

SS-1 SELECTIVE SIGNALING SYSTEM

GENERAL DESCRIPTIVE INFORMATION

PRIVATE LINE TELEPHONE SERVICE

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1. GENERAL

1.01 This section describes the equipment and operating principles of the SS-1 Selective Signaling System, which signals stations associated with 4-wire private line telephone facilities. Such private line telephone services are used by airlines, utilities, trucking concerns, and other companies whose operations require frequent communication between separate facilities. The SS-1 equipment is also used for telephone company order-wire service.

1.02 This section is reissued to describe changes in privacy equipped 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 capable of selectively signaling 81 individual 2-digit station codes. Dial pulses are used to generate the 2-digit codes. The digit 1 is not used for station codes since it is used to cancel an erroneously dialed first digit and precludes waiting for the 6-second time-out period to redial.

1.04 The output signals of the dial are converted to frequency-shifted tone pulses for transmission over the 4-wire private line facility. The tone pulses are received by all SF receivers, but only the station cross-connected to receive that code will respond.

1.05 Two types of interarea switching are available. These arrangements are for interconnecting two 4-wire private line systems equipped with SS-1 selective signaling.

1.06 SS-1 privacy arrangements are available which prevent the intrusion of another station into a conversation established between two stations.

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Additional stations may be dialed into a privacy call by one of the stations already engaged in the call. Certain stations equipped with an override key can temporarily void a privacy call to request permission to pass priority or emergency traffic.

1.07 Access circuits can be provided to establish interconnection and signaling between SS-1 stations and central office or PBX stations. These circuits provide a means for SS-1 stations to dial central office or PBX stations, for PBX stations to dial SS-1 stations, and for an operator's completion of a call to, through, or from a manual PBX position.

2. GENERAL DESCRIPTION

2.01 The SS-1 system operates over a 4-wire multistation private line to signal remotely located station sets. Several station sets are often located at one SS-1 location, as shown in Fig. 1. Signaling over the 4-wire facility is accomplished by means of tones. Signaling between the central office and SS-1 locations can be by either tone or dc signals, depending upon the location of the SS-1 signaling equipment. Three possible arrangements are shown in Fig. 1.

2.02 All signaling equipment associated with SS-1 customer location A is installed at the customer location. Therefore, tone signals are transmitted to and received from the central office. Outgoing signals are converted from dc pulses to tone via the keyer. Incoming tone signals are converted from tone to dc pulses by the SF unit. The dc pulses are recorded by the decoder and sent to the station signaling equipment to signal the called station.

2.03 SS-1 signaling equipment of customer location B is divided between the central office and the customer location, the keyer and SF unit being located at the central office and the decoder at the customer location. DX (duplex) signaling is required between the units to transmit and receive the dc signals. The decoder is located at the customer location since it will probably be required to signal more than two station sets.

2.04 Station C shows another possible equipment grouping. All the signaling equipment, with the exception of the sending and receiving relays, is located in the central office. Loop signaling is employed to and from the customer location. This

arrangement limits the number of station sets to two.

2.05 Codes are transmitted over the 4-wire facility by means of frequency-shifted tone pulses. The SS-1 utilizes 2600-Hz tone bursts to represent the pulses. Following the end of each digit when pulsing ceases, 2400 Hz is transmitted over the line to ensure release of the SF receivers. Tone is present on the circuit only during the signaling interval.

2.06 The system is ready for dialing as soon as the handset is removed from the switch hook or an equivalent action is performed by use of a key. Dialing is blocked, however, if another handset of the same customer location is off-hook at the same time. Before dialing, the station operator must monitor the line to prevent interference with other users. Speech will be present if a nonprivate conversation is in progress. Tone will be present if a privacy conversation is in progress or another station is dialing. If the line is free for use, the code of the desired station of the SS-1 system may be dialed.

2.07 The dc pulses operate a keyer which converts the pulses to tone and transmits the frequency shifted tones to all SF receivers. The SF receivers convert the tones back into dc pulses. These pulses are received by all decoder units on the system. The decoder in turn counts, registers, and sends a momentary signal to the 2-digit corresponding code lead to operate station signaling circuits to signal the called station set.

2.08 If the sending or receiving stations are located in a central office, as they would be for order-wire use, loop or DX signaling links may not be required. In other applications, where all the signaling equipment is located at the customer location, loop or DX signaling links may again not be required since the tone pulses can be extended to the SS-1 station SF equipment.

2.09 The first dial moved off normal in the SS-1 system will lock out all other station sets and prevent interference during dialing. This condition exists until two digits have been dialed or until 6 seconds (the time allowed for dialing the second digit) have elapsed.

