CPU JUMPER TABLE

	CPU*	ROM	Jumpers			
Game	Version	Location	installed	Removed		
Laser Wars	Ver 1	5C	J1b,J3,J4,J6a,J7a,&J8	J1a,J2,J5,J6,&J7b		
	Ver 2	5C	J1b,J3,J4,J5a,J6a,J7b,&J8	J1a,J2,J5,J5b,J6b,&J7		
Secret Service	Ver 2	5B,5C	J1b,J3,J4,J5b,J6b,J7b,&J8	J1a,J2,J5,J5a,J6a,&J7		
Torpedo Alley	Ver 2	58,5C	J1b,J3,J4,J5b,J6b,J7b,&J8	J1a,J2,J5,J5a,J6a,&J7		
Time Machine	Ver 2	58.5C	J16,J3,J4,J5b,J6b,J7b,&J8	J1a,J2,J5,J5a,J6a,&J7		

^{*}Version 1 has a 2K RAM which is a 24-pin iC at location 5D.

Power-up CPU Self Tests

Upon power-up, the CPU board performs a series of self tests of major components. Turn the game on while observing the LEDS on the CPU board. Tests of the PIAs, RAM, and EPROMs are performed automatically and results of the test are indicated by the PIA LED.

With all tests passed, the LEDs lifuminate in the following sequence at power turn-on. The PIA and +5V LEDs illuminate immediately. Approximately 1/2-second later the PIA LED goes out and the Blanking LED illuminates; the +5V and Blanking LEDs remain illuminated until the game is turned off. Test failures are indicated with the PIA LED:

PIA	LED
	LEU

SUSPECT COMPONENT

Stays On
Flashes 1 Time
Flashes 2 Times
Flashes 3 Times

One of the 6821 PIAs 6064 RAM atlocation D5. EPROM at location B5. EPROM at location C5.

QUICK REFERENCE FUSE CHART

PPB BOARD

POWER SUPPLY BOARD

F1 5A Slo-Blo G.I. 6.3VAC
F2 5A Sio-Bio G.I. 6.3VAC
F3 5A Slo-Blo G.I. 6.3VAC
F4 5A Sio-Bio G.I. 6.3VAC
F5 5A Slo-Blo Flipper Power 48VAC
F6 3A Slo-Blo PPB Solenoids/Flash Lamps (34VDC

F1 7A Sio-Bio +5VDC Regulator Input (9VAC)
F2 7A Sio-Bio +5VDC Regulator Input (9VAC)
F3 0.25A Sio-Bio Display Reg. Input (90VAC)
F4 8A Sio-Bio Switched Illumination Buss (18VDC)
F5 3A Sio-Bio Solenoid Buss (34VDC)
F6 5A Sio-Bio Solenoid Buss (34VDC)





AUDIT FUNCTIONS

There are 70 audit functions provided for accounting purposes and for evaluation of game difficulty adjustments. Audit functions are split into two groups. There are eleven most-used audits (AU01 through AU11) in a 'quick look' group and 58 less-used audits (E AU13 through E AU70), in an 'expanded' group. The various auditing functions are summarized in the AUDITING FEATURES TABLE and, when accessed, are shown on the player score displays. The Audit Number is shown in the Player 3 Display, the Description in the Player 1 and 2 Displays, and the Audit Total in the Player 4 Display. Access and control is provided from switches located on the inside of the coin deer.

To access audit functions, open the coin door and make sure that the FORWARD/REVERSE switch is in the FORWARD (up) position. Depress the STEP switch and the game name is shown in the Player 1 and 2 displays, the Player 3 display is blank, and the PROM revision level is shown in the Player 4 display. This indicates access to audit functions.

With the FORWARD/REVERSE push-button switch still in the FORWARD (up) position, depressing the STEP push-button switch advances through the audit functions one at a time. To review lower-numbered functions, set the forward/reverse push-button switch to the REVERSE (down) position and operate the STEP push-button switch.

To access expanded audits, operate the step push-button until AU12, EXPAND AUDITS is displayed. Set the choice to ON as indicated in the Player 4 display by depressing the Credit push-button and then depress the step push-button. The request is installed and E AU13 is displayed. When you exit audits and adjustments, the AU12 setting is returned to off for the next time that a review of audits are required.

