# DOCTOR WHO

TM

## Operations Manual Includes

Operations & Adjustments
Testing & Problem Diagnosis
Parts Information
Reference Diagrams & Schematics

## Jumper Charts

### Display

| | W1 | W2 |
|---|---|---|
| 1MEG, 2MEG, 4 MEG EPROM | In | Out |
| 512K, 1 MEG EPROM | Out | In |

### Country

| Country | W14 | W15 | W16 | W17 | W18 |
|---|---|---|---|---|---|
| America | In | In | In | In | In |
| European | In | In | Out | In | In |
| French | In | In | In | Out | In |
| German | In | In | In | In | Out |

## Solenoid/Flasher Table

| Sol. No. | Function | Solenoid Type and Voltage Connector | | Driver Transistor, Connection, and Wire Color | | | | Solenoid Part Number Flashlamp Type |
|---|---|---|---|---|---|---|---|---|
| 01 | Trap Door | High Power | J107-3 | Q82 | J130-1 | | Vio-Brn | AE-26-1500 |
| 02 | Shooter | High Power | J107-2 | Q80 | J130-2 | | Vio-Red | AE-26-1200 |
| 03 | Opto Popper | High Power | J107-3 | Q78 | J130-4 | | Vio-Orn | AE-23-800 |
| 04 | Mini Left Opto Eject | High Power | J107-2 | Q76 | J130-5 | | Vio-Yel | AE-26-1500 |
| 05 | Mini Right Opto Eject | High Power | J107-2 | Q64 | J130-6 | | Vio-Grn | AE-26-1500 |
| 06 | 2nd Chance Logo, Flasher | High Power | J107-5 | Q66 | J130-7 | J131-3 | Vio-Blu | #906 |
| 07 | Knocker | High Power | J107-3 | Q68 | J130-8 | | Vio-Blk | AE-23-800 |
| 08 | Doctor 3 | High Power | J107-5 | Q70 | | J131-5 | Vio-Gry | #906 |
| 09 | Left Sling | Low Power | J107-2 | Q58 | J127-1 | | Brn-Blk | AE-26-1500 |
| 10 | Right Sling | Low Power | J107-2 | Q56 | J127-3 | | Brn-Red | AE-26-1500 |
| 11 | Left Jet | Low Power | J107-2 | Q54 | J127-4 | | Brn-Org | AE-26-1200 |
| 12 | Right Jet | Low Power | J107-2 | Q52 | J127-5 | | Brn-Yel | AE-26-1200 |
| 13 | Bottom Jet | Low Power | J107-2 | Q50 | J127-6 | | Brn-Grn | AE-26-1200 |
| 14 | Backbox Head, Flasher | Low Power | J107-6 | Q48 | | J128-2 | Brn-Blu | #906 |
| 15 | Outhole | Low Power | J107-2 | Q46 | J127-8 | | Brn-Vio | AE-27-1200 |
| 16 | Trough | Low Power | J107-2 | Q44 | J127-9 | | Brn-Gry | AE-26-1200 |
| 17 | Mini-playfield/Doctor 7, Flasher | Flasher | J107-5,6 | Q42 | J126-1 | J125-1 | Blk-Brn | #906 |
| 18 | 5 x 3 Left/Left, Flasher | Flasher | J107-5 | Q40 | J126-2 | J125-2 | Blk-Red | #906 |
| 19 | 5 x 3 Right/Right, Flasher | Flasher | J107-5 | Q38 | J126-3 | J125-3 | Blk-Org | #906 |
| 20 | Jet Bumpers/Doctor 5, Flasher | Flasher | J107-5,6 | Q36 | J126-4 | J125-5 | Blk-Yel | #906 |
| 21 | REPAIR/Doctor 4, Flasher | Flasher | J107-5,6 | Q28 | J126-5 | J125-6 | Blu-Grn | #906 |
| 22 | W-(H)-O/Doctor 2, Flasher | Flasher | J107-5 | Q30 | J126-6 | J125-7 | Blu-Blk | #906 |
| 23 | W-H-(O)/Doctor 6, Flasher | Low Power | J107-5 | Q34 | J126-7 | J125-8 | Blu-Vio | #906 |
| 24 | ESCAPE/Doctor 1, Flasher | Low Power | J107-5 | Q32 | J126-8 | J125-9 | Blu-Gry | #89 |
| 25 | Not Used | Flasher | | Q26 | | | Blu-Brn | |
| 26 | Not Used | Flasher | | Q24 | | | Blu-Red | |
| 27 | Mini-playfield C.C.W./C.W. | Flasher | J107-6 | Q22 | J122-3 | | Blu-Org | A-15680 |
| 28 | Mini-playfield On/Off | Flasher | J107-6 | Q20 | J122-4 | | Blu-Yel | A-15680 |
| | **G. I. Circuits** | | | | | | | |
| 01 | Insert 1 | G.I. | | Q18 | J121-1 | | Brown | #555 |
| 02 | Insert 2 | G.I. | | Q10 | J121-2 | | Orange | #555 |
| 03 | Playfield A/Insert A | G.I. | | Q14 | J120-3 | J121-3 | Yellow | #44, #555 |
| 04 | Playfield B/Insert B | G.I. | | Q16 | J120-5 | J121-5 | Green | #44, #555 |
| 05 | Playfield C/Insert C | G.I. | | Q12 | J120-6 | J121-6 | Violet | #44, #555 |
| | | | | | | | | |
| | Upper Left Flipper | | J907-8,9 | Q1, Q5 | J902-1, 3 | | Gry-Yel | FL-15411 (ORG) |
| | Lower Left Flipper | | J907-4,5 | Q3, Q9 | J902-7, 9 | | Gry-Yel | FL-15411 (ORG) |
| | Lower Right Flipper | | J907-1,2 | Q4, Q11 | J902-11,12 | | Blu-Yel | FL-15411 (ORG) |

J1XX = Power Driver Board, J9XX = Fliptronic II Board

# DOCTOR WHO

**⚠WARNING**

## Keep hands away from mini-playfield

*Movement of the mini-playfield can cause SERIOUS PHYSICAL INJURY. Keep fingers and loose clothing away from **ALL** moving parts.*

*As a **safety feature**, during normal game play (and attract mode) the mini-playfield will not move unless the coin door is closed and the playfield glass is on. During the mini-playfield test, both flipper buttons must be pressed before it will move.*

**⚠ ACHTUNG**

## Hände weg von der Mini-Spielfläche ! ! Quetschgefahr !

***Durch die Bewegungen der MINI-SPIELFLÄCHE können ERNSTHAFTE VERLETZUNGEN verursacht werden! FINGER WEG und LOSE KLEIDUNG FERNHALTEN!***

*Zur Sicherheit ist die MINI-SPIELFLÄCHE während des Normalspiels und im Attract Modus stillgelegt und bewegt sich nicht, solange die Münzprüfer-Tür geöffnet und die Spielflächenscheibe abgezogen ist.*
*Im Test-Modus bewegt sich die MINI-SPIELFLÄCHE nur, wenn vorher BEIDE Flippertasten gedrückt wurden.*

**⚠ DANGER**

## Tenir vos mains loin du plateau mobile

*Le mouvement du mini-plateau peut provoquer de sérieuses BLESSURES CORPORELLES.* ***Gardez vos doigts et vêtements loin de toute pièce mobile.***

*Pendant le jeu normal et le mode d'attraction, **pour des raisons de sécurité**, le mini-plateau ne pourra se mettre en mouvement si la porte de l'appareil est ouverte et si la glace principale n'est pas à sa place. Ne jamais court-circuiter le contact de fermeture de la glace.*
*Pendant le test du mini-plateau, les deux boutons des flippers doivent être maintenus fermés afin que ce dispositif se mette en mouvement.*

# Table of Contents

## Section 3 - Wiring Diagrams and Schematics

# DOCTOR WHO PINBALL:

# TIME STREAMS

# GAME STORY

Time is running out, literally......

The Master is back and this time he will not fail! He has recruited Davros and what is left of his desperate Daleks. Since being beaten by the Movellans, this group of Daleks have nothing to lose. And both have one enemy in common...the Doctor!

The Master has found an ancient Gallifrey Laboratory equipped with an everlasting self-regenerating "Time Expander". This "Time Expander" can take any part of time and space, stretch it, then allow all other space and time events to interact with this new time stream. This machine requires two operators to work together (changing time and space is serious business). Of course, this has never stopped the Master, or even Davros.

The problem of finding all seven Doctors and expanding their time streams is easily solved in one word-- Earth! This is the Doctor's favorite planet. All of his regenerations past, present, and even future, have or will, arrive upon Earth. All that has to be done is to expand Earth's time and push all the Doctors into the final nova of the Earth's Sun. At game start, you can experience the time expansion of Earth by observing the continental drift back to the past (over 300 million years ago!).

But everything has not gone as planned. All of the Doctors, aware of time being expanded, have escaped. However, not everyone is safe. The first Doctor has escaped to a planet and is being bombarded by the Master's "borrowed and enhanced" Roni spheres. The second Doctor is lost in a land mine of black holes in space and is trying to dodge destruction (the black holes are rumored to power the Time Expander). The third Doctor is trapped in the Whomobile. The fourth Doctor is stranded somewhere to repair his TARDIS from old unreliable force field projectors. The fifth Doctor, transmatted away from Earth is, unfortunately, held prisoner in a never ending transmat web. The sixth Doctor was jettisoned to a mountainous Dalek planet, where the time expanded rebirth of the Dalek race is about to begin. Last but not least, the seventh Doctor is much more fortunate. He escaped unharmed and has found the Time Expander. Now the challenge is to restore Earth's Time to normal, confront the Master and his traps, the Daleks, and of course Davros (the creator of the Daleks).

When it is time for the ultimate battle with Davros, all the Doctors will be re-united, combining their unique knowledge and experience to defeat Davros and his Daleks.

DOCTOR WHO  B

# BACKGROUND

The first episode was broadcast on November 23, 1963.

The shows Thirtieth Anniversary will be celebrated in 1993 (twenty-six seasons broadcasted to date).

Doctor Who is the longest running Science Fiction Show.

There have been a total of seven Doctors. He has 13 "regenerations" possible. Listed below are the actors and their air dates.

1) William Hartnell • 1963-1966, four seasons.

2) Patrick Troughton • 1966-1969, two seasons.

3) Jon Pertwee • 1970-1974, five seasons.

4) Tom Baker • 1975-1981, seven seasons.

5) Peter Davison • 1982-1984, three seasons.

6) Colin Baker • 1984-1986, two seasons.

7) Sylvester McCoy • 1987-1989, three seasons.

The "Time Streams" theme is not patterned after a particular episode.

The "Time Expander" is a new feature of pinball, and for Doctor Who fans.

# TERMINOLOGY

Doctor Who    A Time Lord, who has taken a TARDIS and travels through time and space.

TARDIS    A time machine that the Doctor uses. TARDIS is an acronym for "Time And Relative Dimensions In Space", and is bigger on the inside than the outside. The Doctors' TARDIS is "stuck" in the shape of a police box (the chameleon circuit does not work properly). The "Master" also has a TARDIS, usually in the shape of a Roman Pillar, but his chameleon circuit is fully functional.

Time Lord    The race of the Doctor.

Gallifrey    The home planet of the Doctor.

Dalek    A being intentionally mutated by radiation in a protected shell that is impervious to most weapons.

Davros    The creator of the Daleks. Defeated may times by the Doctor.

The Master    A renegade Time Lord, also defeated by the Doctor.

Transmat    A matter-transmitter that can transport people or objects from one place to another.

Time Expander    A machine to stretch time within a certain area of time and space.

Rassilon    A historical Time Lord who created time travel for the Time Lords.

# RULES

Ball Start:              Use flippers to select one of the seven Doctor's areas, then shoot the ball. The area selected will have increased scoring potential.

Transmat:                Lite extra Doctors by building the Transmat Power (jet bumpers), then hit the flashing "Activate Transmat" target.

Multiball:               Earn locks by hitting center target of Time Expander, lock 2 balls, then restore Earth time to factor 0 by lighting all 15 control panel lamps. Then, shoot the ball into any door.

Jackpot:                 During Multiball, time warp Daleks by going into each door. When Davros Super Jackpot appears, deactivate force field by hitting the 5 targets, then time warp him.

Playfield Multiplier:    Build from cliffhanger (top) ramp, it multiplies ALL scores and builds loop champion.

Sonic Boom:              Scores 10 Million points each for spelling W-H-O every 10th loop.

Unlimited Million:       After playfield multiplier 4X.

Repair Millions:         Complete R-E-P-A-I-R within the allowed time and any REPAIR target is worth 1 Million points.

Lighting Extra Ball:     Complete W-H-O sequence a set amount of times (see status report).
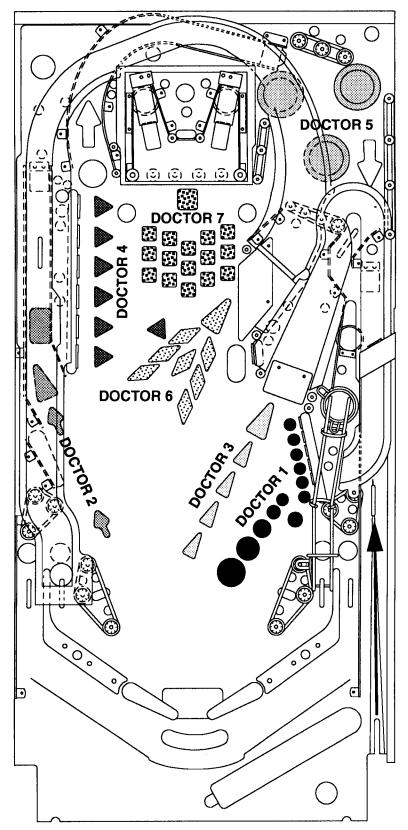
Video Mode:              Relit by spelling ESCAPE. Use 1 flipper to jump over small obstacles, 2 flippers for large obstacles. Extra Ball awarded during wave three (auto adjustable).

Special:                 Complete E-S-C-A-P-E until "S" lamp is ON.

DOCTOR WHO  D

At ball start use your flippers (right flipper increases the Doctor number, left flipper decreases the Doctor number) to choose an area of the playfield (Doctor's 1 thru 7), then launch the ball. The doctor's area selected will have increased scoring potential.

Doctor 1: Spots an extra ESCAPE target for a faster way to the SPECIAL.

Doctor 2: Doubles the score and allows for more time between shots.

Doctor 3: Doubles the score and allows for more time between shots for an easier way to get extra balls.

Doctor 4: Allows for more REPAIR time between shots.

Doctor 5: Makes the transmat bonus grow faster, allowing more Doctor's to be lit.

Doctor 6: Increases the playfield multiplier by 2 steps instead of 1, and allows for more time to score at the current playfield multiplier.
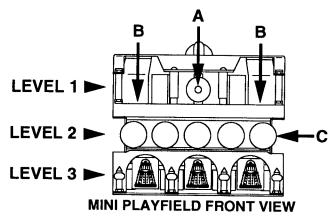
Doctor 7: Spots another "expansion factor" lamp each time a middle level target is hit, lites 1 "expansion factor" lamp each time the center target is hit, allows for more initial re-lock time, and adds more to the re-lock timer when the center target is hit.

DOCTOR WHO E
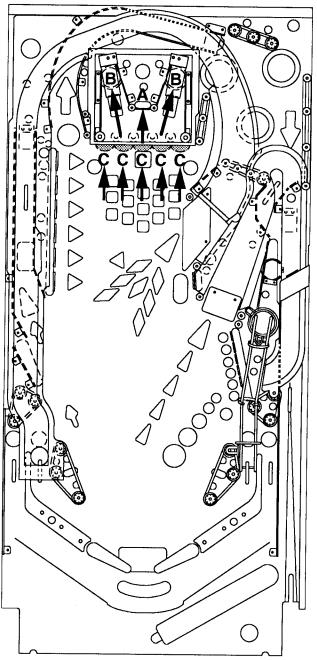
## Multiball - Doctor 7

Light locks by hitting middle target (A) of "Time Expander" (mini-playfield, level 1).
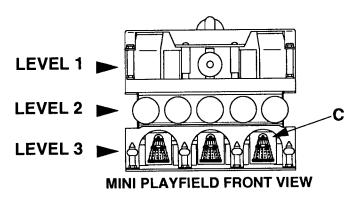
Then lock 2 balls (B), to reveal the "Controls" of the "Time Expander" (level 2). The controls (C) are locked on to Earth and when activated will restore Earth time from an expansion factor of 15 to a normal factor 0. This raises the "Time Expander" to level 3 and the player must start multiball by shooting the ball into one of the 3 doors. The middle door "skips" a jackpot for a faster way to reach the "Super Davros Jackpot".
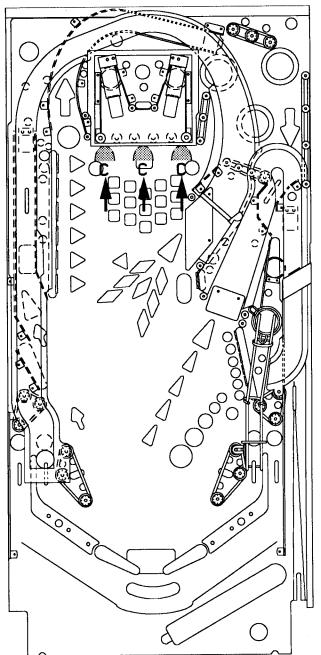
**Selecting Doctor 7** allows for a faster restore of Earth time to the normal factor 0

LEVEL 1 ▶

LEVEL 2 ▶

LEVEL 3 ▶

**MINI PLAYFIELD FRONT VIEW**

DOCTOR WHO   F

**LEVEL 1** ▶

**LEVEL 2** ▶

**LEVEL 3** ▶

**MINI PLAYFIELD FRONT VIEW**

**Jackpot**
Upon start of multiball, the Daleks will march out their ranks to "exterminate the doctor", time warp then by shooting each of the 3 targets (C, Level 3) to award and build up your jackpot score. Loose 1 ball (still in 2 ball multiball) and the player will do battle with a "lesser" Dalek.

The Dalek ranks are:

| | |
|---|---|
| Emperor Dalek | 50 Million |
| Supreme Dalek | 45 Million |
| Gold Daleks | 40 Million |
| White Daleks | 35 Million |
| Blue Daleks | 30 Million |
| Black Daleks | 25 Million |
| Daleks | 5-20 Million |

**Davros Super Jackpot**
100/150/200 Million Points! - after batteing all the Dalek Ranks, Davros appears. He is protected by a force field that is deactivated by hitting all 5 dalek buttons (Level 2). Once the force field is removed, he too can be time warped by the 3 doors (Level 3). But beware, he has found a method of returning from time warp, and his force field is stronger!

**Playfield Multiplier**
Shoot up the top ramp (O) to increase playfield multiplier of ALL scores up to 4X!

*Just try to time warp Davros at 4X!*

**Unlimited Million**
Scores a total (with playfield multiplier) of 1 million points for all shots past the playfield 4X!
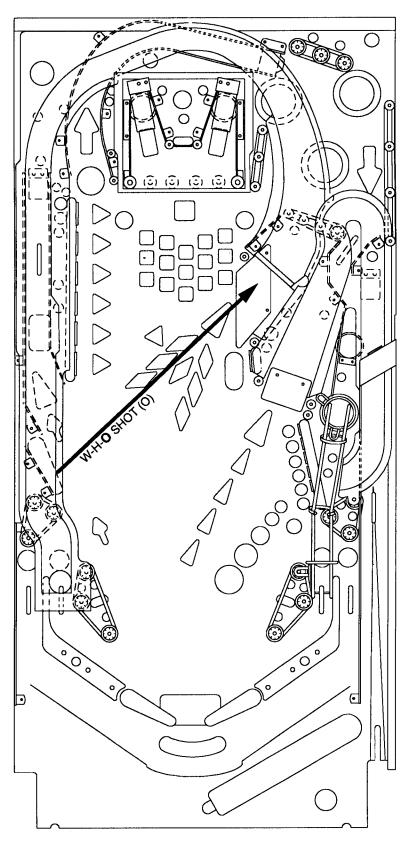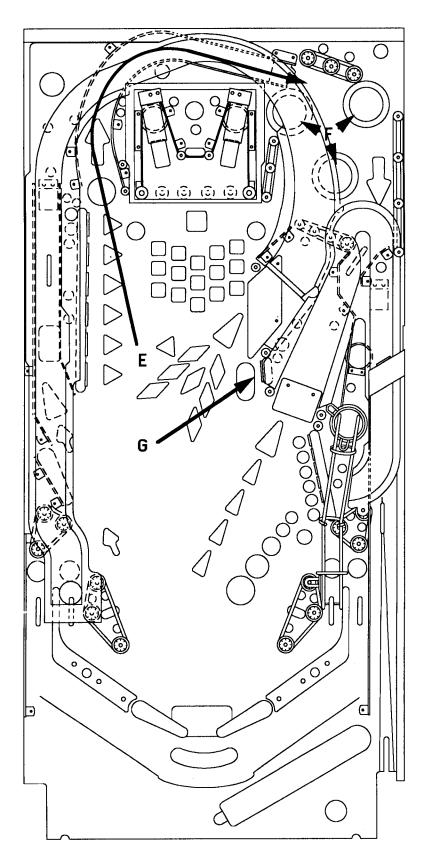
**Loop Champion**
Players can compete for loop champion by beating the current loop champion.

**Sonic Boom**
Every 10th loop the trap door is lowered and each letter of W-H-O is now worth 10 Million Points.

**Selecting Doctor 6** advances the playfield multiplier by 1X (instead of by 1/2X).

W-H-O SHOT (O)
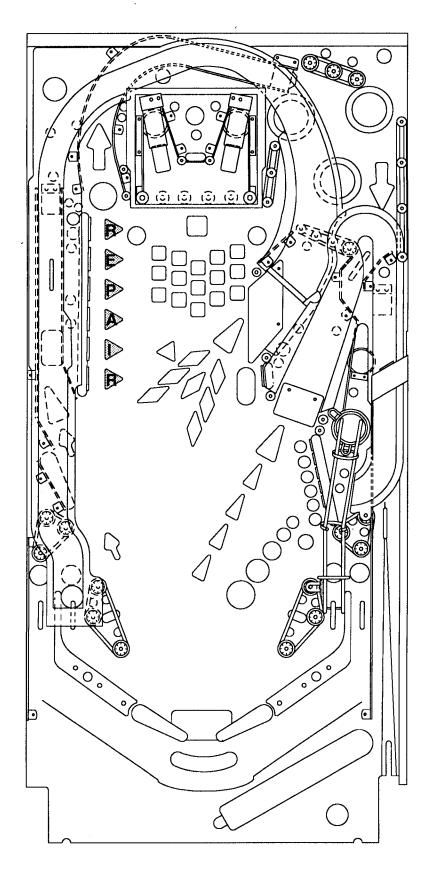
**To add more doctors to the playfield** - Shoot (E) at the jet bumpers (F) to build up enough power to transmat (a matter transmitter) another doctor when target (G) is blinking.
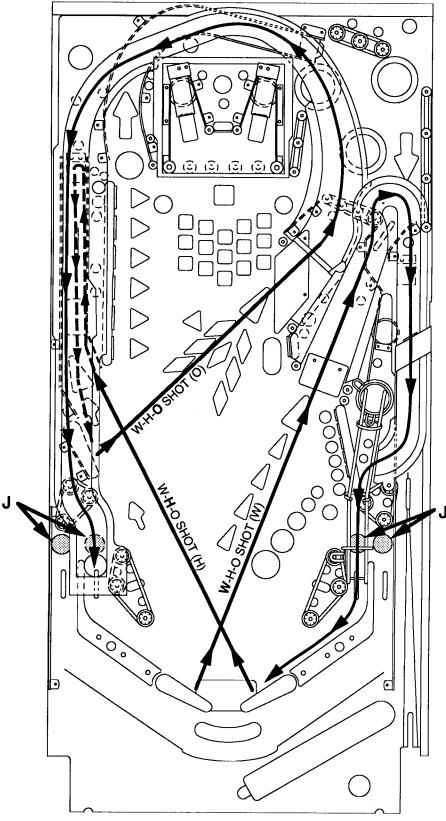
**Selecting Doctor 5** increases the jet bumper score, and builds up the transmat power faster!

**R.E.P.A.I.R. Millions**
Repair each force fields projector (targets) before it breaks down *(these faultey force field projectors always did break down alot)* for increasing score. If all projectors are repaired (lit), each target is worth 1 Million points!

**Selecting Doctor 4** repairs 2 projectors with a single target hit!

DOCTOR WHO   J
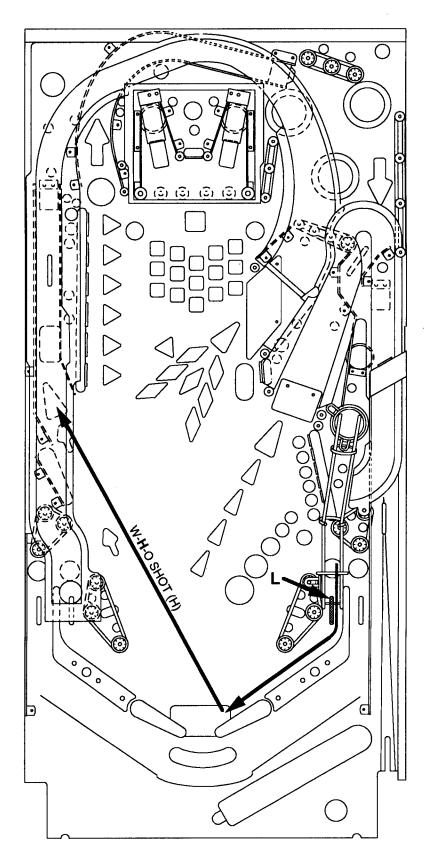
**Lighting Extra Ball**
Completing the sequence of W-H-O ramp shots (W), (H), and (O), a programable (or auto-adjustable) amount of times, will light an extra ball at lamp (J). However, the sequence must be completed in time.
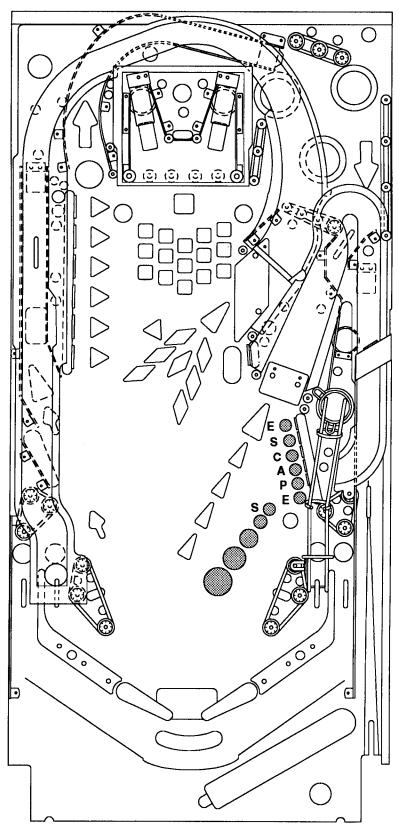
**Selecting Doctor 3** allows more time to complete W-H-O, and temporarily increases its score at each letter.

W-H-O SHOT (O)

W-H-O SHOT (H)

W-H-O SHOT (W)

J

J

DOCTOR WHO  K

**Hangon Score**
Lit by the right return lane (L), and collected by W-H-O shot (H) before it times out, can earn the player 250,000 to 2 million points.

**Selecting Doctor 2** allows more time to complete the Hangon shot, and temporarily doubles its score.



DOCTOR WHO  L

**Special**
Completing ESCAPE, a programmable number of times, awards a Special (S).

**Selecting Doctor 1** awards 2 targets with a single target hit!

## Video Mode
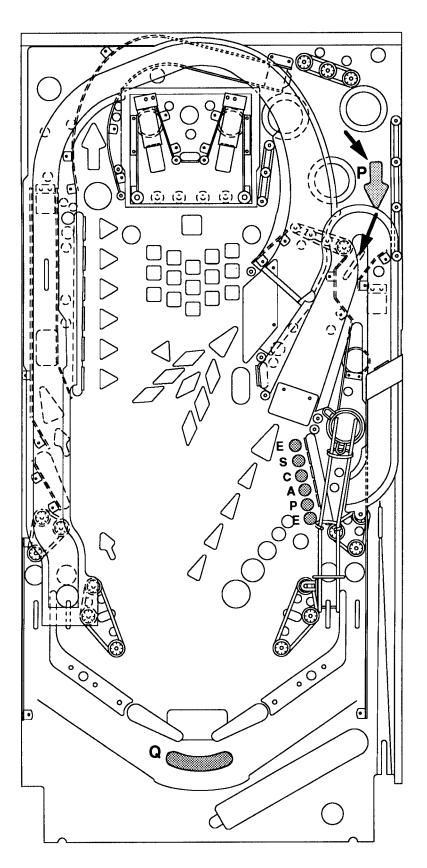
Complete ESCAPE to light Video Mode (P). *Enter to start the chase of your life!* A Dalek is on your heals with orders to capture you ALIVE (well, thank heaven for small favors). However, your path is obstructed with various obstacles that you must carefully jump over. · It is wise to use 1 flipper to jump over the small obsticles, and to use 2 flippers to jump over the large obstacles. You are allowed (adjustable) a few extra lives, in case you hit an obstacle. Reach the TARDIS to avoid capture by the Dalek, (adjustable) receive big bonus points, and video mode re-lit.

## Video Mode-Last Wave

This will score the sum total of all the successfully escaped video modes. Usually totaling hundreds of millions (at 1X playfield multiplier).

## Second Chance (Q)

If a player does not receive a minimum of 2 seconds of play per ball, they receive a second chance, and have the ball re-served back to them.

# Game Operation and Test Information

## DOCTOR WHO (System WPC) ROM Summary

| IC | TYPE | BOARD | LOCATION | PART NUMBER |
|---|---|---|---|---|
| Game ROM 1 | 27020 | CPU | U6 | A-5343-20006-1 |
| Music/Speech ROM 2 | 27040 | Audio | U15 | 5341-13406-U15 |
| Music/Speech ROM 3 | 27010 | Audio | U18 | A-5343-20006-3 |
| Music/Speech ROM 4 | 27040 | Audio | U14 | 5341-13406-U14 |

**NOTICE**

Order replacement ROMs from your authorized MIDWAY MANUFACTURING CO. distributor. Specify: (1) part number (if available); (2) ROM level (number) on the label; (3) game the ROM is used in.

# PINBALL GAME ASSEMBLY INSTRUCTIONS
# DOCTOR WHO IS A 3 BALL GAME.

**_Power:_**  Domestic 120V @ 60 Hz  
Foreign 230V @ 50 Hz  
Japan 100V @ 50Hz  

**_Dimensions:_**  Width: 26" Approx.  
Depth: 56" Approx.  
Height: 85" Approx.  

**_Temp:_**  $32^{0}$ F to $100^{0}$ F  
$(0^{0}$ C to $38^{0}$ C)  

**_Humidity:_**  Not to exceed 95% relative.  

**_Weight:_**  Approx. 286 lbs. (crated)

1. Remove all cartons, parts, and miscellaneous items from the shipping container and set them aside.

2. Place the cabinet on a support and attach rear legs using leg bolts. Leg levelers and leg bolts are provided among the parts in the cash box.

3. Attach the front legs (after installing leg levelers), using leg bolts. See diagram below.



**Pinball Assembly, Playfield Pitch Angle, and Leg Leveler Details.**
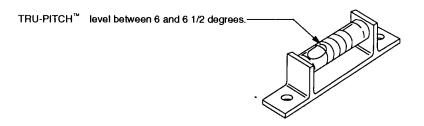
4. Reach into the cabinet and backbox and ensure that the interconnecting cables are not kinked or pinched. Be careful to avoid damaging wires at any stage of the assembly process.

5. Raise the hinged backbox upright and latch it into position. Unlock the backbox, and remove the backglass, storing it carefully to avoid scratches. Remove the shipping block holding the Insert Board. Unlatch and open the Insert Board. Carefully lift the Speaker Panel and lay it down on the playfield glass. Be careful not to damage the Dot Matrix Display/Driver Board. This allows access to the bolt holes used for securing the backbox upright. Install the washer-head mounting bolts through the bottom holes of the backbox into the threaded fasteners in the cabinet to secure the backbox. Close the Insert Board and latch it in position. Replace the Speaker Panel. Reinstall the backglass, and lock the backbox.

# ⚠ CAUTION

**_FAILURE TO INSTALL_** the backbox mounting hardware properly can cause personal injury.  
**_NEVER TRANSPORT_** a pinball game with the hinged backbox erect. Always lower the backbox forward onto the playfield cabinet on a layer of protective material to prevent marring or damage and possible personal injury.

6. Extend each leg leveler slightly below the leg bottom, so that all four foot pads protrude approximately the same distance. Remove the cabinet from its support and place it on the floor.

7. Unlock and open the coin door. Move the molding latch lever toward the left side of the game, to release the front molding. Lift the front molding off the playfield cover glass, return the latch lever to the right, and close the coin door. Carefully slide the glass downward, until it clears the grooves of the left and right side moldings. Lift the glass up and away from the game, storing it carefully to avoid breakage.

8. Place a level or an inclinometer on the playfield surface. Adjust the leg levelers for proper playfield level (side-to-side). NOTE: It is recommended that these measurements be made ON the playfield, not the cabinet nor the playfield cover glass. Tighten the nut on each leg leveler shaft to maintain this setting.

9. The TRU-PITCH™ level is located on the right shooter rail. This allows the playfield pitch angle to be accurately adjusted WITHOUT REMOVING THE GLASS. The first line (closest to the front of game) on the level is approximately 6 degrees. Every line thereafter is approximately another 1/2 degree of pitch. The recommended pitch for Doctor Who is between 6 and 6 1/2 degrees. The NOSE of the bubble is between the first and second line on the level (see diagram below).

TRU-PITCH™ level between 6 and 6 1/2 degrees.
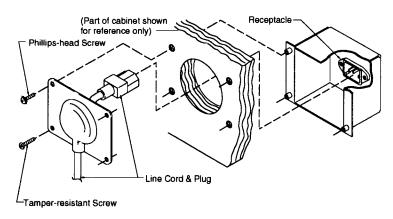


## CAUTION

Playfield pitch angle adjustments can affect the operation of the plumb bob tilt, inside the cabinet. The plumb bob weight is among the parts in the cash box; the operator should install the weight and adjust this tilt mechanism for proper operation, after completion of the desired playfield pitch angle setting.

10. Move the game into the desired location; recheck the level and pitch angle of the playfield.

11. Verify that the *required number* of balls are installed in the game. **DOCTOR WHO** uses 3 balls.

12. Install playfield mylars if desired.

   *NOTE:* The **Doctor Who** playfield is specially coated with a Diamond Plate™ surface and does not require a protective mylar. However, playfield mylars can be purchased through your local Bally Distributor. Specify part number 03-7960-20006-1 for full playfield mylar.

13. Clean and reinstall the playfield cover glass, reversing the procedure of step 7.

14. To attach line cord, remove envelope stapled to the inside cabinet (near cashbox). Remove the four Phillips-head screws that mount the line cord cover plate to the rear cabinet. Match the prongs on the plug with the holes in the receptacle and push line cord securely into place. Make sure cord is aligned with the indentation of plate (indentation should point toward bottom of cabinet). Remount line cord cover plate. If desired, tamper resistant screws have been provided in an envelope marked "Security Screws" (located in cashbox) to remount cover plate. Prepare the game for player operation.



(Part of cabinet shown for reference only)
Receptacle
Phillips-head Screw
Line Cord & Plug
Tamper-resistant Screw

# GAME CONTROL LOCATIONS

## Cabinet Switches

The <u>On-Off switch</u> is located on the bottom of the cabinet near the right front leg.

The <u>Start Button</u> is the pushbutton to the left of the coin door on the cabinet exterior. Press the Start button to begin a game, or during the diagnostic mode, to ask for HELP.

## Coin Door Switches

The operator controls all game adjustments, obtains bookkeeping information, and diagnoses problems, using only four pushbutton switches mounted on the inside of the coin door. The Coin Door Switches have two modes of operation Normal Function and Test Function.

### Normal Function

The <u>Service Credits</u> button puts credits on the game that are not included in any of the game audits.

The <u>Volume Up</u> button raises the sound level of the game. Press and hold the button until the desired level is reached.

The <u>Volume Down</u> button lowers the sound level of the game. Press and hold the button until the desired level is reached. See Adjustment A.1 28 to shut sound OFF completely.

The *<u>Begin Test</u> button starts the Menu System Operation and changes the Coin Door Switches from Normal Function to Test Function.
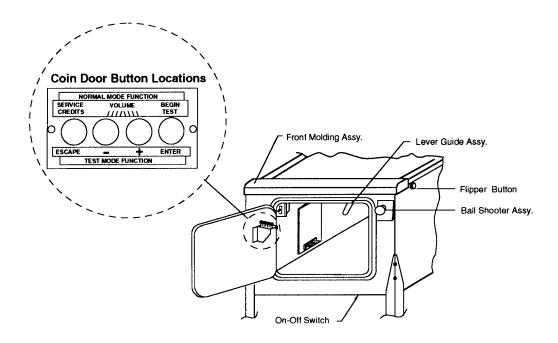
### Test Function

The <u>Escape</u> button allows you to get out of a menu selection or return to the Attract Mode.

The <u>Up</u> button allows you to cycle forward through the menu selections or adjustment choices.

The <u>Down</u> button allows you to cycle backward through the menu selections or adjustment choices.

The *<u>Enter</u> button allows you to get into a menu selection or lock in an adjustment choice.



*To reset High Score, hold down the Begin Test/Enter switch for 5 seconds while in the Attract Mode.*

# GAME OPERATION

## ⚠ CAUTION

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

**POWERING UP.** With the coin door closed, plug the game in and switch it On. In normal operation, testing will show in the display as the game performs Start-Up Tests. Once the Start-Up Tests have been successfully completed the last score is displayed. Afterward, the game goes into the Attract Mode.

*Note:* After the game has been on location for a period of time, the Start-Up Tests may contain messages concerning game problems. See 'Error Messages' for more detailed information regarding messages.

Open the coin door and press the Begin Test Switch. The display shows the game name, number, and software revision. The message changes. The display shows the sound software revision, revision level of the system software and date the game software was revised.

*Example:*           **DOCTOR WHO**          **Sound Rev. L-1**
                      **20006**     **Rev. P-2**     **Sy. 2.31**     **6/24/92**

Press the Enter button to enter the WPC Menu System (refer to the section entitled 'Menu System Operation' for more information). Perform the entire Test Menu routine to verify the game is operating satisfactorily.

**ATTRACT MODE\*.** After completing the Test Menu routine, press the Escape button three times to enter the Attract Mode. During the Attract Mode the display shows a series of messages informing the player of the recent highest scores*, "custom messages*", and the score to achieve to obtain a replay award*

**CREDIT POSTING.** Insert coin(s). A sound is heard for each coin and the display shows the number of credits purchased. So long as the number of maximum allowable credits* are NOT exceeded by coin purchase or high score, credits are posted correctly.

**STARTING A GAME.** Press the Start button once. A startup sound plays and the credit amount shown in the display decreases by one. The display flashes 00 (until the first playfield switch is actuated), and shows ball 1. If credits are posted, additional players may enter the game by pressing the Start button once for each player, before the end of play on the first ball.

**TILTS.** Actuating the Slam Tilt switch inside the cabinet ends the current game and proceeds to the Game Over Mode. With the third closure* of the plumb bob tilt switch, the player loses the remaining play of that ball, but can complete the game.

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

**GAME OVER MODE.** Game Over will show in the display. Afterward, the high scores flash on the display. The game proceeds to the Attract Mode.

*Operator-adjustable feature.

# GAME CHECK-OUT

Game Check-out is a special feature designed to be a rapid method of detecting problems in the game. To start the check-out program, press and hold the enter button while in either the attract mode or during a game. While holding the enter button, wait for the "To Reset Scores" title screen to appear on the display. When it appears, continue to hold down the enter button and simultaneously press the up and down buttons. The "Ckout" title screen will appear. The buttons can now be released.

For Doctor Who, a warning message will appear next. The message warns to *keep fingers away from the moving mini-playfield* (also known as the "Time Expander"). Confirmation of this message is necessary by pressing the advance button. As a safety feature, during the test(s) that require the movement of the mini-playfield, the display will show the message "press and hold both flipper buttons". The mini-playfield will not move until these buttons are pressed.

The Check-out program is arranged into seven individual tests:

1. Ckout: Game features

2. Ckout: Normal Switch Levels

3. Ckout: Vibration test for sensitive switches and lamps

4. Ckout: Solid State Flippers

5. Ckout: Outhole, trough and shooter lane tests

6. Ckout: Coin Slots

7. Ckout: Switch Edges, manually operating all switches

The program will always test for a shorted switch row. Any test can be interrupted to have a picture of the switch matrix (from switch test) appear on the Dot Matrix Display to show the offending short.

**Button Operation:**

The Escape Button will stop any test at any time and return to the attract mode.

The Up Button will abort the current test and go to the next test.

The Down Button will abort the current test and return to the previous test.

The Enter Button is used to continue a test when an error occurs.

## 1. Ckout: Game Features

This section tests;

A) The mini-playfield positioning opto (if enabled from feature adjustments).

B) The mini-playfield opto ejects, switch, and coil (if enabled from feature adjustments).

C) The opto popper switch and coil. The plunger on the opto popper and opto ejects will always trigger the opto beam. The program expects this to happen, even if there is no ball in the device. Otherwise a "Solenoid Switch Error" message is displayed along with the switch number, name, and switch state.

D) The Trap Door (if enabled from feature adjustments).

Tests A and E report the same error messages from their respective diagnostic test. Refer to the individual diagnostic tests, at the end of Section One, for more details.

When all devices have passed their test, the display will read "PASSED".


## 2. Ckout: Normal Switch Levels

This test assumes that all 3 balls are in the trough. Any switches that are normally in the wrong state are displayed. Examine the switch to determine the cause of this problem. **WARNING:** All ejects, poppers, outhole, and shooter kickers will start kicking when their switch is activated.

The display will read "Pass" when all switches are in their proper state.


## 3. Ckout: Vibration

This test will check for sensitive switches and lamps. When all lamps are turned on, the operator must visually look for lamps that are burnt out and watch for lamps that "blink", indicating a loose connection.

All game solenoids are pulsed in a "slow" pattern, then in a "fast" pattern. Any switches that change their state will stop the test and be displayed. Adjust the switch as needed then press the enter button to continue. As a general rule when the outhole, trough, or shooter solenoid is activated it should not trigger its' switch.


## 4. Ckout: Solid State Flippers

All flippers are activated to warm-up the coils. The flippers are then flipped 4 times (1 at a time). Their response and delta millisecond time is measured until the end-of-stroke switch is hit. A (fast) flipper can indicate that the end-of-stroke switch is adjusted too close, too early. A (slow) flipper can be a binding or dirty flipper. A stuck-on or -off flipper can be either a coil (assuming the flipper did not move), mechanical binding flipper, or grossly mis-adjusted flipper end-of-stroke switch. A high delta time (>4ms) can indicate a dirty end-of-stroke switch, or a mis-adjusted "backing" plate on that switch.

## 5. Ckout:  Outhole, Trough, and Shooter Lane

This test begins with all the balls in the trough.  It starts by "machine gunning" the outhole solenoid to see if the outhole switch is wrongly activated.  Two balls are served into the shooter lane, if a ball is mis-served or if any trough switches do not open or close in time, they are reported in the display.  The test is normally stopped, and the operator can continue the test by pressing the enter button.  After the last ball is served, the trough solenoid is "machine gunned" and should not activate any of the trough switches.  When this succeeds, the shooter clears the last ball and "machine guns" also.  Then, the outhole is activated to feed the trough until all 3 balls are back.

Note, when an error occurs, press the enter button to continue the test.

Note, some amount of mis-served balls is acceptable.

## 6. Ckout:  Coin Slots

This test is for coin doors that are switch activated and is performed manually by the operator.  No audits or game credits are effected by this test.  First, close the coin door so that the coin balancers are aligned with the incline of the playfield.  *The test will NOT start until the coin door is closed.*  At this point the coin door may be opened, but this test works best when coins are inserted <u>with the coin door closed</u>.  Next, identify which coin slots are being used by putting 1 coin in each slot to be tested (the coin should activate the coin chute switch).  Then, insert coins until the chute is marked "OK".  If the chute is marked "NG" (no good), look at the measurements of "ON" time.  If it is more that 500ms, the switch is considered stuck on.  Typically, a quarter ranges from 40ms to 300 ms, any reading above this can indicate that the switch actuator needs adjustment (the actuator should be able to move all the way down and touch the bottom stop position).  The full operating range is a mimimum of 20ms (A.3 23) on to start, to a maximum of 500ms on, then an off time of at least 150ms.

**Display Explanation**:  The first number after the name of the coin chute is the debounced millisecond "ON" time.

Note, the bottom two lines are a timing line of the coin switch.  Each dot represents 2ms (milliseconds) of time (0.002 seconds).  The left side of the screen represents the past 128*2ms or 256ms.  The right side of the screen represents the current time.  The second from the bottom line of dots indicate a closed coin switch.  The bottom line of dots indicate an open coin switch.

The slam switch (designed to ignore coins when the game is being abused) will make its "SLAM" sound when activated (for adjustment purposes).

