

CABLE ADDRESS "NORTHPHONE"

THE NORTH ELECTRIC MANUFACTURING COMPANY

MACHINE SWITCHING
TELEPHONE SYSTEMS

GENERAL OFFICES AND FACTORY
GALION, OHIO
U. S. A.

ORIGINAL PARTNERSHIP
ESTABLISHED 1884

Mr. M. H. Enschede
The Pacific Telephone & Telegraph Co.
620 Northern Life Tower
Seattle, Washington

Dear Mr. Enschede:

After the telephone conversation of a couple of weeks ago with you and Mr. McKay, we checked over the features you desired in your magneto line circuits and it appears technically practical to provide appropriate circuits. We do not, however, have any standard circuit which properly fills the bill.

We have a list of standard circuits approved for issue to Bell companies, and Western Electric has asked us not to furnish any new or non-standard circuit except at their request. Furthermore, any new circuit must be checked and approved by Bell Laboratories. Because of this condition, of which I myself was not fully aware when I talked with you, we cannot modify a standard circuit or provide a new circuit to fit some particular situation unless a request for the same comes down thru official Bell channels.

Enclosed is a copy of a standard circuit which illustrates some of the features in which you were interested, though it does not fit your situation in some important respects. More about this will be mentioned later.

Confirming our conversation on dial back trunks, the operation of these trunks is as follows: A subscriber can call the trunk in the normal manner, then the operator can dial back over the same trunk to another subscriber or trunk. If the operator pulls her plug after such a three-way connection is set up, the circuit may be arranged to perform in either of two manners: (a) to not release the trunk, or (b) to release the trunk, leaving the subscribers connected together in the automatic exchange and leaving the trunk free to accept other calls. On a simple two-way call from subscriber to operator or operator to subscriber, pulling the plug does not release the trunk (unless subscriber also hangs up) regardless of whether scheme (a) or scheme (b) is supplied. Trunks arranged for scheme (b) are sometimes termed "dial-assistance" instead of "dial-back".

It is suggested that you obtain cost information on dial-back trunks from Western Electric, as it appears to be a matter of policy for them, and not us, to provide quotations for Bell operating

(Continued)

companies on standard items of our equipment. Each dial-back trunk contains selection relays to connect that trunk to any link; therefore the cost is not a matter of the trunks alone but also depends on the number of links on the board.

The enclosed circuit CC-3989 was designed for a special connection to a magneto office. It could be used for a magneto subscriber line, in which case the terms "magneto trunk", "magneto office" and "magneto operator" in the circuit description would be interpreted to refer to the magneto subscriber line.

This circuit does not distinguish between a single ring and a code ring from the magneto line, which would be a serious limitation to its use on a subscriber line. You will also note that on a call to the magneto line, the ringing code is sent only once, after which the ringing is automatically tripped; whereas for use on a subscriber line it might be preferable to have the usual repeated ring, with the ringing tripped by the subscriber sending in a ring from his magneto.

Relays E, F and G are used to apply a ring-off signal to the magneto line when the party on the other end of the link hangs up (sections 2.2 and 2.4 of the description). These relays would not be used if the magneto line were a subscriber line.

When a subscriber rings in, relays Q and P operate (section 2.3). If a second ring were sent, relay Q would be shunted down during the ring and relay P would release after the ring, opening the d-c loop to the switchboard. Thus any odd number of rings would leave the line landed on the board, while any even number would leave it disconnected. Although this arrangement could be used to distinguish simple codes, it would not be the ideal scheme for general use.

On any completed call, relays A and B (and perhaps L) are operated, and the d-c loop to the switchboard is closed through N-b2 and B-m2. When the party (or operator) at the opposite end of the link hangs up, relay B in the magneto line releases; thus the release of the party at the opposite end of the link causes the magneto line to release also.

If, on a completed call, the magneto line rings off, the operation of relay N opens the d-c loop to the switchboard at N-b2. If the magneto line were connected through the board to another magneto line, a ring-off from either line would thus drop both ends of the connection (see the preceding paragraph).

The circuit DC-3370 which I enclosed in my previous letter (and which, incidentally, is not a standard Bell circuit) contains an arrangement for distinguishing between a single ring and a code ring. By combining this idea with some of the features of CC-3989, and

eliminating unnecessary "gingerbread", it would be possible to make a circuit which would provide the features you desired. A search of our circuit file, however, shows that we do not have a standard circuit with this combination of features, and, as previously mentioned, official procedure would prevent us from initiating the design of such a circuit for you. CC-3989 appears to be the standard circuit which comes closest to meeting your requirements, and if you could make use of it (perhaps with minor modifications), it could, of course, be supplied without difficulty.

Yours very truly,

THE NORTH ELECTRIC MFG. COMPANY

W. H. Blashfield

W. H. Blashfield
Development Laboratory

May 2, 1946
WHBlashfield/mer

Enclosures: CC-3989
Circuit Description

CIRCUIT DESCRIPTION

CO-3989 ISSUE #1
TWO-WAY NON-DIAL TRUNK TO MAGNETO OFFICE FROM CONNECTOR
MULTIPLE WITH RELAYED CODE RING FROM LINK.
REPEAT COIL BRIDGE, AND RING-OFF SUPERVISION

CC-3989 - SERIAL #1

1. GENERAL DESCRIPTION

This circuit description CO-3989, Issue #1 covers Serial #1 of CC-3989.

This trunk circuit is designed for operation between the connector multiple of a North "All-Relay" Automatic Exchange and a magneto office. The trunk is arranged for relayed code ringing from the automatic exchange link and ring-off supervision.

