

DE DATA
EAST

FAST ACTION HERO



FLIPPERSPILL.COM

DATA EAST PINBALL®

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CPU JUMPER TABLE

Game	CPU* Version	ROM Location	Jumpers	
			Installed	Removed
ABC M.N. Football	Ver 2	5B,5C	J1b,J3,J4,J5b,J6b,J7b,&J8	J1a,J2,J5,J5a,J6a,&J7a
Robocop	Ver 2	5B,5C	J1b,J3,J4,J5b,J6b,J7b,&J8	J1a,J2,J5,J5a,J6a,&J7a
Phantom of the Opera	Ver 2	5B,5C	J1b,J3,J4,J5b,J6b,J7b,&J8	J1a,J2,J5,J5a,J6a,&J7a
Back to the Future	Ver 3	5B,5C	J1b,J3,J4,J5b,J6b,J7b,&J8	J1a,J2,J5,J5a,J6a,&J7a
The Simpsons	Ver 3	5B,5C	J1b,J3,J4,J5b,J6b,J7b,&J8	J1a,J2,J5,J5a,J6a,&J7a
Checkpoint	Ver 3	5B,5C	J1b,J3,J4,J5b,J6b,J7b,&J8	J1a,J2,J5,J5a,J6a,&J7a
Teen. Mut. Ninja Turtles	Ver 3	5B,5C	J1b,J3,J4,J5b,J6b,J7b,&J8	J1a,J2,J5,J5a,J6a,&J7a
Batman	Ver 3	5B,5C	J1b,J3,J4,J5b,J6b,J7b,&J8	J1a,J2,J5,J5a,J6a,&J7a
Star Trek	Ver 3	5C	J1b,J3,J5,J5b,J6b,J7b,&J8	J1a,J2,J4,J5a,J6a,&J7a
Hook	Ver 3	5C	J1b,J3,J5,J5b,J6b,J7b,&J8	J1a,J2,J4,J5a,J6a,&J7a
Lethal Weapon 3	Ver 3	5C	J1b,J3,J5,J5b,J6b,J7b,&J8	J1a,J2,J4,J5a,J6a,&J7a
Star Wars	Ver 3	5C	J1b,J3,J5,J5b,J6b,J7b,&J8	J1a,J2,J4,J5a,J6a,&J7a
Rocky & Bullwinkle	Ver 3	5C	J1b,J3,J5,J5b,J6b,J7b,&J8	J1a,J2,J4,J5a,J6a,&J7a
Jurassic Park	Ver 3	5C	J1b,J3,J5,J5b,J6b,J7b,&J8	J1a,J2,J4,J5a,J6a,&J7a
Last Action Hero	Ver 3	5C	J1b,J3,J5,J5b,J6b,J7b,&J8	J1a,J2,J4,J5a,J6a,&J7a

*Version 1 has a 2K RAM which is a 24-pin IC at location 5D.

*Version 2 has an 8K RAM which is a 28-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 illuminate 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

Stays On
Flashes 1 Time
Flashes 2 Times
Flashes 3 Times

SUSPECT COMPONENT

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

QUICK REFERENCE FUSE CHART

PPB BOARD

F1 5A Slo-Blo G.I. 6.3VAC
F2 5A Slo-Blo G.I. 6.3VAC
F3 5A Slo-Blo G.I. 6.3VAC
F4 5A Slo-Blo G.I. 6.3VAC
F5 5A Slo-Blo Flipper Power & 50Volt coils
F6 5A Slo-Blo Flash Lamps (34VDC)
F7 3A Slo-Blo Flipper Power & 50Volt coils
F8 4A Slo-Blo 50Volt coils
F9 5A Slo-Blo 50Volt coils

POWER SUPPLY BOARD

F1 7A Slo-Blo +5VDC Regulator Input (9VAC)
F2 7A Slo-Blo +5VDC Regulator Input (9VAC)
F3 Not Used
F4 8A Slo-Blo Switched Illumination Buss (18VDC)
F5 5A Slo-Blo Solenoid (34VDC) Bumpers Slingshots etc.
F6 5A Slo-Blo Solenoid Buss (34VDC)
F7 0.5A Slo-Blo Display Reg. Input (90VAC)

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GAME SPECIFICATIONS

POWER REQUIREMENTS

This game is provided with a 3-prong plug and **must be connected to a properly grounded outlet to reduce shock hazard** and insure proper game operation. Refer to AC Power Wiring Diagram for transformer connections required for normal, high, and low line conditions.

Normal Line: 109 to 129 Vac (211 to 225 Vac)

High Line: (226 to 235 Vac)

Low Line: 95 to 108 Vac (200 to 210 Vac)

MAJOR ASSEMBLY AND FUSE LOCATIONS

Refer to the Game Illustration (page 2) to identify locations of the major assemblies, and fuse values and locations.

PROM SUMMARY

CPU Board: Location 5C

Sound Board: Locations U17 (Voice ROM 1), U21 (Voice ROM 2), and U7 (Sound ROM)

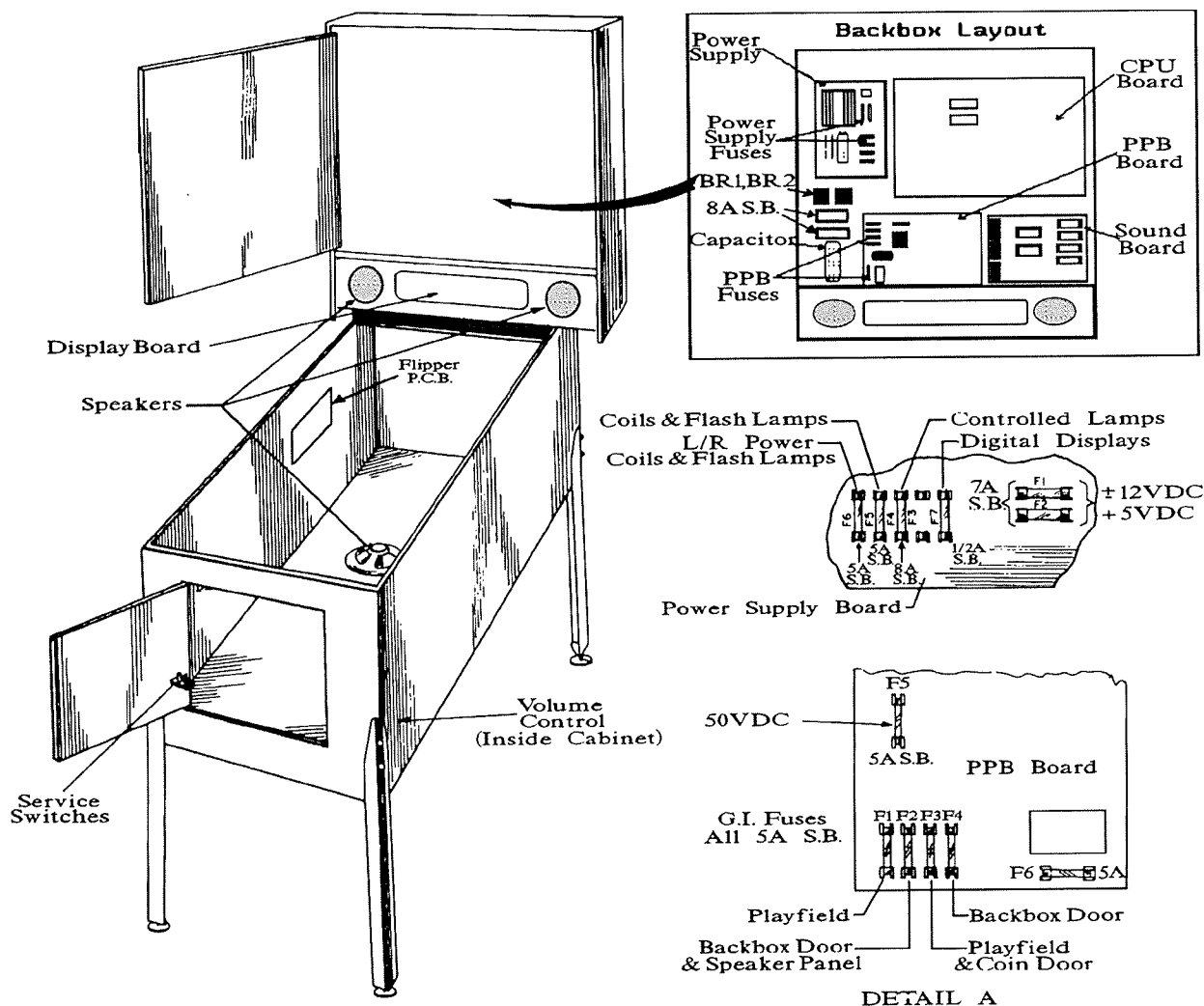
Display Controller Board: Locations U12 & U14

TRANSPORTATION

To reduce the possibility of damage, observe the following precautions whenever transporting the game. Lower the backbox and secure it to the cabinet. Remove the legs and secure the game within the transporting vehicle.

GAME ASSEMBLY PROCEDURES (Refer to the Game Illustration on page 2)

1. Open the top of the carton and lay it on its side with the bottom of the cabinet down. Using the plastic banding strip as a handle, slide the game out of the carton.
2. Remove all packing material. Locate cabinet legs in filler packing inserts and assembly parts package in the cashbox. There should be four leg levelers, eight leg bolts, three pinballs and a large Allen Wrench used for securing the backbox.
3. Attach leg leveler from the parts package to each leg, make sure that each leveler is threaded through a hex nut before threading it into the leg.
4. Support rear of cabinet and attach rear legs using two leg bolts for each leg.
5. Support front of cabinet and attach front legs using two leg bolts for each leg.
6. While assuring that no cables are being pinched, carefully raise the backbox and secure it in its upright position by inserting the Allen Wrench in the hole in the back of the cabinet and rotating the wrench 270 degrees(3/4 turn).



GAME ILLUSTRATION

7. Remove the backbox keys from the clip on the inside of the coin door and unlock and carefully remove the backglass. Set the backglass aside.
8. Carefully remove the playfield glass and set it aside.
9. Check all connectors in the backbox for loose wire terminations. Reseat any loose wire by pushing in on the terminal.
10. Push on all connectors plugged into the CPU board, Sound Board, Power Supply Boards, and (on insert board) Display board to check that they are properly seated.
11. Check that the fuses on the Power Supply board, PPB board and fuse panel are seated properly.
12. Raise the playfield and support it, by connecting the strap located in the left rear of the cabinet, to the eyebolt on the playfield. (Use the instruction sheet provided in the game to see alternative methods of accessing the playfield bottom.)
13. Check all cabinet cable and playfield lamp board connector terminations.

14. Remove the Plumb tilt from the parts package and install on the panel on the inside left of the cabinet. Note that this game is not equipped with a ball roll tilt.

15. Lower the playfield and level the playfield side-to-side by adjusting leg levelers and using the 2 Way Level located beneath the pricing card on the bottom arch.

16. Using the 2 Way Level below the pricing card, adjust the pitch of the playfield to approximately 6.5 degrees.

NOTE

The playfield incline affects difficulty of play. Use the recommended incline; game difficulty is best varied using game adjustments.

17. Check the plumb tilt and adjust as required.

18. If desired, perform any self tests at this time. With the insert door closed, carefully reinstall and lock the backglass.

19. Place the three pinballs on the playfield near the outhole and carefully reinstall the playfield glass.

20. If desired, make game pricing and Add-A-Ball, Novelty, or 5-Ball Play adjustments at this time.

GAME OPERATION

STANDARD FEATURES

Insert coin(s), the game makes a sound for the first credit and generates sounds for each subsequent coin and the Player 4 display indicates the number of credits posted. Depress the credit button and a start-up sound is produced, the posted credits are reduced by one, Player 1 display flashes, Player 4 display indicates BALL 1, and a ball is served to the plunger trough. Additional players may be added by depressing the Credit button before the end of ball 1.

The second closure (adjustable) of the plumb bob tilt switch tilts the ball in play. Closure of the slam tilt switch in the coin door ends the current game(s).

At the end of each ball, earned bonuses are collected. At the end of the last ball for the last player and after bonuses are collected, the system produces a random 2-digit number (a multiple of 10; 00 to 90) for a Match feature (adjustable). Matching the last two digits of a player score with this number awards a credit. Players exceeding high score levels receive free credits (adjustable) and are able to enter their initials with the new High Score achieved. The game then proceeds into the game-over mode and then to the attract mode. A custom message (adjustable) can be displayed during the attract mode.

MANUAL PERCENTAGING

This game is equipped with Manual Percentage Adjustment.

As previously with our games, you can either set operator adjustments for a replay percent or you can set a fixed replay score.

If you set operator adjustments for a particular replay percent, the game will compute a recommended score to keep the game at that replay percentage. If a change is recommended and the game coin door is opened, the displays will indicate a recommended replay score to beat and make a sound to alert the operator. By pressing the start button, the score to beat will be changed to the recommended level. If you close the coin door or go into audit or adjustment mode, no score change will be made.

You may choose to ignore the recommended change; for example, you may not think last week's players were the usual crowd. Just close the door and the message will disappear without altering the existing level. Or you may choose to make a different score to beat adjustment; this is done by utilizing adjustment AD02.

GAME SPECIFIC FEATURES

1) Skill Shot

The skill shot is available at the start of each ball. Pull the trigger on the gun to fire the ball into the CRANE drop targets. Hitting the lit CRANE target awards (1 + ball in play) million points. Hitting an unlit CRANE drop target awards (1 + ball in play) thousand points.

2) Crane Targets / Crane Lock

Completing the CRANE drop targets lights CRANE READY at the top right VUK and starts CRANE hurry-up. Shooting the crane before the hurry-up value reaches zero awards the value.

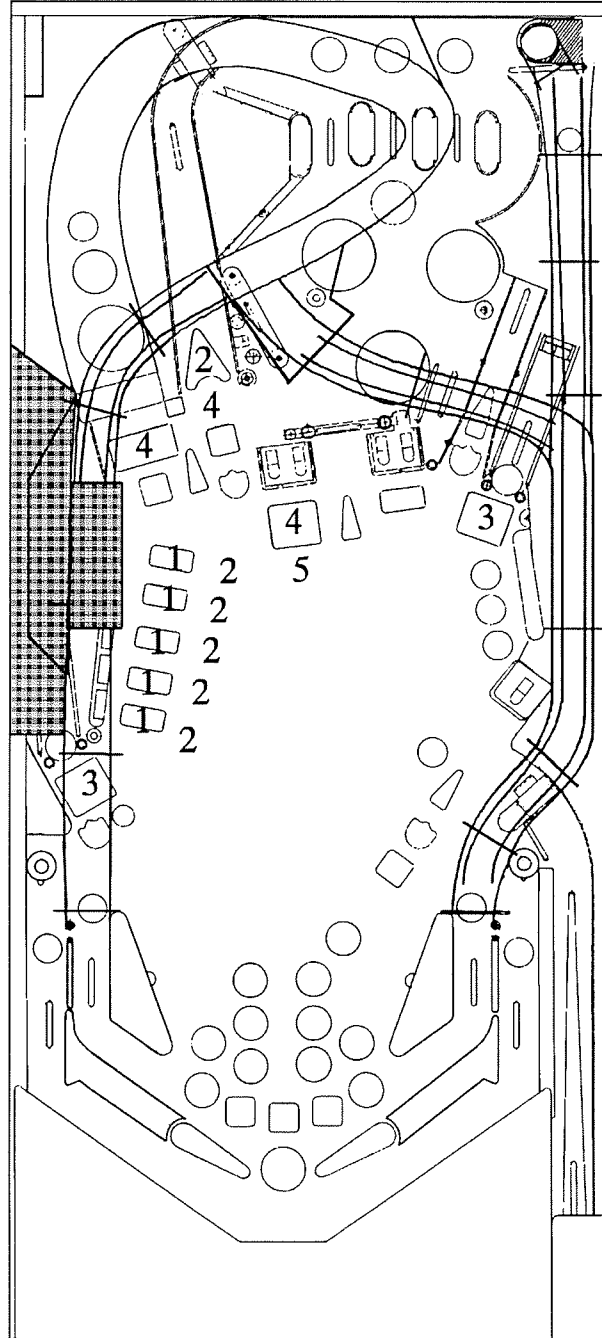
WARNING: hitting the DANGER bar behind the drop targets will reset the drop target bank. If difficulty adjustment 47 (Crane Hurry Up) is set to YES, in order to lock a ball in the TAR PIT, the CRANE shot must be made before the hurry up value reaches zero. If difficulty adjustment 47 (Crane Hurry Up) is set to NO, the CRANE shot can be made to lock a ball in the TAR PIT after the hurry up value reaches zero. Locked balls increase the jackpot values during M-BALL. A maximum of two balls can be locked in the tar pit.

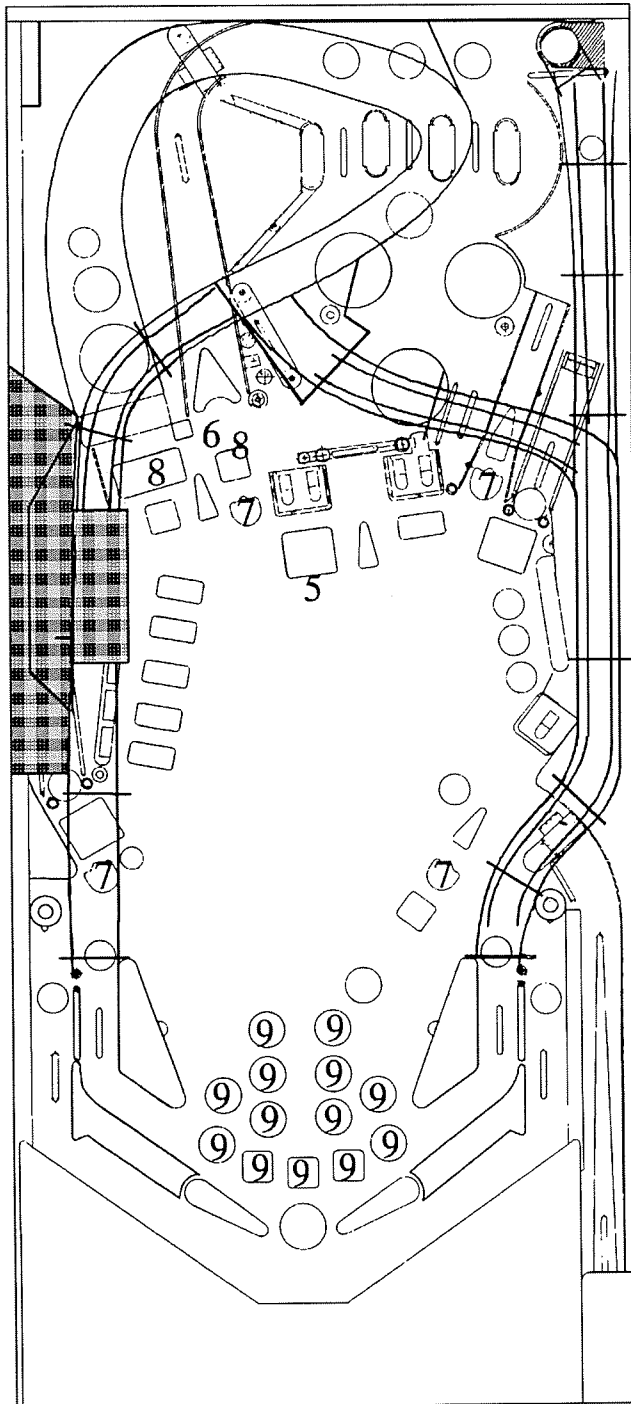
3) Advancing to M-BALL

Shoot the captive balls (M-BALL Advance) to advance the M-BALL countdown to zero. Each captive ball shot decrements the count by 1. The left return lane switch (M-BALL advance x2) lights the right captive ball for a time period to score 2 captive ball hits, and the right return lane switch lights the left captive ball for a time period to score 2 captive ball hits. When the counter reaches 0, M-BALL is lit at the left scoop.

4) M-BALL / Jackpot Qualification

Shoot the left scoop when lit to start M-BALL. Two balls will be put into play via the plunger lane, and any locked balls in the tar pit area will be released. If difficulty adjustment 46 (Crane Qualifies Jackpot) is set to YES, the ramp Jackpot must be qualified first by shooting the crane. If difficulty adjustment 46 (Crane Qualifies Jackpot) is set to NO, the ramp Jackpot will be available immediately at the start of M-BALL.





5) M-BALL / Restart

If all but one ball drains before a Jackpot has been collected, the M-BALL restart feature will light at the left scoop. Shoot the left scoop within the time period for 2 ball M-BALL restart.

