

**SS-1 SELECTIVE SIGNALING SYSTEM**  
**IDENTIFICATION, INSTALLATION CONNECTIONS, AND SERVICE OPTIONS**  
**PRIVATE LINE TELEPHONE SERVICE**

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**1. GENERAL**

**1.01** This section provides identification, installation, connection methods, and service options for the SS-1 selective signaling system as applied to customer locations.

**1.02** This section is reissued to include changes in privacy systems. Terms such as waystation and backbone have been changed to customer location and 4-wire facility, respectively. Since this reissue covers a general revision, arrows ordinarily used to indicate changes have been omitted.

**1.03** The SS-1 system is a 4-wire multistation signaling arrangement which provides dial selective signaling for customer locations and central office installations. Eighty-one stations may be signaled by dialing only two digits for each station code. SS-1 units and associated equipment of the customer location comprise an arrangement for selectively signaling the individual stations or groups of stations. Frequency shift keying, using a 2400- to 2600-Hz keyed oscillator, is the method by which dial pulses are sent over the 4-wire facilities and, where arranged, also over the customer location loops. The tone equipment, usually comprised of a keyer and an SF unit, may be located at the customer location or at a central office. A decoder, which provides for recognition of the signals, may also be found at either location. Different arrangements are employed to reflect the location of the above equipment; the number of stations at the customer location; and the use of various

optional arrangements to provide privacy, interarea dialing, and CO or PBX access.

**2. IDENTIFICATION**

**2.01** A customer location may be assembled from individual units or may be supplied as a preassembled packaged unit with desired features already incorporated. Therefore, identification is divided into two parts to present first, the individual units and second, the common customer location packaged units. Equipment identification is shown in Fig. 1 through 17. Arrangement of equipment on relay racks is illustrated to show typical installations.

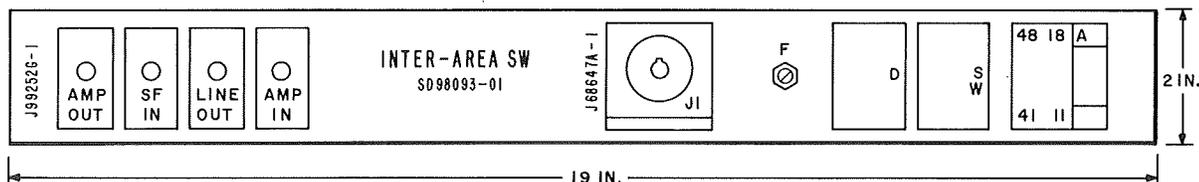
**A. Individual Units**

**2.02 J99252B Sending and Code Relay Unit:**

This unit provides recognition of a maximum of 72 codes in addition to the 9 codes furnished by the J99252K decoder and test jack unit. It stores the first digit of a 2-digit number and connects nine code leads (representing a possible nine digits), one of which will be energized at the end of the second digit. This unit also, at appropriate times, opens the transmitting circuit between the telephone set and the keyer, stops the associated timing circuits, and prevents the decoder from functioning. (4" x 19" mounting space)

**2.03 J99252G Interarea Switching Unit (Fig. 1):**

This unit provides interarea transmission switching and signaling. It completes the connection between two SS-1 systems upon receiving a connect code from either system and removes the connection upon receiving a disconnect code from either system. Station codes must not be duplicated in the systems to be joined when using this interarea switching arrangement, because duplication of codes will result in inadvertent simultaneous signaling of two or more stations. (2" x 19" mounting space)



**Fig. 1—J99252G Interarea Switching Unit**

**2.04 J99252J Sending and Receiving 1 or 2**

**Codes Relay Unit:** This unit is associated with the dial and keyer unit. It repeats dial pulses and performs off-normal functions. This unit can also receive one or two codes from the decoder at the central office and pass the pulses to key equipment to initiate visual answering lamps and audible signals. (2" x 19" mounting space)

**2.05 J99252K Decoder and Test Jack Unit:**

This unit provides for recognition of a maximum of nine codes in any single tens digit or a maximum of eight codes in any two tens digits. This unit operates in conjunction with a single-frequency (SF) unit which provides input pulses to the decoder and test jack unit. Both units will be directly connected when in close physical proximity. They will be connected via a duplex (DX) signaling circuit when they are physically separated (SF unit in the central office and decoder at the customer location). The decoder unit also provides test jacks, a jack for an amplifier, heater resistors for the amplifier, and a pad for adjusting the receive level to the SF unit, when required. (4" x 19" mounting space)

**2.06 J99252L Keyer Unit:**

This unit provides 2400 and 2600 Hz tones for transmission on a frequency-shift basis to represent dial pulsing. The keyer unit also supplies busy tone and privacy locking and unlocking tones to other units. A group of test jacks are provided on the unit to simplify testing procedures. (4" x 19" mounting space)

**2.07 J99252M Fuse Indicator Unit:**

This unit provides fusing for -48 and +130 volt supplies. This unit is used at customer locations when voltages are not already provided through station fuse panels. (2" x 19" mounting space)

**2.08 J99252N Common Control Unit:**

This unit provides the privacy feature and

on-premise dialing when connected with a standard SS-1 packaged unit consisting of decoder, sending relay, and keyer units. It determines call direction; stores disconnect signal information; develops a dc unlock pulse; provides the override key feature, the privacy feature, and the exclusion key for manual lockout; and furnishes a termination for one telephone set. When more than one telephone set termination is required, the J99252P station control unit may be added to furnish additional telephone set terminations. (2" x 23" mounting space)

**2.09 J99252P Station Control Unit (Fig. 2):**

This unit provides privacy, on-premise dialing, and lockout of the dial leads and terminations for up to five additional telephone sets per unit, when used in conjunction with the J99252N common control unit. (2" x 23" mounting space)

**2.10 J99252R Station Control Without System**

**Lockout Unit (Fig. 3):** This unit provides privacy lockout of the dial leads and terminations for up to six additional telephone sets per unit, during dialing only. It provides on-premise dialing and cannot be used in a privacy arrangement. (2" x 23" mounting space)

**2.11 J99252BR Monitor and Lamp Display Test**

**Unit (Fig. 4):** This unit provides a visual indication of the code read by the associated J99252K decoder and test jack units. (4" x 19" mounting space)

**2.12 J99252BU 3-Digit Interarea Switching**

**Unit (Fig. 5):** This unit provides for interarea transmission switching and signaling. It completes the connection between two SS-1 systems upon receiving a connect code from either system and removes the connection upon receiving a disconnect code from either system. Automatic disconnection is provided when used with privacy systems. Because of the use of digit cancellation

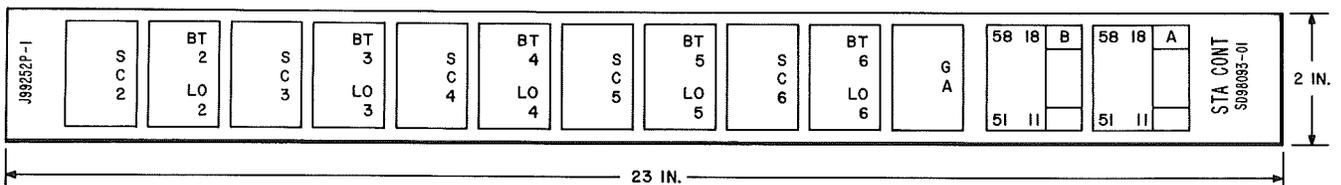


Fig. 2—J99252P Station Control Unit

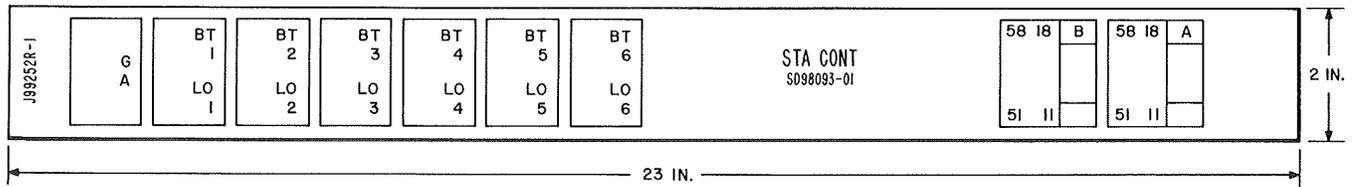


Fig. 3—J99252R Station Control Without System Lockout Unit

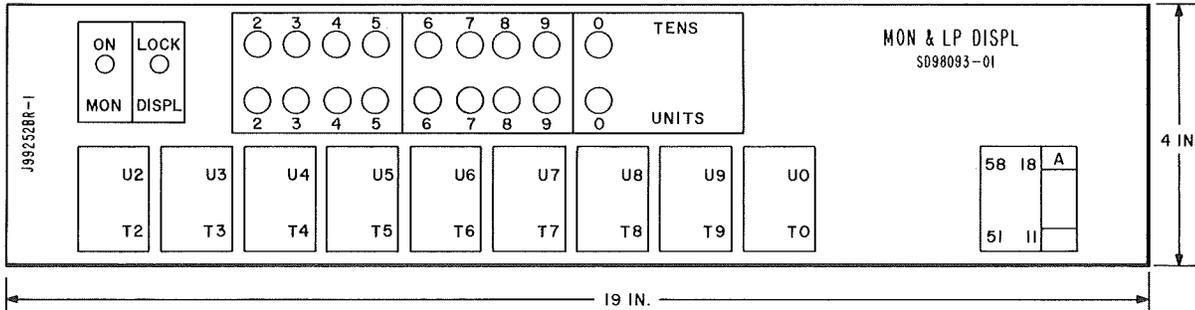


Fig. 4—J99252BR Monitor and Lamp Display Test Unit

in the home-area SS-1 system, station codes may be duplicated in each system without causing simultaneous signaling. (2" x 23" mounting space)

**2.13 J99252BV 2400- 2600-Hz Oscillator Unit (Fig. 6):** This unit is used with an interarea switching circuit when one or both of the locations associated with the interarea switching circuit is equipped for receiving only. It provides SF tones for signaling from the 3-digit interarea switching circuit to either associated SS-1 system to reset decoders or give busy indications. (2" x 19" mounting space)

**2.14 J99252BW Dial Access to CO or PBX Unit (Fig. 7):** This unit provides transmission switching and signaling between an SS-1 system

and a central office or PBX. It provides dial-controlled interconnections from any SS-1 station to a central office station or to a dial PBX station. It also permits dialing from PBX stations or rotary dial PBX operator positions to SS-1 stations or operator completion of calls through a manual PBX. (4" x 23" mounting space)

**B. Packaged Units**

**2.15 J99252BB Send and Receive 1 Code Unit (Fig. 14):** This packaged unit is composed of only one J99252J sending and receiving 1 or 2 codes relay unit to provide for sending all codes and for receiving one code. It is related to a series of packaged units which use only the J99252J unit to provide their functions. Such units form a

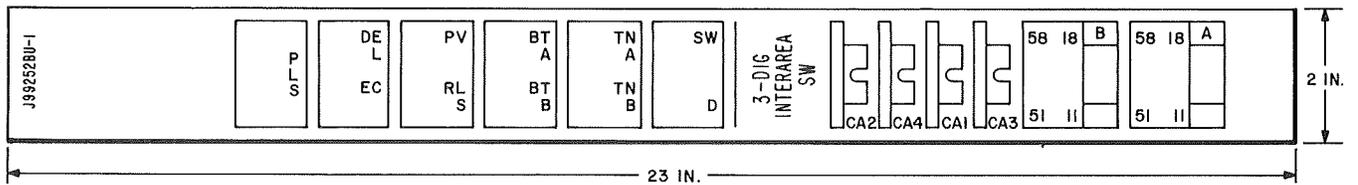


Fig. 5—J99252BU 3-Digit Interarea Switching Unit

small percentage of current SS-1 system installations and will not be covered in detail in this section. The features in Table A are provided by the particular customer location packaged units, depending on the list number of the J99252J unit. (2" x 23" mounting space)

TABLE A

PACKAGED UNIT	SEND ALL CODES	RECEIVE
J99252BB	Yes	1 Code
J99252BC	Yes	2 Codes
J99252BD	Yes	None
J99252BE	No	1 Code
J99252BF	No	2 Codes

**2.16 J99252BG Send and Receive 1 to 81 Codes Unit (Fig. 8):** This packaged unit consists of a J99252K decoder and test jack unit (equipped with amplifier and pad) and a J99252B sending

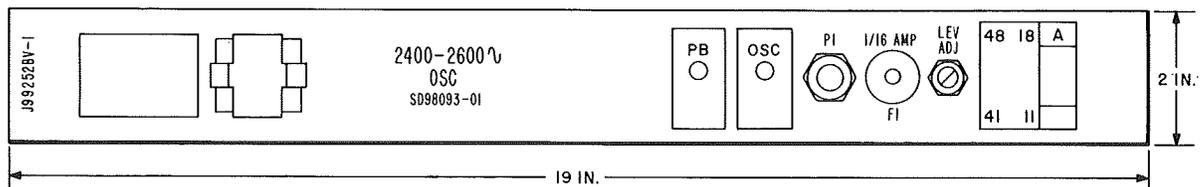


Fig. 6—J99252BV 2400-2600 Hz Oscillator Unit

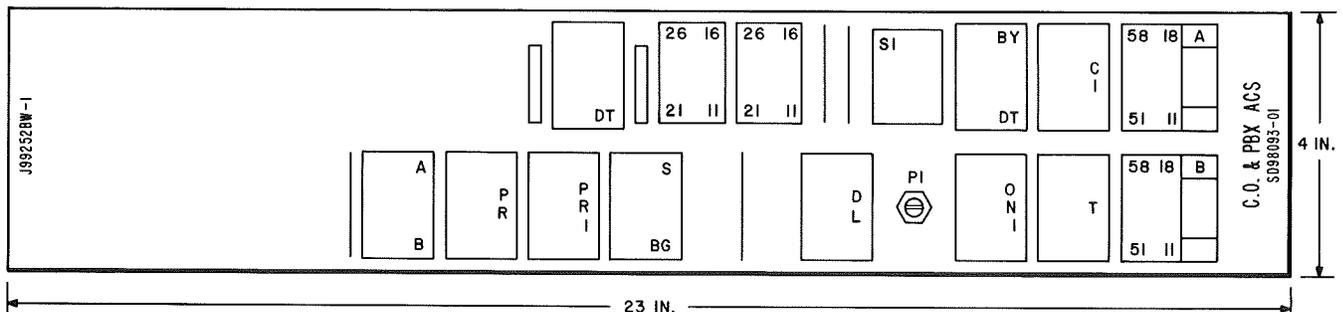


Fig. 7—J99252BW Dial Access to CO or PBX Unit

and code relay unit. A KS-15620-48 volt rectifier will be required, if this voltage is not already available at the customer location. This unit is capable of sending all codes and of receiving 1 to 81 codes, depending on the number of D-relays mounted on the J99252B unit. It may be arranged with or without loop cutoff. (8" x 23" mounting space)

**2.17 J99252BH Send and Receive 1 to 9 Codes Unit (Fig. 9):** This packaged unit consists of a J99252K decoder and test jack unit (equipped with amplifier and pad), a J99252J sending and receiving 1 or 2 codes relay unit, and a J99252L keyer unit. An SF unit is also required as well

as a KS-15620-48 volt rectifier, a J68651W +130 volt power supply, and a J99252M fuse indicator unit, if the voltages are not already available from fuse panels at the customer location. This unit is capable of sending all codes and of receiving one to nine codes. (14" x 23" mounting space)

**2.18 J99252BJ Send and Receive 1 to 81 Codes Unit (Fig. 10):** This packaged unit consists of a J99252K decoder and test jack unit (equipped with amplifier and pad), a J99252B sending and code relay unit (equipped with one to eight D-relays), and a J99252L keyer unit. An SF unit is also required as well as a KS-15620-48 volt rectifier, a J68651W +130 volt power supply, and a J99252M

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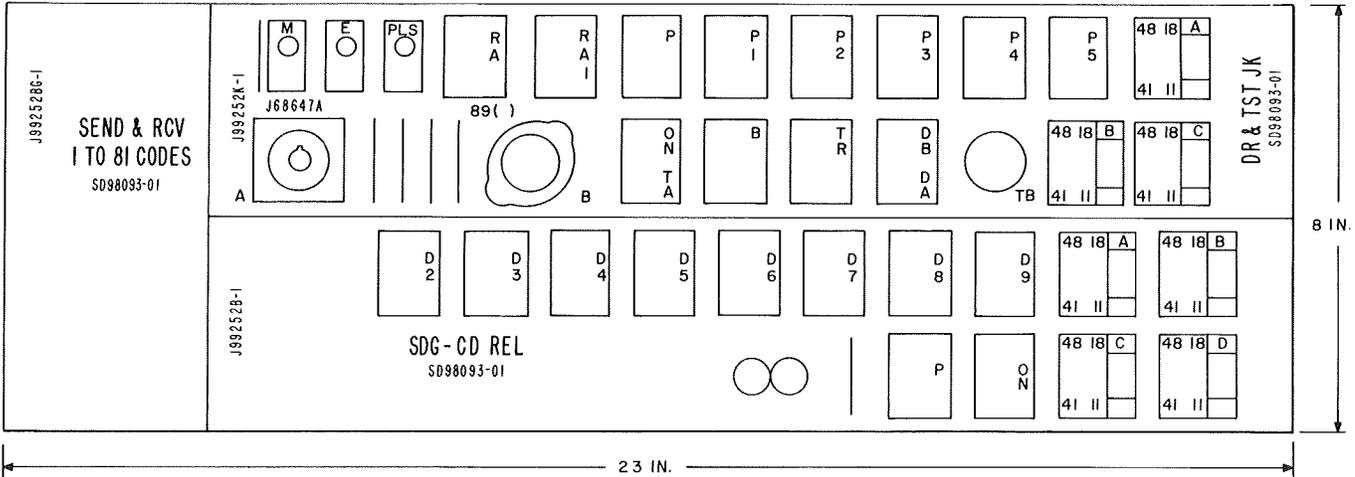


Fig. 8—J99252BG Send and Receive 1 to 81 Codes Unit

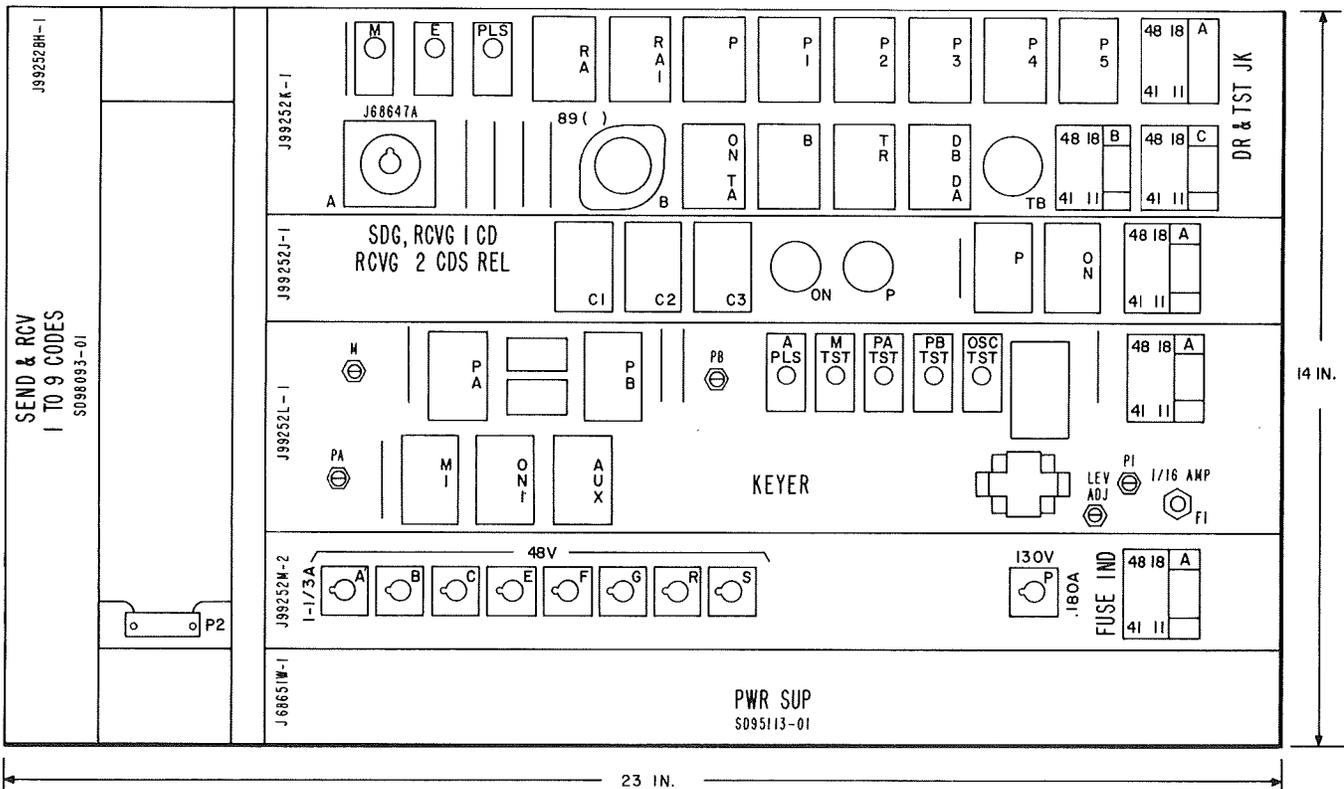


Fig. 9—J99252BH Send and Receive 1 to 9 Codes Unit

fuse indicator unit, if the voltages are not already available from fuse panels at the customer location. This unit is capable of sending all codes and of receiving 1 to 81 codes. (14" x 23" mounting space)

**2.19 J99252BK Send Unit (Fig. 11):** This packaged unit consists of a J99252L keyer unit, a J99252J sending and receiving 1 or 2 codes relay unit, and a J99252M fuse indicator unit. A KS-15620-48 volt rectifier will be required, if this voltage is not already available at the customer location. This unit is capable of sending all codes but cannot receive any codes. (18" x 23" mounting space)

**2.20 J99252BL Receive Only 1 to 9 Codes Unit (Fig. 12):** This packaged unit consists of a J99252K decoder and test jack unit (equipped with amplifier and pad). An SF unit is also required as well as a KS-15620-48 volt rectifier, a J68651W +130 volt power supply and a J99252M fuse indicator unit, if these voltages are not already available from fuse panels at the customer location.

This unit is not equipped to send codes but is capable of receiving from one to nine codes. (14" x 23" mounting space)

**2.21 J99252BM Receive Only 1 to 81 Codes Unit (Fig. 13):** This packaged unit consists of a J99252K decoder and test jack unit (equipped with amplifier and pad) and a J99252B sending and code relay unit. An SF unit is also required as well as a KS-15620-48 volt rectifier, a J68651W +130 volt power supply, and a J99252M fuse indicator unit, if the voltages are not already available from fuse panels at the customer location. This unit is not equipped to send codes but is capable of receiving from 1 to 81 codes, depending on the number of D relays mounted on the J99252B unit. (14" x 23" mounting space)

**2.22 J99252BN Send Unit for SS-1 Keyer Per No. 300 Switching System Sender Application (Fig. 14):** This packaged unit consists of a J99252L keyer unit and a J99252J sending and receiving 1 or 2 codes relay unit. This unit is arranged for use with the No. 300 switching system, furnishing

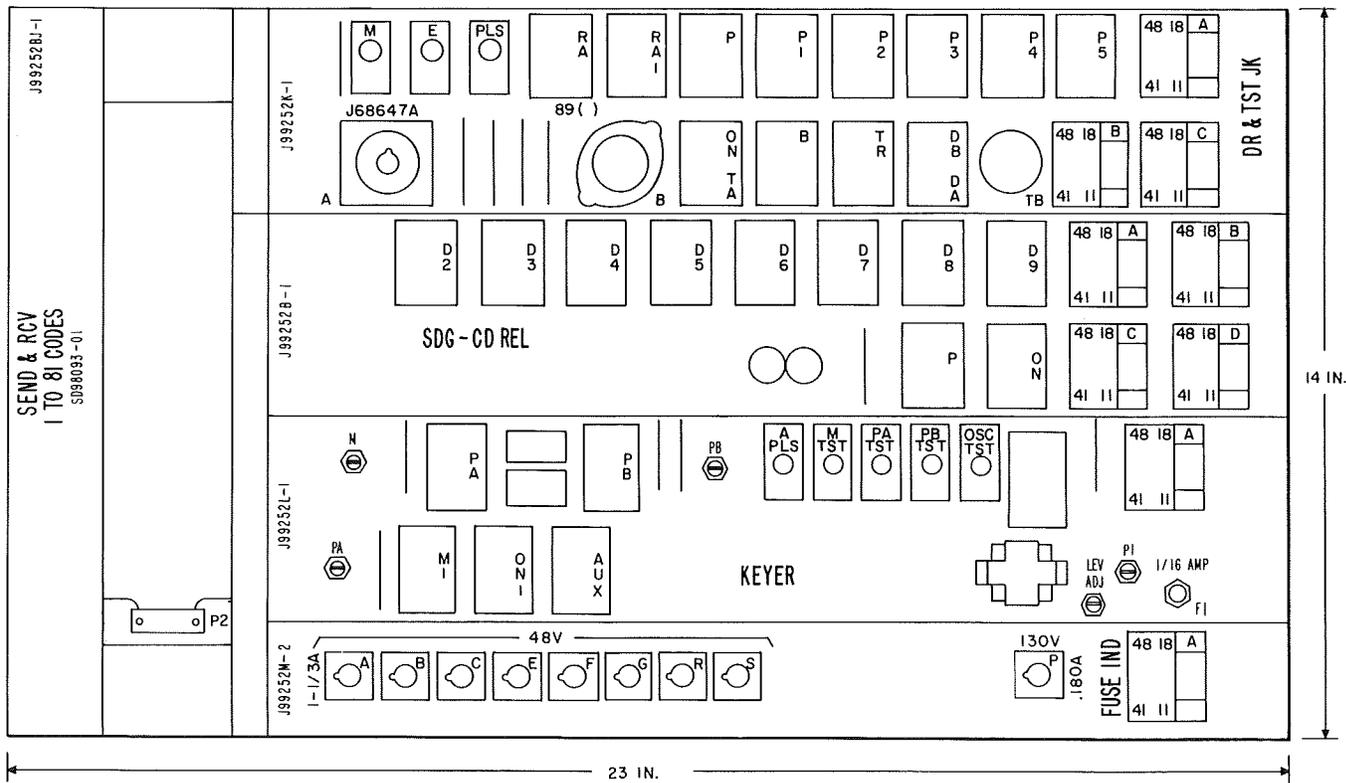


Fig. 10—J99252BJ Send and Receive 1 to 81 Codes Unit

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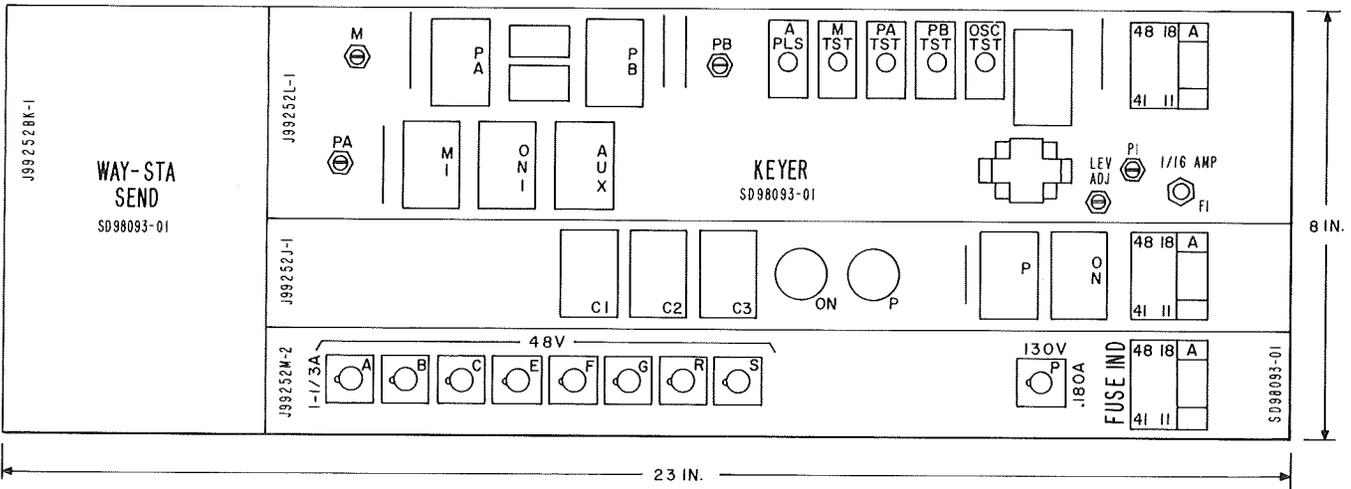


