

# Section 7

## Pinwheel Hopper

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The hopper is a microprocessor-controlled electromechanical assembly. The major electronic components of the hopper are: a 25 VDC motor that runs when coins are to be paid out, an electronic optical sensor that counts the coins paid out, and an adjustable coin-level probe on the hopper bowl that informs the microprocessor when the coins reach a predetermined level.

Machines have either a pinwheel hopper or a holeywheel hopper. This section covers the pinwheel hopper. Refer to Section 1, Holeywheel Hopper, for information on that style hopper.

Topics covered in this section include:

- **Section 7.1, Pinwheel Hopper Removal and Installation** - provides instructions for removing the hopper from and installing it into the machine.
- **Section 7.2, Pinwheel Hopper Routine Maintenance** - details hopper maintenance procedures such as inspection, cleaning and adjustments.
- **Section 7.3, Pinwheel Hopper Coin Level Adjustments** - describes procedures for setting the appropriate hopper probe levels and filling the hopper.
- **Section 7.4, Pinwheel Hopper Bowl Disassembly and Assembly** - covers hopper bowl components and provides disassembly and assembly procedures for the hopper bowl.
- **Section 7.5, Pinwheel Hopper Motor Removal and Installation** - provides removal and installation procedures for the hopper motor.
- **Section 7.6, Pinwheel Hopper Main Housing Disassembly and Assembly** - details hopper main housing components and provides disassembly and assembly procedures for the main housing.

- **Section 7.7, Pinwheel Hopper Chassis Disassembly and Assembly** - describes the components that make up the hopper chassis, as well as disassembly and assembly-procedures.
- **Section 7.8, Pinwheel Hopper Functional Verification** - describes functional verification procedures to ensure proper operation.



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## 7.1 Pinwheel Hopper Removal and Installation

The hopper needs to be removed from the machine for inspection, cleaning and adjustment. To remove the hopper from the lower module, and for installation instructions, see Figure 7-1 and proceed as follows.

### Removal

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

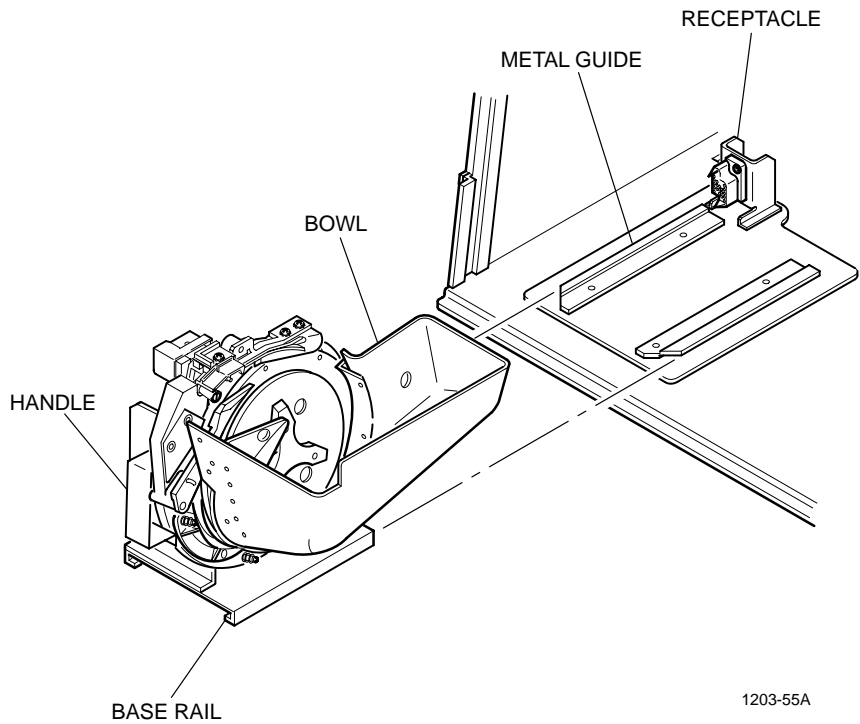


Figure 7-1. Typical Hopper Removal.



## *Installation*

1. Align the hopper base rails with the metal guides on the lower module and slide the hopper into the machine enclosure.
2. Make sure the hopper is firmly plugged into the hopper receptacle.
3. Turn the **power on**; close and lock the machine door.