6) M-BALL / Double Jackpot

After the Jackpot has been collected by shooting the left ramp, the double jackpot will be available at the crane for a time period.

Shooting the crane during the time period awards the double jackpot and starts 6-ball play with shields lit.

If the double jackpot goes uncollected within the time period, the crane qualification, ramp jackpot, and double jackpot sequence will repeat until either all but one ball drains or until the double jackpot is collected at the crane. The only way to start 6 ball play during M-BALL is to collect the double jackpot at the crane during the time period.

7) Shields / M-BALL, M = 6

After the double jackpot has been collected at the crane, the four shields will be lit.

Completing all four shields lights the crane.

Shooting the crane qualifies the Super Jackpot at the ramp.

8) Super Jackpot

Shooting the ramp collects the Super Jackpot, and qualifies, for a time period, the Double Super Jackpot at the crane. Shooting the crane during the time period awards the Double Super Jackpot. If the Double Super Jackpot either times out or is collected, and two or more balls remain in play, the M-BALL sequence restarts with all four shields lit. M-BALL play ends when all or all but one ball drains.

9) Dynamite Features / World Premiere Jackpot

There are 13 dynamite features. At the start of each ball, the light above the left scoop will light solid, indicating to the player that a feature is available. Shooting the left scoop will award the flashing dynamite feature on the grid. The Turbo bumpers rotate the lit dynamite grid feature, and the right scoop lights the first unawarded LAST, ACTION, or HERO grid feature. After a dynamite feature has been awarded, a single ramp shot will re-light the left scoop permanently. The left or the right return lane switches re-light the left scoop for a time period.

Dynamite features are denoted in this guide by (DF).

10) More Time

When a dynamite feature is running, the left captive ball is available for more time. Hitting the left captive ball during the feature resets the timer for that feature back to its starting value. More Time can be earned once when a dynamite feature is running.

11) Wildcard

When a dynamite feature is running, both return lane switches light the right scoop (WILDCARD) for a time period. Shooting the scoop when lit awards WILDCARD, which enhances the scoring values for that feature.

WILDCARD can be earned once when a dynamite feature is running. For details on how WILDCARD affects the scoring values of a dynamite feature, see the WILDCARD section in the description of the dynamite feature.

12) Completion

Most dynamite features are timed features with goals. Completing the dynamite feature increases the value of the World Premiere Jackpot by 5 million points and adds 5 seconds to the World Premiere timer. For details on completing a dynamite feature, see the COMPLETION section in the description of the dynamite feature.

13) Blowout (DF)

Blowout is feature in which all switches are worth 250K for a time period.

Completing 10 switches during this mode increases the switch value by 50K.

Wildcard: Doubles the current switch value and doubles the increase value (from 50K to 100K).

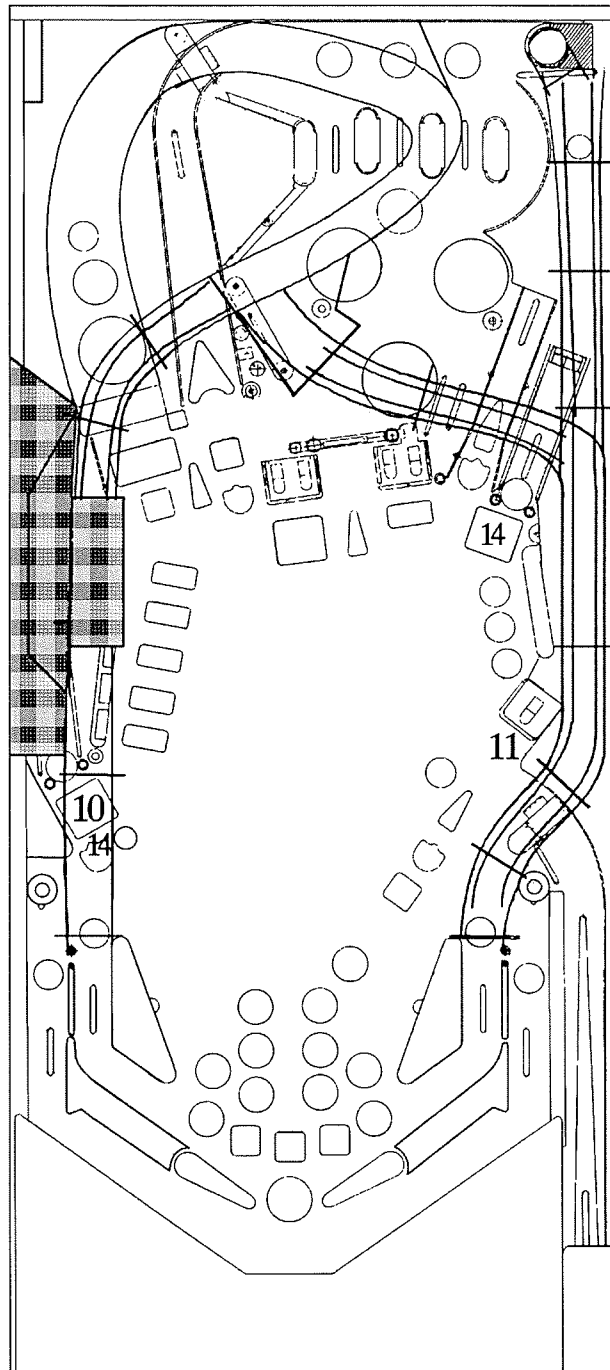
Completion: A total Blowout score of 20M points or more adds 5M to the World Premiere Jackpot and adds 5 seconds to the World Premiere timer.

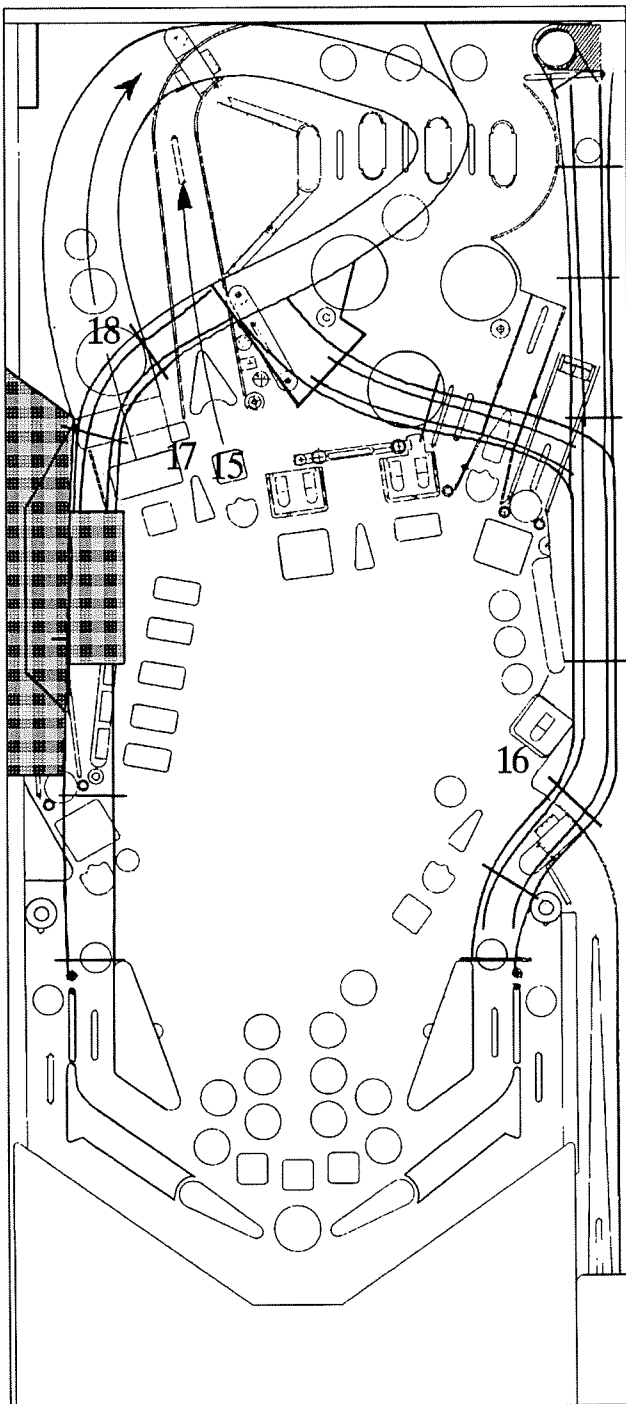
14) Go To The Movies (DF)

Shooting either captive ball during this timed mode adds a ball to the playfield. When the timer expires, if there are two or more balls in play, the captive balls are lit for 5M each.

Wildcard: 2 for 1 Add-A-Ball. Doubles the number of balls added to the playfield for each captive ball shot.

Completion: Left and right captive ball shots made after the timer expires adds 5M to the World Premiere Jackpot and adds 5 seconds to the World Premiere timer.





15) Save Danny (DF)

Save Danny is a countdown feature that is awarded by shooting the crane. The countdown value starts at 20M; the feature ends when either the value reaches zero or is collected.

Wildcard: Doubles the current countdown value.

Completion: Collecting the countdown value before the value reaches zero adds 5M to the World Premiere Jackpot and adds 5 seconds to the World Premiere timer.

16) Light Extra Ball (DF)

This feature lights Extra Ball at the right scoop. Shooting the scoop awards an Extra Ball.

More Time does not apply to this mode. The Extra Ball is available for collection at the scoop for the remainder of the game.

Wildcard: Not available.

Completion: Collecting the Extra Ball adds 5M to the World Premiere Jackpot and adds 5 seconds to the World Premiere timer.

17) Cat Millions (DF)

During this timed mode, hitting the cat target awards the lit value (in millions) shown on the dot-matrix display, and adds another lit value to the display, to a maximum of 3 values.

Subsequent hits on the cat target score the sum of the lit values (in millions) shown on the display.

Wildcard: Awards one hit on the cat target, and adds, to a maximum of 3, another lit value to the display.

Completion: Three hits on the cat target adds 5M to the World Premiere Jackpot and adds 5 seconds to the World Premiere timer.

18) To The Roof (DF)

During this timed mode, the first ramp shot awards 5 million points, the second ramp shot awards 10 million points, and the third ramp shot awards 15 million points. The mode ends when the timer expires or when three ramp shots have been made, whichever comes first.

Wildcard: Doubles the point values of any remaining ramp shots.

Completion: Three ramp shots within the time period adds 5M to the World Premiere Jackpot and adds 5 seconds to the World Premiere timer.

19) Redeye (DF)

During this timed mode, the eyeball targets are lit for increasing point values (5M for the first hit, 10M for the second hit, and 15M for the third and subsequent hits).

Wildcard: Doubles the eyeball target point values.

Completion: Three hits on the eyeball targets during the time period adds 5M to the World Premiere Jackpot and adds 5 seconds to the World Premiere timer.

20) Big Mistake (DF)

In this timed mode, shoot at least one drop target (scores 5M), then at least one eyeball target (scores 10M), and then the left scoop (scores 15M). Wildcard: Doubles all remaining point values that can be awarded during the mode. Completion: Shooting the center scoop when lit during the time period adds 5M to the World Premiere Jackpot and adds 5 seconds to the World Premiere timer.

21) Find the Ticket (DF)

During this timed feature, shoot the left, center, and right scoops to search for the Ticket. Find the Ticket in one of the scoops for 30M points.

Wildcard: Doubles the point value awarded when the Ticket is found.

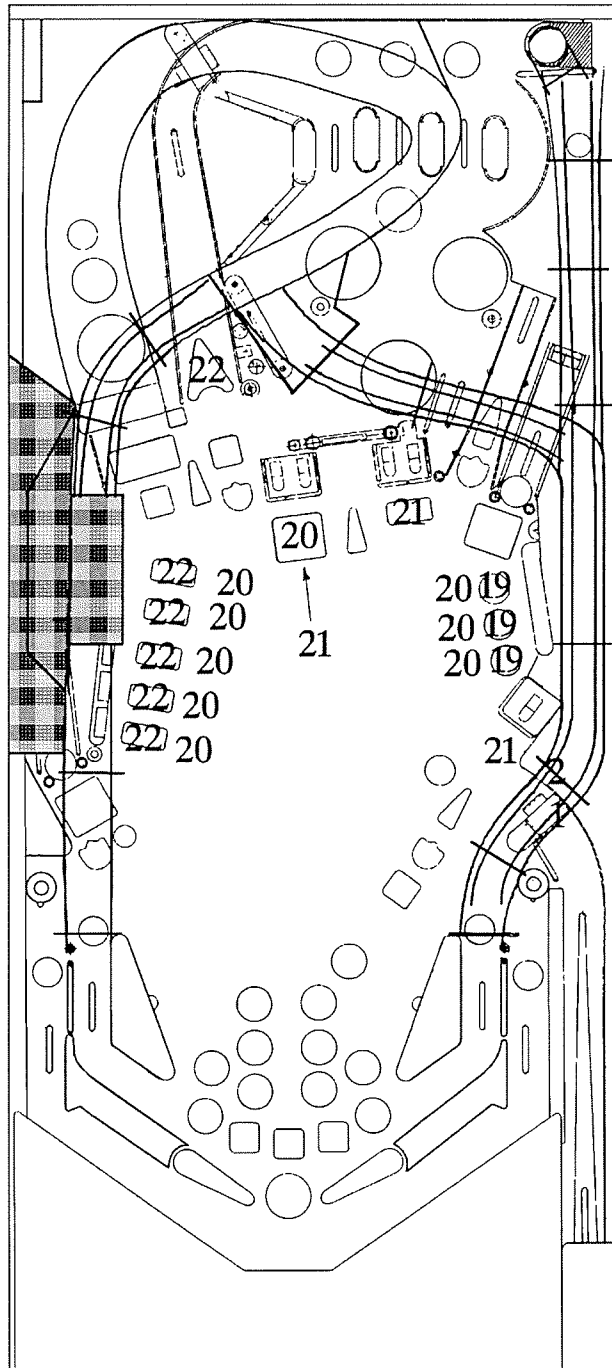
Completion: Finding the Ticket during the timed period adds 5M to the World Premiere Jackpot and adds 5 seconds to the World Premiere timer.

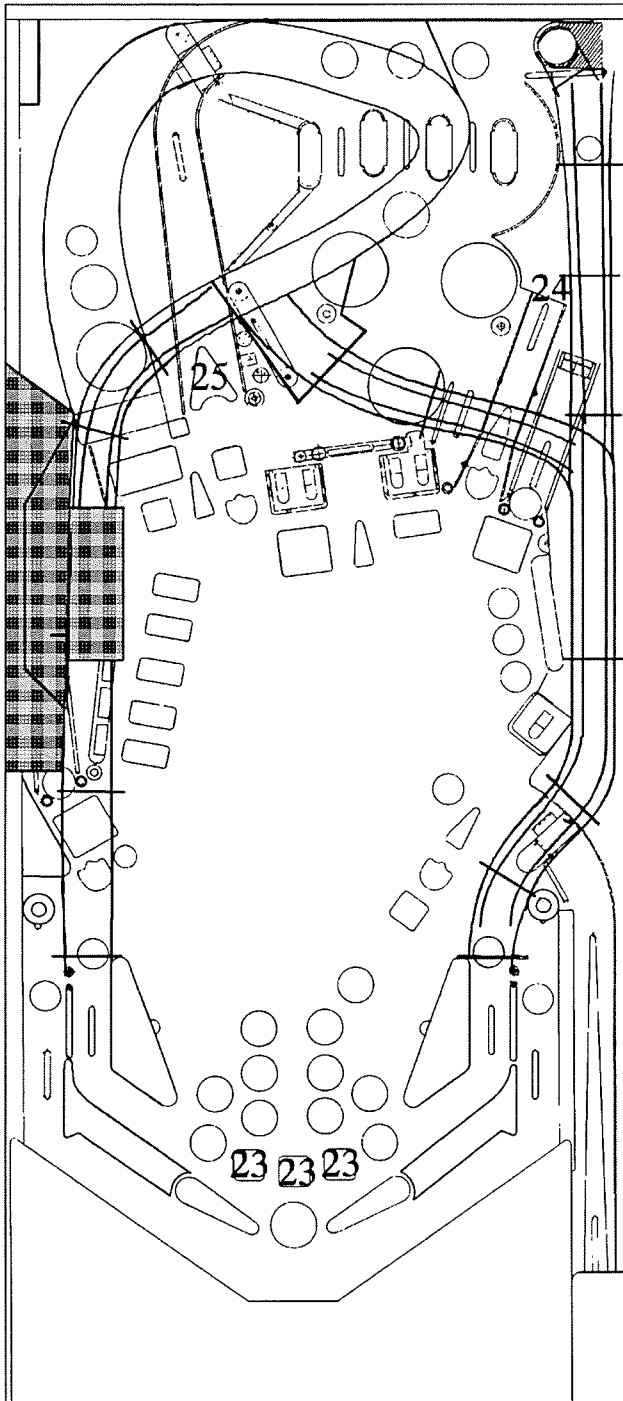
22) Super Crane (DF)

During this timed event, 6 balls are put into play. After the sixth ball is put into play, the crane is lit for a time period. Shoot the crane as many times as possible during the time period to collect crane jackpots. The first jackpot is 5M, the second is 10M, the third is 15M, etc. At the end of the time period, if two or more balls are still in play, shoot the drop targets to re-light the crane for the crane jackpot. Collect the crane jackpot by shooting the crane.

Wildcard: Doubles the crane jackpot value.

Completion: Collecting one crane jackpot at the end of the time period (a drop target / crane jackpot sequence) adds 5M to the World Premiere Jackpot and adds 5 seconds to the World Premiere timer.





23) LAST ACTION HERO (DF)

Completing Last, Action, and Hero on the grid starts a timed, 6 ball event where 100 switch closures must be made during a time period. If the required number of switch closures are made within the time period, 50M is awarded, the required number of switch closures increases by 25, and 10 seconds are added to the amount of time remaining at the point of completion. Additional completions of the required number of switches score 50M.

More Time: Not available

Wildcard: Not available. Completion: Each completion of the required number of switches during the time period adds 5M to the World Premiere Jackpot and adds 5 seconds to the World Premiere timer.

24) Ripper Jackpot

The ripper jackpot starts at 7.5M points. Each shot to the ripper kickback adds 500K to the jackpot and spots 1 letter in RIPPER.

Completing RIPPER collects the jackpot and resets the RIPPER jackpot value to 7.5M.

The RIPPER jackpot value increases ball to ball, player to player, and game to game.

Hitting the RIPPER kickback flashes the RIPPER light. Shooting the RIPPER kickback while flashing spots an extra letter in RIPPER.

A ball freeze will be enabled while the RIPPER light is flashing. If the ball drains while the light is flashing, the ball will be returned to play.

25) Crane Looping

Shooting the Crane shot during single ball play, when the crane is not lit to lock a ball in the tar pit awards 250K. Subsequent

consecutive crane shots award 500K, 750K, 1M, 2M, 3M, 4M, 5M (the point cap on consecutive crane shots is 5M). If there are

less than 2 Balls locked, the sixth consecutive crane shot lites crane ready for a lock.

26) Combo Shots

There are two combo shots in Last Action Hero: CRANE - RAMP - RAMP - RIGHT CAPTIVE BALL will award 4 advances toward M-BALL and 10M points. CRANE - RAMP - RAMP - RIPPER KICKBACK will award 3 letters in RIPPER and 10M points.

27) End Of Ball Bonus

The end of ball bonus is worth 1M at the start of each ball and increases by 10K with every switch closure during single ball play.

Completing the eyeball targets during single ball play increases the switch closure value by 10K. The bonus value is awarded at the end of the ball.

28) Double Your Bonus

Completing the three top rollover lanes (DOUBLE YOUR BONUS) doubles the current bonus value.

29) Ramp Escrow

The ramp escrow starts at 1M points and increases by 100K with each ramp shot. Shooting two ramps in a row qualifies the center scoop to collect the ramp escrow. The ramp escrow increases ball to ball, player to player, and game to game.

30) Dekker Super Spinner

Shooting a RAMP RAMP combination 5 times lights the Dekker spinner for 1M points per spin. As soon as the spinner stops, the feature is disabled, and the spinner points are awarded.