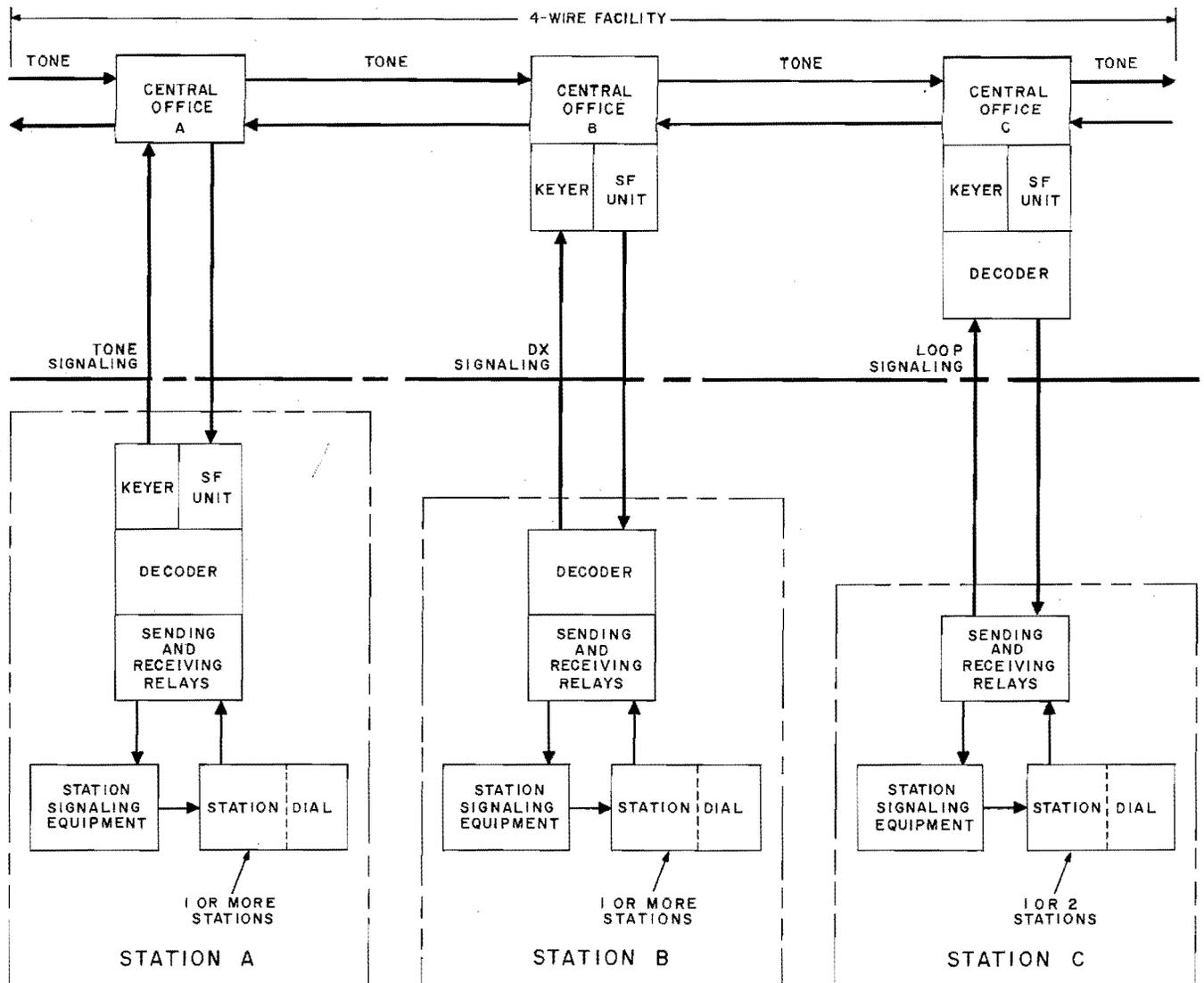


Fig. 1—Typical SS-1 System Arrangements

2.10 If the first digit is dialed in error, the digit may be canceled by dialing the digit 1. This cancels the digit in all the decoders of the system. The user may then immediately dial the correct digit or the system may be allowed to time out. At the end of the 6-second time-out period, the first digit dialed in error is automatically canceled and the system is ready to accept another code.

2.11 Dialing into another SS-1 system is provided by the use of one of two types of interarea switching circuits. The first type permits interarea calls to be initiated by dialing a 2-digit connect code to tie the originating system to a second SS-1

system. Once the two systems are connected, the desired station of the adjacent system can be dialed. However, station codes in the two systems cannot be duplicated, or both stations with the same code in the originating and the adjacent system will be simultaneously signaled. A more complex circuit, called a 3-digit interarea switching circuit, signals only the station in the second system by use of a 3-digit code, even though duplicate codes are assigned in the two systems. The 3-digit code consists of the normal 2-digit code of the desired station with the digit 1 inserted between the first and last digits. For example, if the code of a station in the adjacent system is 27 when dialed from its

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own system, its code becomes 217 when dialed through the 3-digit interarea switching circuit. The inserted digit 1 is used to prevent the signaling of the similarly coded station in the SS-1 system of the call originator.

2.12 Dialing a central office subscriber line number or a PBX station number is accomplished in a similar manner. A 2-digit code is dialed to gain access to the central office or PBX; further digits are dialed to complete the call. Calls may be completed through a manual PBX with the assistance of the PBX operator. Incoming calls can be placed from a PBX (but not a central office) into the SS-1 system. The lockout feature of the common control unit is used with central office and PBX access to control access and to prevent the decoder from ringing SS-1 stations when digits of the subscriber line or PBX station are dialed.

2.13 Privacy of SS-1 conversations may be desired. Privacy can be provided on an automatic basis so that any two stations engaged in conversation are guarded against intrusion, or the system can be arranged so that privacy is on a manual basis, controlled by only a few selected stations. In either case, a privacy override circuit may be employed to allow priority or emergency traffic to break in on privacy conversations when necessary.

A. Tone Circuit

2.14 The tone circuits of the SS-1 system are comprised of keyers and standard SF units. Usually one keyer and one SF unit are associated with each customer location. The keyer generates the 2600- and 2400-Hz pulsing tones from the dc dial pulses; the SF unit restores the tone pulses to dc pulses at the receiving end. Some locations may be equipped to receive only or to send only. In such cases, the keyer or the SF unit is omitted from the customer location equipment.

2.15 Since the SS-1 system puts tone signals on the line only when actively signaling, the signaling system is in the same condition when the circuit is idle as it is when there are speech signals on the line. This means that the SF units must be in a high guard condition when speech is present to avoid talkoff (the response of an SF unit to high-frequency speech components). The SF units will also be in the high guard condition when the line is idle and awaiting dial pulses.

2.16 The first pulse of a digit might be lost when dialing begins if the pulse is a normal length spurt (60 to 70 milliseconds) of 2600-Hz tone and the SF receivers are in the high guard condition. Therefore, the first pulse of a digit is deliberately elongated to at least 100 milliseconds in the keyer. This long burst of tone forces the SF receiver to shift to low guard, where it remains for the rest of the digit. Once the SF unit is shifted to low guard, it remains in this condition until a complete code is received.

2.17 The keyer unit consists of a 2600- and 2400-Hz transistor oscillator and control circuits. Normal dc dial pulses are used to key the oscillator, but the output is frequency-shifted tone keying with an extra long first pulse. Lengthening the first pulse to at least 100 milliseconds is accomplished by using a delay circuit which delays all pulses but fills in most of the space in front of the first pulse with a 2600-Hz tone. The delay time, plus the normal break time of the dial mechanism, results in a long initial pulse. Input and output pulses of the keyer are shown in Fig. 2. The elongated initial pulse is evident. Only the initial pulse need be lengthened since the SF units will be held in the low guard condition as succeeding pulses of a digit arrive.

