EXPLANATION OF PRE-PAY PAYSTATION REPEATER CIRCUIT BOOSTER BATTERY METERING H-61875

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 paystation so connected to connector relay A that the paystation-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.
7. When calling party hangs up (except on C.L.R. calls), this repeater causes the paystation mechanism to collect or refund the coin deposited.
8. After paystation 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 paystation apparatus fails to dispose of the coin deposited.
10. Permits booster-battery metering ("X" wiring) or fourth-wire metering ("Y" wiring) on coin collections made by the repeater.

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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 stuck coin in the distant paystation.

OPERATION

1. Seizure

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 due to its windings being energized in magnetic opposition. Relay A operates, closes B, closes dial tone from the succeeding switch to the paystation ("Z" wiring used), and closes a loop via lead +OUT, #2J, #1G, #1N , #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 impulse springs of A to prevent dial pulses from being repeated until a coin is deposited, closes lead CH1 to CH2 to extend the CHAIN CKT., closes ground to #2N via resistor A, and grounds lead C OUT. The windings of N are closed in magnetic opposition. Relay N does not operate at this time. Diodes CR1 and CR2 provide a low resistance shunt for current flowing in this direction and 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 paystation apparatus grounds line +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.

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Relay P operates, locks, removes the short circuit from the pulse repeating contacts of A, closes dial tone 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. When at normal, A opens the trunk loop to repeat the pulses to the succeeding switches and closes C. Relay C operates, short circuits resistor D across #1L and removes #1G and #1N from the trunk loop to improve dialing. 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 the last pulse of each digit, A remains operated, L (if released) reoperates, and C restores, opening the short circuit through resistor D, and transferring the trunk loop back to #1G and #1N. Relay G operates.

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

When the called party answers, battery polarity on the trunk is reversed, reversing the current through J, #1G and #1N. The two windings of N now aid each other. 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, locks, closes multiple circuit across the CHAIN CKT., closes a multiple circuit to P, closes H, opens A, B, #1L, #1N and #1G to clear the trunk of attachments, closes lead -IN to lead -OUT, and lead +IN to lead +OUT, and closes #2D. Relay D operates, locks and transfers leads -IN and +IN to leads +OUT and -OUT respectively.

Although lead -IN is closed to lead +OUT, and lead +IN to lead -OUT, the Connector back-bridge relay (usually D) has just reversed the battery-feed by Connector relay A so that the polarity of lead +OUT actually is (-) and of lead -OUT is actually (+). Therefore, the ground through Connector relay A on lead -OUT is connected via lead +IN to the paystation-mechanism ground directly and the battery through Connector relay A on lead +OUT is

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connected via lead -IN to the calling paystation's hookswitch. In this way, the paystation-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, closes a multiple ground on lead C IN, and prepares a circuit to close +110 volt and +COLLECT battery on the line to the paystation when the calling party hangs up. Relays A, G and L restore. Relay B restores, opens multiple circuit across the CHAIN CKT., removes multiple ground from lead C IN, and removes multiple holding ground from P.

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

5.1 Called Party Disconnects First

When the called party disconnects first, battery polarity on the trunk is returned to normal by the Connector, releasing 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.

That is, the paystation-mechanism ground directly on lead +IN is connected to lead +OUT and to the ground-connected winding of Connector relay A, and the paystation-mechanism ground is connected only through the hookswitch to lead -IN and to lead -OUT and to the battery -connected winding of Connector relay A. In this way, the paystation-mechanism ground cannot hold Connector relay A after the calling party hangs up, and Connector relay A is under control of the calling party's hookswitch at all times.

When the calling party disconnects, the trunk loop circuit through J is opened and Connector relays A and B restore. Connector relay B removes ground from lead C OUT, opening #2N. Relay N restores, opens the CHAIN CKT., H, P, and S, and closes M before H restores. Relays P and S restore.

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Relay M operates, grounds lead INT. ST & ALARM, connects a multiple ground to lead C IN ("Y" wiring) so that the preceding switches do not release until the deposited coin is collected, opens A and L from the line so 110-volt battery is not crossed with switchboard battery, closes ground through the collect and refund apparatus at the paystation, via lead +IN, in series with E, via lead +COLLECT, to +110V. battery, and removes lead C IN from lead C OUT ("N" wiring). Relay E operates, lights lamp TEST JK, and closes #1K. Relay K operates, locks, closes a multiple ground to lamp TEST JK, closes a locking circuit to H (which remains operated due to its slow-to-release characteristics), closes both sides of the line to capacitor A in series with resistor C to ground, and closes lead PU to #1F.