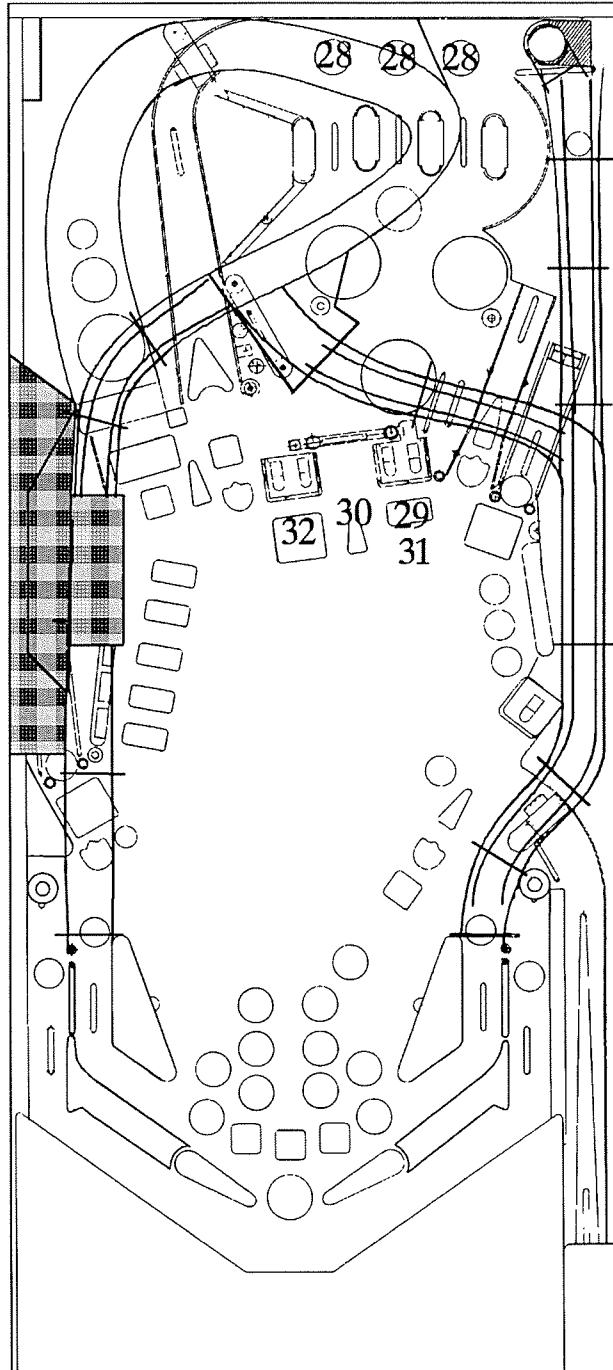
31) Chicken

The chicken feature is available at the center scoop when the scoop is not lit for any other feature. The first chicken award is 10M points and requires 3 shots into the chicken scoop. The second chicken award is Light Extra Ball and requires 5 additional shots into the chicken scoop. The third chicken award is Light Special and requires 7 additional shots into the chicken scoop. If Audit 15 (Actual Extra Ball Percent) meets or exceeds Adjustment 38 (Desired Extra Ball Percent), the second chicken award will be 10M instead of Light Extra Ball.

If Audit 2 (Actual Free Game Percentage) meets or exceeds Adjustment 1 (Desired Replay/Manual), the third chicken award will be 10M instead of light Special.

32) World Premiere

Collecting all dynamite features flashes all grid features and the left scoop. Shooting the left scoop starts the World Premiere sequence. World Premiere is an event in which the left scoop is lit to collect the World Premiere count-up value. The value starts at 10M and increases proportionally during the time period to the value of the World Premiere Jackpot. Shooting the left scoop collects the current value.



AUDIT FUNCTIONS

GENERAL

There are 77 audit functions provided for accounting purposes and for evaluation of game difficulty adjustments. Audit functions are split into two groups. There are 11 most-used audits (1 through 11) in a 'quick look' group and 65 less-used audits (13 through 77), 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 top of the display, the *Description* is shown next and the *Audit Total* in the display. bottom Access and control is provided from switches located on the inside of the coin door.

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 display indicates AUDITS & ADJUSTMENTS. 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 AUDIT 12, EXPAND AUDITS is displayed. Set the choice to YES as indicated in the lower display by depressing the Game Start push-button and then depress the step push-button. The request is installed and Audit 13 is displayed. When you exit audits and adjustments, the Audit 12 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 **ADJUSTMENT 10**, AUDITS RESET. Game adjustments (1 to 12 and 13 to 54) begin after the last audit function (12 or 77). 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.

'QUICK LOOK' FUNCTIONS

Total Paid Credits (AUDIT 1) - the total number of paid credits is displayed.

Free Percent (AUDIT 2) is Free Total (E AUDIT 24) divided by Plays Total (E AUDIT 26).

Ball Time Average (in seconds) (AUDIT 3) is Total Play Time divided by Total Balls Played (AUDIT 13) .

Average Game Time (AUDIT 4) is the Average Game Time expressed in minutes and seconds.

Coins (AUDIT 5, 6, 7 and 8) - These four audit totals are provided to show the amount of coins registered for the left, right, center, and 4th coin chutes, respectively.

Total Coins (AUDIT 9) is the total number of coins dropped through all 4 coin chutes.

Total Earnings (AUDIT 10) is the total cash value accumulated since the last Factory Restore occurred.

Last Earnings (AUDIT 11) is the total cash value accumulated since the last Coins Reset occurred.

Expand Audits (AUDIT 12) permits viewing of expanded audits.

Last Action Hero Audit Table

Audit Number	Audit Description	Audit Number	Audit Description
1	Total Paid Credits	40	Drains Center
2	Free Game Percentage	41	Drains Right
3	Average Ball Time	42	Slam Tilts
4	Av Game Time	43	Extraball Lit From Chicken
5	Coins Left	44	Freeze Used, Skill
6	Coins Right	45	Ramp Shots
7	Coins Center	46	Grid Feature Awarded
8	Coins 4th Chute	47	Grid Feature Completed
9	Total Coins	48	More Time Awarded
10	Total Earnings	49	Wildcard Awarded
11	Last Earnings	50	LAH No Checkpoint Awarded
12	Expand Audits (ON/OFF)	51	LAH Checkpoint 1 Awarded
13	Balls Total	52	LAH Checkpoint 2 Awarded
14	Extra Balls Total	53	LAH Checkpoint 3 Awarded
15	Extra Ball Percent	54	LAH Checkpoint 4 Awarded
16	Replay 1 Awards	55	LAH 6 Ball Completed
17	Replay 2+ Awards	56	World Premiere Awarded
18	Total Replays	57	World Premiere Jackpot Awarded
19	Replay Percent	58	Drop Targets Completed
20	Total Specials	59	Drop Targets Reset
21	Special Percent	60	Crane Hurry Up Awarded
22	Total Matches	61	Captive Ball Advances
23	Hi Score Wins	62	M-Ball Lit
24	High Score Percent	63	3 Ball Start
25	Total Free Plays	64	4 Ball Start
26	Total Plays	65	5 Ball Start
27	0.0 - 49.9 Million	66	M-Ball Start
28	50.0 - 99.9 Million	67	2nd M-Ball
29	100.0 - 199.9 Million	68	Jackpot Awarded
30	200.0 - 299.9 Million	69	Double Jackpot Awarded
31	300.0 - 399.9 Million	70	Shields Completed
32	Over 400 Million	71	Crane Jackpot Awarded
33	Average Scores	72	Super Jackpot Awarded
34	Service Credits	73	Double Super Jackpot Awarded
35	Proprietary	74	Ripper Shots
36	Proprietary	75	Ripper Freeze
37	Proprietary	76	Ripper Jackpot Awarded
38	Total Buyin Games	77	Smart Missile
39	Drains Left		

EXPANDED FUNCTIONS

BALLS TOTAL (Audit 13) is the total of regular and extra balls.

EXTRA BALLS TOTAL (Audit 14) is the total number of extra balls awarded.

EXTRA BALL PERCENTAGE (Audit 15) is Audit 14 divided by Plays Total (Audit 26).

REPLAY AWARDS (Audit 16 & 17) provide the total awards (credit, extra ball, or audit) for replay level 1 or 2 through 4, respectively.

TOTAL REPLAYS (Audit 18) is the total awards (credits, extra balls, or audit only) for exceeding replay score levels.

REPLAY PERCENTAGE (Audit 19) is the Replay Total awards for exceeding replay score levels (Audit 18) divided by Plays Total (Audit 26).

TOTAL SPECIALS (Audit 20) is the total awards (credits, extra balls, or scores) for making specials.

SPECIAL PERCENTAGE (Audit 21) is Special Total (Audit 20) divided by Plays total (Audit 26).

TOTAL MATCHES (Audit 22) is the total credits awarded for matching the last two digits of the score with the system-generated Match Number at the end of the game. Percentage of match credits will be adjustable from 0% to 10%, by **Adj. 13** if enabled.

HIGH SCORE WINS (Audit 23) is the total credits awarded for exceeding the high-score-to-date scores.

HIGH SCORE PERCENTAGE (Audit 24) is High Score Wins (Audit 23) divided by Total Games (Audit 26).

TOTAL FREE PLAYS (Audit 25) is the total free credits for replays, high-score-to-date, specials, and match.

TOTAL GAMES (Audit 26) is the sum of Total Paid Credits (Audit 1) and Free Total (Audit 25). Note that free credits are not recorded in the Audit until they are actually used.

0.0 - 49.9 MILLION (Audit 27) provides the total number of games the Player's final score was between 0 and 49,999,990 points.

50.0 - 99.9 MILLION (Audit 28) provides the total number of games the Player's final score was between 50,000,000 and 99,999,990 points.

100.0 - 199.9 MILLION (Audit 29) provides the total number of games the Player's final score was between 100,000,000 and 199,999,990 points.

200.0 - 299.9 MILLION (Audit 30) provides the total number of games the Player's final score was between 200,000,000 and 299,999,990 points.

300.0 - 399.9 MILLION (Audit 31) provides the total number of games the Player's final score was between 300,000,000 and 399,999,990 points.

OVER 400 MILLION (Audit 32) provides the total number of games the Player's final score was over 400,000,000 points.

AVERAGE SCORES (Audit 33) provides the Average Score by adding the Final Score of each game to a table and dividing this sum by the Total Plays.

SERVICE CREDITS (Audit 34) provides the total number of Service credits added to the game. See *Game Diagnostics* on page 21 for instructions regarding entry of Service Credits.

PROPRIETARY (Audit 35 - Audit 37) provide information to the game designer to aid in design development. (Factory use only.)

TOTAL BUYIN GAMES (Audit 38) provides the number of times a player utilized the Buy In Feature. (See E Ad 40)

DRAINS LEFT (Audit 39) provides the number of times the ball drained out the left drain.

DRAINS CENTER (Audit 40) provides the number of times the ball drained out the center drain.

DRAINS RIGHT (Audit 41) provides the number of times the ball drained out the right drain.

SLAM TILTS (Audit 42) provides the number of times the Slam Tilt switch was activated.

GAME SPECIFIC FUNCTIONS

EXTRA BALL LIT FROM CHICKEN (Audit 43) provides the number of times the extra ball was lit by completing the Chicken feature.

FREEZE USED, SKILL (Audit 44) Provides the total number of times the freeze saved the ball at the start of the ball.

RAMP SHOTS (Audit 45) Provides the total number of ramp shots.

GRID FEATURE AWARDED (Audit 46) Provides the total number of times a grid feature was awarded.

GRID FEATURE COMPLETED (Audit 47) Provides the total number of times a grid feature was completed and added to the World Premier Jackpot.

MORE TIME AWARDED (Audit 48) Provides the total number of times the More Time feature was awarded.

WILDCARD AWARDED (Audit 49) Provides the total number of times the wild Card feature was awarded.

LAH NO CHECKPOINT AWARDED (Audit 50) Provides the total number of times the Last Action Hero grid feature was awarded but no checkpoint was reached.

LAH CHECKPOINT 1 AWARDED (Audit 51) Provides the total number of times the Last Action Hero grid feature was awarded and the 1st checkpoint was reached.

LAH CHECKPOINT 2 AWARDED (Audit 52) Provides the total number of times the Last Action Hero grid feature was awarded and the 2nd checkpoint was reached.

LAH CHECKPOINT 3 AWARDED (Audit 53) Provides the total number of times the Last Action Hero grid feature was awarded and the 3rd checkpoint was reached.

LAH CHECKPOINT 4 AWARDED (Audit 54) Provides the total number of times the Last Action Hero grid feature was awarded and the 4th checkpoint was reached.

LAH 6 BALL COMPLETED (Audit 55) Provides the total number of times the Last Action Hero 6 ball feature was completed.

WORLD PREMIERE AWARDED (Audit 56) Provides the total number of times the World Premier feature was awarded.

WORLD PREMIERE JACKPOT AWARDED (Audit 57) Provides the total number of times the World Premier jackpot was awarded.

DROP TARGETS COMPLETED (Audit 58) Provides the total number of times the Crane drop targets were completed.

DROP TARGETS RESET (Audit 59) Provides the total number of times the Crane drop targets were reset by the bar behind the targets.

CRANE HURRY UP AWARDED (Audit 60) Provides the total number of times the Crane hurry up was made.

CAPTIVE BALL ADVANCES (Audit 61) Provides the total number of times the captive balls were hit to advance to M-Ball.

M-BALL LIT (Audit 62) Provides the total number of times M-Ball was lit.

3 BALL START (Audit 63) Provides the total number of times M-Ball was started with 3 balls.

4 BALL START (Audit 64) Provides the total number of times M-Ball was started with 4 balls.

5 BALL START (Audit 65) Provides the total number of times M-Ball was started with 5 balls.

M-BALL RESTART (Audit 66) Provides the total number of times the M-Ball was restart feature was used.

2nd M-BALL (Audit 67) Provides the total number of times M-Ball was started 2 or more times.

JACKPOT AWARDED (Audit 68) Provides the total number of times the M-Ball ramp jackpot was awarded.

DOUBLE JACKPOT AWARDED (Audit 69) Provides the total number of times the crane double jackpot was awarded.

SHIELDS COMPLETED (Audit 70) Provides the total number of times the shield were completed during M-Ball.

CRANE JACKPOT AWARDED (Audit 71) Provides the total number of times the M-Ball crane 50M feature was awarded.

SUPER JACKPOT AWARDED (Audit 72) Provides the total number of times the M-Ball super jackpot was awarded.

DOUBLE SUPER JACKPOT AWARDED (Audit 73) Provides the total number of times the M-Ball double super jackpot was awarded.

RIPPER SHOTS (Audit 74) Provides the total number of times the Ripper shot was made.

RIPPER FREEZE (Audit 75) Provides the total number of times the freeze feature saved the ball after shooting the Ripper kicker

RIPPER JACKPOT AWARDED (Audit 76) Provides the total number of times the Ripper jackpot was awarded.

SMART MISSILE (Audit 77) Provides the total number of times the Smart Missile Feature was used.

Notes

GAME ADJUSTMENTS

GENERAL

There are 54 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 top of the display, the *Description* is shown next, and the setting, in the bottom of the 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 AUDIT 1 and the FORWARD/REVERSE switch in the REVERSE (down) position, depress the STEP switch and ADJUSTMENT 54 is shown at the top of the display, FACTORY RESTORE is shown in the middle of the display, and NO is shown in the bottom of the display. With the audits displaying AUDIT 12 or 77 and the FORWARD/REVERSE switch in the FORWARD (up) position, depress the STEP switch and ADJUSTMENT 1 is shown in the top of the display, REPLAY/MANUAL is shown in the middle of the display, and the setting is shown in the bottom of the 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 push-button. 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 display indicates REQUEST INSTALLED.

REPLAY AND GENERIC FEATURES

Replays may be adjusted either for fixed levels or for a system-adjusted manual percentage of replay awards. Four levels may be selected. Adjustments allow awarding of a credit or an extra ball as each level is exceeded. With the manual percentage feature, if the actual replay percentage is higher or lower than that desired, the game computes new recommended manual percentage score(s). When the coin door is subsequently opened the player displays indicate the recommended level and a sound is made to alert the operator of a potential change. This new level is entered into adjustments simply by pressing the game start push-button. (If the coin door is closed or you enter audits/adjustments or diagnostics, the replay level is not changed.)

REPLAYS (Adjustment 1 through 6)

ADJ.1 Replay Manual/Fixed

- **Manual:** Adjust for percentage of awards for replay levels (1% through 50%). Proceed to ADJ.02 and 03 for starting replay levels.
- **Fixed:** Lower the automatic value below 1% and Player 1 display indicates FIXED. Proceed to ADJ. 2 and 3 for fixed replay levels.

ADJ. 2 Start Replay

- **Manual:** Adjust the starting Replay 1 setting to between 20,000,000 and 9,999,000,000.

ADJ. 3 Levels Replay/Level 1,2,3 & 4 Replay

- Adjust the number of replay levels to be active (1 to 4). Any additional starting replay levels are automatically set to values higher than Replay 1
- Adjust Replay 1 level to between 20,000,000 and 9,999,000,000. (Same as Start Replay)
If ADJ. 3 is set for 2, adjust Replay 2 level to between 20,000,000 and 9,999,000,000.
If ADJ. 3 is set for 3, adjust Replay 3 level to between 20,000,000 and 9,999,000,000.
If ADJ. 3 is set for 4, adjust Replay 4 level to between 20,000,000 and 9,999,000,000.

Last Action Hero

Game Adjustment Table

Adjustment Number	Description	Factory Setting
1	Replay/Manual	10%
2	Start Replay	300,000,000
3	Levels Replay*	01
4	Game Awards	CREDIT
5	Limit Freegame	03
6	Limit Extraball	03
7	Game Rules	FACTORY
8	Game Price*	USA2
9	Coin Reset	NO
10	Audits Reset	NO
11	Restore Hi Scores	NO
12	Expand Adjustments	NO
13	Match Percent	08
14	Balls Per Game	03
15	Tilt Warnings	01
16	Replay Boost	NO
17	Credits Limit	30
18	High Scores Allowed	YES
19	Hiscore 1 Awards	03
20	Hiscore 2 Awards	01
21	Hiscore 3 Awards	00
22	Hiscore 4 Awards	00
23	Backup World Record	500,000,000
24	Backup Hiscore 2	450,000,000
25	Backup Hiscore 3	400,000,000
26	Backup Hiscore 4	350,000,000
27	Backup Hiscore 5	300,000,000
28	Backup Hiscore 6	250,000,000
29	Reset H.S.T.D. Every	700
30	Free Play	NO
31	Custom Mesage	ON
32	Flash Lamps	NORMAL
33	Coils Pulse	NORMAL
34	Level Adjust By	ANY
35	Next Game Promo	ON
36	Buy In Allowed	NO
37	Restart Game	NO
38	Extra Ball Percentage	25
39	Background Volume	100
40	Bill Validator	NO
41	Shaker Motor	ON
42	Ripper Freeze	YES
43	Crane ON/OFF	ON
44	Extra Ball in Memory	YES
45	Special in Memory	YES
46	Crane Qualifies Jackpot	YES
47	Crane Hurry Up	NO
48	Tournament Style	NONE
49	Attract Mode Music	ON
50	Location I.D.	-
51	Game I.D.	-
52	Printer Reset	-
53	Start Transmit	-
54	Factory Restore	NO

* Some settings result in Drop-Down Tables- See Text

Adj. 4 Game Awards Set for replays to award: **CREDIT, EXTRA BALL, NONE** or **SPECIAL** (when score threshold is achieved a playfield special is lit).

Adj. 5 Limit FreeGame - Adjust for the maximum number of free games that may be accumulated per game; 0 to 9 .

Adj. 6 Limit Extra Balls - Adjust for the maximum number of extra balls that may be accumulated per game; 1 to 9 or OFF.

SINGLE-FUNCTION DIFFICULTY ADJUSTMENT (Adj. 7)

Any one of five INSTALL settings for this adjustment may be activated to automatically select settings for multiple adjustments affecting game difficulty. Use the Start button to choose the difficulty level you require and press the step button to activate the setting. After activation, the individual adjustments may be readjusted if desired. Refer to Install Adjustment Table for details.

Adj. 07 Game Rules - Set to **EXTRA EASY, EASY, FACTORY, HARD** or **EXTRA HARD**.

(Note - Additional game features not variable by the Expanded Adjustments may also change using this setting.)