Audit totals may be reset to zero using Game Adjustment Ad17, Audits Reset. Game adjustments (Ad01 to Ad19 and E Ad20 to E Ad60) begin after the last audit function (AU12 or E AU70). Once audits functions have been recorded, and if no adjustments are required, you may return the game to the attract mode. If adjustments are required, continue pressing the STEP button until the game adjustments are reached. See Game Adjustments for details

	Audit Number	Audit Description	
	(Player 3 Display)	(Players 1 & 2 Displays;	
_		totals in Flaver 4 Display)	E MAGE
_	-	Time Machine PROM ID	E AU 36
	AU 01	Total Paid Credits	E AU 37
	AU 02	Percent Free	E AU 38
	ALI 03	Average Ball Time	E AU 38
	AU 04	Coins Left	E AU 40
	AU 05	Coins Right	E AU 41
	AU 06	Coins Center	E AU 42
	AU 07	Replay Percent	E AU 43
	AU 08	High Score Percent	E AU 44
	AU 09	Extra Ball Total	E AU 45
	AÜ 10	Extra Ball Percent	E AU 46
ı	AU 11	Cycles Burn in	E AU 47
l	AU 12	Expand Audits (ON/OFF)	E AU 48
ž.	E AU 13	Plays Total	E AU 49
	E AU 14	Free Total	E AU 50
B	E AU 15	Replay Total	E AU 51
ľ	E AU 16	Special Total	E AU 52
•	E AU 17	Special Percent	E AU 53
	E ALI 18	Match Total	E AU 54
	E AU 19	High Score Awards	E AU 55
	E AU 20	Play Time (Minutes)	E AU 56
	E AU 21	Balis Total	E AU 57
	E AU 22	Replay 1 Awards	E AU 58
	E AU 23	Replay 2 Awards	E AU 59
	EAU 24	Replay 3 Awards	E AU 60
	E AU 25	Replay 4 Awards	E AU 81
	E AU 26	Games 1 Player	E AU 62
	E AU 27	Games 2 Player	E AU 63
	E AU 28	Games 3 Player	E AU 64
	E AU 29	Games 4 Player	E AU 65
	E AU 30	Cycles Attract Mode	E AU 66
	EAU31	Cycles High Score Reset	E AU 67
	E AU 32	Enter 3 Bail	E AU 68
		Percent 3 Ball	E AU 89
	E AU 33	Percent Lock Ball	E AU 70
	E AU 34	· ·	
	E AU 35	1970 Lit	

Between 1970 1980 Lit Return 1960 1950 Lit Return 1950 Laser Kick Scored Laser Kick Relit Left Ramp Center Ramp Right Ramp Mini Jackpot Scored Left E = MC2 Right E = MC2 Special Lit Special Scored Jackpot Scored 25K Lanes 50K Lanes 100K Lasas Bonus hold Top Extra Ball 2x Scores Star Warp Lit Star Warp Scored Drain Left Drain Center **Drain Right** 2x Bonus 3x Bonus 4x Bonus 5x Bonus Lane Extra Ball 1950 Extra Ball Buy in Games Average Game Time

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^{*}Version 2 has an 8K RAM which is a 28-pin IC at location 5D.

GAME ADJUSTMENTS

There are 50 adjustable functions provided to vary difficulty of play and to periodically reset audits and the high score levels. The various game adjustments are summarized in the **Game Adjustments Table** and, when accessed, are shown on the player score displays. The *Adjustment Number* is shown in the Player 3 Display, the *Description* in the Player 1 and 2 Displays, and the Setting in the Player 4 Display. Access and control is provided from switches located on the inside of the coin door.

Game adjustments are accessed from the audit mode. With the audits displaying game identification and the FOR-WARD/REVERSE switch in the REVERSE (down) position, depress the STEP switch and E Ad60 (Expanded Adjustment 60) is shown in the Player 3 display, FACTORY RESET is shown in the Player 1 & 2 displays, and OFF is shown in the Player 4 display. With the audits displaying AU12(or expanded E AU70) and the FORWARD/REVERSE switch in the FORWARD (up) position, depress the STEP switch and Ad01 is shown in the Player 3 display, REPLAY MANUAL/FIXED is shown in the Player 1 and 2 displays, and the setting is shown in the Player 4 display.

