

# TELEPHONE DIAGRAMS

# $C \bullet N T E N T S.$

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## PART III.-TRUNK CIRCUITS.

## SECTION 1.

# TRUNK CIRCUITS, TERMINAL AND INTERMEDIATE.

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## Plate 63.

T.L. Diagram No. 1A.

#### TRUNK EXCHANGE SYSTEM.

## EXPLANATORY DIAGRAM OF TRUNK CIRCUITS.

Fig. 1.—Minor Exchanges:  $\frac{5+n}{45}$  Switch Sections and  $\frac{3+n}{23}$  Switchboards, Wall. See Plate 66 for Cord Circuits.

Fig. 2.—Switch Sections "C" (where Junction circuits not multipled), Switch Sections "D," and Switch Sections "F." Switch Section "D" Cord Circuit, Plate 69; "F" Cord Circuit, Plate 71.

Fig. 3.—Trunk and Junction Switchbeards, Switch Sections "C" modified for lamp signals, and Switch Sections "E." The diagram shows the arrangement for concentration working of the Trunks, also the Night Relay and Bell which indicate night calls. With the plugs in the Switchsprings as shown, the Trunks are being worked from the Ordinary Sections. Wiring Diagram, Switch Section "E," T.L. No. 241A.

Fig. 4.- Skeleton diagram of a Trunk Circuit; terminated on the left at a Minor Exchange as in Fig. 1, and on the right as in Fig. 3.

Calling is effected at both ends by Generator. At the Minor Exchange, the alternating currents operate the Indicator N.P.C. through the transformer action of the two Bridging Coils. At the larger Exchange, which is fitted for lamp



Plate 63.

signalling, the following operation takes place. The alternating currents from the Generator at the calling station actuate Relay R 7, and its armature comes in contact with the lower stop. The latter point is connected to Earth, as are also the two lower contact springs of Relay R 5; the armature of R 7 and one spring of the armature of R 5 are teed together and connected to the coils of R 5. When the armature of R 7 comes in contact with the lower stop, a current flows from the positive pole of the 24-volt battery through these contacts, the Coils of R 5 and the Pilot Relay (see Fig. 3) to the negative pole. The armature of R 5 is attracted, bringing in the signalling lamp in parallel with R 5 which is now locked, both being in series with the low resistance Pilot Relay. The Pilot Lamp circuit is from Earth on the Night Relay (Fig. 3), 2-way Switch, Lamp, and Pilot Relay contacts to the negative pole. In the "Night" position of the 2-way Switch, the Night Relay is thrown in series with the Pilot Lamp; in the local circuit of the Night Relay are placed a Trembler Bell and a Retardation Coil, 400 ohms. The insertion of a peg in the Switchspring extinguishes both lamps by breaking the lower and long spring contacts; by the same means, the Time Check Key is brought into circuit.

It will be seen from Fig. 3, that by removing the plug from S 1 and inserting it in S 3 the lamps at the Ordinary and Concentration Sections become incandescent (through the inner spring of S 1, which is connected to Earth, coming in contact with the B spring). The removal of the plug from S 4 and its insertion in S 2 extinguishes the lamps; the Trunk line is then terminated on the Concentration Section.

## Plate 64.

T.L. Diagram No. 151A.

## TRUNK SYSTEM, MINOR EXCHANGES; EXPLANATORY DIAGRAM OF TRUNK CIRCUIT WITH AN INTERMEDIATE OFFICE.

The connections at the Terminal Offices must only be considered as theoretical; the apparatus used may be any of those shown in Plate 63.

Normally the Terminal Offices are straight through to each other; generator ringing between the two pass round the loop at the Intermediate Office differentially through the coils of Relay E 1, 100 ohms + 100 ohms, each coil of which is shunted by 200 ohms non-inductive resistance.

Either Terminal Office calls the Intermediate by applying an earthed 24-volt battery to the A line, leaving the B line disconnected; the resulting current flows through one coil of Relay E 1, 100 ohms + 100 ohms, actuating its armature and thereby closing the circuit of the 20-cell battery through the coil of Indicator, Type 34, 1,000 ohms. Two rings should be given from the Up Station, and three rings from the Down.

