

POWER SYSTEMS  
750A PBX POWER PLANT  
CHARGE AND DISCHARGE CIRCUIT  
WITH RELAY FOR CHARGE CONTROL

CHANGES

C. CHANGES IN CIRCUIT REQUIREMENTS OTHER THAN THOSE  
APPLYING TO ADDED OR REMOVED APPARATUS

C.1 Test Note 1 did read

Remove (CHG) and (PWR BB) fuses. Connect ring on "Bat. & Grd." jack of 35C test set to bat. term. 1. Connect tip on "Tip & Ring" jack to 3T (CA) relay. Connect voltmeter across 3T (CA) relay and grd. term. 1. Adjust in accordance with BSP.

All other headings under "Changes", no change.

1. PURPOSE OF CIRCUIT

- 1.1 To provide a battery charge and discharge circuit for this plant.

2. WORKING LIMITS

- 2.1 15-21 volts.

3. FUNCTIONS

- 3.1 To charge the PBX battery from a nearby central office over cable conductors or with a copper-oxide rectifier.
- 3.2 To cause an alarm in the event of blown charge or discharge fuses.

4. CONNECTING CIRCUITS

- 4.1 Alarm, link, trunk circuits and local ringing circuit.

## 5. DESCRIPTION OF OPERATION

### 5.1 Charging Equipment

The 8 cell battery is arranged for charging either from the 24, 36 or 48 volt central office battery over cable conductors or by means of a local 1/2 ampere rectifier operating from an a-c power source. The method used in an individual case is determined by the distance from the central office, the cable conductors available, etc.

### 5.2 Resistance Charge Control

The charge rate is controlled by a 1/2 ampere 50 ohm rheostat in series with a 350 ohm resistor in the charge lead. The resistor has taps at 50 and 150 ohms and by strapping out sections of the resistor and adjusting the rheostat, the resistance can be varied in small increments from 0 - 400 ohms.

### 5.3 Call Charge Control

When a receiver is off the switchhook or an incoming call is being made, ground over the CT lead from the link or trunk circuit operates the (CT) relay which short circuits the rheostat and resistor, giving a high charge rate. The low charge rate is continuous under other conditions.

### 5.4 Voltage Charge Control

When a link or trunk circuit is in use, ground over the CT lead operates the (CA) relay which short circuits all charging resistance (except R2) and gives the high charge rate. When the (CA) relay releases, the circuit of the (CC) relay is completed and the charge is now under control of the (CC) relay, which operates when the battery voltage rises to the fully charged value. Where the (R3) resistor is provided the (CA) relay short circuits this as well as the rheostat and resistor (R1) while the (CC) relay short circuits only the rheostat and resistor (R1). The low rate charge is continuous except when the (CA) relay is operated or the (CC) relay is released.

### 5.5 Local Ringing Machine

The operation of the (CT) or (CA) relay also provides battery to operate the relay in the local ringing machine circuit when used.

## 5.6 Adjustment of Charge

With the rheostat and tapped resistor short-circuited, the charge rate is set at  $1/2$  ampere on the rectifier, or from  $1/2$  to 1 ampere with cable pair feed, depending on the central office voltage and the resistance of conductors. If due to nearness to central office it is not possible to limit the charge current to one ampere, an adjustable tubular type resistor (R2) can be provided and connected as shown in "Y" wiring in the circuit. When the voltage method of charge control is employed and the high rate, with the rheostat and resistor (R1) short-circuited, is over  $1/2$  ampere, an auxiliary resistor (R3) is required in order to make the (CC) relay effective in controlling the charge to the battery.

After adjusting the high charge rate the short circuit across the rheostat and resistors (R1) and (R3) is removed and the charge rate reduced to about  $1/5$  of an ampere by means of the resistor and rheostat.

## 5.7 Grounding Fuses for Exposed Central Office Cable Feeders

When the central office feeders are exposed, the installer inserts the 1.25 ampere fuse of Figure 3 or Figure 4 in these leads. This affords protection in addition to house entrance protection, blocks and fuses (usually 7 ampere). In case of a high voltage cross on the exposed feeders, the  $1-1/3$  or  $1/2$  ampere charge fuses would blow. If the voltage and current were not sufficient to operate the entrance protection apparatus, the charge fuses might continue to arc except that the 1.25 ampere fuse would blow.

