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**BELL SYSTEM PRACTICES**  
**Station Installation and Maintenance**

**SECTION C42.144**  
**Issue 1, June, 1953**  
**AT&T Co Provisional**

## COIN COLLECTORS

### MULTI-SLOT TYPES

### MAINTENANCE

#### 1. GENERAL

1.01 This section covers maintenance for all types of multi-slot coin collectors used on a 5¢ and on a 10¢ initial charge basis in prepayment and in postpayment services. This section replaces Sections C42.128, C42.129, C42.130, C42.132, and C42.138.

1.02 Parts 2 to 6 of this section are confined to common battery prepayment stations using coin collectors equipped for use on a 5¢ and on a 10¢ initial charge basis. Parts 7 to 12 cover information on coin collectors used for special services in the 5¢ and 10¢ areas. Items in brackets [ ] do not apply to 5¢ coin collectors equipped with lead coin chutes. The 10¢ type of coin collector may be used for 5¢ service with a cutover clip and nickel deflector in place.

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**Caution: Whenever removing or reassembling the upper housing from or to the backplate of a coin collector equipped for 10¢ operation, remove the receiver or the handset from the switchhook.**

**Never replace the upper housing without the P-349486 or KS-7994 shield over the relay since the shield protects the relay coils from damage which may result if hit by the housing.**

1.03 This section does not cover any maintenance information for special antifraud attachments which may be installed on the coin collector.

1.04 Maintenance of dial, transmitter, receiver, handset, and cords is covered in Division C30.

1.05 The "Cording" and "Connections" are covered in Subdivisions C42 and C64, respectively.

1.06 The "Supplies" which may be required in connection with work done in accordance with this section are covered in Section C42.104.

1.07 When the trouble is of such a nature that the craftsman cannot clear it, he should report to the test desk and place a KS-7991 "Temporarily Out-of-Service" sign on the coin collector. When the coin collector is restored to service, the KS-7991 sign should be removed and returned to the public telephone subscriber or the agent.

## 2. TOOLS AND GAUGES

2.01 The following tools and gauges are required by this section.

146A Gauge (bias margin test) See 5.04

147A Gauge (trap and vane release test) See 5.02, 5.06, 7.03

139 Tool (for leveling coins) See 5.01

265C Tool (for burnishing contacts) See 5.07, 5.17, 11.04

466A Tool (for adjusting housing contacts) See 6.09

529A Tool (for retaining coins used in tests) See 11.09, 11.10, 12.04

641A Tool (two required to facilitate mounting of dial) See 4.12

KS-2423 Cotton Twill Cloth (cleaning)

KS-7860 Petroleum Spirits (cleaning)

KS-13786 Nylon Brush (cleaning)

No. 00 Abrasive Cloth (for cleaning relay operating fork and housing contacts) See 3.09, 5.14

2B or softer Lead Pencil or equivalent (for lubricating relay operating fork and switchhook pivot pin) See 5.14, 5.20

Dextilose, 12 lb., 9 x 18 Paper (cleaning)

Pipe Cleaners (cleaning)

Tongue Depressor (trap and vane release test) See 5.02

2.02 The following tools and gauges have a limited use and are only needed when required by local instructions.

35F Test Set or equivalent. See 8.02

528A Tool (for cleaning locks) See 3.10

## 3. CLEANING

### General

3.01 Cleaning may be done before or during maintenance operations depending on the circumstances. However, operational tests shall follow any cleaning operations which may affect the mechanisms.

3.02 Use either Dextilose paper, KS-2423 cloth, No. 5 sash brush, or equivalent, to remove loose dirt or dust. Avoid scattering loose dirt and dust into any working parts.

3.03 Clean transmitter mouthpieces, receiver caps, and exterior of coin collector, using Dextilose paper or KS-2423 cloth moistened with water. Wipe dry with clean piece of paper or cloth.

### Coin Gauge

3.04 If coin gauge openings appear to be dirty or sticky, or if a stuck coin is found, clean with Dextilose paper or KS-2423 cloth dampened with KS-7860 petroleum spirits.

Moisten pipe cleaner, or equivalent, with KS-7860 petroleum spirits and clean the coin slots. Wipe dry.

### **Coin Chute**

3.05 Do not attempt to clean coin chute. If chute appears to require cleaning [or if steel chute shows definite signs of rusting on the electromagnet armature, latch spring, or gate spring,] replace chute.

### **Coin Relay**

3.06 Clean and lubricate fork (5.14a) and remove magnetic particles (5.14b) if relay is removed for any reason.

### **Coin Return**

3.07 If coin return is badly rusted, the coin collector shall be replaced.

3.08 If coin return or pull bucket is obviously dirty, it shall be cleaned as follows. When cleaning coin return path, it is desirable to clean angle plate at bottom of hopper. Coin shield shall be removed when cleaning angle plate.

(a) Use a dry nylon brush KS-13786 to remove loose dust and dirt.

(b) Apply a small quantity of KS-7860 petroleum spirits to a KS-13786 brush or a KS-2423 cloth and scrub surfaces to be cleaned.

(c) Remove dirt or excess petroleum spirits from brush by rubbing on a cleaning cloth.

(d) Continue removing dirt and cleaner from the surface with the brush and cleaning the brush with a cloth until surface is clean and practically dry, giving particular attention to bottom portion of coin return just back of vertical step. Cleaning cloth or paper shall be used to wipe surfaces that can be reached readily.

### **Housing Contacts**

3.09 Housing contacts shall be clean. If the contacting surfaces appear dirty or badly tarnished, clean with No. 00 abrasive cloth and wipe off with Dextilose paper or a KS-2423 cleaning cloth.

### **Locks**

3.10 Use the 528A tool to remove foreign material from either the cash compartment door lock or the upper housing lock or follow local instructions.

## 4. UPPER HOUSING

### Upper Housing Play

4.01 The assembled coin collector shall be checked for upper housing vertical play. If play appears to exceed  $1/31''$  as judged visually and by feel, P-12A745 (D-176927) spacer plates ( $1/32''$  thick) shall be added to take up excess play. Assemble the spacer plate with turned-over portion either down or up, or use two plates, one with turned-over portion down, the other turned up and on top of the first plate. In some coin collectors, play is controlled at the inter-locking lugs rather than at top of housing. In this case, it may be necessary to take up more space at top of housing than vertical amount of play would indicate. Spacer plates added shall reduce vertical play to less than  $1/32''$  but shall not cause binding between housing and backplate.

### Coin Gauge

4.02 If coins or slugs are stuck in the coin gauge, remove them using finger or orange stick. Do not use screwdriver or similar tool as damage may result. In some cases, it may be necessary to loosen or remove the coin chute in order to remove coin or slug stuck in coin gauge. Clean coin gauge (see 3.04) after removing stuck coin or slug. If coin gauge is mutilated, the upper housing or the coin collector shall be replaced.

### Coin Chute

4.03 When slugs or coins are stuck in the coin chute, remove chute before dislodging stuck material. Check for cause of sticking, such as dirt, obvious damage to reject openings or coin channels, etc. Removal of chute also will facilitate removal of stuck material without causing damage to chute. If sticking was caused by obviously mutilated coins or slugs and chute does not appear to be damaged or dirty, it may be reassembled in the upper housing. If chute appears to be damaged or dirty, [or latches, gate, or electromagnet arm do not work freely,] replace coin chute.

**Note:** Chute used for replacement shall be of the flared type as identified by an F\* marking on lower end of the 5¢ channel.

4.04 If dial cord or handset (or receiver) cord causes interference with the passage of coins through the coin chute, these cords shall be properly dressed and clamped. Tie cord may be cut off when clamp is provided.

## USUAL STUCK COIN TROUBLES

<u>Place</u>	<u>Probable Cause</u>	<u>Correction</u>
*Coin gauge— 5¢ opening.	Coin chute alignment and oversize nickel.	Replace coin chute and check alignment. [Use flared chute.]
*Coin gauge— 10¢ opening.	Mutilated coin.	Remove stuck material and clean gauge. If gauge is mutilated [or is not ex- panded type,] replace upper housing or coin collector.
**Coin chute— 10¢ near reject opening.	Mutilated dime or good dimes near end of reject. 10¢ reject not beveled.	Replace chute. (Use flared- type chute.)
**Coin chute— 10¢ on top of gong.	Adjustment of gong.	Check spacing between gong and coin chute. Change loca- tion of washer or replace upper housing.
**Coin chute— 25¢ at gong.	Quarter overrides gong.	Replace gong with one having chamfer or bevel on mount- ing hub.
**Coin chute— 5¢ at exit to hopper.	Alignment with hop- per. Cord or tie cord interference at exit.	Replace coin collector. Dress receiver or handset cord.
**Coins at gong guard or return throat.	Gong guard distorted.	Replace upper housing or coin collector.
***Coins on re- lay mechanism base.	Coin falls between coin return and coin chute. Coin return bent downward (in upper housing).	Collector shall be plumb or replace upper housing or coin collector.
***Nickel edge- wise at coin shield.	Coin falls between coin return and coin chute.	Replace coin shield with off- set type.
	Coin return bent downward.	Replace upper housing or coin collector.
Dime at coin shield.	Pivot pin bent or shield distorted, caus- ing sticky shield.	Replace shield and pin.

