

## COIN COLLECTORS

### PREPAY — MAINTENANCE

#### TWO-COIL COIN RELAY

#### 1. GENERAL

**1.01** This section covers specific items of maintenance required for prepay coin collectors arranged for 10-cent operation. These items cover the two-coil coin relay and coin hopper (see Fig. 1 and 2). In addition, see section on general maintenance of coin collectors.

**1.02** This section is reissued to show that the KS-7994 and P-349486 coin relay shields are rated Manufacture Discontinued (MD). Use the P-16A336 coin relay shield for all replacements.

#### 2. PRECAUTIONS

*Caution 1: Remove handset from switch-hook before removing or reassembling upper housing of a coin collector equipped for 10-*

*cent operation. This reduces possibility of damage to the gate operating arm.*

*Caution 2: Do not reassemble upper housing on prepay coin collectors without a P-349486 (MD), KS-7994 (MD), or P-16A336 shield over relay.*

#### 3. TOOLS AND GAUGES

**3.01** The following tool and gauges are needed in addition to those required for general maintenance:

- 146A Gauge—Bias margin test
- 147A Gauge—Trap and vane release test and ground contact-spring force test
- KS-14995—Coin collector tool for trap and vane release test

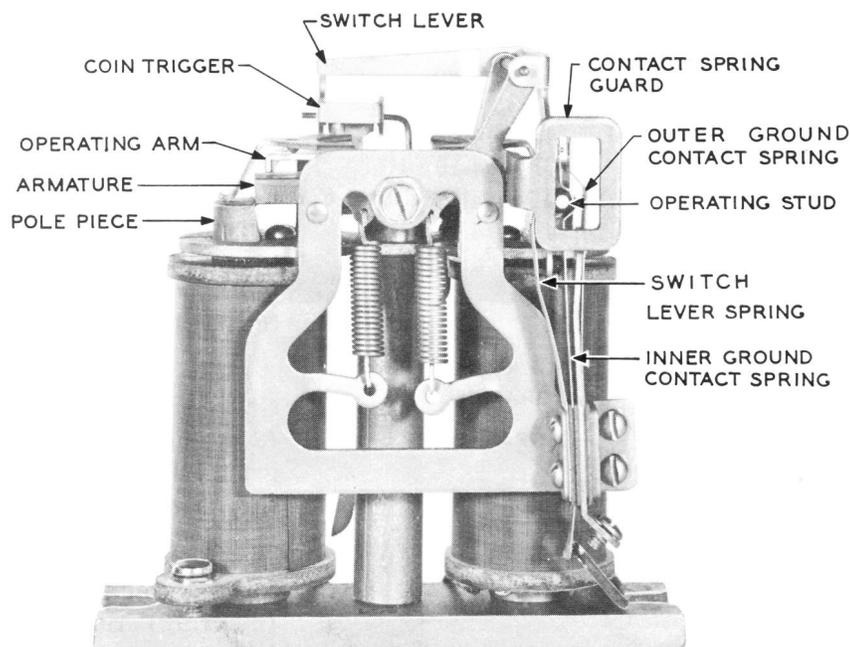


Fig. 1 — P-145749 Coin Relay

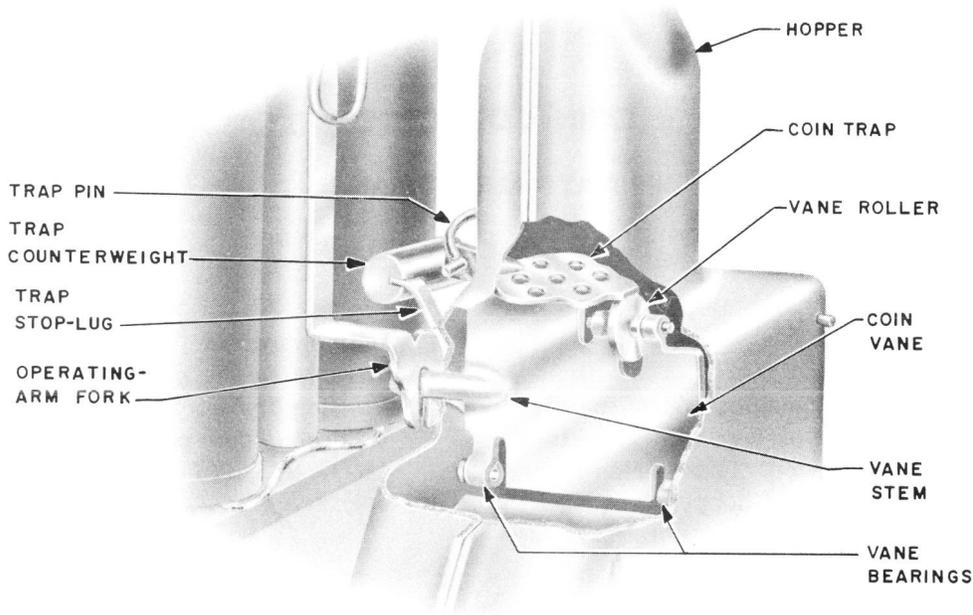


Fig. 2 — Hopper and Rear of Coin Relay

