

S-Plus With Imbedded Bill Acceptor Field Service Manual



International Game Technology

S-Plus With Imbedded Bill Acceptor Field Service Manual

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Section 1

Introduction & Specifications

This section contains an introduction to IGT's S-Plus IBA stepper slot machines. The following information is presented:

- **Section 1.1, Product Introduction** – provides an introduction to the S-Plus IBA machine, including component identification and functional summary, lists of features and options, and brief descriptions of the operational modes.
- **Section 1.2, Specifications** – lists product specifications and operating requirements.
- **Section 1.3, FCC Data** – provides FCC specifications regarding slot machines.
- **Section 1.4, Common Hardware** – identifies specific fasteners (screws, nuts, etc.) used in most IGT products.

1.1 Product Introduction

S-Plus IBA stepper slot machines embody the latest developments in electronic gaming technology and the best in electromechanical design. These machines have been professionally engineered to provide a high level of reliability, flexibility, and ease of installation and maintenance.

The machine's modular design allows easy conversion between various slot games, as well as providing compatibility with a wide range of electromechanical options.

Figure 1-1 shows the major components of typical S-Plus IBA machines. Table 1-1 lists the machine assemblies and their functions, and Figure 1-2 shows the functional relationship of these assemblies.

Notes

Machine configuration may vary significantly depending upon the jurisdiction and the machine options requested.

Contact IGT Customer Service (refer to Section 2) before attempting to change the configuration of an S-Plus IBA machine.

1.1.1 Special Features

A variety of standard and optional features are available for S-Plus IBA machines.

Hardware

- Modular component design provides ease of maintenance and repair
- Power supply and line cord selections for both U.S. and foreign configurations
- Bill acceptor option allows standard U.S. currency and some foreign currency to be accepted and credited to the player
- Fiber-optic interface boards and fiber-optic cables enable reliable data communication options

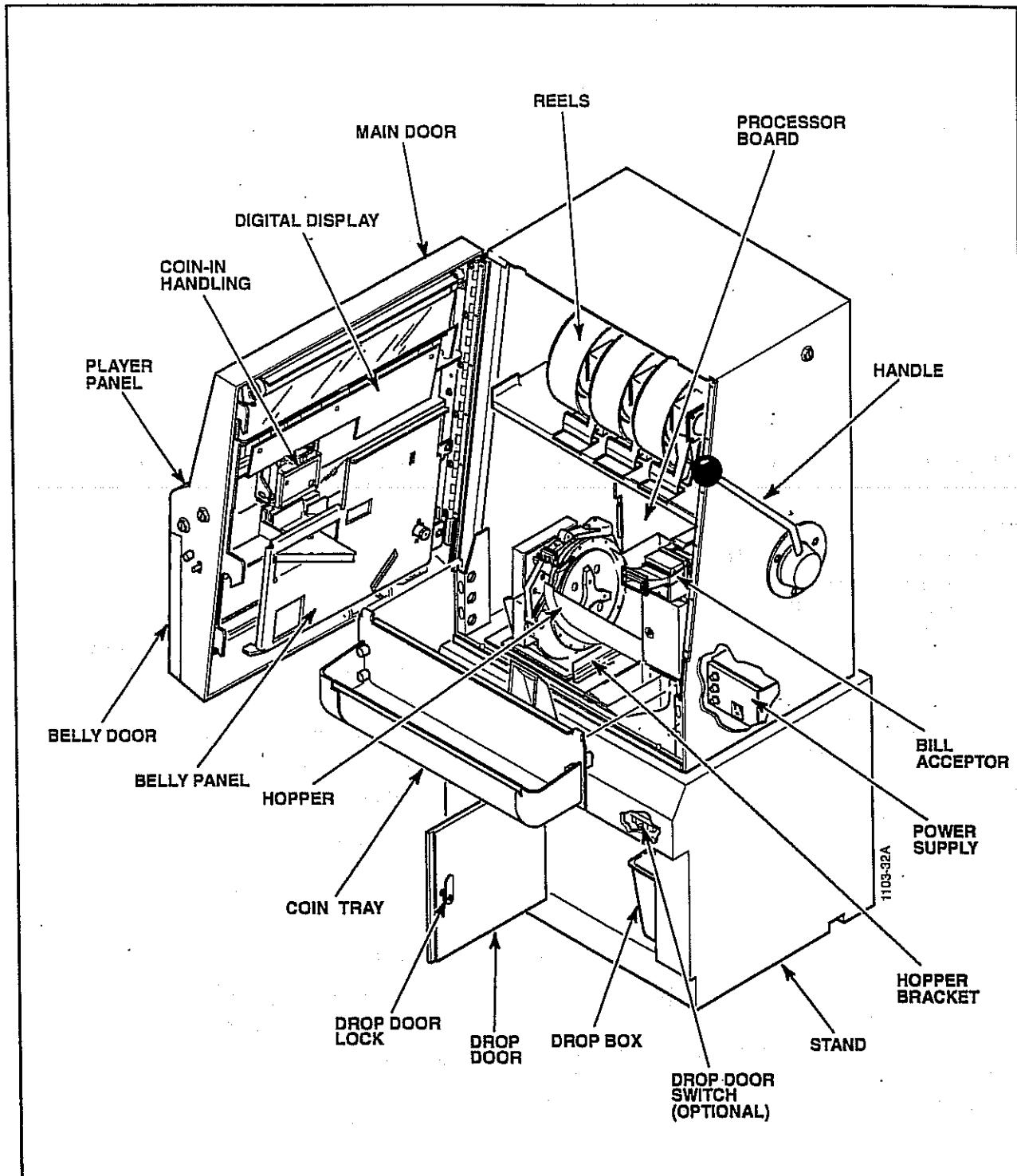


Figure 1-1. Typical S-Plus IBA Machine with Slot Handle.

Table I-1
Summary of Functional Assemblies

Assembly	Function
Bill Acceptor	Validates and accepts a variety of dollar denominations.
Candle	An optional assembly mounted to the top of the machine that flashes to indicate various modes or game conditions.
Coin-In Assembly	An assembly that receives, verifies, counts and routes valid coins to the hopper or drop box. Invalid coins are routed to the coin tray. Includes coin entry, coin acceptor/comparitor, and coin channel chutes.
Data Collection	A wide variety of optional data collection configurations, used to communicate player and machine information.
Digital Display	The 7-segment digital display, located to the right of the reels in most machine configurations, provides game play information and displays error codes in the event of a malfunction.
Door Locks	Various key lock options offer increased security against unauthorized machine access.
Door Optics Assembly	Senses when the front door is open and causes a digital display code.
Drop Box	Area inside the stand containing the coin-drop bucket. The drop box door fastens with a keyed lock and is equipped with an optional door-open sensor.
Front Door	Contains the coin-in assembly, player panel switches, display glass, lower fluorescent panel, speaker, optic receiver, door lock assembly, and locking bar.
Hopper	An assembly that holds and dispenses coins to the coin tray when the game is played in noncredit mode and when a player cashes out.
Lower Cabinet	Houses the power supply, processor and mother boards, harness connector panels, and fuses.
Mechanical Meters	Store and display cumulative game-play information.
Mother Board	Acts as an interface between the processor board and machine components.
Player Panel Switches	Communicate player decisions to the processor board. Some player panel switches also have functions in the self test and statistical data modes.
Processor Board	Controls all internal game and reel functions.
Reset Key Switch	Allows a technician to reset the machine after a top award win, to toggle options in the self test mode and to access the statistical data mode.
Self Test Switch	Accesses and steps through the self test mode; enables data transfer between CMOS RAM and EEPROM.
Speaker	Produces game sounds and attract-mode music.
Stepper Reels	Motorized slot reels individually driven by computerized software programmed to average a specific payback percentage.
Top Box	A variety of optional top-box configurations may house progressive displays, fluorescent lighting, a fan and display glass.

Hardware Special Features (continued)

- High-security bill acceptor located inside the machine cabinet
- Either coin tray or loud bowl for coin collection
- Easily accessible hopper
- Progressive flexibility allows for stand-alone and link-progressive capabilities and a variety of progressive display configurations
- From three to six mechanical meters
- Electronic coin comparitor
- Player-activated switch option duplicates the handle-pull function
- Player messages appear on the digital (7-segment) display or optional alphanumeric (dot matrix) display.
- LEDs illuminate digital player display and payline display, as well as optional alphanumeric player messages
- Logic (processor board) access detection circuitry
- 9", 11", 16", 17", 24" and 25" top box options
- Single and multiple-payline game versions available
- Machine can be configured for a wide variety of U.S. and foreign denominations
- Four voltage selections available: 100, 115, 220, or 240 VAC machine operation
- Machine can be configured for operation at 50 or 60 Hertz
- Progressive meters can be configured as link or stand-alone, non-incrementing or incrementing, non-progressive or progressive
- Slot Information System (SIS) compatible
- Data Link Interface (DLI) compatible
- Personal Computer-Slot Accounting System (PC-SAS) compatible

- Player Tracking compatible

Software Features

- 64K EPROM and 8K RAM drives a variety of player options
- Six different operational modes, including game play, idle, statistical data, self test, tilt and out of service
- Variety of games available, including buy-a-pays, coin multipliers, progressives and linked-jackpot games
- Microprocessor game control ensures reliable, consistent operation
- Enhanced sound package allows selection of various sound themes
- Option selections for game functions such as game speed and music/sounds
- Credit game with auto spin option when max credits/coins are wagered
- Software option selections for music, spin speed, meters selection, etc.
- Credit and noncredit play features

1.1.2 Security Features

S-Plus IBA machines incorporate many advanced electrical and mechanical security features.

Hardware

- All metal cabinet liner
- High-capacity coin-drop box (bucket) is secured behind a locked door
- High-security JCM bill acceptor inside machine cabinet
- Door-open sensors
- Anti-stringing coin-in sensors
- Processor and mother boards that are secured behind a lockable metal panel
- Optional cabinet-mounted candle to indicate tilts, door open, and change requests

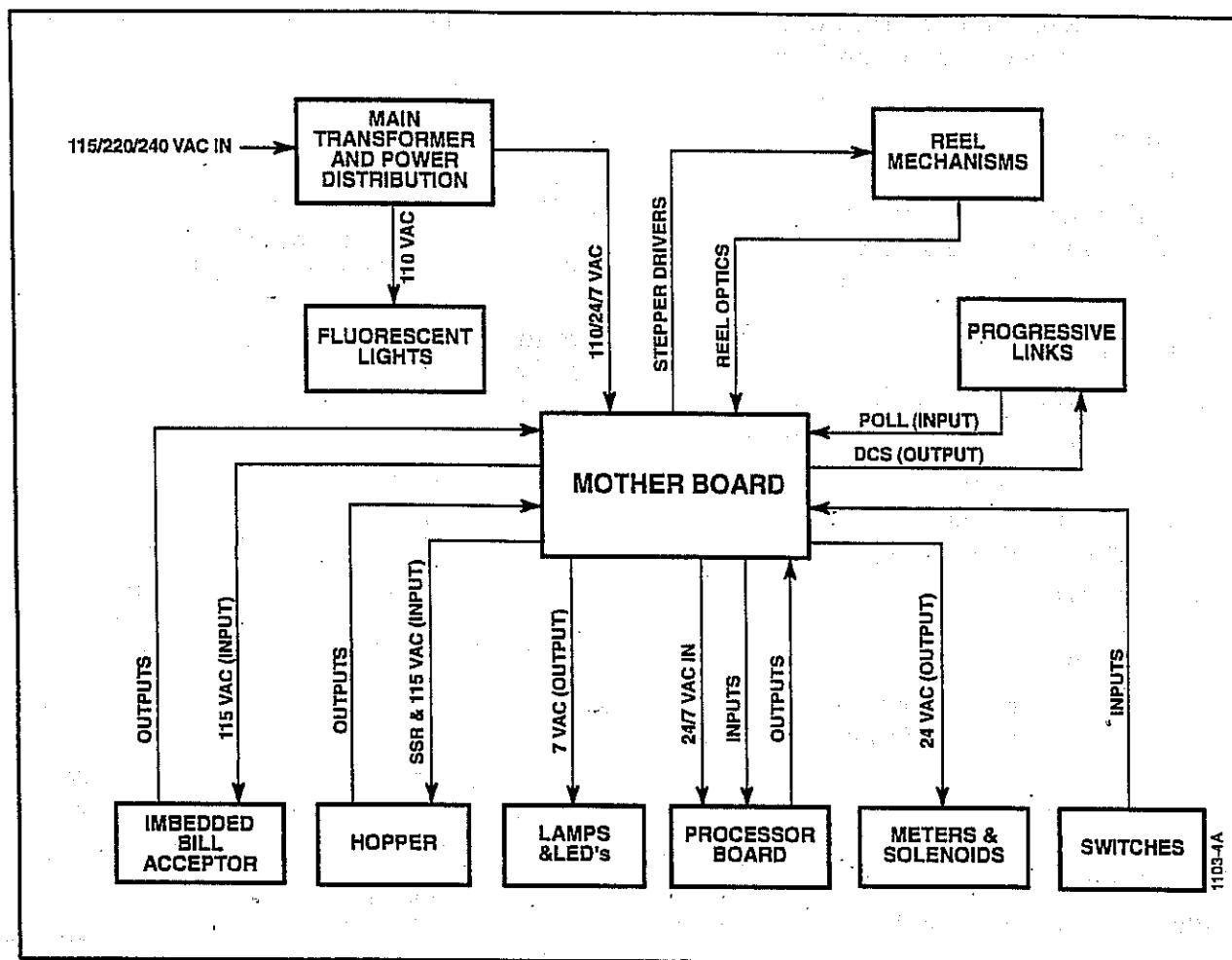


Figure 1-2. Functional Relationship Diagram.

Processor Board

- Backup battery for game-statistic memory circuit ensures storage of record-keeping and game play information in the event of a power failure
- Voltage-sensing circuit verifies that the battery voltage is adequate to maintain game-statistic memory and the reset circuits in the event of power failure
- The backup battery also maintains a constant voltage source to the reset circuits in the event that the machine power is too low or is turned off
- Optional real time clock (RTC) module uses two internal lithium batteries lo-

cated within the RTC module IC to protect the game statistic memory stored in CMOS RAM .

- Lithium batteries on both the processor board and the RTC module have a life expectancy of ten years in operation with the machine power turned off
- A watchdog circuit interfaces with the microprocessor to continually ensure constant and accurate data processing
- Electronically recorded data meters duplicate the data collected by the machine's mechanical meters (optional)
- Recall of the number of games played since the last door opening or power up

- Continuous computer monitoring of the reels for position, speed and direction
- Low voltage detection circuits activate reset circuits if machine power is too low or turned off
- Failure-detection circuitry constantly monitors machine operation and verifies that all circuits are functioning properly

Service Indicators

- Tilt codes indicate that an event other than normal game play has occurred
- Security codes and alarms indicate that a machine door has been opened or that a security problem has occurred
- Service codes indicate that the machine is inoperative and requires the services of a technician
- Data processing error codes indicate a memory or communication problem between the machine processor board and the mother board

1.1.3 Machine Operational Modes

S-Plus IBA machines employ five operational modes: game play, idle, statistical data, self test, and tilt mode.

- **Game play mode** – describes normal machine operation. If the machine is functioning properly and a person is actively playing a game, the machine is in the game play mode.
- **Idle mode** – describes the condition that exists when the machine is functioning properly, but is not being played.
- **Statistical data mode** – provides cumulative game-play data (e.g. total number of coins in) to a service technician. Only a person possessing a reset key can access this information.
- **Self test mode** – allows a technician to exercise processor board inputs and outputs to either verify proper operation or to isolate a problem.

- **Tilt mode** – describes the condition that exists when a malfunction occurs with the machine (e.g. coin jams).

1.2 Specifications

Table 1-2 (Electrical Specifications), Table 1-3 (Physical Specifications), and Table 1-4 (Environmental Specifications) list the machine specifications and requirements. Figure 1-3 shows the basic cabinet dimensions of the S-Plus IBA stepper slot machine.

1.2.1 Power Requirements

The S-Plus IBA machine operates from 99-128 VAC at 50/60 Hz, 198-244 VAC at 50/60 Hz or 216-264 VAC at 50/60 Hz. A main transformer provides power to all components requiring isolated voltages. Table 1-5 lists the main transformer AC voltages.

Note

IGT recommends that no more than five machines be operated per 20-Amp circuit breaker.

1.3 FCC Data

This equipment generates and uses radio frequencies in the radio bandwidth. It has been tested and found to comply with limits for a Class A computing device in accordance with the specifications in Part 15 of the FCC rules, which provide reasonable protection against radio and television interference in an industrial installation. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause interference to radio or television reception, which can be determined by turning the IGT equipment off and on, IGT encourages the user to try to correct the interference. If the interference remains or worsens, contact IGT Customer Service for suggestions to correct the interference.

Table 1-2
Electrical Specifications

Characteristic	Performance
Line Voltage Taps (primary)	
110	87 - 112 VAC RMS single phase
115	99 - 128 VAC RMS single phase
220	195 - 243 VAC RMS single phase
240	210 - 264 VAC RMS single phase
Line Frequency	50 - 60 Hertz (Hz)
Power Consumption (average)	
Idle	100/115 VAC 81 Watts (1.2 Amps)
Hopper on	100/115 VAC 155 Watts (3.1 Amps)
Idle	220/240 VAC 100 Watts (0.83 Amps)
Hopper on	220/240 VAC 280 Watts (3.0 Amps)
Current Protection	
F1	24 VAC, 4 Amps
F2	7 - 8 VAC, 5 Amps
F3	100/115 VAC, 6 Amps
F4	220/240 VAC, 3 Amps / 115 VAC, 2 Amps
Power Cord Receptacle	IEC Connector
Transformer Voltages (secondary)	
	24 VAC @ 5 Amps maximum
	8 VAC @ 4 Amps maximum
	7 VAC @ 4 Amps maximum

Table 1-3
Physical Specifications

Characteristic	Specification
Height without candle	
Roundtop	46.00" (116.8 cm)
9" Top Box	40.00" (101.6 cm)
16" Top Box	46.25" (117.5 cm)
Width with handle	
Wide Body	24.50" (62.23 cm)
Base / Cabinet depth (without door)	
with door (no coin tray)	16.00" (40.64 cm)
with coin tray	20.75" (52.71 cm)
	25.55" (64.43 cm)
Weight	
Roundtop	210 lbs. (94.50 kg)
16" Wide Body	205 lbs. (92.25 kg)
9" Wide Body	210 lbs. (94.50 kg)

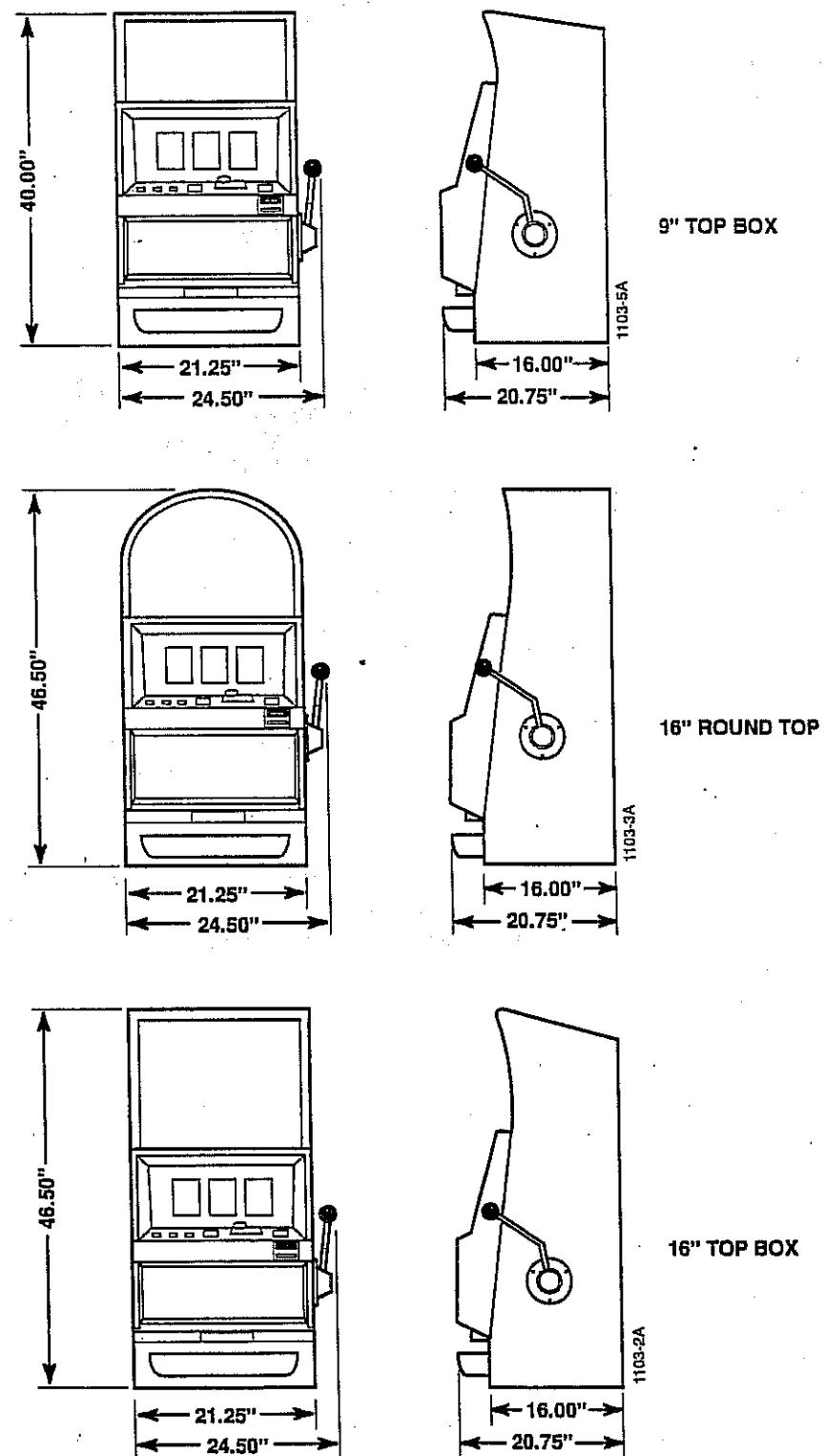


Figure 1-3. Cabinet Dimensions – Typical S-Plus IBA Models.

Table 1-4
Environmental Specifications

Characteristic	Performance Requirement
Temperature (environmental)	
Operating	45°F – 100°F (ambient) 7°C – 38°C
Storage	0°F – 176°F (ambient) -18°C – 80°C
Relative humidity (environmental)	
Operating	10% – 90%
Storage	0% – 95%

Table 1-5
Main Transformer Taps

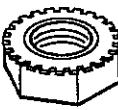
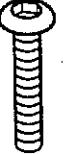
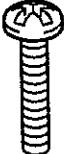
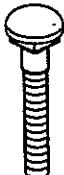
Type	Tap #	Transformer Voltage
115/220 VAC PRI	1 2 3 4 5 6 7 8 9	115/220 VAC Common (primary) 115 VAC Hot (primary or auto) 220 VAC Hot (primary) 24 VAC Hot 24 VAC Center Tap 24 VAC Return 7-8 VAC Common 7 VAC Hot 8 VAC Hot
115/240 VAC PRI	1 2 3 4 5 6 7 8 9	115/240 VAC Common (primary) 115 VAC Hot (primary or auto) 240 VAC Hot (primary) 24 VAC Hot 24 VAC Center Tap 24 VAC Return 7-8 VAC Common 7 VAC Hot 8 VAC Hot

IGT is not responsible for any radio or TV interference caused by unauthorized modifications to this equipment.

1.4 Common Hardware

Table 1-6 shows hardware commonly used in IGT machines.

Table 1-6
Commonly Used Hardware

Item	Description	Item	Description
	Lock nut with raised shoulder and threaded nylon inset; strong locking ability where nut is not often removed		Characterized by a smoother "shoulder" of a larger diameter than the threads; heads range from slotted pan to hex to socket-head
	Lock nut with an external-toothed lock washer permanently attached to the lower portion of the nut		Socket-head or button-socket; screws over 1-inch long have a smooth surface between the head and threads, equal to the threaded diameter
	Available in various styles up to 1/2-inch long, IGT frequently uses the Phillips-head pan style with captive external-toothed lock washer fixed onto screw		IGT uses two types: a spring-loaded pull-type pin plunger and screw-type captive panel screw to fasten metal panels together
	Characterized by fine threads and blunt end, machine screws are slotted or Phillips with flat, round, pan, truss or hex heads		Round head with square shoulder and smooth neck that is equal or slightly larger than outside diameter of threads; inserts into square locating hole and fastens with nut
	Characterized by coarse threads, sheet metal screws have pointed or flat ends with either slot or Phillips-type round, flat, pan or truss heads		Wood screws are tapered with smooth neck, coarse threads and pointed ends; heads are slotted or Phillips and round, flat and pan-shaped

Section 2

Machine Installation

2.1 Introduction

This section provides general installation instructions for S-Plus IBA machines. For detailed information regarding individual components, refer to Section 5.

Section 2 covers the procedures for inspection, installation, initial operation, functional verification and general maintenance of the S-Plus IBA machine. Topics in Section 2 include:

- **Section 2.2, Inspection** – describes examination of the shipping carton and the machine interior and exterior. Information is provided regarding returning the machine for damage adjustment and customer service.
- **Section 2.3, Installation** – contains a table that serves as an overview of installation procedures, and specific instructions for wiring the electrical connections. Procedures are included in this section for mounting the machine to a stand, assembling and attaching a seat to the front of the machine, installing a drop-door sensor and machine lock specifications.
- **Section 2.4, Power Up & Functional Verification** – describes powering up the machine, setting the software options and recording statistical data.

- **Section 2.5, General Maintenance** – describes maintenance procedures to be performed on a routine basis.

Note

Read through Section 2 prior to performing any of these procedures. Important! Check with state and local laws prior to changing or selecting any game options.

CAUTION

Use extreme caution when performing the routines within Section 2 to prevent personal injury or damage to the S-Plus IBA stepper slot machine. Although IGT designs numerous safety features into its products, servicing of the S-Plus IBA machine is to be performed by QUALIFIED PERSONNEL ONLY.

2.2 Inspection

2.2.1 Shipping Carton

Examine the shipping carton for any damage that may have occurred during shipment.

2.2.2 Machine Exterior

Remove the shipping carton and examine the machine exterior for any physical defects such as broken glass, dents, scratches or blemishes.

2.2.3 Machine Interior

Open the machine front door by lifting the door locking bar (located on the right side below the lock hole) and pulling the door open.

Remove any hardware kits, loose power cords, or machine paperwork that may have been shipped inside the machine or machine stand.

Check the interior of the machine, making sure that none of the components or board fasteners are dislodged or loose. Check the wire harnesses, making sure they are securely connected, properly routed and secured away from all moving parts.

2.2.4 Configuration Work Sheets

The configuration work sheets that accompany each machine provide information concerning the individual machine. Use the work sheets to verify the machine's features and options. Also, see that the model number and serial number listed on the top sheet match the machine.

2.2.5 Return for Damage Adjustment

As per the "General Terms and Conditions of Sale," no merchandise may be returned for adjustment without prior written approval of IGT. No credit or replacement will be effected until the alleged defects are established to IGT's satisfaction by tests or inspections performed by IGT at any reasonable time and place it designates.

2.2.6 Customer Service

The first point of contact for technical assistance is your local IGT distributor or service organization. If local service is not available, call the appropriate number listed below.

24-hour Technical Assistance

Machines outside Nevada: 800-845-3948

To Order Replacement Parts

For parts information and ordering, contact:

IGT Customer Service
520 South Rock Boulevard

Reno, Nevada, (USA) 89502
Telephone (8 am - 4 pm PST): 702-688-0364
FAX: 702-688-0675

2.3 Installation

2.3.1 Overview

Table 2-1 summarizes the procedures for installing S-Plus IBA machines on location. For more specific instructions regarding individual machine components and assemblies, refer to the applicable information in Section 5.

2.3.2 Stand Mounting

1. Determine whether the power cord must drop down into the stand or exit out of the back of the machine cabinet between the cabinet base and the stand.
2. If the machine's power cord must exit out of the back of the machine, feed the international plug end of the power cord through the large hole in the floor of the machine cabinet near the back wall before permanently mounting the machine.
Make sure the cabinet does not pinch or cut into the power cord insulation.
3. If the machine's power cord must drop down into the stand, mount the machine to the stand before installing the power cord.
4. **Do not connect the power cord to an electrical outlet at this time.**

The following information provides two techniques for mounting the machine onto a stand:

- **Pre-Drilled Stands** – use this procedure when the stand is ordered with pre-drilled mounting holes.
- **Un-Drilled Stands** – use this procedure when the stand is built locally from IGT blueprints.

Table 2-1
Installation Overview

Procedure	Description	Section Number
Inspection	Remove the machine from the shipping carton, inspect it for damage, and verify model and serial numbers.	2.2
Placement	Place the machine on a base (stand) at a location that has the appropriate line voltage and is within the environmental specifications listed in Section 1.	2.3.2
Electrical Connections	Verify that the machine power switch is turned off. Remove the coin tray (if applicable) and the hopper from the machine. Connect the power cord to the lower module receptacle and to an appropriate outlet.	2.3.6
Drop-Door Sensor Switch Option	Install the optional drop-door sensor switch in the stand, if required.	2.3.5
Security Locks	Install the appropriate security locks.	2.3.4
Seat	Assemble and install a front-mounted seat.	2.3.3
Hopper	Set the hopper probe level, fill the hopper with coins and install the hopper in the machine.	5 (Hopper)
Coin-Drop Bucket	Install a coin-drop box (bucket) in the stand.	5 (Coin-In Handling)
Sample Coin	Install a sample coin in the electronic coin comparitor (if applicable).	5 (Coin-In Handling)
Options	Install and/or set up any electromechanical options, such as progressive displays, bill acceptor, data collection and/or fiber-optic links.	5
Power Up	Turn the machine power on and verify that all of the fluorescent lights illuminate. If applicable, adjust the volume control potentiometer on the processor board tray.	2.4.2
Operational Setup	Use the self test mode for setting or changing the game options and for functional verification of the machine components.	4
Statistical Data	Record the existing cumulative totals from both the software statistical data mode and the mechanical meters.	4
Doors	Lock the processor board tray in place (if applicable), close and lock the front door and drop-box door.	5 (Machine Door)

Pre-Drilled Stands

Tool Required

- 1/2" (13mm) open or box-end wrench

Procedure

1. Set the machine on the stand and align the four mounting holes in the bottom of the cabinet with those in the top of the stand.

2. Insert a 5/16" x 2-1/2" (8mm x 6.4 cm) carriage bolt, from inside the machine, through each of the three designated mounting holes (see Figure 2-2, Stand Mounting) and down into the stand.
3. Secure the bolts with flat washers and hex nuts.

Un-Drilled Stands

Refer to Figure 2-1 and follow the directions below to secure the machine onto a base (stand).

Use the stand-mounting hardware kit shipped inside the machine to attach the IGT S-Plus IBA machine securely.

Notes

The wooden stand for the machine can be ordered from IGT or constructed using IGT blueprints. Metal stands are also available.

Some jurisdictions require special stand configurations. Contact IGT Customer Service (see Section 2.2.6) for more information.

Important! IGT requires a minimum distance of 6 inches (15.24 cm) between the cabinet walls of any two machines, and between machine each machine and any building walls or bulkheads,

Tools Required

- 3/8"drill
- 3/8"or .375" drill bit
- 1/2"open/box-end wrench or nutdriver

Mounting Procedure

1. Position the machine on the stand. Usually the machine is centered left to right, with the back of the machine flush with the back of the stand.
2. Locate the three visible mounting holes, the power cord hole and the coin drop hole. Transfer their locations to the top of the stand using a pencil or scribe.

3. Use the dimensions in Figure 2, Cabinet Base Dimensions, to determine the third (and fourth) mounting hole placement and mark the stand accordingly.
4. Drill four .375" diameter holes into the top of the stand.
5. If necessary, drill two 3.00" diameter holes in the stand using a 3" hole saw, one for the power cord and one for the coin drop chute. The power cord hole can be as small as 1.50".
6. Place the machine on a stand and align the four .375" holes in the floor of the machine cabinet with those in the stand.
7. From inside the machine cabinet, insert a 5/16" x 2-1/2" carriage bolt through each of the three .375" mounting holes to the right and toward the front of the machine.
8. Secure each of the three bolts with a 5/16" flat washer and a 5/16" hex nut. **Do not tighten** at this time.
9. **Machine-Mounted Sign:** From inside the stand, install one 5/16" x 1-1/2" hex-head bolt and one 5/16" flat washer up into the fourth mounting hole.

Note

Important! Failure to install the hex-head bolt into the fourth mounting hole may cause damage to the S-Plus IBA machine cabinet and may result in improper door alignment.

10. With all bolts in place, check the alignment of the machine with the back of the stand.
11. Tighten the three nuts and one bolt using a 1/2" socket or nutdriver.

2.3.3 Seat Mounting

To assemble and attach a seat to the front of the stand, locate the hardware kit shipped with the seat, then see Figure 2-2 and proceed as follows. Refer to the Commonly Used Hardware table in Section 1 to identify any unfamiliar hardware.

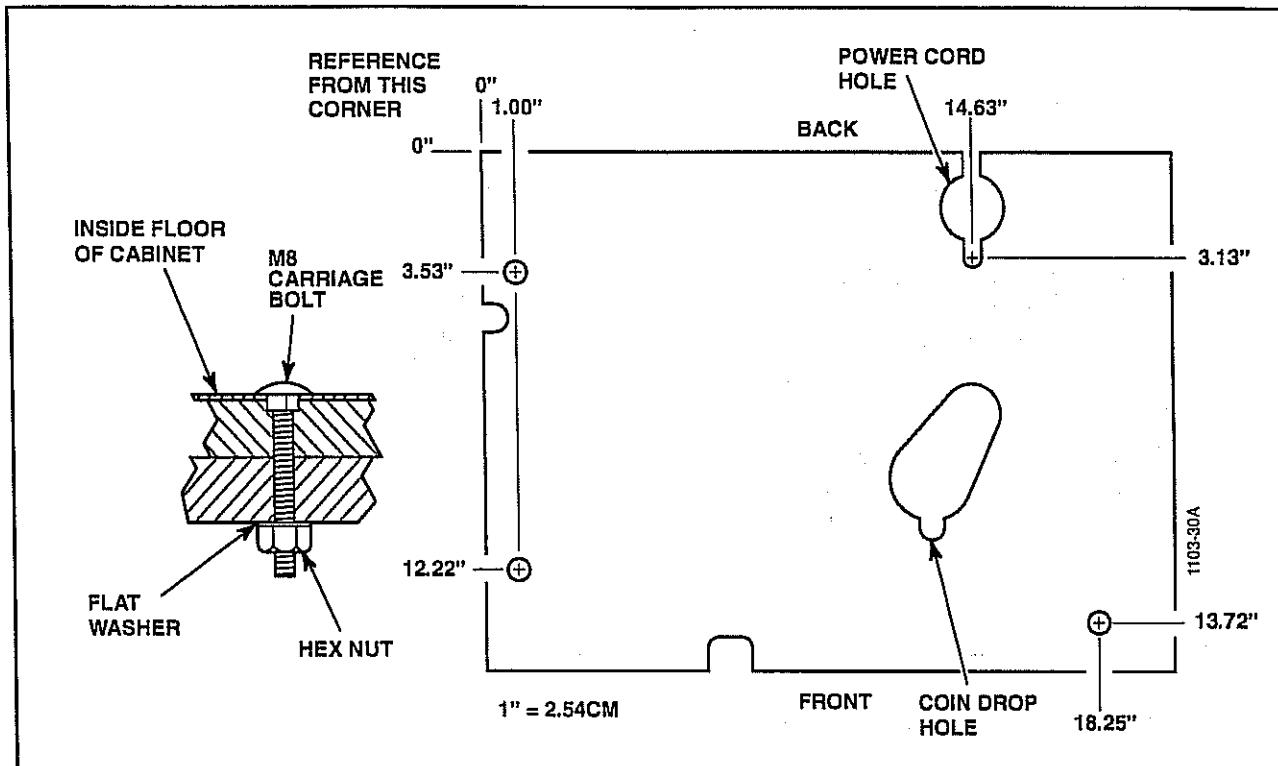


Figure 2-1. Cabinet Base Dimensions – Wide Body.

Tools Required

- Center punch
- 3/16" Allen/socket wrench
- 5/16" Allen/socket wrench
- 5/32" Allen/socket wrench
- 9/16" box-open end wrench
- 3/8" drill
- 3/16" drill bit (if no back plate used)
- #3 Phillips screwdriver (if no back plate used)
- 3/8" drill bit (back plate mounting)
- 5/16" nutdriver (back plate mounting)

Procedure

1. If the front mounting bracket is already installed on the floor plate, proceed to Step 2. Attach the front mounting bracket to the floor plate using four 5/16 x 3/8" button-head socket screws and a 3/16" Allen wrench. The bracket should be flush with

the front of the floor plate at its farthest extension.

2. Center the front mounting bracket and floor plate against the front of the cabinet (stand).
3. Mark the centers of the four mounting holes with a center punch and move the floor plate aside.
4. Drill four 1/8" diameter pilot holes through the front of the cabinet.
5. Attach the floor plate to the cabinet using one of the following methods.

No back plate:

- a. Enlarge the holes using a 3/16" drill bit.
- b. Align the floor plate so that the holes in the mounting bracket line up with the holes drilled in the cabinet.

- c. Install a 1/4 x 1-1/4" Phillips flat-head sheet metal screw into each hole and tighten securely.

Back plate used:

- a. Enlarge the holes using a 3/8" drill bit.
- b. Open the drop box door and remove the wooden floor insert for access to the bottom of the cabinet. Place the back plate inside the cabinet with the four threaded studs extending through the holes in the cabinet front.
- c. Align the floor plate so that the four back-plate mounting studs extend through the holes in the mounting bracket.
- d. Thread a 5/16" flat steel washer and 5/16-18 Esna lock nut on each mounting stud and tighten securely.
6. Mount the pedestal base to the floor plate using four 5/16-18 x 3/8" button-head socket screws. IGT recommends a small amount of removable, thread-locking adhesive to prevent the screws from working loose.
7. Screw the two threaded rods into the holes in the center area of the pedestal base until they rest against the floor plate. Secure each rod to the pedestal base with a 3/8" steel hex nut. Tighten the nuts using a 9/16" wrench.
8. Slide the seat post tube down over the rods so that it rests on the pedestal base.
9. Slide the base cover down over the seat post tube so that it covers the pedestal base and rests on the floor plate.
10. If no footrest will be installed, proceed to Step 11. To install the footrest, secure the footrest clamp to the seat post tube, fastener facing the machine, using a 5/16" Allen wrench. Slide the footrest down over the seat post tube until it rests on the clamp and the tab on the back of the clamp aligns with the notch in the footrest base.

11. Slide the top post casting into the top of the seat post tube so that the larger part of the casting faces the machine and the ends of the threaded rods protrude through the holes in the casting. Secure the casting to the rods with two 3/8-16 Esna nuts. Tighten the nuts using a 9/16" wrench.
12. Align the three holes in the mount casting with the three T-nuts located on the underside of the seat cushion. Attach the mount casting to the seat using three 1/4-20 x 1.5" button-head socket screws. Tighten the screws using a 5/32" Allen wrench.
13. Lubricate the hole in the center of the top post casting with a marble-sized drop of seat lubricant (p/n 162-008-90) and insert the end of the mount casting into the hole.

2.3.4 Security Locks

The front door, processor board tray (card cage) and stand drop box are not shipped with security locks. Refer to Section 5 for information regarding installation of bill acceptor locks.

Install separately keyed locks to ensure proper security. Refer to Table 2-2 for lock specifications and Figure 2-3 for lock dimensions.

2.3.5 Drop-Door Sensor Switch

The drop-door sensor switch monitors the number of times the drop (cash) door is opened. The sensor switch can be mounted in the stand either vertically or horizontally. Use one of the following procedures for installing the optional drop-door sensor switch.

Note

The following instructions involve the mounting of brackets in wooden stands. Brackets are welded into IGT metal stands, so bracket installation is not necessary. When installing drop-door sensor switches into metal stands, simply snap the switch into the bracket (from the front of the bracket). Then slide the two Faston connectors from the harness onto the terminals at the back of the switch. The black wire goes to the normally open terminal

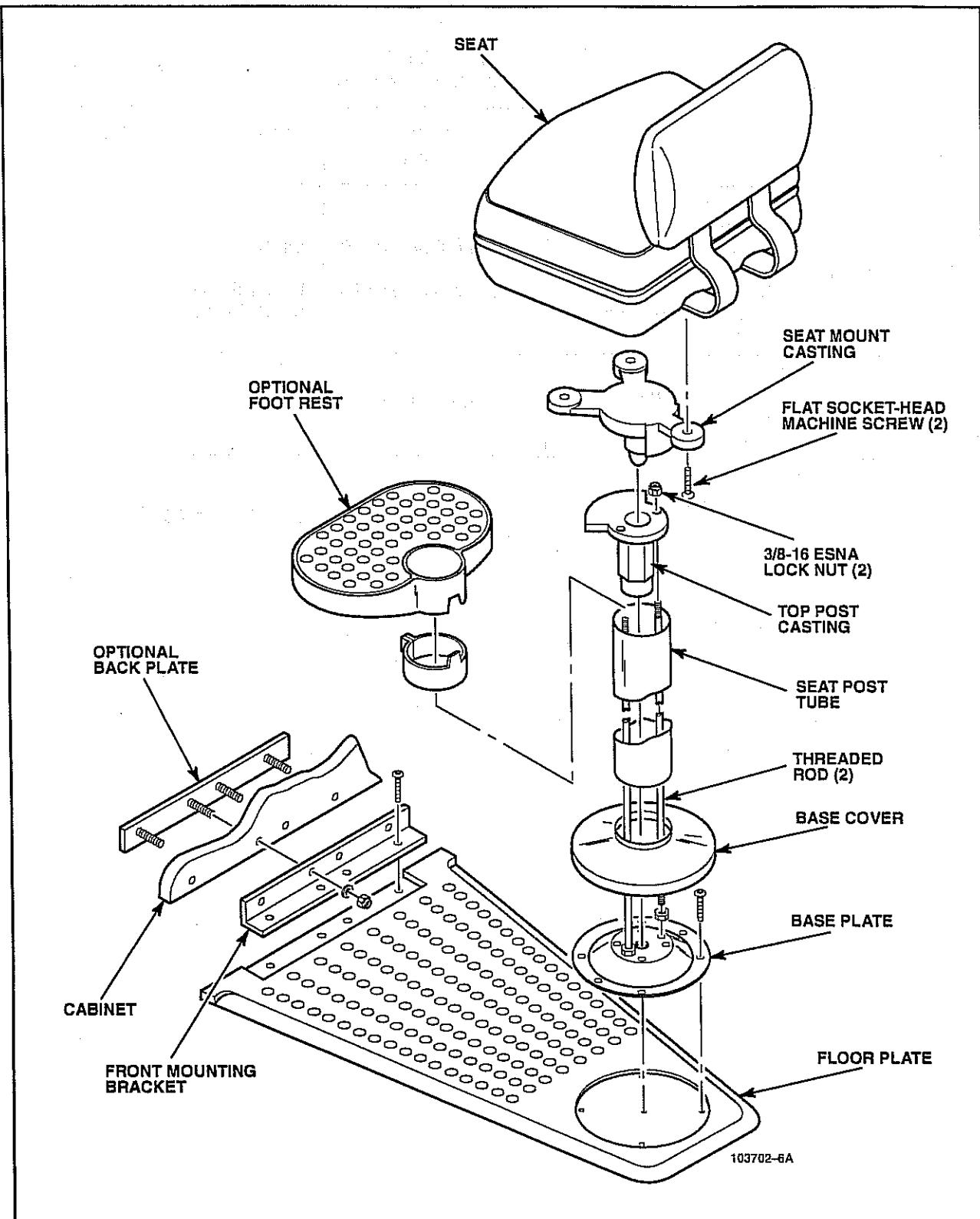


Figure 2-2. Seat Mounting.

Table 2-2
S-Plus Imbedded
Bill Acceptor Lock Assemblies

Lock Description	Lock Information	Collar Information	Lock Tang Information	Hardened Ring
Machine Door	Lower Position: 5/8" right hand turn (requires 1/4" collar) Upper Position: 5/8" right hand turn or 1-1/8" right hand turn (1/2" collar)	1/4": p/n 644-012-90 1/2": p/n 644-010-90	Lower Position: p/n 803-080-00 Upper Position: p/n 803-078-00	N/A
Belly Glass	5/8" or 1-1/8" right or left hand turn (1/2" collar required on 1-1/8" lock)	1/2": p/n 644-010-90	p/n 803-073-00	p/n 644-018-90 (1/8" Collar)
Interior Bill Drop Access Door	5/8" right or left hand turn	Maximum collar: 1/4" Lock head: 1/4" thick (use offset cam to avoid contact with belly door)	p/n 803-081-00	p/n 002-031-72
Stacker Locks	1-1/8" left hand turn ONLY! or 5/8" left hand turn with no collar	N/A	p/n 803-076-90	N/A

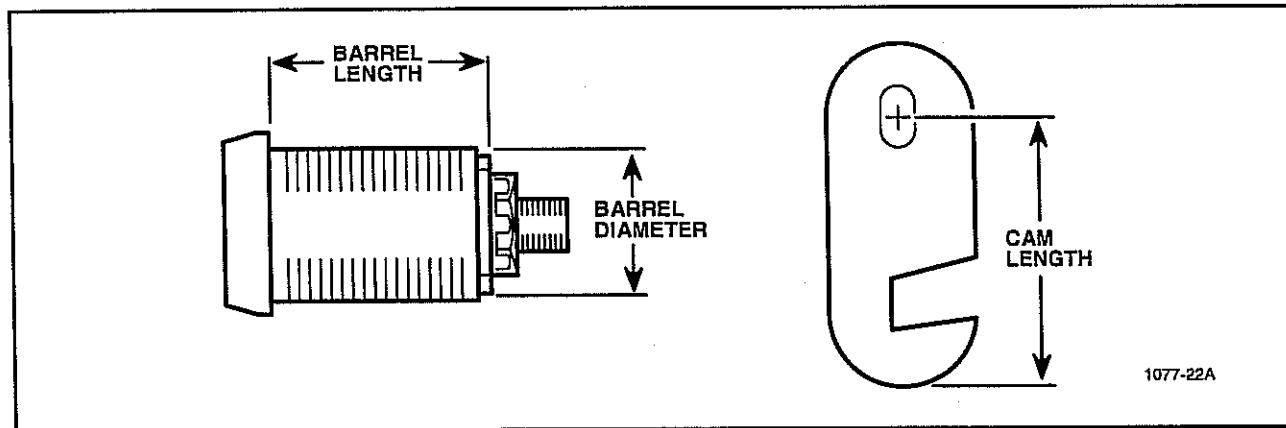


Figure 2-3. Lock Dimensions.

on switch side two, marked NO 2. The clear-coated wire goes to the outside common terminal on switch side two, marked COM 2.

Installation Procedure – Vertical Placement

Refer to Figure 2-4 and the following instructions for installing the drop-door sensor switch in a vertical position in the stand.

Tool Required

– #2 Phillips screwdriver

Procedure

1. Locate the bag of switch-mounting hardware in the installation kit. The kit includes the interlock switch, switch bracket (p/n 636-007-00) and four 6-32 x 5/8" Phillips-head tap screws.
2. Locate the switch harness portion of the door-open/reset harness on the inside, right wall of the cabinet. Route the harness down into the stand through the cable access hole at the back right-hand corner of the cabinet.
3. Position the switch bracket so that the front of the switch faces out of the door opening in front of the stand (when mounted) and the two mounting holes contact the right side of the door, as shown in Figure 2-4.
4. Insert a 6-32 x 5/8" Phillips-head tap screw through the two ground-wire ring terminals, smaller terminal first.
5. Insert the tap screw and ring terminals through the upper mounting hole and start the screw into the brace. **Do not tighten completely.**
6. Insert the second 6-32 x 5/8" Phillips-head tap screw through the lower mounting hole and start the screw into the brace. **Do not tighten completely.**
7. Tighten the two Phillips-head screws securely.

8. Snap the switch into the bracket (from the front of the bracket) so that it appears as shown in Figure 2-4.
9. Slide the two Faston connectors from the harness onto the terminals at the back of the switch. The black wire goes to the normally-open terminal on switch side two, marked NO 2. The clear-coated wire goes to the outside common terminal on switch side two, marked COM 2.

Note

If a DOOR OPEN alarm sounds or a tilt occurs and other doors are securely closed, verify that the drop door closes and locks securely and that the drop-door sensor switch is correctly positioned and connected.

10. Locate the two ty-raps with mounting holes that are attached to the switch harness and secure the harness to the inside top of the stand using the two remaining 6-32 x 5/8" Phillips-head tap screws.

Installation Procedure – Horizontal Placement

Refer to Figure 2-5 and the following instructions for installing the drop-door sensor switch in a horizontal position in the stand.

Tool Required

– #2 Phillips screwdriver

Procedure

1. Locate the bag of switch-mounting hardware in the installation kit. The kit includes the interlock switch, switch bracket and four 6-32 x 5/8" Phillips-head tap screws.
2. Locate the switch harness portion of the door-open/reset harness on the inside, right wall of the cabinet. Route the harness down into the stand through the cable access hole at the back right-hand corner of the cabinet.

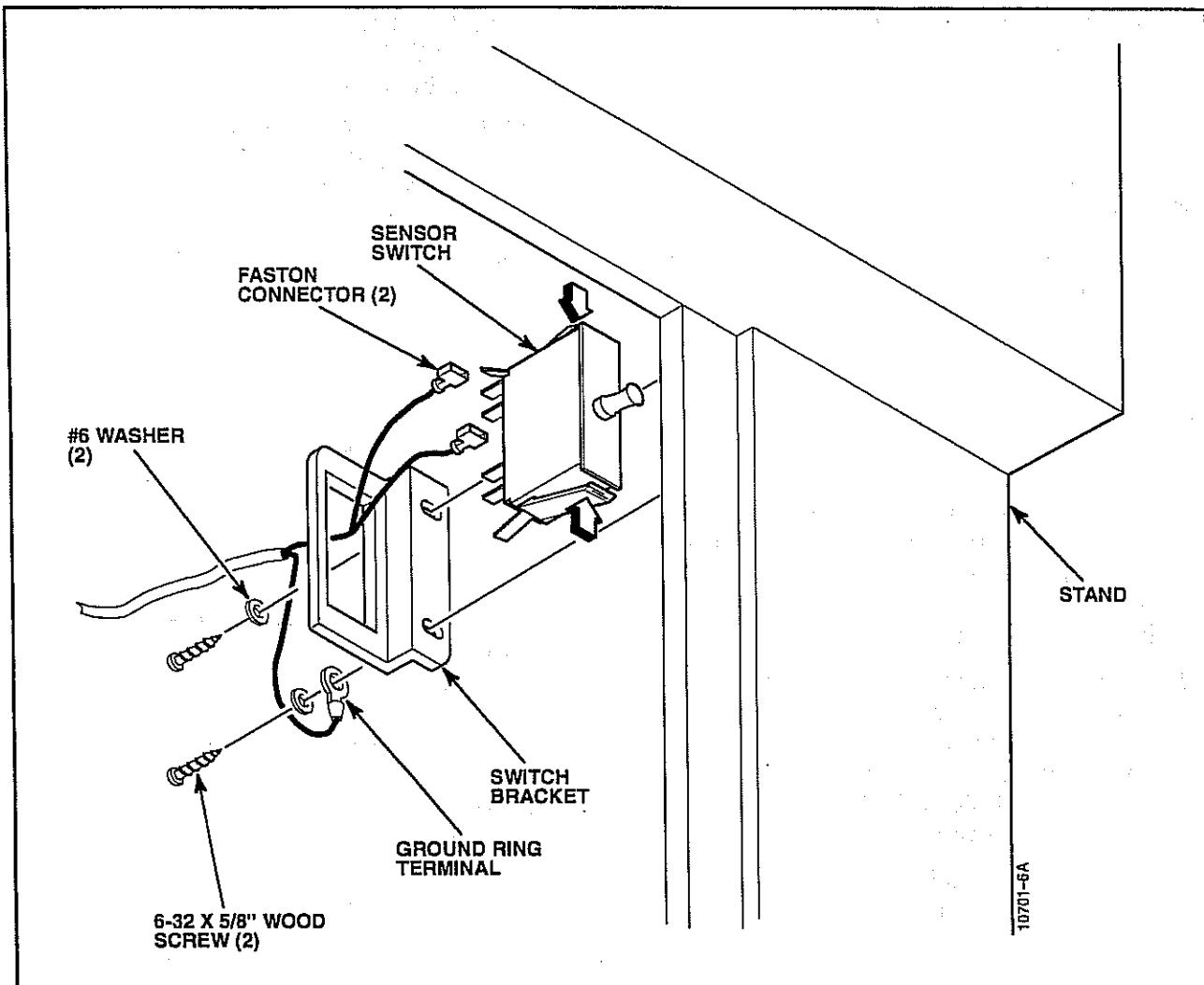


Figure 2-4. Drop-Door Sensor Switch – Vertical Placement.

3. Snap the switch into the bracket (from the front of the bracket) so that it appears as shown in Figure 2-5.
4. Slide the two Faston connectors from the harness onto the terminals at the back of the switch. The black wire goes to the normally open terminal on switch side two, marked NO 2. The clear-coated wire goes to the outside common terminal on switch side two, marked COM 2.
5. Insert a 6-32 x 5/8" Phillips-head tap screw through the two ground-wire ring terminals, smaller terminal first.
6. Position the switch bracket so that the front of the switch faces out of the door opening in front of the stand and the two mounting slots contact the wooden brace in the upper right corner of the door opening, as shown in Figure 2-5.
7. Insert the 6-32 tap screw, with ring terminals attached, through the left-hand mounting slot and start the screw into the brace. **Do not tighten completely.**
8. Insert another 6-32 x 5/8" Phillips-head tap screw through the right-hand mounting slot and start the screw into the brace. **Do not tighten completely.**

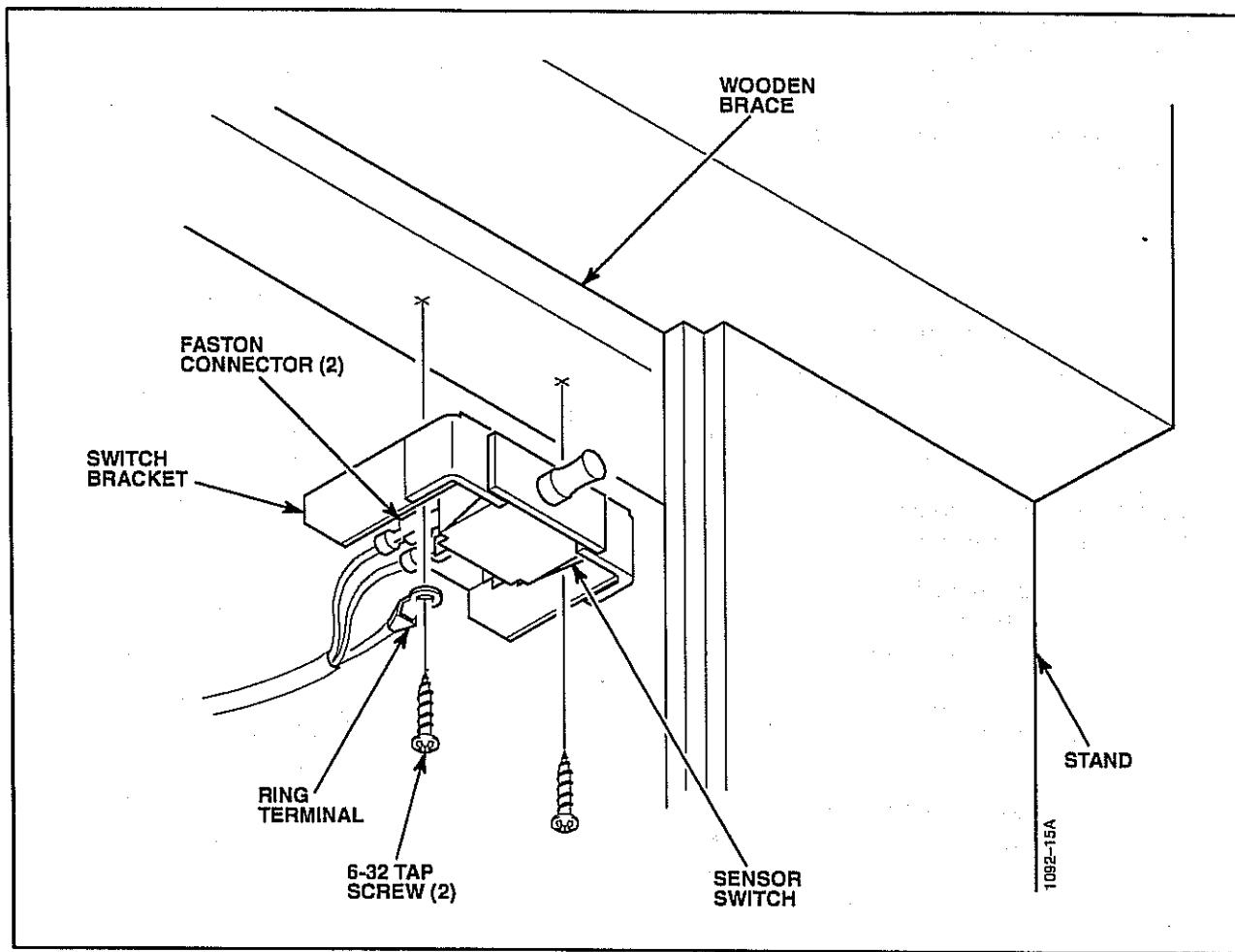


Figure 2-5. Drop-Door Sensor Switch – Horizontal Placement.

9. Adjust the switch location by sliding the switch bracket as far forward as it will go and still allow the door to close and latch. Tighten the two Phillips-head screws securely.

Note

If a DOOR OPEN alarm sounds or tilt occurs and all other doors are securely closed, verify that the drop door closes and locks securely and that the drop-door sensor switch is correctly positioned and connected. Adjust the switch position as needed.

10. Locate the two ty-raps with mounting holes that are attached to the switch harness and secure the harness to the inside

top of the stand using two 6-32 x 5/8" Phillips-head tap screws.

2.3.6 Electrical Connections

The following information provides a guideline for typical, international line-voltage requirements and their respective power plugs. See Table 2-3, Electrical Wire Colors, and Figure 2-6, International Power Plugs.

CAUTIONS

To ensure proper current and voltage for each machine, connect no more than five (5) machines per 20 amp circuit breaker.

A potential hazard exists when ground to neutral exceeds 3VAC, either at the electri-

cal outlet or when measuring from one machine chassis to another.

To avoid electric shock, always ground each machine. Always use extreme care and equipment that is in good condition when working with AC voltages.

Servicing should only be performed by QUALIFIED PERSONNEL.

1. As a precautionary measure, verify the line voltage at the electrical outlet(s) where the machine is being installed by carefully connecting a voltmeter across the contacts of the outlet and reading the value.
2. Check for correct polarity (when applicable) using a circuit polarity tester.
3. Open the door by lifting the sliding door latch (located below the lock hole) and pulling the door toward you.
4. Verify that the machine power switch is turned off (see Figure 2-8 for power switch location).
5. Remove the coin tray (if applicable) by lifting the tray and disengaging it from the cabinet. Remove the hopper by grasping the handle and pulling firmly enough to disengage the plug at the back of the receptacle mounted on the lower module. Slide the hopper out of the machine (refer to the hopper information in Section 5).
6. Connect the international plug end of the machine's power cord to the IEC power receptacle located inside the machine on the rear, lower-right side of the lower module. **Do not turn the machine power on at this time.**
7. Open the drop door; remove the coin-drop bucket and the wooden insert in the center of the floor.
8. Pass the free end of the power cord down through the holes in the right, rear corner of the machine enclosure and the stand, and out through the hole in the back of the stand. Connect the power cord to an appropriate power outlet.

Note

If a DOOR OPEN alarm sounds and/or the security code appears, and all other doors are securely closed, verify that the drop door closes and locks securely and that the drop-door sensor switch is correctly positioned and connected.

**Table 2-3
Electrical Wire Colors**

Reference	115 VAC	220 VAC
Hot	Black	Brown
Neutral	White	Blue
Ground	Green	Green/Yellow

International Power Plugs

115 VAC (USA)

Refer to the 115 VAC (USA) illustration in Figure 2-6. Typically, ground to hot (line) is 115 VAC \pm 5%. Ground and neutral are generally tied together at the circuit breaker box and should not exceed 3 VAC. Check chassis grounds and supply circuit wiring for proper line voltage isolation.

220 VAC (Non-Phased)

Refer to the 220 VAC (Non-Phased) illustration in Figure 2-6. Typically, ground to hot is 220 VAC \pm 5%. Neutral to hot is 220 VAC \pm 5% and ground to neutral is generally tied together at the breaker box.

220 VAC (Phased)

Refer to the 220 VAC (Phased) illustration in Figure 2-6. Typically, ground to either hot is 110 VAC \pm 5%. Hot to hot is 220 VAC \pm 5%.

International Power Outlets

The international power outlet integrates many different line-voltage power cords and supplies to a common power outlet/plug.

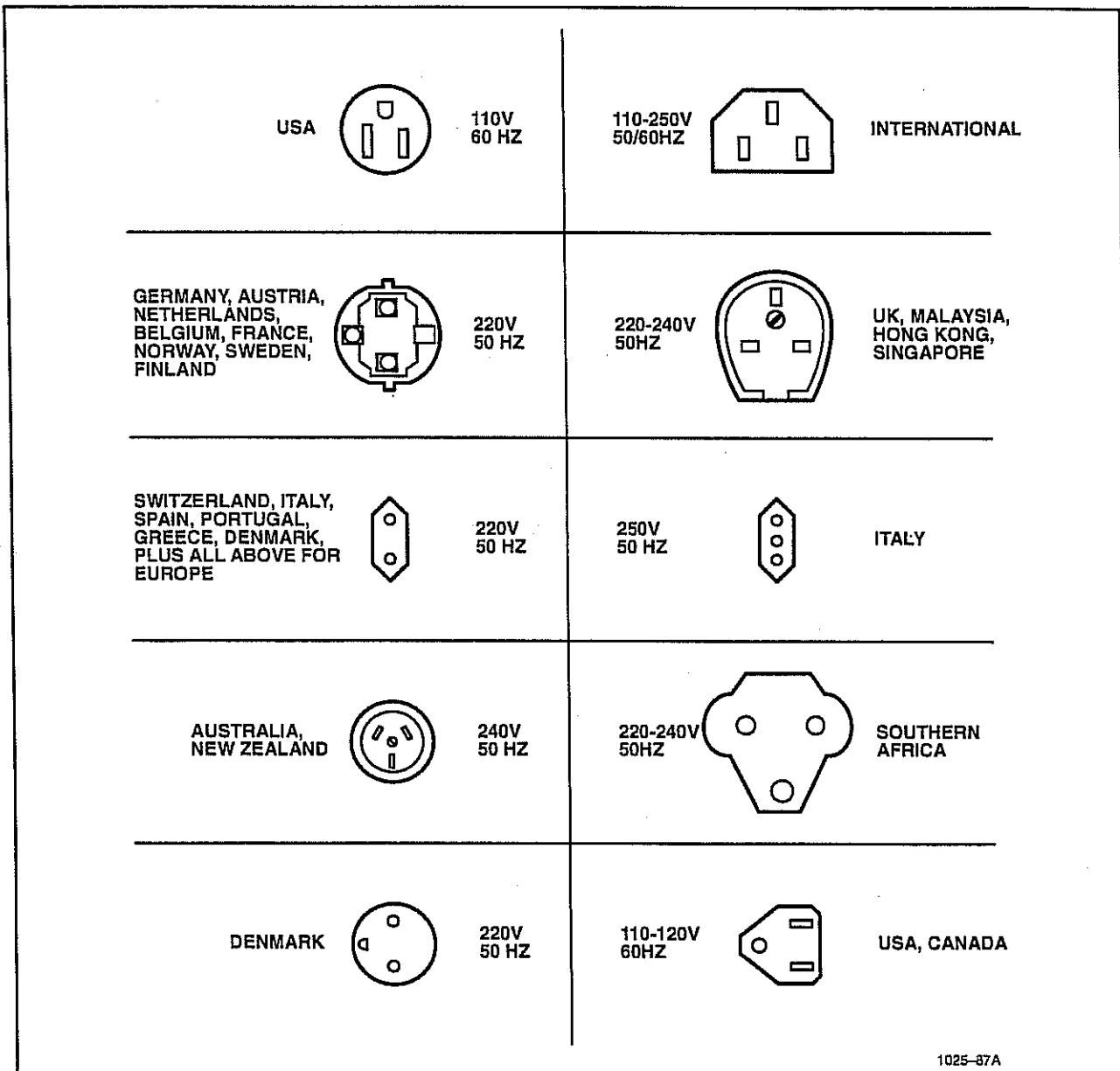


Figure 2-6. International Power Plugs.

115/220 VAC (Non-Phased)

Refer to the International 115/220 (Non-Phased) illustration in Figure 2-7. Typically, ground to hot is 115 or 220 VAC \pm 5%. Ground to neutral is 0 VAC, not exceeding 3 VAC.

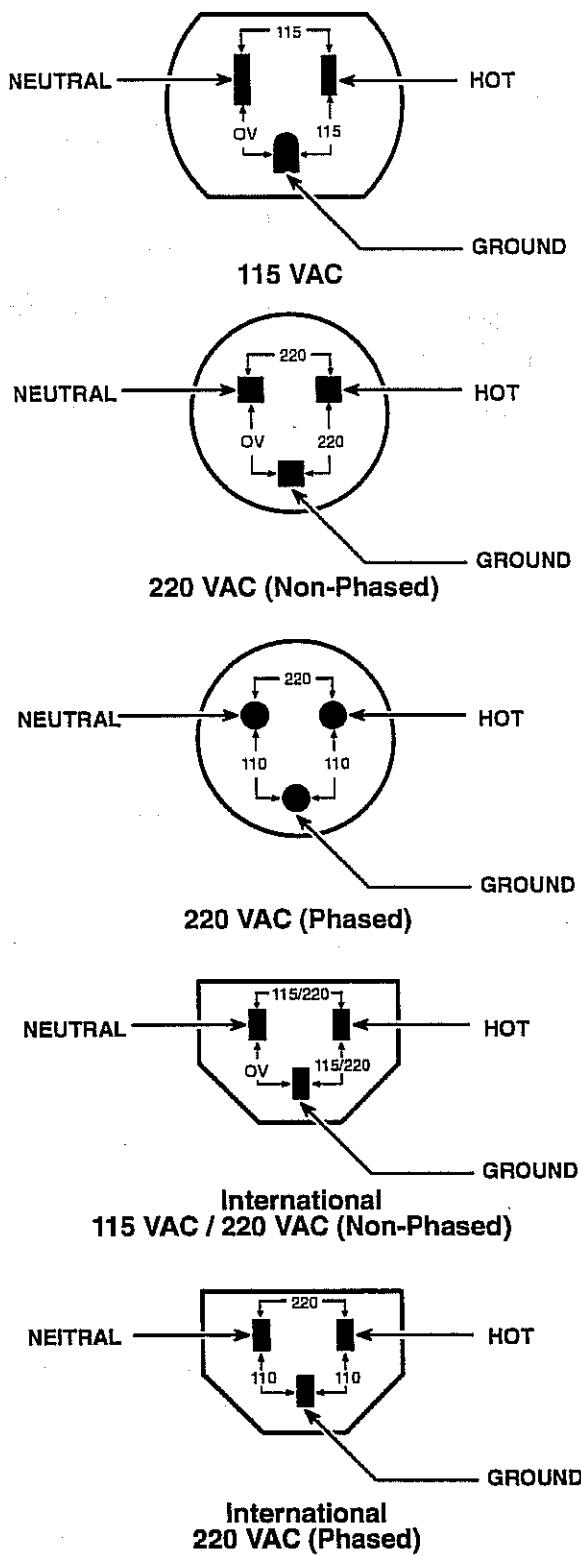
International 220 VAC (Phased)

Refer to the International 220 (Phased) illustration in Figure 2-7. Typically, ground to either hot is $110 \pm 5\%$. Hot to hot is 220 VAC \pm 5%.

2.4 Power Up & Functional Verification

Note

Refer to Table 2-1 to verify that all necessary installation steps have been completed before proceeding with this section.



1027-3A

Figure 2-7. International Power Outlets.

After completing the machine installation, use the following information to power up the machine, set the programmable options and verify correct game operation.

2.4.1 Service Control Switches

Refer to Figure 2-8 for the locations of the service control switches. Table 2-4 briefly describes the functions of each switch.

2.4.2 Power Up

1. Open the front door.
2. Turn the machine **power on**. The fluorescent lights should illuminate. If they do not, refer to Section 5, Main Door.
3. Verify that the correct game display appears on all electronic displays. If the display is not correct, press the self test switch for 3 to 4 seconds to transfer the game data to EEPROM and get the correct display. If a display is still not correct, refer to Section 3, Machine Troubleshooting.
4. Verify that the hopper is functional. Refer to the hopper information in Section 5 to resolve hopper malfunctions.
5. Refer to Section 4 to set up the game, select the options, verify game play and record the Statistical Data.

**Table 2-4
Service Control Switches**

Switch	Function
Main Power	Turns the machine power on or off
Reset Key	Accesses and steps through the statistical data mode; activates some functions in the self test mode
Self Test	Accesses and steps through the self test mode
Spin Reels/ Handle Spin	Activates functions within the self test mode

2.5 General Maintenance

Upon completion of any removal, installation, servicing, disassembly or assembly, refer to Section 4, Game Software, for functional verification procedures to ensure reliable and continuous machine operation.

CAUTIONS

Use extreme caution when performing general maintenance, to prevent personal injury or damage to the machine. Although IGT designs numerous safety features into its products, servicing of machines should be performed by QUALIFIED PERSONNEL ONLY.

Do not use cleaning solvents that contain ammonia on a brass cabinet. Permanent damage to the finish will result. Power to the machine must be turned off before cleaning the inside of the cabinet or removing any electromechanical module.

2.5.1 Component Maintenance Schedule

Table 2-5, Preventive Maintenance Chart, provides a concise machine maintenance schedule. Perform adjustment procedures only as needed. If a component is functioning properly, do not adjust it.

Refer to the Section 5 for specific inspection, cleaning and adjustment procedures.

2.5.2 Monthly Cleaning

Periodic maintenance that should be performed at least every 30 days:

- Wipe the inside of the coin tray clean with a damp cloth
- Clean all exterior glass including the exposed monitor with a nonabrasive, anti-static glass cleaner and a lint-free cloth
- Clean the outside of the machine door with a mild cleaner that does not contain ammonia

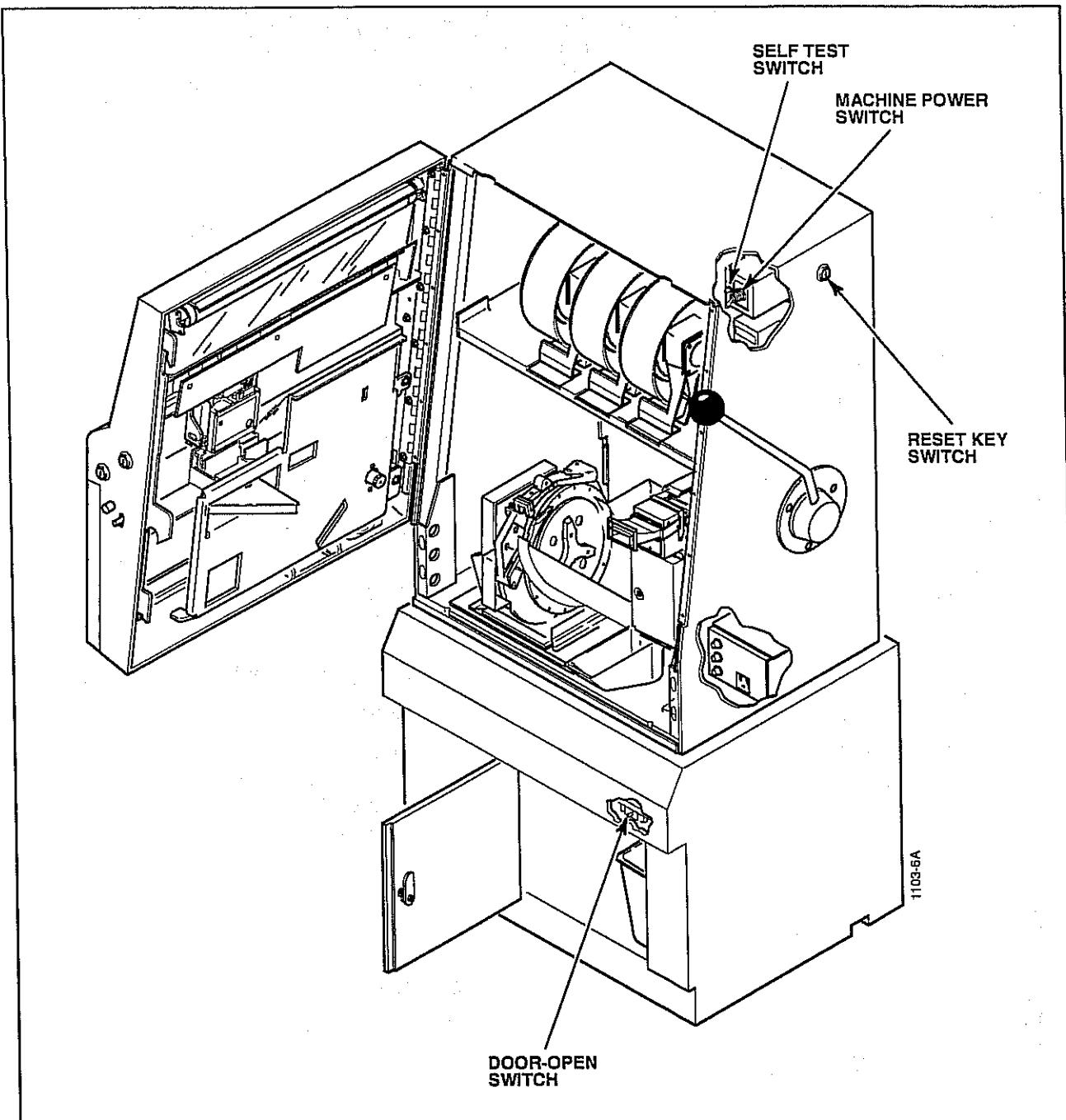


Figure 2-8. Service Control Switches.

2.5.3 Quarterly Maintenance

Periodic maintenance to be performed at least every 90 days.

- Vacuum the inside of the machine and clean dust or dirt from the coin chutes.
- Clean the optics on the coin-in assembly and the door-open sensor with a clean, lint-free cloth.

Table 2-5
Preventive Maintenance Chart

Assembly	Maintenance Item	Service Interval (Months)*			
		1	3	6	12
Machine Door	Player Panel Switches	C			A
	All Glass	C			
	Door-Open Optics		C		
Coin-In	Encoder Optics (Coin Mech)		C		
	Coin Acceptor	C		A	
	Entry Assembly		C		
Cabinet	Door Open Optics		C		
Hopper	Bowl			C	
	Motor Armature & Brake			C	
	Metal Coin Wiper			A	
	Optic Coin Sensor			C	
	Coin Level Probe			C	
	Knife		C		
Slot Handle	Microswitch			A	
Reel Mechanism	Reel Optics		C		
	Reel Strip	C			
Bill Validator	Bill Path	C			
	Timing Belts		C		
	Pinch Rollers		C		
	Magnetic Sensors	C			
	Optical Lenses	C			

* C = Clean & Inspect

A = Check Adjustment

- Clean the button areas of each player-panel switch housing with a noncorrosive, non-fogging plastic cleaner.
- Verify that the fluorescent lights in the machine are properly illuminated. Replace any bulbs, ballasts or starters that are not functioning properly (lights are flickering or burned out).

Section 3

Machine Troubleshooting

3.1 Introduction

This section provides overall troubleshooting information for S-Plus IBA machines, including:

- **Section 3.2, Troubleshooting Charts** – lists possible malfunctions, their probable causes and solutions.
- **Section 3.3, Service Indicators** – describes the different types of tilts, errors and security messages that appear on the digital display, the optional dot matrix display, and that flash on the optional candle (change/service light). Also gives a quick reference for each message or code, its meaning and how to find a solution to the problem.
- **Section 3.4, Troubleshooting Error Codes & Messages** – discusses each code/message listed in Section 3.3 and the proper procedure for resolving it.
- **Section 3.5, Troubleshooting Techniques** – describes how to isolate and repair problems with electrical circuitry. Includes diagrams of main transformer voltages and connector pinouts.

3.1.1 Information Displays

The S-Plus IBA stepper slot machine shows coins played, credits and winner paid amounts

on the 7-segment digital display located on the right side of the reel glass.

The digital display shows a numeric code that must be interpreted. *Example:* The digital display shows 3200 to indicate a coin-out tilt.

Figure 3-1 shows the location of the digital on the reel glass.

3.2 Troubleshooting Charts

The diagnostic charts or tables in this section describe possible machine malfunctions, their probable causes and solutions.

- Table 3-1, Inputs
- Table 3-2, Outputs
- Table 3-3, Software Function
- Table 3-4, Error Codes

The self test mode is a feature of the game software used for electromechanical troubleshooting (inputs, outputs, hopper, reel function). Refer to Section 4 for information about using the self test mode.

Refer to the appropriate instructions in Section 5 to service individual components, i.e. hopper (coin jams), processor board (DIP switch settings and chip locations).

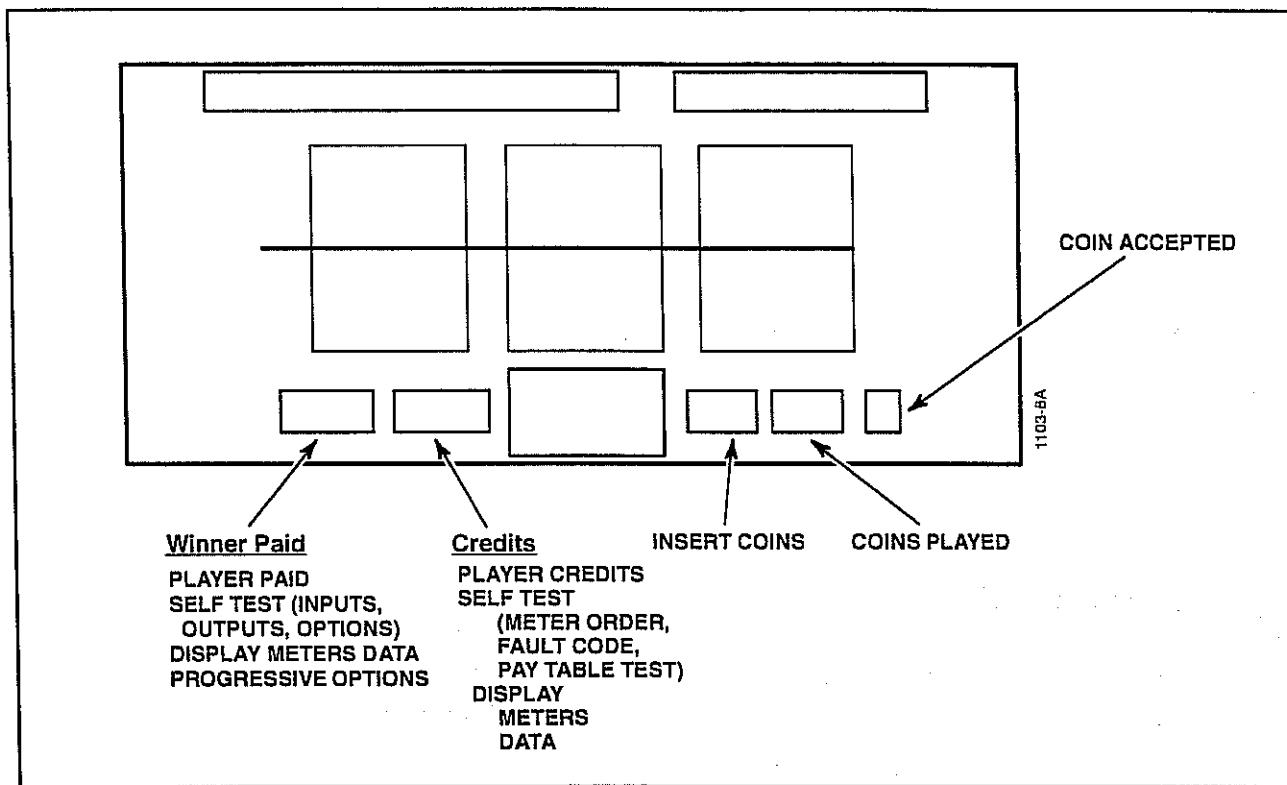


Figure 3-1. Information Displays (Reel Glass).

Table 3-1
Inputs Troubleshooting Chart

Symptom	Possible Cause	Solutions
Will not accept coins	1. Coin jam or tilt has occurred. 2. INSERT COIN is not displayed; game is not over. 3. 24 VAC fuse is blown. 4. Broken wire or bad connection. 5. Wrong sample coin in comparitor (Coin Mech only). 6. Faulty coin acceptor. 7. Faulty processor board. 8. Faulty mother board. 9. Door-open sensor inoperative.	1. Refer to Coin-In Assembly in Section 5. 2. Complete the game. 3. Replace the fuse. 4. Check related wiring and connectors. 5. Install a sample coin of the correct denomination. 6. Replace the coin acceptor. 7. Replace the processor board. 8. Replace the mother board. 9. Align or replace the sensor.
Will not register coins deposited	1. Optics are obstructed. 2. Coin-in channel is misaligned. 3. Broken wire or bad connection. 4. Faulty coin acceptor. 5. Faulty coin-in optics. 6. Faulty mother board. 7. Faulty processor board.	1. Check for objects obstructing optics. 2. Align coin-in components correctly. 3. Check related wiring and connections. 4. Replace the coin acceptor. 5. Replace the coin-in optics. 6. Replace the mother board. 7. Replace the processor board.

Table 3-1
Inputs Troubleshooting Chart (continued)

Symptom	Possible Cause	Solutions
Bill acceptor will not accept bills	1. Bill is returned or not accepted. 2. Bill is stuck in acceptor before reaching lower transport. 3. Object is detected in bill path. 4. Rejects folded, torn, facing wrong. 5. Bill jammed in lower transport or the bill stacker is full.	1. Drop box misaligned or full. 2. Remove upper assembly and pull down on bill to release it. 3. Remove any jammed material. 4. Flatten bill and insert again. 5. Remove lower assembly and dislodge any jammed bills in the stacker or transport.
Player switch(es) not functioning	1. Faulty microswitch. 2. Switch plunger stuck down. 3. Broken wire/bad connection. 4. Switch wires in wrong position. 5. Faulty processor board. 6. Faulty mother board.	1. Replace the microswitch. 2. Clean switch, verify retaining nut finger tight only. 3. Check related wiring and connectors 4. Verify wire positions using wiring diagram. 5. Replace the processor board. 6. Replace the mother board.

3.3 Service Indicators

S-Plus IBA machines indicate service conditions (e.g., errors, tilts, malfunctions) in one of three ways:

- A service message appears on the 7-segment digital display
- An alarm sounds
- An optional candle (change/service light) flashes

3.3.1 Candle Operation

S-Plus IBA machines may be configured with a candle (change lamp), or without a candle. If the machine is equipped with an optional candle, the candle flashes to indicate the various modes or game conditions, including tilts and door-open conditions. Figure 3-2 shows eight typical messages that a two-stage candle communicates.

3.3.2 Error Codes

When the game program senses a service condition or a deviation from standard game play, the machine displays an error code. These codes usually indicate that the assistance of either a service technician or an attendant is required.

The digital display shows a numerical error code of up to four digits in the Winner Paid window of the reel glass. The error code location for the digital display is shown in Figure 3-1.

The following information describes codes that may appear on the digital display. Table 3-4 lists all of the error codes that may appear in most S-Plus IBA games by type, explains the cause of each message and references procedures to rectify each situation.

Tilt Codes & Messages

When a mechanical error, or "tilt," occurs during game play mode or idle mode, the machine enters the **tilt mode**.

- The candle (if present) flashes several times per second.
- All game play is suspended until an authorized person resolves the tilt and resets the game.
- The coin acceptor lockout engages.
- An error code/message appears on the digital display. Tilt messages require that an authorized person correct the problem and reset the game. Table 3-4 lists tilt codes and their causes.

Table 3-2
Outputs Troubleshooting Chart

Symptom	Possible Cause	Solutions
No machine functions	1. Power cord is disconnected. 2. 120 VAC fuse is blown. 3. Faulty power switch.	1. Attach power cord to an appropriate outlet (verify correct voltage) & to the lower module. 2. Replace the fuse. 3. Troubleshoot/replace the switch.
No sound	1. Broken wire or bad connection. 2. Speaker is defective. 3. Faulty processor board. 4. Faulty mother board.	1. Check related wiring & connectors. 2. Replace the speaker. 3. Replace the processor board. 4. Replace the mother board.
Optional change light (candle) does not illuminate	1. Lamp is burned out. 2. Change switch is faulty. 3. 7 VAC fuse is blown (all lamps are out). 4. Broken wire or bad connection. 5. Faulty processor board. 6. Faulty mother board.	1. Replace lamp, verify operation in self test. 2. Replace switch, verify operation in self test. 3. Replace the fuse. If it blows again, check for shorts in 7 VAC/lamp circuit. 4. Check related wiring & connectors. 5. Replace the processor board. 6. Replace the mother board.
Fluorescent lights do not illuminate	1. Starter is burned out. 2. Lamp is burned out. 3. Ballast is defective. 4. Broken wire or bad connection. 5. 120 VAC fuse is blown.	1. Replace the starter. 2. Replace the lamp. 3. Replace the ballast. 4. Check wires, connectors, 110V junction block. 5. Replace the fuse.
Mechanical meter(s) not functioning	1. Faulty meter. 2. 24 VAC fuse is blown. 3. Broken wire or bad connection. 4. Faulty processor board. 5. Faulty mother board.	1. Replace the meter. 2. Replace the fuse. 3. Check related wiring & connectors. 4. Replace the processor board. 5. Replace the mother board.

Data Processing Errors

Data processing error messages indicate a memory or communication problem between the machine processor board and the mother board. These communications are critical to maintain current game statistics and correct game operation.

When a data processing error occurs during the game play mode or the idle mode, the game enters the **tilt mode**:

- All game play is suspended until an authorized person resolves the error condition and resets the game.
- The coin acceptor lockout engages.
- The candle (if present) flashes several times per second.

- A data processing error code appears on the digital display.

Data processing error codes require that an authorized person correct the problem and reset the game. See Table 3-4 for a list of data processing error codes and solutions.

Security Codes & Messages

Security error codes appear (and/or an alarm sounds) when an event other than normal game play occurs, such as opening the front door or the cash door. These messages do not require reset of the game after correcting the security condition. See Table 3-4 for a list of security messages and their causes.

Table 3-3
Software Troubleshooting Chart

Symptom	Possible Cause	Solutions
Code/message appears on the digital or dot matrix display	Game or system software sensed a tilt, error, service or security condition.	All service messages, their causes and solutions are discussed in Section 3.4.
Options (game sounds, hopper pay amounts, progressives) not functioning properly	Game program not compatible with processor board DIP switch settings.	Verify DIP switch settings (see Processor Board information in Section 5). Refer to Section 4, Game Software, for additional information about game options and to component-specific information in Section 5.
Statistical data mode will not display	<ol style="list-style-type: none"> 1. Faulty reset key switch. 2. Game is not over/completed. 3. Broken wire/bad connection. 4. Faulty processor board. 5. Faulty mother board. 	<ol style="list-style-type: none"> 1. Replace reset switch. 2. Complete the current game. 3. Check related wiring and connectors. 4. Replace the processor board. 5. Replace the mother board.
Self test mode will not display	<ol style="list-style-type: none"> 1. Faulty self test switch. 2. Game is not over/completed.* 3. Machine is in tilt mode.* 4. Faulty processor board. 5. Faulty mother board. 	<ol style="list-style-type: none"> 1. Replace the self test switch. 2. Complete the current game. 3. Clear the tilt. 4. Replace the processor board. 5. Replace the mother board.

*test pages appear, but no option pages

Service Displays

The optional candle (change light) flashes to indicate that the services of an authorized person are required.

3.4 Troubleshooting Error Codes

In many instances when the display on the door indicates an error condition, open and close the front door to reset the game and clear the error. Any coins already played are displayed until the door is opened.

Upon opening the front door, the display clears the current game information and a "0" appears in the Coins Played window.

Upon closing the front door, the game resets, the reels spin and stop at their last valid position.

The error code clears and the display returns to normal game play data.

If the problem still exists or quickly recurs, use the information in Table 3-4 and the specific procedures that follow to correct the problem.

Important! Should a problem occur, check state and local laws before rectifying the situation.

CAUTION

*Use extreme caution when performing the routines within the troubleshooting check list to prevent personal injury or damage to the S-Plus IBA stepper slot machine. Although IGT designs numerous safety features into its products, servicing of the S-Plus IBA machine is to be performed by **QUALIFIED PERSONNEL ONLY**.*

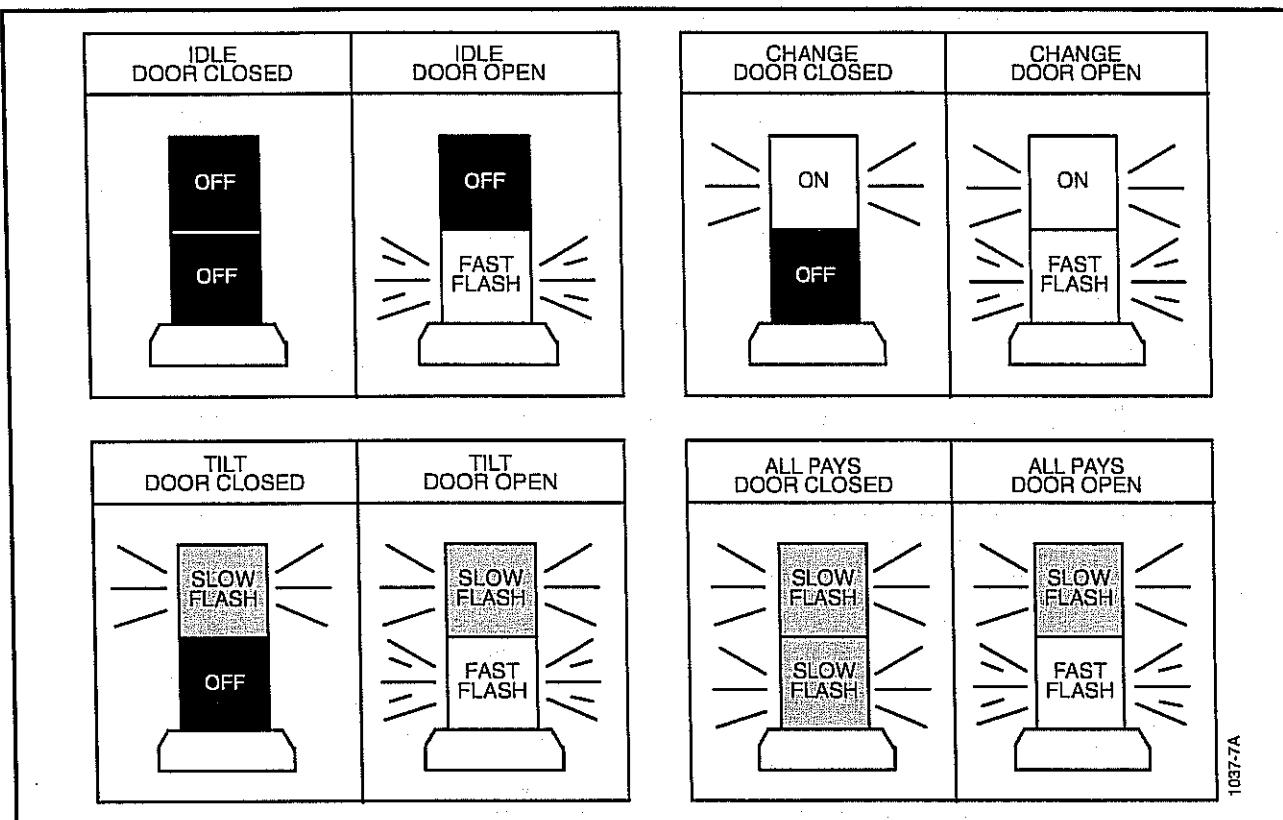


Figure 3-2. Typical Two-Stage Candle Operation.