\*Check before removing upper housing.

\*\*Careful removal of upper housing will facilitate finding these troubles.

\*\*\*May be found after removing upper housing.

**Note:** Slugs or washers of a size close to a standard coin may be found stuck in the coin reject openings. Such slugs shall be removed and coin chute shall be checked for troubles with a standard coin before chute is replaced.

### Coin Chute Replacement

4.05 A new or repaired coin chute appropriate for the code of the coin collector shall be used for replacement.

- (a) [Loosen all outside connections at A and E terminals before attempting to remove coin chute.]
- (b) [If gong signal assembly is mounted on chute, also loosen signal transmitter wire from housing terminal.]
- (c) If filter is present on coin chute, unfasten filter by removing mounting screw. Leave filter hanging loose until replacement chute is installed.
- (d) [If a condenser is mounted on coin chute and replacement coin chute is not equipped with a condenser, remove condenser for reuse on coin chute to be installed. The condenser shall be mounted with lead-wire end upward and if condenser shows signs of leakage of compound, it shall be replaced.]
- (e) [Condenser mounting bracket shall be equipped with a gate operating arm guide. The end of the guide shall clear the gate lever by maximum  $\frac{3}{64}$ " as shown in Fig. 1. The guide to reduce the possibility of distorting the gate operating arm when removing or assembling the upper housing.]

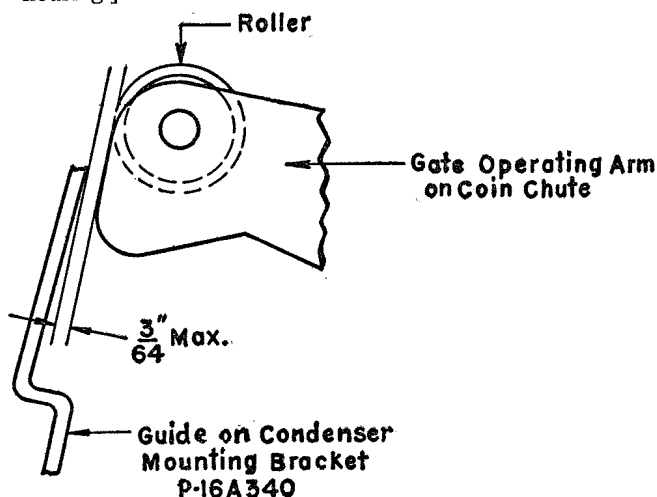


Fig. 1—Clearance between Guide and Gate Opening Arm

- (f) [If gong signal assembly is mounted on the coin chute, it shall be removed for reuse on coin chute to be installed.]
- (g) Turn down mounting screws until they seat securely.
- (h) [On 191-type coin collectors, cord tips on BK housing terminal shall be dressed so as to clear coin chute.]

### **Coin Chute Alignment**

4.06 With the upper housing in a vertical position (but not on backplate), coin chute alignment shall be as follows. Coins used for testing shall not be worn (i.e. rim shall be distinct).

- (a) Deposit a nickel in the 5¢ slot of the coin gauge. Coin shall pass freely from gauge into coin chute. [Coin should stop at the first latch. Release locking latch to permit coin to continue through channel.]
- (b) Deposit a dime in the 10¢ slot of coin gauge. Coin shall pass freely from gauge into chute and exit from chute.
- (c) Deposit a quarter in the 25¢ slot of coin gauge. Coin shall pass freely from gauge into chute and exit from chute. Also, deposit a nickel in the 25¢ slot of coin gauge. It shall pass freely from gauge into chute and shall drop into coin return (of upper housing).
- (d) If coins do not enter chute freely, check that chute is properly positioned on the mounting lugs and that screws are tight.
- (e) In case of a failure in any of the above, try another chute. If any test coin still fails to enter chute freely, the upper housing or the coin collector shall be replaced.

**Caution: Do not use washers to obtain coin chute alignment. No attempt shall be made to take any coin chute apart or to straighten distorted chutes.**

### **Signal Gongs**

4.07 [If there is evidence that coins have been jamming in the quarter runway or if required by local instructions, the quarter gong shall have the revised contour which reduces the possibility of coins sticking or overriding the gong. This type of gong is identified by a chamfer or straight bevel on outer edge of bushing (or mounting hub).]

4.08 At the same time that the coin chute alignment tests are made (see 4.06), the signal gongs shall be checked for signal output as follows:

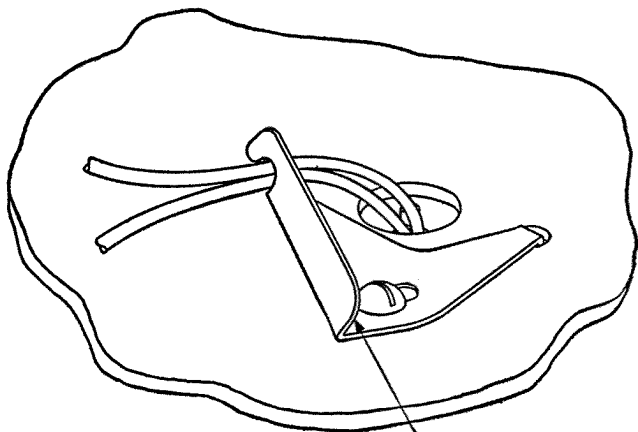
- (a) When either a nickel or a quarter is deposited in its respective opening in the coin gauge and passes through the coin chute, the associated gong shall emit a clear signal.

- (b) The solid gong shall emit two clear signals when a dime is deposited in a similar manner.

4.09 If poor signal is obtained, check that gongs are fastened securely. Round gongs may be rotated to any position to improve signal output or washer may be located on either the inside or the outside of gong. Oval gongs may be rotated so that prick punch mark is within  $1/8''$  of a plane which passes through center of gong and is at right angles to face of gong mounting bracket (judged visually). Handset-type coin collectors shall be equipped with oval-type gongs. If satisfactory signal cannot be obtained, replace upper housing.

### Clamp for Transmitter Cords

4.10 On cast iron upper housings, old style transmitter cord clamp (when present) shall have the vertical section of the cord clamp bent toward the screw (approximately  $45^\circ$ ), as shown in Fig. 2, to eliminate interference with relay cover.



Edge of Clamp bent over  
at approximately  $45^\circ$

**Fig. 2—Bend in Transmitter Cord Clamp**

## **Replacement of Dials**

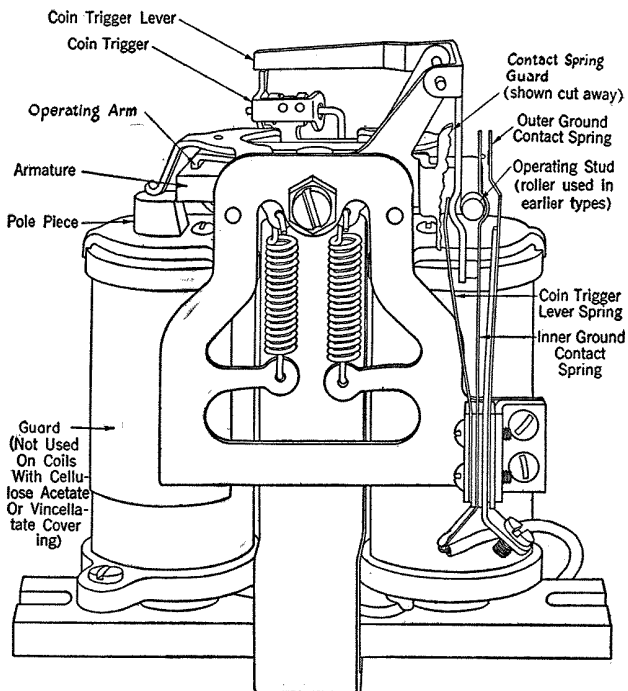
4.11 If dial replacement is necessary, a 4-type or a 5-type dial shall be replaced by a 5-type dial, and a 6-type dial shall be replaced by a 6-type dial. When it is desirable to substitute a 6-type dial (new style) for either a 4-type or a 5-type dial (older style), the upper housing shall be replaced.