4. COIN RELAY AND COIN HOPPER TESTS

4.01 Do not make any adjustment or modification of coin relay or hopper other than those specified below. With coin relay shield removed, make the following tests:

Ground contact springs	4.02, 4.03
Dial shorting contact springs	4.04, 4.05
Trap and vane release test	4.06, 4.07
Bias margin test	4.08, 4.09
Cleaning coin relay	4.10
Replacing coin relay	4.11, 4.12, 4.13
Replacing coin trap	4.14, 4.15, 4.16
Replacing coin shield	4.17

Ground Contact Springs, P-145749 and D-96590 Relays

4.02 Check ground contact spring force for the P-145749 (2-spring) relay and D-96590 (3-spring) relay as follows:

- (1) With ground lead connected to coin collector, place required gram slot of 147A gauge on horizontal portion of switch lever.
- (2) Connect hand test set across line terminals of coin collector, and trip coin trigger. Dial tone will be heard in dial areas, or operator will answer in manual areas. If not, proceed as follows:
- (3) Ground contact-spring force for P-145749 (2-spring) relays should be a minimum 5 grams measured with the 147A gauge as shown in Fig. 3.
- (4) Ground contact-spring force for D-96590 (3-spring) relays should be minimum 3 grams measured with 147A gauge 3-gram slot as shown in Fig. 3. Contact requirements are as follows:

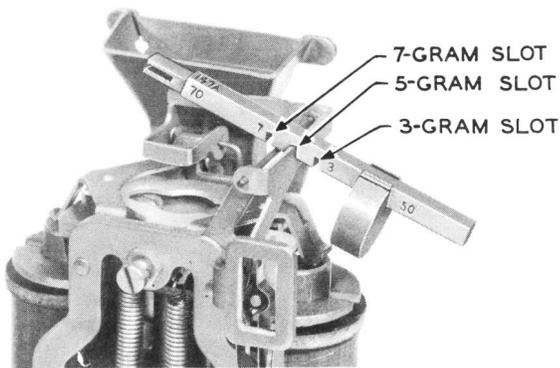
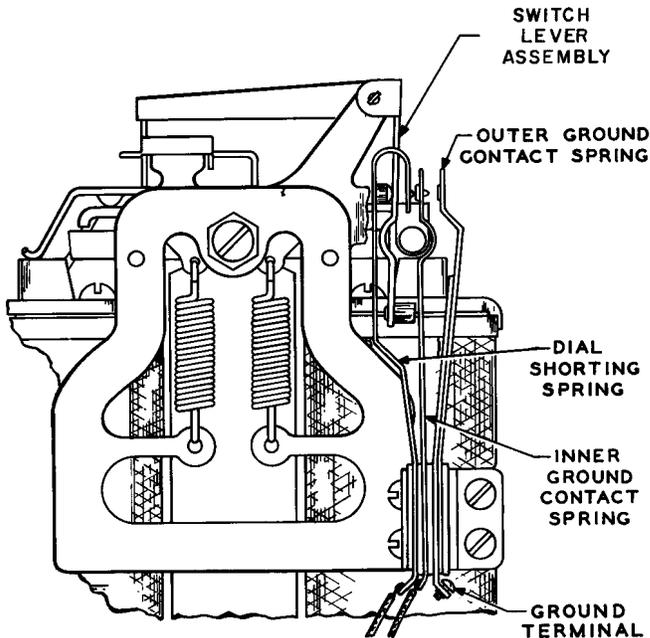