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## 7.2 Pinwheel Hopper Routine Maintenance

These steps identify the areas that require inspection and adjustment. Refer to Section 7.4 and the applicable parts manual to identify hopper bowl components. Refer to Table 7-1 for preventive maintenance information.

### *Inspection*

1. Inspect the optic sensor for clean surfaces and any damage. Confirm that it is fastened securely. Refer to Section 7.6 for for an illustration showing the optic sensor location.
2. Inspect the knife blade for damage and check to see that the knife tip rests lightly against the shelfwheel and the pinwheel. Refer to Section 7.2.1 for hopper knife adjustment. Make certain the knife is fastened securely.
3. Check the metal coin wiper at the top of the main housing for correct height and confirm that the wiper is fastened securely. Refer to Section 7.2.1 for correct clearance.
4. Confirm that the coin level probe is straight and fastened securely.
5. Inspect the bowl for damage. Verify that the metal baffle is tight and that the four compression springs that secure the bowl are tight. Refer to Section 7.4 as needed.



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<b>Table 7-1 Pinwheel Hopper Preventive Maintenance</b>			
<b>Maintenance Item</b>	<b>Service Interval (Months)*</b>		
	<b>1</b>	<b>3</b>	<b>6</b>
Bowl			C
Metal Coin Wiper			A
Polyurethane Coin Wiper	C		
Optic Sensor	C		
Coin Level Probe			C
Knife	C & A		
* C = Clean & Inspect    A = Adjust			

## Cleaning

The following information describes hopper cleaning procedures. Refer to Table 7-1 for cleaning recommendations. Refer to the applicable mechanical parts manual for exploded view illustrations to identify hopper components.

1. Turn the **power off** before starting any cleaning procedure.

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**Note:** *The optic sensor assembly may vary in some hoppers. The following instructions are intended as a general procedure when cleaning the optic sensor.*

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2. Clean the inner surfaces of the optic coin sensor using a cotton swab soaked in isopropyl alcohol.
3. Wipe the sensor dry with a lint-free cloth.
4. Clean the probe (brass screw) using a stiff short-haired brush and isopropyl alcohol.
5. Clean the inside of the bowl with compressed air (not to exceed 60 psi) and remove any foreign objects.

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

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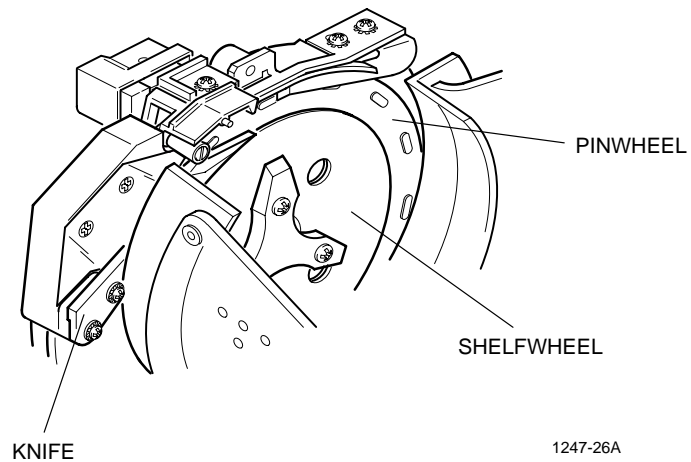
## 7.2.1 Pinwheel Hopper Adjustments

The following information describes hopper adjustment procedures.

### *Knife Adjustment*

See Figure 7-2 and proceed as follows.

1. Loosen the screws that secure the knife in place.
2. Position the tip of the knife against the pinwheel face and the top of the shelfwheel.
3. Lightly hold the knife in place and tighten the screws.



