J1 CONTROL TERMINAL FRAMES AND UNITS
150-MEGAHERTZ BELLBOY®
PERSONAL RADIO SERVICES
EQUIPMENT DESIGN REQUIREMENTS
RADIO SYSTEMS

CONTENTS PAGE

1. GENERAL

Scope

1.01 This specification, together with the supplementary information listed herein, covers the equipment design requirements for the manufacture and installation of the J1 control terminal equipment of the BELLBOY® personal radio services. The J1 control terminal is designed to operate with any No. 5 crossbar, crossbar tandem, or step-by-step switching system. Section 806-140-152 contains the equipment design requirements for the BELLBOY radio equipment and is used together with this section by the equipment engineer so that the equipment can be provided for a complete BELLBOY system.

1.02 This specification is reissued to correct errors in the listings of equipment in Part 4 and to make other minor corrections in Part 1.

Capacity

1.03 The J1 control terminal serves a maximum of 3200 subscribers per system.

Description

A. General

1.04 The BELLBOY personal radio service provides subscriber-dialed one-way signaling service to a person on the move. The system consists principally of a central office J1 control terminal, 1 to 20 FM radio transmitters as required for adequate coverage in a service area, and pocket-carried FM receivers. The J1 control terminal includes switching equipment which can be installed in, or connected to, any central office or switchboard which outpulses dial pulses.

1.05 The J1 control terminal consists of four, five, or six bays of equipment, depending upon the number of subscribers to be served. A minimum of four bays of equipment is always required for the initial installation of a system. The four bays will serve up to 1200 subscribers. The addition of one supplementary bay increases

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the capacity of the system to 2400 subscribers and the installation of a second supplementary bay increases the number of subscribers which can be served to a maximum of 3200.

1.06 A person wishing to contact a BELLBOY subscriber located somewhere within the coverage area of the system dials a 7-digit number, for example, BB5-2348. The call is routed through the local office or the local and tandem office, resulting in the last four digits being dial-pulsed into the J1 control terminal (refer to Fig. 1). The control terminal receives, stores, and translates the four digits into a coded signal in the form of three tones ranging from approximately 500 to 1000 Hz. These tone codes are then transmitted over wire-line facilities to modulate one or more radio transmitters which operate on 152.840 or 158.100 MHz. The tone codes are sent to the transmitters three times, at 30-second intervals, for increased system reliability. The frequency-modulated signals are received by the BELLBOY radio pager (FM receiver) and are then demodulated. Each receiver contains three tuned-reed coding elements capable of responding to only one distinctive 3-tone code. When the proper 3-tone code is received, an audio oscillator is triggered in the receiver and an alerting tone informs the subscriber that he is being paged. The BELLBOY subscriber then calls some prearranged telephone number to obtain his message. To prevent BELLBOY customers from being signaled by any but their own home system, a nationwide numbering plan is used. This plan changes the relationship between the subscriber numbers and the signaling tones. Provisions will be made for eight such numbering plans (A through H), which will be administered by the AT&T Company.

1.07 The incoming trunk register of the J1 control terminal can be connected to a local office or tandem office by standard interoffice dial pulse trunks. However, if the interoffice trunks exceed the range requirements of the incoming trunk register, the range can be increased by inserting dial pulse and supervisory repeaters in the interoffice trunks.

1.08 The dc range of the connecting facility between the J1 control terminal and a transmitter is 10,000 ohms of loop resistance using $\pm$130 volt signal battery. Maximum allowable transmission loss of the facility is 13 dB. Delay equalization is used in all trunks of multitransmitter systems. The purpose of the equalization is to maintain the difference in delay between any of the trunks to less than 110 microseconds.

B. Equipment Arrangement

1.09 The J1 control terminal is made up of shop-wired and tested bays. All of the bays

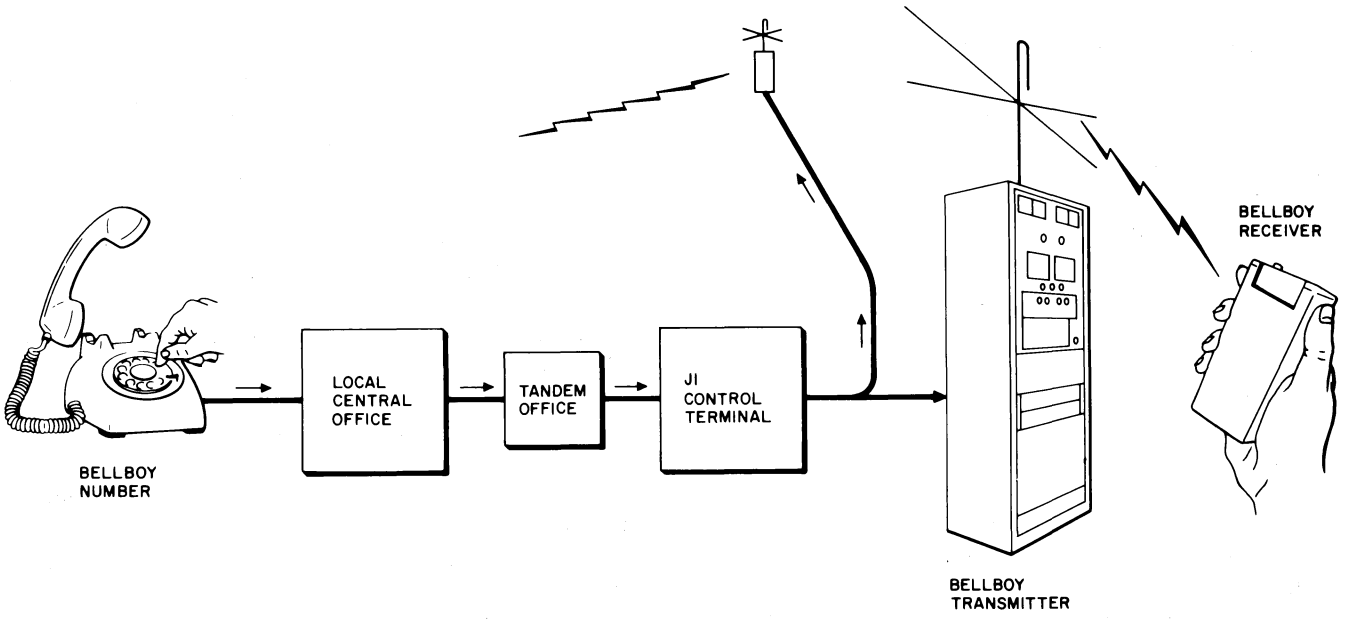


Fig. 1—BELLBOY Call Routing

are 11 feet 6 inches high and accept 2- by 23-inch mounting plates. One double-bay framework and two single-bay frameworks are required for a minimum installation. A larger system may require one or two supplementary (SUPL) bays. Table A lists the sizes and weights of the bays.

1.10 The J99281A double-bay framework, which contains common control equipment, is preferably placed next to the J99281S transmitter control bay, as shown in Fig. 2. The J99281B announcement bay is placed to the right of the common control bay and completes the requirement for a minimum installation. The two supplementary bays, J99281C and J99281D respectively, should be placed in line with the announcement bay but may be placed at another location in the building.

C. Equipment Bays

1.11 The J1 control terminal is made up of the following bays and units with a brief description of their functions.

J99281S Transmitter Control and Tone Supply Bay

1.12 As shown in Fig. 2, the transmitter control and tone supply bay consists of the following:

(1) 32 distributing resistors which attenuate the signaling tones to the transmitter control circuits

(2) 32 regular and 32 spare tone generators below the tone power supply ◗and the transfer and alarm circuit◖

(3) Voice alarm circuit associated with the station identification announcement set

(4) Amplifiers, attenuator, filter, and timers associated with the transmitter common control

(5) Transmitter common control

(6) Alarm and test jack, lamp, and key panel

(7) Station identification announcement set

TABLE A

BAY	FRAME DIMENSIONS			FLOOR LOADING WEIGHT (LBS)	SHIPPING WEIGHT (LBS)
	HEIGHT	WIDTH	DEPTH		
Common Control Equipment J99281A	11 ft 6 in.	4 ft 1-1/4 in.	1 ft	1000	1150
Announcement Bay J99281B	11 ft 6 in.	2 ft 5/8 in.	1 ft	700	850
First Supl Bay J99281C	11 ft 6 in.	2 ft 5/8 in.	1 ft	700	850
Second Supl Bay J99281D	11 ft 6 in.	2 ft 5/8 in.	1 ft	700	850
Transmitter Control Bay 99281S	11 ft 6 in.	2 ft 5/8 in.	1 ft	700	850

(8) Individual transmitter control circuits for a maximum of 20 transmitters

(9) Five delay equalizer networks which can be mounted on this bay when space is available

(10) Fuses and line filter.

J99281A Common Control Bays

1.13 Some of the common control equipment is mounted on this double-bay framework as shown in Fig. 2. The left-hand bay consists of the following:

(1) Register check connector unit for connecting one of the two register check circuits to the register connector unit which is on the right-hand bay

(2) A and B register check circuits

(3) Register check connector preference control circuit and the transfer and alarm circuit

(4) Translator and translator connector circuit

(5) Alarm and test key and lamp panel

(6) Hundreds group number checking circuit

(7) Storage scanning selectors

(8) Storage scanning common control circuit

(9) Ten storage circuits

(10) Storage connector and test circuits

(11) ◗Fuse panel.◖

1.14 The right-hand bay contains the following:

(1) Register connector unit which connects one of a maximum of ten incoming trunk registers to the register check circuit

(2) Six incoming trunk registers

(3) Telephone jacks and battery and ground test terminals

(4) Three number check translators

(5) Ten storage circuits

(6) Storage connector and test circuits.

J99281B Announcement Bay

1.15 As shown in Fig. 2, the announcement bay consists of the following:

(1) Ten intercept trunks (0 through 9)

(2) One incoming trunk register

(3) A and B storage control circuits and their timing units

(4) ***"Tinkle tone"*** generator

(5) Voice alarm circuit used with the three announcement sets on this bay

(6) Three number check translators

(7) Three announcement machines: two for completed calls and one manually controlled trouble announcement set for use when the system is out of service.

1.16 The equipment on the preceding four bays handles up to 1200 numbers. However, the incoming trunk registers, the number check translators, the storage circuits, and the individual transmitter control circuits can be ordered according to the local area demand for BELLBOY service, if fewer than 1200 numbers are to be equipped.

J99281C First Supplementary Bay

1.17 As shown in Fig. 2, the first supplementary bay consists of the following:

(1) Three incoming trunk registers

(2) Six number check translators

(3) Ten storage circuits

(4) Storage connectors and test units

(5) Telephone jacks and battery and ground test terminals.

1.18 The first supplementary bay, fully equipped, increases the capacity of the J1 control

terminal so that it handles up to 2400 numbers. When fewer than 2400 numbers are to be equipped, order incoming trunk registers, number check translators, and storage circuits in quantities needed to meet demands for BELLBOY service in the local area.

J99281D Second Supplementary Bay

1.19 As shown in Fig. 2, the second supplementary bay consists of the following:

(1) Four number check translators

(2) Ten storage circuits

(3) Storage connectors and test circuits

(4) Telephone jacks and battery and ground test terminals.

This bay, fully equipped, increases the capacity of the control terminal to the maximum of 3200 numbers. When fewer than 3200 numbers are to be equipped, number check translators and storage circuits on this bay can be ordered in quantities needed to meet demands for service in the local area.

D. Equipment Units

J99281E Incoming Trunk Register

1.20 The J1 control terminal can be equipped with from two to ten incoming trunk register circuits. This unit registers the 4-digit number which is received on a dial-pulse basis, initiates a sequence of operations which results in connection to the register check and connector control circuit, passes the 4-digit number to the register check and connector control circuit on a two-out-of-five basis, and returns the recorded announcement and supervision signals from the register check and connector control circuit. Normally, the first incoming trunk register is used as a test circuit and is not associated with any incoming trunk circuits. However, when high-traffic conditions require the use of all incoming trunk registers, the first incoming trunk register will be used for customer service rather than for test purposes.

J99281F Register Check Unit

1.21 There are two separate register check units, either of which, with the assistance of several common control relays, is capable of completely processing a request for service from an incoming trunk register and connector circuit. The main reason for furnishing two complete units, register check A and register check B, is to increase system reliability. The two register check units permit the use of an automatic second-trial feature in the event of a trouble condition.

1.22 The register check circuit (for example, register check A) receives the four digits from an incoming trunk register and signals the number check translator to determine whether the number is valid or unassigned. If the number is unassigned, the register check circuit signals the incoming trunk register to connect the calling customer to an intercept trunk. If the number is assigned, the register check circuit seizes an idle storage circuit, passes the number to the storage circuit by means of relay connectors, connects the incoming trunk register circuit to the completed call announcement machine, and transfers control to the duplicate part of the register check circuit (for example, register check B) to handle the next call.

J99281G Register Check and Connector Preference Control Unit

1.23 This unit provides the common relay equipment used in conjunction with register check units A and B and functions to determine which of the register check units will process the request for service from an incoming trunk register.

J99281H 100-Line Intercept Unit

1.24 The 100-line intercept unit is provided for connecting unused numbers (100 at a time) to intercept. Working numbers, in groups of 200, are connected through terminal strips on this unit to individual number check circuits.

J99281J Storage Common Control Unit

1.25 This unit provides the common relay equipment for automatically switching between storage control A and storage control B on alternate series of calls. Storage control units are discussed in 1.29.

J99281K Storage Test Unit

1.26 One storage test unit is provided for each ten storage circuits. The storage test unit closes through a set of leads to the transmitter control circuit when the call in progress is a test call, so that when the information in a particular storage circuit is "read out", the transmitter will not radiate.