The following error categories require procedures other than opening and closing the main door to resolve them:

- Bad CMOS RAM (61)
- Bad game/data EPROM (62)
- Bad EEPROM (65)
- Game EPROM changed (66)
- Data EPROM changed (67)

Refer to Table 3-4 and use the following procedures to help identify and correct the problem.

3.4.1 Coin-In Errors

2100 – Coin-In Tilt

A flow chart summarizing the steps for correcting a coin-in tilt or jam is included in Coin-In Assembly in Section 5. Refer to that flow chart and the following procedure to resolve a coin-in tilt.

Note

The term "coin acceptor" is used interchangeably in this manual to refer to any type of coin acceptor mechanism, including the Coin Mech coin comparitors and the mechanical coin acceptors.

1. In some jurisdictions, coin acceptors utilize a coin-return plunger on the coin entry base. Press the plunger (if present) to release the jammed coin(s).
2. Verify that the front door is closed securely and that the optional dot matrix display does not show a DOOR OPEN message.
3. Open the front door and verify that the comparitor or coin acceptor is seated in all four acceptor clips and that the clips are at the same level.
4. Check the coin acceptor for blockage and clear any jammed coins in the coin channel assembly.

5. Make sure the optics on the coin encoder are not obstructed. Clean the coin optics (Section 3.4.4) or replace the coin encoder (Section 6.5.3).
6. Check the wire harness connections on the coin acceptor and the lower module connector panel.
7. Inspect all related wire harnesses and their connections. (see Section 3.5.5)
8. Verify correct operation using the input tests in the self test mode. Refer to Section 4, Game Software, for information about using the self test mode.
9. Do one of the following to reset the game software.
 - Open and close the front door
 - Push the Collect Winnings/Cashout switch when credits exist on the credit meter

If the tilt quickly recurs, do one or more of the following.

- Replace the coin acceptor, encoder assembly, or (if applicable) the coin mechanical switch (refer to Coin-In Assembly in Section 5)
- Replace the processor board (refer to Processor Boards in Section 5)

3.4.2 Coin-Out & Hopper Errors

3100 - Coin Out Tilt

1. Check the machine for possible tampering or cheating.
2. Check for and clear any jammed coins in the coin-out channel on the hopper (refer to Hoppers in Section 5).
3. Check the optic coin-out sensor for blockage or dirty optic surfaces. Clean if necessary.
4. Check the optic coin-out sensor harness for faulty connections.

5. Check the hopper pinwheel, shelfwheel and agitator, if applicable, for signs of wear.
6. Inspect all related wire harnesses.
7. Verify the correct operation using the self test information in Section 4 for input and hopper tests.

If the tilt quickly recurs, do one or more of the following:

1. Replace the hopper (refer to Hoppers in Section 5).
2. Replace the processor board (refer to Processor Boards Section 5).

3200 - Extra Coin Out

Refer to Hoppers in Section 5 as necessary when performing the following procedures.

1. Check the machine for possible tampering or cheating.
2. Verify that the hopper motor brake functions properly.
3. Check the coin wiper on the hopper for jams.
4. Check the optic coin-out sensor harness for loose or faulty connections.
5. Inspect all related wire harnesses.
6. Verify correct operation using the self test information in Section 4, Game Software, for input and hopper tests.

If the tilt quickly recurs, do one or more of the following:

1. Replace the hopper.
2. Replace the processor board (see Processor Board in Section 5).

3300 - Hopper Empty

Refer to Hoppers in Section 5 as necessary when performing the following procedures.

1. Check the machine for possible tampering or cheating.

Table 3-4
Resolving Error Codes & Messages

Error Type	Digital Code	Description	Situation	Refer To	
Tilt	21bb	Coin In Tilt	Optic coin-in sensors were blocked for over 100 ms.	Section 3.4.1	
	3100	Extra Coin Out*	Hopper coin-out sensor detected a coin was dispensed contrary to program instruction.	Section 3.4.2	
	3200	Coin Out Tilt*	Hopper coin-out sensor was blocked for too long (over 700 ms.).		
	3300	Hopper Empty*	Hopper coin-out sensor detected no coins were dispensed (greater than 8 seconds between each coin).		
	40bb	Stepper Motor (Reel) Tilt	Reel tilt – reel number not specified.	Section 3.4.3	
	41bb	Reel #1 Tilt	Designated reel is misaligned or malfunctioning.		
	42bb	Reel #2 Tilt			
	43bb	Reel #3 Tilt			
	44bb	Reel #4 Tilt			
	45bb	Reel #5 Tilt			
	49bb	Reel Mechanism Disconnected	A reel mechanism has become unplugged or circuit is interrupted.		
Security	63bb	Card Cage (Processor Tray/Logic Area) Access	The main processor (logic) door has been opened and closed since the last game played. The message remains displayed until the end of the next game.	Section 3.4.5	
Data Processing Error	12bb	Low Battery	The battery voltage on the processor board has dropped below 2.9 volts DC. Data stored in CMOS RAM may be lost if a power failure occurs.	Section 3.4.4	
	61bb	CMOS RAM Error	Bad CMOS RAM data, or data was cleared.		
	61b9	Enhanced Features	Contact IGT for additional information.		
	62b0	Bad Game EPROM	Game program or data program checksum does not match sum previously recorded (checks against itself).		
	62b1	Data EPROM Error	Bad EPROM data.		

b = blank or no digit

* indicates alternates with normal display

Table 3-4
Resolving Error Codes & Messages (continued)

Error Type	Digital Code	Description	Situation	Refer To
Data Processing Error (continued)	64bb	Link Down	Link between machines and progressive controller is down (applicable only for machines linked to a progressive controller).	Section 3.4.4
	65b0	Bad EEPROM Device	Either the processor could not successfully "read" from or "write" to the named chip.	
	65b1	Bad EEPROM Data	Data in the named chip is invalid. Either the chip has failed or there is no data.	
	65b2	Game Type Mismatch	Game type data stored in CMOS RAM does not match game type data stored in EEPROM.	
	66bb	Game EEPROM Changed	The machine senses that the game EEPROM has been changed.	
	67bb	Data EPROM Changed	The machine senses that the data EPROM has been changed.	
	68bb	Invalid Data EPROM	Data EPROM not a standard data file.	

b = blank or no digit

* indicates alternates with normal display

2. Check for an empty or low hopper. Refill the hopper if necessary.
3. Check the diverter for correct position.
4. Verify that the hopper level probe is functioning properly, i.e., bridging.
5. Check for proper operation of the hopper brake and motor.
6. Check for hopper thermal out.
7. Check the optic coin-out sensor harness connections.
8. Inspect all related wire harnesses.
9. Verify correct operation using the self test information in Section 4, Game Software, for input and hopper tests.

If the tilt quickly recurs, do one or more of the following:

1. Replace the hopper.
2. Replace the processor board (refer to Processor Board in Section 5).

3.4.3 Reel Mechanism Errors – 4xbb

1. Inspect the machine for possible tampering or cheating.
2. Inspect the indicated reel mechanism (4xbb) to be sure it is properly installed and its harness securely connected.
3. Inspect the reel for contact with other surfaces.

4. Carefully rotate the reel to be sure it spins smoothly without binding.
5. Inspect the indicated reel mechanism for damage. Refer to Reel Mechanism in Section 5 for additional information.
6. Inspect all related harnesses and connectors.
7. Inspect the optic sensor on the indicated reel mechanism for bad or dirty optics.
8. Check the encoder flags of the indicated reel for damage or missing teeth.
9. Verify correct operation using the self test information in Section 4, Game Software, for input and reel tests.

If the tilt quickly recurs, either:

1. Replace the indicated reel mechanism. (Section 5)
2. Replace the processor board. (Section 5)

3.4.4 Data Processing Errors

Memory tilts indicate that a communication problem has occurred on the processor board. These communications are critical to maintaining current game statistics and correct game operations. If a memory tilt occurs, check state and local laws before rectifying the problem.

When following the procedures in this section to resolve data processing errors, refer to processor Board in Section 5 when necessary.

Note

Option selections do not transfer from EEPROM to the CMOS RAM. All options go to default settings and must be reset in the self test mode. Refer to Section 4, Game Software, for information about the self test option selection.

12bb - Low Battery

1. Record the statistical data. Refer to Section 4, Game Software, for information about using the statistical data mode.

Note

Prior to replacing the battery or the processor board, either activate the reset key switch to transfer the current data stored in RAM to the EEPROM, or record the accumulated data. Battery replacement zeroes or clears the memory of the CMOS RAM.

2. Replace the processor board (refer to Processor Boards in Section 5) or proceed to Step 3.

CAUTION

Battery replacement requires soldering and should only be performed by QUALIFIED PERSONNEL.

3. Replace the battery on the processor board.

61bb - CMOS Error

This RAM condition may occur on power up or during game play for the following reasons.

1. On power-up:

- The battery on the processor board has been replaced.
- The RAM data has been corrupted and its contents do not match either the EPROM or the EEPROM.
- A new EPROM has been installed.

2. During game play – The microprocessor has detected bad memory location(s) in the CMOS memory on the processor board.

Note

Every time a CMOS RAM error occurs, the operator must first reset the machine and then step through the self test mode and reset all of the options.

CAUTION

Chip replacement should be carefully performed by QUALIFIED PERSONNEL to avoid damage to the program ICs or to the processor board and its components.

Perform the following steps to help isolate and correct the error condition.

1. Record the statistical data. Refer to Section 4, Game Software, for information about using the statistical data mode.
2. Press the self test switch for three seconds to transfer data from EEPROM to CMOS.
3. If the error condition persists, turn the machine power off and replace the CMOS RAM chip on the processor board. Re-install the processor board, turn the machine power on and repeat Step 2 (see Processor Board in Section 5).

If the error condition persists or immediately recurs, replace the processor board.

1. Press the self test switch for at least three seconds to load the contents of the CMOS RAM into the EEPROM.
2. If the error condition persists or immediately recurs, replace the mother board (refer to Mother Board in Section 5).

62bX – Bad Game EPROM

1. Turn the machine power off, then on again to activate recalculating of the checksum by the game program.
2. If the error condition persists or immediately recurs, replace the game program (EPROM) chip on the processor board with one of an identical program number and version.
3. If the error condition persists or immediately recurs, replace the processor board (refer to Processor Boards in Section 5).

64bb – Link Down

This code only appears in games that are connected to a progressive controller. When serial data is not being received from the progressive controller, the game goes into a link down tilt and the following events occur.

1. If a game is in progress, that game may be completed and then the machine locks up (game play is suspended).

2. A "link down" entry is added to the link status recall page of the statistical data mode (see Section 4).
3. A 64bb code appears on the appropriate display.

To resolve a 64bb code, restore the progressive link. Refer to Progressive Options in Section 5 for information about the progressive controller and progressive harness connections.

When the link is restored, a "link restored" entry is added to the link status recall page of the statistical data mode. The 64bb code disappears from the dot matrix display and the game returns to the normal game play mode.

65b0 – EEPROM Device

1. Check the processor board connectors for bent or damaged pins, and verify that the processor board is properly inserted into the connectors of the mother board.
2. If the error condition persists, replace the processor board (refer to Processor Board in Section 5).
3. If the error condition persists or immediately recurs, replace the mother board (Refer to Mother Board in Section 5).

65b1 – EEPROM Error

There are two possible reasons for this condition:

1. **On Power-up** – Either:
 - The mother board or the processor board has been replaced.
 - A new EEPROM was installed and the self test switch wasn't pressed to transfer the accumulated game-play statistics from the CMOS RAM on the processor board to the EEPROM on the mother board.
2. **During Game Play** – The microprocessor has detected bad memory locations in the EEPROM on the mother board.

Perform the following steps to help isolate and correct the error condition.

1. Check the machine for possible tampering or cheating.
2. Record the statistical data, if possible. Refer to the Statistical Data mode in the S-Plus Program Reference Guide.
3. Press and hold the Self Test switch for 3 seconds to download the game-play statistics from the CMOS RAM.
4. If the error condition persists or immediately occurs again, replace the Mother board. (refer to Mother Board in Section 5)
5. If the error condition persists or immediately occurs again, replace the Processor board. (refer to Processor Board in Section 5)

65b2 – Game Type Mismatch / EEPROM ID

1. Record the statistical data from the hard meters. The statistical data mode is not accessible until this error condition is corrected.
2. Press the self test switch for at least three seconds to load the contents of the EEPROM into the CMOS RAM and clear the error.

3.4.5 Security Messages

63bb – Logic Door Open

1. Check the machine for attempted tampering or cheating.
2. Verify that all machine doors are completely closed and locked.
3. If the message remains, check all door-open sensors (either mechanical or optical) for correct alignment, including:
 - main machine door
 - drop box door
 - processor board

Refer to Section 4, Game Software, for self test information about using the input tests.

4. Close the door(s) securely. Observe whether the 63bb code disappears from the digital display.

If the message remains, do one or more of the following:

1. Check all door-open sensors for correct operation. Refer to Section 4, Game Software, for software self test information about the input tests. Replace any sensors that are not functioning correctly. Refer to the following sections as needed for more specific information:
 - Drop-Door Sensor Switch in Section 2, Machine Installation
 - Optic Door-Open Sensor (refer to Main Door in Section 5)
2. Check all related harnesses and connectors.
3. Replace the processor board (refer to Processor Boards in Section 5).
4. Replace the mother board (refer to Mother Board in Section 5).

3.5 Troubleshooting Techniques

This section describes overall electronic troubleshooting techniques to help resolve functional problems with circuit boards, power supply, and circuits, including:

- a list of recommended test equipment
- procedures to test circuits, board and the main power supply
- diagrams of main transformer AC voltages and connector pinouts

Note

Previously in Section 3, Tables 3-1 through 3-4 list causes and solutions for common malfunctions and Section 3.4 describes procedures and techniques for troubleshooting service messages.

CAUTION

When working with either AC or DC voltage, take care not to touch the wires or circuitry to each other or any other point of contact, including yourself. Use only approved test equipment that is in good working condition. The procedures in this section should only be attempted by QUALIFIED PERSONNEL.

3.5.1 Recommended Test Equipment

- digital volt/ohmmeter (VOM) with a high impedance input for checking AC/DC voltages and resistance
- two extension cables for functionally extending the processor board away from the mother board

Related Test Equipment

An IGT Stepper Slot Tester unit is recommended to troubleshoot the processor board and electronic components of the machine. Use of the Video Tester is not covered in this manual. Refer to the *Stepper-Slot Tester Operator's Manual* (p/n 821-051-00). Contact IGT Customer Service (Section 2) for additional information.

3.5.2 Printed Circuit Boards

1. With the machine power off, check the condition of all harnesses, wires, and the individual contacts of the mating connector on the circuit board.
2. Replace the suspect board with a known good board. Refer to Section 5, Components & Assemblies, for removal and replacement procedures for specific boards.
3. Use the self test mode to check all machine functions for normal operation.

3.5.3 Power Supply

Figure 3-3 shows the main transformer AC voltages.

1. Turn the machine **power off** and check the main fuses at the front of the power supply.
 - a. If a fuse is suspected of being blown (no machine functions or only partial machine functions), remove each fuse one at a time and check it visually if it is of glass construction, or with a continuity tester such as an ohmmeter.
 - b. If a fuse is open (blown), replace it with a fuse of the type and rating indicated on the fuse panel label.
 - c. If the newly replaced fuse blows immediately or soon after applying machine power, suspect a short circuit on one of the circuit boards or within the power supply wiring.
 - d. The problem may be quickly isolated by removing the power supply connections to circuit branches, boards and modules within the machine, replacing the fuse, and systematically reconnecting the power supply to each circuit branch, board and module, until the faulty component is determined.
 - e. Replace any faulty circuit branch, board, module or fuse.
2. If any of the main power transformer secondary voltages is missing or measures low, the problem may be isolated to either the transformer or to an overload condition, using the following procedure.
 - a. Check the voltage on the transformer primary and confirm that power (line voltage) is present.
 - b. Check each of the secondary voltages at the secondary terminals and compare to the voltages shown in Figure 3-3.

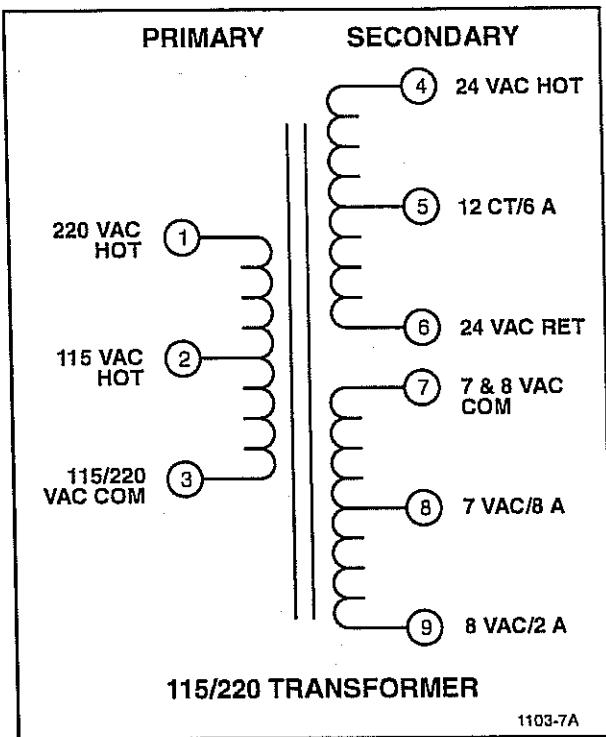


Figure 3-3. Transformer AC Voltages.

- c. If all of the secondary voltages measure very low or near 0 VAC (zero volts AC) but the primary voltages are present on the indicated terminals, the main power transformer may have an open primary winding. To verify, disconnect the machine power and use an ohmmeter to measure the continuity across the primary winding. If the resistance is higher than a few ohms, the transformer is defective and should be replaced.
- d. If only one of the secondary voltage measures very low (near zero volts AC), that secondary may be open. With the machine power disconnected, remove the terminal from the suspected transformer tap and measure across it. If the resistance is higher than a few ohms, the transformer is defective.
- e. If a secondary voltage is present but measures more than 20% low, the cause may be an overload on that particular secondary. This symptom will usually be accompanied by transformer over-

heating, excessive noise (humming) from the transformer, and blown fuses.

To confirm that the low voltage reading is caused by an overload: disconnect one lead from the secondary in question at the transformer and measure the unloaded voltage. If the voltage is now within the normal range, then the disconnected circuit is causing the overload.

To isolate the cause of the overload: disconnect circuit branches, boards and modules that utilize the suspected secondary and reconnect them one at a time until the secondary lead can be reconnected and no drop in secondary voltage is seen.

3. Replace the faulty device.
4. Connect all parts and wires that were removed during troubleshooting.
5. Turn the machine **power on** and complete the functional verification procedures.

3.5.4 Point-to-Point

When a circuit from the processor board is suspected of being "open," a point-to-point continuity measurement is recommended. Use the following steps as a troubleshooting guideline.

1. Turn the machine **power off**.
2. Physically and visually check the harnesses or individual wires for any damage.
3. Check all related connectors for dislodged pins or disconnected wires.
4. Connect a set of test extension cables from P1 and P2 on the mother board to J1 and J2 on the processor board (P1 to J1 and P2 to J2).

Note

If the mother board has a clear plastic cover, remove this cover in order to connect the extension cables. Be sure to replace the cover after testing is completed.

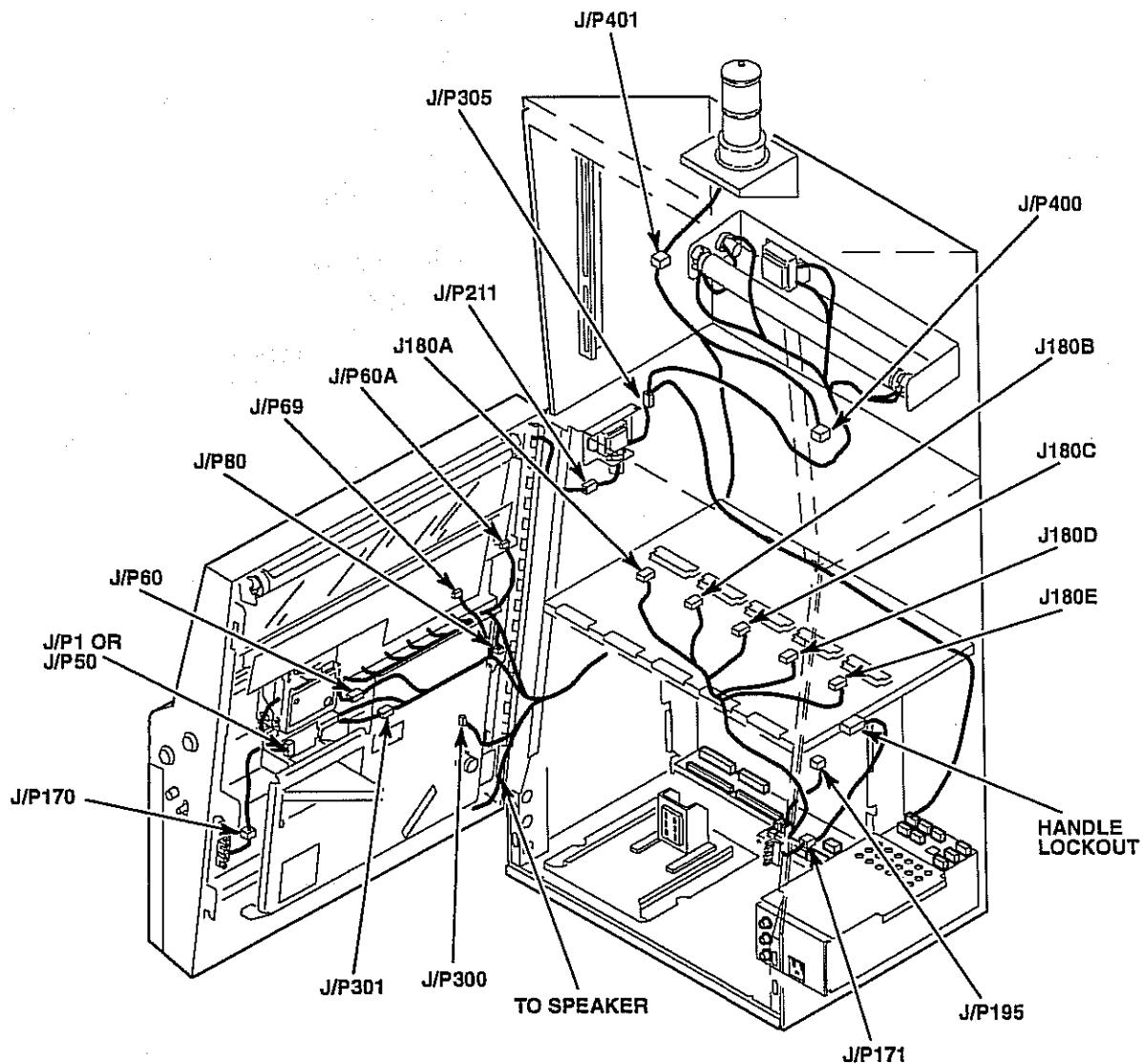
5. Refer to the connector diagrams on the following pages, and to the related wiring diagrams and schematics in Section 5 for detailed wiring information.
6. Set the VOM to the lowest scale for measuring resistance and connect one probe lead to the source component on the processor board. Keep this probe lead connected throughout the point-to-point check.
7. Connect the other probe lead to the device in question and observe the VOM. If the circuit continuity does not measure closed ($0 \text{ ohms} \pm .2 \text{ ohm tolerance}$), proceed to Step 9. If the circuit does measure closed, then an intermittent condition may exist. Recheck the device in question and the processor board or wiggle the related wires and terminations while observing the VOM.
8. Connect the probe lead to the next termination point in the circuit and observe the VOM.
9. Follow this procedure back to the source component on the processor board. The mother board printed circuitry is also subject to failure.

3.5.5 Harness Connectors & Pin-Outs

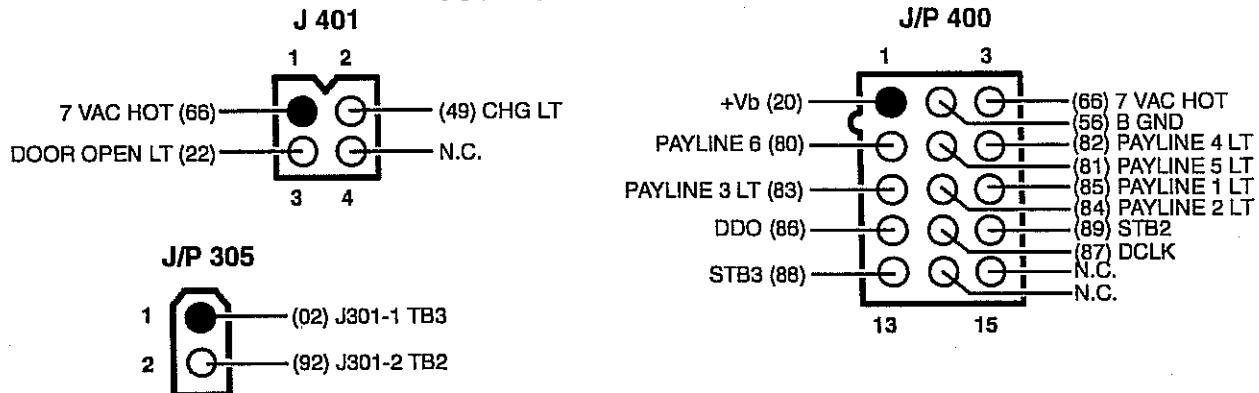
The following pages provide detailed information about the major machine harness connectors. This information provides excellent electrical troubleshooting assistance when used in conjunction with the wiring diagrams and schematics in Section 5.

Blueprints of machine wiring diagrams and schematics are also available from Customer Service (Section 2).

CONNECTOR OVERVIEW

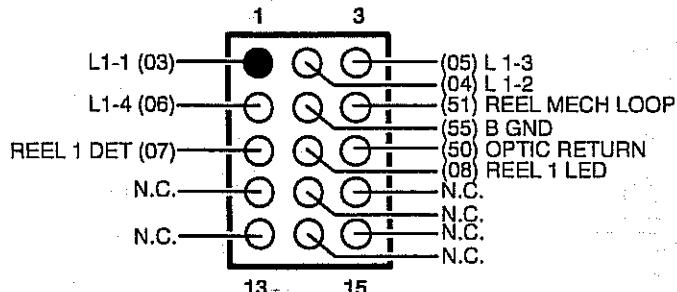
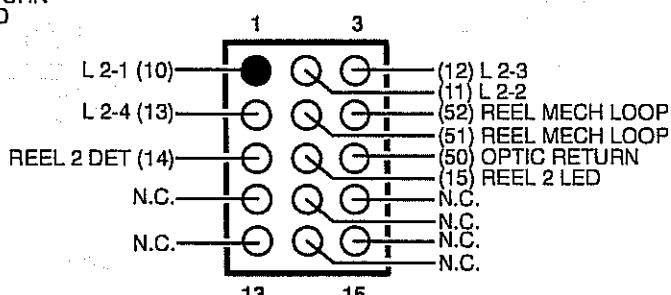
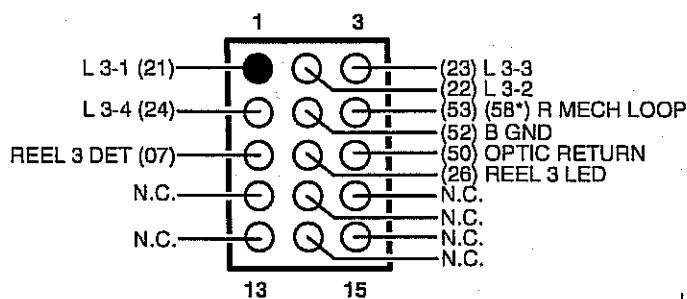
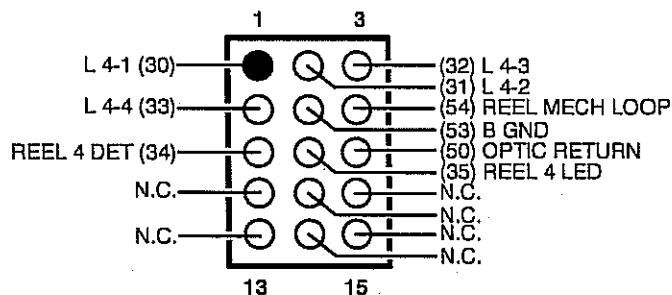
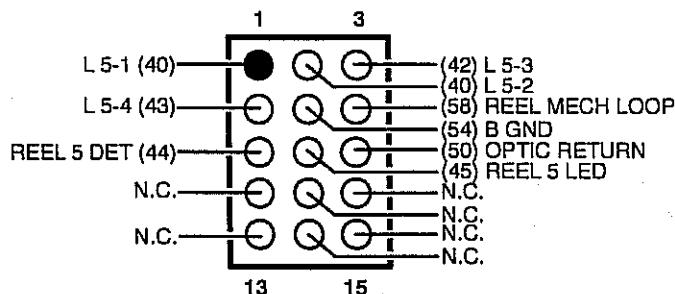
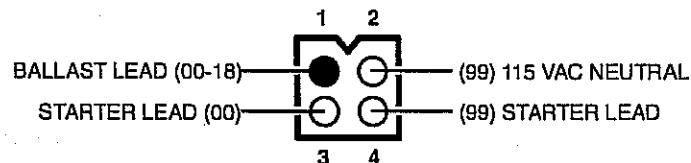


TOP BOX CONNECTORS



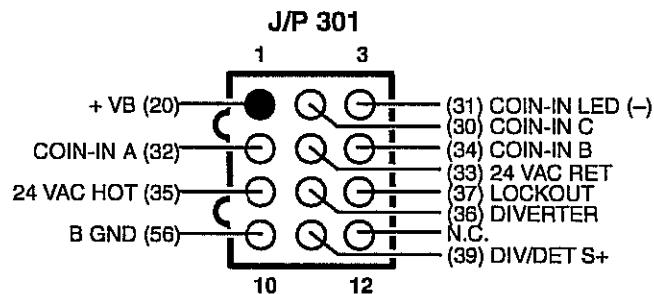
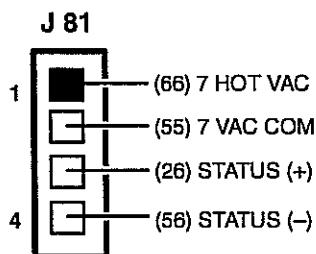
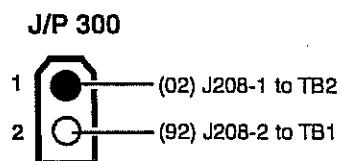
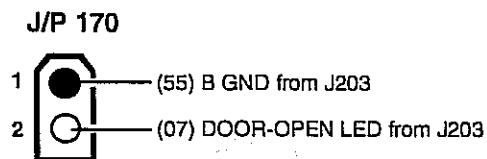
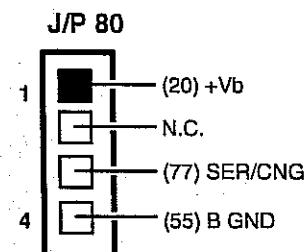
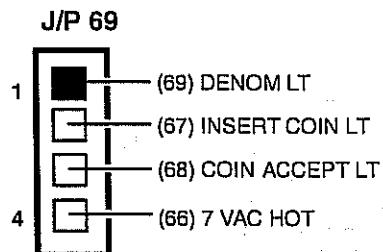
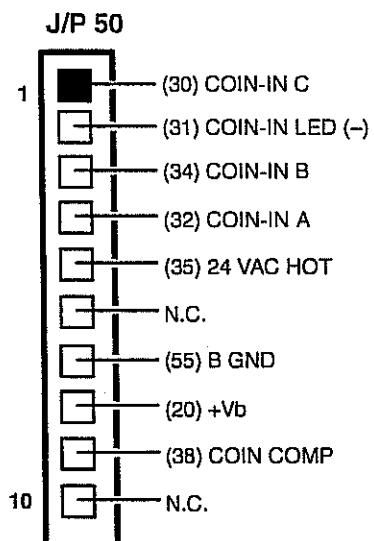
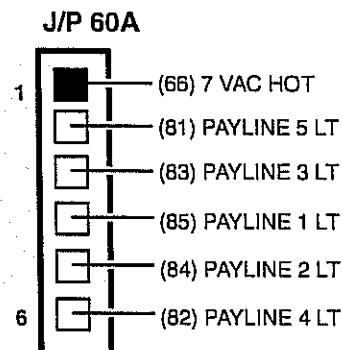
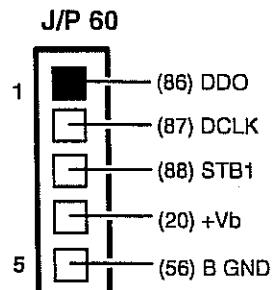
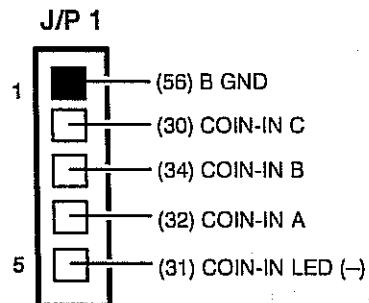
All wires are 22-gauge unless otherwise specified.

REEL CONNECTORS

J/P 180A**J/P 180B****J/P 180C****J/P 180D****J/P 180E****J/P 211**

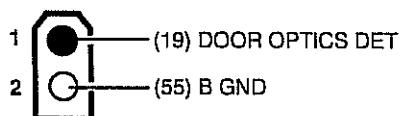
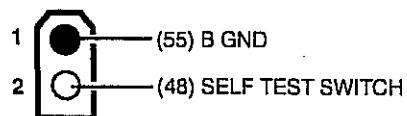
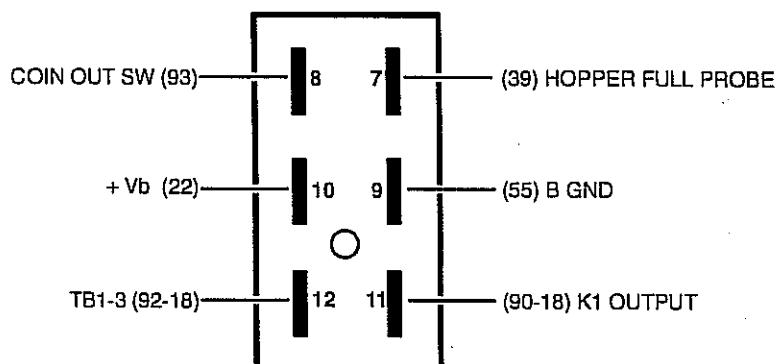
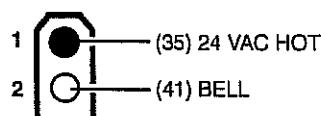
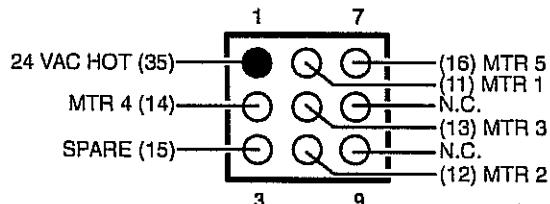
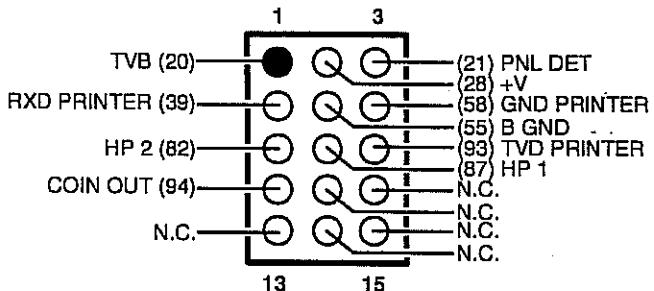
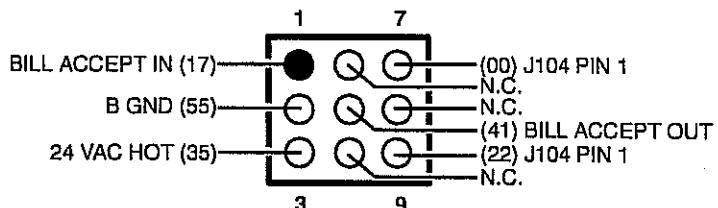
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DOOR CONNECTORS



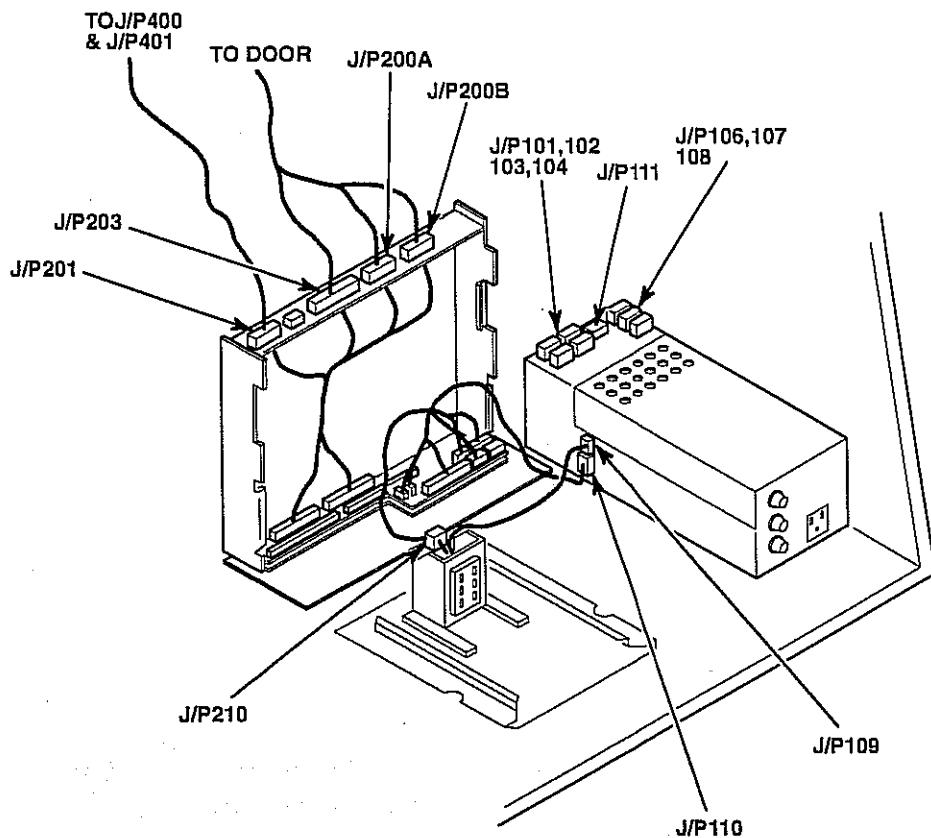
All wires are 22-gauge unless otherwise specified.

CABINET CONNECTORS

J/P 171**J/P 208****J/P 19****J 11****J 145****J/P 212****J/P 195**

All wires are 22-gauge unless otherwise specified.

LOWER CABINET



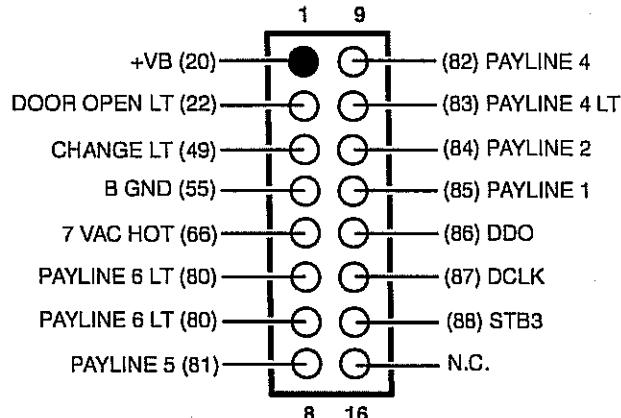
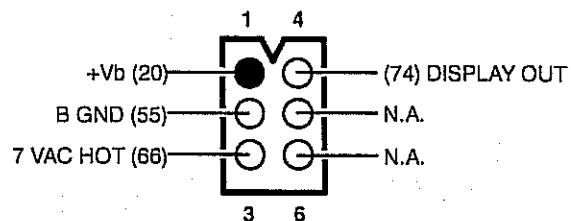
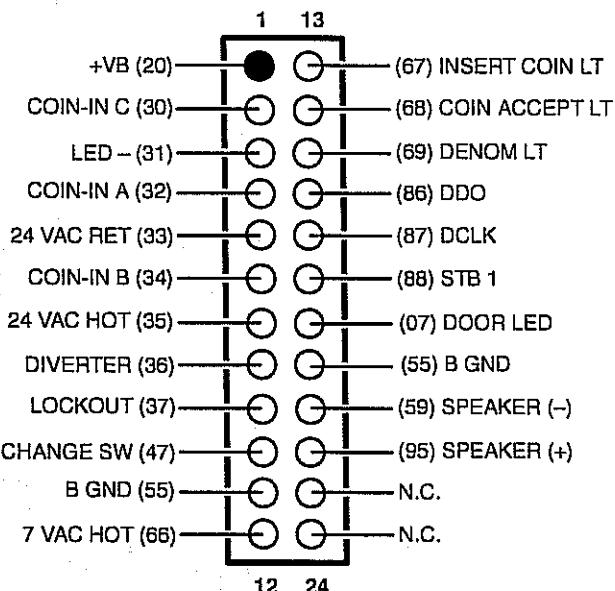
LOWER CABINET CONNECTORS

J/P 200A	
1	10
MAX BET SW (41)	(69) CRED SW LT
PLAY CREDIT SW (42)	N.C.
CASH OUT SW (43)	N.C.
SPIN SW (46)	N.C.
B GND (55)	N.C.
SPIN SW LT (61)	N.C.
MAX BET LT (62)	N.C.
CASH OUT LT (63)	N.C.
7 VAV HOT (66)	N.C.
9	18

J/P 200B	
1	9
+VB (20)	(37) /R DET M+
DIV DET S+ (39)	(81) PAYLINE 5
CHANGE SW (30)	(82) PAYLINE 4
SELF TEST SW (13)	(83) PAYLINE 3
B GND (55)	(84) PAYLINE 2
B GND (55)	(85) PAYLINE 1
SER/CHANGE M+ (64)	N.C.
7 VAC HOT (66)	N.C.
8	16

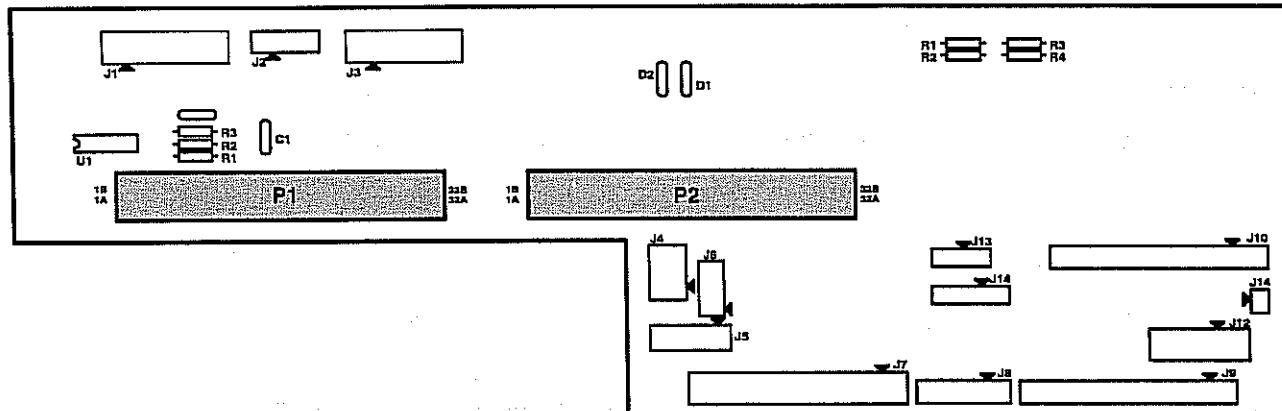
All wires are 22-gauge unless otherwise specified.

LOWER CABINET CONNECTORS (cont'd)

J/P 201**J/P 207****J/P 203**

All wires are 22-gauge unless otherwise specified.

MOTHER BOARD CONNECTORS



P1

GND (U-1)	1A	1B	(U1-8) +5V
SDA (U1-5)	2A	2B	(U1-6) SCL
SW 19 (J3-26)	3A	3B	(J1-36) SW20
OPTIC RETURN (J7-33 & 34)	4A	4B	(J7-33 & 34) OPTIC RETURN
REEL 1 LED (J7-32)	5A	5B	(J7-31) REEL 1 DET
REEL 2 LED (J7-30)	6A	6B	(J7-29) REEL 2 DET
REEL 3 LED (J7-28)	7A	7B	(J7-27) REEL 3 DET
REEL 4 LED (J7-26)	8A	8B	(J7-25) REEL 4 DET
REEL 5 LED (J7-24)	9A	9B	(J7-23) REEL 5 DET
REEL 4 L4-2 (J7-10)	10A	10B	(J7-9) REEL 4 L4-1
SPEAKER + (J3-30 & J10-17)	11A	11B	(J3-20 & J10-18) SPEAKER -
I.R. DET M+ SER/CHG S+ (J1-37)	12A	12B	(J2-5) CARD CAGE DET
BILL ACCEPT IN (J6-2)	13A	13B	(J9-7 & J10-9) COIN-OUT SW
COIN-IN C (J1-22)	14A	14B	(J10-19) DOOR OPTIC DET
COIN-IN A (J1-20)	15A	15B	(J1-21) COIN-IN B
REEL MECH LOOP (J7-7)	16A	16B	(J10-3) PANEL DET
SER/CHANGE M+ TX PRINT (J3-25 & J13-4)	17A	17B	(J3-27 & J13-3) SPARE IN DIV/DET M+, GND PRINT
CHANGE SW (J1-30)	18A	18B	(J13-1) SPARE IN, RX PRINT
SPIN SW (J3-15 & J10-13)	19A	19B	(J3-13) SELF TEST SW
PLAY CREDIT SW (J3-17)	20A	20B	(J10-8) HOPPER FULL PROBE
CASH OUT SW (J3-19)	21A	21B	(J3-18) BET MAX SW
DCLK (J1-11, J3-3 & J14-5)	22A	22B	(J10-15) JACKPOT RESET SW
STB 1 (J3-4)	23A	23B	(J1-10, J3-2 & J14-4) DDO
STB 3 (J3-29 & J14-6)	24A	24B	(J1-12) STB 2
CASH OUT LT (J3-24)	25A	25B	(J3-23) BET MAX LT
SPARE LT DRV. (J1-38)	26A	26B	(J13-6) +V PRINT
INSERT COIN LT (J1-33)	27A	27B	(J1-32) COIN ACCEPT LT
SPIN SW LT (J3-21)	28A	28B	(J1-14) DOOR OPEN LT
CHANGE LT (J1-13)	29A	29B	(J3-22) CREDIT SW LT
DIV/DET S+ (J1-39)	30A	30B	(J7-36) REEL 1 L1-1
7-8 VAC COM (*1)	31A	31B	(J14-3) HI/LOW
7-8 VAC COM (*1)	32A	32B	(*1) 7-8 VAC COM

MOTHER BOARD CONNECTORS

P2	
POLL (J4-9)	1A
GND (J4-2)	2A
PAYLINE 5 (J1-6 & J3-11)	3A
PAYLINE 6 (J1-7)	4A
PAYLINE 2 (J1-3 & J3-8)	5A
MTR 5 (J5-7)	6A
MTR 3 (J5-5 & J9-14)	7A
SPARE (J5-3)	8A
PROGRESSIVE IN (J12-2)	9A
HOPPER 2 (J10-6)	10A
REEL 1 L1-2 (J7-8)	11A
PROGRESSIVE OUT (J12-4)	12A
REEL 4 L4-4 (J7-3)	13A
HANDLE RELEASE (D3 to J10-11)	14A
REEL 4 L4-3 (J7-37)	15A
PANEL LED (R4 & J10-1)	16A
REEL 1 L1-3 (J3-28 & J7-1)	17A
LOCKOUT (D1 to J1-28 & J9-15)	18A
REEL 2 L2-1 (J7-21)	19A
REEL 2 L2-4 (J7-19)	20A
REEL 3 L3-1 (J7-17)	21A
REEL 3 L3-3 (J7-15)	22A
REEL 5 L5-1 (J7-13)	23A
REEL 5 L5-2 (J7-4)	24A
REEL 5 L5-4 (J7-11 & 12)	25A
+Vb (*3)	26A
REEL 5 L5-3 (J7-35)	27A
8 VAC HOT (J8-4)	28A
7-8 VAC COM (*1)	29A
24 VAC HOT (*4)	30A
24 VAC RET (*2)	31A
24 VAC RET (*2)	32A
	1B
	2B
	3B
	4B
	5B
	6B
	7B
	8B
	9B
	10B
	11B
	12B
	13B
	14B
	15B
	16B
	17B
	18B
	19B
	20B
	21B
	22B
	23B
	24B
	25B
	26B
	27B
	28B
	29B
	30B
	31B
	32B
	(J4-7) +V (DCS)
	(J4-5) SDO
	(J1-5 & J8-10) PAYLINE 4
	(J1-4 & J3-9) PAYLINE 3
	(J1-2 & J3-7) PAYLINE 1
	(J5-6 & J9-12) COIN-OUT METER + MTR2
	(J5-4 & J9-13) COIN-IN METER + MTR1
	(J6-1) BILL ACCEPT OUT
	(J1-18 & 19) DISPLAY OUT
	(J9-8 & J10-5) HOPPER 1
	(J9-6) JACKPOT OUT
	(J9-10 & J12-3) PROGRESSIVE RET
	(J5-2 & J9-5) JPX10 METER + MTR4
	(D3 to J10-11) HANDLE RELEASE
	(D2 to J1-27) DIVERTER
	(R1 & J2-6) CARD CAGE LED
	(*2) 24 VAC RET
	(J11-2) BELL
	(J7-22) REEL 1 L1-4
	(J7-20) REEL 2 L2-2
	(J7-18) REEL 2 L2-3
	(J7-16) REEL 3 L3-2
	(J7-14) REEL 3 L3-4
	(*3) +Vb
	(*3) +Vb
	(*5) B GND
	(J8-4) 8 VAC HOT
	(*1) 7-8 VAC COM
	(*4) 24 VAC HOT
	(*4) 24 VAC HOT
	(*2) 24 VAC RET

(*1) – 7 VAC COM connected to:

P1-31A, 32A, 32B	J7-5, 6
P2-27B, 29A, 29B	J8-1, 2 (POWER SUPPLY INPUT)
J1-9, 16, 23, 31	J9-1
J2-3, 4	J10-4, 7, 14, 16, 20
J3-1, 6, 14, 16	J14-1
J6-4	

(*2) – 24 VAC RET connected to:

P2-17B, 31A, 32A, 32B	
J1-26	
J2-2	
J6-6	
J8-6 (POWER SUPPLY INPUT)	

(*3) – +VB connected to:

P2-24, 26	(*4) – 24 VAC HOT connected to:
J1-8, 17, 25	P2-30A, 30B, 31B
J6-3	J1-29
J9-2	J2-1
J10-10	J5-1
J14-2	J6-5
R1, 2, 4	J8-5 (POWER SUPPLY INPUT)
	J9-3
	J10-12
	J11-1

(*5) – B GND connected to:

P1-31A, 32A, 32B	
P2-27B, 29A, 29B	
J1-9, 16, 23, 31 – R3	
J2-3, 4	
J3-1, 6, 14, 16	
J6-4	
J7-5, 6	
J8-1, 2 (POWER SUPPLY INPUT)	
J9-1	
J10-4, 7, 14, 16, 20	
J14-1	

Section 4

Game Program Software

4.1 Introduction

This section provides detailed information about IGT game program software for S-Plus IBA stepper slot machines.

- **Section 4.1, Introduction** – summarizes the game program characteristics.
- **Section 4.2, Game Modes & Messages** – describes all software modes and messages.
- **Section 4.3, Self Test & Option Selection** – details the various software-driven machine tests, setups and option selections.
- **Section 4.4, Statistical Data Mode** – describes software meters.
- **Section 4.5, Functional Verification & Troubleshooting** – gives procedures to verify correct software operation and guidelines to troubleshoot software-related problems.

S-Plus IBA games have been designed with the following software features:

- game modes: game play, idle, self test, tilt and statistical data
- self-test routines for quick diagnostics and problem resolution

- software meters displayed in the statistical data mode
- player panel switches that illuminate when their function is relevant during game play, self test and statistical data modes
- single or multiple payline credit games
- software-enabled options, such as game speed, music and credit limit
- progressive-enabled options, such as progressive, non-progressive, stand-alone, and link

Notes

IGT's S-Plus IBA stepper slot machines support a variety of optional components that may affect game play and alter the machine's physical configuration. The section includes instructions for all S-Plus IBA machines, regardless of game type or optional components. Specific procedures may vary depending upon the game type and physical configuration.

Specific software options may vary depending upon the jurisdiction involved as well. The information presented in this section is common to most jurisdictions. The illustrations and tables provided represent typical software functions.

4.2 Game Modes & Messages

4.2.1 Game Operating Modes

S-Plus IBA game software operates in five modes.

Game Play Mode

Game play mode is the normal operating mode; the game is functioning properly and a person is actively playing the game.

Idle Mode

The idle mode is the condition that exists when the machine is functioning properly but is not actively being played.

Self Test Mode

Describes the feature that allows a technician to:

- exercise any portion of the machine's hardware to either verify proper machine operation or to isolate a problem

- enter setup and option information in the self test edit mode.

Statistical Data Mode

Provides both cumulative game data (display meters) and game tilt log history

Tilt Mode

Describes the condition that exists when a machine malfunction occurs, such as a sequence error or a coin-in tilt.

4.2.2 Player Information Displays

All S-Plus IBA machines include the player digital (7-segment LED) display categories shown in Figure 4-1.

Additional player displays are found on the front door and in the top box and are discussed in Section 5.

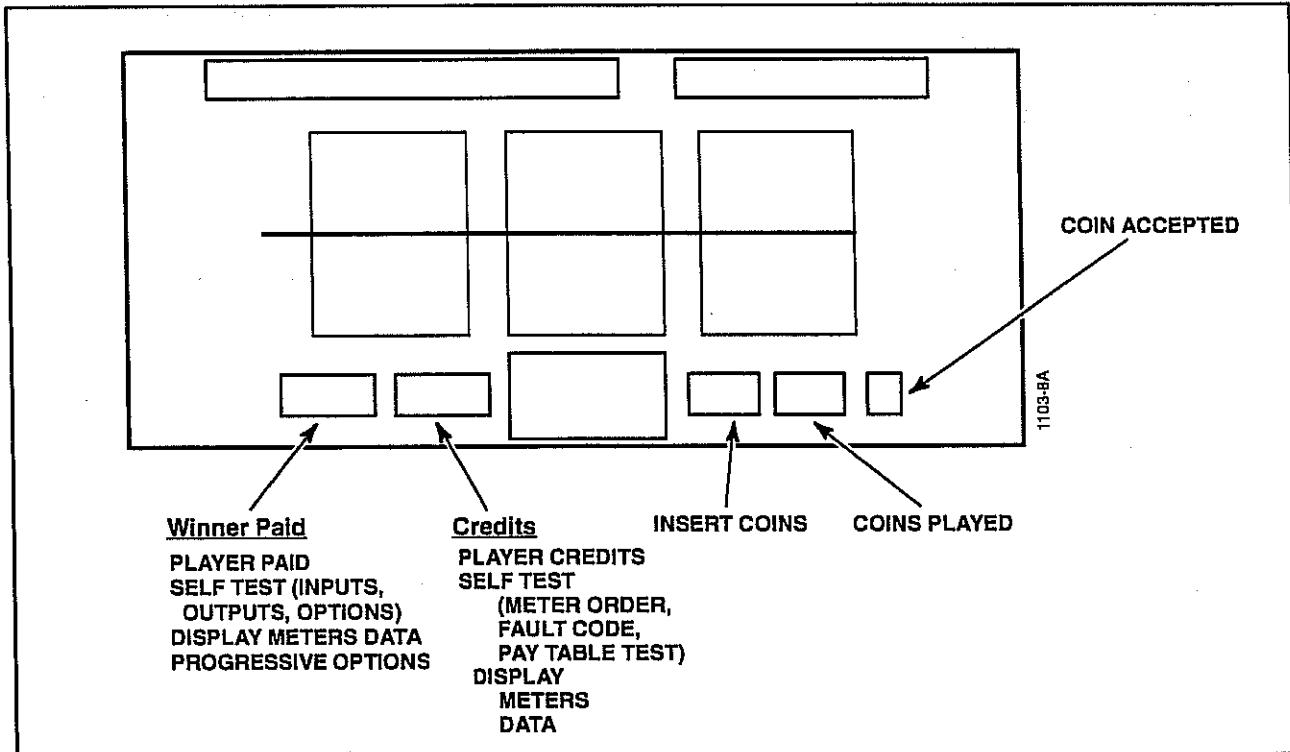


Figure 4-1 . Information Displays.

4.3 Self Test & Option Selection

4.3.1 Self Test Mode Overview

The game program's self test mode serves three purposes:

- allows access to various test routines for machine diagnostics, such as inputs test, outputs test and display test
- enables the selection of software options, such as game speed and credit limit

The player digital (7-segment) display presents self test mode information in the form of "test pages" for easy reference and identification.

The information in this section describes the contents of the game program's self test mode.

Table 4-1 lists all of the possible test pages in the order they appear in the self test mode, however, few programs contain all possible pages.

Note

For additional information about any self test page not documented here, contact IGT Customer Service to request a copy of the .DES file for a specific game program (number on game and reel chips).

When to Use the Self Test Mode

Use the game program's self test mode to:

- set up machine information and select game options when first installing the machine on location
- verify functional operation when first installing the machine on location or when a change in the game options is desired
- select test parameters for machine diagnostics should a problem occur

Entering the Self Test Mode

1. Unlock and open the machine door; turn the machine power on.

Note

In some games, a door alarm sounds. Press the self-test switch, located on the processor board connector panel, one time to turn off the door alarm.

2. Press the self test switch to enter the self test mode. (Refer to Section 3 for help in finding the self test switch.)
3. Press the self test switch to advance through each page of the self test mode. The player digital display presents information for performing tests or selecting options.

Note

If self test is entered while the game is in a tilt condition, the option and setup pages can be viewed but no data can be entered.

Exiting the Self Test Mode

- Close the door during any self test page, except the inputs test page
- Press the self test switch from the last self test page

Switch Functions

Some of the service control and player panel switches are used in the self test mode for different functions than in the game play mode. Any player panel switches that illuminate at this point have special functions within that self test page.

Self Test

Press the self test switch located on the front of the processor board tray/connector panel to enter and exit the self test mode, and to step through the self test pages.

Table 4-1
Self Test Mode

Sequence	Coins Played	Page Type	Description
1	0	Setup	Slot Accounting System (SAS) Address
2	0	Setup	Player Initiated Credit
3	0	Setup	Mechanical Bell
4	0	Setup	Drop Door Selection ¹
5	0	Setup	Bill Acceptor Pay Mode
6	1	Test	Input Tests
7	2	Test	Output Tests
8	(Blank)	Test	Sound Test
9	(Blank)	Option	Music Selection ²
10	8	Test	Display Test (Display All 8's)
11	0	Test	Display Test (Sequence Digits 1, 2, 4, 8)
12	3	Test	Hopper Test
13	4	Test	Paytable Test
14	5	Test	Reel Strip Test
15	6	Setup	Denomination Setup/Display
16	7	Option	Maximum Hopper Pay
17	8	Option	Partial Hopper Pay
18	9	Option	Stand-Alone Progressive Setup

¹If the PC-SAS address does not equal zero, the PC-SAS option will be activated, not allowing further operation.

²Specialty game software only.

Spin

Press to execute an operation or increment a digit when specified on a particular self test page.

Reset Key

Turn the reset key on the right side of the machine to change an option, or enter a change mode for an option, or advance the blinking digit to the next digit.

4.3.2 Self Test Pages

The following information describes all of the self test pages that may appear in S-Plus IBA game versions. The pages are listed in Table 4-1 in order of their appearance.

Options

This page indicates that the machine has entered the self test mode. A zero appears in the Coins Played display. The number of each self test option will appear in the Winner Paid window.

Slot Accounting System (SAS) Address

This self test page is applicable only for machines that are equipped with the PC-SAS (Personal Computer-Slot Accounting System) data collection feature. (Refer to Data Collection in Section 5 for more information about PC-SAS.)

The current SAS address for the machine appears in the Winner Paid display. Valid addresses range from 001 to 127. Turn the reset key to select the digit to be changed. The selected digit begins flashing. Press the Spin switch to increment the digit.

Important! If PC-SAS is not installed, the address must be 000.

Player Initiated Credit

This self test page allows the operator to select whether or not the player can choose between credit and noncredit game play.

The number 5 appears on the far left-hand side of the Winner Paid display. The current selection appears on the far right-hand side of the Winner Paid display. A zero indicates that the game is always in the credit mode, while the number 1 indicates that the player can select between credit and noncredit game play. Press the Spin Reels switch or pull the handle to toggle between the two selections.

Press the self test switch to enter the next self test page.

Mechanical Bell

This self test page allows the operator to select whether the bell rings on all winning combinations or only on hand pays.

Turn the reset key and the number 6 appears on the far left-hand side of the Winner Paid display. Press the Spin Reels switch to change the digit. A zero in this position indicates that the bell will ring only on hand pays, while a 1 allows the bell to ring on all winning combinations.

Press the self test switch to enter the next self test page.

Drop Door Selection

This page allows the operator to choose whether or not the game software will monitor the drop door switch. If the PC-SAS address is not equal to zero, this option is forced on, and therefore, it is skipped.

Turn the reset key. The number 7 appears on the Winner Paid display. Press the Spin Reels switch to change the digit. The number 1 in the far right-hand side of the Winner Paid display indicates that the game software will monitor the drop door switch, while a zero in that position indicates that the game software will not monitor the drop door switch.

Press the self test switch to enter the next self test page.

Bill Acceptor Pay Mode

This self test page allows the operator to select the bill acceptor pay mode: the credit only or standard. In the credit mode, the bill acceptor pays only in the form of awarding credits, regardless of whether the player-initiated selection is credit or noncredit. In the standard mode, the bill acceptor pays by either awarding credits or changing cash, depending upon which player-initiated selection is made.

Turn the reset key. The number 8 appears in the far left-hand side of the Winner Paid display. Press the Spin Reels switch to change the digit. The number 1 in this position indicates that the bill acceptor is in the credit only mode, while a zero in this position indicates that the bill acceptor is in the standard mode.

Input Tests

This page allows the operator to test machine inputs. The number 1 appears in the Coins Played display.

During each input test, 3 digits of a 4-digit code appear in the Winner Paid display (for example, 10_0).

To test an input, locate the number for that input on Table 4-2 and the corresponding toggle instructions. Turn the reset key until the 2 digits on the left-hand side of the display correspond

to the number of the input. As each input is tested, the logic level toggles between 1 and 0. Typically a "0" indicates that the circuit or switch is in an open state and a "1" indicates that the circuit or switch is closed.

Refer to Table 4-2 and use the reset key to step through each input. Press the self test switch to enter the next self test page.

Note

The inputs and outputs for each S-Plus IBA stepper slot machine may vary depending upon the physical configuration of the machine involved. For that reason, some of the inputs listed in Tables 4-2 and 4-3 may not apply to all S-Plus IBA machines.

Output Tests

This page allows the operator to test machine outputs. The number 2 appears in the Coins Played display.

During each output test, 2 digits of a 4-digit code appear in the Winner Paid display (for example, 10__).

To test an output, locate the number for that output on Table 4-3 and the corresponding toggle instructions. Turn the reset key until the 2 digits on the left-hand side of the display correspond to the number of the input. Press the Spin switch to activate/deactivate the output.

Notes

A separate output test for the Spin Reels player switch is not listed since this switch is already illuminated because it performs functions during the output tests. If this switch is not illuminated during the test, determine whether the LED switch socket needs replacing.

If either of the hopper outputs is faulty, replace the hopper. If the problem still exists, replace the processor board.

Refer to Table 4-3 and use the reset key and Spin switch to step through each output. Press the self test switch to enter the next self test page.

Press the self test to enter the next self test page.

Sounds Test

This self test page allows the operator to test six different tones.

The number 50 appears in the Winner Paid display followed by a 2-digit code (5X_Y), where X is the sound/tone and Y is the number of the tone.

- Turn the reset key to step through the sounds:

0 – Coin insertion
1 – Maximum coins in
2 – Credits bet/played
3 – Coins paid out
4 – Tilt
5 – Switch
6 – Jackpot lock up

- Press the Spin Reels switch to play the selected tone.

Press the self test switch to enter the next self test page.

Display Tests

These two tests allow the operator to:

- verify illumination of all segments on the player digital display – by displaying all 8s
- verify that the digital display is receiving correct information/signals from the processor board – by displaying a 1, 2, 4, 8 sequence

Press the self test switch and the number 8 appears on all digital displays.

Press the self test switch again and the numbers 1, 2, 4 and 8 appear sequentially on the digital display.

Press the self test switch to enter the next self test page.

Hopper Test

This page allows the operator to test the hopper pay function by paying out ten coins when the test is initiated. The number 3 appears in the Coins Played window and the number 3 appears in the Winner Paid window.

Press the Spin switch to execute the test. The hopper engages and the Winner Paid display increments from 1 to 10 as each coin is channeled to the coin tray.

Notes

Be sure that the hopper contains enough coins to complete the test without causing a hopper-empty tilt or excessive wear on the hopper.

If the hopper motor runs without paying out ten coins, turn the machine power off, remove the hopper and check for adequate coin level and clear any jammed coins before repeating the test.

Press the self test switch to enter the next self test page.

Pay Table Test

This page allows the operator to test various pay table values. The number 4 appears in the Coins Played display. The reel strip number appears on the Winner Paid display and the game version number appears in the Credits display.

Compare the pay amounts on both displays with the pay table printed on the Reel Strip List (shipped with the machine or with new game program orders) and any pay amounts that appear on the machine glass.

Press the Spin switch or pull the handle to start the test. The reels spin until winning combinations are reached. The single-coin and max-coin pay amounts are displayed alternately using all eight digits on the both Credit display and the Winner Paid display.

After the pay table has been displayed, the reel mechanism will spin to position 1 on the reel

strip. Press the self test switch to enter the next self test page.

Reel Strip Test

This test allows the operator to verify that the symbols that appear on the game reels are correct and that the reels spin to the correct stops. The number 5 appears on the Coins Played display. The operator activates the reels and compares the symbol alignment to the alignment shown on the Reel Strip List (shipped with the machine or with new reel program orders).

The physical stops on a reel are fixed at 22 positions, however, many stepper slot game programs increase the number of actual stops. For example, some stepper slot reel strips have 32 stops, others may have 64 or 128. The game program determines the number of reel stops and their respective stops.

In order to conduct the reel strip test for a game program with more than 22 actual stops (lines on the reel strip listing), the number of stops (lines) must be reduced to 22 positions. The reduction procedure is different for different types of reel strip programs.

- **Expanded** – any single-line game with more than 22 stops. Use the "Reel Strip List" page of the information sheets that accompany each game program.
- **Implied** – any multi-line game with more than 22 stops. Use the "Implied Work Sheet" (shipped with the machine) for the numbered reel strip(s) you wish to test or order one from IGT Customer Service. This worksheet contains information about the implied sequence that should appear for each reel strip.

Expanded

The reel strip test for expanded reel strips works with the reel strip listing contained in the percentage sheets that accompany each game program.

Re-number the lines on the expanded reel strip listing by combining consecutive, identical symbols together to form one stop (line), as shown in the Figure 4-2 example.

Table 4-2
Inputs Test

Winner Paid	Description	Action to Toggle Input
10_1	Coin In A	Activated only when coin comparitor accepts coins in door-closed game mode; go to COIN B input test
11_1	Coin In B	Remove the coin comparitor and disconnect the comparitor harness; drop a coin into the coin path, between the rear encoder-board mounting bracket and the black plastic insert for each optic input (B and C)
12_1	Coin In C	
13_0	Door Optics Receiver	Close and firmly lower the door locking-bar to its lowest position
14_1	Hopper Coin Out	Cover hopper optic with a flat, opaque object to simulate coin out
15_0	Hopper Wt.	Ground hopper coin-level probe to hopper chassis
16_0	Spin	Press player panel switch or trip handle-spin mechanical switch
17_0	Jackpot Re-set	Turn reset key one time
20_0	Play One Credit	Press Bet One Credit player switch
21_0	Play Max Credits	Press Play Max Credits player switch
22_1	Cashout Credits	Press Cash Out player switch
24_1	Reel Mechanism	Disconnect reel harness from J7 mother board connector
25_0	Self Test	Press self test switch one time
27_0	Bill Acceptor	Insert bill into bill acceptor
31_0	Drop Door	Completely close the drop door
40_X	Reel 1	Move first reel up (or down) one stop and return to position
41_X	Reel 2	Move second reel up (or down) one stop & return to position
42_X	Reel 3	Move third reel up (or down) one stop and return to position
43_X	Reel 4	If present, move fourth reel up (or down) one stop and return
44_X	Reel 5	If present, move fifth reel up (or down) one stop and return
0 = a low state 1 = a high state X can be 1 or 0 The state of Reel 1-5 inputs depends upon where each reel has stopped.		

Table 4-3
Output Tests

Winner Paid	Description	Action to Toggle Output
10__	Coin Drop Meter	Press Spin Reels switch to test coin-to-drop box counter
11__	Coin Out Meter	Press Spin Reels switch to test coin-out counter
12__	Coin In Meter	Press Spin Reels switch to test coin-in counter
13__	B Switch (SDS)	Press Spin Reels switch to test B switch (only applicable for machines equipped with SDS)
14__	Hopper Drive #2	Press Spin Reels switch to activate test. If hopper turns on, the other hopper driver (HOPPER 1) is faulty
15__	Stepper Motor Direction	(Bench-level processor board test only)
16__	Mechanical Bell	Press Spin Reels switch to hear mechanical bell
17__	Cancelled Credits Meter	Press Spin Reels switch to test the cancelled credits counter
20__	Payline Light #3	Press Spin Reels switch to illuminate third-coin payline
21__	Payline Light #4	Press Spin Reels switch to illuminate fourth-coin payline
22__	Payline Light #5	Press Spin Reels switch to illuminate fifth-coin payline
23__	Payline Light #6	Press Spin Reels switch to illuminate sixth-coin payline
24__	Door Optics Transmitter	Press Spin Reels switch to test door optics transmitter
25__	Games Played Meter	Press Spin Reels switch to test games played counter
26__	Bill Acceptor	Press Spin Reels switch to test bill acceptor enable
27__	Jackpot Coins	Press Spin Reels switch to test jackpot counter
31__	Change Lamp	Press Spin Reels switch to illuminate change lamp
32__	Handle Release	Press Spin Reels switch to hear handle release activate
33__	Diverter	Press Spin Reels switch to see coin-channel diverter move inside door & logic level toggle between 0 and 1 (as with inputs)
34__	Coin Lockout	Press Spin Reels switch to hear coin lockout activate
35__	Hopper Drive #1	Press Spin Reels switch to activate test. If the hopper turns on, the other hopper driver (HOPPER 2) is faulty
36__	Coin Stepper #1 Lamps	Press Spin Reels switch to illuminate first-coin payline
37__	Coin Stepper #2 Lamps	Press Spin Reels switch to illuminate second-coin payline

Table 4-3 (Continued)
Output Tests

Winner Paid	Description	Action to Toggle Output
40__	Stepper Motor Power Supply	(Bench-level processor board test only)
41__	Insert Coin Lamp	Press Spin Reels switch to illuminate Insert Coin lamp
42__	Coin Accepted Lamp	Press Spin Reels switch to illuminate Coin Accepted lamp
43__	Jackpot/Hand Pay Lamp	Press Spin Reels switch to illuminate Jackpot/Hand pay lamp
44__	Bet Maximum Credits Switch Lamp	Press Spin Reels switch to illuminate Bet Maximum Credits switch lamp
45__	Bet One Credit Switch Lamp	Press Spin Reels switch to illuminate Bet One Credit switch lamp
46__	Cashout Credits Switch Lamp	Press Spin Reels switch to illuminate Cashout Credits switch lamp

Refer to Figure 4-2 and consider the beginning of first of three reel strips shown vertically: a blank on lines 1 and 2 would combine to become stop #1; a 1B (one bar) symbol on lines 3 and 4 would be combined into stop #2, a blank or ghost on line 5 would be a stop by itself (stop #3); a 1B on line 6 would be a stop by itself (stop #4); a blank on line 7 would be a stop by itself (stop #5) and a 5B on lines 8, 9 and 10 would combine to be stop #6.

The reel strip test routine exercises each line of each reel and the Reel Strip List shows the sequential alignment of the symbols on all three reels, as they would appear in the slot machine.

Implied

The reel strip test for implied reel strips works with the specific implied worksheet for each reel strip. Use the "Implied Worksheet" (shipped with the machine) for the numbered reel strip(s) you wish to test or order one from IGT Customer Service.

The first table on the implied work sheet shows the 22 physical stops, lists the symbols that appear at each stop and the number of successive times that symbol appears. The operator simply refers to the stop number and the number of times the position is used. During the reel strip test, the reel spins and stops at each stop number as many times as the implied work sheet says that the position is used.

Nudge Feature – Specialty Games Only

Newer game programs, such as the "Slam Dunk" games, have an added "nudge" feature. A game that has the nudge feature uses a special symbol shown on the Reel Strip List, however, no symbol appears on the reel itself for either type of nudge.

- US – "under slam" nudges reel down to put the winning symbol on the payline
- OS – "over slam" nudges reel up to put winning symbol on the payline

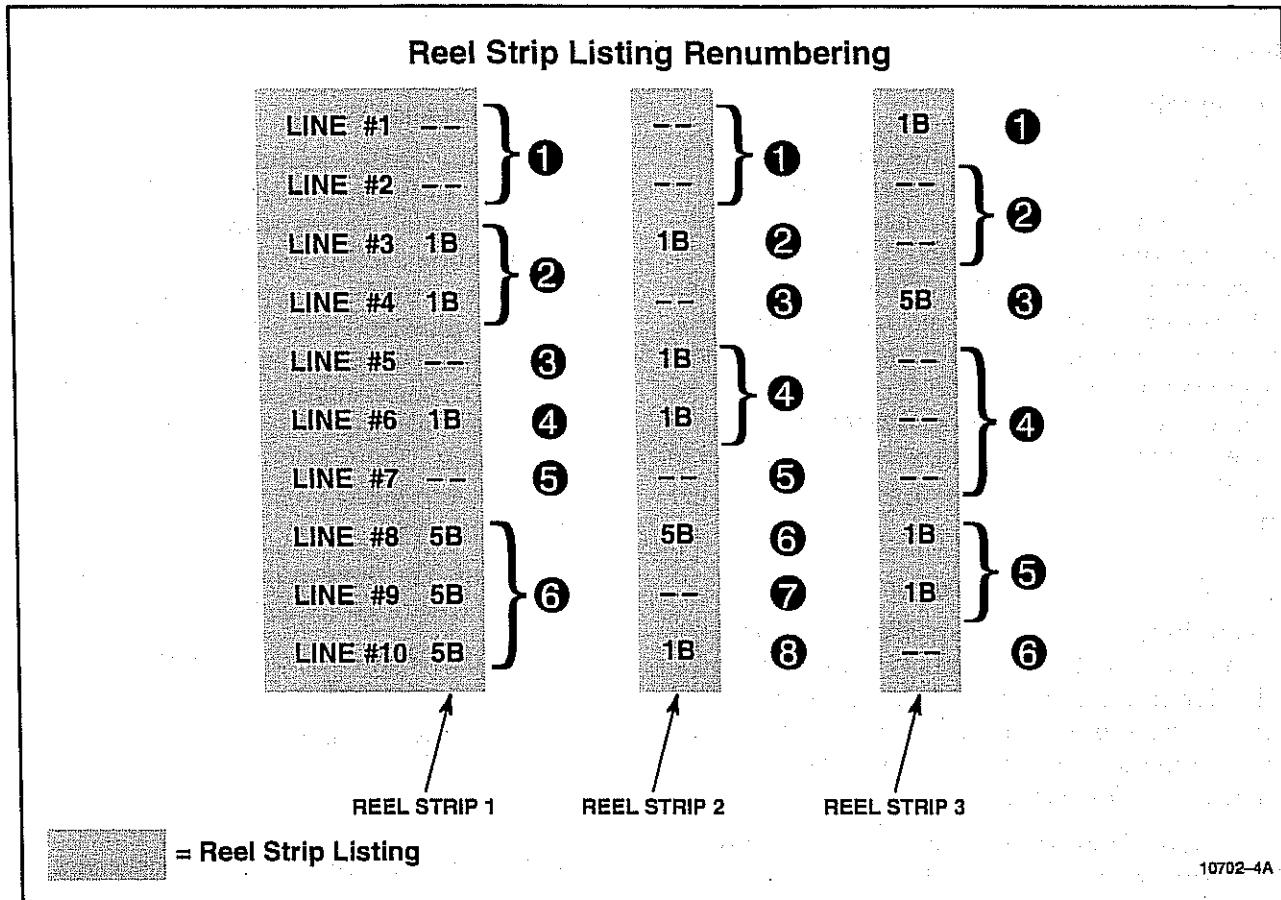


Figure 4-2. Reel Strip List Example.

When the reel stops with the invisible nudge symbol on the payline, the reel strip will be nudged either up or down, depending upon how the symbol is defined in the game software, so that a winning symbol is nudged onto the payline, after a brief pause.

Test Procedure

The number 5 appears in the Coins Played display. Press the Spin switch to start the test. Each time the Spin switch is pressed, the reels spin to the next lowest reel position and the Winner Paid display shows the position number.

1. Press the Spin switch to perform the first and subsequent reel strip tests. The reels spin and stop at a position predetermined by the game program, beginning with Stop #1. At the end of each test, the stop

number appears on the Winner Paid display.

2. Compare the symbols shown on the center payline with the symbols indicated on the Reel Strip List (shipped with the machine) for each line number. In a reel strip program with 22 stops/lines, each test spins the reels and advances each reel one full stop (e.g. Stop #2, Stop #3, etc.).
3. Both expanded and implied reel strip programs have more than 22 lines on the Reel Strip List and therefore follow the pattern created by renumbering the reel stops/lines, shown in Figure 4-2.
4. Press the Spin switch to cycle the reels back to reel stop #1. Press the self test switch to enter the next self test page.

Press the self test or switch to enter the next self test page.

Denomination

The number 6 appears in the Coins Played display. The current denomination appears in the Credits display, in cents. In machines with denominations greater than \$50.00, the denomination amount appears in the Winner Paid display. There are three methods to set or change denomination on S-Plus IBA machines. Which method applies may depend upon the jurisdiction involved or when the machine was manufactured. Use whichever of the following procedures is applicable to either initially set or change denomination.

Non-Selectable Denomination

Some jurisdictions do not allow machine denomination to be changed. In these machines, the denomination is preset in the software and cannot be altered. In these instances, the select denomination page displays the preset denomination. No further action is required.

Press the self test switch to exit select denomination and enter the next self test page.

Selectable Denomination

In early versions of the S-Plus IBA game programs, denomination can be set or altered in the select denomination page. In these programs, the number 6 appears on the Coins Played display and the Winner Paid display shows the current denomination (if any). This page allows the operator to select various game denominations in the field. Press the Spin Reels switch or pull the handle to change the denomination.

Important! The denomination amount should correspond with all of the following:

- the denomination of the machine shown on the sales order
- the hopper denomination
- the denomination printed on the machine glass
- the type of coin acceptor mechanism installed in the machine

Press the self test switch to enter the next self test page.

Set Denomination Chip

To set or change denomination in newer S-Plus IBA game programs, a set denomination chip must be installed on the processor board before the denomination can be altered. In these programs, the number 6 appears in the Coins Played display and the current denomination appears in the Credits display, in cents. In machines with denominations greater than \$50.00, the denomination also appears in the Winner Paid display. (Refer to Processor Board in Section 5 for chip replacement and set denomination procedures.)

Important! The denomination amount should correspond with all of the following:

- the denomination of the machine shown on the sales order
- the hopper denomination
- the denomination printed on the machine glass
- the type of coin acceptor mechanism installed in the machine

Press the self test switch to enter the next self test page.

Maximum Hopper Pay Selection

This self test page allows the operator to select the maximum number of coins to be dispensed by the hopper at one time for any award, other than the top award in progressive machines. The number 7 appears in the Coins Played display, and the Winner Paid display shows the current maximum number of coins that can be paid out by the hopper.

The selection parameter is 1 to 9,999, inclusive. Turn the reset key to select the digit to be set. The selected digit flashes on and off. Press the Spin switch to change the flashing digit's numerical value. When the desired values have been reached for all digits, press the self test switch to save the new values and enter the next self test page.

Note

If no maximum hopper value is chosen, the value is set at 9,999 and all wins less than 9,999 coins will be paid from the hopper. This value may result in excessive hopper fills on progressive machines.

Partial Pay Selection

This self test page allows the operator to select the number of coins partially paid out by the hopper in the event of a hand pay or jackpot. The selection parameter is 0000 to 9,999, inclusive. Select 0000 to disallow a partial pay.

Note

The partial pay amount automatically resets to zero if the selected amount exceeds the amount for maximum hopper pay.

The number 8 appears in the Coins Played display, and the Winner Paid display shows the current partial pay selection. Turn the reset key to select the digit to be set. The selected digit flashes on and off. Press the Spin switch to change the flashing digit's numerical value. When the desired values have been reached for all digits, press the self test switch to save the values and enter the next self test page.

Progressive #1 Selection

This self test page allows the operator to set progressive values for the first progressive.

Note

This selection will only be displayed if the dip switches on the processor board are set for a stand-alone progressive machine, the nonsystem progressive option is selected on self test page 0, and the denomination value is set at a value other than zero (none).

The number 9 appears on the Coins Played display.

Press the self test switch to set the progressive reset value. The number 1 appears on the Winner Paid display and the current progressive reset value appears on the local progressive meter. Turn the

reset key to select the digit to be changed. The selected digit flashes on and off. Increment the value of the digit by pressing the Spin Reels switch. Repeat this procedure until all digits values have been selected.

The number 2 appears on the Winner Paid display and the current *maximum progressive amount* appears on the local progressive meter. Turn the reset key to select the digit to be changed. The selected digit flashes on and off. Increment the value of the digit by pressing the Spin Reels switch. Repeat this procedure until all digits values have been selected.

The number 3 appears on the Winner Paid display and the current *progressive percentage* appears on the local progressive meter. Turn the reset key to select the digit to be changed. The selected digit flashes on and off. Increment the value of the digit by pressing the Spin Reels switch. Repeat this procedure until all digits values have been selected.

The number 4 appears on the Winner Paid display and the current *progressive amount* appears on the local progressive meter. Turn the reset key to select the digit to be changed. The selected digit flashes on and off. Increment the value of the digit by pressing the Spin Reels switch. Repeat this procedure until all digits values have been selected.

Press the self test switch to enter the next self test page.

Progressive #2 Selection

This self test page allows the operator to set progressive values for the second progressive in a double progressive machine.

The number 9 appears on the Coins Played display. Follow the procedures listed under Progressive #1 Selection to set up progressive values for the second progressive.

4.4 Statistical Data Mode

This section gives instructions for retrieving game play data by accessing the statistical data mode. Topics covered in this section include:

- **An overview of the statistical data mode** – describes what this feature does, when and how to use it, and lists the information it contains.
- **Statistical data** – describes in detail the contents of the statistical data mode.

Note

Specific terminology and order of statistical data pages vary depending upon the game software, machine configuration, and jurisdiction involved. The examples provided in this manual are intended to be typical, but may not correspond exactly to every game or every machine configuration. Although specific terminology and order of pages may vary, the overall procedures in the statistical data mode remain the same for all games.

4.4.1 Statistical Data Mode Overview

Software meters are accumulated in the statistical data mode and can be viewed on the Winner Paid and Credits displays. Software meters may be periodically reset according to state laws and predetermined accounting procedures. The data accumulated in the statistical data mode is organized into meter categories and presented in the form of "pages" for easy reference and identification.

Entering and Exiting the Statistical Data Mode

To enter the statistical data mode, turn the reset key clockwise one time when the machine is in the idle mode.

To exit the statistical data mode, turn the reset key while the LED display shows the last display meters category. The game status returns to the idle mode and the LED display shows the current game.

Note

If a switch is not pressed for 60 seconds while in the statistical data mode, the ma-

chine automatically returns to the idle mode.

4.4.2 Statistical Data

The following information describes the statistical data pages that may appear on the LED display for S-Plus IBA machines.

Note

The categories within the statistical data mode may vary depending upon game software and machine configuration. The information presented in this section is intended to be representative of typical S-Plus IBA game software.

Display Meters

Table 4-4 lists all meter categories that may appear on the LED display in the statistical data mode. Each meter shows cumulative totals, unless otherwise noted.

The number of the meter category appears on the Coins In display, one digit at a time followed by a blank display for approximately 1/2 second. For example, the meter number for the Games Won category (08) would mean that the Coins In display would show a zero for 1/2 second, followed by the number 8 for one second, followed by a blank display for 1/2 second. The cumulative total for each meter can be up to 8 digits long and appears on the Credits and Winner Paid display. For example, if the cumulative total of the Games Won meter is 11,088, the Winner Paid display would show the number 0001 and the Credits display would show the remaining part of the number, 1088. Press the Spin Reels switch or pull the handle to advance through each meter category.

Last Game Display

This feature displays information for the last five games, starting with the most recently completed game. The number 2 appears in the Coins Played display. To view the last game display, press the Spin Reels switch. The reels spin to the reel positions of the most recently completed game. The Winner Paid display shows the num-

ber and position of the reel. For example, if the position of the second reel was 27, the Winner Paid display would show 2_27.

Note

In game software containing the nudge feature (such as newer "Slam Dunk" games), the display meters routine shows the last game virtual reel positions on the Winner Paid display as they were before the nudge evaluation, and the last game physical reel positions on the Credits display as they were after the nudge evaluation.

The Credits display reflects the game number and type. The game number ranges from 1 to 5, with 1 being the most recent game and 5 being the earliest game.

Bill Acceptor Transactions

This statistical data page allows the operator to view the last 5 bill acceptor transactions. The number 9 appears on all LED displays. Push the Spin Reels switch or pull the handle to begin viewing transactions. The most recent transaction appears first and is assigned the number 1, and the earliest transaction is assigned the number 5. The transaction number appears in the Coins Played display. The Winner Paid display shows the number of coins dispensed or credits awarded during the most recent transaction. The denomination of the bill is shown in the Credits display.

Progressive Jackpots Recall

The progressive jackpots recall allows the operator to view a number of the most recent progressive jackpots (the number varies depending upon the game software and jurisdiction). The number 4 appears on the Coins Played display. The Winner Paid display shows a number from 64 to 1, with 64 representing the most recent progressive jackpot and 1 representing the earliest progressive jackpot. The progressive display shows the amount won. Subsequent progressive wins decrement the number in the Winner Paid display.

In double progressive machines, the most recent progressive jackpot appears in the progressive display from which the award was won.

Once all of the progressive jackpot amounts are displayed, the game software overwrites the oldest amount in the buffer.

Notes

Some versions of S-Plus IBA software may incorporate additional display meters or meters in a different order than those listed here. If the order or number of display meters varies, contact IGT Customer Service (refer to Section 2 in this manual) to request additional information.

4.5 Functional Verification & Troubleshooting

4.5.1 Functional Verification

1. Confirm that the game, reel and RAM EPROMs, and jumpers are installed correctly on the processor board using the information in Section 5.8.
2. Verify that the game version number printed on game and reel EPROMs match the corresponding numbers on the sales order and reel strip listing shipped with the machine or new/replacement EPROMs.
3. The reel strip and pay table numbers also appear on the LED display in the reel strip test.
4. Step through the self test mode to verify memory, test inputs and outputs and set up all appropriate options (Section 4.2).
5. Play enough games to confirm that:
 - the display meters function as described in Section 4.4.2
 - in special games, the door-open alarm sounds each time the front door is opened with the machine power on

Table 4-4
Typical Display Meters

Meter	Cumulative Total	Description
01	Coins Out	Total number of coins paid or credits won
02	Coins In	Total number of coins accepted through coin head
03	Coin Drop	Total number of coins dispensed to the drop box
04	Cancelled Credits	Total number of credits paid by attendant
05	Games Played	Total number of games played
06	Hand-Pays/Jackpots	Total amount of hand-pays/jackpots
07	Door Opens	Total number of door opens
08	Games Won	Total number of games won
09	Games Lost	Total number of games lost
10	Coin-In Tilts	Total number of coin-in tilts
11	Coin-Out Tilts	Total number of coin-out tilts
12	Resets	Total number of jackpot resets
13	Hopper Empty	Total number of hopper empty tilts
14	Reserved	Reserved for system games
15	Reserved	Reserved for system games
16	Games Since Last Door Closed	Total games played (since last door closed)
17	Games Since Last Power Up	Total games played (since last power up)
18-27	Games Played with 1-10 Coins In	Total number of games played with from 1 to 10 coins in
28	Total \$1 Bills Accepted	Total number of \$1 bills accepted
29	Total \$5 Bills Accepted	Total number of \$5 bills accepted
30	Total \$10 Bills Accepted	Total number of \$10 bills accepted
32	Total Bills accepted	Total number of bills accepted
33	Coins or Credits Dispensed	Total number of coins or credits dispensed for bills
34	Total \$1 Bills Accepted	Total number of \$1 bills accepted (since last meter reading)
35	Total \$5 Bills Accepted	Total number of \$5 bills accepted (since last meter reading)
36	Total \$10 Bills Accepted	Total number of \$10 bills accepted (since last meter reading)
37	Total \$20 Bills Accepted	Total number of \$20 bills accepted (since last meter reading)
38	Total Bills Accepted	Total number of bills accepted (since last meter reading)

Table 4-4
Typical Display Meters (continued)

Meter	Cumulative Total	Description
39	Coins or Credits Dispensed	Total number of coins or credits dispensed for bills (since last meter reading)
40	Dollar Value of All Bills	Total dollar value of all bills accepted (since last meter reading)
41	Dollar Value of All Bills	Total dollar value of all bills accepted
42	Drop Door Open	Total number of drop door opens
43	Credits Played	Total number of credits played
44	Credits Won	Total number of credits won
45	Credits Paid	Total number of credits paid
46	True Coins In	Total number of coins played
47	True Coins Out	Total number of coins dispensed by the hopper
48	Total \$2 Bills Accepted	Total number of \$2 bills accepted
49	Total \$50 Bills Accepted	Total number of \$50 bills accepted
50	Total \$100 Bills Accepted	Total number of \$100 bills accepted
51	Total \$2 Bills Accepted	Total number of \$2 bills accepted (since last meter reading)
52	Total \$50 Bills Accepted	Total number of \$50 bills accepted (since last meter reading)
53	Total \$100 Bills Accepted	Total number of \$100 bills accepted (since last meter reading)

4.5.2 Troubleshooting

Troubleshoot the game software using the following procedure.

1. Complete the functional verification procedure in Section 4.5.1.
2. Refer to other sections of this manual to resolve electrical or mechanical malfunctions.
3. If problems still occur, isolate faulty components by replacing the game chips, the processor board and the mother board, one at a time, in that order.
4. Contact IGT Customer Service for further assistance.