**Figure 7-2. Hopper Knife Adjustment.**



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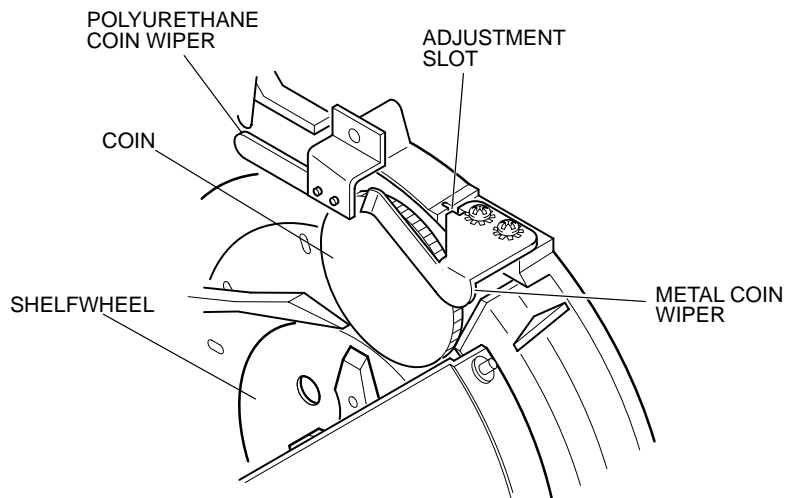
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## Metal Coin Wiper (Large Coin)

The metal coin wiper on pinwheel hoppers may require occasional adjustment. Hoppers that accept large coins use a metal coin wiper and a polyurethane coin wiper.

To adjust the metal coin wiper on dollar and other large-coin hoppers, see Figure 7-3 and proceed as follows.

1. Slightly loosen the screws that secure the metal coin wiper.
2. Place a coin of the correct denomination on the edge of the shelfwheel under the tip of the metal coin wiper.
3. Insert a small flat-blade screwdriver into the adjustment slot at the top of the metal coin wiper and housing.
4. Twist the screwdriver until the tip of the metal coin wiper almost touches the edge/surface of the coin. Leave a very small gap between the wiper and the coin to accommodate coins of the same denomination that may be slightly thicker.
5. Lightly hold the coin wiper in place and tighten the screws, taking care not to change the coin wiper position.



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**Figure 7-3. Hopper Metal Coin Wiper Adjustment – Large Coin.**

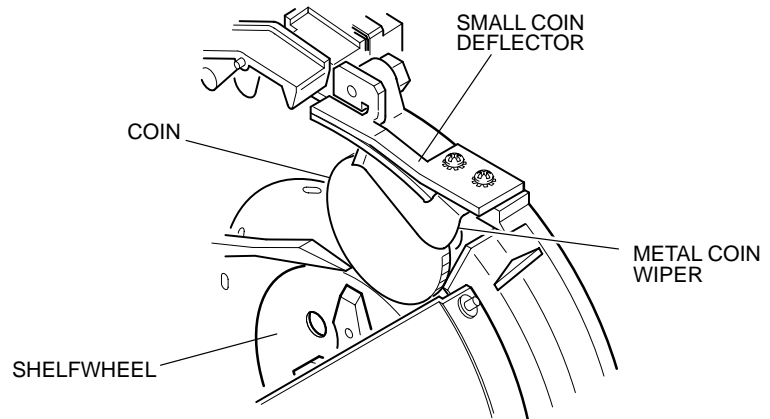


## *Metal Coin Wiper (Small Coin)*

The metal coin wiper on pinwheel hoppers may require occasional adjustment. Hoppers that accept small coins use a metal coin wiper and a small coin deflector.

To adjust the metal coin wiper on small coin hoppers, see Figure 7-4 and proceed as follows.

1. Slightly loosen the screws that secure the metal coin wiper.
2. Place a coin of the correct denomination on the edge of the shelfwheel under the tip of the metal coin wiper.
3. Lightly hold the coin wiper in place and tighten the screws until the metal coin wiper is touching the coin.



**Figure 7-4. Hopper Metal Coin Wiper Adjustment – Small Coin.**



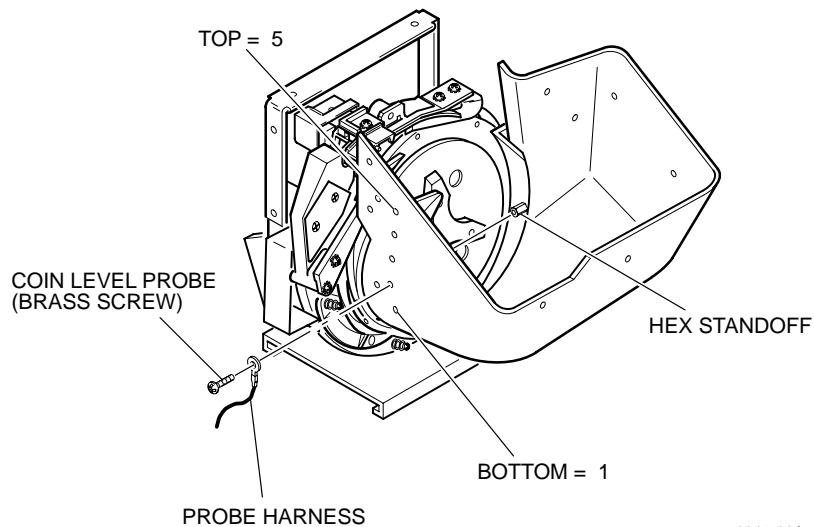
## 7.3 Pinwheel Hopper Coin Level Adjustments

