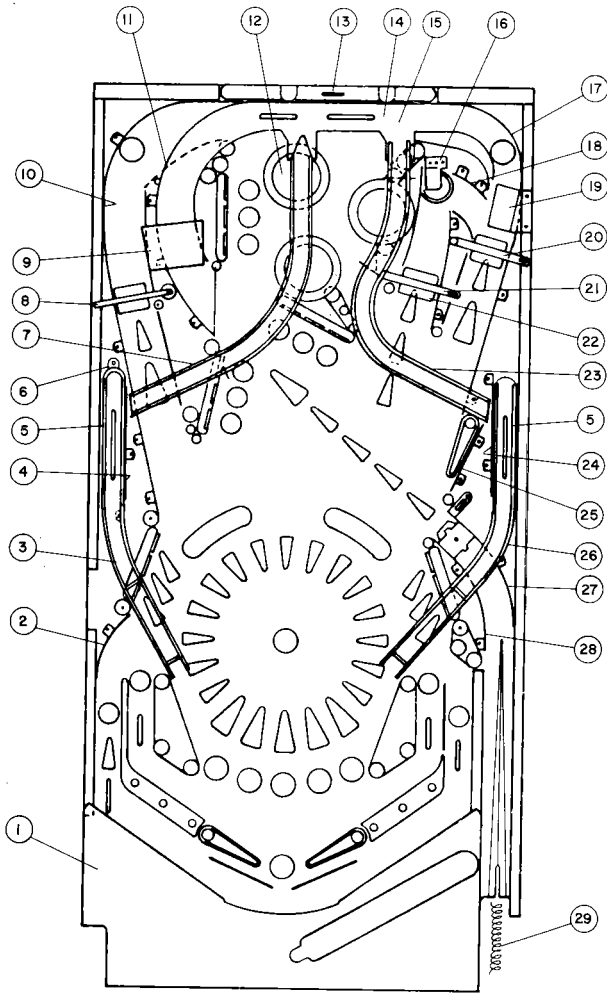
Item	Part No.	Description
1	A-11041	Outlane Kickback Assembly
2	B-10898	Ball Guide
3	D-11050	Ball Chute, Lower Left
4	B-11039	Ball Guide & Switch Bracket
5	01-8325	Rail Protector
6	01-8237	Clip
7	D-10863	Ball Chute, Upper Left
8	B-11019-2	Spin Target Assembly
a)	01-8341	Spin Target Mounting Bracket
b)	03-7796	Target Shaft Washer
c)	12-6620	Switch Actuator Wire
d)	31-1380-2	"Bayshore Freeway" Decal
e)	31-1019-541	*HIGH SPEED* Screened Target
9	B-10921	Traffic Light Assembly
10	C-10893	Ball Guide Assembly
11	12-6680	Ball Guide Wire
12	17-1086	Jet Bumper Cap
13	D-10884	*HIGH SPEED* Ramp Gate Assembly
14	03-8005	Main Ramp Cover
15	D-10905	*HIGH SPEED* Ramp Assembly
16	01-6933-2	Metal Eject Shield
17	C-10894	Ball Guide Assembly
18	A-10889	Ball Guide Assembly
19	01-8217	Ball Deflector
20*	B-11019-1	Spin Target Assembly
d)	31-1380-1	"Santa Monica Freeway" Decal
21*	B-11019-3	Spin Target Assembly
a)	01-7649	Spin Target Mounting Bracket
d)	31-1380-3	"San Diego Freeway" Decal
22	A-10890	Ball Guide Assembly
23	D-10862	Ball Chute, Upper Right
24	B-11038	Ball Guide & Switch Bracket
25	A-10897	Ball Guide Assembly
26	D-11049	Ball Chute, Lower Right
27	C-10935	Ball Guide Assembly
28	B-10896	Ball Guide Assembly
29	10-148-2	Plunger Spring

Notes: * - Complete list of parts (8a through 8e) also applies
to items 20 and 21, except for lettered items noted with
these assemblies.

Switches

Item	Part No.	Description
1	A-8476	Plumb Bob Tilt
2	B-6572	Ball Roll Tilt
3	SW-1A-126	Credit Button
4	904845*	Right Coin Chute (* - Coinco p/n)
5	904845*	Center Coin Chute
6	904845*	Left Coin Chute
7	904704*	Slam Tilt
8	5641-09369-00	High Score Reset
9	17-1067	Outhole
10	5647-09957-00	Left Trough
11	5647-09957-00	Center Trough
12	5647-09933-00	Right Trough
13	A-11022	Red Target (Lwr Left Stoplight Bank)
14	A-11054	Yellow Target (Lwr Left Stoplight Bank)
15	A-11055	Green Target (Lwr Left Stoplight Bank)
16	17-1012	Eject Hole
17	A-11022	Red Target (Upr Left Stoplight Bank)
18	A-11054	Yellow Target (Upr Left Stoplight Bank)
19	A-11055	Green Target (Upr Left Stoplight Bank)
20	SW-1A-124	Left Flipper Return Lane
21	SW-1A-124	Right Flipper Return Lane
22	A-11022	Red Target (Right Stoplight Bank)
23	A-11054	Yellow Target (Right Stoplight Bank)
24	A-11055	Green Target (Right Stoplight Bank)
25	A-8253	Standup Target Arrow - 1
26	A-8253	Standup Target Arrow - 2
27	A-8253	Standup Target Arrow - 3
28	A-8253	Standup Target Arrow - 4
29	A-8253	Standup Target Arrow - 5
30	A-8253	Standup Target Arrow - 6
31	SW-1A-124	Left Outlane
32	SW-1A-124	Right Outlane
33	A-7459-7	Upper Left Jet Bumper
34	A-7459-7	Lower Left Jet Bumper
35	A-7459-7	Right Jet Bumper
36	SW-1A-138	Ball Shooter
37	SW-1A-150-1	Left Flipper Lane Change (Engine Revs)
38	SW-1A-150	Right Flipper Lane Change (Engine Revs)
39	A-11047	Upper Left Hideout
40	17-1085	Lower Left Hideout
41	SW-1A-117	Playfield Tilt
42	SW-1A-160	Left Ramp
43	SW-1A-160	Right Ramp
44	SW-1A-118	Left Spinner
45	SW-1A-118	Center Spinner
46	SW-1A-118	Right Spinner
47	A-11047	Upper Right Hideout
48	17-1085	Lower Right Hideout
49	SW-1A-122	Left Kicker (scoring) [Kicker Actuating Sw:
50	SW-1A-122	Right Kicker (scoring) A-4834-H;
51	SW-1A-157	Left Star Rollover B-8734 w/RC]
52	SW-1A-157	Right Star Rollover
53-64	Not Used	Not Used
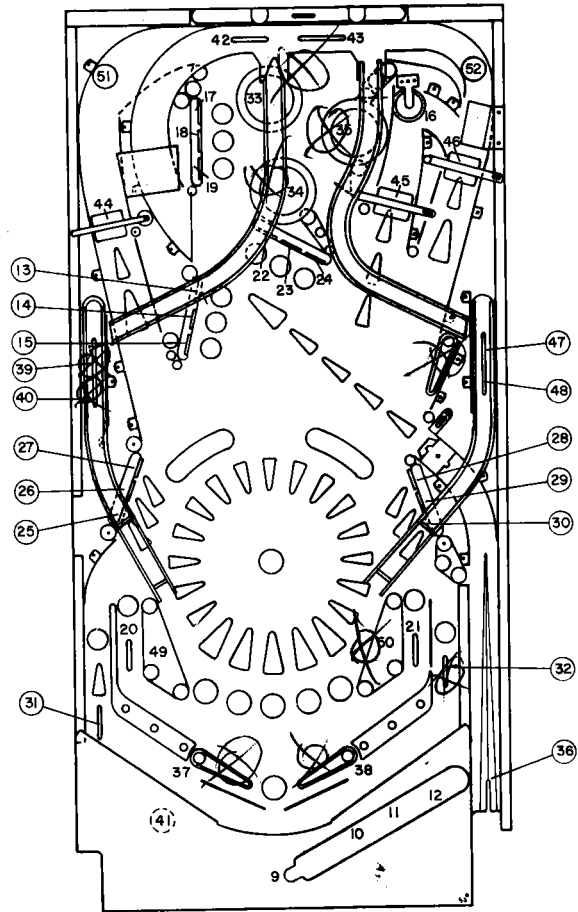
Lamps

