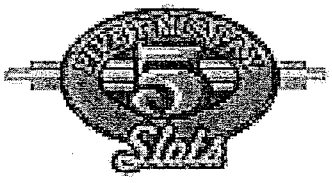

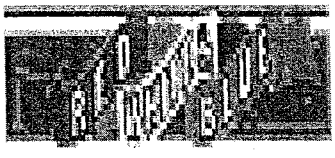

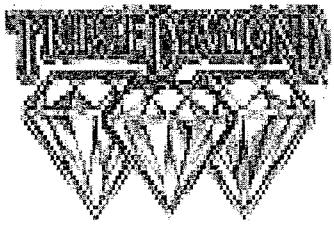

Owners Manual
IGT S-Plus

MITCHELL ENTERPRISES
Currency and Gaming Products

Bruce C. Mitchell

1054 Whitegate Road
Wayne PA 19087

Phone: 610- 687- 5884
Fax: 610- 687- 2126
E- mail: Sales@count-money.com
Website: www.count-money.com

BASIC FACTS FOR THE OPERATION OF IGT S PLUS

1. First plug in machine into a standard 3 prong outlet.

2. Open door and find toggle switch to turn on machine-near bottom of machine on right.

3. At the bottom of the inside of the machine, you will see the hopper. This holds the tokens and looks like a large scoop. Add 50 to 100 tokens to this by simply placing handfuls in the scoop looking portion.

4. Close and lock door and you are ready to play.

5. One to three coins can be played to start the game. After the first coin is accepted, the handle can be pulled to start the game. The INSERT COIN light will go out when the maximum number of coins have been played or when the handle is pulled. When the desired number of coins have been accepted and the handle pulled, the reels will start to spin. The reels then stop one at a time from left to right.

6. A win conditions is any one of the winning combinations of symbols shown on the paytable. When a win occurs, the WINNER PAID light will come on above the LED Matrix Display and the amount paid out will increment on the LED display as the hopper pays out each coin. The number of coins paid-out will remain displayed until the next game.

7. When a large jackpot is hit, the jackpot light will light up and the bell will ring. The machine will lockout until the jackpot is paid and the game is reset. This is done by turning the Jackpot reset key switch (located on the top right outside of the cabinet) clockwise. When the machine has been reset, the bell and jackpot light will turn off and the game will return to idle mode.

8. If a problem occurs with the play, the condition is described in the LED display. If EMPTY appears, open door and add tokens to the hopper. Closing the door will automatically reset the machine. If a TILT condition appears. Open and close the door. If the condition reoccurs, turn the reset key clockwise and additional display codes will appear. Do this before calling for help so the technician can identify the problem.

9. Before moving machine from one location to another, turn off machine and remove tokens from hopper. Loose coins inside a machine can short out boards and do other damage during transport. To empty the tokens, open door, remove the coin tray, grasp hopper handle and gently pull out. Empty tokens and replace hopper by sliding along track on bottom of machine and gently pushing to the back of machine to replug hopper into controls.

