

**CIRCUIT EXPLANATORY**  
**FOR**  
**DIAGRAM 94551/SW**  
**50 LINE P. A. X.**  
**RINGING AND TONES CIRCUIT**

**1. GENERAL**

The diagram shows the circuit arrangement of the Ringing and Tones Equipment used in a 50 line P. A. X.

This diagram should be considered in conjunction with:-

Dgm. 94550/SW    50 Line P. A. X. Line, Connector and Register Circuit.

**2. FACILITY SCHEDULE**

Provision is made for:-

- (1) Starting the operation of the Oscillator on the receipt of a tone start, intrusion tone start, or busy tone start signal from the associated equipment.
- (2) Starting the operation of the vibrator on the receipt of a dial tone start, or ring tone start signal from the associated equipment.
- (3) The generation by means of a vibrator, of alternating current suitable for ringing a standard magneto bell and also for the production of ring and dial tone.
- (4) The generation by means of an oscillator of 400 c.p.s. current used as intrusion and busy tone.
- (5) The interruption of ringing and tone supply.

**3. CIRCUIT DESCRIPTION**

**The Vibrator (Polechanger)**

Relay PC operates and releases by self interruption at a rate of approximately 22 cycles per second. It starts operating when relay SA operates to an earth on the Ring Tone - or Dial Tone Start Lead.

Its weighted armature is allowed to vibrate in the same way as the armature of a trembler bell, that is by self interruption at contact PC.24. An additional pair of contacts (21, 23) is provided between which the armature vibrates thus connecting earth from SA1-2 alternately to terminals 1 and 3 of the ringing transformer TR1 whose primary centre point is connected via retard IA to battery. Thus circuits are completed through each of the 2 sections of the primary winding of the ringing transformer, alternately but in different directions. The current induced in the secondary winding of the transformer is consequently alternating at a frequency of approximately 22 c.p.s. is the exchange continuous ring supply and, controlled by relays AP, BP, and CP, used for the provision of interrupted ringing and special interrupted ringing.

**The Oscillator**

The valve oscillator produces 400 cycles per second current used for intrusion tone and, controlled by relay AP, busy tone. The valve oscillator starts operating when relay IT

or relay NA operate to a start earth connected to the intrusion tone lead, to the busy tone lead, or when earth is connected to the tone start lead.

The tuned circuit of the oscillator consists of capacitor C1 and the (1-2) winding of the transformer. The oscillatory currents induced in the (3-4) winding of the transformer are fed via C2 to the control grid to maintain oscillation. The (5-6) winding of the transformer supplies intrusion tone to the exchange and, under control of relay AP, busy tone.

#### The Ringing and Tones Pulse Controlling Relays

The pulse relays AP, BP and CP serve to obtain appropriate 'on' and 'off' periods of the interrupted signals. Relay BP is controlled by relay CP which is controlled by relay AP. The cycle of operations is started when relay SA operates to earth on the ring tone start or dial tone start lead, or when relay NA operates to earth on the busy tone start lead.

The arrangement is such that relay AP is operated for approximately 500 m/secs. and released for approximately 500 m/secs.

#### Ringing and Tones

Dial tone is 22 c.p.s. continuous and produced by the charging and discharging of capacitor C4 under control of the vibrator contact.

Ring tone is 22 c.p.s. extended under control of AP1-2 to the ring tone supply lead (0.5 secs. 'on', 0.5 secs. 'off').

Intrusion tone is 400 c.p.s. continuous.

Busy tone is 400 c.p.s. extended under control of contact AP22-23 to the busy tone supply lead (0.5 secs. 'on', 0.5 secs. 'off').

Interrupted Ringing is 22 c.p.s. extended to the exchange under control of contact AP5-7 (0.5 secs. 'on', 0.5 secs. 'off').

Special Interrupted Ringing is 22 c.p.s. extended to the exchange under control of relays AP, BP and CP (approximately 50 m/secs. 'on', 300 m/secs. 'off').

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DA/AP