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

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

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, and connects booster battery to lead C IN ("X" wiring) or ground to lead EC IN ("Y" wiring) for metering. After a momentary interval, a ground pulse on lead INT. GRD. holds K via #2K, and closes G. Relay G operates, and opens leads +110V. and +COLLECT from leads +IN and -IN. Relay E restores and opens #1K. Normally, the paystation 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 paystation coin-relay is opened from lead +IN, relay E does not re-operate and after a momentary interval, K restores.

If, however, the paystation coin-relay has been unable to dispose the coin, properly, it remains closed to lead +IN. Relay E re-operates, holds K via #1K, and the coin-collect cycle is repeated. Relay K remains operated,

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alternately via #1K when E is operated and via #2K when G is operated, until the paystation mechanism clears or until a switchman responds to a signal brought in by the ground held on lead INT. ST. & ALARM.

Relay K restores, extinguishes lamp TEST JK., opens the trunk from capacitor A and resistor C in series with ground, and opens H. Relay H restores, opens M, removes metering booster battery or ground, and transfers lead C IN to ground at springs of M ("X" wiring). Relay M restores, opens F, removes ground from lead INT. ST. & ALARM, removes coin control battery from both lines, removes ground from lead C IN (releasing the preceding switch and marking this circuit idle), and closes lead C IN to lead C OUT. Relay F restores and opens #2G from lead INT. GRD.

5.2 Calling Party Disconnects First

When the calling party disconnects first, release is similar to that described in Section 5.1 except that J restores when the line loop is opened (rather than by battery reversal when the called party disconnects, as described in Section 5.1). Relay S does not operate because of the high resistance path offered by diode CR3. Relay D restores when ground is removed from lead C OUT.

5.3 When Call is not Completed (Operated: Relays A, B, G, L and P)

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

When the receiver at the paystation 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 and closes a multiple ground to lead C IN. The succeeding switches restore, removing ground from lead C OUT and thereby opening #2J and #2N. Relay B restores, removes multiple ground from lead C IN, opens CHAIN CKT. and opens P. Relay P restores, 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

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operates, closes a circuit from ground through the collect and refund apparatus at the paystation, and connects lead +IN, relay E, to lead -REFUND and -110V. battery; removes lead C IN from lead C OUT ("N" wiring), removes A and L from the line, closes a multiple ground to lead C IN, and grounds lead INT. ST. & ALARM. Relay E operates, lights lamp TEST JK., and closes #1K. Relay K operates, locks, closes both sides of the line to capacitor A in series with resistor C to ground, closes a multiple ground to the lamp, closes a multiple ground to M, and closes lead PU to #1F. Relay C restores, removes a multiple ground from M, and removes multiple ground from lead C IN. Ground on lead PU closes #1F. Relay F operates, locks, and closes lead INT. GRD. to #2G and #2K.

During the next INT. GRD. pulse, G operates, releases E, and gives the paystation coin-relay time to restore and disconnect from the line. At the end of the INT. GRD. pulse, relay G recloses -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, K restores, extinguishes lamp TEST JK., removes from the line the capacitor A and resistor C in series with ground and opens M. Relay M restores, removes ground from lead INT. ST. & ALARM, removes -110. 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 and opens #2G from lead INT. GRD.

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.

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

When the receiver at the paystation is replaced, A and both windings of unoperated relay L are opened. Relay A restores, closes C, and opens B, #1G, and #1N. Relay G restores. Relay C operates and places a multiple ground from leadC IN, opens the trunk loop to release the succeeding switches, opens the CHAIN CKT., opens C, and closes M before C restores. The succeeding switch restores and removes its ground from lead C OUT. Relay M operates, grounds lead INT. ST. & ALARM, places a multiple ground on lead C IN, removes lead C IN from lead C OUT, and closes -110V. to both sides of the line. Relay C restores, opens M, and removes multiple ground from lead C IN. Relay M restores, removes ground from lead INT. ST. & ALARM, removes ground from lead C IN to release preceding switches and to mark this circuit idle, removes ground from lead C OUT, opening #2J and #2N, removes -110V. battery from both sides of the line, and closes lead C IN to lead C OUT.

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

7.2 Calling Party Disconnects

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 paystation 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

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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 does so automatically as described in Section 6.

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 take 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, closes lead C IN to lead C OUT, and marks this repeater idle.

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8. Busy Key

BUSY KEY provides a means of grounding lead C IN to prevent seizure. Leads CH1 and CH2 are closed for ATB circuit.

9. Test Jack

TEST JACK permits testing or monitoring and grounds lead C IN to mark the switch busy. Lamp TEST JK. indicates when paystation +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 routining during coin-control operation.

10. Metering

For fourth-wire metering ("Y" wiring), the meter of the calling line equipment is closed by preceding equipment to lead EC of the repeater. For booster-battery metering ("X" wiring), the meter is connected to lead C. 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 ("Y" wiring) or booster battery to lead C ("X" wiring), 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).

(5) WMS
(6) RRL:jp

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