ADDENDUM 476-202-520
ISSUE 1, JANUARY, 1968
GT&E STANDARD

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 P1E964 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 coin telephone 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:

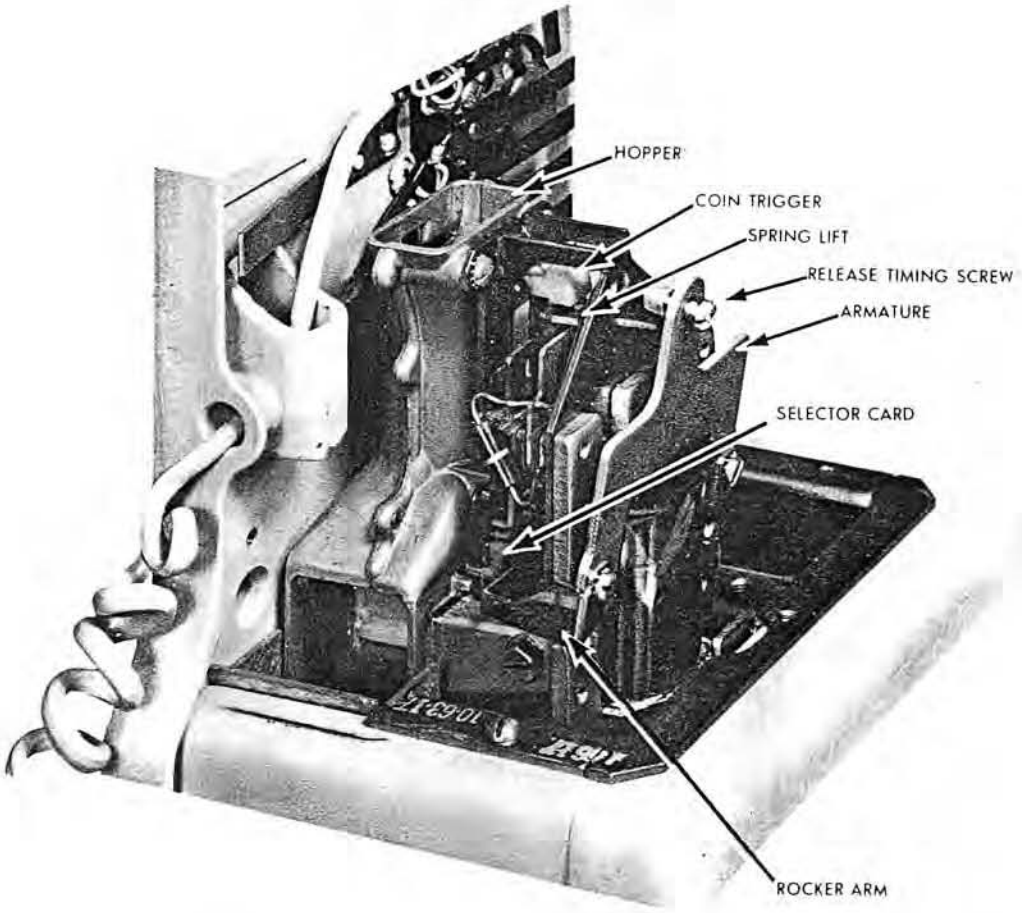

Figure 1. Single-Coil Coin Relay, Shown Installed, With Cover Removed.

