4-WIRE STATIONS

DESCRIPTION, SUPPLIES, AND INSTALLATION

1. GENERAL

1.01 This section was formerly Station Installation and Maintenance Section C53.971, Issue C. It covers the description, supplies and installation of package units of equipment and station sets for use in connection with 4-wire private line telephone services.

1.02 Along with being renumbered into the Station Operation Manual it has been revised to include additional groups of equipment and to rate others "for additions and maintenance only". The basic package now includes equipment for the "Loop Back Test" feature. Since the text is generally revised, change indications have been omitted.

1.03 The equipment arrangements specified herein are applicable to the usual 4-wire service requirements of the C.A.A., Army, Navy, and other customers. Request for special features which are not covered herein, or on Drawing SKCS-425, shall be referred to the office of the station equipment engineer.

1.04 Information concerning inspection and tests of 4-wire station equipment is given in another section of this division.

2. DESCRIPTION

2.01 The equipment outlined in this section provides for:

(a) Terminating a 4-wire line on a customer's premise.

(b) Connection of a multiple number of stations to the line.

(c) Station sets with or without push-to-talk control of either the hand or head type set.

(d) Direct current or 20-cycle continuous generator signaling toward distant station.

(e) Audible or visual signal, or loudspeaker for incoming signaling from the distant station.

(f) Individual or common station control for cutoff of loudspeaker when station answers.

(g) Locked-in local signal circuit for use between subordinates and a master station.

(h) Customer recorder connection, with or without recorder start circuit for starting recorder when station is in use.

(i) Connecting the transmit and receive loops together for testing circuit conditions at the toll test board.

2.02 Package units containing the line and station terminating apparatus, station sets, and other required pieces of apparatus are generally available locally. This equipment is listed on Drawing KCS-424 and also in Part 3 - Supplies, of this section. The following paragraphs describe briefly the basic unit, supplementary station unit, station sets and operating features available.

Basic Unit

2.03 The 4-wire station assembly per Drawing KCS-424, G27 is arranged for terminating a 4-wire line and two stations. It consists of an ED-91472-01, G3 apparatus cabinet containing a line-terminating unit and common equipment per Drawing KCS-424, Figure 1, and a two-station terminating unit per Drawing KCS-424, Figure 2. The circuit arrangements and terminal connections are included on Drawing SKCS-425. Screw-type terminal strips are provided with both units to facilitate installation. A complete set of drawings is furnished with each basic unit.

Supplementary Station Units

2.04 The 4-wire station assembly per Drawing KCS-424, G2 is for use

where more than two stations are to be connected to the 4-wire line. This unit is the same as the station-terminating unit included as part of the basic unit and is required when a third, fifth, seventh, or ninth station is added. Four of these units will mount in one ED-91472-01, G3 apparatus cabinet. When supplementary station units are furnished battery from a 14-26 volt local battery supply, one common talk battery filter per Figure 22 is required for each supplementary station unit.

Station Sets

2.05 Hand-type telephone sets or head telephone sets with or without push-to-talk keys may be provided as required. On a push-to-talk basis, the talk key may be furnished in the handset handle, headset cord, or as a separately mounted key. The key in the hand set handle is nonlocking and has to be held depressed while talking. The key in the head set cord and the externally mounted key are arranged for locking and must be manually released. Reference, Drawing SKCS-425, Figures 3, 4, 5, 6, 7, 26 and 27.

Signaling

2.06 Provision is made for signaling toward the distant stations by either a direct current or 20-cycle continuous generator basis. With direct current, the signaling channel may be the phantom-simplex of the transmitting and receiving loops, simplex of the transmitting loop, or simplex of the receiving loop. With 20-cycle continuous generator or hand generator the signaling channel may be either the transmitting or receiving loop. To facilitate wiring and to permit a uniform method of signaling from the station set location, a push-button key is provided to control a relay in the line terminating unit which in turn completes the signaling circuit to the distant station. Reference, Drawing SKCS-425, Figures B, C, D, E, F, and K.

2.07 Loudspeakers may be used for voice signaling. In this arrangement, loudspeakers are provided at the station locations and are connected to the receiving channel. The calling party speaks into the transmitter and pages the desired station. The message is heard simultaneously through the loudspeakers at all receiving stations. When the called station answers, the loudspeaker at the answering point is silenced. Reference, Drawing SKCS-425, Figure K and Figures G, or L with Figure 20 for common control of loudspeakers from any station; and Figures A (S Wir), K, M, and 21 for individual control of the loudspeaker associated with the answering station.