Install Adjustment	Adj. 7 Extra Easy	Adj. 7 Easy	Adj. 7 Factory	Adj. 7 Hard	Adj. 7 Extra Hard
Adj. 44. Extra Ball in Memory	YES	YES	YES	YES	NO
Adj. 46. Crane Qualifies Jackpot	NO	NO	YES	YES	YES
Adj. 47. Crane Hurry Up	NO	NO	NO	YES	YES

NOVELTY / 5-BALL/ADD-A-BALL SETTINGS

The following three combinations are recommended for situations where local laws restrict certain game features regarding the use of replays or the number of balls per game:

Novelty Play Rules - Set to establish recommended settings for no free play or extra balls:

Adj. 1 Manual Replay = Fixed
 Adj. 2 Start Replay = 00
 Adj. 3 Levels Replay = None
 Adj. 4 Game Awards = None
 Adj. 5 Limit Freegame =0

Adj. 6 Limit Extra Balls = 0
 Adj. 13 Match Percent = Off
 Adj. 19 World Record Awards=0
 Adj. 20-22 Todays 1-3 Awards= 0

5-Ball Play Rules - Set to establish recommended settings for 5-ball play:

Adj. 1 Manual Replay =07%
 Adj. 2 Replay Start = 400,000,000
 Adj. 3 Replay Levels = 01
 Adj. 4 Game Awards = Credit
 Adj. 5 Limit Freegame =3
 Adj. 6 Limit Extra Balls = 3

Adj. 13 Match Percent = 04
 Adj. 14 Balls/Game =5
 Adj. 19 World Record Awards = 3
 Adj. 20 Todays 1 Award= 1
 Adj. 44 Extra Ball in memory = No
 Adj. 46 Crane Qualifies Jackpot = No

Adj.47 Crane Hurry Up = Yes

Extra Ball Settings-To disable awarding of credits and provide awards with an extra ball make the following adjustments:

Adj. 4 Game Awards = Extra Ball
 Adj. 5 Limit Freegame = 0
 Adj. 13 Match Percent = OFF

Adj. 18 Scores Highest = No
 Adj. 19 to 22 World Record & Todays High Awards= 0

GAME PRICING (Adj. 8)

There are two methods available for coin switch programming; Standard and Custom. Standard pricing uses a single adjustment (Adj. 8) to select a pricing scheme shown in the **Standard /Custom Pricing Table**. Custom pricing is used to select additional pricing schemes defined by a Drop Down menu .

With Adj. 8 set to **CUSTOM** operating the step button again initiates a drop down menu representing coin switch pulses for the left, right, and center coin slots. The prescribes the number of pulses required for one credit. For example, if *Left Coin Pulses*, was set to 02 and *Coin Switch Pulses Required for 1 Credit*, to 01 a coin in the left slot would produce two credits. Further, if *Left Coin Pulses*, was set to 01 and *Coin Switch Pulses Required for 1 Credit*, to 02, two coins in the left slot would be required for one credit.

Coin Switch Pulses Required for Bonus Credit may be set to post bonus credits when a minimum amount of coins are inserted at one time. For example, if *Left Coin Pulses* was set to 01, *Coin Switch Pulses Required for 1 Credit* to 01 and *Coin Switch Pulses Required for Bonus Credit* to 04, one credit would be posted for each of the first three coins in the left slot and two credits for the fourth coin.

Standard/Custom Pricing - Set for the desired pricing scheme from the Standard Pricing Table as indicated in the Player 1 and 2 displays. For Custom Pricing, set to **CUSTOM**. When set to CUSTOM, the following adjustments are utilized to tailor each individual coin chute.

Left Coin Switch Pulses - Set the number of pulses registered for closure of the left coin switch; 00 to 99.

Right Coin Switch Pulses - Set the number of pulses registered for closure of the right coin switch; 00 to 99.

Center Coin Switch Pulses - Set the number of pulses registered for closure of the center coin switch; 00 to 99.

Coin Switch Pulses Required for 1 Credit - Set the number of coin switch pulses required to post one credit; 00 to 99.

Coin Switch Pulses Required for Bonus Credit- Set the number of coin switch pulses required to award the 1st bonus credit(s); 00 to 99.

Coin Switch Pulses Required for 2nd Bonus Credit- Set the number of coin switch pulses required to award the 2nd bonus credit; 00 to 99.

Credits awarded for 1st Bonus - Set the number of credits awarded for achieving the first Bonus level; 00 to 99.

CUSTOM PRICING TABLE

Coin Mechs				Plays/Coins	Adjustments							
Left	Right	Center	4th		Left Pulses	Right Pulses	Mid Pulses	4th Pulses	Pulses /Credit	Pulses /bonus	Pulses/ 2nd Bon	Credit/ 1st Bonus
25¢	25¢	\$1.00	n/u	1/25¢ 3/50¢ 1/25¢ 5/\$1.00 1/25¢/ 6/\$1.00	01 01 05	01 01 05	04 04 20	00 00 00	01 01 04	02 04 20	00 00 00	01 01 01
5SCH	10SCH	10SCH	n/u	1/10 SCH 1/10 SCH 4/30SCH	01 04	02 08	02 08	00 00	02 06	00 00	00 00	00 00
10P	£1	50P	20P	1/30P 2/50P 5/£1 1/50P 3/£1 1/30P 4/£1	01 01 01	15 15 12	06 05 05	02 02 02	03 05 03	00 00 00	00 00 00	00 00 00
20¢	\$1.00	n/u	n/u	1/60¢ 2/\$1.00	01	05	00	00	03	05	00	01

STANDARD PRICING TABLE

Adj. 8 Standard Pricing Select	Coin Mechs				Plays Per Coin			
	Left 1st	Center 2nd	Right 3rd	4th	1st	2nd	3rd	4th
USA 1-1 Coin 1 Play	25¢	\$1.00	25¢		1PLAY/1COIN	4PLAY/1COIN	1PLAY/1COIN	
USA 2-4 Coin 3 Play *	25¢	\$1.00	25¢		1PLAY/2COIN	3PLAY/1COIN	1PLAY/2COIN	
					2PLAY/3COIN	6PLAY/2COIN	2PLAY/3COIN	
					3PLAY/4COIN	9PLAY/3COIN	3PLAY/4COIN	
USA 3-2 Coin 1 Play	25¢	\$1.00	25¢		1PLAY/2COIN	2PLAY/1COIN	1PLAY/2COIN	
USA 4-2 Coin 1 Play	25¢		25¢		1PLAY/2COIN For the 1st Play 1PLAY/1COIN during BUY-IN			
USA 5-\$2.00 5 Plays	25¢	\$1.00	25¢		1PLAY/2COIN	2PLAY/1COIN	1PLAY/2COIN	
					5PLAY/8COIN	5PLAY/2COIN	5PLAY/8COIN	
USA 6- 50¢ - 3/\$1Bill	25¢	\$1.00	25¢		1PLAY/2COIN	3PLAY/1COIN	1PLAY/2COIN	
					2PLAY/4COIN	6PLAY/2COIN	2PLAY/4COIN	
USA 7-\$2.00 6 Plays	25¢	\$1.00	25¢		1PLAY/2COIN	2PLAY/1COIN	1PLAY/2COIN	
					2PLAY/4COIN	6PLAY/2COIN	2PLAY/4COIN	
Austria	5 SCH	10 SCH	10 SCH		1PLAY/2COIN	1PLAY/1COIN	1PLAY/1COIN	
					2PLAY/3COIN	3PLAY/2COIN	3PLAY/2COIN	
					3PLAY/4COIN			
Australia	20¢	\$1.00	\$2.00		1PLAY/5COIN	1PLAY/1COIN	3PLAY/1COIN	
Belgium	5f	20f	50f		1PLAY/4COIN	1PLAY/1COIN	3PLAY/1COIN	
Canada	25¢	25¢	\$1.00		1PLAY/2COIN	1PLAY/2COIN		
					2PLAY/3COIN	2PLAY/3COIN		
					3PLAY/4COIN	3PLAY/4COIN		
Denmark	1Kr	5Kr	10Kr	20Kr	1PLAY/3COIN	2PLAY/1COIN	4PLAY/1COIN	8PLAY/1COIN
French 1 *	1f	5f	10f	20f	1PLAY/3COIN	2PLAY/1COIN	5PLAY/1COIN	11PLAY/1COIN
					2PLAY/5COIN	5PLAY/2COIN	11PLAY/2COIN	
					5PLAY/10COIN	11PLAY/4COIN		
French 2	1f	5f	10f	20f	1PLAY/5COIN	1PLAY/1COIN	3PLAY/1COIN	7PLAY/1COIN
					3PLAY/10COIN	3PLAY/2COIN	7PLAY/2COIN	
					7PLAY/20COIN	7PLAY/4COIN		
French 3	1f	5f	10f	20f	1PLAY/3COIN	2PLAY/1COIN	4PLAY/1COIN	9PLAY/1COIN
					2PLAY/5COIN	4PLAY/2COIN	9PLAY/2COIN	
					4PLAY/10COIN	9PLAY/4COIN		
German 1	1 DM	2 DM	5 DM		1PLAY/1COIN	2PLAY/1COIN	6PLAY/1COIN	
					2PLAY/2COIN	4PLAY/2COIN		
					3PLAY/3COIN	6PLAY/3COIN		
German 2	1 DM	2 DM	5 DM		1PLAY/1COIN	2PLAY/1COIN	7PLAY/1COIN	
					2PLAY/2COIN	4PLAY/2COIN	21PLAY/3COIN	
					3PLAY/3COIN	6PLAY/3COIN		
German 3 *	1 DM	2 DM	5 DM		1PLAY/2COIN	1PLAY/1COIN	5PLAY/1COIN	
					2PLAY/3COIN	3PLAY/2COIN	10PLAY/2COIN	
					3PLAY/4COIN	5PLAY/3COIN	15PLAY/3COIN	
Italy 1	500L		500L		1PLAY/1COIN		1PLAY/1COIN	
Italy 2	500L		500L		1PLAY/2COIN		1PLAY/2COIN	
					3PLAY/4COIN		3PLAY/4COIN	
Japan			100¥				1PLAY/1COIN	
							3PLAY/2COIN	
Korea	100 Won		100 Won		1PLAY/1COIN		1PLAY/1COIN	
Netherland 1	1 Guilder	1 Guilder	2.5Guilder		1PLAY/1COIN	1PLAY/1COIN	3PLAY/1COIN	
Netherland 2	1 Guilder	2.5Guilder	5 Guilder		1PLAY/1COIN	3PLAY/1COIN	6PLAY/1COIN	
New Zealand 1	\$1.00		\$2.00		1PLAY/1COIN		2PLAY/1COIN	
New Zealand 2	\$1.00		\$2.00		1PLAY/1COIN		3PLAY/1COIN	
Spain	100Pts		500Pts		1PLAY/1COIN		6PLAY/1COIN	
Sweden	1 SEK	5 SEK	10 SEK		1PLAY/10COIN	2PLAY/3COIN	3PLAY/2COIN	
Swiss 1	1 SFR	2 SFR	5 SFR		1PLAY/1COIN	2PLAY/1COIN	6PLAY/1COIN	
Swiss 2	1 SFR	2 SFR	5 SFR		1PLAY/1COIN	3PLAY/1COIN	9PLAY/1COIN	
UK 1	10P	50P	£1	20P	1PLAY/5COIN	1PLAY/1COIN	3PLAY/1COIN	3PLAY/5COIN
					3PLAY/10COIN	3PLAY/2COIN		
UK 2	10P	50P	£1	20P	1PLAY/4COIN	1PLAY/1COIN	3PLAY/1COIN	1PLAY/2COIN
					2PLAY/8COIN	3PLAY/2COIN		2PLAY/4COIN
					3PLAY/10COIN			3PLAY/5COIN
UK 3	10P	50P	£1	20P	1PLAY/5COIN	1PLAY/1COIN	2PLAY/1COIN	2PLAY/5COIN
					2PLAY/10COIN	2PLAY/2COIN		
Yugoslavia	5 Dur		5 Dur		1PLAY/1COIN		1PLAY/1COIN	

ADDITIONAL GENERIC FEATURES

Adj. 9 Coin Reset - When enabled (set to **YES**) all coin and paid credit totals will be reset to zero when STEP is depressed.

Adj. 10 Audits Reset - When enabled (set to **YES**) all audit totals except for coins and paid credits will be reset to zero when STEP is depressed.

Adj. 11 Restore High Score - When enabled (set to **YES**) the High Score Levels and associated initials will be restored to backup settings when STEP is depressed .

Adj. 12 Expand Adjustments - When set to **NO**, depressing the STEP push-button advances directly to Adj. 46, FACTORY RESTORE. When set to **YES**, depressing the STEP push-button sequences through the expanded adjustments. When exiting from expanded adjustments, this function is reset to **OFF** for the next time that adjustments are required.

Adj. 13 Match Percent- Set Match percent from **00%** to **10%** or **OFF**. At **00%** the match display occurs at the end of the game but never awards a credit.

Adj. 14 Balls Per Game - Adjust the number of balls per game; **2** to **5**.

Adj. 15 Tilt Warnings - Adjust the number of plumb bob tilt switch closures before the ball in play is tilted; **1** to **3** or **OFF**.

Adj. 16 Replay Boost - Set to **YES** or **NO**. When set to **YES**, exceeding a replay will set a temporary replay level for each time a replay level is surpassed. This new level will equal the previous replay level (when the replay was awarded) plus 50 Million for each following game, until the replays have all been played. At this time the previous level is resumed.

Adj. 17 Credits Limit - Adjust the maximum number of credits that may be posted; **4** to **50**.

HIGH SCORE LEVELS (Adj. 18 through 29)

There are four of the six high score levels with associated player initials that are displayed during the attract mode. This provides a high-score-to-date feature. When players exceed these levels, the player initials may be entered to replace the previous ones. These levels may be adjusted to award credits and to be reset to backup values after a selected number of games.

Adj. 18 Hiscores Allowed - Set to enable or disable the four high score levels; **YES** or **NO**.

Adj. 19 World Record - Adjust the number of credits awarded for exceeding level 1 (the highest of the four levels); **0** to **5**.

Adj. 20 Highscore 2 Award- Adjust the number of credits awarded for exceeding level 1; **0** to **3**.

Adj. 21 Highscore 3 Award - Adjust the number of credits awarded for exceeding level 2; **0** to **2**.

Adj. 22 Highscore 4 Award - Adjust the number of credits awarded for exceeding level 3; **0** to **1**.

Adj. 23 Backup World Record - Adjust the score level to which the world record (the highest of the four levels) may be altered. This adjustment is not affected by Adj.30 (Factory Reset defaults to 7,500,000).

Adj. 24 Backup Highscore 2 - Adjust the backup score level to which level 1 may be reset.

Adj. 25 Backup Highscore 3- Adjust the backup score level to which level 2 may be reset.

Adj. 26 Backup Highscore 4- Adjust the backup score level to which level 3 may be reset.

Adj. 27 Backup Highscore 5- Adjust the backup score level to which level 4 may be reset.

Adj. 28 Backup Highscore 6- Adjust the backup score level to which level 5 may be reset.

Adj. 29 High Score Reset Every - Adjust the number of games between automatic resets of high score levels to backup settings and ball time averager adjustments; 100 to 900 or OFF (no reset or adjustment).

Adj. 30 Free Play - When set to **YES**, no coins are required for games.

Adj. 31 Custom Message - When desired, this function is used to establish a custom message periodically displayed during the attract mode. Set the feature to **CHANGE** using the Credit button and depress STEP. The letter **A** is indicated in the first position of the Player 1 display. Vary the letter by operating the left and right flippers. With the desired letter indicated, depress the CREDIT button to lock in the letter and advance to the next display character. Repeat this procedure until the desired message is indicated in the Player 1 and 2 displays. At this time, depress the STEP push-button switch to advance to Adj. 34.

Adj. 32 Flash Lamps- Set to **NORMAL**, **DIM** or **OFF**. When set to **NORMAL** the Flash Lamps are active, when **DIM** the Flash Lamps impulse power is reduced by 25% and when **OFF** the Flash Lamps do not flash.

Adj. 33 Coils Pulse- Set To **NORMAL**, **HARD** or **SOFT**. When **HARD** the coil pulse power is increased by 12.5% of the normal pulse rate. When set to **SOFT** the coil pulse power is reduced by 12.5% of the normal pulse rate. These adjustments are provided to compensate for Low Line or High Line voltage conditions where the solenoids appear to kicking too weak or too hard.

Adj. 34 Level Adjust by - When set to **INT. OPERATOR**, the Manual Percentage Replay Adjustment can only be altered with the front door open (see manual page 3). When set to **EXT. OPERATOR**, the Manual Percentage Replay Adjustment will display the message "PRESS START TO CHANGE REPLAY LEVEL" on power up if a change is recommended, and immediately operating the replay button will initiate the change to the replay score.

Adj. 54 Factory Restore-Depressing STEP without changing the value shown in the Player 4 Display locks in any custom message set with Adj.33 and returns the game to Game Over. Set the value to **ON** and depress STEP switch to revert all game adjustments to factory settings, clear the Custom Message and return to Game Over.

GAME SPECIFIC FEATURES (Adj. 35 TO Adj. 53)

Adj. 35 Next Game Promo- Set to **ON** or **OFF**. When set to **ON**, the game, in attract mode will randomly display a short promotion for our next game. When set to **OFF**, the game in attract mode will not generate any sounds or graphics referring to the next game.

Adj. 36 Buy in Allowed - Set to **YES** or **NO**. When set to **YES**, the game will display a countdown timer at the end of each game allowing the player to "Buy in" most of the features accumulated during the previous game. When set to **NO**, none of the previous game features will be retained and no countdown timer will appear.

Adj. 37 Game Restart -Set to **YES** or **NO**. When set to **YES**, a new game may be started during any ball after the first ball is completed. (Note-Pressing start during the first ball will add additional players.) When set to **NO**, The game disables the start button after the first ball until the final ball is in play.

Adj. 38 Extra Ball Percentage -Set from **0** to **50**. Allows the operator to adjust how frequently the Extra Ball feature is made available to the player.

Adj. 39 Background Volume - Set to **0**, **25**, **50**, **75** or **100** percent. Allows the operator to adjust the background music volume independently from the normal game sounds.

Adj. 40 Bill Validator - Set to **YES** or **NO**. When set to **YES**, the display, in game attract mode, will show an "Insert Bill Animation". When set to **NO**, the display, in game attract mode will show "Insert Coin Animation".

Adj. 41 SHAKER MOTOR- Set to **ON** or **OFF**. Allows operation of the vibrating Shaker motor during certain events in game play.

Adj. 42 RIPPER FREEZE- Set to **YES** or **NO**. When set to **YES**, all balls shot directly into the outhole from the Ripper Kickback shot will be kicked back into play for the same player.

Adj.43 CRANE ON/OFF- Used to disable the crane so game will still operate even if there is a problem with the crane.

Adj.44 EXTRA BALL IN MEMORY - Set to **YES** or **NO**. When set to **YES**, the lit shoot for extra ball light will be retained in memory from ball to ball for the same player. When set to **NO**, the lit shoot for extra ball light will go out at the end of each ball.

Adj.45 SPECIAL IN MEMORY - Set to **YES** or **NO**. When set to **YES**, the lit shoot for Special light will be retained in memory from ball to ball for the same player. When set to **NO**, the lit shoot for Special light will go out at the end of each ball.

Adj.46 CRANE QUALIFIES JACKPOT- When set to **YES**, the crane shot must be made before the M-Ball ramp jackpot is qualified, otherwise jackpot is qualified at M-Ball start.

Adj.47 CRANE HURRY UP- When set to **YES** the Crane ball locks must be made before count down timer runs out.

Adj. 48 TOURNAMENT STYLE - Set to **NONE**, **PINBALL EXPO**, **IFPA-PAPA** or **HOME**. This function determines the default conditions to quickly prepare a game for tournament play. When this setting is changed all audits will be reset and all adjustments will be initiated to the particular style selected. The game will then return to game over attract mode, as if a Factory Restore had been performed.

NONE - Same as a Factory Reset conditions.

IFPA - Straight 50¢ play, no replay, no Extra Ball, no High Scores, 2 Tilt Warnings and No Match.

PINBALL EXPO-PAPA- Same as IFPA settings except Free Play is enabled.

HOME-Sets game for Free Play, extra ball play, no replay, 10% Match and Extra Ball percentage = 30%.

Adj.49 ATTRACT MODE MUSIC- Set to **ON** (approximately every 3 minutes),or **OFF**.

Adj.50 LOCATION I.D.- Set from **0** to **9999**. Allows the operator to assign a location identification number to the audit print-out sheet.(Will not be affected by Factory Restore.)

Adj.51 GAME I.D.- Set from **0** to **9999**. Allows the operator to assign a game identification number to the Audit print-out sheet.(Will not be affected by Factory Restore.)

Adj.52 PRINTER RESET- Resets the print-out counter (to 0) which is incremented and displayed on each new Audit Data sheet printed.

Adj.53 START TRANSMIT-Initiates transmission of the Audit Data from the game to the printer by pressing the start button.

GAME DIAGNOSTICS

The Data East Pinball system provides tests for sounds, digital displays, lamps, 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.

During game play, activation of switches and operation of coils with associated switches are monitored. If a switch is not made for 50 games it is considered bad. When operation of a coil should close or open a switch and does not, the coil is considered bad. In Game over attract mode, bad switches and coils (if any) are reported (See Tech Alert Description below). Note that reporting of an unused switch does not constitute a problem and that a bad coil could mean that the associated switch requires adjustment.

