equipment memorandum

MESSAGE SERVICE SYSTEM

1. INTRODUCTION

The message service system is specifically designed to provide motels, hotels, or similar offices having attendant answering service, with an efficient and time saving method for receiving and delivering incoming messages. It is engineered so it will not interfere with making or receiving calls. This service can be wired to any existing system with a minimum of expense and inconvenience.

Figure 1. Type 80 message service telephone.

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1.1 Description

Below are the major components of the message service system.

a. Self-compensating type 80 message service telephone.

b. Message service control unit.

c. Interrupter circuit.

d. Booster battery circuit (50- or 100-volt battery eliminator).

The above components make up a complete message service system. A description of the telephone, the control unit, the interrupter circuit, and the booster battery circuit is contained in the following sections.

1.2 Self-compensating Type 80 Message Service Telephone

The self-compensating type 80 message service telephone is a standard self-compensating type 80 dial telephone equipped with a neon signal lamp. This lamp is located in the telephone housing, above and to the right of the dial (figure 1). The neon lamp provides a flashing signal to indicate that a message is being held for the user. Figure 2 is a side view line drawing of the self-compensating type 80 message service telephone, showing the position of the lamp, its components and its two connections inside the telephone housing. This unit is engineered so that no additional external wires are needed.

1.3 Message Service Control Unit

The message service control unit (figure 3) is designed in the trim-line styling which is presently being used for the secretarial answering unit and the type 51 attendant cabinet. There are two standard size units. The smaller unit is equipped with 60 lines and has a total capacity of 100 lines. The larger unit is equipped with 140 lines and has a total capacity of 200 lines. Both units can be equipped with the full line capacity with very little time and expense. If more lines are needed, two or more control units can be used.

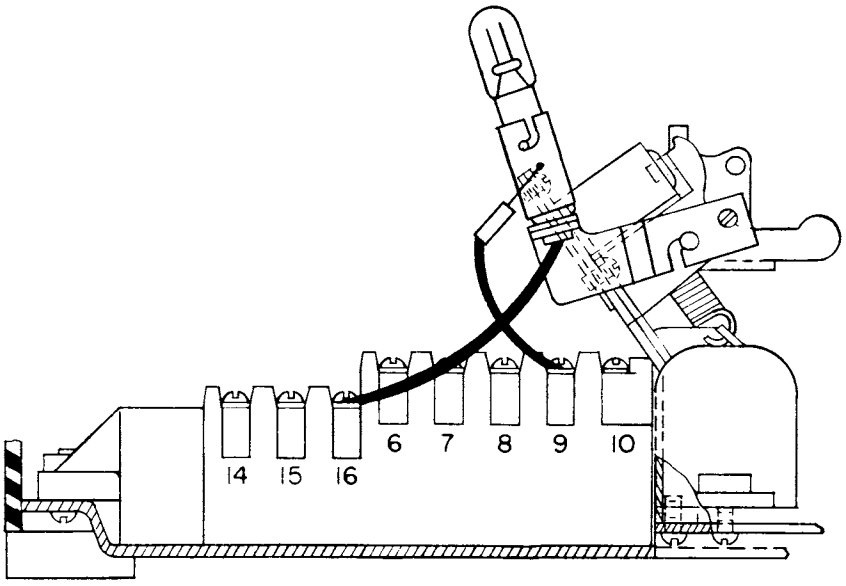

Figure 2. Type 80 message service telephone, side view.

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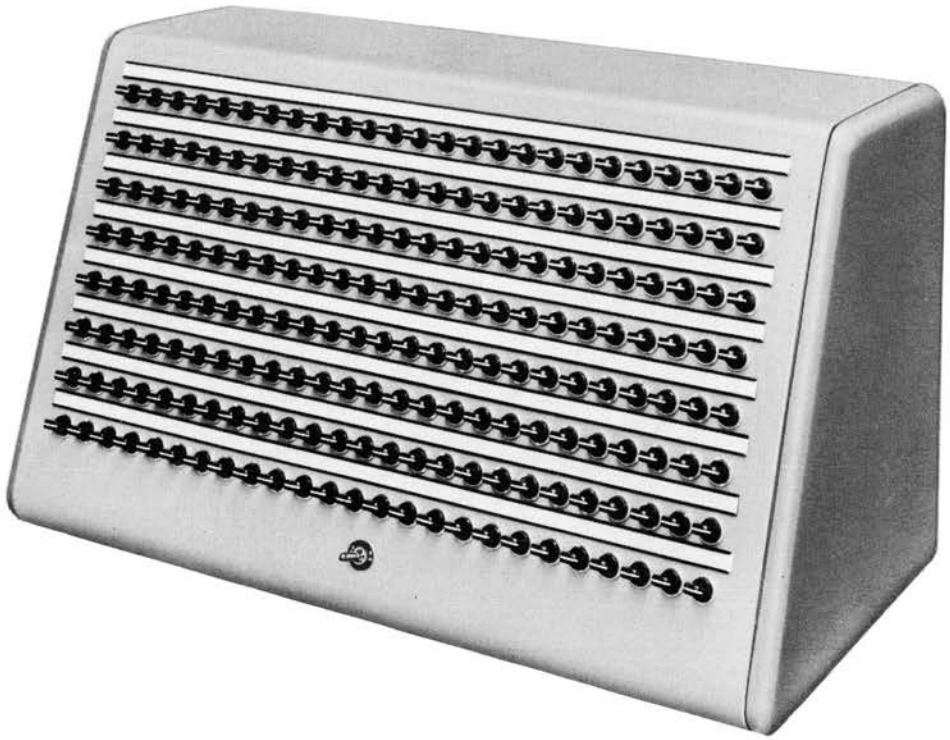

Figure 3. Message service control unit.

The message control unit contains the message service indicating keys, the interrupter start key, and wiring from these keys to a terminal block. The message service indicating keys (turn type) are mounted in horizontal rows with twenty-five keys per row. A designation strip is provided above each row of message service indicating keys. The room number associated with each key, may be printed on this designation strip. The interrupter start key (toggle-switch type) is mounted in the front lower center of the control unit.

1.4 Interrupter Circuit

The interrupter circuit provides a flashing signal for the neon signal lamp. When used with a P-A-B-X or P-B-X 48-volt exchange battery (figure 8), the circuit contains an interrupter start key which is located in the message service control unit, associated resistors and three relays which alternately open and close the line between the booster battery and neon signal lamp, and a diode and 2500-ohm resistor for each 100-station group (but could be reduced to a diode and resistor for each 50-station group, if necessary). The interrupter circuit, mounted and wired on a relay plate, can be shelf or wall mounted and located to meet any special requirement or space availability. This component is provided to interrupt the booster battery to the neon signal lamps at the telephones. In addition to flashing the neon signal lamp to provide a visual signal, the life of the lamp elements is lengthened.