Fig. 11—J99252BK Send Unit

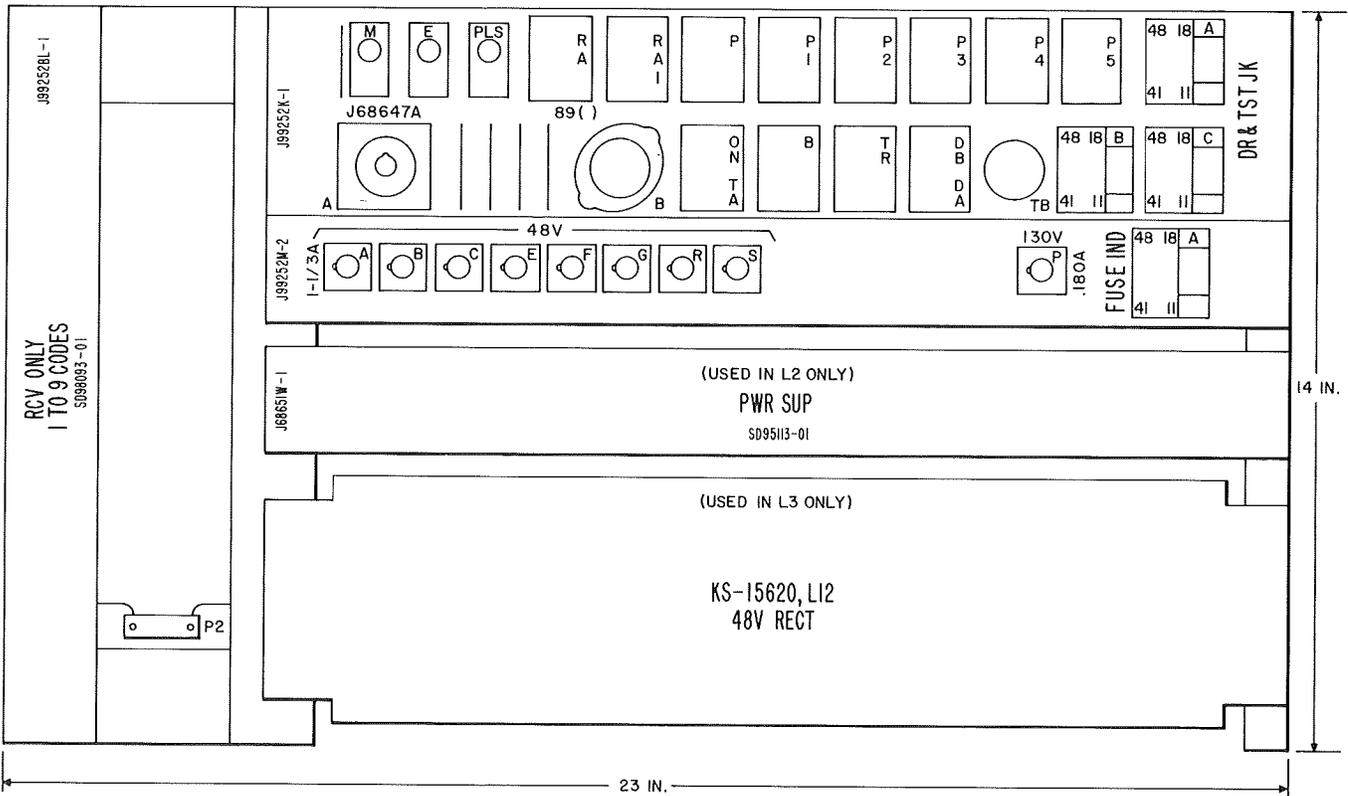


Fig. 12—J99252BL Receive Only 1 to 9 Codes Unit

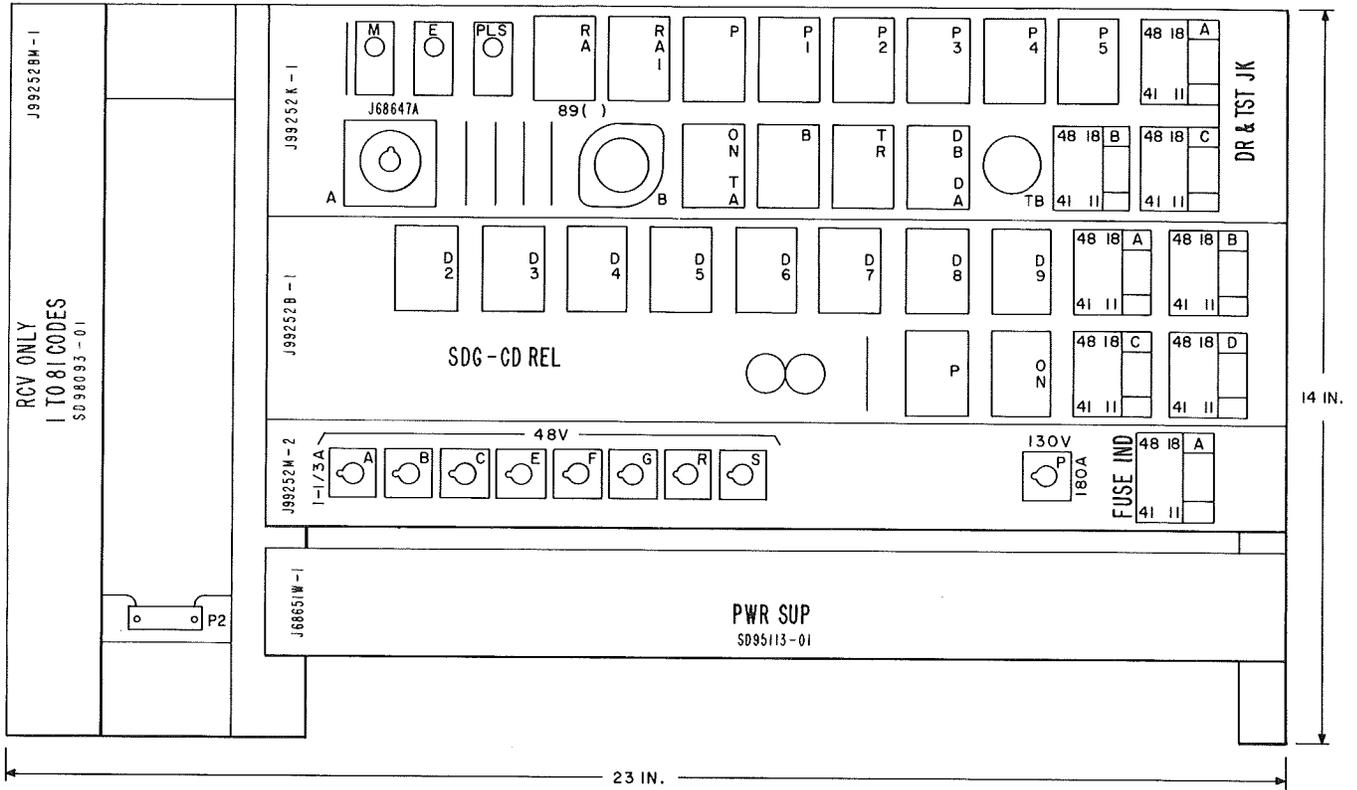


Fig. 13—J99252BM Receive Only 1 to 81 Codes Unit

one keyer per sender. It is equipped to send codes but is not capable of receiving codes. (6" x 23" mounting space)

**2.23 J99252BP Send and Receive 1 to 81 Codes Unit for SS-1 Keyer Per No. 300 Switching System Sender Application (Fig. 15):** This

packaged unit consists of a J99252K decoder and test jack unit (equipped with amplifier and pad) and a J99252B sending and code relay unit. This unit is arranged for use with the No. 300 switching system so that the SF unit can be mounted on a miscellaneous basis. It is capable of receiving 1 to 81 codes. (8" x 23" mounting space)

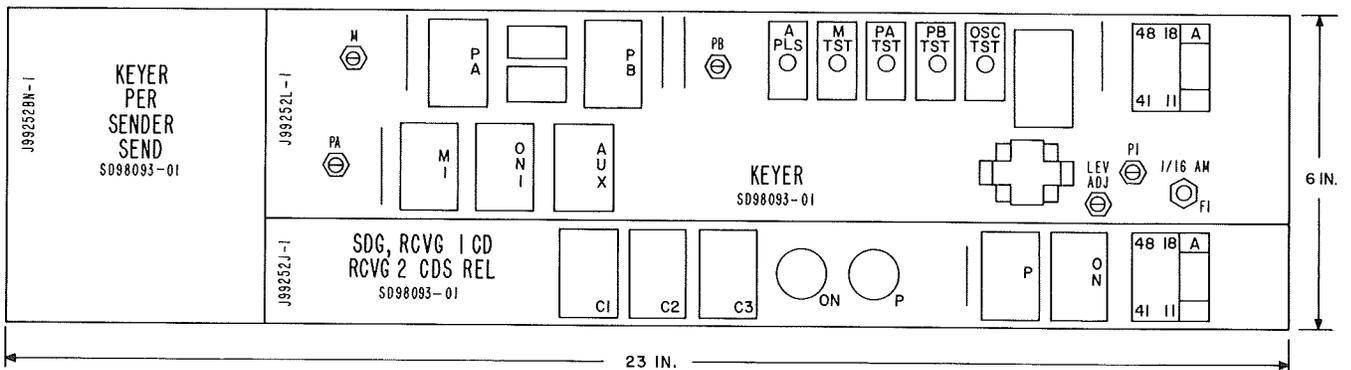


Fig. 14—J99252BN Send Unit for SS-1 Keyer per No. 300 Switching System Sender Application

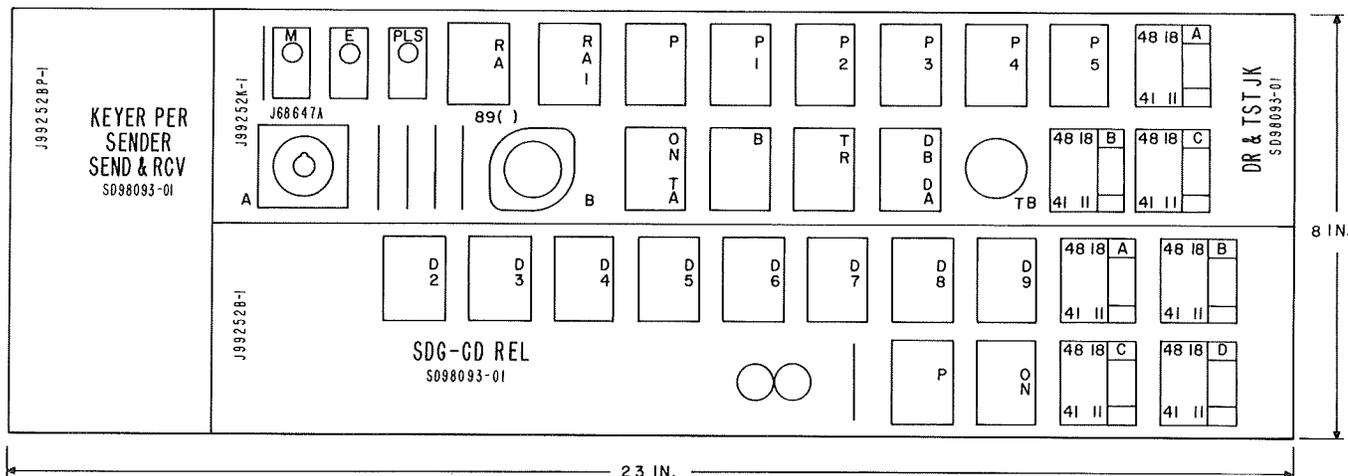


Fig. 15—J99252BP Send and Receive 1 to 81 Codes Unit for SS-1 Keyer per No. 300 Switching System Sender Application

**2.24 J99252BS Send and Receive 1 to 9 Codes Unit Arranged with Automatic or Manual Lockout for Privacy (Fig. 16):** This packaged unit consists of a J99252K decoder and test jack unit (equipped with amplifier and pad), a J99252J sending and receiving 1 or 2 codes relay unit, a J99252L keyer unit, and J99252N common control unit. An SF unit is also required as well as a KS-15620-48 volt rectifier, a J68651W +130 volt power supply, and a J99252M fuse indicator unit, if the voltages are not already available from fuse panels at the customer location. This unit is capable of sending all codes and of receiving one to nine codes. It is equipped with an automatic or manual lockout circuit for privacy. (16" x 23" mounting space)

**2.25 J99252BT Send and Receive 1 to 81 Codes Unit Arranged with Automatic or Manual Lockout for Privacy (Fig. 17):** This packaged unit consists of a J99252K decoder and test jack unit (equipped with amplifier and pad), a J99252B sending and code relay unit, a J99252L keyer unit, and a J99252N common control unit. An SF unit is also required as well as a KS-15620-48 volt rectifier, a J68651W +130 volt power supply, and a J99252M fuse indicator unit, if the voltages are not already available from fuse panels at the customer location. This unit is capable of sending all codes and of receiving 1 to 81 codes. It is equipped with an automatic or manual lockout circuit for privacy. (16" x 23" mounting space)

### 3. INSTALLATION OF BASIC CUSTOMER LOCATIONS

**3.01** Installation connections for all commonly used packaged units are shown in Fig. 25 through Fig. 34. These drawings provide orientation by showing the relationship of equipment which is external to the SS-1 equipment and the actual leads which must be connected by the installer. It is not possible, however, to provide details of the station equipment that may operate with the SS-1 packaged unit. The station equipment will be chosen to fulfill the requirements of each individual installation and cannot be anticipated with certainty.

**3.02** Each customer location installation connection drawing is provided as two sketches: one to show power and ground lead connections, and the second to show signaling and talking lead connections. Code leads are not carried to definite terminals on the panels, since the code leads are to be connected by the installer to provide only the required station codes. This subject is covered in Part 4 and is not repeated on each installation drawing.

**3.03** The installation connections show only the basic systems with one telephone set or other private line station equipment connected. Additional station equipment and special features that may be added to the basic customer location are discussed in the parts of this section which follow. The subjects and the parts in which they appear are given in Table B.

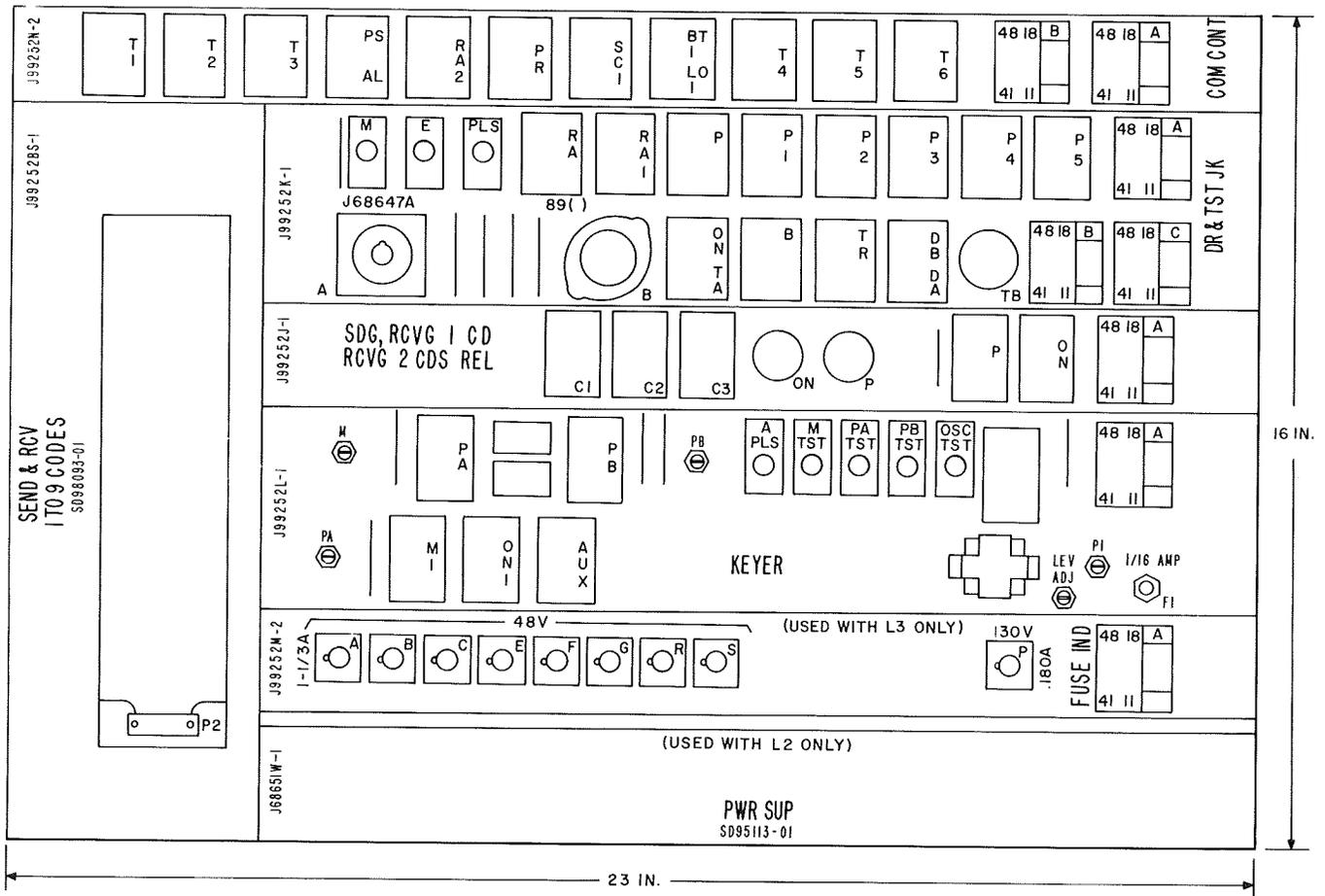


Fig. 16—J99252BS Send and Receive 1 to 9 Codes Unit Arranged with Automatic or Manual Lockout for Privacy

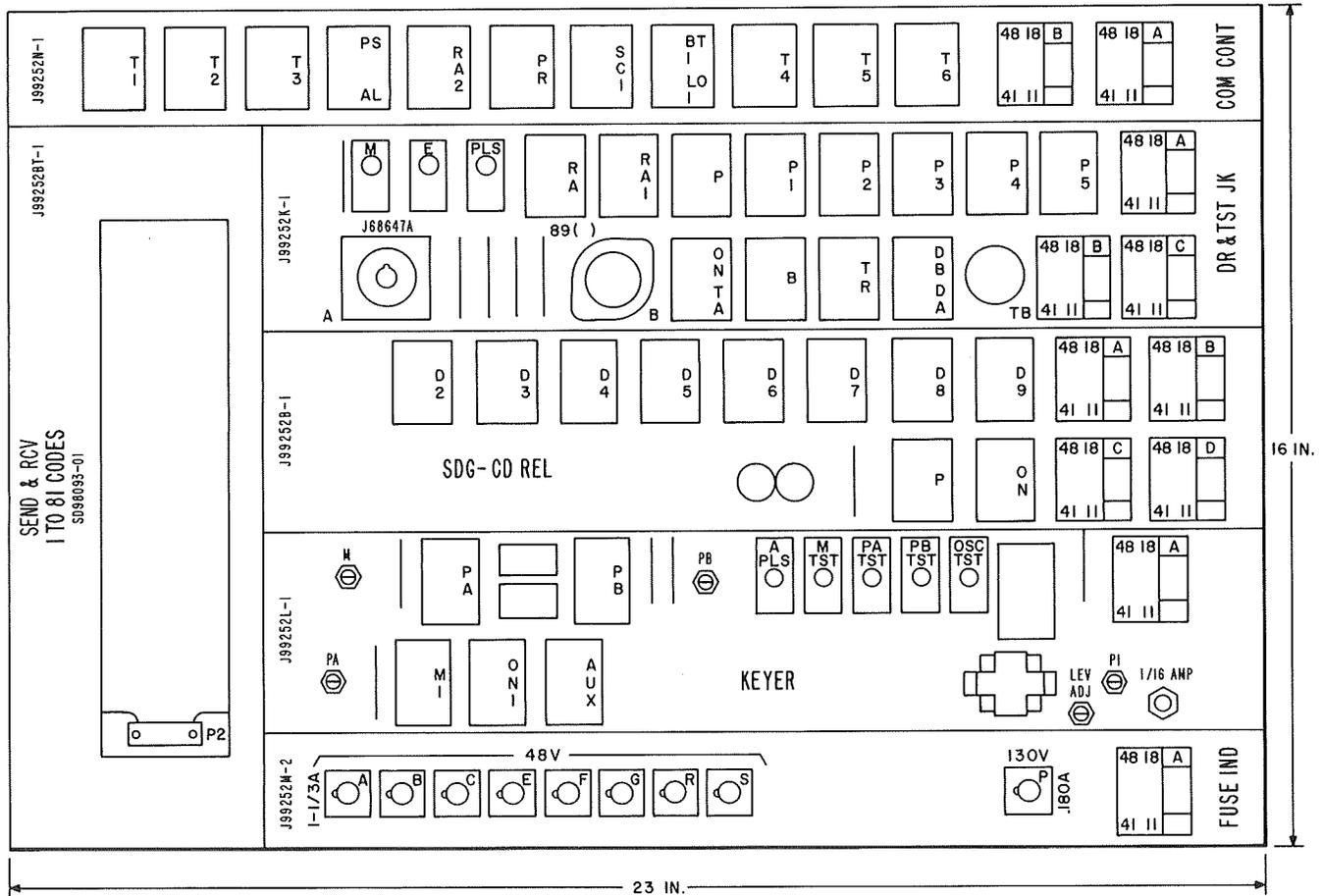


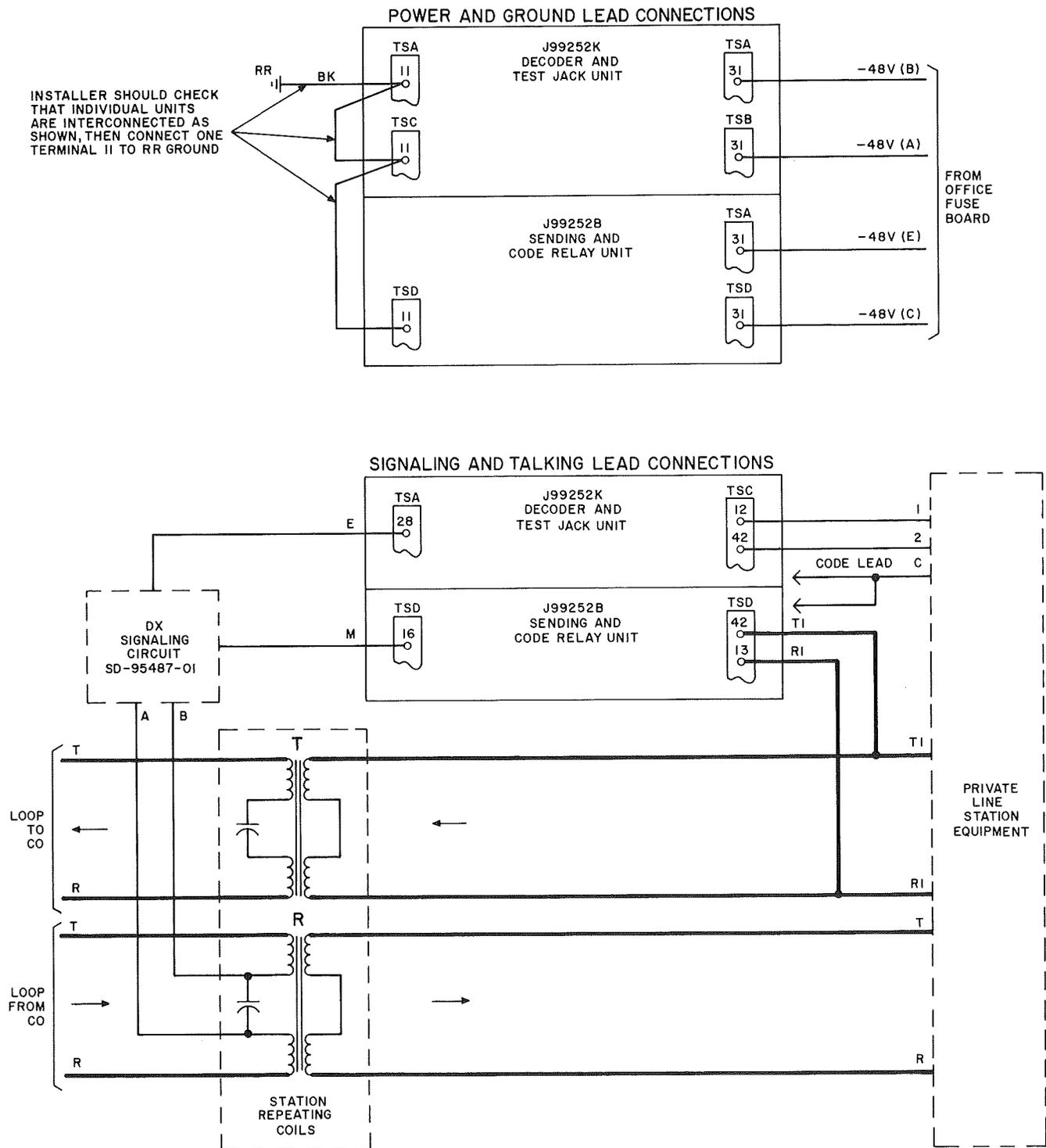
Fig. 17—J99252BT Send and Receive 1 to 81 Codes Unit Arranged with Automatic or Manual Lockout for Privacy

TABLE B

SUBJECT	PART
Addition of Private Line Station Telephone Sets Using Parallel Connections	5
Addition of Private Line Station Telephone Sets Using J99252R Station Control Without System Lockout Unit	6
Addition of Privacy to an Existing Packaged Unit Using J99252N Common Control Unit	7
Addition of Private Line Station Telephone Sets Using J99252P Station Control Unit	8
Addition of Interarea Switching Using J99252G Interarea Switching Unit	9
Addition of Interarea Switching Using J99252BU 3-Digit Interarea Switching Unit	10
Addition of Central Office or PBX Access Using J99252BW Dial Access to CO or PBX Unit	11
Addition of Decoder Monitor to an Existing Packaged Unit Using J99252BR Monitor and Lamp Display Test Unit	12
Miscellaneous Features and Additions to Existing Packaged Units	13

**3.04** Installation connection drawings are presented in the alphabetical order of the J-drawing number which identifies each packaged unit. The drawings are:

	J99252BM	Receive Only 1 to 81 Codes Unit Installation Connections (Fig. 23)
	J99252BN	Send Unit for SS-1 Keyer per No. 300 Switching System Sender Application Installation Connection (Fig. 24)
J99252BG	J99252BP	Send and Receive 1 to 81 Codes Unit for SS-1 Keyer per No. 300 Switching System Sender Application Installation Connection (Fig. 25)
J99252BH	J99252BS	Send and Receive 1 to 9 Codes Unit Arranged for Automatic or Manual Lockout for Privacy Installation Connections (Fig. 26)
J99252BJ	J99252BT	Send and Receive 1 to 81 Codes Unit Arranged with Automatic or Manual Lockout for Privacy Installation Connections (Fig. 27)
J99252BK		
J99252BL		



