

JUNK YARD



OPERATIONS MANUAL INCLUDES

Operations & Adjustments • Testing & Problem Diagnosis • Parts Information • Wiring
Diagrams & Schematics

Williams Electronics Games, Inc., 3401 N. California Avenue, Chicago, IL 60618

DIP SWITCH SETTINGS AND JUMPERS

EPROM Jumper Settings for G11	W1	W2
1MEG, 2MEG, 4 MEG EPROM	In	Out

DIP Switch Chart

COUNTRY	SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8
AMERICA	Off	Off	On	On	On	On	On	On
EUROPEAN	Off	Off	On	On	On	Off	On	On
FRENCH	Off	Off	On	On	On	On	Off	Off
GERMAN	Off	Off	On	On	On	On	On	Off
SPAIN	Off	Off	On	On	Off	On	On	On

SOLENOID/FLASHER TABLE

Sol. No.	Function	Solenoid Type	Voltage Connections			Drive Xistor	Drive Connections			Drive Wire Color	Solenoid Part Number	
			Playfield	Backbox	Cabinet		Playfield	Backbox	Cabinet		Flashlamp Type	Playfield Backbox
01	AUTO PLUNGER	High Power	J133-2			Q72	J116-1			VIO-BRN	AE-23-800	
02	REFRIGERATOR POPPER	High Power	J133-2			Q68	J116-2			VIO-RED	AE-23-800	
03	POWER CRANE	High Power	J133-2			Q71	J116-4			VIO-ORG	A-20099	
04	NOT USED	High Power				Q67				VIO-YEL		
05	SCOOP DOWN	High Power	J133-2			Q70	J116-6			VIO-GRN	SM1-28-900	
06	BUS DIVERTER	High Power	J133-2			Q66	J116-7			VIO-BLU	AE-27-1200	
07	KNOCKER	High Power		J133-2		Q69		J116-8		VIO-BLK		AE-23-800
08	NOT USED	High Power				Q65	J116-9			VIO-GRY		
09	TROUGH	Low Power	J133-3			Q44	J113-1			BRN-BLK	AE-26-1500	
10	LEFT SLINGSHOT	Low Power	J133-3			Q48	J113-3			BRN-RED	AE-26-1200	
11	RIGHT SLINGSHOT	Low Power	J133-3			Q43	J113-4			BRN-ORG	AE-26-1200	
12	NOT USED	Low Power				Q47				BRN-YEL		
13	NOT USED	Low Power				Q42				BRN-GRN		
14	NOT USED	Low Power				Q46				BRN-BLU		
15	HOLD CRANE	Low Power	J133-2			Q41	J113-8			BRN-VIO	A-20099	
16	MOVE DOG	Low Power	J133-3			Q45	J113-9			BRN-GRY	AE-26-1200	
17	DOG FACE FLASHER	Flasher	J133-6			Q28	J111-1			BLK-BRN	#906 (1)	
18	WINDOW SHOP FLSHR	Flasher	J133-6			Q32		J112-2		BLK-RED		#906 (1)
19	AUTOFIRE FLASHERS	Flasher	J133-6			Q27	J111-3			BLK-ORG	#89 (2)	
20	LEFT SIDE FLASHERS	Flasher	J133-6			Q31	J111-4	J112-5		BLK-YEL	#906 (1)	#906 (1)
21	SCOOP UP**	Low Power	J133-3			Q26	J111-5			BLU-GRN	AE-26-1200	
22	UNDER CRANE FLSHR	Flasher	J133-6			Q30	J111-6			BLU-BLK	#906 (1)	
23	BACK LEFT FLASHERS	Flasher	J133-6			Q25	J111-7	J112-8		BLU-VIO	#906 (1)	#906 (1)
24	BACK RIGHT FLASHERS	Flasher	J133-6			Q29	J111-8	J112-9		BLU-GRY	#906 (1)	#906 (1)
25	SHOOTER FLASHER	Gen. Purpose	J133-6			Q16	J109-1			BLU-BRN	#906 (1)	
26	SCOOP FLASHERS	Gen. Purpose	J133-6			Q15	J109-2	J108-3		BLU-RED	#906 (1)	#906 (1)
27	DOG HOUSE FLASHER	Gen. Purpose	J133-6			Q14	J109-3			BLU-ORG	#89 (1)	
28	CARS FLASHERS	Gen. Purpose	J133-6			Q13	J109-4			BLU-YEL	#89 (2)	

General Illumination

01	PLAYFIELD STRING 1	G.I.	J105-1			Q5	J105-7			WHT-BRN	#44	
02	PLAYFIELD STRING 2	G.I.	J105-2			Q4	J105-8			WHT-ORG	#44	
03	LOGO STRING 3	G.I.		J106-3		Q3		J106-9		WHT-YEL		#555
04	*ILLUMINATION STRING 4	G.I.		J106-5		Q2		J106-10		WHT-GRN		#555
05	*ILLUMINATION STRING 5	G.I.		J106-6	J104-3	Q1		J106-11	J104-1	WHT-VIO		#555

Flipper Circuits		Voltage Connection	Playfield	Drive Transistors Power	Hold	Drive Connections Playfield	Power	Drive Wire Colors	Coil Part No.	Coil Colors
29		Lwr. Rt. Power	J119-1 (RED-GRN)	Q90		J120-13	YEL-GRN		FL-11629	BLUE
30	LOWER RIGHT FLIPPER	Lwr. Rt. Hold	J119-1 (RED-GRN)	Q92		J120-11	ORG-GRN			
31		Lwr. Lt. Power	J119-4 (RED-BLU)	Q87		J120-9	YEL-BLU		FL-11629	BLUE
32	LOWER LEFT FLIPPER	Lwr. Lt. Hold	J119-4 (RED-BLU)	Q89		J120-7	ORG-BLU			
33	NOT USED	Upr. Rt. Power	J119-6 (RED-VIO)	Q84		J120-6	YEL-VIO		NOT USED	
34	UPPER RIGHT FLIPPER	Upr. Rt. Hold	J119-6 (RED-VIO)	Q86		J120-4	ORG-VIO			
35	NOT USED	Upr. Lt. Power	J119-8 (RED-GRY)	Q81		J120-3	YEL-GRY		NOT USED	
36	UPPER LEFT FLIPPER	Upr. Lt. Hold	J119-8 (RED-GRY)	Q83		J120-1	ORG-GRY			

J1XX = POWER DRIVER BOARD

24-6549 = #44 BULB; 24-8704 = #89 BULB; 24-8768 = #555 BULB; 24-8802 = #906 BULB

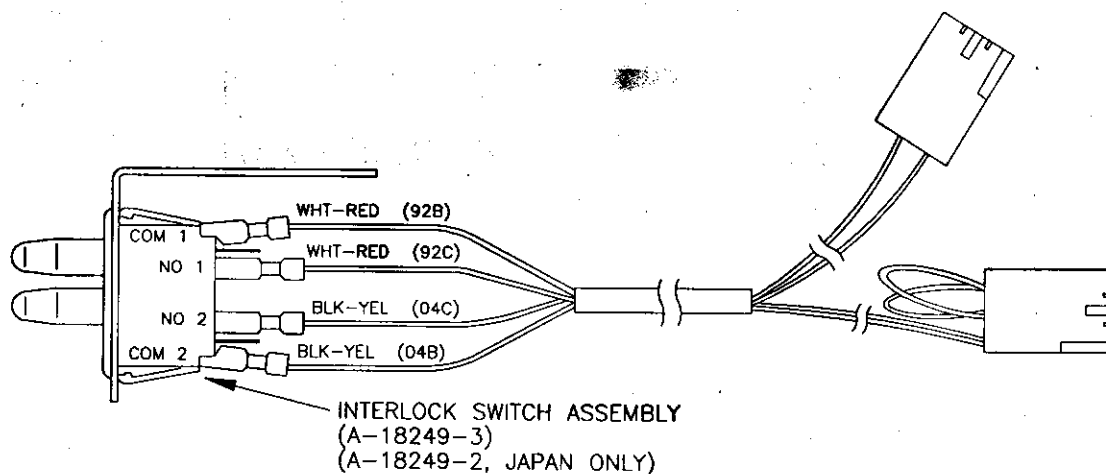
*THESE G.I. STRINGS DO NOT BRIGHTEN AND DIM, THEY ARE ALWAYS ON.

** TIEBACK DIODE FROM J111-12 & J111-13.

IMPORTANT NOTICE

PLEASE READ

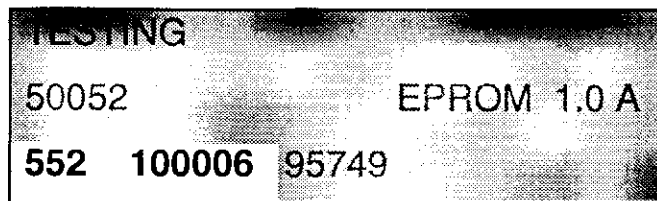
This pinball game is equipped with a SAFETY FEATURE to prevent shocks from the solenoid circuit when the coin door is opened. An interlock switch assembly (part no. A-18249-3), located at the left of the coin door opening, has been added to the game. This assembly is a bracket containing the existing memory protect switch on the bottom and a new interlock switch on the top. When the coin door is opened, this new interlock switch opens, breaking the connection to the +50V and +20V winding of the transformer secondary.



ATTENTION

The game uses a Security CPU Board that is not downward compatible to the CPU boards used in previous games. The board has an added security chip that can be interchanged between other **JUNK YARD** games and software revision levels. The CPU board itself is interchangeable with later model games, but must be equipped with the correct security chip and software for that specific game.

The games' electronic ID number is shown in the display during power-up. The number displayed is the same nine digit number printed on the security chip label. The first three digits are the project number without the country specific code. An example of the power-up display is shown below, the electronic ID number is bolded.



JUNK YARD

Information current at time of release.

Fill out and mail in game Registration card. Be sure to include the game serial number. For your records, write the PIC and game serial numbers in manual.

PIC Number _____ **Serial Number** _____

Williams Electronics Games, Inc. reserves the rights to make modifications and improvements to its products. The specifications and parts identified in this manual are subject to change without notice.

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JUNK YARD...THE STORY

By Dwight Sullivan

"Nice Doggie!", I exclaimed. Where did this ugly dog come from? I was only looking at a beat up old toaster and the next thing I knew a mouth full of ivory spikes was chomping on my heels as I fled for my life.

"GRRRRFFFFFF GRFF GRFFFFFF!" Snarled Spike.

"Maybe I have a Milkbone," it was lie. I rounded the corner and dashed through a large sliding gate. Spike was still coming attitude and all. Dropping the toaster, I hurried to slide the gate shut as spikes' shadow grew all around me. CLANG! The gate closed and Spike was unable to stop in time.

Then I got a bad feeling as I heard a laughter all around me echoing.

"Your trapped in my junkyard HA HA HA HA HA" that must be CRAZY BOB I thought. I am going to have to build some kind of flying jalopy to get out of here.

The growls and snarls of Spike grew faint as I wandered deeper into the canyons of junk. I stumbled across a functional television set. Now if I only had a weather vane I could create a radar device. I looked up and there was a weather vane sticking out of a telephone pole. Climbing on top of a stack of cars, I retrieved the weather vane. Using some extra wiring, I integrated the weather vane to the TV creating a radar device. It was time to test the device. I flipped through the channels on the TV. My choices were Christmas trees, time machines, fireworks, hot babes, junk, and Mean Dogs. I chose fireworks. Then I adjusted the tuner and bingo. The display showed me where and how close the fireworks were.

Just then I saw a hair dryer buried under some bicycle tires. I combined the hair dryer and the toaster creating a kind of toaster gun. Holding the gun I felt the urge to say 'feeling lucky PUNK!', but I resisted.

With new found confidence I made my way deeper into the labyrinth. I had a growing sensation. The sensation of being watched. Turning the corner I saw them. Down the alley, under a street lamp, hundreds, no thousands of rats were bubbling out of crates of fireworks. A sudden urge of stupidity swelled within me. I charged down the alley screaming at the top of my lungs and toaster gun blazing. As I reached the crates, I wasn't sure if it was toast or dead rats crunching under my shoes. I had a feeling that I would need these fireworks sooner or later.

I heard the distinct sound of water running. Climbing over stacks of tires I hid in the shadows and watched. A bare outstretched foot and a wet leg glistened in the moon light. She was taking a bath! I started to forget my surroundings when I heard a familiar yet loathing sound.

"GRRRRFFFF GRFF GRFFFFFF!" Spike had a limited vocabulary. The bathing beauty leapt from the water naked and suds flying. I took a firm grip of the toaster gun, and a smile took control of my face.

"Somebody get this dog away from me!" She blurted. Leaping to my feet, I chased after them. **FLANK FLANK FLANK**, three pieces of toast whizzed past his head. I missed. I followed them to a small alcove. Locked in a figure eight, she was running for her life. I knew how she felt.

Crouching down I took aim. **FLANK**. Nervous, I shot too soon. The toast narrowly went between them. **FLANK**. This time I was successful! Spike, knocked down and away, the girl had time to escape. "Eat hot toast you scruffy old mutt!" I exclaimed victoriously.

That's when I had an idea. I tuned my radar device to the junk channel and calibrated it to search for a fan. I was lucky. There was a fan nearby. I tested the fan. I plugged the fan in and turned it on and the force blew me back against a wall of cars. The next thing I remembered was toast, dead rats, and small pieces of junk flying down the alley.

The bath tub still had her sweet smell. Digging the bike tires out I added them to the bath tub. I attached the fan to the rear. Using the fan as a means of locomotion and a rudder, I was soon tooling around the junk yard in my new jalopy.

I knew then that I would be able to collect all the junk I needed to finish this flying jalopy and go on many more adventures.

- J. W. O'Mally

JUNK YARD

RULES & SHOTMAPS

JUNK YARD RULES

RADAR ADVENTURE

- Build the RADAR to light the adventure.
- Collect WEATHER VANE and TV to build the RADAR.
- Shoot the SEWER when START ADVENTURE is lit.
- During RADAR ADVENTURE, shoot flashing arrows to collect FIREWORKS.
- Collect five FIREWORKS to finish.
- If the TOASTER GUN is assembled, the TOASTER GUN Target will be lit during all adventures. Hit the target to collect FIREWORKS at a cost of five pieces of TOAST (AMMO).

THE GREAT JALOPY RACE

- Build the JALOPY to light the adventure.
- Collect BATH TUB, FAN, and BICYCLE TIRES to build the JALOPY.
- Shoot the SEWER when START ADVENTURE is lit.
- During THE GREAT JALOPY RACE shoot all five flashing arrows to win.
- If the TOASTER GUN is assembled, the TOASTER GUN Target will be lit during all adventures. Hit the target to collect FIREWORKS at a cost of five pieces of TOAST (AMMO).

THE GREAT TOILET ADVENTURE

- Shoot THE GREAT TOILET to build the JACKPOT at all times.
- You need the SUBMERGER completed to light the adventure.
- Build the JALOPY first.
- Then collect FISH BOWL to complete SUBMERGER.
- Shoot the SEWER when START ADVENTURE is lit.
- All shots collect GREAT TOILET JACKPOT.
- During THE GREAT TOILET ADVENTURE shoot SEWER and THE GREAT TOILET to collect FIREWORKS. Collect five to finish.
- If the TOASTER GUN is assembled, the TOASTER GUN Target will be lit during all adventures. Hit the target to collect Fireworks at a cost of five pieces of TOAST (AMMO).

AIR TACTICAL COMBAT

- You need the FLYING JALOPY completed to light the adventure.
- Build the JALOPY first.
- Then collect PROPELLER to complete the FLYING JALOPY.
- Shoot the SEWER when START ADVENTURE is lit.
- Hit the WRECKING BALL five times to win.
- If the TOASTER GUN is assembled, the TOASTER GUN Target will be lit during all adventures. Hit the target to collect FIREWORKS at a cost of five pieces of TOAST (AMMO).

OUTER SPACE

- After all other adventures are completed, and all JUNK is collected, OUTER SPACE will be lit. Shoot the SEWER when START ADVENTURE is lit.
- If 20 FIREWORKS were collected, the player will receive FIREWORKS bonus.
- OUTER SPACE is a four ball continuous MULTIBALL that lasts until all your FIREWORKS run out. Hit the TOASTER GUN target to collect FIREWORKS at a cost of five pieces of TOAST (AMMO). Hit the CRANE to collect more FIREWORKS.
- Shoot flashing arrows before they can be re-lit.
- Complete all five to defeat CRAZY BOB.

RUN FROM SPIKE / SAVE THE GIRL

- Spell DOG to light the DOG video mode.
- Shoot ALLEY to play the video mode.
- RUN FROM SPIKE: Pound flipper buttons to escape from SPIKE.
- SAVE THE GIRL: Use flipper buttons to shoot TOAST at Spike. Hit SPIKE three times to win.
Note: Must have the TOASTER GUN to play SAVE THE GIRL.
Note: The initials hanging from SPIKE'S collar are that of the JUNK CHAMPION.

RECYCLE

- Complete the left three bank target to light the left RECYCLE outlane.
- Complete the right three bank target to light the right RECYCLE outlane.
- If the ball travels over the lit outlane, the player will get the ball back for another SKILL SHOT.

MULTIBALL

- Hit the WRECKING BALL to receive a MULTIBALL LETTER.
- Complete the left or right lower CAR three bank targets to receive a MULTIBALL LETTER.
- SNEAK IN: Shoot past the WRECKING BALL while the CRANE is down to receive three MULTIBALL LETTERS.
- Spell MULTIBALL to light MULTIBALL.
- Shoot the CRANE to start a three ball MULTIBALL.
- During MULTIBALL, shoot the CRANE to collect the JACKPOT.
- Shoot the CRANE while the WRECKING BALL is down to collect the SUPER JACKPOT.

CRANE HURRY UP/ CRANE MULTIBALL

- Complete both lower CAR three bank targets to light START HURRY UP return lanes. If the ball travels over either return lane the player will start CRANE HURRY UP.
- CRANE HURRY UP: Hit WRECKING BALL as quickly as possible to collect value and start CRANE MULTIBALL before value counts down.
- CRANE MULTIBALL: This is a two ball MULTIBALL.
- Hit any CAR target, upper or lower, to collect value.

WINDOW SHOPPING

- A feature of five awards in the backglass artwork that light up individually. The awards are:
Jackpot Is Lit
Collect Three Fireworks
Free Game
Light Extra Ball
Toxic Waste
- Shoot THE GREAT TOILET, when lit, to start WINDOW SHOPPING.
- Use both flipper buttons to stop randomly moving light.

SKILL SHOT - SUPER SKILL SHOT

- Launch ball past spinner. Each rotation of spinner advances the highlighted award on the display. The player receives the last award highlighted. The possible awards are:
Super Skill Shot
Light Time Machine
Light Extra Ball
Spot All Dog Letters
Collect Junk
Bonus Multiplier
Points
Fireworks
Window Shopping
- SUPER SKILL SHOT: Shoot SEWER repeatedly for increasing award values.

TIME MACHINE

- Shoot SEWER when TIME MACHINE is lit to start.
- TIME MACHINE starts one of four modes:
The Mamuska
Move Your Car
Saucer Attack Video Mode
Knight Mission

BUS RAMP

- The Bus Ramp gives three awards:
Bus Rides
Magic Bus When Lit
Collect Junk When Lit
- BUS RIDES: Shoot the BUS ramp to increase BUS RIDES. Awards are given at thresholds. The awards are:
Light Collect Junk
Light Magic Bus
Light Window Shopping
Light Extra Ball
- MAGIC BUS: This is a random feature. One of several features are randomly chosen and awarded. The awards are:
Light Extra Ball
Collect Junk

MAGIC BUS CONTINUED:

Dog Video Mode
Multiball
Bonus Multiplier
Light Jackpot
Window Shopping
Light Time Machine
Light Recycle
Autofire
Big Points
All Of The Above (An Industry First)

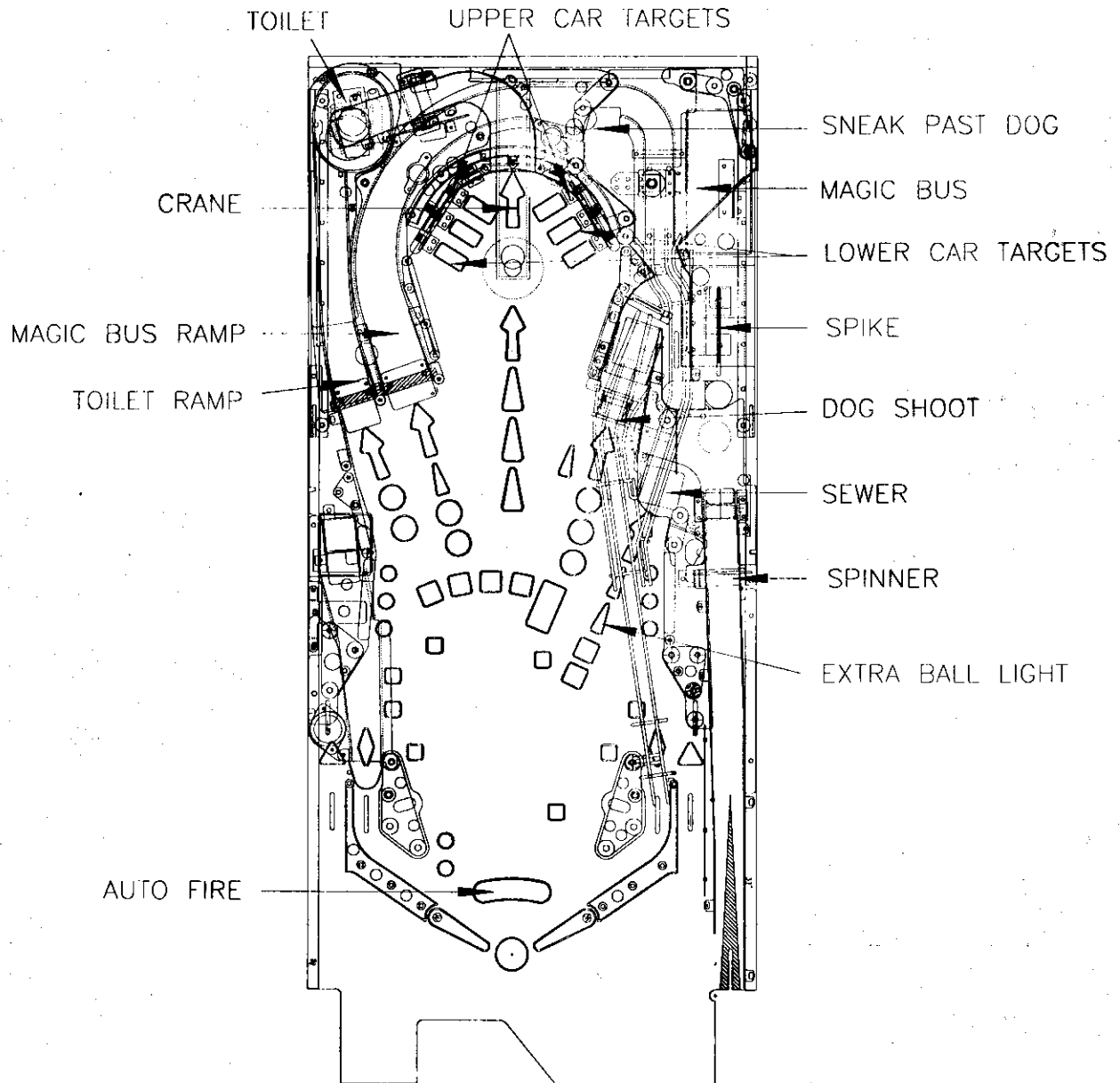
JUNK

- There are several ways to collect JUNK:
Skill Shot
Collect Junk From The Bus Ramp.
Choose Junk From The Great Toilet Ramp.
Dog Video Modes
Magic Bus
- Collect JUNK to light **EXTRA BALL.**
- JUNK CHAMPION: Collect all JUNK to be the JUNK CHAMPION.
- You need to collect all the JUNK to play OUTER SPACE.

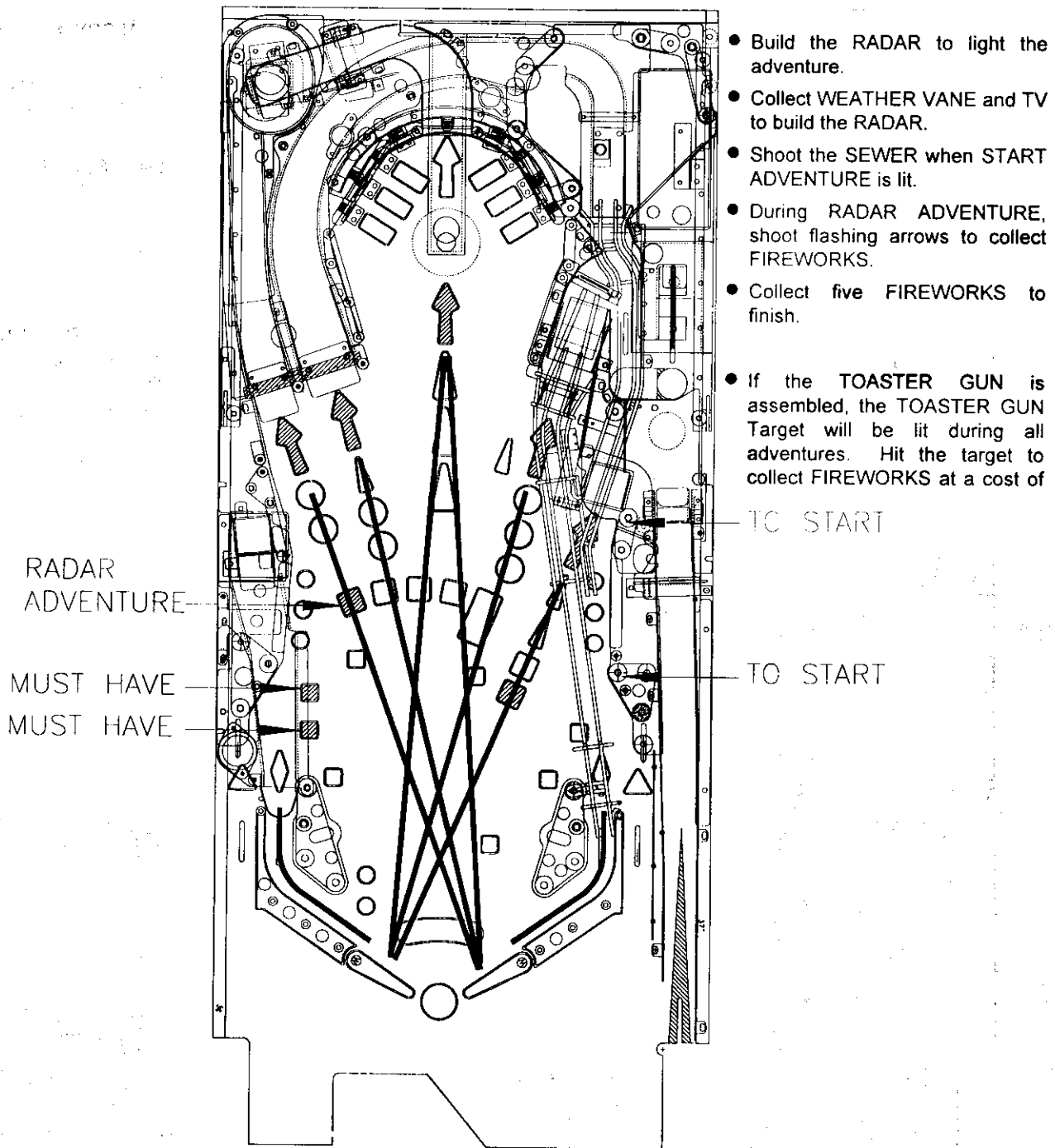
CHOOSE JUNK:

- Shoot THE GREAT TOILET, when lit, to start.
- Use the flippers to move the current JUNK selected.
- Press both flippers to choose the selected piece of JUNK.

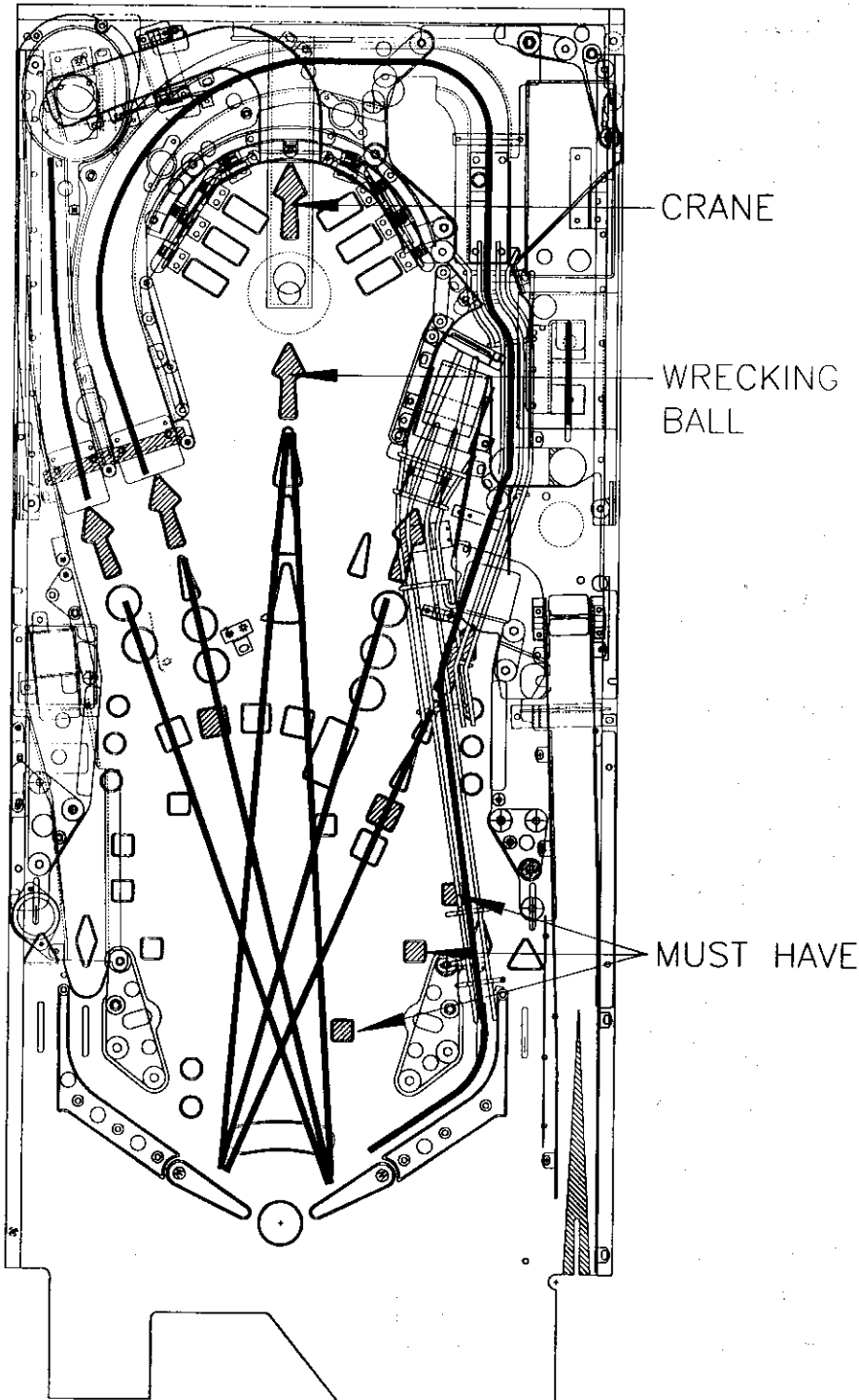
PLAYFIELD SHOTS



RADAR ADVENTURE

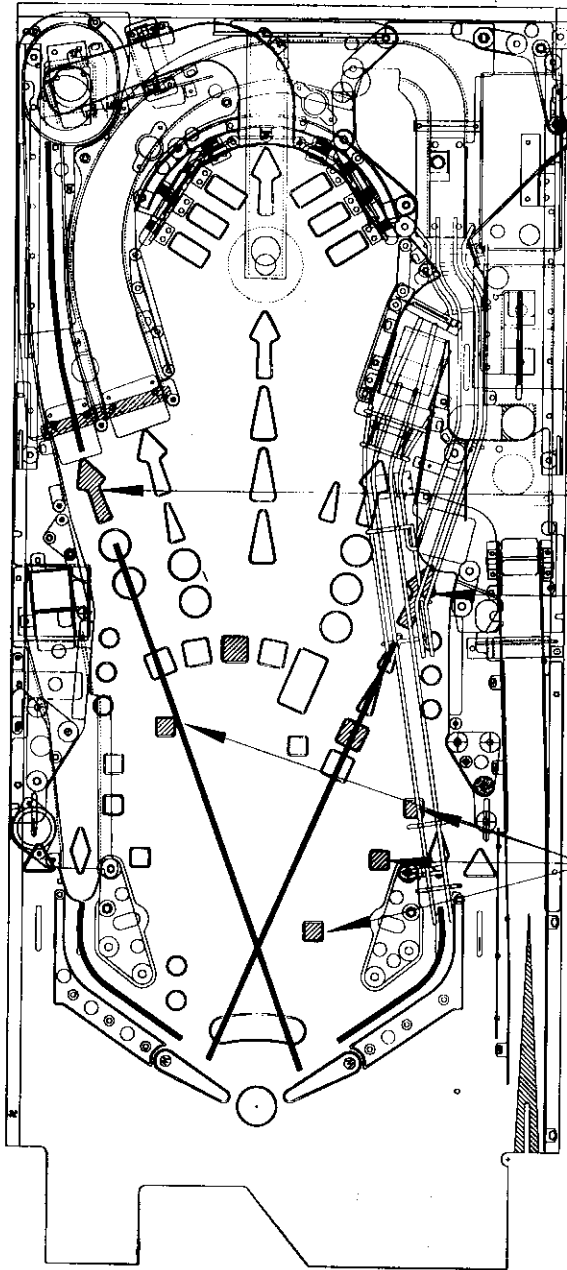


THE GREAT JALOPY RACE



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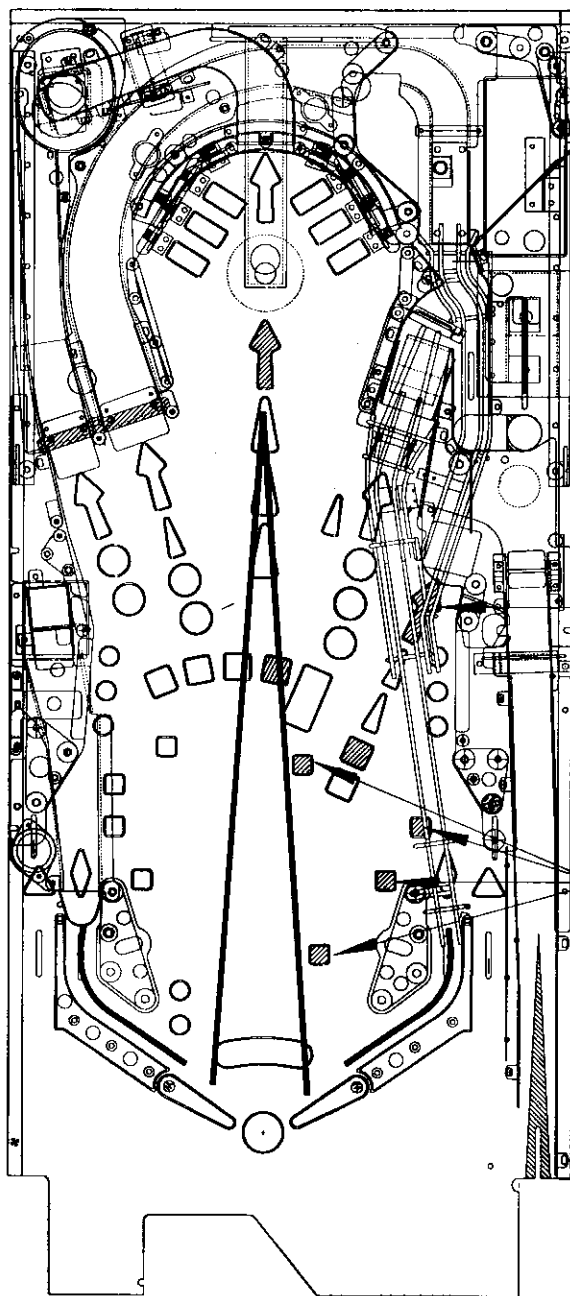
SCORES
FIREWORKS

STARTS
ADVENTURE
&
SCORES
FIREWORKS

MUST HAVE

ALL OTHER SHOTS
SCORE TOILET
JACKPOT.

AIR TACTICAL COMBAT



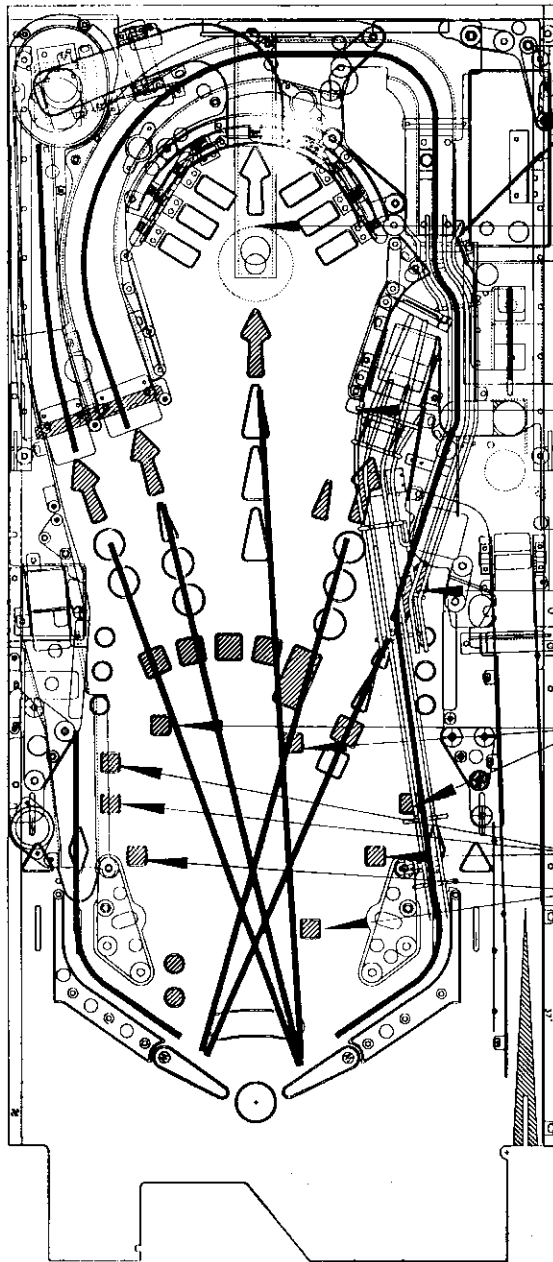
- You need the FLYING JALOPY completed to light the adventure.
- Build the JALOPY first.
- Then collect PROPELLER to complete the FLYING JALOPY.
- Shoot the SEWER when START ADVENTURE is lit.
- Hit the WRECKING BALL five times to win.

- If the TOASTER GUN is assembled, the TOASTER GUN Target will be lit during all adventures. Hit the target to collect FIREWORKS at a cost of five pieces of TOAST (AMMO).

STARTS
ADVENTURE

MUST HAVE

OUTER SPACE



WRECKING
BALL

TOASTER
TARGET
GETS MORE
FIREWORKS

STARTS
ADVENTURE

MUST HAVE

MUST HAVE
MUST HAVE

- After all other adventures are completed, and all JUNK is collected, OUTER SPACE will be lit. Shoot the SEWER when START ADVENTURE is lit.

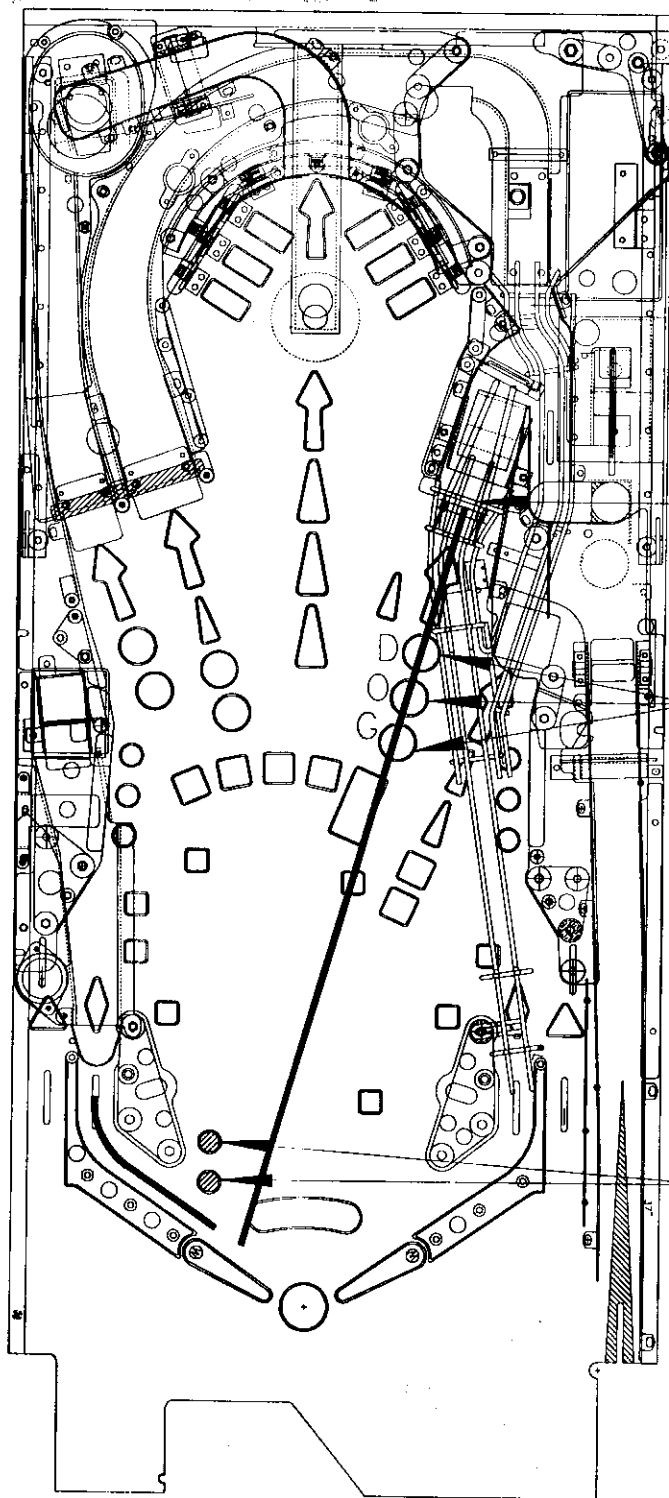
- If 20 FIREWORKS were collected, the player will receive FIREWORKS bonus.

- OUTER SPACE is a four ball continuous MULTIBALL that lasts until all your FIREWORKS run out. Hit the TOASTER GUN target to collect FIREWORKS at a cost of five pieces of TOAST (AMMO). Hit the CRANE to collect more FIREWORKS.

- Shoot flashing arrows before they can be re-lit.

- Complete all five to defeat CRAZY BOB.

RUN FROM SPIKE **&** **SAVE THE GIRL**



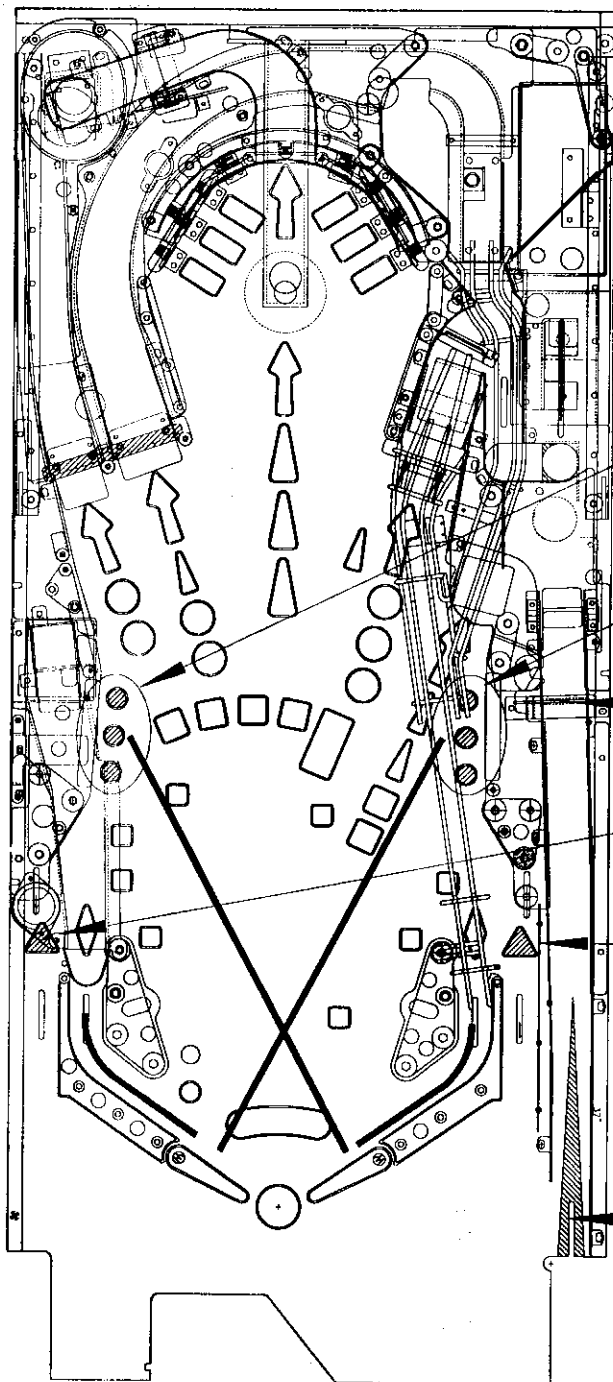
- Spell DOG to light the DOG video mode.
- Shoot ALLEY to play the video mode.
- RUN FROM SPIKE: Pound flipper buttons to escape from SPIKE.
- SAVE THE GIRL: Use flipper buttons to shoot TOAST at Spike. Hit SPIKE three times to win.
- **Note:** Must have the TOASTER GUN to play SAVE THE GIRL.
- **Note:** The initials hanging from SPIKE'S collar are that of the JUNK CHAMPION.

STARTS
VIDEO
MODE

MUST HAVE

NEED FOR
SAVE THE
GIRL

RECYCLE



- Complete the left three bank target to light the left RECYCLE outlane.
- Complete the right three bank target to light the right RECYCLE outlane.
- If the ball travels over the lit outlane, the player will get the ball back for another SKILL SHOT.

LEFT
RECYCLE
3-BANK

RIGHT
RECYCLE
3-BANK

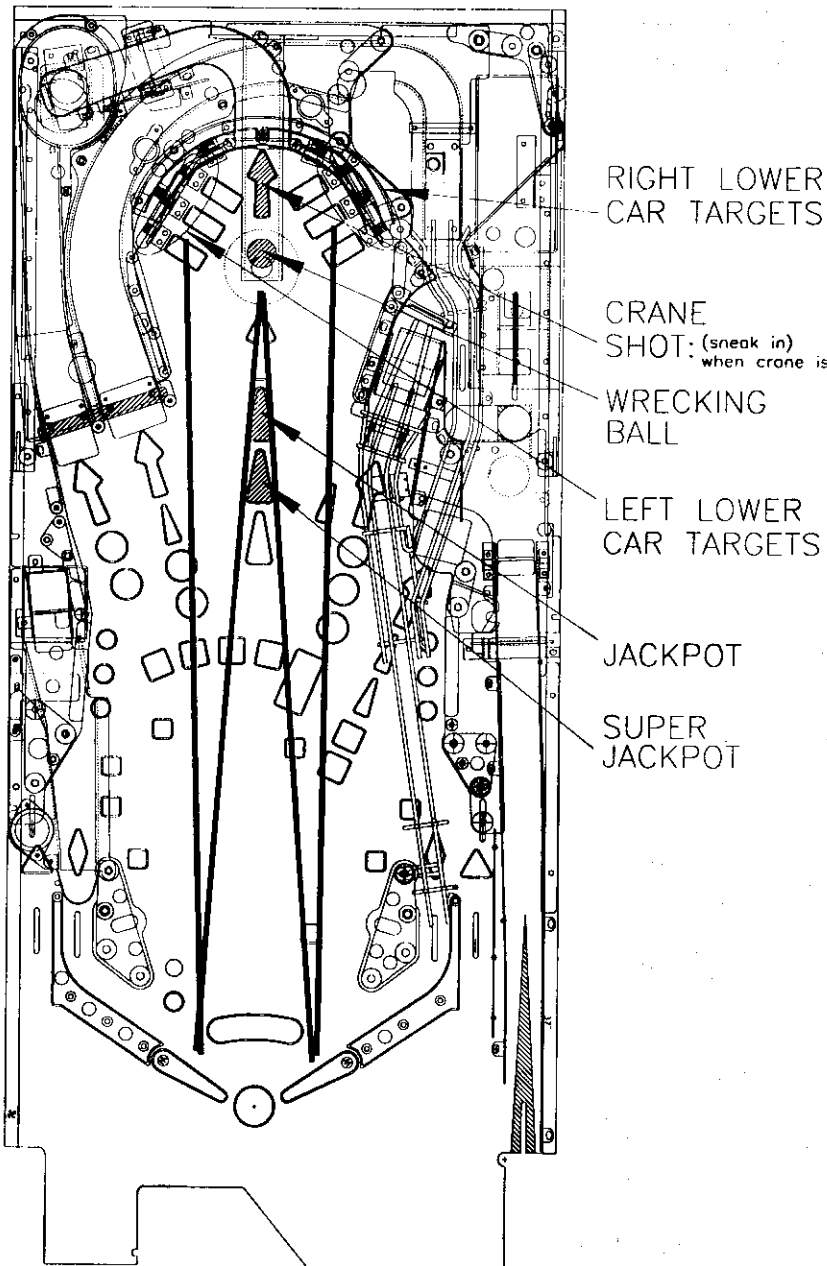
SPINNER

LEFT
RECYCLE
LANE

RIGHT
RECYCLE
LANE

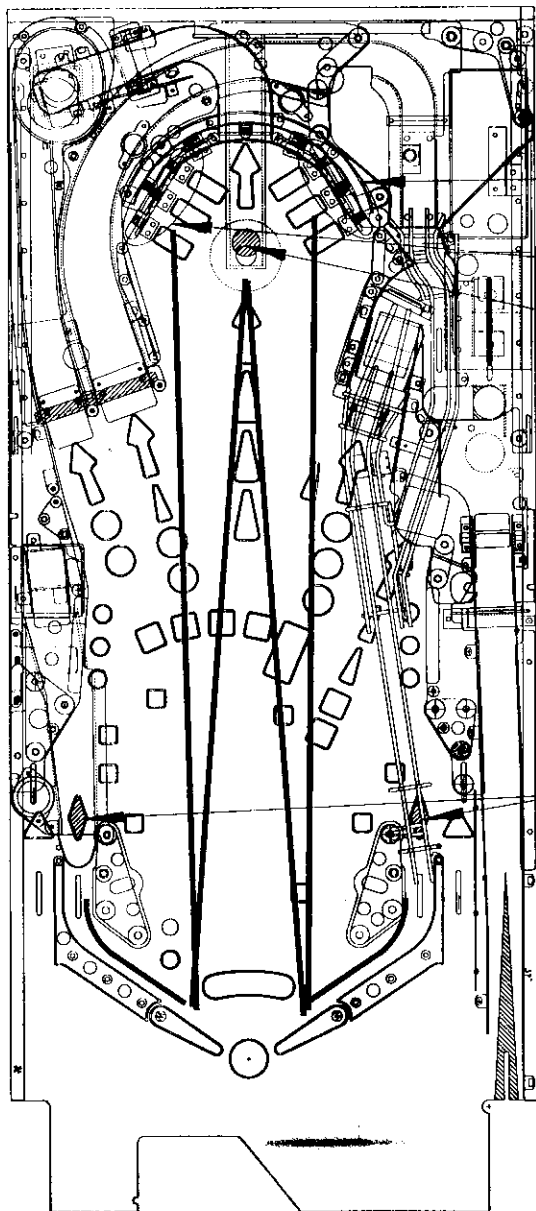
RELAUNCH

MULTIBALL



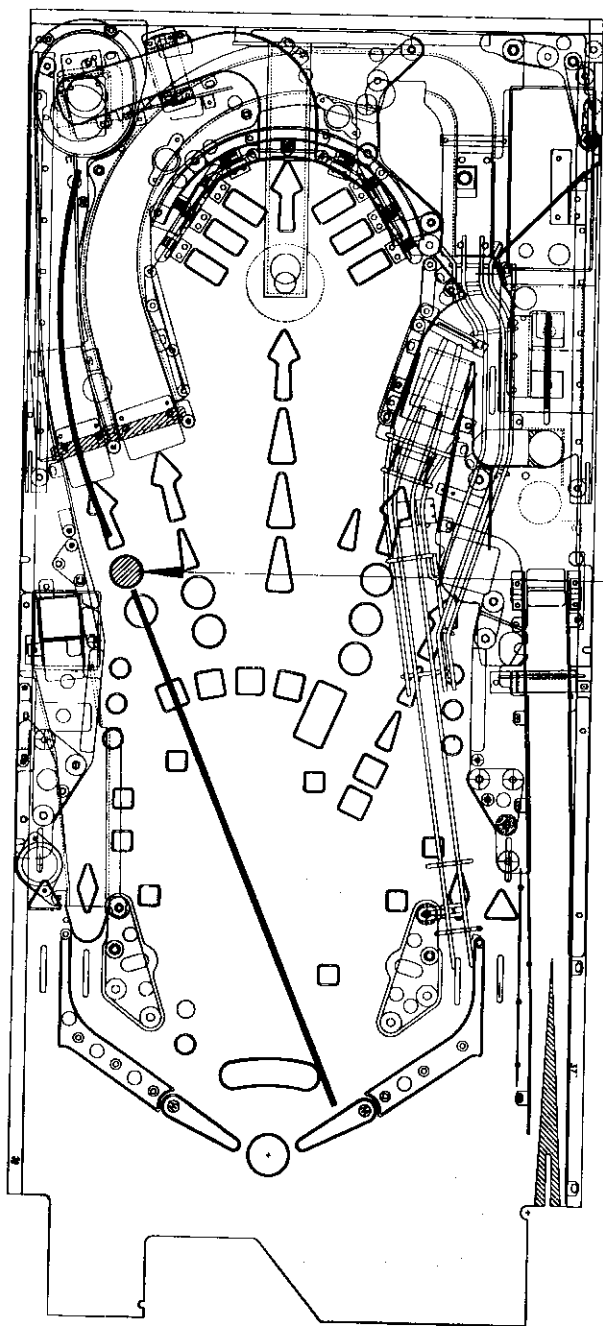
- Hit the WRECKING BALL to receive a MULTIBALL LETTER.
- Complete the left or right lower CAR three bank targets to receive a MULTIBALL LETTER.
- SNEAK IN: Shoot past the WRECKING BALL while the CRANE is down to receive three MULTIBALL LETTERS.
- Spell MULTIBALL to light MULTIBALL.
- Shoot the CRANE to start a three ball MULTIBALL.
- During MULTIBALL, shoot the CRANE to collect the JACKPOT.
- Shoot the CRANE while the WRECKING BALL is down to collect the SUPER JACKPOT.

