

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.

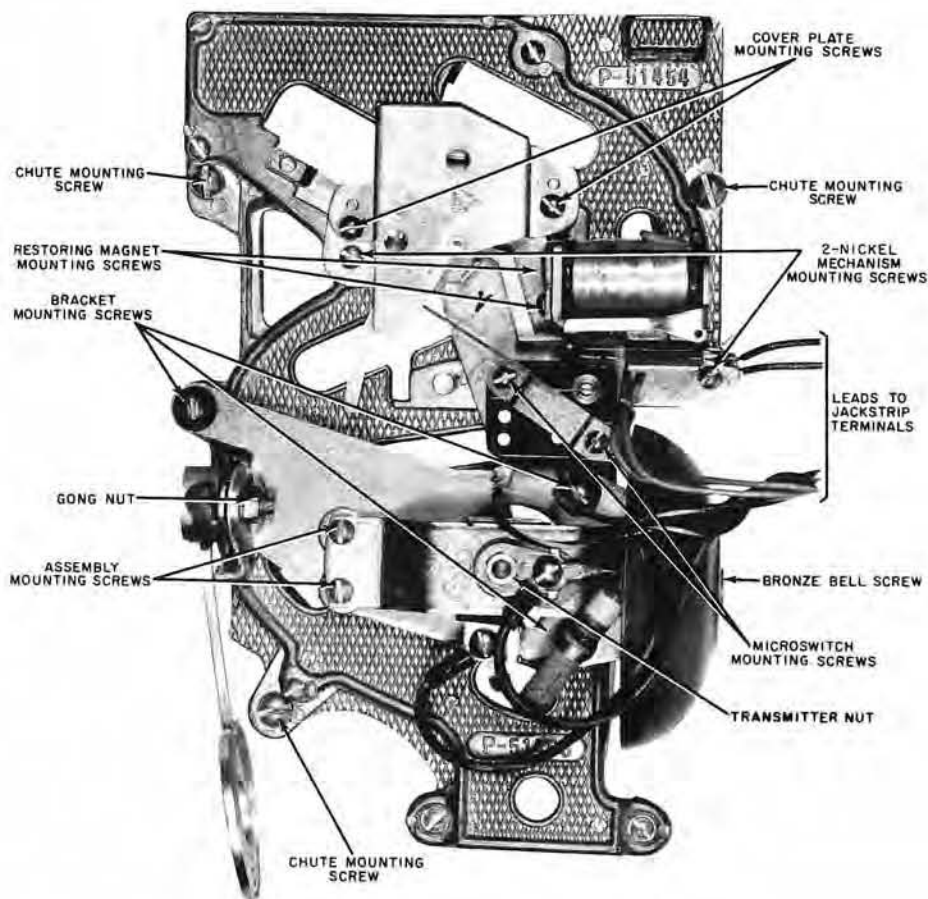


Figure 1. Coin Chute Assembly, Front View.

- (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.

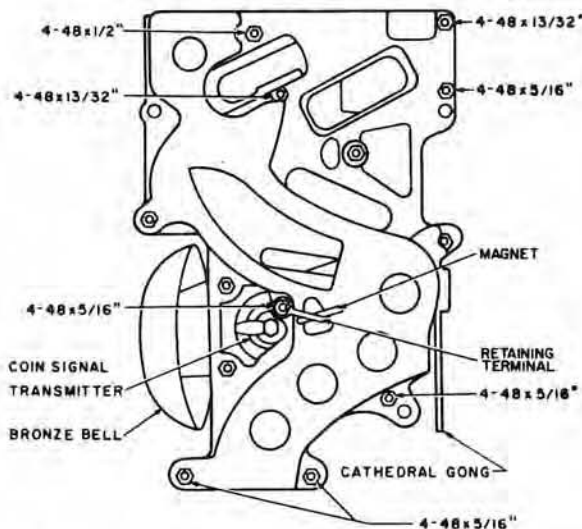


Figure 2. Coin Chute Assembly, Rear View.

- (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.

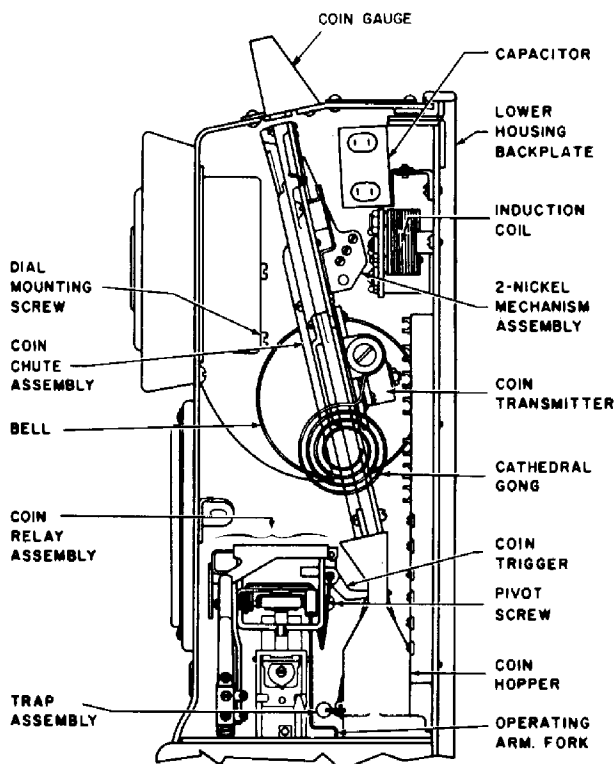


Figure 3. Upper Housing in Position.