The coin level probe on the hopper bowl informs the microprocessor of the approximate coin levels of the hopper bowl.

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

See Figure 7-5 and use the procedure that follows to set the appropriate hopper probe level.

1. Hold the probe (brass screw) with the screwdriver.
2. Remove the hex standoff from the inside of the bowl.
3. Remove the probe (brass screw) from the bowl and re-insert it into the appropriate hole location.
4. Fasten the probe (brass screw) to the bowl with the hex standoff. **Do not** overtighten.
5. Fill the hopper with a desired number of coins.



**Figure 7-5. Hopper Probe Levels.**

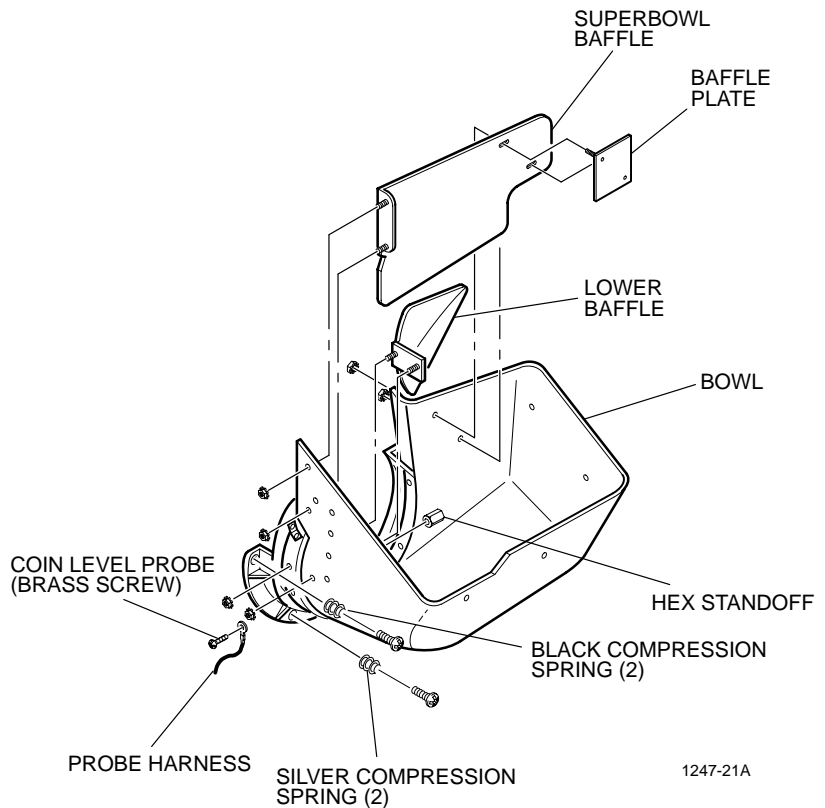


## 7.4 Pinwheel Hopper Bowl Disassembly and Assembly

The components that make up the hopper bowl include the bowl, the baffle and the coin level probe. See Figures 7-6 and 7-7 and use the following procedure to disassemble and assemble the hopper bowl.

