ELECTRIC CLOCK SYSTEM FOR TELEPHONE OFFICES

DESCRIPTION

1. GENERAL

1.01 This section describes the electric clock system for furnishing time service in telephone buildings and for operating switchboard position clocks.

1.02 Means are provided for synchronizing the operation of all master clocks in an area (except the mercurial pendulum type) and for operating wall clocks in addition to switchboard position clocks. Provision is also made for furnishing emergency time service from one office to another should an interruption occur in the regular time service.

1.03 A telephone area is usually divided into districts, the number of which depends upon the size and layout of the area and the number of telephone offices involved. In each district there is a district master clock, the movement of which is arranged to be corrected hourly by the Western Union Telegraph Company where such service is available. The district master clock in turn synchronizes a number of building master clocks, one or more of which are located in each telephone office in the district. Each district and building master clock is arranged to operate secondary wall clocks and switchboard position clocks.

1.04 District master clocks and building master clocks are enclosed in wall type wooden cases and are equipped with pendulum-operated self-winding movements deriving motor power from the main spring wound once per hour from the 24-volt battery supply which is also employed to operate all control relays and secondary and switchboard position clocks. Secondary clocks are enclosed in wall type wooden or metal cases of either the recessed or surface type.

2. DISTRICT MASTER CLOCKS

Equipment features

2.01 The district master clocks are equipped with high grade 60-beat movements and are all of the same general appearance. KS-1924 and KS-1925 master clocks, shown in Fig. 1, are equipped with a pair of 400-ohm synchronizing magnets arranged to be actuated by a correcting pulse of current sent hourly by a Western Union grand master clock. It is possible for this mechanism to function only during the half-minute interval between 15 seconds before and 15 seconds after the minute. At all other times a locking arrangement prevents its operation. Where the Western Union synchronizing signals are transmitted on the hour the use of the clock per KS-1925 is required, and in cities where the signals are transmitted quarter past the hour, the clock per KS-1924 is employed.

DISTRICT MASTER CLOCK
K.S. 1924 K.S. 1925

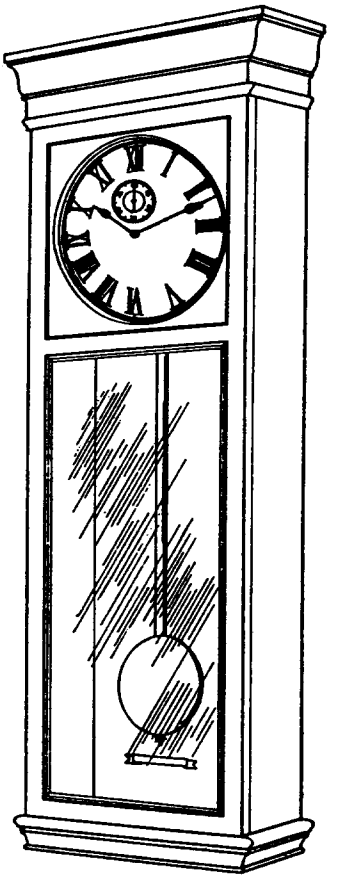

Fig. 1.

2.02 District master clock per KS-1926 is equipped with a mercurial pendulum for increasing its inherent accuracy in keeping time and is not arranged to be synchronized by Western Union time service.

2.03 The movements furnished with all district master clocks are equipped with three circuit closing devices:

(a) The first transmits hourly synchronizing signals to the associated build-

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ing master clocks. Contact is made quarter past the hour on the KS-1925 clock and on the hour on the KS-1924 and KS-1926 clocks for the reason that the clock movement cannot transmit at the same instant that it is receiving the correcting signals from the Western Union service.

(b) The second closes twice per minute on the 20th and 40th seconds and operates secondary clocks placed throughout the building for general time keeping. In order that the secondary clock will show the same time as the master clock operating it, no operating pulse is made on the minute when the synchronizing impulse may be received. It is for this reason that the two pulses per minute for secondary clock operation occur on the 20th and 40th seconds rather than at exact half-minute intervals.

(c) The third provides 10 closures per minute at six-second intervals and is employed to operate the switchboard position clocks. This latter circuit closing device is unaffected by the synchronizing mechanism.

Circuit features

2.04 Means are provided for synchronizing the district master clocks per KS-1924 and KS-1925 hourly by a Western Union grand master clock over a circuit provided by the telephone company for this service. These clocks and the KS-1926 supply hourly impulses for synchronizing all the building master clocks in the district. The district master clock acts as a building master clock for the building in which it is located.

2.05 Transfer keys are provided for exchanging emergency impulses between offices for operating not only the switchboard position clocks but also the secondary clocks in the building in which the district master clock is located, should it fail to function properly. The trunk transfer unit is used in those cases where a spare cable circuit is not available and talking conductors are employed.

