GAME #743
(INSTALL 4 BALLS IN OUTHOLE)

INSTRUCTION MANUAL

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TROUBLESHOOTING GUIDE.............INSIDE BACK COVER

GAME PROM: (TYPE 26C512) DISPLAY PROM: (TYPE 27C040-25) SOUND PROM: (TYPE 27C040-25)
743/GPROM 743/DSPROM 743/DROM1 743/AROM1
743/YROM1 (TYPE 27C020-25) 743/AROM2

NOTE: ANY PROM CHANGES DURING PRODUCTION WILL BE INDICATED BY A REVISION NUMBER FOLLOWING THE GAME NUMBER. CONSULT YOUR DISTRIBUTOR FOR ANY PROM CHANGE UPDATE.
GAME AS SHIPPED VARIES FROM THE INSTRUCTION MANUAL AS PRINTED.

CHANGED PAGE 2

"BEAT THE BUZZER" SHOULD READ "SHOT CLOCK" IN BASKET HOOP DESCRIPTION.

ADDED TO PAGE 7

K. LED DISPLAY TEST
This test checks the operation of the individual digits of the LED Display Board. Pressing the right flipper button will advance to the next step of the test. The digits 0-9 will appear in numerical order starting from the leftmost to rightmost digit position. Only one digit should light during each step of this test.

CHANGED PAGE 15

CHANGED STEP 68 (HIDDEN FEATURES BONUS) FACTORY DEFAULT TO HARD.

ADDED TO PAGE 17

ADD THE FOLLOWING SENTENCE TO THE POST ADJUSTMENTS SECTION.
The playing time in the upper section of the playfield can be controlled by the position of the lower post of the island located just to the left of the spinning disc. The upper position is for conservative playing time and the lower position is for liberal playing time.

CHANGED PAGE 68

MA-1790C SHOULD BE MA-1790A, MA-1791C SHOULD BE MA-1791A

ADDED TO PAGE 65

SEE POST ADJUSTMENT ADDED IN ILLUSTRATION BELOW.

CHANGED PAGE 67

BUMPER TYPE "K" WAS BUMPER TYPE "A", SEE ILLUSTRATION ABOVE.
SYSTEM 3 OVERVIEW

System 3 contains many new features which improve game play and reliability. Some of these features are as follows:

1) New lithium battery provides data retention for a minimum of 5 years under normal operation and virtually eliminates battery leakage. Also a low battery warning is given in the displays when the voltage drops to the critical level.

2) New interlocking connector system for improved reliability.

3) Use of High Speed CMOS technology for low power consumption and cooler operation.

4) Improved solenoid driver reliability due to simplified circuitry and the use of Rugged Power MOSFETS.

5) Lamp short protection.

6) Switch matrix input protection.

7) Easy line voltage adjustment on location.

8) Improved bookkeeping functions.

9) New 128 x 32 Dot Matrix Display.

10) Capability for operators to enter their own messages in the attract mode.

11) Use of new SMART SWITCH(tm)technology which eliminates the use of contact points on switches. Therefore the need for cleaning dirty switches is eliminated.

12) Addition of a Tournament Mode switch which allows a quick and easy way to replace current adjustment settings with special settings. This switch also provides an easy way to set the game for free play.

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

WARNING

DO NOT TRANSPORT GAME WITH LIGHTBOX IN THE UPRIGHT (PLAYING) POSITION.
USE LATCH ONLY TO TEMPORARILY HOLD LIGHTBOX UPRIGHT WHILE ATTACHING THE LIGHTBOX TO THE CABINET.
SECURE THE LIGHTBOX TO THE CABINET WITH THE TWO BOLTS AND LOCKWASHERS PROVIDED.
I. INSTALLATION

A. SET-UP

1. Bolt the legs to the cabinet.
2. Lift lightbox into an upright position. Be sure none of the cables are crimped in between the lightbox and cabinet.
3. Engage the snap in the rear of the lightbox to the cabinet.
4. To remove the lightbox backglass and gain servicing access to the electronics panel and the insert lamp assembly, proceed as follows:
   UNLOCK THE LIGHTBOX BY TURNING THE KEY A QUARTER TURN CLOCKWISE.
   LIFT UP THE BACKGLASS RETAINING BOTTOM TRIM ABOUT 3/4" TO CLEAR THE "H" RETAINING CHANNEL ON THE TOP EDGE OF THE DISPLAY/SPEAKER PANEL, PIVOT OUT TOWARDS YOU AND SLIDE THE BACKGLASS DOWN AND OUT, CAREFULLY SET ASIDE.
   REMOVE THE "H" RETAINING CHANNEL, SLIDE THE PLEXIGLASS INSERT UP AND OUT, SLIDE UP AND REMOVE THE DISPLAY/SPEAKER PANEL AND LAY FACE DOWN ON THE CABINET.
   UNLOOSE THE TWO WING NUTS ON THE LEFT SIDE AND PUSH THE LOCK SLIDE UPWARDS, THIS ALLOWS THE LIGHTBOX LAMP INSERT TO SWING OUT AND FOR GAINING ACCESS TO THE ELECTRONICS PANEL.
5. Secure the lightbox to the cabinet with the bolts and washers provided.
   TO REPLACE THE BACKGLASS, INSERT THE DISPLAY/SPEAKER PANEL, ENSURE THAT THE METAL TABS ON THE PANEL MATE INTO THE WOOD RETAINERS, SLIDE IN THE PLEXIGLASS PANEL AND INSERT THE "H" RETAINING CHANNEL.
   SLIDE THE BACKGLASS UP INTO THE LIGHTBOX, PIVOT INWARDS AND SLIDE DOWN INTO THE "H" CHANNEL, TURN THE KEY A QUARTER TURN COUNTER-CLOCKWISE TO LOCK THE LIGHTBOX.
6. Open the cabinet door and loosen the front moulding locking arm.
7. Remove the front moulding from the cabinet.
8. Slide the playfield glass toward you and remove it, carefully set aside.
9. Slide the playfield toward you, pivot upwards and back towards the lightbox, hold in place and insert the prop stick into the countersunk hole on the underside of the playfield.
   CAUTION!
   Use prop stick when servicing under the playfield.
10. Unravel and straighten out the power line cord located at the rear of the cabinet.
11. Proceed to "B. CHECK-OUT".

B. CHECK-OUT

1. Check that all cables are clear of moving parts.
2. Check for any loose wires.
3. Check switches for loose solder or other foreign matter.
4. Be certain all fuses are firmly seated.
5. Check transformer for any foreign matter across terminals.
6. Be sure that the Transformer Panel power input connector A12J5, corresponds to the supply voltage.
7. Check the setting of the normally open tilt switch on the underside of the playfield. One blade should be free-floating with a weight on the end.
8. The plumb-bob tilt can be adjusted by loosening the clip and raising the plumb-bob to increase its sensitivity, or lowering it to decrease its sensitivity.
9. Lower the playfield into the cabinet. Using the leg adjusters, level the playfield. At this point, the pitch of the playfield should be approximately 6 degrees.
10. Plug the line-cord into a properly grounded 3-wire receptacle ONLY!
11. Refer to Section III to make all necessary game adjustments.
12. Re-install the playfield glass, front moulding and lock the cabinet door.
13. CAUTION! If this game has been subjected to extreme cold, allow to warm up to room temperature.
I. INSTALLATION

C. COIN METER (OPTIONAL)
A +12vdc mechanical coin meter may be installed by the operator to count total coins accepted by the machine. The coin meter leads should be soldered to the lugs on the terminal strip mounted inside the front door on the right side (see Figure 1). If the coin meter is polarized, the positive lead (red) should be attached to the lug that has the cathode (banded) side of the diode attached to it otherwise the leads may be attached in any order. The COIN METER adjustment must be set to on and the following four adjustments should be set to the number of pulses (counts) required for each coin denomination used.

NOTE: Make sure that the GAME MODE adjustment is not set to either REPLAY + TICKETS or TICKETS ONLY (see Game Adjustments section).

D. TICKET DISPENSER (OPTIONAL)
This machine is equipped to easily interface to the Deltronic Labs TD0M-10-S-S ticket dispenser. To install the dispenser, first locate the five partially drilled holes on the inside of the cabinet on the right side (see Figure 1). The four "A" holes are for mounting the cabinet with #10 X 1-3/4" carriage bolts. The "B" hole is for cable access to the unit. Drill the "A" holes out from the inside of the cabinet using a 13/64" drill bit. Drill the "B" hole out from the inside of the cabinet using a 1" drill bit. In the game envelope you will find template #30213 for a 1/2" plywood spacer to be used between the outside of the game cabinet and the dispenser cabinet so that the dispenser will clear the leg on the game when opened for loading tickets.

The GAME MODE adjustment is used to set whether to dispense a number of tickets along with each replay awarded (REPLAY + TICKETS) or to dispense a number of tickets in place of each replay awarded (TICKETS ONLY). The TICKETS TO AWARD adjustment is used to set the number of tickets to dispense for each replay awarded (see Game Adjustments section).

NOTE: Make sure that the COIN METER adjustment is set to off when using a ticket dispenser.

E. BILL ACCEPTOR (OPTIONAL)
A bill acceptor can be easily interfaced electrically to this machine. The two unused 522 (green-red-red) and 622 (blue-red-red) center chute switch wires should be attached to the switch output of the bill acceptor (see Cabinet/Front Door Schematic Diagram). The line voltage validator outlet located inside the cabinet on the right side can be used for supplying power to the unit. The CHUTE 3 UNITS adjustment can then be used to set the value of the bill being used. The bill acceptor models known to fit the door mechanically are Mars model VFM2 and Tekbilt model NV110. The Tekbilt model also requires an adapter plate.

F. COMMUNICATIONS ADAPTER (OPTIONAL)
A kit (MA-1940) may be purchased through your distributor which will allow the system to output Bookkeeping data to a serial printer.
II. GAME PLAY AND SCORING

*** PLAYFIELD FEATURES ***

UPPER LEFT SPOT TARGET:
* SCORE 500,000.

* SCORE 1 BASKET POINT TIMES MULTIPLIER & COLLECT BASKETBALL EVENT ICON IF LIT OR FLASHING.

LEFT UPKICKER:
* SCORE 500,000.

* RECEIVE TIP-OFF AWARD IF IN NORMAL 1 BALL PLAY.

* SCORE 1 BASKET POINT TIMES MULTIPLIER & COLLECT HORSE HEAD EVENT ICON IF LIT OR FLASHING.

DROP TARGETS:
* SCORE 5,000.

* SCORE 1 BASKET POINT TIMES MULTIPLIER.

* SCORE 1 BASKET POINT TIMES MULTIPLIER & COLLECT MVP CUP EVENT ICON IF LIT OR FLASHING.

* ADVANCE MULTIPLIER IF LIT & BANK COMPLETE.

* IF REBOUND LIT & BANK COMPLETE, LIGHT HIDDEN FEATURE #5 AND AWARD 1 GAME BALL, LIGHT REBOUND IN FEATURES COMPLETED CIRCLE, AND COLLECT THE REBOUND PROGRESSIVE SCORE VALUE. THE SEQUENCE GOES 5, 10, & 20 MILLION.

* IF MVP EVENT ACTIVE, COLLECT PROGRESSIVE AWARD. THE SEQUENCE IS EXTRA BALL, 50, 100, AND 300 MILLION.

SPINNER:
* SCORE 5,000.

* SCORE 1 BASKET POINT TIMES MULTIPLIER & COLLECT BASKETBALL EVENT ICON IF LIT OR FLASHING.

* IF #1 FLASHING, LIGHT #1 SOLID AND START FLASHING #2.

* IF #3 FLASHING, LIGHT #3 SOLID AND START FLASHING #4.

* IF SUPER SPINNER ACTIVE, SCORE AND ADVANCE PROGRESSIVE AWARD. THE SEQUENCE IS 5 MILLION, 10 MILLION, AND 3 BASKET POINTS.

* ADD A LETTER TO HORSE IF HORSE EVENT ACTIVE.

UPPER RIGHT SPOT TARGET:
* SCORE 500,000.

* ADVANCE A LETTER IN "SHAQUILLE" IF SPELL SHAQUILLE LIT.

* SCORE 1 BASKET POINT TIMES MULTIPLIER & COLLECT CLOCK EVENT ICON IF LIT OR FLASHING.

BASKET HOOP:
* SCORE 1,000,000.

* COLLECT JACKPOT OR SUPER JACKPOT IF FLASHING & LIGHT JACKPOT IN THE FEATURES COMPLETED CIRCLE.

* IF BEAT THE BUZZER IS ACTIVE, END THE BEAT THE BUZZER EVENT, AWARD 1 GAME BALL, AND BEGIN FLASHING OUT THE SPECIAL LAMP FOR THE BOTTOM RIGHT SPOT TARGET.

* IF ALLEY-OOP FLASHING OUT, AWARD BASKET POINTS (ADJUSTABLE) AND 1 GAME BALL. ALSO LIGHT ALLEY-OOP IN FEATURES COMPLETED CIRCLE.

* AWARD 2 OR 3 BASKET POINTS TIMES MULTIPLIER IF 2 POINTS OR 3 POINTS LIT SOLID.

* IN 1 BALL PLAY, START MULTIBALL FLASHING OR FLASHING OUT.
RIGHT UPKICKER:
* SCORE 500.

* IF #5 FLASHING, COLLECT 1 GAME BALL, LIGHT GAME BALL IN THE FEATURES COMPLETED CIRCLE, OFFER PLAYER THE CHANCE TO TRADE ALL OF HIS GAME BALLS FOR AN AWARD, AND RESTART THE 1-5 GAME BALL SEQUENCE.

* START SUPER SPINNER FLASHING OUT IF THE SPINNER BASKETBALL EVENT ICON UNLIT.

HOLE KICKER:
* SCORE 50,000.

* SCORE 1 BASKET POINT TIMES MULTIPLIER & COLLECT MVP CUP EVENT ICON IF LIT OR FLASHING.

* IF FREE THROW IS LIT, SCORE 1-10 BASKET POINTS, AND IF AN EVENT IS ACTIVE (ADJUSTABLE), LIGHT HIDDEN FEATURE #3 & RECEIVE 1 GAME BALL.

RIGHT SIDE ROLLOVER:
* SCORE 90.

* SCORE 1 BASKET POINT TIMES MULTIPLIER & COLLECT MVP CUP EVENT ICON IF LIT OR FLASHING.

* IF #2 FLASHING, LIGHT #2 SOLID AND START FLASHING #3.

* IF #4 FLASHING, LIGHT #4 SOLID AND START FLASHING #5.

* IF DRIBBLE LIT, START DRIBBLE FLASHING OUT.

CENTER SPOT TARGET:
* SCORE 30,000.

* SCORE 1 BASKET POINT TIMES MULTIPLIER & COLLECT CLOCK EVENT ICON IF LIT OR FLASHING.

* START DRIBBLE FLASHING OUT IF LIT.