Lamp	Location/Description
1	Game Over (Backglass)
2	Match (Backglass)
3	Shoot Again (Backglass)
	Drive Again (Playfield)
4	Left Outlane Special
5	Right Outlane Special
6	Ball In Play (Backglass)
7	Left Spinner 1000 Arrow
8	Right Spinner 1000 Arow
9	20,000 Light Kickback
	(Left & Right Flipper Lanes)
10	Center Spinner 1000 Arrow
11	Extra Ball (Eject Hole)
12	Escape (Eject Hole)
13	Red Light (Lwr Left Target Bank)
14	Yellow Light (Lwr Left Target Bank)
15	Green Light (Lwr Left Target Bank)
16	Kickback Arrow (Left Outlane)
17	Red Light (Upr Left Target Bank)
18	Yellow Light (Upr Left Target Bank)
19	Green Light (Upr Left Target Bank)
20	Left Freeway Arrow
21	Right Freeway Arrow
22	Red Light (Right Target Bank)
23	Yellow Light (Right Target Bank)
24	Green Light (Right Target Bank)
25	Standup Target Arrow - 1
26	Standup Target Arrow - 2
27	Standup Target Arrow - 3
28	Standup Target Arrow - 4
29	Standup Target Arrow - 5
30	Standup Target Arrow - 6
31	Freeway Scores 25,000
32	Freeway Scores 50,000
33	Freeway Scores 75,000
34	Freeway Scores 100,000
35	Freeway Lights Extra Ball
36	Ramp Earns Bonus X
37	Ramp Earns Ramp Bonus
38	Ramp Earns Getaway
39	Ramp Earns Hideout
40	Ramp Earns Hideout Jackpot
41	Stoplights Light Escape (Center)
42	Red Light (Ramp Stoplight)
43	Yellow Light (Ramp Stoplight)
44	Green Light (Ramp Stoplight)
45	Bonus 1000
46	Bonus 2000
47	Bonus 3000
48	Bonus 4000
49	Bonus 5000
50	Bonus 6000
51	Bonus 7000
52	Bonus 8000
53	Bonus 9000
54	Bonus 10,000
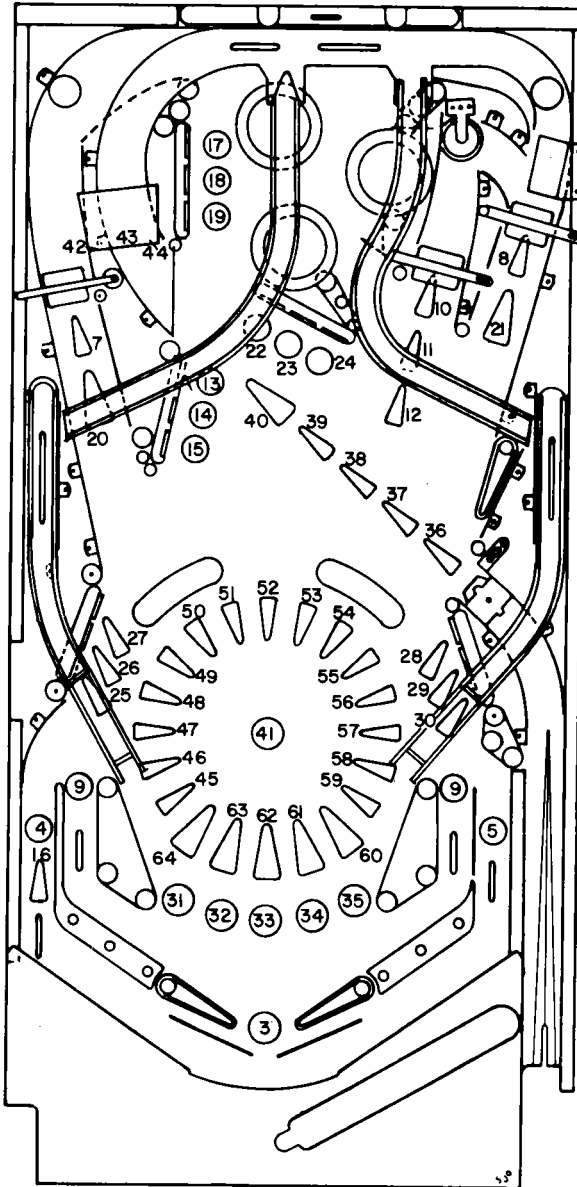
Lamp	Location/Description
55	Bonus 20,000
56	Bonus 30,000
57	Bonus 40,000
58	Bonus 50,000
59	Bonus 60,000
60	Bonus 5X
61	Bonus 4X
62	Hold Bonus
63	Bonus 3X
64	Bonus 2X

Solenoids/ Flashers

Item	Part No.	Description
1	AE-23-800-01	Outhole
2	AE-23-800-03	Ball Release
3	AE-23-800-03	Eject Hole
4	5580-10883-00	Police Light Relay (Backbox)
5	#63 Flashlamps	Left Blue Playfield Flashers
6	#63 Flashlamps	Right Blue Playfield Flashers
7	AE-24-900-02	Left Hideout Relay
8	AE-24-900-02	Right Hideout Relay
9	#63 Flashlamps	Left Red Flashers
10	#63 Flashlamps	Insert Board Flashers
11	Pwr Sup Bd Relay	General Illumination
12	#63 Flashlamps	Right Red Flashers
13	AL-23-800-01	Ramp Gates
14	AE-24-900-01	Left Outlane Kickback (w/relay)
15	AE-23-800-02	Knocker
16	904218-696	Coin-Lockout Relay (Coinco p/n)
17	AE-23-800-03	Left Kicker
18	AE-23-800-03	Right Kicker
19	AE-23-800-03	Right Jet Bumper
20	AE-23-800-03	Lower Left Jet Bumper
21	AE-23-800-03	Upper Left Jeft Bumper
22	#63 Flashlamps	Top Playfield Flashers
-	FL 23/600-30/2600-50VDC	Upper Flipper
-	FL 23/600-30/2600-50VDC	Right Flipper
-	FL 23/600-30/2600-50VDC	Left Flipper

Rubber Parts

Item	Part No.	Description
A	23-6300	5/16" Ring
B	23-6302	1" Ring
C	23-6303	1-1/4" Ring
D	23-6306	2-3/8" Ring
E	23-6310	5" Ring
F	23-6519-4	Red Ring
G	23-6535	Bumper
H	23-6552	Sleeving
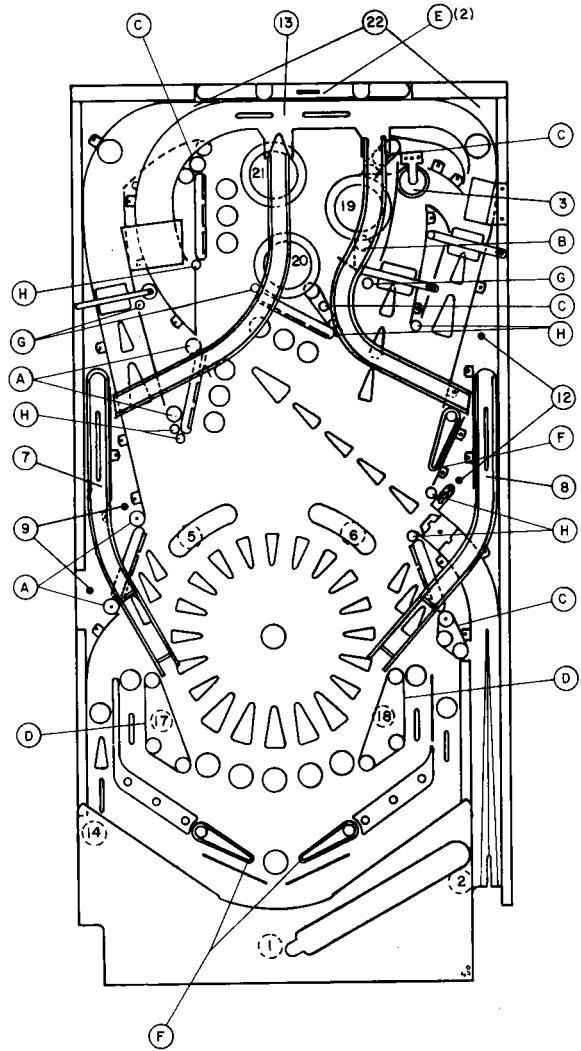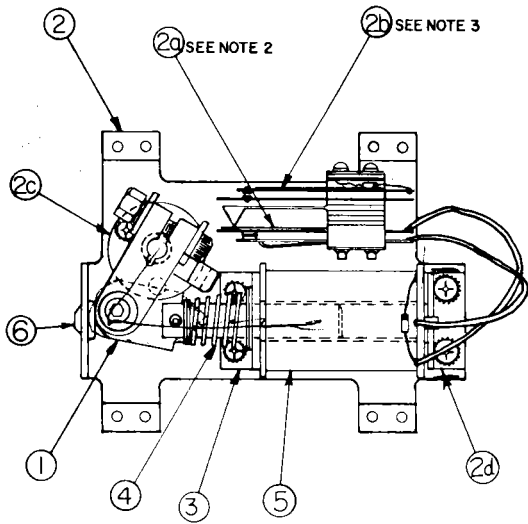
C-9952-R FLIPPER ASSEMBLIES

ITEM	PART NO.	DESCRIPTION
1	B-10655-R	Crank Link Assembly
2	C-9954-R	Flipper Base/Lane Change Assembly
2a	03-7811	End of Stroke (EOS) Switch
2b	SW-1A-150	Lane Change Switch
2c	03-7568	Flipper Bushing
2d	A-10280	Flipper Stock Bracket Assembly
3	01-7695	Solenoid Bracket
4	10-376	Coil Plunger Spring
5	FL 23/600-30/2600	Flipper Coil
6	23-6577	Bumper Plug

NOTES:
1 Each Flipper Assembly is mounted below the playfield, in conjunction with the plastic flipper and shaft (20-9250) and flipper rubber (23-6519) (on the upper side of the playfield).
2 The tip of the EOS Switch must travel .015 (+.010, −.000 inch), before the contacts fully open with the flipper in the actuated position. The EOS Switch contacts must have a gap of .062 (±.015) inch. Any adjustment of the EOS Switch must be made at a minimum distance of .25 inch from the switch body
3 The Lane Change Switch must have a gap of .046 (±.015) inch, when fully open
4 All moving elements of the assembly must operate freely without any evidence of binding
5 Coil plunger spring must fit within the four lugs of the solenoid bracket
6 For coil replacement, remove solenoid bracket (item 3) to prevent screw damage
7 Use Loctite when reassembling flipper stop bracket screws.
8 When using bumper plug on older flipper assemblies, readjust flipper position.
9 Solid color grey (or blue) wire connects to the banded end of the diode, mounted on the connector end of flipper coil (item 5). Wire with trace color connects to the unbanded end of the diode.
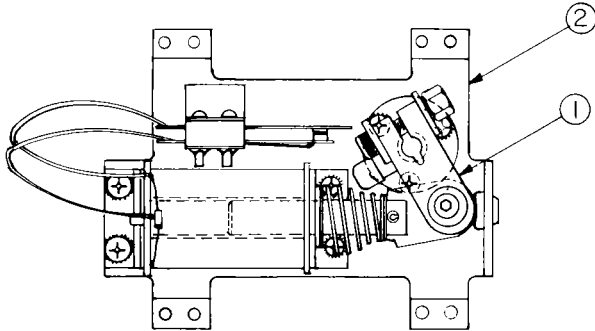
C-9953-L UNIQUE PARTS

ITEM	PART NO.	DESCRIPTION
1	B-10655-L	Crank Link Assembly, Left
2	C-9957-L	Flipper Sub Base Assembly
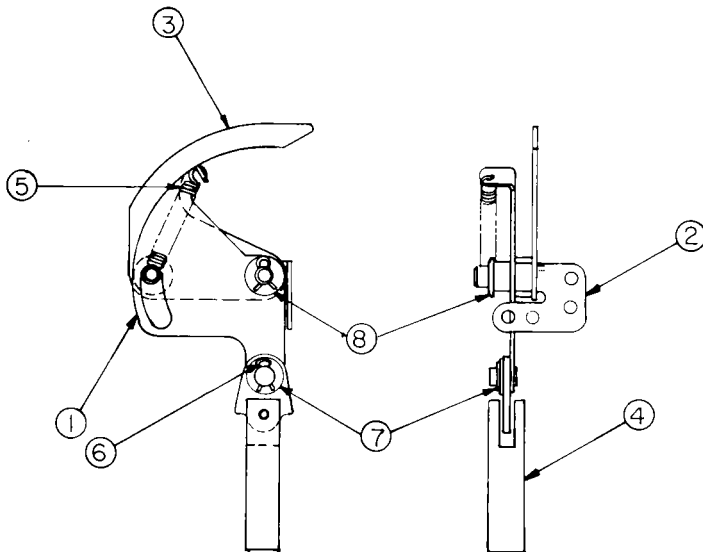
B-9361-R-3 BALL EJECT ASSEMBLY—RIGHT