CRANE HURRY-UP CRANE MULTIBALL



- Complete both lower CAR three bank targets to light START HURRY UP return lanes. If the ball travels over either return lane the player will start CRANE HURRY UP.
- CRANE HURRY UP: Hit WRECKING BALL as quickly as possible to collect value and start CRANE MULTIBALL before value counts down.
- CRANE MULTIBALL: This is a two ball MULTIBALL.
- Hit any CAR target, upper or lower, to collect value.

WINDOW SHOPPING

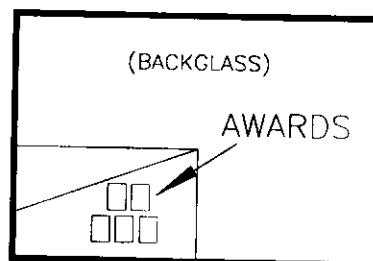


- A feature of five awards in the backglass artwork that light up individually. The awards are:

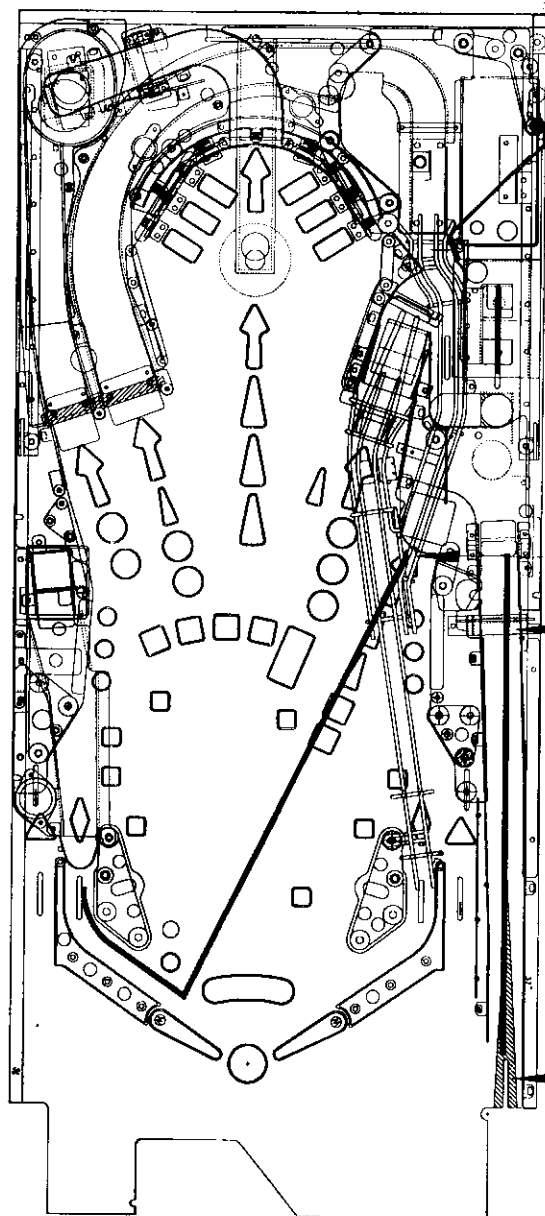
Jackpot Is Lit
Collect Three Fireworks
Free Game
Light Extra Ball
Toxic Waste

- Shoot THE GREAT TOILET, when lit, to start WINDOW SHOPPING.
- Use both flipper buttons to stop randomly moving light.

WINDOW
SHOPPING



SKILL SHOT **&** **SUPER SKILL SHOT**



- Launch ball past spinner. Each rotation of spinner advances the highlighted award on the display. The player receives the last award highlighted. The possible awards are:

Super Skill Shot
Light Time Machine
Light Extra Ball
Spot All Dog Letters
Collect Junk
Bonus Multiplier
Points
Fireworks
Window Shopping

- SUPER SKILL SHOT: Shoot SEWER repeatedly for increasing award values.

SUPER
SKILL SHOT

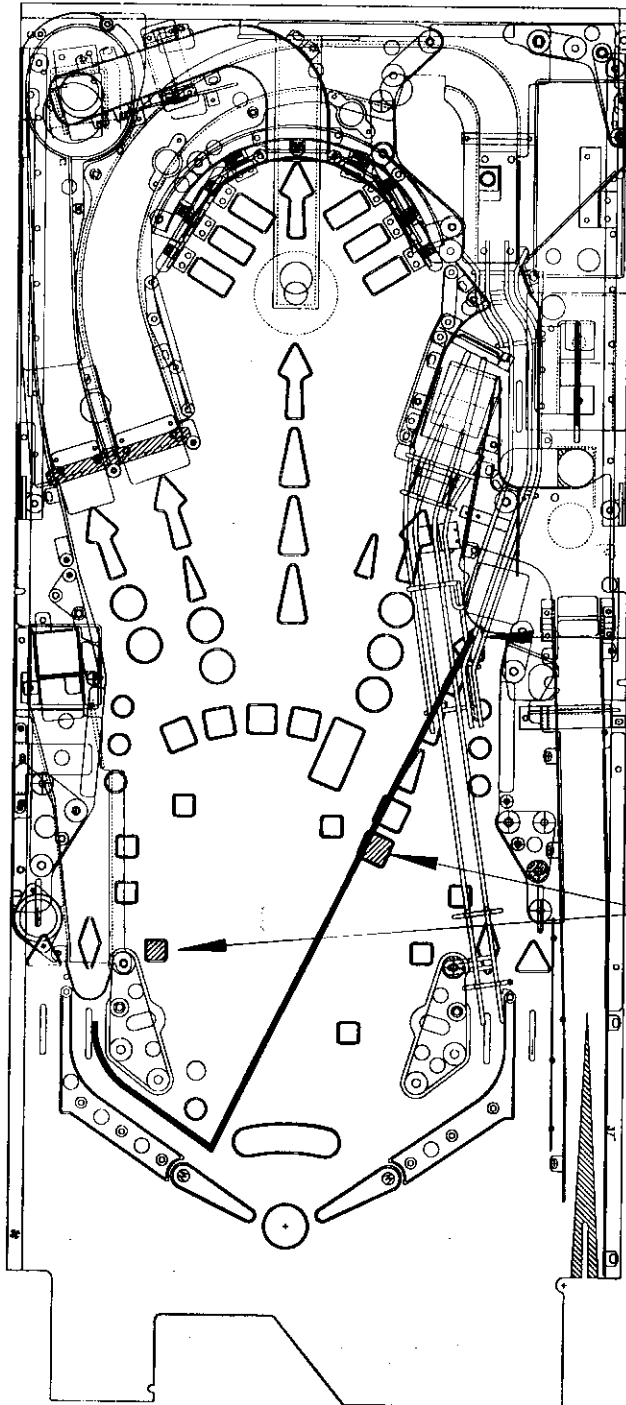
SPINNER

(DISPLAY)

0	CHOICE 1
0	CHOICE 2
0	CHOICE 3
0	CHOICE 4

LAUNCH BALL

TIME MACHINE

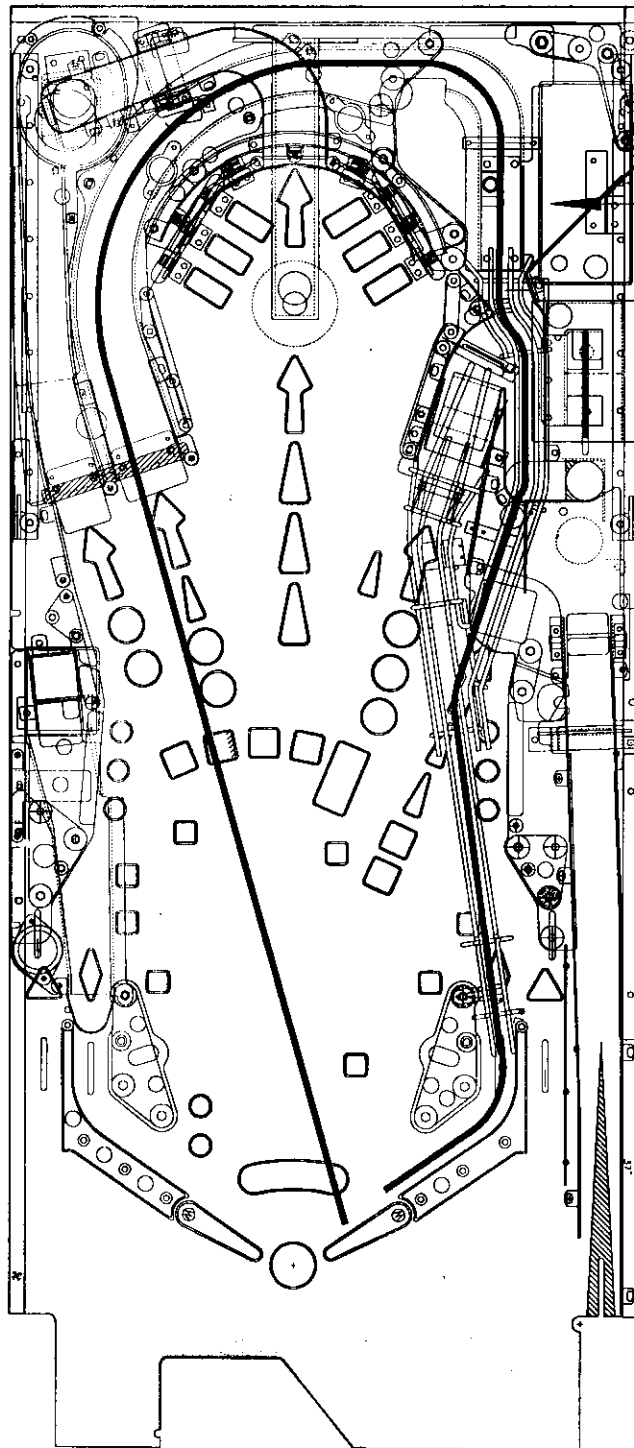


- Shoot SEWER when TIME MACHINE is lit to start.
- TIME MACHINE starts one of four modes:
 - The Mamuska*
 - Move Your Car*
 - Saucer Attack Video Mode*
 - Knight Mission*

STARTS
TIME
MACHINE

MUST
HAVE

BUS RAMP



MAGIC
BUS

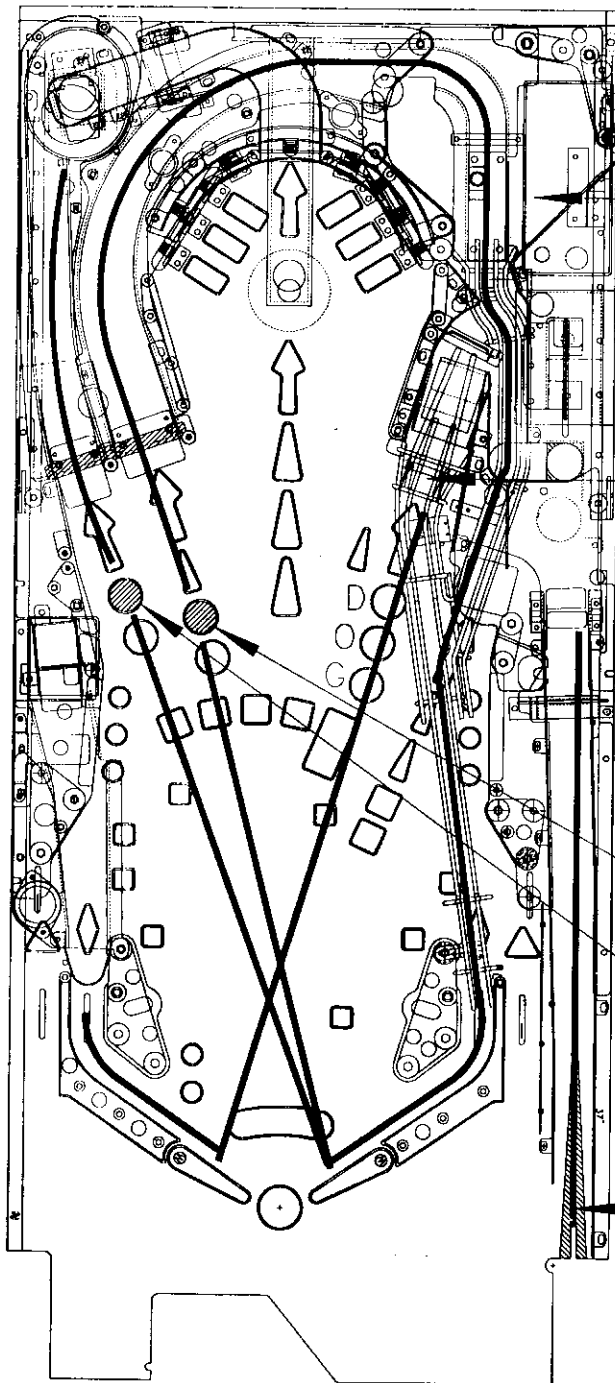
MAGIC BUS



DISPLAY

- The Bus Ramp gives three awards:
Bus Rides
Magic Bus When Lit
Collect Junk When Lit
- BUS RIDES: Shoot the BUS ramp to increase BUS RIDES. Awards are given at thresholds. The awards are:
Light Collect Junk
Light Magic Bus
Light Window Shopping
Light Extra Ball
- MAGIC BUS: This is a random feature. One of several features are randomly chosen and awarded. The awards are:
Light Extra Ball
Collect Junk
MAGIC BUS CONTINUED:
Dog Video Mode
Multiball
Bonus Multiplier
Light Jackpot
Window Shopping
Light Time Machine
Light Recycle
Autofire
Big Points
All Of The Above (An Industry First)

JUNK



- There are several ways to collect JUNK:

Skill Shot

Collect Junk From The Bus Ramp.

Choose Junk From The Great Toilet Ramp.

Dog Video Modes

Magic Bus

- Collect JUNK to light EXTRA BALL.

- JUNK CHAMPION: Collect all JUNK to be the JUNK CHAMPION.

- You need to collect all the JUNK to play OUTER SPACE.

MAGIC
BUS

DOG
VIDEO

COLLECT
JUNK

CHOOSE
JUNK

SKILL
SHOT

SECTION ONE

GAME OPERATION AND TEST INFORMATION

(System WPC) ROM SUMMARY

IC	TYPE	BOARD	LOCATION	PART NUMBER
Game 1	27c040	CPU	G11	A-5343-50052-1
Security Chip	PIC16C57	CPU	G10	A-5400-50052-1
Music/Speech	M27c801	Audio	SU2	A-5343-50052-S2
Music/Speech	M27c801	Audio	SU3	A-5343-50052-S3
Music/Speech	M27c801	Audio	SU4	A-5343-50052-S4

NOTICE

Order replacement ROMs from your authorized Williams Electronics Games, Inc. distributor. Specify: (1) part number (if available); (2) ROM level (number) on label; (3) game in which ROM is used.

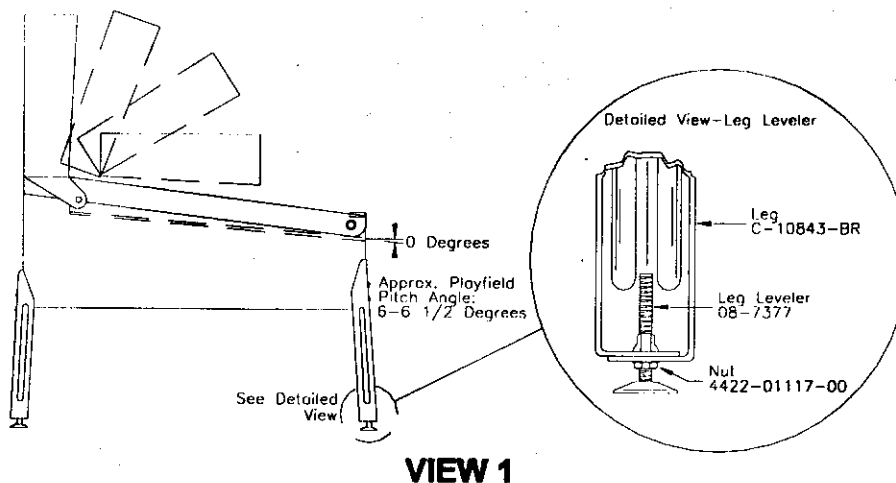
PINBALL GAME ASSEMBLY INSTRUCTIONS

JUNK YARD IS A FOUR BALL GAME.

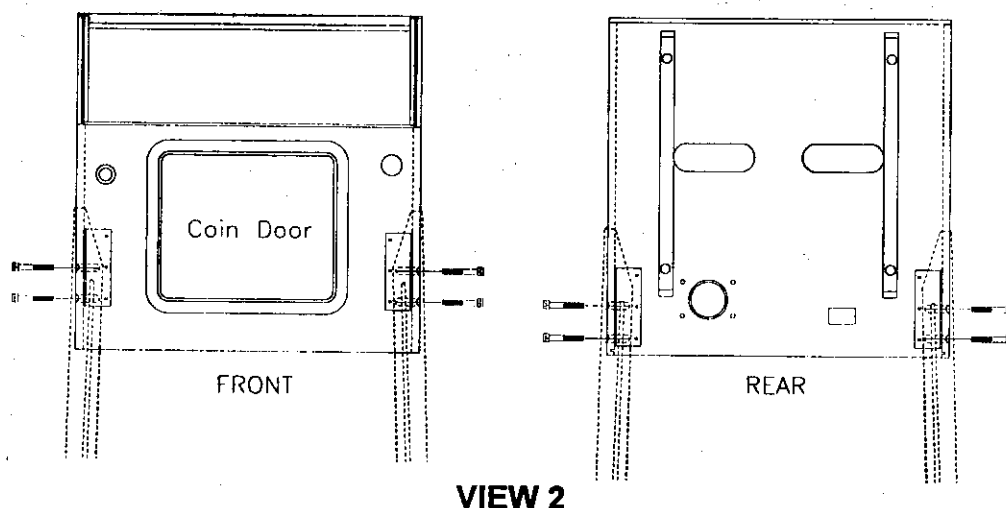
Power: Domestic 120V @ 60Hz
Foreign 230V @ 50Hz
Japan 100V @ 50Hz
Temp: 32°F to 100° F, (0°C to 38°C)
Humidity: Not to exceed 95% relative.

Dimensions: Width: 29" approx.
Depth: 52" approx.
Height: 75" approx.
Weight: 325 lb. approx. (crated)

1. Remove all cartons, parts, and other items from the shipping container and set them aside.
2. Leg levelers and leg bolts are among the parts in the cash box. Install leg levelers on the front and rear legs (View 1). Place cabinet on a support and attach rear legs using leg bolts (View 2).
3. Attach front legs using leg bolts (View 2).



VIEW 1



VIEW 2

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.

Note: The insert panel is no longer hinged to the backbox; it is attached to the backglass. The backglass and the insert panel are removed from the backbox housing as a single unit.

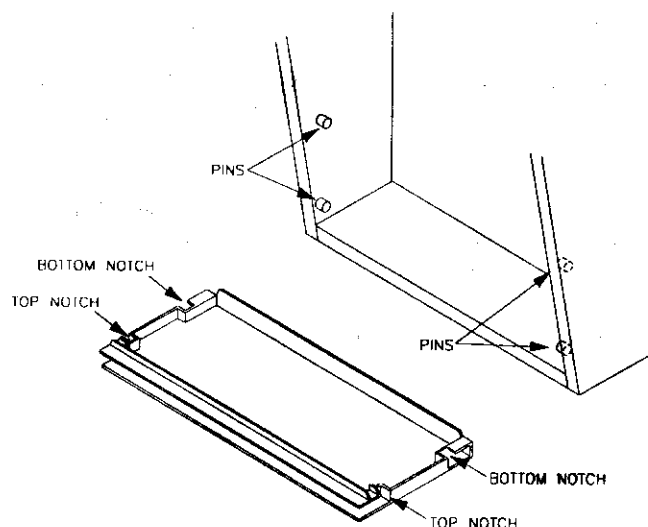
Unlock the backbox. Carefully, lift the backglass/insert panel from the bottom and slide it out of the backbox. Lay it down on the playfield glass. Unplug the cable extending from the backbox to the insert panel. Carefully, set the backglass/insert panel aside.

Note: The speaker panel uses a new hinging system. The bottom of the speaker panel remains attached to the backbox unit when released.

Carefully lift the speaker panel so that the top notches clear the top pins. Rotate it away from the backbox, toward the playfield glass. The speaker panel will remain attached to the backbox unit.

This allows access to the bolt holes 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.

Note: You have the option of removing the speaker panel completely. Lay the speaker panel on the playfield glass. Unplug the display cable, speaker cable, and ground strap. Line up the bottom notches with the bottom backbox pins. Lower the speaker panel through the notches and slide it under the backbox pins.



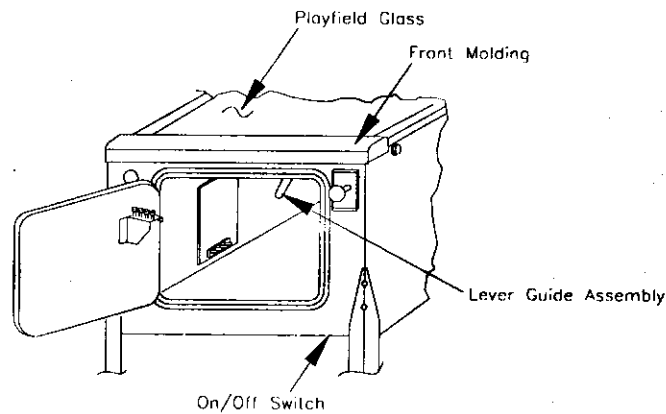
6. After the washer-head mounting bolts are installed, replace the speaker panel and the backglass/insert panel. Lock the backbox.

⚠ 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.

7. Extend each leg leveler *slightly* below the leg bottom, so that all four foot pads are extended about the same distance. Remove the cabinet from its support and place it on the floor.

8. Unlock and open the coin door. Move the lever guide toward the left side of the game. Lift the front molding off the playfield glass. Return the lever guide 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.



9. Place a level or an inclinometer on the playfield surface. Adjust the leg levelers for proper playfield level (side-to-side).

Note: This measurement must 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.

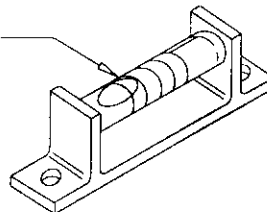
10. Remove the tie-wrap and foam packing from the Wrecking Ball Crane mechanism.

Note: ALWAYS replace the tie-wrap and foam packing from the Wrecking Ball Crane BEFORE moving the game to a new location. Failure to do so could result in damage to the mechanism and/or surrounding parts on the playfield.

If the wrecking ball touches the playfield, the mechanism needs to be adjusted. Loosen the two screws located at the back of the mechanism. Raise the crane arm so that the ball doesn't touch the playfield, but not so high that the crane arm can touch the playfield glass. Tighten the screws.

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

TRU-PITCH™ level 6-1/2 degrees.



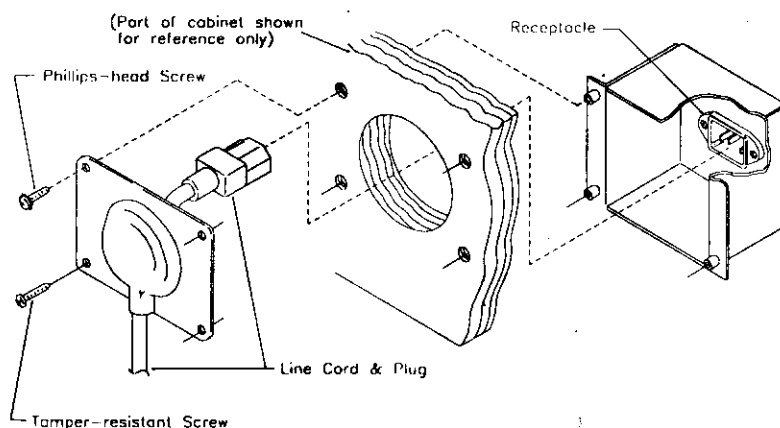
! IMPORTANT !

Playfield pitch angle can affect the operation of the plumb bob tilt. 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. The unit is factory installed for a 6-1/2 degree angle. If an adjustment is necessary, loosen the screw at the bottom of the unit. Move the pointer, one groove at a time to the left or the right, depending on the degree desired. Hold the pointer in place and tighten screw

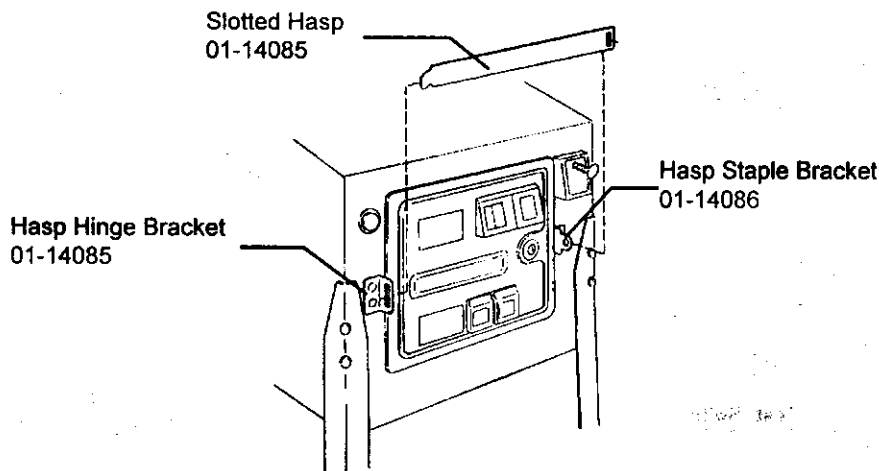
12. Be sure the **required number** of balls are installed. The **JUNK YARD** game uses **FOUR** balls.
13. Install full playfield mylar, if desired.

Note: The **JUNK YARD** playfield is coated with a special hardcoat surface and does not require a protective mylar. However, mylars can be purchased through your local Williams Distributor. Specify part number 03-9610-1 for full playfield mylar.

14. Clean and reinstall the playfield cover glass. Replace and lock the front molding.
15. To attach the line cord, remove the four Phillips-head screws that mount to line cord cover plate to the rear cabinet. Match the prongs on the plug with the holes in the receptacle, and push the line cord securely into place. Make sure the cord is aligned with the indentation on the cover plate (indentation should point toward bottom of the cabinet). Remount line cord cover plate. If desired, four tamper resistant screws have been provided, in the unique parts bag, to remount cover plate.



16. Move the game into the desired location, recheck the level and pitch angle of the playfield.
17. If a padlock is desired, install the security bar as shown below.



18. **IMPORTANT:** Fill out and return the registration card.

GAME CONTROL LOCATIONS

Cabinet Switches

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

The Start Button is a push-button 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 Buttons

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

Normal Function

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

The Volume Up (+) button raises the sound level of the game. Press and hold the button until the desired level is reached.

The Volume Down (-) 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 turn sound off completely.

The Begin Test button starts the Menu System operation and changes the coin door buttons from Normal Function to Test Function.

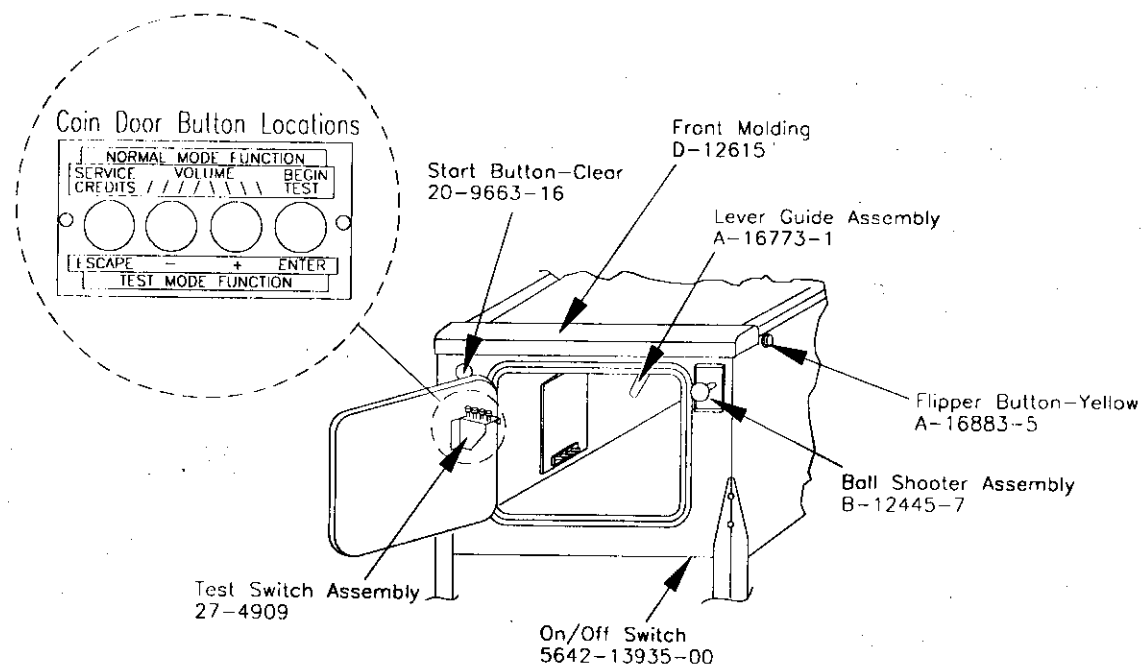
Test Function

The Escape button allows you to get out of a menu selection or return to the Attract mode.

The Up (+) button allows you to cycle forward through the menu selections or adjustment choices.

The Down (-) button allows you to cycle backward through the menu selections or adjustment choices.

The *Enter 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 five seconds while in the Attract mode.**

GAME OPERATION

CAUTION

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

POWERING UP. With the coin door closed, plug the game in, and switch it on. In normal operation, TESTING shows in the displays as the game performs Start-up tests. Once the Start-up tests have been successfully completed the last score is displayed and the game goes into the Attract mode.

Note: After the game has been on location for a 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, and the display shows the sound software revision, the revision level of the system software, and the date the software was revised.

Example:

	JUNK YARD	Sound Rev. 1.0A
50052	Rev. 1.0A	SY. 0.X0
		XX-XX-97

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

Note: In order to operate the tests that use the +50V or +20V circuits, pull the top interlock switch button out. The interlock switches are located on a bracket in the coin door opening.

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 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. 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 cabinet 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 A 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. Credits* 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.

GAME OVER MODE. The Game Over display shows the high scores and the game proceeds to the Attract Mode.

* - Operator-adjustable feature

RAISING THE PLAYFIELD

CAUTION

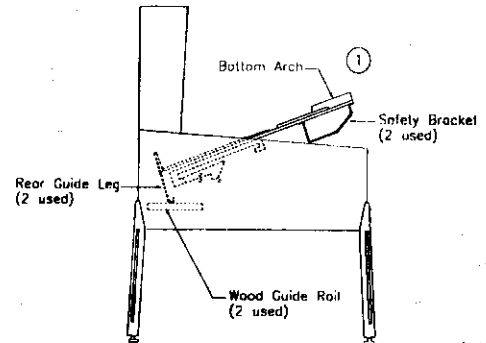
Do not raise the playfield straight up! This game uses a slide assembly to raise and lower the playfield.

Before Raising the Playfield:

Be sure there are no balls present in the ball trough or any of the other ball-holding playfield devices (i.e. poppers). Raising the playfield with balls present in these locations may cause them to come loose and damage the playfield. Use the "Empty Balls Test" to remove all of the balls from these locations.

To Raise the Playfield.

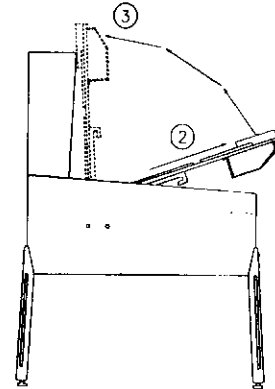
1. Grasp bottom arch and carefully lift up playfield only high enough to clear safety brackets. Rear guide legs should not hit wood guide rails, or be used to slide out playfield.



2. Pull the playfield out toward you until it stops (rest position), and raise it approximately 3".

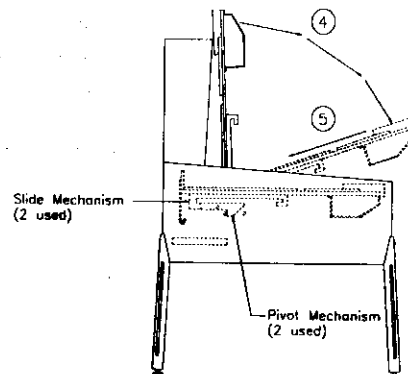
Be sure playfield is in locked position and does not slide back into cabinet. If it does, repeat Step 2 before proceeding to Step 3.

3. Rotate playfield to upright service position (lean on backbox) by pulling toward you and up. Listen for the sound of a click: this ensures locking and pivoting sequence.



To Lower the Playfield.

4. Rotate the playfield to the rest position. This unlocks the pivoting mechanism.
5. Push the playfield back into cabinet and into the playing position.



MENU SYSTEM OPERATION

The Main Menu allows you to choose from several options, which in turn lead to other menus to choose from. To access the Main Menu open the coin door, press the Begin Test button, then the Enter button. Press the Up and Down buttons to scroll through the Main Menu. To access a menu, (Bookkeeping, Printouts, etc.), from the Main Menu, press the Enter button. To return to the Main Menu (from Bookkeeping, Printouts, etc.) press the Escape button. Press the Start button for HELP.

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

Press Escape

To move out of a menu selection.

Press Enter

To get into a menu selection.

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 Time Histograms
- P.7 Time-Stamps
- P.8 All Data

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 or Down to cycle through the selections in a menu.

T. TEST MENU

- T.1 Switch Edges Test
- T.2 Switch Levels Test
- T.3 Single Switches Test
- T.4 Solenoid Test
- T.5 Flasher Test
- T.6 General Illumination Test
- T.7 Sound and Music Test
- T.8 Single Lamp Test
- T.9 All Lamps Test
- T.10 Lamp and Flasher Test
- T.11 Display Test
- T.12 Flipper Coil Test
- T.13 Ordered Lamps Test
- T.14 Lamp Row-Col.
- T.15 DIP Switch Test
- T.16 Empty Balls Test

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

U. UTILITIES MENU

- U.1 Clear Audits
- U.2 Clear Coins
- U.3 Reset H.S.T.D.
- U.4 Set Time and 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

A. ADJUSTMENT MENU

- A.1 Standard Adjustments
- A.2 Feature Adjustments
- A.3 Pricing Adjustments
- A.4 H.S.T.D. Adjustments
- A.5 Printer Adjustments

Press the Up or Down buttons to scroll through the Bookkeeping menu. Press the Enter button to access an audit menu. Press the Escape button to return to the Bookkeeping 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-Stamped

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

B.2 Earning Audits

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

*These audits are NOT re-settable. 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 20	Average Game Time	00
B.3 02	Total Plays**	00	B.3 21	Play Time	00
B.3 03	Total Free Play	00	B.3 22	Minutes On	00
B.3 04	Free Play Percent	00	B.3 23	Balls Played	00
B.3 05	Replay Awards	00	B.3 24	Tilts	00
B.3 06	Percent Replays	00	B.3 25	Replay 1 Awards	00
B.3 07	Special Awards	00	B.3 26	Replay 2 Awards	00
B.3 08	Percent Special	00	B.3 27	Replay 3 Awards	00
B.3 09	Match Awards	00	B.3 28	Replay 4 Awards	00
B.3 10	Percent Match	00	B.3 29	1 Player Games	00
B.3 11	H.S.T.D. Credits	00	B.3 30	2 Player Games	00
B.3 12	Percent H.S.T.D.	00	B.3 31	3 Player Games	00
B.3 13	Extra Ball	00	B.3 32	4 Player Games	00
B.3 14	Percent Extra Ball	00	B.3 33	H.S.T.D. Reset Count	00
B.3 15	Tickets Awarded	00	B.3 34	Burn-in Time†	00:00:00
B.3 16	Percent Tickets	00	B.3 35	1st Replay Level	00
B.3 17	Left Drains	00	B.3 36	Left Flipper	00
B.3 18	Right Drains	00	B.3 37	Right Flipper	00
B.3 19	Average Ball Time	00			

**"Total Plays" only counts on completed games. A game is considered complete when the final ball begins. Audit information from incomplete games is ignored. Operation for test and service do not affect audits.

†This Audit cannot be reset.

B.4 Feature Audits

B.4 01	Buy-in Extra Balls	Number of games that use buy-in.
B.4 02	Time Per Credit	This is the average time per game.
B.4 03	Ball Saves	Number of ball saves.
B.4 04	Total Lit Extra Balls	Total of extra balls lit.
B.4 05	Total Extra Balls	Total of extra balls collected.
B.4 06	Total Recycles	Total times the ball was recycled.
B.4 07	Total Lit Multiballs	Total times multiball was lit.
B.4 08	Total Multiballs	Total times multiball was started.
B.4 09	Total Jackpots	Total jackpots collected.
B.4 10	Total Super Jackpots	Total super jackpots collected.
B.4 11	Total Junk	Total junk collected.
B.4 12	Total Toaster Guns	Total toaster guns assembled.
B.4 13	Total Radar Assembled	Total radar assembled.
B.4 14	Total Radar Adventures	Total radar adventures started.
B.4 15	Total Jalopies	Total jalopies assembled.
B.4 16	Total Jalopy Adventures	Total jalopy races started.
B.4 17	Total Submergers	Total submergers assembled.
B.4 18	Total Toilet Adventures	Total toilet adventures started.
B.4 19	Total Flying Machines	Total flying machines assembled.
B.4 20	Total Combat Adventures	Total air tactical combats started.
B.4 21	Total All Junk	Total times all junk was collected.
B.4 22	Total Outer Space	Total outer space started.
B.4 23	Total Bob Defeated	Total outer space was completed.
B.4 24	Total Time Machines	Total time machine started.
B.4 25	Total Dog Modes	Total dog modes started.
B.4 26	Total Fireworks	Total fireworks collected.
B.4 27	Total Bonus X	Total bonus multipliers collected.
B.4 28	Total Choose Junk	Total choose junk started.
B.4 29	Bus Light Extra Ball	Number of Light Extra Ball bus awards.
B.4 30	Bus Collect Junk	Number of Collect Junk bus awards.
B.4 31	Bus Dog Video	Number of dog video mode bus awards.
B.4 32	Bus Multiball	Number of Multiball bus awards.
B.4 33	Bus Bonus X	Number of Bonus Multiplier bus awards.
B.4 34	Bus Light Jackpot	Number of Light Jackpot bus awards.
B.4 35	Bus Shopping	Number of Window Shopping bus awards.
B.4 36	Bus Light Time	Number of Light Time Machine bus awards.
B.4 37	Bus All Above	Number of all the above bus awards.
B.4 38	Bus Recycle Lit	Number of Recycle Lit bus awards.
B.4 39	Bus Autofire	Number of Autofire bus awards.
B.4 40	Bus Points	Number of points bus awards.
B.4 41	Skill Super	Number of super skill shots.
B.4 42	Skill Light Time	Number of Light Time Machine skill shots.
B.4 43	Skill Light Extra	Number of Light Extra Ball skill shots.
B.4 44	Skill Spot Dog	Number of Spot Dog skill shots.
B.4 45	Skill Award Junk	Number of Junk Awarded skill shots.
B.4 46	Skill Bonus X	Number of Bonus Multiplier skill shots.
B.4 47	Skill Points	Number of Skill Points skill shots.
B.4 48	Skill Windows	Number of Window Shopping skill shots.
B.4 49	Skill Fireworks	Number of Skill Shot fireworks awarded.
B.4 50	Window Toxic Waste	Number of Toxic Waste window awards.
B.4 51	Window Extra Ball	Number of Light Extra Ball window awards.

Features Audits Continued...**B.4 52** Window Light Jackpot

Number of Light Jackpot window awards.

B.4 53 Window Free Game

Number of Free Game window awards.

B.4 54 Window Fireworks

Number of Fireworks window awards.

B.5 Histograms

B.5 01	0.0 - 0.4 Million Scores	00	00%
B.5 02	0.5 - 0.9 Million Scores	00	00%
B.5 03	1.0 - 1.4 Million Scores	00	00%
B.5 04	1.5 - 1.9 Million Scores	00	00%
B.5 05	2.0 - 2.9 Million Scores	00	00%
B.5 06	3.0 - 3.9 Million Scores	00	00%
B.5 07	4.0 - 4.9 Million Scores	00	00%
B.5 08	5.0 - 5.9 Million Scores	00	00%
B.5 09	6.0 - 7.9 Million Scores	00	00%
B.5 10	8.0 - 9.9 Million Scores	00	00%
B.5 11	10 - 15 Million Scores	00	00%
B.5 12	15 - 20 Million Scores	00	00%
B.5 13	Over 20 Million Score	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

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

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

Press the Up or Down buttons to scroll through the Printouts menu. Press the Enter button to access a menu. Press the Escape button to return to the Printouts Menu.

P. PRINTOUTS MENU

(optional board required to use Printouts feature.)

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 the print specification from the Adjustment Menu, A.5 Printer Adjustments.

Press the Up or Down buttons to scroll through the Test menu. Press the Enter button to access a test. Press the Escape button to return to the Test menu. During any test, press the Start button to obtain the wire color, driver number, connector number and fuse location.

T. TEST MENU

T.1 Switch Edges Test	T.10 Lamps And Flasher Test
T.2 Switch Levels Test	T.11 Display Test
T.3 Single Switch Test	T.12 Flipper Coil Test
T.4 Solenoid Test	T.13 Ordered Lamps Test
T.5 Flasher Test	T.14 Lamp Row-Col.
T.6 General Illumination Test	T.15 DIP Switch Test
T.7 Sound & Music Test	T.16 Empty Balls Test
T.8 Single Lamps Test	
T.9 All Lamps Test	

Note: In order to operate the tests that use the +50V or +20V circuits, pull the top interlock switch button out. The interlock switches are located on a bracket in the coin door opening.

The switch matrix, on the left side of the display, shows the state of all switches. A dot indicates the switch is open, 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, 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 of 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 Test

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.

To return the Test menu, press the Escape button.

T.2 Switch Levels Test

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.

To return the Test menu, press the Escape button.

T.3 Single Switches Test

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.

To return the Test menu, press the Escape button.

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 than one solenoid pulses, a solenoid comes on and stays on, or no solenoids pulse during the Repeat and Run modes.

Repeat: The Repeat mode pulses a single solenoid. Press the Enter button to start this test. The name of the first solenoid shows in the display and the corresponding coil pulses. Press the Up or Down buttons to cycle through the solenoids, one at a time. The same solenoid pulses until you press the Up or Down buttons to advance to the next one. To return the Test menu, press the Escape button. To advance to the next test mode, press the Enter button.

Stop: The Stop mode halts the Solenoid test. No solenoids should be active. To return the Test menu, press the Escape button. To advance to the next test mode, press the Enter button.

Run: The Run mode cycles through the solenoids automatically. The display shows the name and number of the solenoid currently being pulsed. To return the Test menu, press the Escape button. To return to the Repeat mode, press the Enter button.

T.5 Flasher Test

This tests the flashlamp part of the solenoid circuit. There are three modes -- Repeat, Stop, and Run. During this test the flashlamp circuit named in the display should blink. The system has detected a problem if more than one flashlamp circuit blinks, the lamps stays on, or no lamps blink during the Repeat and Run modes.

Repeat: The Repeat mode pulses a single flashlamp. Press the Enter button to start this test. The name and number of the first flashlamp is displayed and the corresponding bulb(s) blinks. The same bulb(s) blinks until you press the Up or Down buttons to advance to the next one. To return to the Test menu, press the Escape button. To advance to the next test mode, press the Enter button.

Stop: The Stop mode halts the Flasher test. There should not be any flashlamps lit during this mode. To return to the Test menu, press the Escape button. To advance to the next test mode, press the Enter button.

Run: The Run mode cycles through the flashlamps automatically. The display shows the name and number of the flashlamp circuit currently being pulsed as the corresponding bulb(s) flashes. To return to the Test menu, press the Escape button. To return to the Repeat mode, press the Enter button.

T.6 General Illumination Test

This test checks all of the General Illumination circuits. There are two modes of operation -- Stop and Run. **Note: G.I. strings four and five do not brighten and dim, they are always ON.**

Stop: The Stop mode allows you to cycle through the General Illumination test manually. Press the Up or Down buttons to advance through the test. All illumination is tested first, followed by an individual circuit test. The circuit name and number shows in the display while the corresponding bulbs light. If any other results occur the system has detected an error. To return to the Test menu, press the Escape button. To advance to the next test mode, press the Enter button.

General Illumination Test Continued...

Run: The Run mode cycles through the General Illumination test automatically. For each circuit shown in the display the corresponding bulbs should light. If any other results occur, the system has detected a problem. To return to the Test menu, press the Escape button. To return to the Stop mode, press the Enter button.

T.7 Sound and Music Test

The Sound and Music test checks the audio circuits. This test has three modes for testing the sound and music circuits -- Run, Repeat, and Stop.

Run: The Run mode steps through a sequence of sounds and music. Press the Up or Down buttons to advance to a particular sound or tune. A sound or tune should be heard for each name and number that appears in the display. Any other results indicates the system has detected a problem. To return to the Test menu, press the Escape button. To advance to the next test mode, press the Enter button.

Repeat: The Repeat mode causes the program to stop and repeat a particular sound/tune. The same sound repeats continuously until you press the Up or Down buttons to advance to the next one. Any other results indicates the system has detected a problem. To return to the Test menu, press the Escape button. To advance to the next test mode, press the Enter button.

Stop: The Stop mode stops this test altogether. Nothing should be heard. Any other results indicates the system has detected a problem. To return to the Test menu, press the Escape button. To return to the Run mode, press the Enter button.

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.

The Single Lamp test checks each lamp circuit individually. Press the Up or Down buttons to scroll through this test. A lamp should light for each name and number that is displayed. Any other results indicates the system has detected a problem. To return to the Test menu, press the Escape button.

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 indicates the system has detected a problem. To return to the Test menu, press the Escape button.

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. To return to the Test menu, press the Escape button.

T.11 Display Test

This test automatically checks every dot in the Dot Matrix Display board. A series of patterns appear in sequence. Each pattern turns on and off a section of dots. Every dot on the matrix display should be turned on and off during this test. To return to the Test menu, press the Escape button.

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 than one flipper pulses, a flipper comes on and stays on, or no flippers pulse during the Repeat and Run modes.

Repeat: The Repeat mode pulses a single flipper. Press the Enter button to begin the test. Press the Up or Down buttons to cycle through the flipper coils one at a time. To return to the Test menu, press the Escape button. To advance to the next test mode, press the Enter button.

Stop: The Stop mode halts the Flipper Coil test. No coils should pulse while the test is stopped. To return to the Test menu, press the Escape button. To advance to the next test mode, press the Enter button.

Run: The Run mode cycles through the flippers automatically. The display shows the name and number of the flipper coil currently being pulsed. To return to the Test menu, press the Escape button. To return to the Repeat mode, press the Enter button.

T.13 Ordered Lamps 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 buttons to cycle through the lamps. Lamps light in a clock-wise or counter clock-wise direction starting from the bottom of the playfield. The direction depends on which button, Up or Down, is pressed. For each name and number that is shown in the display, the corresponding lamp should light. Any other results indicates the system has detected a problem. To return to the Test menu, press the Escape button.

T.14 Lamp Row-Col.

This test allows individual rows and columns in the lamp matrix to be operated. This is useful for troubleshooting wiring and driver problems.

Press the Up and Down buttons to cycles through the different rows and columns.

To return to the Test menu, press the Escape button.

T.15 DIP Switch Test

This test is used to show the positions of the DIP switches on the CPU board (U27).

To return to the Test menu, press the Escape button.

T.16 Empty Balls Test

This test kicks out all balls loaded in the troughs, lockups, poppers, and kick-outs until no balls remain in those locations.

To return to the Test menu, press the Escape button.

Note: As the trough kicks the balls out, they may stack up in the shooter groove, which may require manual clearing in order to allow further balls to be kicked out.

To scroll through the Utilities menu, press the Up or Down buttons. To access a utility, press the Enter button. To see the setting choices of a utility option, press the Up and Down buttons. Press the Enter button to lock in a choice. If you make a mistake, press Escape while "Saving Adjustment Value" is in the display. The original setting is retained and the new setting is ignored. To return to the Utilities menu, press the Escape button.

U. Utilities Menu

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

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 buttons to change the value, then press the Enter button to lock in that value. If you make a mistake 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 ON before trying to write a Custom Message.*

Press the Enter button to begin entry of the custom message. Use the Up or Down buttons 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 the 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 Enter is pressed, 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 for the installation of a message, such as game location, that only appears on the printouts. Press the Enter button to activate Set Game I.D. Use the Up or Down buttons to cycle through letters. Use the Start button to cycle through punctuation marks. Press the Enter button to lock in desired letters and punctuation marks.

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 you make a mistake, press the Escape button while "Saving Adjustment Value" is displayed. The new value is ignored and the original value is retained.

Game Difficulty Levels 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 group.

- U.9 01 Install Extra Easy MUCH LESS difficult than factory setting.
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.

Difficulty Setting Table for U.S., Canadian, French, German, and European Games

Adj. #	Adj. Description	Extra Easy U.9 01	Easy U.9 02	Medium U.9 03 (factory)	Hard U.9 04	Extra Hard U.9 05
A.2 04	Ball Saves Time	6 secs.	6 secs.	6 secs.	4 secs.	2 secs.
A.2 10	Extra Ball Percent	45%	40%	35%	30%	25%
A.2 11	Multiball Percent	45%	40%	35%	30%	25%
A.2 12	Recycle Difficulty	Easy	Easy	Medium	Hard	Hard

U.9 06 Install 5 Ball

U.9 07 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 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 Adjustments Table for U.S. and Canadian Games

Adj. #	Adj. Description	Install 5-ball U.9 06	Install 3-ball U.9 07
A.1 07	Replay Start	50,000,000	20,000,000
A.2 04	Ball Saves Time	4 secs.	6 secs.
A.2 10	Extra Ball Percent	30%	35%
A.2 11	Multiball Percent	30%	35%
A.2 12	Recycle Difficulty	Hard	Medium

U.9 08 Install Add-A-Ball

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

<u>Ad</u>	<u>Name</u>	<u>New Setting</u>
A.1 13	Replay Boost	Off
A.1 14	Replay Award	Ex. Ball
A.1 15	Special Award	Ex. Ball
A.1 17	Extra Ball Ticket	No
A.1 19	Match Feature	Off
A.2 14	Window Awards	No Game (Prevents free games from being awarded.)
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 09 Install Ticket

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

<u>Ad</u>	<u>Name</u>	<u>New Setting</u>
A.1 14	Replay Award	Ticket
A.1 15	Special Award	Ticket
A.1 16	Match Award	Ticket
A.1 17	Ex. Ball Ticket	Yes
A.1 31	Ticket Expan.Brd.	Yes
A.4 02	H.S.T.D. Award Ticket	Yes

U.9 10 Install Novelty

This option removes all Free Play and Extra Ball awards. Individual adjustments are affected as follows:

<u>Ad</u>	<u>Name</u>	<u>New Setting</u>
A.1 04	Max. Ex. 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.2 14	Window Awards	No Game (Prevents free games from being awarded.)
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 11 NOT USED

U.9 12 Serial Capture

This sets up the printer adjustments for a serial transmission to a laptop computer, (9600 baud, 40 column, no page breaks, serial printer). This option requires the installation of the optional printer kit; part number 63110.

U.9 13 to U.9 16 NOT USED

U.9 17 Install German 1

U.9 18 Install German 2

U.9 19 Install German 3

U.9 20 Install German 4

U.9 21 Install German 5

U.9 22 Install German 6

Adjustments U.9 17 through U.9 22 are used to modify game pricing and type of play.

U.9 23 Install French 1

U.9 24 Install French 2

U.9 25 Install French 3

U.9 26 Install French 4

U.9 27 Install French 5

U.9 28 Install French 6

Adjustments U.9 23 through U.9 28 are used to modify game pricing and type of play.