Section 5

Components & Assemblies

5.1 Introduction

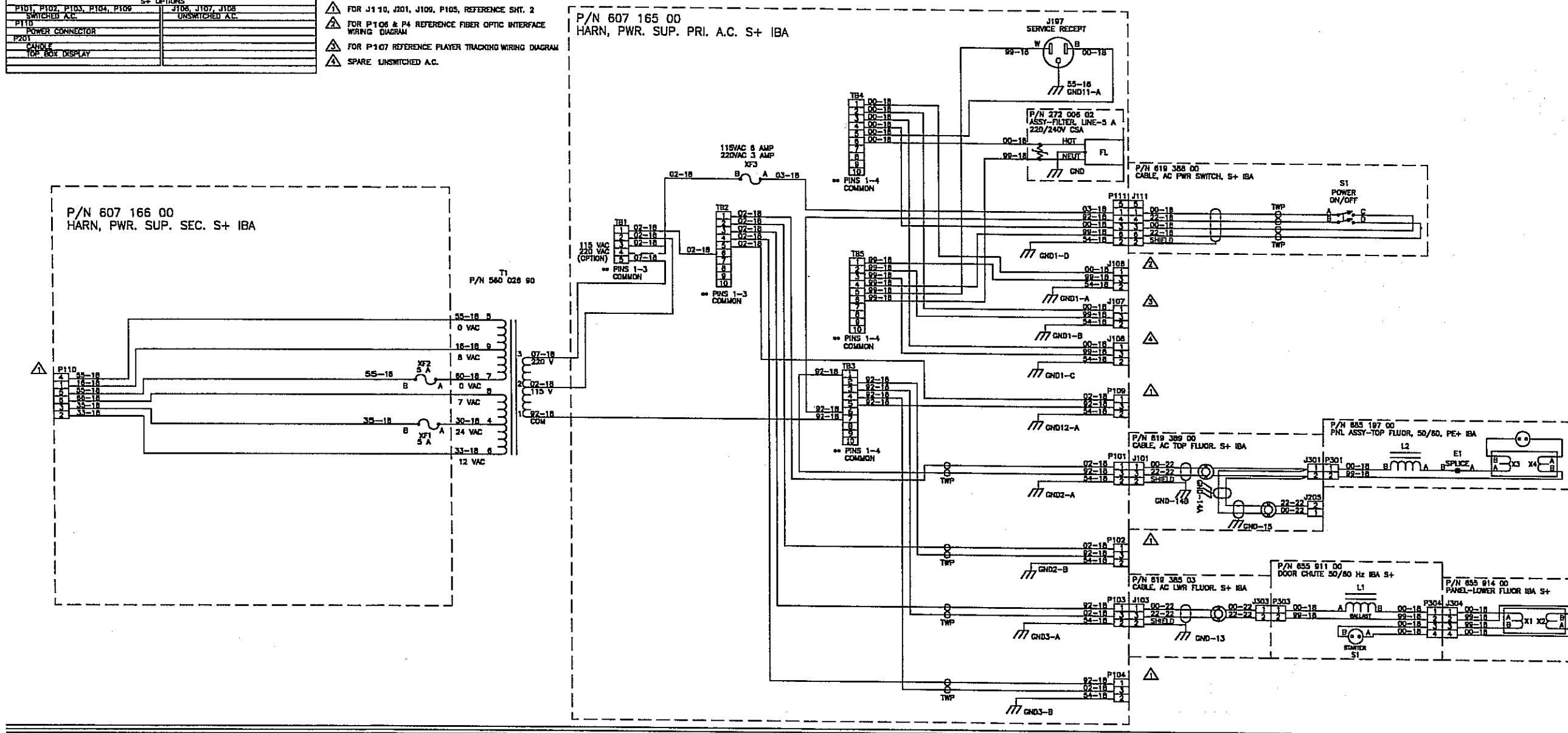
This section describes the individual machine components that make up a S-Plus IBA machine. The following components and assemblies are covered in this section:

- **Section 5.1, Introduction** – covers the components in Section 5. Provides the cabinet exploded view and parts identification for major machine assemblies.
- **Section 5.2, Machine Door** – covers the removal and installation procedures for the machine door components.
- **Section 5.3, Coin-In Handling** – describes the disassembly and assembly procedures for coin-in handling.
- **Section 5.4, Player Panel Switches** – describes the removal/installation procedures for player panel switches.
- **Section 5.5, Superbowl Hopper** – covers hopper removal/installation, probe levels, and troubleshooting.
- **Section 5.6, Machine Power Supply** – provides the parts identification for the major components of the power supply.
- **Section 5.7, Mother Board** – covers the removal and replacement of the mother board.
- **Section 5.8, Processor Board** – details IC chip location and replacement procedures.
- **Section 5.9, Imbedded Bill Acceptor** – describes the removal/installation and disassembly/ assembly of the bill acceptor.
- **Section 5.10, Slot Handle Mechanism** – describes the disassembly and assembly procedures for the slot handle.
- **Section 5.11, Stepper Reel Mechanisms** – describes the removal/installation and disassembly/ assembly of the bill acceptor.
- **Section 5.12, Mechanical Meters** – covers the mechanical meters and the types of information collected.
- **Section 5.13, Machine Bell** – describes the removal/installation procedures for the machine bell.
- **Section 5.14, Top Box** – describes the removal/installation procedures for the fluorescent assembly, payline light barriers, and top box glass.

- **Section 5.15, Candle** – describes the removal/installation procedures for the candle.
- **Section 5.16, Progressive Options** – describes the removal/installation procedures for the progressive options.
- **Section 5.17, Data Collection** – discusses the types of data collection.

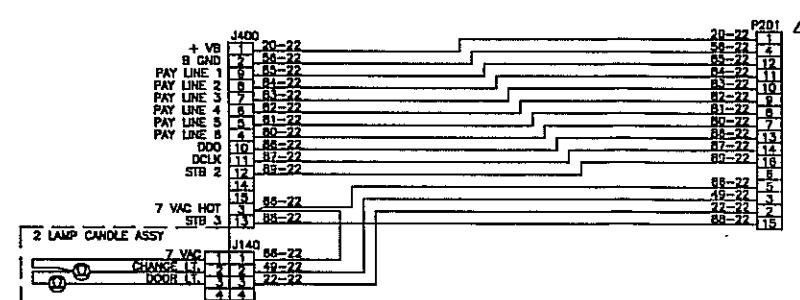
3-5 REEL - LOWER MODULE WIRING DIAGRAM
820-173-00 REV B1 PAGE 1 OF 3

5+ OPTIONS	
P101, P102, P103, P104, P109 SWITCHED AC.	J105, J107, J108 UNSWITCHED AC.
P110 POWER CONNECTOR	
P201	
CABLE TOP BOX DISPLAY	



P/N 607 168 00
HARN, TOP CABINET, S+ IB

TOP CABIN

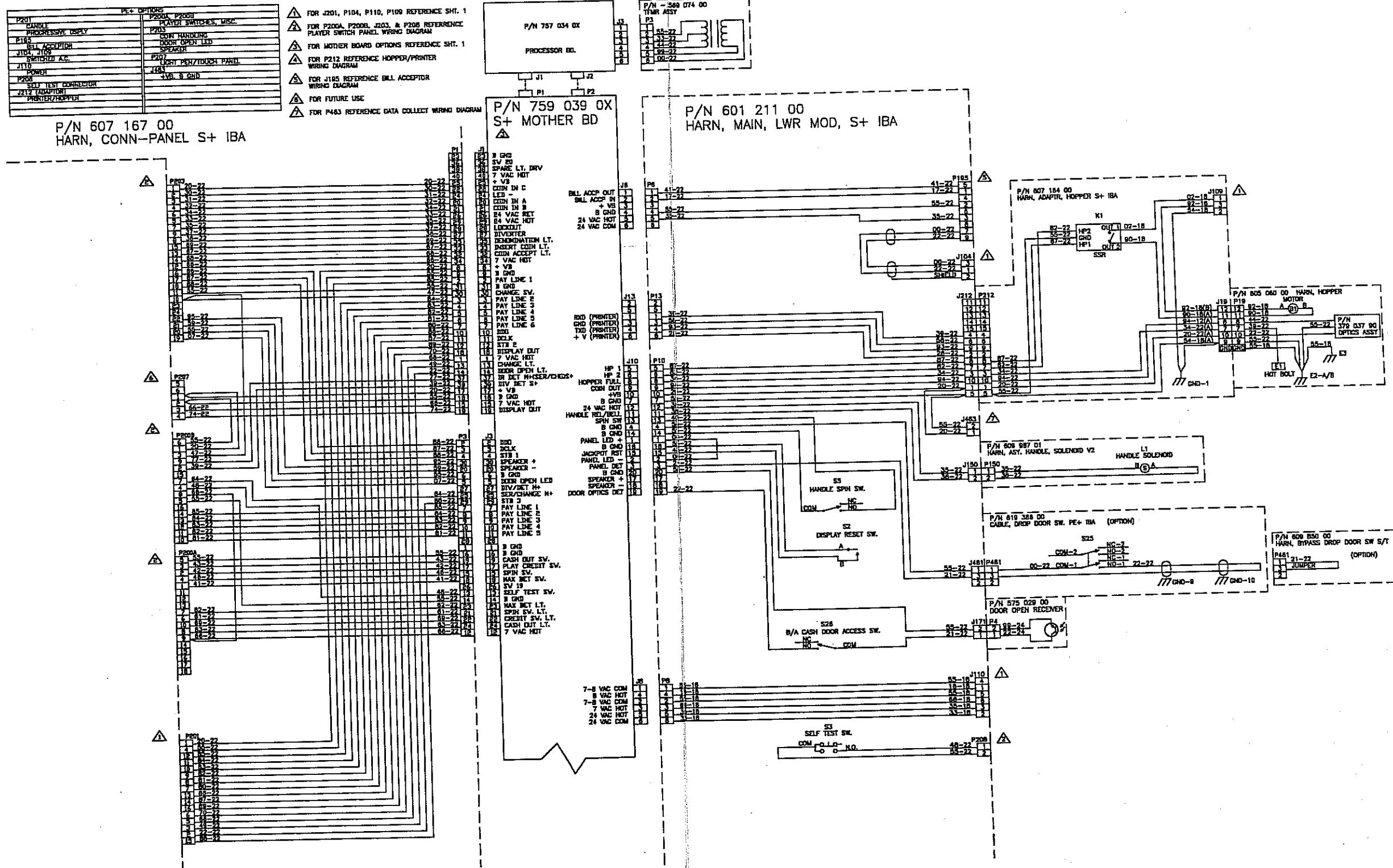


NOTES:

- 1. • DENOTES COMPONENT LEADS ON SPECIFIED CONNECTOR
- 2. ** DENOTES A COMMON PIN ON SPECIFIED CONNECTOR

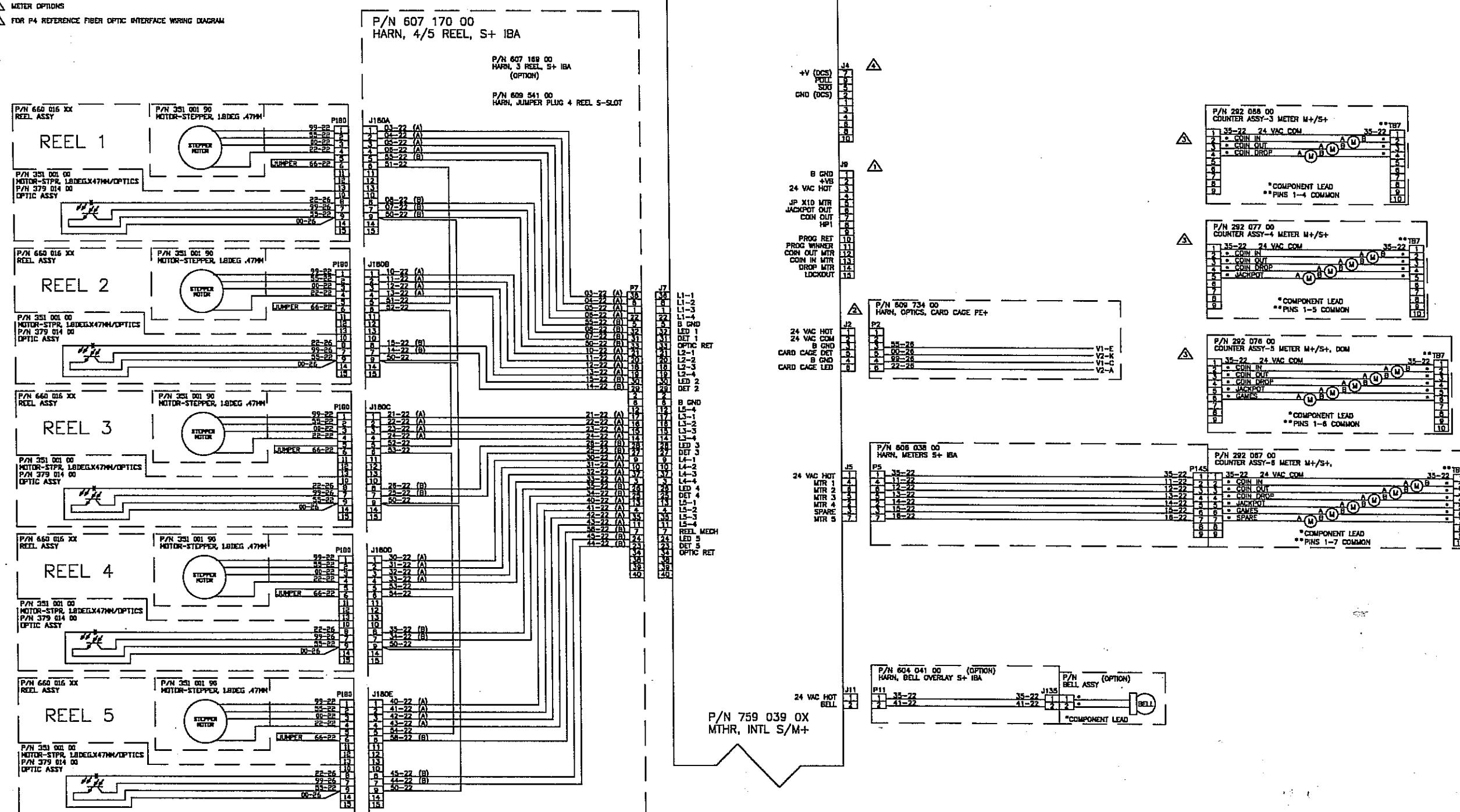
Components & Assemblies

**3-5 REEL - LOWER MODULE WIRING DIAGRAM
820-173-00 REV B1 PAGE 2 OF 3**

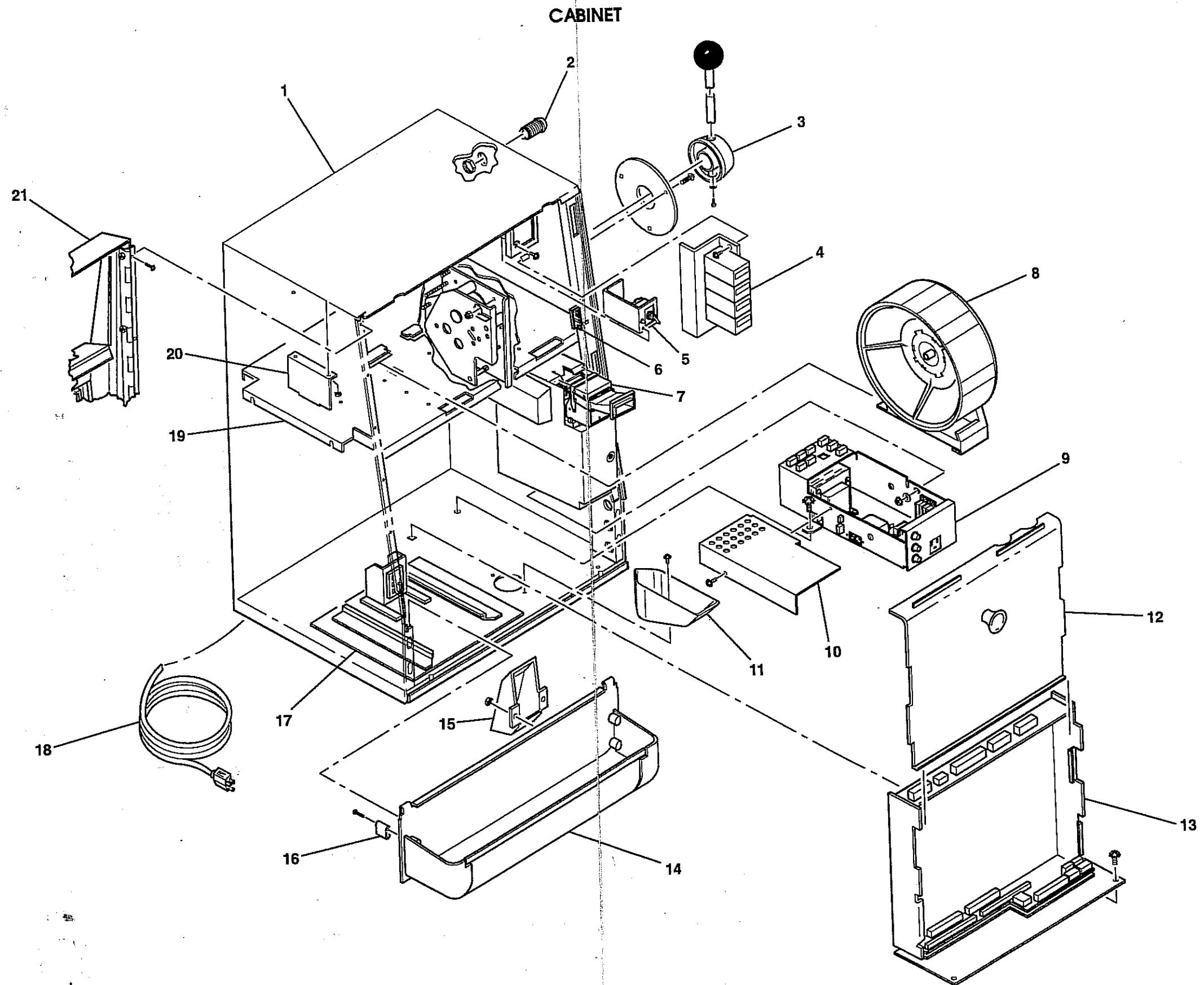


3-5 REEL - LOWER MODULE WIRING DIAGRAM
820-173-00 REV B1 PAGE 3 OF 3

- ▲ REFERENCE SDS
- ▲ J2 HAS MULTIPLE USAGES
- ▲ METER OPTIONS
- ▲ FOR P4 REFERENCE FIBER OPTIC INTERFACE WIRING DIAGRAM



Components & Assemblies



June 25, 1993

CABINET

Fig. No.	Part Number	Description	Qty.
1	142-627-00	CABINET - IMB B/A, S+	1
-A	633-097-00	BASE - WOOD, S+ IBA	1
2	513-001-90	SWITCH, KEY, N/O KEYED ALIKE	1
KIT	915-886-00	KIT - HANDLE ASSEMBLY, S+ IBA, CHROME	1
KIT	911-108-00	KIT - LOCKOUT, HANDLE MODULE	1
3	388-033-00	HANDLE ASSEMBLY - 1 SW, W/LOCKOUT, SS	1
-A	383-005-90	KNOB, SLOT HANDLE, 1 7/8 IN DIA	1
-1	582-023-00	HUB, SHAFT COVER, CHROME	1
-	582-023-40	HUB, SHAFT COVER, UNPLATED	1
-	631-082-00	ARM, LOCKOUT	1
-	631-151-00	ARM - HANDLE, SS, W/BEND, S+IBA, CR	1
-	631-151-40	ARM - HANDLE, SS, W/BEND, S+IBA, RA	1
-	667-038-00	SHAFT - HANDLE MODULE 3.698 L	1
4	292-066-00	COUNTER ASSEMBLY - 3 METER, M+/S+	1
-	210-019-90	RECEPT, W 9S W/EAR, W/TAB	1
-	217-042-90	PLUG, 9P W/EAR	1
-	218-021-90	TERMINAL BLOCK, 10 POS COMMONING	1
-	218-022-90	TERMINAL BLOCK, 5 POS COMMONING	1
-	219-338-90	HOUSING, 7 SOC.100 WL CRP. SL.	1
-	292-034-90	COUNTER, 24 VAC 6 DIGIT TOTAL	3
-	411-001-99	SCREW - MACHINE PH. PAN 4-40 X 3/16	6
-	419-510-92	SCREW - SEMS, PH PAN, 4-40 X 3/8	2
-	424-015-92	NUT - KEP STEEL, M5	2
-	431-003-94	WASHER, LOCK INT STEEL #4	6
-	606-038-00	HARNESS, METERS S+	1
-	824-496-00	INSTRUCTIONAL HARNESS STD "IGT-STD-130A"	1
-	636-756-00	BRACKET - 6 COUNTERS, M+/S+	1
-	850-231-00	LABEL - 3/6 METER, M+/S+	1
5	511-018-90	SWITCH, TOGGLE DPST .250	1
-	626-002-00	BRACKET ON/OFF, SELF TEST	1
6	653-099-00	MOUNT, DOOR OPEN OPTICS	1
-	575-030-00	ENCODER, DOOR OPEN Emitter	1
KIT	915-885-00	KIT - B/A, JCMSS, S+IBA	1
7	145-606-00	JCMSS ENCLOSURE, IBA S+	1
8	660-016-00	REEL ASSEMBLY-1 REEL, 8.7IN X 1.73	3
-	670-118-00	SHELF - 3 REEL, IBA S+	1
-	424-015-92	NUT - KEP STEEL, M5	5
-	430-029-92	WASHER - FENDER, FLAT, STEEL, M5	5
-	419-019-91	SCREW - SEMS, PH PAN, M4X8	2
-	430-029-91	WASHER - FENDER, FLAT, STEEL, M4	2
-	607-169-00	HARNESS, 3 REEL, S+ IBA	1
-	607-169-20	HARNESS, 3 REEL, S+ IBA LS	1
-	824-496-00	INSTRUCTIONAL HARNESS STD "IGT-STD-130A"	1
-	607-169-50	HARNESS, 3 REEL, S+ IBA DW	1
-	219-332-90	HOUSING, 40SOC DUAL .100 CRP S	1
-	446-042-90	CLIP, 40 DUAL ROW INTERIM SL	1
-	210-020-90	RECEPT, W, 15SOC, WOEAR, WTAB WHITE	3
-	143-046-00	CHASSIS - S-SLOT	3
-	351-001-00	MOTOR - STEPPER, 1.8DEG.X47MM/OPTIC	3
-	351-001-90	MOTOR - STEPPER, 1.8DEG.X 47 MM	3
ASSY-	379-014-00	OPTICAL ASSEMBLY, S-SLOT HCTR	3
9	647-176-00	FRAME - POWER SUPPLY, S+ IBA	1
-	125-010-90	OUTLET, 125 VAC .250 Q-DISC GND	1
-	152-055-90	CAP. DISC CERAM, .01MF-500V	2
-	152-105-90	CAP. DISC CERAM, .0047 300 VAC U	2
-	213-045-90	HOLDER, FUSE 3AG SHOCK - PROOF	3
-	218-022-90	TERMINAL BLOCK, 5 POS COMMONING	1
-	218-021-90	TERMINAL BLOCK, 10 POS COMMONING	4
-	219-562-90	HOUSING, 3 PIN, MINI-FIT	5
-	219-372-90	HOUSING, 6 PIN, MINI-FIT JR.	1

CABINET

Fig. No.	Part Number	Description	Qty.
ASSY	272-006-02	ASSEMBLY - FILTER, LNE, 5AMP 220/240 CS	1
-	272-019-90	FILTER, LINE, 5AMP, IEC CON CSA	1
-	483-014-90	VARISTOR, 250V, 40J V250LA4	1
-	524-013-90	FUSE, F.B., 6 AMP	1
-	524-015-90	FUSE, F.B., 8 AMP	1
-	560-026-90	TFMR, 24VCT/6A, 8V/2A, 7V/6A, 220	1
-	589-697-00	PLATE - BACK, POWER SUPPLY, S+IBA	1
-	607-165-00	HARNESS, POWER SUPPLY, S+IBA PRIMARY	1
-	607-165-20	HARNESS, POWER SUPPLY, S+IBA, PRMRY LS	1
-	607-166-00	HARNESS, POWER SUPPLY, S+IBA, SECONDARY	1
-	607-166-20	HARNESS, POWER SUPPLY, S+IBA, SECONDARY LS	1
-	607-166-50	HARNESS, POWER SUPPLY, S+IBA, SECONDARY DW	1
-	607-165-50	HARNESS, POWER SUPPLY, S+IBA, PRIMARY DW	1
-	609-527-00	HARNESS, GROUNDING 16GA.X3.50 IN.	1
-	824-496-00	INSTRUCTIONAL HARNESS STD "IGT-STD-130A"	1
-	850-329-00	LABEL - P/S, 120V, 50/60HZ, S+ IB	1
10	688-476-00	COVER - POWER SUPPLY S+, IBA	1
11	573-251-00	CHUTE - DROP UNIVERSAL	1
12	597-218-00	TRAY - PROCESSOR, S+IBA	1
13	647-175-00	FRAME - PROCESSOR, S+IBA	1
-	597-220-00	TRAY ASSEMBLY - PROG/MOD. STD, S+	1
14	597-109-00	TRAY - COIN, BRUSHED, WIDE BODY, M+S	1
-	655-815-09	PANEL - BTM TRAY, IBA S+, CHROME	1
-	655-815-43	PANEL - BTM TRAY, IBA S+ RAW	1
-	824-077-00	INSTRUCTIONAL - SURFACE FINISH, PLATING	1
-	824-112-00	INSTRUCTIONAL - IGT CHROME PLATING SPEC.	1
15	581-212-00	GUIDE - COIN DROP, 50 MM M+S	1
16	659-104-00	END CAP - RIGHT, CHROME	1
-	659-104-01	END CAP - LEFT, CHROME	1
-	659-104-40	END CAP - RIGHT, RAW	1
-	659-104-41	END CAP - LEFT, RAW	1
17	626-823-00	BRACKET - HOPPER, 2 POS. W/SSR	1
18	618-004-90	CORD, POWER, STD (7.5 FT)	1
19	670-118-0X	REEL SHELF, S+, IBA	1
20	195-043-01	BALLAST/STARTER ASSEMBLY 50/60 HZ, S+	1
-	195-041-90	BALLAST, 118V 14-15W, 50/60HZ, S+	1
-	197-001-90	STARTER, FS-2, 14, 15, 20W	1
-	636-641-00	BRACKET STARTER BALLAST	1
21	712-090-00	DOOR - MAIN, CHROME PLT-IBA S+	1
-	710-141-00	DOOR ASSEMBLY - SUB, CHROME, S+ IBA	1
-	712-085-00	DOOR - MAIN, IMB B/A, S+	1

5.2 Machine Door

This section describes the steps necessary to remove and install the components and assemblies found on the front door. When applicable, procedures for troubleshooting, functional verification, cleaning, and maintenance are included within that component section. Those components not described in this section will be covered under the individual component name within Section 5.

This section contains the following machine door components:

- main door (5.2.1)
- belly panel (5.2.2)
- speaker (5.2.3)
- belly door (5.2.4)
- belly glass (5.2.5)
- reel glass (5.2.6)
- door lock assembly (5.2.7)
- door-open optics (5.2.8)
- reel fluorescent ballast (5.2.9)

To open the machine door: Locate the sliding door-latch pin on the right side of the door, below the key lock. Lift the latch pin to disengage the locking bar and rotate the door away from the cabinet.

5.2.1 Door Removal & Installation

To remove and install the main door on a S-Plus IBA machine, see Figure 5-1 and proceed as follows.

Tools Required

- #2 Phillips screwdriver
- ty-rap gun
- 5.5mm nutdriver

Door Removal

1. Open the door (refer to procedure above) and turn the machine power off. Remove

the coin tray from the cabinet (refer to Section 5.3, Coin Tray).

2. Disconnect the 16-pin, 18-pin and 24-pin door harness connectors from the connector panel on the processor board (refer to Section 5.8, Processor Board) and cut all ty-raps.
3. Remove the braided ground strap from the door by removing the M3 Kep nut.
4. Remove the light leak cover strip from the door hinge side of the cabinet by pulling the strip away from the left wall.
5. Disconnect the 4-pin connector from the light panel above the reel glass.
6. Disconnect the 2-pin connector from the belly panel, along with removing the M3 x 6 Sems screw that grounds the 2-pin connector.
7. Hold the door open and remove the M3 Esna nut that fastens the restraining cable to the reel shelf.
8. Hold the door firmly in place (at about 90 degrees) and remove the six 6-32 x 3/8" Sems screws that fasten the door hinge to the left cabinet wall. The door hinge should rest on top of the protruding metal flange below the hinge on the lower-left cabinet wall.
9. Carefully lift the door and hinge away from the cabinet.

Door Installation

1. Extend the door hinge perpendicular (90 degrees) to the door and set the door hinge on top of the protruding metal flange at the lower-left wall of the cabinet.
2. Hold the door hinge against the hinge mounting surface of the cabinet and align the top mounting holes of the hinge and cabinet.

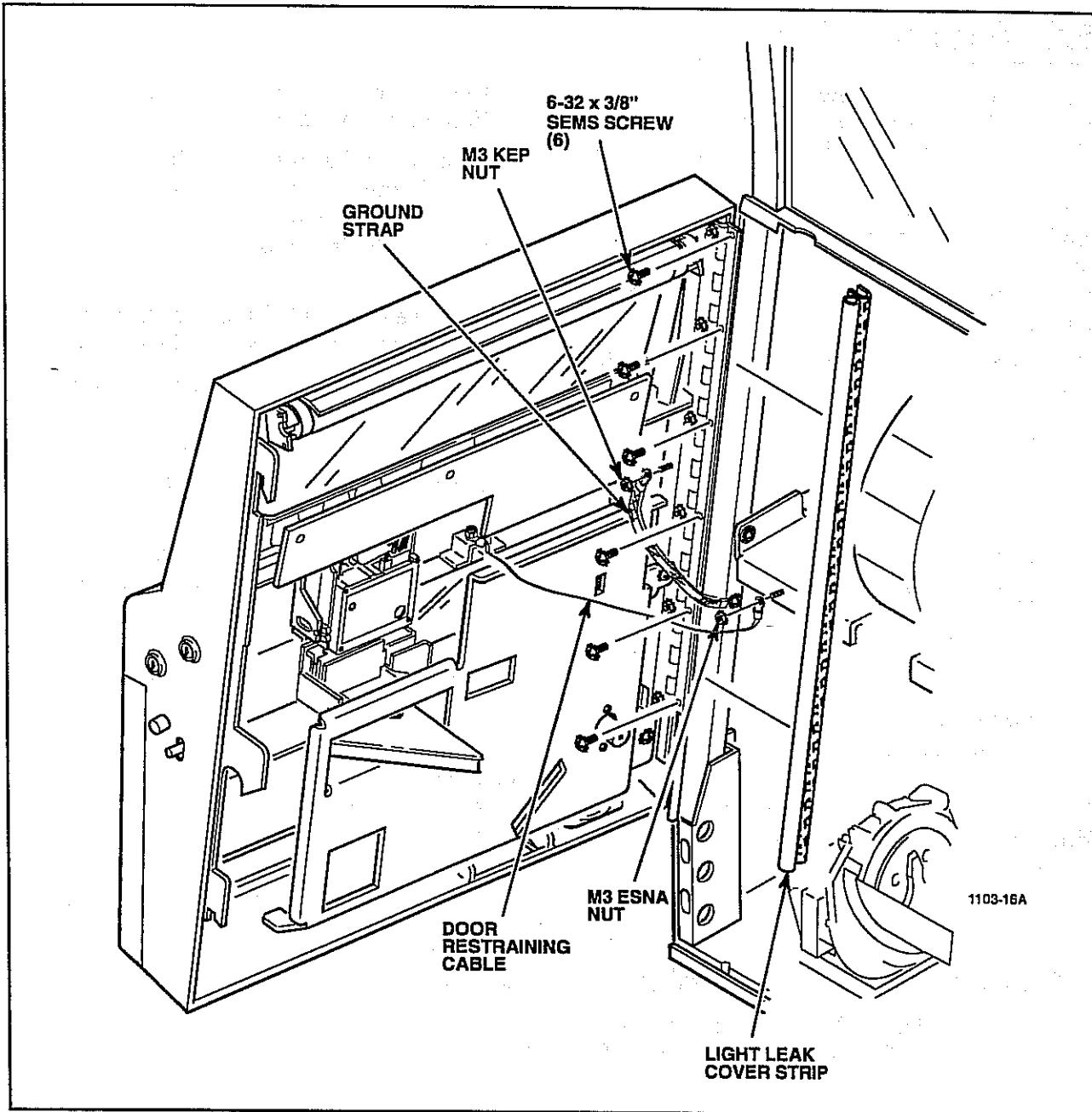


Figure 5-1. Front Door Removal.

3. Install six 6-32 x 3/8" Semis screws into each of the door hinge mounting holes. **Do not fasten securely at this time.**
4. Securely tighten all six of the door hinge screws. Hold the door open from the cabinet (about 60 degrees) and fasten the door restraining cable to the reel shelf with a M3 Esna nut.
5. Close the door and check for proper alignment of the door with the right side of the cabinet. If the door does not open and close smoothly, loosen the six hinge screws

and re-adjust the door height and vertical position. Repeat as necessary.

Note

Some doors, even if installed correctly, need to be lifted slightly and pushed shut in order to be completely closed.

6. Attach the light leak cover strip to the door hinge and hinge mounting surface of the cabinet by aligning the notches in the strip with the ends of the hinge screws and pressing the strip over the hinge, flange, and screws. Make sure the light leak cover is inside the ground strap and restraining cable.
7. Connect the 16-pin, 18-pin and 24-pin door harness connectors to the connector panel on the processor board (refer to Section 5.8, Processor Board).
8. Fasten the braided ground strap to the door with a M3 Kep nut.
9. Connect the 4-pin connector to the light panel above the reel glass.
11. Connect the 2-pin connector to the belly panel, along with fastening the M3 Sems screw that grounds the 2-pin connector to the belly panel.
12. Turn the machine **power on**; close and lock the front door.

5.2.2 Belly Panel

The belly panel attaches to the inside of the machine door and holds parts of the fluorescent light assembly (including ballast and starter) and the coin chute assembly. See Figure 5-2 and use the information that follows to remove and install the belly panel.

Tool Required

- #2 Phillips screwdriver
- 7mm nutdriver

Removal

1. Open the door and turn the **power off**.
2. Disconnect the 2-pin AC harness from the connector located above the fluorescent starter on the belly panel, along with removing the M3 Sems screw that grounds the 2-pin connector.
3. Open the belly door, remove the M4 Kep nut which secures the belly panel to the bottom of the door.
4. Remove two M3 Sems screws, located next to the door hinge, that fasten the belly panel to the door.
5. Then disengage the spring loaded pin plunger, which is located at the top of the belly panel. The pin plunger fastens the belly panel to the coin-in handling. To release the belly panel from the door, pull the pin plunger down and slide the belly panel away from the door.

Disassembly

1. Turn the starter counterclockwise to release it from the socket.
2. To remove the ballast, remove the two M3 x 6 Sems screws and M3 flat fender washers.
3. The white, plastic coin chute is riveted to the inside of the belly panel and should not be removed.

Assembly

1. Place the ballast on the belly panel so that the center notches in the wider mounting flanges align with the threaded inserts in the panel. Fasten the ballast in place with two M3 Sems screws and M3 flat fender washers.
2. Place the starter legs in the socket grooves and turn the starter clockwise to install it in the socket.

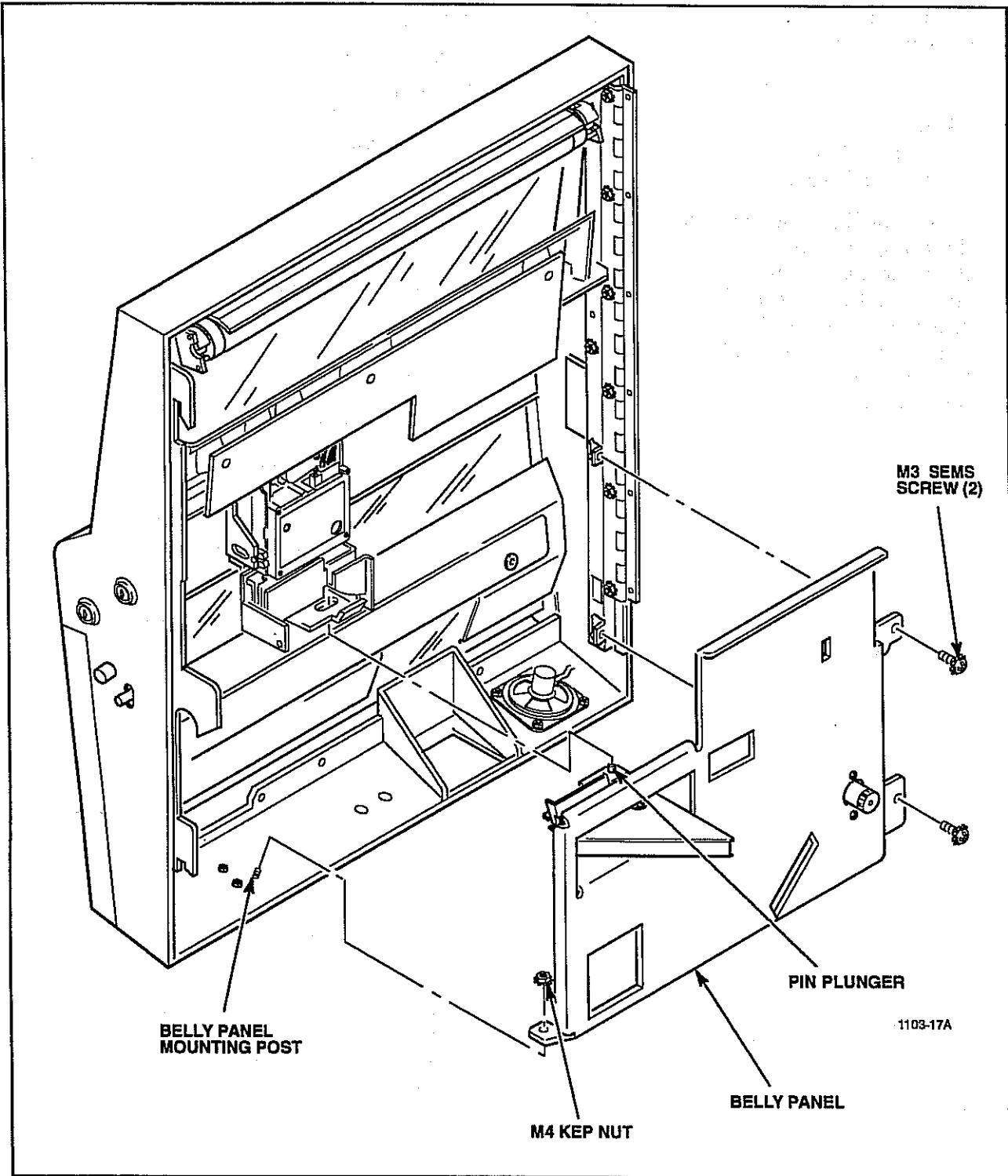


Figure 5-2. Belly Panel Removal.

Installation

1. Place the mounting hole of the belly panel, located on the bottom of the belly panel, on the mounting post on the bottom of the door.
2. Pull the pin plunger down and align the belly panel with the bottom of the coin-in handling bracket. When the panel and bracket are aligned, release the pin plunger to secure them.
3. Install and fasten the M4 Kep nut to the mounting post on the bottom of the door.
4. Fasten the belly panel to the side of the door, with two M3 Sems screws.
5. Connect the 2-pin for the fluorescent harness to the belly panel, located above the fluorescent starter on the belly panel.
6. Fasten the ground for the fluorescent harness to the belly panel, with a M3 Sems screw.
7. Turn the machine **power on**; close and lock the door.

5.2.3 Speaker

The 8-Ohm, 1-Watt speaker mounts inside the machine door, facing down toward the coin tray. Speaker volume is controlled in the self test mode (refer to Section 4, Game Software).

Tool Required

- 5.5mm nutdriver

Removal

To remove the speaker, refer to Figure 5-3 and proceed as follows.

1. Open the front door and turn the **power off**. Remove the belly panel (refer to Section 5.2.2, Belly Panel).
2. Slide the two Faston wire connectors off the speaker terminals.
3. Remove the four M3 Kep nuts that fasten the speaker and cover to the inside of the

door and lift the speaker off the mounting posts.

Installation

1. Place the speaker over the four mounting posts on the door so that the two speaker-wire terminals face the inside of the machine (with the door open). Thread an M3 Kep nut onto each of the four posts and tighten securely.
2. Slide the two Faston wire connectors onto the speaker terminals. Refer to the overall wiring diagram at the end of Section 5.1.
3. Install the belly panel (refer to Section 5.2.2, Belly Panel).
4. Turn the machine **power on**; close and lock the door.

Functional Verification

Play a few games and listen to the game sounds. Change the volume setting in the self test mode and play a few more games to confirm that the speaker responds at a range of volume settings.

Troubleshooting

If the machine is on and operational, but the sound is low or inaudible, proceed as follows.

1. Adjust the volume in the self test mode to see if the speaker responds or is turned too low (refer to Section 4, Game Software).
2. Confirm that the speaker wires are not loose or damaged.
3. Replace the processor board with a known good one (refer to Section 5.8, Processor Board) and repeat Step 1.
4. If the speaker still does not work, use a VOM to measure the resistance of the speaker. Resistance should measure approximately 8 Ohms. If not, replace the speaker.

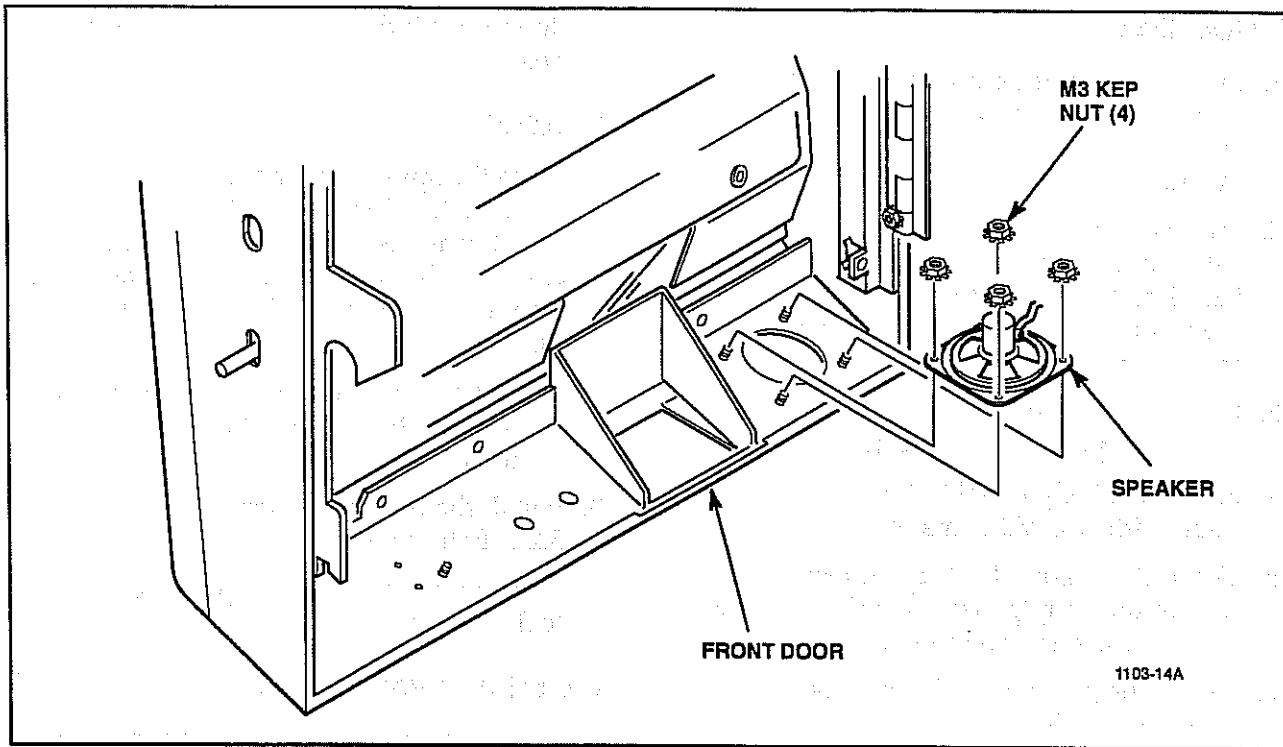


Figure 5-3. Speaker Removal.

5. If the resistance is approximately 8 Ohms, check all harnesses and wires to the speaker for loose or faulty connections.
6. If the speaker still does not work, replace the mother board (refer to Section 5.7, Mother Board).

5.2.4 Belly Door

The belly door can be opened by the following methods:

- Unlocking the belly door and releasing the belly door pin.
- Open the main door and slide the locking bar for the belly door to the right and pull the door down.

Open the belly door to access the lower fluorescent, belly glass and the cash box for the imbedded bill acceptor. The following procedures describe the removal and replacement of the lower fluorescent and belly glass. (For more information about the bill acceptor refer to Section 5.9.)

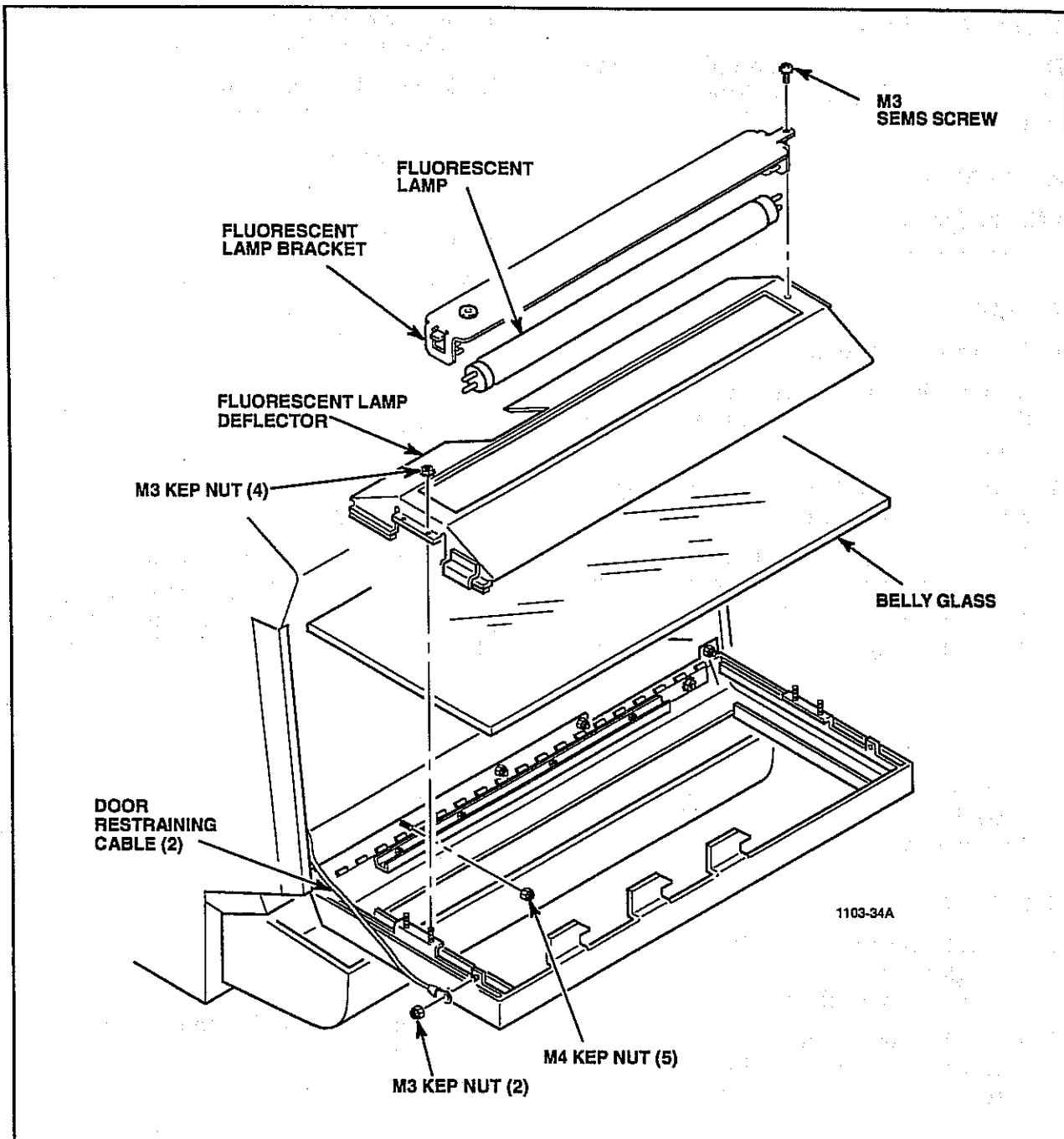
formation about the bill acceptor refer to Section 5.9.)

Fluorescent Lighting

The following procedure describes the steps necessary to remove and install the fluorescent lamp bracket from the belly door.

Lower Lighting Removal

1. Open the belly door.
2. Disconnect the 4-pin harness from the fluorescent panel.
3. Remove the M3 x 6 Sems screw from the middle of the fluorescent bracket to remove only the lower fluorescent panel.
4. Remove the fluorescent bulb(s) by placing one hand at each end of the bulb and rotate the bulb until it disengages from the two sockets.



5-4. Belly Door Fluorescent Removal.

Lower Lighting Installation

1. Remove the belly panel (refer to Section 5.2.2, Belly Panel).

2. Install the lamp in the socket by placing one leg on each end of the fluorescent bulb into the socket grooves and rotate the bulb.

5.2.5 Belly Glass

The following procedure describes the steps necessary to remove and install the belly glass in the belly door (see Figure 5-4).

Tools Required

- #2 Phillips screwdriver
- 5.5mm nutdriver

Removal

1. Open the belly door.
2. Remove the four M3 Kep nuts, that fasten the belly door fluorescent panel to the belly door.
3. Disconnect the cable from the belly door clamp by removing the M4 Kep nut.
4. Remove the tyrap from each side of the belly door fluorescent by removing the M3 x 8 Sems screws.
5. Carefully slide the belly glass to one side and lift up until it clears the mounting posts.

CAUTION

Handle all glass with extreme care to avoid breakage or injury from potentially sharp edges.

Installation

1. Carefully slide the belly glass on to the belly glass frame, making sure the glass fits evenly on the flanges of the door.
2. Align the lower fluorescent assembly so that the rubber strips on the bottom of the assembly rest on the belly glass.
3. Fasten the fluorescent assembly to the belly door with four M3 Kep nuts.
4. Check to make sure the belly glass fits evenly within the belly glass frame and hold the glass in place.
5. Tighten all four nuts until the rubber strips on the mounting clamps are compressed evenly against the glass surface.

6. Replace the tyrap to each side of the door with the two M3 x 8 Sems screws.
7. Connect the grounding cable to the belly door with a M4 Kep nut.
8. Turn the machine power on; close and lock the front door.

Inspection

Confirm that the belly glass is free from cracks or scratches, and that the information displayed on the glass is correct.

Cleaning

Clean the belly glass with a mild, anti-static glass cleaner and a soft, lint-free cloth.

5.2.6 Reel Glass

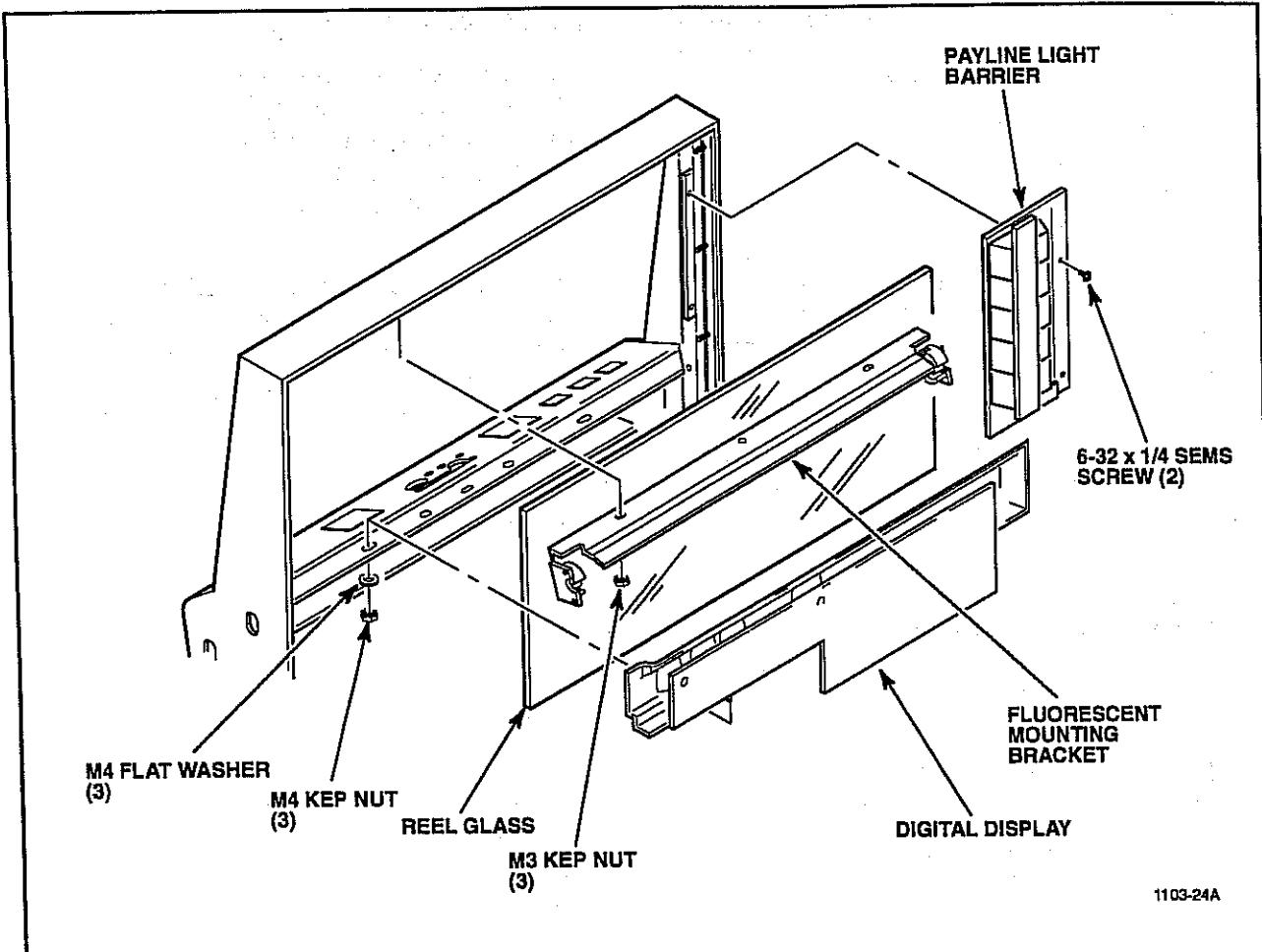
This section describes the steps necessary to remove the reel glass. In order to remove the reel glass from the door the following components also need to be removed: digital display board, reel glass light fluorescent, and payline light barrier.

Tools Required

- 5.5mm nutdriver
- 5/16" nutdriver
- #2 Phillips screwdriver

Reel Glass Removal

1. Open the door and turn the machine power off.
2. Disconnect the 4-pin connector that connects the reel fluorescent harness to the ballast harness located on the upper left wall of the cabinet.
3. Disengage the fluorescent bulb(s) by placing one hand at each end of the bulb and rotate the bulb until it disengages from the two sockets.
4. Disconnect the 6-pin harness from the payline PC board located at the right end of the reel glass. If the door does not include this assembly, disregard Steps 4 &5 and proceed to Step 6.



5-5. Reel Glass Removal

5. Remove two 6-32 x 1/4" Sems screws that fasten the payline light-barrier to the door and lift the assembly away from the door.
6. Disconnect the two harnesses connected to the digital display board.
7. Remove the three 6-32 Kep nuts and #6 flat-steel washers from under the player display board and remove away from the machine.
8. Remove the three M3 Kep nuts from fluorescent mounting bracket and lift away from the cabinet.
9. Carefully lift the glass away from the machine.

CAUTION

Handle all glass with extreme care to avoid breakage or injury from potentially sharp edges.

Reel Glass Installation

1. Carefully place the reel glass against the upper glass frame behind the two mounting flanges on the left end of the door, then set the right end of the reel glass up against the frame.
2. Hold the reel glass in place and install the fluorescent mounting bracket against the reel glass and the top of the door frame.

3. Fasten the fluorescent mounting bracket to the door with three M3 Kep nuts. **Do not tighten** securely at this time.
4. Install the digital display board against the bottom of the reel glass, aligning the mounting posts with the lower reel glass bracket mounting holes.
5. Secure the digital display board with three 6-32 Kep nuts and four #6 flat-steel washers, which are located under the digital display board.
6. Check to make sure that the reel glass fits evenly with the reel glass frame and holds the glass firmly in place. Tighten all the hardware for the upper and lower brackets.
7. Connect the 6-pin harness from the payline PC board located at the right end of the reel glass. If the door does not include this assembly, disregard Step 8 and proceed to Step 9.
8. Fasten the payline light-barrier to the door with two 6-32 x 1/4" Sems screws
9. Connect the fluorescent bulb(s) by placing one hand at each end of the bulb and rotate the bulb until it engages into the two sockets.
10. Connect the two harnesses to the player display board.
11. Turn the machine **power on** and close the door.

Inspection

Confirm that the reel glass is free from cracks or scratches, and that the information displayed on the glass is correct.

Cleaning

Clean the reel glass with a mild, anti-static glass cleaner and a soft, lint-free cloth.

5.2.7 Main Door Lock Assembly

The door lock assembly consists of a keyed security lock and cam, and a locking bar which slides up and down to engage the machine enclosure in three places when the door is closed (refer to Section 2, Machine Installation, for lock specifications).

An optic door-open sensor (emitter) is attached to the locking bar, and corresponds with the receiver mounted on the machine enclosure. Refer to Section 5.2.8 for information about the optic door-open sensor.

Removal & Installation

To remove or install the door lock assembly, refer to Figure 5-6 and proceed as follows.

Tools Required

- 7/16" nutdriver
- 8mm nutdriver
- Socket wrench with 7/8" socket
- 3/8" open/box-end wrench or nutdriver
- Wire snips
- Ty-rap installation tool

Removal - Locking Bar

1. Remove the belly panel from the door (refer to Section 5.2.2, Belly Panel).
2. Disconnect the 2-pin emitter harness located approximately four inches from the emitter, and remove the ty-rap that secures the harness to the lance near the center of the locking-bar. (See Figure 5-7)
3. Hold the locking bar in place and remove the two M5 Esna nuts and M5 flat steel washers from the top, center of the locking bar.

Note

Each threaded mounting post has a small metal spacer over it, which allows the locking bar to slide up and down when the nuts are tightened. Be careful not to lose the spacer when removing the locking bar.

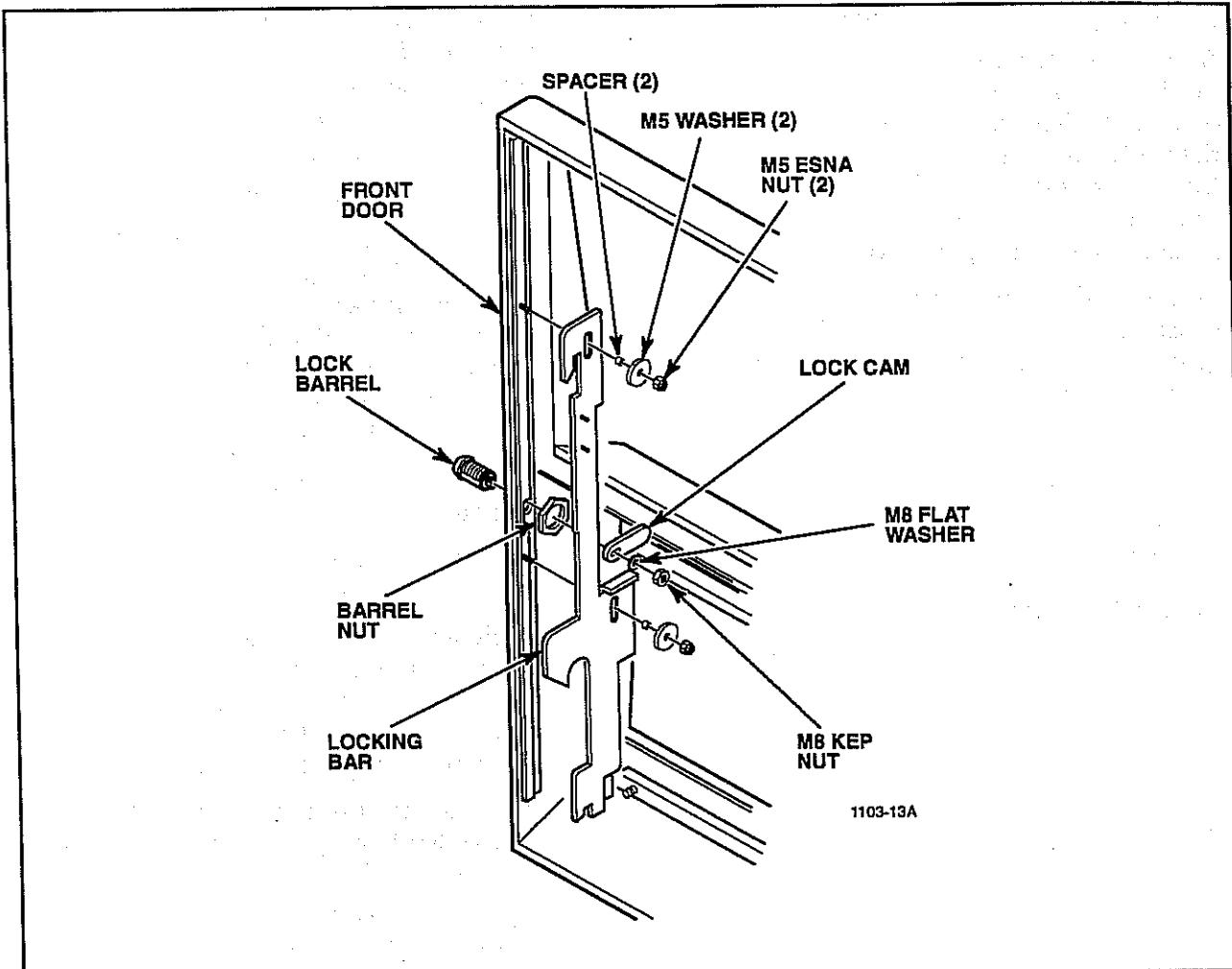


Figure 5-6. Door Lock Assembly.

Installation - Locking Bar

1. Position the bottom of the locking bar first and then rotate into place. Align the locking bar in place so that the latch post protrudes through the slot in the door and the mounting-post slots are over the threaded mounting-posts.

Note

Be sure the door-optics harness is not under the locking bar.

2. Hold the locking bar in place and thread an M5 Esna nut and M5 steel fender washer on each of the two mounting posts. Tighten the nuts securely.

3. Connect the two-pin door optics harness and secure the harness to the lance on the locking bar with a ty-rap.

4. Replace the belly panel (refer to Section 5.2.2, Belly Panel).

Functional Verification

1. Verify that the locking bar slides smoothly. If it does not, the metal standoff may have been removed from one of the threaded mounting posts.
2. Verify that the locking bar cannot be lifted when the security lock is engaged. If the bar can be lifted, the lock cam is positioned incorrectly.

5.2.8 Optic Door-Open Sensor

An optic sensor assembly indicates when the machine door is open/unlocked. The door-open sensor is a two-part pulsed optic assembly: the emitter mounts on the door locking bar, and the receiver mounts on the machine enclosure. The emitter and receiver optics align when the machine door is properly closed.

Figure 5-7 shows the location of optic door-open sensor components. Refer to the wiring diagram at the end of this section for harnessing configuration for the emitter and the receiver.

Note

Opening and closing the machine door while in the self test or statistical data mode, exits that mode.

Removal & Installation

To remove or install the optic emitter and/or receiver, see Figure 5-7 and proceed as follows.

Tools Required

- #1 Phillips screwdriver
- wire snips
- ty-rap installation tool

Removal

1. Complete the troubleshooting and functional verification steps listed in this section to determine if the optic emitter or receiver needs to be replaced.
2. Both the emitter and the receiver are mounted with two M3 Sems screws and M3 flat washers. To remove either the emitter or receiver, remove the Sems screws, remove the ty-rap that secures the harness and disconnect the harness at the Molex connector.

Installation

1. Verify the optic harness assembly part numbers for the door emitter harness (p/n

575-030-00) and the enclosure receiver harness (p/n 575-029-00). The mounts are interchangeable, but the optics will not work interchangeably.

2. To attach the door-open optic emitter to the locking bar on the machine door:
 - a. Position the optic emitter mount on the locking bar flange so that the optic sensor points toward the machine (with the door open) and the flange on the mount is in back of the optic (Figure 5-7). Align the holes in the locking bar with the slots in the bracket.
 - b. Secure the mount in place with two M3 Sems screws and M3 flat steel washers.
3. To attach the door-open optic receiver to the right, front enclosure wall:
 - a. Position the optic receiver mount on the mounting flange so that the openings in the bracket face the front of the machine and the optic sensor points toward the right enclosure wall.
 - b. Secure the optic receiver in place with two M3 Sems screws and M3 flat steel washers. Tighten both screws securely.
4. Connect the optic harness(es) at the Molex connector(s) and replace any ty-raps that were removed.

Troubleshooting

If the emitter and receiver do not work, the following troubleshooting procedures should be used:

1. Verify that the locking bar and latch post are lowered after closing the door.
2. Inspect both the emitter and receiver optics for damage or misalignment (dents, chipped glass, etc.).

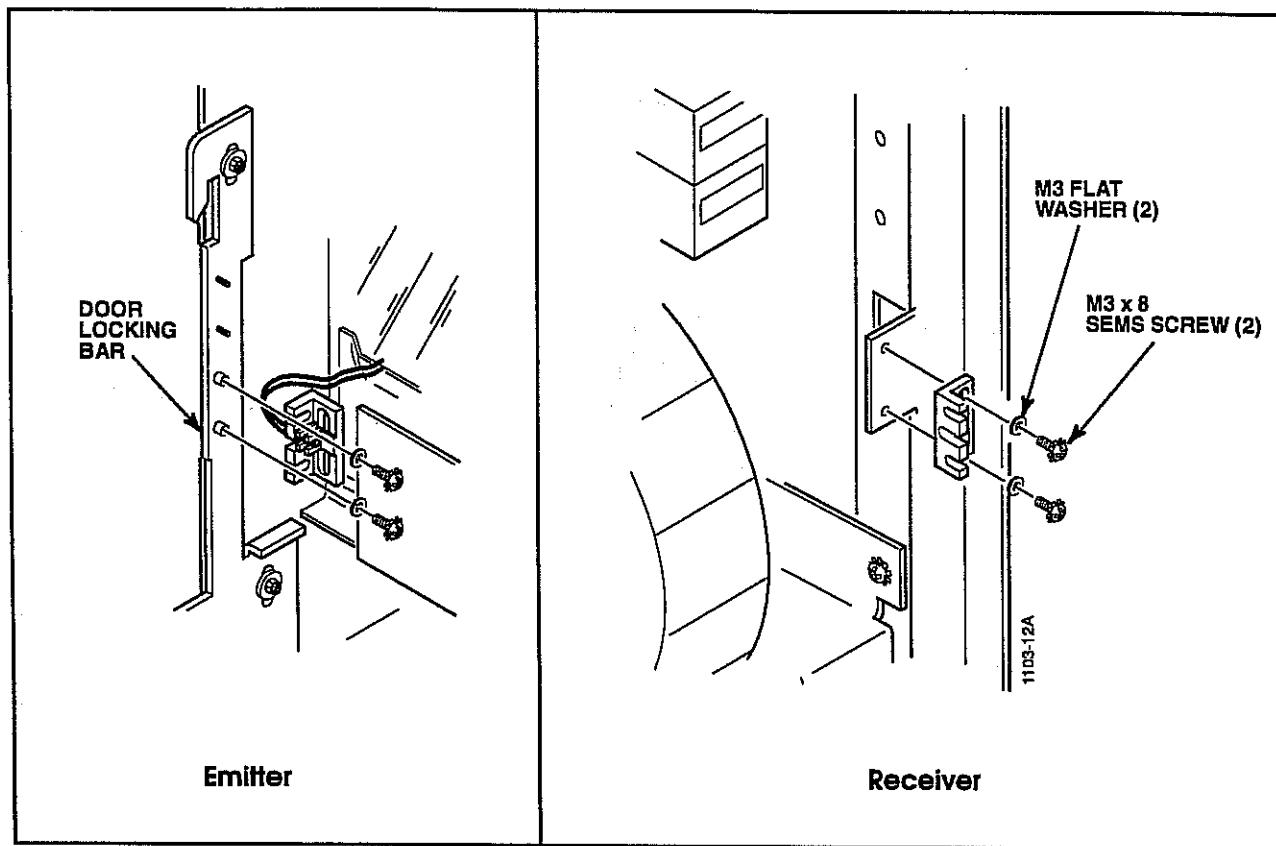


Figure 5-7. Optic Door-Open Sensor Mounting.

3. Inspect all wires for possible internal damage; in particular, check the emitter wires that are soldered together inside the plastic sleeve.
4. If the message remains or immediately recurs, replace the processor board.

Inspection

Confirm that all wire connections are secure and that both optics are clean.

Cleaning

Clean the optics with denatured alcohol or mild glass cleaner as needed.

5.2.9 Reel Fluorescent Ballast Removal/ Installation

Reel Fluorescent Ballast Removal

1. Open the front door and turn the machine power off.
2. Remove the left stepper reel mechanism (Section 5.9). For machines with five reels, remove reels one and two (left side).
3. Disconnect the 4-pin molex connector that connects the ballast harness to the reel fluorescent harness.
4. Disconnect the 2-pin molex connector that connects the ballast harness to the upper cabinet harness.

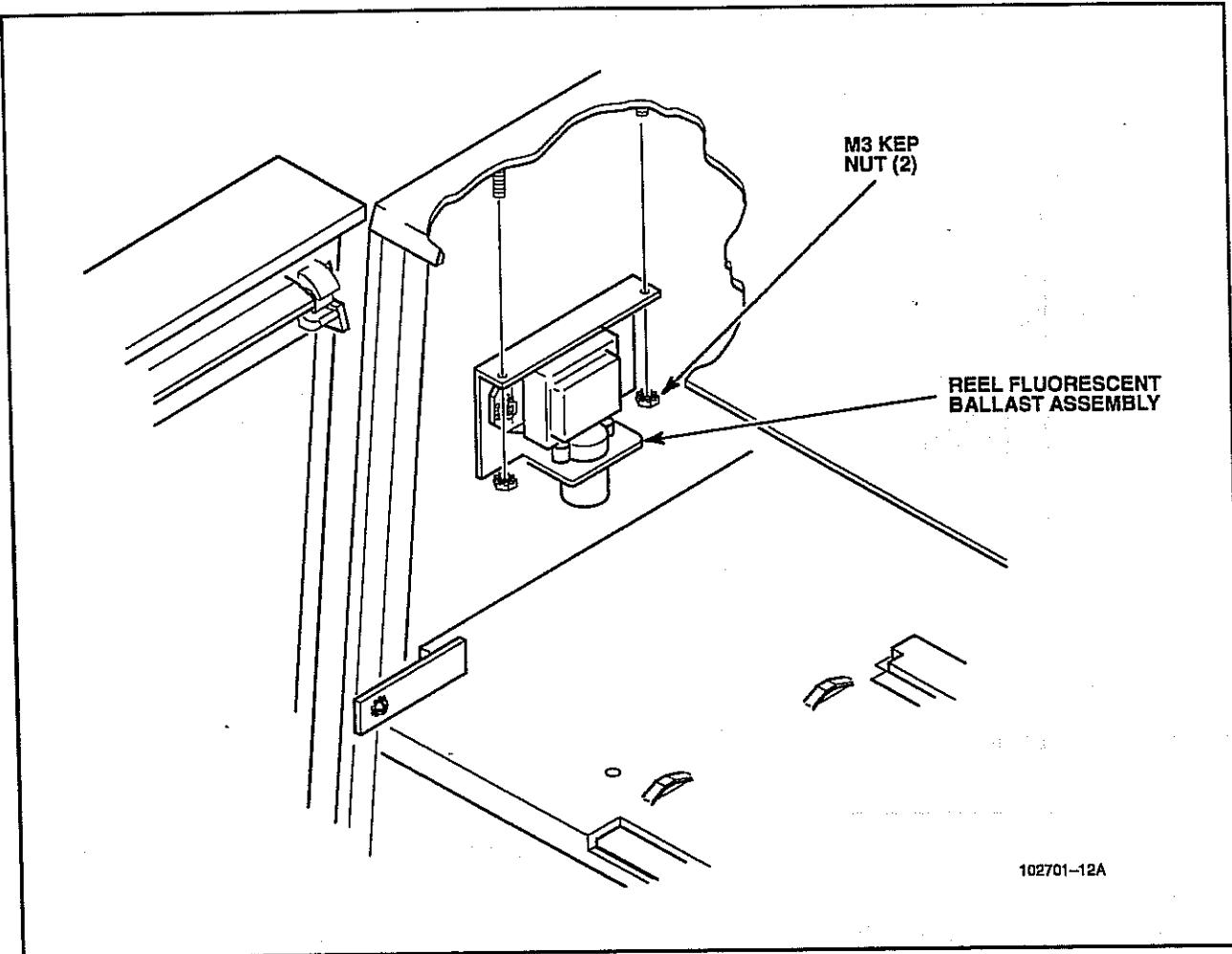


Figure 5-8. Reel Ballast Removal.

5. Hold the ballast in place and remove two M3 Kep nuts that mount the ballast chassis to the top of the cabinet liner.

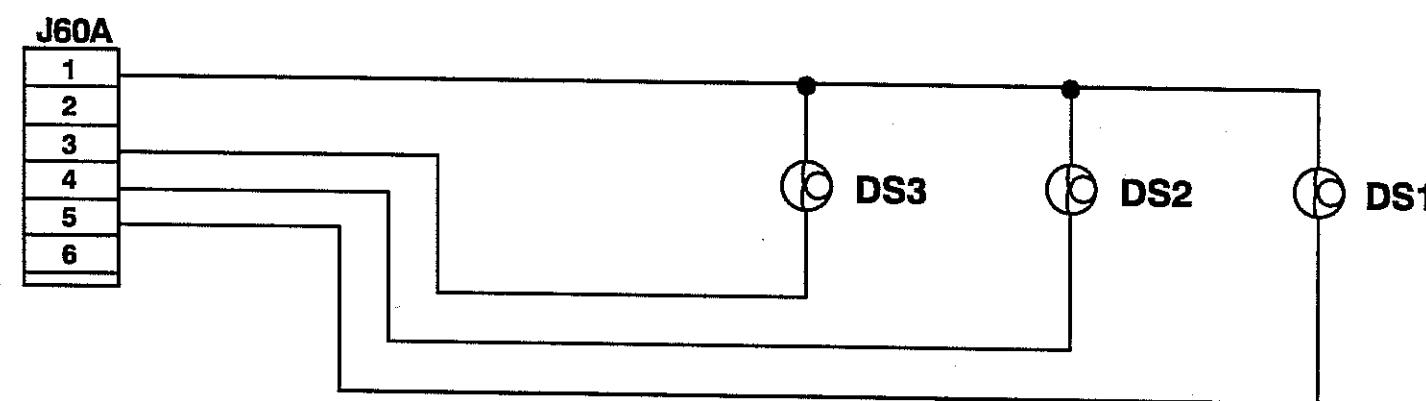
Reel Fluorescent Ballast Installation

To install the reel fluorescent ballast to the top of the cabinet liner, see Figure 5-13 and proceed as follows.

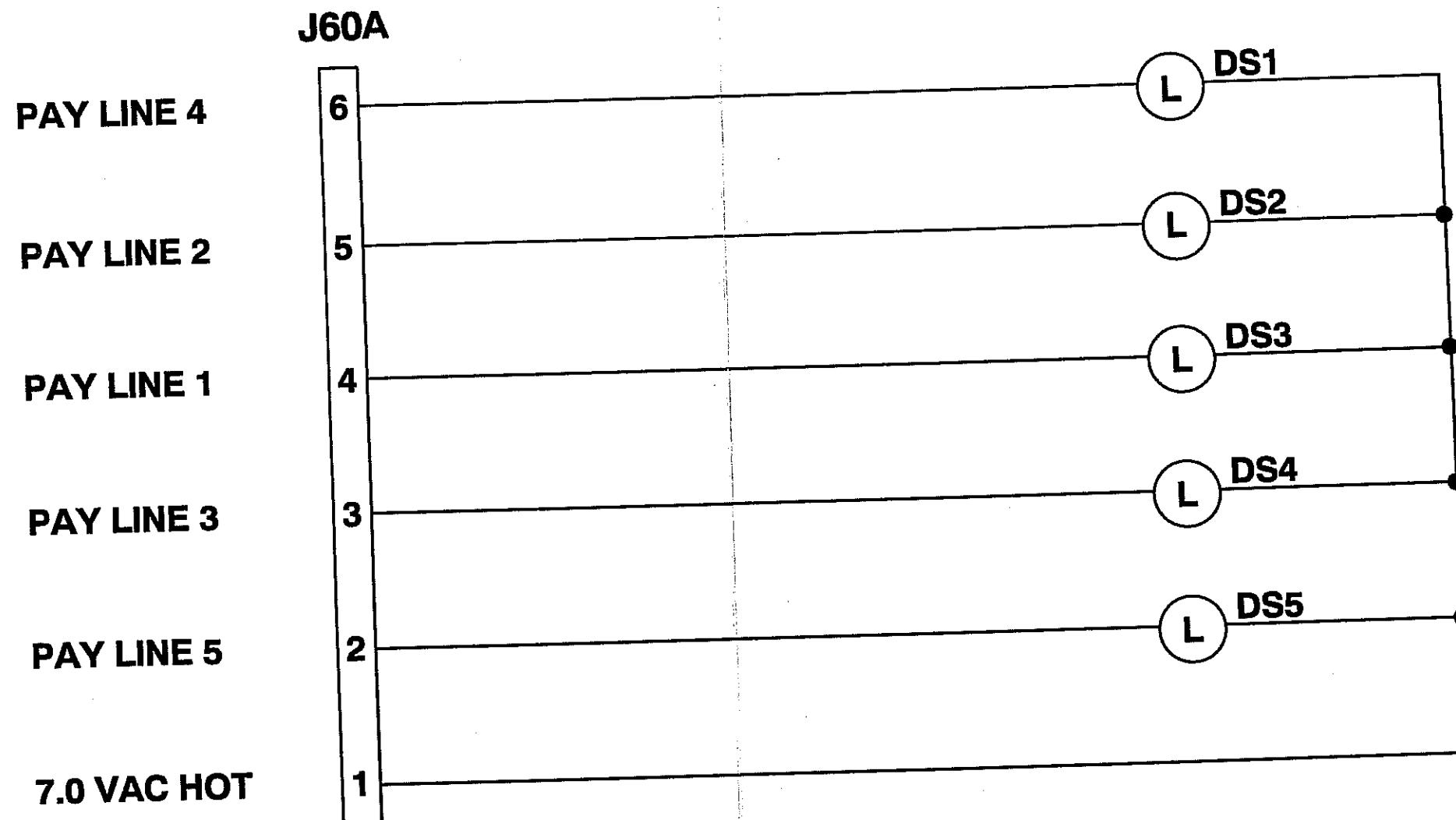
1. Place the ballast over the two cabinet-top mounting posts with the back of the ballast chassis against the upper-left cabinet wall.

2. Fasten the ballast to the top of the cabinet with two M3 Kep nuts.
3. Connect the 2-pin ballast harness to the 2-pin upper cabinet harness.
4. Connect the 4-pin ballast harness to the 4-pin reel fluorescent harness.
5. Install the stepper reel mechanism(s). (Section 5.9)
6. Turn the machine power on; close and lock the front door.

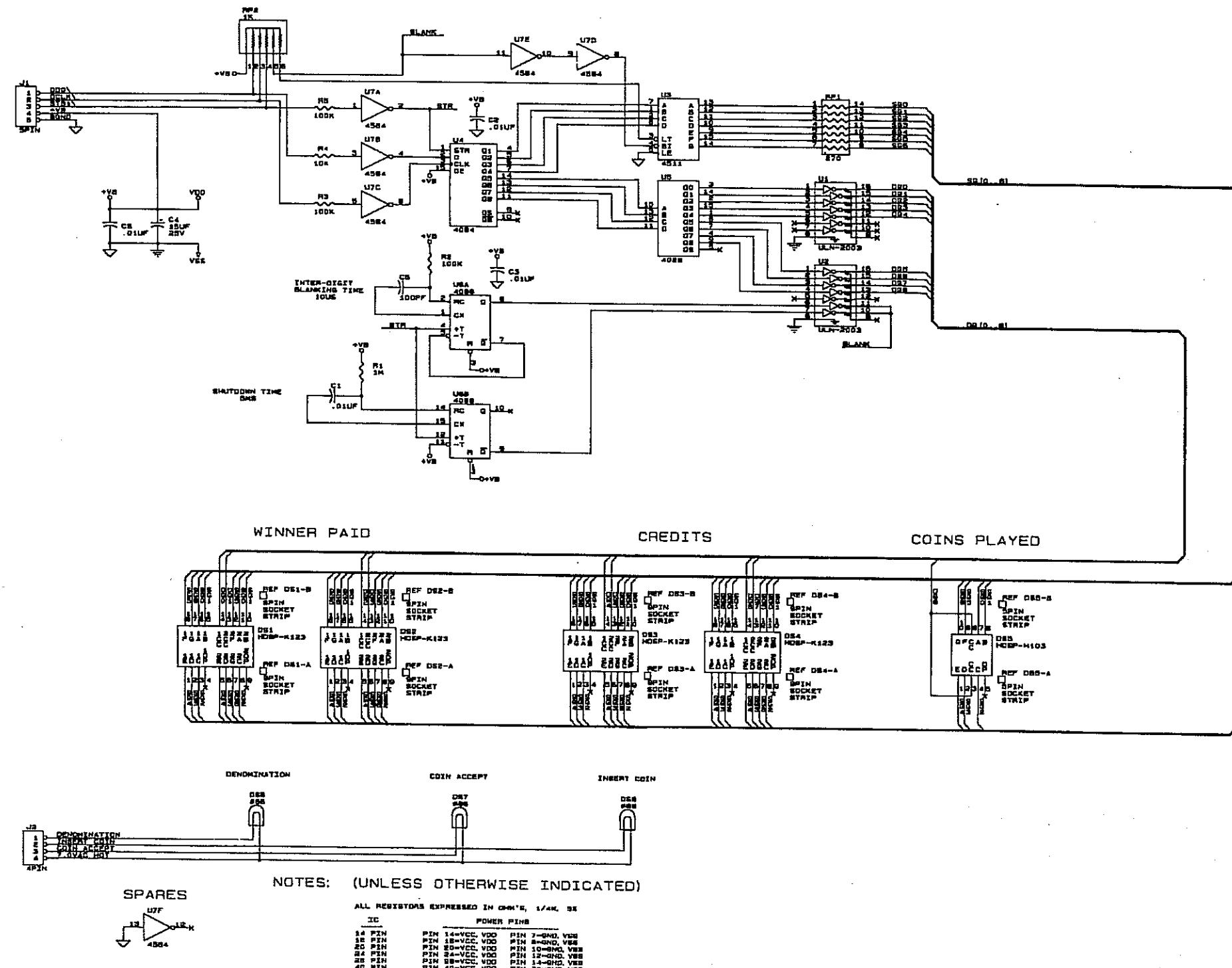
**3-LAMP DISPLAY BOARD SCHEMATIC
751-124-10 REV A**



5-LAMP DISPLAY BOARD SCHEMATIC
751-080-10 REV A



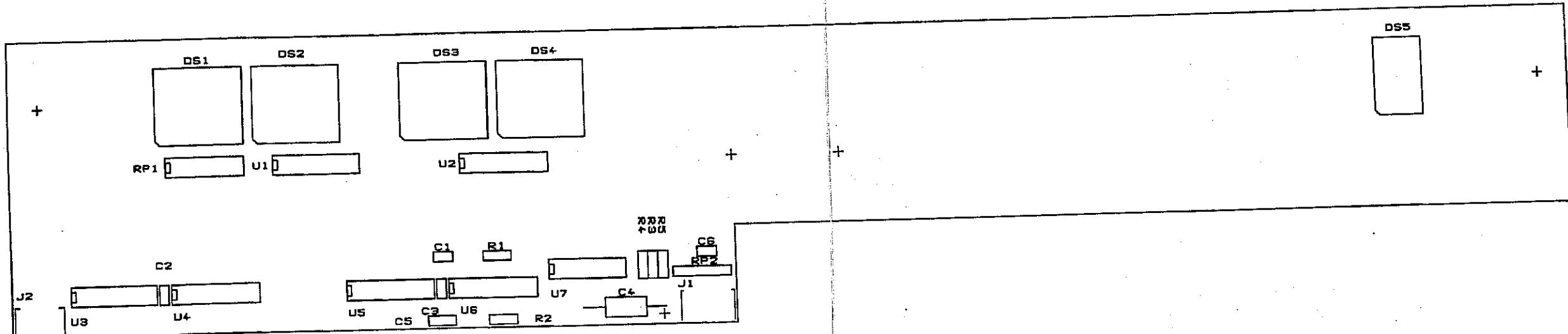
**GAME DISPLAY BOARD SCHEMATIC
751-156-10 REV A**



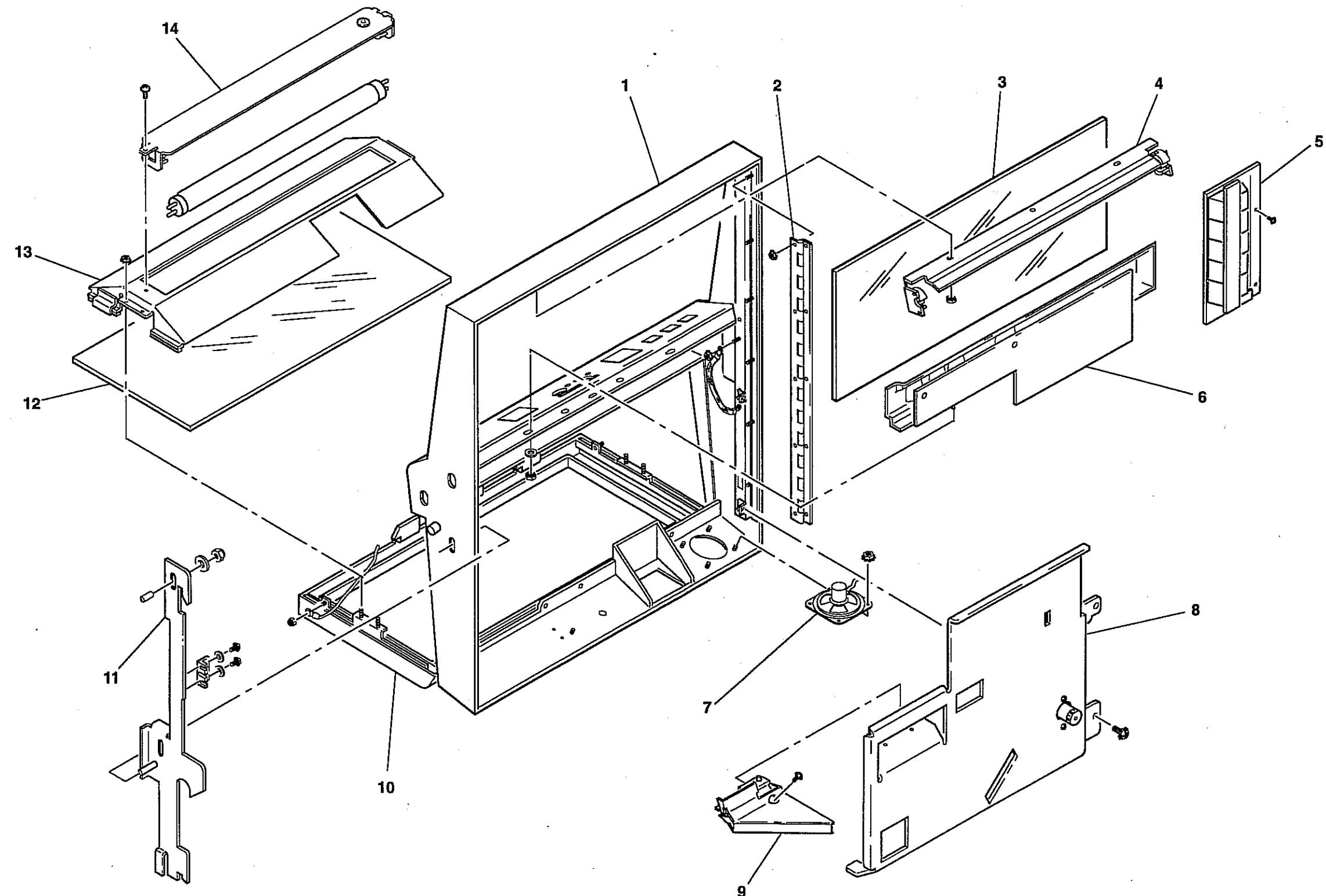
Components & Assemblies

COIN OPTIC ENCODER BOARD
751-156-00

Component	Description	Part Number
BD,PC,DSPL,GME,HOR,DWG	BD, PC, DSPL, GME, HOR, S+, I/BA,, DWG	751-156-50
BD,PC,DSPL,GME,HOR,SCH	BD, PC, DSPL, GME, HOR, S+, I/BA, SCH	751-156-10
C1,2,3,6	CA CER AX .01UF 50V C410	152-077-91
C4	CAP ELCTR AX 15UF 25V	157-007-90
C5	CAP CER AX 100PF 50V C410	152-075-91
DS1-A,DS1-B,DS2-A,DS2-B	SOCKET, STRIP, ELEVATED. 430, 9 PIN	129-048-90
DS1,2,3,4	OPTO, DSPL, 7SEG, .56, DUAL, ALGAAS	372-013-90
DS5	OPTO, DSPL, 7SEG, .56, SGLD, ALGAAS	372-012-90
DS5-A,DS5-B	SOCKET, STRIP, ELEVATED. 430, 5 PIN	129-049-90
DS6,7,8	LAMP T-1 3/4 6.3V WEDGE 86	193-023-90
J1	CONN, HDR, 5 PIN RTA, SHROUD SL	211-031-90
J2	CONN, HDR, 4 PIN, RTA SHROUD SL	211-053-90
REF DS6,7,8	SOCKET, LAMP T-1 3/4 WEDGE BASE	120-043-90
RP1	RESIST. NTWK. 270-7 14P DIP	478-028-90
RP2	RESIST. NTWK. 1K-5 6P SIP	478-064-90
R1	RESIST. CF 1MEG OHM .25W T/R	474-013-91
R2,3,5	RESIST. CF 100K OHM .25W T/R	474-010-91
R4	RESIST. CF 10K OHM .25W T/R	474-026-91
U1,2	IC DRVR DARL 7-OUT ULN2003	320-132-90
U3	IC DECDR/DRV BCD/7-SEG 4511B	320-109-90
U4	IC REGSR SHFT/STOR 4094B	320-108-90
U5	IC DECDR BCD/DECML 4028B	320-003-90
U6	IC MULTVBR DUAL MONO 4098B	320-140-90
U7	IC HEX SCHMITT TRIG CD40106	320-038-90



MAIN DOOR



Components & Assemblies

MAIN DOOR

<u>Fig. No.</u>	<u>Part Number</u>	<u>Description</u>	<u>Qty.</u>
1 ASSY	712-085-00 710-139-00 824-112-00 — — — — — 2	DOOR - MAIN, IMB B/A, S+ DOOR ASSEMBLY - NEUTER, CHROME, S+ IBA INSTRUCTIONAL - IGT CHROME PLATING SPEC. CABLE, GND 5/16 BRAID ENCODER, DOOR OPEN EMITTER PLAQUE - B/A, S+ BEZEL - B/A, ENTRY DOOR HINGE, S-SLOT	1 1 1 1 1 1 1 1
3 ASSY	892-098-00 442-142-00 442-140-00 — 4 442-142-90 5 196-211-90 ASSY 196-339-00 — 196-338-00 6 196-231-00 7 130-014-90 — 688-257-00	GLASS, UNSCREENED, STD S+, IBA CLAMP ASSEMBLY - REEL GLASS CLAMP - REEL GLASS, MGALTG. CLAMP ASSEMBLY - REEL GLASS, WIDE BODY BARRIER ASSEMBLY - PAYLINE, WIDE BODY BARRIER ASSEMBLY - B/A PLAQUE BARRIER - B/A, LIGHT BARRIER ASSEMBLY - NUM. DISPLAY SPEAKER, 8 OHM, 1W, 2 INCH COVER - SPEAKER	1 1 1 1 1 1 1 1 1 1 1 1 1 1
8 9 — 10 11 12	655-030-00 573-299-00 581-254-00 712-094-00 280-078-01 639-079-00 — 449-099-00 639-078-00 676-729-00	PANEL ASSEMBLY - REJ/DRP, 60HZ CHUTE - COIN IN, S-PLUS GUIDE - COIN OUT, CHROME, IBA S+ DOOR - BELLY, CHROME PLT HINGE - BELLY DOOR, NICKEL BAR LOCKING BELLY DOOR PIN, RELEASE, BELLY DOOR BAR - LOCKING, MAIN DOOR IBA S+ GLASS, B - DOOR, UNSCREENED	1 1 1 1 1 1 1 1 1 1
13 KIT ASSY	655-031-00 915-001-01 195-043-01 — — 14 — ASSY ASSY	PANEL ASSEMBLY - LOWER FLUORESCENT KIT - FLUORESCENT, 50HZ, 60HZ BALLAST/STARTER ASSEMBLY - 50HZ SOCKET STARTER BALLAST, F14T8/12 50HZ PANEL LOWER FLUORESCENT SOCKET - FLUORESCENT, MED B1-PIN LIGHT ASSEMBLY - UNIVERSAL, 60HZ, WIDE BODY LIGHT ASSEMBLY - FLUORESCENT, S+/P.C.	1 1 1 1 1 1 1 1 1

5.3 Coin-In Handling

The coin-in assembly is designed to electronically accept coins of the proper denomination and return unacceptable or invalid coins.