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:

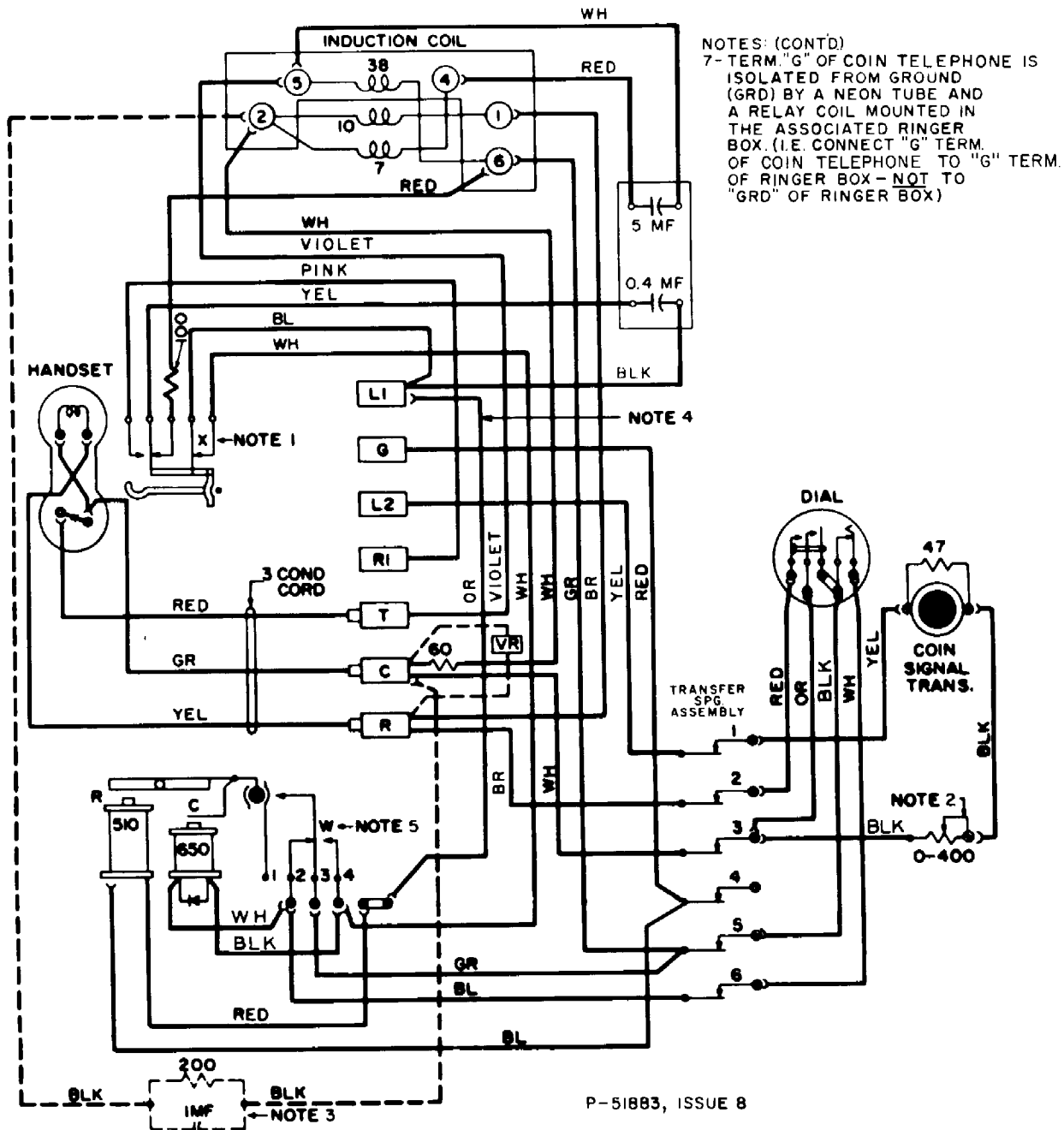
- (1) Feed the dial leads from the front of the coin telephone through the slot in the inner mounting cup and push the dial home.
- (2) Install the three mounting screws and tighten.

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 counter-sunk 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:

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. "LI" OF COIN TELEPHONE (VIA "LI" TERM. OF RINGER BOX). (CONT'D.)

Figure 4. Type LPA 89, Wiring Diagram.