ITEM	PART NO.	DESCRIPTION
1	A-6949-R	Spring Plate
2	A-6950-R	Mounting Bracket Assembly
3	A-7471-R	Eject Cam Assembly
4	A-5103	Coil Plunger Assembly
5	10-362	Spring-Eject
6	12-6227	Hair Pin Clip
7	4700-00030-00	17/64 x 1/2 x 15G
8	4700-00103-00	17/64 x 1/2 x .015
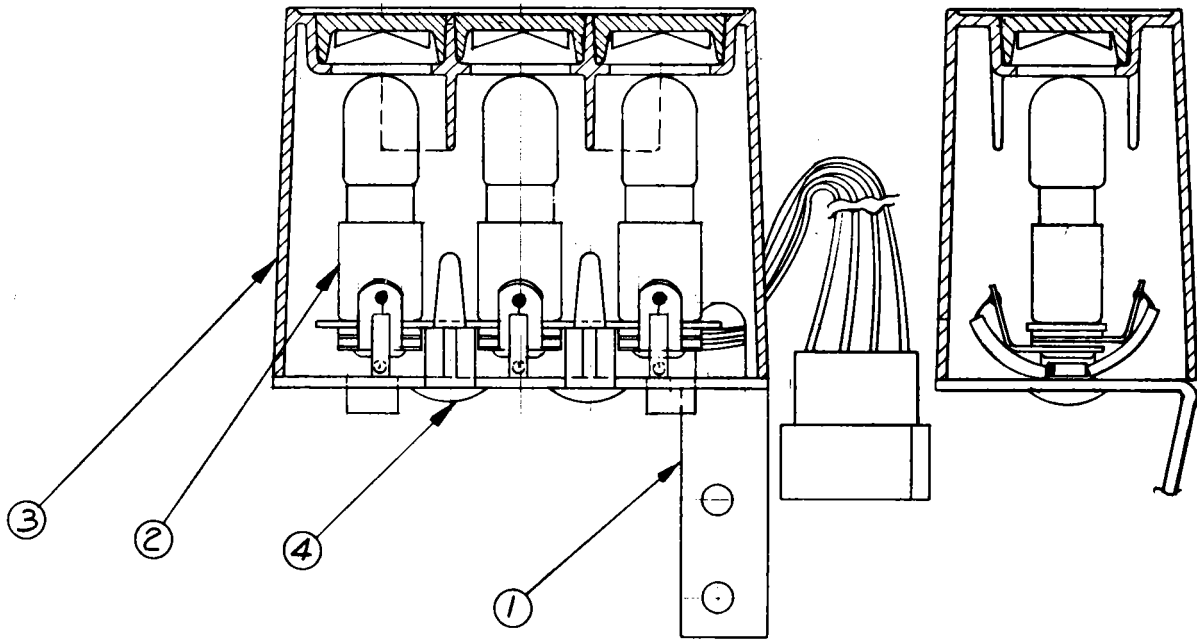
Traffic Light Assembly
p/n B-10921

Item	Part No.	Description
1	01-8231	Light Housing Plate
2	C-10915	Light Socket & Cable Assembly
3	B-10999	Housing Subassembly
4	20-9505-4	PCB Mounting Standoff
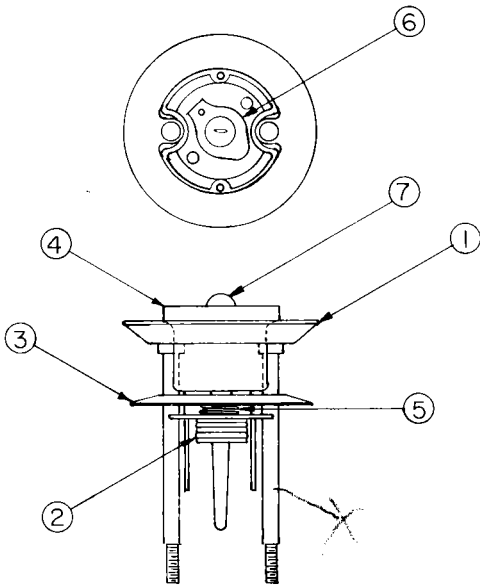
B-9414 JET BUMPER ASSEMBLY

ITEM	PART NO.	DESCRIPTION
1	A-4754	Bumper Ring Assembly
2	03-6009-A5	Bumper Base
3	03-6035-5	Bumper Wafer
4	03-7443-5	Bumper Body
5	10-7	Bumper Spring
6	24-6416	Bumper Socket
7	24-6549	#44 Bulb
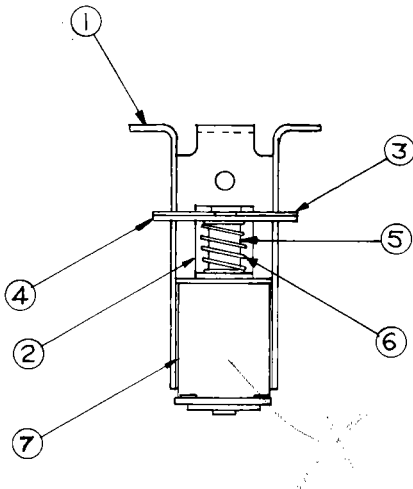
B-9415 JET BUMPER COIL
ASSEMBLY

ITEM	PART NO.	DESCRIPTION
1	B-7417	Bracket and Stop Assembly
2	01-1747	Coil Retaining Bracket
3	01-5492	Armature Link Steel
4	01-5493	Armature Link Bakelite
5	02-3406-1	Coil Plunger
6	10-326	Armature Spring
7	SG1-23-850-DC	Solenoid Coil

NOTE:
ADD ONE DROP OF SILICON OIL
ON ALL ROTATING SHAFTS.
DO NOT ADD OIL TO SOLENOID.

SEE NOTE

SEE NOTE
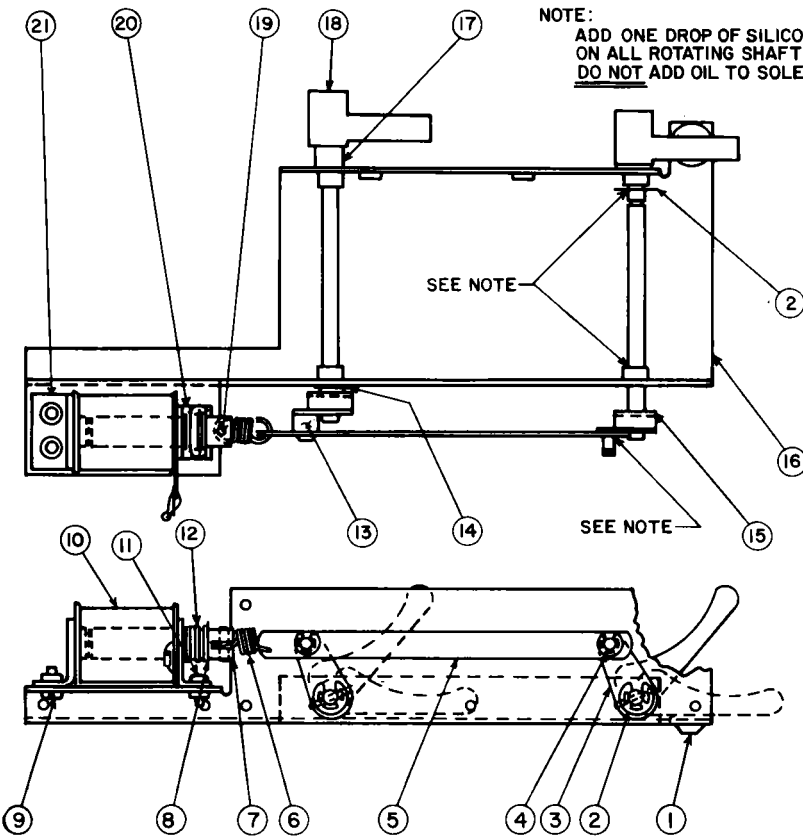
HIGH SPEED Ramp Gate Assembly
p/n D-10884

Item	Part No.	Description
1	23-6577	Plug Bumper, 5/8 dia.
2	20-8712-25	E-Ring, 1/4 in. shaft
3	A-10886	Drive Arm Assembly
4	20-8712-18	E-Ring, 3/16 in. shaft
5	01-8201	Drive Link
6	10-389	Gate Mech. Spring
7	02-4241	Plunger, Coil
8	20-8712-43	E-Ring, 7/16 in. shaft
9	4008-01017-06	Mach. Screw (8-32 x 3/8 P - RH-S)
10	AL-23-800-01	Coil Assembly
11	4006-01003-06	Mach. Screw (6-32 x 3/8 P - PH-S)
12	10-303	Master Spring
13	03-7974	Spacer, Nylon
14	4700-00073-00	Flat Washer: .281 x 0.500 x 0.031
15	20-8716-2	Roll Pin, 3/32 x 5/8
16	D-10885	Gate Mech. Subassembly
17	03-7973	Spacer, Nylon
18	C-10888	Gate
19	20-8716-5	Roll Pin, 1/8 x 7/16
20	01-8-508-S	Solenoid Bracket
21	B-10932	Solenoid Bracket Assembly
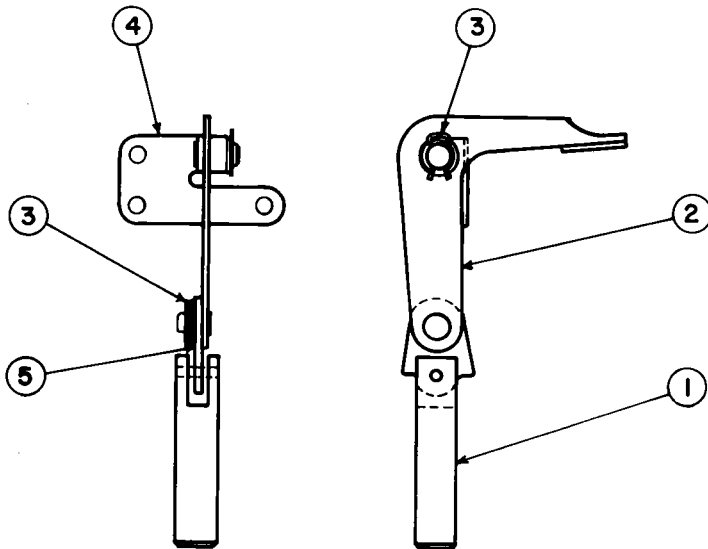
Kicker Arm Assembly
p/n B-11051-R