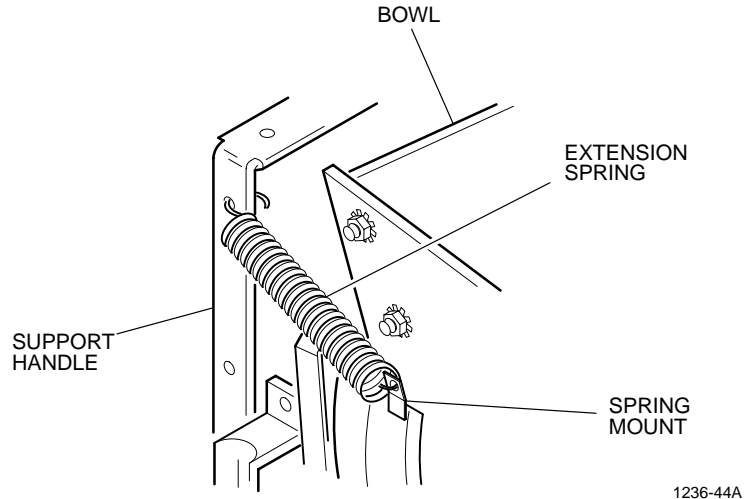
### *Disassembly*

1. Open the machine door and turn the **power off**.
2. Firmly grip the hopper handle with one hand and support the hopper bowl with the other hand. Do not use the hopper bowl for a handle.
3. Pull the hopper straight out from the machine enclosure, taking care not to spill any coins.
4. Empty the coins out and place the hopper on a flat surface.



**Figure 7-6. Pinwheel Hopper Bowl Components.**





**Figure 7-7. Extension Spring Location.**

5. Remove the hex standoff from the probe (brass screw) on the inner left side of the bowl and remove the probe.
6. Remove the nuts that fasten the baffle to the lower left side of the bowl.
7. Remove the four compression springs that fasten the bowl to the main housing and remove the hopper bowl from the main housing.

## Assembly

1. Align the four mounting holes on the bowl with the four mounting posts on the main housing and fit the components together.
2. Thread the heavier gauge (black) compression springs into the upper left and right mounting posts. **Do not** tighten at this time.
3. Thread the lighter gauge (silver) compression springs into the lower left and right mounting posts.
4. Tighten all four compression spring screws securely.
5. Secure the baffle to the inner left side of the bowl, mounting flange facing away from the main housing.
6. Insert the probe (brass screw) and the probe harness into one of the five probe holes located on the left side of the bowl.



7. Thread the hex standoff onto the probe (brass screw) and hand tighten.
8. Position the probe harness so it points toward the main housing and tighten the hex standoff securely.



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## 7.5 Pinwheel Hopper Motor Removal and Installation

The 25 volt DC hopper motor assembly is a replaceable unit. IGT does not recommend disassembly of the motor and its components. To remove or replace the hopper motor, see Figure 7-8 and proceed as follows.

### Removal

1. Disconnect the harness from the motor controller board.
2. Disconnect the grounding harness at the lower left corner of the motor (as shown) and remove the nut for use on the replacement motor.