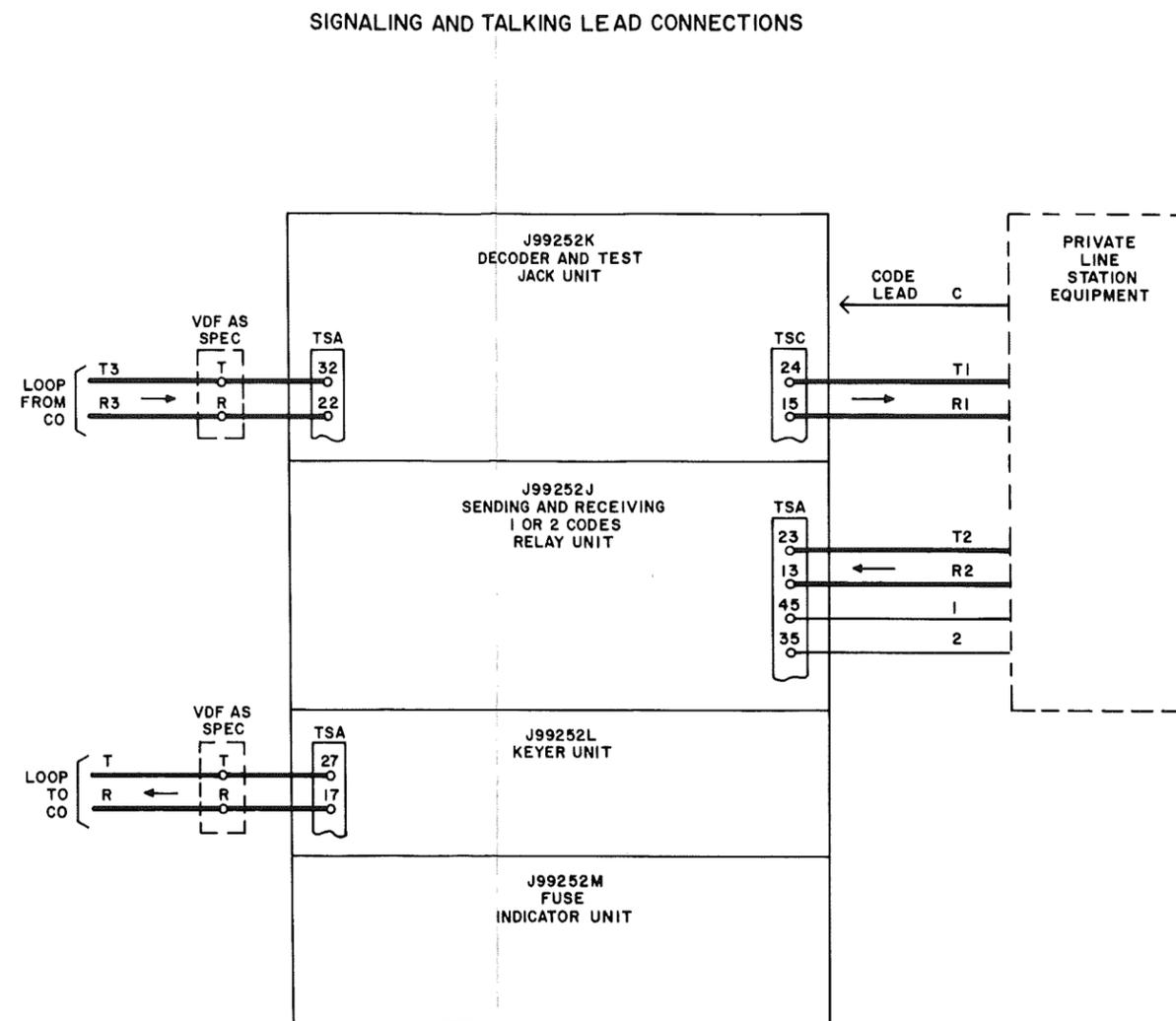
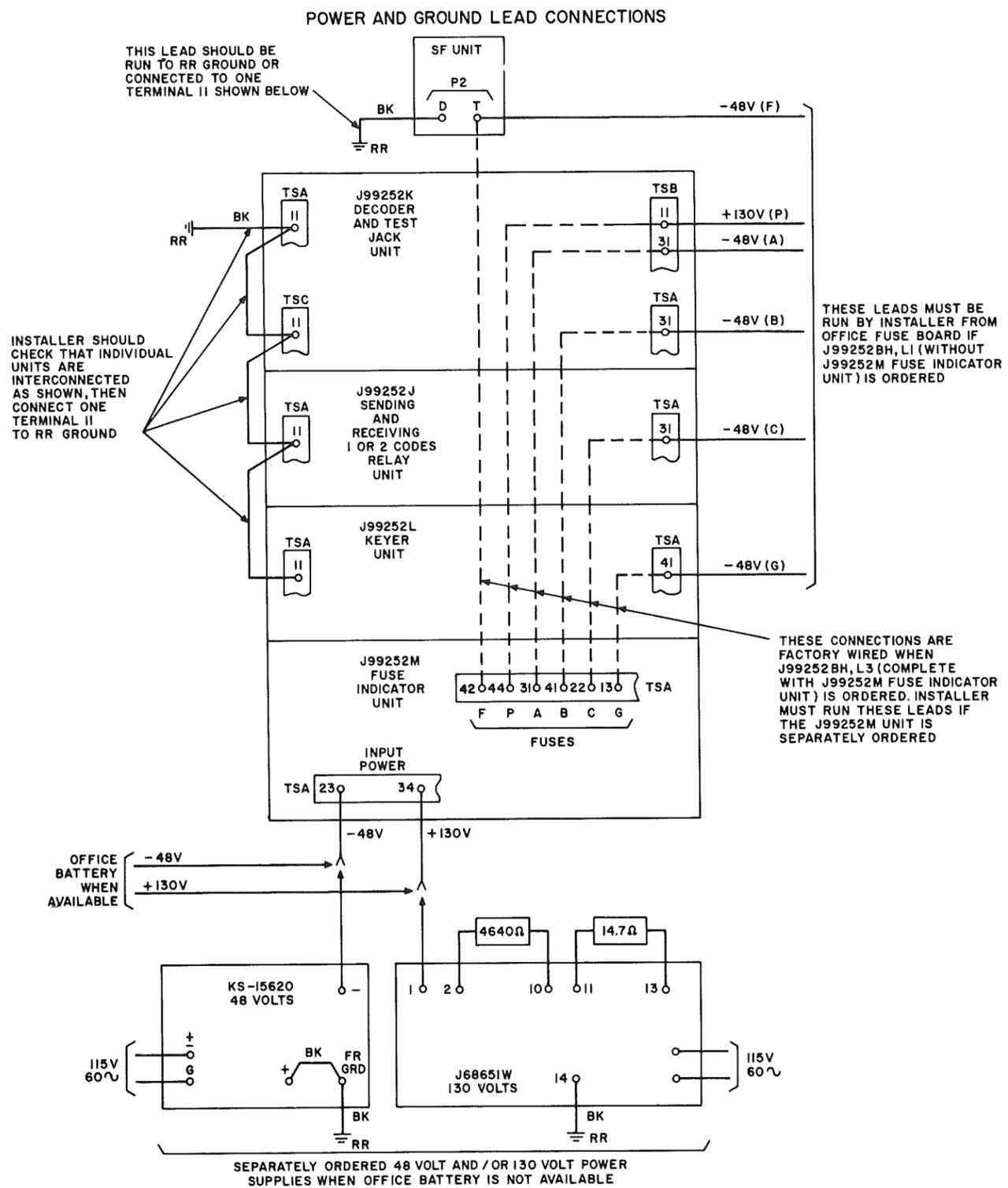
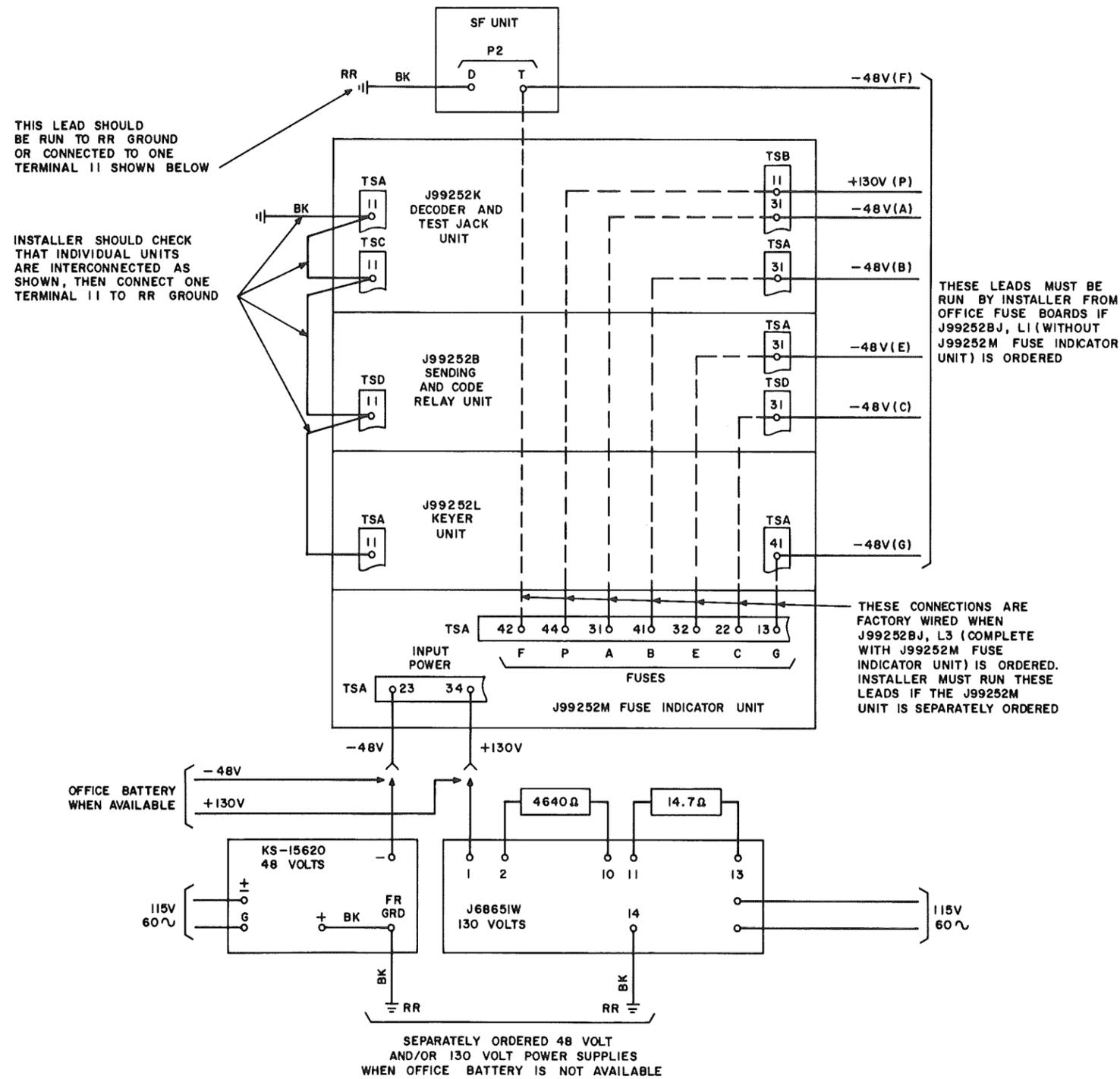


Fig. 19—J99252BH Send and Receive 1 to 9 Codes Unit

POWER AND GROUND LEAD CONNECTIONS



SIGNALING AND TALKING LEAD CONNECTIONS

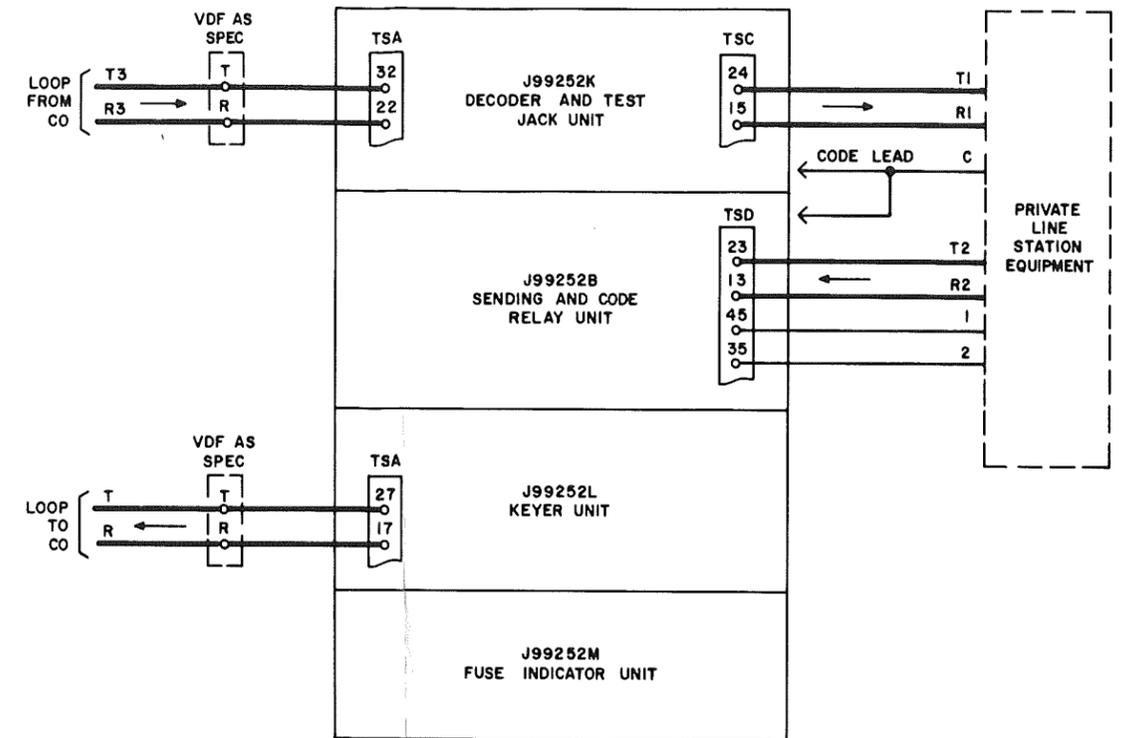


Fig. 20—J99252BJ Send and Receive 1 to 81 Codes Unit

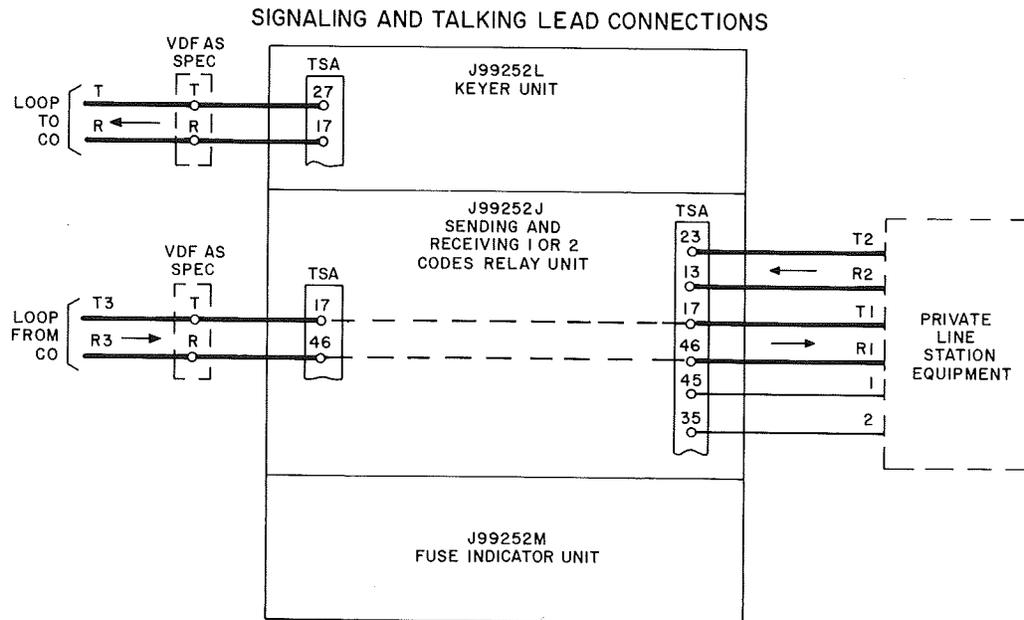
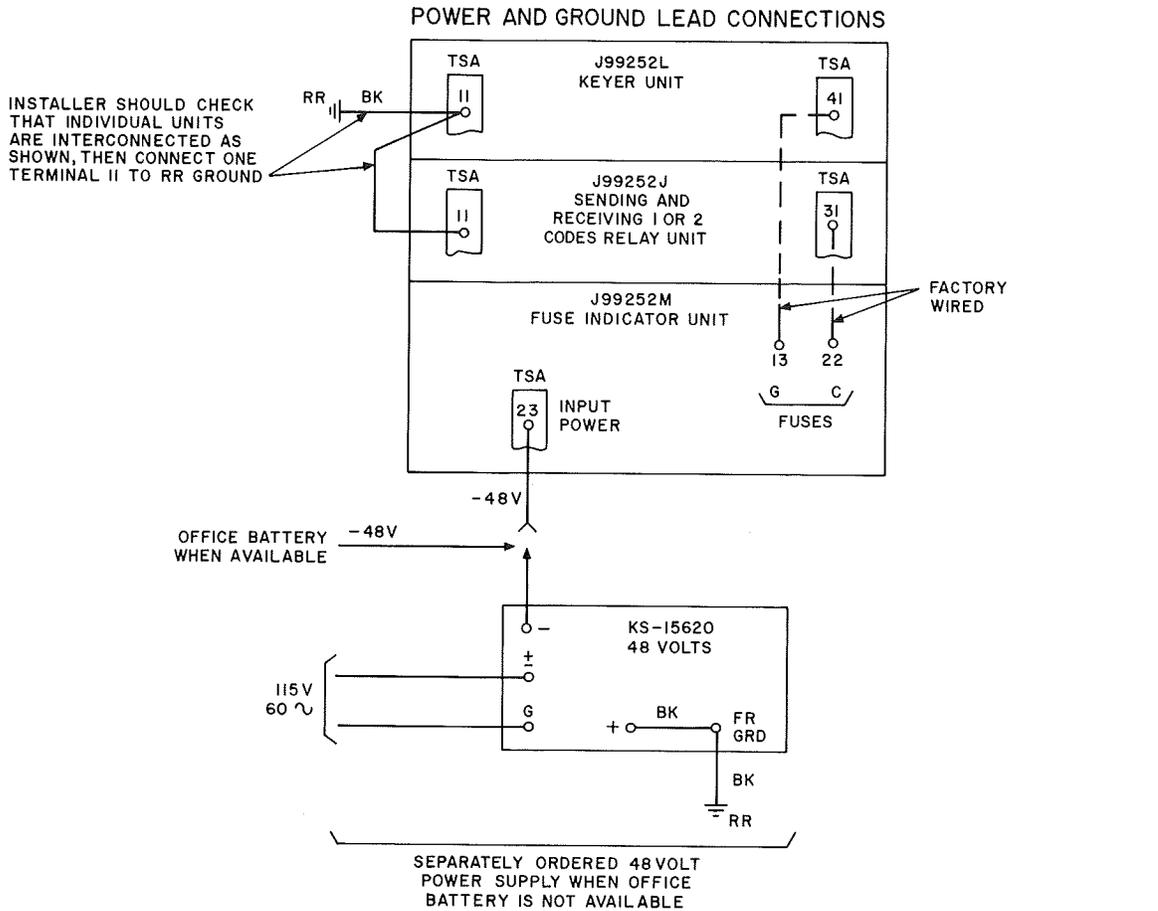


Fig. 21—J99252BK Send Unit

## 4. STATION CODE CONNECTIONS

## DEVELOPMENT

**4.01** One of the more complex series of connections that must be made while installing the SS-1 system is that of strapping the decoder and test jack unit (and, when provided, the D2 through D9 code relays on the J99252B sending and code relay unit) to provide for signaling the correct stations within a customer location. A thorough understanding of station code selection will make the task easier, and the following paragraphs are devoted to that end.

**4.02** As discussed here, station code selection revolves around the operation of a decoder. SS-1 installations may be encountered which require that the decoder be located in the central office and the stations at the customer location, (a maximum of two) be signaled by means of loop signaling. These circuits are straightforward and require no detailed explanation. Installations of this nature are seldom encountered at the present time, since most customer locations now contain the SF unit and decoder combination for the extraction of station signals directly from tones present on the 4-wire loop. It is often desirable to equip customer locations with the capability of signaling at least nine stations, even though a lesser number may be initially employed.

**4.03** The following explanation begins with a discussion of a D1 code relay. The D1 code relay (SD-98093-01, Fig. 17) is now rated "Manufacture Discontinued." It is, of course, found in some older installations but should never be used in new installations. However, it forms a convenient starting point in the total explanation inasmuch as its operation is easily understood. The operation of the DA-DB code relay, which supersedes the D1 relay, may not be so readily understood. An explanation of the DA-DB operation is therefore aided by the prior discussion of the D1 relay.

## D1 CODE RELAY

**4.04** Fig. 28 shows the connections that exist between the pulse counting relays of the decoder and the private line station equipment. Note that code relay D1 is situated between these two circuits and that the station (or stations) connected to D1 can only be signaled when the relay is operated. The pulses to operate the

signaling relays in the called station signaling equipment are fed out on C( )- (code) leads from the D1 relay.

**4.05** Input pulses for the pulse counting relays of the decoder, which are a form of pulse dividing circuit, are received on the E lead from the SF unit. Pulses on the E lead are derived from the 2600- and 2400-Hz signaling tones of the SF unit. These tones drive the pulse counting relays. The first pulse causes the RA relay, then the RA1 relay, to operate. Therefore, at the start of any one digit, no path exists from ground through the make contact of the operated RA1 relay and the break contact of the operated RA relay (shown at the top of the decoder circuit). No ground can be applied through the pulse counting relays to any one of the B- leads while both relays are energized. The B- leads are so labeled because they all connect to Break contacts of the TR (transfer) relay. The TR relay is deenergized except for a maximum period of 6 seconds, which occurs after the receipt of the first digit of a 2-digit station code.

**4.06** If only one pulse (corresponding to the digit 1) is received, no ground output to a B- lead will be forthcoming, since the digit 1 is not used in any of the station codes of the SS-1 system. But from the second input pulse onward, the pulse counting relays connect successively higher numbered B- leads (B2 through B10) to the RA1 relay contacts. Nothing but pulse counting relay operation occurs as long as the pulses continue to be steadily received from the SF unit. Shortly after the last pulse of a digit is received, the RA relay releases. A brief 100-millisecond spurt of ground appears on whichever B- lead happens to be connected to the still-operated RA1 contacts. Then the RA1 relay and all the pulse counting relays are restored to normal in preparation for receiving another digit.

**4.07** The short spurt of ground on one of the B- leads at the end of the first digit will operate the D1 relay, if the D1 relay winding is connected to the grounded B- lead. The first digit, is the tens digit of a number and determines whether the number being called is in the twenties, or the thirties, or the forties, etc. Therefore, the D1 relay (and any other D- relay that may be connected to one of the B- leads) could be called a *tens* code relay. As shown in Fig. 28, the D1 relay is connected to the B3 lead. It will recognize station codes grouped in the thirties, but will not

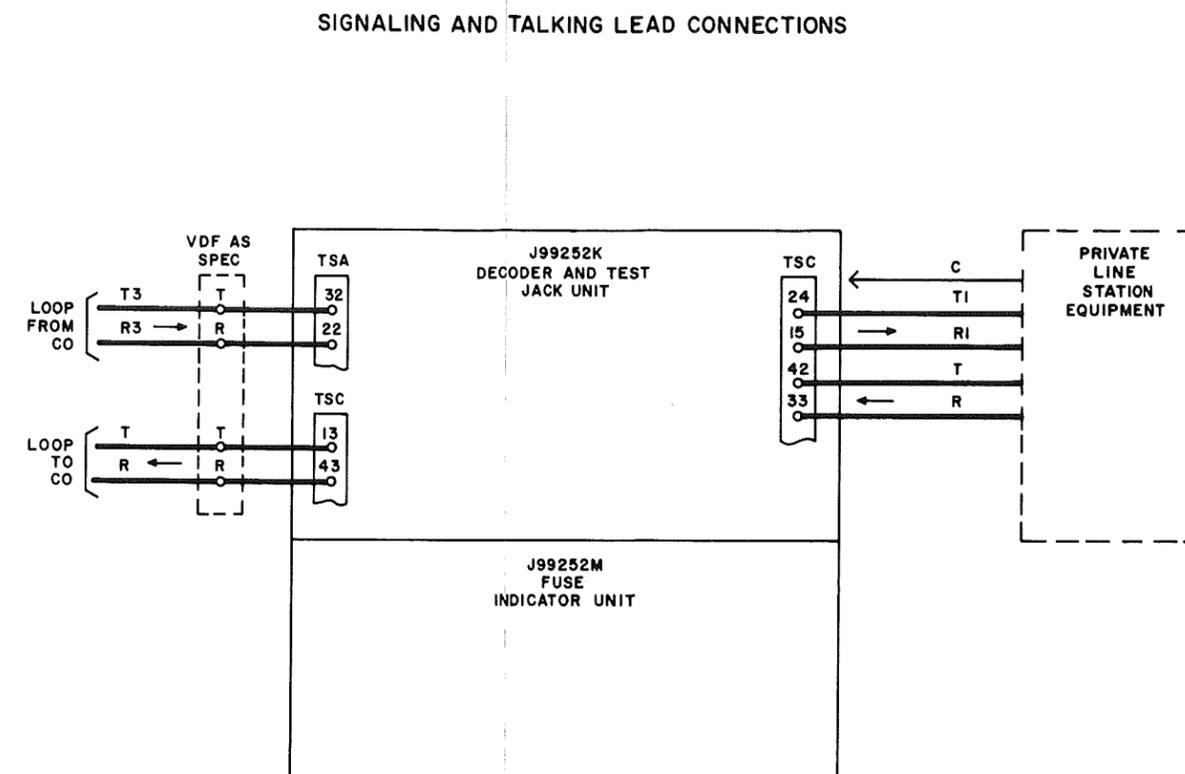
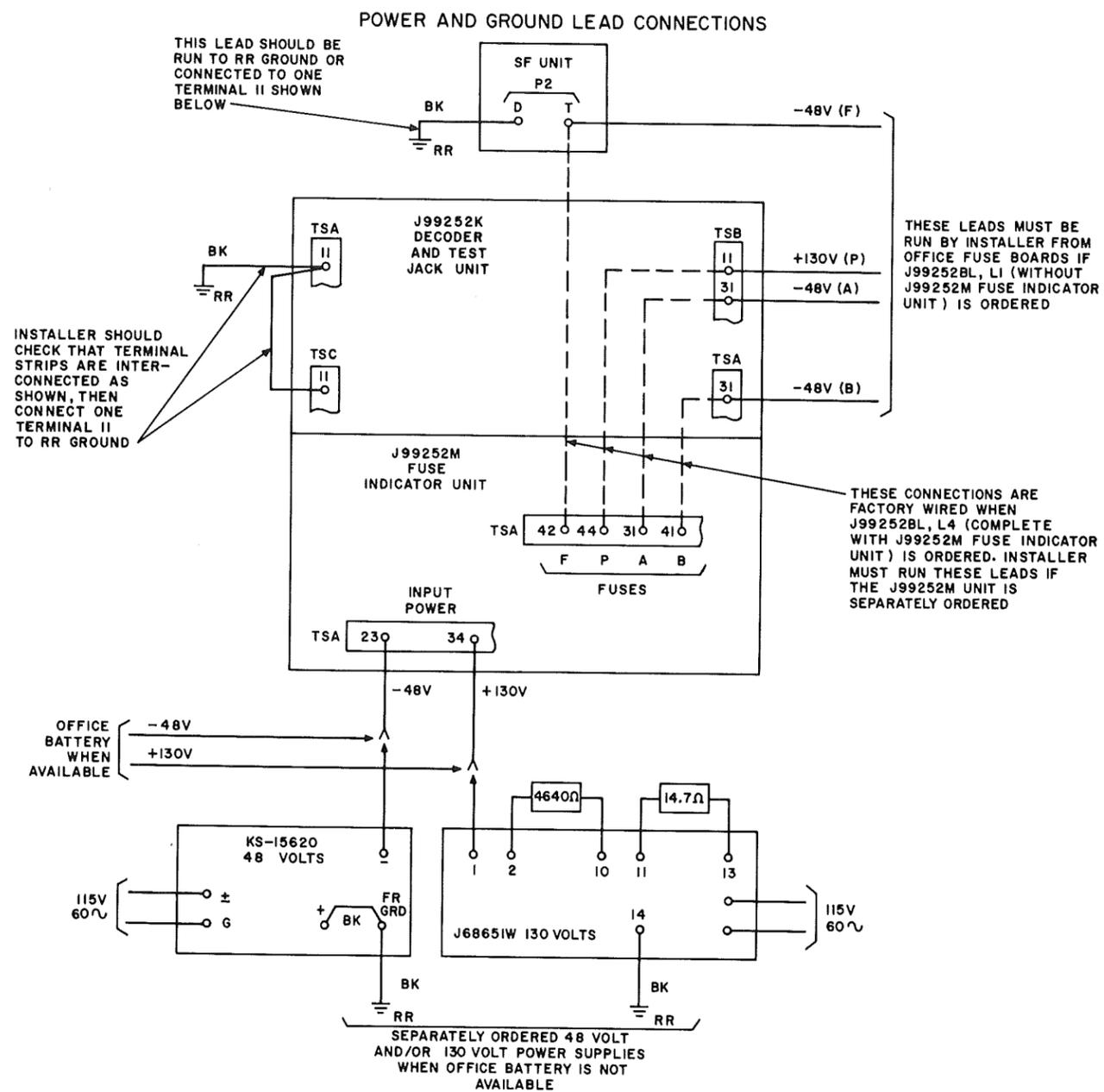


