

Figure 3. Two-Nickel Assembly

microswitch operating arm remains latched. Loop shorting contacts are installed on the restoring magnet where line loops exceed 500 ohms. The shorting contacts are required because battery current applied over a high resistance loop would be insufficient to operate the coin relay. When the restoring magnet operates on coin-collect or refund battery, the loop shorting contacts close setting up a short circuit across L1 and L2 thereby providing parallel paths (L1 and L2) for the application of battery potential to the paystation.

#### Coin Hopper

3.05 Fig. 4 shows the internal mechanism of the coin hopper with the housing removed. Figs. 5, 6, and 7 show typical operation of the hopper.

3.05-a As the coin leaves the coin chute, it enters the coin hopper mouth and operates the coin trigger. The coin trigger opens a set of dial shunt springs to allow the calling party to dial after the deposit of a dime or quarter (see Fig. 5) and simultaneously completes a circuit to ground for the coin relay. The trap bottom

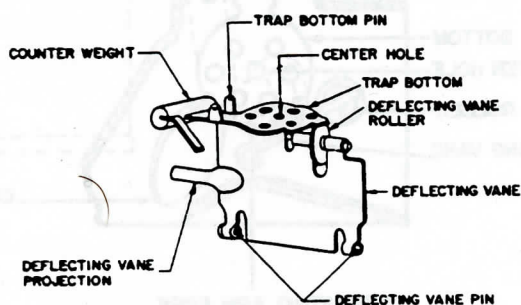


Figure 4. Coin Hopper Trap and Vane Assembly

is held up by the roller of the deflecting vane, and the coin remains on the trap bottom.

3.05-b The projection of the deflecting vane is engaged with the fork of the operating arm of the coin relay. When current from the central office operates the relay, the fork of the operating arm moves to the right or left depending upon the voltage and polarity of the current.

3.05-c The fork in moving to the left or right carries the projection of the deflecting vane with it, and since the projection is part of

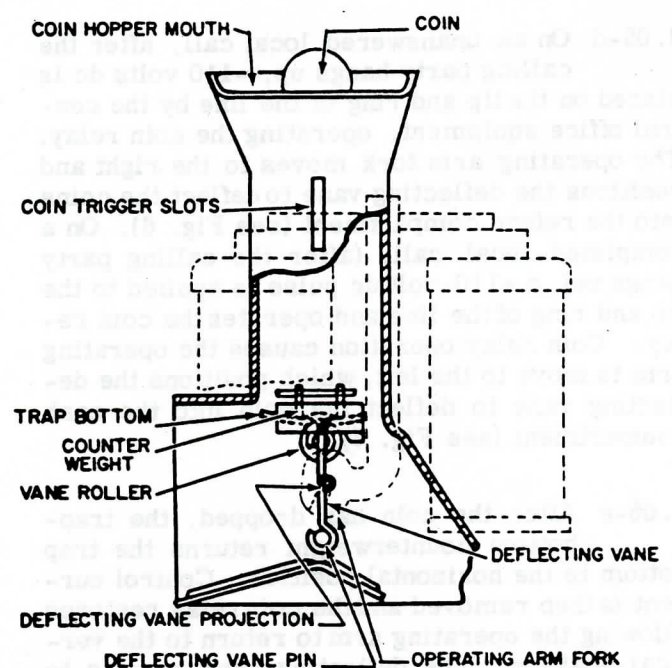


Figure 5. Trap and Vane in Normal Position



## DESCRIPTION

### A. E. CO. PREPAY PAYSTATIONS

#### 1. GENERAL

1.01 This section describes the physical characteristics and operation of types 62 and 82 prepay paystations.

1.02 Prepay paystations (see Fig. 1) are coded according to basic type. The 82 type prepay paystation has improved circuitry and supersedes the 62 type prepay paystation for procurement. A prefix LPA indicates that the paystation uses a manually adjusted loop compensating network; an LPB prefix indicates that the paystation uses a self-compensating network. The suffix -55 indicates that the paystation is equipped for 2-nickel control.

1.03 Schematic diagrams are provided in Figs. 13, 14, and 15.

#### 2. OPERATION WITH CENTRAL OFFICE

2.01 The automatic exchange associated with the prepay paystation must be equipped with coin-control repeaters, sources of positive and negative 110-volt dc collect and refund battery, and an interrupter which results in intermittent coin-control current being applied to the line.

2.02 The calling party is connected to a paystation repeater at the central office upon removal of the handset, but cannot break dial tone until two nickels, one dime, or one quarter has been deposited. After deposit, the calling party may dial and extend a connection in the usual manner.

2.03 Upon completion of the call, the coins deposited are dropped into the cash compartment and the paystation is restored to normal automatically. When the call is not completed, the money is returned to the calling party and the paystation is restored to normal automatically.

2.04 On operator assistance calls, initial deposit is refunded upon connection to the operator. Toll operators may supervise collection of coins by audible signals picked up through a special transmitter. The operator controls the application of coin-collect and refund current on toll calls.

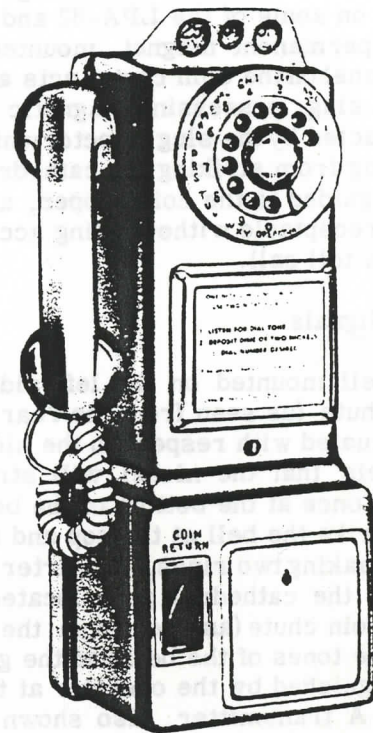


Figure 1. Prepay Paystation

#### 3. MECHANISM

3.01 The coin gauge at the top of the upper housing consists of three different size openings: nickel, dime, and quarter. Each opening is connected to a different channel in the coin chute.

##### Coin Chute

3.02 The coin chute (Fig. 2) is mounted immediately below and in line with the coin gauge. The coin chute has three channels of varying sizes. The channel under the nickel gauge is larger than the dime channel and smaller than the quarter channel. Therefore, only the correct coin in its correct channel will operate the mechanism. All three channels end directly over the mouth of the coin hopper. The lugs which hold the coin chute to the upper housing are part of the framework welded to the upper housing. This framework constitutes the coin-return chute for incorrect coins. The incorrect coins will fall out of the coin chute because the depth of the particular channel on the



rear face of the coin chute is just deep enough to hold a coin of the right size. After falling out of the coin chute, the incorrect coins hit the coin-return chute and are guided to the mouth of the coin-return chute in the lower housing. On type LPB-82 and on some of the LPA-82 and 62 paystations, a permanent magnet, mounted in the quarter channel on the coin chute, acts as a slug rejector. A slug, possessing magnetic properties, is attracted by the slug rejector which prevents the slug from striking the cathedral gong. The slug is guided to the coin hopper, and later to the coin receptacle without being accepted in payment of a toll call.

#### Coin Signals

3.03 The bell mounted on the left side of the coin chute (as seen from the rear in Fig. 2), is so situated with respect to the nickel and dime channels that the nickel will strike and ring the bell once at the bottom of the bell. The dime will strike the bell at the top and again at the bottom, making two rings. A quarter strikes once against the cathedral gong located to the right of the coin chute (as seen from the rear in Fig. 2). The tones of the bell and the gong are easily distinguished by the operator at the central office. A transmitter, also shown in Fig. 2, conveys these signals to the operator.

#### Two-Nickel Control

3.04 Prepay paystations arranged for ten-cent service must be equipped to enforce the deposit of 2 nickels or 1 dime before a local call

can be made. (This does not apply to prepay paystations equipped for five-cent service.) Enforcement of the correct initial deposit is accomplished by the microswitch shown in Fig. 3. The microswitch is mounted on the coin chute with an extension of the wire operating arm in the nickel channel.

3.04-a The first nickel slides the operating arm down along the edge of the pendulum, pushing it somewhat below the pendulum notch. Gravity then draws the narrow bottom of the pendulum against the microswitch operating arm. When the first nickel passes beyond the arm, spring tension in the microswitch lifts the arm into the notch where it latches as shown in the right-hand illustration of Fig. 3. The action of the operating arm short-circuits the dial pulse-springs.

3.04-b When the caller deposits the second nickel, it strikes the operating arm, pushing it down. The arm rides along the cam-like surface out of the notch, and throws the pendulum abruptly to the left. As the coin moves on, spring tension in the microswitch raises the operating arm to normal. By the time the pendulum swings back against the operating arm, the arm is above the position where it could relatch. The microswitch then restores and removes the short circuit from the dial pulse-springs. The caller can now dial.

3.04-c If a dime (or quarter) is used in the paystation, these operations do not occur; the pendulum and microswitch function only when the nickel slot is used.

3.04-d Immediately above the microswitch is the restoring magnet (Fig. 3). Since the restoring magnet is in series with the coin relay the restoring magnet operates every time the central office sends coin-collect or refund battery. In the event that either a single nickel (in the case of an abandoned call) or an odd number of nickels (in the case of a toll call) have been deposited, the armature extension of the energized restoring magnet moves the pendulum to the left and allows the microswitch operating arm to restore and reset the mechanism for the next call. If one nickel is inserted and the caller hangs up, the nickel is refunded. The shock lever is a protective device. If the paystation is given a blow after one nickel has been inserted, in an attempt to set the mechanism for a call with only one nickel, the shock lever moves over and stops the pendulum from moving and the

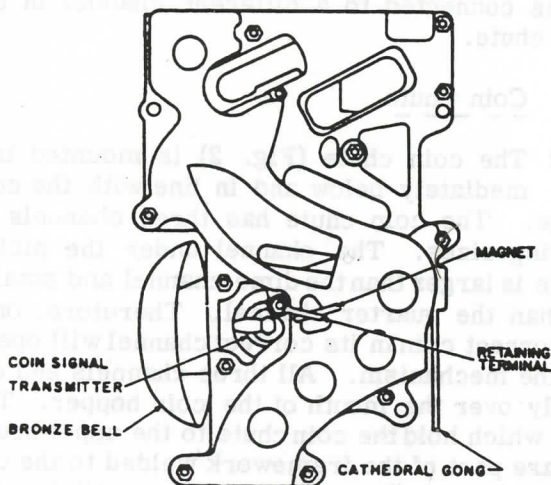


Figure 2. Coin Chute (Rear View)



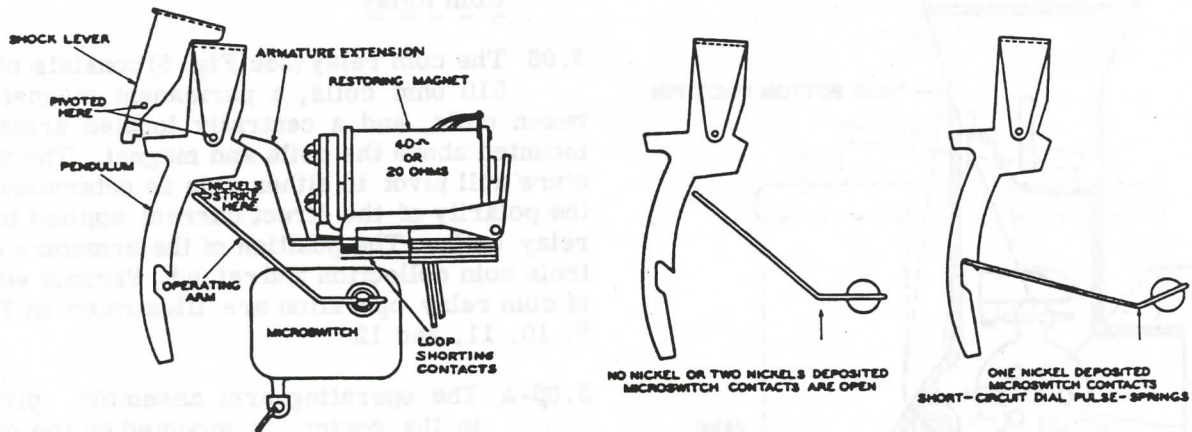


Figure 3. Two-Nickel Assembly

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3.05 Fig. 4 shows the internal mechanism of the coin hopper with the housing removed. Figs. 5, 6, and 7 show typical operation of the hopper.

3.05-a As the coin leaves the coin chute, it enters the coin hopper mouth and operates the coin trigger. The coin trigger opens a set of dial shunt springs to allow the calling party to dial after the deposit of a dime or quarter (see Fig. 5) and simultaneously completes a circuit to ground for the coin relay. The trap bottom

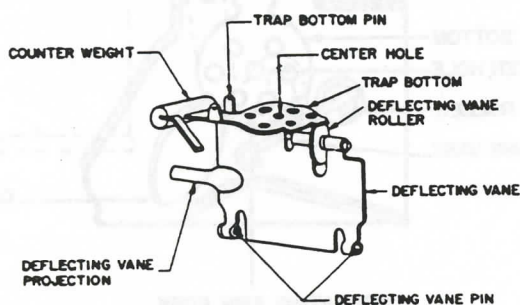


Figure 4. Coin Hopper Trap and Vane Assembly

is held up by the roller of the deflecting vane, and the coin remains on the trap bottom.

3.05-b The projection of the deflecting vane is engaged with the fork of the operating arm of the coin relay. When current from the central office operates the relay, the fork of the operating arm moves to the right or left depending upon the voltage and polarity of the current.

3.05-c The fork in moving to the left or right carries the projection of the deflecting vane with it, and since the projection is part of

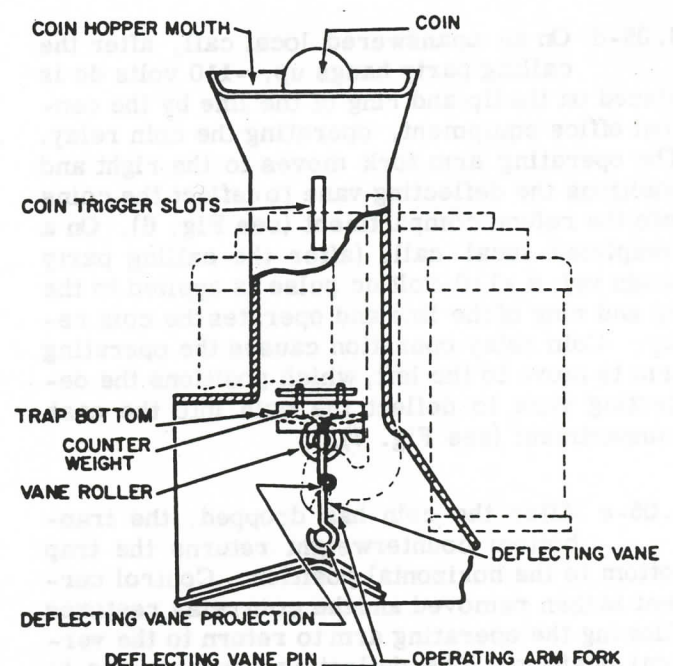


Figure 5. Trap and Vane in Normal Position



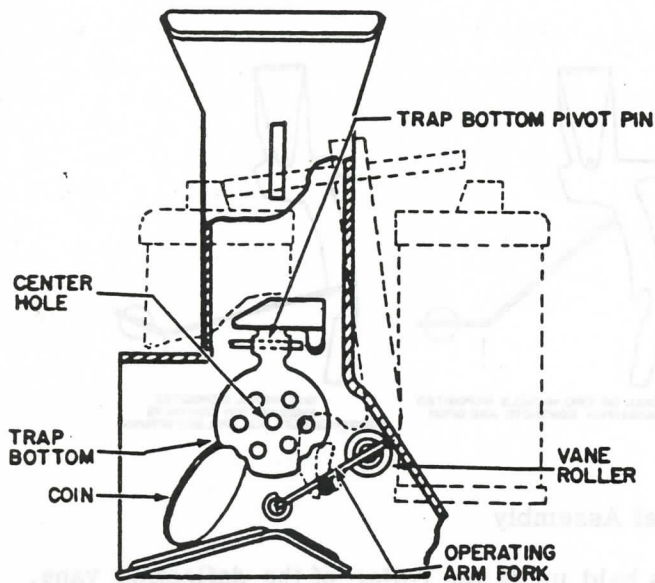


Figure 6. Trap and Vane in Refund Position

the deflecting vane, the vane must also move to the left or right. As the deflecting vane moves under the control of the fork, the roller moves from beneath the trap bottom. The weight of the coin overcomes the resistance of the counterweight, the trap bottom falls down, pivoting on its pin, and the coin slides off the trap bottom and is deflected by the deflecting vane to the left into the coin return chute or to the right into the cash compartment.

3.05-d On an unanswered local call, after the calling party hangs up, -110 volts dc is placed on the tip and ring of the line by the central office equipment, operating the coin relay. The operating arm fork moves to the right and positions the deflecting vane to deflect the coins into the refund compartment (see Fig. 6). On a completed local call, (after the calling party hangs up), a +110-volt dc pulse is applied to the tip and ring of the line and operates the coin relay. Coin relay operation causes the operating arm to move to the left, which positions the deflecting vane to deflect the coin into the cash compartment (see Fig. 7).

3.05-e After the coin has dropped, the trap-bottom counterweight returns the trap bottom to the horizontal position. Control current is then removed and the coin relay restores allowing the operating arm to return to the vertical position. The deflecting vane returns to the vertical position (see Fig. 5) to support the trap bottom.

### Coin Relay

3.06 The coin relay (see Fig. 8) consists of two 510 ohm coils, a permanent magnet between coils, and a centrally located armature mounted above the coils and magnet. The armature will pivot to either side as determined by the polarity of the direct current applied to the relay coils. The position of the armature controls coin collection and refund. Various stages of coin relay operation are illustrated in Figs. 9, 10, 11, and 12.

3.06-a The operating arm assembly, pivoted in the center, is mounted on top of the armature. It consists of the fork (see Fig. 8) that engages the deflecting-vane projection (the horizontal portion of the operating arm is in contact with the armature), and restoring lever. The restoring lever carries the stud that operates the ground-switch springs. Restoring levers (see Fig. 8) are located above the operating arm and are pivoted on the same pin as the operating arm and armature. The restoring levers are in contact with the operating arm and are also connected to the restoring springs (see Fig. 9) which provide a spring bias. The restoring levers insure that the operating arm will return to a horizontal position upon removal of direct current from the coils. A switch lever is pivot-mounted on the coin relay frame. One end of the switch lever rests on the latch of the coin

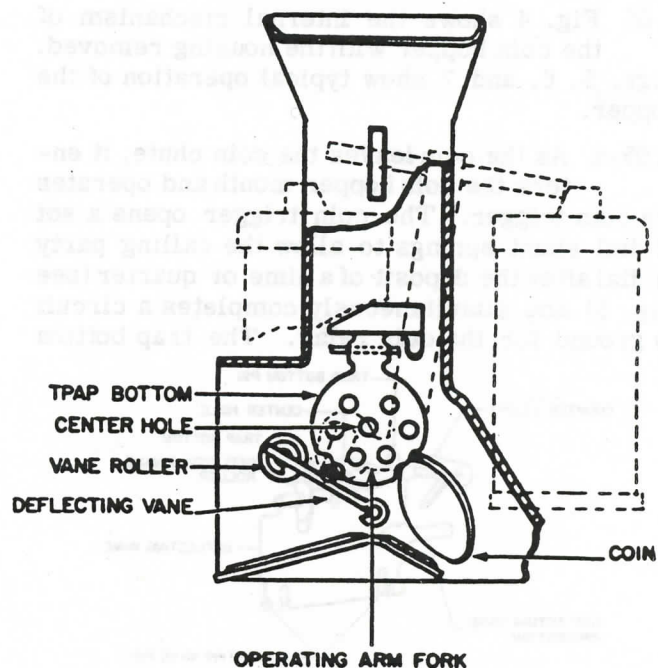
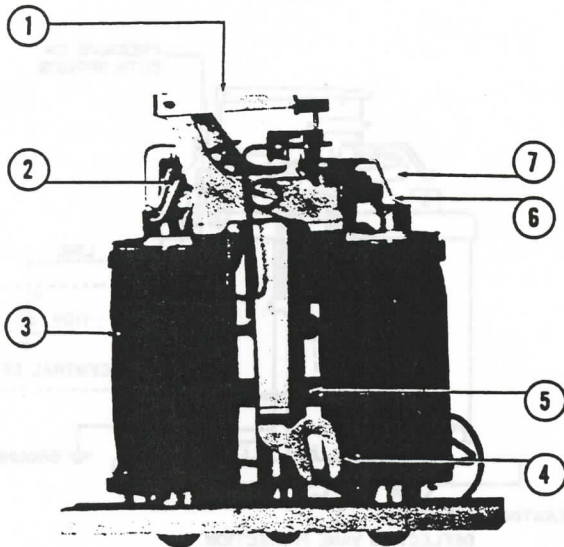


Figure 7. Trap and Vane in Collect Position





- |                       |                     |
|-----------------------|---------------------|
| 1. Switch lever       | 5. Magnet heelpiece |
| 2. Restoring lever    | 6. Armature         |
| 3. Relay coils        | 7. Restoring lever  |
| 4. Operating-arm fork |                     |

Figure 8. Coin Relay (Rear View)

trigger. The other end has a half round set (see Fig. 9) to allow the stud of the restoring arm to restore the switch lever when required. The coin trigger, also pivot-mounted on the coin relay frame, is counter-balanced so that it always returns to the horizontal position when not restrained. The tip of the coin trigger protrudes through the slot in the front and rear of the coin hopper. A coin cannot pass through the coin hopper without tripping the coin trigger.