With the FORWARD/REVERSE switch in the FORWARD (up) position, depressing the STEP switch advances through the game adjustments one at a time. With it in the REVERSE (down) position, the STEP switch selects lower-numbered adjustments. To rapidly scroll through adjustments, hold the STEP switch depressed. Adjustment values are changed by operating the GAME START switch.The FORWARD/REVERSE switch setting determines whether the values are increased or decreased. (With the FORWARD/REVERSE switch up, the value increases, with it down, the value decreases). When the STEP switch is depressed the Player 1 and 2 displays indicate REQUEST INSTALLED.

CUSTOM PRICING TABLE

	Coin Mech	s		"T		Adjust	ment Nu	ımbers	1	
Left	Right	Center	Plays/Coins	14	19	38	39	40	41	42
25¢	25¢	\$1.00	1/25¢ 3/50¢ 1/25¢ 5/\$1.00 1/25¢/ 6/\$1.00	Custom Custom Custom	ON ON	01 01 05	01 01 05	04 04 20	01 01 04	02 04 20
5SCH	IOSCH	10SCH	1/10 SCH 1/10 SCH 4/30SCH	Custom Custom	ON ON	01 04	02 08	02 08	06 02	00 00
20¢	\$1.00		1/20¢ 1/60¢ 2/\$1.00	Custom Custom	ON ON	01 01	05 05	00	01 03	00 05
10 P	10P	50P	1/10P 6/50P 1/20P 3/50P	Custom Custom	ON ON	01 01	01 01	05 05	01 02	05 05

INSTALL ADJUSTMENT TABLE

instali Adjustment	Ad 06 Extra easy	Ad 07 Easy	Ad 08 Factory	Ad 09 Hard	Ad 10 Extra Hard
E Ad 49 General Scores	EASY	FACTORY	FACTORY	FACTORY	HARD
E Ad 50 General Timer	- EASY	EASY	FACTORY	FACTORY	HARD
E Ad 51 General Spotting	EASY	EASY	FACTORY	HARD	HARD
E Ad 52 General Memory	EASY	FACTORY	FACTORY	HARD	HARD
E Ad 54 Starwarp Memory	HOLD	HOLD -	HOLD	1 PLAYER	RESET
E Ad 55 Extra Ball 1950	ON	ON	ON	OFF	OFF
E Ad 56 Extra Ball 6x	ON	ON	ON	ON	CRAH
E Ad 57 Lane Percent	EASY	FACTORY	FACTORY	HARD	HARD
E Ad 58 Laser Kick	EASY	EASY	FACTORY	HARD	HARD