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 helps in finding intermittent problems. The tests that Auto Burn-in cycles through are: the Display Test, the Sound and Music Test, the All Lamps Test, the Solenoid Test, the Flashers Test, the General Illumination Test, and the Flipper Coil Test. All of the tests run concurrently. The time spent on the burn-in cycle, and the total time the game has spent in burn-in are displayed.

Press the Up or Down buttons to scroll through the Adjustments menu. To access an adjustment menu option, press the Enter button. To see the setting choices for that option, press the Up and Down buttons. To lock in a setting choice, press the Enter button. If you make a mistake, press the Escape button while "Saving Adjustment Value" is in the display. The original value is retained and the new value is ignored. Press the Escape button to return to the Adjustment 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 to 10.

A.1 02 Tilt Warnings

The number of total actuation's of the plumb bob that can occur before the game is "tilted".

Range: 1 to 10.

A.1 03 Maximum Extra Balls

The number of extra balls that a player may accumulate.

Range: 0 to 10.

NO EXTRA BALL - No extra balls may be accumulated.

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 but 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% to 50%.

A.1 07 Replay Start

Replay start value when Auto % Replay is used.

Range: 15,000,000 to 250,000,000.

A.1 08 Replay Levels

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

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 value to be used for the 1st through 4th Fixed Replay.

Range: 00 to 250,000,000.

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 when 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

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 one 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 to 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 match of these two digit 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 the date, time in status report or in the Attract mode.

NO - Do Not show date, time in status report or in the Attract mode.

A.1 25 Allow Dim Illumination

The game program dims the general illumination for special effects and during the Attract mode.

YES - Dim the general illumination during the Attract mode.

NO - Do Not dim the general illumination.

A.1 26 Tournament Play

Equalize random game features and global score values during multi-player games.

YES - Equalize random game features and global score values.

NO - Do Not equalize random game features and global score values.

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).

A.1 28 Minimum Volume Override

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 dimness of the lamps. Using this feature substantially increases the life of the lamps.

Setting: OFF, 2 to 60 minutes.

A.1 30 Power Saver Level

When General Illumination Power Saver (A.1 29) is set for 2 to 60 minutes, the Power Saver Level controls the intensity of the general illumination and controlled lamps after the game has been idle for the specified period of time.

Range: 4 to 7. (4 = dimmest, 7 = brightest)

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 to "YES" may extend the life of the flipper mechanisms.

A.1 33 Game Restart

When you press the Start button during or after the 2nd ball, the game in progress ends and a new game begins. This adjustment has three settings to determine how to handle this.

- NEVER - Do not allow a new game 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 the game in progress.
- INSTANTLY- Restart as soon as the Start button is pressed.

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

A.2 Feature Adjustments

A.2 01 Buy Extra Ball - Buy-in Feature

This determines whether each player may buy one extra ball for one credit at the end of the game.

Settings: 1 Credit
OFF

Factory Default: 1 Credit

A.2 02 Buy-in Count

If A.2 01 (BUY EXTRA BALL) is set to "1 CREDIT", this determines the number of Extra Balls that may be purchased at the end of the game. The choices are 1-3 or Unlimited.

Factory Default: 3 Buy-ins

A.2 03 Ball Saves

Maximum number of ball saves a player is allowed.

Settings: 1-5 Balls

Factory Default: 1 Ball

A.2 04 Ball Saves Time

Sets the amount of time a player has Ball Save active at the start of each ball.

Settings: 3-15 seconds
OFF

Factory Default: 6 seconds

A.2 05 Timed Plunger

The ball launch plunger automatically shoots for the player after specified amount of time.

Settings: ON = After 30 - 90 seconds, the plunger will kick automatically.
OFF = The plunger will NOT kick automatically.

Factory Default: OFF

A.2 06 Flipper Plunger

Pressing the flipper button will fire the launch plunger. (Turn this adjustment on ONLY if the Launch button does not function properly.) The choices are:

NO = Pressing the right flipper does not launch the ball.
YES = Pressing the right flipper will launch the ball.

Factory Default: NO

A.2 07 Staged Ball

This allows the operator to turn the Staged Ball feature on or off. The choices are:

ON = Allow Staged Ball Feature.

OFF = No Staged Ball feature.

Factory Default: ON

A.2 08 Special Mode

This allows the operator to turn Special Modes on or off. The choices are:

ON = Allow Special Mode.

OFF No Special Modes.

Factory Default: ON

A.2 09 Attract Mode Bong Sounds

This allows the operator to determine how often the Game Over bong sounds are heard. The choices are:

ON = The Game Over clock will bong.

SPARSE = The Game Over clock will only bong 1/3 of the time.

OFF = The Game Over clock will not bong.

Factory Default: SPARSE

A.2 10 Extra Ball Percent

This allows the operator to select whether or not the Extra Ball light is carried over from ball to ball or reset at ball start. **Note:** *This adjustment may change if the difficulty settings are changed.* The choices are:

ON = The Extra Ball light is carried over from ball to ball.

OFF = The Extra Ball light is reset at ball start.

Factory Default: ON

A.2 11 Multiball Percent

This allows the operator to effect the number of MULTIBALLS the game gives out. **Note:** *This adjustment may change if the difficulty settings are changed.*

Range: 25% to 45%

Factory Default: 35%

A.2 12 Recycle Difficulty

This allows the operator to adjust the difficulty of the recycle feature. The choices are:

EASY - Allows the player to receive more recycles. (This possibly increases ball time.)

MEDIUM

HARD - Allows the player to receive less recycles. (This possibly decreases ball time.)

Factory Default: MEDIUM

A.2 13 Euro Time Machine

This allows the operator to change the month and day display in the time machine display effect. The choices are:

YES - DD MM YY

NO - MM DD YY

Factory Default: MM DD YY

A.2 14 Window Awards

This allows the operator to inhibit the Window Shopping feature, if needed. The choices are:

NORMAL - Neither are prevented.

NO EXTRA BALL - Prevents extra balls from being awarded.

NO GAME - Prevents free games from being awarded.

NO BOTH - Prevents both extra balls and free games from being awarded.

Factory Default: NORMAL

A.2 15 Family Mode

This allows the operator to turn off all potentially offensive speech and sounds. The choices are:

YES - Potentially offensive speech and sounds are inhibited.

NO - No sounds are inhibited.

Factory Default: NO

A.2 16 Disable Crane

This allows the operator to disable the crane device. *Note: If this adjustment is set to "OFF", the game will remind the operator in the test messages at power-up, and the error dot will appear after all credits.* The choices are:

ON - The crane is disabled.

OFF - The crane will work normally.

Factory Default: OFF

A.2 17 Player Tournament

This allows the operator to turn off the Player Tournament mode. The choices are:

YES - Players will be able to start a game in tournament mode.

NO - Players won't be able to start a game in tournament mode.

Factory Default YES

A.3 Pricing Adjustments

A.3 01 Game Pricing (If set to custom, then 02 to 09 are available. Custom Pricing Is Not Available For USA And Canadian Games).

The cost of a game is selected here from the Standard Pricing Table or by using the custom pricing editor (A.3 27).

A.3 02 to A.2 09 NOT USED

A.3 10 Coin Door Type (If set to custom, then 11 to 15, 20 and 25 are available. Custom Pricing Is Not Available For USA And Canadian Games).

This adjustment is used to preset adjustments 11 through 15, 20 and 25, based on standard coin doors.

A.3 11 Collection Text

The coin system is 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

These are the values for the coins for these respective coin slots. These values are used for determining collection totals. The corresponding adjustments A.3 28 (Left Slot Credit Value) through A.3 31 (4th Slot Credit Value) typically contain the same values and are used to determine the number of credits awarded for the coin slot. Whenever these values are changed, the new value is copied to the corresponding A.3 28 through A.3 31 adjustment. If a bonus is desired for a particular coin (such as three credits for dollar coin), then the corresponding A.3 28 through A.3 31 "Credit Value" adjustment should be modified to award the bonus. See "Bonus for Special Coin" section for more information.

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 99. Reaching the specified setting prevents the award of any credits. Factory default is 10.

A.3 17 Free Play

A 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.
- HID NAMES - The coin audit value is shown but not the audit name.

A.3 19 NOT USED

A.3 20 Base Coin Size

This is the smallest unit of coin that may be used when creating a custom pricing mode using the Pricing Editor (A.3 27). For example, in the USA this is typically \$0.25. All pricing levels are then specified in 25 cents (or greater) increments.

A.3 21 Coin Meter Units

The adjustment determines the value of each coin unit on the coin meter. For example, to show the total amount of money collected as total quarters, set the adjustment to 0.25. To show the total 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 the meter installed on the Coin Door Interface board. **Note:** All WPC-95 games are cable ready to operate a coin meter mounted to the Coin Door Interface board. Boards without a meter can use the parts listed below to take advantage of the coin meter feature. The coin meter and spacer may be purchased from your distributor. coin meter +6V p/n 20-9302-3; spacer p/n 20-9914

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.

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.

A.3 23 Minimum Coin Milliseconds

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.

A.3 24 NOT USED

A.3 25 Allow Hundredths

This is used for a custom door specifier. If set to YES, then the values for A.3 12-15 are specified in units and hundredths (such as dollars and quarters). If set to NO, then all values are in units (such as Francs and Lire.)

A.3 26 Credit Fraction

This determines the smallest fraction used for credits. It must be even to accommodate the extra ball buy-in option of 1/2 credit, and is typically 1/2 but may need to be a different value for modes requiring more coins per credit.

A.3 27 Pricing Editor (Custom Pricing Is Not Available For U.S.A. And Canadian Games).

This function is now used to enter information for a custom pricing mode. The adjustment A.3 26 (Credit Fraction) may need to be set before entering the custom pricing editor. This specifies the smallest fraction available for partial credits.

Because of availability of an extra ball (buy-in) for 1/2 credit, this value is always even (1/2, 1/4, 1/6 etc.). The typical setting for A.3 26 is 1/2 (such that there are only full credits and half credits) but you may need to use a different value for other pricing modes.

Please note that formerly, the coin values specified by custom coin doors adjustments A.3 12-15 only affected audit totals that showed collection totals. In the 10/94 pricing system, these coin values are added up for each coin received and credits are awarded based on pricing levels being reached. The pricing editor described here allows you to set these levels, however it may be necessary for you to set A.3 10 (Coin Door Type) to CUSTOM and then change A.3 11-15, 20 and 25 to reflect the value of the coins being used. This is usually NOT NECESSARY, but must be done BEFORE using the custom pricing editor when it is necessary.

Begin the custom pricing function by pressing the Enter button while A.3 27 Pricing Editor is showing in the display.

The pricing editor will now show the data for the currently selected pricing mode. If this is the 1st use of the pricing editor then this will show the last built-in pricing that was selected. Otherwise it will be the last custom mode created by this function. (Note that A.3 01 will display Custom any time a non-standard pricing has been selected.)

Assuming the last mode installed was 1/\$0.50 2/\$0.75 3/\$1.00 the display appears as follows:

CUSTOM PRICING EDITOR		
1)	\$0.25	1/2 cred.
2)	\$0.50	1 cred.
3)	\$0.75	2 cred.
4)	\$1.00	3 cred.

DISPLAY VIEW

The \$0.25 field will be flashing. You may now use the test mode buttons to perform the following functions:

Escape: Undo any changes to the current field and move to the previous field.

"-" (Down): Make the current field lower.

"+" (Up): Make the current field higher.

Enter: Save any changes to the current field and move to the next field. Note that there are 2 columns of fields. Price levels are in the left column and credit levels are in the right column. Pressing Enter will move from left column to right column before moving to the next line.

Start: Save the current price mode or start over

By using the above functions, you simply enumerate each pricing level and the number of credits that should be awarded at that level. Please note that you must specify each fractional level in sequence.

Example:

1/\$0.50	2/\$1.00	4/\$1.50	6/\$2.00
1)	\$0.25	1/2 cred.	
2)	\$0.50	1 cred.	
3)	\$0.75	1 1/2 cred.	
4)	\$1.00	2 cred.	
5)	\$1.25	2 1/2 cred.	
6)	\$1.50	4 cred.	
7)	\$1.75	4 1/2 cred.	
8)	\$2.00	6 cred.	

Also note that once the value of the coins repeat that no further specification is necessary.

Example:

1/\$0.50	2/\$1.00
1)	\$0.25
	1/2 cred.

In the above example, only one line needs to be specified, indicating that 1/2 credit is awarded for each \$0.25 received.

Special Features:

There are some special features available by pressing the Down button while in the left column. The following words will be displayed instead of a pricing level:

End
Delete
Insert
Clear
Repeat 1
Repeat 2
Repeat 3
Repeat 4
Repeat 5
Repeat 6
Repeat 7
Repeat 8
Repeat 9
Repeat 10
Repeat 11
Repeat 12
Repeat 13
Repeat 14
Repeat 15
Repeat 16
Repeat 17
Repeat 18
Repeat 19
Repeat 20

Pressing Enter with the above words selected will activate the following instructions:

- End** This is the same as pressing the Start button. A menu of choices will be provided (see Start Button later in this section).
- Delete** This will delete the current level from the pricing mode.
- Insert** This will insert a new pricing level ABOVE the current level. The current level will be unaffected. There must be room for at least one coin between the current level and the previous level, and at least one fractional credit unit between the current level and the previous level.

Example: Inserting a new pricing level.

CUSTOM PRICING EDITOR		
1)	\$0.50	1 cred.
2)	\$1.00	2 cred.
3)	\$1.50	4 cred.
4)	\$2.00	6 cred

DISPLAY VIEW

Use the Enter button to move to the \$1.50 field. Now press the Down button once to create the following display:

CUSTOM PRICING EDITOR		
1)	\$0.50	1 cred.
2)	\$1.00	2 cred.
3)	INSERT	4 cred.
4)	\$2.00	6 cred

DISPLAY VIEW

Now press the Enter button. The display will now show:

CUSTOM PRICING EDITOR		
1)	\$0.50	1 cred.
2)	\$1.00	2 cred.
3)	\$1.25	2 1/2 cred.
4)	\$1.50	4 cred

DISPLAY VIEW

Note that the line "5) \$2.00 6 cred." No longer fits on the display. Whenever there are more than four pricing levels that the display will scroll up and down as Enter and Escape are used to move from field to field. If you repeatedly press Enter the display will then show:

CUSTOM PRICING EDITOR		
2)	\$1.00	2 cred.
3)	\$1.25	2 1/2 cred.
4)	\$1.50	4 cred.
5)	\$2.00	6 cred

DISPLAY VIEW

Clear This will clear out the current entries to allow a new price mode to be entered.

Repeat (1-20) This will cause all entries above the current line to be repeated the number of times specified. This is only available when there are no pricing levels below the current line.

Example: 1/\$0.50 2/\$1.00 15/\$5.00

Use the "Edit New Pricing Mode" feature described below to clear out the current levels. Use the Up and Enter buttons to specify 1/2 credit for \$0.25:

CUSTOM PRICING EDITOR		
1)	\$0.25	1/2 cred.

DISPLAY VIEW

Now, use the Up button until the display shows "Repeat 20". The display looks like this:

CUSTOM PRICING EDITOR		
1)	\$0.50	1 cred.
2)	REPEAT 20	

DISPLAY VIEW

Press the Enter button and the display will show the following:

CUSTOM PRICING EDITOR		
1)	\$0.25	1/2 cred.
2)	\$0.50	1 cred.
3)	\$0.75	1 1/2 cred.
4)	\$1.00	2 cred

DISPLAY VIEW

Actually, by repeating the 1st line 20 times the pricing mode is currently set up as follows, but only the 1st four lines are displayed.

CUSTOM PRICING EDITOR		
1)	\$0.25	1 1/2 cred.
2)	\$0.50	1 cred.
3)	\$0.75	1 1/2 cred.
4)	\$1.00	2 cred.
5)	\$1.25	2 1/2 cred.
6)	\$1.50	3 cred.
7)	\$1.75	3 1/2 cred.
8)	\$2.00	4 cred.
9)	\$2.25	4 1/2 cred.
10)	\$2.50	5 cred.
11)	\$2.75	5 1/2 cred.
12)	\$3.00	6 cred.
13)	\$3.25	6 1/2 cred.
14)	\$3.50	7 cred.
15)	\$3.75	7 1/2 cred.
16)	\$4.00	8 cred.
17)	\$4.25	8 1/2 cred.
18)	\$4.50	9 cred.
19)	\$4.75	9 1/2 cred.
20)	\$5.00	10 cred

DISPLAY VIEW

Now repeatedly press the Enter button to move the right hand column to the 20th level. The display will show (with "10 cred." Blinking):

CUSTOM PRICING EDITOR		
17)	\$4.25	8 1/2 cred.
18)	\$4.50	9 cred.
19)	\$4.75	9 1/2 cred.
20)	\$5.00	10 cred

DISPLAY VIEW

Now press the Up button repeatedly until the right hand column of line 20 reads "15 cred."

Start Button: Once the pricing mode has been specified, you exit the custom pricing editor by pressing the 'Start' button. This will bring up a menu with some or all of the following choices:

Choose an Option:	
Return to Editor	
Clear Pricing	
Ignore Changes	
Save Changes	

DISPLAY VIEW

Use the Up and Down buttons to select your choice and press the Enter button to activate it. The selections cause the following actions:

Return To Editor: This option will allow you to continue to edit the pricing information.

Clear Pricing: This option will clear out all pricing levels and bring you back to the pricing editor to create a pricing mode from scratch.

Ignore Changes: This option will discard the work done in the previous pricing editor and leave the previously installed pricing mode in the game.

Save Changes: Press the Enter button to save your custom edited pricing mode and install it as the pricing for the game. Note that this choice will not be displayed if there is not at least one pricing level specified in the pricing editor, or if no changes have been made.

Exit Pricing Editor: This option will appear if no changes have been made. It will exit the Pricing Editor leaving the pricing as is.

Bonus for Special Coins

For most coin modes, the system allows the mixing of any combination of any size coin and awards credits as each appropriate amount is accumulated. With A.3 10 (Coin Door Type) set to "custom", the value of each coin slot may be entered for adjustments A.3 12 (Left Slot Value) through A.3 15 (4th slot value). Whenever these values are changed, the new values are copied to A.3 28 (Left Slot Credit Value) through A.3 31 (4th Slot Credit Value) respectively. To give a bonus for a particular coin, you need to modify the Credit Value adjustment to specify the value to be given for the bonus coin.

For example, in a game with a Left Coin Slot that takes quarters and a center coin slot that takes dollars, if you wish to charge 50 cents for 1 play and \$1.00 for 2 plays, you setup the pricing editor to show:

CUSTOM PRICING EDITOR		
1)	\$0.25	1/2 cred.
2)	\$0.50	1 cred.
3)	\$0.75	1-1/2 cred.
4)	\$1.00	2 cred

DISPLAY VIEW

If you set A.3 10 (Coin Door Type) to Custom you will see the following coin door specifier adjustments:

A.3 12	Left Slot Value	0.25
A.3 13	Center Slot Value	1.00
A.3 28	Left Slot Credit Value	0.25
A.3 29	Center Slot Credit Value	1.00

To change the pricing to 1 play for \$0.50, 2 plays for \$1.00 and 3 plays for a dollar coin, you change A.3 29 (Center Slot Credit Value) to 1.50. This will result in the following settings:

A.3 12	Left Slot Value	0.25
A.3 13	Center Slot Value	1.00
A.3 28	Left Slot Credit Value	0.25
A.3 29	Center Slot Credit Value	1.50

This will cause \$1.50 worth of credits (3) to be awarded for each coin inserted in the center coin slot (dollar coin). This is due to the \$1.50 setting of A.3 29 (Center Slot CREDIT VALUE). Note that the 1.00 setting of A.3 13 tells the game that each coin in the center slot adds \$1.00 to the total collection.

- A.3 28 Left Slot Credit Value**
- A.3 29 Center Slot Credit Value**
- A.3 30 Right Slot Credit Value**
- A.3 31 4th Slot Credit Value**

This adjustment specifies the value to be used for awarding credits. It is typically the same value as the corresponding A.3 12 (Left Slot Value) through A.3 15 (4th Slot Value) adjustment.

The A.3 12 through A.3 15 values are used to determine the auditing value of each coin (for collection totals) while the A.3 28 through A.3 31 value determine the coin value for awarding credits. By making this "Credit Value" adjustment higher than the A.3 12 through A.3 15 "Value" adjustment, a bonus may be given for a specific call (see Bonus for Special Coin section for more information).

Pricing Table

Country	CoinChutes				Games/Coins	Display	Pricing Adjustments A3
	Left	Center	Right	4th Chute			02 03 04 05 06 07 08 09
USA	25¢	\$1.00*	25¢	\$1.00	1/50¢, 2/75¢, 3/\$1 ²	50¢, 75¢, \$1.00	
	25¢	\$1.00*	25¢	\$1.00	1/75¢, 2/\$1.50, 3/\$2.00 ²	1/75, 3/2.00	
	25¢	\$1.00	25¢	\$1.00	1/3x25¢ ²	USA 1/\$0.75	
	25¢	\$1.00	25¢	\$1.00	1/50¢, 2/\$1 ²	USA 2/\$1.00	
	25¢	\$1.00	25¢	\$1.00	1/50¢, 3/\$1.00 ²	USA 3/\$1.00	
	25¢	\$1.00	25¢	\$1.00	1/2x25¢, 2/\$1.00, 3/\$1.50, 6/\$2.00 ²	USA 6/\$2.00	
	25¢	\$1.00	25¢	\$1.00	1/2x25¢, 2/\$1.00, 3/\$1.50, 5/\$2.00 ^{1,2}	USA 5/\$2.00	
	25¢	\$1.00	25¢	\$1.00	1/3x25¢, 2/\$1.50, 4/\$2.00 ²	1/75, 4/\$2.00	
	25¢	\$1.00	25¢	\$1.00	1/2x25¢, 2/\$1.00, 4/\$1.50, 6/\$2.00 ²	6/\$2.00 4/\$1.50	
	25¢	25¢	25¢	-	1/4x25¢, 8/\$5.00 ²	1/1, 6/5	
Canada	25¢	-	\$1.00	-	1/4x25¢ ²	1/\$1.00	
	25¢	-	\$1.00	-	1/50¢, 2/75¢, 3/\$1 ²	CAN 50-75-1	
	25¢	-	\$1.00	-	1/50¢, 2/\$1 ²	CAN 2/\$1.00	
	25¢	-	\$1.00	-	1/50¢, 3/\$1.00 ²	CAN 3/\$1.00	
	25¢	-	\$1.00	-	1/2x25¢, 2/4x25¢, 3/\$1.00 ²	3/\$1.00 Coin	
	25¢	-	\$1.00	-	1/2x25¢, 2/\$1.00, 3/\$1.50, 6/\$2.00 ²	CAN 6/\$2.00	
	25¢	-	\$1.00	-	1/2x25¢, 2/\$1.00, 3/\$1.50, 5/\$2.00 ^{1,2}	CAN 5/\$2.00	
	25¢	-	\$1.00	-	1/2x25¢, 2/\$1.00, 4/\$1.50, 6/\$2.00 ²	6/\$2 4/1.50	
	25¢	-	\$1.00	-	1/3x25¢, 2/\$1.50, 4/\$2.00 ²	1/75, 4/2.00	
	25¢	-	\$1.00	-	1/75¢, 2/\$1.50, 3/\$2.00 ²	1/75, 3/2.00	
Canada 3/Dollar Coin	25¢	-	\$1.00	-	1/3x25¢ ²	CAN 1/\$0.75	
Austria	5sch	10sch	10sch	-	1/0.50, 2/\$1.00, 3/\$1.00-Coin	CAN 5 BONUS	
Australia	20¢	\$1	\$1	\$2	1/2x5sch, 3/2x10sch ²	AUSTRIA	
U.K.	20¢	\$1	\$1	\$2	12/5sch, 5/10sch	CUSTOM	02 00 05 00 01 00 01 00
Switzerland	1Fr	2Fr	5Fr	-	1/\$1, 3/\$2 ²	AUSTRALIA 1	
Swiss 2	1Fr	2Fr	5Fr	-	1/\$1, 2/\$2	AUSTRALIA 2	
Swiss 3	1Fr	2Fr	5Fr	-	1/3x10P, 2/50P, 4/E1 ²	U KINGDOM	
Swiss 4	1Fr	2Fr	5Fr	-	1/1Fr, 3/2Fr, 7/5Fr ²	SWISS 1	
Swiss 5	1Fr	2Fr	5Fr	-	1/2Fr, 2/3Fr, 3/4Fr, 5/5Fr	SWISS 2	
Belgium	5Fr	20Fr	50Fr	-	1/1Fr, 5/5Fr	SWISS 3	
Belgium 2	5Fr	20Fr	50Fr	-	1/1Fr, 2/2Fr, 3/3Fr, 4/4Fr, 6/5Fr ¹	SWISS 4	
Germany	1DM	2DM	5DM	-	1/1Fr (all slots = 1Fr)	SWISS 5	
Holland	1G	-	1G	-	1/4x5Fr, 1/20Fr, 3/50Fr ²	BELGIUM	
Sweden	1Kr	5Kr	10Kr	1Kr	1/20Fr, 3/60Fr, 3/50Fr-Coin	BELG BONUS	
France	1Fr	5Fr	10Fr	20Fr	1/2DM, 2/3DM, 3/4DM, 4/5DM ^{1,2}	GER 4/5DM	
Italy	500L	500L	500L	-	1/2DM, 2/3DM, 3/4DM, 5/5DM ²	GER 1/2DM	
Spain	100P	-	500P	-	1/1DM, 2/2DM, 5/5DM ²	GER 1/1DM	
Japan	100M	-	100M	-	1/1DM, 2/2DM, 6/5DM ²	GER 6/5DM	
Chile	Token	-	Token	-	1/1G ²	HOLLAND	
Denmark	1Kr	5Kr	10Kr	20Kr	1/10Kr, 2/15Kr, 3/20Kr ^{1,2}	SWEDEN 1	
Finland	1Mka	-	5Mka	-	1/5Kr ²	SWEDEN 2	
New Zealand	\$1.00	-	\$2.00	-	1/3x1Fr, 2/5Fr, 5/10Fr, 10/20Fr ^{2,3}	TARIFF 1	
Norway	5Kr	-	10Kr	-	1/2x1Fr, 3/5Fr, 7/10Fr, 14/20Fr ^{2,3}	TARIFF 2	
Argentina	10¢	10¢	10¢	-	1/5Fr, 3/10Fr, 7/2x10Fr, 7/20Fr ^{1,2,3}	TARIFF 3	
Greece	10D	20D	50D	-	2/5Fr, 4/10Fr, 9/2x10Fr, 9/20Fr ^{2,3}	TARIFF 4	
Antilles	25¢	25¢	1G	-	2/5Fr, 5/10Fr, 11/2x10Fr, 11/20Fr ^{2,3}	TARIFF 5	
Netherlands	1HFI	2.5HFI	2.5HFI	-	1/5Fr, 3/10Fr, 6/20Fr ^{2,3}	TARIFF 6	
Netherlands 2	1HFI	2.5HFI	2.5HFI	-	1/500L ²	ITALY 1	
Hungary	20 Old	20 New	50P	-	1/2x500L, 3/4x500L ^{1,2}	ITALY 2	
					1/2x500L, 2/4x500L ²	ITALY 3	
					1/100P, 6/500P ²	SPAIN	
					1/25P, 5/100P	CUSTOM	01 00 04 00 01 04 01 00
					1/25P, 4/100P	CUSTOM	01 00 04 00 01 00 01 00
					1/2x25P, 2/100P	CUSTOM	01 00 04 00 02 00 01 00
					1/2x25P, 3/100P	CUSTOM	03 00 12 00 04 00 01 06
					1/100M ²	JAPAN	
					1/1Token ²	CHILE	
					1/2x1 Kr, 3/5 Kr, 7/10 Kr ²	DENMARK 1	
					1/5 Kr, 3/10 Kr, 8/20 Kr ^{1,2}	DENMARK 2	
					1/2x1Mka, 3/5Mka ²	FINLAND 1	
					1/3x1Mka, 2/5Mka ²	FINLAND 2	
					1/\$1, 3/\$2 ²	NEW ZEALAND 1	
					1/\$1, 3/\$2, (\$2-\$1 door)	NEW ZEALAND 2	
					1/5Kr, 2/10Kr, 5/20Kr ²	NORWAY	
					1/1Token ²	ARGENTINA	
					1/2x10D, 1/20D, 3/50D	GREECE	
					1/25¢, 4/1G	ANTILLES	
					1/1HFI, 3/2.5HFI	NETHERLANDS	
					1/1HFI, 3/3HFI, 3/2.5HFI-Coin	NETH. BONUS	
					1/40F, 2/60F, 4/100F	HUNGARY	

Note: 1. Factory Default. 2. Standard Setting - Change by pressing Enter button. 3. Other functions are also affected.

* Only if B/W Acceptor and Center Chute 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 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 a Ticket.

A.4 03 Champion H.S.T.D.

The "Highest" High Score can be 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 displayed.
- OFF - The "Highest" High Score is not retained.

A.4 04 Champion Credits

The number of credits or tickets awarded for a Grand Champion Score.

Range: 00 to 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 awarded whenever a player exceeds the 1st, 2nd, 3rd, or 4th highest score.

Range: 00 to 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 to 999,000,000.

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 - 999,000,000.

A.5 Printer Adjustments (optional board required)

A.5 01 Column Width

The column width to be printed. Range: 22 to 80.

A.5 02 Lines Per Page

The amount of lines per page. Range: 20 to 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 doesn't pause.

A.5 04 Printer Type

Select the type of printer: Parallel, Serial, ADP, Mini-Drucker, or NSM.

A.5 05 Serial Baud Rate

Select which baud rate to use for serial or ADP communications (bit rate): 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 the printer is not ready.
- IGNORE - D.T.R. signal is ignored.

A.5 07 Auto Printout

With the optional printer board installed, this adjustment allows the initiation of printouts whenever the game detects a printer connected to the game. Parallel printers are detected automatically by plugging them in and putting them on-line. Serial printers (or computers) are detected by sending a carriage return (ASCII 0x0D) or XON (ASCII 0x11).

This adjustment has the following settings:

OFF	Disable automatic printouts
MAIN AUDITS	Main Audit Table (B.1)
EARNINGS	Earning Audits (B.2)
STD. AUDITS	Standard Audits (B.3)
FEATURES	Feature Audits (B.4)
HISTOGRAMS	Histograms (B.5)
TIMESTAMPS	Time Stamps (B.6)
ALL DATA	All of the above data

The table specified above will automatically be printed when a printer (or computer) is detected.

If the printer is detected during game over or test mode, the printout will be taken right away.

If the printer is connected while a game is being played, it will take up to 10 seconds to be detected, after which the printout will occur. The game will resume after the printout is complete.

Automatic printouts will only take place if the coin door is open.

After an automatic printout has been generated, a 2nd automatic printout will not be possible until a new game has started, or test mode begins.

ERROR MESSAGES

The WPC-95 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 a 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.

CRANE ADJ. A.2 16 IS SET TO ON.

This message appears when the operator sets the adjustment disabling the crane to on.

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 apx. 30 games). The game program compensates the game play requirements affected by each disabled switch to allow 'nearly normal' play. This helps keep your 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).

CHECK FUSES F115 AND F116 AND OPTO 12V SUPPLY

This message will be displayed if the game senses that all optical switches are not functioning. This usually occurs when there is no +12V supply to the playfield optics.

The problem is likely to be a blown fuse (F109), or at connectors J138, J139, J140 or J141 on the power driver board.

OPTO TROUGH BAD CHECK CONNECTORS, WIRES AND 12V SUPPLY.

This message will be displayed if all of the optics in the playfield ball trough are not functioning. This is usually caused by a problem with a ball trough connector supplying +12V and ground for the optical circuits.

PINBALL MISSING.

This game normally uses four balls, however, it will operate with less. 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.

XXXX 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 hangers, 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 is NOT a switch problem; however, for most games it is a very rare possibility.

G10 ERROR

The security chip is incorrect or faulty. If this occurs, replace the security chip.

G11 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 set. Go to U.4 of the Utilities Menu and set the time and date.

FACTORY SETTINGS RESTORED.

This message indicates that the CMOS RAM (U8) 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 voltages 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 +4V, 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. (Readings taken with an analog meter.) This message can also indicate that there is an open diode on a 50V coil circuit and noise is entering the circuit.

CPU AND AUDIO VISUAL BOARD ERROR CODES

The CPU has three LED's, 201, 202, and 203. At game turn-on, LED 201 and LED 202 are on, LED 203 is off. During normal operation LED 201 is off, LED 202 is on, and LED 203 is flashing.

If the system detects an error the following happens:

CPU BOARD

LED ERROR CODES

Center LED blinks once	= G11 ROM Failure
Center LED blinks twice	= U8 RAM Failure
Center LED blinks three times	= G10 Security Chip Failure

Upon game turn-on you will hear one of the following.

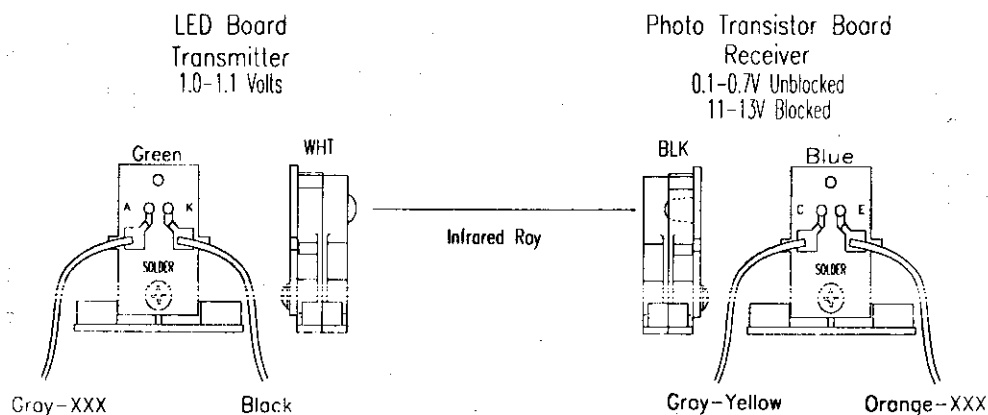
AUDIO VISUAL BOARD

BEEP ERROR CODES

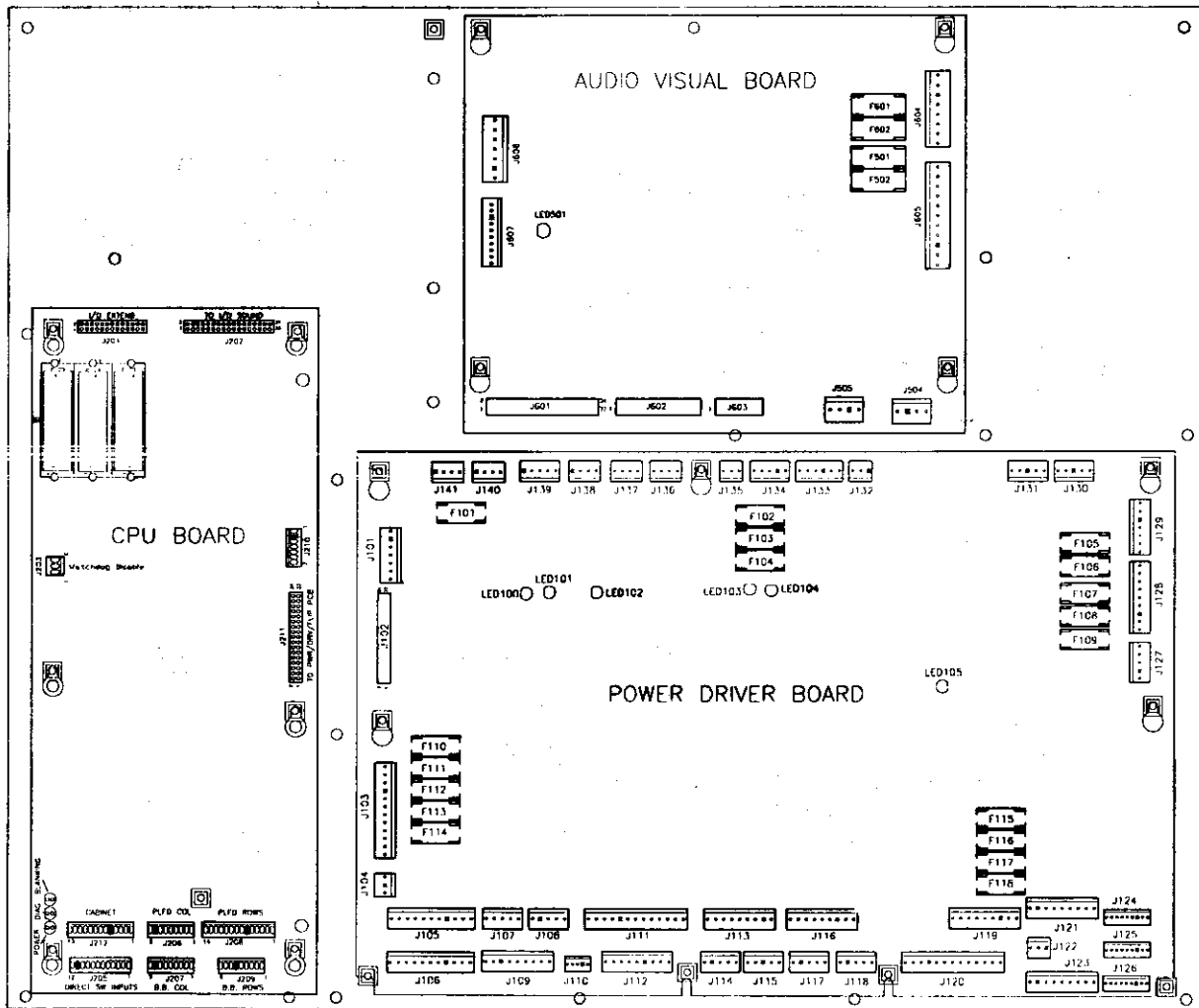
1 Beep	= Audio Visual Board is O.K.
2 Beeps	= S2 Failure
3 Beeps	= S3 Failure
4 Beeps	= S4 Failure
5 Beeps	= S5 Failure
6 Beeps	= S6 Failure
7 Beeps	= S7 Failure
10 Beeps	= Audio Static RAM Failure

OPTO THEORY

The opto receiver (Photo Transistor) 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 (LED) should always be approximately 1.4 volts. **Note:** The transmitter (LED) is larger than the receiver (Photo Transistor); it protrudes further from its case.



LED LIST



CPU BOARD

- LED 201 Blanking
- LED 202 Power
- LED 203 Diagnostics

At game turn-on, LED 201 and LED 202 are on, LED 203 is off. During normal operation LED 201 is off, LED 202 is on, and LED 203 is flashing.

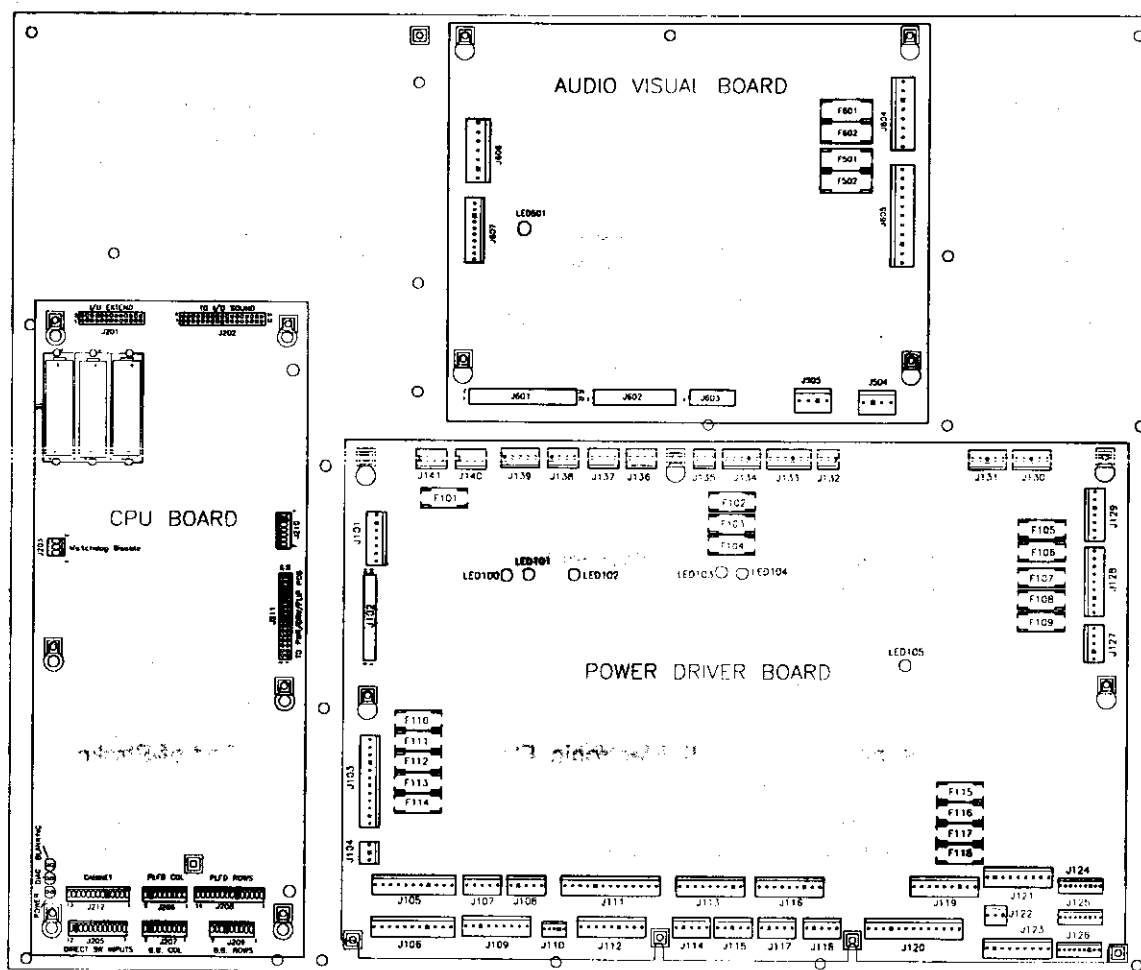
AUDIO VISUAL BOARD

- LED 501 +5VDC, Normally flashing, but at a slower rate than LED 203.

POWER DRIVER BOARD

- LED 100 +12VDC Regulated, Normally On
- LED 101 +5VDC Digital, Normally On
- LED 102 +18VDC Lamps, Normally On
- LED 103 +12VDC Unregulated, Normally On
- LED 104 +20VDC Flashlamps, Normally On
- LED 105 +50VDC Coils, Normally On

FUSE LIST



AUDIO VIDEO BOARD

Loc.	Description	Part Number	Value
F501	-25V	5731-14532-00	T2.5A, 250V
F502	+25V	5731-14532-00	T2.5A, 250V
F601	+62V	5731-14533-00	T0.25A, 250V
F602	-113V & -125V	5731-14533-00	T0.25A, 250V

CPU BOARD

There are no fuses on the CPU board.

POWER DRIVER BOARD

Loc.	Description	Part Number	Value	Loc.	Description	Part Number	Value
F101	Regulated 12V	5731-14531-00	T0.63A, 250V	F110	G.I. #5 WHT-VIO	5731-14530-00	T4.0A, 250V
F102	Solenoid. #25 to #28	5731-14530-00	T4.0A, 250V	F111	G.I. #4 WHT-GRN	5731-14530-00	T4.0A, 250V
F103	Solenoid #1-#8	5731-14530-00	T4.0A, 250V	F112	G.I. #3 WHT-YEL	5731-14530-00	T4.0A, 250V
F104	Solenoid #9 to #16	5731-14530-00	T4.0A, 250V	F113	G.I. #2 WHT-ORG	5731-14530-00	T4.0A, 250V
F105	+5V Logic	5731-14530-00	T4.0A, 250V	F114	G.I. #1 WHT-BRN	5731-14530-00	T4.0A, 250V
F106	+18V Lamp Matrix	5731-14046-00	T5.0A, 250V	F115	+50V Flippers	5731-14530-00	T4.0A, 250V
F107	Flasher Secondary	5731-14530-00	T4.0A, 250V	F116	+50V Flippers	5731-14530-00	T4.0A, 250V
F108	Solenoid Secondary	5731-14529-00	T6.3A, 250	F117	+50V Flippers	5731-14530-00	T4.0A, 250V
F109	Unregulated 12V	5731-14530-00	T4.0A, 250V	F118	+50V Flippers	5731-14530-00	T4.0A, 250V

LINE FILTER

Loc.	Part Number	Value
Foreign	5731-14530-00	T4.0A, 250V
Domestic	5731-14046-00	T5.0A, 250V

MAINTENANCE INFORMATION

LUBRICATION

The two main lubrication points of the Ball Release mechanism are the pivots for the arm. The mechanisms of other playfield devices are somewhat similar to the Ball Release device, 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 the Drop Targets. MBI Instrument Grease, also known as Drop Target Switch Lubricant, with a Williams' part number of E1165, 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. The switch should close when the flipper is energized. All E.O.S. 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 NOT REPLACE these switches with the old style tungsten high current type switches as intermittent operation could occur. **Note:** Unlike the old style of flipper, an E.O.S. switch failure does not harm the flipper. The game notifies the operator of the switch being mis-adjusted in the test report, but continues to play. The E.O.S. switches are a means by which the new electronic flippers feel and play with all of the subtleties of the old flippers.

CLEANING

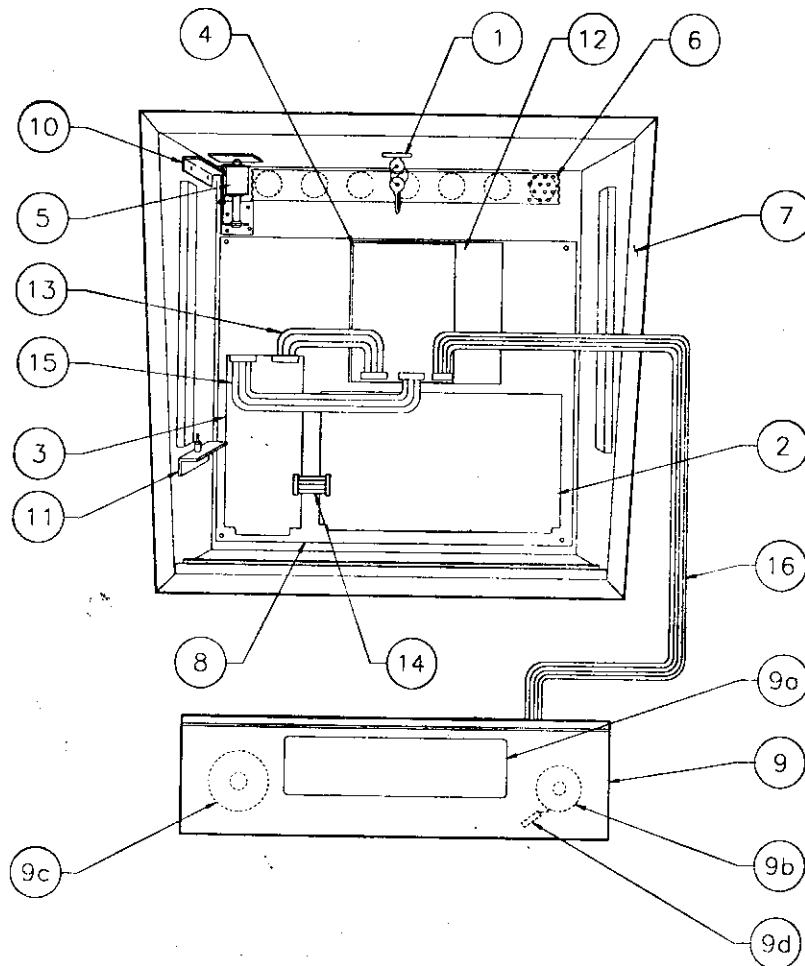
Good game action and extended playfield life are the results of regular playfield cleaning. During each collection stop, the playfield glass should be removed and thoroughly cleaned and the playfield should be wiped off with a clean, lint-free cloth. The game balls should be cleaned and inspected for 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.

SECTION TWO

PARTS INFORMATION

50052-BB Backbox Assembly



Ribbon Cables:

Item	Part Number	Description
1	A-13379	Lock & Plate Assembly
a)	20-9637	Lock & Cam Kit
2	A-20028	WPC95 Power Driver PCB
3	A-21377-50052	WPC95 CPU/Flipper PCB Ass'y
4	A-20516-50052	WPC95 Audio Visual PCB Ass'y
5	B-10686-1	Knocker Assembly
6	01-6645	Vent Screen
7	04-10450-50052	Wood Backbox
8	A-14092-7	Mounting Plate Assembly
9	A-20797	Speaker/Display Assembly
a)	5901-12784-00	Dot Matrix Display/Driver Board
b)	5555-12924-00	Tweeter, 4Ω, 15w
c)	5555-12856-00	Speaker, 5-1/4", 4 Ω, 25w
d)	5045-12914-00	Capacitor, 10mfd, 50v, +/-20%
10	A-12497	Insert Hinge Assy., Upper
11	A-12498	Insert Hinge Assy., Lower
12	01-14480	Audio Visual Shield

Item	Part Number	Description
13	5795-12653-15	Ribbon Cable, 34-Pin, 2 Conn.
14	5795-12653-03	Ribbon Cable, 34-Pin, 3"
15	5795-10938-19	Ribbon Cable, 26-Pin, 2 Conn.
16	5795-13434-25	Ribbon Cable, 14 Pin w/Ferrite

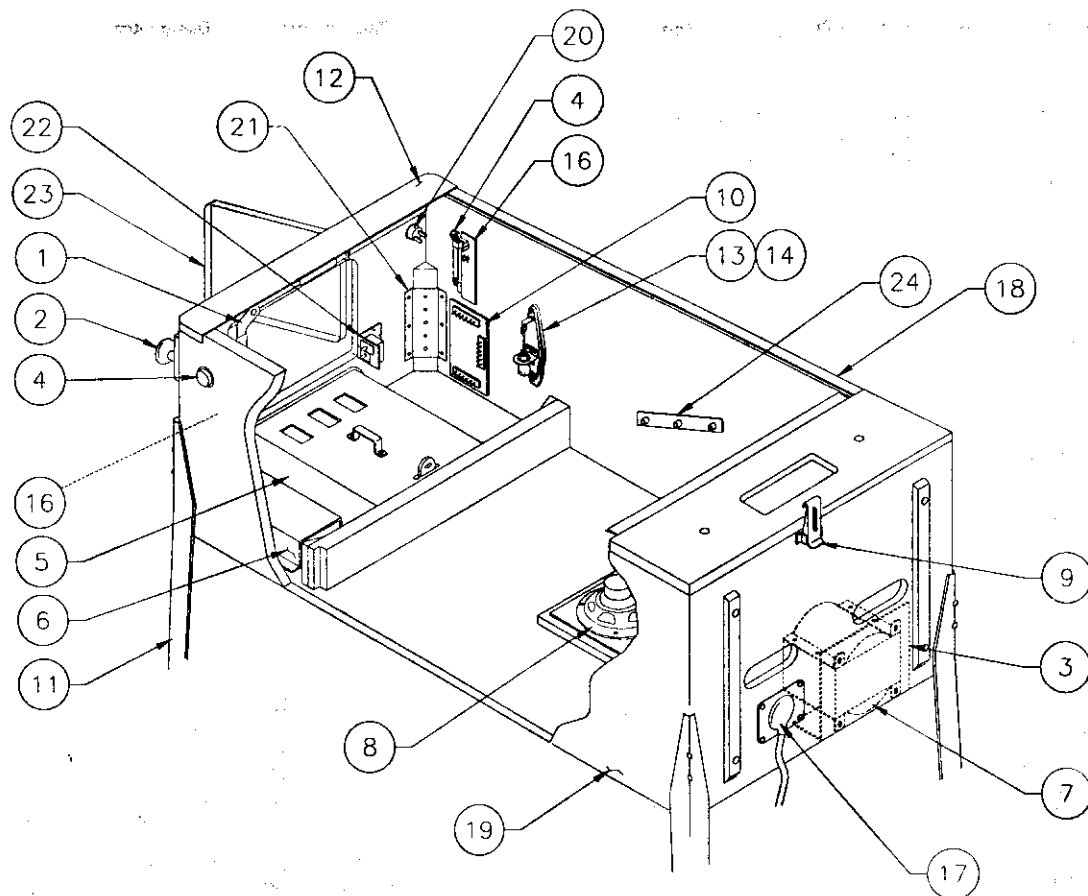
Miscellaneous:

08-7456	Backbox Glass, 27 x 18-7/8"
31-1357-50052	Screened Translite

Cables:

H-20843.1	Speaker Panel Ground Cable
H-16884.1	Speaker Cable
H-11835	Knocker Cable
H-20477	Logic Power Cable
H-20478	Secondary Cable
H-20479	Dot Matrix Power Cable

50052-CAB Cabinet Assembly



Item	Part Number	Description	Part Number	Description
1	A-16773-1	Lever Guide Assembly	A-17195	Tilt Switch Assy. w/Cable
2	B-12445-7	Ball Shooter Assembly	A-19562.1	Stay Arm Assembly
3	01-13936	Drip Plate - Narrow	01-12352	Clip Bracket
4	A-16883-5	Flipper Button w/Spring (2)	01-9011.1-L	Backbox Mtg. Bracket, Left
5	A-20729-5	4-Ball Cashbox Assembly	01-9011.1-R	Backbox Mtg. Bracket, Right
6	A-20871	Power Interface Assy.	01-6389-1	Cashbox Lock Bracket
7	5610-14515-00	WPC Transformer	08-7028-T	Playfield Glass
8	5555-12929-00	Speaker, 4Ω, 6", 25w	08-7377	Leg Leveler Adjuster, 3"
9	20-9347	Toggle Latch	20-6500	Steel Ball, 1-1/16" (6)
10	A-20580	Coin Door Interface Board	01-3535	Rod Mounting Plate
11	A-19514	Leg Assembly, Chrome (4)		
12	D-12615	Front Molding Assembly		
13	20-6502-A	Plumb Bob		
14	04-10346	Tilt Mechanism Assembly		
15	*	Cordset		
16	A-17316	Opto Flipper Assembly (2)		
17	01-10714	Line Cord Cover		
18	A-12359-3	Side Molding Assembly (2)		
19	11-1337	Wood Cabinet		
20	20-9663-16	Push Button w/Sw., Start (Yellow)		
21	01-11400	Leg Plate (4)		
22	A-18249-3	Cable & Interlock Switch Assy.		
23	09-61000-1	Coin Door-U.S.A.		
24	01-11408	Plate Spacer (2)		

Cabinet Cables:

A-20201	Cable & Jumper Assy., Coin Door
H-17217.1	Plumb/Bob Mech. Protect Cable
H-17837-2	Voltage Program Jumper Cable
H-20599-1.1	WPC '95 Cabinet Cable
H-19601-1	Power Extension Cable
H-20856	Cabinet Switch/Lamp Cable

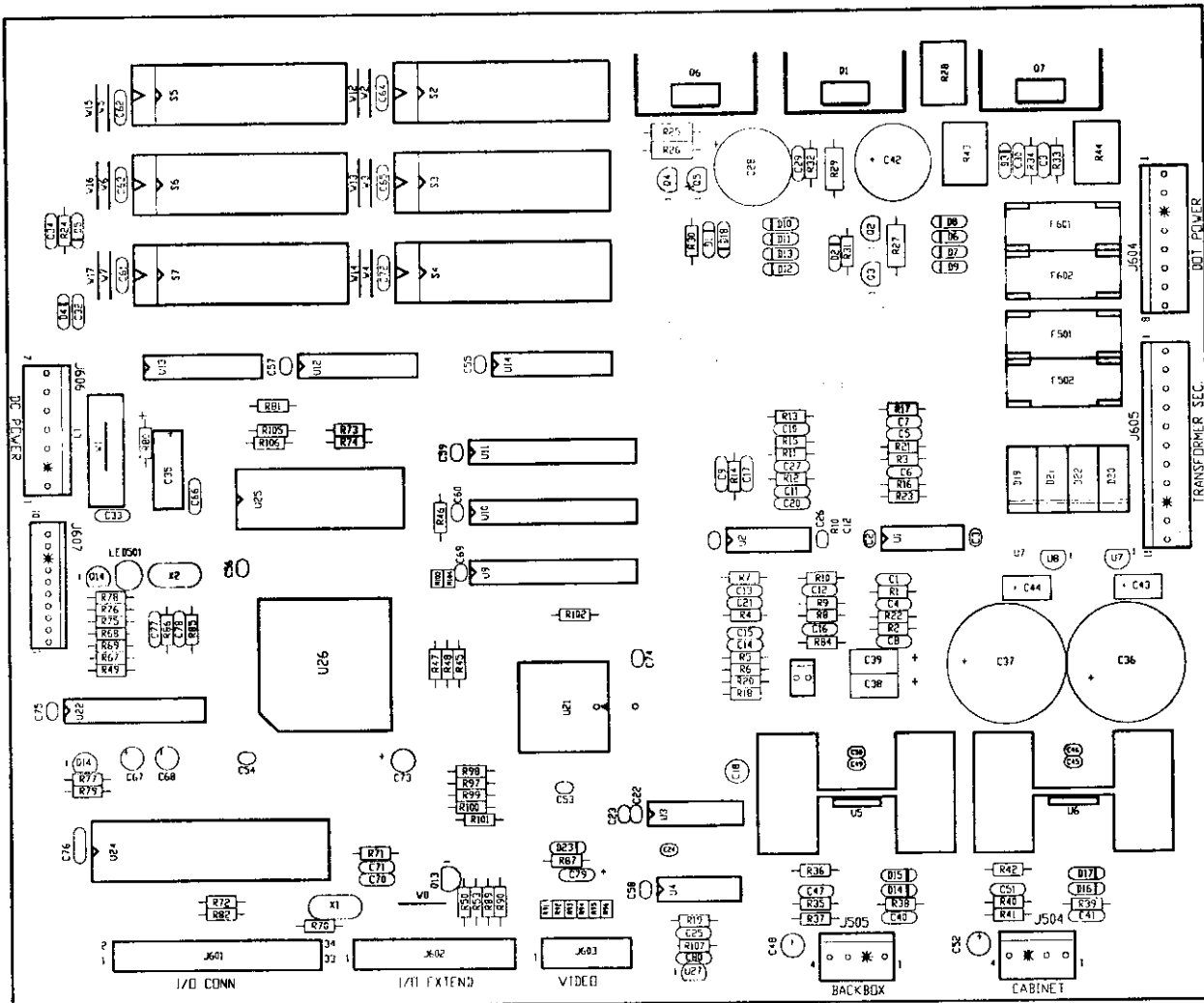
* See Application Chart p.2-27.