## 7. Ckout:  Switch Edges

This test is performed by manually operating all switches with a ball (never use fingers) at least twice.  It is recommended that each switch be activated 3 times.  This will catch most sticky switches.
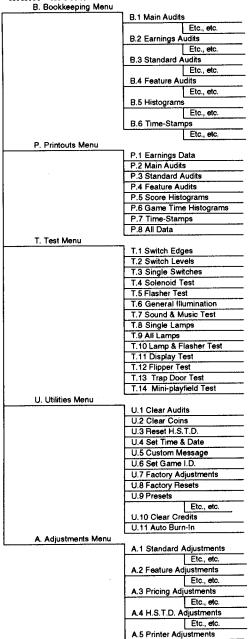
The controlled lamps are cycled in a pattern to reveal lamps that have a shorted diode.  If a lamp does not turn off completely, it usually has a shorted diode.  However, more than 1 shorted diode can falsely make others look bad.

All flashers are flashed for about 30 seconds.  For Doctor Who there are 12 bulbs on the playfield, 10 bulbs in the insert, and 1 bulb in the Dalek (if used) on the top of the backbox.

# MENU SYSTEM OPERATION

This game operates on a Menu System. The Main Menu allows you to choose from several main categories, which in turn lead to other menus to choose from. To enter the Menu System, open the coin door and press the Begin Test button. The displays show the Game I.D. Mode. Press the Enter button and the Main Menu appears. To cycle through the Main Menu selections press either the Up or Down button. Activate any selection by pressing the Enter button when the desired selection appears in the displays. Return to the Attract Mode or a previous menu selection, press the Escape button. Press the Start button for HELP at any time.

## Main Menu

### B. Bookkeeping Menu

| B.1 Main Audits |
| Etc., etc. |
| B.2 Earnings Audits |
| Etc., etc. |
| B.3 Standard Audits |
| Etc., etc. |
| B.4 Feature Audits |
| Etc., etc. |
| B.5 Histograms |
| Etc., etc. |
| B.6 Time-Stamps |
| Etc., etc. |

### P. Printouts Menu

| P.1 Earnings Data |
| P.2 Main Audits |
| P.3 Standard Audits |
| P.4 Feature Audits |
| P.5 Score Histograms |
| P.6 Game Time Histograms |
| P.7 Time-Stamps |
| P.8 All Data |

### T. Test Menu

| T.1 Switch Edges |
| T.2 Switch Levels |
| T.3 Single Switches |
| T.4 Solenoid Test |
| T.5 Flasher Test |
| T.6 General Illumination |
| T.7 Sound & Music Test |
| T.8 Single Lamps |
| T.9 All Lamps |
| T.10 Lamp & Flasher Test |
| T.11 Display Test |
| T.12 Flipper Test |
| T.13 Trap Door Test |
| T.14 Mini-playfield Test |

### U. Utilities Menu

| U.1 Clear Audits |
| U.2 Clear Coins |
| U.3 Reset H.S.T.D. |
| U.4 Set Time & Date |
| U.5 Custom Message |
| U.6 Set Game I.D. |
| U.7 Factory Adjustments |
| U.8 Factory Resets |
| U.9 Presets |
| Etc., etc. |
| U.10 Clear Credits |
| U.11 Auto Burn-In |

### A. Adjustments Menu

| A.1 Standard Adjustments |
| Etc., etc. |
| A.2 Feature Adjustments |
| Etc., etc. |
| A.3 Pricing Adjustments |
| Etc., etc. |
| A.4 H.S.T.D. Adjustments |
| Etc., etc. |
| A.5 Printer Adjustments |

**Press Escape**
To move out of a menu selection.

**Press Enter**
To get into a menu selection.

**Press Up**
Increases sequence; Example A.1, A.2, A.3, A.4.

**Press Down**
Decreases Sequence; Example A.4, A.3, A.2, A.1.

Use Up and Down to cycle through the selections in a menu.

Use Escape and Enter to move into and out of the selected menu

Bookkeeping is the first category available from the Main Menu. Press the Enter button to activate the Bookkeeping Menu. Press the Up or Down button to cycle through the selections. Press the Enter button to activate a selection. Once activated, press the Up or Down button to cycle through the available audits. Audits cannot be set, they can only be cleared by using U1 and U2 from the Utilities Menu. Press the Escape button to return to the Bookkeeping Menu. Press it again to return to the Main Menu.

## B. BOOKKEEPING MENU

**B.1 Main Audits**
**B.2 Earning Audits**
**B.3 Standard Audits**
**B.4 Feature Audits**
**B.5 Histograms**
**B.6 Time-Stamps**

**One Button Audit System.** The Bookkeeping Menu is obtainable directly from the Attract Mode. Repeatedly pressing the Enter button, while in the Attract Mode, will cycle through all of the game audits.

## B.1 Main Audits

| | | | |
|---|---|---|---|
| B.1 | 01 | Total Earnings | 00 |
| B.1 | 02 | Recent Earnings | 00 |
| B.1 | 03 | Free Play Percent | 00 |
| B.1 | 04 | Average Ball Time | 00 |
| B.1 | 05 | Average Game Time | 00 |
| B.1 | 06 | Total Plays | 00 |
| B.1 | 07 | Replay Awards | 00 |
| B.1 | 08 | Percent Replays | 00 |
| B.1 | 09 | Extra Balls | 00 |
| B.1 | 10 | Percent Extra Ball | 00 |

## B.2 Earning Audits*

| | | | |
|---|---|---|---|
| B.2 | 01 | Recent Earnings | 00 |
| B.2 | 02 | Recent Left Slot | 00 |
| B.2 | 03 | Recent Center Slot | 00 |
| B.2 | 04 | Recent Right Slot | 00 |
| B.2 | 05 | Recent 4th Slot | 00 |
| B.2 | 06 | Recent Paid Credits | 00 |
| B.2 | 07 | Recent Service Credits | 00 |
| B.2 | 08 | Total Earnings* | 00 |
| B.2 | 09 | Total Left Slot* | 00 |
| B.2 | 10 | Total Center Slot* | 00 |
| B.2 | 11 | Total Right Slot* | 00 |
| B.2 | 12 | Total 4th Slot* | 00 |
| B.2 | 13 | Total Paid Credits* | 00 |
| B.2 | 14 | Total Service Credits* | 00 |

*These audits are NOT resettable. They are a record of the earnings of the game since the "CLOCK 1ST SET" Time-Stamp.

## B.3 Standard Audits

| | | | |
|---|---|---|---|
| B.3 | 01 | Games Started | 00 |
| B.3 | 02 | Total Plays* | 00 |
| B.3 | 03 | Total Free Play | 00 |
| B.3 | 04 | Free Play Percent | 00 |
| B.3 | 05 | Replay Awards | 00 |
| B.3 | 06 | Percent Replays | 00 |
| B.3 | 07 | Special Awards | 00 |
| B.3 | 08 | Percent Special | 00 |
| B.3 | 09 | Match Awards | 00 |
| B.3 | 10 | Percent Match | 00 |
| B.3 | 11 | H.S.T.D. Credits | 00 |
| B.3 | 12 | Percent H.S.T.D | 00 |
| B.3 | 13 | Extra Ball | 00 |
| B.3 | 14 | Percent Extra Ball | 00 |
| B.3 | 15 | Tickets Awarded | 00 |
| B.3 | 16 | Percent Tickets | 00 |
| B.3 | 17 | Left Drains | 00 |
| B.3 | 18 | Right Drains | 00 |
| B.3 | 19 | Average Ball Time | 00 |
| B.3 | 20 | Average Game Time | 00 |
| B.3 | 21 | Play Time | 00:00:00 |
| B.3 | 22 | Minutes On | 00 |
| B.3 | 23 | Balls Played | 00 |
| B.3 | 24 | Tilts | 00 |
| B.3 | 25 | Replay 1 Awards | 00 |
| B.3 | 26 | Replay 2 Awards | 00 |
| B.3 | 27 | Replay 3 Awards | 00 |
| B.3 | 28 | Replay 4 Awards | 00 |
| B.3 | 29 | 1 Player Games | 00 |
| B.3 | 30 | 2 Player Games | 00 |
| B.3 | 31 | 3 Player Games | 00 |
| B.3 | 32 | 4 Player Games | 00 |
| B.3 | 33 | H.S.T.D. Reset Count | 00 |
| B.3 | 34 | Burn-in Time † | 00:00:00 |
| B.3 | 35 | 1st Replay Level | 00 |
| B.3 | 36 | Left Flipper | 00 |
| B.3 | 37 | Right Flipper | 00 |

* *"Total Plays"* only counts completed games. A game is considered complete when the final ball begins. Audit information from incomplete games is ignored, therefore test and servicing operations do not affect the Audits.

† This Audit is not resettable.

## B.4 Feature Audits

| | | | | |
|---|---|---|---|---|
| B.4 | 01 | All Locks | Doctor 7 | 00 |
| B.4 | 02 | All Multiballs | | 00 |
| B.4 | 03 | 2 Ball Rematch | | 00 |
| B.4 | 04 | 3 Ball Rematch | | 00 |
| B.4 | 05 | All Jackpots | | 00 |
| B.4 | 06 | Davros Jackpots | | 00 |
| B.4 | 07 | Skipped Jackpots | | 00 |
| B.4 | 08 | 2 Ball Jackpots | | 00 |
| B.4 | 09 | 1st 2 Ball Jackpots | | 00 |

## B.4 Feature Audits Continued...

| | | | | |
|---|---|---|---|---|
| B.4 | 10 | 2nd 2 Ball Jackpots | | 00 |
| B.4 | 11 | 3rd 2 Ball Jackpots | | 00 |
| B.4 | 12 | 4th 2 Ball Jackpots | | 00 |
| B.4 | 13 | 5th 2 Ball Jackpots | | 00 |
| B.4 | 14 | 3 Ball Jackpots | | 00 |
| B.4 | 15 | 1st 3 Ball Jackpots | | 00 |
| B.4 | 16 | 2nd 3 Ball Jackpots | | 00 |
| B.4 | 17 | 3rd 3 Ball Jackpots | | 00 |
| B.4 | 18 | 4th 3 Ball Jackpots | | 00 |
| B.4 | 19 | 5th 3 Ball Jackpots | | 00 |
| B.4 | 20 | Playfield 1.5X Lit | Doctor 6 | 00 |
| B.4 | 21 | Playfield 2.0X Lit | | 00 |
| B.4 | 22 | Playfield 2.5X Lit | | 00 |
| B.4 | 23 | Playfield 3.0X Lit | | 00 |
| B.4 | 24 | Playfield 3.5X Lit | | 00 |
| B.4 | 25 | Playfield 4.0X Lit | | 00 |
| B.4 | 26 | Playfield Millions | | 00 |
| B.4 | 27 | Transmat Doctor Lit | Doctor 5 | 00 |
| B.4 | 28 | Transmat Doctor Award | | 00 |
| B.4 | 29 | R.E.P.A.I.R. 1 Lamps | Doctor 4 | 00 |
| B.4 | 30 | R.E.P.A.I.R. 2 Lamps | | 00 |
| B.4 | 31 | R.E.P.A.I.R. 3 Lamps | | 00 |
| B.4 | 32 | R.E.P.A.I.R. 4 Lamps | | 00 |
| B.4 | 33 | R.E.P.A.I.R. 5 Lamps | | 00 |
| B.4 | 36 | R.E.P.A.I.R. Millions | | 00 |
| B.4 | 37 | W-H-O "W" Awards | Doctor 3 | 00 |
| B.4 | 38 | W-H-O "H" Awards | | 00 |
| B.4 | 39 | W-H-O Total Awards | | 00 |
| B.4 | 40 | 1st WHO Awards | | 00 |
| B.4 | 41 | 2nd WHO Awards | | 00 |
| B.4 | 42 | 3rd WHO Awards | | 00 |
| B.4 | 43 | 4th WHO Awards | | 00 |
| B.4 | 44 | Sonic Boom 10 Million | | 00 |
| B.4 | 34 | Extra Ball Lit | | 00 |
| B.4 | 35 | Hang On Awards | Doctor 2 | 00 |
| B.4 | 45 | Collision Awards | | 00 |
| B.4 | 46 | 1 E.S.C.A.P.E. Bonus | Doctor 1 | 00 |
| B.4 | 47 | 2 E.S.C.A.P.E. Bonus | | 00 |
| B.4 | 48 | 3 E.S.C.A.P.E. Bonus | | 00 |
| B.4 | 49 | 4 E.S.C.A.P.E. Bonus | | 00 |
| B.4 | 50 | 5 E.S.C.A.P.E. Bonus | | 00 |
| B.4 | 51 | Special Lit | | 00 |
| B.4 | 52 | Video Mode | Miscellaneous | 00 |
| B.4 | 53 | Video Mode Captured | | 00 |
| B.4 | 54 | Video Mode Escaped | | 00 |
| B.4 | 55 | Video Mode Extra Balls | | 00 |
| B.4 | 56 | Video Mode Seconds | | 00 |
| B.4 | 57 | Bonus X's | | 00 |
| B.4 | 58 | Second Chance | | 00 |
| B.4 | 59 | Mini Playfield Faults | Game Problems | 00 |
| B.4 | 60 | Trap Door Faults | | 00 |
| B.4 | 61 | Not Used | | 00 |
| B.4 | 62 | Other Switch Faults | | 00 |

## B.5 Histograms

| B.5 | 01 | 0-1.9 Million Scores | 00% | 00 |
|-----|----|----|-----|----|
| B.5 | 02 | 2-4.9 Million Scores | 00% | 00 |
| B.5 | 03 | 5-9.9 Million Scores | 00% | 00 |
| B.5 | 04 | 10-19 Million Scores | 00% | 00 |
| B.5 | 05 | 20-29 Million Scores | 00% | 00 |
| B.5 | 06 | 30-39 Million Scores | 00% | 00 |
| B.5 | 07 | 40-49 Million Scores | 00% | 00 |
| B.5 | 08 | 50-69 Million Scores | 00% | 00 |
| B.5 | 09 | 70-99 Million Scores | 00% | 00 |
| B.5 | 10 | 100-149 Million Scores | 00% | 00 |
| B.5 | 11 | 150-199 Million Scores | 00% | 00 |
| B.5 | 12 | 200-299 Million Scores | 00% | 00 |
| B.5 | 13 | Over 300 Million | 00% | 00 |
| B.5 | 14 | Game Time 0.0-1.0 Mins | 00% | 00 |
| B.5 | 15 | Game Time 1.0-1.5 Mins | 00% | 00 |
| B.5 | 16 | Game Time 1.5-2.0 Mins | 00% | 00 |
| B.5 | 17 | Game Time 2.0-2.5 Mins | 00% | 00 |
| B.5 | 18 | Game Time 2.5-3.0 Mins | 00% | 00 |
| B.5 | 19 | Game Time 3.0-3.5 Mins | 00% | 00 |
| B.5 | 20 | Game Time 3.5-4.0 Mins | 00% | 00 |
| B.5 | 21 | Game Time 4-5 Mins | 00% | 00 |
| B.5 | 22 | Game Time 5-6 Mins | 00% | 00 |
| B.5 | 23 | Game Time 6-8 Mins | 00% | 00 |
| B.5 | 24 | Game Time 8-10 Mins | 00% | 00 |
| B.5 | 25 | Game Time 10-15 Mins | 00% | 00 |
| B.5 | 26 | Game Time Over 15 Mins | 00% | 00 |

## B.6 Time-Stamps
The Time-Stamps Menu allows you to view dates and times that are important to game software.

| B.6 | 01 | Current Time |
|-----|----|----|
| B.6 | 02 | Clock 1st Set |
| B.6 | 03 | Clock Last Set |
| B.6 | 04 | Audits Cleared |
| B.6 | 05 | Coins Cleared |
| B.6 | 06 | Factory Setting |
| B.6 | 07 | Last Game Start |
| B.6 | 08 | Last Replay |
| B.6 | 09 | Last H.S.T.D. Reset |
| B.6 | 10 | Champion Reset |
| B.6 | 11 | Last Printout |
| B.6 | 12 | Last Service Credit |

Press the Enter button to activate the Printouts Menu, once the menu name is shown under the Main Menu. Then, use the Up or Down button to cycle through the Printouts Menu selections. Press the Enter button to activate the desired Printouts group. Press again to return to the Main Menu.

## P. PRINTOUTS MENU
(optional board required)

| | |
|---|---|
| P.1 | Earnings Data |
| P.2 | Main Audits |
| P.3 | Standard Audits |
| P.4 | Feature Audits |
| P.5 | Score Histograms |
| P.6 | Time Histograms |
| P.7 | Time-Stamps |
| P.8 | All Data |

The Printouts Menu is a combination of the other menus. This menu allows you to access and print information in the available menu selections.

If no printer is attached the message "Waiting for Printer" appears in the displays.
Note: Set print specification from the Adjustment Menu, A.5 Printer Adjustments.

Press the Enter button to activate the Test Menu, once the menu name is shown under the Main Menu. Then, use the Up or Down button to cycle through the Test Menu selections. Press the Enter button to activate a test. Press the Escape button to return to the Test Menu. Press again to return to the Main Menu. Note: During any test, press the Start button (Help) to obtain the wire color, driver number, connector number, and fuse location.

## T. TEST MENU

| | |
|---|---|
| T.1 | Switch Edges |
| T.2 | Switch Levels |
| T.3 | Single Switch |
| T.4 | Solenoid Test |
| T.5 | Flasher Test |
| T.6 | General Illumination |
| T.7 | Sound & Music Test |
| T.8 | Single Lamps |
| T.9 | All Lamps |
| T.10 | Lamp & Flasher Tests |
| T.11 | Display Test |
| T.12 | Flipper Test |
| T.13 | Trap Door Test |
| T.14 | Mini-playfield Test |

The switch matrix, on the left side of the display, shows the state of all switches. A dot indicates the switch is open, and a square indicates the switch is closed. The numbers assigned to each switch indicate where the switch is located in the matrix. The number on the left indicates the column, and the number on the right indicates the row. Example: Switch 23 is 2nd column, 3rd row.

A short to ground, on either the row or column wire, appears as a shorted row(s). However, a column wire shorted to ground disappears when all the indicated row switches are open. A row wire shorted to ground does not disappear.

A shorted diode in the switch matrix can cause other switches to appear closed. These "phantom" switches (though not actually closed) complete a rectangle in the switch matrix. Therefore, if two switches in the same column are closed (example; #22 and #24), and a third switch is pressed in another column but in the same row as one of the first two (example; #32), the "phantom" switch #34 is falsely indicated as closed. The switch with the shorted diode is diagonally opposite the "phantom " switch (in this case#22).

## T.1   Switch Edges

Press each switch one at a time. The name and number of the switch is shown in the display. If a switch other than the one pressed, or no switch at all is indicated, the system has detected a problem with the switch circuit.

## T.2   Switch Levels

This test automatically cycles through all switches that are detected closed. The name and number of each switch that is detected is shown in the display. A filled square indicates the switch's position in the matrix.

## T.3  Single Switches

The Single Switch Test isolates a particular switch by blocking signals from all other switches.  Use the Up or Down buttons to select the switch to be tested.

## T.4  Solenoid Test

The Solenoid Test has three modes: Repeat, Stop, and Run.  Only one solenoid should pulse at a time.  The system has detected a problem if; more then one solenoid pulses, a solenoid comes On and stays On, or during the Repeat or Run modes, no solenoid pulses.

Repeat  -  The Repeat mode pulses a single solenoid.  After entering this test, Solenoid 1 shows in the display. and the corresponding solenoid activates.  Press the Up or Down button to cycle through the solenoids, one at a time.  The same solenoid pulses until the Up or Down button is pressed.  Either press the Escape button to return to the Test Menu, or press the Enter button to advance to the next mode.

Stop  -  The Stop mode halts the Solenoid Test.  Press Enter during the Repeat mode and the Solenoid Test Stops.  No solenoids should be activated while the test is stopped.  Either press the Escape button to return to the Test Menu, or the Enter button to advance to the next mode.

Running  -  The Run mode cycles through the solenoids automatically.  The display shows the name and number of the solenoid currently being pulsed.  Either press the Escape button to return to the Test Menu, or the Enter button to advance to the next mode.

## T.5  Flasher Test

This tests the flashlamp part of the solenoid circuit exclusively.  This, like the Solenoid Test has three test modes: Repeat, Stop, and Run.  During this test, only one flashlamp circuit should pulse at a time.  The system has detected a problem if more than one circuit pulses, a circuit stays On, or during the Repeat or Run modes, no circuit pulses.

Repeat  -  The Repeat mode pulses a single flashlamp.  After entering this test, the name and number of the first flashlamp circuit will show in the display and the corresponding bulb(s) flash.  Press the Up or Down button to cycle through all of the flashlamp circuits one at a time.  The same circuit pulses until the Up or Down button is pressed.  Either press the Escape button to return to the Test Menu, or press the Enter button to advance to the next mode.

Stop  -  The Stop mode halts the Flasher Test.  No flashlamp circuit should be active during this mode.  Either press the Escape button to return to the Test Menu, or the Enter button to advance to the next mode.

Running  -  The Run mode cycles through the flashlamps automatically.  The display shows the name and number of the flashlamp circuit currently being pulsed and the corresponding bulb(s) flash.  Either press the Escape button to return to the Test Menu, or the Enter button to advance to the next mode.

## T.6   General Illumination

This test checks all of the General Illumination circuits.  There are two modes of operation: Stop and Run.

Stop     -     Press the Up or Down buttons to cycle through the General Illumination Test manually. All illumination is tested first, followed by an individual circuit test.  The circuit name and number will show in the display while the corresponding lamps light.  If any other results occur the system has detected an error.

Run     -     Press the Enter button any time during Stop test mode and the General Illumination Test cycles through automatically.  For each circuit shown in the displays the corresponding bulbs should light.  If any other results occurs the system has detected a problem.

## T.7   Sound and Music Test     The Sound and Music Test allows you to check the audio circuits. This test has three modes for testing the sound and music circuits: Run, Repeat, and Stop.

Run     -     This Run mode steps through a sequence of sounds and music.  Pressing the Up or Down button during this portion of the Sound and Music test advances to a particular sound/tune without having to wait for the program to play all the sounds available in the test.  A sound/tune should be heard for each name and number that appears in the display.  Any other results indicate the system has detected a problem.

Repeat     -     Press the Enter button at any time during the Run mode to cause the program to stop and repeat a particular sound/tune.  The same sound should repeat continuously until the Up or Down button is pressed.  Any other results indicates the system has detected a problem.

Stop     -     Press the Enter button at any time during the Repeat mode to stop this test altogether. No sound/tune should be heard.  Any other results indicates the system has detected a problem.

## T.8   Single Lamp Test     The number assigned to each lamp indicates the lamp's position in the matrix.  The number on the left indicates the column.  The number on the right indicates the row.  Example: Lamp 23 means 2nd column, 3rd row.

This test checks each lamp circuit individually.  Press the Up or Down button to cycle through this test.  For each name and number that is shown in the display the corresponding lamp should light.  Any other results indicate the system has detected a problem.

## T.9   All Lamps Test    This test causes all the controlled lamps to flash at the same time. Every controlled lamp should flash.  Any other results indicate the system has detected a problem.

## T.10  Lamp and Flasher Test     This test causes all the flashlamps and the controlled lamps to flash at the same time.  The controlled lamps blink, while the flashlamps cycle from highest to lowest.  Any other results indicates the system has detected a problem.

**T.11 Display Test**      This test automatically lights every dot in the Dot Matrix Display. A series of patterns appear in sequence. Each pattern turns On and Off a section of dots. Every dot on the display should be turned On and Off during this test.

**T.12 Flipper Coil Test**      The Flipper Coil Test has three modes: Repeat, Stop, and Run. Only one flipper should pulse at a time. The system has detected a problem if; more then one flipper pulses, a flipper comes On and stays On, or during the Repeat or Run modes, no flipper pulses.

Repeat    -    The Repeat mode pulses a single flipper. After entering this test, Coil ? shows in the display and the corresponding flipper activates. Press the Up or Down button to cycle through the flipper coils, one at a time. The same flipper coil pulses until the Up or Down button is pressed. Either press the Escape button to return to the Test Menu, or press the Enter button to advance to the next mode.

Stop      -    The Stop mode halts the Flipper Coil Test. Press Enter during the Repeat mode and the Flipper Coil Test stops. No flipper coil should be activated while the test is stopped. Either press the Escape button to return to the Test Menu, or the Enter button to advance to the next mode.

Running   -    The Run mode cycles through the flippers automatically. The display shows the name and number of the flipper coil currently being pulsed. Either press the Escape button to return to the Test Menu, or the Enter button to advance to the next mode.

## T.13 Trap Door Test

The Dot Matrix display (left side) shows a side view of the trap door mechanism. The top line (right side) identifies the two sub-tests. The second line indicates the current test mode. The third line shows the "number of faults" or errors (from the feature audits). *Note, pressing the credit button during this test will clear the fault number (for easier detection of intermittent problems when cycled overnight).* And the fourth line is a status line, showing the current "moving" or "error" state.

> NOTE: If there are 2 errors with the last 2 complete test cycles, the mode will automatically set itself to "STOPPED" mode. This should prevent accidental damage to the device and allow unattended cycling of this device.

> NOTE: This test will automatically enter a "COOLING" state when the coil starts to get warm. To cancel this, press the "Enter" (mode) Button 3 times.

> NOTE: If the switch matrix has a shorted row or column (the entire row or column is "ON") the entire switch matrix (from the switch tests) is temporarily displayed instead of the trap door. Locate the offending row or column and fix this problem FIRST.

This test is similar in function to the coil test. The different sub-tests can be selected by the "+" or "-" buttons. There are 3 modes to this test (controlled by the ENTER button).

RUNNING  -  Automatically cycles through the different sub-tests.
REPEAT  -  Remain on the same sub-test.
STOPPED  -  Turn off all coils, remain on this sub-test.

### Dot Matrix diagram:
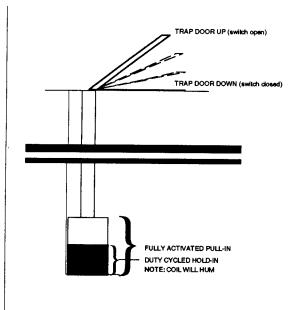
**Switches**
When "TRAP DOWN" switch is closed, the door will be down.

**Coils**
When the coil is fully activated (PULL-IN), it is 100% filled.

When the coil duty is cycled (HOLD-IN ), it is 50% filled.



TRAP DOOR UP (switch open)

TRAP DOOR DOWN (switch closed)

FULLY ACTIVATED PULL-IN
DUTY CYCLED HOLD-IN
NOTE: COIL WILL HUM

**TRAP DOOR AS VIEWED FROM DOT MATRIX DISPLAY**

## T.14 Mini-Playfield Test



*Movement of the mini-playfield can cause SERIOUS PHYSICAL INJURY. Keep fingers and loose clothing away from ALL moving parts.*

*As a safety feature, during normal game play (and attract mode) the mini-playfield will not move unless the coin door is closed and the playfield glass is on. During the mini-playfield test, both flipper buttons must be pressed before it will move.*

When this test is first started a warning message will appear. Pressing the "ENTER" button again confirms that the operator is aware that the high torque motor can cause physical injury. During the test, the operator must press and hold both flipper buttons to allow the mini-playfield to move.

The Dot Matrix display (left side) shows a front view of the Mini-playfield. The top line (right side) identifies the eleven sub-tests. The second line indicates the current test mode. The third line shows the "number of faults" or errors (from the feature audits). *Note, pressing the credit button during this test will clear the fault number (for easier detection of intermittent problems when cycled overnight).* And the fourth line is a status line, showing the current "moving", "kicking", "flashing", or "error" state.

When a switch is considered "active", its area is filled in. A switch is active when it is "closed". An opto is the opposite and is active when the beam is broken, making the switch "open". If all opto switches are abnormally "active" or "open" look for a loss of power, switch column, and opto common wires (for the emitters and receivers).

*NOTE:* If the switch matrix has a shorted row or column (the entire row or column is "ON") the entire switch matrix (from the switch tests) is temporarily displayed instead of the mini-playfield. Locate the offending row or column and fix this problem FIRST.

*NOTE:* If there are 2 errors with the last 2 complete test cycles, the mode will automatically set itself to "STOPPED" mode. This should prevent any accidental damage to the device.

This test is similar in function to the coil test. The different sub-tests can be selected by the "+" or "-" buttons. There are 3 modes to this test (controlled by the ENTER button).

| RUNNING | - | Automatically cycles through the different sub-tests. |
| REPEAT | - | Remain on the same sub-test. |
| STOPPED | - | Turn off all coils, remain on this sub-test. |

## Abbreviations:
C.W. = Clockwise direction
C.C.W. = Counter clockwise direction
Mini. = Mini-playfield

## Dot Matrix Diagram:
### Switches
2 Locking Opto Ejects
1 Stand-up Target
5 Opto Targets (middle level of mini-playfield)
3 Door Switches (on ramp)
1 Opto Playfield Position Sensor (bottom of picture, beam broken or transmitted/received)

### Coils
2 locking opto ejects (not shown)
1 flasher (not shown)
Motor C.C.W./C.W. (arrow indicates direction of wheel when viewed from front of game)
Motor on/off (on = filled in motor picture)
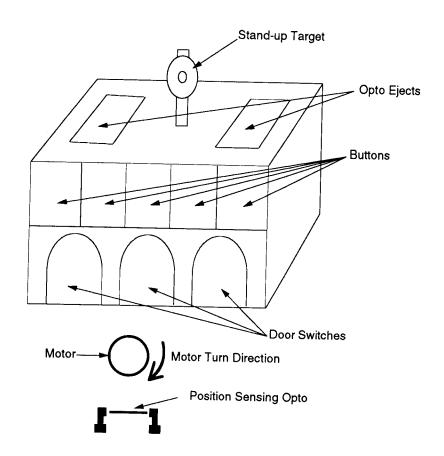
### Controlled lamps (not shown on dot matrix display)
2 lock lamps
1 lite lock lamp

3 G.I. lamps (not shown on dot matrix display)



Stand-up Target

Opto Ejects

Buttons

Door Switches

Motor — Motor Turn Direction

Position Sensing Opto

Press the Enter button to activate the Utilities Menu, once the menu name is shown under the Main Menu. Then, use the Up or Down button to cycle through the Utility Menu selections. Press the Enter button to activate a selection. Use the Up or Down button to rotate the settings. Press the Enter button to lock in a setting. If a mistake is made while changing a setting, press the Escape button while "Saving Adjustment Value" is still in the display. The original setting is retained and the new setting is ignored. Press the Escape button to return to the Utilities Menu. Press it again to return to the Main Menu.

## U. UTILITIES MENU

| | |
|---|---|
| U.1 | Clear Audits |
| U.2 | Clear Coins |
| U.3 | Reset H.S.T.D. |
| U.4 | Set Time & Date |
| U.5 | Custom Message |
| U.6 | Set Game I.D. |
| U.7 | Factory Adjustments |
| U.8 | Factory Resets |
| U.9 | Presets |
| U.10 | Clear Credits |
| U.11 | Auto Burn-in |

### U.1 Clear Audits
Press the Enter button to clear the Standard Audits (except Burn-In Time), Feature Audits, and Histograms.

### U.2 Clear Coins
Press the Enter button to clear the Earnings Audits.

### U.3 Reset H.S.T.D.
Press the Enter button to clear the High Score to Date Table and the Grand Champion.

### U.4 Set Time and Date
Press the Enter button to activate the time and date. Use the Up or Down button to change the value, then press the Enter button to lock in that value. If a mistake is made, press the Escape button while "Saving Adjustment Value" is displayed. The new value is ignored and the original value is retained.

### U.5 Custom Message
Set A.1 20 to YES before writing a Custom Message. Press the Enter button to begin entry of the custom message. Use the Up or Down button to cycle through letters. Use the Start button to cycle through punctuation marks. Press the Enter button to lock in the desired letter and punctuation. If you make a mistake, use Up and Down to select the "back-arrow" character. The "back-arrow" character is located before the space character and after the number nine. Press Enter while the back-arrow shows to erase the previously entered character. Once your message is complete, press and hold the Enter button until "Message Stored" is displayed.

Press the Escape button to cancel the new message. The message "Press Enter to Reset" appears. If you press Enter, the custom message is cleared and no message is displayed. If Escape is pressed, the original message remains intact.

## U.6 Set Game I.D.
This utility allows the operator to install a message, such as game location, that only appears on printouts . Press the Enter button to activate Set Game I.D.. Use the Up or Down button to cycle through letters. Use the Start button to cycle through punctuation marks. Press the Enter button to lock in the desired letter and punctuation.

## U.7 Factory Adjustment
Press the Enter button to restore the adjustments to factory settings.

## U.8 Factory Reset
Press the Enter button to restore the adjustments to their factory setting, clear the Audits, H.S.T.D Table, and Custom Message/Game I.D.

## U.9 Presets
Use the Up or Down buttons to cycle through the available Presets. When the desired Preset is displayed, press the Enter button to lock in that Preset. If a mistake is made, press the Escape button while "Saving Adjustment Value" is displayed. The new value is ignored and the original value is retained.

## U.9 01 Install Extra Easy
The game play difficulty adjustments can be changed to a combination that is MUCH LESS to MUCH MORE difficult than Factory Settings. The Game Difficulty Setting Table lists the adjustments and settings that comprise the individual groups.

## U.9 02 Install Easy
Somewhat LESS difficult than factory setting.

## U.9 03 Install Medium
About the SAME as factory setting.

## U.9 04 Install Hard
Somewhat MORE difficult than factory setting.

## U.9 05 Install Extra Hard
MUCH MORE difficult than factory setting.

## Game Difficulty Setting Table for U.S./Canadian/French Games

| Adj. No. | Adjustment Description | Extra Easy U.9 01 | Easy U.9 02 | Medium U.9 03 | Hard U.0 04 | Extra Hard U.9 05 |
|---|---|---|---|---|---|---|
| A.2 09 | Memory W-H-O Timer | NO | NO | YES | YES | YES |
| A.2 10 | 1st W-H-O Timer | 14 | 12 | 10 | 09 | 09 |
| A.2 11 | 2nd W-H-O Timer | 12 | 10 | 08 | 08 | 07 |
| A.2 12 | 3rd W-H-O Timer | 10 | 08 | 07 | 07 | 06 |
| A.2 13 | Last W-H-O Timer | 08 | 06 | 06 | 06 | 06 |
| A.2 14 | Easy Locks for | 02 | 01 | 01 | 01 | 00 |
| A.2 15 | Easy 3x5 for | 02 | 01 | 01 | 01 | 00 |
| A.2 16 | 3 Ball Jackpot/Davros | 01 | 02 | 02 | 03 | 04 |
| A.2 17 | 2 Ball Jackpot/Davros | 02 | 03 | 03 | 04 | 05 |
| A.2 18 | Rematch 1st Ball | 15 | 15 | 10 | 08 | 07 |
| A.2 19 | Rematch 2nd Ball | 15 | 10 | 05 | 05 | 05 |
| A.2 20 | Rematch Target Add | 10 | 07 | 05 | 04 | 04 |
| A.2 22 | R.E.P.A.I.R. 1 Lamp | 10 | 10 | 10 | 10 | 08 |
| A.2 23 | R.E.P.A.I.R. 2 Lamps | 10 | 10 | 09 | 08 | 07 |
| A.2 24 | R.E.P.A.I.R. 3 Lamps | 10 | 10 | 08 | 07 | 06 |
| A.2 25 | R.E.P.A.I.R. 4 Lamps | 10 | 08 | 07 | 06 | 06 |
| A.2 26 | R.E.P.A.I.R. 5 Lamps | 10 | 06 | 06 | 06 | 06 |
| A.2 27 | R.E.P.A.I.R. All Lamps | 10 | 10 | 10 | 10 | 08 |
| A.2 28 | Transmat/Doctor Memory | YES | YES | YES | YES | NO |
| A.2 29 | Transmat Spot Doctor | 250,000 | 500,000 | 750,000 | 1,000,000 | 1,500,000 |
| A.2 30 | Memory Doctors 1-7 | Add 2 | Add 1 | Add 1 | YES | Forget 1 |
| A.2 31 | Pre-lite E.S.C.A.P.E. | 02 Lamp | 01 Lamp | 01 Lamp | NONE | NONE |
| A.2 32 | E.S.C.A.P.E. Target Memory | YES | YES | YES | NO | NO |
| A.2 33 | E.S.C.A.P.E. Bonus Memory | YES | YES | NO | NO | NO |
| A.2 34 | Bonus 'X' Memory | YES | YES | YES | YES | NO |
| A.2 35 | Playfield 'X' Memory | YES | YES | YES | YES | NO |
| A.2 36 | Playfield, 1.5X | 10 | 11 | 10 | 09 | 10 |
| A.2 37 | Playfield, 2.0X | 10 | 10 | 09 | 08 | 09 |
| A.2 38 | Playfield, 2.5X | 10 | 09 | 08 | 07 | 08 |
| A.2 39 | Playfield, 3.0X | 10 | 08 | 07 | 06 | 07 |
| A.2 40 | Playfield, 3.5X | 10 | 07 | 06 | 06 | 06 |
| A.2 41 | Playfield, 4.0X | 10 | 11 | 10 | 10 | 10 |
| A.2 44 | Video Mode Lit | Ball Start | Game Start | Not Lit | Not Lit | Not Lit |
| A.2 45 | Video Mode ESCAPE Relit | YES | YES | YES | YES | NO |
| A.2 46 | Video Mode Difficulty | Extra Easy | Easy | Medium | Hard | Extra Hard |

# Game Difficulty Setting Table for German/European Games

| Adj. No. | Adjustment Description | Extra Easy U.9 01 | Easy U.9 02 | Medium U.0 03 | Hard U.9 04 | Extra Hard U.9 05 |
|---|---|---|---|---|---|---|
| A.2 09 | Memory W-H-O Timer | NO | YES | YES | YES | YES |
| A.2 10 | 1st W-H-O Timer | 14 | 10 | 09 | 09 | 09 |
| A.2 11 | 2nd W-H-O Timer | 12 | 08 | 08 | 07 | 06 |
| A.2 12 | 3rd W-H-O Timer | 10 | 07 | 07 | 06 | 06 |
| A.2 13 | Last W-H-O Timer | 08 | 06 | 06 | 06 | 06 |
| A.2 14 | Easy Locks for | 02 | 01 | 01 | 00 | 00 |
| A.2 15 | Easy 3x5 for | 02 | 01 | 01 | 00 | 00 |
| A.2 16 | 3 Ball Jackpot/Davros | 01 | 02 | 03 | 04 | 05 |
| A.2 17 | 2 Ball Jackpot/Davros | 02 | 03 | 04 | 05 | 06 |
| A.2 18 | Rematch 1st Ball | 15 | 10 | 08 | 07 | 05 |
| A.2 19 | Rematch 2nd Ball | 15 | 05 | 05 | 05 | 05 |
| A.2 20 | Rematch Target Add | 10 | 05 | 04 | 04 | 03 |
| A.2 22 | R.E.P.A.I.R. 1 Lamp | 10 | 10 | 10 | 08 | 07 |
| A.2 23 | R.E.P.A.I.R. 2 Lamps | 10 | 09 | 08 | 07 | 05 |
| A.2 24 | R.E.P.A.I.R. 3 Lamps | 10 | 08 | 07 | 06 | 05 |
| A.2 25 | R.E.P.A.I.R. 4 Lamps | 10 | 07 | 06 | 06 | 05 |
| A.2 26 | R.E.P.A.I.R. 5 Lamps | 10 | 06 | 06 | 06 | 05 |
| A.2 27 | R.E.P.A.I.R. All Lamps | 10 | 10 | 10 | 08 | 07 |
| A.2 28 | Transmat/Doctor Memory | YES | YES | YES | NO | NO |
| A.2 29 | Transmat Spot Doctor | 250,000 | 750,000 | 1,000,000 | 1,500,000 | 2,000,000 |
| A.2 30 | Memory Doctors 1-7 | Add 2 | Add 1 | YES | Forget 1 | Forget 2 |
| A.2 31 | Pre-lite E.S.C.A.P.E. | 02 Lamp | 01 Lamp | None | None | None |
| A.2 32 | E.S.C.A.P.E. Target Memory | YES | YES | NO | NO | NO |
| A.2 33 | E.S.C.A.P.E. Bonus Memory | YES | NO | NO | NO | NO |
| A.2 34 | Bonus 'X' Memory | YES | YES | YES | NO | NO |
| A.2 35 | Playfield 'X' Memory | YES | YES | YES | NO | NO |
| A.2 36 | Playfield, 1.5X | 10 | 10 | 09 | 10 | 09 |
| A.2 37 | Playfield, 2.0X | 10 | 09 | 08 | 09 | 08 |
| A.2 38 | Playfield, 2.5X | 10 | 08 | 07 | 08 | 07 |
| A.2 39 | Playfield, 3.0X | 10 | 07 | 06 | 07 | 06 |
| A.2 40 | Playfield, 3.5X | 10 | 06 | 06 | 06 | 06 |
| A.2 41 | Playfield, 4.0X | 10 | 10 | 10 | 10 | 10 |
| A.2 44 | Video Mode Lit | Ball Start | Not Lit | Not Lit | Not Lit | Not Lit |
| A.2 45 | Video Mode ESCAPE Relit | YES | YES | YES | NO | NO |
| A.2 46 | Video Mode Difficulty | Extra Easy | Medium | Hard | Extra Hard | Extra Hard |

**U.9  0 6    Install 5 Ball**
**U.9  0 7    Install 3 Ball**

Adjustments U.9 06 and U.9 07 can be used to change a game to 3 or 5 ball play, including the changing of certain features to the recommended 3- and 5-ball level.  The Preset Game Adjustments Table for U.S./Canadian Games lists the adjustments and settings that comprise the individual groups.

## Preset  Game  Adjustments  Table  for  U.S./Canadian  Games

| Adjustment Number | Adjustment Description | Install 5-Ball U.9  06 | Install 3 Ball U.9  07 |
|---|---|---|---|
| U.9 03 | Install Medium | Not Used | YES |
| U.9 04 | Install Hard | YES | Not Used |

**U.9  0 8    Install  Add-A-Ball**

This option deletes all Free Play awards and replace them with Extra Ball awards.  Individual adjustments are affected, as follows:

| Adjustment | Name | New Setting |
|---|---|---|
| A.1 13 | Replay Boost | Off |
| A.1 14 | Replay Award | Extra Ball |
| A.1 15 | Special Award | Extra Ball |
| A.1 17 | Extra Ball Ticket | No |
| A.1 19 | Match Feature | Off |
| A.4 04 | Champion Credits | 00 |
| A.4 05 | High Score 1 Credits | 00 |
| A.4 06 | High Score 2 Credits | 00 |
| A.4 08 | High Score 3 Credits | 00 |
| A.4 07 | High Score 4 Credits | 00 |

**U.9  0 9    Install  Ticket**

This option deletes Credit awards and replace them with Ticket awards.  Individual adjustments are affected, as follows:

| Adjustment | Name | New Setting |
|---|---|---|
| A.1 14 | Replay Award | Ticket |
| A.1 15 | Special Award | Ticket |
| A.1 16 | Match Award | Ticket |
| A.1 17 | Extra Ball Ticket | Yes |
| A.1 31 | Ticket Expansion Board | Yes |
| A.4 02 | H.S.T.D. Award | Ticket |

## U.9  1 0    Install Novelty
This option removes all Free Play and Extra Ball awards.  Individual adjustments are affected, as follows:

| Adjustment | Name | New Setting |
|---|---|---|
| A.1 04 | Max. Extra Ball | Off |
| A.1 05 | Replay System | Fixed |
| A.1 09 | Replay Level 1 | Off |
| A.1 10 | Replay Level 2 | Off |
| A.1 11 | Replay Level 3 | Off |
| A.1 12 | Replay Level 4 | Off |
| A.1 15 | Special Award | Points |
| A.1 19 | Match Feature | Off |
| A.4 01 | Highest Score | On |
| A.4 04 | Champion Credits | 00 |
| A.4 05 | High Score 1 Credits | 00 |
| A.4 06 | High Score 2 Credits | 00 |
| A.4 07 | High Score 3 Credits | 00 |
| A.4 08 | High Score 4 Credits | 00 |

## U.9  1 1    Install Buy-in
This option automatically sets game pricing to 1 for 50¢/2 for $1.00, and 1 Coin Buy-in (A.3 19) to YES.

## U.9  1 2    Not Used

## U.9  1 3    Not Used

## U.9  1 4    Not Used

## U.9  1 5    Not Used

## U.9  1 6    Not Used

| U.9 | 1 7 | Install German 1• |
|-----|-----|-------------------|
| U.9 | 1 8 | Install German 2• |
| U.9 | 1 9 | Install German 3• |
| U.9 | 2 0 | Install German 4• |
| U.9 | 2 1 | Install German 5• |
| U.9 | 2 2 | Install German 6• |

Adjustments U.9 17 through U9 22 are used to modify game pricing and type of game play. The Preset Game Adjustments Table for German/European Games lists the adjustments and settings that comprise the individual groups. **NOTE:** German Replay starts at 50,000,000.