2.08 A ringer, buzzer, or lamp signal may be used as a line signal to indicate incoming calls. The buzzer or lamp signals may be arranged for continuous or noncontinuous operation and are controlled by a ringup relay connected to either the transmitting or receiving loop. Coded signaling may be used except in the case in which the incoming signal is arranged for locking in. Reference, Drawing SKCS-425, Figures 10, 13, 18, 19 and I.

Special Features

2.09 Customer-owned recorders may be connected through recorder-connectors to the line. The power to the customer's recorder may be wired under control of a KS-8232, L1 relay set which, in turn, is under control of the station set switchhook contacts or headset jacks. If it is desired to cut the recorder on or off the circuit manually, a 6017B key is connected into the recorder-connector circuit for this purpose. Reference, Drawing SKCS-425, Figures 15, 16, and H.

2.10 A locked-in local signal circuit may be provided between subordinates and a master station location, with release of the signal under control of the master station's switchhook. A push-button type key at the subordinate station location is used to actuate the signal at the master station. A lamp indicator or buzzer may be used for the signal. This feature is not applicable if loudspeakers are controlled individually from stations (see Paragraph 2.07). Reference, Drawing SKCS-425, Figures 14 and J.

3. SUPPLIES

3.01 All material shall be ordered in accordance with the material requirements specified on the circuit order. Except for equipment per Drawing KCS-424, G2, G3, G26 and G27, the group numbers represent items of material which must be ordered separately by piece part, drawing, or code number. The 89-type resistances

for use in the line terminating circuit per Drawing SKCS-425, Figures 1, 20, and 21, Pads A, B, and C, shall be ordered as specified on the circuit order. (Consult Supplies Catalog for available listings.)

Assembly, Station, 4-Wire

Dwg. KCS-424

Group 1 - (Returns only - Mfr. Disc.)
For terminating 4-wire line and two stations. Consists of equipment per Drawing KCS-424, Figures 1 and 2, and assembled in an ED-91472-01, G3 apparatus cabinet. Includes set of drawings.

Group 2
For terminating 3rd, 5th, 7th, and 9th stations. Consists of equipment per Drawing KCS-424, Figure 2. Requires 1-3/4-inch mounting plate space in an ED-91472-01, G3 apparatus cabinet. Order apparatus cabinet and apparatus panel separately.

Group 3
For use when an additional set of drawings is required or for replacement. Consists of set of drawings as follows:
- Assembly - KCS-424
- Wiring - KCS-425
- Schematic - SKCS-425
- M.O. Sheet - Drawing BKCS-425

Group 4 - Order separately as required: - (A&M)
For Drawing SKCS-425, Figure 3 (N App.)
- Mounting, Set, Hand, G1-3
- Set, Hand, F2B-3
- Unit, Receiver, HA3 (Recover HA1 unit.)

For Drawing SKCS-425, Figure 3 (P App.)
- Mounting, Set, Hand, G1-3
- Set, Hand, F3P-3

Group 5 - Order separately as required: - (A&M)
For Drawing SKCS-425, Figure 4 (N App.)
- Set, Telephone, 302A-3
- Cord, D8M-9
- Set, Hand, F2B-3
- Unit, Receiver, HA3 (Recover F1A handset and HA1 receiver unit.)

For Drawing SKCS-425, Figure 4 (P App.)
- Set, Telephone, 302A-3
- Cord, D8M-9
- Set, Hand, F3P-3 (Recover F1A handset)

Group 6 - Order separately as required: - (A&M)
For Drawing SKCS-425, Figure 5 (N App.)
- Set, Telephone, 410CA-3
- Cord, D8M-9
- Set, Hand, F2B-3
- Unit, Receiver, HA3 (Recover F1A handset and HA1 receiver unit.)

For Drawing SKCS-425, Figure 5 (P App.)
- Set, Telephone, 410CA-3
- Cord, D8M-9
- Set, Hand, F3P-3 (Recover F1A handset.)

