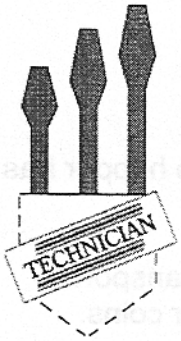


Coin-Out Module

Machine Overview

During this module you will learn:

- What the coin-out assembly is
- How the coin-out assembly works

Floor Operations

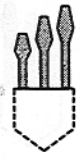
During this module you will learn:

- Key components of the coin-out assembly
- How the coin-out assembly works
- How to clear coin-out jams
- How to clear coin-out tilts

Service and Troubleshooting

During this module you will learn:

- Detailed components of the coin-out assembly
- What each component does
- Theory of operation for the coin-out assembly



Notes

GENERAL COMPONENT DEFINITION

Hopper: Mechanism that holds and dispenses coins paid by the machine to the player.

Bowl: Holds coins.

Probe: Indicates to the processor when the hopper has reached full capacity.

Pinwheel (pinwheel style): Isolates and transports coins via a series of pins. Used with smaller coins.

Pinwheel (holeywheel style): Isolates coins, via a series of holes, to be output to the coin tray.

Shelfwheel: Holds coins in their isolation space, in conjunction with the pinwheel.

Deflector/Wiper: Allows only one coin to be output to the coin tray.

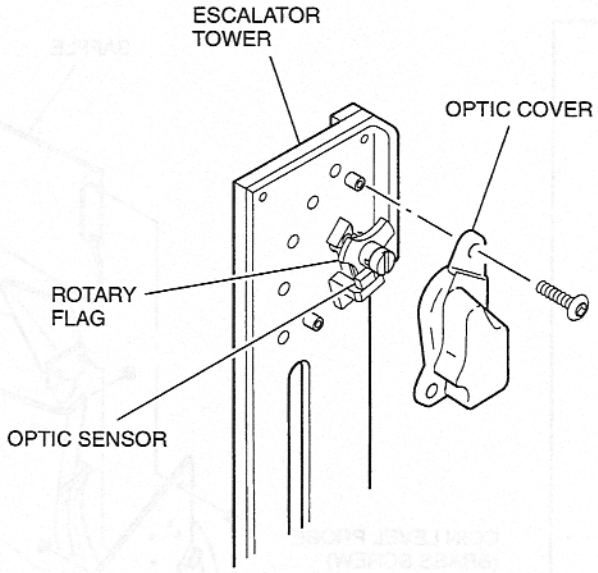
Knife (metal/plastic): picks the coin off the shelfwheel and guides it to the coin output, preventing the coin from reentering the bowl.

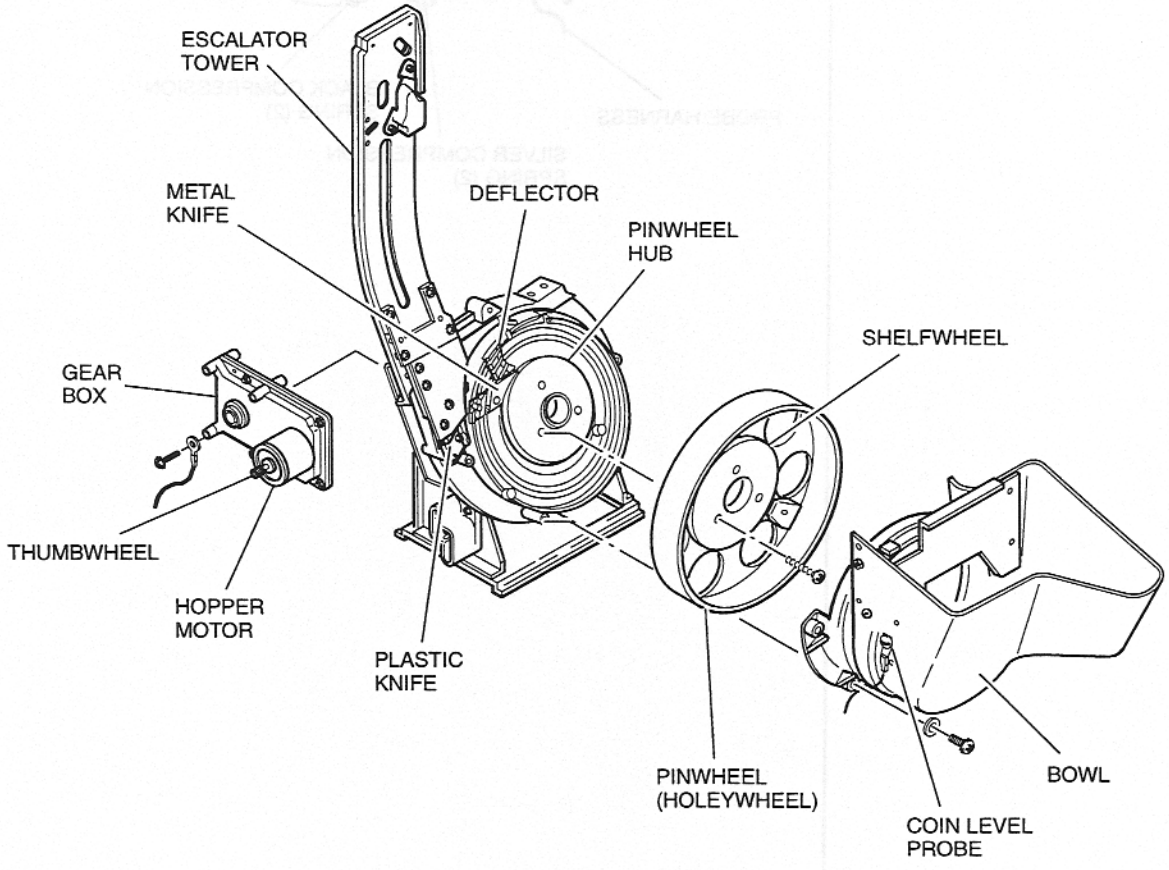
Hopper Motor (DC): Drives the hopper.

Thumbwheel: A manual control to move the wheel assembly. Used to clear coins from the hopper manually.

Gear Box: Unit that holds gears, hopper motor, and thumbwheel.

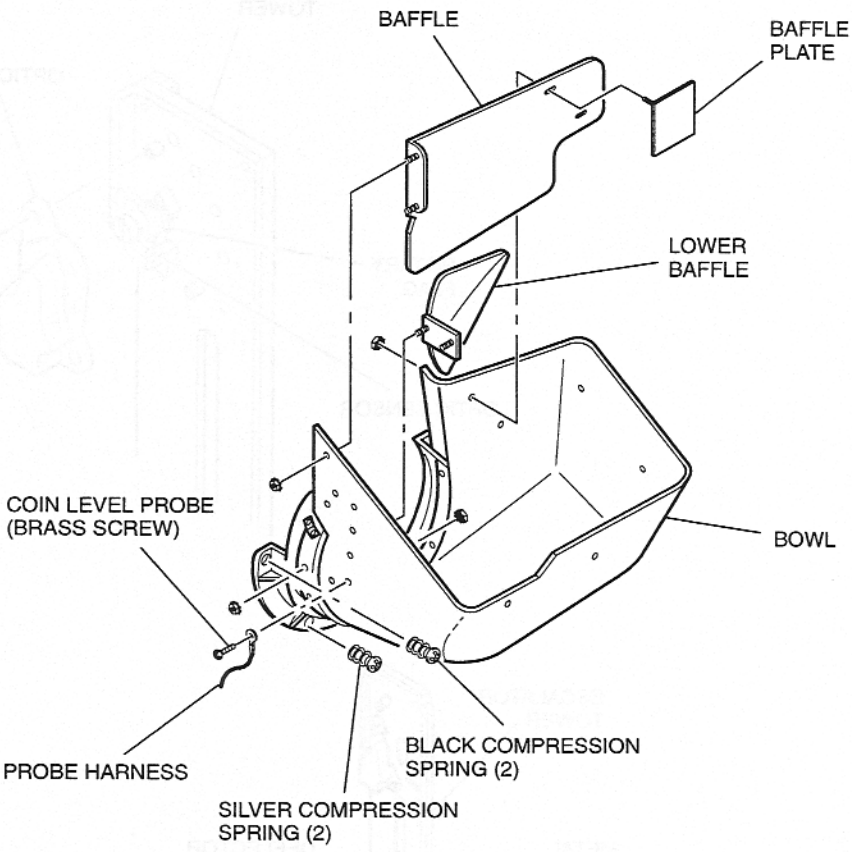
Escalator Tower: Device that carries coins vertically up to the coin chute on slant- and flat-top machines.


ESCALATOR TOWER
OPTIC COVER
ROTARY FLAG
OPTIC SENSOR


ESCALATOR TOWER
METAL KNIFE
DEFLECTOR
PINWHEEL HUB
SHELFWHEEL
GEAR BOX
THUMBWHEEL
HOPPER MOTOR
PLASTIC KNIFE
PINWHEEL (HOLEYWHEEL)
BOWL
COIN LEVEL PROBE

Coin-Out Module

Notes



DETAILED COMPONENT DEFINITION

Hopper

Mechanism that holds and dispenses coins paid by the machine to the player.