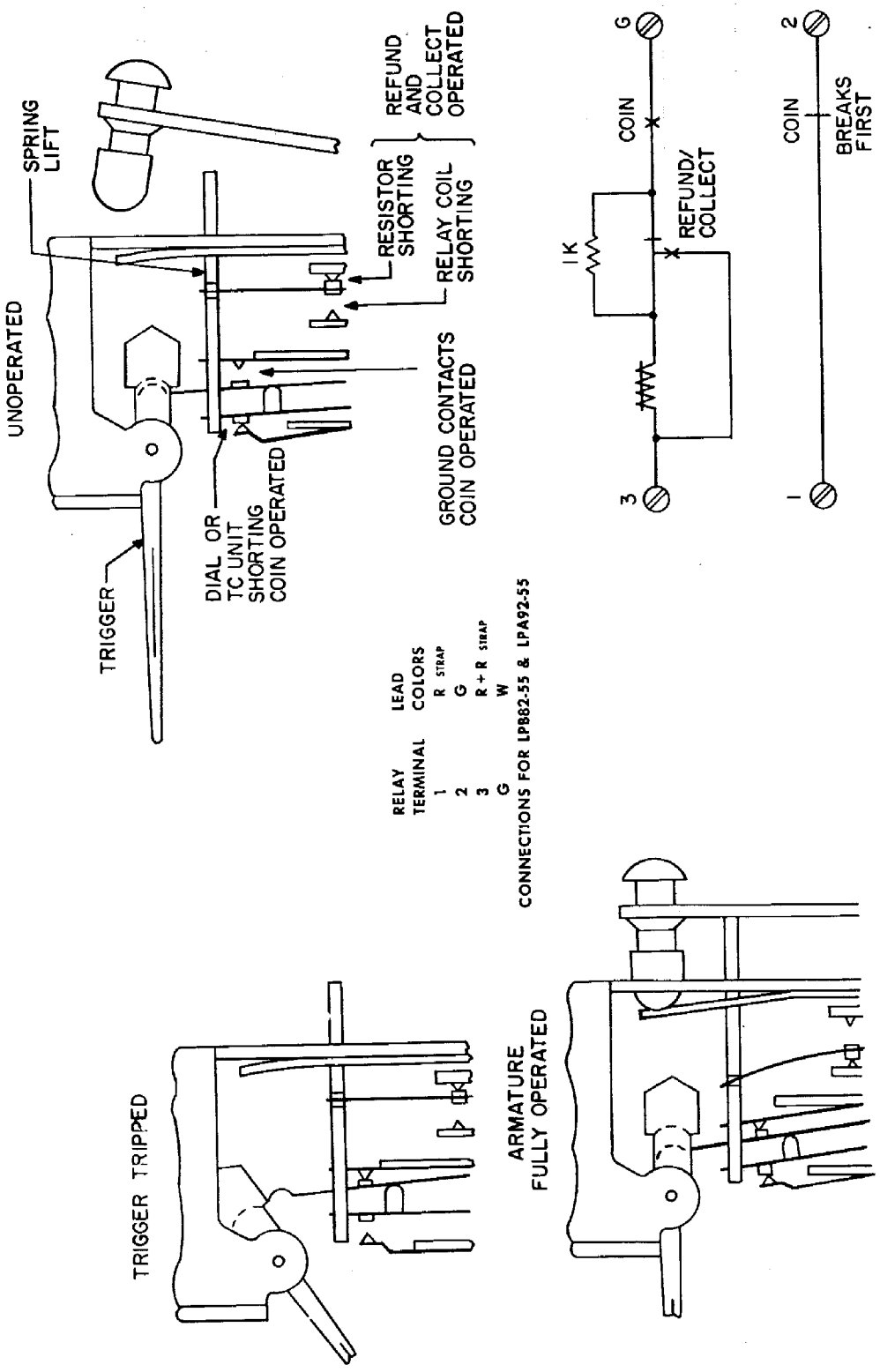

Figure 2. Coin Relay Contact Spring Assembly and Schematic.

(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-

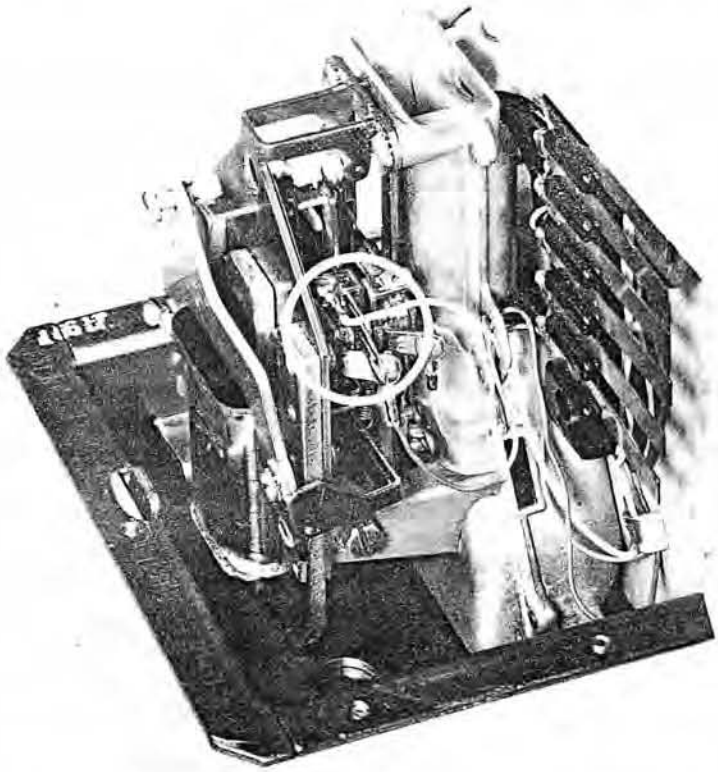

Figure 3. Use of Paper Clip to Bypass Ground Contacts.

serted 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 Ω 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 Ω 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 potential. 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.

