NUMERICAL INDEX—DIVISION 476
COIN TELEPHONE SETS AND ASSOCIATED APPARATUS

1. GENERAL

1.01 Attached to this Title Page is an index of General System Practices in Division 476. When the index is revised only the attached page(s) will be replaced. THIS TITLE PAGE IS TO BE RETAINED.

1.02 An asterisk (*) indicates an item which has been added or changed since the previous issue of the index.

1.03 "Add." is the abbreviation for addendum, and "App." is the abbreviation for appendix.

1.04 The key to the numbering arrangement follows:

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- 476 → Division Number
- 000 → Subdivision Number
- 000 → Key Numbers Designate Class of Material
  - -000 through -029 General, Forms, and Assignment Procedures (Administration)
  - -040 through -059 Training Material
  - -070 through -089 Engineering Application
  - -100 through -199 Description of Systems, Equipment and Apparatus
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  - -700 through -749 Requirements and Adjusting and Lubrication Procedures
  - -800 through -849 Repair and Modification Procedures (Including Ordering Information)
  - -900 through -999 Reserved for Operating Company Practices Having Local Application Only

2. NUMERICAL INDEX

2.01 All Sections which have been issued to date, within Division 476 are listed in the attachment by SECTION number, ISSUE number, and SUBJECT.

2.02 The bold-face numbers, appearing in the attachment indicate the division-subdivision numbers (six digits) and their respective titles. Following each six-digit number are the issued Section numbers (nine digits) and their respective titles.

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COIN TELEPHONE
COIN LEVEL VOLUME SENSOR

1. GENERAL

1.01 This section is issued to provide procedures for installing the Dracon Industries Coin Volume Sensor in the coin telephone.

1.02 The Coin Volume Sensor (CVS) provides a means of monitoring the level of coin fill in the coin telephone. The CVS provides a signal to inform the CO that the coin box is full.

1.03 The purpose of signaling is to determine when collections are necessary. Urban or high-traffic locations may require 24 to 48 hours for collection, and the rural or low-traffic locations may require a longer period of time for collections.

2. DESCRIPTION

2.01 Inside the coin box, a metal probe (Figure 1) is connected from the outside, via a slide contact, to a 39-kilohm resistor mounted on the level sensor (Figure 2). The level sensor is a printed wiring card that is magnetically fastened to the side wall of the coin vault (Figure 2). An insulated lead connects the 39-kilohm resistor to the ring side of the line through the break contacts on the hookswitch. Another lead provides a solid ground connection to the coin box.

2.02 When the coin box fills to the predetermined level, the coins provide an electrical path between the probe and the coin box. This connects the ring side of the line to ground through the 39-kilohm resistor and the break contacts (normally closed) of the hookswitch. Thus, when the coin telephone is idle (on-hook), a 39-kilohm lead to ground is placed on the ring side of the line. When the telephone is busy, the 39-kilohm lead to ground is removed.

NOTE: At the CO, the 39-kilohm resistance between the ring conductor and ground can be detected by a line insulation routiner or test set and interpreted as a full coin box.

3. MATERIAL REQUIREMENTS

3.01 The following materials are required to install the CVS in the coin telephone vault when the telephone company performs the work in local rehabilitation/repair shops:

(a) A coin box.
(b) A suitable arbor press (available equipped with a punch die for accurately and conveniently piercing the side of a coin box to receive rivets for the probe as shown in Figure 1).
(c) A manual rivet gun for setting the copper rivets.
(d) A probe assembly (Figure 1), required for installation into the coin boxes used in coin telephones.
(e) A level sensor (provided with magnets on the back).

NOTE: A coin box level sensor is available for three-slot coin telephones and single–slot coin telephones.

4. INSTALLATION

Telephone Company

4.01 To install the CVS, perform the following steps:

(a) Pierce the side of the coin box with the arbor press and punching die tool (Figure 1).

NOTE: Installation of the probe cannot be done in the field. It is installed (at local company option) in local repair shops or by the manufacturer with a special heavy-duty rivet gun.

(b) The level sensor is magnetically placed up against the right-hand wall of the coin telephone vault (Figure 2).
(c) The leads from the level sensor are connected to terminals available in the coin telephone (Figures 2 and 3).
(d) After the level sensor is securely in place, the coin box is placed inside the vault. This will set contact with the two special copper rivets that are in the side of the coin box, to the two electrodes on the front of the level sensor.

Manufacturer

4.02 If the coin box modification is to be performed by the manufacturer (Dracon), arrangements shall be made with the GTE Automatic Electric warehouse.

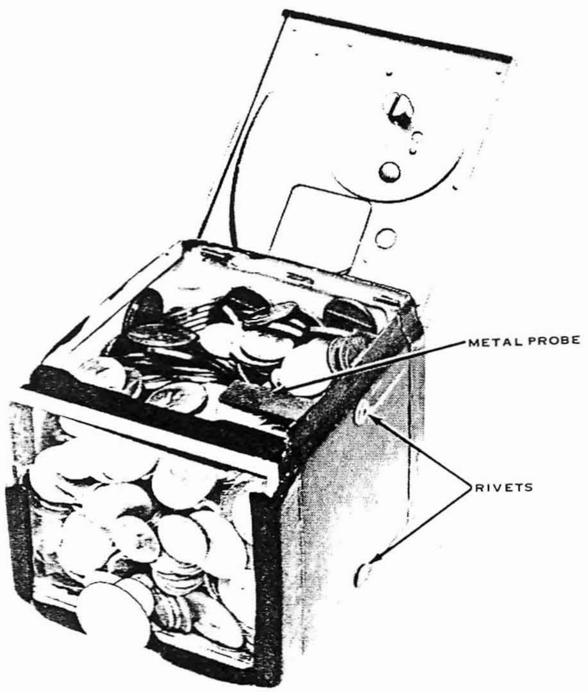

Figure 1. Filled Coin Box.

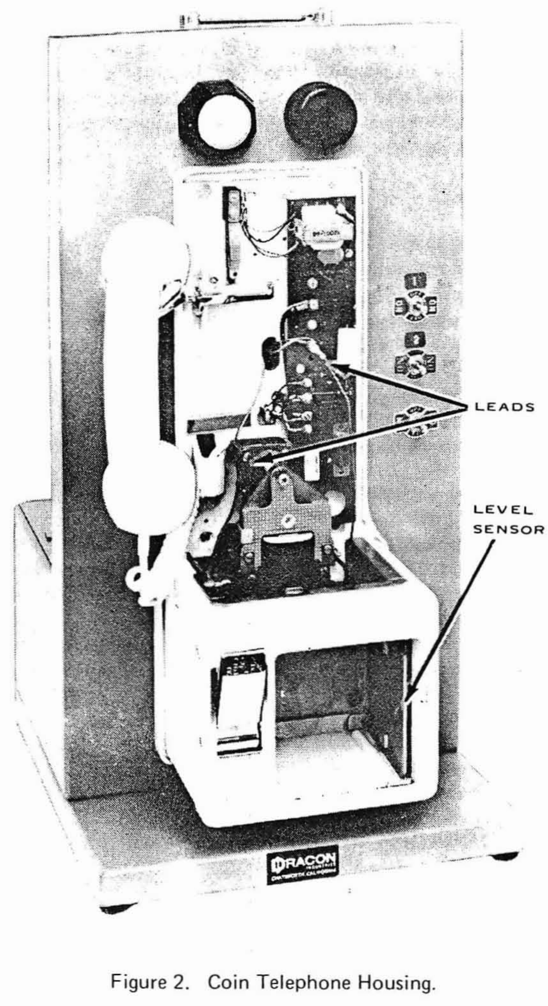

Figure 2. Coin Telephone Housing.

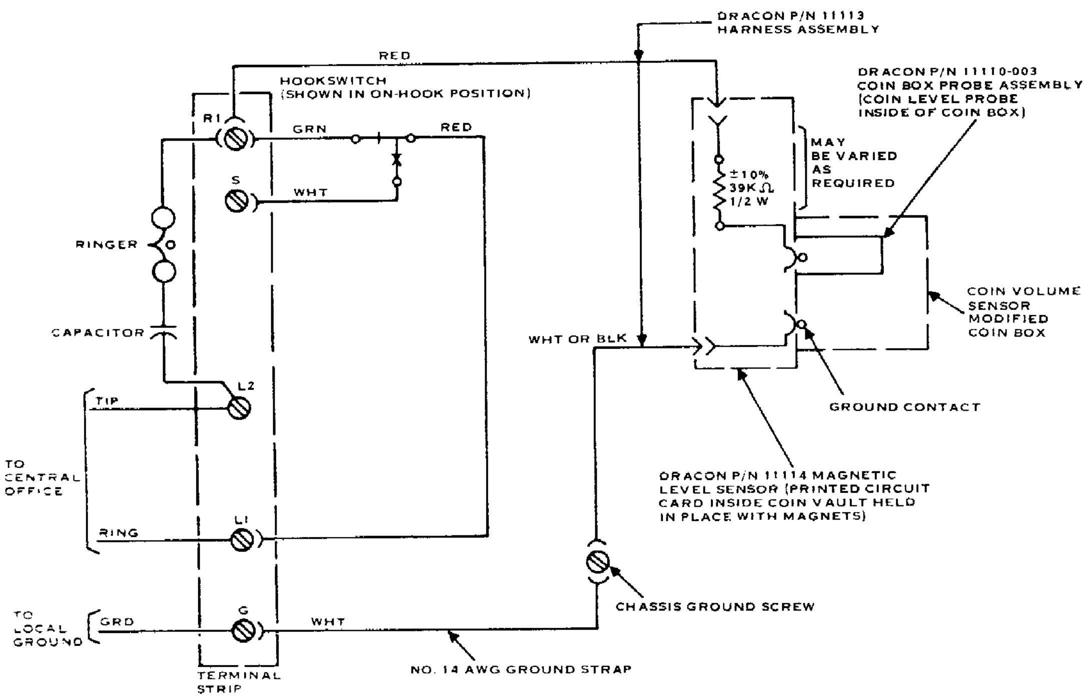

Figure 3. Wiring Diagram for Coin Volume Sensor.

TESTING COIN RELAYS USING MODEL TS-501T TEST SET

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4. TEST SET MAINTENANCE 6

1. GENERAL

1.01 This section provides information pertaining to the description and use of Teltronics, Inc. Model TS-501T Coin Relay Test Set.

2. DESCRIPTION

2.01 The TS-501T (Figure 1) is a totally portable, self-contained, battery-powered test set that is used for testing and calibrating single-coil or two-coil prepay coin telephone set coin relays. The test set energizes the relay for proper current requirements for soak, operate, and nonoperate in both the collect and refund modes. The relay energization time can be monitored during the operation cycle of the single-coil relay, and the elapsed time for each relay operation may be digitally displayed at the option of the user. The test set can also be used for monitoring central office command collect or refund current and pulse duration.

2.02 Refer to Tables 1 and 2 for test set characteristics and a description of operating controls and indicators.

3. USE

3.01 The following paragraphs list procedures for performing various tests with the test set.

Central Office Battery Supply Test

3.02 Perform the central office battery supply test as follows:

(a) Remove the upper housing and routine the station as outlined in Section 476-202-700, Coin Telephone Set Maintenance.

(b) Jumper the terminals between the upper and lower housing using the appropriate test cord (P-60605 or P-60754-A).

(c) Open the station ground and remove the ground strap if it is in place.

(d) Connect the black test lead to the station ground terminal and connect the red test lead to the station ground wire; then, perform the following:

(1) Set the selector switch to CENTRAL OFFICE PULSE MONITOR.

(2) Depress the RESET pushbutton, lift the handset and, when dial tone is heard, trip the coin trigger.

(3) Depress and hold the DISPLAY pushbutton. Observe 000 on the digital readout and replace the handset.

(4) Monitor the amount of current flowing through the meter. There should be in excess of 60 milliamperes; if the flow is less than 60 milliamperes, check the station ground. The third wire (neutral) power ground should be bonded to the telephone booth and cross-connected with the local station ground.

3.03 On an installation where there is a booth that is not lighted or where there is no booth, the ground conditions should be as outlined in Section 435-600-100, Station Grounding Requirements. If these conditions do not exist, refer the installation to your supervisor.

3.04 If the ground conditions are correct, but the coin telephone set does not operate properly request the central office personnel to check the power supply. If the power supply is adequate, the station location is beyond the loop limits. Refer the installation to your supervisor immediately.

3.05 If the current reading is above 80 milliamperes, disconnect the red lead on the restoring coil contacts and tape and fold it back in a position that will not interfere with station operations.

3.06 If no current indication is observed on the meter, hold the connection under test and request central office personnel to check the coin repeater for correct collect or refund voltage value.

Single-Coil Relay Test

3.07 Perform the single-coil relay test as follows:

(a) Disconnect the wire from the coin relay.

(b) Connect the test leads from the test set, red to terminal 3 and black to terminal 4 on the relay; then, perform the following:

(1) Set the selector test set switch to RELAY TEST.

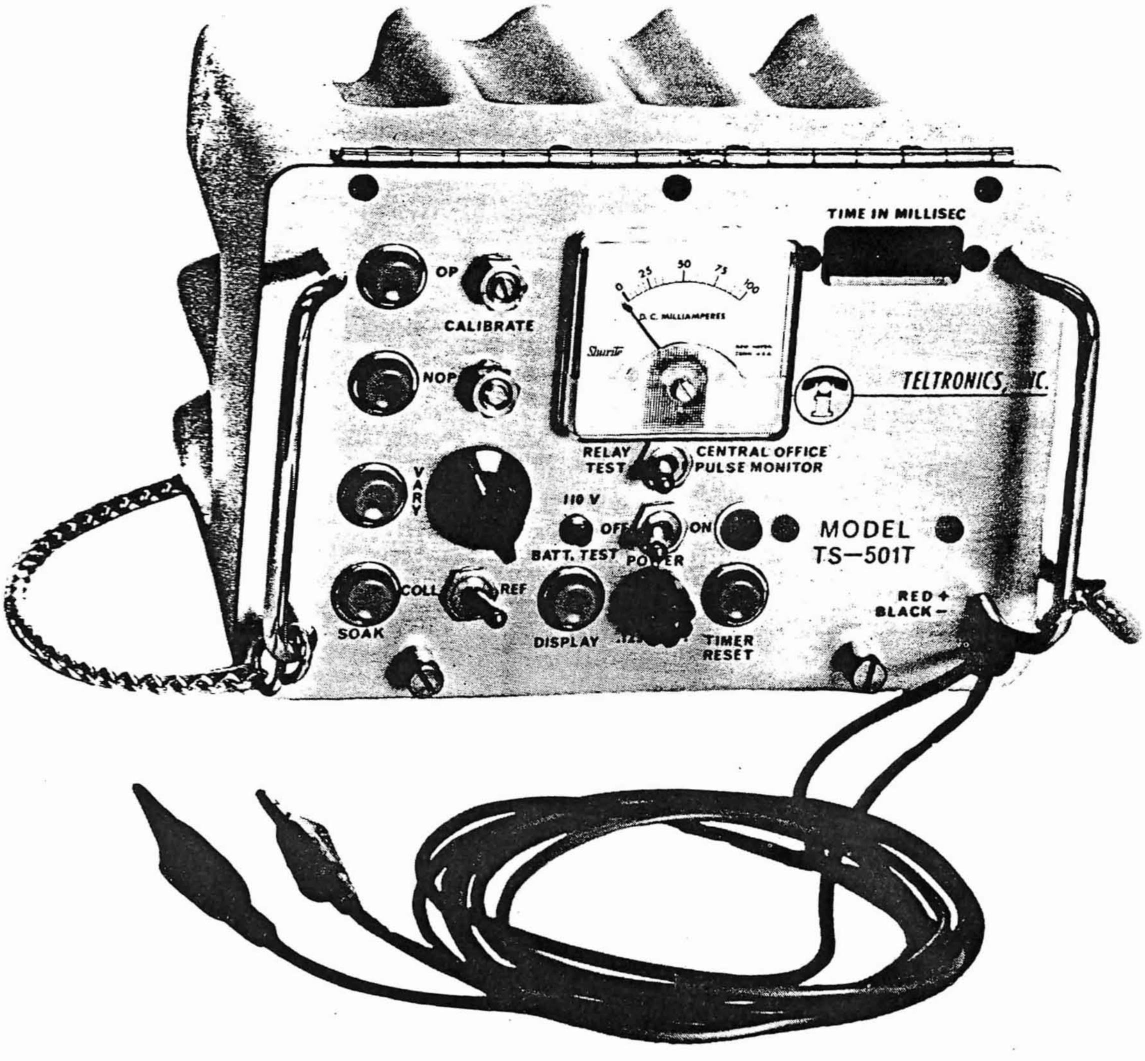


Figure 1. Coin Relay Test Set.

Table 1. Technical Characteristics.

CATEGORY	DESCRIPTION
Output	Soak, nonoperate, operate, and variable current. Output polarity can be programmed for collect or refund in all above modes. Output unaffected by short circuit, load resistance, or internal battery voltage.
Panel Indicators	Meter movement to indicate output current and central office command current. Digital display to indicate relay cycle time.
Input Power	Totally self-contained, battery-operated (standard dry cell batteries).
Mechanical	Dimensions - 6 inches high, 9 inches wide, 8 inches deep. Weight - 8 pounds.
Environmental Limits	Temperature - 0° to 140°F. Relative Humidity - 0 to 95%.

(2) Set the test set power switch to the ON position and trip the coin trigger.

(3) Depress the SOAK pushbutton and hold until the relay operates and times out.

(4) Trip the coin trigger and depress the NOP pushbutton. The relay should not operate. If the relay operates, increase the tension on the restoring spring until the relay does not operate.

(5) Depress the SOAK pushbutton. The relay should operate to the opposite position.

(6) Set the COLL-REF switch to the opposite position.

(7) Depress the SOAK pushbutton. The relay should operate to the opposite position.

(8) Depress the VARY pushbutton and adjust the rheostat until the meter indicates 40 milliamperes. Release the VARY pushbutton.

(9) Trip the coin trigger and depress the VARY pushbutton. The relay should not operate. If the relay operates, increase the tension on the restoring spring until the relay does not operate.

(10) Set the COLL-REF switch in the opposite position.

(11) Trip the coin trigger and depress the VARY pushbutton. The relay should not operate. If the relay operates, increase tension on the restoring spring until the relay does not operate.

(12) Depress the VARY pushbutton and adjust the VARY rheostat until the meter indicates 60 milliamperes. Release the VARY pushbutton.

(13) Trip the coin trigger and depress the VARY pushbutton. The relay should operate and the coin trigger should return to normal. If the relay does not operate, decrease tension on the restoring spring until the relay operates.

(14) Set the COLL-REF switch to the opposite position.

(15) Trip the coin trigger and depress the VARY pushbutton. The relay should operate to the opposite position and the coin trigger should return to normal. If the relay does not operate, decrease the tension on the restoring spring until the relay operates.

(16) Set the test set power switch to OFF.

If any adjustments are made in the collect or refund operate mode, recheck the nonoperate mode.

Table 2. Operating Controls and Indicators.

REFERENCE DESIGNATION	IDENTIFICATION	TYPE	FUNCTION
CONTROLS			
S1	OP	Momentary pushbutton	Supplies operate current to relay under test.
S2	NOP	Momentary pushbutton	Supplies nonoperate current to relay under test.
S3	VARY	Momentary pushbutton	Supplies variable current to relay under test (20 mA to 100 mA).
S4	SOAK	Momentary pushbutton	Supplies 100 mA to relay for coil soaking.
R13	OP CALIBRATE	Screwdriver adjusted potentiometer	Calibrates minimum operate current supplied to relay when S1 is depressed . (Locked in place after calibration).
R14	NOP CALIBRATE	Screwdriver adjusted potentiometer	Calibrates maximum nonoperate current supplied to relay when S2 is depressed (locked in place after calibration).
R15	VARY	Knob adjusted potentiometer	Varies current supplied to relay from 20 to 100 mA when S3 is depressed.
S5	COLL-REF	Toggle switch	Selects collect or refund polarity for preceding tests.
S8	RELAY TEST/ CENTRAL OFFICE PULSE MONITOR	Toggle switch	Selects relay test function or central office pulse current to be shown on meter movement when test leads are placed appropriately.
S6	110 Volts Battery	Momentary pushbutton	Directs 110 volts battery supply through 1,000-ohm resistor to read 100 mA or greater.
S9	POWER OFF/ON	Toggle switch	Battery power off or on.
S7	DISPLAY	Momentary pushbutton	Provides 4.5 volts display power to digital display.
S10	TIMER RESET	Momentary pushbutton.	Resets digital timer.

Table 2. Operating Controls and Indicators. (continued)

REFERENCE DESIGNATION	IDENTIFICATION	TYPE	FUNCTION
Indicators and Protection			
M1	DC MILIAMPERES	0 to 100 mA meter	Shows current passing through test leads.
DS-1, SD-2, DS-3	TIME IN MILLISEC	Digital readout	Displays time in milliseconds for relay tests when display switch is depressed.
DS-4	POWER ON	Neon lamp	Power ON DISPLAY.
F1		0.125-ampere fuse	Circuit protection.

Single-Slot Coin Telephone Set Single-Coil Relay Test

3.08 All electrical operating requirements shall be met with the unit mounted in an assembled coin telephone or its equivalent.

CAUTION: The armature of the coin relay should not be manually held nor be allowed to remain in the closed position while current is passing through the 1,000-ohm resistor for a period greater than 1 second because of potential damage to the resistor.

3.09 To perform the electrical tests, apply the voltage potential to terminals associated with springs 3 and 5 (wire lead colors are white and green, respectively).

3.10 All electrical operating requirements shall be met with the unit connected to a constant current power source limited to 60 Vdc unless otherwise specified.

3.11 If single-slot coin telephone set single-coil relays are to be adjusted, refer to paragraphs 3.12 through 3.14.

3.12 The unit shall not operate when connected to a dc source supplying a 0.039-ampere minimum current and when seven test slugs, part no. P-11772-D3 (quarter-type slugs, 0.083 inch thick by 0.961 inch in diameter) are deposited one at a time (at the approximate rate of one slug every 0.3 second) into the coin hopper while current is passing through the coil, and after the unit has been operated in the same direction by 120 Vdc (soak condition). The unit shall meet this requirement for both polarities.

3.13 The unit shall collect separetely a deposit of one test slug, part no. P-1172-D10, (dime-type slugs, 0.043 inch thick by 0.685 inch in diameter with square edges) and a deposit of seven test slugs, part no. P-11772-D3 (quarter-type slugs, 0-0.83 inch thick by 0.961 inch in diameter) when connected to a dc source (white lead positive, green lead negative) supplying a 0.048-ampere maximum current for a duration of 0.200 second maximum after the unit has been operated in the reverse direction by 120 Vdc (soak condition). The unit shall similarly refund the deposits when the battery polarity is reversed.

3.14 The relay shall fully operate and release, as determined by the opening of contact springs 4 and 5, 0.600 ± 0.050 second after a direct current of 0.052 ampere is applied for 0.200 second minimum.

NOTE: Adjust the timing screw as required.

Double-Coil Relay Test

3.15 Perform the double-coil relay test as follows:

(a) Disconnect the lead from the left coin terminal of the relay facing the station.

(b) Connect the leads from the test set to the two terminals on the coin relay with the two windings in series with the test set; then, perform the following steps:

(1) Set the selector switch to RELAY TEST.

(2) Set the test set power switch to ON.

(3) Depress the SOAK pushbutton. The relay should operate.

(4) Set the COLL-REF switch to the opposite position.

(5) Trip the coin trigger and depress the OP pushbutton. The relay should operate. If the relay does not operate, decrease tension on the restoring spring until the relay does operate. If an adjustment is made in this mode, recheck the nonoperate mode.

(6) Depress the TIMER RESET pushbutton, trip the coin trigger, depress the OP pushbutton, and hold until the relay operates and times out.

(7) Depress the DISPLAY pushbutton and chek the time display. The indication should be 600 milliseconds $\pm$ 50 milliseconds. If the relay is out of time, adjust the timing screw until the relay times out as near to 600 milliseconds as possible. Apply Glyptol cement to both sides of the timing residual screw.

(8) Set the test set power switch to OFF.

4. TEST SET MAINTENANCE

4.01 The test set has a solid state network, and all circuits are protected against shorts, grounds, and power surges. Field maintenance should be minimal and should be limited to replacement of batteries and checking for loose connections.

4.02 The operate and nonoperate potentiometers are preset to test the single-coil relay and should not be adjusted.

4.03 To check the power supply, turn the test set power switch to ON and depress the 100V pushbutton. The meter should indicate in excess of 95 milliamperes. If the meter does not indicate in excess of 95 milliamperes, change the following batteries:

(a) 3 to 45 volts, No. 738 Eveready batteries or equivalent (120-volt power supply).

(b) 1 to 9 volts, No. 216 Eveready battery or equivalent (operates timer).

(c) 1 to 4-1/2 volts, No. 714 Eveready battery or equivalent (operates digital display for single-coil millisecond timing).

TYPE 120A SINGLE-SLOT COIN TELEPHONE SET
DESCRIPTION AND INSTALLATION

1. GENERAL

1.01 This addendum to Issue 5 of this section provides changes to Table 1.

1.02 Microfiche Copy Recipients. Remove Issue 5 of this section from the file and replace it with the microfiche copy identified as Issue 5, Addendum 1. Changes are marked in the replacing copy.

1.03 Paper Copy Recipients. In ink or red pencil, make the changes indicated in part 2 of this addendum. Write "See Addendum" in the margin next to each change. File this addendum directly in front of the addended section.

2. CHANGES

2.01 In Table 1, under the column heading "Connect White Jumper G to," change P* to P** and X to S.

2.02 In Table 1, under NOTES, change cam to coin.

TYPE 120A SINGLE-SLOT COIN TELEPHONE SET DESCRIPTION AND INSTALLATION

1. GENERAL

1.01 This addendum to Issue 5 of this section adds information on conductor loop limits.

1.02 The changes previously included in Issue 2 of this addendum are also included in this issue. The changes appearing for the first time in this addendum are shown by marginal indicators.

1.03 Microfiche Copy Recipients. Remove Issue 5, Addendum 2 of this section from the file and replace it with the microfiche copy identified as Issue 5, Addendum 3. Changes are not marked in the replacing copy.

1.04 Paper Copy Recipients. In ink or red pencil, make the changes indicated in part 2 of this addendum. Write "See Addendum" in the margin next to each change. File this addendum directly in front of the addended section.

2. CHANGES

2.01 Add the following to the last sentence in paragraph 1.01: "or emergency prepay service."

2.02 Remove and destroy pages 3 and 4 of this section and replace them with the new pages 3 and 4 attached to this addendum.

2.03 Replace Table 2 with Table 2 of this addendum.

2.04 Change the first sentence of paragraph 3.33 to read as follows:

A newly designed handset (L-9080) containing the D-51030-B capsule is available for use on the Type 120A telephone.

2.05 Add the following to paragraph 3.33:

On handsets manufactured after January, 1979, the transmitter and receiver caps will be permanently bonded to the handset shell. A 1-1/2 inch by 3-inch card will be placed inside the telephone set housing by the installer to alert the repairman that the L-9080 handset contains caps which are permanently bonded to the handset shell. The card will read as follows:

This handset has transmitter and receiver caps that are permanently bonded to the handset shell. Any attempts to repair or salvage the receiver and transmitter units should be done by rehab centers since it requires the destruction of the handset shell and caps.

2.06 After paragraph 3.33, add the following paragraph:

3.34 When installing the L-9080 handset, remove the 1-1/2 by 3-inch card from the protective plastic bag surrounding the handset and place the card inside the telephone set housing.

2.07 In paragraph 4.03, change step (e) to read as follows:

(e) Lock the hopper door in the collect position. This is done by moving the door with the pin located in the left bottom corner of the hopper assembly and locking the door in this position with a 4-40 by 1/8-inch screw, part No. D-762044-A. The screw is inserted into the tapped hole adjacent to the door lever in the lower left-hand corner of the hopper assembly.

2.08 Add the following sentence to paragraph 4.20:

Refer to the 435-600 subdivision or Section 476-500-200 of GTE Practices for recommended grounding requirements.

2.09 Replace paragraph 4.31 with the following:

Retrofit of Line Wire Termination Kit

4.31 To install the retrofit line wire termination kit, part No. HH-920004-1, perform the following steps after removing the upper housing, vault door and coin box, chassis assembly, coin reject chute, and rejector assembly:

(a) Remove the left side coin relay rail mounting screw from the vault area.
(b) Disconnect the line wires and the ground wire from the existing line wire pile-up.
(c) Replace the relay mounting screw with the shortest screw, part No. D-762047-E, provided in the retrofit kit.
(d) Place the terminal plate (provided with the kit), part No. HD-781015-A, on the mechanism base with the cutout portion over the screw inserted in step (c).

NOTE: For all installations of parts, the L1, G, and L2 designations are kept to the installer's right.

(e) Place the washer (provided), part No. D-17345-A, over the screw, install the nut (provided), part No. D-7701-A, and tighten.

(f) Place the terminal block (provided), part No. HD-150058-A, onto the terminal plate and secure it with the two remaining screws (provided), part No. D-762047-F.

(g) Place one spade terminal of the 14-gauge ground wire strap assembly (provided), part No. HD-540162-A, under a ground terminal screw on the terminal block (Figure 14). Place the remaining spade terminal of the ground wire strap assembly under one of the terminal block mounting screws. Tighten the screws down securely.

(h) Verify continuity between the ground terminal screw and a distant point on the telephone housing.

NOTE: Do not connect any other wires except the ground wire strap assembly to the ground terminal during this test.

(i) If discontinuity is detected, clean the paint from the contacting surfaces, reassemble, and test until the defect is cleared.

(j) Attach the smaller spade end of the three-conductor strap cable, part No. HD-540106-A, to the left side row of the terminal screws of the terminal block and bend the barrel portion up 90 degrees.

(k) Terminate the other end of the strap cable to the line pileup terminal screws of the existing line wire pileup.

(l) Route the line wire and the ground wire to the right side row of the terminal screws of the terminal block of the mechanism base and terminate. Refer to the 435-600 sub-division or Section 476-500-200 of GTE Practices for recommended external grounding requirements.

NOTE: When routing the line wire, ground wire, and strap cable, care should be taken that none of these wires are routed so that they would be under the chassis assembly when it is reinstalled.

(m) Replace the rejector assembly, the coin reject chute, and the chassis assembly. Check for proper routing of the wires and make certain that no wires are pinched under the chassis assembly frame.

(n) Replace the upper housing, the new coin box, and the vault door.

2.10 Add the following sentence to the end of paragraph 6.02:

To collect, the central office applies coin battery (+) to L2 (TIP) and (−) to ground; to refund, the central office applies coin battery (−) to L2 (TIP) and (+) to ground.

2.11 In paragraph 8.02, after step (f), add the following:

NOTE: Later issues of the Type 120A telephone use a dry-reed relay rather than a mercury-wetted relay.

2.12 In Table 4, step 10, change the FIELD ACTION column to read as follows:

Replace coin chute and trigger switch assembly or replace coin relay-hopper coin chute assembly.

2.13 In paragraph 8.03, after step (d), add the following:

NOTE: Later issues of the Type 120A telephone use two small independent coil springs to return the latches, rather than one common flat (VANE) spring.

2.14 Add the new page 28a attached to this addendum to Issue 5 of this section.

Attached: Page 3 of 28 dated November 1979, revised.
Page 4 of 28 dated November 1979, reissued.
Page 28a of 28a dated November 1979, added.

I Table 2. Type 120A Coin Telephone Conductor Loop Limits.

TYPE OF CENTRAL OFFICE	PREPAY		SEMIPOSTPAY	
	WITHOUT LOOP EXTENDER (OHMS)	WITH LOOP EXTENDER (OHMS)	WITHOUT LOOP EXTENDER (OHMS)	WITH LOOP EXTENDER (OHMS)
SxS	1,200	2,600*	1,200	3,200
CXP-5	1,600	2,600	1,600	4,000
C-1 EAX	1,400	2,600	1,400	3,600
No. 1 EAX	1,600	3,900	Service not offered	
No. 2 EAX	1,600	2,600	1,600	4,000

*Limit is based on 0-Vdc earth potential. With –3-Vdc or greater earth potential, loop extender is not usable due to coin-detection failure.

NOTES:

1. Test Conditions – Office battery: 48 Vdc
   Ground resistance: 50 ohms
   Earth potential: 0 Vdc
   Minimum coin battery:

   No. 1 EAX: 135 Vdc (135 to 145 Vdc)
   All other systems: 100 Vdc (100 to 120 Vdc)

2. Loop extension equipment by Lorain Products Corp. Model SRM-169 loop extender strapped S-1.
3. If an extension telephone is used with the Type 120A telephone, a loop limit of 800 ohms without a loop extender or 1,900 with the Lorain SRM-169 loop extender must be observed to provide a minimum of 10 mA to the coin telephone during periods when the coin telephone and extension are off-hook simultaneously.
4. If longer loop operation is required, the extension telephone must be modified by adding series diodes to the telephone so that its dc resistance matches that of the coin telephone. When an extension is used with a Type 120A telephone, wire two FD-1029-LD zener diodes (3.3 volts, 1 watt), connected anode to anode in series with the tip or ring conductor of the extension. This change to the extension telephone will allow the coin telephone to be used at the higher table limits.

TYPE 120B (SINGLE-SLOT) COIN TELEPHONE SET DESCRIPTION AND INSTALLATION

1. GENERAL

1.01 This addendum to Issue 2 of this section includes information for the Type 20D Integrated Circuit Touch Calling Unit, WECo. SOUND BOOSTER Handset, protector plate kit, stripper and screw assembly, hookswitch cam cleaning, and options for the vault door.

1.02 Microfiche Copy Recipients. Remove Issue 2, Addendum 1 of this section from the file and replace it with the microfiche copy identified as Issue 2, Addendum 2.

1.03 Paper Copy Recipients. In ink or red pencil make the changes indicated in part 2 of this addendum. Write "See Addendum" in the margin next to each change. File this addendum directly in front of the addended section.

1.04 GTE AE practices are used by GTE employees for operating and maintaining the equipment GTE AE manufactures and sells. These practices may change or may not be suitable in a specific situation and so are recommended as suggested guidelines only. GTE AE hereby disclaims any responsibility and/or liability for any consequential or inconsequential damages that may result from the use of such practices unless such practices are utilized in conjunction with the operation and maintenance of original equipment manufactured or supplied by GTE AE and covered by its standard warranty. GTE AE acknowledges that the customer's special requirements policy/practices may take precedence over those supplied by GTE AE if conflicts develop during installation and ongoing operation.

2. CHANGES

2.01 Replace Figure 3 with Figure 3 of this addendum.

2.02 After the last sentence in paragraph 3.08, add the following:

> The Inductor Capacitor TCU (LCTCU) manufactured prior to May 1, 1982 is superseded by the Type 20D Integrated Circuit TCU (ICTCU). To replace the LCTCU with the ICTCU, order part No. HD-840138-BR. To replace a Type 20D ICTCU with another Type 20D ICTCU order part No. HD-840138-AR.

2.03 Replace Table 1 with Table 1 of this addendum.

2.04 Replace Figure 7 with Figure 7 of this addendum.

2.05 After the paragraph 3.28 NOTE, add the following paragraph:

> 3.29 The protector plate kit (HH-880119-1) is available for protection of the coin relay armature against vandalism. The kit includes one hardened steel protector plate, two screws and installation procedures.
>
> 3.30 The WECo SOUNDBOOSTER Handset is available from WECo for use by the hard of hearing. The handset is equipped with a self-restoring volume control amplifier.

2.06 Renumber paragraph 3.29 through 3.31 to 3.31 through 3.33.

2.07 Replace Table 2 with Table 2 of this addendum.

2.08 Replace Figure 11 with Figure 11 of this addendum.

2.09 In the Figure 12 title, change "Figure 12" to "Figure 12a".

2.10 Add Figure 12b of this addendum.

2.11 Change Table 5, STEP 12, under the FIELD ACTION column, to read as follows:

(a) Loose connections at line terminal.
(b) Line or central office problem.
(c) Handset.

2.12 In Table 6, under the SPECIFIC TROUBLE column, make the following changes:

(a) In STEP 14, change to read "Coin relay will not operate on long loop."
(b) In STEP 15, change to read "Coin relay pulses or chatters."
(c) In STEP 16, change to read "Cannot mount replacement coin relay and hopper assembly."

2.13 In Table 6, under the FIELD ACTION column, make the following changes:

(a) In STEP 1, change to read "Replace coin relay and hopper assembly."
(b) In STEP 2, change to read "Replace coin relay and hopper assembly."
(c) In STEP 4, change to read "Replace coin relay."
(d) In STEP 13, change to read "Replace coin relay and hopper assembly."

2.14 In Table 8, under the FIELD ACTION column, make the following changes:

(a) In STEP 1, change to read "Replace the entire hookswitch and dial assembly."
(b) In STEP 2, change to read "Replace hookswitch and TCU assembly".
(c) In STEP 3, change to read "Adjust springs (if possible) or replace hookswitch and dial assembly."
(d) In STEP 5, change to read "Replace mounting screw."

TABLE 1. ORDERING INFORMATION FOR TYPE 120B COIN TELEPHONE AND REPLACEMENT PARTS.

			COLOR SUFFIXES					
DESCRIPTION	PART NO.	MATERIAL CODE NO.	BLACK	MATERIAL CODE NO.	BEIGE	MATERIAL CODE NO.	CHROME	MATERIAL CODE NO.
120B, Rotary	HC-120XX0-CSA		00	385350	10	385360	51	385451
120B, Touch Calling	HC-120XX0-JSA		00	385850	10	385860	51	385861
Upper Housing, Rotary	HD-480050-XX		AM	431155	BM		SM	
Upper Housing, Touch Calling	HD-480051-XX		AM	431156	BM		SM	
Hookswitch Dial Assembly	HD-500003-ER	431125						
Hookswitch Touch Call Assembly	HD-500003-FR	431126						
Touch Calling Unit	HD-840138-AR							
Adapter Plate, Touch Calling	HD-780171-A							
Coin Relay	HD-550001-B	431131						
Coin Hopper	HD-780044-CR	431159						
Coin Chute and Triggers	HD-780034-CR	431147						
Totalizer Chassis	HD-731095-A	431035						
American Coin Rejector, Complete	HD-500018-A	431158						
Canadian Coin Rejector, Complete	HD-500018-C	431146						
Handset Assembly	L-9080-CX		A	435445	B	435446		
Cord, Test	HD-540154-A	432544						
T-Wrench	HD-590000-A	579246						
Window, Card, Upper	HD-530000-A	439322						
Window, Card, Lower	HD-530001-A	439323						
Cover, Plastic, Relay	HD-490011-A	434046						
Cover, Plastic, Trigger	HD-490012-A	434124						

NOTE: The suffix M indicates a matte chrome finish; for bright chrome, delete the suffic M from the part number.

TABLE 2. TYPE 120B COIN TELEPHONE CONDUCTOR LOOP LIMITS

TYPE OF CENTRAL OFFICE	PREPAY WITHOUT LOOP EXTENDER (OHMS)	PREPAY WITH LOOP EXTENDER (OHMS)	SEMIPOSTPAY WITHOUT LOOP EXTENDER (OHMS)	SEMIPOSTPAY WITH LOOP EXTENDER (OHMS)
SxS	1,240	2,600*	1,240	3,200
CXP-5	1,640	2,600	1,640	4,040
C-1 EAX	1,440	2,600	1,440	3,640
No. 1 EAX	1,640	3,900	Service not offered	
No. 2 EAX	1,640	2,600	1,640	4,040

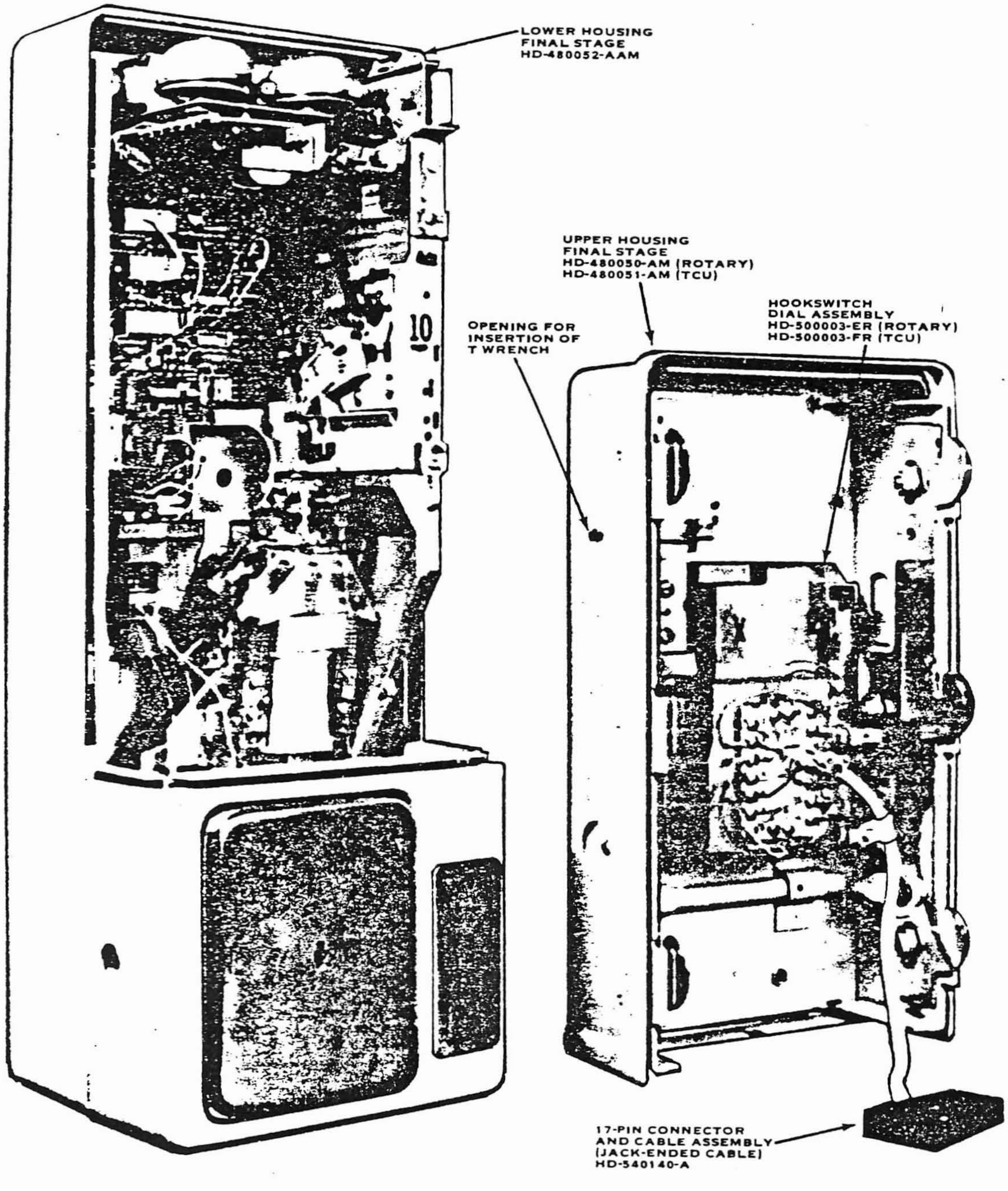
*Limit is based on 0-Vdc earth potential. With -3-Vdc or greater earth potential, loop extender is not usable due to coin-detection failure.

NOTES:

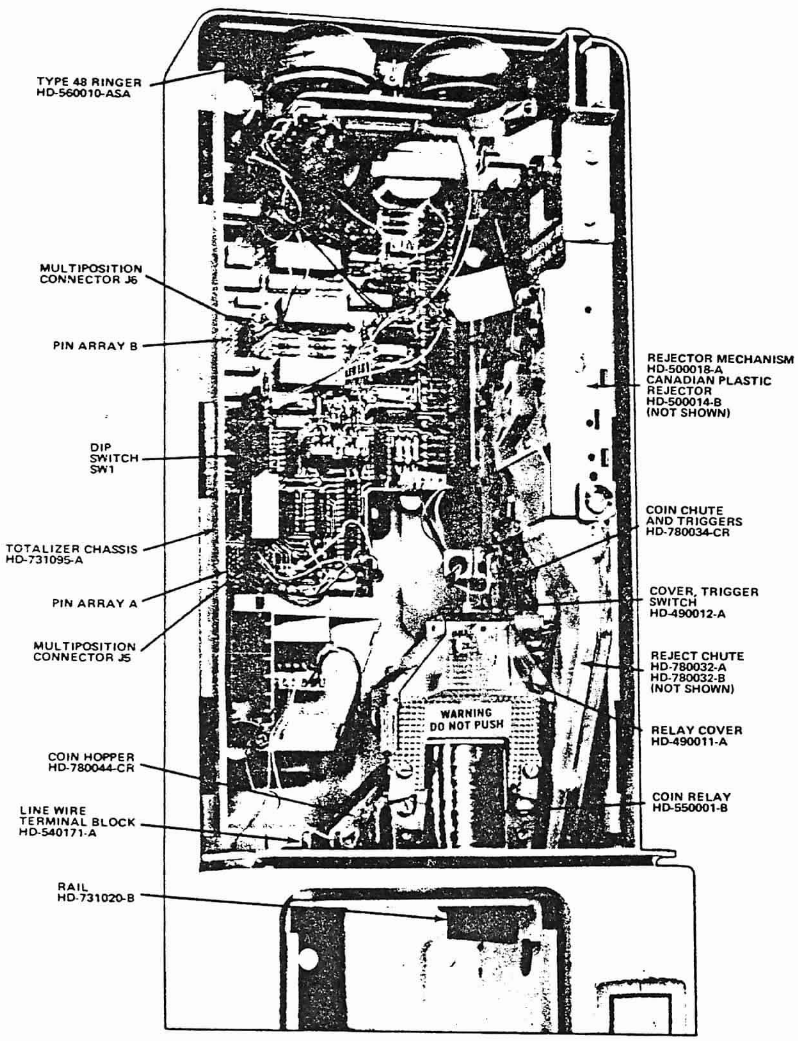
1. Test Conditions - Office battery: 48 Vdc
   Ground resistance: 50 ohms
   Earth potential: 0 Vdc
   Minimum coin battery:

   No. 1 EAX: 135 Vdc (135 to 145 Vdc)
   All other systems: 100 Vdc (100 to 120 Vdc)

2. Loop extension equipment by Lorain Products Corp. Model SRM-169 loop extender strapped S-1.
3. If an extension telephone is used with the Type 120B telephone, a loop limit of 800 ohms without a loop extender or 1,900 ohms with the Lorain SRM-169 loop extender must be observed to provide a minimum of 10 mA to the coin telephone during periods when the coin telephone and extension are off-hook simultaneously.
4. If longer loop operation is required, the extension telephone must be modified by adding series diodes to the telephone so that its dc resistance matches that of the coin telephone. When an extension is used with a Type 120B telephone, wire four FD-1029-HT diodes in series with the tip or ring conductor of the extension. This change to the extension telephone will allow the coin telephone to be used at the higher table limits.



| Figure 3. Interior View of Lower and Upper Housings.



I Figure 7. Interior View of Lower Housing.

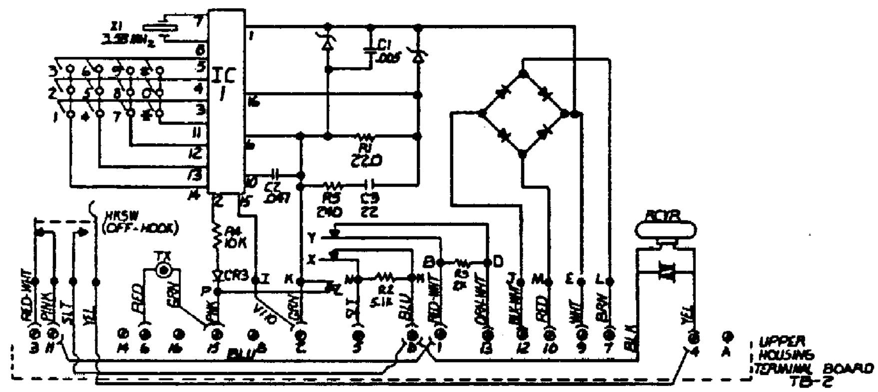
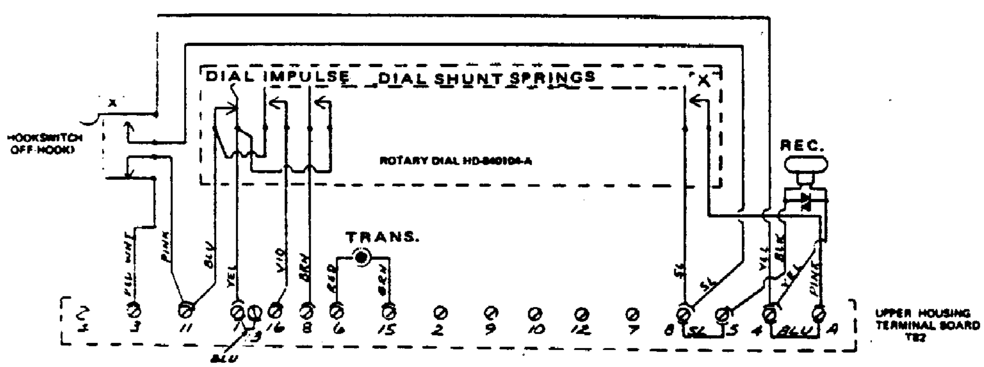


Figure 11. Wiring Diagram for Type 120B Telephone Equipped With A Type 20D TCU.