Bowl

Plastic reservoir for the machine's coins available to be transported and, ultimately, paid out. Receives coins from the machine's coin-in assembly or is hand filled by an attendant.

Super Baffle & Lower Baffle

Prevents the coins from affecting the knife, deflector, and hopper optics.

Springs

(Screw) Black
(Screw) Silver
Large spring connected from bowl to hopper frame.

Coin Level Probe

Brass screw extending into the plastic bowl. A voltage level placed on this screw is shorted to ground when the coins in the bowl fill to a level where they create a conducting path to ground, indicating that the hopper is full.

Escalator Tower (Slant and Flat Machines)

Passive channel through which coins are force-fed by motor-operated moving parts so coins can be dispensed at a convenient height for players, higher than the resting point of the hopper bowl.

Coin-Out Sensor – Non-Secure Count

Mechanical rocker arm with an optic flag that serves 2 functions:

- Physically isolates individual coins
- Communicates passing of individual coins past the count point to optics that sense the count via a plastic flag

Non-Secure Count Hopper Optics

LED/light-sensitive transistor pair where the transistor senses a break in the beam of light directed toward it by the LED. Has four leads.

Secure-Count Hopper Optics

LED/light-sensitive transistor pair where the transistor senses a break in the beam of light directed toward it by the LED. Has six leads.

Optic Cover

An anti-tampering shield that covers the hopper optics.

Notes

DETAILED COMPONENT DEFINITION (cont.)

Agitator

Coins can stack in such a way that no coins fall into the "isolation spaces" for transport. The agitator destabilizes these stacks, allowing coins to fall into the isolation spaces and become available for transport.

Pinwheel & Shelfwheel

Pin-pairs on the pinwheel work with the shelfwheel to form isolation spaces used to transport individual coins toward the hopper's coin-out sensor, then to the coin-out chute. The pinwheel and shelfwheel are connected to the motor via the gearbox.

14 isolation spaces on a $.25 pinwheel.
11 isolation spaces on a $1.00 token pinwheel.

Holeywheel, Back Plate, & Spring-Loaded Deflector Plate

Holes in the holeywheel, slightly larger than coins appropriate for a given denomination, serve as the filter point feeding the isolation spaces behind the holeywheel.

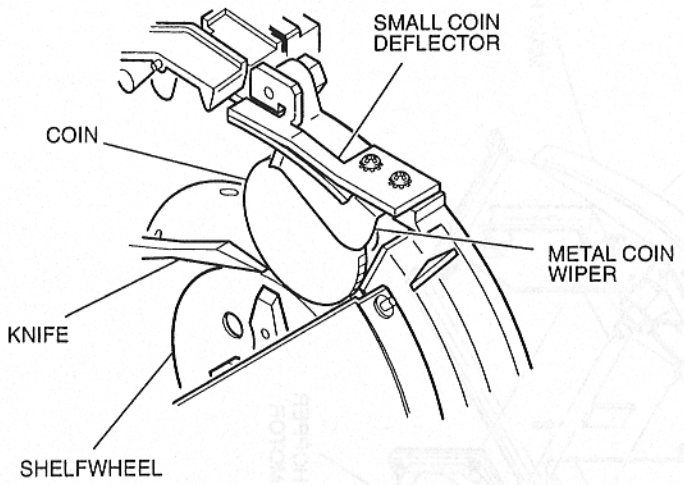
The holeywheel thickness is just more than the thickness of the coins, and has pins offset from the holes in the holeywheel to define the trailing edge of the isolation spaces.

The deflector plate prevents a coin that is not in an isolation space from jamming against the knife.

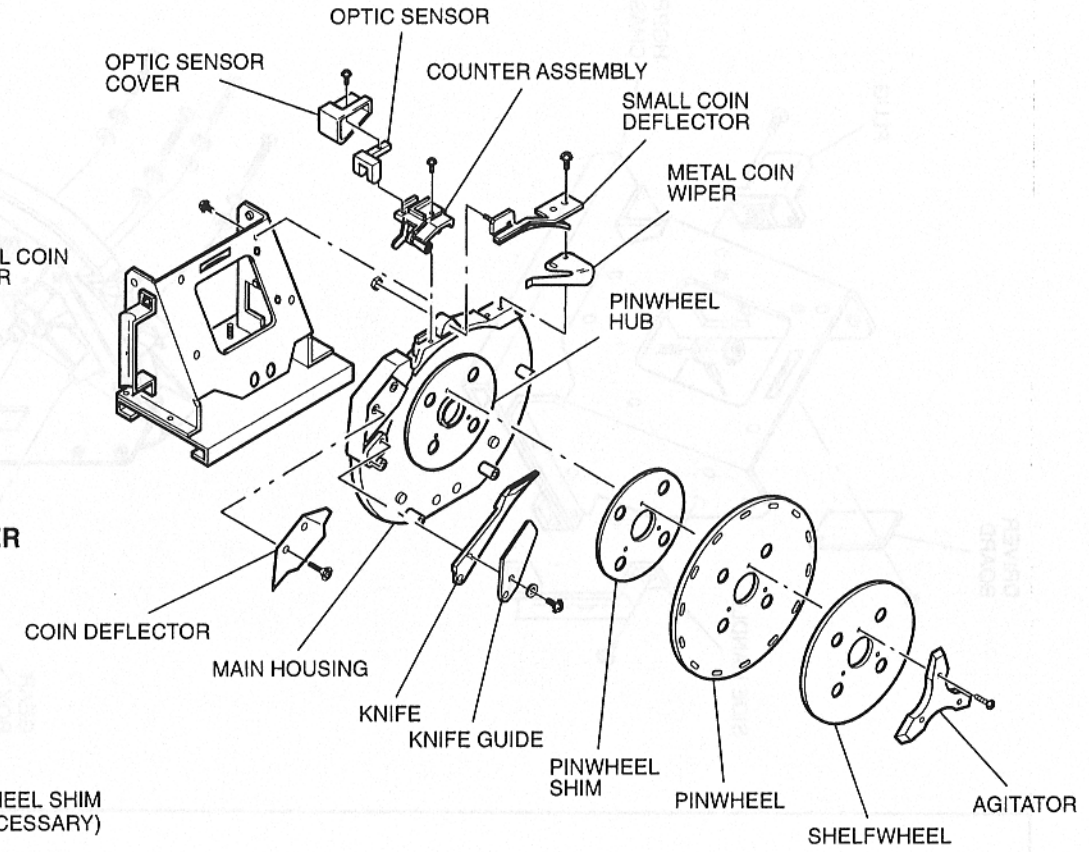
A spring-loaded arm just before the deflector keeps the topmost coin pushed back against the holeywheel pins, so coins won't jam against the knife.

12 isolation spaces on a $.25 holeywheel.
7 isolation spaces on a $1.00 token holeywheel.