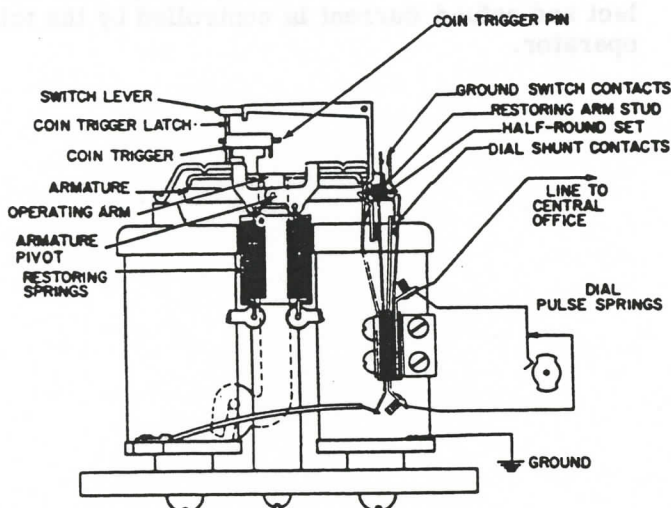


Figure 9. Coin Relay - Paystation Idle

3.06-b Fig. 9 shows the relay and ground-switch springs in position before any coins have been deposited. The ground-switch contacts are open and the dial-shunt springs are closed preventing dial pulses from being sent to the central office. A deposited coin drops down the coin hopper and forces the coin trigger down. The coin trigger latch moves away from the switch lever and the switch lever drops slightly. When the switch lever is in this position, the coin trigger latch butts against the switch lever and cannot return to its horizontal position. The end of the switch lever with the half round set moves to the right and simultaneously closes the ground-switch contacts and opens the dial shunt contacts (see Fig. 10). The restoring-arm stud remains in the center. The dial can now send pulses, unless a first nickel was deposited. If a first nickel was deposited, the microswitch places a shunt across the dial, preventing pulses from reaching the central office until the second nickel has been deposited (see paragraph 3.04). When a dime or quarter is deposited, the coin relay has opened the path for dial pulses and there will be no dial shunt.

3.06-c When a caller hangs up after an incomplete local call, -110 volts dc is applied to the tip and ring of the line. This polarity reversal causes the armature to pivot to the left (see Fig. 11). The operating arm fork moves the deflecting vane to the right, allowing the trap bottom to drop. The deflecting vane guides the coins to the refund chute. Simultaneously, the operating-arm stud moves up out of the area of

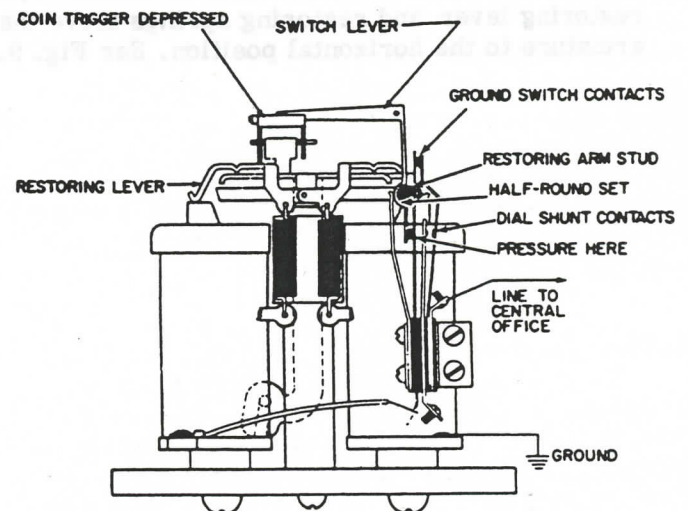


Figure 10. Coin Relay - Coin Trigger Tripped



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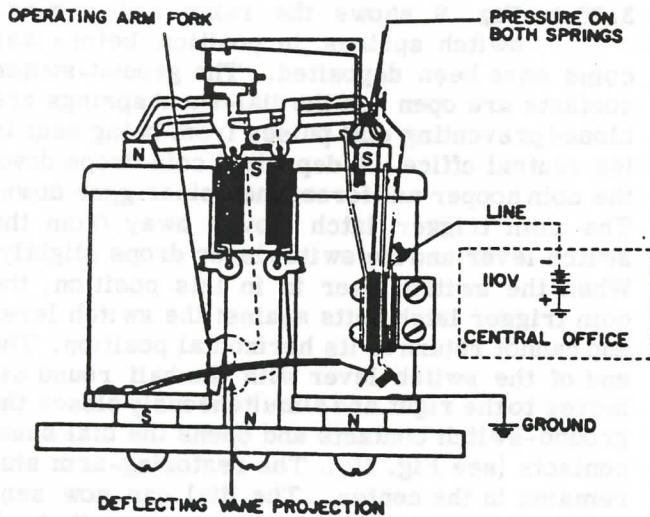


Figure 11. Coin Relay - Refund Position

the two half round sets in the switch lever and the ground-switch spring. The operating-arm stud forces the half round end of the switch lever to the left which allows the other end of the switch lever to move up away from the latch of the coin trigger. The coin trigger then returns to its normal horizontal position.

3.06-d The operating arm stud also insures (through counter-tension of opposing springs) that ground-switch-spring contacts remain closed throughout the operation. When the -110 volts dc is removed from the line, the switch lever will rest on the coin trigger projection causing the ground-switch contacts to open and the dial shunt contacts to close. The restoring lever and restoring springs move the armature to the horizontal position. See Fig. 9.

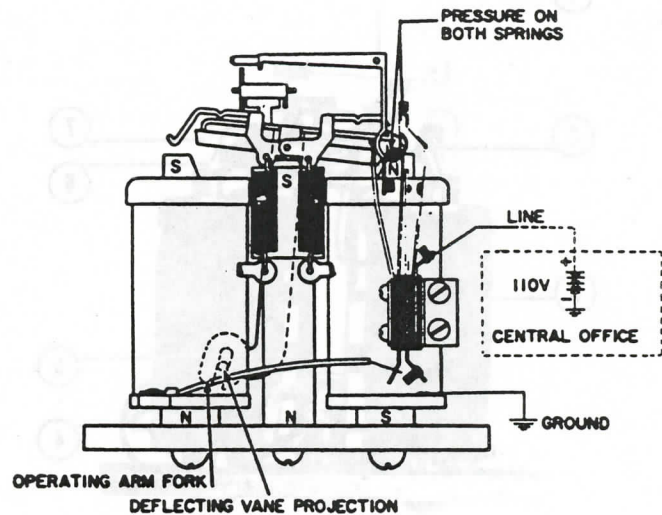


Figure 12. Coin Relay - Collect Position

3.06-e When a caller hangs up after a completed local call, +110 volts dc is applied to the tip and ring of the line. The armature will pivot to the right (see Fig. 12). The operating arm fork moves the deflecting vane to the left allowing the trap bottom to drop. The deflecting vane guides the coins to the cash department. Ground-switch contacts remain closed. When the +110 volts dc is removed from the line, the restoring lever and restoring springs move the armature to the horizontal position.

NOTE: On operator calls, initial deposit is refunded as soon as connection is made with the operator. Coin relay operation is otherwise the same as on caller dialed calls, except that collect and refund current is controlled by the toll operator.



1. "X" CONTACTS BREAK FIRST, MAKE LAST.
2. ⊗ JACK CONNECTIONS BETWEEN UPPER AND LOWER HOUSINGS.
3. ○ TERMINAL BLOCK CONNECTIONS.
4. MICROSWITCH AND RESTORING MAGNET PROVIDED ON 62-55 ONLY.

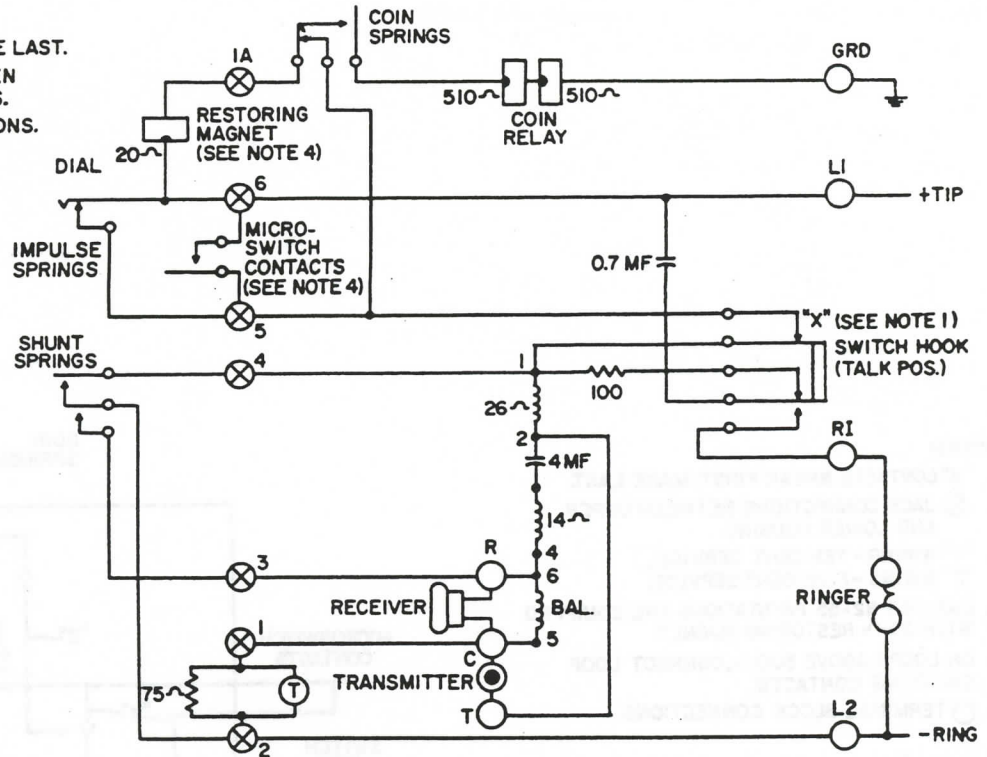


Figure 13. Type 62 Prepay Paystation - Schematic Diagram

1. "X" CONTACTS BREAK FIRST, MAKE LAST.
2. LOOP COMPENSATOR SET AT 2 FOR LESS THAN 200~ LOOPS AND AT ZERO FOR OVER 200~.
3. SIDETONE BALANCING IMPEDANCE USED ON UNLOADED CABLE LOOPS OF OVER 200~ PROVIDING ANY ADJACENT OPEN WIRE SECTION IS LESS THAN 200~.
4. ⊗ JACK CONNECTIONS BETWEEN UPPER AND LOWER HOUSINGS. IMPU SPR
5. ○ TERMINAL BLOCK CONNECTIONS.
6. ON LOOPS ABOVE 500~, CONNECT LOOP SHORTING CONTACTS. SHU SPR
7. MICROSWITCH AND RESTORING MAGNET PROVIDED ON LPA-82-55 ONLY.

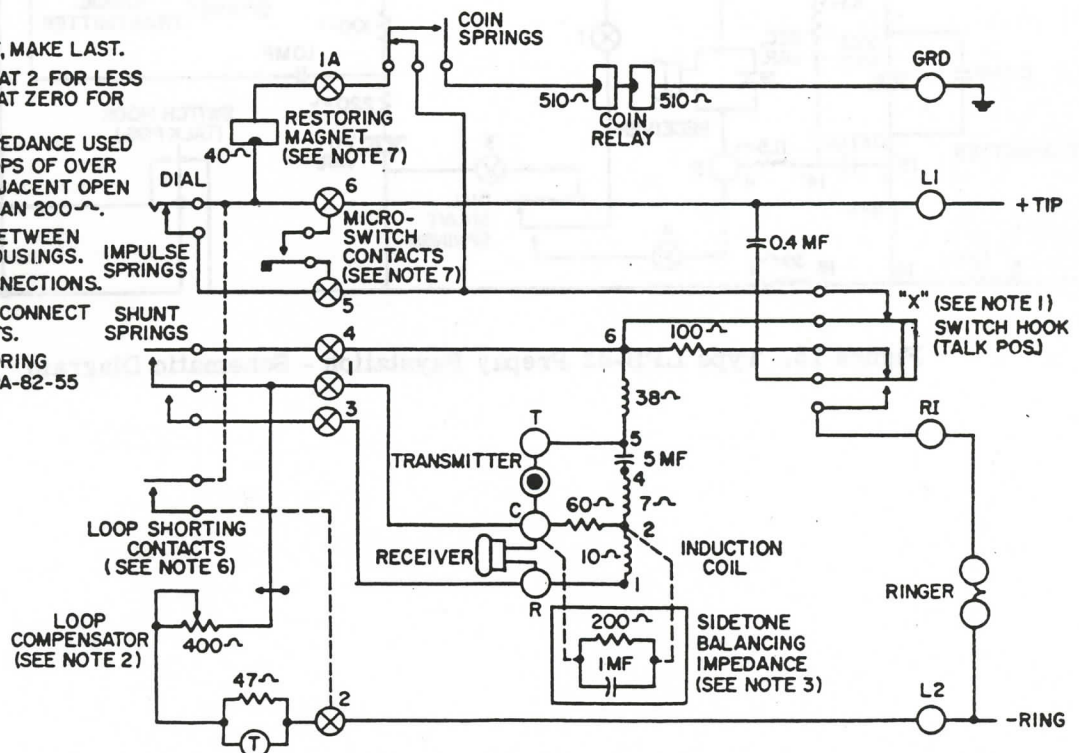


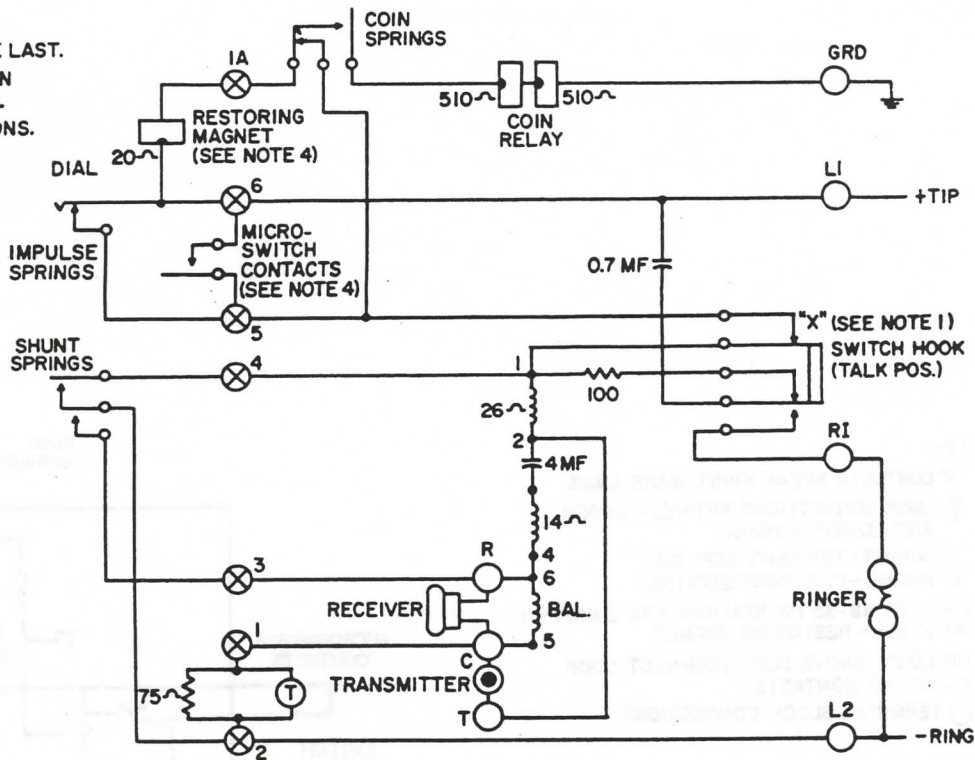
Figure 14. Type LPA-82 Prepay Paystation - Schematic Diagram



## ISSUE 1

**NOTES:**

1. "X" CONTACTS BREAK FIRST, MAKE LAST.
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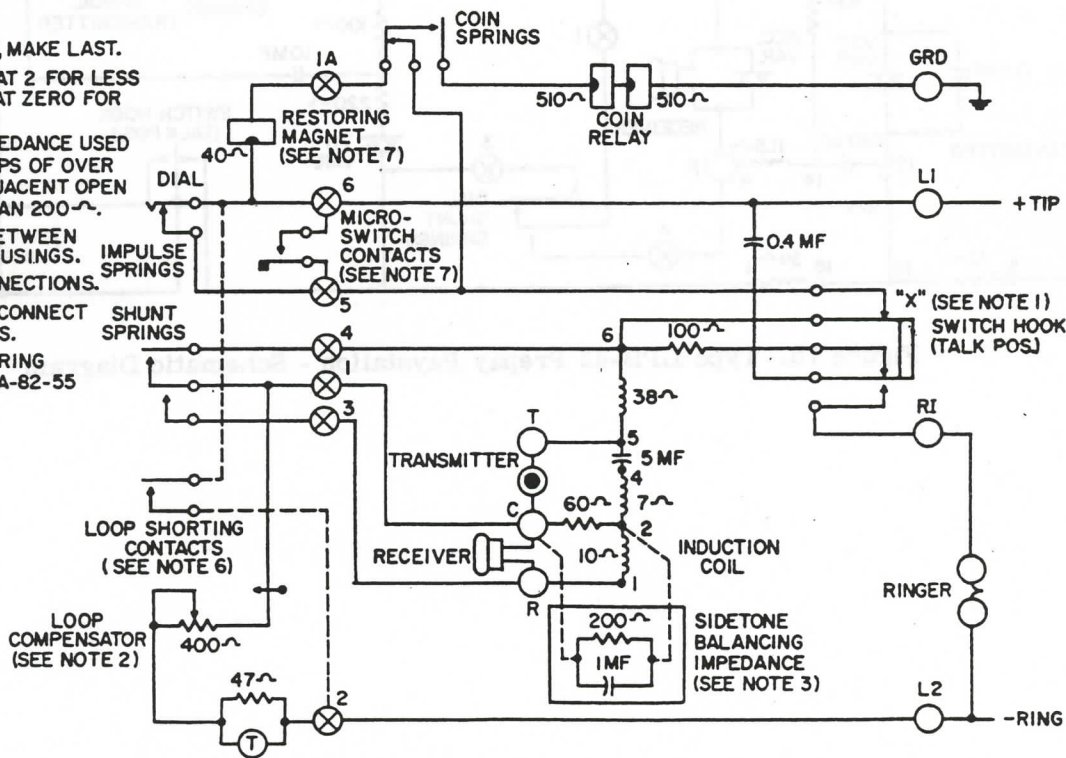


Figure 14. Type LPA-82 Prepay Paystation - Schematic Diagram



A.E.CO. PREPAY COIN TELEPHONE SETS  
EQUIPPED WITH SINGLE-COIL COIN RELAY  
DESCRIPTION

	CONTENTS	PAGE
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2.	UPPER HOUSING CONSTRUCTION .....	1
3.	LOWER HOUSING CONSTRUCTION .....	1
4.	RELAY CONSTRUCTION .....	2
5.	RELAY OPERATION .....	4
1.	GENERAL	

1.01 This section describes A.E. Co. prepay coin telephone sets manufactured since the introduction of the single-coil coin relay design. It is reissued with a change in title to include models from current production and to delete installation (connection) information now provided in other sections. Because of general revision, marginal arrows are omitted.

1.02 The single-coil coin relay has been used in both LPB- and LPC-series coin telephone sets. For discussion of operation and construction of LPB-series instruments, see the corresponding section covering those equipped with the two-coil coin relay mechanism of earlier design. Except for differences specifically mentioned herein, construction of the LPC-series sets is identical to that of the LPB series.

## 2. UPPER HOUSING CONSTRUCTION

2.01 Coin telephone sets equipped with the single-coil coin relay employ the same basic upper housing design as earlier instruments using the two-coil relay, and in LPB-series sets they are identical. In the LPC series, the seven-conductor transfer contact assembly has been replaced by a 15-pin connector on a short length of cable, and the lead terminating facilities which it offered have been provided by a seven-point, laminated phenolic terminal strip mounted at the bottom of the coin chute (see Figure 1). On Touch Calling models the keyset oscillator is mounted on an alu-

minum angle bracket which supports it horizontally beneath the chute (Figure 2) and the dial and instruction card mounting parts are replaced by an aluminum die-cast faceplate (Figure 3).

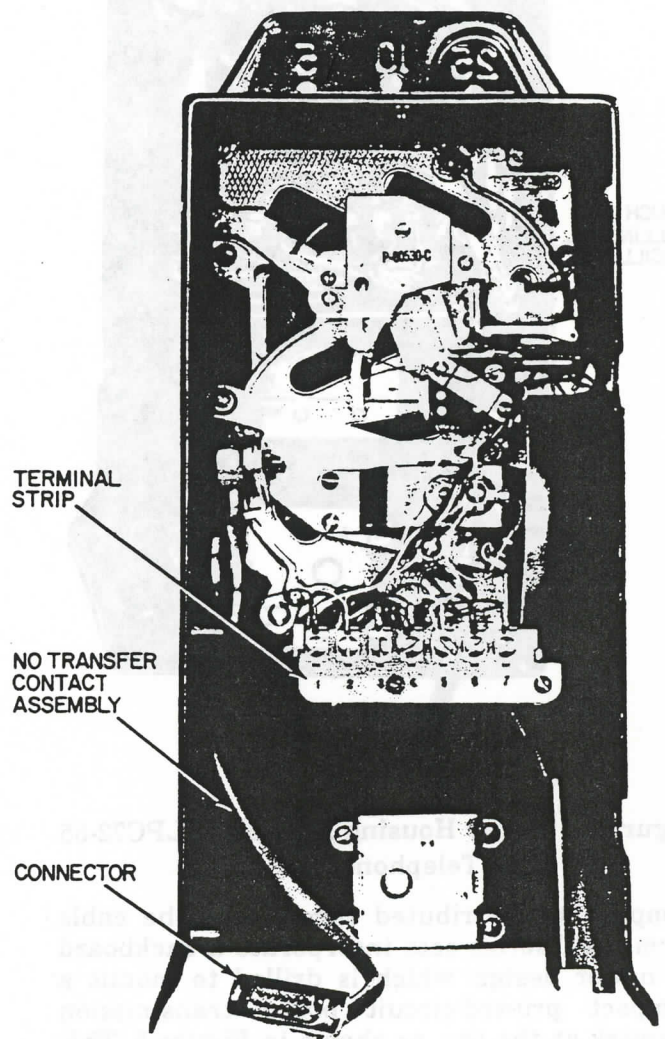


Figure 1. Upper Housing Assembly, LPC82-55 Coin Telephone Set.