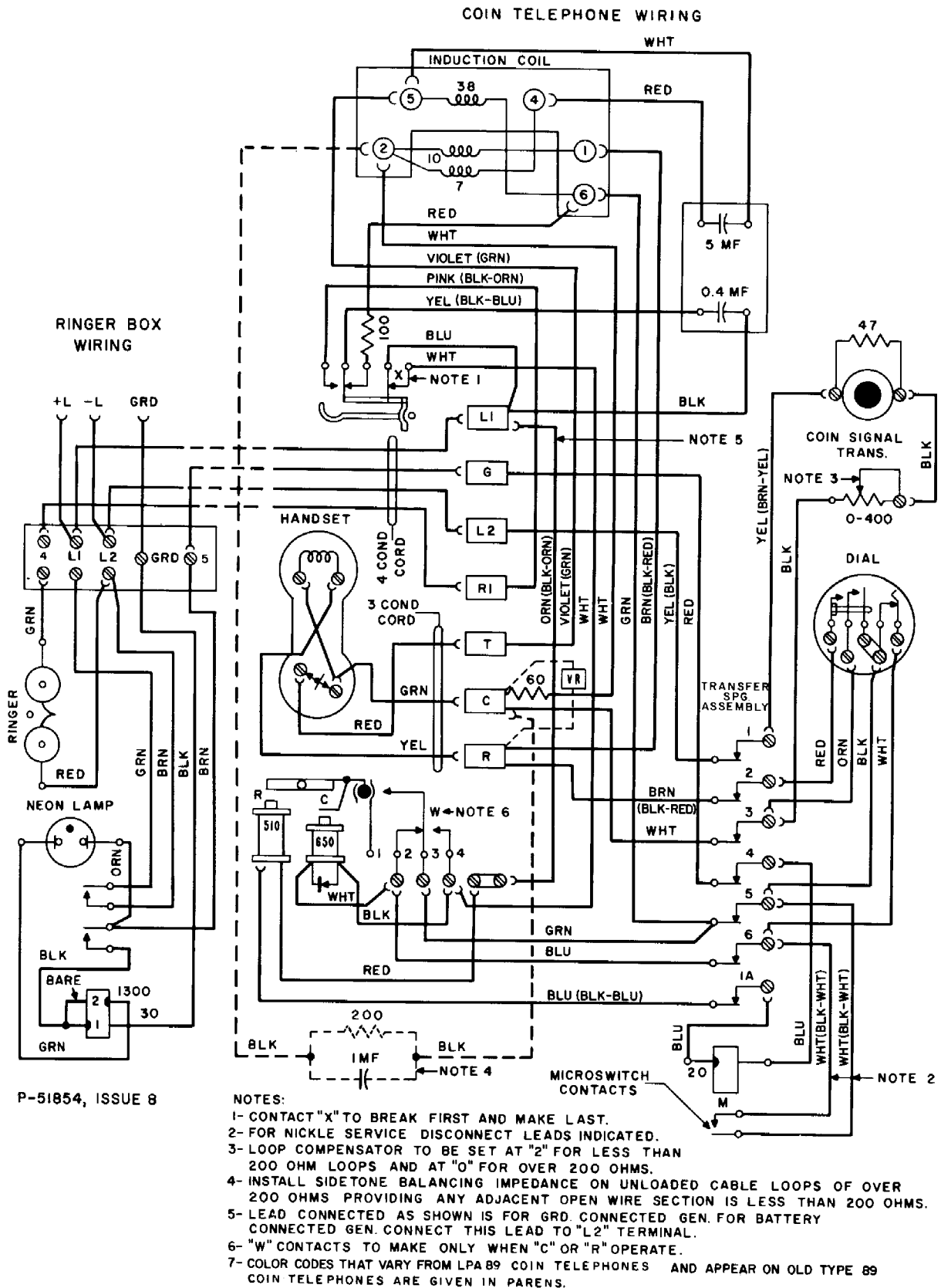
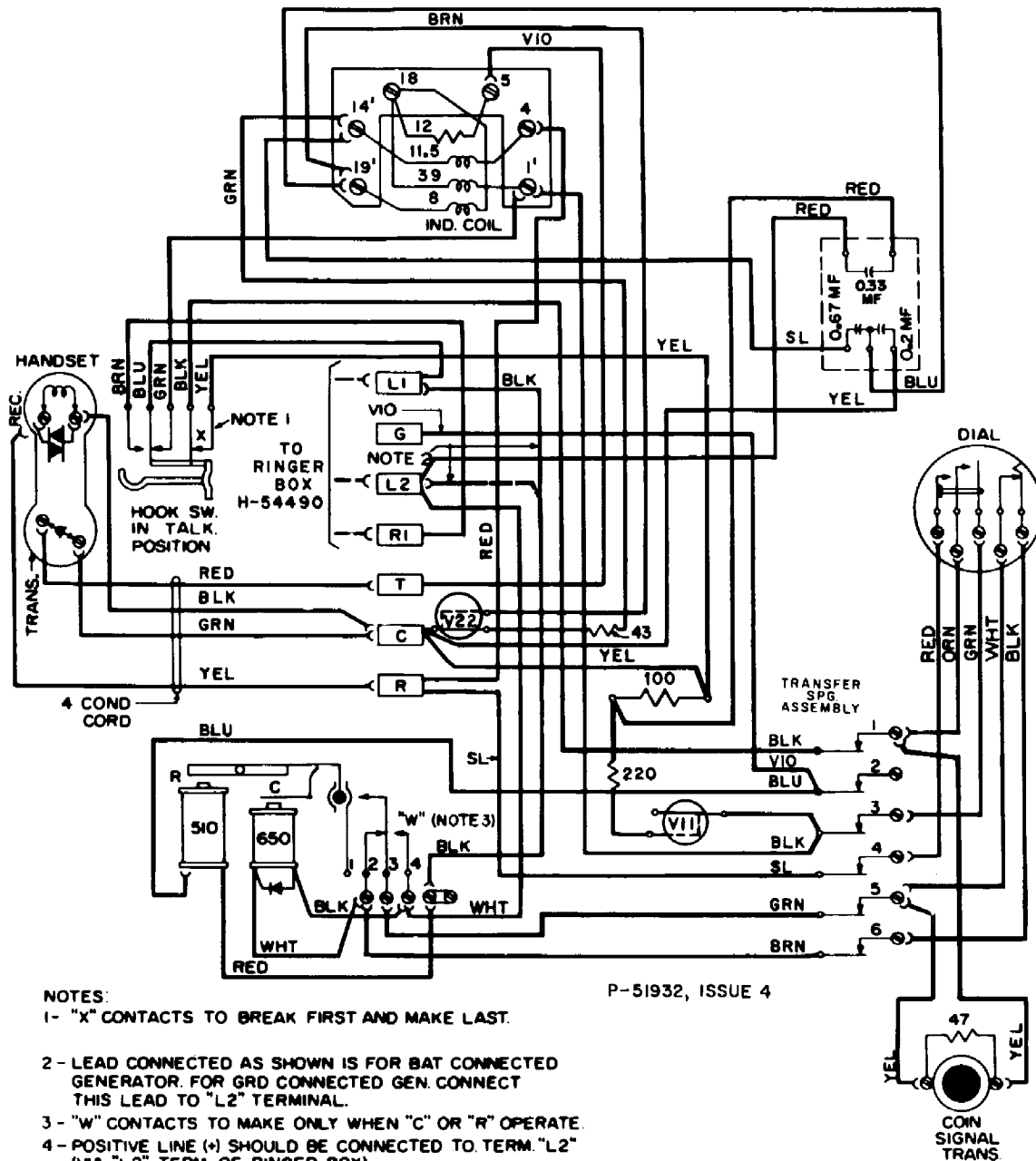
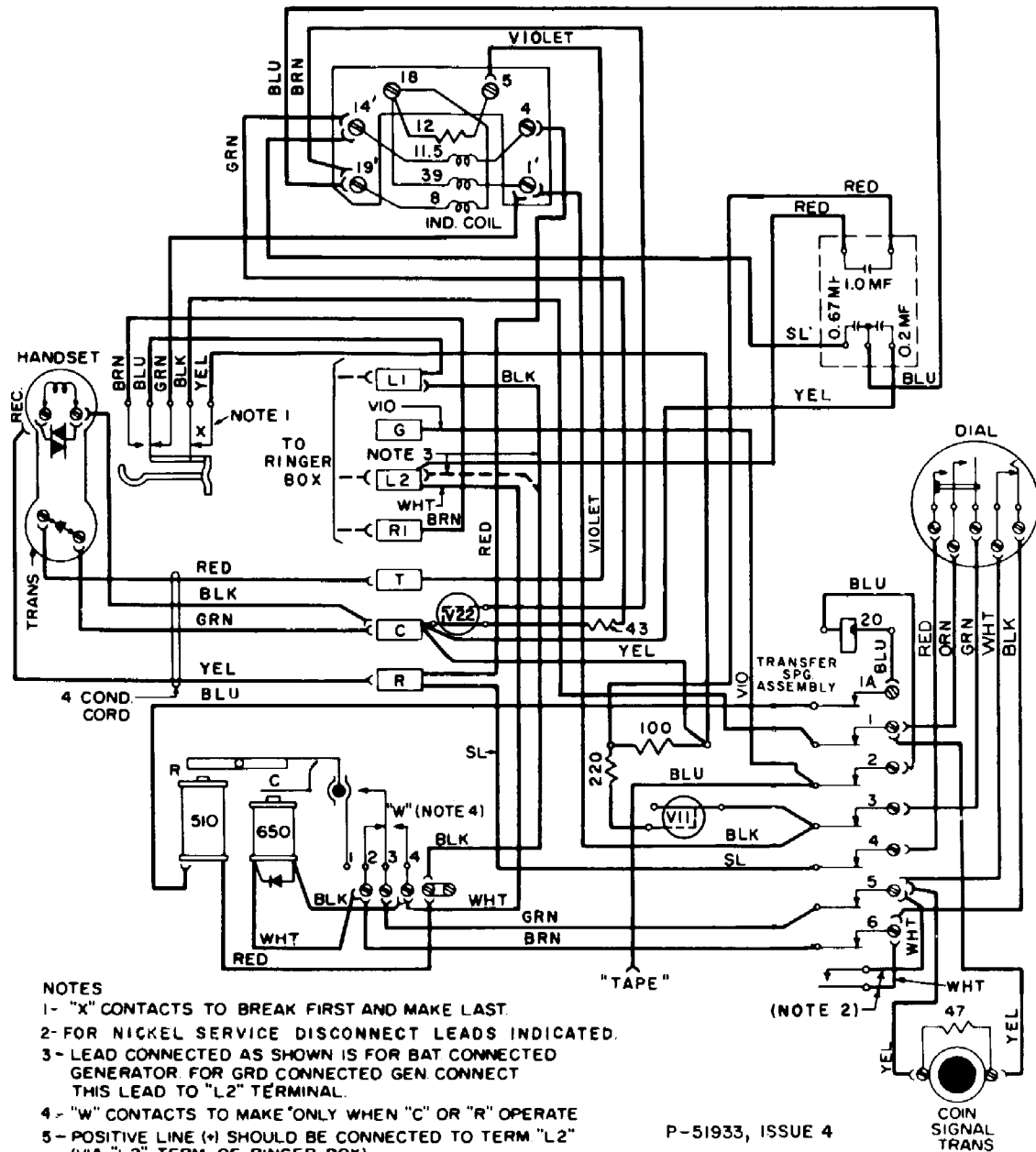