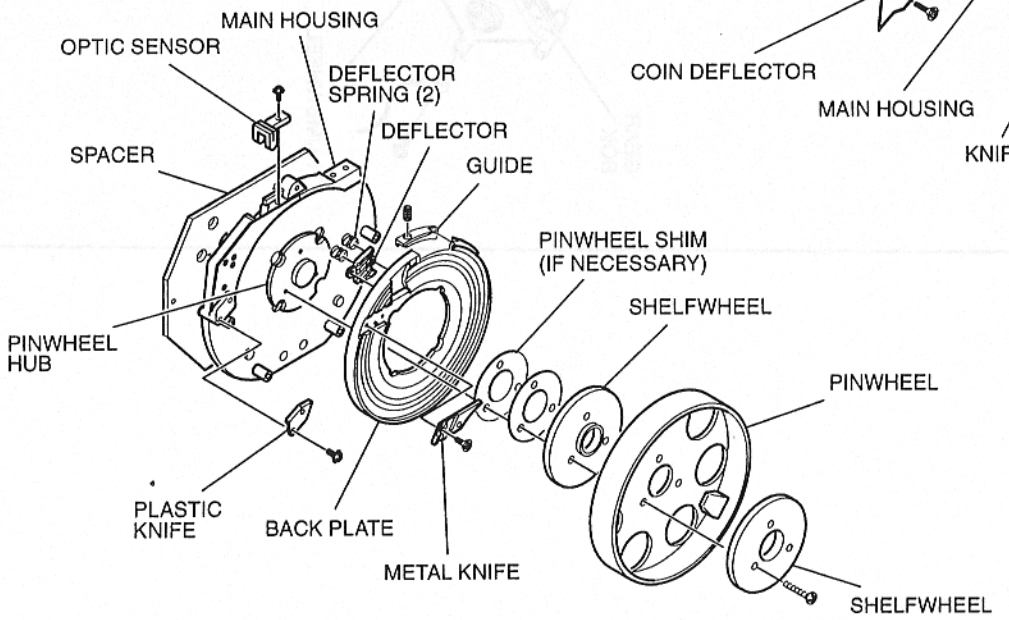
COIN PASSAGE DETAIL



PINWHEEL HOPPER

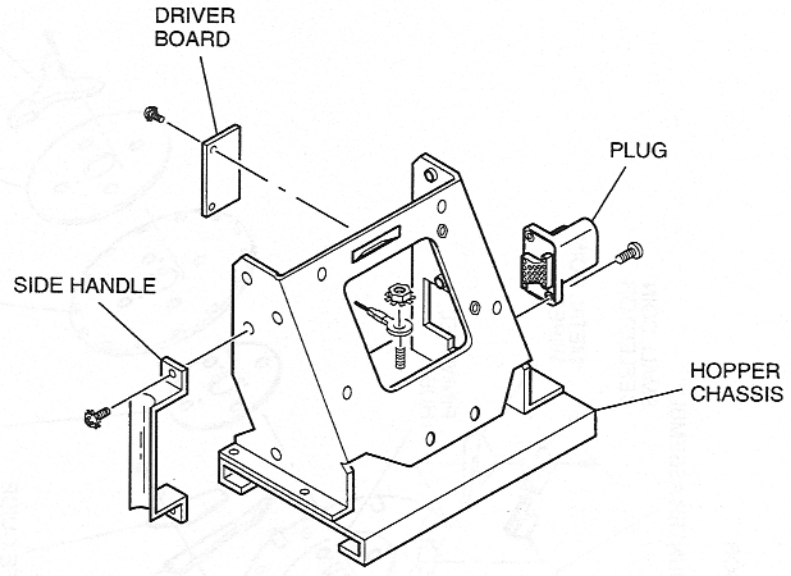


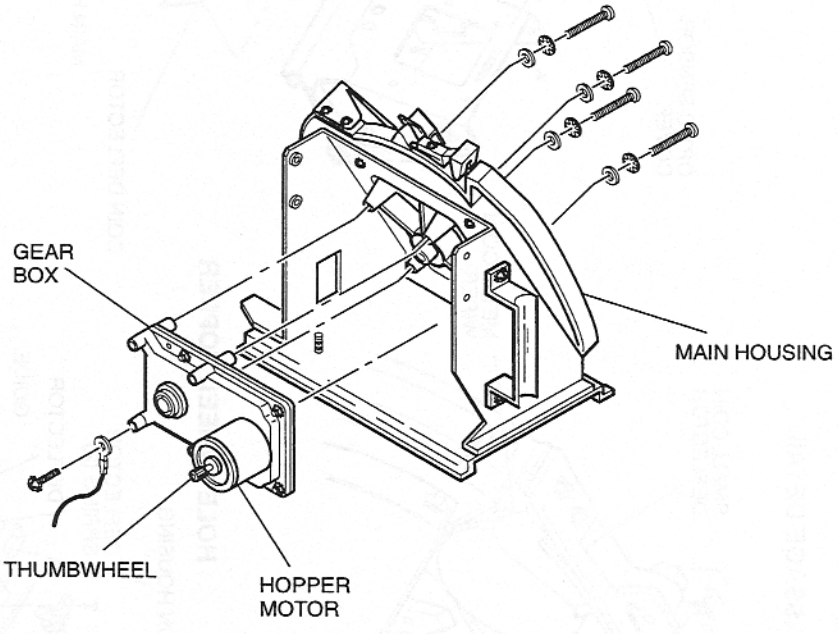
HOLEYWHEEL HOPPER



Coin-Out Module

Notes





DETAILED COMPONENT DEFINITION (cont.)

Knife (Metal & Plastic, Holeywheel)

A holeywheel hopper has both a metal and a plastic knife. A transported coin encounters the metal knife first, which pulls the coin from the transport path and guides the coin toward the plastic knife. The plastic knife is the last part of the path the coin encounters as it is dispensed.

Wiper

Mechanical arm positioned to dislodge a coin piggybacking an isolated coin.

Knife (Metal or Plastic, Pinwheel)

Serves two functions:

- To provide a second mechanism for further separating a piggybacked coin from an isolated coin
- To "pick" the isolated coin from the transport so it can be counted and dispensed.

The alignment of the knife to the coin transport is critical. Metal knives last longer than plastic, but are VERY difficult to align if bent. Plastic knives are cheaper than metal knives and are brittle enough that they do not bend.

Plug

Supplies electrical connections to supply power to the motor and for the optic sensor.

Motor (24VDC), Thumbwheel & Gearbox

24 VDC motor animates the coin out transport mechanism. The thumbwheel attached to the back of the motor allows manual turning of the motor. The gearbox gears down the connection between the motor and the actual coin transport mechanism. The ratio = 80:1.

Non-Secure-Count Hopper Circuit Board

Receives 13 VDC & develops Vcc (+5 VDC) locally for local TTL circuitry. Receives/relays signals from processor board used to control the DC motor. Powers the hopper optic sensor and receives the pulses generated by the sensor as coins pass the count point, then relays those pulses back to the processor board. The board has four connectors:

- J123 = DC to the motor
- J122 = Optics connection
- J120 = Connection to the machine
- J121 = N/C at this time

Notes

GENERAL THEORY OF OPERATION

The primary function of coin-out operation is to dispense payment according to player and processor interaction.

The hopper motor receives signals from the processor to activate. This, in turn, activates the gearbox at a predetermined speed. The entire wheel assembly turns at this speed.

Coins are then conveyed either through a series of pins or holes and counted by breaking a constant beam of light in the optics assembly. This count is transmitted back to the processor to ensure proper payout to the coin tray.

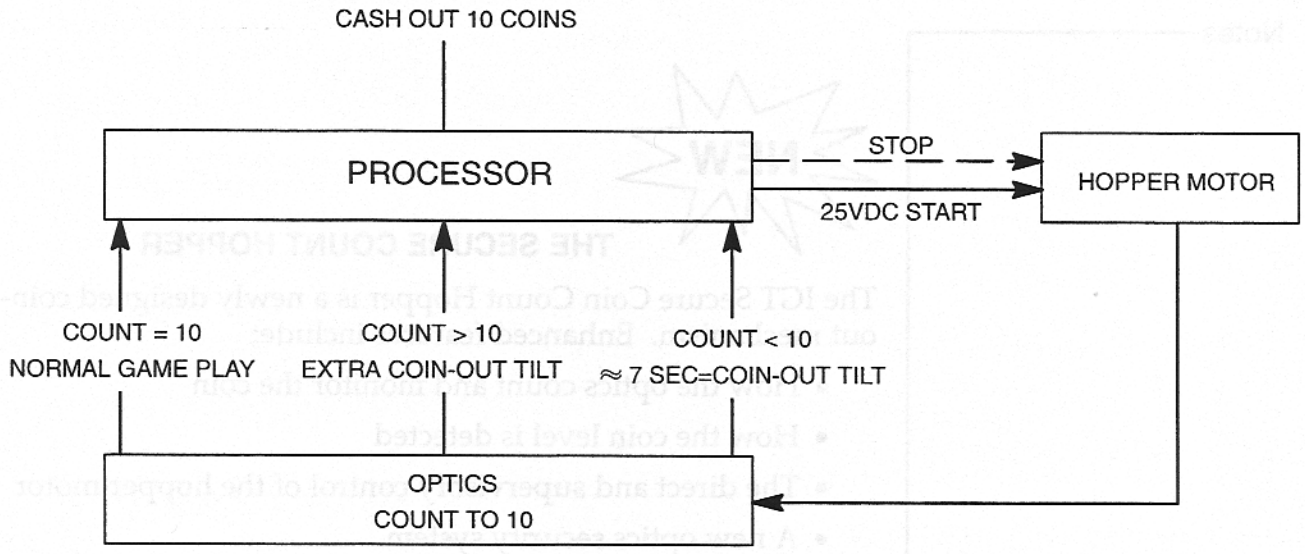
If an extra coin is paid out, then a signal is sent to the processor , which halts game play and displays a tilt condition. Conversely, if after seven seconds the hopper optics do not detect a coin-out, game play will halt and a "hopper empty" tilt will occur.

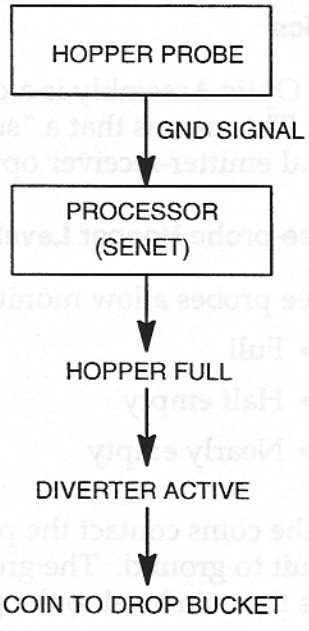
DETAILED THEORY OF OPERATION

The hopper receives coins from the coin-in assembly into the bowl. When the processor sends a command via I/O circuitry to the hopper motor to start, the pinwheel/holeywheel assembly moves. Coins in the bowl are gravity fed to isolation spaces in the pinwheel/holeywheel assembly and carried toward the coin-out chute as the motor turns the pinwheel/holeywheel.

Although only one coin should be in an isolation space, sometimes more than one rides a space. The wiper wipes off such riders. When the isolated coin is driven far enough, it's picked off of the isolation space by the knife. The coin continues over the knife toward the coin-out chute, pushed by the pinwheel/holeywheel motion. There, the coin activates the coin-out sensor mechanism. The coin-out sensor sends feedback to the processor that a coin passed by. This I/O combination allows the processor to move coins toward the output chute and count coins passing through the sensor point, out the chute and into the coin tray.