1.5 Booster Battery Circuit

The positive (+) booster battery circuit (figure 4) provides the necessary voltage to operate 20 per cent of the total number of neon signal lamps at one time. When used with a P-A-B-X or P-B-X 48-volt exchange battery, the circuit consists of a 50-volt booster battery. When used with a P-B-X 24-volt exchange battery, the circuit consists of a 100-volt booster battery. A maximum multiple of four booster battery leads (BB), each serving up to 100 stations, may be used.

A simple wiring change at the booster battery terminal strip provides either 50 or 100 volts. For use with a 50-volt P-A-B-X or P-B-X, connect the "P" lead to terminal No. 2 which provides a 50-volt d-c output. For use with a 24-volt P-B-X, connect the "P" lead to terminal 1, which provides a 100-volt d-c output. Figure 4 shows a booster battery with the "P" lead connected to terminal 1 and providing a 100-volt d-c output.

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Figure 4. Booster battery connected for 100-volt d-c output.

2. APPLICATION

In the following discussion, we will cover two possible applications of the message service control unit. In the first application, the control unit is located next to the attendant cabinet, and in the second application the control unit is located in an area other than with the attendant cabinet. However, if space permits, the control keys can be installed into an existing or a new attendant cabinet, allowing the operation to remain the same as if the control unit were located next to the attendant cabinet. NOTE: The interrupter start key, located on the message service control unit, is first operated prior to operating the first turn key. It remains in the operated position until all turn keys are in their normal positions. To conserve power, the start key is then returned to normal.

2.1 The Message Service Control Unit Placed Adjacent to the Attendant Cabinet

In this location, the operator can be responsible for the operation of the control unit. The sequence of operation is as follows:

a. A call is placed to the switchboard and extended to the called party's telephone (figure 5A).

b. If the called party fails to answer, the operator disconnects the line and records any message which the calling party wishes to leave. The operator then operates the called party's message service indicating key (figure 5B) which provides a flashing signal to the called party's telephone.

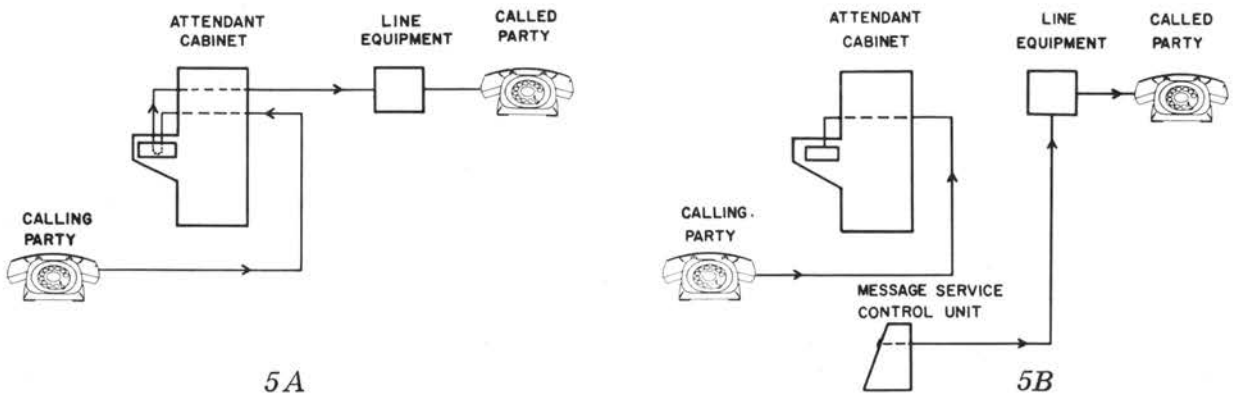

Figure 5. Call control, control unit located adjacent to attendant's cabinet.

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c. When the called party returns and notices the signal, the operator is dialed and the message received. The operator returns the message service indicating key to its normal position which extinguishes the neon signal lamp.

2.2 The Message Service Control Unit Placed Away From the Attendant Cabinet

At this location (possibly the reception desk), a telephone is placed nearby so the message service clerk or receptionist can receive and record any incoming messages. The sequence of operation is as follows:

a. A call is placed to the switchboard and is extended to the called party's telephone (figure 6A).

b. If the called party fails to answer, the operator disconnects his line and connects the message service attendant to the calling party (figure 6B). The message service attendant then records the calling party's message and operates the message service indicating key associating with the called party's telephone, which provides a flashing signal to the called party's telephone.

c. To receive the message, the called party dials the message service control unit. After the message is received, the control unit attendant returns the message service indicating key to normal, which extinguishes the neon signal lamp.

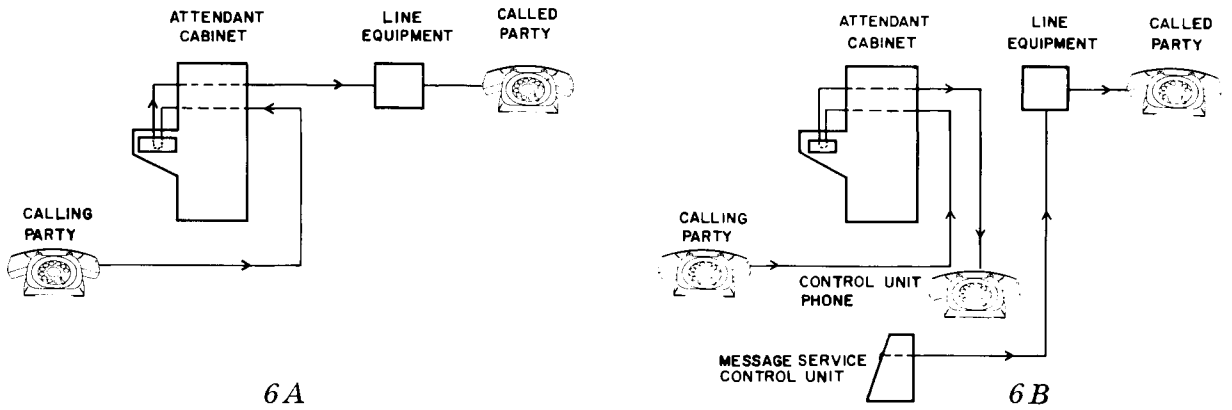

Figure 6. Call control, control unit located away from attendant's cabinet.

3. INSTALLATION

The message service system is adaptable to a wide variety of telephone systems. The following sections supply installation information applying for the 100- and 200-line type 75 P-A-B-X, the type 50 P-A-B-X, and the Leich L-55 P-B-X.

3.1 Message Service Telephone Installation

The type 80 message service telephone (figure 1) is equipped at the factory with all necessary wiring. Installation requires only the removal of the old telephone and replacement with the message service telephone. No additional wiring changes are required.