Wiring to switches, solenoids and controlled lamps uses color-coded wires that basically follows a resistor color-code scheme for the eight rows and eight columns. During the switch tests and during the discrete lamp test, identification of the color of the row and column wires are indicated in the Player 3 & 4 Displays. For example, making the right coin switch during the Switch Test results in the switch functional name (RIGHT COIN) shown in the Player 1 and 2 Displays, the row (WHT-YEL) and column (GRN-BRN) wire color codes shown in the Player 3 display, and the switch number shown in the Player 4 display.

BLK=Black
BRN=Brown
RED=Red
ORN=Orange
YEL=Yellow

GRN=Green
BLU=Blue
VIO=Violet
GRY=Grey
WHT=White

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 (U.S. including Illinois) and the toll number (708) 345-7700 (Outside the United States). this indicates entry into game diagnostics.

Service Credits

With the phone number displayed depress the STEP push-button switch. The game now gives the technician the option of adding 1 to 5 service credits. These credits allow the technician to test-play the game without adding any counts to the coin audits (AU 01 & AU 05-AU 08). When the message appears, press and hold the Game Start pushbutton until the desired number of credits are shown on the display. Then press the step button again to add these credits to the game and enter Tech Alert. If no Service Credits are desired, press the step button with the initial message displayed.

Tech Alert

The player displays will now indicate if there are any Bad Switches (Switches that are closed, that should not be, or switches that have not been activated in 50 games).

Easy Trough Clear

Pressing the step button again displays the EASY TROUGH CLEAR message and instructs the player to operate either flipper button to easily remove the balls from the trough. This is provided, to allow the technician a simple method of removing the balls from the trough prior to entering the Active Switch Test ,thereby reducing the number of switches closed.

Burn-In Minutes

Pressing the step button while in Tech Alert mode will step game into Burn-in Mode(Factory use). At this stage pressing the game start button will cause the game to exercise all CPU I/O functions. This is provided to constantly exercise sounds, solenoids, etc...

To stop the test press the start button again. Cumulative Burn-In minutes will be displayed. To reset Burn-In minutes to 00, you must perform a Audit Reset Adj. 11 or a Factory Restore Adj. 99.

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 bottom display shows the sound board circuit under test and the corresponding sounds are selected by operating the left and right flipper buttons to choose the circuit to be tested. Now press the start button to initiate the sound. Refer to the Sound Test Chart for the sound circuits displayed and the sounds produced.

The sound 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 SPEAKER CENTER SPEAKER RIGHT SPEAKER VOICE ROM1 (Loc U17) VOICE ROM2 (Loc U21) MUSIC TEST (Sound ROM Loc U7)	Left Sine (Left Speaker Only) Center Sine (All speakers) Right Sine (Right Speaker Only) "I'll be back!" "Ready?" Level 1 Through Level 3 Music

Speaker Phase Testing

Connections to each of the three speakers are polarized and each must be connected appropriately for the best quality sound. If one speaker has the positive and negative connections reversed with respect to the other two, bass frequencies will not be produced properly and the overall sound quality will be poor.

To test for proper speaker phasing, use the sound test to cycle through the Left, Center, and Right Sine functions. If the Center Sine produces more volume and bass than the Left and Right Sines, the speakers are connected properly. If it produces the same or less, one speaker is connected improperly. To isolate and correct reversed speaker connections, one of two methods may be used.

1. Check each speaker for polarity markings. If the speakers have polarity markings, verify that the single-color wire (BLK, YEL or RED) is connected to the negative (-) terminal.
2. Disconnect the speaker output connector from the Sound Board and connect a 1.5-volt battery across each speaker pair one at a time while observing the speakers. Make sure that the positive battery terminal is connected to the positive lead (CN1-pin 1, 3, or 6) each time. As the connection is made, check speaker cone movement; proper connections are indicated by outward movement.

DIGITAL DISPLAY TEST

The Digital display utilizes a Dot Matrix Display Control board mounted in piggyback fashion to the display driver Board. The purpose behind this board is to provide more information (32 X 128 Dots) to the operator as well as displaying graphics to the player.

The board is controlled by a 68B09E microprocessor and it's personality ROMs (Unique to the Game) . It receives Data, Reset & Clock information from the CPU Board via the ribbon cable and sends back multiple Status and Busy signals to the CPU . This is to insure synchronized communication between the CPU and the Display Controller board.

The Drivers for the rows and columns are provided on 4 surface mounted integrated circuits on the Display driver board.

Automatic Test

To enter Display tests, operate the STEP push-button switch from the Sound Manual test. The displays will first illuminate one vertical column of dots in the Display. After a slight delay it will cycle one column from left to right. After a period of time, it will begin the Row test by lighting the top row of the display, then turning it off and illuminating the next row, until each row has been individually lit, while the other rows are off. The test will then turn all the dots in the display on except for one column. It will then cycle this blank column from left to right. After a period of time, it will begin the second Row test by blanking the top row of the display, then turning it on and blanking the next row, until each row has been individually blanked, while the other rows are on. The next test begins with every other dot lit, in both the rows and columns. These dots then go out, and the unlit dots light, resulting in an alternating checkerboard pattern. The test will then repeat these cycles again until advanced to the next test or until the power is removed. (Please Note- these tests may be interrupted at any time by operating the STEP push-button switch to advance to the next test.)

Crane Test

This test shows the status of the two limit switches for the crane mechanism, and provides motor control to actuate these switches. To move the crane left and right, operate the start button. As long as the button is depressed the motor will continue to rotate. The motor only rotates in one direction, but the cam on the motor, allows the crane arm to sweep an arc of 145 degrees and then return. During this process the display indicates the status of both limit switches.(i.e. LEFT CRANE SW. ON - RIGHT CRANE SW. OFF)

Operating the trigger switch should pulse the ball release coil on the crane mechanism.

Magnet Test

This test rapidly cycles the 3 magnets located in the center of the playfield as long as the start button is operated. In addition, the display indicates the current status of the test. It is recommended that this test not be operated for more than a few seconds due to the high current required to operate these magnets.

Laser Kick Test

This test provided to insure proper interaction between certain switches and their associated solenoids without entering game play. For example, by rolling the ball over the left outlane switch the Laser Kick should fire. If it kicks too early or too late, the switch actuator should be adjusted to compensate for this error. If it fails to fire, use the switch test or coil test to help determine the cause of failure. Note: During this function, similar tests may be performed on Vertical Up Kickers or Saucers in the game.

Switches

Switches are configured in 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.

Switch Test

From the Laser Kick 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 until another switch is closed or the test is exited.

Active Switches

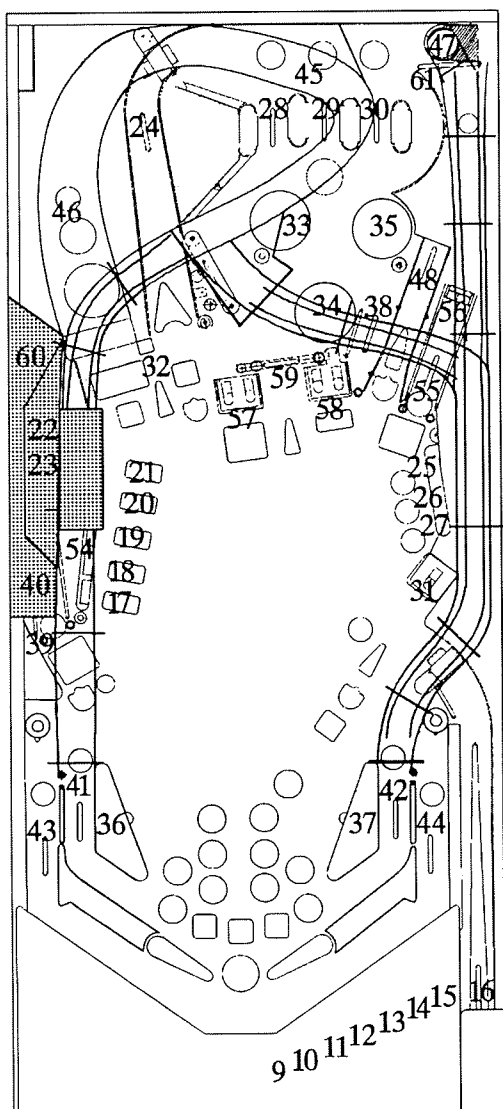
Operate the STEP push-button switch from the Switch Test. Player 1 and 2 Displays indicate ACTIVE SWITCHES. If any switches are stuck closed (or made from the presence of a ball), the Player 1 and 2 displays sequence through switch names, the Player 3 display indicates the row and column wire colors, 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.

SWITCH MATRIX CHART

COLUMN ROW	1 Q55 GRN-BRN CN8-1	2 Q54 GRN-RED CN8-2	3 Q53 GRN-ORN CN8-3	4 Q52 GRN-YEL CN8-4	5 Q51 GRN-BLK CN8-5	6 Q50 GRN-BLU CN8-7	7 Q49 GRN-VIO CN8-8	8 Q48 GRN-GRY CN8-9
1 WHT-BRN CN10-9	Plumb Tilt 1	Trough #1 Left 9	Drop Target C 17	Right Stand Up Top 25	Left Turbo Bumper 33	Left Return 41	Not Used 49	Middle Scoop Left 57
2 WHT-RED CN10-8	4th Coin 2	Trough #2 10	Drop Target R 18	Right Stand Up Middle 26	Bottom Turbo Bumper 34	Right Return 42	Not Used 50	Middle Scoop Right 58
3 WHT-ORN CN10-7	Credit Button 3	Trough #3 11	Drop Target A 19	Right Stand Up Bottom 27	Right Turbo Bumper 35	Left Outlane 43	Not Used 51	Scoop Spinner 59
4 WHT-YEL CN10-6	Right Coin 4	Trough #4 12	Drop Target N 20	Top Rollover Left 28	Left Slingshot 36	Right Outlane 44	Not Used 52	Crane Left Limit 60
5 WHT-GRN CN10-5	Center Coin 5	Trough #5 13	Drop Target E 21	Top Rollover Middle 29	Right Slingshot 37	Left Ramp Exit 45	Not Used 53	Crane Right Limit 61
6 WHT-BLU CN10-3	Left Coin 6	Trough #6 14	Left Lock Top 22	Top Rollover Right 30	Right Scoop R.O. 38	Left Ramp Enter 46	Drop Target Bar (2) 54	Smart Missile 62
7 WHT-VIO CN10-2	Slam Tilt 7	Trough #7 Right 15	Left Lock Bottom 23	Right Scoop Assem. 31	Left Captive Rollover 39	VUK 47	Right Captive Rollover 55	Left Flipper 63
8 WHT-GRY CN10-1	Launch Trigger 8	Shooter Lane 16	Single Left Rollover 24	Animated Cat Target 32	Left Captive Ball Target 40	Ripper Kickback 48	Right Captive Target 56	Right Flipper 64

Last Action Hero - Switch Part Numbers

Switch Number	Description	Part No.
01*	Plumb Tilt	See Cabinet
02*	4th Coin	-
03*	Credit Button	500-5097-02
04*	Right Coin	180-5024-00
05*	Center Coin	180-5024-00
06*	Left Coin	180-5024-00
07*	Slam Tilt	180-5022-00
08*	Launch Trigger	180-5111-00
09	Trough #1 Left	180-5119-00
10	Trough #2	180-5119-00
11	Trough #3	180-5119-00



Switch Locations

Switch Number	Description	Part No.
12	Trough #4	180-5119-00
13	Trough #5	180-5119-00
14	Trough #6	180-5119-00
15	Trough #7 Right	180-5118-00
16	Shooter Lane	180-5100-01
17	Drop Target C	180-5092-01
18	Drop Target R	180-5092-01
19	Drop Target A	180-5092-01
20	Drop Target N	180-5092-01
21	Drop Target E	180-5092-01
22	Left Lock Top	180-5128-00
23	Left Lock Bottom	180-5128-00
24	Single Left Rollover	500-5706-00
25	Right Stand-Up Top	180-5130-00
26	Right Stand-Up Middle	180-5130-01
27	Right Stand-Up Bottom	180-5130-02
28	Top Rollover Left	500-5706-00
29	Top Rollover Middle	500-5706-00
30	Top Rollover Right	500-5707-00
31	Right Scoop Assembly	500-5057-00
32	Animated Cat Target	180-5125-02
33	Left Turbo Bumper	180-5015-01
34	Bottom Turbo Bumper	180-5015-01
35	Right Turbo Bumper	180-5015-01
36	Left Slingshot	180-5054-00
37	Right Slingshot	180-5054-00
38	Right Scoop Rollover	500-5707-00
39	Left Captive Rollover	500-5706-00
40	Left Captive Target	180-5114-08
41	Left Return	500-5706-00
42	Right Return	500-5707-00
43	Left Outlane	500-5706-00
44	Right Outlane	500-5707-00
45	Left Ramp Exit	180-5090-00
46	Left Ramp Entrance	180-5090-00
47	VUK	180-5116-00
48	Ripper Kickback	500-5707-00
49	Not Used	-
50	Not Used	-
51	Not Used	-
52	Not Used	-
53	Not Used	-
54	Drop Target Bar (2)	180-5129-00
55	Right Captive Rollover	500-5707-00
56	Right Captive Tgt.	180-5114-08
57	Middle Scoop Left	180-5116-00
58	Middle Scoop Right	500-5700-00
59	Scoop Spinner	180-5010-04
60	Crane Left Limit	180-5093-00
61	Crane Right Limit	180-5093-00
62	Smart Missile	180-0028-00
63	Left Flip. Cab	180-5048-01
64	Right Flip. Cab	180-5048-01

LAMP TESTS

Controlled lamps are configured in 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, all lamps, lamp return (row), lamp drive (column), and discrete (individual) lamps. Row and column wire colors are indicated in the discrete lamp test using corresponding resistor color code numbers.

All Lamps

From the Active Switch test, operate the STEP push-button switch. Player 1 and 2 displays indicate ALL LAMPS and all controlled lamps will light.

Lamp Returns

From the ALL LAMPS test, depress the STEP push-button switch. The top display indicates LAMP RETURNS and the Bottom display indicates wire color and the LAMP RETURN driver transistor. All controlled lamps in row 1 should be lit. Operating the Game Start push-button switch cycles through each of the rows separately.

Lamp Drives

From the LAMP RETURNS test, depress the STEP push-button switch. The Top display indicates LAMP COLUMNS and the bottom display indicates wire color and the LAMP DRIVES driver transistor. All controlled lamps in column 1 should be lit. Operating the Game Start push-button switch, cycles through each of the columns separately.

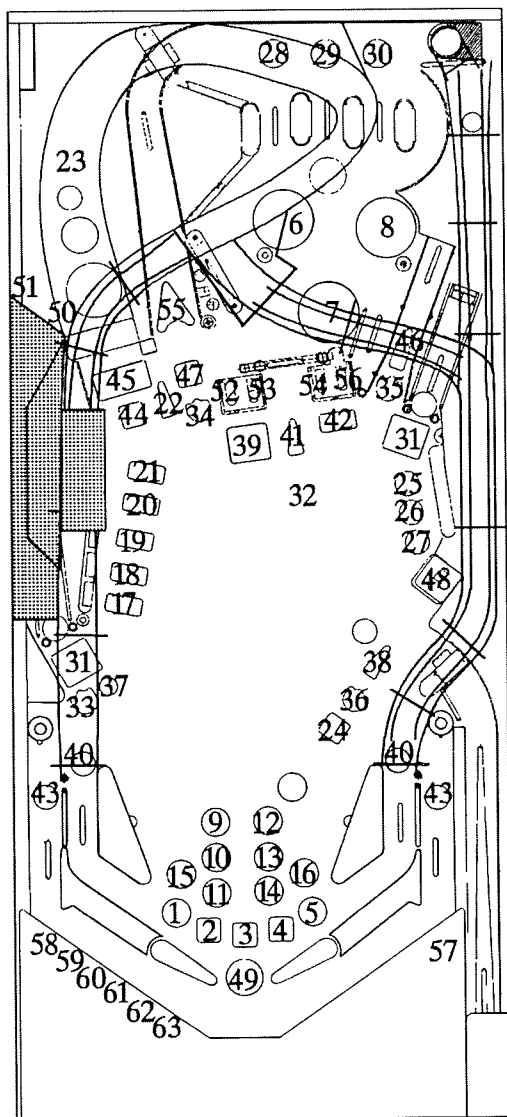
Single Lamp

From the LAMP DRIVES test, depress the STEP push-button switch. The top display indicates lamp name. The bottom display indicates the row and column wire colors and the lamp matrix number. Lamp 01 should light. With the FORWARD/REVERSE push-button switch in the FORWARD (up) position, operating the Game Start push-button switch selects higher-numbered lamps; with it in the REVERSE (down) position, Game Start selects lower-numbered lamps.

LAMP MATRIX CHART

COLUMN ROW	1 Q71 YEL-BRN CN7-1	2 Q70 YEL-RED CN7-2	3 Q69 YEL-ORN CN7-3	4 Q68 YEL-BLK CN7-4	5 Q67 YEL-GRN CN7-6	6 Q66 YEL-BLU CN7-7	7 Q65 YEL-VIO CN7-8	8 Q64 YEL-GRY CN7-9
1 Q72 RED-BRN CN6-1	Grid: Find Benedict ₁	Grid: Fast Scoring ₉	C 17	Benedict's Eyeball Top	Shield Left ₃₃	Spinner ₄₁	Shoot Again ₄₉	Smart Missile ₅₇
2 Q73 RED-BLK CN6-2	Grid: Last ₂	Grid: Go To The Movies ₁₀	R 18	Benedict's Eyeball Middle ₂₆	Shield Left Center ₃₄	Chicken ₄₂	Lock Bottom (Right) ₅₀	R 58
3 Q74 RED-ORN CN6-3	Grid: Action ₃	Grid: Save Danny ₁₁	A 19	Benedict's Eyeball Bottom ₂₇	Shield Right Center ₃₅	Outlanes X2 ₄₃	Lock Top (Left) ₅₁	I 59
4 Q75 RED-YEL CN6-5	Grid: Hero ₄	Grid: LightExtra Ball ₁₂	N 20	Top Rollover Left ₂₈	Shield Right ₃₆	The Roof ₄₄	Middle Scoop ₅₂	P 60
5 Q76 RED-GRN CN6-6	Super Crane Chaos ₅	Grid: Cat Millions ₁₃	E 21	Top Rollover Middle ₂₉	More Time ₃₇	Jackpot ₄₅	Middle Scoop ₅₃	P 61
6 Q77 RED-BLU CN6-7	Left Turbo Bumper ₆	Grid: ToThe Roof ₁₄	Animated Cat Target ₂₂	Top Rollover Right ₃₀	Extra Ball ₃₈	Ripper ₄₆	Middle Scoop ₅₄	E 62
7 Q78 RED-VIO CN6-8	Top Turbo Bumper ₇	Grid: Red Eye ₁₅	Ramp ₂₃	Captive Ball X2 ₃₁	M-Ball ₃₉	Save Danny ₄₇	Shoot The Crane ₅₅	R 63
8 Q79 RED-GRY CN6-9	Right Turbo Bumper ₈	Grid: Big Mistake ₁₆	Wild Card ₂₄	Ticket ₃₂	Return Lanes X2 ₄₀	Right Scoop ₄₈	Middle Scoop ₅₆	Credit Button ₆₄

Lamp Number	Description
01	Find the Ripper
02	Grid:Last
03	Grid:Action
04	Grid:Hero
05	Grid:Super Crane
06	Left Turbo Bumper
07	Top Turbo Bumper
08	Right Turbo Bumper
09	Grid:Fast Scoring
10	Grid:Go to The Movies
11	Grid:Save Danny



Lamp Locations

Note:
See page 36 for lamp part numbers

12	Grid:Light Extra Ball
13	Grid:Cat Millions
14	Grid:To The Roof
15	Grid:Redeye
16	Grid:Big Mistake
17	C
18	R
19	A
20	N
21	E
22	Animated Cat Target
23	Left Ramp
24	Wild Card
25	Benedict's EyeTop
26	Benedict's Eye Middle
27	Benedict's Eye Bottom
28	Top Rollover Left
29	Top Rollover Middle
30	Top Rollover Right
31	Captive Ball X2
32	Ticket
33	Shield Left
34	Shield Left Center
35	Shield Right Center
36	Shield Right
37	More Time
38	Extra Ball
39	M-Ball
40	Return Lanes (2 Bulbs)
41	Spinner
42	Chicken
43	Outlanes (2 Bulbs)
44	The Roof
45	Jackpot
46	Ripper
47	Save Danny
48	Right Scoop
49	Shoot Again
50	Lock Bottom (Right)
51	Lock Top (Left)
52	Middle Scoop
53	Middle Scoop
54	Middle Scoop
55	Shoot the Crane
56	Middle Scoop
57	Smart Missile
58	R
59	I
60	P
61	P
62	E
63	R
64	Credit Button

FLASH LAMP / COIL TESTS

Twenty-Two regular (pulsed under microprocessor control) coil drivers are provided to switch ground to coils. The Left/Right relay is used in conjunction with drives 1 through 8 to switch +32 volts between coils or flash lamps; these sets are termed "left" and "right". This relay is located on the PPB board which provides isolation diodes and current limiting resistors. This effectively provides 29 regular coils.