## 3. LOWER HOUSING CONSTRUCTION

3.01 LPB-series instruments, whether equipped with the single-coil or the two-coil relay, use a lower housing assembly in which the induction coil is mounted separately to the backplate adjacent to the hookswitch as shown in Figure 4, with the remainder of the network



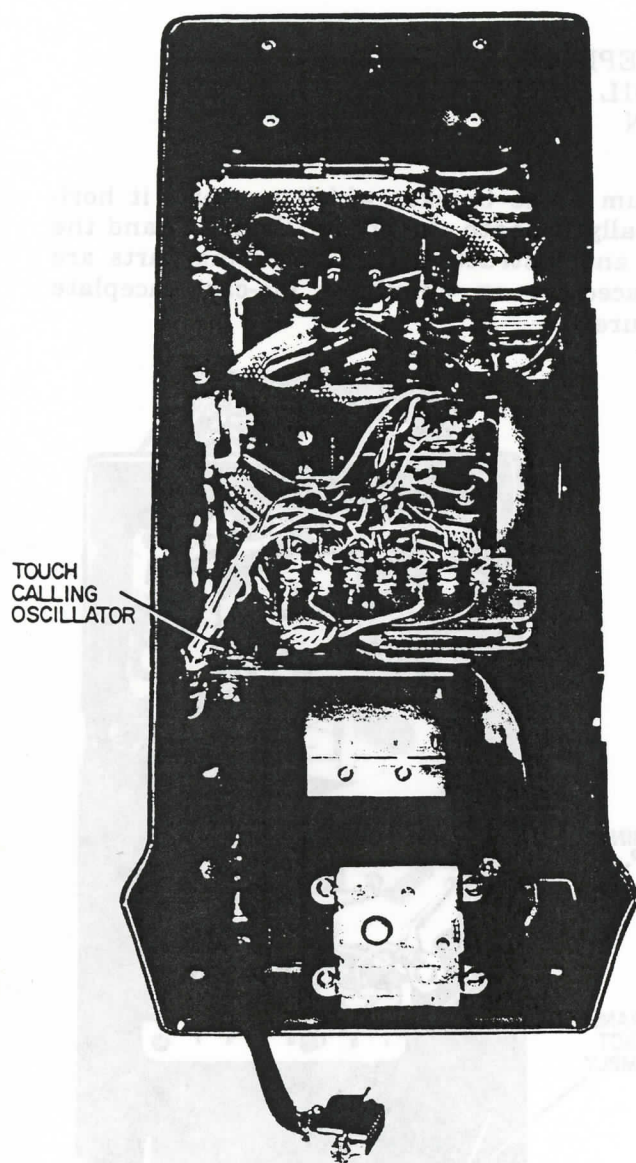


Figure 2. Upper Housing Assembly, LPC72-55 Coin Telephone Set.

components distributed throughout the cable form. LPC-series sets incorporate a backboard of newer design which is drilled to mount a compact printed-circuit board transmission network at the top, as shown in Figure 5. This incorporates all passive components of the talking circuit, and is insulated from the backplate by a narrowed version of the same L-shaped styrene bracket used to support the full-size network in standard dial instruments. The combined terminal strip and transfer spring assembly has been replaced by a nine-point molded phenolic barrier terminal strip, with a 15-contact chassis receptacle mounted on an adjacent bracket to accept the cable connector from the upper housing.

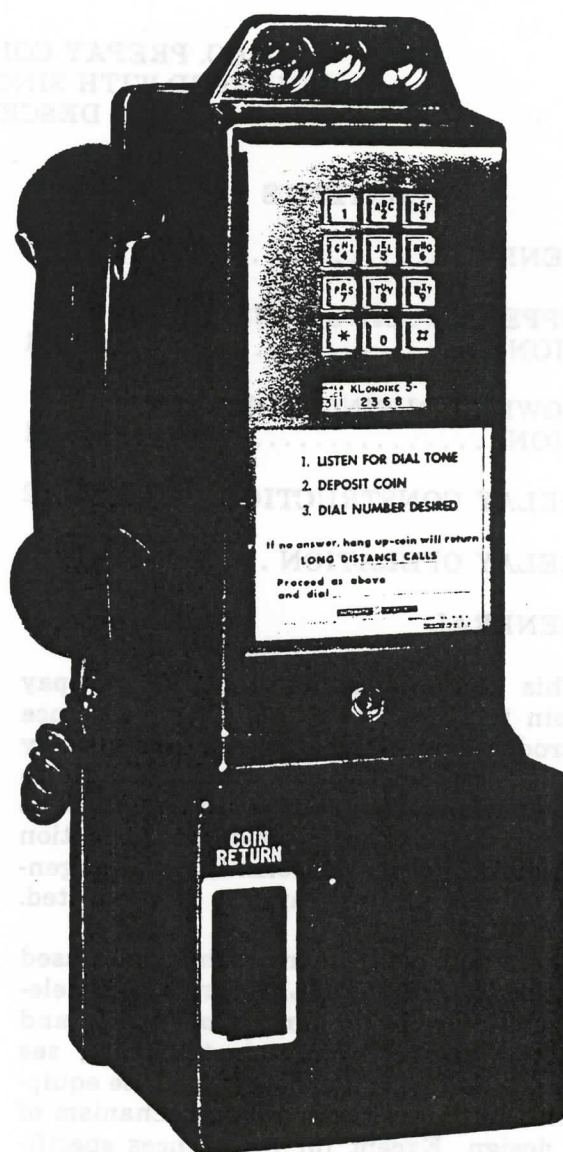


Figure 3. LPC72-55 Coin Telephone Set.

#### 4. RELAY CONSTRUCTION

4.01 The single-coil coin relay is assembled on a solid, stamped-iron E-form frame and provided with a flap-type armature. Contact springs are mounted on the inner side of the frame and actuated by a phenolic fibre lift which protrudes through the frame. A rocker arm connected to the armature at its pivot point provides vertical movement to a nylon selector card, shown in Figure 6, which is supported on a U-shaped mounting bracket on the rear of the frame. This movement is imparted to a nylon cam, the top of which pivots approximately 40° to the left or right of vertical as the armature and selector card are operated. A



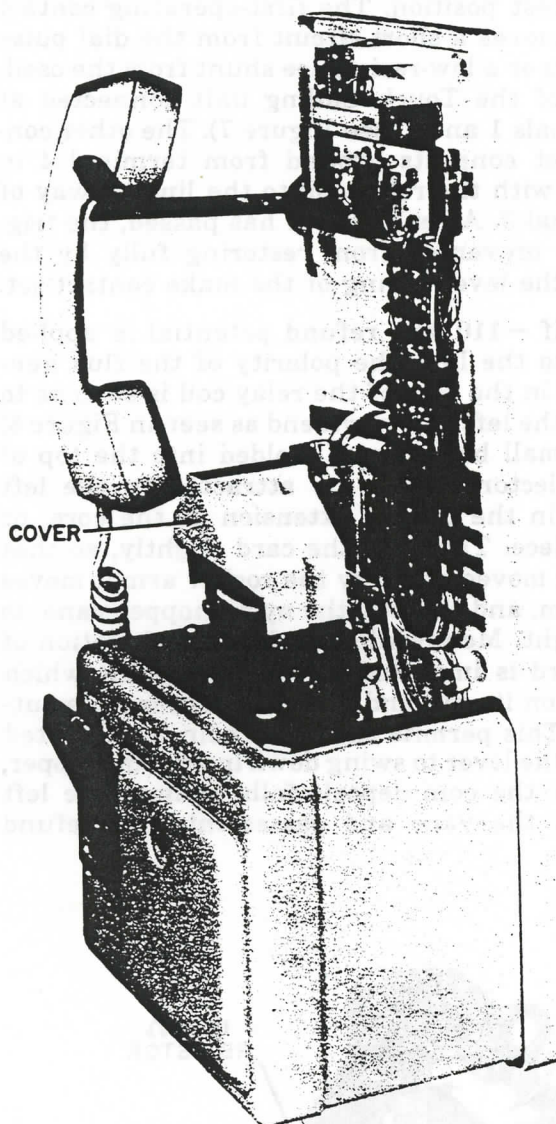


Figure 4. Lower Housing Assembly, LPB-Series Prepay Coin Telephone Set.

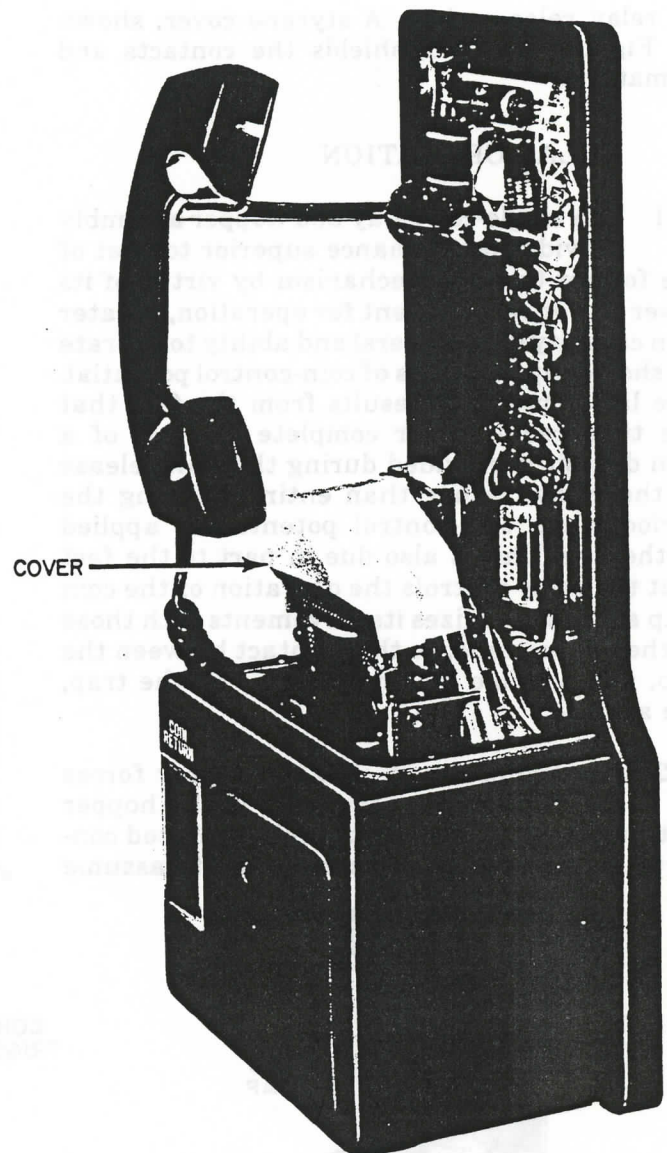


Figure 5. Lower Housing Assembly, LPC-Series Prepay Coin Telephone Set.

horizontal rectangular opening in the selector card transfers the vertical motion of the card to the coil trap lever of a new style coin hopper, while a square opening in the top of the cam engages the stem of the hopper vane and moves it radially to the refund or collect position. At the top of the relay assembly, a nylon coin trigger controls a group of contacts at the rear of the spring pile which are restored by the fibre spring lift when the armature is operated.

4.02 All connections to the relay are made at screw terminals located at the right side

of the contact spring pile. A  $1000\Omega$  resistor controlled by the contacts is soldered to similar terminals at the left side of the pile, with the relay coil connected in like manner to terminals on both sides. At the very top of the armature tab, above its point of contact with the spring lift, a Phillips-head screw with a nylon stop insert can be adjusted to protrude through a hole in the frame-supporting member when the armature reaches the limit of its travel. A nylon stud on the end of the screw displaces a phosphor-bronze spring strip mounted to the frame behind the hole, permitting factory adjustment



of relay release time. A styrene cover, shown in Figures 4 and 5, shields the contacts and armature.

## 5. RELAY OPERATION

5.01 The single-coil relay and hopper assembly provides performance superior to that of the former two-coil mechanism by virtue of its lower power requirement for operation, greater coin capacity (20 quarters) and ability to operate on shorter applications of coin-control potential. The latter property results from the fact that the time required for complete disposal of a coin deposit is provided during the slow release of the relay, rather than entirely during the period when coin-control potential is applied to the line. This is also due in part to the fact that the relay controls the operation of the coin trap and synchronizes its movements with those of the hopper vane, so that contact between the two, and possible lodging of coins on the trap, are avoided.

5.02 Passage of a coin into the hopper forces the coin trigger downward in the hopper slot, tripping it to permit the coin-operated contacts at the rear of the spring pile to assume

their rest position. The first-operating contact set removes a short-circuit from the dial pulse springs or a low-resistance shunt from the oscillator of the Touch Calling unit connected at terminals 1 and 2 (see Figure 7). The other contact set connects ground from terminal 4 in series with the relay coil to the line by way of terminal 3. After the coin has passed, the trigger is prevented from restoring fully by the tit of the lever spring of the make contact set.

5.03 If -110 volt refund potential is applied to the line, the polarity of the flux generated in the core of the relay coil is such as to cause the left end (right end as seen in Figure 6) of a small bar magnet molded into the top of the selector card to be attracted to the left (right in the figure) extension of the core, or pole piece. This tilts the card slightly, so that as it is moved down by the rocker arm it moves the cam, and thereby the nylon hopper vane, to the right. Meanwhile the downward motion of the card is imparted to the trap lever, which pivots on its pin and moves its upper edge outward. This permits the nylon coin trap pivoted above the lever to swing down inside the hopper, so that the coin deposit falls against the left side of the vane and passes into the refund chute.

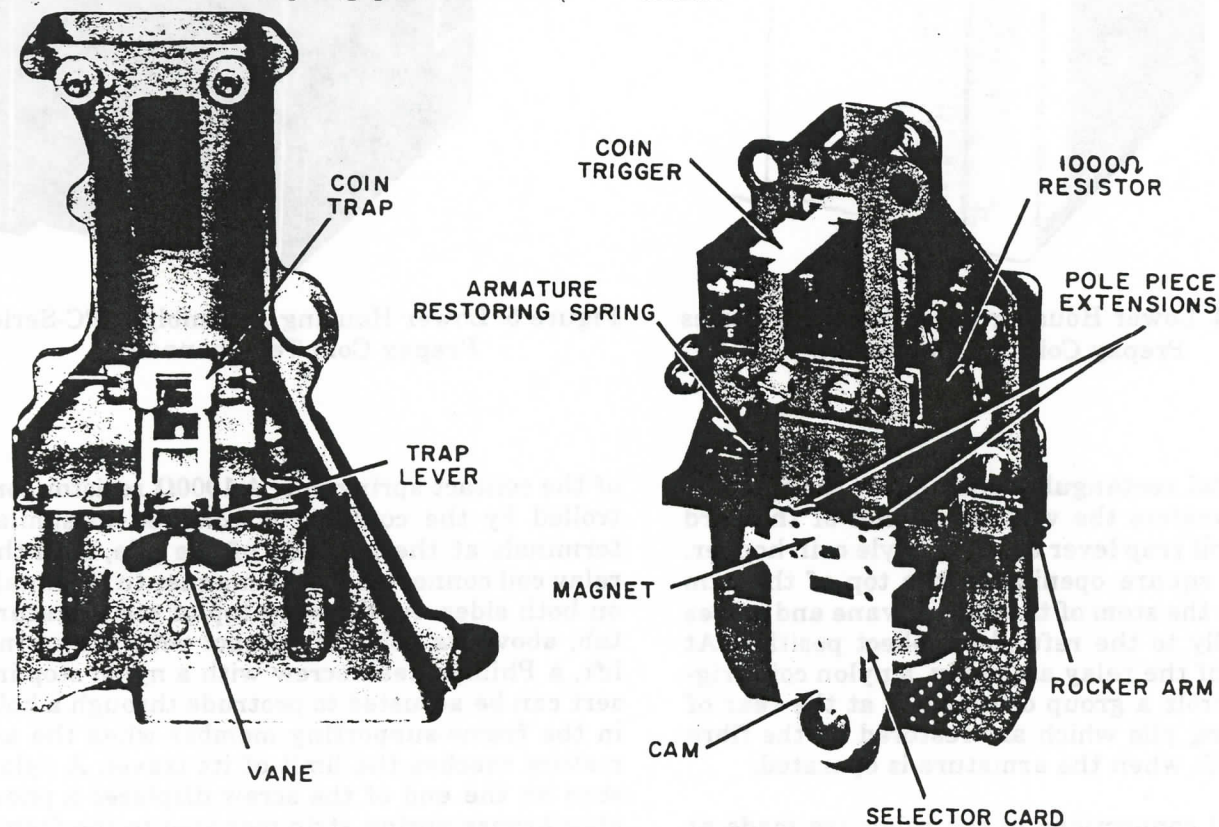


Figure 6. Single-Coil Coin Relay and Hopper Assembly.



5.04 If +110 volt collect potential is applied to the line, the flux generated at the pole piece extensions is such as to attract the right end (left as seen in Figure 6) of the selector card magnet, tilt the card to the left, operate the cam and vane to the left, and drop the coin deposit against the right side of the vane into the coin receptacle.

5.05 As the relay armature operates the selector card through the rocker arm, it also moves the spring lift toward the hopper, actuating a set of transfer contacts which insert a  $1000\Omega$  resistance in series with the coil and then short-circuit the coil. The resistance thus takes the place of the coil in the path of the coin control current, stabilizing the latter to prevent damage to the ground contacts when they open and to resistance lamps in the supply circuit at the central office. At the end of its stroke the spring lift provides substantial follow to the coin operated ground contacts, so that the tip of the lever spring no longer interferes with the trigger, which restores completely to normal under the force of a coil spring in torsion. The dial- or TC unit-shunting springs are forced closed.

5.06 With the relay coil shorted, the current induced by the collapsing field tends to retard the decay of the flux in the core and makes the armature slow to release. As it begins to restore, the spring lift permits the coin-operated springs to return from their over-travel position. With the trigger normal, the lever spring of the make contact set is prevented from returning to its rest position. This in turn prevents the break (dial- or TC unit-shunting) contact set from reopening and allows the make (ground) contact set to open. As the ground path is opened, the relay is disconnected from the coin battery circuit, thus extinguishing the coin pilot lamp if collection or refund is being controlled from a manual switchboard, and preventing reoperation of the relay if the operator or control circuit continues application of coin battery to the line. Finally, the transfer contact set is restored to remove the short-circuit from the relay coil and bypass the series resistor. The upward motion of the selector card during release acts to return the coin trap to horizontal and the hopper vane to its neutral vertical position in preparation for the next deposit.

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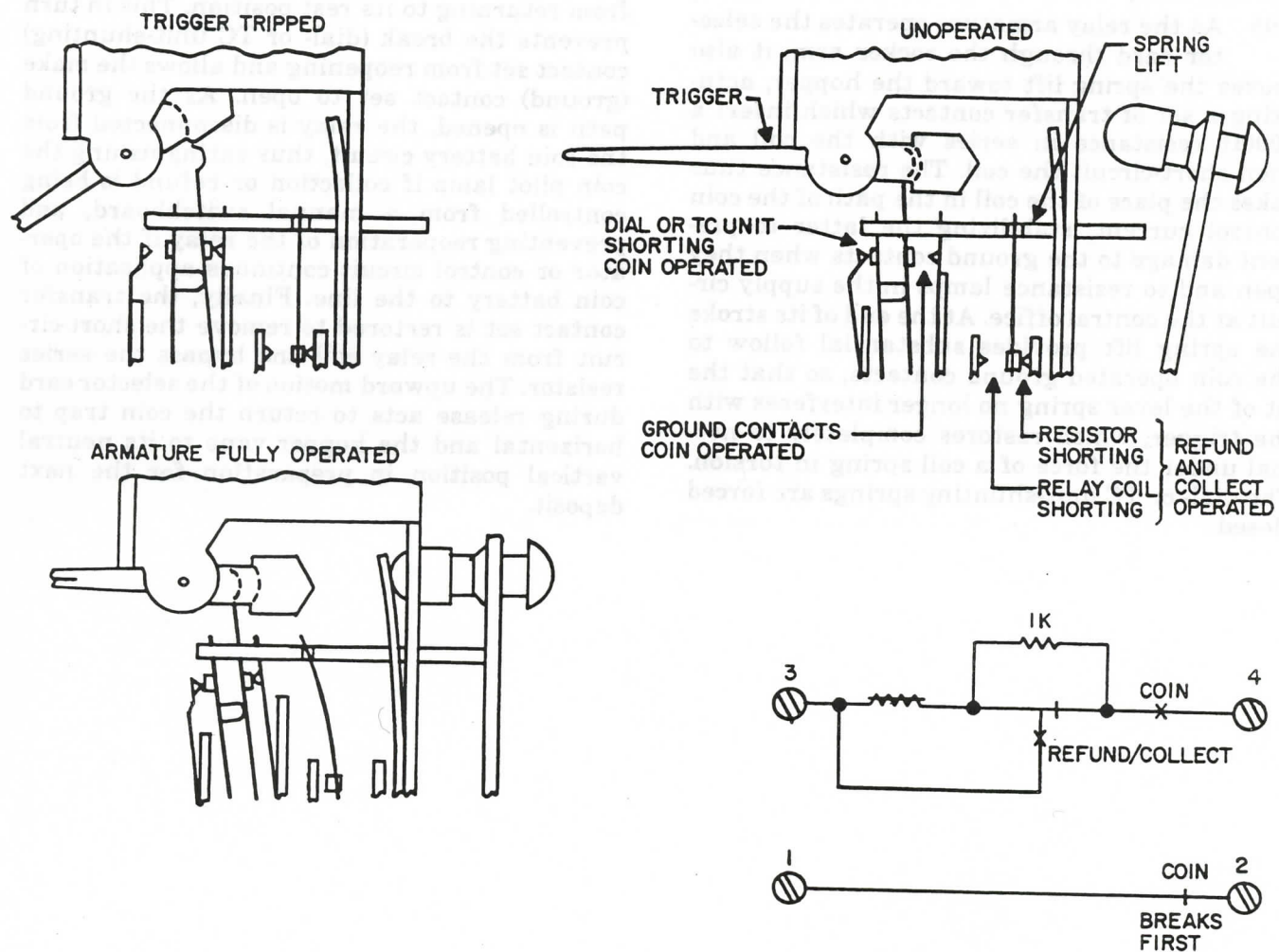


Figure 7. Coin Relay Contact Spring Assembly and Schematic.