J99281L Storage Unit

1.27 The storage unit consists of one mounting plate for each two storage circuits. The storage unit locks in (stores) the 4-digit number received from the register check circuit on a two-out-of-five basis. This number information remains in storage until it can be processed and transmitted. The J1 control terminal can be equipped with from 2 to 40 storage units.

J99281M Number Check Units

1.28 Each number check unit is capable of providing a positive signal for a working number or routing a nonworking number to intercept. A number check unit handles two groups of 100 numbers on an individual basis. From 1 to 16 of these units may be provided in the control terminal.

J99281N Storage Control and Timing Unit

1.29 There are two separate and independently operable storage control and timing units in each J1 control terminal. They are identified as storage control and timing unit A and storage control and timing unit B. As in the case of the register check units, the presence of two separate units adds to the general reliability of the system and permits an automatic second trial in the event of a trouble condition.

1.30 The storage control and timing unit is used to control the connections between the storage and storage connector circuits and the translator connector circuits, and also to control the connections between the translator and translator connector circuits and the transmitter control circuit (Fig. 3). The storage control and timing unit also performs the various counting and timing functions required to guarantee that each request is transmitted the proper number of times within the correct time intervals between successive transmissions. In addition to the previously mentioned functions, the storage control ▸and timing unit◂ is also responsible for releasing storage circuits after they have been served, detecting troubles in the storage circuit and the translator, and the timing of any condition which prevents requests from being served within the proper time interval.

J99281P Translator Unit

1.31 There are two separate translator units, each capable of performing all of the translator circuit functions. The use of redundant equipment units, as discussed previously, increases overall system reliability. The particular translator unit used on any given call is determined by the storage control ▸and timing unit.◂ The function of the translator unit is to translate the subscriber's 4-digit number which has been stored in the storage unit into a corresponding 3-audio-frequency code.

J99281T Tone Supply Unit

1.32 This unit provides mounting facilities for 32 tone generators (36A oscillators). The output consists of 32 frequencies spaced 15 Hz apart in the range between 517.5 and 997.5 Hz and connects to an associated resistor in the distribution network. A standby group of tone generators is provided for automatic substitution when a trouble condition develops in the operating units (regular group).

J99281U Common Transmission Control Unit

1.33 The common transmission control unit accepts ground on 3 out of 32 leads from a translator circuit. These grounds cause 3 out of 32 selection relays to operate, which select the corresponding tones from the distributing network. The three tones are then filtered to remove harmonics and amplified for transmission.

J99281W Transmitter Trunk Originating Unit

1.34 This unit connects the output of the common ▸transmission◂ control panel to the associated transmitter. It also provides means for readying the transmitter for transmission and receiving a confirmation indication when the transmitter is operating properly. One transmitter trunk originating unit is required for each transmitter.

KS-16765, L2 Announcement Set

1.35 There are four announcement sets associated with the J1 control terminal, each of which occupies the space of five mounting plates. An announcement set on the transmitter control bay provides for periodic station identification. The "A" announcer on the announcement bay provides the voice message to the calling party that his order has been received and that his call will be transmitted. The "B" announcer on the announcement bay has the same message and serves calls alternately, with further provision that either unit may assume the entire load. The "C" announcer is used during periods when the system is out of service, and advises the calling parties of the service interruption.

J95415H Voice Alarm Units

1.36 The control terminal is equipped with two voice alarm units. The voice alarm unit on the transmitter control bay provides an alarm in the event that station identification is not made. The voice alarm unit on the announcement bay provides an alarm in the event that an announcement is required but not made.

J99281AC Intercept Trunk Unit

1.37 This unit occupies the space of one plate for four circuits. The intercept trunk unit is required for all intercept arrangements except where intercept is provided through direct association of the incoming trunk register with a KS-16765, L1 announcement set.

J99281AD Miscellaneous Test Unit

1.38 This unit occupies the space of one mounting plate and provides for lighting and holding lamp indications during test calls.

Note: Since the J1 control terminal is made up of shop-wired and tested frames, the key and lamp panels, connector relay assemblies, and terminal strips are provided as subassemblies under the frame specification.

J99281AE Delay Network Panel

1.39 The delay network panel occupies the space of one mounting plate and accommodates delay networks 4049A and B, and 4050A. The panel may be installed in the J99281S bay when ten or fewer transmitters are used, or in the J99281D bay, if space is available. Otherwise, space must be provided on the office miscellaneous equipment frames. One mounting plate is required per transmitter. Delay networks are required in all trunks of multitransmitter systems, to maintain the difference in delay between any two of the trunks to less than 110 microseconds.

J99281A, Fig. A, Trunk Register Connector Unit

1.40 This unit occupies the space of four and one-half plates. It contains the multicontact relays for connecting the functioning leads from the register to the register check circuit.

J99281A, Fig. B, Translator Connector Unit

1.41 This unit occupies the space of two and one-half plates. The translator connector unit is equipped with the multicontact relays that connect to the transmitter control frame and the storage units.

J99281A, Fig. C, Key and Lamp Panel

1.42 This key and lamp panel occupies the space of four plates. It contains various alarm keys, lamps, and jacks for maintenance and testing of the switching equipment.

J99281A, Fig. D, Storage Scan Terminal Strip

1.43 This terminal strip occupies the space of two plates. It provides terminals for administration of cross-connection for leads between the translators and the storage circuits. For convenience, terminals on this strip are used for cross-connections associated with other circuits.

J99281A, Fig. E, Storage Scan Selector Unit

1.44 This unit occupies the space of four plates. These selectors scan the storage circuits for busy conditions and pass the functioning leads from the busy circuit to the translator.

J99281A, Fig. F, Control Memory Connector Unit

1.45 This unit occupies the space of two and one-half plates. The multicontact relays in this unit prepare paths to release the storage circuits after they have been served.

J99281A, Fig. G, J99281C, Fig. B, J99281D, Fig. B, Storage Connector Unit

1.46 This unit occupies the space of four and one-half plates. The storage connector relays are multicontact types that are used to connect functioning leads in and out of the storage relays.

J99281A, Fig. H, Register Connector Unit

1.47 This unit occupies the space of four and one-half plates. The register connector multicontact relays connect the individual registers to the register check circuit.

E. Functional Description

1.48 The following paragraphs, with the aid of the block diagram in Fig. 3 and the functional sequence and call progress signals chart of Fig. 4, describe the processing of a call through the J1 control terminal.

Seizure of Incoming Trunk Register

1.49 A person wishing to contact a BELLBOY subscriber dials a 7-digit number (such as BB5-2348) assigned to the customer. The digits are trunked through the local office or the local and tandem office, resulting in the last four digits being dial-pulsed into an incoming trunk register of the J1 control terminal. Access to the incoming trunk register may also be from an operator switchboard position. In this case, the operator inserts a plug into a personal signaling system (PSS) trunk which terminates at that switchboard position. This trunk connects directly to the incoming trunk register and the operator is required to dial only the last four digits of the BELLBOY number.

1.50 The J1 control terminal can be equipped with from two to ten incoming trunk registers. This circuit counts the pulses and registers the first three digits on register relays and the fourth digit on pulse counting relays. At the end of the last pulse of the fourth digit, the incoming trunk register connects audible ringing tone to the calling customer as an indication that the call was received and attempts to seize the register check and connector control circuit.

Register Check Circuit Seizes The Incoming Trunk Register

1.51 The register check and connector control circuit consists of a common part and two duplicate parts. The duplicate parts, register check A and register check B, serve calls alternately. This redundant circuitry permits the use of an automatic second-trial feature. If one register check circuit attempts to serve a call and fails, the call is automatically switched to the other circuit. The incoming trunk register attempts to seize one of the register check circuits (A or B) by operating a preference relay. If the register check circuit is idle, connector relays will operate immediately and connect the incoming trunk register to the register check circuit. Assume that register check A is busy serving a call when an incoming trunk register requests service. The preference relay will operate and the incoming trunk register will wait its turn to be served in the preference chain. As soon as register check A becomes idle, register check B will seize the waiting incoming trunk register via the connector preference control circuit. The register check circuit can serve only one incoming trunk register at a time.

Register Check Circuit Makes Number Check

1.52 When the connector relays operate (two per incoming trunk register and two per register check circuit), they connect leads from the incoming trunk register to the register check circuit. Some of these leads transfer the 4-digit number, on a two-out-of-five basis, from the incoming trunk register to the register check circuit, and the remainder are used as control leads between the two circuits.

1.53 When the register check circuit receives the four digits, two checks are made simultaneously: a two-out-of-five check to determine whether or not the information received from the incoming trunk register is complete, and a check to determine if the number received is valid. The number check is made in various ways as described in 1.56 and 1.57.

Placing The Four Digits In an Idle Storage Circuit

1.54 When the register check circuit has completed checking the number received from the incoming trunk register and has determined that the number is valid, it begins scanning for an idle

storage circuit. (A J1 control terminal can be equipped with a maximum of 40 storage circuits.) When an idle storage circuit is selected, connector relays operate (one in the register check and one in the storage circuit) to connect leads from the register check circuit to the selected storage circuit. Some of these leads are used to pass the 4-digit number to the storage circuit on a two-out-of-five basis and the remainder of the leads are control leads between the two circuits. When the register check circuit is satisfied that the information is properly stored in the storage circuit, it signals the incoming trunk register to connect the completed call announcement to the calling customer. At this point, the register check circuit begins releasing.

Completed Call Announcement Returned to Customer

1.55 The incoming trunk register has three options for returning a completed call signal to the caller.

(1) With customer dialing and normal supervision, a charging condition (off-hook) is returned to the caller for 5 to 9 seconds before sending a start signal to the completed call announcement set.

(2) With customer dialing and delayed supervision, a noncharge condition (on-hook) is returned to the caller and a start signal is sent to the announcement set.

(3) With operator dialing, the announcement is replaced by a battery reversal (off-hook). Audible ringing is returned to the caller until the announcement set starts.

1.56 Consider first an in-block number, that is, a number falling within the blocks of numbers which can be assigned to a BELLBOY service customer. These number blocks are 1000 to 1999, 2100 to 2699, 3000 to 3999, and 4100 to 4699. The hundreds group translator in the register check circuit checks the thousands and hundreds digits. For those numbers in hundreds groups having assignments, the hundreds group translator signals the proper number check translator to translate the tens and units digits. If the number is assigned to a customer, the number check translator returns a proceed signal, allowing the register check circuit to proceed in storing the number. If the number is not assigned to a customer, no indication is returned to the register check circuit and a relay operates in the register check circuit, connecting the calling customer to intercept.

1.57 Now consider an out-of-block number, that is, a number which cannot be assigned to a BELLBOY customer. The arrangement of the hundreds group translator is such that all out-of-block hundreds group numbers appear as in-block hundreds group numbers. Therefore, the hundreds group translator either returns an intercept signal or calls in the number check translator. The number check translator translates the tens and units digits as if they were in-block numbers. If the simulated in-block number is not assigned to a customer, no indication is returned to the register check circuit, a relay operates in the register check circuit, and the calling customer is connected to intercept. If the simulated in-block number is assigned to a customer, a proceed signal is returned to the register check circuit. This proceed signal is processed further by the out-of-block hundreds group translator. Since the number dialed was an out-of-block number, the translation will permit the operation of a relay, thus routing the calling customer to the intercept facilities.

1.58 With customer dialing and a start signal sent to the announcement set, nothing happens until the announcement set is idle. After a period of from 0 to approximately 10 seconds, depending on the position of the announcement set drum head and on whether or not an announcement was in progress when the start signal arrived, the announcement set recycles to the beginning of the announcement. At this time, audible ringing tone is removed from the calling customer line and the announcement set drum head looks for the start of the message. This requires from 1 to 4 seconds. At the end of this time, a distinctive tone, called ***"tinkle tone,"*** is connected to the customer line for 2 seconds, followed by an appropriate voice announcement of approximately 5- to 6-second duration. At the end of one announcement, a 10-point selector (one per incoming trunk register) steps one step, provided that the calling customer has not hung up. A cross-connection is made to one of the ten selector terminals, so that when the selector steps to the cross-connected terminal, a disconnect reversal (on-hook) is returned to the calling customer trunk circuit if normal supervision is employed, or an answer reversal (off-hook) for 5 to 9 seconds followed by a disconnect reversal (on-hook) is returned if delayed supervision is employed. Thus, after a predetermined number

of announcement messages and the time-out of the originating trunk circuit, a disconnect of the calling customer is forced.

Storage Control Seizes The Busy Storage Circuit

1.59 As soon as the number is placed in the storage circuit and while the calling customer is listening to the completed call announcement, the storage circuit places a request to be served by the storage control circuit. The storage control circuit consists of two duplicate parts, storage control A and storage control B, and some common relay equipment. Either storage control, A or B, in conjunction with the common equipment, is capable of performing all the storage control circuit functions. These two circuits are used alternately on successive seizures by the storage control circuit. The use of redundant circuitry increases system reliability and permits the use of an automatic second-trial feature in the event that a trouble condition is encountered on a call. If the storage control circuit is idle at the time a request for service is made, it begins scanning and stops on the storage circuit requesting service. If the storage control circuit is busy at the time the request for service is made and has not passed the storage circuit requesting service during the first scan cycle, it will serve this request. If the circuit is on its second or third scan cycle, it will serve all previous busy stores before serving this request.

1.60 When the storage control circuit stops on a busy storage circuit, it operates a connector relay in the storage circuit and two connector relays in the translator circuit. The storage connector relay and the connector relay on the input side of the translator circuit connect leads between the translator circuit and the storage circuit for the purpose of passing the stored 4-digit number to the translator. The connector relay on the output side of the translator connects leads which contain translated information from the translator to the transmitter control circuit.