10. If technical problems occur that are not remedied by the above, call your local distributor.

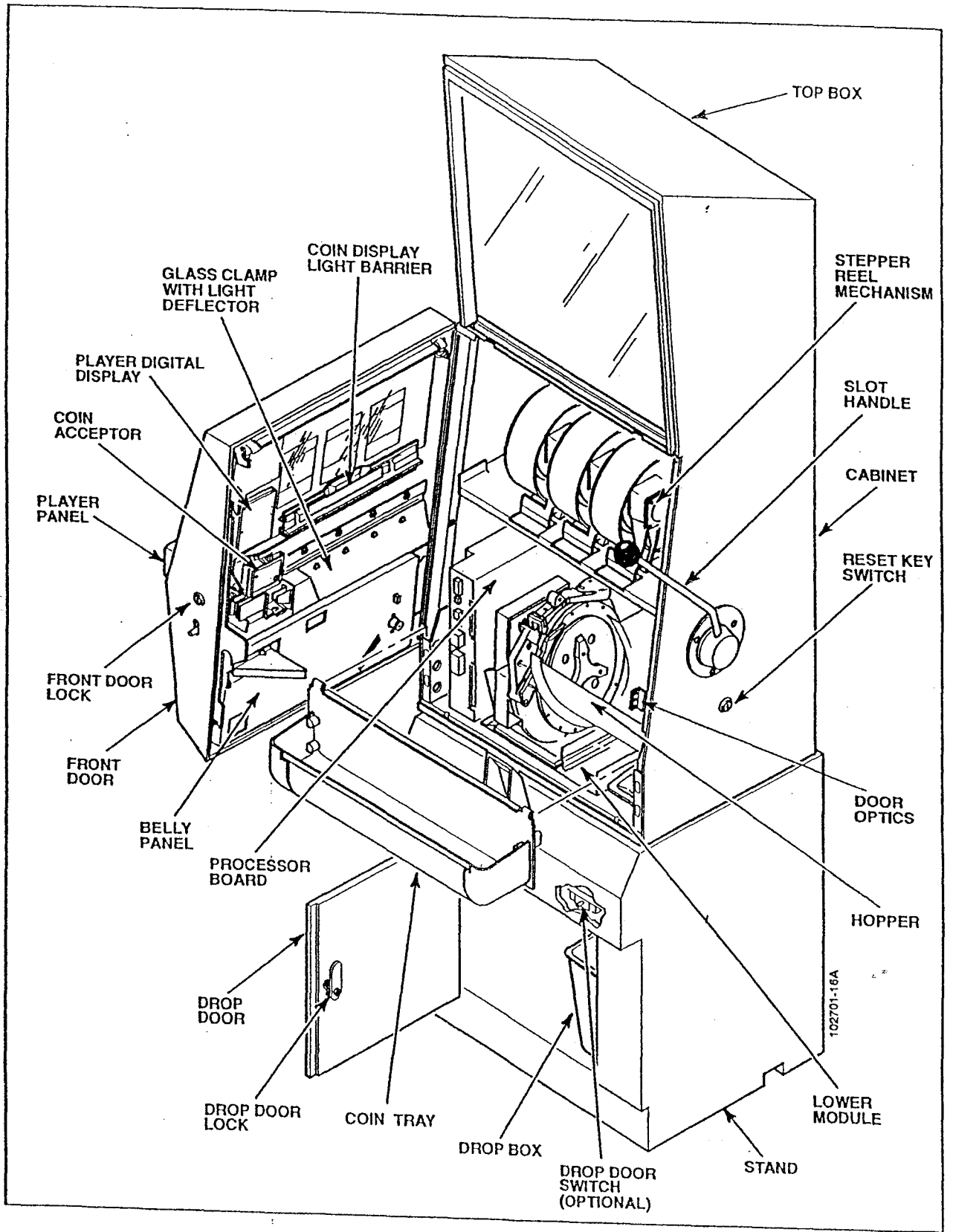

Figure 1-1. Typical S-Plus Machine with Slot Handle.

Table 1-1
Summary of Functional Assemblies

Assembly	Function
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. IGT generally supplies both shipping locks and cams for customer supplied door locks.
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 Module	Houses the power supply, processor and mother boards, harness connector panels, self test switch, main power switch 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)

- 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 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
- 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

Section 3
Machine Troubleshooting

3.1 Introduction

This section provides overall troubleshooting information for S-Plus 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 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).

