

The Code Ringing Delay Unit



THIS equipment was developed to meet the need for an apparatus which would permit inter-party code calling on a party line but without calling the exchange except when required. The general appearance is shown in Fig. 1.

When development commenced the actual requirements were of a particularly indefinite nature and a certain amount of field work was necessary. The conditions associated with the most promising commercial outlet were therefore examined.

- (c) The duration of a short ring varies from 200 to 750 milliseconds.
- (d) The interval between rings varies from 200 to 500 milliseconds.
- (e) A minimum waiting period of ten seconds occurs between repeat rings.

It will be appreciated that the human element is a controlling factor in the majority of the points enumerated and therefore a mere machine could not be economically produced which would em-

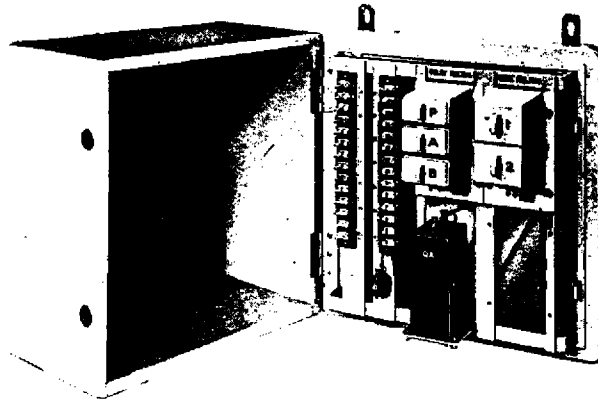


Fig. 1--Code Ringing Delay Unit

The facility afforded an exceedingly useful application to the multi-party lines used on haulage roads in coal mines and, from the review of conditions encountered in this field, the following more precise information was obtained :—

- (a) Code calls are usually a series of short rings numbered according to the position on the line of the called party.
- (b) Five instruments per line forms an efficient maximum.

brace the complete human divergence in these matters. Attention was therefore confined to the more reasonable limits outlined above.

Next came the problem of how it was to be done. Was the final form to be a completely new system, or should it be a unit which could be added to an existing system? From a circuit point of view a new system is usually preferable, but in this case the circuit elements could take either form. The provision of a unit that

could be added to existing approved systems was therefore chosen. This decision narrowed the development to an equipment which could be interposed between the line and the exchange calling signal and which would absorb all short rings but enable a prolonged ring to actuate the exchange calling signal.

The next requirement was to decide the minimum length of time that a normal person could be expected to ring continuously when calling the exchange. Six seconds was considered satisfactory. The unit was therefore designed to absorb all calling signals of less than five seconds. It will now be obvious that whether the operator is called or not will depend on the length of time a calling signal persists. A method of measuring this time was therefore necessary. This measurement may be made by mechanical or electrical means. Although mechanical methods are generally more accurate than the usual electrical ones, this is only the case if adequate maintenance and lubrication are given. Moreover, if a mechanism fails the chances are that the operator would never be called, because the delay limit would not be reached. This would be serious if the call was made in an emergency. Battery operated electrical methods on the other hand, are usually subject to wide timing ranges due to normal battery voltage variations. The system under consideration was designed to overcome these shortcomings. There is no intricate mechanism, the only moving parts being ordinary relays. Also, if the delay source fails, the delay period is automatically decreased.

The actual delay period is dependent on the time taken for the gradual release of energy stored by an electrolytic condenser. This energy maintains a relay operated until

the discharge current from the condenser through the relay reaches the release current value of the relay. The release of this relay marks the limit of the delay period. The effect of battery voltage variation is minimized by controlling the charge time of the condenser according to the battery voltage. The condenser is charged for the operating time of a relay. Consequently if the volts are high this period is shorter than if the volts are low and the energy stored by the condenser is thus controlled. On the release of the delay equipment any residual charge is dissipated practically instantaneously. The delay period, therefore, is not extended or shortened by successive calls.

Consideration of call traffic has led to the provision of an equipment which may be common to more than one line. In practice the delay unit will function satisfactorily unless all the following adverse conditions occur at the same time :—

- (a) Two or more calls are made simultaneously.
- (b) Two or more codes are being rung simultaneously.
- (c) The ringing periods are so disposed that the silent periods of each code are completely masked so that there is no silent period during the whole time for which the delay unit is set.

Now examine an actual case of simultaneous calls—one from A on line 1, and one from B on line 2. They both want to ring the party on their respective lines whose code call is five short rings. A “short ring” may be half a second to A with a half second interval, and to B it may be three quarters of a second with three quarters of a second interval. Let

them start ringing together. The relationship of their ring periods is shown in Fig. 2.

It will be seen that the longest ring period without a silent period on the common delay equipment is one and half seconds.