## Preset Game Adjustments Table for German/European Games

| Adj. # | Adj. Description | German 1<br>U.9 17 | German 2<br>U.9 18 | German 3<br>U.9 19 | German 4<br>U.9 20 | German 5<br>U.9 21 | German 6<br>U.9 22 |
|--------|------------------|----------|----------|----------|----------|----------|----------|
| A.1 14 | Replay Award | Credit | Ticket | Audit | Credit | Ticket | Audit |
| A.1 15 | Special Award | Credit | Extra Ball | Points | Credit | Extra Ball | Points |
| A.1 15 | Match Award | Credit | Ticket | Credit | Credit | Ticket | Credit |
| A.1 19 | Match Feature | 7% | 7% | Off | 7% | 7% | Off |
| A.3 01 | Game Pricing | 6 spiele/5 DM | 6 spiele/5 DM | 6 spiele/5 DM | 7 spiele/5 DM | 7 spiele/5 DM | 7 spiele/5 DM |
| A.4 02 | H.S.T.D. Award | Credit | Ticket | Credit | Credit | Ticket | Credit |
| A.4 04 | Champion Credits | 03 | 03 | 00 | 03 | 03 | 00 |
| A.4 05 | High Score 1 Credits | 01 | 01 | 00 | 01 | 01 | 00 |
| A.4 06 | High Score 2 Credits | 00 | 00 | 00 | 00 | 00 | 00 |
| A.4 07 | High Score 3 Credits | 00 | 00 | 00 | 00 | 00 | 00 |
| A.4 08 | High Score 4 Credits | 00 | 00 | 00 | 00 | 00 | 00 |
| A.4 10 | Backup Champion | 500,000,000 | 500,000,000 | 00 | 500,000,000 | 500,000,000 | 00 |
| A.4 11 | Backup High Score 1 | 450,000,000 | 450,000,000 | 00 | 450,000,000 | 450,000,000 | 00 |
| A.4 12 | Backup High Score 2 | 400,000,000 | 400,000,000 | 00 | 400,000,000 | 400,000,000 | 00 |
| A.4 13 | Backup High Score 3 | 350,000,000 | 350,000,000 | 00 | 350,000,000 | 350,000,000 | 00 |
| A.4 14 | Backup High Score 4 | 300,000,000 | 300,000,000 | 00 | 300,000,000 | 300,000,000 | 00 |

• For German Jumpered CPU Boards only.   German Jumpers are:

| W14 | W15 | W16 | W17 | W18 |
|-----|-----|-----|-----|-----|
| In | In | In | In | Out |

| U.9 | 2 3 | Install French 1* |
|-----|-----|-------------------|
| U.9 | 2 4 | Install French 2* |
| U.9 | 2 5 | Install French 3* |
| U.9 | 2 6 | Install French 4* |
| U.9 | 2 7 | Install French 5* |
| U.9 | 2 8 | Install French 6* |

Adjustments U.9 23 through U.9 26 are used to modify game pricing and type of play. The Preset Game Adjustments Table for French Games lists the adjustments and settings that comprise the individual groups.

## Preset Game Adjustments Table for French Games

| Adj. # | Adjustment Description | French 1<br>U.9 23 | French 2<br>U.9 24 | French 3<br>U.9 25 | French 4<br>U.9 26 | French 5<br>U.9 27 | French 6<br>U.9 28 |
|--------|------------------------|----------|----------|----------|----------|----------|----------|
| U.9 06 | Install 5 Ball | N/A | N/A | N/A | N/A | N/A | Yes |
| A.2 03 | Video Mode Auto. Extra Ball | 10% | 7% | 12% | 12% | 10% | 10% |
| A.2 05 | WHO Auto. Extra Ball | 10% | 7% | 12% | 12% | 10% | 10% |

*For French Jumpered CPU Boards only.   French Jumpers are:

| W14 | W15 | W16 | W17 | W18 |
|-----|-----|-----|-----|-----|
| In | In | In | Out | In |

## U.10 Clear Credits

Press the Enter button to clear the game Credits.

## U.11 Auto Burn-in

Press the Enter button to activate Auto Burn-in. This utility automatically cycles through several tests. This will help in find intermittent problems. The tests that Auto Burn-in cycle through are: the Display Test, Sound and Music Test, All Lamps Test, Solenoid Test, Flashers Test, General Illumination Test, and the Flipper Coil Test. All of the tests are run concurrently. The time spent on the current burn-in cycle, and the total time the game has spent in burn-in are displayed.

Press the Enter button to activate the Adjustments Menu, once the menu name is shown under the Main Menu. Press the Up or Down button to cycle through the Adjustment Menu selections. Press the Enter button to activate the selection. Press the Up or Down button to cycle through the available adjustments. Press the Enter button to activate an adjustment. When an adjustment is activated, the setting value begins to flash. Use the Up or Down button to raise or lower the setting value. Press Enter to lock in the value. If a mistake is made, press the Escape button while "Saving Adjustment Value" is displayed. The new value is ignored and the original value is retained. Press the Enter button to return to the Adjustments Menu. Press it again to return to the Main Menu.

# A. ADJUSTMENTS MENU

> **A.1 Standard Adjustments**
> **A.2 Feature Adjustments**
> **A.3 Pricing Adjustments**
> **A.4 H.S.T.D Adjustments**
> **A.5 Printer Adjustments** (optional board required)

## A.1 Standard Adjustments

### A.1 01 Balls Per Game
A "game" is defined by specifying the number of balls to be played.
Range:          1-10

### A.1 02 Tilt Warnings
The number of total actuations of the plumb bob mechanism that can occur before the game is "tilted".
Range:          1-10

### A.1 03 Maximum Extra Balls
The number of extra balls that a player may accumulate.
Range:          1-10

### A.1 04 Maximum Extra Balls/Ball in Play
The number of extra balls to be awarded per ball in play.

OFF     -          No maximum number of Extra Balls per ball in play.
1-10    -          1 through 10 Extra Balls per ball in play.

### A.1 05 Replay System
The type of replay system to be used.

Fixed   -   Replay value is set and does not change during game play.
Auto%  -   Replay starting value is set and changes every 50 games to comply with the percentage of replays desired.

### A.1 06 Replay Percent*
The percentage of replays the players are able to earn when Auto Replay is used.
Range:          5-50%

### A.1 07 Replay Start*
The replay start value when Auto% Replay is used. The range of this setting is 1, 000, 000 to 20, 000, 000.

**A.1 08 Replay Levels***

The number of replay levels used by the Auto% Replay mode. The range of this setting is 1 to 4. When two replay levels are chosen, the second replay level is automatically adjusted to twice the starting replay level value. When three of four replay levels are chosen, their values are automatically adjusted to three or four times the starting replay level.

*For Auto % Replay.

**A.1 09 Replay Level 1**
**A.1 10 Replay Level 2**
**A.1 11 Replay Level 3**
**A.1 12 Replay Level 4**

The values used for the 1st through 4th levels of Fixed Replay. Range: 00 - 25,000,000.

**A.1 13 Replay Boost**

The replay score can be temporarily boosted by the selected amount EACH time the player reaches or exceeds the replay score. This temporary boost is canceled when credits equal 0, the player inserts another coin, or Begin Test is pressed.

ON      -      Score is boosted between 500, 000 and 5, 000, 000 points.
OFF     -      Replay score is not boosted.

**A.1 14 Replay Award**

For the form of award automatically provided when the player exceeds any replay level for either Auto% Replay, or Fixed Replay.

Credit  -      Reaching each Replay level awards credit.
Ticket  -      Reaching each Replay level awards a ticket.
Ball    -      Reaching each Replay level awards an Extra Ball.
Audit   -      Reaching each Replay level awards nothing to the player; it does
               increase the entry value of the Audit Item(s) maintaining a tally
               of these awards.

**A.1 15 Special Award**

The award automatically provided when the player scores a special.

Credit  -      Scoring a Special awards a Credit.
Ticket  -      Scoring a Special awards a Ticket.
Ball    -      Scoring a Special awards an Extra Ball.
Points  -      Scoring a Special awards 1 Million points.

**A.1 16 Match Award**

The award automatically provided when the players wins a match.

Credit  -      Winning a Match awards a Credit.
Ticket  -      Winning a Match awards a Ticket.

**A.1 17 Extra Ball Ticket**

A Ticket is awarded when the player earns an Extra Ball.

YES     -      The player is awarded a Ticket in addition to an Extra Ball.
NO      -      The player is not awarded a Ticket.

**A.1 18 Maximum Ticket/Player**
> The amount of Tickets each player can earn.
> Range 00 - 100


**A.1 19 Match Feature**
> The desired percentage for the Match Feature occurring at the end of the game.
>
> OFF        -        Match Feature is not available.
> 1 -50% -        1% is 'hard'; 50% is 'extremely easy'. The Match Feature selects a random two-digit number at the end of the game and compares each players score for an identical two digits in the rightmost two positions. A matching of these two digits results in an award of a Credit or a Ticket.


**A.1 20 Custom Message**
> The message displayed during the Attract Mode.
>
> YES        -        A message is displayed
> NO        -        A message is not displayed.


**A.1 21 Language**
> The language the game uses: English, French, or German.


**A.1 22 Clock Style**
> The style of clock the game uses: A.M./P.M., or 24 Hours.


**A.1 23 Date Style**
> The style of date the game uses: Month/Date/Year, or Date/Month/Year.


**A.1 24 Show Date and Time**
> The date and time show in the Attract Mode.
>
> YES        -        Show date and time in status report, or Attract Mode.
> NO        -        Do Not show date and time in status report or Attract Mode.


**A.1 25 Allow Dim Illumination**
> The game program dims the General Illumination for special effects during the Attract Mode.
>
> YES        -        Dim General Illumination during Attract Mode.
> NO        -        Do Not dim General Illumination.


**A.1 26 Tournament Play**
> Equalize Multi-ball and Jackpots during multi-player games, (do not carry over to next player).
>
> YES        -        Keep Multi-ball and Jackpots equal.
> NO        -        Do Not Keep Multi-ball and Jackpots equal.


**A.1 27 Euro. Scr. Format**
> Use either commas or dots between digits when numbers are displayed.
>
> YES        -        Dots instead of commas, (example 1.000.000).
> NO        -        Commas instead of dots, (example 1,000,000).

DOCTOR WHO   1-32

### A.1 28 Minimum Volume Control
The volume can be turned Off.

YES   -         Volume can be turned Off.
NO    -         Volume can be turned Down but not Off.


### A.1 29 General Illumination Power Saver
This allows the general illumination and controlled lamps to be dimmed following a time interval after a game is played.  Power Saver Level (A.1 30) determines how dimness of lamps.  Using this feature will substantially increase the life of the lamps.

Setting:        -         Off, 2-60 Minutes


### A.1 30 Power Saver Level
When General Illumination Power Saver (A.1 29) is set to On, this controls the intensity of the G.I. and controlled lamps once the game has been idle for a specified period of time.

Range:        4-7


### A.1 31 Ticket Expansion Board
When a Ticket Expansion Board is connected, full control of the ticket dispenser is available. This includes a ticket low/error lamp, resume on ticket jam switch, and manual ticket dispense switch.

Yes   -         Ticket Expansion Board is connected.
No    -         Ticket Expansion Board is NOT installed in the game.


### A.1 32 No Bonus Flips
The activation of flippers during the end of ball "bonus" sequence.  Setting this to "YES" may extend the life of the flipper mechanisms.


### A.1 33 Game Restart
When the start button is pressed during or after the 2nd ball, the game in progress will end and a new game will begin.  This adjustment has 3 settings to determine how this is handled.

Never:      -         Do not allow a new game to start until the current game is over.

Slow:       -         Restart if the start button is pressed continuously for over 1/2 second. This helps to prevent the unintended restart of game in progress.

Instantly:   -         Restart as soon as the start button is pressed.

When the start button is pressed during game over, or during the 1st ball (to add a player), it is always handled instantly.

## A.2 Feature Adjustments

### A.2 01 Ball Time
This is the desired ball time for this game. The game will award more features to the players that are under this time.

Settings:       OFF = Do not use this.
                 1-99 = Desired ball time.


### A.2 02 Automatic % Special And Match
Auto-adjust specials through the "Percent Match Awards" (A.1 19). When this is set to YES, the special AND match awards are regulated by adjustment "Percent Match Awards" (A.2 19).

Settings:       YES = Auto-adjust specials and match to A.1 19 percent.
                 NO = Do not Auto-adjust special.


### A.2 03 Video Mode Automatic Extra Ball
This will Auto-adjust the award of extra ball for video mode. *Note:* Since this is a skill shot, it will pick the first wave that does NOT exceed this percentage per game. When active it will change the next adjustment. *Note:* If the next adjust is "none", auto-adjust will NOT change it.

Settings:       OFF = Do not auto-adjust the next adjustment.
                 1-99%= Auto-adjust awarding extra ball to this percentage per game.


### A.2 04 Video Mode Extra Ball
This controls which video mode wave the extra ball "sign" appears. When auto-adjusted by A.2 03, this is the current setting being used.

Settings:       NONE = No extra ball is offered in video mode.
                 1-25 = Wave number for extra ball.


### A.2 05 Automatic Extra Ball Lit
This will Auto-adjust the lighting of Extra Ball awards at or below this percentage per game. This is done by changing the next two game adjustments.

Settings:       OFF = Do not Auto-adjust the next two settings.
                 1-99 = Auto-adjust Lighting Extra Ball to this percentage per game.


### A.2 06 1st Extra Ball Lit
Completing the sequence W-H-O this many times will light an extra ball lamp. (Note, disabling extra ball is done by A.1 03 or A.1 04 adjustments). When this is auto-adjusted by A.2 03, this is the current setting being used.

Settings:       1 - 50 W-H-O's


### A.2 07 Next Extra Ball Lit
Completing the sequence W-H-O this many times after extra ball has been lit will light an extra ball lamp. The next takes twice as long, the third takes three times as long, etc. (Note, disabling extra ball is done by A.1 03 or A.1 04). When this is auto-adjusted by A.2 03, this is the current setting being used.

Settings:       +1 - +50 W-H-O's

**A.2 08 Memory Extra Ball**
This controls what lamps will be turned off at the start of a ball for the extra ball lamps on the outlane and return lanes.

Settings:        NO = All lamps are turned off at ball start.
YES = Lamps remain on at the start of a ball.
FORGET 1 = Turn 1 lamp off at the start of a ball.
FORGET 2 = Turn 2 lamps off at the start of a ball.
FORGET 3 = Turn 3 lamps off at the start of a ball.

**A.2 09 Memory W-H-O Timer**
This controls which W-H-O timer (next 4 adjustments) to use at the start of a ball.

Settings:        NO = Use the "1st W-H-O Timer" at the start of a ball.
YES = Continue using the current W-H-O timer.

**A.2 10 1st W-H-O Timer**
**A.2 11 2nd W-H-O Timer**
**A.2 12 3rd W-H-O Timer**
**A.2 13 Last W-H-O Timer**
This controls how fast the W-H-O timed sequence shots time down. The 1st W-H-O timer is for the 1st completion of W-H-O, etc.

Setting        2-50 seconds.

**A.2 14 Easy Locks for...**
This controls how hard the locks are for jackpot, located on the "Time Expander" mini-playfield. Hard locks first require hitting the middle mini-playfield "Lite Lock" target before locks are lit.

Setting        Jackpot 0 - Start the locks hard for the 1st Jackpot.
Jackpot 1-50 - Start easy for these Jackpots.

**A.2 15 Easy 3x5 for...**
This controls how hard it is to complete the 3x5 "Time Expander" mini-playfield lamps. An easy setting will spot 2 lamps on the 3x5 matrix for every 1 target hit.

Setting        Jackpot 0 - Start the 3x5 hard for the 1st Jackpot.
Jackpot 1-50 - Start the 3x5 easy for these Jackpots.

**A.2 16 3 Ball Jackpot/Davros**
**A.2 17 2 Ball Jackpot/Davros**
This controls how many Jackpots are required before reaching the Davros Jackpot (a super jackpot). We recommend that 2 Ball Jackpots be higher than 3 Ball Jackpots, because obtaining a 2 Ball Jackpot is easier than a 3 Ball Jackpot. Also, during the game, if a player gets closer to the Davros Jackpot during 2 Ball Multiball, the 3 Ball Jackpot will be the same as a 2 Ball Jackpot.

Setting        0 to 12 - Number of jackpot awards before reaching the Davros Jackpot.

## A.2 18 Rematch 1st Ball
## A.2 19 Rematch 2nd Ball

After multiball, and if the player has NOT obtained a jackpot, the player is allowed to lock 1 or 2 balls for Instant Multiball again. These are the times allowed to re-lock a ball.

Setting:     1-50 Seconds.


## A.2 20 Rematch Target Add

During the allowed time for instant multiball (see above), the "Time Expanders" mini-playfield center target will add this amount of time to the current time left.

Setting:     OFF = Do not effect instant multiball timers.
             1-50 Seconds = Add this amount of time to the timers.


## A.2 21 Game Over Unlock

This controls if the next player can have balls left in the locks. A player must still "earn" their locks by hitting the "Time Expanders" mini-playfield middle target.

Setting:     NO = Keep the balls locked between games.
             YES = Unlock any locked balls at game over.


## A.2 22 R.E.P.A.I.R 1 Lamp
## A.2 23 R.E.P.A.I.R 2 Lamps
## A.2 24 R.E.P.A.I.R 3 Lamps
## A.2 25 R.E.P.A.I.R 4 Lamps
## A.2 26 R.E.P.A.I.R 5 Lamps
## A.2 27 R.E.P.A.I.R All Lamps

This is the amount of time that the R.E.P.A.I.R lamps remain on per number of lamps lit, then the entire string of lamps is turned off. When all lamps are on, unlimited million (from hitting any target) is awarded. We recommend that the times should be the same or higher than the next adjustment.

Settings:    1-50 Seconds.


## A.2 28 Transmat/Doctor Memory

This controls the "AWARD TRANSMAT" lamp at the start of a ball. It effects how many additional Doctors can be added to the play of a game.

Setting:     YES = Lamp remains in its current state.
             NO = Lamp is turned off at the start of a ball.


## A.2 29 Transmat Spot Doctor

This controls the threshold score needed to add another doctor to the playfield by the "AWARD TRANSMAT" target.

Setting:     0 = Add another doctor after 1st hit of jet bumpers.
             50,000 to 2 million = Threshold score to reach before adding another doctor.

## A.2 30 Memory Doctors 1-7

This controls what lamps will be turned off at the start of a ball for the 7 Doctor lamps. Each lamp represents making an area of the playfield easier to Award or Score.

Setting:
NO = All lamps are turned off at ball start.
YES = Lamps remain on at the start of a ball.
FORGET 1 = Turn 1 lamp off at the start of a ball.
FORGET 2 = Turn 2 lamps off at the start of a ball.
FORGET 3 = Turn 3 lamps off at the start of a ball.
ADD 1 = Turns 1 additional lamp.
ADD 2 = Turns 2 additional lamps.
ADD 3 = Turns 3 additional lamps.

## A.2 31 Pre-lite E.S.C.A.P.E.

This controls how easy the special is to award. This is done by pre-lighting the ESCAPE bonus lamps, the last (5th) lamp is the SPECIAL award lamp.

Settings:
None = Start with all lamps off at game start.
1-4 Lamps = Start with 1 to 4 lamps on.

## A.2 32 E.S.C.A.P.E. Target Memory

This controls the individual "E.S.C.A.P.E." target lamps at the start of a ball. It effects the award of the Special.

Setting:
YES = Lamps remain in their current state.
NO = Lamps are turned off at the start of a ball.

## A.2 33 E.S.C.A.P.E. Bonus Memory

This controls the bonus lamps when completing the "ESCAPE" targets at the start of a ball. It effects the award of the Special.

Settings:
YES = Lamps remain in their current state.
NO = Lamps are turned off at the start of a ball.

## A.2 34 Bonus 'X' Memory

This controls the value of the outhole bonus multiplier at the start of a ball.

Setting:
YES = Multiplier remains at its current value.
NO = Multiplier starts at 1X at the start of a ball.

## A.2 35 Playfield 'X' Memory

This controls what lamps will be turned off at the start of a ball for the playfield multiplier and playfield unlimited million.

Setting:
NO = All lamps are turned off at ball start.
YES = Lamps remain on at the start of a ball.
FORGET 1 = Turn 1 lamp off at the start of a ball.
FORGET 2 = Turn 2 lamps off at the start of a ball.
FORGET 3 = Turn 3 lamps off at the start of a ball.

**A.2 36 Playfield, 1.5X**
**A.2 37 Playfield, 2.0X**
**A.2 38 Playfield, 2.5X**
**A.2 39 Playfield, 3.0X**
**A.2 40 Playfield, 3.5X**
**A.2 41 Playfield, 4.0X**

This is the amount of time that the playfield multiplier lamps remain on per multiplier. When this multiplier has timed down the next lower multiplier starts to time down. When all lamps are on, the playfield unlimited million is awarded. We recommend that the times should be the same or lower than the previous adjustment, except for the 4.0X which should be higher or the same as the 3.5X adjustment.

Settings:     2-50 Seconds.

**A.2 42 Hang On Time**

This is the amount of time that the "HANG ON" lamp is lit. It is lit by the right return lane and collected by the upper left flipper shot.

Settings:     OFF = Lamp is lit until the end of a ball.
1-50 Seconds = Amount of time to leave lamp on.

**A.2 43 Second Chance**

After ball start, this is the amount of time that the "SECOND CHANGE" lamp is lit. It allows players who drain within this time to be served another ball.

Settings:     OFF = There is NO second change.
1-50 Seconds = Minimum amount of time for ball to be on playfield.

**A.2 44 Video Mode Lit**

This selects alternative methods of lighting the video mode lamp, besides the normal completion of ESCAPE.

Settings:     GAME START, BALL START, and NOT LIT.

**A.2 45 Video Mode ESCAPE Relit**

This allows the video mode lamp to be relit when the player plays video mode and successfully completes (escapes) video mode.

Settings:     YES = Re-lites video mode when player successfully escapes video mode.
NO = Does not re-lite video mode when player successfully escapes video mode.

**A.2 46 Video Mode Difficulty**

This selects how difficult video mode is at the start of a game.

Settings:     Extra Easy, Easy, Medium, Hard, and Extra Hard.

**A.2 47 Mini-playfield**

Set to DISABLED to stop the operation of the "Time Expander" mini-playfield. When set to DISABLED, lower the mini-playfield all the way down to continue operation of the game.

Settings:     ENABLED, or DISABLED.

### A.2 48 Trap Door
Set to DISABLED to stop the operation of the Trap Door. When "DISABLED", the door should be "open" so that the ball falls to the upper left flipper.

Settings:     ENABLED, or DISABLED.


### A.2 49 Not Used


### A.2 50 Attract Mode Sounds
This allows the game to make sounds, during the attract mode (game over), on a regular basis.

Settings:     ALOT = After a game is played it will make alot of sounds.
SOME = After a game is played it will make 10 sounds.
NONE = After a game is played it will make no sound.


### A.2 51 Fancy Attract Mode G.I.
When set to "YES", it allows the attract mode to blink the General Illumination lamps in an effect to attract more players. When set to "NO", the General Illumination lamps are just left ON.


### A.2 52 Timed Plunger
This is the time allowed for a player to hit the plunger switch (or the "launch ball"switch) to start a ball. Then this time is exceeded, the ball is automatically launched.

Settings:     OFF = Do not automatically launch the ball.
5-120 seconds = Time allowed before ball is automatically launched.


### A.2 53 Flipper Plunger
If the "launch ball" switch is malfunctioning, set this adjustment to "YES" to use the left flipper to fire the plunger. Normally, the software tries to detect a malfunctioning "launch ball" switch and will automatically use the left flipper to launch a ball. Also, the plumb-bob tilts' first switch hit will also launch a ball.

Settings:     NO = Do not use left flipper to launch a ball.
YES = Use the left flipper to launch a ball.

## A.3   Pricing Adjustments

### A.3 01 Game Pricing (if set to custom, then 02 to 09 are available)
The cost of a game is selected from the Standard Pricing Table or by installing Custom pricing.

### A.3 02 Left Coin Units
### A.3 03 Center Coin Units
### A.3 04 Right Coin Units
### A.3 05 4th Slot Units
The number of coin units purchased by a coin passing through the left, right, center, and fourth coin chutes.

### A.3 06  Units/Credits
Defines the number of coin units required to obtain 1 credit. A coin unit counter in the game program totals the number of coin units purchased through all coin chutes prior to each game. If the total number of these coin units exceeds or matches the Unit per Credit value by a multiple (or more, coin units) of the specified Units per Credit value the Credits display shows the proper number of credits. The coin unit counter retains any remaining coin units, until the start of Ball 2; then the coin unit counter is cleared (its contents are zeroed).

### A.3 07  Units/Bonus
Additional credits are to be indicated in the credits display, when a certain number of coin units are accumulated.

### A.3 08 Bonus Credits
The number of credits that are awarded when the Units/Bonus level is achieved.

### A.3 09 Minimum Units
No credits are to be posted (indicated in the credit display), until the credits unit counter reaches a particular value, by setting this value to 02 (or more).

### A.3 10 Coin Door Type (if set to custom, then 11 to 15 are available)
This adjustment is used to preset adjustments 11 through 15, based on standard coin doors (U.S.A., German, Etc.).

### A.3 11 Collection Text
The coin system used to display the Earning Audits.

### A.3 12 Left Slot Value
### A.3 13 Center Slot Value
### A.3 14 Right Slot Value
### A.3 15 4th Slot Value
The monetary value of the left, center, right, and 4th coin chutes.

### A.3 16 Maximum Credits
The maximum number of credits the game can accumulate, either through game play awards or coin purchases. The range of this setting is 5 through 10. Reaching the specified setting prevents the award of any credits.

## A.3 17 Free Play
The player can operate the game without a coin (free play) or with a coin.

NO     -     A coin is necessary for game play.
YES    -     Game play is free; no coin required.


## A.3 18 Hide Coin Audits
The coin audits may, or may not be displayed.

YES         -     The coin audits are not displayed.
NO           -     The coin audits are displayed.
HIDE NAMES  -     The coin audit value is shown but not the audit name.


## A.3 19 1 Coin Buy-in
If game pricing is set to 1 for 50¢/2 for $1.00 the player is allowed to 'buy-in' a subsequent game for 1 coin. The number of games that may be purchased at this cost is determined by the number of players in the previous game; that is, if the previous game had three players, 3 Credits can be purchased at the rate of 1 coin per credit.

YES    -     The player has 10 seconds to buy-in at 1 coin per game.
NO      -     The buy-in feature is disabled.


## A.3 20 Base Coin Size
The number of ticket per coin calculations.


## A.3 21 Coin Meter Units
It is possible to connect a coin meter to the knocker coil driver which will log all coins through all slots. This adjustment activates the use of the knocker driver for this purpose, and determines the value of each unit on the meter. For example, to show the total amount of money collected as "total quarters", set this adjustment to "0.25". To show the amount of money collected as "total dollars", set this adjustment to "1.00".

Setting this adjustment to anything other than Off establishes the coin unit for a meter attached to the knocker driver, and overrides use of the knocker during awards.


## A.3 22 Dollar Bill Slot
The system normally requires 150 microseconds between coin pulses. This is too long a delay for a fast-pulsing dollar bill validator. This adjustment may be used to tell the game that there is a fast pulsing dollar bill validator connected to one of the coin switches. The options are:

NONE      =     No validator connected.
LEFT       =     Validator connected to left slot.
CENTER  =     Validator connected to center slot.
RIGHT    =     Validator connected to right slot.
FOURTH  =     Validator connected to fourth slot.


## A.3 23 Minimum Coin Microseconds
This is the minimum width required for coin pulses to be accepted as valid coins. This may be changed to prevent certain kinds of cheating.

# Pricing Table

| Country | Coin Chute | | | 4th Chute | Games/Coin | Display | Pricing Adjustments A.3 02 03 04 05 06 07 08 09 |
|---|---|---|---|---|---|---|---|
| | Left | Center | Right | | | | |
| USA | 25¢ | *$1.00 | 25¢ | - | 1/25¢, 4/$1 [2]<br>1/50¢, 2/75¢, 3/$1 [1,2]<br>1/50¢, 2/$1 [2]<br>1/25¢, 3/$1 [2]<br>1/25¢, 3/50¢, 6/$1<br>1/25¢, 5/$1 | U.S.A. 4/$1.00<br>50-75-1.00<br>U.S.A. 2/$1.00<br>U.S.A. 3/$1.00<br>CUSTOM<br>CUSTOM | 01 04 01 00 01 02 01 00<br>01 00 01 00 01 04 01 00 |
| Canada | 25¢ | - | $1.00 | - | 1/50¢, 2/75¢, 3/$1 [2]<br>1/50¢, 2/$1 [2] | CANADA 1<br>CANADA 2 | |
| Austria | 5 Sch<br>5 Sch | 10 Sch<br>- | 10 Sch<br>10 Sch | -<br>- | 1/2x5 Sch, 3/2x10 Sch [2]<br>2/5 Sch, 5/10 Schilling | AUSTRIA<br>CUSTOM | 02 00 05 00 01 00 01 00 |
| Australia | 20¢ | $1 | $1 | $2 | 1$1, 3/$2 [2] | AUSTRALIA | |
| United Kingdom | £1.00 | 50 P | - | 20 P | 1/3x10P, 2/50P, 4/£1.00, 4/5x20P | U. KINGDOM | |
| Switzerland | 1 Fr | 2 Fr | 5 Fr | - | 1/1 Fr, 3/2 Fr, 7/5 Franc [2] | SWISS | |
| Belgium | 5 Fr | 20 Fr | 50 Fr | - | 1/4 x 5F, 1/20 F, 3/50 Franc [2] | BELGIUM | |
| West Germany | 1DM | 2DM | 5DM | - | 1/1 DM, 2/2 DM, 7/5 DMark [2]<br>1/1 DM, 2/2 DM, 6/5 DM [1,2]<br>1/1 DM, 3/2 DM, 9/5 DM<br>1/2x1 DM, 1/2 DM, 3/5 DM<br>2/1 DM, 5/2 DM, 14/5 DM | GER. 7/6 DM<br>GER. 6/5 DM<br>CUSTOM<br>CUSTOM<br>CUSTOM | 09 18 45 00 05 00 01 00<br>03 06 15 00 05 00 01 00<br>13 26 65 00 05 65 01 00 |
| Netherlands | 1HFI<br>25¢<br>1G | 2.5HFI<br>-<br>- | 2.5HFI<br>1G<br>1G | -<br>-<br>- | 1/1 HFI, 3/2.5 Holland Florin [2]<br>1/25¢, 5/1 Guilder<br>1/1 Guilder [2] | NETHERLAND<br>CUSTOM<br>HOLLAND | 01 00 05 00 01 00 01 00 |
| Sweden | 5 Kr | 5 Kr | 5 Kr | - | 1/5 Krona [2] | SWEDEN | |
| France | 1 Fr<br>1 Fr<br>1 Fr<br>1 Fr<br>1 Fr<br>1 Fr | 5 Fr<br>5 Fr<br>5 Fr<br>5 Fr<br>5 Fr<br>5 Fr | 10 Fr<br>10 Fr<br>10 Fr<br>10 Fr<br>10 Fr<br>10 Fr | -<br>-<br>-<br>-<br>-<br>- | 1/3x1 F, 2/5 F, 5/10 Franc [2,3]<br>1/2x1 F, 3/5 F, 7/10 Franc [2,3]<br>1/5 F, 3/10 F, 7/2x10 Franc [2,3]<br>2/5 F, 4/10 F, 9/2x10 Franc [1,2,3]<br>2/5 F, 5/10 F, 11/2x10 Franc [2,3]<br>1/5 F, 3/10 Franc [2,3] | TARIF 1<br>TARIF 2<br>TARIF 3<br>TARIF 4<br>TARIF 5<br>TARIF 6 | |
| Italy | 500L | 500L | 500L | - | 1/500 Lire [2] | ITALY | |
| Spain | 100 P<br>25 P<br>25 P<br>25 P<br>25 P | -<br>-<br>-<br>-<br>- | 500 P<br>100 P<br>100 P<br>100 P<br>100 P | -<br>-<br>-<br>-<br>- | 1/100 P, 6/500 Peseta [2]<br>1/25 P, 5/100 Peseta<br>1/25 P, 4/100 Peseta<br>1/2x25 P, 2/100 Peseta<br>1/25x25 P, 3/100 Peseta | SPAIN<br>CUSTOM<br>CUSTOM<br>CUSTOM<br>CUSTOM | 01 00 04 00 01 04 01 00<br>01 00 04 00 01 00 01 00<br>01 00 04 00 02 00 01 00<br>03 00 12 00 04 00 01 06 |
| Japan | 100 ¥ | - | 100 ¥ | - | 1/100 Yen [2] | JAPAN | |
| Chile | Token | - | Token | - | 1/1 Token [2] | CHILE | |
| Denmark | 1 Kr | 5 Kr | 10 Kr | - | 1/2x1 Kr, 3/5 Kr, 7/10 Krone [2] | DENMARK | |
| Finland | 1 Mka | - | 5 Mka | - | 1/2x1 Mka, 3/5 Markka [2] | FINLAND | |
| New Zealand | $1.00<br>20¢ | -<br>- | $2.00<br>20¢ | -<br>- | 1/$1.00, 3/$2.00<br>1/3x20¢ [2] | NEW ZEALAND<br>CUSTOM | 01 00 01 0 03 00 00 01 |
| Norway | 5 Kr | - | 10 Kr | - | 1/5 Kr, 2/10 Kr, 5/20 Krone [2] | NORWAY | |
| Argentina | 10¢ | 10¢ | 10¢ | - | 1/1 Token [2] | ARGENTINA | |
| Greece | 10 D | 20 D | 50 D | - | 1/2x10D, 1/20D, 3/50 Drachma [2] | GREECE | |

**NOTES**: 1. Factory Default.  2. Standard Setting - Change by pressing Enter button.  3. Other functions are also affected.
* Only if center coin chute and dollar bill acceptor are available.

## A.4   H.S.T.D.  Adjustments

### A.4  01  Highest  Scores
The game maintains a record of the four highest scores achieved to date.

OFF    -    No high scores are recorded, or displayed.
ON    -    The four highest scores are stored in memory and displayed in the Attract Mode.

### A.4  02  H.S.T.D.  Award
The award given for achieving the High Score To Date, or the Champion H.S.T.D.: Credit or Ticket.

### A.4  03  Champion   H.S.T.D.
The "Highest" High Score is displayed in the Attract Mode.   This score is not cleared when "High Score Reset Every" occurs.

ON    -    The "Highest" High Score is retained in memory and is displayed.
OFF    -    The "Highest" High Score is not retained.

### A.4  04  Champion  Credits
The operator chooses the number of credits or tickets awarded for a Grand Champion Score. Range: 00 - 10.

### A.4  05  H.S.T.D.  1  Credits
### A.4  06  H.S.T.D.  2  Credits
### A.4  07  H.S.T.D.  3  Credits
### A.4  08  H.S.T.D.  4  Credits
The number of credits or tickets to be awarded whenever a player exceeds the 1st, 2nd, 3rd, and 4th highest scores.  Range: 00 - 10.

### A.4  09  High  Score  Reset  Every
The number of games to be played before an automatic reset of the displayed "Highest Score"occurs.  The values provided upon reset are those selected by the operator in the Back-up High Scores.  Range: OFF (disabled); 250 to 20, 000.

### A.4  10  Backup  Champion
The Back-up  Grand Champion Score. Range: 00 - 99,900,000.

### A.4  11  Backup  H.S.T.D.  1
### A.4  12  Backup  H.S.T.D.  2
### A.4  13  Backup  H.S.T.D.  3
### A.4  14  Backup  H.S.T.D.  4
The first through the fourth Back-up High Score values.  The game automatically restores this value when the High Score Reset Every value is reached.  Range: 00 - 99,900,000.

## A.5  Printer Adjustments (optional board required)

### A.5 01 Column Width
The column width to be printed. Range: 22 - 80.

### A.5 02 Lines Per Page
The amount of lines per page. Range: 20 - 80

### A.5 03 Pause Every Page
Choose whether the printer pauses at the end of a page.

YES    -    The printer does pause.
NO     -    The printer does not pause.

### A.5 04 Printer Type
Select the type of printer. Choices: Parallel, Serial, or ADP

### A.5 05 Serial Baud Rate
The baud rate used for Serial or ADP communications (bit rate). Choices: 300, 600, 1200, 2400, 4800, or 9600.

### A.5 06 Serial D.T.R. (Data Terminal Ready)
When a Serial Printer is used, this line may be connected to a printer output line signaling that the printer is busy.

Normal        -    Normal D.T.R. signal goes low to indicate the printer is not ready.

Inverted      -    Inverted D.T.R. (busy) signal goes high to indicate printer is not
                   ready.

Ignore        -    D.T.R. signal is ignored.

# ERROR MESSAGES

The WPC game program has the capability to aid the operator and service personnel. At Game Turn-on, or after pressing the Begin Test switch, (once the game has been operating for an extended period), the display may signal with the message, "Press ENTER for Test Report". This indicates the game program has detected a possible problem with the game.

To obtain details of the problem, open the coin door and press the Begin Test switch. Press the Enter button to begin displaying the message(s). The following messages apply to your game.

## Check Switch ##.

This message indicates that at least one switch was stuck 'On' at game turn-on or has NOT been actuated during ball play (for 90 balls or ≈30 games). The game program compensates the game play requirements affected by each disabled switch to allow 'nearly normal' play. This helps keep the game earning, until the service technician can repair the problem.

To verify the problem, refer to the Test Menu text describing Switch Testing, and check each reported switch using applicable switch tests. Always check switch operation using a ball, to simulate game conditions. Switch problems may often be resolved by adjusting the wire switch actuators, fixing switch circuitry problems, securing loose connectors, etc. Mechanisms using 'opto switches' (drop targets, etc.) need to be checked for proper power connections (+12V dc and ground).

## Pinball Missing.

This game normally uses three balls; however, it will operate with one ball. This message announces that a ball is missing or stuck. When the ball is located, return it to the game via the Outhole. Other possibilities for this problem could be malfunctions of the Ball Trough switches or the Ball Shooter switch.

## xxxxx Sw. is Stuck On.

This message indicates that a switch, which is not usually On, remains in the On position after the game is switched On. The stuck switch is essential for game play (for example, a coin chute switch, the slam tilt switch, the plumb bob tilt switch), and should be cleared to permit proper game operation.

## Ground Short Row-N, Wht-xxx.

This message indicates that the switch wires being called out are touching a grounded part on the playfield or coin door. The following should be checked:
1. Slam Tilt (or other coin door) switch touching the grounded coin door.
2. A leaf-type, playfield switch touching a grounded part.
3. Players poking metallic objects (wires, coat hanger, etc.) into the game
4. Switch cable insulation pierced or damaged allowing bare wire contact with a grounded part
5. All switches in a row closing at the same time. Note: This instance is NOT a switch problem; however, for most games this is a very rare possibility.

## U6 Checksum Error.

The game ROM checksum is invalid. If this occurs replace the game ROM.

**Time and Date Not Set.**

    The real time clock is not running. If this occurs go to U.4 of the Utilities Menu and set the time and date.


**Factory Settings Restored.**

    This message indicates that the CMOS RAM no longer retains any custom Pricing or Game Adjustment settings and has reverted to factory default settings. Generally, the following CPU checks will isolate the cause of the CMOS RAM memory failure. The voltage at pin 28 and pin 26 of U8 should be +5V (game turned On) and at least +4V (game turned Off). When the voltage drops below +4 V, memory reset occurs. Check the batteries and battery holder. Be sure that the batteries are good and that there is no contamination on the battery holder terminals. Turn the game OFF, and use an ohmmeter to check diodes D1 and D2 on the CPU Board. D1 should read 0 ohms when forward-biased and infinite ohms when reverse-biased. D2 should read 15 ohms when forward-biased and infinite ohms when reverse-biased. Note: Readings taken from Analog Meter. This message can also indicate that there is an open diode on a 50V coil, and noise is entering the circuit.


**Trap Door Down Error**
**Trap Door Up Error**

    The Trap Door did not get to its intended position. Go to "T.12 Trap Door Test" and check the "TRAP DOOR DOWN" switch, the Trap Door linkage, and the coils for proper operation.


**Mini-playfield Error - C.W. Direction Reversed**
**Mini-playfield Error - C.C.W. Direction Reversed**
**Mini-playfield Error - No C.W. Movement**
**Mini-playfield Error - No C.C.W. Movement**

    The Mini-playfield has a problem positioning itself.

    The abbreviations C.W. is clockwise direction, C.C.W. is counter clockwise as viewed from the front of the game. If both reversed errors occur, the DC motor is wired backwards. If only 1 reversed message occurs, the motor direction driver is stuck on/off (loose wire?).

    No movement in both directions can be a fuse or loose wire from the motor. No movement in one direction can indicate a loose wire, binding playfield, or a defective motor controller board.


**Examine Left Jet Bumper Switch**
**Examine Right Jet Bumper Switch**
**Examine Bottom Jet Bumper Switch**

    The game detected an unusually low number of hits on the indicated jet bumper. Examine and/or adjust the switch while in diagnostics. The error message(s) are removed when any jet bumper is hit during any diagnostic mode.

## CPU L.E.D.'s

The CPU has three L.E.D.'s located on the upper left side of the board: D19, D20, and D21. On game power-up D19 and D21 turn On for a moment then, D19 turns Off and D20 starts to blink rapidly. D21 remains On. The system has detected a problem if the following happens:

### CPU Board L.E.D. Error Codes

| | | |
|---|---|---|
| Center L.E.D. blinks one time | - | ROM Error U6 |
| Center L.E.D. blinks two times | - | RAM Error U8 |
| Center L.E.D. blinks three times | - | Custom Chip Failure U9 |

### Sound Board Beep Error Codes
### Upon Game Turn-On:
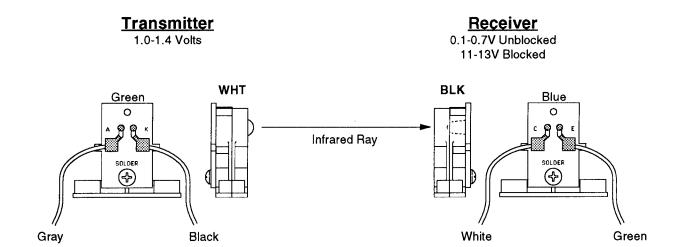
| | | |
|---|---|---|
| 1 Beep | = | Sound Board O.K. |
| 2 Beeps | = | U9 Failure (RAM) |
| 3 Beeps | = | U18 Failure (ROM) |
| 4 Beeps | = | U15 Failure (ROM), if used |
| 5 Beeps | = | U14 Failure (ROM), if used |
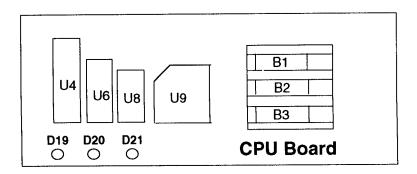
## OPTO THEORY

The opto receiver (detector) should be approximately 0.1-0.7 volts when the opto beam is unblocked and approximately 11-13 volts when the opto beam is blocked. The opto transmitter (emitter or L.E.D.) should always be approximately 1.4 volts. Note, the transmitter (L.E.D.) is larger than the receiver (it protrudes further from its case).