In an escalator hopper, the escalator is a passive extended coin path between the knife pick off point and the sensor assembly. Coin motion through the escalator is force fed by the motion of the pinwheel/holeywheel.


CASH OUT 10 COINS
PROCESSOR
STOP
25VDC START
HOPPER MOTOR
COUNT = 10
NORMAL GAME PLAY
COUNT > 10
EXTRA COIN-OUT TILT
COUNT < 10
≈ 7 SEC=COIN-OUT TILT
OPTICS
COUNT TO 10


HOPPER PROBE
GND SIGNAL
PROCESSOR
(SENET)
HOPPER FULL
DIVERTER ACTIVE
COIN TO DROP BUCKET

Notes

THE SECURE COUNT HOPPER

The IGT Secure Coin Count Hopper is a newly designed coin-out mechanism. Enhanced features include:

- How the optics count and monitor the coin
- How the coin level is detected
- The direct and supervisory control of the hopper motor
- A new optics security system

Optics

The Optic Assembly is a custom dual opto-interrupter module. This means that a "smarter eye" has replaced the traditional emitter-receiver optic pair.

Three-probe Hopper Level Detect

Three probes allow monitoring of the coin level in the hopper:

- Full
- Half empty
- Nearly empty

As the coins contact the probes, they complete an electrical circuit to ground. The grounding of each hopper probe transmits the coin level to the processor board.

Advantages Of Functional Design

An advantage of a secure count hopper is the new DIRECT coin count system, which replaces the mechanical lever action coin detect. This provides extra operational security and the ability to detect different coin levels in the hopper bowl.

This design eliminates mechanical tolerance issues with the security arm. A small metal coin stabilizing arm replaces the larger rocker arm, reducing stress on the hopper knives. It also improves coin exit because there is no physical contact between the coin and the security arm.

Enhanced communication of events from the hopper to the host machine provides the service technician visual information about tilt conditions through the LED display.

Security Features

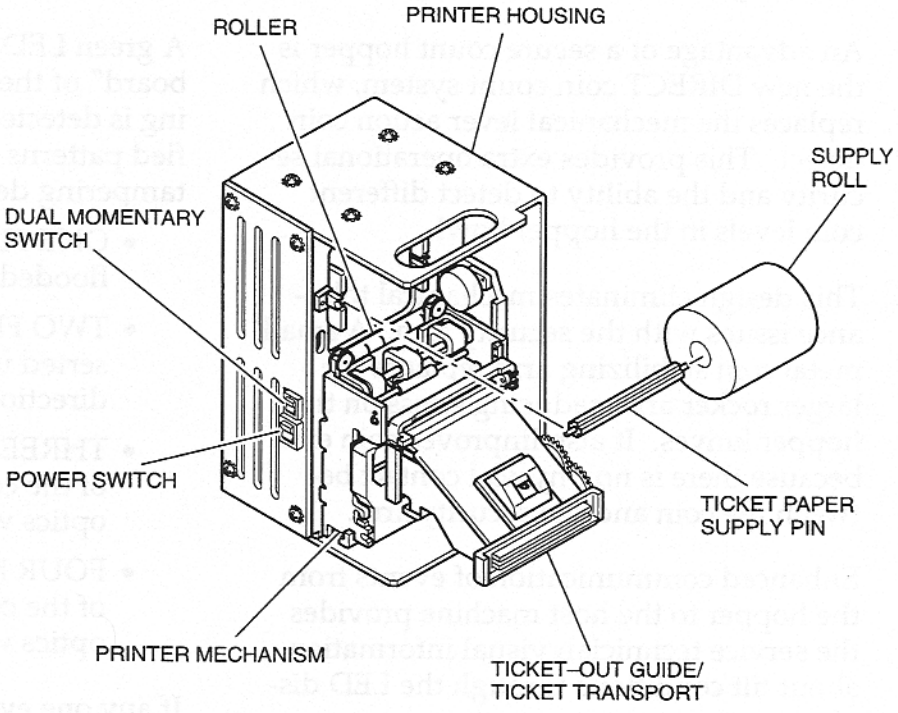
A green LED is located on the "smart board" of the new hopper. When tampering is detected, the LED flashes with specified patterns to indicate the type of tampering detected:

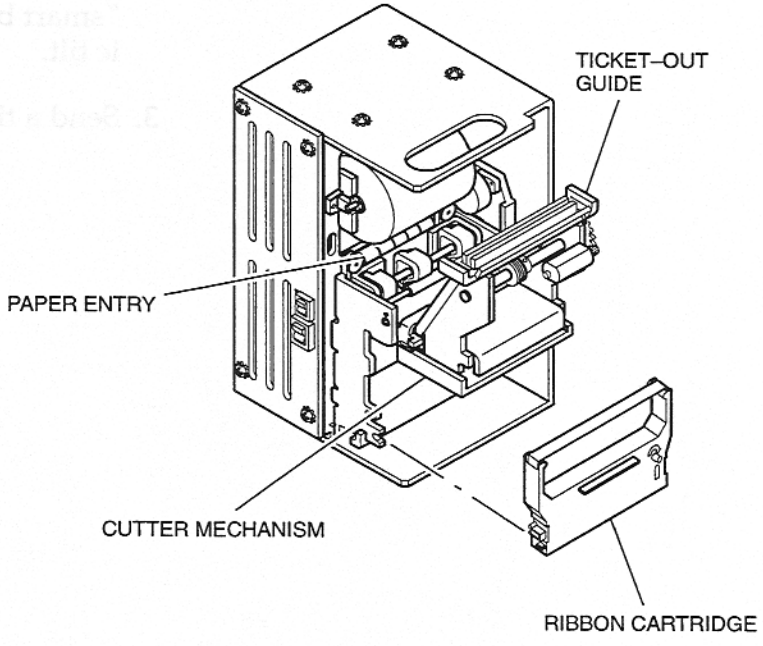
- ONE FLASH = The optics have been flooded with light
- TWO FLASHES = An object was inserted into the optics in the reverse direction
- THREE FLASHES = The time interval of the coin entering and exiting the optics was too short
- FOUR FLASHES = The time interval of the coin entering and exiting the optics was too long

If any one event occurs the secure count hopper will:

1. Turn the hopper motor off.
2. Flash the LED on the secure count "smart board" to indicate the specific tilt.
3. Send a tilt message to the processor.

Notes


ROLLER
PRINTER HOUSING
SUPPLY ROLL
DUAL MOMENTARY SWITCH
POWER SWITCH
TICKET PAPER SUPPLY PIN
PRINTER MECHANISM
TICKET–OUT GUIDE/ TICKET TRANSPORT


TICKET–OUT GUIDE
PAPER ENTRY
CUTTER MECHANISM
RIBBON CARTRIDGE

GENERAL COMPONENT DEFINITION

Ticket Printer: dispenses tickets to be paid (instead of coins).

DETAILED COMPONENT DEFINITION

Ticket Printer

Dispenses tickets to be paid (instead of coins).

Printer Housing

Metal case that holds printer components.

Supply Pin

Holds the supply roll.

Supply Roll

Holds the blank roll of paper.

Thumbwheel Gear

Feeds 2-ply paper into the paper entry.

Paper Entry

The paper passes through here and enters the printer mechanism.

Audit Paper Take-up Spool

Device that holds the printed yellow paper in an audit ticket printer.

Roller

Device that transports the paper through the printer mechanism.

Ribbon Cartridge

Ink that is on the ribbon is transferred to paper to print tickets.

Ribbon Separator

Holds the ribbon in place against the print head.

Print Head

The ribbon rides between the separator and print head. The print head presses the ribbon, leaving an imprint on the paper.

Ribbon Feed Knob

Pulls the ribbon through the ribbon cartridge.

Cartridge Guide

Slides into the printer housing and holds the ribbon cartridge in place.

Printer Mechanism

Device that prints the tickets.

Cutter Assembly

Device that cuts tickets after they are printed and dispensed.

Power Switch

Turns component power on or off.

Dual Momentary Switch

A self-test switch. Pressing the switch one direction allows the printer to perform a self-test; the other acts as a line feed.