Item	Part No.	Description
1	A-5103	Coil Plunger Assembly
2	A-5652-1	Kicker Crank Assembly, Right
3	12-6227	Hair Pin Clip
4	B-11052	Kicker Mounting Assembly
5	4700-00030-00	Washer, 9/32 x 1/2 x 1/32

Police Light Assembly
p/n C-10933

Item	Part No.	Description
1	5791-09111-00	Connector Shell
2	5820-09080-00	Connector Pin
3	14-7939	Motor, 100 rpm, 24VAC
4	4004-01003-05	Mach. Screw (4-40 x 5/16, P-PH-S)
5	4006-01076-04	Cap Screw (6-32 x 1/4)
6	02-4239	Motor Shaft Collar
7	24-8771	Bulb, #1683, 28V
8	B-10917	Reflector Assembly
9	B-10934	Motor Plate & Socket Assembly
10*	03-7981	Red Lens
11*	A-11053	Lens Clip Assembly
12*	4700-00023-00	Washer
13*	4408-01120-00	Wing Nut

Note: Items marked with asterisk (*) are not part of C-10933.
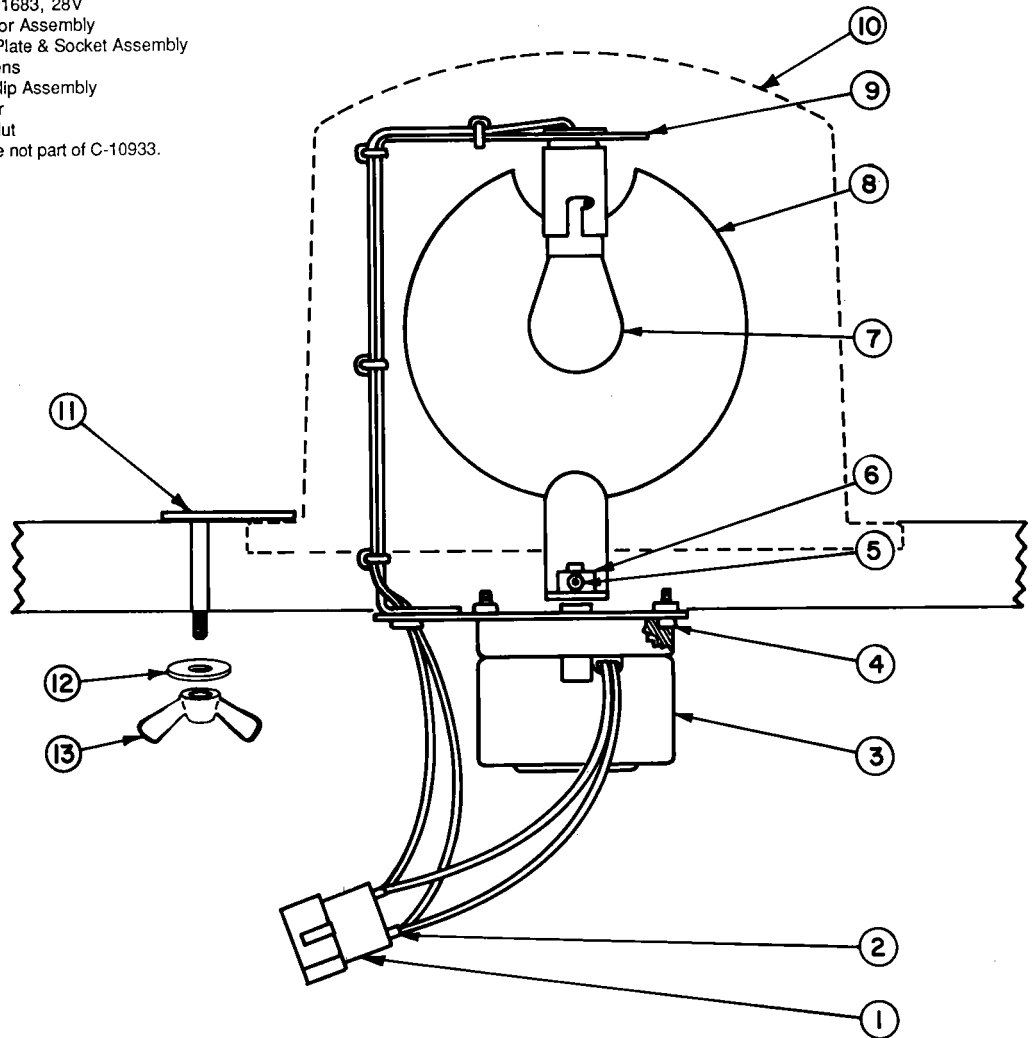
HIGH SPEED Ramp Assembly
p/n D-10905

Item	Part No.	Description
1	A-11063	Ramp Wire & Bracket Assembly
2	D-10950	Main Ramp Assembly
3	H-10909	Top Ramp Cable
4	SW-1A-160	Rollover Switch
5	01-3670-1	Switch Plate, Flat
6	01-8227	Switch Cover Bracket
7	03-8005	Main Ramp Cover
8	4104-01001-04	Sheet Metal Screw, #4 x 1/4, P-PH-A
9	4106-01018-04	Sheet Metal Screw, #6 x 1/4, P-PH-ST
10	4404-01117-00	Hex Nut, 4-40

SEE NOTE 1

⑧

SEE NOTE 2
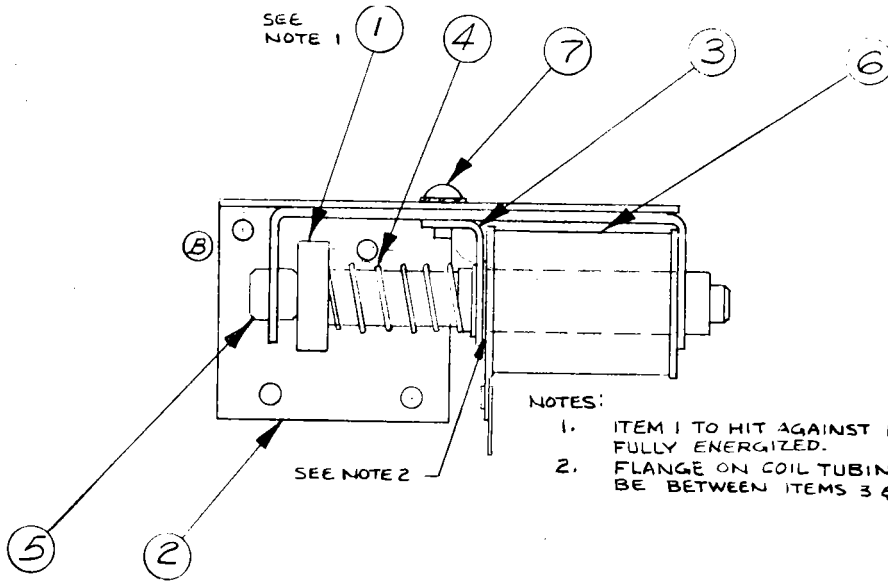
NOTES:
1. ITEM 1 TO HIT AGAINST ITEM 3 WHEN FULLY ENERGIZED.
2. FLANGE ON COIL TUBING MUST BE BETWEEN ITEMS 3 & 6.

A-10959

01-8250
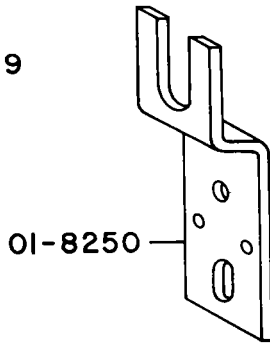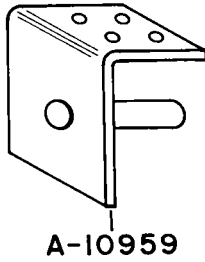
Outlane Kickback Assembly
p/n A-11041

Item	Part No.	Description
1	A-6306-2	Bell Armature Assembly *020335*
2	B-7409-2	Mounting Bracket Assembly
3	01-8-508-T	Solenoid Bracket
4	10-135	Solenoid Spring
5	23-6420	Rubber Grommet
6	AE-24-900-01	Coil Assembly, Complete
7	4008-01017-05	Mach. Screw (8-32 x 5/16, P-RH-S)

Plunger

Hülse   020544

Playfield Pivot Pin & Bracket
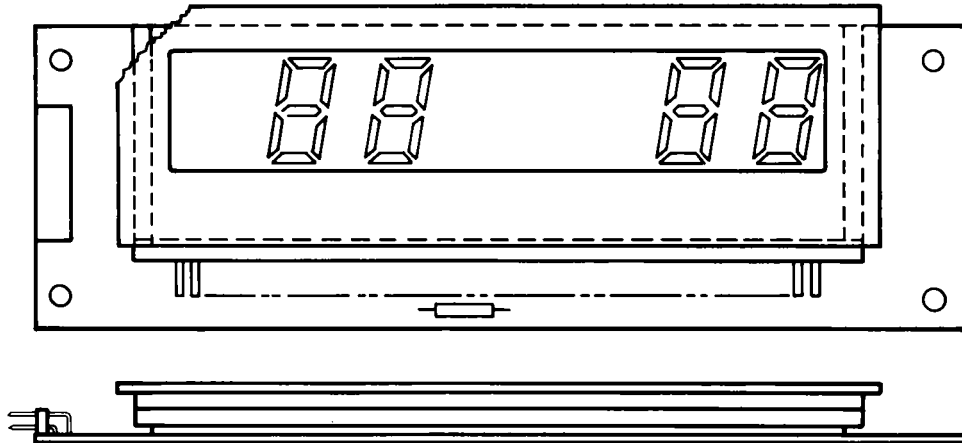
C-8365 Ball In Play/ Match Display Panel   *50000631*