Fig. 22—J99252BL Receive Only 1 to 9 Codes Unit

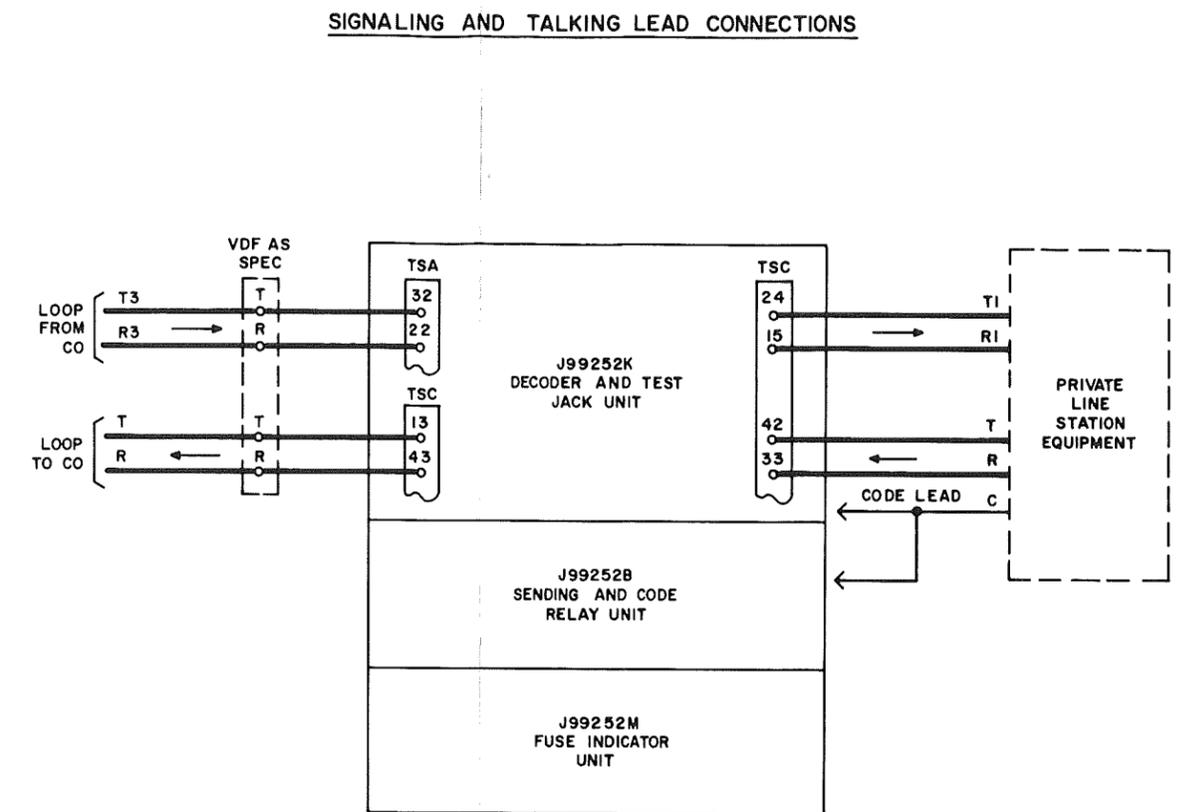
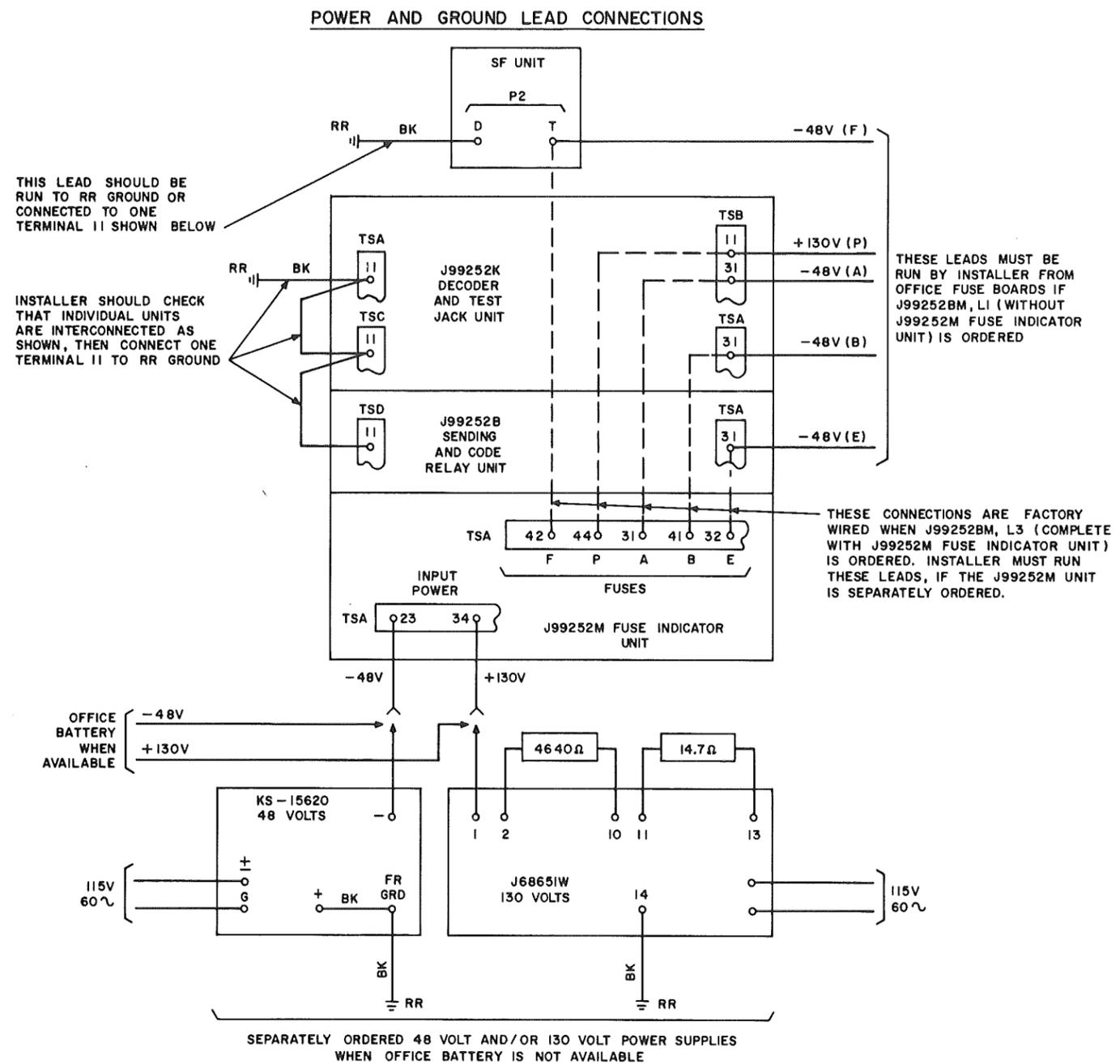
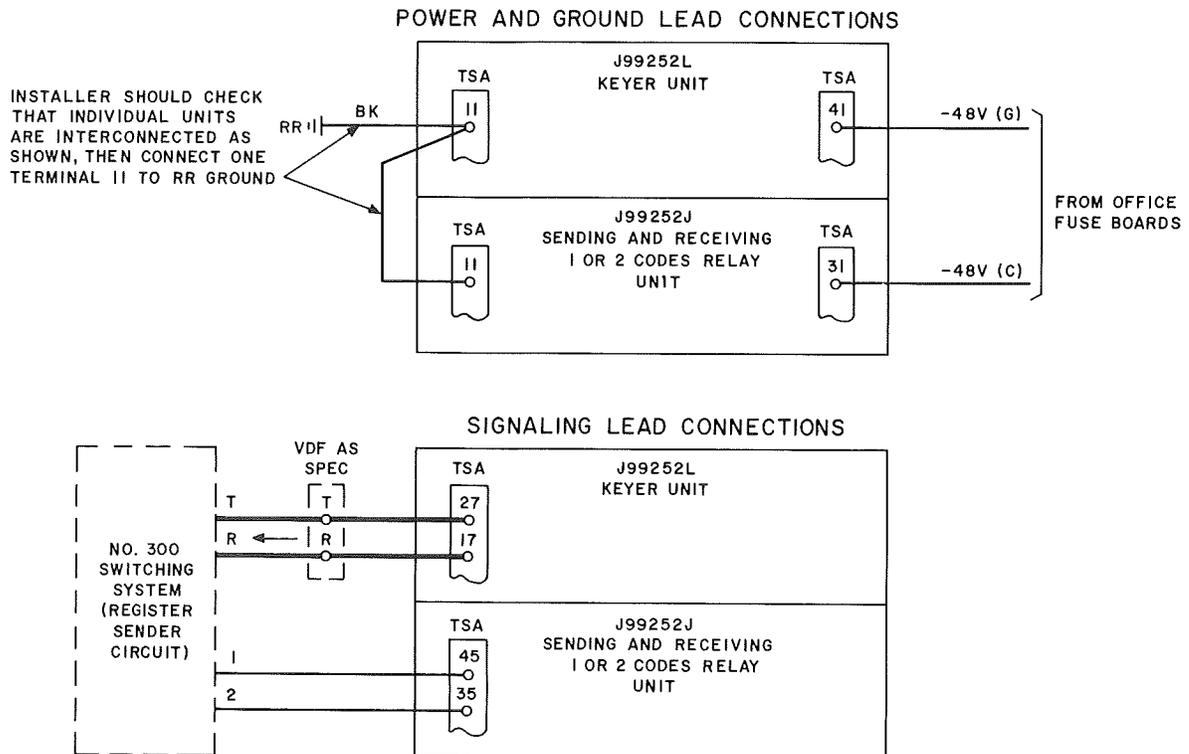


Fig. 23—J99252BM Receive Only 1 to 81 Codes Unit



**Fig. 24—J99252BN Send Unit for SS-1 Keyer per No. 300 Switching System Sender Application**

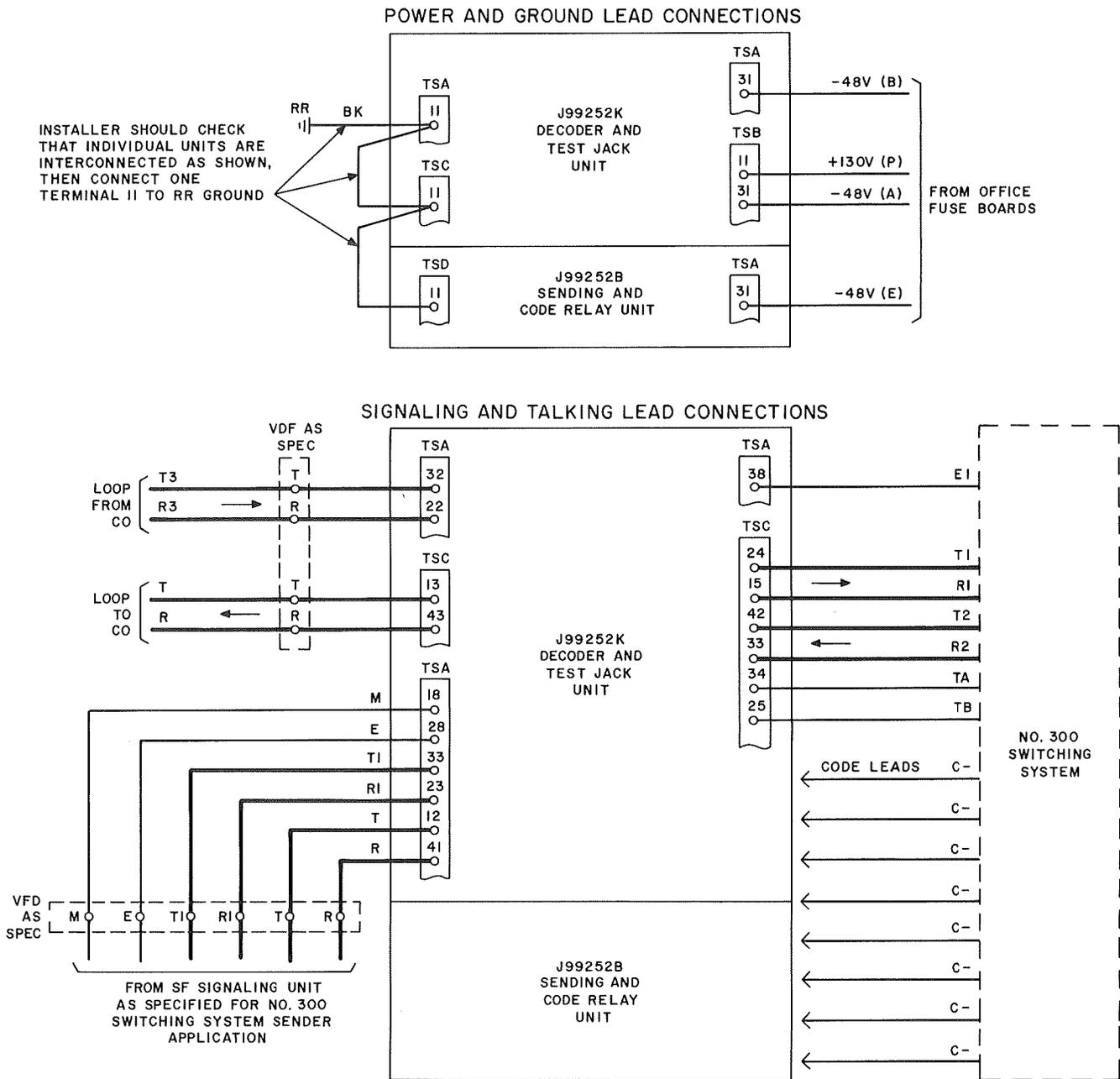
be able to recognize codes which start with some other number. Note, also, that this connection from the winding of D1 is movable and could have been placed on any of the B- leads. It could have been placed on B7, for example, to recognize codes in the seventies, rather than being connected to B3 to recognize codes in the thirties, as shown.

**4.08** When the D1 relay is operated, it locks up through its own M1 contacts and is placed under control of the ON (off-normal) relay. The ON relay will remain deenergized until the second digit has been received and registered or until the decoder times out if the second digit is not received within 6 seconds after the first digit is received.

**4.09** There is only one D- relay in the decoder (the D1 relay under discussion). Therefore, the decoder on its own can only provide signaling for stations with codes that all begin with the same *tens* digit, a maximum of nine codes. If all the codes of the stations at one location do not begin with the same number, additional D- relays must be provided to recognize as many of the *tens* digits as are assigned. These additional D- relays

(SD-98093-01, Fig. 2) are mounted on the J99252B sending and code relay unit. This unit comes equipped with one D- relay, and up to seven more may be added. These relays will be discussed later, but their connection to the B- leads of the decoder are shown in Fig. 28. Some 81 codes may be recognized by a full complement of D- relays. If only the D1 relay in the decoder is used, the maximum number of station codes that can be recognized is nine. Thus, a basic distinction between packaged units can be seen. Those packaged units which use the code relay of the decoder only are called 1- to 9-code units. Those packaged units which also use the relays of the J99252B sending and code relay unit are classified as 1- to 81-code units.

**4.10** Assuming that the D1 relay is actually connected to the B3 lead, as shown in Fig. 35, and that the first digit received of the incoming 2-digit code was 3, the D1 relay will have been operated by the momentary ground which appeared on the B3 lead and will have been locked up under the control of the break contacts of the ON relay. At this time, transfer relay TR will



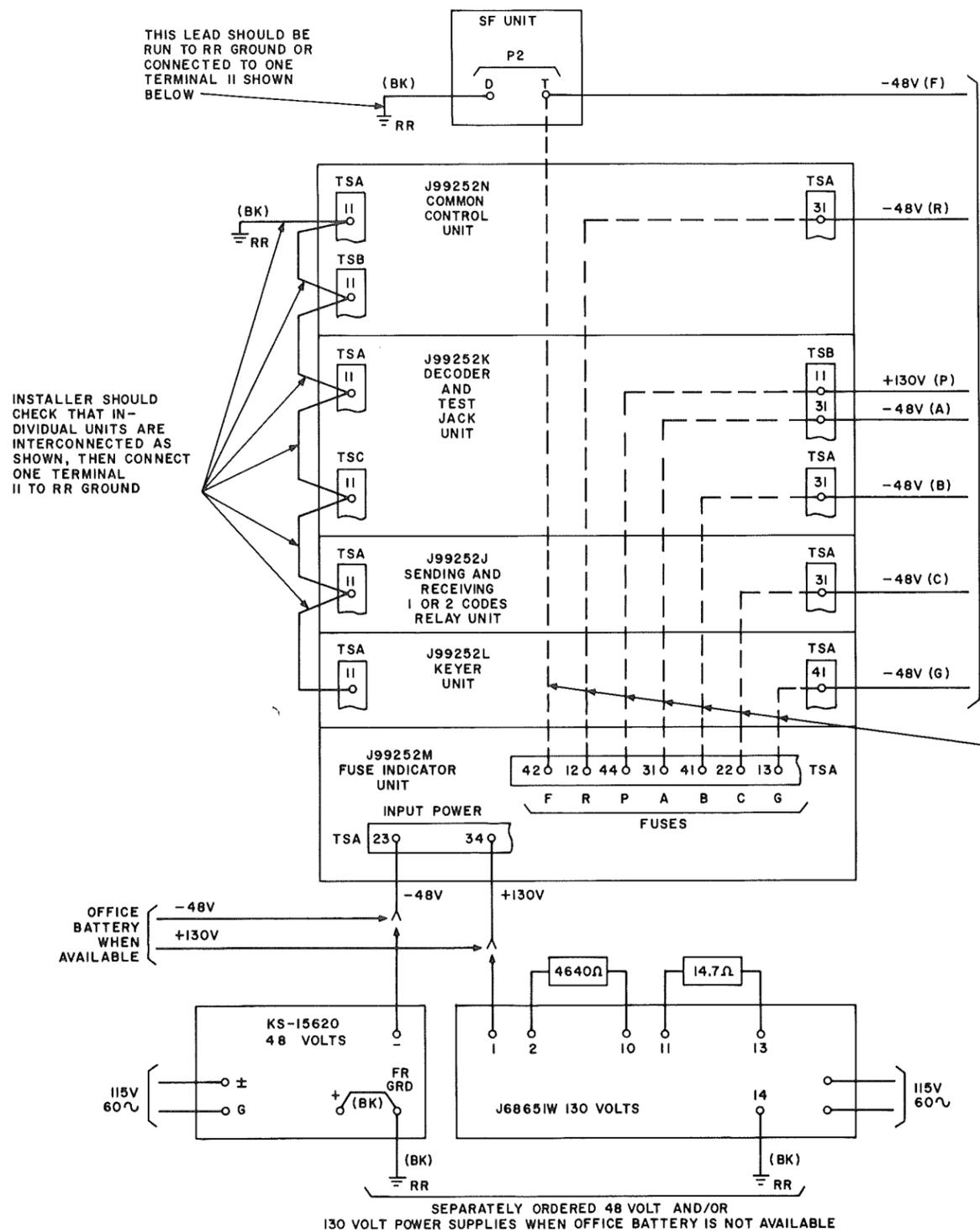
**Fig. 25—J9925BP Send and Receive 1 to 81 Codes Unit for SS-1 Keyer per No. 300 Switching System Sender Application**

operate. This will transfer all the output leads of the pulse counting relays from the B2 through B10 leads to the M2 through M10 leads (the Make leads). The D1 relay will remain energized, since the ON relay will not yet have operated. Now it will be possible to feed a ground out through the pulse-counting relays and through the D1 relay contacts to the

C( )- leads of the private line station equipment. First, however, the second digit will have to be received.

4.11 Pulsing on the E lead from the SF unit will resume as soon as the second station code digit is started at the sending station. The RA

POWER AND GROUND LEAD CONNECTIONS



THESE LEADS MUST BE RUN BY INSTALLER FROM OFFICE FUSE BOARD IF J99252BS, L1 (WITHOUT J99252M FUSE INDICATOR UNIT) IS ORDERED

THESE CONNECTIONS ARE FACTORY WIRED WHEN J99252BS, L3 (COMPLETE WITH J99252M FUSE INDICATOR UNIT) IS ORDERED. INSTALLER MUST RUN THESE LEADS IF THE J99252M UNIT IS SEPARATELY ORDERED.

SIGNALING AND TALKING LEAD CONNECTIONS

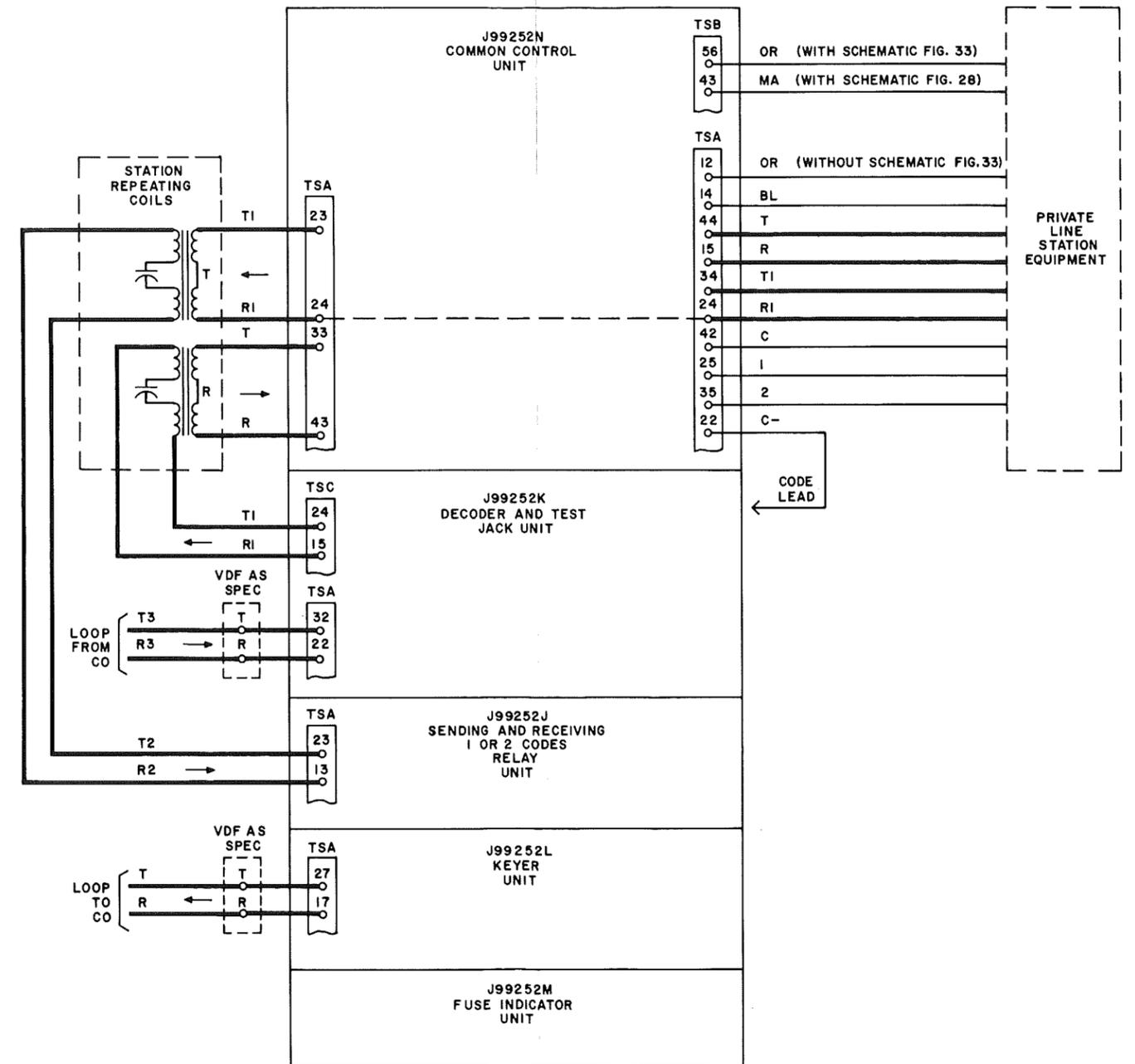


Fig. 26—J99252BS Send and Receive 1 to 9 Codes Unit Arranged with Automatic or Manual Lockout for Privacy



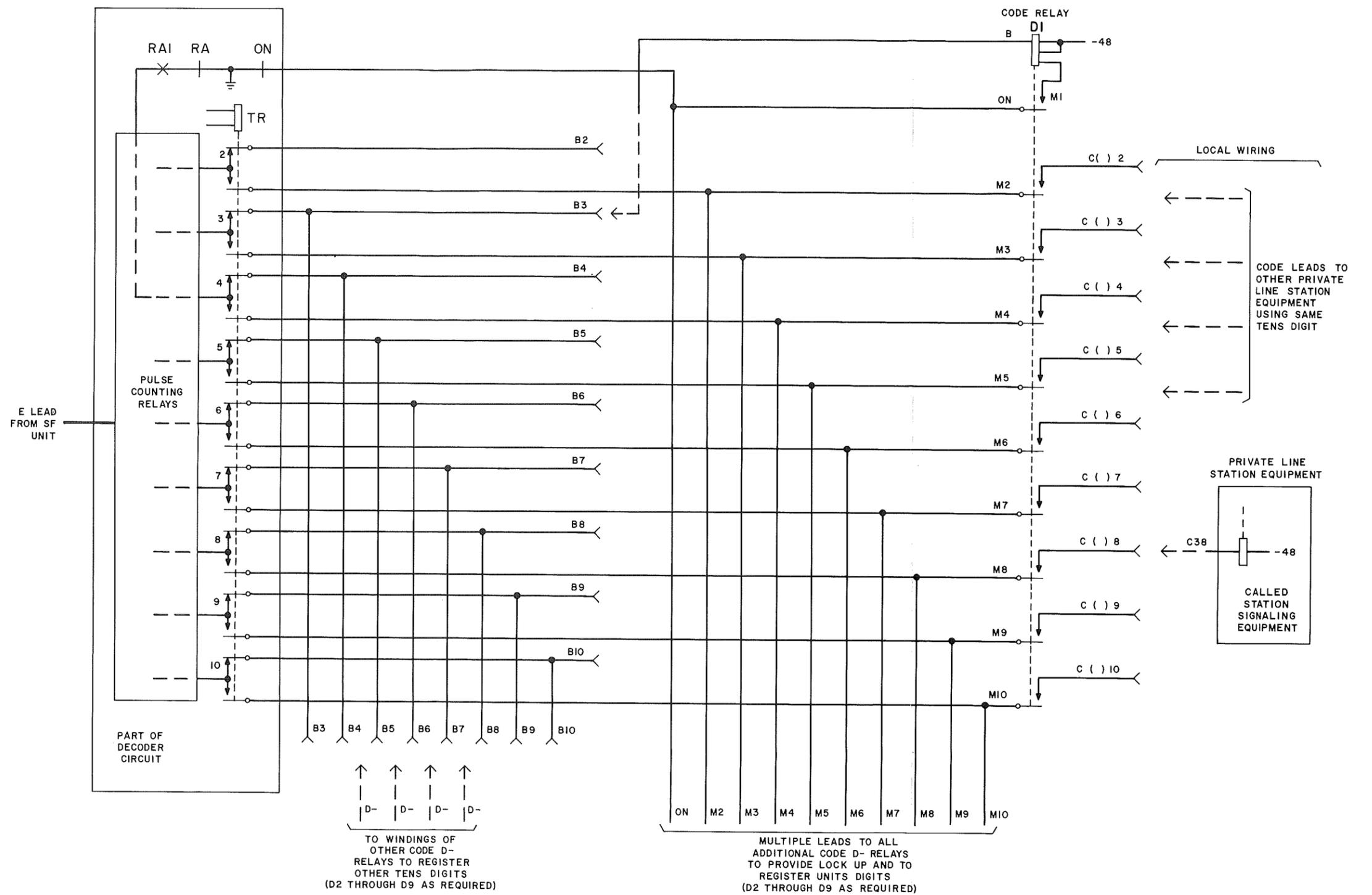


Fig. 28—D1 Code Relay Operation

and RA1 relays will reoperate and the pulse counting relays will again transfer the connection from the contacts of the RA1 relay along from lead to lead, this time on the M- leads. Eventually the whole digit will be received and the pulse counting relays will stop their movement. Then the RA relay will fall out, followed by the RA1 relay in about 100 milliseconds. Again a momentary ground will be applied through the pulse-counting relays, this time to one of the M- leads. Since the D1 relay will still be energized, this ground will be fed out to one of the C ( )- leads. If this C ( )- lead is connected to a private line station, the station will be signaled. The SS-1 signaling equipment supplies only a momentary ground to the relay of the called station signaling equipment. Circuits within the private line station must perform the locking and signaling functions.