N.E.CO. SINGLE-COIL COIN RELAY  
DESCRIPTION

1. GENERAL

1.01 This addendum is issued to expand the scope and modify the rating of Section 476-202-120, Issue 1. In ink or red pencil, write "See Addendum" to the right of the title on that section, and file this addendum ahead of it in the practices binder.

2. CHANGES

2.01 The equivalent A.E.Co. coin relay assembly referred to in Paragraph 1.01 is substantially identical in construction to the N.E.Co. version, and this section may be applied to both, subject to minor exceptions as herein noted. The A.E.Co. unit is rated System standard, as is this section when so applied.

2.02 From an appearance standpoint, the only distinguishing features of the A.E.Co. coin relay and hopper assembly are the use of headed-over integral studs to fasten the front

and rear hopper castings together, rather than brass rivets as shown in Figure 1; provision of a relief in the right edge of the rear hopper casting to clear the corner of the terminal block assembly; provision of a coin shield in the refund aperture as standard; use of a resistor with a higher dissipation rating; use of wound brown cotton as a coil cover in place of acetate strip; and designation of terminal G as 4.

2.03 The corresponding A.E.Co. number for the P11E964 relay and hopper assembly referred to in Paragraph 1.01 and Figure 3 is P-60701. For the P10E786 relay mentioned in Paragraphs 1.01 and 3.06 and in Figure 2 the A.E.Co. equivalent is P-60702. The P10E755 hopper specified in Paragraph 3.06 and Figure 2 corresponds to A.E.Co. hopper P-60703. Dust cover P10E783, mentioned in Paragraph 2.02 and shown in Figure 3, is the same as A.E.Co. dust cover P-51942. Terminal G, referred to in Paragraph 3.01 and Figure 4, is designated as terminal 4 in the A.E.Co. assembly.

N.E.CO. SINGLE-COIL COIN RELAY  
DESCRIPTION

1. GENERAL

1.01 This section describes the Northern Electric Co. P10E786 coin relay and its operation. This relay, which forms a part of the P11E964 relay and hopper assembly, is a single-coil device of considerably greater sensitivity than the conventional two-coil relay presently supplied on A.E. Co. coin telephone sets arranged for prepay service. It is provisionally accepted as System standard for replacement purposes in situations requiring extended loop operation or increased hopper capacity over that afforded by the two-coil mechanism. The N.E. Co. unit will be superseded by an equivalent A.E. Co. assembly when available.

1.02 Illustrations in this section show a relay and hopper assembly of domestic manufacture. Slight variations in construction may be noted in the Canadian product.

2. CONSTRUCTION

2.01 The P10E786 coin relay is assembled on a solid, stamped-iron E-form frame and provided with a flap-type armature similar to that found on W.E. Co. U-type relays (see Figure 1). Contact springs are mounted on the inner side of the frame and actuated by a phenol fibre lift which protrudes through the frame. A rocker arm connected to the armature at its pivot point provides vertical movement to a nylon selector card (see Figure 2) which is slidably supported on a U-shaped mounting bracket on the rear of the frame. This movement is imparted to a nylon cam, the top of which pivots approximately 40° to the left or right of vertical as the armature and selector card are operated. A horizontal rectangular opening in the selector card transfers the vertical motion of the card to the coin trap lever of a new style coin hopper, while a square opening in the top of the cam engages the stem of the hopper vane and moves it radially to the refund

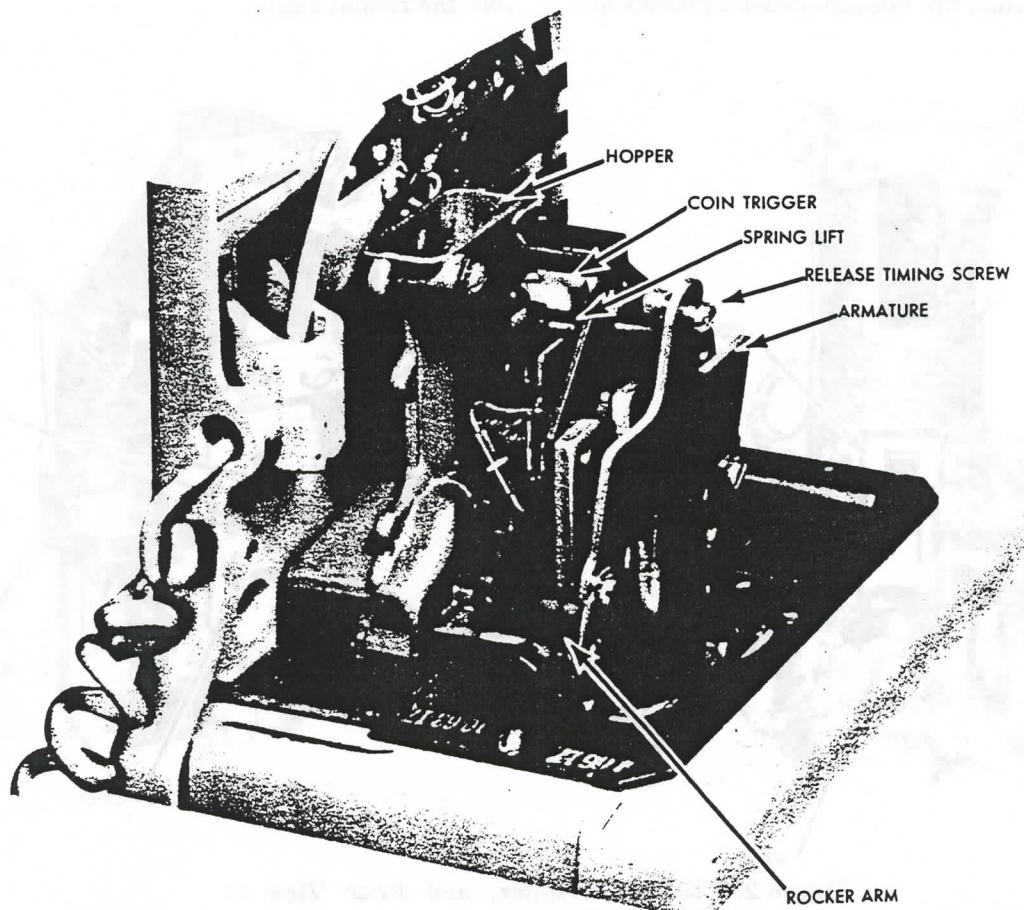


Figure 1. Single-Coil Coin Relay, Shown Installed,  
With Cover Removed.



or collect position. At the top of the relay assembly, a nylon coin trigger controls a group of contacts at the rear of the spring pile which are restored by the fibre spring lift when the armature is operated.

2.02 All connections to the relay are made at screw terminals located at the right side of the contact spring pile. A  $1000\Omega$  resistor controlled by the contacts is soldered to similar terminals at the left side of the pile, with the relay coil connected in like manner to terminals on both sides. At the very top of the armature tab, above its point of contact with the spring lift, a Phillips-head screw with a nylon stop insert can be adjusted to protrude through a hole in the frame-supporting member when the armature reaches the limit of its travel. A nylon stud on the end of the screw displaces a phosphor-bronze spring strip mounted to the frame behind the hole, permitting factory adjustment of relay release time. A P10E783 styrene cover (see Figure 3) shields the contacts and armature.

### 3. OPERATION

3.01 Passage of a coin into the hopper forces the coin trigger downward in the hopper slot, tripping it to permit the coin-operated contacts at

the rear of the spring pile to assume their rest position. The first-operating contact set removes a short-circuit from the dial pulse springs or a low-resistance shunt from the oscillator of the Touch Calling unit connected at terminals 1 and 2 (see Figure 4). The other contact set connects ground from terminal G in series with the relay coil to the line by way of terminal 3. After the coin has passed, the trigger is prevented from restoring fully by the tit of the lever spring of the make contact set.

3.02 If -110 volt refund potential is applied to the line, the polarity of the flux generated in the core of the relay coil is such as to cause the left end (right end as seen in Figure 2) of a small bar magnet molded into the top of the selector card to be attracted to the left (right in the figure) extension of the core, or pole piece. This tilts the card slightly, so that as it is moved down by the rocker arm it moves the cam, and thereby the nylon hopper vane, to the right. Meanwhile the downward motion of the card is imparted to the trap lever, which pivots on its pin and moves its upper edge outward. This permits the nylon coin trap pivoted above the lever to swing down inside the hopper, so that the coin deposit falls against the left side of the vane and passes into the refund chute.

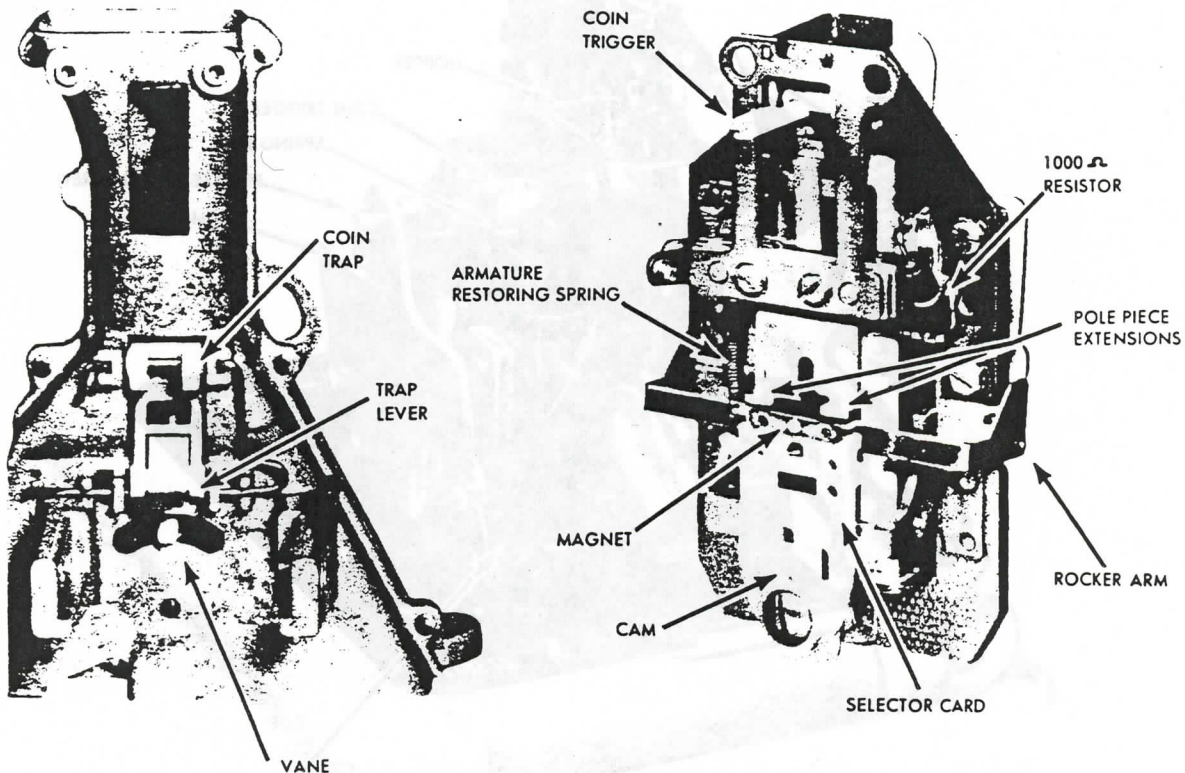


Figure 2. P10E755 Hopper, and Rear View of P10E786 Relay.



3.03 If +110 volt collect potential is applied to the line, the flux generated at the pole piece extensions is such as to attract the right end (left as seen in Figure 2) of the selector card magnet, tilt the card to the left, operate the cam and vane to the left, and drop the coin deposit against the right side of the vane into the coin receptacle.

3.04 As the relay armature operates the selector card through the rocker arm, it also moves the spring lift toward the hopper, actuating a set of transfer contacts which insert a  $1000\Omega$  resistance in series with the coil and then short-circuit the coil. The resistance thus takes the place of the coil in the path of the coin control current, stabilizing the latter to prevent damage to the ground contacts when they open and to resistance lamps in the supply circuit at the central office. At the end of its stroke the spring lift provides substantial follow to the coin operated ground contacts, so that the tilt of the lever spring no longer interferes with the trigger, which restores completely to normal under the force of a coil spring in torsion. The dial-or TC unit-shunting springs are forced closed.

3.05 With the relay coil shorted, the current induced by the collapsing field tends to retard the decay of the flux in the core and makes the armature slow to release. As it begins to restore, the spring lift permits the coin-operated springs to return from their over-travel position. With the trigger normal, the lever spring of the make contact set is prevented from returning to its rest position. This in

turn prevents the break (dial-or TC unit-shunting) contact set from reopening and slows the make (ground) contact set to open. As the ground path is opened, the relay is disconnected from the coin battery circuit, thus extinguishing the coin pilot lamp if collection or refund is being controlled from a manual switchboard, and preventing reoperation of the relay if the operator or control circuit continues application of coin battery to the line. Finally, the transfer contact set is restored to remove the short-circuit from the relay coil and bypass the series resistor. The upward motion of the selector card during release acts to return the coin trap to horizontal and the hopper vane to its neutral vertical position in preparation for the next deposit.

3.06 In conjunction with its associated P10E755 hopper, the P10E786 coin relay provides performance superior to that of the two-coil mechanism by virtue of its lower power requirement for operation, greater coin capacity and ability to operate on shorter applications of coin potential. The latter property results from the fact that the time required for complete disposal of a coin deposit is provided during the slow release of the relay, rather than entirely during the period when coin control potential is applied to the line. This is also due in part to the fact that the relay controls the operation of the coin trap and synchronizes its movements with those of the hopper vane, so that contact between the two, and possible lodging of coins on the trap, are avoided.

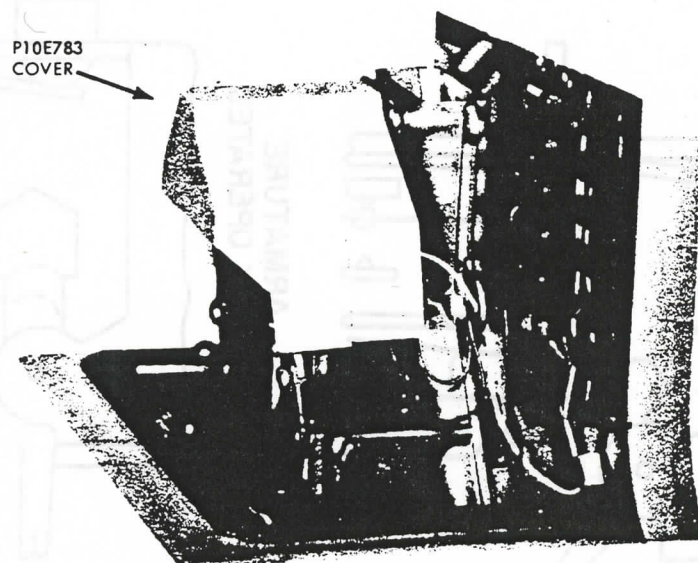


Figure 3. P11E964 Relay and Hopper Assembly  
Installed in A. E. Co. Coin Telephone  
Set.



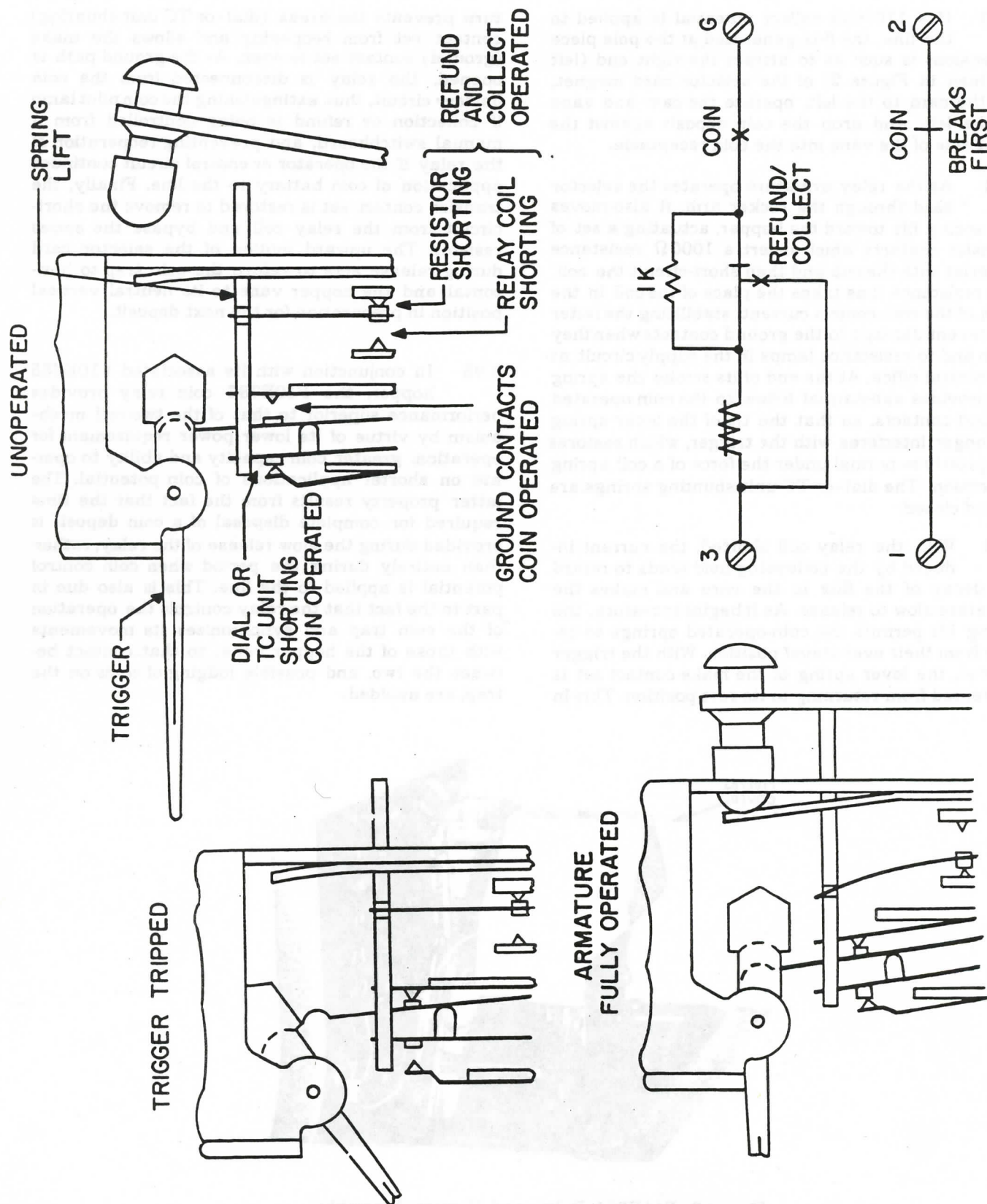


Figure 4. Coin Relay Contact Spring Assembly and Schematic.

A.E.CO. 3-GAUGE COIN TELEPHONE SET  
INSTALLATION

1. GENERAL

1.01 This section provides installation instructions for A.E.Co. Prepay Coin Telephone sets. Details on booths, coin telephone security devices, connections, signs, directories, and directory apparatus are provided in other sections in this division of General System Practices.

2. LOCATION

2.01 The location where the coin telephone is to be installed will be specified on the service order. The location should:

- (a) Have sufficient light.
- (b) Be free from excessive noise, vibration and dirt.
- (c) Be clear of pedestrian and vehicle traffic.
- (d) Be clear of glass counters, showcases, or other fragile objects.
- (f) Have a 6-inch clearance from fluorescent lights, transformers and similar apparatus to avoid inductive interference.

2.02 The surface on which the backboard is to be mounted should be sufficiently firm so that the backboard cannot be dislodged. The surface must be flat so that the backboard and coin telephone cannot be pried loose.

2.03 If the coin telephone must be located on finely finished surfaces, obtain instructions from your immediate supervisor before proceeding with the installation. Arrangements should be made to have the customer or building owner drill mounting and wire entrance holes through glazed tile, marble and other such surfaces.

3. INSTALLATION

3.01 Installation of the coin telephone in an aluminum booth is described in the 476-500 series of General System Practices. Install the coin telephone in a wood booth or on a wall as follows:

- (1) Place the backboard (see Figure 1) against the wall vertically (it is important that the backboard and the coin telephone are exactly upright).
- (2) Mark through holes B onto the wall.
- (3) Drill holes, where marked, to take 1/4-20 anchors.
- (4) Push a loop of inside wire through backboard hole C.

NOTE: When installing a coin telephone in a wood booth or on a wall, #14 ground wire must be connected between the coin telephone lower housing and protector ground as described in Part 5. The ground wire must be connected to the coin telephone before the coin telephone is mounted on the backboard.

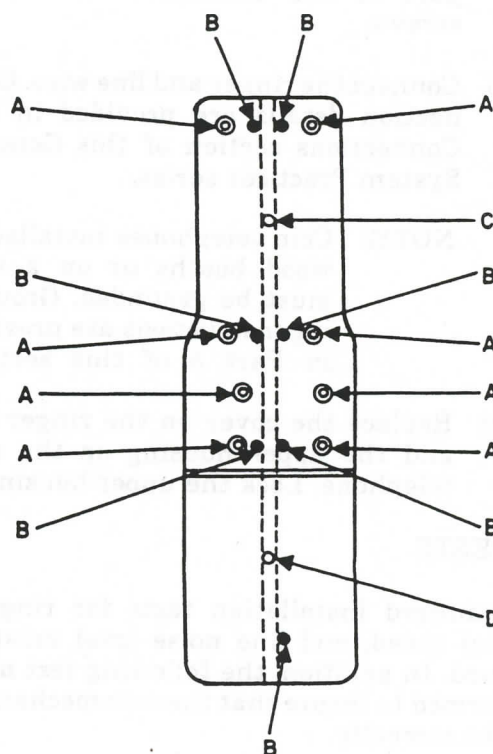


Figure 1. Coin Telephone Backboard.