110,39

80,- 7F
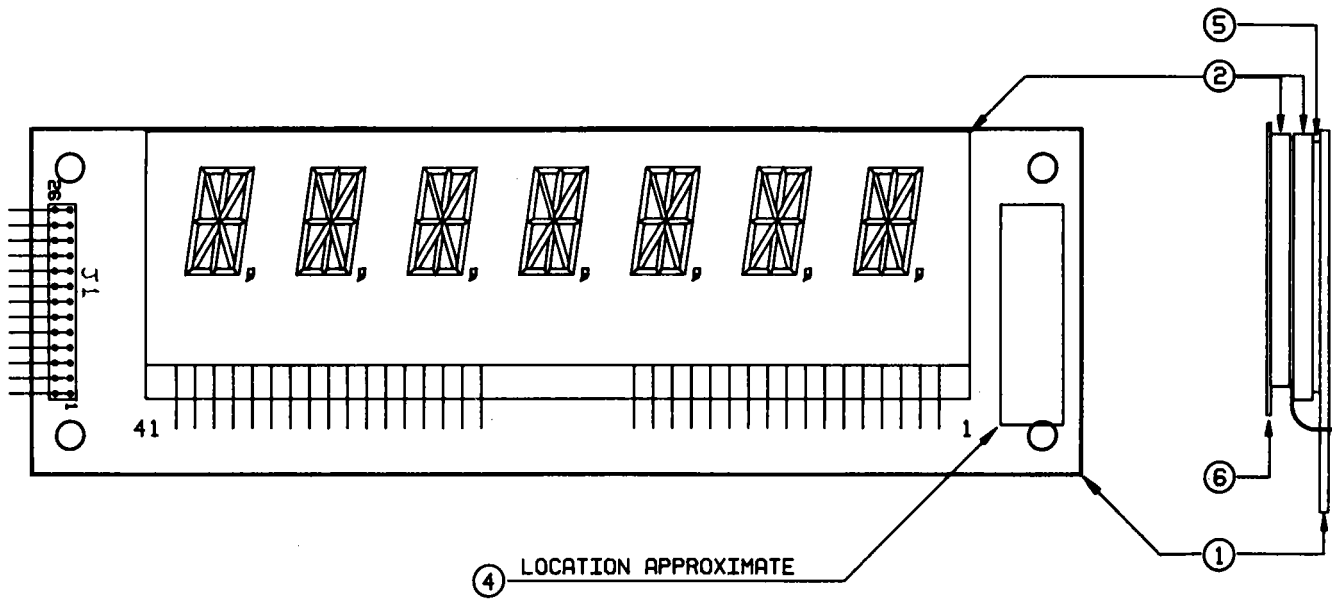
C-10866 Player Score Display Panel (Alphanumeric)
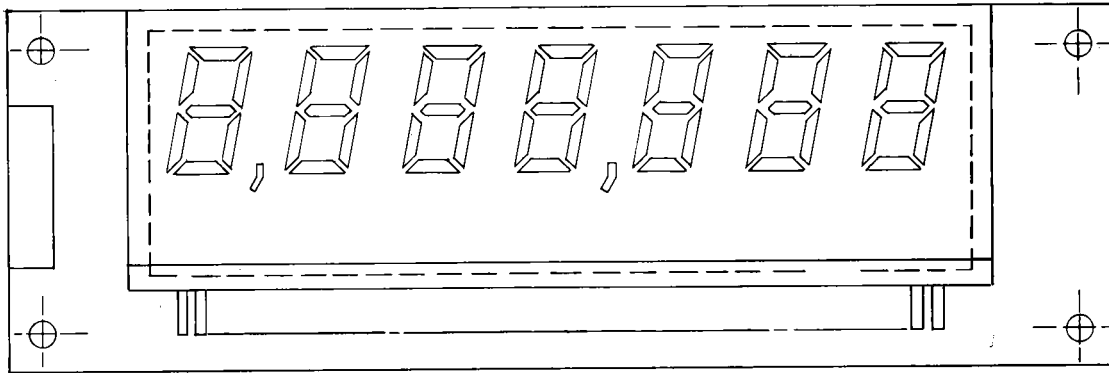
C-8364 Player Score Display Panel (7-Segment)   020280 54160

SEGMENT DIAGRAM

@ LOCATION APPROXIMATE

4J6 PLAYER 4   4J7 PLAYER 3   4J8 PLAYER 2   4J10 PLAYER 1

W6
W2
R51   R59   R58   W5   R56   R53
R61   W4   W8   W1   R57   R8   R52   R54
R60   W7   W3   W1   R41   R55   D1
R50   R12   R36
R27   U1   U5   R15   R35   U12   U15
R32   R17   R34   R6
R33   R14   R37   R7   B
R26   R13   R39   R3
R31   R16   R38   R5   U16
R29   U2   U6   R11   R40   R4
R30   R10   R2   B
R28   R18   R9
R47   R19
R49   R23
R46   U3   U7   R20   U10   U13   U17
R43   R21
R45   B   B   R22   B
R44   R24
R42
R48   U4   U8   U9   U11   U14   U18
R25
R1   SR2   SR1   SR3
4J3   4J2   4J1

4J4 C/MATCH   J11   J12

INDICATES KEYING PIN

Alphanumeric Master Display Board
p/n C-10877

Item	Part No.	Ckt Designation	Description
1	5760-10875-00		Bare P. C. Board
2	5791-10850-00	J8, J10, J12	Connector, 26 pin (Hdr)
3	5791-09437-00	J4, J6, J7	Connector, 20 pin (Hdr)
4	5791-10862-12	J1	Connector, 12 pin (Hdr)
5	5791-10862-09	J2, J3	Connector, 9 pin (Hdr)
6	5791-10862-06	J11	Connector, 6 pin (Hdr)
7	5010-10258-00	R25, R26, R50 - R61	Resistor, 1 M, 1/4 w, 5%
8	5010-09774-00	R1, R2, R6, R10, R14, R34, R35	Resistor, 18 K, 1/4 w, 5%
9	5010-08772-00	R49	Resistor, 15 K, 1/4 w, 5%
10	5010-08981-00	R18 - R24, R27 - R33, R36, R37, R39, R40, R42 - R48	Resistor, 10 K, 1/4 w, 5%
11	5010-09534-00	W1 - W8	Resistor, 0 Ω
12	5019-10387-00	SR1 - SR3	SIP, 18 K, 9R, 10P, 5%
13	5043-08980-00	B	Capacitor, 0.01 mfd, 50V
14	5075-09135-00	D1	Zener, 1N4740A, 10V, 1 w
15	5310-09153-00	U10, U11, U15 - U18	IC, Hex Buffer, 4050
16	5310-09882-00	U3, U4, U7, U8	IC, Quad NOR, 4001B
17	5680-08969-00	U9, U12 - U14	IC, Cathode Seg. Driver, UDN7180A
18	5680-08968-00	U1, U2, U5, U6	IC, Anode/Digit Driver, UDN6118A or 6184
19	16-8850-139		Label, P. C. Board Ident.
20	5010-10927-00	R3 - R5, R7 - R9, R11 - R13, R15 - R17, R38, R41	Resistor, 8.2 K, 1/2 w, 5%
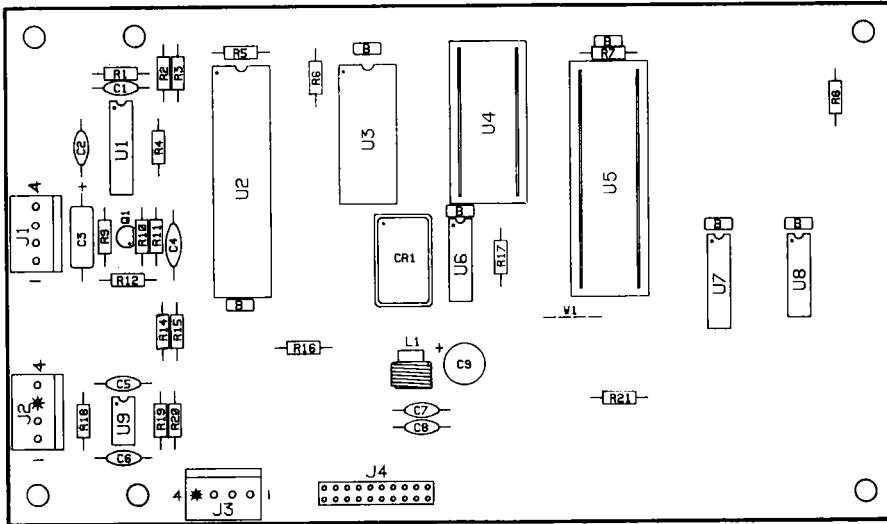
Background Sound Board
p/n C-11030

Item	Part No.	Ckt Designation	Description
1	5766-10929-00		Bare P. C. Board
2	5371-09152-00	U1	IC, D/A Convtr, MC1408
3	5430-10322-00	U2	IC, PIA, MC68B21
4	5340-09878-00	U3	IC, RAM, 2016
5	5281-09487-00	U6	IC,74LS74
6	5281-09745-00	U7	IC,74LS138
7	5281-09235-00	U8	IC,74LS10
8	5281-09321-00	U9	IC, Op Amp, MC1458
9	5160-10269-00	Q1	Transistor, 2N3904, NPN
10	5010-08983-00	R1, R4, R11	Resistor, 3.3K, 5%, 1/4w, Carbon Film
11	5010-08991-00	R2, R3, R5 - R8 R16, R17, R21	Resistor, 4.7K, 5%, 1/4w, Carbon Film
12	5010-08997-00	R12	Resistor, 2.7K, 5%, 1/4w, Carbon Film
13	5010-09179-00	R10	Resistor, 3.3M, 5%, 1/4w, Carbon Film
14	5010-09034-00	R14, R15	Resistor, 10K, 5%, 1/4w, Carbon Film
15	5010-09363-00	R18	Resistor, 5.6K, 5%, 1/4w, Carbon Film
16	5010-09324-00	R19, R20	Resistor, 27K, 5%, 1/4w, Carbon Film
17	5043-09844-00	C1	Capacitor, 47 pfd, ceramic, 50V, axial
18*	5043-08980-00	C2, C5, C6	Capacitor, .01 mfd, ceramic, 50V, axial
19	5043-09343-00	C3	Capacitor, 10 mfd, electr., 20V, axial
20	5043-09030-00	C4	Capacitor, .047 mfd, ceramic, 50V, axial
21	5043-09845-00	C7, C8	Capacitor, .001 mfd, ceramic, 50V, axial
22	5040-10974-00	C9	Capacitor, 100mfd, electr., 35V, axial
23	5551-10161-00	L1	Inductor, 2.0 µH, 3A
24	5791-10862-04	J1, J2, J3	Connector, 4 pin (Hdr)
25	5791-09437-00	J4	Connector, 20 pin, (Hdr) Ribbon Cable
26	5700-10176-00		IC Socket, 28 pin
a)	A-5343-541-4	U4	IC, B/G Sound ROM
27	5700-08985-00		IC Socket, 40 pin
a)	5400-10320-00	U5	IC, µProcessor, MC68B09E
28	5010-09534-00	W1, R9	Resistor, 0Ω, 1/4w, Carbon Film
29	5521-10931-00	CR1	Oscillator, 8 MHz

