VOICE CONNECTING ARRANGEMENT CEZ
KS-20893, LIST 10 INTERCONNECTING UNIT
KS-20893, LIST 11 INTERCONNECTING SERVICE UNIT

1. GENERAL

1.01 This section provides identification, installation, operation, maintenance, and connecting information for Voice Connecting Arrangement (VCA) CEZ. Voice Connecting Arrangement CEZ provides a 2-wire voiceband only connection between customer-provided (CP) conferencing equipment and Bell System Key Telephone Systems. Each circuit of this connecting arrangement is seized by a loop closure from the CP equipment after a call has been established on the key telephone set. A disconnect signal causes the connecting arrangement to signal the CP equipment (momentary open) whenever the central office (CO) or PBX provides a momentary open or battery reversal. The CP equipment must recognize the momentary open and disconnect automatically. When the automatic disconnect feature is not desired, the interconnecting unit (IU) is strapped for manual disconnect and the disconnect signal is not provided to the CP equipment which must always be released manually.

1.02 This section is reissued to:

- To delete reference to Uniform Service Order Code CEZAW for manual disconnect.
- Include information on wiring changes made on KS-20893, List 11 Interconnecting Service Unit (ISU) to permit use with CALL DIRECTOR® sets.
- Add Fig. 6 showing VCAs with CALL DIRECTOR sets.
- Revise Table A to show six key circuits and battery and ground terminal change.

1.03 Voice Connnecting Arrangement CEZ requires one KS-20893, List 11 ISU, Fig. 1 and 2, per five lines and one KS-20893, List 10 IU, Fig. 3, per line. A KS-20893, List 11 ISU equipped for five lines is shown in Fig. 4. Not all COs or PBXs provide an open or battery reversal on disconnect, and some may provide an open for other reasons. The CP equipment may disconnect automatically or manually. The service provided is determined by the CP equipment and type of CO or PBX. Option terminals are provided on the KS-20893, List 10 IU (Fig. 3) which must be strapped to provide connecting arrangement CEZ with disconnect feature desired (option Z for automatic disconnect or option W for manual disconnect per SD-69952-01).

1.04 The KS-20893, List 11 ISUs have been modified for application with CALL DIRECTOR sets by changing the local power leads from (O-Y) to (G-R) for battery and from (Y-O) to (S-W) for ground to permit the sixth pickup key to be used. Modified units are stamped with an A in a circle on the baseplate. All units manufactured after November 1972 have this change incorporated.

1.05 This issue of the section is based on the following drawings:

CD-69952-01 Issue 1, App. 2D

SD-69952-01 Issue 3D

If this section is to be used with equipment or apparatus reflecting later issue(s) of the drawing(s), reference should be made to the SDs and CDs to determine the extent of the changes and the manner in which the section may be affected.

2. IDENTIFICATION

PURPOSE

- To provide a 2-wire voiceband only connection between CP conferencing equipment and Bell System Key Telephone System (KTS) lines terminated on a 6-button, plug-ended key telephone set or CALL DIRECTOR set.
- To extend line circuit supervision to the CP equipment

- To limit excessive levels from CP equipment and to provide protection for personnel against hazardous voltages.

APPLICATION

- 1A1 or 1A2 Key Telephone Systems.

ORDERING GUIDE

- Unit, Service, Interconnecting, KS-20893, L11 (one per five lines)
- Unit, Interconnecting, KS-20893, L10 (one per line terminated on key telephone set; maximum five per ISU)
- Cable, Connector, B25A (as required for CALL DIRECTOR sets. See Fig. 6.)

Associated Apparatus (Order Separately)

- Unit, Power, 19C2 or equivalent, if existing key system supply is inadequate. (Maximum current drain for each KS-20893, List 10 IU is 0.11 ampere at 26 volts.)

Note: This unit meets acceptable noise requirements as explained under Power Supplies in Section 332-104-102. Other power units may be used when specified by local engineering.

Replaceable Components

- Diode, Motorola, IN4001

DESIGN FEATURES

KS-20893, List 11 Interconnecting Service Unit (Fig. 1, 2, and 4)

- Mounts on any flat surface, typically in knee well of desk.
- Size—approximately 4-1/2 by 8 by 8-1/4 inches; weight—approximately four pounds.
- Equipped with five 912A 14-pin connectors.
- Designed to mount five KS-20893, List 10 IUs.
- Current models stamped with (A) on the baseplate are wired for use with CALL DIRECTOR or 6-button sets. Models not so stamped are for use with 6-button sets only.