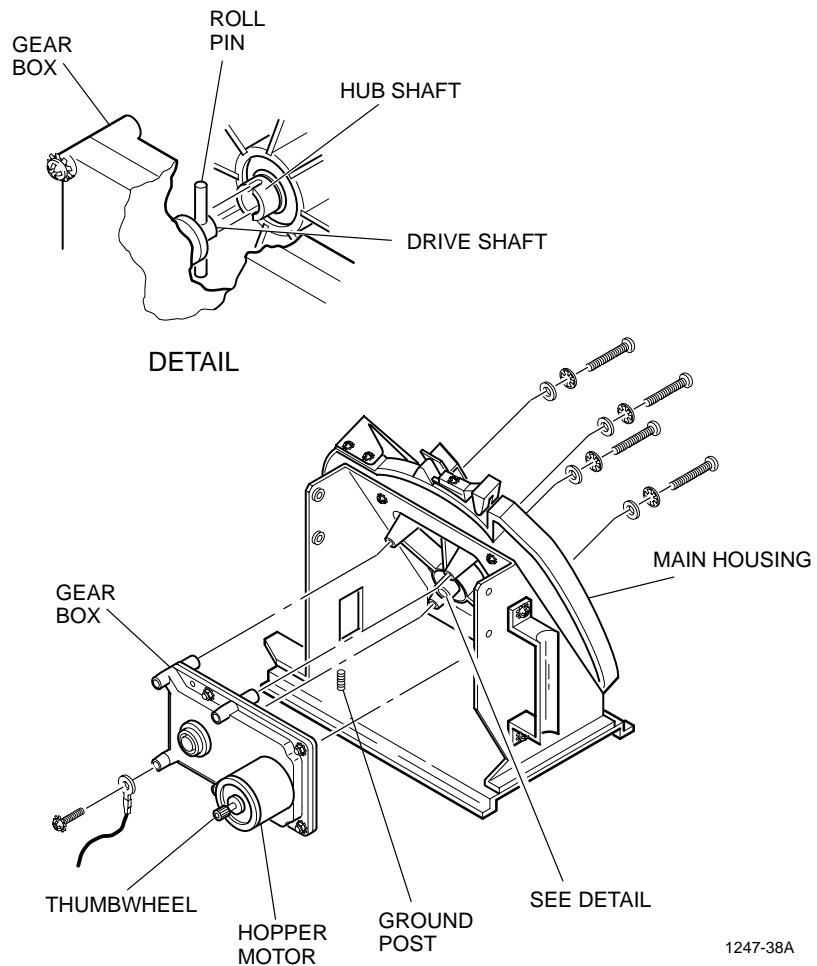


Figure 7-8. Hopper Motor.



3. Rotate the thumbwheel on the end of the motor shaft until the four access holes in the hub align with the screws.
4. Hold the motor in place and remove the screws, starlock washers and flat washers that fasten the motor to the main housing.
5. Remove the motor from the hopper assembly.

## Installation

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

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1. Align the drive shaft and roll pin with the hub shaft on the main housing. Fit the pin into the notches on either side of the hub shaft.
2. Press the motor drive shaft into the hub shaft and rotate the motor until the four mounting posts of the main housing and motor align.
3. Hold the motor in place and rotate the thumbwheel until the access holes align with the motor mounting holes.
4. Fasten the motor to the main housing by starting each of the screws, starlock washers and flat washers. **Do not** tighten until all four screws are started.
5. Tighten two of the screws that are located diagonally from each other by alternating between the two screws every two or three turns until the gearbox fits tightly against the main housing and the roll pin fits completely into the hub shaft.
6. Securely tighten the remaining two mounting screws and double check the tightness of the first two.
7. Fasten the grounding harness to the lower left corner of the motor.
8. Connect the motor harness to the motor controller board.

Refer to Section 7.1 for hopper installation procedures.



## 7.6 Pinwheel Hopper Main Housing Disassembly and Assembly

The components that make up the pinwheel main housing include a knife, coin wipers, an optic sensor, counter assembly and a pinwheel/shelfwheel assembly. To disassemble or assemble the hopper main housing, see Figure 7-9 and proceed as follows.



### Disassembly

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1. Remove the hopper bowl and motor from the main housing (refer to Sections 7.4 and 7.5).