Note: Six capacitors provide +5VDC filtering for ICs; they are shown on diagram with "B" symbol.
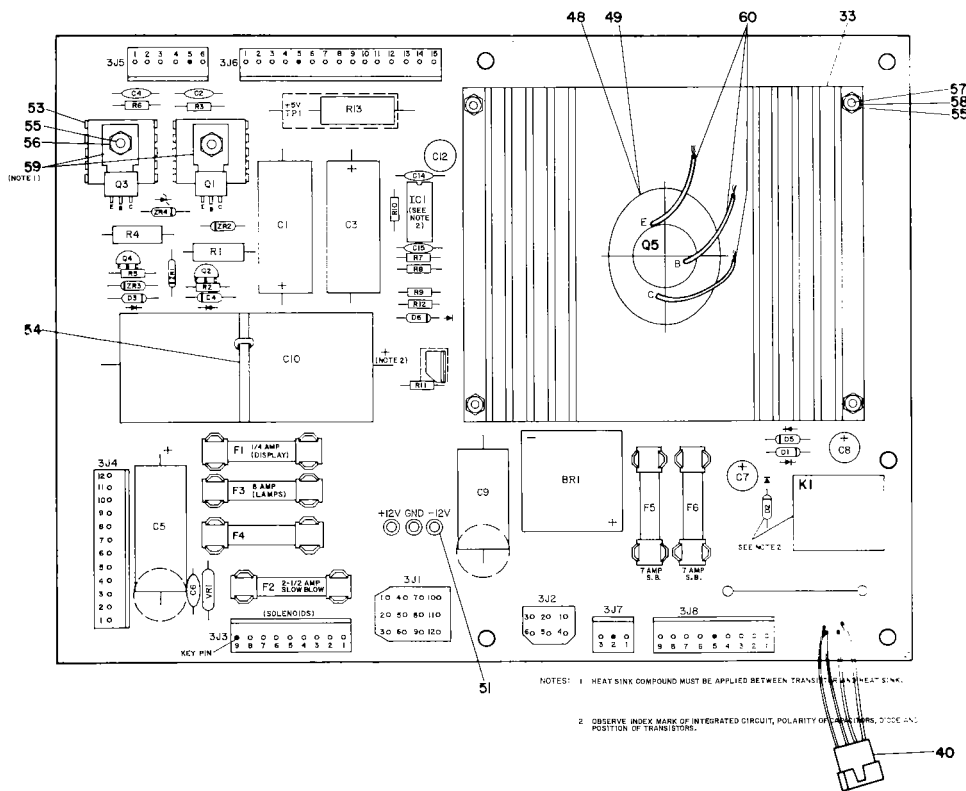
NOTES:
1. Heat sink compound must be applied between transistor and heat sink.
2. Observe index mark on integrated circuit, polarity of diodes and capacitors, and position of transistors.
3. The view of Q5 and its related heat sink and hardware is from the bottom of the heat sink, to clarify installation.

Power Supply
p/n D-8345-541

Item	Part No.	Ckt Designation	Description	Item	Part No.	Ckt Designation	Description
1	5765-09466-01		Bare P. C. Board	28	5164-09057-00	Q1	Transistor, SDS201, NPN
2	5013-09426-00	R7	Resistor, 2.15K, 1%, 1/4w, Metal Film	29	5164-09056-00	Q4	Transistor, MPSD02, NPN
				30	5194-09058-00	Q3	Transistor, SDS202, PNP
3	5013-09427-00	R8	Resistor, 4.99K, 1%, 1/4w, Metal Film	31	5194-09055-00	Q2	Transistor, MPSD52, PNP
				32	5162-09425-00	Q5	Transistor, 2N6057, NPN
4	5010-09428-00	R11	Resistor, 1.5K, 2%, 1/4w, Carbon Film	33	5705-09431-00		Heak Sink
5	5010-09085-00	R10	Resistor, 1.5K, 5%,1/4w	34	5791-09074-00	3J6	Connector, 15 pin (Hdr)
6	5010-09541-00	R9	Resistor, 2.7K, 2%,1/4w	35	5791-09027-00	3J3, 3J8	Connector, 9 pin (Hdr)
7	5010-09508-00	R12	Resistor, 270Ω, 2%, 1/4w, Carbon Film	36	5791-09038-00	3J2	Connector, 6 pin (Hdr)
				37	5791-09067-00	3J5	Connector, 6 pin (Hdr)
8	5012-09429-00	R13	Resistor, 0.12Ω, 5%,5w	38	5791-09434-00	3J4	Connector, 12 pin (Hdr)
9	5010-09536-00	R1, R4	Resistor, 39K, 5%,1w	39	5791-09435-00	3J7	Connector, 3 pin (Hdr)
10	5010-09061-00	R2, R5	Resistor, 680Ω, 2w	40	H-11065	3J9	Cable/Connector Assembly
11	5010-09069-00	R3, R6	Resistor, 330K, 5%,1/2w	a)	5791-09400-00		Connector shell
12	5040-09419-00	C10	Capacitor, 18,000 mfd, electr., 20V, axial	b)	5820-09080-00		Connector pin
				41	5791-09068-00	3J1	Connector, 12 pin (Hdr)
13	5040-09420-00	C9	Capacitor, 1000 mfd, electr., 25V, axial or radial	42	5321-09178-00		Fuseholder
				43	5731-09128-00	F2	Fuse, 2.5A, 250v, S-B
14	5040-09423-00	C12	Capacitor, 330 mfd, electr., 10V,radial	44	5731-09071-00	F3	Fuse, 8A, 32v
				45	5731-09128-00	F4	Fuse, 2.5A, 250v, S-B
15	5043-9065-00	C15	Capacitor, 470 pfd	46	5731-08761-00	F1	Fuse, 1/4A, 250v, S-B
16	5040-9053-00	C1, C3	Capacitor, 100 mfd, electr., 150V	47	5017-09064-00	VR1	Varistor
17	5040-09070-00	C5	Capacitor, 100 mfd, electr., 100V, axial or radial	48	5700-09445-00		Socket
				49	5701-09425-00		Mica Insulator
18	5043-09072-00	C2, C4	Capacitor, 0.1 mfd, 500V, disc	50	5580-09555-00	K1	Relay, 24VDC, 10A, DPDT
19	5043-09446-00	C14	Capacitor, 0.1 mfd, 50V, disc	51	5824-09428-00	TP1 - TP4	Terminal, #1502-1 (Test Post)
20	5070-06258-00	D1, D2, D5, D6	Diode, 1N4001	52	5100-09418-00	BR1	Bridge Rectifier, 35A, 100V
21	5070-09054-00	D3, D4	Diode, 1N4004	53	5705-09042-00		Heat Sink
22	5075-09059-00	ZR1, ZR3	Zener, 1N5990, 3.9v, 5%	54	03-7947		Tie Wrap
23	5075-09060-00	ZR2, ZR4	Zener, 1N4764, 100v, 5%	55	4005-01016-00		Mach. Screw, 5-40 x 7/16, RH
24	5460-09424-00	IC1	IC, Volt. Reg., MC1723C	56	4700-00004-00		Flatwasher, 0.146 x 3/8, 21 Ga.
25	5043-09443-00	C6	Capacitor, 0.1 mfd, 200v, disc	57	4701-00023-00		Lockwasher, #5, split
26	5040-09421-00	C7	Capacitor, 100 mfd, 25v, radial	58	4405-01117-00		Hex Nut. 5-40
27	5040-09422-00	C8	Capacitor, 47 mfd, 50v, radial	59	20-9229		Heat sink Thermal Compound
				60	HW-30118-4		Lead wire, 18 AWG, 3"
				61	5731-01003-00	F6, F5	Fuse, 7A, 250V, S-B

Section 3

Reference Diagrams & Schematics

- Diagrams and Schematics:

  Cabinet Wiring
  Power Wiring
  Alphanumeric Master Display Board
  Background Sound Board
  Interboard Wiring Diagrams
  CPU Board Parts
  CPU Board Schematic
  Power Supply Board Schematic
  Display Schematic