A-20516-50052

WPC '95 Audio Visual PCB Assembly

Part Number	Designator	Description	Part Number	Designator	Description
4004-01005-06	-	Mach. Screw, 4-40 x 3/8"	5048-13172-00	C78	Cap., 47pf, 50v, 20% Ax.
4404-01119-00	-	Nut 4-40 ESN	5048-13418-00	C4 - C6	Cap., .047m, 50v, 5% Ax.
5010-08774-00	R2, R17, R22, R23, R35, R36, R40, R42, R87	Resistor, 22K Ω , 1/4w, 5%	5048-13609-00	C9, C12, C15	Cap., 3900pf, 50v, 5% Ax.
5010-08991-00	R20, R46-R48, R50, R72, R76, R77, R80, R107	Resistor, 4.7K Ω , 1/4w, 5%	5048-13610-00	C8, C10, C11, C13, C14	Cap., 1000pf, 50v, 5% Ax.
5010-09034-00	R21	Resistor, 10K Ω , 1/4w, 5%	5048-13611-00	C16, C17, C20, C21	Cap., 680pf, 50v, 5% Ax.
5010-09036-00	R19	Resistor, 100 Ω , 1/4w, 5%	5048-14563-00	C29-C31, C81, C82	Cap., .01 μ f, 200v, 10% Axial
5010-09134-00	R32-R34	Resistor, 150K Ω , 1/4w, 5%	5070-09045-00	D19-D22	Diode MR501, 3.0A
5010-09219-00	R1, R3	Resistor, 8.2K Ω , 1/4w, 5%	5070-09054-00	D4, D6-D17, D23	Diode 1N4004, 1.0A
5010-09416-00	R73, R74, R82, R88, R105, R106	Resistor, 470 Ω , 1/4w, 5%	5075-12823-00	D1, D18	Zener, 1N4758A 55v, 1w
5010-09807-00	R30, R31, R67-R69, R102	Resistor, 120 Ω , 1/4w, 5%	5075-12824-00	D3, D5	Zener, 1N4742A 12v, 1w
5010-10171-00	R24	Resistor, 56 Ω , 1/4w, 5%	5075-12826-00	D2	Zener, 1N4759, 6.2v, 1w
5010-10258-00	R86	Resistor, 1M Ω , 1/4w, 5%	5160-08938-00	Q13-Q15	Transistor, 2N4401 NPN
5010-10983-00	R53, R75, R79, R84, R85, R89, R90	Resistor, 1.8K Ω , 1/4w, 5%	5164-09056-00	Q2, Q3	Transistor, MPSD12 NPN
5010-12832-00	R25, R26, R27, R29	Resistor, 47K Ω , 1/4w, 5%	5164-12154-00	Q1, Q7	Transistor, MJE15030 NPN
5010-13215-00	R78, R97-R101	Resistor, 200K Ω , 1/4w, 5%	5194-09055-00	Q4, Q5	Transistor, MPSD52 PNP
5010-13372-00	R91-R96, R103, R104	Resistor, 220 Ω , 1/8w, 5%	5194-12155-00	Q6	Transistor, MJE15031 PNP
5010-13420-00	R37, R41	Resistor, 680 Ω , 1/4w, 5%	5250-13302-00	U7	Reg. 78L05T 5v
5010-13517-00	R38, R39	Resistor, 15 Ω , 1/4w, 5%	5250-13303-00	U8	Reg. 79L05T 5v
5010-13607-00	R4, R5, R7-R15	Resistor, 6.19K Ω , 1/8w, 1%	5311-12538-00	U4	IC 74HC14 Hex. S-T
5012-14558-00	R44	Resistor, 1.8K Ω , 5w vertical	5317-12211-00	U12-U14	IC Octal Buffer 74ALS541
5012-14559-00	R43	Resistor, 4.7K Ω , 5w vertical	5340-12278-00	U25	S/Ram 2064 150NS
5012-14560-00	R28	Resistor, 120 Ω , 5w vertical	5370-12687-00	U27	IC MC 340640Reset Chp
5013-13661-00	R16	Resistor, 9.09K Ω , 1/4w, 1%	5349-14351-00	U9-U11	IC Op Amp TL084
5013-14456-00	R6, R18	Resistor, 3.32K Ω , 1/4w, 1%	5370-12730-00	U1, U2	IC TDA 2030AV 18w, Audio A
5040-14569-00	C35	Cap., 100mf, 25v, Axial	5370-13419-00	U5, U6	IC Ad-1851 16bit mono
5040-09365-00	C38, C39, C43, C44	Cap., 1m, 63v(+50,-10%)Ax.	5371-13299-00	U3	IC Ad-1851 16bit mono
5040-12750-00	C48, C52, C73	Cap., 22m, 35v Radial	5520-14561-00	X2	Crystal 20mHz, parallel 20pf
5040-13098-00	C18, C67, C68	Cap., 4.7 μ , 35v ($\pm$ 20%)	5671-14516-00	LED 501	Led-Display Red T 1-3/4
5040-13417-00	C36, C37	Cap., 10000 μ f, 35v Radial	5700-08985-00	U24	Socket IC 40-pin .6
5040-14564-00	C28, C42	Cap., 150 μ f, 160v, 20%Rad.	5700-12047-00	U22	Socket IC 24.3P
5043-08996-00	C2, C3, C19, C22- C24, C26, C32, C34, C45, C46, C49, C50, C53-C66, C69, C72, C74-C76, C79, C80	Cap., 0.1 μ f, 50v ($\pm$ 20%) Ax.	5700-12088-00	S2-S7	Socket Dip 32.6P*
5043-10267-00	C47, C51	Cap., 150pf, 100v Cer. Ax.	5705-12638-00	U5, U6	Heatsink 5298B
5048-10992-00	C27	Cap., .0047m, 50v, 10% Ax.	5705-14562-00	Q1, Q6, Q7	Heatsink 10-220 wave sol 28
5048-11028-00	C77	Cap., 22p, 50v, Axial	5733-14528-00	F501, F502, F601, F602	Fuse Holder 5x20mm 10A.
5048-11029-00	C25	Cap., 100p, 50v, 5% Axial	5731-14532-00	F501, F502	Fuse 5x20mm T2.5A., 250V
5048-11030-00	C7	Cap., 470p, 50v, Axial	5731-14840-00	F601, F602	Fuse 5x20mm T0.315A., 250
5048-11033-00	C1	Cap., .022m, 50v, 10% Ax.	5791-10850-00	J602	Connector, 26-pin Header Str.
5048-12036-00	C40, C41	Cap., .22m, 50v, Axial	5791-10862-04	J504, J505	Connector, 4-pin Header Str.
			5791-10862-07	J606	Connector, 7-pin Header Str.
			5791-10862-08	J604	Connector, 8-pin Header Str.
			5791-10862-11	J605	Connector, 11-pin Header Str.
			5791-12516-00	J601	Connector, 34 hdr 2 x 17 .100
			5791-12827-00	J603	Connector, 14 Hen 7x2 Str.
			5791-13830-10	J607	Connector, 10-pin Str. Sq.
			5010-09534-00	W0, W1, W12-W17, R49	Resistor, 0 Ω , 0w
			A-5343-50052-S2	S2	E-PROM Assembly
			A-5343-50052-S3	S3	E-PROM Assembly
			A-5343-50052-S4	S4	E-PROM Assembly

A-20516-50052 **WPC '95 Audio Visual PCB Assembly**



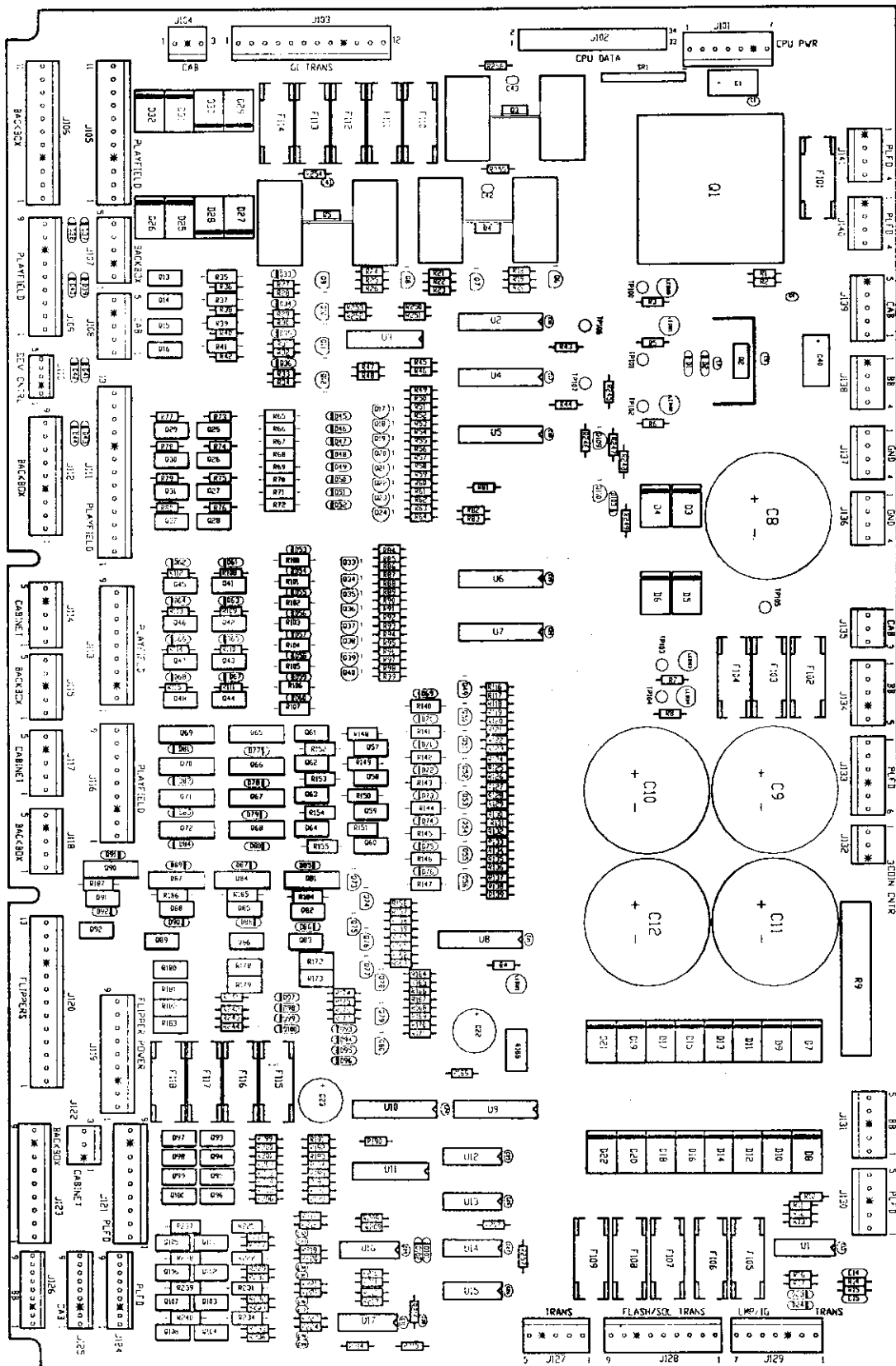
A-20028

WPC '95 Power Driver PCB Assembly

Part Number	Designator	Description	Part Number	Designator	Description
5040-14569-00	C1, C40	Capacitor, 100µF, 25v, Ax.	5010-09999-00	R3, R4, R6-R8, R43, R44, R81-R83, R190	Resistor, 2KΩ, 1/4w, 5%
5043-08996-00	C2, C4, C5, C7, C13, C16-C21, C24-C39, C41-C43	Capacitor, 0.1m, 50v (±20%) Ax.	5010-09224-00	R5, R14 - R17	Resistor, 270Ω, 1/4w, 5%
5040-13417-00	C8 - C12	Capacitor, 10000µf, 35v Radial	5012-12632-00	R9	Resistor, 12Ω, 10w, 5%
5048-11031-00	C14, C15	Capacitor, .001m, 50v, 10% Ax.	5010-09324-00	R10	Resistor, 27KΩ, 1/4w, 5%
5040-09537-00	C22, C23	Capacitor, 100µ, 100v (±20%) Radial	5010-09358-00	R11, R157, R159, R161, R163, R165, R167, R169, R171, R216-R224	Resistor, 1KΩ, 1/4w, 5%
5070-09054-00	D1, D2, D23, D24, D33 - D100, D103	Diode 1N4004 1.0A.	5010-09036-00	R247	Resistor, 100Ω, 1/4w, 5%
5070-14526-00	D3-D22, D25-D32	Diode P600G 6A 400 PIV	5010-09034-00	R12, R13, R189, R208-R215, R248	Resistor, 10KΩ, 1/4w, 5%
5070-08919-00	D101, D102	Diode, 1N4148 150mA.	5010-08992-00	R18, R21, R24, R192, R194, R196, R198, R200, R202, R204, R206	Resistor, 560Ω, 1/4w, 5%
5731-14531-00	F101	Fuse 5 x 20mm T.63A., 250V	5010-08991-00	R19, R22, R25, R28, R30, R32, R34, R50, R52, R54, R56, R58, R60, R62, R64, R84, R86, R88, R90, R92, R94, R96, R98, R116, R119, R122, R125, R128, R131, R134, R137, R246	Resistor, 4.7KΩ, 1/4w, 5%
5731-14530-00	F102-F105, F107, F109-F118	Fuse 5 x 20mm T 4A, 250V	5010-11079-00	R20, R23, R26, R254-R256	Resistor, 51Ω, 1/4w, 5%
5731-14046-00	F106	Fuse S-B, 5A, 5x20mm	5010-09416-00	R27, R29, R31, R33, R45-R49, R51, R53, R55, R57, R59, R61, R63, R85, R87, R89, R91, R93, R95, R97, R99, R117, R120, R123, R126, R129, R132, R135, R138, R156, R158, R160, R162, R164, R166, R168, R170, R245, R250-R253, R257	Resistor, 470Ω, 1/4w, 5%
5731-14529-00	F108	Fuse 5 x 20mm T 6.3A, 250V	5010-08993-00	R35, R37, R39, R41, R65-R72, R100-R107, R140-R147	Resistor, 68Ω, 1/4w, 5%
5733-14528-00	F101-F118	Fuse Holder 5 x 20mm10A	5010-08997-00	R36, R38, R40, R42, R73-R80, R108, R109, R110-R115, R118, R121, R124, R127, R130, R133, R136, R139	Resistor, 2.7kΩ, 1/4w, 5%
5705-14724-00	Q1	Heat Sink TO-3 5.1DEG/W	5010-09361-00	R148-R155, R184-R187	Resistor, 220Ω, 1/4w, 5%
5701-09652-00	Q1	Thermal Pad TO-3	5011-12956-00	R172, R173, R178-R183	Resistor, 2.7KΩ, 1/4w, 5%
4406-01128-00	Q1	Nut 6-32 KEPS	5010-10171-00	R174-R177, R241-R244	Resistor, 56Ω, 1/4w, 5%
4006-01005-06	Q1	Mach. Screw, 6-32 x 3/8"	5010-14711-00	R188	Resistor, 10KΩ, 1/4w, 5%
5705-14562-00	Q2	Heat Sink 10-220 Wave Sol 287	5010-09314-00	R191, R193, R195, R197, R199, R201, R203, R205	Resistor, 1.2kΩ, 1/4w, 5%
4004-01005-06	Q2-Q5	Mach. Screw, 4-40 x 3/8"	5010-09086-00	R207	Resistor, 6.8kΩ, 1/4w, 5%
4404-01119-00	Q2-Q5	Nut 4-40 ESN	5010-12427-00	R225, R228, R231, R234, R237-R240	Resistor, .22kΩ, 1/4w, 5%
5705-12638-00	Q3-Q5	Heat Sink 5298B	5010-08998-00	R226, R227, R229, R230, R232, R233, R235, R236	Resistor, 2.2kΩ, 1/4w, 5%
5791-10862-07	J101, J129	Connector, 7-pin Header Str.	5010-13517-00	R249	Resistor, 150Ω, 1/4w, 5%
5791-12516-00	J102	Connector, 34 Hdr 2x17	5019-10143-00	SRI	SIP RES 47C x 9R
5791-10862-12	J103	Connector, 12-pin Header Str.	5824-09248-00	TP100-TP107	Test Point #1502-1
5791-10862-03	J104, J122, J132, J135, J105, J106	Connector, 3-pin Header Str.	5370-12272-00	U1, U16, U17	I.C. LM339 Quad Comp
5791-10862-11	J107, J108, J114, J115, J117, J118, J127, J130, J131, J134, J139	Connector, 11-pin Header Str.	5281-09486-00	U2, U4-U8, U10	I.C. 74LS374 8d/f/f
5791-10862-05	J116, J119, J121, J123, J128, J111, J120	Connector, 5-pin Header Str.	5162-12422-00	U3, U11	Trans uln 2803 Oc-dr
5791-10862-09	J124-J126	Connector, 9-pin Header Str.	5281-10182-00	U9	I.C. 74LS240 1/dnvr
5791-10862-13	J133	Connector, 13-pin Header Str.	5281-09487-00	U12 - U15	I.C. 74LS74 Dual d f/f
5791-13830-09	J136-J138, J140, J141	Connector, 9-pin Header Str.	5791-13830-05	J110	Connector 5-pin Header
5791-10862-06	LED100-LED105	Connector, 6-pin Header Str.			
5791-10862-04	Q1	Connector, 4-pin Header Str.			
5671-14516-00	Q2	LED Dspl Red T-1			
5250-14527-00	Q2	Regulator Voltage LM317K			
5460-12423-00	Q3-Q5	I.C. LM7812			
5131-12725-00	Q6-Q12, Q17-Q24,	Triac BT138E			
5194-09055-00	Q33-Q40, Q49-Q56, Q109	Transistor, MPSD52 PNP			
5162-12635-00	Q13-Q16, Q25-Q32, Q41-Q48, Q57-Q64, Q82, Q83, Q85, Q86, Q88, Q89, Q91, Q92, Q101-Q108	Transistor, TIP102			
5191-12179-00	Q65-Q72, Q81, Q84, Q87, Q90	Transistor, TIP36C			
5190-09016-00	Q73 - Q80	Transistor, 2N4403 PNP			
5192-12428-00	Q93 - Q100	Transistor, TIP107			
5160-10269-00	Q110	Transistor, 2N3904			
5013-14535-00	R1	Resistor, 750Ω, 1/4w, 1%			
5013-14534-00	R2	Resistor, 243Ω, 1/4w, 1%			

A-20028

WPC '95 Power Driver PCB Assembly

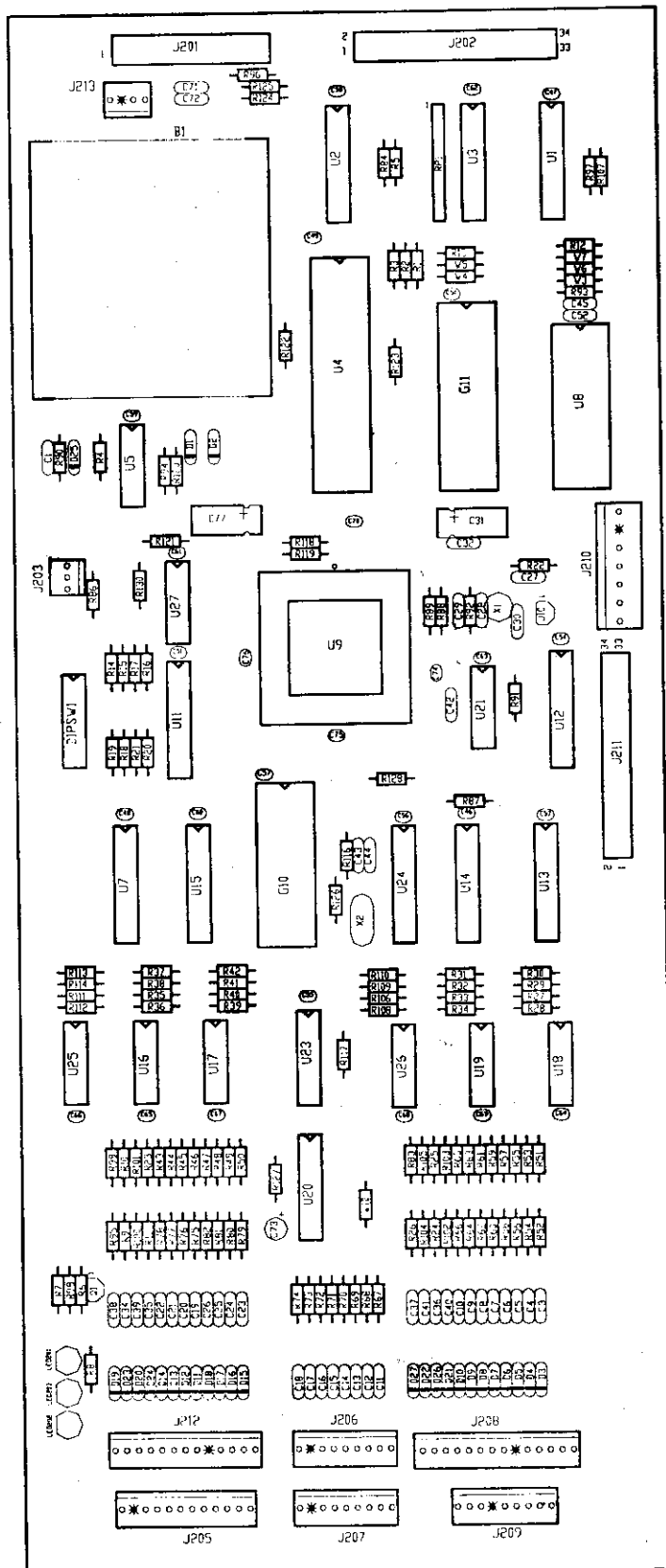


A-21377-50052

WPC '95 CPU PCB Assembly

Part Number	Designator	Description
A-15814	B1	Battery Holder
5048-11033-00	C1, C42	Capacitor, .022m, 50v, 10% Axial
5048-11030-00	C3-C26, C34-C41	Capacitor, 470p, 50v, Axial
5043-09030-00	C27	Capacitor, .047m, 50v (±20%) Axial
5048-13375-00	C28	Capacitor, 100p, 50v (10%) Axial
5048-11028-00	C29, C30, C34, C44	Capacitor, 22p, 50v Axial
5040-14569-00	C31, C77	Capacitor, 100mf, 25v Axial
5048-11031-00	C32	Capacitor, .001m, 50v, 10% Axial
5043-08996-00	C45-C70, C74-C76	Capacitor, 0.1m, 50v (±20%) Axial
5040-13098-00	C73	Capacitor, 4.7µF, @35v (±20%)
5645-09025-00	DIPSW1	Switch Dip 8 Pos
5070-09266-00	D1, D25	Diode 1N5817 1.0A
5070-08919-00	D2-D24, D26, D27	Diode 1N4148 150ma
5700-10176-00	G10A	Socket Dip 28.6
5700-12088-00	G11	Socket Dip 32.6p"
5700-08985-00	U4	Socket I C 40PI N .6
5700-12424-00	U9	socket 84 PI N PL CC
5700-10389-00	U20	Socket I C 18 PIN 3"
5791-10850-00	J201	26H STR SQ .100
5791-12516-00	J211, J202	34 HDR 2x17 .100
5791-13830-12	J205	12H STR SQ PIN .100 Solid Tab
5791-13830-09	J206, J207, J209	9H STR SQ PIN .100 Solid Tab
5791-13830-14	J208	14H STR SQ PIN .100 Solid Tab
5791-10862-07	J210	7H STR SQ PIN .156
5791-13830-13	J212	13H STR SQ PIN .100 Solid Tab
5671-14516-00	LED201, LED202, LED203	LED DSPL RED T-1 3/4
5160-10269-00	Q1	Trans 2N3904 PNP
5019-09669-00	RP1	SIP 1K 9R 10 5%
5010-09358-00	R1, R2, R3, R4, R9, R10, R11, R23, R24, R25, R26, R43, R44, R45, R46, R47, R48, R49, R50, R51, R52, R53, R54, R55, R56, R57, R58, R59, R60, R61, R62, R63, R64, R65, R66, R67, R68, R69, R70, R71, R72, R73, R74, R75, R76, R77, R78, R79, R80, R81, R82, R83, R84, R93, R95, R96, R97, R99, R100, R101, R102, R103, R104, R105, R106, R107, R108, R109, R110, R111, R112, R113, R114, R117	RES 1K 1/4w 5%
5010-09416-00	R5, R6, R7, R8, R12, R13, R87, R88, R89	RES 470 1/4w 5%
5010-09034-00	R14, R15, R16, R17, R18, R19, R20, R21, R22, R27, R28, R29, R30, R31, R32, R33, R34, R35, R36, R37, R38, R39, R40, R41, R42, R86, R90, R94, R98	RES 10K 1/4w 5%
5010-12104-00	R91	RES 22M 1/4w 5%
5010-10989-00	R92	RES 470K 1/4w 5%
5010-09187-00	R118, RR119, R120, R121, R122, R123, R128, R130	RES 150 1/4w 5%
5010-09534-00	W3, W4, W7, R124, R125	RES 0.0w
5010-10258-00	R126	RES 1M 1/4w 5%
5010-09040-00	R127	RES 33 1/4w 5%
5281-09867-00	U1, U2	I C 74LS244 OCT BUF
5281-09308-00	U3	I C 74LS245 TRNC
5281-09851-00	U5	I C 74LS14 SMT/TRG
5315-12031-00	U7	I C 74HCT244
5340-13062-00	U8	I C RAM 32K x8 Static Cmos 100ns
5370-12687-00	U10	I C MC 34064 Reset CHP
5281-10182-00	U11, U12, U13, U15	I C 74LS240 L/DRVR
5311-14068-00	U14, U24	I C 74HC574 OCTAL D-L atch
5370-12272-00	U16, U17, U18, U19, U25, U26	I C LM339 Quad Comp
5284-12651-00	U21	I C 4584 Hex Schmitt
5311-14554-00	U23	U I C 74HC237 3 to 8 NON I NV DE
5281-09247-00	U27	I C 74LS02 Quad Nor
5520-12084-00	X1	Crystal 32.768 KHZ
5520-14761-00	X2	XTL 8MHz Anti-Res Parallel Cut

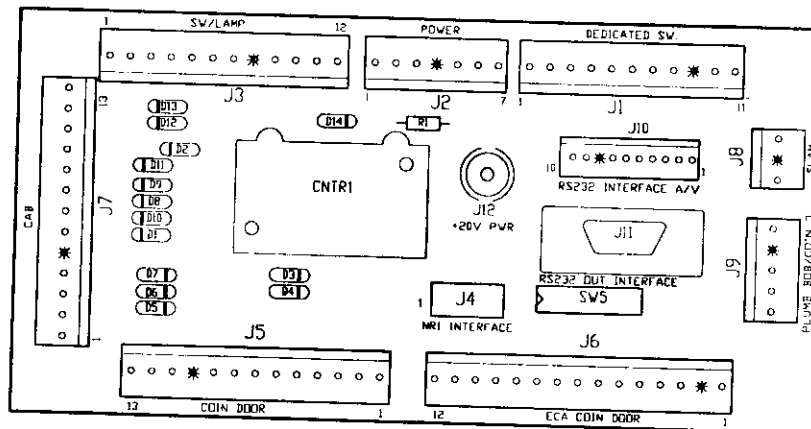
A-21377-50052 WPC '95 CPU PCB Assembly



A-20580

Coin Interface PCB Assembly

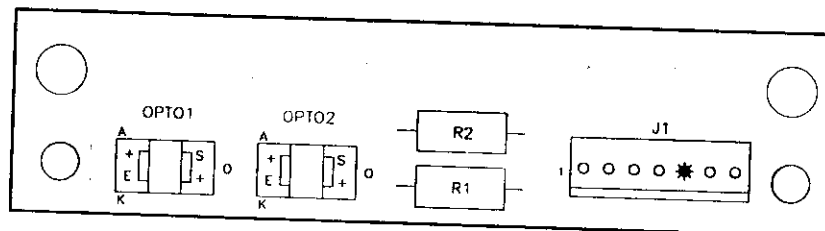
(This board does not contain optional items such as the coin counter and printer interface.)



Part Number	Designator	Description
5070-09054-00	D1-D14	Diode 1N4004 1.0A.
5791-10862-11	J1	Connector, 11-pin Header Str. Sq.
5791-10862-07	J2	Connector, 7-pin Header Str. Sq.
5791-10862-12	J3	Connector, 12-pin Header Str. Sq.
5791-11000-10	J4	Connector, 10-pin Header Str. Sq.
5791-10862-13	J5, J7	Connector, 13-pin Header Str. Sq.
5791-10862-15	J6	Connector, 15-pin Header Str. Sq.
5791-10862-03	J8	Connector, 3-pin Header Str. Sq.
5791-10862-05	J9	Connector, 5-pin Header Str. Sq.
5791-12462-10	J10	Connector, 10-pin Header Str. Sq.
5010-13517-00	R1	Resistor, 15Ω, 1/4w, 5%
5645-09025-00	SW5	Switch DIP 8 Pos.

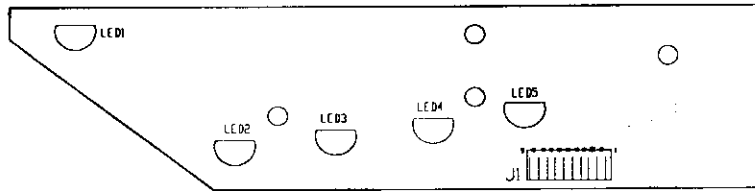
A-17316

Flipper Opto PCB Assembly



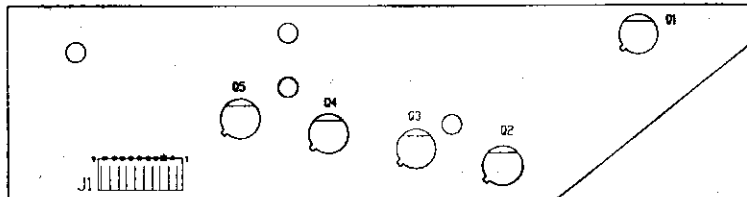
Part Number	Designator	Description
A-20207.1	-	Flipper Opto Switch PCB
5010-09061-00	R1, R2	Resistor, 680Ω, 1/2w, 5%
5490-14575-00	OPTO1, OPTO2	IC Opto Integ Schmitt 10mA.
5791-13830-07	J1	Connector, 7-pin Header Solid Sq.
03-9001.1	-	Interrupter Flip-Opto
01-14348	-	Flipper Switch Spring

A-18617-1 Trough IR LED PCB Assembly



Part Number	Designator	Description
5671-12731-00	LED1 - LED5	Infra Red Diode
5791-12622-09	J1	Connector, 9-pin Header Sq.

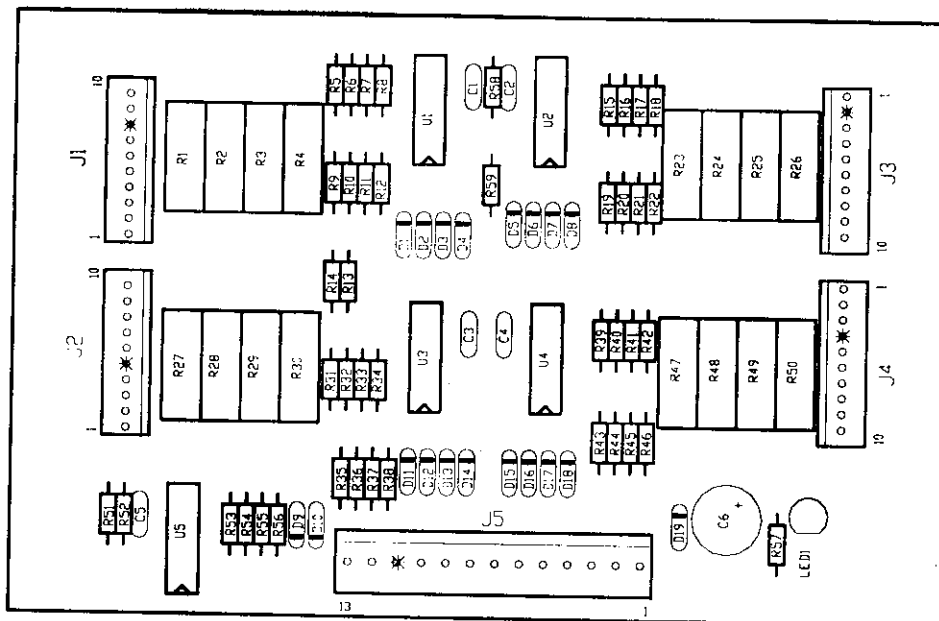
A-18618-1 Trough IR Photo Transistor PCB Assembly



Part Number	Designator	Description
5671-14114-00	Q1 - Q5	Infra Red Photo Transistor
5791-12622-09	J1	Connector, 9-pin Header Sq.

A-16998.2

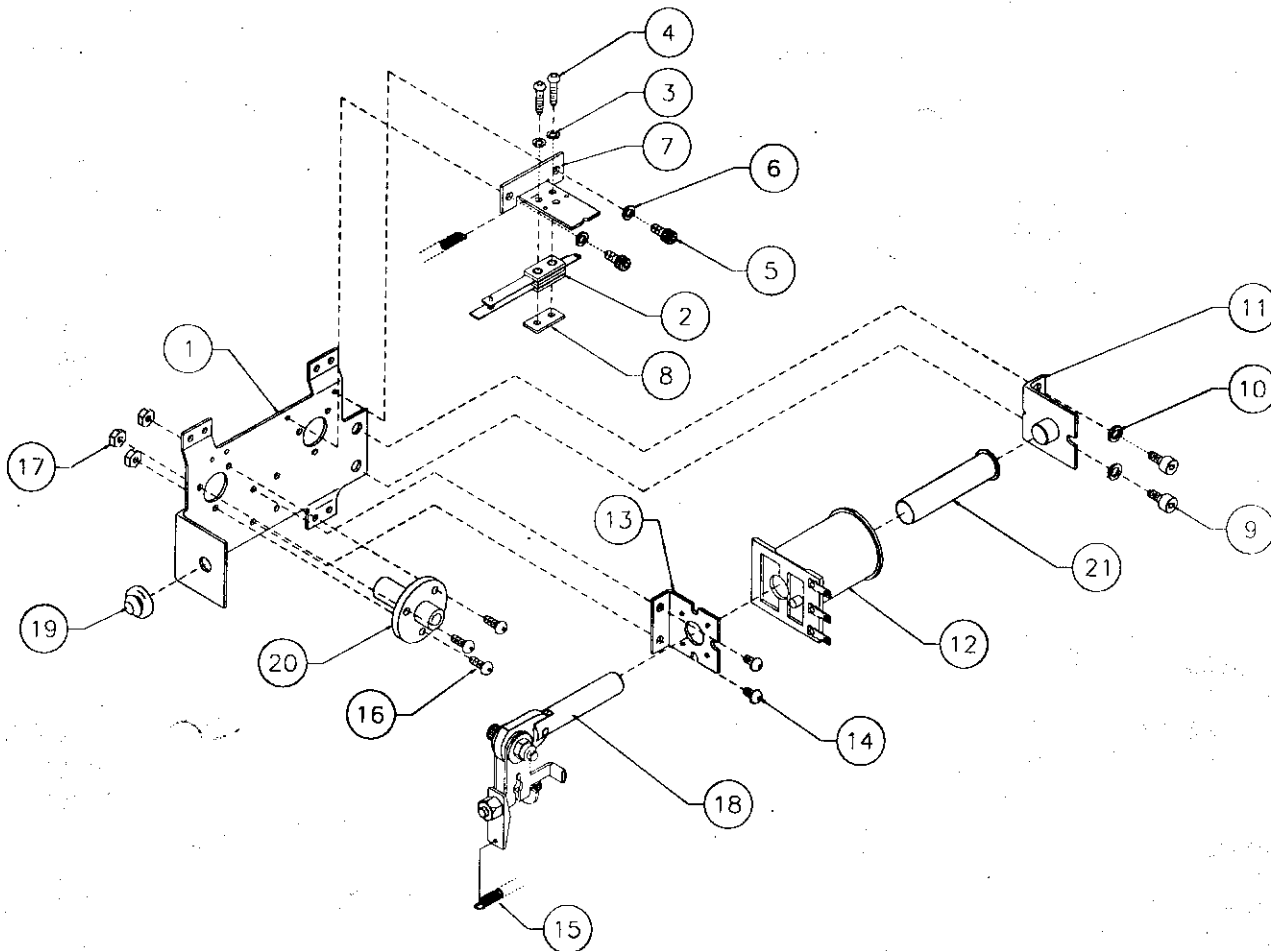
16-Opto PCB Assembly



Part Number	Designator	Description
5043-08996-00	C1 - C5	Cap., 0.1m, 50v ($\pm 20\%$) Ax.
5040-13102-00	C6	Cap., 470 μ f, @35v ($\pm 20\%$)
5070-09054-00	D1 - D19	Diode 1N4004 1.0A.
5791-13830-10	J1 - J4	Connector, 10-pin Header
5791-10862-13	J5	Connector, 13-pin Header
5671-14516-00	LED1	LED Display Red T-1 $\frac{3}{4}$
5010-12928-00	R1-R4, R23-R30, R47-R50	Resistor, 270 Ω , 2w, 5%
5010-09999-00	R5-R12, R15-R22, R31-R46, R57	Resistor, 2K Ω , $\frac{1}{4}$ w, 5%
5010-08774-00	R13, R14, R51, R53, R55	Resistor, 22K Ω , $\frac{1}{4}$ w, 5%
5010-09162-00	R52, R54, R56, R58, R59	Resistor, 100K Ω , $\frac{1}{4}$ w, 5%
5370-12272-00	U1 - U5	IC LM339 Quad Comp

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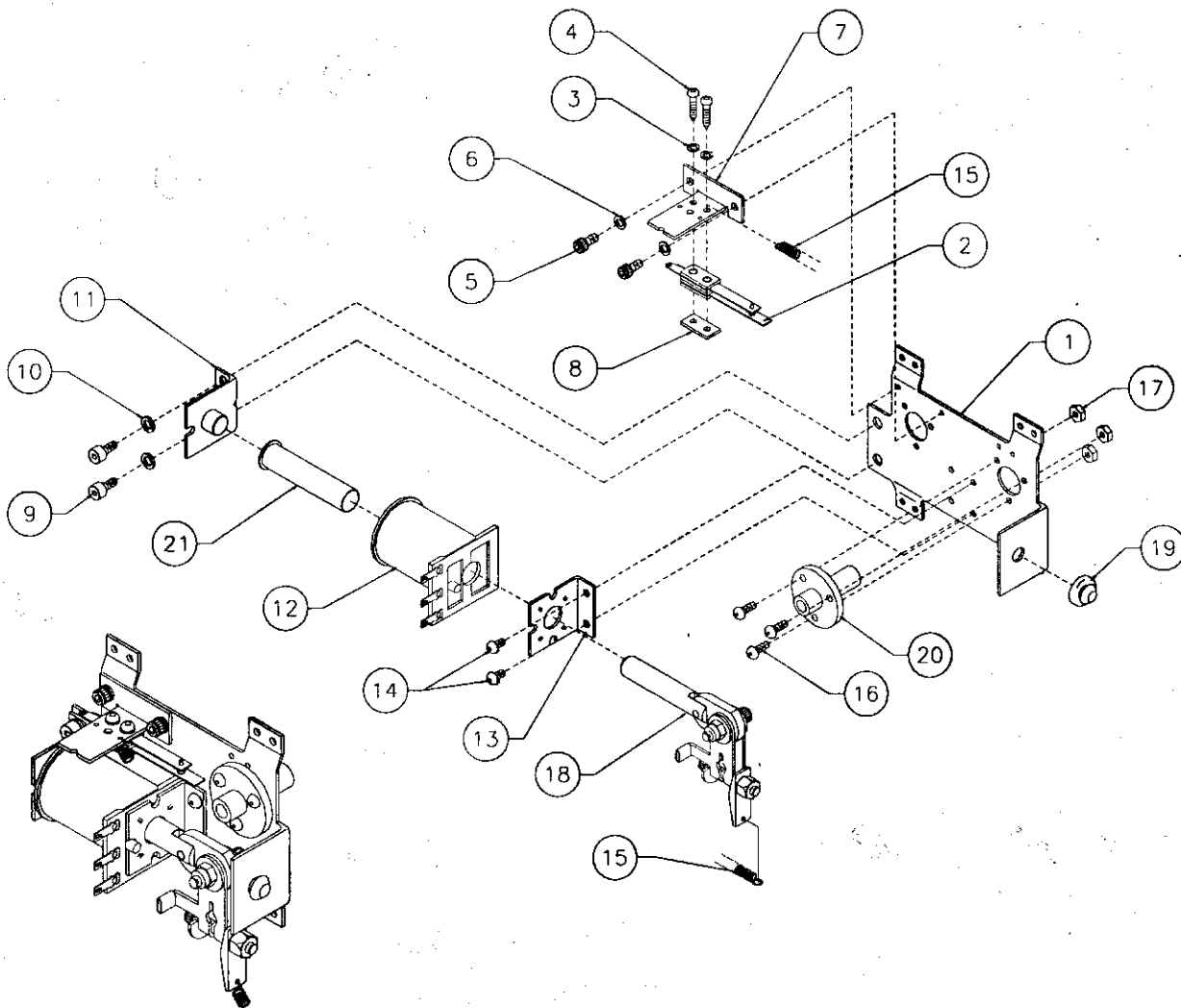
Flipper Assembly

[illegible]

Flipper Notes...

1. Each Flipper Assembly is mounted beneath the playfield, in conjunction with the Plastic Flipper & Shaft, and Flipper Rubber on the upper side of the playfield.
2. With the flipper, in the non-activated position, the E.O.S. Switch contacts must have a gap of .062 ($\pm .015$) inch. When flipper is activated switch must close.
3. Any adjustment of the E.O.S. switch must be made at a minimum distance of 0.25 inch from the switch body.
4. Longer blade of E.O.S. switch must be made straight. Gap adjustment is done by adjusting shorter blade.
5. All moving elements of the assembly must operate freely without any evidence of binding.
6. Apply Loctite™ 245 when reattaching screws to the Flipper Stop Assembly, the Solenoid Bracket, and the Flipper Bushing.

A-15849-L-2 Flipper Assembly



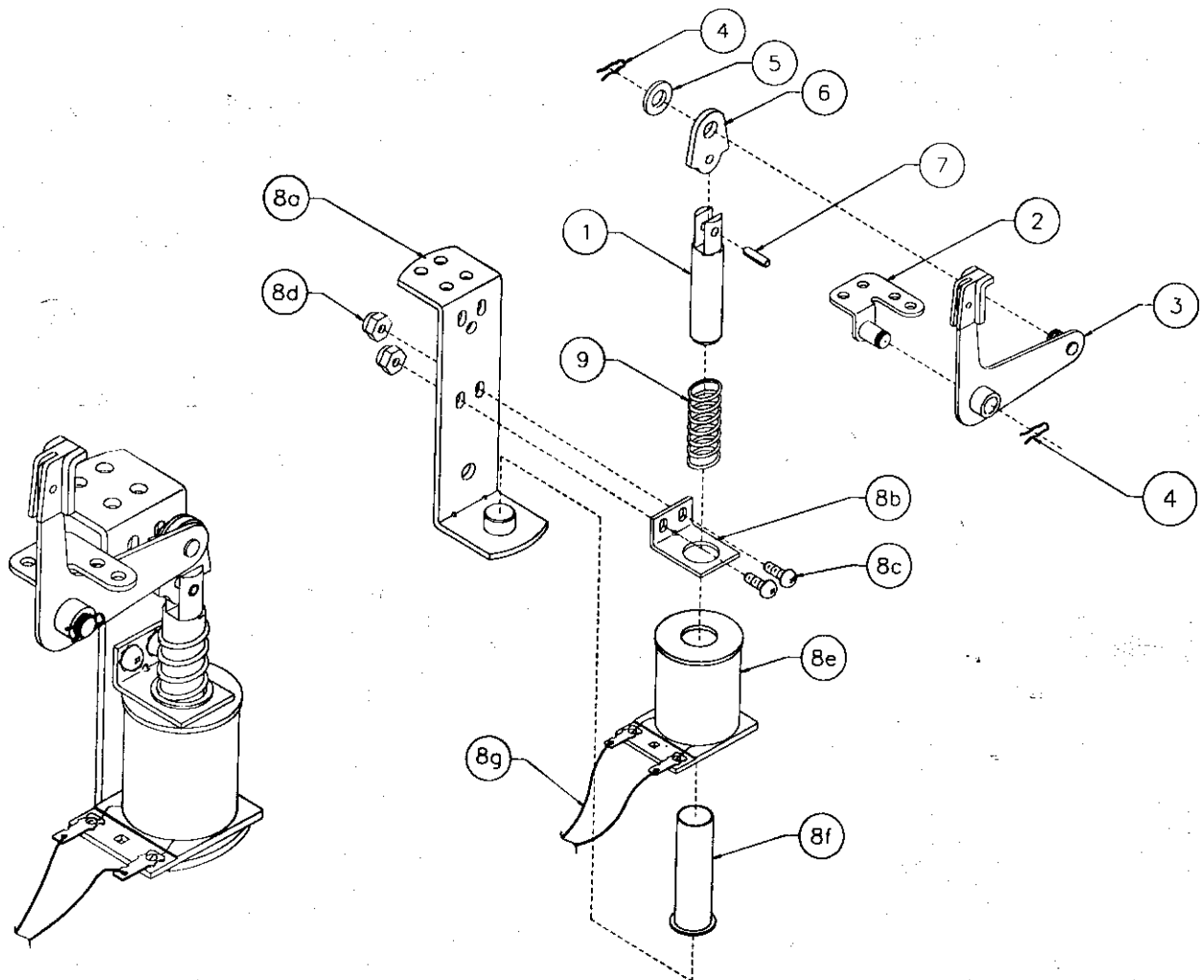
Item	Part Number	Description
1	B-13104-L	Flipper Base Assembly, Left
2	SW-1A-194	Switch Assembly
3	4701-00002-00	Lock Washer #6 Split
4	4105-01019-10	Sh. Metal Screw, #5 x 5/8"
5	4008-01079-05	Mach. Screw, 8-32 x 5/16"
6	4701-00003-00	Lock Washer #8 Split
7	01-9375	Switch Mounting Bracket
8	20-6516	Speednut, Tinnerman
9	4010-01066-06	Cap Screw, 10-32 x 3/8"
10	4701-00004-00	Lock Washer #10 Split
11	A-12390	Flipper Stop Assembly
12	FL-11629	Flipper Coil, Blue
13	01-7695-1	Solenoid Bracket
14	4006-01017-04	Mach. Screw, 6-32 x 1/4"
15	10-364	Spring
16	4006-01005-06	Mach. Screw, 6-32 x 3/8"
17	4406-01117-00	Nut 6-32 Hex.