When a peg is inserted in either of the Switchsprings, 10-point, at the Intermediate Office and conversation taking place between either of the Terminal Offices and the Intermediate, the 10 cell + 10 cell centre-carthed battery is autematically connected up to the disengaged section



Plate 64.

of the line through the coils of Relay E 1, 200 ohms + 200 ohms, thus forming a complete Trunk Circuit of that section.

To ascertain whether the Trunk Circuit is engaged, the Key, Type H 3, at the Intermediate Office, should be pressed, thereby connecting the Indicator, Type 34, across the lines. If the line be disengaged, the "eyeball" of the Indicator will show.

Intermediate connections on Switch Sections "D" and "F" are shown on Plate 65.

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## Plate 65.

#### T.L. Diagram No. 61A.

## TRUNK LINE SWITCH SECTIONS "D" AND "F"; EXPLANATORY DIAGRAM OF AN INTERMEDIATE TRUNK CIRCUIT.

The Terminal Offices are called by Generator round the loop. Relay R 1 is differential to currents circulating round the loop; each of its coils is shunted by 200 ohms non-inductive resistance to minimise the risk of false calls on leaky lines.

Either Terminal Office calls the Intermediate by applying an earthed 24-volt battery to the A line, and leaving the **B** line disconnected, the resulting current flows through one coil of Relay R I and actuates its armature. The latter closes the circuits of the Visual Indicators  $V_2$  and  $V_3$ . Two rings should be given from the Up Station and three from the Down.

To ascertain whether the Trunk Circuit is engaged, a spare peg should be inserted in the Switchspring S.L. If the Telephone Exchange Galvanometer in the cords shows a deflection, it indicates that the line is disengaged.

When a peg is inserted in the Switchspring S 2 or S 3, Relay R 3 or R 4 is actuated and the 10 cell + 10 cell centre-earthed battery is applied to the disengaged section of the line through Relay R 2, thus forming a complete Trunk circuit of that section.



INTERMEDIATE.

TERMINAL.



Plate 65.

The small figure at the right bottom corner shows the relative positions of Switchsprings S 1, S 2, and S 3, with the corresponding Visual Indicators, on the Transfer Strips. If one Intermediate circuit is connected to a section, Transfer Switchsprings 8, 9, and 10 will be utilised; if two circuits, Switchsprings 5, 6, 7, 8, 9, and 10.

## Plate 66.

T.L. Diagram No. 150A.

TRUNK SYSTEM, MINOR EXCHANGES; EXPLANATORY DIAGRAM OF CORD CIRCUITS ON  $\frac{5+10}{45}$  Switch Sections and  $\frac{3+10}{23}$  Switchboards, Wall.

WIRING DIAGRAMS, 5 + 10 - 10 - 10 T.L. No.  $254_{\text{A}}$ ; 3 + 10 - 23T.L. 253a. Apparatus Schedules, Circular E. 11.

The upper portion of the diagram represents in skeleton form the circuit of the ordinary Cords, *i.e.*, those to be used in connecting subscribers' lines together. When a subscriber hangs up his Receiver, he connects his  $\Lambda$  line to Earth; the clearing signal is received on the corresponding Indicator, Type 39, through the  $\Lambda$  Coil, the third point of the peg, and the socket of the Switchspring, which is connected to the negative pole of the battery.

The lower portion of the diagram shows the circuit of the Cords for connecting Trunk to Trunk. A clearing signal is sent automatically round the loop and through both Coils of the Indicator, Type 39, by the withdrawal of the peg at the distant station.

Ringing Circuits, Key, Type 407 :---

No. 1 (T.K. X) depressed. Generator on loop. To call on ordinary Trunk.

No. 2 (T.K. Int.) depressed. 24 volts on A line and Earth. To call Intermediate Trunk Staticn, see Plates 64 and 65.

Plate 66.

CORD CINCUIT FOR CONNECTING TRUNK TO TRUNK.



No. 3 (Sub X.P.) depressed. Generator on A line and Earth. To call Ordinary and Party Line X subscribers, see Plates 57 and 58.

ORDINARY CORD CIRCUIT.

## Plate 67.

T.L. Diagram No. 278A.

MINOR EXCHANGE CONVERSION; DIAGRAM OF CIRCUITS ON WALLBOARDS, HINGED, 35" × 28", CONVERTED TO C.B.S. WORKING. DIAGRAM E.C. 617 MODIFIED.