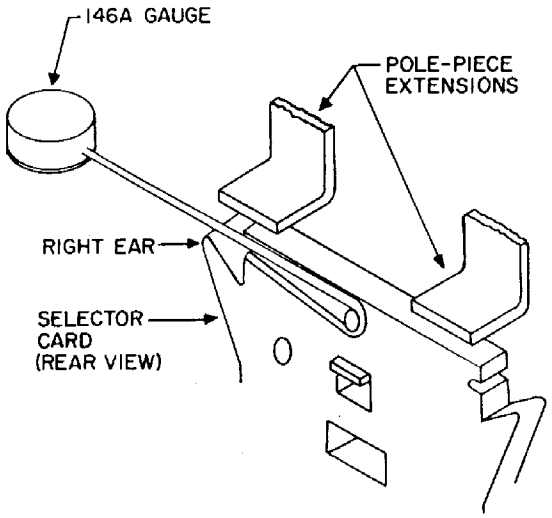

Figure 4. Use of 146A Gauge for Bias Margin Test.

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-

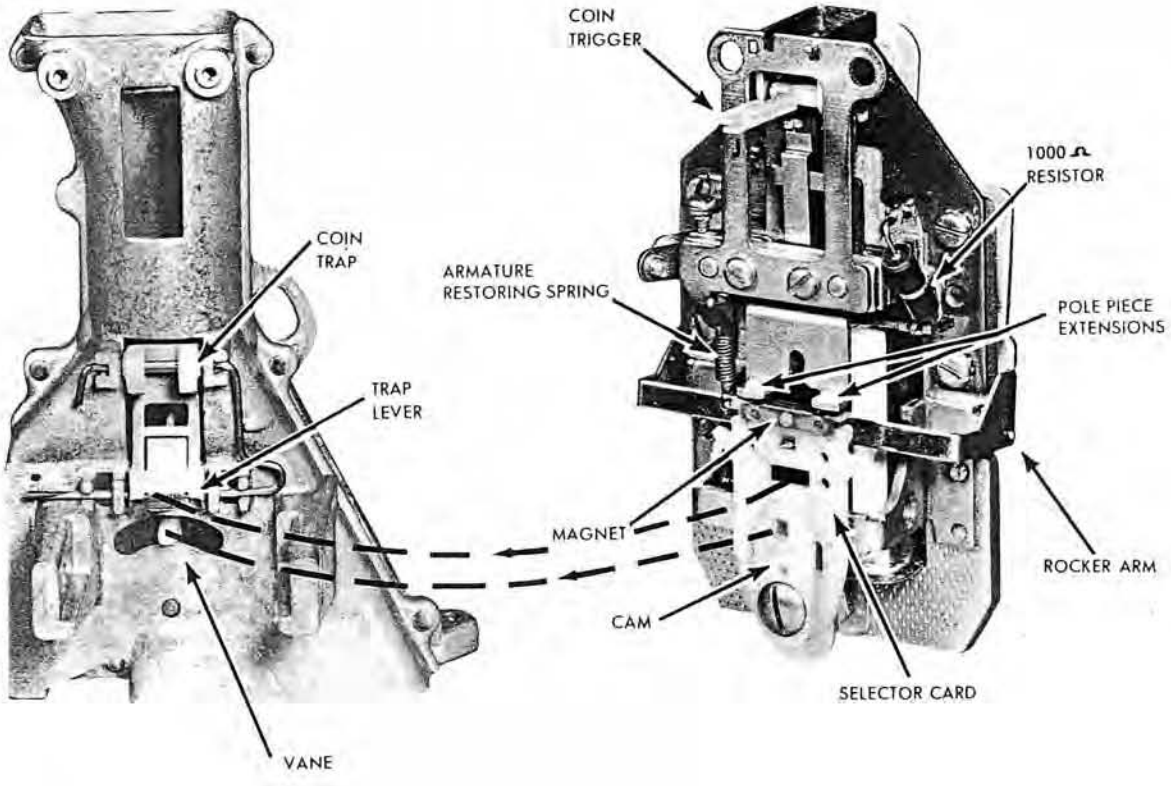

Figure 5. P10E755 Hopper, and Rear View of P10E786 Relay.

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.