Translation of Four Digits To 3-Out-Of-32 Code

1.61 The translator and translator connector circuit consists of two identical parts, each of which is capable of performing all of the translator circuit functions. The particular translator which is used on a given call is determined by the storage control circuit. The use of two translators increases overall system reliability by eliminating the possibility of a single translator trouble placing the entire system out of service.

1.62 When the connector relay on the input side of the translator operates, the stored 4-digit number is passed to the translator register relays on a two-out-of-five basis. Once the register relays have operated, the translator checks the information for completeness and proceeds to make the translation. When all relays necessary for translation have operated, a lead is grounded to the storage control circuit to indicate that the translation has been completed. At this time, 3 out of 32 translator output leads to the transmitter control circuit are grounded. Tables A and B in Plans A through H (refer to Part 4 of this section) show the signal leads which are grounded for any given subscriber's number. Table A of each plan indicates the signal leads which are grounded when a number in number blocks 1000 through 1999 and 2100 through 2699 is translated. Table B of each plan indicates the signal leads which are grounded when a number in number blocks 3000 through 3999 and 4100 through 4699 is translated. For example, using Plan A, Table A, the number 2348 is translated in the following manner: for thousands digit 2 and hundreds digit 3, read down column 2 to row 3, obtaining signal lead 13; for tens digit 4 and units digit 8, read down column 6 to row 8, obtaining signal leads 21 and 26. Thus, for the number 2348, signal leads 13, 21, and 26 will be grounded by the translator to the transmitter control circuit. These leads indicate the particular three frequencies (tones) which are to be transmitted.

Transmitting The Three Audio Frequencies

1.63 The personal signaling system uses 32 frequencies which are the odd harmonics of 7.5 Hz, starting with 517.5 Hz and continuing through 997.5 Hz with 757.5 Hz excluded. (See Table B.) The exclusion of 757.5 Hz divides the code frequencies into two groups of 16, with frequencies in the first group being numbered from 1 through 16 and in the second group from 18 through 33.

1.64 The transmitter control circuit receives the 32 tones simultaneously from oscillators in the tone generator circuit; however, only three tones are used for a call. The three grounded leads from the translator (which represent the translated 4-digit number) operate three signal

TABLE B

OSCILLATOR EQUIPPED POSITIONS

	FREQ REF NO.	OSC OUTPUT	CRYS FREQ
GROUP A	1	517.5	2070
	2	532.5	2130
	3	547.5	2190
	4	562.5	2250
	5	577.5	2310
	6	592.5	2370
	7	607.5	2430
	8	622.5	2490
	9	637.5	2550
	10	652.5	2610
	11	667.5	2670
	12	682.5	2730
	13	697.5	2790
	14	712.5	2850
	15	727.5	2910
	16	742.5	2970
GROUP B	18	772.5	3090
	19	787.5	3150
	20	802.5	3210
	21	817.5	3270
	22	832.5	3330
	23	847.5	3390
	24	862.5	3450
	25	877.5	3510
	26	892.5	3570
	27	907.5	3630
	28	922.5	3690
	29	937.5	3750
	30	952.5	3810
	31	976.5	3870
	32	982.5	3930
	33	997.5	3990

relays in the transmitter control circuit which select the three tones to be transmitted. In the example given in 1.62, the number 2348 was translated to ground signal leads 13, 21, and 26. Referring to Table C, Plan A, the tones selected when the signal relays associated with these leads operate are 697.5 Hz, 817.5 Hz and 892.5 Hz. Upon operation of the three signal relays, the three tones are combined, filtered, amplified, and sent through the transmitter trunk originating unit to the transmitter trunk terminating units. The level at the output of the transmitter trunk originating unit is −5 dBm per tone. After the storage control circuit receives a translation-complete signal from the translator, it sends a start signal to the transmitter control circuit. The transmitter control circuit then makes a 3-out-of-32 check of the signal relays to determine if the oscillators selected by the signal relays are working; and, if the check is satisfactory, the transmitter control circuit turns on all transmitters. At the same time, the three audio tones are sent to all transmitters.

1.65 The transmitter returns a transmitter-on signal to the transmitter control circuit, lighting a TON lamp (one for each transmitter) to indicate each transmitter turned on and starting a timer circuit. When approximately 1/2 second has elapsed, the transmitter control circuit signals the storage control circuit that transmission is completed. The storage control circuit releases the transmitter control circuit and translator, disconnects itself from the storage circuit, and prepares to advance to the next busy storage circuit.

Radio Transmitter Action

1.66 The ▶3-tone signal◀ received by the radio transmitters from the control terminal modulates the transmitters, and the frequency-modulated carrier is radiated from each transmitter. Each signal is sent out three times as explained in 1.68 and 1.69.

Radio Receiver and Customer Action

1.67 The transmitted signal is received by all receivers, but only the receiver with the three coding elements responsive to the ▶3-tone signal◀ sounds its alerting tone. The BELLBOY customer carrying this receiver, upon hearing the alerting tone, presses a RESET button which silences the tone. He then phones his office to obtain a message or takes some other prearranged action.

End of First Scan by Storage Control Circuit

1.68 The storage control circuit records two bits of data before it leaves the first busy storage circuit. It records that this particular storage circuit contains a number to be transmitted again, and that this storage circuit was the beginning of the first scan cycle. The storage control circuit continues scanning, advancing to the next full storage circuit, where it causes the number to be translated and signals to be transmitted. The storage control circuit continues the above procedure until the end of a scan cycle is reached, recording for each storage circuit that it is to be served again. The storage control circuit ascertains that a minimum of 30 seconds have elapsed from the end of the first storage transmission before it proceeds to the second scan cycle. The 30-second period can be manually changed to a minimum of 16 seconds.

Transmission Repeated on Second and Third Scans

1.69 The storage control circuit scans its individual storage memory circuits on the second and third scans. Thus, on the second and third scans, the storage control circuit works with just those storage circuits which were served on the first scan and were recorded in the storage control memory for individual stores. Between the second and third scans, the storage control circuit again ascertains that at least 30 seconds have elapsed from the end of the first storage transmission on the second scan cycle before it proceeds to the third scan cycle.

1.70 The minimum time of 30 seconds between each transmission for a particular storage circuit may be exceeded because this time depends on the number of storage circuits to be served and the control time required to make one transmission. However, since the control time in making a transmission is approximately 1 second and the holding time of an incoming trunk register is an average of approximately 10 seconds, it is highly improbable that more than 30 storage circuits will become busy within the three scan cycles, except under extremely heavy traffic or trouble conditions. Under these circumstances the elapsed time will be lengthened as necessary to complete the scan.

Release of Storage Circuits

1.71 At the end of the third scan, the storage control circuit releases all storage circuits for which three transmissions are completed, provided that the register check circuit is not scanning for an idle store. The circuit which prevents store release under the above conditions is a mutual lockout circuit in the storage control circuit. The storage control circuit also prevents scanning by the register check while the releasing of the storage circuits is being performed.

Calls Waiting In Storage

1.72 After the storage control circuit begins its first scan and stops on the first busy storage circuit, it is possible that the register check circuit will place a number in one of the storage circuits preceding the full storage circuit. The storage circuit containing the recently stored number becomes locked out of the scan for three scan cycles or a nominal period of 60 seconds. The 60

seconds may be decreased by the amount of time elapsing between the time that the storage control circuit stopped on the first full storage circuit and the time that the locked-out storage circuit requests transmission. The 60 seconds may be increased by the quantity of storage circuits requesting transmission on the first three scans and possibly by station identification.

Radio Station Identification

1.73 The call letters of the central office station are transmitted 30 minutes after the first personal signaling service (PSS) call is initiated, or as soon thereafter as the transmitters become available. After the station is identified, a new 30-minute timing cycle is started upon the next transmission of a PSS call. The identification message is recorded on an announcement set. The message consists of a 2-second audio tone, ***"tinkle tone,"*** followed by the station's call letters, which are transmitted three times. International Morse Code is used to identify the station. The time of the recording and tone is 25 to 30 seconds. The ***"tinkle tone"*** signal preceding station identification is necessary to properly activate the transmitter modulation detector.

F. Test Equipment

1.74 A list of test equipment suggested for the maintenance of the 150-Megahertz BELLBOY System is contained in a current EM. Refer to the EM files for this information.

EQUIPMENT CODE	RATING OF UNIT	TITLE	EQUIPMENT DRAWING	CIRCUIT DRAWING	CIRCUITS PER UNIT	MTG PLATES PER UNIT
J95415H	AT&TCo Std	Voice Alarm Unit	J95415H-( )	SD-95959-01	1	5
J99281A	AT&TCo Std	Common Control Equipment Frame	J99281A-( )	SD-96501-01 SD-96504-01 SD-96505-01 SD-96506-01 SD-96507-01 SD-96565-01		
J99281B	AT&TCo Std	Announcer Frame	J99281B-( )	SD-95281-01 SD-95283-01 SD-95959-01 SD-96501-01 SD-96507-01 SD-96565-01		
J99281C	AT&TCo Std	First Supl Frame	J99281C-( )	SD-96501-01 SD-96505-01 SD-96565-01		
J99281D	AT&TCo Std	Second Supl Frame	J99281D-( )	SD-96505-01 SD-96565-01		
J99281E	AT&TCo Std	Inc Trk Reg Unit	J99281E-( )	SD-96501-01	1	5
J99281F	AT&TCo Std	Reg Check Unit	J99281F-( )	SD-96504-01	1	4
J99281G	AT&TCo Std	Reg Check and Conn Pref Cont Unit	J99281G-( )	SD-96504-01	1	4
J99281H	AT&TCo Std	100-Line Intercept Unit	J99281H-( )	SD-96504-01	1	4
J99281J	AT&TCo Std	Storage Common Cont Unit	J99281J-( )	SD-96507-01	1	4
J99281K	AT&TCo Std	Storage Tst Unit	J99281K-( )	SD-96505-01	10	1
J99281L	AT&TCo Std	Storage Unit	J99281L-( )	SD-96505-01	2	1
J99281M	AT&TCo Std	No. Check Unit	J99281M-( )	SD-96565-01	1	5
J99281N	AT&TCo Std	Storage Cont & Timing Unit	J99281N-( )	SD-96507-01	1	4
J99281P	AT&TCo Std	Translator Unit	J99281P-( )	SD-96506-01	1	4
J99281R	AT&TCo Std	Fr Fuse Panel	J99281R-( )	SD-96504-01		
J99281S	AT&TCo Std	Transmitter Control & Supl Fr	J99281S-( )	SD-96562-01 SD-96563-01 SD-96564-01		

EQUIPMENT CODE	RATING OF UNIT	TITLE	EQUIPMENT DRAWING	CIRCUIT DRAWING	CIRCUITS PER UNIT	MTG PLATES PER UNIT
J99281T	AT&TCo Std	Tone Supl Unit	J99281T-( )	SD-96563-01	1	13-1/2
J99281U	AT&TCo Std	Common Trmsn Control Unit	J99281U-( )	SD-96564-01	1	9
J99281W	AT&TCo Std	Transmitter Trk Orig Unit	J99281W-( )	SD-96564-01	1	1
J99281Y	AT&TCo Std	Transmitter Cont Fr Fuse Panel	J99281Y-( )	SD-96564-01		
J99281AA	AT&TCo Std	1st Supl Frame Fuse Panel	J99281AA-( )	SD-96504-01		
J99281AB	AT&TCo Std	2nd Supl Frame Fuse Panel	J99281AB-( )	SD-96504-01		
J99281AC	AT&TCo Std	Intercept Trk Unit	J99281AC-( )	SD-96501-01	4	1
J99281AD	AT&TCo Std	Misc Test Unit	J99281AD-( )	SD-96506-01	1	1
J99281AE	AT&TCo Std	Delay Network Panel	J99281AE-( )	SD-96564-01	1	1

2. SUPPLEMENTARY INFORMATION

2.01

407-200-100—150-Megahertz BELLBOY—Overall System—General Description
407-207-100—150-Megahertz BELLBOY—J1 Control Terminal Description
Floor Plan Data—Section 7.1, sheets 67, 68, 69, and 70

3. DRAWINGS

3.01 For additional drawings forming a part of this specification, see listing under Subdivisions of Equipment.

ED-25435-01—Tandem Crossbar Keysheets
ED-91201-51—Frame Ground and Appliance Outlets
ED-94809-10—Switchboard Cabling Details—Common Control Equipment Frame
ED-94809-11—Switchboard Cabling Details—Announcer Frame
ED-94809-12—Switchboard Cabling Details—First Supplementary Frame
ED-94809-13—Switchboard Cabling Details—Second Supplementary Frame
ED-94809-14—Switchboard Cabling Details—Transmitter Control Frame
SD-25760-01—No. 5 Crossbar Keysheets

4. EQUIPMENT

J99281A—AT&TCo Std—J1 Control Terminal Common Control Frame Equipment

Equipment—J99281A-( )

List 1—Framework, assembly, wiring, and equipment for one J1 Control Terminal Common Equipment Frame. (See Note A.)

Inc Trk Reg & Conn Ckt,	WIRE	EQUIP	SEE NOTES
SD-96501-01:			
Fig. 1	6	2	J
Fig. 2	1	1	—
Fig. 3	1	1	—
Reg Chk & Conn Cont Ckt,			
SD-96504-01:			
Fig. 1	2	2	B
Fig. 2	1	1	C
Fig. 3	1	1	—
Fig. 4	1	1	—
Fig. 5	1	1	—
Fig. 6	1	1	E
Fig. 7	1	1	—
Fig. 8	1	1	M
Stg & Stg Conn Ckt,			
SD-96505-01:			
Fig. 1	20	2	H,L
Fig. 2	20	10	—
Fig. 3	1	1	—
Fig. 4	10	5	G,L
Trnsl & Trnsl Conn Ckt,			
SD-96506-01:			
Fig. 1	2	2	D
Fig. 2	1	1	—
Fig. 3	2	2	—
Fig. 4	1	1	N
Fig. 5	1	1	—
Fig. 6	0	5	—

Stg Cont Ckt,	WIRE	EQUIP	SEE NOTES
SD-96507-01:			
Fig. 1	1	1	F
Fig. 3	1	1	—
Fig. 4	1	1	—
Fig. 5	1	1	—
No. Chk Trnsl Ckt,			
SD-96565-01:			
Fig. 1	3	0	—
Fig. 2	0	1	—

List 2—Wiring and equipment required in addition to List 1 and/or 3 for each two additional storage circuits.