**Note:** The replacement of the older style dial by a new style dial involves the added replacement of the dial adapter, the number plate, and the dial cord. It is considered impractical to make such replacement in the field.

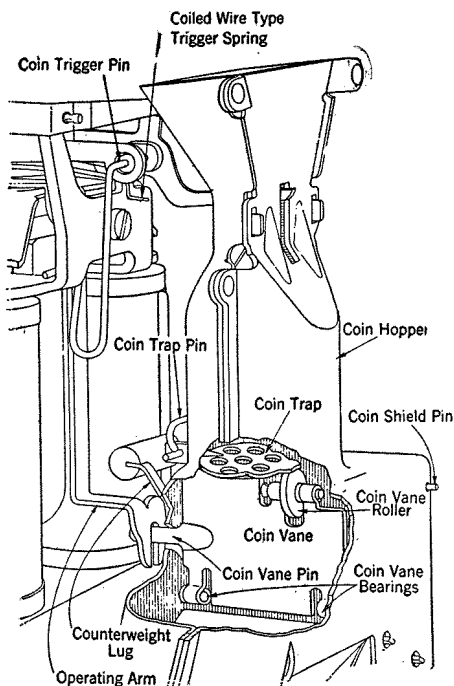
4.12 The assembly of a 5-type dial can be facilitated by the use of two 641A tools which are screwed into the upper two mounting holes before assembly to act as guide pins while assembling the dial on the upper housing. The lower screw can then readily be inserted for fastening. The remaining screws can be inserted by removing the tools one at a time. The 6-type dial shall be equipped with the mounting studs in place before assembling the dial on the upper housing. This dial is fastened with lockwashers and nuts instead of shoulder screws.

## 5. LOWER HOUSING AND BACKPLATE ASSEMBLY

**Caution:** No modifications or adjustments of relay or hopper other than specified herein shall be made.



**Fig. 3—Coin Relay—Earlier Design of Magnet Shown**



**Fig. 4—Coin Hopper and Rear of Coin Relay—  
Earlier Design of Hopper Shown**

### **Leveling of Coins**

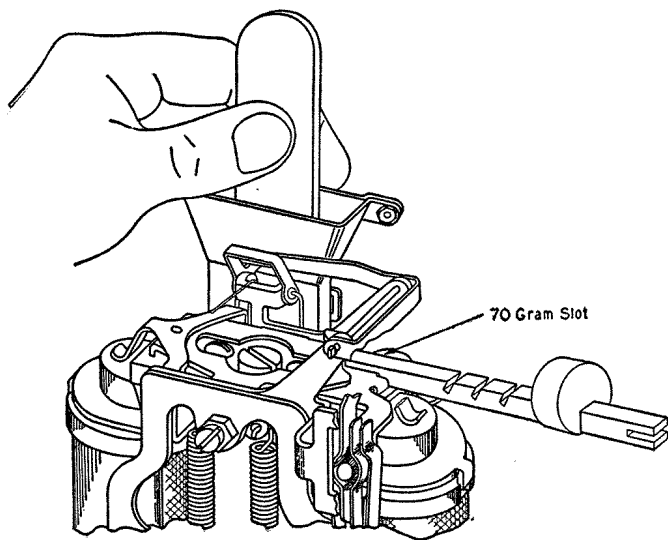
5.01 In cases where the coin relay will not operate properly due to the coin receptacle being full, the trouble can be cleared temporarily by inserting the 139 tool through hole in right side of coin relay tray and leveling the coins in the receptacle. Report that a collection should be made.

### **Trap and Vane Release Test**

5.02 The trap, vane, and relay shall restore fully to their nonoperate positions against a torque of 70 gram-inches applied to the relay operating arm when the armature

and the trap have been fully operated manually and the trap is permitted to restore **slowly** by means of a tongue depressor inserted through the hopper throat. This test shall be made three times for each direction of operation as follows:

- (a) Remove P-349486 or KS-7994 shield from relay.
- (b) Apply slot marked "70" of 147A gauge to right rear horizontal portion of relay operating arm as shown in Fig. 5. Make sure that end of slot bears against edge of operating arm and that weight on gauge is uppermost.



**Fig. 5—Gauge and Tongue Depressor for Trap and Vane Release Test**

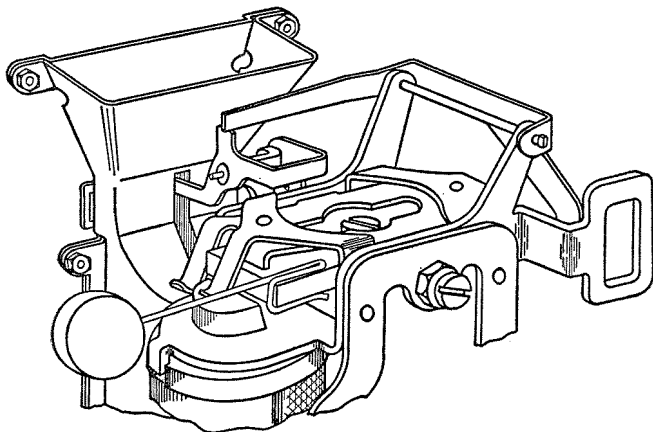
- (c) Press down on 147A gauge to fully operate relay and vane to the limits of their travel.
- (d) Insert tongue depressor into throat of hopper. Let depressor down as far as it will go and hold it in place. Do not force.
- (e) Release pressure on 147A gauge.
- (f) Slowly withdraw tongue depressor. Take at least five seconds.

- (g) Observe that vane and relay return to their unoperated positions.
  - (h) Make test three times with gauge on the right (collect) side and three times on the left (refund) side.
- 5.03 If the mechanism fails, remove relay and proceed as follows:
- (a) If hopper is equipped with a brass coin vane, the coin collector shall be replaced.
  - (b) Check vane for binding on its bearings.
    - (1) Hold vane almost vertical but slightly to the right.
    - (2) The vane shall drop to the fully-operated refund position (right) when released.
    - (3) Hold vane almost vertical but slightly to the left.
    - (4) The vane shall drop to the fully-operated collect position (left) when released. If vane binds on its bearings, the coin collector shall be replaced.
  - (c) Check vane for binding on hopper.
    - (1) Hold vane pin with the fingers.
    - (2) With vane as far forward as possible, move vane over its full travel in each direction three times feeling that it does not scrape on the front of hopper.
    - (3) Push vane to rear of hopper and move vane over its full travel in each direction, feeling that it does not scrape on the back of the hopper. Do not push hard enough to distort hopper. If vane binds on hopper, the coin collector shall be replaced.
  - (d) Check trap for catching on vane or on vane roller as follows:
    - (1) Hold vane in fully-operated collect position (to the left), using the left hand.
    - (2) With the right hand, lift trap counterweight to its fully-operated position.
    - (3) Move vane slowly until it engages trap.
    - (4) Continue moving vane toward vertical position while gently restraining the trap. The vane shall move smoothly to the vertical position.
    - (5) Repeat test on refund side (to the right), reversing use of hands. If trap catches on vane or vane roller, replace trap as in 5.10 and repeat test. If replacing trap still catches, the coin collector shall be replaced.
  - (e) Check clearance between the trap and the vane roller.
    - (1) With trap in unoperated position, place a finger lightly on the counterweight.

- (2) Move vane to vertical position. The vane shall not rub on the trap. If vane rubs, adjust trap counterweight lug so that trap will just clear vane.
- (3) With vane in vertical position, lift trap counterweight. Trap shall not move more than a few degrees before touching vane roller. Adjust by bending counterweight lug.
- (f) Check the operating arm fork and the vane pin for roughness and dirt and clean if necessary per 5.14(a). Also check operating stud. If stud is of roller type, replace relay as in 5.14.
- (g) Reassemble relay as in 5.14 and repeat trap and vane release test. If mechanism fails, replace relay. If replacement relay fails, the coin collector shall be replaced.

### **Bias Margin Test**

5.04 The relay shall operate in the collect and in the refund direction against the torque of a 146A gauge attached to the armature as shown in Fig. 6 with appropriate coin battery applied. Coin trigger shall restore. Proceed with test as follows:



**Fig. 6—Bias Margin Test**

- (a) Connect hand test set across line terminals (R and Y).
- (b) Place a 146A gauge on left side of armature (collect).
- (c) Trip coin trigger.