* IF DRIBBLE FLASHING OUT, SPOT A DROP TARGET (UNLESS IN MVP EVENT) AND SCORE THE PROGRESSIVE DRIBBLE AWARD. THE SCORE SEQUENCE IS 5 MILLION, 10 MILLION, AND 3 BASKET POINTS.

VARI-TARGET (4 STEPS):
* SCORE 300,000, 1, 3, OR 5 MILLION DEPENDING UPON DEPTH OF HIT.

* SCORE 1 BASKET POINT TIMES MULTIPLIER & COLLECT BASKETBALL EVENT ICON IF LIT OR FLASHING.

* ADVANCE BONUS VALUE IF LIT. WHEN BONUS VALUE REACHES 20 MILLION, LIGHT BONUS 20M IN THE FEATURES COMPLETED CIRCLE.

* IF BONUS AT 20 MILLION, SPOT A DROP TARGET IF THE VARI-TARGET IS DRIVEN COMPLETELY BACK.

* IF BREAK THE BACKBOARD FLASHING OUT AND TARGET HIT BACK FAR ENOUGH (ADJUSTABLE), RECEIVE THE PROGRESSIVE BREAK THE BACKBOARD AWARD. THE SEQUENCE IS 10 MILLION, START HURRY-UP EB FLASHOUT, 10 BASKET POINTS, AND 1 GAME BALL.

RAMP TOP OPTO:
* LOCK BALL IF LOCK FLASHING.

* BEGIN ALL FLASHING EVENTS IF BEGIN EVENT FLASHING.

* SCORE 1 BASKET POINT TIMES MULTIPLIER & COLLECT CLOCK EVENT ICON IF LIT OR FLASHING.

* IF LIGHT ALLEY-OOP IS LIT OR SHOOTER LANE ALLEY-OOP IS FLASHING, BEGIN ALLEY-OOP FLASHOUT.

* IF IN MULTIBALL, HOLD BALL FOR 5 SECONDS. SHOOTING THE REMAINING BALL OR BALLS INTO THE RAMP WILL SCORE A JACKPOT OR SUPER JACKPOT AND THEN RELEASE ALL THE BALLS.

* SCORE 100 MILLION WHEN IN SUPERMODE.

LOWER LEFT SPOT TARGET:
* SCORE 30,000.

* AWARD AN EXTRA BALL IF LAMP FLASHING OR FLASHING OUT.

* SCORE 1 BASKET POINT TIMES MULTIPLIER & COLLECT HORSE HEAD EVENT ICON IF LIT OR FLASHING.

BOTTOM RIGHT SPOT TARGET:
* SCORE 30,000.

* AWARD SPECIAL IF FLASHING OUT.

* SCORE 1 BASKET POINT TIMES MULTIPLIER & COLLECT CLOCK EVENT ICON IF LIT OR FLASHING.
II. GAME PLAY AND SCORING

BOTTOM LEFT SPOT TARGET:
* ADVANCE MULTIPLIER WHEN LIT.
* UNLIT, SCORE 3,000.

BALL SHOOTER (PLUNGER SKILL SHOT):
* BALL LEAVING THE SHOOTER WILL FREEZE THE FLASHING SKILL SHOT LAMP.

KICKING RUBBERS:
* SCORE 30.
* WHILE IN 1 BALL PLAY, A HIT ON THE LEFT KICKING RUBBER FOLLOWED IMMEDIATELY BY A HIT ON THE RIGHT KICKING RUBBER WILL START THE DRAIN SHIELD FLASHING OUT.
* TOGGLE LIT EVENT ICON OBJECTIVES IF ALL EVENTS HAVE ALREADY BEEN PLAYED ONCE.

LEFT RETURN ROLLOVER:
* SCORE 30,000.
* SCORE 1 BASKET POINT TIMES MULTIPLIER & COLLECT HORSE HEAD EVENT ICON IF LIT OR FLASHING.
* START SUPER SPINNER FLASHING OUT IF SPINNER BASKETBALL EVENT ICON UNLIT.

RIGHT RETURN ROLLOVER:
* SCORE 30,000.
* SCORE 1 BASKET POINT TIMES MULTIPLIER & COLLECT BASKETBALL EVENT ICON IF LIT OR FLASHING.
* START SUPER SPINNER FLASHING OUT IF SPINNER BASKETBALL EVENT ICON UNLIT.
* START THE VARI-TARGET BREAK THE BACKBOARD LAMP FLASHING OUT.

LEFT OUTLANE:
* SCORE 3,000.
* RETURN BALL IF DRAIN SHIELD IS FLASHING OUT.
* SCORE 6 BASKET POINTS IF IN 1 BALL PLAY AND DRAIN SHIELD UNLIT.

RIGHT OUTLANE:
* SCORE 3,000.
* AWARD SPECIAL IF FLASHING OUT.
* SCORE 6 BASKET POINTS IF IN 1 BALL.

OUTHOLE:
* AT END OF BALL, SCORE ANY OUTHOLE BONUS TIMES MULTIPLIER, HIDDEN FEATURE BONUS IF ANY (ADJUSTABLE), & SLAMMIN' JAMMIN' BONUS (ADJUSTABLE) IF A SLAMMIN' JAMMIN MULTIBALL WAS PLAYED.
* AT END OF GAME, SCORE 100,000 FOR EACH BASKET POINT (ADJUSTABLE) AND 5 MILLION FOR EACH GAME BALL.

FLIPPERS:
* SELECT AWARD CHOICE FROM VARIOUS Displayed OPTIONS.
* CRADLING THE BALL FOR 2 SECONDS WILL CHANGE THE BASKET VALUE LAMP FROM 3 POINTS TO 2 POINTS.
* PRESSING BOTH FLIPPERS WHILE COLLECTING OUTHOLE BONUSES WILL SPEED UP THE COLLECTION PROCESS.
II. GAME PLAY AND SCORING

*** GENERAL GAME FEATURES ***

GAME THEME:
* THE PLAYER TRIES TO SCORE THE MOST POINTS AND BASKET POINTS WHILE PLAYING 4 TIMED QUALIFYING EVENTS ON THE ROAD TO THE FINALS EVENT. EACH EVENT IS QUALIFIED BY COMPLETING ALL OF ITS ASSOCIATED EVENT ICONS. ALL FLASHING EVENTS BEGIN BY SHOOTING THE RAMP WHILE "BEGIN EVENT" IS FLASHING. MULTIPLE EVENTS CAN BE ACTIVE AT THE SAME TIME (MULTIMODE) FROM THE BEGINNING, OR A NEW EVENT CAN BE QUALIFIED WHILE PLAYING AN EVENT AND THEN SHOOTING THE RAMP AGAIN.

HORSE EVENT:
* QUALIFIED BY SHOOTING ALL THE HORSE HEAD EVENT ICONS. THE OBJECTIVE IS TO COMPLETE THE LETTERS OF H-O-R-S-E BY REPEATED SPINNER SHOTS BEFORE TIME EXPIRES. THE FIRST 4 LETTERS OF HORSE SCORE 10 BASKET POINTS EACH AND THE LAST LETTER AWARDS 3 GAME BALLS AND ENDS THE EVENT.

MVP EVENT:
* QUALIFIED BY SHOOTING ALL THE MVP CUP EVENT ICONS. THE OBJECTIVE IS TO SHOOT THE DROP TARGET AS MANY TIMES AS POSSIBLE BEFORE TIME EXPIRES. THE SCORING PROGRESSES FROM AN EXTRA BALL TO 50 MILLION, TO 100 MILLION, AND TO 300 MILLION & END THIS EVENT.

GAME BALLS EVENT:
* QUALIFIED BY SHOOTING ALL THE BASKETBALL EVENT ICONS. THE OBJECTIVE IS TO SHOOT THE VARI-TARGET AS MANY TIMES A POSSIBLE BEFORE TIME EXPIRES. SCORE 2 GAME BALLS FOR ANY HIT AND 3 GAME BALLS IF THE VARI-TARGET IS DRIVEN ALL THE WAY BACK.

SHOT CLOCK EVENT:
* QUALIFIED BY SHOOTING ALL THE CLOCK EVENT ICONS. THE OBJECTIVE IS TO SHOOT THE BASKET HOOP ONCE BEFORE TIME EXPIRES. THE FIRST HOOP SHOT AWARDS 1 GAME BALL, STARTS THE BOTTOM RIGHT SPOT TARGET SPECIAL FLASHING OUT, AND ENDS THE EVENT.

FINALS EVENT:
* QUALIFIED BY PLAYING ALL 4 OF THE PREVIOUSLY DESCRIBED EVENTS. THE OBJECTIVE IS TO MAKE ALL THE STROBING SHOTS BEFORE TIME EXPIRES (ADJUSTABLE). COMPLETING ALL SHOTS SCORES THE POINT VALUE CHOSEN WHEN FINALS WAS ENTERED. WHEN TIME EXPIRES, THE BOARD IS RESET AND THE EVENT QUALIFICATION PROCESS BEGINS AGAIN.

MULTIBALL:
* 3 BALL MULTIBALL QUALIFIED BY MAKING THE RAMP SHOT WHILE MULTIBALL IS FLASHING OR FLASHING OUT. SHOOTING THE BASKET HOOP WHILE IN 1 BALL PLAY (EXCEPT DURING FINALS) STARTS THE MULTIBALL LAMP FLASHING OR FLASHING OUT. THE OBJECTIVE IS TO SCORE JACKPOTS OR SUPER JACKPOTS BY SHOOTING THE HOOP OR RELOCKING ALL BALLS BACK IN THE RAMP.

SHAQ ATTACK:
* 3 BALL MULTIBALL QUALIFIED BY FILLING THE FEATURES COMPLETED CIRCLE AND THEN SHOOTING THE RAMP. WHILE IN SHAQ ATTACK, ALL TARGETS SCORE 1 BASKET POINT TIMES MULTIPLIER. SHAQ ATTACK CONTINUES UNTIL ONLY 1 BALL REMAINS ON THE PLAYFIELD.

MULTIMODE:
* OCCURS AS A RESULT OF HAVING 2 OR MORE EVENTS ACTIVE AT THE SAME TIME. THE SPINNER AND RIGHT SIDE ROLLOVER NOW SCORE AN ADDITIONAL MILLION POINTS FOR EACH ACTIVE EVENT. MULTIMODE LEVEL 3 OR GREATER LIGHTS THE "LEVEL 3" LAMP IN THE FEATURES COMPLETED CIRCLE.
II. GAME PLAY AND SCORING

SUPERMODE:
* ENABLED WHEN ALL 4 EVENTS, MULTIBALL, AND SHAQ ATTACK ARE ALL ACTIVE AT THE SAME TIME. IN ADDITION TO SCORING MULTIMODE AS PREVIOUSLY DESCRIBED, THE RAMP SCORES 100 MILLION.

SLAMMIN' JAMMIN':
* QUALIFIED BY COMPLETING ALL LETTERS OF "SHAQILLE" AND THEN CHOOSING TO PLAY THE FEATURE AFTER SHOOTING THE LEFT UPKICKER. SHAQILLE LETTERS CAN BE ADVANCED BY HITTING THE LIT TOP RIGHT SPOT TARGET OR CHOOSING ADVANCE SHAQILLE FROM TIP-OFF. SLAMMIN' JAMMIN' IS A 3 BALL MULTIBALL WHERE EVERY TARGET ADDS MILLIONS OF POINTS (ADJUSTABLE) TO A BONUS THAT WILL BE COLLECTED AT END OF BALL. THIS FEATURE REMAINS ACTIVE UNTIL 2 BALLS DRAIN.

SUPER SPINNER:
* CAN ONLY BE ACTIVATED AFTER THE SPINNER BASKETBALL EVENT ICON HAS BEEN COLLECTED. SHOOTING THE SPINNER, RIGHT UPKICKER, AND EITHER RETURN ROLLOVER STARTS SUPER SPINNER FLASHING OUT. SHOOTING THE SPINNER NOW SCORES THE PROGRESSIVE AWARD OF 5 MILLION, 10 MILLION, AND 3 BASKET POINTS.

BREAK THE BACKBOARD:
* THE RIGHT RETURN ROLLOVER STARTS THE VARI-TARGET BACKBOARD LAMP FLASHING OUT (ADJUSTABLE). A HIT (ADJUSTABLE) ON THE VARI-TARGET SCORES A PROGRESSIVE SEQUENCE OF 10 MILLION, START HURRY-UP EB, 10 BASKET POINTS, AND 1 GAME BALL.

ALLEY-OOP:
* ENABLED FROM THE PLUNGER SKILL SHOT OR BY SHOOTING THE RAMP WITH A LIT LIGHT ALLEY-OOP LAMP. THE BASKET HOOP ALLEY-OOP LAMP BEGINS FLASHING OUT. SHOOTING THE HOOP SCORES SEVERAL BASKET POINTS (ADJUSTABLE), 1 GAME BALL, AND LIGHTS ALLEY-OOP IN THE FEATURES COMPLETED CIRCLE.

HIDDEN FEATURES:
* 5 HIDDEN FEATURES ARE SCATTERED AROUND THE PLAYFIELD. DISCOVERING THEM LIGHTS A CORRESPONDING LAMP AND SCORES AN "END OF GAME" OR "END OF BALL" BONUS (ADJUSTABLE). THE HIDDEN FEATURES ARE AS FOLLOWS:
  #1 - PLAYING MULTIMODE LEVEL 5 OR SUPERMODE.
  #2 - RELOCK ALL BALLS IN RAMP DURING MULTIBALL.
  #3 - SHOOTING "FREE THROW" DURING AN EVENT (ADJUSTABLE).
  #4 - TIP-OFF 5,000 POINTS CHOSEN 2 OR 3 TIMES (ADJUSTABLE).
  #5 - SCORE A DROP TARGET REBOUND.

* THE BONUS IS BASED ON TOTAL FOUND AND IS AS FOLLOWS:
  1 FOUND - 10 MILLION
  2 FOUND - 30 MILLION
  3 FOUND - 100 MILLION
  4 FOUND - 300 MILLION
  5 FOUND - 1 BILLION

GAME BALL:
* THIS FEATURE REQUIRES ADVANCING THE FLASHING 1, 2, 3, AND 4 LAMPS BY SHOOTING THE SPINNER AND RIGHT LAMP ROLLOVER. COMPLETING THOSE 4 LAMPS WILL FLASH #5. SHOOTING THE RIGHT UPKICKER WILL THEN AWARD 1 GAME BALL AND LIGHT GAME BALL IN THE FEATURES COMPLETED CIRCLE. THE PLAYER IS THEN GIVEN THE OPTION OF TRADING ALL GAME BALLS FOR AN AWARD. THE MORE GAME BALLS ACCUMULATED - THE BETTER THE AWARD.