NOTE:
REFER TO TABLE 4 FOR SERVICE STRAPPING AND CONNECTIONS.

Figure 12b. Wiring Diagram of Upper Housing Equipped With Rotary Dial.

SECTION 476-202-100
ISSUE 1, FEBRUARY, 1963
GT&E STANDARD

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.

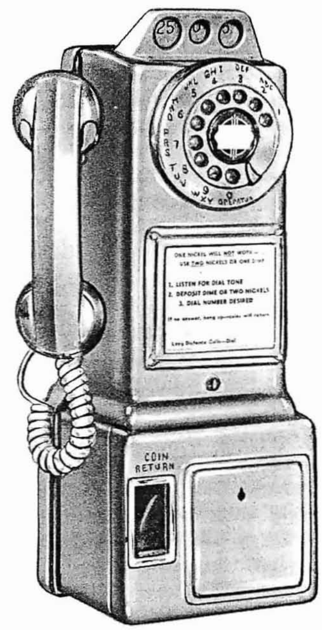


Figure 1. Prepay Paystation

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

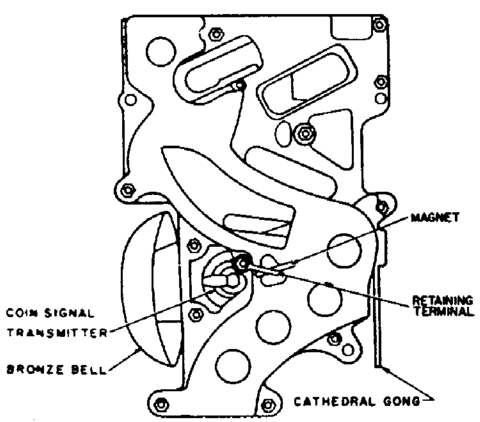


Figure 2. Coin Chute (Rear View)

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

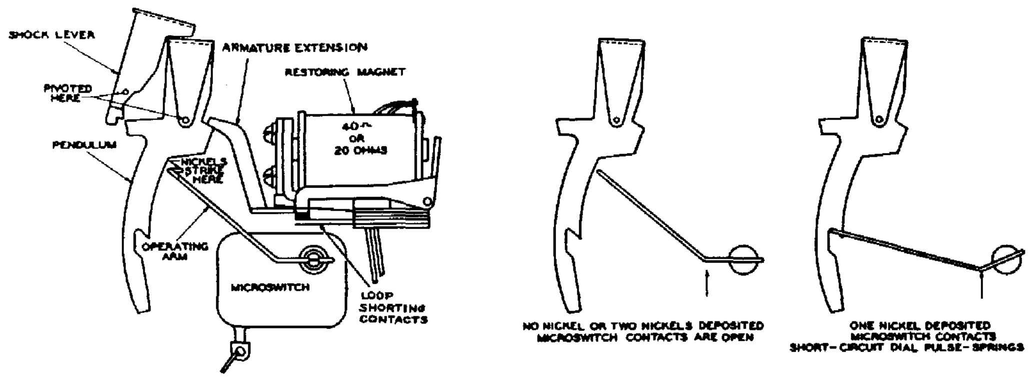


Figure 3. Two-Nickel Assembly

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 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

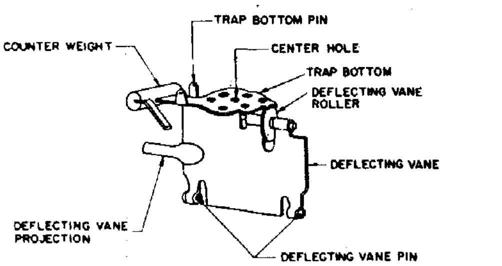


Figure 4. Coin Hopper Trap and Vane Assembly

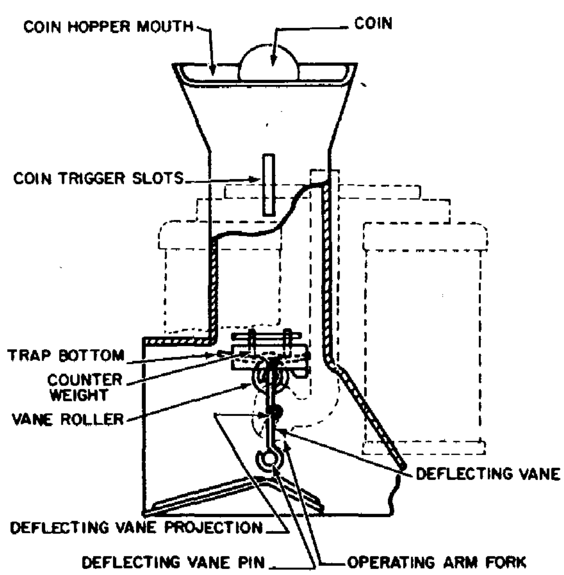


Figure 5. Trap and Vane in Normal Position

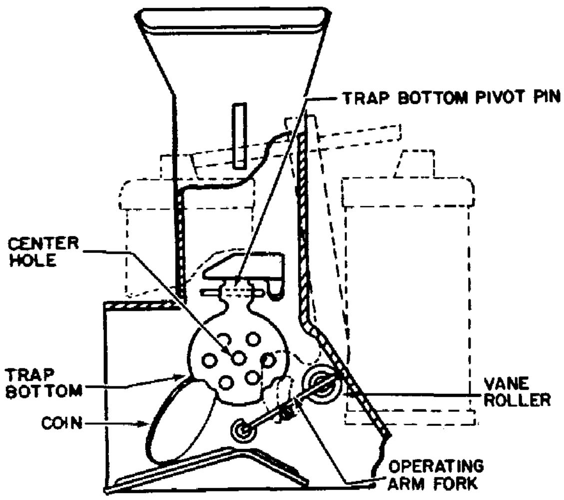


Figure 6. Trap and Vane in Refund Position

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

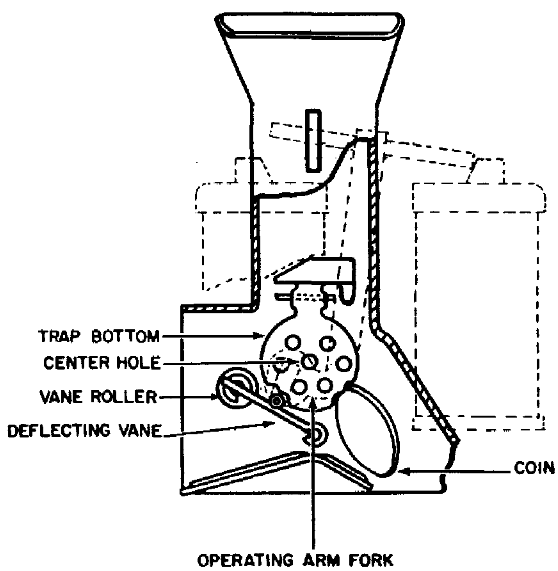
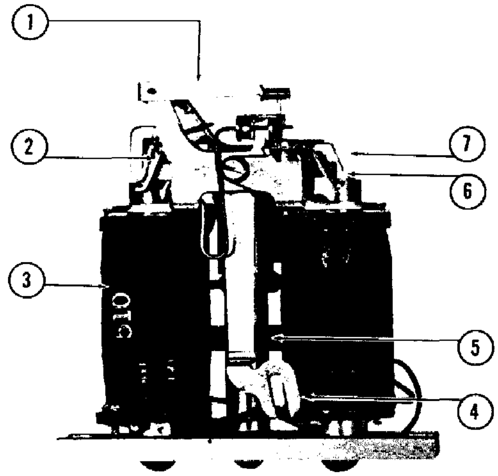


Figure 7. Trap and Vane in Collect Position



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

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.

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 incompleted 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

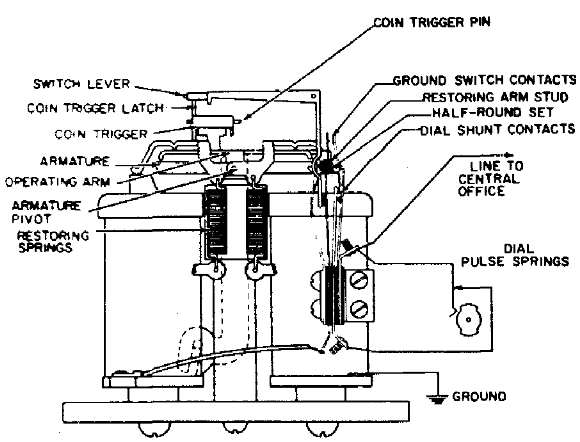


Figure 9. Coin Relay - Paystation Idle

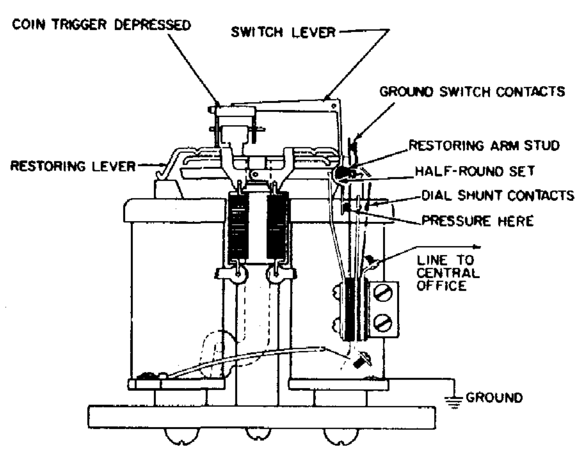


Figure 10. Coin Relay - Coin Trigger Tripped

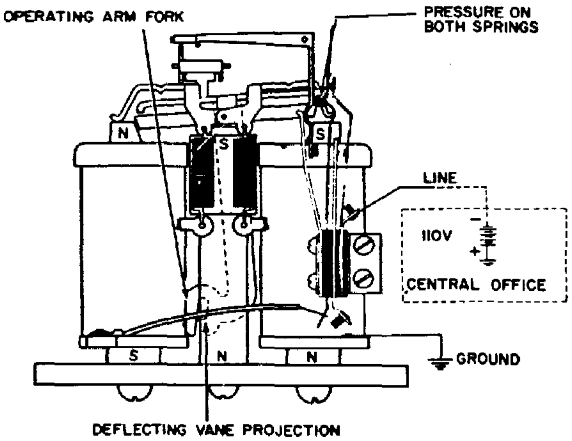


Figure 11. Coin Relay - Refund Position

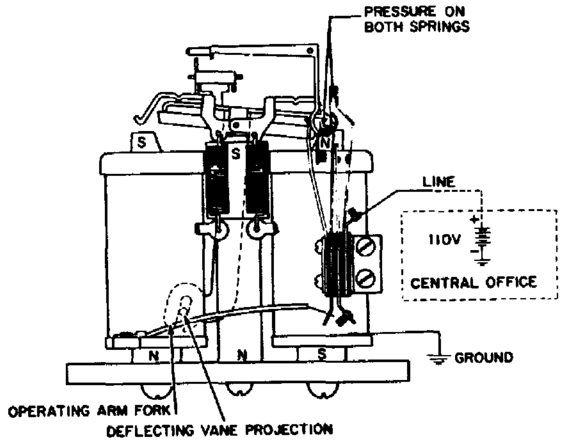


Figure 12. Coin Relay - Collect Position

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.

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.

NOTES:
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.

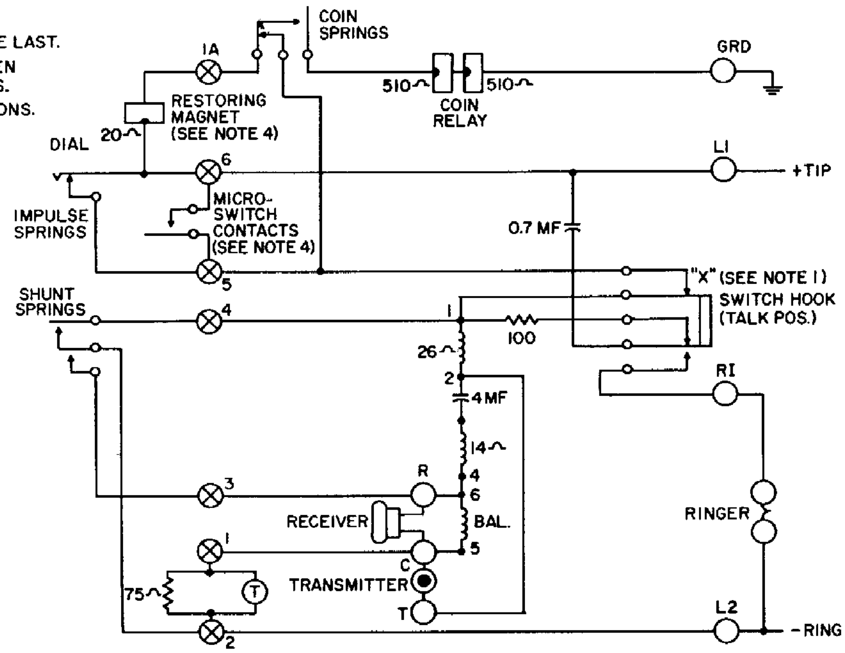


Figure 13. Type 62 Prepay Paystation - Schematic Diagram

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

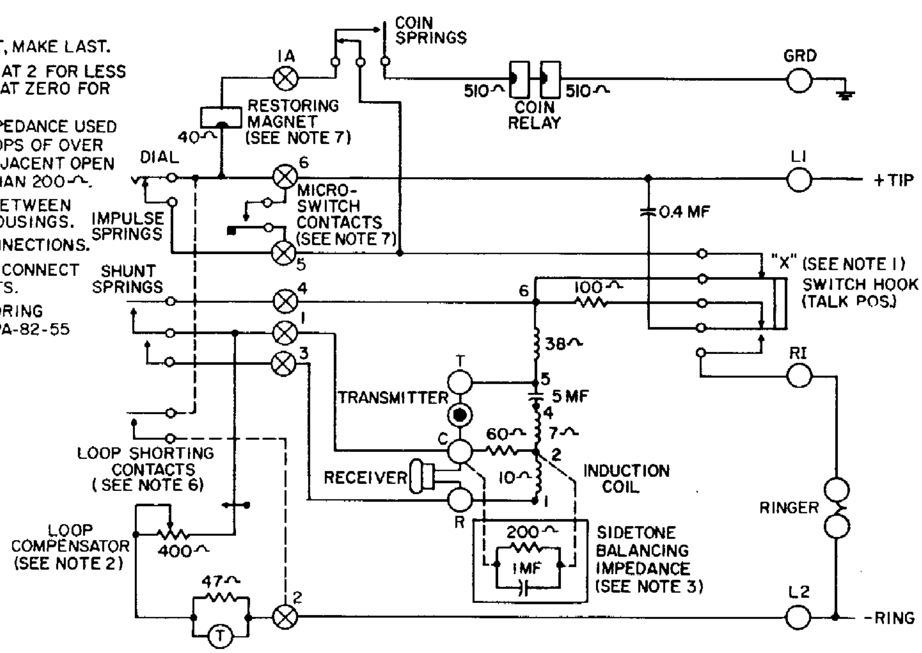


Figure 14. Type LPA-82 Prepay Paystation - Schematic Diagram

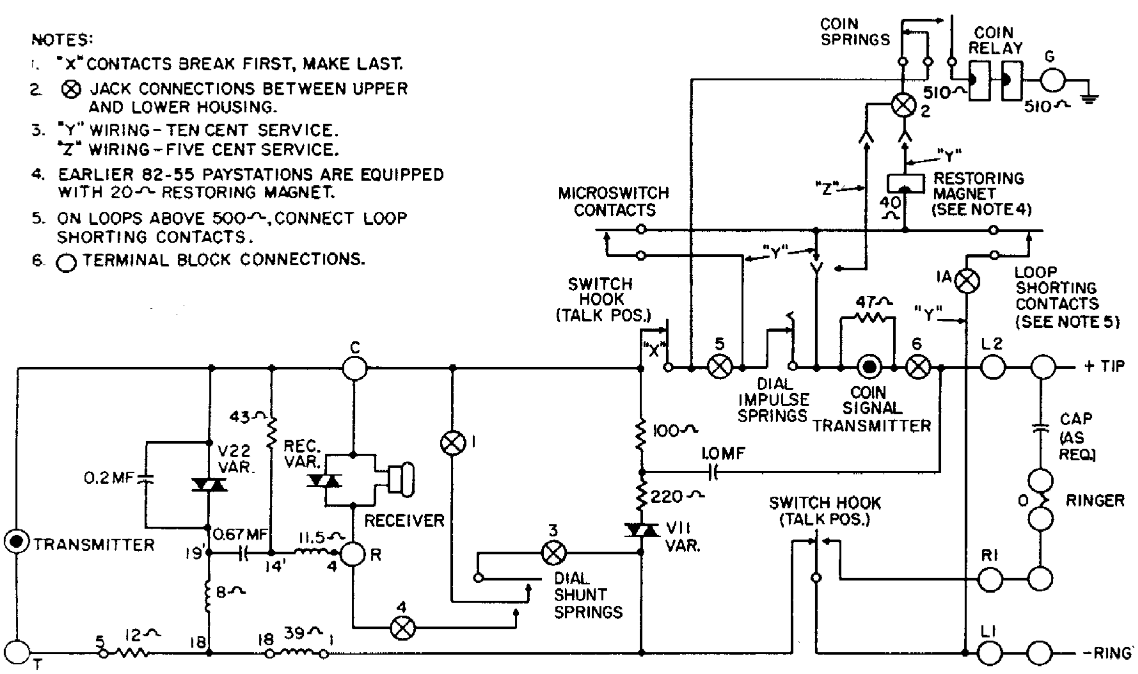


Figure 15. Type LPB-82 Prepay Paystation - Schematic Diagram

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

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1. GENERAL 1
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 aluminum 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).

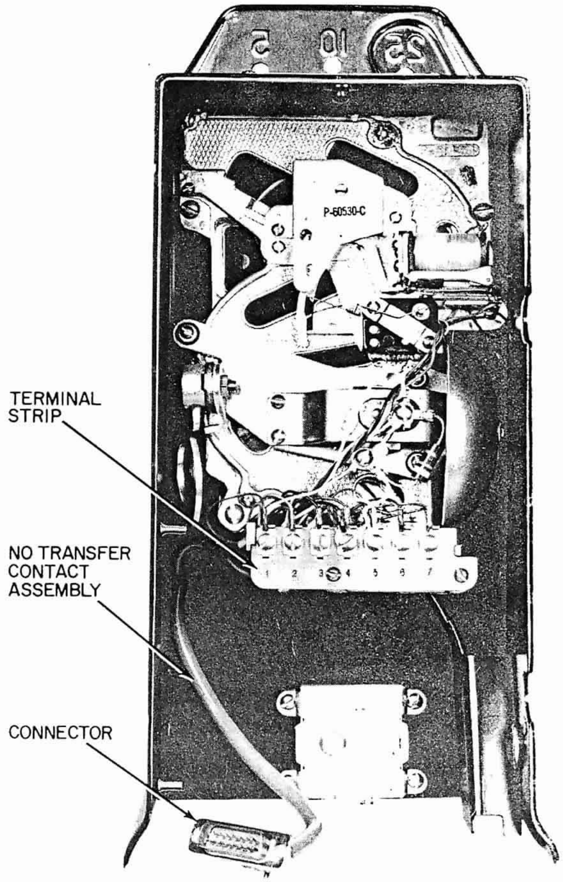


Figure 1. Upper Housing Assembly, LPC82-55 Coin Telephone Set.

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

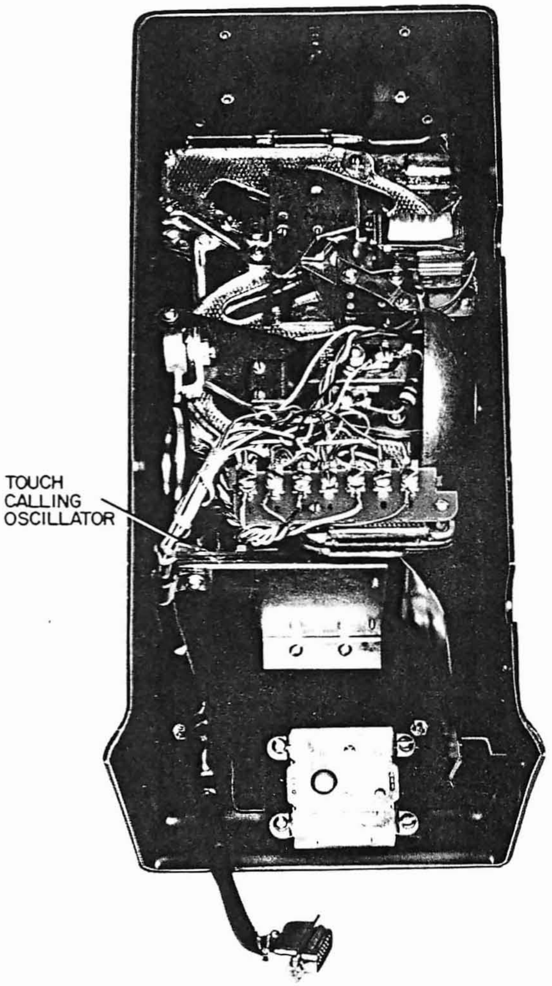


Figure 2. Upper Housing Assembly, LPC72-55 Coin Telephone Set.

Figure 3. 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.

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

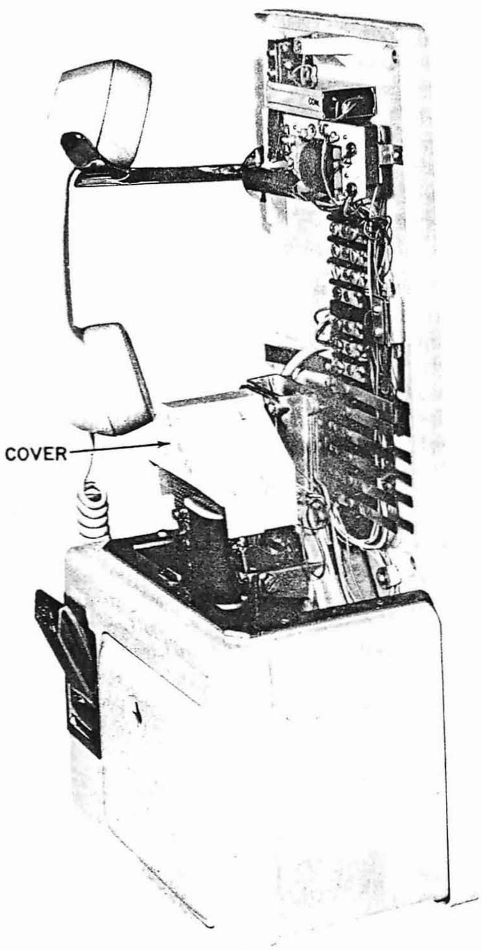


Figure 4. Lower Housing Assembly, LPB-Series Prepay Coin Telephone Set.

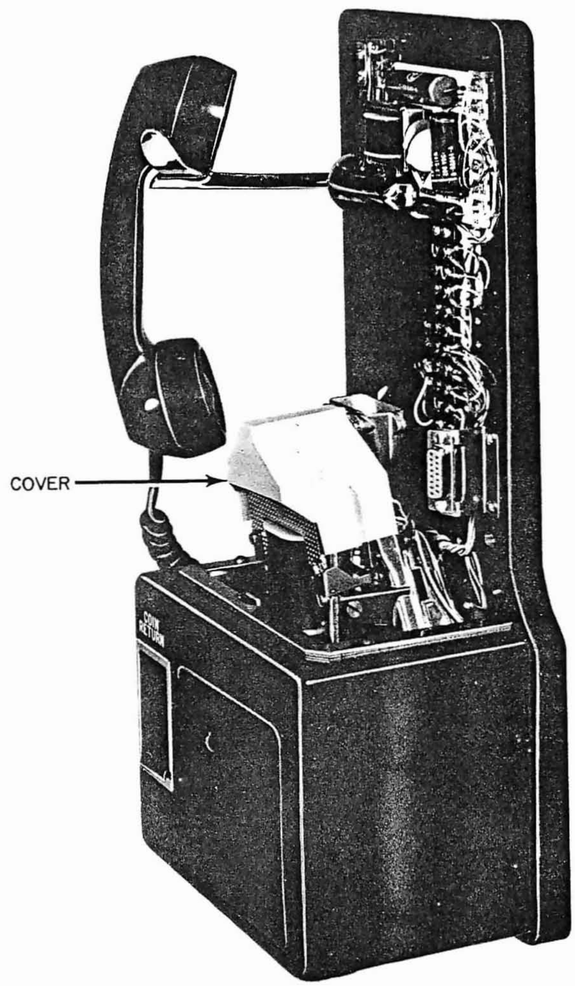


Figure 5. Lower Housing Assembly, LPC-Series Prepay Coin Telephone Set.

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 1000Ω 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.

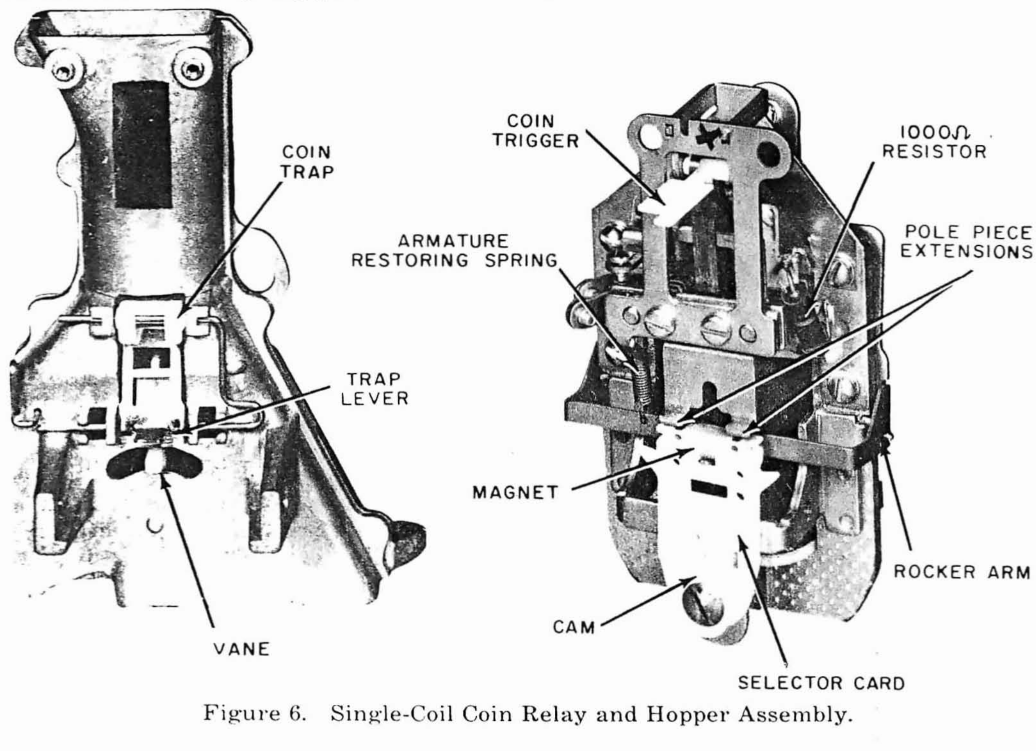


Figure 6. Single-Coil Coin Relay and Hopper Assembly.

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 1000Ω 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 tit 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.

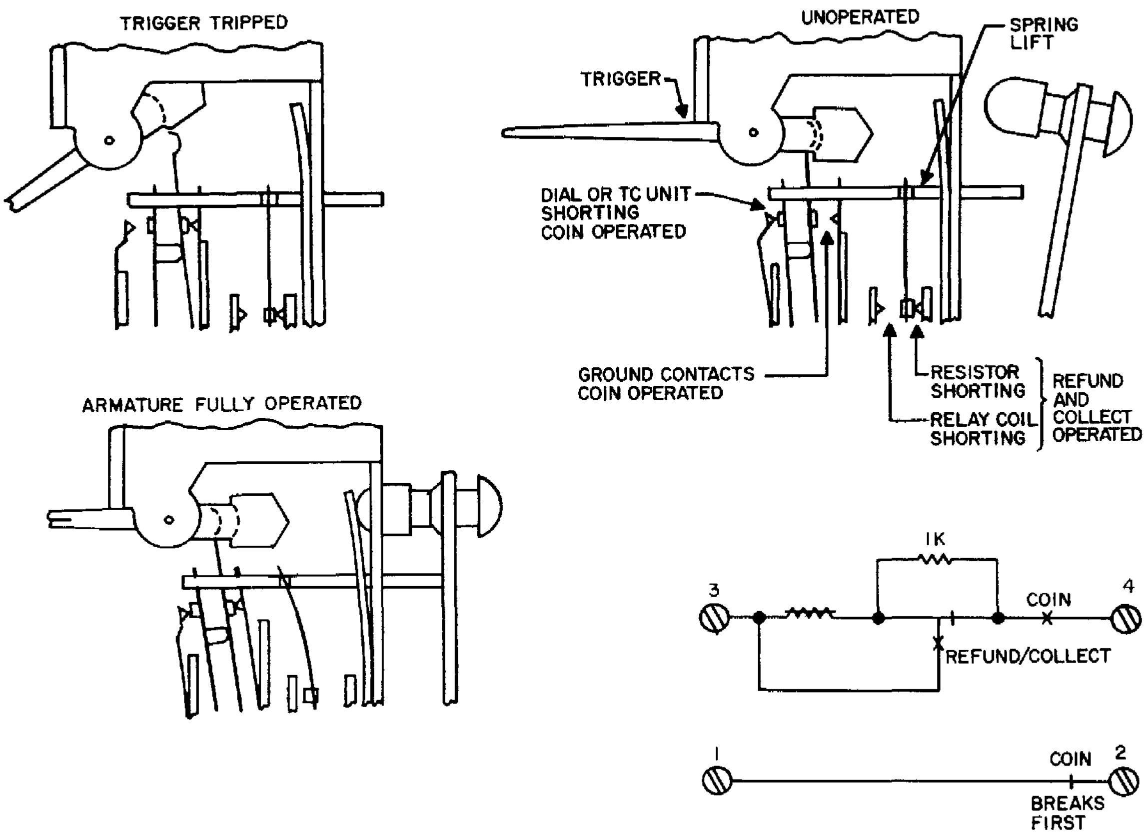


Figure 7. Coin Relay Contact Spring Assembly and Schematic.

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

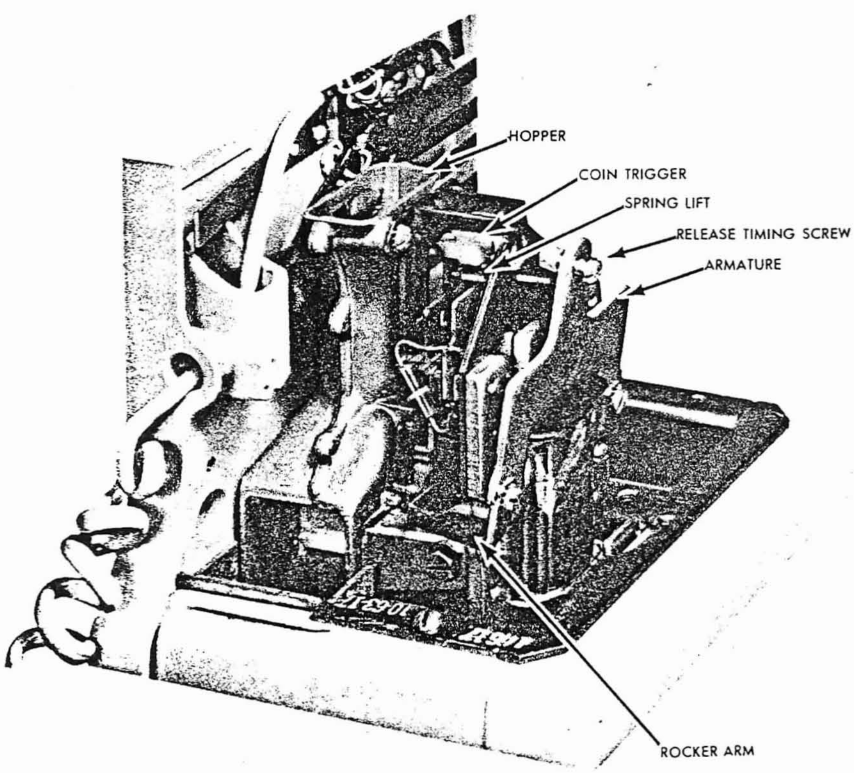


Figure 1. Single-Coil Coin Relay, Shown Installed, With Cover Removed.

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 1000Ω 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 it 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.

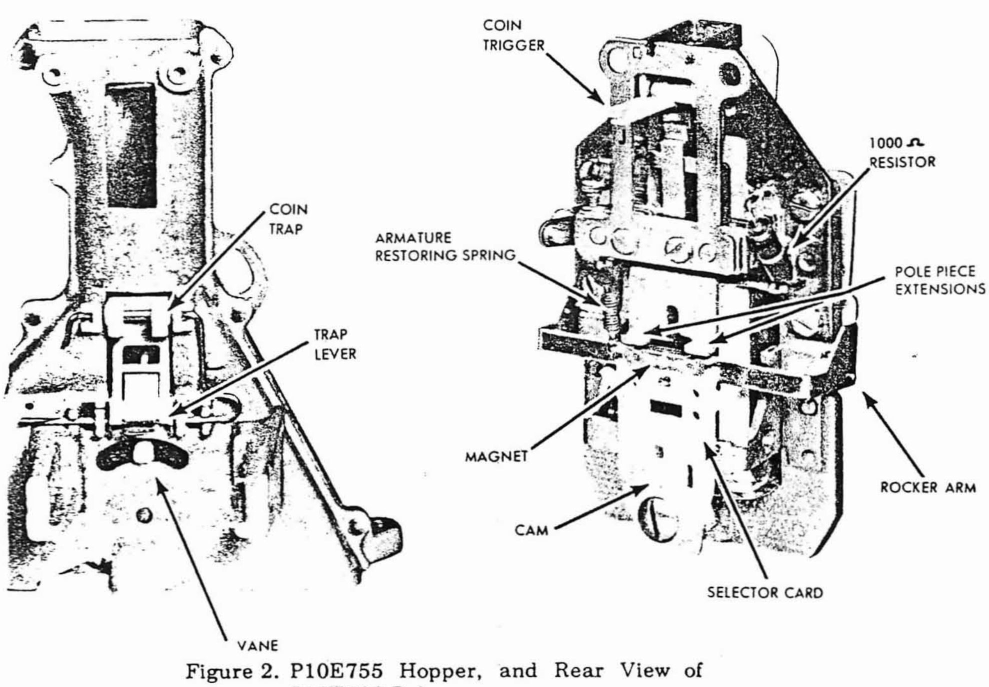


Figure 2. P10E755 Hopper, and Rear View of P10E786 Relay.

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 1000Ω 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 tit 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.

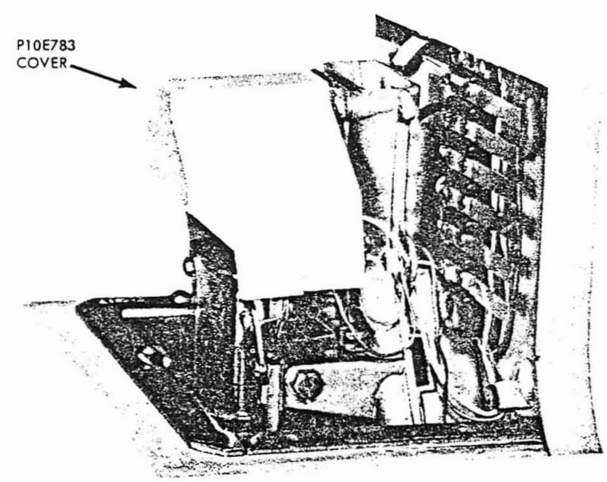


Figure 3. P11E964 Relay and Hopper Assembly Installed in A. E. Co. Coin Telephone Set.

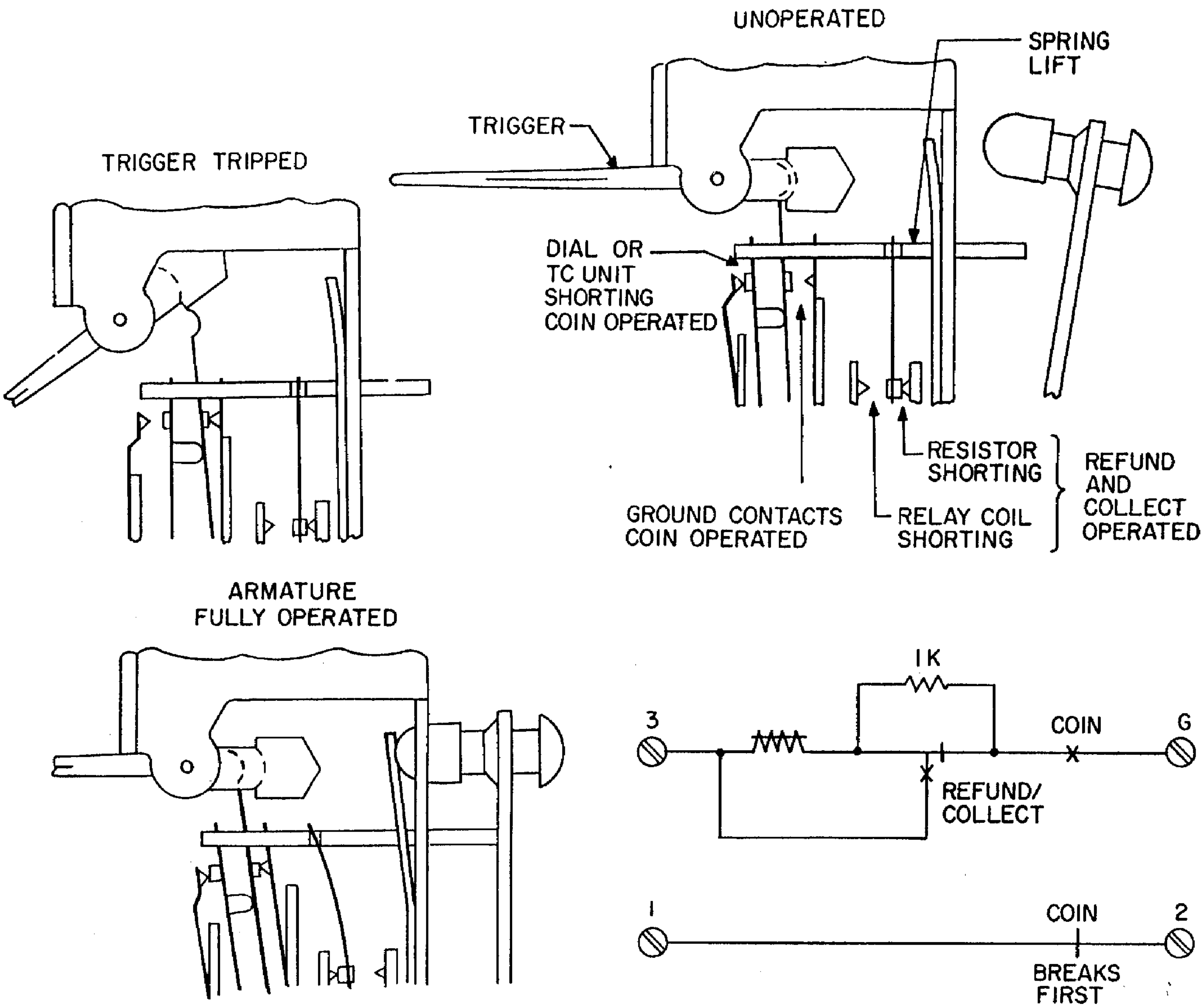


Figure 4. Coin Relay Contact Spring Assembly and Schematic.

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.

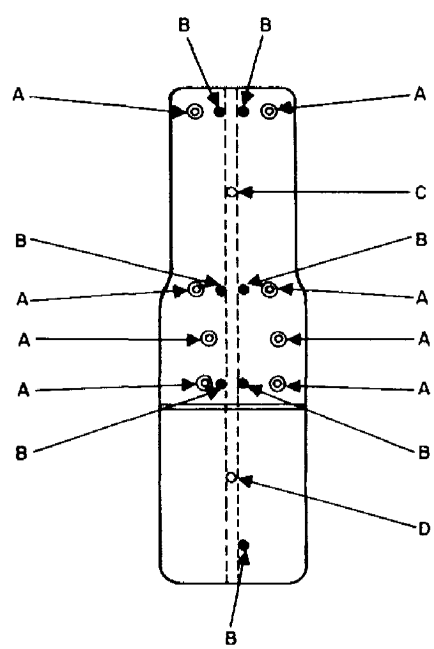


Figure 1. Coin Telephone Backboard.

(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) Depost 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.

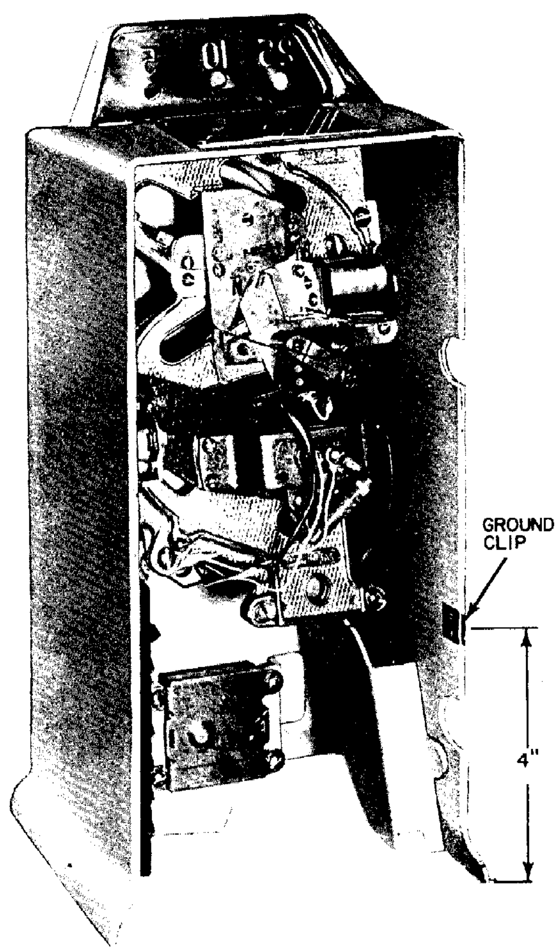
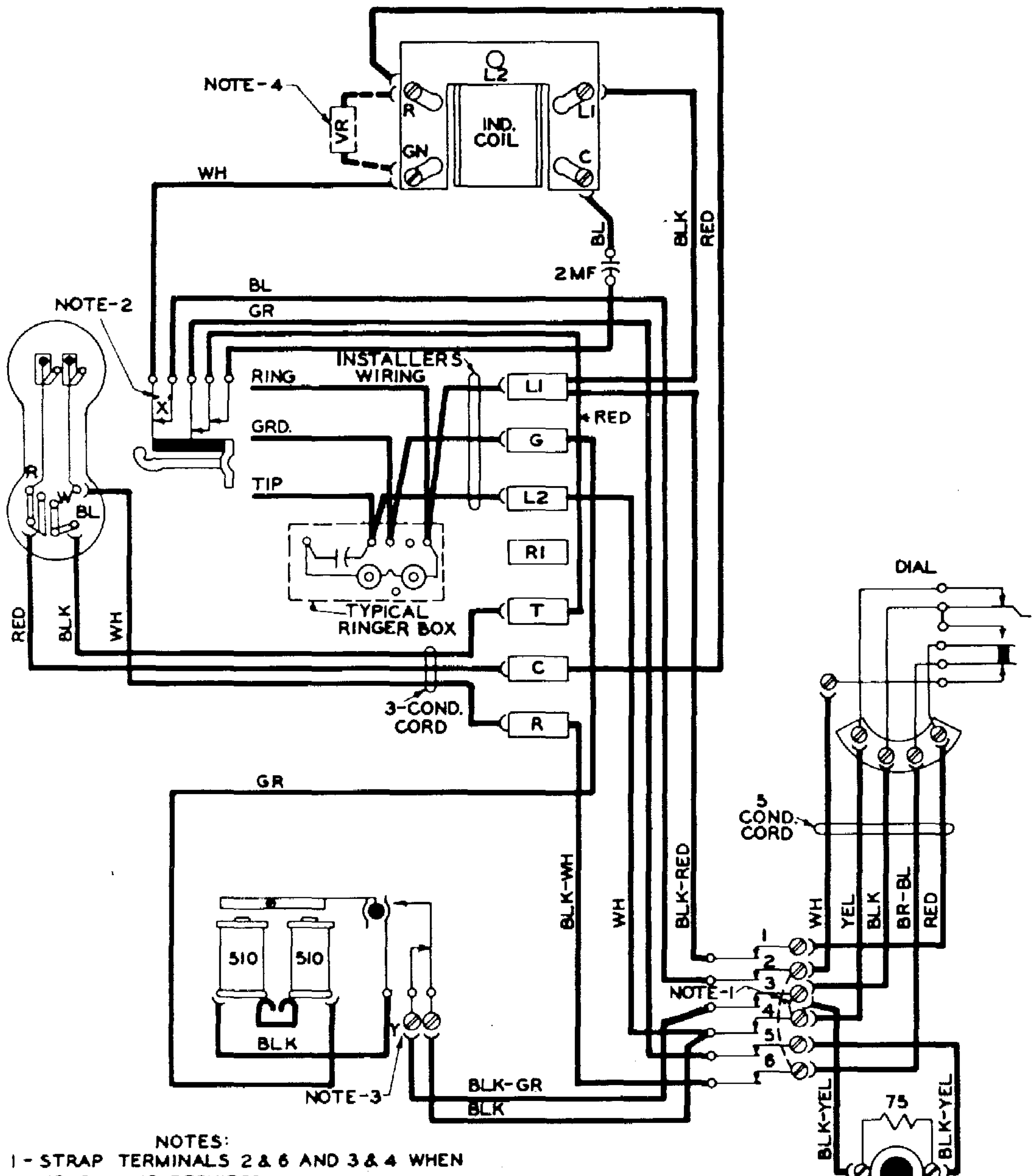


Figure 2. Ground Clip Attachment.

A.E.CO. 92-N AND 92-W PREPAY COIN TELEPHONE SETS CONNECTIONS

1. GENERAL

1.01 This section provides connection drawings for Types 92-N and 92-W coin telephone sets. The 92 series coin telephone sets provide prepay service. The 92-N and 92-W sets are equipped with F1A type components. The 92-W sets have W.E.Co. dials and the 92-N sets have A.E.Co. dials. Figure 1 shows the wiring diagram for a set equipped for single-nickel service. The wiring diagram for a set equipped for two-nickel service is shown in Figure 2. The wiring diagram for a 92-N set arranged for dime-only service in a manual exchange is shown in Figure 3.



NOTES:

1 - STRAP TERMINALS 2 & 6 AND 3 & 4 WHEN NO DIAL IS REQUIRED.

2 - CONTACT "X" TO BREAK FIRST & MAKE LAST.

3 - WHEN USED WITH REPEATERS THAT DO NOT REQUIRE A SHUNTED DIAL CONTROL, DISCONNECT CLIP "Y."

4 - VARISTOR "VR" USED WHEN SPECIFIED.

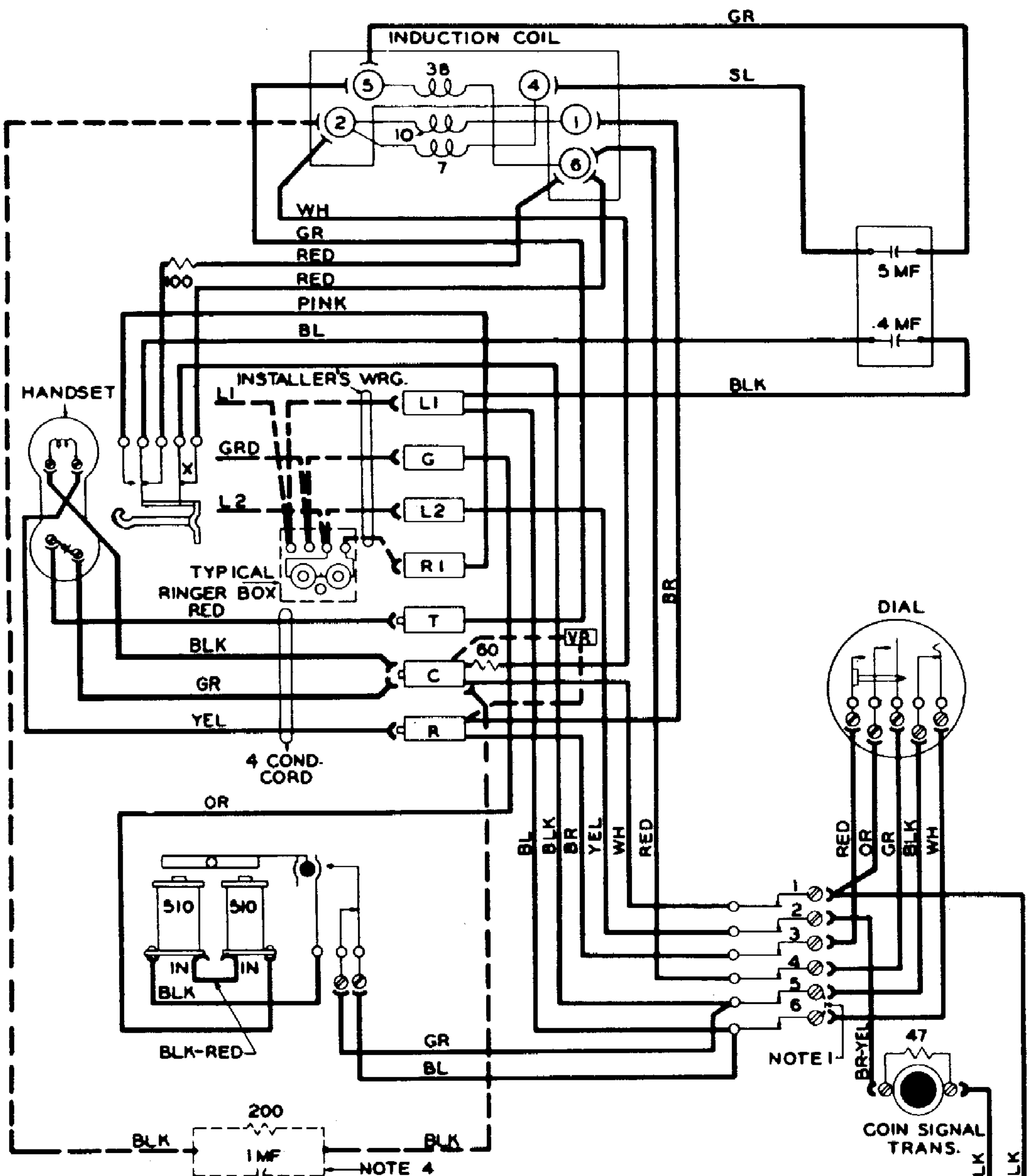
5 - TAPE LEADS NOT USED.

