

APP'D.	DR.	SIZE	E-61876-B	SHEET	1	TOTAL	14
DATE:			AUTOMATIC ELECTRIC COMPANY NORTH LAKE, ILL., U.S.A. GENOA, ILL., U.S.A. WAUKESHA, WISC., U.S.A.				
ISSUE 1							
7-10-64							
CO-2-E-61876-B							
Class C							
Changed							
Title,							
Sections							
1, 4,							
5.1, 5.3,							
6.2 and							
10							
3-10-66							
Issue 2							
Changed							
Sections							
1.00, 3.00							
4.00, 5.01							
5.03, 6.02							
and 8.00							
(for H-12							
4/68:sm							
Relich							
M.C.R.							
H/4/24/68							
Issue 3							

EXPLANATION  
OF  
PRE-PAY COIN TELEPHONE  
REPEATER CIRCUIT  
STUCK COIN ALARM RELEASE  
BOOSTER BATTERY  
OR 4TH WIRE METERING  
H-61876-B

FEATURES

1. Dial tone either before or after coin is deposited.
2. Prevents a call from being set up if no coin is deposited.
3. Permits a connection to be set up if a coin is deposited.
4. Repeats pulses to the switches ahead.
5. When called party answers,
  - 5.1 Sets itself to collect when calling party hangs up.
  - 5.2 Keeps the coin telephone so connected to Connector relay A that the coin telephone mechanism ground always is connected directly to the +winding of Connector relay A (and only thru the hookswitch to the -winding), so that the hookswitch of the calling party controls Connector relay A at all times.
6. If call is not completed or no answer is received or if call is intercepted, refunds the coin when calling party hangs up.

Written by

Approved by

ANM 3/17/66

E-61876-B

PTX-2200-2 (11-65)

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7. When calling party hangs up (except on CLR calls), this Repeater causes the coin telephone mechanism to collect or refund the coin deposited.
8. After coin telephone mechanism has disposed of the coin(s) deposited, the Repeater itself releases, and releases preceding equipment.
9. Causes an alarm to be given if the coin telephone apparatus fails to dispose of the coin deposited.
10. Permits booster-battery metering or fourth-wire metering on coin collections made by the Repeater.
11. Permits re-ringing by CLR Operator.
12. Collects coins on toll calls if the CLR Operator forgets to collect or to refund.
13. An amperite relay is provided to operate 30 seconds after the coin release cycle begins so as to release the switch train in case of a struck coin in the distant coin telephone.

OPERATION

1. Seizure <sup>\*</sup> (FIG 1A or 2A)

Absence of ground via lead C IN marks this circuit idle to preceding equipment. When the preceding switch finds the calling paystation, a circuit is closed to A via #1L, the line loop and #2L. Relay L does not operate since its windings are energized in magnetic opposition. Relay A operates, closes B, connects -OUT to +IN via capacitor P to extend dial tone from succeeding equipment to the coin telephone, connects dial tone to the coin telephone

SEE  
OVER TO 5.5f  
DOWN TO C ON  
H-61876-B

\* WRITTEN TO DESCRIBE HOW CALLING PARTY RECEIVES DIAL TONE WITH OUT DEPOSITING COIN, UNLESS 'Z' WIRING STRAP IS CUT (SEE TOP PAGE 3).

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CUT STRAPS 'Z' IF DIAL TONE IS TO BE  
 DELAYED UNTIL COIN IS DEPOSITED.

("Z" wiring see NOTE 3;H-61876-B),and closes a loop via lead +OUT, #2J, #1N, #1G, #1J and lead -OUT to the battery feed relay of the succeeding switch.

Relay B operates, grounds lead C IN to hold the preceding equipment, short circuits the pulse springs of A to prevent dial pulses from being repeated until a coin is deposited, closes #2N via resistor A in magnetic opposition to #1N,preventing N from operating, and connects resistance(resistor E)battery to lead C OUT. Diode CR1 and CR2 provide a low resistance shunt for the windings of J so that, with normal battery polarity via +OUT and -OUT, J does not operate. Relay G operates.

2. Calling Party Deposits Coin (Operated: Relays A, B and G)

When the calling party deposits a coin in the coin hopper, the coin telephone apparatus grounds lead +IN through the resistance of the magnets of the collect and refund apparatus. Current is decreased in #1L and increased in magnetically opposing #2L so that the magnetic fields no longer neutralize each other. Relay L operates and closes P.

After its slow-to-operate interval, P operates, locks, removes the short circuit from the pulse repeating contacts of A, connects dial tone via capacitor P from the succeeding switch to the paystation("Z" wiring omitted)and removes #2L from the loop to reduce impedance in the dialing circuit.