Fig. 3 — Gauge for Ground Contact Spring Force



**Fig. 4 – D-96590 Dial Shorting Relay,  
3-Spring (Guard Cut Away)**

- (a) If contacts are open, force is less than minimum required. Replace relay.
- (b) If contacts touch but test open, burnish contacts with 265C tool.
- (c) If dial tone is not heard after burnishing contacts, short-circuit ground contact springs.
- (d) If dial tone is heard when contact springs are shorted, replace relay.
- (e) If dial tone is not heard when contact springs are shorted, test for open relay coil or trouble in station ground or line circuit.

#### Ground Contact Springs, P-10C117 Relay

**4.03** Check ground contact-spring force for the P-10C117 (4-spring) relay as follows:

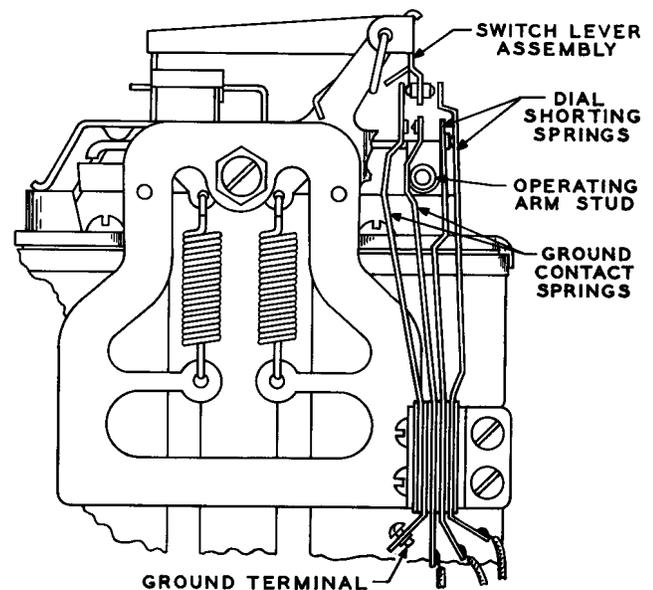
- (1) Ground contacts shall have perceptible follow. Observe while raising switch lever slowly by hand from its tripped position.

**Note:** Do not use 147A gauge for checking ground contact-spring force on this relay.

- (2) Connect hand test set across line terminals of coin collector, and trip coin trigger. Dial tone will be heard in dial areas, or operator will answer in manual areas. If not, proceed as follows:
  - (a) If contacts have perceptible follow but test open, burnish contacts with 265C tool.
  - (b) After burnishing contacts, if dial tone is not heard, short-circuit ground contact springs.
  - (c) If dial tone is heard when contact springs are shorted, replace relay.
  - (d) If dial tone is not heard when contact springs are shorted, test for open relay coil or trouble in station ground or line circuit.

#### Dial Shorting Contact Springs

**4.04** With coin trigger and operating arm in normal unoperated positions, dial shorting contact springs should have perceptible follow. With coin trigger tripped, they should be open; judge visually. (See Fig. 4 and 5.)



**Fig. 5 – P-10C117 Dial Shorting Relay,  
4-Spring (Guard Cut Away)**

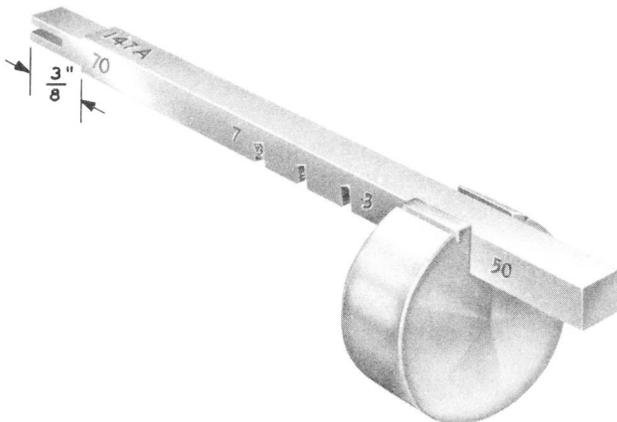


Fig. 6 - 147A Gauge

**4.05** Dial shorting contacts should shunt dial pulsing contacts when coin trigger is in normal position. With ground lead connected, check as follows:

- (1) Provide ground on line by strapping around ground contact springs:
  - On D-96590 (3-spring) relays, strap ground terminal to **tip** side of line.
  - On P-10C117 (4-spring) relays, strap ground terminal to **right** coil terminal.
- (2) Make sure that coin trigger is **not** tripped.