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- (5) Bring the remainder of the wire down the channel at the rear of the backboard.
- (6) Push the end of the inside wire through the hole marked D.

NOTE: If the inside wire runs along the bottom of the booth or enclosure, push a loop of inside wire through hole D; bring the wire up the backboard channel and push it through hole C.

- (7) Mount the backboard on the wall with anchor screws.
- (8) Unlock the coin telephone upper housing and lift the housing off.
- (9) Mount the lower housing and backplate onto the backboard with 1/4-20 flathead machine screws through the threaded inserts of holes A.
- (10) Remove the cover from the ringer box.
- (11) Mount the ringer box on the bottom part of the backboard with wood screws.
- (12) Connect the ringer and line wire. Connection details are provided in the Connections section of this General System Practices series.

NOTE: Coin telephones installed in wood booths or on a wall must be grounded. Grounding instructions are provided in Part 5 of this section.

- (13) Replace the cover on the ringer box and the upper housing on the coin telephone. Lock the upper housing.

#### 4. TESTS

4.01 Standard installation tests for ringing, dial speed, and line noise level must be performed. In addition, the following test must be performed to insure that the coin mechanism functions correctly.

4.02 When the cash compartment key is available or the cash compartment door is not

installed check coin mechanism operation as described in the following procedure. (See Paragraph 4.03 for checking a locked coin telephone when no key is available.)

- (1) For a coin telephone providing five-cent service, deposit a nickel, dial the number of the coin telephone and wait for busy tone. Hang up and check for correct coin refund.
- (2) For a coin telephone equipped for two-nickel service, deposit one nickel and check that a call cannot be made. Deposit a second nickel and dial the number assigned to the coin telephone. When busy tone is heard, hang up and check for correct coin refund.
- (3) For coin telephones equipped for dime-only control, deposit a dime or quarter and dial the number assigned to the coin telephone. When busy tone is heard, hang up and check for correct coin refund.
- (4) Remove cash compartment door if it is in place.
- (5) Insert a dime and dial the test line.
- (6) When connection is completed to the test line, hang up. Check that the dime falls into the cash compartment.
- (7) Deposit a quarter, dial the test line and hang up when connection is made. Check that the quarter falls into the cash compartment.
- (8) Deposit a dime. Dial the local testboard (or operator) for assistance with coin signal testing.
- (9) Deposit the proper coin in each slot and have the testboardman identify each coin.
- (10) Have the testboardman apply refund current. Check that the coins drop into the coin return receptacle.
- (11) Redeposit the coins and have the testboardman apply collect current. Check that coins drop into the cash compartment.
- (12) Replace and lock the cash compartment door.

4.03 When a cash compartment key is not available and the cash compartment door is locked, check the coin telephone as follows:

- (1) Depending on the type of coin operation the coin telephone is equipped for, perform step (1), (2), or (3) of Paragraph 4.02.
- (2) Make a call to the local testboard (or operator) for assistance with coin signal testing.
- (3) Deposit the proper coin in each slot and have the testboardman identify each coin. Hang up.

#### 5. COIN TELEPHONE HOUSING GROUND

5.01 A coin telephone installed in a wood booth or on a wall must be grounded as follows:

- (1) Solder a spade terminal (D-15830-A) to each end of an 11-inch #14 wire. Terminate one end under a mechanism base machine screw. Route the wire to avoid the coin chute opening and terminate the other spade terminal at terminal strip ground terminal G. Solder a spade terminal to one end of a #14 wire (wire length sufficient to reach from terminal G through the lower housing wire opening and to the protector ground terminal). Terminate the spade terminal at terminal G. Route the #14 wire through the lower housing wire opening and wrap the end of the wire around the protector ground terminal.
- (2) At the point on the edge of the upper housing which will contact the equalizing spring when the upper housing is installed (see Figure 2), remove sufficient paint from the inside surface so that a ground clip can make contact with the metal of the upper housing. Place a Tinnerman

C-23405-012-3B ground clip on the upper housing at the point where it will contact the equalizing spring when the housing is installed.

5.02 The coin telephone installation must be in accordance with the protection and grounding procedures described in the 435 division of General System Practices.

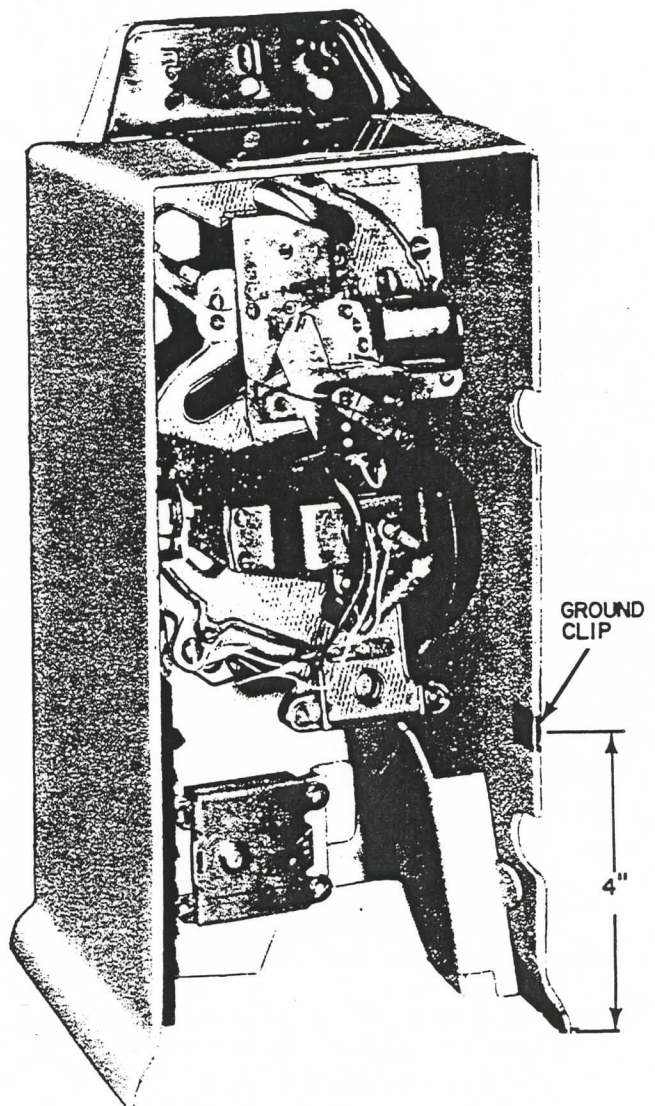


Figure 2. Ground Clip Attachment.



A.E.CO. LPB82-SERIES COIN TELEPHONE SETS  
CONNECTIONS

1. GENERAL

1.01 This addendum is issued to make a wiring change in Section 476-202-403, Issue 1, Figure 5 Wiring Diagram.

1.02 In ink or red pencil make the change indicated in Part 2 and file this addendum ahead of Section 476-202-403, Issue 1.

2. CHANGE

2.01 When using Touch Calling Service remove the wiring strap between contacts 2 and 3 of the single coin relay as shown in Figure 5 Wiring Diagram on Page 9.

A.E. CO. LPB82-SERIES COIN TELEPHONE SETS  
CONNECTIONS

1. GENERAL

1.01 This section provides connection drawings for LPB82-series coin telephone sets. These are prepay instruments with the components of a varistor-regulated transmission network distributed among the wires in the cable form and connected to an induction coil having screw terminals. Sets manufactured after July, 1967, are equipped with a single-coil coin relay assembly, as shown in the main body of each drawing. Those of earlier manufacture use the original two-coil assembly shown as an alternate; either may be found on rebuilt instruments.

1.02 Figure 1 shows the wiring of the LPB82 set for single-nickel service in dial or manual offices, and Figure 2 the wiring of the LPB82-55 set, which requires a dime or two-nickel deposit. Figure 3 applies to a small number of factory-built and to shop-rebuilt sets based on the LPB82-55 (dial) assembly, but provided with a Touch Calling unit mounted in a stainless steel extension housing over the normal dial location. Figure 4 covers LPB82-55 instruments modified for mounting behind a Type 101 panel, and Figure 5 the same assembly arranged for Touch Calling service.



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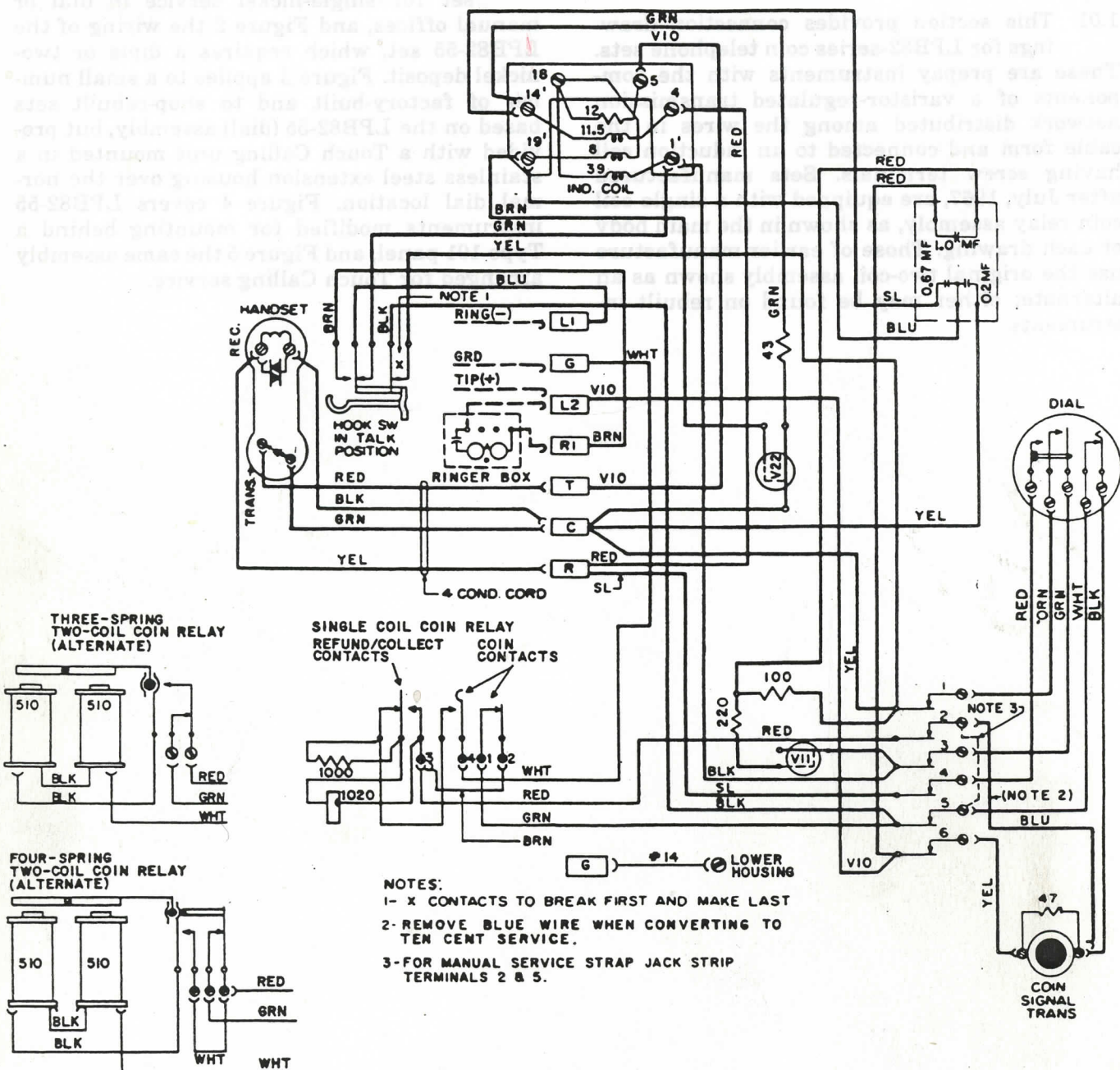


Figure 1. Wiring Diagram, LPB82 Coin Telephone Set.

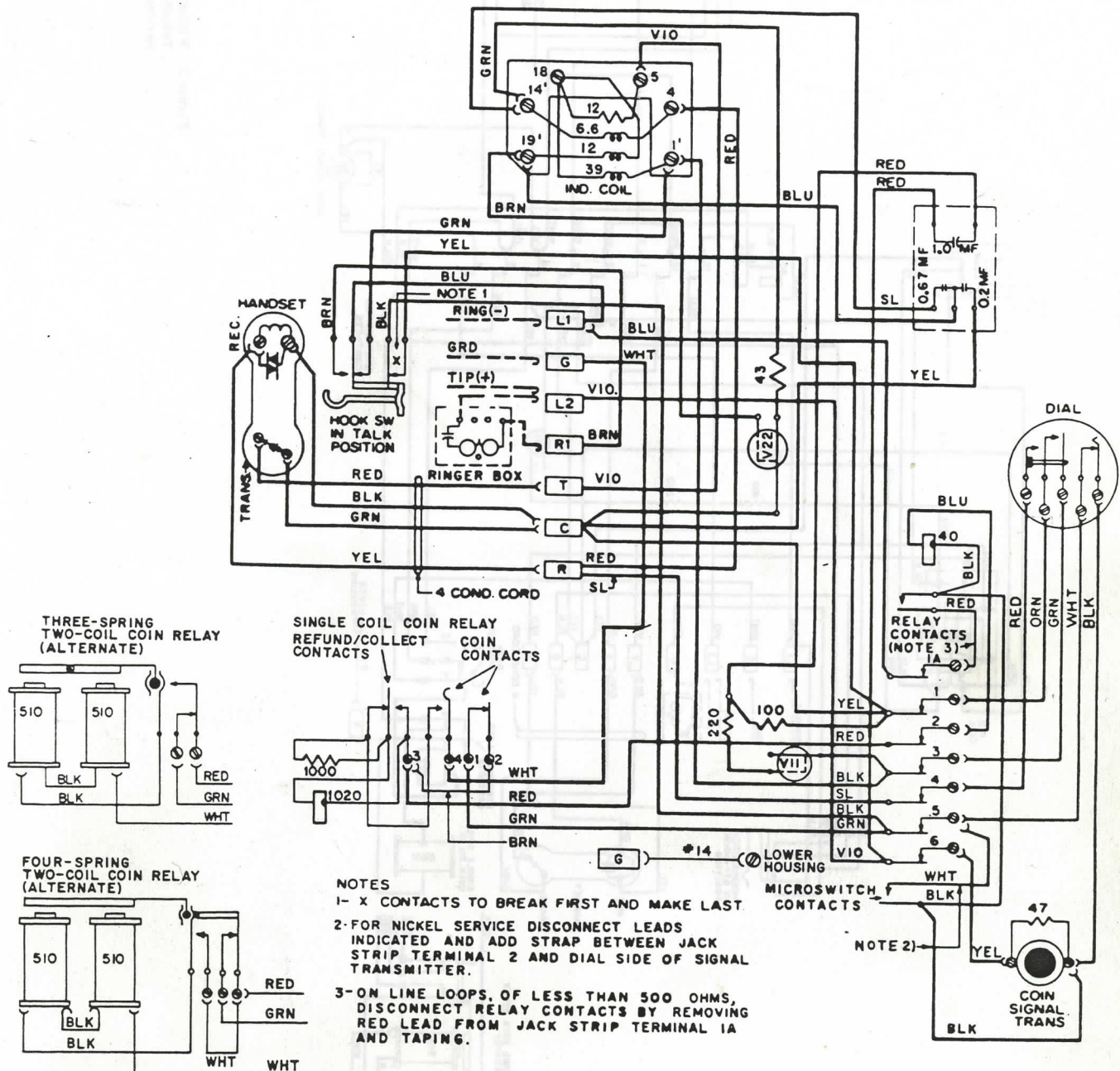


Figure 2. Wiring Diagram, LPB82-55 Coin Telephone Set.



N. E. CO. SINGLE-COIL COIN RELAY  
MAINTENANCE

1. GENERAL

1.01 This addendum is issued to expand the scope and modify the rating of Section 476-202-520, Issue 1. In ink or red pencil, write "See Addendum" to the right of the title on that section, and file this addendum ahead of it in the practices binder.

2. CHANGES

2.01 An A.E.Co. coin relay and hopper assembly, substantially identical in construction to the N.E.Co. unit referred to in Paragraph 1.01, has been made available and rated as System standard. Subject to minor exceptions as herein noted, this section may be applied to both, and is likewise rated as standard when so applied.

2.02 The corresponding A.E.Co. number for the P11E964 relay and hopper assembly referred to in Paragraph 1.01 is P-60701. For

the P10E786 relay and P10E755 hopper specified in Figure 5 the A.E.Co. equivalents are relay P-60702 and hopper P-60703. Dust cover P10E783, mentioned in Paragraphs 2.01, 3.01 and 4.03, is the same as A.E.Co. dust cover P-51942. The P10E810 Sems fasteners and P10E752 hex head screws detailed in Paragraphs 4.01 and 4.03 are listed by A.E.Co. as upper coin relay mounting screw D-761037-A and lower coin relay mounting screw D-761036-A, respectively. Terminal G, referred to in Paragraph 2.02(2) and Figure 2, is designated as terminal 4 in the A.E.Co. assembly.

2.03 In factory-assembled cointelephone sets using the P-60701 relay and hopper, the green lead from transfer spring 5 is connected to relay terminal 1, rather than to terminal 2 as shown in Figure 2. The strap from relay terminal 3 is connected to relay terminal 2, rather than to terminal 1, and is made of brown wire rather than red.

N.E.CO. SINGLE-COIL COIN RELAY  
MAINTENANCE

1. GENERAL

1.01 This section sets forth maintenance procedures for the Northern Electric Co. P11E964 relay and hopper assembly when installed in an A.E. Co. prepay coin telephone set as replacement for the original two-coil mechanism. For maintenance of other components of the set, see the section in the 476-201 series entitled "Field Maintenance—A.E. Co. Prepay and Local Prepay Paystations".

2. CONTACT SPRINGS

Ground Contact Springs

2.01 If a trouble report indicates that dial tone is not returned after coin deposit (coin-first offices), or that dialing after deposit fails to break dial tone (tone-first offices), the coin-operated ground contact springs may be at fault. With the upper housing removed from the instrument and connected to the lower housing by a P-60605 test cord assembly, and with the P10E783 cover removed from the coin relay (see Figure 1), investigate as follows:

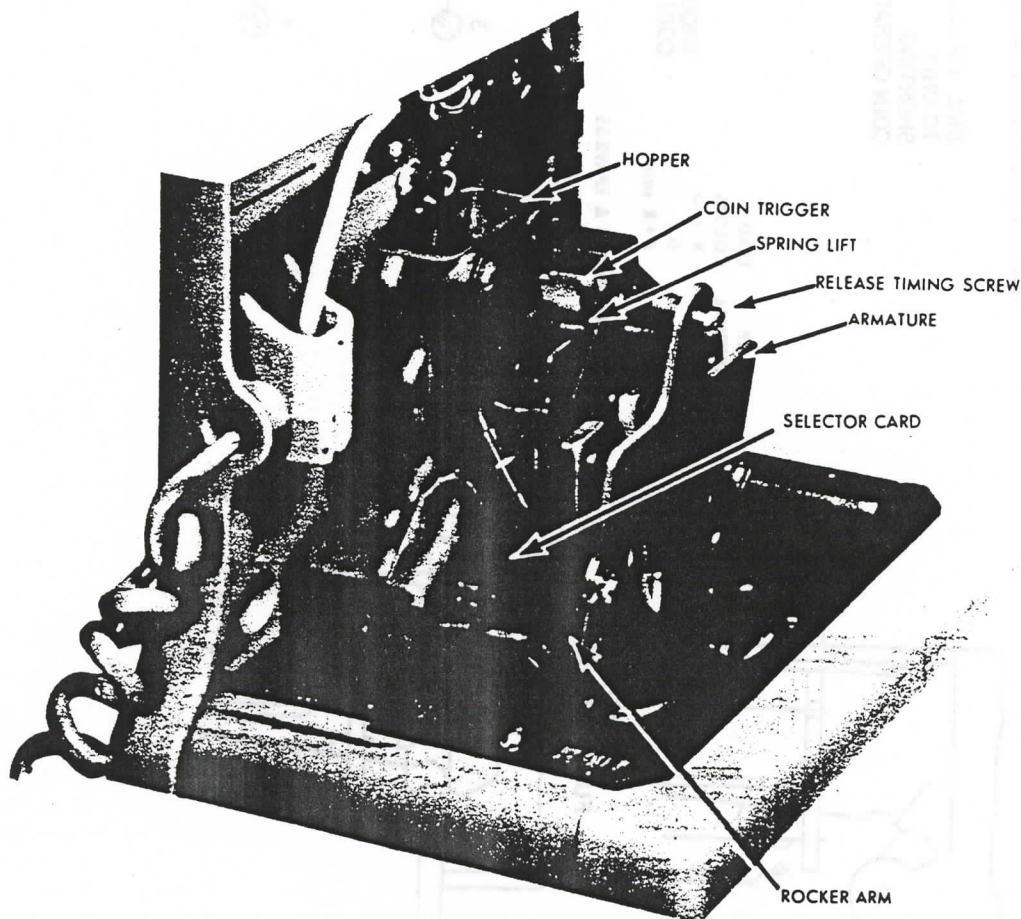


Figure 1. Single-Coil Coin Relay, Shown Installed,  
With Cover Removed.