Notes

GENERAL THEORY OF OPERATION

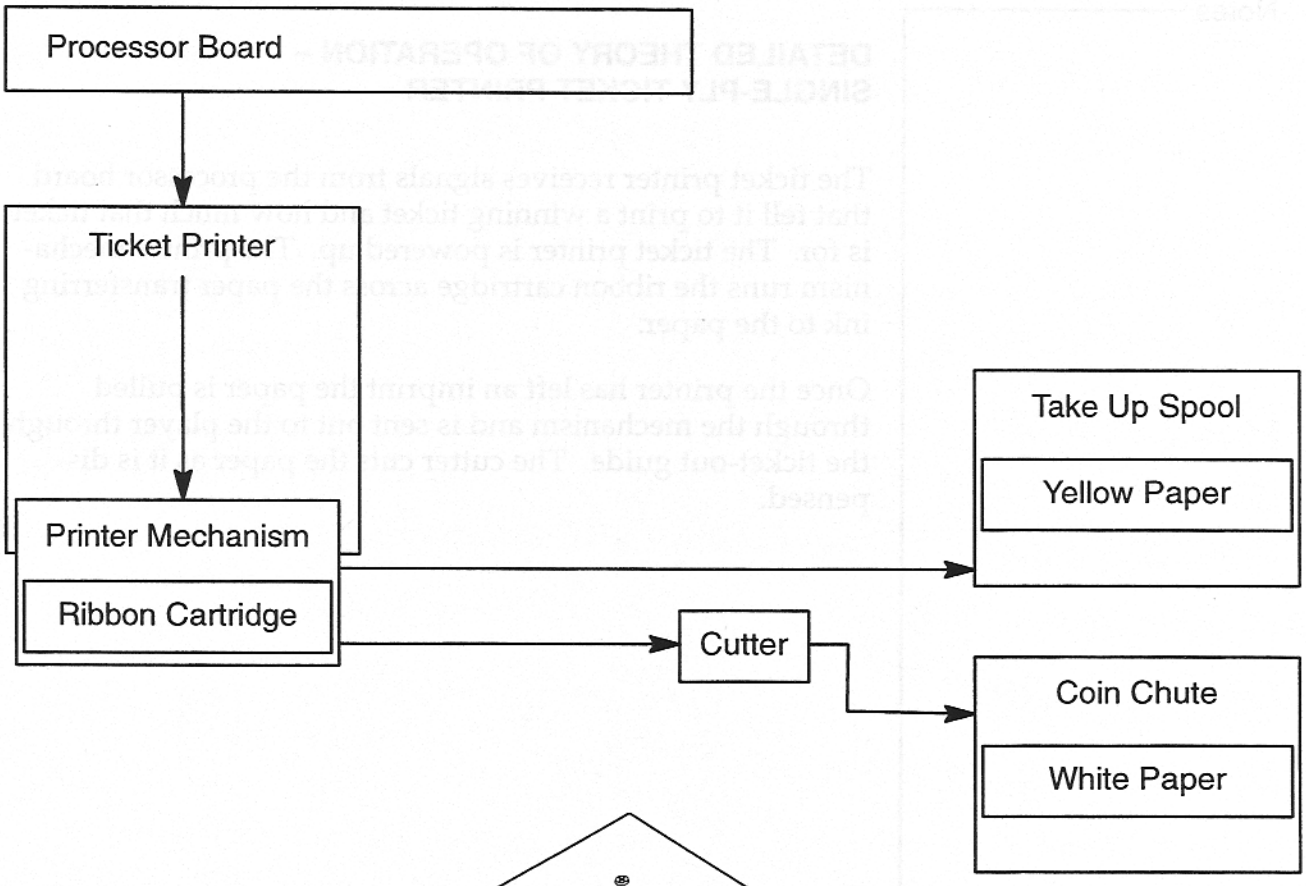
The primary function of coin-out operation is to dispense payment according to player and processor interaction.

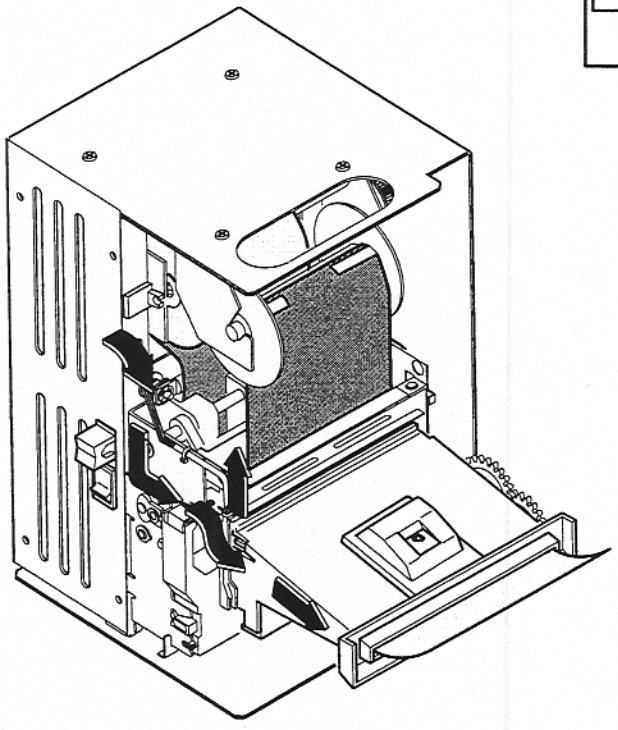
The ticket printer is an alternative to the coin-dispensing hopper and is usually used in jurisdictions that don't have coin payouts. Any time a player cashes out on a machine, a signal is sent to the ticket printer, a ticket prints the winning amount, then the ticket is dispensed.

DETAILED THEORY OF OPERATION – AUDIT (TWO-PLY) TICKET PRINTER

The ticket printer receives signals from the processor board that tell it to print a winning ticket and how much that ticket is for. The ticket printer is powered up. The printer mechanism runs the ribbon cartridge across the paper, transferring ink to the paper.

In an audit ticket printer, the paper is a 2-ply roll that has both yellow and white paper. Once the printer has left an imprint the paper is pulled through the mechanism. The yellow piece is taken up by the audit paper take up spool (stored for later use) and the white paper is sent out to the player through the coin chute on the machine. The cutter cuts the paper as it is dispensed.


Processor Board
Ticket Printer
Printer Mechanism
Ribbon Cartridge
Take Up Spool
Yellow Paper
Cutter
Coin Chute
White Paper

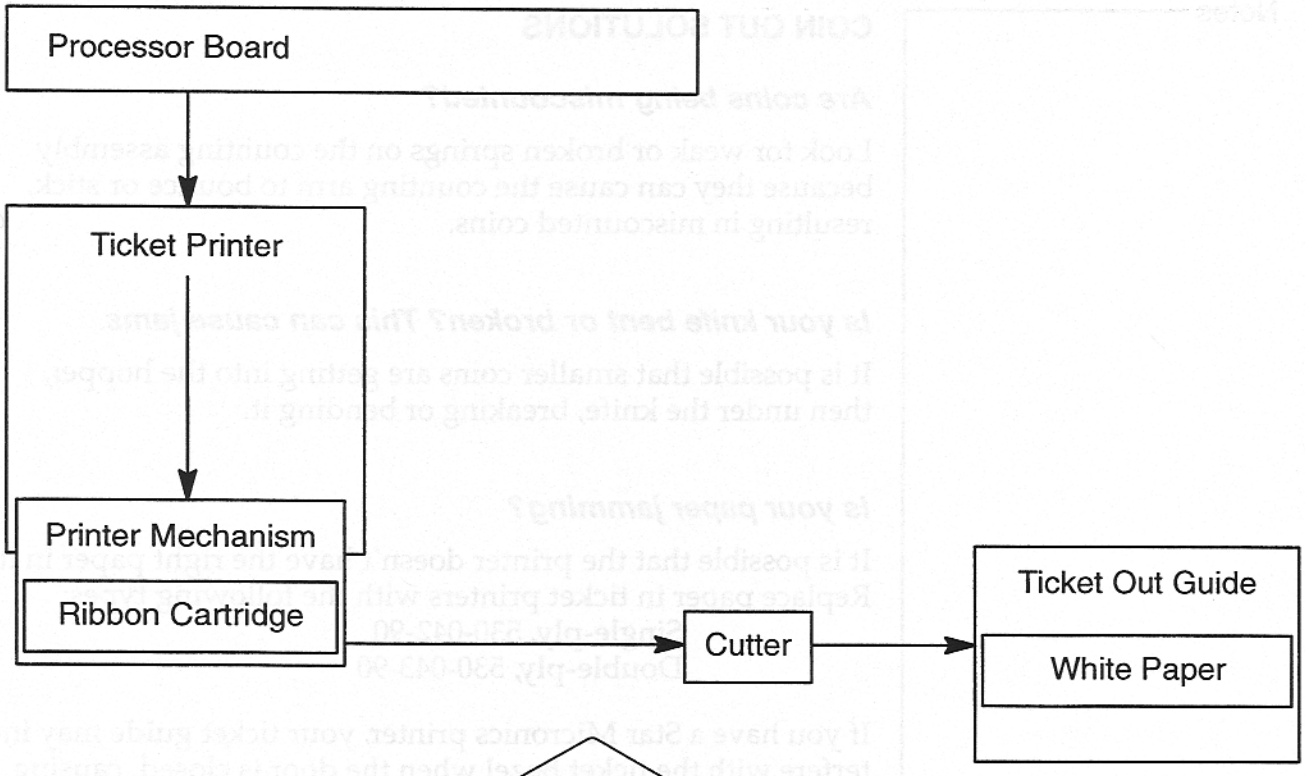


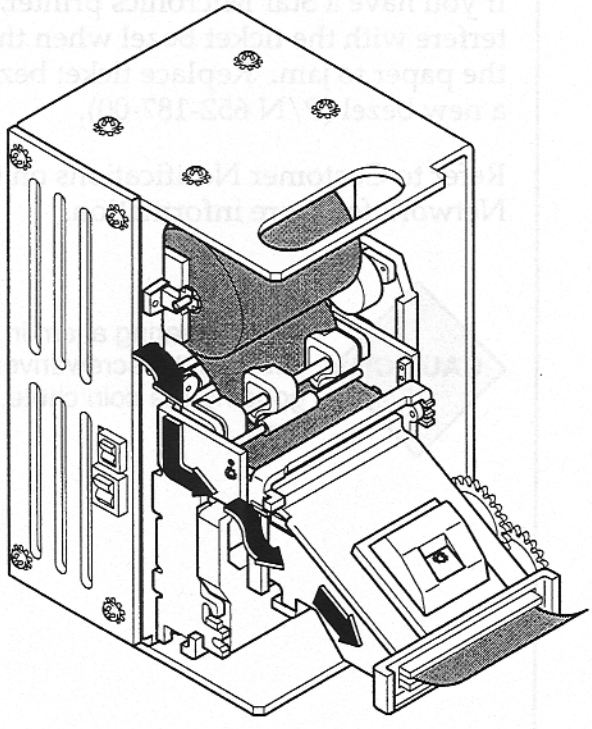
Notes

DETAILED THEORY OF OPERATION – SINGLE-PLY TICKET PRINTER

The ticket printer receives signals from the processor board that tell it to print a winning ticket and how much that ticket is for. The ticket printer is powered up. The printer mechanism runs the ribbon cartridge across the paper transferring ink to the paper.