### Transmitter
1.0-1.4 Volts

### Receiver
0.1-0.7V Unblocked
11-13V Blocked
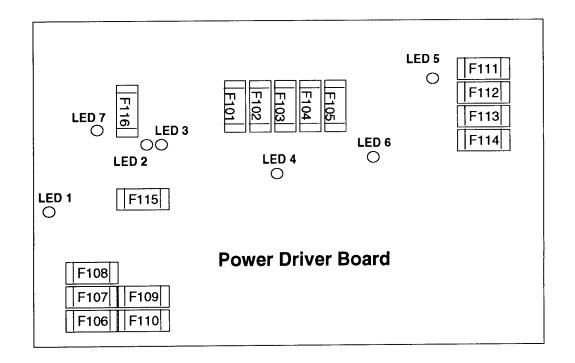
# LED List



## CPU Board
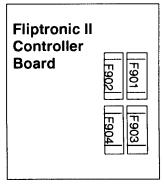
D19, Blanking
D20, Diagnostic
D21, +5vdc
At Game Turn-On = D19 & D21 On, D20 Off
During Normal Operation = D19 Off, D20 flashing, D21 On
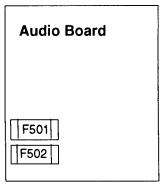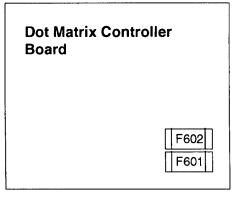


## Power Driver Board
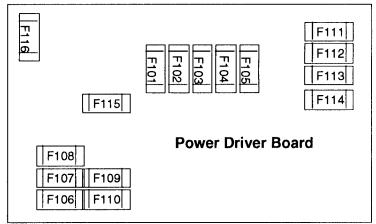
LED 1, +12vdc, Switch Circuit, Normally On
LED 2, High/Low Line Voltage Sensor, Normally On
LED 3, High/Low Line Voltage Sensor, Normally Off
LED 4, +5vdc, Digital Circuit, Normally On
LED 5, +20vdc, Flashlamp Circuit, Normally On
LED 6, +18vdc, Lamps Circuit, Normally On
LED 7, +12vdc, Power Circuit (Motors, Relays, Etc.), Normally On

# Fuse List

```
┌─────────────────────┐   ┌─────────────────────┐   ┌───────────────────────────────┐
│ Fliptronic II       │   │ Audio Board         │   │ Dot Matrix Controller         │
│ Controller          │   │                     │   │ Board                         │
│ Board    ┌──┐┌──┐   │   │                     │   │                               │
│          │F9││F9│   │   │                     │   │                               │
│          │02││01│   │   │                     │   │                               │
│          └──┘└──┘   │   │  ┌──────┐           │   │                    ┌──────┐   │
│          ┌──┐┌──┐   │   │  │ F501 │           │   │                    │ F602 │   │
│          │F9││F9│   │   │  └──────┘           │   │                    └──────┘   │
│          │04││03│   │   │  ┌──────┐           │   │                    ┌──────┐   │
│          └──┘└──┘   │   │  │ F502 │           │   │                    │ F601 │   │
│                     │   │  └──────┘           │   │                    └──────┘   │
└─────────────────────┘   └─────────────────────┘   └───────────────────────────────┘
```

```
                    ┌──────────────────────────────────────────────────────────┐
                    │ ┌──┐                                          ┌───────┐    │
                    │ │F1│                                          │ F111  │    │
                    │ │16│                                          └───────┘    │
                    │ └──┘        ┌─┐┌─┐┌─┐┌─┐┌─┐                  ┌───────┐    │
                    │             │F││F││F││F││F│                  │ F112  │    │
                    │             │1││1││1││1││1│                  └───────┘    │
                    │             │01││02││03││04││05│             ┌───────┐    │
                    │             └─┘└─┘└─┘└─┘└─┘                  │ F113  │    │
                    │        ┌──────┐                              └───────┘    │
                    │        │ F115 │                              ┌───────┐    │
                    │        └──────┘                              │ F114  │    │
                    │                                              └───────┘    │
                    │                   Power Driver Board                      │
                    │   ┌──────┐                                                │
                    │   │ F108 │                                                │
                    │   ┌──────┐ ┌──────┐                                       │
                    │   │ F107 │ │ F109 │                                       │
                    │   ┌──────┐ ┌──────┐                                       │
                    │   │ F106 │ │ F110 │                                       │
                    └──────────────────────────────────────────────────────────┘
```

## Audio Board

| | | |
|---|---|---|
| F501 | -25V Circuit | 3A, S.B. |
| F502 | +25V Circuit | 3A, S.B. |

## Dot Matrix Controller Board

| | | |
|---|---|---|
| F601 | +62V Circuit | 3/8A, S.B. |
| F602 | -113V and -125V Circuits | 3/8A, S.B. |

## Power Driver Board

| | | |
|---|---|---|
| F101 | Left Flipper | 3A, S.B. (Not Used) |
| F102 | Right Flipper | 3A, S.B. (Not Used) |
| F103 | Solenoid #25-#28 | 3A, S.B. |
| F104 | Solenoid #9-#16 | 3A, S.B. |
| F105 | Solenoid #1-#8 | 3A, S.B. |
| F106 | G.I. #5 Wht-Vio | 5A, S.B. |
| F107 | G.I. #4 Wht-Grn | 5A, S.B. |
| F108 | G.I. #3 Wht-Yel | 5A, S.B. |
| F109 | G.I. #2 Wht-Org | 5A, S.B. |
| F110 | G.I. #1 Wht-Brn | 5A, S.B. |
| F111 | Flasher Secondary | 5A, S.B. |
| F112 | Solenoid Secondary | 5A, S.B. |
| F113 | +5V Logic | 5A, S.B. |
| F114 | +18V Lamp Matrix | 8A, N.B. |
| F115 | +12V Switch Matrix | 3/4A, S.B. |
| F116 | +12V Secondary | 3A, S.B. |

## Fliptronic II Controller Board

| | | |
|---|---|---|
| F901 | Upper Left Flipper | 3A, S.B. |
| F902 | Upper Right Flipper | 3A, S.B. |
| F903 | Lower Left Flipper | 3A, S.B. |
| F904 | Lower Right Flipper | 3A, S.B. |

## Line Filter

| | |
|---|---|
| Domestic Game | 8A |
| Foreign Game | 5A, S.B. |

# MAINTENANCE INFORMATION

## LUBRICATION

The two main lubrication points of the Ball Shooter Lane Feeder mechanism are the pivots for the arm. The mechanism of other playfield devices are somewhat similar and have the same lubrication requirements. A medium viscosity oil (switch target grease) is satisfactory for these devices.

Because of the functional design (arm-actuated via solenoid plunger operation), the pivot points of the Left and Right Kickers ("Slingshots") all require lubrication as a regular servicing procedure.

Lubrication to ensure proper operation also applies to the target blades of Drop Targets. MBI Instrument Grease, also known as Drop Target Switch Lubricant, (Bally part number of EI 165), is a recommended lubricant.

## SWITCH CONTACTS

### Playfield Switches
For proper game operation, switch contacts should be free of dust, dirt, contamination, and corrosion. Blade switch contacts are plated to resist corrosion. Cleaning blade switch contacts requires gentle closing of the contacts on a clean business card or piece of paper, and then pulling the paper about 2 inches, which should restore the clean contact surface. Adjust the switch contacts to a 1/16-inch gap.

### Flipper Switches
This game uses the new Fliptronic II Electronic Flipper System. The end-of-Stroke switches are NORMALLY OPEN and should close when the flipper is energized. All end-of-stroke switches and flipper button cabinet switches are gold flashed computer grade leaf switches. Only low computer current is carried through these switches. DO NOT FILE or abrasively clean these switches! DO NO REPLACE these switches with the old style tungsten high current type switches, as intermittent operation could occur. Please note that unlike the old style of flipper, an end-of-stroke switch failure will not harm the flipper. The game will notify the operator of a switch being mis-adjusted in the test report, but will continue to play. The end-of-stroke switches are a means by which the new electronic flippers feel and play with all of the subtleties of the old flippers.

## CLEANING

Good game action and extended playfield life are the results of regular playfield cleaning. During each collection stop, the playfield glass should be removed and thoroughly cleaned and the playfield should be wiped off with a clean, lint-free cloth. The game balls should be cleaned and inspected for any chips, nicks, or pits. Replace any damaged balls to prevent playfield damage.

Regular, more extensive, playfield cleaning is recommended. However, avoid excessive use of water and caustic or abrasive cleaners because they tend to damage the playfield surface. Playfield wax (or any carnauba based wax), or polish may be used sparingly, to prevent a buildup on the playfield surface. Do not use cleaners containing petroleum distillates on any playfield plastics because they may dissolve the plastic material or damage the artwork.
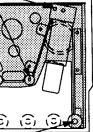
# PLAYFIELD ADJUSTMENTS
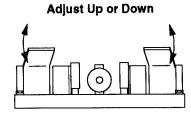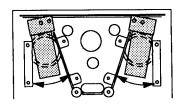
### PLAYFIELD GLASS SWITCH:
The playfield glass switch should be adjusted so that when the glass is inserted, the switch closes when the front of the glass is in line with the front of the cabinet. Use Test Menu, T.1 Switch Edges, switch #82, to check adjustment.

**Remove Screws**

**Adjust Up or Down**

**Adjust Side to Side**

**Remove Nuts**
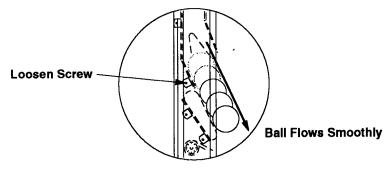
### MINI-PLAYFIELD BALL EJECT:
To adjust ejects from kicking the ball down the center of the playfield to the outhole:
First remove the (4) screws and (2) nuts from the plastic shroud covering the mini-playfield assembly. Remove shroud. Then, **either;**
    **1.** with pliers, bend the ball deflectors up or down slightly, **or;**
    **2.** loosen the (2) screws on the ball deflectors and turn slightly. Tighten the screws **and;**
Test the eject action for accuracy. The ball, when ejected, should hit the lower playfield flippers.
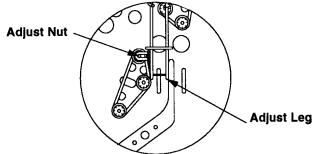
**Loosen Screw**

**Ball Flows Smoothly**

### BALL ROLLOUT FROM HANG ON LANE:
Ball should roll out of the Hang On Lane smoothly. To adjust, loosen the screw on the ball guide just above flipper. Move the ball guide so that the ball when rolling off the ball guide is even with the flipper. Ball should not bounce off or drop onto the flipper when rolling.

**Adjust Nut**

**Adjust Leg**
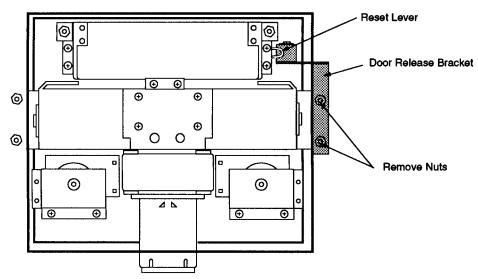
### RIGHT WIRE RAMP BALL DROP:
To prevent the ball from dropping into the drain lane from the Police Box wire ramp, **either;**
    **1.** with pliers, bend the lower right leg of the ramp inward slightly, toward the center of playfield, **or;**
    **2.** loosen nut and move ramp to the left.
This will help to reduce the balls backspin and guide it back into the ball return lane.
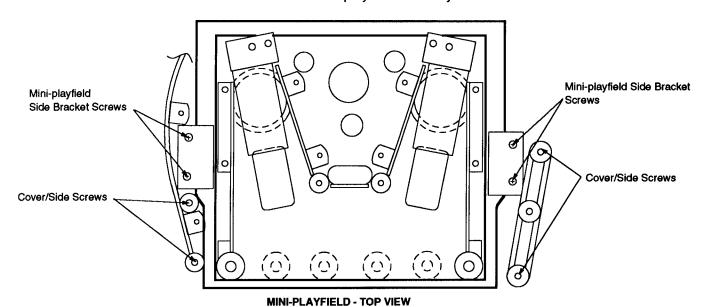
# MINI-PLAYFIELD SERVICE INSTRUCTIONS



Reset Lever

Door Release Bracket

Remove Nuts

**MINI-PLAYFIELD - BOTTOM VIEW**
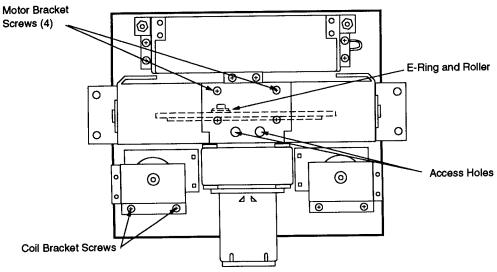
## TO REMOVE THE MINI-PLAYFIELD ASSEMBLY (Bottom of Playfield):

1. Mini-playfield should be in the down position.
2. Turn power OFF.
3. Remove (2) nuts, and lift off Door Release Bracket. When reassembling, position mini-playfield in the middle position (use diagnostics). Then, mount Release bracket against flip-up target reset lever, so that the targets drop. Tighten nuts.
4. Disconnect all cables from mini-playfield assembly.



Mini-playfield
Side Bracket Screws

Cover/Side Screws

Mini-playfield Side Bracket Screws

Cover/Side Screws

**MINI-PLAYFIELD - TOP VIEW**

## (Top of Playfield)

5. Remove (4) screws on Cover/Side Bracket.
6. Remove (4) screws from Mini-playfield Side Brackets.
7. Carefully lift mini-playfield up, then tilt back slightly to avoid catching motor.

**Motor Bracket Screws (4)**

**E-Ring and Roller**

**Access Holes**

**Coil Bracket Screws**
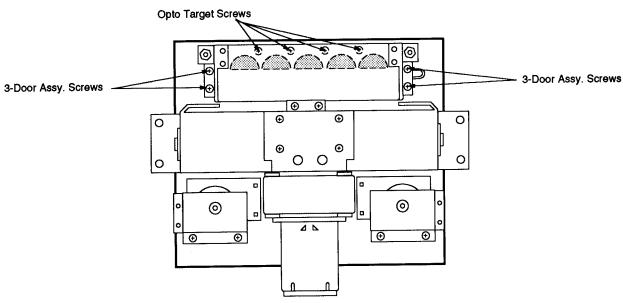
**MINI-PLAYFIELD - BOTTOM VIEW**

## TO REMOVE MOTOR BRACKET ASSEMBLY:

1. Remove E-ring and Roller from Cam.
2. Remove lower Opto (LED, white) Assembly, via the access holes.
3. Remove (4) screws from Motor Bracket.*

## TO REMOVE EJECT COIL ASSEMBLIES:

1. Remove (2) screws on Coil Bracket Assembly.*

**Opto Target Screws**

**3-Door Assy. Screws**

**3-Door Assy. Screws**

**MINI-PLAYFIELD - BOTTOM VIEW**

## TO REMOVE OPTO TARGET ASSEMBLY:

1. Remove (4) screws on 3-Door Assembly.*
2. Remove (4) screws on Opto Target Assembly.*

*NOTE: APPLY LOCTITE TO THESE SCREWS WHEN REASSEMBLING.

# Notes...

........................................................................

........................................................................

........................................................................

........................................................................

........................................................................

........................................................................

........................................................................

........................................................................

........................................................................

........................................................................

........................................................................

........................................................................

........................................................................

........................................................................

........................................................................

........................................................................

........................................................................

........................................................................

........................................................................

........................................................................

........................................................................

........................................................................
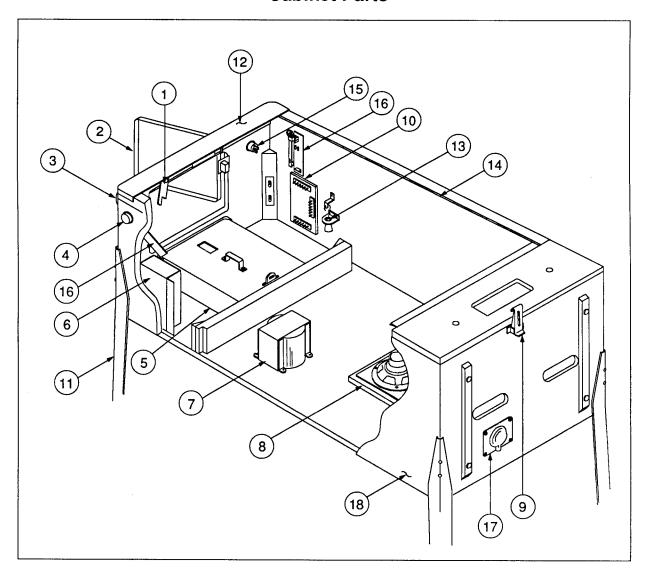
# Game
# Parts
# Information

# Line Filter/Cordset Application Chart

| COUNTRY | LINE FILTER ASSY. A-15707-120V | A-15707-230V | | CORDSET 5850-13271-00 | 5850-13272-00 | 5850-13273-00 | 5850-13274-00 | 5850-13275-00 | 5850-13276-00 | 5850-13277-00 | 5850-13278-00 | H-15756 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| UNITED STATES | ● | | | ● | | | | | | | | |
| CANADA | ● | | | ● | | | | | | | | |
| TAIWAN | ● | | | ● | | | | | | | | |
| MEXICO | ● | | | ● | | | | | | | | |
| CENTRAL AMERICA | ● | | | ● | | | | | | | | |
| SOUTH KOREA | ● | | | ● | | | | | | | | |
| PUERTO RICO | ● | | | ● | | | | | | | | |
| AUSTRIA | | ● | | | ● | | | | | | | |
| BELGIUM | | ● | | | ● | | | | | | | |
| FINLAND | | ● | | | ● | | | | | | | |
| FRANCE | | ● | | | ● | | | | | | | |
| GREECE | | ● | | | ● | | | | | | | |
| HOLLAND | | ● | | | ● | | | | | | | |
| HUNGARY | | ● | | | ● | | | | | | | |
| NETHERLANDS | | ● | | | ● | | | | | | | |
| NETH. ANTILLES | | ● | | | ● | | | | | | | |
| NORWAY | | ● | | | ● | | | | | | | |
| POLAND | | ● | | | ● | | | | | | | |
| PORTUGAL | | ● | | | ● | | | | | | | |
| SPAIN | | ● | | | ● | | | | | | | |
| SWEDEN | | ● | | | ● | | | | | | | |
| TURKEY· | | ● | | | ● | | | | | | | |
| WEST GERMANY | | ● | | | ● | | | | | | | |
| UNITED KINGDOM | | ● | | | | ● | | | | | | |
| IRELAND | | ● | | | | ● | | | | | | |
| HONG KONG | | ● | | | | ● | | | | | | |
| DENMARK | | ● | | | | | ● | | | | | |
| ITALY | | ● | | | | | | ● | | | | |
| CHILE | | ● | | | | | | ● | | | | |
| PEOPLE'S REP. OF CHINA | | ● | | | | | | ● | | | | |
| SWITZERLAND | | ● | | | | | | | ● | | | |
| AUSTRALIA | | ● | | | | | | | | ● | | |
| NEW ZEALAND | | ● | | | | | | | | ● | | |
| ARGENTINA | | ● | | | | | | | | ● | | |
| JAPAN | ● | | | | | | | | | | ● | ● |

DOCTOR WHO 2-2
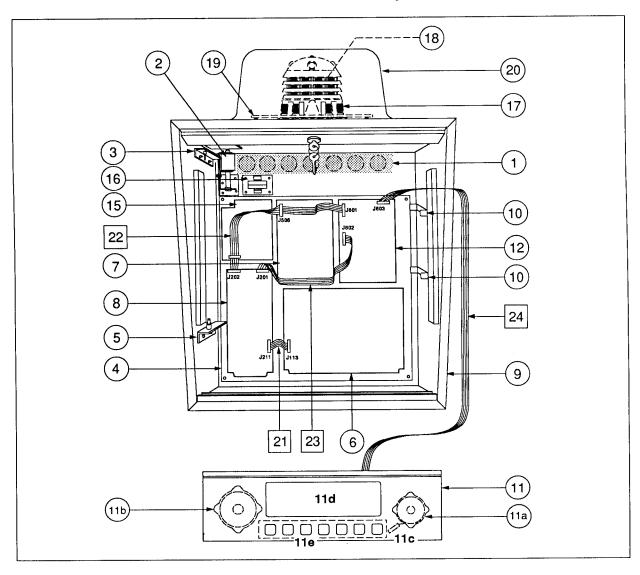
# Cabinet Parts



## Cabinet Parts

| Item | Part Number | Description |
|------|-------------|-------------|
| 1. | D-9174-3 | Lever Guide Assembly |
| 2. | A-14148-1 | Coin Door - 2 Slot |
| 3. | A-15896 | Lit Switch Button Assembly |
| 4. | B-12273-6 | Flipper Button - Yellow (2 Used) |
| 5. | A-15459-1 | Cashbox Assembly |
| 6. | * | Line Filter Assembly |
| 7. | 5610-12835-00 | WPC Transformer, 115/230v |
| 8. | 5555-12929-00 | Speaker, 4Ω, 6", 25w |
| 9. | 20-9347 | Toggle Latch |
| 10. | A-14689 | WPC Coin Door Interface Bd. |
| 11. | C-10843-1 | Metal Leg Assembly |
| 12. | D-12615 | Front Molding Assy. |
| 13. | 20-6502-A | Plum Bob |
| 14. | A-12359-3 | Side Molding Assembly |
| 15. | 20-9663-1 | Start Button |

| Item | Part Number | Description |
|------|-------------|-------------|
| 16. | A-15894 | Flipper Opto Board (2 Used) |
| 17. | 01-10714 | Line Cord Cover |
| 18. | 11-1066-20006 | "Doctor Who" Wood Cabinet |
| 19. | * | Cordset |

## Miscellaneous Parts

| | | |
|---|---|---|
| 08-7028-T | Tempered Playfield Glass: 21" x 43" |
| 20-6500 | Steel Ball, 1-1/16" (3) |
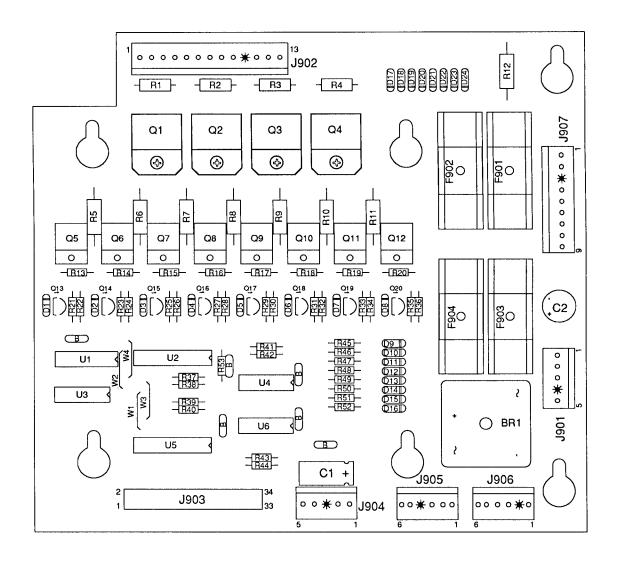
* See Application Chart (p.2-2).

# Backbox Assembly



| Item | Part Number | Description |
|------|-------------|-------------|
| 1. | 01-6645 | Venting Screen |
| 2. | B-10686-1 | Knocker & Bracket Assy. |
| 3. | A-12497 | Upper Insert Bd Hinge Assy. |
| 4. | A-14092-3 | Mounting Plate Assembly |
| 5. | A-12498 | Lower Insert Bd Hinge Assy. |
| 6. | A-12697-1 | Power Driver Assembly |
| 7. | A-12738-20006 | WPC Sound Board |
| 8. | A-12742-20006 | WPC CPU Board |
| 9. | A-14376-20006 | Backbox Assembly |
| 10. | 01-9047 | Insert Stop Bracket |
| 11. | A-15823 | Speaker / Display Assy. |
| a) | 5555-12924-00 | Speaker, 4Ω, 15w |
| b) | 5555-12856-00 | Speaker, 5-1/4", 4Ω, 25w |
| c) | 5045-12914-00 | Cap., 10μfd., 50v, (±20%) |
| d) | 5901-12784-00 | Dot Matrix Display/Driver Bd. |
| e) | A-15805 | 7-Lamp Board Assembly |
| 12. | A-14039 | Dot Matrix Contoller Board |
| 13. | A-13379 | Lock & Plate Assembly |
| a) | 20-9637 | Lock & Cam Kit |
| 14. | 20006-IN | Insert Board |
| 15. | A-15472 | Fliptronic II Board |

| Item | Part Number | Description |
|------|-------------|-------------|
| 16. | A-15309-1 | 2-10W Resistor Board |
| 17. | A-16199 | Dalek Assembly |
| 18. | A-16191 | Dalek Light Assembly |
| 19. | A-15742 | 4-Lamp Board |
| 20. | A-15748 | Cover Assembly |

## Ribbon Cables:

| | | |
|------|-------------|-------------|
| 21. | 5795-12653-03 | Ribbon Cable, 3" |
| 22. | 5795-13018-00 | Ribbon Cable, 22" |
| 23. | 5795-10938-14 | Ribbon Cable, 14" |
| 24. | 5795-12838-30 | Ribbon Cable, 30" |

## Miscellaneous Parts:

| | | |
|------|-------------|-------------|
| | A-8552-20006 | Tempered Backglass Assy. |
| | 08-7456 | Backbox Glass: 27" x 18-7/8" |
| | 31-1357-20006 | Screened Translight |
| | 03-8228-2 | Glass Channel Top (1) |
| | 03-8228-3 | Glass Channel Edge (2) |
| | 03-8229-1 | Glass Lift Channel (1) |

# A-15472    Fliptronic II Board
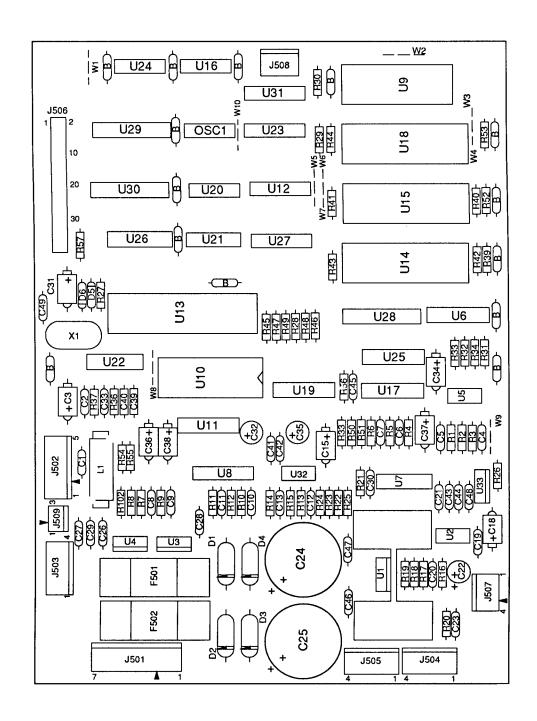


| Part Number | Designator | Description |
|---|---|---|
| 01-10572 | Q1-Q4 | Heatsink |
| 20-9684 | Q5-Q12 | Fastener Snap |
| 4006-01003-08 | Q1-Q4 | Mach. Screw, 6-32 |
| 4406-01128-00 | Q1-Q4 | Nut 6-32 KEPS |
| 5010-09034-00 | R37 - R44, R53 | Resistor, 10KΩ, 1/4w, 5% |
| 5010-09358-00 | R22, R24, R26, R28, R30, R32, R34, R36, R45 - R52 | Resistor, 1KΩ, 1/4w, 5% |
| 5010-09361-00 | R1 - R4 | Resistor, 220Ω, 1/2w, 5% |
| 5010-09416-00 | R21, R23, R25, R27, R29, R31, R33, R35 | Resistor, 470Ω, 1/4w, 5% |
| 5010-09534-00 | W3, W4 | Resistor, 0Ω |
| 5010-10171-00 | R13 - R20 | Resistor, 56Ω, 1/4w, 5% |
| 5011-12956-00 | R5 - R12 | Resistor, 2.7KΩ, 1w, 5% |
| 5040-08986-00 | C1 | Capacitor, 100M, 10v |
| 5043-08980-00 | B | Capacitor, .01µF, 50v |
| 5040-09537-00 | C2 | Capacitor, 100µF, 100v |
| 5070-09054-00 | D1 - D24 | Diode1N4004 |
| 5162-12635-00 | Q5-Q12 | Transistor TIP102 NPN |
| 5190-09016-00 | Q13 - Q20 | Transistor 2N4403 PNP |
| 5191-12179-00 | Q1-Q4 | Transistor TIP36C PNP |
| 5315-12009-00 | U2 | IC 74HCT374 |
| 5315-12031-00 | U5 | IC 74HCT244 |
| 5315-12812-00 | U1 | IC 74HCT138 |
| 5315-12951-00 | U3 | IC 74HCT00 |
| 5370-12272-00 | U4, U6 | IC LM339 QUAD COMP |
| 5791-10862-09 | J907 | Connector, 9-pin Header  Sq. Pin |
| 5791-10862-05 | J901, J904 | Connector, 5-pin Header Sq. Pin |
| 5791-10862-13 | J902 | Connector, 13-pin Header Sq. Pin |
| 5791-12461-06 | J905, J906 | Connector, Str Sq. Pin Header .100 |
| 5791-12516-00 | J903 | 34 HEN 2x17  STR |
| 5100-09690-00 | BR1 | Bridge Rectifier |
| 5731-10356-00 | F901 - F904 | Fuse S-B, 3A., 250v |
| 5733-12060-01 | - | Fuse Holder (F901-F904) |

# A-12738-20006    WPC Audio Board

| Part No. | Designator | Description |
|---|---|---|
| 01-9980 | | Shield: Wire Protector |
| 4004-01005-06 | U1 | Mach. Screw, 4-40 x 3/8 |
| 4104-01012-04 | U1 | Sh. Mach. Screw, #4 x 1/4 |
| 4404-01119-00 | U1 | Nut, 4-40 SNUT |
| 5010-08772-00 | R21 | Resistor, 15KΩ, 1/4w, 5% |
| 5010-12065-00 | R22, R25 | Resistor, 120KΩ, 1/4w, 5% |
| 5010-08991-00 | R51 | Resistor, 4.7KΩ, 1/4w, 5% |
| 5010-10987-00 | R23, R24 | Resistor, 56KΩ, 1/4w, 5% |
| 5010-09034-00 | R13, R14, R29-R31, R33, R34, R50, R45-R49 | Resistor, 10KΩ, 1/4w, 5% |
| 5010-09035-00 | R4 | Resistor, 47KΩ, 1/4w, 5% |
| 5010-09036-00 | R35 | Resistor, 100Ω, 1/4w, 5% |
| 5010-09134-00 | R1, R2, R6, R8, R9, R11,R12 | Resistor, 150KΩ, 1/4w, 5% |
| 5010-09162-00 | R26, R102 | Resistor, 100KΩ, 1/4w, 5% |
| 5010-08774-00 | R3, R5, R17, R19 | Resistor, 22K, 1/4w, 5% |
| 5010-09269-00 | R15 | Resistor, 12KΩ, 1/4w, 5% |
| 5010-09358-00 | R18, R32 | Resistor, 1KΩ, 1/4w, 5% |
| 5010-09416-00 | R28, R36, R37, R39-R44 R52, R53, R57 | Resistor, 470Ω, 1/4w, 5% |
| 5010-09534-00 | W3, W5, W7-W10 | Resistor, 0Ω |
| 5010-10171-00 | R38, R56 | Resistor, 56Ω, 1/4w, 5% |
| 5010-10258-00 | R16 | Resistor, 1M, 1/4w, 5% |
| 5010-10650-00 | R7, R10 | Resistor, 62K, 1/4w, 5% |
| 5010-10989-00 | R54, R55, R27 | Resistor, 470K, 1/4w, 5% |
| 5010-12752-00 | R20 | Resistor, 1Ω, 1/4w, 5% |
| 5040-08986-00 | C3 | Capacitor, 100M, 10v (±20%) |
| 5040-09332-00 | C15, C18, C34, C36, C38 | Capacitor, 47μfd., 25v, Axial |
| 5040-11036-00 | C32, C35 | Capacitor, 47μfd., 16v, Rad |
| 5040-12729-00 | C24, C25 | Capacitor, 4700μfd., 35v. |
| 5040-12750-00 | C22 | Capacitor, 22μfd., 35v, Rad. |
| 5041-09031-00 | C26-C29, C37, C46-C48 | Capacitor, 1μfd. TANT |
| 5041-09243-00 | C20, C21 | Capacitor, 10μfd. TANT |
| 5043-08980-00 | C41-C44, B(15) | Capacitor, .01M, 50v, (+80, -20) |
| 5043-08996-00 | C1, C2 | Capacitor, .1μfd., 50v, 10% |
| 5048-11027-00 | C8, C10 | Capacitor, 33pfd., 50v, 10% |
| 5048-11028-00 | C45 | Capacitor, 22pfd., 50V, Axial |
| 5048-11029-00 | C33, C49 | Capacitor, 100pfd., 50v |
| 5048-11030-00 | C12 | Capacitor, 470pfd., 50v |
| 5048-11031-00 | C19, C31 | Capacitor, .001μfd., 50v, 10% |
| 5048-11065-00 | C13 | Capacitor, .0022μfd., 50v, 10%, Ax. |
| 5048-11072-00 | C39, C40 | Capacitor, .0033μfd. |
| 5048-12036-00 | C23 | Capacitor, .22μfd., 10v, Ceramic |
| 5048-12745-00 | C4, C6 | Capacitor, 1800pfd., 50V, 10% |
| 5048-12746-00 | C5, C7 | Capacitor, 330pfd., 50V |
| 5048-12748-00 | C9, C11, C30 | Capacitor, 220pfd., 50V |

| Part No. | Designator | Description |
|---|---|---|
| 5070-08919-00 | D5, D6 | Diode, 1N4148 |
| 5070-09045-00 | D1-D4 | Diode MR501, 3.0A |
| 5250-10495-00 | U3 | Reg. 7912 1.0A -12v. |
| 5281-09215-00 | U22 | IC, 74LS04 Hex INV |
| 5281-09246-00 | U12 | IC, 74LS139 2-4 Dec. |
| 5281-09486-00 | U28-U30 | IC, 74LS374 8 Dual Flipflop |
| 5281-09487-00 | U6, U23-U25 | IC, 74LS74 Dual Flipflop |
| 5281-09500-00 | U31 | IC, 74LS32 |
| 5281-09745-00 | U26, U27 | IC, 74LS138 DMLTPX |
| 5281-09850-00 | U20 | IC, 74LS11 Tripple AND |
| 5281-10577-00 | U16 | IC, 74LS125 Q/B Bfr |
| 5370-11086-00 | U10 | IC, YM2151 Sound |
| 5371-11087-00 | U11 | IC, YM3012 D/A |
| 5400-10320-00 | U13 | IC, MPU 68B09E |
| 5284-12651-00 | U21 | IC 4584 |
| 5340-12278-00 | U9 | S/Ram 2064 |
| 5370-09691-00 | U17 | IC, 55536 CVSD |
| 5370-12260-00 | U2 | IC, 3340 Elec Atten |
| 5370-12728-00 | U1 | IC, Audio Amp LM1875 |
| 5370-12730-00 | U7, U8 | IC, Op Amp TL084 |
| 5370-12742-00 | U32 | IC, Op Amp TL082 |
| 5371-12727-00 | U19 | Dac AD7524 |
| 5432-12726-00 | U5 | EE Prom Pot X9503 |
| 5460-12423-00 | U4 | IC, LM7812 |
| 5460-12743-00 | U33 | LM7809 TO-220 |
| 5520-09020-00 | X1 | Crystal, 3.58 MHz. |
| 5521-10931-00 | OSC1 | Oscillator, 8.0 MHz. |
| 5551-09822-00 | L1 | Ind, 4.7UH 3.0A. |
| 5700-08985-00 | U13 | Socket, IC 40-pin, .6" |
| 5700-09004-00 | U10 | Socket, IC 24-pin, .6" |
| 5700-09006-00 | U11 | Socket, IC 16-pin, .3" |
| 5341-13406-U14 | U14 | IC, Audio ROM |
| 5341-13406-U15 | U15 | IC, Audio ROM |
| A-5343-20006-3 | U18 | IC, Audio ROM |
| 5700-12088-00 | U1 | Socket, IC 32-pin (U15, U18) |
| 5705-12755-00 | | Heatsink 5299B-220 |
| 5731-10356-00 | F501, F502 | Fuse, 3A, S-B, 250v |
| 5733-12060-01 | | Fuse Holder (F501, F502) |
| 5791-10862-04 | J504, J505 | Connector, 4-pin Header Sq. .156 |
| 5791-10862-05 | J502 | Connector, 5-pin Header Sq. .156 |
| 5791-10862-07 | J501 | Connector, 7-pin Header Sq. .156 |
| 5791-12462-03 | J509 | Connector, 3-pin Header Sq. .100 |
| 5791-12462-04 | J508 | Connector, 4-pin Header Sq. .100 |
| 5791-12516-00 | J506 | 34 Hen 2x17 STR |

# A-12738-20006    WPC Audio Board



DOCTOR  WHO  2-7

# A-12742-20006   WPC CPU Board

| Part Number | Designator | Description |
|---|---|---|
| 5010-09034-00 | R14-R22, R27-R42, R86, R90, R94, R98 | Resistor, 10KΩ, 1/4w, 5% |
| 5010-09085-00 | R1, R2, R4, R93, R96, R97 | Resistor, 1.5KΩ, 1/4w, 5% |
| 5010-09314-00 | R52, R54, R56, R58, R60, R62, R64, R66, R75-R82 | Resistor, 1.2KΩ, 1/4w, 5% |
| 5010-09358-00 | R3, R43-R51, R53, R55, R57, R59, R61, R63, R65, R67-R74, R84 | Resistor, 1KΩ, 1/4w, 5% |
| 5010-09416-00 | R5-R8, R12, R13, R87-R89 | Resistor, 470Ω, 1/4w, 5% |
| 5010-09534-00 | W1, W4, W7, W13 - W18 | Resistor, 0Ω |
| 5010-10258-00 | R95, R99 | Resistor, .01µfdΩ, 1/4w, 5% |
| 5010-10989-00 | R92 | Resistor, 470KΩ, 1/4w, 5% |
| 5010-12104-00 | R91 | Resistor, 22µfd, 1/4w, 5% |
| 5019-09362-00 | SIP 1 | SIP, 9R, 10-pin, 4.7KΩ, 5% |
| 5040-08986-00 | C31 | Capacitor, 100µfd, 10v (±20%) |
| 5043-08980-00 | B | Capacitor, .01µfd, 50v, (+80, -20%) |
| 5043-09030-00 | C27 | Capacitor, 0.047µfd, 50v (±20%) |
| 5043-09065-00 | C3 - C26 | Capacitor, 470pfd, 50v (±20%) |
| 5043-09491-00 | C2, C29, C30, C34 | Capacitor, 22pfd, 1KV, (±10%) |
| 5043-09492-00 | C28 | Capacitor, 100pfd, 50v, (±10%) |
| 5043-09845-00 | C32, C33 | Capacitor, 1KP, 50v, (±20%) |
| 5070-08919-00 | D2 - D18 | Diode, 1N4148, 150MA |
| 5070-09266-00 | D1, D25 | Diode, 1N5817, 1.0A. |
| 5160-10269-00 | Q1 | Transistor, 2N3904, NPN |
| 5162-12422-00 | U20 | IC, ULN, 2803A |
| 5281-09308-00 | U3 | IC, 74LS245, Octal Bus Trncv |
| 5281-09486-00 | U14 | IC, 74LS374, 8D F/F |
| 5281-09851-00 | U5 | IC, 74LS14, SMT/TRG |
| 5281-09867-00 | U1, U2, U7 | IC, Octal Buffer, 74LS244 |
| 5281-10182-00 | U11, U12, U13, U15 | IC, 74LS240 Driver |
| 5284-12651-00 | U21 | IC, 4584 |
| 5340-12278-00 | U8 | S/RAM 2064 |
| 5370-12272-00 | U16 - U19 | IC, LM339, Quad. Comp |
| 5370-12687-00 | U10 | MC, 34064 Reset Chip |
| 5520-10438-00 | X2 | Crystal, 8.0MHz. |
| 5520-12084-00 | X1 | Crystal 32.768 KHz |
| 5551-09822-00 | L1 | ILN, 4.7 UH 3A |
| 5671-09019-00 | D19 - D21 | DSPL LED RED |
| 5700-08985-00 | U4 | Socket, IC 40P, .6" |
| 5700-12088-00 | U6 | Socket, IC 32P, .6" |
| 5700-12424-00 | U9 | Socket, 84 Pin PLCC |
| 5791-10850-00 | J201, J204 | Connector, 26-pin Header Str Sq. |
| 5791-10862-07 | J210 | Connector, 7-pin Header Str Sq. |
| 5791-12461-08 | J212 | Connector, 8-pin Header Str Sq. |
| 5791-12461-09 | J206 - J209 | Connector, 9-pin Header Sq. pin |
| 5791-12461-12 | J205 | Connector, 12-pin Header Sq. pin |
| 5791-12516-00 | J202, J211 | 34 Hen 2x17 STR |
| 5881-09021-00 | B1 - B3 | Battery Holder "AA" |
| 5048-11033-00 | C50 | Capacitor, 0.022µf, 10v |
| A-5343-20006-1 | U6 | Game PROM Assembly |
| 5410-12426-00 | U9 | WPC-89 ASIC |
| 5400-10320-00 | U4 | IC MPU 68B09E |
| 5880-09022-00 | B1 - B3 | Battery, Alkaline, 1.5v ( "AA") |