The coin-in assembly discussed in this section utilizes a Coin Mech coin comparitor for checking coin validity and re-routing rejected coins to the coin tray (see Figure 5-9, Coin-In Assembly).

Periodic maintenance of the coin-in assembly is recommended to ensure optimum performance.

5.3.1 Electronic Coin Comparitor

The Coin Mechanisms® coin comparitor is an electronic coin tester that analyzes the material content of an incoming coin, compares it to a sample coin and either accepts or rejects the coin. The coin comparitor uses a sample coin, placed within a magnetic field on the acceptor, to create a specific signal characteristic for comparison. The signal generated from the sample coin is important in distinguishing coins of similar material.

As an incoming coin or token passes through a separate magnetic field inside the coin comparitor, the signal generated from the incoming coin is electronically compared to the signal generated by the sample coin. If the two signals are alike, an internal lockout solenoid energizes and allows the coin to pass through the accept channel. If the two signals are different, the lockout solenoid remains inactive and diverts the coin to the reject channel.

Note

The coin lockout solenoid requires a removable plastic spacer for use with small denomination acceptors.

The electronic coin comparitor also features a +6V (reference to ground) output signal. The internal sensing circuits trigger and send the output signal upon acceptance of a good or valid coin.

Coin Size Specifications

Model CC-16C (Small Coins)

Coin diameter range: .700" through 1.295"

Maximum coin thickness: .115"

Note

For coin diameters of 1.295" through 1.950", a plug spacer is recommended.

Model CC-33 (Large Coins)

Coin diameter range: 1.296" to 1.520"

Maximum coin thickness: .125"

Model CC-37(Large Coins)

Coin diameter range: 1.521" to 1.950"

Maximum coin thickness: .145"

5.3.2 Coin-In Assembly Removal

To remove the coin-in assembly from the machine for inspection, cleaning, adjustment or repair, see Figures 5-9 and 5-12 proceed as follows.

Tool Required

- #2 Phillips screwdriver

Procedure

1. Open the door and turn the power off.
2. Remove the coin comparitor by disconnecting the 3-wire harness from the side of the comparitor, then pulling up on the corners to release the mounting tabs from the comparitor clips.
3. Hold the coin chassis in place and remove the two 6-32 Sems screws that secure the coin chassis to the coin chassis mounting plate (see Figure 5-9, Coin-In Assembly with Electronic Comparitor).
4. Disconnect the 12-pin coin chassis harness from the main door harness and remove the coin chassis from the machine.

Note

Refer to Section 5.3.6, Disassembly & Assembly for information about removing other coin channel components, such as the entry assembly.

5.3.3 Inspection

Refer to Figures 5-9 and 5-11, and proceed as follows.

Electronic Coin Comparitor

1. Inspect the coin channel for foreign deposits, film or dust.
2. Check the anti-stringing device on the bottom, back side of the coin comparitor for free movement.

3. Check the lockout lever on the back of the coin comparitor for smooth operation. The lever is located just above the anti-stringing device.
4. Check the dampner lever (counter weight) for free movement. If the dampner lever sticks, the machine will not accept coins.
5. Check the sliding sensor coil for unobstructed spring action.

Coin Encoder

1. Refer to Figure 5-10, Optic Coin Encoder.

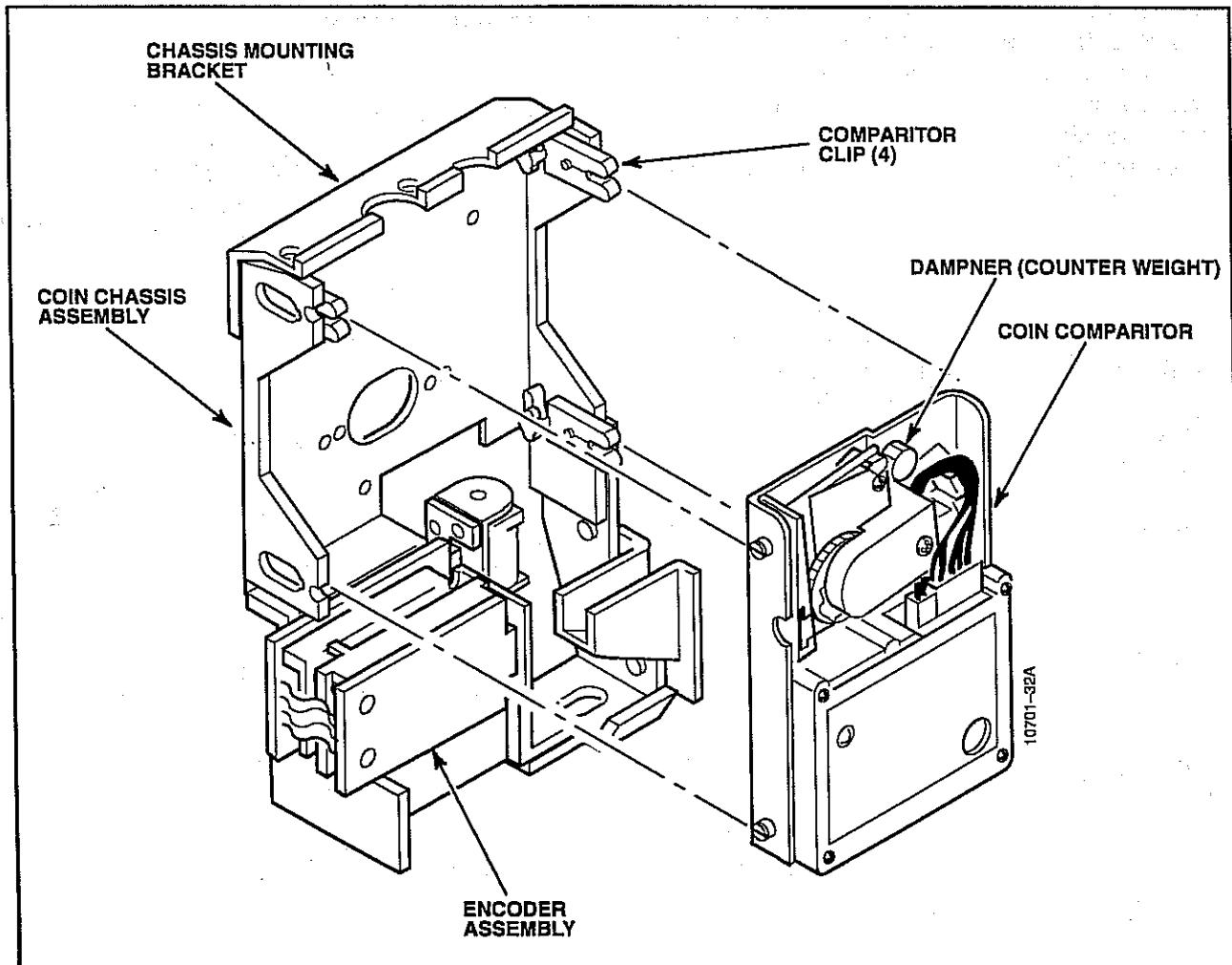


Figure 5-9. Coin-In Assembly with Electronic Comparitor.

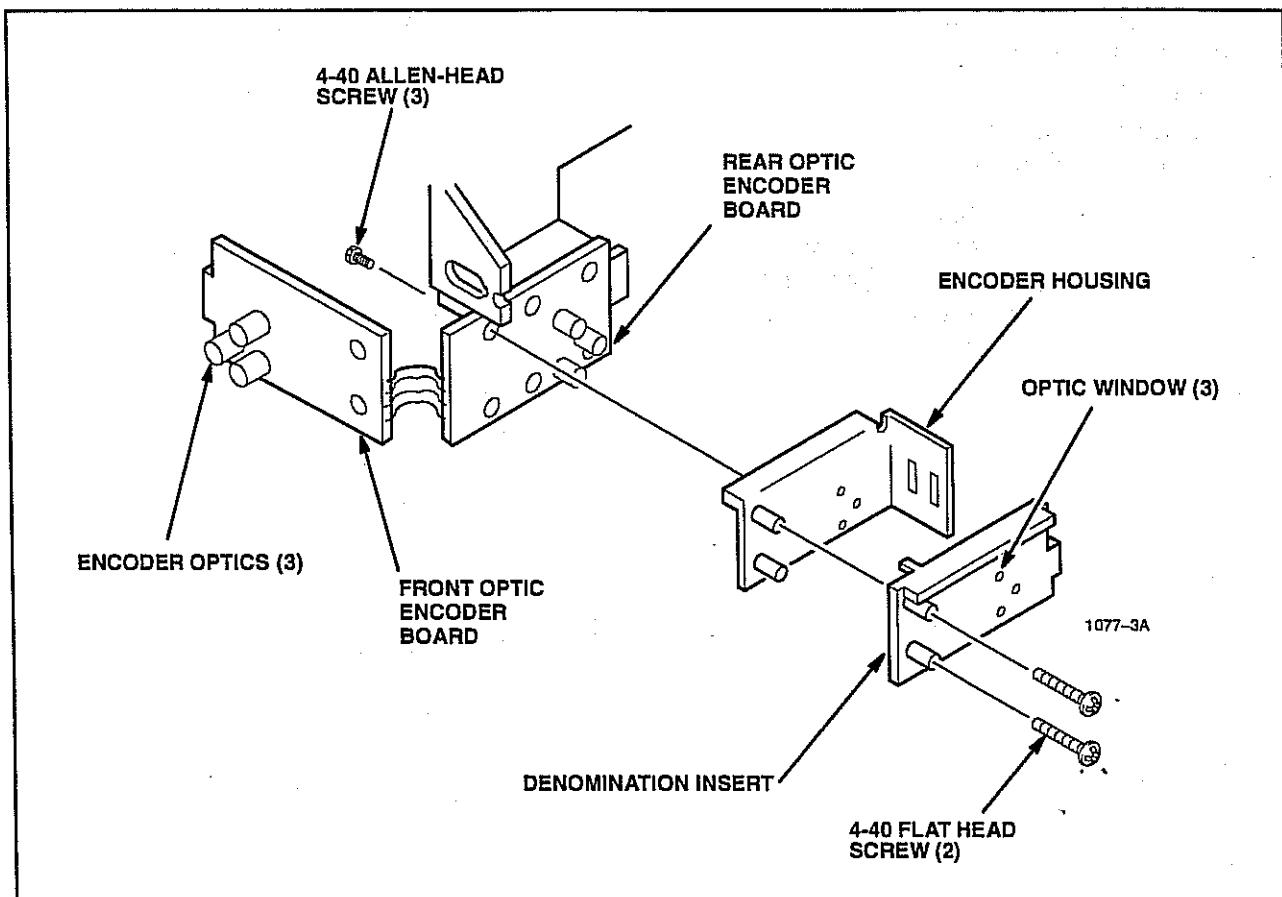


Figure 5-10. Optic Coin Encoder.

Note

The two circuit boards that make up the coin encoder are connected by a delicate ribbon cable. Take care to avoid bending the cable any more than necessary.

2. Inspect the optics on both PC boards for clean surfaces.
3. Inspect the encoder housing and the plastic denomination insert. Check for clean surfaces, making sure that their optic windows are free from dirt or other foreign material.
4. Inspect the ribbon cable connecting the front and rear encoder boards for cracks or tears.

5.3.4 Cleaning

For light cleaning, dust with compressed air (not to exceed 60 psi).

For thorough cleaning, follow the steps below.

CAUTION

Always wear eye protection when working with pressurized air or cleaning solvents.

1. Remove the coin comparitor from the coin-in assembly (refer to Section 5.3.2).
2. Clean the outside of the comparitor using a stiff short-haired brush and isopropyl alcohol.
3. Remove the sample coin by sliding the sample coin holder to the right and tip-

- ping the coin comparitor forward to allow the coin to fall out.
4. Refer to Figure 5-11 to remove the extension spring on the back of the comparitor from the metal bracket on the sensor coil.
 5. Hold the bracket in place and remove the retaining screw on top of the sensor coil. Lift the top of the sensor coil assembly and clean the electro-magnetic sensors using a cotton swab soaked in alcohol.
 6. Replace the top of the assembly and the retaining screw. Re-attach the extension spring to the bracket on the coil.
 7. Clean the damper lever using spray-on contact cleaner, or a pipe cleaner and isopropyl alcohol.
 8. Replace the sample coin.
 9. Install the coin comparitor in the coin-in assembly.

Coin Encoder

See Figure 5-10, Optic Coin Encoder.

1. Clean the surface of the optics on both PC boards, the encoder housing and the denomination insert, using a soft cloth or cotton swab and isopropyl alcohol.
2. Clean the optic windows of the encoder housing and denomination insert, using a pipe cleaner or a stiff short-haired brush.

5.3.5 Adjustments

Each coin comparitor is factory adjusted for excellent discrimination against slugs. However, finer adjustment of the coin comparitor may be necessary to detect certain high-quality slugs and ensure acceptance of valid coins.

1. Adjust the fine-tuning potentiometer in the lower, right corner of the comparitor clockwise as far as possible, using a #1 flat-blade screwdriver.
2. Replace the coin comparitor (if removed) and insert a coin of the correct denomination to ensure accurate acceptance. If the coin comparitor rejects a valid coin, slight-

ly adjust the fine-tuning potentiometer counterclockwise until the valid coin passes.

Note

Turning the fine-tuning potentiometer fully counterclockwise can cause the comparitor to "chatter" and/or accept slugs.

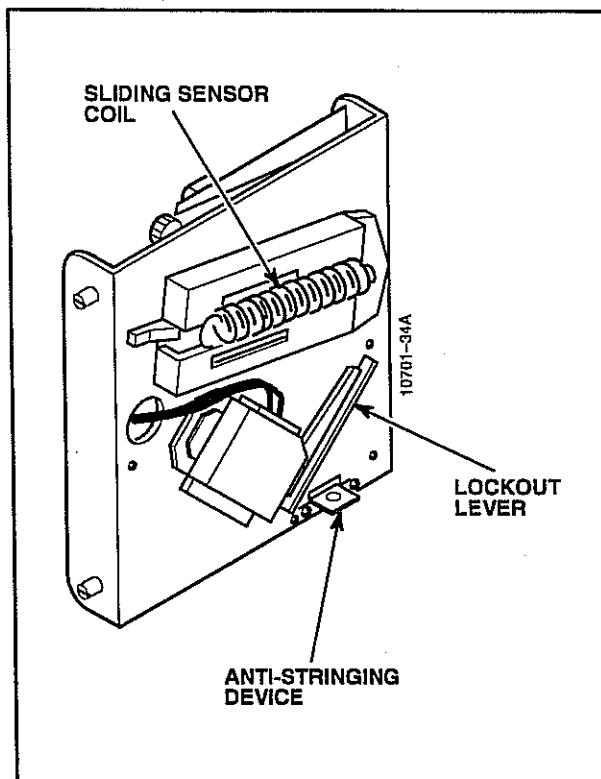


Figure 5-11. Comparitor – Back View.

5.3.6 Disassembly & Assembly

The following procedures describe how to completely disassemble and assemble the coin-in assembly, for repair or to make a denomination change. See Figure 5-9, Coin-In Assembly with Electronic Comparitor, and proceed as follows.

Denomination Change

To remove the components of the coin channel for denomination change, refer to Table 5-1, Denomination Change and proceed as follows.

Tools Required

- #2 Phillips screwdriver
- #1 Phillips screwdriver
- 3/32" Allen/socket wrench
- 7/64" Allen/socket wrench
- 5/16" open/box-end wrench or nutdriver

Coin Comparitor

The electronic coin comparitor is a replaceable unit. IGT does not recommend disassembly of the coin comparitor.

Removal

1. Open the machine door and turn the power off.
2. Disconnect the 3-wire harness from the side of the coin comparitor.
3. Firmly grip the sides of the coin comparitor and pull up from the chassis to disengage the four comparitor clips.

Note

The orientation of the mechanism in the assembly (sample coin holder in front or in back) for reinstallation. The position depends on whether the machine is set up to accept small or large coins.

4. To remove the plastic comparitor clips, lightly push inward on the end of each clip and rotate the clip 1/4 turn (90 degrees). Remove the clip from the inside.

Installation

1. Install the four comparitor clips (if removed) from the inside of the coin chassis by inserting each clip into a clip slot and rotating the clip 1/4 turn (90 degrees) until the tab on the clip snaps into the notch on the chassis. Make certain that all clips are at the same height.
2. Position the coin comparitor face up (sample coin holder on top) for small coin han-

dling or face down (sample coin holder facing the coin chassis) for large coin handling. See that the four mounting tabs on the comparitor are against the four comparitor clips. Press down firmly on each corner to engage the clips.

CAUTION

Do not press hard on the center of the comparitor, as this may cause damage to the mechanism's electronics.

3. Connect the coin comparitor harness to the side of the mechanism.

Optic Coin Encoder

The components that make up the optic coin encoder include the front and rear optic encoder boards, the denomination insert, and the encoder housing. See Figure 5-10, Optic Coin Encoder and proceed as follows.

Tools Required

- #1 Phillips screwdriver
- 3/32" Allen/socket wrench

Disassembly

1. Disconnect the harness from the front optic encoder board.
2. Remove two 4-40 flat-head screws that fasten the encoder board to the encoder housing using a #1 Phillips screwdriver.
3. Carefully lift the encoder board away from the encoder housing and remove the black plastic denomination insert.
4. Remove three 4-40 Allen-head screws that fasten the encoder housing and the rear optic encoder board to the coin chassis using a 3/32" Allen wrench.

Note

The two circuit boards that make up the coin encoder are connected by a delicate ribbon cable. Take care to avoid bending the cable any more than necessary.

Table 5-1
Denomination Change

From	Electronic Comparitor			
	Large Coin		Small Coin	
To	Large Coin	Small Coin	Large Coin	Small Coin
Coin Guide	—	N	A	N
Coin Entry Base	—	C	C	—
Coin Entry Head	C	C	C	C
Coin Comparitor	—	C	C	—
Comparitor Clips	—	M	M	—
Encoder Insert	C	C	C	C
Encoder Housing	—	M	M	—
Lockout Solenoid	N	N	N	N
Lockout Spacer	N	N	N	N
Coin Acceptor	N	N	N	N

A – ADD C – CHANGE M – MOVE N – NOT NEEDED DASH – NO CHANGE

Assembly

1. Align the mounting holes on the rear encoder board (the one without a switch) with those on the coin chassis.
2. Position the encoder housing on top of the encoder board so that its slotted side faces outward next to the plastic coin-reject chute.
3. Fasten the encoder board and the encoder housing to the coin chassis with three 4-40 Allen-head screws. Tighten securely using a 3/32" Allen wrench.
4. Place the denomination insert on the encoder housing, channel side down, and fit the plastic tab of the insert into the lower slot in the encoder housing.

5. Insert the tab on the front encoder board into the upper slot into the encoder housing and align the two mounting holes with those of the denomination insert and the encoder housing.
6. Fasten the front encoder board and the denomination insert to the encoder housing with two 4-40 flat-head screws. Tighten securely using a #1 Phillips screwdriver.

Note

Depending on the denomination size, this assembly can mount one of two ways.

7. Install the coin-in assembly in the machine and connect all appropriate harnesses (refer to Section 5.3.6).

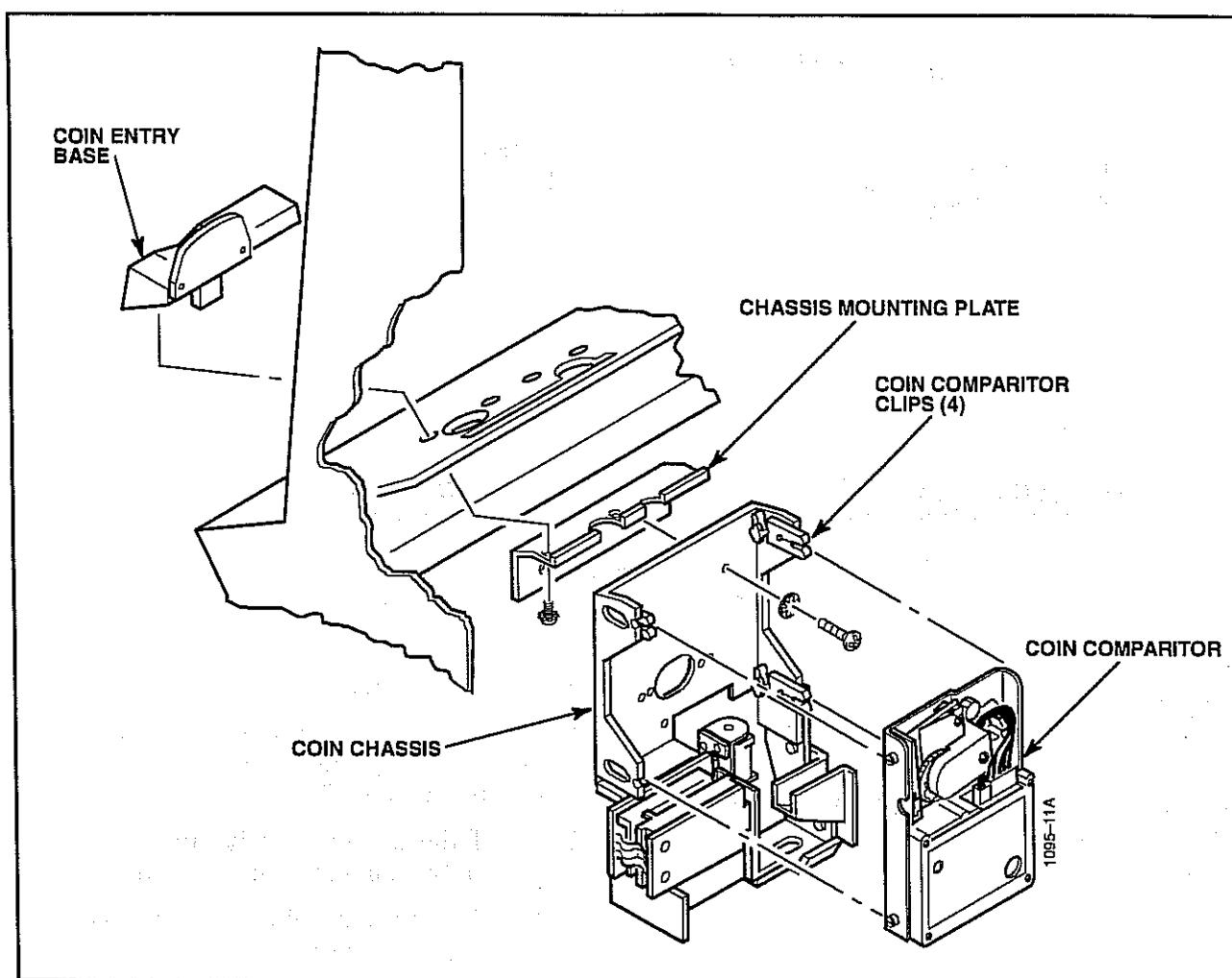


Figure 5-12. Coin Channel Position.

Coin Reject Chute

The coin reject chute attaches to the coin chassis and channels incorrect or invalid coins to the coin tray. See Figure 5-9, Coin-In Assembly with Electronic Comparitor, and proceed as follows to remove or install the coin reject chute.

Tool Required

- #2 Phillips screwdriver

Removal

1. Remove the coin-in assembly from the machine and place it on a flat surface.
2. Remove the two 6-32 machine screws and #6 flat washers that fasten the black, plas-

tic coin reject chute to the coin chassis and remove the chute.

Installation

1. Position the coin reject chute on the coin chassis so that the two holes in the chute flange align with the mounting holes in the chassis.
2. Fasten the chute in place with two 6-32 machine screws and #6 flat washers, and tighten securely.

Coin Entry & Chassis Mounting Plate

The coin entry consists of a coin entry base and a coin head. Coin entry bases are available in two

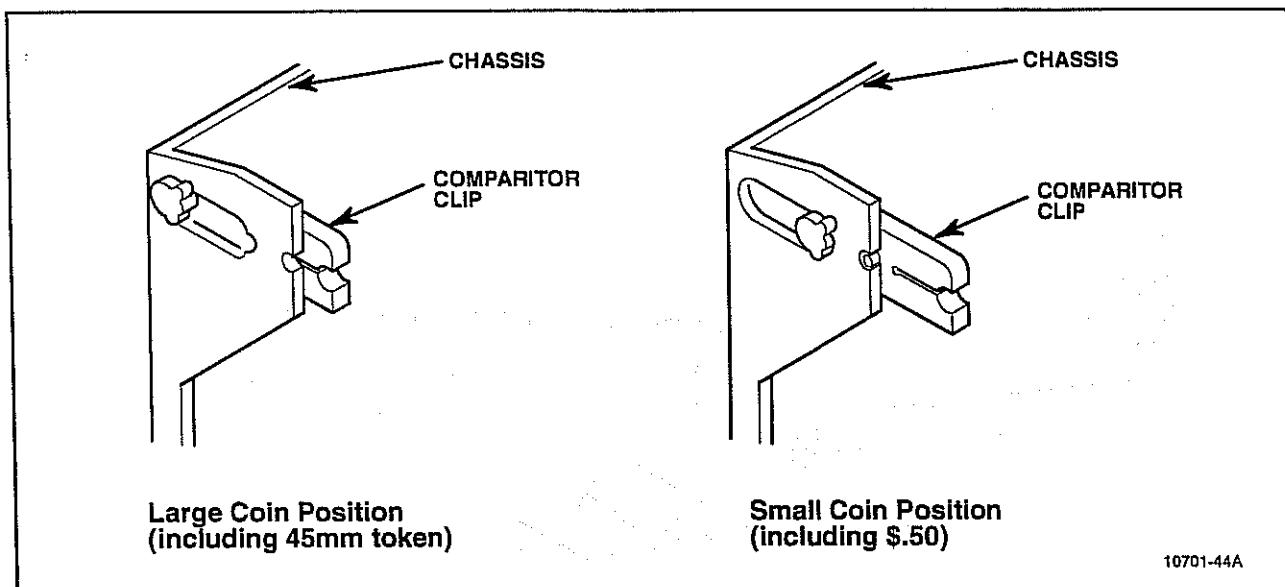


Figure 5-13. Comparitor Clip Positions.

sizes to accommodate large or small coins, and a different coin head is available for each size.

The chassis mounting plate is mounted to the coin guide on the coin denomination. See Figures 5-13 and 5-14 for coin channel position and comparitor clip positions.

Tools Required

- #2 Phillips screwdriver
- 5/64" Allen wrench

Removal & Disassembly

1. Open the front door and turn the machine **power off**. Locate the coin acceptor mechanism.
2. Remove the coin comparitor/acceptor and coin chassis.
3. Remove the two 6-32 machine screws that fasten the coin chassis mounting plate, coin guide (large coin handling only) and the coin entry to the machine door.
4. Remove the coin entry assembly from the door and place it on a flat surface.
5. Remove the two 3-48 Allen-head screws and 3-48 Esna nuts that fasten the coin entry base, using a 5/64" Allen wrench.

Assembly & Installation

1. Fasten the coin head to the coin head base with two 3-48 Allen-head screws. Tighten securely using a 5/64" Allen wrench.
2. Install the coin entry, coin guide (large coin only), coin-channel mounting plate.
3. Position the coin guide (large coin only) and the coin chassis mounting plate on the inside of the machine door so that their mounting holes line up with the holes in the door.
4. Install the two 6-32 machine screws that fasten all three components to the underside of the door. The coin entry and the coin chassis mounting plate to the right for small denomination coins when viewed from inside the door.
5. Adjust the coin comparitor clips located on the sides of the coin chassis. Push the end of the clip slightly inward and rotate the clip 1/4 turn (90 degrees) to unlock. Move each clip forward or backward for position and rotate each clip again 1/4 turn (90 degrees) to lock into place. (See Figure 5-13, Comparitor Clip Positions.)

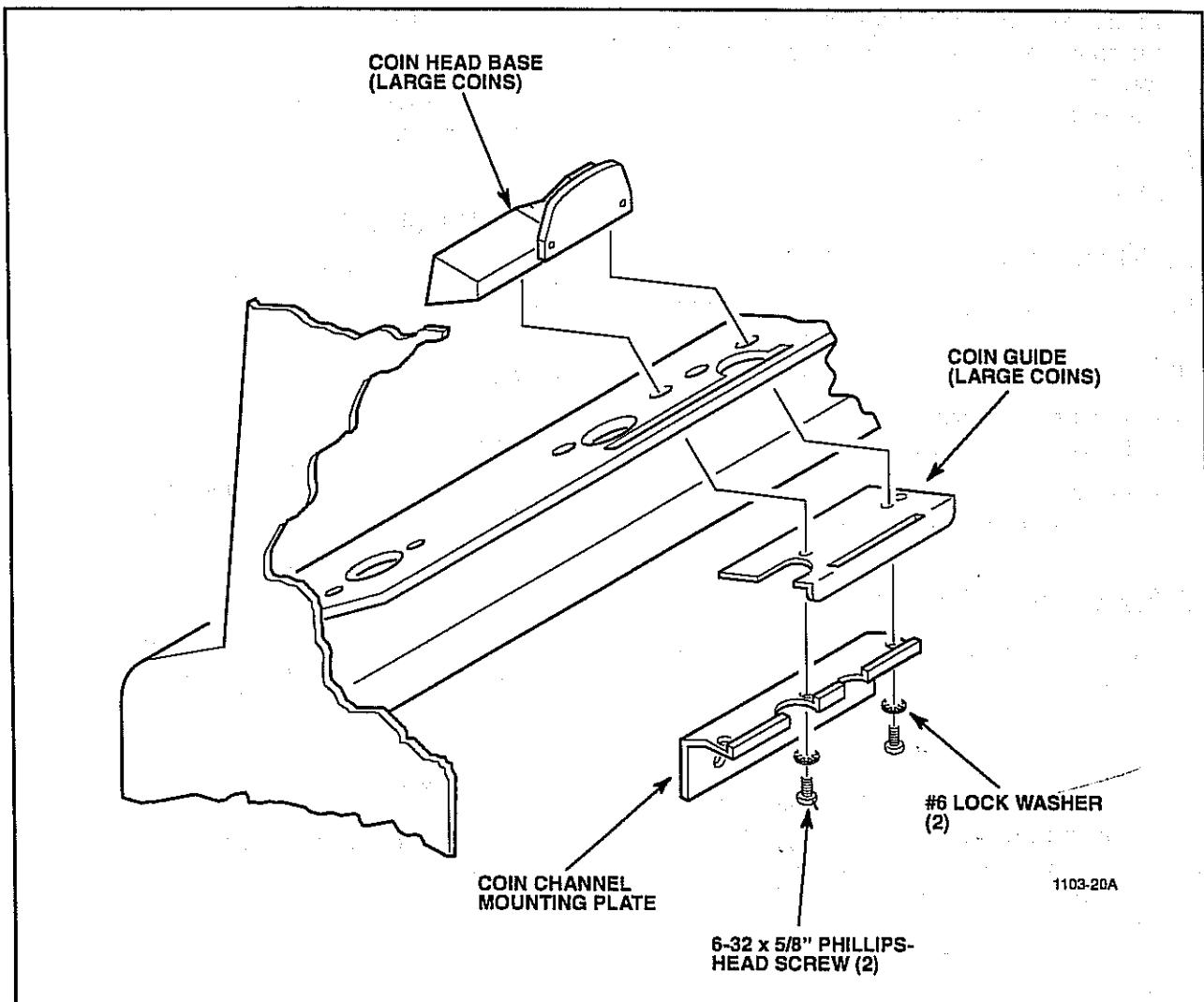


Figure 5-14. Chassis Mounting Position – Large Denomination.

6. Install the coin comparitor. Connect the harness to the comparitor and install the sample coin.
7. Make certain all harnesses are properly routed and secured away from all moving parts.
8. Turn the machine **power on** and refer to the input and output test information in Section 5.3.8, for functional verification.

5.3.7 Coin-In Installation

1. If the coin entry base was removed, re-install it according to the information in

- the preceding coin entry section. Verify that the optic coin encoder is correctly installed on the coin chassis (see Figure 5-12).
2. Connect the optic coin encoder harness from the machine door to its connector on the coin-in assembly.
3. Position the coin chassis on the inside of the door so that the two mounting holes in the chassis line up with those in the coin chassis mounting plate. Attach the chassis to the mounting plate with two 6-32 Sems screws and tighten securely.

4. Install the coin comparitor according to the information in Section 5.3.6, Coin Comparitor; and connect the 3-wire harness to the side of the comparitor.
5. Turn the machine **power on**; close and lock the door.

5.3.8 Functional Verification

Refer to Section 4, Game Software, for information about using the machines self test mode for functional verification:

- **Inputs** – to verify correct operation of the optic coin encoder.
- **Outputs** – to verify correct operation of the coin lockout assembly.

5.3.9 Troubleshooting

1. Consult the troubleshooting flow chart in Figure 5-15, Resolving Coin-In Tilts.
2. Check all wires and connectors, refer to Table 5-2.
3. Perform the cleaning, maintenance and adjustment procedures detailed in Section 2, Machine Installation. Replace any hardware that may be worn, such as Esna nuts that have nylon inserts.
4. Consult the troubleshooting procedures in Section 2, Machine Installation.
5. Contact IGT Customer Service for further assistance (refer to Section 2).

Table 5-2
Coin Comparitor Wire Colors

Wire Color	Description
Violet	+6 VDC output signal
Yellow	24 VDC
Black	Ground

5.3.10 Coin-In Tilts

Follow the procedures listed below for each coin-in tilt message. The tilt messages are discussed in the same order as shown in Figure 5-15, Resolving Coin-In Tilts or Jams.

CALL ATTENDANT

This message may appear with coin-in tilts. If the video monitor displays the message CALL ATTENDANT:

1. Record the statistical data, if possible. Refer to Section 4, Game Software, for information on statistical data mode.
2. Open the front door to display the specific tilt message associated with this screen. Refer to Section 4, Game Software, for that tilt message.
3. If the error condition persists or immediately occurs again, replace the processor board (refer to Section 5.8, Processor Board).

COIN-IN TIME OUT

A flow chart summarizing the procedures for correcting a coin-in tilt or jam is shown in Figure 5-15. Refer to the following list to resolve a coin-in time-out tilt.

Note

The term "coin acceptor" is used interchangeably in this section to refer to any type of coin acceptor mechanism.

1. In some situations, coin acceptors utilize a coin-return plunger on the coin entry base. Press the plunger (if present) to release the jammed coin(s).
2. Verify that the front door is closed securely and that the screen does not display a DOOR OPEN message.
3. Open the front door and verify that the coin acceptor is seated in all four comparitor clips and that the clips are at the same level.

Table 5-3
Coin-In Troubleshooting Chart

Symptom	Possible Cause	Solutions
Will not accept coins	1. Coin jam or tilt has occurred. 2. INSERT COIN is not displayed; game is not over. 3. 24 VAC fuse is blown. 4. Broken wire or bad connection. 5. Wrong sample coin in comparitor (Coin Mech only). 6. Faulty coin acceptor. 7. Faulty processor board. 8. Faulty mother board. 9. Door-open sensor inoperative.	1. Refer to Section 5.3.10 2. Complete the game. 3. Replace the fuse. 4. Check related wiring and connectors. 5. Install a sample coin of the correct denomination. 6. Replace the coin acceptor. 7. Replace the processor board. 8. Replace the mother board. 9. Align or replace the sensor.
Will not register coins deposited	1. Optics are obstructed. 2. Coin-in channel is misaligned. 3. Broken wire or bad connection. 4. Faulty coin acceptor. 5. Faulty processor board. 6. Faulty mother board. 7. Faulty coin-in optics.	1. Check for objects obstructing optics. 2. Align coin-in components correctly. 3. Check related wiring and connections. 4. Replace the coin acceptor. 5. Replace the processor board. 6. Replace the mother board. 7. Replace the coin-in optics.

4. Check the coin acceptor for blockage and clear any jammed coins in the coin channel assembly.
5. Check the wire harness connections on the coin acceptor and the lower module connector panel.
6. Verify correct operation using the input tests in the self test mode. Refer to Section 4, Game Software, for information about using the self test mode.
7. Do one of the following to reset the game software.
 - Turn and hold the reset key for 3 seconds and then release
 - Open and close the front door
 - Wait one minute for the tilt message to disappear from the screen
 - Push the Collect Winnings switch when credits exist on the credit meter

If the tilt quickly recurs, do one or more of the following.

- Replace the coin acceptor
- Replace the processor board

5.3.11 Sample Coin

The Coin-Mech electronic coin comparitor utilizes a sample coin, against which incoming coins are compared for validity. Figure 5-9 shows the location of the coin comparitor in the coin-in assembly.

Be sure the sample coin is the exact denomination or token shown on the configuration work sheet, the self test screen, and the display glass.

1. Remove the electronic coin comparitor from the coin-in assembly by gripping the sides of the comparitor and pulling it straight off the assembly, disengaging the four comparitor clips. Do not disconnect the harness from the side of the comparitor.

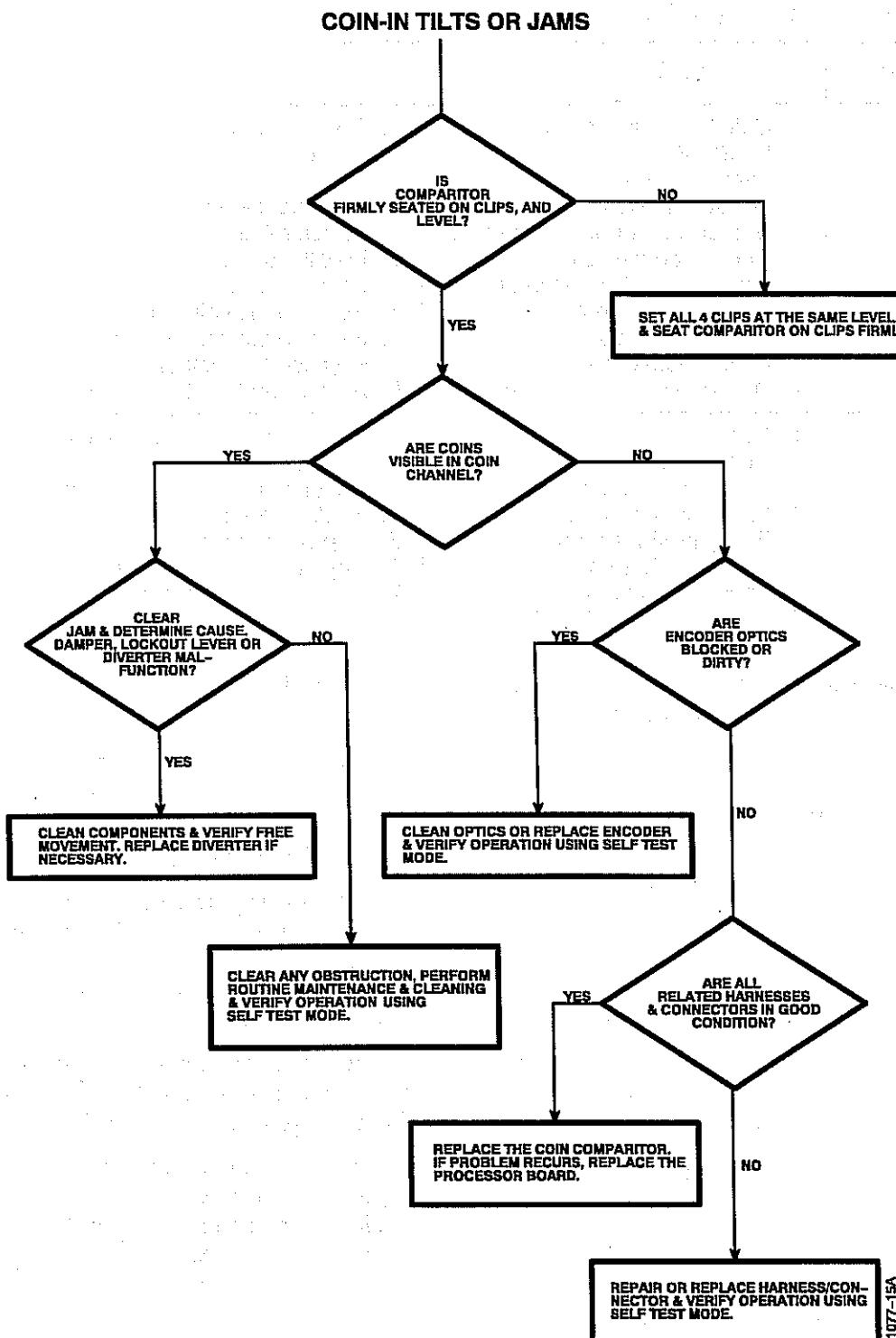


Figure 5-15. Resolving Coin-In Tilts.

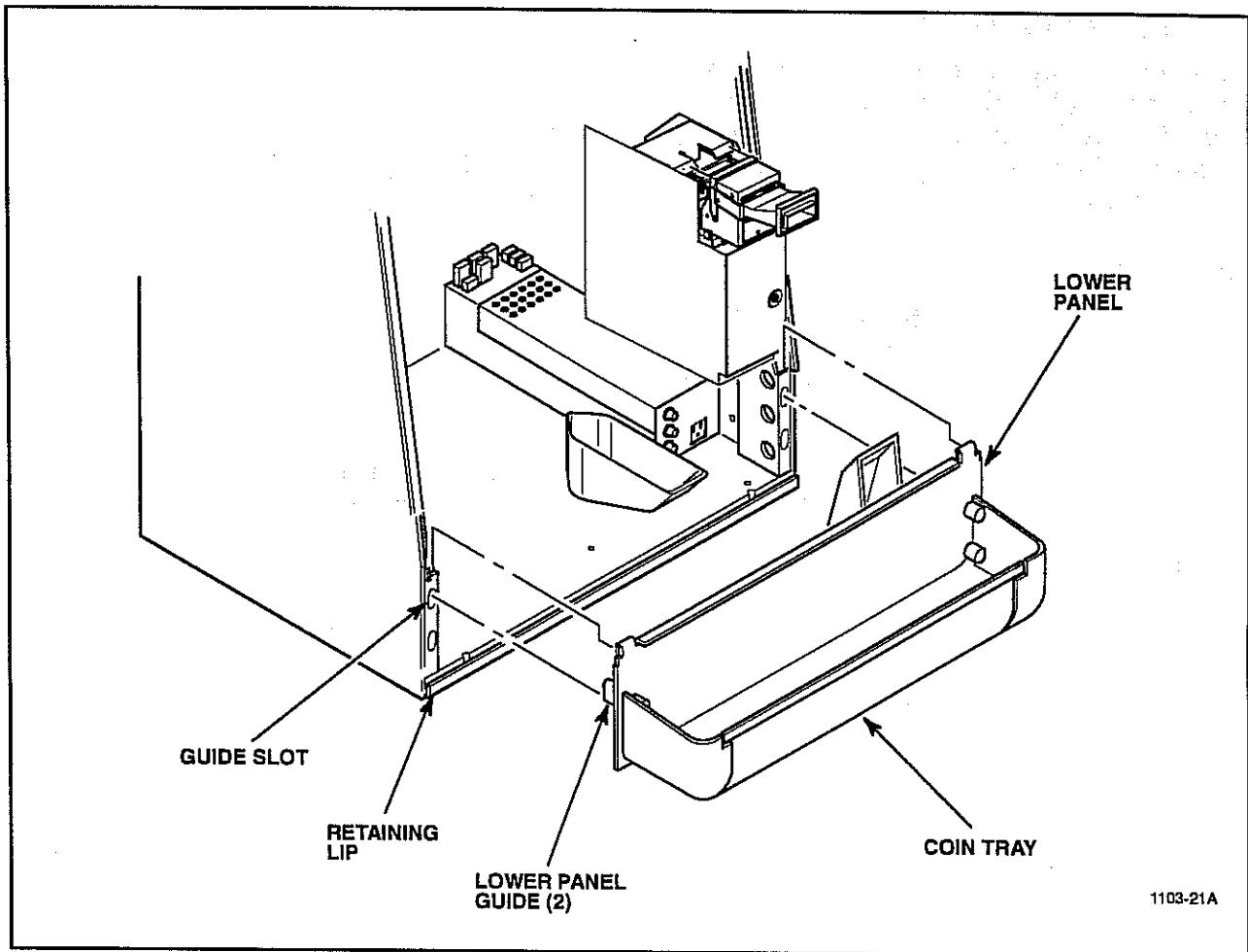


Figure 5-16. Coin Tray Removal.

2. Turn the coin comparitor over (large coin). Slide (without lifting) the sample coin holder toward the right side of the comparitor.
3. Insert a coin of the correct denomination into the sample coin holder and carefully release. The coin should rest firmly within the sample coin holder and against the rail insert.
4. Replace the coin comparitor on the coin-in assembly.
 - a. Position the coin comparitor either with the sample coin face up in the upper left corner of the coin-in assembly (for small coin handling) or face down in

- the upper right corner of the coin-in assembly (for large coin handling).
- b. See that the four tabs on the metal comparitor bracket rest against the four comparitor clips on the assembly.
 - c. Press down firmly enough on each corner of the coin comparitor to engage the clips.

Note

Press only on the corners of the comparitor. Pressing in the center can damage the mechanism's electronic components.

5.3.12 Coin Drop Box

Install an appropriate coin drop box (bucket) in the stand to collect the coins that are fed into the machine. Verify that the opening into the coin-drop box aligns with the drop-box chute in the top of the stand, to avoid coin spilling.

5.3.13 Coin Tray

The coin tray attaches to the outside of the machine door and holds coins that are being returned to the player by the coin-in assembly. This section covers periodic maintenance and removal/installation.

Cleaning

To clean the coin tray, spray a mild, non-ammonia cleaner on all surfaces of the tray and wipe with a soft cloth.

Removal

1. Open the door and turn the machine **power off**.
2. Lift the coin tray up and away from the machine, allowing the panel guides on the back of the coin tray to clear the retaining lip at the bottom of the cabinet (see Figure 5-16).

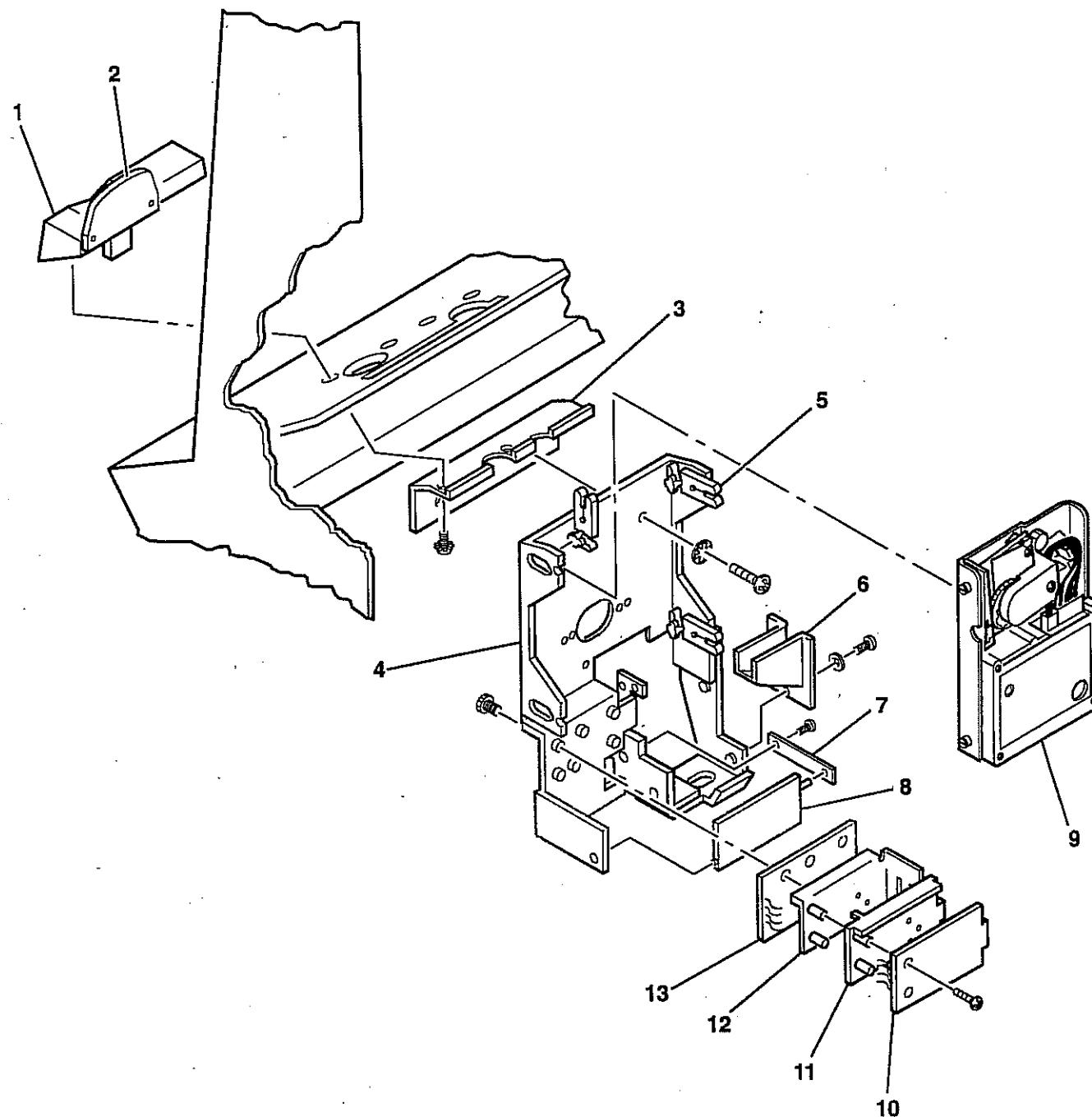
Installation

1. Set the lower panel in the retaining lip at the bottom of the cabinet.
2. Align the left and right panel guides with the cabinet guide slots on the inner wall.
3. Lift the lower panel up into the guide slots and drop the panel is set into the retaining lip at the bottom of the cabinet.
4. Turn the machine **power on**; close and lock the front door.

COIN-IN HANDLING WITH ELECTRONIC COMPARITOR

Fig. No.	Part Number	Description	Qty.
ASSY	911-328-02	KIT, COIN-IN, 25 CENT, ELEC. W/OPTIC SW	1
1	599-237-12	ENTRY ASSEMBLY - CHROME, .990 x .095	1
1	414-600-92	SCREW - CAP, HEX SOC 3 - 48 x 3/8	2
2	599-234-12	ENTRY - HEAD, CHROME, .990 x .095	1
2	599-410-12	ENTRY - HEAD, .990 x .095, RAW	1
3	653-242-00	MOUNT - CHASSIS, SHORT	1
4	143-084-00	CHASSIS	1
5	446-032-00	CLIP - ACCEPTOR, UNIVERSAL COIN SYSTEM	4
6	573-260-00	CHUTE - REJECT, UNIVERSAL COIN	1
7	676-021-00	DIVERTER, SUPPORT (LOTTERY ONLY)	1
8	576-036-00	DIVERTER - UNIVERSAL COIN SYSTEM, UPRIGHT	1
8	576-036-00	DIVERTER - UNIVERSAL COIN SYSTEM, UPRIGHT	1
9	570-132-90	COMPARATOR, ELEC. COIN MECH, CC-16C	1
10	753-052-00	BD, PC, ABC, OPTIC EMTR/DET, ASSEMBLY	1
11	584-054-11	INSERT, .889-1.055 (25 CT/SBA)V	1
12	649-109-00	HOUSING, ENCODER, UNIVERSAL COIN	1
12	753-038-00	BOARD PC, 3 OPTIC ENCODER ASSEMBLY	1
10	916-890-00	Coin optic Board	1

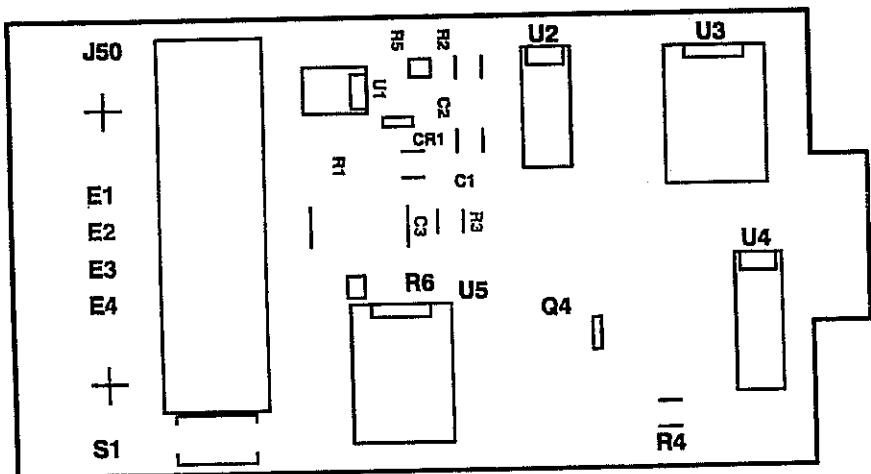
COIN-IN HANDLING WITH ELECTRONIC COMPARITOR



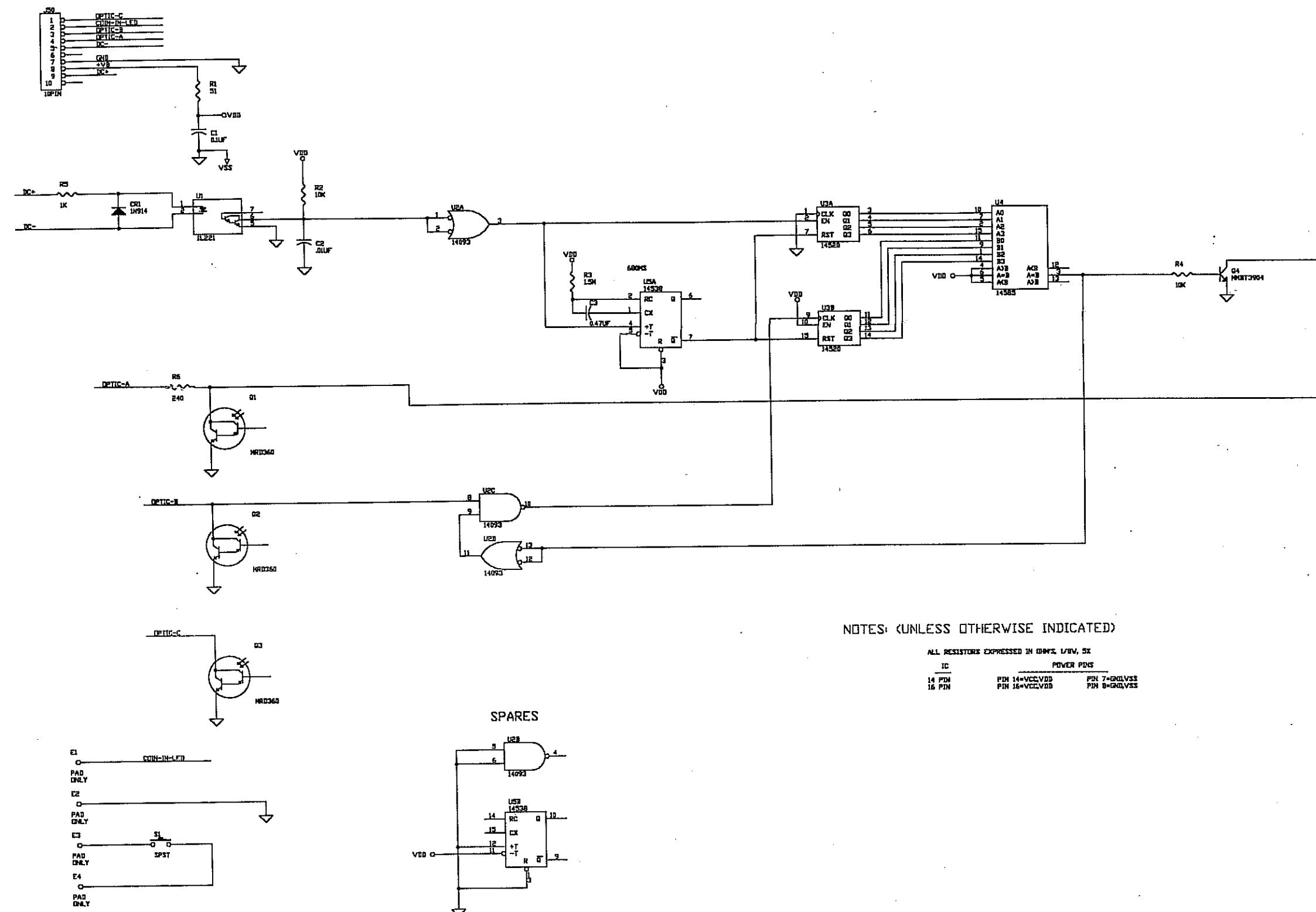
Components & Assemblies

ABC COIN DETECTOR BOARD
753-052-00

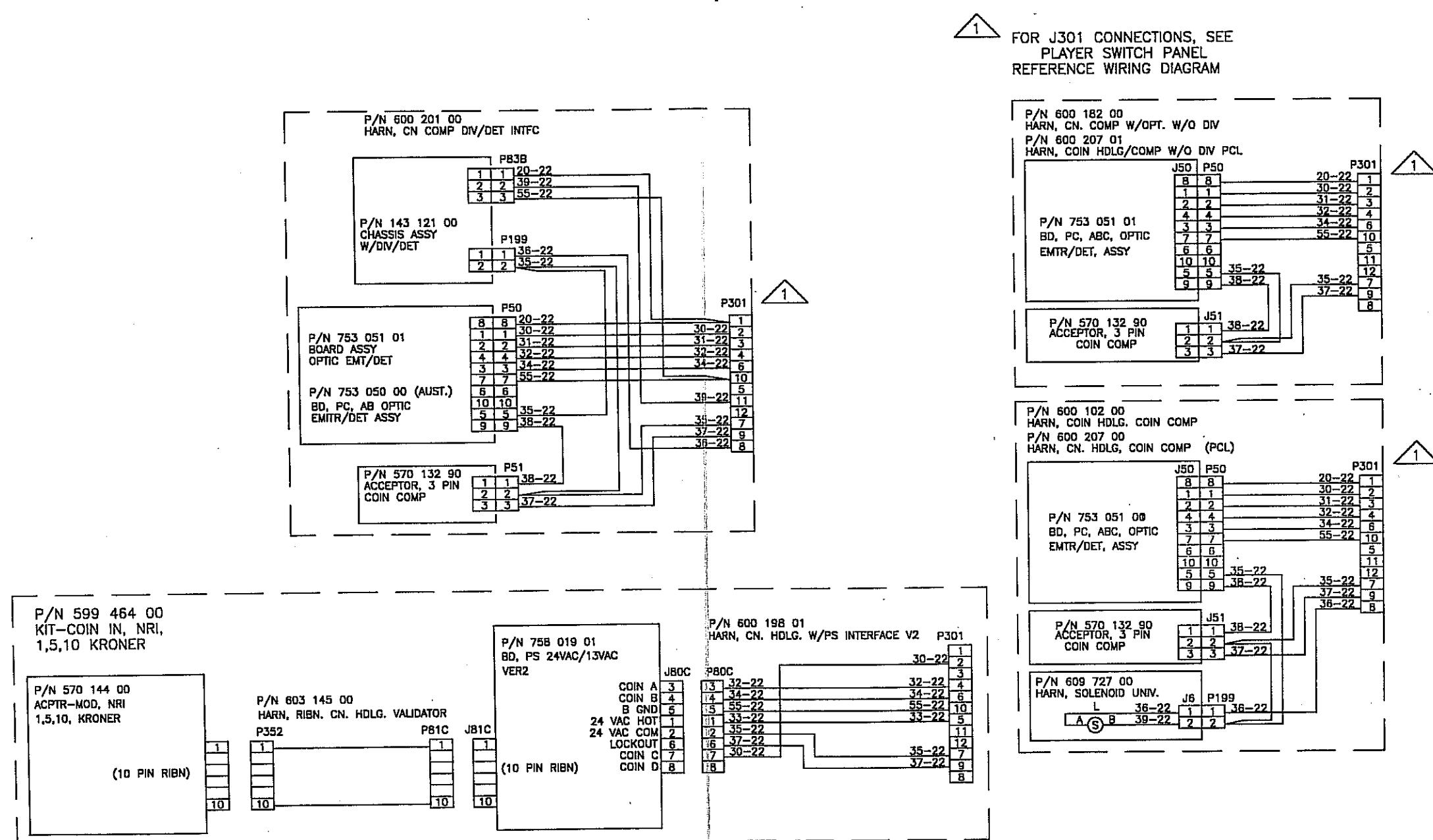
Component	Description	Part Number
BOARD, PC	BOARD, PC, ABC OPTIC DE/XL VW	753-052-00
C1	CAPACITOR, CER, .1UF, 50V, +80-20%, Z5U, 1206	152-109-90
C2	CAPACITOR, CER, .01UF, 50V, 10%, X7R, 1206	152-108-90
C3	CAPACITOR, CER, .47UF, 50V, 10%, X7R, 1825	152-110-90
CR1	DIODE, IN914, SOT-23, T/R	480-082-91
J50	WAFER, RT. ANG, .1, 10 PIN	219-283-90
Q1, 2, 3	PHOTOTRANS, 250MW, 40V	373-004-90
Q4	XTR, NPN, MMBT3904, SOT23	481-092-90
REF Q1, 2, 3	SPACER, INSULATING	674-003-90
REF. SCHEMATIC	BOARD, PC, ABC, OPTIC, DE/XL, V2	753-052-10
R1	RESISTOR, TFC, 51 OHM, 1/8W, 5%, 1206	474-115-90
P2, 4	RESISTOR, TFC, 10K OHM, 1/8W, 5%, 1206	474-116-90
R3	RESISTOR, TFC, 1.5M OHM, 1/8W, 5%, 1206	474-117-90
R5	RESISTOR, TFC, 1K OHM, 5%, 1/8W, 1206	474-122-91
R6	RESISTOR, TFC, 240 OHM, 5%, 1/8W, 1206	474-123-91
S1	SWITCH, PC MT, MICROMINI, PB, 1A	510-141-90
U1	OPTO, COUPLER, XTR, IL221, SOIC-8	370-021-90
U2	IC, QUAD, 2 IN, NAND, 14093B, SOIC W	320-409-90
U3	IC, DUAL, BIN CTR, 14520B, SOIC W	320-406-90
U4	IC, 4BIT, MAG. COMP, 14585B, SOIC	320-407-90
U5	IC, DUAL, RP, MMULT, 14538B, SOIC W	320-408-90



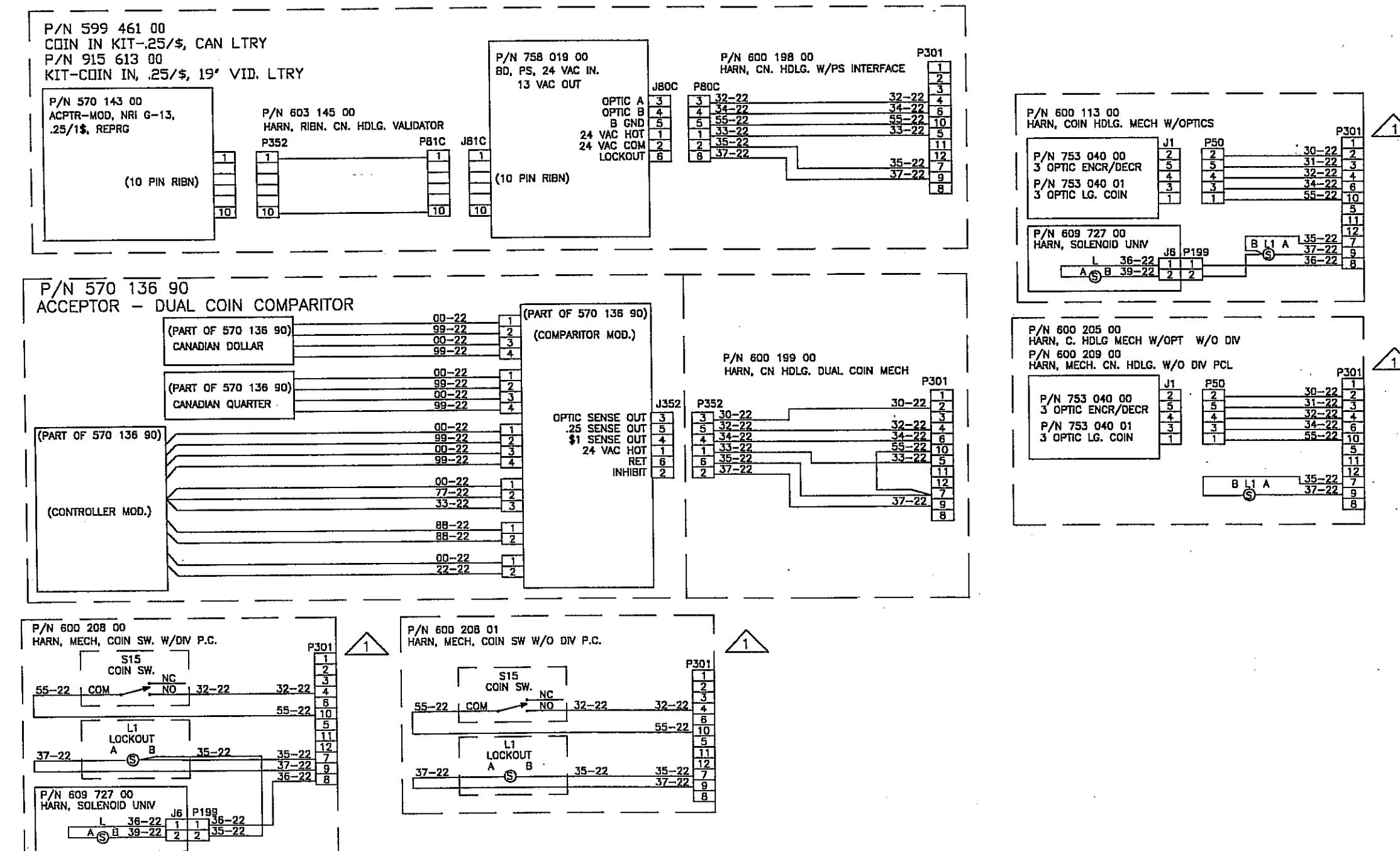
**ABC COIN OPTIC DETECTOR/TRANSLATOR V2 BOARD SCHEMATIC
753-052-10 REV A**



**COIN HANDLING WIRING DIAGRAM
820-108-00 REV D PAGE 2 OF 2**



**COIN HANDLING WIRING DIAGRAM
820-108-00 REV D PAGE 1 OF 2**



5.4 Player Panel Switches

The player panel switches are electromechanical devices that interact between the player and the processor board. Each player panel switch illuminates whenever its function is available, both during the game play mode and the self test mode. The S-Plus IBA machine uses Starpoint player panel switches.

5.4.1 Starpoint Player Panel Switch

The following procedures describe the removal and installation, and disassembly and assembly of the Starpoint switch.

Switch Removal

It is not necessary to remove the entire switch body from the player control panel for minor cleaning or to replace the lamp. In these instances, refer to the partial removal procedure that follows.

Refer to the complete removal procedure to remove the entire player panel switch. The switch installation procedure follows the Disassembly & Assembly sections.

Tool Required

- Needle-nose pliers

Removal Procedure

1. Open the cabinet and turn the machine **power off**.
2. Disconnect all wires from the back of the switch assembly.
 - a. **Partial Removal:**
Grasp the microswitch and pull straight out to disengage the lamp/switch housing from the switch body.
 - b. **Complete Removal:**
From the underside of the panel, grasp the microswitch and pull straight out to

disengage the lamp/switch housing from the switch body.

Unscrew and remove the plastic retaining nut and spacer that fasten the switch assembly to the player panel. Lift the switch assembly away from the front of the panel.

Switch Disassembly & Assembly

The following procedure describes how to completely disassemble and assemble a player panel switch. The components of a switch include: a switch body, retaining nut, spacer, compression spring, plunger, lens cap, legend plate, microswitch, lamp/switch housing and a 6.3-volt, .25-amp lamp and microswitch (see Figure 5-18 and 5-19).

Tools Required

- Small needle-nose pliers
- Small flat-blade screwdriver or knife

Lamp

The lamp consists of a socket and a wedge lamp. It is not necessary to remove the entire player panel switch from the top panel to disassemble the lamp switch assembly.

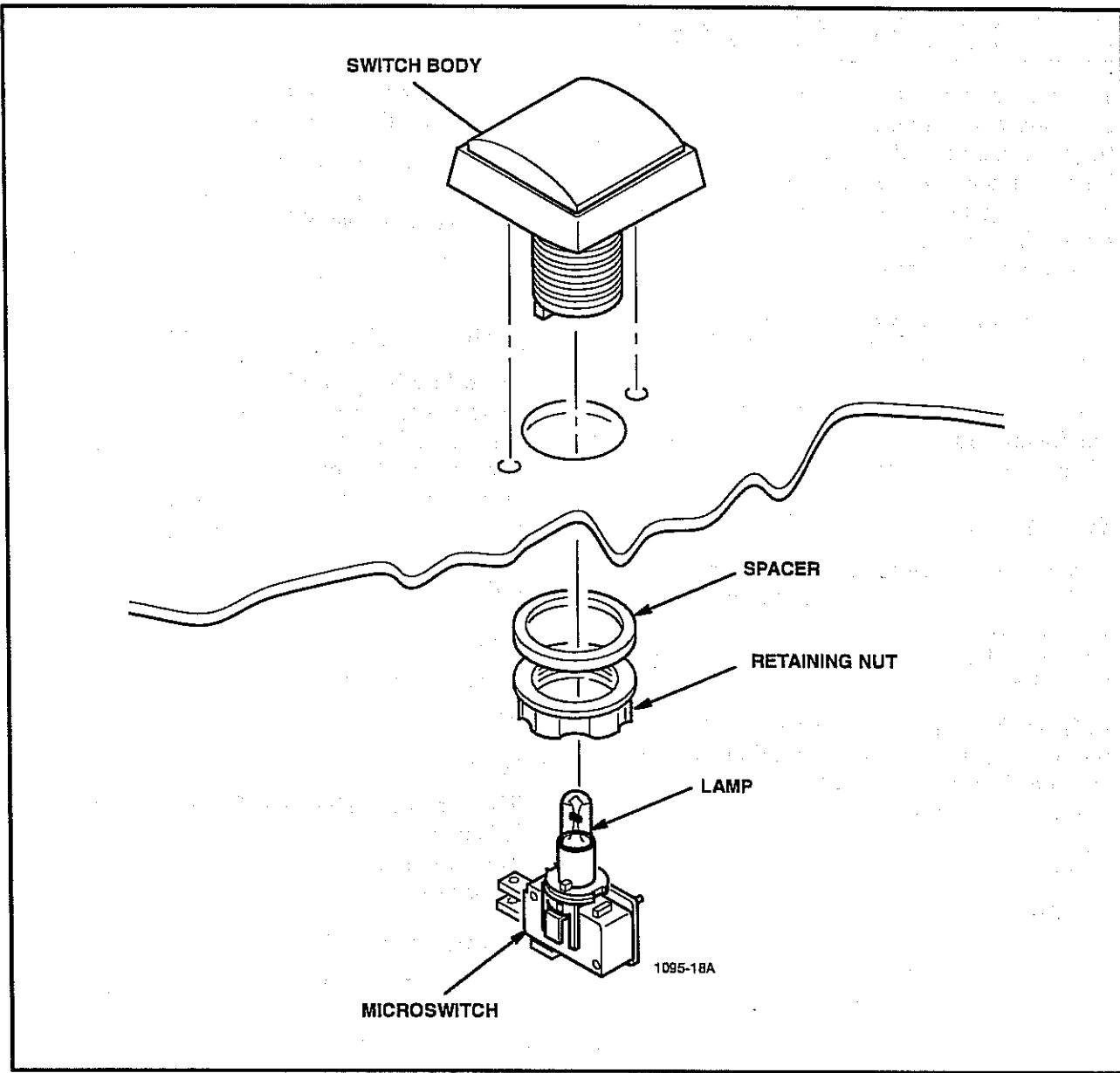
Lamp Disassembly

1. With the machine **power off**, disconnect all wires from the back of the switch assembly, noting wire colors and positions.
2. Grasp the microswitch and pull straight out to disengage the lamp/switch housing from the switch body.

CAUTION

Do not use pliers to remove the lamp. The glass may shatter, causing potential eye injury.

3. Carefully pull the lamp straight out from the lamp socket using only your fingers.



5-17. Player Panel Switch Removal.

Lamp Assembly

1. Position both leads on the lamp so that each lead is bent toward the flat area on opposite sides of the lamp. Align the flat area on the lamp with the slotted opening in the lamp socket and carefully insert the lamp into the socket.

2. Position the lamp/switch housing in the switch body so that the plunger tabs align with the cutouts in the base of the lamp socket. Press the assembly firmly to snap it into place.

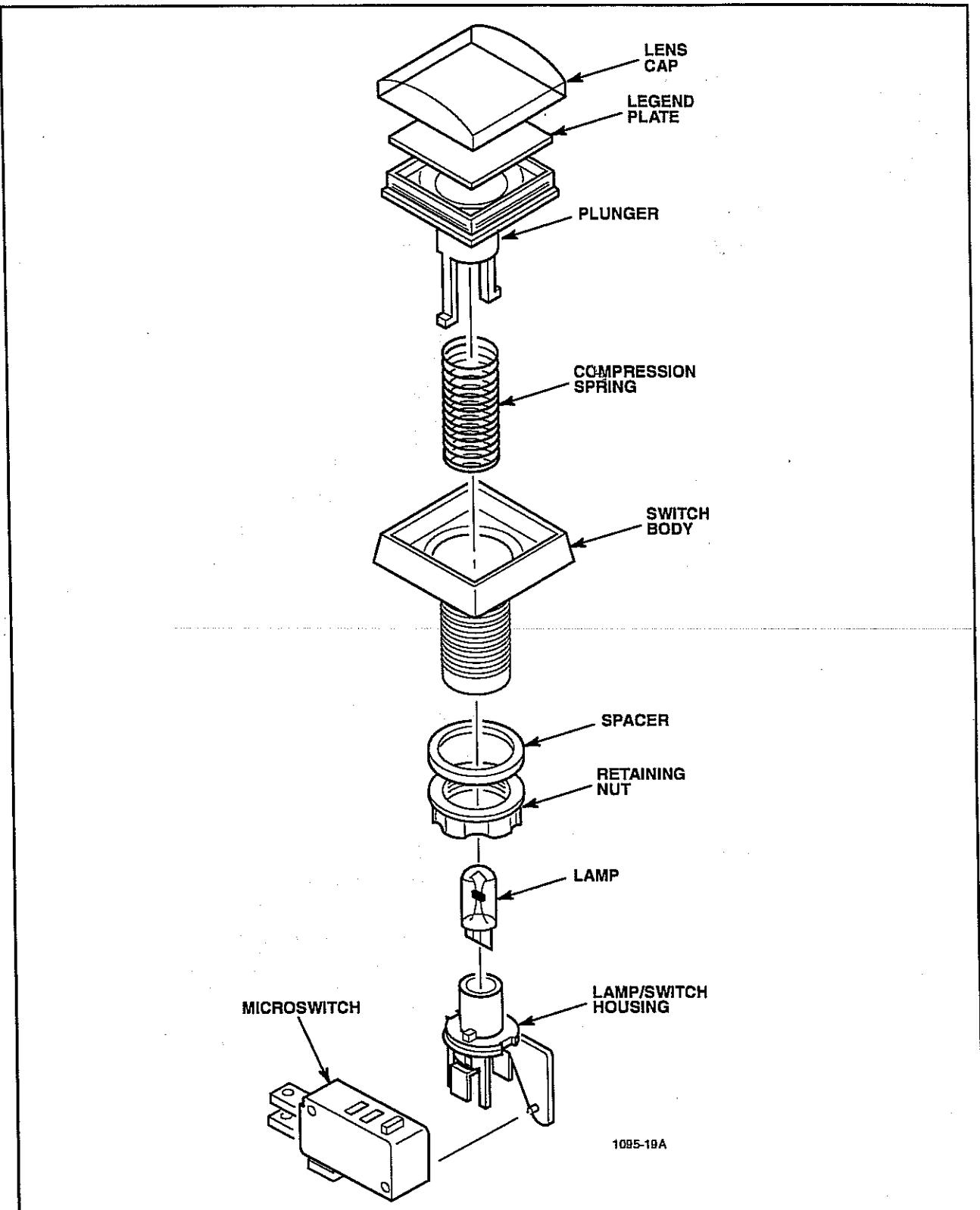
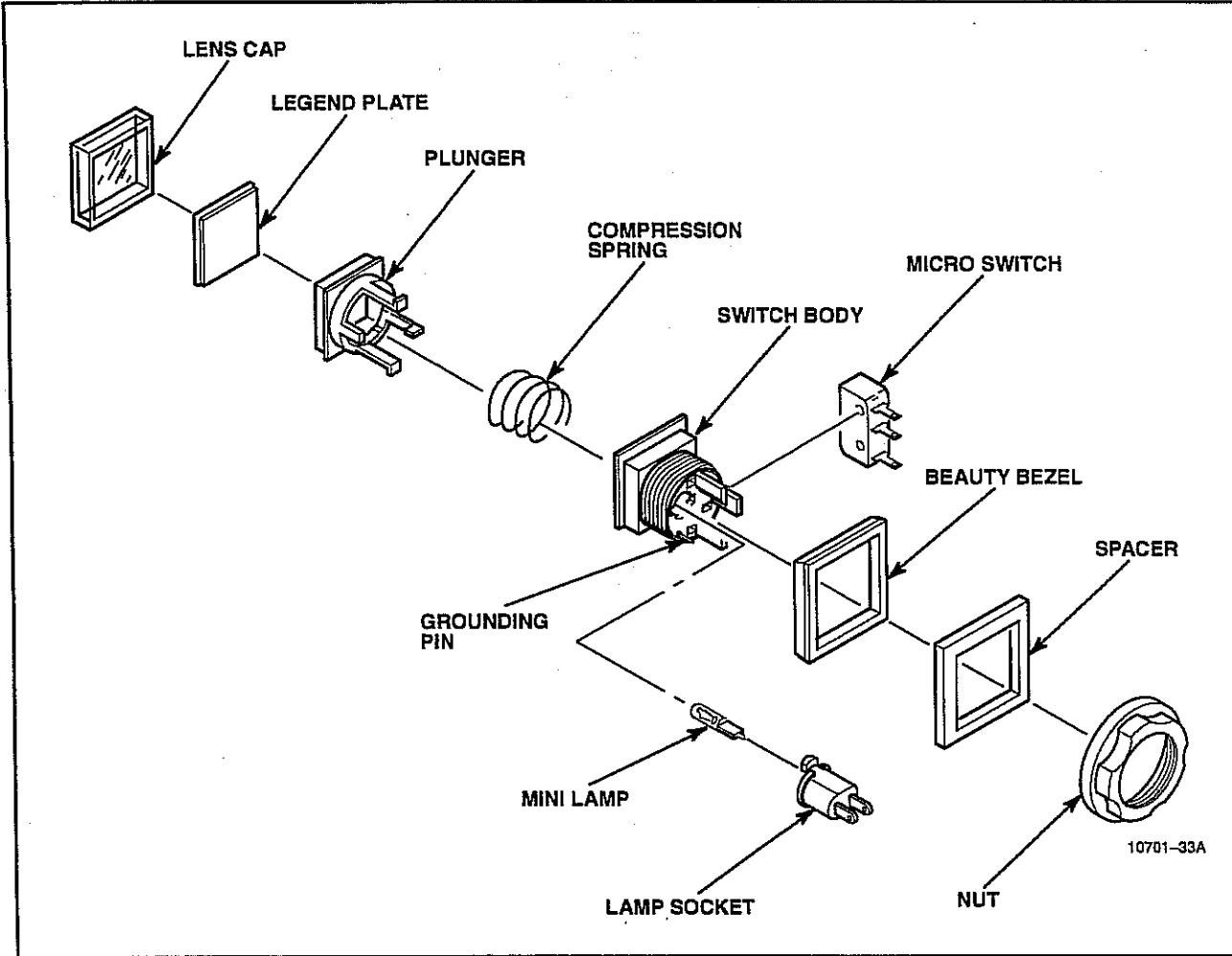


Figure 5-18. Starpoint Player Panel Switch Disassembly.



5-19. Player Panel Switch Disassembly.

3. Connect the wires to the back of the lamp socket as noted during lamp disassembly or refer to the appropriate overall wiring diagram at the end of this section.
 2. Grasp the microswitch and pull straight out to disengage the lamp/switch housing from the switch body.
 3. Position the lamp/switch housing as shown in Figure 5-18. Grasp the switch with your fingers or needle-nose pliers. Carefully bend the longest point of the lamp/switch housing away from the microswitch and rotate the microswitch forward and down, just enough to disengage the switch from the housing. Continue rotating the switch until it is completely free from the housing.
- Microswitch**
The microswitch is a self-contained, removable unit on the underside of the player panel switch assembly.
- Microswitch Removal**
1. With the machine power off, disconnect all wires from the back of the switch assembly, noting their wire colors and positions.

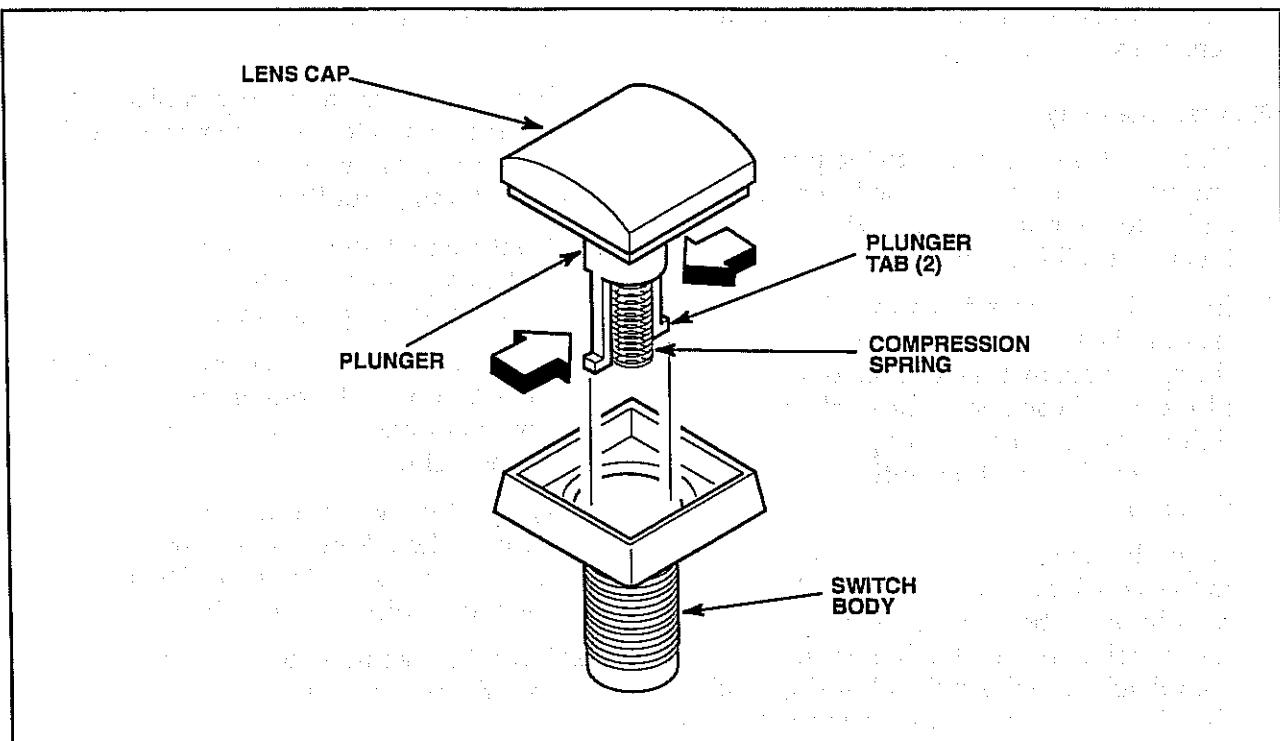


Figure 5-20. Starpoint Plunger Disassembly.

Microswitch Installation

1. Align the microswitch and the lamp/switch housing as shown in Figure 5-18. Tilt the microswitch forward and down. Insert the rear housing post into the corresponding slot in the microswitch, rotate the microswitch upward and snap the remaining housing post into the slot in the microswitch.
2. Carefully bend the longest point of the lamp/switch housing away from the microswitch enough to move the microswitch up into position. Adjust the microswitch until the two tabs on the retaining flanges capture the switch.
3. Position the lamp/switch housing in the switch body so that the plunger tabs align with the cutouts in the base of the lamp socket. Press the assembly firmly to snap it into place.
4. Connect the wires to the back of the microswitch as noted during removal.

Plunger

The plunger assembly consists of a lens cap, legend plate, plunger and compression spring.

Plunger Disassembly

Refer to Figure 5-20, Plunger Disassembly.

1. Turn the machine power off.
2. Grasp the microswitch/lamp housing and pull straight out to disengage the lamp/switch housing from the switch body.
3. Squeeze the two, white plunger tabs together and push the plunger up through the cylindrical area of the switch body.
4. Use the eraser end of a pencil or an other soft, blunt, cylindrical object to push the plunger assembly up and out of the switch body from underneath the top panel.
5. Carefully insert the tip of a flat-blade screwdriver or knife between the edge of the lens cap and the lip on the plunger.

Gently rotate the blade until the lens cap separates from the plunger.

Plunger Assembly

1. Place the legend plate onto the plunger and fit the lens cap over the legend plate and onto the plunger, squeezing the two together until they snap into place.
2. Install the compression spring between the tabs on the back of the plunger. Compress the spring against the bottom of the plunger and use needle-nose pliers to lightly squeeze the two longer opposing tabs toward each other until they capture the spring.
3. Align the two plunger tabs with the holes in the switch housing and carefully insert the plunger tabs into the cylindrical area of the switch housing. Push the plunger completely into the switch housing until the plunger tabs protrude from the back of the housing. Verify that the compression spring is not crooked.
4. Press and release the plunger several times to confirm that the plunger moves freely within the switch housing. If the plunger sticks or does not return, repeat the disassembly and assembly steps or replace the switch assembly.
5. If the microswitch and the lamp socket were removed from the switch body or the switch was removed from the top panel, re-install them, as described in microswitch installation.

Switch Installation

If the entire switch was removed from the player control panel proceed as follows.

Tool Required

— Needle-nose pliers

Installation Procedure

1. Insert the switch assembly through the appropriate hole in the player control pan-

- el. Be sure the legend plate is oriented correctly.
2. Hold the switch assembly in place and fasten the switch to the player panel with the plastic spacer and retaining nut. Tighten the retaining nut finger tight only.
3. Confirm that all switch components are installed properly, including the microswitch and lamp housing.
4. Confirm that the switch moves freely after installation. If the plunger sticks or has limited movement, the retaining nut may be too tight.
5. Connect the wires to the microswitch and lamp socket. Refer to the wiring diagrams and schematics at the end of this section, for correct pinouts and wire colors.
6. Turn the machine **power on**; close and lock the player control panel.

5.4.2 Inspection

1. Inspect the lens cap area of the switch for aesthetic quality and proper seating in the switch body.
2. Confirm that the plunger moves freely, without binding, by repeatedly pressing down on the lens cap, both in the center and around the edges.
3. Make certain each switch body is properly mounted in the player panel and that its retaining nut is finger tight only.
4. Confirm that all wire connections are secure and that all wires are in good condition.
5. Confirm that the legend plate does not have any edges with burrs that may cause the switch to bind.

5.4.3 Switch Maintenance

Periodic maintenance of each player panel switch is recommended to ensure optimum performance and aesthetic quality.

General Cleaning

1. Clean the surface of each lens cap using a cloth soaked with a mild glass or plastic cleaner.
2. Wipe dry using a lint-free cloth.

Note

Do not use cleaners or solvents that contain chemicals capable of dissolving or fogging plastic, such as Acetone.

Always wear eye protection when using strong cleaning solvents or compressed air.

Do not use hand tools to install switches, as over-tightened switches will bind.

Make sure the S-Plus IBA machine is completely turned off, before performing any cleaning procedure.

Precision Cleaning

Perform the following procedures for each player panel switch (refer to Figure 5-19).

Plunger

1. Clean the plunger spring with alcohol, using a stiff, short-haired brush.
2. Clean the plunger sides and tabs, the lens cap and the legend plate with warm soapy water using a stiff, short-haired brush.
3. Rinse thoroughly with clean water and dry each part using compressed air (not to exceed 60 psi).

Switch Body

1. Clean the outer rim and the inner areas of the switch body with warm soapy water, using a stiff, short-haired brush.
2. Rinse thoroughly with clean water and dry each part using compressed air (not to exceed 60 psi).

Microswitch

1. Clean the microswitch terminals and actuator with alcohol using a stiff, short-

haired brush. Always direct the brush strokes away from the switch to avoid contaminating the internal switch contacts.

2. Dry the switch using compressed air (not to exceed 60 psi).
3. If the internal switch contacts are sticky or dirty, replace the microswitch.

Lamp & Socket

1. Clean the internal contacts and external terminals of the socket and the lamp contacts with alcohol, using a stiff, short-haired brush.
2. Dry the socket and lamp using compressed air (not to exceed 60 psi).

Hardware

1. Clean the retaining nut, beauty bezel and spacer with warm soapy water, using a stiff, short-haired brush.
2. Rinse thoroughly with clean water and dry each part using compressed air (not to exceed 60 psi).

5.4.4 Switch Adjustments

The player panel switch does not require any operational adjustments. However, use the following procedures to optimize switch reliability.

1. Make certain the lamp fits securely into the lamp socket and that both sets of contacts properly engage. Carefully bend the lamp contacts slightly away from the flat part of the lamp (perpendicular) to help make a better connection upon inserting the lamp.
2. Be sure that the microswitch and the lamp socket are properly attached to the switch body.
3. Check to see that the lens cap and legend plate fit properly on the plunger and that the plunger moves freely without binding within the switch body.

4. Make certain the switch retaining nut is finger tight only. If the plunger does not move freely after installation or cleaning, the switch retaining nut may be too tight.

5.4.5 Functional Verification

Refer to Section 4, Game Software, for information about using the self test mode, input tests and output tests.

- **Inputs** – to verify correct operation of the microswitches.
- **Outputs** – to verify correct operation of the switch lamps.