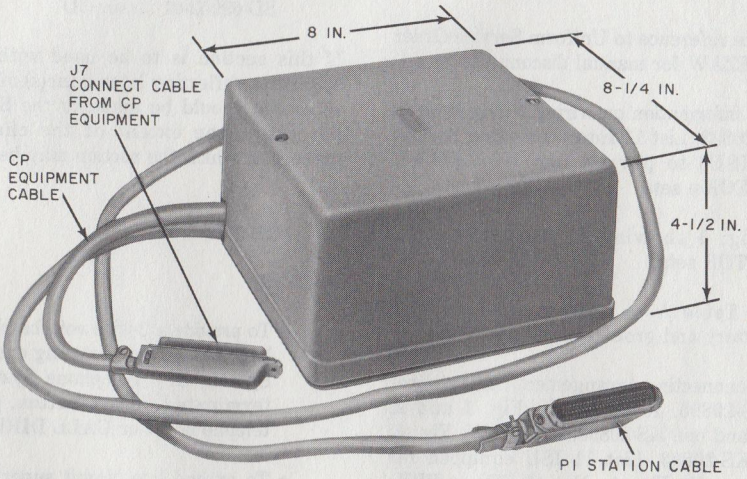


Fig. 1—KS-20893, List 11 Interconnecting Service Unit

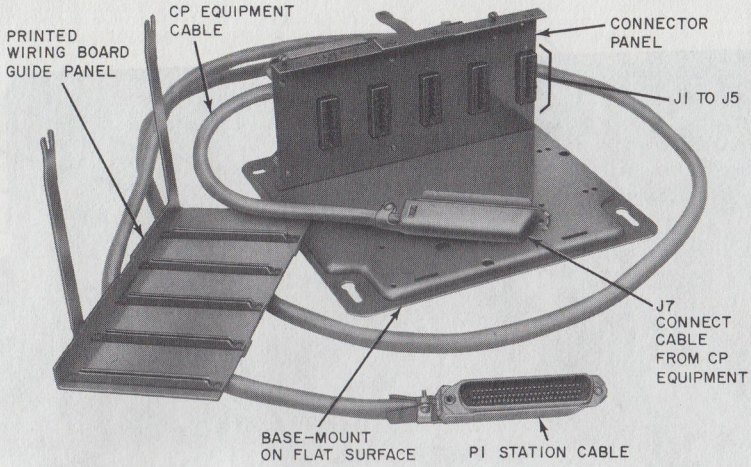


Fig. 2—KS-20893,List 11 Interconnecting Service Unit, Unequipped (Cover Removed)

- Provides interface connector (J7) for connecting to CP equipment (customer provides mating connector and cabling).
- Equipped with a connector (J6) for connecting the telephone set and a plug-ended cable (P1) for connecting the existing station cable.

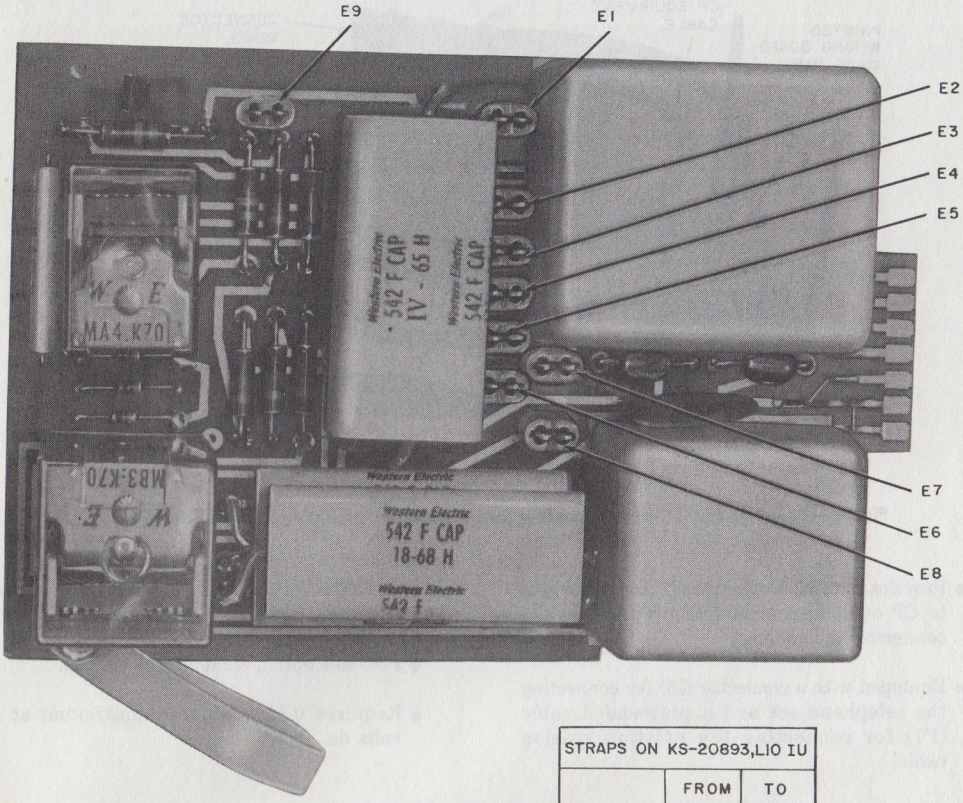
KS-20893, List 10 Interconnecting Unit (Fig. 3)