(d) Obtain collect current by any available local arrangement. Relay shall operate to collect (lifting gauge). Trigger shall restore when relay releases. Observe at least three operations.

(e) Place 146A gauge on right side of armature (refund).

(f) Trip coin trigger.

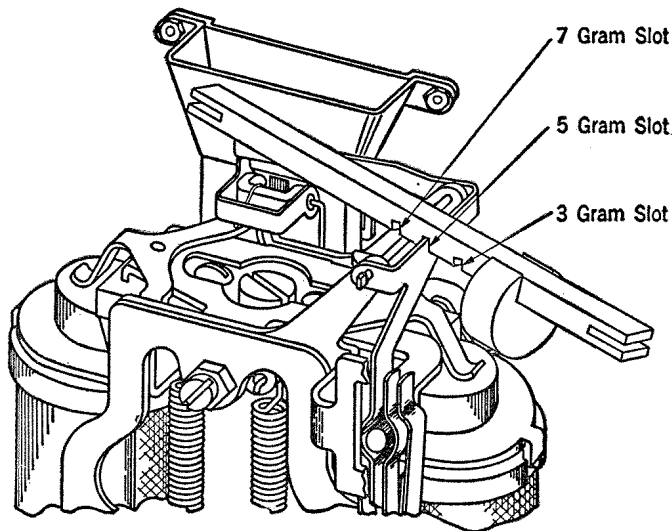
(g) Relay shall operate to refund (lifting gauge). Trigger shall restore when relay releases. Observe at least three operations.

5.05 If relay fails to operate in the correct direction or if trigger fails to restore, check for magnetic particles as in 5.14(b) or replace relay as in 5.14. If replacing relay fails, the coin collector shall be replaced.

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

### Ground Spring Contact Pressure

5.06 Ground spring contact pressure shall be minimum 5 grams measured with the 147A gauge as indicated in Fig. 7. Proceed with test as follows:



**Fig. 7—Gauge for Ground Spring Contact Pressure**

- (a) With ground lead connected to coin collector, place 5-gram slot of 147A gauge on horizontal portion of coin trigger lever as shown in Fig. 7.
- (b) Connect hand test set across terminals R and Y of coin collector and trip coin trigger. Dial tone should be heard in dial areas or operator should answer in manual areas.
- (c) In areas where dial tone is received before deposit, dial one digit (any except "1") to determine if the contacts are closed as indicated by dial tone going off.

5.07 If relay fails on above tests, proceed as follows:

- (a) If contacts are open (pressure is less than 5 grams), replace relay as in 5.14.
- (b) If contacts touch but test open, burnish contacts with 265C tool.
- (c) If dial tone is not heard, short-circuit the contact springs.
  - (1) If dial tone is heard when contact springs are shorted, replace relay as in 5.14.
  - (2) If dial tone is not heard when contact springs are shorted, look for open relay coils or trouble in ground or line circuits.

### **Ground Spring Contact Continuity**

5.08 When the coin trigger is tripped, the contacts shall be made and shall be held without break while the armature is moved from its normal to its fully-operated position. This test shall be made three times in each direction (collect and refund). To make this test, proceed as follows:

- (a) Use hand test set to call operator, test desk, or local test code to obtain talking battery on the line.
- (b) With the coin trigger held tripped, operate relay rapidly by hand to the fully-operated collect position. No clicks shall be heard in the receiver on the operate stroke. Frying noise heard on the operate stroke or clicks heard during release stroke should be disregarded.
- (c) Repeat as in (b) above but operating relay to refund direction.

5.09 If clicks are heard during the operate stroke on either collect or refund, indicating that contacts open momentarily, replace relay as in 5.14.

### **Replacement of Coin Trap**

**5.10 To replace coin trap in new style hoppers (straight slot in front):**

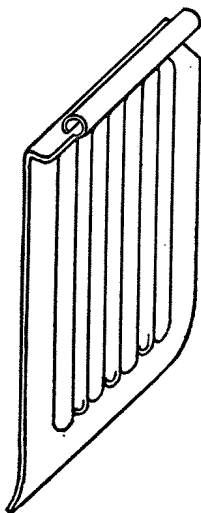
- (a) Move vane to the right.
- (b) Remove trap pin by lifting the right end of the loop and sliding pin to the left.
- (c) Hold trap by counterweight and turn so that it can be pulled through slot in front of hopper.
- (d) Put replacing trap in place with lugs uppermost.
- (e) Assemble trap pin from the left with straight end on the bottom. Raise free end over the right bearing lug so that pin locks in place. See Fig. 4.
- (f) Recheck clearance between the trap and the vane roller per 5.03(e).

**5.11 To replace coin trap in old style hoppers:**

- (a) Remove coin return shield by inserting the blade of a cabinet screwdriver in loop of pin. Twist screwdriver sufficiently to release end of pin from hole in hopper and slowly pull the shield and pin out together.
- (b) Move vane to the right.
- (c) Fasten a piece of string or wire to trap counterweight.
- (d) Remove trap pin.
- (e) Push trap into hopper and allow it to drop into the coin return.
- (f) Fasten string or wire to replacing trap and pull trap up to slot in front of hopper.
- (g) Position replacing trap with lugs uppermost and assemble trap pin.
- (h) Recheck clearance between the trap and the vane roller per 5.03(e).

### **Replacement of Coin Return Shield**

**5.12** If coins are stuck due to a damaged or distorted coin return shield or if a bent pivot pin causes the shield to stick, pivot pin and shield shall be replaced as follows:



**Fig. 8—Coin Return Shield**

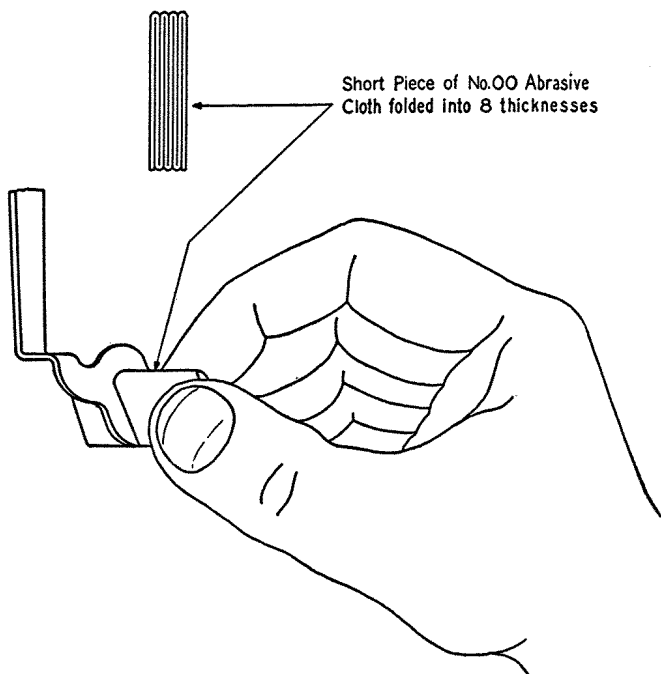
- (a) Place pin through groove in top of shield so that turned-over portion on bottom of shield is toward hopper when loop of pin is to the front.
- (b) Hold loop of pin with long-nose pliers or fingers and place coin shield pin in hole in rear of hopper.
- (c) Hold shield in place with fingers and secure end of loop in front hole of hopper with the aid of long-nose pliers.
- (d) Adjust loop in such a manner that pin does not come out when play is taken up in either direction.

#### **Pull Bucket Return**

5.13 With all play taken up, the pull bucket shall not rub against the escutcheon, the guard, or the chute (except at the bucket side bosses) over the entire range of operation. Bucket shall not be broken and shall be free from sharp burrs and nicks likely to cause personal injury. Bucket shall restore freely to the fully-closed position when released slowly from the fully-open position. If trouble cannot be cleared, the coin collector shall be replaced.