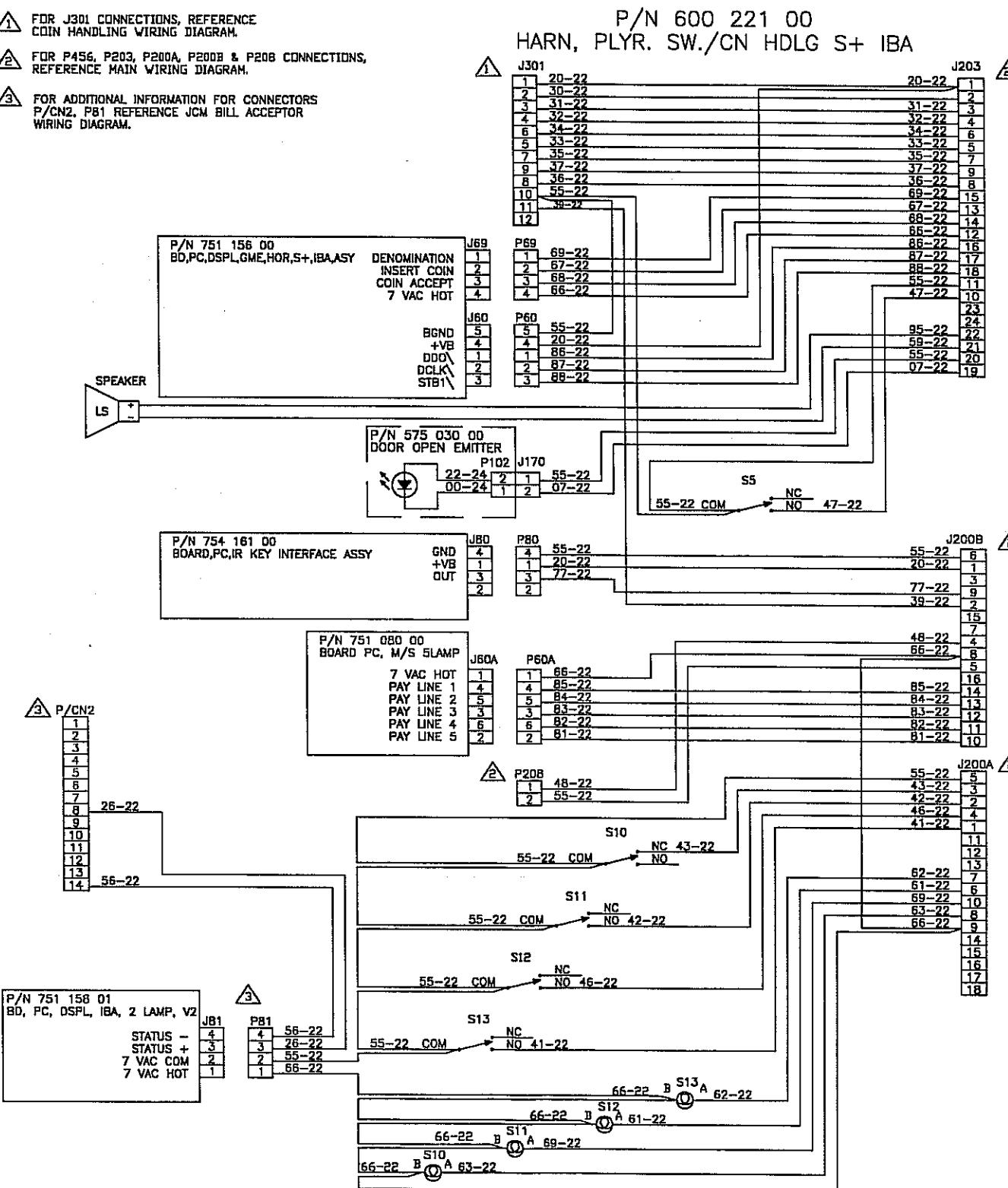
5.4.6 Troubleshooting

1. Check the switch operation using the input test in the self test mode. Refer to Section 4, Game Software, for information about using the self test mode.
2. If a switch input is nonfunctional in the self test mode, turn the table **power off** and:
 - a. Verify that all connectors and wires leading to the switch terminals are in good condition.
 - b. Verify that all connectors on the front panel of the lower module are firmly seated on both sides of the panel and that wires are not damaged.

- c. Verify that all connectors on the processor board are fully seated; if any pins are damaged or bent, replace the mother board.
3. Turn the S-Plus IBA machine **power on** and use a voltmeter to measure the operating voltage to the switch.
 - Voltage should measure 7-10 VDC until the switch is depressed, when it should read 0 volts.
 - If the voltage reads 0 volts before the switch is activated, disconnect the N.O. (normally open) terminal and measure the voltage again. If 7-10 volts is now measured, the switch is defective and requires replacement.
 - If the voltage still measures 0 volts:
 - a. the wire to the switch is either open between the processor and the switch or shorted to ground or to another line
 - b. the processor board or mother board is defective
4. Replace any defective parts.

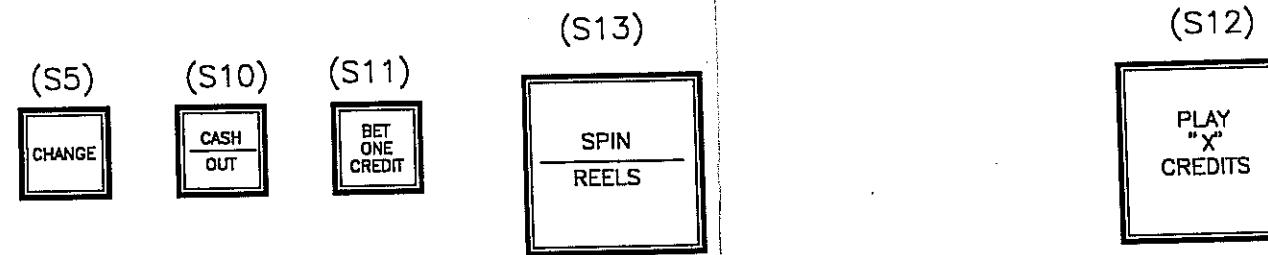
**PLAYER SWITCH PANEL WIRING DIAGRAM
820-175-00 · REV C · PAGE 1 OF 2**

- ①** FOR J301 CONNECTIONS, REFERENCE COIN HANDLING WIRING DIAGRAM.
- ②** FOR P456, P203, P200A, P200B & P208 CONNECTIONS, REFERENCE MAIN WIRING DIAGRAM.
- ③** FOR ADDITIONAL INFORMATION FOR CONNECTORS P/CN2, P81 REFERENCE JCM BILL ACCEPTOR WIRING DIAGRAM.

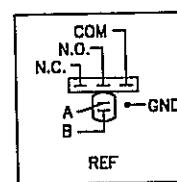


Components & Assemblies

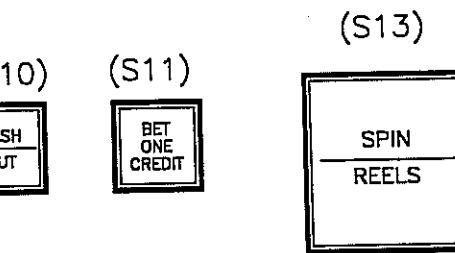
PLAYER SWITCH PANEL WIRING DIAGRAM
820-175-00 REV C PAGE 2 OF 2



(VIEW FROM OUTSIDE MACHINE)



55 GREEN
41 YEL/BRN
OPEN
62 BLU/RED



(VIEW FROM INSIDE MACHINE)

55 GREEN
46 YEL/RED
OPEN
61 BLU/BRN

55 GREEN
42 YEL/RED
OPEN
66 BLUE

55 GREEN
43 YEL/BRN
OPEN
63 BLU/ORN

55 GREEN
47 YEL/VIO
OPEN

(S13)

(S12)

(S11)

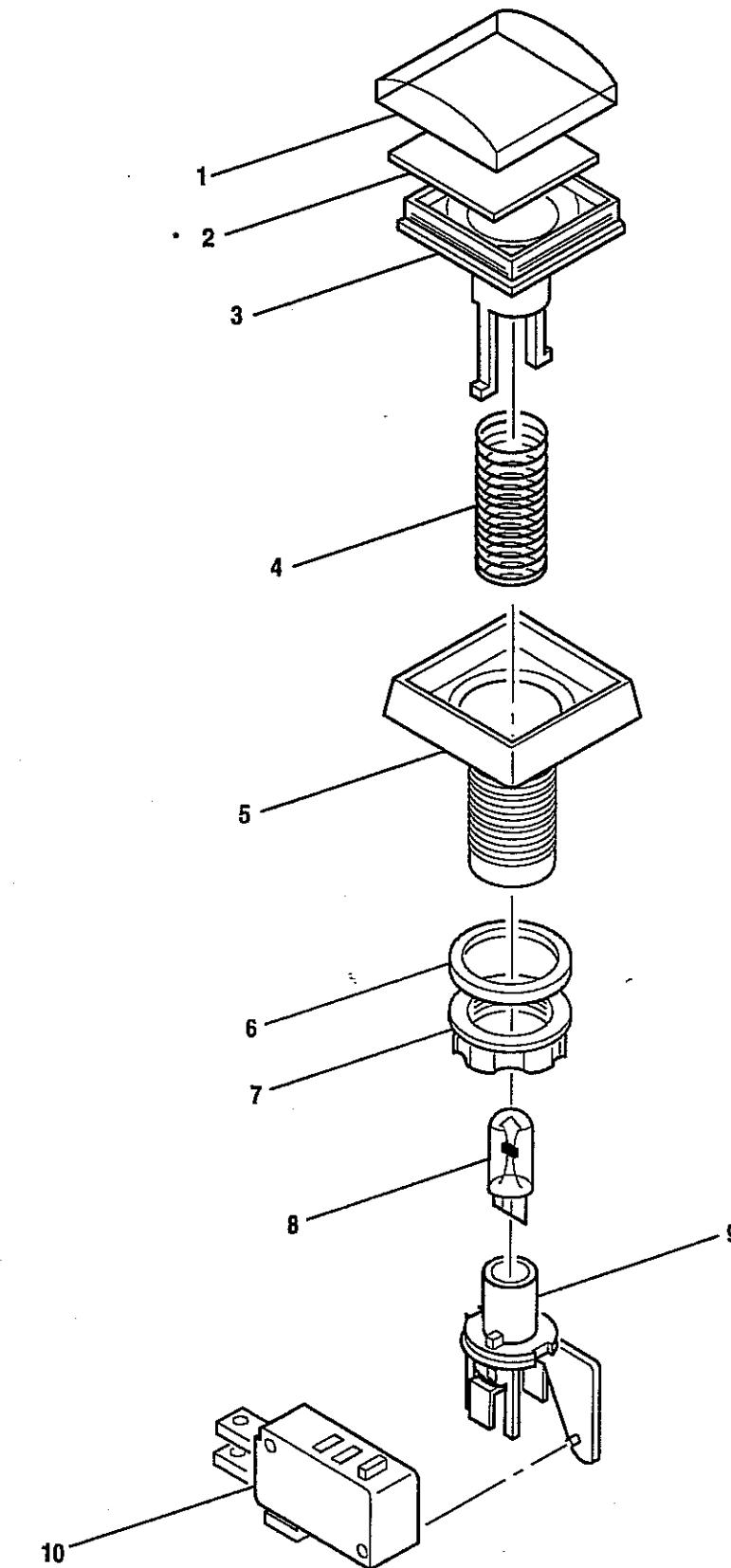
(S10)

(S5)

PLAYER PANEL SWITCH

Fig. No.	Part Number	Description	Qty.
KIT	915-759-00	SWITCH, POKER, CREDIT, 20 VIDEO	0
KIT	915-759-01	SWITCH, SLOT, CREDIT, 20 VIDEO	0
KIT	915-759-09	SWITCH, DOUBLE UP, 19 VIDEO	0
KIT	915-759-02	SWITCH, 21, CREDIT, 20 VIDEO	0
-	685-126-00	PANEL, SWITCH, POKER, 20 P/E, CHROME	1
-	685-126-01	PANEL, SWITCH, DOM SLOT 20	1
1	517-100-90	CAP, CLEAR, 2X1.3 RECTANGULAR, STARPOINT	7
1	517-099-90	CAP, CLEAR, 1.3 SQUARE, STARPOINT	1
2	515-172-07	PLATE, .925 SQ, W, HOLD/CANCEL	5
-	515-013-90	PLATE, LEGEND, SQ BLANK WHITE	5
-	515-172-06	PLATE, .925 SQ, W, DEAL, DRAW	1
-	515-172-00	PLATE, .925 SQ, W, BET 1 CREDIT	1
-	515-172-01	PLATE, .925 SQ, W, CASH OUT	1
-	515-172-26	PLATE, .925 SQ, RED	1
-	515-172-27	PLATE, .925 SQ, BLACK	1
-	515-172-28	PLATE, .925 SQ,W, TAKE WIN	1
-	515-172-29	PLATE, .925 SQ, W, DOUBLE	1
-	515-172-30	PLATE, .925 SQ, W, HALF DOUBLE	1
-	515-180-00	PLATE, .925 SQ, SPL, SPIN REELS	1
-	515-172-17	PLATE, .925 SQ,W, SURRENDER	1
-	515-172-18	PLATE, .925 SQ, W, INSURANCE	1
-	515-172-19	PLATE, .925 SQ, W, SPLIT	1
-	515-172-20	PLATE, .925 SQ, DOUBLE DOWN	1
-	515-172-21	PLATE, .925 SQ,W STAND	1
-	515-172-22	PLATE, .925 SQ, W, DEAL/HIT	1
-	515-145-48	PLATE, - LGND, 2 IN SQ, SPIN REEELS	1
-	515-106-90	PLATE, - LGND, 2IN SQ, BLANK WHT	1
-	515-072-02	PLATE, .925 SQ, W, CASH/CREDIT	1
3	658-045-00	PLUNGER, SWITCH, MOD 2	1
4	331-044-90	SPRING, COMPRESSION, .30OD x .76L x .022W	1
5	516-042-90	SWITCH, P/B RECTANGULAR W/O CAP & PLATE	1
5	516-041-90	SWITCH, P/B SQUARE, W/O CAP & PLATE	1
6	647-114-00	SPACER – ROUND	1
7	661-038-00	NUT, RETAINING, SWITCH	1
8	193-023-90	LAMP, MINI, T-1, 3/4", 6.3V, WEDGE	1
9	120-027-90	SOCKET, LAMP, MINI WEDGE, T-1, 3/4"	1
10	510-108-90	SWITCH, SNAP, SUB-MIN, PIN PLUNGER	1

PLAYER PANEL SWITCH



5.5 Superbowl Hopper

The hopper is a microprocessor-controlled electro-mechanical assembly. The major components of the hopper are: a 120 VAC motor that runs when coins are to be paid out; an electronic optical sensor that counts the coins that are paid out; and an adjustable coin-level probe on the hopper bowl that informs the microprocessor of the approximate coin level in the hopper bowl.

Note

A video tape detailing hopper operation and service procedures is available from IGT Customer Service.

Periodic maintenance of the hopper is necessary to ensure optimum performance. Refer to Table 5-5, Hopper Preventive Maintenance, for maintenance schedules and intervals.

5.5.1 Removal & Initial Installation

Hopper Removal

It is necessary to remove the hopper from the machine for inspection, cleaning and adjustment. Remove the hopper and empty the coins from the bowl.

To remove the hopper from the lower module, see Figure 5-21 and proceed as follows.

1. Open the front door and turn the machine **power off**. Remove the coin tray from the cabinet.
2. Firmly grip the hopper handle with one hand and support the hopper bowl with the other hand. **Do not** use the hopper bowl for a handle.
3. Pull the hopper straight out from the cabinet, taking care not to spill any coins.

Hopper Installation

1. Align the hopper base rails with the metal guides on the lower module and slide the hopper into the cabinet.
2. Make sure the hopper is firmly plugged into the hopper receptacle.

3. Turn the machine **power on**; close and lock the front door. Install the coin tray on the cabinet.

Determining the Coin Level

The following procedures provide instructions for setting the coin-level probe located on the hopper bowl, filling the hopper and setting the game options for hopper coin-level accounting.

Tools Required

- #6 flat-blade screwdriver
- 3/8" open or box-end wrench

Setting the Coin Level Probe

See Figure 5-22 and Table 5-4, and the procedure that follows to set the appropriate hopper probe levels.

1. Determine the appropriate coin level using Table 5-4.
2. Adjust the coin-level probe located on the front of the hopper bowl according to the desired levels found in the probe level table.
 - a. Hold the 10-32 brass screw (probe) using a #6 flat-blade screwdriver.
 - b. Remove the 10-32 standoff from the inside of the bowl using a 3/8" wrench.
 - c. Remove the probe from the bowl and re-insert it into the appropriate hole location. **Do not remove** the connector from the probe.
 - d. Fasten the probe to the bowl with the 10-32 standoff using a 3/8" wrench. **Do not over-tighten.**

Filling the Hopper

Fill the hopper with a desired number of coins based upon the information provided in Table 5-4. The coin-level probe on the hopper bowl informs the game processor of the approximate coin level.

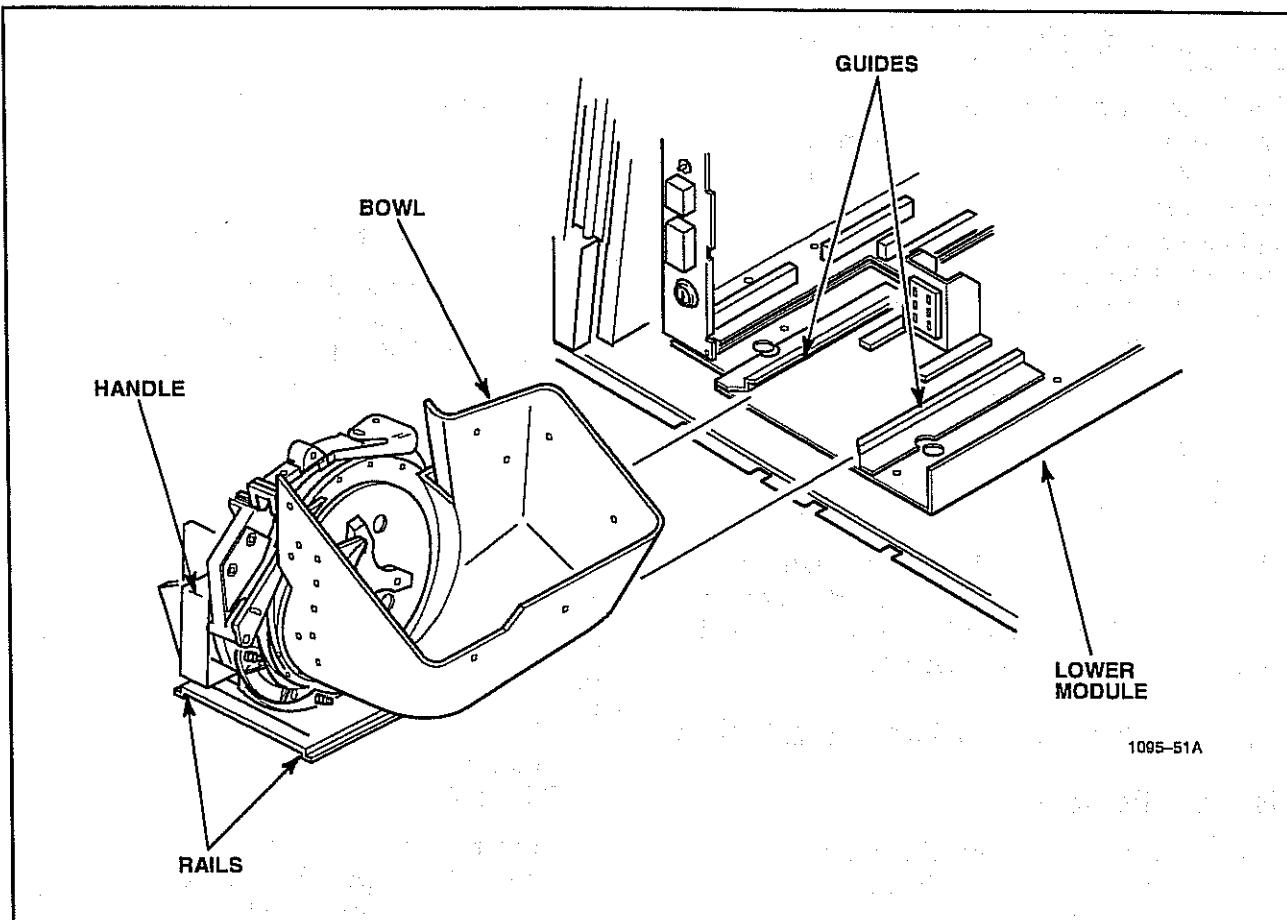


Figure 5-21. Hopper Removal.

When the coins come in contact with the probe, the processor instructs the coin diverter assembly to divert all incoming coins away from the hopper bowl and channels them to the coin drop chute to prevent an overfill.

Table 5-4, Superbowl Probe Levels, lists the probe hole location and the maximum recommended coin levels for the superbowl hopper.

Hopper Option Selections

The following steps provide a checklist for setting the hopper options in the self test mode (refer to Section 4, Game Software).

1. If the hopper/no hopper option page (screen) appears in the self test mode for this game version, select **HOPPER**.

2. Choose the appropriate **DENOMINATION**.
3. Enter the **HOPPER REFILL AMOUNT**, if required.

5.5.2 Maintenance

Refer to exploded view drawing of the hopper at the end of this section to identify hopper components.

Inspection

1. Inspect the motor brake and confirm that it moves freely without binding.
2. Inspect the optic sensor for clean surfaces and any damage. Confirm that it is fastened securely.

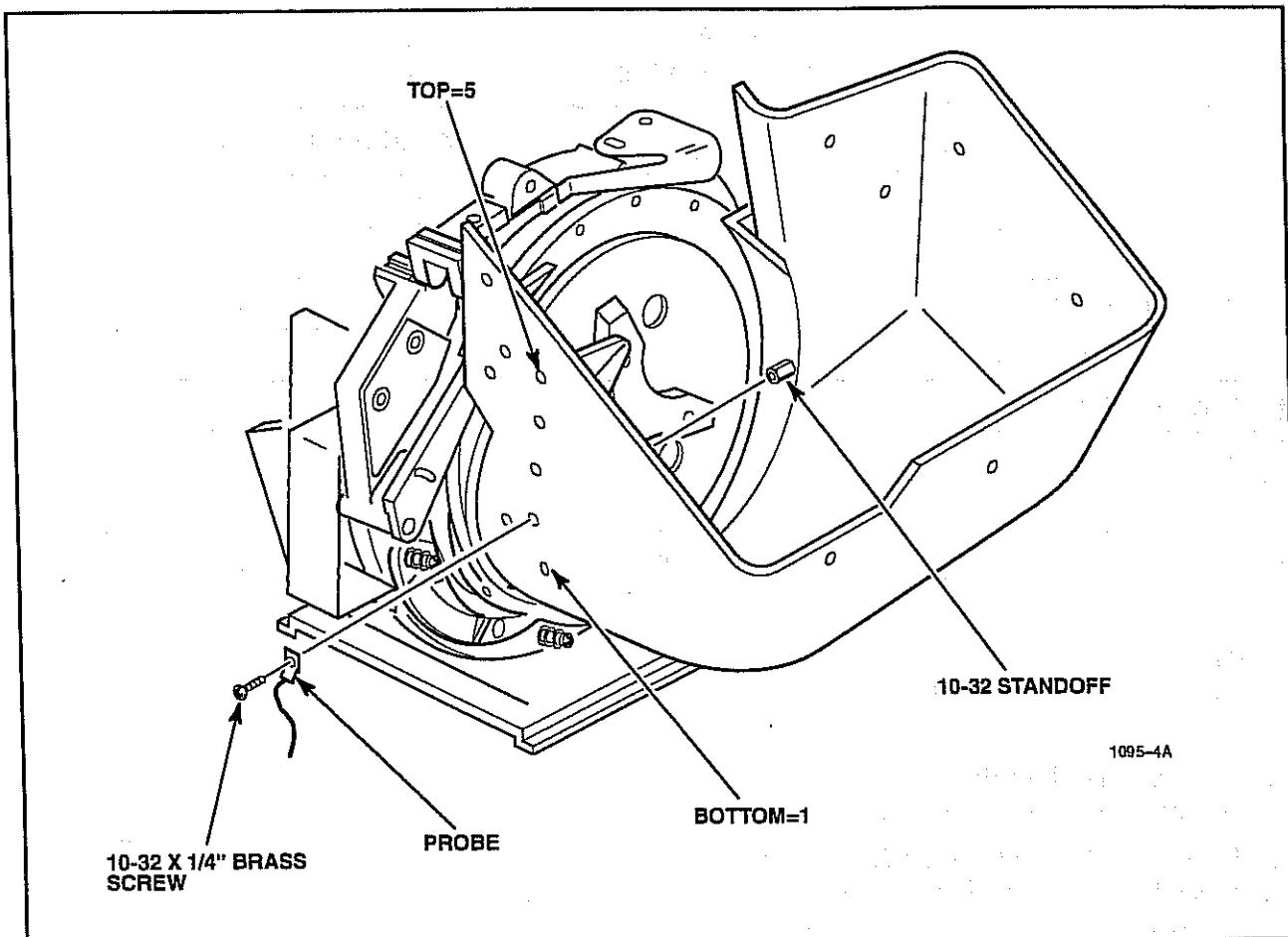


Figure 5-22. Hopper Probe Levels.

**Table 5-4
Superbowl Probe Levels**

Denomina- tion	Probe Hole Number*				
	1	2	3	4	5
Nickel	760	1090	1500	2400	3200
Dime	1520	2300	3300	5100	6900
Quarter	650	1100	1450	2180	3050
Fifty	500	750	1000	1200	1450
Dollar	220	320	420	600	820

* 1=Bottom Hole 5=Top Hole

Table 5-5
Hopper Preventive Maintenance

Maintenance Item	Service Interval (Months)*			
	1	3	6	12
Bowl			C	
Motor Armature & Brake			C	
Metal Coin Wiper			A	
Optic Coin Sensor			C	
Coin Level Probe			C	
Knife		C		

* C = Clean & Inspect A = Adjust

3. Check the metal coin wiper for correct height. Confirm that it is fastened securely.
4. Confirm that the coin level probe is straight and fastened securely.
5. Inspect the knife blade for damage and check to see that the knife tip rests lightly against the coin disc and the pinwheel. Make certain the knife is fastened securely.
6. Release the motor brake and rotate the pinwheel to check for smooth operation.
7. Inspect the bowl for damage; verify that the metal baffle is tight and that the four compression screws that secure the bowl are tight.

Cleaning

1. Turn the **power off** before starting any cleaning procedure.
2. Clean the inner surfaces of the optic sensor using a cotton swab soaked in isopropyl alcohol.
3. Wipe the sensor dry with a lint-free cloth.
4. Clean the coin level probe using a stiff short-haired brush and isopropyl alcohol.

5. Clean and remove any grease from the nylon parts of the motor brake, using a cotton swab soaked in alcohol.

CAUTION

Always wear eye protection when working with pressurized air or cleaning solvents.

6. Clean the inside of the bowl with compressed air (not to exceed 60 psi) and remove any foreign objects.

Metal Coin Wiper Adjustments

1. Slightly loosen the two 10-32 Sems retaining screws.
2. Place a coin on the edge of the coin disc under the tip of the metal coin wiper.
3. Insert a small flat blade screwdriver into the slot at the top of the coin wiper and housing.
4. Twist the screwdriver until the tip of the coin wiper just touches the edge/surface of the coin.
5. Lightly hold the coin wiper in place and tighten the two retaining screws, taking care not to change the coin wiper position.

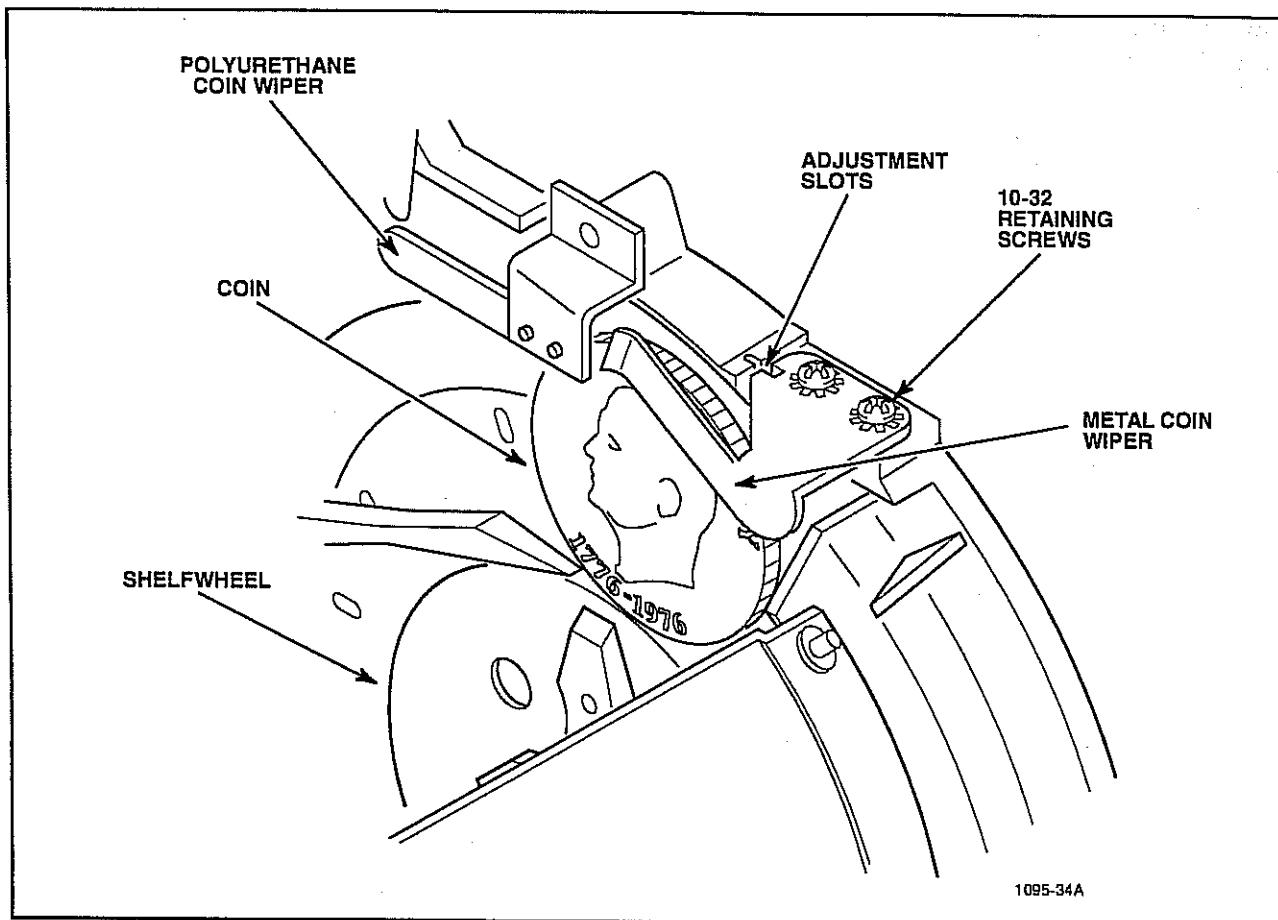


Figure 5-23. Hopper Wiper Adjustment - Large Coin.

5.5.3 Functional Verification

- **Inputs** – to verify correct operation of the coin level probe and optic sensor.
- **Hopper Test** – to verify correct operation of the hopper motor and optic sensor.

5.5.4 Troubleshooting

If the problem still exists, use the following information to help identify and correct the problem.

Service Messages

When a tilt or an error occurs during the game play mode or the idle mode, the machine enters the **tilt mode**:

- All game play is suspended.

- All hopper outputs are disabled.
- A service indicator appears on the video screen.

Tilt messages appear when an event other than normal game play occurs. These messages require that an authorized person correct the problem and reset the machine. The following brief explanations define hopper tilt messages.

Coin-Out Time Out – indicates the hopper coin-out sensor was blocked for too long (greater than 700 ms).

Extra Coin Out – indicates the hopper coin-out sensor detected a coin was dispensed contrary to program instruction.

Hopper Empty – indicates the hopper coin-out sensor detected no coins were dispensed (greater than 8 seconds).

Hopper Malfunction, Extra Coin Out – indicates the hopper coin-out sensor detected a coin was dispensed contrary to program instruction.

Resolving Errors

COIN OUT TIME OUT

1. Check the machine for possible tampering or cheating.
2. Check the optic coin-out sensor for blockage or dirty optic surfaces. Clean if necessary.
3. Check the optic coin-out sensor harness for faulty connections.
4. Inspect all related wire harnesses (see wiring diagrams at the end of this section).
5. Verify the correct operation using the self test information for input and hopper tests.

If the tilt quickly recurs, do one or more of the following:

1. Replace optic sensor.
2. Replace the hopper.
3. Replace the processor board (refer to Section 5.8, Processor Board).

EXTRA COIN OUT or HOPPER MALFUNCTION EXTRA COIN OUT

1. Check the machine for possible tampering or cheating.
2. Verify that the hopper motor brake functions properly.
3. Check the coin wiper on the hopper for jams.
4. Check the optic coin-out sensor harness for loose or faulty connections.
5. Inspect all related wire harnesses.

6. Verify correct operation using Section 2, Game Software, for input and hopper tests.

If the tilt quickly recurs, do one or more of the following:

1. Replace the hopper.
2. Replace the processor board (refer to Section 5.8, Processor Board).

HOPPER EMPTY

1. Check the machine for possible tampering or cheating.
2. Check for an empty or low hopper. Refill the hopper if necessary (refer to Section 5.6.2). If the hopper is empty or low too often, check the diverter for correct operation.
3. Verify that the hopper level probe is functioning properly.
4. Check for proper operation of the hopper brake and motor.
5. Inspect all related wire harnesses.
6. Verify correct operation using self test information for input and hopper tests.

If the tilt quickly recurs, do one or more of the following:

1. Replace the hopper.
2. Replace the processor board (refer to Section 5.8, Processor Board).

5.5.5 Hopper Bowl Disassembly & Assembly

The components that make up the hopper bowl include the superbowl, a small baffle, a large baffle and a brass coin-level probe. Refer to Figure 5-24 and proceed with the following procedure.

Tools Required:

- #2 Phillips screwdriver
- #6 flat-blade screwdriver

- 3/8" open/box-end wrench or nutdriver

Disassembly

1. Remove four 10-32 Kep nuts that fasten the superbowl baffle to the superbowl using a 3/8" wrench.
2. Two 10-32 nuts are located at the right rear of the bowl and two are located at the left side of the bowl.
3. Remove two 10-32 Kep nuts that fasten the lower baffle to the lower left side of the bowl using a 3/8" wrench.
4. Disconnect the two support springs that are attached to the bowl and the overhead frame on the hopper chassis.
5. Disconnect the harness from the coin-level probe.
6. Remove the 10-32 hex nylon bushing from the brass coin-level probe on the inner left side of the bowl using a #6 flat-blade screwdriver and a 3/8" wrench. Remove the brass probe.
7. Remove four 10-32 machine screws and four compression springs that fasten the bowl to the main housing using a #2 Phillips screwdriver.
8. Remove the hopper bowl from the main housing.

Assembly

1. Align the four mounting holes on the bowl with the four mounting posts on the main housing and fit the two components together.
2. Thread two 10-32 machine screws and the two heavier-gauge (black) springs into the upper left and right mounting posts. Do not tighten at this time.
3. Thread two 10-32 machine screws and the two lighter gauge (silver) springs into the lower left and right mounting posts.
4. Tighten all four screws securely using a #2 Phillips screwdriver.

5. Fasten the small baffle to the bowl (lower left) mounting flange facing away from the main housing with two 10-32 Kep nuts. Tighten securely using a 3/8" wrench.
6. Install the large baffle, left end first, onto the bowl and fasten with the four 10-32 Kep nuts. Tighten securely using a 3/8" wrench.
7. Attach the two support springs to the lugs on the upper sides of the bowl and on the forward holes in the overhead frame.
8. Insert the brass coin-level probe and the .25" terminal lug into one of the five probe holes located on the left side of the bowl.
9. Thread the nylon, 10-32 bushing onto the brass probe screw and hand tighten.
10. Position the terminal lug so it points toward the main housing and tighten the nylon bushing securely using a 3/8" wrench and a #6 flat-blade screwdriver.
11. Connect the coin-level probe harness to the terminal log.

5.5.6 Hopper Motor Removal & Installation

The components that make up the hopper motor include a factory sealed gearbox; a 120VAC 50/60Hz motor; and a mechanical brake assembly. The hopper motor assembly is a replaceable unit. IGT does not recommend disassembly of the motor and its components. Refer to Figure 5-25 and perform the following procedure.

Tools Required

- #2 Phillips screwdriver

Removal

1. If the motor harness uses faston connectors, simply disconnect them from the motor terminals.
2. Disconnect the ground wire at the upper left corner of the motor gearbox and remove the 10-32 grounding screw for use on the replacement motor.

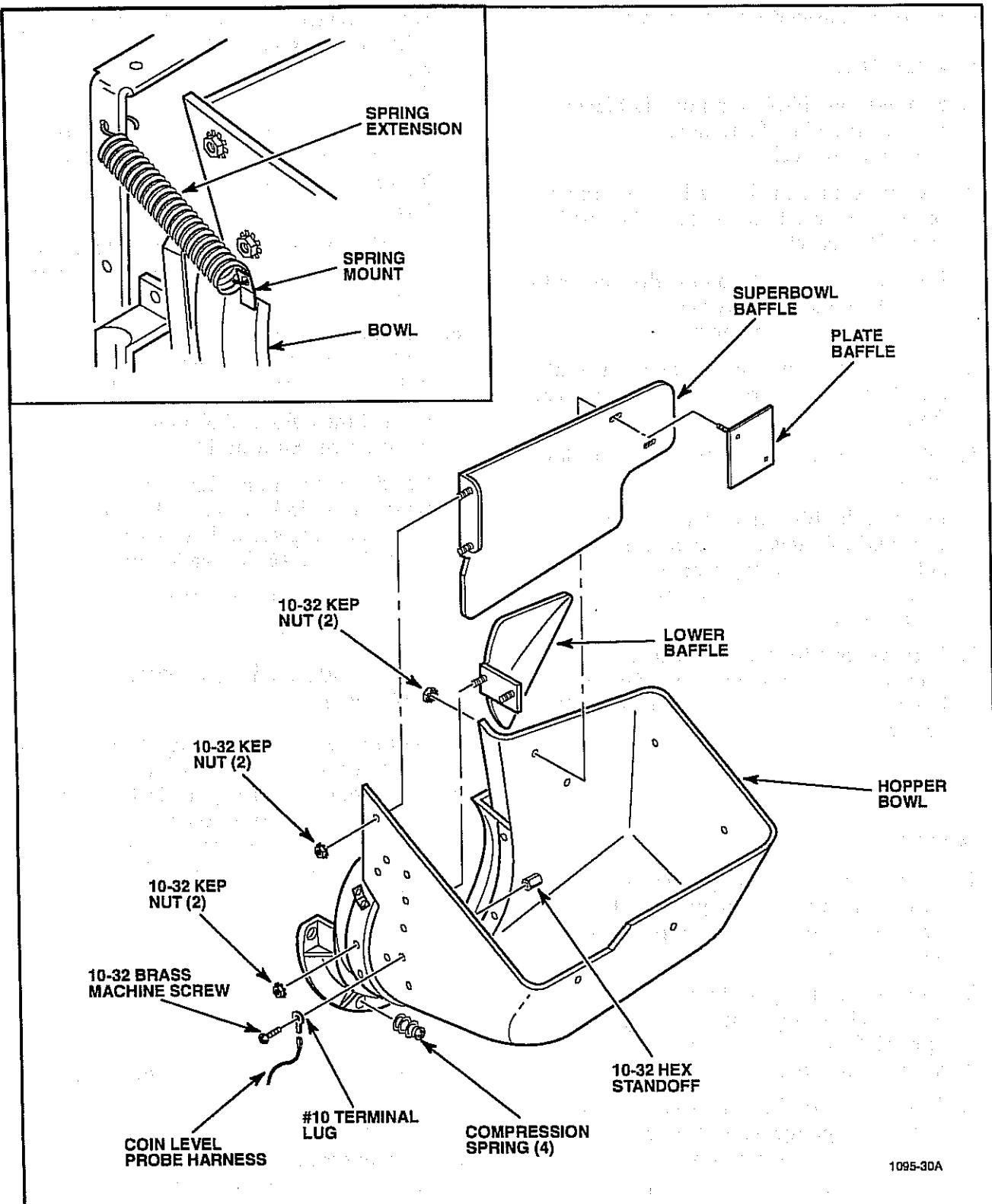


Figure 5-24. Hopper Bowl Components.

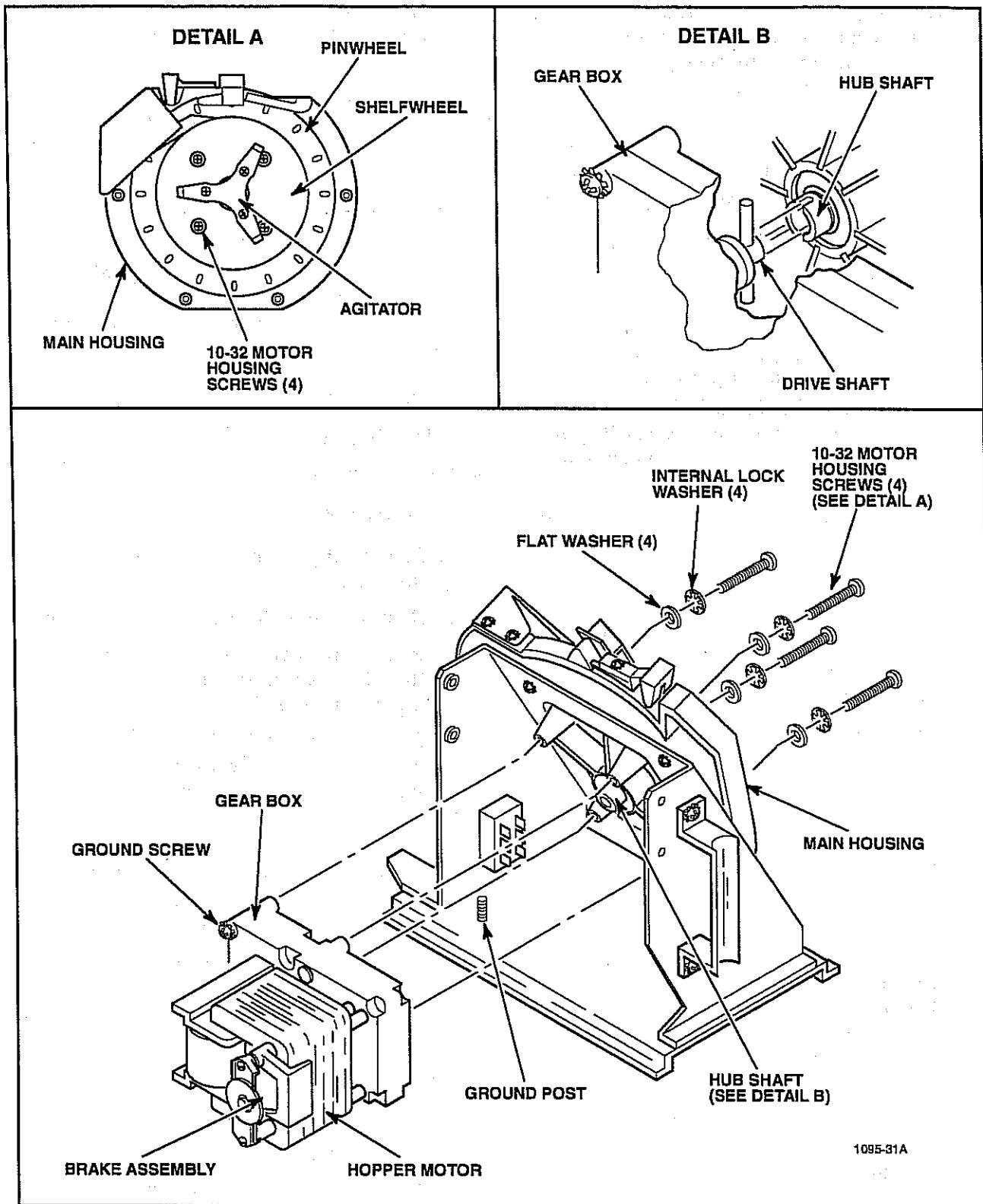


Figure 5-25. Hopper Motor.

3. Release the motor brake and rotate the pinwheel counterclockwise until the four access holes in the pinwheel align with the motor-mounting screws under the pinwheel.
4. Hold the motor in place and remove the four 10-32 motor housing screws, along with four #10 flat washers that fasten the motor to the main housing.

Installation

Note

Be sure the replacement motor has a roll pin installed in the drive shaft and that the pin is centered in the shaft. If the new motor does not have this pin, remove the pin from the old motor using either a press or a hammer and a 1/8" drift.

1. Align the motor drive-shaft and pin with the bearing shaft on the main housing.
2. Press the motor onto the shaft and rotate the motor until the four mounting posts of the main housing and gearbox align.
3. Hold the motor in place and release the motor brake.
4. Rotate the pinwheel counterclockwise until its access holes align with the gearbox mounting holes.
5. Fasten the motor gearbox to the main housing by starting each of the four 10-32 Motor Housing screws along with four #10 flat washers. **Do not tighten** until all four screws are started.
6. Tighten two of the screws that are located diagonally from each other by alternating between the two screws every two or three turns until the gearbox fits tightly against the main housing and the driveshaft roll pin fits completely into the hub shaft.
7. Securely tighten the remaining two mounting screws and double check the tightness of the first two.

8. Fasten the ground wire spade-lug to the upper-left corner of the gearbox with a 10-32 Sems screw.
9. If the motor harness uses faston connectors, connect the harness to the appropriate motor terminals.

5.5.7 Hopper Main Housing Disassembly & Assembly

The components that make up the main housing include a knife, metal and polyurethane coin wipers (large coin only), an optic coin-out sensor, and a pinwheel/ shelfwheel assembly.

Tools Required:

- #2 Phillips screwdriver
- 11/32" open/box-end wrench or nutdriver

Disassembly

1. Remove the hopper bowl from the main housing.
2. Remove the motor from the main housing.
3. Remove the coin deflector by removing the 8-32 hex nut from the back of the housing using an 11/32" wrench.
4. Remove the two 10-32 Sems screws that fasten the coin deflector and metal coin-wiper to the top of the main housing. Remove the wiper and coin deflector.
5. Remove the 8-32 Kep nut that fastens the polyurethane coin wiper from behind the main housing using an 11/32" wrench. Pull the wiper out from the housing.
6. Disconnect the coin-out sensor harness from the 7-pin hopper plug on the rear left side of the chassis and unfasten its ground wire from the grounding post on the chassis base using a 3/8" wrench.
7. Remove the 8-32 Sems screw that fastens the coin-out sensor to the top of the main housing and remove the sensor.
8. Remove two 10-32 Sems screws that fasten the knife to the main housing.

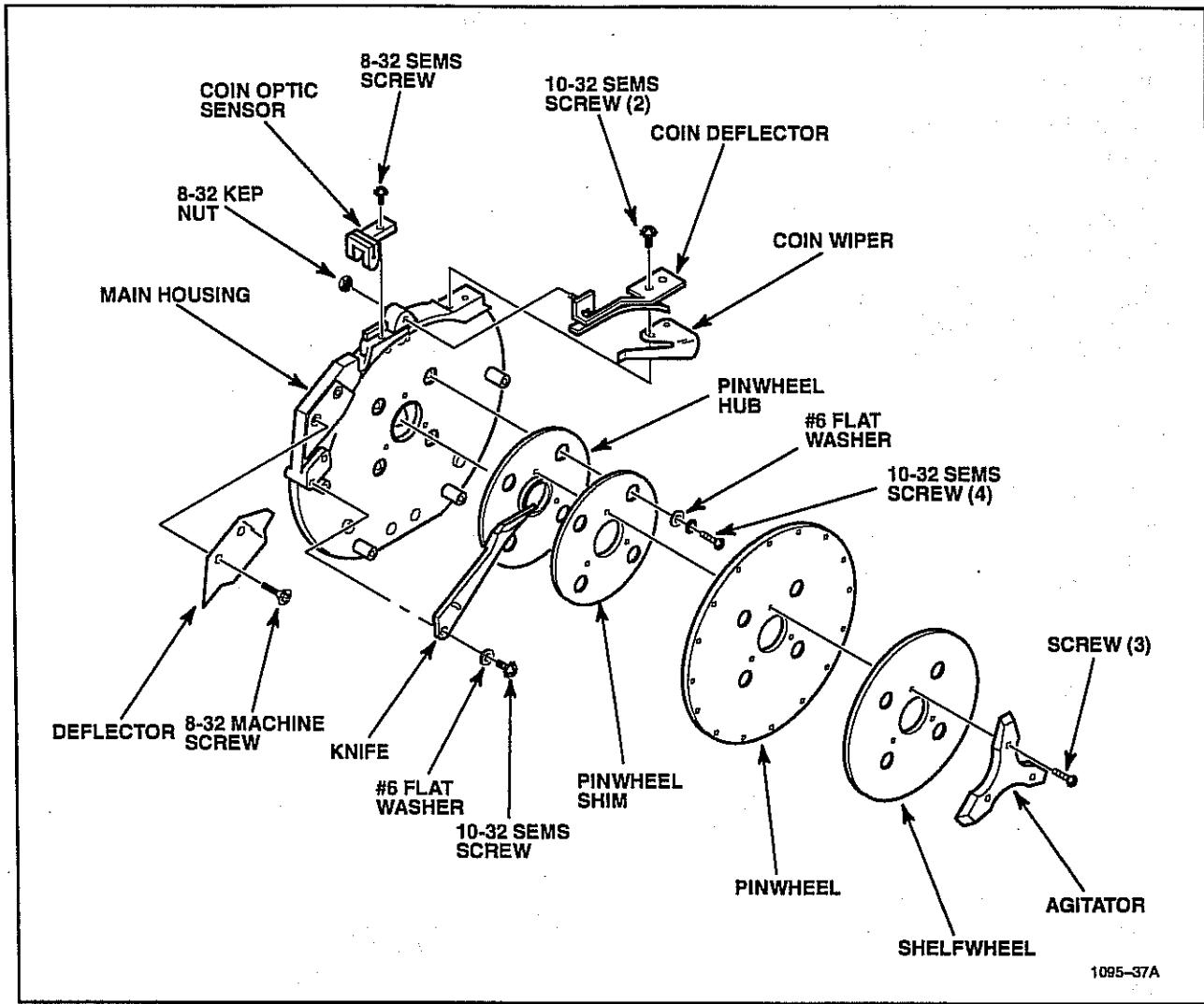


Figure 5-26. Hopper Main Housing - Small Coin.

9. Remove two 8-32 flat-head screws that fasten the coin deflector to the main housing and remove the deflector.
10. Remove three 10-32 machine screws that fasten the agitator, shelfwheel, pinwheel and shim(s) to the pinwheel hub and remove these components.
11. Remove four 10-32 Sems screws that fasten the main housing to the chassis from the back of the chassis.
12. Place the main housing face down on a bearing press so that the pinwheel hub is

unobstructed. IGT recommends using an IGT pinwheel hub-removal fixture.

13. Press the pinwheel hub out from the center bearings in the main housing. The self contained center bearings are factory pressed and can not be removed.

Assembly

1. Set the main housing face on a flat surface and insert the shaft of the pinwheel hub into the center bearing. IGT recommends using an IGT pinwheel hub-installation fixture.

2. Align the shaft perpendicular (90 degrees to the housing and press the pinwheel hub into place.
3. Attach the main housing to the chassis with four 10-32 Sems screws and four #6 flat washers. Be sure the cutout for the optic coin-sensor faces toward the top of the chassis.
4. Place the shim(s), pinwheel and shelf-wheel onto the pinwheel hub and align the three mounting holes with those in the hub. The four motor mounting holes should line up as well.
5. Align the three mounting holes in the agitator and fasten the agitator, shelfwheel, pinwheel and shim(s) to the pinwheel hub with three 10-32 Sems screws. Tighten securely using a #2 Phillips screwdriver.
6. Rotate the pinwheel counterclockwise and check that the pinwheel surface is slightly above or flush with the coin-out area on the main housing. If necessary, install shims between the pinwheel hub and the pinwheel to adjust for the correct height. (Shims are available at IGT Customer Service, see Section 2.)
7. Align the mounting holes of the coin deflector and coin wiper to the top of the main housing. Fasten the coin deflector to the main housing with two 10-32 Sems screws and tighten securely.
8. Assemble the knife to the main housing with two 10-32 Sems screws, #6 flat washers. Do not tighten securely at this time.
9. Assemble the coin-out sensor to the top of the main housing with one 8-32 Sems screw.
10. Connect the coin-out sensor harness to the 7-pin hopper plug on the rear, left side of the chassis and fasten its ground wire to the grounding post on the chassis base using a 3/8" wrench. Tighten securely.
11. Install the polyurethane coin wiper (large coin only) from the front of the main hous-
- ing and fasten securely with an 8-32 hex nut from the back of the housing using an 11/32" wrench.
12. Adjust the knife, and metal coin wiper (refer to Sections 5.5.2 and 5.5.8).
13. Fasten the motor to the main housing.
14. Fasten the hopper bowl to the main housing.

5.5.8 Adjustments

The following information describes the hopper adjustment procedures.

Hopper Knife

See Figure 5-27, Hopper Knife Adjustment.

1. Loosen the two 10-32 Phillips-head, knife retaining screws.
2. Position the tip of the knife against the pin wheel face and the top of the shelf wheel.
3. Lightly hold the knife in place and tighten the two retaining screws.
4. Release the motor brake and rotate the pin wheel counterclockwise to check for smooth operation.

5.5.9 Hopper Chassis Disassembly & Assembly

The components that makeup the hopper chassis include the main housing, the hopper plug and the handle. The Superbowl hopper requires an overhead frame and two bowl support springs.

Tools Required

- #1 Phillips screwdriver
- #2 Phillips screwdriver
- 1/8" Allen wrench
- 3/8" Open/box-end wrench or nutdriver
- wire cutters
- 600°F Soldering iron

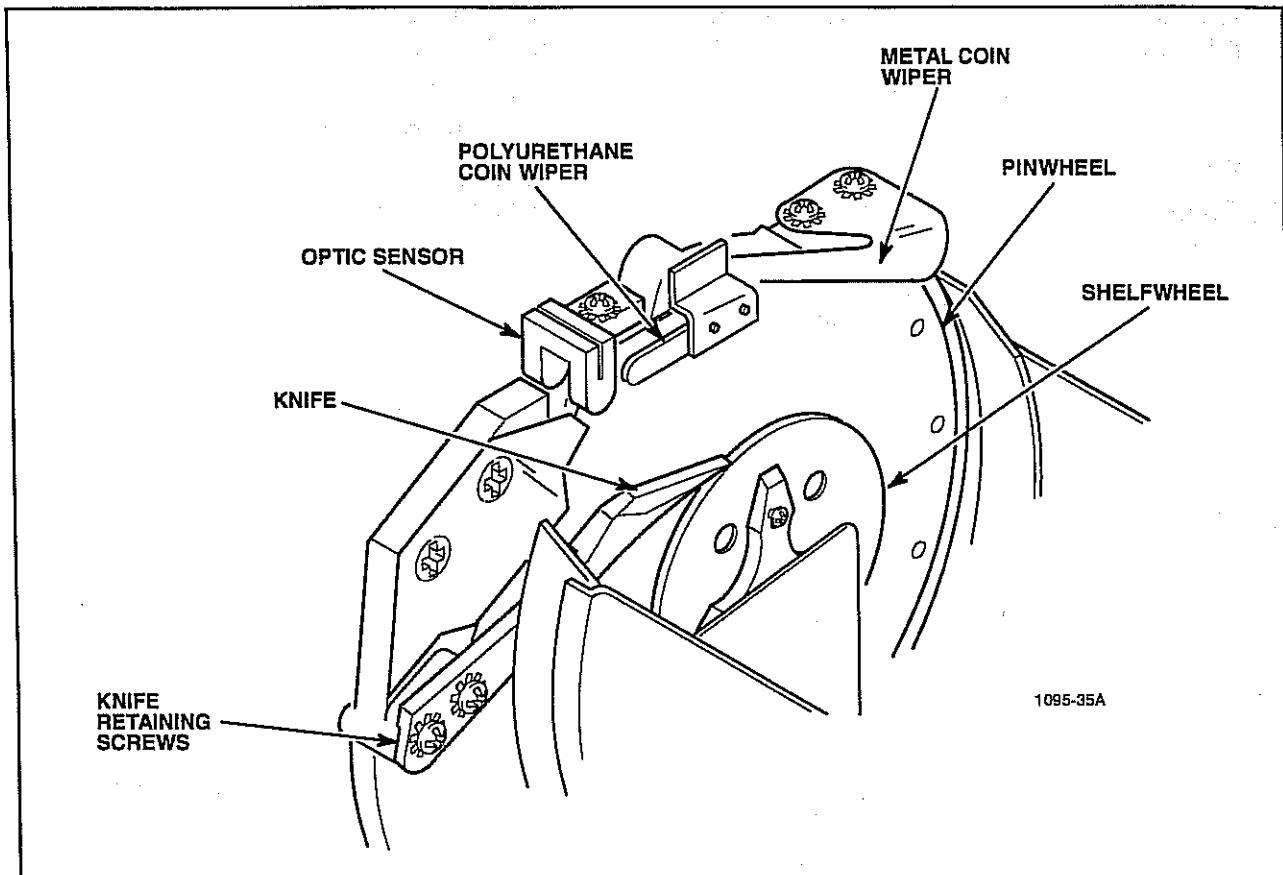


Figure 5-27. Hopper Knife Adjustment - Large Coin Only.

Disassembly

1. Remove the tyrap that secures the coin-out sensor harness to the top of the chassis.
2. Note the wire colors and their positions on the 7-pin hopper plug and disconnect the harness from the plug.
3. Disconnect the ground wires from the ground post on the chassis base using a 3/8" wrench.
4. Disconnect the harness from the coin-level probe on the side of the hopper bowl.
5. Remove the hopper bowl, motor and main housing.

Note

Unless replacing the hopper harness, removal of the A.C. wires from the motor is not necessary.

6. Remove two 10-32 machine screws that fasten the hopper plug to the left end of the chassis using a 1/8" Allen wrench.
7. Remove two 10-32 Sems screws that fasten the handle to the right side of the chassis.
8. Remove four 10-32 Sems screws that fasten the slot overhead frame to both ends of the chassis.

Assembly

1. Fasten the handle to the side of the chassis with two 10-32 Sems screws and tighten securely.
2. Fasten the overhead frame to both ends of the chassis with four 10-32 Sems screws. Tighten securely.
3. Fasten the hopper plug from the outside of the chassis, ground pin toward the bot-

- tom, with two 10-32 machine screws. Use a 1/8" Allen wrench and tighten securely.
4. Fasten the main housing to the chassis and the motor and hopper bowl to the main housing.
 5. Connect the harness for the coin-level probe on the left side of the hopper bowl.
 6. Fasten the double and single-wire ground lugs to the ground post on the chassis base
 -
 -
 -
 7. Connect the wires of the hopper harness to the 7-pin hopper plug.
 8. Secure the coin-out sensor harness to the top of the chassis using a small tyrap. Use small wire cutters to remove the excess tyrap.

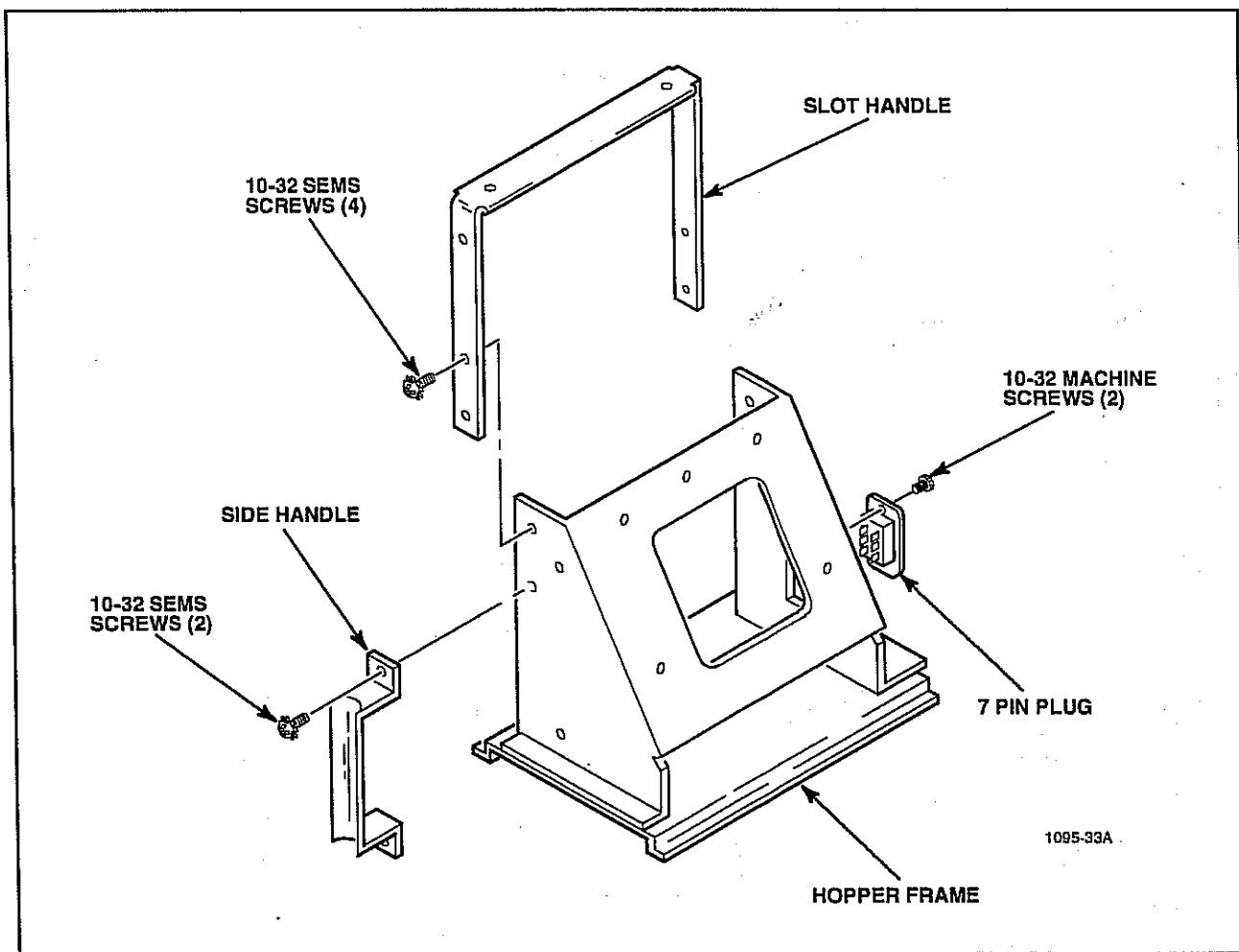
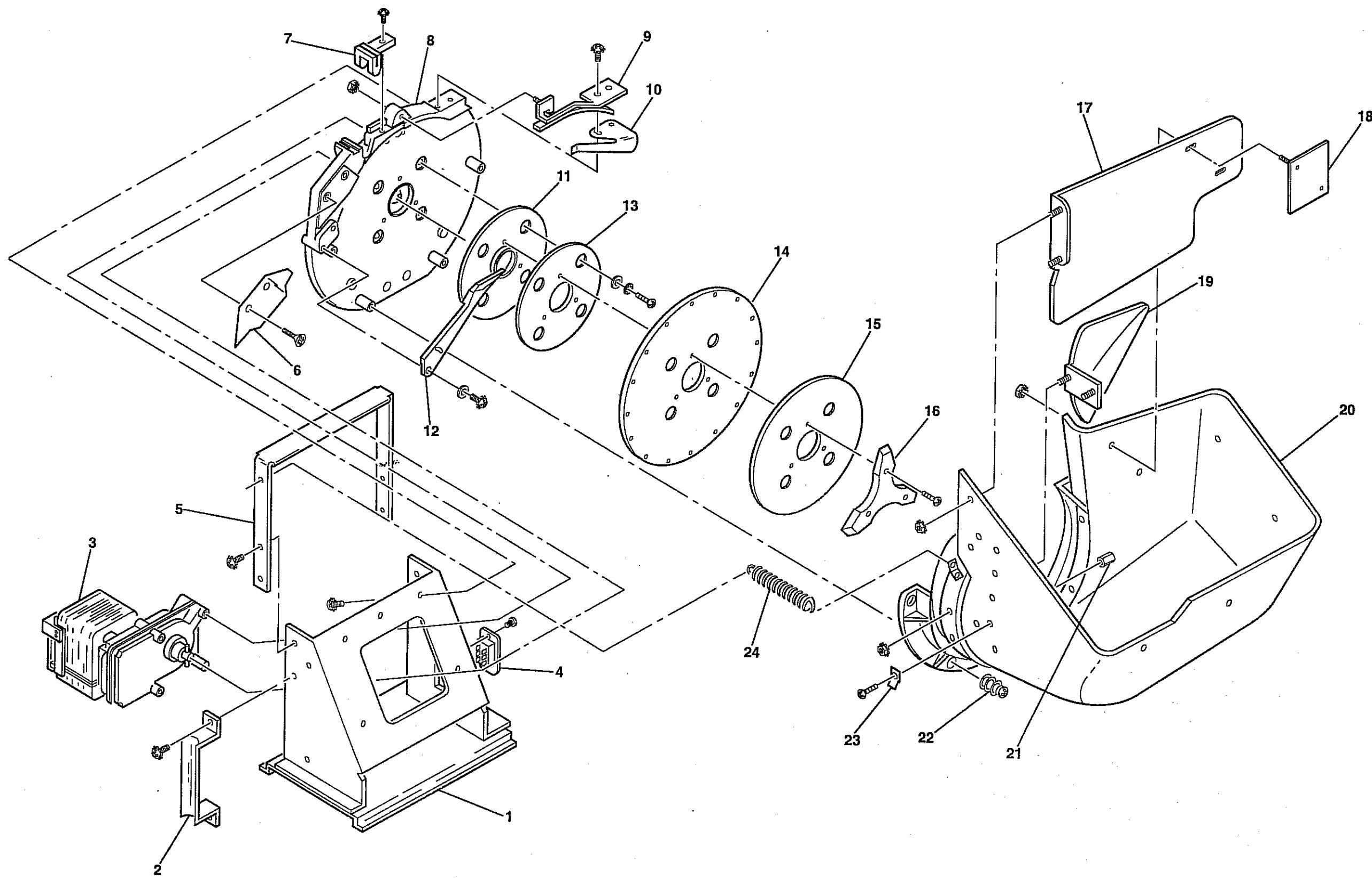


Figure 5-28. Hopper Chassis.

SUPERBOWL HOPPER

Components & Assemblies

SUPERBOWL HOPPER

<u>Component</u>	<u>Description</u>	<u>Part Number</u>
ASSY	ASSEMBLY - HOPPER SUPERBOWL, 5 CENTS (SMALL)	1
ASSY	ASSEMBLY - HOPPER SUPERBOWL, 25 CENTS (SMALL)	1
ASSY	ASSEMBLY - HOPPER SUPERBOWL, 50 CENTS	1
ASSY	ASSEMBLY - HOPPER SUPERBOWL, IKE \$ (LARGE)	1
KIT	COMMON PARTS, SIDE EJECT	1
KIT	BOWL ASSEMBLY, SUPERBOWL, SMALL COIN	1
KIT	BOWL ASSEMBLY, SUPERBOWL, IKE	1
1.	FRAME, HOPPER	1
2	HANDLE, HOPPER	1
-	SCREW, SEMS, PH PAN, 10-32 x 3/8"	12
3	MOTOR, HOPPER, 25 RPM, HEAVY DUTY, 50/60 HZ	1
-	WASHER, FLAT STEEL, #10	4
-	WASHER, LOCK INT., STEEL, #10	4
-	SCREW, MACHINE, PH PAN, 10-32 x 1/2"	4
-	SCREW, MACHINE, PH PAN, 10-32 x 1/2", PREGND, GOLD	1
4	PLUG, 7 PIN W/MTG BKT, PREGND, GOLD	2
-	SCREW, MACHINE, SOC BUT, 10-32 x 1/4"	
5	BRACKET, HOPPER	1
6	DEFLECTOR, COIN, HOPPER	1
-	SCREW, MACHINE, PH FLT HD, 8-32 x 3/8" 100DEG	2
7	OPTICAL ASSEMBLY - HOPPER	1
-	SCREW, SEMS, PH PAN, 8-32 x 3/8"	1
8	MAIN HOUSING, HOPPER, SIDE EJECT	1
9	DEFLECTOR, COIN, SIDE EJECT, METAL SMALL COIN	1
10	WIPER, COIN, HOPPER, METAL	1
-	WIPER, COIN, HOPPER, RED	1
-	NUT, KEP STEEL, 8-32	1
11	HUB, PINWHEEL	1
12	KNIFE, HOPPER, HARD PLASTIC LARGE COIN	1
-	KNIFE, HOPPER, HARD PLASTIC SMALL COIN	1
13	SHIM, PINWHEEL, .010 (THK)	1
14	PINWHEEL, HOPPER, 14 PIN, HORIZ, 5 CT	1
-	PINWHEEL, HOPPER, 15 PIN, 25/50 CT	1
-	PINWHEEL, HOPPER, 11 PIN, IKE	1
15	SHELFWHEEL, 5 CENT SIDE EJECT	1
-	DISC, COIN, 5CT, .812-.878 x 14 GA	1
-	DISC, COIN, 25CT, .875-.988 x 14 GA	1
-	DISC, COIN, 50CT, 1.150-1.286 x 13 GA	1
-	DISC, COIN, IKE \$, .38MM x 13 GA	1
16	AGITATOR, LOW PROFILE, HOPPER	1
-	SCREW, MACH., PH PAN, 10-32 x 1/2"	3
17	BAFFLE, SMALL COIN, SUPERBOWL	1
-	BAFFLE, DOLLAR, SUPERBOWL	1
18	PLATE, BAFFLE, SUPERBOWL	1
19	BAFFLE, HOPPER, LOWER, SUPERBOWL	4
-	NUT, KEP STEEL, 10-32	1
-	SUPPORT, SPRING, SUPERBOWL	1
20	BOWL, HOPPER, SUPERBOWL SMALL COIN	1
-	BOWL, HOPPER, SUPERBOWL LARGE COIN	1
21	STANDOFF, 10-32, HEX, .50(LG), NYLON	1
22	SPRING, COMPRESSION, LIGHT (SHOWN)	2
-	SPRING, COMPRESSION, HEAVY	2
23	TERMINAL LUG	1
24	SPRING, EXT., .49(OD) X 2.75(LG) X .057(W)	2
-	HARNESS, HOPPER, 7 PIN, COIN-OUT OPTICS	1

5.6 Power Supply

This section provides a description of the power supply configuration. Refer to the power supply exploded view illustration at the end of this section to identify specific components. Refer to the overall wiring diagram at the end of this section for more specific electrical information.

5.6.1 Power Supply Removal & Installation

The power supply is located under the imbedded bill acceptor and is able to be removed from the cabinet. The following procedure describes the steps necessary to remove the power supply from the cabinet. (See Figure 5-29)

Tools Required

- 5.5mm nutdriver
- #2 Phillips screwdriver

Power Supply Removal

The following procedure describes the steps necessary to remove the power supply from the cabinet. (See Figure)

1. Open the machine door and turn the machine **power off**.
2. Remove the coin tray and hopper from the machine.
3. Unplug all the harnesses to the power supply and clear them out of the way.
4. Remove the M4 x 6 Sems screw from the floor of the cabinet, which is one of two fasteners that attach the power supply to the cabinet.
5. The last fastener is located within the power supply, so remove the 6-32 x 5/16" Sems screw that secures the back plate to the frame.
6. Remove the back plate by lifting up and then away from the power supply.
7. Remove the M3 Kep nut located on the right wall of the power supply.

8. Slide the power supply from under the bill acceptor

Power Supply Installation

The following procedure describes the steps necessary to install the powersupply in the cabinet. (See Figure .)

1. Slide the power supply under the bill acceptor, making sure the connectors are in the back and fuses are at the front.
2. Fasten the power supply to the side of the cabinet with a M3 Kep nut.
3. Arrange the back plate on the power supply with the mounting hole of the back plate aligning with the mounting hole of the power supply.
4. Secure the back plate to the cabinet with a 6-32 x 5/16" Sems screw.
5. Fasten the power supply to the bottom of the cabinet with a M4 x 6 Sems screw.
6. Plug the harnesses into the appropriate connectors.
7. Install the hopper and coin tray on the machine.
8. Turn the machine **power on** and close the door to the machine.

5.6.2 Inspection

Routinely inspect all electrical connections in the power supply.

1. Turn the machine **power off** and remove the coin tray and hopper from the machine.

Note

The door alarm sounds each time the machine door is opened with the power on. To turn the alarm off, press the white self test switch on the processor connector panel.

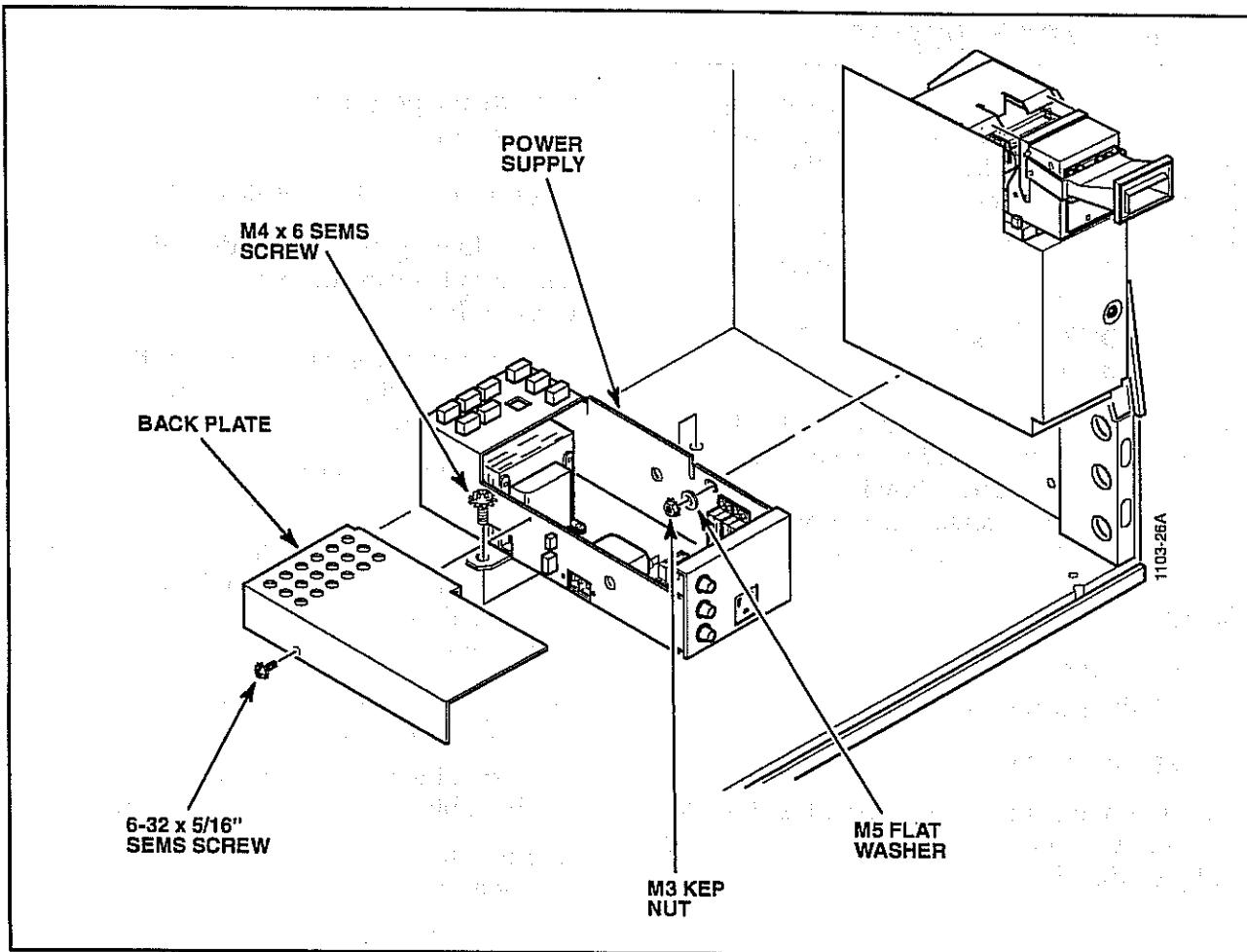


Figure 5-29. Power Supply Removal

2. Verify the integrity of all . Make certain that wires are not frayed or pinched by nearby components.
3. Be sure that all connections are secure.
4. Replace any damaged wires or connectors.
5. Identify the current voltage configuration using the voltage conversion label affixed to the power supply cover, to the left of the main fuses. Figure 5-30 also shows the voltage-conversion label information.

5.6.3 Operating Voltages & Frequencies

The S-Plus machine can easily be converted to operate at four voltage ranges and two operat-

ing frequencies. See Figure 5-30, Voltage Conversion.

1. Disconnect the machine from all power sources and remove the coin tray and hopper from the machine.
2. Identify the current voltage configuration using the voltage conversion label affixed to the power supply cover, to the left of the main fuses.
3. Determine the operating frequency, either 50 Hz or 60 Hz. The 50 Hz ballasts are identified with a white label.
4. To convert to a different operating voltage: simply follow the instructions on the con-

VOLTAGE CONVERSION			
VOLTAGE TAP	VOLTAGE RANGE	MOVE BLACK/VIOLET WIRE ON T1 TO:	MOVE BLACK/RED WIRE ON TB6 TO:
115 VAC	99-128 VAC	10	3
220 VAC	195-243 VAC	10	4
240 VAC	210-264 VAC	11	4

POWER TRANSFORMER T1 TB6
1 2 3 4 5
5-POSITION TERMINAL BLOCK

NOTE: WHEN CONVERTING MACHINE, IF THE OPERATING FREQUENCY IS DIFFERENT, THE BALLAST FOR THE LIGHT ASSEMBLIES MUST BE CHANGED.

1073-15A

Figure 5-30. Voltage Conversion.

version label and use the parts included in the voltage conversion kit shipped with the machine.

Note

IMPORTANT! Disconnect the machine from all power sources before making changes to operating voltage or frequency.

Double check all electrical connections before applying power to avoid permanent damage to the machine's electronic components.

5. To convert to a different operating frequency: the ballasts for all of the light assemblies must also be changed.
6. Contact IGT Customer Service to order the new lighting kit (ballasts for the top box fluorescent light, upper door fluorescent, belly panel fluorescent).

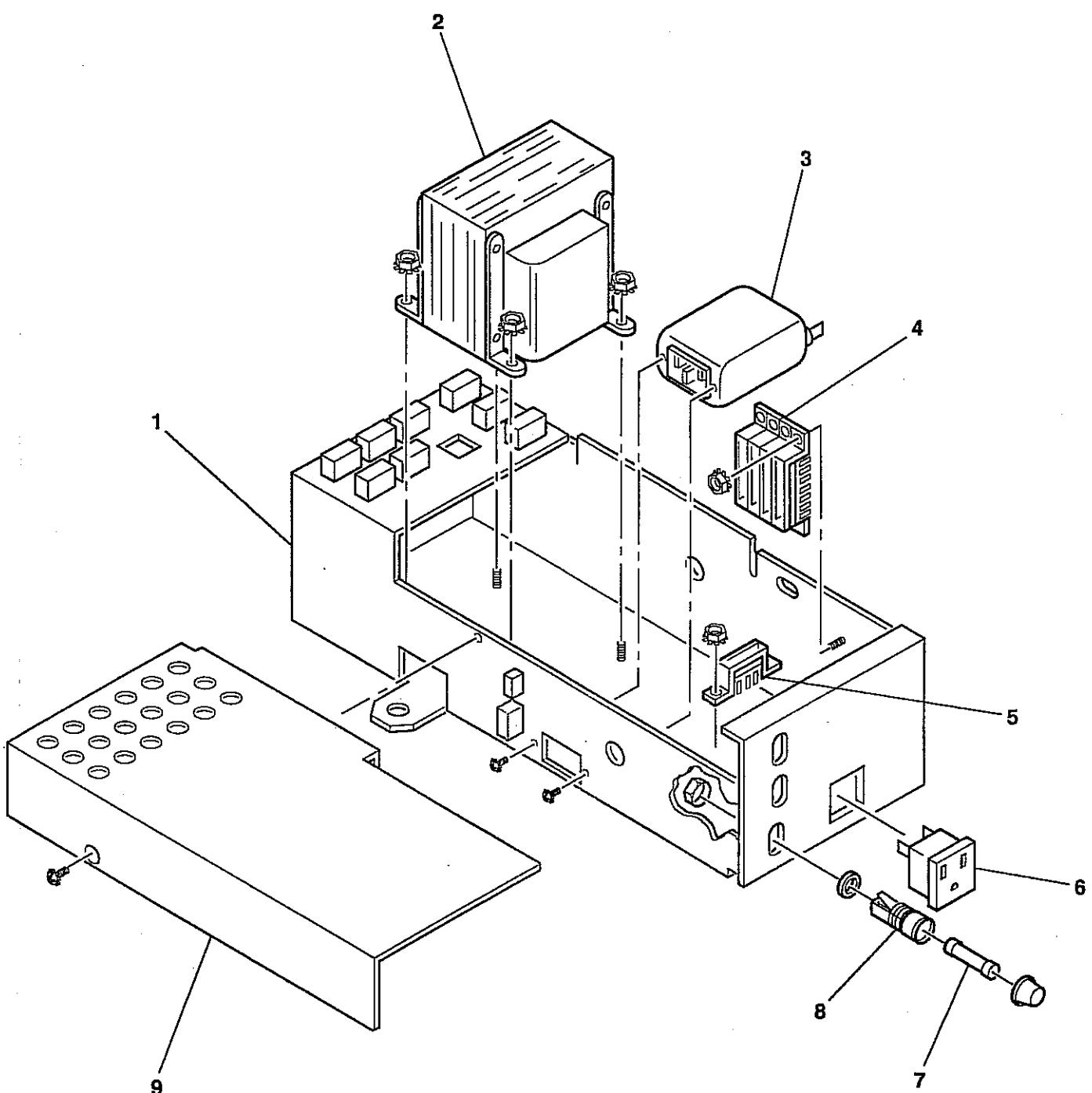
5.6.4 Troubleshooting the Power Supply

1. If the machine is inactive (no functions observed), verify that:

- the power cord is operational, connected properly and plugged into a functioning outlet
 - the main power fuse (F3) is not open
2. If only the fluorescent lights are operational (no other machine functions) and there is no tension on the stepper reels, the 24 VAC, 4 Amp fuse may be open.
 3. If the fluorescent lights are not illuminated but all other machine components are functional, the 2 Amp, 115 VAC fuse (F4) may be open or the processor board may not be properly connected.
 4. Consult the wiring diagrams and schematics at the end of this section.

MAIN POWER SUPPLY

Fig. No.	Part Number	Description	Qty.
1	647-176-00	FRAME - POWER SUPPLY, S+IBA	1
2	560-026-90	TFMR, 24VCT/6A, 8V/2A, 7V/6A, 220	1
ASSY	272-006-02	ASSEMBLY - FILTER, LNE, 5AMP 220/240 CS	1
3	272-019-90	FILTER, LINE, 5AMP, IEC CON CSA	1
-	483-014-90	VARISTOR, 250V, 40J V250LA4	1
-	152-055-90	CAP. DISC CERAM, .01MF-500V	2
-	152-105-90	CAP. DISC CERAM, .0047 300 VAC U	2
-	609-527-00	HARNESS, GROUNDING 16GA. x 3.50 IN.	1
4	218-021-90	TERMINAL BLOCK, 10 POS COMMONING	4
-	219-562-90	HOUSING, 3 PIN, MINI-FIT	5
-	219-372-90	HOUSING, 6 PIN, MINI-FIT JR.	1
5	218-022-90	TERMINAL BLOCK, 5 POS COMMONING	1
6	125-010-90	OUTLET, 125 VAC .250 Q-DISC GND	1
7	524-013-90	FUSE, F.B., 6 AMP	1
7	524-015-90	FUSE, F.B., 8 AMP	1
7	524-013-90	FUSE, F.B., 6 AMP	1
-	850-329-00	LABEL - P/S, 120V, 50/60HZ, S+IB	1
8	213-045-90	HOLDER, FUSE 3AG SHOCK - PROOF	3
-	607-166-00	HARNESS, POWER SUPPLY, S+IBA, SECONDARY	1
-	607-166-20	HARNESS, POWER SUPPLY, S+IBA, SECONDARY LS	1
-	824-496-00	INSTRUCTIONAL HARNESS STD "IGT-STD-130A"	1
-	607-166-50	HARNESS, POWER SUPPLY, S+IBA, SECONDARY DW	1
-	219-372-90	HOUSING, 6 PIN, MINI-FIT JR.	1
9	589-697-00	PLATE - BACK, POWER SUPPLY, S+IBA	1
-	607-165-00	HARN, POWER SUPPLY, S+IBA PRIMARY	1
-	607-165-20	HARNESS, POWER SUPPLY, S+IBA, PRIMARY LS	1
-	824-496-00	INSTRUCTIONAL HARNESS STD "IGT-STD-130A"	1
-	607-165-50	HARNESS, POWER SUPPLY, S+IBA, PRIMARY DW	1

MAIN POWER SUPPLY

5.7 Mother Board

The mother board is located against the back wall of the machine behind the hopper.

5.7.1 Inspection

Confirm that the power cord, the connectors on the front connector panel, the fiber-optic cables and any optional equipment connectors are all firmly seated. Check the integrity of all wires and fuses and verify that no wires are pinched by the processor board tray.

Tools Required

- #2 Phillips screwdriver
- 8mm nutdriver

5.7.2 Mother Board Removal & Installation

To remove or install the mother board on the lower module, see Figure 5-31 and proceed as follows.

Tool Required

- #2 Phillips screwdriver

Removal

1. Open the machine door and turn the power off.
2. Remove the hopper (refer to Section 5.5, Superbowl Hopper) and disconnect the machine power cord. If a harness is connected at J/P 210 above the power cord, disconnect it.
3. Remove the processor board assembly (refer to Section 5.8, Processor Board).
4. Disconnect all harnesses from the mother board. Each black harness connector has a safety catch on one side. Press and hold the safety catch to release the harness connector from the board connector. Pull straight up on the connector to avoid bending any pins.
5. Remove the two M3 x 8 Sems screws, two M3 flat washers, M3 x 16 machine screw and center standoff that fasten the mother board assembly to the bottom of the lower module (see Figure 5-31).

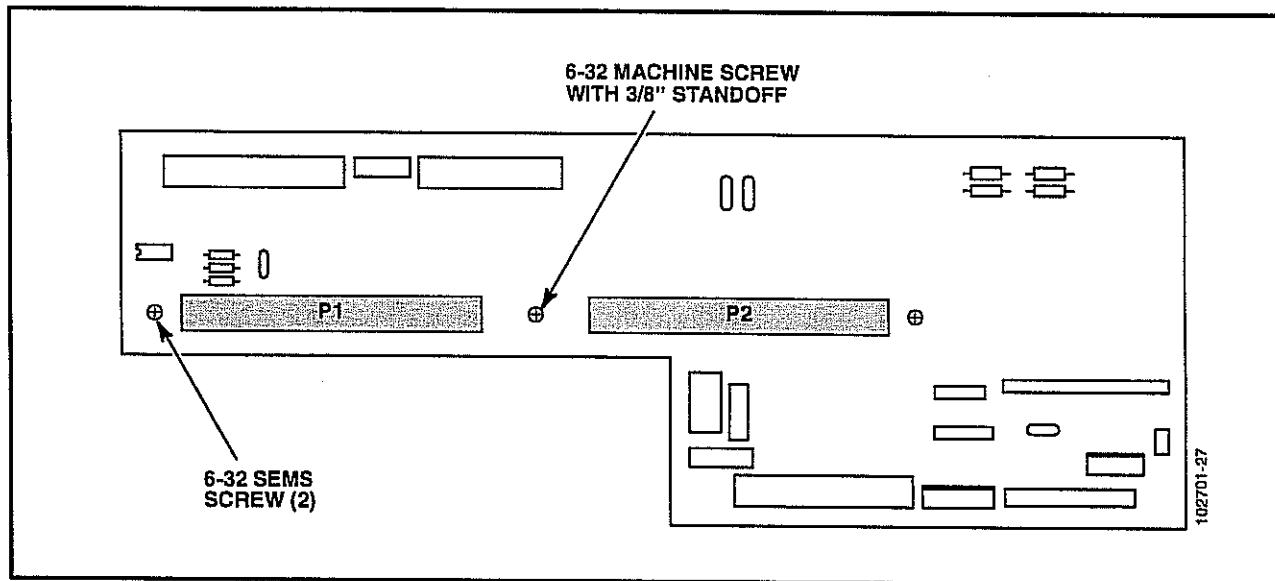


Figure 5-31. Mother Board.

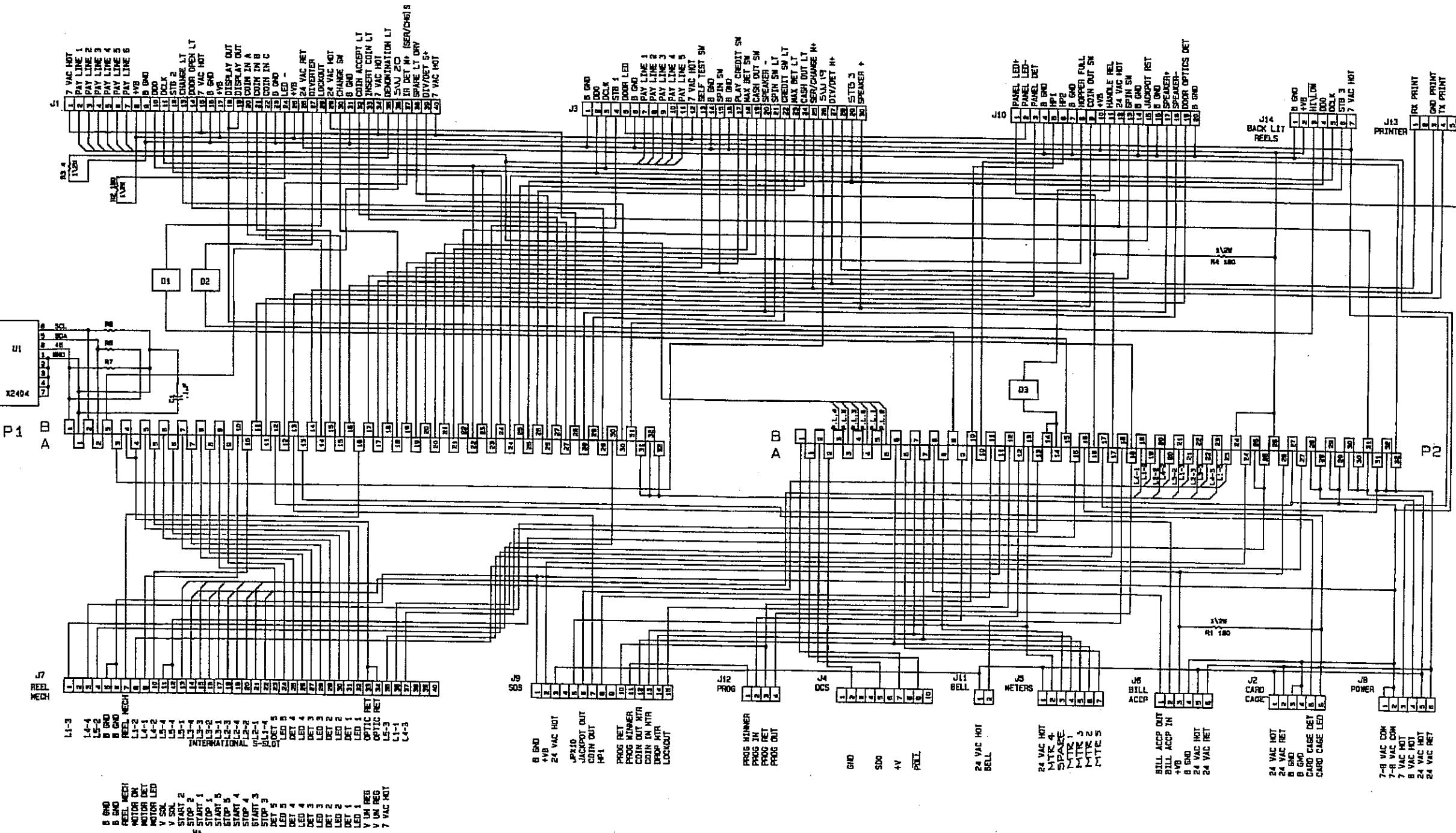
6. Carefully unsnap the corners of the mother board from the four snap top standoffs and lift the board, clear plastic cover and white board insulator out of the lower module.

Installation

1. Orient the mother board with the white board insulator underneath and the clear, plastic board cover on top so that connector J1 is in the right, rear corner. Push the mother board corners down onto the snap top standoffs on the floor of the lower module.
2. Fasten the mother board to the cabinet with two M3 x 8 Sems screws (at the two extreme ends of connectors P1 and P2).
Tighten securely.