Fig. 1.—Connections of Subscribers' Lines. When a subscriber raises his Receiver the calling signal is automatically indicated on the corresponding Indicator, Type 34. A clearing signal is received, when the Receiver is replaced, on the Relay J, Non-polarised, 500 ohms  $\pm$  500 ohms, connected across the Cords. Both currents are supplied by the Main Signalling Battery, which consists of the two left-hand sets of 10 cells shown in the diagram. Subscribers are called by Generator on the A line and Earth. See Plate 68 for Cord Circuits.

Fig. 2.—Connections of Trunk Circuit. Ordinary Trunks are called by pressing the Key, Type H 3, Oval, marked "D," and turning the generator handle; Intermediate Trunk Offices by pressing the Key marked "C." In the latter case, the negative pole of the 10-cell P.C. Battery is connected to the A line, and the B line disconnected. Sce Plates 64 and 65, Intermediate Trunk Circuit connections.

Fig 3.—Connections of Junction Circuit to N.T. Company's Exchange. Calling is effected by Generator which is connected to the lines by pressing the Key H 3, Oval, marked "B." An automatic clearing signal is sent from the 20-cell battery through the Bridging Coil to the lines in parallel by withdrawing the peg from the Switchspring.

For the position of the apparatus on the Board and Schedule, see T.L. Diagram No. 279A.

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## Plate 68.

T.L. Diagram No. 278A.

MINOR EXCHANGE CONVERSION; DIAGRAM OF CORD CIRCUITS ON WALLBOARDS, HINGED, 35" × 28", CONVERTED TO C.B.S. WORKING. DIAGRAM E.C. 617 MODIFIED.

The Indicator, N.P., 1,000 ohms, "e," and Relays, I, Non-polarised, 500 + 500 ohms, "f" and "g," are associated with the Trunk Cords, the Indicator "e" being fitted in the local circuit of Relay "f." The two A cords and the two B cords of the pair of pegs are connected to each other through the two Condensers, m.c., 2 m.f. Relays "f" and "g" are connected between the A and B cords of the Black and Red peg respectively.

A Relay, J, Non-polarised, 500 + 500 ohms, "h," is teed across each pair of ordinary cords for subscribers' clearing signals. The two A cords and the two B cords of these pegs are connected to each other through the Ringing Key associated with the pair.

In conjunction with the Ringing Keys belonging to the Pegs and Cords, the following facilities for calling are provided by the wiring of the Plug Ringing Keys :--

Y.P. pressed. Generator on B line and Earth. To call Party Line Y subscribers. See Plates 57 and 58.

TER. pressed. Generator on A line and Earth.

To call Party Line X and Ordinary subscribers. TK.X. pressed. Generator on the loop. 'To call on Trunk.

For the position of the apparatus on the Board and Schedule, see T.L. Diagram No. 279A.



Plate 68.

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## Plate 69.

T.L. Diagram No. 60.

## TRUNK LINE SWITCH SECTION "D"; EXPLANATORY DIAGRAM OF CORD CIRCUIT.

WIRING DIAGRAM, DRAWING NO. 1367; APPARATUS Schedule, Circular E 11.

Clearing signals are received on the Self-Restoring Indicator and Telephone Exchange Galvanometer, which are permanently teed in series across the cords. *See* Plate 63 for battery connections at Trunk ends.

Trunk Key U 14 (Black) provides for generator ringing on the Black Peg, and in the speaking position connects the battery to the restoring coil of the Self-Restoring Indicator, as well as the operator's set across the cords.

Junction Key U 7 (Red) provides for generator ringing on the Red Peg, and in conjunction with the Speaking Transfer and Battery Ringing Key U 11 provides for speaking to the line connected to the Red Peg, at the same time breaking the connection to the Black Peg. When the Keys U 14 and 7 are both in the speaking position the operator's set is connected to the Black Peg only, the Junction side being then disconnected.

Speaking, Transfer, and Battery Ringing Key, U 11 (Black, Switching Key on Wiring Diagram), in addition to the foregoing, provides for battery ringing in conjunction with the Black Peg on the A line and Earth, in order to call an Intermediate Trunk Station (see Plate 65).

Coupling Key U 2 is fitted for concentration purposes.



Plate 69.

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## Plate 70.