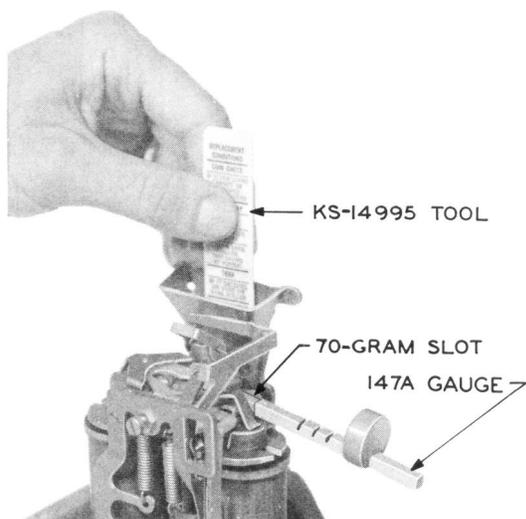


Fig. 7 - Trap and Vane Release Test

- (3) Place upper housing on coin collector and wait for dial tone.
- (4) When dial tone is heard, dial any digit except 1. Dial tone should not be broken.
- (5) If dial tone is not broken, **remove strap** and proceed with remaining tests.
- (6) If dial tone is broken, dial shorting contacts are not shunting dial. Clean contacts and recheck follow of dial shorting springs. Check wiring and transfer spring contacts for continuity.

**Trap and Vane Release Test**

*Note:* At manual stations, disconnect ground from coin relay while making this test.

**4.06** Trap, vane, and relay should restore fully to their unoperated positions against a torque of 70 gram-inches applied to relay operating arm with a 147A gauge (see Fig. 6 and 7). Test as follows:

- (1) Remove shield from relay.
- (2) Apply slot 70 of 147A gauge to right rear horizontal portion of relay operating arm. Make sure that enclosed end of slot is against edge of operating arm and that weight on gauge is positioned up, as shown in Fig. 7.
- (3) Press down on 147A gauge to operate relay and vane to limits of their travel.
- (4) Insert KS-14995 coin collector tool into throat of hopper to operate trap to the limit of its travel. Hold in place as shown in Fig. 7.
- (5) Release pressure on 147A gauge.
- (6) Slowly withdraw KS-14995 tool. Take at least 5 seconds.

- (7) Be sure that vane and relay return to their unoperated positions.
- (8) Make test three times with gauge on right (collect) side and three times on left (refund) side.

**4.07** If the mechanism fails, remove relay and proceed as follows:

- (1) If hopper is equipped with a brass coin vane, replace coin collector.
- (2) Check vane for binding on its bearings as follows:
  - (a) Hold vane almost vertical but slightly to the right.
  - (b) Vane should drop to fully operated refund position (right) when released.
  - (c) Hold vane almost vertical but slightly to left.
  - (d) Vane should drop to fully operated collect position (left) when released.
  - (e) If vane binds on its bearings, replace coin collector.
- (3) Check vane for binding on hopper as follows:
  - (a) Holding vane stem as far forward as possible, move vane over its full travel in each direction three times. Make sure that it does not scrape on front of hopper.
  - (b) Push vane to rear of hopper and move vane over its full travel in each direction. Make sure that it does not scrape on back of hopper. Do not push hard enough to distort hopper.
  - (c) If vane binds on hopper, replace coin collector.