Once the printer has left an imprint the paper is pulled through the mechanism and is sent out to the player through the ticket-out guide. The cutter cuts the paper as it is dispensed.


Processor Board
Ticket Printer
Printer Mechanism
Ribbon Cartridge
Cutter
Ticket Out Guide
White Paper



Notes

COIN OUT SOLUTIONS

Are coins being miscounted?

Look for weak or broken springs on the counting assembly because they can cause the counting arm to bounce or stick, resulting in miscounted coins.

Is your knife bent or broken? This can cause jams.

It is possible that smaller coins are getting into the hopper, then under the knife, breaking or bending it.

Is your paper jamming?

It is possible that the printer doesn't have the right paper in it. Replace paper in ticket printers with the following types:

Single-ply, 530-042-90
Double-ply, 530-043-90

If you have a Star Micronics printer, your ticket guide may interfere with the ticket bezel when the door is closed, causing the paper to jam. Replace ticket bezel (P/N 652-153-00) with a new bezel (P/N 652-187-00).

Refer to Customer Notifications on the Product Information Network for more information.

When clearing a jam in an escalator tower NEVER use a metal screwdriver. Take care to avoid gouging the coin chute, as this can create future jams.

Bill Acceptor Module

Machine Overview

During this module you will learn:

- What a bill acceptor is and what it does
- Different kinds of bill acceptors

Floor Operations

During this module you will learn:

- How a bill acceptor works
- How to keep the bill acceptor working optimally
- How to clear bill jams

Service and Troubleshooting

During this module you will learn:

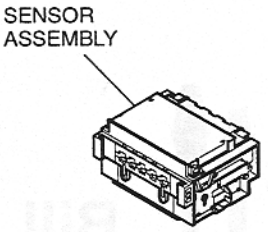
- How a bill acceptor works
- How to calibrate the WBA
- How to perform tests on the WBA

Notes

GENERAL COMPONENT DEFINITION

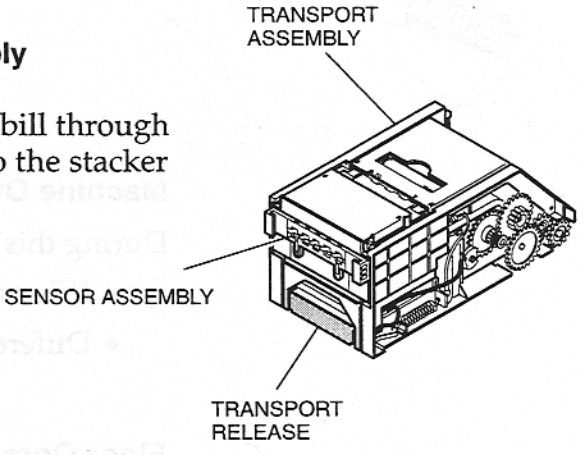
Sensor Assembly

Verifies predetermined paper currency.



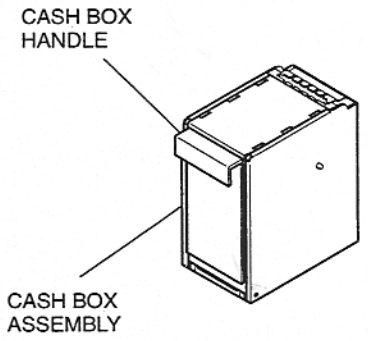
Transport Assembly

Carries approved bill through the bill acceptor to the stacker (cash box).



Stacker (Cash Box)

Stores accepted bills.



G0999-43T

SENSOR ASSEMBLY COMPONENT DEFINITION

Optical Sensors

(WBA-6) (DBV-4) – Used to detect both reflective (light bouncing off) and transmissive (light passing through) characteristics. Do not detect color.

Magnetic Sensors

(WBA-3) (DBV-1) – Used to detect the magnetic permeability of the paper.

Bill Lockout Levers

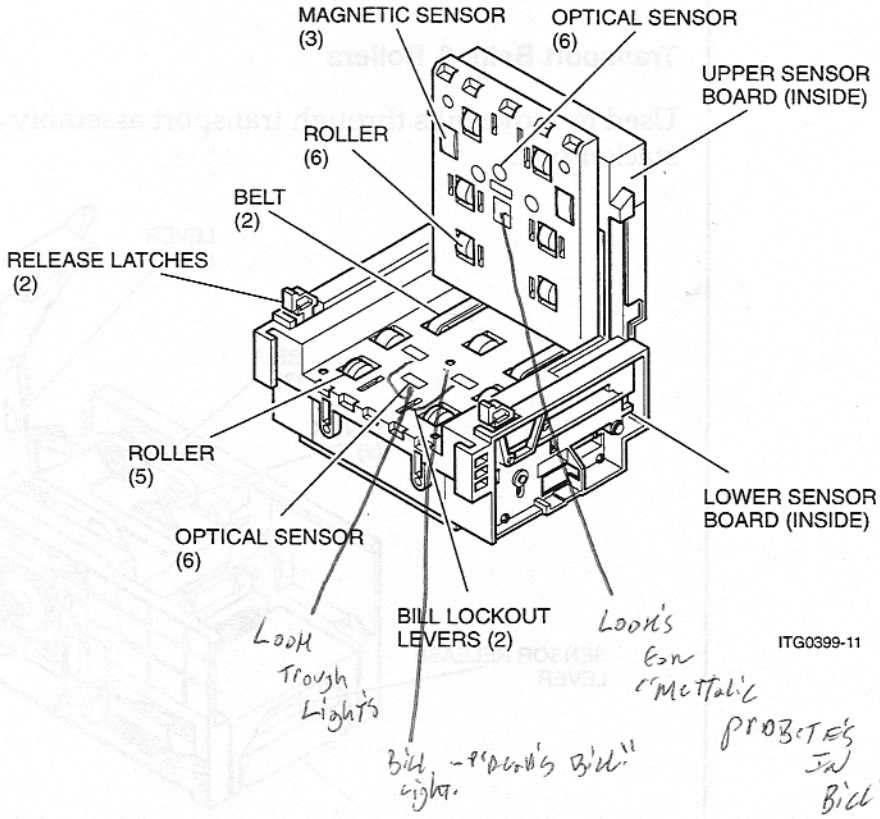
Prevents other bills from entering the mechanism until the current bill has completed its evaluation process.

Belts & Rollers

Used to move bills through the sensor assembly.

Upper & Lower Sensor Boards

All optic and magnetic sensors are located on these boards. If a bill acceptor is not holding calibration information, the boards may need to be replaced.



Notes

TRANSPORT ASSEMBLY – TOP VIEW

Sensor Assembly Release Lever

Round bar on face of transport. To remove the sensor assembly, push bar down while pulling assembly straight out.

Transport Release Lever

Flat bar on face of transport. To remove transport, pull bar down and slide transport assembly straight out.

Bill Position Lever

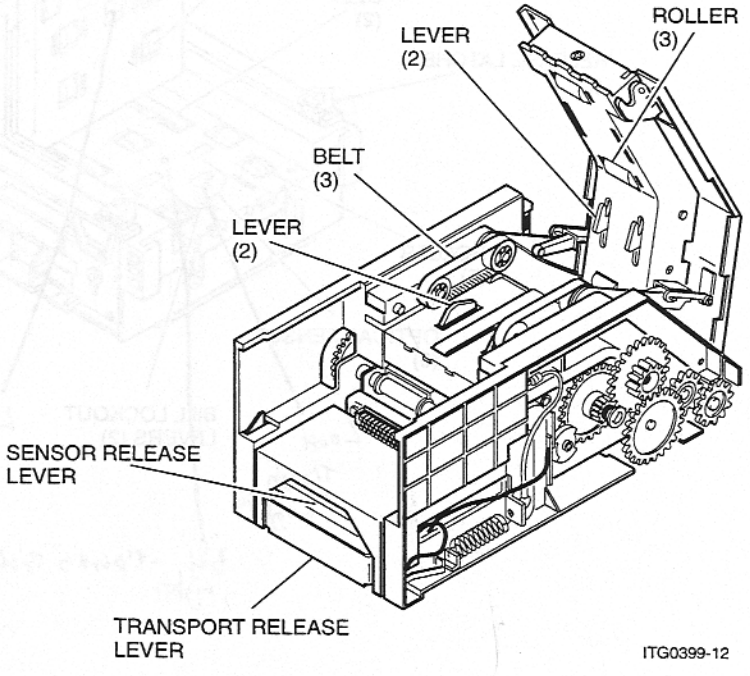
Used to detect the position of bill in the transport and communicate that information to the acceptor CPU Board.