Stg Ckt,	WIRE	EQUIP	SEE NOTES
SD-96505-01:			
Fig. 1	0	2	H

List 3—Assembly and equipment required in addition to List 1 for the 11th and 12th additional storage circuits.

Stg & Stg Conn Ckt	WIRE	EQUIP	SEE NOTES
SD-96505-01:			
Fig. 1	—	2	H
Fig. 2	—	10	—
Fig. 4	—	5	G

List 4—Assembly, wiring, and equipment, when required, in addition to List 1 for each additional incoming trunk register per SD-96501-01. (See Note J.)

List 5—Assembly, wiring, and equipment, when required, in addition to List 1 for each number check translator circuit per SD-96565-01, Fig. 1. (See Note K.)

Notes

A. See Table C.

B. Equipment per J99281F, L1.

TABLE C

WIRING ONLY OPTIONS

J99281A

IN ADDITION TO LIST	FOR	WHEN	PROVIDE	
			CIRCUIT	OPTION
1	Customer Dialing	Supervision for charging on message-rate lines or for flat-rate service on flat-rate lines is required.	SD-96501-01	Z
		Delayed supervision for flat-rate service on message-rate lines is required.	SD-96501-01	R
1	Operator Dialing		SD-96501-01	Y
1		Originating office outgoing trunks are arranged to recognize make-busy signal.	SD-96501-01	S
1, 2, or 3		One of storage circuits 2 to 20 (even) is last equipped storage circuit.	SD-96505-01	Z
1	Alarm Control	Located in other than No. 5 crossbar office.	SD-96507-01	X
1		Located in No. 5 crossbar office.	SD-96507-01	Y
1		Located in office without alarm sending.	SD-96507-01	X
2	Vacant or unassigned number intercept with customer dialing	6A announcement machine is provided.	SD-96501-01	4

C. Equipment per J99281G, L1.

D. Equipment per J99281P, L1.

E. Equipment per J99281H, L1.

F. Equipment per J99281J, L1.

G. Equipment per J99281K, L1.

H. Equipment per J99281L, L1.

J. Equipment per J99281E, L1.

K. Equipment per J99281M, L1.

L. Space for 20 storage and storage connector circuits is provided on frame per J99281A; space for 10 storage and storage connector circuits is provided on frames per J99281C and J99281D. Two circuits are provided on frame per J99281A and additional circuits are provided in units of two per telephone company order.

M. Equipment per J99281R, L1.

N. Equipment per J99281AD, L1.

J99281B—AT&TCo Std—J1 Control Terminal Announcer Frame

Equipment—J99281B-( )

List 1—Framework, assembly, wiring, and equipment for one J1 Control Terminal Announcer

Frame. (See Note A.)

	WIRE	EQUIP	SEE NOTES
Ampl Set Ckt, SD-95281-01:			
Fig. 3	3	3	G
Announcement Set Ckt SD-95283-01:			
Fig. 1	3	3	F
Voice Alarm Ckt, SD-95959-01:			
Fig. 1	1	1	E
Inc Trk Reg Ckt, SD-96501-01:			
Fig. 1	1	0	—
Fig. 4	10	0	B
Stg Cont Ckt, SD-96507-01:			
Fig. 2	2	2	C
No. Chk Trnsl Ckt, SD-96565-01:			
Fig. 1	3	0	D
401A Tone Generator Ckt, SD-99720-01:			
Fig. 1	1	1	H

List 2—Assembly, wiring, and equipment required in addition to List 1 for one incoming trunk register per J99281E, L1.

List 3—Assembly, wiring, and equipment required in addition to List 1 for each number check translator when required, per J99281M, L1.

List 4—Assembly, wiring, and equipment required in addition to List 1 per SD-96501-01, four Fig. 4. One Fig. 4 is required with customer dialing for each equipped incoming trunk register (ITR) when vacant or unassigned numbers are to be intercepted and a regular intercept operator or 6A announcement machine is used. Equipment per J99281AC, L1.

Notes

A. In addition, there are options involving wiring only. See Table D.

B. Equipment per J99281E, L1.

C. Equipment per J99281N, L1.

D. Equipment per J99281M, L1.

E. Equipment per J95415H, L1.

F. Equipment per KS-16765, L2 and L7.

G. The amplifier set per KS-16754, L4 is mounted on mounting bracket per KS-16765, L7. Because of the delicate nature of the announcement sets and their mounting details, the announcement sets should be shipped separately.

H. The 401A tone generator is a one-circuit, one-mounting plate unit.

TABLE D

WIRING ONLY OPTIONS

J99281B

IN ADDITION TO LIST	FOR	WHEN	PROVIDE	
			CIRCUIT	OPTION
2	Customer Dialing	Supervision for charging on message-rate lines or for flat-rate service on flat-rate basis is required.	SD-96501-01	Z
		Delayed supervision for flat-rate service on message-rate lines is required.	SD-96501-01	R
2	Operator Dialing		SD-96501-01	Y
2		Originating office outgoing trunks are arranged to recognize make-busy signal.	SD-96501-01	S
2	Vacant or unassigned number intercept with customer dialing	6A announcement machine is provided.	SD-96501-01	M 4

J99281C—AT&TCo Std—J1 Control Terminal First Supplementary Frame

Equipment—J99281C-( )

List 1—Framework, assembly, wiring, and equipment for one J1 Control Terminal First Supplementary Frame.

	WIRE	EQUIP	SEE NOTES
Inc Trk Reg Ckt, SD-96501-01:			
Fig. 1	3	0	—
Reg Chk & Conn Cont Ckt, SD-96504-01:			
Fig. 7	1	1	B
Fig. 9	1	1	—
Stg & Stg Conn Ckt, SD-96505-01:			
Fig. 1	10	0	—
Fig. 4	5	0	—
No. Chk Trnsl Ckt, SD-96565-01:			
Fig. 1	6	0	—

List 2—Assembly, wiring, and equipment required in addition to List 1 for the first two storage units installed on the frame.

SD-96506-01:	WIRE	EQUIP	SEE NOTES
Fig. 1	0	2	C
Fig. 2	—	10	—
Fig. 4	—	5	D

List 3—Wiring and equipment required in addition to List 2 for each additional two storage circuits.

Stg & Stg Conn Ckt, SD-96505-01:	WIRE	EQUIP	SEE NOTES
Fig. 1	0	2	C

List 4—Assembly, wiring, and equipment, when required, in addition to List 1 for each number check translator, SD-96565-01, Fig. 1. (See Note E.)

List 5—Assembly, wiring, and equipment, when required, in addition to List 1 for one incoming trunk register per SD-96501-01, Fig. 1. (See Note. F.)

Notes

A. See Table E.

TABLE E

WIRING ONLY OPTIONS

J99281C

IN ADDITION TO LIST	FOR	WHEN	PROVIDE	
			CIRCUIT	OPTION
5	Customer Dialing	Supervision for charging on message rate lines or for flat-rate service on flat-rate lines is required.	SD-96501-01	Z
5	Operator Dialing	Delayed supervision for flat-rate service on message-rate lines is required.		Y
		Originating office outgoing trunks are arranged to recognize make—busy signals.		
2 or 3		One of storage circuits 22-30 (even) is last equipped storage circuit.	SD-96505-01	Z
5	Vacant or unassigned number intercept with customer dialing	6A announcement machine is provided.	SD-96501-01	M 4

B. Equipment per J99281AA, L1.

C. Equipment per J99281L, L1.

D. Equipment per J99281K, L1.

E. Equipment per J99281M, L1.

F. Equipment per J99281E, L1.

J99281D—AT&TCo Std—J1 Control Terminal Second Supplementary Frame

Equipment—J99281D-( )

List 1—Framework, assembly, wiring, and equipment for one J1 Control Terminal Second Supplementary Frame.

Reg Chk & Conn Ckt,	WIRE	EQUIP	SEE NOTES
SD-96504-01:			
Fig. 7	1	1	—
Fig. 10	1	1	B
Stg & Stg Conn Ckt,			
SD-96505-01:			
Fig. 1	10	0	—
Fig. 2	10	0	—
Fig. 4	5	0	—
No. Chk Trnsl Ckt,			
SD-96565-01:			
Fig. 1	4	0	—

List 2—Assembly, wiring, and equipment, when required, in addition to List 1 for each number check translator per SD-96565-01, Fig. 1. (See Note C.)

List 3—Assembly, wiring, and equipment required in addition to List 1 for the first two storage units installed on frame.

Stg & Stg Conn Ckt,	WIRE	EQUIP	SEE NOTES
SD-96505-01:			
Fig. 1	—	2	D
Fig. 2	—	10	—
Fig. 4	—	5	E

List 4—Wiring and equipment required in addition to List 3 for each 2 additional storage circuits.

Stg & Stg Conn Ckt,	WIRE	EQUIP	SEE NOTES
SD-96505-01:			
Fig. 1	—	2	D

Notes

A. Wiring required in addition to List 3 or 4 per SD-96505-01, "Z" option when one of storage circuits 32 to 40 (even) is last equipped storage circuit.

B. Equipment per J99281AB, L1.

C. Equipment per J99281M, L1.

D. Equipment per J99281L, L1.

E. Equipment per J99281K, L1.

J99281E—AT&TCo Std—J1 Control Terminal Incoming Trunk Register Unit

Equipment—J99281E-( )

List 1—Assembly, wiring, and equipment per SD-96501-01, Fig. 1, for one J1 Control Terminal Incoming Trunk Register Unit.

Note

A. In addition, there are options involving wiring only. See Table F.

J99281F—AT&TCo Std—J1 Control Terminal Register Check Unit

Equipment—J99281F-( )

List 1—Assembly, wiring, and equipment per SD-96504-01, Fig. 1, for one J1 Control Terminal Register Check Unit.

J99281G—AT&TCo Std—J1 Control Terminal Register Check and Connector Preference Control Transfer and Alarm Unit

TABLE F

WIRING ONLY OPTIONS

J99281E

IN ADDITION TO LIST	FOR	WHEN	PROVIDE	
			CIRCUIT	OPTION
1	Vacant or unassigned number intercept with customer dialing	Originating office is arranged to recognize make-busy signal.	SD-96501-01	S
		Intercept announcement is provided by direct connection to a machine per KS-16765.		K

Equipment—J99281G-( )

List 1—Assembly, wiring, and equipment per SD-96504-01, Fig. 2, for one J1 Control Terminal Register Check and Connector Preference Control Transfer and Alarm Unit.

J99281H—AT&TCo Std—J1 Control Terminal 100-Line Intercept Unit

Equipment—J99281H-( )

List 1—Assembly, wiring, and equipment per SD-96504-01, Fig. 6, for one J1 Control Terminal 100-Line Intercept Unit.

J99281J—AT&TCo Std—J1 Control Terminal Storage Common Control Unit

Equipment—J99281J-( )

List 1—Assembly, wiring, and equipment per SD-96504-01, Fig. 2, and SD-96507-01, Fig. 1, for one J1 Control Terminal Storage Common Control Unit.

J99281K—AT&TCo Std—J1 Control Terminal Storage Test Unit

Equipment—J99281K-( )

List 1—Assembly, wiring, and equipment per SD-96505-01, Fig. 4, for one J1 Control Terminal Storage Test Unit arranged for ten circuits per SD-96505-01, five Fig. 4.

J99281L—AT&TCo Std—J1 Control Terminal Storage Unit

Equipment—J99281L-( )

List 1—Assembly, wiring, and equipment for one J1 Control Terminal Storage Unit arranged per SD-96505-01, two Fig. 1.

Note

A. Wiring required in addition to List 1 per SD-96505-01, "Z" option, when storage circuit is last equipped in system.

J99281M—AT&TCo Std—J1 Control Terminal Number Check Unit

Equipment—J99281M-( )

List 1—Assembly, wiring, and equipment per SD-96565-01, Fig. 1, for one J1 Control Terminal Number Check Unit arranged for two hundreds groups of directory numbers subject to assignment.

J99281N—AT&TCo Std—J1 Control Terminal Storage Control and Timing Unit

Equipment—J99281N-( )

List 1—Assembly, wiring, and equipment per SD-96507-01, Fig. 2, for one J1 Control Terminal Storage Control and Timing Unit.

J99281P—AT&TCo Std—J1 Control Terminal Translator Unit

Equipment—J99281P-( )

List 1—Assembly, wiring, and equipment per SD-96506-01, Fig. 1, for one J1 Control Terminal Translator Unit.

J99281R—AT&TCo Std—J1 Control Terminal Common Control Frame Fuse Panel

Equipment—J99281R-( )

List 1—Assembly, wiring, and equipment per SD-96504-01, Fig. 8, for one J1 Control Terminal Common Control Frame Fuse Panel.

J99281S—AT&TCo Std—J1 Control Terminal Transmitter Control and Tone Supply Frame

Equipment—J99281S-( )

List 1—Framework, assembly, wiring, and equipment for one J1 Control Terminal Transmitter Control and Tone Supply Frame.