1.1 Designation of Equipment

In the following description, relays are referred to by the letter or number assigned to them on the circuit drawing. The actual relays in the unit are marked with the same designation.

The following abbreviations are used for relay contacts:

Make Contact: #1, #2, #3, #4, #5, #6,
m1, m2, m3, m4, m5, m6.

Break Contact: #1, #2, #3, #4, #5, #6,
b1, b2, b3, b4, b5, b6.

This designation is preceded by the letter or number of the relay in question, thus, for example:-

A-m1 refers to relay A, make contact #1.
1-b3 refers to relay 1, break contact #3.

The relay contacts are counted from left to right, looking at the front of the unit.

The relay designations alone, without a contact abbreviation refers to the winding or coil of the relay.

2. OPERATION

2.1 Call to Magneto Office

When the subscribers or manual office operator has dialled the trunk code and the connector has selected the trunk, relay C becomes operated by ground over test wire P thru 150 ohms in the connector. This ground also causes the trunk to test busy to other connectors.

Relay C operates relay D thru C-m5 and relay A thru C-m2 and L-b3. Relay A steps-up the automatic trunk selection thru A-m2.

When the opposing windings of relay B become energized with currents of equal strength, these windings balance each other and the relay will not operate. If one winding receives a lesser amount of current, the unbalance will cause the relay to operate.

The windings of relay B are energized with direct ground thru A-m1 and ground thru 150 ohms resistance in connector P wire thru A-m5; relay B is operated.

Ring current from the automatic link thru D-m1, D-m3 condenser Z and repeat coil windings operates relay M.

Relay M operates relay N which operates relay J. (Relays P and Q operate and release having no functions at this time).

Relay J operates relay K and it in turn operates relay L which locks thru A-m1.

Relay C is held operated thru K-m3 and L-m3. Relay K is a slow release type of relay and remains operated during the short interval of time between code components. When the silent period between successive codes occurs relay K releases, opening the circuit for relays C and D which remove relay M and rectifier units from the loop. This limits the code rung on the magneto trunk to one complete train of code impulses. Relay N operates relay H thru N-m5 to send the code to the magneto office thru H-m1 and H-m3.

The release of relay C closes the loop circuit for the automatic link answer relays D and E which operate and supply talking battery for the connector. The magneto operator may now answer verbally.

2.2 Release of Connection on Call to Magneto Office

When the calling party releases, relay B of the link releases operating link relay PL which puts direct ground on the connector P wire releasing trunk relay B. (See B relay Section 2.1) The operation of relay B operated relay E, which remained operated until the B relay releases and establishes a new circuit for relay E.

Relay E being a slow release relay locks up thru B-b1, E-b1 and A-m4 to the ground on the MH lead.

Relay F operates when relay B is released thru B-b3 and E-m3 and operates relay G.

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Relay G holds relay A, in turn holds the trunk, and starts the converters thru G-m2.

The starting of the converters removes ground from lead MH and releases relay E. Relay F releases, being a pendulum relay its ground pulses will hold the slow release relay G operated supplying a ring-off signal to the trunk thru G-m1 and G-m3.

The release of relay G and the link removes ground from relay A which releases the trunk. The trunk is now returned to normal and may receive other calls.

2.3 Calls from Magneto Operator

The magneto operator selects an idle trunk and applies ringing current to the trunk line operating relay M thru rectifier units R1 and R2.

Relay M operates relay N which in turn operates relay Q thru N-m1, D-b2 and P-b1.

The removal of ringing current from the trunk line releases relays M and N permitting relay P to operate thru N-b1 and Q-b2. Relays P and Q are locked by ground on B-b3. (*P holds in series with Q.*)

The link lands in over a loop circuit thru P-m2 operating the line relay LR, which operates the line-finder relays to establish connection to the link. The A relay of the trunk is operated by direct ground placed on the line-finder P wire in the link.

This non-dial trunk is designed to operate with North "All-Relay" Automatic link cut-thru trunk to a master office.

When the call is answered 150 ohms is placed in the line-finder P wire operating trunk relay B. (See Section 2.1) The operation of relay B opens the holding circuit for relays P and Q at B-b3. Also, relay B now holds the link thru B-m2 after P released opening the original circuit at P-m2.

2.4 Release of Connection on Call from Magneto Office

When the called party releases relay B of trunk releases, direct ground being placed on the P wire from the connector relay G.

When relay B operated ^{it} ~~and~~ held relay E. When relay B released relay E has a new holding circuit thru B-b2, E-m1 and A-m4. Relays F and G operate and relay G, holds relay A thru G-m2. The B relay de-energizes and releases the link. The trunk will release and put a ring-off signal on the line as explained in Section 2.2 by opening the MH lead.

2.5 Control of Connection

The calling subscriber in the automatic exchange or a master office operator on calls to the trunk controls the link and releases the trunk as explained in Section 2.2. On calls from the magneto office, the called party releases the trunk as explained in Section 2.4.

2.6 Incomplete Call Disconnect

In case a call from the magneto office trunk is not answered and the calling party does not release, the connection will be released by the incomplete call disconnect feature in the link, within 2 to 4 minutes. Further, if either the calling subscriber or manual operator fails to disconnect after termination of a

conversation, the incomplete call disconnect will release the connection after 2 to 4 minutes. The calling line then goes on lock-out, while the magneto trunk becomes free.

2.7 All Trunk Busy Register

Contact #6 of the A relays of all trunks in a group are wired in series to terminal ATB. When all trunks are busy, ground will be connected to terminal ATB to which an "All Trunk Busy Meter" may be connected.

2.8 Contact Protection

A 1/4 MF condenser and a 150 ohms resistor in series is connected across F-m and J-m to protect them against damage from sparking.