PLUNGER SKILL SHOT:

TIP-OFF:
* A MYSTERY AWARD ACTIVE DURING NORMAL 1 BALL PLAY AND ENABLED BY SHOOTIN' THE LEFT UPKICKER. THE PLAYER IS ALLOWED TO CHOOSE BETWEEN A POINT AWARD OR SOME OTHER AWARD.
There are several functions accessible to the operator while in the test mode. These functions are Self-Test, Bookkeeping, Game Adjustments, and Utilities. Each of these functions will be explained in detail later in this section. To enter the test mode, the game must be in the attract mode (game over). Then depress the Test button located just inside the front door of the game. The operator will then be given a choice as to which function he wants to access. Use the left flipper button to choose (highlight) the function desired and then either the Test button or the right flipper button to enter the chosen function.

NOTE: The Test button may be held in to fast forward through the steps of a particular function.

To exit the test mode or change functions the Slam switch (front door) must be activated or the power must be turned off.

I. SELF-TEST
This function will allow the operator to test all the hardware related devices in the game. Each test is described below. In most cases the Credit button can be used to restart each test (see Testmode Flowchart).

A. MEMORY TEST
This function tests all memory devices on the Control Board (A1). If all the devices pass the test an "OK" will be displayed. If a failure occurs, a description of the faulty component will be displayed. Then after a short period of time the Game Prom check sum will be displayed.

B. LAMP CHECK
This function will flash all the controlled lamps and flasher lamps continuously. This will allow the operator to easily check for and replace any burned out light bulbs.

C. LAMP MATRIX TEST
This test will allow an operator to single step through and check the operation of each lamp in the game. The left flipper button will decrement the active lamp number by one while the right flipper button will increment the active lamp number by one. The strobe number and the return number are combined to form the lamp number (strobe,return) which is shown in the display along with a description of the lamp. Only one lamp at a time should flash during this test.

D. RELAY AND SOLENOID TEST
This test will allow an operator to single step through and check the operation of each relay and solenoid driver in the game. The left and right flipper buttons are used to change the active driver number. The selected driver description and number will appear in the display. The Credit button is then used to activate the driver for a short time period. Solenoid #31 ('Q' relay) is always on during this test so as to provide power to devices such as the pop bumpers and kicking rubbers (see Playboard Schematic Diagram).

E. SWITCH MATRIX TEST
The first part of this test will report any switch(s) which have not been operated in the course of the last 15 games (INOPERATIVE SWITCHES). The second part of the test will report any switch(s) which are stuck closed. If no switches are closed when this test is started, the message "ALL SWITCHES OPEN" will be displayed. If any switches are closed, the closed switch(s) name and number will continuously be displayed. The strobe number and the return number are combined to form the switch number (strobe,return). The Credit button can be used to restart this test.

F. SWITCH EDGES TEST
This test will display the name and number of any switch that is actuated. When actuating each switch, a problem exists if either no switch is shown or any switch other than the one actuated is displayed.

G. DISPLAY TEST
This test checks the operation of the 128 x 32 dot matrix display. The right flipper button is used to advance this
III. TEST MODE

- The first two steps check the different levels of display intensity. Each block that appears on the display should be of lesser intensity than the one to the left of it. During the next four steps a diagonal pattern is stepped from left to right in the display. While in this part of the test every fourth pixel only in each row of dots should be lit. During the next eight steps another diagonal pattern is stepped from left to right in the display. While in this part of the test every eighth pixel only in each row of dots should be lit.

- H. SOUND TEST
This test checks the interface lines from the Control Board (A1) to the Sound Board (A6). Every time the right flipper button is pressed, a different tone should be heard. During each tone, the sound line connection which is being tested will be shown in the display. After the tone stops the sound line which is being tested will still be kept at a low level (<= 0.8V) until the right flipper button is pressed again or the Credit button is used to restart the test.

- J. FRONT DOOR TEST
This test checks the operation of the coin chutes used in the game.
- Utilizing this function will not affect any bookkeeping values. Each coin chute closure is categorized and shown in the display.

- II. BOOKKEEPING
The Test button is used to step through bookkeeping. The display will contain a description of each step, the step number, and two different bookkeeping values. The value in the leftmost column represents long term bookkeeping. The value in the rightmost column (in brackets) represents short term bookkeeping. These two values are provided so that the operator may compare recent performance with long term performance and then make any necessary game adjustments.

NOTE: The left column of steps 1 (earnings) and 17-20 (coin chute counts) will not be displayed unless the credit button is pressed during that active step number.

- The left flipper button will allow the operator to reset all of the left (long term) and right (short term) bookkeeping values. The right flipper button will allow the operator to reset all of the right (short term) bookkeeping values only. If the R.BOOK AUTO-RESET adjustment is on, the right (short term) bookkeeping will automatically be reset after every 2000 plays (see Game Adjustments). Therefore, the operator does not need to reset the short term bookkeeping himself unless he prefers to follow his own procedure. Also, this feature will aid in adjusting the game payout percentage to the caliber of players in different locations. If there happens to be a major error in a long term bookkeeping value the word ERROR will appear to the right of that bookkeeping value. To correct this error the long term bookkeeping must be reset. A description of each bookkeeping step is given in the test mode flowchart.

III. GAME ADJUSTMENTS
This function allows the operator to make any adjustments to his game as necessary.

A. FACTORY SETTINGS
Upon entering the game adjustment section of bookkeeping, the operator is given a choice to load all factory settings or to single step through the game adjustments and adjust each section individually. If he chooses
III. TEST MODE

to enter the factory settings by depressing the Credit button, he will also be given a choice of what language to load. By using the right flipper button he may choose the appropriate language and then depress the Credit button again to enter the settings. After the settings are loaded the display should show the message "FACTORY SETTINGS LOADED" for a short time and then proceed to game adjustment step 1. At any time during the previous steps the operator may either exit the test mode or depress the Test button to proceed immediately to game adjustment step 1.

WARNING
Loading the factory settings will affect all previous game adjustment settings. Therefore be careful when selecting this feature.

B. GAME ADJUSTMENT STEPS
Each time the Test button is pressed a description of the next step appears in the display along with the step number and the current status of that step. Unless otherwise specified, the left and right flipper buttons are used to change the possible selections in each step.

1) SCORE REPLAY LEVEL 1
2) SCORE REPLAY LEVEL 2
3) SCORE REPLAY LEVEL 3
Each Score Replay Level may be set by using the left flipper button to decrement the score and the right flipper button to increment the score. The Credit button can be used to load the factory setting for each individual level if desired. If the Auto-Percentaging adjustment is on, Replay Levels 2 & 3 can only be set to on or off. If Replay Level 2 is on, the score level will be set to two times Replay Level 1. If Replay Level 3 is on, the score level will be set to three times Replay Level 1. This allows the operator several combinations of levels in the Auto-Percentaging mode (i.e. 1, 1 & 2, 1 & 3, or 1 & 2 & 3).

4) HIGH GAME TO DATE 1
5) HIGH GAME TO DATE 2
6) HIGH GAME TO DATE 3
7) HIGH GAME TO DATE 4
8) HIGH GAME TO DATE 5
Each High Game To Date may be set by using the left flipper button to decrement the score and the right flipper button to increment the score. The Credit button can be used to load the factory setting for the displayed level and all those below it.

9) GAME PRICING
This step provides a choice of loading a standard setting for a particular country or a custom setting. When a standard setting is selected, the following steps (10-17) are skipped.

10) CHUTE 1 UNITS (L)
11) CHUTE 2 UNITS (R)
12) CHUTE 3 UNITS (C)
13) CHUTE 4 UNITS
14) UNITS REQUIRED FOR CREDIT
15) UNITS REQUIRED FOR BONUS
16) BONUS CREDITS
17) MINIMUM UNITS REQUIRED FOR CREDIT
Steps 10-17 are used if a custom setting is selected in step 9 (GAME PRICING). Steps 10-13 select the number of units that each chute is worth when a coin is dropped into that particular chute. The value entered for step 14 determines how many units must be accumulated for a credit to be issued on the game. Steps 15 and 16 determine how many units must be accumulated for any bonus credits to be issued. A value of zero entered for step 15 will disable the bonus feature. Step 17 indicates the number of units required before any credits are issued (see Coin Chute Setting Table for examples).

18) COIN METER
If set to ON, the pulses to be given for each of the four coin chutes can be defined so that the number of pulses for a given chute are in relation to the currency denomination. If set to OFF, steps 19-22 will be skipped.

19) CHUTE 1 PULSES
20) CHUTE 2 PULSES
21) CHUTE 3 PULSES
22) CHUTE 4 PULSES
The four steps above are used to set
### III. TEST MODE

#### COIN CHUTE SETTING TABLE

<table>
<thead>
<tr>
<th>Country</th>
<th>Coin Chutes</th>
<th>Plays/Coin(s)</th>
<th>Chute Adjustment Steps</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Left</td>
<td>Right</td>
<td>Center</td>
</tr>
<tr>
<td>USA</td>
<td>.25</td>
<td>.25</td>
<td>$1</td>
</tr>
<tr>
<td>USA (Custom)</td>
<td></td>
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</tr>
<tr>
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</tr>
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<td>$2</td>
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</tr>
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<td>50 Fr</td>
</tr>
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<td>10 Kr</td>
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</tr>
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<td>5 Fr</td>
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<td>10 Fr</td>
</tr>
<tr>
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<td>2 DM</td>
<td>1 DM</td>
</tr>
<tr>
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<td>5 OD</td>
<td>-</td>
</tr>
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</tr>
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<td>100 Y</td>
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</tr>
<tr>
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<tr>
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<td>100 P</td>
<td>-</td>
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<td>2 Fr</td>
</tr>
<tr>
<td>United Kingdom 1</td>
<td>1 f</td>
<td>50 P</td>
<td>20 P</td>
</tr>
<tr>
<td></td>
<td>2 f</td>
<td>50 P</td>
<td>20 P</td>
</tr>
<tr>
<td>Universal</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
the number of pulses to be issued for each of the four coin chutes.

23) COIN DOOR TYPE
This step provides a choice of loading a standard setting for a particular country or a custom setting. When a standard setting is selected, the following steps (24-28) are skipped.

24) COLLECTION TEXT
25) CHUTE 1 VALUE
26) CHUTE 2 VALUE
27) CHUTE 3 VALUE
28) CHUTE 4 VALUE
Step 24 is used to enter the name of the currency in use. The remaining four steps are used to set the monetary value of each coin chute.

29) GAME BUY-IN BONUS
At the end of a game, if enabled, a 10-second timer is initialized allowing each player that participated in the previous game a chance to purchase 1 credit for either 1 or 2 coins.

30) EXTENDED PLAY
At the end of a player's last ball in play, if enabled, a 10-second timer is initialized allowing the player to continue playing his current game by inserting either 1 or 2 coins for one extra ball.

31) EXTENDED PLAY MAXIMUM
This step sets the maximum number of extra balls a player may purchase in any one game when the EXTENDED PLAY feature is enabled. In a multiple player game, each player can only purchase one ball so this step will have no effect.

32) EXTENDED PLAY CHUTE(S)
This step sets which coin chute(s) will be enabled toward purchasing a game if step 29 is enabled and/or an extra ball if step 30 is enabled. A coin dropped in any other chute will be used toward purchasing a new game.

33) GAME PERCENT PAYOUT
This step is used to set the game payout percentage used when the Auto-Percentaging adjustment is on. The value entered for this step is compared to the value calculated by dividing total replays by total plays (see Bookkeeping section). Total replays include all replays won from beating the score replay level, achieving a new high game to date, winning a playfield special, and all match replays.

When the GAME MODE adjustment is set to Add a Ball this setting refers to extra ball percentage rather than replay percentage. The value entered in this case will be compared to the value calculated by dividing total extra balls won by total plays (see Bookkeeping section).

34) MATCH PERCENT PAYOUT
This step is used to set the match payout percentage. If this step is set to zero, the match will be disabled.

NOTE: The MATCH PERCENT PAYOUT value is included in the value entered for GAME PERCENT PAYOUT (step #33). Therefore in order to retain the same payout percentage for the other payout features in the game such as score level replays, the GAME PERCENT PAYOUT will be automatically adjusted by the same amount as this step when changed.

35) HIGH GAME REPLAYS
This step is used to set the number of replays to award when the highest game to date has been beaten.

36) MAXIMUM CREDITS
This step sets the maximum number of credits allowed on the game.

37) TILT WARNINGS
This step sets the number of tilts allowed before the current player's ball in play is terminated.

38) BALLS PER GAME
This step sets the number of balls per game to 1-5.

39) GAME MODE
This step allows the game to be played in Replay, Replay + Tickets, Tickets Only, Add a Ball, or Novelty mode. In Replay mode all Specials and replays are allowed. Replay + Tickets mode is the same as Replay mode with the addition of one or more tickets to be issued (TICKETS TO AWARD) along
THE TEST MODE CAN ONLY BE ACCESSED DURING
THE ATTRACT MODE (GAME OVER).
THE TEST MODE MAY BE EXITED BY EITHER
ACTUATING THE SLAM SWITCH ON THE FRONT
DOOR OR TURNING THE POWER OFF.

**SELF-TEST**

- **MEMORY TEST** (also displays check-sum)
  - C: RESTART TEST

- **LAMP CHECK**
  - C: RESTART TEST

- **LAMP MATRIX TEST**
  - C: RESTART TEST
  - L: PREVIOUS LAMP
  - R: NEXT LAMP

- **RELAY AND SOLENOID TEST**
  - C: ACTIVATE DRIVER
  - L: PREVIOUS DRIVER
  - R: NEXT DRIVER

- **SWITCH MATRIX TEST**

**BOOKKEEPING**

- **STEP**
  1. TOTAL EARNINGS (a)
  2. TOTAL PLAYs
  3. BALL TIME (MIN-SEC)
  4. GAME TIME (MIN-SEC)
  5. TOTAL EXTRA BALLS
  6. PERCENT EXTRA BALLs
  7. TOTAL REPLAYS
  8. PERCENT REPLAYS
  9. PLAYFIELD SPECIALS
  10. SCORE LEVEL REPLAYS
  11. HIGH GAME REPLAYS
  12. MATCH REPLAYS
  13. TOTAL TILTS
  14. TILT WARNINGS
  15. SERVICE CREDITS
  16. TOTAL PLAYs PAID
  17. <L> CHUTE 1 COINS (a)
  18. <R> CHUTE 2 COINS (a)
  19. <C> CHUTE 3 COINS (a)
  20. CHUTE 4 COINS (a)
  21. EXTENDED PLAY COINS
  22. EXTENDED PLAY BALLS
  23. 0-24.9M SCORES
  24. 25M-49.9M SCORES
  25. 50M-69.9M SCORES
  26. 70M-79.9M SCORES
  27. 80M-89.9M SCORES
  28. 90M-99.9M SCORES
  29. 100M-124.9M SCORE
  30. 125M-149.9M SCORE
  31. 150M-199.9M SCORES
  32. 200M-299.9M SCORES
  33. 300M-499.9M SCORES