Figure 1. A.E.Co. 92-N and 92-W Coin Telephone Sets — Wiring Diagram.

A.E.CO. LPA82-SERIES PREPAY COIN TELEPHONE SETS CONNECTIONS

1. GENERAL

1.01 This section provides connection drawings for LPA82-series prepay coin telephone sets. LPA-series coin telephone sets are arranged for manually-adjusted loop compensation. Figure 1 shows the wiring diagram for an LPA82 set equipped for single-nickel service. The wiring for a set equipped for dime or two-nickel service is shown in Figure 2. The wiring diagram for an LPA82 set designed for dime-only service in a manual exchange is shown in Figure 3.



NOTES:

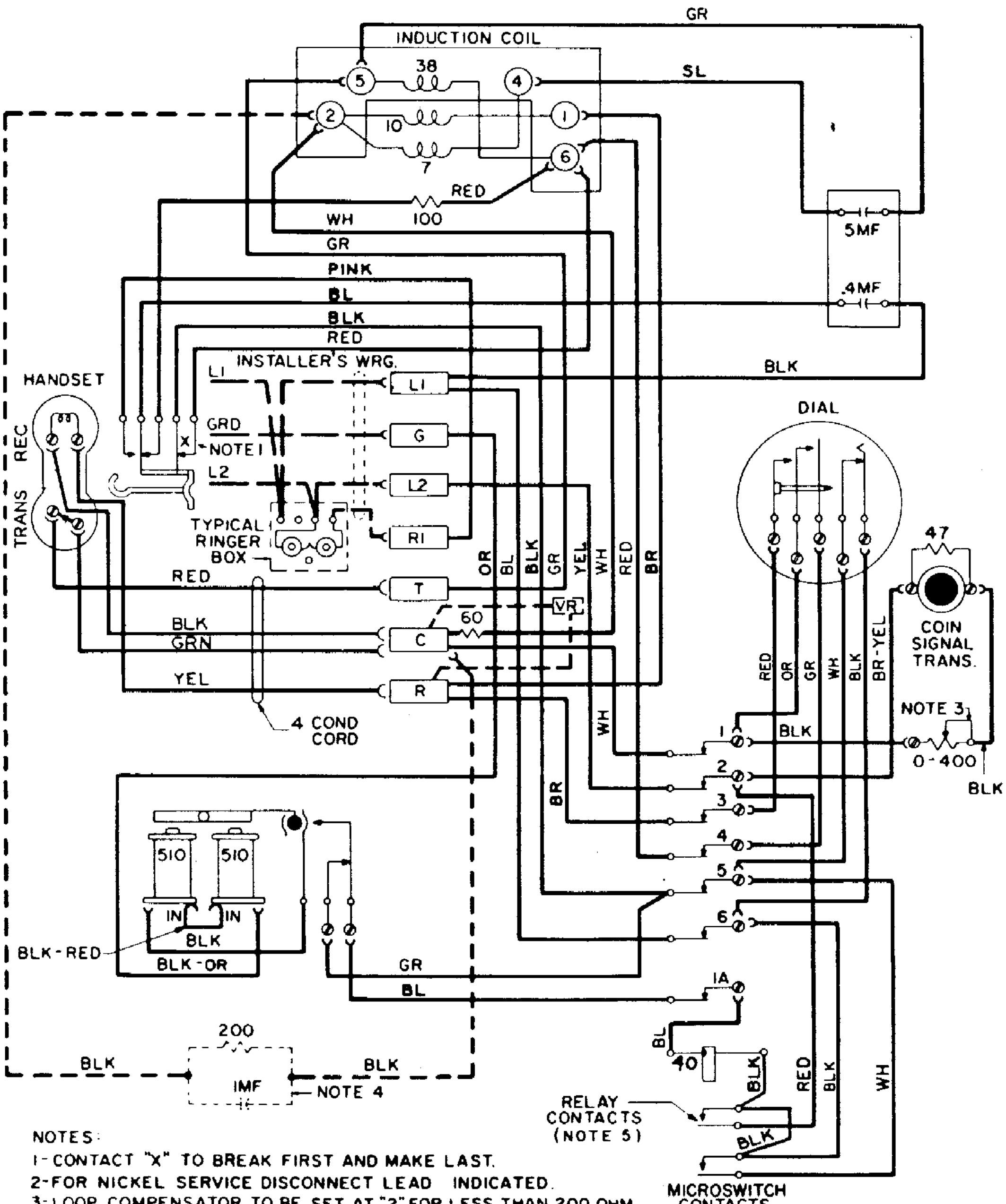
1– WHEN NO DIAL IS USED STRAP TERMINALS 5 & 6. WHEN NO RELAY IS USED TAPE LEADS.

2– CONTACT "X" TO BREAK FIRST AND MAKE LAST.

3– LOOP COMPENSATOR TO BE SET AT "2" FOR LESS THAN 200 OHM LOOPS AND AT "0" FOR OVER 200 OHMS.

4– INSTALL SIDETONE BALANCING IMPEDANCE ON UNLOADED CABLE LOOPS OF OVER 200 OHMS PROVIDING ANY ADJACENT OPEN WIRE SECTION IS LESS THAN 200 OHMS.

Figure 1. LPA82 Coin Telephone Set — Wiring Diagram.



NOTES:
1- CONTACT "X" TO BREAK FIRST AND MAKE LAST.
2- FOR NICKEL SERVICE DISCONNECT LEAD INDICATED.
3- LOOP COMPENSATOR TO BE SET AT "2" FOR LESS THAN 200 OHM LOOPS AND AT "0" FOR OVER 200 OHMS.
4- INSTALL SIDETONE BALANCING IMPEDANCE ON UNLOADED CABLE LOOPS OF OVER 200 OHMS PROVIDING ANY ADJACENT OPEN WIRE SECTION IS LESS THAN 200 OHMS.
5- ON LINE LOOPS LESS THAN 500 OHMS ISOLATE RELAY CONTACTS BY EITHER BENDING SPRINGS TO AVOID CONTACT OR BY DISCONNECTING "RED" RELAY LEAD FROM JACK STRIP TERMINAL AND TAPING OR CUTTING OFF.

Figure 2. LPA82-55 Coin Telephone Set — Wiring Diagram.

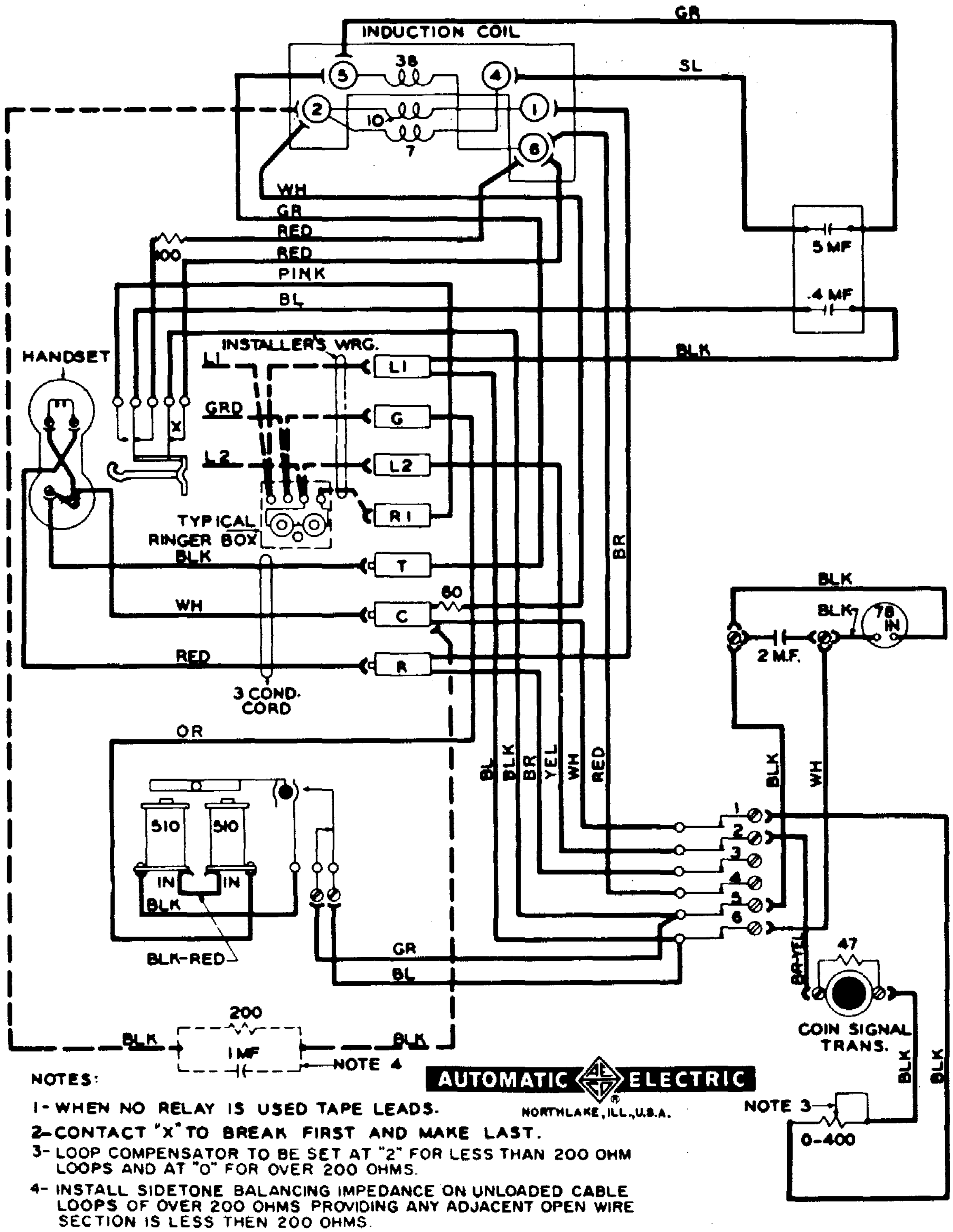
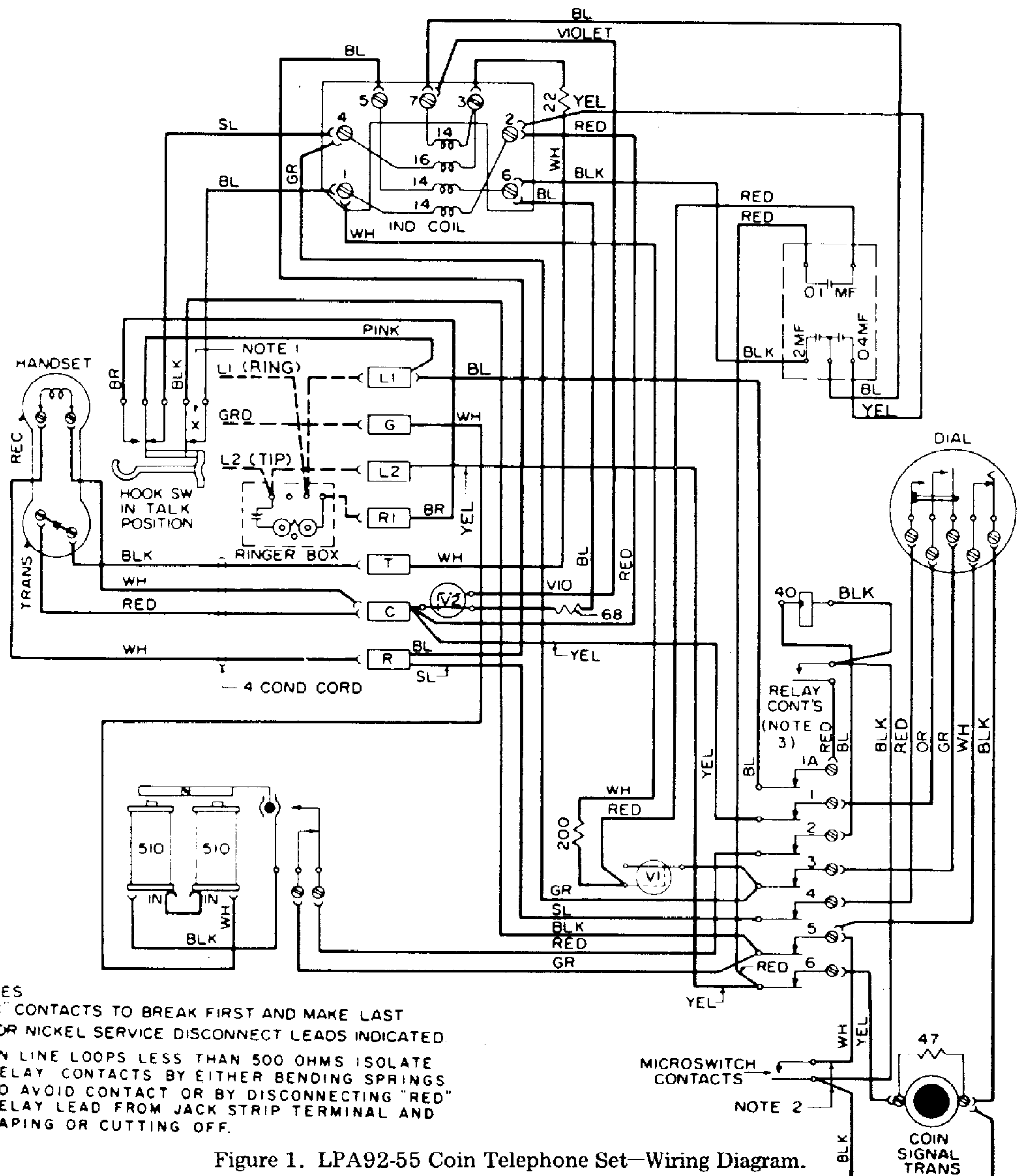


Figure 3. LPA82-10 (Manual) Coin Telephone Set — Wiring Diagram.

A.E.CO. LPA92-SERIES PREPAY COIN TELEPHONE SETS CONNECTIONS

1. GENERAL

1.01 This section provides a connection drawing for LPA92-series prepay coin telephone sets. LPA92 sets are equipped with G1A components providing self-compensating type loop adjustment. Figure 1 is a wiring diagram for an LPA92-55 coin telephone set. The diagram includes instructions for modifying the set to provide one-nickel service.



NOTES
1- "X" CONTACTS TO BREAK FIRST AND MAKE LAST
2-FOR NICKEL SERVICE DISCONNECT LEADS INDICATED
3-ON LINE LOOPS LESS THAN 500 OHMS ISOLATE RELAY CONTACTS BY EITHER BENDING SPRINGS TO AVOID CONTACT OR BY DISCONNECTING "RED" RELAY LEAD FROM JACK STRIP TERMINAL AND TAPING OR CUTTING OFF.

Figure 1. LPA92-55 Coin Telephone Set—Wiring Diagram.

ADDENDUM 476-202-403
ISSUE 1, APRIL, 1969
GT&E STANDARD

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.

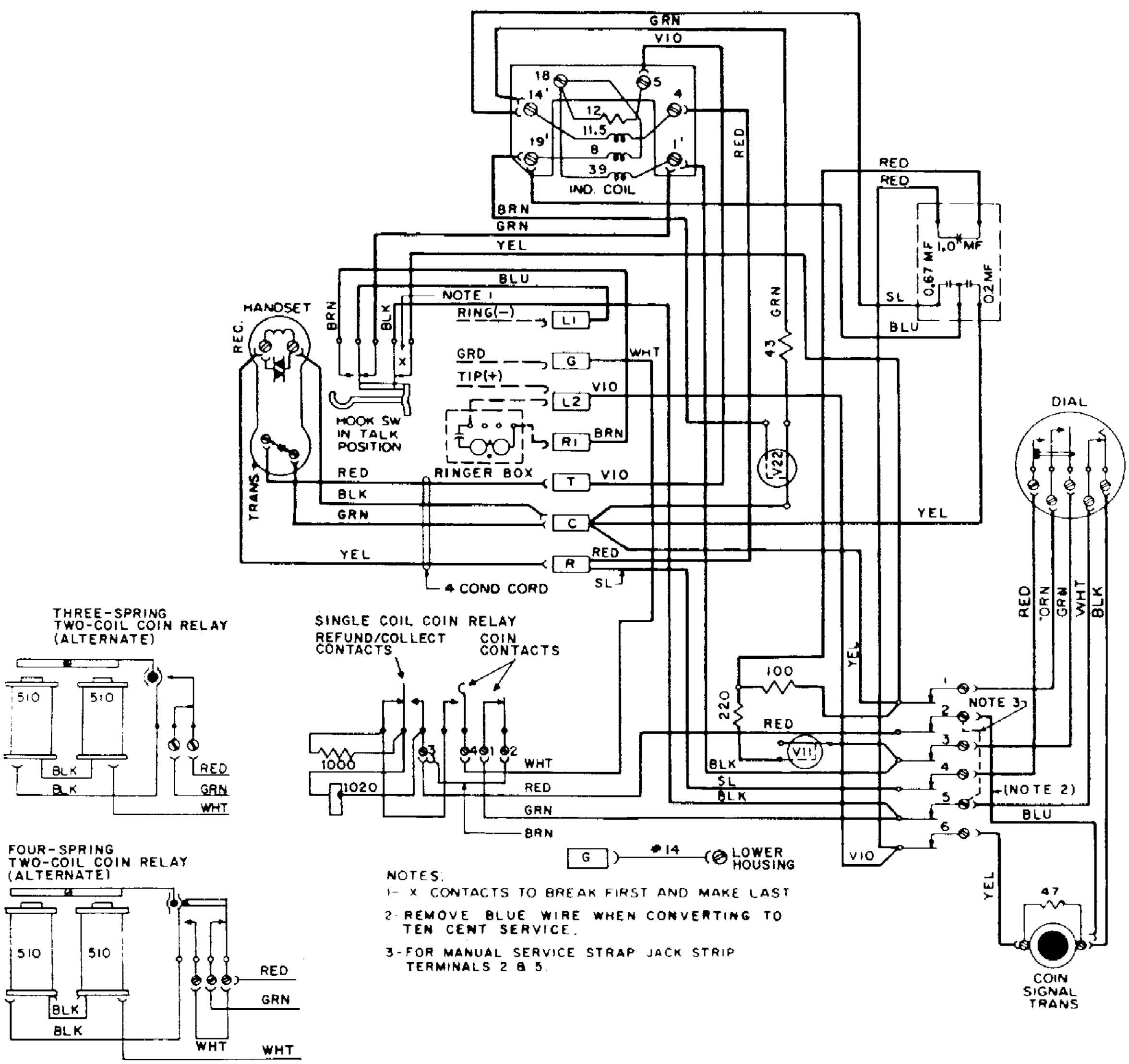


Figure 1. Wiring Diagram, LPB82 Coin Telephone Set.

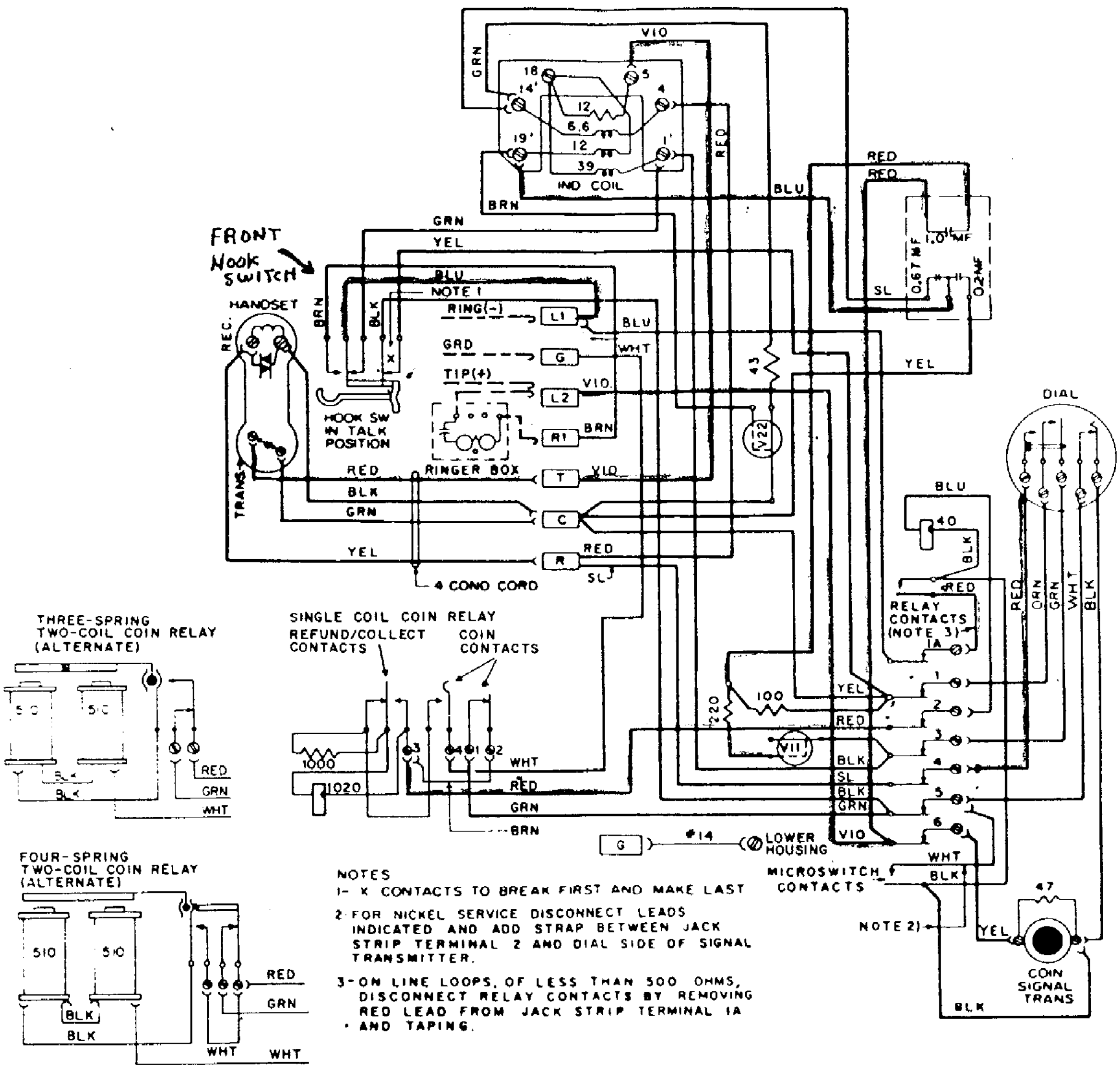


Figure 2. Wiring Diagram, LPB82-55 Coin Telephone Set.

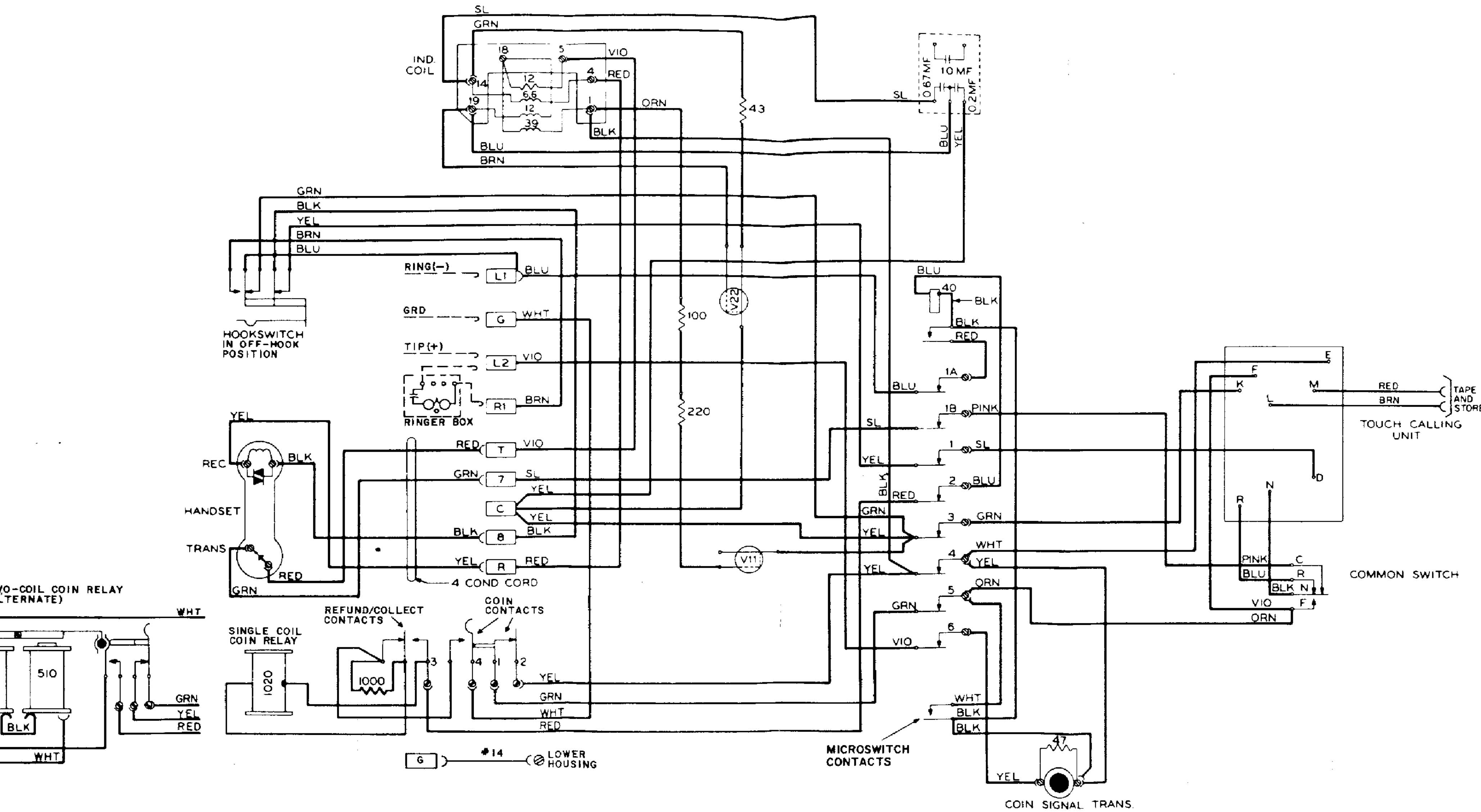


Figure 3. Wiring Diagram, LPB82-55 Coin Telephone Set for Touch Calling Service.

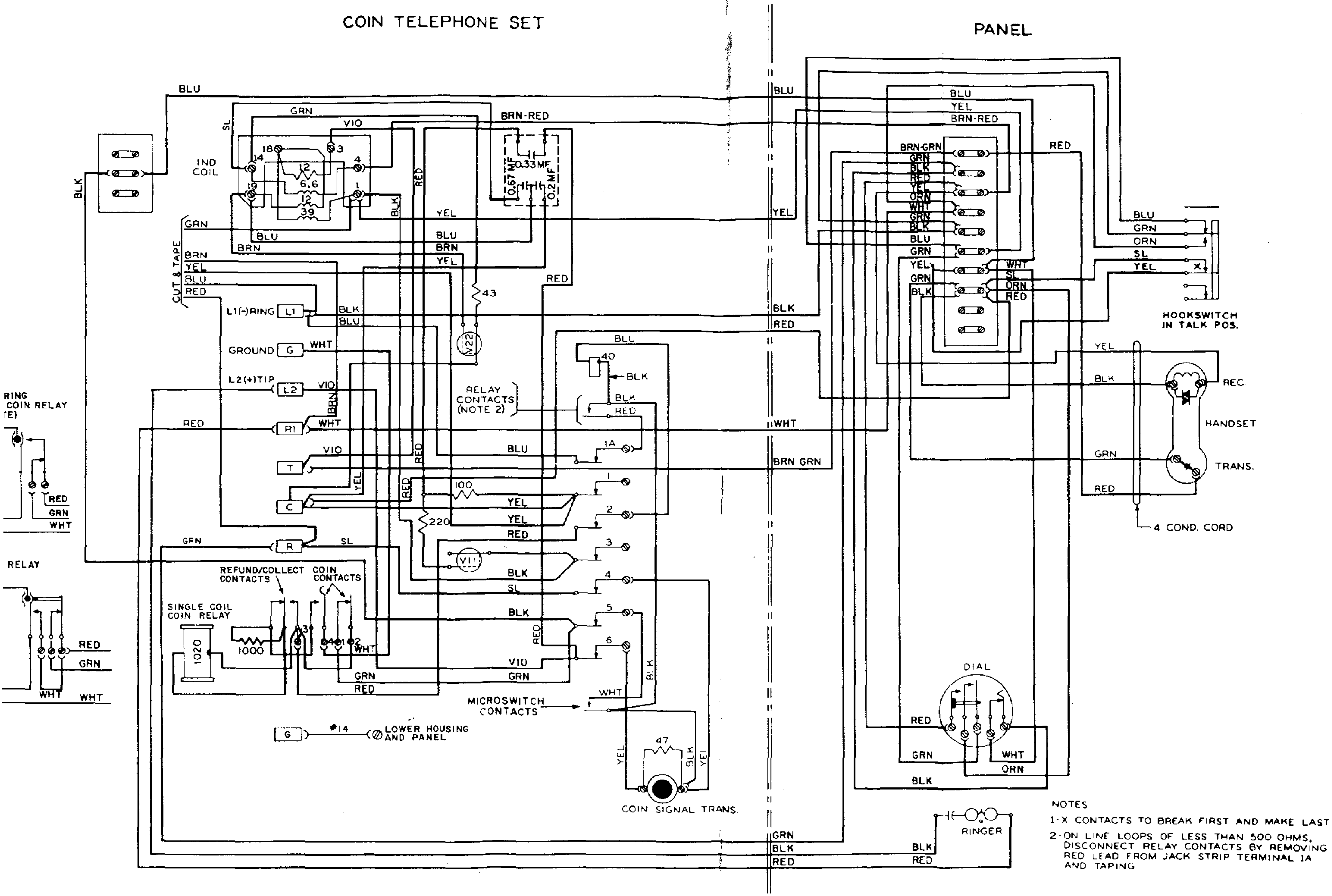
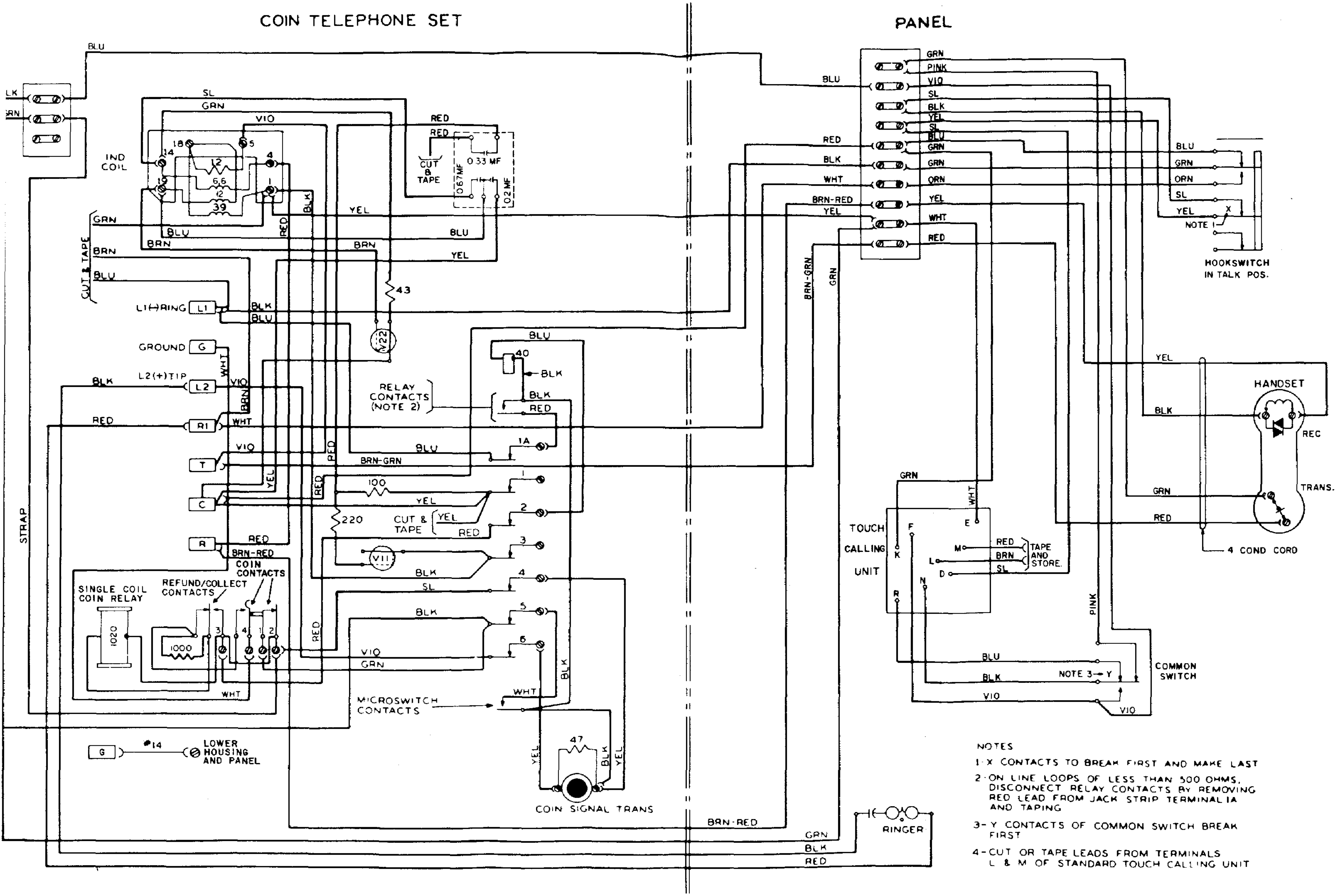


Figure 4. Wiring Diagram, LPB82-55 Coin Telephone Set Modified for Use With Type 101 Panel.



NOTES

1- X CONTACTS TO BREAK FIRST AND MAKE LAST

2- ON LINE LOOPS OF LESS THAN 500 OHMS, DISCONNECT RELAY CONTACTS BY REMOVING RED LEAD FROM JACK STRIP TERMINAL 1A AND TAPING

3- Y CONTACTS OF COMMON SWITCH BREAK FIRST

4- CUT OR TAPE LEADS FROM TERMINALS L & M OF STANDARD TOUCH CALLING UNIT

Figure 5. Wiring Diagram, LPB82-55 Coin Telephone Set Modified for Use With Type 101 Panel in Touch Calling Service.

A.E.CO. LPC82-SERIES COIN TELEPHONE SETS CONNECTIONS

1. GENERAL

1.01 This section provides connection drawings for LPC82-series coin telephone sets. These are prepay instruments for dial service, equipped with a printed-circuit board network and with 15-pin connector interface between the upper and lower housings. Figure 1 shows the wiring of the LPC82 set for single-nickel service, and Figure 2 the wiring of the LPC82-55 set, which requires a dime or two-nickel deposit.

NOTES

1-"X" CONTACTS MAKE FIRST AND BREAK LAST.
2-"Z" CONTACTS BREAK FIRST AND MAKE LAST.
3-WHEN CONVERTING TO TEN CENT SERVICE REMOVE BRN-YEL LEAD TERMINAL 2 AND CONNECT TO TERMINAL 3.
4-FOR MANUAL SERVICE, STRAP TERMINAL STRIP TERMINALS 4 & 5.
5-THIS IS A SPARE LEAD AND THE CONNECTION IS NOT FUNCTIONAL IN THIS CIRCUIT.
6-CONNECTOR PLUG 4 IN UPPER HOUSING IS BLACK LEAD TAPED TO CABLE SHIELD.

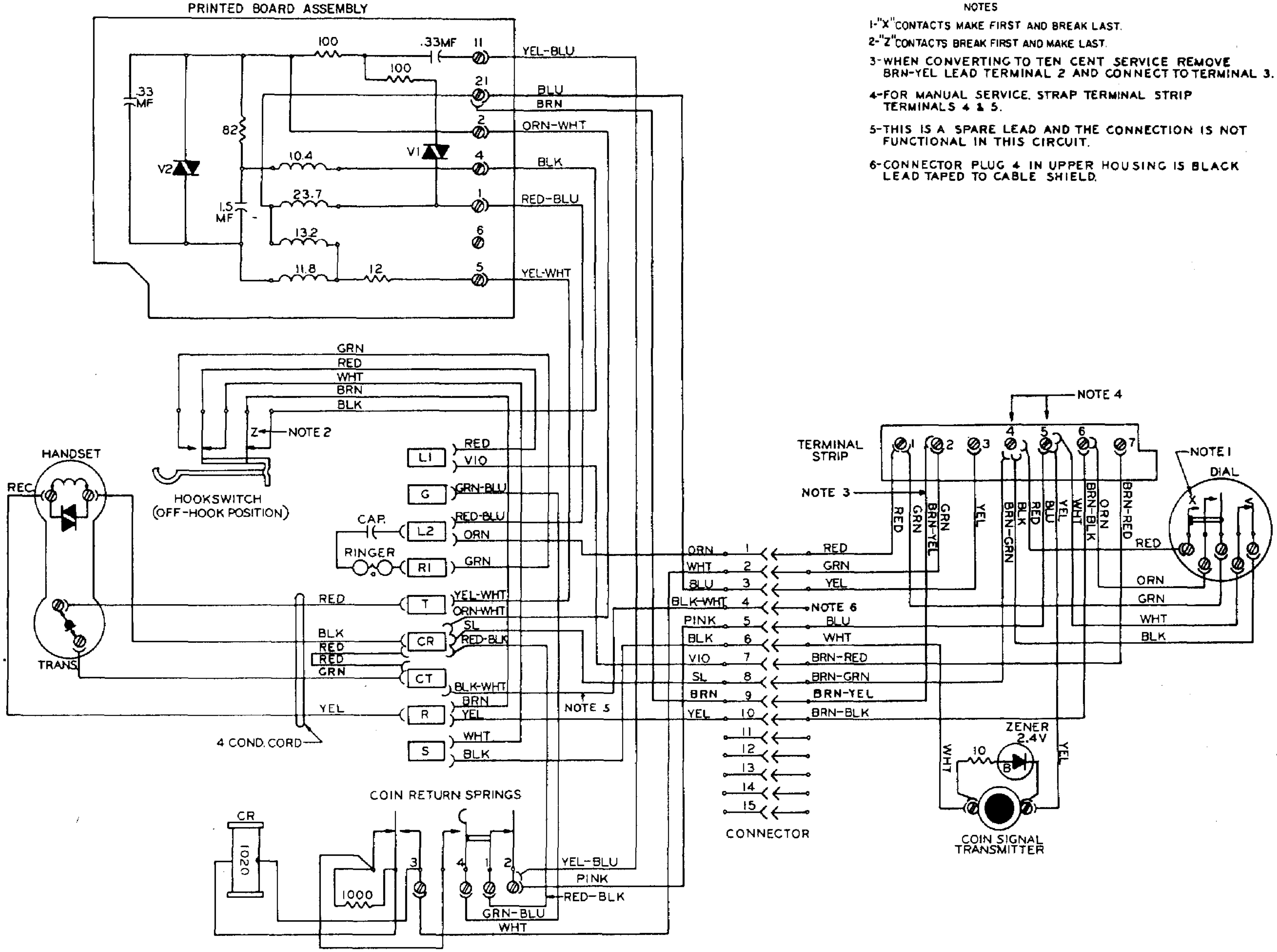


Figure 1. Wiring Diagram, LPC82 Coin Telephone Set.

MANUFACTURING NOTES:

1-"X" CONTACTS MAKE FIRST AND BREAK LAST.

2-"Z" CONTACTS BREAK FIRST AND MAKE LAST.

3-DISCONNECT AND TAPE 2 LEADS INDICATED FOR FIVE CENT SERVICE.

4-DISCONNECT FOR LINE LOOPS OF LESS THAN 500 OHMS.

5-THIS IS A SPARE LEAD. AND THE CONNECTION IS NOT FUNCTIONAL IN THIS CIRCUIT.

6-CONNECTOR PLUG 4 IN UPPER HOUSING IS BLACK LEAD TAPED TO CABLE SHIELD.

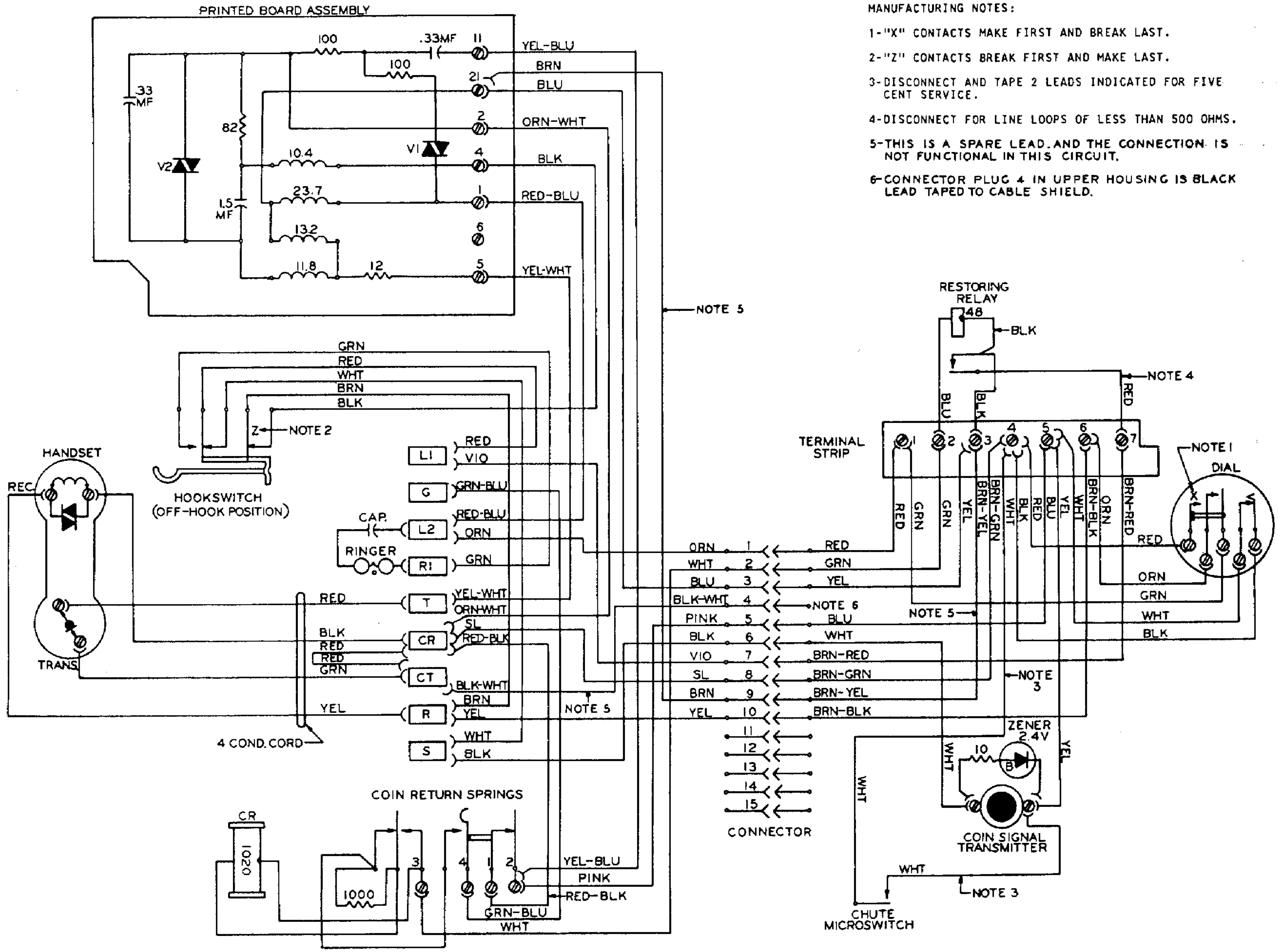


Figure 2. Wiring Diagram, LPC82-55 Coin Telephone Set.

LPC72-SERIES COIN TELEPHONE SETS CONNECTIONS

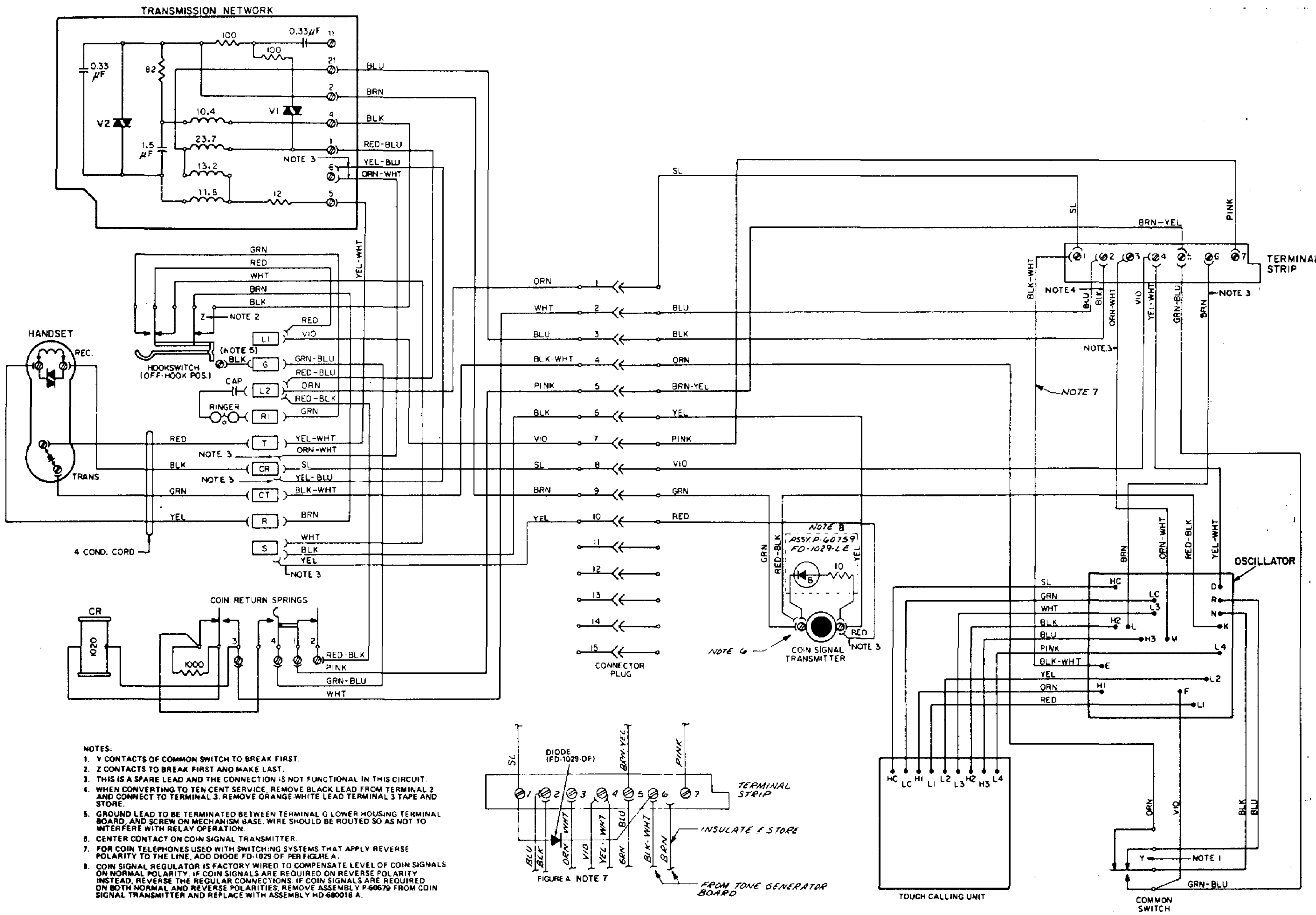
1. GENERAL

1.01 This section provides connection drawings for the LPC72-Series Coin Telephone sets. These are prepay instruments used for Touch Calling service and equipped with a printed wiring card and a 15-pin connector interface between the upper and lower housings.