- Components are mounted on a 14-pin printed wiring board.
- Size—approximately 3-1/2 by 5-1/4 inches.
- Weight—approximately one pound.
- Provides voice frequency ***only*** access to key telephone line (requires one IU per line to be conferenced.
- Extends A and A1 lead supervision from the key telephone line circuit to CP equipment.
- Provides transformer isolation and hazardous voltage protection between CP equipment and Bell System equipment.
- Provides for accepting supervisory signals from Bell System equipment and CP equipment.
- Provides option strapping terminals.
- Requires 0.110 amperes (maximum) at 26 volts dc.

3. INSTALLATION

3.01 Locate the voice connecting arrangement near the CP conferencing device and associated key telephone set, typically in the knee well of the desk on which the key telephone set and the CP equipment are located. The station cable on the ISU is approximately six feet long; therefore, the distance between the ISU and the connector on the existing station cable from the KTS equipment (Fig. 5) must not exceed 6 feet. Provide adequate room or cable slack for access to the ISU for testing and maintenance. When it is not possible to locate the ISU within 6 feet of the station cable connector, B25A connector cables may be used to extend length of P1 cable.

3.02 One KS-20893, List 10 IU must be provided per line to be connected to the CP equipment for conferencing (minimum of two and maximum of five per KS-20893, List 11 ISU).



STRAPS ON KS-20893,L10 IU		
	FROM	TO
CEZ	E1	E2
	E2	E3
	E3	E4
	E6*	E9*
	E7	E8

* THIS STRAP REQUIRED FOR MANUAL DISCONNECT ONLY. INSULATED WIRE SHOULD BE USED FOR STRAP FROM E6 TO E9 — CHECK CONTINUITY AFTER STRAPPING.

Fig. 3—KS-20893, List 10 Interconnecting Unit

3.03 Provide straps on KS-20893, List 10 IU for required disconnect feature as shown in Fig. 3. Use 24 gauge bare wire for strapping except where noted. Where an insulated wire is used for strapping, ends should be stripped before inserting in option terminals. Check continuity after strapping.