Stacker Sensing Lever

Blocks the bill path until it receives "stacker installed" signals (installed and reset) from the stacker sensor board.

Transport Belts & Rollers

Used to move bills through transport assembly and into the stacker box.



TRANSPORT ASSEMBLY – BOTTOM VIEW

CPU Board

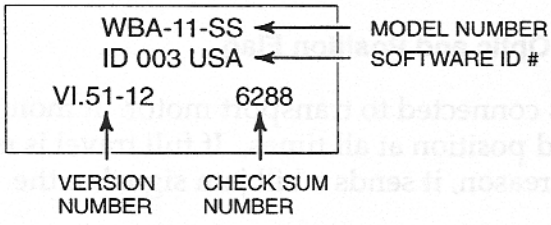
Controls all functions of acceptor assembly. May or may not house a program PROM, depending on model.

The WBA 10 has three connectors:

- Connector 1 = Power (13 VDC)
- Connector 2 = Data (transmit/ receive)
- Connector 3 = LED (enable light on front of machine, Vision & iGame-Plus; not used in Game King)

The *dip switch block* allows you to disable or enable certain bill signatures, also used for maintenance and calibration settings.

EPROM LABEL



Stacker Motor

Drives stacker up and down and into reset position (reversible).

Transport Motor

Drives transport and sensor belts (reversible).

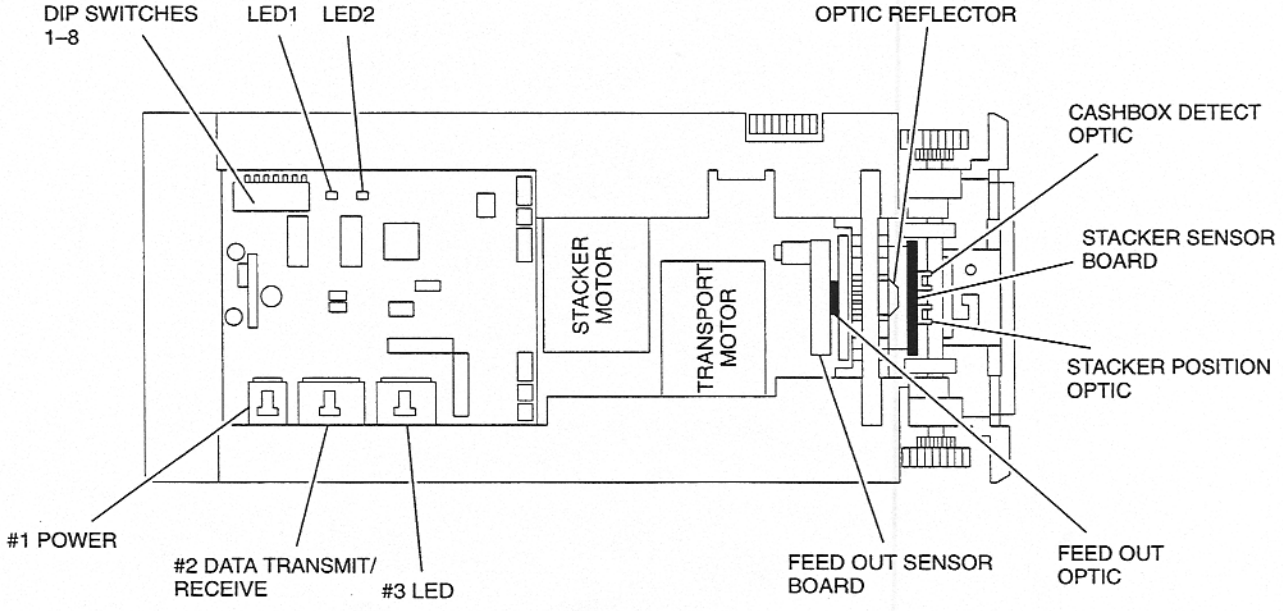
Feed Out Sensor Board, Feed Out Optic & Optic Reflector

Used to detect when a bill has fully passed into the stacker assembly. The sensor optic transmits and receives an IR signal that is reflected back to it. This type is used to conserve space by building the transmit and receive into one unit instead of two (1 transmit and 1 receive optic).

Stacker Sensor Board

Has two optic sensors:

- 1 detects a cash box has been installed
- 2 detects when the stacker has reached its reset position



Notes

TRANSPORT ASSEMBLY – LEFT VIEW

Stacker Position Optic and Stacker Position Flag

The position flag is connected to the stacker motor. It continually monitors and communicates the stacker position to the CPU. When the stacker is full it cannot travel its full range. The optic detects this and sends a stacker full message to the machine.

Stacker Box Gearing

Larger gear reduction because of limited stacker travel.

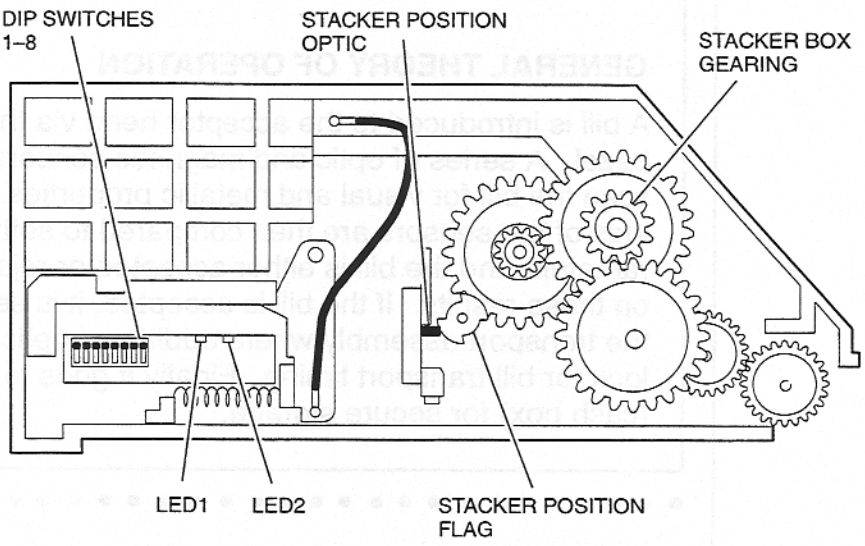
TRANSPORT ASSEMBLY – RIGHT VIEW

Main Connector

Modular connector provides input/output signal path for WBA.

Transport Position Optic and Position Flag

The position flag is connected to transport motor. It monitors transport travel and position at all times. If full travel is not achieved for some reason, it sends a bill jam signal to the machine.



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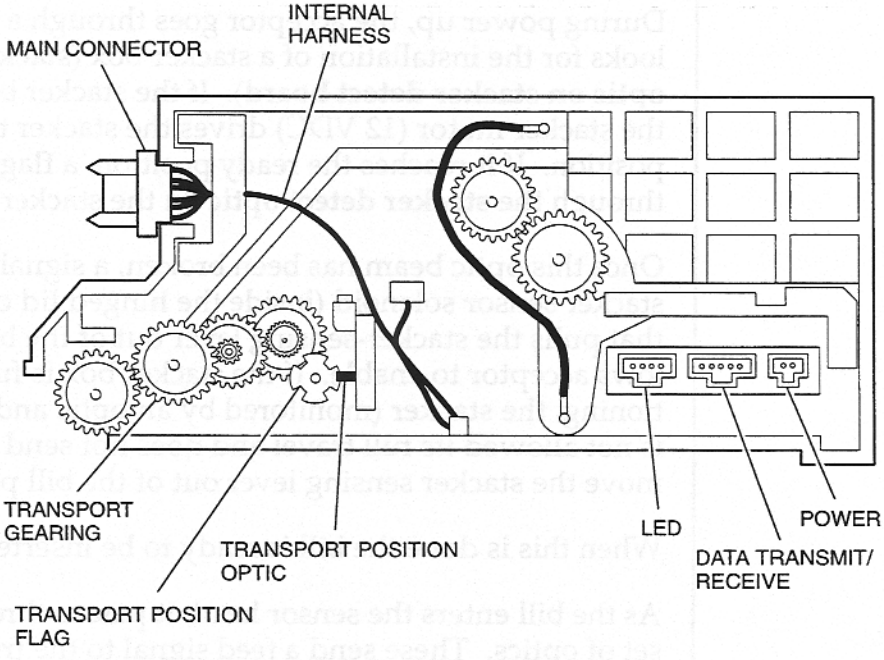

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Notes

GENERAL THEORY OF OPERATION

A bill is introduced to the acceptor head via the acceptor bezel. A series of optic and magnetic sensors detect and scan the bill for visual and metallic properties. The findings of the sensors are then compared to software parameters and the bill is either accepted or rejected based on those results. If the bill is accepted, it is sent through the transport assembly where additional optic sensors look for bill transport timing. Finally it goes to the stacker (cash box) for secure storage.