#### T.L. Diagram No. 251.

## Switch Sections "D"; NATIONAL TELE-PHONE JUNCTION AND SERVICE CIR-CUITS WHEN CALLING INDICATORS ARE REQUIRED.

The Switchsprings, 5-point, Strip No. 11, shown on E.-in-C.'s Drawing 1,367 (wiring diagram of Section Trunk Switch "D") will be replaced by Switchspring Indicators H 2, as in the diagram, when calling indicators are required. N refers to the number of working circuits.

An automatic clearing signal is sent to the Company's Exchange by withdrawing the peg from the Switchspring, the current passing through the coils of the Switchspring Indicator differentially and along both lines in parallel. Calling is effected by Generator.

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Plate 70.

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## Plate 71.

T.L. Diagram No. 248A.

## TRUNK LINE SWITCH SECTION "F"; EXPLANATORY DIAGRAM OF CORD CIRCUIT.

#### WIRING DIAGRAM T.L. 259A; APPARATUS SCHEDULE, CIRCULAR E 11.

This Section is practically a "D" Section with the Cord Circuits modified so that an operator may use the pegs for connecting Trunk Circuits terminating on the "F" Section to Subscribers' Circuits on an adjacent Local Section. See Plate 61. For this purpose a Relay H 1, 1,000 + 1,000 ohms, is connected to the third point of the Red Peg, so that when the Peg is inserted in a Switchspring on the Local Section, the Relav H 1 is operated and its springs close on the inner contacts. These contacts are connected to the Coils of an Indicator, Type 39, 1,000 + 1,000 ohms, to the middle point of which is joined the negative pole of the 20-cell battery. The Indicator, Type 39, is thus connected **a**cross the cords; when the local subscriber hangs up his receiver, thereby connecting his A line to Earth, a clearing signal is received on the Indicator.

The functions of the various keys are explained on page 186, Switch Section "D."



Additional ringing facilities are provided by the Key, Type 407, as follows :----

- T.K. depressed. Generator on Loop. Trunk ringing.
- X depressed. Hand Generator on loop.
- Sub X.P. depressed. Alterations on A line, B line to Earth. 'To call X Party Line and ordinary subscribers, see Plates 57 and 58.
- Y.P. depressed. Alterations on B line, A line to Earth. To call Y Party Line subscribers, see Plates 57 and 58.
- TER. depressed. Alterations on A line, B line disconnected.

When a Power Generator is not fitted, the Key U 12 will not be required; the connections made by the contacts at A should then be made direct.

The Power Generator and Transformer T 2 are common to the Exchange; Generator, Bracket. 3 terminals, and Transformer T 1, one of each per Section. Key, Type U 12 (1 per Section), to be mounted on Intermediate Panel.

The Condensers, 2 m.f., in the Cords are fitted in "Case with Condensers, Section, Trunk Switch, 12 m.p. : (Condensers, Section, 1455

2 m.f., <sup>12</sup>/<sub>12</sub>, " E.-in-C.'s Drawing, No. 1475.

## Plate 71A.

#### T.L. Diagram No. 421.

## LAMP SIGNALLING TRUNK LINE SWITCH SECTION. EXPLANATORY DIAGRAM OF CORD CIRCUIT.

The functions of the various keys are similar to those described on page 186.

Relay R is the equivalent of the Telephone Exchange Galvanometer on the older sections, and is operated by battery from the distant Trunk Exchange when the peg is withdrawn from the Switchspring. In its local circuit is connected Lamp L, the earth connection for which is made through Relay R<sub>1</sub>. In the local circuit of R<sub>1</sub> Lamp L<sub>2</sub> is joined up so as to be lighted when either relay R or relay R<sub>3</sub> is operated. Relay R<sub>1</sub> remains locked until the operator short-circuits it by turning the Key K<sub>1</sub> into the speaking position.