## Replacement of Coin Relay

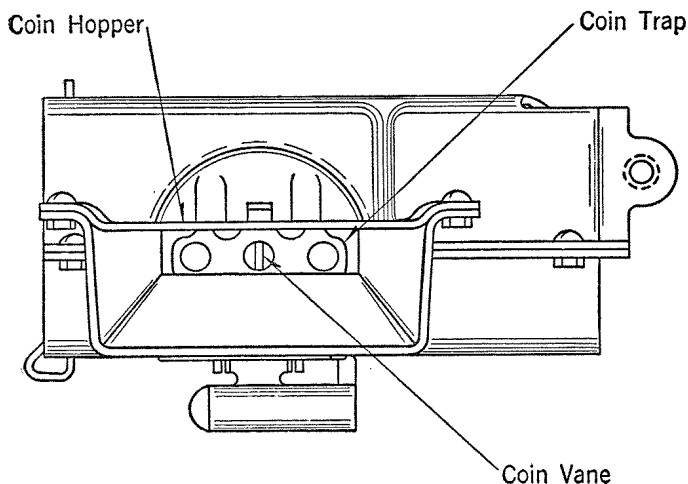
- 5.14 When assembling the relay, the following shall apply:
- (a) Clean and lubricate the fork and the vane pin. If bearing surfaces of fork are so rough that they cannot readily be made smooth, replace relay, otherwise smooth rough spots using a small piece of No. 00 abrasive cloth folded as shown in Fig. 9. Clean off with a KS-2423 cleaning cloth moistened with KS-7860 petroleum spirits. Apply the lead of a grade 2B or softer lead pencil to bearing surfaces of fork slot. Rub the lead on these surfaces so as to deposit as continuous a coating as practicable.



**Fig. 9—Polishing of Fork Slot**

(b) Remove magnetic particles from adjacent surfaces of armature and pole pieces or on top of magnet with rubber tape or the equivalent. Place a piece of rubber tape about 1" long on top of the pole piece on the left side of the relay so that at least  $1/4$ " extends into the air gap. Press down on the armature on the left side until it squeezes the rubber tape. Magnetic particles will become imbedded in the tape which should be discarded. Repeat on the right side with an unused piece of rubber tape. Use tape folded over orange stick to remove particles from top of magnet.

(c) When assembling the relay, it shall be as close as possible to the hopper but at least  $1/16$ " clearance between the fork and the hopper, between the vane stem and the relay, and between the trap counterweight and the relay. Coin trigger shall not touch at upper end of slot in coin hopper or bind on sides of slot at any point of its travel. The full thickness of the vane shall be visible in center hole of trap as shown in Fig. 10. If this cannot be obtained with a replacing relay, the coin collector shall be replaced.



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

### **Condensers (On Backplate under Induction Coil)**

5.15 If the 195C condenser indicates leakage of filling compound or collapse of the container, the condenser shall be replaced by a 452C condenser or a new or repaired 195C condenser. The 452C condenser (which is shorter than the 195C) shall be located so that the depression in the edge of the container engages with upper housing mounting lug on backplate, and the lead-wire end of the 452C condenser will be in the same relative position as the 195C condenser with lead wires toward the left.

### **Varistors**

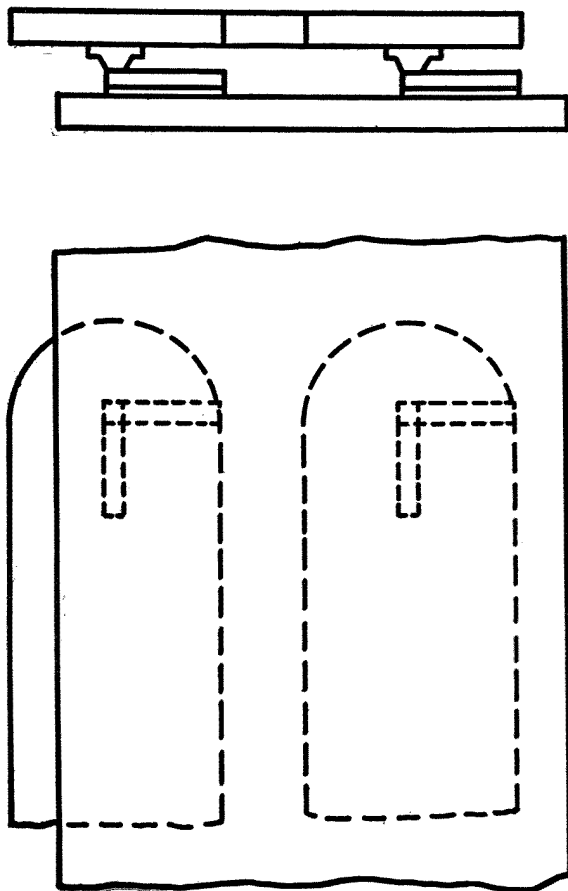
5.16 Check that the 37A varistor is present and connected as indicated in the connection diagrams in Subdivision C64. Add varistor as necessary in all stations. Insulating finish around lead-out terminal shall be intact. If not, varistor shall be replaced.

### **Switchhook Contact Springs**

5.17 The switchhook contact springs shall meet the following conditions. Coin collectors not meeting the required conditions shall be replaced unless otherwise noted in the following subparagraphs.

(a) **Make, Break, Sequence:** Contacts shall make and break and shall have such sequence as shown in the applicable figures of the connection diagrams in Subdivision C64. Contacts that touch but do not make shall be burnished with a 265C tool.

(b) **Contact Alignment, Pileup Tightness:** The spring pileup shall be tight, judged by feel, and the contacts shall line up so that a contact point falls wholly within the circumference of the opposing contact disc, or a contact bar falls wholly within the length of the opposing contact bar. Limiting condition of bar contacts is illustrated in Fig. 11. The requirement applies throughout the entire range of operation in which contacts are normally made.



**Fig. 11—Engagement Limits of Bar Contacts**

(1) **On coin collectors having terminals on wooden block**, the switchhook spring pileup, if loose, may be tightened, or if contacts do not line up, they may be loosened to line up contacts and then retightened.

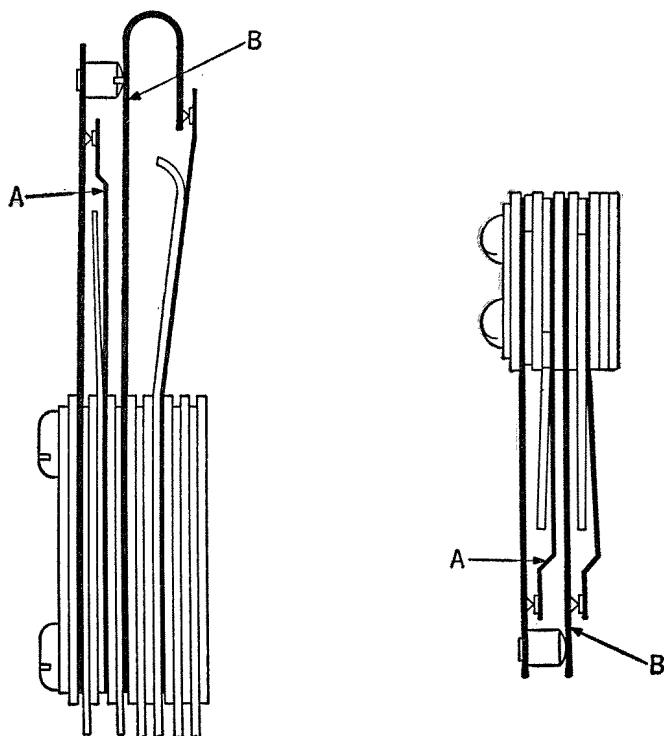
(2) **On coin collectors having terminals in spring pileup**, if spring pileup is loose or contacts do not line up, the coin collector shall be replaced.

**Note:** The screws in this case are power tightened while the pileup is under heavy pressure. **Do not loosen or attempt to tighten these screws.**

(c) **Contact Follow:** All contacts shall have a perceptible follow (approximately 1/64") and pairs of contacts of twin contacts shall make at approximately the same time.

(d) **Contact Separation:** Separation between mating contacts, when open, shall be minimum .025" for the point-disc type and minimum .016" for the bar type. Judge visually.

(e) **Spring Clearance:** Clearance between springs not intended to make contact as shown in Fig. 12 and between spring and backplate shall be minimum 1/32". Judge visually.



Min.  $\frac{1}{32}$ " Clearance between  
Springs A and B

**Fig. 12—Spring Clearance**

### **Switchhook Operation**

5.18 The switchhook shall move freely without binding, squeaking, or interfering with the upper housing throughout its entire travel and shall come to a positive stop in its up and down positions. Proceed as follows:

- (a) When the receiver or the handset is slowly lifted from the switchhook, the switchhook shall move upward and come to a positive stop against the coin collector backplate.
- (b) When the receiver or handset is slowly lowered into place onto the switchhook, it shall cause the switchhook to move downward and come to a positive stop against the coin collector backplate.

5.19 Check for binding between switchhook and upper housing by taking up all upper housing play sidewise and up and down while operating switchhook. Also, check operation of switchhook with upper housing removed. If switchhook binds on upper housing, the coin collector shall be replaced.