	WIRE	EQUIP	SEE NOTES
Announcement Set Ckt,			
SD-95283-01:			
Fig. 1	1	1	—
Voice Alarm Ckt,			
SD-95959-01:			
Fig. 1	1	1	—
Tone Supply Ckt,			
SD-96563-01:			
Fig. 4	1	1	—
Transmitter Control Ckt,			
SD-96564-01:			
Fig. 1	1	1	—
Fig. 2	20	1	C
Fig. 3	1	1	—
Fig. 4	1	1	—

List 2—Assembly, wiring, and equipment required in addition to List 1 per SD-96564-01, Fig. 2, for each additional transmitter trunk originating unit. (See Note C.)

List 3—Assembly, wiring, and equipment required in addition to List 1 for one tone supply circuit to be provided with the first transmitter control and tone supply frame. (See Note D.)

SD-96563-01:	WIRE	EQUIP	SEE NOTES
Fig. 1	2	2	—
Fig. 2	1	1	—
Fig. 3	1	1	—
Fig. 6	32	0	G,H
Fig. 7	32	0	G,H
Fig. 8	2	2	—
Fig. 10	1	1	—

List 4—Equipment required in addition to List 1 when voice transmission of station identification is specified.

List 5—Equipment required in addition to List 1 when code transmission of station identification is specified by code wheel or announcement set.

Notes

A. In addition, options involving wiring only are as follows:

1. Wiring required in addition to List 3 per SD-96563-01, "Y" option (omit "Z") for alarm control when system is installed in a No. 5 crossbar office.

2. Wiring required in addition to List 1 per SD-96564-01, "W" option (omit "V"), for alarm control when system is installed in a No. 5 crossbar office.

3. SD-96564-01, "W" option is required for alarm control in No. 5 crossbar offices; "V" option is required for all other offices;

"T" option is required when alarm sending circuit is provided, and "S" option is required when alarm sending circuit is not provided.

B. The bay local cabling is defined per SD-96563-01, CADs 1, 2, and 3 and per SD-96504-01, CADs 1 and 2.

C. One transmitting trunk originating unit is required for each transmitter served. Local frame cabling is provided to wire a maximum of 20 units.

D. One tone supply unit and associated plug-in apparatus is adequate for a system supplying service to 3200 customers.

E. All plug-in apparatus may be ordered by apparatus codes.

F. The local bay cabling shall include interconnecting wiring.

G. Provides wiring and receptacles only.

H. Provides 36A oscillators or 4035A networks as follows.

1. The BELLBOY equipment has the capability of serving 3200 customers. These customers are assigned numbers in the following number blocks:

1000-1999, 2100-2699 (See Table A.)
3000-3999, 4100-4699 (See Table B.)

A nationwide numbering plan has been devised to prevent BELLBOY customers from being signaled by any but their own home system. Provisions will be made for Plans A through H which will be administered by the AT&TCo.

An examination of Tables A and B in any of Plans A through H will show that 100 customer numbers can be obtained by equipping 1 tone generator in regular group A and 16 tone generators in regular group B, or vice versa. (Refer to Table B.) A standby group A and B are also provided in case the regular tone generates fail.

2. One customer number in series 1000 to 2699 requires one of the signal tone numbers between 1 and 16 for the first two digits and two of the signal tone numbers between 18 and 33 for the third and fourth digits in accordance with Table A of any of Plans A through H.

3. One customer number in series 3000 to 4699 requires one of the signal tone numbers between 18 and 33 for the first two digits and two of the signal tone numbers between 1 and 16 for the third and fourth digits in accordance with Table B of any of Plans A through H.

4. Each additional tone generator equipped in Group A will give an added 100 customer numbers up to a total of 1600; however, when both groups A and B are fully equipped, 3200 numbers are possible.

5. For test purposes, slot positions 1 and 33 should always be equipped with tone generators (36A oscillators and selected ◗KS-16515, L3◖ crystal units). (Refer to Table B for crystal selection.)

6. Plug-in networks 4035A are required for all unequipped slot positions; these networks are dummy loads used to simulate dc loading of the 36A oscillators in the power supply circuit.

7. When customer numbers have been determined and slot positions ascertained, crystals per KS-16515, L3 shall be selected and plugged into the crystal socket assembly of the 36A oscillator. The combination of 36A oscillator and KS-16515, L3 crystal is a tone generator with a given output frequency. The telephone company will identify this tone generator with its frequency and slot position number under the transparent tab provided on the oscillator casting.

8. Oscillator numbers and oscillator output frequencies corresponding to the slot positions shall be entered on the designation card, which is mounted on the J99281T tone

supply unit, by the telephone company in accordance with the nationwide numbering plan.

9. The following example illustrates the use of Table A, Plan A, plus the use of Tables B and C.

Required:

Selection of three signal tone numbers, oscillators, slot positions, and crystal units for a given customer number of "2348".

From Table A, Plan A:

Signal tone number for the first and second digits is selected at the intersection of column 2, row 3, which yields 13.

Signal tone numbers for the third and fourth digits are selected at the intersection of columns designated tens digits and units digits. In this example column 6, row 8, thus "48" of the customer number, yields signal tone numbers of 21 and 26.

From Tables B and C:

Signal tone numbers are also termed slot positions. Slot positions 13, 21, and 26 will be equipped according to Table C, Plan A, and crystal units selected from Table B (appearing in Part 1 of this section), as follows:

SLOT POS	CRYS	OSC OUT
13	2790 Hz	697.5 Hz
21	3270 Hz	817.5 Hz
26	3570 Hz	892.5 Hz

Outputs from equipped positions may be verified by measuring at the OSC OUT jack of the tone generators as indicated above.

10. Table B, Plan A, is used in place of Table A when the customer number is in the series 3000 to 4699.

11. All information covered in 5.01 applies to both regular and standby shelf arrangements for tone oscillators or networks.

J99281T—AT&TCo Std—Tone Supply Unit

Equipment—J99281T-( )

List 1—Assembly, wiring, and equipment per SD-95963-01, 32 Fig. 6 and 7, two Fig. 1 and 8, and one Fig. 2, 3, and 10, for one J1 Control Terminal Tone Supply Unit.

J99281U—AT&TCo Std—J1 Control Terminal Common Transmission Control Unit

Equipment—J99281U-( )

List 1—Assembly, wiring, and equipment per SD-96564-01, Fig. 1 and 3, for one Common Transmission Control Unit.

List 2—Wiring and apparatus required in addition to List 1 per SD-95963-01, Fig. 10, for one lamp and key circuit (required only on frame which mounts the tone supply unit).

List 3—Apparatus required in addition to List 1 when voice transmission of station identification is specified.

List 4—Apparatus required in addition to List 1 when code transmission of station identification is specified.

J99281W—AT&TCo Std—J1 Control Terminal Transmitter Trunk Originating Unit

Equipment—J99281W-( )

List 1—Assembly, wiring, and equipment per SD-96564-01, Fig. 2, for one J1 Control Terminal Transmitter Trunk Originating Unit. (See Note A.)

J99281Y—AT&TCo Std—J1 Control Terminal Transmitter Control Frame Fuse Panel

Equipment—J99281Y-( )

List 1—Assembly, wiring, and equipment per SD-96564-01, Fig. 5 and 6, for one J1 Control Terminal Transmitter Control Bay Fuse Panel.

J99281AA—AT&TCo Std—J1 Control Terminal First Supplementary Frame Fuse Panel

Equipment—J99281AA-( )

List 1—Assembly, wiring, and equipment per SD-96504-01, Fig. 9, for one J1 Control Terminal First Supplementary Frame Fuse Panel.

J99281AB—AT&TCo Std—J1 Control Terminal Second Supplementary Frame Fuse Panel

Equipment—J99281AB-( )

List 1—Assembly, wiring, and equipment per SD-96504-01, Fig. 10, for one J1 Control Terminal Second Supplementary Frame Fuse Panel.

J99281AC—AT&TCo Std—J1 Control Terminal Intercept Trunk

Equipment—J99281AC-( )

List 1—Assembly, wiring, and equipment per SD-96501-01, Fig. 4, for one J1 Control Terminal Intercept Trunk. (See Note B.)

J99281AD—AT&TCo Std—J1 Control Terminal Miscellaneous Test Unit

Equipment—J99281AD-( )

List 1—Assembly, wiring, and equipment per SD-96506-01, Fig. 5, for one J1 Control Terminal Miscellaneous Test Unit

J99281AE—AT&TCo Std—J1 Control Terminal Delay ▶Equalizer Panel◀

Equipment—J99281AE-( )

List 1—Panel for mounting delay equalizer networks. Delay equalizers 4049A, 4049B, or 4050A must be ordered as required. ▶(See Note C.)◀

Notes

A. One transmitter trunk originating unit is required for each transmitter equipped.

B. In addition, options involving wiring only are as follows:

1. Wiring required in addition to List 1 per SD-96501-01, Fig. 4, options "Q" and "4" for vacant or unassigned number intercept with customer dialing when external circuit loop is greater than 2000.

2. Wiring required in addition to List 1 per SD-96501-01, Fig. 4, options "N" and "4" for vacant or unassigned number intercept with customer dialing when external circuit loop is greater than 3000.

C. One delay equalizer panel is required for each transmitter equipped.

5. GENERAL NOTES

Wiring

5.01 No. 24 BU-type wire shall be used for local cable on all of the following frames.

J99281A	J99281D
J99281B	J99281S (See Note)
J99281C	

The surface wiring used on each of the units listed below shall be 24 gauge, BW-type wire.

J99281E	J99281P
J99281F	J99281R
J99281G	J99281S (See Note)
J99281H	J99281T
J99281J	J99281U
J99281K	J99281W
J99281L	J99281AA
J99281M	J99281AB
J99281N	J99281AC

Note: All local cabling on the transmitter control and tone supply bay is made up of BU-type wire except that local cabling associated with the tone supply unit per J99281T, which uses BW-type wire.

5.02 The J1 control terminal is designed to be ordered and equipped in any combination of

incoming trunk registers, storage units, and number check units required by the traffic in a particular office. However, for average traffic conditions, four equipment configurations can be ordered to satisfy the requirements of a specific number of subscribers:

(a) For 600 lines, provide frames per J99281A, L1, four L2, four L4, three L5; J99281B, L1, L4 as required; and J99281S, L1, L2 as required, L3, thereby providing:

6 Incoming Trunk Registers

10 Storage Circuits

3 Number Check Circuits

(b) For 1200 lines, provide frames per J99281A, L1, eight L2, L3, four L4, three L5; J99281B, L1, L2, three L3, L4 as required; and J99281S, L1, L2 as required, L3, thereby providing:

7 Incoming Trunk Registers

20 Storage Circuits

6 Number Check Circuits

(c) For 2400 lines, provide frames per J99281A, L1, eight L2, L3, four L4, three L5; J99281B, L1, L2, three L3, L4, as required; J99281C, L1, L2, four L3, six L4, three L5; and J99281S, L1, L2 as required, L3, thereby providing:

10 Incoming Trunk Registers

30 Storage Circuits

12 Number Check Circuits

(d) For 3200 lines (maximum possible size), provide frames per J99281A, L1, eight L2, L3, four L4, three L5; J99281B, L1, L2, three L3, L4 as required; J99281C, L1, L2, four L3, six L4, three L5; J99281D, L1, four L2, L3, four L4; J99281S, L1, L2 as required, L3, thereby providing:

10 Incoming Trunk Registers

40 Storage Circuits

16 Number Check Circuits

5.03 All bays associated with the J1 control terminal are equipped with a full local cable with local cable skinners turned back and sleeved at locations of unequipped units.

5.04 The incoming trunk registers in a J1 control terminal can be arranged for either operator or customer dialing. All registers in a particular system must be arranged in the same manner.

5.05 Incoming trunk register "0" is intended for use as a test register for routine testing of the system. If this register must be used to serve regular traffic, it should be added as the last register in a trunk group.

5.06 Traffic usage observations should, preferably, be made in the originating office using a traffic usage recorder (TUR) on the trunks assigned to personal signaling. In the originating office where no TUR is available, the observations may be made in the office containing the J1 control terminal using the TU lead from each incoming trunk register circuit. In either office where no TUR is available, connections should be made in the originating office using traffic registers associated with the outgoing trunks to record "peg-count" and "all-trunks-busy" conditions. In the originating office where traffic registers are not available, connections to traffic registers in the host office should be made using ITB leads from the incoming trunk registers for "peg-count" observations and ATB leads from the registers for "all-trunks-busy" observations. In step-by-step areas, traffic usage or register measurements should be made on a trunk group basis, one trunk group per office served, and one register associated with each trunk group for each measurement required.