Relay  $R_2$  is not operated when Trunk is connected to Trunk, and in these circumstances Relays  $R_3$  and  $R_4$  and Lamp  $L_1$  are not in circuit, and the condensers are short-circuited. When the red peg is inserted in a Junction Switchspring  $R_2$  is energised, and its armatures connect  $R_3$  in series across the cords with  $R_4$  joined between the centre point of the coils of the latter and earth.  $R_3$  is for the purpose of indicating a magneto clearing signal on the loop, and  $R_1$  a clearing

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Plate 71A.

signal from a C.B. subscriber; the latter is energised by a current transmitted along both lines of the Junction in parallel and passing differentially through  $R_3$ 

Relay  $R_7$  provides an engaged test on multiplied junctions and transfer circuits, Lamp L<sub>3</sub> in its local circuit being additional to the ordinary "click" test. When key K<sub>2</sub> is thrown into the speaking position  $R_7$  also acts as a supervisory relay in place of  $R_4$ .

The operator's telephone set is wired for common battery working, with, however, a 150 ohms receiver to raise the impedance of the receiving apparatus when the operator is listeningin on the line, and a 4 m.f. condenser in the primary circuit, instead of 2 m.f., to increase the volume of speech.

A more recent arrangement provides for the connection of Relay  $R_3$  across the cords on Junction Circuits not only when Key<sub>2</sub> is normal but also when thrown into the speaking position, in order that Relay  $R_4$  may be kept in circuit in both positions of the key. A Coil, Bridging, 600 ohms + 600 ohms, takes the place of Relay  $R_7$ , and Test Lamp  $L_3$  is dispensed with.

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## SECTION 2.

# CALL OFFICES ON TRUNK SWITCH SECTIONS.

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## Plate 72.

Diagram T.L. No. 276.

Second Receiver.

## CALL OFFICE SWITCH, CONNECTED TO TRUNK SWITCH SECTION "D."

FIG. 1.—CONNECTIONS FOR ONE TELEPHONE. Apparatus Schedule

Counter.

Wallboard,  $15^{\prime\prime} \times 14^{\prime\prime}$ .

Bell, Magneto, 100 ohms.

Bell, Trembler, Circular, 25 ohms.

Switch, 6-terminal, 2-position.

The apparatus should be requisitioned separately, and mounted on the Wallboard locally.

Cabinet

Telephone No. 21.

Arm. Bell Receiver

Receiver. Bell

Cord, Flexible, No. 222

Battery, Leclanché, Combination, 4-cell.

Normally, the Combined Battery is applied to the Exchange Lines through the Magneto Bell, and the current holds up the shutter of an Indicator, Polarised, No. 2, fitted on the Trunk Switch Section. To call the Exchange the attendant turns the Switch to the other position and lifts the Receiver. This disconnects the Battery and causes the shutter of the Indicator to fall forward. When the Receiver is restored to the rest the P.C. Battery is automatically reconnected to the Exchange Lines, furnishing a Clearing Signal to the Exchange, and at the same time a current flows from the Speaking Battery through the Trembler Bell on the Wallboard. The bell will continue to ring until the Switch is restored to the normal position.

FIGURE 1. WALLBOARD,  $24'' \times 16''$ . FIGURE 2.



Calls are received on the Magneto Bell from Generator currents applied at the Exchange.

FIG. 2.-CONNECTIONS FOR TWO TELEPHONES.

Apparatus Schedule.

Counter.

Wallboard to Diagram T.L. 276, Fig. 2. The description includes the Wallboard  $(24'' \times 16'')$ , wired, and fitted with the following items:--

Telephone No. 21.

Bell, Magneto, 100 ohms.

Bell, Trembler, Circular, 25 ohms.

Switch, 6-terminal, 2-position.

Battery, Leclanché, Combination, 4-cell.

Cabinet.

Telephone No. 21.

Arm, Bell Receiver

Receiver, Bell Cord, Flexible, No. 222 for Second Receiver.

Battery, Leclanché, Agglomerate, 6-block, 2-cell.

The electrical arrangement is on the same lines as Fig. 1, but in this case the Call Office attendant is provided with a Telephone for the purpose of passing particulars of calls to the Exchange. The Clearing Signal from the Cabinet Telephone when the Receiver is hung up is received only upon the Trembler Bell on the Wallboard at the Counter, the Clearing Signal to the Exchange being given when the Switch is restored to the normal position. The Counter Telephone is joined up so as to enable the attendant to call the Exchange, and, when the Switch is turned to the reverse position to extend the Cabinet Telephone to the Exchange, the attendant can "listen in" on the circuit, if necessary, in order to assist the caller in case of difficulty arising.

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## Plate 73.

T.L. Diagram No. 239A.