1.02 This section is reissued to update Figures 1 and 2 of this section. Marginal arrows are used to identify the new material. Remove the previous issue of this section from the binder or microfiche file and replace it with this issue.

2. DRAWINGS

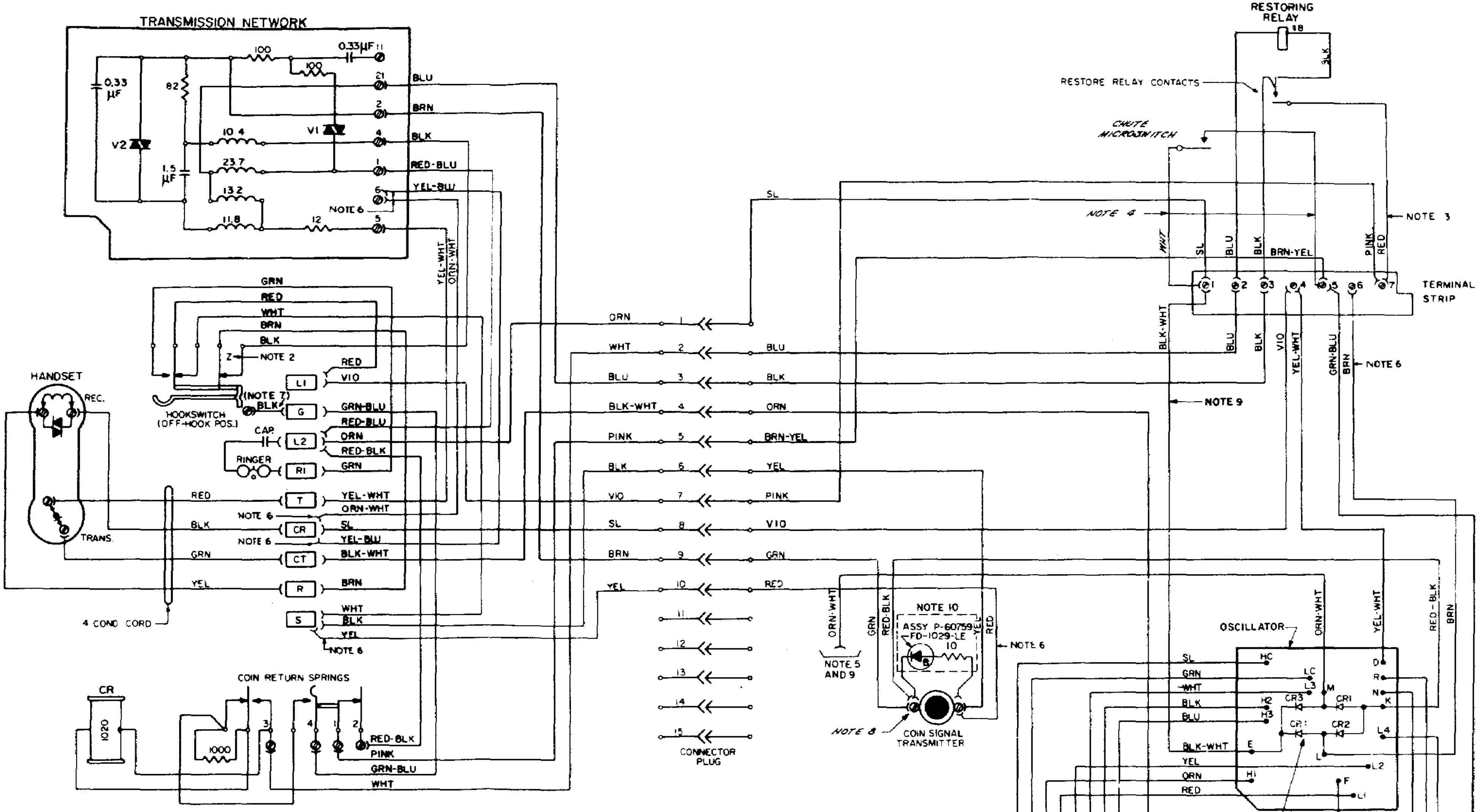
2.01 Figure 1 shows the wiring of the LPC72 coin telephone, which is arranged for single-nickel coin deposits. Figure 2 shows the wiring of the LPC72-55 telephone, which requires a dime or two-nickel deposit.



NOTES:

1. Y CONTACTS OF COMMON SWITCH TO BREAK FIRST.
2. Z CONTACTS TO BREAK FIRST AND MAKE LAST.
3. THIS IS A SPARE LEAD AND THE CONNECTION IS NOT FUNCTIONAL IN THIS CIRCUIT.
4. WHEN CONVERTING TO TEN CENT SERVICE, REMOVE BLACK LEAD FROM TERMINAL 2 AND CONNECT TO TERMINAL 3. REMOVE ORANGE-WHITE LEAD TERMINAL 3 TAPE AND STORE.
5. GROUND LEAD TO BE TERMINATED BETWEEN TERMINAL G LOWER HOUSING TERMINAL BOARD, AND SCREW ON MECHANISM BASE. WIRE SHOULD BE ROUTED SO AS NOT TO INTERFERE WITH RELAY OPERATION.
6. CENTER CONTACT ON COIN SIGNAL TRANSMITTER.
7. FOR COIN TELEPHONES USED WITH SWITCHING SYSTEMS THAT APPLY REVERSE POLARITY TO THE LINE, ADD DIODE FD-1029-DF PER FIGURE A.
8. COIN SIGNAL REGULATOR IS FACTORY WIRED TO COMPENSATE LEVEL OF COIN SIGNALS ON NORMAL POLARITY. IF COIN SIGNALS ARE REQUIRED ON REVERSE POLARITY INSTEAD, REVERSE THE REGULAR CONNECTIONS. IF COIN SIGNALS ARE REQUIRED ON BOTH NORMAL AND REVERSE POLARITIES, REMOVE ASSEMBLY P-60579 FROM COIN SIGNAL TRANSMITTER AND REPLACE WITH ASSEMBLY HD-680016-A.

Figure 1. Wiring Diagram, LPC72 Coin Telephone.



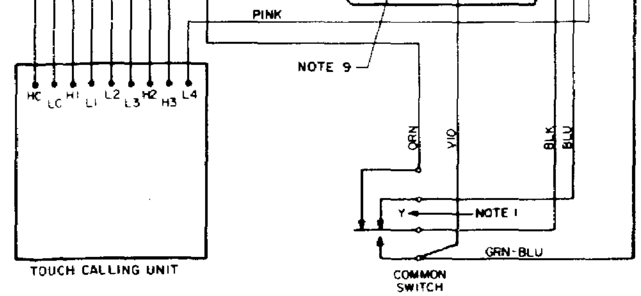
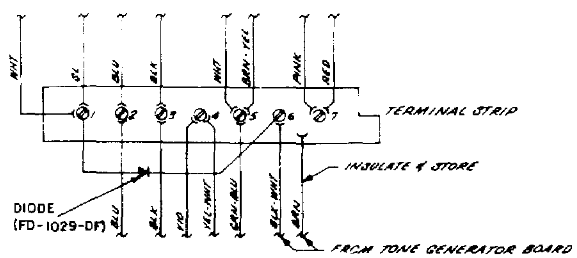


FIGURE A (NOTE 9)



NOTES:

1. Y CONTACTS OF COMMON SWITCH TO BREAK FIRST.
2. Z CONTACTS TO BREAK FIRST AND MAKE LAST.
3. DISCONNECT FOR LINE LOOPS OF LESS THAN 500 OHMS.
4. FOR NICKEL SERVICE DISCONNECT LEADS INDICATED.
5. NOT REQUIRED FOR PREPAY SERVICE. TAPE TO HARNESS.
6. THIS IS A SPARE LEAD AND THE CONNECTION IS NOT FUNCTIONAL IN THIS CIRCUIT.
7. GROUND LEAD TO BE TERMINATED BETWEEN TERMINAL G LOWER HOUSING TERMINAL BOARD, AND SCREW ON MECHANISM BASE. WIRE SHOULD BE ROUTED SO AS NOT TO INTERFERE WITH RELAY OPERATION.
8. CENTER CONTACT ON COIN SIGNAL TRANSMITTER.
9. FOR COIN TELEPHONES USED WITH SWITCHING SYSTEMS THAT APPLY REVERSE POLARITY TO THE LINE, ADD DIODE FD-1029-DF PER FIGURE A.
10. COIN SIGNAL REGULATOR FACTORY-WIRED TO COMPENSATE LEVEL OF COIN SIGNALS ON NORMAL POLARITY. IF COIN SIGNALS ARE REQUIRED ON REVERSE POLARITY INSTEAD, REVERSE THE REGULAR CONNECTIONS. IF COIN SIGNALS ARE REQUIRED ON BOTH NORMAL AND REVERSE POLARITIES, REMOVE ASSEMBLY P-60579 FROM COIN SIGNAL TRANSMITTER AND REPLACE WITH ASSEMBLY HD-680015-A.

Figure 2. Wiring Diagram, LPC72-55 Coin Telephone.

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:

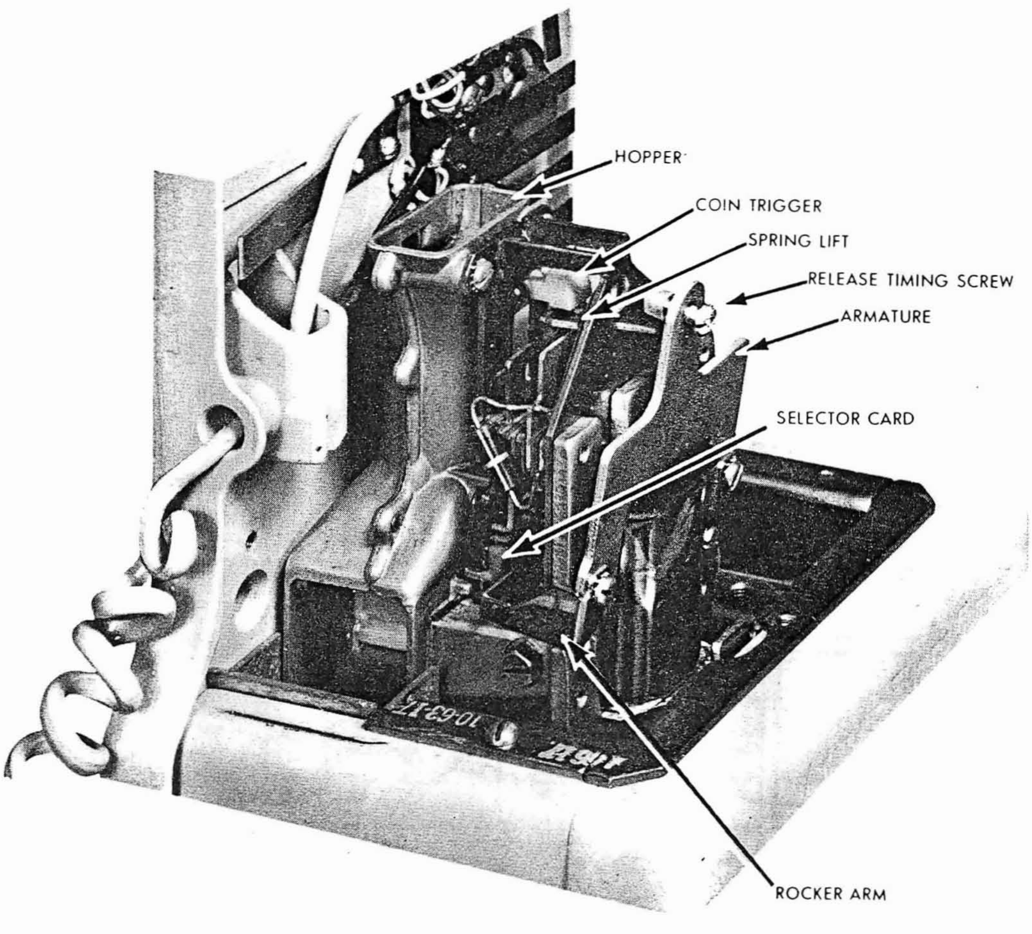
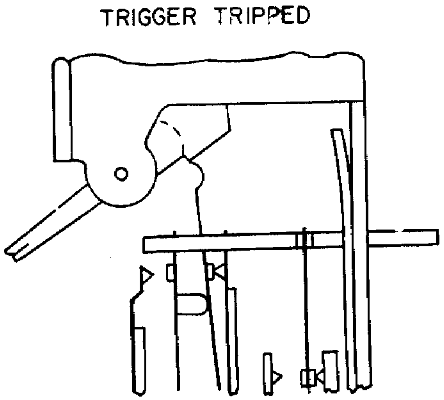
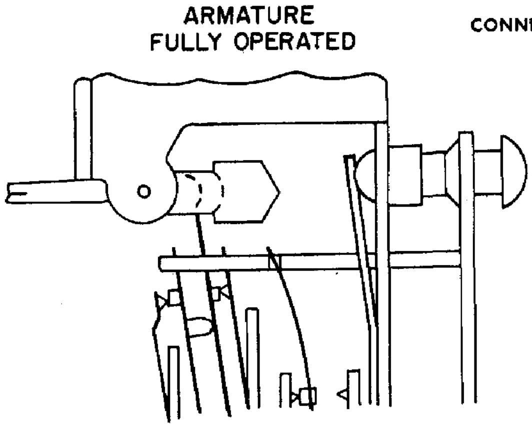


Figure 1. Single-Coil Coin Relay, Shown Installed, With Cover Removed.





RELAY TERMINAL	LEAD COLORS
1	R STRAP
2	G
3	R + R STRAP
G	W

CONNECTIONS FOR LPB82-55 & LPA92-55

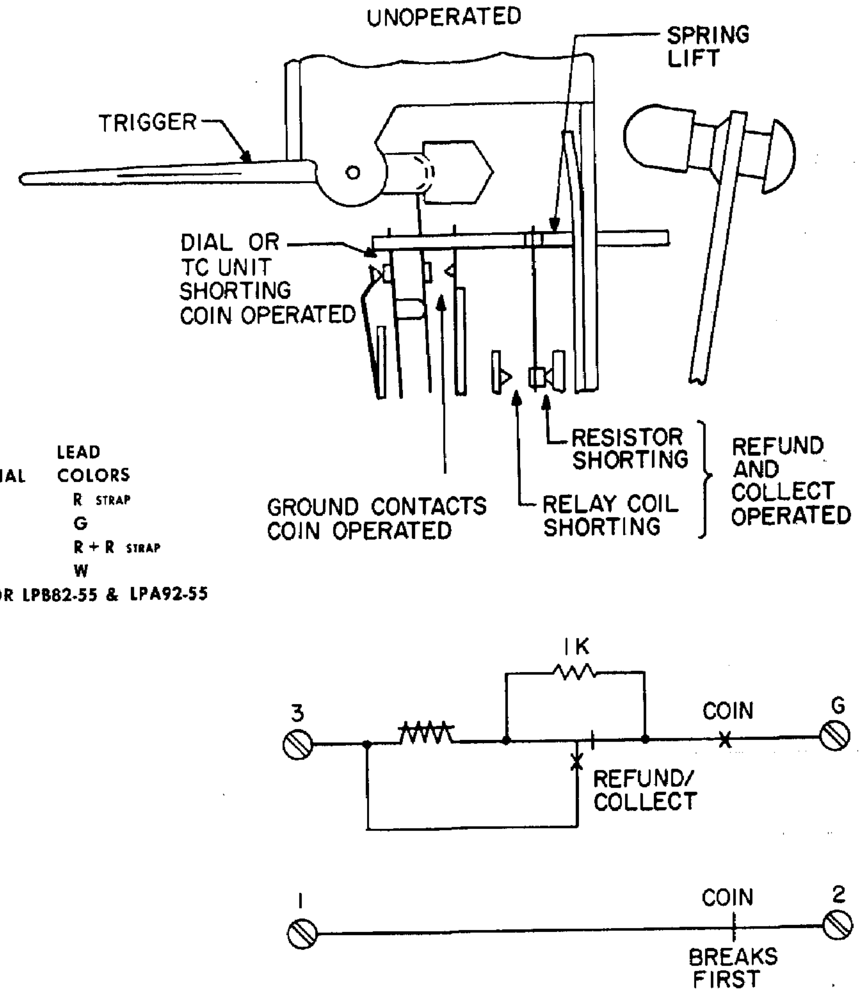


Figure 2. Coin Relay Contact Spring Assembly
and Schematic.

(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-

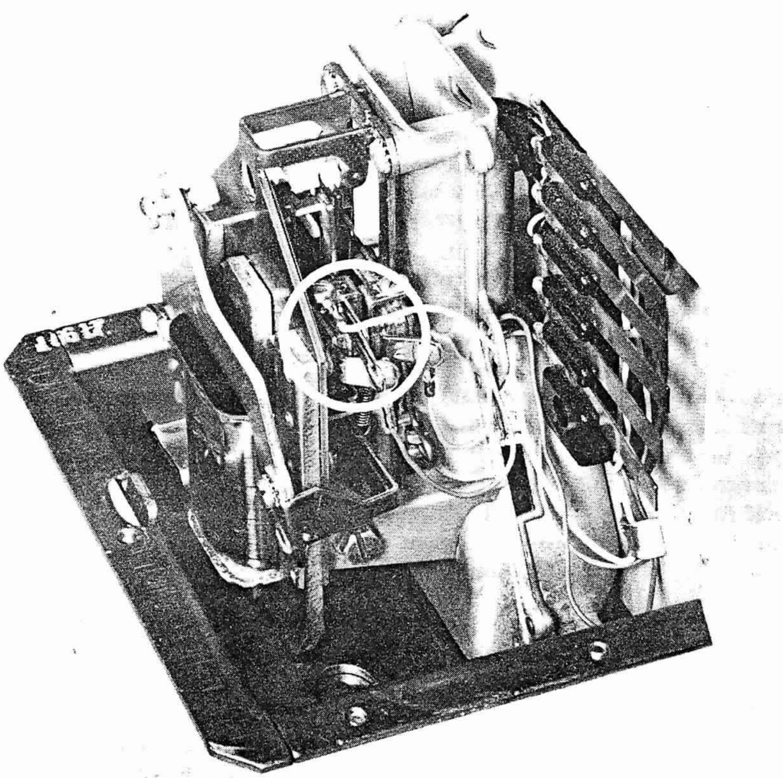


Figure 3. Use of Paper Clip to Bypass Ground Contacts.

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.

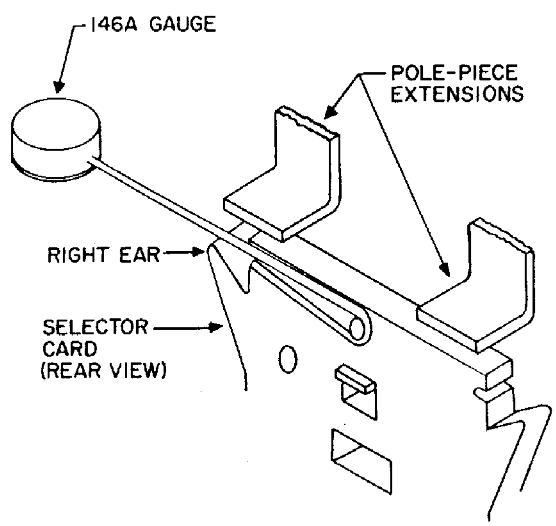


Figure 4. Use of 146A Gauge for Bias Margin Test.

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-

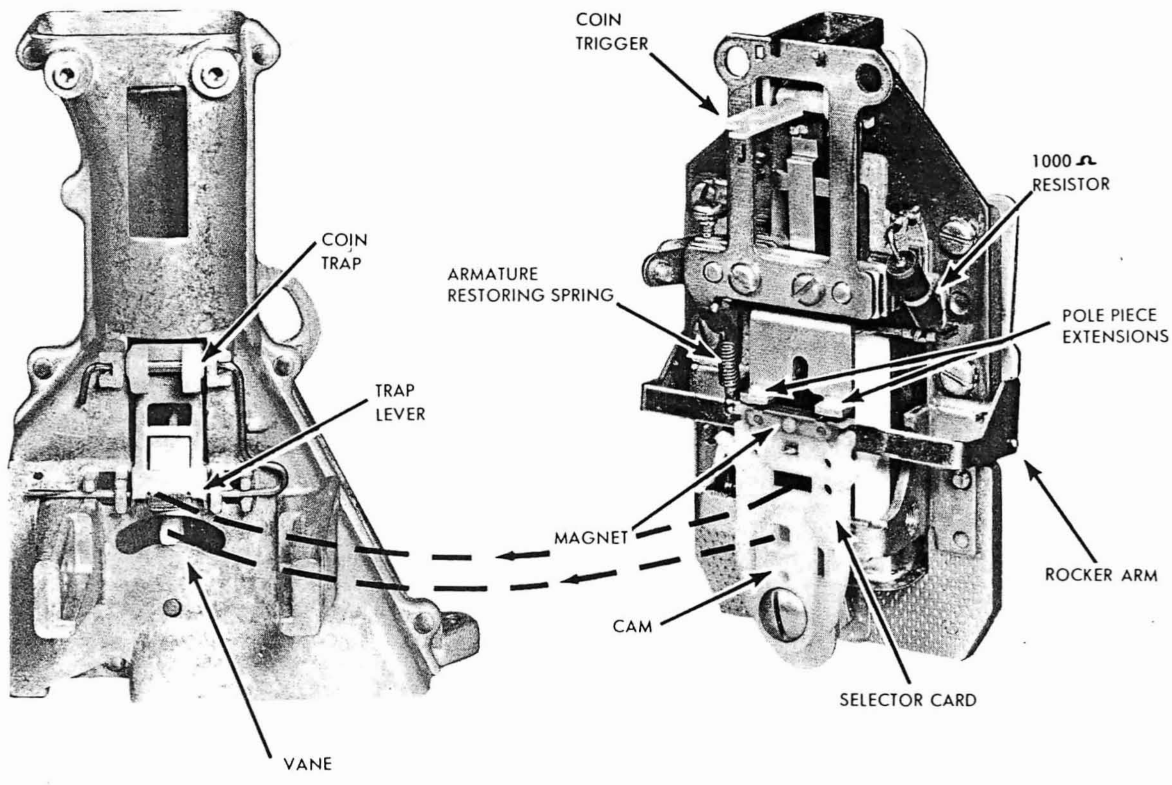


Figure 5. P10E755 Hopper, and Rear View of P10E786 Relay.

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.

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 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.

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 shute 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

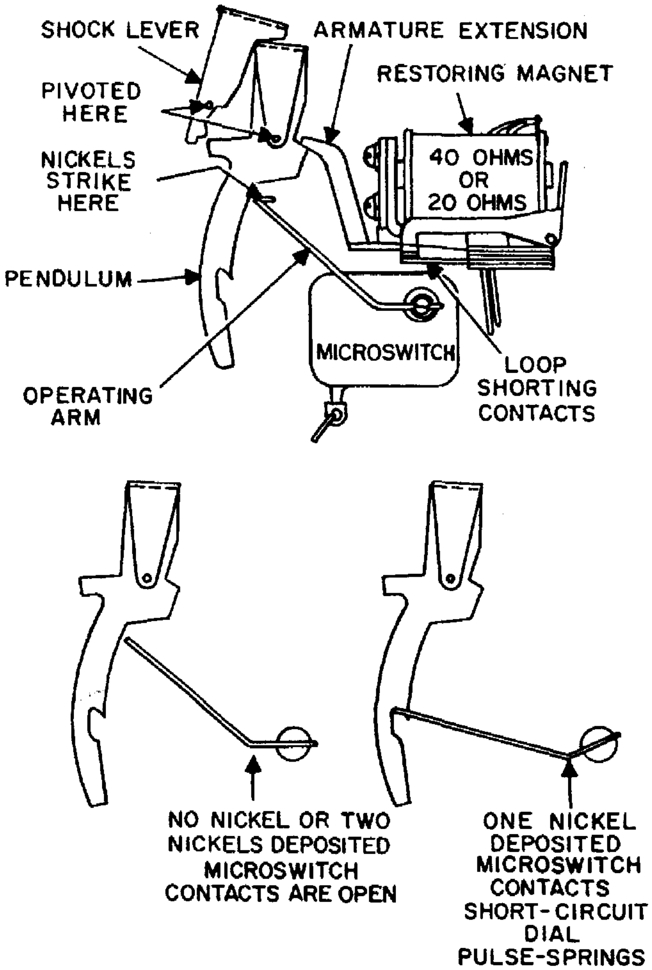


Figure 1. Two-Nickel Assembly.

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	

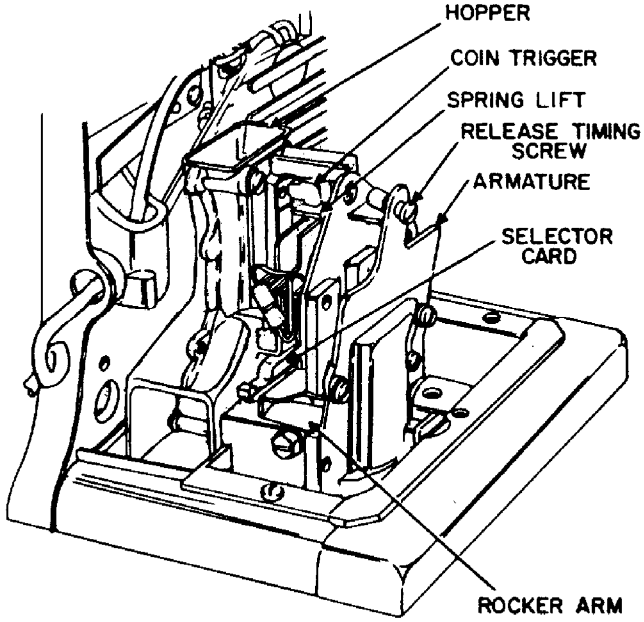


Figure 2. Single Coil Coin Relay, Installed, Cover Removed.

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 fradulent 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

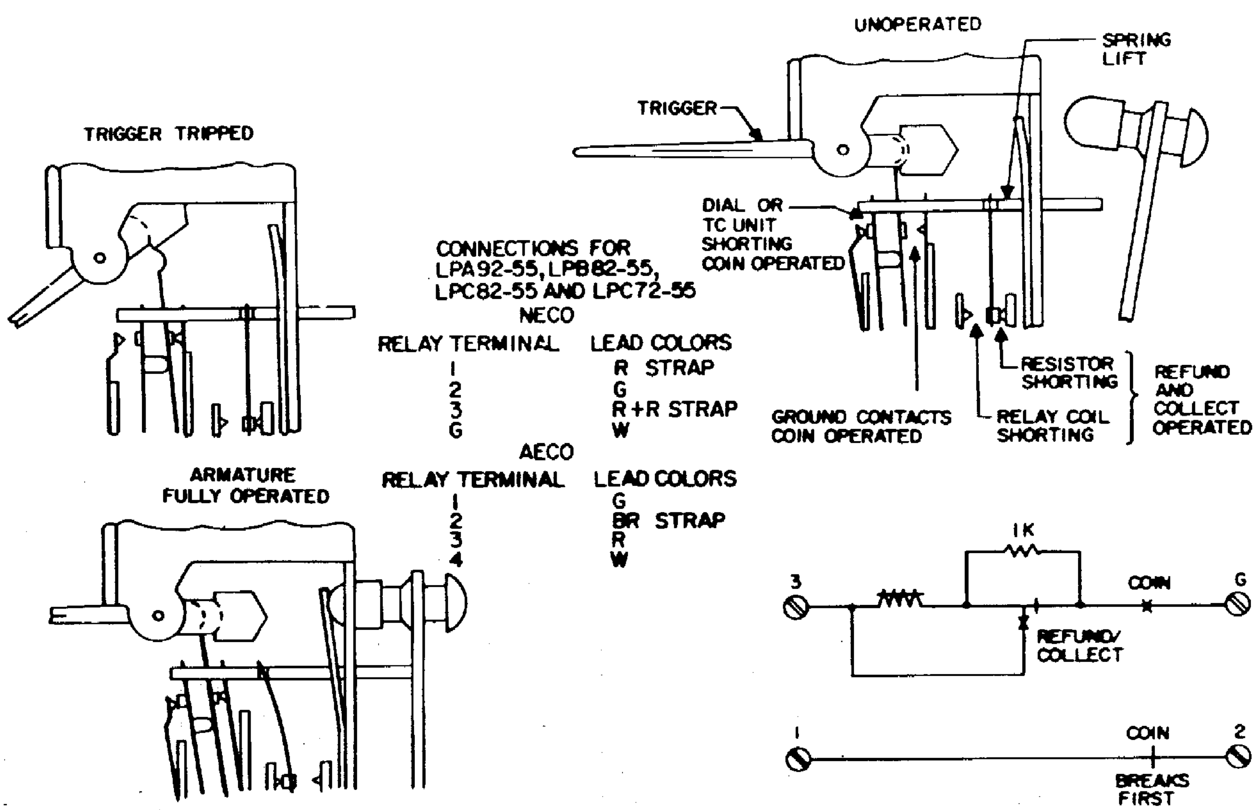


Figure 3. Coin Relay Contact Spring Assembly and Schematic.

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

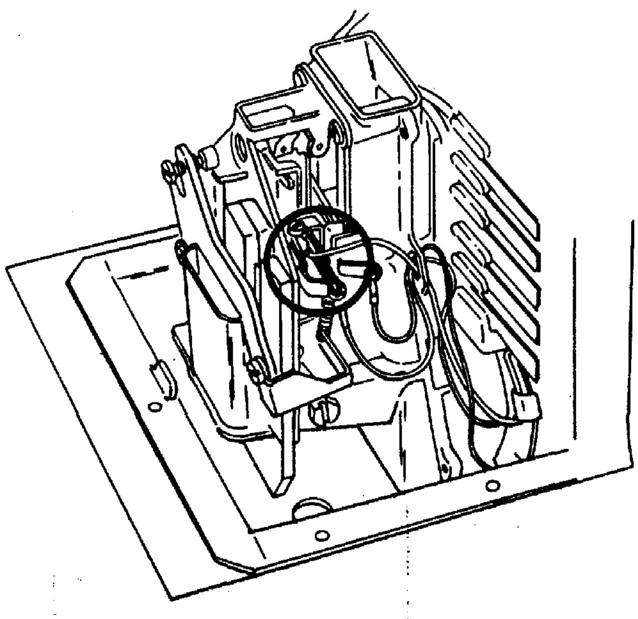


Figure 4. Use of Paper Clip to Bypass Ground Contacts.

(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 40Ω 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 Ω 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 rlease 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 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 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.

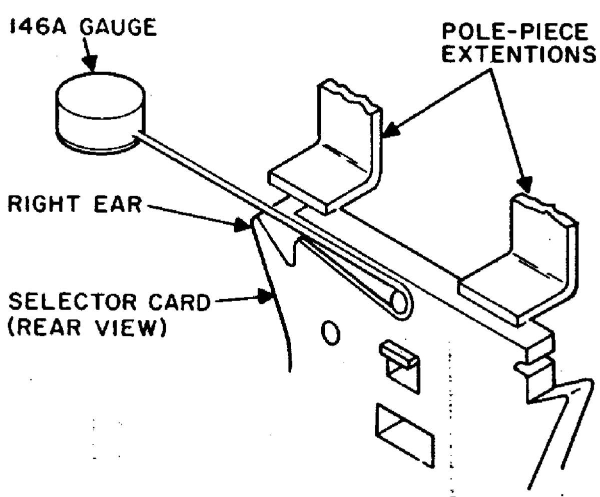


Figure 5. Use of 146A Gauge for Bias Margin Test.

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.

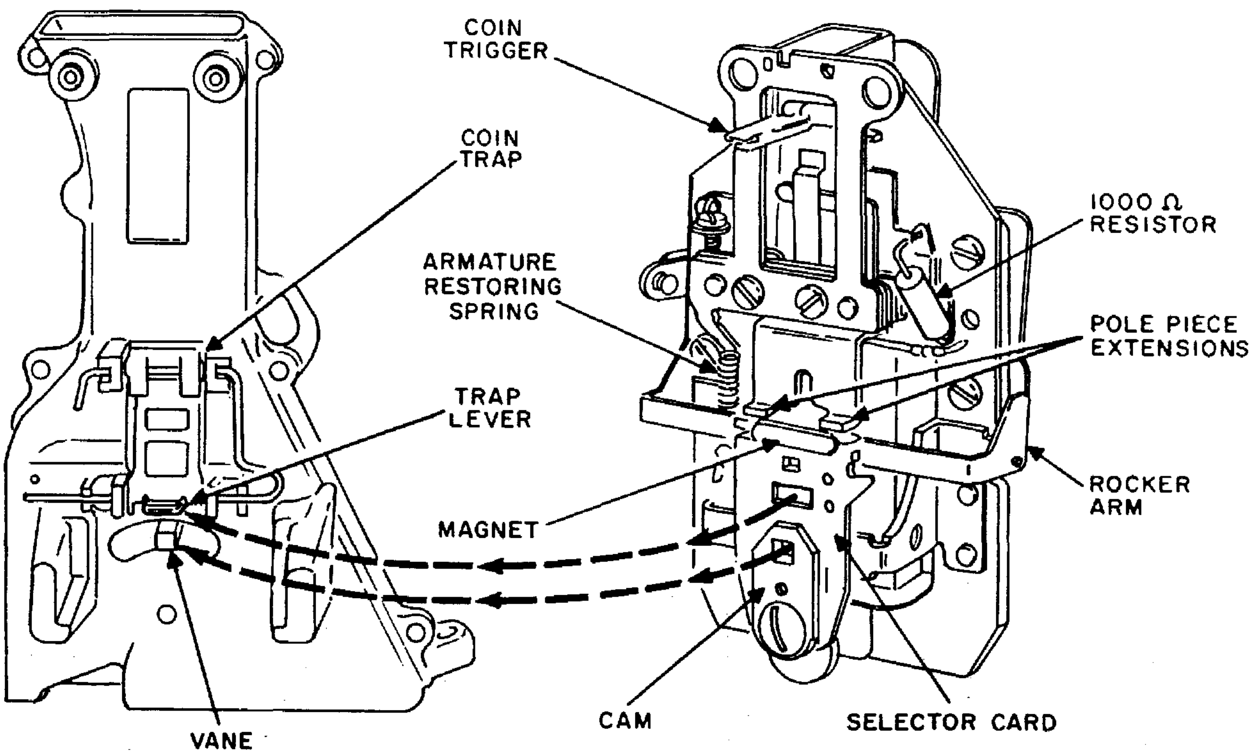


Figure 6. NECo Hopper and Rear View of NECo Relay.

(9) Tighten each pair of mounting screws evenly. While tightening the upper screws, check to be sure that the 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.

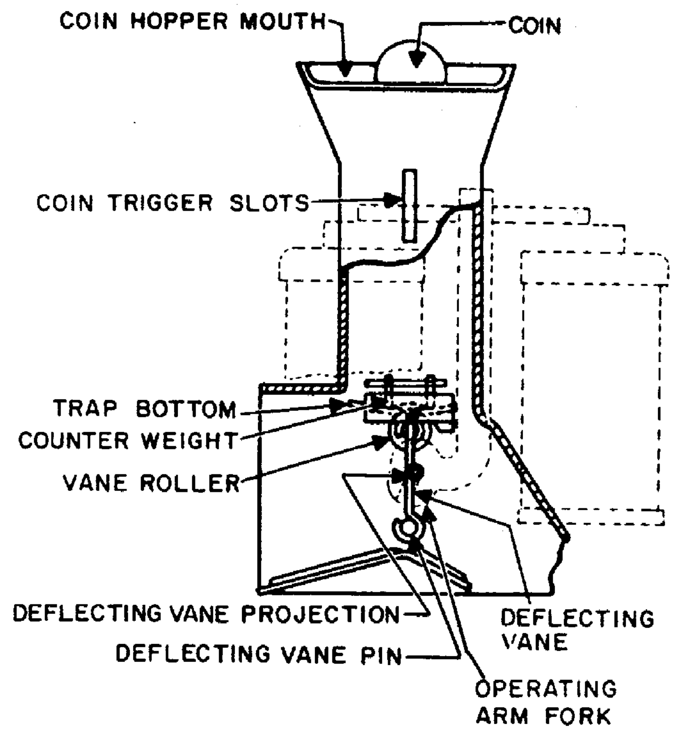


Figure 7. Coin Hopper (2-Coil Assembly).

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.

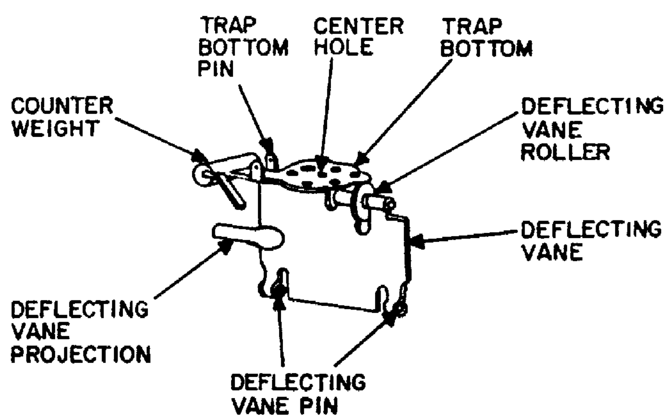


Figure 8. Trap and Vane (2-Coil Assembly).

(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 maintaining 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.

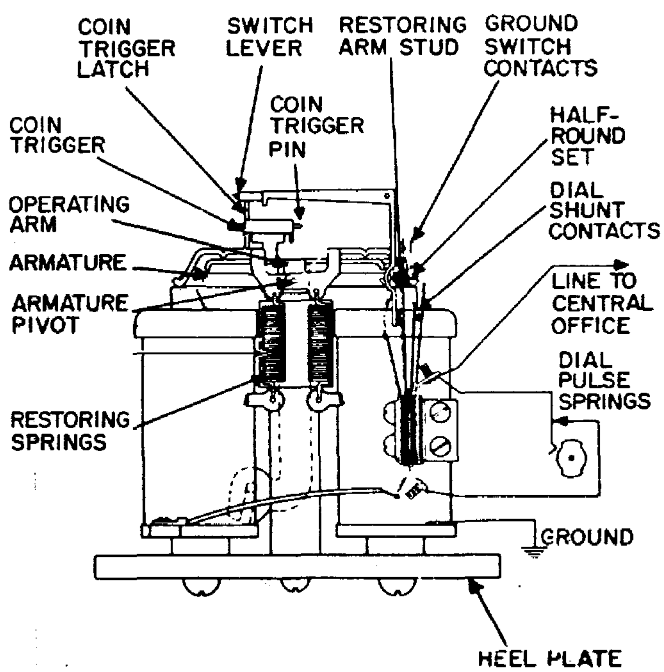
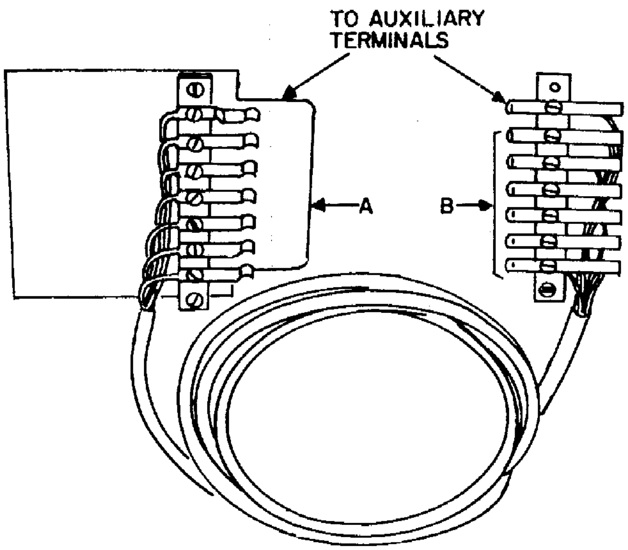


Figure 9. 2-Coil Coin Relay.



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.

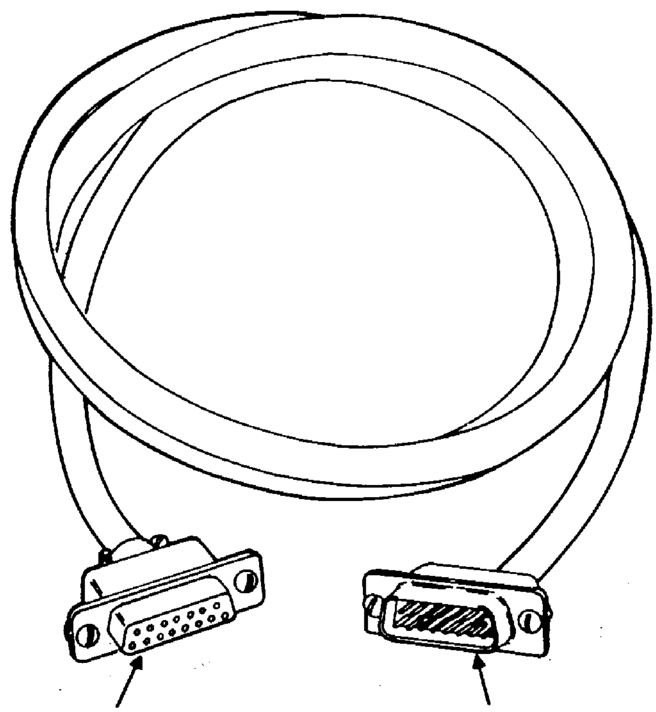


Figure 11. Coin Telephone Test Cord P-60754-A.

(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.

A.E. CO. SEMI-POSTPAY COIN TELEPHONE SETS
DESCRIPTION

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1. GENERAL

1.01 This section describes the construction and operation of A.E. Co. semi-postpay coin telephone sets (see Figure 1). It is reissued with a change in title to include models from current production. Because of general revision, marginal arrows are omitted.

1.02 With few exceptions, the principles of operation apply generally to all semi-postpay instruments of A.E. Co. manufacture, dating back to the earliest sets marketed under the name "Autelco paystation". Illustrations in this section are of LPC-series models introduced in 1968, unless otherwise identified to show earlier construction.

1.03 Semi-postpay service is identified by the final significant digit 6 in the main body of the model number. The preceding digits or letters indicate the type of transmission components used, as follows:

60-series	Type 40 Monophone desk set components
90-series	F1A set components
LPA80-series	Type 80 (with series rheostat) components
LPB80-series	Type 80 (original varistor network) components
LPC -series	Type 80 (1967 revised network) components
LPA90-series	G1A set components

Models from current (LPC-series) production are available for dial service (LPC86) or for Touch Calling operation (LPC76). The absence of a suffix to the number indicates a set for nickel service. Suffix -55, available only on 90-series and later sets, indicates that the mechanism is arranged to accept two nickels or a dime. Suffix -10, available on all models except the current LPC-series, indicates that the mechanism will accept a dime only. The most common current model is the LPC86-55.

2. STATION OPERATION

2.01 Semi-postpay operation provides fully automatic enforcement of coin collection on local calls in central offices arranged for reverse battery answer supervision. The station user receives dial tone without deposit and is free to dial any number of digits required to place a local call or to reach the toll or EAS operator. Should his call for any reason not be completed, it is unnecessary for the instrument to return any coins, as none have been deposited. When the called party answers, the switching equipment reverses the polarity of battery feed to the calling line. This causes a polarized relay in the coin telephone set to short-circuit the transmitter and shunt the receiver, preventing conversation. If the station user deposits the proper amount, the passage of the coin through the mechanism permits some of the operated relay contacts to restore, removing the transmission impairments so the parties may converse.

2.02 After the coin station user restores the handset at the conclusion of the call, the polarized relay remains connected to the line. When sets built prior to 1963 are used on short loops, this combined loop and relay resistance may be low enough to hold the switchtrain. Instruments of current design have a diode in series with the relay which blocks reverse battery so the loop is effectively opened when the handset is restored. On these sets, as with those of the earlier design when used on longer loops, the switchtrain releases, and the station receives battery feed of normal polarity from the line circuit. If an older instrument is used on a short loop, the switchtrain is held until the called party disconnects, at which time the switching equipment returns battery feed to normal

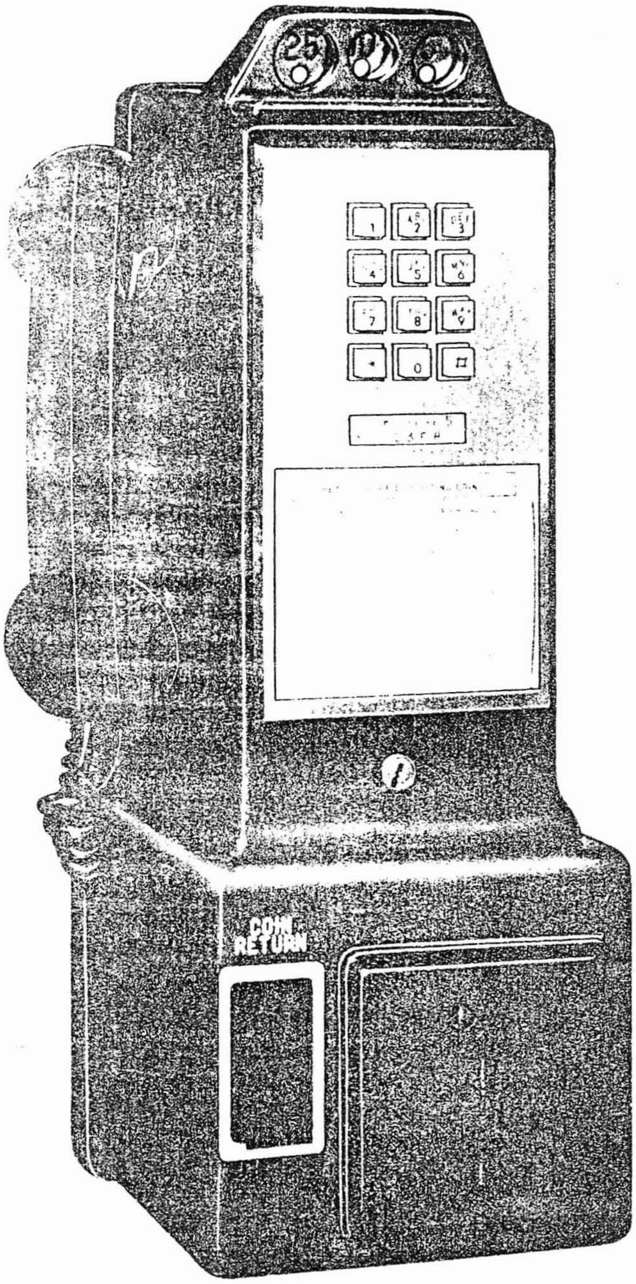


Figure 1a. LPC76-55 (Touch Calling).

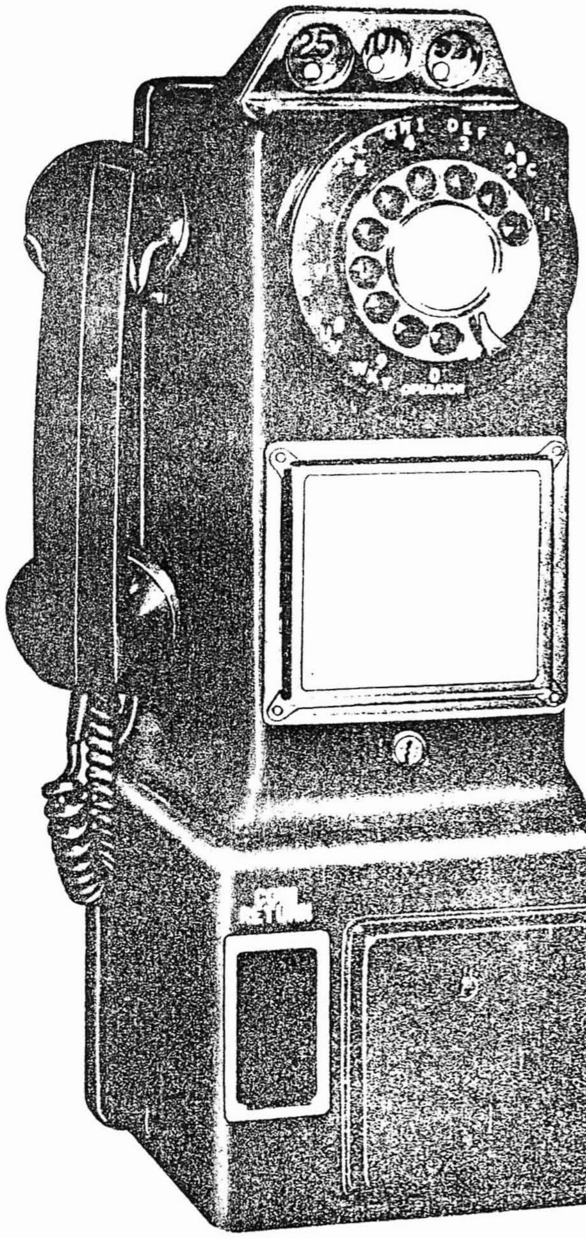


Figure 1b. LPC86-55 (Dial Service).

Figure 1. Semi-Postpay Coin Telephone Sets.

polarity on the calling line. As soon as normal battery is received, the polarized relay resets itself, disconnecting its coil from the line.