Item	Part Number	Description
18	A-15848-L	Crank Link Assembly, Left
a)	A-17050-L	Flipper Crank Assembly, Left
b)	A-15847	Flipper Link Assembly
c)	02-4676	Link Spacer Bushing
d)	4010-01086-14	Cap Screw, 10-32 x 7/8"
e)	4700-00023-00	Flat Washer, 5/8 x 13/64 x 16ga.
f)	4701-00004-00	Lock Washer #10 Split
g)	4410-01132-00	Nut 10-32 ESN
19	23-6577	Bumper Plug, 5/8"
20	03-7568	Flipper Bushing
21	03-7066-5	Coil Tubing

Associated Parts: (Not Shown)

23-6695-	Flipper Ring
20-10110-5	Flipper Bat w/Shaft

A-17811 Kicker Arm (Slingshot) Assembly



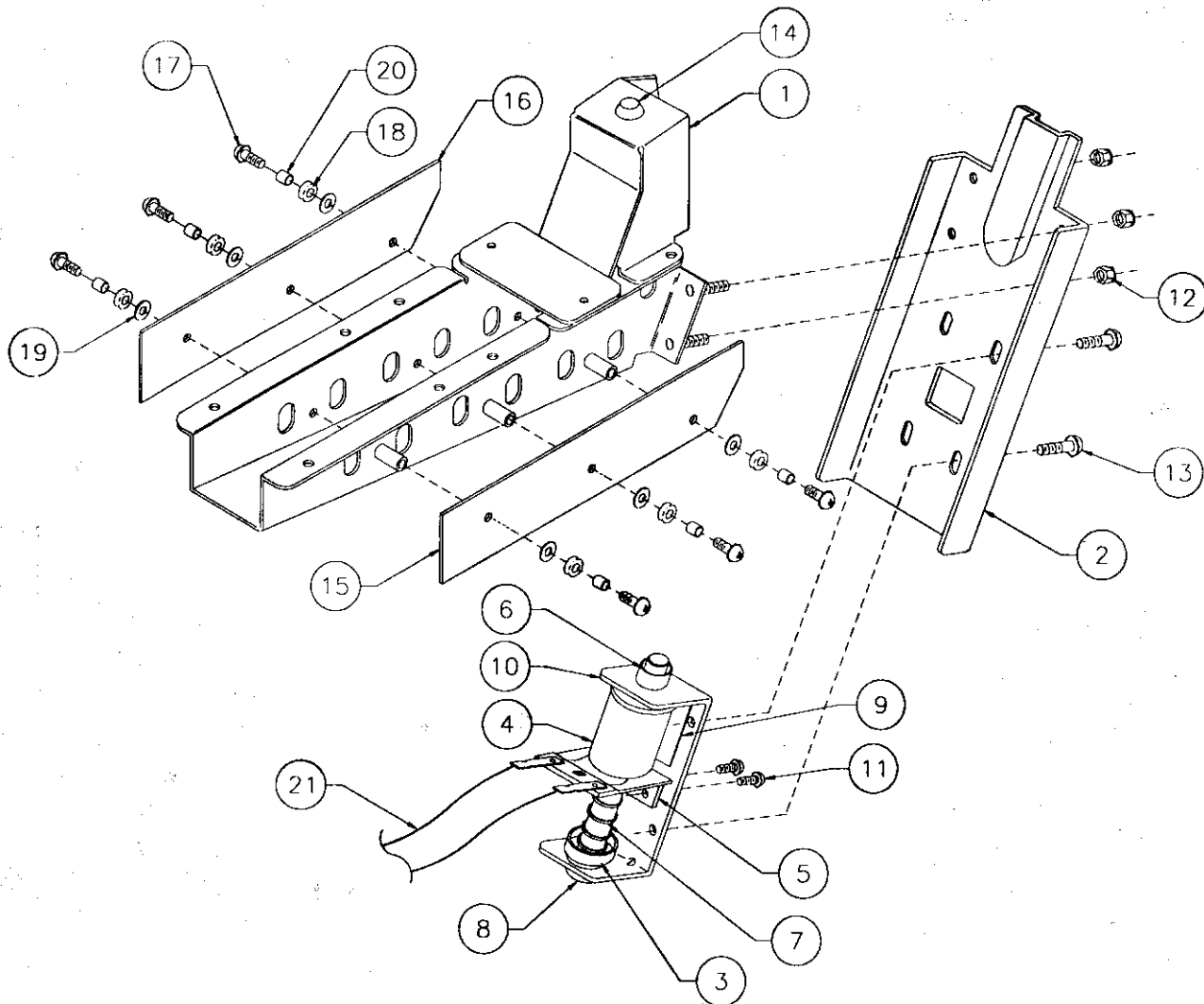
Associated Parts for Right & Left Kickers:

Item	Part Number	Description
1	02-2364	Coil Plunger
2	A-17810	Mounting Bracket Assembly
3	A-12664	Kicker Crank Assembly
4	12-6227	Hairpin Clip
5	4700-00030-00	FW, 17/64 x 1/2 x 15ga.
6	03-8085	Armature Link
7	20-8716-5	Roll Pin, 1/8 x 7/16"

Item	Part Number	Description
8	B-9362-R-3	Coil & Bracket Assembly
a)	A-17808	Bracket & Stop Assembly
b)	01-8-508-S	Coil Retaining Bracket
c)	4006-01017-06	Mach. Screw, 6-32 x 3/8"
d)	4406-01119-00	Nut, 6-32 ESN
e)	AE-26-1200	Coil Assembly
f)	03-7066	Coil Tubing
g)	H-19523	Mini Solenoid Cable
9	10-128	Spring

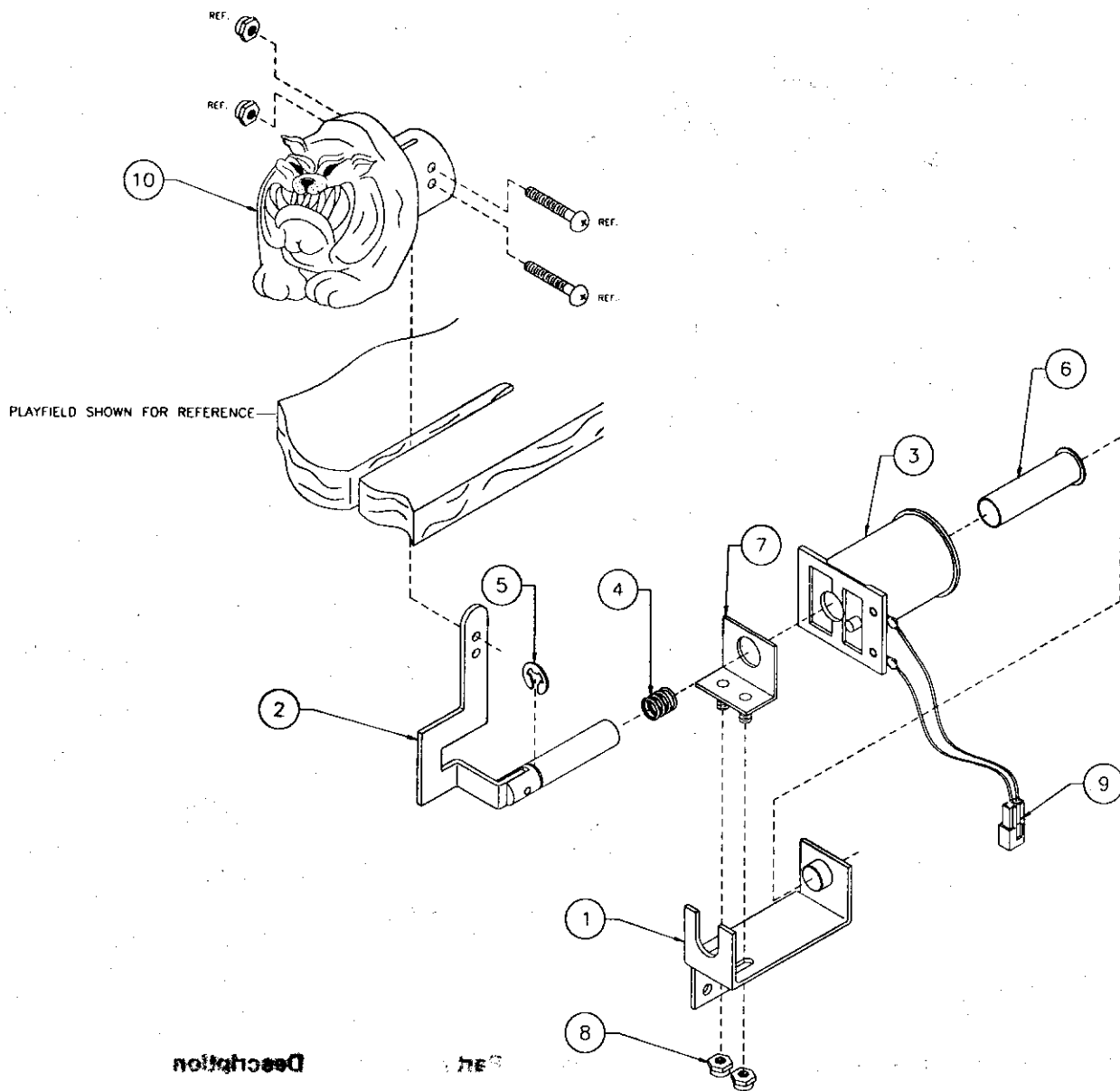
A-19963-1

Ball Trough Assembly Complete



Item	Part Number	Description	Item	Part Number	Description
1	A-16809-2	Ball Trough Welded Assy.	12	4408-01119-00	Nut 8-32 ESN
2	01-11587	Ball Trough Front	13	4008-01017-06	Mach. Screw, 8-32 x 3/8"
3	A-6306-2	Bell Armature Assembly	14	23-6702	Bumper Plug
4	AE-26-1500	Coil Assembly	15	A-18617-1	Trough IRED LED PCB Assembly
5	01-8-508-T	Solenoid Assembly	16	A-18618-1	Trough IRED Transistor PCB Assy.
6	03-7067-5	Coil Tubing	17	4006-01003-10	Mach. Screw, 6-32 x 5/8" SEMS
7	10-135	Spring	18	23-6626	Rubber Grommet
8	23-6420	Rubber Grommet	19	4700-00004-00	Flat Washer, 9/64 x 7/16 x 21ga.
9	03-8523	Insulator	20	02-4975	Bushing
10	01-11586	Coil Mounting Bracket	21	H-19523	Mini Solenoid Cable
11	4008-01017-05	Mach. Screw, 8-32 x 5/16"			

A-21383 Dog Mechanism Assembly



Item	Part Number	Description
1	04-10587.1	Dog Mechanism Bracket
2	A-21384	Plunger Assembly
3	AE-26-1200	Coil
4	10-128	Spring
5	20-8712-43	"E" Retaining Ring
6	03-7066	Coil Tubing
7	04-10322-2	Coil Bracket

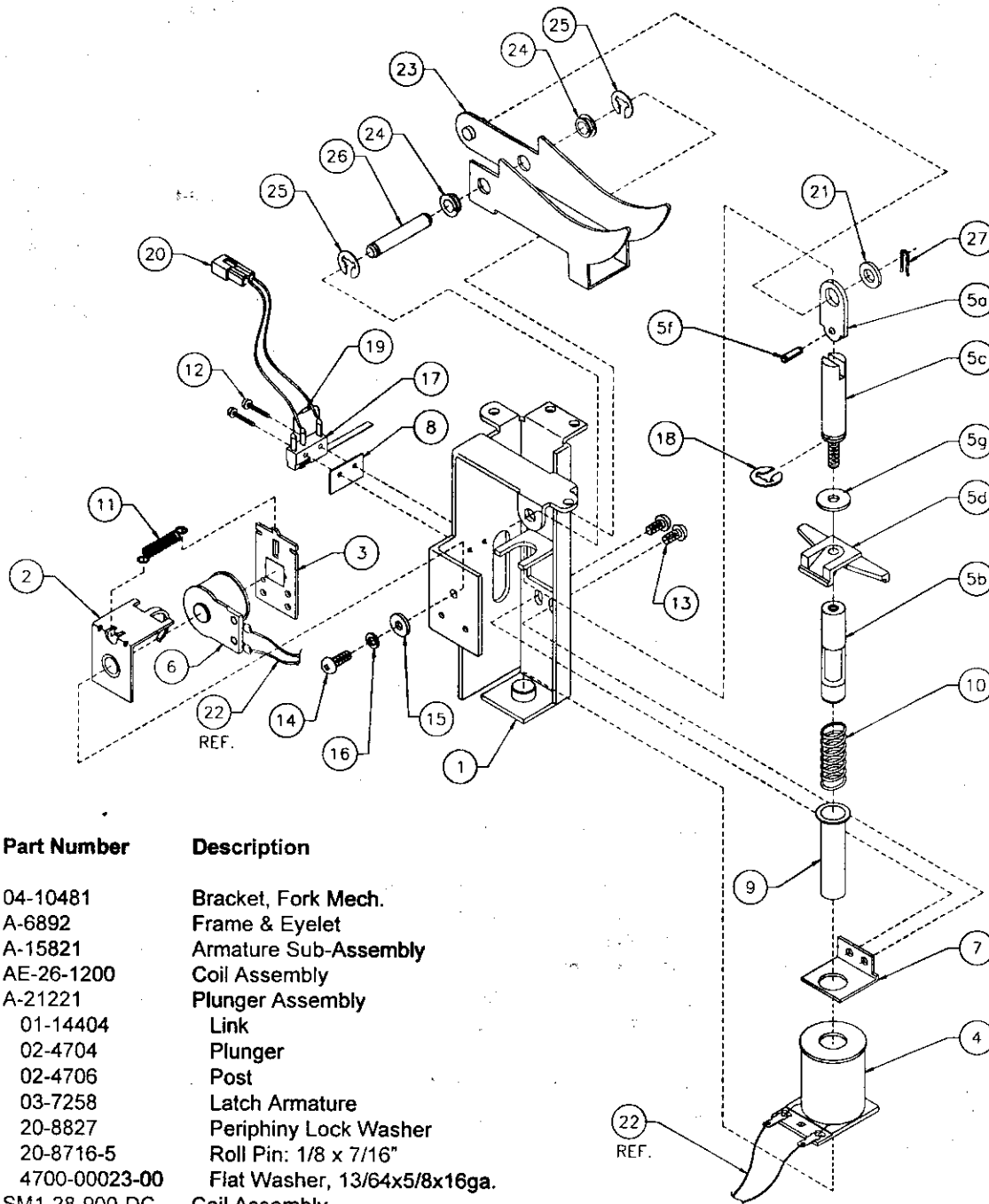
Item	Part Number	Description
8	4408-01119-00	Nut #8-32 ESN
9	H-19523	Cable

Associated Assemblies:

10	31-2598	Dog
*11	A-21398	Decal & Dog House Assy.

* Not shown.

A-21220 Fork Lifter Assembly



Item	Part Number	Description
1	04-10481	Bracket, Fork Mech.
2	A-6892	Frame & Eyelet
3	A-15821	Armature Sub-Assembly
4	AE-26-1200	Coil Assembly
5	A-21221	Plunger Assembly
a)	01-14404	Link
b)	02-4704	Plunger
c)	02-4706	Post
d)	03-7258	Latch Armature
*e)	20-8827	Periphery Lock Washer
f)	20-8716-5	Roll Pin: 1/8 x 7/16"
g)	4700-00023-00	Fiat Washer, 13/64x5/8x16ga.
6	SM1-28-900-DC	Coil Assembly
7	01-14405	Coil Retain Bracket
8	01-8600	Insulator
9	03-7066	Coil Tubing
10	10-437	Kicker Spring
11	10-363	Spring
12	4002-01105-08	Mach. Screw, 2-56 x 1/2"
13	4008-01017-05	Mach. Screw, 8-32 x 5/16"
14	4008-01021-07	Mach. Screw, 8-32 x 7/16"
15	4700-00089-00	Fiat Washer, 11/64 x 7/16 x 16ga.
16	4701-00003-00	Lock Washer #8 Split
17	5647-12693-36	Mini Switch
18	20-8712-43	"E" Ring, 7/16" Shaft

Item	Part Number	Description
19	5070-09054-00	Diode 1N4004
20	H-16437	Cable Assembly
21	4700-00030-00	Flat Washer, 17/64 x 1/2 x 15ga.
22	H-19692	Cable
23	04-10482	Forks
24	20-8790	Nyliner
25	20-8712-25	"E" Ring, 1/4" Shaft
26	02-5277	Axle
27	12-6227	Hair Pin Clip

* Not Shown.

A-21385

Wrecking Ball & Back Panel Assembly

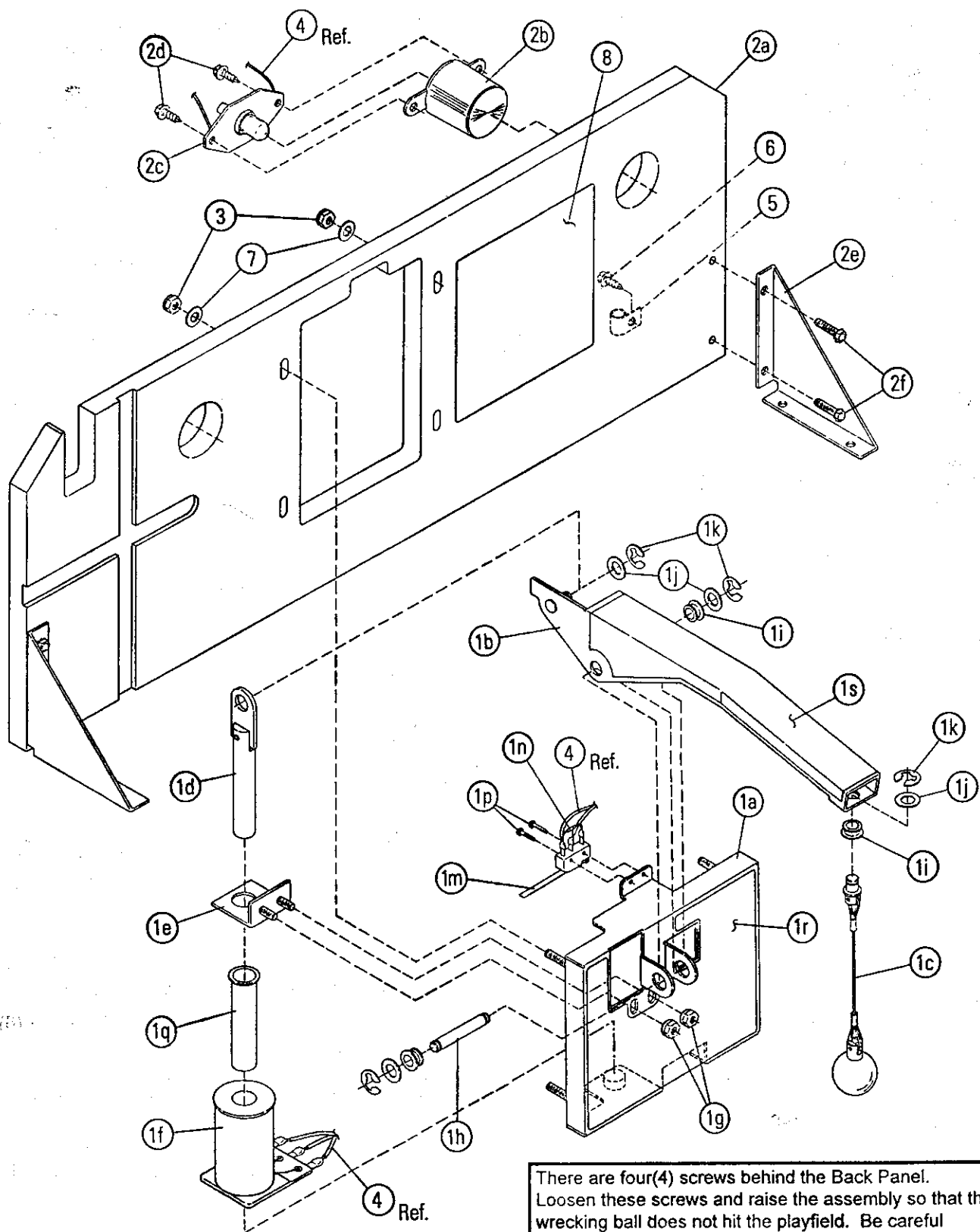
Item	Part Number	Description
1	A-21523	Moving Crane Assembly
a)	04-10715	Crane Mount
b)	04-10714	Crane Arm
c)	A-21326	Wrecking Ball Cable Assembly
d)	A-21524	Crane Plunger Assembly
e)	04-10716	Coil Stop Bracket
f)	A-20099	Coil Assembly
g)	4408-01119-01	Nut 8-32 ESN (2)
h)	02-5277	Axle
i)	20-8790	Nyliner (3)
j)	4700-00072-00	FW .265 i.d. x .500 o.d. x .032 ga. (4)
k)	20-8712-25	*E* Ring, .21 Shaft (4)
m)	5647-12693-31	Micro Mini Switch
n)	5070-09054-00	Diode 1N4001, 1.0A
p)	4002-01105-06	MS 2-56 x 3/8 P-PH-S (2)
q)	03-7066-5	Coil Tubing
r)	*31-2605-8	Decal
s)	*31-2605-10	Decal
2	A-21214	Back Panel Assembly
a)	04-10474.1	Wood Back Panel
b)	03-8149-13	Mini Dome, Clear (2)
c)	A-20158	Single Flash Lamp Assembly (2)
d)	4106-01114-08	TCS #6 x 1/2 PL-HWH T-17 (4)
e)	01-12569	Gusset Bracket (2)
f)	4008-01168-10	MS 8-32 x 5/8 PL-HH-S (4)
3	4408-01119-01	Nut 8-32 ESN (4)
4	H-21359.1	Cable Assembly
5	†03-7655-4	Cable Clamp (4)
6	†4106-01114-08	TCS #6 x 1/2 PL-HWH T-17 (4)
7	4700-00021-00	FW .203 i.d. x .437 o.d. x .032 ga. (4)
8	*31-2605-9	Decal

*Not available individually. Order Decal Set #31-2605.

†Mounted in back of panel.

A-21385

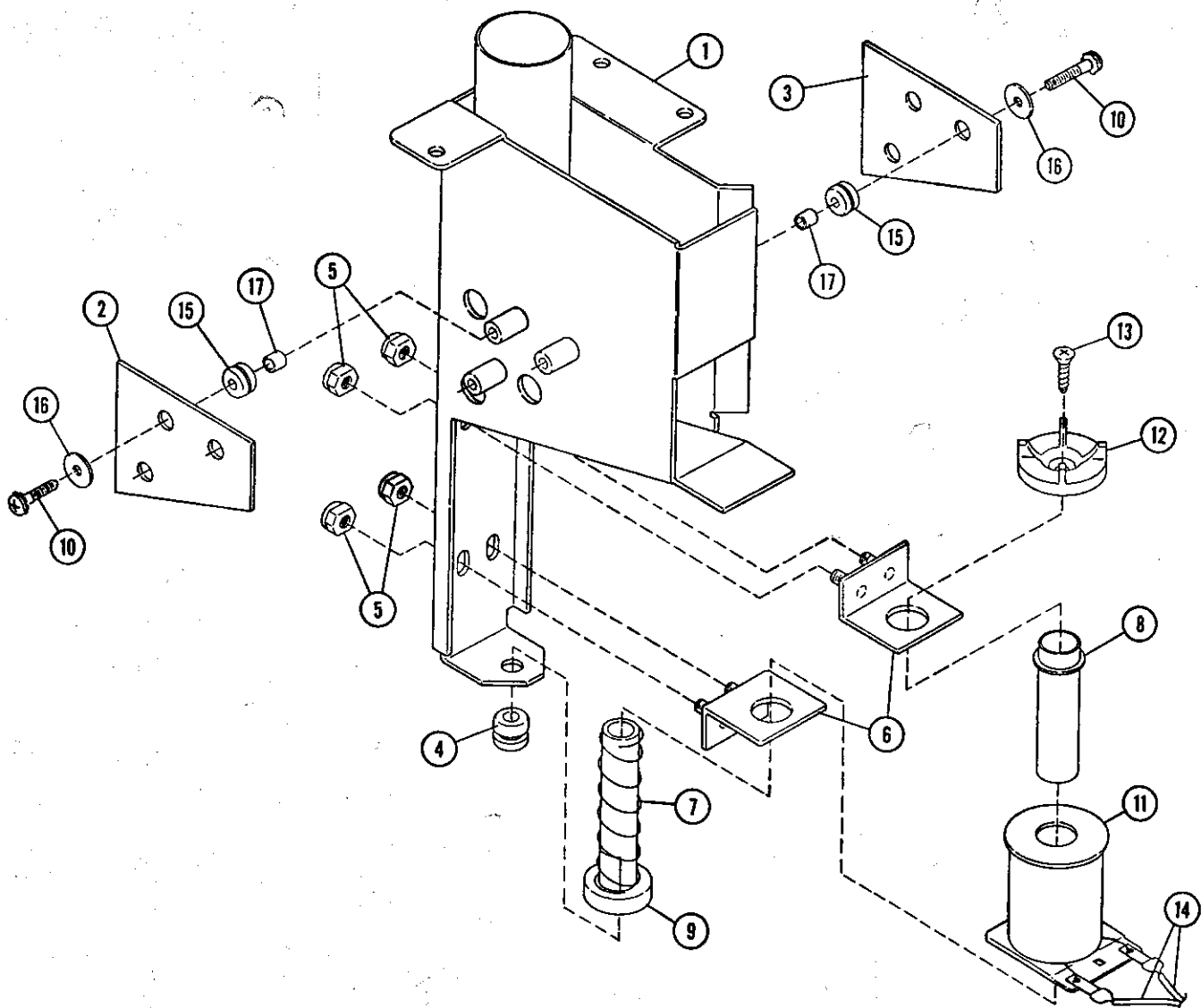
Wrecking Ball & Back Panel Assembly



There are four(4) screws behind the Back Panel. Loosen these screws and raise the assembly so that the wrecking ball does not hit the playfield. Be careful though, that it is not raised up so high that crane arm hits the playfield glass.

A-21216

3-Ball Popper Assembly



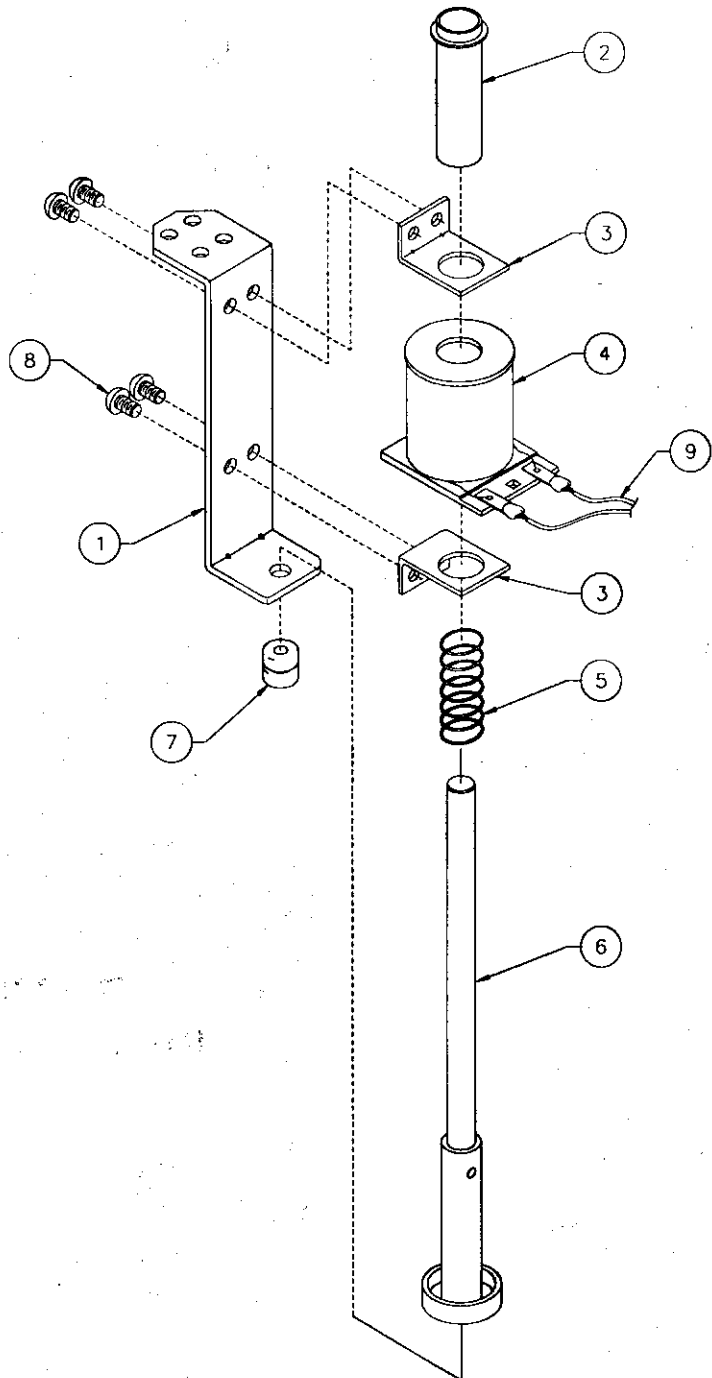
Item	Part Number	Description
1	04-10475.2	3-Ball Popper Frame
2	A-21518	3-IR LED Assembly
3	A-21517	3-IR Trans. Assembly
4	23-6420	Rubber Grommet
5	4408-01119-00	Nut 8-32 ESN (4)
6	04-10322-2	Coil Bracket (2)
7	10-135	Compression Spring
8	03-7067	Coil Tubing
9	04-10291	Bell Armature Assembly

Item	Part Number	Description
10	4006-01003-10	MS 6-32 x 5/8 P-PH-S (6)
11	AE-23-800	Coil Assembly
12	03-8561	Ball Popper Cap
13	4106-01152-08	SMS 6-32 x 1/2 TFP-FH
14	H-19523	Cable Assembly
15	23-6626	Rubber Grommet (6)
16	4700-00004-00	FW .140 x .437 x .032 (6)
17	02-4975	Bushing (6)

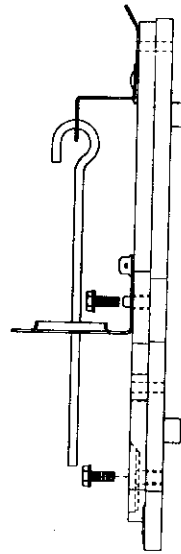
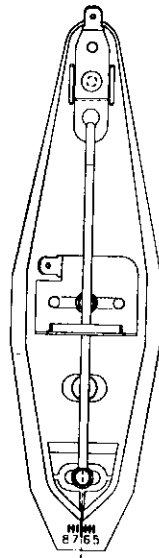
A-21409-1

Up/Down Post Assembly

Item	Part Number	Description
1	01-12441	Diverter Post Bracket
2	03-7067-5	Coil Tubing
3	01-8-508-T	Coil Retainer Bracket
4	AE-27-1200	Coil Assembly
5	10-135	Spring
6	04-10703	Bell Armature Assy.
7	23-6420	Rubber Grommet
8	4008-01017-04	MS, 8-32 x 1/4" (4)
9	H-19523	Mini Solenoid Cable



04-10346 Tilt Mechanism Assembly



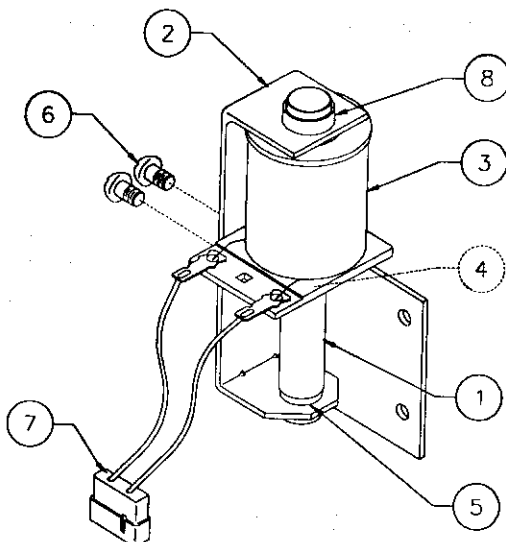
Associated Assemblies:

20-6502-A
Plumb Bob

20-10289
Fastener

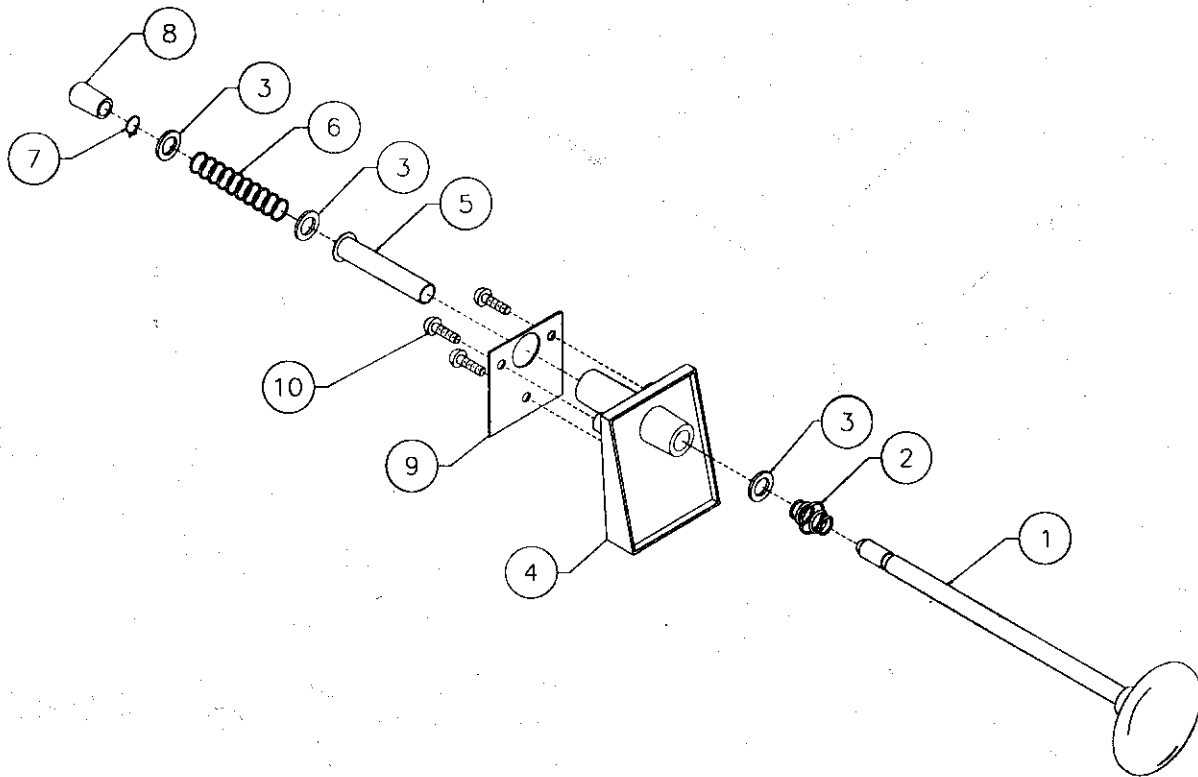


B-10686-1 Knocker Assembly



Item	Part Number	Description
1	A-5387	Coil Plunger Assembly
2	01-11273	Mounting Bracket Assembly
3	AE-23-800	Coil Sub-Assembly
4	01-8-508-T	Coil Retaining Bracket
5	23-6420	Rubber Grommet
6	40008-01017-04	Mach. Screw, 8-32 x 1/4"
7	H-11835	Knocker Cable
8	03-7067-5	Coil Tubing

B-12445-7 Ball Shooter Assembly



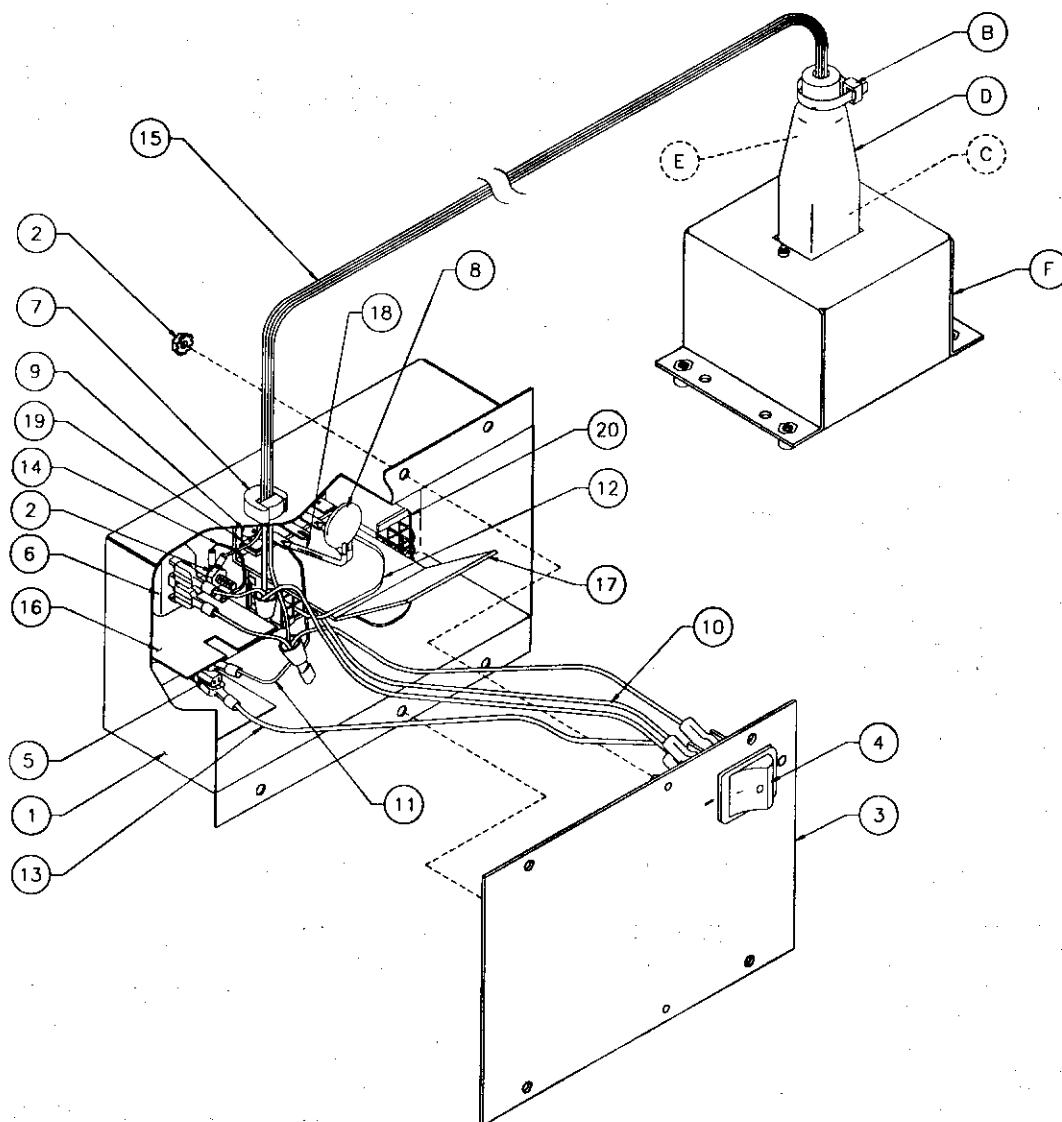
Item	Part Number	Description
1	20-9253-7	Ball Shooter Rod
2	10-149	Outer Spring
3	4700-0051-00	Flat Washer, 25/64x5/8x16ga.
4	21-6645-1	Shooter Housing
5	03-7357	Shooter Sleeve
6	10-148-7	Power Spring
7	20-8712-37	External Retainer Ring
8	23-6327	Ball Shooter Tip

Associated Assemblies:

9	01-3535	Rod Mounting Bracket
10	4010-01006-08	Mach. Screw, 10-32 x 5/8"

A-20871

Power Interface Assembly



Item	Part Number	Description	Item	Part Number	Description
A	A-20872	Power Control Chassis Assembly	14)	H-17542	Ground Jumper Gm/Yel Cable
1)	04-10292	Power Control Chassis Box	15)	5797-13940-01	Jumper Cable
2)	4406-01128-00	Nut #6-32 KEPS (3)	16)	01-10623	Insulator, Thermistor
3)	01-12294	Switch Mounting Plate Assembly	17)	01-12299	Insulator, Terminal Strip
4)	5642-13935-00	Power Switch	18)	RM-21-06	#18 Vinyl Fgls
5)	5733-14734-00	Fuse Holder Panel (5x20mm)	19)	5822-13865-00	Terminal Strip 3-CKT 2-Mtg.
6)	5851-13867-00	Outlet-IEC Conn. 237 Socket	20)	H-18050	Jumper Cable, Transformer Prog.
7)	03-8712	Strain Relief Bushing	B	03-7933	Ty-Wrap Nylon
8)	5016-12978-00	Thermistor 8A., 2.5R25	C	5045-14007-00	Capacitor, 1µF 275v
9)	4006-01003-10	Mach. Screw, #6-32 x 5/8"	D	23-6776-4	Heat Shrink
10)	H-17992	Jumper Cable Neutral Sw/1FC	E	RM-21-06	#18 Vinyl Sleeving
11)	H-17543	Hot Jumper Black Cable	F	A-20873	Line Filter Entry Chassis
12)	H-17546	Jumper Interface Hot Black Cable			
13)	H-17545	Jumper Switch/Fuse Black Cable			

Power Interface/Cordset Application

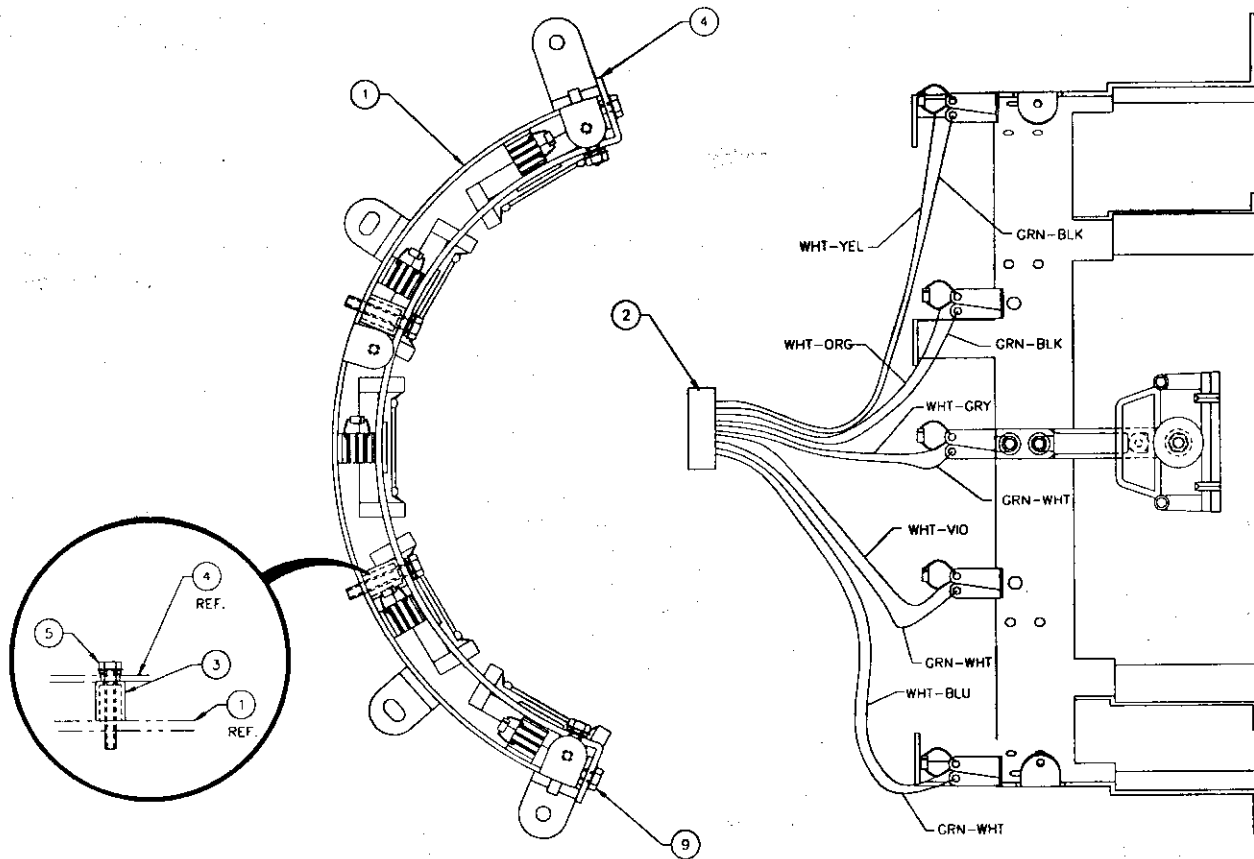
COUNTRY	UNIVERSAL PWR. INTERFACE ASSEMBLY	VOLTAGE PROGRAMMING JUMP CABLE				4AMP FUSE/ LABEL	5AMP FUSE/ LABEL	LABEL HIGH/ VOLTAGE CAUTION	POWER ADAPTER CORD	CORDSET										
		A-20871	H-17837-1	H-17837-2	H-17837-3	H-17837-4	5731-14530-00 FUSE 16-10145 LABEL			5731-14046-00 FUSE 16-9698 LABEL	16-9669	5850-14052-00	5850-13271-00	5850-13272-00	5850-13273-00	5850-13274-00	5850-13275-00	5850-13276-00	5850-13277-00	5850-13278-00
UNITED STATES	X		X				X	X		X										
CANADA	X	X					X	X			X									
TAIWAN	X		X				X	X			X									
MEXICO	X		X				X	X			X									
CENTRAL AMERICA	X		X				X	X			X									
SOUTH KOREA	X		X				X	X			X									
PUERTO RICO	X		X				X	X			X									
AUSTRIA	X			X		X X			X			X								
BELGIUM	X			X		X X			X			X								
FINLAND	X			X		X X			X			X								
FRANCE	X			X		X X			X			X								
GREECE	X			X		X X			X			X								
HOLLAND	X			X		X X			X			X								
HUNGARY	X			X		X X			X			X								
NETHERLANDS	X			X		X X			X			X								
NETH. ANTILLES	X			X		X X			X			X								
NORWAY	X			X		X X			X			X								
POLAND	X			X		X X			X			X								
PORTUGAL	X			X		X X			X			X								
SPAIN	X			X		X X			X			X								
SWEDEN	X			X		X X			X			X								
TURKEY	X			X		X X			X			X								
WEST GERMANY	X			X		X X			X			X								
UNITED KINGDOM	X			X		X X			X				X							
IRELAND	X			X		X X			X				X							
HONG KONG	X			X		X X			X				X							
DENMARK	X			X		X X			X					X						
ITALY	X			X		X X			X						X					
CHILE	X			X		X X			X						X					
PEOPLE'S REP. OF CHINA	X			X		X X			X						X					
SWITZERLAND	X			X		X X			X							X				
AUSTRALIA	X			X		X X			X								X			
NEW ZEALAND	X			X		X X			X								X			
ARGENTINA	X			X		X X			X								X			
JAPAN	X				X		X	X										X	X	
CROATIA	X			X		X X			X				X							

Posts

Part Number	Description	Quantity
02-3905	Post #8WS	5
02-4425-1	Post Fastener 8-32x8/32x5/8"	1
02-4425-2	Post Fastener 8-32x8/32x9/32"	21
02-4660	Single Bumper Post #10	2
02-4765-12	Post 10-32 x 3.5"	1
02-4765-23	Post Round 10-32 x 4.0"	2
02-5107	Post Adjusting	2
02-5222	Post #10 8-32 Top	5
02-5249	Post Bumper 10-32	7
02-5282	Bumper Post	3
03-8319-10	Post #8 Starred Trp.	27
03-9357-10	Post #8 x 1.06"	4

A-21247

Wreck Ball Target Assembly



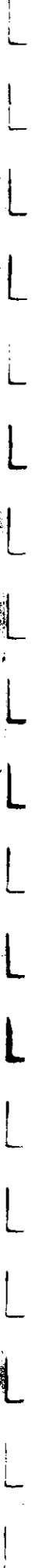
Item	Part Number	Description
1	A-21519	Target Switch Assembly
2	H-21374.1	Cable
3	03-9255-3	Spacer #8 x .541" Long
4	31-2593	Wreck Ball Target Cover
5	4008-01113-14	Mach. Screw, 8-32 x .875"
6	4008-01113-04	Mach. Screw, 8-32 x 1/4"

Upper Playfield Parts

Item No.	Part No.	Description	Not Shown:	
1	A-19963-1	Ball Trough Assembly	03-8633	Level Mount
2	A-21022	Shooter Lane Kicker Assembly	03-9610-1	*Full Playfield Mylar
3	A-15849-R-2	Flipper Assembly	03-9610-2	Drop Area Mylars (2)
	20-10110-5	Shaft & Paddle Assembly	03-9610-3A	Wrecking Ball Area Mylar
4	03-9216-13	Clear Flipper Ball Guide	03-9610-5	Right Rear Area Mylar
5	A-21224	Wire Ramp Assembly	20-6500	Steel Balls (4)
6	A-17811	Kicker Assembly	20-9691	Level
	B-9362-R-3	Coil & Bracket Assembly	31-1357-50052	Backglass Translite
7	A-21349-1	Blue Standup Target	31-2601	Screened Bottom Arch
8	A-21338	Spinner	36-50052	Screened Hardcoat Playfield
9	A-18530-6	Yellow Standup Target		
10	31-2598	Dog		
11	A-21398	Dog House & Decal Assembly		
	31-2599	Dog House		
12	A-21220	Fork Lift Assembly		
	A-21232	Fork Mech. Gate Assembly		
13	A-21355	Fork Hood Assembly		
14	A-21351-1	Decal & Standup Target		
	A-18060-4	Target		
	31-2603-3	Decal		
15	A-21351-2	Decal & Standup Target		
	A-18060-4	Target		
	31-2603-4	Decal		
16	A-21351-3	Decal & Standup Target		
	A-18060-4	Target		
	31-2603-5	Decal		
17	A-21409-1	Up/Down Post		
18	A-21370	Switch Gate Assembly		
19	31-2597.1	Bus		
20	A-21516	Bus Bracket Assembly		
21	A-21247	Wrecking Ball Target Assembly		
22	A-21222	Main Ramp		
23	A-21215	Wrecking Ball Mech. Assembly		
24	A-18530-4	Red Standup Target		
25	A-21249	Popper Ball Guide		
26	31-2595	Toilet		
27	A-21351-4	Decal & Standup Target		
	A-18060-4	Target		
	31-2603-6	Decal		
28	A-21351-5	Decal & Standup Target		
	A-18060-4	Target		
	31-2603-7	Decal		
29	A-21351-6	Decal & Standup Target		
	A-18060-4	Target		
	31-2603-8	Decal		
30	A-21383	Dog Mech.		
31	A-17515	Switch Gate & Bracket		
32	A-21223	Toilet Ramp		
33	01-14407	Main Ramp Flap		
34	A-21207	Ramp Gate Assembly		
35	01-14410	Toilet Ramp Flap		
36	31-2596	Refrigerator		
37	A-21216	3-Ball Popper Assembly		
38	A-21349-1	Blue Standup Target		
39	A-21212	Left Plastic Ramp		
40	03-9216-13	Clear Flipper Guide		
41	A-15849-L-2	Flipper Assembly		
	20-10110-5	Shaft & Paddle Assembly		

*The JUNKYARD hardcoat playfield does not require a full mylar. However, mylars can be purchased through your local Williams Distributor.

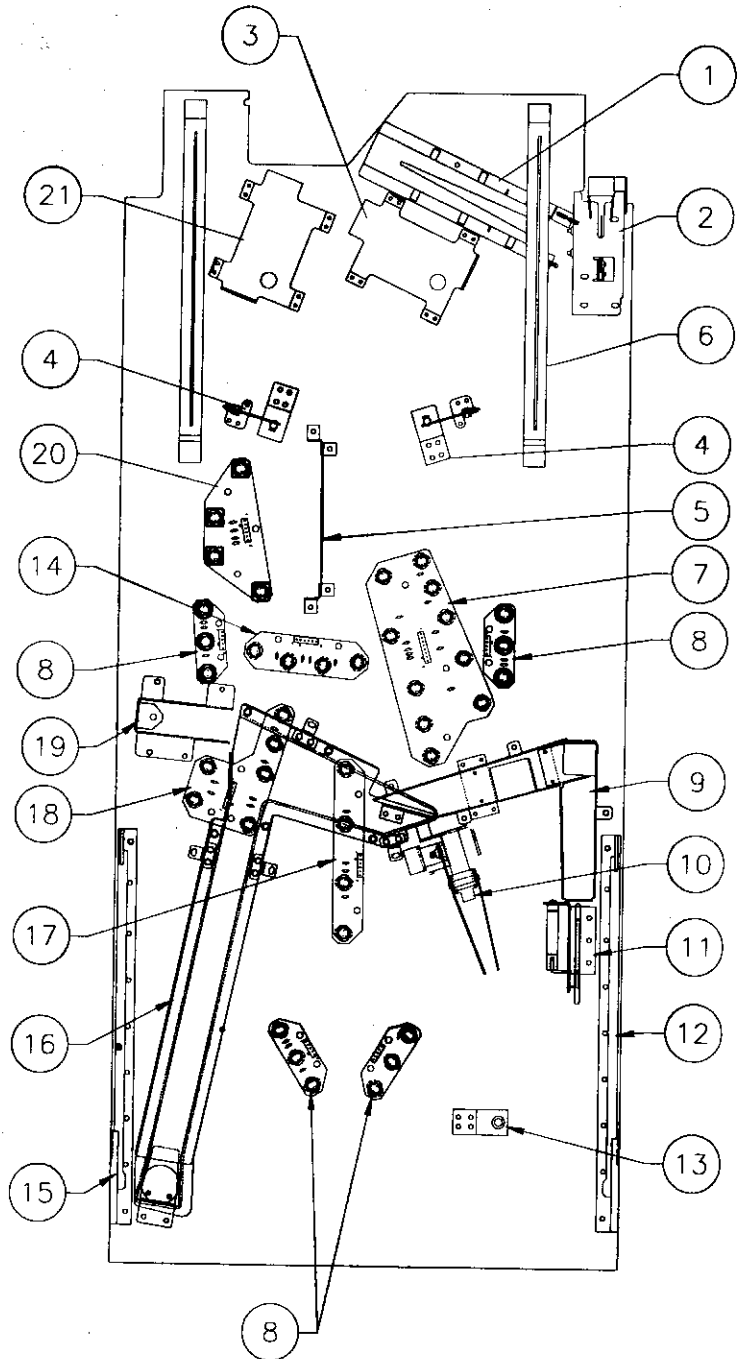
Figure 1 consists of two line graphs. The left graph shows the growth rate (log CFU/h) of *E. coli* in a 100% water activity medium as a function of temperature (°C). The growth rate increases from approximately 0.5 at 10°C to a peak of about 1.5 at 37°C, and then decreases to about 0.5 at 50°C. The right graph shows the growth rate (log CFU/h) of *E. coli* in a 90% water activity medium as a function of temperature (°C). The growth rate increases from approximately 0.5 at 10°C to a peak of about 1.0 at 37°C, and then decreases to about 0.5 at 50°C.