**UTILITIES**

- **STEP**
  - L: NEXT ITEM
  - R or T: SELECT

- **UPDATE**
  - C: RESTART TEST

- **LAMP CHECK**
  - C: RESTART TEST

- **LAMP MATRIX TEST**
  - C: RESTART TEST
  - L: PREVIOUS LAMP
  - R: NEXT LAMP

- **RELAY AND SOLENOID TEST**
  - C: ACTIVATE DRIVER
  - L: PREVIOUS DRIVER
  - R: NEXT DRIVER

- **SWITCH MATRIX TEST**

**GAME ADJUSTMENTS**

- **SELECT**
  - C: RESTART TEST

- **STEP**
  1. NEXT STEP
  2. CHANGE ADJUSTMENT
  3. CHANGE ADJUSTMENT

- **CHOOSE FUNCTION**
  - C: SET TO FACTORY DEFAULT (Applies only to steps below that are followed by an asterisk *)

- **LOAD FACTORY DEFAULTS**
  - C: ENGLISH
  - R: GERMAN OR FRENCH

- **LOAD DEFAULT VALUES**

**LEGEND**

- T: PRESS TEST BUTTON
- C: PRESS CREDIT BUTTON

1. FIRST REPLAY LEVEL *
2. SECOND REPLAY LEVEL *
3. THIRD REPLAY LEVEL *
4. HIGHEST GAME TO DATE *
5. HIGH GAME TO DATE 2 *
6. HIGH GAME TO DATE 3 *
7. HIGH GAME TO DATE 4 *
8. HIGH GAME TO DATE 5 *
9. GAME PRICING
   - Steps 10-17 are skipped
   - IF GAME PRICING IS NOT SET TO CUSTOM,
   - IF COIN METER IS OFF.
10. <L> CHUTE 1 UNITS
11. <R> CHUTE 2 UNITS
12. <C> CHUTE 3 UNITS
13. CHUTE 4 UNITS
14. UNITS/CREDIT
15. UNITS/BONUS CREDIT
16. MINIMUM UNITS
17. COIN METER
   - Steps 19-22 are skipped
   - IF COIN METER IS OFF.
19. CHUTE 1 PULSES
20. CHUTE 2 PULSES
21. CHUTE 3 PULSES
22. CHUTE 4 PULSES
III. TEST MODE

with each replay. In Tickets Only mode one or more tickets will be issued in place of each replay won. In Add a Ball mode all Score Level Replays and Playfield Specials award an extra ball in place of a replay. Also the Match and High Game To Date awards are disabled. However, after the Add a Ball mode is selected, the PLAYFIELD SPECIAL, MATCH PERCENT PAYOUT, and HIGH GAME REPLAYS adjustments may be individually set to whatever setting may be desired. In Novelty mode all Specials award 50,000,000 points, Extra Balls award 20,000,000 points and the Score Replay Levels, Match, and High Game to Date awards are disabled.

NOTE: If either the Replay + Tickets or Tickets Only setting is selected do not set the COIN METER setting to on.

40) TICKETS TO AWARD
This step allows the operator to set the number of tickets to award when a replay has been won. This setting will only apply when the GAME MODE is set to either Replay + Tickets, or Tickets Only.

41) LANGUAGE
This step allows the Test Mode steps to be displayed in English, German, or French.

42) AUTO-PERCENTAGING
If this step is set to on, the Score Replay Levels will be adjusted periodically so that the Game Percent Payout setting will match the actual Replay Percentage displayed in Bookkeeping.

NOTE: If the GAME MODE is set to Add a Ball, the Extra Ball Percentage in bookkeeping is used in place of the Replay Percentage.

43) REPLAY LIMIT
This step may be set to no limit or one per player per game.

44) HIGH GAMES 2-5
This step will determine if High Games to Date (2-5) will be saved or erased when power is turned off.

45) ATTRACT SOUND
This step determines whether or not sounds are enabled during the attract mode (game over).

46) ATTRACT MESSAGE 1
This step is used to enter, enable, or disable an operator message. The message is permanently stored in memory and will be periodically displayed during the attract mode (game over). To enter a message press the Credit button. The current message will be displayed and the cursor position will be indicated by the flashing character. If the current position is blank, a flashing directional arrow will appear. This type of arrow will indicate which direction the cursor will move if the Credit button is pressed. The characters are chosen using the left and right flipper buttons and then entered into memory by pressing the Credit button.

47) ATTRACT MESSAGE 2
This step is used to enter, enable, or disable an second operator message. See step 43 above for details. When both messages are enabled they will be displayed consecutively.

48) RIGHT BOOKKEEPING AUTO-RESET
If this step is set to on, all the short term bookkeeping steps (in brackets) will reset after 2000 plays. Otherwise they will not reset until 10,000 games have been played on the machine.

49) PLAYFIELD SPECIAL
When a playfield special is won, either a replay or an extra ball is awarded to the player based on the setting of this step.

50) REPLAY LEVEL BOOST
This step may be set anywhere from 0 to 990,000,000 in increments of 10,000,000. If set to zero, the boost is disabled. Otherwise the Replay Level will be increased by the boost value after completing a game where a player has won a replay and his skill level has been determined to be above average. The Replay Level will return back to its base level once all of the replays won have been played.
III. TEST MODE

51) GAME RESTART
This step is used to enable or disable the credit button from starting a new game while currently in a game. If set to ON, a new game will begin when the credit button is pressed if there are any remaining credits. If set to OFF, a new game cannot be started until the current game has ended.

52) GAME INACTIVITY TIMER
This timer can be used to cause a game to go to game over automatically if there is no activity on the playfield for a specified time period. This period can be set from one to nine minutes. Setting this step to zero disables the timer.

OPERATOR ADJUSTMENT SETTINGS
(*** = ENGLISH & GERMAN FACTORY DEFAULT SETTING)
(** = FRENCH FACTORY DEFAULT SETTING)

53) GAME DIFFICULTY
THE ADJUSTMENTS LISTED IN THE TABLE BELOW ARE AUTOMATICALLY SET AS INDICATED IN THE TABLE UNLESS FINE-TUNE IS SELECTED USING THE RIGHT FLIPPER BUTTON. IF FINE-TUNE IS SELECTED, EACH STEP IN THE TABLE CAN BE ADJUSTED INDIVIDUALLY. OTHERWISE THESE STEPS ARE SKIPPED. WHEN FINE-TUNE IS SELECTED, ALL SETTINGS REVERT BACK TO THE FACTORY DEFAULT SETTINGS AS SHOWN IN THE TABLE BELOW.

<table>
<thead>
<tr>
<th>STEP</th>
<th>***</th>
<th>**</th>
</tr>
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<tbody>
<tr>
<td>53</td>
<td>GAME DIFFICULTY</td>
<td>VERY EASY</td>
</tr>
<tr>
<td>54</td>
<td>EVENT TIMING</td>
<td>-------</td>
</tr>
<tr>
<td>55</td>
<td>BACKBOARD LAMP TIMING</td>
<td>EASY</td>
</tr>
<tr>
<td>56</td>
<td>BREAK THE BACKBOARD</td>
<td>EASY</td>
</tr>
<tr>
<td>57</td>
<td>HURRYUP EB TIMING</td>
<td>EASY</td>
</tr>
<tr>
<td>58</td>
<td>HURRYUP EB START</td>
<td>EASY</td>
</tr>
<tr>
<td>59</td>
<td>FINALS EVENT TIMER</td>
<td>EASY</td>
</tr>
<tr>
<td>60</td>
<td>TIP OFF EXTRA BALL %</td>
<td>VERY EASY</td>
</tr>
<tr>
<td>61</td>
<td>SUPER JACKPOT</td>
<td>EASY</td>
</tr>
</tbody>
</table>

54) EVENT TIMING
Sets the speed of the timer during feature events.
VERY EASY – Slowest
EASY
MEDIUM
HARD
VERY HARD – Fastest

55) BACKBOARD LAMP TIMING
Sets the speed of the flashout timer for the BREAK THE BACKBOARD lamp.
EASY – Slowest
MEDIUM
HARD – Fastest

56) BREAK THE BACKBOARD
Sets the distance the Vari-target must travel to score BREAK THE BACKBOARD.
EASY – Any hit
MEDIUM – Half way
HARD – All the way back

57) HURRY-UP EB TIMING
Sets the speed of the flashout timer for the EXTRA BALL lamp.
EASY – Slowest
MEDIUM
HARD – Fastest

58) HURRY-UP EB START
Sets the basket point levels where the HURRY-UP EXTRA BALL lamp starts flashing out.
EASY – 50, 200, 700
MEDIUM – 100, 200, 700
HARD – 200, 700

59) FINALS EVENT TIMER
Selects the starting time value for the FINALS event.
EASY – 40
MEDIUM – 30
HARD – 20

60) TIP OFF EXTRA BALL %
Filters EXTRA BALL out of the TIP OFF award when the EB% exceeds the following:
VERY EASY – 50%
EASY – 40%
MEDIUM – 30%
HARD – 20%
VERY HARD – 10%

61) SUPER JACKPOT
Sets the difficulty for scoring a SUPER JACKPOT during multiball by selecting the time the SUPER JACKPOT lamp flashes out.
EASY – Slowest
MEDIUM
HARD – Fastest
III. TEST MODE

62) GAME BALL TRADE VALUE
Selects the worth of each game ball in millions of points should the player be offered a trade.
EASY - 30 million
*** MEDIUM - 20 million
HARD - 10 million

63) SLAMMIN' JAMMIN' BONUS
Sets the points added to the bonus during SLAMMIN' JAMMIN' multiball.
EASY - 10 million
*** MEDIUM - 5 million
HARD - 3 million

64) LAST BALL SPECIAL
Starts SPECIAL lamps flashing out on last ball if score is under 30,000,000.
** OFF - No
*** ON - Yes

65) HIGH BASKETS SPECIAL
Award a special when HIGH BASKETS has been beaten?
OFF - No
*** ON - Yes

66) HURRY-UP SPECIAL TIME
Sets the speed of the flashout timer for the spot target SPECIAL lamp.
EASY - Slowest
*** MEDIUM
HARD - Fastest

67) HIDDEN FEATURES
Selects the difficulty for completing HIDDEN FEATURES #3 and #4.
*** EASY - Shoot FREE THROW during any event.
Choose 5,000 twice.
HARD - Shoot FREE THROW during only MVP.
Choose 5,000 three times.

68) HIDDEN FEATURES BONUS
Determines when the HIDDEN FEATURE BONUS is collected.
*** EASY - Collected for each ball
** HARD - Collected on last ball only.

69) SHAQ ATTACK CIRCLE ADVANCE
Affects the difficulty of completing the SHAQ ATTACK circle.
*** EASY - Another lamp lit at game over.
** HARD - No lamps added.

70) ALLEY-OOP AWARD
Selects the basket points value for shooting the hoop when ALLEY-OOP is flashing.
EASY - 10
*** MEDIUM - 8
HARD - 5

71) SHAQUILLE FEATURE
Sets the difficulty in completing all letters of SHAQUILLE.
*** EASY - Carry over letters from previous ball.
HARD - Start fresh on every ball.

72) BALL TIME SAFETY
Should a ball drain very quickly, it will be returned to the shooter based upon setting.
VERY EASY - 20 Seconds
EASY - 15 Seconds
*** MEDIUM - 10 Seconds
HARD - 5 Seconds
** VERY HARD - No safety time

73) REDUCED SCORING
*** OFF - JACKPOT scores 20 Million.
SUPER JACKPOT scores 100 Million.
Multiplier set to 3X at start of last ball.
Bonus 3 Million lit at start of ball.
Collect bonus for basket points at end of game.
ON - JACKPOT scores 10 Million.
SUPER JACKPOT scores 50 Million.
Multiplier always starts at 1X.
No bonus lamps lit at start of ball.
No end of game bonus for basket points.

74) HIGH BASKET POINTS
This step adjusts the "HIGH BASKETS" to date. (40-999).

75) MINIMUM GAME TIME
This step allows for continuing play up to an adjusted minimum time. (0 - 4 minutes)

76) REDUCED COACH SPEECH
Reduces the amount of coaching background speech.
*** OFF - Normal
ON - Reduced speech
III. TEST MODE

IV. UTILITIES
Use the left flipper button to choose (highlight) a function and then the right flipper button to select or change the value of the function. Each utility is described below.

A. PRINT
Bookkeeping - all values
Short Bookkeeping - first 8 values

B. PRINTER SET-UP
Type - NSM DATA or SERIAL
Baud Rate - 1200, 2400, 4800, 9600
Data - 7 bit or 8 bit
Parity - none, even, or odd

C. ID NUMBERS
Two six digit numbers can be entered in permanent memory during this step. One is a GAME ID and the other is an ARCADE ID. These two ID's appear on all printouts. Also the GAME ID number will appear in the display on power-up. The left and right flipper buttons alter the digit value and the credit button enters the displayed value into memory and then proceeds to the next digit position.

D. BURN-IN
This function can be used to continuously exercise all the lamps and solenoids in the game.

V. TOURNAMENT MODE
The Tournament Mode switch provides a simple way to alter some of the normal game settings in order to provide for tournament play. The switch is located on a circuit board just inside the front door of the game to the lower left. The game must be in a game over condition in order to recognize the switch changing states. When the switch is moved to the "ON" position with the front door open, four Tournament Mode adjustments will appear on the display. These adjustments can be altered by using the left flipper button to select the function and the right flipper button to alter the current setting. Once these settings have been chosen they will remain in permanent memory so that all that has to be done each subsequent time that tournament play is desired is to move the switch to the "ON" position. When the Tournament Mode settings are in effect they override the normal Game Adjustment settings. When the switch is moved to the "OFF" position, all the normal Game Adjustment settings are back in effect.

NOTE: Even if the game will not be used for tournament play, this switch can be used to provide an easy way to set the game for FREE PLAY without affecting any other game settings by setting the remaining three Tournament Mode adjustments to "NORMAL".

Each Tournament Mode adjustment is described below.

*** = Factory Default Setting

1) FREE PLAY
*** OFF = Credits are required to start a game.
   ON = A game may be started without any credits posted.

2) GAME FEATURES
*** NORMAL = Normal play.

   TOURNAMENT =
   Various game features are altered as described below in order to provide the same odds for all players.
   a) Reset "Shaq Attack" circle lamps to Jackpot, Bonus 20M, and Level 3 lit at start of each ball.
   b) Mystery always alternates award choices between 5,000 or 5,000,000 and 2 basket points.
   c) No short ball time safety.

3) SPECIAL/REPLAY
*** NORMAL = Normal play.

   POINTS =
   Playfield Special awards
   50,000,000 points. Match, High Game to Date, and Score Replay Level payouts are disabled.

4) EXTRA BALL
*** NORMAL = Normal play.

   POINTS =
   Extra Ball awards 20,000,000 points.
III. TEST MODE

SERVICE SWITCH
The switch is actuated when the front door is closed. With the front door closed, all bookkeeping steps are incremented normally. When the front door is opened all bookkeeping steps are frozen at their current values. Any credits that are added with the front door open are recorded in the SERVICE CREDITS bookkeeping steps.

SOUND ADJUSTMENTS
The speaker(s) output is controlled by the volume control located on a circuit board just inside the front door of the game to the lower left.

Turning the volume control counterclockwise will decrease the volume. Turning it clockwise will increase the volume.