Figure 5. Type LPA 89-55, Wiring Diagram.



- 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 (GRO) 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.

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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.)

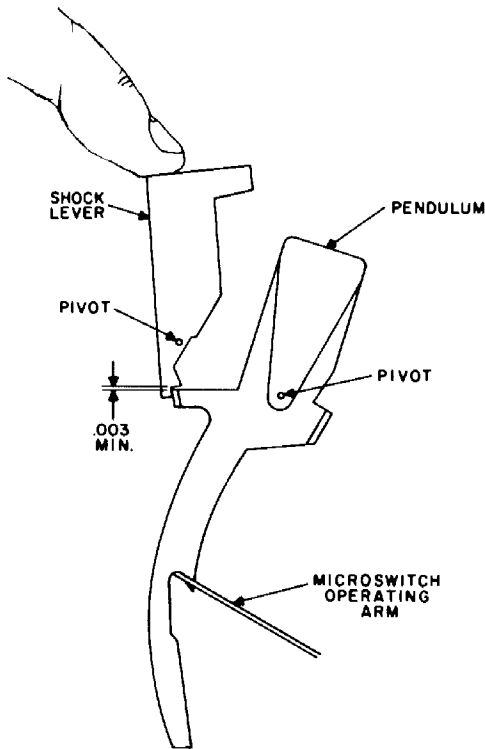


Figure 8. Pendulum and Shock Lever with Cover Removed.