3.2 Message Service Control Unit Installation

The message service control unit (figure 3) is wired at the factory in two forms: one is wired for use in up to 100-line systems, the other for use with systems having up to 200 lines. The message service control unit may be placed either adjacent to the attendant cabinet or away from the attendant cabinet (sections 2.1 and 2.2). The message service control unit rests on cork pads and will not mar or scratch the desk or table top on which

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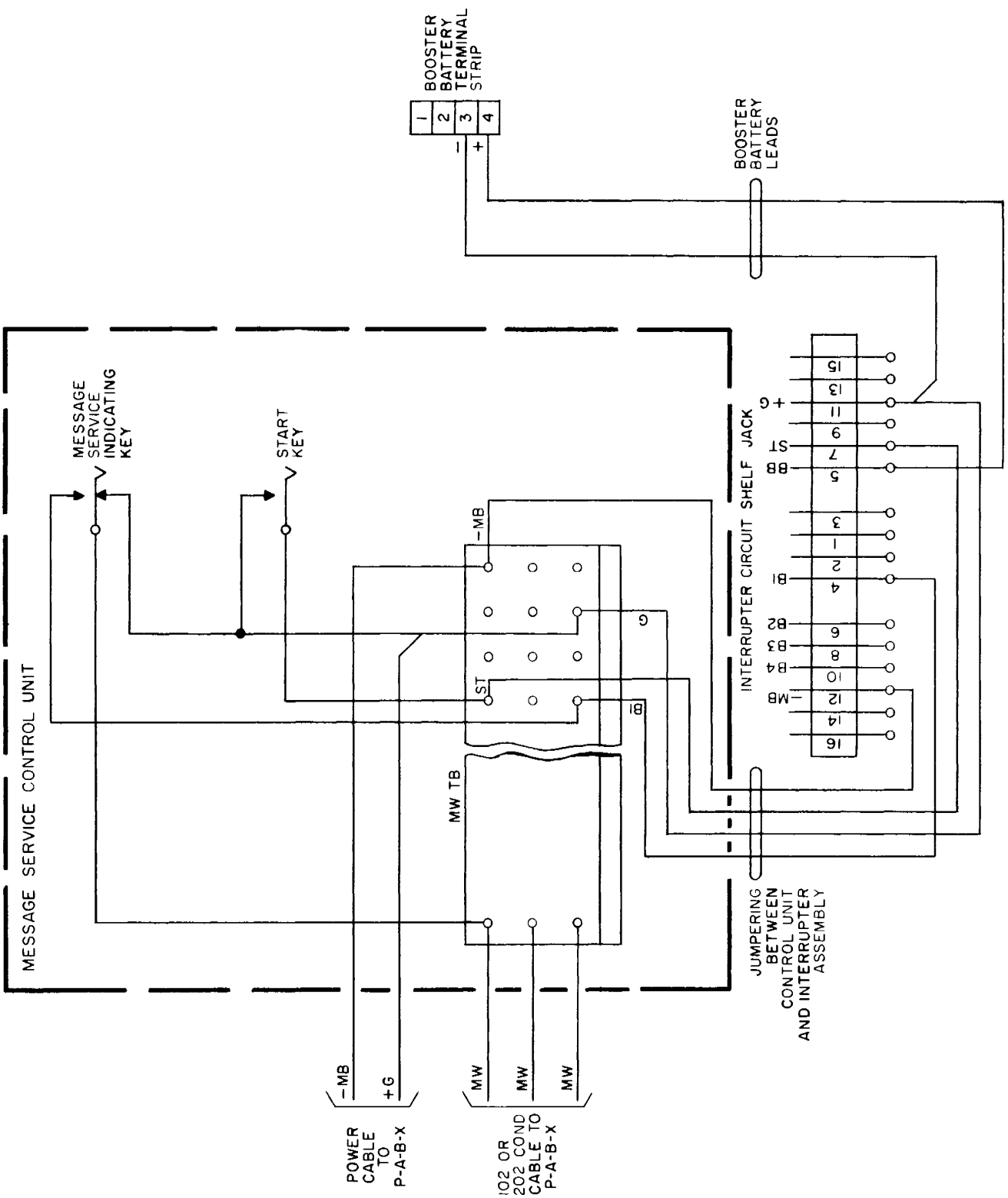

Figure 7. Typical cabling diagram.

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it is placed. Figure 7 shows the terminals to which ground (from the fuse panel of the P-A-B-X) must be attached. One ground lead is connected in the 100-line unit, and two ground leads are connected in a 200-line unit. The ground lead, through contacts of the message service indicating key in a normal position, operates the line equipment if the line is seized by an incoming or outgoing call. Figure 7 also shows the message service control unit terminal to which the interrupter circuit start lead (ST) is attached.

3.3 Interrupter Circuit Installation

The interrupter circuit, on a relay plate for shelf or wall mounting, can be placed to meet any special requirements or space availability. If space is available on the power shelf in the P-A-B-X, the interrupter may be jacked in there. More-than-likely, the interrupter circuit will be wall mounted and require a wall mounting unit equipped with jacks to accommodate the relay plate of the interrupter circuit. The jacks on the power shelf or wall mounting unit must be wired as per figure 7. When up to 100 lines require message service, lead B1 at jack 4 must be run to the message service control unit. When up to 200 lines require message service, leads B1 and B2, at terminals 4 and 6, must be run to the message service control unit and attached as per figure 7.

Assembly 16 of drawing H-56152 shows a wall mounting unit suitable for use with the interrupter circuit. The mounting is fastened to the wall vertically with the proper lag screws, etc. dictated by the mounting surface. Mounting screws are not furnished.

When the interrupter circuit is used with a 50-volt P-A-B-X or P-B-X, "X" straps (figure 10) around the 1500-ohm resistors must be used and "W" straps around resistors J, K, and L must be omitted. When the interrupter circuit is used with a 24-volt P-B-X, "X" straps are omitted and "W" straps are connected.

3.4 Installation of Additional Turn Keys

If additional turn keys are to be added to the message service control unit, remove the rear cover. At the positions where the new keys are to be mounted, remove the snap-in plug buttons. Place the keys into the mounting holes from the rear of the unit. The keys have two nuts; a hexagonal nut that provides adjustment for the degree of protrusion through the hole (mounted within the cabinet), and a knurled nut which locks the key in place (mounted on the exterior of the cabinet). Upon completion of key mounting, attach the appropriate wires to the new keys. The wires are fanned from the cable and are located directly behind the associated key. Solder all wired terminals and replace the back cover.

3.5 Booster Battery Installation

The booster battery (figure 4) may be mounted in any convenient location, but should be near an outlet to commercial a-c power. The two leads from the booster battery supply are run to the shelf jacks which will hold the interrupter assembly. The positive output lead connects to shelf jack 5 and the negative output lead is connected to shelf jack 11. NOTE: Paragraph 1.1.4 describes the wiring changes at the terminal strip of the booster battery for selection of either a 50- or 100-volt d-c output.