- (4) Check trap for catching on vane or on vane roller as follows:
  - (a) Hold vane in fully operated collect position (to the left) using left hand.
  - (b) With the right hand, lift trap counterweight to its fully operated position.
  - (c) Move vane slowly until it engages trap.
  - (d) Continue moving vane toward vertical position while gently restraining trap. Vane should move smoothly to vertical position.
  - (e) Repeat test on refund side (to the right), reversing use of hands. If trap catches on vane or vane roller, replace trap as covered in 4.14 through 4.16 and repeat test. If replacement trap still catches, replace coin collector.
- (5) Check clearance between trap and vane roller as follows:
  - (a) With trap in unoperated position, place a finger lightly on counterweight.
  - (b) Move vane to vertical position. If vane rubs on trap, adjust trap stop lug so that trap will just clear vane (Fig. 2).
  - (c) With vane in vertical position, lift trap counterweight. Trap should not move more than a few degrees before touching vane roller. Adjust by bending stop lug. (See Fig. 2.)
- (6) Check operating arm fork and vane stem for roughness. Clean and lubricate as covered in 4.10. Also check operating stud. If stud is rough or roller type, replace relay.
- (7) Remount coin relay as covered in 4.11 and repeat trap and vane release test. If mechanism fails, replace relay.

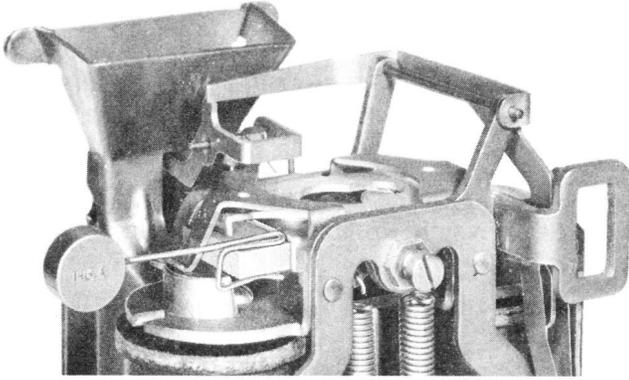


Fig. 8 – Bias Margin Test

**Bias Margin Test**

*Note:* Make bias margin test only if relay fails to operate or operates in wrong direction.

**4.08** Relay should operate against torque of a 146A gauge attached to armature in both collect and refund directions when appropriate central office coin battery is applied. Test as follows:

- (1) To test in collect direction, place a 146A gauge on left side of armature (see Fig. 8).
- (2) Connect hand test set across line terminals.
- (3) Trip coin trigger (see 4.09).

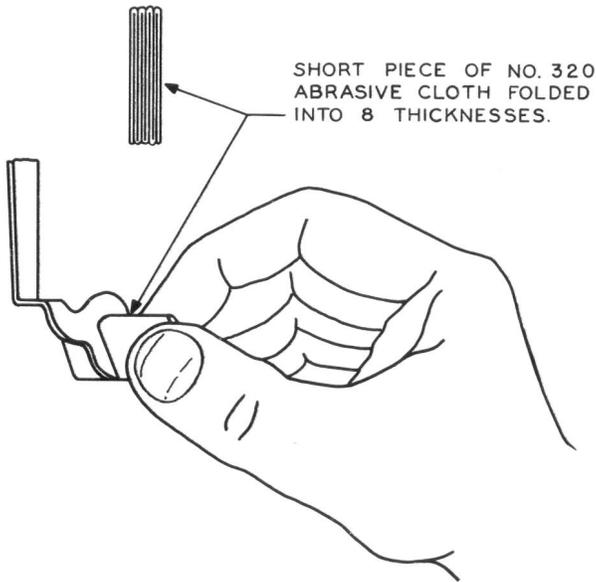


Fig. 9 – Polishing of Fork Slot

- (4) Obtain collect current by any available local arrangement. Relay should operate to collect (lifting gauge) and trigger should restore. Make test three times (see 4.09).
- (5) To test in refund direction, place 146A gauge on right side of armature.
- (6) Trip coin trigger.
- (7) Obtain refund current. Relay should operate to refund (lifting gauge) and trigger should restore. Make test three times.
- (8) If relay fails to operate in the correct direction or if trigger fails to restore, check for and remove magnetic particles or replace relay.

*Note:* Make sure that line and ground are satisfactory and that coin battery is being applied.

**4.09** When coin trigger is tripped, ground contact springs should close and remain closed without break while armature is moved from its normal to its fully operated position. It is immaterial at what point on return stroke contacts open.