PLAN A

TABLE A

FOR DETERMINING SIGNALING TONES TO BE GENERATED FOR SUBSCRIBER NUMBERS 1000-1999 AND 2100-2699

COLUMN

ROW	1	2		3	4	5	6	7	8	9	10	11	12
	TH DIGIT	1	2	TENS DIGIT	1	2	3	4	5	6	7	8	9	0
	H DIGIT	1ST SIGNAL TONE NUMBER		UNITS DIGIT	2ND AND 3RD SIGNAL TONE AND LEAD NUMBER									
1	1	2	11	1	18 33	19 33	20 33	21 33	22 33	23 33	24 33	25 33	26 33	27 33
2	2	3	12	2	18 32	19 32	20 32	21 32	22 32	23 32	24 32	25 32	26 32	27 32
3	3	4	13	3	18 31	19 31	20 31	21 31	22 31	23 31	24 31	25 31	26 31	27 31
4	4	5	14	4	18 30	19 30	20 30	21 30	22 30	23 30	24 30	25 30	26 30	27 30
5	5	6	15	5	18 29	19 29	20 29	21 29	22 29	23 29	24 29	25 29	26 29	27 29
6	6	7	16	6	18 28	19 28	20 28	21 28	22 28	23 28	24 28	25 28	26 28	20 23
7	7	8	–	7	18 27	19 27	20 27	21 27	22 27	23 27	24 27	25 27	23 21	28 30
8	8	9	–	8	18 26	19 26	20 26	21 26	22 26	23 26	24 26	20 22	29 31	28 31
9	9	10	–	9	18 25	19 25	20 25	21 25	22 25	23 25	21 19	30 32	29 32	28 32
10	0	1	–	0	18 24	19 24	20 24	21 24	22 24	20 18	31 33	30 33	29 33	28 33

TABLE B

FOR DETERMINING SIGNALING TONES TO BE GENERATED FOR SUBSCRIBER NUMBERS 3000-3999 AND 4100-4699

COLUMN

ROW	1	2		3	4	5	6	7	8	9	10	11	12
	TH DIGIT	3	4	TENS DIGIT	1	2	3	4	5	6	7	8	9	0
	H DIGIT	1ST SIGNAL TONE NUMBER		UNITS DIGIT	2ND AND 3RD SIGNAL TONE AND LEAD NUMBER									
1	1	19	28	1	1 16	2 16	3 16	4 16	5 16	6 16	7 16	8 16	9 16	10 16
2	2	20	29	2	1 15	2 15	3 15	4 15	5 15	6 15	7 15	8 15	9 15	10 15
3	3	21	30	3	1 14	2 14	3 14	4 14	5 14	6 14	7 14	8 14	9 14	10 14
4	4	22	31	4	1 13	2 13	3 13	4 13	5 13	6 13	7 13	8 13	9 13	10 13
5	5	23	32	5	1 12	2 12	3 12	4 12	5 12	6 12	7 12	8 12	9 12	10 12
6	6	24	33	6	1 11	2 11	3 11	4 11	5 11	6 11	7 11	8 11	9 11	3 6
7	7	25	–	7	1 10	2 10	3 10	4 10	5 10	6 10	7 10	8 10	6 4	11 13
8	8	26	–	8	1 9	2 9	3 9	4 9	5 9	6 9	7 9	3 5	12 14	11 14
9	9	27	–	9	1 8	2 8	3 8	4 8	5 8	6 8	4 2	13 15	12 15	11 15
10	0	18	–	0	1 7	2 7	3 7	4 7	5 7	3 1	14 16	13 16	12 16	11 16

PLAN B

TABLE A

FOR DETERMINING SIGNALING TONES TO BE GENERATED FOR SUBSCRIBER NUMBERS 1000-1999 AND 2100-2699

ROW	COLUMN 1	2		3	4	5	6	7	8	9	10	11	12
	TH DIGIT	1	2	TENS DIGIT	1	2	3	4	5	6	7	8	9	0
	H DIGIT	1ST SIGNAL TONE NUMBER		UNITS DIGIT	2ND AND 3RD SIGNAL TONE AND LEAD NUMBER									
1	1	1	10	1	18 33	19 33	20 33	21 33	22 33	23 33	24 33	25 33	26 33	27 33
2	2	2	11	2	18 32	19 32	20 32	21 32	22 32	23 32	24 32	25 32	26 32	27 32
3	3	3	12	3	18 31	19 31	20 31	21 31	22 31	23 31	24 31	25 31	26 31	27 31
4	4	4	13	4	18 30	19 30	20 30	21 30	22 30	23 30	24 30	25 30	26 30	27 30
5	5	5	14	5	18 29	19 29	20 29	21 29	22 29	23 29	24 29	25 29	26 29	27 29
6	6	6	15	6	18 28	19 28	20 28	21 28	22 28	23 28	24 28	25 28	26 28	20 23
7	7	7	–	7	18 27	19 27	20 27	21 27	22 27	23 27	24 27	25 27	23 21	28 30
8	8	8	–	8	18 26	19 26	20 26	21 26	22 26	23 26	24 26	20 22	29 31	28 31
9	9	9	–	9	18 25	19 25	20 25	21 25	22 25	23 25	21 19	30 32	29 32	28 32
10	0	16	–	0	18 24	19 24	20 24	21 24	22 24	20 18	31 33	30 33	29 33	28 33

TABLE B

FOR DETERMINING SIGNALING TONES TO BE GENERATED FOR SUBSCRIBER NUMBERS 3000-3999 AND 4100-4699

ROW	COLUMN 1	2		3	4	5	6	7	8	9	10	11	12
	TH DIGIT	3	4	TENS DIGIT	1	2	3	4	5	6	7	8	9	0
	H DIGIT	1ST SIGNAL TONE NUMBER		UNITS DIGIT	2ND AND 3RD SIGNAL TONE AND LEAD NUMBER									
1	1	19	28	1	16 15	1 15	2 15	3 15	4 15	5 15	6 15	7 15	8 15	9 15
2	2	20	29	2	16 14	1 14	2 14	3 14	4 14	5 14	6 14	7 14	8 14	9 14
3	3	21	30	3	16 13	1 13	2 13	3 13	4 13	5 13	6 13	7 13	8 13	9 13
4	4	22	31	4	16 12	1 12	2 12	3 12	4 12	5 12	6 12	7 12	8 12	9 12
5	5	23	32	5	16 11	1 11	2 11	3 11	4 11	5 11	6 11	7 11	8 11	9 11
6	6	24	33	6	16 10	1 10	2 10	3 10	4 10	5 10	6 10	7 10	8 10	2 5
7	7	25	–	7	16 9	1 9	2 9	3 9	4 9	5 9	6 9	7 9	5 3	10 12
8	8	26	–	8	16 8	1 8	2 8	3 8	4 8	5 8	6 8	2 4	11 13	10 13
9	9	27	–	9	16 7	1 7	2 7	3 7	4 7	5 7	3 1	12 14	11 14	10 14
10	0	18	–	0	16 6	1 6	2 6	3 6	4 6	2 16	13 15	12 15	11 15	10 15

PLAN C

TABLE A

FOR DETERMINING SIGNALING TONES TO BE GENERATED FOR SUBSCRIBER NUMBERS 1000-1999 AND 2100-2699

ROW	TH DIGIT	1	2	TENS DIGIT	COLUMN 3	4	5	6	7	8	9	10	11	12
	H DIGIT	1ST SIGNAL TONE NUMBER		UNITS DIGIT	2ND AND 3RD SIGNAL TONE AND LEAD NUMBER									
1	1	16	9	1	18 33	19 33	20 33	21 33	22 33	23 33	24 33	25 33	26 33	27 33
2	2	1	10	2	18 32	19 32	20 32	21 32	22 32	23 32	24 32	25 32	26 32	27 32
3	3	2	11	3	18 31	19 31	20 31	21 31	22 31	23 31	24 31	25 31	26 31	27 31
4	4	3	12	4	18 30	19 30	20 30	21 30	22 30	23 30	24 30	25 30	26 30	27 30
5	5	4	13	5	18 29	19 29	20 29	21 29	22 29	23 29	24 29	25 29	26 29	27 29
6	6	5	14	6	18 28	19 28	20 28	21 28	22 28	23 28	24 28	25 28	26 28	20 23
7	7	6	–	7	18 27	19 27	20 27	21 27	22 27	23 27	24 27	25 27	23 21	28 30
8	8	7	–	8	18 26	19 26	20 26	21 26	22 26	23 25	24 19	20 32	29 32	28 32
9	9	8	–	9	18 25	19 25	20 25	21 25	22 25	23 26	21 26	30 22	29 31	28 31
10	0	15	–	0	18 24	19 24	20 24	21 24	22 24	20 18	31 33	30 33	29 33	28 33

TABLE B

FOR DETERMINING SIGNALING TONES TO BE GENERATED FOR SUBSCRIBER NUMBERS 3000-3999 AND 4100-4699

ROW	TH DIGIT	1	2	TENS DIGIT	COLUMN 3	4	5	6	7	8	9	10	11	12
	H DIGIT	1ST SIGNAL TONE NUMBER		UNITS DIGIT	2ND AND 3RD SIGNAL TONE AND LEAD NUMBER									
1	1	19	28	1	15 14	16 14	1 14	2 14	3 14	4 14	5 14	6 14	7 14	8 14
2	2	20	29	2	15 13	16 13	1 13	2 13	3 13	4 13	5 13	6 13	7 13	8 13
3	3	21	30	3	15 12	16 12	1 12	2 12	3 12	4 12	5 12	6 12	7 12	8 12
4	4	22	31	4	15 11	16 11	1 11	2 11	3 11	4 11	5 11	6 11	7 11	8 11
5	5	23	32	5	15 10	16 10	1 10	2 10	3 10	4 10	5 10	6 10	7 10	8 10
6	6	24	33	6	15 9	16 9	1 9	2 9	3 9	4 9	5 9	6 9	7 9	1 4
7	7	25	–	7	15 8	16 8	1 8	2 8	3 8	4 8	5 8	6 8	4 2	9 11
8	8	26	–	8	15 7	16 7	1 7	2 7	3 7	4 7	5 7	1 3	10 12	9 12
9	9	27	–	9	15 6	16 6	1 6	2 6	3 6	4 6	2 16	11 13	10 13	9 13
10	0	18	–	0	15 5	16 5	1 5	2 5	3 5	1 15	12 14	11 14	10 14	9 14

PLAN D

TABLE A

FOR DETERMINING SIGNALING TONES TO BE GENERATED FOR SUBSCRIBER NUMBERS 1000-1999 AND 2100-2699

COLUMN

ROW	1	2		3	4	5	6	7	8	9	10	11	12
	TH DIGIT	1	2	TENS DIGIT	1	2	3	4	5	6	7	8	9	0
	H DIGIT	1ST SIGNAL TONE NUMBER		UNITS DIGIT	2ND AND 3RD SIGNAL TONE AND LEAD NUMBER									
1	1	15	8	1	18 33	19 33	20 33	21 33	22 33	23 33	24 33	25 33	26 33	27 33
2	2	16	9	2	18 32	19 32	20 32	21 32	22 32	23 32	24 32	25 32	26 32	27 32
3	3	1	10	3	18 31	19 31	20 31	21 31	22 31	23 31	24 31	25 31	26 31	27 31
4	4	2	11	4	18 30	19 30	20 30	21 30	22 30	23 30	24 30	25 30	26 30	27 30
5	5	3	12	5	18 29	19 29	20 29	21 29	22 29	23 29	24 29	25 29	26 29	27 29
6	6	4	13	6	18 28	19 28	20 28	21 28	22 28	23 28	24 28	25 28	26 28	20 23
7	7	5	–	7	18 27	19 27	20 27	21 27	22 27	23 27	24 27	25 27	23 21	28 30
8	8	6	–	8	18 26	19 26	20 26	21 26	22 26	23 26	24 26	20 22	29 31	28 31
9	9	7	–	9	18 25	19 25	20 25	21 25	22 25	23 25	21 19	30 32	29 32	28 32
10	0	14	–	0	18 24	19 24	20 24	21 24	22 24	20 18	31 33	30 33	29 33	28 33

TABLE B

FOR DETERMINING SIGNALING TONES TO BE GENERATED FOR SUBSCRIBER NUMBERS 3000-3999 AND 4100-4699

COLUMN

ROW	1	2		3	4	5	6	7	8	9	10	11	12
	TH DIGIT	3	4	TENS DIGIT	1	2	3	4	5	6	7	8	9	0
	H DIGIT	1ST SIGNAL TONE NUMBER		UNITS DIGIT	2ND AND 3RD SIGNAL TONE AND LEAD NUMBER									
1	1	19	28	1	14 13	15 13	16 13	1 13	2 13	3 13	4 13	5 13	6 13	7 13
2	2	20	29	2	14 12	15 12	16 12	1 12	2 12	3 12	4 12	5 12	6 12	7 12
3	3	21	30	3	14 11	15 11	16 11	1 11	2 11	3 11	4 11	5 11	6 11	7 11
4	4	22	31	4	14 10	15 10	16 10	1 10	2 10	3 10	4 10	5 10	6 10	7 10
5	5	23	32	5	14 9	15 9	16 9	1 9	2 9	3 9	4 9	5 9	6 9	7 9
6	6	24	33	6	14 8	15 8	16 8	1 8	2 8	3 8	4 8	5 8	6 8	16 3
7	7	25	–	7	14 7	15 7	16 7	1 7	2 7	3 7	4 7	5 7	3 1	8 10
8	8	26	–	8	14 6	15 6	16 6	1 6	2 6	3 6	4 6	15 2	9 11	8 11
9	9	27	–	9	14 5	15 5	16 5	1 5	2 5	3 5	1 15	10 12	9 12	8 12
10	0	18	–	0	14 4	15 4	16 4	1 4	2 4	16 14	11 13	10 13	9 13	8 13

PLAN E

TABLE A

FOR DETERMINING SIGNALING TONES TO BE GENERATED FOR SUBSCRIBER NUMBERS 1000-1999 AND 2100-2699

ROW	COLUMN 1	2		3	4	5	6	7	8	9	10	11	12
	TH DIGIT	1	2	TENS DIGIT	1	2	3	4	5	6	7	8	9	0
	H DIGIT	1ST SIGNAL TONE NUMBER		UNITS DIGIT	2ND AND 3RD SIGNAL TONE AND LEAD NUMBER									
1	1	14	7	1	18 33	19 33	20 33	21 33	22 33	23 33	24 33	25 33	26 33	27 33
2	2	15	8	2	18 32	19 32	20 32	21 32	22 32	23 32	24 32	25 32	26 32	27 32
3	3	16	9	3	18 31	19 31	20 31	21 31	22 31	23 31	24 31	25 31	26 31	27 31
4	4	1	10	4	18 30	19 30	20 30	21 30	22 30	23 30	24 30	25 30	26 30	27 30
5	5	2	11	5	18 29	19 29	20 29	21 29	22 29	23 29	24 29	25 29	26 29	27 29
6	6	3	12	6	18 28	19 28	20 28	21 28	22 28	23 28	24 28	25 28	26 28	20 23
7	7	4	–	7	18 27	19 27	20 27	21 27	22 27	23 27	24 27	25 27	23 21	28 30
8	8	5	–	8	18 26	19 26	20 26	21 26	22 26	23 26	24 26	20 22	29 31	28 31
9	9	6	–	9	18 25	19 25	20 25	21 25	22 25	23 25	21 19	30 32	29 32	28 32
10	0	13	–	0	18 24	19 24	20 24	21 24	22 24	20 18	31 33	30 33	29 33	28 33