GAME ADJUSTMENT TABLE

Adjustment Number	Description	FactorySetting
(Player 3)	(Players 1 & 2)	(Player 4)
AD 01	REPLAY/MANUAL	104- 2010
AD 02	START REPLAY/LEVEL 1 REPLAY	1,900,000
AD 03	LEVELS REPLAY/LEVEL 2 REPLAY	01
AD 04	LEVEL 3 REPLAY	-
AD 05	LEVEL 4 REPLAY	
AD 06	EXEASY RULES	OFF
AD 07	EASY RULES	OFF
AD 08 AD 09	FACTORY RULES	ON
AD 10	HARD RULES EXHARD RULES	OFF OFF
AD 11	NOVELTY RULES	OFF
AD 12	5 BALL RULES	OFF
AD 13	ADDABALL RULES	OFF
AD 14	STANDARD/CUSTOM PRICING	LIST CLSTOM
AD 15	AVERAGE BALL TIMER	ON
AD 16	COIN RESET	OFF
AD 17	AUDITS RESET	OFF
AD 18	HIGH SCORE RESET	OFF
AD 19	EXPAND ADJUSTMENTS	AFF OIL
E Ad 20	AWARDS REPLAY	CREDITS
E Ad 21	AWARDS SPECIAL	CREDITS
E Ad 22	MATCH FEATURE	ON CHE
E Ad 23	BALLS/GAME	03
E Ad 24	WARNING TILT	01
E Ad 25	MAXIMUM EXTRA BALL	in 1
EAd 26	CREDITS MAXIMUM	30
E Ad 27	SCORES HIGHEST	ON
E Ad 28	CREDITS HSCR 1	03
EAd 29	CREDITS HSCR 2	00
EAd 30	CREDITS HSCR 3	00
E Ad 31	CREDITS HSCR 4	00
EAd 32	BACKUP HSCR 1	5,000,000
EAd 33	BACKUP HSCR 2	4,000,000
E Ad 34	BACKUP HSCR 3	3,000.000
E Ad 35	BACKUP HSCR 4	2,500,000
E Ad 36	HSRESET EVERY	, 700
E Ad 37	FREE PLAY	OFF
E Ad 38	LEFT COIN PULSES	- <u>1</u>
E Ad 39	RIGHT COIN PULSES	- \$_
E Ad 40	CENTER COIN PULSES	-10_
E Ad 41	PULSES FOR CREDIT	- A
E Ad 42 E Ad 43	PULSES FOR BONUS CREDIT	
E Ad 44	MESSAGE CUSTOM TEXT	ON ASIA FIRE
E Ad 45	ATTMODE MUSIC	ON DIED TO CHARLEN
E Ad 46	FEATURE .	ON TITE CALLES HE
E Ad 47	CHIMES	WILL IN COMPTICE
E Ad 48	FLASH LAMPS	ON CLUTTE
E Ad 49	GENERAL SCORES	FACTORY
E Ad 50	GENERAL TIMER	FACTORY
E Ad 51	GENERAL SPOTS	FACTORY
E Ad 52	GENERAL MEMORY	FACTORY
E Ad 53	STARWARP SCORES	· 1,000,000
E Ad 54	STARWARP MEMORY	ON
E Ad 55	EXTRA BALL 1950	ON
E Ad 56	EXTRA BALL 5X	ON
E Ad 57	LANE PERCENT	FACTORY
E Ad 58	LASER KICK	FACTORY
E Ad 59	KLACKER WARNING	ON
E Ad 60	FACTORY RESET	OFF
	· · · · · · · · · · · · · · · · · · ·	Of I

GAME DIAGNOSTICS

The Data East Pinball system provides tests for sounds, digital displays, tamps, switches, and solenoids. Each feature may be tested manually or automatically using the STEP and FORWARD/REVERSE push-button switches inside the coin door and the Game Start push-button switch on the front of the cabinet. The automatic tests may be used for a quick verification of automatic test functions and the manual tests, for troubleshooting.

ENTERING DIAGNOSTICS

With the game in the game-over mode, open the coin door and make sure that the FORWARD/REVERSE push-button switch is set to REVERSE (down) and depress the STEP push-button switch. The Player displays will show the tollfree Customer Service number 1-800-KICKERS, that is 1-800-542-5377 (outside Illinois) and the toll number (312) 345-7700 (inside Illinois). this indicates entry into game diagnostics.

SOUND TESTS

The Data East Pinball sound system produces true digital stereo sound on left and right speakers and mono on a center speaker. During Sound tests, the Player 1 and 2 displays show the sound board circuit under test and the corresponding sounds are produced. Refer to the Sound Test Chart for the sound circuits displayed and the sounds produced.

The sine wave functions allow verification that all channels are functioning properly and that the speaker connections are correct. Speaker Phase Testing procedures follow for checking speaker connections.

SOUND TEST CHART

Auto/Manual Tests (Player 1 & 2)	Sounds Produced
LEFT SINE CENTER SINE VOICE ROM1 (Loc F6) VOICE ROM2 (Loc F4) MUSIC TEST (Sound ROM Loc F7)	60 CYCLE TONE (Left Speakers Only) 60 CYCLE TONE (All speakers) PRESS. FIELD, NEAT-O, SEE YA LATER ALLIGATOR PSYCHEDELIC MAN70'S, GAG ME WITH A ,FAR OUT! MUSIC

Automatic Test

With Customer Service telephone numbers displayed, depress the STEP push-button switch. Player 1 and 2 displays indicate SOUNDS AUTO and the system sequences through the test producing the sounds indicated in the Sound Test Chart.

Manual Test

Operate the STEP push-button switch during the Automatic tests until SOUNDS MANUAL is indicated in the Player 1 and 2 displays. Depressing the Game Start push-button switch allows you to advance through each sound function.

DIGITAL DISPLAY TEST

Digital displays are driven by digit and segment driver circuits. Digit drivers sequentially select individual character positions (Player 1 and 2 displays) and digit positions (Player 3 and 4 displays). Segment drivers (16 for Player 1 and 2 characters; 7 for Player 3 and 4 digits) select the Individual segments of each position.