Group 7 - Order Separately:
For Drawing SKCS-425, Figure 6
- Jack, 223A
- Jack, 361C
- Mounting, Jack, 237A

Assembly, Station
4-Wire (Continued)

Group 8 - Order separately as required:
For Drawing SKCS-425, Figure 7 (N App.)
Set, Telephone, Head, 52C
For Drawing SKCS-425, Figure 7 (P App.)
Set, Telephone, Head, 52B
Unit, Receiver, HC4 (Recover HC1 or HC3 receiver unit.)
Group 9 - Order separately:
For Drawing SKCS-425, Figure 8
Set, Loudspeaker, 100F
Group 10 - Order separately:
For Drawing SKCS-425, Figure 9 or 15
Key, 6017-B
Group 11 - Order separately:
For Drawing SKCS-425, Figure 10
Set, Subscriber, 584DEX
Group 12 - Order separately:
For Drawing SKCS-425, Figure 11
Key, 551A
Group 13 - Order separately:
For Drawing SKCS-425, Figure 12
Set, Subscriber, 299F
Group 14 - Order separately:
For Drawing SKCS-425, Figure 13
Unit, Telephone, Key, 15B
For Drawing SKCS-425, Figure 13 (V Wir.) and A (X or Y Wire)
Unit, Telephone, Key, 15B
Resistance, 18G (not required with Figure A (Y Wir.))
Group 15 - Order separately:
For Drawing SKCS-425, Figure 14
Unit, Telephone, Key, 20A
Group 16 - Order separately as required:
For Drawing SKCS-425, Figures 16 and A (X or Y Wir.)
Set, Subscriber, 634CJ
For Drawing SKCS-425, Figures 16 (W Wir. and App.) and A (X or Y Wir.)
Set, Subscriber, 634CJ
Set, Relay, KS-8232-L1
Resistance, 18G (not required with Figure A (Y Wir.))
Group 17 - Order separately:
For Drawing SKCS-425, Figure 1 with Figure B or C
Lamp, Resistance, 12G
Group 18 - Order separately:
For Drawing SKCS-425, Figure 18
Indicator, 15D-3
Lamp, Switchboard, B2
Group 19 - Order separately:
For Drawing SKCS-425, Figure 19
Buzzer, 4C
Group 20 - Order separately:
For Drawing SKCS-425, Figure 20 or 21
Unit, Equipment, ED-91929-01, G28
(For Figure 21, Provide one for each loudspeaker)
Group 21 - Order separately:
For Drawing SKCS-425, Figure 22
Unit, Equipment, ED-91929-01, G1
Unit, Telephone, Key, 27A

Assembly, Station, 4-Wire (Continued)	Group 23 - Order separately: For Drawing SKCS-425, Figure 26 (AA App.) Set, Telephone, 500SR-3 Unit, Receiver, U2 (Recover U1 Receiver) Blank Apparatus 95B-3 (Recover 7G-3 Dial) For Drawing SKCS-425, Figure 26 (AB App.) Set, Telephone, 500SR-3 Set, Hand, G2HR-3 (Recover G1AR-3 Handset) Blank, Apparatus 95B-3 (Recover 7G-3 Dial) Group 24 - Order separately: For Drawing SKCS-425, Figure 27 (AA App.) Set, Telephone, 511CR-3 Unit, Receiver, U2 (Recover U1 Receiver) For Drawing SKCS-425, Figure 27 (AB App.) Set, Telephone, 511CR-3 Set, Hand G2HR-3 (Recover G1AR-3 Handset) Group 25 - Order separately: For Drawing SKCS-425, Figure 25 (AA App.) Mounting, Set, Hand, G6-3 Set, Hand, G1AR-3 Unit, Receiver, U2 (Recover U1 Receiver) For Drawing SKCS-425, Figure 25 (AB App.) Mounting, Set, Hand, G6-3 Set, Hand, G2HR-3 Group 26 For use when converting a "Mfr Disc" Group 1 to a Group 27. Consists of 1-229A KTU, 2-Bracket, and 4 Screws. Group 27 For terminating 4-wire line and two stations. Consist of equipment per Drawing KCS-424, Figures 1 and 2, and assembled in an ED-91472-01, G3 Apparatus Cabinet. Includes set of Drawings.
Battery	KS-6700 Two required when Drawing KCS-425, Figure A (Y Wir.) is specified. One additional required when Figure L (Y Wir.) and Figures B, C, D, E, or F are specified.
Cabinet, Apparatus	Dwg. ED-91472-01, G3 For each four Drawings KCS-424, G2, units added.
Cord	Retractile - Provide only when specified on circuit order. H4CB - Nominal length 4' or 7'. Specify required length. For use with F2B or F3P handset. H5S - Nominal length 7'. For use with F3P handset. H5K - Waterproof jacket - Nominal length 4' 3". For use with F3P handset. H6P-3 - Nominal length 4', 9' or 13'. Specify required length. For use with G Type Push-to-Talk Handsets.
Panel, Apparatus	P-452262 For each ED-91472-01 apparatus cabinet added.