3. Repeating Pulses (Operated: Relays A, B, G, L and P)

Relay A follows the dial pulses and when at normal, it opens the loop to the succeeding switches via #1N and #1G, opening N and G, and closes C. Relay C operates,shunts #1L via resistor D, and removes the short- circuit from resistor B.Relay N will not operate due to high resistance

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TO THE LEFT OF RELAY 'N'.  
 (resistor A) in series with its #2 winding. Relay G restores. Relays B and C remain operated during pulsing due to their slow-to-release characteristics. Relay L either follows dial pulses or releases during the digit, depending upon resistance of the calling party's loop.

After pulsing of a digit is completed, the loop is closed via leads +IN and -IN, closing #1L and A. Relay A operates, closes the loop to succeeding equipment via CR1 and CR2, and opens C. After its slow-to-release interval, C restores, short-circuits resistor B, and transfers the loop to succeeding equipment from diodes CR1 and CR2 to the initial loop via diode CR1, #1N, #1G, and diode CR2, closing #1G, and #1N in magnetic opposition to #2N. Relay L operates (if released). Relay G operates and removes resistance (resistor D) ground from #1L.

#### 4. Called Party Answers (Operated: Relays A,B,G,L and P)

When the called party answers, battery polarity from the trunk is reversed, reversing the current through J, and closing #1N magnetically aiding #2N. Diodes CR1 and CR2 offer a high resistance to current flowing in this direction, and the current now flows through the windings of J. Relay J operates. Relay N operates its "X" contacts and locks by short-circuiting resistor A, operates fully, closes H and #2D, opens A,B, #1L, #1N and #1G to clear the trunk of attachments, connects lead -IN to lead -OUT, and lead +IN to lead +OUT and transfers lead C OUT from resistance (resistor E) battery to resistance (#2N) battery. Ground via lead C OUT holds N operated. After its slow-to-operate interval, D operates, locks via #1D, and transfers leads -IN and +IN to leads +OUT and -OUT, respectively.

Although lead -IN is connected to lead +OUT, and lead +IN to lead -OUT, the Connector back-bridge relay has

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just reversed the battery polarity from the Connector so that the polarity of lead +OUT actually is (-) and of lead -OUT is actually (+). Therefore, the ground through the Connector via lead -OUT is connected via lead +IN to the coin telephone mechanism ground directly and the battery through Connector relay A on lead +OUT is connected via lead -IN to the calling coin telephone's hook-switch. In this way, the coin telephone mechanism ground cannot hold Connector relay A if the calling party hangs up first, and Connector relay A is under control of the calling party's hookswitch at all times.

Relay H operates. Relays A and L restore. Relay G restores and connects lead +COLLECT to E and R ("B" WRG & APP) in series. After its slow-to-release interval, B restores.

5. Release (Operated: Relays H, J, N, P and D)

5.1 Called Party Disconnects First

When the called party disconnects first, battery polarity via the trunk is returned to normal by the associated switch opening J. Relay J restores, opens #2D, and closes S. Relay S operates and opens #1D. Relay D restores and transfers leads -IN and +IN to leads -OUT and +OUT respectively.

When the calling party disconnects, the trunk loop circuit via diodes CR1 and CR2 is opened to the Connector.

A relay in the Connector removes ground from lead C OUT, opening #2N. Relay N restores, opens H, P, and S, disconnects leads -IN and -IN from leads +OUT and -OUT, respectively, connects resistance (E1L and resistor D in multiple) ground to lead +IN, and closes M before H restores. Relay S restores. Relay P restores and disconnects the shunt from #1L via resistor D. Relay H remains operated due to its slow-to-release characteristics, keeping A disconnected from lead +IN. This prevents the operation of A, and, consequently, B to prevent re-seizure of the associated Selector when used with timed-idle Connectors (Strapped per NOTE 5; H-61876-B).

Relay M operates, grounds lead INT ST & ALM, disconnects resistance (#1L) ground from the line, connects leads -IN and +IN, and connects ground through the collect and refund apparatus at the coin telephone via lead +IN in series with R ("B" WRG & APP) and E, via lead +COLLECT to +110V battery. Relay E operates, lights lamp and closes #1K. After its slow-to-operate interval, K operates, locks, closes a locking circuit to H (which remains operated due to its slow-to-release characteristics), connects leads -IN and +IN, to capacitor A in series with resistance (resistor C) ground, and connects lead PU to #1F.

Normally, the +110V tilts the coin telephone coin-relay armature and the coin or coins fall into the coin receptacle. (The ground-connected coin telephone on coil relay remains connected to lead +IN as long as the +110 volts stay on.)

The ground on lead INT ST & ALM starts a timer, which at 1-second interval, alternately grounds lead INT GRD and lead PU.

INTERMITTANT.  
GROUND.