Lower Playfield Parts

Item	Part Number	Description
1	A-19963-1	Ball Trough Assy. w/Cable
2	A-21022	Shooter Lane Auto Kicker
3	A-15849-R-2	Flipper Assembly - Right
4	B-9362-R-3	Coil & Bracket Assembly (2)
	*A-17811	Kicker (Slingshot) Assy. (2)
5	A-17223	16-Opto PCB w/Bracket
6	01-11781	Support Bracket Assy. (2)
7	A-21319	10-Lamp PCB Assembly
8	A-21322	4-Lamp PCB Assembly (4)
9	A-21227	Metal Trough Assembly
10	A-21220	Fork Lift Assembly
11	A-21383	Dog Mech. Assembly
12	A-17749.1-2	Playfield Slide Assy.-Right
13	A-21409-1	Up/Down Post Assembly
14	A-21321	4-Lamp Assembly
15	A-17749.1-1	Playfield Slide Assy.-Left
16	A-21226	Trough Assembly
17	A-21323	4-Lamp PCB Assembly
18	A-21320	6-Lamp PCB Assembly
19	A-21216	3-Ball Popper Assembly
20	A-21324	4-Lamp PCB Assembly
21	A-15849-L-2	Flipper Assembly - Left

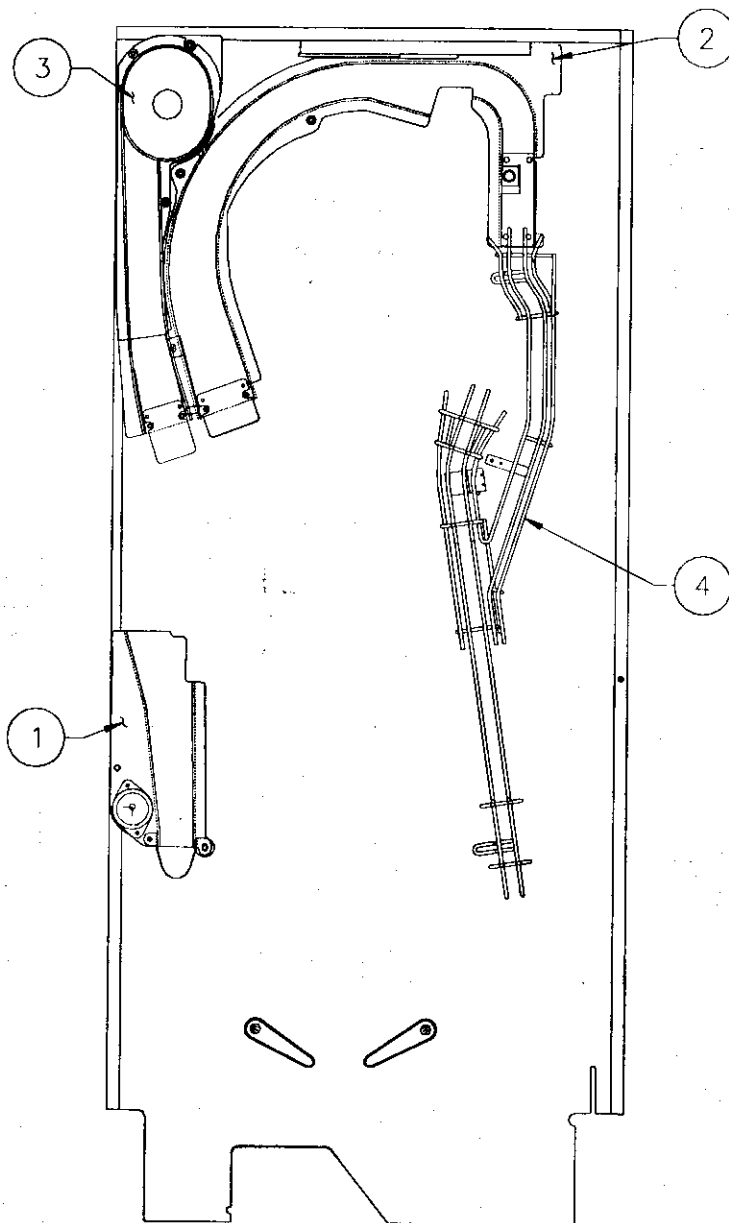
* Located on top of playfield



Underside of Playfield, Viewed in Raised Position

Ramps

Item	Part Number	Description
1	A-21212	Left Plastic Ramp
2	A-21222	Main Ramp Assy.
3	A-21223	Toilet Ramp Assy.
4	A-21224	Wire Ramp Assembly



SWITCH MATRIX

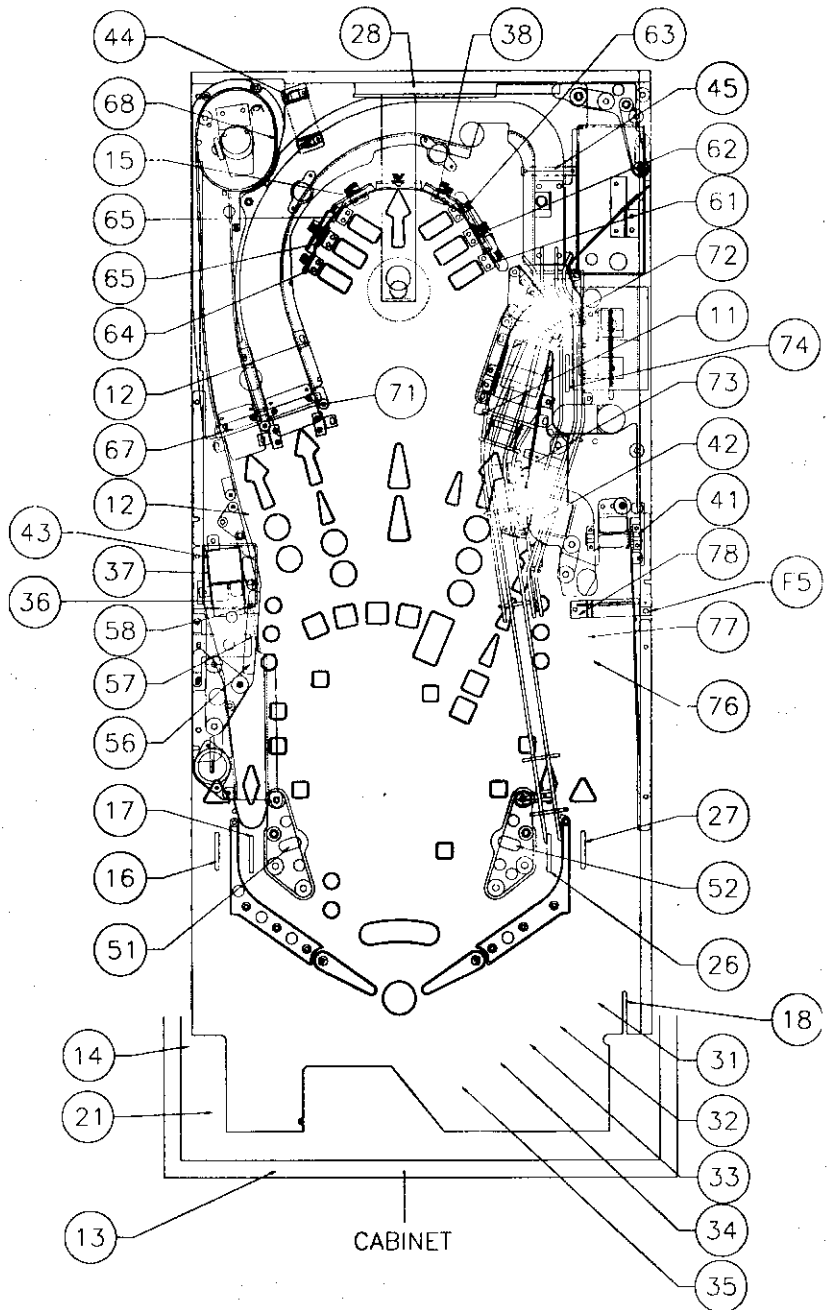
White  Green

Dedicated Grounded Switches	Column	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
	Row									
Orange-Brown J205-1 Left Coin Chute U17-5 D1	1 White-Brown J208-1 U18-11	TOASTER GUN 11	SLAM TILT 21	TROUGH EJECT 31	PAST SPINNER 41	LEFT SLING 51	UPPER RIGHT 3 BANK BOTTOM 61	RAMP ENTRY 71	NOT USED 81	Black-Green J208-13 Lower Right Flipper E.O.S. F1
Orange-Red J205-2 Center Coin Chute U17-7 D2	2 White-Red J208-2 U18-9	REBOUND SWITCH 12	COIN DOOR CLOSED 22	TROUGH BALL 1 32	IN THE SEWER 42	RIGHT SLING 52	UPPER RIGHT 3 BANK MIDDLE 62	SCOOP DOWN 72	NOT USED 82	Blue-Violet J212-12 Lower Right Flipper Opto F2
Orange-Black J205-3 Right Coin Chute U17-11 D3	3 White-Orange J208-3 U18-5	START BUTTON 13	NOT USED 23	TROUGH BALL 2 33	LOCK JAM 43	CAR TARGET 4 53	UPPER RIGHT 3 BANK TOP 63	SCOOP MADE 73	NOT USED 83	Black-Blue J208-12 Lower Left Flipper E.O.S. F3
Orange-Yellow J205-4 4th Coin Chute U17-9 D4	4 White-Yellow J208-4 U18-7	PLUMB BOB TILT 14	ALWAYS CLOSED 24	TROUGH BALL 3 34	PAST CRANE 44	CAR TARGET 5 (RIGHT) 54	UPPER LEFT 3 BANK BOTTOM 64	DOG ENTRY 74	NOT USED 84	Blue-Gray J212-11 Lower Left Flipper Opto F4
Orange-Green J205-6 Normal Function Srv Crdts U16-9 Test Function Escape D5	5 White-Green J208-5 U19-11	TOP LEFT CRANE 15	NOT USED 25	TROUGH BALL 4 35	RAMP EXIT 45	NOT USED 55	UPPER LEFT 3 BANK MIDDLE 65	NOT USED 75	NOT USED 85	Black-Violet J208-11 SPINNER F5
Orange-Blue J205-7 Normal Function Volume Dn U16-11 Test Function Down D6	6 White-Blue J208-7 U19-9	LEFT OUTLANE 16	RIGHT RETURN LANE 26	LOCK UP 2 36	CAR TARGET 1 (LEFT) 46	LOWER LEFT 3 BANK BOTTOM 56	UPPER LEFT 3 BANK TOP 66	RIGHT 3 BANK BOTTOM 76	NOT USED 86	Black-Yellow J212-10 Upper Right Flipper Opto F6
Orange-Violet J205-8 Normal Function Volume Up U16-7 Test Function Up D7	7 White-Violet J208-8 U19-5	LEFT RETURN LANE 17	RIGHT OUTLANE 27	LOCK UP 1 37	CAR TARGET 2 47	LOWER LEFT 3 BANK MIDDLE 57	BOWL ENTRY 67	RIGHT 3 BANK MIDDLE 77	NOT USED 87	Black-Gray J208-10 Upper Left Flipper E.O.S. F7
Orange-Gray J205-9 Normal Function Begin Test U16-5 Test Function Enter D8	8 White-Gray J208-9 U19-7	SHOOTER LANE 18	CRANE DOWN 28	TOP RIGHT CRANE 38	CAR TARGET 3 48	LOWER LEFT 3 BANK TOP 58	BOWL EXIT 68	RIGHT 3 BANK TOP 78	NOT USED 88	Black-Blue J212-9 Upper Left Flipper Opto F8

J2XX = CPU BOARD  = OPTO, TYPICALLY CLOSED

Switch Locations

Item No.	Switch No.	Description
F1	SW-1A-194	Lower Right Flipper E.O.S.
F2	A-17316	Lower Right Flipper Cabinet
F3	SW-1A-194	Lower Left Flipper E.O.S.
F4	A-17316	Lower Left Flipper Cabinet
F5	5647-12693-24	Spinner
F6	Not Used	Upper Right Flipper Cabinet
F7	Not Used	Upper Left Flipper E.O.S.
F8	Not Used	Upper Left Flipper Cabinet
11	A-18530-6	Toaster Gun
12	A-17794 (2)	Rebound Switch
13	20-9663-16	Start Button
14	04-10346	Plumb Bob
15	A-18530-4	Top Left Crane
16	5647-12693-19	Left Outlane
17	5647-12693-19	Left Return Lane
18	5647-12693-65	Shooter Lane
21	A-17238	Slam Tilt
22	5643-09268-00	Coin Door Closed*
23		Not Used
24	5643-15190-00	Always Closed*
25		Not Used
26	5647-12693-19	Right Return Lane
27	5647-12693-19	Right Outlane
28	5647-12693-31	Crane Down
31	A-18617-1 (LED)	Tough Eject
32	A-18618-1 (PHOTO TRANS)	Trough Ball 1
33	A-18617-1 (LED)	Trough Ball 2
34	A-18618-1 (PHOTO TRANS)	Trough Ball 3
35	A-18617-1 (LED)	Trough Ball 4
36	A-18618-1 (PHOTO TRANS)	Lock Up 2
37	A-16908 (LED)	Lock Up 1
38	A-16909 (PHOTO TRANS)	Top Right Crane
41	A-18530-4	Past Spinner
42	A-16908 (LED)	In The Sewer
43	A-16909 (PHOTO TRANS)	Lock Jam
44	A-16908 (LED)	Past Crane
45	A-12556	Ramp Exit
46	SW-1A-210-1	Car Target 1 (Left) ***
47	SW-1A-210-2	Car Target 2 ***
48	SW-1A-210-3	Car Target 3 ***
51	A-17800 (KICK)	Left Slingshot (Angel)
52	A-17794 (SCORE)	Right Slingshot (Devil)
53	A-17800 (KICK)	
54	SW-1A-210-4	Car Target 4 ***
55	SW-1A-210-5	Car Target 5 (Right) ***
56		Not Used
57	A-21349-1	Lower Left 3-Bank Bottom
58	A-21349-1	Lower Left 3-Bank Middle
61	A-21351-1	Lower Left 3-Bank Top
62	A-21351-2	Upper Right 3-Bank Bottom
63	A-21351-3	Upper Right 3-Bank Middle
64	A-21351-4	Upper Right 3-Bank Top
65	A-21351-5	Upper Left 3-Bank Bottom
66	A-21351-6	Upper Left 3-Bank Middle
67	5647-12693-36	Upper Left 3-Bank Top
68	5647-12693-36	Bowl Entry
71	5647-12693-21	Bowl Exit
72	5647-12693-36	Ramp Entry
73	5647-12693-21	Scoop Down
74	5647-12693-19	Scoop Made
75		Dog Entry
76		Not Used
77	A-21349-1	Right 3-Bank Bottom
78	A-21349-1	Right 3-Bank Middle
81 to 88	A-21349-1	Right 3-Bank Top
		Not Used



*NOT SHOWN. **SCORE SWITCHES HAVE DIODES ATTACHED.

***ABOVE CRANE.

LAMP MATRIX

Yellow (B+) →

→ Red

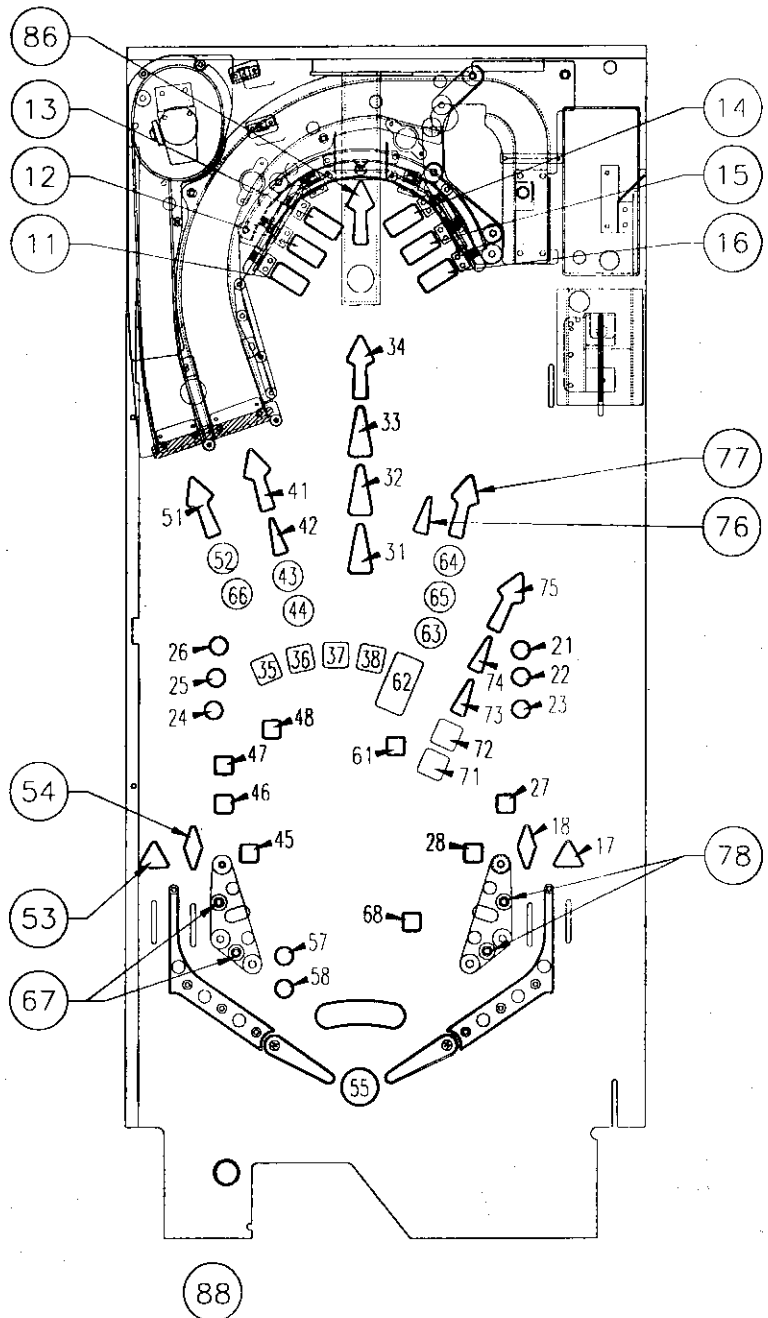
Column Row	1 Yellow-Brown J121-1 Q96	2 Yellow-Red J121-2 Q100	3 Yellow-Orange J121-3 Q95	4 Yellow-Black J121-4 Q99	5 Yellow-Green J121-5 Q94	6 Yellow-Blue J121-6 Q98	7 Yellow-Violet J121-7 Q93	8 Yellow-Gray J121-9 Q97
1 Red-Brown J125-1 Q104	TOP LEFT BANK BOTTOM 11	RIGHT 3 BANK TOP 21	JACKPOT 31	GEN. BUS 41	GEN. TOILET 51	PROPELLER 61	TIME MACHINE 71	FIREWORKS 81
2 Red-Black J125-2 Q108	TOP LEFT BANK MIDDLE 12	RIGHT 3 BANK MIDDLE 22	SUPER JACKPOT 32	TOAST 42	WINDOW SHOPPING 52	OUTER SPACE 62	START ADVENTURE 72	TOXIC WASTE 82
3 Red-Orange J125-4 Q103	TOP LEFT BANK TOP 13	RIGHT 3 BANK BOTTOM 23	MULTIBALL 33	MAGIC BUS 43	LEFT RECYCLE 53	DO(G) 63	EXTRA BALL 73	LIGHT EXTRA BALL 83
4 Red-Yellow J125-5 Q107	TOP RIGHT BANK TOP 14	LEFT BANK BOTTOM 24	WRECKING BALL 34	COLLECT JUNK 44	LEFT CRANE H. U. 54	(D)OG 64	TOAST 74	FREE GAME 84
5 Red-Green J125-6 Q102	TOP RIGHT BANK MIDDLE 15	LEFT BANK MIDDLE 25	RADAR ADVENTURE 35	COO COO CLOCK 45	SHOOT AGAIN 55	D(O)G 65	GEN. SEWER 75	LIGHT JACKPOT 85
6 Red-Blue J125-7 Q106	TOP RIGHT BANK BOTTOM 16	LEFT BANK TOP 26	JALOPY RACE 36	TELEVISION 46	NOT USED 56	CHOOSE JUNK 66	TOASTER GUN 76	GEN. CRANE 86
7 Red-Violet J125-8 Q101	RIGHT RECYCLE 17	FAN 27	TOILET ADVENTURE 37	WEATHER VANE 47	TOASTER 57	ANGEL SLING 67	GEN. ALLEY 77	NOT USED 87
8 Red-Gray J125-9 Q105	RIGHT CRANE H. U. 18	BATH TUB 28	A.T.C. ADVENTURE 38	FISH BOWL 48	HAIR DRYER 58	BICYCLES 68	DEVIL SLING 78	START BUTTON 88

J1XX = Power Driver Board

Lamp Locations

Item No.	Bulb No.	Lamp Assy No.	Description
11	24-8768	A-21322	Top Left Bank Bottom
12	24-8768	A-21322	Top Left Bank Middle
13	24-8768	A-21322	Top Left Bank Top
14	24-8768	A-21322	Top Right Bank Top
15	24-8768	A-21322	Top Right Bank Middle
16	24-8768	A-21322	Top Right Bank Bottom
17	24-6549	A-17835	Right Recycle
18	24-6549	A-17835	Right Crane H.U.
21	24-8768	A-21322	Right 3-Bank Top
22	24-8768	A-21322	Right 3-Bank Middle
23	24-8768	A-21322	Right 3-Bank Bottom
24	24-8768	A-21322	Left Bank Bottom
25	24-8768	A-21322	Left Bank Middle
26	24-8768	A-21322	Left Bank Top
27	24-6549	A-17835	Fan
28	24-6549	A-17835	Bath Tub
31	24-8768	A-21323	Jackpot
32	24-8768	A-21323	Super Jackpot
33	24-8768	A-21323	Multiball
34	24-8768	A-21323	Wrecking Ball
35	24-8768	A-21321	Radar Adventure
36	24-8768	A-21321	Jalopy Race
37	24-8768	A-21321	Toilet Adventure
38	24-8768	A-21321	A.T.C. Adventure
41	24-8768	A-21320	Gen. Bus
42	24-8768	A-21320	Toast
43	24-8768	A-21320	Magic Bus
44	24-6549	A-17807	Collect Junk
45	24-8768	A-21324	Coo Coo Clock
46	24-8768	A-21324	Television
47	24-8768	A-21324	Weather Vane
48	24-8768	A-21324	Fish Bowl
51	24-8768	A-21320	Gen. Toilet
52	24-8768	A-21320	Window Shopping
53	24-6549	A-17835	Left Recycle
54	24-6549	A-17835	Left Crane H.U.
55	24-6549	A-17807	Shoot Again
56			Not Used
57	24-6549	A-17835	Toaster
58	24-6549	A-17835	Hair Dryer
61	24-8768	A-21319	Propeller
62	24-8768	A-21319	Outer Space
63	24-8768	A-21319	DO(G)
64	24-8768	A-21319	(D)OG
65	24-8768	A-21319	D(O)G
66	24-8768	A-21320	Choose Junk
67	24-6549	04-10514	Angel Slingshot (2 Bulbs)
68	24-6549	A-17835	Bicycles
71	24-8768	A-21319	Time Machine
72	24-8768	A-21319	Start Adventure
73	24-8768	A-21319	Extra Ball
74	24-8768	A-21319	Toast
75	24-8768	A-21319	Gen. Sewer
76	24-6549	A-17807	Toaster Gun
77	24-6549	A-17807	Gen. Alley
78	24-6549	04-10514	Devil Slingshot (2 Bulbs)
81	24-8768	-----	*Fireworks
82	24-8768	-----	*Toxic Waste
83	24-8768	-----	*Light Extra Ball
84	24-8768	-----	*Free Game
85	24-8768	-----	*Light Jackpot
86	24-6549	A-17835	*Gen. Crane
87			Not Used
88	-----	20-9663-16	Start Button

* These lamps are located on the insert panel.
24-6549 = #44 Bulb 24-8768 = #555



SOLENOID/FLASHER TABLE

Sol. No.	Function	Solenoid Type	Voltage Connections			Drive Xistor	Drive Connections			Drive Wire Color	Solenoid Part Number	
			Playfield	Backbox	Cabinet		Playfield	Backbox	Cabinet		Flashlamp Type	Playfield Backbox
01	AUTO PLUNGER	High Power	J133-2			Q72	J116-1			VIO-BRN	AE-23-800	
02	REFRIGERATOR POPPER	High Power	J133-2			Q68	J116-2			VIO-RED	AE-23-800	
03	POWER CRANE	High Power	J133-2			Q71	J116-4			VIO-ORG	A-20099	
04	NOT USED	High Power				Q87				VIO-YEL		
05	SCOOP DOWN	High Power	J133-2			Q70	J116-6			VIO-GRN	SM1-28-900	
06	BUS DIVERTER	High Power	J133-2			Q66	J116-7			VIO-BLU	AE-27-1200	
07	KNOCKER	High Power		J133-2		Q69		J116-8		VIO-BLK		AE-23-800
08	NOT USED	High Power				Q65	J116-9			VIO-GRY		
09	TROUGH	Low Power	J133-3			Q44	J113-1			BRN-BLK	AE-26-1500	
10	LEFT SLINGSHOT	Low Power	J133-3			Q48	J113-3			BRN-RED	AE-26-1200	
11	RIGHT SLINGSHOT	Low Power	J133-3			Q43	J113-4			BRN-ORG	AE-26-1200	
12	NOT USED	Low Power				Q47				BRN-YEL		
13	NOT USED	Low Power				Q42				BRN-GRN		
14	NOT USED	Low Power				Q46				BRN-BLU		
15	HOLD CRANE	Low Power	J133-2			Q41	J113-8			BRN-VIO	A-20099	
16	MOVE DOG	Low Power	J133-3			Q45	J113-9			BRN-GRY	AE-26-1200	
17	DOG FACE FLASHER	Flasher	J133-6			Q28	J111-1			BLK-BRN	#906 (1)	
18	WINDOW SHOP FLSHR	Flasher	J133-6			Q32		J112-2		BLK-RED		#906 (1)
19	AUTOFIRE FLASHERS	Flasher	J133-6			Q27	J111-3			BLK-ORG	#89 (2)	
20	LEFT SIDE FLASHERS	Flasher	J133-6			Q31	J111-4	J112-5		BLK-YEL	#906 (1)	#906 (1)
21	SCOOP UP**	Low Power	J133-3			Q26	J111-5			BLU-GRN	AE-26-1200	
22	UNDER CRANE FLSHR	Flasher	J133-6			Q30	J111-6			BLU-BLK	#906 (1)	
23	BACK LEFT FLASHERS	Flasher	J133-6			Q25	J111-7	J112-8		BLU-VIO	#906 (1)	#906 (1)
24	BACK RIGHT FLASHERS	Flasher	J133-6			Q29	J111-8	J112-9		BLU-GRY	#906 (1)	#906 (1)
25	SHOOTER FLASHER	Gen Purpose	J133-6			Q16	J109-1			BLU-BRN	#906 (1)	
26	SCOOP FLASHERS	Gen Purpose	J133-6			Q15	J109-2	J108-3		BLU-RED	#906 (1)	#906 (1)
27	DOG HOUSE FLASHER	Gen Purpose	J133-6			Q14	J109-3			BLU-ORG	#89 (1)	
28	CARS FLASHERS	Gen Purpose	J133-6			Q13	J109-4			BLU-YEL	#89 (2)	

General Illumination

01	PLAYFIELD STRING 1	G.I.	J105-1			Q5	J105-7			WHT-BRN	#44	
02	PLAYFIELD STRING 2	G.I.	J105-2			Q4	J105-8			WHT-ORG	#44	
03	LOGO STRING 3	G.I.		J106-3		Q3		J106-9		WHT-YEL		#555
04	*ILLUMINATION STRING 4	G.I.		J106-5		Q2		J106-10		WHT-GRN		#555
05	*ILLUMINATION STRING 5	G.I.		J106-6	J104-3	Q1		J106-11	J104-1	WHT-VIO		#555

Flipper Circuits		Voltage Connection	Drive Transistors		Drive Connections	Drive Wire Colors		Coil Part No.	Coil Colors
			Playfield	Power Hold		Playfield	Power Hold		
29	LOWER RIGHT FLIPPER	Lwr. Rt. Power	J119-1 (RED-GRN)	Q90		J120-13	YEL-GRN	FL-11629	BLUE
30		Lwr. Rt. Hold	J119-1 (RED-GRN)	Q92		J120-11	ORG-GRN		
31	LOWER LEFT FLIPPER	Lwr. Lt. Power	J119-4 (RED-BLU)	Q87		J120-9	YEL-BLU	FL-11629	BLUE
32		Lwr. Lt. Hold	J119-4 (RED-BLU)	Q89		J120-7	ORG-BLU		
33	NOT USED	Upr. Rt. Power	J119-6 (RED-VIO)	Q84		J120-6	YEL-VIO	NOT USED	
34	UPPER RIGHT FLIPPER	Upr. Rt. Hold	J119-6 (RED-VIO)	Q86		J120-4	ORG-VIO		
35	NOT USED	Upr. Lt. Power	J119-8 (RED-GRY)	Q81		J120-3	YEL-GRY	NOT USED	
36	UPPER LEFT FLIPPER	Upr. Lt. Hold	J119-8 (RED-GRY)	Q83		J120-1	ORG-GRY		

J1XX = POWER DRIVER BOARD

24-6549 = #44 BULB; 24-8704 = #89 BULB; 24-8768 = #555 BULB; 24-8802 = #906 BULB

*THESE G.I. STRINGS DO NOT BRIGHTEN AND DIM, THEY ARE ALWAYS ON.

** TIEBACK DIODE FROM J111-12 & J111-13.

Solenoid/Flashlamp Locations

Item No.	Coil/Flasher Number	Assembly Number	Description
01	AE-23-800	A-21022	Auto Plunger
02	AE-23-800	A-21216	Refrigerator Popper
03	A-20099	A-21523	Power Crane
04			Not Used
05	SM1-28-900	A-21220	Scoop Down
06	AE-27-1200	A-21409-1	Bus Diverter
07	AE-23-800	B-10686-1	**Knocker
08			Not Used
09	AE-26-1500	A-19963-1	Trough
10	AE-26-1200	B-9362-R-3	Left Slingshot
11	AE-26-1200	B-9362-R-3	Right Slingshot
12			Not Used
13			Not Used
14			Not Used
15	A-20099	A-21523	**Hold Crane
16	AE-26-1200	A-21383	Move Dog
17	#906 (1)	A-21395	Dog Face Flasher
18	#906 (1)	-----	Window Shop Flshr
19	#89 (2)	A-17984	AutoFire Flashers
20	#906 (1)	-----	Left Side Flashers
	#906 (1)	-----	Insert Panel
21	AE-26-1200	A-21220	Scoop Up
22	#906 (1)	A-21525	Under Crane Flshr
23	#906 (1)	A-20158	Back Left Flashers
	#906 (1)	-----	Insert Panel
24	#906 (1)	A-20158	Back Right Flashrs
	#906 (1)	-----	Insert Panel
25	#906 (1)	A-17802	Shooter Flasher
26	#906 (1)	A-21355	Scoop Flashers
	#906 (1)	-----	Insert Panel
27	#89 (1)	A-17983	Dog House Flasher
28	#89 (2)	04-10509	Cars Flasher

Flippers

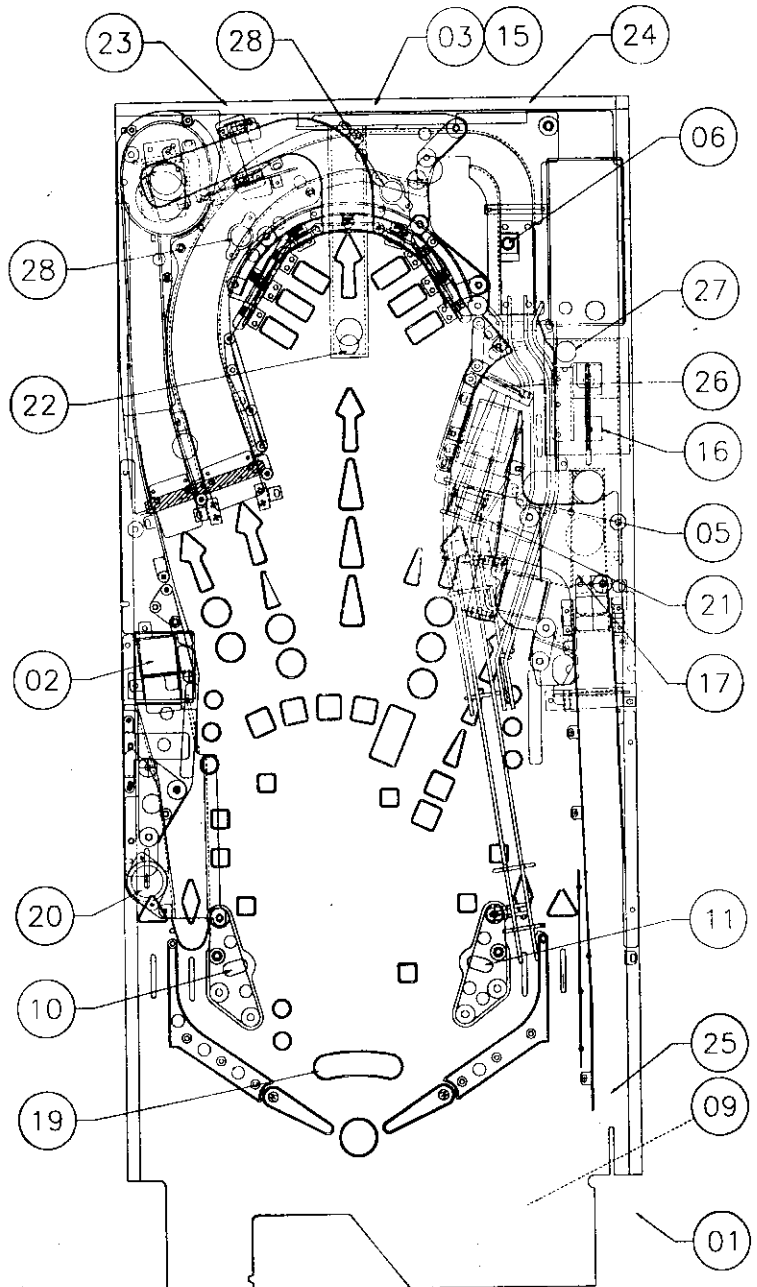
Item No.	Coil/Flasher Number	Assembly Number	Description
29-30	FL-11629	A-15849-R-2	Lower Right Flipper
31-32	FL-11629	A-15849-L-2	Lower Left Flipper
33-34			
35-36			

General Illumination

Item No.	Bulb Number	Description
01	#44	*Playfield String 1
02	#44	*Playfield String 2
03	#555	*Logo String 3
04	#555	*Illumination String 4
05	#555	*Illumination String 5

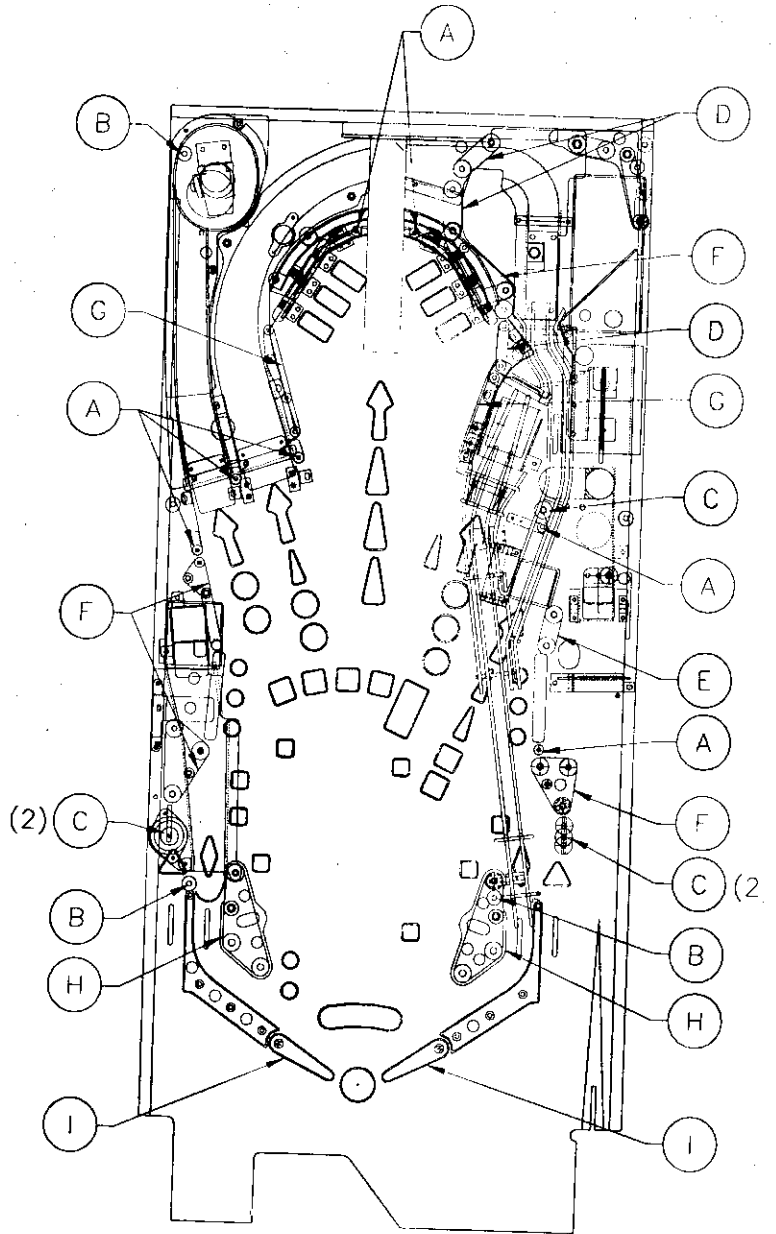
24-6549 = #44 BULB
 24-8704 = #89 BULB
 24-8768 = #555 BULB
 24-8802 = #906 BULB

*NOT SHOWN
 **IN BACKBOX



Rubber Rings

Item No.	Part No.	Description	Quantity
A	23-6556	Black Bumper Sleeve	7
B	23-6694-1	Black Rubber Grommet	3
C	23-6694-3	Black Rubber Ring 5/16"	5
D	23-6694-5	Black Rubber Ring 1"	3
E	23-6694-6	Black Rubber Ring 3/4"	1
F	23-6694-8	Black Rubber Ring 1 1/2"	4
G	23-6694-9	Black Rubber Ring 2"	2
H	23-6694-10	Black Rubber Ring 2 1/2"	2
I	23-6695	Black Flipper Ring	2



SECTION THREE

GAME WIRING AND SCHEMATICS

CONNECTOR & COMPONENT IDENTIFICATION

Each plug or jack receives a number that identifies the circuit board and the position on that board that it connects to. J-designations refer to a male connector. P-designations refer to a female connector. For example, J101 designates jack 1 of board 1 (a Power Driver 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 is a fuse on the Audio Video board.

Prefix numbers for WPC circuit boards are listed below.

J1XX - Power Driver board jacks; F1XX - Power Driver board fuses

J2XX - CPU Board (There are no fuses on the CPU board.)

J5XX and J6XX - Audio Video board (AV board) jacks; F5XX and F6XX - Audio Video board fuses

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.

SWITCH MATRIX

Dedicated Grounded Switches		Column Row	White					Green		Flipper Grounded Switches
			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	
Orange-Brown J205-1 Left Coin Chute U17-5 D1	1 White-Brown J208-1 U18-11	1 TOASTER GUN	SLAM TILT	TROUGH EJECT	PAST SPINNER	LEFT SLING	UPPER RIGHT 3 BANK BOTTOM	RAMP ENTRY	NOT USED	Black-Green J208-13 Lower Right Flipper E.O.S.
Orange-Red J205-2 Center Coin Chute U17-7 D2	2 White-Red J208-2 U18-9	REBOUND SWITCH	COIN DOOR CLOSED	TROUGH BALL 1	IN THE SEWER	RIGHT SLING	UPPER RIGHT 3 BANK MIDDLE	SCOOP DOWN	NOT USED	Blue-Violet J212-12 Lower Right Flipper Opto
Orange-Black J205-3 Right Coin Chute U17-11 D3	3 White-Orange J208-3 U18-5	START BUTTON	NOT USED	TROUGH BALL 2	LOCK JAM	CAR TARGET 4	UPPER RIGHT 3 BANK TOP	SCOOP MADE	NOT USED	Black-Blue J208-12 Lower Left Flipper E.O.S.
Orange-Yellow J205-4 4th Coin Chute U17-9 D4	4 White-Yellow J208-4 U18-7	PLUMB BOB TILT	ALWAYS CLOSED	TROUGH BALL 3	PAST CRANE	CAR TARGET 5 (RIGHT)	UPPER LEFT 3 BANK BOTTOM	DOG ENTRY	NOT USED	Blue-Gray J212-11 Lower Left Flipper Opto
Orange-Green J205-6 U16-9 Normal Function Srv Cmts D5	5 White-Green J208-5 U19-11	TOP LEFT CRANE	NOT USED	TROUGH BALL 4	RAMP EXIT	NOT USED	UPPER LEFT 3 BANK MIDDLE	NOT USED	NOT USED	Black-Violet J208-11 SPINNER
Orange-Blue J205-7 U16-11 Normal Function Volume Dr D6	6 White-Blue J208-7 U19-9	LEFT OUTLANE	RIGHT RETURN LANE	LOCK UP 2	CAR TARGET 1 (LEFT)	LOWER LEFT 3 BANK BOTTOM	UPPER LEFT 3 BANK TOP	RIGHT 3 BANK BOTTOM	NOT USED	Black-Yellow J212-10 Upper Right Flipper Opto
Orange-Violet J205-8 U16-7 Normal Function Volume Up D7	7 White-Violet J208-8 U18-5	LEFT RETURN LANE	RIGHT OUTLANE	LOCK UP 1	CAR TARGET 2	LOWER LEFT 3 BANK MIDDLE	BOWL ENTRY	RIGHT 3 BANK MIDDLE	NOT USED	Black-Gray J208-10 Upper Left Flipper E.O.S.
Orange-Gray J205-9 U18-5 Normal Function Begin Test D8	8 White-Gray J208-9 U19-7	SHOOTER LANE	CRANE DOWN	TOP RIGHT CRANE	CAR TARGET 3	LOWER LEFT 3 BANK TOP	BOWL EXIT	RIGHT 3 BANK TOP	NOT USED	Black-Blue J212-9 Upper Left Flipper Opto

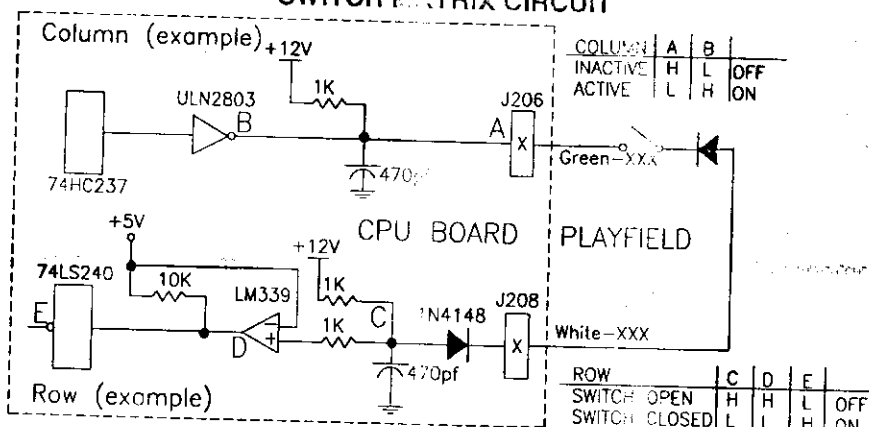
J2XX = CPU BOARD

- OPTO. TYPICALLY 0.005"

J2XX = CPU BOARD

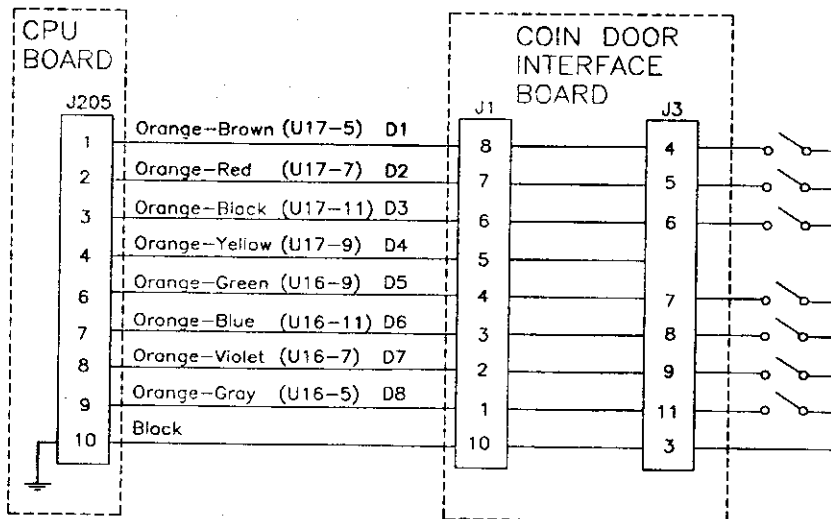
= OPTO, TYPICALLY CLOSED

SWITCH MATRIX CIRCUIT



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, therefore, its output is 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



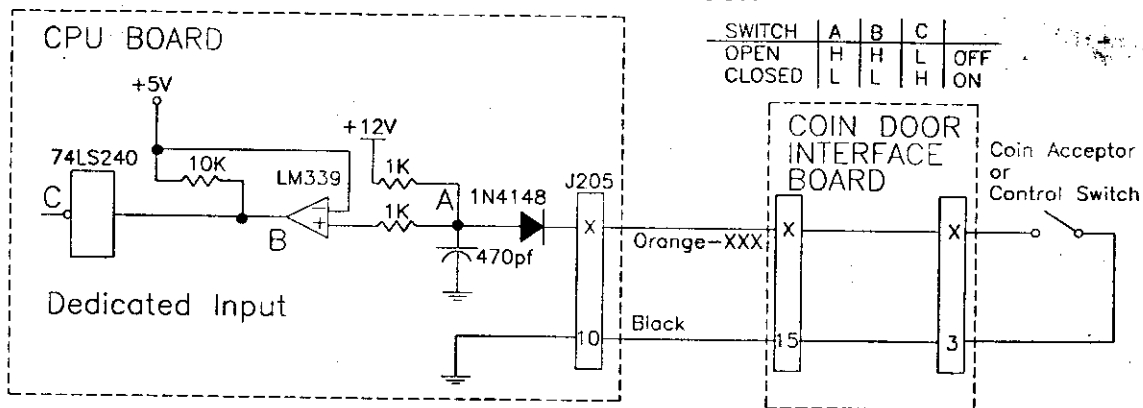
Coin Acceptor Switches

- D1 - Left Coin Chute
- D2 - Center Coin Chute
- D3 - Right Coin Chute
- D4 - Fourth 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



The dedicated switches operate similar 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).

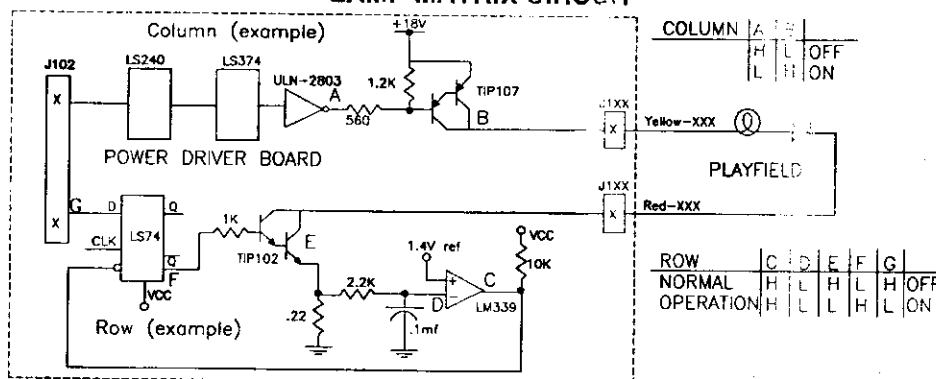
When a switch closes, the row side (dedicated input) of the circuit activates. The "+" input to the LM339 drops below +5V, therefore the output is low. Since the row circuit (dedicated input) is tied directly to ground through the switch, the switch is considered closed by the microprocessor. When the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

LAMP MATRIX

		Yellow (B+)  Red						
Column	1 Yellow-Brown J121-1 Q96	2 Yellow-Red J121-2 Q100	3 Yellow-Orange J121-3 Q95	4 Yellow-Black J121-4 Q99	5 Yellow-Green J121-5 Q94	6 Yellow-Blue J121-6 Q98	7 Yellow-Violet J121-7 Q93	8 Yellow-Gray J121-9 Q97
Row	1 Red-Brown J125-1 Q104	2 Red-Black J125-2 Q108	3 Red-Orange J125-4 Q103	4 Red-Yellow J125-5 Q107	5 Red-Green J125-6 Q102	6 Red-Blue J125-7 Q106	7 Red-Violet J125-8 Q101	8 Red-Gray J125-9 Q105
	TOP LEFT BANK BOTTOM 11	RIGHT 3 BANK TOP 21	JACKPOT 31	GEN. BUS 41	GEN. TOILET 51	PROPELLER 61	TIME MACHINE 71	FIREWORKS 81
	TOP LEFT BANK MIDDLE 12	RIGHT 3 BANK MIDDLE 22	SUPER JACKPOT 32	TOAST 42	WINDOW SHOPPING 52	OUTER SPACE 62	START ADVENTURE 72	TOXIC WASTE 82
	TOP LEFT BANK TOP 13	RIGHT 3 BANK BOTTOM 23	MULTIBALL 33	MAGIC BUS 43	LEFT RECYCLE 53	DO(G) 63	EXTRA BALL 73	LIGHT EXTRA BALL 83
	TOP RIGHT BANK TOP 14	LEFT BANK BOTTOM 24	WRECKING BALL 34	COLLECT JUNK 44	LEFT CRANE H. U. 54	(D)OG 64	TOAST 74	FREE GAME 84
	TOP RIGHT BANK MIDDLE 15	LEFT BANK MIDDLE 25	RADAR ADVENTURE 35	COO COO CLOCK 45	SHOOT AGAIN 55	D(O)G 65	GEN. SEWER 75	LIGHT JACKPOT 85
	TOP RIGHT BANK BOTTOM 16	LEFT BANK TOP 26	JALOPY RACE 36	TELEVISION 46	NOT USED 56	CHOOSE JUNK 66	TOASTER GUN 76	GEN. CRANE 86
	RIGHT RECYCLE 17	FAN 27	TOILET ADVENTURE 37	WEATHER VANE 47	TOASTER 57	ANGEL SLING 67	GEN. ALLEY 77	NOT USED 87
	RIGHT CRANE H. U. 18	BATH TUB 28	A.T.C. ADVENTURE 38	FISH BOWL 48	HAIR DRYER 58	BICYCLES 68	DEVIL SLING 78	START BUTTON 88

J1XX = Power Driver Board

LAMP MATRIX CIRCUIT



The microprocessor 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 microprocessor drives the input of the 74LS74 low, causing a high at output "F". A high state at the base of the TIP102 causes the transistor to conduct, bringing the row circuit to ground and turning the lamp on. The microprocessor 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 circuit off.