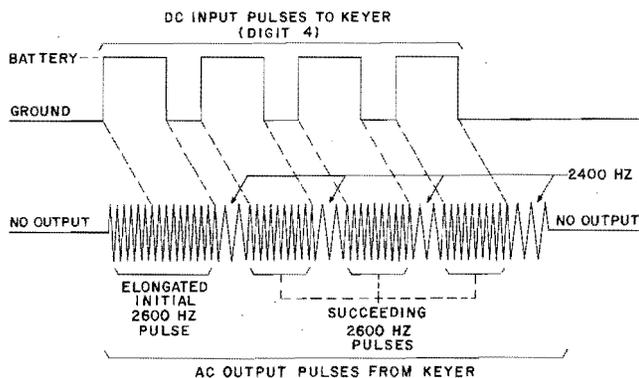


Fig. 2—Keyer Input and Output Pulses

2.18 A guard tone of 2400 Hz is inserted between pulses and at the end of the last pulse to ensure that the SF units release at the end of each 2600-Hz pulse. The 2400-Hz tone, which enters the guard channel of the SF units, forces them to release at the end of each pulse despite the possible presence of 2600-Hz echo that might tend to hold the SF units operated.

2.19 The keyer incorporates a fail-safe feature which prevents continuous tone from being fed to the line. This prevents a keying fault at one location from disabling the complete SS-1 system.

B. Loop and DX Signaling Circuits

2.20 When the tone equipment associated with SS-1 is located in a central office, either loop or DX signaling may be used. Loop signaling may be used if only one or two stations are located at the customer location. In this case, the decoder can be located with the tone equipment in the central office, and the station sets can be alerted by signals sent over the loop. If more than two station sets are used at the customer location, or if it is desirable to locate the decoder there for some other reason, DX signaling is used between the tone equipment in the central office and the decoder at the customer location.

2.21 Loop signaling is shown in Fig. 3. The customer location may contain one or, at most, two telephone sets to be signaled. The output of the SF receiver in the central office is connected to the decoder. DC pulses from the SF unit are registered in the decoder. A short output pulse is produced by the decoder when the proper 2-digit code is received. The output pulse of the decoder energizes one of two dc sending relays. Battery of one polarity or the other will be sent through the 4-wire loop terminations to the receiving relay circuit of the SS-1 station. The receiving relay circuit will contain one or two receiving relays. If only one telephone set is to be signaled, only one receiving relay will be used. Battery of either polarity sent from the dc sending relay circuit will operate the receiving relay. If two telephone sets are to be selectively signaled, two relays and two poling diodes comprise the receiving relay circuit. One telephone set or the other will be signaled, depending on the battery polarity applied from the dc sending relay circuit and the corresponding operation of a receiving relay. Codes are transmitted in the other direction from a telephone set dial to the keyer in the central office on the second pair of the 4-wire loop. The sending relay circuit, located between the dial and the keyer, performs dial pulse repeating and off-normal functions and shorts the station end of the transmitting loop to prevent room noises from interfering with signaling.

2.22 When a customer location associated with a particular central office has three or more telephone sets, the decoder will be located at the customer location and DX signaling will be used. This arrangement is illustrated in Fig. 4. During incoming dialing, the guard transfer and busy tone circuit opens the transmitting loop to the bridge and transmits busy tone to the SS-1 station. On outgoing calls, dial pulses are repeated by the sending relay and the signal lead extension circuit to cause the keyer in the central office to pulse. As shown in Fig. 4, the outgoing call may be originated from a No. 300 Switching System, used at air route traffic control centers, rather than by a dial of the SS-1 system. The No. 300 Switching System is briefly discussed in Part 7.

2.23 As mentioned earlier, special signaling arrangements are not required if the tone equipment is located with the decoder. The equipment arrangement may then be provided as shown in Fig. 5, which contains all the signaling equipment at the customer location. Tone signals from the central office are extended on a 4-wire loop to the customer location. An amplifier will be optionally inserted in the signaling receiving leg when required. Incoming codes are registered in the decoder and are used to trigger the station signaling equipment. Outgoing codes are originated via dial or a No. 300 Switching System.

C. Decoder

2.24 The decoder counts incoming dial pulses, determines the digits dialed, and provides an input to the station signaling equipment when the incoming code corresponds to one of the station telephone set codes. The basic decoder can recognize all nine codes of one tens group (the number of codes is nine since the digit 1 is not used) or it can recognize up to four codes in each of two separate tens groups (a total of eight in this case). By use of additional relays to recognize and store additional tens group information, the capacity of the decoder can be enlarged to include all 81 available codes. This subject is further discussed in Part 3.

2.25 The decoder is seized by the first digit of a code and is normally released when the second digit of the code is received. However, only 6 seconds (interdigital time) is allotted for dialing the second digit of a code after the first digit has been dialed. This is done to prevent a