3.6 Cabling to the Line Equipment

When the message service system is added to an existing type 75 P-A-B-X with combined line and cut-off relay line circuits, an applique cable (including terminal block, cable, and mounting material) is available. This cable mounts on the P-A-B-X frame and is wired to each line circuit. Then from the terminal block, another cable is connected to the message service control unit terminal block. Installation of the applique cable, in a 100- or 200-line type 75 P-A-B-X equipped with a combined line and cut-off relay line circuit will be described in paragraph 3.6.1. However, the line equipment is cabled directly (without the applique cable) to the message service control unit when used with the type 75 P-A-B-X having separate line and cut-off relay line circuits, type 50 P-A-B-X, and the Leich L-55 P-B-X (see paragraphs 3.6.2 to 3.6.4).

These wiring changes provide ground (when the message service indicating key is at normal) to operate the line equipment; or interrupted booster battery (when the message service indicating key is operated) to light the neon signal lamp. Ground, through a diode

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in the interrupter circuit, is also provided when the message service indicating key is operated; so that the line circuits may function if seized by an incoming or outgoing call.

When the message service system is ordered on a new P-A-B-X, wiring of the line circuits is done at the factory.

3.6.1 Installation of the applique cable in a 100- or 200-line type 75 P-A-B-X with combined line and cut-off relay line circuit.

The applique cable is mounted per drawing D-241685 is used with a 100-line type 75 P-A-B-X. Remove the ground (usually one ground lead is common to 20 line circuits per plate) from the 550-ohm winding of the line relay of each line circuit. Connect message service system applique cable leads (per drawing H-981491) to the 550-ohm windings of the line relays of each of the respective line circuits. Cabling between the applique cable terminal block and the message service control unit terminal block is done with a 102-conductor installer's cable. The 102-conductor installer's cable (drawing D-910018) is color coded so that line circuit 01 may be connected to message service indicating key No. 1, and line circuit 02 to key No. 2, etc., up to line circuit 00 which is connected to message service indicating key No. 100.

The applique cable is mounted per drawing D-241685 if used with a 200-line type 75 P-A-B-X. Remove the ground (usually one ground lead is common to 20 line circuits per plate) from the 550-ohm winding of the line relay of each line circuit. Connect the applique cable leads (per drawing H-981480) to the 550-ohm windings of the line relays of the respective line circuits. Cabling between the applique cable terminal block and message service control unit terminal block is done with a 202-conductor installer's cable. The 202-conductor installer's cable (drawing D-910021) is color coded so line circuit 01 can be connected to message service indicating key No. 1, and consecutively on up to line circuit 00 connected to key No. 200.

3.6.2 Message service control unit cabled directly to a 100- or 200-line type 75 P-A-B-X using separate line and cut-off relay line circuits.

When the message service system is to be added to an existing type 75 P-A-B-X using separate line and cut-off relay line circuits, ground must be removed from the positive normal (N) lead at spring 6 of the CO relay of each line circuit. Then, at spring 6 of the CO relay of each line circuit, a lead from 102- or 202-conductor installer's cable (cable drawing D-910018 for P-A-B-X equipped with up to 100 lines, D-910021 if equipped with up to 200 lines) must be connected. Then each line circuit is connected to a terminal, at the message service control unit terminal block, corresponding to the proper message service indicating key. Line circuit 01 should correspond with message service indicating key No. 1, line circuit 02 with key No. 2 etc.

3.6.3 Message service control unit cabled directly to the lineswitch circuit of the type 50 P-A-B-X.

When the message service system is to be added to an existing type 50 P-A-B-X using lineswitch circuits, ground must be removed from spring 4 of relay B of each lineswitch. Then a lead from 102- or 202-conductor installer's cable (cable drawing D-910018 if P-A-B-X is equipped with up to 100 lines, D-910021 if equipped with up to 200 lines) is connected to spring 4 of relay B at each lineswitch. Then each lineswitch is connected to a terminal at the message service control unit terminal block, corresponding to the proper message service indicating key. Lineswitch No. 1 should connect to indicating key No. 1, lineswitch No. 2 to indicating key No. 2, etc.

3.6.4 Message service control unit cabled directly to the station line and relay line circuits of the Leich L-55 P-B-X.

When the message service is to be added to an existing L-55 P-B-X using station line circuits, ground must be removed from the back spring of the tip (T) lead of each station line circuit. Then a lead from 102- or 202-conductor installer's cable (drawing D-910018 if P-B-X is equipped with up to 100 lines, drawing D-910021 if P-B-X is equipped with up to 200 lines) is connected to the back spring of the tip (T) lead of each station line circuit. Each station line circuit is connected to a terminal at the message service control unit terminal block corresponding to the proper message service indicating key. Station line circuit No. 1 should correspond with message service indicating key No. 1, etc.

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When a message service system is to be added to an existing L-55 P-B-X using relay line circuits, ground must be removed from the No. 1 winding of each line relay of the line circuit. A lead from 102- or 202-conductor installer's cable (drawing D-910018 if P-B-X is equipped with up to 100 lines, drawing D-910021 if P-B-X is equipped with up to 200 lines) is connected to the No. 1 winding of each line relay of the line circuit. Each line circuit is cabled to a terminal at the message service control unit terminal block, corresponding to the proper message service indicating key. Line circuit No. 1 should correspond with message service indicating key No. 1, etc.

3.7 Typical System Cabling

Figure 7 illustrates a typical method of cabling between components of the message service system. Two leads from the terminal strip of the booster battery are jumpered to the shelf jacks of the interrupter circuit. If the interrupter circuit is mounted on a jack position of the P-A-B-X, the (+) G and (-) MB leads can be connected directly to the P-A-B-X fuse panel, and lead B1 and ST are jumpered (or cabled) to the message service control unit. If the interrupter circuit is located away from the P-A-B-X, and closer to the message service control unit, the connections can be made as shown on figure 7. All MW leads should be connected to the MW terminal block. This facilitates addition of indicating keys, since only the key will have to be added and wired.

4. CIRCUIT EXPLANATION

The message service system can be installed into any existing system. The following sections will describe the operation of the message service system in conjunction with the three different types of systems listed below.

a. Line circuits with a separate line and cut-off relay or a combined line and cut-off relay as used with the type 75 P-A-B-X.

b. With a lineswitch circuit as used with the type 50 P-A-B-X.

c. With the station line circuit or relay line circuit as used with the Leich L-55 P-B-X.