- (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.

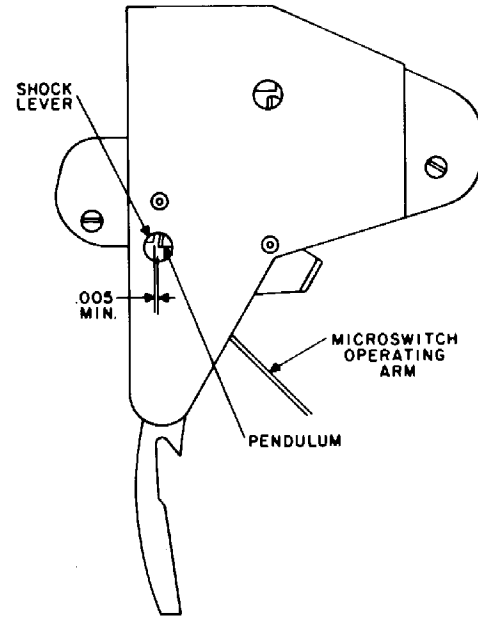


Figure 9. Pendulum and Shock Lever with Cover Installed.

- (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 traveled 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.

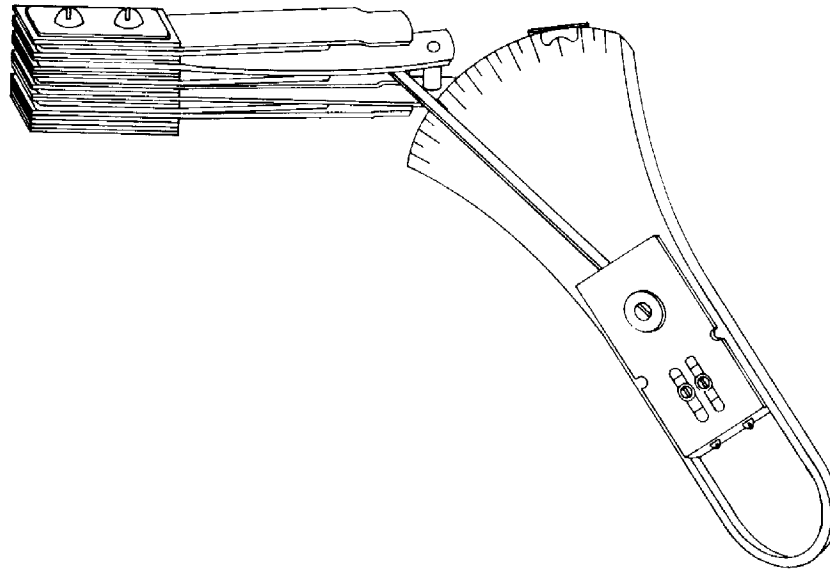


Figure 10. Testing Restoring Force of Hookswitch Contact Points.

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:

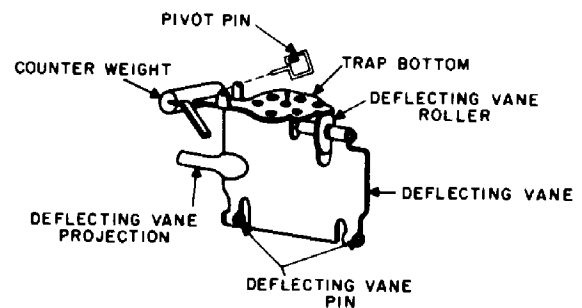


Figure 11. Coin Hopper.

- (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:

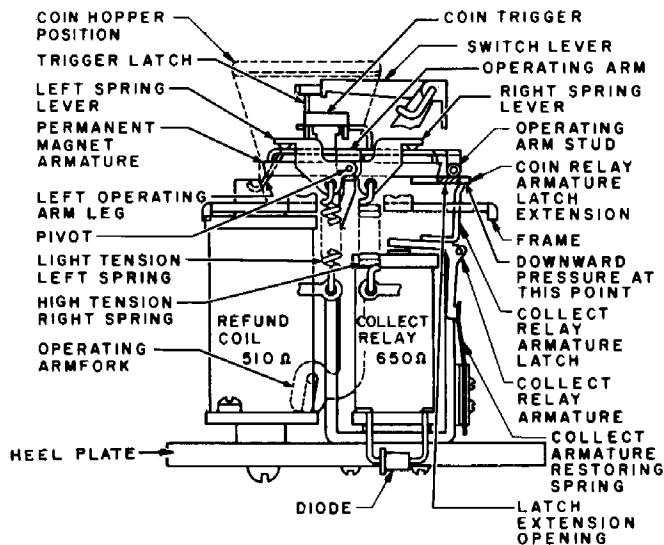


Figure 12. Coin Control Mechanism.

- (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.

Lower Housing Reassembly

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).

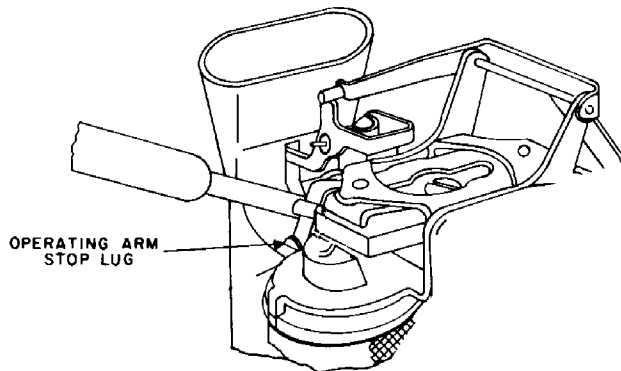


Figure 13. Adjust Operating-Arm Stop Lugs.