**Cleaning Coin Relay**

**4.10** If relay has been removed for any reason, proceed as follows:

- (1) Clean and lubricate fork and vane stem as follows:
  - (a) Surfaces of fork slot should be smooth. If bearing surfaces of fork are so rough that they cannot readily be made smooth, replace relay. Otherwise, smooth rough spots using No. 320 or finer abrasive cloth folded as shown in Fig. 9.
  - (b) Clean with a KS-2423 cleaning cloth moistened with KS-7860 petroleum spirits.

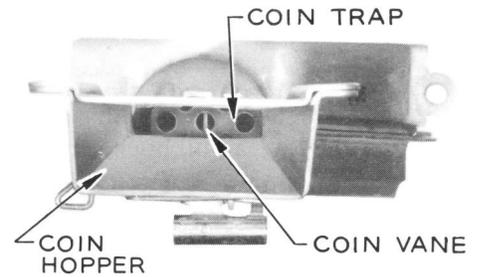
- (c) Apply graphite from grade 2B or softer lead pencil to bearing surfaces of fork slot. Rub lead on these surfaces to deposit as continuous a coating as possible.
- (2) Remove magnetic particles from adjacent surfaces of armature, pole pieces, and top of magnet with rubber tape or equivalent. To remove particles:
- Place a piece of rubber tape about 1 inch long on top of pole piece on left side of relay with at least 1/4 inch extending into airgap under armature. Press down on armature until it squeezes rubber tape. Discard tape with embedded magnetic particles.
  - Repeat operation on right side with a new piece of rubber tape.
  - Use tape folded over orange stick to remove particles from top of magnet.

#### Replacing Coin Relay

**4.11** When mounting relay center it so that with operating arm in its normal vertical position, fork slot engages vane stem and holds coin vane in a vertical position. Full thickness of coin vane is visible in the center hole of coin trap (Fig. 10). If relay cannot be centered, replace relay. If replacing relay cannot be centered, replace coin collector.

**4.12** Coin trigger should not touch upper end of slot in hopper or bind on sides of slot at any point of travel.

**4.13** Place relay as close as possible to hopper. There should be at least 1-1/16 inch clearance between fork and hopper, between vane stem and relay, and between trap counterweight and relay.



**Fig. 10** – Position of Vane when Relay Is Centered

#### Replacing Coin Trap

**4.14** Relay must be removed to replace coin trap.

**4.15** Coin traps in later style hoppers may be replaced through front of hopper without removing coin shield.

**4.16** To replace coin trap in *earlier* style hoppers:

- Remove coin return shield, if present, by inserting blade of a cabinet screwdriver in loop of pin. Twist screwdriver sufficiently to release end of pin from hole in hopper. Slowly pull shield and pin out together.
- Move vane to the right.
- Fasten a piece of string or wire to trap counterweight.
- Remove trap pin by lifting right end of loop and sliding pin to the left.
- Push trap into hopper and allow it to drop into coin return.
- Fasten string or wire to new trap and pull trap up to slot in front of hopper.
- Position new trap with bearing lugs uppermost and assemble trap pin.
- Recheck clearance between trap and vane roller.

### Replacing Coin Shield

**Note:** Coin shield is not required on coil collector equipped with pull bucket return chute.

**4.17** If coins stick due to damaged or distorted coin shield, or if a bent shield pin causes shield to stick, remove shield pin and shield. Replace as follows:

- (1) Place P-247411 pin through tubular bearing at top of P-296792 shield. Curved-in portion on bottom of shield is toward hopper when loop of pin is to the front (see Fig. 11).
- (2) Hold loop of pin with long nose pliers or fingers and place coin shield pin in hole in rear of hopper.
- (3) Hold shield in place with fingers and secure end of loop in front hole of hopper with long nose pliers.
- (4) Adjust loop so that pin does not come out when play is taken up in either direction.
- (5) Check operation of shield.

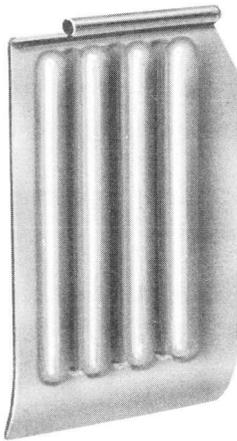


Fig. 11 — P-296792 Coin Shield

### 5. COIN RELAY SHIELD

**5.01** The coin relay must be protected by a shield. The P-16A336 shield replaces the P-349486 (MD) and KS-7994 (MD) shields and should be used for all replacements.