## Counter Communication Switch for Trunk and Local Service.

Apparatus Schedule.

Counter.

Wallboard to Diagram T.L. 239A. The description includes the Wallboard  $(24'' \times 16'')$ , wired, and fitted with the following apparatus :—

Telephone No. 21. Switch, 6-terminal, 2-position. Bell, Magneto, 100 ohms. Bell, Trembler, Circular, 25 ohms.

Battery, Leclanché, Combination, 4-cell.

#### Cabinet.

Telephone No. 21.

Arm, Bell Receiver

Receiver, Bell for extra Receiver.

Cord, Flexible, No. 222

Box, Coin Collecting, Complete (when required). Battery, Leclanché, Agglomerate, 6-block, 2-cell.

The Cabinet is normally through to the Exchange. For a Trunk Call the Counter clerk obtains the attention of the Exchange by lifting



the Receiver, and passes particulars of the call. When the call matures the Trunk operator calls the Counter. The Counter clerk tells the caller to enter the Cabinet, then turns the Switch to No. 2 position, listens for the conversation to begin, and then hangs up the Receiver. When the caller hangs up the Receiver in the Cabinet the Counter Bell will ring until the Switch is restored to No. 1 position. The movement of the Switch to No. 1 position will be indicated at the Switch Section on the Clearing Indicator in the Cord Circuit.

To complete the Coin Collecting Box Circuit an internal connection in the Cabinet Telephone must be made by means of a piece of covered wire; one end to be fixed to the lower left screw (Primary) of the Induction Coil, and the other clamped below the lower contact of the Press Button.

The small figure shows the corresponding connections of Switches. 6-terminal, 2-position, and 7-terminal, 2-position.

## Plate 74.

Diagram T.L. No. 218.

Counter Communication Switch for Post Office P.C. and National Telephone Company's Magneto Systems, with Coin Collecting Box for Local Calls.

Apparatus Schedule.

#### Counter.

Wallboard to Diagram T.L. 218. The description includes the Wallboard  $(24'' \times 16'')$ , wired, and fitted with the following apparatus :--

Bell, Trembler, Circular, 25 ohms. Case, Switch and Indicator,  $3\frac{1}{2}$ . Coil, Resistance, Various, 100 ohms. 2 Condensers, m.c., 2 m.f.

Indicator, Non-polarised, 1,000 ohms,  $\frac{2}{5}$ .

Switchspring, 5-point and 8-point,  $\frac{1+5}{6}$ .

Telephone No. 21.

Battery, Leclanché, No. 1 C.Z., 4-cell (P.C.).

", ", Agglomerate, 6-block, 2-cell (Speaking).

2 Pairs, Pegs, No. 201 (Red or Black) with cord, 16".

Cabinet.

Telephone No. 21.



Arm, Bell Receiver Receiver, Bell Cord, Flexible, No. 222 Bell, Magneto, 100 ohms. Generator, Bracket, 3-terminal.

Battery, Leclanché Combination, 4-cell.

The Coin Collecting Box will be supplied and maintained by the Company. When a Box isfitted, an additional internal connection must be made in the Cabinet Telephone by means of a piece of covered wire, one end of which should be fixed to the lower left screw of the Induction Coil, and the other clamped below the lower contact of the Press Button.

The Counter clerk will call the P.O. Exchange by simply inserting the connecting peg in the Exchange Switchspring which causes the shutter of the Indicator, Polarised, No. 2, at the Trunk Switch Section to fall. If a Vibrating Signal is required, owing to the inattention of the Switch operator, this may be sent by repeated insertion and withdrawal of the peg.

The restoration of the Receiver to the rest on the Telephone in the Cabinet will send a Clearing Signal to the P.O. Exchange. When the caller rises from the seat the Bell on the Counter Switch will continue to ring until the Cabinet connection has been severed.

The attention of the Company's Exchange will be gained direct by the caller turning the handle of the Generator fitted in the Cabinet, and a Clearing Signal should be sent in a similar manner.

The connections are arranged to disconnect the Generator during a Trunk call.

For Call Office arrangements on Local Switch Sections, see Plates 59 and 60, and for full particulars on the subject generally, see Circular E 11.

## Plate 75.

Diagram C.B.S. No. 147.