Cabinet Wiring Diagram
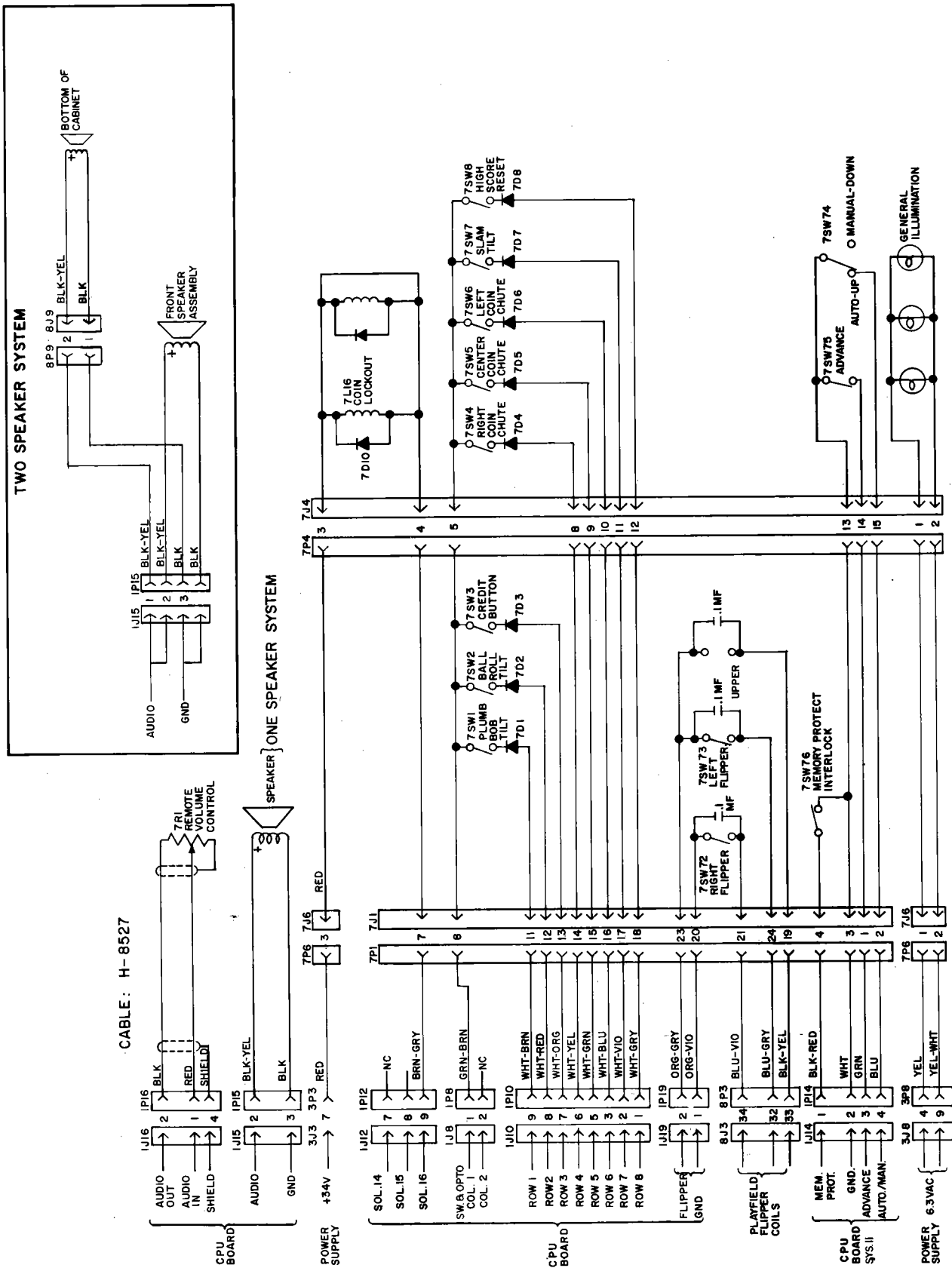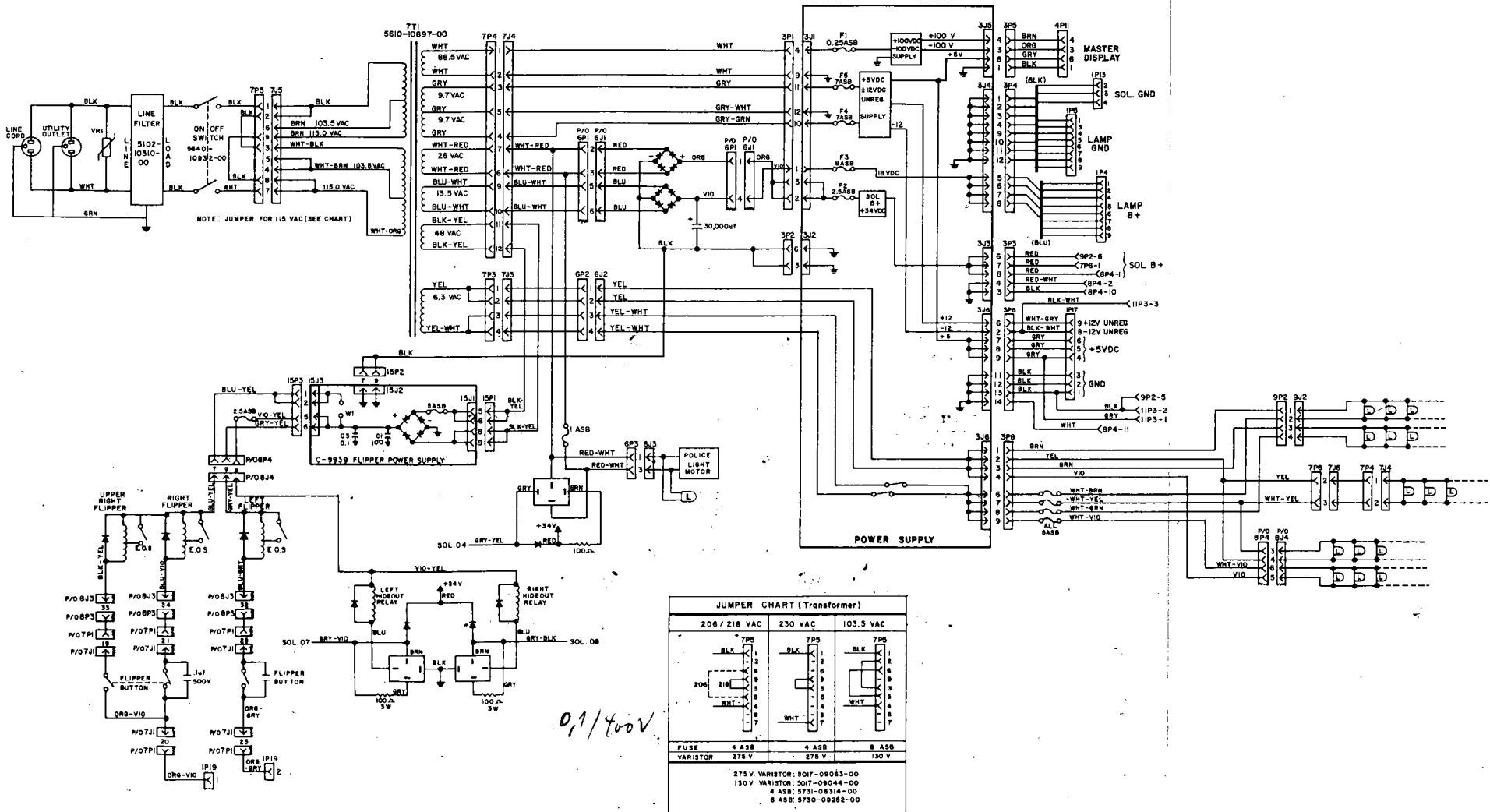
Power Wiring Diagram

POWER TABLE

TYPE	REF. DESIG.	+5V	GND	+90	-100
14050	V10,V11, V15-V18	1	8	–	–
14001	V3, V4, V7, V8	14	7	–	–
UDN 6118	U1,U2, U5,U6	–	9	10	–
UDN 7180	U9,U12, U13,U14	–	9	–	10

VALUE OF UNMARKED RESISTORS

DESIGNATORS	OHMS	WATTS	%
R3, R5, R7, R9, R11-R17	8.2K	1/2W	5
R36, R37, R39, R40, R18-R24, R21-R35, R41-R43	10K	1/2W	5
R47	15K	1/4W	5
R1, R2, R6, R10, R14, R34, R35	18K	1/4W	5

Alphanumeric Master Display Board Schematic

High Speed 4B

J2

J3

J12

J1

J11

J4
CREDIT/MATCH

J5
PLAYER 6

J9
PLAYER 5

J6
PLAYER 4

J7 PLAYER 3

J8
PLAYER 2

J10
PLAYER 1
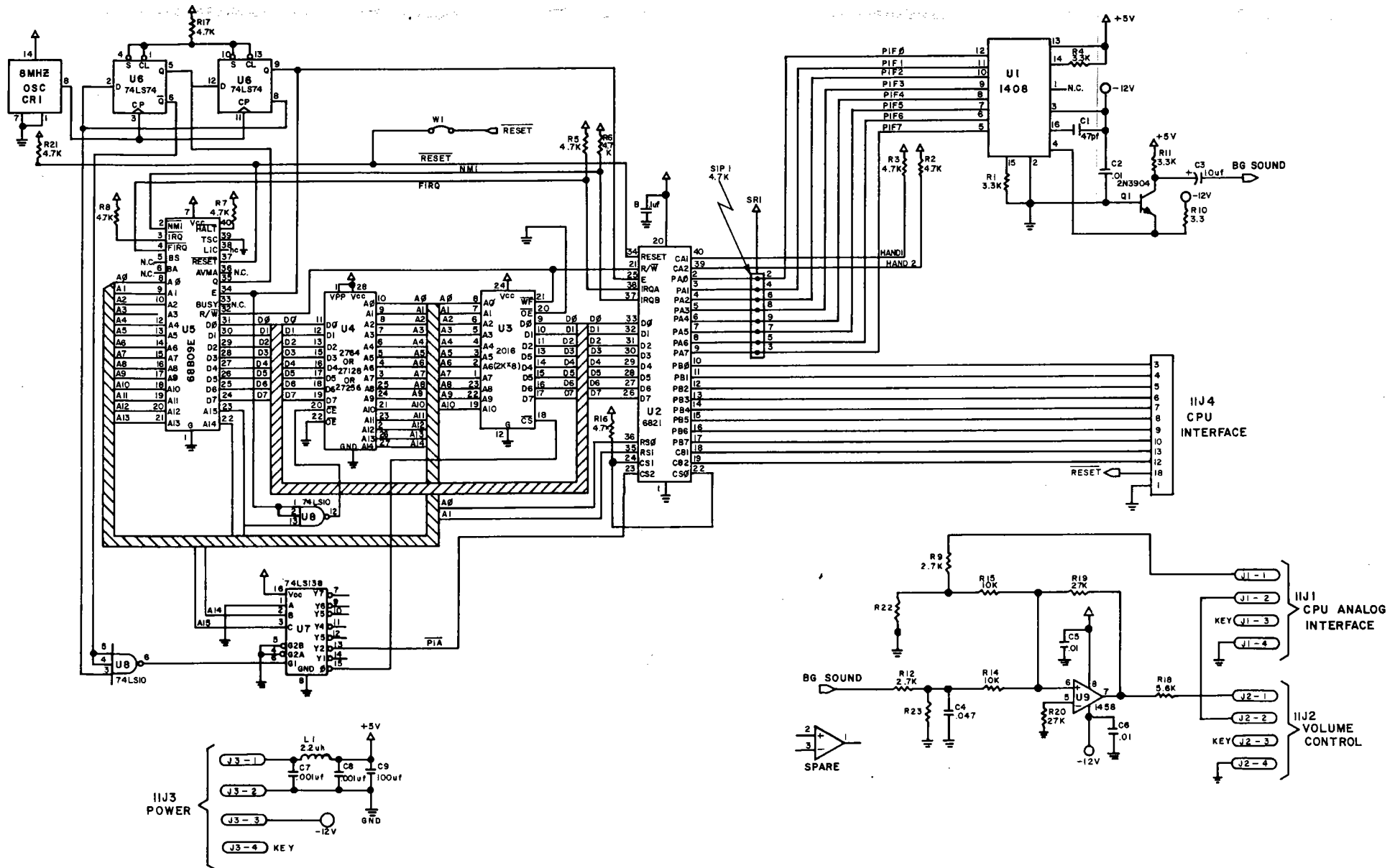
Background Sound Board Schematic

CPU BOARD

SYSTEM 11

D-10881

POWER SUPPLY

D-8345- 541

FLIPPER POWER
SUPPLY

C-9939

C-11029 B/G SOUND BD.