SOLENOID/FLASHER TABLE

Sol. No.	Function	Solenoid Type	Voltage Connections			Drive Xistor	Drive Connections			Drive Wire Color	Solenoid Part Number	
			Playfield	Backbox	Cabinet		Playfield	Backbox	Cabinet		Flashlamp Type	Backbox
01	AUTO PLUNGER	High Power	J133-2			Q72	J116-1			VIO-BRN	AE-23-800	
02	REFRIGERATOR POPPER	High Power	J133-2			Q68	J116-2			VIO-RED	AE-23-800	
03	POWER CRANE	High Power	J133-2			Q71	J116-4			VIO-ORG	A-20099	
04	NOT USED	High Power				Q67				VIO-YEL		
05	SCOOP DOWN	High Power	J133-2			Q70	J116-6			VIO-GRN	SM1-28-900	
06	BUS DIVERter	High Power	J133-2			Q66	J116-7			VIO-BLU	AE-27-1200	
07	KNOCKER	High Power		J133-2		Q69		J116-8		VIO-BLK		AE-23-800
08	NOT USED	High Power				Q65	J116-9			VIO-GRY		
09	TROUGH	Low Power	J133-3			Q44	J113-1			BRN-BLK	AE-26-1500	
10	LEFT SLINGSHOT	Low Power	J133-3			Q48	J113-3			BRN-RED	AE-26-1200	
11	RIGHT SLINGSHOT	Low Power	J133-3			Q43	J113-4			BRN-ORG	AE-26-1200	
12	NOT USED	Low Power				Q47				BRN-YEL		
13	NOT USED	Low Power				Q42				BRN-GRN		
14	NOT USED	Low Power				Q46				BRN-BLU		
15	HOLD CRANE	Low Power	J133-2			Q41	J113-8			BRN-VIO	A-20099	
16	MOVE DOG	Low Power	J133-3			Q45	J113-9			BRN-GRY	AE-26-1200	
17	DOG FACE FLASHER	Flasher	J133-6			Q28	J111-1			BLK-BRN	#906 (1)	
18	WINDOW SHOP FLSHR	Flasher	J133-6			Q32		J112-2		BLK-RED		#906 (1)
19	AUTOFIRE FLASHERS	Flasher	J133-6			Q27	J111-3			BLK-ORG	#89 (2)	
20	LEFT SIDE FLASHERS	Flasher	J133-6			Q31		J112-5		BLK-YEL	#906 (1)	#906 (1)
21	SCOOP UP**	Low Power	J133-3			Q26		1-5		BLU-GRN	AE-26-1200	
22	UNDER CRANE FLSHR	Flasher	J133-6			Q30		1-6		BLU-BLK	#906 (1)	
23	BACK LEFT FLASHERS	Flasher	J133-6			Q29	J111-7	J112-8		BLU-VIO	#906 (1)	#906 (1)
24	BACK RIGHT FLASHERS	Flasher	J133-6			Q25	J111-8	J112-9		BLU-GRY	#906 (1)	#906 (1)
25	SHOOTER FLASHER	Gen. Purpose	J133-6			Q2	J109-1			BLU-BRN	#906 (1)	
26	SCOOP FLASHERS	Gen. Purpose	J133-6			Q1	J109-2	J106-3		BLU-RED	#906 (1)	#906 (1)
27	DOG HOUSE FLASHER	Gen. Purpose	J133-6			Q3	J109-3			BLU-ORG	#89 (1)	
28	CARS FLASHERS	Gen. Purpose	J133-6			Q4	J109-4			BLU-YEL	#89 (2)	

General Illumination

01	PLAYFIELD STRING 1	G.I.	J105-1			Q5	J105-7			WHT-BRN	#44	
02	PLAYFIELD STRING 2	G.I.	J105-2			Q4	J105-8			WHT-ORG	#44	
03	LOGO STRING 3	G.I.		J106-3		Q3		J106-9		WHT-YEL		#555
04	*ILLUMINATION STRING 4	G.I.		J106-5		Q2		J106-10		WHT-GRN		#555
05	*ILLUMINATION STRING 5	G.I.		J106-6	J104-3	Q1		J106-11	J104-1	WHT-VIO		#555

Flipper Circuits		Voltage Connection	Drive Transistors		Drive Connections	Drive Wire Colors		Coil Part No.	Coil Colors
			Playfield	Power Hold		Playfield	Power Hold		
29		Lwr. Rt. Power	J119-1 (RED-GRN)	Q90		J120-13	YEL-GRN	FL-11629	BLUE
30	LOWER RIGHT FLIPPER	Lwr. Rt. Hold	J119-1 (RED-GRN)	Q92		J120-11	ORG-GRN		
31		Lwr. Lt. Power	J119-4 (RED-BLU)	Q87		J120-9	YEL-BLU	FL-11629	BLUE
32	LOWER LEFT FLIPPER	Lwr. Lt. Hold	J119-4 (RED-BLU)	Q89		J120-7	ORG-BLU		
33	NOT USED	Upr. Rt. Power	J119-6 (RED-VIO)	Q84		J120-6	YEL-VIO	NOT USED	
34	UPPER RIGHT FLIPPER	Upr. Rt. Hold	J119-6 (RED-VIO)	Q85		J120-4	ORG-VIO		
35	NOT USED	Upr. Lt. Power	J119-8 (RED-GRY)	Q81		J120-3	YEL-GRY	NOT USED	
36	UPPER LEFT FLIPPER	Upr. Lt. Hold	J119-8 (RED-GRY)	Q83		J120-1	ORG-GRY		

J1XX = POWER DRIVER BOARD

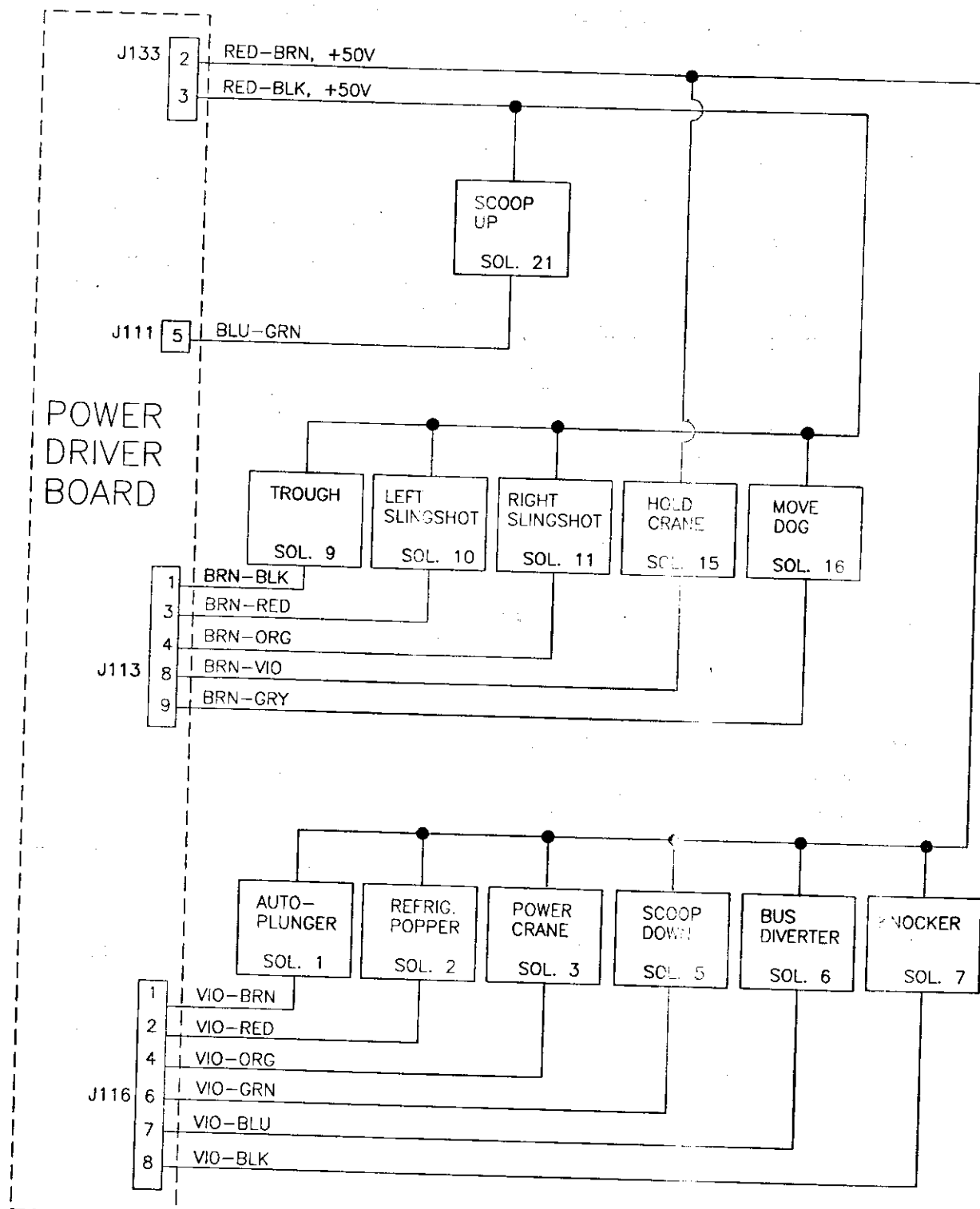
24-6549 = #44 BULB; 24-8704 = #89 BULB; 24-8768 = #555 BULB; 24-8802 = #906 BULB

*THESE G.I. STRINGS DO NOT BRIGHTEN AND DIM, THEY ARE ALWAYS ON.

** TIEBACK DIODE FROM J111-12 & J111-13.

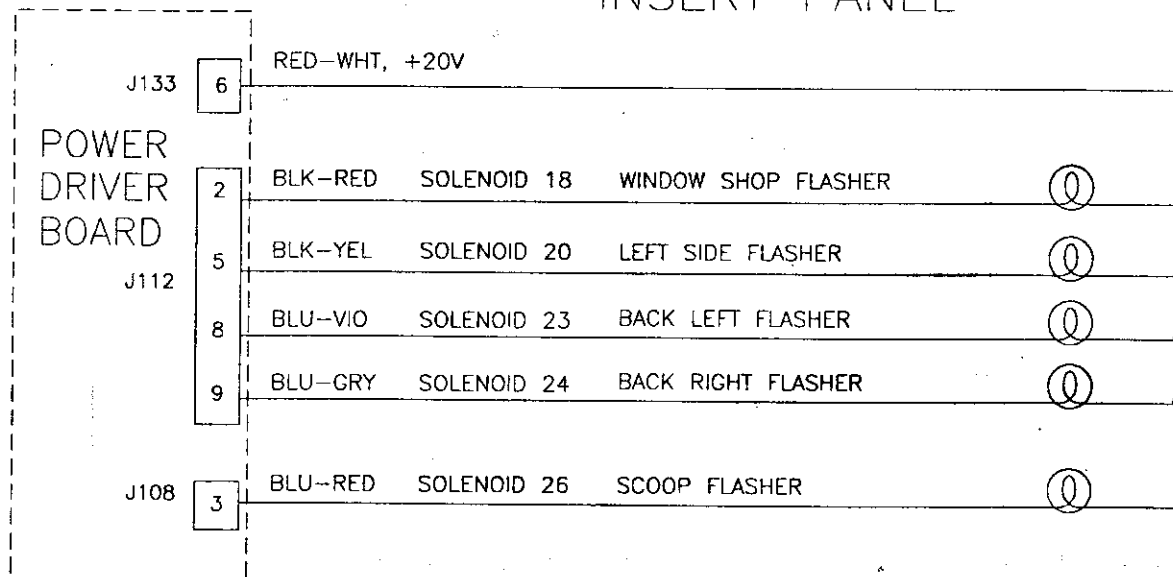
COILS

SOLENOID WIRING

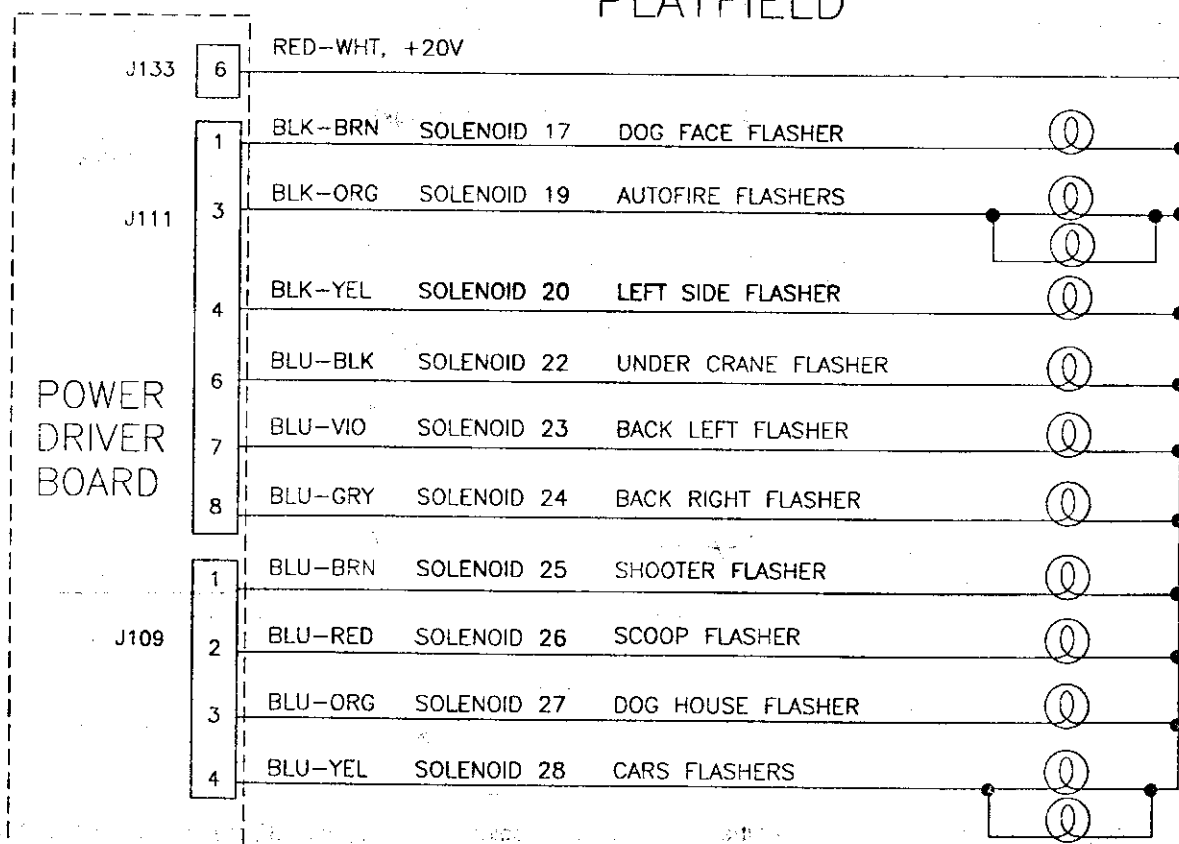


FLASHLAMPS

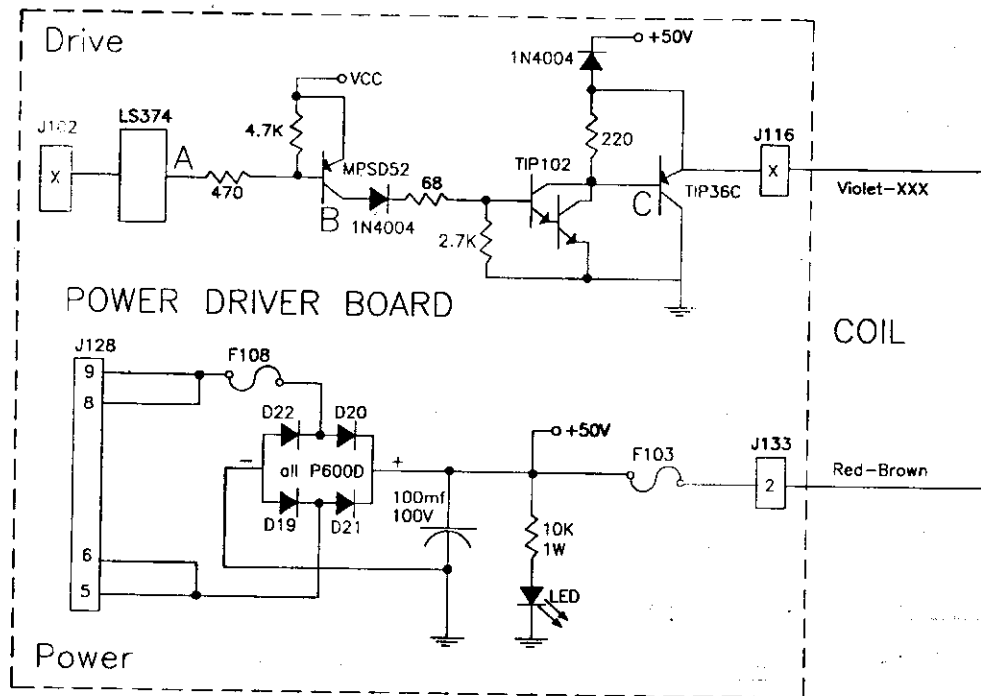
INSERT PANEL



PLAYFIELD

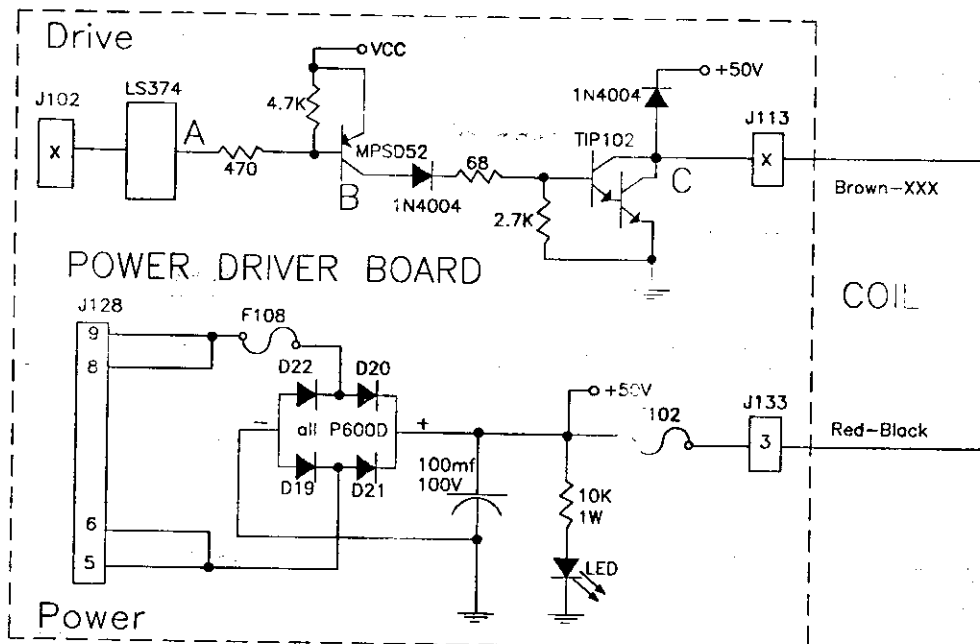


HIGH POWER SOLENOID CIRCUIT



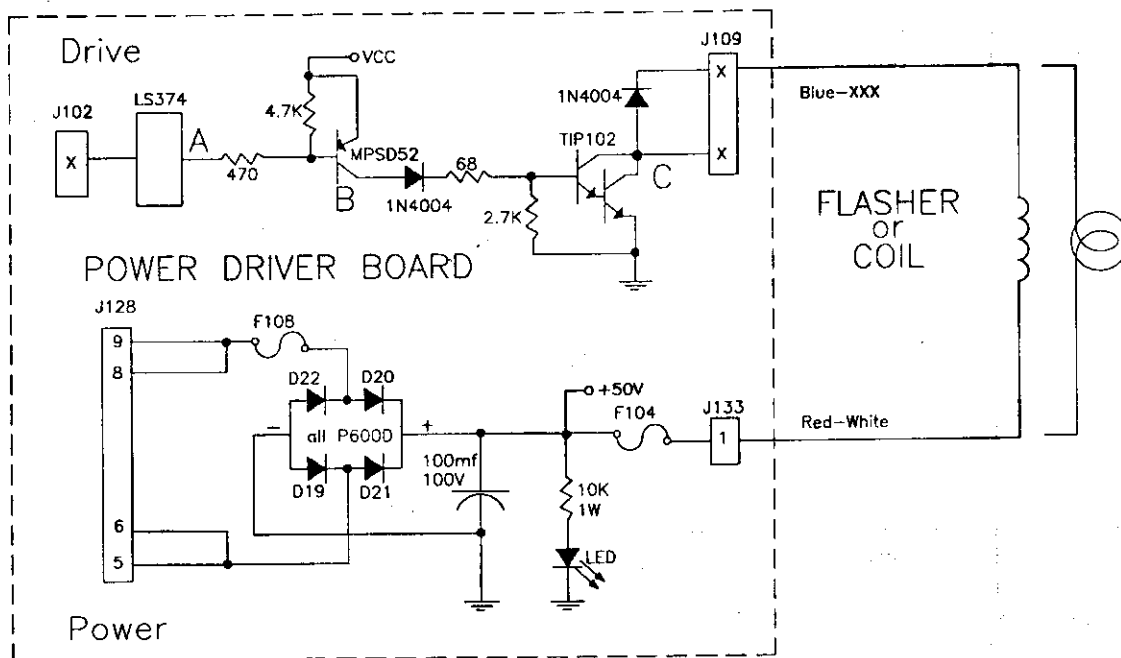
The microprocessor toggles the output of the 74LS374. When point "A" is low, point "B", the collector of the 2N5401 transistor, is high. A high at point "B" causes point "C", the collector of the TIP102 transistor and point "D", the emitter of the TIP36C transistor, to drop low. When point "D" is low, the coil is grounded through the transistor and 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 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 turns on. The coil shuts off when point "A" toggles high.

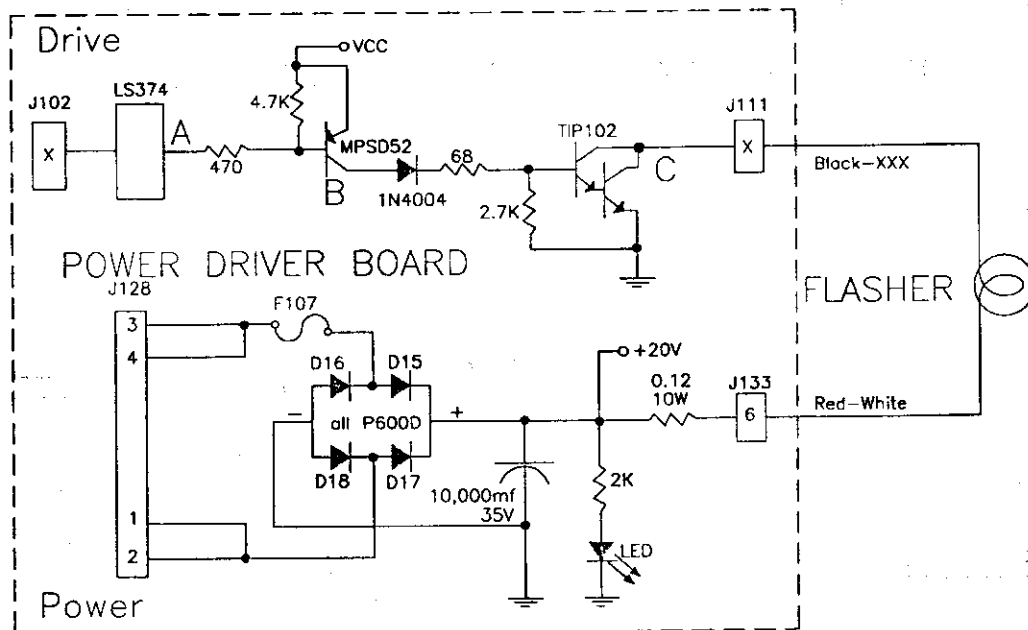
SPECIAL (GENERAL PURPOSE) SOLENOID CIRCUIT



The microprocessor toggles the output of the 74LS374. When point "A" is low, point "B" the collector of the 2N5401 transistor, is high. 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 turns on. When point "A" toggles high the coil/flashlamp turns off.

* Tieback diode is not used for flashlamp circuit.

FLASHLAMP 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 turns on. When point "A" toggles high, the current shuts off.

GENERAL ILLUMINATION CIRCUIT

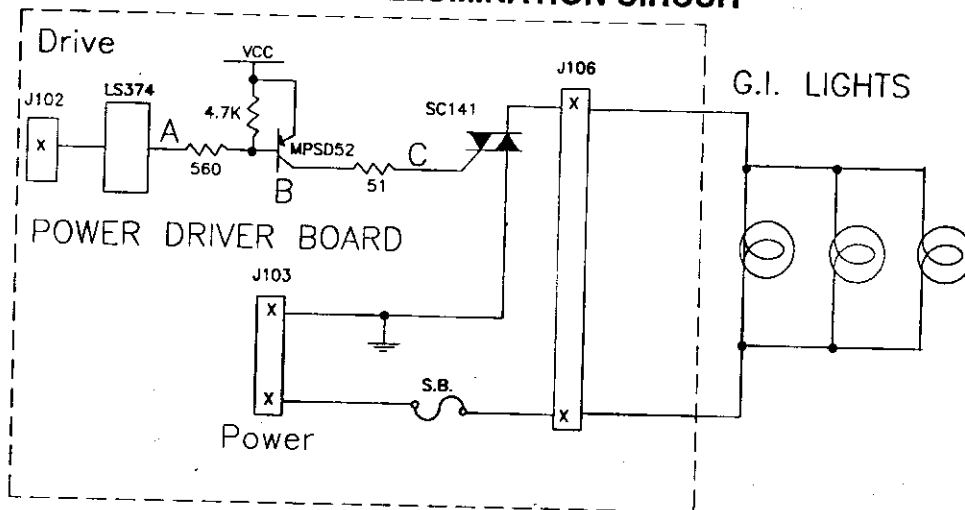


Figure #1

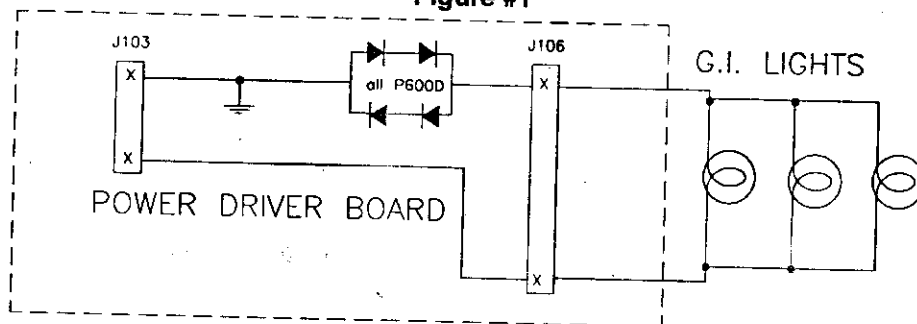
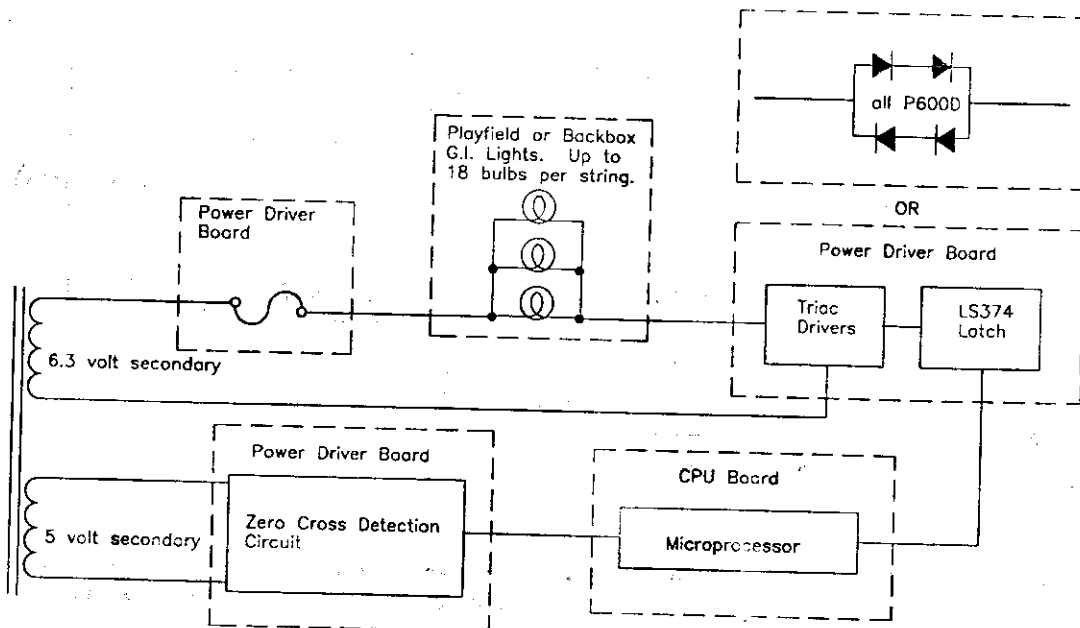


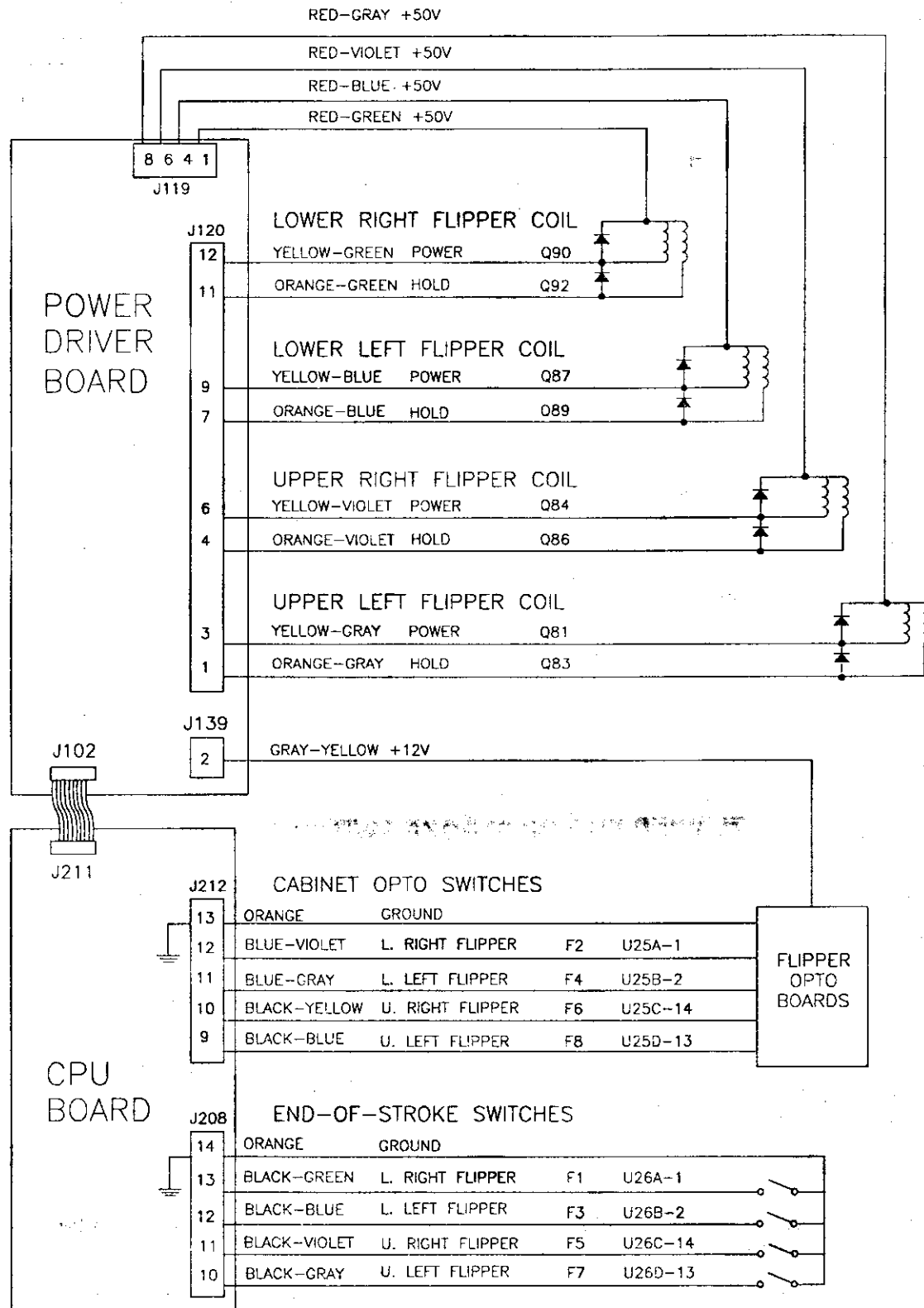
Figure #2

There are five general illumination strings; three like figure #1 and two like figure #2. When point "A" toggles low, points, "B" and "C" are high. This turns on the triac and the desired general illumination string of lights.

BLOCK DIAGRAM OF GENERAL ILLUMINATION CIRCUIT

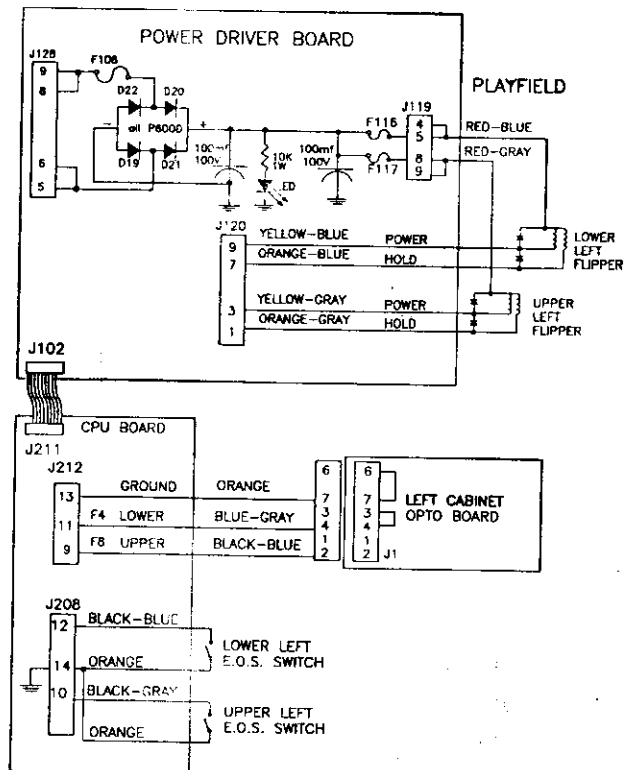


FLIPPER CIRCUIT DIAGRAM

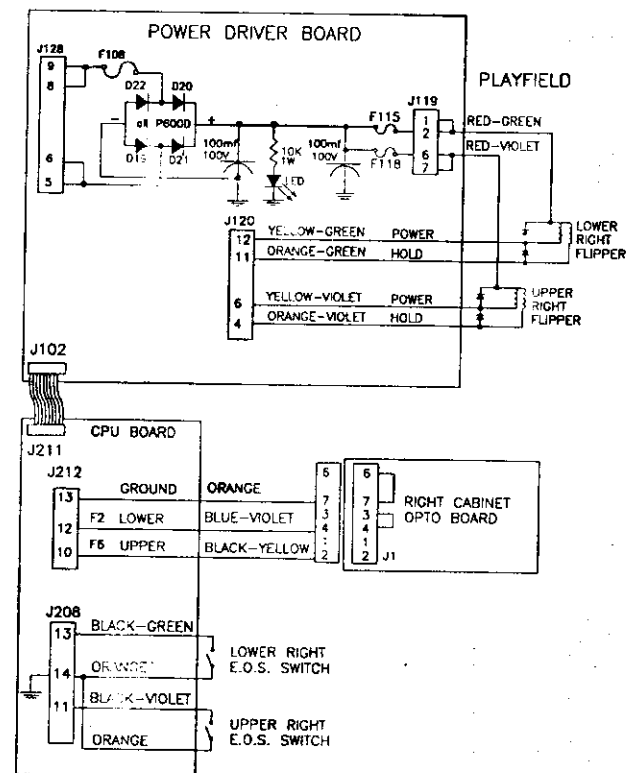


FLIPPER COIL CIRCUITS

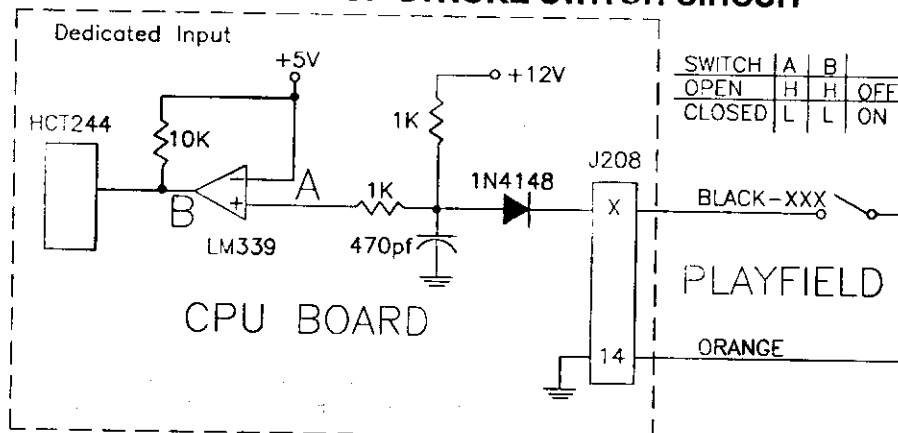
LEFT FLIPPER CIRCUIT



RIGHT FLIPPER CIRCUIT



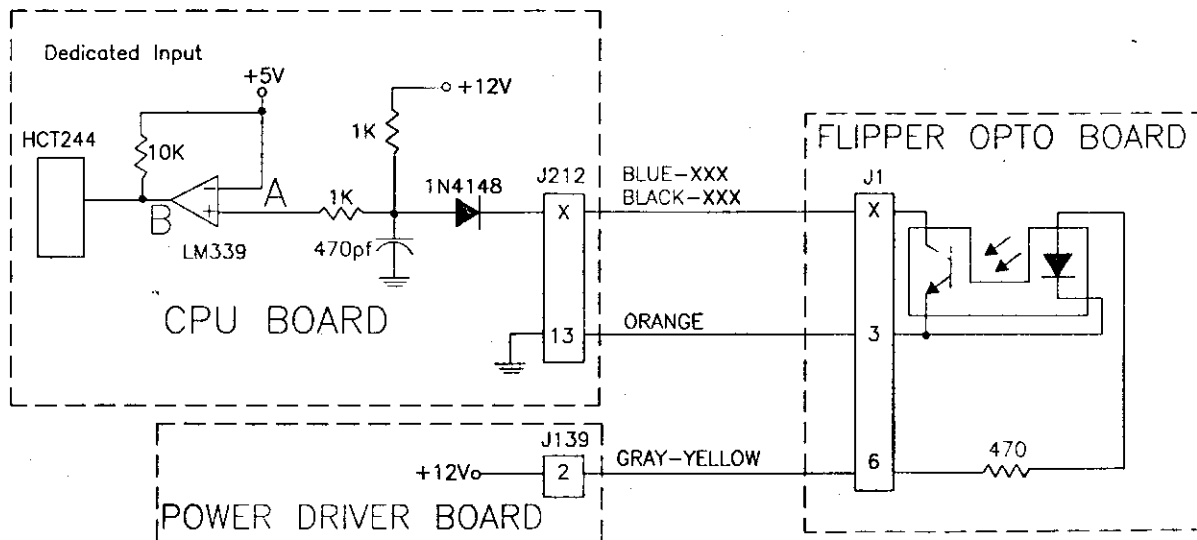
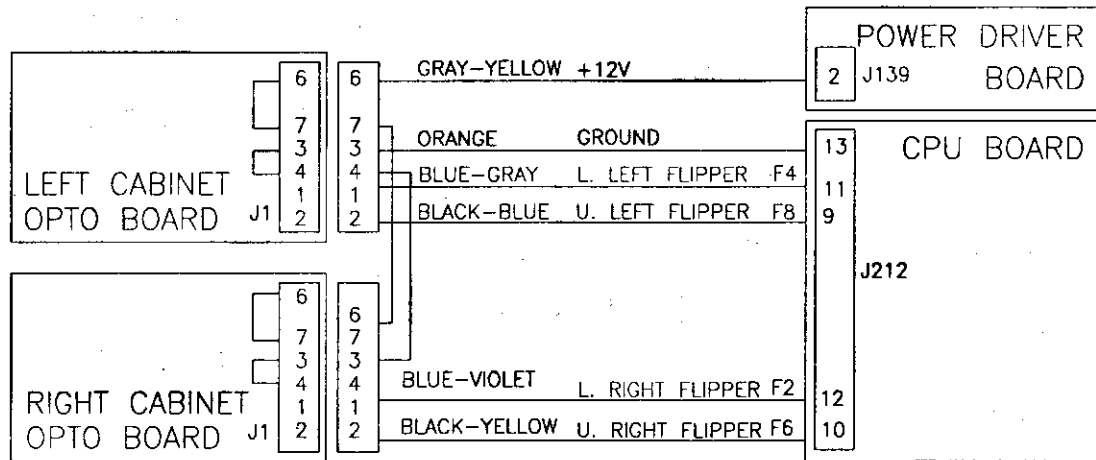
FLIPPER END-OF-STROKE SWITCH CIRCUIT



The flipper E.O.S. 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 of the LM339 drops below +5V therefore its output is 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.

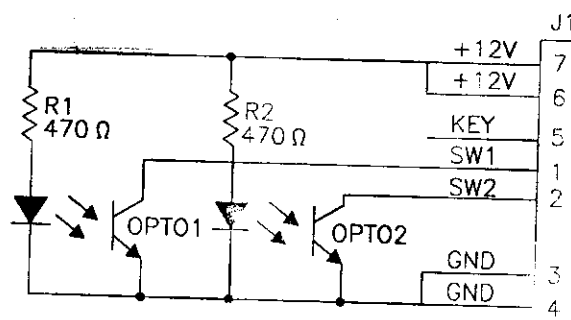
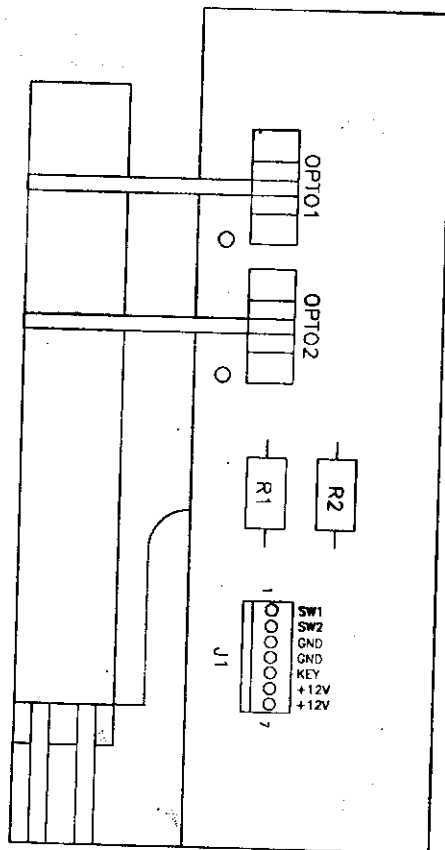
FLIPPER CABINET SWITCH CIRCUITS



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

When a switch closes, the row side (dedicated input) of the circuit activates. The "+" input to the LM339 drops below +5V, therefore, its output is 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.

FLIPPER OPTO BOARD ASSEMBLY **A-17316**



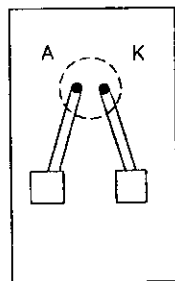
Left Flipper Opto Board Assembly

- J1-1 Black-Blue from CPU board J212-9
- J1-2 Blue-Gray from CPU board J212-11
- J1-3 N/C
- J1-4 Orange from CPU board J212-13
- J1-5 N/C
- J1-6 Gray-Yellow from Power Driver Board J139-2
- J1-7 Gray-Yellow from Power Driver Board J139-2

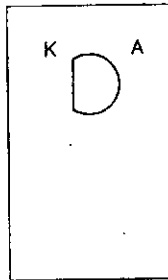
Right Flipper Opto Board Assembly

- J1-1 Black-Yellow from CPU board J212-10
- J1-2 Blue-Violet from CPU board J212-12
- J1-3 Orange from CPU board J212-13
- J1-4 Orange from Left Flipper Opto Board Assy J1-4
- J1-5 N/C
- J1-6 Gray-Yellow from Left Flipper Opto Board Assy J1-6
- J1-7 N/C

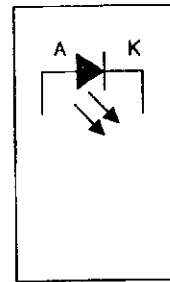
LED BOARD ASSEMBLY **A-16908** **(TRANSMITTER-GREEN BOARD)**



solder side

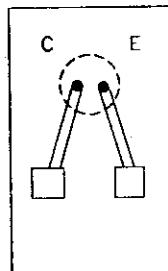


component side

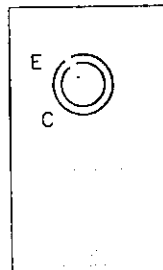


schematic

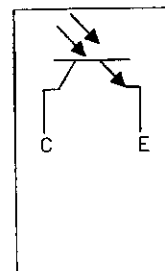
PHOTO TRANSISTOR BOARD ASSEMBLY **A-16909** **(RECEIVER-BLUE BOARD)**



solder side



component side



schematic

TYPICAL CIRCUIT DIAGRAM

LED BOARD
Transmitter
1.0-1.4 volts

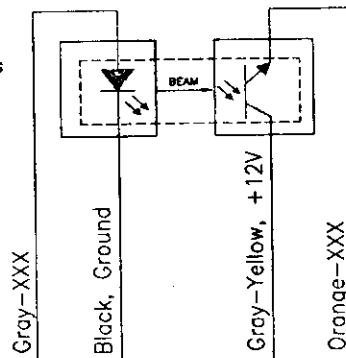
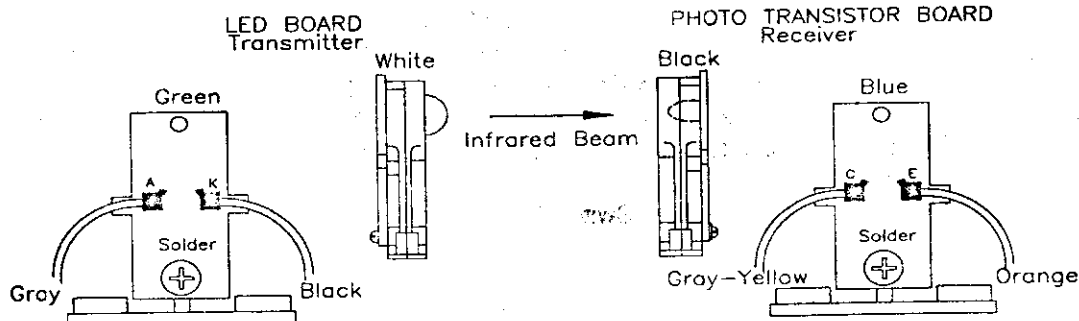
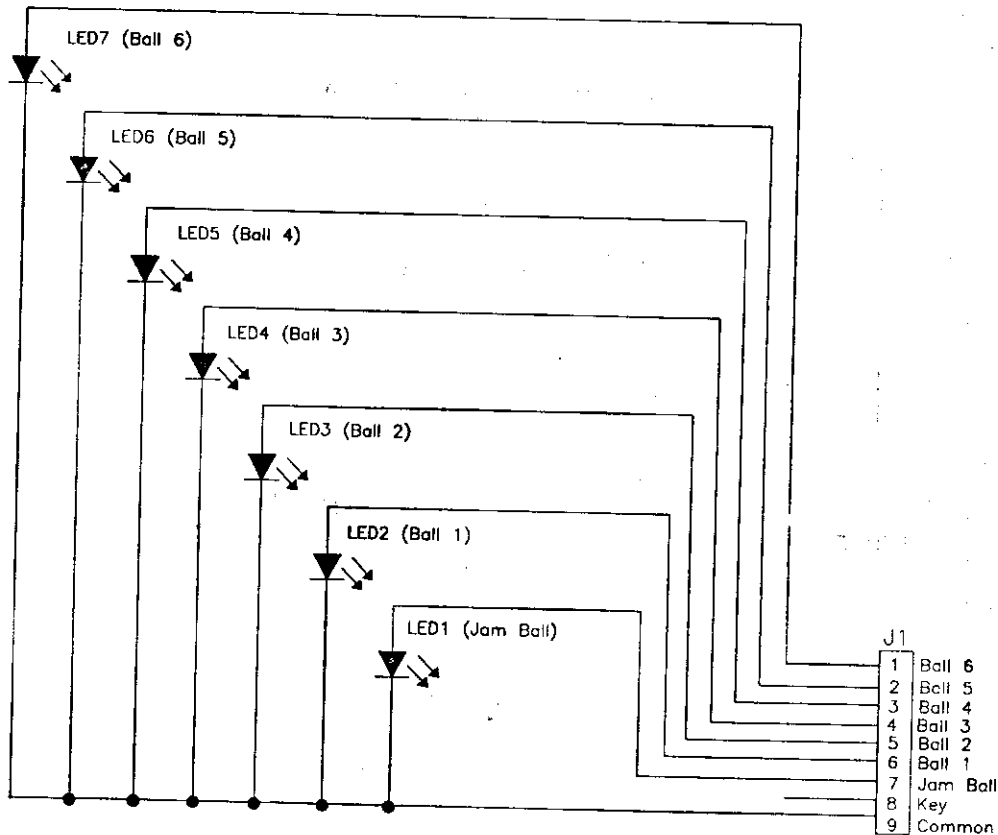
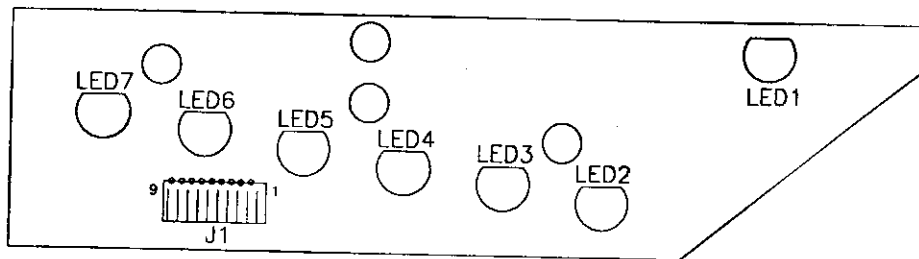


PHOTO TRANSISTOR BOARD
Receiver
0.1-0.7 volts unblocked
11-13 volts blocked

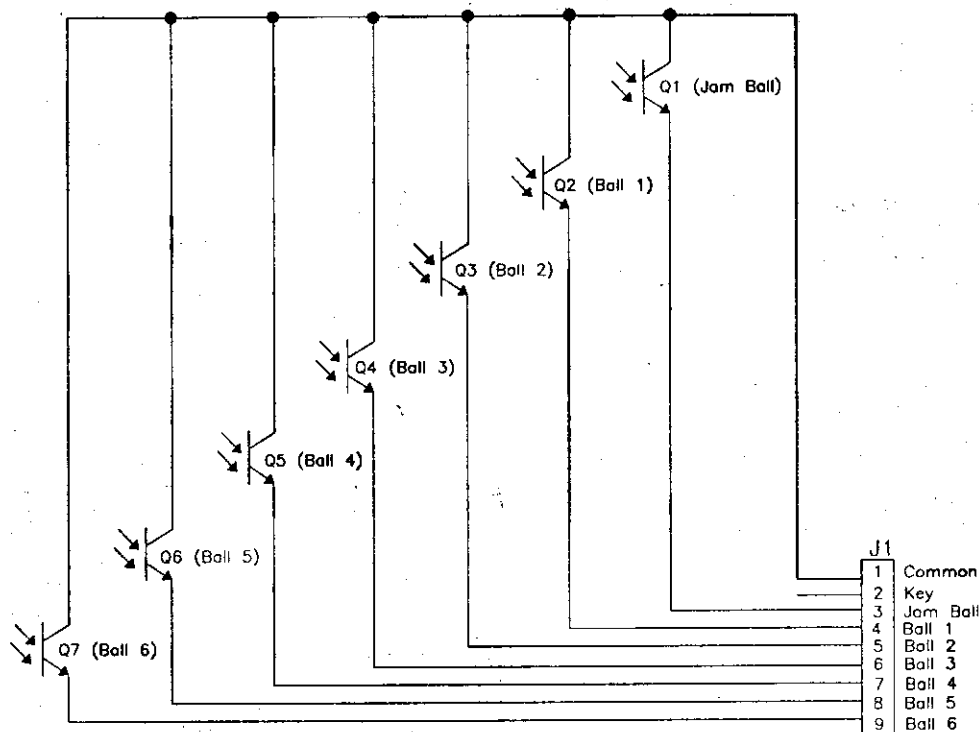
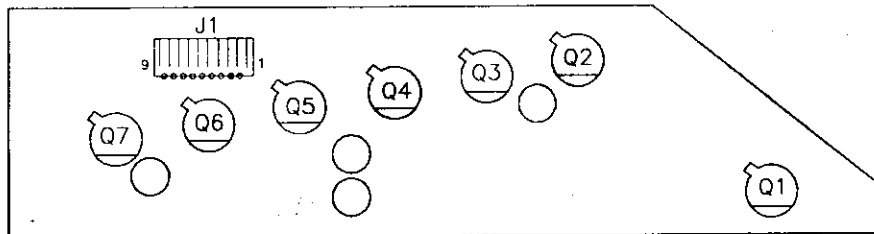


**Trough IR LED Board Assembly
(transmitter-green board)
A-18617-1**



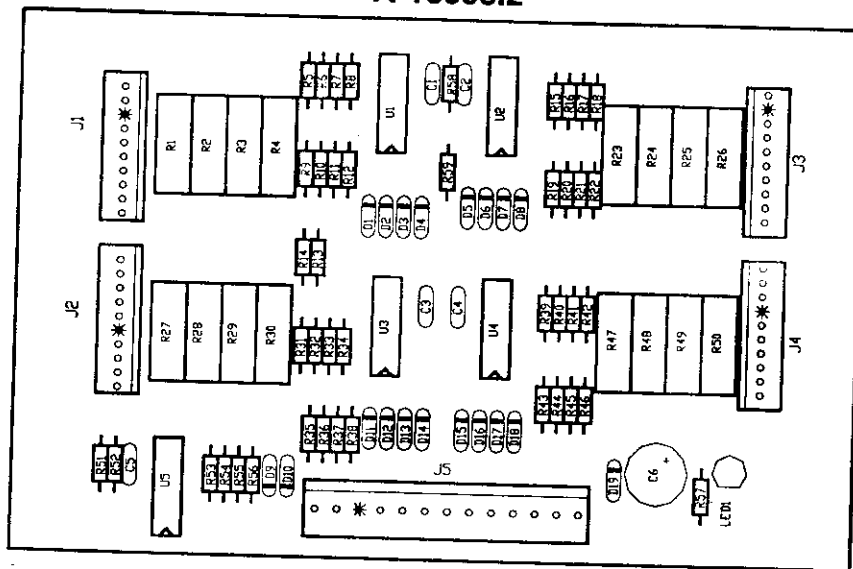
- J1-1 N/C
- J1-2 N/C
- J1-3 GRY-GRN, LED 5, to 16-Opto Switch Board J1-4
- J1-4 GRY-BLK, LED 4, to 16-Opto Switch Board J1-5
- J1-5 GRY-ORG, LED 3, to 16-Opto Switch Board J1-6
- J1-6 GRY-RED, LED 2, to 16-Opto Switch Board J1-7
- J1-7 GRY-BRN, LED 1, to 16-Opto Switch Board J1-9
- J1-8 Key
- J1-9 BLK, ground, to 16-Opto Switch Board J1-10