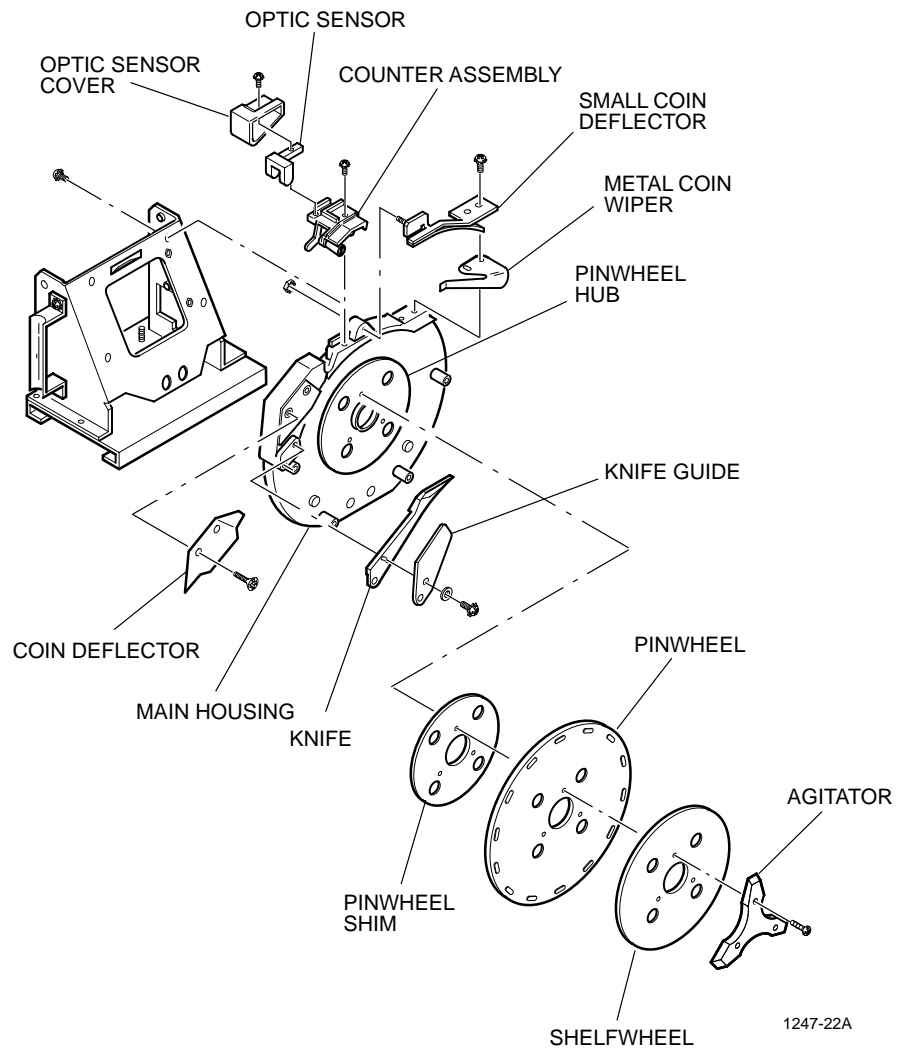


Figure 7-9. Pinwheel Hopper Main Housing.

2. On dollar and other **large-coin machines**, remove the screws that fasten the metal coin wiper to the top of the main housing. Remove the nut to remove the polyurethane coin wiper. On **small-coin machines**, remove the screws and the nut that secure the metal coin wiper and the small coin deflector to the top of the main housing.
3. Disconnect the coin-out sensor harness from the motor controller board on the rear left side of the chassis and unfasten the ground wire and lug from the grounding post on the chassis base by removing the nut.
4. Remove the screws and flat washers that secure the knife to the main housing and remove the knife and knife shim(s) if present.
5. Remove the screws that secure the optic sensor cover, optic sensor and counter assembly to the top of the main housing and remove these components.
6. Remove the screws that secure the coin deflector to the main housing and remove the deflector.
7. Remove the screws that secure the agitator, shelfwheel, pinwheel and shim(s) to the pinwheel hub and remove these components.
8. Remove the screws, located on the back of the chassis, that hold the main housing in place. Lift the main housing and pinwheel hub off the chassis.

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**Note:** *The hub should not be removed from the main housing. If a problem occurs, replace the entire assembly.*

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## Assembly

1. Secure the housing, with pinwheel hub facing outward, to the chassis with flat washers, starlock washers and screws.
2. Place the shim(s), pinwheel and shelfwheel onto the pinwheel hub and align the three mounting holes with those in the hub. The four motor mounting holes should line up as well.
3. Align the three mounting holes in the agitator with those on the shelfwheel and secure the agitator, shelfwheel, pinwheel and shim(s) to the pinwheel hub with screws and tighten securely.



4. Rotate the pinwheel counterclockwise and check that the pinwheel surface is slightly above or flush with the coin-out area on the main housing. If necessary, install shims between the pinwheel hub and the pinwheel to adjust for the correct height.
5. Secure the coin deflector to the main housing with the flat head screws.
6. Secure the counter assembly, optic sensor and optic sensor cover to the top of the main housing.
7. Secure the knife and knife shim(s) if present to the main housing with the flat washers and screws.
8. Connect the coin-out sensor harness to the motor controller board on the rear left side of the chassis and fasten the ground terminal to the grounding post on the chassis base with the nut.
9. On dollar and other **large-coin machines**, install a polyurethane coin wiper on the top of the main housing. Install a metal coin wiper on the top of the main housing. On **small-coin machines**, place the metal coin wiper and the small coin deflector over the top of the main housing and secure with screws.