# A-12742-20006　WPC CPU Board



DOCTOR　WHO　2-9

# A-12697-1    WPC Power Driver Assembly

| Item | Part Number | Ckt Designator | Description |
|---|---|---|---|
| 1 | Not Used | | |
| 2 | 4006-01005-06 | Q1, Q2 | Mach. Screw, 6-32 x 3/8 |
| 3 | 4406-01128-00 | Q1, Q2 | Nut, 6-32 KEPS |
| 4 | 4004-01005-06 | Q10, Q12, Q14, Q16, Q18 | Mach. Screw, 4-40 x 3/8 |
| 5 | 4404-01119-00 | Q10, Q12, Q14, Q16, Q18 | Nut, 4-40 SNUT |
| 6 | 5010-08981-00 | R260 | Resistor, 10KΩ, 1/2w, 5% |
| 7 | 5010-08991-00 | R9, R12, R15, R18, R21, R23, R27, R31, R35, R39, R43, R47, R51, R55, R59, R63, R67, R71, R75, R79, R83, R87, R91, R95, R99, R126, R128, R130, R132, R134, R136, R138, R140, R209, R227 | Resistor, 4.7KΩ, 14w, 5% |
| 8 | 5010-08992-00 | R8, R11, R14, R17, R20, R177, R179, R181, R183, R185, R187, R189, R191 | Resistor, 560Ω, 1/4w, 5% |
| 9 | 5010-08993-00 | R25, R29, R33, R37, R41, R45, R49, R53, R57, R61, R65, R69, R73, R77, R81, R85, R89, R93, R97, R101, R103, R106, R109, R112, R115, R118, R121, R124 | Resistor, 68Ω, 1/4w, 5% |
| 10 | 5010-08997-00 | R24, R28, R32, R36, R40, R44, R48, R52, R56, R60, R64, R68, R72, R76, R80, R84, R88, R92, R96, R100, R102, R105, R108, R111, R114, R117, R120, R123, R195 | Resistor, 2.7KΩ, 1/4w, 5% |
| 11 | 5010-08998-00 | R155, R157, R159, R161, R165, R167, R169, R171 | Resistor, 2.2KΩ, 1/4w, 5% |
| 12 | 5010-09034-00 | R3, R4, R6, R142-R149, R197-R198 | Resistor, 10KΩ, 1/4w, 5% |
| 13 | 5010-09085-00 | R194, R196, R251, R253-R257 | Resistor, 1.5KΩ, 1/4w, 5% |
| 14 | 5010-09086-00 | R252 | Resistor, 6.8KΩ, 1/4w, 5% |
| 15 | 5010-09224-00 | R1, R2, R192, R201- R205, R208 | Ressistor, 270Ω, 1/4w, 5% |
| 16 | 5010-09314-00 | R176, R178, R180, R182 R184, R186, R188, R190 | Resistor, 1.2KΩ, 1/4w, 5% |
| 17 | 5010-09324-00 | R206 | Resistor, 27KΩ, 1/4w, 5% |
| 18 | 5010-09358-00 | R154, R156, R158, R160, R164, R166, R168, R170, R162, R193, R199, R200 R250 | Resistor, 1KΩ, 1/4w, 5% |
| 19 | 5010-09361-00 | R104, R107, R110, R113 R116, R119, R122, R125 | Resistor, 220Ω, 1/4w, 5% |
| 20 | 5010-09416-00 | R22, R26, R30, R34, R38, R42, R46, R50, R54, R58, R62, R66, R70, R74, R78, R82, R86, R90, R94, R98, R127, R129, R131, R133, R135, R137, R139, R141 | Resistor, 470Ω, 1/4w, 5% |
| 21 | 5010-09534-00 | W1, W2 | Resistor, 0Ω |
| 22 | 5010-11079-00 | R7, R10, R13, R16, R19 | Resistor, 51Ω, 1/4w, 5% |
| 23 | 5010-12427-00 | R150-R153, R172-R175 | Resistor, .22Ω, 1w, 5% |
| 24 | 5012-12632-00 | R224 | Resistor, .12Ω, 10w, 5% |
| 25 | 5012-12238-00 | R210, R211 | Resistor, 3.3KΩ, 5w, 10% |
| 26 | 5019-10143-00 | SR1 | SIP, 9R, 10 pin, 470Ω, 5% |
| 27 | 5040-08986-00 | C4 | Capacitor, 100µfd, 10v (±20%) |
| 28 | 5040-09421-00 | C2 | Capacitor, 100µfd, 25v (+50, -10%) |
| 29 | 5040-09537-00 | C8 | Capacitor, 100µfd, 100v (±20%) |
| 30 | 5040-12313-00 | C5, C6, C7, C11, C30 | Capacitor, 15,000µfd, 25v (±20%) |
| 31 | 5043-08980-00 | B-BYPASS | Capacitor, .01µfd, 50v (+80, -20%) |
| 32 | 5043-08996-00 | C13-C20, C31 | Capacitor, .1µfd, 50v (±20%) |
| 33 | 5043-09845-00 | C1, C12 | Capacitor, 1,000pfd, 50v (±20%) |
| 34 | 5048-10994-00 | C3 | Capacitor, .33µfd, 50v (±20%) Ax. |
| 35 | 5070-08919-00 | D33, D34 | Diode, 1N4148, 150MA. |
| 36 | 5070-09054-00 | D1-D3, D5-D12, D17-D32, D38, D39 | Diode, 1N4004, 1.0A. |
| 37 | 5100-09690-00 | BR1-BR5 | Bridge Rectifier, 35A., 200v |
| 38 | 5131-12725-00 | Q10, Q12, Q14, Q16, Q18 | Triac, BT138E |
| 39 | 5162-12422-00 | U19 | IC, ULN 2803 |
| 40 | 5162-12635-00 | Q20, Q22, Q24, Q26, Q28 Q30, Q32, Q34, Q36, Q38, Q40, Q42, Q44, Q46, Q48, Q50, Q52, Q54, Q56, Q58, Q63, Q65, Q67, Q69, Q75, Q77, Q79, Q81, Q83 - Q90 | Transistor, TIP 102 |
| 41 | 5194-09055-00 | Q9, Q11, Q13, Q15, Q17, Q19, Q21, Q23, Q25, Q27, Q29, Q31, Q33, Q35, Q37, Q39, Q41, Q43, Q45, Q47, Q49, Q51, Q53, Q55, Q57, Q59-Q62, Q71-Q74, Q99 | Transistor, 2N5401 PNP |
| 42 | 5191-12179-00 | Q64, Q66, Q68, Q70, Q76 Q78, Q80, Q82 | Transistor, TIP36C PNP |
| 43 | 5192-12428-00 | Q91-Q98 | Transistor, TIP 107 |
| 44 | 5250-12634-00 | Q1 | Reg LM 323  5v |
| 45 | 5281-09486-00 | U1-U5, U18 | IC, 74LS374 Dual D Flipflop |
| 46 | 5281-09487-00 | U10-U13 | IC, 74LS74 Dual D flipflop |
| 47 | 5281-10182-00 | U9 | IC, 74LS240, L/Drvr |
| 48 | 5370-12272-00 | U6, U15, U16 | IC, LM339 Quad. Comp |
| 49 | 5460-12423-00 | Q2 | IC, LM 7812 |
| 50 | 5490-10892-00 | U7, U8 | Opto Isolator, 4N25 |
| 51 | 5580-08994-01 | RLY 1 | Relay 4PDT 6VDC5A VS |
| 52 | 5671-09019-00 | LED1 - LED7 | Diaplay LED Red |
| 53 | 5701-09652-00 | Q1 | Thermal Pad TO-3 |
| 54 | 5705-09199-00 | Q2 | Heatsink, #6030B |
| 55 | Not Used | | |
| 56 | 5705-12637-00 | Q1 | Heatsink 5054 |
| 57 | 5705-12638-00 | Q10, Q12, Q14, Q16, Q18 | Heatsink 5298B |
| 58 | 5733-12060-01 | Fuse Holder, F101-F116 | |
| 59 | Not Used | | |
| 60 | 5791-10862-03 | J108, J119, J136 | Connector, 3-pin Header STR Sq. |
| 61 | 5791-10862-04 | J103, J116-J118 | Connector, 4-pin Header STR Sq. |
| 62 | 5791-10862-05 | J112, J104-J106, J123, J124, J128, J129, J131, J132 | Connector, 5-pin Header STR Sq. |
| 63 | 5791-10862-06 | J107 | Connector, 6-pin Header STR Sq. |
| 64 | 5791-10862-07 | J101, J109, J114 | Connector, 7-pin Header STR Sq. |
| 65 | 5791-10862-09 | J102, J110, J122, J125, J127, J130, J137, J138 | Connector, 9-pin Header STR Sq. |
| 66 | 5791-10862-11 | J120, J121 | Connector, 11-pin Header STR Sq. |
| 67 | 5791-10862-12 | J115 | Connector, 12-pin Header STR Sq. |
| 68 | 5791-10862-13 | J126 | Connector, 13-pin Header STR Sq. |
| 69 | 5791-12461-05 | J111 | Connector, 5-pin Header STR Sq. |
| 70 | 5791-12461-09 | J133-J135 | Connector, 9-pin Header STR Sq. |
| 71 | 5791-12516-00 | J113 | 34 HEN 2x17 STR |
| 72 | 5824-09248-00 | TP1-TP8 | Test Point #1502-1 |
| 73 | 5041-09163-00 | C9 | Capacitor, 2.2µfd TANT |
| 74-100 | Not Used | | |
| 101 | Not Used | | |
| 102 | 5730-09071-00 | F114 | Fuse, 8A, 32v |
| 103 | Not Used | | |
| 104 | 5731-09432-00 | F112 | Fuse, S-B, 7A., 250v |
| 105 | 5731-09651-00 | F106 - F111, F113 | Fuse, S-B, 5A., 250v |
| 106 | Not Used | | |
| 107 | 5731-10356-00 | F101 - F105, F116 | Fuse, S-B, 3A., 250v |
| 108 | 5730-09797-00 | F115 | Fuse, S-B, 3/4A., 250v |
| 109 | 5705-12698-00 | | Heatsink #62365 |
| 110 | 4010-01006-00 | | Mach. Screw, 10-32 x 5/8 |
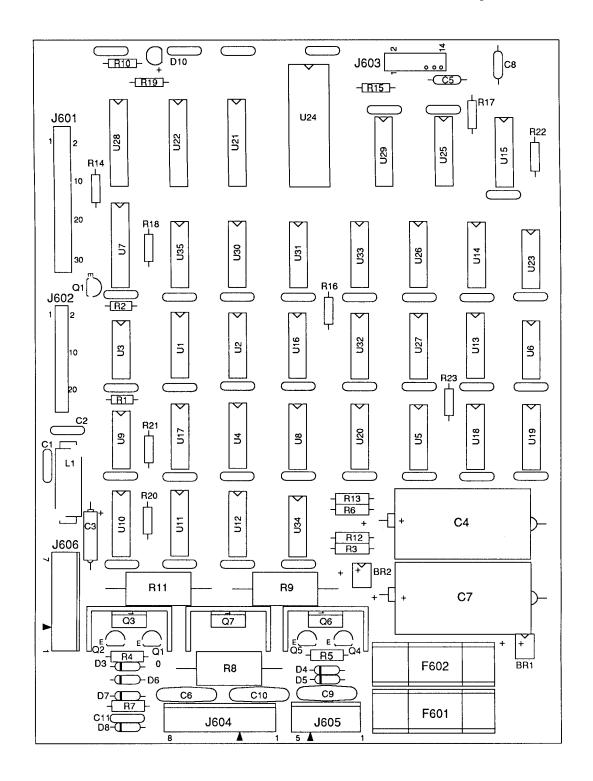
# A-12697-1    WPC Power Driver Assembly
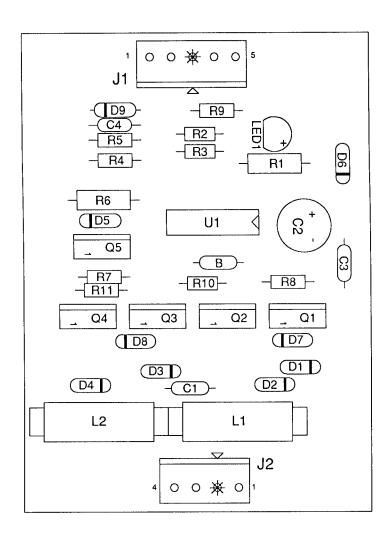
# A-14039    Dot Matrix Controller Assembly

| Part Number | Ckt Designator | Description |
|---|---|---|
| 5010-08991-00 | R1 | Resistor, 4.7KΩ, 1/4w, 5% |
| 5010-09224-00 | R10 | Resistor, 270Ω, 1/4w, 5% |
| 5010-12832-00 | R3, R6, R12, R13 | Resistor, 47KΩ, 1/2w, 5% |
| 5010-12841-00 | R4, R5 | Resistor, 120Ω, 1/2w, 5% |
| 5012-12830-00 | R9 | Resistor, 1.8KΩ, 5w, 5% |
| 5012-12842-00 | R11 | Resistor, 120Ω, 5w, 5% |
| 5012-12843-00 | R8 | Resistor, 4.7K, 5w, 5% |
| 5010-10171-00 | R7 | Resistor, 56Ω, 1/4w, 5% |
| 5040-08986-00 | C3 | Capacitor, 100µfd., 10v, (±20%) |
| 5040-12324-00 | C4, C7 | Capacitor, 150µfd., 160v, (±50%) |
| 5043-08980-00 | BYPASS | Capacitor, .01µfd., 50v, (+80, -20%) |
| 5043-09072-00 | C6, C9, C10 | Capacitor, .1µfd., 500v, (+80, -20%) |
| 5043-09845-00 | C1, C2, C11 | Capacitor, 1KP, 50v, (±20%) |
| 5043-09492-00 | C5, C8 | Capacitor, 100P, 50v, (±10%) |
| 5070-09054-00 | D7 | Diode, 1N4004, 1.0A. |
| 5075-12824-00 | D6, D8 | Zener, 1N4742A, 12v |
| 5075-12823-00 | D4, D5 | Zener, 1N4758A, 62v |
| 5075-12826-00 | D3 | Zener, 1N4759A, 62v |
| 5100-12833-00 | BR1, BR2 | Bridge, 400v, 1A. |
| 5160-10269-00 | Q1 | Transistor, 2N3904 NPN |
| 5164-09056-00 | Q2, Q10 | Transistor, MPSD02, NPN |
| 5164-12154-00 | Q3, Q7 | Transistor, MJE15030 NPN |
| 5194-09055-00 | Q4, Q5 | Transistor, MPSD52 PNP |
| 5194-12155-00 | Q6 | Transistor, MJE15031 PNP |
| 5281-09738-00 | U16, U25 - U27 | IC, 74LS157 |
| 5281-10033-00 | U3 | IC, 74LS30 |
| 5281-10043-00 | U31 - U33, U35 | IC, 74LS175 |
| 5311-10946-00 | U4, U5, U17, U18, U20 | IC, 74HC74 |
| 5311-10947-00 | U9 | IC, 74HC125 |
| 5311-10951-00 | U10, U11 | IC, 74HC161 |
| 5311-10977-00 | U6 | IC, 74HC04 |
| 5311-12817-00 | U29 | IC, 74HC165 |
| 5311-12819-00 | U21 | IC, 74HC688 |
| 5311-12820-00 | U23 | IC, 74HC27 |
| 5311-12822-00 | U13 - U15 | IC, 74HC193 |
| 5315-12009-00 | U22 | IC, 74HCT374 |
| 5315-12812-00 | U1, U2, U30 | IC, 74HCT138 |
| 5281-09308-00 | U28 | IC, 74HCT245 |
| 5315-12815-00 | U8, U34 | IC, 74HCT08 |
| 5315-12816-00 | U19 | IC, 74HCT32 |
| 5315-12821-00 | U7 | IC, 74HCT240 |
| 5340-12278-00 | U24 | S/RAM 2064 150NS |
| 5551-09822-00 | L1 | IND 4.7µH, 3.0A. |
| 5671-09019-00 | D10 | Display LED Red |
| 5705-09199-00 | Q3, Q6, Q7 | Heatsink 6030B |
| 5731-12328-00 | F601, F602 | Fuse, 3/8A.,SB, 250v |
| 5733-12060-00 |  | Fuse Holder (F601, F602) |
| 5791-10850-00 | J602 | Connector, 26-pin STR Sq. |
| 5791-10862-05 | J605 | Connector, 5-pin Header Sq. |
| 5791-10862-07 | J606 | Connector, 7-pin Header Sq. |
| 5791-10862-08 | J604 | Connector, 8-pin Header Sq. |
| 5791-12516-00 | J601 | 34 Hen 17x2 STR |
| 5791-12827-00 | J603 | 14 Hen 7x2 STR |
| 5010-09036-00 | R14-R23 | Resistor, 100Ω, 1/4w, 5% |
| 4006-01003-06 | Q3, Q6, Q7 | Mach. Screw, 6-32 x 3/8 |
| 4406-01128-00 | Q3, Q6, Q7 | Nut, 6-32 KEPS |

# A-14039    Dot Matrix Controller Assembly
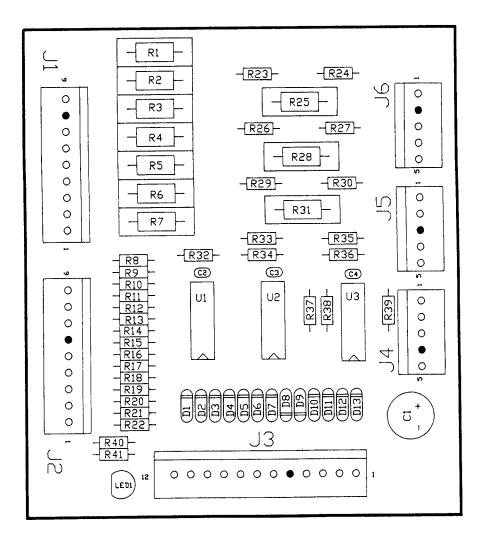
# A-15680    Bi-Directional Motor Drive Assembly
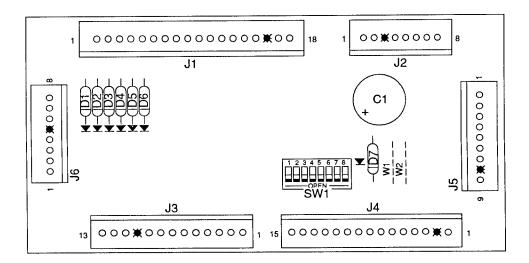


| Part Number | Designator | Description |
| --- | --- | --- |
| 5162-12635-00 | Q1, Q3, Q5 | Transistor TIP 102 NPN |
| 5192-12428-00 | Q2, Q4 | Transistor TIP 107 PNP |
| 5370-12272-00 | U1 | I.C. LM339 Quad Comp |
| 5551-09822-00 | L1,L2 | Ind. 4.7µΩ |
| 5791-12273-04 | J2 | Connector, 4-pin Header Str Sq. LCK .156 |
| 5791-12273-05 | J1 | Connector, 5-pin Header Str Sq. LCK .156 |
| 5070-09054-00 | D1 - D9 | Diode 1N4004, 1.0A. |
| 5043-08996-00 | C1 | Capacitor, 0.1µfd (±20%) |
| 5040-10974-00 | C2 | Capacitor, 100µfd, 35v (+80, -20%) |
| 5043-08980-00 | C3, B, C4 | Capacitor, 0.01µfd, 50v (+1, -20%) |
| 5010-09085-00 | R2, R3, R9 | Resistor, 1.5KΩ, 1/4w, 5% |
| 5010-09034-00 | R4, R5 | Resistor, 10KΩ, 1/4w, 5% |
| 5010-08991-00 | R7, R8, R10, R11 | Resistor, 4.7KΩ, 1/4w, 5% |
| 5010-09061-00 | R1, R6 | Resistor, 680Ω, 1/2w, 5% |
| 5671-09019-00 | LED1 | Display LED Red |

# A-15430    10-Switch Opto Board



| Part Number | Designator | Description |
|---|---|---|
| 5040-10974-00 | C1 | Capacitor, 100µfd, 35v (+80, -20%) |
| 5043-08980-00 | C2 - C4 | Capacitor, 0.01µfd, 50v (+1, -20%) |
| 5671-09019-00 | LED1 | Display LED 1 Red |
| 5370-12272-00 | U1 - U3 | IC LM339 Quad |
| 5070-09054-00 | D1 - D13 | Diode 1N4004 1.0A. |
| 5010-12928-00 | R1 - R7, R25, R28, R31 | Resistor, 270Ω, 2w, 5% |
| 5010-09999-00 | R8 - R21, R23, R24, R26, R27, R29, R30 | Resistor, 2KΩ, 1/4w, 5% |
| 5010-09314-00 | R22 | Resistor, 1.2KΩ, 1/4w, 5% |
| 5010-09162-00 | R32, R35, R39, R40, R41 | Resistor, 100KΩ, 1/4w, 5% |
| 5010-08774-00 | R33, R34, R36 | Resistor 22KΩ, 1/4w, 5% |
| 5010-09034-00 | R37, R38 | Resistor, 10KΩ, 1/4w, 5% |
| 5791-10862-12 | J3 | Connector, 12-pin Header STR Sq. Pin .156 |
| 5791-10862-09 | J1, J2 | Connector, 9-pin Header STR Sq. Pin .156 |
| 5791-10862-05 | J4 - J6 | Connector, 5-pin Header STR Sq. Pin .156 |

# A-14689    WPC Coin Door Interface Board
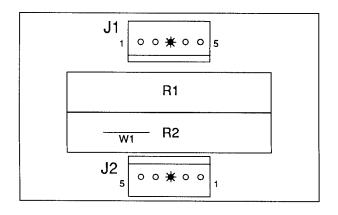


| Part Number | Designator | Description |
|---|---|---|
| 5070-09054-00 | D1-D7 | Diode, 1N4004, 1.0A. |
| 5791-10862-18 | J1 | Connector, 18-pin Header Str Sq. |
| 5791-10862-08 | J2, J6 | Connector, 8-pin Header Str Sq. |
| 5791-10862-13 | J3 | Connector, 13-pin Header Str Sq. |
| * 5791-10862-15 | J4 | Connector, 15-pin Header Str Sq. |
| * 5791-10862-09 | J5 | Connector, 9-pin Header Str Sq. |
| * 5645-09025-00 | SW1 | Switch DIP 8-Position |
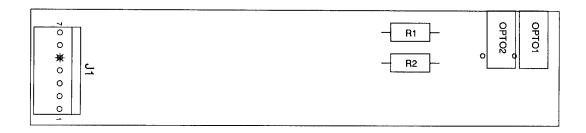
**Notes:**
1. For Belgium, France, Finland, Sweden and England use A-14689-1 Coin Door Interface Board.
2. * = Used on Electronic Coin Door only.

# A-15309-1    2-10W Resistor PCB  Assembly

```
          J1
              1  o  o  ✳  o  o  5

        ┌──────────────────────────┐
        │            R1            │
        ├──────────────────────────┤
        │  ──── W1 ──   R2         │
        └──────────────────────────┘
          J2
              5  o  o  ✳  o  o  1
```

| Part Number     | Designator | Description              |
|-----------------|------------|--------------------------|
| 5012-13138-00   | R1         | Resistor, 1Ω, 10w, 5%    |
| 5010-09534-00   | R2         | Resistor, 0Ω Jumper      |
| 5791-10862-05   | J1, J2     | Connector, 5-pin Header  |
| 03-8022-1       | -          | Spacer                   |

# A-15894    Flipper Opto Board

```
  7 o
    o
    ✳     J1                          ─┤ R1 ├─        OPTO2  OPTO1
    o                                  ─┤ R2 ├─
    o
    o
    o
  1
```

| Part Number     | Designator     | Description                |
|-----------------|----------------|----------------------------|
| 5010-08930-00   | R1, R2         | Resistor 470Ω, 1/2w, 5%    |
| 5490-12451-00   | OPTO1, OPTO2   | Opto Inter Lg. 10ma.       |
| 5791-12273-07   | J1             | Connector, 7-pin Header    |

## A-15205-R-4    Fliptronic II Flipper Assembly (Lower Right)
## A-15205-L-4    Fliptronic II Flipper Assembly (Lower Left)

| Item | Part Number | Description |
|------|-------------|-------------|
| 1. | B-13104-R | Flipper Base Assy, Right |
| * | B-13104-L | Flipper Base Assy, Left |
| 2. | SW-1A-193 | Switch Assembly |
| 3. | 4701-00002-00 | Lockwasher, #6 Split |
| 4. | 4105-01019-10 | Sh. Metal Screw, #5 x 5/8 P-RH-A |
| 5. | 4008-01079-05 | Mach. Screw, 8-32 x 5/16 H-SOC |
| 6. | 4701-00003-00 | Lockwasher, #8 Split |
| 7. | 01-9375 | Switch Mounting Bracket |
| 8. | 20-6516 | Speednut, Tinnerman |
| 9. | 4010-01066-06 | Cap Screw, 10-32 x 3/8, SH |
| 10. | 4701-00004-00 | Lockwasher, #10 Split |
| 11. | A-12111 | Flipper Stop Assembly |
| 12. | FL-15411 | Flipper Coil (Orange) |
| a) | 03-7066-5 | Coil Tubing |
| 13. | 01-7695 | Solenoid Bracket |
| 14. | 4006-01017-04 | Mach. Screw, 6-32 x 1/4 P-RH-S |
| 15. | 10-364 | Spring |
| 16. | B-13882-R | Crank Link Assembly, Right |
| * | B-13882-L | Crank Link Assembly, Left |
| a) | B-13884-R | Flipper Crank Assembly, Right |
| * | B-13884-L | Flipper Crank Assembly, Left |
| b) | A-10656 | Flipper Link Assembly |
| c) | 02-4179 | Link Spacer Bushing |
| d) | 4010-01086-14 | Cap Screw, 10-32 x 7/8 SH |
| e) | 4700-00023-00 | Flatwasher, 5/8 x 13/64 x 16ga. |
| f) | 4701-00004-00 | Lockwasher #10 Split |
| g) | 4410-01132-00 | Nut, 10-32 ESN |
| 17. | 23-6577 | Bumper Plug, 5/8" |
| 18. | 03-7568 | Flipper Bushing |
| 19. | 4006-01005-06 | Mach. Screw, 6-32 x 3/8 P-PH |
| 20. | 4406-01117-00 | Nut, 6-32 Hex. |

**Associated Parts for Left & Right Flippers:**

| | | |
|------|-------------|-------------|
| 21. | 23-6678-7 | Flipper Rubber (Red) |
| 22. | 20-9734-6 | Flipper & Shaft (Yellow) |

Notes:
1. * Items for Left Flipper Assembly ONLY.
2. Each Flipper Assembly is mounted beneath the playfield, in conjuction with the Plastic Flipper & Shaft, and Flipper Rubber on the upper side of the playfield.
3. With the flipper, in the non-activated position, the E.O.S. Switch contacts must have a gap of .062 (±.015) inch. When flipper is activated switch must close.
4. Any adjustment of the E.O.S. Switch must be made at a minimum distance of 0.25 inch from the switch body.
5. Longer blade of E.O.S. Switch must be straight. Gap adjustment is done by adjusting shorter blade.
6. All moving elements of the assembly must operate freely without any evidence of binding.
7. Apply Loctite™ 242 when reataching screws to the Flipper Stop Assy, the Solenoid Bracket, and the Flipper Bushing.

## A-16090-L-4
## Flipper Assembly (Upper Left)
(Parts listed replace same items of A-15205-R-4)

| Item | Part Number | Description |
|------|-------------|-------------|
| 1. | A-16091-L | Flipper Base Assy, Left |

**Associated Part:**

| | | |
|------|-------------|-------------|
| 22. | 20-9250-6 | Flipper & Shaft (Yellow) |

# A-15205-R-4, A-15205-L-4 & A-16090-L-4
## Fliptronic II Flipper Assembly
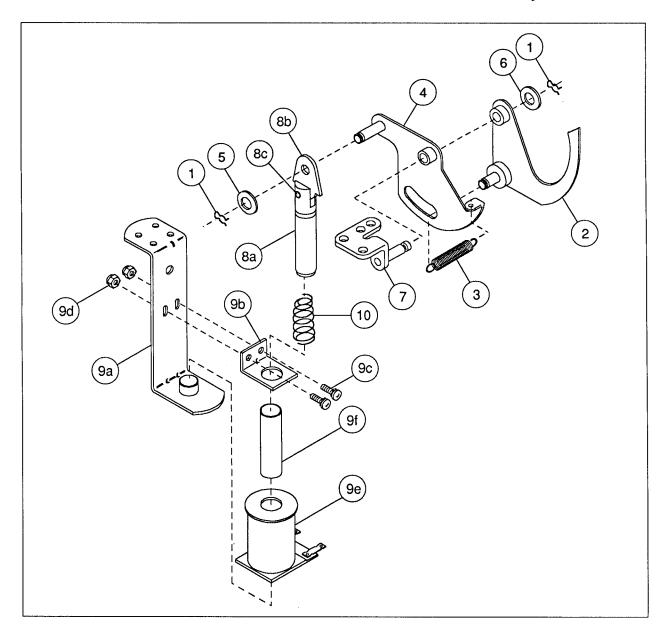
# A-8039-3     Outhole Kicker Assembly



| Item | Part Number | Description |
|------|-------------|-------------|
| 1. | A-6378 | Mounting Plate Assembly |
| 2. | 03-7066 | Coil Tubing |
| 3. | A-6889 | Kicker Lever Assembly |
| 4. | A-8038 | Coil Stop Assembly |
| 5. | AE-27-1200 | Coil Assembly |
| 6. | 03-7176-1 | Striker Ring |
| 7. | 10-101-4 | Spring-Reset |
| 8. | 20-8712-25 | "E" Ring, 1/4" Shaft |
| 9. | 4006-01003-03 | Mach. Screw, 6-32 x 3/16" |
| 10. | A-8335 | Coil Plunger Assembly |
| a) | 02-2364 | Coil Plunger |
| b) | 20-8716-5 | Roll Pin, 1/8 x 7/16" |
| c) | 01-4251 | Ball Return Link |
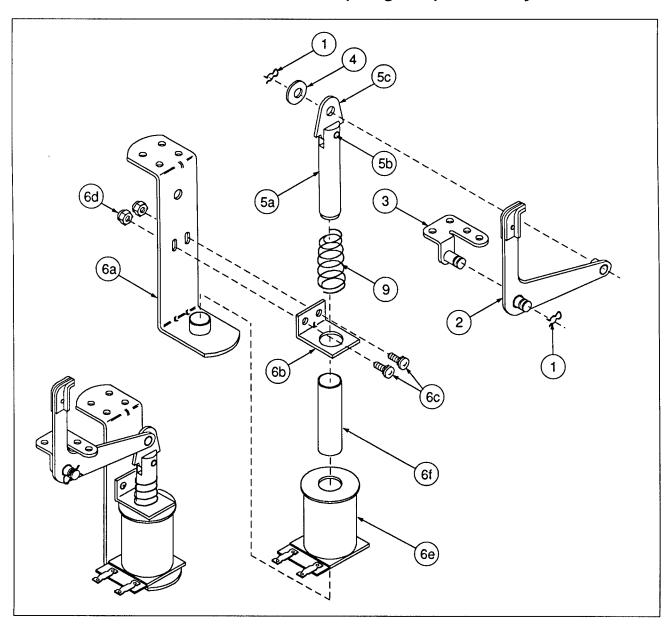
# C-9638    Ball Shooter Lane Feeder Assembly



**Associated Parts:**
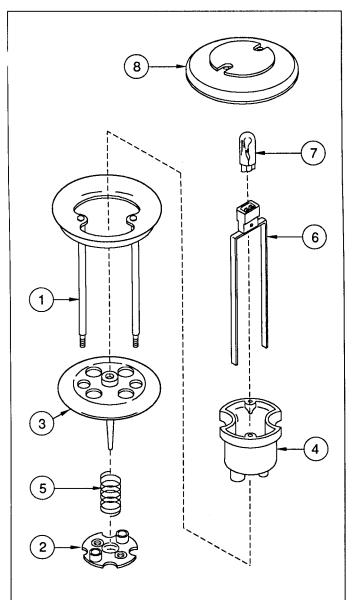
| Item | Part Number | Description | | Item | Part Number | Description |
|------|-------------|-------------|---|------|-------------|-------------|
| 1. | 12-6227 | Hairpin Clip | | 9. | **B-9362-L-2** | Coil & Bracket Assembly |
| 2. | A-8247 | Eject Cam Assembly | | a) | B-7572-1 | Bracket & Stop Assembly |
| 3. | 10-362 | Ejector Spring (Plain) | | b) | 01-8-508-S | Coil Retaining Bracket |
| 4. | A-6949-L | Spring Plate Assembly | | c) | 4006-01017-06 | Mach. Screw, 6-32 x 3/8 |
| 5. | 4700-00030-00 | Flatwasher, 17/64 x1/2 x 15ga. | | d) | 4406-01119-00 | Nut, 6-32 ESN |
| 6. | 4700-00103-00 | Flatwasher, 17/64 x1/2 x 28ga. | | e) | AE-26-1200 | Coil Assembly |
| 7. | A-8268 | Mounting Bracket Assembly | | f) | 03-7066 | Coil Tubing |
| 8. | A-8050-1 | Coil Plunger Assembly | | 10. | 10-128 | Spring |
| a) | 02-3407-2 | Coil Plunger Assy, 2-1/8" | | | | |
| b) | 03-8085 | Armature Link | | | | |
| c) | 20-8716-5 | Roll Pin, 1/8 x 7/16" | | | | |

# B-12665    Kicker Arm (Slingshot) Assembly

| Item | Part Number | Description | | Item | Part Number | Description |
|------|-------------|-------------|---|------|-------------|-------------|
| 1. | 12-6227 | Hairpin Clip | | 6. | **B-11203-R-1** | Coil & Bracket Assembly |
| 2. | A-12664 | Kicker Crank Assembly | | a) | B-7572-1 | Bracket & Stop Assembly |
| 3. | A-5653 | Mounting Bracket Assembly | | b) | 01-8-508-S | Coil Retaining Bracket |
| 4. | 4700-00030-00 | Flatwasher, 17/64 x 1/2 x 15ga. | | c) | 4006-01017-06 | Mach. Screw, 6-32 x 3/8 |
| 5. | A-5103 | Coil Plunger Assembly | | d) | 4406-01119-00 | Nut, 6-32 ESN |
| a) | 02-2364 | Coil Plunger | | e) | AE-26-1500 | Coil Assembly |
| b) | 03-8085 | Armature Link | | f) | 03-7066 | Coil Tubing |
| c) | 20-8716-5 | Roll Pin, 1/8 x 7/16" | | | | |
| | | | | 7. | 10-128 | Spring |

# B-9414-3
## Jet Bumper Assembly
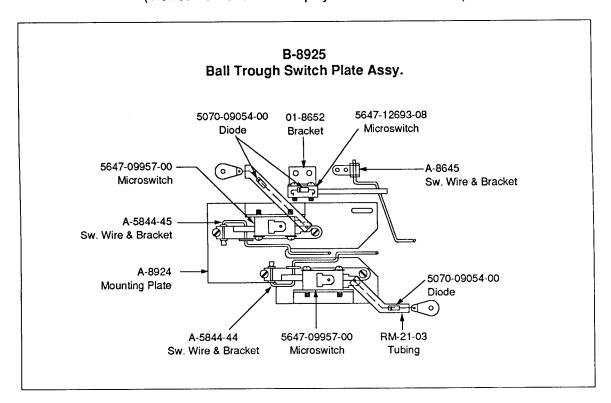
| Item | Part Number | Description |
|---|---|---|
| 1. | A-4754 | Bumper Ring Assembly |
| 2. | 03-6009-A5 | Bumper Base, White |
| 3. | 03-6035-4 | Bumper Wafer, Red |
| 4. | 03-7443-5 | Bumper Body, White |
| 5. | 10-7 | Spring |
| 6. | 24-8776 | Socket - Wedge Base |
| 7. | 24-8768 | Bulb #555 (6.3V., 0.25A.) |

**Associated Parts:**

| Item | Part Number | Description |
|---|---|---|
| 8. | 03-8254-9 | Jet Bumper Cap, Trans. Red (3) |
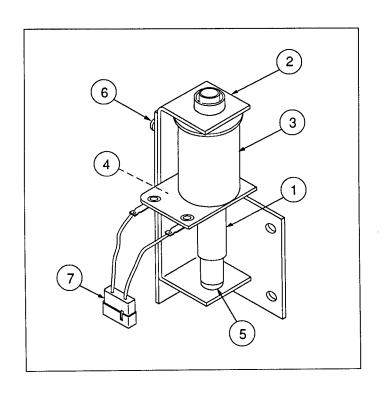
# A-9415-2
## Jet Bumper Coil Assembly

| Item | Part Number | Description |
|---|---|---|
| 1. | B-7417 | Bracket & Stop Assembly |
| 2. | 01-1747 | Coil Retaining Bracket |
| 3. | 01-5492 | Armature Link, Steel |
| 4. | 01-5493 | Armature Link, Bakelite |
| 5. | 02-3406-1 | Coil Plunger |
| 6. | 10-326 | Armature Spring |
| 7. | AE-26-1200 | Coil Assembly |
| 8. | 4006-01017-04 | Mach. Screw, 6-32 x 1/4" |
| 9. | 03-7066 | Coil Tubing |
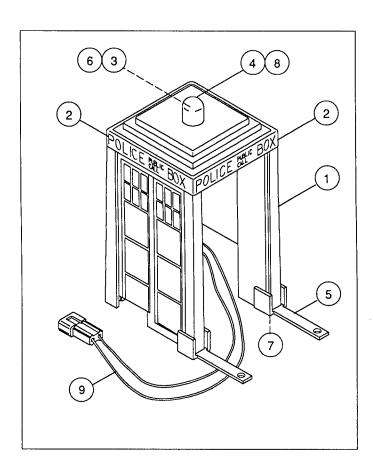
# Ball Trough Switches
(Viewed from underside of playfield to show locations)

## B-8925
## Ball Trough Switch Plate Assy.

5070-09054-00
Diode

01-8652
Bracket

5647-12693-08
Microswitch

5647-09957-00
Microswitch

A-8645
Sw. Wire & Bracket

A-5844-45
Sw. Wire & Bracket

A-8924
Mounting Plate

5070-09054-00
Diode

A-5844-44
Sw. Wire & Bracket

5647-09957-00
Microswitch

RM-21-03
Tubing

## B-10686-1
## Knocker Assembly
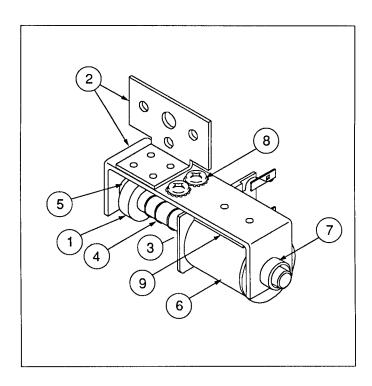
| Item | Part Number | Description |
|------|-------------|-------------|
| 1. | A-5387 | Coil Plunger Assembly |
| 2. | B-7409-2 | Mtg. Bracket Assembly |
| 3. | AE-23-800 | Coil Sub-Assembly |
| 4. | 01-8-508-T | Coil Retaining Bracket |
| 5. | 23-6420 | Rubber Grommet |
| 6. | 4008-01017-06 | Mach. Screw, 8/32 x 3/8 |
| 7. | H-11835 | Knocker Cable |
| 8. | 03-7067-5 | Coil Tubing |

# A-15647
## Tardis Box Assembly

| Item | Part Number | Description |
|------|-------------|-------------|
| 1. | 03-8659 | Tardis Box |
| 2. | *31-1688 | Decal |
| 3. | 24-8821 | Socket Assembly |
| 4. | 24-8768 | Bulb #555, 6.3v |
| 5. | 01-10748 | Mounting Bracket |
| 6. | 4104-01001-06 | Sh. Metal Screw, #4 x 3/8 P-PH |
| 7. | 4104-01042-08 | Sh. Metal Screw, #4 x 1/2 P-FH |
| 8. | 03-8063-1 | Light Bulb Sleeve |
| 9. | H-15512 | Cable Assembly |

* Not available for individual sale. Order Decal Set (31-1688)

# A-15720
## Kicker Bracket Assembly

| Item | Part Number | Description |
|------|-------------|-------------|
| 1. | A-6306-2 | Bell Armature Assembly |
| 2. | A-14526 | Mounting Bracket Assembly |
| 3. | 01-8-508-T | Solenoid Bracket |
| 4. | 10-135 | Solenoid Spring |
| 5. | 23-6420 | Rubber Grommet |
| 6. | AE-26-1200 | Coil Assembly |
| 7. | 03-7067-5 | Coil Tubing |
| 8. | 4008-01017-04 | Mach. Screw, #8-32 x 5/16 P-RH |
| 9. | 03-8523 | Insulator |
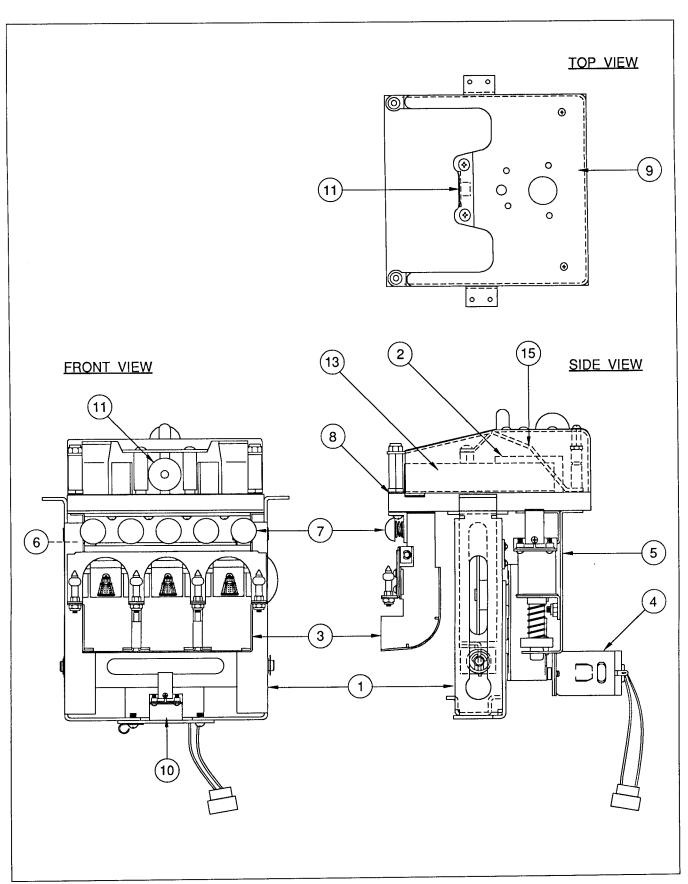
# 20006-PL-UP    Mini-Playfield Assembly

| Item | Part Number | Description |
|---|---|---|
| 1. | A-15581 | Main Support Bracket |
| 2. | 01-10671 | Ball Guide (2) |
| 3. | A-15356 | 3-Door Assembly |
| 4. | A-15634 | Motor & Cam Assembly |
| 5. | A-15358 | Ball Popper Assembly |
| 6. | A-15358-1 | Ball Popper Assembly |
| 7. | A-15500 | 5-Target Assembly |
| 8. | A-15551 | Flap Assembly |
| 9. | A-15582 | Mini-Playfiled Cover Assembly |
| 10. | A-15897 | Opto & Cable Assembly |
| 11. | A-15903 | Standup Target & Decal Assembly |
| 12. | 01-10644-L | Ball Guide, Left |
| 13. | 01-10644-R | Ball Guide, Right |
| 14. | 01-10646-L | Ball Deflector, Left |
| 15. | 01-10646-R | Ball Deflector, Right |
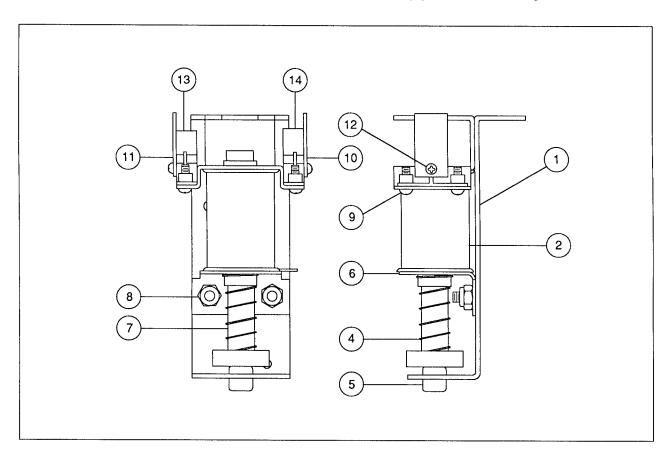
**Not Shown:**

| | | |
|---|---|---|
| | A-8882 | Light Socket Assembly w/Diode (2) |
| | A-11905 | Socket & Bulb Assembly (3) |
| | H-15514 | Mini Playfield Cable |
| | H-15593 | Motor Cable |
| | 02-4426-2 | Post Fastener #8WS  6-32 (2) |
| | 02-4342-1 | Post 8-32 Threaded (2) |
| | 02-4576 | Roller Cam |
| | 02-4659 | Post #10 (2) |
| | 03-7520-2 | Ty-Wrap Nylon (2) |
| | 02-4252-10 | F-F Spacer, 6-32 x 5/8 |
| | 03-8365-9 | Post # 8 Transparent (2) |
| | 20-8712-37 | "E"-Ring 3/8" Shaft |
| | 23-6556 | Rubber Bumper Sleeve, Black (4) |
| | 36-20006-1 | Hardcoat Mini-Playfield |
| | 4104-01020-08 | Sh. Metal Screw, #4 x 1/2 (4) |
| | 4106-01115-06Y | Sh. Metal Screw#6x3/8 (3) |
| | 4106-01033-08 | Sh. Metal Screw, #6 x 1/2 (8) |
| | 4700-00021-00 | Flatwasher, 13/64 x 7/16 x 21ga. (2) |
| | 4408-01119-01 | Nut 8-32 ESNA/NTM (2) |
| | 4006-01027-06 | Mach. Screw, 6-32 x 3/8 (4) |
| | 4406-01119-00 | Nut 6-32 ESN (2) |
| | 4008-01017-10 | Mach. Screw, 8-32 x 5/8 (4) |
| | 4006-01003-08 | Mach. Screw, 6-32 x 1/2 (4) |

# 20006-PL-UP    Mini-Playfield Assembly



TOP VIEW

⑪

⑨

FRONT VIEW

⑪

⑥

⑦

③

①

⑩

SIDE VIEW

⑬  ②  ⑮

⑧

⑤

④
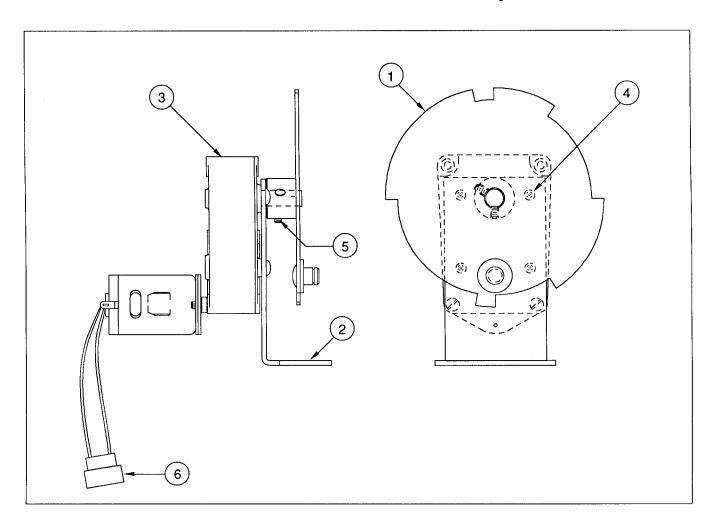
# A-15358 & A-15358-1    Ball Popper Assembly
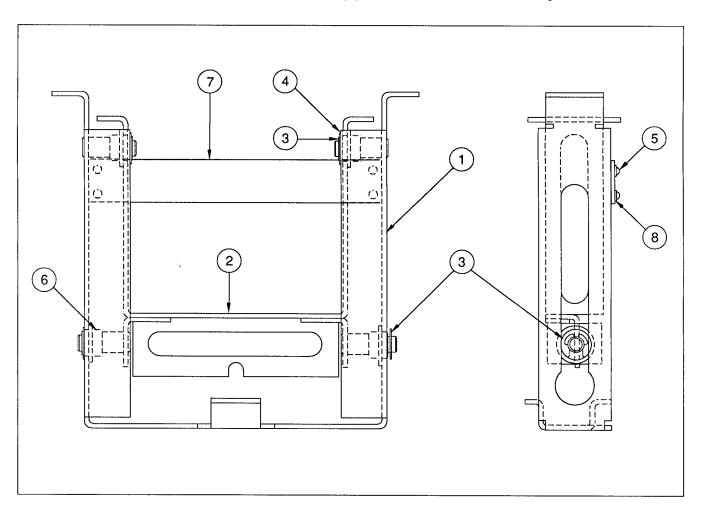


| Item | Part Number | Description |
| --- | --- | --- |
| 1. | A-15359 | Bracket Sub-Assembly |
| 2. | AE-26-1500 | Coil Assembly |
| 3. | 03-7067 | Coil Tubing |
| 4. | 10-135 | Solenoid Spring |
| 5. | 23-6420 | Rubber Grommet |
| 6. | 01-10895 | Coil Mounting Bracket |
| 7. | A-13270 | Bell Armature Assembly |
| 8. | 4408-01119-00 | Nut 8-32 ESN |
| 9. | 4106-01004-06 | Sh. Metal Screw #6 x 3/8 P-PH-ST |
| 10. | A-14231 | LED Assembly |
| 11. | A-14232 | Photo Trans. Assembly |
| 12. | 4104-01001-06 | Sh. Metal Screw #4 x 3/8 P-PH |
| 13. | 03-8506 | Opto Mounting Base, Black |
| 14. | 03-8506-1 | Opto Mounting Base, White |

# A-15634    Motor & Cam Assembly
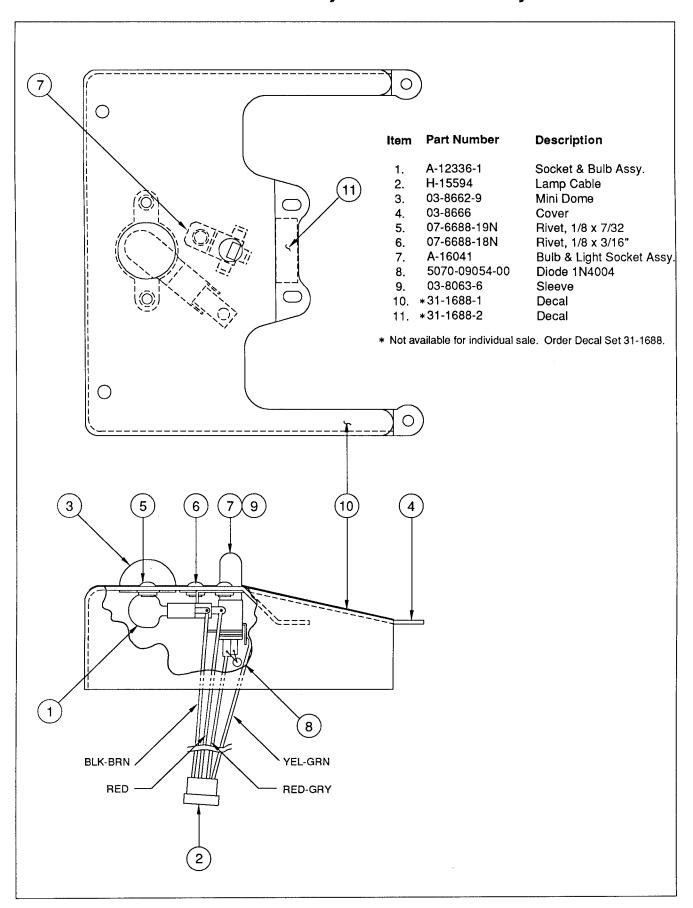


| Item | Part Number | Description |
|------|-------------|-------------|
| 1. | A-15035 | Cam Assembly |
| 2. | 01-10421 | Motor Mounting Bracket |
| 3. | 14-7970 | Motor, 20v |
| 4. | 4008-01005-06 | Mach. Screw, #8-32 x 3/8 P-PH |
| 5. | 4323-01158-06 | Set Screw, 1/4-28 x 1/4 SH-KN-CP |
| 6. | H-15593 | Motor Cable |

# A-15581    Main & Support Bracket Assembly
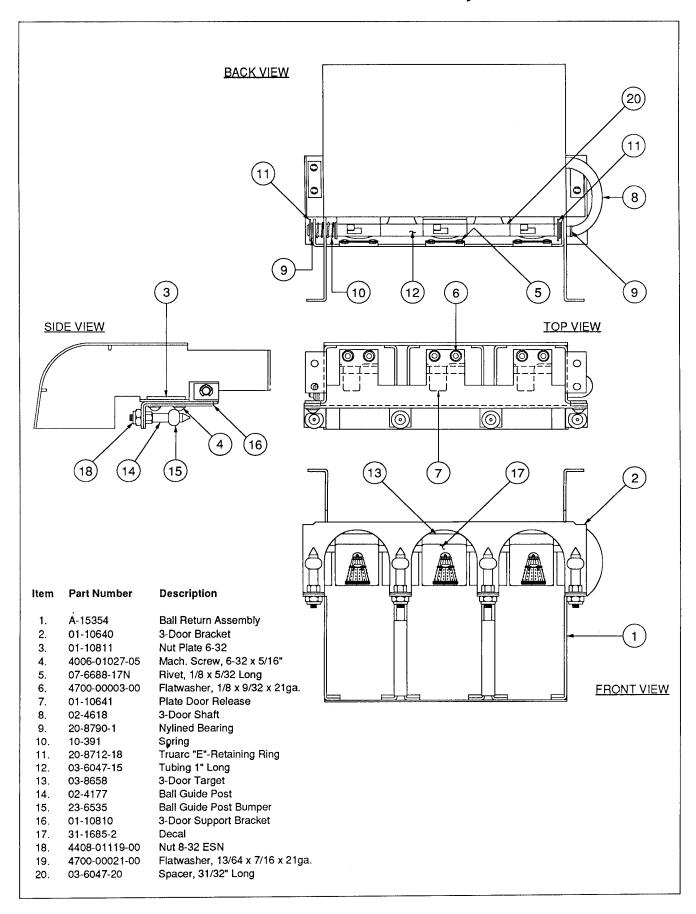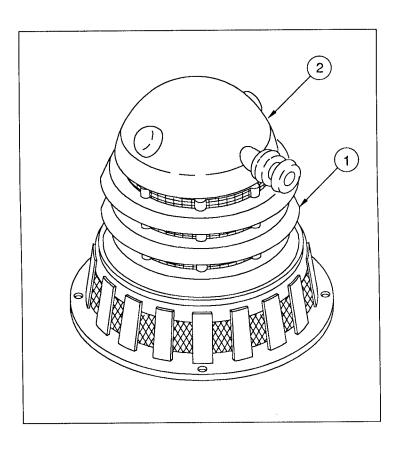


| Item | Part Number | Description |
|------|-------------|-------------|
| 1. | A-15036 | Support Bracket |
| 2. | A-15037 | Main Bracket |
| 3. | 20-8712-37 | "E"-Ring 3/8" Shaft |
| 4. | 4700-00131-00 | Flatwasher, 3/8 x 7/8 x 16ga. |
| 5. | 4006-01027-06 | Mach. Screw, 6-32 x 3/8 |
| 6. | 02-4579 | Roller w/Flange |
| 7. | 01-10642 | Plate Adjustment |
| 8. | 4701-00002-00 | Flatwasher #6 Split |

# A-15582    Mini-Playfield Cover Assembly

| Item | Part Number | Description |
|------|-------------|-------------|
| 1. | A-12336-1 | Socket & Bulb Assy. |
| 2. | H-15594 | Lamp Cable |
| 3. | 03-8662-9 | Mini Dome |
| 4. | 03-8666 | Cover |
| 5. | 07-6688-19N | Rivet, 1/8 x 7/32 |
| 6. | 07-6688-18N | Rivet, 1/8 x 3/16" |
| 7. | A-16041 | Bulb & Light Socket Assy. |
| 8. | 5070-09054-00 | Diode 1N4004 |
| 9. | 03-8063-6 | Sleeve |
| 10. | *31-1688-1 | Decal |
| 11. | *31-1688-2 | Decal |

* Not available for individual sale. Order Decal Set 31-1688.