4.1 Circuit as Used With Type 75 P-A-B-X

A schematic drawing of a complete message service system showing its operation in conjunction with a separate line and cut-off relay line circuit or a combined line and cut-off relay line circuit, as used with the type 75 P-A-B-X, is shown in figure 8. In the following paragraphs, we will discuss the operation of the message service system through both separate and combined line and cut-off relay line circuits.

4.1.1 Circuit through combined line and cut-off relay line circuit.

The interrupter start key is a locking key, located in the message service control unit, which provides ground to start the interrupter. When operated, the start key extends ground to jack 7 of the interrupter circuit and starts the cycle of relays A, B, and C. When the start key is returned to its normal position, ground is cut off and the interrupter stops.

With the start key operated, ground is supplied to the 275-ohm winding of relay B through the 300-ohm resistor K (figure 8). Relay B operates and closes contacts 1-2 and 3-4. Contacts 3-4 complete a circuit to operate the neon signal lamp at the message service telephone and contacts 1-2 provide ground through the 400-ohm resistor J to operate slow-to-operate relay A. Relay A then closes contacts 1-2, which supply ground through the 400-ohm resistor L to operate slow-to-operate relay C. Relay C operates after its slow-to-operate interval and at contacts 1-2 opens the circuit to slow-to-release relay B. Relay B restores and opens relay A at contacts 1-2, and also opens the circuit to the neon signal lamp at contacts 3-4. Relay A restores and opens the circuit to relay C. Relay C restores and again closes relay B. Relay B operates and the cycle starts again. This alternate breaking and making of the operating circuit at relay B contacts 3-4, causes the neon signal lamp to flash.

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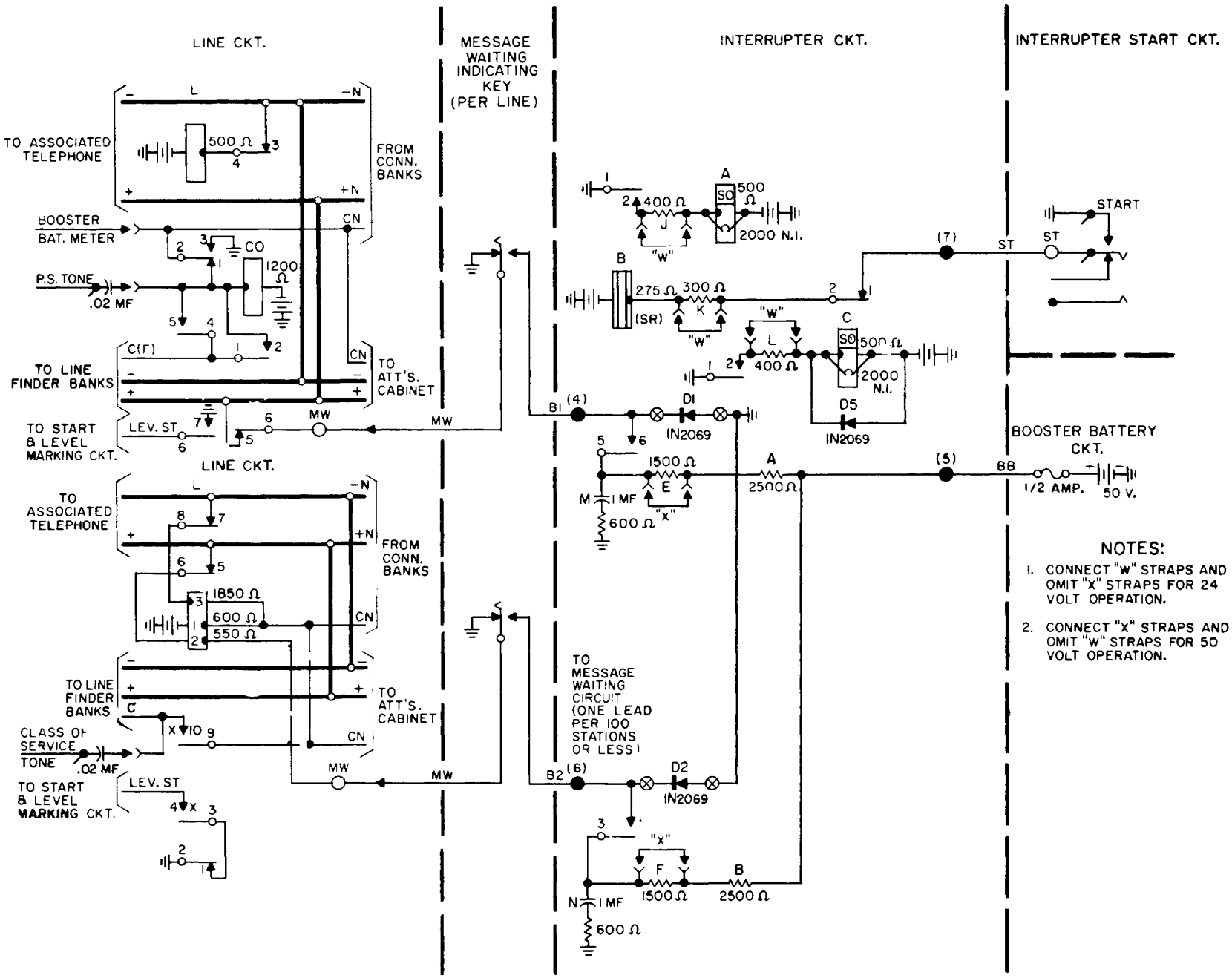

Figure 8. Combined and separate line and cut-off relay, type 75 P-A-B-X.

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With the interrupter start key operated and a message being held for a subscriber, the message service attendant operates the message service indicating key associated with his line. Positive (+) booster battery is extended to negative battery via the following path: from battery through the 2500-ohm resistor and "X" strap (a strap around the 1500-ohm resistor is needed for 50-volt operation), through relay B (interrupter circuit) contacts 3-4, the operated message service indicating key to the message waiting (MW) terminal of the combined line and cut-off relay line circuit, and through the 550-ohm winding of relay L, contacts 5-6, the (+) line of the line circuit, and to the (+) line of the associated telephone (figure 8). Through the telephone via the (+) line through the 56K-ohm resistor to the neon signal lamp, through the ringer and out to the (-) line. The interrupted booster battery then extends through relay L contacts 7-8, in the line circuit to the 1850-ohm winding of relay L, and the 600-ohm winding of relay L to negative battery.

The neon signal lamp will light over this circuit, but relay L, because of the high resistance, will not. However, when the subscriber picks up his handset, relay L will operate over a low-resistance circuit, breaking the circuit to the neon signal lamp at contacts 5-6 and 7-8. Relay L operates its "X" contacts only. The "X" contacts 3-4 ground the level start (LEV. ST.) lead and start a linefinder. The linefinder connects to this line at lead C(F), grounding connector lead CN through "X" contacts 9-10 to busy the line to other calls and operate relay L fully. Relay L, operating fully, removes ground from the LEV. ST. lead and removes itself from across the line. The subscriber can now dial the message service attendant. When he receives his message, the attendant returns the message service indicating key to normal, which extinguishes the neon signal lamp. Also, should a call be extended to the subscriber's line circuit, the combined relay would operate; that is, relay L contacts 5-6 and 7-8 would break, extinguishing the lamp before the subscriber picks up his handset. When the call is completed and the handset replaced, the neon signal lamp lights again.