- (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

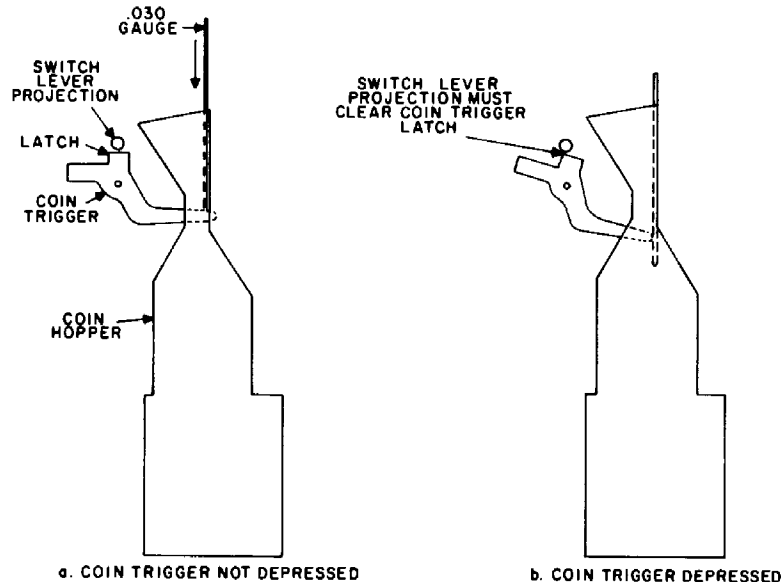
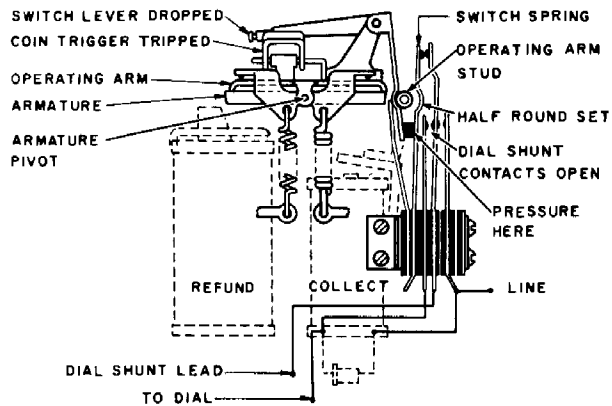


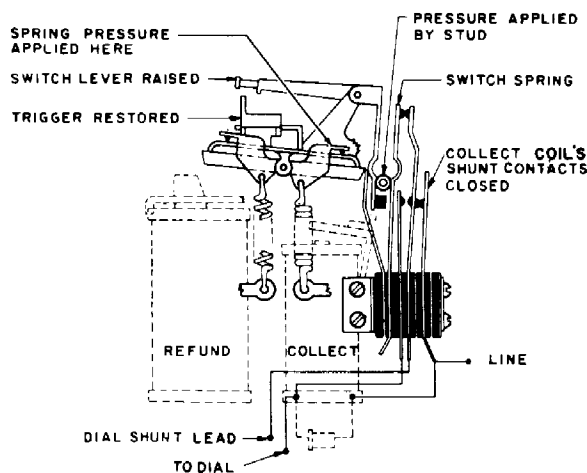
Figure 14. Checking for Clearance Between Switch Lever Projection and Coin Trigger Latch.

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.

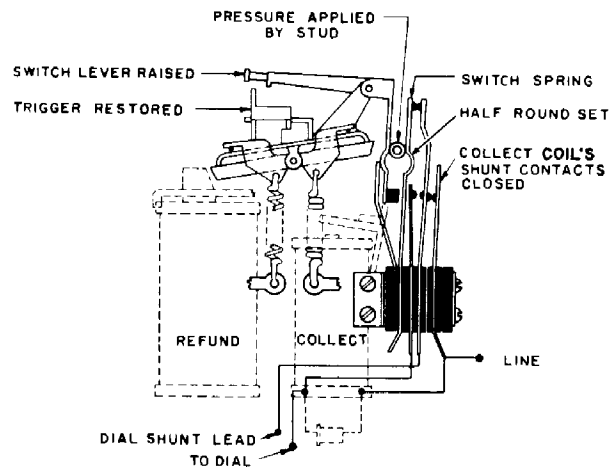
- (20) The switch lever should fall freely of its own weight when the force (pressure) of the switch lever restoring spring and the half-round spring are relieved and the trigger is tripped.
- (21) Check that the switch lever roller rises an equal distance above the coin trigger whether the armature 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.



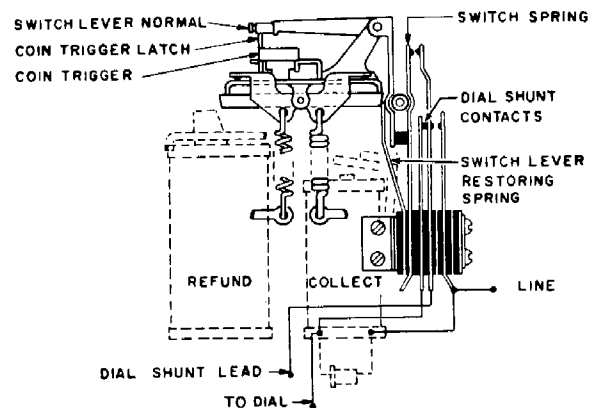
a. NORMAL POSITION



b. COIN DEPOSITED



c. COLLECT POSITION



d. REFUND POSITION

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.