3.04 Provide power from the key telephone equipment talk battery by connecting battery

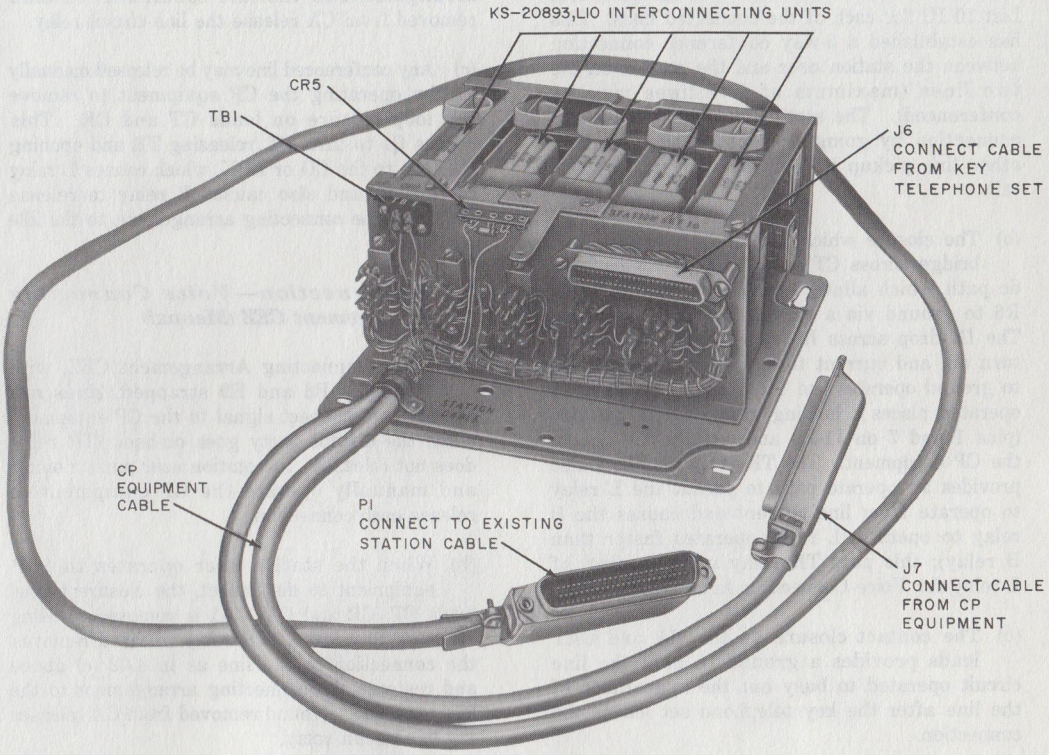


Fig. 4—KS-20893, List 11 Interconnecting Service Unit, Equipped (Cover Removed)

to the (G-R) lead, pin 8, and ground to the (S-W) lead, pin 5, of the existing station cable from the KTS line circuits. If these leads are not available, see 6.01.

3.05 When the KS-20893, List 11 ISU is used with a multiple plug-ended CALL DIRECTOR set, a B25A connector cable is required as shown in Fig. 6. A separate B25A connector cable and KS-20893, List 11 ISU will be required for each plug (five circuits) used.

4. OPERATION

4.01 ***Connection—Voice Connecting Arrangement CEZ (Fig. 7)***

(a) An incoming or outgoing call from the CO, PBX, or intercom is handled in the normal manner for a key telephone set. The station user may then activate two or more connecting arrangements to provide a conference connection between two or more lines on the key telephone set. When a call on a line on the key telephone set is to be conferenced, the station user operates the CP equipment to connect it to that line, then operates the line pickup key of another CO, PBX, or intercom line on the key telephone set and establishes a connection to the other party to be conferenced. The station user then operates the CP equipment to connect the second line for conferencing. The station user, in operating the CP equipment, has now provided a dc impedance through a contact closure across the CT and CR leads and a contact closure on the

CA and CA1 leads associated with the KS-20893, List 10 IU for each of the connected lines. This has established a 3-way conference connection between the station user and the parties on the two lines (maximum of five lines may be conferenced). The station user may leave the connection by going on-hook or by operating other line pickup keys to answer or originate calls.

(b) The closure which provides a dc impedance bridge across CT and CR leads completes a dc path which allows current to flow through R6 to ground via a closed contact on B relay. The IR drop across R6 causes transistor Q1 to turn on, and current through TR relay and Q1 to ground operates the TR relay. The TR relay operated places a holding bridge across the line (pins 1 and 7 on J1-J5) and couples the line to the CP equipment. The TR relay operated also provides an operate path to permit the L relay to operate from line current and causes the B relay to operate (L relay operates faster than B relay); this puts TR relay under control of L relay for Voice Connecting Arrangement CEZ.

(c) The contact closure on the CA and CA1 leads provides a ground to hold the line circuit operated to busy out the appearance of the line after the key telephone set leaves the connection.

4.02 ***Disconnection—Voice Connecting Arrangement CEZ (Automatic)***

(a) If the CO or PBX provides a disconnect signal (momentary open or battery reversal on leads T and R) when a distant party on a conference line goes on hook, Voice Connecting Arrangement CEZ recognizes the disconnect, and the L relay releases the loop to the CO or PBX and causes TR relay to release. The release of TR relay opens the loop on leads CT and CR toward the CP equipment and causes B relay to release and reclose the loop to CT and CR. The release of TR and B relays provide a momentary open (approximately 25 milliseconds) to the CP equipment.

(b) The CP equipment recognizes the momentary interruption as a disconnect signal and removes the closure across leads CT, CR and leads CA, CA1, restoring the connecting arrangement to the idle condition. Ground removed from CA release the line circuit relay.