## CALL OFFICE SWITCH FOR TRUNK AND LOCAL SERVICE, INCLUDING NATIONAL TELEPHONE COMPANY'S.

The diagram shows the Circuit terminated on a Section, Local Switch, 50 or 80 Line. On combined Trunk and Local Switch Sections, the N.T. Co.'s Circuit is terminated on a 5-point Switchspring with an Indicator, N.P.C., for the receipt of calls in the same way as an ordinary Junction circuit.

#### APPARATUS SCHEDULE.

Counter.

Telephone No. 21.

Bell, Magneto, 100 ohms.

Bell, Trembler, Circular, 25 ohms.

Switch, 6-terminal, 2-position.

Battery, Leclanché, Agglomerate, 6-block, 2-cell.

#### Cabinet.

Telephone No. 21.



Arm, Bell Receiver

Receiver, Bell Cord, Flexible, No. 222 for Second Receiver.

Battery, Leclanché, Agglomerate, 6-block, 2-cell.

Box, Coin Collecting, Complete (when required).

When a Coin Collecting Box is fitted, the additional internal connection of the Telephone should be made by means of a piece of covered wire. See page 201.

With the Switch in position 2, the Counter clerk is enabled to "listen-in," and to assist the caller to secure connection if necessary. In this position also, the Trembler Bell will ring when the caller has replaced the Receiver on the rest; at the same time a Clearing Signal is sent to the Exchange.

## Plate 76.

Diagram C.B.S. No. 148.

## CALL OFFICE SWITCHBOARD FOR ONE CIRCUIT TO POST OFFICE EXCHANGE AND ONE CIRCUIT TO NATIONAL TELE-PHONE COMPANY'S EXCHANGE.

Apparatus Schedule.

Wallboard to Diagram C.B.S. 148. The description includes the Wallboard,  $16^{\prime\prime} \times 10^{\prime\prime}$ , wired, and fitted with the following apparatus :---

Case, Switch and Indicator,  $3\frac{1}{2}^{\prime\prime}$ . Indicator, N.P., 1,000 ohms,  $\frac{5}{5}$ . Coil, Bridging, 120 ohms. Switchspring, 8-point,  $\frac{5}{5}$ . Coil, Induction,  $\frac{150}{1}$ . Bell, Trembler, Circular, 25 ohms. Suspender for Micro Telephone. 4 Plates, Connection, Trembler Bell.

Telephone No. 28 (with hook).

2 Pairs, Pegs, No. 201 (Black or Red), with Cord  $16^{\prime\prime}.$ 

Battery, Leclanché, Agglomerate, 6-block, 2-cell.

Cabinet.

Telephone No. 13. See Plate 92.



TELE. WALL INTERMEDIATE WITH MAGNETO BELL AND GENERATOR COMPLETE.

## Plate 76.

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Receiver, Watch, "D," Complete. 2 Cells, 2-block, Agglomerate, Complete.

The Coin Collecting Box will be supplied and maintained by the Company.

Communication with the N. T. Co.'s Exchange is normally obtained direct from the Cabinet, without necessitating switching at the Counter Switchboard, by means of the Generator fitted in the Telephone. When it is desired to use the Cabinet Set for communication with the Post Office Exchange, the Call Office attendant connects the Switchsprings marked "P.O. Ex." and "Cabinet" respectively by means of a pair of pegs and cords. When this latter condition obtains, and the Cabinet Telephone Receiver is restored to the rest on conclusion of a conversation, an independent Clearing Signal is given at the Counter by the ringing of the Trembler Bell. The withdrawal of the pegs from the Switchspring causes the bell to stop ringing automatically and sends a Clearing Signal to the Post Office Exchange.

The Post Office Exchange is called automatically when one peg of a pair is inserted in the Exchange Switchspring, the other peg being inserted in the operator's Telephone or Cabinet Switchspring so as to give the necessary "loop." The connections of the circuit at the Exchange are similar to those shown in Plate 75.

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## Plate 77.

Diagram T.L. 336.

#### SWITCHBOARD, MAGNETO (CALL OFFICE): FOR OMNIBUS CIRCUIT CALL OFFICE FROM ONE TO EIGHT SUB-WITH SCRIBERS (MAGNETO WORKING).

Apparatus Schedule.