**5.02** On coin collectors equipped with a D-95365 contact device, use P-16A336 shield. This differs from the P-349486 shield in that the lower left corner is cut away so as not to interfere with contact device.

### 6. FINAL TESTS

#### Coin Chute Operation and Refund Test

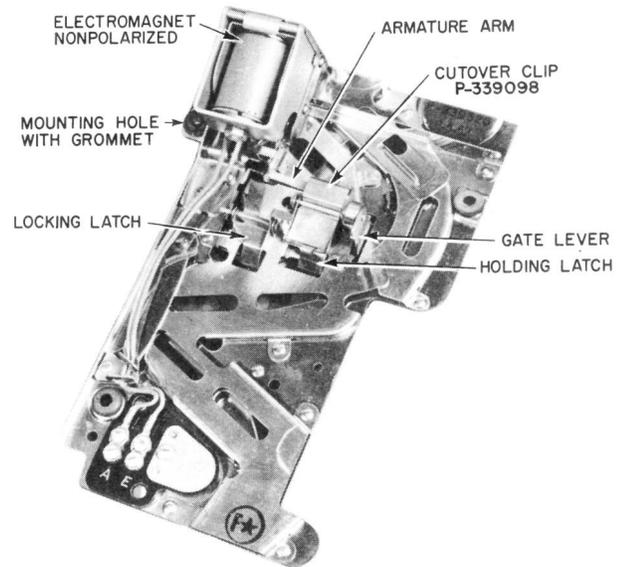
**6.01** To ensure that coin chute and coin return paths are clear and that station and coin relay are operating satisfactorily, make final test as follows:

- (1) Place coin relay shield on coin relay.
- (2) With upper housing locked in place and handset off-hook, deposit nickel. Nickel shall be held at holding latch. Lower switch-hook slowly. Coin shall drop into coin return. Make test five times.
- (3) If coin collector is equipped with washer reject and coin release mechanism, test with handset off-hook. Deposit nickel. Nickel shall be held at holding latch. Operate pushbutton slowly. Nickel shall be released by gate and drop into coin return. Make test five times.
- (4) With handset off-hook, deposit nickel. Nickel shall be held at holding latch. Deposit second nickel. Second nickel shall release first nickel and permit both coins to pass through coin chute, strike gong, and trip trigger as they drop into hopper. Dial tone shall be heard at dial stations, or operator shall answer at manual stations. Deposit third nickel. Third nickel shall pass through coin chute, strike gong, and reach trap in coin hopper.

- (5) At dial stations, when dial tone is heard, dial any digit except 1 to break dial tone; then hang up handset. Coins shall drop into coin return on hang-up. At manual stations, when operator answers, request that coins be returned.
- (6) With handset on-hook, deposit dime. Dime shall pass through coin chute, strike gong twice, and trip trigger. Dial tone or manual operator shall be heard after handset is removed from switchhook.
- (7) With handset off-hook, deposit dime. Dime shall pass through coin chute, strike gong twice, and trip trigger bringing in dial tone or manual operator.
- (8) With handset on-hook, deposit quarter. Quarter shall be stopped by the open gate. Remove handset from switchhook. Gate will close and quarter will release and strike gong. Dial tone or manual operator should be heard.
- (9) With handset off-hook, deposit quarter. Quarter shall pass through coin chute, strike gong, and trip trigger bringing in dial tone or manual operator.
- (10) If cutover clip is used for 5-cent operation, initial nickel deposited shall not be held at holding latch. All other tests are the same as above (see Fig. 12).

#### Coin Signal Test

**6.02** Notify operator that tests for coin signals are about to be made and that coins are to be returned after deposit. Deposit nickel, dime,



**Fig. 12 — Prepay Steel Coin Chute (Equipped with Cutover Clip for 5-Cent Service)**

and quarter. If operator does not identify signals correctly, inspect for trouble at station. Correct as specified under coin chute alignment in the section on general maintenance of coin collectors.

#### Extended Range

**6.03** Coin collectors used with a subscriber set which extends the coin relay range should meet all above maintenance requirements. Check operation and adjustment of the *S36* relay housed in the subscriber set as covered in the section on subscriber set maintenance. If relay is defective, replace subscriber set.