AUTO-PRINT FEATURE
If there is a Communications Adapter installed in the game, the printer will immediately begin printing the first eight bookkeeping values as soon as it is plugged in during game over. If a different printout option is required the Test Mode must be entered first before plugging the printer in so that the immediate printout process does not begin.

POST ADJUSTMENTS
The post at the mouth of the left outlane and the post at the mouth of the right outlane can be positioned for liberal/conservative play. The smaller openings produce a more liberal game.

IV. THEORY OF OPERATION

[Diagram of interconnection diagram]

FIGURE 1. INTERCONNECTION DIAGRAM
IV. THEORY OF OPERATION

FIGURE 2. SYSTEM 3 BLOCK DIAGRAM
IV. THEORY OF OPERATION

A. CONTROL BOARD (A1)
The Control Board is supplied with 5vdc (A1P1) from the Power Supply (A2P2). The data contained in ram (U3) is kept valid when power is turned off by the lithium battery (BAT1) and controller (U6).

NOTE: When replacing either the battery, ram, or the controller there may be a message that appears in the display on power up the first time that indicates a low battery condition. If this occurs, turn the power off and back on again. The board should power up normally this time. If not, there is another problem on the board.

The Control Board can accommodate either a 27512 or a 27256 Eeprom. JP1 must be installed for a 27512 or JP2 for a 27256 Game Prom. A 4 Mhz oscillator is configured using U17,R1,R2,C22,C23, and XTAL1. The oscillator output is then divided by 2 to a 2Mhz clock by U18 which is used as the input clock to the 6502 (U1) microprocessor. The clock output of U1 (pin 39) is used as a sync signal for reading from or writing to the peripheral devices.

Two versatile interface adapters (U4,U5) are used to develop the necessary control signals for the system. The display connector (A1P3) is comprised of several signals. U4-15 and U4-17 are used as inputs to receive data from the Display Controller Board. Data is output to the Display Controller Board by U7 (BD0-BD7) and then latched by pulsing the DS0 line at U9-4. The output at DS1 (U9-5) is used to reset the Display Controller Board if it does not respond to data output by the Control Board.

The Driver Board connector (A1P2) contains all the signals necessary to operate the lamp and switch matrix strobes, the lamp matrix returns, and the solenoids. The lamp clear (LCIR), lamp strobe (LSTB), and lamp strobe data (LDATA) are generated by U4-12,U4-11, and U4-10 respectively. The appropriate lamp return data during each active lamp strobe is output by U7 and latched into U5 on the Driver Board by the lamp return data strobe (LDS). The solenoid data is output by U7 (BD0-BD7) and latched into the appropriate Driver Board device (U1-U4) by the solenoid strobes (SS0-SS3).

The switch matrix returns are input at A1P5, buffered by U19 and U20 and then input to U4. Discrete inputs are provided at A1P5 for the slam, tilt, and test switches.

The connection to the Sound Board (A1P4) is made up of eight sound data lines (SD0-SD7), a return line (SRET), and a reset line (MR).

A reset circuit is configured using U13,U14,R3, and C24. When power is applied to the system, the microprocessor reset pin (U1-40) is held low for approximately 10 milliseconds. The system can also be reset by pressing the switch (SW1) on the board. Whenever a reset occurs the master reset signal (MR) (U18-9) is held low until the display strobe (DSTB) becomes active. At this point the master reset goes high which enables the peripheral IC's on the Display Board and Driver Board to accept data.

A watchdog circuit is employed to monitor both the display digit strobe and the lamp strobe. This circuit is made up of U11,U12,U13,U16,R5,R6,R29, R32,R33,C20,C21,C28, and C29. If either the display strobe (DSTB) or the lamp strobe (LSTB) is missing for 330 milliseconds the system will be reset. The system will also be reset if the supply voltage drops below 4vdc. This voltage monitor is configured using U21,VR1,D1,D2,R34, and R35.

B. POWER SUPPLY (A2)
The transformer panel delivers 12vdc to the input of the power supply. The regulated output voltage should be set to 5vdc by using potentiometer R3. This voltage is then supplied to the Control Board (A1), Driver Board (A3), Display Board (A4), Sound Board
IV. THEORY OF OPERATION

(A6), Display Controller Board (A8), and any other auxiliary board which may require it.

C. DRIVER BOARD (A3)
Two voltages are supplied to this board at A3P1. The 5vdc is supplied from the Power Supply (A2) and the 20vdc is supplied from the transformer panel. The 20vdc is used to source the controlled lamps and the switch matrix. The Driver Board receives its data at A3P2 from the Control Board (A1P2). Solenoid data is latched into U1-U4. Lamp return data is latched into U5. Lamp and switch strobe data is shifted through U6 and U7. The comparators (U10,U11) are used to protect the MOSFETS (Q33-Q49). If a sensed input voltage exceeds the reference voltage (Vref), the corresponding MOSFET is turned off immediately following the lamp clear pulse (LCLR) supplied by U12 thus limiting the duty cycle. If the master reset signal (MR) is held low all lamps and solenoids will be disabled.

D. DISPLAY CONTROLLER (A8)
This board is comprised of the power supply section and the digital section. The power supply is used to generate the necessary voltages that are required to power the Display Board. All voltages are input at A8P1 and then output to the Display Board at A8P2.

The digital section controls the information which appears in the display and also the refresh of the display information. The clock circuit runs at 3.579 MHz and is divided by two through U5 and then fed to the microprocessor (U1-37) as the master clock. The LED on the board will flash if the microprocessor (U1) is running properly. A controller chip (U2) is used to refresh the Display Board independent from the code which is being executed by the microprocessor (U1). U1 uses the data bus during the phase 2 portion of the clock while U2 uses it during the phase 1 portion. The address lines from both U1 and U2 are multiplexed through U9-U11 to determine which device has control of the ram (U4). The necessary data is then output to the Display Board at A8P4. Data is both transmitted and received from the Control Board at A8P3. If the Control Board cannot successfully communicate with the Display Controller Board it will attempt to reset the Controller Board by sending a negative going signal on A8P3-14 (DS1).

E. DISPLAY BOARD (A4)
The Display Board consists of a 128 column X 32 row gas plasma display. The drive electronics located on the backside of the board convert low voltage serial data in to high voltage parallel data out for driving the display. The column drivers contain output latches so that column data for the following row can be entered while the present row is being displayed. All voltages required by the display are input at A4P1. All control signals needed to multiplex the display are input at A4P2. The Display Controller Board sends 128 bits of serial column data on the SDATA line for every row of display information. The data is shifted through the driver IC's by the dot clock signal (DCLK). The column data for a particular row is then latched by the column latch (CLATCH) signal. The row clock (RCLK) signal is used to clock the row driver data (RDATA) through the row driver IC. There is only one active row at a time. Between rows the display enable (DE) signal is used to prevent the display from flickering.

F. SOUND BOARD (A6)
The Sound Board consists of two 6502 microprocessor systems, a dual DAC, an input port to receive commands from the system Control Board, and a low level audio output at A6P2-9 which is sent to the summing amplifier located on the Auxiliary Sound Board (A20) for amplification.

The Sound Board requires three supply voltages +5vdc, +12vdc, and -12vdc. In addition, a power-up reset signal is required from the Control Board. If a manual reset is desired, pressing SW2 will reset both processors.
IV. THEORY OF OPERATION

A 4MHz oscillator is configured with R11, R12, C14, C15, C22, XTAL1, and T1. This clock is then divided down by S1 into either a 2MHz or 1MHz clock signal for the processors N1 and T3. A 250 KHz clock signal from S1-11 is used by the programmable timer section consisting of N5, H5, T5, and K5.

Eight lines from the Control Board are input at A6P1 on the Sound Board and sent to the two input code latches A3 and B2. When any of these inputs goes low (except for A6P1-9 when JP7 is not installed) A2-8 goes high which causes the input code data to be latched into A3 and B2. Also at the same time the flip-flops contained in A4 are clocked which cause the IRQ input of each microprocessor to go low. The outputs of A4 will remain in the low state until each flip-flop is cleared by a signal from its associated microprocessor after each IRQ is processed.

The Sound Board is designed to accommodate different types of Eproms. Jumpers JP1, JP2, JP3, and JP4 should be set to their proper positions based on the density of the Eproms being used.

G. AUXILIARY SOUND BOARD (A20)
The Auxiliary Sound Board contains a sound generator YM2151 (U9) and a sound/speech generator MSMS6295 (U1). Both of these IC's operate under the control of the T3 microprocessor on the master Sound Board (A6). The sound generator YM2151 responds to its commands by sending serial data to the YM3014 DAC (U10). The DAC then converts this data into an analog signal which is filtered through a series of op-amps and then sent to the main summing amplifier (U11).

A 74HCT74 IC (U6) is used to divide the 4 MHz clock signal present at A20P4-9 into both a 1 MHz and 2 MHz signal which is selectable via JP3 (2 MHz) or JP4 (1 MHz). This signal is then used as the master clock for the speech generator (U1). When the speech generator (U1) receives a command, it then retrieves its data from the Eproms (U4, U5). The analog output at pin 36 (DAO) is then sent through an active filter network and then to the main summing amplifier (U11).

The output of the main summing amplifier (U11-7) is input to a voltage controlled amplifier (VCA) (U13). The volume is controlled by a potentiometer located just inside the front door of the game. The potentiometer acts as a resistor divider which supplies a 0 to 5 volt signal to the VCA at U13-2. The output of the VCA is then sent to Auxiliary Power Supply (A5) for amplification.

H. SENSOR BOARD (A15)
This board is used to detect if any flipper is energized and then inputs the data to the Control Board to be processed. This board therefore eliminates the need for a second switch to be used on the flipper assembly itself. U1 is an optocoupler device which converts the input signal from the flipper circuit when energized to a signal which can be recognized by the Control Board as a valid switch closure.

I. OPTICAL INTERFACE (A25)
The optical interface assembly generates and receives the infrared light pulses needed to optically detect the ball breaking an infrared light beam. It also provides a visual indication that the interface assembly is functioning properly.

This method of detection transmits infrared light pulses from an opto LED to an opto phototransistor receiver. The LED light pulses are generated from a switch strobe that is buffered and current amplified by two sections of the LM339 voltage comparator (output pins 1 & 2) and transistor Q2.

When no ball is present, the light pulses reach the opto receiver which passes the pulses 180 degrees out of phase with the switch strobe on to two additional sections of the comparator (pins 9 & 10). Because the strobe pulses and receive pulses are out of phase, they cancel at resistors R1 & R3 and keep comparator
IV. THEORY OF OPERATION

output pin 13 high therefore preventing Q1 from passing strobes on to the switch return line.

As a ball passes between the opto transmitter and receiver, the light beam is broken. Now, with no out of phase pulses coming from the receiver, the strobe appears at comparator inputs 9 & 10. Comparator output pin 13 begins pulsing low and passes the strobes through Q1 to the return line to signal a closed switch. Also positive strobe pulses at output pin 14 of the comparator turn Q3 on and light LED D2. D2 lit indicates a broken light beam and a closed optical switch.

J. SMART SWITCH™ (Piezo Film Sensor)

These devices take the place of the normal contact point type switches used for sensing the ball on various different devices in the game. These devices should not require any adjustment. DO NOT ATTEMPT TO ADJUST THE WIDE CANTILEVER BEAM used in a switch assembly. This could cause permanent damage to the device. The lifetime of these switches has been determined to be over 10 million cycles. The main advantage of these switches is the fact that they cannot be contaminated by such elements as moisture, dust, or smoke. Each switch assembly consists of a wide cantilever beam which has a piezo film sensor element laminated to its surface. When this beam is deflected, it induces a strain on the laminated piezo film sensor element. As the beam is returning to its rest position it generates an output voltage which triggers the on board circuit. This circuit then generates a momentary output which resembles that of contact points being closed. The switch design used in rollover and spot target applications generates an output signal as the beam which contains the piezo film returns to its rest position after it is actuated. The switch design used for pop bumpers generates an output signal as the beam is deflected in order to provide an immediate response by the pop bumper solenoid. This immediate response type of switch can be distinguished from the other because either the film itself or the printed circuit board will be colored blue. BE CAREFUL not to interchange these two different types of switches.
V. GENERAL INFORMATION

A. PRINTED CIRCUIT BOARDS ARE DESIGNATED AS FOLLOWS:

A1 - Control Board
A2 - Power Supply
A3 - Driver Board
A4 - Dot Matrix Display
A5 - Auxiliary Power Supply
A6 - Sound Board
A8 - Display Controller
A11 - Auxiliary Driver Board
A13 - Resistor Board
A15 - Sensor Board
A16 - Filter Board
A17 - Diode Board
A20 - Auxiliary Sound Board
A22 - LED Board
A25 - Optical Interface Board
A26 - Game Controls Board
A27 - Communications Adapter (Optional)
A28 - Interface Board (Miscellaneous)

Printed circuit board connectors will be labeled AX-JX. For example, A3-J4 is the connector J4 to the driver board (A3).