BLK-BRN

RED

YEL-GRN

RED-GRY

# A-15356    3-Door  Assembly

SIDE VIEW

TOP VIEW

FRONT VIEW

| Item | Part Number | Description |
|------|-------------|-------------|
| 1.  | A-15354        | Ball Return Assembly |
| 2.  | 01-10640       | 3-Door Bracket |
| 3.  | 01-10811       | Nut Plate 6-32 |
| 4.  | 4006-01027-05  | Mach. Screw, 6-32 x 5/16" |
| 5.  | 07-6688-17N    | Rivet, 1/8 x 5/32 Long |
| 6.  | 4700-00003-00  | Flatwasher, 1/8 x 9/32 x 21ga. |
| 7.  | 01-10641       | Plate Door Release |
| 8.  | 02-4618        | 3-Door Shaft |
| 9.  | 20-8790-1      | Nylined Bearing |
| 10. | 10-391         | Spring |
| 11. | 20-8712-18     | Truarc "E"-Retaining Ring |
| 12. | 03-6047-15     | Tubing 1" Long |
| 13. | 03-8658        | 3-Door Target |
| 14. | 02-4177        | Ball Guide Post |
| 15. | 23-6535        | Ball Guide Post Bumper |
| 16. | 01-10810       | 3-Door Support Bracket |
| 17. | 31-1685-2      | Decal |
| 18. | 4408-01119-00  | Nut 8-32 ESN |
| 19. | 4700-00021-00  | Flatwasher, 13/64 x 7/16 x 21ga. |
| 20. | 03-6047-20     | Spacer, 31/32" Long |

## A-16199
## Dalek Assembly

| Item | Part Number | Description |
|------|-------------|-------------|
| 1. | 03-8731 | Dalek Bottom |
| 2. | 03-8735 | Dalek Top |
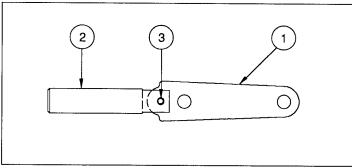
## A-16191
## Light Dalek Assembly

| Item | Part Number | Description |
|------|-------------|-------------|
| 1. | 01-10724-1 | Bracket |
| 2. | A-12336-1 | Light Socket Assy. |
| 3. | 4006-01003-04 | Mach. Screw, 6-32 x 1/4 |
| 4. | H-15703 | Cable |
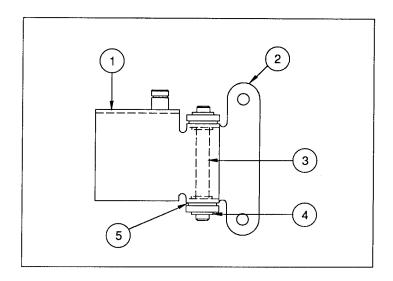
## A-15641
## Trap Door Assembly

| Item | Part Number | Description |
|------|-------------|-------------|
| 1. | B-7572-1 | Bracket & Stop Assembly |
| 2. | 01-8-508-S | Coil Retaining Bracket |
| 3. | 4006-01017-06 | Mach. Screw, 6-32 x 3/8 |
| 4. | 4406-01119-00 | Nut, 6-32 ESN |
| 5. | AE-26-1500 | Coil Assembly |
| 6. | 03-7066 | Coil Tubing |

## A-15442
## Cam & Plunger Assembly
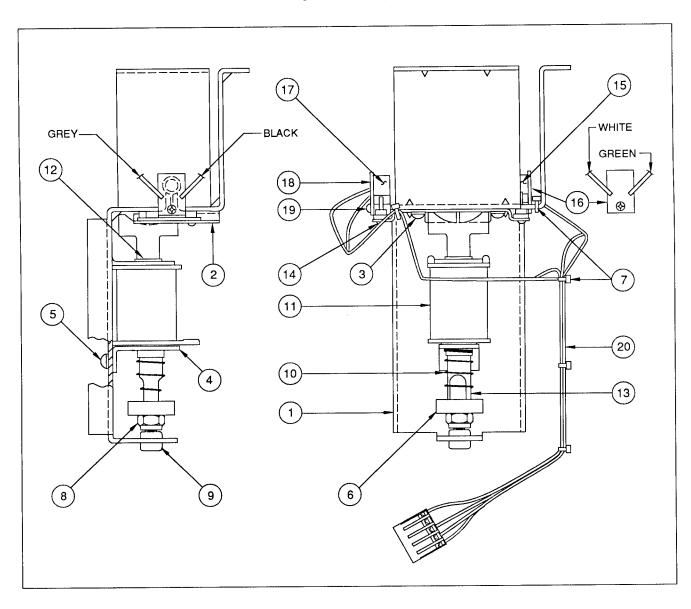
| Item | Part Number | Description |
|------|-------------|-------------|
| 1. | A-15443 | Cam & Stop Pin Assy. |
| 2. | 02-3407 | Solenoid Plunger |
| 3. | 20-8716-5 | Roll Pin 1/8 x 7/16" |

## A-15444
## Gate Assembly
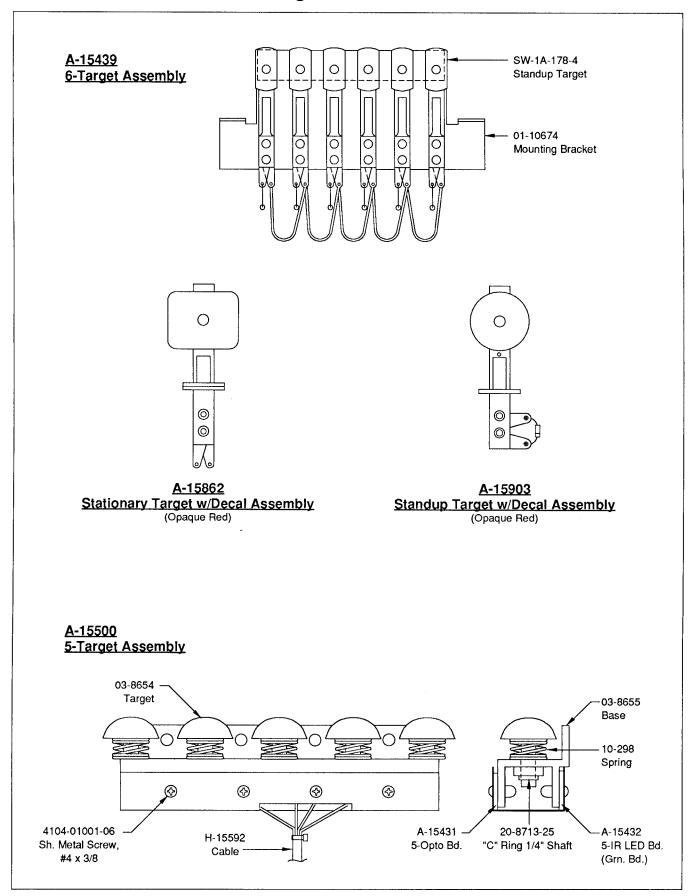
| Item | Part Number | Description |
|------|-------------|-------------|
| 1. | A-15445 | Gate Sub-Assembly |
| 2. | 01-10681 | Mounting Bracket |
| 3. | 02-4619 | Pin Pivot |
| 4. | 20-8712-18 | "E"-Ring 3/16" Shaft |
| 5. | 20-8790-1 | Nylined Bearing |

# A-15440    Cap Ball Popper Assembly



| Item | Part Number | Description | Item | Part Number | Description |
|------|-------------|-------------|------|-------------|-------------|
| 1. | 01-10676 | Main Bracket | 11. | AE-23-800 | Coil Assembly |
| 2. | 01-10677 | Opto Mounting | 12. | 03-7067-5 | Coil Tubing, Black |
| 3. | 4006-01017-04 | Mach. Screw, 6-32 P-RH-S | 13. | A-15580 | Armature Assembly |
| 4. | 01-9794 | Bracket | 14. | 4106-01004-06 | Sh. Metal Screw, #6 x 3/8 P-PH-ST |
| 5. | 4008-01017-04 | Mach. Screw, 8-32 x 1/4 P-RH-S | 15. | 03-8506 | Opto Mounting Base, Black |
| 6. | 02-2963 | Bell Armature Stop | 16. | A-14232 | Photo Transistor Assembly |
| 7. | 03-7520-2 | Ty-Wrap | 17. | 03-8506-1 | Opto Mounting Base, White |
| 8. | 4420-01119-00 | Nut, 1/4-20 ESN | 18. | A-14231 | LED Assembly |
| 9. | 23-6420 | Rubber Grommet | 19. | 4104-01001-06 | Sh. Metal Screw, #4 x 3/8 P-PH |
| 10. | 10-135 | Spring | 20. | H-15517 | Opto Cable |

# Target Assemblies

**A-15439**
**6-Target Assembly**

SW-1A-178-4
Standup Target

01-10674
Mounting Bracket

**A-15862**
**Stationary Target w/Decal Assembly**
(Opaque Red)

**A-15903**
**Standup Target w/Decal Assembly**
(Opaque Red)

**A-15500**
**5-Target Assembly**

03-8654
Target

03-8655
Base

10-298
Spring

4104-01001-06
Sh. Metal Screw,
#4 x 3/8

H-15592
Cable

A-15431
5-Opto Bd.

20-8713-25
"C" Ring 1/4" Shaft

A-15432
5-IR LED Bd.
(Grn. Bd.)

# Metal & Plastic Posts

| | Part Number | Description | Quantity |
|---|---|---|---|
| | 02-4020 | Support Post | 2 |
| | 02-4036 | Mini Post | 8 |
| | 02-4424-1 | Spring Post, 6-32 x 8-32 | 10 |
| | 02-4425-1 | Post, 8-32/ #8-32 | 2 |
| | 02-4426-1 | Post, #6-32 / #8 SMS | 10 |
| | 02-4426-2 | Post, #6-32 / #8 SMS | 3 |
| | 02-4433 | Post, #8 x 1-3/16" | 2 |
| | 02-4450 | Post Double Bumper | 3 |
| | 02-4657-1 | Mounting Post, 6-32 x 3.25" | 1 |
| | 02-4658 | Double Bumper Post | 2 |
| | 02-4659 | Mini Post | 10 |
| | 02-4660 | Mini Post Single Bumper | 1 |
| | 02-4677 | Mini Post | 3 |
| | 02-4658 | Double Bumper Post | 2 |
| | 02-4679 | Bumper Post #10 | 1 |
| | 03-8319-9 | Star Post #8 | 15 |
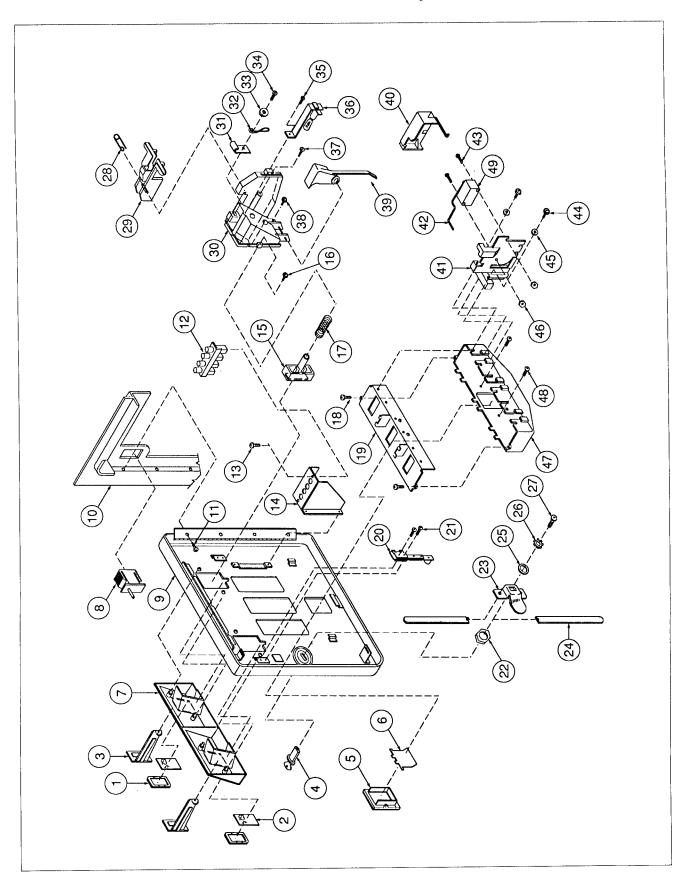
# Coin Door Assembly
## A-14148-1    U.S.A. Door with Decals
09-17002-x        2-Chute Door
09-17003-x        3-Chute Door
("x" is the country designator)

| Item | Part No. | Description | Quantity |
|------|----------|-------------|----------|
| 1 | 27-1038 | Button Cover | 2 or 3 |
| 2 | 27-1041-1→ 58 | Price Panel | 2 or 3 |
| 3 | 27-1026-1→ 17 | Coin Entry Plate | 2 or 3 |
| 4 | 27-1016 | Lock Assembly | 1 |
| 5 | 27-1061-1 | Coin Return - Bezel | 1 |
| 6 | 27-1062 | Coin Return Flap | 1 |
| 7 | 27-1021 | Button Housing - 2-slot | 1 |
|   | 27-1022 | Button Housing - 3-slot | 1 |
| 8 | 27-1111 | Interlock Switch | 1 |
| 9 | 27-1006-1 | Coin Door , 2-Slot | 1 |
|   | 27-1007-1 | Coin Door , 3-Slot | 1 |
| 10 | 27-1005 | Coin Door Frame | 1 |
| 11 | 27-1003 | M/C Screw, 6-32 x 3/16 | 4 |
| 12 | 5641-12724-00 | Diagnostic Switch | 1 |
| 13 | 27-1101 | M/C Screw, 4-40 x 1/4 | 2 |
| 14 | 01-9885 | Bracket, Diagnostic Switch | 1 |
| 15 | 27-1037 | Plastic Button | 1 |
| 16 | 27-1078 | M/C Screw, 6-32 x 3/8 | 2 or 3 |
| 17 | 27-1039 | Conical Spring | 2 or 3 |
| 18 | 27-1079 | Self-tapping Screw, #6 x 1/4 | 2 |
| 19 | 27-1077-1 | Coinbox Cover | 1 |
| 20 | 27-1066 | Slam Switch | 1 |
| 21 | 27-1067 | M/C Screw, 4-40 x 1/2 | 2 |
| 22 | 27-1017 | Nut (key) | 1 |
| 23 | 27-1012 | Locking Cam | 1 |
| 24 | 27-1011 | Locking Arm | 2 |
| 25 | 27-1020 | Washer | 1 |
| 26 | 27-1018 | Star Washer | 1 |
| 27 | 27-1019 | M/C Screw, 1/4-28 x 5/16 | 1 |
| 28 | 27-1089 | R-Ring | 1 |
| 29 | 27-1083 | Retainer | 1 |
| 30 | 27-1081 | Coin Inlet Chute | 2 or 3 |
| 31 | 27-1088 | Cable  Clamp | 2 or 3 |
| 32 | 27-1025 | Key Hook | 1 |
| 33 | 27-1086 | Washer, #6 | 2 or 3 |
| 34 | 27-1078 | M/C Screw, 6-32 x 3/8 | 1 or 2 |
|   | 27-1113 | M/C Screw, 6-32 x 7/16 | 1 |
| 35 | 27-1079 | Self-tapping Screw, #6 x 1/4 | 2 or 3 |
| 36 | 27-1084 | Lamp Socket | 2 or 3 |
|   | 27-1085 | Lamp | 2 or 3 |
| 37 | 27-1096 | Self-tapping Screw, #5 x 3/8 | 2 or 3 |
| 38 | 27-1087 | M/C Screw, 6-32 x 5/8 | 2 or 3 |
| 39 | 27-1082 | Lever Arm | 2 or 3 |
| 40 | 27-1097 | Switch Cover | 2 or 3 |
| 41 | 27-1091-1 | Coin Accept Chute | 2 or 3 |
| 42 | 27-1075 | Wire Form (Small) | 2 or 3 |
|   | or |  |  |
|   | 27-1093 | Wire Form (Large) |  |
| 43 | 27-1094 | M/C Screw, 4-40 x 7/8 | 4 or 6 |
| 44 | 27-1087 | M/C Screw, 6-32 x 5/8 | 4 or 6 |
| 45 | 27-1086 | Washer, #6 | 4 or 6 |
| 46 | 27-1095 | Nut, 4-40 ESNA | 4 or 6 |
| 47 | 27-1076-1 | Coin  Return Box | 1 |
| 48 | 27-1078 | M/C Screw, 6-32 x 3/8 | 2 |
| 49 | 27-1092 | Microswitch | 2 or 3 |
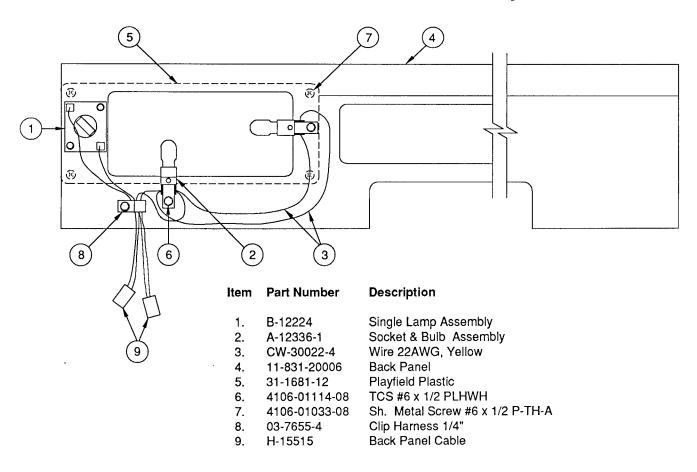
# Coin Door Assembly

# Cable List

| Part Number | Description |
|---|---|
| H-11835 | Knocker Cable |
| H-13870 | Black Jumper Cable |
| H-14584 | Dot Matrix Display Cable |
| H-14790 | A.C. Cable |
| H-14792-1 | A.C. Jumper Cable |
| H-14792-2 | A.C. Jumper Cable |
| H-15011 | Speaker Panel Cable |
| H-15476 | Logic Power Cable |
| H-15478 | Tilt Switch Cable |
| H-15511 | 3-Switch Cable |
| H-15512 | Ramp Lamp Cable |
| H-15513 | Flasher Cable |
| H-15514 | Mini-Playfield Cable |
| H-15515 | Back Panel Cable |
| H-15516 | Ramp Switch Cable |

| Part Number | Description |
|---|---|
| H-15517 | Opto Cable |
| H-15518 | Playfield Switch Cable |
| H-15519 | Playfield Lamp Cable |
| H-15520 | Playfield Solenoid Cable |
| H-15521 | Insert Cable |
| H-15586 | Cabinet Cable |
| H-15587 | Speaker Lamp Cable |
| H-15588 | Right Ramp Cable |
| H-15591 | Home Opto Cable |
| H-15592 | Five Opto Cable |
| H-15593 | Motor Cable |
| H-15594 | Mini-Playfield Lamp Cable |
| H-15702 | Ramp Opto Cable |
| H-15724 | Cabinet Button Cable |
| H-15736 | Secondary Cable |

## A-15501    Back Panel Assembly



| Item | Part Number | Description |
|---|---|---|
| 1. | B-12224 | Single Lamp Assembly |
| 2. | A-12336-1 | Socket & Bulb Assembly |
| 3. | CW-30022-4 | Wire 22AWG, Yellow |
| 4. | 11-831-20006 | Back Panel |
| 5. | 31-1681-12 | Playfield Plastic |
| 6. | 4106-01114-08 | TCS #6 x 1/2 PLHWH |
| 7. | 4106-01033-08 | Sh. Metal Screw #6 x 1/2 P-TH-A |
| 8. | 03-7655-4 | Clip Harness 1/4" |
| 9. | H-15515 | Back Panel Cable |
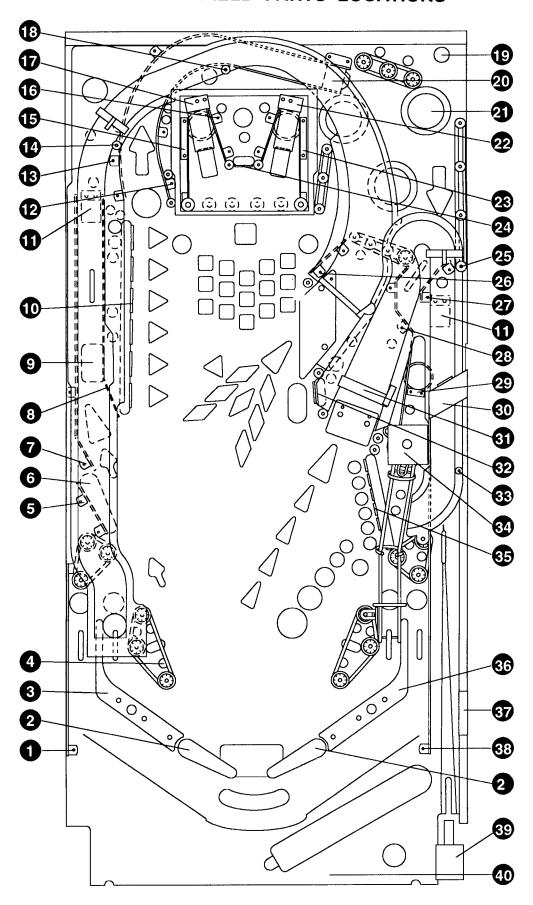
# Unique Parts List

| Part Number | Description |
|---|---|
| A-12738-20006 | WPC Sound Board |
| A-12742-20006 | WPC CPU Board |
| A-13204-20006 | Bottom Arch Assembly |
| A-13769-20006 | Playfield & Insert Assembly |
| A-13769-20006 | Mini Playfield & Inset Assembly |
| A-14376-20006 | Backbox Assembly |
| A-15035 | Cam Assembly |
| A-15036 | Support Bracket Assembly |
| A-15037 | Main Bracket Assembly |
| A-15309-1 | 2-10W Resistor PCB Assembly |
| A-15340 | Motor EMI w/Brake Assembly |
| A-15354 | Ball Return , Ramp Assembly |
| A-15355 | Bracket Door Release Assy. |
| A-15356 | 3-Door Assembly |
| A-15358 | Ball Popper Assembly |
| A-15358-1 | Ball Popper Assembly |
| A-15424 | 15-Lamp Board |
| A-15426 | 8-Lamp Board |
| A-15427 | 5-Lamp Board |
| A-15428 | 6-Lamp Board |
| A-15429 | 5-Lamp Board |
| A-15430 | Opto Switch 10-PCB Assy. |
| A-15431 | 5-Opto PCB Assembly |
| A-15432 | 5 LED PCB Assembly |
| A-15436 | Main Ramp Assembly |
| A-15438-L | Flipper Ball Guide Assembly, Left |
| A-15438-R | Flipper Ball Guide Assembly, Right |
| A-15439 | 6-Target Assembly, Opaque Red |
| A-15440 | Cap Ball Popper Assembly |
| A-15441 | Lower Ramp Assembly |
| A-15442 | Cam & Plunger Assembly |
| A-15443 | Cam & Stop Pin Assembly |
| A-1544 | Gate Assembly |
| A-15459-1 | Cashbox Assembly |
| A-15477 | Switch Bracket Assemby |
| A-15500 | 5-Target Assembly |
| A-15501 | Back Panel Assembly |
| A-15551 | Flap Assembly |
| A-15581 | Main & Support Bracket Assembly |
| A-15582 | Mini-Playfiled Cover Assembly |
| A-15604 | Ramp Ball Popper Assembly |
| A-15631-4 | Standup Target w/Decal - Op. Red |
| A-15634 | Motor & Cam Assembly |
| A-15640-1 | Playfield Plastic Assembly |
| A-15640-2 | Playfield Plastic Assembly |

| Part Number | Description |
|---|---|
| A-15641 | Bracket & Coil Assembly |
| A-15647 | Tradis Assembly |
| A-15680 | Bi-Directional Motor Drive Board |
| A-15690 | Right Ramp Assembly |
| A-15691 | Cover/Sides Mini-Plfd Assy. |
| A-15719 | Shooter Gate Assembly |
| A-15720 | Kicker Bracket Assembly |
| A-15742 | 4-Lamp Board |
| A-15748 | Cover Assembly |
| A-15805 | 7-Lamp Board |
| A-15806 | Interrupter Assembly |
| A-15823 | Speaker/ Display Assembly |
| A-15827 | Switch Gate Assembly |
| A-15831-4 | Stationary Target Assy. - Op. Red |
| A-15832-4 | Stationary Target Assy. - Op. Red |
| A-15862 | Standup Target & Decal Assy. |
| A-15894 | Double Flipper Opto Assembly |
| A-15894-1 | Single Flipper Opto Assembly |
| A-15896 | Switch Button & Cable Assembly |
| A-15903 | Standup Target Assembly |
| A-15904 | Switch Gate & Decal Assy. |
| A-16191 | Dalek Light Assembly |
| A-16199 | Dalek Assembly |
| A-8552-20006 | Back Glass Assembly |
| 02-4252-25 | F-F Spacer 6-32 x 9/16" |
| 02-4657-1 | Post 6-32 x 3.25 Mtg. Ramp |
| 02-4677 | Rubber Bumper Post #10 |
| 02-4678 | Double Bumper Post #10 |
| 02-4679 | Bumper Post #10 |
| 03-7960-20006 | Mylar Playfield Set |
| 11-1066-20006 | Wood Cabinet |
| 31-1002-20006 | Screened Palyfield |
| 31-1002A-20006 | Screened Playfield |
| 31-1008-20006 | Screened Bottom Arch |
| 31-1357-20006 | Screened Translite |
| 31-1420-20006 | Screened Speaker Panel Cover |
| 31-1681 | Playfield Plastics Set |
| 31-1685 | Standup Target Decal Set |
| 31-1686 | Decal Set - Top |
| 31-1687 | Decal Set - Bottom |
| 31-1688 | Decal Set - Top/Bottom (Small) |
| 31-1708 | Decal Set - Dome |

# UPPER PLAYFIELD PARTS LIST

| Item | Part Number | Description |
|------|-------------|-------------|
| 1 | 01-10682 | Ball Guide |
| 2 | 20-9734-6 | Flipper Bat and Shaft (2) |
| 3 | A-15438-L | Flipper Ball Guide |
| 4 | B-8284-1 | Kicker Count Switch |
| 5 | 01-10683 | Ball Guide |
| 6 | 20-9250-6 | Flipper Bat and Shaft |
| 7 | 01-10688 | Ball Guide |
| 8 | 01-10689 | Ball Guide |
| 9 | A-15444 | Gate Assembly |
| 10 | A-15631-4 | Stand-up Target w/Decal |
| 11 | A-12121 | Ball Deflector |
| 12 | 01-10690 | Ball Guide |
| 13 | 01-10691 | Ball Guide |
| 14 | 02-4657-2 | Stand-off 3" |
| 15 | 01-10644-L | Ball Guide |
| 16 | 01-10671 | Ball Guide (2) |
| 17 | 01-10646-L | Deflector Bracket |
| 18 | 02-4657-1 | Stand-off 3 1/4" |
| 19 | 02-4252-10 | Stand-off 5/8" |
| 20 | A-8112-L | Ball Gate Assembly |
| 21 | B-9414-3 | Jet Bumper Assembly |
|  | 03-8254-9 | Jet Bumper Cap, Red |
| 22 | 01-10646-R | Deflector Bracket |
| 23 | 01-10644-R | Ball Guide |
| 24 | A-15903 | Stand-up Target w/Decal |
| 25 | 02-4436-2 | Stand-off 2.31" |
| 26 | 01-10687 | Ball Guide |
| 27 | 01-10685 | Ball Guide |
| 28 | 01-10686 | Ball Guide |
| 29 | 01-10673 | Ball Deflect Bracket |
| 30 | A-15719 | Shooter Gate Assembly |
| 31 | A-15904 | Switch Gate & Decal |
| 32 | A-15862 | Stand-up Target w/Decal |
| 33 | 02-4436-13 | Stand-off 2 1/8" |
|  | A-12258-2 | 8-32 Nut Plate Assembly |
| 34 | A-15647 | Tardis Assembly |
| 35 | A-15439 | 6 Target Assembly |
| 36 | A-15438-R | Flipper Ball Guide |
| 37 | A-15802 | Level Assembly |
| 38 | 01-10684 | Ball Guide |
| 39 | A-15720 | Kicker Bracket Assembly |
| 40 | A-8039-3 | Ball Release Assembly |

**Not Shown:**

| Part Number | Description |
|-------------|-------------|
| A-13204-2006 | Bottom Arch Assembly |
| A-15691 | Mini-playfield Cover/Side |
| A-8645 | Wire Form & Bracket |
| B-8623 | Guide & Baffle Assy. |
| C-8235 | Ball Runway Assy. |
| 01-3569-1 | Ball Return Runway |
| 01-5575 | Bottom Arch Mtg. Brkt. (2) |
| 01-8419 | Holdown Bracket (2) |
| 01-10136 | Shooter Cover Plate |
| 03-7960-20006-2 | Jet Area Mylar |
| 03-7960-20006-3 | Drop Area Mylar |
| 03-7960-20006-4 | Oval Mylar |
| 03-7960-20006-5 | Mini-playfield Mylar |
| 12-6542 | Runway Gate Wire |
| 20-6500 | 1 1/16 Steel Ball (3) |
| 36-20006 | *Screened Playfield |
| 36-20006-1 | Screened Mini-playfield |
| 31-1681-1 thru 18 | Playfield Plastics |

* The DOCTOR WHO Diamond Plate™ playfield does not require a full mylar. However, mylars can be purchased through your local Bally Distributor (ref. #03-7960-20006-1).

# UPPER PLAYFIELD PARTS LOCATIONS

# LOWER PLAYFIELD PARTS

| Item | Part Number | Description |
|------|-------------|-------------|
| 1. | B-8925 | Micro-Switch Plate Assembly |
| 2. | A-15720 | Kicker Assembly |
| 3. | C-9638 | Multiball Eject Assembly |
|  | 10-128 | Spring |
|  | B-9362-L-2 | Coil & Bracket Assembly |
| 4. | A-15205-R-4 | Lower Right Flipper |
| 5. | A-15205-L-4 | Lower Left Flipper |
| 6. | A-15680 | Bi-Directional Motor Drive Assy. |
| 7. | B-12665 | Kicker Arm (Slingshot) Assy. (2) |
|  | B-11203-R-1 | Coil & Bracket Assembly |
|  | 10-128 | Spring |
|  | B-8284-1 | Kicker Switch Assembly |
| 8. | A-15429 | 5-Lamp Board Assembly |
| 9. | A-15427 | 5-Lamp Board Assembly |
| 10. | A-15428 | 6-Lamp Board Assembly |
| 11. | A-15440 | Cap Ball Popper Assembly |
| 12. | 01-10675 | Ball Popper Ramp |
| 13. | A-15441 | Lower Ramp Assembly |
| 14. | A-15424 | 15-Lamp Board Assembly |
| 15. | A-9415-2 | Jet Bumper Assembly (3) |
|  | B-12030-2 | Switch & Diode Assembly (3) |
| 16. | 20006-PL-UP | Mini-Playfield Assembly |
| a) | A-15356 | 3-Door Assembly |
| b) | A-15358 | Ball Popper Assembly |
| c) | A-15634 | Motor & Cam Assembly |
| d) | A-15358-1 | Ball Popper Assembly |
| e) | A-15581 | Main Support Bracket Assembly |
| 17. | A-14520 | 6-Lamp Board Assembly |
| 18. | A-15641 | Trap Door Assembly |
|  | 10-399 | Spring |
|  | A-15442 | Cam & Plunger |
|  | A-15477 | Switch Bracket Assembly |
| 19. | A-15426 | 8-Lamp Board Assembly |
| 20. | A-16090-L-4 | Upper-Left Flipper |
| 21. | A-15430 | 10-Switch Opto PC Board |



*Underside of Playfield, Viewed in Raised Position*

# LAMP LOCATIONS

| Item No. | Bulb No. | Lamp Assy. No. | Description |
|---|---|---|---|
| 11 | 24-8768 | A-15428 | (E)-S-C-A-P-E |
| 12 | 24-8768 | A-15428 | E-(S)-C-A-P-E |
| 13 | 24-8768 | A-15428 | E-S-(C)-A-P-E |
| 14 | 24-8768 | A-15428 | E-S-C-(A)-P-E |
| 15 | 24-8768 | A-15428 | E-S-C-A-(P)-E |
| 16 | 24-8768 | A-15428 | E-S-C-A-P-(E) |
| 17 | 24-6549 | A-11271 | Left Drain |
| 18 | 24-6549 | A-11271 | Left Return |
| 21 | 24-6549 | A-11271 | Right Return |
| 22 | 24-6549 | A-11271 | Right Drain |
| 23 | 24-8768 | A-15805 | Doctor 7 (1 playfield) |
|  | 24-6549 | A-8882 | (1 speaker panel) |
| 24 | 24-8768 | A-15427 | ESCAPE Special |
| 25 | 24-8768 | A-15427 | ESCAPE 3,000,000 |
| 26 | 24-8768 | A-15427 | ESCAPE 2,000,000 |
| 27 | 24-8768 | A-15427 | ESCAPE 1,000,000 |
| 28 | 24-8768 | A-15427 | ESCAPE 500,000 |
| 31 | 24-8768 | A-15424 | 5X3, Top Left 1 |
| 32 | 24-8768 | A-15424 | 5X3, Top Left 2 |
| 33 | 24-8768 | A-15424 | 5X3, Top Middle |
| 34 | 24-8768 | A-15424 | 5X3, Top Right 2 |
| 35 | 24-8768 | A-15424 | 5X3, Top Right 1 |
| 36 | 24-8768 | A-15805 | Doctor 2 (1 playfield) |
|  | 24-8768 | A-11271 | (1 speaker panel) |
| 37 | 24-6549 | A-11754 | Hang On Score |
| 38 | 24-6549 | A-11754 | Video Mode |
| 41 | 24-8768 | A-15424 | 5X3, Middle Left 1 |
| 42 | 24-8768 | A-15424 | 5X3, Middle Left 2 |
| 43 | 24-8768 | A-15424 | 5X3, Middle Middle |
| 44 | 24-8768 | A-15424 | 5X3, Middle Right 2 |
| 45 | 24-8768 | A-15424 | 5X3, Middle Right 1 |
| 46 | 24-6549 | A-11754 | Transmat Award |
| 47 | 24-8768 | A-15647 | Tardis |
| 48 | 24-8768 | A-15805 | Doctor 1 (1 playfield) |
|  | 24-8768 | A-11271 | (1 speaker panel) |
| 51 | 24-8768 | A-15424 | 5X3, Bottom Left 1 |
| 52 | 24-8768 | A-15424 | 5X3, Bottom Left 2 |
| 53 | 24-8768 | A-15424 | 5X3, Bottom Middle |
| 54 | 24-8768 | A-15424 | 5X3, Bottom Right 2 |
| 55 | 24-8768 | A-15424 | 5X3, Bottom Right 1 |
| 56 | 24-6549 | A-8882 | Mini-playfield Left Lock |
| 57 | 24-6549 | A-8882 | Mini-playfield Right Lock |
| 58 | 24-6549 | A-11905 | Mini-playfield Target |
| 61 | 24-8768 | A-14520 | (R)-E-P-A-I-R |
| 62 | 24-8768 | A-14520 | R-(E)-P-A-I-R |
| 63 | 24-8768 | A-14520 | R-E-(P)-A-I-R |
| 64 | 24-8768 | A-14520 | R-E-P-(A)-I-R |
| 65 | 24-8768 | A-14520 | R-E-P-A-(I)-R |
| 66 | 24-8768 | A-14520 | R-E-P-A-I-(R) |
| 67 | 24-8768 | A-15805 | Doctor 5 (1 playfield) |
|  | 24-8767 | B-12224 | (1 back panel) |
| 68 | 24-6549 | A-11754 | Shoot Again |
| 71 | 24-8768 | A-15805 | Doctor 4 (1 playfield) |
|  | 24-8768 | A-15426 | (1 speaker panel) |
| 72 | 24-8768 | A-15805 | Doctor 6 (1 playfield) |
|  | 24-8768 | A-15426 | (1 speaker panel) |
| 73 | 24-8768 | A-15426 | 1.5X |
| 74 | 24-8768 | A-15426 | 2X |
| 75 | 24-8768 | A-15426 | 2.5X |
| 76 | 24-8768 | A-15426 | 3X |
| 77 | 24-8768 | A-15426 | 3.5X |
| 78 | 24-8768 | A-15426 | 4X |
| 81 | 24-8768 | A-15427 | W-H-O (W) |
| 82 | 24-8768 | A-15805 | Doctor 3 (1 playfield) |
|  | 24-8768 | A-15427 | (1 speaker panel) |
| 83 | 24-8768 | A-15427 | W-H-O 1,000,000 |
| 84 | 24-8768 | A-15427 | W-H-O 2,000,000 |
| 85 | 24-8768 | A-15427 | W-H-O Lite Extra Ball |
| 86 | 24-6549 | A-11754 | Ball Transmat & |
|  | 24-8768 | A-11271 | Advance Bonus X |
| 87 | 20-9663-B-2 | A-15896 | Launch Ball |
| 88 | --- | 20-9663-1 | Game Start |

DOCTOR WHO 2-45

# SWITCH LOCATIONS

| Item | Switch Number | Assembly Number | Description |
|------|---------------|-----------------|-------------|
| F1 | SW-1A-193 | A-15205-R-4 | *Right Flipper EOS |
| F2 | --- | A-15894 | *Right Flipper Opto Board |
| F3 | SW-1A-193 | A-15205-L-4 | *Left Flipper EOS |
| F4 | --- | A-15894 | *Left Flipper Opto Board |
| F7 | SW-1A-193 | A-16090-L-4 | *Upper Left Flipper EOS |
| F8 | --- | A-15894 | *Upper Left Flipper Opto Board |
| | | | |
| 11-12 | --- | --- | Not Used |
| 13 | --- | 20-9663-1 | Start Button |
| 14 | --- | 20-6502-A | *Plumb Bob Tilt |
| 15 | SW-1A-114 | B-8284-1 | Left Sling |
| 16 | SW-1A-114 | B-8284-1 | Right Sling |
| 17 | 5647-12693-04 | A-11619 | Shooter Lane |
| 18 | 5647-12693-21 | A-12688-1 | Exit Jets |
| 21 | --- | 27-1066 | *Slam Tilt |
| 22 | --- | A-8630 | *Coin Door closed |
| 23 | --- | Not Used | *Ticket Opto |
| 24 | --- | A-8630 | *Always Closed |
| 25 | 5647-12693-08 | A-11680 | Trough 1 Ball |
| 26 | 5647-09957-00 | B-8925 | Trough 2 Balls |
| 27 | 5647-09957-00 | B-8925 | Trough 3 Balls |
| 28 | 5647-12133-12 | A-10417 | Outhole |
| 31 | A-14231 (LED) A-14232 (Trans) | A-15440 | Opto Popper |
| 32 | A-14231 (LED) A-14232 (Trans) | A-15634 | †Mini-ply Home Opto |
| 33 | A-14231 (LED) A-14232 (Trans) | A-15436 | Enter Top Ramp Opto |
| 34 | --- | A-15896 | Launch Ball |
| 35 | 5647-12693-21 | A-15436 | Score Top Ramp |
| 36 | 5647-12693-11 | A-15904 | Enter Bottom Ramp |
| 37 | 5647-12693-21 | A-15690 | Score Bottom Ramp |
| 38 | 5647-12693-13 | A-12238 | Mini-ply Door, Middle |
| 41 | --- | A-15631-4 | (E)-S-C-A-P-E |
| 42 | --- | A-15631-4 | E-(S)-C-A-P-E |
| 43 | --- | A-15631-4 | E-S-(C)-A-P-E |
| 44 | --- | A-15631-4 | E-S-C-(A)-P-E |
| 45 | --- | A-15631-4 | E-S-C-A-(P)-E |
| 46 | --- | A-15631-4 | E-S-C-A-P-(E) |
| 47 | 5647-12693-19 | A-12688 | Hang On Score |
| 48 | 5647-12693-19 | A-12688-1 | Select Doctor |
| 51 | SW-1A-178-4 | A-15439 | (R)-E-P-A-I-R |
| 52 | SW-1A-178-4 | A-15439 | R-(E)-P-A-I-R |
| 53 | SW-1A-178-4 | A-15439 | R-E-(P)-A-I-R |
| 54 | SW-1A-178-4 | A-15439 | R-E-P-(A)-I-R |
| 55 | SW-1A-178-4 | A-15439 | R-E-P-A-(I)-R |
| 56 | SW-1A-178-4 | A-15439 | R-E-P-A-I-(R) |
| 57 | 5647-12693-36 | A-15477 | †Trap Door Down |
| 58 | --- | A-15862 | Transmat Award |
| 61 | SW-11A-37 | B-12030-2 | Left Jet |
| 62 | SW-11A-37 | B-12030-2 | Right Jet |
| 63 | SW-11A-37 | B-12030-2 | Bottom Jet |
| 64 | 5647-12693-19 | A-26888 | Left Drain |
| 65 | 5647-12693-19 | A-26888 | Left Return |
| 66 | 5647-12693-19 | A-26888 | Right Return |
| 67 | 5647-12693-19 | A-26888 | Right Drain |
| 68 | 5647-12693-13 | A-12238 | Mini-ply Door, Left |
| 71 | | | Mini-ply Opto 5-Bank Right 1 |
| 72 | | A-15431 (Trans) | Mini-ply Opto 5-Bank Right 2 |
| 73 | --- | & A-15432 (LED) | Mini-ply Opto 5-Bank Middle |
| 74 | | | Mini-ply Opto 5-Bank Left 2 |
| 75 | | | Mini-ply Opto 5-Bank Left 1 |
| 76 | --- | A-14231 (LED) & A-14232 (Trans) | Mini-ply Left Opto Eject |
| 77 | --- | A-14231 (LED) & A-14232 (Trans) | Mini-ply Right Opto Eject |
| 78 | --- | A-15903 | Mini-ply Target |
| 81 | --- | --- | Not Used |
| 82 | 5647-12693-11 | A-15877 | *Playfield Glass |
| 83-87 | --- | --- | Not Used |
| 88 | 5647-12693-13 | A-12238 | Mini-ply Door, Right |

* Not shown.
† Located on underside of playfield.