**4.12** The ON relay will operate after the second digit has been received and registered. This will open the holding path for the D1 relay and it will restore to normal. Now the entire decoder is normalled, and a new station code can be received.

**4.13** Note the multiple M- leads at the bottom of Fig. 28. These leads will be connected to every D-relay installed on the J99252B sending and code relay unit so that all *units* digits can be received through all connected D- relays. The ON lead is also multiplied to the D- relays. Therefore, D- relays are placed under the holding control of the ON relay.

#### DA-DB CODE RELAY

**4.14** The D1 relay has been rated "Manufacture Discontinued" to substitute an AK-type relay for the original AF relay. The AK relay consists of two functionally independent relays mounted on a common core and base. The new relay is called the DA-DB relay. It can be wired to decode nine codes in any *tens* digit (as the D1 relay does) or to decode four codes in each of two *tens* digits. The difference in operation depends on whether both windings are energized by the same B- lead or whether each winding is connected to a separate B-lead. The DA-DB code relay is shown on SD-98093-01 as Fig. 18.

**4.15** The functional independence of each half of the DA-DB relay is evident in Fig. 29. Separate windings and armature mechanisms allow either half of the relay to operate independently

of the other half. Therefore one half of the relay, for instance AA, can be wired to receive station codes using a *tens* digit of three. The other half, DB, can be connected to B5 to recognize station codes in the fifties. These explanatory connections are shown in Fig. 29. Notice that the winding lead designations are associated with similarly named portions of the code relay. The BA lead connects to the DA relay and the BB lead connects to the DB relay.

**4.16** The DA-DB relay adds flexibility to the code relay in the decoder. A location having several private line stations with codes that fall into two *tens* digits is not forced to use the J99252B sending and code relay unit to afford recognition of the second *tens* digit, as was formerly the case. Now the DA portion of the code relay can be used to recognize one *tens* digit and the DB portion, to recognize the second *tens* digit. If more than two *tens* digits are required, either because of the large number of stations located there or because the codes of a small number of stations are not grouped together, the J99252B sending and code relay unit will be required to provide the additional *tens* digits. The DA-DB code relay can still be used to minimize the number of D- relays required in the J99252B unit.

**4.17** There are times when all the station codes at a customer location are grouped into one *tens* digit. When it is desirable to operate both halves of the AA-DB relay simultaneously so that all the *units* digits in one *tens* digits group can be recognized. To allow this operation or split relay operation, two options are provided with the DA-DB relay. One option or the other must be strapped in by the installer before the DA-DB relay can function completely.

**4.18** The ZL-wiring option, shown in Fig. 29, causes both halves of the relay to be operated by one *tens* digit. ZL wiring extends the BA lead from the DA relay winding to the DB relay winding. (Lead BB is not used because it is part of the ZM wiring.) Now the DB relay will operate with the DA relay. ZL wiring also extends the M10 lead through the DB portion of the relay. The M10 lead then becomes the C ( )0 code lead. This required two more connections, as shown.

**Note:** The M10 lead cannot be permanently connected through the AB relay, since the BM12 contacts of DB are used to connect the

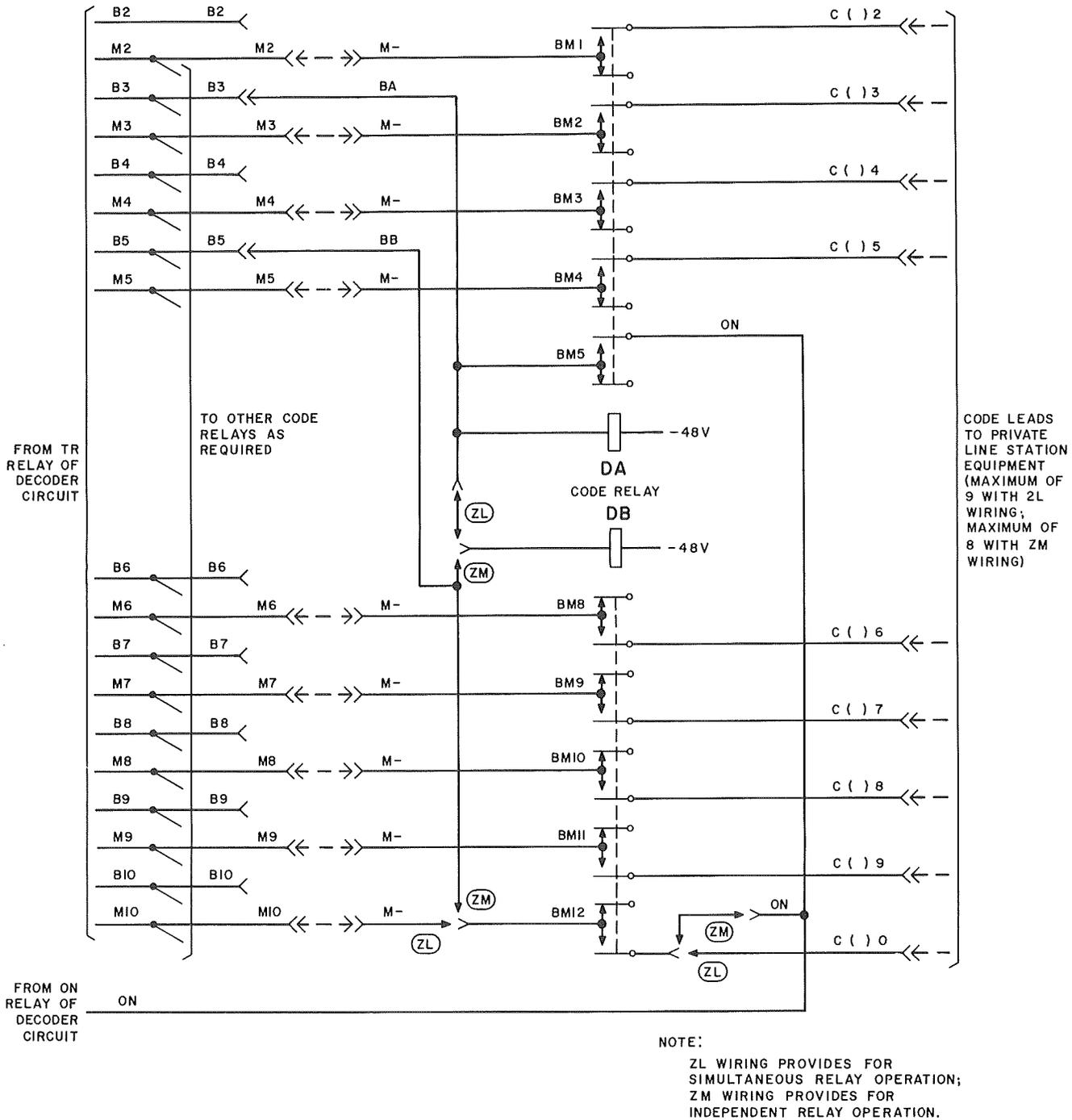


Fig. 29—DA-DB Relay Operation

ON lead when the ON lead is required to provide lockup for the DB relay in the split mode of operation.

independently. Lead BA from the DA relay winding must be strapped to one of the B- leads, as usual, so that up to four station codes can be recognized in that *tens* digit. Now another strap called BB is added to connect the DB relay winding to a second *tens* digit lead. This makes possible

4.19 Option ZM is used when the two halves of the DA-DB relay are to be operated

recognition of up to four station codes in the second *tens* digit. The two halves of the code relay can recognize a maximum of eight station codes. Note that it is now impossible to signal a station on the C( )0 lead, since the ZM option must provide a holding path from the DB winding, through the BM12 contacts of the DB relay, and through a ZM strap to the ON lead.

**4.20** The M- leads must also be strapped in by the installer. This again provides flexibility in the recognition of station codes. Assuming that the DA and DB relays are connected to the B3 and B5 leads, respectively, as shown in Fig. 29; the four codes to be signaled through use of the DA relay might actually be 32, 33, 34, and 35, as shown. On the other hand, the station codes might fall anywhere within the thirties group; eg, 34, 36, 37, and 39. In such a case, the installer would connect the M4 lead to the BM1 contact of DA, the M6 lead to BM2, the M7 lead to BM3, and the M9 lead to BM4. Further connections would then be made from the C( )2 lead to the private line station coded 34, from the C( )3 lead to station 36, from the C( )4 lead to station 37, and from the C( )5 lead to station 39. Similar connections would be made to the DB relay to signal stations assigned codes in the fifties.

#### ADDITIONAL CODE RELAYS

**4.21** As shown earlier, a single D1-code relay, or even a DA-DB code relay, may not provide enough *tens* digits through which to signal all the stations at a customer location. In such an event, a J99252B sending and code relay unit would be employed to increase the number of *tens* digits available. The unit comes with one D-relay already installed. This relay, plus the DA-DB relay of the decoder, is usually sufficient for all situations. That is, this combination provides two full *tens* digits groups or one full *tens* digits group and two partial *tens* digits groups. If even more *tens* digits are required, a maximum of seven additional D-relays may be ordered and installed on the same plate.

**4.22** Figures of the D1 and DA-DB relays indicated that the B- leads and the M- leads could be extended to additional code relays. Fig. 30 shows how the first additional code relay, D2, may be added to the original code relay complement (D1 or DA-DB). With this addition, up to nine stations in another *tens* digit may be signaled. Even more

D-relays may be added, as shown. Note that the M- leads and the ON lead must be multiplied to every code relay but that only one individual B-lead will be connected to the winding of each relay.

#### CONNECTION INSTRUCTIONS FOR PROVIDING STATION CODES

**4.23** Only one of five basic connection situations will be encountered when the SS-1 equipment is to be wired to provide station codes. The five situations and the paragraphs which discuss the methods of connection are:

- (a) Packaged units such as the J99252BH, J99252BL, or J99252BS which use only the DA-DB code relay in the decoder and in which the installer must wire the DA-AB relay to provide 1 to 9 codes in one *tens* digit (see 4.25 through 4.29).
- (b) Packaged units listed in (a) which use only the DA-DB code relay in the decoder and in which the installer must wire the DA-DB relay to provide 1 to 8 codes in two *tens* digits but not more than 4 codes in either *tens* digit (see 4.30 through 4.35).
- (c) Packaged units such as the J99252BJ or J99252BT in which the DA-DB code relay is factory wired in the decoder to provide 1 to 9 codes in one *tens* digit and which use additional code relays to provide up to 72 additional codes (see 4.36 through 4.40).
- (d) Packaged units such as J99252BG, J99252BM, or J99252BP which use the DA-DB code relay in the decoder to provide 1 to 8 codes in two *tens* digits but not more than 4 codes in either *tens* digit, as wired by the installer, and which use additional code relays to provide up to 72 additional codes (see 4.41 through 4.48).
- (e) Packaged units listed in (d) which use the DA-DB code relay in the decoder to provide 1 to 9 codes in one *tens* digit, as wired by the installer, and which use additional code relays to provide up to 72 additional codes (see 4.49 through 4.55).

**4.24** Terminals are identified in the following connection procedures by giving first, the abbreviation TS (for terminal strip); second, the identifying letter of the terminal strip (A, B, C,

or D); and last, the terminal number. When required for clarity, the name of the lead and/or an abbreviated name of the unit on which the terminal strip is located may also be given in parentheses. For example, terminal 14 on terminal strip C of the J99252B decoder and test jack unit could be given as TSC14 (T1 decoder).

**A. Connecting 1 to 9 Codes, DA-DB Relay to be Wired by Installer for One Tens Digit**

**4.25** Make the connections outlined in 4.26 through 4.29 to connect this type of arrangement. Terminals for these connections are all located on the decoder.

**4.26 BA Lead:** Connect the BA lead from the DA relay winding to the desired *tens* digit by strapping TSB14 to one of the B- leads as shown in Table C.

**4.27 ZL Option:** Provide ZL option wiring to cause the DB relay to operate with the DA relay by strapping TSB12 to TSB14, and TSB48 (M10) to TSC16.

**4.28 M-Leads:** Connect leads M2 through M9 to contacts of the DA-DB relays to provide *units* digits to the code relays, as shown in Table D.

**Note:** Lead M10 to obtain code lead C( )0 was connected by ZL option in 4.27.

**4.29 Station Code Leads:** Connect the private line station equipment code leads to the C( )-code terminals on the decoder, as required. The numbers in parentheses in the station code lead column must be the same *tens* digit established by the BA lead connection of 4.26. Connect the assigned station code leads as shown in Table E.

**B. Connecting 1 to 8 Codes, DA-DB Relay to be Wired by Installer for Two Tens Digits**

**4.30** Make the connections outlined in 4.31 through 4.35 below to connect this type of arrangement. Terminals for these connections are all located on the decoder.

**4.31 BA Lead:** Connect the BA lead from the DA relay winding to the desired first *tens* digit, as given in 4.26, to provide the DA relay *tens* digit.

**4.32 BB Lead:** Connect the BB lead from the DB relay winding to the desired second *tens* digit by strapping TSB12 to one of the B-leads as shown in Table F to provide the DB relay *tens* digit.

**4.33 ZM Option:** Provide ZM option wiring to allow the DB relay to lock up under control of the ON lead by strapping TSB12 to TSC16, and TSB36 to TSA45.

**4.34 M- Leads:** As explained in 4.20, the M-leads from transfer relay TR in the decoder must be strapped to provide the required *units* digits for each half of the code relay. Therefore, the first set of DA relay contacts (BM1) need not necessarily be connected to the M2 lead to provide the *units* digit 2 on code lead C( )2. Any other *units* digit could be connected to BM1 to provide a desired station code. The same flexible connection arrangement must be maintained for all contacts of the DA and DB relays which provide station codes. Therefore, Table G below is arranged to provide a connection from any digit lead through the DA or DB relays to the station code terminals on the decoder.

**4.35 Station Code Leads:** Connect the private line station equipment code leads to the C( )-station code terminals on the decoder. The station codes provided at the decoder terminals were determined by the BA lead strap provided in 4.31, the BB lead strap provided in 4.32, and the M-lead straps provided in 4.34. The code leads and the terminals of the decoder on which they appear are given in Table E (code lead terminals are those on terminal strip A).

**C. Connecting 1 to 81 Codes, DA-DB Relay Factory Wired for One Tens Digit**

**4.36** The DA-DB relay is factory wired to recognize only one tens digit in customer location packaged units such as the J99252BJ or J99252BT. Therefore, no M- lead, ZL-ZM option, or BB lead connections must be made by the installer. One additional code relay must be provided for each additional *tens* digit. Make the connections outlined in 4.37 through 4.40 to provide the proper station codes.

**4.37 BA Lead:** On the decoder, connect the BA lead to provide recognition of the first *tens* digit by the DA-DB relay, as outlined in 4.26.

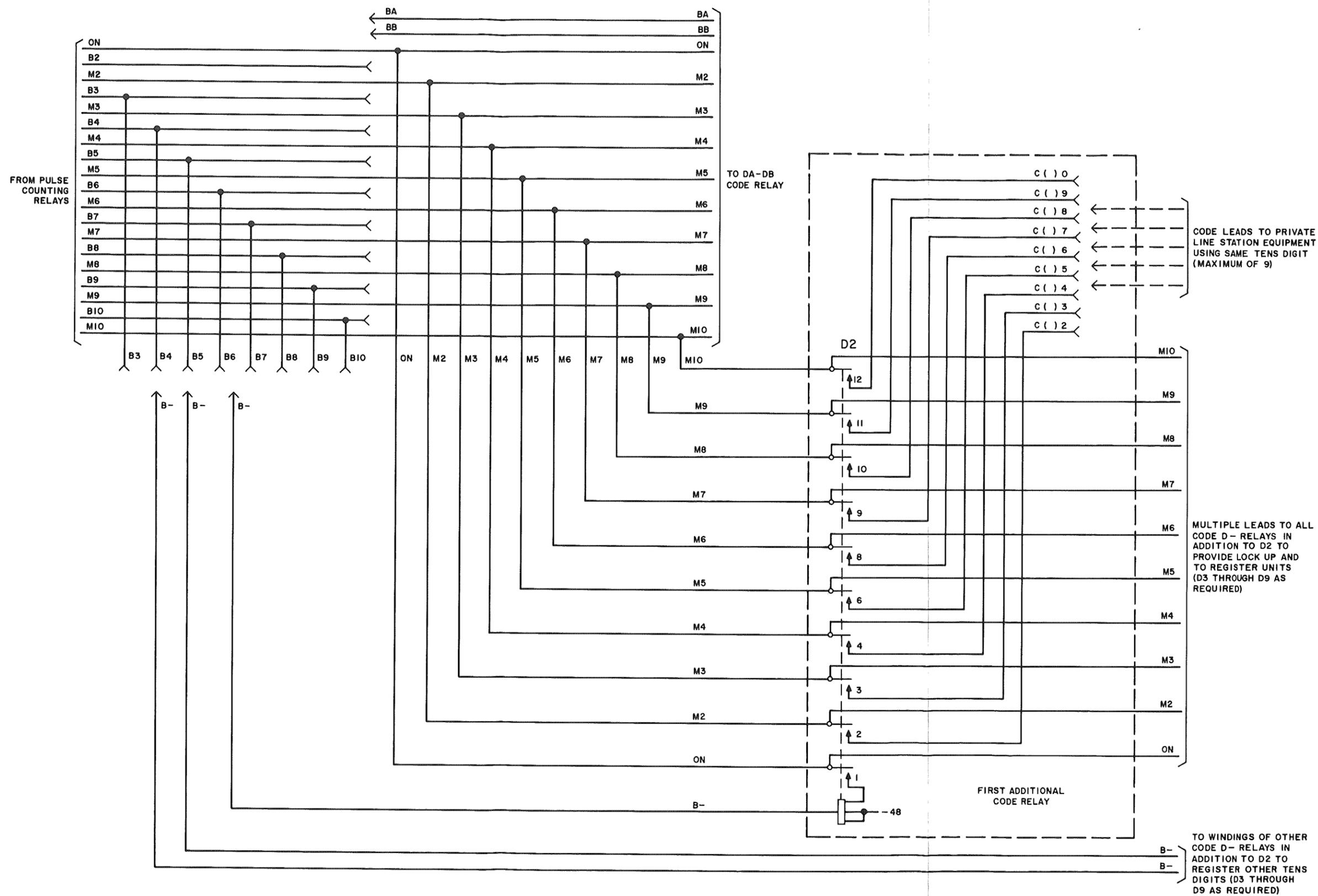


Fig. 30—Addition of One Code Relay

TABLE C

TO OBTAIN TENS DIGIT OF	STRAP	
	FROM	TO
2	TSB14(BA)	TSB24(B2)
3		TSB34(B3)
4		TSB44(B4)
5		TSB15(B5)
6		TSB25(B6)
7		TSB35(B7)
8		TSB45(B8)
9		TSB16(B9)
0		TSB26(B10)

TABLE D

TO OBTAIN UNITS ON CODE DIGIT LEAD C( )-	STRAP	
	FROM TERMINAL	TO M- TERMINAL
2 C( )2	TSC48(DA-BM1)	TSB46(M2)
3 C( )3	TSC38(DA-BM2)	TSB17(M3)
4 C( )4	TSC28(DA-BM3)	TSB27(M4)
5 C( )5	TSC18(DA-BM4)	TSB37(M5)
6 C( )6	TSC17(DB-BM8)	TSB47(M6)
7 C( )7	TSC46(DB-MB9)	TSB18(M7)
8 C( )8	TSC36(DB-BM10)	TSB28(M8)
9 C( )9	TSC26(DB-BM11)	TSB38(M9)

Note: Lead M10 to obtain code lead C( )0 was connected by ZL option in 4.28.

TABLE E

CONNECT STATION CODE LEAD	TO DECODER TERMINAL
C( )2	TSA43
C( )3	TSA14
C( )4	TSA24
C( )5	TSA34
C( )6	TSA44
C( )7	TSA15
C( )8	TSA25
C( )9	TSA35
C( )0	TSA45

TABLE F

TO OBTAIN TENS DIGIT OF	STRAP	
	FROM	TO
2	TSB12(BB)	TSB24(B2)
3		TSB34(B3)
4		TSB44(B4)
5		TSB15(B5)
6		TSB25(B6)
7		TSB35(B7)
8		TSB45(B8)
9		TSB16(B9)
0		TSB26(B10)

**4.38 Adding Code Relays to the Sending and Code Relay Unit:**

The J99252B sending and code relay unit is equipped with one code relay (D2) and has equipment space for the addition of seven more code relays (D3 through D9). If more than two *tens* digits are required at a location, the additional code relays (SD-98093-01, Fig. 2) must be installed and connected by the installer. Leads ON and M2 through M10 must be extended from the previous code relay to each newly installed code relay. The -48 volt E battery must be connected from the previous code relay to the 1L and 2L winding terminals of each new code relay. The 1M contact of each relay must be connected to the 2U winding terminal of the relay. Then the C( )2 through C( )0 code leads from each new code relay must be connected to the terminal strips of the sending and code relay unit. The code leads from the relays to the terminal strips should be connected as shown in Table H. Finally, the B-leads of the additional relays should be run from the 1U winding terminals to terminal strip A, as shown in Table I. All these leads should be run on the shop side of the equipment.

**4.39 B- Leads:**

At the decoder, connect the B-leads from the D2 through D9 code relays, as required, so that the code relays are energized by the desired *tens* digits. Each B-lead from a particular code relay is identified by the wire color called for in Table J. For example, the D2 relay has a BL (blue) lead, the D3 relay has an OR (orange) lead, etc. These leads are to be connected on the shop side of the equipment.

**4.40 Station Code Leads:**

Connect the private line station equipment code leads to the C( )-code terminals on the decoder and on the sending and code relay unit, as required. The code output terminals for *units* digits and for *tens* digits (as established when each code relay was connected to recognize a particular *tens* digit) are shown in Table K. To find the proper terminal to which to connect a code lead, locate the D- relay which has been wired for the desired *tens* digit. Then follow down the vertical column until opposite the desired *units* entry. The terminal on which the station code appears is at the intersection of the columns.

**D. Connecting 1 to 81 Codes, DA-DB Relay to be Wired by Installer for Two Tens Digits**

4.41 The DA-DB relay can be wired to recognize two *tens* digits in packaged units such as

TABLE G

TO OBTAIN UNITS DIGIT	ON CODE LEAD							
	FIRST TENS DIGIT (RELAY DA)				SECOND TENS DIGIT (RELAY DB)			
	C( 12)	C( 13)	C( 14)	C( 15)	C( 16)	C( 17)	C( 18)	C( 19)
	CONNECT							
2	TSB46 to TSC48	TSB46 to TSC38	TSB46 to TSC28	TSB46 to TSC18	TSB46 to TSC17	TSB46 to TSC46	TSB46 to TSC36	TSB46 to TSC26
3	TSB17 to TSC48	TSB17 to TSC38	TSB17 to TSC28	TSB17 to TSC18	TSB17 to TSC17	TSB17 to TSC46	TSB17 to TSC36	TSB17 to TSC26
4	TSB27 to TSC48	TSB27 to TSC38	TSB27 to TSC28	TSB27 to TSC18	TSB27 to TSC17	TSB27 to TSC46	TSB27 to TSC36	TSB27 to TSC26
5	TSB37 to TSC48	TSB37 to TSC38	TSB37 to TSC28	TSB37 to TSC18	TSB37 to TSC17	TSB37 to TSC46	TSB37 to TSC36	TSB37 to TSC26
6	TSB47 to TSC48	TSB47 to TSC38	TSB47 to TSC28	TSB47 to TSC18	TSB47 to TSC17	TSB47 to TSC46	TSB47 to TSC36	TSB47 to TSC26
7	TSB18 to TSC48	TSB18 to TSC38	TSB18 to TSC28	TSB18 to TSC18	TSB18 to TSC17	TSB18 to TSC46	TSB18 to TSC36	TSB18 to TSC26
8	TSB28 to TSC48	TSB28 to TSC38	TSB28 to TSC28	TSB28 to TSC18	TSB28 to TSC17	TSB28 to TSC46	TSB28 to TSC36	TSB28 to TSC26
9	TSB38 to TSC48	TSB38 to TSC38	TSB38 to TSC28	TSB38 to TSC18	TSB38 to TSC17	TSB38 to TSC46	TSB38 to TSC36	TSB38 to TSC26
0	TSB48 to TSC48	TSB48 to TSC38	TSB48 to TSC28	TSB48 to TSC18	TSB48 to TSC17	TSB48 to TSC46	TSB48 to TSC36	TSB48 to TSC26

the J99252BG, J99252BM, and J99252BP; or the DA-DB relay may be wired simply to provide one *tens* digit. One additional code relay must be provided for each additional *tens* digit not provided by the DA-DB code relay. Make the connections outlined in 4.42 through 4.48 to provide the proper station codes when the DA-DB relay is to be wired to provide two *tens* digits.

**4.42 BA Lead:** At the decoder, connect the BA lead from the DA relay winding to a desired

*tens* digit, as given in 4.26, to provide the DA code relay *tens* digit.

**4.43 BB Lead:** At the decoder, connect the BB lead from the DB relay winding to a desired *tens* digit, as given in 4.32, to provide the DB relay *tens* digit.

**4.44 ZM Option:** At the decoder, provide ZM option wiring, as given in 4.33.

TABLE H

CONNECT THESE CODE RELAY MAKE CONTACTS	TO TERMINALS LISTED BELOW FOR EACH D- CODE RELAY						
	D3	D4	D5	D6	D7	D8	D9
Lead C( )2 at 2M	TSB24	TSB41	TSC46	TSC24	TSC41	TSD46	TSA22
Lead C( )3 at 3M	TSB34	TSB12	TSC17	TSC34	TSC12	TSD17	TSA32
Lead C( )4 at 4M	TSB44	TSB22	TSC27	TSC44	TSC22	TSD27	TSA42
Lead C( )5 at 6M	TSB15	TSB32	TSC37	TSC15	TSC32	TSD37	TSA13
Lead C( )6 at 8M	TSB25	TSB42	TSC47	TSC25	TSC42	TSD47	TSA23
Lead C( )7 at 9M	TSB35	TSB13	TSC18	TSC35	TSC13	TSD18	TSA33
Lead C( )8 at 10M	TSB45	TSB23	TSC28	TSC45	TSC23	TSD28	TSA43
Lead C( )9 at 11M	TSB16	TSB33	TSC38	TSC16	TSC33	TSD38	TSA14
Lead C( )10 at 12M	TSB26	TSB43	TSC48	TSC26	TSC43	TSD48	TSA24

TABLE I

CONNECT TO WINDING TERMINAL OF RELAY	TO TERMINAL
D3	TSA44
D4	TSA15
D5	TSA25
D6	TSA35
D7	TSA45
D8	TSA16
D9	TSA26

4.47 **B- Leads:** At the decoder, connect the B-leads from the D2 through D9 code relays, as given in 4.39.

4.48 **Station Code Leads:** Connect the private line station equipment code leads to the C( )-code terminals on the decoder and on the sending and code relay unit, as given in 4.35 for the DA-DB code relay outputs and in 4.40 for the D2 through D9 code relay outputs (disregard the DA-DB column in Table K).

4.45 **M-Leads:** At the decoder, connect M-leads to the DA-DB relays, as given in 4.34.