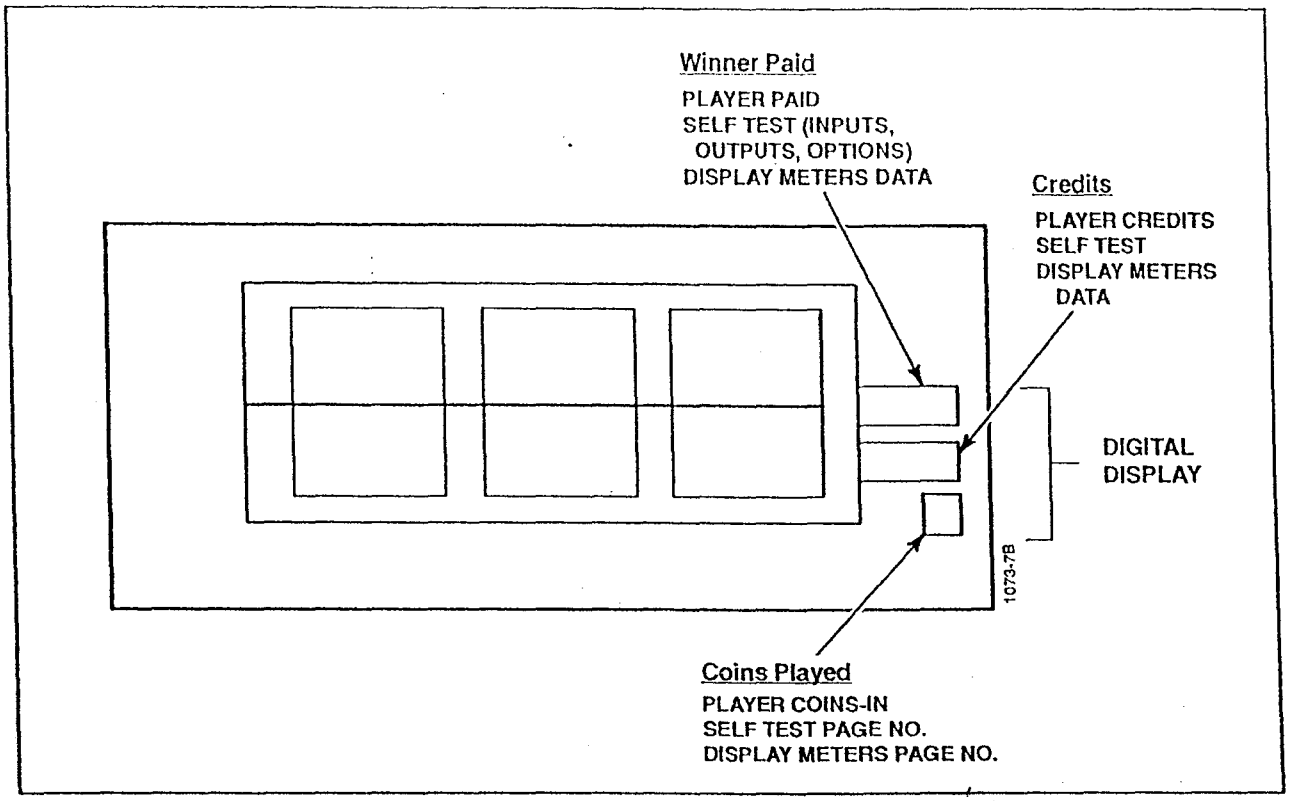

Figure 3-1. Information Displays (Reel Glass).

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 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 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 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	1. Faulty reset key switch. 2. Game is not over/completed. 3. Broken wire/bad connection. 4. Faulty processor board. 5. Faulty mother board.	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	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.	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 stepper slot machine. Although IGT designs numerous safety features into its products, servicing of the S-Plus machine is to be per- formed by QUALIFIED PERSONNEL ONLY.