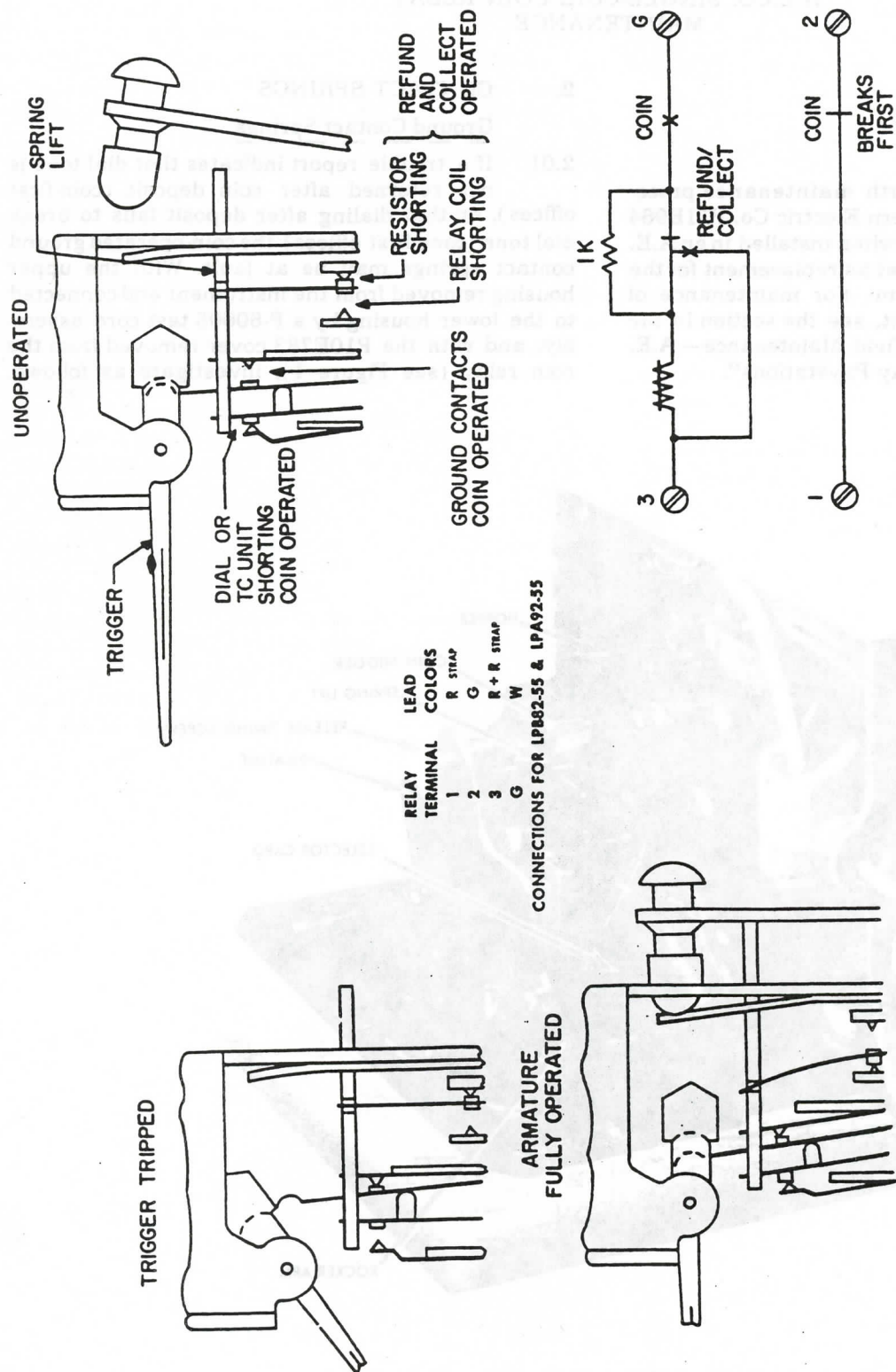


Figure 2. Coin Relay Contact Spring Assembly and Schematic.

- (a) Trip the coin trigger and make visual inspection of the contact springs. The ground contacts (see Figure 2) should make firmly. Verify by feel, using an orange stick.
- (b) Lift the handset and check for presence of dial tone. Dial a local selection digit and check for absence of dial tone.
- (c) If dial tone is not heard in a coin-first office, tilt the relay selector card by pressing down on one ear, and then operate the relay armature. If dial tone is then heard, the relay has an open coil and should be replaced.
- (d) If dial tone is not heard in a tone-first office, check at the line terminals of the set for central office battery feed. If battery is not detected there, check the station and drop wiring for defects.
- (e) If dial tone is heard in a tone-first office, but cannot be broken by dialing, yet the ground contacts appear to make firmly, burnish the contacts with a CB-5 contact burnisher.
- (f) If burnishing fails to clear the trouble, replace the relay.

#### Shunt Contact Springs

2.02 If fraudulent call trouble has been reported,

the coin-operated contact springs which maintain a short circuit across the dial pulse contacts (or a low-resistance shunt across the oscillator of the Touch Calling unit) may be at fault. Using the same test arrangement as in Paragraph 2.01, investigate as follows:

- (1) Make a visual check of the dial shorting contacts. With the coin trigger unoperated, the contacts should be held closed, and the rear spring should exhibit perceptible follow beyond its stop spring, as shown in Figure 2. With the trigger tripped, the buffer on the front spring is free to move forward, and the contacts should be open (rest position).
- (2) With the coin trigger unoperated, provide a substitute path to ground the relay. If a clip lead is available, connect it to relay terminal G and to the resistor lead which terminates at the first and fourth contact springs. If no such lead is at hand, slightly widen the larger U-bend of a common #1 paper clip and insert the clip under the bent portion of relay terminal G as shown in Figure 3, so that it touches the edge of the clamped portion of the stop spring for the fourth contact spring. Be sure the clip does not touch relay terminal 3, and is not in-

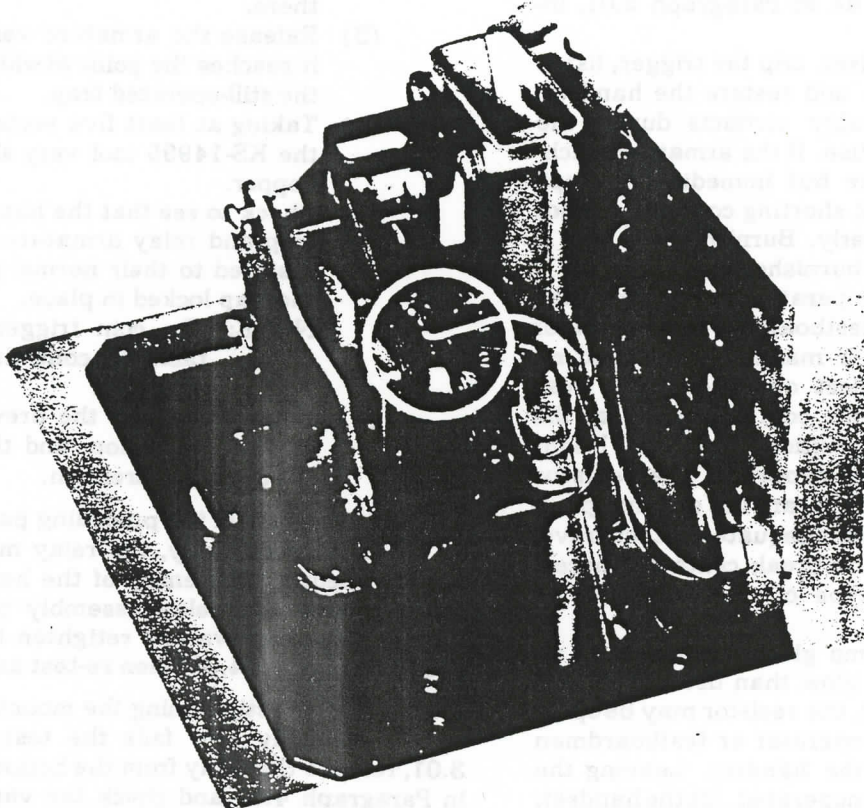


Figure 3. Use of Paper Clip to Bypass Ground Contacts.



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sented far enough to interfere with the contact springs.

- (3) Lift the handset, listen for dial tone, and dial a local selection digit. It should not be possible to break dial tone. If dial tone remains unbroken, remove the paper clip or clip lead and proceed to other tests.
- (4) If it is possible to break dial tone, check the dial shorting contacts with the trigger unoperated to insure that they are firmly closed with perceptible follow. Use a CB-5 contact burnisher to burnish the contact pair.
- (5) If burnishing does not clear the trouble, check the continuity of the wiring in the upper housing from the coin signal transmitter to the microswitch contacts, to the latch release relay contacts, through the latch release relay coil to upper housing transfer spring 2. If there is no continuity through the 40  $\Omega$  relay coil (which will also cause failure to refund or collect coins), replace the latch release relay assembly.

Coil\_ and Resistor-Shorting Contact Springs

2.03 If refund or collect trouble has been reported, the armature-operated contact springs which apply a shunt to the relay coil and remove one from the 1000  $\Omega$  resistor may be at fault. Using the same test arrangement as in Paragraph 2.01, investigate as follows:

- (1) Lift the handset, trip the trigger, listen for dial tone and restore the handset. Watch the relay contacts during the refund operation. If the armature reaches full stroke but immediately drops back, the coil shorting contacts are not making properly. Burnish them with a CB-5 contact burnisher.
- (2) If the refund operation appears normal, contact the testboard or local operator and request a manually-controlled refund and collect operation, with close attention to the coin pilot lamp at the switchboard position. If a very bright pilot lamp is reported, the resistor shorting contacts are not opening properly. Check for adequate contact travel and adjust the break contact if necessary. This type of trouble should be quite rare.
- (3) If no pilot lamp glow is reported (or an even briefer glow than usual with this type of relay), the resistor may be open. Dismiss the operator or testboardman and restore the handset. Leaving the coin trigger unoperated, lift the handset, tilt the relay selector card by pressing

down on one ear, and then operate the relay armature. If dial tone is not heard (coin-first offices) or cannot be broken by dialing (tone-first offices), the resistor is open. Replace the coin relay.

3. COIN HOPPER

Trap and Vane Release Test

3.01 The relay armature, coin trap and hopper vane should not depend on rapid release to provide inertia for complete restoration, but should restore fully to their nonoperated positions even when the armature and trap are prevented from restoring at their normal rate and are manually released at a very slow rate. To test this function, proceed as follows with the P10E783 cover removed from the relay:

- (1) Tilt the relay selector card by pressing down on one ear (left ear for collect; right ear for refund), and then operate the relay armature by applying force at the circular dimpled point just above the coil. Push the armature back until it makes firm contact with the center leg of the core.
- (2) Insert a KS-14995 coin collector tool into the mouth of the coin hopper and use it to force the coin trap to the limit of its downward travel and to hold it there.
- (3) Release the armature very slowly until it reaches the point at which it is held by the still-operated trap.
- (4) Taking at least five seconds, withdraw the KS-14995 tool very slowly from the hopper.
- (5) Check to see that the hopper vane, coin trap and relay armature have all fully restored to their normal positions, with the trap locked in place.  
NOTE: The coin trigger and the contacts it controls will remain operated.
- (6) Repeat twice for the previous direction of vane operation, and three times for the opposite direction.

3.02 If the test of the preceding paragraph is not met successfully, the relay may be binding due to unequal tightening of the hex-head screws which mount the relay assembly to the hopper. Loosen these screws and retighten them as specified in Paragraph 4.03; then re-test as above.

3.03 If after retightening the mounting screws the assembly still fails the test of Paragraph 3.01, remove the relay from the hopper as explained in Paragraph 4.01 and check the vane and trap as specified in Paragraphs 3.04 and 3.05.



3.04 Check to make sure that the vane does not bind on the inner surfaces of the hopper. To verify this, proceed as follows:

- (1) Hold the vane slightly to the right of vertical, and then release it. It should drop all the way down to the right (refund) position.
- (2) Hold the vane slightly to the left of vertical, and then release it. It should drop all the way down to the left (collect) position.
- (3) If the vane binds in either direction, arrange to have the coin telephone set replaced and returned to the shop for replacement of the relay and hopper assembly.

3.05 Check to make sure that the coin trap operates, restores and locks properly. To verify this, proceed as follows:

- (1) With a fingertip, press the tab of the trap lever down slowly. The trap should fall freely and come to a positive stop against the front wall of the hopper.
- (2) Slowly release the trap lever tab. The trap should restore to normal and lock in its normal position.
- (3) If the coin trap, trap lever, trap lever spring or trap pin are defective, arrange to have the coin telephone set replaced and returned to the shop for rehabilitation of the hopper assembly.

3.06 If the vane and trap meet the tests of Paragraphs 3.04 and 3.05, reassemble the coin relay to the hopper as explained in Paragraph 4. and repeat the tests of Paragraph 3.01. If the assembly again fails these tests, replace the relay and repeat the tests. If the assembly still fails the tests with the replacement relay installed, arrange to have the coin telephone set replaced and returned to the shop for rehabilitation of the hopper assembly.

#### Bias Margin Test

3.07 If refund or collect trouble has been reported, especially in cases of collection when refund was due or vice versa, the selector card may not be receiving proper bias prior to operation of the armature. Using the same test arrangement as in Paragraph 2.01, investigate as follows:

- (1) To test collect operation, place a W.E. Co. 146A gauge on the right side of the selector card, as shown in Figure 4. Push the relay leads aside so that the gauge can move freely.
- (2) Trip the coin trigger, listen for dial tone, and dial the testboard, local operator, or (where provided) the paystation test circuit. Ask or dial the code for application of +110 volt collect po-

tential. The right end of the selector card magnet should tip upward, lifting the gauge, and the cam should operate the hopper vane to the collect position. To check this, look down the hopper throat. If the booth is too dark to see, shine a flashlight at the coin return opening at the lower left of the hopper, or through the narrow cleanout slot on the lower right. As the armature reaches full stroke, the trigger should restore. Repeat this test twice with collect potential.

- (3) With the gauge mounted on the left side of the selector card, proceed as in (2), above, but ask or dial the code for application of -110 volt refund potential. Test three times.
- (4) If the vane does not operate fully in the proper direction on each test, remove the coin relay as explained in Paragraph 4.01, clean it as set forth in Paragraph 4.02, and remount in accordance with Paragraph 4.03. Then repeat procedures (2) and (3). If the vane still does not operate properly, replace the relay.

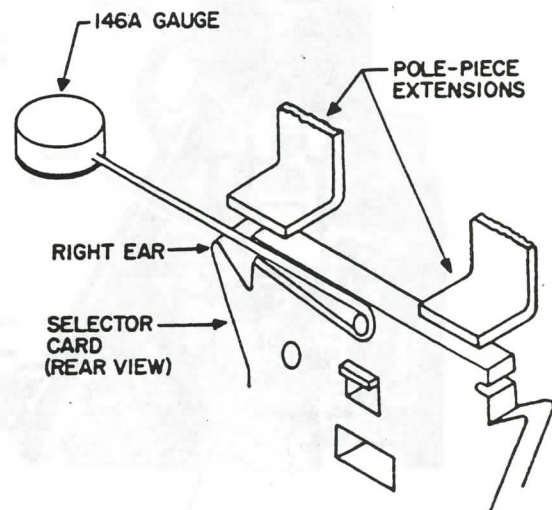


Figure 4. Use of 146A Gauge for Bias Margin Test.



#### 4. COIN RELAY

##### Removal

4.01 To remove the coin relay from the hopper, proceed as follows:

- (1) Remove the two P10E810 Sems fasteners from the top mounting bracket.
- (2) Remove the two P10E752 slotted hex head machine screws from the cast projections of the hopper which support the the relay near the bottom.
- (3) Slide the relay forward in the grooves cast into the inner surfaces of the supporting projections. When the cam is clear of the vane stem and the selector card is clear of the trap lever tab, lift the relay upward.

##### Cleaning

4.02 Each time a relay is removed for servicing or adjustment, clean the pole piece extensions and selector card magnet to lift off any steel filings or other magnetic particles which may have lodged on them. Fold a piece of self-bonding electrical tape (used on drop wire) over the end of an orange stick, with the adhesive side out. Tilt the relay selector card by pressing down on one ear, and then operate the relay armature. With the armature held closed, press the tape-covered orange stick against the top of one side of the selector card and the adjacent pole piece extension. Discard the tape, apply a clean piece to the orange stick, and repeat the process for the other pole piece extension and ad-

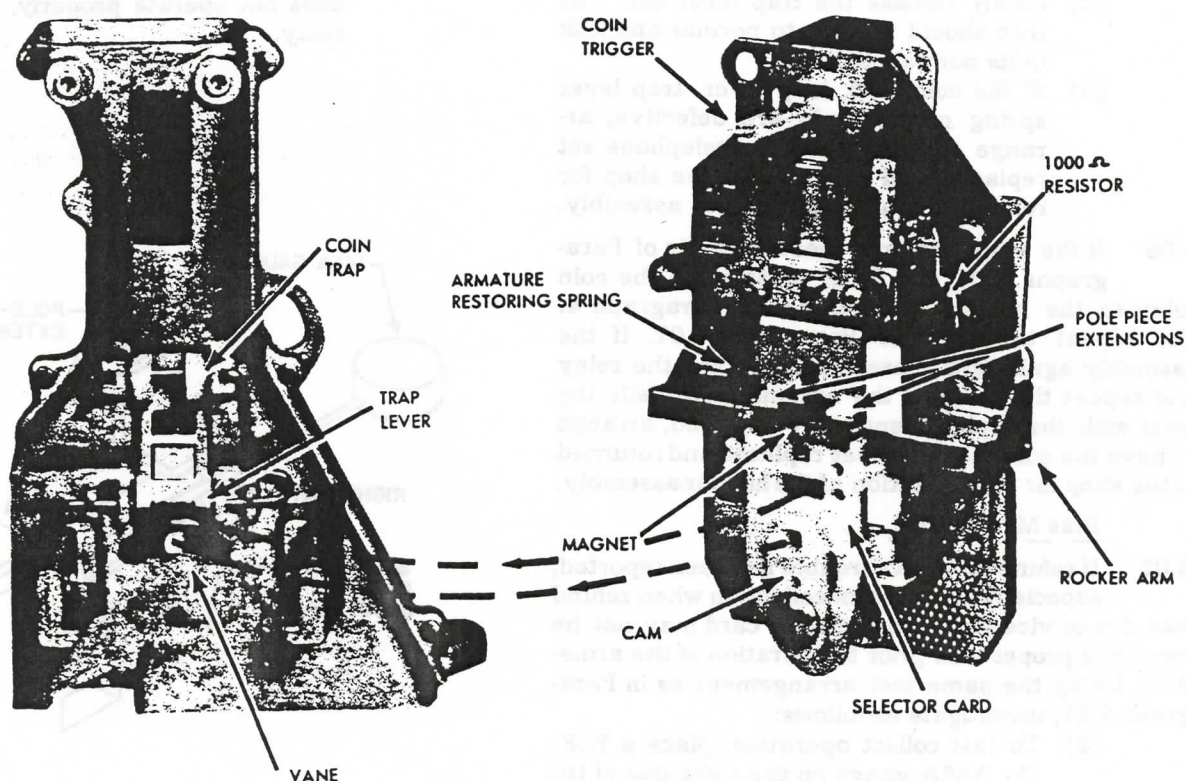


Figure 5. P10E755 Hopper, and Rear View of P10E786 Relay.

jacent surface of the selector card.

#### Installation

4.03 To install the coin relay on the hopper, proceed as follows:

- (1) If the relay is being reinstalled after removal, first clean the selector card and pole piece extensions as explained in Paragraph 4.02.
- (2) With a finger inserted in the coin return opening at the left of the hopper, hold the hopper vane vertical.
- (3) Trip the relay trigger and rest the relay mounting brackets in the grooves on the inner surfaces of the projecting arms cast into the front of the hopper base.
- (4) Slide the relay back, guiding the trigger into the hopper slot, until the tab of the trap lever barely engages the slot in the selector card (see Figure 5).
- (5) Aligning the vane as necessary, slide the relay farther back so that the stem of the vane engages the hole in the relay cam.
- (6) Check to be sure that the bosses at the top of the hopper enter the holes in the trigger-support bracket. If distortion of the bracket prevents this, return the relay to the shop for repair and install another one.

- (7) Align the holes in the relay mounting bracket with the holes in the arms projecting from the hopper, and insert two P10E752 (10-32 x 3/8") slotted hex head machine screws.
- (8) Insert two P10E810 (4-40 x 7/32") external-tooth Sems fasteners through the holes in the trigger-support bracket and into the threaded holes at the top of the hopper.
- (9) Tighten each pair of mounting screws evenly. While tightening the upper screws, check to be sure that the trigger pivot pins have some end play, and are not binding in their bearing holes. If the trigger binds, loosen the upper mounting screws and check again for binding. If the trigger moves freely with the upper mounting screws loose, retighten the screws evenly. If the trigger then binds again, replace the relay.
- (10) Check to be sure that the relay armature, coin trap and hopper vane operate and release without binding. If binding is noted, loosen the lower mounting screws and retighten them evenly. If binding is still evident, replace the relay.
- (11) If no further tests are required, snap the P10E783 styrene cover in place on the trigger support bracket.



COIN TELEPHONE SET  
AECO PREPAY  
MAINTENANCE

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1. GENERAL

1.01 This section contains field maintenance procedures for AECO prepay coin telephone sets. Wherever appropriate (depending on local test facilities), the repairman should call a local test board or preassigned number instead of the operator where operator is specified in this section.

2. ROUTINE MAINTENANCE

2.01 Check the dial for bind-free operation and correct speed. Check the switch hook for ease of operation. Inspect the condition of the handset cord and replace it if defective. Inspect handset caps and remove any dirt accumulation from the openings.

3. COIN GAUGE

3.01 Inspect the coin gauge for damage and stuck coins or slugs. Remove any stuck coins or slugs with a wood instrument such as an orange stick; do not use a hard metal instrument to clear the gauge. The cause of coin sticking may be dirt in the coin gauge or coin gauge damage. If the gauge is dirty, remove the dirt with alcohol. If the coin gauge is misaligned or otherwise damaged so that a coin cannot be properly deposited, replace the upper housing with serviceable unit.

4. COIN CHUTE

4.01 When inspecting the coin chute, a check for cleanliness is important, and if a damaged coin or slug has stuck in the chute, check that the chute is not damaged. Do not attempt to clean a dirty chute. If the coin chute is dirty or damaged, replace the upper housing with a serviceable unit.

4.02 With the upper housing off, check the microswitch lever (see Figure 1). The microswitch lever should latch in the pendulum notch on the first nickel deposited and should unlock after the second nickel is deposited. Insure that the shock lever engages the pendulum when the upper housing is tilted to the left 30 degrees. Deposit a dime in the nickel chute; the coin should fall out to the return chute. Perform the same check on the quarter chute.