4.46 **Adding Code Relays to the Sending and Code Relay Unit:** Add additional code relays to the sending and code relay unit, if required, as given in 4.38.

E. **Connecting 1 to 81 Codes, DA-DB Relay to be Wired by Installer for One Tens Digit**

4.49 Make the connections outlined in 4.50 through 4.55 to provide the proper station codes when the DA-DB relay in the J99252BG, J99252BM,

TABLE J

TO OBTAIN TENS DIGIT OF	ON CODE RELAY							
	D2 CONNECT BL LEAD TO	D3 CONNECT OR LEAD TO	D4 CONNECT BR LEAD TO	D5 CONNECT R-BR LEAD TO	D6 CONNECT W LEAD TO	D7 CONNECT R-G LEAD TO	D8 CONNECT R-S LEAD TO	D9 CONNECT S LEAD TO
2	TSB24	TSB24	TSB24	TSB24	TSB24	TSB24	TSB24	TSB24
3	TSB34	TSB34	TSB34	TSB34	TSB34	TSB34	TSB34	TSB34
4	TSB44	TSB44	TSB44	TSB44	TSB44	TSB44	TSB44	TSB44
5	TSB15	TSB15	TSB15	TSB15	TSB15	TSB15	TSB15	TSB15
6	TSB25	TSB25	TSB25	TSB25	TSB25	TSB25	TSB25	TSB25
7	TSB35	TSB35	TSB35	TSB35	TSB35	TSB35	TSB35	TSB35
8	TSB45	TSB45	TSB45	TSB45	TSB45	TSB45	TSB45	TSB45
9	TSB16	TSB16	TSB16	TSB16	TSB16	TSB16	TSB16	TSB16
0	TSB26	TSB26	TSB26	TSB26	TSB26	TSB26	TSB26	TSB26

TABLE K

TO OBTAIN UNITS DIGIT	AND TENS DIGIT FROM RELAY								
	DA-DB	D2	D3	D4	D5	D6	D7	D8	D9
	CONNECT CORRESPONDING STATION CODE LEAD TO								
2	TSA43*	TSB46	TSB24	TSB41	TSC46	TSC24	TSC41	TSD46	TSA22
3	TSA14*	TSB17	TSB34	TSB12	TSC17	TSC34	TSC12	TSD17	TSA32
4	TSA24*	TSB27	TSB44	TSB22	TSC27	TSC44	TSC22	TSD27	TSA42
5	TSA34*	TSB37	TSB15	TSB32	TSC37	TSC15	TSC32	TSD37	TSA13
6	TSA44*	TSB47	TSB25	TSB42	TSC47	TSC25	TSC42	TSD47	TSA23
7	TSA15*	TSB18	TSB35	TSB13	TSC18	TSC35	TSC13	TSD18	TSA33
8	TSA25*	TSB28	TSB45	TSB23	TSC28	TSC45	TSC23	TSD28	TSA43
9	TSA35*	TSB38	TSB16	TSB33	TSC38	TSC16	TSC33	TSD38	TSA14
0	TSA45*	TSB48	TSB26	TSB43	TSC48	TSC26	TSC43	TSD48	TSA24

\* These terminals are on the decoder. All other terminals in this table are on the sending and code relay unit.

or J99252BP packaged unit is to be wired to provide one *tens* digit.

**4.50 BA Lead:** At the decoder, connect the BA lead from the DA relay winding to the desired *tens* digit, as given in 4.26, to provide the DA-DB code relay *tens* digit.

**4.51 ZL Option:** At the decoder, provide ZL option wiring, as given in 4.27, to cause the DB relay to operate with the DA relay.

**4.52 M- Leads:** At the decoder, connect leads M2 through M9 to contacts of the DA-DB relay, as given in 4.28.

**4.53 Adding Code Relays to the Sending and Code Relay Unit:** Add additional code relays to the sending and code relay unit, if required, as given in 4.38.

**4.54 B- Leads:** At the decoder, connect the D2 through D9 code relays, as given in 4.39.

**4.55 Station Code Leads:** Connect the private line station equipment code leads to the C( )-code terminals on the decoder and on the sending and code relay unit, as given in 4.40 for the DA-DB code relay outputs and for the D2 through D9 code relay outputs.

## 5. ADDITION OF PRIVATE LINE STATION TELEPHONE SETS USING PARALLEL CONNECTIONS

**5.01** Basic customer location packaged units provide terminations for only one private line station telephone set or other apparatus to be signaled.

Since most locations contain more than one telephone set, a method of making these additional connections must be provided. Talking and signaling paths must both be considered when adding telephone sets.

**5.02** Talking and signaling paths for one private line station telephone set are shown in Fig. 31. Tip and ring leads for the receiving and transmitting paths are connected from the station set to the T and R repeating coils. The repeating coils are not part of the SS-1 equipment. They provide isolation and impedance matching of the 4-wire private line to the telephone set. The repeating coils can be so chosen and wired as to form a low-impedance bus on the equipment side that will allow more telephone sets to be connected later. A code lead over which the telephone set can be signaled is connected from the decoder and test jack unit to the station signaling equipment. Code lead connections are covered in Part 4. The 1 and 2 leads from the dial of the telephone set complete the interconnections that are required between the SS-1 packaged unit and the private line station equipment.

**5.03** If connection of one or more additional telephone sets to a packaged unit is desired, the simplest method of connection is paralleling similar tip and ring leads and the 1 and 2 leads of the telephone sets. Then a separate code lead for signaling purposes should be run from the decoder and test jack unit to signal the added telephone set. This arrangement is shown in Fig. 32. Preferably, the T and R repeat coils should each now form a low-impedance bus for the connection of the paralleled telephone sets.

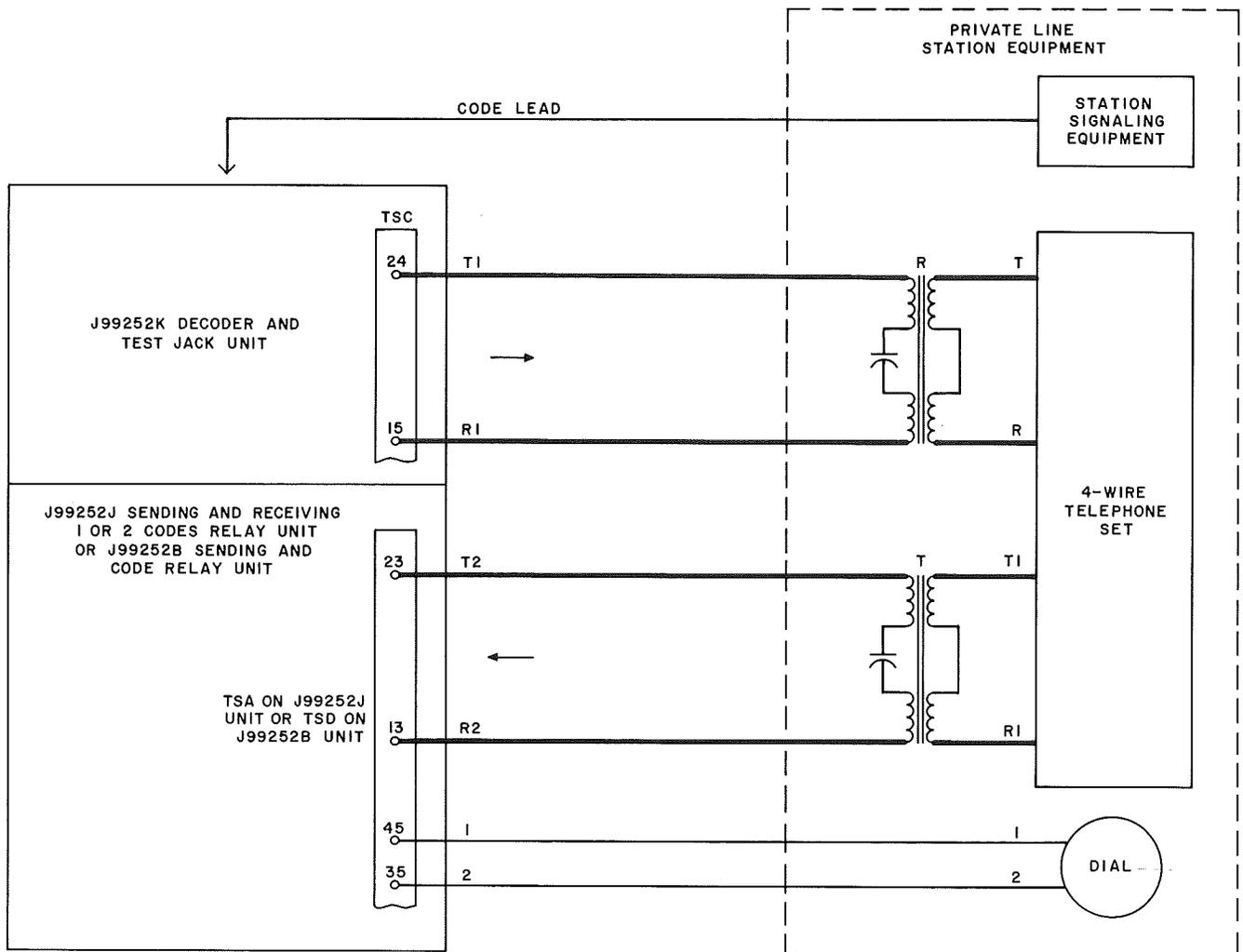


Fig. 31—Connections for One Telephone Set

This condition avoids the need for restrapping the repeating coils to provide correct impedance matching each time another telephone set is added to the station equipment. Such a low-impedance bus arrangement may require that additional amplification be provided in the talking paths. However, a mismatch condition utilizing the original 4 to 1 impedance ratio in the repeating coils may be acceptable in some arrangements. Note that the parallel telephone set arrangement cannot provide privacy and that dialing interference may readily occur. It is for this reason that station control units such as the J99252R (nonprivacy station control unit) and the J99252P (privacy station control unit) have been made available.

## 6. ADDITION OF PRIVATE LINE STATION TELEPHONE SETS USING J99252R STATION CONTROL WITHOUT SYSTEM LOCKOUT UNIT

**6.01** The J99252R station control without system lockout unit provides terminations for a maximum of six private line station telephone sets, plus busy tone and preferential lockout for the number 1 and 2 dial leads during dialing. The unit is not used with the J99252N common control unit and therefore cannot be used to provide system lockout (privacy).

**6.02** Make the changes, additions, and deletions of 6.03 through 6.11, as required, to add

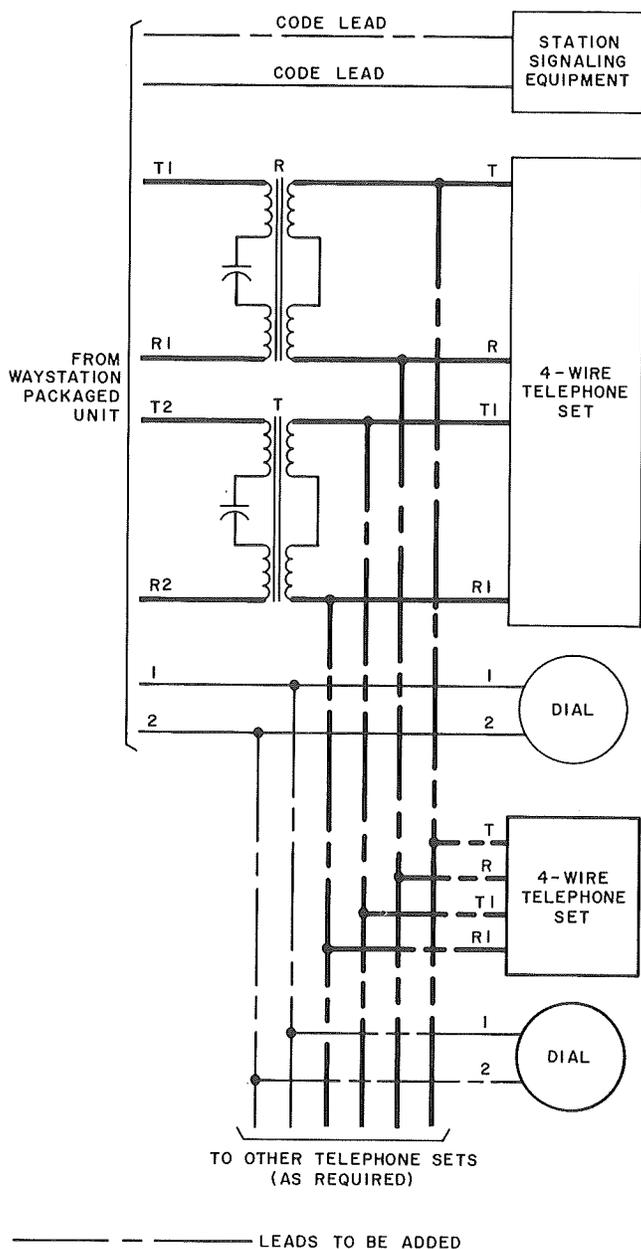


Fig. 32—Connections for Paralleled Telephone Sets

the station control without system lockout unit to an existing packaged unit.

**6.03 Mounting:** Mount the J99252R unit in a vacant space in or near the SS-1 bay. The unit occupies a 2-inch by 23-inch space. Each unit is initially equipped to provide terminations for two telephone sets (J99252R, List 1). Four additional terminations may be provided by the installation

of a maximum of four J99252R, List 2, circuits (LO- and BT- relays) into the mounting plate. If more than six telephone sets are to be terminated, additional J99252R units must be installed. They should be grouped together for convenience.

**6.04 Power:** Provide -48 volt power for relay operation by connecting TSA31 on the J99252R unit to TSA12 (R battery) on the J99252M fuse indicator unit (if installed in the packaged unit) or to a fuse of the office fuse board. The fuse rating should be 1-1/3 amperes. Connect TSA11 on the J99252R unit to an available ground.

**6.05 Repeating Coil and Dial Lead Connections:**

The repeating coil and dial lead connections of a packaged unit equipped with a single telephone set were shown in Fig. 31. This private line station equipment must be reconnected, as shown in Fig. 33, to route the talking paths and the dial leads through the station control unit. The 4-wire telephone set and the dial, shown disconnected in Fig. 33, will later be reconnected to the J99252R unit as the first appearance telephone set and dial equipment. The T and R repeating coils should be chosen and connected to provide low-impedance buses.

**6.06 Removing the Existing Optional Connections:**

Optional connections YA, ZW, and ZR, if connected, *must be removed* from the existing packaged unit when the J99252R unit is added. These optional connections are shown in Table L.

**6.07 Control Connections:**

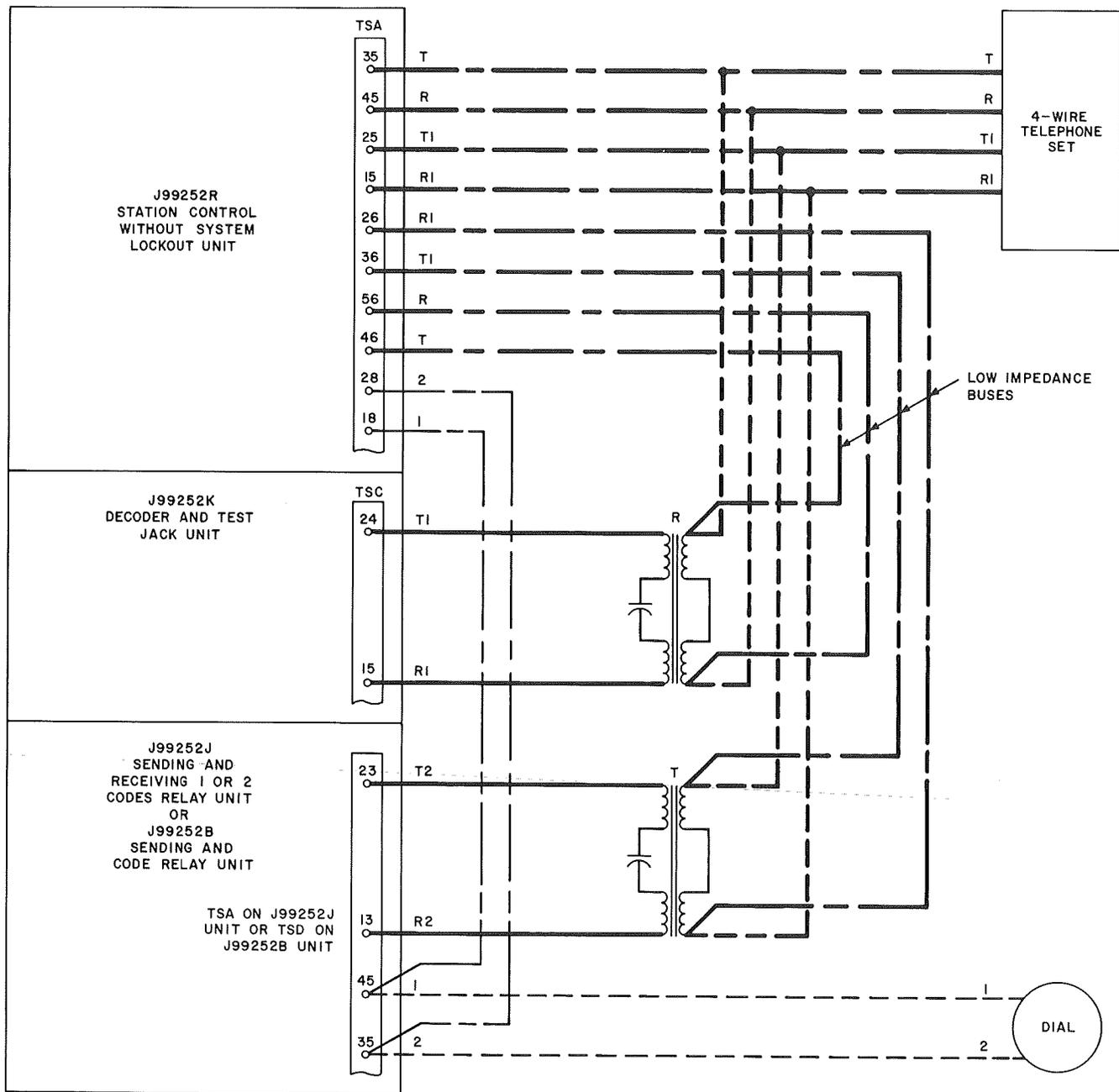
Control leads and a busy tone supply are connected to the first J99252R unit by making the interunit connections shown in Table M.

**6.08 Addition of the YD Option:**

The YD option must be installed to interconnect the E and M leads throughout the packaged unit for use with the J99252R unit. The YD option consists of the connections shown in Table N.

**6.09 J99252L Keyer Modification:**

The keyer must be modified by the YK option when additional subsets or the privacy feature are added to an existing customer location. This modification is shown on SD-98093-01, Fig. 3. It consists of placing resistors R20 and R21 in the T3 and R3 leads, respectively. Disconnect the resistor end of the existing leads which run between TSA26 and R7 and between TSA16 and R11. Mount R20 and R21 on the Minaplas assembly next to the



LEGEND:

- — — — — LEADS TO BE ADDED
- - - - - LEADS TO BE REMOVED

Fig. 33—Reconnection of Repeating Coil and Dial Leads for Nonprivacy

TABLE L

OPTION	CONNECTION BETWEEN
YA	TSA38 (decoder) and TSA18 (keyer)
ZW	TSA28 (decoder) and P2P (SF unit)
ZR	TSC12 (decoder) and TSA48 (keyer) TSC22 (decoder) and *TSD16 or TSA16 (sending relay circuit)

\* This connection is made to the J99252B sending and code relay unit terminal strip D or to the J99252J sending and receiving 1 or 2 codes relay unit terminal strip A, depending on which unit is installed in the existing packaged unit.

TABLE M

LEAD NAME	FROM J99252R UNIT TERMINAL	TO	
		UNIT	TERMINAL
AL	TSA37	J99252K	TSC32
T4	TSA17	J99252L	TSA46
R4	TSA27	J99252L	TSA36
OP	TSA38	*J99252B (J99252J)	TSD12 (TSA12)
LB	TSA47	*J99252B (J99252J)	TSD14 (TSA14)
SG1	TSA57	*J99252B (J99252J)	TSD24 (TSA24)

\* This connection is made to the J99252B sending and code relay unit terminal strip D or to the J99252J sending and receiving 1 or 2 codes relay unit terminal strip A, depending on which unit is installed in the existing packaged unit.

TABLE N

FROM	TO
TSA32 (keyer)	P2-P (SF unit)
TSA32 (keyer)	TSA18 (keyer)
TSA28 (decoder)	TSA42 (keyer)
TSC11 (decoder)	TSC22 (decoder)
TSC41 (decoder)	TSA48 (keyer)
TSC41 (decoder)	*TSD16 or TSA16 (sending relay circuit)

\* This connection is made to the J99252B sending and code relay unit terminal strip D or to the J99252J sending and receiving 1 or 2 codes relay unit terminal strip A, depending on which unit is installed in the existing packaged unit.

bare strap which runs alongside resistor R14. Connect one end of R20 to the free end of R7 and connect one end of R21 to the free end of R11. This connects each pair of resistors in series. Connect the leads from TSA26 and TSA16 to the remaining ends of R20 and R21, respectively, to complete the modification.

**6.10 Addition of the YG Option to Lock Out Additional Station Telephone Sets During Dialing:** The J99252R unit provides lockout and busy tone while digits are actually being dialed but *not* in the interdigital period between the two digits of a station code. If it is desired to bridge the interdigital period with lockout and busy tone, YG option should be installed. The YG option consists of placing a strap across the EMB4 contacts of every LO- relay (one for every station telephone set) as shown in Fig. 34; a connection from TSA11 to TSA46 of the decoder; and a connection from TSA27 of the decoder to TSD41 of the J99252B code relay unit or TSA41 of J99252J sending and receiving 1 or 2 codes relay unit, depending upon which unit is installed in the existing customer location packaged unit.

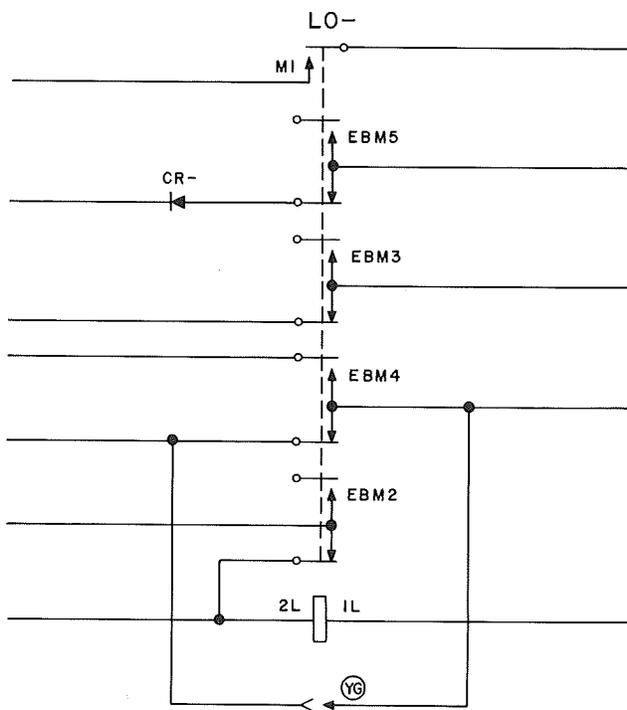


Fig. 34—YG Strap on LO-Relay

**6.11 Talking Path and Dial Lead Connections to Telephone Sets:** Connect the station telephone set talking paths and dial leads to the J99252R unit as shown in Table O. All the terminals are located on the J99252R unit, providing terminations for up to six telephone set appearances on this one unit.

**6.12 Code Leads:** Connect the code leads of the additional station telephone sets, as directed in Part 4, to complete the connections required when adding private line station telephone sets using the J99252R unit.

## 7. ADDITION OF PRIVACY TO AN EXISTING CUSTOMER LOCATION PACKAGED UNIT USING J99252N COMMON CONTROL UNIT

**7.01** The J99252N common control unit provides the privacy feature of the SS-1 system when connected to a standard SS-1 packaged unit consisting of decoder, keyer, and sending relay circuit units. It may be arranged to provide privacy on an automatic or a manual basis. The unit also provides terminations for one station telephone set. If additional station telephone set terminations are required after the privacy feature has been installed, the terminations should be provided by use of the J99252P station control unit.

**7.02** Make the changes, additions, and deletions of 7.03 through 7.14, as required to add the common control unit to an existing packaged unit.

**7.03 Mounting:** Mount the J99252N common control unit in a vacant space in or near the SS-1 bay. The unit occupies a 2-inch by 23-inch space.

**7.04 Power:** Provide -48 volt power for relay operation by connecting TSA31 on the J99252N unit to TSA12 (R battery) on the J99252M fuse indicator unit (if installed in the SS-1 packaged unit) or to a fuse of the office fuse board. The fuse rating should be 1-1/3 amperes. Connect TSA11 and TSB11 on the J99252N unit to an available ground.

**7.05 Repeating Coil and Dial Lead Connections:** The repeating coil and dial lead connections of a packaged unit equipped with a single telephone set were shown in Fig. 31. This private line station equipment must be reconnected as shown in Fig. 35

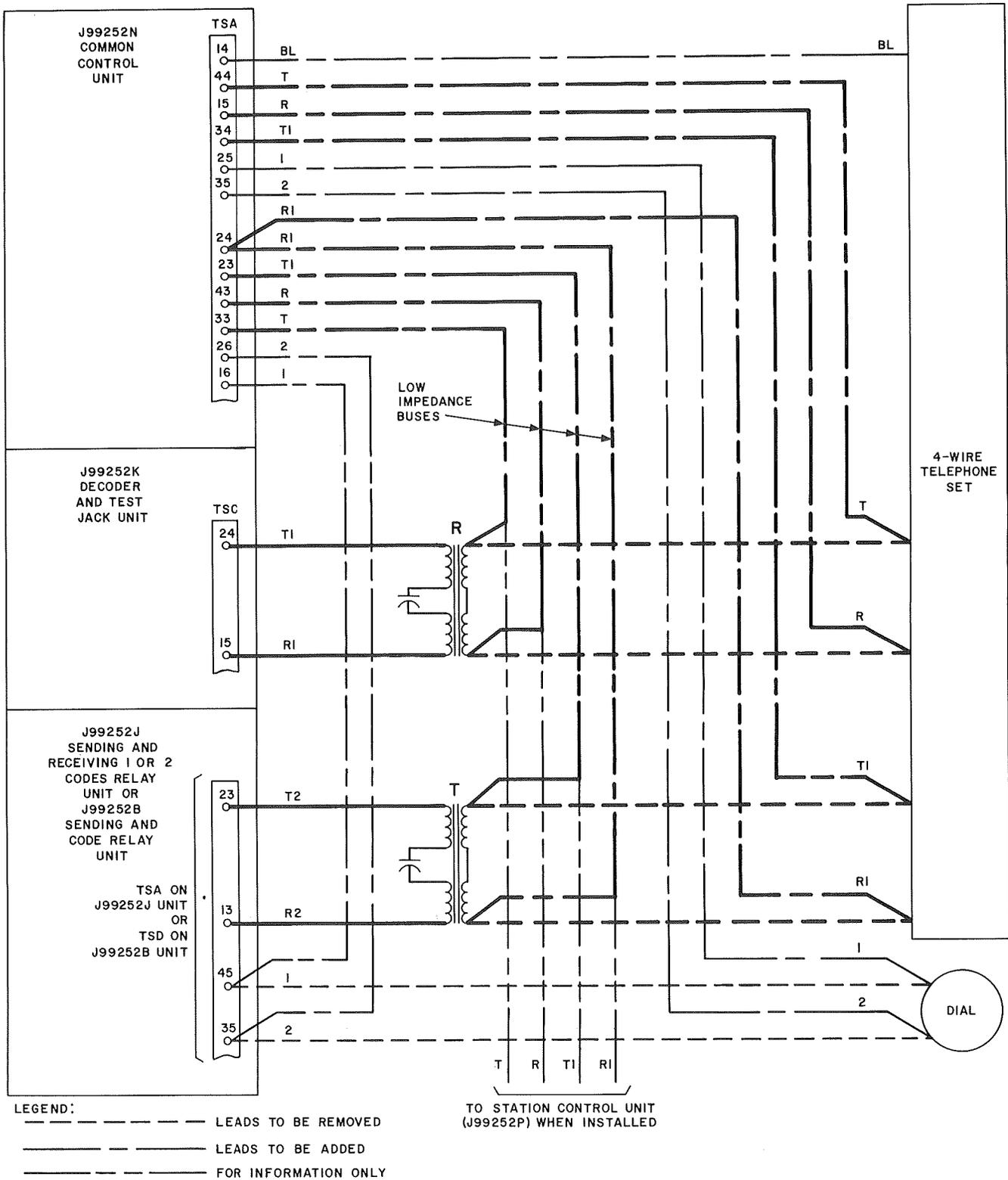


Fig. 35—Reconnection of Repeating Coil and Dial Leads for Privacy

to route the talking paths and dial leads through the common control unit before they reach the station equipment. Since the common control unit provides a termination for one telephone set, the disconnected telephone set may be reconnected to the J99252N unit, as shown in Fig. 35. The T and R repeating coils should be chosen and wired to provide low impedance buses. The dashed lines, shown for information only, may be connected to the J99252P station control unit when this unit is installed to provide additional telephone set terminations. The talking path leads for the J99252P unit can be connected in parallel with the input leads of the common control unit where they terminate on the J99252N unit (see Part 8 for further information).