BELL TELEPHONE LABORATORIES, INC.

**CIRCUIT DESCRIPTION**  
**AMERICAN TELEPHONE & TELEGRAPH CO.,**  
**DEPT. OF DEVELOPMENT & RESEARCH,**  
**BELL TELEPHONE LABORATORIES, INC.**  
**PRINTED IN U.S.A.**

**CD-20477-01**  
**Issue 4-B**  
**June 21, 1932**  
**(3 Pages) Page 1**

**POWER SYSTEMS**  
**750-A PBX POWER PLANT**  
**CHARGE AND DISCHARGE CIRCUIT**  
**WITH RELAY FOR CHARGE CONTROL**

**CHANGES**

**A. CHANGED AND ADDED FUNCTIONS**

**A.1 None.**

**B. CHANGES IN APPARATUS**

**B.1 None.**

**C. CHANGES IN CIRCUIT REQUIREMENTS OTHER THAN THOSE APPLYING TO ADDED OR REMOVED APPARATUS**

**C.1 None.**

**D. DESCRIPTION OF CIRCUIT CHANGES**

**D.1** On issue 3, figure 4 was a part of figure 3 and the (RHEO) fuse was strapped to the discharge instead of the battery side of the (CHG) fuse.

**DEVELOPMENT**

**1. PURPOSE OF CIRCUIT**

**1.1** To provide a battery charge and discharge circuit for this plant.

**2. WORKING CONDITIONS**

**2.1** 115-21 volts unregulated.

**OPERATION**

**3.1 DISCHARGE**

**3.1.1** Discharge the PBX battery from a nearby central office over cable conductors or with a copper-plate rectifier.

**3.2** To cause an alarm in the event of blown charge or discharge fuses.

#### 4. CONNECTING CIRCUITS

##### 4.1 Alarm, link, trunk circuits and local ringing circuit.

#### 5. DETAILED DESCRIPTION

##### 5.1 Charging Equipment

The 8 cell (15-21 volt) battery is arranged for charging either from the central office 24V, 36V or 48V battery over cable pairs or from a local 1/2 ampere rectifier operating from the AC house service. The cable pair method is generally used where the PBX is so near a central office that only a few feeders are required to provide a low resistance path to the PBX batteries.

The rectifier is generally used where the cable feeders are not available or where the PBX is remote from a central office so that a large number of conductors would be required for cable pair feed.

##### 5.2 Resistance Charge Control

The charge rate is controlled by a series connected 1/2 ampere, 50 ohm rheostat and a fixed 350 ohm resistor with taps at 0, 50, 150 and 350 ohms. By strapping the resistor taps and adjusting rheostat, the resistance can be varied in small increments from 0-400 ohms.

##### 5.3 Relay Charge Control

During the time a receiver is off the switchhook or an incoming call is being made, ground from the link or trunk circuit over the CT lead operates the (CT) relay to short-circuit the charging resistance, thus increasing the charging rate until the link and trunk circuit are restored to normal.

##### 5.4 Local Ringing Machine

The operation of the (CT) relay also provides battery to operate the relay in the local ringing machine circuit when used.

##### 5.5 Adjustment of Charge

With the resistance short-circuited, the charge rate is set at 1/2 ampere on the rectifier, or from 1/2 to 1 ampere with cable pair feed, depending on the central office voltage and the resistance of conductors. The short is then removed

and the charge rate reduced by means of the resistor and rheostat to about  $1/5$  of an ampere.

The  $1/5$  ampere charge is continuous except when the resistance is shorted by the operation of the (CT) relay which increases the charge to the full value of  $1/2$  to 1 ampere. The high rate is maintained until the restoration of the PBX circuits to normal releases the (CT) relay which removes the short and reduces the current to the low value.

#### 5.6 Grounding Fuses for Exposed Central Office Cable Feeders

When the central office feeders are exposed, the installer inserts the 2 ampere grounding fuses of Figure 3 in these leads. This affords protection in addition to house entrance protection blocks and fuses (usually 7 ampere). In case of a high voltage cross on the exposed feeders, the  $1-1/3$  or  $1/2$  ampere charge fuses would blow. If the voltage and current were not sufficient to operate the entrance protection apparatus, the charge fuses might continue to arc except that the 2 ampere grounding fuses would blow and ground the line.

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