3. Install the M3 x 16 machine screw and .140ID x .280D x .38L standoff at the mounting hole between connectors P1 and P2 and tighten securely.
4. Connect the harnesses from the lower module connector panel and the remaining applicable harnesses to the mother board.
5. Install the processor board and hopper into place.
6. Turn the machine **power on**; close and lock the door.

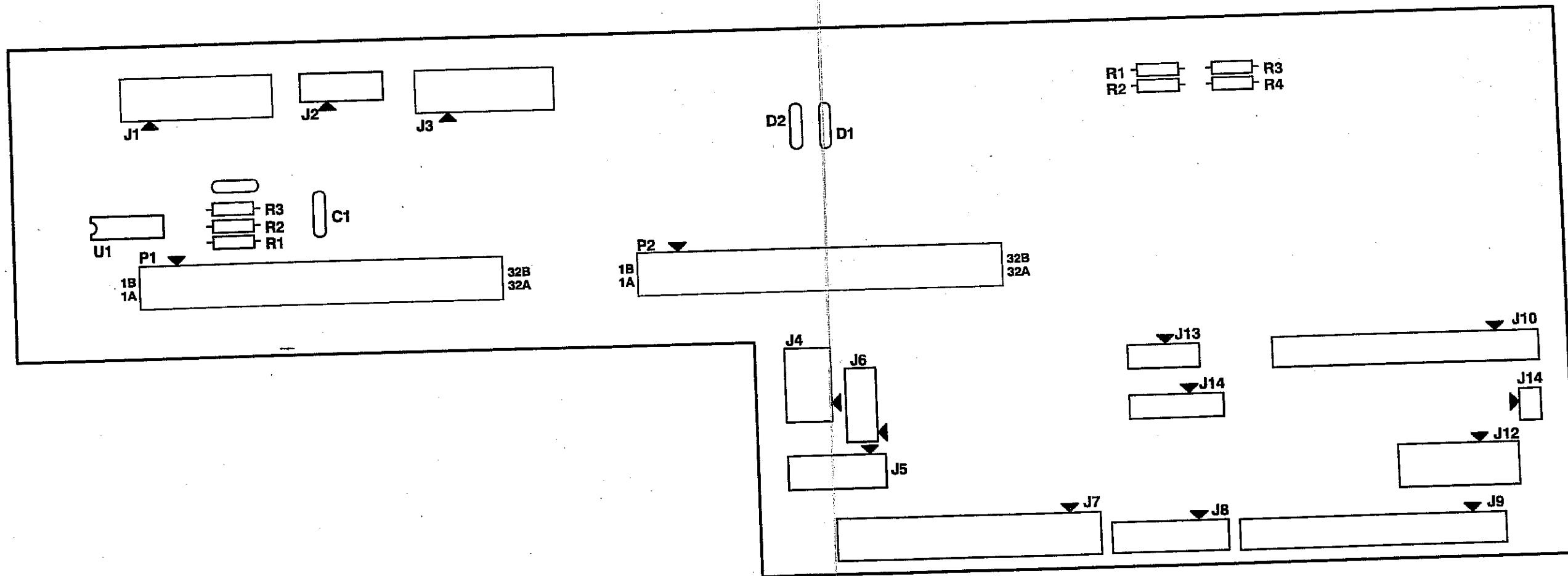
MOTHER BOARD SCHEMATIC
759-039-10 REV A



Components & Assemblies

MOTHER BOARD
759-039-00 REV A

Component	Description	Part Number
C1	CAP CER BYPS .1UF 50V	152-071-90
D1-3	SUPPR CURRENT 0.75A RXE050	483-027-90
J1,7	CONN, HDR, 40PIN, STR, SHR, DR SL	211-052-90
J10	CONN, HDR, 20PIN, STR SHROUD SL	211-055-90
J11	CONN, HDR, 2PIN, STR SHROUD SL	211-049-90
J12	WAFER, 045RD 4 PIN STR PLZD	219-123-90
J2,6,13	CONN, HDR, 6PIN, STR SHROUD SL	211-058-90
J3	CONN, HDR, 30PIN, STR, SHR DR SL	211-051-90
J4	CONN, HDR, 10PIN, STR, SHR, DR SL	211-054-90
J5,14	CONN, HDR, 7PIN, STR SHROUD SL	211-056-90
J8	WAFER, RD.WIRE, 6 PIN, MOLEX2403	219-013-90
J9	CONN, HDR, 15PIN, STR SHROUD SL	211-057-90
P1,2	CONNECTOR, DIN, 64 PIN, FEMALE	215-010-90
RAW BOARD	BOARD, PC, MTHR.INTL S/M+ RAW	759-039-30
RAW BOARD	BOARD, P, MTHR.INTL S+/M RAW	759-039-31
REF ASSY DWG	BOARD, PC, MTHR, INTL S/M+ DWG	759-039-50
REF SCHEMATIC	BOARD, PC, MTHR.INTL S/M+ SCH	759-039-10
R1,2,4	RESIST. COMP 180 OHM .5W RC20*	471-172-90
R3	RESIST. COMP 3.9 OHM .5W RC20*	471-178-90
R5-7	RESIST. CF 10K OHM .25W LP	474-026-90
U1	EEPROM, 4K, SERIAL, 24C04	708-016-90



June 25, 1993

5.8 Processor Board

The processor board is mounted to the processor board tray and plugs into the mother board. The processor board is located behind the hopper against the back wall of the cabinet. It contains the game software IC (integrated circuit) EPROMs, the battery-backed game statistic memory, and all circuitry necessary to control game and video functions.

Machines are equipped with a lockable processor board. The lock assembly is monitored to determine whether the processor board is locked in place. Refer to Section 2, Machine Installation, for processor board lock specifications.

5.8.1 Removal

To remove the processor board from the cabinet, see Figure 5-33 and proceed as follows.

CAUTION

The processor board and components are static-sensitive. Prior to touching any component on the processor board, verify that any static charge buildup in your body is discharged.

Tool Required

- #2 Phillips screwdriver

Procedure

1. Open the machine door and turn the power off.
2. Remove the hopper (refer to Section 5.5, Superbowl Hopper).
3. Unlock the security lock on the processor board, if present. Refer to Section 2, Machine Installation for lock specifications.
4. Firmly grip the knob on the side of the processor board tray and lift the tray straight up.
5. Tilt the top of the tray and lift it up and out of the cabinet.

6. To remove the processor board from the tray:
 - a. Remove the 6-32 x 1/2" Sems screw and #6 flat washer that fasten the plastic pin-guide in place between J1 and J2. Lift the guide off of the processor board.
 - b. Disconnect the 6-pin Molex connector from the transformer at J3.
 - c. Remove the three 6-32 x 1/4" Sems screws that fasten the processor board to the metal standoffs on the tray. Lift the board up and away from the tray.

5.8.2 Inspection

Inspect the board components for any obvious problems: damaged or bent components or connections, chips not seated properly, etc. Board components and locations, along with the processor board schematic are shown at the end of this section.

5.8.3 Adjustments

The only adjustment possible on the processor board is game program jumper locations. For game program adjustments refer to Section 4, Game Software.

5.8.4 IC Chip Replacement

To remove or install IC (integrated circuit) chips on the processor board, see Figure 5-32 and proceed as follows.

Note

Record the statistical data before removing game program chips. Chip removal clears all current statistical data.

Tools Required

- Chip extractor
- Chip inserter

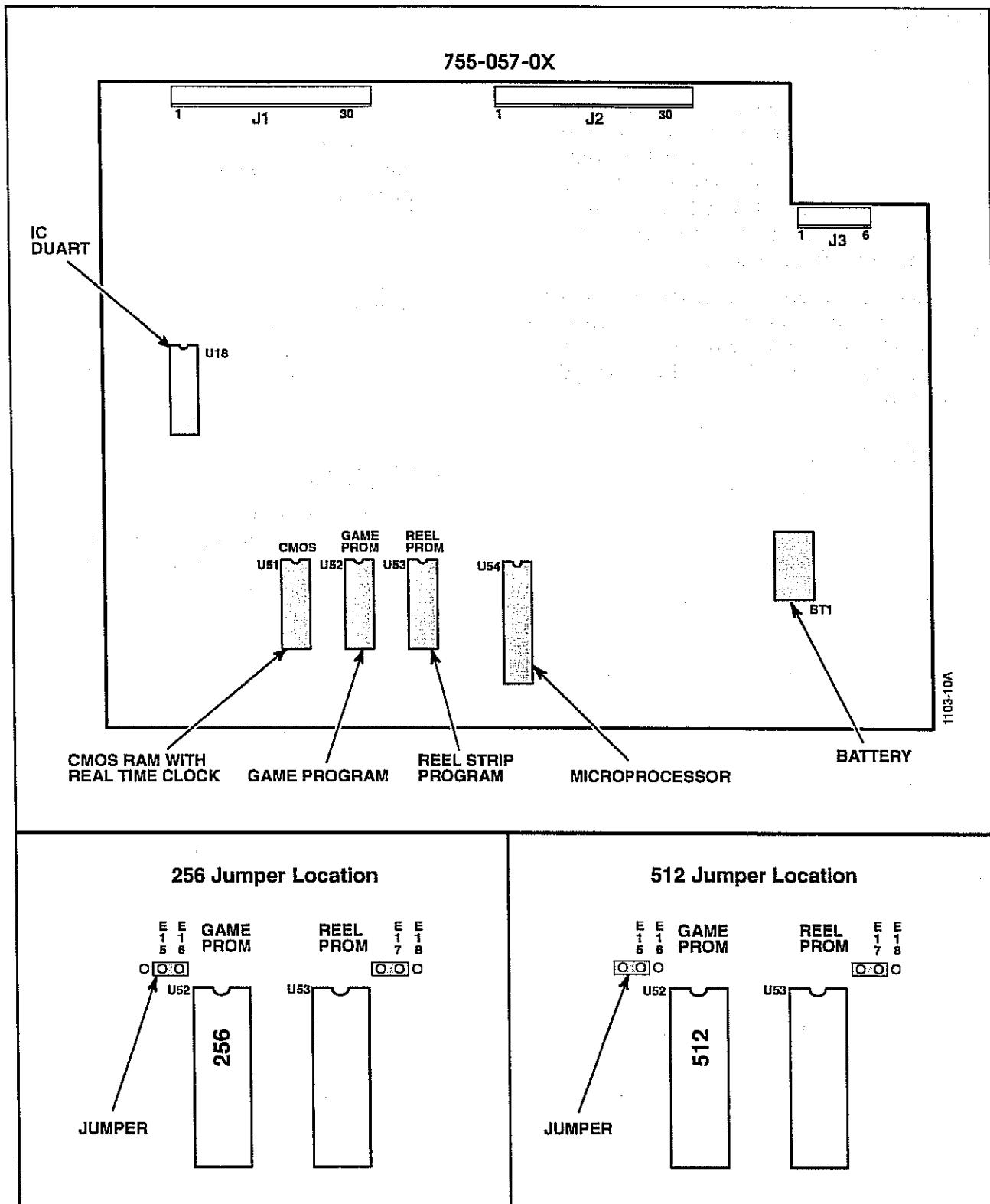


Figure 5-32. IC Chip Locations.

Chip Removal

The ICs intended for field replacement are the game program EPROM and reel strip program, shown in Figure 5-32. Most other ICs are soldered into place and not intended for replacement in the field.

CAUTION

Chip removal and replacement instructions should be followed carefully to avoid damaging both the individual program chips and the circuit board itself. These devices are static-sensitive and should be handled by QUALIFIED PERSONNEL ONLY.

1. Open the machine door and turn the power off. Remove the processor board from the cabinet.
2. Place the processor board on a stable, flat surface. **Important!** Ground yourself to neutralize static that can damage both the ICs and the processor board.

CAUTION

Prying against the circuit board with a pointed object damages the traces underneath the IC socket.

3. Locate the chip to be replaced and, after grounding yourself, carefully remove it with a chip extractor.

Chip Installation

1. Handling the computer chip only by the ends, visually align it by matching the orientation notch, located at one end of the chip, with the notched outline on the processor board.

CAUTION

If the computer chip is placed into its socket in the wrong direction or with one or more pins ("legs") out of position, the chip will be irreversibly damaged when the machine power is turned on.

2. The two sets of "legs" on each computer chip are generally spread a little wider

apart than the openings in the receptacle. If the legs appear too wide for the receptacle, adjust the alignment by using a chip installation tool of the correct size.

If an installation tool is not available, it may be possible to spring the legs into alignment by placing the chip on its side on a flat non-metal surface and gently tilting the chip just enough to bend all of the legs inward a little on each side.

3. When the chip is properly aligned, use gentle hand pressure to push it into the socket.
4. Check both sides of the chip to be sure that all legs are engaged correctly before pushing all the way down into its seat.
5. Verify that the E15/E16 jumper is in the correct position using the adjustment procedures in Section 5.8.3.
6. Install the processor board assembly and lock into place (refer to Section 5.8.5).
7. Turn the machine power on. Refer to Section 4, Game Software, for information about setting the machine address and selecting programmable game options using the self test mode.
8. Close and lock the machine door.

5.8.5 Processor Board Installation

To install the processor board in the lower module, see Figure 5-33 and proceed as follows.

Tool Required

- #2 Phillips screwdriver

Installation Procedure

1. To install the processor board onto the tray:
 - a. Slide the processor board into the metal tray and seat it so that the tabs on the board protrude through the slots in the top of the tray.

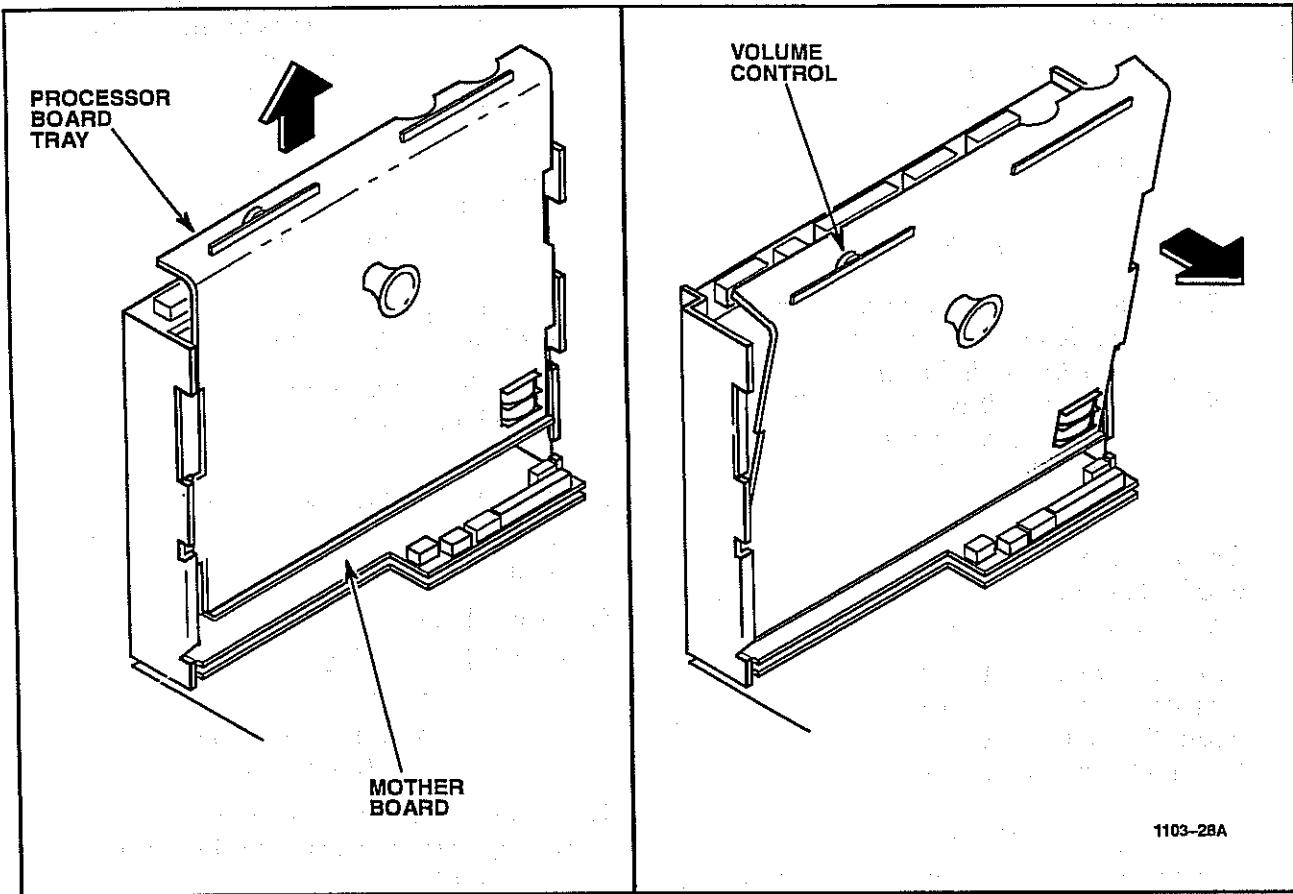


Figure 5-33. Processor Board Tray Removal.

- b. The holes in the back of the processor board should line up with the metal standoffs on the tray. Attach the board to the tray using three 6-32 x 1/4" Sems screws.
- c. Position the black plastic pin-guide on the board between J1 and J2 and attach it with a 6-32 x 1/2" Sems screw and #6 flat washer.
- d. Connect the 6-pin Molex connector from the transformer to J3 on the processor board.
- 2. If present, set the security lock in the full open (unlocked) position.
- 3. Angle the top of the processor board tray towards the back wall and set the tray down over the mother board.
- 4. Align the tray edges with the staggered front and rear guides on the lower module by lifting the tray up into place.
- 5. Push down on the tray until its upper flange is flush with the top front of the lower module connector panel.
- 6. Lock the processor board tray in place with the security lock, if present. Refer to Section 2, Machine Installation, for lock specifications.
- 7. Install the hopper in the cabinet (refer to Section 5.5, Superbowl Hopper).
- 8. Turn the machine **power on**; close and lock the door.

5.8.6 Functional Verification

Refer to Section 4, Game Software, for procedures to verify proper software operation.

5.8.7 Troubleshooting

1. If the reels do not work, check the location and orientation of the game program chip.
2. If a tilt or error message appears, refer to Section 4, Game Software, to resolve the error.

5.8.8 Set Denomination

To initially set machine denomination, or to change the existing machine denomination, use the following procedure.

Tools Required

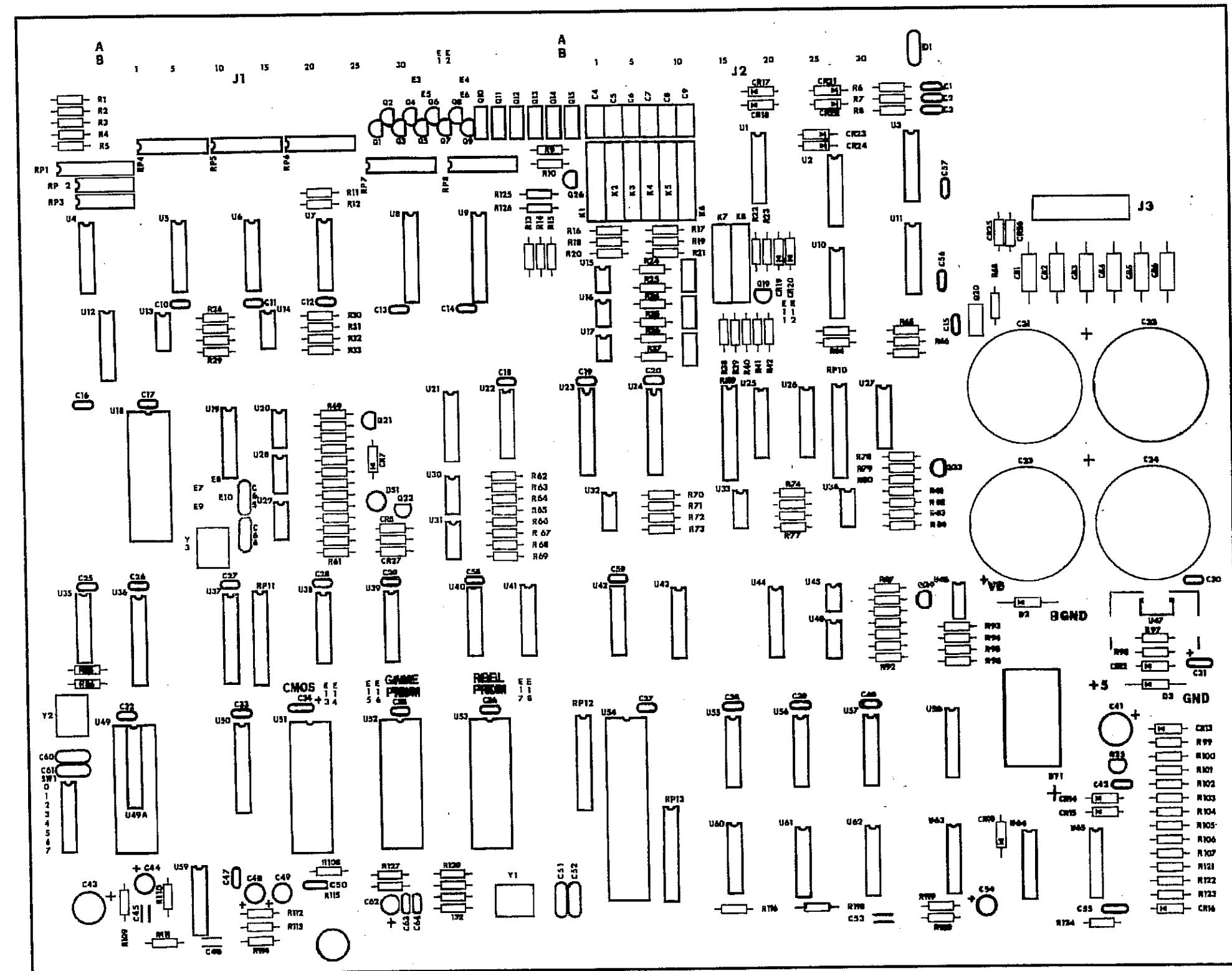
- Chip extractor
- Chip installation tool

Procedure

1. With the game program EPROM installed in the processor board, turn the machine **power on**.
2. Proceed through the statistical data mode (refer to Section 4, Game Software) to ensure that the EEPROM holds the most current game information.
3. Open the main door and turn the machine **power off**.
4. Remove the processor board (refer to Section 5.8.1).

5. Remove the game program EPROM and replace it with a set denomination chip (labeled either TST301 or TST309), following the IC replacement procedures in Section 5.8.4.
6. Install the processor board using the procedures in Section 5.8.5.
7. Turn the machine **power on**.
8. Turn the reset key until the desired denomination is displayed on the monitor.
9. Push the self test switch for at least 3 seconds to record the denomination amount in EEPROM.
10. Turn the machine **power off**.
11. Remove the processor board (refer to Section 5.8.1).
12. Replace the set denomination chip (labeled either TST301 or TST309) with the game program EPROM, following the IC replacement procedures in Section 5.8.4.
13. Install the processor board using the procedures in Section 5.8.5.
14. Turn the machine **power on**.
15. Push the self test switch for at least 3 seconds to transfer data from CMOS to EEPROM, and clear the CMOS DATA message displayed on the video monitor.

PROCESSOR BOARD
755-057-00



PROCESSOR BOARD CONT.
755-057-00

Component	Description	Part Number
R55,60,92	RESIST. CF 1.5K OHM .25W LP	474-001-90
R6-8	RESIST. CF 47 OHM .25W LP	474-009-90
R63,67,71,93	RESIST. CF 680 OHM .25W LP	474-057-90
R80	RESIST. CF 8.2K OHM .25W LP	474-039-90
R9,22,23,31,78	RESIST. CF 750 OHM .25W LP	474-008-90
R97	RESIST. MF 887 OHM .25W 1% LP	476-024-90
R98	RESIST. MF 243 OHM .25W 1% LP	476-016-90
SW1	SWITCH, DIP, 8POS, 16PIN	510-105-90
U1,2,10,11	REPLACED BY 32102990	321-004-90
U1,2,10,11	IC STEPPER MOTOR DRV TY40477	321-029-90
U12,22,27,64	IC HEX SCHMITT TRIG CD40106	320-038-90
U13,14,20,28,30-34,46,48	OPTO, COUPLER, DARL, 6N139	370-007-90
U15-17	OPTO, COUPLR, TRIAC MOC3031	370-012-90
U18	REF INST 82412300 OPTION ALIC, DUART, 2681A 28 PIN	321-006-90
U19,35	IC, BUF/DRV/R QUAD 74HC126	320-321-90
U21,43,44	IC DRVR DARL 7-OUT ULN2003	320-132-90
U25,26	OPTO, COUPLER, QUAD-ILQ-1	370-016-90
U29	OPTO, COUPLER DUAL ILD-2	370-017-90
U36	IC OCTAL D F/F TRI 74HC 574	320-262-90
U37,50	IC LATCH OCTL TRANSP 74HC 573	320-309-90
U38,39	IC DECDR 3 TO 8 LN 74HC138	320-274-90
U4	IC HEX INVRTG BUFFER 4049	320-295-90
U40,42,58	IC HEX INVERTER 74HC04	320-272-90
U41	IC, GATE, AND, QUAD 2-IN 74HC08	320-273-90
U45	OPTO, COUPLER TRANS H11A1	370-003-90
U47	REGR, POS, ADJ, 1.5A, LM317T	488-025-90
U49	IC, SOUND GEN, GAMES, AY38912	320-089-90
U5,6,7,55,56	IC REGSR SHFT 8-BIT STIC 4021	320-103-90
U51	RAM STATIC C-MOS 8KX8 150NS	706-005-90
U52	PROM C-MOS 256K 250NS 27C256	708-013-90
U53	REPLACED BY 70801990	708-009-90
U54	MICROPRCSR, 8-BIT, 12 MHZ, 8031	327-004-90
U54	MICROPRCSR 12MHZ 40P DIP 80C32	327-018-90
U57	IC REGSR SHFT/STOR 4094B	320-108-90
U59	IC, AUDIO, POWER, 1.5W LM388	324-004-90
U60	IC, COUTR, DUAL 4 BIT, 74HCT393	320-366-90
U61	IC, CNTR, 12 STAGE, BIN 4040	320-105-90
U62	IC, F/F, DUAL, J-K 4027	320-201-90
U63	IC MULTVBR DUAL MONO 4098B	320-140-90
U65	IC COMPTR QUAD VOLT LM3302	320-130-90
U8,9,23,24	IC, 10-BIT, SER DRV W/LTCH 5810A	320-264-90
Y1	CRYSTAL 10.0 MHZ HC-18/U	230-121-90
Y3	CRYSTAL, 3.6864 MHZ HC-18/U	230-123-90

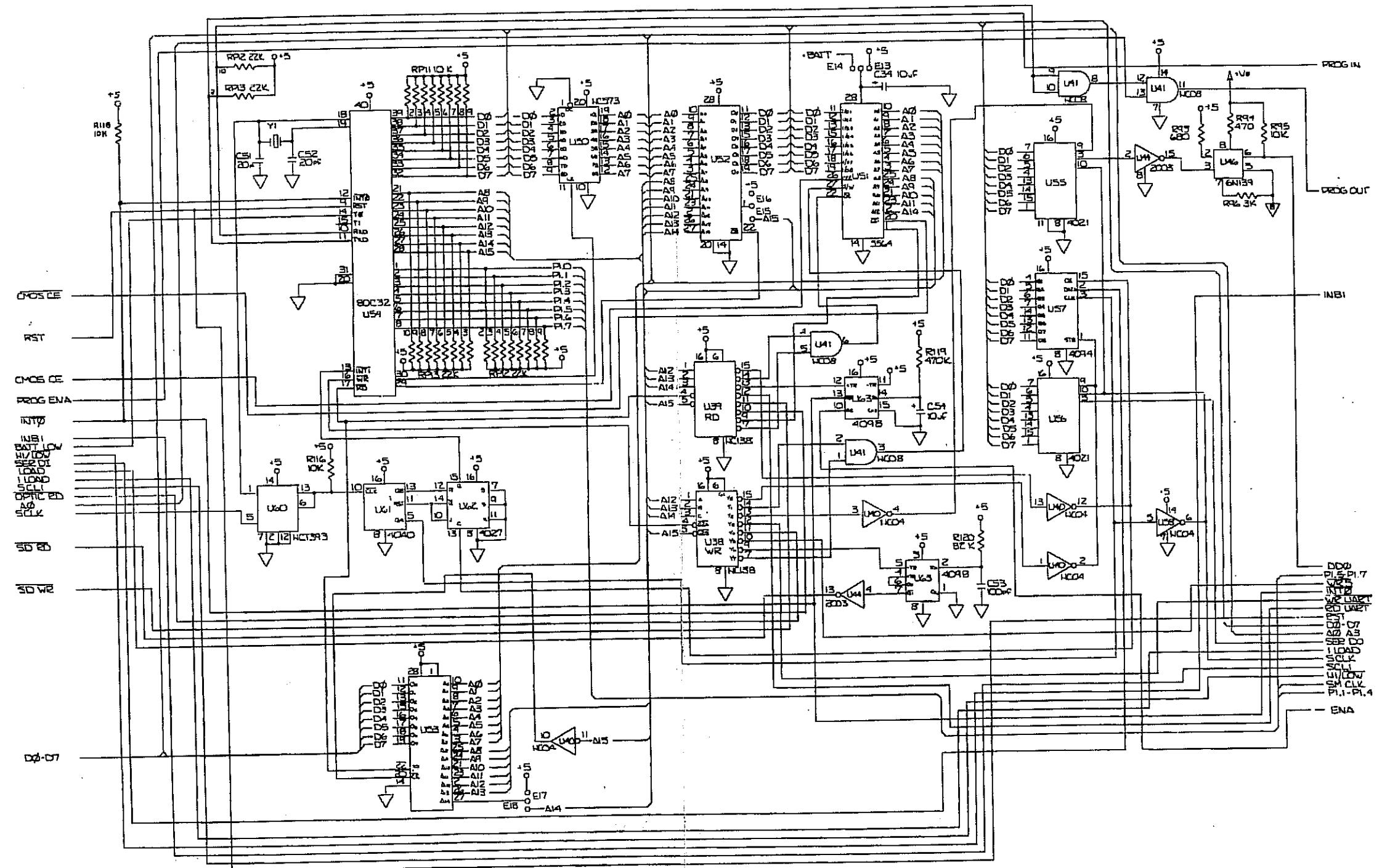
PROCESSOR BOARD
755-057-00

Component	Description	Part Number
BT1	BATTERY, LITHIUM, 3.4V, 600MA	404-011-90
CR1-6	DIODE RECT 5A 100V AXIAL T/R	480-081-91
CR12,13	RCTFI,SIL,100V,1.0A 1N4002	484-022-90
CR15	DIODE SCHOTT 60V 400MW 1N6263	480-058-90
CR17-26	DIODE SCHOTT 30V 1A *1N5818	480-059-91
CR17-26	DIODE SCHOTT 30V .5A MBR030	480-069-90
CR7	DIODE ZEN 7.5V N755A T/R	480-019-90
CR8-11,14,16,27	DIODE CMPTR 100V/MA 1N4148	480-033-90
C1-3,10-20,25-30,32,33,35-40	CAP CER BYPS .1UF 50V	152-071-90
C21,22	CAP ELCTR RD 6800UF 25V LGB-	156-045-90
C23	CAP ELCTR RD 10000UF 16V LGB-	156-066-90
C24	CAP ELCTR RD 6800UF.16V LGB-	156-051-90
C31,34	CAP TANT DP 10UF 35V T352A	154-010-90
C4-9	CAP CER. .033UF 100V CK06BX333K	152-022-90
C41	CAP ELCTR RD 470UF 16V 515D*	156-043-90
C43	CAP ELCTR RD 220UF 16V 515D*	156-021-90
C44,48,49,54	CAP ELCTR RL 10UF 35V 515D*	156-017-90
C45	CAPR, DISC CERAMIC, .05MF,25V	152-049-90
C50	CAP CER .33UF 100V CK06BX334K	152-023-90
C51,52	CAPR, DIP MICA, 20PF,500V	153-005-90
C53	CAP CER 100PF 200V CK05BX101K	152-003-90
C55,46	CAP CER RL 4700PF 200V CK06	152-068-90
C66	CAPR, DIP MICA, 15PF,500V	153-003-90
DS1	EMITTER LED RED MV5753	371-002-90
DWG	BOARD, PC, INTL S-SLOT,PROC,DWG	755-057-50
D1	VRISTR 47V/1.8J/250A V47ZA1	483-009-90
D2	SUPPR VOLTG 12V/5W 1N6376	483-011-90
D3	SUPPR VOLTG 5V/5W 1N6373	483-010-90
E12,16,17	JUMPER, 2 PIN,.100	639-027-90
E14	WIRE, BUSS BAR22 SIM-BEld 80210	612-004-90
J1,2	CONN, DIN, 64 PIN, RTA, MALE	215-009-90
J3	WAFER, RD. WIRE, 6 PIN, MOLEX2403	219-013-90
K1-8	RELAY, SSR, 120VAC 1A, SIP	454-038-90
Q1-9	TRIAC, LOGIC, 200V, 1AMP	482-017-90
Q10-12	REPLACED BY 48202090	482-016-90
Q10-15	TRIAC 4.0A 200V L2004L3	482-020-90
Q10-15	TRIAC 4.0A 200V L2004L3	482-020-90
Q16-18	TRIAC 8A 250V MAC3030-8	482-015-90
Q19,22,23,24,26	TRANS, NPN, GEN PURP AMP, 2N3904	481-017-90
Q20	TRANS, PNP, DARLINGTON, 8A,TIP125	481-034-90
Q21,	TRANS, NPN, DARLINGTN, 1A MPS6724	481-081-90
Q25	DIODE REF 2.5V TL431CLP	480-063-90

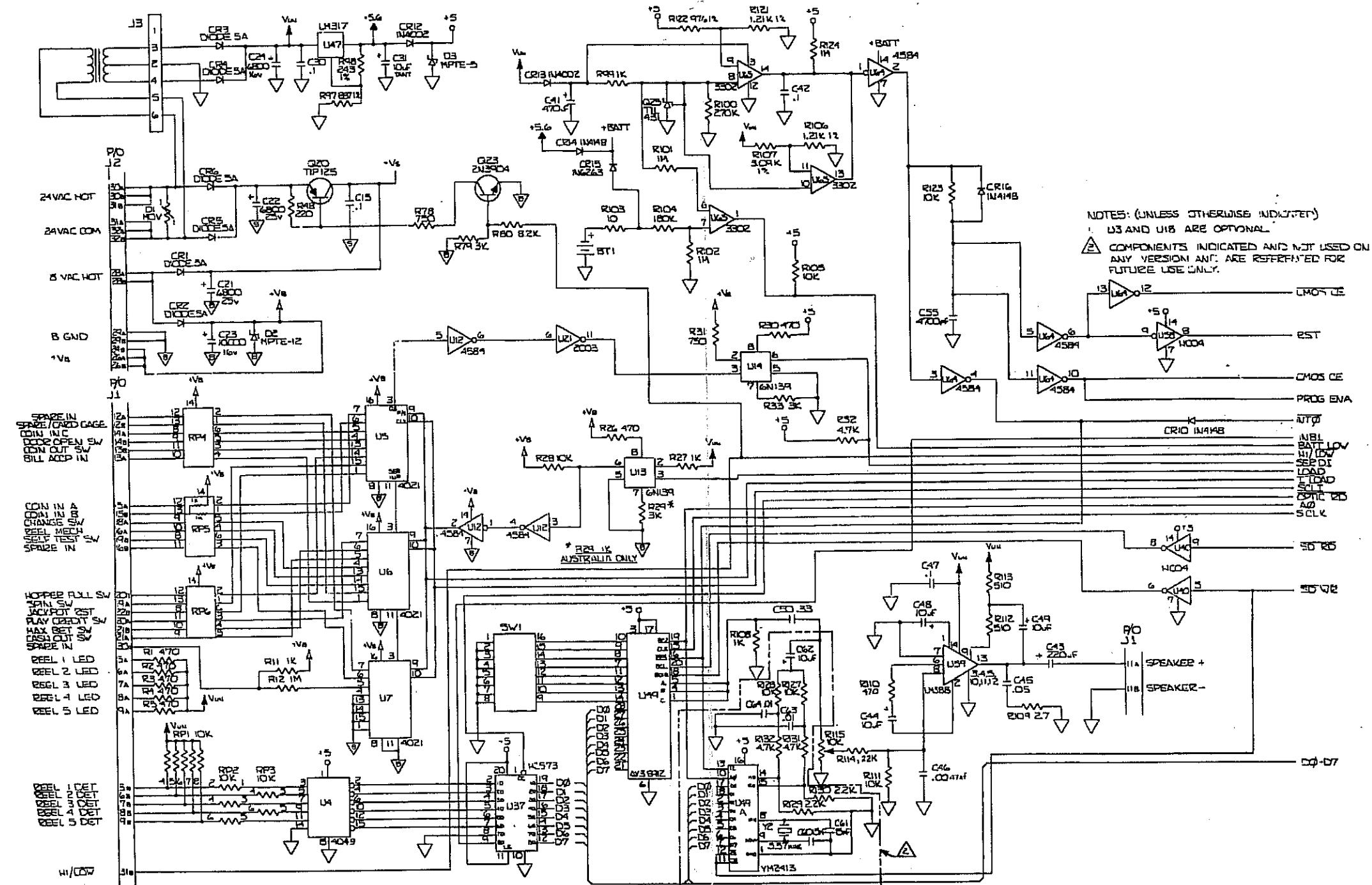
PROCESSOR BOARD CONT.
755-057-00

Component	Description	Part Number
RAW BOARD	BOARD, PC, INTL S-SLOT,PROC,RAW	755-057-30
REF E1-2,3-4,5-6,E11-12,E15-16	WAFER, STRIP 3 PIN	219-354-90
REF SCHEMATIC	BOARD, PC, INTL S-SLOT, PROC, SCHM	755-057-10
REF U18,49,51-53	SOCKET, I.C. DIP, 28 PIN	127-011-90
REF U3	SOCKET, IC DIP, 6PIN	127-031-90
REF U47	HEATSINK, 18C/W, TO-220, IMPROVED	267-031-90
REF U47	COMPOUND, HEAT SINK	161-001-90
REF U54	SOCKET, I.C. DIP, 40 PIN	127-010-90
REF Y1,Y3	TAPE-D/SIDED, .032THK X.187 W	319-044-90
REF 8T1	TY-RAP, SMALL CABLE	289-003-90
RP1	RESIST. NTWK. 10K-7 8P SIP	478-016-90
RP10,11	RESIST. NTWK. 10K-9 10P SIP	478-017-90
RP12,13	RESIST. NTWK. 22K-9 10P SIP	478-020-90
RP2,3	RESIST. NTWK. 10K-3 6P SIP	478-055-90
RP4-6	RESIST. NTWK. 1M/1K-6 14P DIP	478-074-90
RP7,8	RESIST. NTWK. 390/750-7 16 DIP	478-073-90
RP9	RESIST. NTWK. 1K-9 10P SIP	478-032-90
R1-5,26,30,40,52,54,62,66,70	RESIST. CF 470 OHM .25W LP	474-020-90
R10,16-21,38,39	RESIST. CF 390 OHM .25W LP	474-006-90
R100	RESIST. CF 270K OHM .25W LP	474-035-90
R103	RESIST. CF 10 OHM .25W LP	474-048-90
R104	RESIST. CF 180K OHM .25W LP	474-011-90
R106,121	RESIST. MF 1.21K .25W 1% LP	476-010-90
R107	RESIST. MF 3.09K .25W 1% LP	476-017-90
R109	RESISTOR, COMP,2.7 OHM 1/4W	471-162-90
R11,25,27,35,37,82,84,99,108	RESIST. CF 1K OHM .25W LP	474-023-90
R112,113	RESIST. CF 510 OHM .25W LP	474-021-90
R114	RESIST. CF 22K OHM .25W LP	474-028-90
R115	POT, LINEAR, 10K, HORIZ	460-034-90
R119	RESIST. CF 470K OHM .25W LP	474-012-90
R12,101,102,124	RESIST. CF 1MEG OHM .25W LP	474-013-90
R120	RESIST. CF 82K OHM .25W LP	474-044-90
R122	RESIST. MF 976 OHM .25W 1% LP	476-009-90
R126	RESIST. CF 2.2K OHM .25W LP	474-033-90
R13-15,87	RESIST. CF 330 OHM .25W LP	474-054-90
R24,34,36,85,86	RESIST. CF 100 OHM .25W LP	474-002-90
R28,41,42,57,64,68,72,76,83,88	RESIST. CF 10K OHM .25W LP	474-026-90
R29,33,65,69,73,77,79,90,96	RESIST. CF 3K OHM .25W LP	474-005-90
R32	RESIST. CF 4.7K OHM .25W LP	474-025-90
R43-47	RESIST. CF 47K OHM .25W LP	474-029-90
R48,53,58	RESIST. CF 220 OHM .25W LP	474-018-90
R49	RESIST. CF 15K OHM .25W LP	474-027-90

PROCESSOR BOARD SCHEMATIC
755-057-10 REV R PAGE 2 OF 4



PROCESSOR BOARD SCHEMATIC
755-057-10 REV R PAGE 1 OF



5.9 Bill Acceptor

The imbedded bill acceptor allows IGT S-Plus IBA machines to accept valid U.S. currency bills, using the JCM Model DBV-45-SS bill acceptor.

Note

Check state and local laws and regulations to determine which denominations (\$1, \$5, \$10, \$20, \$50 and \$100) are accepted in particular jurisdictions.

Figure 5-34 shows the components of the JCM bill acceptor assembly.

The bill acceptor is enabled only when the game is in the coin-in mode and the machine door is closed. The validator will not accept bills

- during game play: after the spin reels or handle selection has been activated
- when the number of credits on the credit meter is greater than or equal to the maximum credits allowed

Credits are accumulated on the credit meter when a bill is accepted. The game software determines the maximum number of credits a player may accumulate on the credit meter.

A typical bill acceptor transaction consists of five steps: bill detection, transport, recognition, validation and storage.

When a bill is inserted into the validator portion of the bill acceptor, it breaks a light sensor path. This causes the microprocessor to enable the sensors and the gearbox/motor assembly. As the bill is pulled into the assembly, the reflective and transmissive sensors optically scan the bill and transmit data to the microprocessor. A magnetic sensor also scans the bill for correct magnetic properties.

Once the magnetic and optical parameters have been determined, the motor stops and the microprocessor determines if the bill matches predetermined criteria for valid currency. If a match is not determined, the bill is rejected. The motor direction reverses and the bill is returned through the slot in the front of the validator. If a match is determined, the bill is accepted. The bill

is transported to the stacker assembly for storage and the COINS IN meter increments on the digital display board.

Bill acceptor accounting data is displayed by the host machine in two ways.

- The Credits-In electromechanical meter counts bills accepted and coins-in.
- Software accounting meters tabulate bills by specific denomination in the game's statistical data mode.

Information about the game's acceptor-related software is included in Section 4, Game Software. Bill acceptor inputs and outputs can be checked using the game program's self test mode, and statistical information is accumulated in the game's statistical data mode.

5.9.1 Security Locks

For lock specification for the bill acceptor, refer to Section 3.

Lock Installation – Cash Box/Stacker Assembly Door

Follow the directions below to remove the shipping locks and install a security lock on both the cash box drop door and cash box assembly.

Tools Required

- 7/16" nutdriver
- 5/16" nutdriver
- #1 Phillips screwdriver
- Socket wrench with 15/16" socket (at least 1-1/4" deep)

Procedure

1. Open the machine door and turn the power off. Turn the T-handle on the cash box/stacker assembly door 1/4 turn to disengage the lock and open the door.
2. Remove the 1/4" cam nut that secures the cam and washer to the end of the lock barrel. Remove the washer and cam (retain the cam for use with the security lock).

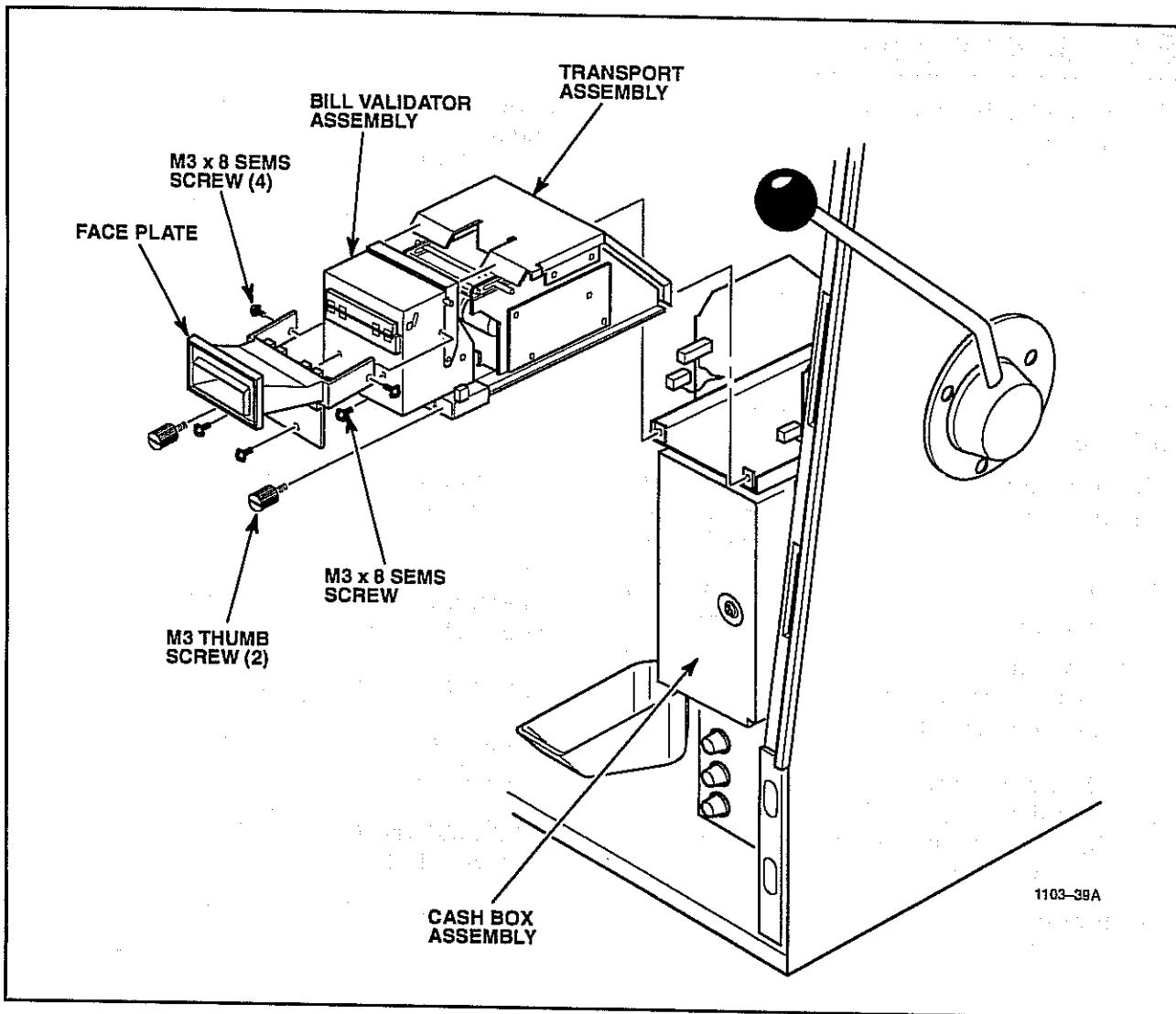


Figure 5-34. JCM Bill Acceptor Validator/ Transport Removal.

3. Unscrew and remove the 7/8" barrel nut that secures the lock barrel to the inside of the door. Remove the shipping lock.
4. Insert the security lock barrel through the hole in the cash box door and secure it in place with the 7/8" barrel nut, tightening securely.
5. Place the cam on the end of the lock barrel, positioned so that the cam hook will engage the lock bracket on the door in the locked position (depends on which direction the lock rotates). Place the washer over the cam and attach the cam and

washer to the barrel with the 1/4" cam nut, tightened securely.

6. Close the cash box door. Lock the door by turning the key 1/4 turn.

Lock Installation – Cash Box Drop Door

Follow the directions below to remove the shipping locks and install a security lock on both the cash box drop door and cash box assembly.

Tools Required

– 7/16" nutdriver

- 5.5mm nutdriver
- #1 Phillips screwdriver
- Socket wrench with 15/16" socket (at least 1-1/4" deep)

Procedure

1. Open the machine door and turn the **power off**.
2. The cash box drop door is shipped without a shipping lock. To open the cash box drop door, insert a finger (or wrench) in the hole in the front of the door and pull open.
3. Using a 5.5mm nutdriver, remove the two M3 Esna nuts that fasten the inner door plate to the door assembly.
4. To assemble the security lock, thread the brass washer onto the cam, followed by the bearing and the 1/4" Esna nut(all are supplied in the IGT hardware kit).
5. Install the lock with the bearing side positioned toward the front of the cash box drop door.
6. Using a 7/16" nutdriver, install the retaining nut.
7. Replace the inner plate of the cash box drop door assembly, securing the two M3 Esna nuts with a 5.5mm nutdriver.
8. Close the cash box drop door. Lock the door by turning the key 1/4 turn.

5.9.2 Bill Validator/Transport Removal & Replacement

This section provides removal and replacement instructions for machines with the imbedded JCM Model DBV-45-SS bill acceptor. The instructions that follow pertain to removal of the bill validator/transport assembly. Refer to Section 5.9.3 for information regarding disassembly of the bill validator and transport assemblies.

See Figure 5-34 and proceed as follows to remove the JCM bill validator/transport assembly from the bill acceptor enclosure.

Tools Required

- small flat-blade screwdriver
- ty-rap tool

Removal Procedure

1. Open the machine door and turn the **power off**.
2. Remove the two M3 slotted thumb screws from under the front of the face plate and directly under the LED display, located directly above the cash box door.
3. Disconnect the 4-pin connector from the right side of the bill validator assembly.
4. Disconnect the 14-pin connector from the left side of the bill validator assembly.
5. Disconnect the 6-pin connector from the left side of the bill validator assembly.
6. Pull the validator/transport assembly slightly forward, push down on the extraction lever and pull the unit straight out of the enclosure.

Replacement Procedure

1. Orient the bill validator/transport assembly as shown in Figure 5-35. With extraction lever pushed down, slide the assembly into the enclosure as far back as possible, then lift the extraction lever.
2. Connect the 6-pin connector on the left side of the bill validator assembly.
3. Connect the 14-pin connector on the right side of the bill validator assembly.
4. Connect the 4-pin connector on the right side of the bill validator assembly.
5. Insert the two M3 slotted thumb screws in the front of the face plate, directly under the LED display.
6. Replace the cash box assembly.
7. Close and lock the cash box drop door.
8. Turn the machine **power on**, and close and lock the machine door.

9. Test bill acceptor operation using the Functional Verification guidelines in Section 5.9.6.

5.9.3 Bill Validator/Transport Disassembly/Assembly

See Figure 5-36 and refer to the following procedure to separate the bill validator from the transport assembly.

Tools Required

- #0 Phillips-head screwdriver

Disassembly Procedure

1. Follow the procedures in Section 5.9.2 to remove the bill validator/transport assembly from the bill acceptor enclosure.
2. Hold the bill validator assembly securely by placing one hand under the face plate and the other at the back of the transport assembly.
3. Remove the M3 x 8 Phillips-head Sems screw from the face plate, directly under the bill validator assembly.
4. Disconnect the 12-pin connector from the right side of the bill validator.
5. Carefully separate the bill validator from the transport assembly.
6. To remove the face plate, disconnect the 14-pin connector from the left side of the bill validator assembly, and remove the M3 x 8L Sems screw located on each side of the black plastic face plate assembly, as well as the two on the front of the face plate.

Assembly Procedure

1. If the face plate was removed, connect the 14-pin connector on the left side of the bill validator assembly, and insert the M3 x 8L Sems screw and washer on each side of the black plastic face plate assembly, as well as the two on the front of the face plate.

2. Position the bill validator assembly so that the bill path and LED display faces front and rests on the front plate of the transport assembly (see Figure 5-35).
3. Insert the M3 x 8 Sems screw in the center of the face plate, directly under the LED display. Tighten securely.
4. Connect the 12-pin connector on the right side of the bill validator.

5.9.4 Stacker Assembly Removal/Replacement

Refer to the following instructions and Figure 5-35 to remove/replace the stacker assembly.

Tools Required

- #2 Phillips-head screwdriver

Removal Procedure

Note

The following procedure can also be performed with only the belly panel door opened, rather than the main machine door.

1. Open the front door and turn the machine power off.
2. Unlock (if necessary) and open the cash box door.
3. Firmly grip the cash box handle with one hand and push up on the cash box latch with the other hand. Pull the cash box straight out from the enclosure.
4. Rotate the cash box so that the cash box entry door faces up.
5. Open the cash box. Remove the two M3 Phillips-panhead mounting screws from the end of the stacker assembly.
6. Lift the cash box assembly. The stacker will come out of the opposite end of the cash box/stacker assembly (it may be necessary to depress the spring-loaded bill stacking plate).

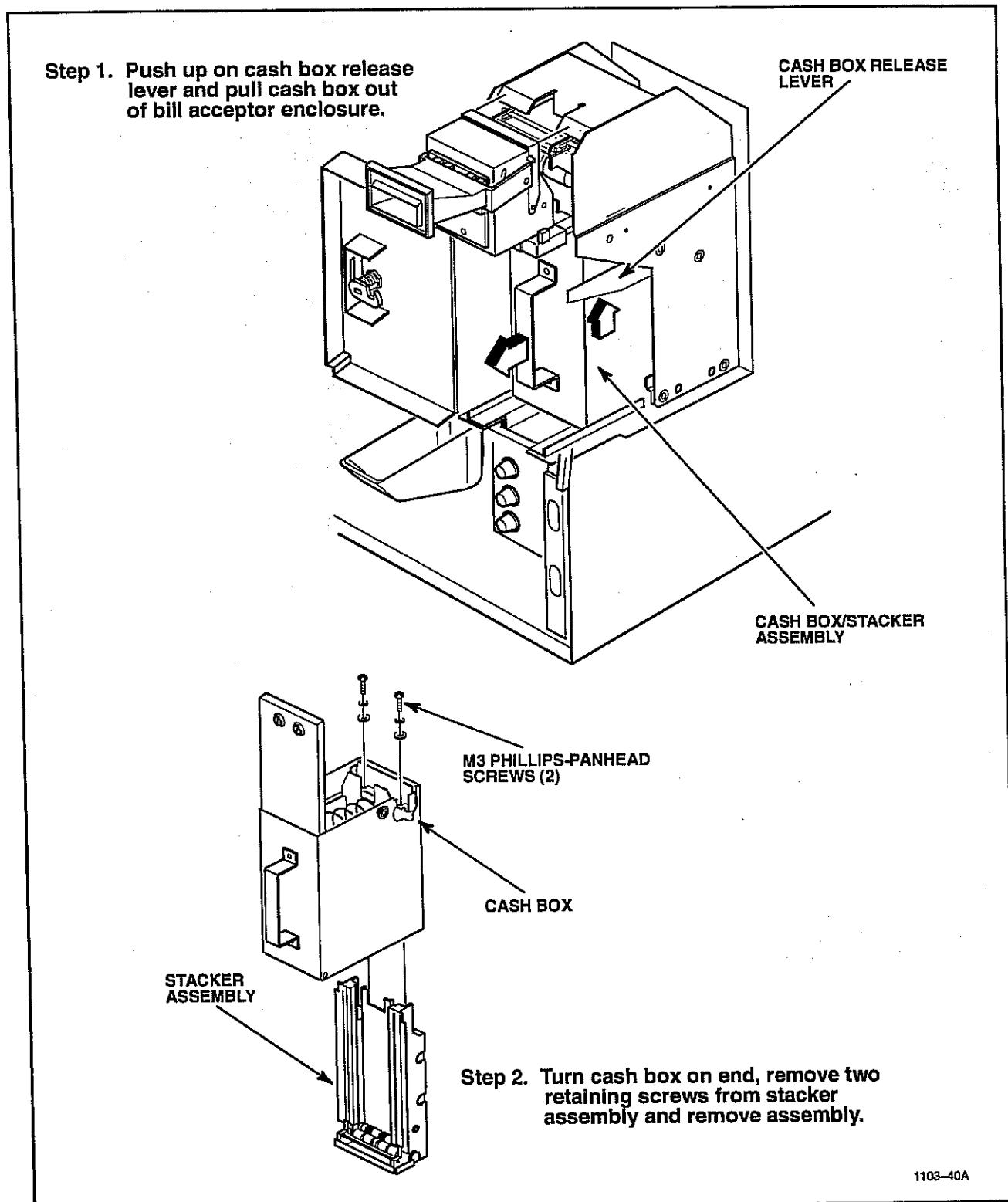


Figure 5-35. Cash Box/Stacker Assembly Removal/Replacement.

Replacement Procedure

1. Set the replacement stacker assembly on its end so its orientation matches that of the cash box (see Figure 5-35).
2. Place the cash box assembly over the stacker assembly, so that the stacker fits into place within the cash box.
3. Attach the stacker assembly to the cash box assembly with the two M3 Phillips-panhead screws at the end of the stacker assembly. **Tighten both screws securely.**
4. Close and replace the stacker/cash box assembly; close and lock the cash box door. Turn the machine **power on** and test bill acceptor operation using the Functional Verification guidelines in Section 5.9.6.

5.9.5 Power Supply Removal/ Replacement

The bill acceptor power supply unit is mounted on the side of the bill acceptor. Use the following procedure to remove/replace the power supply in the bill acceptor assembly enclosure.

Tools Required

- Ty-rap cutting and installation tool
- 5.5mm nutdriver or end wrench

Removal Procedure

1. Open the machine door and turn the **power off**.
2. Remove the hopper (refer to Section 5.8).
3. Disconnect the 6-pin connector from the left side of the bill validator assembly.
4. Cut the ty-raps that connect the harness and power cord on the left side of the bill acceptor enclosure.
5. Disconnect the 9-pin Molex connector at the end of the power cord, located on the left-hand side of the bill acceptor enclosure.
6. Remove the two M3 Kep nuts that secure the power supply mounting bracket to the side of the bill acceptor.

7. Remove the power supply unit from the machine cabinet.

Replacement Procedure

1. Position the power supply unit on the side of the reel shelf, making sure that the holes in the power supply bracket line engage with the studs on the bill acceptor, and the left side of the power supply unit mounting bracket fits into the slot on the bracket.
2. Hold the power supply unit in place with one hand, and fasten the M3 Kep nuts to the studs. **Tighten the nuts securely.**
3. Connect the 9-pin Molex connector at the end of the power cord to the harness located on the left-hand side of the bill acceptor enclosure.
4. Attach ty-raps around the harness and power cord located on the left side of the bill acceptor to secure them in place.
5. Connect the 6-pin connector on the left side of the bill validator assembly.
6. Replace the hopper (refer to Section 5.5).
7. Turn the machine **power on**. Close and lock the front door.

5.9.6 Functional Verification

1. Turn the machine **power on** and confirm that no tilt conditions exist either with the machine or the bill acceptor. The JCM acceptor indicates an inoperable state by flashing red lights on the front of the acceptor enclosure.
2. Insert several bills of each denomination selected, to verify acceptance, transport and storage for each denomination.
3. Confirm that the appropriate number of credits increment on the on-screen credit meter for each bill denomination.
4. Resolve any problems using the guidelines in the troubleshooting section that follows.
5. Refer to Section 4, Game Software, for bill acceptor-related software routines such as

- self test inputs/outputs and statistical data meters.
- Close and lock the bill acceptor door.

5.9.7 Troubleshooting & Maintenance

The bill acceptor does not require lubrication or other routine maintenance, with the exception of occasional internal cleaning.

This section details bill acceptor troubleshooting and cleaning procedures, including:

- Clearing jammed bills
- Cleaning the bill validator
- Electrical troubleshooting

Clearing Jammed Bills

Bill Validator/Transport Assembly Jams

Refer to Figure 5-36 when clearing bill validator jams.

- Open the machine door and turn the **power off**.
- Unlock (if necessary) and open the cash box drop door.
- Check for any bills visibly jammed inside the unit.
- Remove the bill validator/transport assembly as described in Section 5.9.2.
- Pull forward on the spring-loaded rod located at the top of the transport assembly and open the cover of the transport assembly.
- Release the securing lever on the top of the validator by pulling it up, then lift the upper scanner.
- Remove the jammed bill.

Stacker/Cash Box Assembly Jams

See Figure 5-36 and refer to the following instructions to clear jammed bills in the cash box/stacker assembly.

Note

Check to be sure that bills are not caught between the transport assembly and cash box. Bills jammed in this area may be torn when the jam is cleared.

- Open the front door and turn the machine **power off**.
- Unlock (if necessary) and open the cash box drop door.
- Firmly grip the cash box handle with one hand and push up on the cash box latch with the other hand. Pull the cash box straight out from the enclosure.
- Rotate the cash box so that the cash box entry faces up.
- Open the cash box, push down on the stacker's spring-loaded plate and remove all visible bills and debris from the stacker/cash box. If a bill is visible in the validator, but is inaccessible, proceed to the Bill Validator Jams section.
- Close and replace the stacker/cash box assembly; close and lock the cash box drop door. Turn the machine **power on**, close and lock the machine door, and test bill acceptor operation using the Functional Verification guidelines in Section 5.9.6.
- If frequent jamming occurs, contact IGT Customer Service (refer to Section 2).

Cleaning the Bill Validator

Bill jamming or inaccuracy of bill validation may be the result of a dirty sensor. See Figure 5-36 and refer to the following procedure to clean the bill validator.

- Open the machine door and turn the **power off**.
- Unlock (if necessary) and open the cash box drop door.
- Release the securing lever on the top of the validator by pulling it up, then lift the upper scanner.

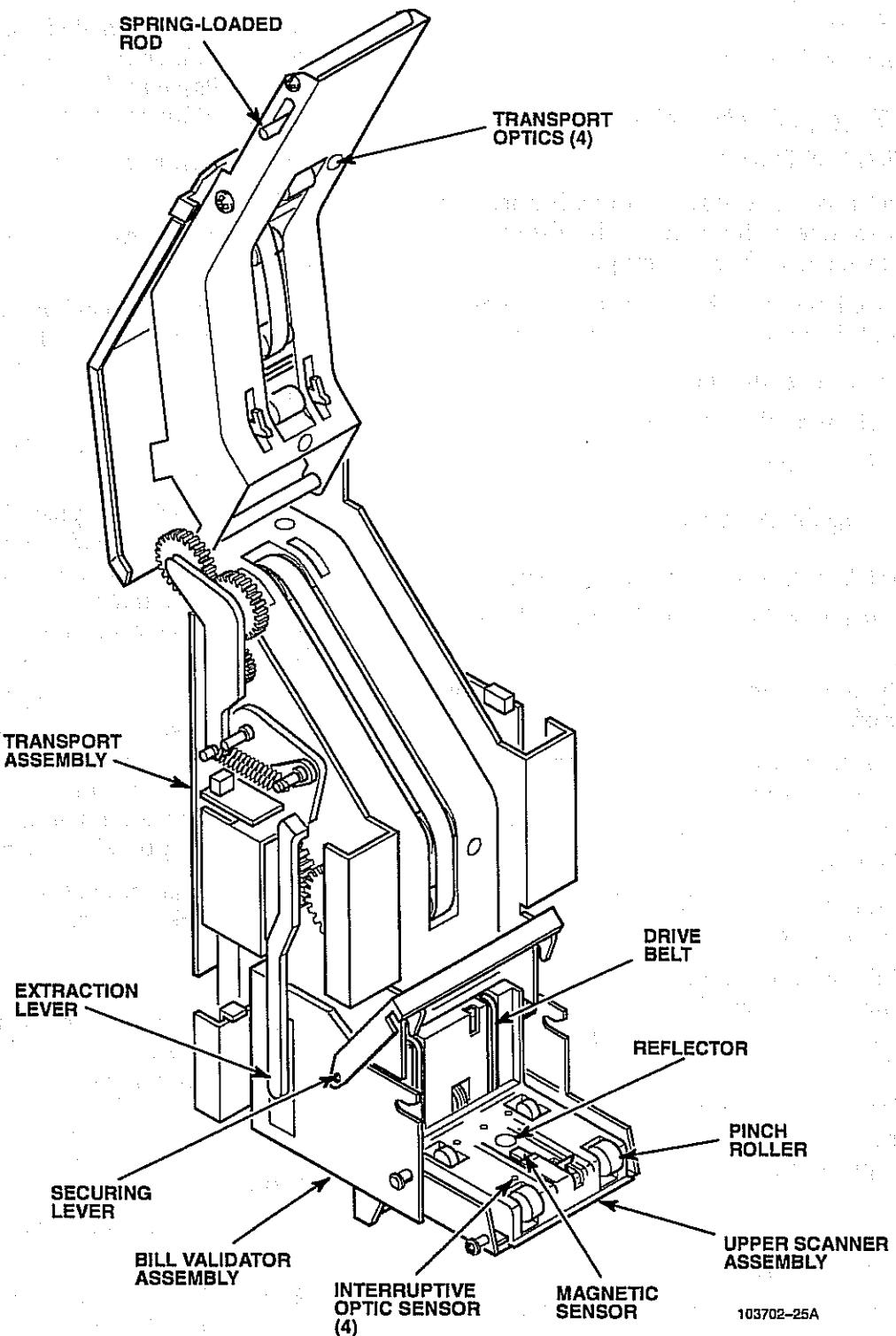


Figure 5-36. Cleaning the Bill Validator/Transport Assemblies.

4. Clean the bill path and timing belts using a lint-free cloth moistened with a mild, non-ammonia cleaner.

Notes

Do not spray cleaners directly onto the interior of the bill validator.

Do not use alcohol-based cleaners on rubber parts.

5. Remove any debris from the pinch roller and magnetic sensor using household transparent tape, making sure that no sticky residue remains on surfaces.
6. Clean all optics with a cotton swab soaked in mild, isopropyl alcohol. **Do not get alcohol on the drive belts.**
7. Close the upper scanner assembly and the top of the transport assembly. Reassemble and install the bill validator.
8. Verify correct bill acceptor operation using the procedure in Section 5.9.6.

Electrical Troubleshooting

This section provides guidelines for troubleshooting the JCM Model DBV-45-SS bill acceptor.

CAUTION

*Use extreme caution when performing the troubleshooting routines to prevent personal injury or damage to the machine. Although IGT has designed numerous safety feature into its products, servicing of the machine and optional components should be performed by **QUALIFIED PERSONNEL ONLY**.*

If the bill acceptor is not functioning, proceed as follows to isolate and resolve the problem.

1. Verify that the machine is functioning properly (refer to Section 2).
2. Verify that the current game has been completed and the maximum credit limit has not been reached on the credit meter. Bills are not accepted beyond the maximum credit limit.

3. Check for jammed bills and verify that the cash box is not too full. Confirm that the green LEDs on the front of the acceptor are constantly illuminated. If the LEDs are not illuminated, either the power supply is blown or no AC power connection exists.

4. Check all electrical connections to the bill acceptor harness, including the ground straps.
5. Verify that the 6-pin connector is firmly seated to J6 on the mother board and the AC power wires are connected at terminal blocks #1 and #2.

Note

Refer to the bill acceptor control/interface board schematic at the back of this section.

6. If the problem persists, contact IGT Customer Service (see Section 2).

5.9.8 Denomination Plaque

The bill acceptor plaque is located on the front of the door. Different dollar denominations are fed through opening in the bill acceptor entry bezel. The plaque is part of an assembly which includes a barrier light and a 2 lamp display board.

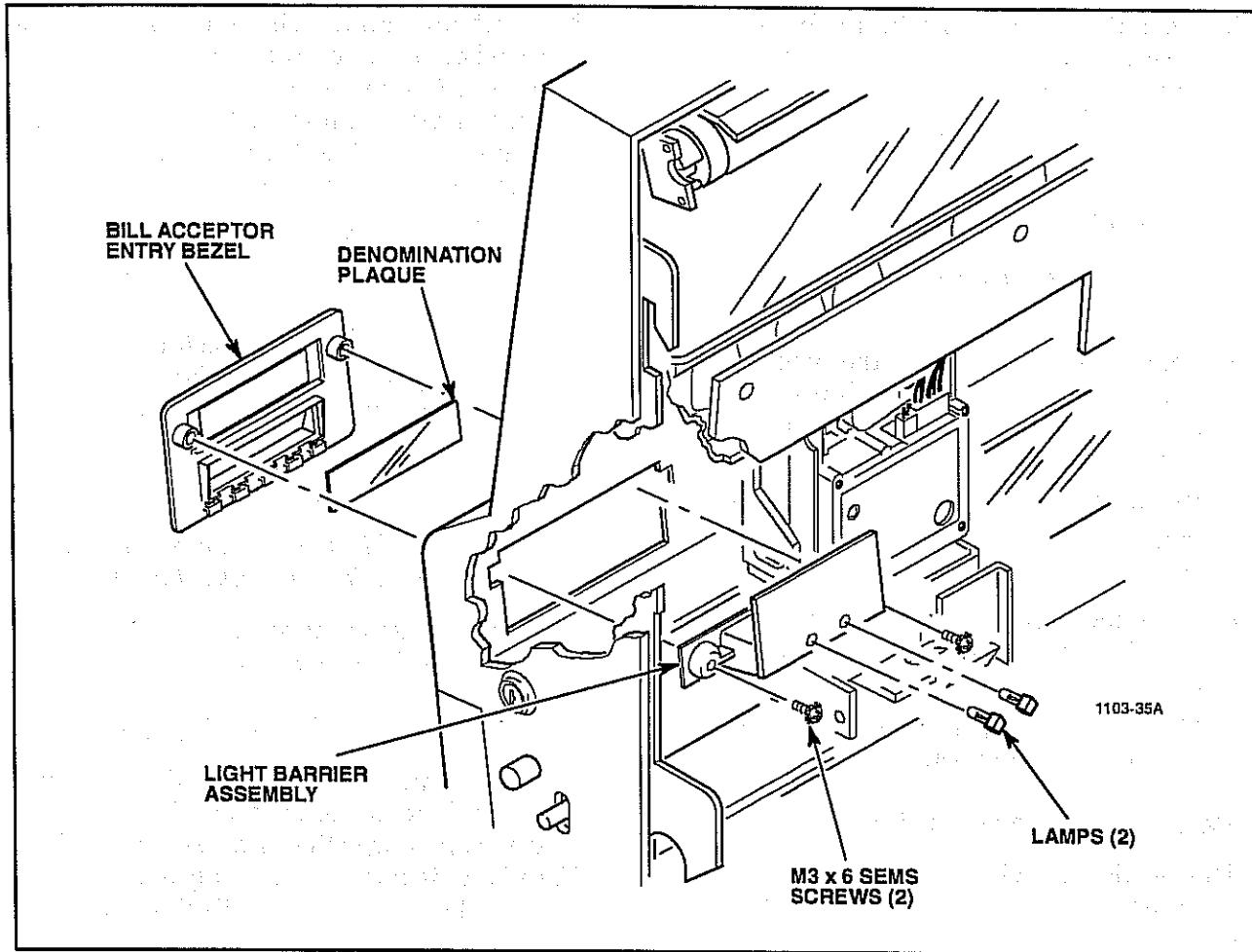
This section describes the steps necessary to remove the denomination plaque assembly from the front door. Refer to Figure 5-37 and procedure with the following procedure.

Tool Required

- #2 Phillips screwdriver

Bill Acceptor Plaque Removal

1. Open the machine door and turn the machine off.
2. Remove the player panel switch assembly that is located in front of the light barrier assembly (refer to Section 5.4, Player Panel Switches).
3. Disconnect the 4 pin connector from the 2-lamp display board attached to the barrier light assembly.



5-37. Denomination Plaque Removal

4. Remove the two M3 x 6 Sems screws from each side of the barrier light assembly.
5. Lift the barrier light assembly from the machine.
6. The denomination plaque is now able to be removed from the front side of the machine. Remove the bill entry bezel from the machine and remove the plaque from the bezel.
2. Align the barrier light assembly to the back of the bill acceptor entry bezel from inside the machine. Align the mounting holes of the two assemblies together.
3. Fasten the bill acceptor entry bezel to the barrier light assembly with two M3 x 6 Sems screws.
4. Connect the 4-pin connector to the 2-lamp display board.
5. Re-install the player panel switch to the player panel (refer to Section 5.4, Player Panel Switches).
6. Turn the machine **power on** and close the door.

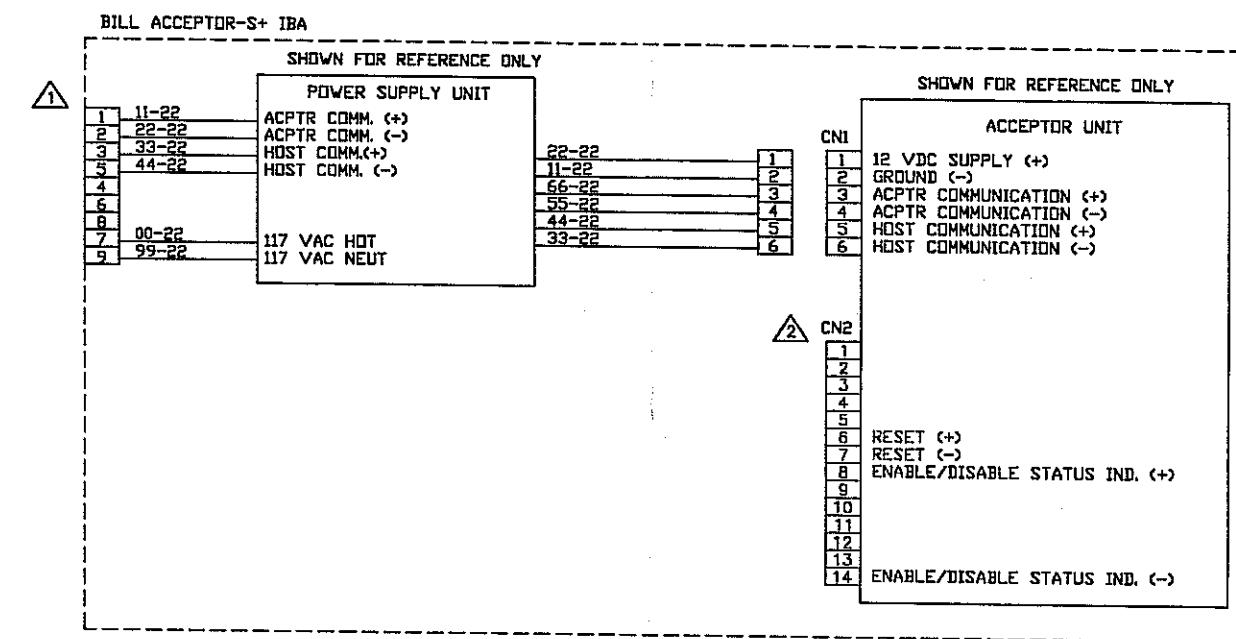
Bill Acceptor Plaque Installation

1. Replace the denomination plaque on the bill acceptor entry bezel and insert the bezel in the front of the machine.

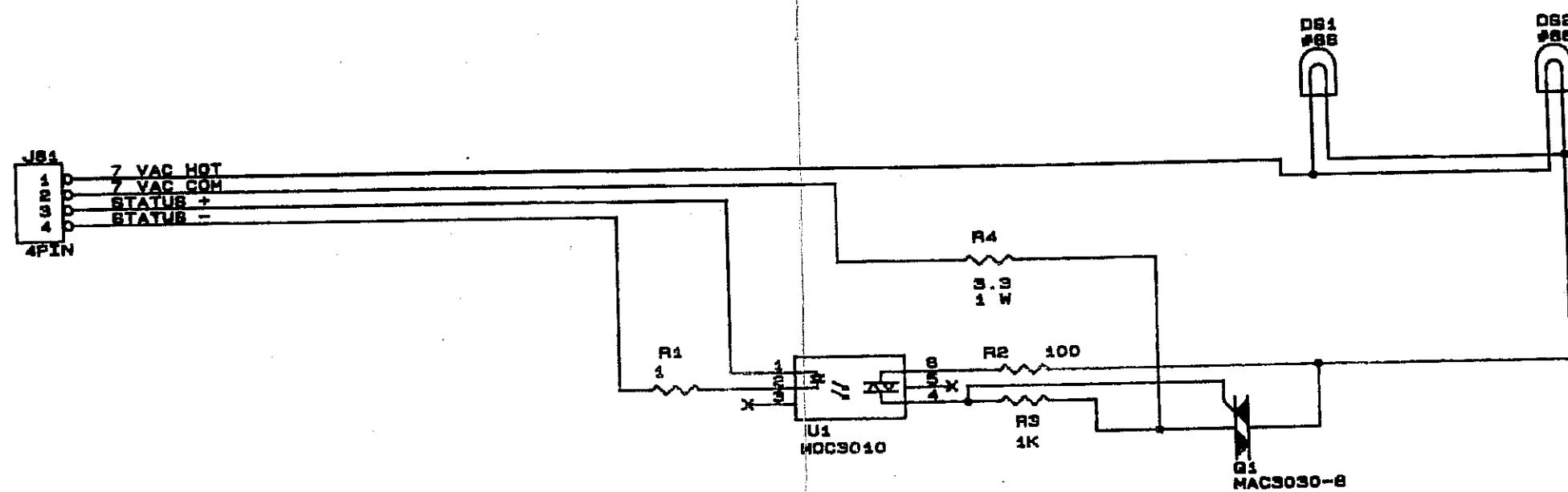
**JCM BILL ACCEPTOR WIRING DIAGRAM
820-176-00 REV B**

 **1** REFERENCE S+ IBA WIRING DIAGRAM, CONNECTOR P195

 **2** REFERENCE PLYL. SW. PANEL S+ IBA WIRING DIAGRAM.

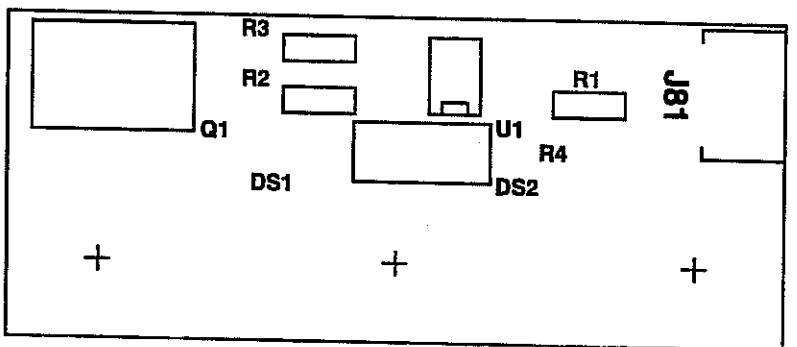


**IBA DISPLAY BOARD SCHEMATIC
751-158-11 REV A**



COIN OPTIC ENCODER BOARD
751-158-00

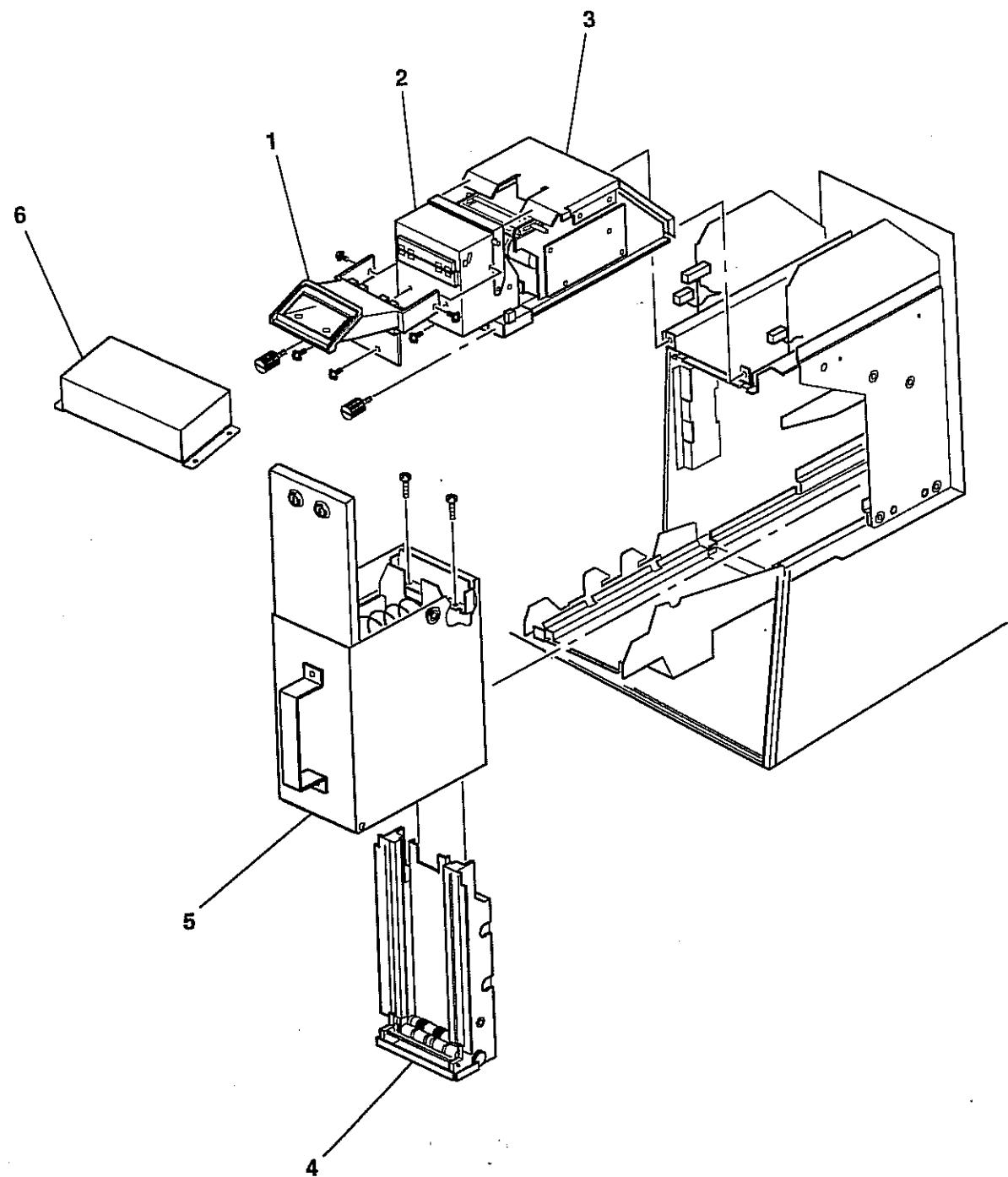
Component	Description	Part Number
ASSY DRAWING REF ONLY	BOARD PC, DSPL, IBA 2 LAMP DWG	751-158-50
ASSY DRAWING REF ONLY	BD, PC, DSPL, IBA, 2 LAMP V2 DWG	751-158-51
DS1,2	LAMP T-1 3/4 6.3V WEDGE 86	193-023-90
J81	CONN, HDR, 4PIN, RTA SHROUD SL	211-053-90
Q1	TRIAC 8A 250V MAC3030-8	482-015-90
RAW BOARD	BOARD PC,DSPL,IBA,2 LAMP RAW	751-158-30
RAW BOARD	BD,PC,DSPL,IBA,2 LAMP V2 RAW	751-158-31
REF DS1,2	SOCKET,LAMP T-1 3/4 WEDGE BASE	120-043-90
R1	RESIST. CF 1 OHM .25W T/R	474-079-91
R2	RESIST. CF 100 OHM .25W T/R	474-002-91
R3	RESIST. CF 1K OHM .25W T/R	474-023-91
R4	RES, PWR, 3.3 OHM, 1W, 5%, METOX, TR	473-058-91
SCHEMATIC REF ONLY	BOARD PC, DSPL, IBA, 2 LAMP SCH	751-158-10
SCHEMATIC REF ONLY	BD, PC, DSPL, IBA, 2 LAMP V2 SCH	751-158-11
U1	OPTO COUPLER, TRIAC MOC3010	370-011-90



Components & Assemblies

BILL ACCEPTOR

Fig. No.	Part Number	Description	Qty.
KIT	915-885-00	KIT - B/A, JCMSS, S+ IBA	1
-	145-606-00	ENCLOSURE - JCMSS, IBA S+	1
-	712-091-00	DOOR - JCMSS, CASH BOX, IBA S+	1
ASSY	625-188-90	ACCEPTOR ASSEMBLY - DBV 45 SS V3, 600	1
-	652-152-00	BEZEL - B/A ENTRY, S+ IBA	1
-	581-257-00	GUIDE - B/A ENTRY, S+ IBA	1
-	890-031-00	PLAQUE - B/A, S+ IBA, \$1	1
-	751-158-01	BD, PC, DSPL, IBA, 2 LAMP V2 AS	1
1	578-210-00	ENTRY ASSEMBLY - BILL, JCM SS, \$1	1
2	625-187-90	VALIDATOR ASSEMBLY	1
3	625-200-00	TRANSPORT ASSEMBLY	1
4	625-162-90	CASH BOX - 600 BILL CAP, JCM SS	1
-	671-071-00	SHIELD - B/A PLAQUE, S+ IBA	1
5	500-179-00	BOX - CASH W/HANDLE, B/A, DBVSS	1
6	473-058-91	RES, POWER, 3.3 OHM, 1W, 5%, METOX, T	1

BILL ACCEPTOR

June 25, 1993

5.10 Slot Handle Mechanism

The slot handle mechanism is an electromechanical ratchet device comprised of a mechanical ratchet assembly, a microswitch (handle spin switch) and a slot handle arm.

Periodic maintenance of the slot handle mechanism is necessary to ensure optimum performance. Refer to the Periodic Maintenance Chart in Section 2 for maintenance schedules and intervals.

It is not necessary to remove the slot handle mechanism from the cabinet for inspection, light cleaning, lubrication or adjustment.

5.10.1 Inspection

Pull the slot handle forward as often as necessary to complete the following inspection.

1. Check for smooth operation of the ratchet up to and beyond the point where the release cam contacts the stop roller.
2. Check for smooth and unaided return of the ratchet.
3. Pull the handle forward until the ratchet plate fully rests on the microswitch.
4. Lift the handle up slowly and listen for the switch to click.
5. Slowly pull the handle down again until the switch clicks again. The distance from this point to where the ratchet plate fully stops is .070" +/- .020" (approximately 1/16").
6. Inspect the ratchet plate, release cam, ratchet pawl and handle module shaft for dirty or contaminated lubricants.
7. Check the slot handle mechanism for loose hardware on the switch and the handle arms.

5.10.2 Cleaning

Caution

Always wear eye protection when using strong cleaning solvents or pressurized air.

1. Clean the surfaces of the lever on the switch, the stop roller, the release cam, the ratchet pawl, and the ratchet plate using a cotton swab soaked in isopropyl alcohol.
2. Clean and dry the slot handle mechanism with compressed air (not to exceed 60 psi).
3. Clean the surface of the two brass oilite washers on the handle module shaft using a dry cotton swab. Do not use any cleaning solvent on oilite self-lubricating bearings or washers.

5.10.3 Adjustments

The slot handle mechanism does not require any critical or operational adjustments. However, make certain the microswitch (handle spin switch) is securely fastened and that the lever is not bent or loose.

5.10.4 Slot Handle Removal

To remove the slot handle mechanism from the cabinet, see Figure 5-38, Handle Mechanism Disassembly and proceed as follows.

1. Open the front door and turn the machine **power off**.
2. Remove the hopper (refer to Section 5, Superbowl Hopper).
3. Place a shop rag over the coin drop chute to prevent any parts from falling into the stand.
4. Disconnect the microswitch, located at the front of the mechanism. Take note of the switch wire colors and positions.

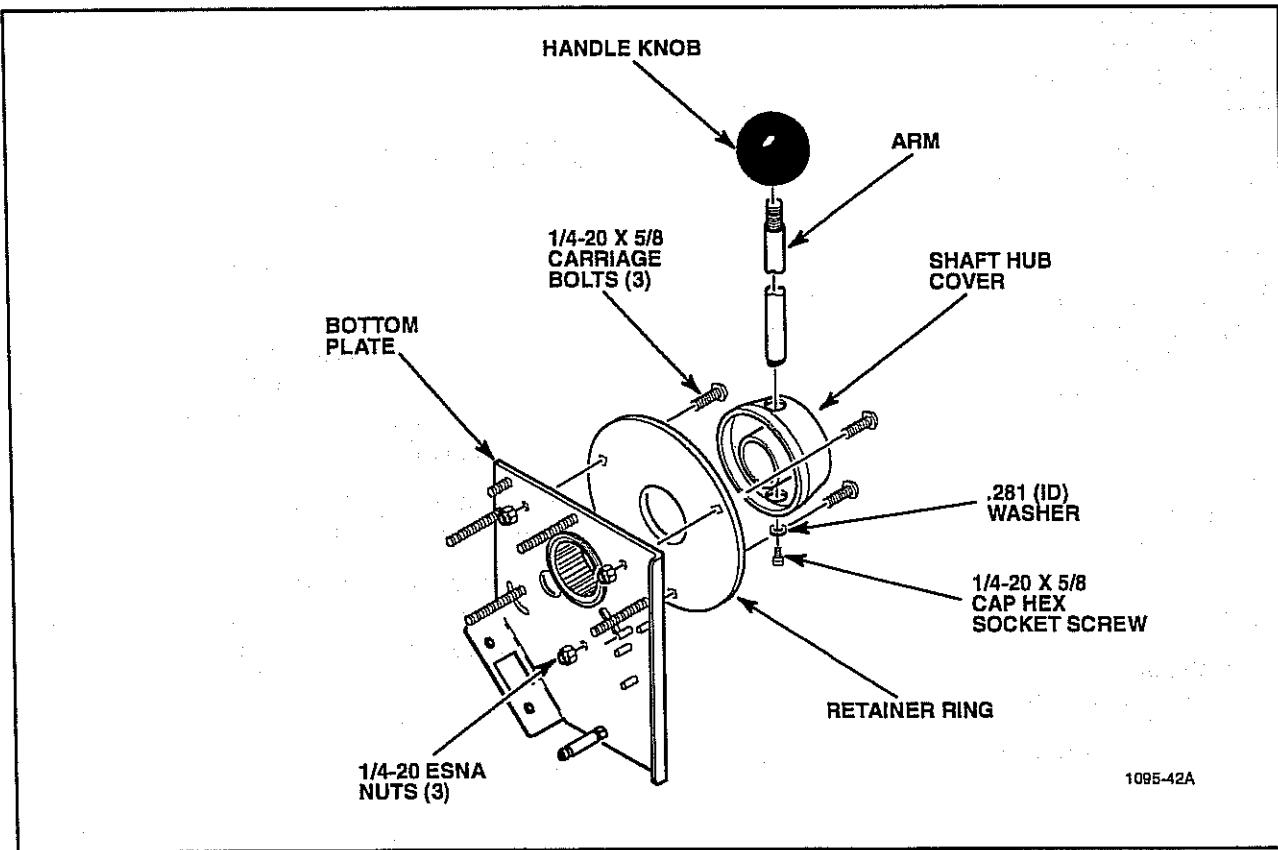


Figure 5-38. Slot Handle Mechanism Disassembly.

5. Remove the 10-32 hex nut that fastens the braided, slot-handle grounding strap to the underside of the reel shelf using a 3/8" wrench.
6. Remove the 1/4-20 Cap-hex socket screw and .281 (ID) flat washer that fastens the handle to the center hub. The screw and washer are located at the underside of the hub cover (outside machine).
7. Pull the handle straight up from the hub and remove the hub cover.
8. Remove three 1/4-20 Esna nuts that mount the handle mechanism to the cabinet wall (inside machine). Use a deep 7/16" socket and ratchet or nutdriver.
9. Remove the handle mechanism by pulling it straight away from the cabinet wall.
10. Remove the three 1/4-20 carriage bolts and the bottom ring plate.

To Install the slot handle mechanism

1. Place a shop rag over the coin drop chute to prevent any parts from falling into the stand.
2. Hold the slot handle mechanism with the center hub pointing toward the right cabinet wall.
3. Insert the center hub through the hole in the right cabinet wall and align the three mounting holes.
4. Place the bottom ring plate over the center hub and insert three 1/4-20 carriage bolts from the bottom ring plate through the wall and handle mechanism. Be careful not to pinch the handle mechanism harness between the base plate and the wall.
5. Thread three 1/4-20 self-locking nuts onto the three carriage bolts and fasten securely.