MINI-PLAYFIELD FRONT VIEW

DOCTOR WHO 2-46

# SOLENOID/FLASHER LOCATIONS

| Item | Coil/Flasher Number | Assy. No. | Description |
|------|---------------------|-----------|-------------|
| 01 | AE-26-1500 | A-15641 | Trap Door |
| 02 | AE-26-1200 | A-15720 | Shooter |
| 03 | AE-23-800 | A-15440 | Opto Popper |
| 04 | AE-26-1500 | A-15358-1 | Mini-playfield Left Opto Eject |
| 05 | AE-26-1500 | A-15358 | Mini-playfield Right Opto Eject |
| 06 | 24-8802 | A-12336-1 | 2nd Change Logo, Flasher (4) |
| 07 | AE-23-800 | B-10686-1 | *Knocker |
| 08 | 24-8802 | --- | *Doctor 3, Flasher . |
| 09 | AE-26-1500 | B-11203-R-1 | Left Sling |
| 10 | AE-26-1500 | B-11203-R-1 | Right Sling |
| 11 | AE-26-1200 | A-9415-2 | Left Jet |
| 12 | AE-26-1200 | A-9415-2 | Right Jet |
| 13 | AE-26-1200 | A-9415-2 | Bottom Jet |
| 14 | 24-8802 | A-12336-1 | *Backbox Head, Flasher (if used) |
| 15 | AE-27-1200 | B-8039-3 | Outhole |
| 16 | AE-26-1200 | B-9362-L-2 | Trough |
| 17 | --- | A-16041 | Mini-playfield/Doctor 7, Flasher |
| 18 | 24-8802 | A-12336-1 | 5x3 Left/Left, Flasher |
| 19 | 24-8802 | A-12336-1 | 5x3 Right/Right, Flasher |
| 20 | 24-8802 | A-12336-1 | Jet Bumpers/Doctor 5, Flasher (2) |
| 21 | 24-8802 | A-12336-1 | REPAIR/Doctor 4, Flasher (2) |
| 22 | 24-8802 | A-12336-1 | W-(H)-O/Doctor 2, Flasher |
| 23 | 24-8802 | A-12336-1 | W-H-(O)/Doctor 6, Flasher |
| 24 | 24-8704 | A-8798 | ESCAPE/Doctor 1, Flasher |
| 25 | --- | --- | Not Used |
| 26 | --- | --- | Not Used |
| 27 | --- | A-15680 | Mini-playfield C.C.W./C.W. |
| 28 | --- | A-15680 | Mini-playfield On/Off |

## General Illumination Circuits

| *01 | 24-8768 | Insert |
|------|---------|--------|
| *02 | 24-8768 | Insert |
| *03 | 24-6549/24-8768 | Playfield/Insert A |
| *04 | 24-6549/24-8768 | Playfield/Insert B |
| *05 | 24-6549/24-8768 | Playfield/Insert C |

| * | FL-15411 (Org) | A-16090-L-4 | Upper Left Flipper |
|---|----------------|-------------|--------------------|
| * | FL-15411 (Org) | A-15205-L-4 | Lower Left Flipper |
| * | FL-15411 (Org) | A-15205-R-4 | Lower Right Flipper |



■ Square indicates coil or P.C.B.

● Circle indicates flasher

* **Not shown.**
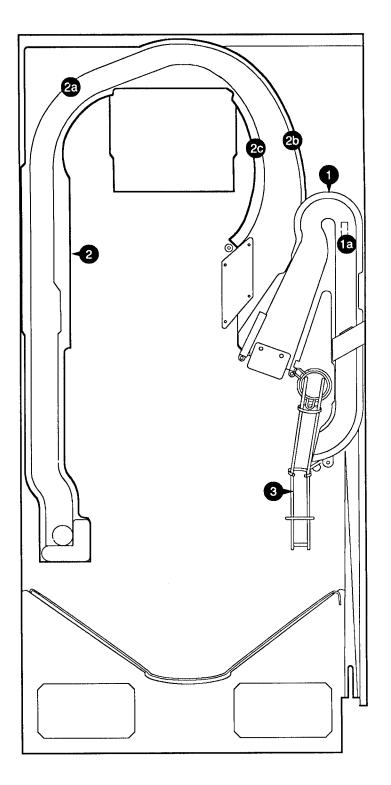
# RUBBER PARTS

| ITEM | PART NO. | QTY | DESCRIPTION |
|------|----------|-----|-------------|
| A. | 23-6302 | 1 | 1" Rubber Ring |
| B. | 23-6303 | 2 | 1 1/4" Rubber Ring |
| C. | 23-6304 | 4 | 1 1/2" Rubber Ring |
| D. | 23-6305 | 2 | 2" Rubber Ring |
| E. | 23-6308 | 1 | 3 1/2" Rubber Ring |
| F. | 23-6535 | 2 | Rubber Bumper |
| G. | 23-6552 | 3 | Rubber Sleeve, Yellow |
| H. | 23-6556 | 7 | Rubber Sleeve, Black |
| I. | 23-6579 | 1 | 3/4" Tapered Bumper |
| J. | 23-6678-7 | 3 | Flipper Rubber, Black |
| K. | 23-6686 | 1 | Bumper Plug |

# Ramps

| Item | Part Number | Description |
|------|-------------|-------------|
| 1. | A-15690 | Right Ramp Assembly |
| a) | 5647-12693-21 | Sub-Miniature Switch Assy. |
| 2. | A-15436 | Upper Main Assembly |
| a) | 5647-12693-21 | Sub-Miniature Switch Assy. |
| b) | A-14231 | Opto LED Assembly |
| c) | A-14232 | Photo Transistor Assy. |
| 3. | A-15604 | Ball Popper Ramp Assy. |

# Notes...

# Game Wiring and Schematics

## CONNECTOR & COMPONENT IDENTIFICATION

Each plug or jack receives a number that identifies the circuit board and position on that board that it connects to. J-designations refer to the male part of a connector. P-designations refer to the female part of a connector. For example, J101 designates jack 1 of board 1 (a Power Driver Board Board jack); P206 designates plug 6 of board 2 (a CPU Board plug). Identifying the specific pin number of a connector involves a hyphen, which separates the pin number from the plug or jack designation. For example, J101-3 refers to pin 3 of jack 1 on board 1.

Other game components may also have similar numbers to clarify their locations or related circuits. For example, F501 refers to a fuse located on the Sound Board.

Prefix numbers for the WPC circuit boards are listed below.
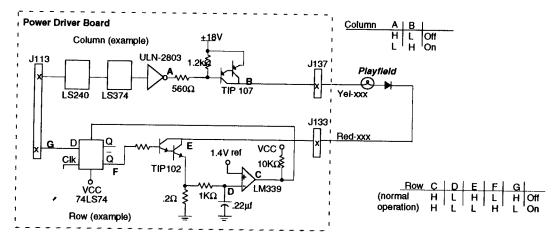
> 1- Power Driver Board
> 2- CPU Board
> 5- Sound Board
> 6- Dot Matrix Controller
> Dot Matrix Display/Driver Board
> 9 -Fliptronic II Controller Board

**Schematics for standard WPC backbox boards are found in the WPC Schematics Manual. Playfield, cabinet, and all other backbox board schematics are found in this section.**

# LAMPS

Yellow (B+) ───⊗──▶│── Red

| Column \ Row | 1 Yellow-Brown J137-1 Q98 | 2 Yellow-Red J137-2 Q97 | 3 Yellow-Orange J137-3 Q96 | 4 Yellow-Black J137-4 Q95 | 5 Yellow-Green J137-5 Q94 | 6 Yellow-Blue J137-6 Q93 | 7 Yellow-Violet J137-7 Q92 | 8 Yellow-Gray J138-9 Q91 |
|---|---|---|---|---|---|---|---|---|
| 1 Red-Brown J133-1 Q90 | (E)-S-C-A-P-E  11 | Right Return  21 | 5 x 3, Top Left 1  31 | 5 x 3, Middle Left 1  41 | 5 x 3, Bottom Left 1  51 | (R)-E-P-A-I-R  61 | Doctor 4 (2 lamps)  71 | (W)-H-O  81 |
| 2 Red-Black J133-2 Q89 | E-(S)-C-A-P-E  12 | Right Drain  22 | 5 x 3, Top Left 2  32 | 5 x 3, Middle Left 2  42 | 5 x 3, Bottom Left 2  52 | R-(E)-P-A-I-R  62 | Doctor 6 (2 lamps)  72 | Doctor 3 (2 lamps)  82 |
| 3 Red-Orange J133-4 Q88 | E-S-(C)-A-P-E  13 | Doctor 7 (2 lamps)  23 | 5 x 3, Top Middle  33 | 5 x 3, Middle Middle  43 | 5 x 3, Bottom Middle  53 | R-E-(P)-A-I-R  63 | 1.5X  73 | W-H-O 1,000,000  83 |
| 4 Red-Yellow J133-5 Q87 | E-S-C-(A)-P-E  14 | ESCAPE Special  24 | 5 x 3, Top Right 2  34 | 5 x 3, Middle Right 2  44 | 5 x 3, Bottom Right 2  54 | R-E-P-(A)-I-R  64 | 2X  74 | W-H-O 2,000,000  84 |
| 5 Red-Green J133-6 Q86 | E-S-C-A-(P)-E  15 | ESCAPE 3,000,000  25 | 5 x 3, Top Right 1  35 | 5 x 3, Middle Right 1  45 | 5 x 3, Bottom Right 1  55 | R-E-P-A-(I)-R  65 | 2.5X  75 | W-H-O Lite Extra Ball  85 |
| 6 Red-Blue J133-7 Q85 | E-S-C-A-P-(E)  16 | ESCAPE 2,000,000  26 | Doctor 2 (2 lamps)  36 | Transmat Award  46 | Mini-ply Left Lock  56 | R-E-P-A-I-(R)  66 | 3X  76 | Ball Transmat & Advance Bonus X  86 |
| 7 Red-Violet J133-8 Q84 | Left Drain  17 | ESCAPE 1,000,000  27 | Hangon Score  37 | Tardis  47 | Mini-ply Right Lock  57 | Doctor 5 (2 lamps)  67 | 3.5X  77 | Launch Ball  87 |
| 8 Red-Gray J133-9 Q83 | Left Return  18 | ESCAPE 500,000  28 | Video Mode  38 | Doctor 1 (2 lamps)  48 | Mini-ply Target  58 | Shoot Again  68 | 4X  78 | Game Start  88 |

## LAMP MATRIX CIRCUIT



| Column | A | B | |
|---|---|---|---|
| | H | L | Off |
| | L | H | On |

| Row | C | D | E | F | G | |
|---|---|---|---|---|---|---|
| (normal operation) | H | L | H | L | H | Off |
| | H | L | L | H | L | On |

The processor sends a signal to the column circuit, causing the output of the UNL-2803 to toggle. When point "A" drops low, the TIP107 transistor conducts and point "B" changes to a high state. At the same time the processor drives the input of the 74LS74 low, causing a high at output "F". A high state at the base of TIP102 causes the transistor to conduct, bringing the row circuit to ground and turning the lamp On.
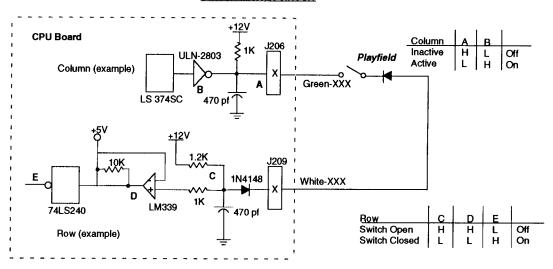
The processor changes the input of the 74LS74 to a high state to turn the lamp Off.

In overcurrent conditions the lamp is shut Off through the comparator. If the voltage at the negative input of the LM339 rises above 1.4V the output changes to a low, which is fed back to the 74LS74 and shuts the row circuit Off.

# SWITCHES

White ——▶——/○—— Green

| Dedicated Grounded Switches | Column / Row | 1 Green-Brown J206-1 U20-18 | 2 Green-Red J206-2 U20-17 | 3 Green-Orange J206-3 U20-16 | 4 Green-Yellow J206-4 U20-15 | 5 Green-Black J206-5 U20-14 | 6 Green-Blue J206-6 U20-13 | 7 Green-Violet J206-7 U20-12 | 8 Green-Gray J206-9 U20-11 | Flipper Grounded Switches |
|---|---|---|---|---|---|---|---|---|---|---|
| Orange-Brown J205-1 (1) Left Coin Chute D1 | 1 White-Brown J208-1 U18-11 | Not Used 11 | Slam Tilt 21 | Opto Popper 31 | (E)-S-C-A-P-E 41 | (R)-E-P-A-I-R 51 | Left Jet 61 | Mini Opto 5 Bank Right 1 71 | Not Used 81 | Black-Green J906-1 Right Flipper End of Stroke F1 |
| Orange-Red J205-2 (2) Center Coin Chute D2 | 2 White-Red J208-2 U18-9 | Not Used 12 | Coin Door Closed 22 | Mini-ply Home Opto 32 | E-(S)-C-A-P-E 42 | R-(E)-P-A-I-R 52 | Right Jet 62 | Mini Opto 5 Bank Right 2 72 | Playfield Glass 82 | Blue-Violet J905-1 Right Flipper Opto F2 |
| Orange-Black J205-3 (3) Right Coin Chute D3 | 3 White-Orange J208-3 U18-5 | Start Button 13 | Ticket Opto. 23 | Enter Top Ramp Opto 33 | E-S-(C)-A-P-E 43 | R-E-(P)-A-I-R 53 | Bottom Jet 63 | Mini Opto 5 Bank Middle 73 | Not Used 83 | Black-Blue J906-3 Left Flipper End of Stroke F3 |
| Orange-Yellow J205-4 (4) 4th Coin Chute D4 | 4 White-Yellow J208-4 U18-7 | Plumb Bob Tilt 14 | Always Closed 24 | Launch Ball 34 | E-S-C-(A)-P-E 44 | R-E-P-(A)-I-R 54 | Left Drain 64 | Mini Opto 5 Bank Left 2 74 | Not Used 84 | Blue-Gray J905-2 Left Flipper Opto F4 |
| Orange-Green J205-6 (5) Normal Function Service Credits \| Test Function Escape D5 | 5 White-Green J208-5 U19-11 | Left Sling 15 | Trough 1 Ball 25 | Score Top Ramp 35 | E-S-C-A-(P)-E 45 | R-E-P-A-(I)-R 55 | Left Return 65 | Mini Opto 5 Bank Left 1 75 | Not Used 85 | Black-Violet J906-4 Upper Right Flipper End of Stroke F5 |
| Orange-Blue J205-7 (6) Normal Function Volume Down \| Test Function Down D6 | 6 White-Blue J208-7 U19-9 | Right Sling 16 | Trough 2 Balls 26 | Enter Bottom Ramp 36 | E-S-C-A-P-(E) 46 | R-E-P-A-I-(R) 56 | Right Return 66 | Mini-ply Left Opto Eject 76 | Not Used 86 | Black-Yellow J905-3 Upper Right Flipper Opto F6 |
| Orange-Violet J205-8 (7) Normal Function Volume Up \| Test Function Up D7 | 7 White-Violet J208-8 U19-5 | Shooter Lane 17 | Trough 3 Balls 27 | Score Bottom Ramp 37 | Hang On Score 47 | Trap Door Down 57 | Right Drain 67 | Mini-ply Right Opto Eject 77 | Not Used 87 | Black-Gray J906-5 Upper Left Flipper End of Stroke F7 |
| Orange-Gray J205-9 (8) Normal Function Begin Test \| Test Function Enter D8 | 8 White-Gray J208-9 U19-7 | Exit Jets 18 | Outhole 28 | Mini-ply Door, Middle 38 | Select Doctor 48 | Transmat Award 58 | Mini-ply Door, Left 68 | Mini-ply Lites Lock 78 | Mini-ply Door, Right 88 | Black-Blue J905-5 Upper Left Flipper Opto F8 |

## SWITCH MATRIX CIRCUIT



| Column | A | B | |
|---|---|---|---|
| Inactive | H | L | Off |
| Active | L | H | On |

| Row | C | D | E | |
|---|---|---|---|---|
| Switch Open | H | H | L | Off |
| Switch Closed | L | L | H | On |
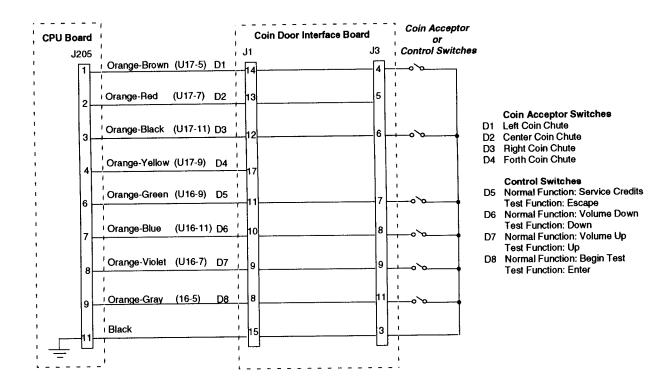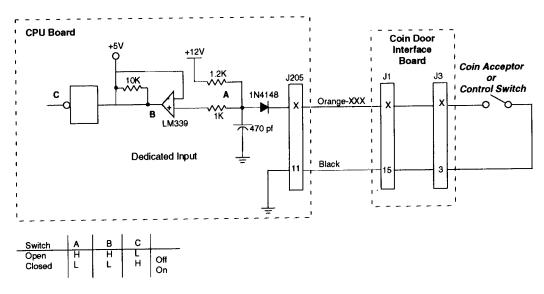
The microprocessor is constantly strobing the column side of the switch. When point "A" on the column circuit toggles low the column side is active.

When a switch closes, the row side of the circuit activates. The "+" input to the LM339 drops below +5V causing its output to go low. Corresponding row and column switches must be low at the same time, for the switch to be considered closed by the microprocessor. When the switch opens, the "+" input to the LM339 is above +5V, its output is high and the row is inactive.

## DEDICATED SWITCHES



**Coin Acceptor Switches**
D1 Left Coin Chute
D2 Center Coin Chute
D3 Right Coin Chute
D4 Forth Coin Chute

**Control Switches**
D5 Normal Function: Service Credits
   Test Function: Escape
D6 Normal Function: Volume Down
   Test Function: Down
D7 Normal Function: Volume Up
   Test Function: Up
D8 Normal Function: Begin Test
   Test Function: Enter

## DEDICATED SWITCH CIRCUIT



| Switch | A | B | C | |
|--------|---|---|---|-----|
| Open | H | H | L | Off |
| Closed | L | L | H | On |

The dedicated switches operate similar to switches in the matrix except that instead of a column circuit there is a direct tie to ground. Therefore, the column side is constantly active (low).
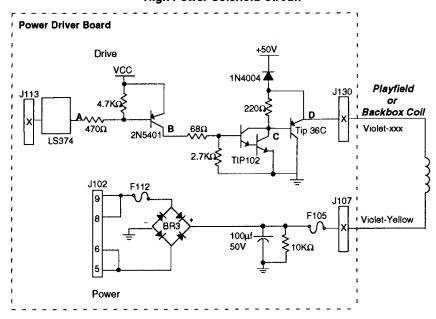
When a switch closes the row side (dedicated input) of the circuit activates. The "+" input to the LM339 drops below +5V causing its output to go low. Since the row circuit (dedicated input) is tied directly to ground through the switch, the switch is considered closed by the microprocessor. When the switch opens, the "+" input to the LM339 is above +5V, its output is high and the row is inactive.

DOCTOR WHO 3-4

# SOLENOID/FLASHER TABLE

| Sol. No. | Function | Solenoid Type and Voltage | Connector | Driver Transistor | Connection | Connection | Wire Color | Solenoid Part Number Flashlamp Type |
|---|---|---|---|---|---|---|---|---|
| 01 | Trap Door | High Power | J107-3 | Q82 | J130-1 | | Vio-Brn | AE-26-1500 |
| 02 | Shooter | High Power | J107-2 | Q80 | J130-2 | | Vio-Red | AE-26-1200 |
| 03 | Opto Popper | High Power | J107-3 | Q78 | J130-4 | | Vio-Orn | AE-23-800 |
| 04 | Mini Left Opto Eject | High Power | J107-2 | Q76 | J130-5 | | Vio-Yel | AE-26-1500 |
| 05 | Mini Right Opto Eject | High Power | J107-2 | Q64 | J130-6 | | Vio-Grn | AE-26-1500 |
| 06 | 2nd Chance Logo, Flasher | High Power | J107-5 | Q66 | J130-7 | J131-3 | Vio-Blu | #906 |
| 07 | Knocker | High Power | J107-3 | Q68 | J130-8 | | Vio-Blk | AE-23-800 |
| 08 | Doctor 3 | High Power | J107-5 | Q70 | | J131-5 | Vio-Gry | #906 |
| 09 | Left Sling | Low Power | J107-2 | Q58 | J127-1 | | Brn-Blk | AE-26-1500 |
| 10 | Right Sling | Low Power | J107-2 | Q56 | J127-3 | | Brn-Red | AE-26-1500 |
| 11 | Left Jet | Low Power | J107-2 | Q54 | J127-4 | | Brn-Org | AE-26-1200 |
| 12 | Right Jet | Low Power | J107-2 | Q52 | J127-5 | | Brn-Yel | AE-26-1200 |
| 13 | Bottom Jet | Low Power | J107-2 | Q50 | J127-6 | | Brn-Grn | AE-26-1200 |
| 14 | Backbox Head, Flasher | Low Power | J107-6 | Q48 | | J128-2 | Brn-Blu | #906 |
| 15 | Outhole | Low Power | J107-2 | Q46 | J127-8 | | Brn-Vio | AE-27-1200 |
| 16 | Trough | Low Power | J107-2 | Q44 | J127-9 | | Brn-Gry | AE-26-1200 |
| 17 | Mini-playfield/Doctor 7, Flasher | Flasher | J107-5,6 | Q42 | J126-1 | J125-1 | Blk-Brn | #906 |
| 18 | 5 x 3 Left/Left, Flasher | Flasher | J107-5 | Q40 | J126-2 | J125-2 | Blk-Red | #906 |
| 19 | 5 x 3 Right/Right, Flasher | Flasher | J107-5 | Q38 | J126-3 | J125-3 | Blk-Org | #906 |
| 20 | Jet Bumpers/Doctor 5, Flasher | Flasher | J107-5,6 | Q36 | J126-4 | J125-5 | Blk-Yel | #906 |
| 21 | REPAIR/Doctor 4, Flasher | Flasher | J107-5,6 | Q28 | J126-5 | J125-6 | Blu-Grn | #906 |
| 22 | W-(H)-O/Doctor 2, Flasher | Flasher | J107-5 | Q30 | J126-6 | J125-7 | Blu-Blk | #906 |
| 23 | W-H-(O)/Doctor 6, Flasher | Low Power | J107-5 | Q34 | J126-7 | J125-8 | Blu-Vio | #906 |
| 24 | ESCAPE/Doctor 1, Flasher | Low Power | J107-5 | Q32 | J126-8 | J125-9 | Blu-Gry | #89 |
| 25 | Not Used | Flasher | | Q26 | | | Blu-Brn | |
| 26 | Not Used | Flasher | | Q24 | | | Blu-Red | |
| 27 | Mini-playfield C.C.W./C.W. | Flasher | J107-6 | Q22 | J122-3 | | Blu-Org | A-15680 |
| 28 | Mini-playfield On/Off | Flasher | J107-6 | Q20 | J122-4 | | Blu-Yel | A-15680 |
| | **G. I. Circuits** | | | | | | | |
| 01 | Insert 1 | G.I. | | Q18 | J121-1 | | Brown | #555 |
| 02 | Insert 2 | G.I. | | Q10 | J121-2 | | Orange | #555 |
| 03 | Playfield A/Insert A | G.I. | | Q14 | J120-3 | J121-3 | Yellow | #44, #555 |
| 04 | Playfield B/Insert B | G.I. | | Q16 | J120-5 | J121-5 | Green | #44, #555 |
| 05 | Playfield C/Insert C | G.I. | | Q12 | J120-6 | J121-6 | Violet | #44, #555 |
| | | | | | | | | |
| | Upper Left Flipper | | J907-8,9 | Q1, Q5 | J902-1, 3 | | Gry-Yel | FL-15411 (ORG) |
| | Lower Left Flipper | | J907-4,5 | Q3, Q9 | J902-7, 9 | | Gry-Yel | FL-15411 (ORG) |
| | Lower Right Flipper | | J907-1,2 | Q4, Q11 | J902-11,12 | | Blu-Yel | FL-15411 (ORG) |

J1XX = Power Driver Board, J9XX = Fliptronic II Board

## High Power Solenoid Circuit



The microprocessor toggles the output of the 74LS374. When point "A" drops low, point "B" the collector of the 2N5401 transistor is high. A high at point "B" causes point "C" the collector of the TIP102 transistor, and point "D" the emitter of the TIP36 transistor to drop low. When point "D" is low the coil is grounded through the transistor and the coil turns On. The coil shuts Off when point "A" toggles high.

## Low Power Solenoid Circuit
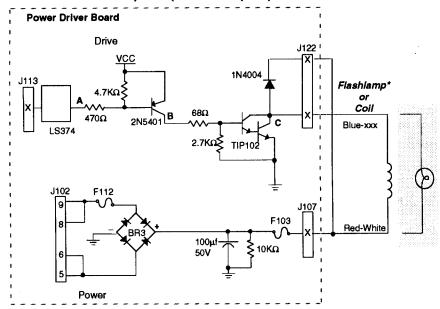


The microprocessor toggles the output of the 74LS374. When point "A" is low, point "B" the collector of the 2N5401 transistor is driven high. A high at point "B" turns On the TIP102 transistor and causes point "C" to drop low. When point "C" is low the coil is grounded through the transistor and the coil turns On. The coil shuts Off when point "A" toggles high.

## Flashlamp Solenoid Circuit



The microprocessor toggles the output of the 74LS374. When point "A" is low, point "B" the collector of the 2N5401 transistor is high. Once point "B" is high, point "C" the collector of the TIP102 transistor is low. When Point "C" is low the flashlamp is grounded through the transistor and the flashlamp turns On. When point "A" toggles high the circuit shuts Off.
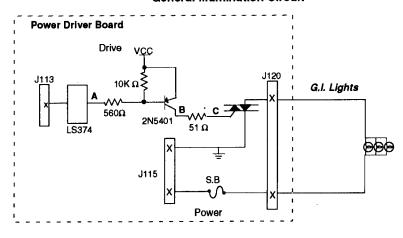
## Special (General Purpose) Solenoid Circuit
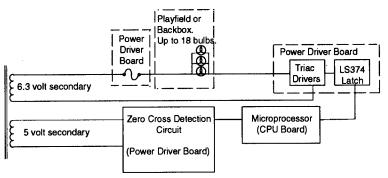


The microprocessor toggles the output of the 74LS374. When point "A" drops low, point "B" is high. A high at point "B" causes a low at point "C". When point "C" is low the coil/flashlamp is grounded through the transistor and the coil/flashlamp turns On. When point "A" toggles high the coil/flashlamp turns Off.

\* Tieback Diode is not used for flashlamp circuit.
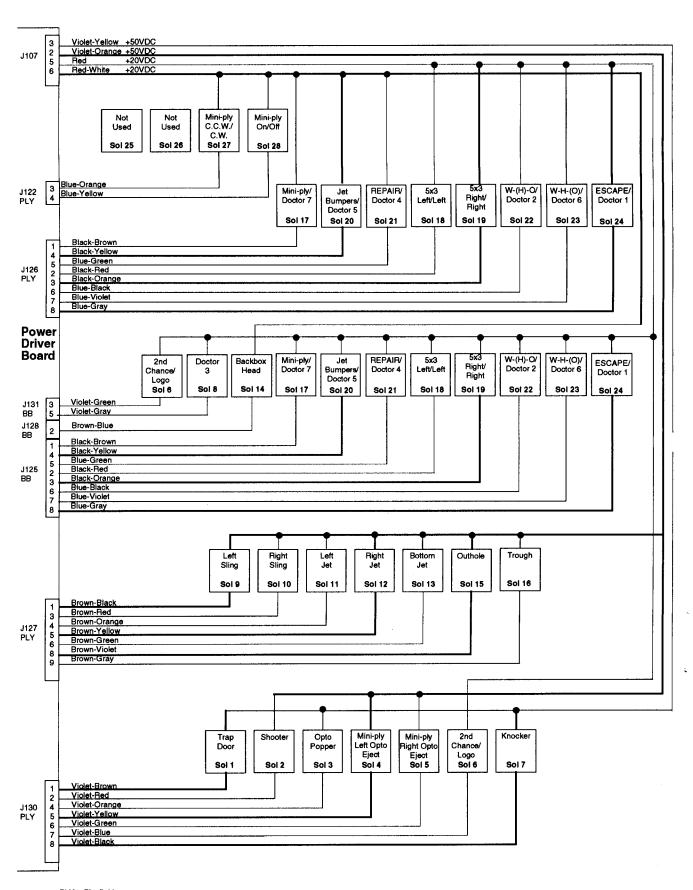
## General Illumination Circuit



When point "A" toggles low, then points "B" and "C" are high. This turns On the triac and the desired General Illumination string lights.

# SOLENOID WIRING

**J107**

| 3 | Violet-Yellow | +50VDC |
| 2 | Violet-Orange | +50VDC |
| 5 | Red | +20VDC |
| 6 | Red-White | +20VDC |

| Not Used | Not Used | Mini-ply C.C.W./ C.W. | Mini-ply On/Off |
|---|---|---|---|
| Sol 25 | Sol 26 | Sol 27 | Sol 28 |

**J122 PLY**

| 3 | Blue-Orange |
| 4 | Blue-Yellow |

| Mini-ply/ Doctor 7 | Jet Bumpers/ Doctor 5 | REPAIR/ Doctor 4 | 5x3 Left/Left | 5x3 Right/ Right | W-(H)-O/ Doctor 2 | W-H-(O)/ Doctor 6 | ESCAPE/ Doctor 1 |
|---|---|---|---|---|---|---|---|
| Sol 17 | Sol 20 | Sol 21 | Sol 18 | Sol 19 | Sol 22 | Sol 23 | Sol 24 |

**J126 PLY**

| 1 | Black-Brown |
| 4 | Black-Yellow |
| 5 | Blue-Green |
| 2 | Black-Red |
| 3 | Black-Orange |
| 6 | Blue-Black |
| 7 | Blue-Violet |
| 8 | Blue-Gray |

**Power Driver Board**

| 2nd Chance/ Logo | Doctor 3 | Backbox Head | Mini-ply/ Doctor 7 | Jet Bumpers/ Doctor 5 | REPAIR/ Doctor 4 | 5x3 Left/Left | 5x3 Right/ Right | W-(H)-O/ Doctor 2 | W-H-(O)/ Doctor 6 | ESCAPE/ Doctor 1 |
|---|---|---|---|---|---|---|---|---|---|---|
| Sol 6 | Sol 8 | Sol 14 | Sol 17 | Sol 20 | Sol 21 | Sol 18 | Sol 19 | Sol 22 | Sol 23 | Sol 24 |

**J131 BB**

| 3 | Violet-Green |
| 5 | Violet-Gray |

**J128 BB**

| 2 | Brown-Blue |

**J125 BB**

| 1 | Black-Brown |
| 4 | Black-Yellow |
| 5 | Blue-Green |
| 2 | Black-Red |
| 3 | Black-Orange |
| 6 | Blue-Black |
| 7 | Blue-Violet |
| 8 | Blue-Gray |

| Left Sling | Right Sling | Left Jet | Right Jet | Bottom Jet | Outhole | Trough |
|---|---|---|---|---|---|---|
| Sol 9 | Sol 10 | Sol 11 | Sol 12 | Sol 13 | Sol 15 | Sol 16 |

**J127 PLY**

| 1 | Brown-Black |
| 3 | Brown-Red |
| 4 | Brown-Orange |
| 5 | Brown-Yellow |
| 6 | Brown-Green |
| 8 | Brown-Violet |
| 9 | Brown-Gray |

| Trap Door | Shooter | Opto Popper | Mini-ply Left Opto Eject | Mini-ply Right Opto Eject | 2nd Chance/ Logo | Knocker |
|---|---|---|---|---|---|---|
| Sol 1 | Sol 2 | Sol 3 | Sol 4 | Sol 5 | Sol 6 | Sol 7 |

**J130 PLY**

| 1 | Violet-Brown |
| 2 | Violet-Red |
| 4 | Violet-Orange |
| 5 | Violet-Yellow |
| 6 | Violet-Green |
| 7 | Violet-Blue |
| 8 | Violet-Black |

PLY = Playfield
BB = Backbox

**DOCTOR WHO   3-8**

# Flipper Opto Switch Board
## A-15894

**Left Side Flipper Opto Switch Board**
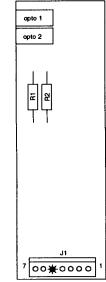
J1 - 1 Blue-Gray (lower flipper) from Fliptronic II Board J905-2
J1 - 2 Black-Blue (upper flipper) from Fliptronic II Board J905-5
J1 - 3 Orange (Switch Grd) from Fliptronic II Board J905-6
J1 - 4 Orange  (Switch Grd) loop from J1-3
J1 - 5 Key
J1 - 6 Gray-Yellow (+12V) from Power Driver Board J116-2
J1 - 7 Gray-Yellow (+12V) loop from J1-6
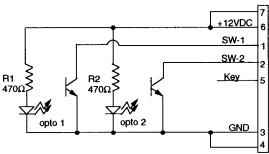
**Right Side Flipper Opto Switch Board**

J1 - 1 Blue-Violet (lower flipper) from Fliptronic II Board J905-1
J1 - 2 Black-Yellow (upper flipper) from Fliptronic II Board J905-3
J1 - 3 Orange ((Switch Grd) loop from Left Side Opto Board J1-4
J1 - 4 N/C
J1 - 5 Key
J1 - 6 Gray-Yellow (+12V) from Power Driver Board J116-2
J1 - 7 Gray-Yellow (+12V) loop from J1-6
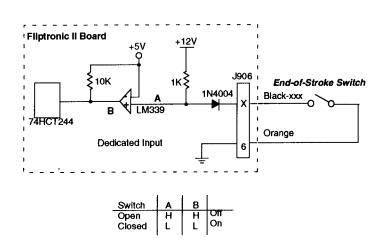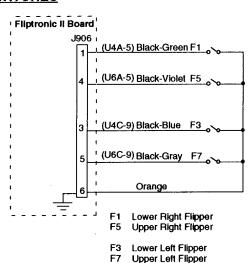
**Please Note:**
The Left Flipper Opto Switch Board must be
connected In order for the Right Flipper Opto
Switch Board to operate because power and
gound are connected though the printed
circuit board.



## FLIPTRONIC II FLIPPER END-OF-STROKE SWITCHES
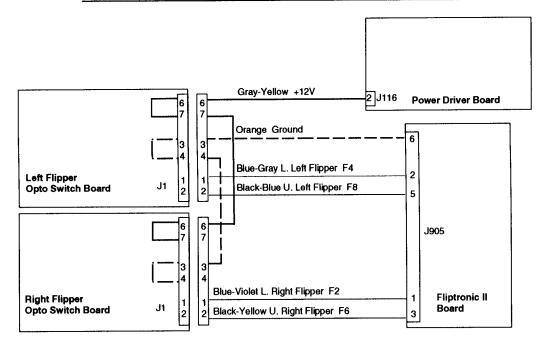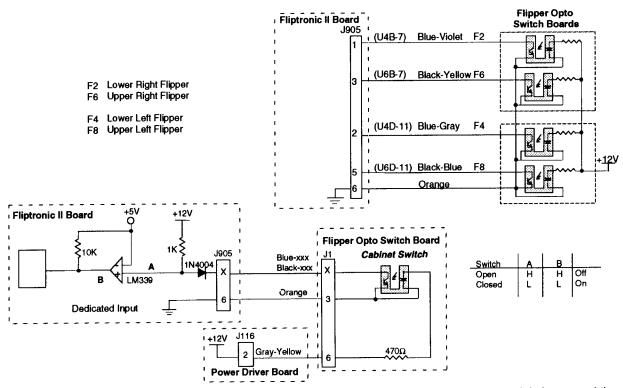


| Switch | A | B | |
|--------|---|---|------|
| Open   | H | H | Off |
| Closed | L | L | On |

F1   Lower Right Flipper
F5   Upper Right Flipper

F3   Lower Left Flipper
F7   Upper Left Flipper

The flipper switch circuits operate similar to the dedicated switch circuit.  The circuits are active low and tied to ground through the switch.

When a switch closes the row side (dedicated input) of the circuit activates.  The "+" input to the LM339 drops below +5V causing its output to go low. Since the row (dedicated input) circuit is tied directly to ground through the switch, the switch is considered closed by the microprocessor.  When the switch opens,  the "+" input to the LM339 is above +5V, its output is high and the row (dedicated input) is inactive.

## FLIPTRONIC II FLIPPER CABINET SWITCH CIRCUIT DIAGRAM
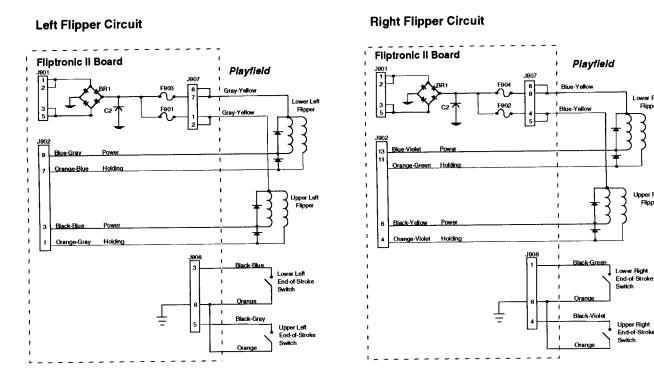


## FLIPTRONIC II FLIPPER CABINET SWITCHES
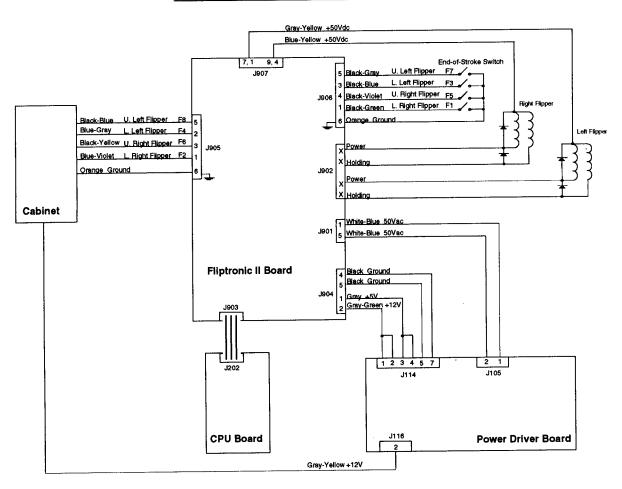


F2  Lower Right Flipper
F6  Upper Right Flipper

F4  Lower Left Flipper
F8  Upper Left Flipper

| Switch | A | B | |
|--------|---|---|-----|
| Open | H | H | Off |
| Closed | L | L | On |

The flipper switch circuits operate similar to the dedicated switch circuit. The circuits are active low and tied to ground through the switch.

When a switch closes the row side (dedicated input) of the circuit activates. The "+" input to the LM339 drops below +5V causing its output to go low. Since the row (dedicated input) circuit is tied directly to ground through the switch, the switch is considered closed by the microprocessor. When the switch opens, the "+" input to the LM339 is above +5V, its output is high and the row (dedicated input) is inactive.