B. WIRE COLORS ARE SHOWN AS NUMBERS:

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

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

C. FUSE AND COIL INFORMATION

TRANSFORMER PANEL

F1 Line Input.........................110V AC...8 Amp SLO-BLO
                                   220V AC...4 Amp SLO-BLO
F2 Primary Power......................110V AC...5 Amp SLO-BLO
                                   220V AC...2-1/2 Amp SLO-BLO
F3 Display................................3/8 Amp SLO-BLO
F4 Display................................3/8 Amp SLO-BLO
F5 Power Supply........................4 Amp SLO-BLO
F6 Controlled Lamps and Switches.....10 Amp SLO-BLO
F7 Solenoids................................8 Amp SLO-BLO
F8 Lightbox Illumination...............15 Amp
F9 Playfield Illumination...............10 Amp
F10 Auxiliary Power Supply.............3 Amp SLO-BLO
F11 Auxiliary Power Supply.............3 Amp SLO-BLO

NOTE:
FUSE DESIGNATIONS F12 THRU F14 NOT USED.
### PLAYBOARD FUSES, COILS/COLORS/SLEEVES

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<th>RATING</th>
<th>PART NO.</th>
<th>USAGE</th>
<th>COIL/COLOR</th>
<th>SLEEVE</th>
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## V. GENERAL INFORMATION

### D. COIL CHART

#### SOLENOID COILS

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<th>RESISTANCE (OHMS)</th>
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<th>WRAPPER COLOR</th>
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<td>FLIPPER (OLD UNIT)</td>
<td>11.4/202</td>
<td>960/3670</td>
<td>#28/#33</td>
<td>GREEN</td>
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<tr>
<td>A-30468</td>
<td>FLIPPER (OLD UNIT)</td>
<td>11.59/269</td>
<td>960/4700</td>
<td>#28/#33</td>
<td>WHITE</td>
</tr>
<tr>
<td>A-27926</td>
<td>GENERAL PURPOSE</td>
<td>64.7</td>
<td>3475</td>
<td>#29</td>
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#### RELAY COILS

<table>
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<tr>
<th>PART NUMBER</th>
<th>WHERE USED</th>
<th>RESISTANCE (OHMS)</th>
<th>NUMBER OF TURNS</th>
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<tr>
<td>A-26452</td>
<td>DROP TAR. TRIP</td>
<td>137</td>
<td>2450</td>
<td>#35</td>
<td>PINK</td>
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<tr>
<td>A-16890</td>
<td>GENERAL PURPOSE</td>
<td>231</td>
<td>4000</td>
<td>#35</td>
<td>ORANGE</td>
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# VI. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS

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<td>Control Board (A1)</td>
<td>Component Location and Parts List</td>
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<td>Component Location and Parts List</td>
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<td>Display Controller (A8)</td>
<td>Schematic Diagram</td>
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<td>Dot Matrix Display (A4)</td>
<td>Front View, Wiring Diagram</td>
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<td>Switch Matrix</td>
<td>Schematic Diagram</td>
<td>50,51</td>
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<tr>
<td>Power Supply (A2)</td>
<td>Component Location and Parts List</td>
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<td>Schematic Diagram</td>
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<td>Lamp Matrix</td>
<td>Schematic Diagram</td>
<td>53,54</td>
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<td>Schematic Diagram</td>
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<td>Schematic Diagram</td>
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<td>Cabinet/Front Door</td>
<td>Schematic Diagram</td>
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<td>Electronic Front Door</td>
<td>Schematic Diagram</td>
<td>62</td>
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</table>
VI. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS

**DIODE BOARD (A17) COMPONENT LOCATION**

![Diode Board Diagram]

**DIODE BOARD (A17) PARTS LIST**

<table>
<thead>
<tr>
<th>REFERENCE</th>
<th>DESCRIPTION</th>
<th>PART NUMBER</th>
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<tbody>
<tr>
<td>I1</td>
<td>Diode Matrix Assembly</td>
<td>MA-1448</td>
</tr>
<tr>
<td>D1-D12</td>
<td>Diode, 1N4148</td>
<td>X0-261</td>
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<tr>
<td>P1, P2</td>
<td>Header, 18 Position</td>
<td>X0-916</td>
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<tr>
<td>R1-R4</td>
<td>Resistor, 220 OMM, 5%, 1/4W</td>
<td>X0-21</td>
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<td>Circuit Board Support (4)</td>
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**RESISTOR BOARD (A13) COMPONENT LOCATION**

![Resistor Board Diagram]

**RESISTOR BOARD (A13) PARTS LIST**

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<tr>
<th>REFERENCE</th>
<th>DESCRIPTION</th>
<th>PART NUMBER</th>
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<tbody>
<tr>
<td>D9, D10</td>
<td>RESISTOR BOARD (A13)</td>
<td>30987</td>
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<tr>
<td>D14</td>
<td>DIODE, 1N4004</td>
<td>X0-254</td>
</tr>
<tr>
<td>R4-R7</td>
<td>RESISTOR, 220 OMM, 5%, 1/4W</td>
<td>X0-913</td>
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<tr>
<td>P1</td>
<td>HEADER, 12 POSITION</td>
<td>X0-21</td>
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<tr>
<td></td>
<td>SPACER (4)</td>
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</table>

**FILTER BOARD (A16) COMPONENT LOCATION**

![Filter Board Diagram]

**FILTER BOARD (A16) PARTS LIST**

<table>
<thead>
<tr>
<th>REFERENCE</th>
<th>DESCRIPTION</th>
<th>PART NUMBER</th>
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<tbody>
<tr>
<td>C1</td>
<td>FILTER BOARD ASSEMBLY</td>
<td>MA-745</td>
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<tr>
<td>D1</td>
<td>CAPACITOR, 2200UF, 100V</td>
<td>X0-923</td>
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<tr>
<td>R1</td>
<td>RESISTOR, 24K OMM, 5%, 1/4W</td>
<td>X0-263</td>
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<tr>
<td>P1</td>
<td>HEADER, 4 POSITION</td>
<td>X0-910</td>
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<tr>
<td></td>
<td>CIRCUIT BOARD SUPPORT (4)</td>
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**GAME CONTROLS BOARD (A26) COMPONENT LOCATION**

![Game Controls Board Diagram]

**GAME CONTROLS BOARD (A26) PARTS LIST**

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
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<tbody>
<tr>
<td>Game Controls Board (A26)</td>
<td>MA-1851</td>
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<tr>
<td>Potentiometer, 10K OMM, 20%, 15W</td>
<td>X0-1194</td>
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<tr>
<td>Pushbutton Switch</td>
<td>X0-897</td>
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<tr>
<td>Slide Switch</td>
<td>X0-1193</td>
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<td>Header, 8 Position</td>
<td>X0-920</td>
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<tr>
<td>Mounting Bracket</td>
<td>28619</td>
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<tr>
<td>Key Cap, Yellow</td>
<td>X0-1198</td>
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</table>
Solenoid, Relay and Lamp Grounds
NOTE:
DIODES D1 THRU D32 INCLUSIVE ARE SHOWN BUT NOT USED.
## VI. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS

**DRIVER BOARD (A3) COMPONENT LOCATION**

![Diagram of driver board components](image)

### DRIVER BOARD (A3) PARTS LIST

<table>
<thead>
<tr>
<th>Reference</th>
<th>Description</th>
<th>Part Number</th>
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</thead>
<tbody>
<tr>
<td>C1-C7</td>
<td>Capacitor, 0.1 UF, ±80%, ±20%, ±25%</td>
<td>MA-1358</td>
</tr>
<tr>
<td>C8</td>
<td>Capacitor, 100 UF, ±20%, ±25%</td>
<td>XO-127</td>
</tr>
<tr>
<td>C9</td>
<td>Capacitor, 100 UF, ±20%, ±25%</td>
<td>XI-127</td>
</tr>
<tr>
<td>C10-C11</td>
<td>Capacitor, ±0.1 UF, ±0.1%</td>
<td>XO-1229</td>
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<tr>
<td>C12-C44</td>
<td>Capacitor, ±0.01 UF, ±10%</td>
<td>XO-1296</td>
</tr>
<tr>
<td>C45</td>
<td>Capacitor, ±0.01 UF, ±10%</td>
<td>XO-1286</td>
</tr>
<tr>
<td>D23-D48</td>
<td>Diode, 1N4148</td>
<td>XO-1261</td>
</tr>
<tr>
<td>Q1-Q32</td>
<td>Transistor, RF12610L, OR IRLA30, Q45-Q52, Q54</td>
<td>XO-1247</td>
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<tr>
<td>Q33-Q44</td>
<td>Transistor, RF12606, IRF9531 OR MT2955 P-Channel MOSFET</td>
<td>XO-1248</td>
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<tr>
<td>Q53</td>
<td>Transistor, MPSA13, Darlington</td>
<td>XO-1204</td>
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<td>R1-R8</td>
<td>Resistor, 10K Ohm, 5%, 1/4W</td>
<td>XO-1218</td>
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<td>R9-R16</td>
<td>Resistor, 3.3K Ohm, 5%, 1/4W</td>
<td>XO-1238</td>
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<tr>
<td>R12-R24</td>
<td>Resistor, 3 Ohm, 5%, 5W</td>
<td>XO-1294</td>
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<tr>
<td>R25-R32</td>
<td>Resistor, 560 Ohm, 5%, 1/4W</td>
<td>XO-1236</td>
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<tr>
<td>R33-R44</td>
<td>Resistor, 1K Ohm, 5%, 1/4W</td>
<td>XO-1205</td>
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<tr>
<td>R45-R36</td>
<td>Resistor, 330 Ohm, 5%, 1/4W</td>
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<tr>
<td>R57</td>
<td>Resistor, 10K Ohm, 5%, 1/4W</td>
<td>XO-1245</td>
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<tr>
<td>R58</td>
<td>Resistor, 6.8K Ohm, 1%, 1/4W</td>
<td>XO-1243</td>
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<tr>
<td>R59</td>
<td>Resistor, 1K Ohm, 1%, 1/4W</td>
<td>XO-1244</td>
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<tr>
<td>R60</td>
<td>Resistor, 4.7K Ohm, 5%, 1/4W</td>
<td>XO-127</td>
</tr>
<tr>
<td>R61-R93</td>
<td>Resistor, 2.2K Ohm, 5%, 1/4W</td>
<td>XO-127</td>
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<tr>
<td>R94</td>
<td>Resistor, 27K Ohm, 5%, 1/4W</td>
<td>XO-1211</td>
</tr>
<tr>
<td>S1P1</td>
<td>Resistor Pack, 4.7K Ohm X 8.2K, 1/4W</td>
<td>XO-12161</td>
</tr>
<tr>
<td>S1P2</td>
<td>Resistor Pack, 33K Ohm X 8.2K, 1/4W</td>
<td>XO-12945</td>
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<tr>
<td>S1P3</td>
<td>Resistor Pack, 10K Ohm X 7.5K, 1/4W</td>
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<tr>
<td>U1-U5</td>
<td>IC, Octal &quot;D&quot; Flip-Flops, 74HC273</td>
<td>XO-1249</td>
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<tr>
<td>U6-U7</td>
<td>IC, Shift Register, 74HC164</td>
<td>XO-1250</td>
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<tr>
<td>U8-U9</td>
<td>IC, Buffer, 7406</td>
<td>XO-1285</td>
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<tr>
<td>U10-U11</td>
<td>IC, Quad Comparator, LM339</td>
<td>XO-12838</td>
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<tr>
<td>U12</td>
<td>IC, Timer, 8555</td>
<td>XO-1263</td>
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<td>A1P1</td>
<td>Header, 8 Position</td>
<td>XO-12910</td>
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<td>A2P2</td>
<td>Header, 14 Position</td>
<td>XO-12914</td>
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<td>A3P4</td>
<td>Header, 16 Position</td>
<td>XO-12912</td>
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<td>A5P5</td>
<td>Header, 18 Position</td>
<td>XO-12916</td>
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<td>A6P6</td>
<td>Header, 8 Position</td>
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VI. WIRING AND SCHEMATIC DIAGRAM

OPTO LED TRANSMITTER BOARD SCHEMATIC DIAGRAM

OPTO PHOTOTRANSISTOR RECEIVER BOARD SCHEMATIC DIAGRAM

OPTO LED TRANSMITTER BOARD COMPONENT LOCATION

OPTO LED TRANSMITTER BOARD PARTS LIST

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<td>Opto LED Transmitter Assembly: MA-1330</td>
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<td>Plastic Transmitter LED: 10-394</td>
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<td>RX</td>
<td>Plastic Receiver</td>
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<td>RX</td>
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BRACKET AND OPTIC BOARD ASSEMBLIES REFERE:

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<th>PLATE AND SUPPORT</th>
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<td>30993</td>
<td>A9P13</td>
<td>59862</td>
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<tr>
<td>30993</td>
<td>A9P15</td>
<td>29662</td>
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NOTE: BRACKET AND OPTIC BOARD ASSEMBLY DOES NOT INCLUDE WIRING HARNESS.
VI. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS

AUXILIARY POWER SUPPLY (A5) COMPONENT LOCATION

AUXILIARY POWER SUPPLY (A5) PARTS LIST

<table>
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<td>A5</td>
<td>AUXILIARY POWER SUPPLY</td>
<td>MA-1772</td>
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<tr>
<td>C1,C3,C11</td>
<td>CAPACITOR, 4.7UF, 10V, 10V</td>
<td>X0-469A</td>
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<td>C13</td>
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<tr>
<td>C2,C10</td>
<td>CAPACITOR, 0.1UF, 10V, 100V</td>
<td>X0-784</td>
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<td>C5,C35</td>
<td>CAPACITOR, 4.7UF, 10V, 10V</td>
<td>X0-226</td>
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<td>C6,C16,C25</td>
<td>CAPACITOR, 22UF, +80V-200V, 16V</td>
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<tr>
<td>C7,C8,C9</td>
<td>CAPACITOR, 0.1UF, +80V-200V, 50V</td>
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<tr>
<td>C20,C21</td>
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<td>C23,C24</td>
<td>CAPACITOR, 10.000UF, +80V-200V, 25V</td>
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<td>D1-D4</td>
<td>DIODE, 1N5401</td>
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<td>R1,R13,JP1</td>
<td>RESISTOR, 0 OHM, JUMPER</td>
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<td>R16,R17</td>
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<td>R2,R14</td>
<td>RESISTOR, 1 MEGOHM, 5%, 1/4W</td>
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<td>R3</td>
<td>RESISTOR, 12K OHM, 5%, 1/4W</td>
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<td>R4</td>
<td>RESISTOR, 43K OHM, 5%, 1/4W</td>
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<td>R5,R20</td>
<td>RESISTOR, 10K OHM, 5%, 1/4W</td>
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<td>R6</td>
<td>RESISTOR, 6.8K OHM, 5%, 1/4W</td>
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<td>R8</td>
<td>RESISTOR, 2.2K OHM, 5%, 1/4W</td>
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<td>R9,R23</td>
<td>RESISTOR, 22K OHM, 5%, 1/4W</td>
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<td>R10,R24</td>
<td>RESISTOR, 680 OHM, 5%, 1/4W</td>
<td>X0-139</td>
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<td>R11,R25</td>
<td>RESISTOR, 24K OHM, 5%, 1/4W</td>
<td>X0-10</td>
</tr>
<tr>
<td>R12,R26</td>
<td>RESISTOR, 4.7 OHM, 5%, 1/4W</td>
<td>X0-800</td>
</tr>
<tr>
<td>R15,R18,R21</td>
<td>RESISTOR, 4.7K OHM, 5%, 1/4W</td>
<td>X0-7</td>
</tr>
<tr>
<td>U1</td>
<td>IC, QUAD AMP, MC3403P</td>
<td>X0-953</td>
</tr>
<tr>
<td>U2,U3</td>
<td>IC, AUDIO AMPLIFIER, TDA2040</td>
<td>X0-1038</td>
</tr>
<tr>
<td>VR1</td>
<td>REGULATOR, +12V, LM7812CT</td>
<td>X0-1039</td>
</tr>
<tr>
<td>VR2</td>
<td>REGULATOR, -12V, LM7912CT</td>
<td>X0-130</td>
</tr>
<tr>
<td>J3</td>
<td>CONNECTOR, RCA</td>
<td>X0-1035</td>
</tr>
<tr>
<td>P1</td>
<td>HEADER, 10 POSITION</td>
<td>X0-912</td>
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<td>HEAT SINK</td>
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</table>
VI. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS

POWER SUPPLY (A2) COMPONENT LOCATION

POWER SUPPLY (A2) PARTS LIST

<table>
<thead>
<tr>
<th>REFERENCE</th>
<th>DESCRIPTION</th>
<th>PART NUMBER</th>
</tr>
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<tbody>
<tr>
<td>Power Supply (A2)</td>
<td>MA-1359</td>
<td></td>
</tr>
<tr>
<td>C1</td>
<td>Capacitor, 0.1uF, +80% -20%, 50V</td>
<td>XO-230</td>
</tr>
<tr>
<td>C2</td>
<td>Capacitor, 4.7uF, 10% 10V</td>
<td>XO-228</td>
</tr>
<tr>
<td>J1</td>
<td>Header, 6 Position</td>
<td>XO-910</td>
</tr>
<tr>
<td>J2</td>
<td>Header, 8 Position</td>
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<tr>
<td>Q1</td>
<td>Regulator, LM338, (5 Amp)</td>
<td>XO-839</td>
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<tr>
<td>R1</td>
<td>Resistor, 390 Ohm, 5%, 1/4W</td>
<td>XO-845</td>
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<tr>
<td>R2</td>
<td>Resistor, 220 Ohm, 5%, 1/4W</td>
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<tr>
<td>R3</td>
<td>Resistor, (Pot) 500 Ohm, 10%, 1W</td>
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<td>Heat Sink</td>
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<tr>
<td>Insulator (Regulator)</td>
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<td>Insulator (Regulator)</td>
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VI. WIRING AND SCHEMATIC

NOTES:
1. XXX INDICATES WIRE COLOR.
2. A12J8 SHOWN IN 50VAC OPERATION.
3. CIRCUIT GROUND / GROUND

FUSE DESIGNATIONS TABLE

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<thead>
<tr>
<th>FUSE</th>
<th>RATING</th>
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<td>F1</td>
<td>8.0A</td>
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<td>F3</td>
<td>3.8A</td>
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<td>3.8A</td>
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<td>4.0A</td>
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<td>POWER SUPPLY</td>
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<td>F6</td>
<td>10A</td>
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<td>CONTROLLED LAMPS</td>
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<td>F7</td>
<td>8.0A</td>
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<td>SOLENOIDS</td>
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<td>F8</td>
<td>15A</td>
<td>E125</td>
<td>LIGHTBOX INSERT ILLUMINATION</td>
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<td>F9</td>
<td>10A</td>
<td>E123</td>
<td>PLAYBOARD ILLUMINATION</td>
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<td>3.0A</td>
<td>E19</td>
<td>AUXILIARY POWER SUPPLY</td>
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<td>F11</td>
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<td>F12</td>
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NOTE:
1. AMOUNT OF PARTS VARIES PER GAME.
2. ALL DIODES ARE TYPE IN4004.
3. A18 JS (FROM TRANSFORMER PANEL).