4.1.2 Circuit through separate line and cut-off relay line circuit (figure 8).

Should the line circuit contain a separate line and cut-off relay (figure 8), the operation will remain basically the same. The only change is in the line circuit. When the start and message service indicating keys are operated, the circuit is as follows: positive (+) booster battery through the 2500-ohm resistor and "X" strap (needed for 50-volt operation) to relay B contacts 5-6 (interrupter circuit), to the message waiting (MW) lead, through relay CO contacts 5-6, and out the (+) line to the associated telephone (figure 9); through the 56K-ohm resistor, to the neon signal lamp, through the ringer and out the (+) line. The booster battery extends through break contacts of the CO relay (figure 8) to the 500-ohm winding of relay L and to negative battery. The neon signal lamp lights over this circuit. Relay L because of the high resistance will not operate in series with the neon signal lamp. The neon signal lamp will continue to flash until the subscriber returns and signals the attendant for his message, or until the CO (cut-off) relay operates. The CO relay operates when:

a. The user picks up his handset and his line equipment is seized by a line finder.

b. The telephone is in operation.

c. An outside call has been extended to the using party's line equipment.

The lamp will light again when the call has terminated and the handset is replaced. NOTE: The neon signal lamp remains lit except for the above conditions, until the message service attendant returns the operated message service indicating key to normal.

4.2 Circuit as Used With Type 50 P-A-X/P-A-B-X

A schematic drawing of a complete message service system with a lineswitch circuit, as used with the type 50 P-A-B-X, is shown in figure 10. In the following paragraph, we will discuss the operation of the message service system through a lineswitch circuit.

See paragraph 4.1.1 for operation of the interrupter circuit. Booster battery is extended through the 2500-ohm resistor, to the "X" strap (a strap around the 1500-ohm resistor is required when using 50-volt booster battery), to relay B (interrupter circuit) contacts 3-4 to the message service indicating key. When a message is left for a subscriber, the

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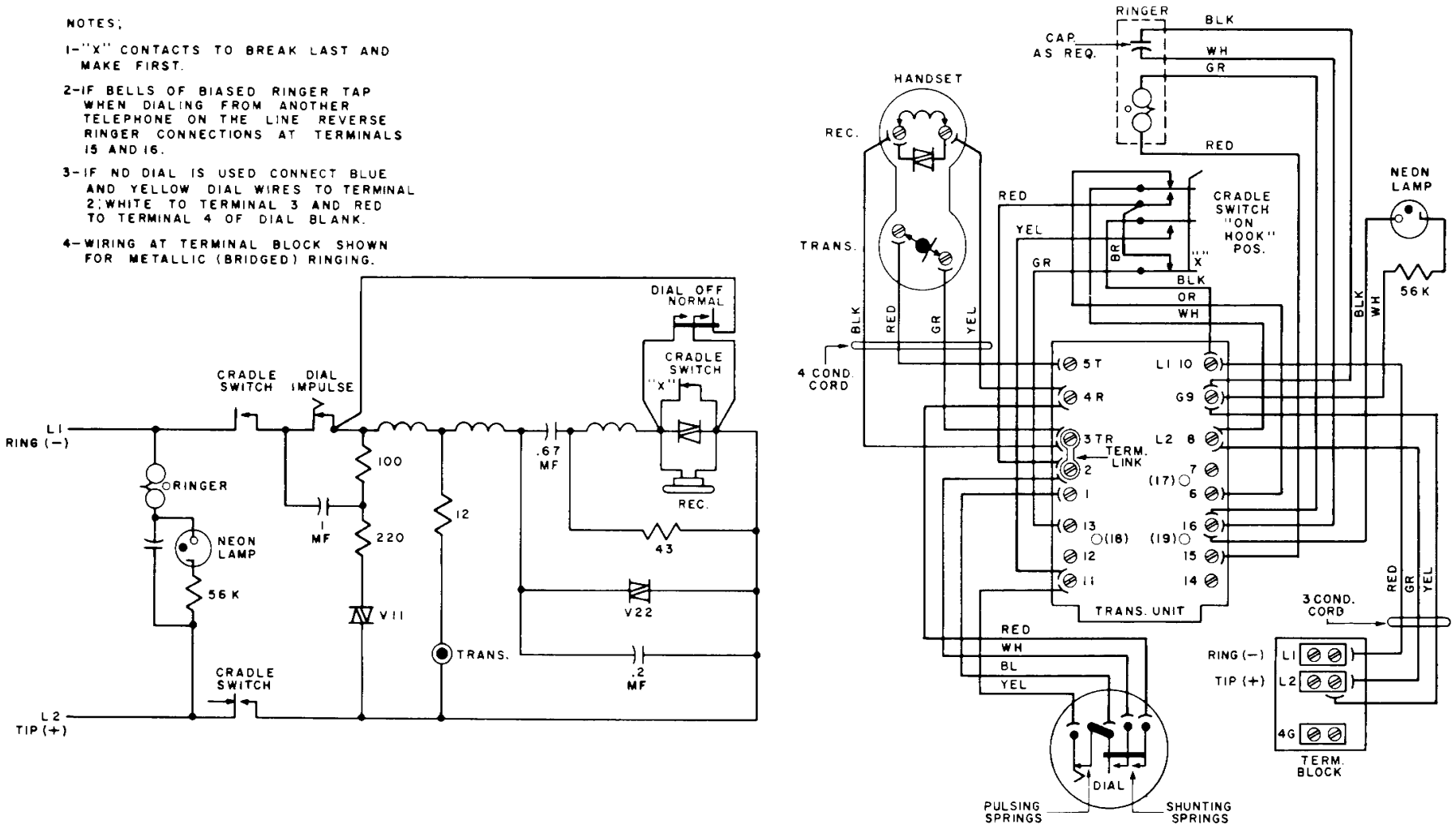

Figure 9. Schematic drawing of type 80 message service telephone.