6. Place the hub cover onto the center hub and align the offset holes in the cover with those in the center hub.
7. Insert the handle into the top hole in the hub cover and turn the handle until the handle shafts fit completely into the center hub.
8. Place a drop or removable, thread-locking adhesive on the end threads of the 1/4-20 cap-hex socket screw to keep the handle from working loose.
9. Fasten the handle securely with the 1/4-20 cap-hex screw and .281 (ID) flat washer.
10. Connect the handle mechanism harness to the microswitch located at the forward end of the mechanism.
11. Remove the shop rag from the coin drop chute.
12. Install the hopper (refer to Section 5, Superbowl Hopper).
13. Turn the machine **power on**; close and lock the front door.

5.10.5 Top and Bottom Chassis Handle Plates

Refer to Figures 5-39, 5-40, and 5-41 for top and bottom chassis plate illustrations. Disassemble the top and bottom chassis according to the order of the following sections.

Handle Removal

1. Open the front door and turn the machine **power off**.
2. Disconnect the harnesses from the microswitch.
3. Remove the slot handle mechanism from the machine cabinet. Refer to the Removal/Replacement section.
4. Disconnect the two extension springs from the spring mounting spacer located between the top and bottom chassis plates in the lower portion of the handle mechanism.

5. Remove the two 6-32 machine screws, #6 flat washers located the lower left side of the handle mechanism chassis and one 8-32 machine screws, and #8 flat washer located at the lower face of the chassis, using a #2 Phillips screwdriver.
6. Remove the three 1/4-20 Esna nuts and three 1/4" inside diameter (I.D.) spring-steel washers that fasten the top and bottom chassis plates together, using a 7/16" wrench.
7. Place the handle mechanism, shaft end facing down, on a flat surface and slowly pull the two chassis plates apart.

Top Chassis Plate Disassembly

1. Remove the two extension springs from the hammer plate and the ratchet plate.
2. Remove the outer E-ring from the handle shaft using a #4 flat-blade screwdriver or small needle-nose pliers.
3. Remove the stainless-steel washer, wave washer and bronze oilite washer from the handle shaft.
4. Remove the handle shaft from the bearing on the top chassis plate.
5. Remove the two bronze oilite washers, hammer plate and ratchet plate from the handle shaft.
6. Clean all parts thoroughly and replace as necessary.

Ratchet Plate Disassembly

1. Remove the E-ring that fastens the release cam to the ratchet plate using a #4 flat-blade screwdriver or the small needle-nose pliers.
2. Remove the two bronze oilite washers, the release cam and the cam torsion spring from the cam mounting post on the ratchet plate.

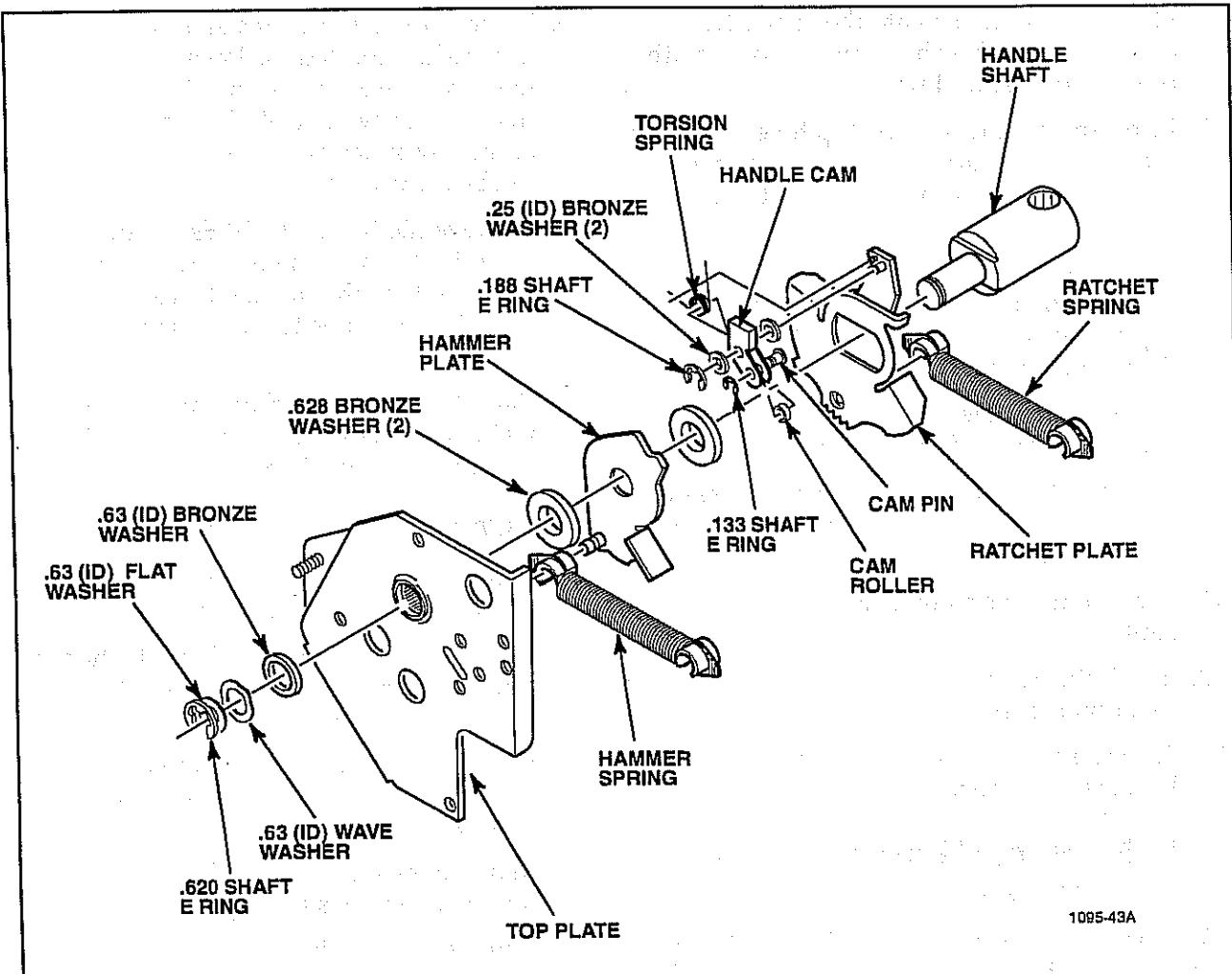


Figure 5-39. Top Handle Plate.

3. Remove the small E-ring from the cam roller pin on the release cam using a #4 flat-blade screwdriver.
4. Remove the cam roller pin and cam roller from the release cam.
5. Clean all components thoroughly and replace parts as necessary.

Ratchet Plate Assembly

1. Place the cam roller between the ends of the release cam and align the roller with the holes for the cam roller pin.
2. Insert the cam pin, from the non-folded side of the cam, through the release cam

- and cam roller and fasten with the small .188 E-ring.
3. Install a .25 (ID) bronze oilite washer onto the cam mounting post located next to the threaded post.
4. Hold the cam torsion spring in one hand by squeezing the long and short ends of the spring between your thumb and index finger.
5. Insert the cam torsion spring into the release cam so that the short end of the spring faces the threaded post, while keeping the spring and cam holes aligned.

6. Install the spring and cam (small E-ring side up) onto the cam mounting post so that the short end of the spring fits between the cam post and the threaded post. The short end of the spring should rest against the threaded post. The long end of the spring should rest against the inside of the release cam.
7. Install the second .25 (ID) bronze oilite washer onto the cam mounting post and fasten with the large .250 E-ring.

Top Chassis Plate Assembly

1. Install the ratchet plate onto the handle shaft so that the release cam side of the plate faces toward the small end of the shaft and so the cam aligns with the microswitch actuators tab on the ratchet plate.
2. Install a .63 (ID), .125 (THK) bronze washer onto the shaft against the ratchet plate.
3. Install the hammer plate onto the shaft with the post and flange side facing toward the small end of the shaft.
4. Rotate the release cam, allowing the hammer plate to rest against the oilite washer, and position the hammer plate so that the release cam fits into the notch at the narrow end of the plate.
5. Install a second .631 (ID), .125 (THK) bronze washer onto the shaft and against the hammer plate.
6. Insert the handle shaft into the center bearing on the top chassis plate from the protruding bearing side of the plate.
7. Install the thin .63 (ID) bronze washer, the .63 (ID) wave washer, and a .63 (ID) stainless-steel washer onto the handle shaft and fasten with a .62 E-ring. Use a #1 flat-blade screwdriver to compress the washers and the needle-nose pliers to fasten the E-ring.

Bottom Chassis Plate Disassembly

1. Remove the handle plate stop bumper from the top center mounting post.

2. Remove the cam release roller and spacer from the upper right mounting post.
3. Remove the hammer plate stop bumper located next to the microswitch.
4. Remove the spring mounting spacer located at the bottom center of the chassis using a 1/4" open-end wrench.
5. Remove the short pawl spacer, a bronze oilite washer, the ratchet pawl, another bronze oilite washer, the long pawl spacer and the pawl torsion spring from the lower left mounting post.
6. Remove the two 4-40 machine screws that fasten the microswitch to the chassis, using a #1 Phillips screwdriver. Remove the switch.

Bottom Chassis Plate Assembly

1. Position the handle microswitch on the two upper right switch-mounting posts with the switch lever pointing toward the center bearing.
2. Align the two mounting holes. Place a drop of removable thread-locking adhesive on the end threads of two 4-40 machine screws before fastening. Tightening both screws securely, but do not over-tighten.
3. Install the ratchet torsion spring onto the lower left mounting post so that both ends of the spring fit on each side of the small threaded post. (See Figure 5-40, Ratchet Torsion Spring Placement.)
4. Install the long pawl spacer onto the mounting post and through the spring.
5. Install a .38" (I.D.) bronze washer, the pawl and another .38" (I.D.) bronze washer onto the long pawl spacer. Position the long arm on the pawl between the two ends of the ratchet torsion spring and into the curved slot on the chassis.
6. Fasten the spring mounting spacer to the bottom center mounting post with the wrench end against the chassis. Tighten securely using a 1/4" open-ended wrench.

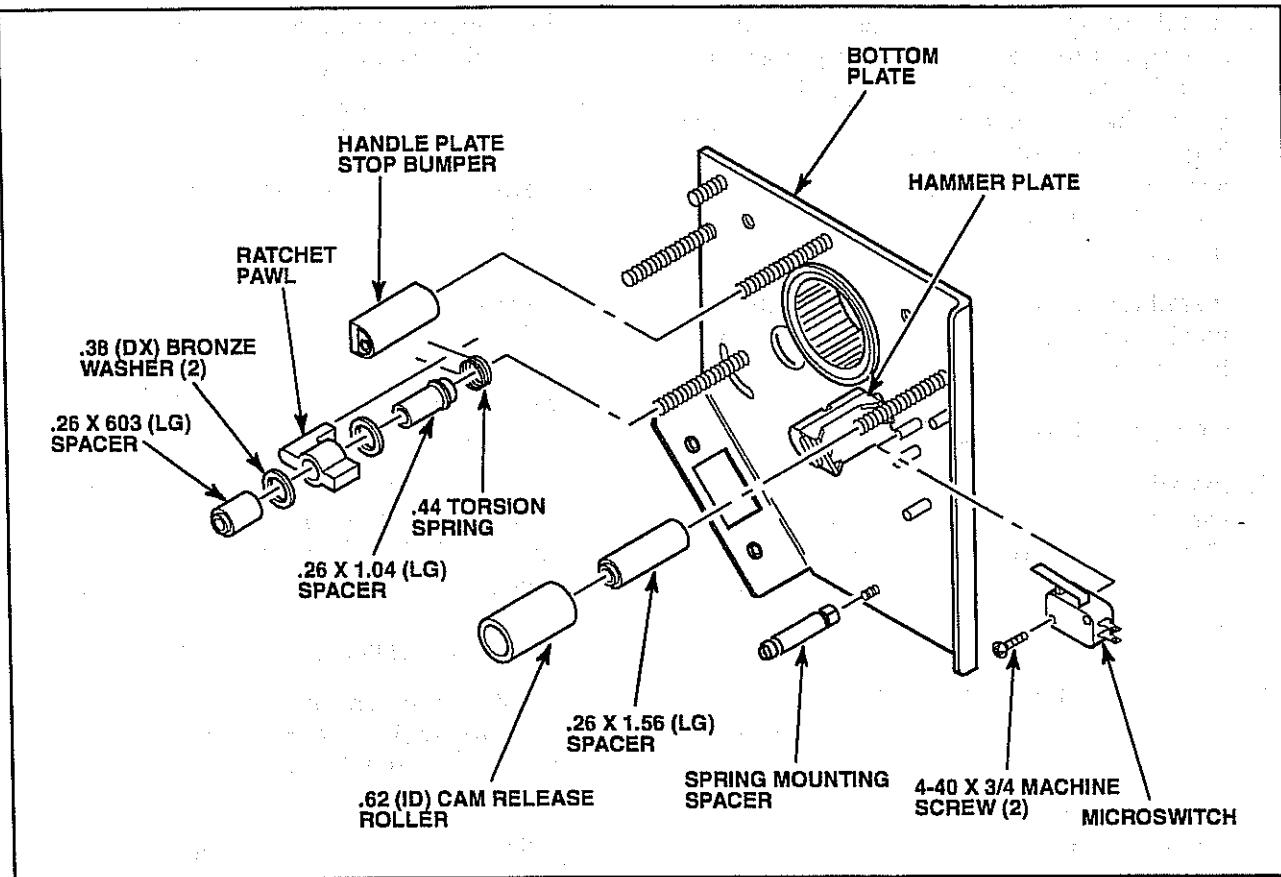


Figure 5-40. Ratchet Torsion Spring Placement.

7. Insert the slot end of the handle stop bumper, soft rubber side down, into the slot located next to the microswitch.
8. Install the cam release spacer and cam release roller onto the upper right mounting post.
9. Install the handle stop bumper, flat end, and onto the top center mounting post.
3. Align the three mounting posts on the bottom chassis plate with the holes on the top chassis plate, the D-shaped end on the handle stop bumper and the elongated end on the handle stop bumper with their respective holes on the top chassis plate.
4. Attach, but do not tighten, the two 6-32 machine screws and #8 flat washers that fasten the lower left sides of the two chassis plates together.
5. Attach, but do not tighten, one 8-32 machine screw, #8 flat washers that fasten the spring mounting post to the top chassis plate.
6. Install three 1/4" spring-steel washers onto the three chassis mounting posts, convex side out. Fasten, but do not tighten, three 1/4-20 self-locking hex nuts over the washers.

Top and Bottom Chassis Plates Assembly & Installation

1. Align the lower middle hole on the top chassis plate with the half circle cutouts in the hammer and ratchet plates.
2. Insert the handle shaft on the top chassis plate into the large center bearing on the bottom chassis plate.

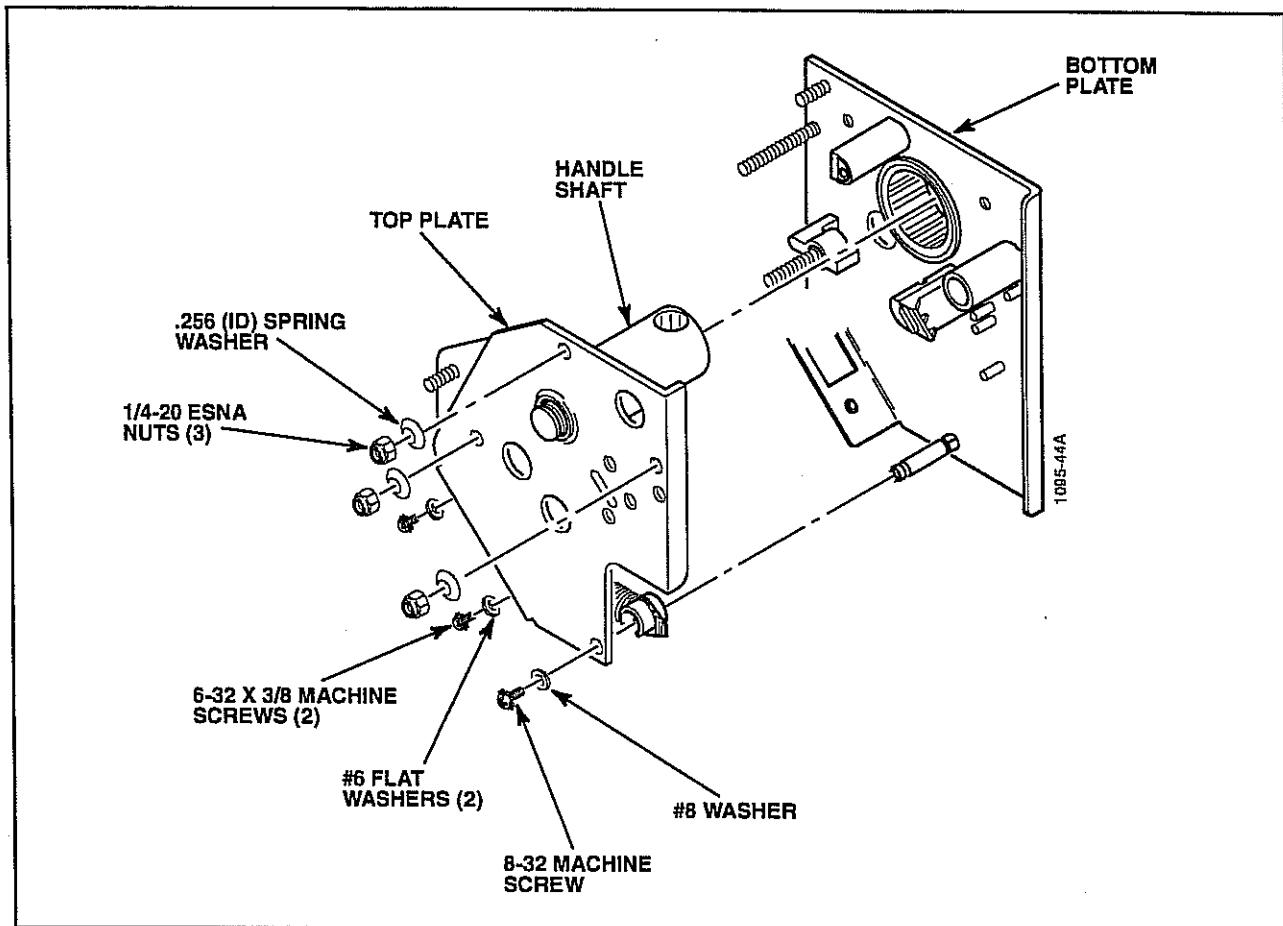
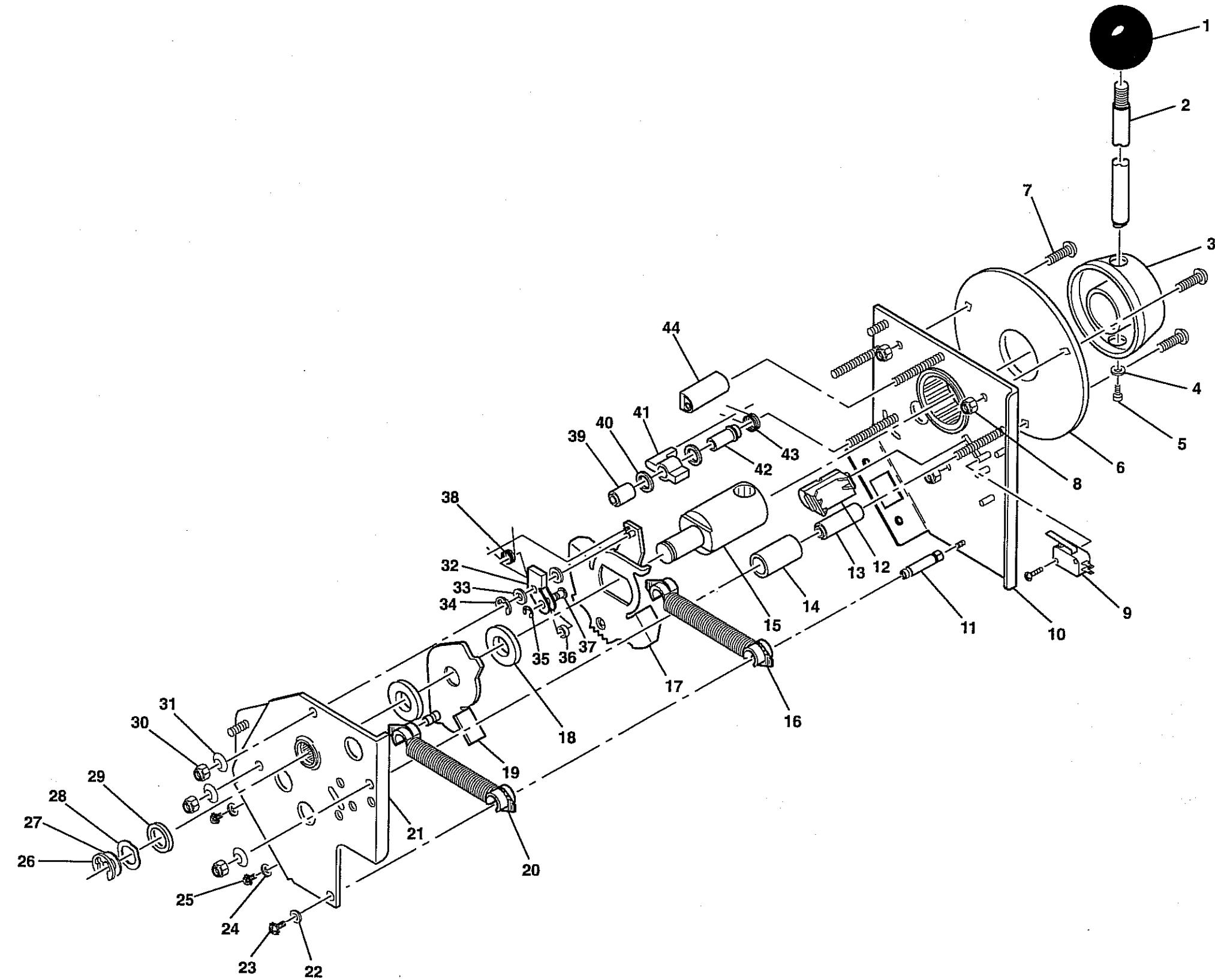


Figure 5-41. Top and Bottom Plate Assembly.

7. Align all spacers and bumpers and securely tighten the three self-locking hex nuts and the three machine screws, using a 7/16" wrench and a #2 Phillips screwdriver.
8. Attach the two extension springs to the spring mounting spacer located at the bottom of the chassis.
9. Loosen the top self-locking hex nut and rotate the ratchet plate stop bumper until the stop flange on the bumper rests squarely against the flat side of the stop flange of the ratchet plate and hold firmly in place.
10. Securely tighten the top self-locking hex nut using a 7/16" wrench.
11. Attach the shorter (heavy-gauge wire) extension spring to the spring mounting post located on the ratchet plate. Newer models paint the ends of this spring white for identification purposes. Spring hooks must be oriented as shown in Figure 5-39.
12. Attach the longer (light-gauge wire) extension spring to the spring mounting post located on the hammer plate.
13. Install the slot handle mechanism in the machine cabinet.
14. Connect the 2-pin harness to the microswitch.
15. Turn the machine **power on** and verify proper operation of the microswitch.
16. Close and lock the front door.

SLOT HANDLE MECHANISM



Components & Assemblies

SLOT HANDLE MECHANISM

Fig. No.	Part Number	Description	Qty.
KIT ASSY	915-247-02	HANDLE, WIDE ARM, CRM, VIDEO	1
1	388-033-01	HANDLE ASSEMBLY - 1SW, W/O LOCKOUT	1
2	383-005-90	KNOB, SLOT HANDLE, 7/8 IN DIA	1
3	631-148-00	ARM HANDLE, W/BEND CHROME	1
4	582-023-00	HUB, SHAFT COVER CHROME	1
5	430-022-90	WASHER - ST,.281 DX .625	1
6	414-611-95	SCREW, CAP HEX SOC 1/4 - 20X 5/8	1
	661-081-00	RETAINER - RING, SLOT HANDLE	1
7	412-903-90	BOLT, CARRIAGE, 1/4-20X 5/8	3
8	421-011-01	NUT, LOCK ESNA THIN 1/4-20	3
9	510-030-90	SWITCH, SNAP-MINI LEVER	1
10	589-326-00	PLATE, BOTTOM, HANDLE MODULE	1
11	674-171-00	SPACER, - ST RD .312 OD x 1.56	1
12	637-020-00	BUMPER - HANDLE STOP	1
13	674-170-00	SPACER, ST RD .265 IDX .500 DX 1.56	1
14	665-020-00	ROLLER, .62 ID X .75 OD x 1.45	1
15	667-038-00	SHAFT - HANDLE MODULE 3.698	1
16	330-100-00	SPRING - EXT, .5100DX 2.73LX .062W	1
17	589-608-00	PLATE - RATCHET, RS, HANDLE MODULE	1
18	439-046-90	WASHER, BRS, .628 x 1.25 ODX. 12TH	1
19	589-328-00	PLATE, HAMMER, HANDLE MODULE	1
20	330-101-00	SPRING - EXT, .500 ODX2 .83LX .058W	1
21	589-325-00	PLATE, TOP, HANDLE MODULE	1
22	430-006-98	WASHER, STEEL #8 TYPES N	1
23	411-007-90	SCREW, MACHINE, PH PAN 8-32 x 1/4	1
24	430-003-95	WASHER, FLAT-STEEL #6	1
25	411-003-99	SCREW, MACHINE PH PAN 6-32 x 3/8	2
26	447-040-90	RING-E .188 SHAFT	1
27	430-021-90	WASHER - SS, .63IDX .86 ODX .016	1
28	436-007-90	WASHER - WAVE .691 IDX 1.000DX .010T	1
29	439-044-90	WASHER, BRZ, .631DX1 00DX.062TH	3
30	421-011-91	NUT, LOCK ESNA THIN 1/4-20	3
31	434-007-90	WASHER, SPRING .256 IDX .694OD	1
32	599-454-00	CAM - HANDLE REDUCE STROKE	1
33	439-040-90	WASHER, BRZ .25IDX .50 ODX .031TH	2
34	447-040-90	RING - E 133-.250 SHAFT	1
35	447-073-90	RING - E .188 SHAFT	1
36	440-028-00	PIN CAM REDUCED STROKE HANDLE	1
37	665-006-00	ROLLER CAM	1
38	332-008-00	SPRING TORSION CAM	1
39	674-160-00	SPACER - ST RD .265 IDX .500X .603 (LG)	4
40	439-045-90	WASHER, BRZ .381DX .630DX .062TH	1
41	656-017-00	PAWL, HANDLE , RATCHET	1
42	674-167-00	SPACER - ST RD .265 IDX .500 X 1.047	1
43	332-034-00	SPRING - TORS .442 IDX1.12L X .38W	1
44	637-021-00	BUMPER RUBBER	1

5.11 Stepper Reels

The stepper reel is a D.C. motor controlled device that starts, stops and monitors the position of the reel. The S-Plus machine accommodates three, four or five stepper reel assemblies. Periodic maintenance of each stepper reel is necessary to ensure optimum performance and aesthetic quality. Refer to the Preventive Maintenance Chart in Section 2, for maintenance schedules and intervals.

5.11.1 Inspection

1. Check each reel strip for a clean surface. The reel strip should be free of dust and body oil from handling.
2. Check each reel strip for proper attachment to the reel frame. The reel strip should fit under the lip on both sides of the reel frame.
3. Check the encoding flags located on the inner frame of each reel. Make sure they are not chipped or broken and that they are free of dust.
4. Check the harness on each stepper reel for proper routing and that the harness wires are secured away from any moving parts.
5. If a stepper reel was removed, check the reel optic for dust accumulations on the inner surfaces of the optic fork and make sure the reel optic is fastened securely.

5.11.2 Maintenance

The stepper reel assembly do not require lubrication or adjustments.

CAUTION

Always wear eye protection when using pressurized air or cleaning solvents.

Cleaning

1. Open the front door and turn the machine power off.

2. Carefully wipe clean each reel strip with a cloth moistened with warm water to remove any dust or dirt.
3. If a stepper reel was removed, use compressed air (not to exceed 60 psi) to remove any dust accumulations from the encoding flags on the inner reel, the reel optic, the reel chassis and reel frame.
4. Clean the reel optics with denatured alcohol or mild glass cleaner as needed.

Functional Verification

Refer to Section 4, Game Software, to test the outputs, payable test, and reel strip test for functional verification for each of the reels.

Note

Refer to the exploded-view illustration and parts list for the cabinet at the end of Section 5.1 for part numbers.

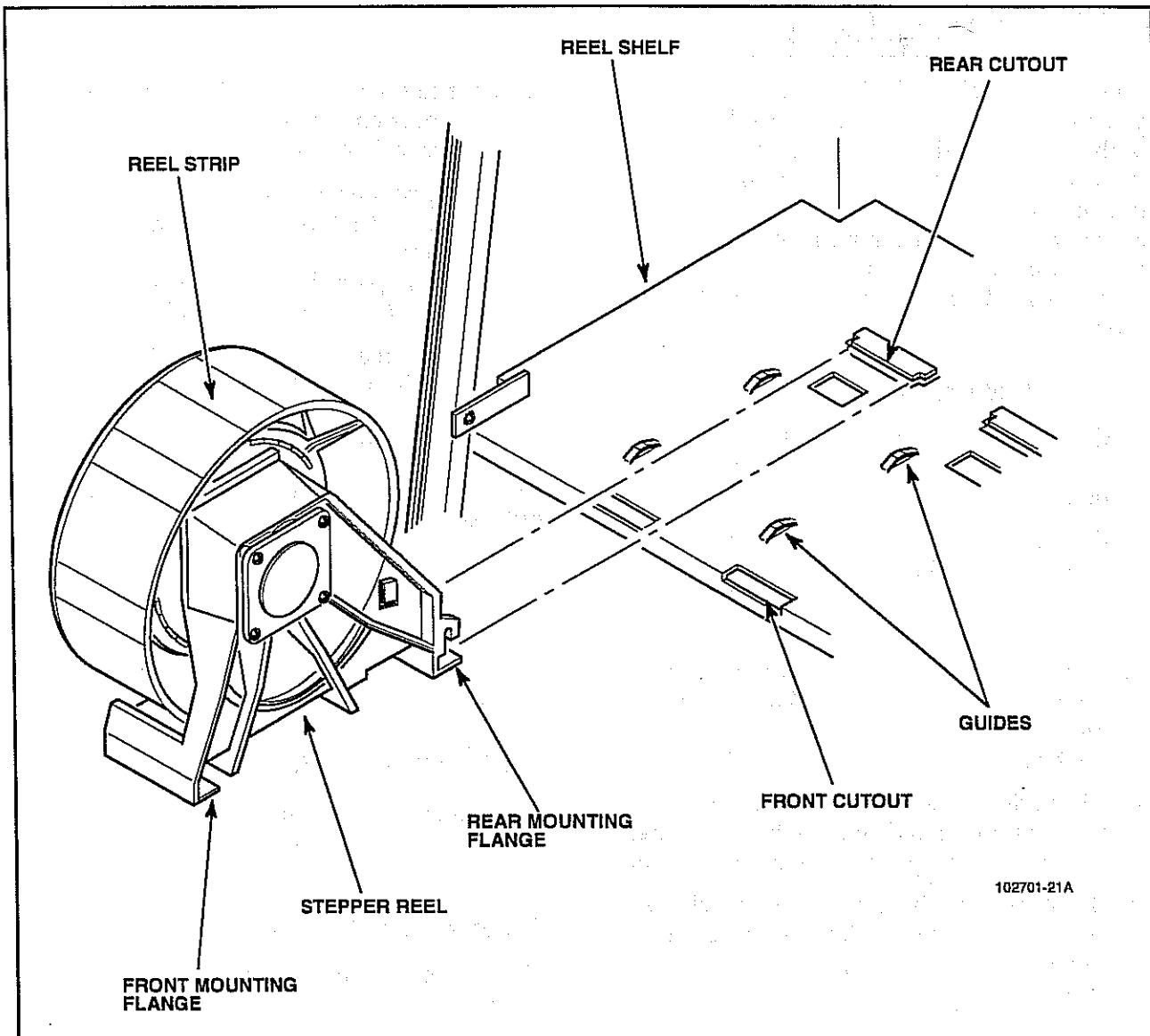
5.11.3 Stepper Reel

When a stepper reel needs repair or to be replaced, the following procedure should be used for removal and installation.

Stepper Reel Removal

To remove a stepper reel from the reel shelf, see Figure 5-42 and proceed as follows.

1. Open the front door and turn the machine power off.
2. Disconnect the reel harness for the appropriate stepper reel from the underside of the reel shelf.
3. Place your fingertips behind the front mounting flange from the underside of the reel shelf and place your thumb against the front edge of the reel shelf.
4. Squeeze and carefully pull the stepper reel straight out from the reel shelf.
5. Repeat Steps 2, 3 & 4 for each stepper reel.



5-42. Stepper Reel Removal.

Stepper Reel Installation

To install a stepper reel:

1. Position the stepper reel against the two protruding guides on the reel shelf.
2. Align the front and rear mounting flanges on the stepper reel with the front and rear cut-outs in the reel shelf.

3. Slide the stepper reel toward the back cabinet wall. Be sure both mounting flanges fit securely under the reel shelf.
4. Connect the appropriate reel harness to the stepper reel from the underside of the reel shelf.
5. Repeat Steps 1 through 4 for each stepper reel.
6. Turn the machine **power on**; close and lock the front door.

5.11.4 Reel Strip

Reel Strip Removal

Note

For easy reel strip removal, the stepper reel should remain installed in the machine.

To remove a reel strip from a stepper reel:

1. Open the front door and turn the machine **power off**.
2. Rotate the stepper reel to locate the end of the reel strip.
3. Carefully peel the adhesive end of the strip away from the reel and the underlying strip.
4. Remove the reel strip from under the retaining lip encircling both sides of the reel.
5. Repeat Steps 2, 3 & 4 for each stepper reel.

Reel Strip Installation

To install a reel strip onto a stepper reel, proceed as follows.

Note

For easy reel strip installation, the stepper reel should remain installed in the machine.

1. Rotate the stepper reel until the two index marks on the outer rims of the reel point straight out from the cabinet.
2. Drape the reel strip down the back side of the reel with the notched end of the reel strip facing toward you.
3. Align the notches on both sides of the reel strip with the index marks on both rims of the reel.
4. Insert one edge of the reel strip under the inner lip of the rim until the notch engages the index tab inside the lip. Repeat for the other edge of the reel strip.
5. Insert both reel strip edges under the encircling lip on both rims until approximately 3 inches (7.6cm) of the reel strip re-

main unattached. Make certain the reel strip fits evenly around the rim.

6. Remove the paper backing from the adhesive tape on the underside of the reel strip.
7. Insert one edge at the end of the reel strip under the inner lip, without attaching the adhesive tape, then carefully insert the other edge. Make certain the reel strip fits evenly around the rim.
8. Carefully apply pressure to the outer and under sides of the reel strip at the same time to bond the ends of the reel strip together.
9. Make certain the reel strip fits evenly around the rim. The reel strip should have no depressions or bulges and the rim should not be warped. Repeat Steps 7 and 8 if necessary.
10. Repeat Steps 1 through 9 for each stepper reel.
11. Turn the machine **power on**.
12. Refer to Section 4, Game Software, to verify the reel strip characters and position.
13. Close and lock the front door.

5.11.5 Reel

The following procedure describes how to remove and replace the reel.

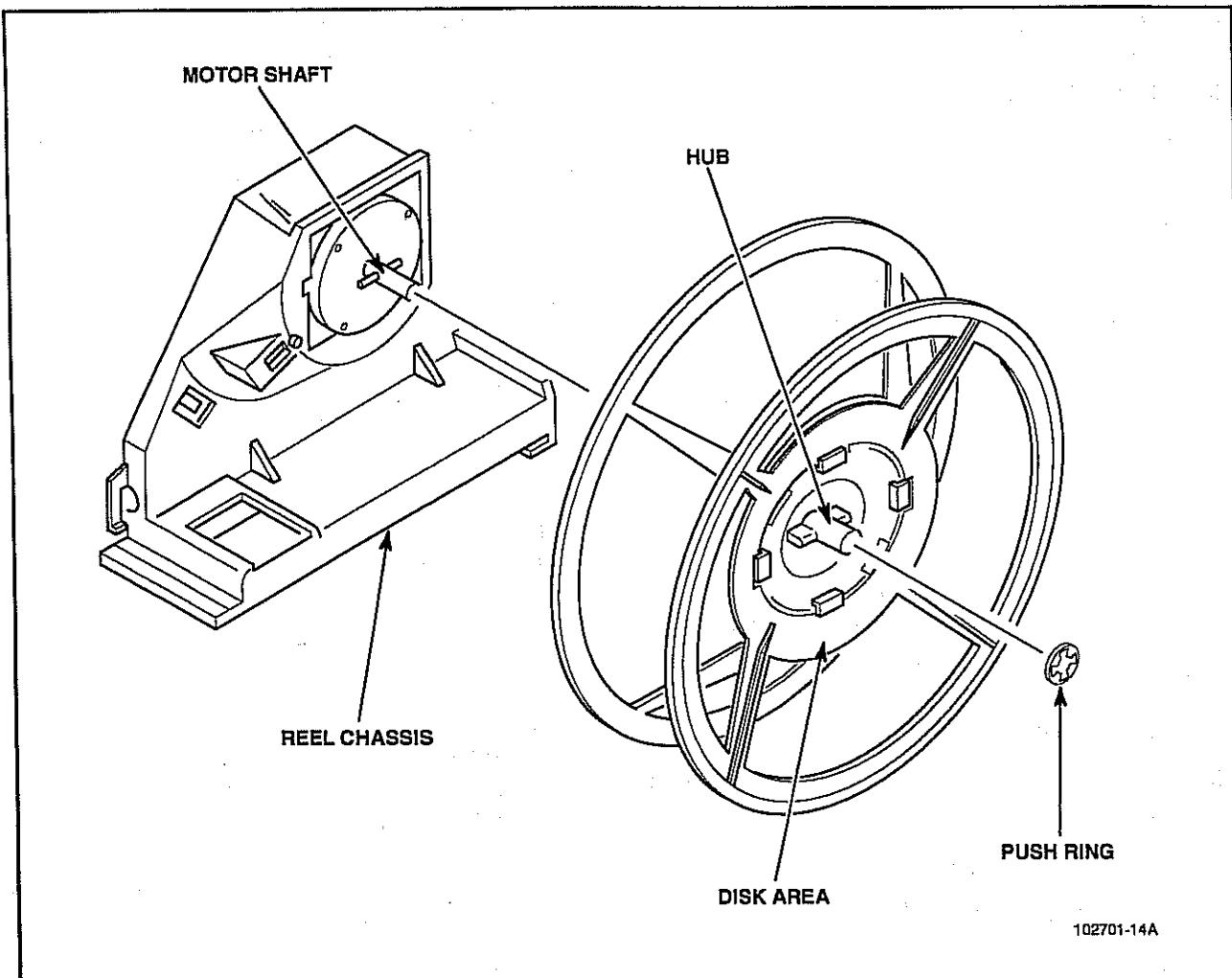
Tool Required

– #4 Flat-blade screwdriver

Stepper Reel Removal

To remove the reel from the stepper motor, see Figure 5-43 and proceed as follows.

1. Open the front door and turn the machine **power off**.
2. Remove the stepper reel from the machine cabinet and place it on a flat surface. Refer to Section 5.11.3 for the stepper reel removal procedure.



5-43. Stepper Reel Removal.

3. Remove the reel strip from the stepper reel. Refer to Section 5.11.4 for the reel strip removal procedure.
4. Position the stepper reel so that the stepper motor faces away from you.
5. Remove the push-ring from the motor shaft using a #4 flat-blade screwdriver. Work the tip of the screwdriver under the push-ring and around the shaft while pulling slightly outward.
6. Using both hands, place your finger tips firmly behind the encoder reel and place your thumb onto the front of the motor shaft. **Do not grip the encoder flags.**
7. Push your thumb inward while evenly pulling the stepper reel toward you. The stepper reel should slide out from the motor shaft until the end of the motor shaft is flush with the reel hub.
8. Hold the stepper reel chassis in one hand and pull the reel off from the motor shaft.

Stepper Reel Installation

1. Insert the motor shaft into the slotted hole in the encoder side of the reel.
2. Align the motor shaft dowel with the slot in the reel and push the reel completely onto the motor shaft.

3. Secure the reel to the motor shaft with a .25 push-ring. Make sure the push-ring fits tightly around the motor shaft and flat against the reel hub.
4. Install the reel strip onto the stepper reel. Refer to Section 5.11.4 for the reel strip installation procedure.
5. Install the stepper reel into the machine cabinet. Refer to Section 5.11.3 for the stepper reel installation procedure.
6. Turn the machine power on; close and lock the front door.

5.11.6 Reel Optic Sensor

To remove and install the reel optic sensor, see Figure 5-44 and proceed as follows.

Tools Required

- #1 Phillips screwdriver
- Molex pin extractor (small)
- Small wire cutters

Reel Optic Sensor Removal

To remove the reel optic sensor, see Figure 5-44 and proceed as follows.

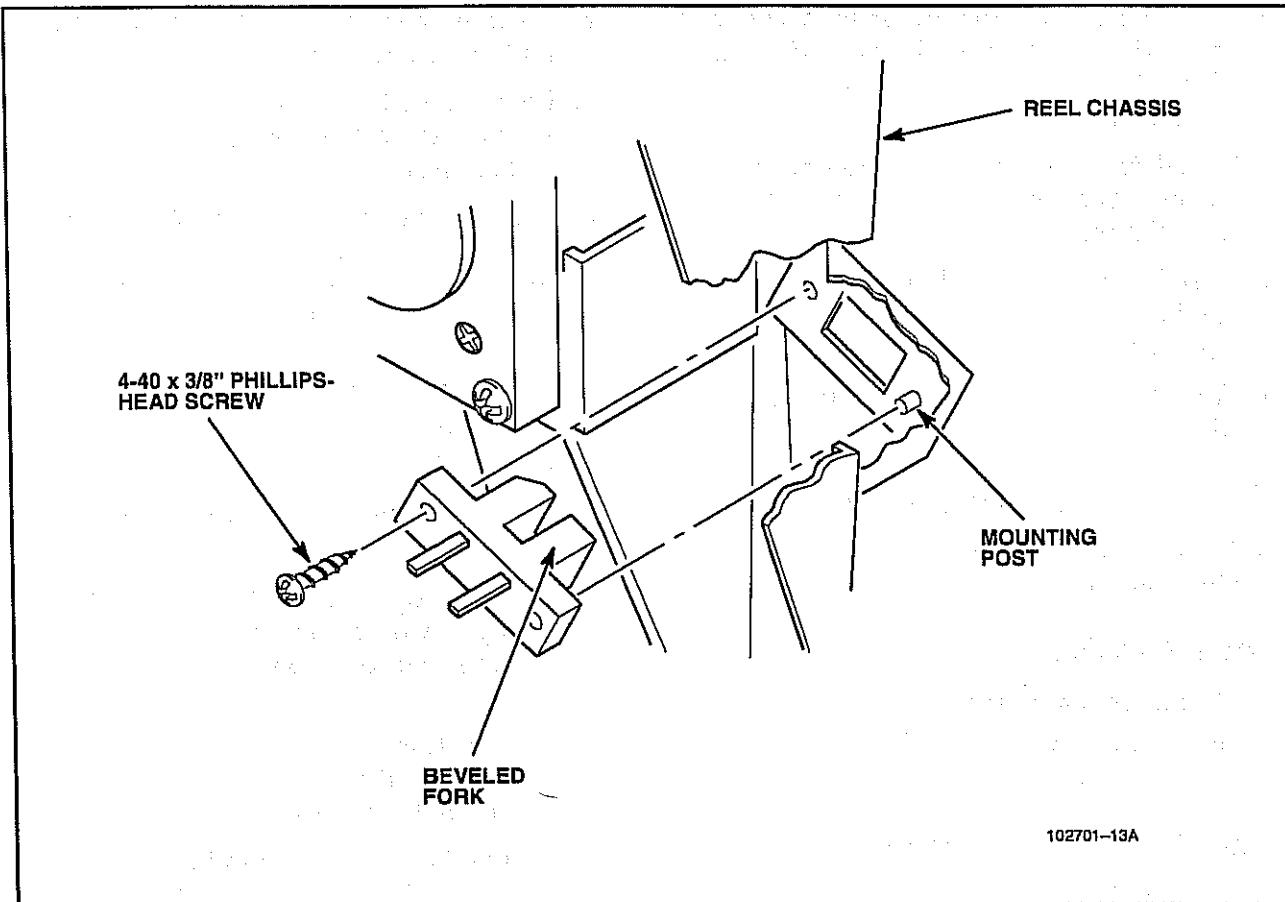
1. Open the front door and turn the machine **power off**.
2. Remove the stepper reel from the machine cabinet and place it on a flat surface. Refer to Section 5.11.3 for the stepper reel removal procedure.
3. Position the stepper reel so that the stepper motor faces away from you.
4. Carefully cut the tyrap that secures the stepper motor harness and the optic sensor wires using small wire cutters.
5. Remove the four, optic sensor wires (lighter gauge) from the 15-pin Molex connector located at the chassis base using a small, Molex pin remover. Wire location numbers are pins 7, 8 & 9 (2 in 1 pin).

6. Position the stepper reel so that the stepper motor faces toward you.
7. Remove the two 4-40 x 3/8" Phillips-head screws that fastens the optic sensor to the reel chassis.
8. Unhook the optic sensor harness from the harness retaining clip on the back side of the reel chassis and remove the optic sensor from the reel chassis.

Reel Optic Sensor Installation

To install the reel optic sensor, see Figure 5-44 and proceed as follows.

1. Locate the beveled edge on the optic sensor fork.
2. Insert the optic sensor fork, beveled edge facing toward the stepper motor, into the rectangle cut-out from the back of the reel chassis.
3. Place bottom mounting hole on the optic sensor over the mounting post on the chassis and hold in place.
4. Fasten the optic sensor to the chassis with two 4-40 x 3/8" Phillips-head screws. Tighten securely, but **do not over-tighten**, using a #1 Phillips screwdriver.
5. Insert the optic sensor wire-terminals into the correct pin locations in the 15-pin Molex connector located at the chassis base.
6. Hook the optic sensor wires under the harness retaining clip located at the back of the reel chassis.
7. Secure the stepper motor harness and the optic sensor wires to the reel chassis tyrap mount with a small tyrap. Carefully remove the excess tyrap with wire cutters.
8. Install the stepper reel into the machine cabinet. Refer to Section 5.11.3 for the stepper reel removal procedure.



5-44. Reel Optic Sensor Removal.

9. Turn the machine **power on**; close and lock the front door.

5.11.7 Stepper Motor

To remove the stepper motor from the reel chassis, see Figure 5-45 and proceed as follows.

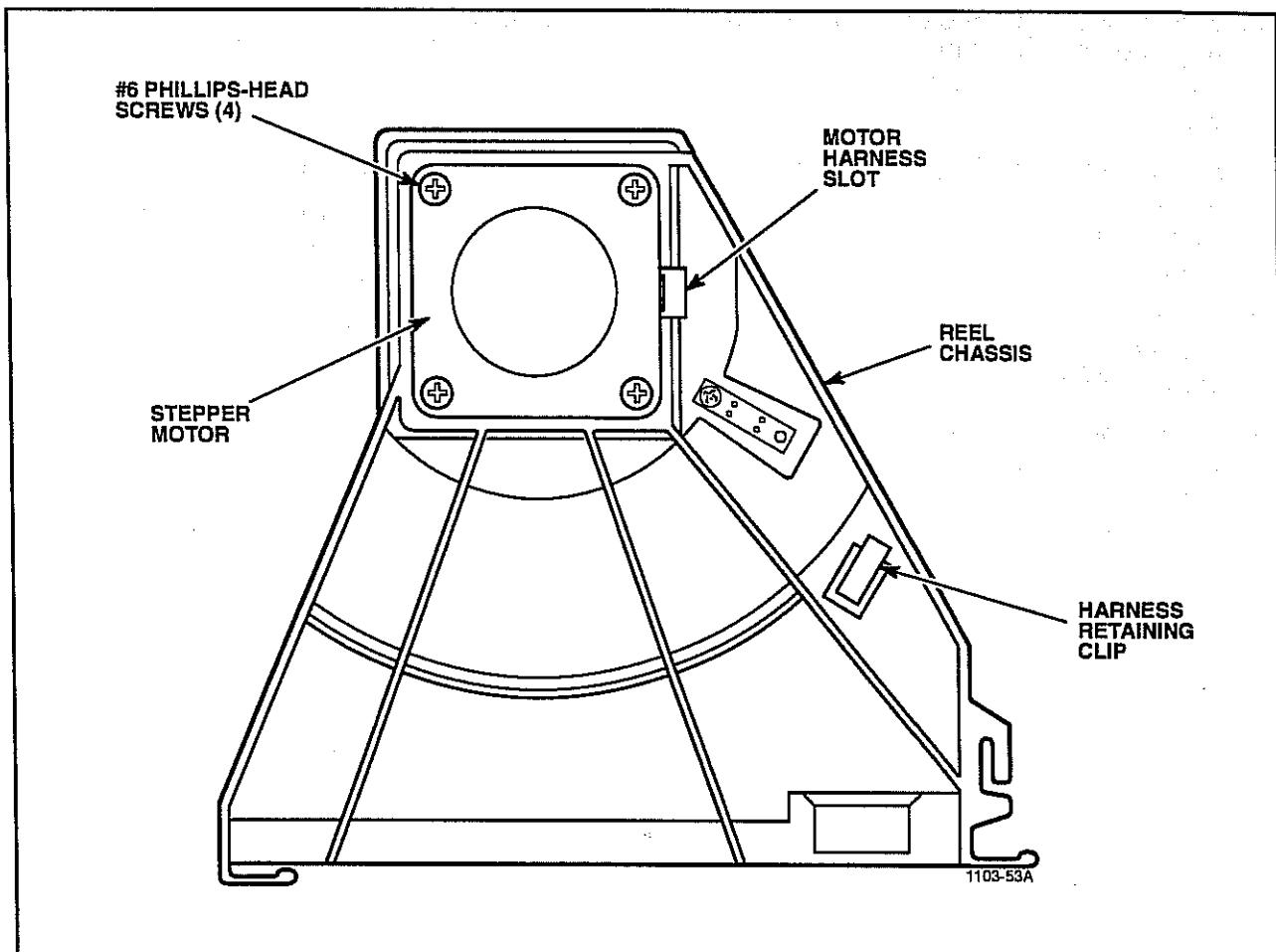
Tool Required

- #2 Phillips screwdriver

Stepper Motor Disassembly

1. Open the front door and turn the machine **power off**.

2. Remove the stepper reel from the machine cabinet and place it on a flat surface. Refer to Section 5.11.3 for the stepper reel removal procedure.
3. Remove the reel strip from the reel. Refer to Section 5.11.4 for the reel strip removal procedure.
4. Position the stepper reel so that the stepper motor faces away from you.
5. Remove the reel from the motor shaft. (Section 5.11.5)



5-45. Stepper Motor Removal.

6. Carefully cut the tyrap that secures the stepper motor harness and the optic sensor wires using small wire cutters.
7. Remove the six, stepper motor wires (heavier gauge) from the 15-pin Molex connector located at the chassis base using a small, Molex pin remover. Wire location numbers are pins 1, 2, 3, 4, 5 & 6.
8. Unhook the stepper motor harness from the harness retaining clip on the back of the reel chassis.

WARNING

Do not loosen or remove the four smaller, flat-head screws located to the inside of the

larger pan-head screws. Permanent damage to the stepper motor will immediately result.

9. Hold the reel chassis securely and remove four #6 Phillips-head screws that fasten the stepper motor to the reel chassis.
10. Pull the stepper motor out from the reel chassis.

Stepper Motor Assembly

1. Insert the stepper motor into the chassis motor mount so that the motor harness slides between the cut-out in the motor mount.
2. Align the four mounting holes in the stepper motor with those in the reel chassis.

3. Fasten the stepper motor to the reel chassis with four #6 x 5/8" Phillips-head screws. Tighten securely, but **do not overtighten**, using a #2 Phillips screwdriver.
4. Insert the stepper motor wire-terminals into the correct pin locations in the 15-pin Molex connector located at the chassis base.
5. Hook the stepper motor harness under the harness retaining clip located at the back of the reel chassis.
6. Secure the stepper motor harness and the optic sensor wires to the chassis tyrap mount with a small tyrap. Carefully remove the excess tyrap with wire cutters.
7. Install the reel onto the motor shaft. (Section 5.11.5)
8. Install the reel strip onto the stepper reel. Refer to Section 5.11.4 for the reel strip installation procedure.
9. Install the stepper reel into the machine cabinet. Refer to Section 5.11.3 for the stepper reel installation procedure.
10. Turn the machine **power on**; close and lock the front door.

5.12 Mechanical Meters

All S-Plus slot machines are equipped with as many as six mechanical meters, mounted on the right side of the cabinet next to the stepper reels. The mechanical meters display lifetime cumulative data.

Notes

In some game versions the meters count in dollar increments, regardless of the denomination of the machine.

Check the sales order and the label on each meter to confirm the statistical category tabulated by each meter.

5.12.1 Meter Categories

Included below are definitions of the common mechanical meter categories.

- **Coins In or Dollars In** – The coins-in meter increments once for each coin wagered, and the appropriate number of times when a bill is accepted. The dollars-in meter increments once for each dollar wagered.
- **Dollars Out** – The dollars-out meter increments once for each dollar collected (paid out).
- **Credits Played or Dollars Played** – The credits-played meter increments once for each credit wagered. The dollars-played meter increments once for each dollars-worth of credits wagered.
- **Credits Won or Dollars Won** – The credits-won meter represents the total number of credits won on the machine. The dollars-won meter represents the total dollars-worth of credits won on the machine.
- **Games Played** – This meter increments each time a player begins a game.

5.12.2 Meter Removal & Installation

To remove or install the meter assembly or an individual meter from the cabinet, see Figure 5-46 and proceed as follows.

Tools Required

- Wire snips
- #1 Phillips screwdriver
- #2 Phillips screwdriver
- Pin extractor
- 5.5mm nutdriver
- Ty-rap installation tool

Meter Assembly Removal

1. Open the door and turn the machine power off.
2. Remove the stepper reels closest to the meter assembly (refer to Stepper Reel in Section 5).
3. Remove the two M5 Kep nuts that fasten the meter assembly bracket to the side of the cabinet wall.

Individual Meter Removal

1. Remove the meter assembly and set the assembly face down on a smooth surface.
2. Carefully cut all ty-raps associated with the black meter wires.
3. Each meter has two wires; one going to the terminal block, and one to the harness connector plug. Trace the two wires from the meter to be replaced. Disengage the wire at the terminal block by pulling it straight out.
4. Remove the wire at the connector plug using a pin extractor to push it out from the inside. Note the placement of the wire for later installation.

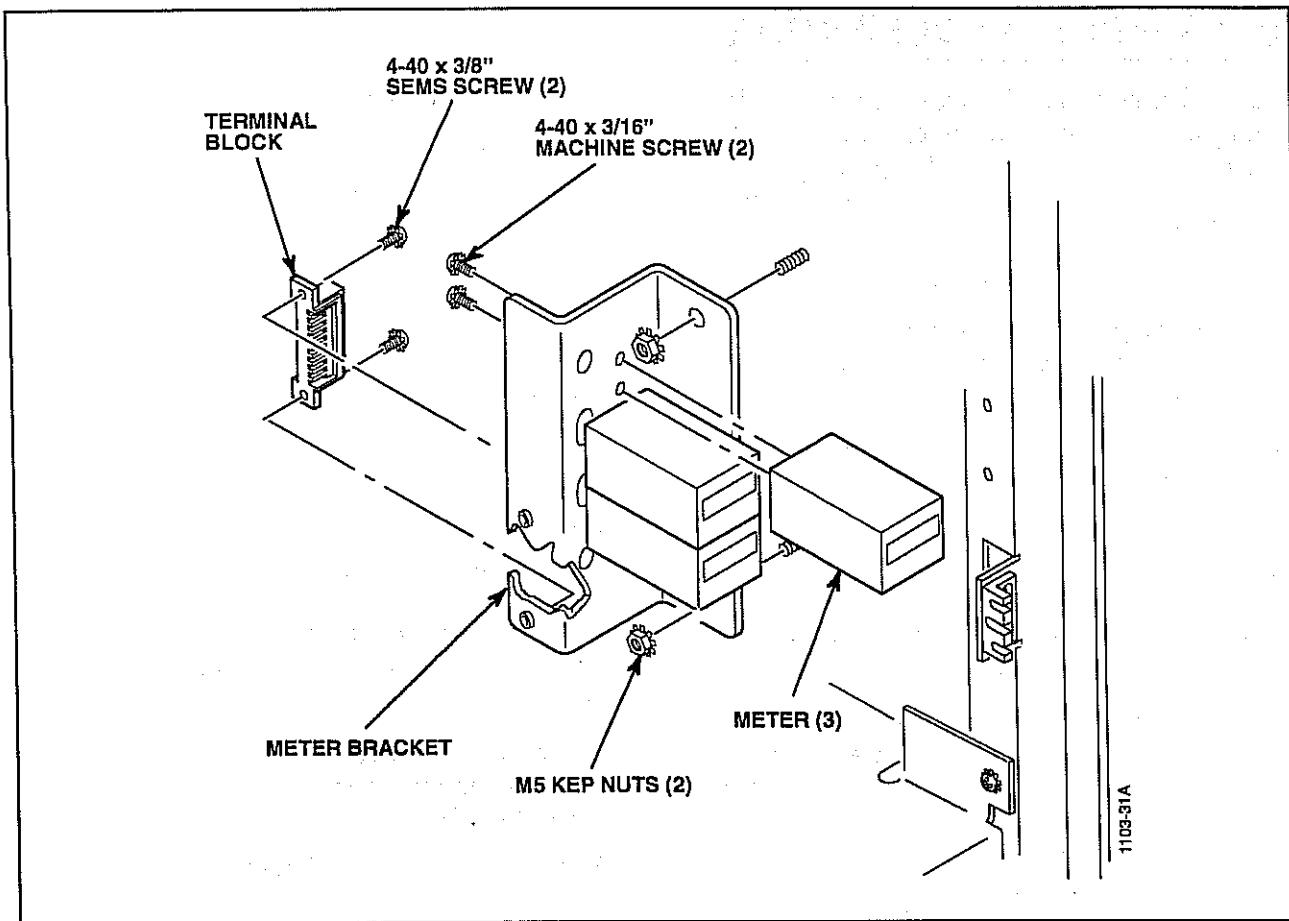


Figure 5-46. Meter Removal.

- Remove the two 4-40 x 3/16" machine screws that fasten the meter to the back of the meter bracket.

Individual Meter Installation

- Place the meter on the bracket so that its display match those of the other meters.
- Attach the meter to the back of the bracket with two 4-40 x 3/16" machine screws.
- Insert the U-shaped commoning pin into position in the terminal block and the pointed terminal pin into position in the harness connector plug. Verify that both pins snap completely into place.
- Secure the meter wires to the remaining harness wires using ty-raps. Start at the harness connector plug and work back to the meter bracket.

Meter Assembly Installation

- Align the mounting holes on the meter bracket to the mounting posts of the cabinet.
- Fasten the meter assembly bracket to the right side of the cabinet with two M5 Kep nuts and tighten securely.
- Connect the meter harness at the Molex connector.
- Turn the machine power on, close and lock the door.

5.12.3 Functional Verification

Play a number of games and observe each meter. Verify that each meter increments properly. Refer to the definitions given previously for each meter category.

5.12.4 Troubleshooting

If a meter is not functioning, proceed as follows.

1. Check for correct operation using the output tests in the self test mode. Refer to Section 4, Game Software, for information about using the self test mode.
2. If the meter does not increment, replace the processor board with a known good one (refer to Section 5, Processor Board) and repeat the output tests.
3. If the meter still does not increment, use a voltmeter to measure operating voltage to the meters. Voltage should measure approximately 24 VAC. If not, check all harnesses and wires to the meter for loose or faulty connections.
4. Replace the meter.
5. If the meter still does not increment, replace the mother board (refer to Section 5, Lower Module).

5.13 Bell Option

Machines that are ordered with the bell option are shipped with the 24-volt bell and bell harness in place. This section provides procedures for removing the bell assembly.

5.13.1 Removal

To remove the bell assembly, refer to Figure 5-47, Bell Removal.

Tool Required:

- 8mm nutdriver

Procedure

1. Open the front door and turn the machine **power off**.
2. Remove the stepper reels from the reel shelf (refer to Section 5.11, Stepper reels).
3. The bell is located on the back wall of the machine.

4. Disconnect the bell harness along the bottom edge of the assembly and at J4 on the mother board.
5. Hold the bell in place and remove the two M5 Esna nuts that fasten the bell.
6. Lift the bell away from the mounting studs and out of the enclosure.

5.13.2 Installation

To install the bell assembly, refer to Figure 5-47 Bell Removal.

Procedure

1. Hold the bell in place and fasten the two M5 Esna nuts that hold the bell.
2. Connect the bell harness along the bottom edge of the assembly and at J4 on the mother board.
3. Install the stepper reels and turn the **power on**.

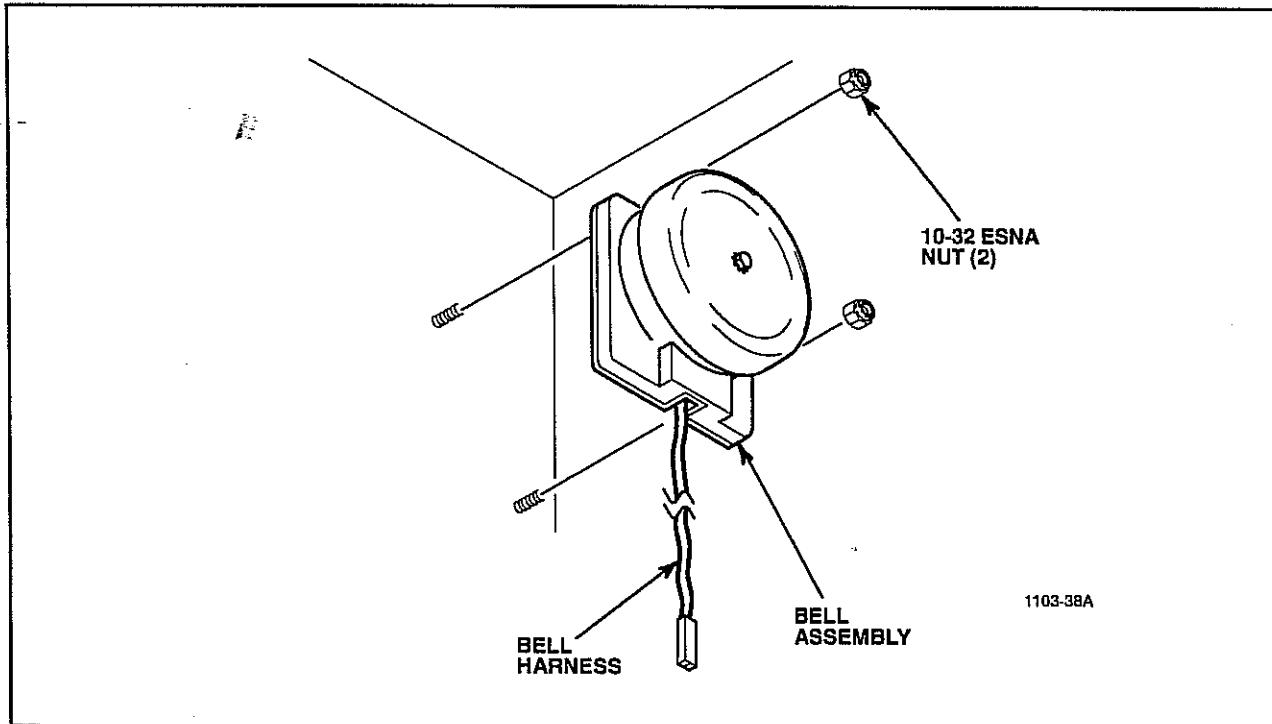


Figure 5-47. Bell Removal.

5.14 Top Box

The S-Plus IBA top box may contain one or more of the following assemblies: display glass, fluorescent assembly, multiplier light-barrier, payline light-barrier (single), payline light-barrier (dual), candle, data collection options, progressive display(s) and progressive driver board.

The information that follows describes removal and replacement of these top-box components:

- display glass
- fluorescent assembly
- multiplier light-barrier
- payline light-barrier (single)
- payline light-barrier (dual)

Refer to Section 3, Troubleshooting, for maintenance and troubleshooting information relating to these top-box components.

Note

The candle, data collection and the progressive options are detailed in separate subsections of Section 5.

5.14.1 Top-Box Glass

CAUTION

Handle all glass with extreme care to avoid breakage or injury by potentially sharp edges.

Glass Removal

To remove the top-box glass, see Figure 5-48 and proceed as follows.

1. Open the front door and turn the machine power off.
2. Locate the two half moon cut-outs at the top front rim of the machine cabinet (left and right) and place your index fingers under the chrome glass clamp of the top-box glass.
3. Lift the top-box glass upward about 1/8" and tilt the bottom of the glass 1/2" out-

ward and down from the top box. Do not let go of the glass.

Glass Installation

1. Position the upper edge of the top-box glass toward the top of the top box against the left and right glass stops.
2. Carefully slide the glass upward into the glass retaining slot in the top of the cabinet.
3. Push the lower edge of the glass inward until the bottom of the chrome glass clamp rests completely on the front rim of the machine cabinet.
4. Turn the machine power on; close and lock the front door.

5.14.2 Top-Box Fluorescent

Fluorescent Removal

To remove the fluorescent from the top box, see Figure 5-48 and proceed as follows.

1. Open the front door and turn the machine power off.
2. Remove the top-box glass.
3. Remove the fluorescent bulb by placing both hands at each end of the bulb and rotate the bulb from the two sockets.
4. Disconnect the 2-pin fluorescent harness from the top-box harness.
5. Hold the fluorescent mounting bracket in place and remove the three 6-32 Kep nuts that mount the bracket to the back wall of the top box.

Fluorescent Installation

1. Position the fluorescent mounting bracket over the three mounting posts on the back wall of the cabinet.
2. Fasten the mounting bracket to the back wall with three 6-32 Kep nuts.

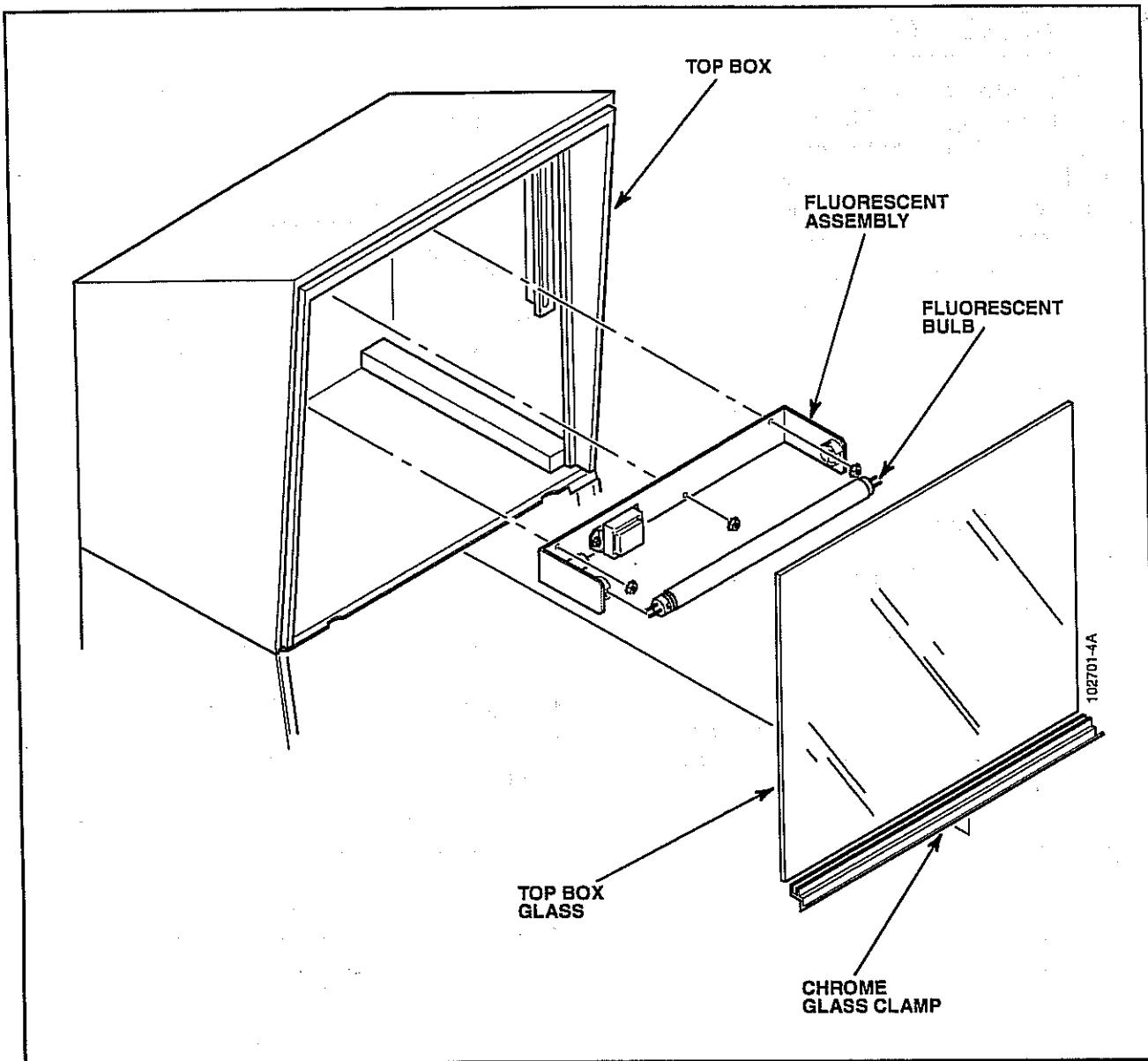


Figure 5-48. Typical Top Box Components.

3. Connect the 2-pin fluorescent harness to the top-box harness.
4. Install the fluorescent bulb by aligning the two pins at each end of the bulb with the guides in the two sockets and rotate the bulb until it is firmly seated.
5. Install the top-box glass.

6. Turn the machine **power on**; close and lock the front door.

Functional Verification – Fluorescent

Confirm that the display glass is illuminated when the machine power is on. If the lamp flickers or does not illuminate, refer to the troubleshooting section below and in Section 3.

Troubleshooting the Fluorescent

If the machine is on and operational but the fluorescent display lamp doesn't illuminate or flickers, proceed as follows.

1. Replace the bulb.
2. If the lamp still doesn't illuminate, replace the starter with a new one.
3. With the machine power on, use a voltmeter to measure the operating voltage to the light. Voltage should measure approximately 115 VAC. If not, check all harnesses and connections to the light.
4. If the lamp still doesn't illuminate, replace the ballast.

5.14.3 Multiplier Light Barrier

Refer to the exploded-view illustrations near the back of Section 5.14 for parts identification and assembly.

Light Barrier Removal

1. Open the front door and turn the machine **power off**.
2. Remove the top-box glass.
3. Mark one end of the multiplier light barrier to identify the left or right end.
4. Mark the left and right barrier mounting-brackets with a pencil to help determine correct positioning upon installation.
5. Remove two 6-32 x 3/8" Sems screws, #6 starlock and flat washers and two 6-32 nut plates (anti-rotation) that fasten the multiplier light-barrier to the left and right barrier mounting-brackets.
6. Disconnect the barrier harness from the top-box harness.

Multiplier Light Barrier Installation

1. Connect the barrier harness to the top-box harness.
2. Determine the left and right ends of the multiplier light-barrier and hold the barrier against the two barrier mounting-brackets.

er against the two barrier mounting-brackets.

3. Insert one 6-32 x 3/8" Sems screw, #6 starlock and #6 flat washers through one of the barrier mounting holes and hold both the screw and the barrier against the mounting-bracket.
4. Thread a 6-32 nut plate onto the screw, non-rotating side against the bracket, and hold the nut plate in a vertical manner against the bracket so the half-hits fit in the bracket slot.
5. Tighten the screw until the nut plate is firmly against the bracket. **Do not tighten securely at this time.**
6. Repeat Steps 3, 4 & 5 for the other end.
7. Align the ends of the barrier with the markings on the barrier mounting-bracket and tighten the two 6-32 Phillips-head screws securely.
8. Install the top-box glass.
9. Turn the machine **power on**; close and lock the front door.

5.14.4 Payline Light Barrier (Single)

Refer to the exploded-view illustrations near the back of Section 5.14 for parts identification and assembly.

Payline Light Barrier Removal (Single)

1. Open the front door and turn the machine **power off**.
2. Remove the top-box glass.
3. Disconnect the barrier harness from the top-box harness. If the top-box includes a progressive display/driver, disconnect the barrier harness from the progressive driver board also.
4. Mark the top box along one edge of the barrier mounting-bracket with a pencil to help determine correct positioning upon installation.

5. Hold the payline light-barrier in place and remove two 8-32 Phillips-head screws, #8 starlock and flat washers, located behind the front of the barrier mounting-bracket, that fasten the barrier to the top of the cabinet.

Payline Light Barrier Installation (Single)

1. Hold the payline light-barrier mounting-bracket against the top of the cabinet and align the two elongated holes in the bracket with those in the top of the cabinet.
2. Align the barrier mounting-bracket with the mark on top box and fasten the bracket to the cabinet with two 8-32 x 3/4" Phillips-head screws, #8 starlock and flat washers.
3. Connect the barrier harness to the top-box harness. If the top-box requires a progressive display/driver, connect the barrier harness to the progressive driver board also.
4. Install the top-box glass.
5. Turn the machine **power on**; close and lock the front door.

5.14.5 Payline Light Barrier (Dual)

Refer to the exploded-view illustrations near the back of Section 5.14 for parts identification and assembly.

Payline Light Barrier Removal (Dual)

1. Open the front door and turn the machine **power off**.
2. Remove the top-box glass.
3. Disconnect the barrier harness from the top-box harness. If the top-box includes a progressive display/driver, disconnect the barrier harness from the progressive driver board also.
4. Mark one of the two payline light-barriers to identify which one is left or right for installation.

5. Mark the left and right barrier mounting-brackets with a pencil to help determine correct positioning for installation.
6. Remove two 6-32 Phillips-head screws, #6 starlock and flat washers and two 6-32 nut plates (non-rotating) that fasten the payline light-barrier to the barrier mounting-bracket.
7. Repeat Step 6 to remove the other payline light-barrier.

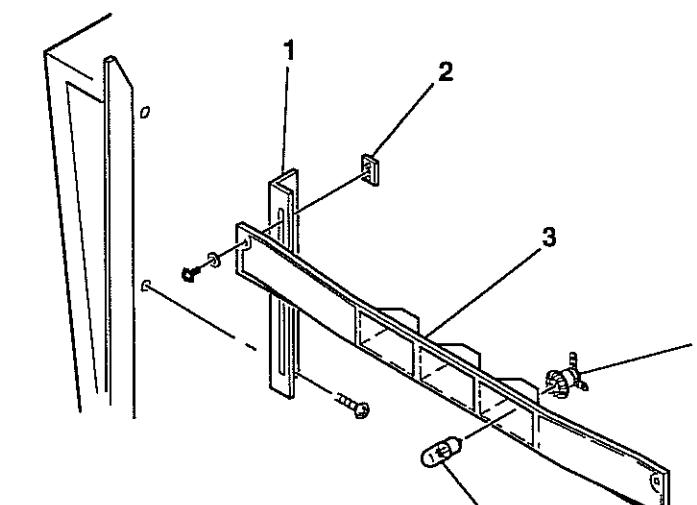
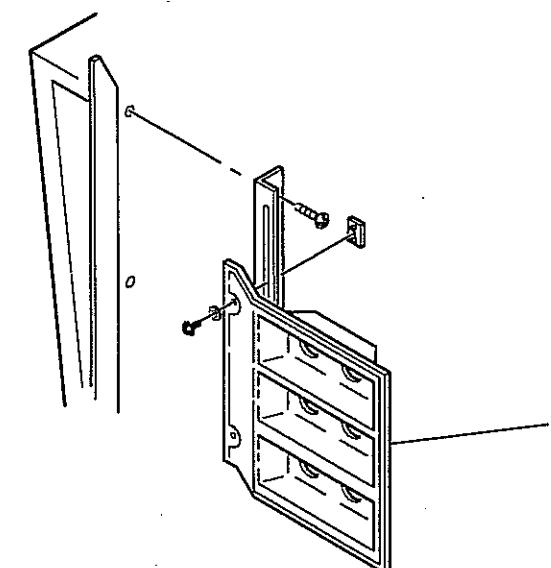
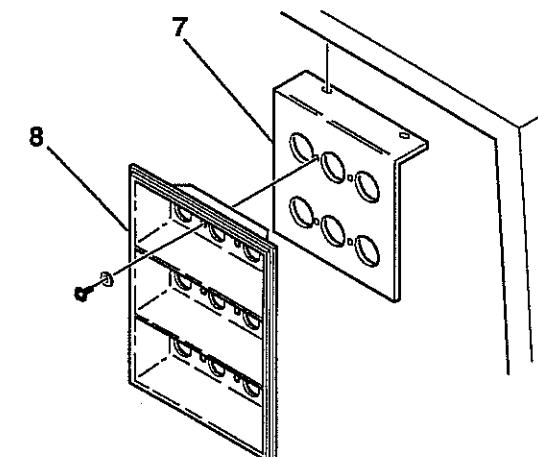
Payline Light Barrier Installation (Dual)

1. Hold the right payline light-barrier against the right barrier mounting-bracket.
2. Insert a 6-32 x 1/2" Phillips-head screw, #6 starlock and flat washer through the upper mounting hole and hold the screw and barrier against the mounting-bracket.
3. Thread a 6-32 nut plate onto the screw, non-rotating side against the bracket, and hold the nut plate in a vertical manner against the bracket so the half-hits fit in the bracket slot.
4. Tighten the screw until the nut plate is firmly against the bracket. **Do not tighten securely at this time.**
5. Insert a second 6-32 x 1/2" Phillips-head screw, #6 starlock and flat washer through the lower mounting hole and mounting-bracket.
6. Thread a second 6-32 nut plate onto the screw, non-rotating side against the bracket, and hold the nut plate in a vertical manner against the bracket so the half-hits fit in the bracket slot.
7. Tighten the screw until the nut plate is firmly against the bracket. **Do not tighten securely at this time.**
8. Align the payline light-barrier with the mark on the barrier mounting-bracket and fasten securely.
9. Repeat Steps 1 through 8 for the left payline light-barrier.

10. Connect the barrier harness to the top-box harness. If the top box requires a progressive display/driver, connect the barrier harness to the progressive driver board also.
11. Install the top-box glass.
12. Turn the machine **power on**; close and lock the front door.

TOP BOX STEPPERS

Fig. No.	Part Number	Description	Qty.
KIT	911-546-00	KIT - NON/PROG 2CM WIDE, M+/S+	1
KIT	911-547-00	KIT - NON/PROG 3CM WIDE, M+/S+	1
KIT	911-548-00	KIT - NON/PROG 5CM WIDE, M+/S+	1
KIT	911-549-00	KIT - NON/PROG 6CM WIDE, M+/S+	1
KIT	911-549-02	KIT - NON/PROG 6CM DUAL, WIDE	1
KIT	911-550-00	KIT - NON/PROG 3CBP WIDE, M+/S+	1
KIT	911-551-00	KIT - NON/PROG 4CBP WIDE, M+/S+	1
KIT	911-552-00	KIT - NON/PROG 5LCC WIDE, M+/S+	1
KIT	911-244-00	KIT - STEPPER, LOW BOY, 2CM, W/B	1
KIT	911-244-01	KIT - STEPPER, LOW BOY, 3CM, W/B	1
KIT	911-244-02	KIT - STEPPER, LOW BOY, 5CM, W/B	1
KIT	911-244-03	KIT - STEPPER, LOW BOY, 3CBP, W/B	1
KIT	911-244-04	KIT - STEPPER, LOW BOY, 4CBP, W/B	1
KIT	915-594-00	KIT - BONUS TIME, 16" S- UPRIGHT	1
KIT	911-243-00	KIT - STEPPER, LOW BOY, 2CM, INTERMEDIATE BODY	1
KIT	911-243-01	KIT - STEPPER, LOW BOY, 3CM, INTERMEDIATE BODY	1
KIT	911-243-02	KIT - STEPPER, LOW BOY, 5CM, INTERMEDIATE BODY	1
KIT	911-243-03	KIT - STEPPER, LOW BOY, 3CBP, INTERMEDIATE BODY	1
KIT	911-243-04	KIT - STEPPER, LOW BOY, 4CBP, INTERMEDIATE BODY	1
KIT	911-546-01	KIT - NON/PROG 2CM INT., M+/S+	1
KIT	911-547-01	KIT - NON/PROG 3CM INT., M+/S+	1
KIT	911-548-01	KIT - NON/PROG 5CM INT., M+/S+	1
KIT	911-549-01	KIT - NON/PROG 6CM INT., M+/S+	1
KIT	911-550-01	KIT - NON/PROG 3CBP INT., M+/S+	1
KIT	911-551-01	KIT - NON/PROG 4CBP INT., M+/S+	1
KIT	911-552-01	KIT - NON/PROG 5LCC INT., M+/S+	1
KIT	911-553-00	KIT - N/P3L SLANT, WIDE BODY, INTERMEDIATE BODY M+/S	1
1	911-553-04	KIT - N/P 3 LINE FLAT TOP, WIDE BODY/INTERMEDIATE BODY	1
1	636-670-00	BRACKET - MOUNTING, STEPPER	2
2	431-019-96	WASHER, LOCK EXT. #8	4
2	589-354-00	PLATE - NUT, 6-32	2
2	424-003-95	NUT, KEP STEEL 6-32	2
2	411-007-96	SCREW, MACH PH PAN 8-32X3/4	4
2	419-510-96	SCREW - SEMS, PH PAN, 8-32 X 3/8	2
3	430-003-95	WASHER, FLAT, STEEL #6, TYPE B/N	1
3	196-187-01	BARRIER - LT, 16 IN 3CM, INTERMEDIATE BODY	1
3	196-195-01	BARRIER - LIGHT, 3CBP, INTERMEDIATE BODY	1
3	196-188-01	BARRIER - LT, IB, 2 COIN MULT UNI	1
3	196-196-01	BARRIER - LIGHT, 4CBP, INTERMEDIATE BODY	1
3	196-197-01	BARRIER - LIGHT, 5CM, INTERMEDIATE BODY	1
4	120-010-90	SOCKET, BAYONET, MINI - LAMP	6
4	120-043-90	SOCKET, LAMP T-1 3/4 WEDGE BAS	8
4	196-217-00	BARRIER, LOW BOY STEP, 2CM, WIDE BODY	1
4	196-217-01	BARRIER, LOW BOY STEP, 2CM, INTERMEDIATE BODY	1
4	196-218-01	BARRIER, LOW BOY STEP, 3CM, INTERMEDIATE BODY	1
4	196-219-01	BARRIER, LOW BOY STEP, 3CBP, INTERMEDIATE BODY	1
4	196-220-01	BARRIER, LOW BOY STEP, 4CBP, INTERMEDIATE BODY	1
4	196-221-00	BARRIER, LOW BOY STEP, 5CM, WIDE BODY	1
4	196-221-01	BARRIER, LOW BOY STEP, 5CM, INTERMEDIATE BODY	1
5	190-013-90	LAMP, BAYONET, 6V, .15A, #4	6
5	193-016-90	LAMP, MINI T-1, 1/2 6.3V,	8
5	193-023-90	LAMP T-1 3/4 6.3V WEDGE 86	8
6	196-185-00	BARRIER - LT, WB 3 LINE, 16 IN TB	2
6	196-186-01	BARRIER - LT, IB 5 LINE CC, UNIV.	2
7	636-672-00	BRACKET - 9 IN, 3 LINE, WIDE BODY	1
7	636-704-01	BRACKET, LOW BOY STEPPER MTG, INTERMEDIATE BODY	1
8	196-190-00	BARRIER - LT, WB 3 LINE, 9 IN TB	1

**MULTIPLIER AND BUY-A-PAY STEPPER****PAYLINE AND CRISSCROSS STEPPERS****3 COIN PAYLINE STEPPER**

5.15 Candle Option

The multiple-stage candle, or change/service light, mount on top of the enclosure. Each stage illuminates in various combinations (slow flash, fast flash, solid on or off) to indicate certain game modes or conditions (door open, change request, etc.).

The pattern of candle illumination may change from jurisdiction to jurisdiction. Refer to the Machine Installation in Section 2, for an illustration of specific candle operation.

This section provides the information required to maintain, remove, install, and trouble-shoot the two-stage candle.

CAUTION

Do not use cleaning solvents that contain ammonia on the exterior of a brass cabinet. Permanent damage to the finish will result.

5.15.1 Lamp Replacement

The candle does not need to be removed to replace a lamp inside the candle.

1. Turn the machine **power off**.
2. Remove the acorn (cap) nut on the top of the candle.
3. Carefully slide the housing up and away from the candle base, to avoid damaging the colored mylar used to denote each candle stage.
4. Support the bayonet-type lamp socket and circular base with one hand and remove the lamp by pushing down and turning the lamp with the other hand.
5. When replacing the candle housing, orient the seam in the colored mylar so it faces the back of the candle.

5.15.2 Slant Top Box Candle Removal

To remove the candle from the top of the standard top box, round top, or lowboy, see Figure 5-49 and proceed as follows.

Tool Required

- #2 Phillips screwdriver

Removal

1. Turn the machine **power off**.
2. Remove the top box glass to locate the bottom of the candle assembly.

Note

If the machine does not come with a top box, then open the front door and remove the reels, to locate the candle.

3. Disconnect the 4-pin candle harness and candle ground wire from the upper enclosure harness.
4. Remove the two 8-32 x 3/4" machine screws, two #8 lock washers, and #8 flat washers, located inside the enclosure, that fasten the candle to the top of the enclosure.
5. Lift the candle straight up from the enclosure and carefully feed the candle harness and its connector up through the hole in the top of the enclosure.

Note

The candle mount on a slant top does not require removal, when removing the candle.

5.15.3 Installation

Tool Required

- #2 Phillips screwdriver

Installation

1. Carefully insert the candle harness down through the hole in the top of the machine enclosure and position the candle so that its top cap nut faces toward the back of the enclosure.
2. Align the two mounting holes in the candle base from inside the enclosure.

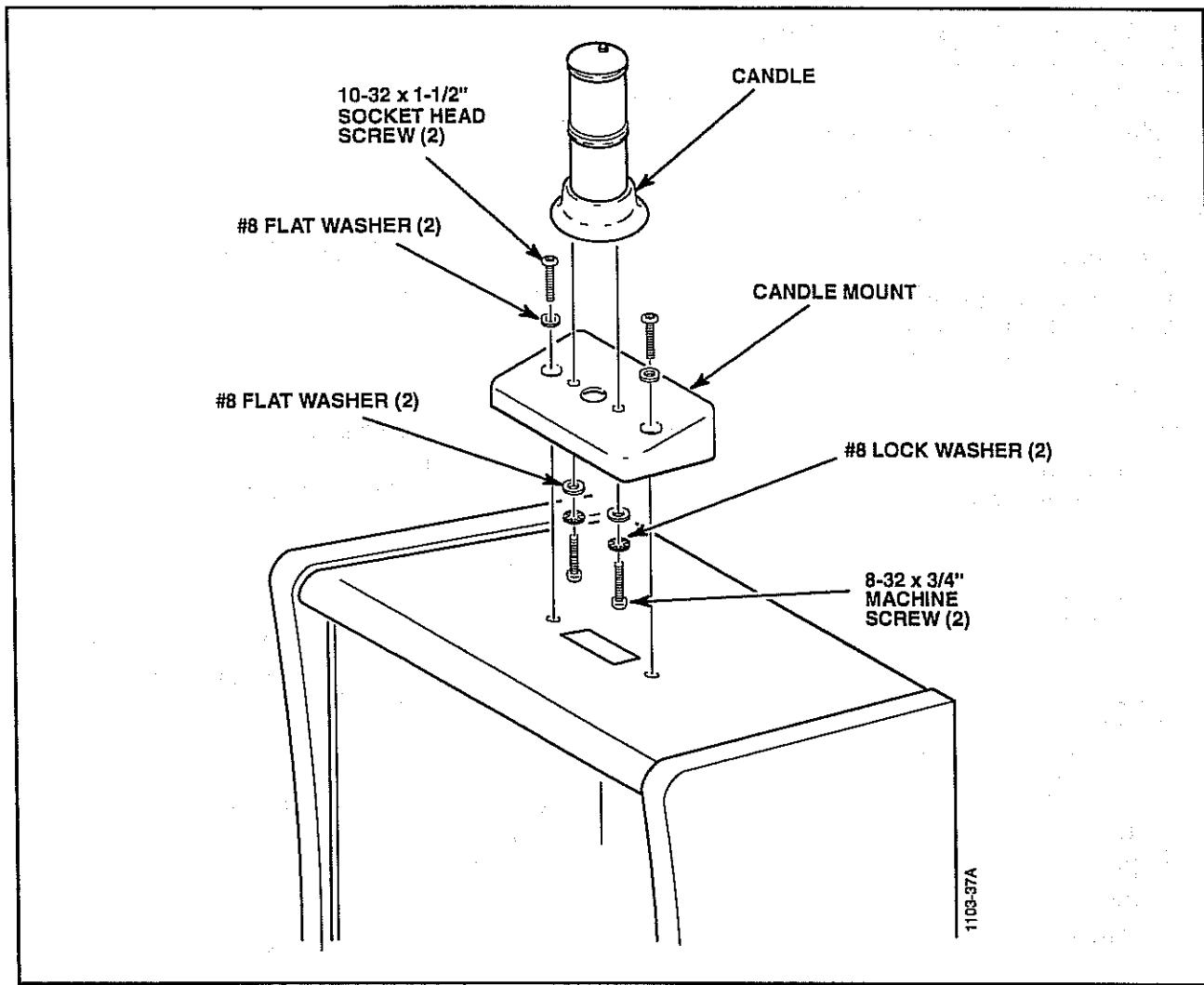


Figure 5-49. Candle Removal (Slant Top).

3. Hold the candle in place and thread the two 8-32 x 3/4" machine screws, with the #8 flat washers and #8 lock washers. Tighten securely.
4. Connect the 4-pin candle harness to the upper enclosure harness.
5. Turn the machine **power on**; close and lock the door.

5.15.4 Standard & Round Top Box Candle Removal

To remove or install the candle, see Figure 5-50 and proceed as follows.

Tool Required

- #2 Phillips screwdriver

Removal Procedure

1. Open the front door and turn the machine **power off**.
2. Disconnect the 4-pin candle harness from the upper enclosure harness.
3. Remove the two 8-32 x 3/8" Sems screws and #8 washers located inside the enclosure that fasten the candle to the top of the enclosure.