MECHANICAL FRONT DOOR

REF. NO. | LEFT COIN CHUTE SW.
---------|---------------------
SWITCH 00 | RETURN 0

REF. NO. | RIGHT COIN CHUTE SW.
---------|---------------------
SWITCH 01 | RETURN 1

REF. NO. | CENTER COIN CHUTE SW.
---------|---------------------
SWITCH 02 | RETURN 2

SLAM SWITCH

VOLUME CONTROL 10K DGH 1/2W

TEST SWITCH

NC TOURNAMENT SWITCH

COIN METER

SWITCH JAPAN ONLY

(A-5915) KNOCKER ASSEMBLY

TO CABINET

(A24) FRONT DOOR INTERFACE

COMPONENT LOCATION

REFERENCE | DESCRIPTION | PART NO.
R1 | R2 | Q1
D1 | D2 | Q2
R3 | R4 | Q3
R5 | R6 | Q4
R7 | R8 | Q4
P1 | D3 | D4

COLOR CODE

O BLACK
1 BROWN
2 RED
3 ORANGE
4 YELLOW
5 GREEN
6 BLUE
7 VIOLET
8 GRAY
9 WHITE

Premier Technology

SCHEMATIC DIAGRAM

ELECTRONIC FRONT DOOR-4 OUTPUT

PARTS LIST

MA1645
XD-261
XD-580
XD-912
23984

Premier Technology

SCHEMATIC DIAGRAM

RLM 09-20-91 28541

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<td>UPKICKER PARTS EXPLODED VIEW</td>
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<td>VARI TARGET ASSEMBLY ASSEMBLY VIEW</td>
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## VII. Parts Information

### Cabinet Parts

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<td>1</td>
<td>Cabinet</td>
<td>10520-743</td>
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<td>2</td>
<td>Lightbox Mounting Thumb Screw (2) (Not Shown for Reference Only, Part of Lightbox Assembly)</td>
<td>FA-162</td>
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<tr>
<td>3</td>
<td>Butt Hinge (2) (Attached to Lightbox)</td>
<td>26449</td>
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<tr>
<td>4</td>
<td>&quot;U&quot; Bolt (P/O Lightbox)</td>
<td>24659</td>
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<tr>
<td>5</td>
<td>Latch Assembly (P/O Cabinet)</td>
<td>21969</td>
</tr>
<tr>
<td>6</td>
<td>Line Cord (Domestic)</td>
<td>23365</td>
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<td>7</td>
<td>Line Cord Cover Plate</td>
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<td>8</td>
<td>Speaker, 4 Ohm, 8&quot;</td>
<td>28934</td>
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<tr>
<td>9</td>
<td>Speaker Grille</td>
<td>28935</td>
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<tr>
<td>10</td>
<td>Prop Stick, Playfield</td>
<td>23940</td>
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<tr>
<td>11</td>
<td>Right Flipper Switch Assembly (Switch with Bracket) (Switch Only)</td>
<td>28693</td>
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<tr>
<td>12</td>
<td>Left Flipper Switch Assembly (Switch with Bracket) (Switch Only)</td>
<td>28668</td>
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<td>13</td>
<td>Front Door Assembly (Universal)</td>
<td>29106</td>
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<td>14</td>
<td>Cable Assembly</td>
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<td>15</td>
<td>Slam Switch (N/O)</td>
<td>LA-2</td>
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<td>6V DC Lamp, Wedge Base, #555 Lampholder</td>
<td>FD-24</td>
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<td>17</td>
<td>Ball Shooter Assembly</td>
<td>26314</td>
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<td>18</td>
<td>Cover</td>
<td>SEE NOTE</td>
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<td>19</td>
<td>Plumb Bob Tilt Switch Assembly</td>
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<td>20</td>
<td>Strike Plate</td>
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<td>21</td>
<td>Carbon, Tilt Bob</td>
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<td>22</td>
<td>Rod, Tilt</td>
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<td>23</td>
<td>Bracket</td>
<td>14693</td>
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<td>24</td>
<td>Clip</td>
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<td>25</td>
<td>Knocker Assembly</td>
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<td>5&quot; Bell Assembly (When Used)</td>
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<td>Leg Bolt (8)</td>
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<td>28</td>
<td>1/2&quot; Leg Adjuster (4)</td>
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<td>29</td>
<td>7/8-16&quot; Jaw Nut (8)</td>
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<td>Transformer Panel Assembly</td>
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<td>Bridge Rectifier (3)</td>
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<td>Capacitor, (10,000UF), 25V</td>
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<td>Capacitor, (33,000UF), 35V</td>
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<td>Fuse Holder and Cap</td>
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<td>Fuse Block (8 Pole)</td>
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<td>F1, 3/8 Amp, SLO-BLO</td>
<td>EL-31</td>
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<td>F4, 3/8 Amp, SLO-BLO</td>
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<td>38</td>
<td>F5, 4 Amp, SLO-BLO</td>
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<td>39</td>
<td>F6, 10 Amp, SLO-BLO</td>
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<td>40</td>
<td>F7, 8 Amp, SLO-BLO</td>
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<td>41</td>
<td>F8, 15 Amp</td>
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<tr>
<td>42</td>
<td>F9, 10 Amp</td>
<td>EL-23</td>
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<td>43</td>
<td>F10, 3 Amp, SLO-BLO</td>
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<td>44</td>
<td>F11, 1 Amp, SLO-BLO</td>
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<td>45</td>
<td>Transformer</td>
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### Game Controls Board (A26)

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<td>1</td>
<td>Cabinet Pivot Bracket (Left)</td>
<td>25658</td>
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<td>Cabinet Pivot Bracket (Right)</td>
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<td>3</td>
<td>Game Controls Board (A26)</td>
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### Ball Roll Tilt Housing and Switch Assembly

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<tr>
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<td>Right Moulding (Not Shown)</td>
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<td>Front Moulding (Not Shown)</td>
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<td>Relay Strip Assembly</td>
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<td>&quot;G&quot; Relay</td>
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<td>&quot;H&quot; Relay</td>
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<td>&quot;M&quot; Relay</td>
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<td>&quot;A&quot; Relay</td>
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### Power Module Assembly (110V AC)

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<td>Fuse Holder and Cap (2)</td>
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<td>Power Module Assembly (GERMANY)</td>
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<td>Power Module Assembly (JAPAN)</td>
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<td>F1, 8 Amp SLO-BLO, 110V AC</td>
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<td>F4 Amp SLO-BLO, 220V AC</td>
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<td>F2, 5 Amp SLO-BLO, 220V AC</td>
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*NOTE: COVER USED WITH ELECTRONIC DOOR OR 3 CHUTE DOOR, PART NO. 28062

*COVER USED WITH 2 CHUTE DOOR WITH $1.00 ACCEPTOR SLOT, PART NO. 30002*
### VII. PARTS INFORMATION

#### PLAYBOARD SWITCH ASSIGNMENTS

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<td>LEFT COIN CHUTE (#1)</td>
<td>P/O FRONT DOOR</td>
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<td>RIGHT COIN CHUTE (#2)</td>
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<td>CENTER COIN CHUTE (#3)</td>
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<td>SW 3</td>
<td>COIN CHUTE (#4)</td>
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<td>START (CREDIT) BUTTON</td>
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<td>SW 5</td>
<td>TOURNAMENT</td>
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<td>SW 6</td>
<td>FRONT DOOR (SERVICE)</td>
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<td>SW 7</td>
<td>VARI TARGET #1, #2</td>
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<td>SW 10</td>
<td>LEFT KICKING RUBBER (2)</td>
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<td>SHOOTER LANE ROLLOVER</td>
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<td>DROP TARGET #1</td>
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<td>SPINNER</td>
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<td>OUTHOLE</td>
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<td>LEFT OUTSIDE ROLLOVER</td>
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<td>SW 84</td>
<td>RIGHT OUTSIDE ROLLOVER</td>
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<td>SW 85</td>
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<td>SW 86</td>
<td>BOTTOM LEFT SPOT TARGET (WHITE)</td>
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<td>SW 87</td>
<td>CENTER SPOT TARGET (YELLOW)</td>
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<td>SW 91</td>
<td>BASKET HOOP (2)</td>
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<td>LEFT RETURN ROLLOVER</td>
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<td>SW B7</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*SMART SWITCH™

---

**Schematic Representation**

---

**Rollover Type**

SMART SWITCH™

DO NOT ADJUST WIDE BEAM

SEE PAGE 22
### VII. PARTS INFORMATION

#### PLAYBOARD PARTS INFORMATION

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
<th>PART NO.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>12 DIGIT DISPLAY AND BRACKET</td>
<td>MA-2075</td>
</tr>
<tr>
<td>2</td>
<td>PLASTIC SHIELD SET</td>
<td>31049</td>
</tr>
<tr>
<td>3</td>
<td>BASKET AND BACKBOARD ASSEMBLY</td>
<td>30778</td>
</tr>
<tr>
<td>4A</td>
<td>TARGET BANK ASSEMBLY, 5 POSITION (SEE ASSEMBLY ILLUSTRATION)</td>
<td>MA-1838</td>
</tr>
<tr>
<td>4B</td>
<td>DROP TARGET DECAL (5)</td>
<td>30903</td>
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<td>5</td>
<td>BALL SCOOP ASSEMBLY</td>
<td>30763</td>
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<tr>
<td>6</td>
<td>VACUUM FORM DOME</td>
<td>30755</td>
</tr>
<tr>
<td>7</td>
<td>TARGET SHIELD</td>
<td>14043</td>
</tr>
<tr>
<td>8</td>
<td>SWINGING TARGET ASSEMBLY</td>
<td>24494</td>
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<tr>
<td>9</td>
<td>SWITCH ROD</td>
<td>20406</td>
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<tr>
<td>10</td>
<td>NYLON WASHER (2)</td>
<td>20407</td>
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<tr>
<td>11</td>
<td>SPINNER SPACER</td>
<td>27244</td>
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<tr>
<td>12</td>
<td>PLASTIC DOME, 1-1/4&quot;, RED</td>
<td>25147U</td>
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<tr>
<td>13</td>
<td>BALL DEFLECTOR (3)</td>
<td>21158</td>
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<tr>
<td>14</td>
<td>UPKICKER ASSEMBLY (SEE ASSEMBLY ILLUSTRATION)</td>
<td>MA-1743</td>
</tr>
<tr>
<td>15</td>
<td>BALL GUIDE RAIL</td>
<td>17106</td>
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<tr>
<td>16</td>
<td>LIGHT STRIP ASSEMBLY</td>
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<tr>
<td>17</td>
<td>BALL DEFLECTOR</td>
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<tr>
<td>18</td>
<td>NYLAR OVERLAY (UPPER)</td>
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<tr>
<td>19</td>
<td>BALL RAMP</td>
<td>30769</td>
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<tr>
<td>20</td>
<td>BALL HOLE KICKER (SEE ASSEMBLY ILLUSTRATION)</td>
<td>MA-1905</td>
</tr>
<tr>
<td>21</td>
<td>SPINNING DISC MAT</td>
<td>31070</td>
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<tr>
<td>22</td>
<td>SPINNER AND MOTOR ASSEMBLY</td>
<td>26048</td>
</tr>
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<td>23</td>
<td>RAMP, DECALS AND SPACERS ASSEMBLY</td>
<td>31060</td>
</tr>
<tr>
<td>24</td>
<td>TOP LEFT FLIPPER ASSEMBLY (SEE ASSEMBLY ILLUSTRATION)</td>
<td>MA-1790A</td>
</tr>
<tr>
<td>25</td>
<td>TOP RIGHT FLIPPER ASSEMBLY (SEE ASSEMBLY ILLUSTRATION)</td>
<td>MA-1791A</td>
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<td>26</td>
<td>UPKICKER ASSEMBLY</td>
<td>5A-1789</td>
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<td>27</td>
<td>RAMP FLAP</td>
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<td>28</td>
<td>WIREFORM RAMP</td>
<td>30753</td>
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<tr>
<td>29</td>
<td>VARI TARGET ASSEMBLY</td>
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<td>30</td>
<td>WIREFORM RAMP</td>
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<td>31</td>
<td>WIREFORM RAMP</td>
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<td>32</td>
<td>NYLAR OVERLAY (LOWER)</td>
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<td>33</td>
<td>PLASTIC DOME, 1-1/4&quot;, AMBER</td>
<td>2417R</td>
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<tr>
<td>34</td>
<td>CELLULAR BUMPER</td>
<td>2517R</td>
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<tr>
<td>35</td>
<td>CELLULAR BUMPER</td>
<td>28274</td>
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<tr>
<td>36</td>
<td>STEEL BALL, 1-1/16&quot; DIAMETER</td>
<td>21864</td>
</tr>
<tr>
<td>37</td>
<td>KICKER ASSEMBLY</td>
<td>3083</td>
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<tr>
<td>38</td>
<td>KICKER ASSEMBLY</td>
<td>3083</td>
</tr>
<tr>
<td>39</td>
<td>BALL GUIDE RAIL</td>
<td>27916</td>
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<tr>
<td>40</td>
<td>BALL GUIDE RAIL</td>
<td>27915</td>
</tr>
<tr>
<td>41</td>
<td>SNUBBER RAIL (2)</td>
<td>13798</td>
</tr>
<tr>
<td>42</td>
<td>BOTTOM LEFT FLIPPER ASSEMBLY (SEE ASSEMBLY ILLUSTRATION)</td>
<td>MA-1790E</td>
</tr>
<tr>
<td>43</td>
<td>BOTTOM RIGHT FLIPPER ASSEMBLY (SEE ASSEMBLY ILLUSTRATION)</td>
<td>MA-1791E</td>
</tr>
<tr>
<td>44</td>
<td>COIL AND DIODE ASSEMBLY</td>
<td>29876</td>
</tr>
<tr>
<td>45</td>
<td>FLIPPER SWITCH ASSEMBLY</td>
<td>26439</td>
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<tr>
<td>46</td>
<td>CARHOLDER ASSEMBLY</td>
<td>29837</td>
</tr>
<tr>
<td>47</td>
<td>OPTO SWITCH AND BRACKET ASSEMBLY (2)</td>
<td>25437B</td>
</tr>
</tbody>
</table>