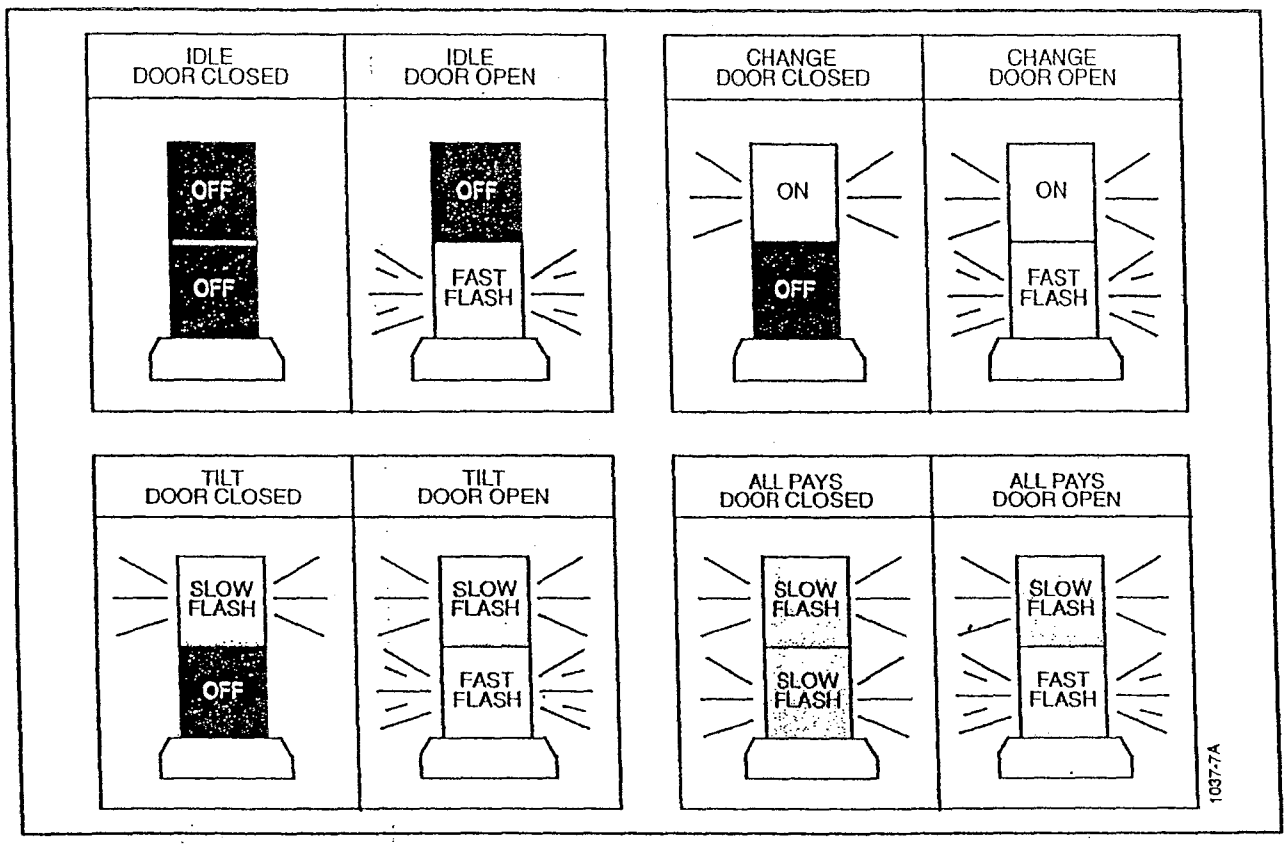

Figure 3-2. Typical Two-Stage Candle Operation.

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)
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 mal-functioning.	
	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 check-sum 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. Reinstall 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 Lower Module 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 Lower Module 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. (Section 5.7)
5. If the error condition persists or immediately occurs again, replace the Processor board. (Section 5.5)

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 video monitor.

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 Lower Module 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 back of the lower module (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.
   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