2.06 The clock circuit is arranged to give a steady alarm in case a fuse operates.

3. BUILDING MASTER CLOCKS

Equipment features

3.01 The individual telephone offices in a district are usually equipped with building master clocks whose function is to operate secondary clocks and switchboard position clocks and are usually corrected hourly by connection to a district master clock. The building master clocks shown in Fig. 2 are equipped with 120-beat movements and are all of the wooden case surface wall type.

BUILDING MASTER CLOCK.
KS. 1927-1928-1931.
AND
SWITCHBOARD POSITION MASTER CLOCK
KS. 1299-1929-1930.

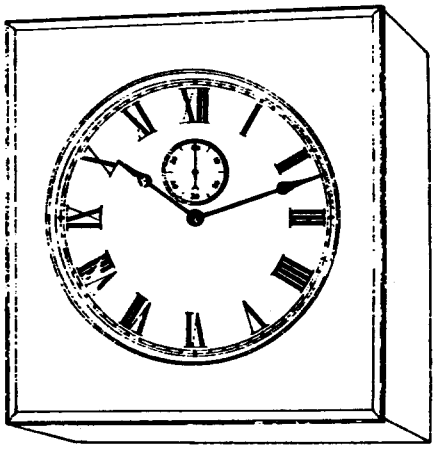

Fig. 2.

3.02 The clocks per KS-1928 and KS-1927 are equipped with synchronizing magnets arranged to receive the synchronizing signal. The former is synchronized 15 minutes past the hour while the latter is synchronized on the hour. The clock per KS-1931 is not equipped with synchronizing attachment and is for use where correcting impulses are not available. These clocks are equipped with two circuit closing devices; the first closes twice per minute on the 20th and 40th seconds to operate secondary clocks throughout the building, the second provides 10 closures per minute on six-second intervals for operating the switchboard position clocks.

3.03 These clocks may be equipped with a program ringing contact arranged to close according to a predetermined schedule with a minimum interval of five minutes between signals.

Circuit features

3.04 Where there are a number of building master clocks, means are provided for exchanging emergency impulses over cable pairs for operating the clocks in a telephone office in case the building master clock should fail to operate. However

where there may be only one building or where the use of cable pairs may be uneconomical, an emergency master clock is provided and is employed in case the regular building master clock should fail.

4. SWITCHBOARD POSITION MASTER CLOCKS

4.01 In offices where switchboard position clocks only are operated and where no secondary wall clocks are connected, one of three types of control clocks may be installed. KS-1930 is arranged to receive synchronizing signals at 15 minutes past the hour, and KS-1929 arranged to receive synchronizing signals on the hour. Clock per KS-1299 is not equipped with synchronizing attachment.

4.02 The switchboard position master clocks have the same appearance and dimensions as building master clocks and are furnished as wall type clocks with 120-beat movements and are enclosed in wooden cases. They are equipped with one circuit closing device making contact at six-second intervals with 10 closures per minute. This is a timing contact only and is not affected by the synchronizing attachment.

5. SECONDARY CLOCKS

Equipment features

5.01 Secondary clocks are employed for general building use such as in operating rooms, operators' quarters, terminal rooms and offices. They are operated by impulses from either district master clocks or building master clocks. Secondary clocks consist essentially of an electromagnetic stepping device arranged to move the hands of the clock as controlled by a contact device on an associated master clock. The stepping magnet is operated by two advancements per minute with operation on the 20th and 40th seconds.

5.02 The secondary clock KS-1987 has the same general appearance as the building master clock and is supplied in a wall type wooden case with various sizes of dials.

5.03 In addition to wall type square wooden cases other types of secondary clocks are employed, and may be of the recessed or surface type. A recessed type metal case clock is shown in Fig. 3. The movement proper is encased in a metal outlet box recessed in the wall, the only visible part being a hinged spun metal rim containing protection glass and dial. A surface type clock per KS-6620 shown in Fig. 4 is also furnished. This clock has a spun metal circular case projecting 4½ inches from the wall and is furnished in various dial sizes.