System 11 CPU Board Parts Layout and Parts Listing

Schematic, System 11 CPU (16-8947, Sheet 1 of 4)

High Speed 52

Schematic, System 11 CPU (16-8947, Sheet 2 of 4)

Schematic, System 11 CPU (16-8947, Sheet 4 of 4)

NOTES:
1. Display voltage measured with digits display test ON, and displays at all zeroes.
2. Unless otherwise indicated, all resistors are in ohms (Ω), 1/4 watt.
3. TP3 (unregulated +12 VDC) readout should not go lower than +10.5 V, or intermittent reset will occur.
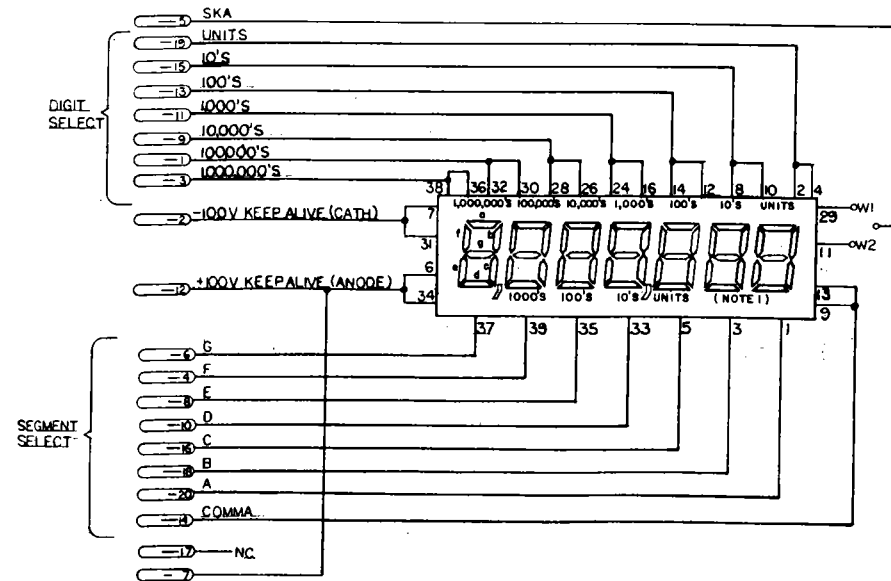
NOTE 1. SHUFFLE ALLEY ONLY.

HIGH SPEED Switch-Matrix Table

COLUMN ROW	1 Q45 GRN-BRN 1J8-1	2 Q49 GRN-RED 1J8-2	3 Q44 GRN-ORN 1J8-3	4 Q48 GRN-YEL 1J8-4	5 Q43 GRN-BLK 1J8-5	6 Q47 GRN-BLU 1J8-7	7 Q42 GRN-VIO 1J8-8	8 Q46 GRN-GRY 1J8-9
1 WHT-BRN 1J10-9	Plumb Bob Tilt 1	Outhole 9	Upper Left Stoplight Bank - Red Target 17	Standup Target Arrow #1 25	Upper Left Jet Bumper 33	Playfield Tilt 41	Left Kicker 49	Not Used 57
2 WHT-RED 1J10-8	Ball Roll Tilt 2	Ball Trough #3 (Upper Left) 10	Upper Left Stoplight Bank - Yel Target 18	Standup Target Arrow #2 26	Lower Left Jet Bumper 34	Left Ramp 42	Right Kicker 50	Not Used 58
3 WHT-ORN 1J10-7	Credit Button 3	Ball Trough #2 (Center) 11	Upper Left Stoplight Bank - Grn Target 19	Standup Target Arrow #3 27	Right Jet Bumper 35	Right Ramp 43	Left Star Rollover 51	Not Used 59
4 WHT-YEL 1J10-6	Right Coin Chute 4	Ball Trough #1 (Lower Right) 12	Left Flipper Return Lane 20	Standup Target Arrow #4 28	Ball Shooter 36	Left Spinner 44	Right Star Rollover 52	Not Used 60
5 WHT-GRN 1J10-5	Center Coin Chute 5	Lower Left Stoplight Bank - Red Target 13	Right Flipper Return Lane 21	Standup Target Arrow #5 29	Left Flipper Engine Revving (E O S) 37	Center Spinner 45	Not Used 53	Not Used 61
6 WHT-BLU 1J10-3	Left Coin Chute 6	Lower Left Stoplight Bank - Yel Target 14	Right Stoplight Bank - Red Target 22	Standup Target Arrow #6 30	Right Flipper Engine Revving (E O S) 38	Right Spinner 46	Not Used 54	Not Used 62
7 WHT-VIO 1J10-2	Slam Tilt 7	Lower Left Stoplight Bank - Grn Target 15	Right Stoplight Bank - Yellow Target 23	Left Outlane 31	Upper Left Hideout 39	Upper Right Hideout 47	Not Used 55	Not Used 63
8 WHT-GRY 1J10-1	High-Score Reset 8	Eject Hole 16	Right Stoplight Bank - Green Target 24	Right Outlane 32	Lower Left Hideout 40	Lower Right Hideout 48	Not Used 56	Not Used 64

HIGH SPEED Lamp-Matrix Table

2 Two lamps in circuit.

COLUMN ROW	1 Q66 YEL-BRN 1J7-1	2 Q64 YEL-RED 1J7-2	3 Q62 YEL-ORN 1J7-3	4 Q60 YEL-BLK 1J7-4	5 Q58 YEL-GRN 1J7-6	6 Q56 YEL-BLU 1J7-7	7 Q54 YEL-VIO 1J7-8	8 Q52 YEL-GRY 1J7-9
Q80 RED-BRN 1 1J6-1	Game Over [2] 1	Flipper Return Lanes [2] 9	Upper Left Target Bank - Red Light 17	Standup Target Arrow #1 25	Freeway Scores 75,000 33	Stoplights Light Escape (Center) 41	Bonus 5000 49	Bonus 40,000 57
Q81 RED-BLK 2 1J6-2	Match 2	Center Spinner 1000 Arrow 10	Upper Left Target Bank - Yellow Light 18	Standup Target Arrow #2 26	Freeway Scores 100,000 34	Ramp Stoplight Red Light 42	Bonus 6000 50	Bonus 50,000 58
Q82 RED-ORN 3 1J6-3	Shoot Again - Drive Again [2] 3	Extra Ball (Eject Hole) 11	Upper Left Target Bank - Green Light 19	Standup Target Arrow #3 27	Freeway Lights Extra Ball 35	Ramp Stoplight Yellow Light 43	Bonus 7000 51	Bonus 60,000 59
Q83 RED-YEL 4 1J6-5	Left Outlane Special 4	Escape (Eject Hole) 12	Left Freeway Arrow 20	Standup Target Arrow #4 28	Ramp Earns Bonus X 36	Ramp Stoplight Green Light 44	Bonus 8000 52	Bonus 5X 60
Q84 RED-GRN 5 1J6-6	Right Outlane Special 5	Lower Left Target Bank - Red Light 13	Right Freeway Arrow 21	Standup Target Arrow #5 29	Ramp Earns Ramp Bonus 37	Bonus 1000 45	Bonus 9000 53	Bonus 4X 61
Q85 RED-BLU 6 1J6-7	Ball In Play 6	Lower Left Target Bank - Yellow Light 14	Right Target Bank - Red Light 22	Standup Target Arrow #6 30	Ramp Earns Getaway 38	Bonus 2000 46	Bonus 10,000 54	Hold Bonus 62
Q86 RED-VIO 7 1J6-8	Left Spinner 1000 Arrow 7	Lower Left Target Bank - Green Light 15	Right Target Bank - Yellow Light 23	Freeway Scores 25,000 31	Ramp Earns Hideout 39	Bonus 3000 47	Bonus 20,000 55	Bonus 3X 63
Q87 RED-GRY 8 1J6-9	Right Spinner 1000 Arrow 8	Left Outlane Kickback Arrow 16	Right Target Bank - Green Light 24	Freeway Scores 50,000 32	Ramp Earns Hideout Jackpot [2] 40	Bonus 4000 48	Bonus 30,000 56	Bonus 2X 64

WARNINGS & NOTICES

WARNING
FOR SAFETY AND RELIABILITY, *WILLIAMS ELECTRONICS GAMES* does not recommend or authorize any substitute parts or modifications of *WILLIAMS'* equipment.

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WARNING
FCC STICKER. Check the back of your HIGH SPEED game to verify that an FCC-certification sticker was attached to your game at the factory.

All games that leave *WILLIAMS'* plants have been tested and found to comply with FCC Rules. Because the sticker is proof of this fact, legal repercussions to the owner and distributor of the game may result, if the sticker is missing. If you receive any *WILLIAMS'* game, manufactured after December 1982, that has no FCC sticker, call *WILLIAMS* for advice or write us a note on your game Registration Card. Be sure that the card bears your game's serial number.

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CABLE HARNESS PLACEMENTS and ground strap routing on this game have been designed to keep RF radiation and conduction within levels accepted by the FCC Rules.

TO MAINTAIN THESE LEVELS, reposition harnesses and reconnect ground straps to their original placements, if they become disconnected during maintenance.

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FOR SERVICE...
CALL your authorized *WILLIAMS'* Distributor.

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