5.20 **On coin collectors having terminals on wooden block,** if the switchhook fails to meet the above requirements, proceed as follows:

- (a) If binding still exists with upper housing removed, loosen set screw and remove pivot pin. If necessary to use long-nose pliers during removal, be careful not to burr bearing surfaces on pin. Replace pin if bent or rusted.
- (b) If pin is not replaced, clean pin with cloth or paper dampened with petroleum spirits and then use a dry cloth or paper. Lubricate bearing surfaces of pin with the lead of a grade 2B or softer lead pencil, rubbing the lead on pin so as to deposit as continuous a coating as practicable. Also, clean and lubricate bearing surfaces of switchhook and lugs on backplate.
- (c) Clean hard rubber stud on switchhook and adjacent spring. Lubricate with lead pencil.
- (d) Reassemble switchhook. Pin shall be within 1/64" to 1/32" of end of hole in switchhook (judge by feel). Tighten set screw. If above operations do not clear trouble with upper housing removed, the coin collector shall be replaced.

5.21 **[On coin collectors having terminals in spring pileup,** if switchhook fails due to any binding when checked in accordance with 5.19, proceed as follows:]

- (a) [On coin collectors with an induction coil on the backplate, if failure occurs in the up position, check that gate operating arm is not touching induction coil or any wiring to the induction coil.]
- (b) [If failure occurs in the down position, check that gate on coin chute operates smoothly (without binding or sticking). Also, check gate operating arm adjustment (5.22).]

### **Gate Operating Arm Adjustment**

5.22 [The gate operating arm shall not be obviously distorted.]

- (a) [On coin collectors having terminals on wooden block, straighten or replace gate operating arm (P-347226).]
- (b) [On coin collectors having terminals in spring pileup, gate operating arm shall be straightened or the coin collector shall be replaced.]

5.23 [The gate operating arm on the switchhook shall not be in contact with the roller on the coin chute gate lever when the switchhook is in the up position and shall open the gate at least 3/4 of the full gate travel when the switchhook is in the down position. This may be checked in accordance with 5.24.]

### **5.24 [Arm Adjustment]**

- (a) [**Arm not Touching Roller, Hook in Up Position:** With upper housing in place, move switchhook downward with finger to locate point at which arm makes contact with roller. An approximate point of contact can be determined when switchhook is operated moderately fast. A click can be heard and felt when the arm contacts the roller. After approximate location is found, a more definite point of contact can be determined when switchhook is operated slowly. An increase in pressure can be felt at the point of contact. This point of contact shall not be less than 1/16" from the up position of the switchhook (outer end).]

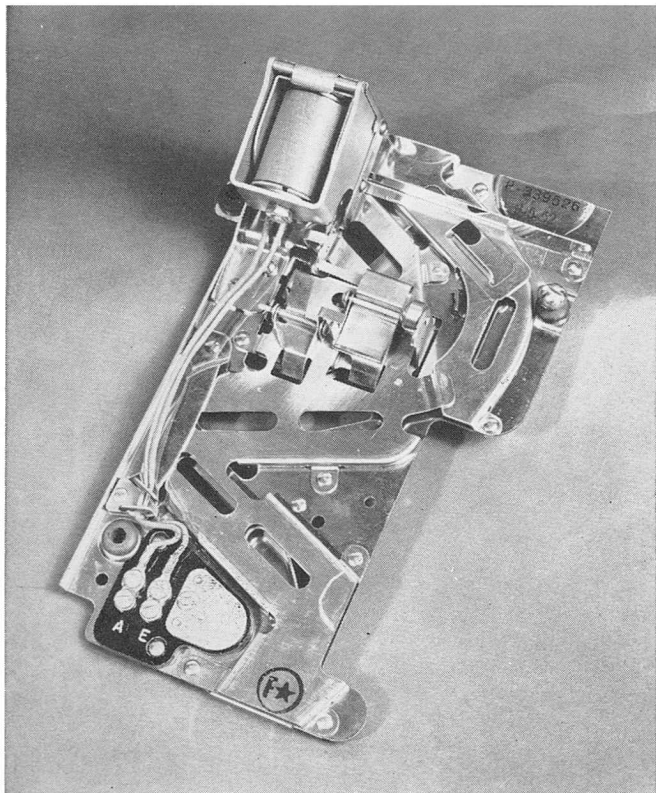
[**Note:** The point of contact will ordinarily be found within the first 1/4 to 1/2 travel of the switchhook.]

- (b) [**Gate Open, Hook in Down Position:** With switchhook in the up position, deposit a nickel which should stop at the first latch. Move switchhook downward slowly until coin is released (passes to coin return). After releasing coin, the switchhook (outer end) shall have at least 3/16" more travel before reaching the down position. The travel of switchhook (outer end) while operating arm and roller are in contact shall not be less than 1/4" from the down position.]

## **6. FINAL TESTS**

### **Coin Chute Operation and Refund Test**

6.01 To insure that the coin chute and the coin return paths are clear and that the station is operating satisfactorily, make a final check as follows:



**Fig. 13—Prepayment Steel Coin Chute—With Cutover Clip for 5¢ Service**

- (a) [With the upper housing locked in place and with the receiver or **handset on switchhook**, deposit a nickel. Coin shall drop into coin return. Repeat test five times and coin shall be returned each time.]
- (b) With upper housing locked in place and with receiver or **handset off switchhook**, deposit a nickel. [When operating on a 10¢ initial charge basis, the first nickel shall

be held at the first latch. Deposit a second nickel. The second nickel shall release the first nickel and permit both coins to pass through the coin chute.] Dial tone shall be heard at dial stations or the operator shall answer at manual stations. [Deposit a third nickel. The third nickel shall pass through the coin chute (observed by gong tone) and reach the trap in the coin hopper. (The latter shall also occur in case a dime or a quarter is first deposited.)]

(c) At dial stations, when dial tone is heard, hang up receiver or handset. Coins shall drop into coin return on hang-up. At manual stations, when operator answers, request that coins be refunded.

(d) With upper housing locked in place and with receiver or handset **on switchhook**, deposit a quarter. [The quarter shall drop into the coin chute (stopped by open gate) but no gong signal shall be heard. Lift receiver or handset off switchhook.] The quarter [shall be released and] should strike the gong. Dial tone shall be heard or operator should answer.

(e) With upper housing locked in place and with receiver or handset **off or on switchhook**, deposit a dime. The gong shall be struck twice. If the dime is deposited before the quarter or separately, dial tone shall be heard or operator should answer.

(f) At dial stations, when dial tone is heard, hang up receiver or handset. Coins shall drop into coin return on hang-up. At manual stations, when operator answers, request that coins be returned.

6.02 If coin collector does not meet the tests specified above, first look for cause at station and correct as specified in the foregoing. If station appears satisfactory, report to test desk.

### **Test for Housing Crossed with Station Wiring and for Ground or Power on Booth (Nongrounded Booth Linings)**

**Note:** Paragraphs 6.03 and 6.04 apply only where the coin collector is not normally grounded.

6.03 To check for housing crossed with wiring, proceed as follows:

- (a) Pass a short length of insulated wire through coin return and attach it to ground terminal on coin relay.
- (b) Place shield over relay.
- (c) Lock upper housing in place and leave handset or receiver off switchhook.

- (d) Connect one clip of hand test set to end of wire connected to ground.
- (e) With other clip of test set, touch the various exposed metal parts of the coin collector. If a battery click or dial tone is heard, coin collector is crossed with station wiring.
- (f) This test also shall be made with receiver or handset on switchhook.
- (g) Remove wire when test is completed.

6.04 If there is a battery cross with the wiring as indicated by test, first look for defective wiring between subscriber set and coin collector and then check remainder of station wiring. If cross is not caused by defective station wiring, the coin collector shall be replaced.

6.05 To check for ground or power on booth, proceed as follows:

**Note:** This only applies to booths not normally grounded.

- (a) Connect one clip of hand test set to battery side of line.
- (b) Touch exposed parts of booth lining with other clip.
- (c) If a battery click is heard, booth is grounded.
- (d) If a loud 60-cycle hum is heard, booth is crossed with a power line.

6.06 If booth is grounded, look for BX cable or cable fasteners touching lining or for station wire crossed with booth lining. If lining has power on it, look for a defect in BX wiring or a defective light switch.