DETAILED THEORY OF OPERATION

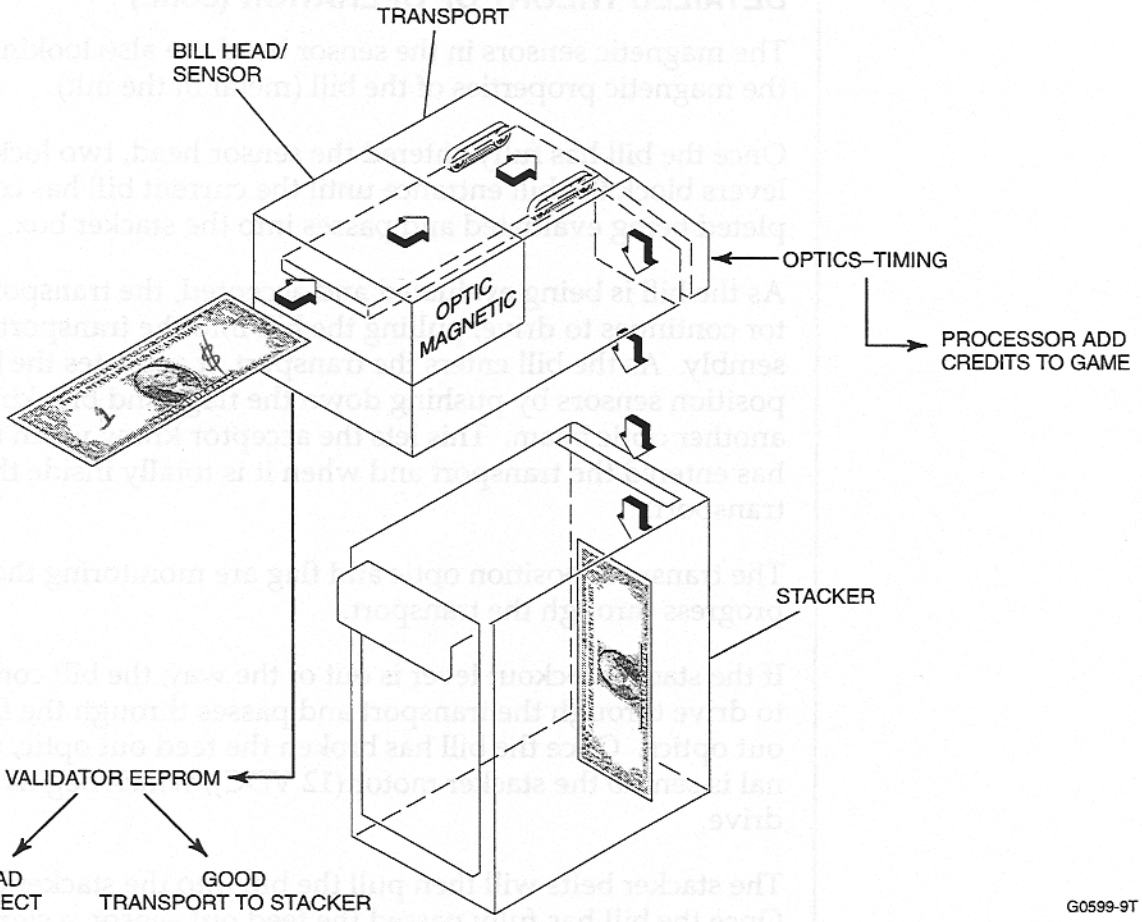
The enable light (normally on the machine door) needs to be on, ensuring that the acceptor has been enabled.

During power up, the acceptor goes through a self test and looks for the installation of a stacker box (**stacker box detect optic on stacker detect board**). If the stacker box is installed, the stacker motor (12 VDC) drives the stacker to its ready position. If it reaches the ready position, a flag is pushed through the **stacker detect optic** on the stacker sensor board.

Once this optic beam has been broken, a signal goes to the stacker sensor solenoid (inside the hinged lid of the stacker) that pulls the stacker-sensing lever out of the bill path and allows acceptor to enable. If the stacker box is full or malfunctioning, the stacker (monitored by an optic and flag assembly) is not allowed its full travel and does not send a signal to move the stacker sensing lever out of the bill path.

When this is done the bill is ready to be inserted.

As the bill enters the sensor head, it passes through the first set of optics. These send a feed signal to the transport motor (12 VDC) which is geared directly to the belts in the sensor head. As the bill is pulled into the sensor, the optic sensors look for reflected and pass-through light at designated points on the bill. The software installed in the acceptor designates these areas. The optic sensors may be looking at a barcode on a coupon, depending on the model of acceptor.


TRANSPORT
BILL HEAD/
SENSOR
OPTIC
MAGNETIC
OPTICS–TIMING
PROCESSOR ADD
CREDITS TO GAME
STACKER
VALIDATOR EEPROM
BAD
REJECT
GOOD
TRANSPORT TO STACKER
G0599-9T

Notes

DETAILED THEORY OF OPERATION (cont.)

The magnetic sensors in the sensor head are also looking for the magnetic properties of the bill (metal in the ink).

Once the bill has fully entered the sensor head, two lockout levers block the bill entrance until the current bill has completed being evaluated and passes into the stacker box.

As the bill is being evaluated and accepted, the transport motor continues to drive, pulling the bill into the transport assembly. As the bill enters the transport, it activates the bill position sensors by pushing down the flags and breaking another optic beam. This lets the acceptor know when the bill has entered the transport and when it is totally inside the transport.

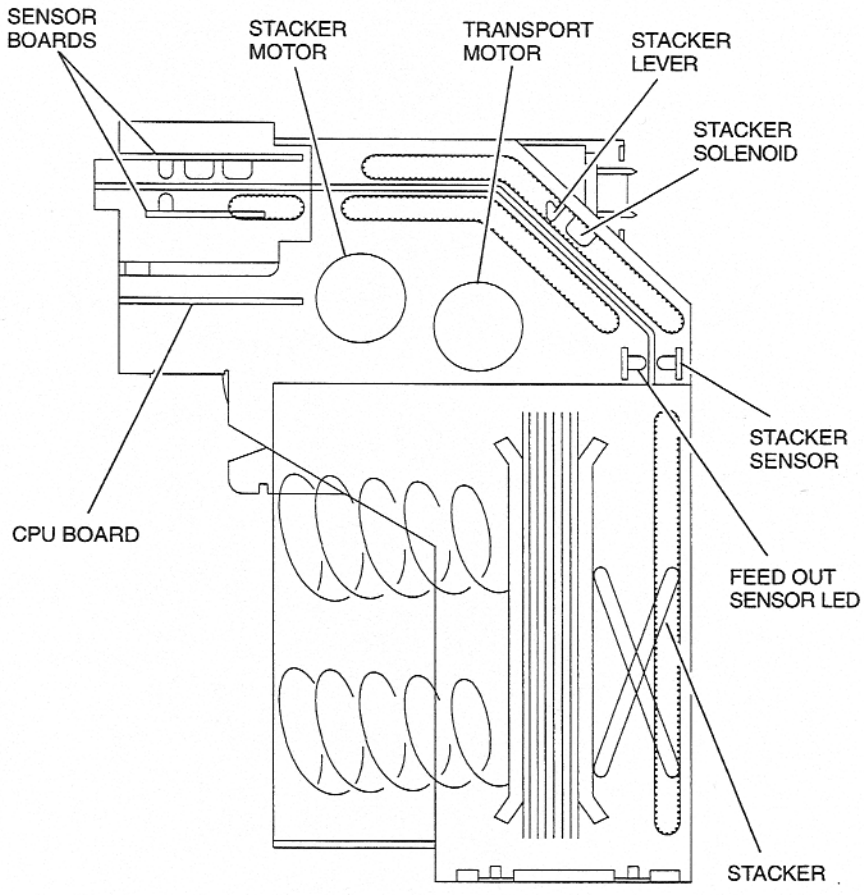
The transport position optic and flag are monitoring the bill's progress through the transport.

If the stacker lockout lever is out of the way, the bill continues to drive through the transport and passes through the feed out optics. Once the bill has broken the feed out optic, a signal is sent to the stacker motor (12 VDC), which begins to drive.

The stacker belts will then pull the bill into the stacker box. Once the bill has fully passed the feed out sensor, a signal will be sent to the machine letting it know the bill has cleared the transport assembly.

Once the bill has been fully pulled into the stacker box (monitored by stacker position optic and flag), it is pushed by the stacker into the stack of bills.

It is important to remember that the optic sensors are monitoring the bill throughout its journey into the stacker. If at any point there is a disruption of the optic timing network, a tilt signal will be sent to the machine and the acceptor will be disabled.


SENSOR BOARDS
STACKER MOTOR
TRANSPORT MOTOR
STACKER LEVER
STACKER SOLENOID
STACKER SENSOR
CPU BOARD
FEED OUT SENSOR LED
STACKER
G0999-42T