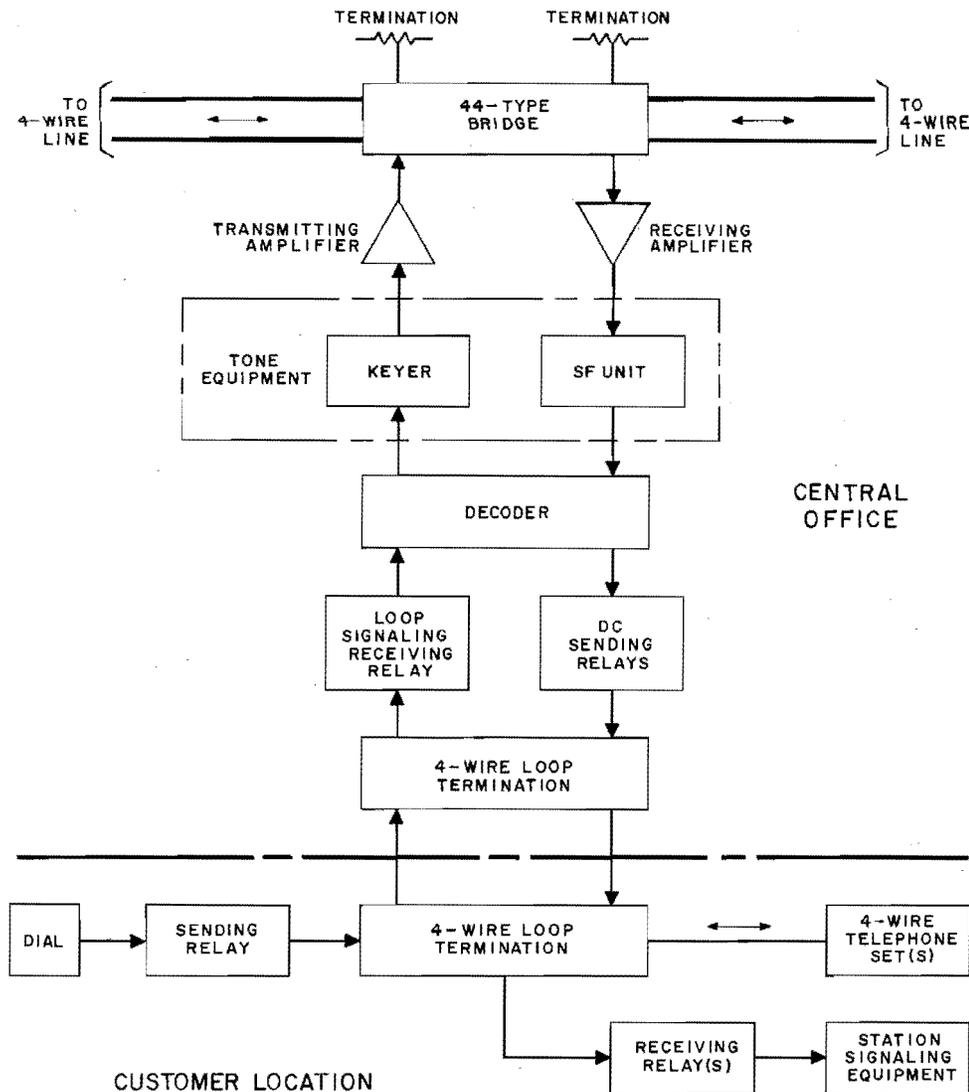


Fig. 3—Loop Signaling

tie-up of the system caused by a dialing error wherein only one digit is dialed.

2.26 If the digit 1 is dialed after the initial digit, the first digit stored in the decoder will be canceled and the dialing of a new code may commence. This procedure is used to cancel a digit which has been dialed in error without waiting for the 6-second time-out period to expire. The digit 1 is also used to dial a station when 3-digit interarea switching is used to interconnect two SS-1 systems. This prevents the signaling of the same coded station in the area where the dialing originates when the desired station is signaled.

D. Loop Bridging Arrangements

2.27 If two or more SS-1 locations are in close proximity to a common central office, the tone equipment (keyer and SF unit) may be mounted in the central office and shared by the customer location. Such an arrangement involving two locations is shown in Fig. 6.

2.28 A decoder is used with the SF unit to decode incoming signals and operate the correct station signaling equipment. If more than two codes are required at a station, a second decoder is provided and the dc pulses are repeated at the

