

Operator connections in No. 5 crossbar

Calls from subscribers in a No. 5 crossbar office to other subscribers in the same office, and for the most part other subscribers in other offices in the immediate area, are completed mechanically under control of the subscriber's dial. Although these mechanically completed calls constitute most of the traffic originating in the office, there are many occasions when a dial subscriber requires the assistance of an operator to complete a call, and a considerable number of trunk equipments are needed to serve these operator-assistance calls.

Operator's assistance is sometimes required to complete calls to manual offices, and also, at the present time, to complete long distance calls. Even though all offices were of the dial type, however, and even should subscriber dialing for toll calls become universal, there still would be occasions when an operator's assistance was needed. Such conditions as the provision of telephones for the blind often make it necessary to furnish manual service even in dial offices. Certain types of emergency calls also require access to an operator.

For all such outgoing operator calls in crossbar or panel areas, either a recording-completing or a special-service trunk will be used when the subscriber dials 211 or 0.* With previous types of offices, two different types of trunks were generally used, but for the No. 5 office a single circuit has been designed that is used as either a recording-completing or a special-service trunk—the former terminating in a toll position and the latter in a DSA position. It is common practice to combine the DSA and toll boards, and thus dialing either 0 or 211 may reach the same switchboard, but in considering

the handling of the calls this fact may be ignored.

For originating calls of any type in a No. 5 crossbar office, a marker is connected to the line by the lifting of the handset, and in turn connects an originating register to receive the number to be dialed. The marker then releases. After recording the digits, the register calls in a marker to establish a connection between the subscriber's line and a suitable trunk, as determined from the code dialed. So far, the operation is the same for all types of dial calls; the difference is in the type of trunk the marker connects to the line. If the code dialed were 211 or 0, either a recording-completing or a special-service trunk will be connected. On calls from manual lines, where the subscriber does not dial, the steps taken are essentially the same except that the marker, when called in by the lifting of the handset, recognizes that a manual line is calling and indicates this fact to the register it selects. The register, in turn, after seizing a marker to complete the connection to the trunk, will indicate to the marker that a DSA operator is required.

Besides making provisions to enable a subscriber in a No. 5 crossbar office to reach an operator, there must be provisions for operators at DSA or toll boards to reach a subscriber in a No. 5 office. Incoming operator-assistance trunks will thus be required as well as the outgoing trunks.

Both outgoing and incoming trunks between a No. 5 crossbar office and toll and DSA operator positions are of several types, as indicated diagrammatically in Figure 1. Outgoing trunks may be for use with coin or non-coin lines, and in either of these forms they may or may not be arranged to give a class-of-service signal to the operator. This class-of-service signal is used to identify a particular class of subscriber when an out-

*In areas predominantly step-by-step, codes of the type 11X are commonly used.