\* INTERMITTANT START  
AND ALARM

ISSUE

3

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During the first pick-up pulse, ground on lead PU closes #1F. Relay F operates, locks, connects #2G and #2K in multiple to lead INT GRD, opens the locking circuit to #1K, extends ground to lead ALM BAT via R, and connects booster battery via #2F to lead C IN (See NOTE 76; H-61876-B) or ground via #2F to lead EC IN (See NOTE 77; E-61876-B) for metering. After a momentary interval, a ground pulse via lead INT GRD holds K via #2K, and closes #2G. Relay G operates and disconnects lead +COLLECT from leads +IN and -IN, opening E. Relay E restores and opens #1K. Normally, the coin telephone coin relay has disposed of the coin or coins properly, and the armature now restores and opens the ground-connected coin-relay coils from lead +IN.

Usually the coin telephone coin-relay is opened from lead +IN, E does not re-operate and after a momentary interval, K is opened.

If the paystation coin-relay has been unable to dispose of the coin, properly, it remains closed to lead +IN. Relay E re-operates (via "A" WRG), holds K via #1K, and the coin-collect cycle is repeated. Relay K remains operated, alternately via #1K when E is operated and via #2K when G is operated, until the coin telephone mechanism clears or until a switchman responds to a signal brought in by the ground held on lead INT ST & ALM.

If a coin in the distant coin-telephone is not disposed properly, ground is extended to the heating coil of R. After approximately a 30 second time delay, R operates and opens the line loop via lead +IN and -IN from E, opening E (via "B" WRG & APP). Relay E restores and opens #1K. The following release operation is the same as normal release operation.

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Relay K restores, extinguishes lamp, disconnects capacitor A in series with resistance (resistor C) ground from lead -IN and +IN, and opens H. After its slow-to-release interval, H restores, removes metering booster battery or ground via lead C IN or EC IN, respectively, and opens M. Relay G restores and connects lead -REFUND to E and R ("B" WRG & APP) in series. After its slow-to-release interval, M restores, opens F, removes ground from lead INT ST & ALM, removes coin control battery from both lines, and removes ground from lead C IN (releasing the preceding switch and marking this circuit idle). Relay F restores and disconnects #2K and #2G from lead INT GRD. The circuit is now at normal.

## 5.2 Calling Party Disconnects First

When the calling party disconnects first, J restores when the line loop is opened and opens #2D.

When the called party disconnects the circuit to S is closed. Relay S operates and opens #1D. Relay D restores and transfers leads -IN and +IN to leads -OUT and +OUT, respectively. The succeeding operation is same as described in Section 5.1.

## 5.3 When Call Is Not Completed (Operated: Relays A, B, G, L and P)

When the call is not completed, the battery polarity via the trunk is not reversed, relays N and J remain normal, and the line loop remains closed through A and #1L.

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When the receiver at the coin telephone is replaced, A and #1L are opened. Relay L restores. Relay A restores, opens #1G, #1J, #1N and B, closes C and opens the trunk loop, releasing the succeeding switches. Relay G restores. Relay C operates. The succeeding switches restore and remove ground from lead C OUT. After its slow-to-release interval, B restores, opens #2N (not operated), removes resistance (resistor E) battery from lead C OUT, and opens P. Relay P restores, transfers lead +IN from resistance (A) to (A and #2L in series) battery, closes M, and opens C. Relay C is slow-to-release and remains operated long enough to permit M to operate and to keep lead C IN grounded until M operates. Relay M operates, closes a circuit from ground through the collect and refund apparatus at the coin telephone and connects lead +IN in series with R ("B" WRG & APP, and E, to lead -REFUND (-110V battery), removes resistance (#2L and A in series) battery from lead +IN, and grounds lead INT ST & ALM. Relay E operates, lights a lamp to indicate that the coins are being returned, and closes #1K. After its slow-to-operate interval, K operates, locks, connects leads -IN and +IN to capacitor A in series with resistance (resistor C) ground, and connects lead PU to #1F. After its slow-to-release interval, C restores. Ground via lead PU closes #1F. Relay F operates, locks, and connects lead INT GRD to #2G and #2K, and grounds lead ALM BAT.

During the next INT GRD pulse, G operates, opens E, and gives the coin telephone coin-relay time to restore and

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disconnect from the line. At the end of the INT GRD pulse, G restores and connects lead -REFUND and -110V to leads -IN and +IN to test whether the coin or coins have been refunded satisfactorily as described in Section 5.1.

Assuming the coin or coins have been disposed of properly, E restores and opens K. Relay K restores, extinguishes lamp, removes from the line capacitor A in series with resistance (resistor C) ground and opens M. After its slow-to-release interval, M restores, removes ground from lead INT ST & ALM, removes -110V battery from both sides of the line, opens #1F, and removes ground from lead C IN to release the preceding switch and mark this circuit idle. Relay F restores, disconnects #2G from lead INT GRD, and removes ground from lead ALM BAT. The circuit is now at normal.