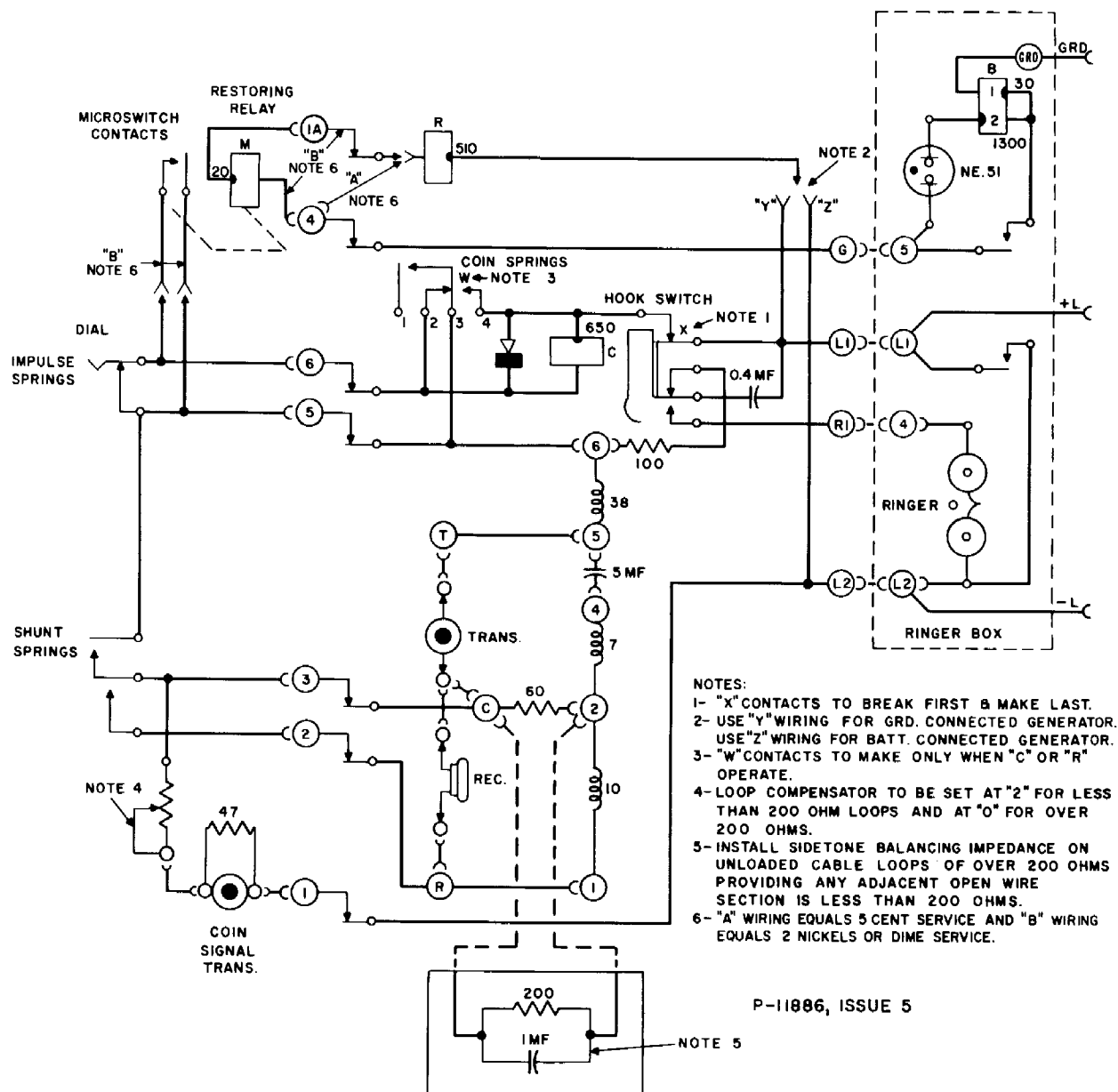


Figure 16. Schematic Diagram for Type LPA 89 Local Prepay Coin Telephone.

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:

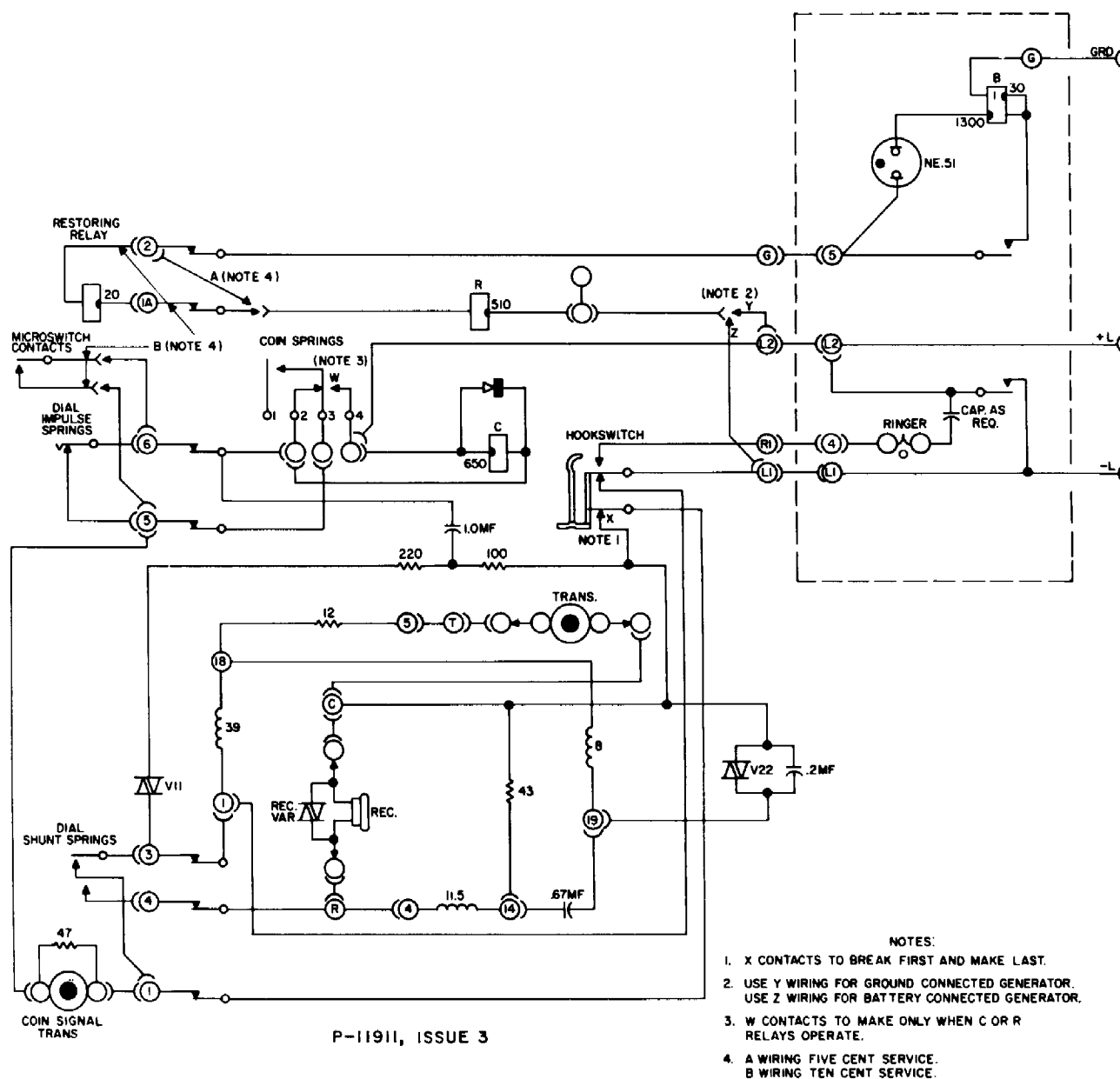
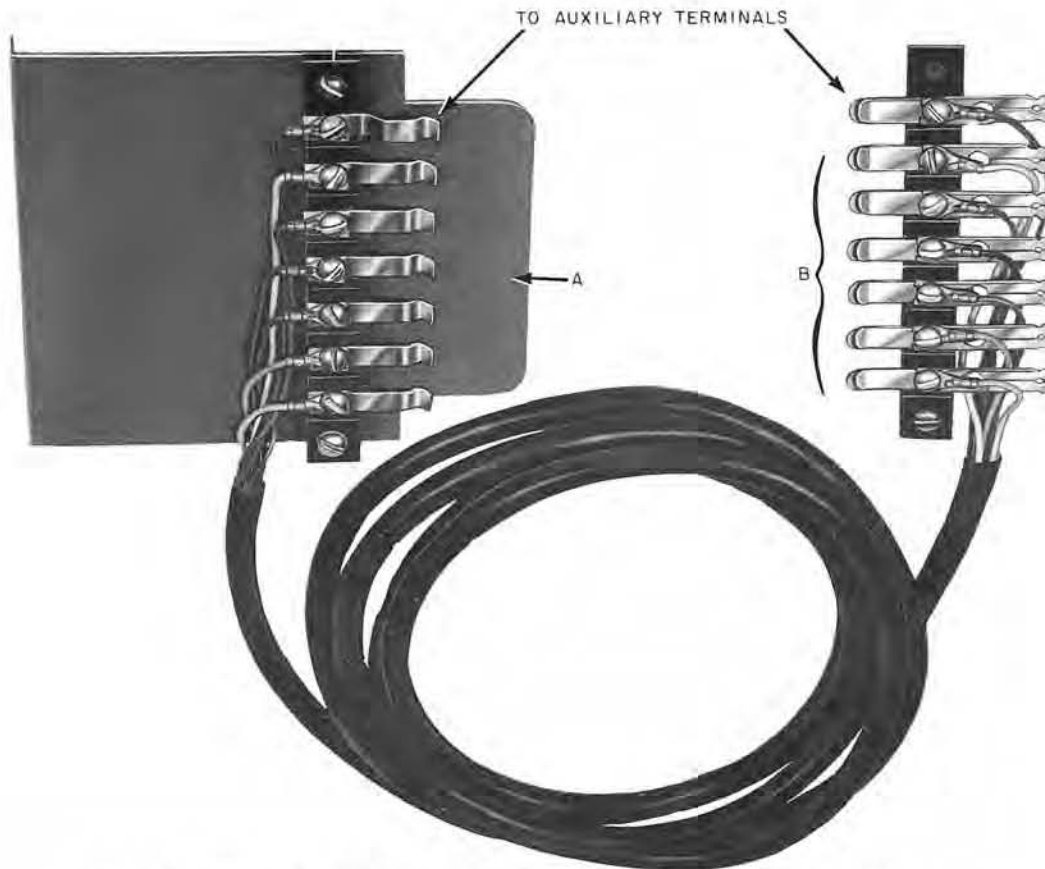


Figure 17. Schematic Diagram for Type LPB 89 Local Prepay Coin Telephone.



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- μ F 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- μ F 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- μ F 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- μ F 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- μ F capacitor reads approximately 0 ohms.
 - (2) YEL lead to BLK lead both on 0.4- μ F 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. Retractable 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.