2.03 On calls to or through an operator's position, battery feed polarity on the coin service line remains normal, so the relay in the instrument does not operate when the operator answers, and no coin deposit is necessary to pass call details or make an inquiry. If the operator completes a connection for which a charge is due, she provides aural supervision of the coin collection before permitting conversation to proceed. Each coin deposited strikes either a cupped bronze or flat wire gong during its travel through the telephone set, and the tones so produced are picked up by a signal transmitter adjacent to the gong mountings and coupled to the line to provide an indication to the operator of the amount deposited.

3. COIN MECHANISM

Coin Gauge

3.01 The coin gauge at the top of the upper housing has three different size openings. Each of these openings is directly above the corresponding channel in the coin chute.

Coin Chute

3.02 The coin chute is mounted inside the upper housing directly below the coin gauge (see Figure 2). The three channels are designed so that only a coin of proper dimensions in the correct channel will operate the mechanism. All three channels end directly over the mouth of the coin hopper (see Figure 3). The lugs which hold the coin chute to the upper housing are part of a framework welded to the upper housing, which constitutes the coin return chute. Rejected coins fall down this chute to the coin return slot in the lower housing.

3.03 The three channels of the coin chute are arranged so that coins are directed to either a cupped bronze gong ("bell") or helical

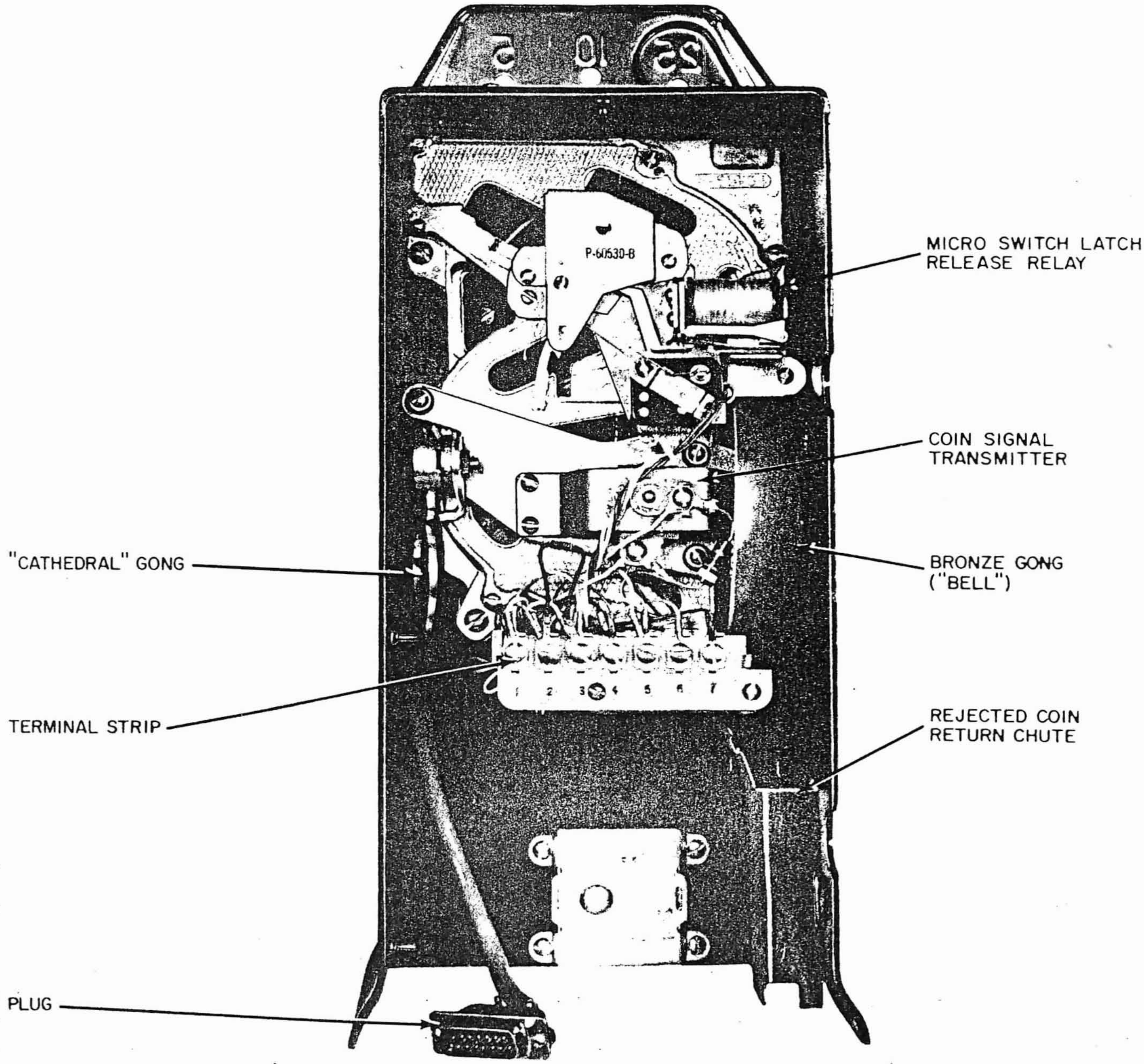


Figure 2. Upper Housing.

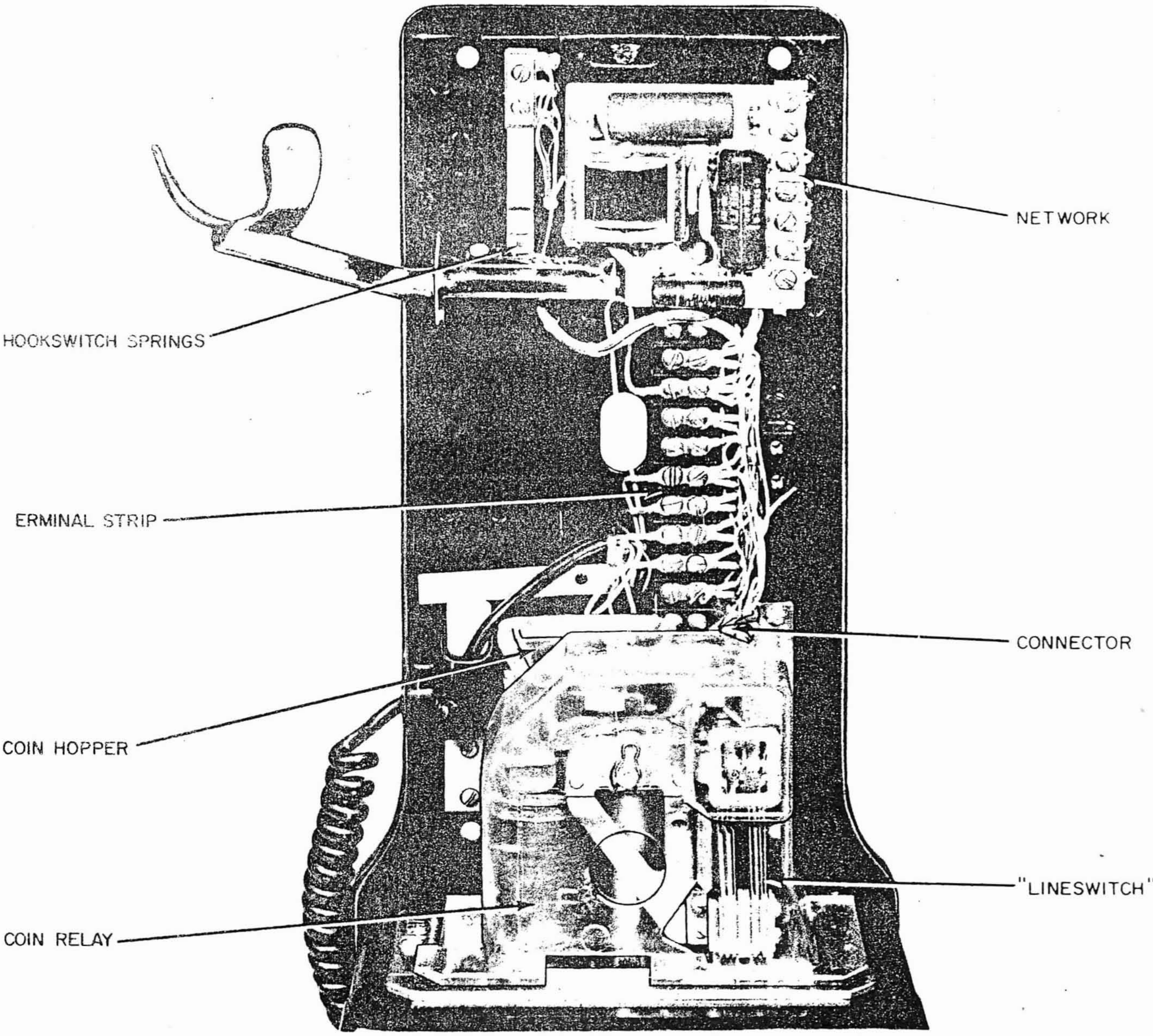


Figure 3. Lower Housing.

flat wire gong ("cathedral gong"). A nickel strikes once at the lower edge of the "bell", a dime strikes once at the upper edge and again at the lower edge of the "bell", and a quarter strikes the cathedral gong once. These gong signals are conveyed to the central office via the special transmitter mounted on the back of the coin chute (see Figures 2 and 4). In sets built since 1966 a permanent magnet mounted adjacent to the quarter channel on the coin chute acts as a slug rejector. A ferrous slug deposited in the quarter gauge will be attracted by the slug rejector and diverted to the cash compartment without striking the cathedral gong. It is thus confiscated to prevent further misuse, but is not accepted by the toll operator in the absence of any gong signal.

<u>Coin Relay</u>

3.04 Figures 5, 6 and 7 show the polarized coin relay in its normal condition. Two coils are mounted vertically on the base; on most sets, one coil is arranged with 2900Ω and 77Ω windings, and the other with a single 83Ω winding. The 77Ω and 83Ω windings are connected in series aiding, though on separate coils. The armature has a permanent magnet attached to its under side and is pivoted in the center above the two coils. Attached to its right end are two pair of roller-type buffers which engage the relay contact assembly ("lineswitch") when the armature is tilted to the right. One pair of these buffers is suspended from the armature on a swinging arm, while the other pair is fixed below the end of the armature. Suspended between the two sets is a switch lever, which pivots on the relay frame and extends its stop arm to the left, with the end stud positioned above the coin trigger by about ten mils. This permits the trigger to be tripped on coin deposits for toll charges, when the armature is normal, and to restore to its rest position after the passage of each coin.

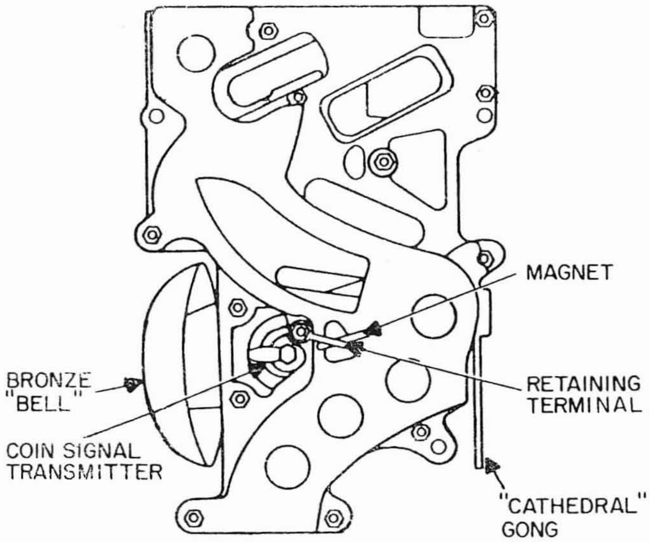


Figure 4. Coin Chute.

Coin Relay Operation

3.05 Figure 7 is drawn to show the coin relay in its normal condition, as found during dialing, waiting for the called party to answer, and throughout operator-handled calls. Note that the armature is tilted to the left, the coin trigger is at rest, and all "lineswitch" contacts are open. This situation applies when line polarity is normal (L1 negative). Under these conditions, current flows from L2 through the coin signal transmitter, dial pulse springs, handset transmitter, 12Ω resistor, induction coil primary winding, 78Ω coil of the "restoring" relay, 83Ω and 77Ω windings of the coin relay to the hookswitch contacts and L1, as shown in Figure 8. The "restoring" relay is the latch release relay provided on two-nickel models (see

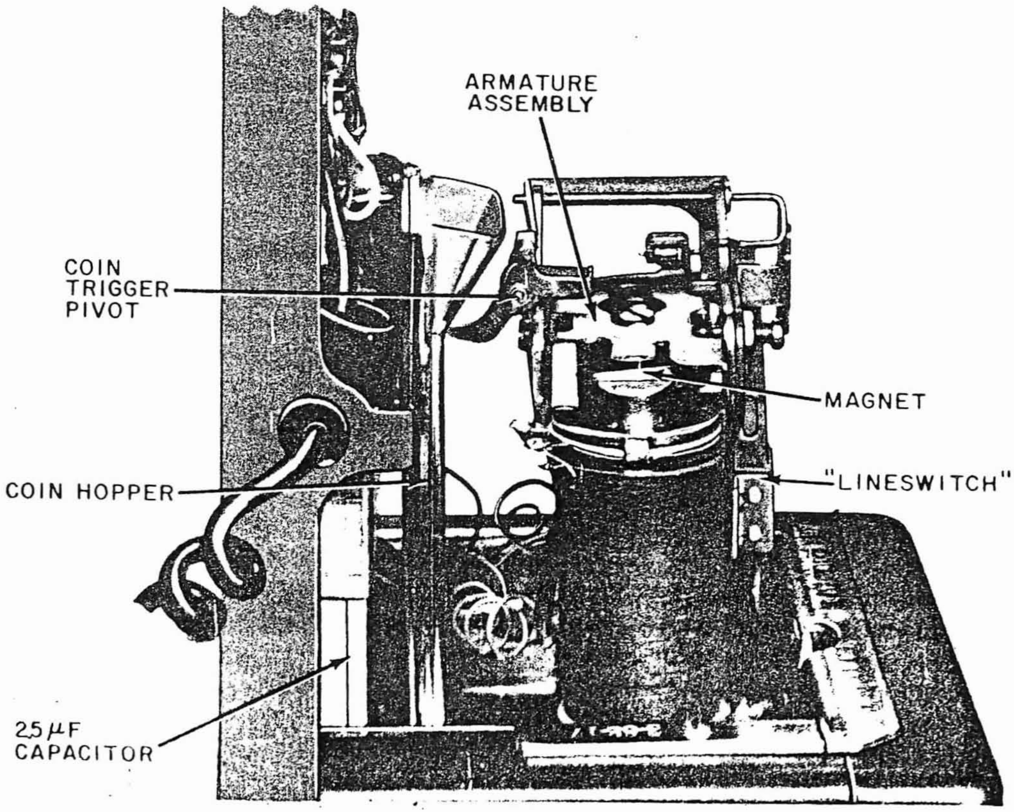
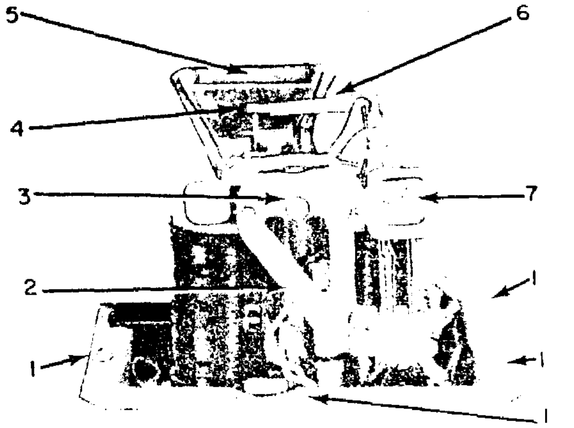


Figure 5. Coin Relay Installed in Lower Housing.

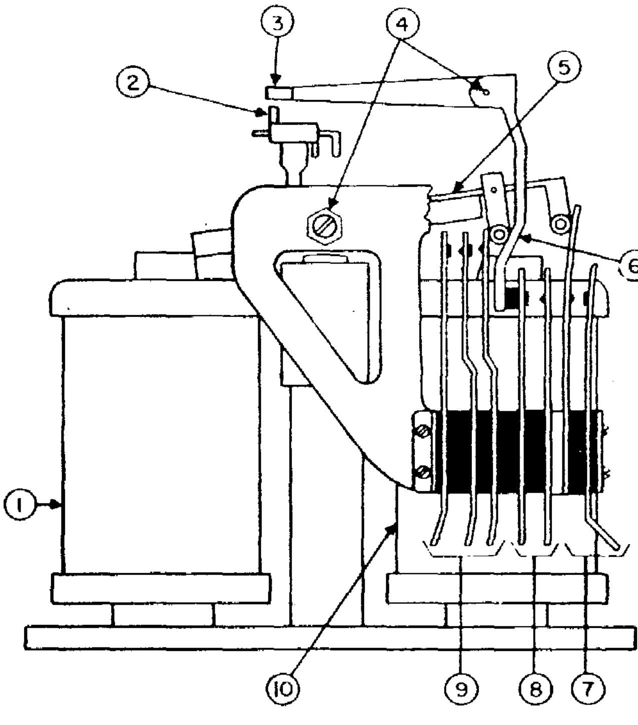
Paragraph 3.12); on earlier sets with the dime-only option, the same relay performs a different mechanical function to admit nickels to the nickel channel when battery is normal. The polarity of the armature magnet is such as to be repelled by the flux in the 83Ω winding. To prevent this flux on short loops from neutralizing the effect of the magnet and attracting the iron armature to the right, the 77Ω winding on the left hand coil provides a smaller flux to attract the armature magnet and keep it tilted to the left. Early 60- and 90-series sets used a relay assembly which lacked this winding and provided only a 3000Ω coil at the left and a 90Ω coil at the right. With this design it was necessary to provide a means of reducing or eliminating the flux generated by the 90Ω coil on normal battery. At first this was accomplished by providing a 90Ω resistance to be wired in parallel with the coil on short loop installations, and later by shunting the coil with a parallel rectifier.

3.06 When the called party answers on a local call placed from the coin service line, battery polarity on the line is reversed, so that current through the coin relay windings flows in the opposite direction. The flux generated by the 77Ω winding now repels the left end of the magnetic armature, while that in the 83Ω winding attracts the right end, which moves downward to the position shown in Figure 9. Roller-buffer 3, nearer the observer, operates "restoring" springs 6 and 7, which do no restoring, but connect the 2900Ω winding of the coin relay to the line (on most models it is short-circuited by a hookswitch contact). As roller 4, nearer the armature on the same shaft as 3, moves down, it permits the right edge of the switch lever to move farther to the right. This allows the left end of the stop arm to drop until it strikes the coin trigger stop surface. Roller 2, nearer the armature on the swinging arm, moves downward along the left edge of the switch lever and forces the swinging arm to the left. Roller-buffer 1, nearer the observer on the same shaft as 2, operates coin/shunt springs 1, 2 and 3, which short-circuit the transmitters and place a low-resistance shunt across the primary winding of the induction coil. Although the station user can faintly hear the called party answer, the efficiency of the receiver is reduced to an extent that renders it incapable of being used as a transmitter. On models for ten cent service, the 78Ω relay, which had been operated on normal battery, now releases as current flows instead through its parallel diode.



1. MECHANISM BASE MOUNTING SCREWS
2. FRAME ASSEMBLY
3. ARMATURE PIVOT SCREW
4. STOP ARM STUD
5. COIN HOPPER MOUTH
6. SWITCH LEVER
7. ARMATURE ROLLER BUFFERS (TWO PAIR)

Figure 6. Coin Relay (Front View).



1. 2900Ω/77Ω COIL
2. COIN TRIGGER
3. STOP ARM STUD
4. PIVOT POINTS
5. ARMATURE
6. SWITCH LEVER
7. "RESTORING" SPRINGS 6 & 7
8. "SHORT" SPRINGS 4 & 5
9. COIN/SHUNT SPRINGS 1,2 & 3
10. 83Ω COIL

Figure 7. Coin Relay - Normal.

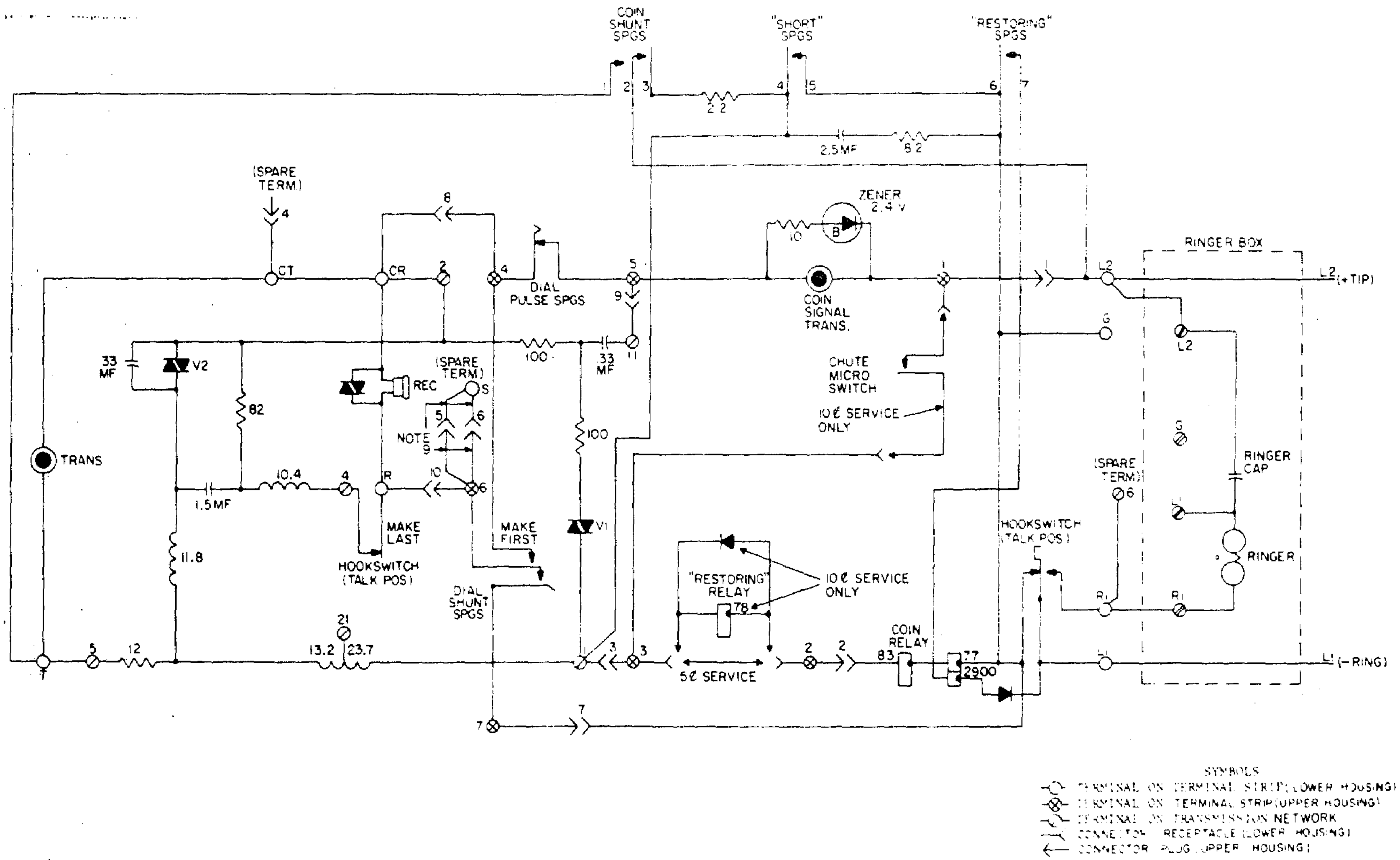


Figure 8. Schematic Diagram, LPC-Series Semi-Postpay Coin Telephone Set.

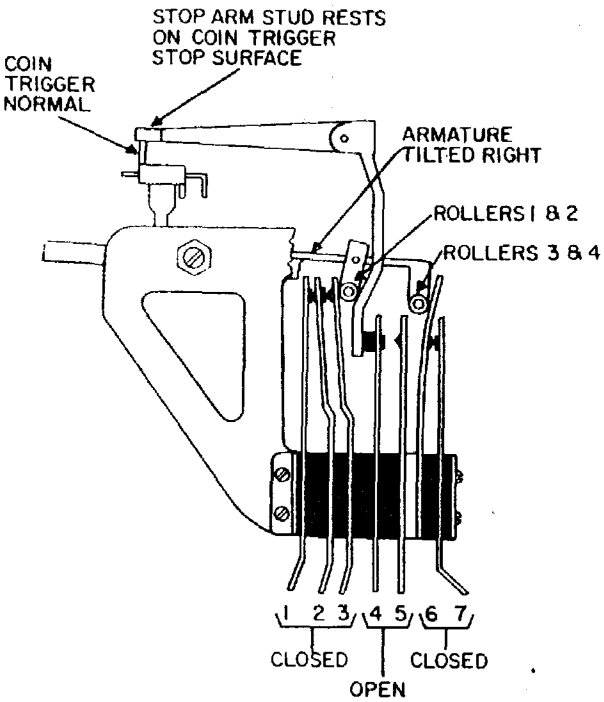


Figure 9. Coin Relay - Battery Reversed as Local Call is Answered.

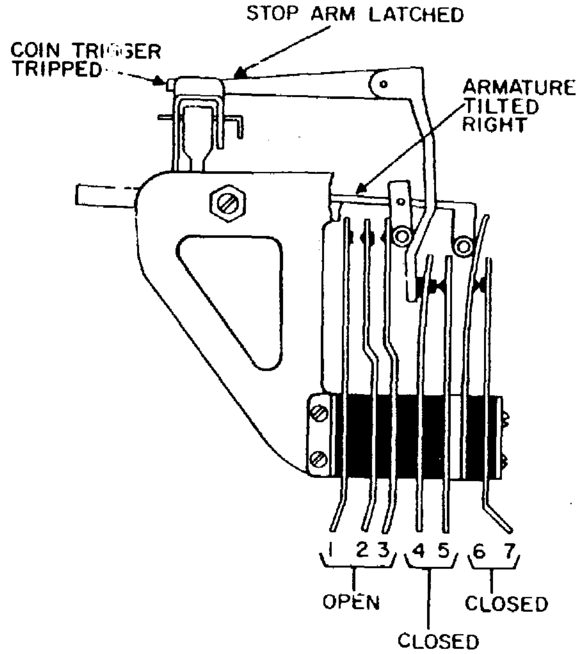


Figure 10. Coin Relay - After Deposit on Local Call.

3.07 If the station user deposits a coin to permit conversation, its passage through the upper housing of ten cent models causes the actions described in Paragraphs 3.11 and 3.13. As the first coin enters the hopper it trips the coin trigger, which no longer supports the stud of the stop arm. The restoring force of coin/shunt springs 1, 2 and 3 against roller-buffer 1 is transmitted by roller 2 to the switch lever, moving it to the right as the stop arm drops. This movement is sufficient not only to allow springs 1, 2 and 3 to open and remove the transmission impairments, but also to operate "short" springs 4 and 5 from a fixed buffer on the lower end of the switch lever, as shown in Figure 10. These springs short-circuit the 77Ω and 83Ω windings of the coin relay (and in ten cent models, the 78Ω winding of the relay in the upper housing) to remove their impedance from the transmission path. The latter now extends from L1 through the hookswitch contacts, "short" springs 5 and 4, the induction coil primary winding, 12Ω resistor, handset transmitter, dial pulse springs and coin signal transmitter to L2. The coin relay remains in this condition during conversation.

3.08 If the coin station user restores the handset first at the end of the call, the hookswitch contacts remove the short circuit from the 2900Ω winding of the coin relay, so that it is inserted in series with the line. If the called station handset remains off-hook, battery is still reversed as these contacts open. On LPC- and late LPB-series sets, a diode in series with the 2900Ω winding blocks current flow, so the loop is effectively opened and the switchtrain releases. On sets without the series diode, the switchtrain is held over the loop including the relay winding, unless the resistance of the station loop from office to instrument is rather high. When so held, the switching equipment keeps the 2900Ω winding energized until the called party disconnects, but the flux so generated is such as to repel the left end of the coin relay armature, which remains tilted to the right.

3.09 When the switchtrain is released, reverse battery is disconnected from the coin service line, which then receives battery feed of normal polarity from its line circuit. If the switchtrain has been held but the called party disconnects, battery feed to the calling line reverts to normal. The same applies if the called party disconnects first, and the coin station user then restores the handset. In any case, normal battery applied to the 2900Ω winding of the coin relay causes it to attract the left end of the armature, which moves downward. As roller 4 is moved upward at the right end, it bears against the right end of the switch lever and moves it to the left. This permits springs 4 and 5 to open, removing the shunt from the other relay coils so all are energized in series for an instant. Because of the series inductance of the 2900Ω winding, these contacts are protected from erosion by an RC spark suppression network consisting of an 8.2Ω resistor and 2.5μF capacitor. Movement of the switch lever also raises the stud on the left end of the stop arm high enough to clear the coin trigger and permit it to restore. At the same time, roller-buffer 3 moves upward and permits "restoring" springs 6 and 7 to open. Although this disconnects the 2900Ω winding of the relay coil, its core is fitted with a copper sleeve to retard decay of the flux so that enough remains to carry the armature the rest of the way to its normal position. With all contacts open, the coin telephone set is disconnected from the line and ready for another call.

Dime-Only Control

3.10 When ten-cent service was first introduced, it was feared that delay incident to the insertion of two nickels after the called party answers would be excessive, and lead to lost calls occasioned by the called party becoming impatient and disconnecting before deposit. To avoid this problem, it was decided to provide ten cent service on a dime-only basis by providing a coin chute which would accept nickels only in payment of toll charges. Such a chute is shown in the upper housing of Figure 11, and is fitted with a modified relay referred to as a nickel "rejector" but which acts to admit nickels when energized. This device, herein called the nickel admitter, is actuated by a class S relay which has no contacts and only a single restoring spring. An extension arm welded to its armature terminates in a notched end which engages a pivoted wire loop mounted adjacent to an opening in the nickel channel. With the relay armature normal, the loop lies in and across the channel, so that a nickel inserted into the coin gauge falls only a short distance into the chute before striking the loop. It is then tripped out into the upper housing, whence it falls through the return chute and drops into the coin return slot.

3.11 When battery feed to the coin service line is normal, it energizes the 78Ω coil of the nickel admitter relay, so that the armature pivots the wire loop out of the channel. A nickel deposited at this time is free to travel the entire length of the nickel channel and actuate the coin trigger. This situation applies on local calls prior to the time the called party answers, but the instruction cards prepared for semi-postpay instruments clearly state that coins should not be deposited at that time, and nickels inserted then are collected without effect. After the called party has answered, battery feed to the coin service line is reversed, current flows through the bypass diode rather than the 78Ω relay coil, and the relay armature restores. This allows the wire loop to enter the nickel channel, so that nickels inserted in an attempt to pay for the local call are returned to the caller, who must use a dime or quarter to remove the transmission impairments and converse. On calls to an operator, battery remains normal, and nickels in any number may be deposited in payment of toll charges.

Two-Nickel Control

3.12 The inconvenience of requiring that a dime be used for a ten cent call was found to outweigh the anticipated disadvantage of two-nickel operation, and another coin chute was designed to accept either a dime or two nickels in payment for a local call. Preference for this arrangment has made it the only surviving option for ten cent service on LPC-series sets. Figure 12 shows the apparatus added to the coin chute, which is fitted with a Micro snap-action switch having a wire operating arm extending through the nickel channel, so that passage of each nickel deflects the arm and operates the switch. A pendulum pivoted above the operating arm is in turn deflected by the arm, which rides against the curved surface of the pendulum. A notch provided in this curved surface is so formed as to permit the operating arm to latch in the operated position as it begins to return from the full extent of its travel. The same sort of relay used in the dime-only chute is here arranged so that an angled extension welded to its armature serves to move the pendulum aside, clear of the operating arm, when the coil is energized. Since the Micro switch is latched by the pendulum, and the pendulum is released by the operation of the so-called "restoring" relay, the latter is herein referred to as the Micro switch latch release relay.

3.13 When battery feed to the coin service line is normal, it energizes the 78Ω coil of the latch release relay, so that the armature holds the pendulum slightly to the left of the Micro switch operating arm. This leaves the arm free

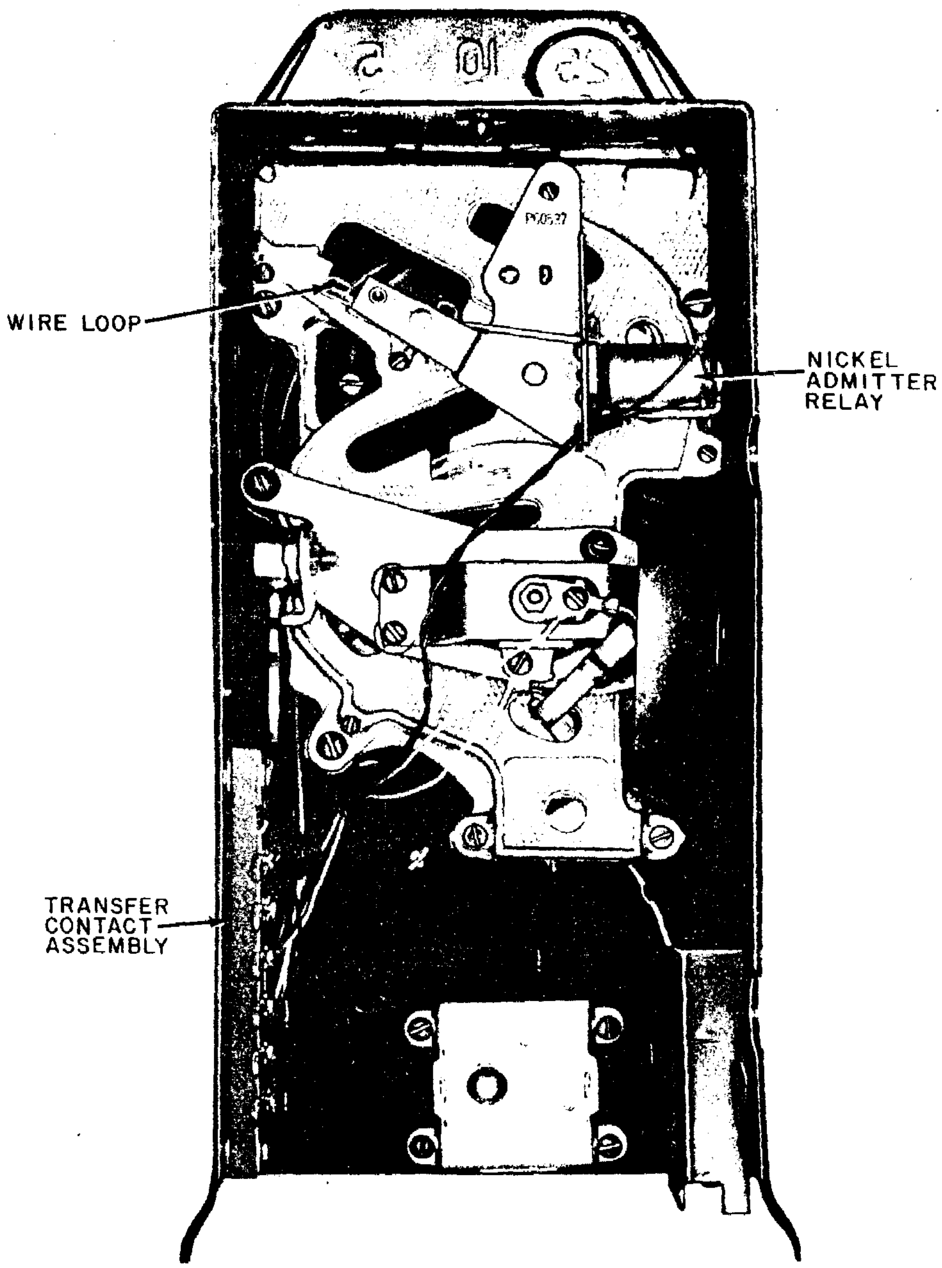


Figure 11. Upper Housing Arranged for Dime-Only Service (Model LPB86-10 or Earlier).

to operate and restore without latching, and its normal position is at point A in the figure, with the contacts open. This situation applies on local calls prior to the time the called party answers, and a nickel inserted at that time trips the Micro switch momentarily but is collected without effect. After the called party has answered, battery feed to the coin service line is reversed, current flows through the bypass diode rather than the 78Ω relay coil, and the relay armature restores. This allows the pendulum to swing to a nearly vertical position. If the station user deposits a nickel, it passes through the nickel channel and strikes the Micro switch operating arm with sufficient force to carry the arm down the edge of the pendulum, past the latching notch. This closes the switch contacts, which on LPC-series sets merely short-circuit the entire transmission circuit of the telephone set, blocking conversation completely. As the nickel passes on down the chute, it permits the switch operating arm to rise, traveling upward along the edge of the pendulum until it reaches the notch and latches in position B as shown in the figure, with its contacts still operated. Thus, although the nickel trips the coin trigger and performs the same functions as in a five cent instrument, conversation is still blocked. Note that at this point the deposit of a dime or quarter will have no effect in removing the blockage, as the switch operating arm is unaffected by anything but nickel deposits.

3.14 If the station user deposits a second nickel, it strikes the switch operating arm, forcing it downward against the lower inclined edge of the pendulum wedge. This forces the pendulum abruptly to the left as the arm moves first to the lower limit of its travel, and then back up as the nickel passes on down the chute. By the time the pendulum swings back against the operating arm, the arm has risen above the notch and cannot re-latch. It thus restores to normal, opens the switch contacts and removes the short circuit across the network so conversation may proceed. Should the station user lose count and mistakenly deposit a third nickel, transmission will again be blocked until a fourth nickel is inserted, and so on for each odd- and even-numbered nickel deposit.

3.15 On calls to an operator, battery remains normal, and nickels in any number may be deposited in payment of toll charges.

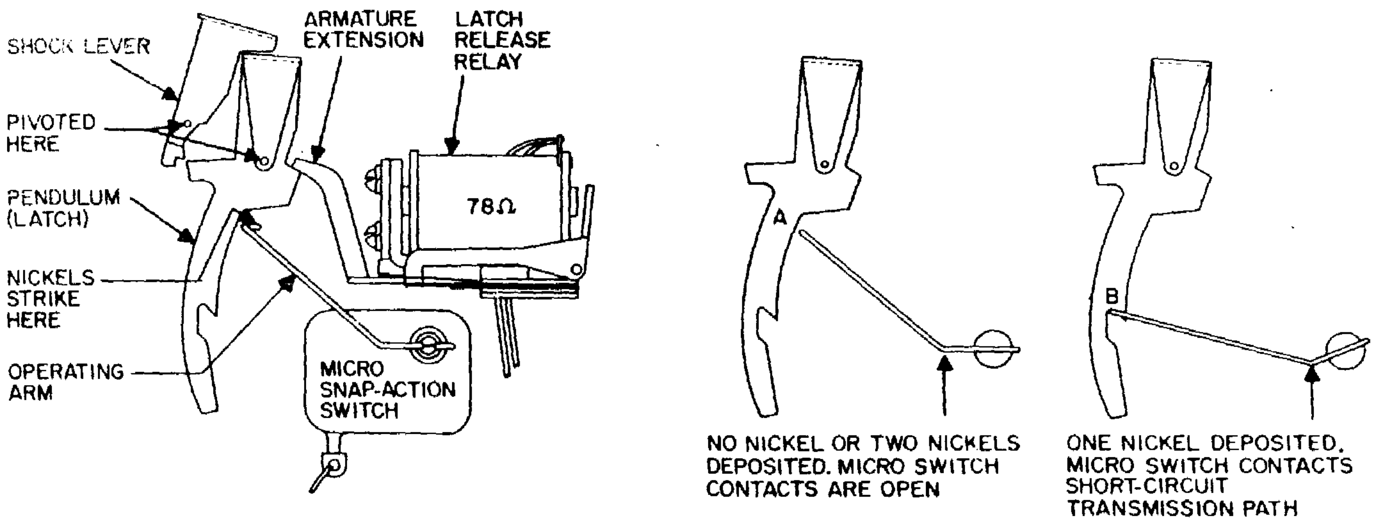


Figure 12. Two-Nickel Mechanism for Ten Cent Coin Chute.

A.E.CO. SEMI-POSTPAY COIN TELEPHONE SET INSTALLATION

1. GENERAL

1.01 This section provides installation instructions for A.E.Co. Semi-Postpay 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.

(e) Have a 6-inch clearance from fluorescent lights, transformers, and similar apparatus, to avoid inductive interference.

2.02 The surface on which the coin telephone 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 a finely finished surface, 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 Instructions for installing a coin telephone in an aluminum booth are provided 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, a #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.

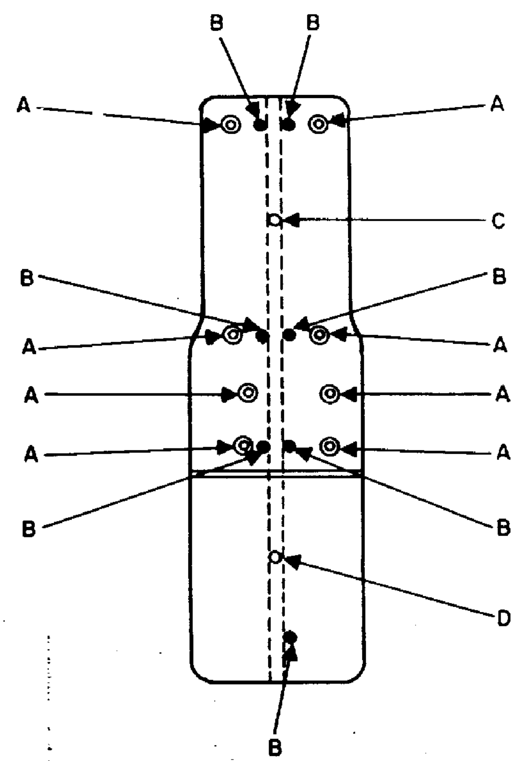


Figure 1. Coin Telephone Backboard.

(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 wires. 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 set. 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 cover is 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) Dial the coin telephone number and wait for busy tone. Hang up.

(2) Unlock cash compartment door.

(3) Dial predetermined number for assistance in checking coin telephone operation. Do not call the operator.

(4) When called party answers, deposit one nickel. On coin telephones equipped for dime-only control, the nickel will be rejected. On coin telephones equipped for five-cent service, the nickel will be collected and the transmission block will be removed. On coin telephones equipped for two-nickel control, the transmission block will remain, therefore, deposit a second nickel which should remove the transmission block. Hang up.

(5) Call the same party for further assistance and when the called party answers, deposit a dime. Transmission block should be removed. Hang up.

(6) Repeat step (5) using a quarter.

(7) Call the operator for assistance with coin signal testing.

(8) Deposit the proper coin in each slot and have the operator identify each coin. Hang up. Lock the cash compartment cover.

4.03 When a cash compartment key is not available and the cash compartment cover is installed, check coin mechanism operation as follows:

(1) Dial the number of the coin telephone and wait for busy tone. Hang up.

(2) Call operator for assistance in coin signal testing.

(3) Deposit the proper coin in each slot and have the operator identify each coin. Hang up.

5. COIN TELEPHONE HOUSING GROUND

5.01 A semi-postpay 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 a #14 wire (wire length sufficient to reach from mechanism base mounting screw, through the wire opening in the lower housing to the protector ground terminal). Terminate the spade terminal under the mechanism base mounting screw shown in Figure 2. Route the wire through the lower housing to the protector ground terminal (the wire must be routed so that it does not obstruct the coin return chute opening or the coin trigger). 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 3), 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.

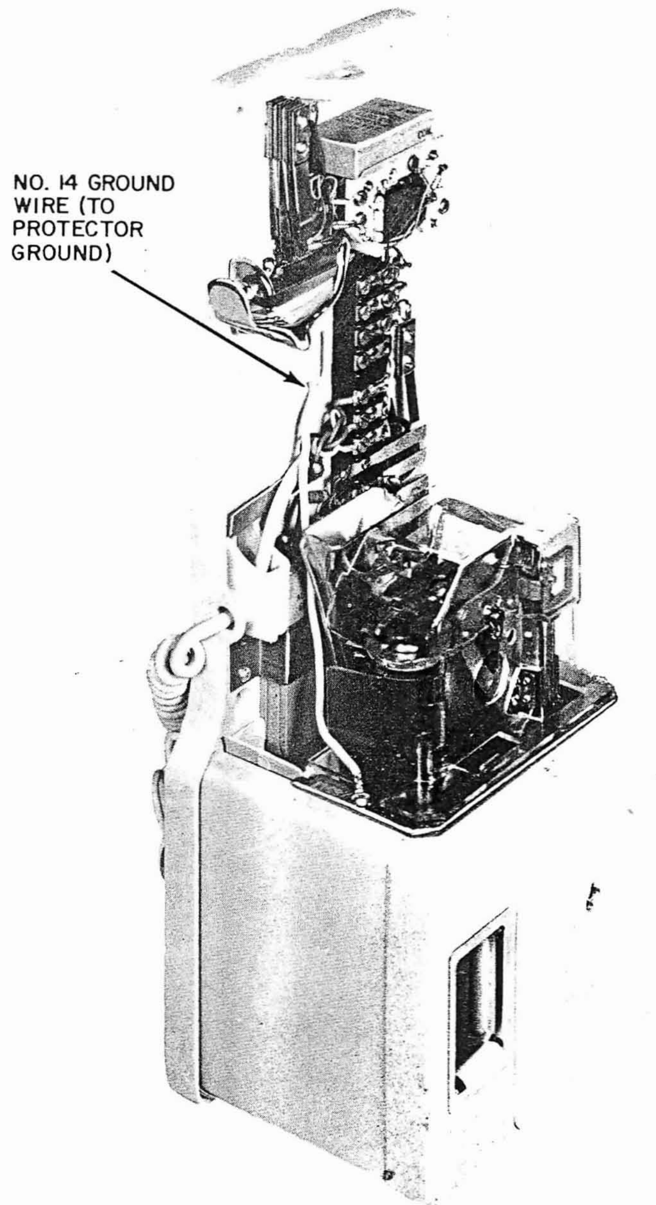


Figure 2. Ground Wire Attachment.

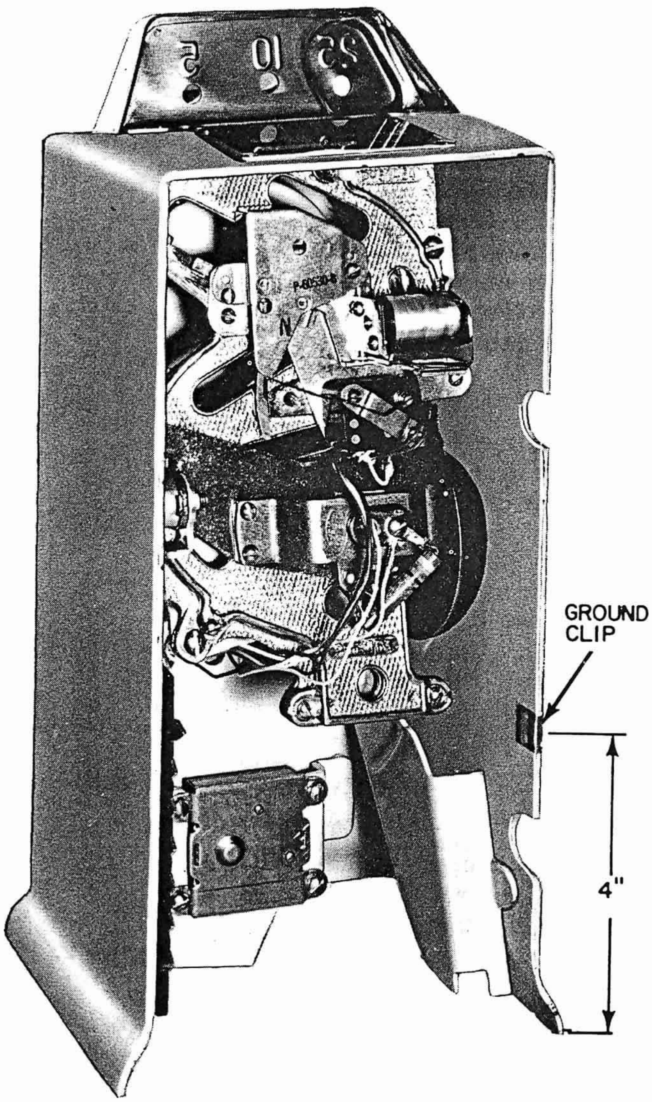


Figure 3. Ground Clip Attachment.

SHOP PROCEDURE
INSTALLATION OF A. E. CO. ANTI-STUFFING DEVICE COIN-RETURN CHUTE ON A. E. CO. PAYSTATIONS

1. GENERAL

1.01 This section contains instructions for installing an anti-stuffing device coin-return chute on a paystation.

1.02 Special tools required for installation of an anti-stuffing device coin-return chute are a P-70294 drill jig, a #20 drill (0.161 inch), an 82-degree countersink, and a P-70293 conversion kit which consists of the following:

(a) 1, P-11845 Coin-Return Escutcheon.

(b) 1, P-11848 Swivel Pin.

(c) 1, P-11858-A Anti-Stuffing Device.

(d) 1, P-60617 Coin-Return Chute.

2. PROCEDURE

2.01 Disassemble paystation as follows:

(1) Remove paystation upper housing.

(2) Remove cash compartment cover and coin box.