Flash Lamp

From the Single Lamp test, depress the STEP push-button switch. All Flash lamps will fire randomly. This allows the Technician to easily spot any burned out bulbs and replace them without stepping through the tests below.

Automatic Test

From the Flash Lamps test, depress the STEP push-button switch. Player 1 and 2 displays indicate ALL COILS. 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 wire colors in the Player 3 and 4 displays.

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 1st drive, the wire colors are indicated in the Player 3 and 4 displays. Operate either Flipper 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 START push-button switch to cause it to be pulsed repeatedly.

RETURN TO GAME OVER

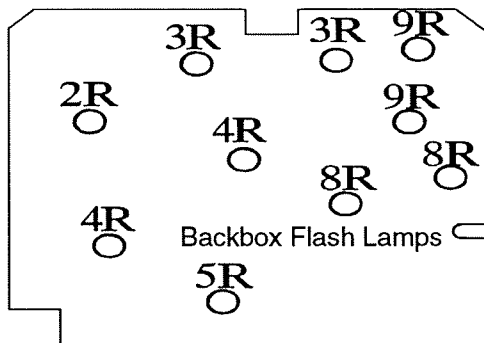
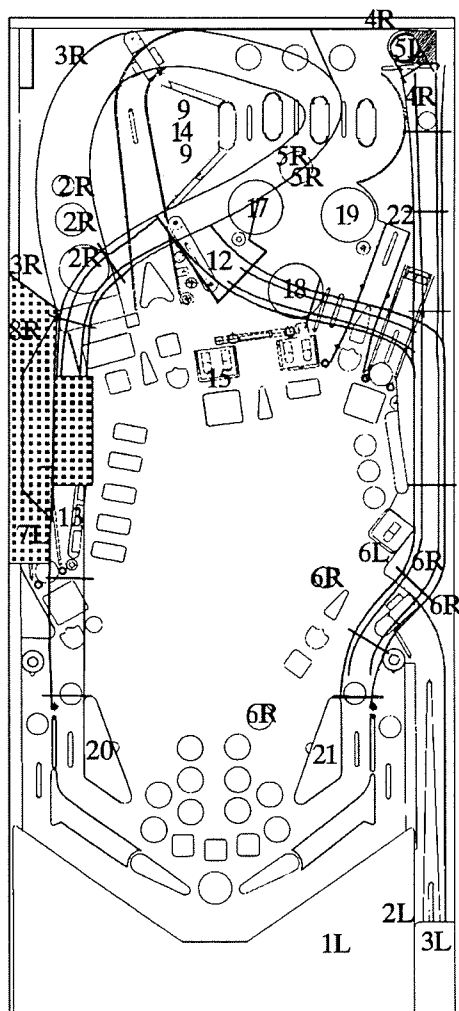
From the Select Coil test, depress the STEP push-button switch once. The game returns to the game-over mode.

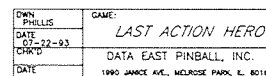
CPU Controlled Auxillary Solenoids

Coil Number	Coil Description	Control Line (CPU to Coil)	Power Line (PS to Coil)	Drive Transistor	Coil Type
17	Left Turbo Bumper	BLU-BRN CPU CN19-7	RED PS CN3-6	Q11	23-800
18	Center Turbo Bumper	BLU-RED CPU CN19-4	RED PS CN3-6	Q9	23-800
19	Right Turbo Bumper	BLU-ORN CPU CN19-3	RED PS CN3-6	Q8	23-800
20	Left Slingshot	BLU-YEL CPU CN19-6	RED PS CN3-6	Q10	23-800
21	Right Slingshot	BLU-GRN CPU CN19-8	RED PS CN3-6	Q12	23-800
22	Ripper Kickback (See Schematic)	WHT-VIO CPU CN19-9	VIO-YEL PPB J7-3	Q13	23-800

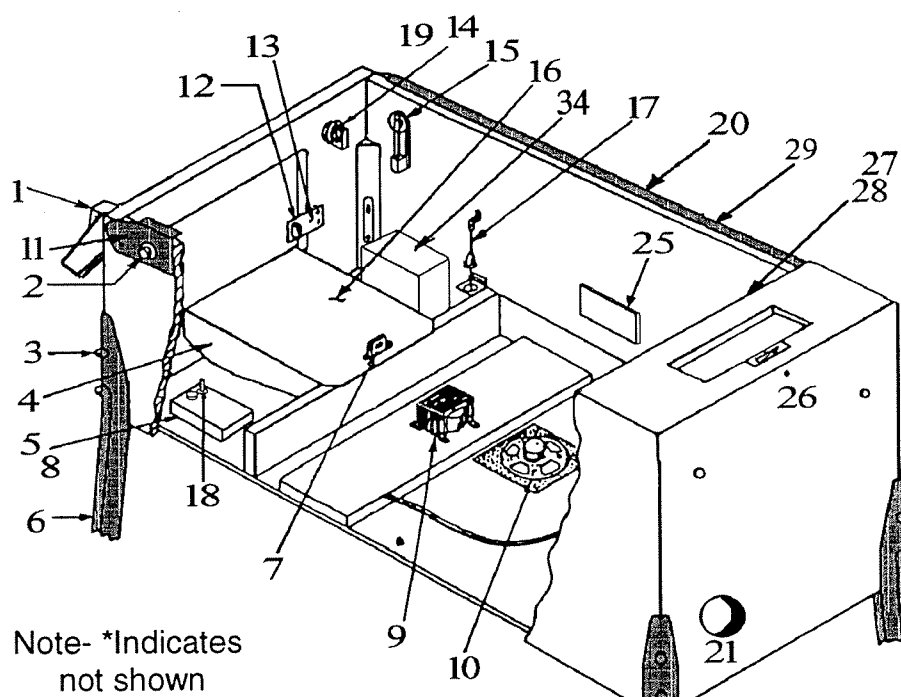
Flipper Solenoids

Coil Description	Flipper GND CPU to Flip Sw. to Flip.PCB	Power Lines FlipPc toCoil	Coil Type	Power Input To Flip PCB
Left Flipper 090-5020-30	ORN-GRY CPU CN19-2	BLU-GRY CN1-10	23-900	BLK-WHT 50VDC
Right Flipper 090-5020-30	ORN-VIO CPU CN19-1	BLU-VIO CN1-7	23-900	GRY, GRY-GRN 8VAC





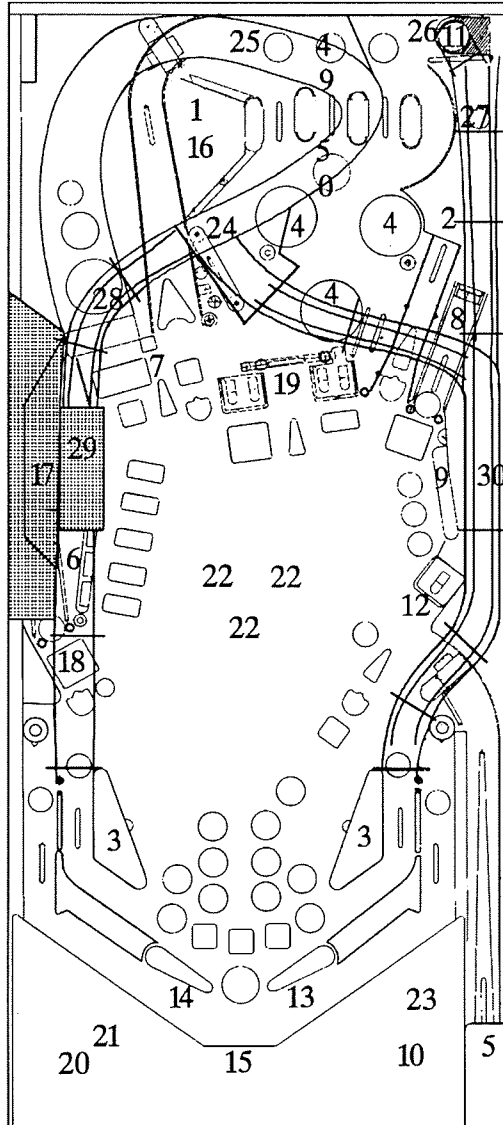
CABINET PARTS ILLUSTRATION



Note- *Indicates
not shown

Item	Description	Part No.
1	Shooter Gun Assy.	500-5731-00
2	Flipper Button	500-5026-32
3	Leg Bolt (Black)	231-5000-01
4	Cash Box Bottom	545-5090-00
5	On/Off Switch DP/ST	180-5001-00
6	Leg (Black)	535-5020-30
7	Lock Bracket-Cash Box	535-5215-00
8	Power Input Box Assy	515-5360-00
9	Transformer	010-5003-00
10	Speaker-Round (8")	031-5005-00
11	Side Armor-Right	535-5010-31
12	Memory Protect Switch	180-5000-00
13	Memory Protect Switch Bracket	535-6409-00
14	Push Button Switch	180-0028-00
15	Left Flipper Leaf Switch	180-5048-01
15a	Right Flipper Leaf Switch *	180-5122-00
16	Cash Box Top	535-5013-03
17	Plumb Bob Tilt Assembly	500-5023-00
18	Volume Control	123-5000-02
19	Playfield Glass (Tempered) *	660-5001-00
20	Side Armor -Left	535-5010-32
21	Recessed cup for Line cord	545-5122-00
22	Service Switch (Not Shown)	180-5012-00
23	Front Molding Lockdown Assy.*	500-5020-00
24	Front Molding -Black *	500-5021-10
25	S.S.Flipper P.C.B.	520-5070-00
26	Roto Lock Bottom	355-5006-01
27	Rear Plastic Extrusion for Playfield Glass	545-5038-00
28	Mounting Foam for Extrusion	626-5004-00
29	Plastic Channel (Right & Left)	545-5017-00
30	Backbox Hinge Left *	535-6172-00
31	Backbox Hinge Right *	535-6172-01
32	Leg Leveler *	500-5017-00
33	Coin Door with Validator Blank*	500-5018-17
34	Shaker Motor	515-5893-00
35	Shaker Motor P.C. Board *	520-5065-00

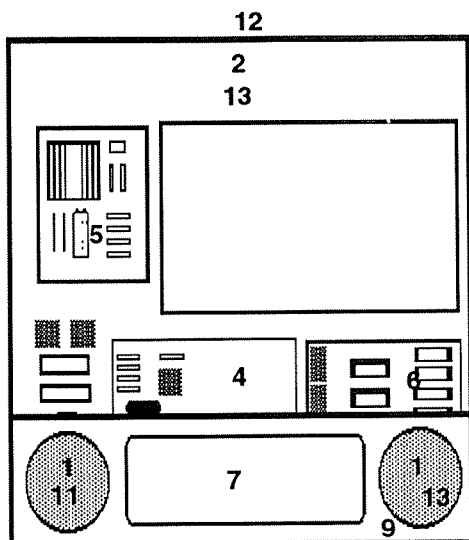
Playfield - Major Assemblies



Item	Description	Part No.
1.	Crane Motor	041-5027-00
2.	Kick Back Assy	500-5081-00
3.	Slingshot Assy.	500-5226-00
4.	Turbo Bumper Assy.	500-5227-00
5.	Ball Launch Assy	500-5477-01
6.	5 Bank Drop Target	500-5621-05
7.	Narrow S/U Target	500-5639-12
8.	1 Bank S/U Target	500-5640-18
9.	3 Bank S/U Target	500-5681-08
10.	6 Ball Switch Assy.	500-5683-01
11.	VUK Assy.	500-5690-00
12.	New Scoop Assy.	500-5691-00
13.	Flipper Right	500-5693-01
14.	Flipper Left	500-5693-02
15.	Bottom Arch	500-5708-00
16.	Crane Assy.	500-5715-01
17.	Lock Ball Assy.	500-5730-00
18.	1 Bank S/U Target Lft. Side	500-5738-08
19.	Double Scoop	515-5772-01
20.	Level Horizontal	670-5000-00
21.	Level Vertical	670-5001-00
22.	Magnet Coil (3)	090-5042-00
23.	Lock Ball Assembly	500-5684-00
24.	Diverter	515-5453-00
25.	Plastic Ramp	500-5695-00
26.	VUK Ramp	500-5724-00
27.	Wire Ramp (Transfer)	535-6626-00
28.	Left Wire Ramp	535-6701-00
29.	Blue Ramp	500-5718-00
30.	Right Wire Ramp	535-6625-00

Note:
See page 29 for switch part numbers

Individual part breakdowns for most of these assemblies can be found on pages 39 through 45 and 72 through 78



† When ordering PC Boards with ROMs please specify game name

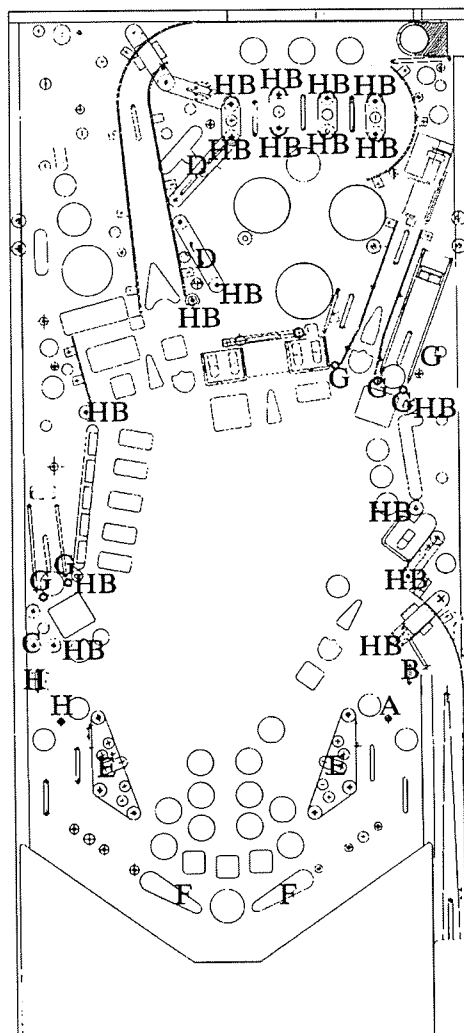
‡ Indicate Manufacturer

* Not Shown

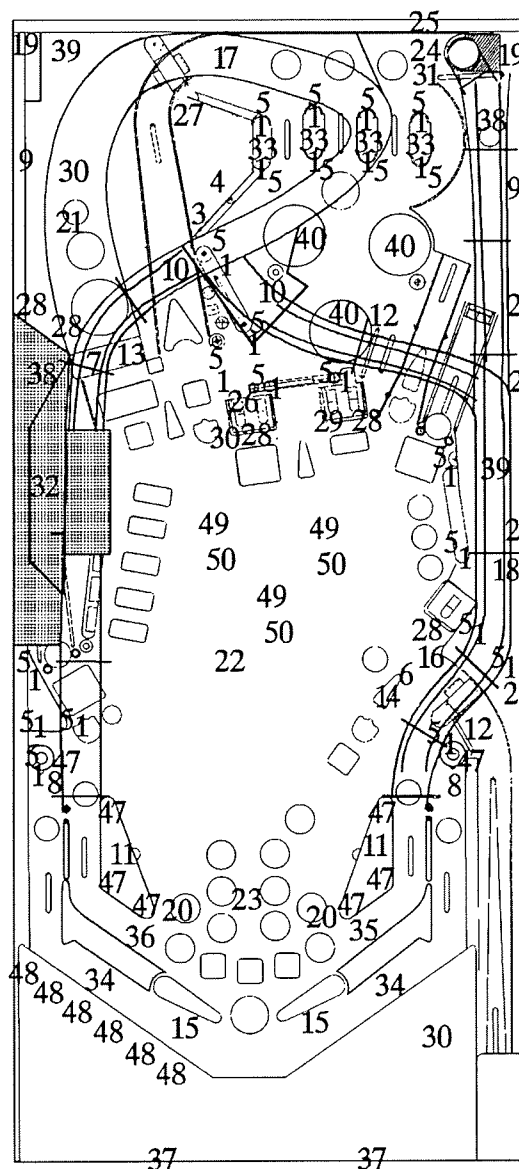
Item	Description	Part No.
1	Speakers	031-5004-00
2	Back Box Lock	355-5008-00
3	CPU †	520-5003-00NR
4	PPB Board	520-5021-05
5	Power Supply	520-5047-02
6	Sound Board †	520-5050-02
7	Dot Matrix ‡	520-5052-XX
8	Display Controller Board †	520-5055-00
9	Speaker Housing	545-5180-01
10	BackGlass Mylar *	830-5227-00
11	Speaker Grill Left	830-5624-00
12a	Police light (Left) -Blue	550-5058-05
12b	Police light (Mid.)	550-5415-00
12c	Police light (Right)-Red	550-5058-02
13	Speaker Grill Right	830-5624-01
14	Static Shield*	535-6437-00
15	Backglass Clear	660-5008-00
16	26" Plastic Extrusion*	545-5018-04
17	21 3/8" Plastic Extr. (2)*	545-5018-07
18	Plastic Extrusion (Bottom)*	545-5021-01

RUBBER PARTS ILLUSTRATION

Item	Description	Part #
A	3/16" I.D. Rubber Ring(2)	545-5348-01
B	5/16" I.D. Rubber Ring(19)	545-5348-02
C	1 1/4" I.D. Rubber Ring	545-5348-06
D	1 1/2" I.D. Rubber Ring(3)	545-5348-07
E	2 3/4" I.D. Rubber Ring(2)	545-5348-20
F	Flipper Rubber(2)	545-5277-00
G	Rubber Bumper(5)	545-5105-00
H	Post Rubber(19)	545-5151-00