Trough IR Photo Transistor Board Assembly
(receiver-blue board)
A-18618-1



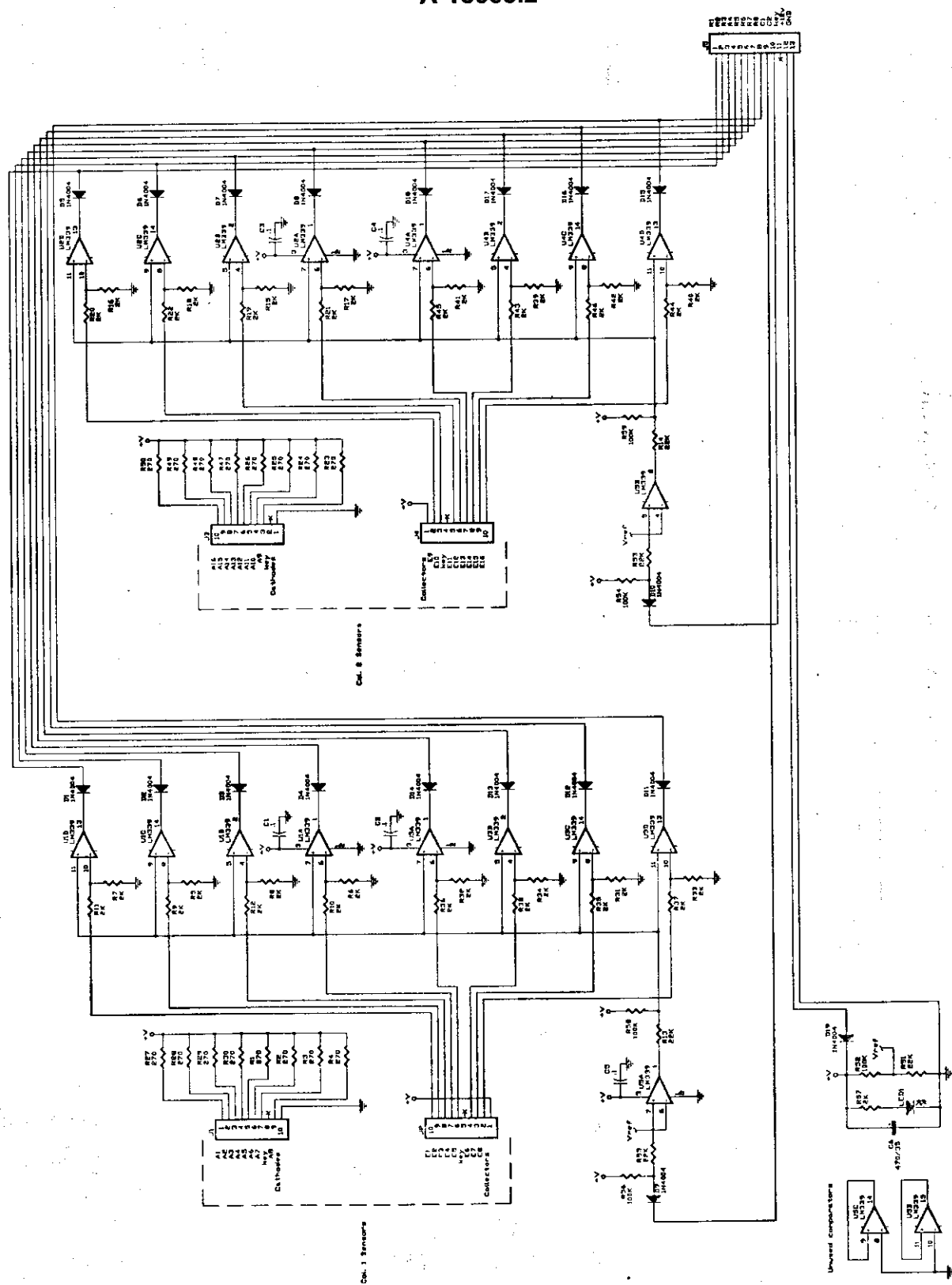
- J1-1 GRY-YEL, +12V, to 16-Opto Switch Board J2-1
 J1-2 Key
 J1-3 ORG-BRN, Photo Transistor 1, to 16-Opto Switch Board J2-10
 J1-4 ORG-RED, Photo Transistor 2, to 16-Opto Switch Board J2-9
 J1-5 ORG-BLK, Photo Transistor 3, to 16-Opto Switch Board J2-8
 J1-6 ORG-YEL, Photo Transistor 4, to 16-Opto Switch Board J2-7
 J1-7 ORG-GRN, Photo Transistor 5, to 16-Opto Switch Board J2-6
 J1-8 N/C
 J1-9 N/C

16-Opto Switch Board Assembly **A-16998.2**

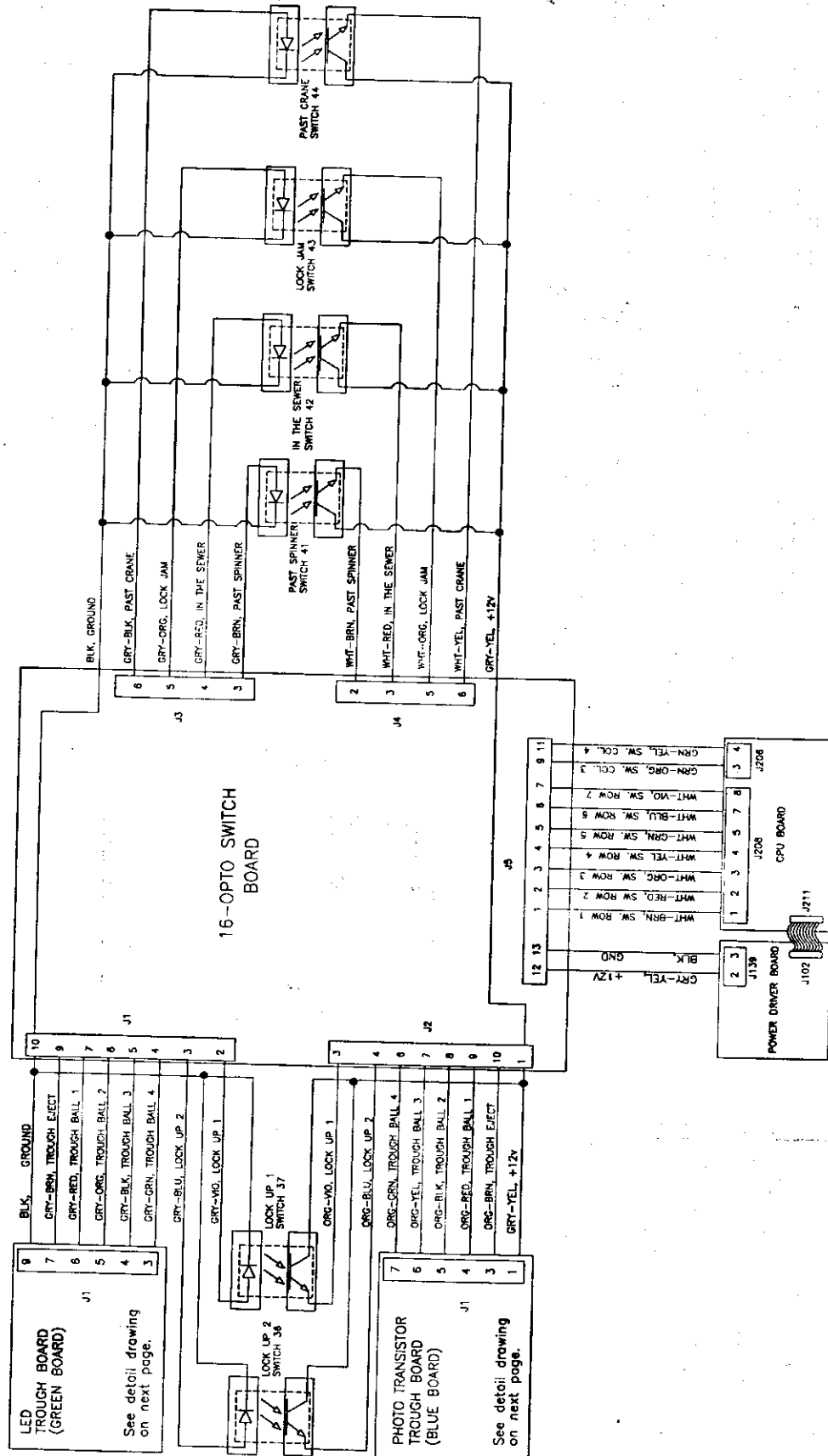


J1-1	N/C		J4-1	N/C	
J1-2	GRY-VIO	to Lock Up 1 (sw# 37) LED board	J4-2	WHT-BRN	to Past Spinner (sw# 41) Photo Trans brd
J1-3	GRY-BLU	to Lock Up 2 (sw# 36) LED board	J4-3	WHT-RED	to In the Sewer (sw# 42) Photo Trans brd
J1-4	GRY-GRN	to Trough LED board J1-3	J4-4	KEY	
J1-5	GRY-BLK	to Trough LED board J1-4	J4-5	WHT-ORG	to Lock Jam (sw# 43) Photo Trans brd
J1-6	GRY-ORG	to Trough LED board J1-5	J4-6	WHT-YEL	to Past Crane (sw# 44) Photo Trans brd
J1-7	GRY-RED	to Trough LED board J1-6	J4-7	N/C	
J1-8	KEY		J4-8	N/C	
J1-9	GRY-BRN	to Trough LED board J1-7	J4-9	N/C	
J1-10	BLK	Ground to LED boards	J4-10	N/C	
J2-1	GRY-YEL	+12V to Photo Transistor boards	J5-1	WHT-BRN	switch row 1 from CPU J208-1
J2-2	N/C		J5-2	WHT-RED	switch row 2 from CPU J208-2
J2-3	ORG-VIO	to Lock Up 1 (sw# 37) Photo Trans brd	J5-3	WHT-ORG	switch row 3 from CPU J208-3
J2-4	ORG-BLU	to Lock Up 2 (sw# 36) Photo Trans brd	J5-4	WHT-YEL	switch row 4 from CPU J208-4
J2-5	KEY		J5-5	WHT-GRN	switch row 5 from CPU J208-5
J2-6	ORG-GRN	to Trough Photo Trans brd J1-7	J5-6	WHT-BLU	switch row 6 from CPU J208-7
J2-7	ORG-YEL	to Trough Photo Trans brd J1-6	J5-7	WHT-VIO	switch row 7 from CPU J208-8
J2-8	ORG-BLK	to Trough Photo Trans brd J1-5	J5-8	N/C	
J2-9	ORG-RED	+12V to Trough Photo Trans brd J1-4	J5-9	GRN-ORG	switch col. 3 from CPU J206-3
J2-10	ORG-BRN	to Trough Photo Trans brd J1-3	J5-10	KEY	
J3-1	N/C		J5-11	GRN-YEL	switch col. 4 from CPU J206-4
J3-2	KEY		J5-12	GRY-YEL	+12V from Power Driver brd J139-2
J3-3	GRY-BRN	to Past Spinner (sw# 41) LED board	J5-13	BLK	Ground from Power Driver brd J139-3
J3-4	GRY-RED	to In the Sewer (sw# 42) LED board			
J3-5	GRY-ORG	to Lock Jam (sw# 43) LED board			
J3-6	GRY-BLK	to Past Crane (sw# 44) LED board			
J3-7	N/C				
J3-8	N/C				
J3-9	N/C				
J3-10	N/C				

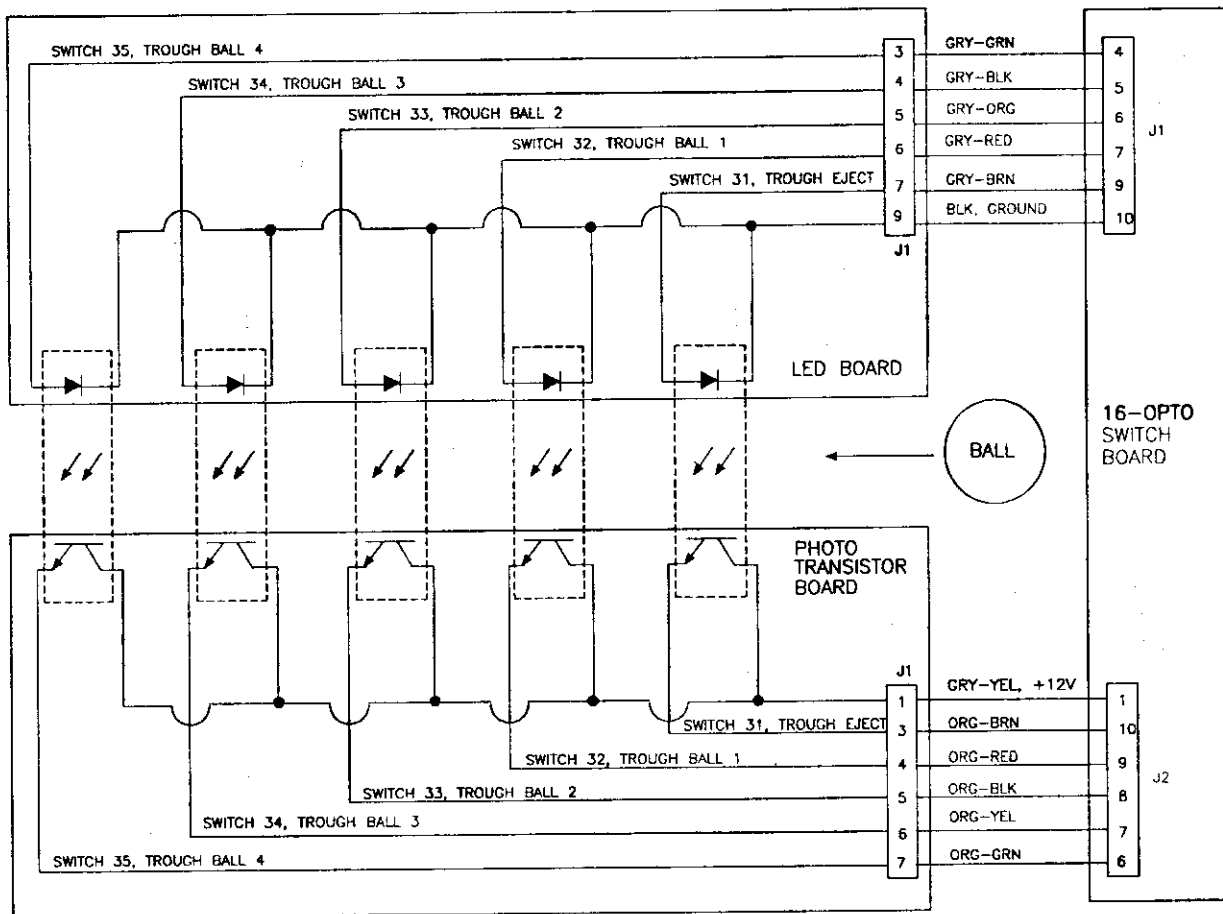
16-Opto Switch Board Schematic A-16998.2



Playfield Opto Switches Wiring Diagram

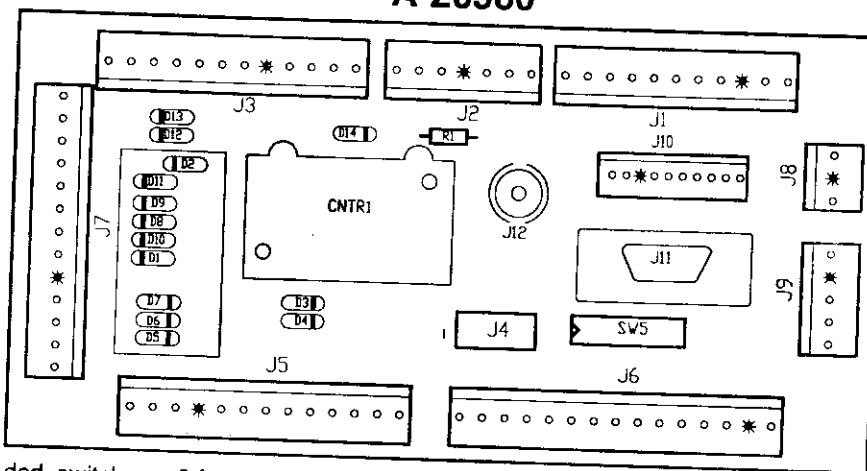


Trough Opto Switches Wiring Diagram



THE BALL ROLLS BETWEEN THE LED BOARD AND THE PHOTO TRANSISTOR BOARD, BREAKING THE BEAM. WHEN THE BEAM IS BROKEN THE SWITCH IS MADE.

Coin Door Interface Board A-20580



J1-1 ORG-GRY, ded. switch row 8 from CPU J205-9
 J1-2 ORG-VIO, ded. switch row 7 from CPU J205-8
 J1-3 ORG-BLU, ded. switch row 6 from CPU J205-7
 J1-4 ORG-GRN, ded. switch row 5 from CPU J205-6
 J1-5 ORG-YEL, ded. switch row 4 from CPU J205-4
 J1-6 ORG-BLK, ded. switch row 3 from CPU J205-3
 J1-7 ORG-RED, ded. switch row 2 from CPU J205-2
 J1-8 ORG-BRN, ded. switch row 1 from CPU J205-1
 J1-9 KEY
 J1-10 BLK, ground from CPU J205-10
 J1-11 ORG-WHT, switch enable from CPU J205-12

J2-1 BLK, ground from Power Driver Board J141-3
 J2-2 GRY-YEL, +12vac for Power Driver Board J141-2
 J2-3 WHT-VIO, G.I. 6.8vac from Power Driver J104-1
 J2-4 KEY
 J2-5 VIO, G.I. from Power Driver Board J104-3
 J2-6 N/C
 J2-7 BLK-WHT, signal for coin meter from Power Driver board J139-5

J3-1 GRN-BRN, switch column 1 from CPU J212-1
 J3-2 GRN-RED, switch column 2 from CPU J212-2
 J3-3 WHT-BRN, switch row 1 from CPU J212-4
 J3-4 WHT-RED, switch row 2 from CPU J212-6
 J3-5 WHT-ORG, switch row 3 from CPU J212-7
 J3-6 WHT-YEL, switch row 4 from CPU J212-8
 J3-7 KEY
 J3-8 YEL-GRY, lamp col. 8 from Power Driver J122-3
 J3-9 RED-BLU, lamp row 6 from Power Driver J125-7
 J3-10 RED-VIO, lamp row 7 from Power Driver J125-8
 J3-11 RED-GRY, lamp row 8 from Power Driver J125-9

J4- NOT USED

J5-1 VIO, G.I. return to coin door
 J5-2 WHT-VIO, G.I. 6.8vac to coin door
 J5-3 BLK, ground to coin door
 J5-4 ORG-BRN, ded. switch row 1 to coin door
 J5-5 ORG-RED, ded. switch row 2 to coin door
 J5-6 ORG-BLK, ded. switch row 3 to coin door
 J5-7 ORG-GRN, ded. switch row 5 to coin door
 J5-8 ORG-BLU, ded. switch row 6 to coin door
 J5-9 ORG-VIO, ded. switch row 7 to coin door
 J5-10 KEY
 J5-11 ORG-GRY, ded. switch row 8 to coin door
 J5-12 GRN-RED, switch column 2 to coin door Slam Tilt
 J5-13 WHT-BRN, switch row 1 to coin door Slam Tilt

J6- NOT USED

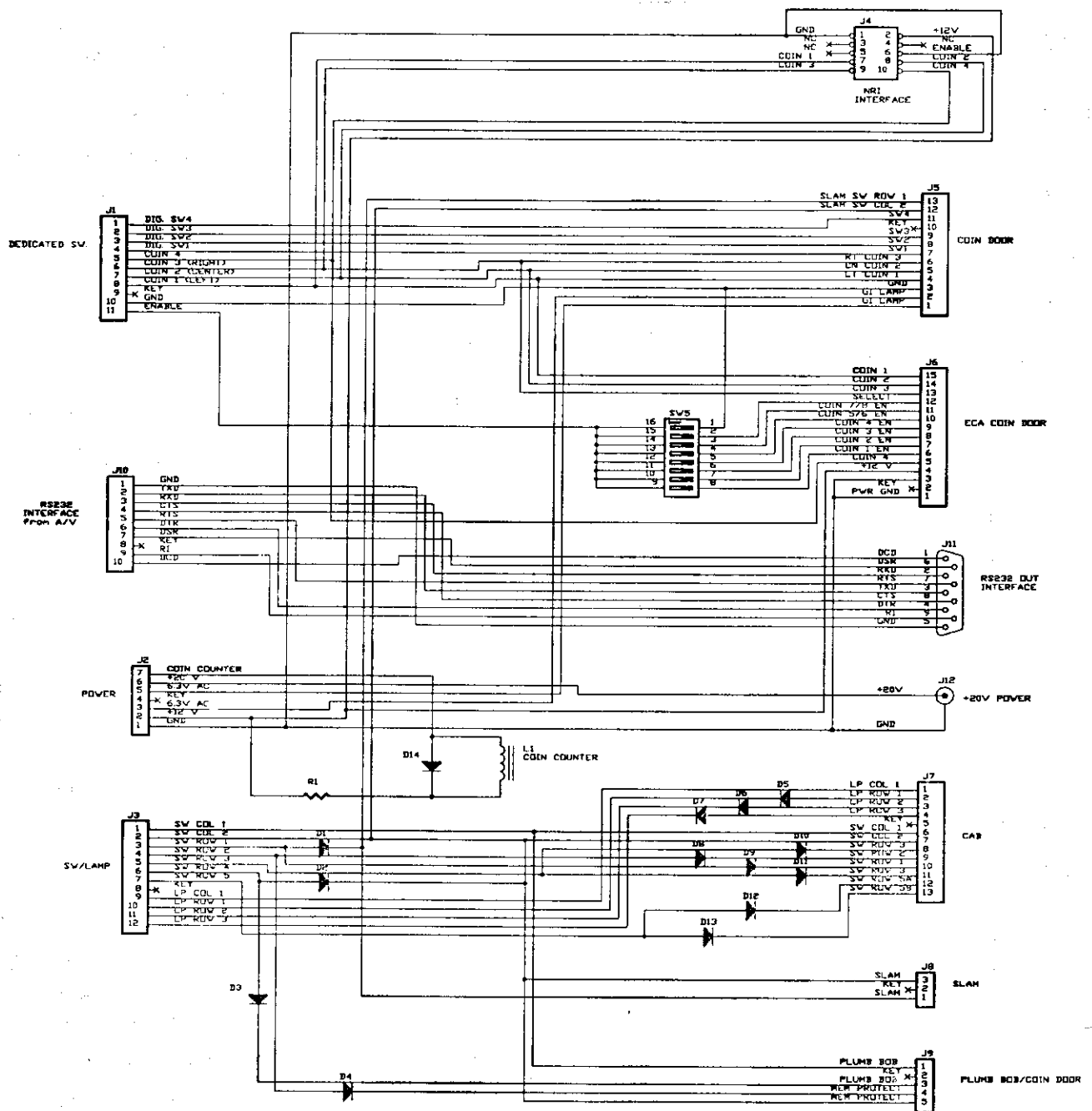
J7-1 YEL-GRY, lamp column 8 to cabinet
 J7-2 N/C
 J7-3 N/C
 J7-4 RED-GRY, lamp row 8 to cabinet
 J7-5 KEY
 J7-6 GRN-BRN, switch column 1 to cabinet
 J7-7 N/C
 J7-8 N/C
 J7-9 N/C
 J7-10 N/C
 J7-11 WHT-ORG, switch row 3 to cabinet
 J7-12 N/C
 J7-13 N/C

J8-1 WHT, switch row to cabinet Slam Tilt
 J8-2 KEY
 J8-3 GRN, switch column to cabinet Slam Tilt

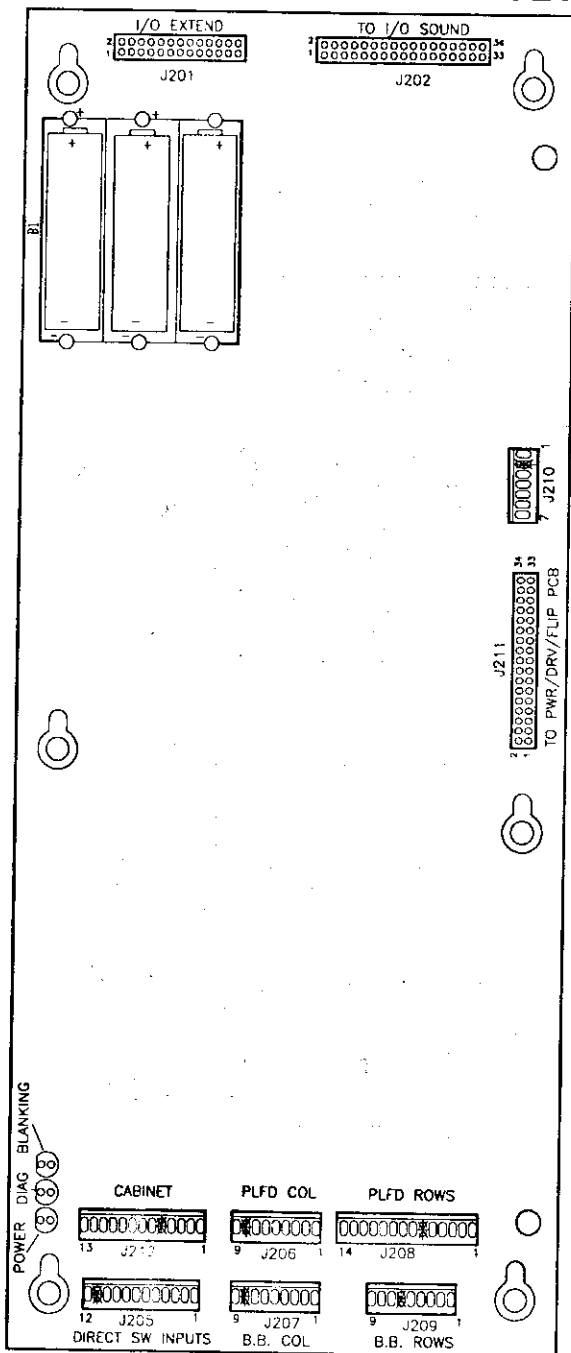
J9-1 WHT-YEL, switch row 4 to Plumb Bob Tilt
 J9-2 KEY
 J9-3 GRN-BRN, switch column 1 to Plumb Bob Tilt
 J9-4 WHT-RED, switch row 2 to Interlock Switch
 J9-5 GRN-RED, switch column 2 to Interlock Switch

J10, Ribbon cable to cash flow coin mechanism.

Coin Door Interface Board Schematic A-20580



Security CPU Board Assembly A-21377-50052



J201, 26-pin ribbon cable, data to/from J602

J202, 34-pin ribbon cable, data to/from J601

J203- NOT USED

J204- NOT USED

J205-1 ORG-BRN, ded. sw. row 1, to Coin Door Brd J1-8

J205-2 ORG-RED, ded. sw. row 2, to Coin Door Brd J1-7

J205-3 ORG-BLK, ded. sw. row 3, to Coin Door Brd J1-6

J205-4 ORG-YEL, ded. sw. row 4, to Coin Door Brd J1-5

J205-5 N/C

J205-6 ORG-GRN, ded. sw. row 5, to Coin Door Brd J1-4

J205-7 ORG-BLU, ded. sw. row 6, to Coin Door Brd J1-3

J205-8 ORG-VIO, ded. sw. row 7, to Coin Door Brd J1-2

J205-9 ORG-GRY, ded. sw. row 8, to Coin Door Brd J1-1

J205-10 BLK, ground, to Coin Door Brd J1-10

J205-11 KEY

J205-12 ORG-WHT, switch enable, to Coin Door Brd J1-11

J206-1 GRN-BRN, switch column 1, to playfield switches

J206-2 GRN-RED, switch column 2, to playfield switches

J206-3 GRN-ORG, switch column 3, to playfield switches

J206-4 GRN-YEL, switch column 4, to playfield switches

J206-5 GRN-BLK, switch column 5, to playfield switches

J206-6 GRN-BLU, switch column 6, to playfield switches

J206-7 GRN-VIO, switch column 7, to playfield switches

J206-8 KEY

J206-9 N/C

J207- NOT USED

J208-1 WHT-BRN, switch row 1, to playfield switches

J208-2 WHT-RED, switch row 2, to playfield switches

J208-3 WHT-ORG, switch row 3, to playfield switches

J208-4 WHT-YEL, switch row 4, to playfield switches

J208-5 WHT-GRN, switch row 5, to playfield switches

J208-6 KEY

J208-7 WHT-BLU, switch row 6, to playfield switches

J208-8 WHT-VIO, switch row 7, to playfield switches

J208-9 WHT-GRY, switch row 8, to playfield switches

J208-10 N/C

J208-11 BLK-VIO, F5 to Spinner

J208-12 BLK-BLU, F3, to lower left E.O.S. switch

J208-13 BLK-GRN, F1, to lower right E.O.S. switch

J208-14 ORG, ground to E.O.S. switches

J209-NOT USED

J210-1 BLK, ground, from Power Driver Board J101-5, 7

J210-2 KEY

J210-3 BLK, ground, from Power Driver Board J101-5, 7

J210-4 GRY, +5V, from Power Driver Board J101-3, 4

J210-5 GRY, +5V, from Power Driver Board J101-3, 4

J210-6 GRY-GRN, +12V, from Power Driver Board J101-1, 2

J210-7 GRY-GRN, +12V, from Power Driver Board J101-1, 2

J211, 34-pin ribbon cable, data to/from J102

J212-1 GRN-BRN, switch col. 1, to coin door board J3-1

J212-2 GRN-RED, switch col. 2, to coin door board J3-2

J212-3 N/C

J212-4 WHT-BRN, switch row 1, to coin door board J3-3

J212-5 KEY

J212-6 WHT-RED, switch row 2, to coin door board J3-4

J212-7 WHT-ORG, switch row 3, to coin door board J3-5

J212-8 WHT-YEL, switch row 4, to coin door board J3-6

J212-9 BLK-BLU, F8, to left flipper opto board J1-1

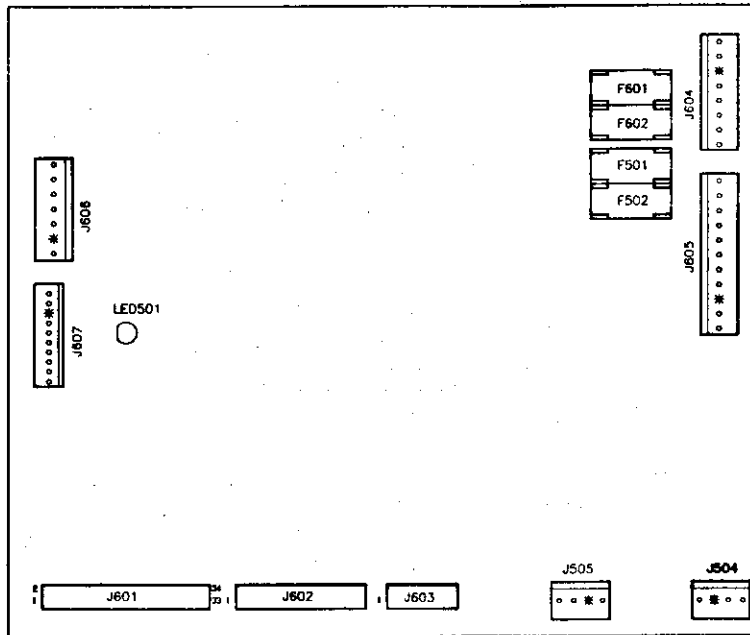
J212-10 BLK-YEL, F6, to right flipper opto board J1-1

J212-11 BLU-GRY, F4, to left flipper opto board J1-2

J212-12 BLU-VIO, F2, to right flipper opto board J1-2

J212-13 ORG, Ground to left flipper opto board J1-4

Audio Visual Board Assembly A-20516-50052



J601, 34-pin ribbon cable, data to CPU J202

J602, 26-pin ribbon cable, data to CPU J201

J603, 14-pin ribbon cable, data to/from dot matrix display driver

J604-1 ORG, -125V to display driver pin 1

J604-2 BLU, -113V to display driver pin 2

J604-3 KEY

J604-4 BLK, ground to display driver pin 4

J604-5 BLK, ground to display driver pin 5

J604-6 GRY, +5V to display driver pin 6

J604-7 GRY-YEL, +12 to display driver pin 7

J604-8 BRN, +62 to display driver pin 8

J605-1 WHT, 80VAC from transformer secondary

J605-2 WHT, 80VAC from transformer secondary

J605-3 VIO, 100VAC from transformer secondary

J605-4 VIO, 100VAC from transformer secondary

J605-5 GRY-WHT, 18VAC from transformer secondary

J605-6 GRY-WHT, loop from J605-5

J605-7 GRY, 18VAC from transformer secondary

J605-8 GRY, loop from J605-7

J605-9 KEY

J605-10 GRY-GRN, 18VAC from transformer secondary

J605-11 GRY-GRN, 18VAC loop from J605-10

J606-1 BLK, ground from power driver board J101-7

J606-2 KEY

J606-3 BLK, ground from power driver board J101-5

J606-4 GRY, +5V from power driver board J101-4

J606-5 GRY, +5V from power driver board J101-3

J606-6 GRY-GRN +12V from power driver board J101-2

J606-7 GRY-GRN, +12V from power driver board J101-1

J607 NOT USED

J504-1 BLK-YEL, signal to speaker

J504-2 KEY

J504-3 N/C

J504-4 BLK, signal to speaker

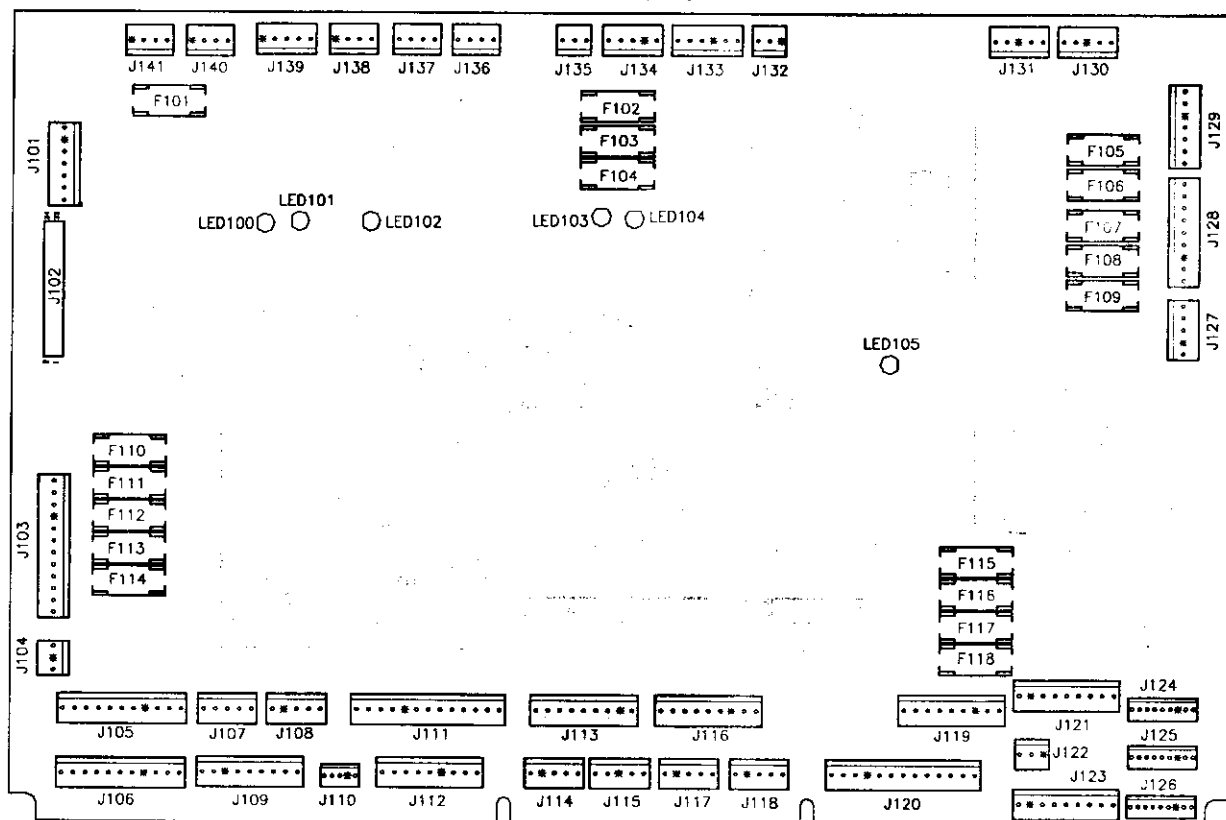
J505-1 BLK-YEL, signal to speaker

J505-2 N/C

J505-3 KEY

J505-4 BLK, signal to speaker

Power Driver Board Assembly A-20028



J101-1 GRY-GRN, +12V to J210-6, 7; J606-1
 J101-2 GRY-GRN, +12V to J210-6, 7; J606-2
 J101-3 GRY, +5V to J210-4, 5; J3-1,3; J606-3
 J101-4 GRY, +5V to J210-4, 5; J3-1,3; J606-4
 J101-5 BLK, ground to J210-1, 3; J606-5
 J101-6 KEY
 J101-7 BLK, ground to J210-1,3; J606-7

J102, 34-pin ribbon cable, data to/from CPU J211

J103-1 YEL-WHT, 6.8Vac from xformer secondary
 J103-2 WHT-BRN, 6.8Vac from xformer secondary
 J103-3 WHT-BRN, 6.8Vac from xformer secondary
 J103-4 WHT-ORG, 6.8Vac from xformer secondary
 J103-5 WHT-YEL, 6.8Vac from xformer secondary
 J103-6 WHT-YEL, 6.8Vac from xformer secondary
 J103-7 ORG, 6.8Vac from xformer secondary
 J103-8 ORG 6.8Vac from xformer secondary
 J103-9 KEY
 J103-10 GRN, 6.8Vac from xformer secondary
 J103-11 BRN, 6.8Vac from xformer secondary
 J103-12 BRN, 6.8Vac from xformer secondary

J104-1 VIO, return, G.I. to Coin Door Board J2-3
 J104-2 KEY
 J104-3 WHT-VIO, 6.8Vac, G.I. to Coin Door Brd J2-5

J105-1 BRN, return, G.I. to playfield
 J105-2 ORG, return, G.I. to playfield
 J105-3 N/C
 J105-4 KEY
 J105-5 N/C
 J105-6 N/C
 J105-7 WHT-BRN, 6.8Vac, G.I. to playfield
 J105-8 WHT-ORG, 6.8Vac, G.I. to playfield
 J105-9 N/C
 J105-10 N/C
 J105-11 N/C

J106-1 N/C
 J106-2 N/C
 J106-3 YEL, return, G.I. to insert panel
 J106-4 KEY
 J106-5 GRN, return, G.I. to insert panel
 J106-6 VIO, return, G.I. to insert panel
 J106-7 N/C
 J106-8 N/C
 J106-9 WHT-YEL, 6.8Vac, G.I. to insert panel
 J106-10 WHT-GRN, 6.8Vac, G.I. to insert panel
 J106-11 WHT-VIO, 6.8Vac, G.I. to insert panel

J107-NOT USED

Power Driver Board Continued...

J108-1 N/C
J108-2 BLU-RED, solenoid 26 drive to insert flasher
J108-3 N/C
J108-4 KEY
J108-5 N/C

J109-1 BLU-BRN, solenoid 25 drive to playfield flasher
J109-2 BLU-RED, solenoid 26 drive to playfield flasher
J109-3 BLU-ORG, solenoid 27 drive to playfield flasher
J109-4 BLU-YEL, solenoid 28 drive to playfield flasher
J109-5 N/C
J109-6 N/C
J109-7 KEY
J109-8 N/C
J109-9 N/C

J110- NOT USED

J111-1 BLK-BRN, solenoid 17 drive to playfield flasher
J111-2 N/C
J111-3 BLK-ORG, solenoid 19 drive to playfield flasher
J111-4 BLK-YEL, solenoid 20 drive to playfield flasher
J111-5 BLU-GRN, solenoid 21 drive to playfield coil
J111-6 BLU-BLK, solenoid 22 drive to playfield flasher
J111-7 BLU-VIO, solenoid 23 drive to playfield flasher
J111-8 BLU-GRY, solenoid 24 drive to playfield flasher
J111-9 KEY
J111-10 N/C
J111-11 N/C
J111-12 RED-ORG, tieback diode for solenoid 21
J111-13 RED-ORG, tieback diode for solenoid 21

J112-1 N/C
J112-2 BLK-RED, solenoid 18 drive to insert flasher
J112-3 N/C
J112-4 KEY
J112-5 BLK-YEL, solenoid 20 drive to insert flasher
J112-6 N/C
J112-7 N/C
J112-8 BLU-VIO, solenoid 23 drive to insert flasher
J112-9 BLU-GRY, solenoid 24 drive to insert flasher

J113-1 BRN-BLK, solenoid 9 drive to playfield coil
J113-2 KEY
J113-3 BRN-RED, solenoid 10 drive to playfield coil
J113-4 BRN-ORG, solenoid 11 drive to playfield coil
J113-5 BRN-YEL, solenoid 12 drive NOT USED
J113-6 BRN-GRN, solenoid 13 drive NOT USED
J113-7 BRN-BLU, solenoid 14 drive NOT USED
J113-8 BRN-VIO, solenoid 15 drive to playfield coil
J113-9 BRN-GRY, solenoid 16 drive to playfield coil

J114- NOT USED

J115- NOT USED

J116-1 VIO-BRN, solenoid 1 drive to playfield coil
J116-2 VIO-RED, solenoid 2 drive to playfield coil
J116-3 KEY
J116-4 VIO-ORG, solenoid 3 drive to playfield coil
J116-5 VIO-YEL, solenoid 4 drive NOT USED
J116-6 VIO-GRN, solenoid 5 drive to playfield coil
J116-7 VIO-BLU, solenoid 6 drive to playfield coil
J116-8 VIO-BLK, solenoid 7 drive to backbox coil
J116-9 VIO-GRY, solenoid 8 drive NOT USED

J117- NOT USED

J118- NOT USED

J119-1 RED-GRN, +50V to lower right flipper coil
J119-2 RED-GRN, loop from J119-1
J119-3 KEY
J119-4 RED-BLU, loop from J119-5
J119-5 RED-BLU, +50V to lower left flipper coil
J119-6 N/C
J119-7 N/C
J119-8 N/C
J119-9 N/C

J120-1 N/C
J120-2 N/C
J120-3 N/C
J120-4 N/C
J120-5 N/C
J120-6 N/C
J120-7 ORG-BLU, holding, lower left flipper coil
J120-8 N/C
J120-9 YEL-BLU, power, lower left flipper coil
J120-10 KEY
J120-11 ORG-GRN, holding, lower right flipper coil
J120-12 N/C
J120-13 YEL-GRN, power, lower right flipper coil

J121-1 YEL-BRN, lamp column 1 to playfield
J121-2 YEL-RED, lamp column 2 to playfield
J121-3 YEL-ORG, lamp column 3 to playfield
J121-4 YEL-BLK, lamp column 4 to playfield
J121-5 YEL-GRN, lamp column 5 to playfield
J121-6 YEL-BLU, lamp column 6 to playfield
J121-7 YEL-VIO, lamp column 7 to playfield
J121-8 KEY
J121-9 N/C

J122-1 KEY
J122-2 N/C
J122-3 YEL-GRY, lamp column 8 to cabinet

J123-1 N/C
J123-2 N/C
J123-3 N/C
J123-4 N/C
J123-5 N/C
J123-6 N/C
J123-7 N/C
J123-8 KEY
J123-9 YEL-GRY, lamp column 8 to insert panel

Power Driver Board Continued...

J124-1 RED-BRN, lamp row 1 to playfield
J124-2 RED-BLK, lamp row 2 to playfield
J124-3 KEY
J124-4 RED-ORG, lamp row 3 to playfield
J124-5 RED-YEL, lamp row 4 to playfield
J124-6 RED-GRN, lamp row 5 to playfield
J124-7 RED-BLU, lamp row 6 to playfield
J124-8 RED-VIO, lamp row 7 to playfield
J124-9 RED-GRY, lamp row 8 to playfield

J125-1 N/C
J125-2 N/C
J125-3 KEY
J125-4 N/C
J125-5 N/C
J125-6 N/C
J125-7 RED-BLU, lamp row 6 to cabinet
J125-8 RED-VIO, lamp row 7 to cabinet
J126-9 RED-GRY, lamp row 8 to cabinet

J126-1 RED-BRN lamp row 1 to insert panel
J126-2 RED-BLK, lamp row 2 to insert panel
J126-3 KEY
J126-4 RED-ORG, lamp row 3 to insert panel
J126-5 RED-YEL, lamp row 4 to insert panel
J126-6 RED-GRN, lamp row 5 to insert panel
J126-7 N/C
J126-8 N/C
J126-9 N/C

J127-1 WHT-GRN, 9.8Vac from xformer secondary
J127-2 WHT-GRN, 9.8Vac loop from J112-1
J127-3 WHT-GRN, 9.8Vac from xformer secondary
J127-4 KEY
J127-5 WHT-GRN, 9.8VAC loop from J112-3

J128-1 WHT-RED, 16Vac loop from J102-2
J128-2 WHT-RED, 16Vac from xformer secondary
J128-3 WHT-RED, 16Vac loop from J102-4
J128-4 WHT-RED, 16Vac from xformer secondary
J128-5 BLK-YEL, 16Vac loop from J102-6
J128-6 BLK-YEL, 16Vac from xformer secondary
J128-7 KEY
J128-8 BLK-YEL, 16Vac loop from J102-9
J128-9 BLK-YEL, 16Vac from xformer secondary

J129-1 RED, 9Vac from xformer secondary
J129-2 RED, 9Vac from transformer secondary
J129-3 KEY
J129-4 BLU-WHT, 13Vac from xformer secondary
J129-5 BLU-WHT, 13Vac loop from J101-4
J129-6 BLU-WHT, 13Vac from xformer secondary
J129-7 BLU-WHT, 13Vac loop from J101-6

J130-NOT USED

J131-NOT USED

J132-NOT USED

J133-1 RED-ORG, +50V to coils
J133-2 RED-BRN, +50V to coils
J133-3 RED-BLK, +50V to coils
J133-4 KEY
J133-5 N/C
J133-6 RED-WHT, +20V to playfield flasher

J134-1 N/C
J134-2 N/C
J134-3 N/C
J135-4 KEY
J134-5 RED-WHT, +20V to insert panel flasher

J135- NOT USED

J136- NOT USED

J137- NOT USED

J138- NOT USED

J139-1 KEY
J139-2 GRY-YEL, +12V to playfield boards
J139-3 BLK, ground to playfield boards
J139-4 N/C
J139-5 BLK-WHT, signal for coin meter to Coin Door Interface board J2-7.

J140-NOT USED

J141-1 KEY
J141-2 GRY-YEL, +12V to Coin Door Board J2-2
J141-3 BLK, ground to Coin Door Board J2-1
J141-4 N/C

LAMP MATRIX

		Yellow (B+) → Red							
Column	1	2	3	4	5	6	7	8	
Row	1	2	3	4	5	6	7	8	
1	Red-Brown J125-1 Q104	TOP LEFT BANK BOTTOM	RIGHT 3 BANK TOP	JACKPOT	GEN. BUS	GEN. TOILET	PROPELLER	TIME MACHINE	FIREWORKS
2	Red-Black J125-2 Q108	TOP LEFT BANK MIDDLE	RIGHT 3 BANK MIDDLE	SUPER JACKPOT	TOAST	WINDOW SHOPPING	OUTER SPACE	START ADVENTURE	TOXIC WASTE
3	Red-Orange J125-4 Q103	TOP LEFT BANK TOP	HIGHT 3 BANK BOTTOM	MULTIBALL	MAGIC BUS	LEFT RECYCLE	DO(G)	EXTRA BALL	LIGHT EXTRA BALL
4	Red-Yellow J125-5 Q107	TOP RIGHT BANK TOP	LEFT BANK BOTTOM	WRECKING BALL	COLLECT JUNK	LEFT CRANE H. U.	(D)OG	TOAST	FREE GAME
5	Red-Green J125-6 Q102	TOP RIGHT BANK MIDDLE	LEFT BANK MIDDLE	RADAR ADVENTURE	COO COO CLOCK	SHOOT AGAIN	D(O)G	GEN. SEWER	LIGHT JACKPOT
6	Red-Blue J125-7 Q106	TOP RIGHT BANK BOTTOM	LEFT BANK TOP	JALOPY RACE	TELEVISION	NOT USED	CHOOSE JUNK	TOASTER GUN	GEN. CRANE
7	Red-Violet J125-8 Q101	RIGHT RECYCLE	FAN	TOILET ADVENTURE	WEATHER VANE	TOASTER	ANGEL SLING	GEN. ALLEY	NOT USED
8	Red-Gray J125-9 Q105	RIGHT CRANE H. U.	BATH TUB	A.T.C. ADVENTURE	FISH BOWL	HAIR DRYER	BICYCLES	DEVIL SLING	START BUTTON

J1XX = Power Driver Board

SWITCH MATRIX

		White → Green									
Dedicated Grounded Switches	Column	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	
Row	1										
Orange-Brown J205-1 Left Coin Chute U17-5	1 White-Brown J208-1 U18-11	1 TOASTER GUN	SLAM TILT	TROUGH EJECT	PAST SPINNER	LEFT SLING	UPPER RIGHT 3 BANK BOTTOM	RAMP ENTRY	NOT USED	Black-Green J208-13 Lower Right Flipper E.O.S.	
D1		11	21	31	41	51	61	71	81	F1	
Orange-Red J205-2 Center Coin Chute U17-7	2 White-Red J208-2 U18-9	REBOUND SWITCH	COIN DOOR CLOSED	TROUGH BALL 1	IN THE SEWER	RIGHT SLING	UPPER RIGHT 3 BANK MIDDLE	SCOOP DOWN	NOT USED	Blue-Violet J212-12 Lower Right Flipper Opto	
D2		12	22	32	42	52	62	72	82	F2	
Orange-Black J205-3 Right Coin Chute U17-11	3 White-Orange J208-3 U18-5	START BUTTON	NOT USED	TROUGH BALL 2	LOCK JAM	CAR TARGET 4	UPPER RIGHT 3 BANK TOP	SCOOP MADE	NOT USED	Black-Blue J208-12 Lower Left Flipper E.O.S.	
D3		13	23	33	43	53	63	73	83	F3	
Orange-Yellow J205-4 4th Coin Chute U17-9	4 White-Yellow J208-4 U18-7	PLUMB BOB TILT	ALWAYS CLOSED	TROUGH BALL 3	PAST CRANE	CAR TARGET 5 (RIGHT)	UPPER LEFT 3 BANK BOTTOM	DOG ENTRY	NOT USED	Blue-Gray J212-11 Lower Left Flipper Opto	
D4		14	24	34	44	54	64	74	84	F4	
Orange-Green J205-6 U16-9 Normal Function Test Function Srv Crdts Escape	5 White-Green J208-5 U19-11	TOP LEFT CRANE	NOT USED	TROUGH BALL 4	RAMP EXIT	NOT USED	UPPER LEFT 3 BANK MIDDLE	NOT USED	NOT USED	Black-Violet J208-11 SPINNER	
D5		15	25	35	45	55	65	75	85	F5	
Orange-Blue J205-7 U16-11 Normal Function Test Function Volume On Down	6 White-Blue J208-7 U208-7 U19-9	LEFT OUTLANE	RIGHT RETURN LANE	LOCK UP 2	CAR TARGET 1 (LEFT)	LOWER LEFT 3 BANK BOTTOM	UPPER LEFT 3 BANK TOP	RIGHT 3 BANK BOTTOM	NOT USED	Black-Yellow J212-10 Upper Right Flipper Opto	
D6		16	26	36	46	56	66	76	86	F6	
Orange-Violet J205-8 U16-7 Normal Function Test Function Volume Up Up	7 White-Violet J208-8 U19-5	LEFT RETURN LANE	RIGHT OUTLANE	LOCK UP 1	CAR TARGET 2	LOWER LEFT 3 BANK MIDDLE	BOWL ENTRY	RIGHT 3 BANK MIDDLE	NOT USED	Black-Gray J208-10 Upper Left Flipper E.O.S.	
D7		17	27	37	47	57	67	77	87	F7	
Orange-Gray J205-9 U16-5 Normal Function Test Function Begin Test Enter	8 White-Gray J208-9 U19-7	SHOOTER LANE	CRANE DOWN	TOP RIGHT CRANE	CAR TARGET 3	LOWER LEFT 3 BANK TOP	BOWL EXIT	RIGHT 3 BANK TOP	NOT USED	Black-Blue J212-9 Upper Left Flipper Opto	
D8		18	28	38	48	58	68	78	88	F8	

J2XX = CPU BOARD

OPTO, TYPICALLY CLOSED

WARNINGS & NOTICES

WARNING

FOR SAFETY AND RELIABILITY, substitute parts and equipment modifications are not recommended. Use of Non-WILLIAMS parts or modifications of game circuitry, may adversely affect game play, or may cause injuries.

SUBSTITUTE PART OR EQUIPMENT MODIFICATIONS may void FCC/CANADA Type Acceptance.

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

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

RF Interference Notice

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

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

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For Service...
Call your authorized Williams Distributor

Williams Electronics Games, Inc.
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***CAUTION: Transport this game ONLY
with the hinged backbox DOWN!***