Automatic Test

To enter Display tests, operate the STEP push-button switch from the Sound Manual test. Player 1 and 2 displays indicate DISPLAY AUTO. The displays will sequence from all ZEROS to all nines in the four displays. Next all segments are lit for each digit position in sequence.

Manual Test

Operate the TEST push-button switch from the automatic test; Player 1 and 2 displays indicate DISPLAY MANUAL and then display ZEROS in all positions. Operate the Game Start push-button switch to cycle through each portion of the test.

Switches

Switches are configured on an 8 x 8 matrix of columns (switch drives) and rows (switch returns) with up to 64 switches possible. The switch tests include three parts; switch test, active switches, and bad switches. Row and column wire colors are indicated in each test using corresponding resistor color code numbers.

0 = Black	5 = Green
1 = Brown	6 = Bl ue
2 = Red	7 = Violet
3 = Orange	8 = Grey
4 = Vellow	Q - 14/bito

From the Display Manual test, operate STEP push-button switch. Player 1 and 2 displays indicate SWITCH TEST. Close each switch and observe the displays. The Player 1 and 2 displays will indicate the switch name, the Player 3 display indicates the row and column wire colors, and the Player 4 display indicates the switch number. When a switch is released, the name and number disappear unit another switch is closed or the test is exited.

Active Switches

Operate the STEP push-button switch from the Switch Test. Player 1 and 2 Displays Indicate ACTIVE SWITCHES. If any switches are stuck closed (or made from the presence of a ball), the Player 1 and 2 displays sequence through switch names, the Player 3 display indicates the row and column wire colors, and the switch numbers are indicated in the Player 4 display. This cycle continues until all switches are cleared or until the STEP push-button switch is depressed.

Bad Switches

Number Description

Operate the STEP push-button switch from the Switch Test. Player 1 and 2 Displays indicate BAD SWITCHES. During game play, the system keeps track of the last game in which each switch was made. Should a switch not be made for 100 games, it is considered to be bad. If there are any, the Player 1 and 2 displays sequence through switch names, the Player 3 display indicates the row and column wire colors, and the switch numbers are indicated in the Player 4 disptay. This cycle continues until the STEP push-button switch is depressed.

Qut Hole

180-5011-00

515-5162-05

Part No.

RUBBL	ser pescription	Fait No.	10	QUI I IDIB	100.3011.00
	-		11	Trough #1	180-5009-00
01*	Plumb Tilt	500-5023-00	12	Trough #2	180-5009-00
02	Not Used		13	Trough #3	180-5010-00
03	Credit Button	500-5097-00	14	Shooter Lane	500-5143-00
04*	Right Coin	180-5024-00	15	Left Flip, Instant Info.	180-5026-00
05*	Center Coin	180-5024 00		Left EOS	180-5018-00
06*	Left Coin	180-5024-00	16	Right Flip. Instant Info.	180-5026-00
07*	Slam Tilt	180-5022-00		Right EOS	180-5018 00
08	Not Used		17	Left Outlane	500-5144-00
09	Not Used		18	Left Return Lane	180-5003-00
			19	Right Outlane	500-5142-00
57.			20	Right Return Lane	180-5003-00
18			21	Left Slingshot Trigger Sw.	180-5023-00
		- 27 66 n N		Left Slingshot Point Sw.	180-5035-00
1/	77 ~ 7915901		22	Right Slingshot Trigger Sw.	180-5023-00
H				Right Slingshot Point Sw.	160-5035-00
- 11	28	/ 7×/1/1	23	Not Used	
117			24	Not Used	
	(45)	(48)/ ○/	25	Left Top Lane	500-5142-00
- 11		_ ~ 2°/ 32	26	Center Top Lane	500-5142-00
Ho		32	27	Right Top Lane	500-5142-00
	44 4	7 D S "	28	Left Ramp	180-5002-00
112		2 (A	29	Center Ramp	180-5002-00
M	TI I I A A TO	8 8 1/t	30	Right Ramp	180-5002-00
	3 42	5 4 1/4	31	Left Star Rollover	180-5003-00
녆	棚 ロピース	- 74° - 72° d	32	Right Star Rollover	180-5003-00
3			33	Left 3 Bank Bottom	515-5161-02
		/	34	Left 3 Bank Center	515-5124-06
119			35	Left 3 Bank Top	515-5162-05
्र)	36	Lock Ball #1	180-5028-00
l c	VXVIV) >		37	Lock Ball #2	180-5028-00
	<i>>\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ </i>) Yazıı	38	Lock Ball #3	180-5028-00
- 11/			39	Not Used	
11/-	$\sim 110^{\circ}$	マー/太徳田川 一	40	Not Used	•-
115		. Astronomical	41	Center 3 Bank Left	515-5161-02
- 11/	間はアムしい		42	Center 3 Bank Middle	515-5124-06
11,		~*/~ [g]	43	Center 3 Bank Right	515-5162-05
	$\circ \approx w_A$	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	44	Ramp Sw. Under Plyfld	180-5030-00
		(9)	45	Right Super VUK	180-5041-00
Щ			46	Left Pop Bumper	180-5036-00
		3	47	Center Pop Bumper	180-5036-00
	· \ 15 \	í6 / J	48	Right Pop Bumper	180-5036-00
٠			49	Right 3 Bank Top	515-5161-02
	THE LEGISLE) 14 -	50	Right 3 Bank Center	515-5124-06
1177		1.7 (3.1.7)		Diales of Control Control	E15 5100 05