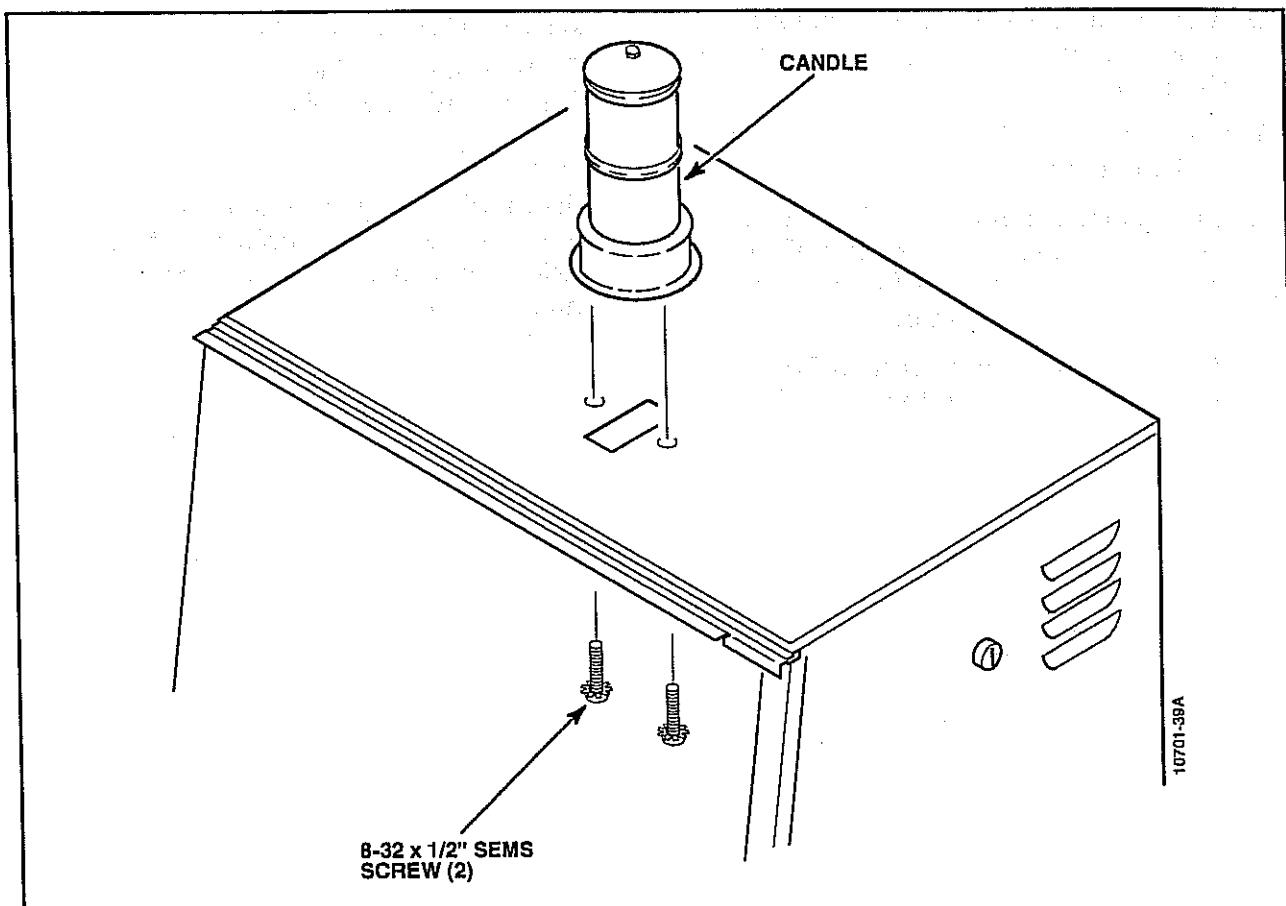


Figure 5-50. Candle Removal & Installation (Flat & Round Tops).

4. Lift the candle straight up from the enclosure and carefully feed the candle harness and its connector up through the hole in the top of the enclosure.

Installation Procedure

1. Carefully insert the candle harness down through the hole in the top of the machine enclosure and position the candle so that its top cap nut faces toward the back of the enclosure.
2. Align the two mounting holes in the candle base from inside the enclosure.
3. Hold the candle in place and thread the two 8-32 x 3/8" Sems screws and #8 washers. Tighten securely.

Note

Be sure to attach the green ground wire to the zinc-coated mounting hole, for better grounding contact.

4. Connect the 4-pin candle harness and candle grounding wire to the upper enclosure harness.
5. Turn the machine **power on**; close and lock the door.

5.15.5 Candle Troubleshooting

1. The lamps are made with clear glass. If a lamp is milky white or carbon black, replace it. If the lamp is still not functioning, proceed to Step 2.

2. With the machine power off, measure across the two lamp socket tabs using an ohmmeter.
3. If resistance equals 4 ohms, the harness to the lamp is open.
4. If resistance is greater than 5 ohms, remove the lamp from the socket. Check the bulb and socket contacts for misalignment and re-measure the lamp.
5. If the resistance is greater than 5 ohms, replace the lamp (refer to Section 5.15.6).

5.15.6 Maintenance

The two-stage candle requires only occasional cleaning and bulb replacement.

Cleaning

The candle does not require routine cleaning, however, the exterior surface can be dusted occasionally with a clean, soft, lint-free cloth. A mild, anti-fogging plastic or glass cleaner may be used, if needed.

5.16 Progressive Options

This section contains removal and installation instructions for the various types of progressive display/drivers that may be mounted in the top-box of S-Plus machines. It also contains instructions for installing a progressive controller to link progressive displays within a group of machines, and instructions on creating a progressive harness for use between a controller and a S-Plus machine.

Two types of progressive display boards mount in the top-box: single display for a single top progressive award and a double display for two top progressive awards. Refer to the illustrations at the back of this section for each meter configuration.

5.16.1 Progressive Display/Driver

The following procedure describes the steps necessary to remove and install the progressive display/driver. Depending on the type of progressive and top-box, removal and installation instructions will vary.

Progressive Display/Driver Removal

To remove the progressive display/driver from the top-box cabinet and driver chassis, see Figure 5-28 and proceed as follows.

1. Open the front door and turn the machine **power off**.
2. Remove the top-box glass.
3. Disconnect the progressive harness leading to the driver board.
4. Mark the cabinet along the edge of the chassis with a pencil to help determine correct positioning for installation.
5. Hold the progressive display/driver chassis in place and remove two 8-32 x 3/4" machine screws and #8 flat-steel washers that mounts the chassis to the top of the cabinet.
6. Remove the four 6-32 x 1/4" Sems screws that fasten the progressive driver board to the progressive driver chassis.

7. To detach the progressive display bracket from the progressive driver chassis, remove the 6-32 x 1/4" Sems screws.

Progressive Display/Driver Installation

To install the progressive display/driver:

1. Attach the progressive display bracket to the progressive driver chassis with two 6-32 x 1/4" Sems screws.
2. Fasten the progressive driver board to the progressive driver chassis with four 6-32 x 1/4" Sems screws
3. Hold the progressive display/driver chassis against the top of the top-box cabinet and align the two, elongated mounting holes on the chassis with those in the top of the cabinet.
4. Fasten the progressive driver chassis to the top of the cabinet with two 8-32 x 3/4" machine screws and #8 washers. **Do not** tighten securely at this time.
5. Align the edge of the chassis with the mark on the cabinet and tighten the hardware securely.
6. Connect the progressive harness to the progressive driver board.
7. Install the top-box glass. (Section 5.24)
8. Turn the machine **power on**; close and lock the front door.

5.16.2 Progressive Controller

The following procedures give general instructions for connecting a S-Plus machine to an IGT PD200 or PD300 progressive controller. For details concerning applications and configurations other than that contained in this manual, contact IGT Customer Service (refer to Section 2 for information on IGT Customer Service).

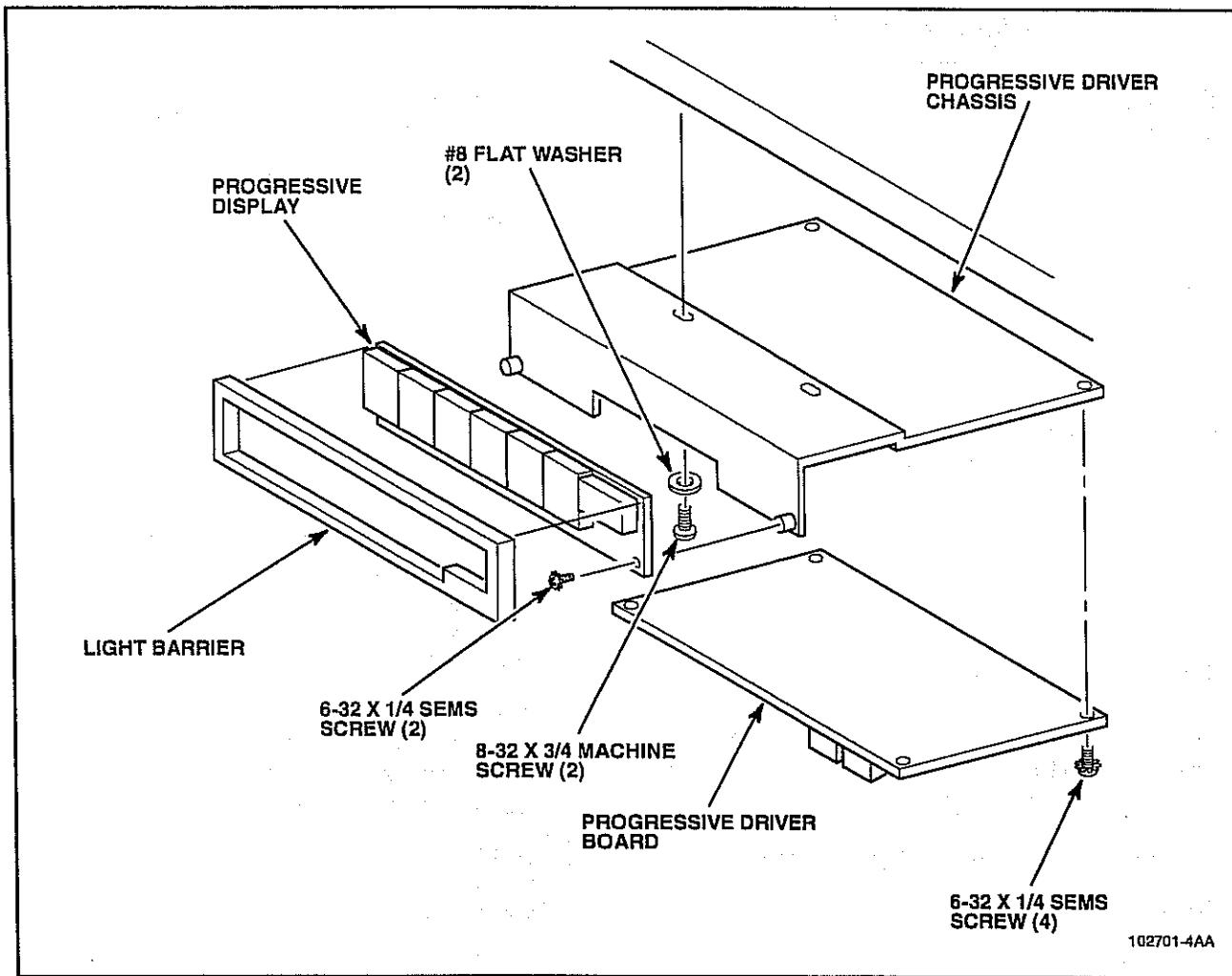


Figure 5-51. Progressive Display/Driver.

CAUTION

Use only shielded cable when connecting IGT machines to any peripheral device such as a progressive controller. Electrostatic discharge (ESD) causes excessive machine resets and, depending on the amount of discharge voltage, ESD can cause damage to the machine's electronic components.

1. Open the front door and turn the machine power off.
2. Install the progressive controller inside one of the machine stands that is central to all machines, to avoid insufficient progressive harness length.

3. Remove the hopper from the machine cabinet (refer to Hopper in Section 5).
4. Route the 4-pin connector end of the progressive harness from inside the stand up through the power cord hole in the bottom of the machine cabinet.
5. Connect the 4-pin connector end of the progressive harness to connector J12 on the mother board.
6. Fasten the shield wire to one of the mounting posts that fasten the hopper receptacle bracket to the machine cabinet. Make sure the wire does not touch any other component except the chassis.

7. Route the progressive harness, through the machine stand(s), to the progressive controller.
8. Connect the 9-pin end of the progressive harness to the appropriate connector on the controller, as specified for the IGT controller program.
9. Install the hopper (refer to Hopper in Section 5).
10. Repeat steps 3 through 9 for each machine.
11. Refer to the IGT progressive-controller operations manual to verify harness connections, install the correct controller program and set the applicable progressive levels and amounts.
12. Refer to Section 4, Game Software, to set any internal progressive options in the self test mode.

Progressive Harness

The following procedure describes how to create a progressive harness for use between an IGT progressive controller and an IGT S-Plus machine. Table 5-6 lists the signal names and pin-outs for each connector.

1. Use shielded cable containing three differently colored, insulated wires. IGT recommends a shielded cable, typically containing red, black and white wires.
2. Determine the length of progressive harness cable that is needed to run between the progressive controller and each machine. Add at least 3 feet (1 meter) to each end of the cable for servicing purposes.
3. On the machine end of the progressive harness, strip away approximately 10" of the outer insulation on the cable to expose the braided shield.
4. Unwrap the braided shield and twist the shield strands tightly together to form a single wire.
5. Crimp a #8 ring lug onto the end of the shield wire.
6. Strip away 1/8" of the insulation from each wire and crimp a Molex pin onto the end of each wire.
7. Insert the Molex terminated wires into a 4-pin Molex wafer-connector (#156). Table 5-6 lists typical wire colors and their signal positions for the progressive harness.

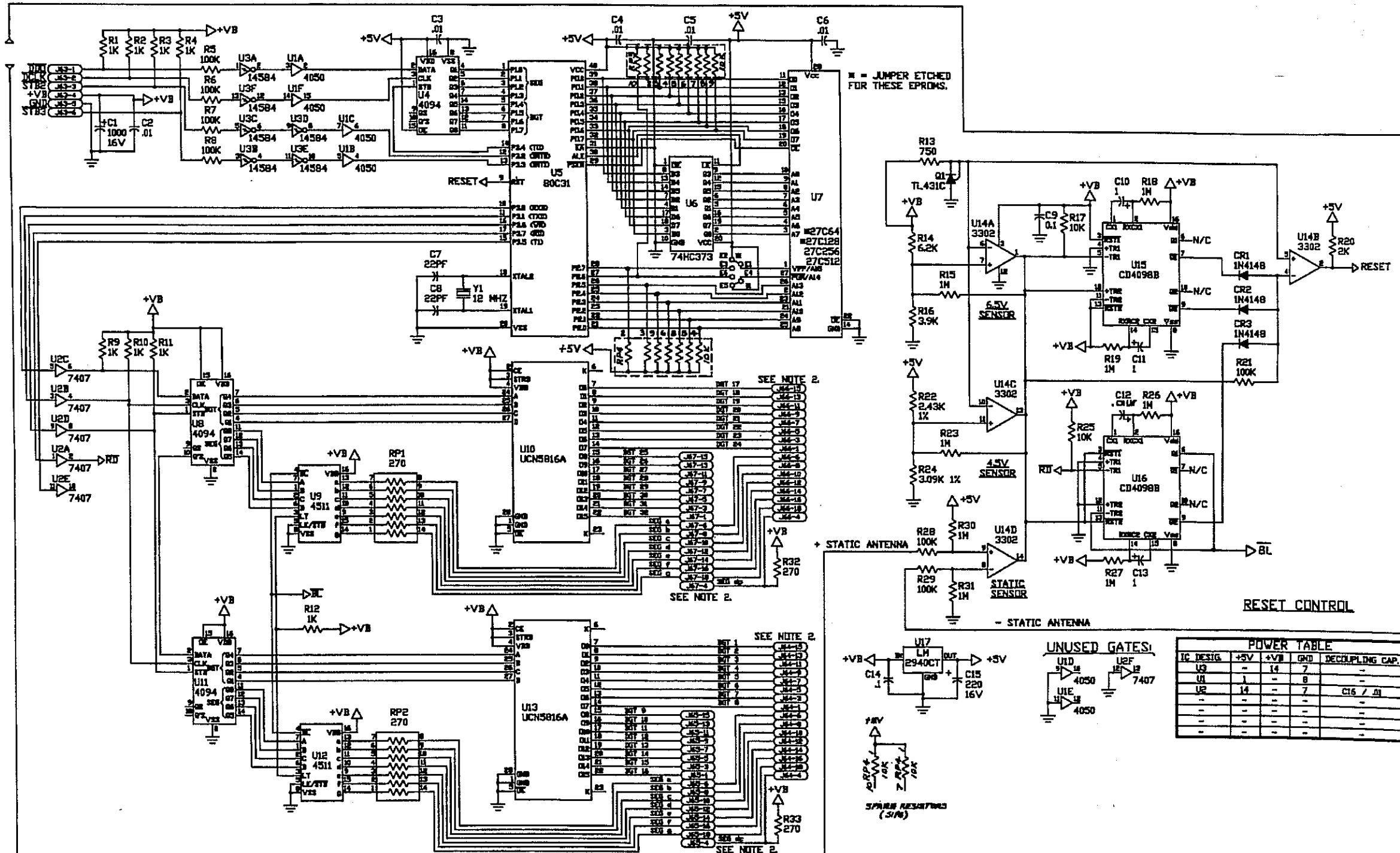
**Table 5-6
Progressive Harness**

Connector	Color	Pin #	Description
J12	---	1	No connection
J12	Red	2	Controller data
J12	Black	3	Signal ground
J12	White	4	Coin in signal
Machine Chassis	Shield	Pin #	Chassis Ground
IGT	Black	4	Signal ground
IGT	Red	6	Controller data
IGT	White	7	Coin in signal

8. On the controller end of the progressive harness, strip and terminate each wire with an amp pin. The shield does not require termination at this end.
9. Insert the amp-terminated wires into a 9-pin amp connector. Table 5-6 lists typical wire colors and their signal positions for the progressive harness.

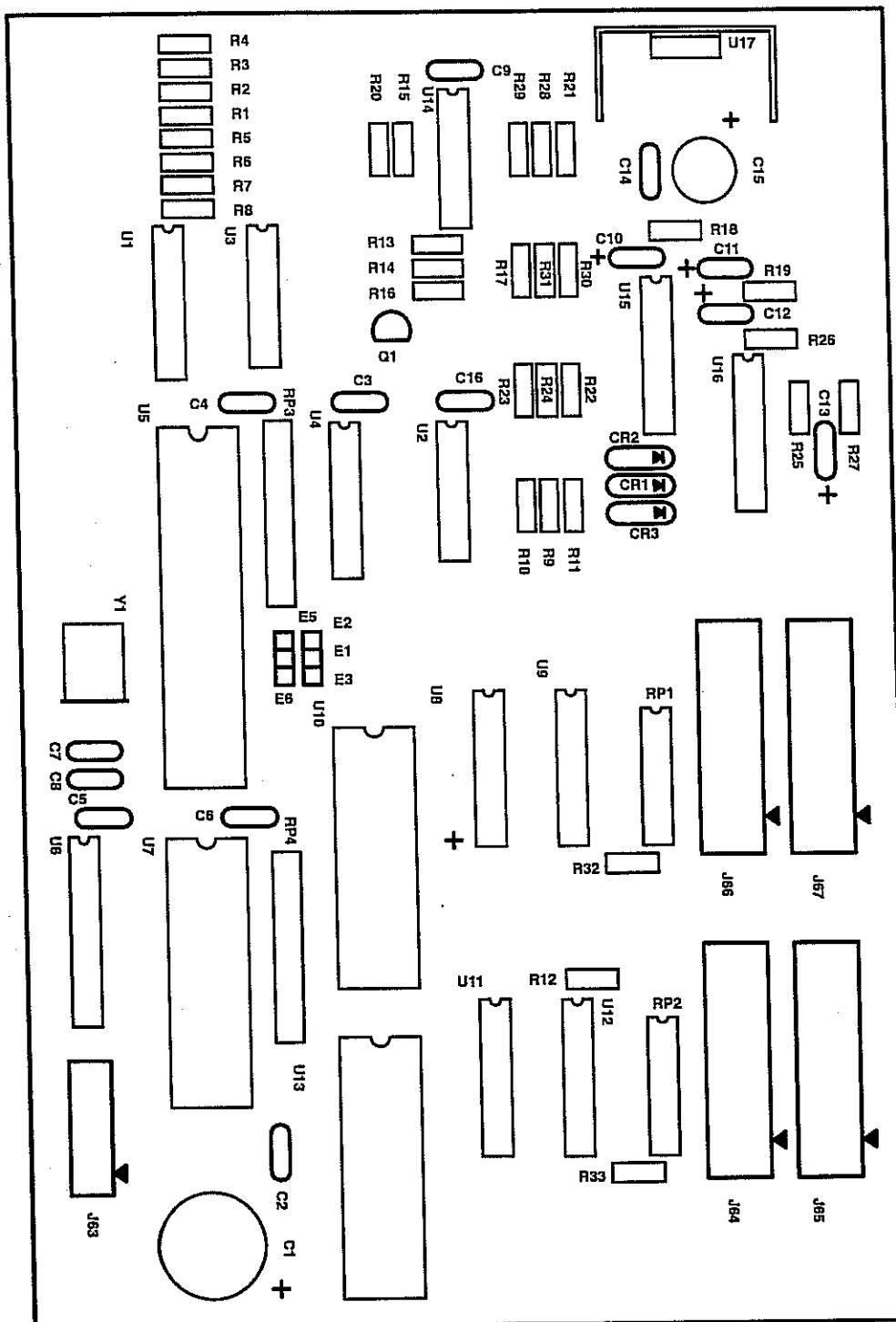
PROGRESSIVE DRIVER BOARD
751-095-10 REV A

NOTES: UNLESS OTHERWISE SPECIFIED
 1. ALL RESISTANCE IS IN OHMS, 1/4 WATT, SIZ AND ALL CAPACITANCE IS IN MICROFARADS.
 2. BLANK PINS ON CONNECTORS J64-J67 ARE 2, 17, 19 & 20.

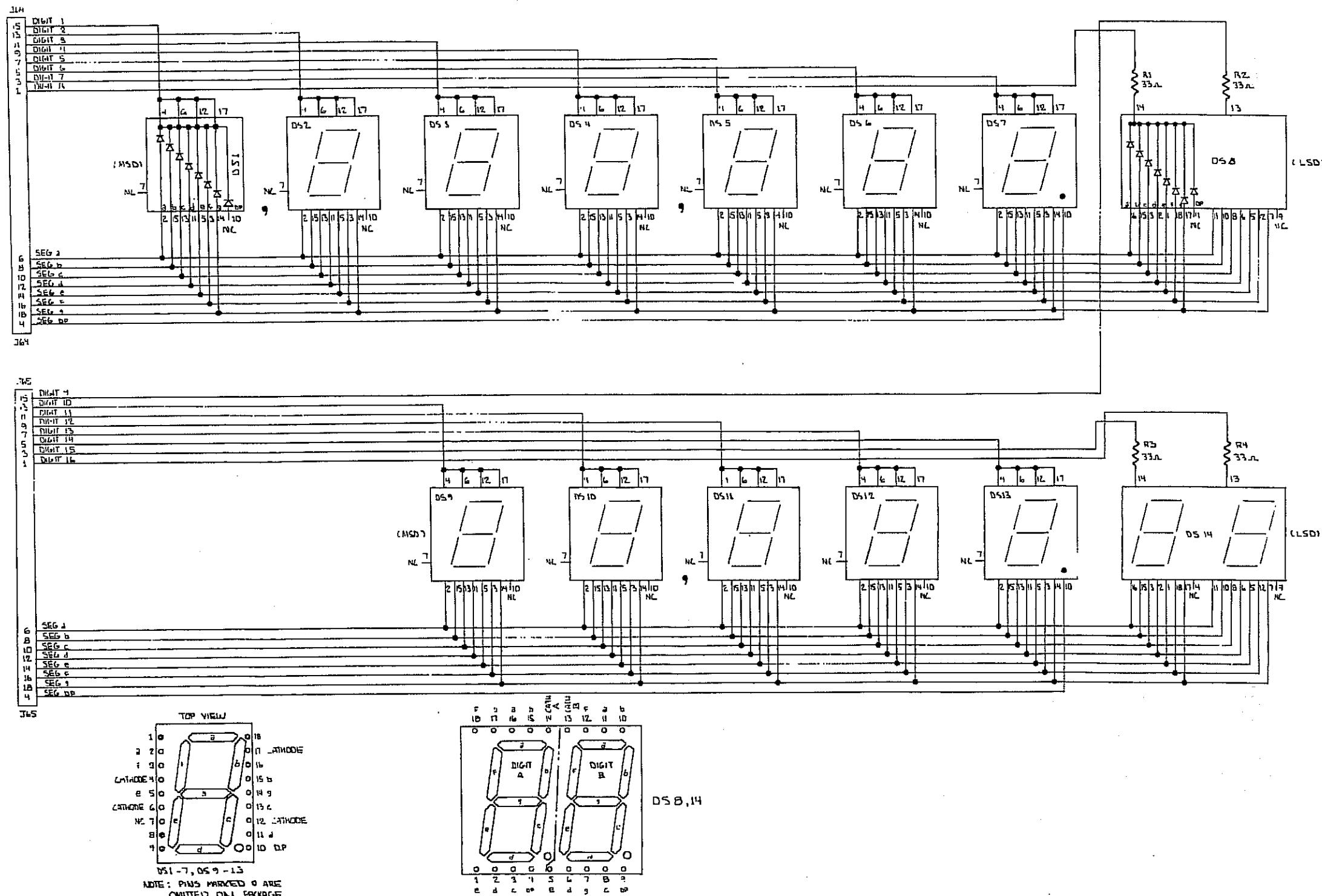


PROGRESSIVE DRIVER BOARD
751-095-00

Component	Description	Part Number
CR1-3	DIODE CMPTR 100V/MA 1N4148	480-033-90
C1	CAP ELCTR RD 1000UF 16V 503D*	156-007-90
C10,11,13	CAPR, DIP, TANT, 1MF, 25V	154-005-90
C15	CAP ELCTR RD 220UF 16V 515D*	156-021-90
C2-6,12,16	CAP CER BYPS .01UF 50V C315	152-072-90
C7,8	CAP CER 22PF 200V CK05BX220K	152-008-90
C9,14	CAP CER BYPS .1UF 50V C315	152-071-90
J63	CONN, HDR, 6PIN, STR SHROUD SL	211-058-90
J64-67	CONN, HDR, 20P, SHROUD, NO EJECTOR	211-017-90
Q1	DIODE REF 2.5V TL431CLP	480-063-90
RAW BOARD	BOARD, PC, CPU, PROG, DRIVER RAW	751-095-30
REF ASSEMBLY DRAWING	BOARD PC, CPU, PROG DRIVER DWG	751-095-50
REF ASSEMBLY DRAWING	BOARD PC, CPU, PROG DRIVER DWG	751-095-50
REF MTG. HOLES	WASHER-NYLON, #6 PSA ONE SIDE	439-067-00
REF SCHEMATIC	BOARD, PC, CPU, PROG, DRIVER SCHM	751-095-10
REF SCHEMATIC	BOARD, PC, CPU, PROG, DRIVER SCHM	751-095-10
REF Y1	SPACER, SIP, 2POS, 0.2" LD, SP	674-443-90
RP1,2	RESIST. NTWK. 270-7 14P DIP	478-028-90
RP3,4	RESIST. NTWK. 10K-9 10P SIP	478-017-90
R1-4,9-12	RESIST. CF 1K OHM .25W LP	474-023-90
R13	RESIST. CF 750 OHM .25W LP	474-008-90
R14	RESIST. CF 6.2K OHM .25W LP	474-073-90
R15,18,19,23,26,27,30,31	RESIST. CF 1MEG OHM .25W LP	474-013-90
R16	RESIST. CF 3.9K OHM .25W LP	474-032-90
R17,25	RESIST. CF 10K OHM .25W LP	474-026-90
R20	RESIST. CF 2K OHM .25W LP	474-060-90
R22	RESIST. MF 2.43K .25W 1% LP	476-011-90
R24	RESIST. MF 3.09K .25W 1% LP	476-017-90
R32,33	RESIST. CF 270 OHM .25W LP	474-004-90
R5-8,21,28,29	RESIST. CF 100K OHM .25W LP	474-010-90
U1	IC, BUFFER, HEX, 4050	320-319-90
U10,13	IC, INTRFC, DECDR/LTCH/SNK DRVR	321-010-90
U14	IC COMPTR QUAD VOLT LM3302	320-130-90
U15,16	IC MULTVBR DUAL MONO 4098B	320-140-90
U17	VREG +5V/1.5A LDO LM2940CT	488-026-90
U17 REF	HEAT SINK, 18C/W, TO-220, IMPROVED	267-031-90
U2	IC, BUF/DRV, HEX, 7407	320-064-90
U3	IC HEX SCHMITT TRIG CD40106	320-038-90
U4,8,11	IC REGSP SHFT/STOR 4094B	320-108-90
U5	UPROCESSOR 80C31BH CMOS	327-010-90
U5 REF	SOCKET, I.C. DIP, 40-PIN	127-010-90
U6	IC LTCH OCTL TR74HC373	320-234-90
U7	EPROM, CMOS, 64K, 250NS 27C64	708-019-90
U7 REF	SOCKET, I.C. DIP, 28-PIN	127-011-90
U9,U12	IC DECDR/DRV BCD/7-SEG 4511B	320-109-90
Y1	CRYSTAL, 12.0 MHZ, HC-18U	230-019-90



**9 + 7 DIGIT DISPLAY BOARD SCHEMATIC
751-088-10 REV A**

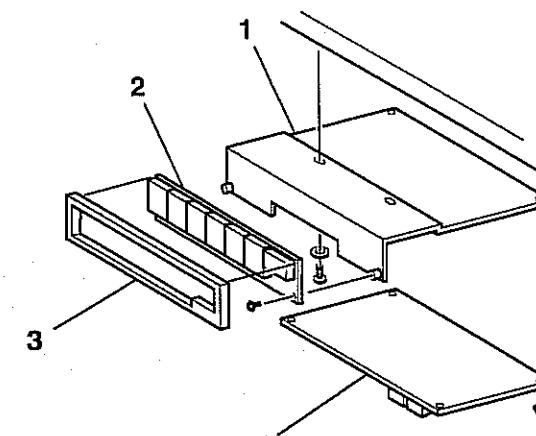


TOP BOX PROGRESSIVE DISPLAYS

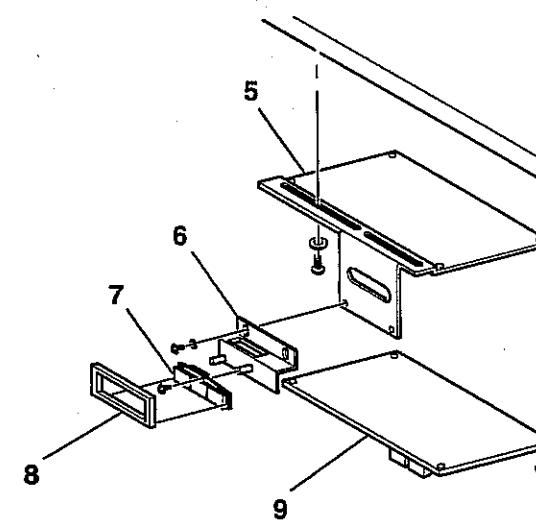
Fig. No.	Part Number	Description	Qty.
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TYPE A PROGRESSIVE

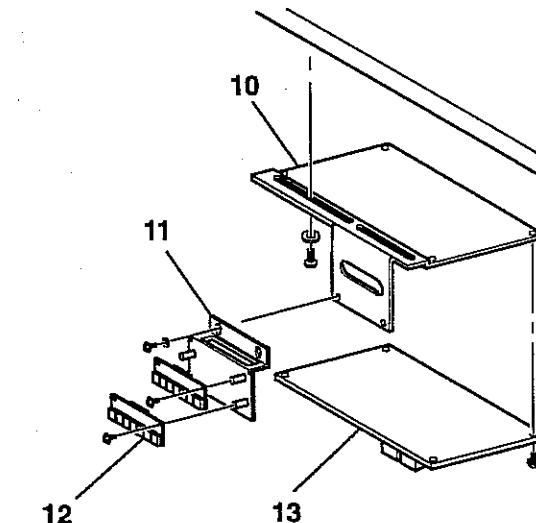
1	636-680-00	BRACKET, 16 IN, TYPE A, PROG	1
1	636-684-00	BRACKET, 9 IN, TYPE A, PROG	1
1	636-673-01	BRACKET, 9 IN, SNGL A, PROG	1
1	636-995-00	BRACKET, 9 IN, TYPE A, ENH	1
2	751-072-00	BOARD PC DISPLAY SSLT .80 PROG	1
3	196-192-00	BARRIER - LIGHT, .80 DISPLAY	1
4	751-095-00	BOARD, PC CPV, PROG, DRIVER	1
-	674-443-90	SPACER, SIP, 2 POS, 0.2 LD, SP	1
-	419-510-94	SCREW - SEMS, PH PAN, 6-32 X 1/4	2
-	411-007-96	SCREW - MACH PH PAN 8-32 X 3/4	2

**TYPE A PROGRESSIVE****TYPE B, C AND E SINGLE PROGRESSIVE**

5	686-682-00	BRACKET - 16 IN, TYPE B, .56" PROG	1
5	636-686-00	BRACKET - 9 IN, TYPE B, .56 PROG	1
6	589-355-00	PLATE - TYPE B, .56 PROG	1
-	636-699-00	BRACKET, METER INTERMEDIATE B, 16" 3 CBP, 9: 4 CBP	1
-	636-700-00	BRACKET, METER INTERMEDIATE B, 16" 4 CBP, 9" 3 CBP	1
-	636-701-00	BRACKET, METER, TYPE B PROG, 16", 5 LINE	1
-	636-701-01	BRACKET, METER, TYPE B PROG, 9", 5 LINE	1
-	636-708-00	BRACKET, METER, TYPE C, PROG, 16", 5 LINE	1
-	636-708-01	BRACKET, METER, TYPE C, PROG, 9", 5 LINE	1
7	751-075-00	BOARD PC DISPLAY SSLT .56 PRG.	1
8	196-194-00	BARRIER - LIGHT, .56 DISPLAY	1
9	751-095-00	BOARD, PC CPV, PROG, DRIVER	1
KIT	911-558-08	KIT - 9/11 TYPE B PROG, 4 CBP, M+S	1
-	636-699-00	BRACKET - METER INTERMEDIATE, B	1
-	419-510-96	SCREW - SEMS, PH PAN, 6-32 X 3/8	2
-	419-510-94	SCREW - SEMS, PH PAN, 6-32 X 1/4	2
-	419-510-93	SCREW - SEMS, PH PAN, 4-40 X 1/2	2
-	411-007-96	SCREW - MACH PH PAN 8-32 X 3/4	2

**TYPE B, C AND E SINGLE PROGRESSIVE****TYPE B, C AND E DOUBLE PROGRESSIVE**

10	636-682-00	BRACKET - 16", TYPE B, .56" PROG	1
10	636-686-00	BRACKET - 9 IN, TYPE B .56 PRG.	1
11	589-356-00	PLATE - TYPE B .56 DOUBLE PRG.	1
12	751-075-00	BOARD PC DISPLAY SSLT .56 PRG.	1
13	751-095-00	BOARD, PC CPV, PROG, DRIVER	1
KIT	911-571-06	KIT - 9/11 B DOUBLE PROG, 3CBP, M+S	1
-	636-700-00	BRACKET - METER, INTERMEDIATE, B	1
-	419-510-96	SCREW - SEMS, PH PAN, 6-32 X 3/8	2
-	419-510-94	SCREW - SEMS, PH PAN, 6-32 X 1/4	2
-	419-510-93	SCREW - SEMS, PH PAN, 4-40 X 1/2	4
-	411-007-96	SCREW, MACH PH PAN 8-32 X 3/4	2
-	636-699-00	BRACKET, METER, INTERMEDIATE B, 16", 3 CBP	1
-	636-700-00	BRACKET, METER, INTERMEDIATE B, 9" 3 CBP	1

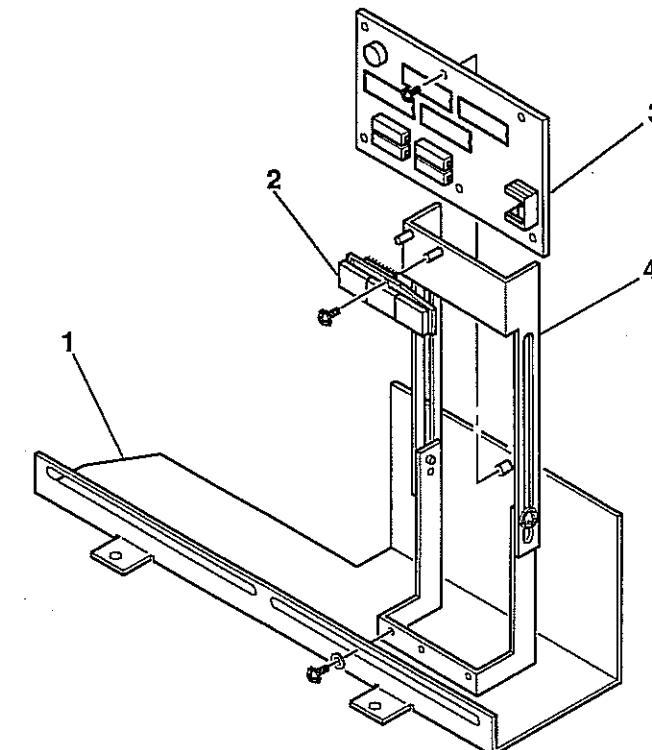
**TYPE B, C AND E DOUBLE PROGRESSIVE**

TOP BOX PROGRESSIVE DISPLAYS
(cont'd)

Fig. No.	Part Number	Description	Qty.
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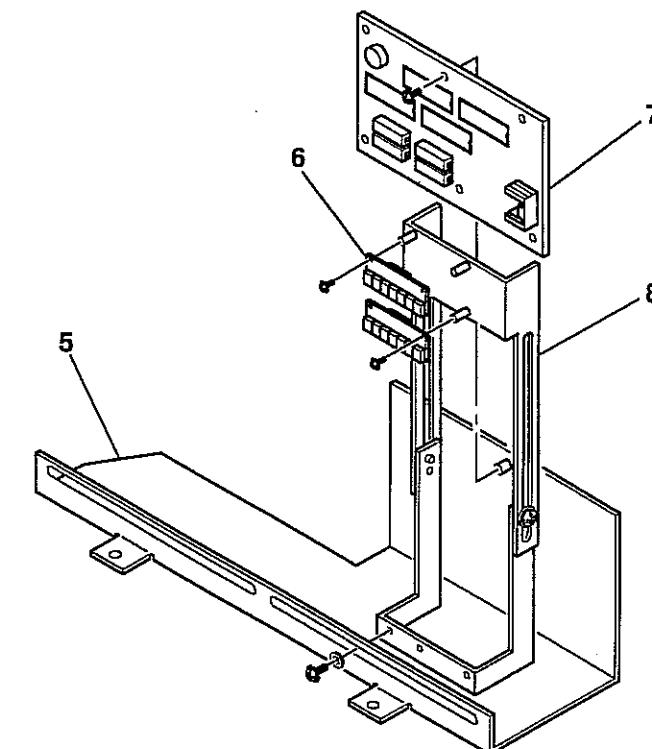
TYPE B, C AND E SINGLE PROGRESSIVE

1	636-940-00	BRACKETING - IMB, PROG. METER RND TOP	1
2	751-075-00	BOARD DISPLAY SS LT .56 PRG. ASSY	1
3	751-095-10	BOARD, PC, CPU, PROG DRIVER	1
4	653-360-00	MOUNT - IMB PROG METER RND TOP	1
-	430-008-99	WASHER, FLAT STEEL #10, TYPE/N	2
-	419-510-96	SCREW - SEMS, PH PAN, 6-32 X 3/8	4
-	419-510-96	SCREW - SEMS, PH PAN, 6-32 X 3/8	2
-	430-003-95	WASHER, FLAT, STEEL #6, TYPE B/N	2
-	419-510-90	SCREW - SEMS, PH PAN, 4-40 X 1/4	2
-	430-003-95	WASHER, FLAT, STEEL #6, TYPE B/N	2
-	419-510-93	SCREW - SEMS, PH PAN, 4-40 X 1/2	2
-	196-194-00	BARRIER - LIGHT, .56 DISPLAY	1



TYPE B, C AND E SINGLE PROGRESSIVE

5	636-940-00	BRACKETING - IMB, PROG. METER RND TOP	1
6	751-073-00	BOARD PC DISPLAY SS LT .39 PRG.	2
7	751-095-10	BOARD, PC, CPU, PROG DRIVER	1
8	653-360-00	MOUNT - IMB PROG METER RND TOP	1
-	430-008-99	WASHER, FLAT STEEL #10, TYPE/N	2
-	419-510-96	SCREW - SEMS, PH PAN, 6-32 X 3/8	4
-	419-510-96	SCREW - SEMS, PH PAN, 6-32 X 3/8	2
-	430-003-95	WASHER, FLAT, STEEL #6, TYPE B/N	2
-	419-510-90	SCREW - SEMS, PH PAN, 4-40 X 1/4	2
-	430-003-95	WASHER, FLAT, STEEL #6, TYPE B/N	2
-	419-510-93	SCREW - SEMS, PH PAN, 4-40 X 1/2	2
-	196-194-00	BARRIER - LIGHT, .56 DISPLAY	1



TYPE B, C AND E DOUBLE PROGRESSIVE

5.17 Data Collection

Information about the functions of S-Plus machines can be collected using data collection packages. Machine functions that can be monitored include security events (i.e., door open), maintenance events (i.e., power loss) and accounting information (i.e., coins in and coins out). When information about the activity of more than one machine is desired, machines can be linked together by fiber-optic cables or hard-wire harnesses.

Although several forms of data collection packages exist, the most common package includes fiber-optic cables to link several machines together, fiber-optic interface boards which are installed in each machine in the link, an intermediary controller which gathers machine information, and a computer (often with specialized software) which stores the data received from the controller.

This section includes an overview of each data collection package and instructions for making fiber-optic connections.

5.17.1 Data Collection Options

There are numerous software communication packages that monitor machine functions (i.e., meter readings and security events), and allow this data to be transmitted to a controller or computer. This section describes these options:

- Direct Link Interface (DLI)
- Personal Computer-Slot Accounting System (PC-SAS)
- Player Tracking System (PTS)
- Slot Information System (SIS)

Note

Contact IGT Customer Service (refer to Section 2) for more information regarding part numbers of manuals, instructions, kits, fiber-optic boards, and cables.

Direct Link Interface (DLI)

Direct Link Interface (DLI) is a data collection package that requires installation of fiber-optic

boards into S-Plus machines, which are then linked together via fiber-optic cables. Data on machine activity is transmitted to a controller which, in turn, transmits the collected data to a computer.. The complete DLI package consists of the following:

- the fiber-optic interface board installed into each S-Plus machine
- fiber-optic cables that link machines together
- the Star Controller that gathers data on machine activity via fiber-optic cables
- computer(s) that gather information transmitted by the controller(s)

IGT provides a DLI kit that contains all necessary components of this package, along with installation instructions. Part numbers for the DLI kit and DLI instruction manuals are provided at the end of this section, as well as part numbers for schematics of the fiber-optic interface board. General procedures for fiber-optic cabling are contained in Section 5.17.3.

Personal Computer-Slot Accounting System (PC-SAS)

Personal Computer-Slot Accounting System (PC-SAS) operates similarly to the DLI system, except that a different fiber-optic interface board and fiber-optic cables are used, as well as a different controller. The complete PC-SAS package includes the following:

- the fiber-optic interface board installed into each S-Plus machine
- fiber-optic cables that link machines together
- the LCT Controller
- telephone lines which connect the LCT Controller with the computer(s) (telephone lines and computers are not supplied by IGT)
- the computer(s) that gather information transmitted by the controller(s)

The part numbers for PC-SAS instructional material are included at the end of this section, along with part numbers of installation kits and schematics of the fiber-optic interface board.

Player Tracking System (PTS)

Player Tracking System (PTS) enables the owner/operator of IGT machines to identify and gather information about playing patterns of individuals. PTS allows the owner/operator to form a sort of "club" consisting of valued customers. To become a club member, the player completes an enrollment form containing personal information. This information is then entered into a computer, and the customer is issued a membership card. The player inserts this card into the card box attached to a S-Plus machine. The card box displays the customer's name, and alerts the owner/operator that a club member is playing a machine. The card box keeps track of the customer's activity, and awards bonus points based on the volume of play. These points can then be redeemed for cash or other benefits as determined by the owner/operator.

The PTS package consists of the following components:

- the card box attached to each S-Plus machine
- fiber-optic cables *or* hard-wire harnesses that link machines together
- a Data Collection Unit (DCU), the controller that collects the data gathered by the card boxes
- a Plastic Fiber Universal Converter (PCON), which serves as an interpreter between the DCU and the computer
- the computer(s) that receives data transmitted by the DCU (computer not supplied by IGT)
- specially designed computer software, capable of interpreting data received from the DCU

PTS part numbers are provided at the end of this section. Fiber-optic cabling guidelines are contained in Section 5.17.3.

Note

Installation of the Player Tracking System can only be performed by trained IGT-AUTHORIZED PERSONNEL. For additional service and/or installation information, contact IGT Customer Service (refer to Section 2, Machine Installation). Part numbers of PTS components and PTS manuals may be obtained from IGT Customer Service (refer to Section 2).

Slot Information System (SIS)

Slot Information System (SIS) is a data collection package comprised of many of the same hardware components as PTS. Although PTS is often a part of SIS, PTS is not a mandatory component of SIS. The SIS specially designed software is capable of generating various reports which summarize the activity of one or more banks of linked machines. Machines can be connected through either fiber-optic cables or hard wires within SIS. SIS also allows the manual entry of data into the computer for stand-alone machines.

The SIS package consists of the following components:

- fiber-optic cables *or* hard-wire harnesses that link machines together
- a Data Collection Unit (DCU), the controller that collects the data gathered by the card boxes
- a Plastic Fiber Universal Converter (PCON), which serves as an interpreter between the DCU and the computer
- the computer(s) that receives data transmitted by the DCU (computer not supplied by IGT)
- specially designed computer software, capable of interpreting data received from the DCU

SIS part numbers are provided at the end of this section. Fiber-optic cabling guidelines are contained in Section 5.17.3.

Note

Installation of the Slot Information System can only be performed by trained IGT-AUTHORIZED PERSONNEL. For additional service and/or installation information, contact IGT Customer Service (refer to Section 2, Machine Installation). Part numbers of SIS components and SIS manuals may be obtained from IGT Customer Service (refer to Section 2).

5.17.2 Fiber-Optic Board Installation

With some software communication packages, a fiber-optic interface board is mounted on the right side of the lower module to act as an interface between each S-Plus machine and the rest of the communication system link.

This section includes instructions for installing the fiber-optic interface boards. For information regarding installation of fiber-optic cables, refer to Section 5.17.3.

DLI Fiber-Optic Board Installation

Follow the information in this section to install the fiber-optic board used with the DLI software communication package. Refer to Figure 5-52, Fiber-Optic Board Placement.

Tools Required

- #2 Phillips screwdriver

Installation

1. Open the front door and turn the machine **power off**.
2. Remove the hopper by grasping the handle firmly and pulling it straight out of the machine.
3. Disconnect the AC power cord from the AC power input receptacle.
4. Remove the protective coverings from the two adhesive patches on the back of the

DLI interface board. Place the mounting plate (with interface board and cover attached) against the rear, lower right side of the lower module so that the mounting post rests on the top edge of the lower module and the board faces to the right.

5. Mount the board by pressing it firmly against the side of the lower module to ensure that the adhesive holds. See Figure 5-53 for correct placement of the board. Fasten securely with the four sheet metal screws included in the DLI kit.
6. Locate the DLI power harness (p/n 607-HAR-223A) from the DLI kit. On the DLI interface board, connect the 2-pin MTA connector onto header J1. Plug the other end of the power harness into the service outlet located behind the hopper.
7. Locate the DLI data harness (p/n 607-HAR-221A) from the DLI kit. Plug the 4-pin connector into receptacle J3 on the interface board.
8. Route the free end of the DLI data harness behind the lower module and plug the connector into the mating receptacle labeled J6 on the mother board.
9. Plug the AC power cord into the input receptacle.
10. Replace the hopper by aligning the base rails with the metal guides on the cabinet floor and sliding the printer/hopper into place. Turn the machine **power on**; close and lock the door.

Note

The Direct Link Interface Floor Guide and the Direct Link Interface Operator's Guide provide more detailed information on DLI.

5.17.3 Fiber-Optic Cabling

The following information describes fiber-optics and provides instructions for making the fiber-optic connections from a communication controller the first machine in the link, and to all successive machines in the same link.

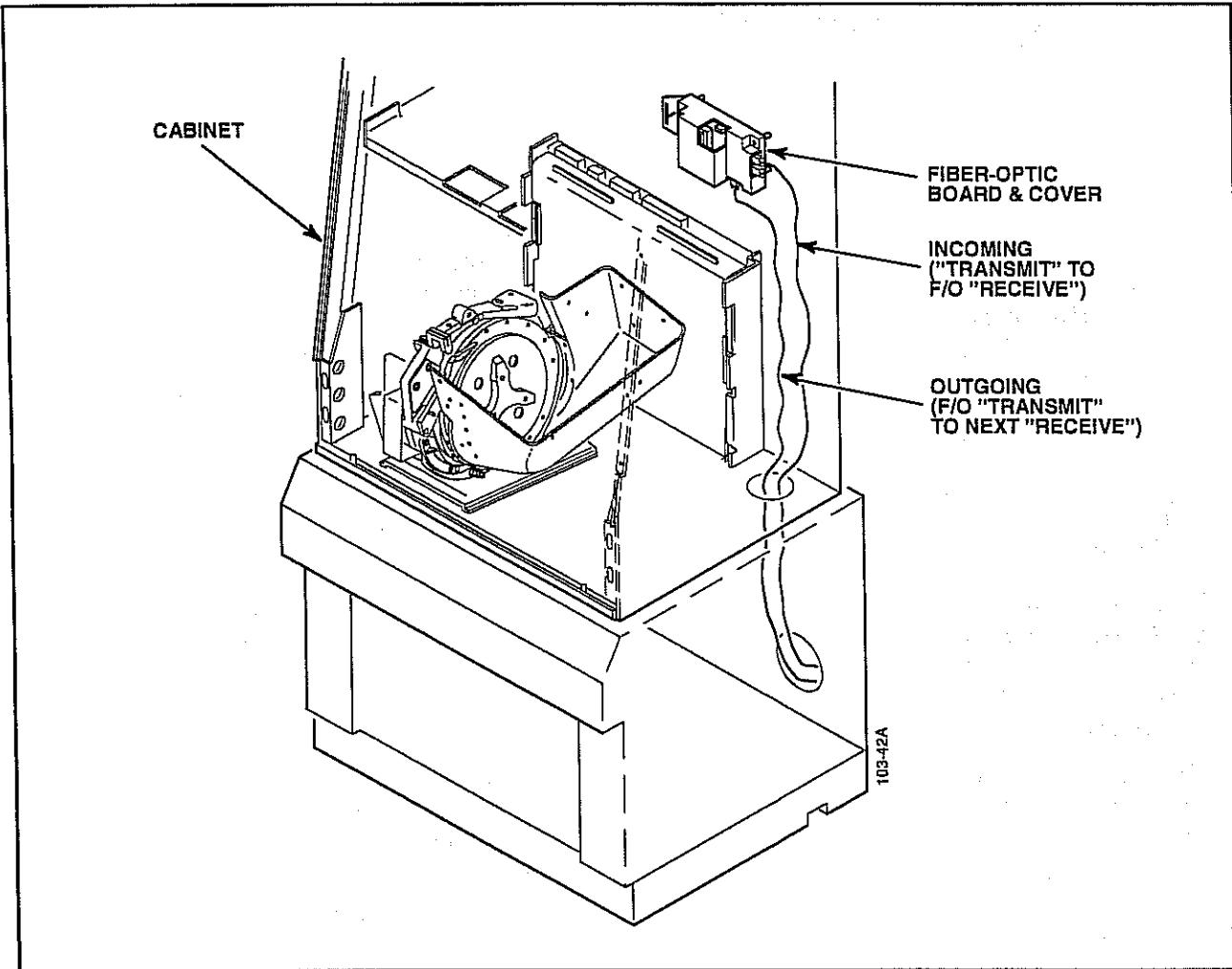


Figure 5-52. Fiber-Optic Board Placement.

Communication controller installation requires a kit with special hardware and fiber-optic cables. Refer to the parts list in the back of this section for part numbers of controllers. Contact IGT Customer Service (Section 2, Machine Installation) to order specific installation kits.

In some cases, a long initial and return cable will have to be made on location by the installer. In the case of multiple installations, the installer may elect to create all of the fiber-optic cables from raw materials. Refer to "Using Fiber-Optic Cables" for guidelines concerning cable length and to "Making Cable Terminations" for termination procedures.

Notes

Prior to beginning installation, verify that all communication system components are present, and match those listed on the sales order.

Communication system installation is to be performed by IGT-AUTHORIZED PERSONNEL ONLY.

For communication controller installation, use the procedures in the instructions included with the controller or kit, as well as the fiber-optic link instructions in this section.

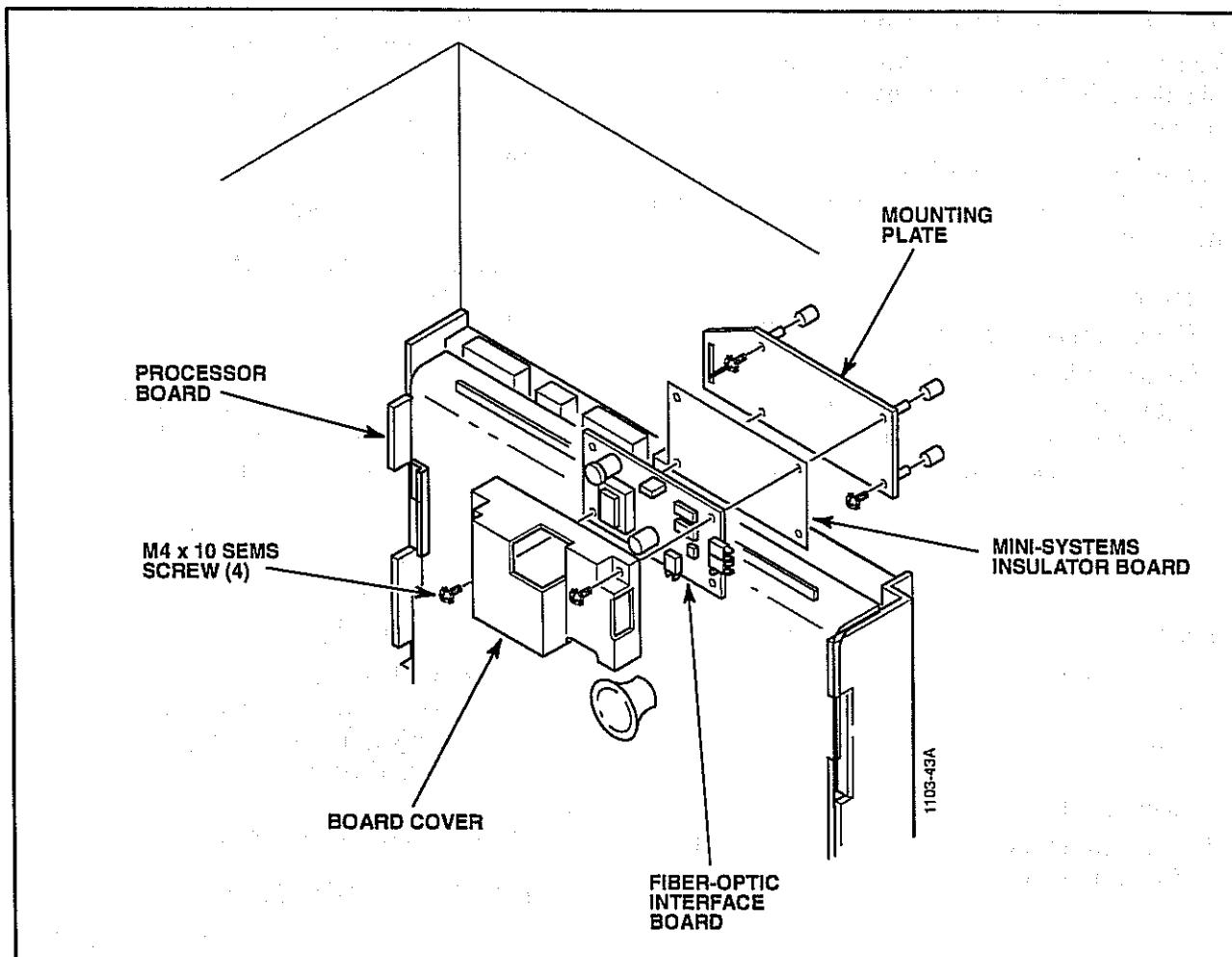


Figure 5-53. Typical Fiber-Optic Interface Board Installation.

Introduction to Fiber-Optic Cables

Using fiber optics to transport data increases both message security and accuracy, over and above conventional wire harnessing, because fiber-optic communication is less susceptible to noise, humidity and distance problems.

Two types of fiber-optic cabling are utilized by IGT: plastic cable and glass cable. Plastic cable is preferred for most applications because it is effective and economical, however, glass cable may be required in some instances to meet fire codes or to reach long distances.

This section contains procedures for making cable terminations for plastic fiber-optic cable. Termination procedures for plastic cables are also contained in IGT instruction p/n 824

-277-00. For glass termination procedures, consult IGT instruction p/n 824-366-00.

Guidelines for Handling Fiber-Optic Cables

- Avoid physical stress – stretching, crushing, and extremely high temperatures; no bend less than 6-inch radius.
- Avoid excessive lengths – measure cable length needed for each use; add enough extra length to allow for ease in servicing, but not so much that the excess becomes unmanageable.
- Secure carefully – route and secure cable away from physical harm.
- Finish correctly – polish plastic cable terminations as described below.

Making Cable Terminations

The following procedure describes how to make plastic cable terminations easily using snap-on connectors.

No adhesive material is needed to secure the cable in the connector, and the cable can be used immediately after polishing.

Materials

- Plastic fiber-optic cable, IGT p/n 375-005-90
- Polishing kit (HP - HFBR-4595) or a polishing fixture, 600-grit abrasive paper and 3-micron pink lapping film (3M - OC3-14)
- Gray connector and crimp ring (HFBR 4501), IGT p/n 375-007-90
- Blue connector and crimp ring (HFBR 4511), IGT p/n 375-006-90

Tools

- Industrial razor blade or wire cutters
- 16-gauge latching wire strippers
- Crimp tool, AMP 90364-2

Termination Procedure

1. Determine the length of cable required, including enough slack to allow for easy servicing, but not an excessive amount.
2. After cutting the cable to the desired length, strip off approximately 9/32 (0.28) inch of the outer jacket with the 16-gauge wire strippers, as shown in Figure 5-54.
3. Place the crimp ring and connector over the end of the cable as shown in Figure 5-55; the fiber should protrude about 1/8 (0.12) inch through the end of the connector.

Note

Place the gray connector on the cable end to be connected to the transmitter and the blue connector on the cable end to be connected to the receiver to maintain the color coding (both connectors are the same mechanically).

4. Any excess fiber protruding from the connector end may be cut off; however the

trimmed fiber should extend at least 1/16 (0.06) inch from the connector end.

5. Insert the assembled connector fully into the polishing fixture with the connector end protruding from the bottom of the fixture.

Note

The four dots on the bottom of the polishing fixture are wear indicators. Replace the polishing fixture when any dot is no longer visible.

6. Refer to Figure 5-56. Place the 600-grit abrasive paper face-up on a flat, smooth surface. Pressing down on the connector, polish the fiber and the connector in a figure-8 motion until the connector is flush with the end of the polishing fixture. Wipe the connector and fixture with a clean cloth or tissue.
7. Place the flush connector and polishing fixture on the dull side of the 3-micron pink lapping film and continue to polish the fiber and connector, for approximately 30 strokes. The fiber should be flat, smooth and wiped clean.

Using Fiber-Optic Cables

IGT recommends limiting the maximum length of fiber-optic cables in the following situations.

- **Controller to first machine:**
108 ft. maximum – plastic
656 ft. maximum – glass
- **Machine to machine:**
108 ft. maximum – plastic
656 ft. maximum – glass
- **Machine to controller:**
269 ft. maximum – plastic
4101 ft. maximum – glass

Communication Controller to First Machine in Link

1. Verify that the communication controller is properly installed at the desired location, using the procedures detailed in the installation instructions.

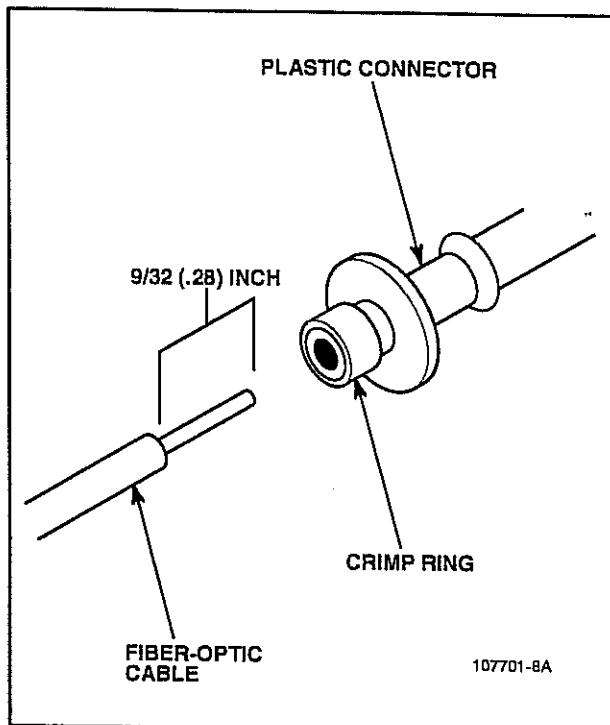


Figure 5-54. Insert Cable into Connector.

2. Attach the gray connector end of the fiber-optic cable to the transmit position (black connector) on the communication controller and power up the unit.
3. Verify each machine is plugged into a live electrical outlet, but not powered up. This allows signals from the communication controller unit to pass from one machine to the next for functional verification of the link.

4. Verify that the communication controller is transmitting via the fiber-optic cables by observing the red light flash (at 3-second intervals) in the free end of the fiber-optic cable. If the unit is not transmitting, refer to the applicable controller instructions (in this field service manual or a separate service manual) to resolve the problem.
5. Run the cable from the communication controller to the fiber-optic board in the first machine in the link. Pass the cable up through the cable access holes in the stand and cabinet (the same holes the power cord goes through).
6. Locate the fiber-optic interface board on the right, rear wall of the lower module and attach the end of the cable to FO1 (connector at the lower, back) on the board. This is the "receive" position.
7. Pass the gray connector end of another fiber-optic cable up through the cable access holes and attach it to FO3 (black connector at the lower, front) on the board. This is the "transmit" position.
8. Carefully secure the fiber-optic cables to the inside of the stand to avoid potential damage to the cables.

Successive Machines in Link

1. Repeat Steps 6 through 9 for each successive machine in the link.
2. When the connection is made at the last machine in the link, route the "transmit" cable back to the communication controller and connect the cable end to the "receive" position on the unit. In some cases, a long initial and return cable will have to be made on location by the installer.

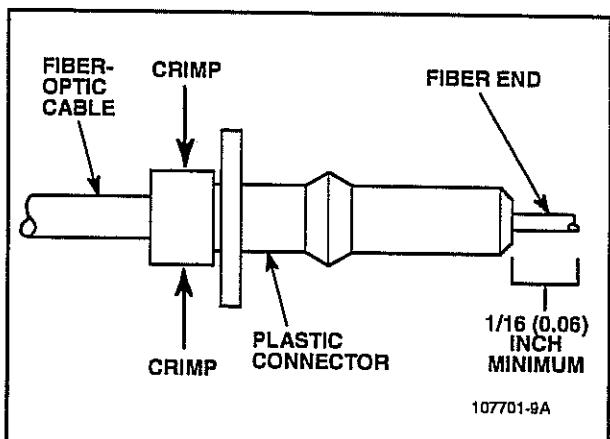


Figure 5-55. Adjust Fiber and Crimp.

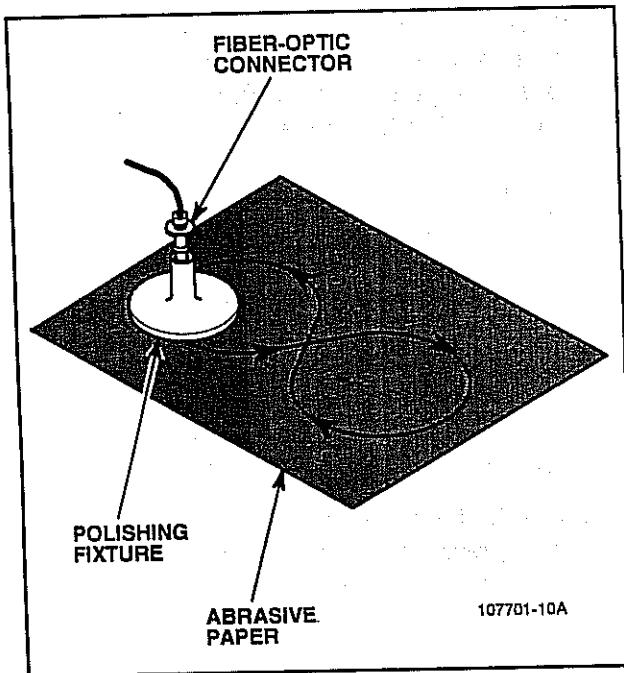
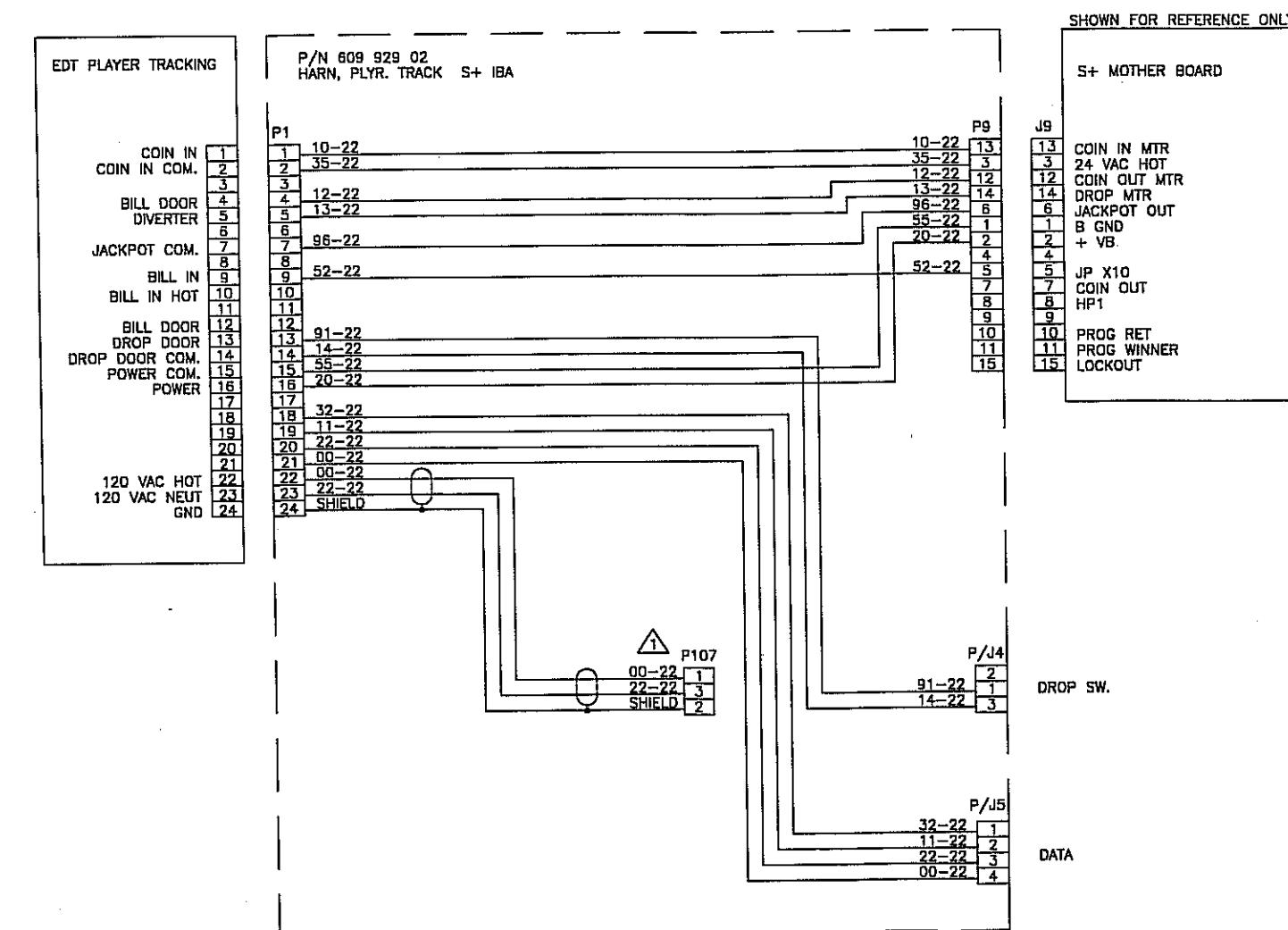


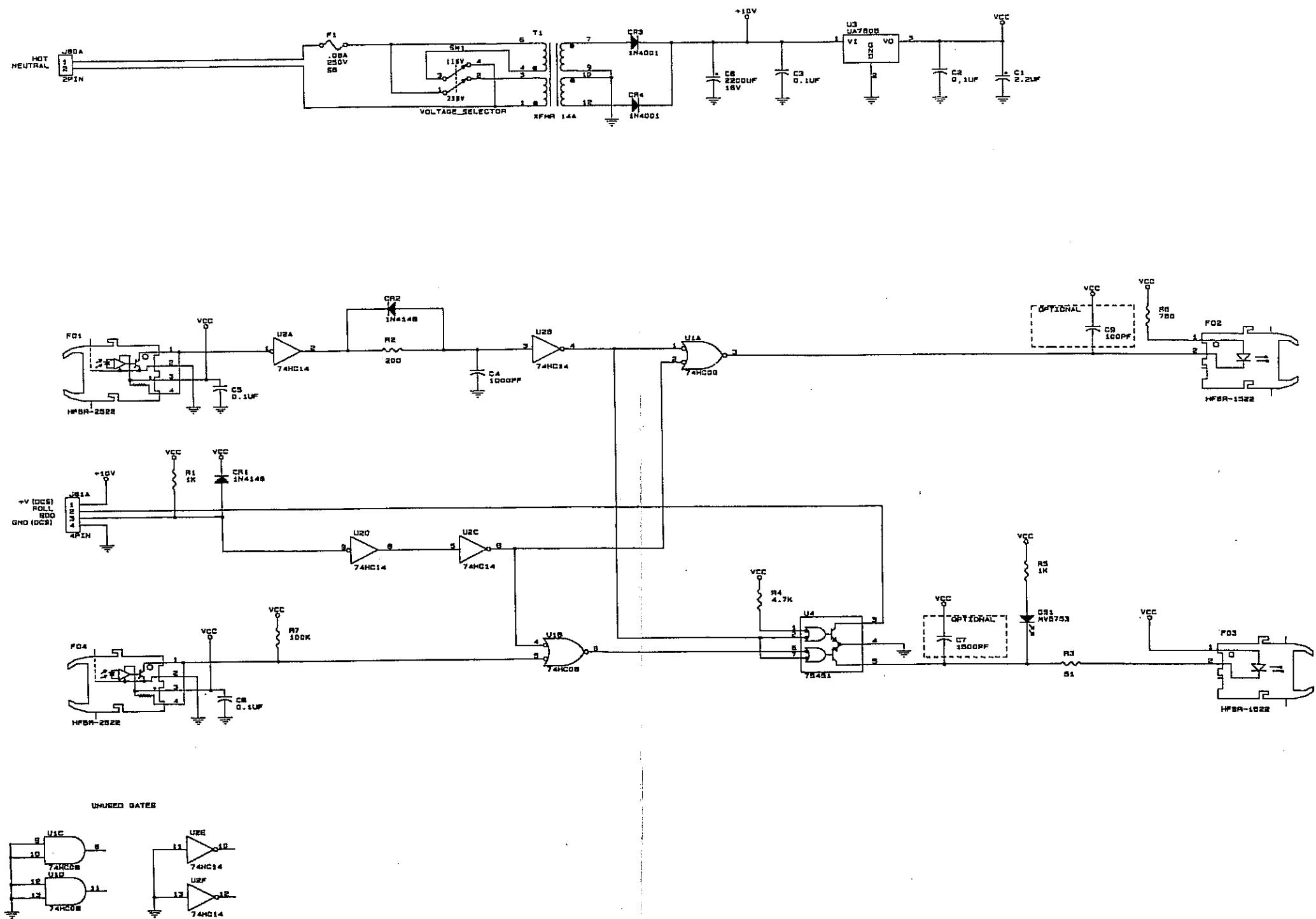
Figure 5-56. Polish Fiber.

**PLAYER TRACKING WIRING DIAGRAM
820-178-00 REV A**

**△ FOR J107 INFORMATION REFERENCE
S+ IBA WIRING DIAGRAM.**

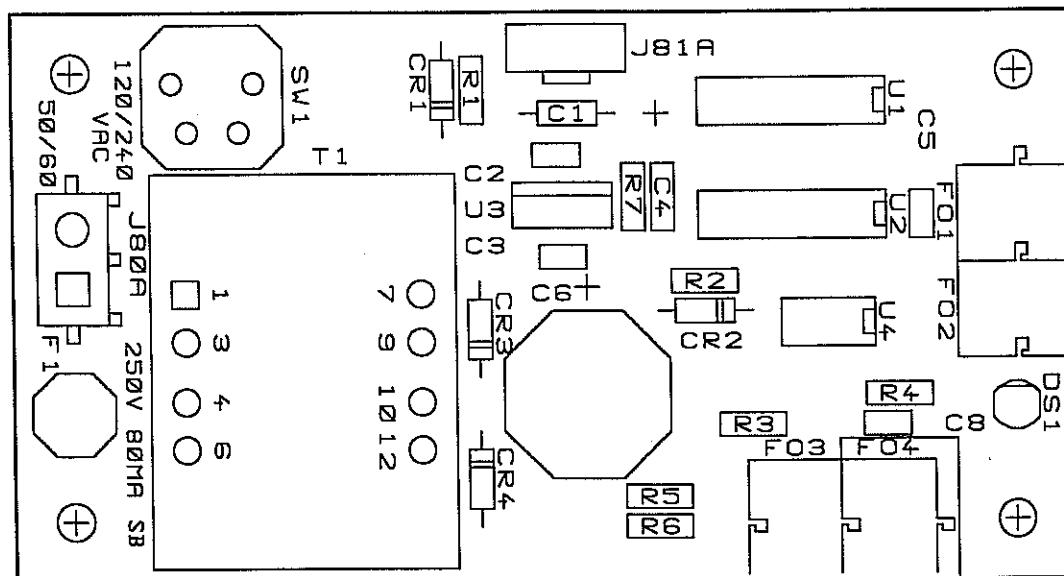


**FIBER-OPTIC INTERFACE BOARD SCHEMATIC
754-216-10 REV C**

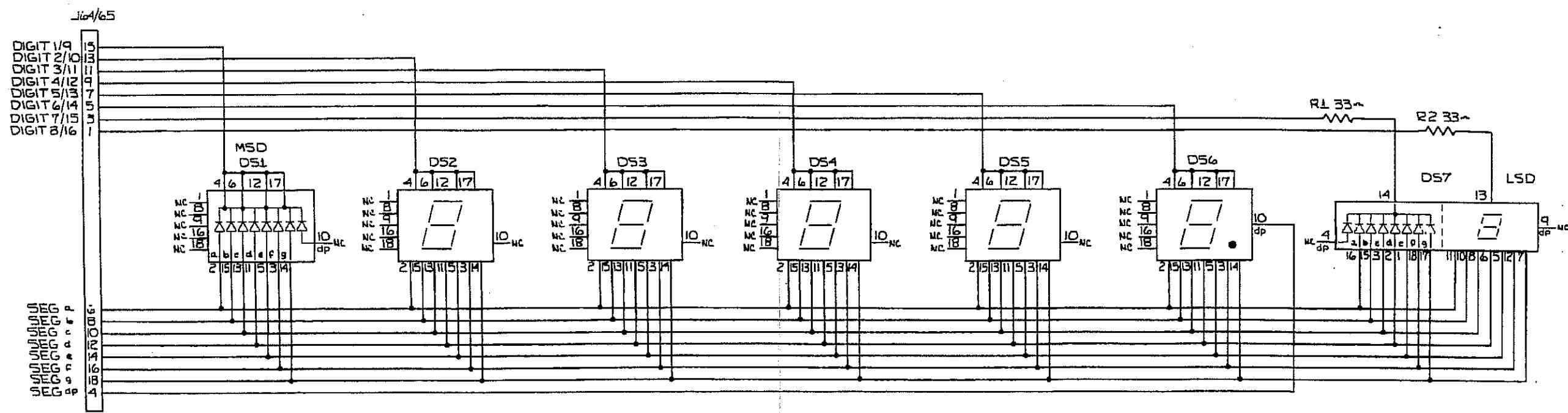


FIBER-OPTIC INTERFACE BOARD
754-216-00

Component	Description	Part Number
CR1,2	DIODE CMPTR 100V/MA 1N4148	480-033-91
CR3,4	RCTFI SIL 1A 50V 1N4001	484-021-90
C1	CAP TANT AX 2.2UF 15V T322A	154-028-91
C2,3,5,8	CAP CER AX .1UF 50V C410	152-078-91
C4	CAP CER AX 1000PF 50V C410	152-086-91
C6	CAP ELCTR RD 2200UF 16V 711-	156-044-90
DS1	EMITTER LED RED MV5753	371-002-90
FO1	FIBER OPTIC RVR, HFBR - 2522	375-016-90
FO2,FO3	FIBER OPTIC XMIT, HFBR - 1522	375-015-90
F1	REPLACED BY 52901690	529-013-90
J80A	CONN, SOCKET, PCB, 2 PIN	211-002-90
J81A	CONN, HDR, 4PIN, STR SHROUD SL	211-050-90
RAW BOARD	BD,PC, FIBER OPTIC INTF CSA RAW	754-216-30
REF ASSY DWG	BD,PC, FIBER OPTIC INTF CSA DWG	754-216-50
REF SCHEMATIC	BD, PC, FIBER OPTIC INTF CSA SCH	754-216-10
R1,5	RESIST. CF 1K OHM .25W T/R	474-023-91
R2	RESIST. CF 200 OHM .25W T/R	474-017-91
R3	RESIST. CF 51 OHM .25W T/R	474-096-91
R4	RESIST. CF 4.7K OHM .25W T/R	474-025-91
R6	RESIST. CF 750 OHM .25W T/R	474-008-91
SW1	SWITCH,2 POS,VOLTAGE SELECT	510-143-90
T1	TFMR, 16VCT, .15A DUAL CSA PCMNT	560-057-92
U1	IC, GATE, AND, QUAD 2-IN 74HC08	320-273-90
U2	IC SCHMIT/TRIG HX/INV 74HC14	320-266-90
U3	VREG +5.0V/1.5A TO220 LM7805	488-012-90
U4	IC, 75451	320-184-90

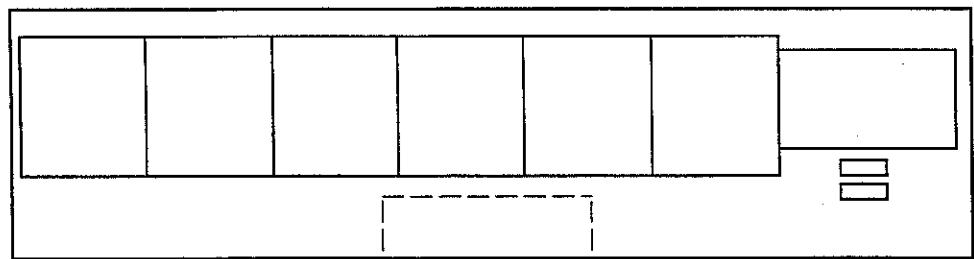


.80" PROGRESSIVE DISPLAY BOARD SCHEMATIC
751-072-10 REV A

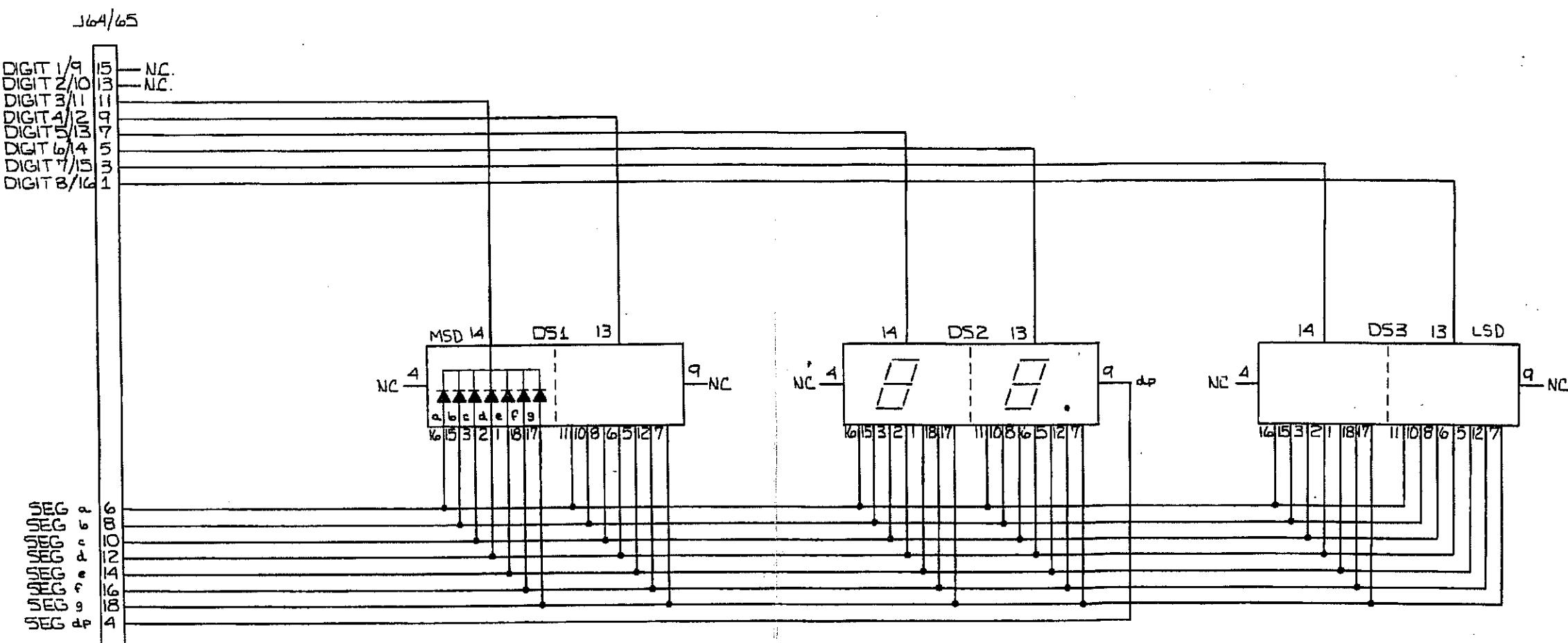


**.80" PROGRESSIVE DISPLAY BOARD
751-072-00**

Component	Description	Part Number
BOARD, PC	BOARD, PC, DISPLAY, .80", RAW	751-072-30
DS1, 2, 3, 4, 5, 6	LED, RED, 7 SEG, .80, 1 DGT, C-CATH	372-010-90
DS7	LED, RED, 7 SEG, .56, 2 DGT, C-CATH	254-010-90
J64, 65	CONNECTOR, 20 PIN, SHROUD, NO EJCTR	211-017-90
R1, 2	RESISTOR, C-FILM, 33 OHM, 1/4W	474-051-90



.56" PROGRESSIVE DISPLAY BOARD SCHEMATIC
751-075-10 REV A



Glossary

attract mode Visual and/or music options intended to attract players when the machine is in the idle mode.

bar machines Collective term referring to slant-top and flat-top machines, as opposed to upright machines.

Bet Max (Bet Five, etc.) A player panel switch that wagers either the maximum number of credits the machine will accept or, if insufficient credits exist, all remaining credits.

Bet One A player panel switch that wagers one credit each time it is pressed.

bill acceptor or bill validator Optional assembly that accepts valid paper bills and causes the host machine to either dispense change or issue credits.

bonus pay Expanded pay for top awards won with maximum coins bet, greater than a linear multiple of the wager. If the top award multiplier (number of coins paid per coin bet) is 300 for one to four coins bet, it might be 900 for five (max) coin bet. See multiplier pay.

cabinet The exterior, laminated wood "shell" that surrounds the metal enclosure on some machines.

candle Light that mounts either on top of the machine or in a remote location and indicates various machine modes and game conditions. Most candles have two or more "stages", or sections, stacked vertically.

CAP Color Attribute Prom Contains color definitions used to build images on the screen during each phase of a video game. A complete set of video game chips includes a CAP, a set of CGs, and a game program EPROM.

cash out Convert machine credits to cash or payable vouchers. The Cash Out switch on the player panel activates this machine function.

Central Computer System (CCS) In lottery-type games, monitors game machine operation and collects accounting and security information.

CG Character Generator chip. A Player's Choice Arcade video game uses four CG EPROMs. A complete set of video game chips includes a set of CG EPROMS, a CAP and a game program EPROM.

checksum The result of an arithmetic operation on the number of bits in a sequence, used to verify the integrity of game data in the EPROM.

CMOS memory *Complementary Metal Oxide Semiconductor* battery-powered memory, used to store backup RAM data for most IGT games.

coin comparitor Electronic coin acceptor mechanism that receives and validates coins deposited in the machine. A coin comparitor uses a sample coin against which incoming coins are compared for validity.

coin tray Metal tray on a machine where coins are paid out or returned.

coin-in Coins wagered. The coin-in assembly receives, verifies, counts and appropriately routes coins deposited in the machine. The coin-in meters (mechanical and software) accumulate total coin-in numbers.

coin-out Coins or credits won and paid, or credits won and wagered. The coin-out meters (mechanical and software) accumulate total coin-out numbers.

collective remote candle Several machines connected to one candle.

communication system Any one of several system configurations linking machines and a control device (LCOM, CTV or modem) via fiber-optic cables to a central computer for the purpose of gathering accounting data.

Glossary

credit limit The maximum number of credits the machine will accumulate before causing either a hopper-pay, hand-pay or cash-out ticket situation.

credit play Allows all awards except the top award and hand pays to accumulate on the Credits display rather than dispensing from the hopper. Some game versions allow player-selected credit or noncredit play.

cursor A symbol displayed on the video monitor in the self test mode indicating where the user's next action will take effect.

DACOM *Dutch Asynchronous Communication System.* A data collection system used only in Holland.

DCS *Data Communication System.* One of several optional communication systems whereby the machine sends selected data to an external accounting device.

degauss To correct video display discoloration by neutralizing the magnetic field of a video monitor using a special degaussing tool.

denomination Coin or bill value. U.S. coin denominations are: 5 cent, 10 cent, 25 cent, 50 cent and dollar.

DIP switch *Dual In-line Package* switch. A small switch that can be manually set for one of two different values (usually on or off). DIP switches are used on PC boards for setting up various machine configurations.

Direct Link Interface (DLI) A data collection package that allows machines to be linked together via fiber-optic cables.

diverter The portion of the coin-in assembly that channels coins to either the hopper or the drop box.

drop Coins or bills in the drop box.

drop box The container in the bottom of the cabinet that catches and holds coins when the hopper is full.. In bill acceptors, the lower compartment where bills are deposited.

EEPROM *Electrically Erasable Programmable Read-Only Memory.* Many IGT machines utilize an EEPROM chip on the mother board to store backup game data.

enclosure The metal body that houses internal machine components. The enclosure is often installed in a cabinet.

EPROM *Erasable Programmable Read-Only Memory.* The game program and video graphics are stored on EPROMs. A complete set of video game chips includes a game program EPROM, a set of CG EPROMs and a CAP.

ERROR Data processing problem. The machine enters the tilt mode, an error message displays and game play is suspended until the problem is corrected.

escalator In slant-top and flat-top machines, the part of the hopper that carries coins up to the coin tray.

Eurocredit A credit handling protocol used in some European game software.

fiber-optic interface board Any one of several optional PC boards that convert electronic digital data to light for fiber-optic transmission.

field service manual IGT service publication covering machine hardware, including: installation, maintenance, troubleshooting, disassembly and assembly, parts lists, wiring diagrams and schematics. A field service manual works in conjunction with a program reference guide.

hand pay Money award paid by an attendant rather than being dispensed by the machine.

hopper Assembly inside the machine that receives, holds and dispenses coins. When the hopper is full, coins are diverted to the drop box.

host machine A machine used in conjunction with another assembly that cannot stand alone, such as a dual-monitor module or a bill acceptor.

idle mode The condition that exists when no one is playing the game and no credits exist on the credit meter.

instruction IGT (engineering) service publication, available in photocopied form, that usually details one specific procedure.

Glossary

jackpot Top award win.

jackpot reset switch Key-activated switch that: (a) enables option selections within some self test pages; (b) enters and advances through the statistical data mode; and (c) resets the machine's internal progressive parameters (as applicable) after a jackpot.

LED *Light Emitting Diode*. Used in digital displays and as status indicators.

light box Plastic bracket containing fluorescent lights to illuminate the display glass.

lockup This occurs during some tilt and error conditions. Game play is suspended but self test and statistical data modes are operational.

lower module Removable assembly within the machine. The lower module chassis houses the power supply, mother board, processor board, connector panels and various optional assemblies or PC boards.

machine address Unique hexidecimal number resident on a processor board or communication board, used by some accounting and communication systems for machine identification.

machine door On upright machines, the main access door typically contains the player switches and/or other input devices, coin entry, key lock and various other assemblies.

Max Coin or Max Bet Maximum number of coins or credits the game will accept for a single play (usually six or less).

Max Win or Max Pay Highest award on the game pay table.

meters Counters. IGT machines utilize both mechanical and software meters to collect game play data. Hardware meters collect lifetime totals and cannot be reset. Software meters are displayed in the statistical data mode, and can be reset to zero.

mode Operational state of the machine. IGT machines typically have five modes: game play, idle, statistical data, self test and tilt.

mother board PC board on the lower module that acts as an interface between the processor board and the electrical machine assemblies.

multiplier pay Each win amount is a linear multiple of the number of coins or credits bet. See **bonus pay**.

noncredit mode The machine will accept no more than the max bet allowed per game, and all wins are paid out in coins or by an attendant at the time of the win. If a bill acceptor is present, it functions as a changer only.

NTSC decoder board Optional PC board that allows video machines to display an NTSC (National Television Standards Committee) signal. DIP switches on the board allow various configurations.

page In video games, one full screen display of information as presented in the self test and statistical data modes.

pay table Chart of pay amounts as a function of each winning combination and number of coins or credits bet.

Personal Computer-Slot Accounting System (PC-SAS) A data collection package that involves machines linked together fiber optically.

player digital display In reel slot machines, game information is presented as an LED digital display through windows on the slot glass.

player switch or player panel switch An input switch that communicates player selections to the processor board. Some player switches also have functions in self test and statistical data modes.

Player Tracking System (PTS) A data collection package that enables the owner/operator of IGT machines to identify and gather information about players via ID cards and readers.

preliminary service guide IGT service publication prepared in advance of a field service manual to give basic information.

processor board Controls all video and/or game functions in a machine.

program reference guide IGT service publication covering game software. A program reference guide works in conjunction with a field service manual.

Glossary

progressive A system of pooling a fraction of each wager into a cumulative fund which is available for a top-pay win.

progressive controller Controls all progressive functions in a progressive link system (several machines linked together to increment progressive totals equally).

RAM *Random Access Memory.* Backup memory of game information is stored in the CMOS RAM chip on the processor board.

RBP *Rapid Bonus Progressive.* A progressive configuration that can increment and pay on up to six levels of winning combinations, rather than just the top and second levels.

real time clock Optional battery-backed clock on the processor board used by some games.

reel strip A set of symbols on a slot reel.

self test mode The software mode that allows processor board input and output tests and enables option selections.

self test switch A service control switch that enters and advances through the self test mode, and enables data transfer between the CMOS RAM and EEPROM chips.

slot game A type of machine that utilizes spinning slot reels or a video simulation of reels. A win occurs when reel symbols line up in a specified manner.

slot handle Optional handle located on the right side of a slot machine. Pulling the handle after a wager causes the reels to spin.

Slot Information System (SIS) A data collection package that enables the owner/operator of machines to keep information on players, as well as accounting information and statistical information related to machine events.

slot reel The part of a slot machine that holds one reel strip and spins. Machines generally have three or more independent slot reels.

stand The wood or metal base, housing the drop box, to which a standard upright machine is attached.

statistical data mode The software mode that displays statistics accumulated in the game play mode, such as the number of coins in or the number of credits won.

tilt Error in machine operation that suspends game play. Tilts can be caused by hardware or software problems and must be corrected before game play can continue.

top box An enclosed area at the top of the machine that typically contains a light box and display glass, a candle and / or various optional assemblies.