### **Coin Signal Test**

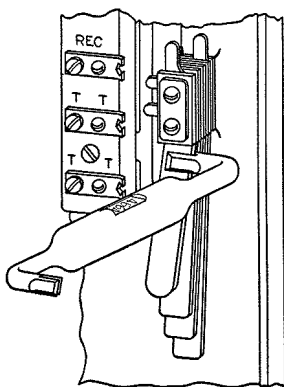
6.07 Call the operator and inform her that you are about to test coin signals and that she should return coins deposited. Deposit a nickel, dime, and quarter. If operator does not identify signals correctly, the upper housing or the coin collector shall be replaced.

### **Station Tests**

6.08 With upper housing locked in place, get talking battery on the line. There shall be no noise or cutouts in the talking circuit resulting from the following.

- (a) Move upper housing up and down, from side to side, and forward and backward.
- (b) Move transmitter up and down on receiver-transmitter type.

- (c) Check that pressure between housing and equalizing springs and between housing and contact springs, as determined by feel, is approximately equal.
- 6.09 If talking circuit is noisy, or cutouts occur, trouble may be corrected as follows:
- (a) Clean or adjust housing contact springs and equalizing spring to have approximately  $1/4''$  follow and so that housing comes into contact with housing contact springs and equalizing spring at about the same time. Use the 466A tool for adjusting contacts as shown in Fig. 14.
  - (b) If noise is introduced by manipulating the transmitter, tighten transmitter terminal and rim screws or replace transmitter cords.



**Fig. 14—Adjustment of Housing Contact Springs**

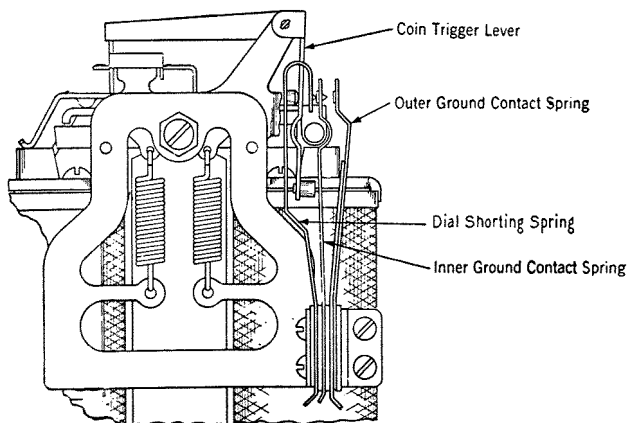
## **7. DIAL SHORTING COIN COLLECTORS**

### **General**

- 7.01 The following parts and paragraphs of this section apply to these coin collectors.
- (a) Parts 3 and 4.
  - (b) Part 5, except omit 5.06 to 5.09 (ground spring contacts).
  - (c) Part 6.
  - (d) Following paragraphs of Part 7.

### Separation of Ground Spring Contacts

7.02 With the coin trigger and operating arm in their normal positions, the dial shorting spring, shown in Fig. 15, shall follow the inner ground contact spring for a minimum of .010", judged visually.



**Fig. 15—3-spring (Dial Shorting) Relay—Contact Spring Guard Cut Away**

7.03 With the coin trigger and the operating arm in their normal positions, the force required just to open the contacts between the inner and outer ground contact springs, shown in Fig. 15, shall not be less than 3 grams. This pressure shall be measured with the 147A gauge as shown in Fig. 7.

### Final Tests

7.04 The dial shorting contacts shall shunt the dial pulsing contacts when the coin trigger is in the unoperated position. Check as follows:

- Before replacing upper housing, reconnect ground lead to GND terminal on terminal block or to right coil terminal on relay.
- Strap Y terminal of coin collector to left coil terminal of relay.
- Make sure that coin trigger is **not** tripped.

- (d) Place upper housing on coin collector and wait for dial tone.
- (e) When dial tone is heard, dial any digit except "1".
- (f) If dial tone is not broken in (e), remove strap and proceed with tests.
- (g) If dial tone is broken, the dial shorting contact is not shunting the dial.
- (h) Clean relay contacts and recheck follow of dial shorting springs (7.02).
- (i) If dial tone is still broken in (e), replace relay.

7.05 Check that dial shorting contacts in the unoperated position are not touching the housing. At stations where coin collector housing (or booth lining) is **not** grounded, proceed as follows:

- (a) Block relay in refund position. Use folded paper or wood cleat.
- (b) Temporarily disconnect yellow wire which connects the left coil terminal of relay to outer ground spring.
- (c) Remove receiver or handset from switchhook and lock upper housing in place.
- (d) Push housing to the right as far as possible.
- (e) Apply test for crosses, holding the housing in this position.
- (f) Remove relay blocking and reconnect yellow wire when test is completed.

## **8. LONG LOOP COIN COLLECTORS**

### **General**

8.01 These coin collectors shall meet the requirements in Parts 3 to 6. However, an S36 relay is housed in the subscriber set of this station arrangement. Therefore, if trouble is experienced on collect or refund of coins, the subscriber set shall be replaced, or if facilities are available, check operation and adjustment of S36 relay in accordance with 8.02.

### **Adjustment of Relay**

8.02 Use 35F test set, or equivalent. Receiver or handset shall be on the switchhook and the red wire shall be disconnected from the RR terminal of the induction coil while testing.

### Direct Current Flow Requirements

Operate—Test 47.0 M.A., Readjust 44.5 M.A.

Nonoperate—Test 37.5 M.A., Readjust 39.6 M.A.

**Note:** For **operate requirements**, slowly increase currents to the above values using a battery supply of not less than 3 volts.

## 9. INDUCTION REDUCTION COIN COLLECTORS

9.01 These coin collectors shall meet the requirements in Parts 3 to 6.

## 10. LOCAL BATTERY TALKING, COMMON BATTERY SIGNALING COIN COLLECTORS

10.01 The following parts of this section apply to these coin collectors.

- (a) Parts 3 to 6.
- (b) Parts 7 and 8 also apply when these coin collectors are used for dial shorting and long loop services, respectively.

## 11. DIAL POSTPAYMENT COIN COLLECTORS (CDO)

### General

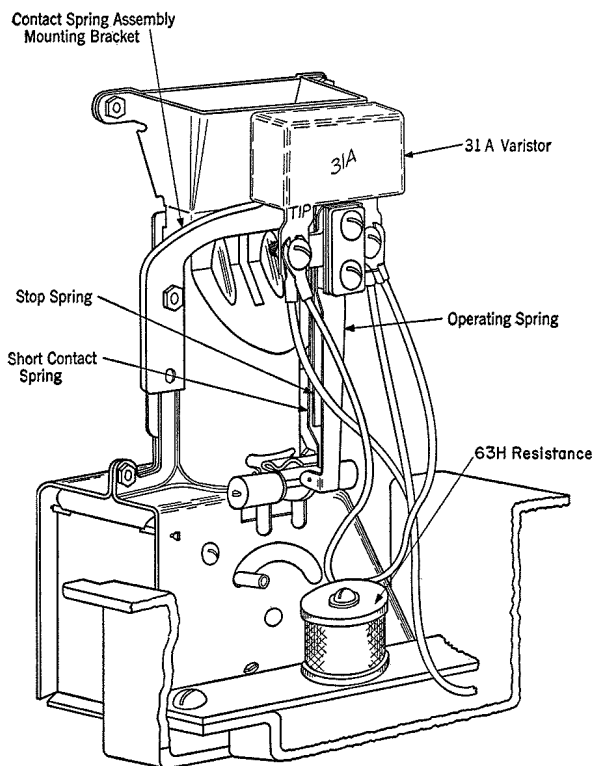
11.01 The following parts and paragraphs of this section apply to these coin collectors.

- (a) Parts 3 and 4.
- (b) Part 5, except 5.02 to 5.14 (relay operation).
- (c) Part 6, 6.08 and 6.09 only.
- (d) Following paragraphs of Part 11.