TABLE B

FOR DETERMINING SIGNALING TONES TO BE GENERATED FOR SUBSCRIBER NUMBERS 3000-3999 AND 4100-4699

ROW	COLUMN 1	2		3	4	5	6	7	8	9	10	11	12
	TH DIGIT	3	4	TENS DIGIT	1	2	3	4	5	6	7	8	9	0
	H DIGIT	1ST SIGNAL TONE NUMBER		UNITS DIGIT	2ND AND 3RD SIGNAL TONE AND LEAD NUMBER									
1	1	19	28	1	13 12	14 12	15 12	16 12	1 12	2 12	3 12	4 12	5 12	6 12
2	2	20	29	2	13 11	14 11	15 11	16 11	1 11	2 11	3 11	4 11	5 11	6 11
3	3	21	30	3	13 10	14 10	15 10	16 10	1 10	2 10	3 10	4 10	5 10	6 10
4	4	22	31	4	13 9	14 9	15 9	16 9	1 9	2 9	3 9	4 9	5 9	6 9
5	5	23	32	5	13 8	14 8	15 8	16 8	1 8	2 8	3 8	4 8	5 8	6 8
6	6	24	33	6	13 7	14 7	15 7	16 7	1 7	2 7	3 7	4 7	5 7	15 2
7	7	25	–	7	13 6	14 6	15 6	16 6	1 6	2 6	3 6	4 6	2 16	7 9
8	8	26	–	8	13 5	14 5	15 5	16 5	1 5	2 5	3 5	15 1	8 10	7 10
9	9	27	–	9	13 4	14 4	15 4	16 4	1 4	2 4	16 14	9 11	8 11	7 11
10	0	18	–	0	13 3	14 3	15 3	16 3	1 3	15 13	10 12	9 12	8 12	7 12

PLAN F

TABLE A

FOR DETERMINING SIGNALING TONES TO BE GENERATED FOR SUBSCRIBER NUMBERS 1000-1999 AND 2100-2699

ROW	1 TH DIGIT	2 1ST SIGNAL TONE NUMBER		3 TENS DIGIT	COLUMN 1	2	3	4	5	6	7	8	9	10
	H DIGIT			UNITS DIGIT	2ND AND 3RD SIGNAL TONE AND LEAD NUMBER									
1	1	13	6	1	18 33	19 33	20 33	21 33	22 33	23 33	24 33	25 33	26 33	27 33
2	2	14	7	2	18 32	19 32	20 32	21 32	22 32	23 32	24 32	25 32	26 32	27 32
3	3	15	8	3	18 31	19 31	20 31	21 31	22 31	23 31	24 31	25 31	26 31	27 31
4	4	16	9	4	18 30	19 30	20 30	21 30	22 30	23 30	24 30	25 30	26 30	27 30
5	5	1	10	5	18 29	19 29	20 29	21 29	22 29	23 29	24 29	25 29	26 29	27 29
6	6	2	11	6	18 28	19 28	20 28	21 28	22 28	23 28	24 28	25 28	26 28	20 23
7	7	3	–	7	18 27	19 27	20 27	21 27	22 27	23 27	24 27	25 27	23 21	28 30
8	8	4	–	8	18 26	19 26	20 26	21 26	22 26	23 26	24 26	20 22	29 31	28 31
9	9	5	–	9	18 25	19 25	20 25	21 25	22 25	23 25	21 19	30 32	29 32	28 32
10	0	12	–	0	18 24	19 24	20 24	21 24	22 24	20 18	31 33	30 33	29 33	28 33

TABLE B

FOR DETERMINING SIGNALING TONES TO BE GENERATED FOR SUBSCRIBER NUMBERS 3000-3999 AND 4100-4699

ROW	1 TH DIGIT	2 1ST SIGNAL TONE NUMBER		3 TENS DIGIT	COLUMN 1	2	3	4	5	6	7	8	9	10
	H DIGIT			UNITS DIGIT	2ND AND 3RD SIGNAL TONE AND LEAD NUMBER									
1	1	19	28	1	12 11	13 11	14 11	15 11	16 11	1 11	2 11	3 11	4 11	5 11
2	2	20	29	2	12 10	13 10	14 10	15 10	16 10	1 10	2 10	3 10	4 10	5 10
3	3	21	30	3	12 9	13 9	14 9	15 9	16 9	1 9	2 9	3 9	4 9	5 9
4	4	22	31	4	12 8	13 8	14 8	15 8	16 8	1 8	2 8	3 8	4 8	5 8
5	5	23	32	5	12 7	13 7	14 7	15 7	16 7	1 7	2 7	3 7	4 7	5 7
6	6	24	33	6	12 6	13 6	14 6	15 6	16 6	1 6	2 6	3 6	4 6	14 1
7	7	25	–	7	12 5	13 5	14 5	15 5	16 5	1 5	2 5	3 5	1 15	6 8
8	8	26	–	8	12 4	13 4	14 4	15 4	16 4	1 4	2 4	14 16	7 9	6 9
9	9	27	–	9	12 3	13 3	14 3	15 3	16 3	1 3	15 13	8 10	7 10	6 10
10	0	18	–	0	12 2	13 2	14 2	15 2	16 2	14 12	9 11	8 11	7 11	6 11

PLAN G

TABLE A

FOR DETERMINING SIGNALING TONES TO BE GENERATED FOR SUBSCRIBER NUMBERS 1000-1999 AND 2100-2699

ROW	TH DIGIT	1	2	TENS DIGIT	COLUMN 1	2	3	4	5	6	7	8	9	10
	H DIGIT	1ST SIGNAL TONE NUMBER		UNITS DIGIT	2ND AND 3RD SIGNAL TONE AND LEAD NUMBER									
1	1	12	5	1	18 33	19 33	20 33	21 33	22 33	23 33	24 33	25 33	26 33	27 33
2	2	13	6	2	18 32	19 32	20 32	21 32	22 32	23 32	24 32	25 32	26 32	27 32
3	3	14	7	3	18 31	19 31	20 31	21 31	22 31	23 31	24 31	25 31	26 31	27 31
4	4	15	8	4	18 30	19 30	20 30	21 30	22 30	23 30	24 30	25 30	26 30	27 30
5	5	16	9	5	18 29	19 29	20 29	21 29	22 29	23 29	24 29	25 29	26 29	27 29
6	6	1	10	6	18 28	19 28	20 28	21 28	22 28	23 28	24 28	25 28	26 28	20 23
7	7	2	–	7	18 27	19 27	20 27	21 27	22 27	23 27	24 27	25 27	23 21	28 30
8	8	3	–	8	18 26	19 26	20 26	21 26	22 26	23 26	24 26	20 22	29 31	28 31
9	9	4	–	9	18 25	19 25	20 25	21 25	22 25	23 25	21 19	30 32	29 32	28 32
10	0	11	–	0	18 24	19 24	20 24	21 24	22 24	20 18	31 33	30 33	29 33	28 33

TABLE B

FOR DETERMINING SIGNALING TONES TO BE GENERATED FOR SUBSCRIBER NUMBERS 3000-3999 AND 4100-4699

ROW	TH DIGIT	3	4	TENS DIGIT	COLUMN 1	2	3	4	5	6	7	8	9	10
	H DIGIT	1ST SIGNAL TONE NUMBER		UNITS DIGIT	2ND AND 3RD SIGNAL TONE AND LEAD NUMBER									
1	1	19	28	1	11 10	12 10	13 10	14 10	15 10	16 10	1 10	2 10	3 10	4 10
2	2	20	29	2	11 9	12 9	13 9	14 9	15 9	16 9	1 9	2 9	3 9	4 9
3	3	21	30	3	11 8	12 8	13 8	14 8	15 8	16 8	1 8	2 8	3 8	4 8
4	4	22	31	4	11 7	12 7	13 7	14 7	15 7	16 7	1 7	2 7	3 7	4 7
5	5	23	32	5	11 6	12 6	13 6	14 6	15 6	16 6	1 6	2 6	3 6	4 6
6	6	24	33	6	11 5	12 5	13 5	14 5	15 5	16 5	1 5	2 5	3 5	13 16
7	7	25	–	7	11 4	12 4	13 4	14 4	15 4	16 4	1 4	2 4	16 14	5 7
8	8	26	–	8	11 3	12 3	13 3	14 3	15 3	16 3	1 3	13 15	6 8	5 8
9	9	27	–	9	11 2	12 2	13 2	14 2	15 2	16 2	14 12	7 9	6 9	5 9
10	0	18	–	0	11 1	12 1	13 1	14 1	15 1	13 11	8 10	7 10	6 10	5 10

PLAN H

TABLE A

FOR DETERMINING SIGNALING TONES TO BE GENERATED FOR SUBSCRIBER NUMBERS 1000-1999 AND 2100-2699

ROW	1	2		3	4	5	6	7	8	9	10	11	12
	TH DIGIT	1	2	TENS DIGIT	1	2	3	4	5	6	7	8	9	0
	H DIGIT	1ST SIGNAL TONE NUMBER		UNITS DIGIT	2ND AND 3RD SIGNAL TONE AND LEAD NUMBER									
1	1	11	4	1	18 33	19 33	20 33	21 33	22 33	23 33	24 33	25 33	26 33	27 33
2	2	12	5	2	18 32	19 32	20 32	21 32	22 32	23 32	24 32	25 32	26 32	27 32
3	3	13	6	3	18 31	19 31	20 31	21 31	22 31	23 31	24 31	25 31	26 31	27 31
4	4	14	7	4	18 30	19 30	20 30	21 30	22 30	23 30	24 30	25 30	26 30	27 30
5	5	15	8	5	18 29	19 29	20 29	21 29	22 29	23 29	24 29	25 29	26 29	27 29
6	6	16	9	6	18 28	19 28	20 28	21 28	22 28	23 28	24 28	25 28	26 28	20 23
7	7	1	–	7	18 27	19 27	20 27	21 27	22 27	23 27	24 27	25 27	23 21	28 30
8	8	2	–	8	18 26	19 26	20 26	21 26	22 26	23 26	24 26	20 22	29 31	28 31
9	9	3	–	9	18 25	19 25	20 25	21 25	22 25	23 25	21 19	30 32	29 32	28 32
10	0	10	–	0	18 24	19 24	20 24	21 24	22 24	20 18	31 33	30 33	29 33	28 33

TABLE B

FOR DETERMINING SIGNALING TONES TO BE GENERATED FOR SUBSCRIBER NUMBERS 3000-3999 AND 4100-4699

ROW	1	2		3	4	5	6	7	8	9	10	11	12
	TH DIGIT	3	4	TENS DIGIT	1	2	3	4	5	6	7	8	9	0
	H DIGIT	1ST SIGNAL TONE NUMBER		UNITS DIGIT	2ND AND 3RD SIGNAL TONE AND LEAD NUMBER									
1	1	19	28	1	10 9	11 9	12 9	13 9	14 9	15 9	16 9	1 9	2 9	3 9
2	2	20	29	2	10 8	11 8	12 8	13 8	14 8	15 8	16 8	1 8	2 8	3 8
3	3	21	30	3	10 7	11 7	12 7	13 7	14 7	15 7	16 7	1 7	2 7	3 7
4	4	22	31	4	10 6	11 6	12 6	13 6	14 6	15 6	16 6	1 6	2 6	3 6
5	5	23	32	5	10 5	11 5	12 5	13 5	14 5	15 5	16 5	1 5	2 5	3 5
6	6	24	33	6	10 4	11 4	12 4	13 4	14 4	15 4	16 4	1 4	2 4	12 15
7	7	25	–	7	10 3	11 3	12 3	13 3	14 3	15 3	16 3	1 3	15 13	4 6
8	8	26	–	8	10 2	11 2	12 2	13 2	14 2	15 2	16 2	12 14	5 7	4 7
9	9	27	–	9	10 1	11 1	12 1	13 1	14 1	15 1	13 11	6 8	5 8	4 8
10	0	18	–	0	10 16	11 16	12 16	13 16	14 16	12 10	7 9	6 9	5 9	4 9