# FLIPTRONIC II FLIPPER CIRCUITS

## Left Flipper Circuit

**Fliptronic II Board**

*Playfield*

J901
1
2
3
5

BR1
C2

F903
F901

J907
6
7
1
2

Gray-Yellow
Gray-Yellow

Lower Left
Flipper

J902
9 Blue-Gray Power
7 Orange-Blue Holding

3 Black-Blue Power
1 Orange-Gray Holding

Upper Left
Flipper

J906
3 Black-Blue
6 Orange
5 Black-Gray
Orange

Lower Left
End-of-Stroke
Switch

Upper Left
End-of-Stroke
Switch

## Right Flipper Circuit

**Fliptronic II Board**

*Playfield*

J901
1
2
3
5

BR1
C2

F904
F902

J907
8
9
4
5

Blue-Yellow
Blue-Yellow

Lower Right
Flipper

J902
13 Blue-Violet Power
11 Orange-Green Holding

6 Black-Yellow Power
4 Orange-Violet Holding

Upper Right
Flipper

J906
1 Black-Green
6 Orange
4 Black-Violet
Orange

Lower Right
End-of-Stroke
Switch

Upper Right
End-of-Stroke
Switch
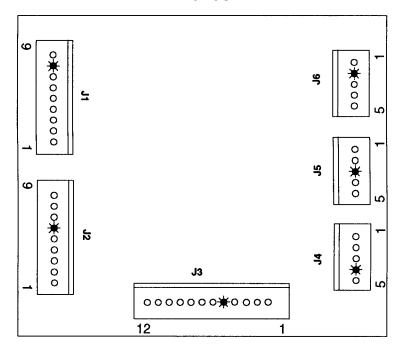
# FLIPTRONIC II FLIPPER CIRCUIT DIAGRAM

Gray-Yellow +50Vdc
Blue-Yellow +50Vdc

7, 1   9, 4
J907

End-of-Stroke Switch

J906
5 Black-Gray  U. Left Flipper  F7
3 Black-Blue  L. Left Flipper  F3
4 Black-Violet  U. Right Flipper  F5
1 Black-Green  L. Right Flipper  F1
6 Orange  Ground

Right Flipper
Left Flipper

**Cabinet**

Black-Blue  U. Left Flipper  F8
Blue-Gray  L. Left Flipper  F4
Black-Yellow  U. Right Flipper  F6
Blue-Violet  L. Right Flipper  F2
Orange  Ground

J905
5
2
3
1
6

J902
X Power
X Holding
X Power
X Holding

J901
1 White-Blue  50Vac
5 White-Blue  50Vac

J904
4 Black  Ground
5 Black  Ground
1 Gray  +5V
2 Gray-Green  +12V

**Fliptronic II Board**

J903

J202

**CPU Board**

1 2 3 4 5 7
J114

2 1
J105

J116
2

**Power Driver Board**

Gray-Yellow +12V

## DOCTOR WHO 3-11

# Opto Switch 10 PCB Assembly
## A-15430

J1-1 Gray-Violet, to opto transmitter Sw #77
J1-2 Gray-Blue, to opto transmitter Sw #76
J1-3 Gray-Green, to opto transmitter Sw #71
J1-4 Gray-Yellow, to opto transmitter Sw #72
J1-5 Gray-Orange, to opto transmitter Sw #73
J1-6 Gray-Red, to opto transmitter Sw #74
J1-7 Gray-Brown, to opto transmitter Sw #75
J1-8 Key
J1-9 Black, Ground

J2-1 Orange-Violet, to opto receiver Sw #77
J2-2 Orange-Blue, to opto receiver Sw #76
J2-3 Orange-Green, to opto receiver Sw #71
J2-4 Orange-Yellow, to opto receiver Sw #72
J2-5 Orange-Black, to opto receiver Sw #73
J2-6 Key
J2-7 Orange-Red, to opto receiver Sw #74
J2-8 Orange-Brown, to opto receiver Sw #75
J2-9 Gray, +12VDC

J3-1 Black, Ground
J3-2 Gray-Yellow, +12VDC from J118-2
J3-3 Green-Orange, from J206-3, to playfield switches
J3-4 Green-Violet, from J206-7, to playfield switches
J3-5 Key
J3-6 White-Violet, from J208-8, to playfield switches
J3-7 White-Blue, from J208-7, to playfield switches
J3-8 White-Green, from J208-5, to playfield switches
J3-9 White-Yellow, from J208-4, to playfield switches
J3-10 White-Orange, from J208-3, to playfield switches
J3-11 White-Red, from J208-2, to playfield switches
J3-12 White-Brown, from J208-1, to playfield switches

J4-1 Gray, to opto transmitter Sw #33
J4-2 Key
J4-3 Black, to opto transmitter Sw #33
J4-4 White, to opto receiver Sw #33
J4-5 Green, to opto receiver Sw #33

J5-1 Gray-Yellow, to opto transmitter Sw #32
J5-2 Black, to opto transmitter Sw #32
J5-3 Key
J5-4 White, to opto receiver Sw #32
J5-5 Green, to opto receiver Sw #32

J6-1 Gray, to opto transmitter Sw #31
J6-2 Black, to opto transmitter Sw #31
J6-3 White, to opto receiver Sw #31
J6-4 Key
J6-5 Green, to opto receiver Sw #31

# Opto Sw10 PCB Schematic



DOCTOR WHO 3-13

# Bi-directional Motor Drive Assembly
## A-15680

J1-1 Blue-Yellow, from J122-3
J1-2 Blue-Orange, from J122-4
J1-3 Key
J1-4 Black, Ground
J1-5 Red-White, +20VDC from J107-6
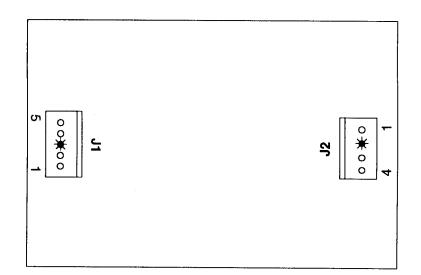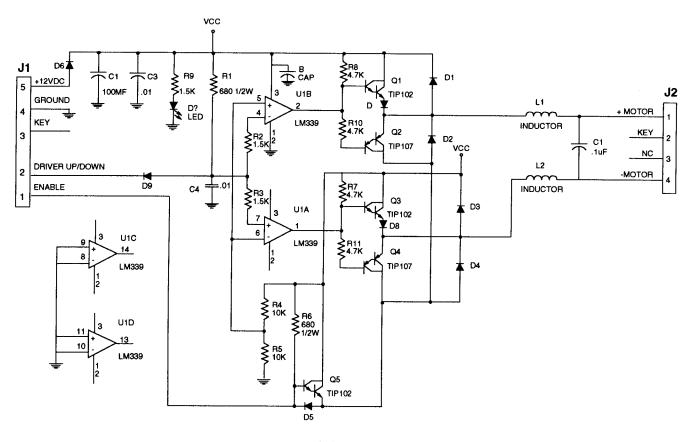
J2-1 Black, Gound
J2-2 Key
J2-3 Not Used
J2-4 Red, to cannon motor, Sol 27
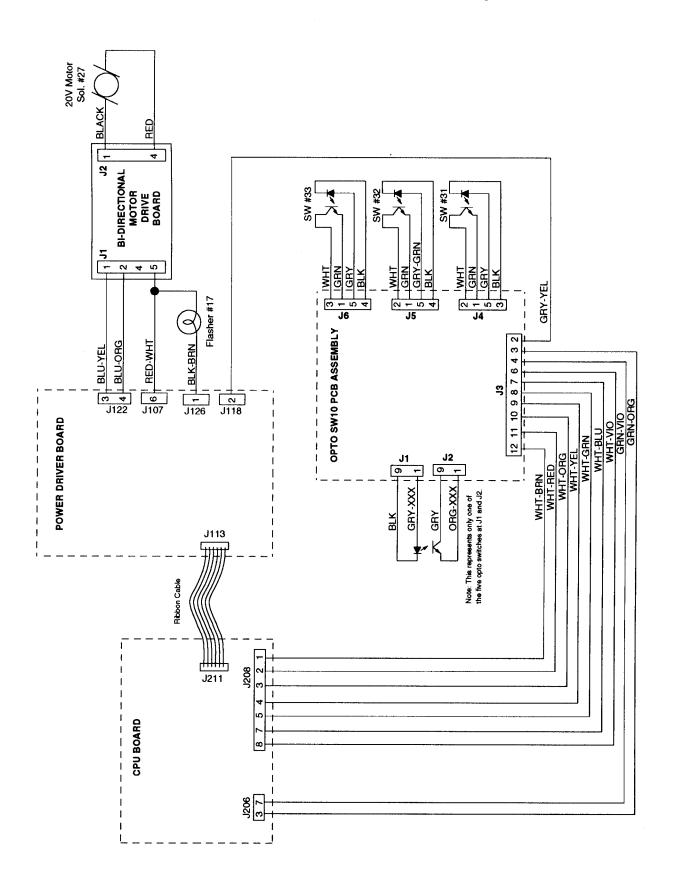
Schematic
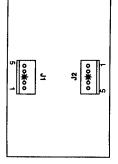
# Mini-playfield Wiring Block Diagram
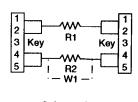
## *2-10W Res PCB Assembly A-15309-1

J1-1 White-Orange, to backbox lamps J1-1 (4 Lamp G.I. Assy.)
J1-2 Not Used
J1-3 Key
J1-4 Not Used
J1-5 Orange, Ground to backbox lamps J1-3 (4 Lamp G.I. Assy.)

J2-1 White-Orange, from J121-8
J2-2 Not Used
J2-3 Key
J2-4 Black, Ground from J118-3
J2-5 Not Used
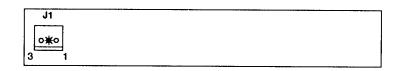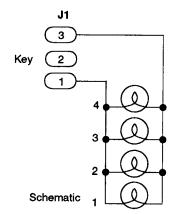
Schematic
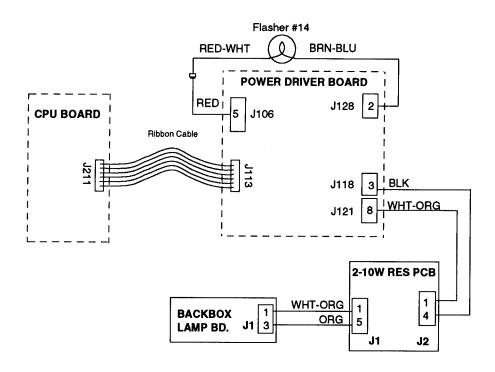
## 4 Lamp G.I. Assembly A-15742

J1-1 White-Orange, from 2-10W Res PCB J1-1
J1-2 Key
J1-3 Orange, Ground from 2-10W Res PCB J1-5
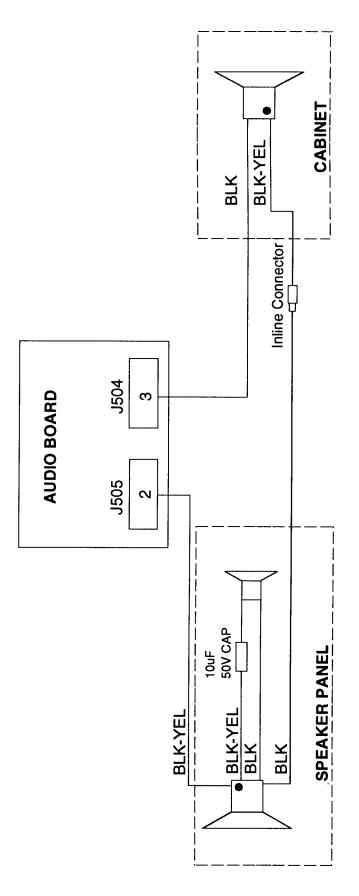
Schematic

## DALEK WIRING BLOCK DIAGRAM

# SPEAKER WIRING DIAGRAM



**CABINET**

BLK

BLK-YEL

Inline Connector

**AUDIO BOARD**

J504
3

J505
2

**SPEAKER PANEL**

BLK-YEL

BLK-YEL

10uF
50V CAP

BLK

BLK
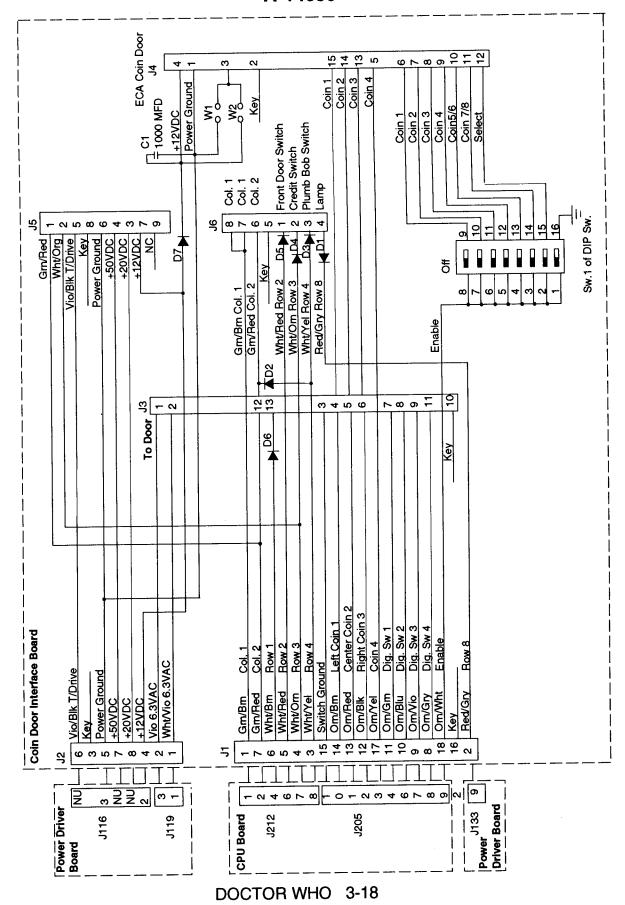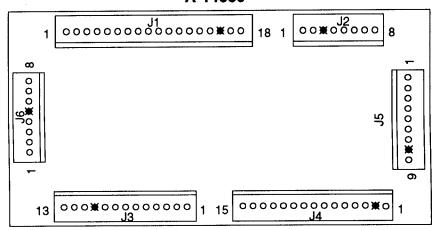
# Coin Door Interface Board Schematic
## A-14689



DOCTOR WHO   3-18

# COIN DOOR INTERFACE BOARD
## A-14689



J1-1    Green-Brown, switch column 1 from J212-1
J1-2    Red-Gray, lamp row 8 from J134-9
J1-3    White-Yellow, switch row 4 from J212-8
J1-4    White-Orange, switch row 3 from J212-7
J1-5    White-Red, switch row 2 from J212-6
J1-6    White-Brown, switch row 1 from J212-4
J1-7    Green-Red, switch column 2 from J212-2
J1-8    Orange-Gray, dedicated switch row 8 from J205-9
J1-9    Orange-Violet, dedicated switch row 7 from J205-8
J1-10 Orange- Blue, dedicated switch row 6 from J205-7
J1-11 Orange-Green, dedicated switch row 5 from J205-6
J1-12 Orange-Black, dedicated switch row 3 from J205-3
J1-13 Orange-Red, dedicated switch row 2 from J205-2
J1-14 Orange-Brown, dedicated switch row 1 from J205-1
J1-15 Black, Ground from J205-10
J1-16 Key
J1-17 Orange-Yellow, dedicated switch row 4 from J205-4
J1-18 Orange-White, switch enable from J205-12

J2-1 Violet, G.I. return from J119-3
J2-2 White-Violet, G.I. 6.8VAC from J119-1
J2-3 Key
J2-4 Gray-Yellow, +12V from J116-2
J2-5 Black, Ground from J116-3
J2-6 Not Used
J2-7 Not Used
J2-8 Not Used

J3-1    Violet, G.I. return to coin door
J3-2    White-Violet, G.I. 6.8VAC to coin door
J3-3    Black, Ground to coin door
J3-4    Orange-Brown, dedicated switch row 1 to coin door
J3-5    Not Used
J3-6    Orange-Black, dedicated switch row 3 to coin door
J3-7    Orange-Green, dedicated switch row 4 to coin door
J3-8    Orange-Blue, dedicated switch row 6 to coin door
J3-9    Orange-Violet, dedicated switch row 7 to coin door
J3-10 Key
J3-11 Orange-Gray, dedicated switch row 8 to coin door
J3-12 Green-Red, switch column 8 to coin door
J3-13 White-Brown, switch row 1 to coin door

J4   Not Used

J5   Not Used

J6-1 White-Red, switch row 2 to cabinet
J6-2 White-Orange, switch row 3 to cabinet
J6-3 White-Yellow, switch row 4 to cabinet
J6-4 Red-Gray, lamp row 8 to cabinet
J6-5 Key
J6-6 Green-Red, switch column 2 to cabinet
J6-7 Green-Brown, switch column 1 to cabinet
J6-8 Green-Brown, switch column 1 to cabinet
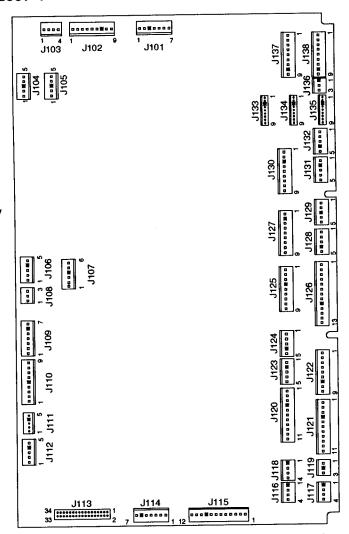
**P.C. Board Legend**

| | |
|---|---|
| J1-J6 | Coin Door Interface Board |
| J1xx | Power Driver Board |
| J2xx | CPU Board |
| J5xx | Audio Board |
| J6xx | Dot Matrix Controller Board |
| J9xx | Fliptronic II Board |

# POWER DRIVER BOARD
## A-12697-1

J101-1 Red, 9VAC from transformer secondary
J101-2 Red, 9VAC from transformer secondary
J101-3 Key
J101-4 Blue-White, 13VAC from transformer secondary
J101-5 Blue-White, loop from J101-4
J101-6 Blue-White, 13VAC from transformer secondary
J101-7 Blue-White, loop from J101-6

J102-1 White-Red, loop from J102-2
J102-2 White-Red, 16VAC from transformer secondary
J102-3 White-Red, loop from J102-4
J102-4 White-Red, 16VAC from transformer secondary
J102-5 Black-Yellow, loop from J102-6
J102-6 Black-Yellow, 16VAC from transformer secondary
J102-7 Key
J102-8 Black-Yellow, loop from J102-9
J102-9 Black-Yellow,16VAC from transformer secondary

J103 Not Used

J104-1 White-Blue, 50VAC to J901-1
J104-2 White-Blue, 50VAC to J901-3
J104-3 Key
J104-4 Not Used
J104-5 Not Used

J105 Not Used

J106-1 Not Used
J106-2 Not Used
J106-3 Not Used
J106-4 Key
J106-5 Red, +20V to insert flashlamps

J107-1 Not Used
J107-2 Violet-Orange, 50V to coils
J107-3 Violet-Yellow, 50V to coils
J107-4 Key
J107-5 Red, +20V to flashlamps
J107-6 Red-White, +20V to flashlamps

J108 Not Used

J109 Not Used

J110 Not Used

J111 Not Used



J112-1 White-Green, 9.8VAC from transformer secondary
J112-2 White-Green, loop from J112-1
J112-3 White-Green, 9.8VAC from transformer secondary
J112-4 Key
J112-5 White-Green, loop from J112-3

J113 Ribbon Cable, Data to/from J211

J114-1 Gray/Green, +12VDC to J210-7
J114-2 Gray/Green, +12VDC to J210-6; J904-2
J114-3 Gray, +5VDC to J210-5; J502-3
J114-4 Gray, +5VDC to J210-4; J502-1; J904-1
J114-5 Black, Ground to J210-3; J502-5; J904-5
J114-6 Key
J114-7 Black, Ground to J210-1; J502-4; J904-4

| P.C. Board Legend | |
| --- | --- |
| J1-J6 | Coin Door Interface Board |
| J1xx | Power Driver Board |
| J2xx | CPU Board |
| J5xx | Audio Board |
| J6xx | Dot Matrix Controller Board |
| J9xx | Fliptronic II Board |

# POWER DRIVER BOARD CONTINUED...

J115-1 Yellow-White, 6.8VAC from transformer secondary
J115-2 White-Brown, 6.8VAC from transformer secondary
J115-3 White-Brown, loop from J115-2
J115-4 White-Orange, 6.8VAC from transformer secondary
J115-5 White-Yellow, loop from J115-6
J115-6 White-Yellow, 6.8VAC from transformer secondary
J115-7 Orange, 6.8VAC from transformer secondary
J115-8 Orange, 6.8VAC loop from J115-7
J115-9 Key
J115-10 Green, 6.8VAC from transformer secondary
J115-11 Brown, 6.8VAC from transformer secondary
J115-12 Brown, 6.8VAC loop from J115-11

J116-1 Key
J116-2 Gray-Yellow, +12VDC to coin door; J2-4
J116-3 Black, Ground to coin door; J2-5
J116-4 Not Used

J117-1 Key
J117-2 Gray-Yellow, +12VDC to J606-7
J117-3 Black, Ground to J606-3
J117-4 Gray, +5VDC to J606-5

J118-1
J118-2 Gray-Yellow, +12VDC to backbox
J118-3 Black, Ground
J118-4

J119-1 White-Violet, 6.8VAC G.I. to coin door; J2-2
J119-2 Key
J119-3 Violet, Return G.I. to coin door; J2-1

J120-1 Not Used
J120-2 Not Used
J120-3 Yellow, Return G.I. to playfield
J120-4 Key
J120-5 Green, Return G.I. to playfield
J120-6 Violet, Return G.I. to playfield
J120-7 Not Used
J120-8 Not Used
J120-9 White-Yellow, 6.8VAC to playfield
J120-10 White-Green, 6.8VAC to playfield
J120-11 White-Violet, 6.8VAC to playfield

J121-1 Brown, Return G.I. to insert
J121-2 Orange, Return G.I. to insert
J121-3 Yellow, Return G.I. to insert
J121-4 Key
J121-5 Green, Return G.I. to insert
J121-6 Violet, Return G.I. to insert
J121-7 White-Brown, 6.8VAC to insert
J121-8 White-Orange, 6.8VAC to insert
J121-9 White-Yellow, 6.8VAC to insert
J121-10 White-Green, 6.8VAC to insert
J121-11 White-Violet, 6.8VAC to insert

J122-1 Not Used
J122-2 Not Used
J122-3 Blue-Orange, Sol 27, Special 7 Drive
J122-4 Blue-Yellow, Sol 28, Special 8 Drive
J122-5 Not Used
J122-6 Not Used
J122-7 Key
J122-8 Not Used
J122-9 Not Used

J123 Not Used

J124-1 Not Used
J124-2 Not Used
J124-3 Not Used
J124-4 Key
J124-5 Not Used

J125-1 Black-Brown, Sol 17 to insert board flashlamp
J125-2 Black-Red, Sol 18 to insert board flashlamp
J125-3 Black-Orange, Sol 19 to insert board flashlamp
J125-4 Key
J125-5 Black-Yellow, Sol 20 to insert board flashlamp
J125-6 Blue-Green, Sol 21 to insert board flashlamp
J125-7 Blue-Black, Sol 22 to insert board flashlamp
J125-8 Blue-Violet, Sol 23 to insert board flashlamp
J125-9 Blue-Gray, Sol 24 to insert board flashlamp

J126-1 Black-Brown, Sol 17 to playfield flashlamp
J126-2 Black-Red, Sol 18 to playfield flashlamp
J126-3 Black-Orange, Sol 19 to playfield flashlamp
J126-4 Black-Yellow, Sol 20 to playfield flashlamp
J126-5 Blue-Green, Sol 21 to playfield flashlamp
J126-6 Blue-Black, Sol 22 to playfield flashlamp
J126-7 Blue-Violet, Sol 23 to playfield flashlamp
J126-8 Blue-Gray, Sol 24 to playfield flashlamp
J126-9 Key
J126-10 Not Used
J126-11 Not Used
J126-12 Not Used
J126-13 Not Used

J127-1 Brown-Black, Sol 9 to playfield coil
J127-2 Key
J127-3 Brown-Red, Sol 10 to playfield coil
J127-4 Brown-Orange, Sol 11 to playfield coil
J127-5 Brown-Yellow, Sol 12 to playfield coil
J127-6 Brown-Green, Sol 13 to playfield coil
J127-7 Not Used
J127-8 Brown-Violet, Sol 15 to playfield coil
J127-9 Brown-Gray, Sol 16 to playfield coil

| P.C. Board Legend | |
| --- | --- |
| J1-J6 | Coin Door Interface Board |
| J1xx | Power Driver Board |
| J2xx | CPU Board |
| J5xx | Audio Board |
| J6xx | Dot Matrix Controller Board |
| J9xx | Fliptronic II Board |

J128-1 Not Used
J128-2 Brown-Blue, Sol 14, to backbox
J128-3 Not Used
J128-4 Key
J128-5 Not Used

J129 Not Used

J130-1 Violet-Brown, Sol 1 to playfield coil
J130-2 Violet-Red, Sol 2 to playfield coil
J130-3 Key
J130-4 Violet-Orange, Sol 3 to playfield coil
J130-5 Violet-Yellow, Sol 4 to playfield coil
J130-6 Violet-Green, Sol 5 to playfield coil
J130-7 Violet-Blue, Sol 6 to playfield coil
J130-8 Violet-Black, Sol 7 to playfield coil
J130-9 Not Used

J131-1 Not Used
J131-2 Key
J131-3 Violet-Blue, to insert flasher
J131-4 Not Used
J131-5 Violet-Gray, to insert flasher

J132-1 Not Used
J132-2 Not Used
J132-3 Blue-Orange, to insert flasher
J132-4 Key
J132-5 Blue-Yellow, to insert flasher

J133-1 Red-Brown, Row 1 to playfield lamps
J133-2 Red-Black, Row 2 to playfield lamps
J133-3 Key
J133-4 Red-Orange, Row 3 to playfield lamps
J133-5 Red-Yellow, Row 4 to playfield lamps
J133-6 Red-Green, Row 5 to playfield lamps
J133-7 Red-Blue, Row 6 to playfield lamps
J133-8 Red-Violet, Row 7 to playfield lamps
J133-9 Red-Gray, Row 8 to playfield lamps

J134-1 Not Used
J134-2 Not Used
J134-3 Key
J134-4 Not Used
J134-5 Not Used
J134-6 Not Used
J134-7 Not Used
J134-8 Not Used
J134-9 Red-Gray, Row 8 to cabinet lamp

J135-1 Red-Brown, Row 1 to speaker panel lamp
J135-2 Red-Black, Row 2 to speaker panel lamp
J135-3 Key
J135-4 Red-Orange, Row 3 to speaker panel lamp
J135-5 Not Used
J135-6 Not Used
J135-7 Red-Blue, Row 6 to speaker panel lamp
J135-8 Red-Violet, Row 7 to speaker panel lamp
J135-9 Red-Gray, Row 8 to speaker panel lamp

J136-1 Key
J136-2 Not Used
J136-3 Yellow/Gray , Col 8 to cabinet lamp

J137-1 Yellow-Brown, Col 1 to playfield lamps
J137-2 Yellow-Red, Col 2 to playfield lamps
J137-3 Yellow-Orange, Col 3 to playfield lamps
J137-4 Yellow-Black, Col 4 to playfield lamps
J137-5 Yellow-Green, Col 5 to playfield lamps
J137-6 Yellow-Blue, Col 6 to playfield lamps
J137-7 Yellow-Violet, Col 7 to playfield lamps
J137-8 Key
J137-9 Yellow-Gray, Col 8 to playfield lamps

J138-1 Not Used
J138-2 Yellow-Red, Col 2 to speaker panel lamps
J138-3 Yellow-Orange, Col 3 to speaker panel lamps
J138-4 Yellow-Black, Col 4 to speaker panel lamps
J138-5 Not Used
J138-6 Yellow-Blue, Col 6 to speaker panel lamps
J138-7 Yellow-Violet, Col 7 to speaker panel lamps
J138-8 Key
J138-9 Yellow-Gray, Col 8 to speaker panel lamps

| P.C. Board Legend | |
| --- | --- |
| J1-J6 | Coin Door Interface Board |
| J1xx | Power Driver Board |
| J2xx | CPU Board |
| J5xx | Audio Board |
| J6xx | Dot Matrix Controller Board |
| J9xx | Fliptronic II Board |

# CPU BOARD
## A-12742-20006

J201 Ribbon Cable, Data to J602

J202 Ribbon Cable, Data to J903; J506; J601

J203 Not Used

J204 Not Used

J205-1 Orange-Brown, Dir Sw 1, Left Coin to J1-14
J205-2 Orange-Red, Dir Sw 2, Center Coin to J1-13
J205-3 Orange-Black, Dir Sw 3, Right Coin to J1-12
J205-4 Orange-Yellow, Dir Sw 4, 4th Coin J1-17
J205-5 Key
J205-6 Orange-Green, Dir Sw 5, Escape/Service to J1-11
J205-7 Orange-Blue, Dir Sw 6, Down/Volume Down to J1-10
J205-8 Orange-Violet, Dir Sw 7, Up/Volume Up to J1-9
J205-9 Orange-Gray, Dir Sw 8, Enter/Test to J1-8
J205-10 Black, Ground to J1-15
J205-11 Not Used
J205-12 Orange-White, Enable to J1-18

J206-1 Green-Brown, Sw Col 1 to Playfield Switches
J206-2 Green-Red, Sw Col 2 to Playfield Switches
J206-3 Green-Orange, Sw Col 3 to Playfield Switches
J206-4 Green-Yellow, Sw Col 4 to Playfield Switches
J206-5 Green-Black, Sw Col 5 to Playfield Switches
J206-6 Green-Blue, Sw Col 6 to Playfield Switches
J206-7 Green-Violet, Sw Col 7 to Playfield Switches
J206-8 Key
J206-9 Green-Gray, Sw Col 8 to Playfield Switches

J207 Not Used
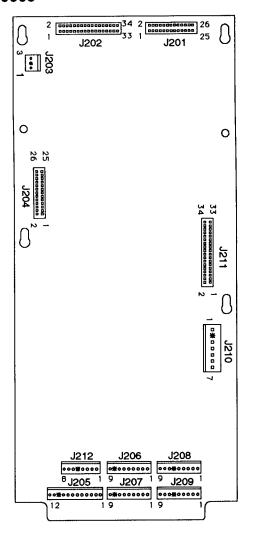
J208-1 White-Brown, Sw Row 1 to Playfield Switches
J208-2 White-Red, Sw Row 2 to Playfield Switches
J208-3 White-Orange, Sw Row 3 to Playfield Switches
J208-4 White-Yellow, Sw Row 4 to Playfield Switches
J208-5 White-Green, Sw Row 5 to Playfield Switches
J208-6 Key
J208-7 White-Blue, Sw Row 6 to Playfield Switches
J208-8 White-Violet, Sw Row 7 to Playfield Switches
J208-9 White-Gray, Sw Row 8 to Playfield Switches

J209 Not Used

J210-1 Black, Ground from J114-7
J210-2 Key
J210-3 Black, Ground from J114-5
J210-4 Gray, +5VDC from J114-4
J210-5 Gray, +5VDC from J114-3
J210-6 Gray-Green, +12VDC from J114-2
J210-7 Gray-Green, +12VDC from J114-1
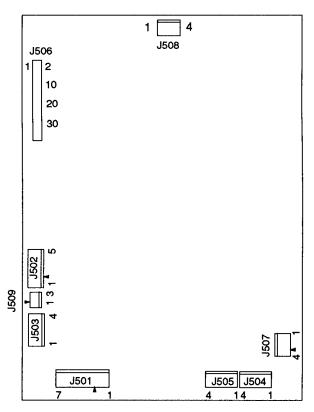


J211 Ribbon Cable, Data from J113

J212-1 Green-Brown, Sw Col 1 to J1-1
J212-2 Green-Red, Sw Col 2 to J1-7
J212-3 Green-Orange, Sw Col 3 to J2-3 on
        5-Sw. & Diode P.C.
J212-4 White-Brown, Sw Row 1 to J1-6
J212-5 Key
J212-6 White-Red, Sw Row 2 to J1-5
J212-7 White-Orange, Sw Row 3 to J1-4
J212-8 White-Yellow, Sw Row 4 to J1-3

| P.C. Board Legend | |
| --- | --- |
| J1-J6 | Coin Door Interface Board |
| J1xx | Power Driver Board |
| J2xx | CPU Board |
| J5xx | Audio Board |
| J6xx | Dot Matrix Controller Board |
| J9xx | Fliptronic II Board |

## AUDIO BOARD
## A-12738-20006



J501-1 Gray-Green, 20VAC from transformer secondary
J501-2 Gray-Green, loop from J501-1
J501-3 Key
J501-4 Gray, 20VAC from transformer secondary
J501-5 Gray, 20VAC loop from J501-4
J501-6 Gray-White, 20VAC loop from transformer secondary
J501-7 Gray-White, 20VAC loop from J501-6

J502-1 Gray, +5VDC from J114-4
J502-2 Key
J502-3 Gray , +5VDC from J114-3
J502-4 Black, Ground from J114-7
J502-5 Black, Ground from J114-5

J503 Not Used

J504-1 Not Used
J504-2 Not Used
J504-3 Black, Signal to speaker
J504-4 Not Used

J505-1 Not Used
J505-2 Black-Yellow, Signal to speaker
J505-3 Not Used
J505-4 Not Used

J506 Ribbon Cable, Data to/from J601; J903; J202

J507 Not Used

J508 Not Used

J509 Not Used

P.C. Board Legend
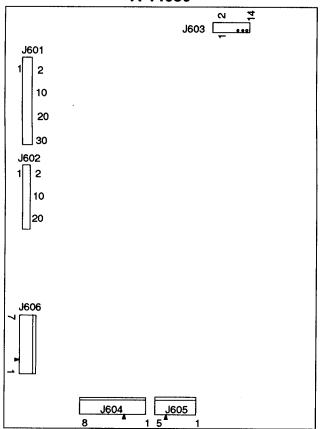
| | |
|---|---|
| J1-J6 | Coin Door Interface Board |
| J1xx | Power Driver Board |
| J2xx | CPU Board |
| J5xx | Audio Board |
| J6xx | Dot Matrix Controller Board |
| J9xx | Fliptronic II Board |

# DOT MATRIX CONTROLLER BOARD
## A-14039

J603  2  14
J603  1

J601
1  2
10
20
30

J602
1  2
10
20

J606
7
1

J604  J605
8  1 5  1

J601 Ribbon Cable, Data  to/from J202; J903; J506

J602 Ribbon Cable, Data  from J201

J603 Ribbon Cable ,Data  to Dot Matrix Display Driver

J604-1 Orange, -125V to Dot Matrix Display Driver Pin 1
J604-2 Blue, -113V to Dot Matrix Display Driver Pin 2
J604-3 Key
J604-4 Black, Ground to Dot Matrix Display Driver Pin 4
J604-5 Black, Ground to Dot Matrix Display Driver Pin 5
J604-6 Gray , +5V to Dot Matrix Display Driver Pin 6
J604-7 Gray-Yellow, +12V to Dot Matrix Display Driver Pin 7
J604-8 Brown, +62 to Dot Matrix Display Driver Pin 8

J605-1 White, 80VAC from transformer secondary
J605-2 White, 80VAC from transformer secondary
J605-3 Violet, 100VAC from transformer secondary
J605-4 Key
J605-5 Violet, 100VAC from transformer secondary

J606-1 Black, Ground loop from J606-3
J606-2 Key
J606-3 Black, Ground from J117-3
J606-4 Gray, +5V loop from J606-5
J606-5 Gray, +5V from J117-4
J606-6 Gray-Yellow, +12V loop from J606-7
J606-7 Gray-Yellow, +12V from J117-2

| P.C. Board Legend | |
|---|---|
| J1-J6 | Coin Door Interface Board |
| J1xx | Power Driver Board |
| J2xx | CPU Board |
| J5xx | Audio Board |
| J6xx | Dot Matrix Controller Board |
| J9xx | Fliptronic II Board |
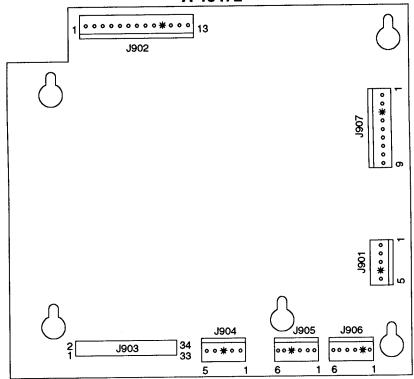
DOCTOR WHO   3-25

# FLIPTRONIC II BOARD
## A-15472



J901-1  White-Blue, 50VAC loop from J105-1
J901-2  White-Blue, loop from J901-1
J901-3  White-Blue, 50VAC loop, from J105-2
J901-4  Key
J901-5  White-Blue, loop from J901-3

J902-1  Orange-Gray,  ?
J902-2  Not Used
J902-3  Black-Blue, ?
J902-4  Not Used
J902-5  Not Used
J902-6  Not Used
J902-7  Orange-Blue, holding to lower left flipper
J902-8  Not Used
J902-9  Blue-Gray, power to lower left flipper
J902-10 Key
J902-11 Orange-Green, holding to lower right flipper
J902-12 Not Used
J902-13 Blue-Violet, power to lower right flipper

J903 Ribbon Cable, data to/from J202; J506; J601

J904-1 Gray, +5V from J114-4
J904-2 Gray-Green, +12V from J114-2
J904-3 Key
J904-4 Black, Ground from J114-7
J904-5 Black, Ground from J114-5

J905-1 Blue-Violet, to right flipper opto
J905-2 Blue-Gray, to left flipper opto
J905-3 Black-Yellow, to right flipper opto
J905-4 Key
J905-5 Black-Blue, to left flipper opto
J905-6 Orange, Switch Ground

J906-1 Black-Green, to lower right end-of-stroke switch
J906-2 Key
J906-3 Black-Blue, to lower left end-of-stroke switch
J906-4 Not Used
J906-5 Black-Gray, to upper left end-of-stroke switch
J906-6 Orange, Switch Ground

J907-1 Blue-Yellow,  +50V to lower right flipper
J907-2 Blue-Yellow, loop from J907-1
J907-3 Key
J907-4 Gray-Yellow,  +50V to lower left flipper
J907-5 Gray-Yellow,  loop from J907-4
J907-6 Not Used
J907-7 Not Used
J907-8 Gray-Yellow, loop from J907-9
J907-9 Gray-Yellow,  +50V to upper left flipper
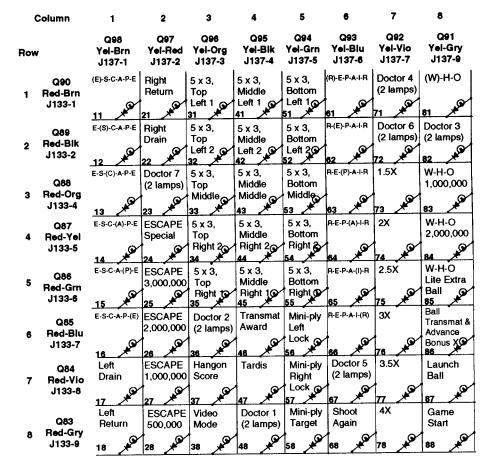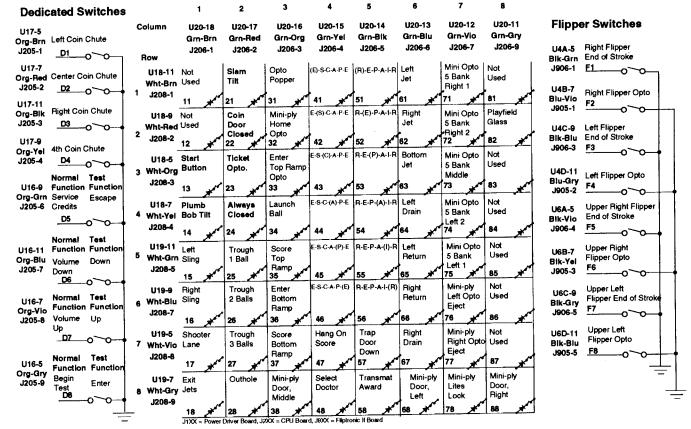
| P.C. Board Legend | |
|---|---|
| J1-J6 | Coin Door Interface Board |
| J1xx | Power Driver Board |
| J2xx | CPU Board |
| J5xx | Audio Board |
| J6xx | Dot Matrix Controller Board |
| J9xx | Fliptronic II Board |

# LAMP MATRIX

| Row | Column 1 — Q98 Yel-Brn J137-1 | 2 — Q97 Yel-Red J137-2 | 3 — Q96 Yel-Org J137-3 | 4 — Q95 Yel-Blk J137-4 | 5 — Q94 Yel-Grn J137-5 | 6 — Q93 Yel-Blu J137-6 | 7 — Q92 Yel-Vio J137-7 | 8 — Q91 Yel-Gry J137-9 |
|---|---|---|---|---|---|---|---|---|
| 1 — Q90 Red-Brn J133-1 | (E)-S-C-A-P-E  11 | Right Return  21 | 5 x 3, Top Left 1  31 | 5 x 3, Middle Left 1  41 | 5 x 3, Bottom Left 1  51 | (R)-E-P-A-I-R  61 | Doctor 4 (2 lamps)  71 | (W)-H-O  81 |
| 2 — Q89 Red-Blk J133-2 | E-(S)-C-A-P-E  12 | Right Drain  22 | 5 x 3, Top Left 2  32 | 5 x 3, Middle Left 2  42 | 5 x 3, Bottom Left 2  52 | R-(E)-P-A-I-R  62 | Doctor 6 (2 lamps)  72 | Doctor 3 (2 lamps)  82 |
| 3 — Q88 Red-Org J133-4 | E-S-(C)-A-P-E  13 | Doctor 7 (2 lamps)  23 | 5 x 3, Top Middle  33 | 5 x 3, Middle Middle  43 | 5 x 3, Bottom Middle  53 | R-E-(P)-A-I-R  63 | 1.5X  73 | W-H-O 1,000,000  83 |
| 4 — Q87 Red-Yel J133-5 | E-S-C-(A)-P-E  14 | ESCAPE Special  24 | 5 x 3, Top Right 2  34 | 5 x 3, Middle Right 2  44 | 5 x 3, Bottom Right 2  54 | R-E-P-(A)-I-R  64 | 2X  74 | W-H-O 2,000,000  84 |
| 5 — Q86 Red-Grn J133-6 | E-S-C-A-(P)-E  15 | ESCAPE 3,000,000  25 | 5 x 3, Top Right 1  35 | 5 x 3, Middle Right 1  45 | 5 x 3, Bottom Right 1  55 | R-E-P-A-(I)-R  65 | 2.5X  75 | W-H-O Lite Extra Ball  85 |
| 6 — Q85 Red-Blu J133-7 | E-S-C-A-P-(E)  16 | ESCAPE 2,000,000  26 | Doctor 2 (2 lamps)  36 | Transmat Award  46 | Mini-ply Left Lock  56 | R-E-P-A-I-(R)  66 | 3X  76 | Ball Transmat & Advance Bonus X  86 |
| 7 — Q84 Red-Vio J133-8 | Left Drain  17 | ESCAPE 1,000,000  27 | Hangon Score  37 | Tardis  47 | Mini-ply Right Lock  57 | Doctor 5 (2 lamps)  67 | 3.5X  77 | Launch Ball  87 |
| 8 — Q83 Red-Gry J133-9 | Left Return  18 | ESCAPE 500,000  28 | Video Mode  38 | Doctor 1 (2 lamps)  48 | Mini-ply Target  58 | Shoot Again  68 | 4X  78 | Game Start  88 |

# SWITCH MATRIX

## Dedicated Switches

| | | |
|---|---|---|
| U17-5 Org-Brn Left Coin Chute J205-1 | | D1 |
| U17-7 Org-Red Center Coin Chute J205-2 | | D2 |
| U17-11 Org-Blk Right Coin Chute J205-3 | | D3 |
| U17-9 Org-Yel 4th Coin Chute J205-4 | | D4 |
| U16-9 Org-Grn Service Credits J205-6 | Normal Function / Test Escape | D5 |
| U16-11 Org-Blu Volume Down J205-7 | Normal Function / Test Down | D6 |
| U16-7 Org-Vio Volume Up J205-8 | Normal Function / Test Up | D7 |
| U16-5 Org-Gry Begin Test J205-9 | Normal Function / Test Enter | D8 |

| Row | Column 1 — U20-18 Grn-Brn J206-1 | 2 — U20-17 Grn-Red J206-2 | 3 — U20-16 Grn-Org J206-3 | 4 — U20-15 Grn-Yel J206-4 | 5 — U20-14 Grn-Blk J206-5 | 6 — U20-13 Grn-Blu J206-6 | 7 — U20-12 Grn-Vio J206-7 | 8 — U20-11 Grn-Gry J206-9 |
|---|---|---|---|---|---|---|---|---|
| 1 — U18-11 Wht-Brn J208-1 | Not Used  11 | Slam Tilt  21 | Opto Popper  31 | (E)-S-C-A-P-E  41 | (R)-E-P-A-I-R  51 | Left Jet  61 | Mini Opto 5 Bank Right 1  71 | Not Used  81 |
| 2 — U18-9 Wht-Red J208-2 | Not Used  12 | Coin Door Closed  22 | Mini-ply Home Opto  32 | E-(S)-C-A-P-E  42 | R-(E)-P-A-I-R  52 | Right Jet  62 | Mini Opto 5 Bank Right 2  72 | Playfield Glass  82 |
| 3 — U18-5 Wht-Org J208-3 | Start Button  13 | Ticket Opto.  23 | Enter Top Ramp Opto  33 | E-S-(C)-A-P-E  43 | R-E-(P)-A-I-R  53 | Bottom Jet  63 | Mini Opto 5 Bank Middle  73 | Not Used  83 |
| 4 — U18-7 Wht-Yel J208-4 | Plumb Bob Tilt  14 | Always Closed  24 | Launch Ball  34 | E-S-C-(A)-P-E  44 | R-E-P-(A)-I-R  54 | Left Drain  64 | Mini Opto 5 Bank Left 2  74 | Not Used  84 |
| 5 — U19-11 Wht-Grn J208-5 | Left Sling  15 | Trough 1 Ball  25 | Score Top Ramp  35 | E-S-C-A-(P)-E  45 | R-E-P-A-(I)-R  55 | Left Return  65 | Mini Opto 5 Bank Left 1  75 | Not Used  85 |
| 6 — U19-9 Wht-Blu J208-7 | Right Sling  16 | Trough 2 Balls  26 | Enter Bottom Ramp  36 | E-S-C-A-P-(E)  46 | R-E-P-A-I-(R)  56 | Right Return  66 | Mini-ply Left Opto Eject  76 | Not Used  86 |
| 7 — U19-5 Wht-Vio J208-8 | Shooter Lane  17 | Trough 3 Balls  27 | Score Bottom Ramp  37 | Hang On Score  47 | Trap Door Down  57 | Right Drain  67 | Mini-ply Right Opto Eject  77 | Not Used  87 |
| 8 — U19-7 Wht-Gry J208-9 | Exit Jets  18 | Outhole  28 | Mini-ply Door, Middle  38 | Select Doctor  48 | Transmat Award  58 | Mini-ply Door, Left  68 | Mini-ply Lites Lock  78 | Mini-ply Door, Right  88 |

## Flipper Switches

| | |
|---|---|
| U4A-5 Blk-Grn Right Flipper End of Stroke J906-1 | F1 |
| U4B-7 Blu-Vio Right Flipper Opto J905-1 | F2 |
| U4C-9 Blk-Blu Left Flipper End of Stroke J906-3 | F3 |
| U4D-11 Blu-Gry Left Flipper Opto J905-2 | F4 |
| U6A-5 Blk-Vio Upper Right Flipper End of Stroke J906-4 | F5 |
| U6B-7 Blk-Yel Upper Right Flipper Opto J905-3 | F6 |
| U6C-9 Blk-Gry Upper Left Flipper End of Stroke J906-5 | F7 |
| U6D-11 Blk-Blu Upper Left Flipper Opto J905-5 | F8 |

J1XX = Power Driver Board, J2XX = CPU Board, J9XX = Fliptronic II Board

## *CAUTION:* Transport this game ONLY with hinged backbox DOWN!