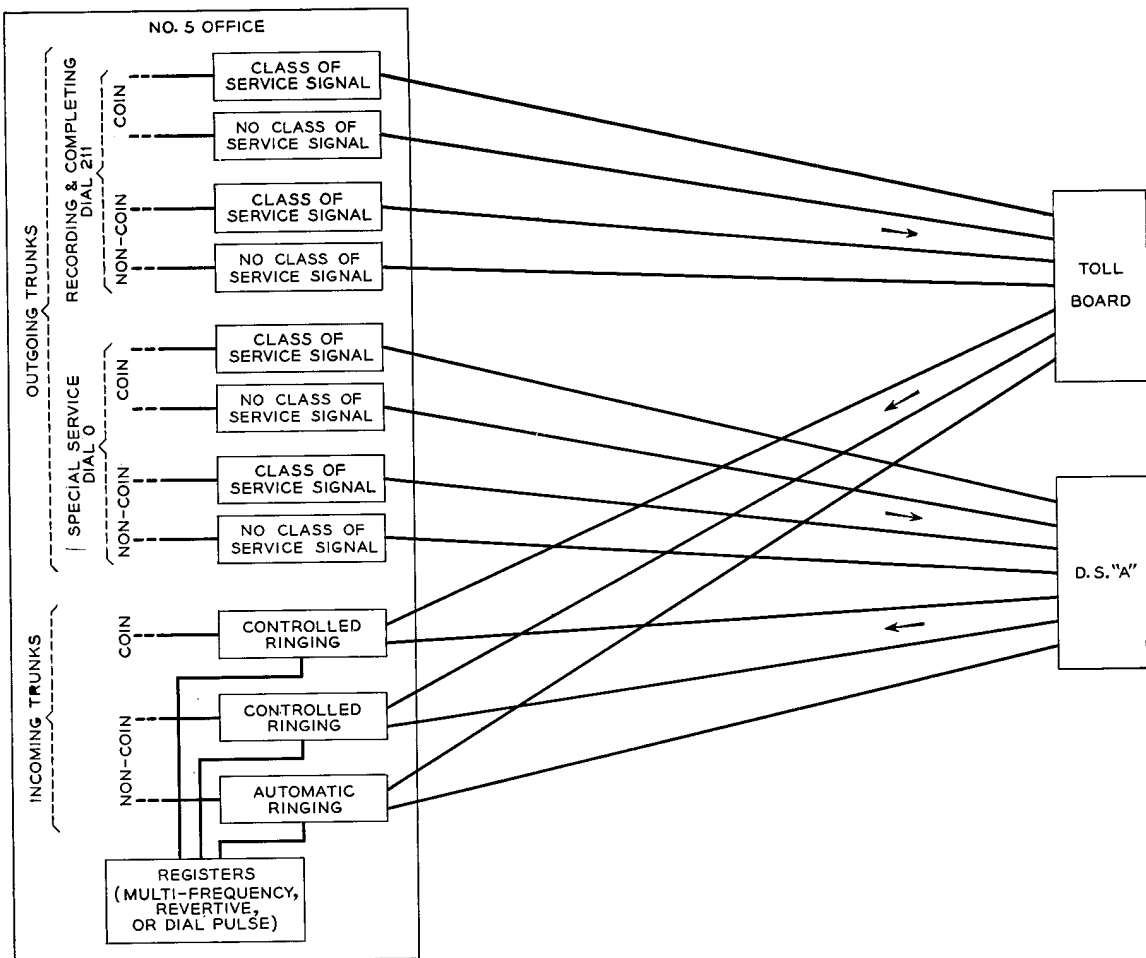


Fig. 1—In each of the three major classes of operator-assistance trunks—recording-completing, special-service, and incoming—there are subgroups for coin and noncoin lines which are further subdivided depending on the type of ringing provided and on whether or not a class-of-service signal is used.

going group of trunks serves two or more classes of subscriber service. With non-coin trunks, the class-of-service signal is used to indicate that the call is from a manual line, such as is provided for an incapacitated subscriber, while with coin trunks it may indicate that the call is from a manual coin-box line.

All of the outgoing trunks of the above type include provisions for ring-back. They differ in this respect from outgoing trunks to dial offices since the operator may need to recall the subscriber before the call is terminated. With coin trunks, continuous ringing voltage may be applied across the line under control of the operator whether or not the subscriber has hung up. With non-coin lines,

two types of ringing are provided. One, used principally for PBX trunks, rings under off-hook conditions, since even though the subscriber has hung up, the trunk will be in the off-hook condition as long as the PBX operator is plugged into it. The other type, used primarily in emergencies, applies all ringing voltages to the line successively regardless of whether the line is in the on-hook or off-hook condition. This latter type of ringing and its purpose have already been described in the RECORD.*

There are also several types of incoming trunks used for operator-assistance calls. They differ in their ringing provisions and also in being arranged for coin or non-coin

*RECORD, March, 1941, page 206.

traffic. Coin incoming trunks are not arranged for automatic ringing, but only for controlled ringing. After the trunk is seized and a marker has subsequently established a connection to the called line, the marker sets up the proper ringing conditions.† Ringing will not be applied, however, until the ringing key at the switchboard is operated. This permits the operator to seize and hold the line at once, but not to ring until she is ready to bring the subscriber into the connection.

Non-coin incoming trunks may be arranged for either controlled or automatic ringing. With the latter type of ringing, the subscriber line is rung as soon as it is seized, and after the subscriber answers, the ringing switch remains connected with the trunk for further use. With controlled ringing, for both coin and non-coin trunks, the ringing switch remains connected with the trunk until final disconnection, and may be reused under control of the operator. All of these incoming trunks may be connected to any of the three types of registers: multifrequency, revertive, or dial pulse.

In the trunk diagram of Figure 1, only certain of the features that differentiate the various types of trunks are indicated. In addition to these features, all of the coin trunks—either outgoing or incoming—have provision for collecting and returning coins. For outgoing trunks this is obviously necessary, but it is also needed sometimes with

incoming trunks, such, for example, as when the charge is to revert to the called subscriber. The return of the original coin used to reach the operator is under control of the originating register, and the coin is returned automatically on calls dialing 0 or 211. Subsequent return or collection of the coin, however, is done by the trunk under control of the operator.

In addition to the differences mentioned above, operator-assistance trunks are available in two forms commonly referred to as two-wire and three-wire trunks. The latter form is used when the switchboard is in the same building as the No. 5 office, and the former when it is in a distant building. With the switchboard in the same building, three wires—tip, ring, and sleeve—are carried from the trunk circuit to the switchboard, and the third or sleeve lead provides an extra path for supervisory signals and for holding switches and relays operated. Circuits to distant offices, however, have only two wires—tip and ring conductors—and thus the trunk circuits used at both ends of the circuit must have additional relays and other elements to substitute for the third conductor. Two-wire trunks are thus somewhat larger and more expensive than three-wire trunks.

Operator-assistance trunks are used in considerable quantity; a 10,000 line office will usually have more than 100 of them. The quantity varies over a wide range, depending upon the percentage of the traffic that is not handled on a full-mechanical basis.

†RECORD, April, 1941, page 170.