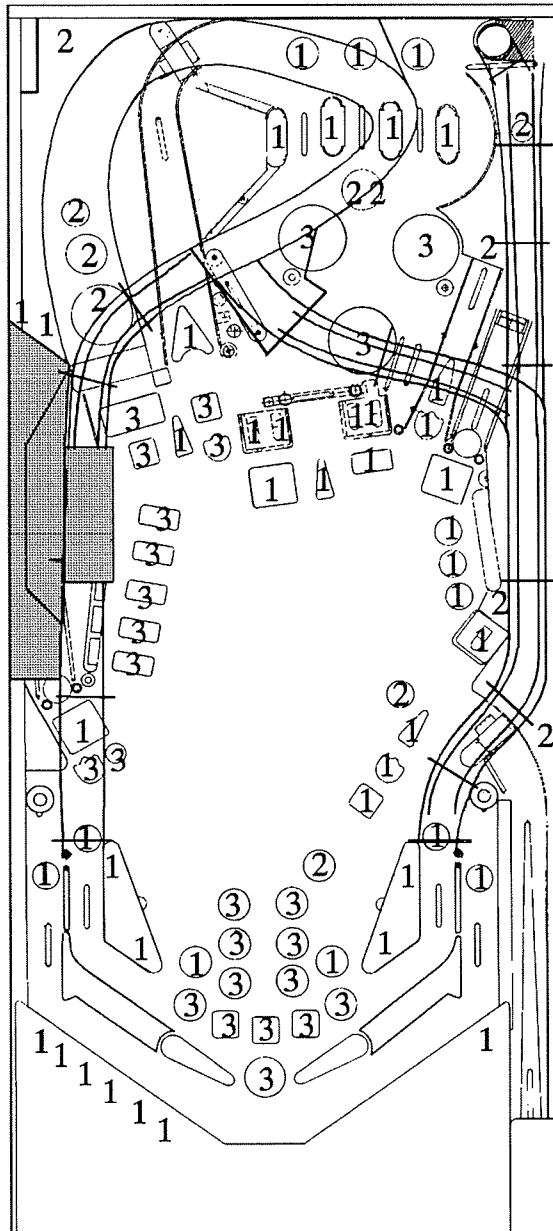
Playfield Parts



Note:
See page 29 for switch part numbers

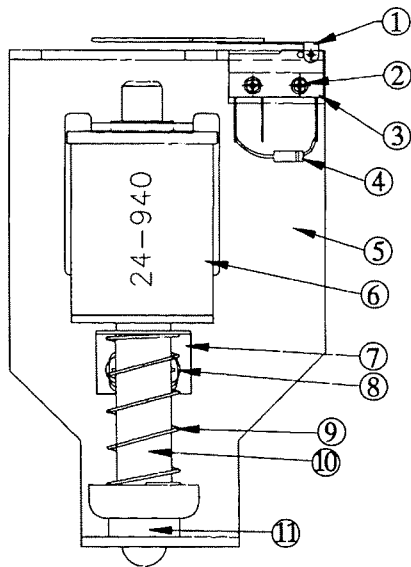
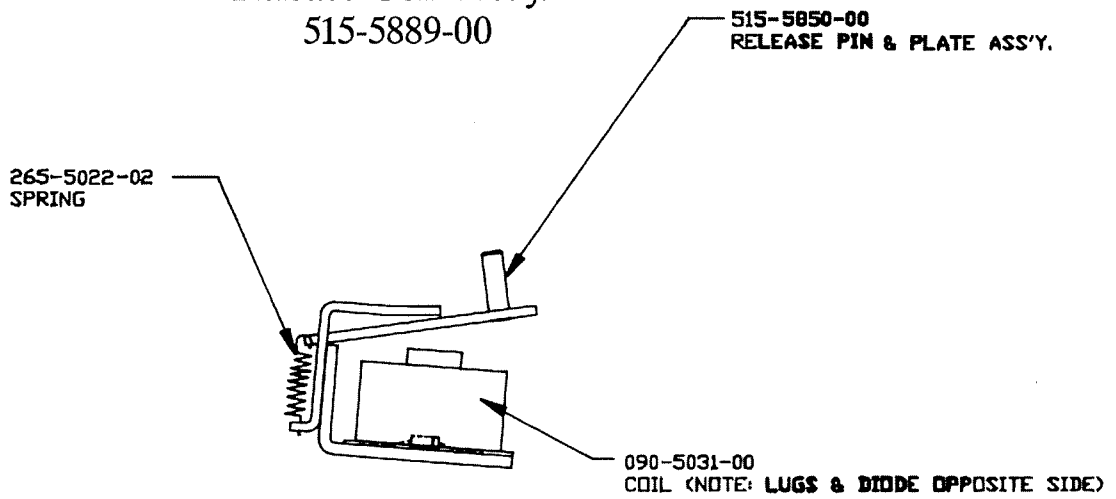
No.	Description	Part No.
1.	#6X1/2" Phillips Head (15)	237-5809-00
2.	Plastic Spacer (4)	254-5000-18
3.	Relay Spring	266-5020-00
4.	Pivot Brkt. Assy	500-5329-00
5.	Metal Standoff (15)	530-5035-01
6.	Rebound Gate	535-5022-00
7.	Protect Plate	535-6707-00
8.	Adjust. Outlane Plate	535-5091-01
9.	P/F Support Brkt.	535-5216-00
10.	Wire Ramp Brkt.	535-5291-00
11.	Wire Form 1" (2)	535-5300-05
12.	Wire Form 1 3/4"	535-5300-09
13.	Protect Plate	535-6707-01
14.	Rebound Hinge	535-5372-00
15.	Snubber Wire	535-5373-01
16.	Rebound Mtg Brkt	535-5742-00
17.	Gate Shield	535-6488-00
18.	Stay Arm Brkt.	535-5747-00
19.	Edge Slide Brkt (2)	535-5988-00
20.	P/F Support Brkt.	535-5991-00
21.	Switch Body Protector	535-6539-00
22.	Magnet Control Board	520-5068-00
23.	Lamp Boards	520-5067-XX
24.	Wire Ramp VUK	535-6628-00
25.	Protector	535-6659-00
26.	Spinner Switch Bracket	535-6714-00
27.	Ball Deflector	535-6718-00
28.	Lite Cover Green	545-5014-04
29.	Lite Cover Blue	545-5014-05
30.	Lite Cover Yellow	545-5014-06
31.	Lite Reflector	545-5409-00
32.	Small Plastic Spacer	550-5034-01
33.	Light Hood Clear	550-5036-01
34.	Return Lane	550-5037-01
35.	Return Lane	550-5042-01
36.	Return Lane	550-5046-01
37.	Playfield Hanger Bracket	535-5216-01
38.	Mini Mars Red	550-5055-02
39.	Mini Mars Blue	550-5055-05
40.	Pop Bumper Cap	550-5056-02
41.	Playfield Glass	660-5001-00
42.	Playfield Mylar	820-5833-00
43.	Decal Sheet	820-6101-00
44.	Screened Playfield	830-5127-00
45.	Screened Plastic Set-(Butyrates)	830-5453-00
46.	Spinner Target	515-5236-00
47.	Bumper Post (8)	550-5034-01
48.	Lite Cover Red	545-5014-02
49.	Magnet Mtg. Brkt.	535-6637-00
50.	Magnet Core	530-5266-00

Lamp Bulb Part Numbers



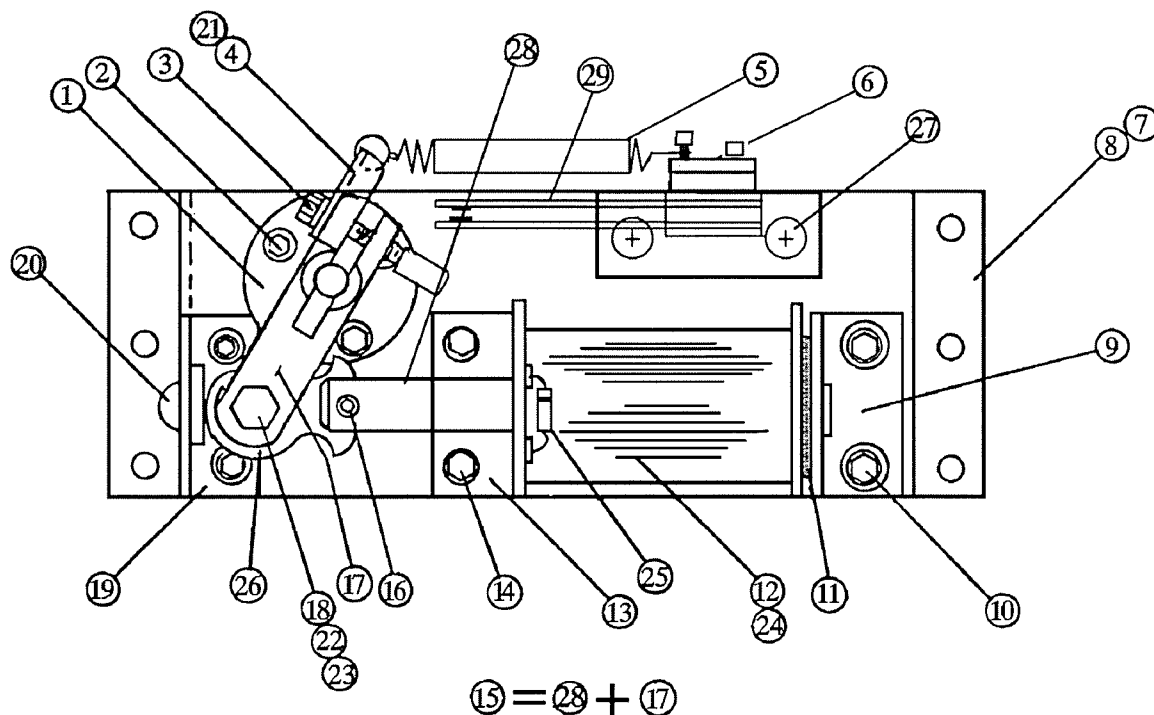
Item	Description	Part Number
1	#44 Bulb	165-5000-44
2	#89 Bulb	165-5000-89
3	#555 Bulb	165-5002-00
4	# 906 Bulb	165-5004-00

Release Coil Ass'y.
515-5889-00



Item	Description	Part #
1	Micro Switch	180-5116-00
2	Screw (2)& Washer (2)	237-5806-00
3	Protector	244-5001-00
4	1N4001 Diode	535-6539-00
5	Bracket	112-5001-00
6	Coil 24-940	535-6607-00
7	Coil Retainer Brkt.	090-5036-00
8	#6-32 x 1/4 SEMS	535-5203-01
9	Spring	232-5200-00
10	Plunger Assy.	266-5020-00
11	Bumper	515-5000-02
		545-5105-00

VUK
500-5690-00

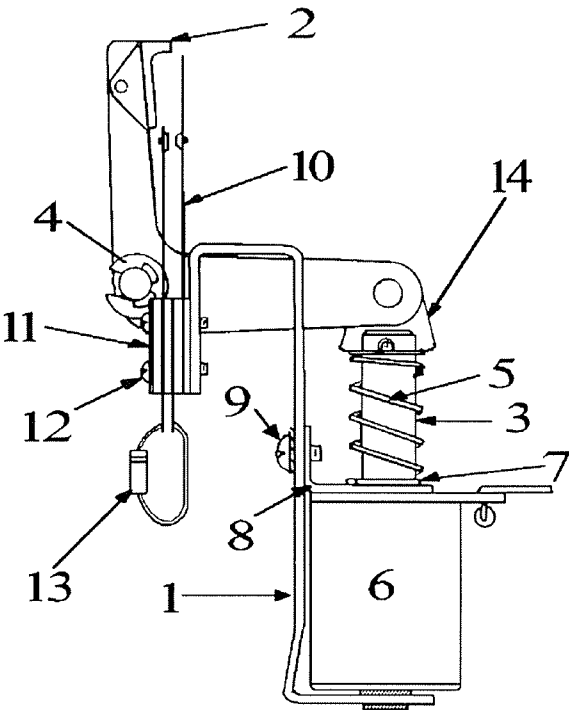


Item	Description	Part #	Item	Description	Part #
1	Flipper Bushing	545-5070-00	16	Pin	251-5000-00
2	#6 x ³ / ₈ Hex Hd.scr.	234-5000-00	17	Pawl	530-5070-00
3	#10-32 x ³ / ₄ Soc.Hd.scr.	232-2206-12	18	10-32x ³ / ₄ Shoulder Bolt	231-5019-00
4	Spring Brkt. (left)	535-6663-02	19	Rebound Brkt.	535-5279-00
5	Flipper Return Spring	265-5029-02	20	Rubber Bumper	545-5105-00
6	Sw. Mtg. Bracket	535-6664-00	21	Spring Brkt. (right)	535-6663-01
7	Flipper Base (left)	515-5077-02	22	Bushing (inside Link)	530-5139-00
8	Flipper Base (right)	515-5077-01	23	10-32 Elastic Stop Nut	238-1306-00
9	Coil Stop Brkt.	515-5346-00	24	Coil Sleeve	260-0003-00
10	1/4-20x ³ / ₈ Soc.Hd.scr.	231-2507-06	25	1N4004 Diode	112-5003-00
11	Spring Washer	269-5002-00	26	Flipper Link	545-5401-00
12	Coil 23-900	090-5020-30	27	#8 ³ / ₈ Pan Hd.Thr.Form	237-5821-00
13	Front Brkt.	535-6453-00	28	Plunger & Link Ass'y.	515-5822-00
14	#8 x ³ / ₈ Hex Hd.Scr.	234-5100-00	29	E.O.S. Power Switch	180-5124-00
15	Plunger, Link & Pawl	515-5051-00			

Flipper Assemblies
500-5693-01 Right
500-5693-02 Left

Slingshot Assembly **500-5226-00**

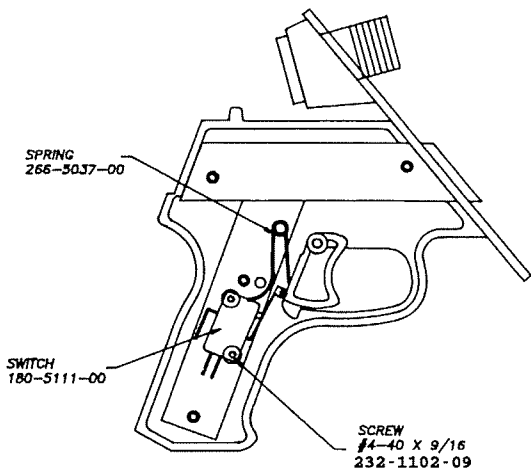
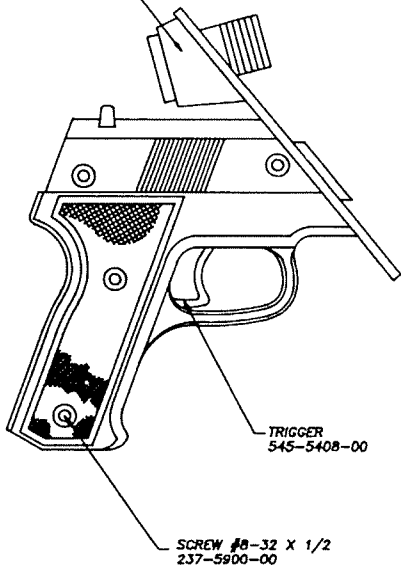
Item	Description	Part No.
1	Slingshot Bracket	515-5339-00
2	S.S. Arm & Tip Assy.	515-5340-00
3	Plunger & Link Assy.	515-5338-00
4	1/4 Retaining Ring (2)	270-5002-00
5	Spring	266-5020-00
6	23-800 Coil	090-5001-00
7	Coil Sleeve	260-0004-00
8	Coil Retainer	535-5203-03
9	#8-32 X 1/4" Screw (2)	232-5300-00
10	Slingshot Switch (2)	180-5054-00
11	Tension Plate (2)	535-5846-00
12	#4-40 X 1/2" Screw (4)	237-5837-00
13	Diode 1N4004 (2)	112-5004-00
14	Link	545-5062-00



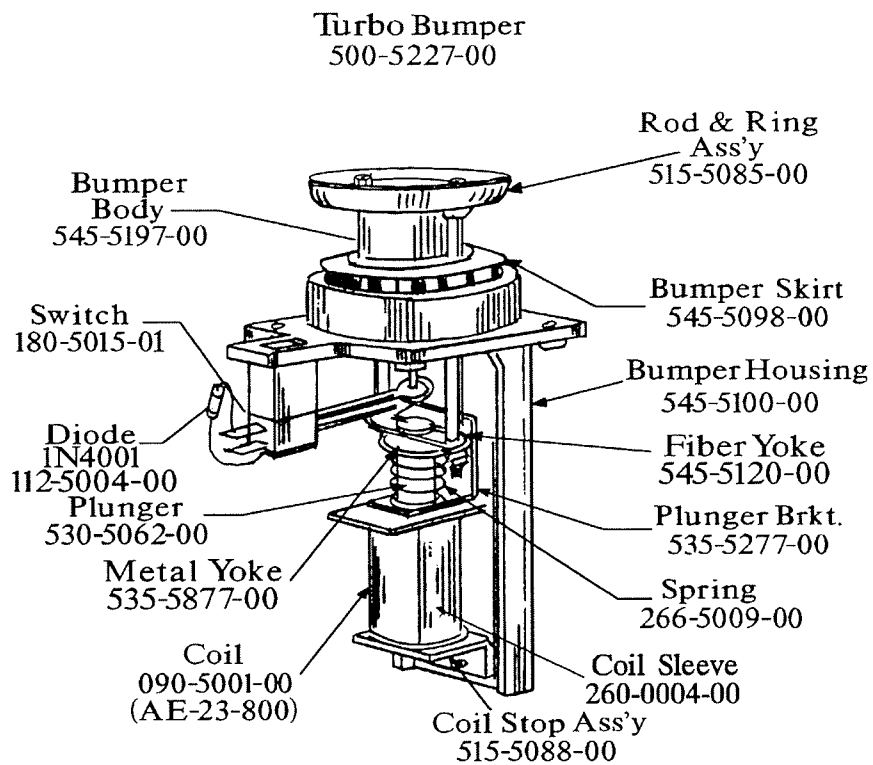
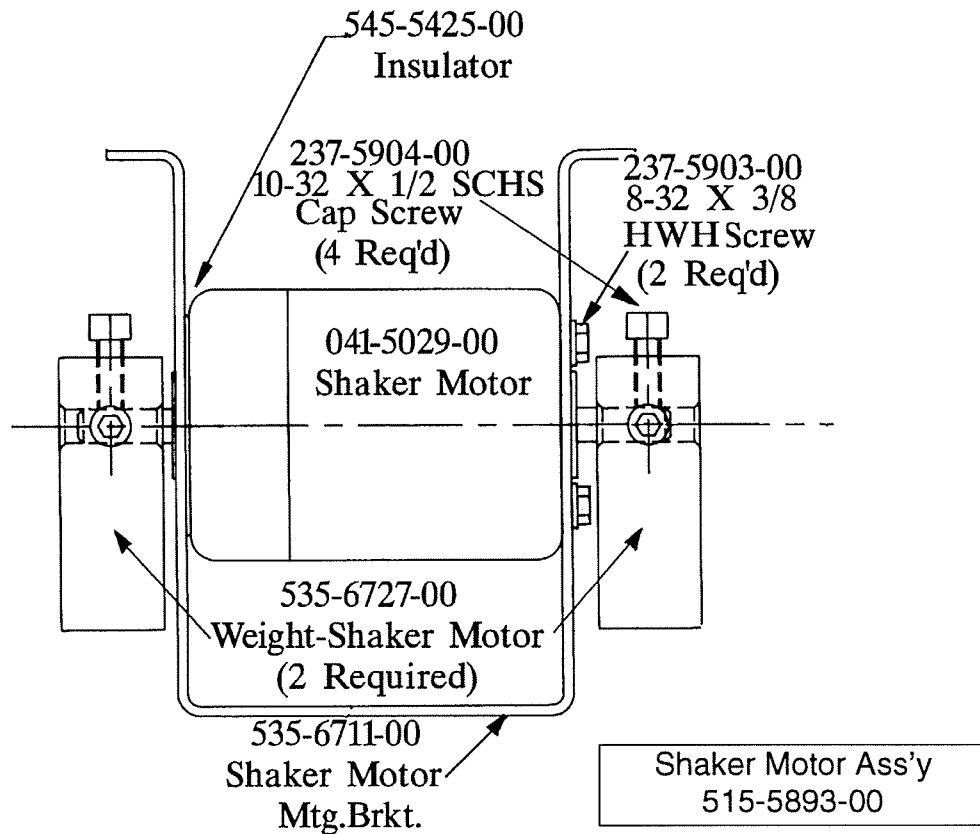
BUTTON ASSY. SMART BOMB
 515-5904-00