**7.06 Removing the Existing Optional Connections:**

Optional connections M, YA, ZK, ZR, and ZW, if connected, **must be removed** from the existing packaged unit when the J99252N unit is added. These optional connections are shown in Table P.

**7.07 Control Connections:** Control leads and a busy tone supply are connected to the J99252N unit by making the interunit connections shown in Table Q.

**7.08 Addition of Miscellaneous Options and One Diode to Allow Privacy Operation:**

N, ZQ, ZV, and ZX options plus one steering diode must be installed in the privacy-equipped system to make it function. The diode (a 420G diode shown as Fig. 11 on T-98093-59 and Fig. 5 on T-98093-60) is to be connected from TSB42 to TSB43 on the decoder (J99252K) with the anode (arrow) connected to TSB43. The optional wiring which must be added consists of the connections shown

in Table R. Option N was provided as one of the control lead connections of 7.07.

**7.09 Provision for One Telephone Set Termination Using YP Option:**

The YP option must be connected in the J99252N unit **if** only a single telephone set is to be terminated in the privacy-equipped location. The YB option consists of two straps, one from TSA35 to TSA45 and a second from TSB18 to TSB38. If two or more telephone sets are to be terminated, the J99252P station control unit must be added, as directed in Part 8, and the YB option is then no longer required.

**7.10 J99252L Keyer Modification:** The addition of privacy requires modification of the keyer. This modification is discussed in 6.09.

**7.11 Providing the Automatic Lockout Feature:**

The J99252N unit provides automatic lockout when the ZY option is connected. With automatic lockout, manual lockout relays T4, T5, and T6 are not installed in the common control unit. This forms the J99252N, List 1, unit. Be sure that Zy wiring **has** been installed and that ZZ wiring has **not** been installed as shown in Table S.

**7.12 Providing the Manual Lockout Feature:**

The J99252N unit must be provided with manual lockout relays T4, T5, and T6 to allow manual control of the privacy feature. The addition of the relays and ZZ wiring (rather than ZY wiring) forms a J99252N, List 2, unit. Be sure that ZZ wiring **has** been installed and that ZY wiring has **not** been installed, as shown in Table T.

**7.13 Connecting the Manual Lockout Control Lead:**

If the J99252N unit has been provided with the manual lockout feature discussed in 7.11, a control lead from each station telephone set

TABLE O

TELEPHONE SET APPEARANCE	CONNECT LEADS AS LISTED BELOW					
	1	2	R	T	R1	T1
First	TSA55	TSA16	TSA45	TSA35	TSA15	TSA25
Second	TSA44	TSA54	TSA34	TSA24	TSA53	TSA14
Third	TSA33	TSA43	TSA23	TSA13	TSA42	TSA52
Fourth	TSB48	TSB58	TSB38	TSB28	TSB57	TSB18
Fifth	TSB37	TSB47	TSB27	TSB17	TSB46	TSB56
Sixth	TSB26	TSB36	TSB16	TSB55	TSB35	TSB45

TABLE P

OPTION	CONNECTION BETWEEN
M	TSA11 (keyer) and TSA34 (keyer)
YA	TSA38 (decoder) and TSA18 (keyer)
ZK	TSB42 (decoder) and TSB43 (decoder)
ZR	TSC12 (decoder) and TSA48 (keyer) TSC22 (decoder) and *TSD16 or TSA16 (sending relay circuit)
ZW	TSA28 (decoder) and P2-P (SF unit)

\* This connection is made to the J99252B sending and code relay unit terminal strip D or to the J99252J sending and receiving 1 or 2 codes relay unit terminal strip A, depending on which unit is installed in the existing packaged unit.

TABLE Q

LEAD NAME	FROM J99252N UNIT TERMINAL	TO	
		UNIT	TERMINAL
LB	TSA36	*J99252B (J99252J)	TSD14 (TSA14)
UP	TSA46	*J99252B (J99252J)	TSD44 (TSA44)
SG1	TSA17	*J99252B (J99252J)	TSD24 (TSA24)
SG	TSA17	J99252K	TSA27
B	TSA27	J99252K	TSA17
T4	TSA37	J99252L	TSA46
R4	TSA47	J99252L	TSA36
E	TSA18	J99252L	TSA18
E1	TSA13	J99252K	TSA28
E8	TSA28	J99252L	TSA43
E2	TSA38	J99252L	TSA34
E6	TSA48	J99252L	TSA45
A1	TSB13	J99252K	TSC21
B1	TSB23	J99252K	TSC31
P1	TSB33	J99252K	TSC37
P	TSB46	J99252K	TSC27
LA	TSB17	J99252K	TSB43
AL	TSB37	J99252K	TSC32

\* This connection is made to the J99252B sending and code relay unit terminal strip D or to the J99252J sending and receiving 1 or 2 codes relay unit terminal strip A, depending on which unit is installed in the existing packaged unit.

TABLE R

OPTION	CONNECTION BETWEEN
ZQ	TSC11 (decoder) and TSC22 (decoder) TSC41 (decoder) and TSA48 (keyer) TSC41 (decoder) and *TSD16 or TSA16 (sending relay circuit)
ZV	TSA18 (keyer) and P2-P (SF unit)
ZX	TSA13 (common control) and TSA28 (decoder)

\* This connection is made to the J99252B sending and code relay unit terminal strip D or to the J99252J sending and receiving 1 or 2 codes relay unit terminal strip A, depending on which unit is installed in the existing packaged unit.

TABLE S

THESE LEADS MUST BE CONNECTED (ZY OPTION)		THESE LEADS MUST NOT BE CONNECTED (ZZ OPTION)	
FROM	TO	FROM	TO
TSB11	TSB14	TSB14	TSB24
TSB34	TSB44	TSB44	TSB15
TSB25	TSB35		
TSB16	TSB26		
TSB36	TSB46		

TABLE T

THESE LEADS MUST BE CONNECTED (ZZ OPTION)		THESE LEADS MUST NOT BE CONNECTED (ZY OPTION)	
FROM	TO	FROM	TO
TSB14	TSB24	TSB11	TSB14
TSB44	TSB15	TSB34	TSB44
		TSB25	TSB35
		TSB16	TSB26
		TSB36	TSB46

equipped with a key to provide control of the privacy feature must be connected to TSB43 on the J99252N unit. The control leads are designated MA.

#### 7.14 Connecting the Master Override Control

**Lead:** Some or all station telephone sets may be equipped with a master override key to make possible interruption of privacy conversations for emergency or priority traffic. Connect an

override (OR) lead from each station telephone set equipped for master override to TSA12 on the J99252N unit.

#### 7.15 Code Lead of the First Station Telephone

**Set:** Code leads from the code relays no longer run directly to the station signaling equipment when the J99252N unit is installed. Instead, the code leads are routed to the common control unit and the J99252P station control unit (when installed). There the signals, when activated, operate the SC- (secondary code) relays for the called stations. The station code signal is forwarded to the station signaling equipment (part of the private line station equipment) as well. Connect the incoming code lead (see Part 4), destined for the station telephone set connected to the J99252N unit, to TSA22. Connect the outgoing code lead, going to the station signaling equipment, to TSA42.

### 8. ADDITION OF PRIVATE LINE STATION TELEPHONE SETS USING J99252P STATION CONTROL UNIT

**8.01** The J99252P station control unit provides terminations for a maximum of five private line station telephone sets and preferential lockout for the number 1 and 2 dial leads. The unit is used in conjunction with the J99252N common control unit to provide system lockout (privacy).

**8.02** Make the changes, additions, and deletions discussed in 8.03 through 8.10, as required, to add the station control unit to an existing packaged unit.

**8.03 Mounting:** Mount the J99252P unit in a vacant space in or near the SS-1 bay. It

should preferably be mounted adjacent to the J99252N unit. The station control unit occupies a 2-inch by 23-inch space. Each unit is equipped to provide terminations for one telephone set (J99252P, List 4). Additional terminations may be provided by the installation of a J99252P, List 5, circuit (LO-, BT-, and SC- relays) into the mounting plate. If more than six telephone sets are to be terminated (one terminates on the J99252N unit), additional J99252P units must be installed. They should be grouped together for convenience.

**8.04 Power:** Provide -48 volt power for relay operation by connecting TSA31 on the J99252P unit to TSA31 on the J99252N common control unit. This provides R battery to the station control unit. Connect TSA11 on the J99252P unit to an available ground.

**8.05 Incoming Talking Path Connections:** The incoming T, R, T1, and R1 leads may be run directly from the repeating coils of the station system to the station control unit, as indicated by the dashed line in Fig. 35. In this case, the T lead must be connected to TSA16; the R lead to TSA26; the T1 lead to TSA55; and the R1 lead to TSA45. It will probably be more convenient to connect the talking path leads to the J99252N common control unit. These interconnections are provided by the connections indicated in Table U.

TABLE U

LEAD	FROM J99252N	TO J99252P
T	TSA33	TSA16
R	TSA43	TSA26
T1	TSA23	TSA55
R1	TSA24	TSA45

**8.06 Removal of the YB Option:** The YB option *must be removed* from the J99252N common control unit when additional station telephone set terminations are to be provided by use of the J99252P unit. The YB option consists of two straps, one from TSA35 to TSA45 and a second from TSB18 to TSB38.

**8.07 Control Leads:** Control leads and a busy tone supply are connected to the first J99252P unit by making the interunit connections shown in Table V.

**8.08 Talking Path, Dial Lead, and Busy Lamp Connections to Telephone Sets:** Connect the station telephone set talking paths, dial leads, and busy lamp leads to the J99252P unit as shown in Table W. All the terminals are located on the J99252P unit and up to five telephone set appearances are provided at this one unit. The first telephone set appearance is on the J99252N unit.

**8.09 Incoming Code Leads:** As discussed in 7.14, the code leads from the code relays do not run directly to the station signaling equipment when the J99252N unit is installed to provide privacy. Instead, these code leads are brought first to the J99252N unit or the J99252P unit; then are forwarded to the station signaling equipment. Connect the incoming code leads (see Part 4) destined for the station telephone sets connected to the J99252P unit as shown in Table X.

**8.10 Outgoing Code Leads:** The J99252P unit may be equipped with the station control circuits shown in SD-98093-01, Fig. 26, (Manufacture Discontinued) or with the station control circuits shown in SD-98093-01, Fig. 40. If the unit has SD-98093-01, Fig. 26, station control circuits, either XA option or the XB option may be installed. Connect the outgoing code leads to the station signaling equipment for the various station telephone set appearances, as shown in Table Y, according to the station control circuit figure and option provided.

**8.11 Connecting the XD Option for Manual Lockout:** The XC optional wiring may be found in J99252P units in SD-98093-01, Fig. 26. This XC option is satisfactory for automatic lockout, but the XD option *must* be installed when manual lockout control is provided (T4, T5, and T6 relays in the J99252N unit—see 7.11). The XC and XD optional wiring is given in Table Z. J99252N and J99252P units which use SD-98093-01, Fig. 39, and SD-98093-01, Fig. 40, respectively, do not use these options.

TABLE V

LEAD NAME	FROM J99252P UNIT TERMINAL	TO	
		UNIT	TERMINAL
T4	TSA25	J99252N	TSA37
R4	TSA35	J99252N	TSA47
1	TSA36	J99252N	TSA16
2	TSA46	J99252N	TSA26
BL	TSA27	J99252N	TSB27
AL	TSA37	J99252N	TSB37
LU	TSA47	J99252N	TSB47
LC	TSA57	J99252N	TSB28
B1	TSA18	J99252N	TSB48
1A	TSA28	J99252N	TSB38
G1	TSA48	J99252N	TSA45
G2	TSA58	J99252N	TSA35
OP	TSA38	*J99252B (J99252J)	TSD12 (TSA12)

\* This connection is made to the J99252B sending and code relay unit terminal strip D or to the J99252J sending and receiving 1 or 2 codes relay unit terminal strip A, depending on which unit is installed in the existing packaged unit.

TABLE W

TELEPHONE SET APPEARANCE	CONNECT LEADS AS LISTED BELOW						
	1	2	R	T	R1	T1	BL
Second	TSB48	TSB58	TSB38	TSB28	TSB57	TSB18	TSB47
Third	TSB27	TSB37	TSB17	TSB56	TSB36	TSB46	TSB26
Fourth	TSB55	TSB16	TSB45	TSB35	TSB15	TSB25	TSB54
Fifth	TSB34	TSB44	TSB24	TSB14	TSB43	TSB53	TSB33
Sixth	TSB13	TSB23	TSB52	TSB42	TSB22	TSB32	TSB12

## 9. ADDITION OF INTERAREA SWITCHING USING J99252G INTERAREA SWITCHING UNIT

TABLE X

TELEPHONE SET APPEARANCE	CONNECT CODE LEAD	TO J99252P TERMINAL
Second	C1	TSA17
Third	C2	TSA15
Fourth	C3	TSA44
Fifth	C4	TSA24
Sixth	C5	TSA53

**9.01** The J99252G interarea switching unit provides a switching circuit for interconnecting two adjacent SS-1 systems in order to extend their coverage. Connect codes and disconnect codes must be assigned in each SS-1 system to allow either system to initiate or terminate the switched mode of operation. Two basic conditions may exist in the customer location where the J99252G unit is to be installed. Either both SS-1 systems make an appearance at the customer location or only the home area system makes an appearance. In the first instance, a decoder for each of the two

TABLE Y

TELEPHONE SET APPEARANCE	CONNECT CODE LEAD	TO J99252P TERMINAL		
		WHEN SD-98093-01, FIG. 40 IS SUPPLIED	WHEN SD-98093-01, FIG. 26 MD AND XA OPTION ARE SUPPLIED	WHEN SD-98093-01, FIG. 26 MD AND XB OPTION ARE SUPPLIED
Second	C1	TSA17	TSA56	TSA17
Third	C2	TSA15	TSA54	TSA15
Fourth	C3	TSA44	TSA34	TSA44
Fifth	C4	TSA24	TSA14	TSA24
Sixth	C5	TSA53	TSA43	TSA53

TABLE Z

XC OPTION CONNECTIONS	XD OPTION CONNECTIONS
From 6 contact on SC- relay to B12 contact on GA relay (J99252P unit)	From M4 contact on LO- relay to B12 contact on GA relay (J99252P unit)
	From M10 contact on T3 relay to 12 contact on PS relay (J99252N unit)
	From M12 contact on PS relay to 8 contact on PS relay (J99252N unit)

systems is already installed at the customer location, as well as 4-wire lines from each of the two systems. In the second arrangement, a 4-wire line must be extended to the 4-wire bridge in the terminating CO of the adjacent SS-1 system in order to establish the interconnection. The adjacent system must also be able to control the J99252G unit. Therefore, an SF unit and a decoder must be installed to monitor the SF signals present in the adjacent SS-1 system. Since this is the more complex arrangement, it is chosen for illustration. SEE Fig. 36.

**9.02 Mounting:** The J99252G interarea switching unit occupies a 2-inch by 19-inch space. The J99252K decoder and test jack unit (used for monitoring the adjacent area) occupies a 4-inch by 19-inch space. A J99252M fuse indicator panel may be supplied for power distribution, unless fusing is available through office fuse boards. The J99252M unit is a 2-inch by 19-inch plate. The SF unit

mounting plate (which should be mounted vertically in the bay to form a left-hand mounting flange for the other units) is approximately 5 inches by 14 inches. The SF unit, decoder, and fuse indicator unit configuration forms a J99252BL packaged unit with the J99252BL, List 4 (fuse indicator unit) included. Ordering that particular packaged unit will be the most convenient arrangement, if a 14-inch by 23-inch space is available. The unit interconnections will all be factory wired when the packaged unit is used, except for those leads which must be run to the J99252G interarea switching unit. Whether the J99252BL packaged unit is used or not, a typical arrangement, including the interarea switching unit itself, might be as shown in Fig. 37.

**9.03 Power:** Power lead connections are part of Fig. 38 which shows all the leads that are run to interconnect the interarea switching equipment to the existing equipment. Power leads to the decoder and SF unit will already be connected, if

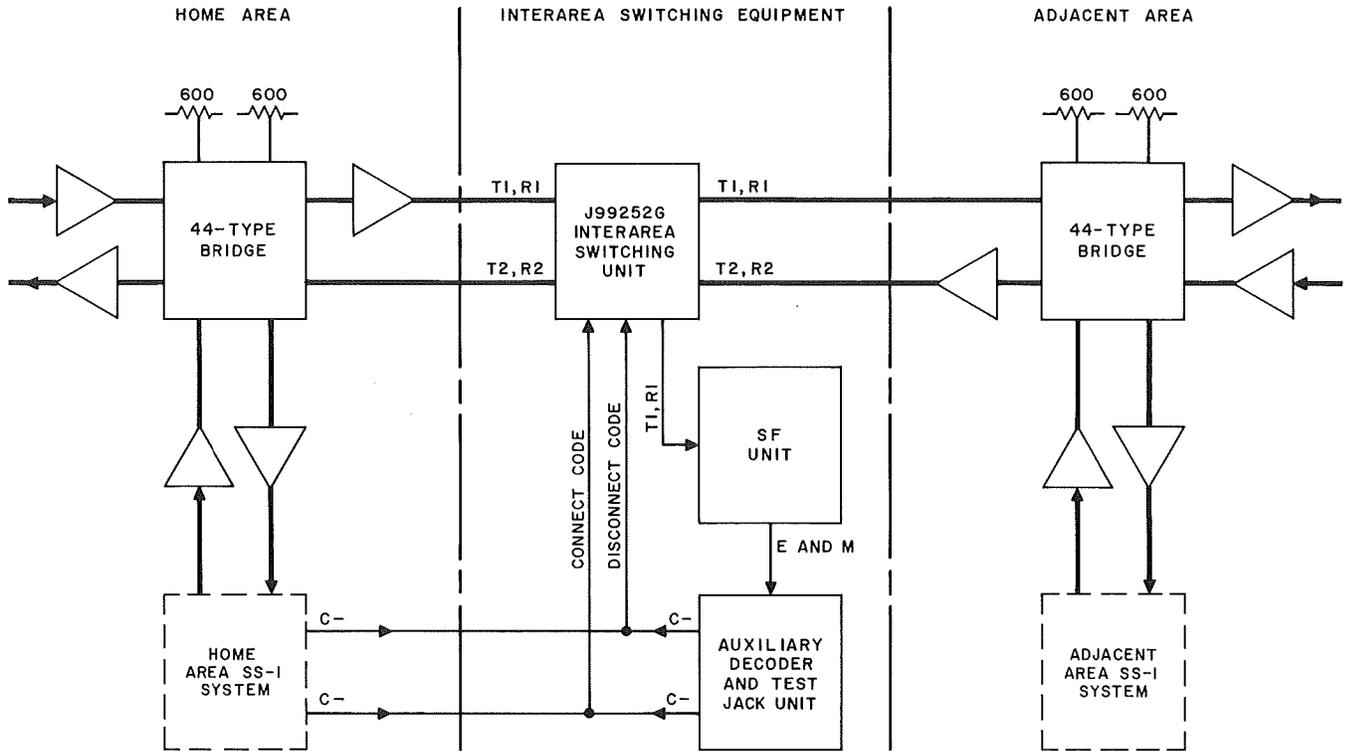


Fig. 36—Typical Interarea Switching System

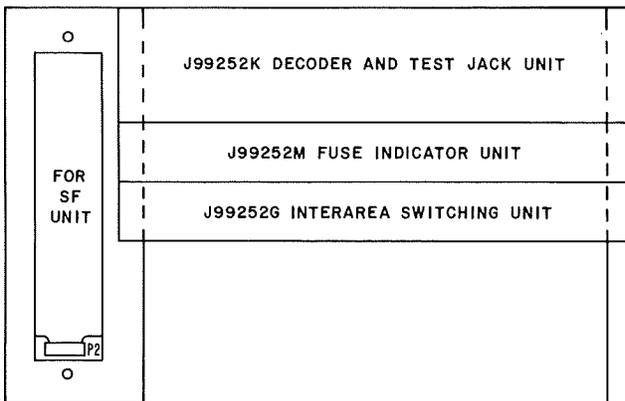


Fig. 37—Typical Interarea Switching Group

the J99252BL unit is ordered. However, the interarea switching unit must be connected to -48 and +130 volt power even if the packaged unit is used.

**9.04 SF Unit Signal Connections:** The T1 and R1 leads from the interarea switching unit feed 4 wire signals from the adjacent SS-1 system

to the SF unit. Tone signals are converted in the SF unit to E and M dc signals, which are fed to the auxiliary decoder and test jack unit. The connections are shown in Fig. 38. None of these leads need be run by the installer, if the J99252BL unit is used.

**9.05 Bridge Connections:** The 4-wire lines from both the home area and the adjacent area 4-wire, 4-way birdges terminate at the J99252G unit. These connections are to be made by the installer, as shown in Fig. 38. An overall view of the 4-wire line connections is given in Fig. 36.

**9.06 Code Lead Connections:** A connect code lead and a disconnect code lead are run to the J99252G unit from each decoder or sending and code relay unit, as shown in Fig. 38. Code lead connections to the code relays are discussed in Part 4.

**10. ADDITION OF INTERAREA SWITCHING USING J99252BU 3-DIGIT INTERAREA SWITCHING UNIT**

**10.01** The J99252BU 3-digit interarea switching unit provides a switching circuit for

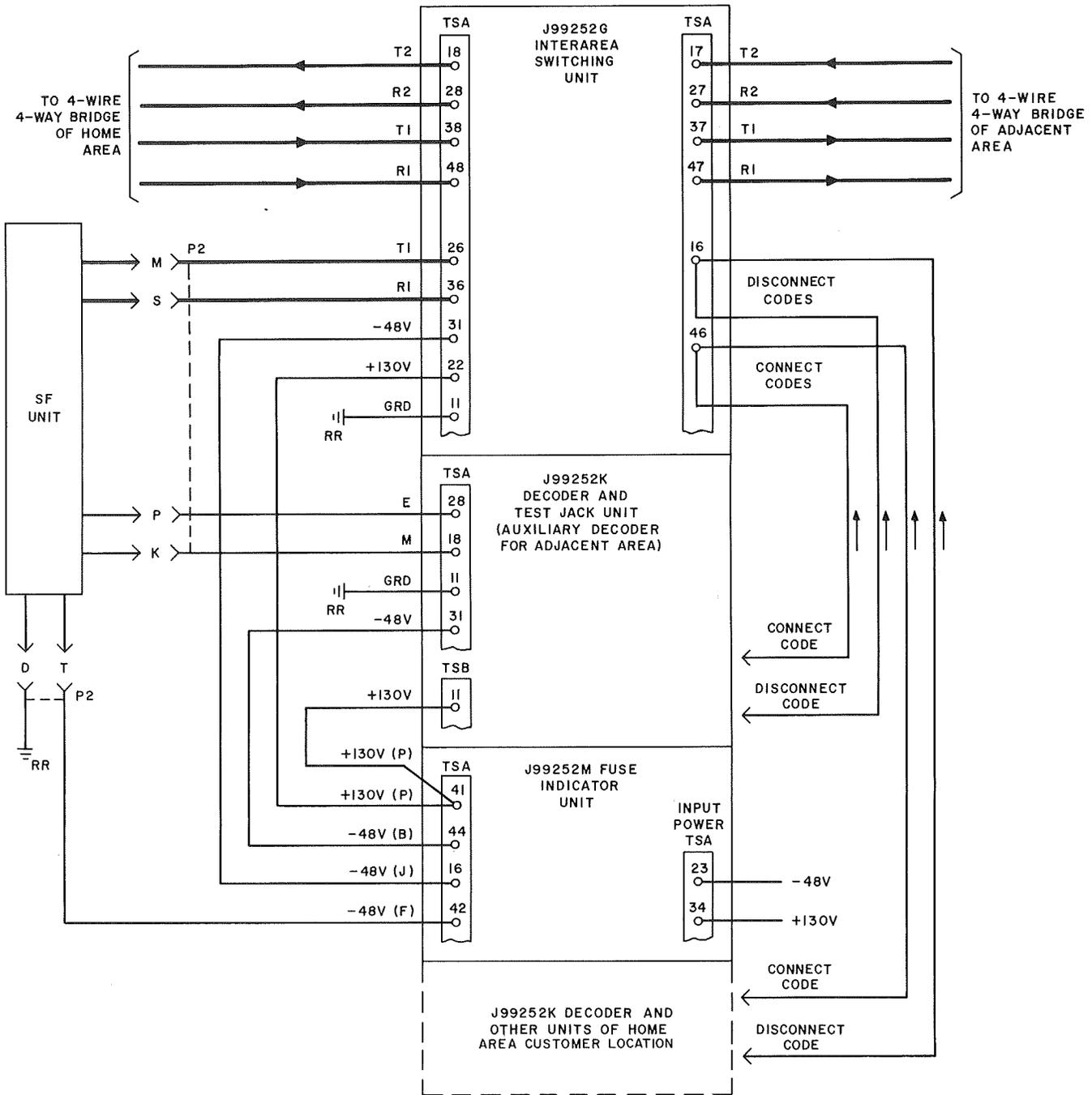


Fig. 38—Connections for Interarea Switching

interconnecting two adjacent SS-1 systems in which the station codes may be duplicated in each system. Common control is *not* a prerequisite to 3-digit interarea dialing although either or both SS-1 systems may use common control. If only one of the SS-1 systems uses common control, the customer

location at the junction of the two systems should be designated as the customer location area B.

**10.02** Connect codes and disconnect codes must be assigned in each SS-1 system to allow either system to initiate or terminate the switched

mode of operation. However, if the station which initiates the interarea call is in a system equipped with common control, the systems will be disconnected automatically when the calling station goes on-hook.

**10.03** The 3-digit interarea switching unit must be installed in a location where both systems make an appearance. A number of interconnections are required between the J99252BU unit and the two existing customer locations. Wide separation would make such interconnections difficult. The basic 3-digit interarea switching system at the junction of the two SS-1 systems is shown in Fig. 39.

**10.04** Early configurations of some units are not capable of functioning in the 3-digit interarea dialing system. The J99252K decoder and test jack unit must be List 3 or higher (YR wiring and apparatus) and the J99252L keyer unit must be List 4 or higher (YN wiring). Make the changes and additions discussed in 10.05 through 10.11, as required, to add the 3-digit interarea switching unit to existing customer location packaged units.

**10.05 Mounting:** The J99252BU 3-digit interarea switching unit occupies a 2-inch by 23-inch space. Space for a J99252BV 2400- to 2600-Hz oscillator unit must also be provided, if either or

both of the existing locations is a receive-only arrangement without a J99252L keyer unit. The J99252V unit occupies a 2-inch by 19-inch space. If neither existing location has a keyer unit, one J99252BV will be adequate for the requirements of both locations.

**10.06 Power:** Power lead connections are part of Fig. 40, which shows all the leads that are run to interconnect the 3-digit interarea switching equipment to the existing SS-1 equipment. The -48 volt power for the J99252BU unit (and for the J99252BV unit when it is required) may be obtained from the J99252M fuse indicator unit located in either customer location packaged unit. If neither location uses the J99252M unit, power should be obtained through an office fuse board.

**10.07 Bridge Connections:** Four-wire lines from bridges in both SS-1 systems terminate at the J99252BU unit. These connections are to be made by the installer, as shown in Fig. 40. Note the use of two separate terminal strips on the J99252BU unit with similarly numbered terminals. Area A and area B customer locations and bridges connect to terminal strips A and B, respectively.