5. SINGLE COIL COIN RELAY ASSEMBLY

5.01 AECO prepay coin telephone sets with a single coil relay will have either an AECO P-60701 relay and hopper assembly or (where a field modification has been made) a Northern Electric Company (NECO) P11E964 relay and hopper assembly. Component part numbers are listed in Table 1.

Ground Contact Springs

5.02 If a trouble report indicates that dial tone is not returned after coin deposit (coin-first offices), or that dialing after deposit fails to break dial tone (tone-first offices), the coin-operated ground contact springs may be at fault. With the

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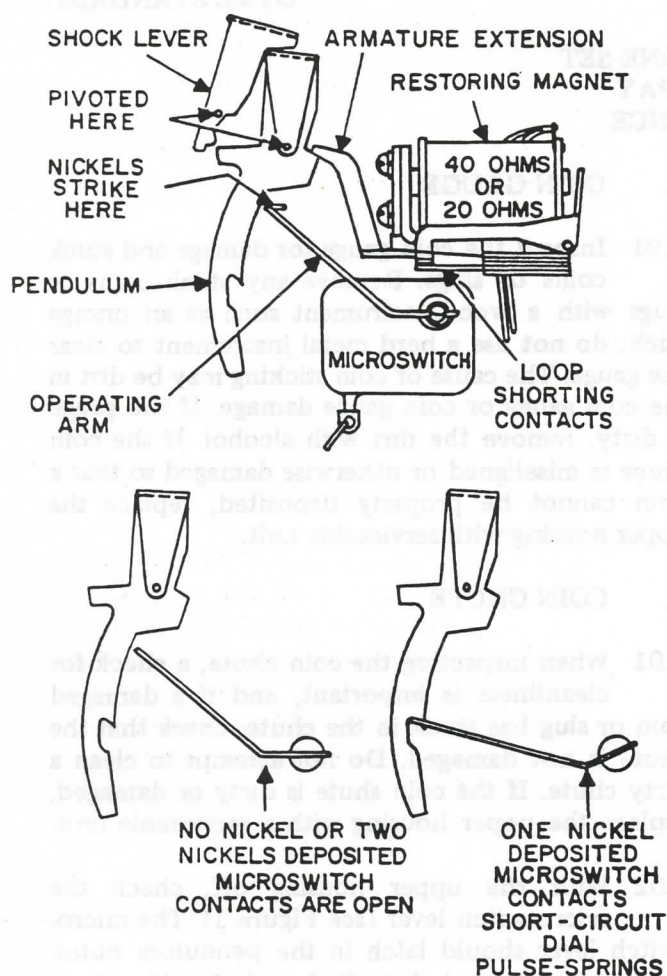


Figure 1. Two-Nickel Assembly.

upper housing removed from the instrument and connected to the lower housing by a test cord assembly (see Part 7), and with the dust cover removed from the coin relay (see Figure 2), investigate as follows:

- (1) Trip the coin trigger and make visual inspection of the contact springs. The ground contacts (see Figure 3) should make firmly. Verify by feel, using an orange stick.
- (2) Lift the handset and check for presence of dial tone. Dial a local selection digit and check for absence of dial tone.
- (3) If dial tone is not heard in coin-first office, tilt the relay selector card by pressing down on one ear, and then operate the relay armature. If dial tone is then heard, the relay has an open coil and should be replaced.
- (4) If dial tone is not heard in a tone-first office, check at the line terminals of the set for central office battery feed. If battery is not detected there, check the station and drop wiring for defects.
- (5) If dial tone is heard in tone-first office, but cannot be broken by dial-

Table 1. AECO/NECO Single Coil Coin Relay Assembly—Part Number.

PART	AECO NO.	NECO NO.
Relay and Hopper Assembly	P-60701	P11E964
Relay	P-60702	P10E786
Hopper	P-60703	P10E755
Dust Cover	P-51942	P10E783
Sems Fastener		P10E810
Upper Coin Relay Mounting Screw	D-76037-A	
Hex Head Screw		P10E752
Lower Coin Relay Mounting Screw	D-76036-A	



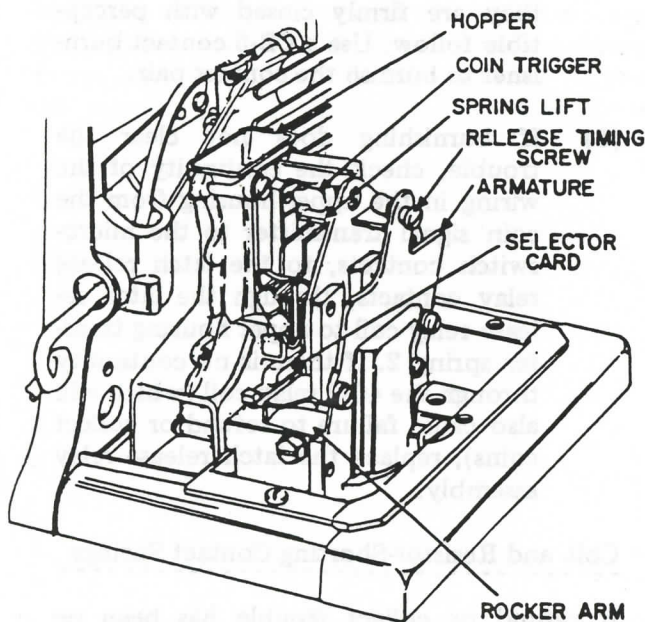


Figure 2. Single Coil Coin Relay, Installed, Cover Removed.

ing, yet the ground contacts appear to make firmly, burnish the contacts with a CB-5 contact burnisher.

- (6) If burnishing fails to clear the trouble, replace the relay.

#### Shunt Contact Springs

5.03 If fraudulent call trouble has been reported, the coin-operated contact springs which maintain a short circuit across the dial pulse contacts (or a low-resistance shunt across the oscillator of the Touch Calling unit) may be at fault. Using the same test arrangement as in Paragraph 5.02, investigate as follows:

- (1) Make a visual check of the dial shorting contacts. With the coin trigger unoperated, the contacts should be held closed, and the rear spring should exhibit perceptible follow beyond its stop spring, as shown in Figure 3. With the trigger tripped, the buffer on

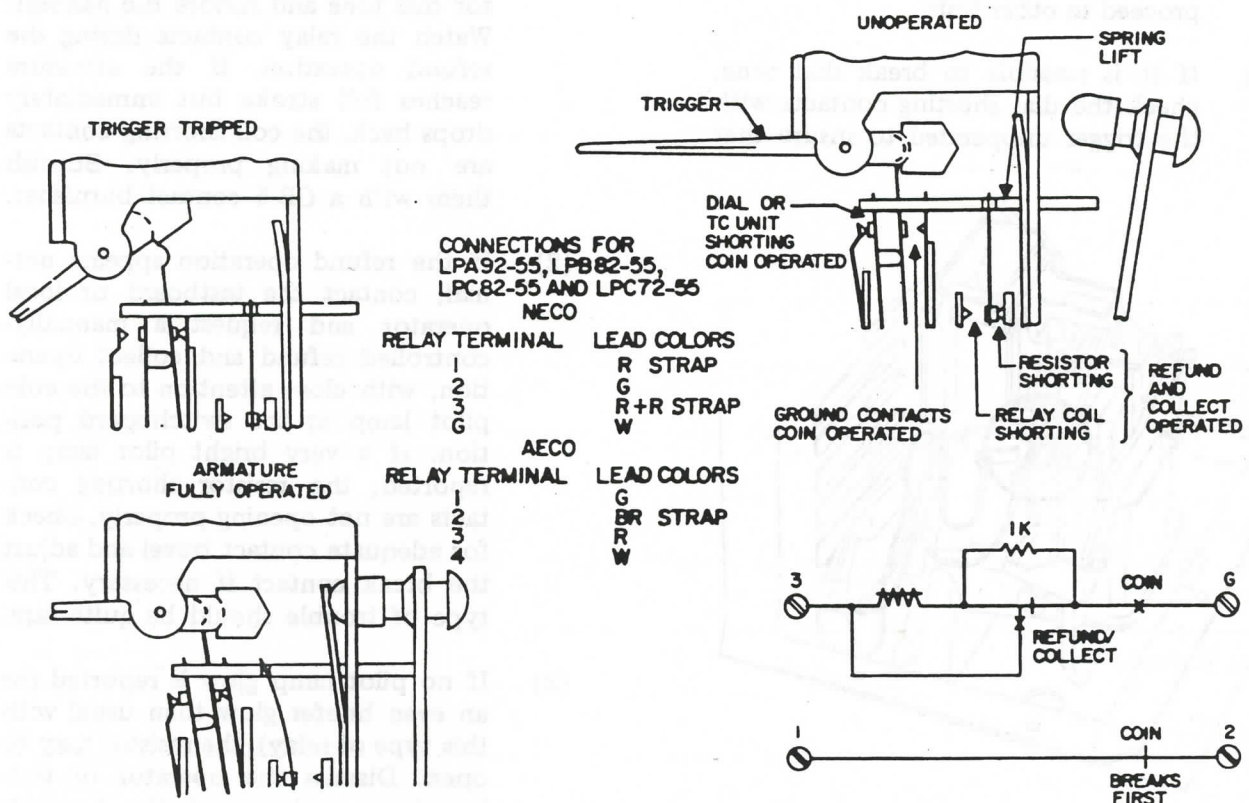


Figure 3. Coin Relay Contact Spring Assembly and Schematic.

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the front spring is free to move forward, and the contacts should be open (rest position).

- (2) With the coin trigger unoperated, provide a substitute path to ground the relay. If a clip lead is available, connect it to relay terminal 4 (or G) and to the resistor lead which terminates at the first and fourth contact springs. If no such lead is at hand, slightly widen the larger U-bend of a common #1 paper clip and insert the clip under the bent portion of relay terminal 4 (or G) as shown in Figure 4, so that it touches the edge of the clamped portion of the stop spring for the fourth contact spring. Be sure the clip does not touch relay terminal 3, and is not inserted far enough to interfere with the contact springs.
- (3) Lift the handset, listen for dial tone, and dial a local selection digit. It should not be possible to break dial tone. If dial tone remains unbroken, remove the paper clip or clip lead and proceed to other tests.
- (4) If it is possible to break dial tone, check the dial shorting contacts with the trigger unoperated to insure that

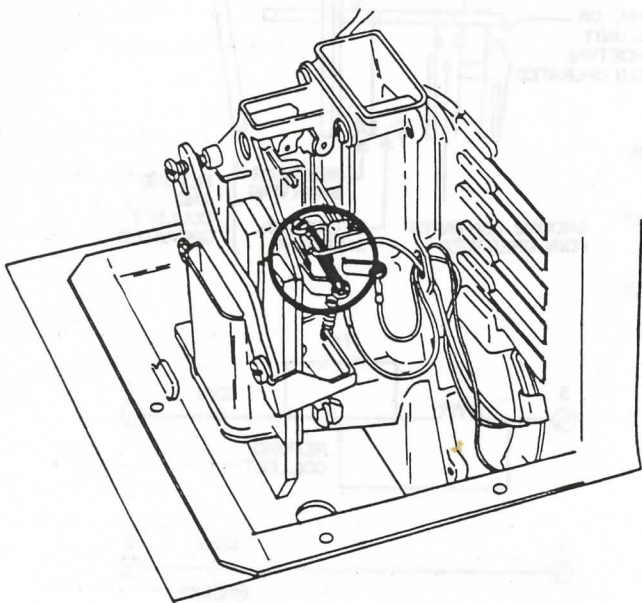


Figure 4. Use of Paper Clip to Bypass Ground Contacts.

they are firmly closed with perceptible follow. Use a CB-5 contact burnisher to burnish the contact pair.

- (5) If burnishing does not clear the trouble, check the continuity of the wiring in the upper housing from the coin signal transmitter to the micro-switch contacts; to the latch release relay contacts, through the latch release relay coil to upper housing transfer spring 2. If there is no continuity through the  $40\Omega$  relay coil (which will also cause failure to refund or collect coins), replace the latch release relay assembly.

Coil- and Resistor-Shorting Contact Springs

5.04 If refund or collect trouble has been reported, the armature-operated contact springs, which apply a shunt to the relay coil and remove a shunt from the  $1000\Omega$  resistor, may be at fault. Using the same test arrangement as in Paragraph 5.02, investigate as follows:

- (1) Lift the handset, trip the trigger, listen for dial tone and restore the handset. Watch the relay contacts during the refund operation. If the armature reaches full stroke but immediately drops back, the coil shorting contacts are not making properly. Burnish them with a CB-5 contact burnisher.
- (2) If the refund operation appears normal, contact the testboard or local operator and request a manually-controlled refund and collect operation, with close attention to the coin pilot lamp at the switchboard position. If a very bright pilot lamp is reported, the resistor shorting contacts are not opening properly. Check for adequate contact travel and adjust the break contact if necessary. This type of trouble should be quite rare.
- (3) If no pilot lamp glow is reported (or an even briefer glow than usual with this type of relay), the resistor may be open. Dismiss the operator or testboardman and restore the handset. Leaving the coin trigger unoperated, lift the handset, tilt the relay selector



card by pressing down on one ear, and then operate the relay armature. If dial tone is not heard (coin-first offices) or cannot be broken by dialing (tone-first offices), the resistor is open. Replace the coin relay.

#### Coin Hopper Trap and Vane Release Test

5.05 The relay armature, coin trap and hopper vane should not depend on rapid release to provide inertia for complete restoration, but should restore fully to their nonoperated positions even when the armature and trap are prevented from restoring at their normal rate and are manually released at very slow rate. To test this function remove cover from the relay and proceed as follows:

- (1) Tilt the relay selector card by pressing down on one ear (left ear for collect; right ear for refund), and then operate the relay armature by applying force at the circular dimpled point just above the coil. Push the armature back until it makes firm contact with the center leg of the core.
- (2) Insert coin collector relay tool (Material Code 578921) into the mouth of the coin hopper and use it to force the coin trap to the limit of its downward travel and to hold it there.
- (3) Release the armature very slowly until it reaches the point at which it is held by the still-operated trap.
- (4) Taking at least five seconds, withdraw the relay tool very slowly from the hopper.
- (5) Check to see that the hopper vane, coin trap and relay armature have all fully restored to their normal positions, with the trap locked in place.

NOTE: The coin trigger and the contacts it controls will remain operated.

- (6) Repeat twice for the previous direction of vane operation, and three times for the opposite direction.

5.06 If the test of the preceding paragraph is not met successfully, the relay may be binding due to unequal tightening of the hex-head screws which mount the relay assembly to the hopper. Loosen these screws and retighten them as specified in Paragraph 5.14; then re-test as above.

5.07 If after retightening the mounting screws the assembly still fails the test of Paragraph 5.05, remove the relay from the hopper as explained in Paragraph 5.12 and check the vane and trap as specified in Paragraphs 5.08 and 5.09.

5.08 Check to make sure that the vane does not bind on the inner surfaces of the hopper. To verify this, proceed as follows:

- (1) Hold the vane slightly to the right of vertical, and then release it. It should drop all the way down to the right (refund) position.
- (2) Hold the vane slightly to the left of vertical, and then release it. It should drop all the way down to the left (collect) position.
- (3) If the vane binds in either direction, arrange to have the coin telephone set replaced and returned to the shop for replacement of the relay and hopper assembly.

5.09 Check to make sure that the coin trap operates, restores and locks properly. To verify this, proceed as follows:

- (1) With a fingertip, press the tab of the trap lever down slowly. The trap should fall freely and come to a positive stop against the front wall of the hopper.
- (2) Slowly release the trap lever tab. The trap should restore to normal and lock in its normal position.
- (3) If the coin trap, trap lever, trap lever spring or trap pin are defective, arrange to have the coin telephone set replaced and returned to the shop for rehabilitation of the hopper assembly.

5.10 If the vane and trap meet the tests of Paragraphs 5.08 and 5.09, reassemble the



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coin relay to the hopper as explained in Paragraph 5.14 and repeat the tests of Paragraph 5.05. If the assembly again fails these tests, replace the relay and repeat the tests. If the assembly still fails the tests with the replacement relay installed, arrange to have the coin telephone set replaced and returned to the shop for rehabilitation of the hopper assembly.

Bias Margin Test

5.11 If refund or collect trouble has been reported, especially in cases of collection when refund was due or vice versa, the selector card may not be receiving proper bias prior to operation of the armature. Using the same test arrangement as in Paragraph 5.02, investigate as follows:

- (1) To test collect operation, place WECO 146A gauge on the right side of the selector card as shown in Figure 5. Push the relay leads aside so that the gauge can move freely.
- (2) Trip the coin trigger, listen for dial tone, and dial the testboard, local operator, or (where provided) the paystation test circuit. Ask or dial the code for application of +110 volt collect potential. The right end of the selector card magnet should operate the hopper vane to the collect position. To check this, look down the hopper throat. If the booth is too dark to see, shine a flashlight at the coin return opening at the lower left

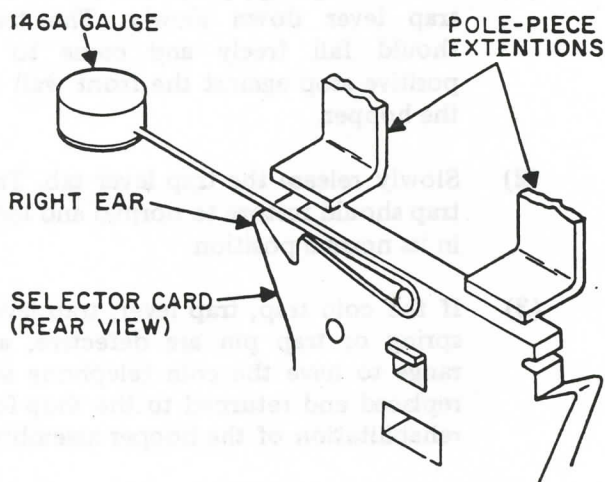


Figure 5. Use of 146A Gauge for Bias Margin Test.

of the hopper, or through the narrow cleanout slot on the lower right. As the armature reaches full stroke, the trigger should restore. Repeat this test twice with collect potential.

- (3) With the gauge mounted on the left side of the selector card, proceed as in (2), above, but ask or dial the code for application of -110 volt refund potential. Test three times.
- (4) If the vane does not operate fully in the proper direction on each test, remove the coin relay as explained in Paragraph 5.12, clean it as set forth in Paragraph 5.13. Then repeat procedures (2) and (3). If the vane still does not operate properly, replace the relay.

Removal

5.12 To remove the coin relay from the hopper, proceed as follows:

- (1) Remove the two upper coin relay mounting screws (or Sems fasteners) from the top mounting bracket.
- (2) Remove the two P10E752 lower coin relay mounting screws (or slotted hex head machine screws) from the cast projections of the hopper which support the relay near the bottom.
- (3) Slide the relay forward in the grooves cast into the inner surfaces of the supporting projections. When the cam is clear of the vane stem and the selector card is clear of the trap lever tab, lift the relay upward.

Cleaning

5.13 Each time a relay is removed for servicing or adjustment clean the pole piece extensions and selector card magnet particles which may have lodged on them. Fold a piece of self-bonding electrical tape (used on drop wire) over the end of an orange stick, with the adhesive side out. Tilt the relay selector card by pressing down on one ear, and then operate the relay armature. With the armature held closed, press the tape-covered orange stick against the top of one side of the selector



card and the adjacent pole piece extension. Discard the tape, apply a clean piece to the orange stick, and repeat the process for the other pole piece extension and adjacent surface of the selector card.

#### Installation

5.14 To install the coin relay on the hopper, proceed as follows:

- (1) If the relay is being reinstalled after removal, first clean the selector card and pole piece extensions as explained in Paragraph 5.13.
- (2) With a finger inserted in the coin return opening at the left of the hopper, hold the hopper vane vertical.
- (3) Trip the relay trigger and rest the relay mounting brackets in the grooves on the inner surfaces of the projecting arms cast into the front of the hopper base.
- (4) Slide the relay back, guiding the trigger into the hopper slot, until the

tab of the trap lever barely engages the slot in the selector card (see Figure 6).

- (5) Aligning the vane as necessary, slide the relay farther back so that the stem of the vane engages the hole in the relay cam.
- (6) Check to be sure that the bosses at the top of the hopper enter the holes in the trigger-support bracket. If distortion of the bracket prevents this, return the relay to the shop for repair and install another one.
- (7) Align the holes in the relay mounting bracket with the holes in the arms projecting from the hopper, and insert two lower mounting screws (or slotted hex head machine screws).
- (8) Insert two upper mounting screws (or Sems fasteners) through the holes in the trigger-support bracket and into the threaded holes at the top of the hopper.

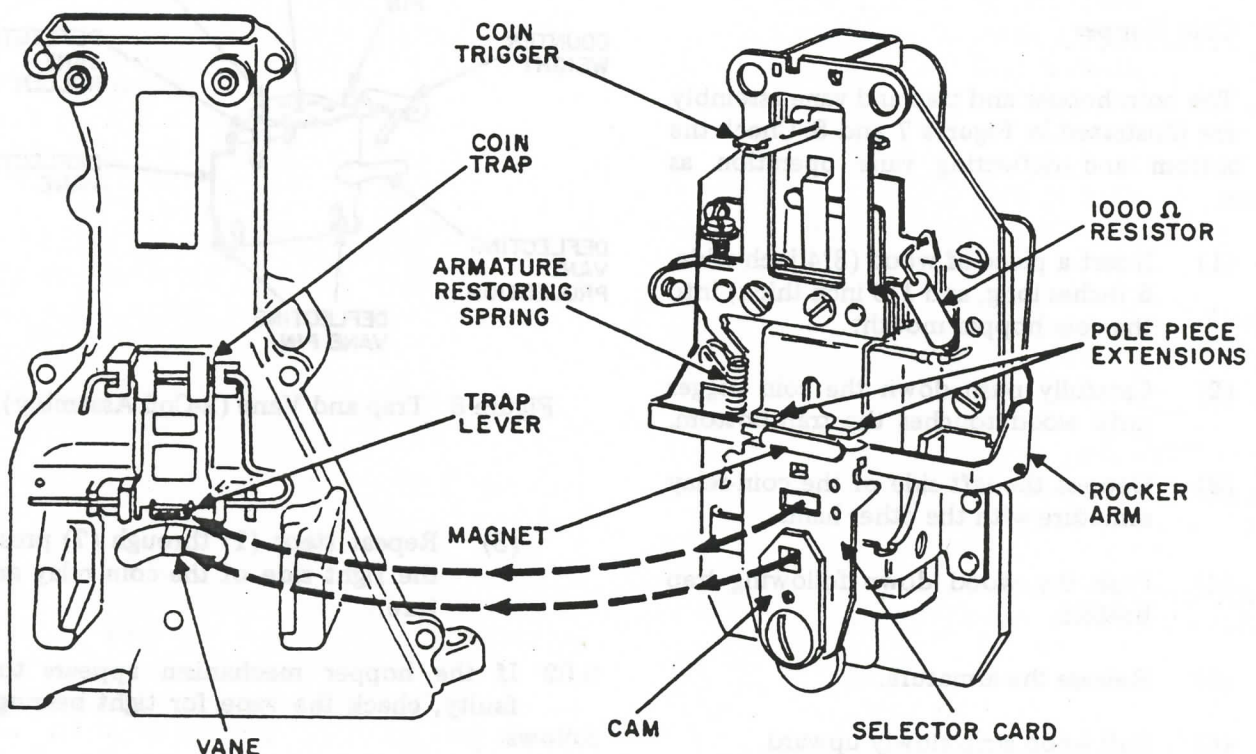


Figure 6. NECo Hopper and Rear View of NECo Relay.