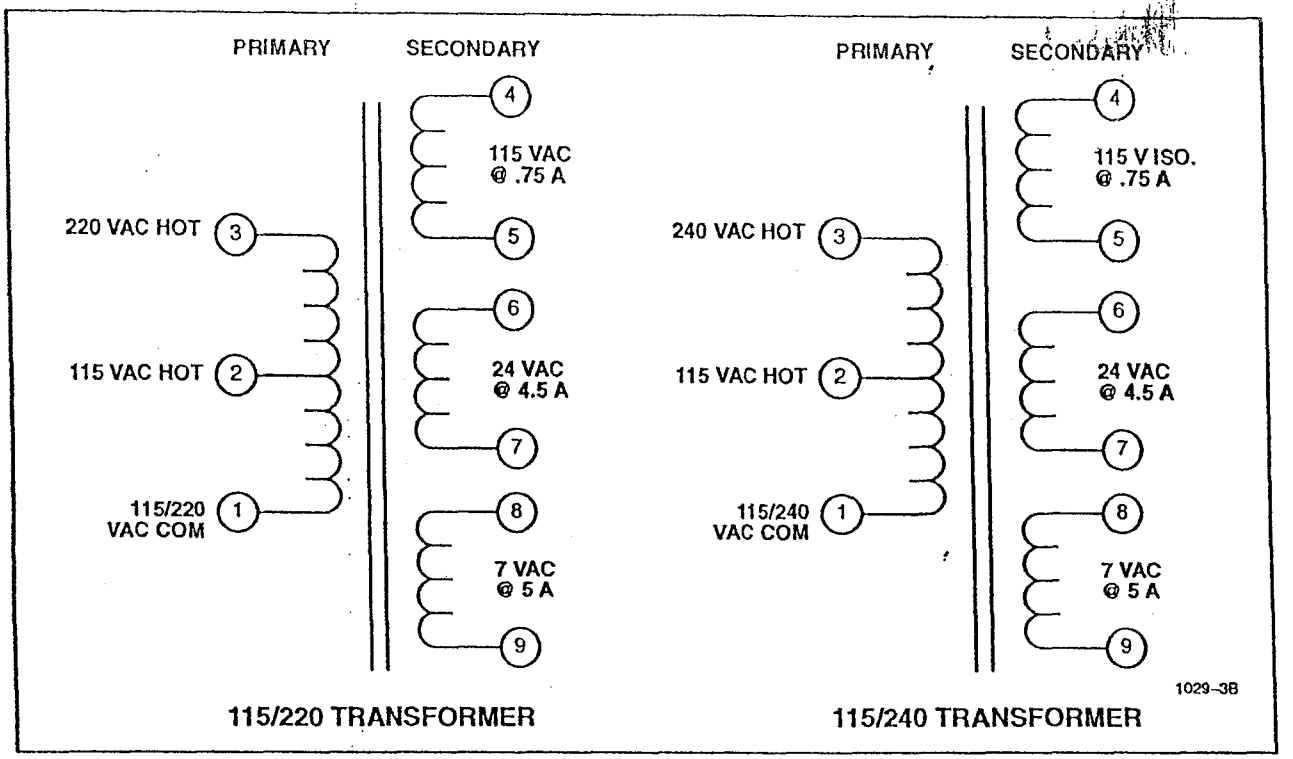

Figure 3-3. Transformer AC Voltages.

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 overheating, 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 ohms ± .2 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).

Section 4
Game Program Software

4.1 Introduction

This section provides detailed information about IGT game program software for S-Plus 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 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 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 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 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 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.

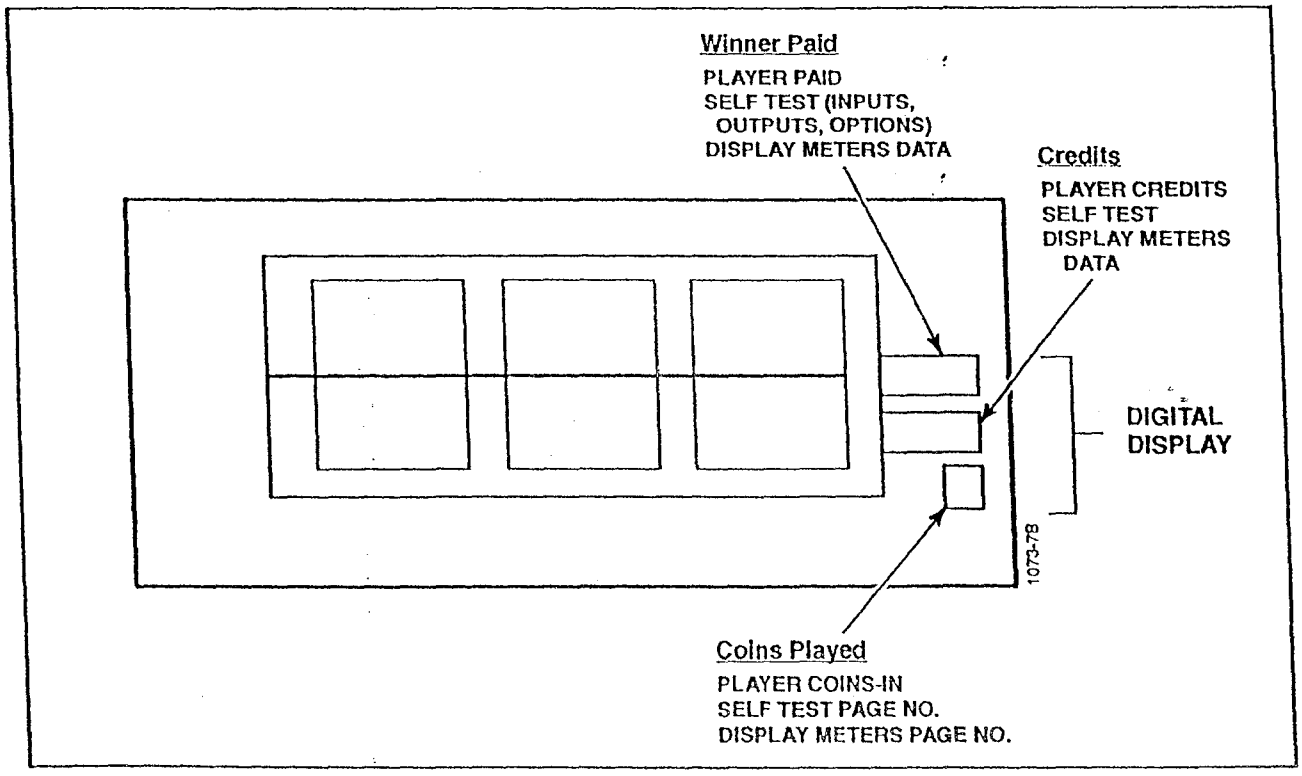

Figure 4-1. Information Displays.

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

[1]If the PC-SAS address does not equal zero, the PC-SAS option will be activated, not allowing further operation.
[2]Specialty 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 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 Pain 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 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 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) 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.