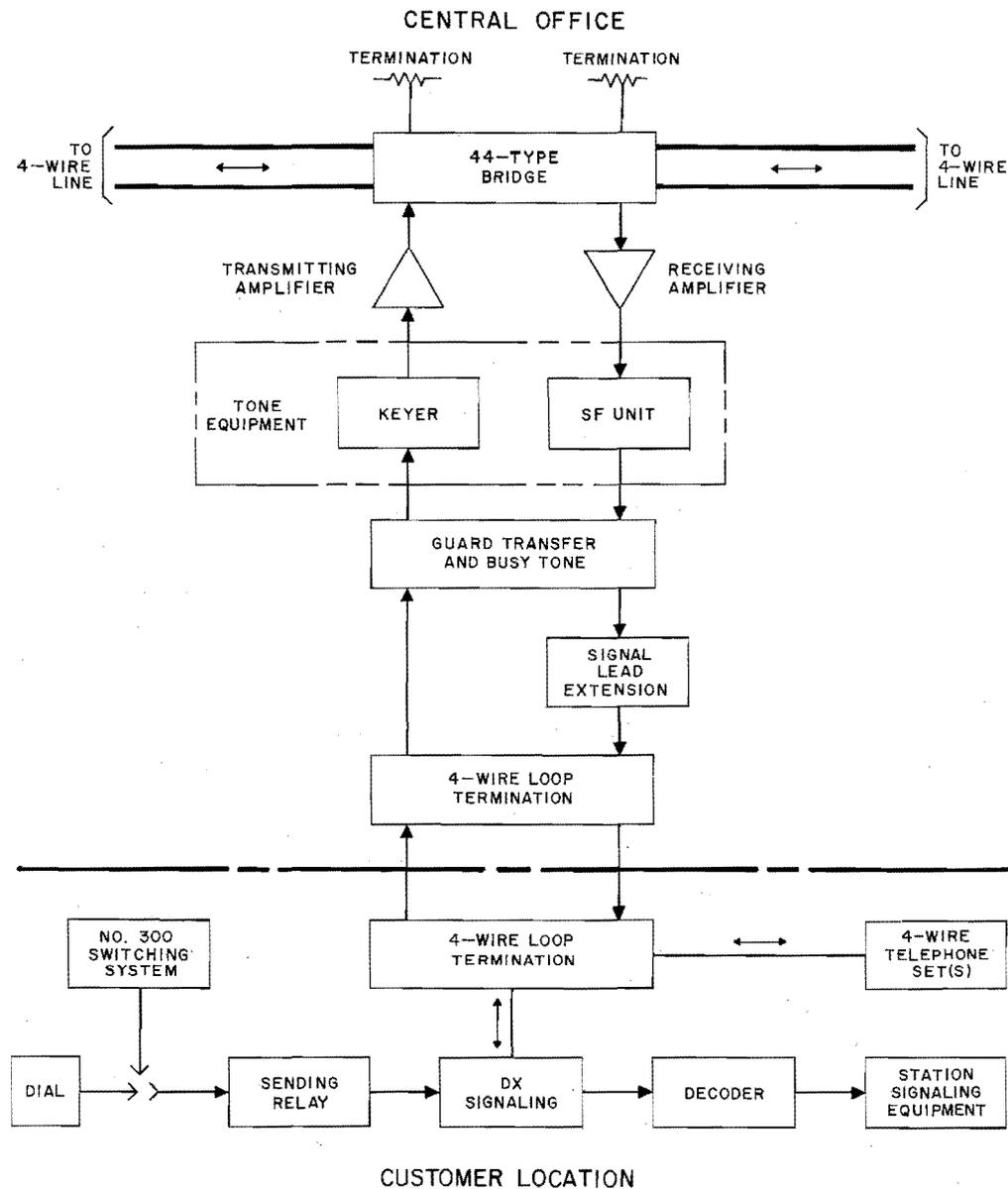


Fig. 4—DX Signaling

central office for transmission over a DX signaling loop. A station loop will be connected for DX signaling (if more than two station sets must be signaled at that station) or for loop signaling if only one or two station sets are located at that station. As shown in Fig. 6, loop signaling is employed between station A and the central office. DX signaling is used with station B.

2.29 If a third customer location is to share the tone equipment located at one central office,

another pulse repeating and busy tone circuit must be installed. Additional sending and receiving relays (or a signal lead extension circuit) must also be used to exchange dc pulses with the stations.

E. Dialing Stations of Adjoining SS-1 Systems

2.30 Provision has been made for dialing from one private line SS-1 system into a second SS-1 system. Dialing into an adjoining system can be accomplished in two ways. One method is called

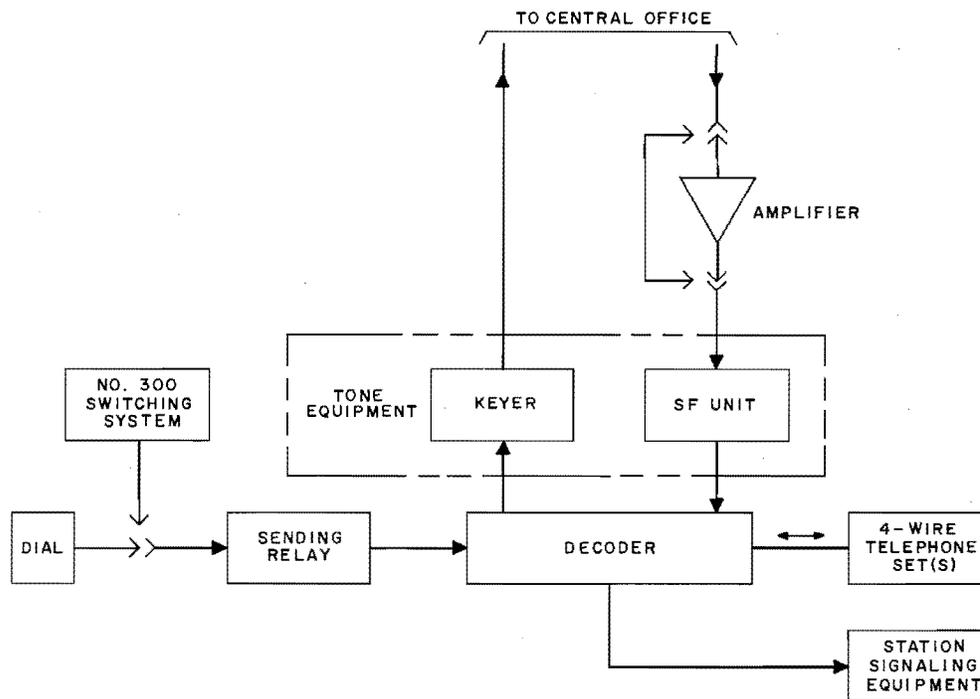


Fig. 5—Signaling Equipment at Customer Location

interarea switching; the second method is called 3-digit interarea switching. These two arrangements are discussed in the following paragraphs.

2.31 Interarea switching involves two adjoining SS-1 systems which normally carry their own traffic and operate independently of each other. If a special access code is dialed, however, the two systems are tied together. The originating station in the first system can now dial any station located in either system by dialing a prefix 2-digit code, the second code being that of the desired station set in the second system. As can be seen, coordination in the assignment of codes in the two SS-1 systems is essential if the alerting of two station sets (one in each system) by dialing one code is to be avoided. That is, the same code cannot be assigned to individual station sets in both systems. Upon completion of the call from one SS-1 system to another, a special code must be dialed to disconnect the two systems.

2.32 Signaling in two adjoining SS-1 systems interconnected by the 3-digit interarea switching circuit occurs only in the called-station system when 3-digit dialing is used. Thus, station codes may be assigned in one SS-1 system without

concern about possible duplication of code assignments in another system. Access into the second system is gained by dialing the 2-digit access code, as discussed for the interarea switching circuit. The 3-digit switching circuit will return a busy signal if the adjacent system is in the process of dialing or if it is engaged in a private conversation. When the two systems are linked, the desired station in the second system is signaled by use of the 3-digit code discussed in 2.11. Stations in the first system may be added by dialing their codes in the normal 2-digit form. The 3-digit codes are processed in the following manner. The first digit of the called code is registered in all the decoders of both SS-1 systems. As a result, both decoders in the area which provides the 3-digit interarea switching circuit will be off-normal. The circuit is so arranged that when both decoders are off-normal, the talking path between the two systems is temporarily opened. This prevents the decoders of the second system from registering the upcoming digit. The digit already registered in the decoders of the second system is retained, however. When the second digit, 1, is dialed, the decoders of the originating system recognize this as the cancellation signal and restore to normal. Now, only the decoders of the second SS-1 system have a registered digit