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- (9) Tighten each pair of mounting screws evenly. While tightening the upper screws, check to be sure that the trigger pivot pins have some end play, and are not binding in their bearing holes. If the trigger binds, loosen the upper mounting screws and check again for binding. If the trigger moves freely with the upper mounting screws loose, retighten the screws evenly. If the trigger then binds again, replace the relay.
- (10) Check to be sure that the relay armature, coin trap and hopper vane operate and release without binding. If binding is noted, loosen the lower mounting screws and retighten them evenly. If binding is still evident, replace the relay.
- (11) If no further tests are required, snap the styrene cover in place on the trigger support bracket.

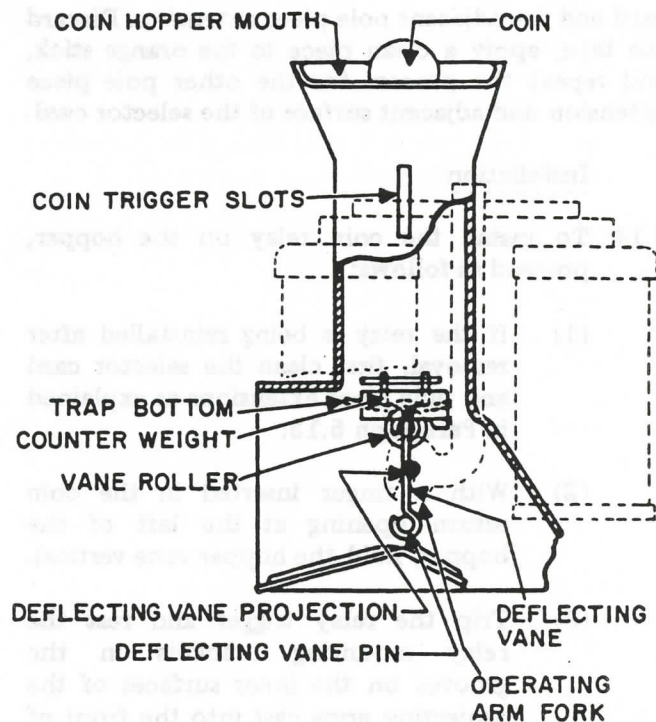


Figure 7. Coin Hopper (2-Coil Assembly).

## 6. 2-COIL RELAY COIN ASSEMBLY

### Coin Hopper

6.01 The coin hopper and trap and vane assembly are illustrated in Figures 7 and 8. Check the trap bottom and deflecting vane operation as follows:

- (1) Insert a piece of wood (3/4 inch wide, 5 inches long, and 1/8 inch thick) into the coin hopper mouth.
- (2) Carefully push down the coin trigger until wood touches the trap bottom.
- (3) Depress the left side of the coin-relay armature with the other hand.
- (4) Push the wood down following trap bottom.
- (5) Release the armature.
- (6) Pull wood strip slowly upward.
- (7) Check that the vane and trap bottom return to original position.

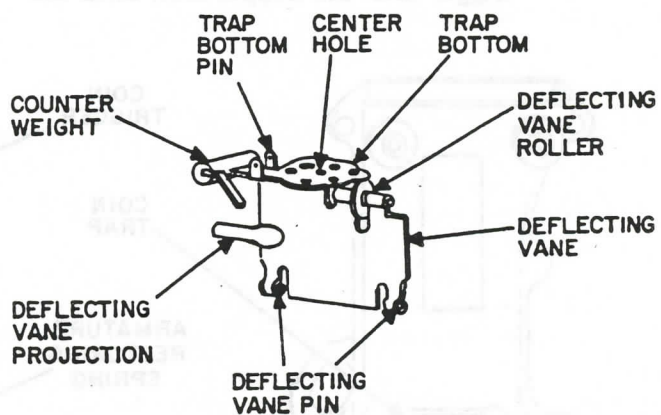


Figure 8. Trap and Vane (2-Coil Assembly).

- (8) Repeat steps (1) through (7) pressing the right side of the coin relay armature.

6.02 If the hopper mechanism appears to be faulty, check the vane for tight bearings as follows:

- (1) Loosen the coin relay heel plate mounting screws.



card and the adjacent pole piece extension. Discard the tape, apply a clean piece to the orange stick, and repeat the process for the other pole piece extension and adjacent surface of the selector card.

#### Installation

5.14 To install the coin relay on the hopper, proceed as follows:

- (1) If the relay is being reinstalled after removal, first clean the selector card and pole piece extensions as explained in Paragraph 5.13.
- (2) With a finger inserted in the coin return opening at the left of the hopper, hold the hopper vane vertical.
- (3) Trip the relay trigger and rest the relay mounting brackets in the grooves on the inner surfaces of the projecting arms cast into the front of the hopper base.
- (4) Slide the relay back, guiding the trigger into the hopper slot, until the

tab of the trap lever barely engages the slot in the selector card (see Figure 6).

- (5) Aligning the vane as necessary, slide the relay farther back so that the stem of the vane engages the hole in the relay cam.
- (6) Check to be sure that the bosses at the top of the hopper enter the holes in the trigger-support bracket. If distortion of the bracket prevents this, return the relay to the shop for repair and install another one.
- (7) Align the holes in the relay mounting bracket with the holes in the arms projecting from the hopper, and insert two lower mounting screws (or slotted hex head machine screws).
- (8) Insert two upper mounting screws (or Sems fasteners) through the holes in the trigger-support bracket and into the threaded holes at the top of the hopper.

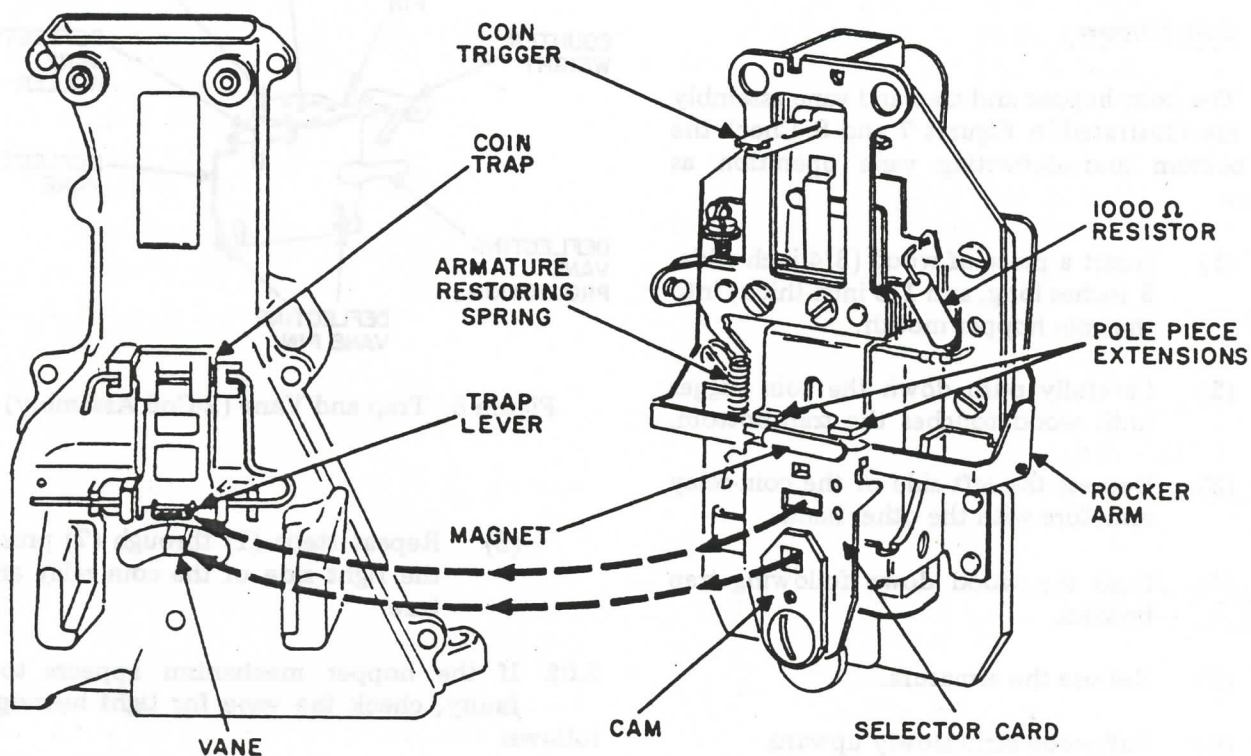


Figure 6. NECo Hopper and Rear View of NECo Relay.

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- (9) Tighten each pair of mounting screws evenly. While tightening the upper screws, check to be sure that the trigger pivot pins have some end play, and are not binding in their bearing holes. If the trigger binds, loosen the upper mounting screws and check again for binding. If the trigger moves freely with the upper mounting screws loose, retighten the screws evenly. If the trigger then binds again, replace the relay.
- (10) Check to be sure that the relay armature, coin trap and hopper vane operate and release without binding. If binding is noted, loosen the lower mounting screws and retighten them evenly. If binding is still evident, replace the relay.
- (11) If no further tests are required, snap the styrene cover in place on the trigger support bracket.

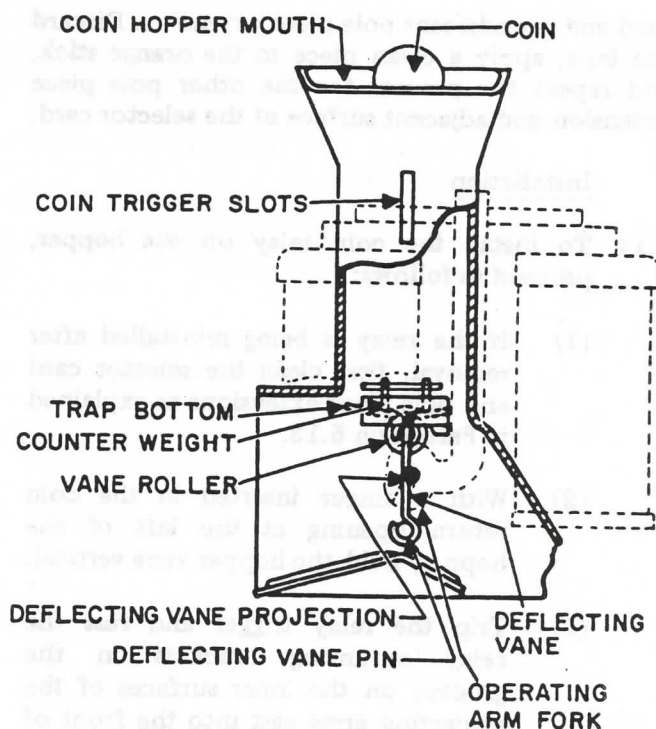


Figure 7. Coin Hopper (2-Coil Assembly).

## 6. 2-COIL RELAY COIN ASSEMBLY

### Coin Hopper

6.01 The coin hopper and trap and vane assembly are illustrated in Figures 7 and 8. Check the trap bottom and deflecting vane operation as follows:

- (1) Insert a piece of wood (3/4 inch wide, 5 inches long, and 1/8 inch thick) into the coin hopper mouth.
- (2) Carefully push down the coin trigger until wood touches the trap bottom.
- (3) Depress the left side of the coin-relay armature with the other hand.
- (4) Push the wood down following trap bottom.
- (5) Release the armature.
- (6) Pull wood strip slowly upward.
- (7) Check that the vane and trap bottom return to original position.

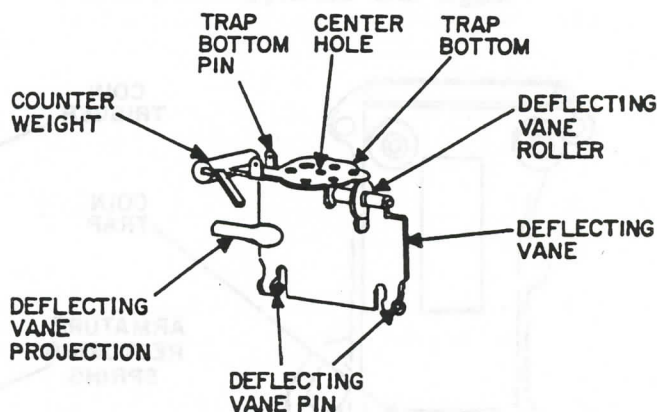


Figure 8. Trap and Vane (2-Coil Assembly).

- (8) Repeat steps (1) through (7) pressing the right side of the coin relay armature.

6.02 If the hopper mechanism appears to be faulty, check the vane for tight bearings as follows:

- (1) Loosen the coin relay heel plate mounting screws.



- (2) Disconnect the leads on the contact springs.
- (3) Remove the coin relay, being careful to clear the coin trigger from the slot in the hopper.
- (4) Hold the vane projection slightly left of vertical.
- (5) The vane should drop fully to the collect position when released.
- (6) Hold the vane slightly to the right of vertical.
- (7) The vane should drop fully to refund position when released.
- (8) If the vane binds in any way, replace the hopper assembly.

6.03 Check vane for binding on hopper as follows:

- (1) Grasp the vane projection pin and pull.
- (2) While pulling the pin, move the vane to the left and right.
- (3) Make sure the vane does not scrape the front of hopper.
- (4) Grasp the vane projection pin and push.
- (5) While pushing the pin, move the vane to the left and to the right.
- (6) Make sure the vane does not scrape the rear of the hopper.
- (7) If the vane scrapes, replace the hopper assembly.

6.04 Check the trap and vane for ease of movement as follows:

- (1) Move the vane to the left.
- (2) Using the other hand, lift the trap bottom counterweight.
- (3) Move the vane to an upright position slowly while at the same time main-

taining slight pressure on the counterweight.

- (4) Check that the vane lifts the trap smoothly and evenly.
- (5) Repeat to the right.
- (6) If the vane or trap binds replace the hopper.

6.05 To check for trap and vane clearances move the counterweight up and down; there should be a small clearance.

Coin Relay

6.06 Field maintenance of the coin relay (see Figures 9 and 10) is performed as follows:

- (1) Remove the coin relay as described in 6.02 (1) through (3).
- (2) Lubricate the inner surfaces of the fork by rubbing with a pencil point.
- (3) Check the coin trigger for ease of operation.

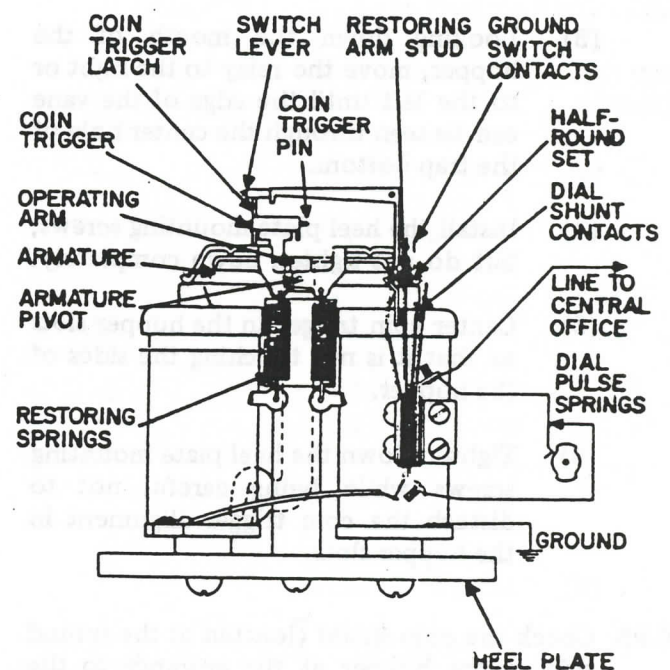
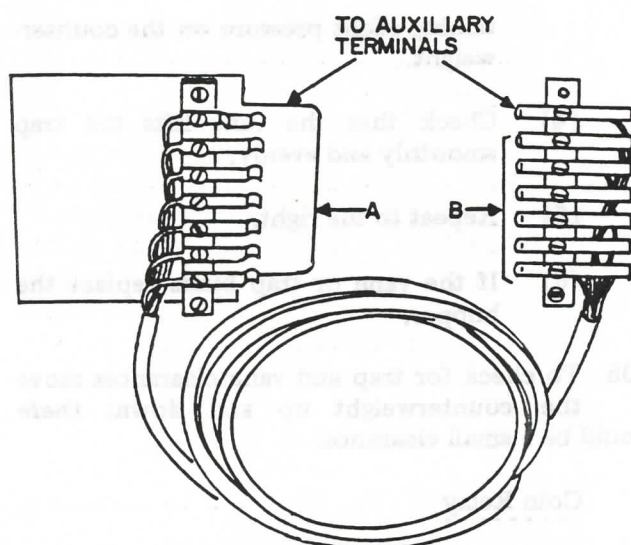


Figure 9. 2-Coil Coin Relay.

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- A. SLIP THIS EDGE OF BRACKET UNDER JACK TERMINAL STRIP ON UPPER HOUSING.  
B. CLIP THESE TERMINALS TO JACK SPRINGS ON LOWER HOUSING.

Figure 10. Coin Telephone Test Cord P-60605.

6.07 Install the coin relay after tests as follows:

- (1) Ease the coin trigger through the slots in the hopper.
- (2) Move the vane to the upright position and ease the projection into the fork.
- (3) Looking down the mouth of the hopper, move the relay to the right or to the left until the edge of the vane can be seen through the center hole of the trap bottom.
- (4) Install the heel plate mounting screws, but do not tighten down completely.
- (5) Center coin trigger in the hopper slots so that it is not touching the sides of the hopper.
- (6) Tighten down the heel plate mounting screws while being careful not to disturb the coin trigger alignment in the hopper slots.

6.08 Check the coin shield (located at the refund side of the hopper at the entrance to the refund chute) for ease of operation. Replace it if faulty.

6.09 Check all switch points for cleanliness, especially horizontal transfer switch points.

## 7. COIN COLLECTION

7.01 Check coin collecting operation as follows:

- (1) Jumper terminals between upper and lower housing using:
  - (a) A P-60605 test cord (Figure 10) for LPA- and LPB- series coin telephone sets.
  - (b) A P-60754-A test cord (Figure 11) for LPC telephone sets.
- (2) Lift the handset. Deposit a test coin in the hopper. Hang up and check for coin refund.
- (3) Lift the handset. Deposit a test coin in the hopper. Dial a predetermined local number. When the called party answers, check transmission and then have called party hang up. Hang up and check that the coin is collected.

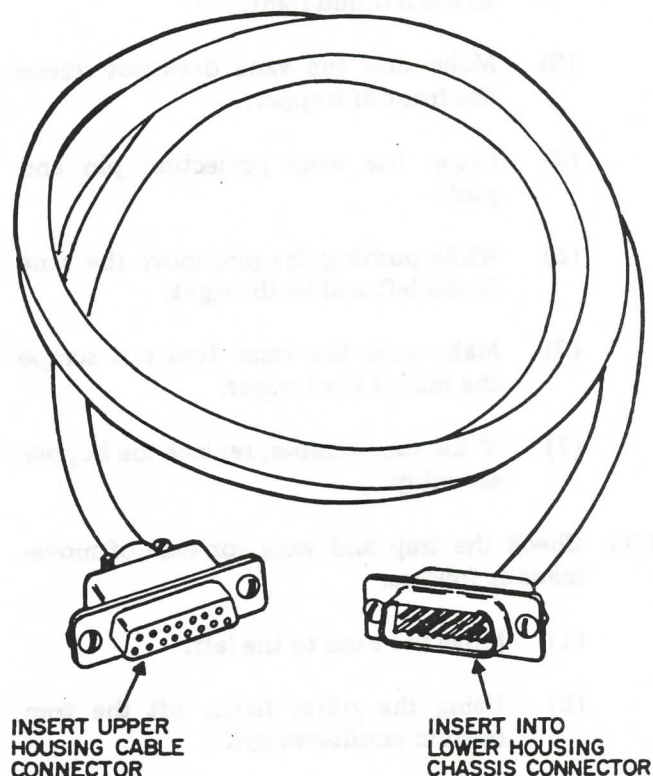


Figure 11. Coin Telephone Test Cord P-60754-A.



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- (4) Lift the handset. Deposit a test coin in the hopper. Dial operator. Check for coin refund when the operator answers. Check that operator can identify the call as originating from a coin telephone. (If equipment is not arranged to refund automatically, have the operator apply refund current. Check for coin refund.)
- (5) Deposit a nickel, dime and quarter test coins in coin gauges and have the operator identify each coin deposited. Have the operator apply refund current. Check that the application of refund current causes the loop shorting contacts to close, the microswitch latch to release (see Figure 1), and the coin relay armature to operate to the refund side.
- (6) Redeposit the nickel. Have the operator apply collect current. Check that application of collect current causes the loop shorting contacts to close, the microswitch latch to release (see Figure 1), and the coin relay armature to return to the collect side.
- (7) Have the operator disconnect. Hang up coin telephone handset.
- (8) Restore coin telephone to operating condition.