5.04 A type of secondary clock per KS-6622, is used mainly in operators' quarters and in restaurants. It is more ornate than any of the foregoing clocks and consists of a 16-inch square wooden panel furnished with

RECESSED TYPE SECONDARY CLOCK.
METAL RIM
K.S.6621

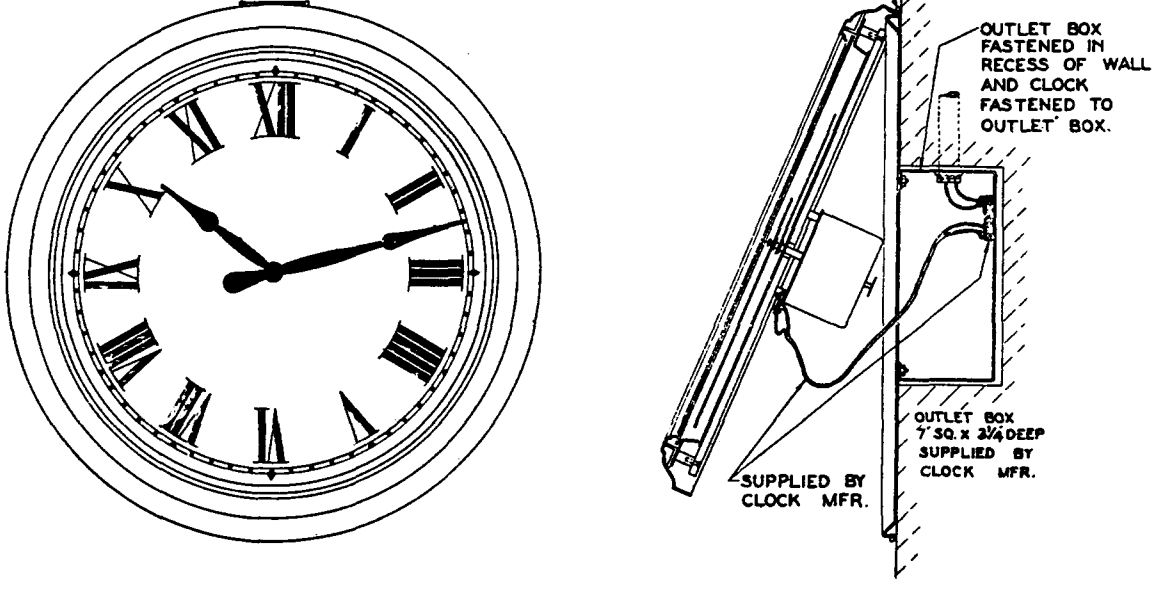

Fig. 3.

SURFACE TYPE SECONDARY CLOCK.
METAL CASE.
K.S.6820

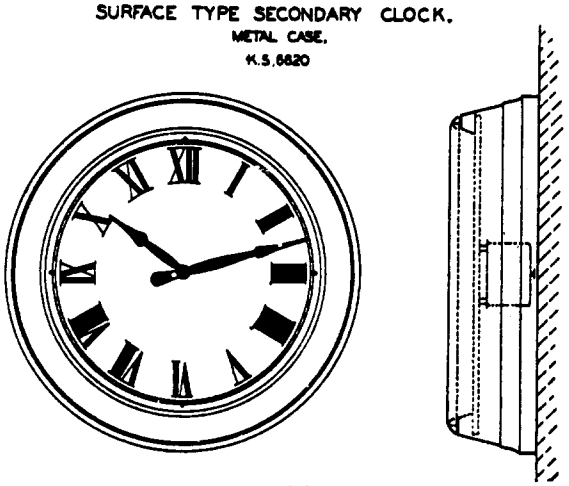

Fig. 4.

a white priming coat of paint so that it may be painted at the building to match the surrounding wall. Raised bronze Roman numerals are mounted in a 14-inch diameter circle and the movement is connected to the panel at the center. The clock movement is arranged to set back into an outlet box recessed in the wall approximately 2 inches, leaving the wooden panel flush with the wall.

Circuit features

5.05 In addition to the regular group relay an emergency group relay is provided. By the operation of the group relay key the impulses from the master clock are transferred to the emergency relay which in turn supplies the pulses for operating the secondary clocks in case the regular group relay becomes faulty in operation.

5.06 The number of secondary clocks is limited to six clocks per relay contact and four relays per master clock contact. Other arrangements are required where more than 24 clocks are needed. All secondary clock circuits have the fuse alarm feature.

6. CIRCUITS AND CIRCUIT DESCRIPTIONS

6.01 Table 1 is a list of circuit drawings pertaining to electric clock systems for telephone offices. Detailed circuit descriptions will be found in the associated CD sheets.

Table 1

Abbreviated Title	Drawing
District Master Clock Circuit Using Trunk Pairs for Exchanging Emergency Impulses	SD-90083-011
Master Clock Circuit Using Emergency Master Clock	SD-90029-01
Master Clock Circuit Using Trunk Pairs for Exchanging Emergency Impulses	SD-90030-01
Position and Secondary Clock Circuit Where Ultimate Number of Clocks is 24 or less	SD-90032-01
Position and Secondary Clock Circuit Where Number of Clocks is More Than 24	SD-90409-01