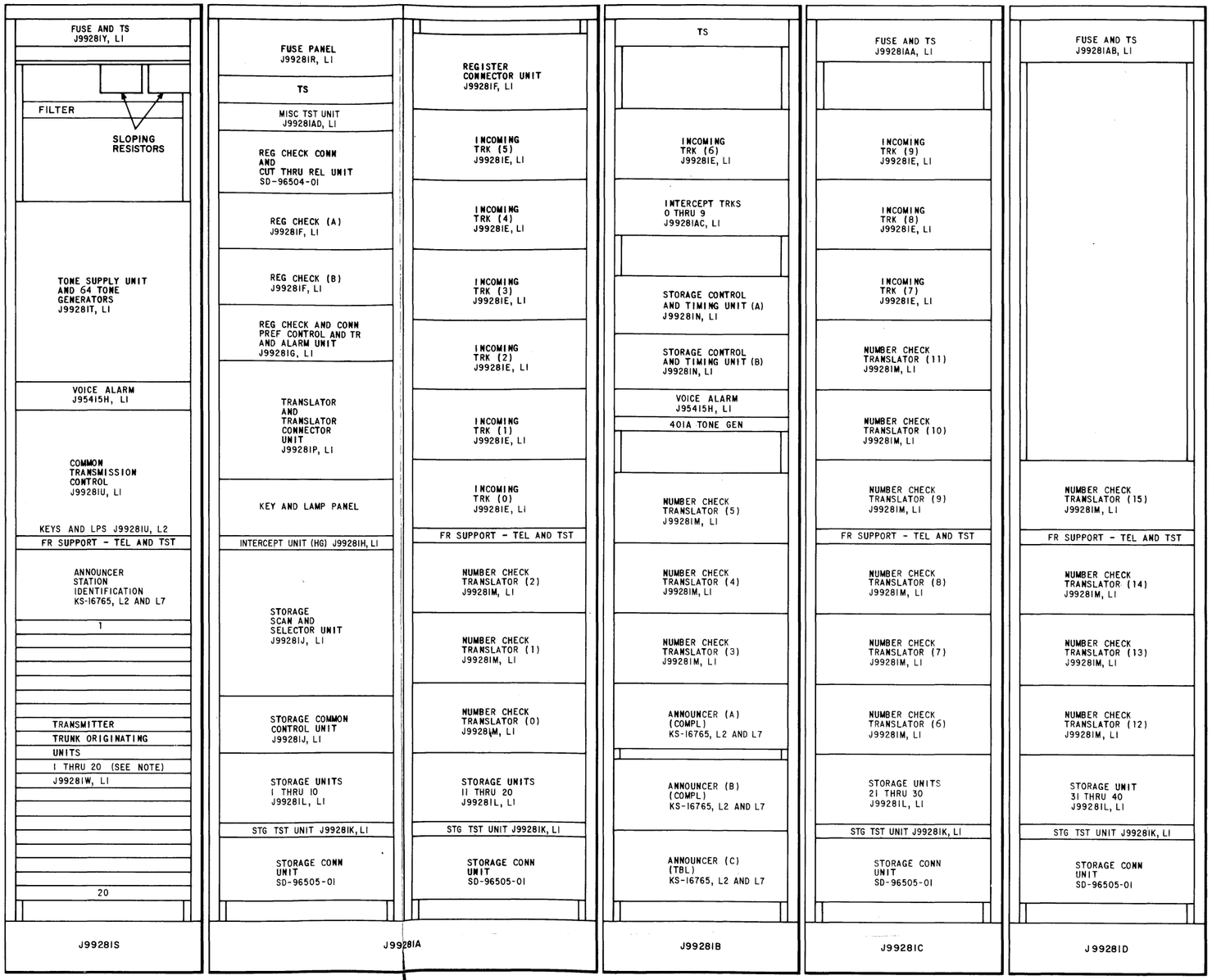
PLANS A-H

TABLE C

SIGNAL TONE NUMBER SLOT ASSIGNMENT FOR NATIONWIDE PLAN

SIGNAL TONE HZ	SIGNAL TONE NO. (OSCILLATOR)	SLOT NUMBER							
		PLAN A	PLAN B	PLAN C	PLAN D	PLAN E	PLAN F	PLAN G	PLAN H
517.5	1	1	2	3	4	5	6	7	8
532.5	2	2	3	4	5	6	7	8	9
547.5	3	3	4	5	6	7	8	9	10
562.5	4	4	5	6	7	8	9	10	11
577.5	5	5	6	7	8	9	10	11	12
592.5	6	6	7	8	9	10	11	12	13
607.5	7	7	8	9	10	11	12	13	14
622.5	8	8	9	10	11	12	13	14	15
637.5	9	9	10	11	12	13	14	15	16
652.5	10	10	11	12	13	14	15	16	1
667.5	11	11	12	13	14	15	16	1	2
682.5	12	12	13	14	15	16	1	2	3
697.5	13	13	14	15	16	1	2	3	4
712.5	14	14	15	16	1	2	3	4	5
727.5	15	15	16	1	2	3	4	5	6
742.5	16	16	1	2	3	4	5	6	7
772.5	18	18	18	18	18	18	18	18	18
787.5	19	19	19	19	19	19	19	19	19
802.5	20	20	20	20	20	20	20	20	20
817.5	21	21	21	21	21	21	21	21	21
832.5	22	22	22	22	22	22	22	22	22
847.5	23	23	23	23	23	23	23	23	23
862.5	24	24	24	24	24	24	24	24	24
877.5	25	25	25	25	25	25	25	25	25
892.5	26	26	26	26	26	26	26	26	26
907.5	27	27	27	27	27	27	27	27	27
922.5	28	28	28	28	28	28	28	28	28
937.5	29	29	29	29	29	29	29	29	29
952.5	30	30	30	30	30	30	30	30	30
967.5	31	31	31	31	31	31	31	31	31
982.5	32	32	32	32	32	32	32	32	32
997.5	33	33	33	33	33	33	33	33	33

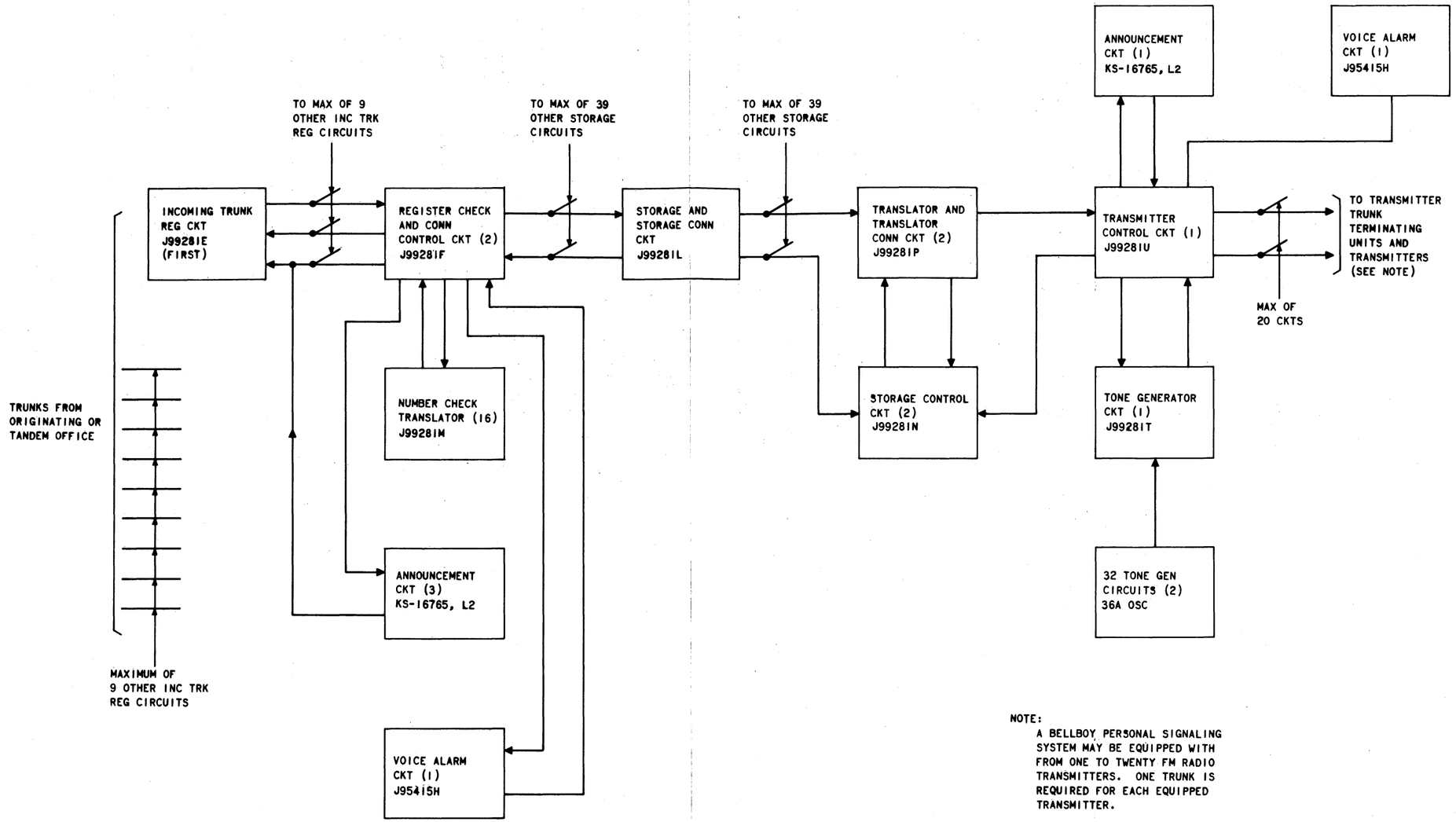
Note: Tone 17 is not used



NOTE:
THE J99281AE, L1 DELAY NETWORKS MAY BE INSTALLED IN THE J99281S BAY WHEN TEN OR LESS TRANSMITTER TRUNK ORIGINATING UNITS ARE USED OR IN THE J99281D BAY IF SPACE IS AVAILABLE. OTHERWISE, SPACE MAY BE PROVIDED IN THE OFFICE EQUIPMENT MISCELLANEOUS FRAMES.

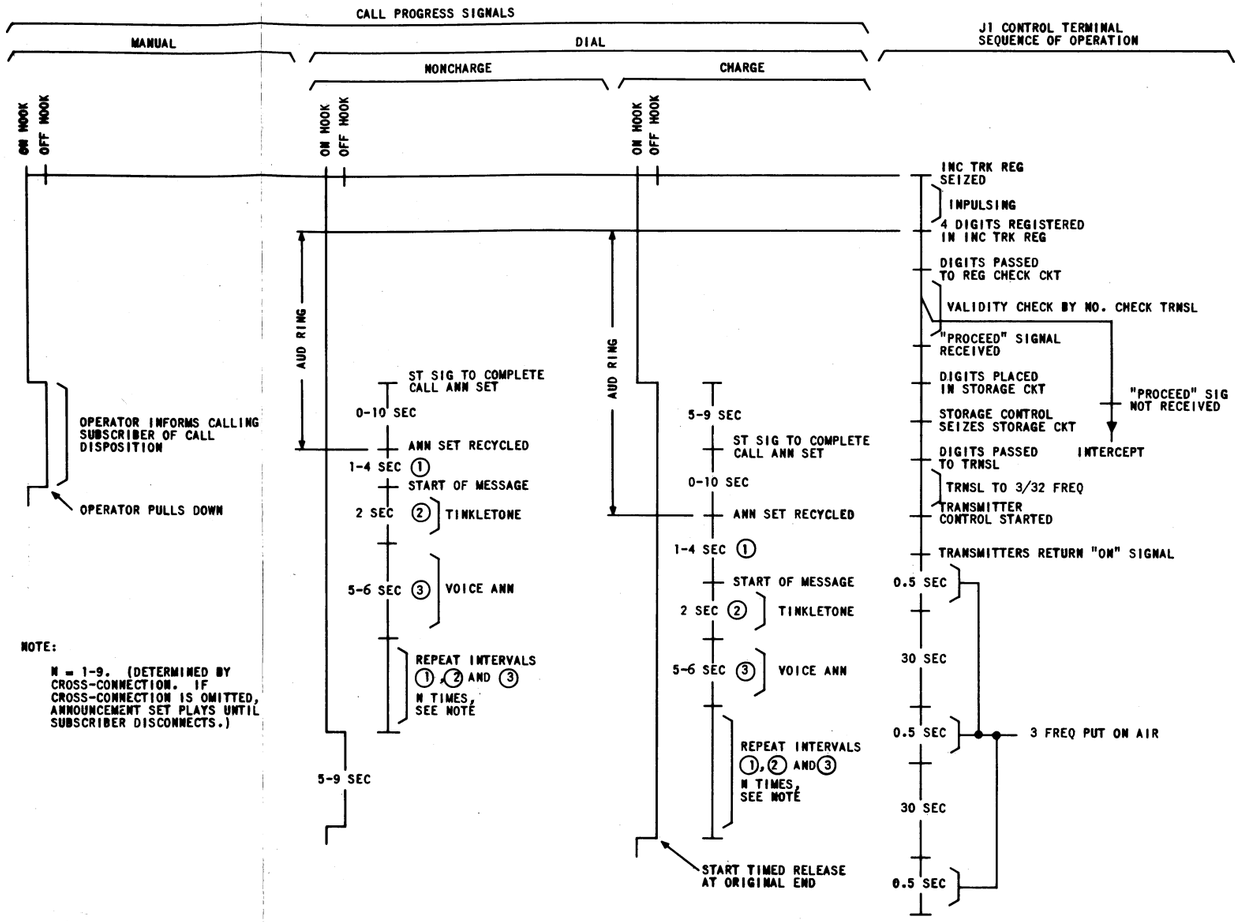
TRANSMITTER CONTROL AND TONE SUPPLY BAY | COMMON CONTROL BAY | ANNOUNCEMENT BAY | FIRST SUPPLEMENTAL BAY | SECOND SUPPLEMENTAL BAY

Fig. 2—Equipment Layout in J1 Control Terminal



NOTE:
A BELLBOY PERSONAL SIGNALING SYSTEM MAY BE EQUIPPED WITH FROM ONE TO TWENTY FM RADIO TRANSMITTERS. ONE TRUNK IS REQUIRED FOR EACH EQUIPPED TRANSMITTER.

Fig. 3—Functional Block Diagram—J1 Control Terminal



NOTE:

N = 1-9. (DETERMINED BY CROSS-CONNECTION. IF CROSS-CONNECTION IS OMITTED, ANNOUNCEMENT SET PLAYS UNTIL SUBSCRIBER DISCONNECTS.)

Fig. 4—J1 Control Terminal Functional Sequences and Call Progress Signal to Calling Distributor