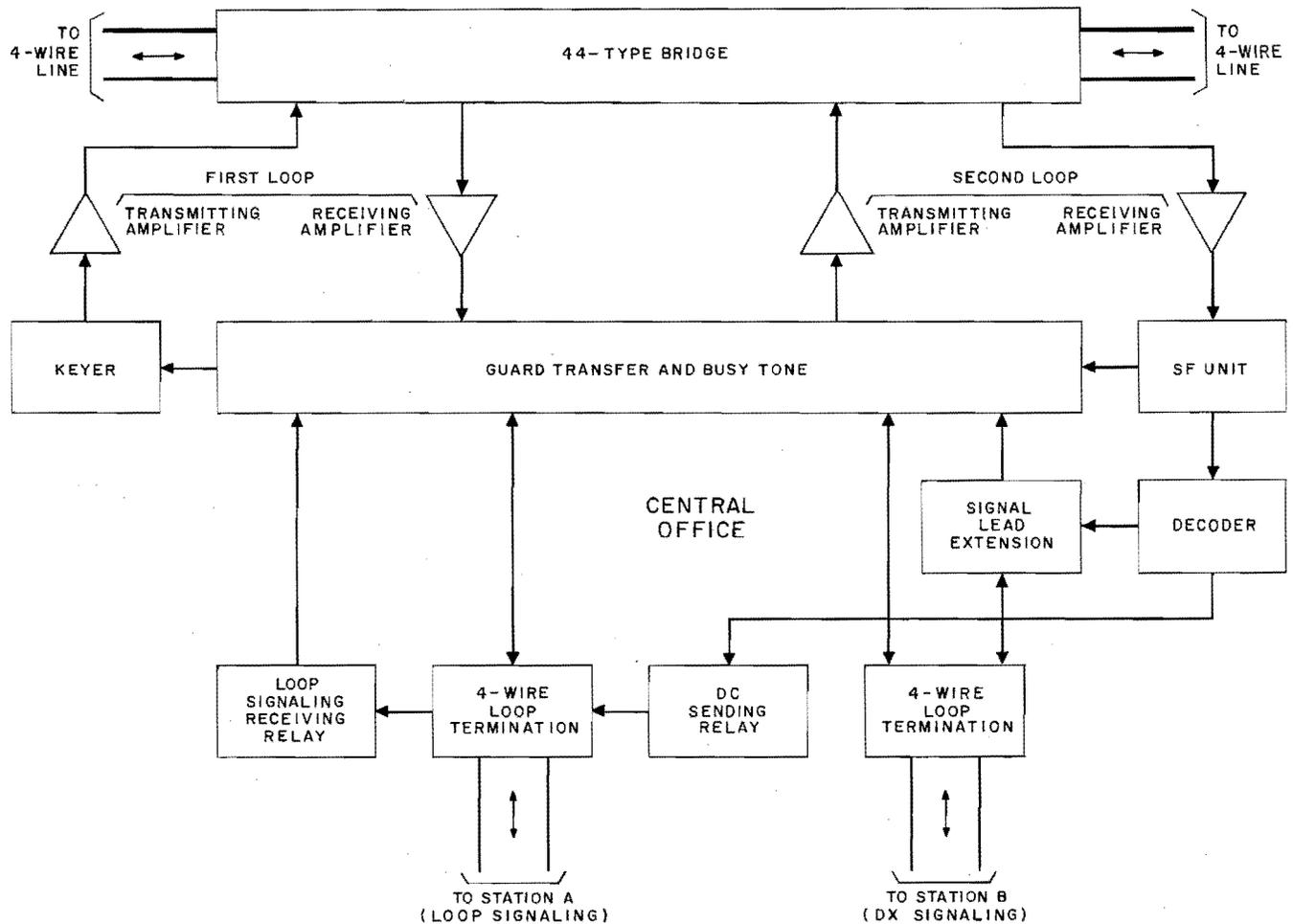


Fig. 6—Loop Bridging Arrangement

and are off-normal. This closes the talking path between the two systems again. The third digit of the 3-digit code is now dialed. This digit is registered in all the decoders of the second system as the last part of a station code. The desired station is signaled. The decoders in the first system register the third digit of the 3-digit code as the first digit of a new code because the original first digit has been canceled. Immediately after the called station in the second system has been signaled, a simulated digit 1 is automatically sent to all decoders so that the decoders of the first system will be immediately normalized and the conversation begin. At the end of the conversation, the link between the two systems is broken down by dialing a disconnect code if the originating station is not equipped with common control (privacy). The link is automatically disconnected when the originating station goes on-hook if it is equipped with common control.

F. Loop Cutoff

2.33 If an excessively noisy loop must be employed as part of the SS-1 system, the connection of this loop to the 4-wire facilities may be controlled by the switch hook or an equivalent key. This arrangement permits incoming signaling, even though the voice path is disconnected from the 4-wire facilities, until the switch hook is operated.

G. Common Control

2.34 The common control circuit provides the privacy feature of the SS-1 system. This circuit is connected with the keyer, decoder, and sending relay circuits on an optional basis. The common control circuit provides a termination for one telephone set at a customer location and also provides for use of an override key for stations which are allowed to break into existing privacy

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conversations. The connection of additional telephone sets to the common control circuit at a customer location can be accomplished by installation of individual station control circuits and a gate circuit to provide preference lockout for the dial leads.

2.35 With automatic privacy wiring of the common control circuit, all stations except the calling and called stations are locked out of the system whenever any station makes a call. A 2600-Hz busy tone is applied locally at all locked out stations if they go off-hook during a privacy call. Common control circuits wired for manual privacy operation cause privacy to be initiated only when an exclusion key is operated. Upon operation of the key, all stations except those already in on the call will be locked out. Additional stations may be conferenced on privacy arrangements by sequentially dialing the desired 2-digit codes.

2.36 Certain stations may be equipped with a local override key which can be used to enter a privacy call. The intruding station can then request that the line be made available for emergency use. During override, a 2400-Hz warning tone is applied to the line. The overriding station is not provided with dialing capability until the originating station of the privacy call goes on-hook.

H. Dialing From Nonprivacy to Privacy System

2.37 When dialing from an SS-1 system (without common control) to a privacy system (with common control), the interarea switching circuit sends an unlocking pulse to delete privacy. This is required to prevent the privacy-equipped system from remaining locked out if the party at the nonprivacy originating station fails to dial the 2-digit disconnect code. While the unlocking pulse is being transmitted, a tone pulse is heard at the originating station set. This tone also serves to indicate that the disconnect code was not dialed after a previous call. If a station making a local call hears this tone (100 ms of 2600 Hz), he may dial the disconnect code and clear the SS-1 system for local dialing.