Resistances

89 Types
For Drawing SKCS-425, Figure 1, Pads A, B, and C. Order as specified on circuit order.

89A	0 db
89E	1 db
89J	2 db
89N	3 db
89T	4 db
89AA	5 db
89AE	6 db
89AJ	7 db
89AN	8 db
89AT	9 db
89BA	10 db
89BL	15 db
*89CA	20 db
*89CF	25 db
*89CG	30 db

*Not stocked locally. Install 89BL resistance for temporary service.

4. INSTALLATION

4.01 Apparatus cabinets and station sets shall be mounted in accordance with sections of the Bell System Practices covering these items.

4.02 The signaling key and the external push-to-talk key, if required, should preferably be located near to the telephone set mounting or headset jacks and in accordance with the customer's wishes. The customer's operating requirements should be considered when selecting the mounting location.

4.03 Power supply for the station system may be obtained from either 8 or 10 cell battery power plant or from two sets of KS-6700 dry cell batteries. The 8 or 10 cell battery power plant should be used in preference to the dry cells when available. If dry cells are used, they shall be located adjacent to the apparatus cabinet.

4.04 The terminating equipment per Drawing KCS-424, G27 shall be located within 300 feet route-measurement of the stations. If a station is to be located beyond this limit, a supplementary station unit per Drawing KCS-424, G2 shall be located within 300 feet route-measurement of the station. This equipment shall be mounted in an ED-91472-01, G3 apparatus cabinet equipped with a P-452262 apparatus panel.

4.05 All equipment shall be tested at the time of installation in accordance with the test requirements outlined in another section of this division.

5. CABLING AND CONNECTIONS

5.01 All station connections shall be made in accordance with Drawing SKCS-425. Figures A and L cover connections common to the system, however, Figure L is for use only when an extension station exceeds the cable route-measurement given in Paragraph 4.04. Figures B, C, D, E, F, and K provide optional line signaling connections and only one of the figures shall be used per system. Other figures not included in the above may be used as required to provide the desired service features.

5.02 Pads A, B, and C of the line terminating equipment per Drawing SKCS-425, Figures 1, 20, and 21 shall be equipped with 89-type resistances as specified on the circuit order.

5.03 Provide four pairs of station wire or cable from the apparatus cabinet to

each station location (except as noted in Paragraph 5.04) and terminate on 44A connecting block. Five conductors of the four pairs provide the talking and supervisory paths and three conductors are for the ringer and signaling paths. If the initial circuit order does not specify the ringer or signaling key at a particular station, these three conductors shall be left available for future use.

5.04 If a lamp indicator, recorder cut-off key, hand generator, or loudspeaker is required at a station location, provide cable pairs as required and add a 44A connecting block as shown in Drawing SKCS-425, Figure 17.

5.05 The resistance of the battery feeders from an 8 or 10 cell battery power plant shall not exceed 11.5 ohms or 180 feet of one pair 22-gauge wire or cable. If the power plant is beyond 180 feet the number of battery feeders shall be determined as follows:

$$\text{No. of 22-gauge battery feed pairs required} = \frac{\text{Route-measurement of feeders in feet}}{180}$$

5.06 If dry cells are used for source of power, connect two sets of KS-6700 dry cell batteries in parallel to obtain 4.5 volts. Provide one pair of 22-gauge wire for feeders between apparatus unit terminal strip and the dry cells.

5.07 Connections for signaling ground shall be in accordance with the section of the Bell System Practices entitled "Protector and Signaling Grounds".

5.08 If 20-cycle continuous generator is specified for signaling toward the distant station, provide a 12G resistance lamp in the lamp socket of the line terminating unit.

5.09 If the circuit order specifies 120H or L repeating coils in place of the 120K repeating coils provided in the line terminating unit, the coils specified on the circuit order shall be ordered separately and installed in the field.