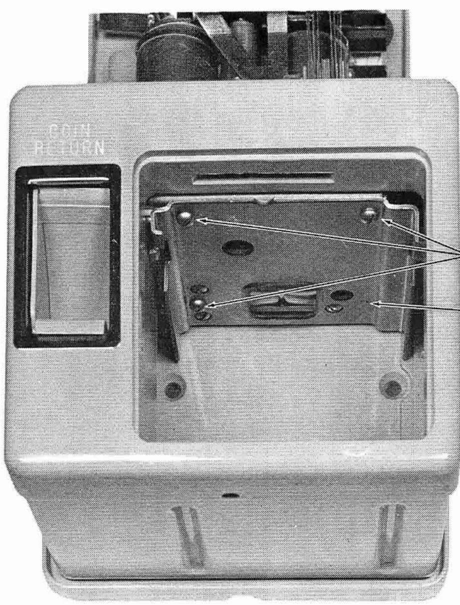


Figure 1.

(3) Using an offset screwdriver, remove the three screws within the cash compartment that secure the rail assembly to the lower housing (see Fig. 1); remove the fourth rail assembly mounting screw from the top of the lower housing. Remove assembly from cash compartment.

(4) Remove five mounting screws from the rear of the back plate (see Fig. 2).

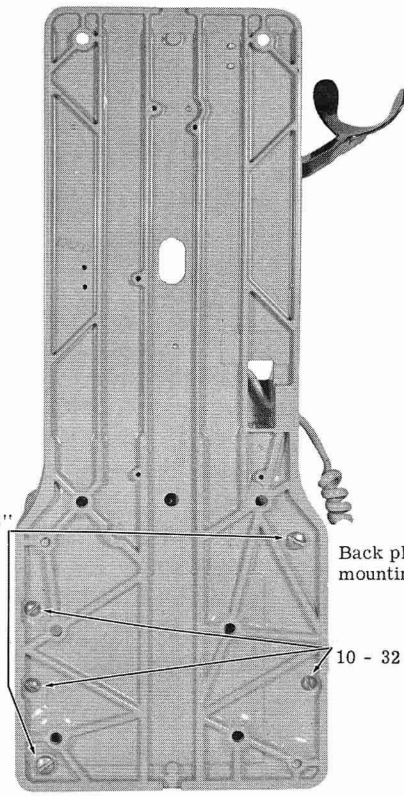


Figure 2.

(5) Remove dust cover clip and dust cover. Remove the two screws which attach the coin relay mounting base to the mechanism base (see Fig. 3). Carefully withdraw the coin relay assembly from the mechanism base and lay aside. Do not disconnect wire connections.

(6) Remove the two remaining screws which attach the back plate to the lower

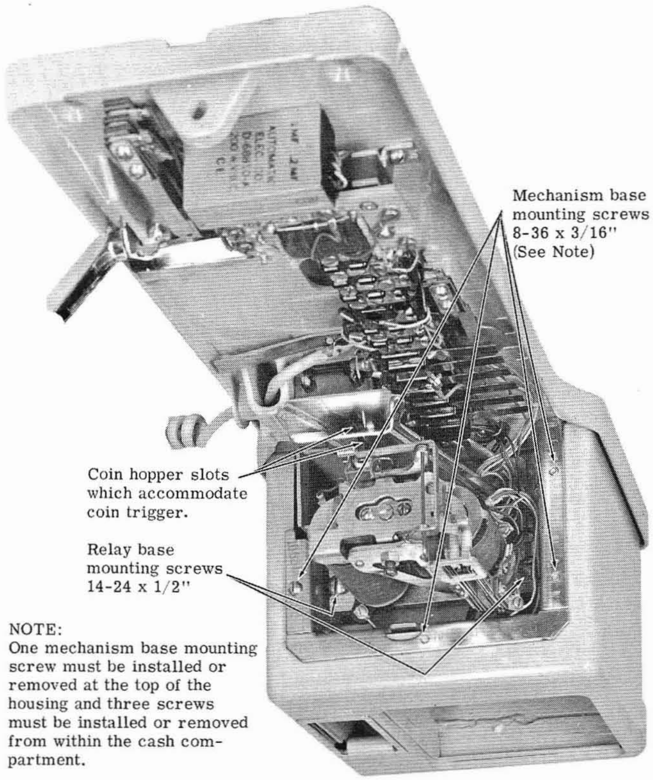


Figure 3.

housing (see Figs. 4 and 5). Access to the back plate mounting screw shown in Fig. 5 is attained by placing a screwdriver with a blade of approximately 6

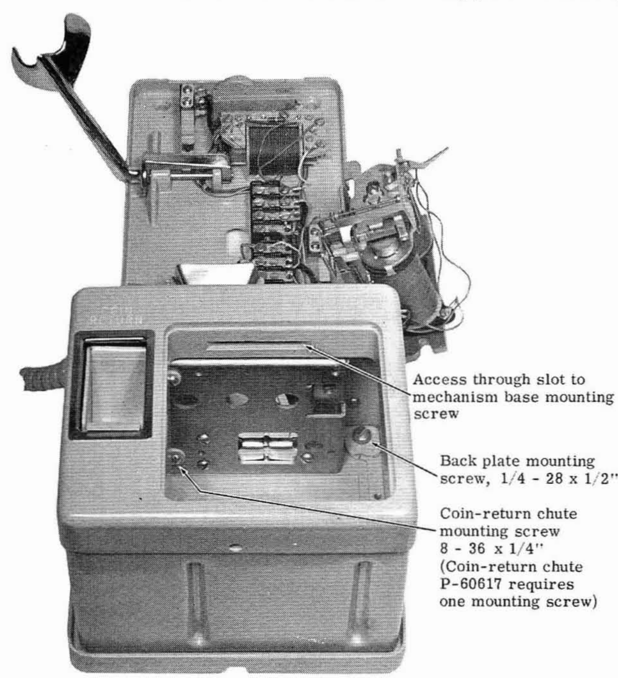


Figure 4.

inches through the slot (shown above the mounting screw in Fig. 5) and onto the screw. Remove lower housing from back plate. Be careful not to disturb relay assembly wire connections.

(7) Remove four screws which attach mechanism base to lower housing (see Figs. 3 and 4). Remove coin-return chute and mechanism base.

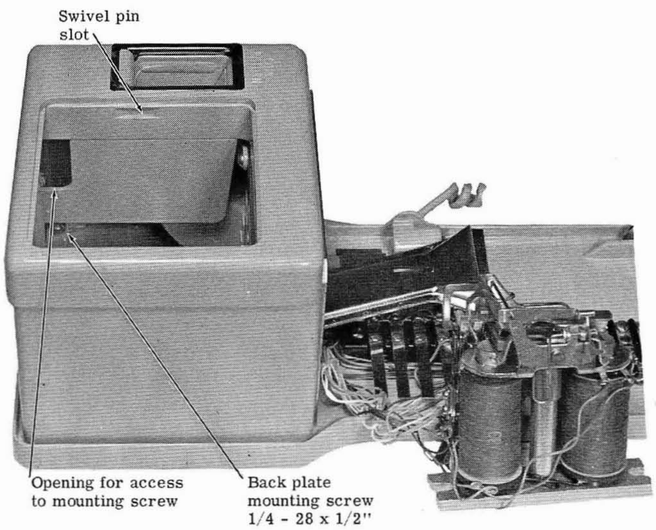


Figure 5.

(8) Remove escutcheon by prying bottom flange away from housing (on inside of housing) or, on older paystations, remove four drive pins (retain two drive pins).

2.02 Drill housing and install anti-stuffing device coin-return chute as follows:

(1) Coin-return opening on older paystations will require widening to accommodate the anti-stuffing device. If opening is 1-1/4 inches, mill the opening to 1-5/16 inches (see Fig. 6).

(2) Place lower housing on its right side (right side as paystation is normally viewed from front).

(3) Place drill jig (P-70294) on lower housing in coin-return opening and clamp tight as shown and according to the instructions in Fig. 7.

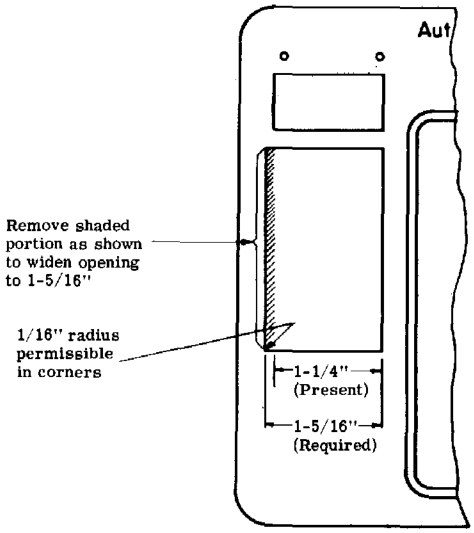


Figure 6.

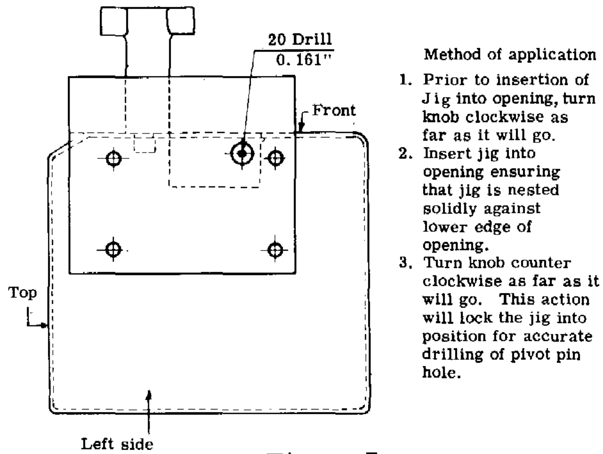


Figure 7.

(4) Using the jig and a #20 drill (0.161 inch), preferably mounted in a drill press, drill hole through outside of housing and inner partition (see Fig. 8).

(5) Using an 82-degree countersink, countersink outside hole to 5/16 inch outside diameter to accommodate swivel pin (see Fig. 8).

(6) On older paystations, plug two upper escutcheon holes with drive pins removed in step (8) of paragraph 2.01 (see Fig. 10).

(7) Insert new escutcheon (P-11845) into coin-return opening. Place lower housing on work bench so that face of escutcheon is flush with work bench surface. Bend over escutcheon bottom flange against inside of housing.

(8) Place lower housing upright on work bench. Place refund chute in lower housing with grooved pin to front at coin-return opening (see Fig. 9).

(9) Insert end of coil spring into liphole of anti-stuffing device (see Fig. 9), then close up loop of spring.

(10) Turn anti-stuffing device one-half turn so that its handle is pointing down.

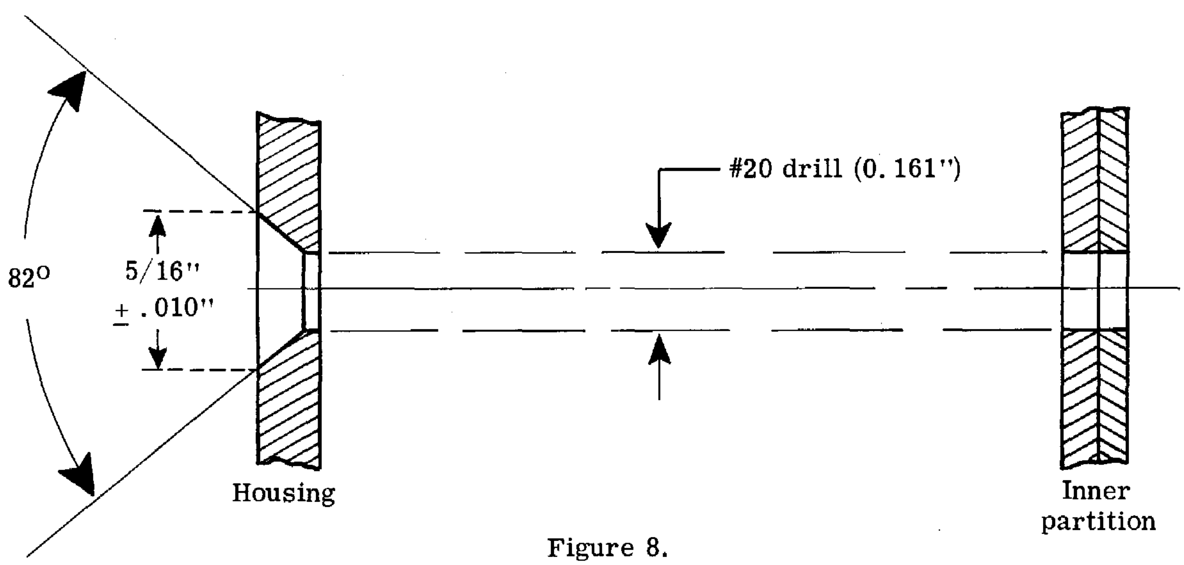


Figure 8.

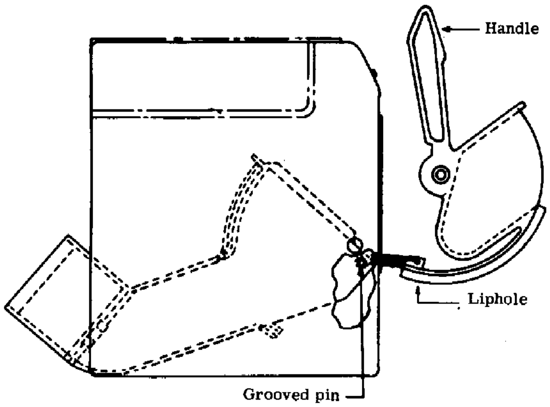


Figure 9.

(11) Insert anti-stuffing device into coin-return chute (see Fig.10). Align holes of anti-stuffing device, coin-return chute, and lower housing so that swivel pin can be inserted.

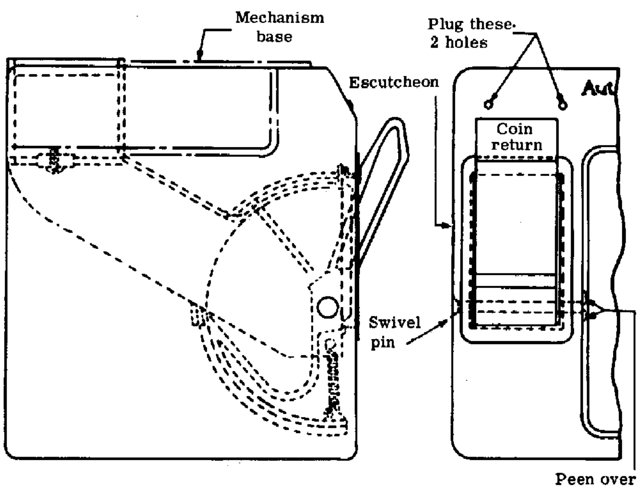


Figure 10.

(12) Insert swivel pin. Lay the housing on the work bench with the left side down so that the head of the swivel pin is flush against the work bench. Peen over legs of swivel pin against side of partition within slot (see Figs. 5 and 10). Legs must be peened completely into slot. If any portion of legs protrudes above slot, installation of cash compartment door may not be possible.

2.03 Reassemble paystation as follows:

(1) Remove mounting screws that attach old coin-return chute to mechanism base.

(2) Place the mechanism base in position on lower housing with mounting holes aligned and install mechanism base mounting screws (see Figs. 3 and 4). Install the screw through the slot last (see Fig. 4); Use adhesive material such as beeswax on tip of screwdriver to hold screw during insertion.

(3) Install coin-return chute mounting screw (see Fig. 4).

(4) With the lower housing upright, place the back plate and relay assembly in position for attachment. Be careful not to disturb relay assembly wire connections.

(5) Install five back plate mounting screws from rear of back plate (see Fig. 2).

(6) Align relay assembly so that coin trigger lever is positioned through both slots in coin hopper (see Fig. 3) and does not touch any side of slots. Trigger will rest against top of slots. Install relay base mounting screws (see Fig. 3) maintaining trigger alignment in slots. Check for free trigger movement after base mounting screws have been installed.

(7) Place back plate and lower housing down on bench so that opening in cash compartment faces up. Install back plate mounting screws shown in Figs. 4 and 5. To install screw shown in Fig. 5, attach screw to screwdriver tip with adhesive material such as beeswax; insert screw through opening (shown above mounting screw in Fig. 5) and into position; tighten screw.

(8) Place the rail assembly in position (see Fig. 1) and install mounting screws. Use an offset screwdriver to install the three screws within the cash compartment; to install screw from top of housing, attach screw to screwdriver as in step (7).

(9) Replace dust cover and dust cover clip; install cash box; install and lock cash compartment cover and upper housing.

SHOP PROCEDURE
INSTALLATION OF A.E.Co. ANTI-STUFFING DEVICE COIN-RETURN CHUTE ON A.E.Co. PAYSTATIONS

1. GENERAL

1.01 This addendum is issued to renumber GSP 997-010-001, Issue 1, to GSP 997-250-800, Issue 1. In ink or red pencil, make the change indicated in Part 2.

2. CHANGES

2.01 Cross out Section number 997-010-001 and write the number 997-250-800 in its place. This change is being made to bring GSP 997-010-001 into conformance with the overall GSP numbering scheme. Refile this practice in division 997.

PROCEDURE
INSTALLATION OF COIN GAGE GUARDS ON COIN TELEPHONES

1. GENERAL

1.01 This Section contains instructions for installing two types of coin gage guards on coin telephones. The function of the coin gage guards is to prevent users from inserting coins in the coin gage before reading the dial instruction card information.

1.02 The coin gage guards differ only by the direction of the arrow on the plastic cover. Coin gage guard S-9794, List 1, has the arrow pointing up and should be used where a dial instruction card is mounted on the top of the telephone. Coin gage guard S-9792, List 2, has the arrow pointing down and should be used when the dial instruction card is mounted below the dial assembly.

1.03 No special tools will be required for this installation. A small punch, a socket wrench of the appropriate size and a chisel will be adequate.

2. PROCEDURE

2.01 The installation of the List 1 or List 2 coin gage guard will be the same, except for the addition of the oversize card holder on the installation of a List 1 coin gage guard. Prior to installing a coin gage guard, the patent plate must be removed and, consequently, the rivets securing the patent plate and the oversize card holder, if used. The rivets are accessed by removing the upper housing.

NOTE: The best time to remove the rivets and, in turn, install the coin gage guard is at the point of disassembly where the coin telephone is disassembled to its fullest extent. At this point of disassembly the shop personnel will not only have freedom of movement with a chisel, if necessary, but will not be concerned with chips becoming lodged in the telephone mechanism located in the upper housing.

2.02 Remove the coin chute, patent plate and rivets by the following procedure:

(1) Remove the three pan head machine screws holding the coin chute to the upper housing (see Figure 1).

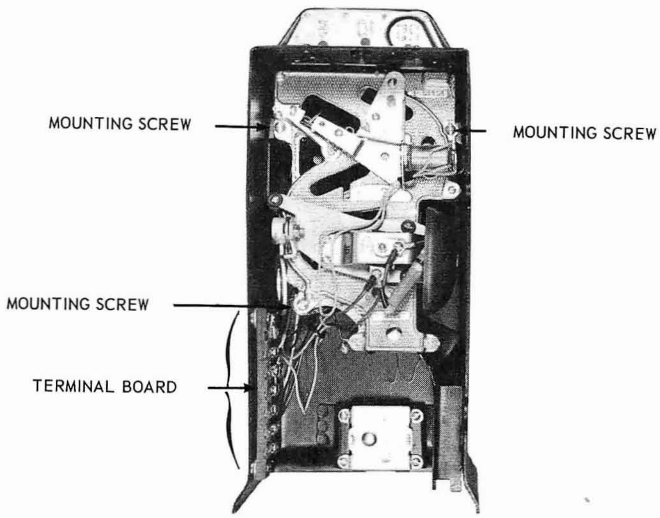


Figure 1. Coin Gage Chute.

(2) Disconnect the wires between the coin chute and the upper housing terminal board (see Figure 1).

NOTE: Record the terminal from which each wire is removed. Do not disconnect dial wires.

(3) Remove the coin chute from the upper housing.

(4) Using a small punch and hammer, attempt to drive out the patent plate rivets from the inside of the housing. Make certain the two front rivets are not those securing the coin gage (see Figure 2).

(5) Step 4 should remove the rivets; however, if a stubborn rivet is encountered chisel the inside peined end off the rivet and then drive out the remainder with a punch (see Figure 3).

3. INSTALLATION

3.01 Figure 4 illustrates the sequence in which the List 1 coin gage guard, oversize card holder and patent plate should be mounted. To mount these three items, proceed as follows:

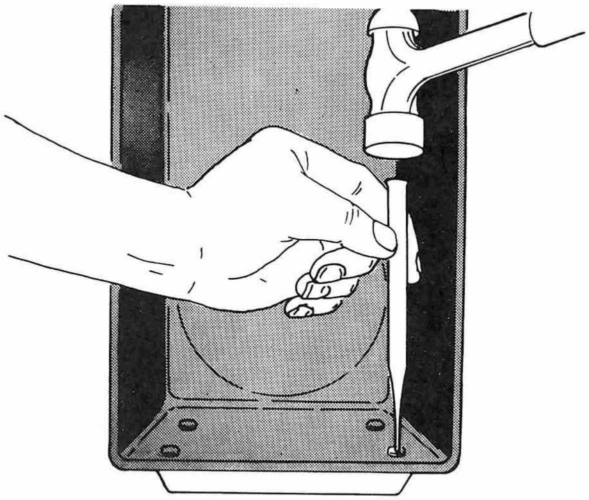


Figure 2. Method of Punching Out Rivets.

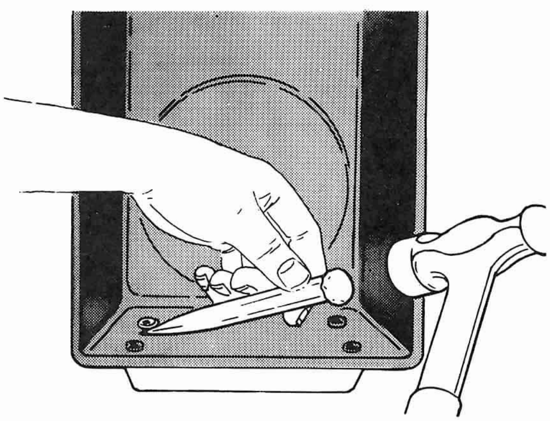


Figure 3. Method of Chiseling Peined End Off Rivet.

(1) Align the List 1 coin gage guard over the holes on the top of the housing behind the coin gage.

(2) Align the oversize card holder and patent plate over the coin gage guard.

(3) Insert and secure four 4-32 x 1/2 inch button head screws with a split washer and nut.

NOTE: Obtain screws and washers locally.

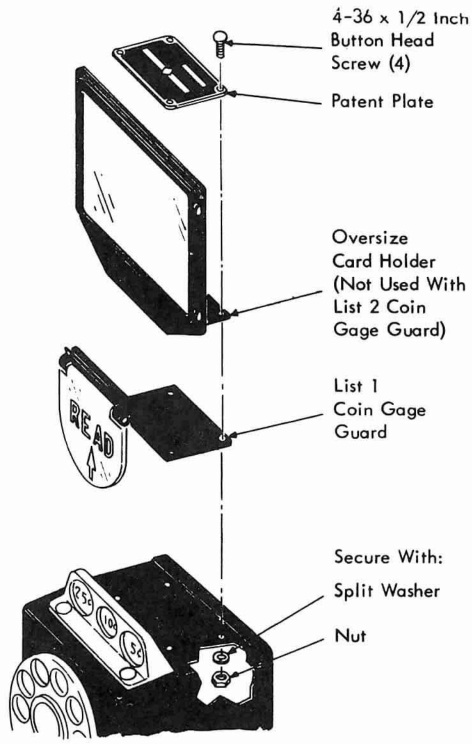


Figure 4. Mounting Sequence for List 1 Coin Gage Guard.

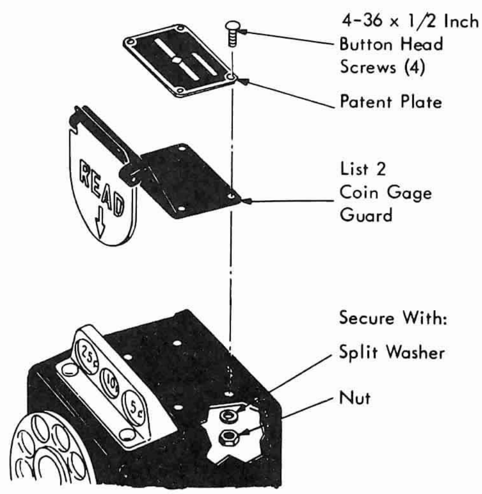


Figure 5. Mounting Sequence for List 2 Coin Gage Guard.

3.02 The installation of a List 2 coin gage guard will be the same as that for the List 1 coin gage guard, except that the List 2 coin gage guard will have the arrow pointing down to the sign below the dial assembly and the oversize card holder will not be used. This installation is illustrated in Figure 5.

N.E. CO. SINGLE-COIL COIN RELAY SHOP PROCEDURE—INSTALLATION

1. GENERAL

1.01 This section describes the installation of the Northern Electric Co. P11E964 relay and hopper assembly in coin telephone sets manufactured by A.E. Co. under the trade name "Autelco Paystation". The assembly includes a P10E786 single-coil coin relay for prepay service which is provisionally accepted as System standard for replacement purposes in situations requiring extended loop operation or increased hopper capacity over that afforded by the present A.E. two-coil relay and hopper. The N.E. Co. unit will be superseded by an A.E. Co. single-coil relay and hopper assembly when available.

1.02 Because the circumstances which merit the substitution of a single-coil relay are usually associated with a station location in transmission zones 5 or LL, the N.E. Co. relay and hopper assembly should be installed only in coin telephone sets of the LPB80 or LPA90 series, which have self-compensating transmission circuit components. Instructions are given for connection in models LPB82-55 and LPA92-55.

1.03 Figure 1 shows a relay and hopper assembly of domestic manufacture. Slight variations in construction may be noted in the Canadian product.

2. INSTALLATION

2.01 Prepare the telephone set for installation as follows:

(1) Unlock the upper housing and remove it.

(2) Unlock the cash compartment door, if still in place, and remove it and the coin receptacle.

(3) Snap off the wire clip which retains the acrylic shield to the standard two-coil relay, and remove the shield. Set aside the shield and clip for return to stock.

(4) Disconnect the spade-ended leads terminated at the coin relay springs, and at the rear of the collect coil spoolhead.

(5) Remove the two screws which attach the coin relay assembly to the mechanism base. Carefully withdraw the coin relay assembly from the mechanism base. Set aside the assembly and the mounting screws for readjustment and reuse in other instruments.

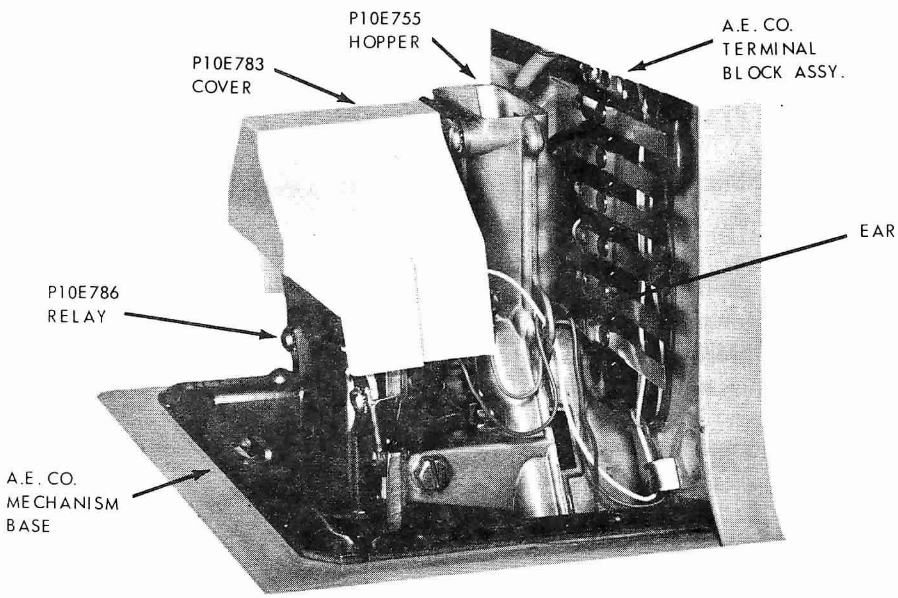


Figure 1. P11E964 Relay and Hopper Assembly, Installed in A.E. Co. Coin Telephone Set.

(6) Using a stub-handled screw driver inserted into the cash compartment, remove the three 8-36 x ¼" round-head screws, accessible through holes in the receptacle mounting rail assembly (see Figure 2), which fasten the coin hopper to the mechanism base. Lift the hopper from the base and replace the screws in the hopper for storage before returning the hopper assembly to stock.

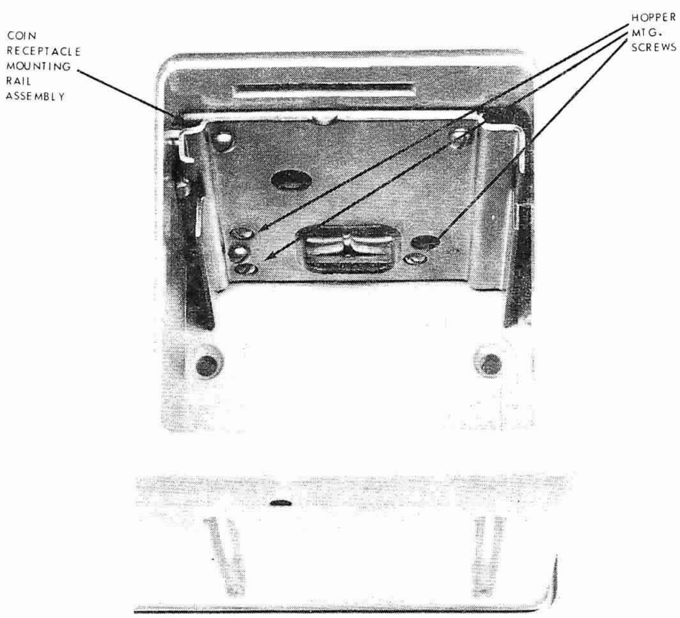


Figure 2. Location of Hopper Mounting Screws.

(7) Using a narrow-bladed cabinet screw driver, remove the lower of two screws which fasten the terminal block assembly to the back plate. Set aside the screws for return to stock and loosen the upper screw a quarter-turn, sufficient to permit the lower edge of the terminal block to be moved to the right approximately a quarter of an inch.

2.02 Install the P11E964 relay and hopper assembly as follows:

(1) Should the relay and hopper assembly have been purchased as part of a complete P10E683 mechanism unit, remove the three 8-32 x ¼" round-head screws which fasten the P10E755 hopper to the mechanism base, and lift the relay and hopper assembly off the base. Retain the screws and return the mechanism base to stock.

(2) If the relay and hopper assembly was purchased by itself, three 8-32 x ¼" round-head screws will be required for mounting. Using a short (less than four-inch) screw holder or retaining-type screw driver inserted into the cash compartment, mount the P10E755 hopper to the mechanism base of the A.E. Co. coin telephone set with these three screws, inserted through clearance holes in the receptacle mounting rail assembly (see Figure 2). Start all three screws before tightening any of them. Since the hopper supports the weight of the coin relay, it must be securely fastened to to the mechanism base.

(3) Remove the P10E783 cover from the top of the coin relay, and thread the three leads which provide the coin relay connections through the oval hole provided for that purpose on an ear cast onto the right side of the hopper.

(4) Push the bottom of the terminal block assembly as far to the left as it will go (it interferes slightly with the coin hopper) and tighten its upper mounting screw securely.

(5) Connect a short length of red wire between terminals 1 and 3 of the coin relay mechanism.

(6) On LPB82-55 and LPA92-55 models, connect the white lead to relay terminal G, the green lead to terminal 2, and the red lead to terminal 3 in addition to the strap placed in (5), above. Dress the leads back toward the hopper in downward loops, away from moving parts of the relay assembly.

(7) If test facilities are available, conduct tests as set forth in the section in the 476-202 series entitled "N.E. Co. Single-Coil Coin Relay—Maintenance".

(8) Snap the styrene cover in place on top of the relay assembly.

(9) Replace the upper housing and lock it.

(10) If 2A coin receptacles are used, insert one into the cash compartment, replace the door, and lock it.

A.E.CO. LOCAL PREPAY COIN TELEPHONE (SERIES 89) SHOP PROCEDURES

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1. GENERAL

1.01 This section describes the overhauling and testing of the A.E.Co. Local Prepay Coin Telephone (Series 89) in the shop. For the description, installation, and field maintenance of the Local Prepay Coin Telephone, refer to the appropriate sections in the 476-200 series of General System Practices.

2. SHOP OVERHAUL

Upper Housing Disassembly

2.01 To separate upper housing from lower housing, unlock the upper housing with the key provided and pull the lower part forward and lift. This disengages the projection on the inside top of the upper housing from the socket on the back plate, freeing the upper housing from the lower housing.

2.02 To remove the upper housing mechanism, lay the upper housing front downward on the bench and proceed as follows (refer to Figure 1):

(1) Unscrew the three coin chute mounting screws.

(2) Remove the leads to the jack strip terminal.

(3) Lift out the upper housing mechanism carefully to avoid damaging the cathedral gong.

(4) Pull the leads through the retaining bracket fixed to the housing. Lay the mechanism flat with sub-assembly uppermost.

2.03 To disassemble the upper housing mechanism, which should be disassembled only when necessary, proceed as follows:

(1) Remove the screw holding the bronze bell and remove bell and brass washer.

(2) Remove the nut and screw holding the cathedral gong and remove gong.

(3) Remove the two mounting screws and nuts of the 2-nickel mechanism.

NOTE: The long screw is situated underneath the restoring magnet.

(4) Remove the three screws and nuts holding the bracket on which the signal transmitter is mounted. Then lift off the bracket complete with the signal transmitter sub-assembly.

NOTE: The long screw is situated just above the cathedral gong mounting.

(5) Remove the four screws holding the signal transmitter assembly to the bracket. Then lift off the sub-assembly.

(6) Remove the nut holding the signal transmitter. Lift out the signal transmitter.

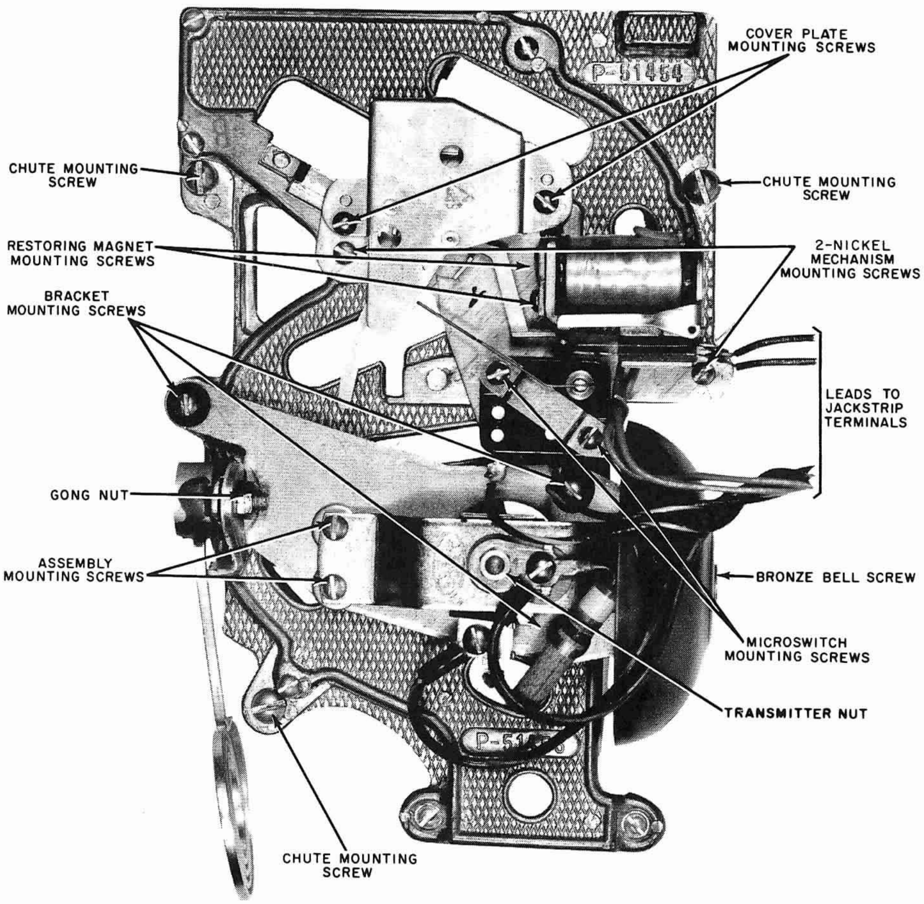


Figure 1. Coin Chute Assembly, Front View.

(7) Remove the remaining eight screws and nuts on the coin chute (see Figure 2); then remove the slug rejector magnet and retaining terminal. The three parts may now be separated.

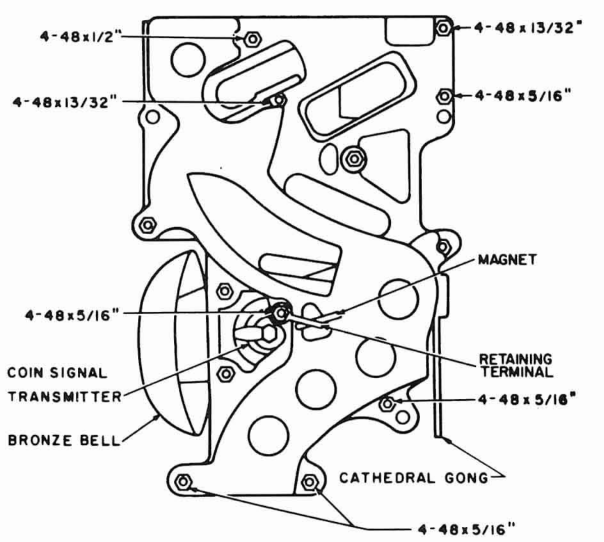


Figure 2. Coin Chute Assembly, Rear View.

(8) Remove the two screws holding the restoring magnet to the bracket and withdraw the restoring magnet.

(9) Remove the two screws running through the microswitch and withdraw the microswitch carefully so as not to damage the operating spring arm.

(10) Remove the two remaining screws holding the cover plate of the pendulum and shock lever, then remove the cover plate. Carefully remove the pendulum and shock lever from their respective pivots.

(11) Draw the pivots from the back of the plate.

2.04 To remove the dial, proceed as follows:

(1) After the coin chute has been removed, disconnect the dial leads from the jackstrip terminal inside the upper housing.

(2) Remove the three dial-mounting screws and carefully pull the dial forward, feeding the leads through the slot in the inner mounting cup.

(3) For disassembly, cleaning, reassembly, lubrication, and adjustment of the dial, refer to the section in the 997-300 series of General System Practices entitled "A.E.Co. Dials – Shop Procedures." For adjustment of the dial speed, which should be between 9.5 and 10.5 pps, refer to this same series of General System Practices.

NOTE: Clean, inspect, and test all parts as required. Replace defective parts as needed.

2.05 If necessary to remove the coin gauge (see Figure 3), knock out its mounting rivets.

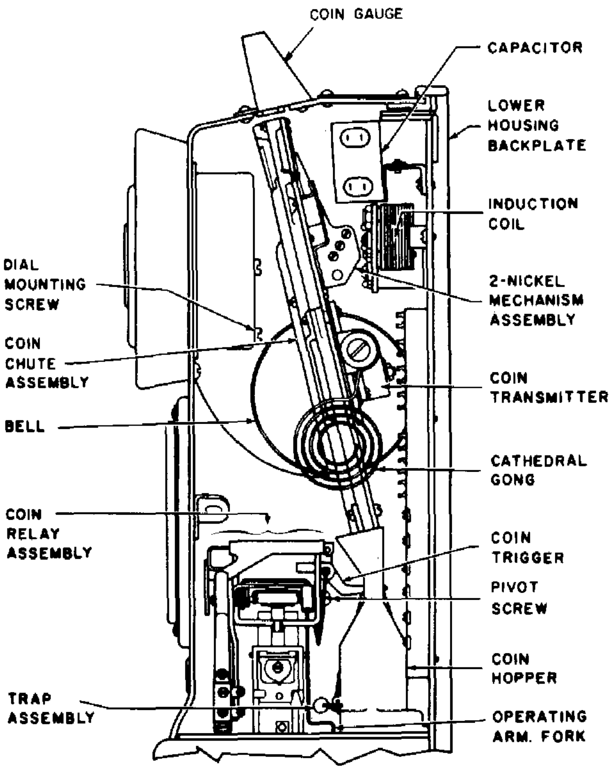


Figure 3. Upper Housing in Position.

Upper Housing Reassembly

2.06 If the coin gauge was removed, install a new one using buttonhead machine screws of the type used to mount the patent plate.

2.07 To replace the dial, proceed as follows:

(1) Feed the dial leads from the front of the coin telephone through the slot in the inner mounting cup and push the dial home.

(2) Install the three mounting screws and tighten.

NOTE: If difficulty is encountered in locating the threaded holes in the dial, rotate the dial slightly back and forth until the mounting screws align with the holes.

(3) Connect the dial leads to the jack-strip terminal as in the applicable wiring diagram (Figures 4 through 7).

2.08 To reassemble the upper housing mechanism, proceed as follows:

(1) Place the three parts of the coin chute together. Insert the slug rejector in the quarter slot with the retaining terminal, and install the screws and nuts (see Figures 1 and 2). Take care to use screws of the correct length.

(2) Install the bell and gong mounting bracket with the three screws and nuts, being careful to use screws of the correct length.

(3) Mount the cathedral gong.

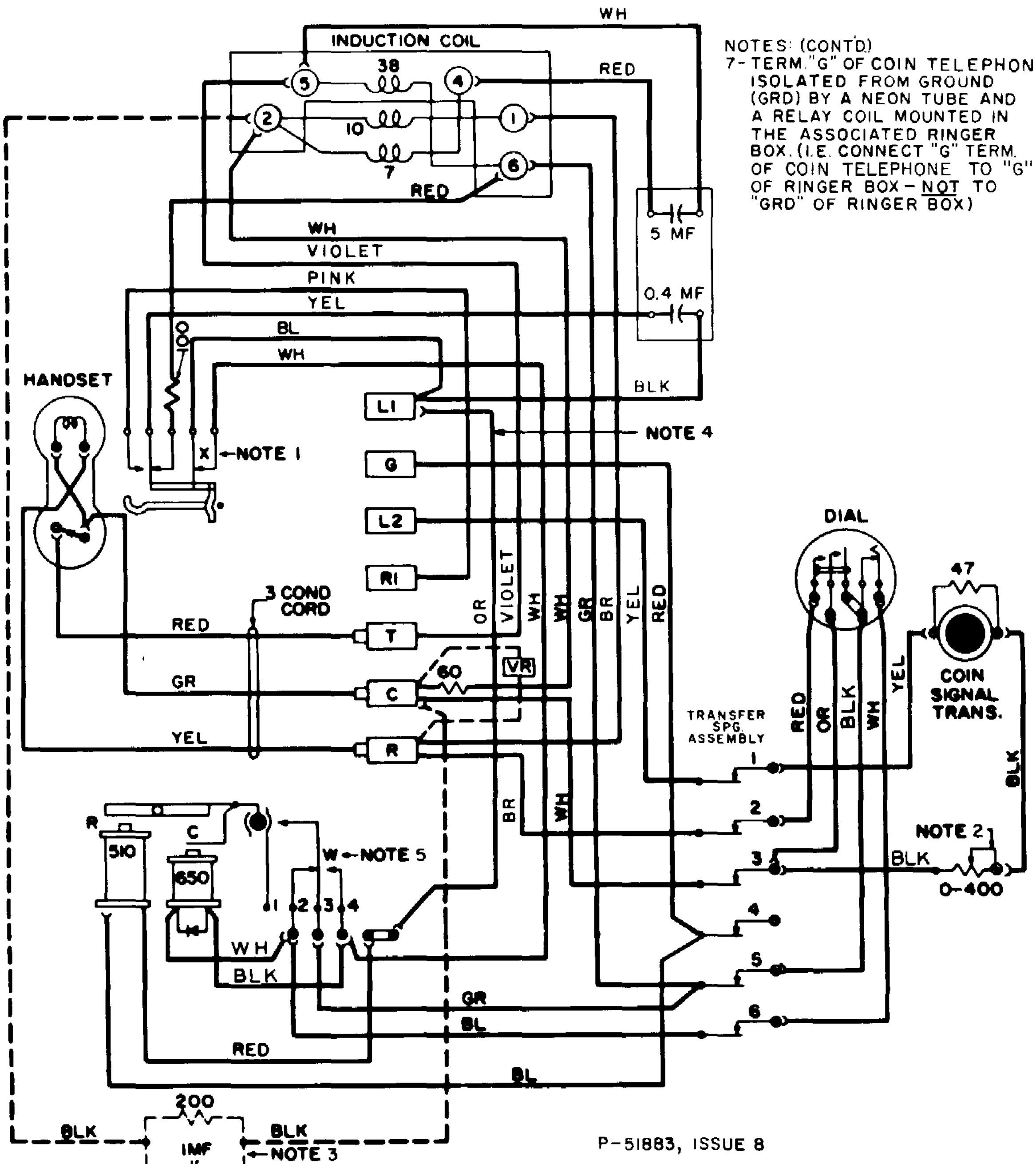
(4) Mount the bronze bell, and insert the flat brass washer between the bell and the bracket with the countersunk part of the washer next to the bell.

(5) Test the coin chute with slugs or actual coins (see Paragraphs 2.09 and 2.10).

(6) Place the restoring magnet on the mounting plate and secure with two screws.

(7) Secure the microswitch to the mounting plate, taking care to clamp the restoring magnet leads with the clamp bracket.

(8) Install the copper pivots for the pendulum and shock lever through the back of the plate.

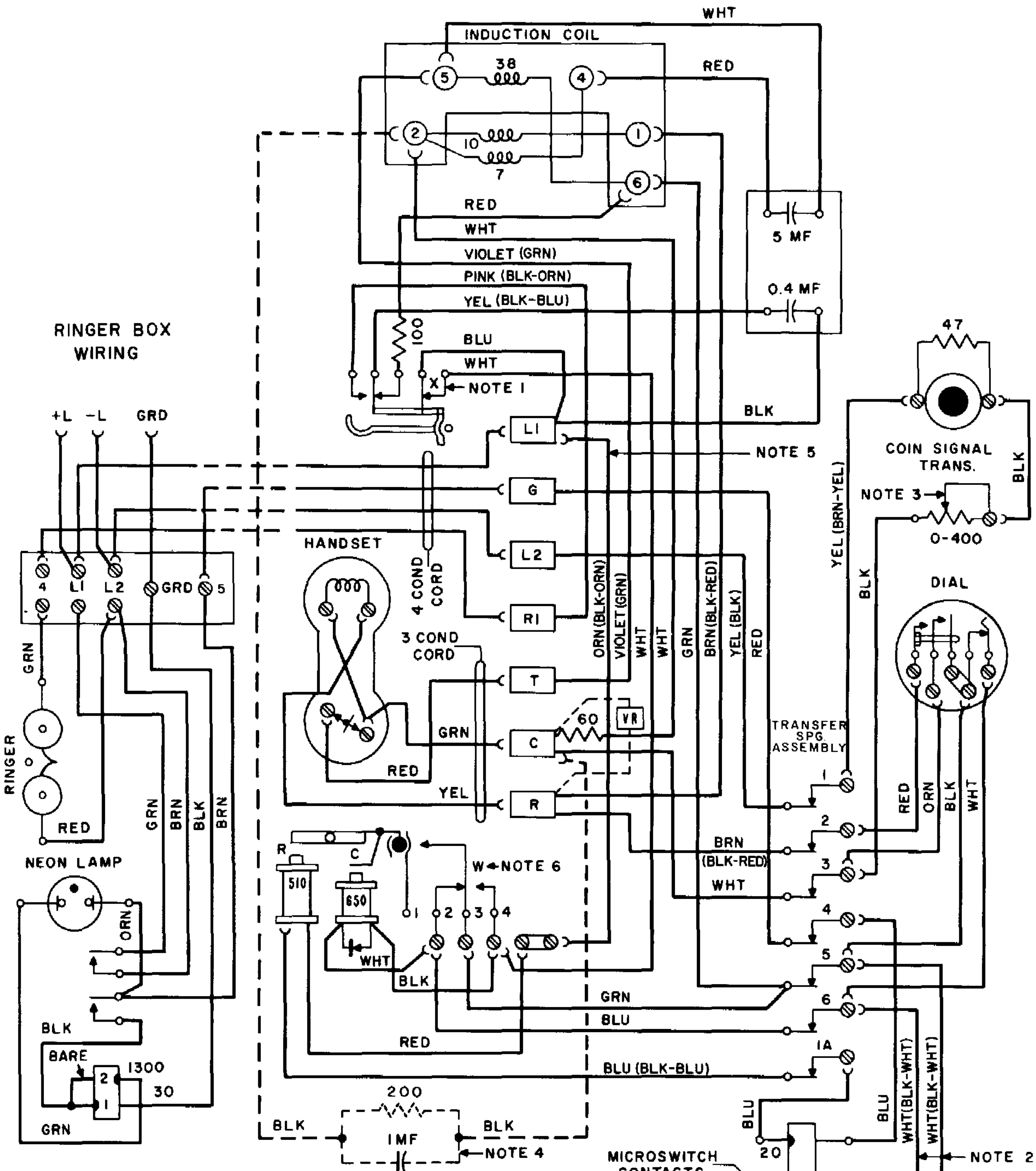


NOTES: (CONT'D.)
7- TERM. "G" OF COIN TELEPHONE IS ISOLATED FROM GROUND (GRD) BY A NEON TUBE AND A RELAY COIL MOUNTED IN THE ASSOCIATED RINGER BOX. (I.E. CONNECT "G" TERM. OF COIN TELEPHONE TO "G" TERM. OF RINGER BOX – NOT TO "GRD" OF RINGER BOX)

NOTES:
1- CONTACT "X" TO BREAK FIRST AND MAKE LAST.
2- LOOP COMPENSATOR TO BE SET AT "2" FOR LESS THAN 200 OHM LOOPS AND AT "0" FOR OVER 200 OHMS.
3- INSTALL SIDETONE BALANCING IMPEDANCE ON UNLOADED CABLE LOOPS OF OVER 200 OHMS PROVIDING ANY ADJACENT OPEN WIRE SECTION IS LESS THAN 200 OHMS.
4- LEAD CONNECTED AS SHOWN IS FOR GRD. CONNECTED GEN. FOR BATTERY CONNECTED GEN. CONNECT THIS LEAD TO "L2" TERMINAL.
5- "W" CONTACTS TO MAKE ONLY WHEN "C" OR "R" OPERATE.
6- POSITIVE LINE (+) SHOULD BE CONNECTED TO TERM. "L1" OF COIN TELEPHONE (VIA "L1" TERM. OF RINGER BOX). (CONT'D.)