#### RUBBER RINGS

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
<th>PART NO.</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>BUMPER, TAPERED (BLK)</td>
<td>26648Y</td>
</tr>
<tr>
<td>B</td>
<td>3/4&quot;</td>
<td>10222</td>
</tr>
<tr>
<td>C</td>
<td>1&quot;</td>
<td>10218</td>
</tr>
<tr>
<td>D</td>
<td>1-1/2&quot;</td>
<td>10220</td>
</tr>
<tr>
<td>E</td>
<td>2-1/2&quot;</td>
<td>10222</td>
</tr>
<tr>
<td>F</td>
<td>3/4&quot;</td>
<td>10218</td>
</tr>
<tr>
<td>G</td>
<td>MINI-POST, SMALL</td>
<td>14753</td>
</tr>
<tr>
<td>H</td>
<td>3/16&quot;</td>
<td>10217</td>
</tr>
<tr>
<td>I</td>
<td>2&quot;</td>
<td>10221</td>
</tr>
</tbody>
</table>

#### MISCELLANEOUS PARTS

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
<th>PART NO.</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>RUBBER GROMMET</td>
<td>5240</td>
</tr>
<tr>
<td>B</td>
<td>HAIRPIN CLIP</td>
<td>6947</td>
</tr>
<tr>
<td>C</td>
<td>MINI-POST SCREW</td>
<td>14772</td>
</tr>
<tr>
<td>D</td>
<td>HEX POST WITH GRIP</td>
<td>26531</td>
</tr>
<tr>
<td>E</td>
<td>PLASTIC RIVET</td>
<td>26570</td>
</tr>
<tr>
<td>F</td>
<td>PLASTIC POST, 1&quot; (RED)</td>
<td>265410</td>
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<tr>
<td>G</td>
<td>PLASTIC POST, 1-3/16&quot; (RED)</td>
<td>11362U</td>
</tr>
<tr>
<td>H</td>
<td>PLASTIC POST (RED)</td>
<td>206250</td>
</tr>
</tbody>
</table>

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67
REPAIR NOTE:
BEFORE INSERTING ITEM 1,
PLACE ONE DROP OF SAF-T-LOK
T70 THREAD LOCKING COMPOUND
INTO THE THREADED HOLE OF ITEM 4.

NOTE:
ITEMS 1 THRU 4 ARE NOT PART
OF THE FLIPPER ASSEMBLY.

PARTS DIFFERENCES
FLIPPER ASSEMBLY MA-1791B

ITEM DESCRIPTION PART NO.
1 5-32 X 1" PHILLIPS FA-51
2 RUBBER RING, RED 13149
3 FLIPPER 11241
4 FLIPPER SHAFT ASSY. 29942

NOTE:
SEE V. GENERAL INFORMATION FOR
FLASBOARD COILS/COLORES/SLEEVES CHART.
ITEM | DESCRIPTION | PART NO.
--- | --- | ---
1 | WIREFORM AND BRACKET | MA-1743, 16570 COIL
2 | RHMS-SENS 6-32 X 3/16" (3) | 28953
3 | RHMS 5-40 X 1/4" SENS (2) | FA-30
4 | MICROSWITCH WITH ACTUATOR | FA-10
5 | RHMS-SENS 8-32 X 5/16" (2) | 27667A
6 | #8 WASHER (2) | FA-67
7 | FRAME | FA-617
8 | RUBBER GROMMET | 21416
9 | PLUNGER AND TIP ASSEMBLY | 21412
10 | SPRING | 26739
11 | COIL MOUNTING BRACKET | 15409
12 | DIODE, 1N4004 | XO-254 (SEE SCHEMATIC)
13 | COIL | 14
14 | SLIP-IN-CORE | 23411
15 | PAN HEAD 4-40 X 5/8" (2) | FA-107
16 | MICROSWITCH MOUNTING BRACKET | 27870
17 | ELASTIC STOP NUT, 4-40 (2) | FA-648
NOTE:

1. DESIGNATED LAMPS ARE TYPE #904 WEDGE BASE, LAMPS NOT DESIGNATED ARE GENERAL ILLUMINATION, TYPE #555 WEDGE BASE.
## VII. PARTS INFORMATION

### BALL HOLE KICKER PARTS

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
<th>PART NO.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6 x 1/2&quot; HHWSMS (2)</td>
<td>FA-270</td>
</tr>
<tr>
<td>2</td>
<td>Ball Snubber</td>
<td>16038</td>
</tr>
<tr>
<td>3</td>
<td>Metal Hole Liner</td>
<td>11151</td>
</tr>
<tr>
<td>4</td>
<td>Hole Base Plate (Specify Color)</td>
<td>15708</td>
</tr>
<tr>
<td>5</td>
<td>Hole Switch Arm (Specify Color)</td>
<td>15707</td>
</tr>
<tr>
<td>6</td>
<td>Ball Cam (See Tables)</td>
<td>6443</td>
</tr>
<tr>
<td>7</td>
<td>Nylon Washer</td>
<td>22234</td>
</tr>
<tr>
<td>8</td>
<td>Spring Cam (See Tables)</td>
<td>22233</td>
</tr>
<tr>
<td>9</td>
<td>Spring (See Tables)</td>
<td>15409</td>
</tr>
<tr>
<td>10</td>
<td>Fulcrum</td>
<td>15409</td>
</tr>
<tr>
<td>11</td>
<td>E-Ring (3)</td>
<td>5064</td>
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<tr>
<td>12</td>
<td>Link and Plunger Assy.</td>
<td>20597</td>
</tr>
<tr>
<td>13</td>
<td>Spring Retaining Washer</td>
<td>21532</td>
</tr>
<tr>
<td>14</td>
<td>Spring</td>
<td>22972</td>
</tr>
<tr>
<td>15</td>
<td>Mounting Bracket</td>
<td>18993</td>
</tr>
<tr>
<td>16</td>
<td>Coil with Diode (Specify Game)</td>
<td>27865</td>
</tr>
<tr>
<td>17</td>
<td>Coil Sleeve</td>
<td>24A Spring Cam (15° Offset) (See Tables)</td>
</tr>
<tr>
<td>18</td>
<td>Coil Stop and Mounting Bracket</td>
<td>24A (Opposite Tab) (See Tables)</td>
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</table>

### ASSEMBLY WITH FULCRUM

<table>
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<tr>
<th>BALL CAM</th>
<th>SPRING CAM (NO SPRING)</th>
<th>SPRING</th>
<th>SPRING SOLID HEIGHT</th>
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<tbody>
<tr>
<td>A-15827</td>
<td>A-15822</td>
<td>A-15826</td>
<td>A-9758</td>
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<td>A-15828</td>
<td>A-15822</td>
<td>A-15826</td>
<td>A-15598</td>
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<td>A-16083</td>
<td>A-15822</td>
<td>A-15826</td>
<td>A-8727</td>
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<td>A-25842</td>
<td>A-15822</td>
<td>A-18993</td>
<td>A-15598</td>
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</tbody>
</table>

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### Solid Height 5/8"
**UNIQUE PARTS**

The following denotes new parts and assemblies unique to SHAQ ATTAQ, GAME #743. Part numbers prefixed with an asterisk (*) will be illustrated or can be located on pages 28 thru 75. Numbers in parenthesis ( ) indicates multiple quantities.

### PLAYBOARD

<table>
<thead>
<tr>
<th>ITEM/DESCRIPTION</th>
<th>PART NO.</th>
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<tbody>
<tr>
<td>WIREFORM RAMP</td>
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<tr>
<td>WIREFORM RAMP</td>
<td>*30753</td>
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<tr>
<td>WIREFORM RAMP</td>
<td>*30754</td>
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<tr>
<td>VACUUM FORM DOME</td>
<td>*30755</td>
</tr>
<tr>
<td>BALL SCOOP ASSEMBLY</td>
<td>*30763</td>
</tr>
<tr>
<td>BALL RAMP</td>
<td>*30769</td>
</tr>
<tr>
<td>BASKET AND BACKBOARD ASSEMBLY</td>
<td>*30778</td>
</tr>
<tr>
<td>LIGHT STRIP ASSEMBLY</td>
<td>*30786</td>
</tr>
<tr>
<td>RAMP FLAP</td>
<td>*30781</td>
</tr>
<tr>
<td>OPTO SWITCH AND BRACKET ASSEMBLY</td>
<td>*30893</td>
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<tr>
<td>CARDHOLDER ASSEMBLY</td>
<td>*30894</td>
</tr>
<tr>
<td>VARI TARGET ASSEMBLY</td>
<td>*30971</td>
</tr>
<tr>
<td>MYLAR OVERLAY (LOWER)</td>
<td>*31037</td>
</tr>
<tr>
<td>MYLAR OVERLAY (UPPER)</td>
<td>*31038</td>
</tr>
<tr>
<td>PLASTIC SHIELD SET</td>
<td>*31049</td>
</tr>
<tr>
<td>SPINNING DISC MAT</td>
<td>*31070</td>
</tr>
<tr>
<td>RAMP, DECALS AND SPACERS ASSEMBLY</td>
<td>*31080</td>
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### CABINET

<table>
<thead>
<tr>
<th>ITEM/DESCRIPTION</th>
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<tr>
<td>CABINET SCREENED</td>
<td>*30520-743</td>
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<td>TRANSFORMER PANEL</td>
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### LIGHTBOX

<table>
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<th>ITEM/DESCRIPTION</th>
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<tbody>
<tr>
<td>LIGHTBOX SCREENED</td>
<td>28750-743</td>
</tr>
<tr>
<td>SPEAKER PANEL, PLEXI SCREENED</td>
<td>28827-743</td>
</tr>
<tr>
<td>STYRENE (BACKGLASS ART)</td>
<td>28833-743</td>
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## BASIC TROUBLESHOOTING GUIDE

<table>
<thead>
<tr>
<th>CONDITION</th>
<th>POSSIBLE CAUSE</th>
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</thead>
</table>
| Game does not power up                                                   | * Line fuse (F1) blown  
|                                                                           | * Primary fuse (F2) blown                                                                                                                       |
| Game does not power up but general illumination lamps light               | * Power supply fuse (F5) blown                                                                                                                  |
| SWITCH SHORT message appears in display on power up                      | * Check for a voltage >0v shorted to switch return number shown in display  
|                                                                           | * Bad Control Board (A1)                                                                                                                         |
|                                                                           | * Bad Driver Board (A3)                                                                                                                          |
| Lightbox illumination lamps do not light                                  | * Fuse (F8) blown                                                                                                                                |
| Playfield illumination lamps do not light                                 | * Fuse (F9) blown                                                                                                                                |
| All controlled lamps, flash lamps, relays, and switches not working       | * Fuse (F6) blown  
|                                                                           | * Bad Driver Board (A3)                                                                                                                         |
| All controlled lamps work but some switches do not work                   | * Bad diode associated with the switch (contact point type switch only)                                                                        |
| Some controlled lamps and some switches do not work                       | * Short circuit on associated strobe line on playfield  
|                                                                           | * Bad Driver Board (A3)                                                                                                                         |
| Display not working (blank) but LED on Dot Matrix Controller Board (A8) is flashing | * Display fuse (F3) or (F4) blown  
|                                                                           | * Bad Dot Matrix Display Board (A4)                                                                                                               |
|                                                                           | * Bad Display Controller Board (A8)                                                                                                               |
| Display not working and LED on Control Board is flickering rapidly        | * Bad Dot Matrix Controller Board (A8)                                                                                                          |
|                                                                           | * Bad Control Board (A1)                                                                                                                         |
| Display not working and LED on Dot Matrix Controller Board (A8) is glowing bright to dim | * Bad Dot Matrix Controller Board (A8)                                                                                                          |
| A solenoid operated device does not work. (Pop Bumper, Kicker, etc.)      | * Associated fuse on playfield is blown  
|                                                                           | * Bad Driver Board (A3)                                                                                                                         |
| All flippers and solenoids do not work                                   | * Solenoid fuse (F7) blown                                                                                                                       |
| A flipper coil overheats and burns or fuse keeps blowing                  | * End of stroke switch on flipper unit not opening when the flipper button is held in.  
|                                                                           | * Shorted capacitor on flipper unit                                                                                                               |
| Flipper chatters when flipper button is held in                           | * Open hold winding (small diameter wire) on flipper coil                                                                                       |
| No sound or speech                                                       | * Bad Auxiliary Power Supply fuse (F10 or F11)  
|                                                                           | * Bad Auxiliary Power Supply Board (A5)                                                                                                          |
|                                                                           | * Bad Auxiliary Sound Board (A20)                                                                                                                |
|                                                                           | * Bad Sound Board (A6)                                                                                                                          |
| Some sounds or speech missing                                            | * Bad Auxiliary Sound Board (A20)                                                                                                                |
|                                                                           | * Bad Sound Board (A6)                                                                                                                          |
| An optical switch does not work or works intermittently                   | * Misalignment of LED transmitter to receiver  
|                                                                           | * Bad LED transmitter and/or receiver                                                                                                            |
|                                                                           | * Bad Optical Interface Board (A25)                                                                                                               |

## IMPORTANT NOTICE

THIS SHIPMENT HAS BEEN CAREFULLY INSPECTED AND PROPERLY PACKED BEFORE LEAVING THE FACTORY.

WE CANNOT ASSUME RESPONSIBILITY FOR BREAKAGE THAT MAY OCCUR IN TRANSPORTATION. IF THIS SHIPMENT IS DAMAGED IN ANY WAY, IMMEDIATELY NOTIFY THE CARRIER AND FILE DAMAGE REPORT SO THAT A SATISFACTORY ADJUSTMENT CAN BE MADE BY THEM.