Switchboard, Magneto, Call Offices,  $\frac{5}{10}$ . Ē. The title includes the following items :----

1 Indicator, N.P.C., 500 + 500 ohms,  $\frac{5}{5}$ , 6".

- 1 Cover for Bell, Magneto, 1,000 ohms, for Wall Telephones.
- Bell, Magneto, 1,000 ohms, for Wall 1 Telephones.
- 2 Bell Domes 2<sup>1</sup>/<sub>2</sub>.
  2 Pillars, with Heads for Bell, Magneto, 1,000 ohms, for Wall Telephones.

1 Switchspring, 5-point,  $\frac{5}{5}$ , 6".

- 1 Key, Type H 3, Oval, <sup>5</sup>/<sub>5</sub>, 6''.
- 1 Generator, Bracket, Unmounted.
- 1 Switchspring, 5-point, with brass socket.

1 Coil, Induction,  $\frac{150}{1}$ 

- 1 Bell, Trembler, Circular, 25 ohms.
- 1 Switch, Tumbler, 3 ampères (bronzed).
- 1 Suspender for Micro Telephone.



Plate 77.

4 Plates, Cord Connection.

1 Strip, Cross Connection,  $5 \times 4$ .

4 Plates, Connection, Trembler Bell.

1 Card Holder.

2 Pegs, Circular, Triple with Cords 16".

#### Separate Items.

1 Telephone, No. 28 (with hook).

Battery, Leclanché, Agglomeraie. 6-block, 2-cell.

These fittings provide the necessary apparatus for working on I Head Office, I Cabinet, and 3 Subscribers. When accommodation is required for 1 to 5 additional subscribers' circuits, the following apparatus should be requisitioned separately and fitted locally :---

Indicator, N.P.C., 500 + 500 ohms, <sup>5</sup>/<sub>5</sub>, 6''.
 Switchspring, 5-point, <sup>5</sup>/<sub>5</sub>, 6''.

1 Key, Type H 3, Oval,  $\frac{5}{5}$ , 6''.

The board is wired for 10 lines when issued. The Exchange Circuit is joined up at the Head Office for Open Circuit Magneto working.

## SECTION 3.

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# RECORD CALL JUNCTION AND TRANSFER CIRCUITS.

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## Plate 78.

T.L. Diagram No. 268.

EXPLANATORY DIAGRAM OF RECORD CALL JUNCTION CIRCUITS, AND TRANSFER CIRCUITS BETWEEN TRUNK SECTIONS AND RECORD TABLE TRANSFER SWITCH SECTION.

For full wiring and fittings of "Section, Record Table Transfer,  $\frac{5}{10}$ ." see Diagram T.L. 267.

Fig. 1.--Arrangement for terminating Record Call Junction Circuits on "Record Table Transfer Switch Sections" and "Junction Transfer Sections."

Normally, the batteries at the P.O. and the National Telephone Company's Exchange oppose each other, and there is no current on the lines. A call is given at both ends when either the peg is raised at the P.O., or the peg inserted in the Switchspring at the Company's end; the operation at either end cuts off the home battery and allows the distant battery to send a current through both Indicators, and along the lines in parallel. Clearing is also performed automatically, but in that case the home battery sends the clearing current.

Fig. 2.—Arrangements for terminating R.C.J. Circuits on Trunk Switch Sections.





FIGURE 3.

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Plate 78.

## Plate 78-cont.

The arrangement and methods of calling and clearing are similar to those shown in Fig. 1; 8-point Switchsprings on the Trunk Switch Sections, however, taking the place of the Pegs and Contact Sockets on the Record Table Transfer and Junction Transfer Sections.

The Relay F, 100 ohms, Mounted, in both cases is utilised for Night Calls, and should have a Trembler Bell and Local Battery fitted in its local circuit for that purpose.

In the earlier boards two Coils, Bridging, 100 ohms, were fitted in the position occupied by the 1 Coil, Bridging, 600 + 600 ohms, in this diagram.

Fig. 3.—Transfer Circuits between Trunk Sections and Record Table Transfer Switch Section.

Normally, the Indicators are not actuated. The insertion of a peg at either end causes a current to flow through both Indicators in parallel. A peg inserted in the Switchspring at each end, breaks the battery circuit and the signal disappears.

Calling and Clearing Signals are thus sent automatically by the insertion and the withdrawal of the peg.