I. Dialing From Privacy to Nonprivacy System

2.38 The interarea switching circuit operates as described in 2.32. Dialing from privacy-equipped SS-1 systems to nonprivacy systems will not preclude privacy at the originating station or local conferenced stations. No disconnect code is required, as in

2.37, because termination of the interconnected systems is automatic via the common control circuit.

J. Central Office and PBX Access

2.39 Circuits to permit access to central offices or PBXs may be added to an SS-1 system equipped with common control. These circuits permit dialing from any SS-1 station to a central office station or to a dial PBX station. They also permit dialing from PBX stations or the PBX operator position to SS-1 stations.

2.40 A station lockout circuit must be used in conjunction with central office and PBX access. The lockout circuit, required at all SS-1 locations, recognizes all central office and PBX access codes assigned to the SS-1 system. The lockout circuit provides control of the access circuit located at the SS-1 station and prevents the decoder from signaling SS-1 stations when codes intended for the central office or PBX are transmitted over the line.

2.41 A repeater is required to terminate the 4-wire SS-1 line on the 2-wire central office or PBX line. It can be arranged to either provide monitor capability for PBX operators or to deny this capability. The repeater also converts the standard loop dial pulsing from the PBX station or operator's position to the 1- and 2-lead type pulsing required for compatibility with SS-1.

3. ASSIGNMENT OF CODES

A. Code Grouping

3.01 The SS-1 system has a capacity of 81 codes. This means that up to 81 different stations in the system may be assigned individual codes. When a station is dialed, only the called station is signaled. These stations may all be at separate locations or a number of them may be grouped at a common location and be served by a common loop from the central office. Such a station grouping might be, for example, various stations of an airline at an airport. This station grouping could include operations, reservations, radio room, and PBX access. The SS-1 system provides ready communications between stations at this airport and stations of the airline located at other cities.

3.02 The code relay in the decoder is one which can be wired to decode nine codes in any

one *tens* digit or four codes in each of two *tens* digits. If more than nine codes are used at one station grouping, and if the assignments fall within more than two *tens* digits, or if more than four codes are assigned in one *tens* digit and at least one code in another *tens* digit, additional code relays must be used. Many customer locations will not require any additional code relays to recognize all the codes assigned to that location if the codes are grouped economically.

3.03 As an example of economical grouping, consider the central office installation with three loops running to separate customer locations, each having one or two codes assigned. A single decoder will be located in the central office. If all the codes of the three locations fall within one or two *tens* digits, the basic code relay complement of the decoder will be sufficient to recognize all of the codes. In the case of a larger location with 15 codes, if these codes are carefully chosen to be confined to only two or three *tens* digits, just one additional code relay need be added to the basic code relay complement to recognize all of the required codes. On the other hand, if the codes are indiscriminately assigned, as many as eight additional code relays might be required to do the job.

B. Multiple Usage of Codes

3.04 Under some conditions it is possible to obtain more than 81 individual station selections within the same SS-1 system. Sometimes the SS-1 customer locations are arranged so that on-premises dialing is not permitted. This prevents personnel from using the SS-1 system for local communications when other equipment is available for this purpose. Since a number of codes will be assigned to this loop, none of which can signal the others, these same codes could be duplicated in another location of the system. When a station set of one location dials a particular duplicated code, only the station at another location will be signaled. This arrangement is practical only in an SS-1 system consisting of two SS-1 customer locations.

3.05 Consider an extreme example of two air route traffic control centers which are the only stations of an SS-1 system. Each station of one location can signal a maximum of 81 codes in the second location and vice versa. Thus, 162 stations could be located in the same SS-1 system and signaled individually. Of course, this maximum

number would be greatly reduced if on-premises dialing were allowed, interarea switching were involved, or some codes provided central office or PBX access.

4. DESCRIPTION OF EQUIPMENT

4.01 Equipment at both central offices and customer locations varies with each particular type of installation. The equipment is provided on a building-block basis, as required. However, a number of common configurations are supplied as preassembled and prewired packages ready for installation into mounting bays. The amount of interunit wiring to be performed at the time of installation is thereby greatly reduced.

4.02 Packaged units which incorporate one or more of the following capabilities in various combinations are available:

- (a) To send codes, to receive codes, or to send and receive codes
- (b) To receive one or two codes or to receive up to 81 codes
- (c) To incorporate privacy, either automatic or manual
- (d) To incorporate interarea switching, using 2-digit or 3-digit codes
- (e) To have access to central office or PBX
- (f) To have on-premise dialing or lockout of on-premise stations (during dialing only).

4.03 A typical customer location packaged unit is shown in Fig. 7. This SS-1 configuration is equipped to send all codes and receive up to about 18 codes. The restriction on the number of codes that can be received depends upon the number of D- relays installed on the sending and code relay unit, the second horizontal panel. Since only one relay is installed (although others can be added at a later date), a maximum of 18 codes can be recognized by operation of the code relays of the decoder unit at the top of the assembly and the code relay of the sending and code relay unit. This packaged unit is comprised of four separate SS-1 units: a decoder unit, a sending and code relay unit, a keyer unit, and a fuse indicator unit. In addition, there are positions for four standard

plug-in units. One is the SF unit (single-frequency signaling circuit), which is mounted vertically on the left side of the assembly. The other three plug-in units become part of the decoder. They are: an amplifier, a pad, and a 6-second time delay relay.

4.04 The components of most individual SS-1 units are mounted on 19-inch plates. The completed 19-inch units are placed alongside the vertical SF unit mounting plate, which forms a mounting surface for one end of the 19-inch units as shown in Fig. 7. The overall width of the assembled package is then 23 inches and mounts in a 23-inch bay drilled or adapted for 2-inch mounting centers. If more than 14 inches of vertical room (the height of the SF unit mounting plate) is required to mount the 19-inch panels, the remainder are mounted below the SF unit with adapters to extend them to 23 inches. A few of the SS-1 units, for example, the common control unit, are already 23 inches wide and are usually placed above the SF unit. Standard E-type SF units, DX signaling circuits, and signal lead

extension circuits, as required, plus a combination of individual SS-1 units comprise the necessary equipment.