Examination of various similar diagrams with slight differences in the code ring periods will soon show that the possibility of even three simultaneous calls giving a

Delay Units certified safe for Mines (Certificate T/Tel. 48), are usually kept in stock for use with two, four, or six lines. A 2-line unit is illustrated in Figure 1. They are available for use with either magneto or battery call systems. On the latest Ericsson mining switchboards of the N.550 and N.530 types wiring and terminals already exist for the addition of the delayed exchange call facility on certain lines. The provision of these lines is shown below :—

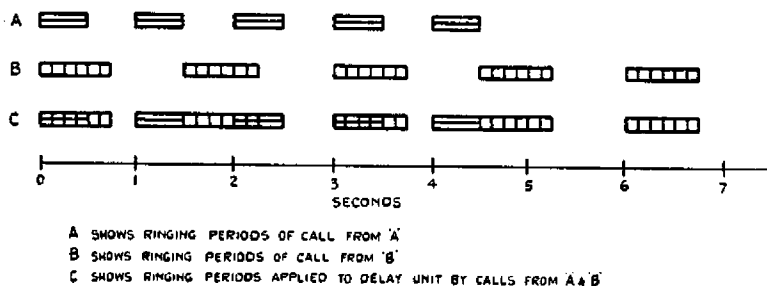


Fig. 2—Relationship of Simultaneous Calls

continuous ring period of five seconds to the delay equipment is exceedingly remote.

A diversity factor of 4 is, therefore, suggested when a delay period of five seconds is used. This means that four lines are recommended as a maximum to be connected to one delay unit if code signalling is in general use on each line.

Practice may prove that another diversity factor may be used under different local conditions, such as, the varying interval between calls on the same line, the probability of simultaneous calls from different lines at the same time, the maximum length of the code call, the maximum number of false exchange calls tolerated without complaint, and similar considerations.

The circuits are shown in Figure 3.

No. of lines on Switchboard.	Lines wired for delayed call facility.
10	2
15	4
20	4
25	6
30	6

INSTALLATION.

The method of connecting for new equipment will be obvious from the circuits. The lines wired for delay unit facilities merely require connecting to the equivalent terminals of the delay call unit.

At the switchboard the following straps should be removed, JA—SA and JB—SB. Connections should then be made between these terminals and the corresponding

terminals on the delay unit, i.e., JA on the switchboard to JA on the delay unit, JB to JB, SA to SA and SB to SB.

Similar connections must be made for each line associated with the delay unit.

When the delay unit is added to an existing system it will be necessary to disconnect the wiring between the inner springs of the answering jack and the indicator. The wiring from the delay unit terminals SA, SB, JA and JB must then be connected to these points in the manner indicated on the line circuits shown in Figure 3.

The battery supply may be taken from any suitable source within the voltage range of 12 to 20 volts. Care must be taken that the supply is correctly connected in accordance with the polarity marked on the delay unit.

Another use for the delay unit is the prevention of code ringing from affecting a particular party on a party line. For instance, where a telephone in a private house is connected to a party line used for code ringing the addition of a delay unit at the house would suppress the code ringing and still enable a call to be made to the telephone by a prolonged ring.

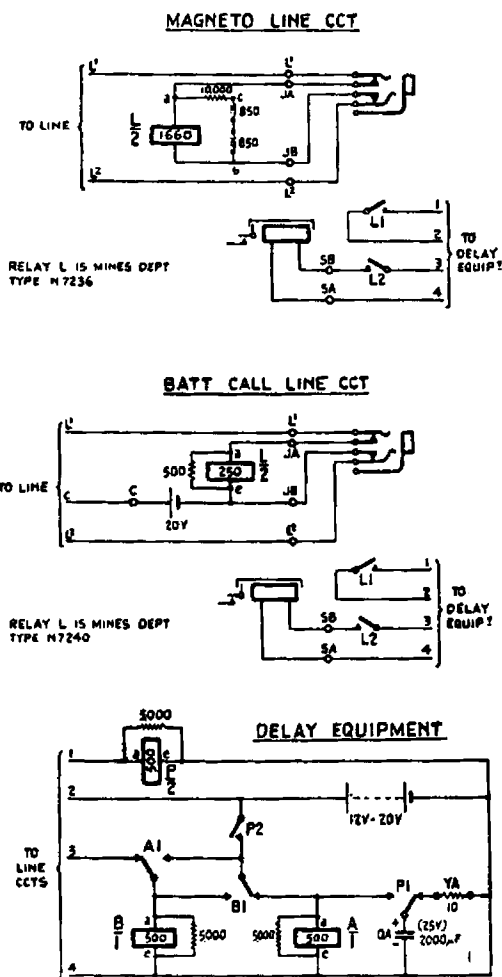


Fig. 3—Line and Delay Unit Circuits

The advantages are particularly obvious where code ringing is used during the night.

(The Ericsson Code Ringing Delay Unit is protected by Letters Patent No. 495,253).