Figure 4. Type LPA 89, Wiring Diagram.

COIN TELEPHONE WIRING



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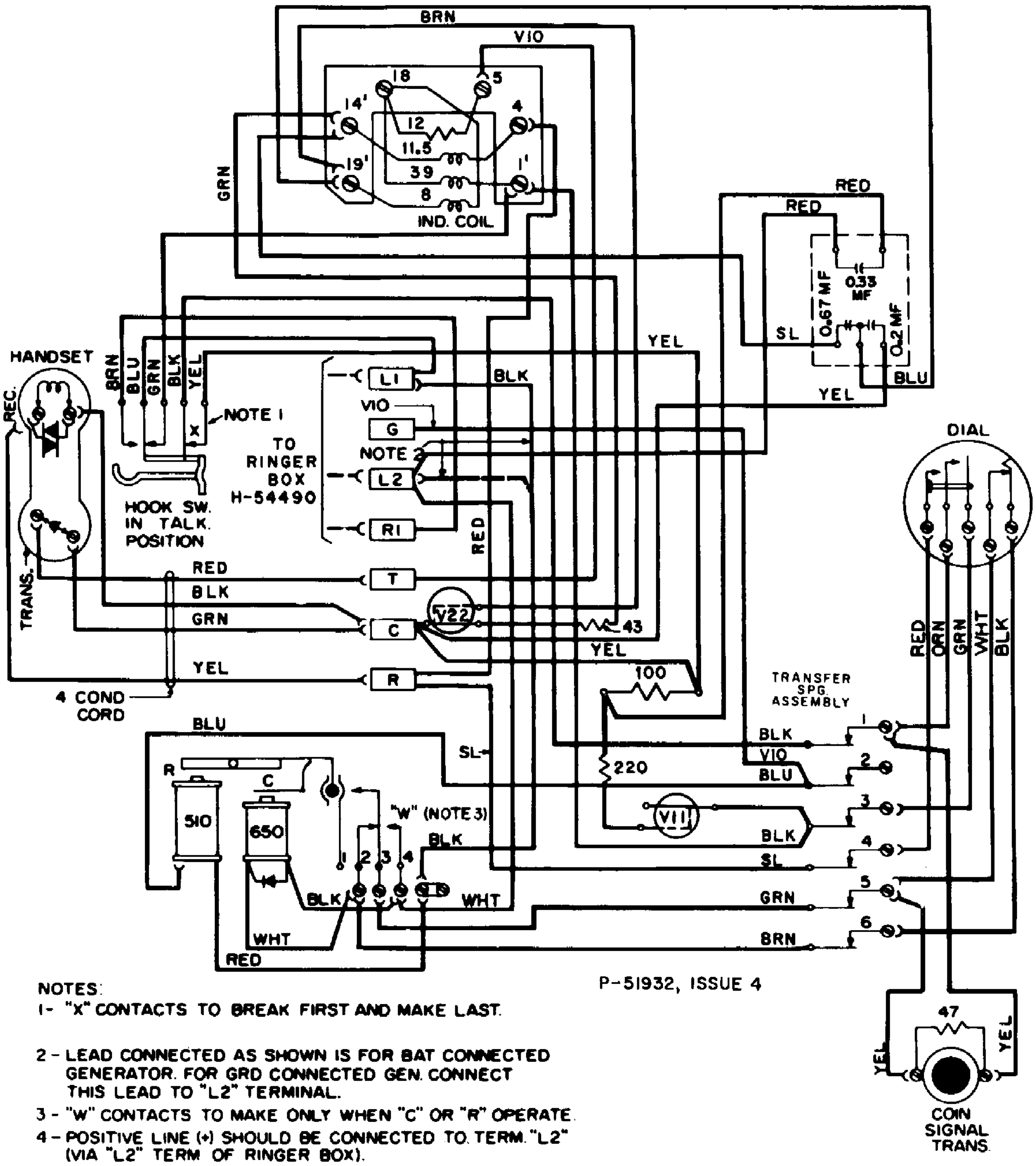
NOTES:

1- CONTACT "X" TO BREAK FIRST AND MAKE LAST.
2- FOR NICKLE SERVICE DISCONNECT LEADS INDICATED.
3- LOOP COMPENSATOR TO BE SET AT "2" FOR LESS THAN 200 OHM LOOPS AND AT "0" FOR OVER 200 OHMS.
4- INSTALL SIDETONE BALANCING IMPEDANCE ON UNLOADED CABLE LOOPS OF OVER 200 OHMS PROVIDING ANY ADJACENT OPEN WIRE SECTION IS LESS THAN 200 OHMS.
5- LEAD CONNECTED AS SHOWN IS FOR GRD. CONNECTED GEN. FOR BATTERY CONNECTED GEN. CONNECT THIS LEAD TO "L2" TERMINAL.
6- "W" CONTACTS TO MAKE ONLY WHEN "C" OR "R" OPERATE.
7- COLOR CODES THAT VARY FROM LPA 89 COIN TELEPHONES AND APPEAR ON OLD TYPE 89 COIN TELEPHONES ARE GIVEN IN PARENS.

Figure 5. Type LPA 89-55, Wiring Diagram.



NOTES:

1- "X" CONTACTS TO BREAK FIRST AND MAKE LAST.

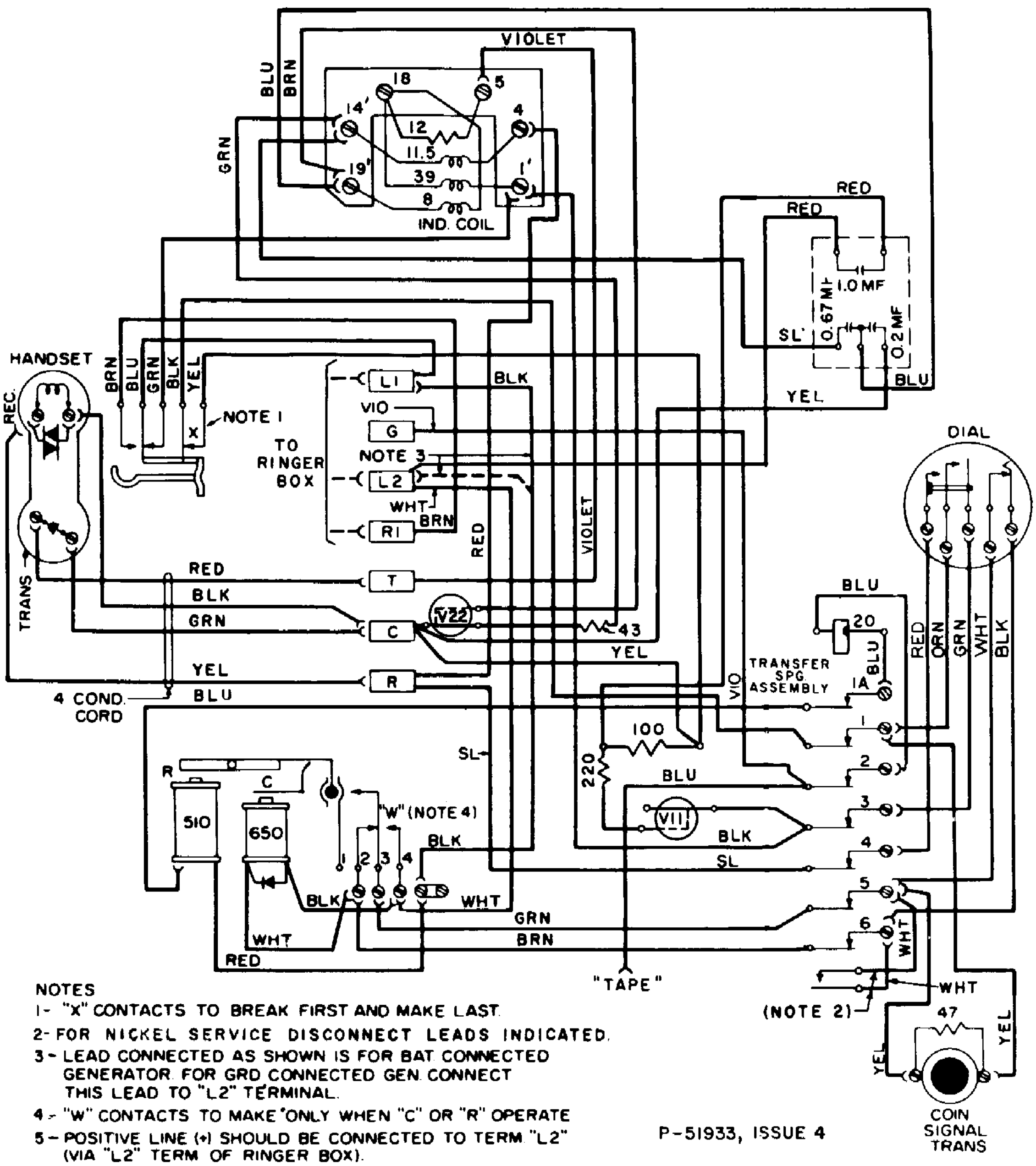
2- LEAD CONNECTED AS SHOWN IS FOR BAT CONNECTED GENERATOR. FOR GRD CONNECTED GEN. CONNECT THIS LEAD TO "L2" TERMINAL.

3- "W" CONTACTS TO MAKE ONLY WHEN "C" OR "R" OPERATE.

4- POSITIVE LINE (+) SHOULD BE CONNECTED TO TERM. "L2" (VIA "L2" TERM OF RINGER BOX).

5- TERM. "G" OF COIN TELEPHONE IS ISOLATED FROM GROUND (GRD) BY A NEON TUBE AND A RELAY COIL MOUNTED IN THE ASSOCIATED RINGER BOX. (I.E. CONNECT "G" TERM. OF COIN TELEPHONE TO "G" TERM. OF RINGER BOX - NOT TO "GRD" OF RINGER BOX). FOR RINGER BOX WIRING SEE DRAWING H-54490 (D-530314-A)

Figure 6. Type LPB 89, Wiring Diagram.



NOTES

1- "X" CONTACTS TO BREAK FIRST AND MAKE LAST.
2- FOR NICKEL SERVICE DISCONNECT LEADS INDICATED.
3- LEAD CONNECTED AS SHOWN IS FOR BAT CONNECTED GENERATOR. FOR GRD CONNECTED GEN. CONNECT THIS LEAD TO "L2" TERMINAL.
4- "W" CONTACTS TO MAKE ONLY WHEN "C" OR "R" OPERATE.
5- POSITIVE LINE (+) SHOULD BE CONNECTED TO TERM "L2" (VIA "L2" TERM OF RINGER BOX).
6- TERM "G" OF COIN TELEPHONE IS ISOLATED FROM GROUND (GRD) BY A NEON TUBE AND A RELAY COIL MOUNTED IN THE ASSOCIATED RINGER BOX (I.E. CONNECT "G" TERM OF COIN TELEPHONE TO "G" TERM OF RINGER BOX - NOT TO "GRD" OF RINGER BOX) FOR RINGER BOX WIRING SEE FIGURE 5.

Figure 7. Type LPB 89-55, Wiring Diagram.

(9) Carefully mount the pendulum and shock lever on their respective pivots.

(10) Place the pendulum and shock lever cover plate on the two pivots. Ensure that the pivots are projecting through the two holes in the cover plate and that the cover plate is fully seated on the mounting plate. Then install the two small screws. The pendulum must not bind on its shaft, and its sides must be parallel to the mounting plate.

NOTE: Apply one drop of spindle oil (Spec. 5231, or equivalent) to the bearing pins of the pendulum and shock lever.

(11) Mount the 2-nickel mechanism on the coin chute with the correct length screws and nuts, being careful not to damage the microswitch operating arm. Tighten the screws and nuts.

(12) Test the coin gauge with slugs or actual coins (see Paragraph 2.09 and 2.10).

(13) Mount the coin chute and tighten the three mounting screws.

(14) Connect leads as shown in the appropriate wiring diagram (Figures 4 through 7).

NOTE: Whenever screws or nuts are tightened, make sure they are tightened securely.

Upper Housing Tests and Adjustments

2.09 Non-magnetic quarter-size test coins are recommended for tests on coin telephones having a magnetic slug rejector. Dimensions of the test slugs for the coin gauge and coin chute are listed in Tables 1 and 2. If it is necessary to replace the coin gauge, follow the instructions in Paragraphs 2.05 and 2.06.

NOTE: The coin gauge must accept the minimum and standard size slugs and reject the maximum size slugs listed in Table 1. The coin chute must reject the sub-minimum size slugs listed in Table 2.

Table 1. Maximum, Minimum, and Standard Size Slugs for Coin Chute.

	Quarter		
	Max.	Min.	Std.
Diameter	0.977″	0.938″	0.961″
Thickness	0.090″	0.052″	0.083″

	Dime		
	Max.	Min.	Std.
Diameter	0.721″	0.685″	0.710″
Thickness	0.070″	0.043″	0.058″

	Nickel		
	Max.	Min.	Std.
Diameter	0.857″	0.805″	0.846″
Thickness	0.090″	0.050″	0.083″

Table 2. Sub-Minimum Size Slugs for Rejection by Coin Chute.

	Quarter	Dime	Nickel
Diameter	0.903″	0.653″	0.767″
Thickness	0.083″	0.052″	0.083″

2.10 A dime or nickel deposited into any opening other than its own must drop into the coin return chute. A penny deposited in either the nickel or quarter opening must also drop into the coin return chute.

2.11 To check the 2-nickel mechanism, remove the cover of the pendulum and shock lever and make the following checks:

(a) Check the pendulum and shock lever for freedom of movement.

(b) Check that the sides of the shock lever are parallel with the mounting plate.

(c) Place the microswitch operating arm in the latched position, then manually move the shock lever into the locking position. Measuring vertically, there should be a minimum clearance of .003 inch between the shock lever dog and the pendulum. (See Figure 8.)

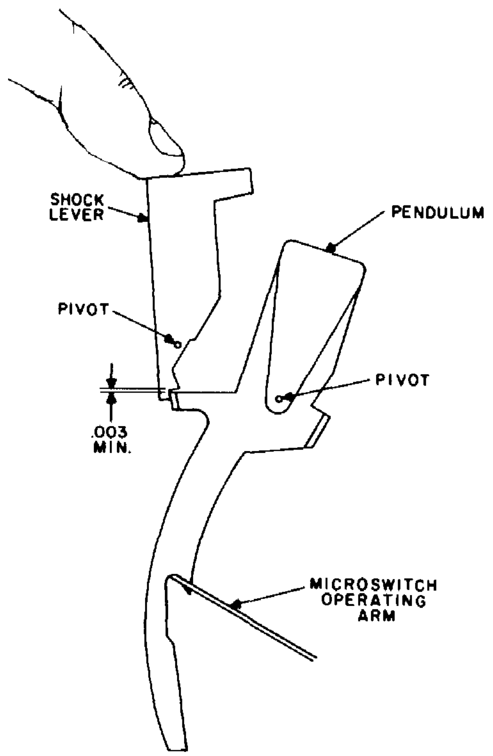


Figure 8. Pendulum and Shock Lever with Cover Removed.

(d) Reinstall the cover of the pendulum and shock lever. Make sure the pivots come through the small holes in the cover, then tighten the mounting screws securely. Place the chute in the vertical position and the microswitch operating arm in the unlatched position. Through the lower bearing hole, check that there is a minimum clearance of .005 inch between the pendulum and the shock lever dog. (See Figure 9.)

(e) With the operating arm engaged in the pendulum notch and the upper housing tilted counterclockwise approximately 30 degrees, the shock lever must turn counterclockwise freely to the locking position. This can be observed through the lower bearing hole. (See Figure 9.)

(f) Check the microswitch operating arm as follows:

(1) The operating arm must clear the case and mounting screws of the microswitch, the pendulum and shock lever cover, and the 2-nickel mechanism mounting plate by at least 1/32 inch. Gauge by eye.

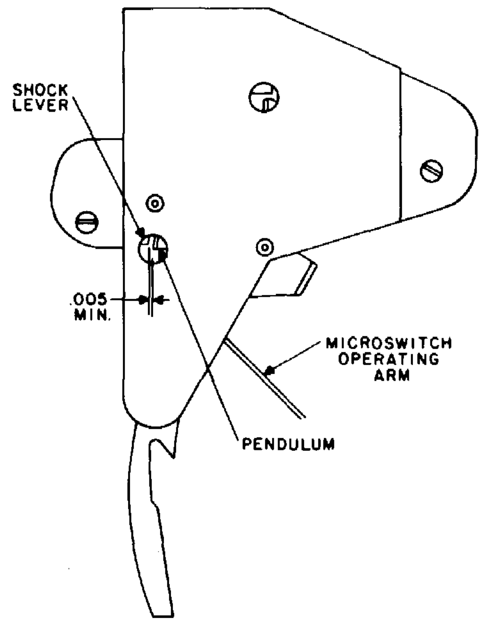


Figure 9. Pendulum and Shock Lever with Cover Installed.

(2) The operating arm must clear the three sides of the slot in the coin chute by at least .010 inch.

(3) The operating arm must extend into the slot in the coin chute at least 1/64 inch beyond the full width of the nickel slot. Gauge by eye.

(4) The operating arm must operate freely and without binds over the entire length of its travel, resting against the coin chute or mounting plate in the normal position and touching the bottom of the slot in the coin chute when operated fully.

(5) The microswitch must have sufficient restoring torque to return the operating arm to its uppermost position.

(6) The operating arm when latched in the pendulum, must ride in the radius of the notch.

(7) When the operating arm is moved downward from its normal (at rest) position, the microswitch contacts must operate before the operating arm has

reached the notch in the pendulum. The operation of the contacts is accompanied by an audible click.

(8) When the operating arm is returned to normal by hand, the microswitch must not restore (open) until the arm has travelled 3/16 inch above the pendulum notch; but it must restore before the operating arm reaches a point 1/16 inch below its uppermost position.

(9) When the operating arm is in its normal position, it must operate and latch when a nickel is released in the coin chute from 1/4 inch above the arm. [This test can be performed by holding a stiff wire (such as a paper clip) across the nickel chute just above the operating arm, dropping a nickel into the chute, stopping its fall with the stiff wire, then withdrawing the wire to let the nickel drop from 1/4 inch above the operating arm.] Perform the test again but with the nickel released from the top of the chute.

(10) When the operating arm is in its latched position, it must unlatch and return to the normal position when a nickel is released in the coin chute 1/4 inch above the arm. (This test can be performed in a manner similar to that noted in the preceding step.) It must also unlatch and return to normal when the nickel is released from the top of the chute.

2.12 To check the restoring magnet relay, proceed as follows:

(1) Set the stroke at .010 inch minimum. This may be done before the magnet is mounted in the coin telephone.

NOTE: The following steps are to be performed with the restoring magnet assembly mounted in the coin telephone or in a position similar to that of the coin telephone mounting.

(2) Check that with the microswitch operating arm in the latched position and the magnet armature against the heelpiece there is perceptible clearance between the tip of the armature and the tip of the pendulum.

(3) Check that the tip of the armature is parallel with the mounting plate.

(4) Check that the tip of the armature strikes approximately in the center of the formed wing of the pendulum.

(5) Check that with the microswitch operating arm in the latched position the top of the armature extends beyond the formed wing of the pendulum by at least 1/32 inch.

Hookswitch Removal and Replacement

2.13 To remove the hookswitch, proceed as follows:

(1) Loosen the lock screw holding the hookswitch rod.

(2) Withdraw the rod to the right.

NOTE: It may be necessary to loosen the induction coil mounting screw to provide clearance for the removal.

2.14 To replace the hookswitch, reverse the removal procedure.

Back Plate Tests and Adjustments.

2.15 To check the transfer spring assembly, test insulation between all adjacent metal parts. Insulation must withstand 500-volts ac between 16 and 60 Hz for 1/4 second.

NOTE: Under no circumstances should insulation tests be made from terminal to terminal.

2.16 To check the hookswitch, test force of contact points with the receiver off-hook and the tip of the tension gauge 1/16 inch above contacts (see Figure 10). Force must not be less than 2-1/2 ounces (78 grams). Check the clearance between contacts when open; it must not be less than 1/64 (.015) inch. Check the degree of operating spring movement; it must not be less than 5/64 (.078) inch. The hookswitch must go to a full stop when the handset is taken off-hook.

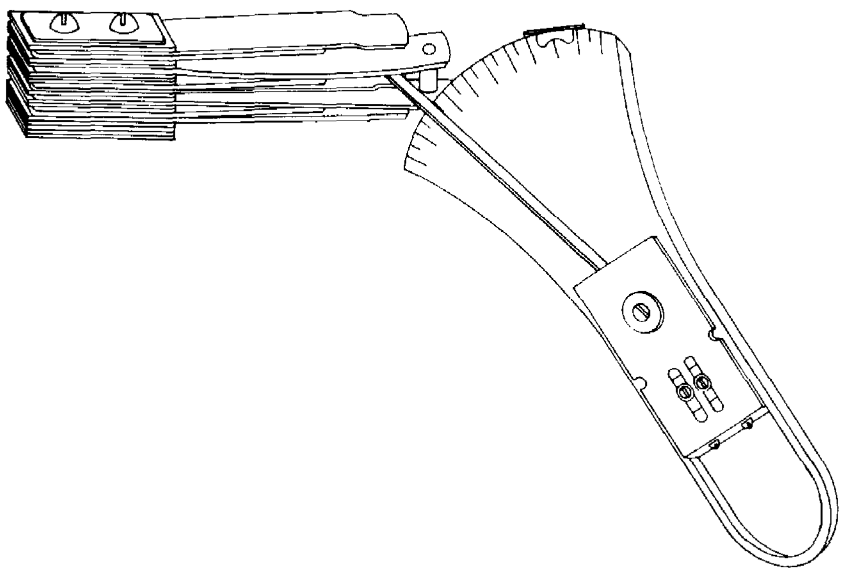


Figure 10. Testing Restoring Force of Hookswitch Contact Points.

NOTE: It may be necessary to remove the induction coil to facilitate testing.

2.17 To ensure correct operation with or without armored cord, evenly tension the hookswitch lever and make springs to provide 250 grams (approximately 8 ounces) of tension as measured at the extreme end of the hookswitch arm. The hookswitch must go to a full stop when the handset is placed on-hook.

2.18 When adjustment is needed, the heavy gauge buffer springs are adjusted to provide the required gauging for the contact springs, and the two lever springs are adjusted to provide the specified force in grams.

Lower Housing Disassembly

2.19 To remove the coin control mechanism, proceed as follows:

(1) Loosen the two terminal screws at the spring contacts and one screw at rear of the coil.

(2) Disconnect the three leads.

(3) Remove the two roundhead screws holding the heel plate of the coin relay.

(4) Trip the coin trigger by hand.

(5) Carefully remove the coin relay. Make sure the operating-arm fork disengages from the deflecting-vane projection. Exercise care so as not to bend the coin trigger slots of the coin hopper.

2.20 To remove the coin hopper, proceed as follows:

(1) Remove three small screws from the inside top of the cash compartment.

(2) Lift out the coin hopper.

(3) Clean thoroughly with a soft brush and ensure that the coin hopper mechanism works freely.

2.21 To disassemble the coin trap (Figure 11), proceed as follows:

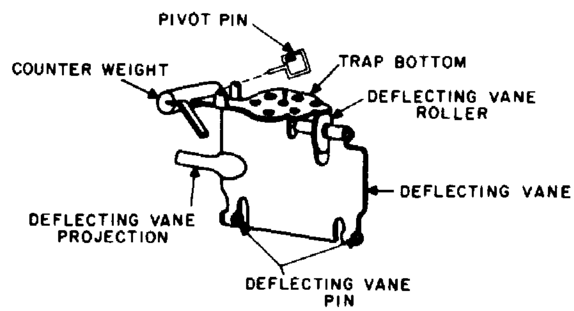


Figure 11. Coin Hopper.

(1) Unhook the upper tip of the key-shaped coin trap pivot pin from the opening of the coin hopper.

(2) Hold the counterweight in the horizontal position.

(3) Withdraw the pivot pin from the counterweight bearing.

(4) Tilt the counterweight at a 45-degree angle and withdraw it through the slot of the coin hopper.

2.22 To disassemble the coin control mechanism (if necessary), refer to Figure 12 and proceed as follows:

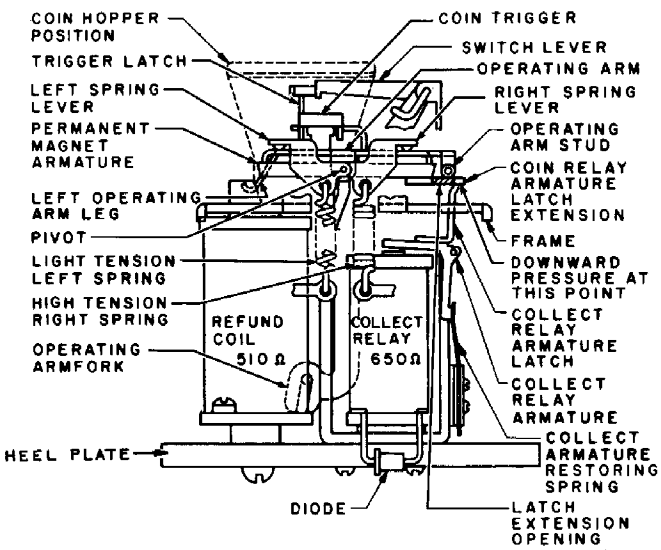


Figure 12. Coin Control Mechanism.

(1) Remove the switch lever pin.

(2) Lift off the switch lever. Take care not to bend the ground switch springs.

(3) Remove the coin trigger pin.

(4) Remove the coin trigger spring.

(5) Lift off the coin trigger.

(6) Unlatch the restoring springs from the tension arm and restoring lever.

(7) Loosen the 5/16-inch nut on the front armature pivot screw.

(8) Remove both armature pivot screws.

(9) Remove both armature restoring arms and remove the armature from beneath the operating arm.

(10) Lift off the operating arm, taking care not to bend the deflecting-vane projection.

(11) To remove coils, first remove the outer screws on the bottom of the mounting plate. Disconnect the wires at the coil terminals. Then pull the lower part of the coil out and remove from the frame.

<u>Lower Housing Reassembly</u>

2.23 To reassemble and adjust the coin trap, proceed as follows:

(1) Tilt the counterweight at a 45-degree angle and insert the coin trap through the slot of the coin hopper.

(2) Hold the counterweight in the horizontal position and insert the pivot pin through the counterweight bearing.

(3) Lock the pivot pin in the hopper frame.

(4) Horizontal play of the coin trap in any direction shall be from a minimum of barely perceptible to a maximum of .010 inch as gauged by eye and feel.

(5) Adjust the counterweight backstop to position the coin trap horizontally.

NOTE: If there is any binding of the coin trap, replace the trap or hopper as necessary.

(6) Operate the coin vane manually in both directions and check for clearance between the vane and the hopper. The clearance should be between 1/64 inch and 1/16 inch as gauged by eye and feel.

2.24 To replace the coin hopper, position it inside the housing and insert the three small screws inside the top of the cash compartment.

2.25 To reassemble the coin control mechanism, reverse the procedures of Paragraph 2.22.

2.26 To replace the coin control mechanism in the housing, reverse the procedures of Paragraph 2.19.

Lower Housing Tests and Adjustments

2.27 To adjust the coin trap, proceed as follows:

(1) Check for binding at the engagement of the coin vane projection and the operating lever yoke. The vane projection should not touch the top of the forked slot of the yoke when fully operated from the collect position to the refund position as gauged by eye and feel.

(2) The coin vane should be approximately perpendicular and centered to the center hole of the coin trap when held by the operating arm, with the coin relay not operated and the play of the coin trap taken up in every direction. Gauge by eye through the center hole of the coin trap.

NOTE: Adjustment can usually be made by shifting the coin relay. If unable to align in accordance with the above instructions, replace the lower housing.

(3) Check the coin trap counterweight by depositing one dime. Depress the coin relay armature to the right (collect) end of its maximum travel. This should cause the coin to be collected and deposited into the cash box. The counterweight should restore the trap bottom.

(4) Repeat step (3), but this time depress the coin relay armature to the left (refund). This should cause the coin to be deposited in the refund chute.

2.28 Check the coin control mechanism for proper mechanical adjustment as follows:

(1) The armature should be approximately centered within the relay frame, as gauged visually.

(2) The gaps between the armature and the armature stops on the operating arms should be between .007 and .020 inch as measured individually with all the play taken up from the opposite gap. The armature stop surface should be parallel to the armature surface.

(3) With the tension of the restoring springs removed and the collect coil armature held down, the armature should move freely in both the collect and the refund directions. Gauge the pivot play by eye and feel by applying a horizontal force at the end of the armature and parallel to the axis of the pivot screws so as to cause a rotational movement of the armature. Pivot play should be between .002 and .005 inch. Play may be adjusted, if necessary, by turning the front pivot screw.

(4) The coin relay armature shall be adjusted so that there is an .008-inch to .010-inch clearance between the armature and the refund coil pole piece.

(5) The restoring levers should not touch the sides of the frame but should rest against the shoulders of the pivot screws when all play between the associated parts has been taken up in the adverse direction.

(6) With the restoring springs removed, the restoring levers should return by their own weight when they are released from a point 1/4 inch above their normal position.

(7) The sideplay of the restoring levers should be between .005 and .020 inch, as gauged visually.

(8) There should be a .020-inch clearance between the operating-arm stop lugs and armature when all play between the associated parts has been taken up in the adverse direction, as gauged visually.

NOTE: If necessary, the operating arm may be bent out to meet the requirement, using duckbill or long-nose pliers.

(9) The operating-arm extension should not touch the front of the hopper or the backs of the relays. It should have at least 1/16 inch clearance at all points in its travel as gauged visually and by feel. This should be checked with all the horizontal play of the operating arm taken up in the same direction as the clearance being checked.

(10) The mechanism shall be adjusted so that, with the armature in the

normal position, the space between the frame and the lugs (which limit the armature travel) is between .129 inch and .135 inch.

NOTE: To meet this requirement, bend the stop lugs up or down, as necessary, using duckbill or long-nose pliers or a spring bender (see Figure 13).

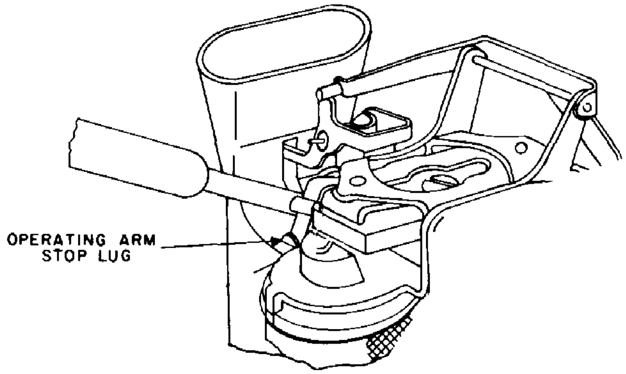


Figure 13. Adjust Operating-Arm Stop Lugs.

(11) The nylon roller on the operating-arm stud should not bind.

(12) The prong of the operating-arm fork should be at a slight angle to the right of the plane that passes through the core centers.

(13) The vertical center line of the operating-arm fork slot should pass through the area of the head of the pivot screw as near as possible to the vertical center line of the head of the pivot screw.

(14) The operating-arm fork, when in normal position, shall bring the vane into a perpendicular position so that the thickness of the vane may be seen through the center hole of the trap bottom as viewed through the mouth of the hopper.

(15) The operating-arm extension shall be adjusted so that there is clearance between it and the spool head of the collect magnet when the armature is operated fully to the refund position.

(16) The side play of the switch lever should be from barely perceptible to a maximum of .010 inch, as gauged by eye and feel.

(17) The switch lever roller should not bind.

(18) The arm of the switch lever shall rest on the coin trigger approximately on the vertical center line of the pivot for the trigger.

(19) When the coin trigger is depressed until a .030-inch feeler gauge can be placed between the point of the trigger and the inside rear wall of the coin hopper (see Figure 14), the

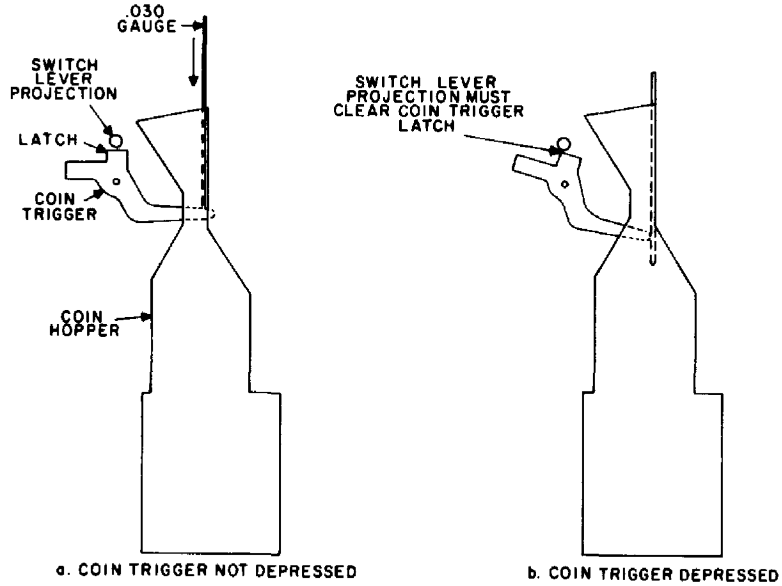


Figure 14. Checking for Clearance Between Switch Lever Projection and Coin Trigger Latch.

switch lever projection must be clear of the coin trigger latch. When the switch lever is tripped, the switch spring contacts shall remain closed until the armature is operated in either direction.

(20) The switch lever should fall freely of its own weight when the force (pressure) of the switch lever restoring spring and the half-round spring are relieved and the trigger is tripped.

(21) Check that the switch lever roller rises an equal distance above the coin trigger whether the armature is in the collect position or the refund position. If it is necessary to adjust the switch lever roller, raise or lower the roller by bending the horizontal portion of the operating-arm stud.

(22) The coin trigger must be free of bind on its bearing pins. The coin trigger shall be adjusted so that the side play between the trigger and its supporting bracket shall not exceed .005 inch. The restoring arm, which extends from the operating arm, shall be adjusted so that the switch lever may be safely restored to its normal position with the full stroke of the armature, and to permit the coin trigger to latch the lever.

(23) With the coin trigger in the tripped position there should be clearance between the trigger and the relay frame, as gauged by eye. The trigger should trip with a maximum of 5 grams of pressure applied midway between the hopper and the coin relay assembly.

(24) With the coin trigger in the switched position, gradually lifting the switch lever from the trigger cam should cause the trigger to restore.

(25) After assembly, the extension of the coin trigger shall be located approximately on the vertical center line of the coin hopper slot and shall not touch either of the sides or the top of the slot in its travel up and down with all the side play taken up in each direction, as gauged by eye.

(26) The switch lever shall be adjusted so that the coin trigger, after being tripped, will safely restore when either of the operating-arm lugs (which limit the armature movement) is given its full travel; but shall not restore when either of the operating lugs is moved downward slowly by hand to within .03 inch of its full downward travel. For the refund position, this is done by applying pressure inside the rounding at the end of the operating-arm lug. For the collect position, the collect magnet armature is operated by hand and the armature retarded at the latch.

(27) With the operating arm at approximately the centered position of its side play, check for approximate centering of the switch springs on the operating-arm stud. With all the play between the associated parts taken up in the adverse direction, neither the portion of the operating arm adjacent to the stud nor the head of the stud should touch the contact springs or the switch lever at any point of its travel. Gauge by eye and feel. If adjustment is necessary, realign the spring pile-up.

(28) Check and, if necessary, correct the vertical position of the switch assembly so that the half-round of the curved contact spring centers the operating-arm stud. Retighten the positioning screws.

(29) The coin switch springs shall normally be open not less than .01 inch at contact points (see Figure 15a). The minimum size dime dropped through the coin chute into the coin hopper shall trip the coin trigger and cause the dial shunt springs to open not less than .01 inch at the contact points for each of the first ten times dropped (see Figure 15b). The collect magnet shorting springs shall not make contact only when the coin trigger is tripped. These springs shall make contact only when the mechanism is in the collect or refund position (see Figures 15c and 15d). The contact springs shall have a minimum follow of .01 inch. The switch lever may be bent to aid in meeting the above requirements.

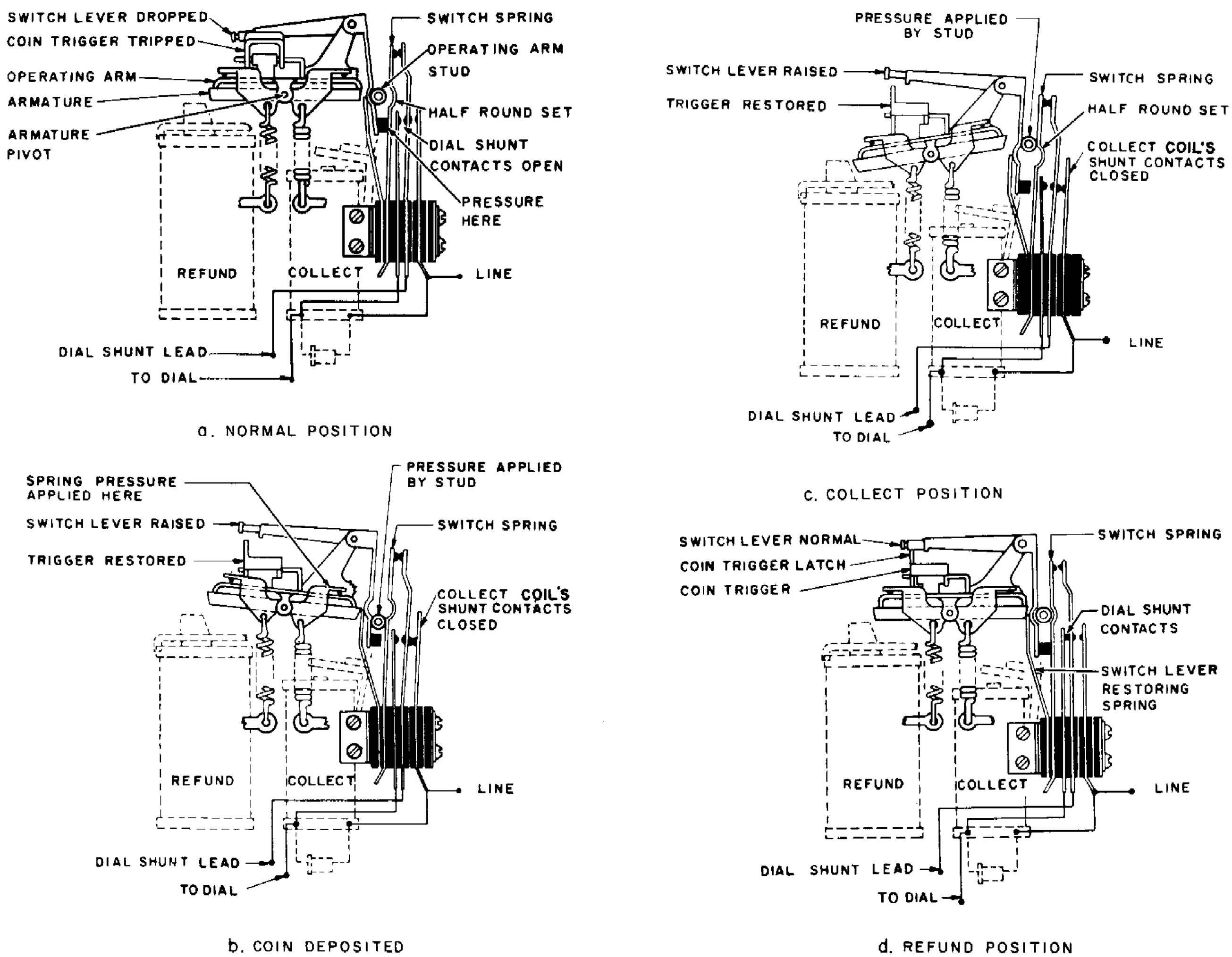


Figure 15. Checking Coin Relay Switch Contacts.

(30) The clearance between the latching arm extension on the collect coil armature and the inside of the latch arm extension on the mechanism armature shall be a minimum of .018 inch and a maximum of .022 inch when the mechanism is operated to the collect position by hand and retarded from its travel. The stroke of the collect magnet armature shall be approximately .04 inch. The latching arm extension should rest flat on the top of the latch.

(31) There shall be 70 to 75 grams of tension on the left restoring spring lever. The tension is measured just as the lever breaks away from the operating-arm. There shall be 175 grams of tension on the right restoring spring lever, also measured just as the lever breaks away from the operating arm. When measured at the operating-arm stud, there shall be a minimum of 75 grams just as the right stop lug of the operating arm breaks away from the frame (with the armature in the collect position).

(32) With the trigger tripped, connect an ohmmeter between the spring terminals to determine if there is electrical continuity between the half-round spring and the offset spring while the armature is moved from its rest position to its fully operated position in each direction (collect and refund). It is immaterial at what point on the return stroke the contacts open.

NOTE: If contacts touch but test "open," burnish the contacts.

2.29 Before testing the coin mechanism assembly electrically, set the line-compensating rheostat (on LPA 89 series) to the zero (0) position. The coin telephone should be connected to a ringer box, No. L-1510-BSL on LPA series and No. L-1510-CSL on LPB series. See Figures 16 and 17. Jumper the upper and lower housings with coin telephone test cord P-60605 (Figure 18).

2.30 To check the coin mechanism relay electrically, ascertain that its performance meets the following specifications: The collect magnet shall operate on 15 volts across terminals L1 and L2 (positive to L2 on LPA 89 series, positive to L1 on LPB 89 series). The refund magnet shall operate with between 85 and 120 volts across terminals L1 and G on LPA 89 series and L2 and G on LPB 89 series, both tests with a pileup of 11 nickels or 1 dime. The collect magnet shall not operate under any condition with 13 volts across terminals L1 and L2 (positive to L2 on LPA 89 series and positive to L1 on LPB 89 series). The refund magnet shall not operate under any condition with a minimum of 70 volts. If the relays operate on these lower limits, make certain the thickness of the vane may be seen through the center hole of the trap bottom.

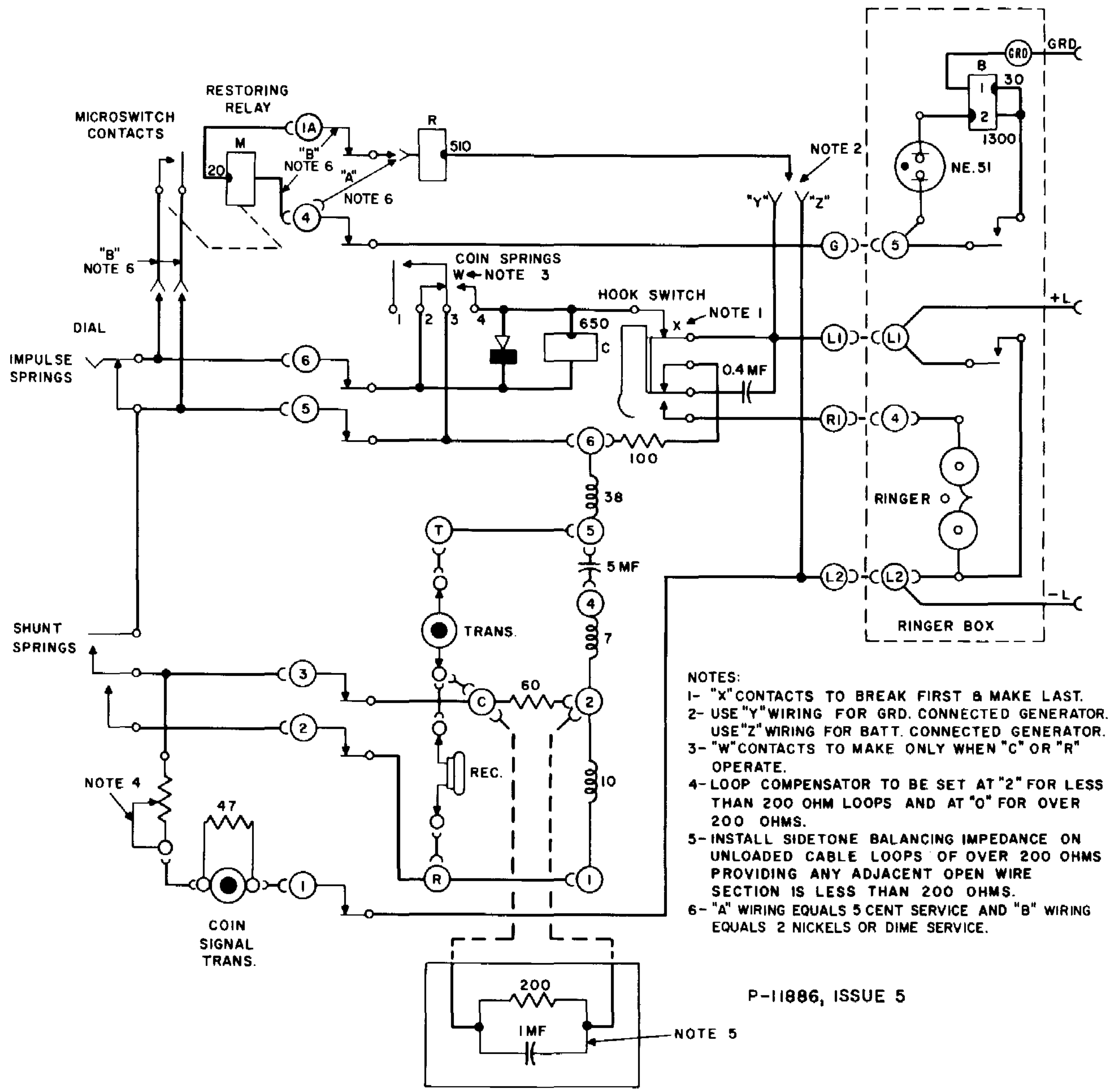
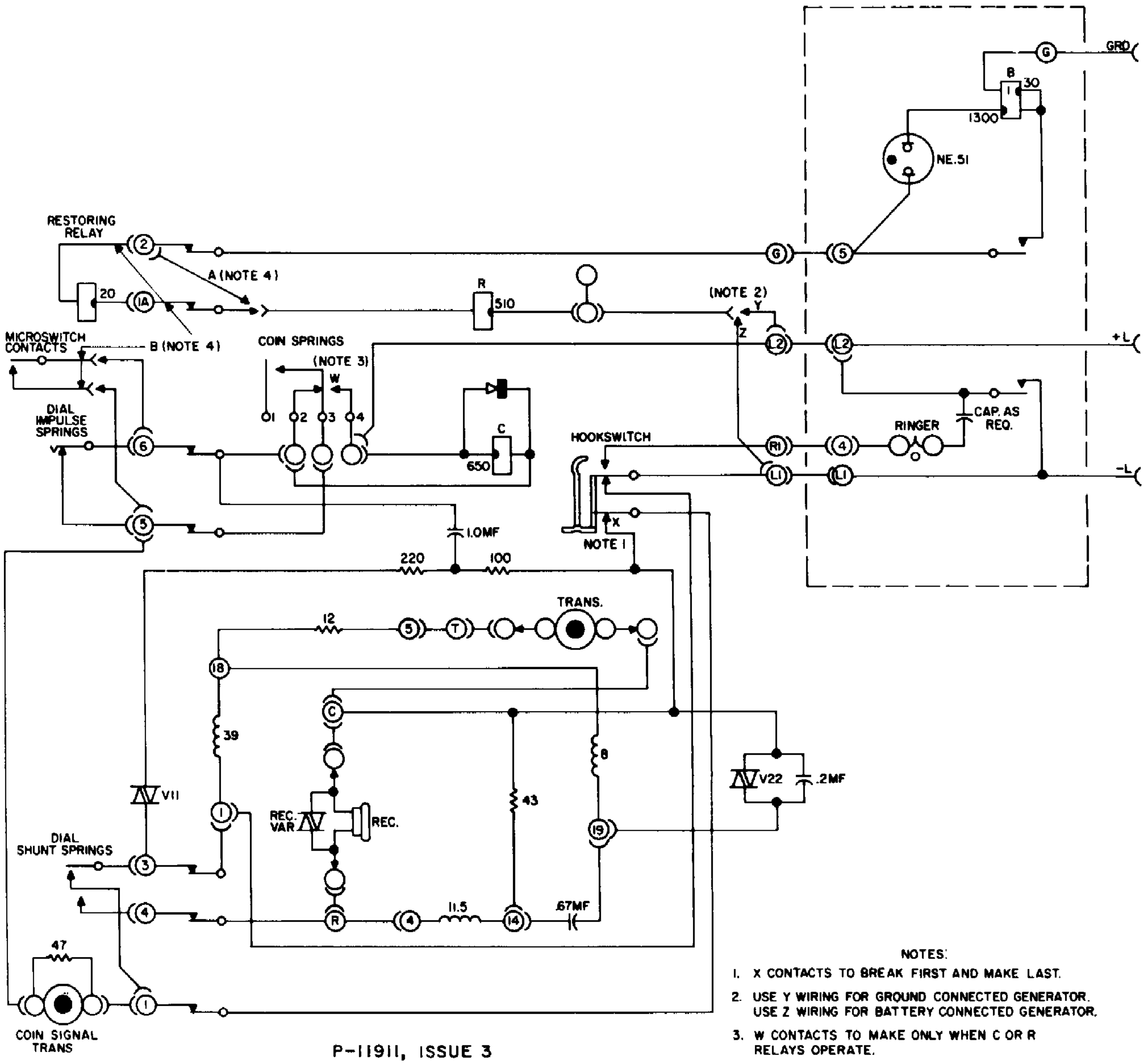


Figure 16. Schematic Diagram for Type LPA 89 Local Prepay Coin Telephone.