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message service attendant turns the message service indicating key associated with the subscriber's line, which connects the interrupted booster battery to the message waiting lead. Positive (+) booster battery continues ocer the message waiting lead to lineswitch relay B contacts 3-4 and to the (+) line of the associated telephone (figure 9). Then through the 56K-ohm resistor to the neon signal lamp, through the ringer, to the (-) line of the lineswitch circuit (figure 10), through relay B contacts 5-6 to the 800-ohm winding of relay A and to negative battery. Over this path the neon signal lamp will light, but relay A, because of the high resistance, will not operate in series with the neon signal lamp. When the subscriber returns and notices the flashing neon signal lamp, he picks up his handset to dial the message service attendant. By lifting the handset, relay A of the lineswitch operates. The circuit for operation of relay A is as follows: positive (+) battery through diode D1, through the message service indicating key, over the message waiting (MW) lead, to relay B contacts 4-3, and to the (+) line of the telephone. Through the telephone to the (-) line of the lineswitch circuit, through relay B contacts 5-6, to the 800-ohm winding of relay A and negative battery. Relay A operates. Ground on the "IN" CHAIN lead through relay A contacts 4-6, to the 240-ohm No. 1 winding of relay B, to negative battery, operates relay B. Relay B winding No. 1 has enough energy to operate both the plunger and B.C.O. armatures. Operation of the B.C.O. armature cuts off ground to relay A at break contacts 3-4 and 5-6; break contacts 5-6 also break the circuit to the neon signal lamp, causing it to extinguish. Ground through relay A contacts 2-3, through relay B make contacts 1-2 of the plunger armature, to the 1200-ohm winding No. 2 of relay B and negative battery, keeps relay B operated during the slow-to-release interval of relay A. This slow-to-release interval is necessary so a selector can connect to the lineswitch.

Relay A then releases from the line and relay B is held operated through its No. 2 winding from ground coming back on the R. T. normal lead from the selector. The subscriber can now dial the message service attendant for his message. When he receives his message, the message service attendant returns the message service indicating key to normal, extinguishing the neon signal lamp. The neon signal lamp will also go out should another call seize the subscriber's line equipment, but would flash again when the line equipment is released.

4.3 Circuit as Used With the Leich L-55 P-B-X

A schematic drawing of a complete message service system with a line relay or a station line circuit as used with the Leich L-55 P-B-X equipped for either 24- or 50-volt operation, is shown in figure 11. The following paragraphs will explain the message service system as applied to either a line relay or station line circuit.

4.3.1 Circuit operation of the message service system through a line relay circuit (figure 11).

When the P-B-X is a 50-volt exchange, the interrupter circuit will operate as stated in paragraph 4.1.1. When a 24-volt P-B-X is used, "W" straps around the resistors associated with the interrupter circuit A, B, and C relays, must be added and the "X" strap around the 1500-ohm resistor is removed. Booster battery terminal strip wiring changes (paragraph 1.1.4) are also necessary when using a 24-volt P-B-X.

Positive (+) booster battery is extended through the 2500- and 1500-ohm resistors (figure 11), when the P-B-X is 24-volt operated. A "Z" strap around the 1500-ohm resistor would be added, if the P-B-X were 50-volt operated. Positive booster battery continues through relay B (interrupter circuit) contacts 3-4 to the message service indicating key. When a message is left for a subscriber, the message service attendant operates the message service indicating key associated with the subscriber's line. By so doing, positive (+) booster battery is extended through the message waiting (MW) lead, through line relay L winding No. 1, through break contacts of the station line jack, to the (+) line of the associated telephone (figure 9), and through the telephone as follows: the (+) line through the 56K-ohm resistor, through the neon signal lamp, to the ringer, and on to the (-) line of the line circuit, through break contacts of the station line jack (figure 11), through the 560-ohm winding No. 2 of line relay L, to negative battery. Over this circuit, the neon signal lamp lights, but relay L, because of the high resistance, will not operate in series with the neon signal lamp. However, if the subscriber lifts his handset, he completes a circuit to operate relay L. The circuit is as follows: from ground through diode D2 to the message waiting lead, through relay L winding No. 1, and through station line jack break

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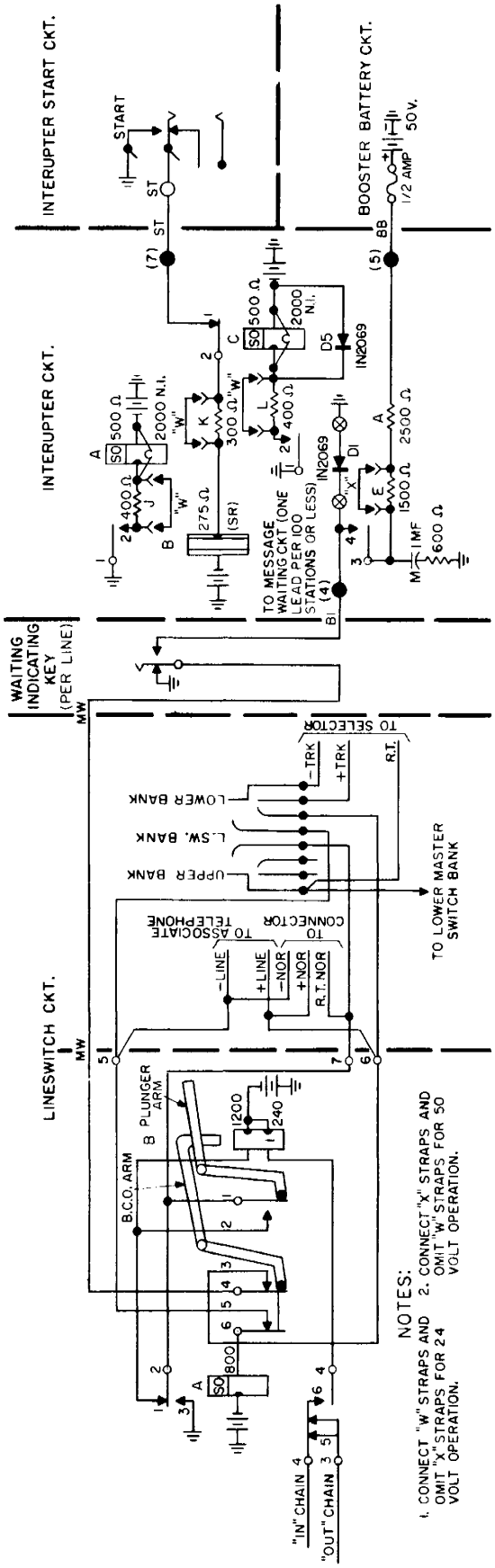

Figure 10. Lineswitch circuit, type 50 P-A-B-X.