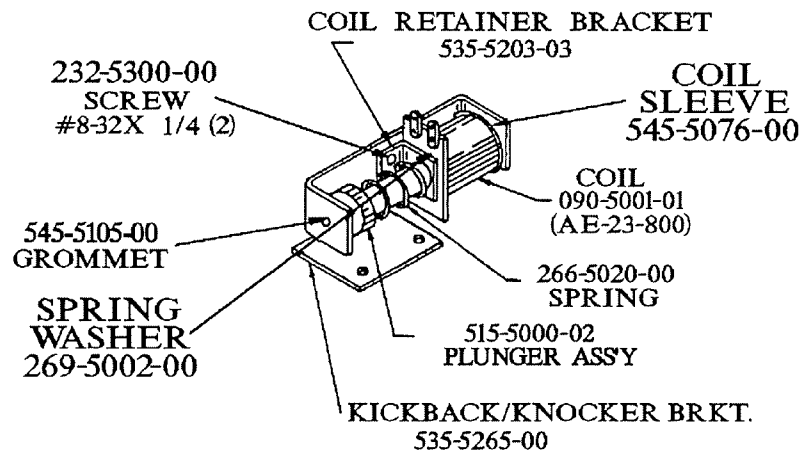
GUN HANDLE-LEFT
 545-5429-00

GUN HANDLE-RIGHT
 545-5429-01

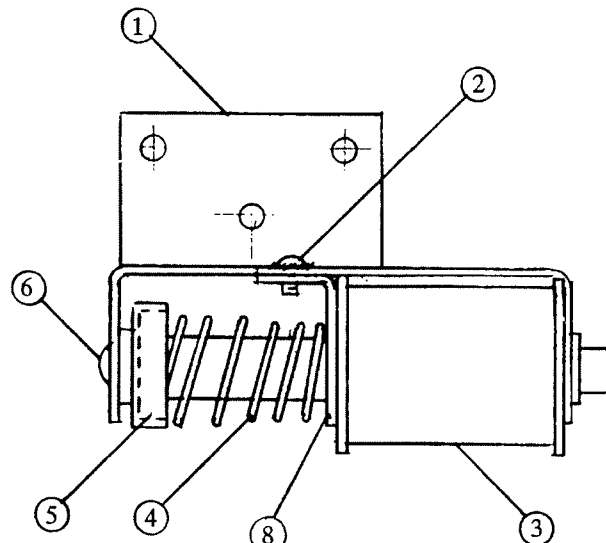


Gun Ass'y. L.A.H.
 500-5731-00



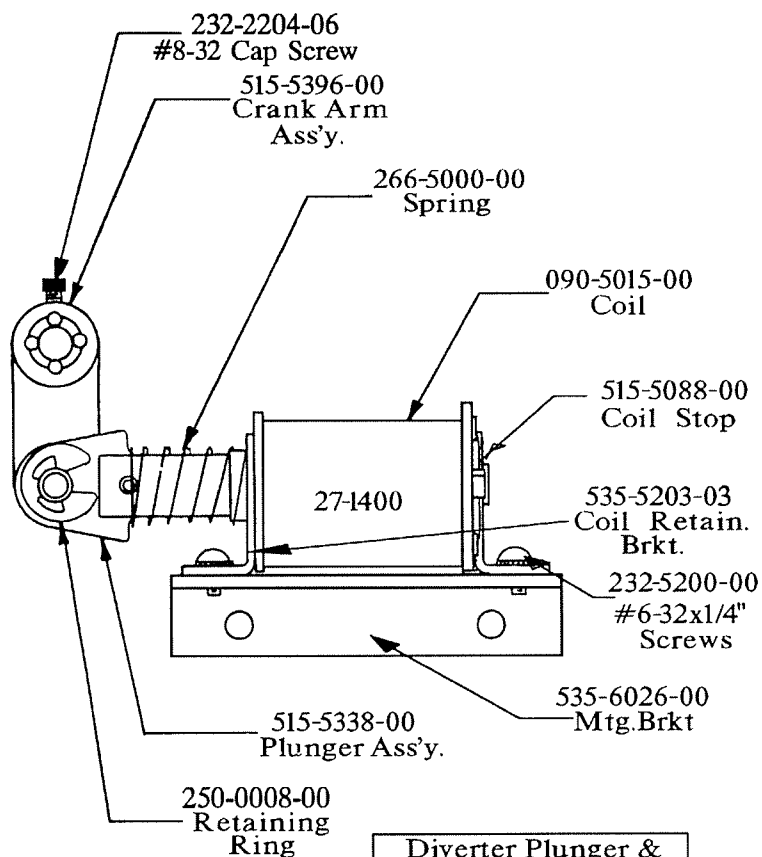


KICKBACK &
KNOCKER ASSEMBLY 500-5081-00

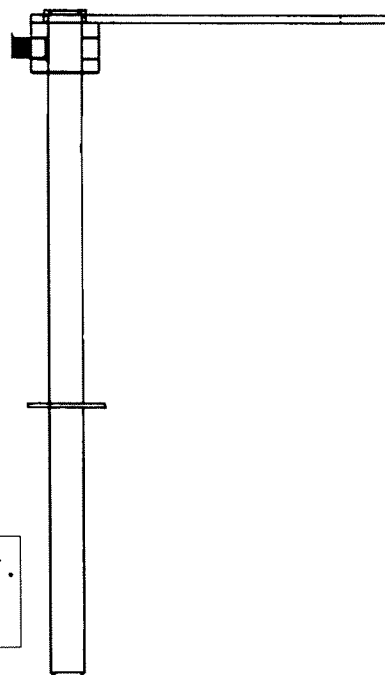


Item	Description	Part #
1	Coil Mtg. Brkt.	535-6385-00
2	8-32x1/4 Sems.(2)	232-5300-00
3	Coil 23-800	090-5001-01
4	Spring	266-5020-00
5	Plunger Ass'y.	515-5000-02
6	Grommet	545-5105-00
7	1N4004 Diode	112-5003-00
8	Coil Retainer Brkt.	535-5203-03

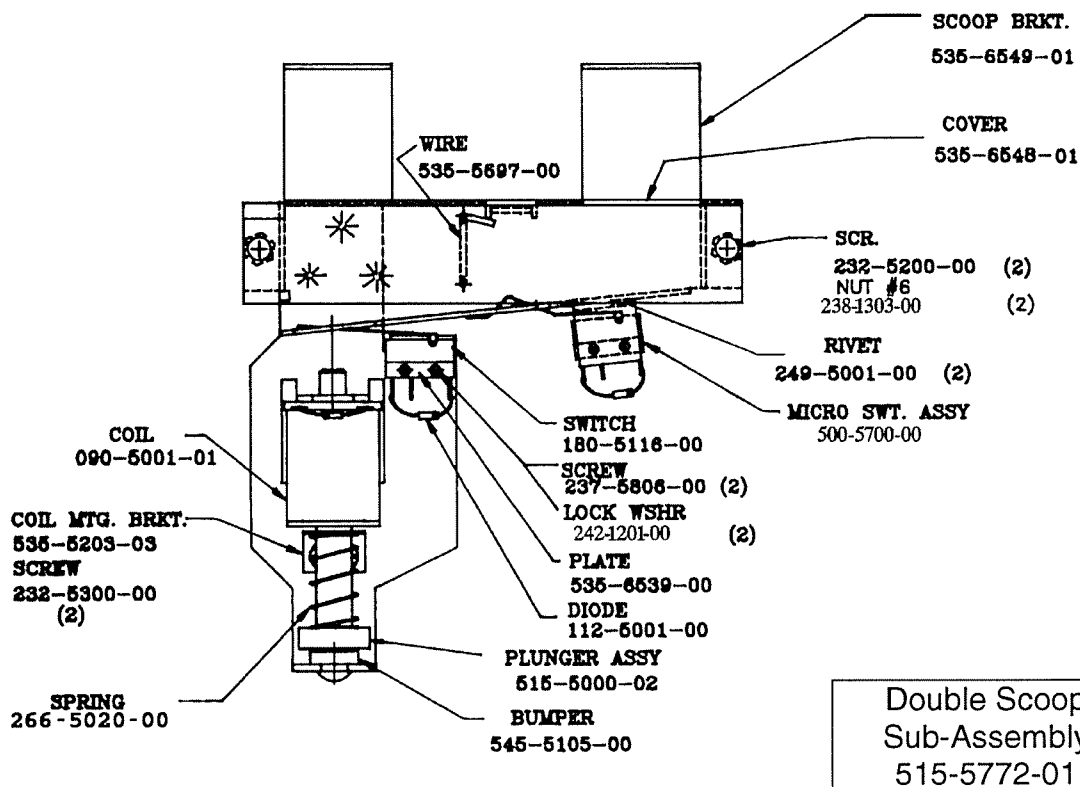
Ball Launch Ass'y
500-5477-00



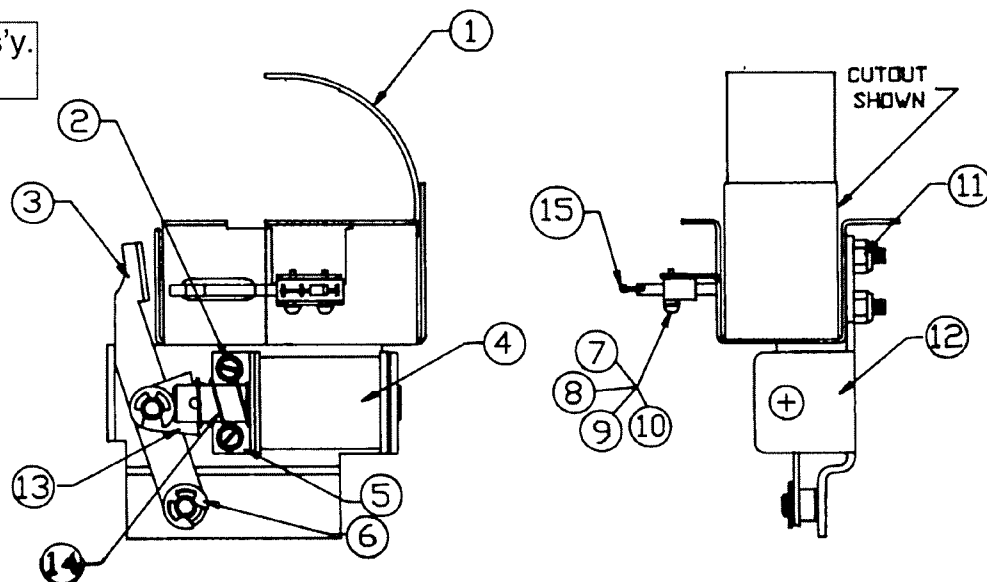
Diverter Plunger &
Crank Arm Assy
515-5453-00



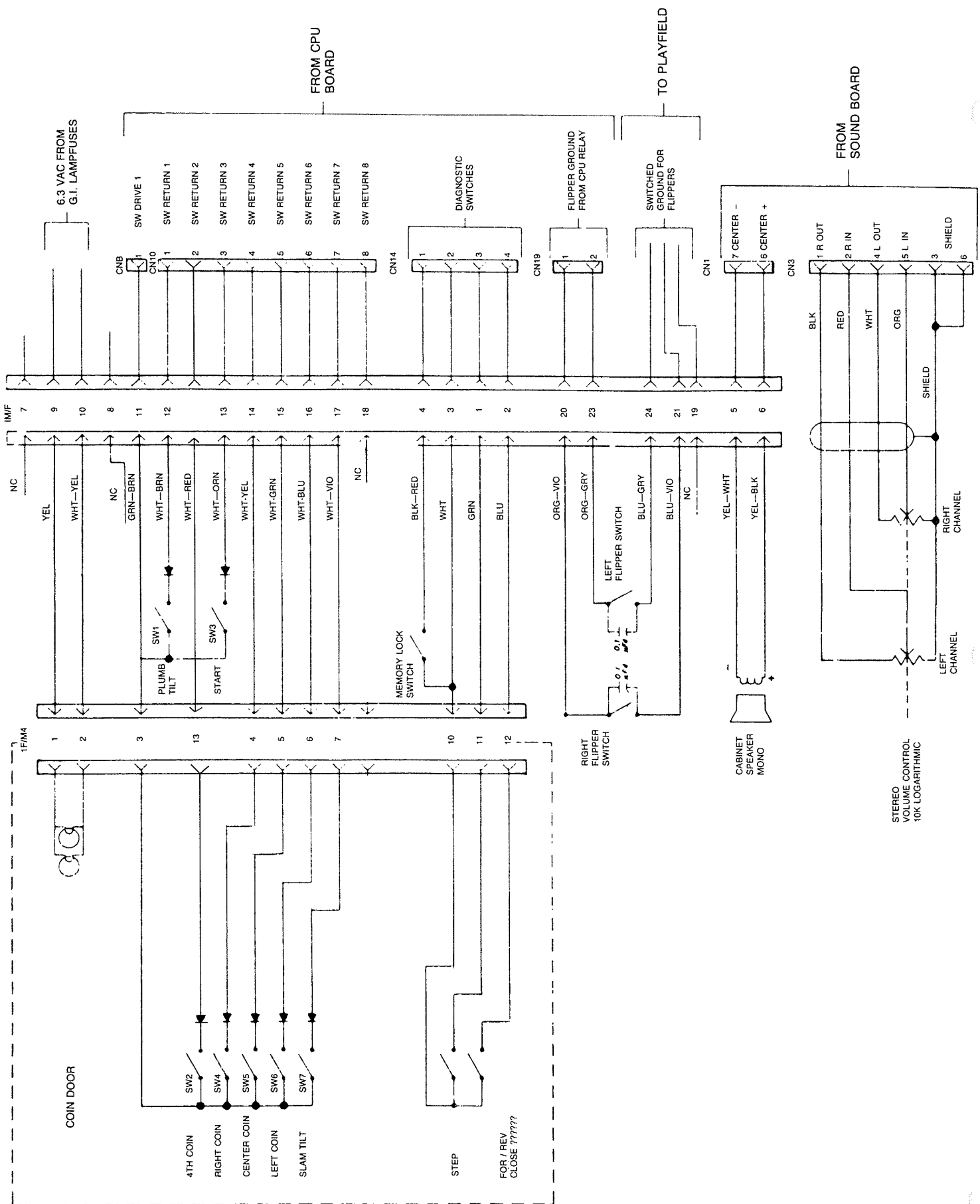
Diverter Arm Ass'y.
500-5743-00

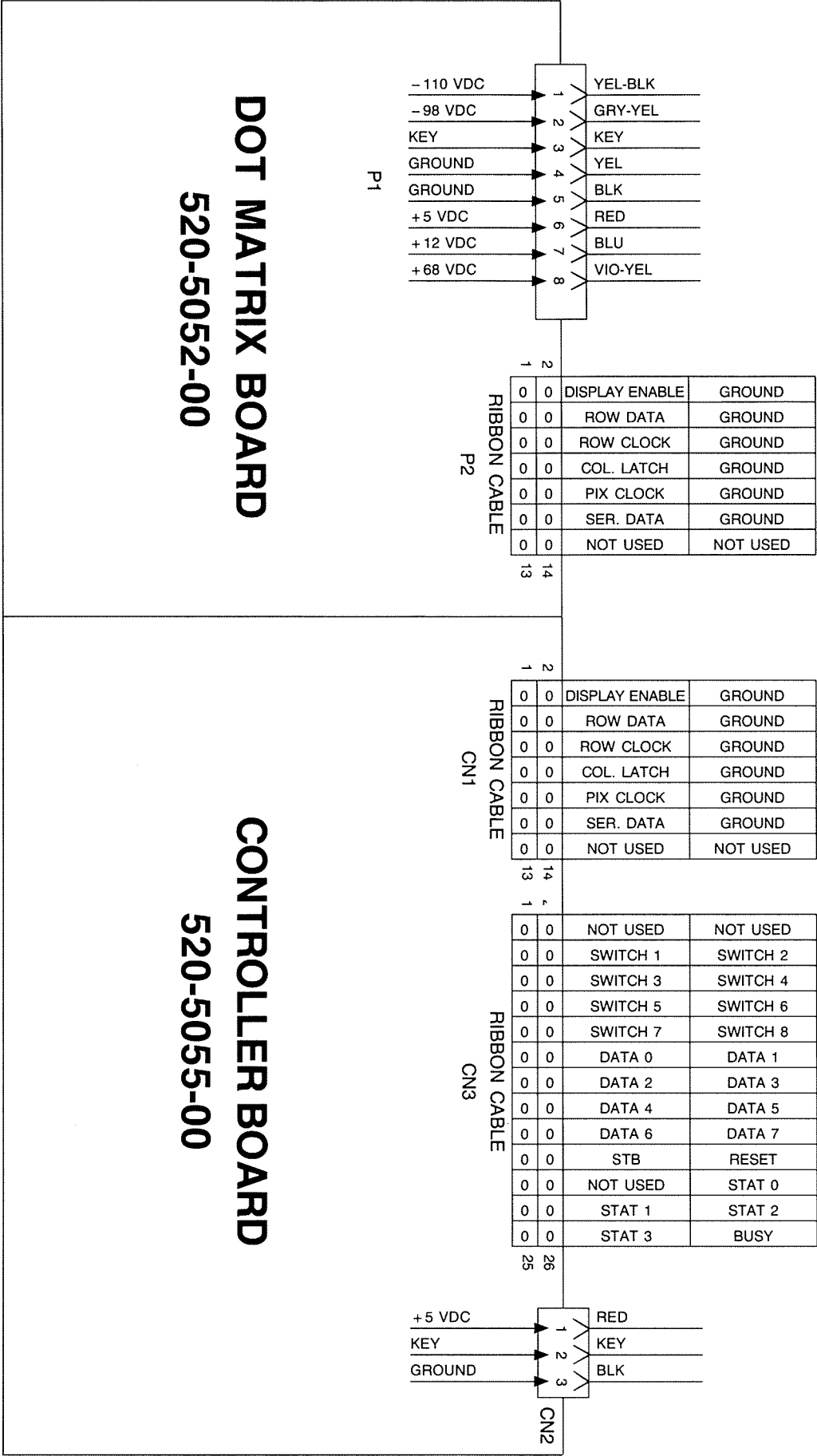


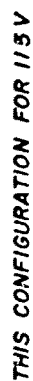
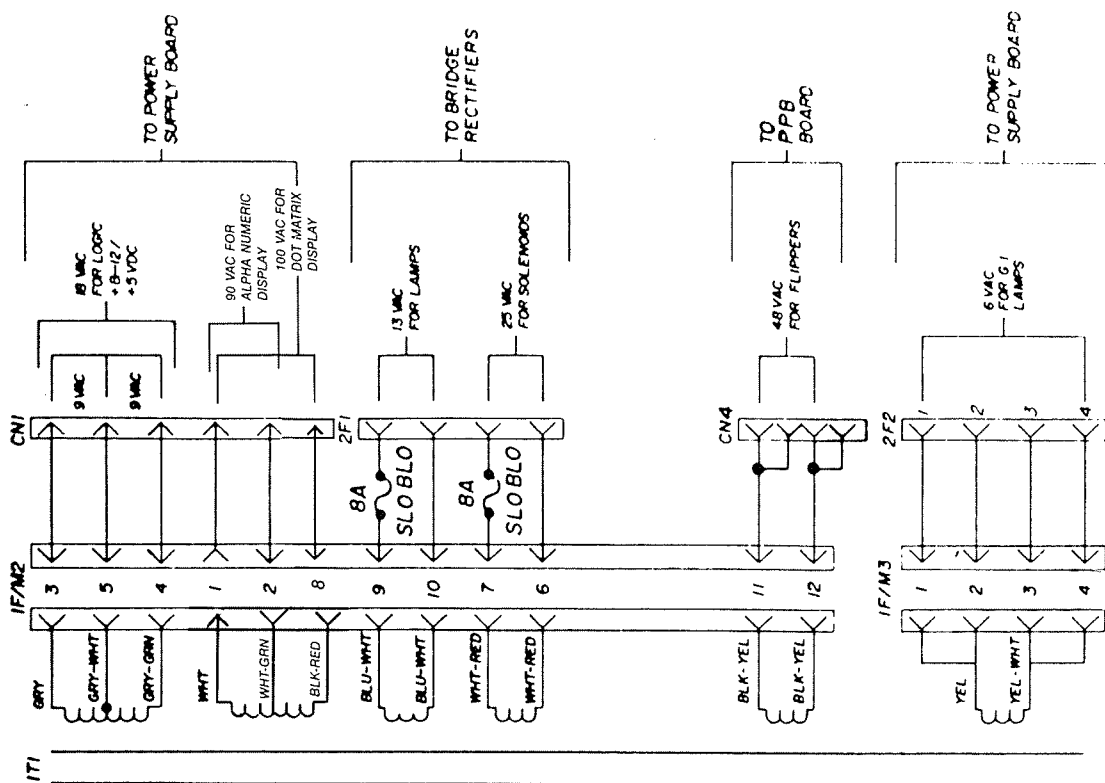
Power Scoop Ass'y.
500-5691-00



Item	Description	Part #	Item	Description	Part #
1	Trough Scoop Ass'y.	515-5820-00	9	Switch Protector	535-6539-00
2	#8-32 Hex WHD TF Type C (2)	237-5903-00	10	#2 Ph Screw (2)	237-5806-00
3	Kicker	515-5818-00	11	#8 Nyloc (2)	238-1304-00
4	23-800 Coil	090-5001-01	12	Kicker Brkt. Ass'y.	515-5819-00
5	Coil Mtg. Brkt.	535-6654-00	13	Plunger & Link	515-5338-00
6	Retaining Ring (2)	250-0008-00	14	Spring	266-5000-00
7	Micro Switch	180-5057-00	15	1N4001 Diode	112-5001-00
8	#2 Lock Washer (2)	242-1201-00			







DATA EAST LIMITED WARRANTY

Data East USA, Inc., ("Seller") warrants only to the initial purchaser of its products that the items listed below are free from defects in material and workmanship under normal use and service for the warranty period specified:

PRINTED CIRCUIT BOARDS (GAME LOGIC) 60 DAYS

No other parts of Seller's product are warranted.

Warranty periods are effective from the initial date of shipment from Seller to its authorized distributors.

Seller's sole liability shall be, at its option, to repair or replace products which are returned to Seller during the warranty periods specified, provided:

1. Seller is notified promptly upon discovery by purchaser that stated products are defective.
2. Such products are properly packaged and then returned freight prepaid, to Seller's plant.

This warranty does not apply to any parts damaged during shipment and/or due to improper handling, or due to improper installation or usage, or alteration. In no event shall the Seller be liable for any anticipated profits, loss of profits, loss of use, accidental or consequential damages or any other losses incurred by the customer in connection with the purchase of a Data East USA., product.

WARRANTY DISCLAIMER

EXCEPT AS SPECIFICALLY PROVIDED IN A WRITTEN CONTRACT BETWEEN SELLER AND PURCHASER, THERE ARE NO OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

WARNING--This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.