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);

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 Reset	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

a blank on line 7 would be a stop by itself (stop #5) and a 5 B 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

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.

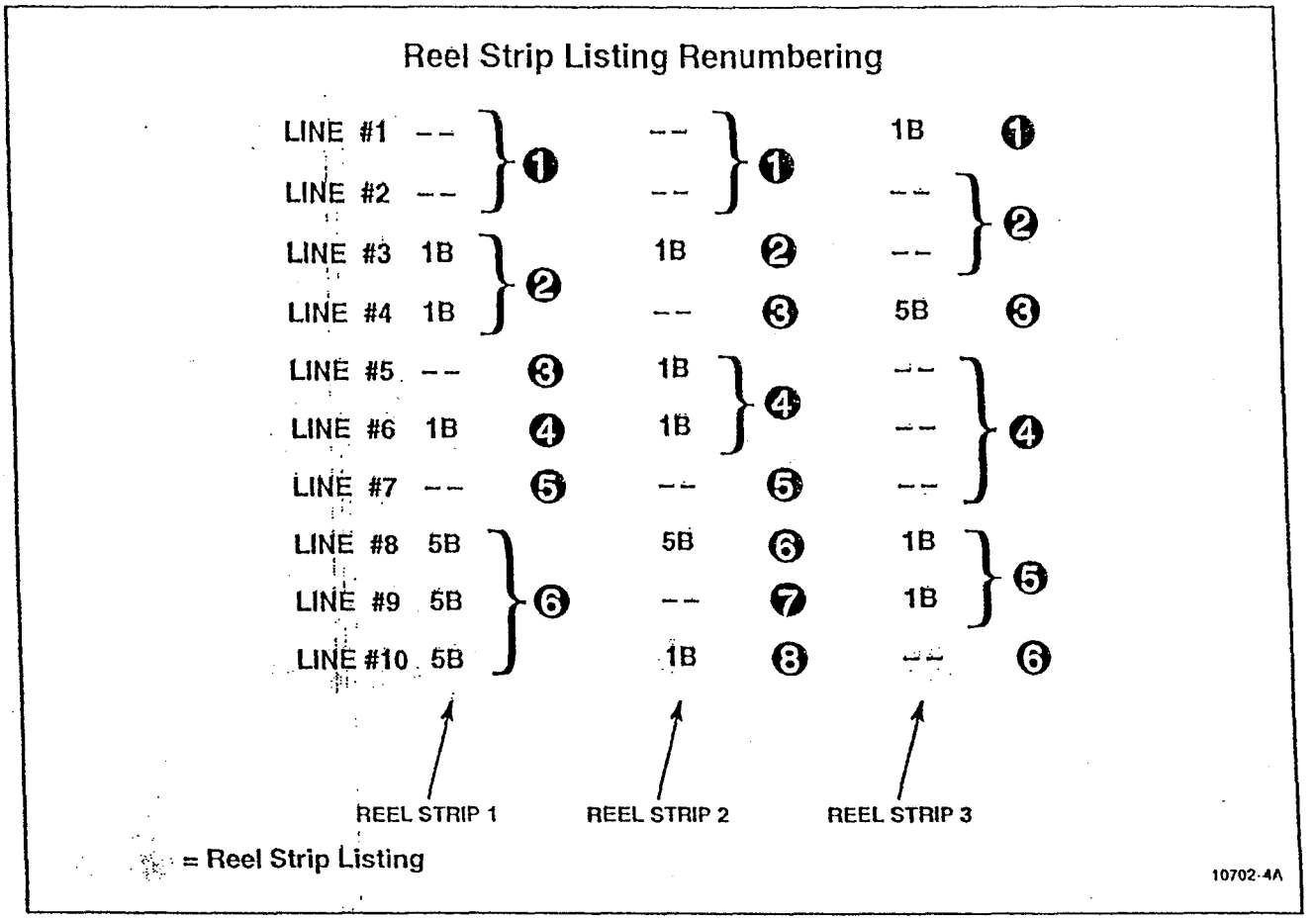

Figure 4-2. Reel Strip List Example.

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 denomina-

tion amount appears in the Winner Paid display. There are three methods to set or change denomination on S-Plus 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 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 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 restrict 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 machine 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 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 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 number 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 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

4.5.2 Troubleshooting

Troubleshoot the game software using the following procedure.

1. Complete the functional verification procedure in Section 4.5.1.

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)

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.