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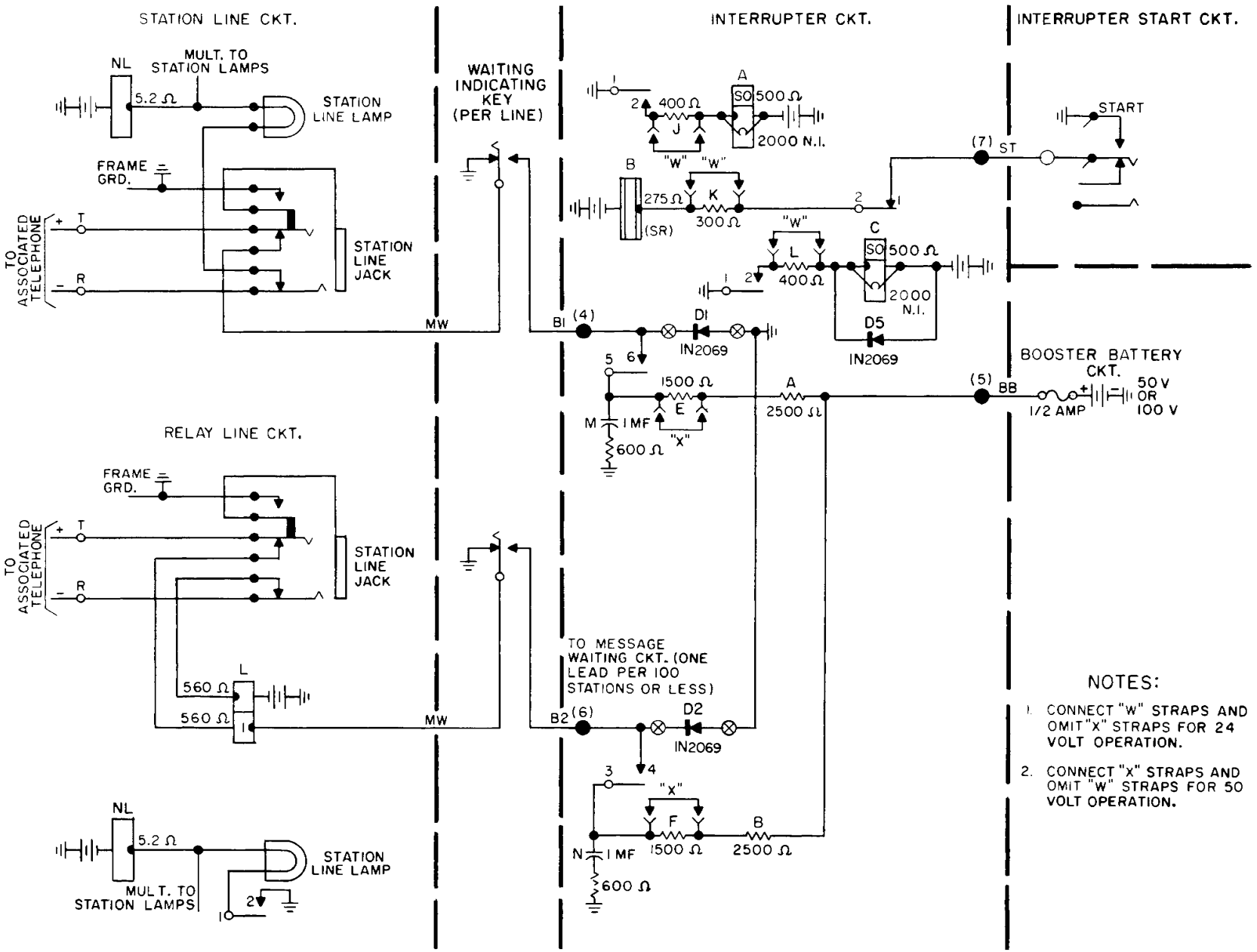

Figure 11. Relay line circuit and station line circuit, L-55 P-B-X.

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contacts to the (+) line of the telephone. Then through the telephone to the (-) line of the line circuit, to break contacts of the station line jack, to relay L winding No. 2, and to negative battery. Relay L operates. Relay L contacts 1-2 make and complete a circuit to the station line lamp from ground at relay L contacts 1-2, through the station signal lamp, to pilot relay NL and negative battery. The station line lamp, located at the P-B-X switchboard, lights, informing the operator that the line wants service. The operator plugs in to the associated station line jack and breaks the station line jack contacts, which releases relay L from the line. The subscriber can now get his message from the message service attendant. When the message is received the message service attendant returns the message service indicating key to normal, extinguishing the lamp. The neon signal lamp would also go out should the operator plug into the subscriber's line to put through another call.

4.3.2 Circuit operation of the message service system through a station line circuit (figure 11).

The conditions of "X" and "W" wiring stated in paragraph 4.3.1 also apply when a station line circuit is used.

Positive (+) booster battery is extended through the 2500- and 1500-ohm resistors (figure 11, when the P-B-X is 24-volt operated. An "X" strap around the 1500-ohm resistor would be added if the P-B-X were 50-volt operated. Positive booster battery continues through relay B (interrupter circuit) contacts 5-6 to the message service indicating key. When a message is left for a subscriber, the message service attendant turns the message service indicating key associated with the subscriber's line. Thus, positive (+) booster battery is extended to the message waiting (MW) lead, to break contacts of the station line jack, to the (+) line of the line circuit, and to the (+) line of the telephone (figure 9). Positive (+) booster battery continues through the telephone as follows: (+) line through the 56K-ohm resistor, through the neon signal lamp, the ringer, and to the (-) line of the line circuit. Then through break contacts of the station line jack (figure 11), through the station line lamp, to pilot relay NL and negative battery. Over this path the neon signal lamp lights.

The station line lamp and pilot relay NL, because of the high resistance, will not operate in series with the neon signal lamp. Should the subscriber return, notice the lamp, and lift his handset to call the message service attendant, he completes a low-resistance circuit to light the station line lamp; from positive (+) battery through diode D1, to the message waiting lead, to break contacts of the station line jack, to the (+) line of the telephone. Through the telephone to the (-) line of the line circuit, through break contacts of the station line jack, to the station line lamp, and on to pilot relay NL and negative battery. Over this circuit the station line lamp lights, indicating to the operator that this line wants service. The operator plugs in to the station line jack associated with the subscriber's station line lamp. The subscriber is now connected to the operator, who may also be the message service attendant if the message service control unit is located at the P-B-X attendant cabinet. The subscriber can get his message from the operator, or if the message service control unit is located elsewhere, the operator can connect him to the message service attendant. When the subscriber receives his message, the message service attendant returns the message service indicating key to normal, extinguishing the neon signal lamp. The neon signal lamp would also be extinguished should the operator extend another call to the subscriber's line while the message service indicating key for his line is operated.

5. MAINTENANCE

5.1 Neon Signal Lamp Replacement

To replace a defective neon signal lamp, remove the plastic telephone housing. To do this, loosen the three screws labeled "base housing screws" on the base of the telephone. Do not loosen any other screws. Then lift off the telephone housing. The neon signal lamp is now easily accessible (figure 2). To remove the lamp simply push down and turn the lamp counterclockwise until it is free. Then lift out the defective lamp and replace it with a new one. The order number for a new neon signal lamp is FD-1023-AD.

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