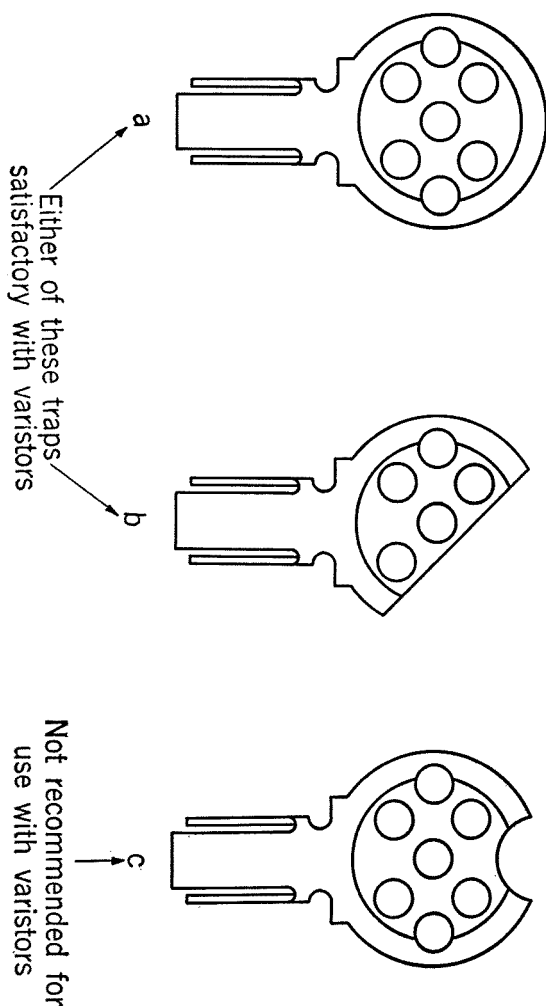
### Coin Hopper Assembly

11.02 **Varistor and Type of Trap:** The 31A varistor shall be present and connected as shown in Fig. 16. At existing stations where a varistor is to be installed, the trap shall be of the type shown in Fig. 17(a) or 17(b), rather than the type shown in Fig. 17(c). The varistor shall be mounted with the terminal marked TIP(+) always connected to the contact spring terminal which is on the tip side of the line.

**Note:** Traps shown in Fig. 17(a) and (b) have been found to be less likely to result in sticking of coins, between the trap and hopper, than the trap shown in Fig. 17(c). If a coin sticks, holding the trap down and the contacts open, the varistor is very likely to be damaged.



**Fig. 16—Coin Hopper Assembly with 31A Varistor**



**Fig. 17—Types of Traps**

11.03 If a coin is found stuck between the trap and the hopper, release coin and proceed with tests and adjustments. If repeated troubles due to stuck coins are experienced, the coin collector shall be replaced.

11.04 **Contacts:** Hopper contacts shall normally be made. Dial the number of the station under test. A busy signal shall be received. If not and other parts of circuit, such as dial contacts, switchhook contacts, and wiring, are in good condition, proceed as follows:

- (a) If contacts touch but do not make, burnish with a 265C tool.
- (b) If contacts do not touch, the coin collector shall be replaced.

11.05 **Trap and Spring Requirements:** The trap shall restore freely to the normal position when released slowly from the fully-open position. If it does not, the coin collector shall be replaced.

#### **Final Tests**

11.06 **Operation:** Connect hand test set across terminal R (on contact spring assembly or induction coil) and contact spring terminal which is connected to the Y housing contact spring (W in case of 163C or D coin collector for local battery talking, common battery signaling service). Call a local line (not a "free call" line). When dial tone is again heard, operate trap manually to complete connection.

**Note:** Completion of circuit by manual operation of the trap may require several attempts, on account of critical adjustment of central office equipment. Trap must be fully operated and quickly released. If trap is not fully operated, circuit may not cut through. If trap is not released quickly, the central office equipment may disconnect, which will necessitate redialing.

If the connection is not completed after several attempts, check the following:

- (a) Reversed or defective 31A varistor.
- (b) Line reversed.
- (c) Open 63CH resistance.
- (d) If no fault can be found at station, report to test desk.

11.07 **Varistor Effectiveness:** In operating trap manually on a local call (11.06), a click will be heard in the receiver. If this click is as loud on a call to the operator as it is on a local call, the 31A varistor is defective and shall be replaced.

11.08 **Cross with Wiring:** If a ground connection is available at the station, standard tests for crosses between coin collector housing and wiring shall be made (see 6.03, 6.04). If

ground is not readily available, this test may be omitted except when a cross is suspected or a periodic inspection is made. In these cases, a piece of wire shall be temporarily connected to the nearest available ground.

11.09 [**Coin Chute Operation and Refund Test:** Position electromagnet arm so that the end is out of the 5¢ channel as shown in Fig. 18. Insert the 529A tool in the top of the coin hopper to retain test coins.]

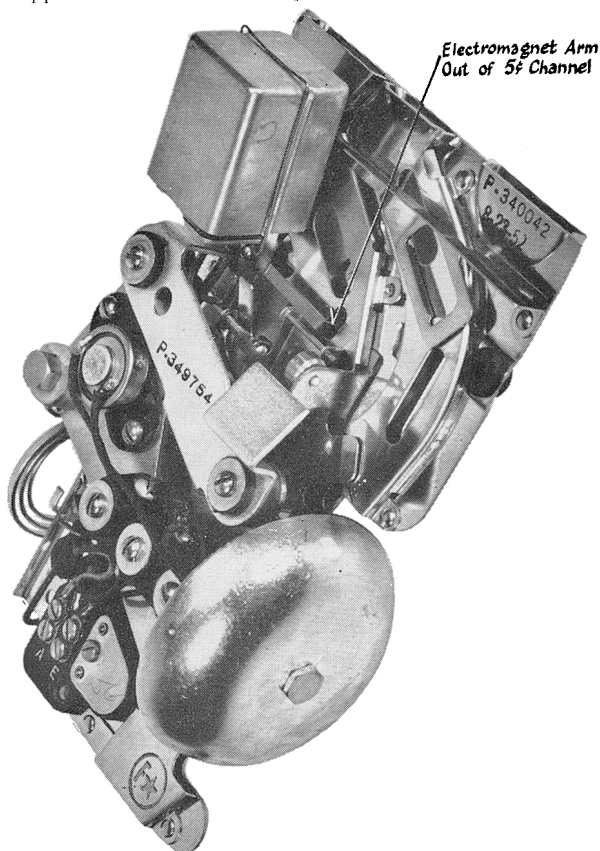


Fig. 18—Postpayment Steel Coin Chute

(a) [With upper housing locked in place and with receiver or handset **on switchhook**, deposit a nickel. The coin shall drop into coin return. Test shall be made five times and nickel shall return each time.]

(b) [With receiver or handset **off switchhook**, call operator. When operator answers, deposit a nickel. (On dial tone, the electromagnet operates so that the end of the electromagnet arm enters the 5¢ channel if it is not already there.) The coin shall pass through the chute, striking the gong, and shall reach the 529A tool in the hopper.]

(1) [If test is met, it indicates that electromagnet and line wires are connected correctly.]

(2) [If nickel falls into coin return, check switchhook operation (5.18) and gate operating arm adjustment (5.22).]

(3) [If nickel does not pass through chute as indicated by striking gong, deposit another nickel. If both coins pass through chute and strike gong, it indicates that the first nickel stopped in chute at first latch. Check operation and wiring of electromagnet in accordance with connection diagram in appropriate section of Subdivision C64. If nickel still fails to reach 529A tool, replace coin chute and repeat tests.]

(4) [If nickel sticks in chute, replace chute and repeat all tests.]

(c) [If test in (b) above is met, request operator to call back as in a delayed call. Answer call and repeat test with a nickel. Have operator make this test over local and toll connectors if both are available. Test shall meet the same conditions as in (b) above. If test in (b) is met but test over local and toll connectors is **not** met, report to test desk.]

11.10 **Coin Signal Test:** Use a 529A tool. Call operator and inform her that you are about to test coin signals. Deposit a nickel, dime, and quarter. If operator does not identify signals correctly, the upper housing or the coin collector shall be replaced.

## 12. MANUAL POSTPAYMENT 5¢ COIN COLLECTORS

### General

12.01 The following parts and paragraphs of this section apply to these coin collectors.

- (a) Parts 3 and 4.
- (b) Part 5, except 5.02 to 5.14 (relay operation).
- (c) Part 6, 6.08 and 6.09 only.
- (d) Following paragraphs of Part 12.

### Coin Hopper

12.02 The coin hopper in these coin collectors is a simple channel to guide the coins from the coin chute to the coin receptacle. The only coins returned in this service are improper deposits. If sticking of coins occurs in coin hoppers not provided with clear-out holes, the coin collector shall be replaced.

### Final Tests

12.03 **Cross with Wiring:** If a ground connection is available at the station, standard tests for crosses between coin collector housing and wiring shall be made (see 6.03, 6.04). If ground is not readily available, this test may be omitted except when a cross is suspected or a periodic inspection is made. In these cases, a piece of wire shall be temporarily connected to nearest available ground.

12.04 **Coin Signal Test:** Use a 529A tool. Call operator and inform her that you are about to test coin signals. Deposit a nickel, dime, and quarter. If operator does not identify signals correctly, the upper housing or the coin collector shall be replaced.