Adjust by shifting the mechanism to the left or the right. Otherwise, the adjustment for this feature is limited to retensioning the restoring springs. No appreciable amount of trouble should be experienced.

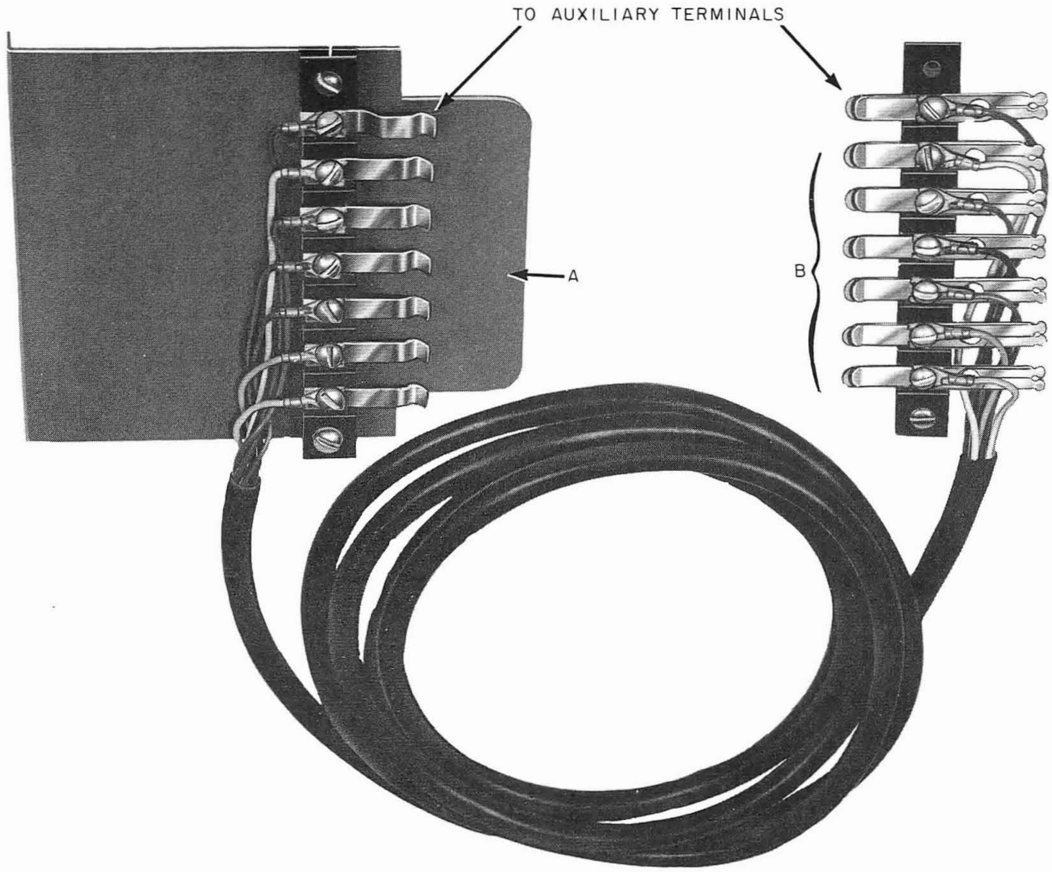
2.31 Sluggish operation may be caused by insufficient follow on the coin spring contacts. Correct any sluggishness by increasing the tension of the coin switch operating spring or by bending the contact springs. Take care that the dial shunting springs break at a minimum of .01 inch and that the tension of the switch lever on the coin trigger is not increased to the point where a minimum size dime does not trip the coin trigger. If the mating surfaces of the coin trigger and switch lever are rough, smoothing them with crocus paper will facilitate operation with the minimum size dime.

2.32 For units that fail to collect on the proper polarity of 15 volts, collect on reverse polarity of 36 volts, fail to refund when 85 volts is applied, or fail to release from the refund position when 13 volts is applied, check and adjust as follows:



NOTES:
1. X CONTACTS TO BREAK FIRST AND MAKE LAST.
2. USE Y WIRING FOR GROUND CONNECTED GENERATOR. USE Z WIRING FOR BATTERY CONNECTED GENERATOR.
3. W CONTACTS TO MAKE ONLY WHEN C OR R RELAYS OPERATE.
4. A WIRING FIVE CENT SERVICE. B WIRING TEN CENT SERVICE.

Figure 17. Schematic Diagram for Type LPB 89 Local Prepay Coin Telephone.



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

Figure 18. Coin Telephone Test Cord P-60605.

(1) If the collect magnet operates on the reverse polarity of 36 volts (positive to L1 for LPA 89 series and positive to L2 for LPB 89 series), the diode across the collect coil terminals is wired incorrectly or damaged. After proper wiring or replacement, recheck the relay adjustments.

(2) If the refund magnet fails to operate during the test, the trouble may be due to a faulty neon lamp or relay, both of which are located in the ringer box. During the 85-volt test, the neon lamp should flash, the relay should operate, and the neon lamp should then extinguish. The relay is supplied already adjusted, but if it fails to operate on the 70-volt test, either the relay is not adjusted properly or the neon lamp is faulty. During the 70-volt test, the neon lamp remains lighted, and the relay should not operate. If either of these units is replaced, recheck the mechanism for proper operation. (Replacement of the neon lamp should clear most of the trouble here.)

(3) Check for a clearance between the operating-arm extension and the spool head of the collect magnet when the armature is operated fully in the refund position. Inspect the armature and coil cores for metal chips and remove them if found.

(4) Check the coin vane for binding; there should be a clearance between the vane and the hopper with play out in both directions. Correct if necessary.

(5) Check for binding at the engagement of the coin vane and operating arm. Remove any burrs and adjust the vane arm if it hits the top of the slot in the operating arm.

(6) Check the trap for binding. Check for binding of the armature, operating arm, and spring levers. (It may help to remove one end of the lever spring, when removing bind here.)

(7) With everything working freely, adjust the lever springs to the least tension permissible to still have a positive release from refund with 13 volts across terminals L1 and G for LPA 89 series and L2 and G for LPB 89 series.

(8) Check for collect operation on 15 volts (positive to L2 on LPA 89 series and positive to L1 on LPB 89 series), and refund operation at 85 volts. In most cases, operation should be satisfactory. If not, readjust the lever springs or the collect magnet armature restoring spring.

(9) If the refund operation is not satisfactory, loosen the locking screws in the armature and shift the armature towards the refund pole piece. (When making this adjustment, movement is more readily seen if the armature is tilted to observe the clearance between the armature and the pole piece.) Recheck steps (7) and (8).

NOTE: All final tests involving the coin relay must be performed with the upper housing in place (see Part 6). Install three 6-inch leads (tip, ring, and ground). Installer should remove them at the time of installation.

3. BREAKDOWN TESTS

3.01 The insulation between all adjacent metal parts shall withstand a 500-volt ac, 60-Hz current for 1/4 second. A breakdown test unit with a 500-volt ac, 60-Hz source and integral ringer is used to perform this test. The ringer shall be adjusted to ring through a resistance of 150,000 ohms and not ring through a resistance of 250,000 ohms.

NOTE: Do not test from terminal to terminal.

Lower Housing

3.02 The ringer shall not operate when 500-volt ac, 60-Hz current is connected for 1/4 second between the housing and all soldered connections and terminals.

Upper Housing

3.03 With the dial at normal, the ringer must not operate when 500-volt ac, 60-Hz current is applied between the housing and all soldered connections and terminals.

3.04 With the dial off-normal and the ringer connected between jackstrip terminals 5 and 6, let the dial return to normal. An intermittent ringing should be heard; a steady ring indicates a short and no ring indicates that the pulsing springs are not making.

4. CONTINUITY TESTS

4.01 Continuity tests using an ohmmeter (Simpson 260 V-O-M, or equivalent) can be made on all reconditioned coin telephone sets before they are reassembled.

Lower Housing

4.02 Type LPA (Figures 4, 5, or 16). To perform the continuity tests, proceed as follows:

(a) Hookswitch up - trigger normal.

(1) Terminal L1 to BLK lead on 0.4-μF capacitor reads approximately 0 ohms.

(2) Terminal L1 to ground switch assembly spring 4 reads approximately 0 ohms.

(3) Transfer spring 5 to transfer spring 6 reads approximately 0 ohms.

(4) Transfer spring 5 to lug 5 on induction coil reads approximately 38 ohms.

(5) Lug 5 on induction coil to WHT lead on 5-μF capacitor reads approximately 0 ohms.

(6) Lug 5 on induction coil to terminal T reads approximately 0 ohms.

(7) Terminal T to terminal C reads continuity.

NOTE: This value is measured across the transmitter and may vary considerably depending on the age of the telephone, the type of ohmmeter used, and the position of the transmitter.

(8) Terminal C to lug 2 on induction coil reads approximately 60 ohms.

(9) Lug 2 on induction coil to terminal R reads approximately 10 ohms.

(10) Lug 2 on induction coil to RED lead on 5-μF capacitor reads approximately 7 ohms.

(11) Terminal G to transfer spring 4 reads approximately 0 ohms.

(12) Terminal L2 to transfer spring 1 reads approximately 0 ohms.

(13) Transfer spring 2 to transfer spring 3 reads approximately 0 ohms.

(14) Lug 6 on induction coil to YEL lead on 0.4-μF capacitor reads approximately 100 ohms.

(15) Terminal L1 to transfer spring 6, with the (+) polarity of the ohmmeter connected to terminal L1 and the (−) polarity connected to transfer spring 6, reads less than 5 ohms.

(16) Terminal L1 to transfer spring 6, with the (−) polarity of the ohmmeter connected to terminal L1 and the (+) polarity connected to transfer spring 6, reads approximately 650 ohms.

(17) On LPA 89 only, terminal L1 to transfer spring 4 reads approximately 510 ohms; on LPA 89-55 only, terminal L1 to auxiliary spring 1A reads approximately 510 ohms.

(b) Hookswitch down - collect relay operated.

(1) Terminal R1 to YEL lead on 0.4-μF capacitor reads approximately 0 ohms.

(2) YEL lead to BLK lead both on 0.4-μF capacitor is open - high resistance.

(3) Ground switch assembly spring 4 to transfer spring 6 reads approximately 0 ohms.

(c) Hookswitch up or down - trigger tripped.

(1) Transfer spring 5 to transfer spring 6 reads open circuit.

4.03 Type LPB 89 (Figures 6, 7 or 17). To perform the continuity tests, proceed as follows:

(a) Hookswitch up - trigger normal.

(1) Terminal L1 to lug 18 on induction coil reads approximately 39 ohms.

(2) Transfer spring 5 to transfer spring 6 reads approximately 0 ohms.

(3) Terminal T to lug 18 on induction coil reads approximately 12 ohms.

(4) Transfer spring 1 to terminal C reads approximately 0 ohms.

(5) Lug 14 on induction coil to terminal C reads approximately 43 ohms.

(6) Lug 14 on induction coil to terminal R reads approximately 11.5 ohms.

(7) Terminal L2 to transfer spring 6, with the (+) polarity of the ohmmeter connected to terminal L2 and the (−) polarity to transfer spring 6, reads less than 5 ohms.

(8) Terminal L2 to transfer spring 6, with the (−) polarity of the ohmmeter connected to terminal L2 and the (+) polarity to transfer spring 6, reads approximately 650 ohms.

(9) Terminal T to terminal C reads continuity.

NOTE: This value is measured across the transmitter and may vary considerably depending on the age of the telephone, the type of ohmmeter used, and the position of the transmitter.

(10) On LPB 89 only, terminal L1 to transfer spring 2 reads approximately 510 ohms; on LPB 89-55 only, terminal L1 to auxiliary transfer spring 1A reads approximately 510 ohms.

(b) Hookswitch down - collect relay operated.

(1) Terminal R1 to L1 reads approximately 0 ohms.

(2) Ground switch assembly spring 4 to transfer spring 5 reads approximately 0 ohms.

(c) Hookswitch up or down - trigger tripped.

(1) Transfer spring 5 to transfer spring 6 reads open circuit.

Upper Housing

4.04 Type LPA 89 (Figures 4, 5, or 16). To perform the continuity tests, set the line compensator at 4 and proceed as follows:

(a) Dial normal - microswitch open or closed.

(1) Transfer spring 1 to transfer spring 3 reads approximately 425 ohms.

NOTE: This value is measured across the transmitter and may vary considerably depending on the age of the telephone, the type of ohmmeter used, and the position of the transmitter.

(2) Transfer spring 4 to auxiliary transfer spring 1A reads approximately 20 ohms (on LPA 89-55 only).

(b) Dial off-normal - microswitch open or closed.

(1) Transfer spring 2 to transfer spring 3 reads approximately 0 ohms.

(2) Transfer spring 2 to transfer spring 5 reads approximately 0 ohms.

(c) Dial normal (impulse springs closed) - microswitch open.

(1) Transfer spring 5 to transfer spring 6 reads approximately 0 ohms.

(d) Dial off-normal (impulse springs open) - microswitch closed.

(1) Transfer spring 5 to transfer spring 6 reads approximately 0 ohms.

4.05 Type LPB 89 (Figures 6, 7, or 17). To perform the continuity tests, proceed as follows:

(a) Dial normal - microswitch open or closed.

(1) Transfer spring 1 to transfer spring 5 reads approximately 20-30 ohms.

NOTE: This value is measured across the transmitter and may vary considerably depending on the age of the telephone, the type of ohmmeter used, and the position of the transmitter.

(2) Transfer spring 2 to auxiliary transfer spring 1A reads approximately 20 ohms (on LPB 89-55 only).

(b) Dial off-normal - microswitch open or closed.

(1) Transfer spring 3 to transfer spring 1 reads approximately 0 ohms.

(2) Transfer spring 3 to transfer spring 4 reads approximately 0 ohms.

(c) Dial normal (impulse springs closed) - microswitch open.

(1) Transfer spring 5 to transfer spring 6 reads approximately 0 ohms.

(d) Dial off-normal (impulse springs open) - microswitch closed.

(1) Transfer spring 5 to transfer spring 6 reads approximately 0 ohms.

5. INSPECTION

5.01 The 2-nickel mechanism, coin control mechanism, signal transmitter, and dial must meet the electrical requirements outlined in Part 2.

5.02 Inspect the lower housing assembly to see that it fulfills the following requirements:

(a) The hookswitch assembly must meet the requirements prescribed in Paragraphs 2.16 through 2.18.

(b) The handset must be free of scratches, dirt, cracks, etc., and equipped with receiver and transmitter capsules of the correct type, with all connections tight. Retractile cord or armored cord must be securely fastened with cord stays at both ends.

(c) The transfer terminal strip and auxiliary terminal assemblies must be securely mounted and all connections be tight.

(d) The ground strap must be run so as not to interfere with any movable part, must be of prescribed length and gauge, and must have spade lugs soldered or securely crimped at both ends and fastened under proper screw heads (see the section in the 476-200 series of General System Practices entitled "Installation").

(e) The coin trap must meet the requirements prescribed in Paragraph 2.27.

(f) The coin control relay assembly must be free of all foreign matter, particularly iron filings between coil cores and armature assembly. The armature must have barely perceptible play in any direction of a horizontal plane. This assembly must meet the applicable requirements of Part 2.

(g) The return chute must be clean, free of all obstructions, and its opening and interior free of sharp edges or projections. The anti-stuffing unit must be clean, free of obstructions, sharp edges, etc., and its return spring must have sufficient tension to completely close the hopper. The head of the bearing pin should be slightly recessed into the lower housing, and its split end should be flared enough to ensure a very snug fit without interfering with the insertion or removal of the cash box or cash box compartment door.

(h) The cash box compartment door must present a fairly snug fit. Each side of the cash box compartment door should measure between 4.213 and 4.228 inches. Each side of the aperture into which the door fits should measure between 4.230 and 4.245 inches.

5.03 Inspect the upper housing to see that it fulfills the following requirements:

NOTE: Replace parts as required.

(a) The coin gauge must accept standard coins and reject maximum test coins (see Paragraphs 2.09 and 2.10). It must be undamaged and securely fastened.

(b) The slug rejector must reject all ferrous quarter-size slugs.

(c) The 2-nickel control must meet all requirements of Part 2.

(d) The coin chute must be free of all obstructions, including bends, kinks, burrs, ridges, dirt, etc., and must be securely mounted in a manner that will not cause any distortion to the lateral planes of any of its three parts.

(e) The bronze bell and cathedral gong must be securely mounted and must perform as prescribed in the 476-202 series of General System Practices entitled "Description." The gong must be positioned so as not to touch terminals or leads of the horizontal transfer switch terminal assembly.

(f) The dial assembly must be securely mounted and correctly positioned. The fingerwheel must be firmly mounted and correctly positioned. It must turn freely without bind or chatter when the 0 hole is moved off normal completely around to the finger stop and released. The finger stop must be securely mounted and correctly positioned, and must have no binding effect upon the fingerwheel. The escutcheon ring must be securely fastened to the fingerwheel, with the plastic window in place. The number plate must be free of scratches and dirt; letters and numerals must be clearly defined.

NOTE: Before reinstalling the upper housing on the lower housing, carefully check the cleanliness and tension of the transfer spring assembly mounted on the terminal block assembly on the back plate. These springs and contacts connect all circuits between the upper and lower housings.

(g) Install the upper housing on the lower housing. The upper housing should fit the lower housing tightly enough that the tip of a No. 6 screwdriver blade cannot be inserted between the base of the upper housing and the top of the coin box lower housing.

(h) The lock must turn freely with the keys provided when the upper housing is fully removed. To lock the upper housing in place should require firm pressure against its front to seat it completely and allow the lock to be operated.

(i) The keys must be free of burrs and foreign material. They must fit their matching locks easily and turn them freely. When the upper housing is locked in place, there should be a maximum of 1/32 inch play between the rear flange of the upper housing and the back plate. This will allow the lock to turn freely and provide correct coin chute and hopper alignment.

6. FINAL TEST AND INSPECTION

6.01 To make final operational tests, connect the three leads installed at the end of Part 2 to the appropriate tip, ring, and ground connection of a local coin telephone line, and proceed as follows:

(1) Insert two nickels, dial the coin telephone number, and wait for busy tone. Hang up. Check for coin refund.

NOTE: On coin telephones equipped for 2-nickel control, check that a call cannot be dialed through after the deposit of the first nickel, then deposit the second nickel. On coin telephones equipped for dime-only control, deposit a dime or quarter. On coin telephones equipped for 5-cent service, deposit 2 nickels, dime, or quarter.

(2) Insert a dime and dial the test line.

(3) When connection is completed to the test line, hang up.

(4) Check that the coin falls into the cash compartment.

(5) Repeat steps (2) through (4), using a quarter.

(6) Deposit a dime. Dial the operator for assistance with coin signal testing.

(7) Deposit the proper coin in each slot and have the operator identify each coin deposited. Check that the coins fall into the cash compartment. Hang up.

6.02 Check the coin telephone appearance for the following:

(a) Damage to upper or lower housing (i.e., scratched, dented, bent, twisted, etc.).

(b) Damage to handset. Check for cracks and punctures, loose or missing receiver or transmitter caps, faulty receiver or transmitter connections, and damaged cord.

(c) Instruction card holder(s) in place and equipped with acetate window.

6.03 Check the coin telephone packaging for the following:

(a) Carton damage.

(b) Security bracing in place.

(c) Polyethylene cover in place.

(d) Handset and cord in polyethylene cover.

(e) Inspector's tags in place.

(f) Correct keys attached.

HOOKSWITCH DIALING INHIBITOR
MODIFICATIONS FOR COIN TELEPHONE USE

1. GENERAL

1.01 This section provides description, installation, and operation information on the hookswitch dialing inhibitor. The hookswitch dialing inhibitor prevents free local calls from being made from hookswitch pulsing on prepay and local prepay coin telephone sets.

1.02 The inhibitor is required for all local prepay coin telephone sets and those prepay coin telephone sets that are served by central office equipment that does not contain coin detection circuitry for the restriction of dialing.

1.03 The hookswitch dialing inhibitor (KH-840401-A20A) is mounted on a printed wiring card that measures 1-13/16 inches by 1-5/8 inches. It can be added to all existing coin telephone sets and is easily attached because of its adhesive backing.

1.04 This section is reissued because of the extensive changes to the hookswitch inhibitor and to add information on installation in the single-slot coin telephone. Marginal arrows have been omitted because of these changes. Remove Issue 1 of this section from the binder and/or microfiche file and replace it with this issue.

2. DESCRIPTION

2.01 The hookswitch dialing hnhibitor (Figure 1) stops the use of the hookswitch for dialing by providing a delay of 350 milliseconds (approximately) in reclosing the line after the hookswitch contacts are momentarily opened. This delay acts as a disconnect signal and causes release of the switching equipment.

2.02 When the calling party goes off-hook, an initial delay occurs; the inhibitor then turns on for as long as the hookswitch contacts remain closed. The inhibitor will not produce on turn-on delay due to dialing, or due to a break in line current caused by CO equipment during the progress of a call.

2.03 No delay is produced on a hookswitch flash under reverse battery conditions, preventing accidental release of the line on completed local calls to or from local prepay coin telephone sets. In prepay systems, reverse battery is not returned to the coin telephone set.

3. INSTALLATION

Mounting

3.01 To mount the hookswitch dialing inhibitor, proceed as follows:

(a) Remove the upper housing of the coin telephone set (not necessary for multislot panel installations).

(b) For multislot sets, the inhibitor mounts in the lower housing (Figure 2) alongside the coin relay. Orient the inhibitor to a vertical position so the large capacitor is at the top and the wire leads are at the top rear of the card. Remove the paper backing from the inhibitor and position the inhibitor against the right side and at the far rear of the coin relay mounting base. Press the inhibitor's card firmly against the surface until the adhesive adheres. For the multislot panel sets, mount the inhibitor on the inside surface of the panel (Figure 3). Orient the inhibitor with the large capacitor at the top and the wire leads at the top left of the card. Remove the paper backing from the inhibitor and position it directly below the hookswitch assembly. Press the card firmly against the surface until the adhesive adheres. For the single slot set, the inhibitor mounts in the upper housing (Figure 4). Orient the inhibitor to a vertical position with the large capacitor at the top and the wire leads at the top left of the card. Remove the paper backing and position the inhibitor on the vertical surface of the dial housing just above the terminal board and to the left of the hookswitch springs. Press the card firmly against the surface until the adhesive backing adheres.

(c) Refer to Table 1 and make the proper connections.

(d) Dress the wires so that excess length does not interfere with the function of other parts of the telephone set.

(e) Replace the upper housing.

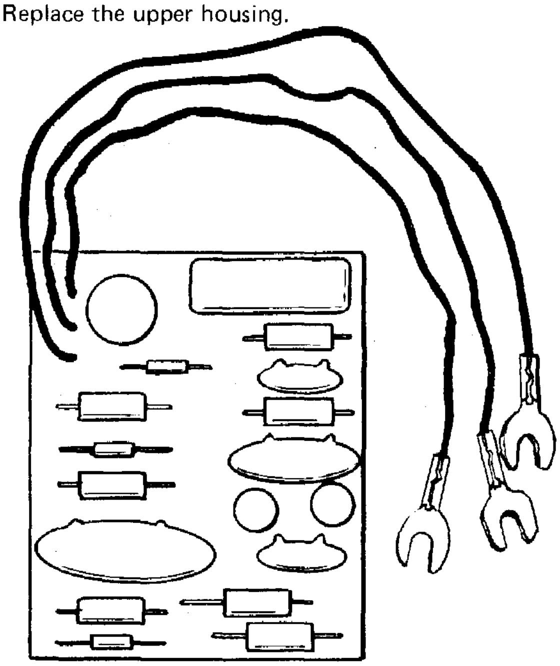


Figure 1. Hookswitch Dialing Inhibitor.

Testing

3.02 Verify that the inhibitor operates properly by trying to place a call by using the hookswitch. Momentary operation of the hookswitch should release the line and seize a new line.

4. OPERATION

4.01 In the on-hook condition capacitor C2, (Figure 5) is charged from the line through a path from the GRN (+) lead through resistors R1 and R4, capacitor C2, diode CR1 and resistor R5 to the BLK (-) lead.

4.02 In the off-hook condition, capacitor C2 discharges through the central office battery via a path through the hookswitch contacts, which bridge the RED and BLK leads, capacitor C2, and resistor R2 to the GRN lead.

4.03 As soon as capacitor C2 has discharged to zero, it starts charging in the opposite direction from the line through the hookswitch contacts and resistor R2. When capacitor C2 has charged sufficiently to raise the base voltage of transistor Q1 to approximately 0.7 volt, transistor Q1 turns on, which in turn turns on transistor Q2 firing silicon-controlled rectifier SCR1.

4.04 When silicon-controlled rectifier SCR1 fires, line current flows from the GRN lead through SCR1 to the RED lead. Capacitor C2 discharges through resistor R2 and silicon controlled rectifier SCR1 (approximately 0.8 volt). The base voltage of transistor Q1 falls below 0.7 volt and Q1 turns off, turning off transistor Q2. Varistor VR1 protects the circuitry against line surges while diode CR3 protects against reverse battery and also provides a nondelay path during reverse battery conditions.

4.05 A hookswitch flash (momentary opening and reclosing of the contacts) removes the minimum holding current from silicon controlled rectifier SCR1 and it turns off. During the open period of the hookswitch contacts, capacitor C2 discharges through the line to central office battery by a path from the GRN lead through resistors R1 and R4, a capacitor C2, diode CR1, and resistor R5 to the BLK lead. (If the hookswitch contacts are open long enough, capacitor C2 will charge in the opposite direction as described in paragraph 4.01. It will discharge upon reclosure of the hookswitch contacts, causing capacitor C2 to charge in the same manner described in paragraph 4.03, creating a time delay in turning on silicon-controlled rectifier SCR1 sufficiently to cause release of the switching equipment and reseizure of a new line.

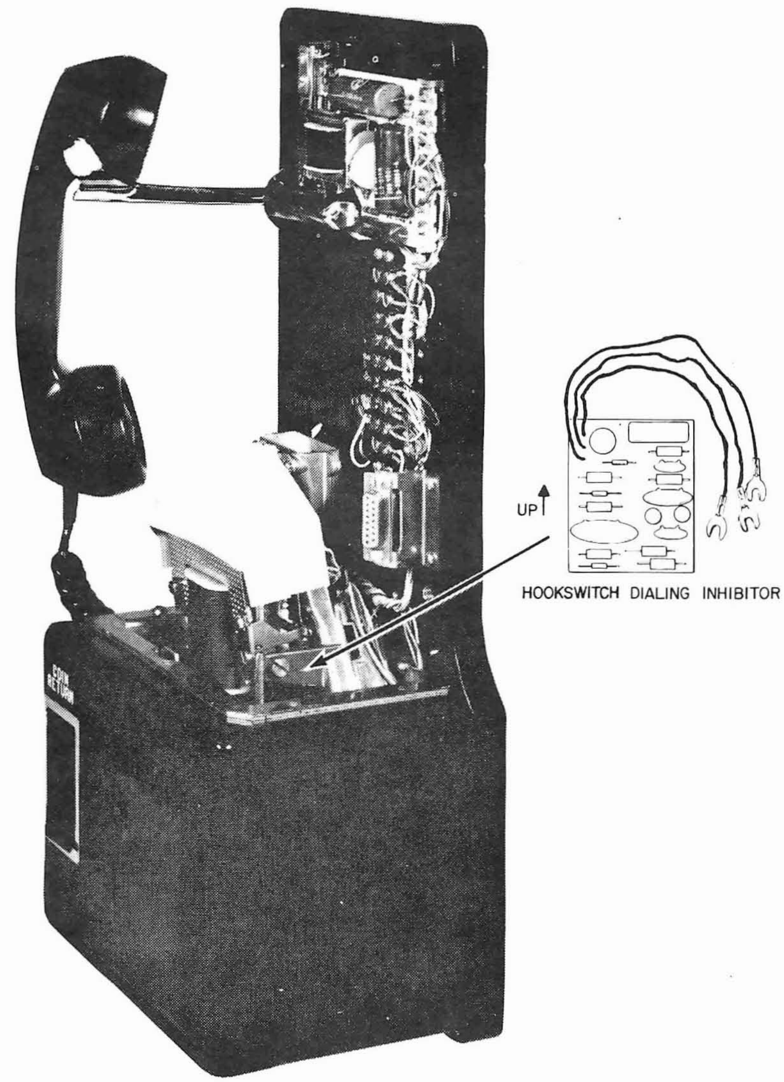


Figure 2. Inhibitor Installation in Multislot Set.

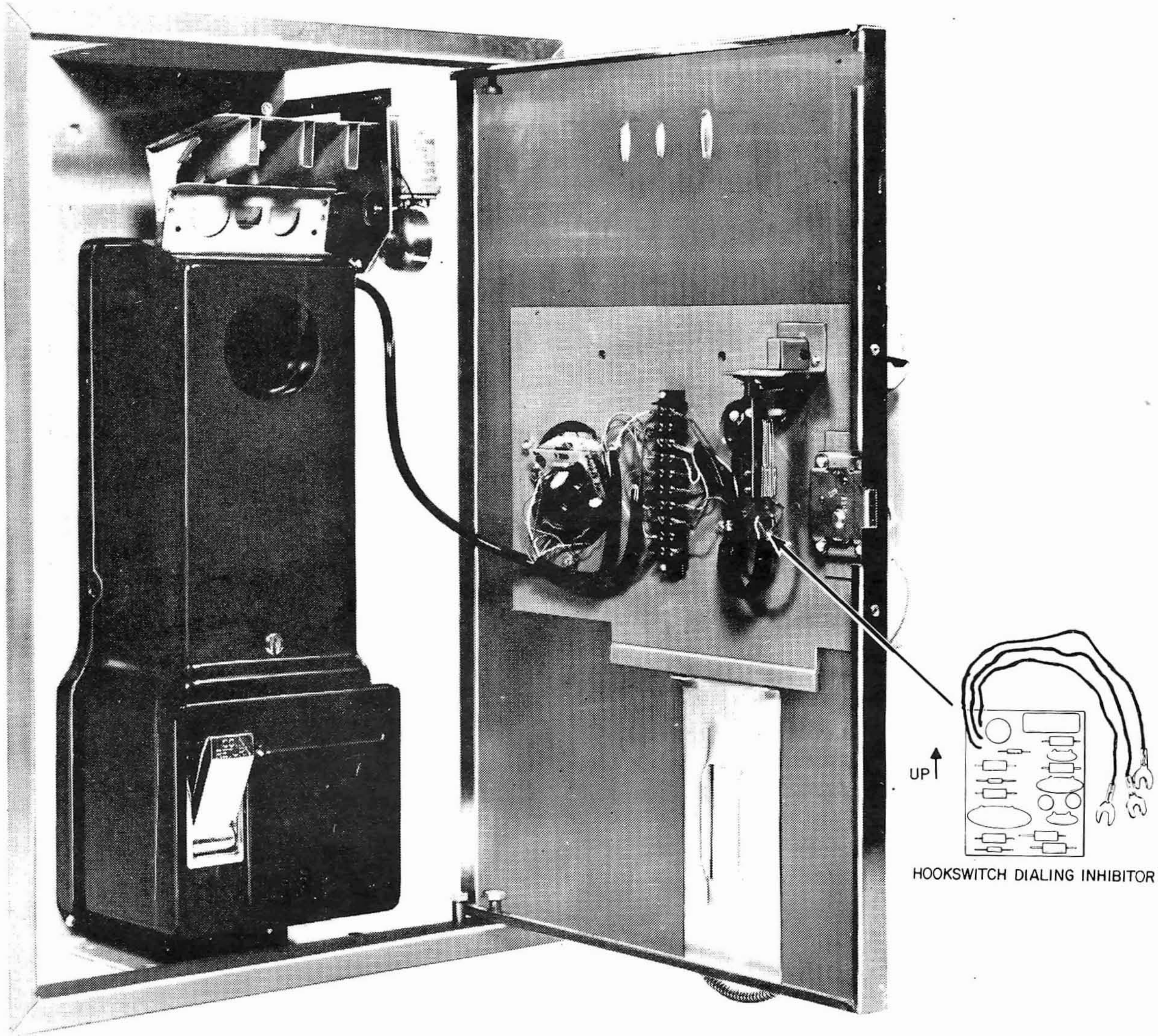


Figure 3. Inhibitor Installation in Multislot Panel Set.

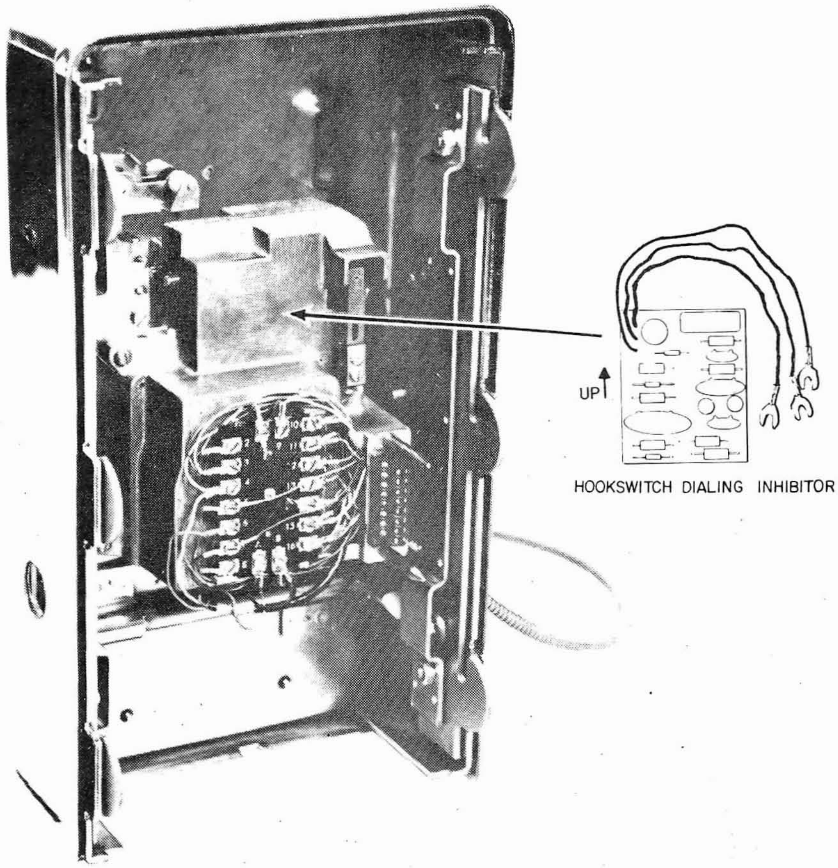


Figure 4. Inhibitor Installation in Single Slot Set.

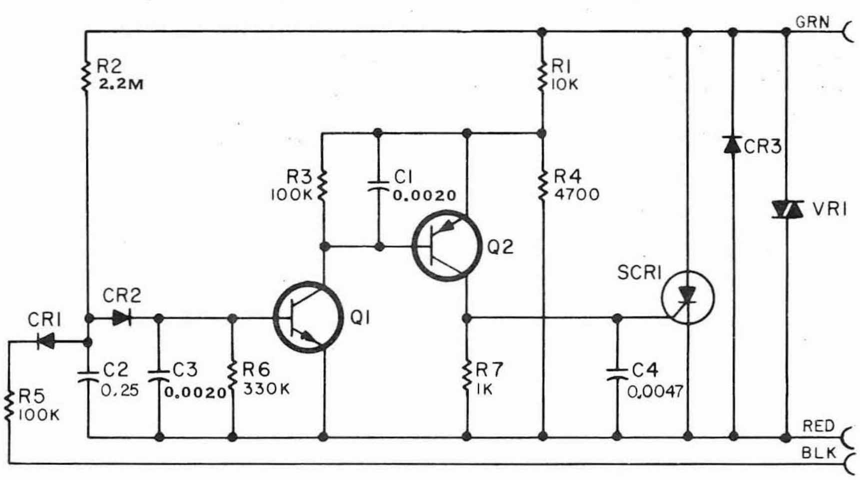


Figure 5. Hookswitch Dialing Inhibitor Circuit.

Table 1. Hookswitch Dialing Inhibitor Connections.

TELEPHONE SERIES	CONNECT INHIBITOR LEADS		
	RED to:	GRN to:	BLK to:
LPA-82	Cut BLK hookswitch lead at terminal block spring 5 and splice to RED inhibitor lead.	GRN lead at coin relay break contact.	Induction coil terminal 6.
LPA-89	Remove BLU hookswitch lead from L1 and connect to RED inhibitor lead with spade connector.	L1	WHT and BLK leads at coin relay made contact.
LPB-82 -89	Remove GRN hookswitch lead from induction coil terminal 1 and connect to RED inhibitor lead with spade connector.	Induction coil terminal 1.	L1
LPB-82 T/C Field Conversion	Cut GRN hookswitch lead at terminal block spring 3 and splice to RED inhibitor lead.	C	L1
LPB-89 T/C Field Conversion	Cut BLK lead between hookswitch and terminal block spring 4 at midpoint. Splice RED inhibitor lead to BLK lead from hookswitch.	Splice GRN inhibitor lead to BLK lead from terminal block spring 4.	L1
LPC-72 -79 -82 -89	Remove WHT hookswitch lead from terminal S and connect to RED inhibitor lead with spade connector.	S	L1
Dial Panels LPB-82 -89 LPC-82 -89 T/C Panels LPB-82 LPC-72 -79	Remove BLU hookswitch lead from panel terminal block and connect to RED inhibitor lead with spade connector.	Panel terminal that BLU hookswitch lead was removed.	GRN hookswitch lead.
T/C Panel LPB-89	Remove WHT hookswitch lead from panel terminal block and connect to RED inhibitor lead with spade connector.	Panel terminal that WHT hookswitch lead was removed.	RED hookswitch lead.
120A Single Slot	Remove PINK hookswitch lead from terminal 11 and connect to terminal 13 with RED inhibitor lead.	Terminal 11	Terminal 3

TYPE 120A (SINGLE-SLOT) COIN TELEPHONE SET REJECTOR MECHANISM SALES AND SERVICE CENTERS

1. GENERAL

1.01 This appendix is issued to provide information on sales and service centers for rejector mechanisms.

1.02 National Rejectors Industries and Coin Acceptors, Incorporated, are the two manufacturers of the rejector mechanism. The manufacturer's name is stamped on the rejector mechanism; therefore, the customer must contact the appropriate manufacturer for sales or servicing. Table 1 lists the sales and service centers for National Rejectors Industries, and Table 2 lists the centers for Coin Acceptors, Incorporated.

Table 1. National Rejectors Industries Sales and Service Centers.

SALES AND SERVICE CENTERS			
ATLANTA National Rejectors Industries 4297 Northeast Expressway Atlanta, Georgia 30340 Phone No. (404) 939-4950	DALLAS National Rejectors Industries 4633 Insurance Lane Dallas, Texas 75205 Phone No. (214) 526-7983	LOS ANGELES National Rejectors Industries 6940 Knott Ave., Suite A Buena Park, Calif. 90620 Phone No. (714) 523-7770	ST. LOUIS National Rejectors Industries 44 Worthington Access Maryland Heights, Mo. 63043 Phone No. (314) 434-9230
CHICAGO National Rejectors Industries 9650 Allen Avenue Rosemont, Illinois 60018 Phone No. (312) 622-3614	DAYTONA BEACH National Rejectors Industries 930 Orange Avenue Daytona Beach, Fla. 32014 Phone No. (904) 253-5050	MONTREAL Navend Industries Limited 875 Montee de Liesse St. Laurent Montreal, Quebec Phone No. (514) 341-3238	TORONTO Navend Industries Limited 2 Banigan Drive Toronto 17, Ontario Phone No. (416) 421-0541
COLUMBUS National Rejectors Industries 1975 Riverside Drive Columbus, Ohio 43221 Phone No. (614) 486-7146	HOT SPRINGS National Rejectors Industries P.O. Box 1550 Hot Springs, Arkansas 71901 Phone No. (501) 767-2313	NEW YORK National Rejectors Industries 42-71 65th Place Woodside, L. I. New York, 11377 Phone No. (212) 672-3200	VANCOUVER Navend Industries Limited 8559 Main Street Vancouver, B.C. Phone No. (604) 324-3214
FACTORY-AUTHORIZED SERVICE CENTERS			
BALTIMORE Vendors Repair Service 1509 Vera Ave. Baltimore, Md. 21227 Phone No. (301) 242-0057	DENVER Francone Eq. & Ser. Co. 4101 Inca Street Denver, Colorado 80211 Phone No. (303) 433-8857	LAS VEGAS J & T, Inc. 2603 South Highland Ave. Las Vegas, Nev. 89102 Phone No. (702) 732-4712	PITTSBURGH Casey's Specialized Service Culmerville Airport Box 129A, RD 4 Tarentum, Pa. 15084 Phone No. (412) 265-2620
BOSTON Vending Electronics Serv. Co. 302 Copeland Street West Quincy, Mass. 02169 Phone No (617) 479-0347	DETROIT Vendors Internat'l Dist. Co. 5812 Tireman Detroit, Michigan 48204 Phone No. (313) 898-9880	MINNEAPOLIS Bev-Serv 4439 Hiawatha Ave., South Minneapolis, Minn. 54406 Phone No. (612) 721-7405	PORTLAND Vendor's Service Center, Inc. 2627 S.E. Holgate Blvd. Portland, Oregon 97202 Phone No. (503) 234-0541
CLEVELAND Electro-Changers Labs, Inc. 553 Alpha Drive No. 53 Cleveland, Ohio 44143 Phone No. (216) 461-6427	KANSAS CITY E.A.S. Coinage Co. 100B East 16th Street Lee's Summit, Mo. 64063 Phone No. (816) 524-3969	OAKLAND Lesco Eq. Distributors, Inc. 828 98th Avenue Oakland, California 94603 Phone No. (415) 562-0949	RALEIGH Owen-Barbot, Inc. Hwy. 401 No., P.O. Box 11456 Raleigh, N. C. 27609 Phone No. (919) 876-4919
MANUFACTURER'S REPRESENTATIVES (SALES)			
CRESTLINE, OHIO Ken Zehnder and Assoc. 300 Warehouse Rd. Crestline, Ohio 44827 Phone No. (419) 683-1191	OVERLAND PARK, KA. R & S Sales Co., Suite 312 4550 W. 109th Street P.O. Box 7166 Overland Park, Kansas 66207 Phone No. (913) 341-7203	VANCOUVER, WASH. Mr. Howard Seney P.O. Box 268 Vancouver, Wash. 98660 Phone No. (206) 694-2284	WATERTOWN, MASS. E.M. Saari Co. 11 Calvin Road Watertown, Mass. 02172 Phone No. (617) 924-1000
MANUFACTURING FACILITIES			
UNITED STATES National Rejectors Industries Highway 88, P.O. Box 1550 Hot Springs, Ark. USA 71901 Phone No. (501) 767-2313	UNITED KINGDOM National Rejectors, Ltd. Beaumont Road Banbury, Oxfordshire, Eng. Phone No. 50171	WEST GERMANY Nat'l Rejectors, Inc. GMBH 2150 Buxtehude Zum Fruchtof 6 West Germany Phone No. 04161-3051	ITALY ISMEA 20090 Trezzano S/N Pietro Verri Milano, Italy Phone No. 445344-1/2/3

Table 2. Coin Acceptors, Incorporated, Branches and Service Centers.

FULL-SERVICE BRANCHES		
CALIFORNIA Coin Acceptors, Inc. 1590 Gilbreth Road Burlingame, California 94010 Phone No. (415) 697-7416 (415) 697-2013	MISSOURI Coin Acceptors, Inc. 5005 Daggett Ave. St. Louis, Missouri 63110 Phone No. (314) 531-7662	CANADA Coin Acceptors, Canada No. 3-590 West Broadway Ave. Vancouver 9, British Columbia Phone No. (604) 873-2343
Coin Acceptors, Inc. 1537 East Washington Blvd. Los Angeles, California 90021 Phone No. (213) 747-8878	NEW YORK Coin Acceptors, Inc. 23-10 44th Drive Long Island City, New York 11101 Phone No. (212) 361-1451	Coin Acceptors, Canada 189 Rockland Rd. Town of Mount Royal, (Montreal), Quebec Phone No. (514) 342-4664
FLORIDA Coin Acceptors, Inc. 3103 E. Seventh Ave. Tampa, Florida 33605 Phone No. (813) 248-5706	OHIO Coin Acceptors, Inc. 4740-P Dues Drive Cincinnati, Ohio 45246 Phone No. (513) 874-4460	Coin Acceptors, Canada 868 Progress Ave. Scarborough, (Toronto) Ontario Phone No. (416) 438-6314
GEORGIA Coin Acceptors, Inc. 4507-1 Mills Place S.W. Atlanta, Georgia 30336 Phone No (404) 691-2777	PENNSYLVANIA Coin Acceptors, Inc. 3345 Evergreen Road Pittsburgh, Pennsylvania 15237 Phone No. (412) 366-6100	Coin Acceptors, Canada 90[illegible] St. James Street Winnipeg, Manitoba Phone No. (204) 786-3086
ILLINOIS Coin Acceptors, Inc. 4450 N. Central Ave. Chicago, Illinois 60630 Phone No. (312) 725-4483	TEXAS Coin Acceptors, Inc. 2936 Reward Lane Dallas, Texas 75220 Phone No. (214) 358-5605	JAPAN Nippon Coinco Co. Ltd. 18th Floor, Hazama Building 5-8, Kita Aoyama, 2 Chome Minato-Ku, Tokyo 107, Japan Phone No. 03-405-7431
LOUISIANA Coin Acceptors, Inc. 3207 Dublin Street New Orleans, Louisiana 70118 Phone No. (504) 488-3738	Coin Acceptors, Inc. 2183 Portsmouth St. Houston, Texas 77006 Phone No. (713) 526-4601	PUERTO RICO Coin Acceptors, Inc. P.O. Box 174 Quebradillas, Puerto Rico 00742 Phone No. (809) 895-2290
MICHIGAN Coin Acceptors, Inc. 10631 Dix Avenue Dearborn, Michigan 48120 Phone No. (313) 843-1600	WASHINGTON Coin Acceptors, Inc. 6206 Eighth Ave. N.W. Seattle, Washington 98107 Phone No. (206) 784-2707	

SERVICE CENTERS		
ARIZONA Coin Acceptors, Inc. 106 E. Pierce Street Phoenix, Arizona 85004 Phone No. (602) 253-1088	FLORIDA Coin Acceptors, Inc. 1208 South Dixie Highway Hollywood, Florida 33020 Phone No. (305) 922-8086	MINNESOTA Coin Acceptors, Inc. 4921 Central Ave. N.E. Minneapolis, Minnesota 55421 Phone No. (612) 788-8166
CALIFORNIA Coin Acceptors, Inc. 6931 North Ave. Lemon Grove, California 92045 Phone No. (714) 460-8191	MARYLAND Coin Acceptors, Inc. 1724 Russell Street Baltimore, Maryland 21230 Phone No. (301) 685-2787	NORTH CAROLINA Coin Acceptors, Inc. 3127 Tuckaseegee Road Charlotte, North Carolina 28208 Phone No. (704) 394-0123
COLORADO Coin Acceptors, Inc. 3895 Forest St. Denver, Colorado 80207 Phone No. (303) 322-1053	MASSACHUSETTS Coin Acceptors, Inc. 260 Calvary Street Waltham, Massachusetts 02154 Phone No. (617) 894-4525	TENNESSEE Coin Acceptors, Inc. 212 N. 4th Street Memphis, Tenn. 38103 Phone No. (901) 526-6210
		UTAH Coin Acceptors, Inc. 1479 S. Main St. Salt Lake City, Utah 84115 Phone No. (801) 467-4554