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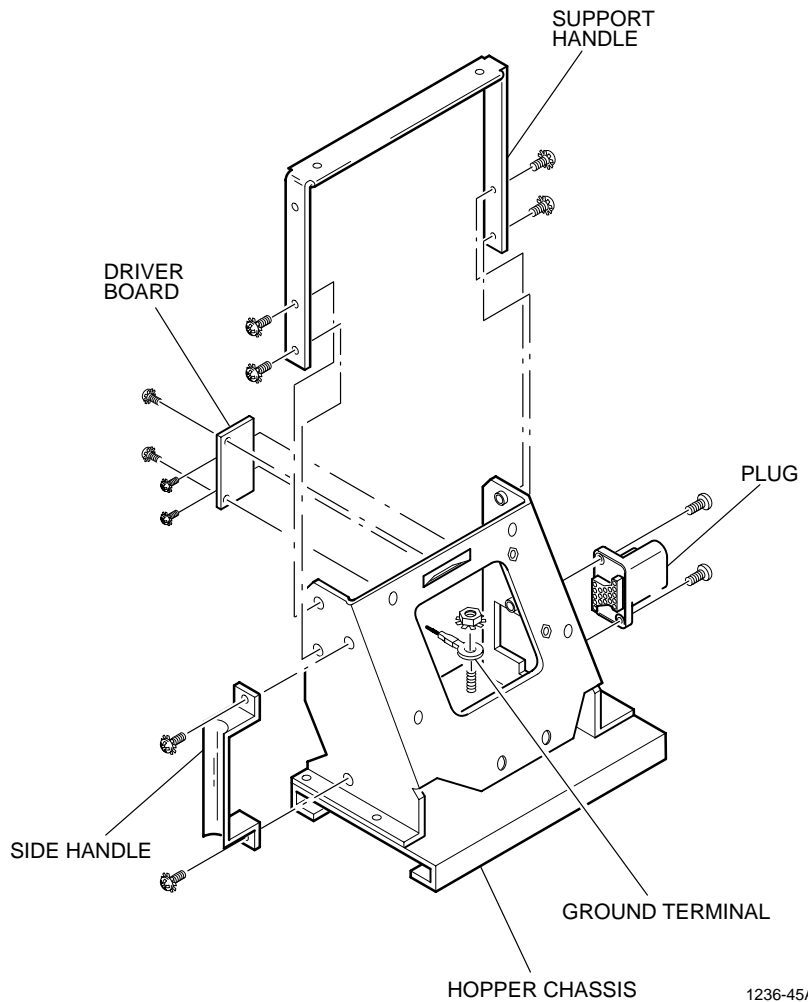
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## 7.7 Pinwheel Hopper Chassis Disassembly and Assembly

The components that make up the hopper chassis include the hopper plug, the driver board and the handle. To disassemble or assemble the hopper chassis, see Figure 7-10 and proceed as follows.

### *Disassembly*

1. Remove the ty-rap that secures the coin-out sensor harness to the top of the chassis.



**Figure 7-10. Pinwheel Hopper Chassis.**



2. Note all harness locations before disconnecting them from the driver board.
3. Disconnect the ground terminal from the ground post on the chassis base by removing the nut.
4. Disconnect the probe harness from the coin-level probe on the side of the hopper bowl by removing the probe (brass screw) and hex standoff.
5. Remove the hopper bowl, motor and main housing.
6. Remove the screws that secure the hopper 19-pin plug to the hopper chassis and remove the plug.
7. Remove the screws that secure the handle to the side of the hopper chassis and remove the handle.
8. To remove the driver board, remove the screws that secure the driver board to the hopper chassis.



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## Assembly

1. To install a driver board onto the hopper chassis, place the board into the back of the chassis and align the two mounting holes on the driver board with the two mounting studs on the back of the chassis, and the two mounting holes on the side of the driver board with those in the side of the chassis. Secure the driver board to the back of the chassis and to the side of the chassis.
2. Secure the handle to the side of the hopper chassis.
3. From the outside of the hopper chassis, secure the 19-pin plug, ground pin toward the bottom, to the chassis.
4. Fasten the main housing to the chassis and the motor and hopper bowl to the main housing.
5. Connect the probe harness for the coin-level probe on the left side of the hopper bowl by securing it in place with the probe (brass screw) and hex standoff.
6. Connect the ground terminal to the ground post on the chassis base.
7. Plug all harnesses into the hopper driver board.
8. Secure the coin-out sensor harness to the top of the hopper chassis using a small ty-rap. Use small wire cutters to remove the excess ty-rap.

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## 7.8 Pinwheel Hopper Functional Verification

1. Fill the hopper with the desired number of coins and turn the machine **power on**. Close and lock the machine door.
2. Refer to the *Game Software: Vision Slot Products* manual to perform the following procedures:
  - **Inputs** – to verify correct operation of the coin level probe and hopper motion sensor
  - **Hopper Test** – to verify correct operation of the hopper motor and optic sensor