51

52

SWITCH MATRIX CHART

GRN-GRY (58) 048	Not Used	Not Used	Not Used S	Not Used	Not Used	Not Used	Not Used	Not Used
K GRN-BLU GRN-VIO GRN 051 (56) 059 (57) 049 (58)	Right Bank 149	Right Bank 2 ₅₀	Right Bank 3 ₅₁	Not Used 52	Not Used 53	Not Used 54	Not Used 55	Not Used S6
6RN-BLU (56) 050	Center Bank 1	Center Bank 2 42	Center Bank 3 ₄₃	Wireform 4 44	Super VUK 45	Left Pop Bumper 46	Center Pop Bumper 47	Right Pop Bumper 48
5 GRN-BLK (50) 051	Left Bank 1 33	Left Bank 2 ₃₄	Left Bank 3 35	Wireform 1 36	Wireform 2 37	Uìreforπ 3 38	Not Used 39	Not Used
GRN-YEL (54) 052	1 Lan	2 Lane ₂₆	3 Lane ₂₇	Left Ramp 28	Center Rarip 29	Right Ramp 38	Left Rollover 31	Right Rollover 32
3 GRN-0RN (53) 053	* ~ ~	Left Return ₁₈	Right Outlane ₁₉	Right Return 20	Left Slingshot _l	Right Slingshot 4	Not Used 23	Not Used 24
GRN-RED (52) 054	Used 9	Outhole 10	Trough #1 11	Trough #2 12	Trough #3	Shooter Lane 14	Left EOS 1S	Right EOS 16
1 (*) GRN-BRN (51) 055		Not Used	Credit Button 3	Right Coin 4	Center Coin S	Left Coin 6	Slam Tilt 7	Not Used 8
ROU (*)	1 UHT-BRN (91.)	2 WHT-RED (92)	3 WHT-ORN (93)	4 UHT-YEL (94)	5 UHT-GRN (95)	6 UNT-BLU (96)	7 WHT-V10 (76)	8 UHT-GRY (98)

Right 3 Bank Bottom

Not Used Thru 64

Controlled lamps are configured on an 8 x 8 matrix of columns (lamp drives) and rows (lamp returns) with up to 64 lamps possible. The lamp tests include four parts, at lamps, lamp; return (row), lamp drive (column), and discrete lamps. How and corumn wire colors are indicated in the discrete lamp test using corresponding resistor color

All Lamps

From the Bad Switch test, operate the STEP push-button switch. Player 1 and 2 displays indicate ALL LAMPS and

Lamp Returns

From the ALL LAMPS test, depress the STEP push-button switch. Player 1 and 2 displays indicate LAMP ROWS and the Player 4 display indicates 01 for row 1. All controlled lamps in row 1 should be it. Operating the Game Start push-button switch cycles through each of the rows separately.

Lamp Drives

From the LAMP ROWS test, depress the STEP push-button switch. Player 1 and 2 displays indicate LAMP COLUMNS and the Player 4 display indicates 01 for column 1. All controlled lamps in column 1 should be lit Operating the Game Start push button switch cycles through each of the columns separately.