5. POWER REQUIREMENTS

5.01 If signaling equipment is located at the central office, it is arranged for -48 volt battery operation. The sending equipment located at the customer location may be wired for -48 or -24 volt battery operation. When the decoder is also located at the customer location, -48 volt battery must be available for its operation. A separate -48 volt rectifier may be installed if the decoder is located at a customer location not already equipped with -48 volt battery.

5.02 If all the signaling equipment associated with one location (including the SF unit) is located at the customer location, an amplifier may be required to raise incoming tone signals to the proper level for SF unit operation. Battery of +130 volts is required, in addition to a -48 volt

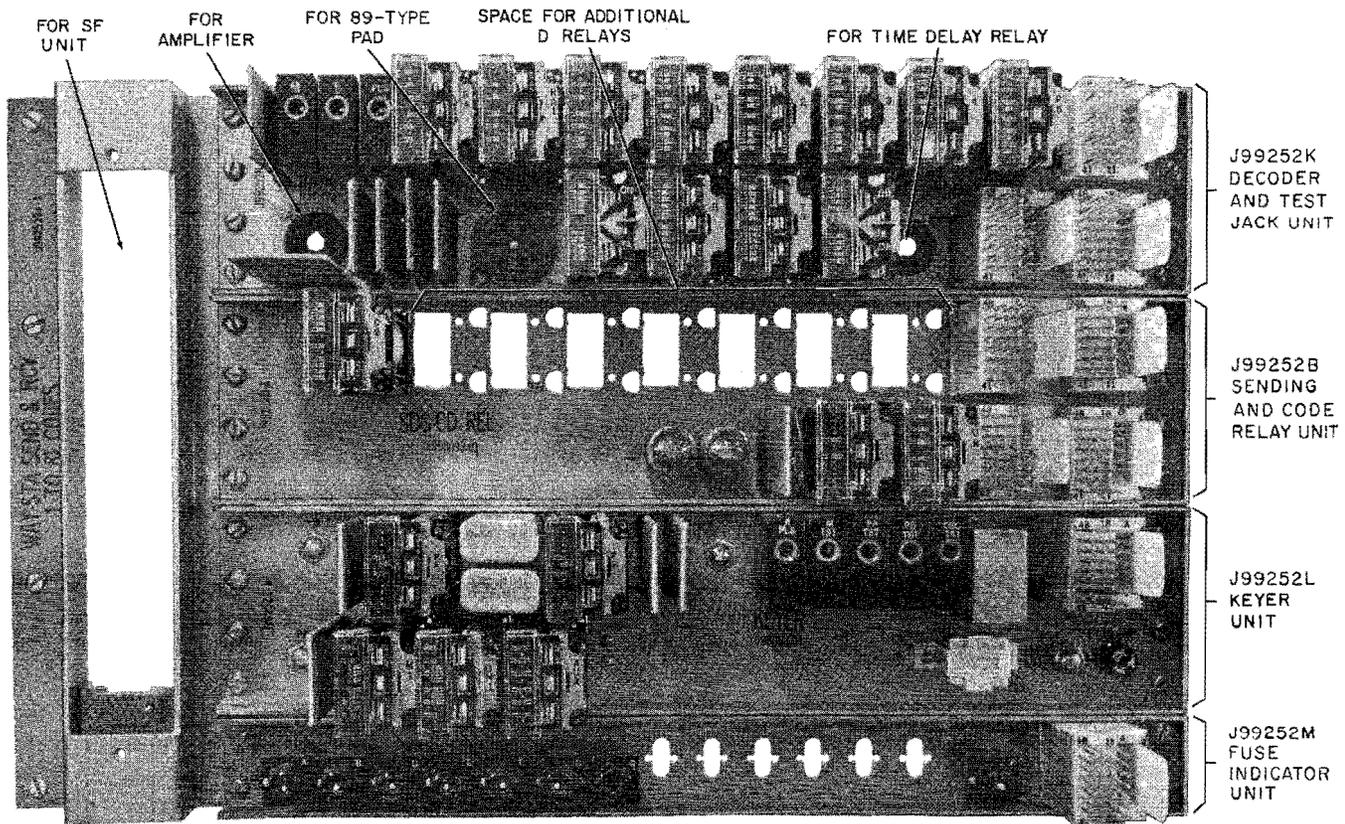


Fig. 7—Typical Customer Location Packaged Unit

source, to power a tube-type amplifier. If this power is not already available, a separate +130 volt power supply will be required.

6. MAINTENANCE FEATURES

6.01 A number of jacks are mounted on the decoder and keyer units to facilitate line-up and maintenance procedures. Other jacks on the 4-wire loop termination, dc sending, and loop signaling receiving relay unit provide access to the transmitting and receiving loop circuits.

6.02 The SF unit and the amplifier, when used, may be readily checked by temporary replacement with service tested units. Separate maintenance procedures are provided for these units.

6.03 The pulsing break time of the keyer may be tested and adjusted using the 2B signaling test set. The 2400- and 2600-Hz frequencies of the keyer oscillator and its output level may be checked and adjusted by use of standard test equipment. All other units of the SS-1 system use standard relay equipment and require standard Bell System relay adjustment procedures.

7. USE WITH NO. 300 SWITCHING SYSTEM

7.01 The SS-1 Selective Signaling System is used with the No. 300 Switching System at air

route traffic control centers of the FAA. Dialing is accomplished in a slightly different manner when the No. 300 Switching System is involved. Before dialing, the station operator seizes a 300 system register sender. Two digits, the desired station code, are key pulsed into the register sender. The register sender outputpulses the digit 1, sends the two station digits inserted by the station operator, then drops off the line. Since the register sender drops off the line automatically as soon as one station code is outputpulsed, it must be repeatedly reseized if a number of station codes are to be outputpulsed in succession.

7.02 If a dialing error is made on the first digit, it may be corrected by pressing the CLEAR key on the No. 300 Switching System. By this action, the sender is cleared but not released. The correct code may then be key pulsed into the sender without the necessity of reseizing the sender.

7.03 The digit 1, which precedes the station code when the sender outputpulses, clears the decoders at all other locations. If the digit 1 were to be keyed to cancel an error when using the No. 300 Switching System, the sender would release. It would be necessary to reseize the sender before the station code could be sent correctly.