**10.08 Control Lead Connections:** Connect the leads which provide control from each

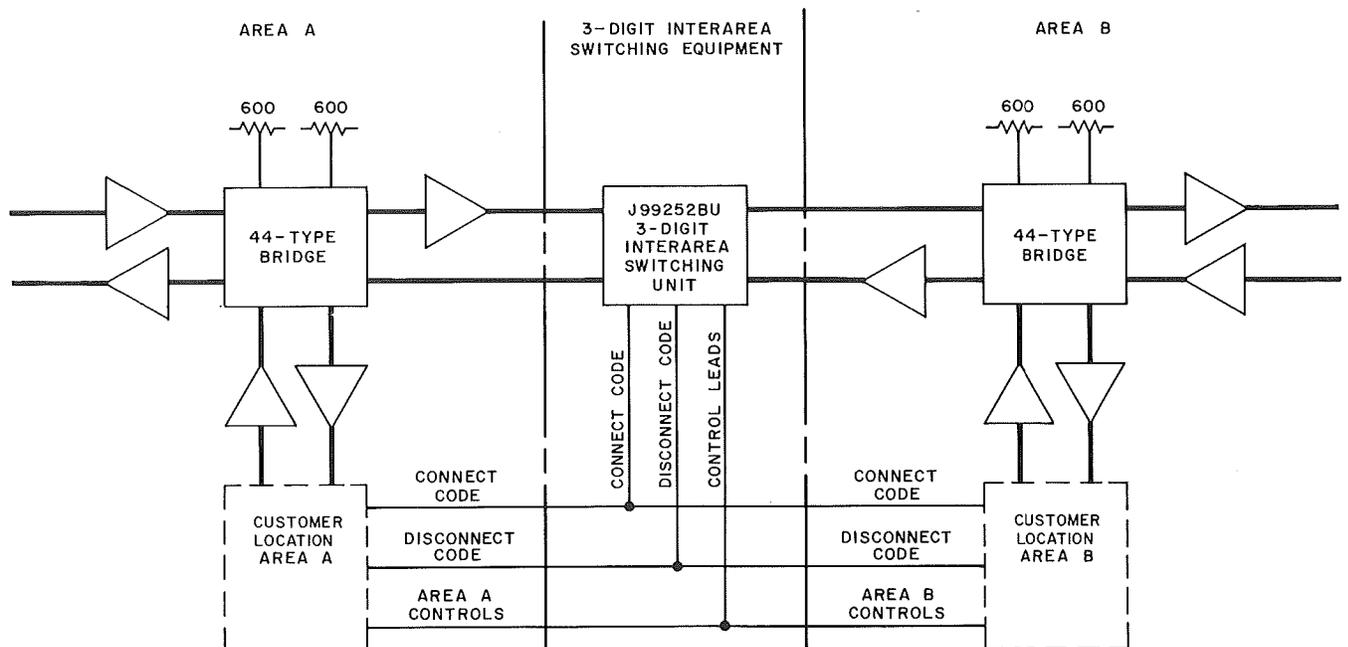


Fig. 39—Typical 3-Digit Interarea Switching System

location to the J99252BU unit. These connections will also include leads from the keyer, if they are included as part of the existing location, but will not include the connect and disconnect code leads. All of these connections are shown in Fig. 40.

**10.09 Code Lead Connections:** A connect code lead and a disconnect code lead are run from *each* decoder or sending and code relay unit, as shown in Fig. 40. Code lead connections to the code relays are discussed in Part 4.

**10.10 Auxiliary Oscillator Connections:** Oscillators of J99252L keyer units are connected to the J99252BU unit when keyer units are provided in the existing locations. Receive-only locations do not contain keyer units. An auxiliary oscillator must be provided separately. This unit is designated as the J99252BV 2400- to 2600-Hz oscillator unit. It is used if either or both the customer locations are receive-only types. However, only one auxiliary oscillator will be required even if both locations are receive-only types. Connect the auxiliary oscillator to one or both terminal strips, as required, by making the connections shown in Fig. 40.

**10.11 The YT Option:** If only one customer location is equipped with common control, it is to be connected as area B for 3-digit interarea dialing. The YT option must be connected when using this equipment configuration. The YT option consists of one lead from ground (2 contacts on the RLS relay) to the 12M contact of the BTA relay.

## 11. ADDITION OF CENTRAL OFFICE OR PBX ACCESS USING J99252BW DIAL ACCESS TO CO OR PBX UNIT

**11.01** An SS-1 system may be connected to a central office or PBX system by use of the J99252BW unit. This unit (using SD-98093-01, Fig. 36, only) provides dialed connections from SS-1 station sets to station sets of a central office or dial PBX. The unit (using SD-98093-01, Fig. 37, only) provides dialed or operator assisted connections to and from PBX to SS-1 station sets. When using, SD-98093-01, Fig. 37, for dialing from an SS-1 system, a customer location lockout circuit (SD-98093-01, Fig. 35) must be connected to the J99252N common control unit of *each* customer location (not just the location through which access is obtained). The common control (privacy) feature is a prerequisite to CO or PBX access. Because the J99252BW

unit with both SD-98093-01, Fig. 36, and SD-98093-01, Fig. 37, requires the most installation effort, it will be described in detail. The connections to be made to install the unit are shown in Fig. 41. Note the division of the unit into two figures. If only one figure is to be installed, the connections that are made to the other figure may be ignored except for the YY and YZ options, as appropriate.

**11.02** Make the changes, additions, and deletions discussed in 11.03 through 11.11, as required, to add the dial access to CO or PBX unit to an existing packaged unit.

**11.03 Mounting:** Mount the J99252BW unit, along with a 24V4 repeater panel, in a vacant space in or near the SS-1 bay. The 24V4 repeater is required to connect the 4-wire SS-1 system to the 2-wire CO or PBX system. See SD-98093-01, note 304(a) for a listing of equipment to be ordered with the 24V4 repeater panel. Both panels occupy a 2-inch by 23-inch space.

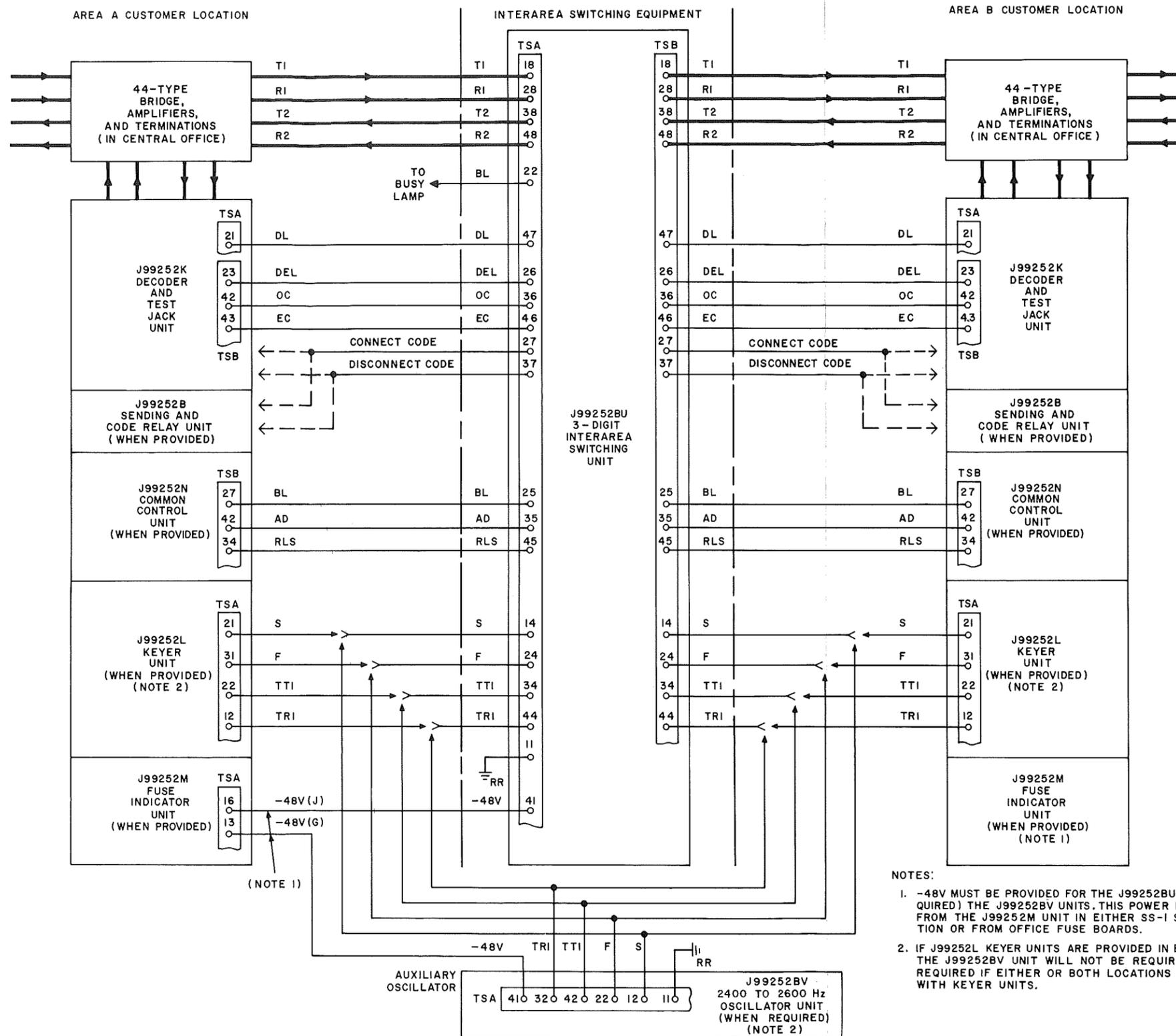
**11.04 Power:** Provide 48 volt power for relay operation by connecting TSA41 on the J99252BW unit to TSA21 (S battery) on the J99252M fuse indicator unit (if installed in the packaged unit) or to a fuse of the office fuse board. The fuse rating should be 1-1/3 amperes. The 24V4 repeater must be separately powered.

**11.05 Control Lead and Talking Path Connections:** Make the control lead and talking path connections as shown in Fig. 41, as appropriate, for the figures with which the J99252BW unit is equipped. Temporarily ignore the optional wiring which is shown and the access code lead connections.

**11.06 YY and YZ Optional Connections:** If SD-98093-01, Fig. 37, is not provided, YY wiring must be installed. If SD-98093-01, Fig. 36, is not provided, YZ wiring must be installed. If both figures are provided, neither option need be wired in, since the interconnections will be provided by shop wiring. The options are detailed in (a) and (b) below.

(a) The YY optional wiring, shown in Table AA, is to be installed when SD-98093-02, Fig. 37, is not provided. These connections are on J99252BW unit, except as noted.

(b) The YZ optional wiring, shown in Table AB, is to be installed when SD-98093-01, Fig. 36,



- NOTES:
1. -48V MUST BE PROVIDED FOR THE J99252BU AND (WHEN REQUIRED) THE J99252BV UNITS. THIS POWER MAY BE OBTAINED FROM THE J99252M UNIT IN EITHER SS-1 SYSTEM LOCATION OR FROM OFFICE FUSE BOARDS.
  2. IF J99252L KEYER UNITS ARE PROVIDED IN EACH SS-1 SYSTEM, THE J99252BV UNIT WILL NOT BE REQUIRED. IT WILL BE REQUIRED IF EITHER OR BOTH LOCATIONS ARE NOT EQUIPPED WITH KEYER UNITS.

Fig. 40—Connections for 3-Digit Interarea Switching



TABLE AA

OPTION	CONNECTION BETWEEN
YY	TSB13 and TSB14 TSB23 and TSB24 TSB57 (J99252N unit) and TSB58 (J99252N unit)

is not provided. All of these connections are shown on the J99252BW unit.

TABLE AB

OPTION	CONNECTION BETWEEN
YZ	TSB37 and TSB53 11B contact of S relay and TSB2-21 11B contact of T relay and TSB2-11 9 contact of T relay and TSA16

**11.07 Adding Station Lockout Circuits:** A station lockout circuit (SD-98093-01, Fig. 35) must be connected in every common control unit of an SS-1 system using the dial access to CO or PBX feature. The station lockout circuit prevents SS-1 stations from being signaled by dial codes intended for central office or PBX stations. The circuit is not included in common control units which use SD-98093-01, Fig. 25, until the units are modified as detailed in Part 13C. After the common control unit is modified, or if the unit is already equipped with SD-98093-01, Fig. 35, the connections to the station lockout circuit shown in Fig. 41 will provide proper lockout control.

**11.08 Code Lead Connections at Customer Locations Having Dial Access Equipment:**

Code leads which cause the lockout circuit to function are shown in Fig. 41. The off-premises access code lead should be connected to the code leads, if any, which are assigned as access code leads for equipment *not* located at this location. In addition, either the on-premises CO access code lead or on-premises PBX access code lead should be connected to provide the lockout function when locally installed dial access equipment is operated. These latter code leads will be associated with

telephone set appearances on the J99252P unit which are assigned to provide access connections.

**Note:** If the J99252P station control unit is provided with SD-98093-01, Fig. 26, the access code leads are XB option. Remove the XA option when the XB option is required.

**11.09 Code Lead Connections at Customer Locations Not Having Dial Access Equipment:**

Only the off-premises code lead should be connected at locations which do not themselves provide access to a CO or PBX.

**11.10 YU Option for Use With Type 606A, 606B, 607A, 608A, or 608D PBX:**

The YU optional equipment and wiring must be installed on the J99252BW unit when used with these PBX switchboards. The YU option consists of resistors R2, R6 and the connections shown in Table AC.

TABLE AC

OPTION	CONNECTION BETWEEN
YU	1M contact of S1 relay to R6 12 contact of S relay to TSB2-22 Ground (black) lead to R6 Ground (black) lead to R2

**11.11 YV Option for Use with Type 552A, 552D, 556A, 605A, or 607B PBX:**

The YV optional equipment and wiring must be installed on the J99252BW unit when used with these PBX switchboards. The YV option consists of resistors R2, R3, diode D1, and the connections shown in Table AD. Install the 446F diode D1 on TSB1 between terminals 11 and 21 with the anode (arrow) connected to terminal 21.

**12. ADDITION OF DECODER MONITOR TO AN EXISTING PACKAGED UNIT USING J99252BR MONITOR AND LAMP DISPLAY TEST UNIT**

**12.01** The J99252BR monitor and lamp display test unit displays station codes received by the decoder. It may, therefore, be used as a test device to check the response of the decoder and the SF unit to incoming station codes and to check the response of the decoder and sending relays to outgoing station codes, when on-premises dialing is supplied. The unit provides momentary or locked-in displays, as selected by a DISPLAY switch.

TABLE AD

OPTION	CONNECTION BETWEEN
YV	TSB2-22 and R3 (top) TSB1-11 and R3 (center) TSB1-21 and 1M contact of S1 relay 2L winding terminal of DT relay to R3 (top) Ground (black) lead to R3 (bottom) TSA-41 (-48) lead to R2

**12.02** Make the additions of 12.03 through 12.05 to add the monitor and lamp display test unit to an existing packaged unit.

**12.03 Mounting:** Mount the J99252BR unit in a vacant space in or near the SS-1 bay. The unit occupies a 4-inch by 19-inch space.

**12.04 Power:** Provide -48 volt power for relay and lamp operation by connecting TSA31 on the J99252BR unit to TSA21 (S battery) on the J99252M fuse indicator unit (if installed in the SS-1 packaged unit) or to a fuse of the office fuse board. The fuse rating should be 1-1/3 amperes. Connect TSA11 on the J99252BR unit to an available ground.

**12.05 Control Connections:** Provide control leads between the J99252BR unit and the J99252K decoder and test jack unit by making the interunit connections shown in Table AE.

### 13. MISCELLANEOUS FEATURES AND ADDITIONS TO EXISTING PACKAGED UNITS

#### A. SF UNIT OPTION (CIRCUIT NOTE 120)

**13.01** Plug P2 of the SF unit has a strap from P2-J to P2-N (YM option) in units manufactured prior to issue 12D of SD-98093-01. This strap is necessary for unmodified E1B or E2B units but should not be used with E1B or E2B SF units which have been modified to the E3B configuration or with any E3B or later model unit. If signaling difficulties are encountered, check to ensure that the strap is present or removed, as appropriate for the model 1 of SF unit installed.

#### B. MODIFICATION FOR LOCAL OVERRIDE

**13.02** Local override is a feature introduced by Issue 12D of SD-98093-01. Local override

TABLE AE

LEAD NAME	FROM J99252K UNIT TERMINAL	TO J99252BR UNIT TERMINAL
B2	TSB24	TSA23
B3	TSB34	TSA33
B4	TSB44	TSA43
B5	TSB15	TSA53
B6	TSB25	TSA14
B7	TSB35	TSA24
B8	TSB45	TSA34
B9	TSB16	TSA44
B10	TSB26	TSA54
ON	TSB36	TSA51
M2	TSB46	TSA25
M3	TSB17	TSA35
M4	TSB27	TSA45
M5	TSB37	TSA55
M6	TSB47	TSA16
M7	TSB18	TSA26
M8	TSB28	TSA36
M9	TSB38	TSA46
M10	TSB48	TSA56

differs from the original master override provision in that it does not abruptly terminate the existing privacy connection but instead allows an intrusion into the existing connection to request the use of the circuit.

**13.03** Local override requires the addition of SD-98093-01, Fig. 33, to the J99252N common control unit. It can be ordered as J99252N, List 3. Prior lists used SD-98093-01, Fig. 25, (Manufacture Discontinued) as the common control circuit. With this figure, the common control circuit occupies all of the 2-inch by 23-inch panel. It is possible, however, to replace the original T2 relay, (AG4 relay) with one-half of an AK4 relay. The other

half of the AK4 relay can then be used to add the local override circuit to the common control unit. SD-98093-01, Fig. 25, with YN option is already equipped with an AK4 relay as are all later common control units which use SD-98093-01, Fig. 39, to provide privacy. To convert an SD-98093-01, Fig. 25, unit without YN option to one which provides local override, perform the following operations:

- (1) Remove all leads from contacts and winding terminals of the existing AG4 relay used as T2. The leads are shown in Fig. 42. Leave the leads as long as possible for later reconnection.
- (2) Remove the AG4 relay.
- (3) Install an AK4 relay in the vacated position of the common control unit.
- (4) Reconnect the leads disconnected in (1) to one-half of the AK4 relay. The connections are shown in Fig. 43.
- (5) Connect the other half of the AK4 relay, as shown in SD-98093-01, Fig. 33, to add the local override feature to the common control unit.

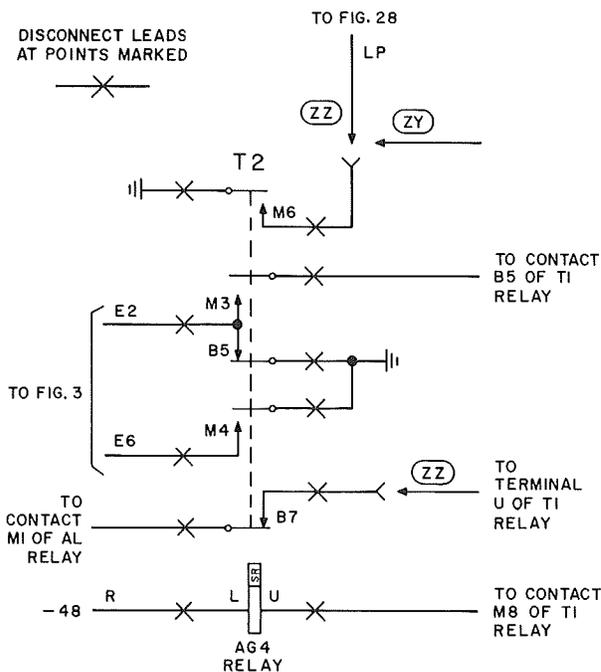


Fig. 42—T2 Connections Using AG4 Relay

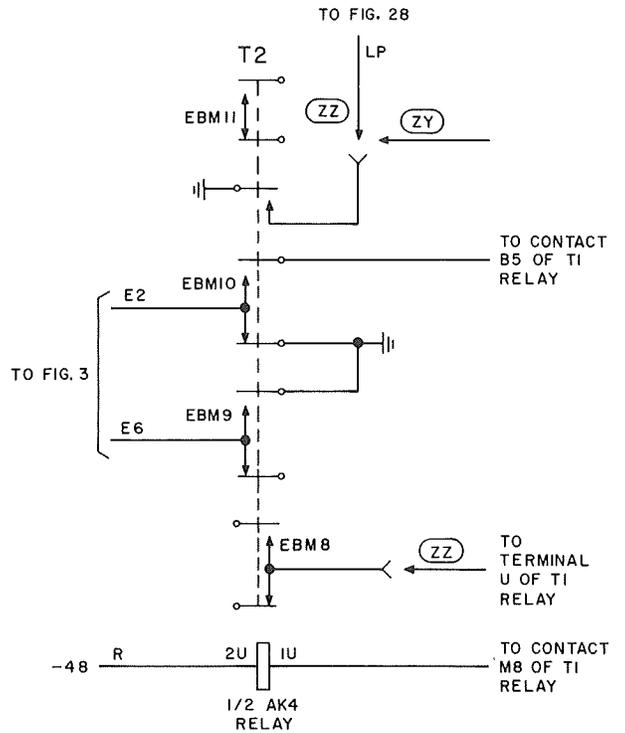


Fig. 43—T2 Connections Using AK4 Relay

C. MODIFICATION FOR STATION LOCKOUT

**13.04** When central office or PBX access is added to existing customer locations equipped with J99252N common control units, station lockout circuits (SD-98093-01, Fig. 35) must be added to the units at all locations in the system. Early model common control units use SD-98093-01, Fig. 25, as the basic unit. With this figure, as pointed out in 13B, the common control circuit occupies all of the panel. In order to install the station lockout circuit in the unit, it is necessary to replace the original RA2 (an AG4 relay) with one-half of an AK37 relay. The other half of the AK37 relay can then be used to add the station lockout circuit. Common control units which use SD-98093-01, Fig. 39, to provide privacy are already equipped with an AK37 relay in the RA2 position and an AK4 relay in the T2 position. To convert an SD-98093-01, Fig. 25, unit to one which provides station lockout, perform the following operations:

- (1) Remove all leads from contacts and winding terminals of the existing AG4 relay used as RA2. The leads are shown in Fig. 44. Leave the leads as long as possible for later reconnection.

- (2) Remove the AG4 relay.
- (3) Install an AK37 relay in the vacated position of the common control unit.
- (4) Reconnect the leads disconnected in (1) to one-half of the AK37 relay. The connections are shown in Fig. 45.
- (5) Reconnect the other half of the AK37 relay, as shown in SD-98093-01, Fig. 35, to add the station lockout circuit to the common control unit.

14. DRAWING CROSS REFERENCE

14.01 J drawings and T drawings of individual SS-1 units and of packaged units are available for use when installing the equipment. It is recommended that these drawings be provided to the installer as an aid to installation. The information found on the T drawings is often more easily followed than the schematic CAD presentations, since CAD's must depict many different equipment configurations. The J drawings are most useful in defining the material and quantities furnished for different equipment lists. Wiring options and notes of significance appear on both drawings.

14.02 Table AF provides a cross reference of drawings and unit identification for the most commonly used units. The table is not intended to be a complete listing of units and drawings. It excludes central office packaged units and also a number of customer location packaged units, which rely on loop or DX signaling arrangements. Neither loop nor DX signaling is extensively employed for customer location signaling at present time.

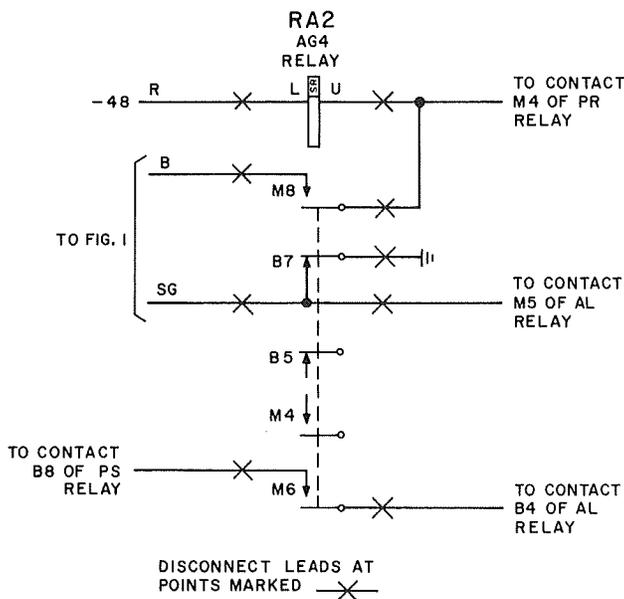


Fig. 44—RA2 Connections Using AG4 Relay

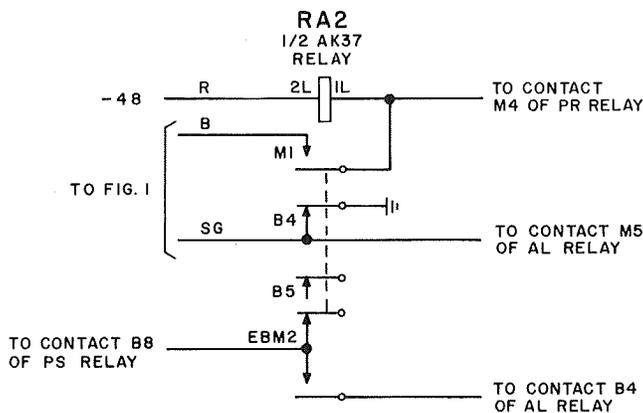


Fig. 45—RA2 Connections Using AK37 Relay

TABLE AF

J DRAWING	UNIT	T DRAWING
J99252B-1	Sending and Code Relay Unit	T-98093-31
J99252G-1	Interarea Switching Unit	T-98093-36
J99252J-1	Sending and Receiving 1 or 2 Codes Relay Unit	T-98093-38
J99252K-1	Decoder and Test Jack Unit	T-98093-57
J99252K-2	Decoder and Test Jack Unit	T-98093-704
J99252L-1	Keyer Unit	T-98093-58
J99252L-2	Keyer Unit	T-98093-705
J99252M-1	Fuse Indicator Unit	T-98093-61
J99252M-2	Fuse Indicator Unit	T-98093-61
J99252N-1	Common Control Unit	T-98093-77
J99252N-2	Common Control Unit	T-98093-701
J99252N-3	Common Control Unit	T-98093-713
J99252P-1	Station Control Unit	T-98093-78
J99252P-2	Station Control Unit	T-98093-714
J99252R-1	Station Control Without System Lockout Unit	T-98093-79
J99252BG-1	Send and Receive 1 to 81 Codes Unit	T-98093-75
J99252BH-1	Send and Receive 1 to 9 Codes Unit	T-98093-59
J99252BH-2	Send and Receive 1 to 9 Codes Unit	T-98093-708
J99252BJ-1	Send and Receive 1 to 81 Codes Unit	T-98093-60
J99252BJ-2	Send and Receive 1 to 81 Codes Unit	T-98093-709
J99252BK-1	Send Unit	T-98093-62
J99252BL-1	Receive Only 1 to 9 Codes Unit	T-98093-66
J99252BM-1	Receive Only 1 to 81 Codes Unit	T-98093-65
J99252BN-1	Send Unit for SS1 Keyer per No. 300 Switching System Sender Application	T-98093-80
J99252BP-1	Send and Receive 1 to 81 Codes Unit for SS1 Keyer per No. 300 Switching System Sender Application	T-98093-81
J99252BR-1	Monitor and Lamp Display Test Unit	T-98093-700
J99252BS-1	Send and Receive 1 to 9 Codes Unit Arranged with Automatic or Manual Lockout for Privacy	T-98093-702
J99252BS-2	Send and Receive 1 to 9 Codes Unit Arranged with Automatic or Manual Lockout for Privacy	T-98093-710
J99252BT-1	Send and Receive 1 to 81 Codes Unit Arranged with Automatic or Manual Lockout for Privacy	T-98093-703
J99252BT-2	Send and Receive 1 to 81 Codes Unit Arranged with Automatic or Manual Lockout for Privacy	T-98093-711
J99252BU-1	3-Digit Interarea Switching Unit	T-98093-706
J99252BV-1	2400- to 2600-Hz Oscillator Unit	T-98093-707
J99252BW-1	Dial Access to CO or PBX Unit	T-98093-712