Discrete Lamp

Lamp Description Number 01* 02"

s T'arwarp

From the LAMP COLUMNS test, depress the STEP push-button switch. Player 1 and 2 displays indicate LAMP TEST and then the name assigned to lamp 01; the Player 1 and 2 displays indicate the lamp name, the Player 3 TEST and their time harmed assignment or ramp of the major is also a unspray a minimate the camp ramp, the rayor a display indicates the row and column wire colors, and the Player 4 display indicates 01. Lamp 01 should light. With the FORWARD/REVERSE push button switch in the FORWARD (up) position, operating the Game Start pushbutton switch selects higher-numbered lamps; withit in the REVERSE (down) position, Game Start selects lower numbered larnos.

	3 * 0100E/P	13
03*	st"A"rwarp	14
04*	sta' R' warp	15
05*	star*W*arp	16
06*	slarw"A"rp	
07*		17
	starwa"Rip	18
*80	stanwar P ^a	19
09	Center Square	20
10	Center Circle	21
		22
		23
14/20C	1049 = 1 7.	24
		25
10/	√ √ √ √ √ √ √ √ √ √ √ √ √ √ √ √ √ √ √	26
1 / 4	N N N N N N N N N N N N N N N N N N N	27
- <i> </i>		28
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		30
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Carrie		61
THEME		62*
11		63
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1		64

11	Center Triangle
12	Left Ramp 1970
13	Left Ramp 1960
14	Left Ramp 1950
15	5X
16	4X
17	Special
18	3 Ball Jackpot
19	Left Ramp E MC ²
20	Left Mini Jackpot
21	Center Mini Jackpot
22	Right Mini Jackpot
23	3X
24	2X
25	2X All Scores Cntr Plyfld
26	Extra Bali Back Panel
27	Bonus Hold Back Panel
28	100K Back Panel
29	50K Back Panel
30	25K Back Panel
31	Targets Light Special
32	2X All Scores
33	Left Triangle
34	Left Circle
35	Left Square
36	Left Extra Ball
37	Laser Kick
38	Left Return
39	Extra Ball Center Playfield
40	Bonus Hold Center Plyfid
41	Right Square
42	Right Circle
43	Right Triangle
44	Right Hotdog
45	Right Return
46	Right Extra Ball
47	Left Hotdag
48	Starwarp Center Playfield
49	Lane 1
50	Lane 2
51	Lane 3
52	Left Pop Bumper
53	Center Pop Bumper
54	Right Pop Bumper
55	1980
56	1970
57	Top Right Arrow
58	Hight Ramp $E = MC^2$
59	Right Ramp 1950
60	Right Ramp 1960
61	Right Ramp 1970
62 *	Engine
63	1960
~4	4000

1950

*Indicates Insert Lamp

8 YEL –GRY (48)	845		Right 1950 S	Right 1960 A	Right 1970	Insert	1960	8561 93
7 U YEL-VIO 066 (47) 065	2	Lane 2	Lane 3 51	Pop Left 52	Pop Center	Pop Right	I	1978 56
RN YEL-BLU D67 (46.) D66	Righ Squar	Right Circle 42		Right Hotdog ₄₄	1		Left Hotdog 47	Starwarp 48
5 YEL-GRN (45) 067	Lef	Left Circle 34	teft Square 35	Left Extra Ball 36	Laser Kick 37	Left Return 38	Extra Ball 39	Bonus Hold Over 46
4 YEL-BLK (48) 068	2x Scores 25	Extra Ball 26	Bonus Hold 27	100K 28	50K	25K 30	Targets Lite Special ₃₁	All Scores 2x 32
3 YEL-0RN (43) 069	5	3 Ball Jackpot ₁₈	Left EMCSQR 19	Left Mini Jackpot 20	Center Mini Jackpot 21	Right Mini Jackpot 22	3x 23	2x 24
2 YEL- RED (42) G78	Cente Squar	Center Circle ₁₀	Center Triangle	Left 1970 12	Left 1960 13	Left 1950 14	5x 15	4x 16
1 YEL-BRN (41) Q71	Starwarp #1 1	Starwarp #2 2	Stanuanp #3 3	Starwarp #4 4	Starwarp #5 5	Stanuanp #6 6	Stanwarp #7 7	Stanwanp #8 8
ROW (*)	1 RED-BRN (21) G72	2 RED-BLK (20) Q73	3 RED-ØRN (23) Q74	4 RED-YEL (24) Q75	5 RED-GRN (25) Q 76	6 RED-BLU (26) 077	7 RED-VIO (27) Q78	8 RED-GRY (28) 0 79

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(*) 2 DIGET NUMBER IN PARENTHESES INDICATES RESISTOR COLOR CODE NUMBER DISPLAYED DURING DIAGNOSTICS.