## 6 Calling Party Fails To Deposit Coin

### 6.1 Seizure

When this switch is seized, it performs as described in Section 1. When the calling party does not deposit a coin, L and P remain unoperated. The succeeding switch cannot be stepped because the impulse springs of A remain short circuited. Due to its great sensitivity, L can sometimes be caused to flutter by slightly unequal voltages induced in its two windings by interruptions of the line circuit, but P is slow-to-operate so that momentarily closing of its circuit does not operate it.

### 6.2 Release (Operated: Relays A, B and G)

When the receiver at the coin telephone is replaced, A and

both windings of unoperated relay L are opened. Relay A restores, closes C, and opens B. Relay C operates, removes the short circuit from resistor B, and short circuits the series resistance consisting of resistor B, #1N, and #1G, part of the loop to succeeding equipment. Relay G restores. After its slow-to-release interval, B restores, opens C, opens the loop to succeeding equipment via the windings of J, closes M, and disconnects resistance (resistor E) battery from lead C OUT. The succeeding switch restores and removes its ground from lead C OUT. Relay M operates, grounds lead INT ST & ALM, and connects lead -REFUND and -110V via relay E to leads -IN and -LN. After its slow-to-release interval, C restores, short-circuits resistor B, and opens M. After its slow-to-release interval, M restores, removes ground from lead INT ST & ALM, removes ground from lead C IN to release preceding switches and to mark this circuit idle, and removes lead -REFUND and -110V battery from leads +IN and -IN.

## 7. Calls To CLR Operator ?

### 7.1 Call Is Initiated

A coin must be deposited before dialing the CLR Operator. The circuit operates as described in Sections 1, 2, and 3.

When the CLR Operator answers, battery polarity is reversed to the trunk, closing J and #1N magnetically aiding #2N. Relay J operates. Relay N operates, locks, and closes H and #2D. Relay D and H operate as described in Section 4. The CLR trunk then sends -110V battery back via the trunk to refund the coin used in calling the Operator. Thereafter, conversation takes place between subscriber and Operator.

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## 7.2 Calling Party Disconnects (Operated: Relays J, N, H and D)

The Operator suggests that the calling party disconnects due to a short delay on the call. (It is assumed that the CLR Operator holds the coin telephone line engaged until she is able to complete the call). When the calling party disconnects, J is opened, and ground on lead C OUT at the toll switchboard holds the intervening switch-train and holds N. Relay J restores and opens #2D. Relay N holds H which grounds lead C IN to hold preceding switches. Relay D remains operated via its #1 winding. Relay S does not operate due to the high resistance path offered by diode CR3.

## 7.3 Operator Re-Rings

Relay N of this Repeater has the calling line switched through to the toll switchboard with no attachments (except J) so the Operator rings back through the Repeater to the paystation.

When the calling party answers, J operates and conversation may now take place.

## 7.4 Coin Control

Collection or refund of coins deposited for the long distance call is controlled by the Operator from 110V sources in her switchboard circuits.

An exception is that if the Operator should forget to collect the coins at the end of the call, the Repeater collects automatically as described in Section 6.

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## 7.5 Release

Release is under control of the CLR Operator.

After the call is completed and the parties disconnect, the Operator disconnects and removes ground from lead C OUT. Relay N (and possibly D) restores, and the operations described in Section 6 takes place, including placing +110V on lines +IN and -IN, except that E, F, G and K do not operate as there should be no coins in the hopper at this time. (If the Operator has forgotten to collect the coins at the end of the toll call, they are collected when the Operator disconnects, as described in Section 6.2.) Restoration of relay M removes ground from lead C IN, releases the calling line, and marks this Repeater Idle.

## 8. Busy Key

BUSY KEY provides a means of grounding lead C IN to prevent seizure.

## 9. Test Jack

TEST JACK permits testing or monitoring and grounds lead C IN to mark the switch busy. Lamp TEST JK indicates when coin telephone +COLLECT or -REFUND battery is being applied by this switch. This indication aids tracing alarm conditions and also warns test men not to interrupt for routing during coin-control operation.

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# 10. Metering

For fourth-wire metering (NOTE 7; H-61876-B), the meter of the calling line equipment is connected by preceding equipment to lead EC IN of the Repeater. For booster-battery metering (NOTE 7; H-61876-B), the meter is connected to lead C IN. When the called party answers, H operates, and at the end of the call, F operates during the collection of the coin, connecting ground to lead EC or booster battery to lead C IN, operating the meter.

The meter records collections made on local calls only (except that it also registers collections made by this Repeater on toll calls when the Operator forgets to collect).

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