Sixteen regular (pulsed under microprocessor control) and six switch-triggered coil drivers are provided to switch ground to coils. Coil number 10 is used in conjunction with drives 1 through 8 to switch +34 volts between coils or flash lamps; these sets are termed "left" and "right". Coil number 10 is located on the PPB board which provides isolation diodes and current limiting and heater resistors. This effectively provides 23 regular coils.

Automatic Test

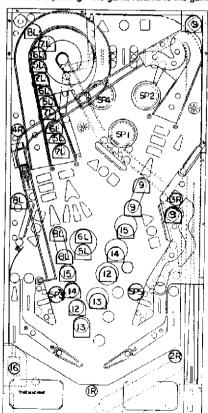
From the Discrete Lamps test, depress the STEP push-button switch. Player 1 and 2 displays indicate COIL TEST. The test pulses each regular solenoid or flash lamp sequentially with the coil/flash-lamp name indicated in the Player 1 and 2 displays and the drive number in the Player 4 display.

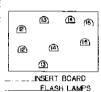
Select Coil

From the Coil Test, depress the STEP push-button switch. Player 1 and 2 displays indicate SELECT COIL and then the name of drive 1L, the drive number is indicated in the Player 4 display. Operate the Game Start push-button switch to select the coil or flash lamp to be tested. With the desired drive number indicated in the Player 4 display, depress the STEP push-button switch to cause it to be pulsed repeatedly.

RETURN TO GAME OVER

From the Select Coil test, depress the STEP push-button switch one time if a selected coil is pulsing or two times none is pulsing. The game returns to the game-over mode.





SWITCH TRIGGERED SOLENOIDS

CoH	Coll	Control Line		Trigger Line	Driva	Coil
Number	Description	i .	(PS to Coil)	(Coal See To CZPU)	Transistor (TIP 122)	Туре
SP1	Center Pop Bumper	BLU-ORN	RED	OAN-BLK	Oa	23 AUC
		CPU CN19-3	PS CN3-8	CPU CN 18-2		
SP2	Right Pop Bumper	BLU-RED -	RED	ORN-RED	O9	23 BCG
- 1		CPU CN19-4	PS CN3-6	CPU CN 18-3		
5P3	Left Singshol	BLU-YEL	RED	ORN-YEL	0.13	23 800
!		CPU CN19-6	PS CN3 6	CPU CN 18-4		
5P4	Left Pop Bumper	BLU-BRN	RED	OAN-BBN	011	23 800
		CPU CN19-7	PS CN3 6	CPU CN 18-5		
SP5	Right Singshot	BLU GRN :	HEO	OAN GRN	012	2.3 800
		CPU CN 19-8	PS CNO 6	CPU CN 18-8		
SP6	NOT USED				D13	
ı		CPU CN19-9	PS CN3-6	CPU CN 18-9		ı

FLIPPER SOLENOIDS

	Coil Flipper GND		Power Line	Coll	
Description	(CPU se Cab)	(Cas To Coa)	(PP8 to Ct4)	Тура	
Left Flipper	ORN-BLU	BLU-GRY	GRY-YEL	22 750/30-2600	
	CPU CN19-2	1M/F-24	PPH J7-5		
Right Flipper	ORN-RED	BLU-VIO	BLK-WHT	22 750/30-2630	
	CPU CN19-1	1M/F-21	PPB J7-1.2	1	

TIME MACHINE COIL PART NUMBER CHART

USED	COIL TYPE	DATA EAST PINBALL PART HUMBER
7	23-800	090-5001-00
1	24-900	090-5002-00
2	23-840	090 5005 00
2	22-750/30-2000	090 5011-00
3	27-1400	090 SG15 QU