(c) Any conferenced line may be released manually by operating the CP equipment to remove the loop closure on leads CT and CR. This causes Q1 to turn off, releasing TR and opening the loop to the CO or PBX, which causes L relay to release, and also causes B relay to release restoring the connecting arrangement to the idle condition.

4.03 ***Disconnection—Voice Connecting Arrangement CEZ (Manual)***

(a) Voice Connecting Arrangement CEZ, with terminals E6 and E9 strapped, ***does not*** provide a disconnect signal to the CP equipment when the distant party goes on-hook (TR relay does not release). The station user must monitor and manually operate the CP equipment to release each connection.

(b) When the station user operates the CP equipment to disconnect, the closure across leads CT, CR and CA, CA1 is removed, causing TR relay to release. TR relay released removes the connection to the line as in 4.02 (c) above and restores the connecting arrangement to the idle condition. Ground removed from CA releases the line circuit relay.

5. MAINTENANCE

5.01 Precautions should be taken when performing tests to avoid adversely affecting service to the customer. Local instructions should be followed with reference to notifying the customer before performing the tests.

5.02 When there is an indication of trouble in the connecting arrangements, the circuit must be opened at the interface (J7 on the CP equipment cable on the KS-20893, List 11—see Fig. 4) to verify in which direction the trouble exists.

5.03 ***Tests—Voice Connecting Arrangement CEZ***

(a) Check for faulty diode(CR5) on KS-20893, List 11 ISU.

(b) Check for presence of battery and ground and proper polarity on TB1 (−24 volts) on KS-20893, List 11 ISU (see Fig. 4, 6, and 7).

(c) Disconnect the key telephone set and the key telephone equipment from the KS-20893, List 11 ISU (see Fig. 5).

(d) Connect the plug on the key telephone set mounting cord directly to the connector on the existing station cable from the key telephone equipment (Fig. 5).

(e) Using existing practices, perform normal KTS tests to ascertain that the trouble is not in the key telephone set or the key telephone equipment.

(f) If the key telephone set and the key telephone equipment are operating properly, reconnect the connecting arrangement equipment as shown in Fig. 5.

(g) Set up conference calls and determine which circuit in the connecting arrangement is at fault. Replace the KS-20893, List 10 IU (Fig. 3) associated with the circuit under test with a KS-20893, List 10 IU known to be good.

Always remove power at TB1 when replacing an interconnecting unit. Be sure that the KS-20893, List 10 IU is strapped in accordance with the information shown in Fig. 3.

(h) If it becomes necessary to test transmission on individual circuits, use a stub-ended A25D connector cable or a P90D259 wiring harness (part of D-180375 Kit of Parts) or equivalent, to provide access to leads CT and CR of the individual circuits (see Table A for pin numbers of CT and CR leads on J7 on the CP equipment cable on the KS-20893, List 11 ISU). Connect the A25D connector cable to J7 on the CP equipment cable on the KS-20893, List 11 ISU. Using the key telephone set, establish a call to a test center or test tone; using a 1013A hand test set or equivalent with switch operated to the TALK position, connect to CT and CR of circuit under test. Transmission levels heard at key telephone set and hand test set should be approximately the same.

(i) If replacement of the KS-20893, List 10 IUs does not cure the trouble, replace the entire KS-20893, List 11 ISU.

Do not attempt any tests or repairs to the CP equipment.

5.04 When in the repairman's judgment the trouble is located in the CP equipment, the Repair Service Bureau should be notified so that proper Maintenance of Service Charge billing can be initiated as outlined in BSP 660-101-312 entitled Maintenance of Service Charge on Service With Customer-Provided Equipment (CPE).

6. CONNECTIONS

6.01 Connect plug P1 on the cable from the KS-20893, List 11 ISU to the connector on the existing station cable from the key telephone equipment (see Fig. 4 and 5). Connect the plug on the mounting cord from the key telephone set to connector J6 on the KS-20893, List 11 ISU. Connect the plug on the cable from the CP equipment to connector J7 on the CP equipment cable on the KS-20893, List 11 ISU. The plug on the cable from the CP equipment mates with connector J7 on the CP equipment cable on the KS-20893, List 11 ISU.

The (S-W) (G-R) leads in the cable on the KS-20893, List 11 ISU are provided for battery and ground connection to the ISU from the key telephone equipment (see Fig. 6 and 7). If these leads are not available in the existing station cable from the key telephone equipment, separate wiring must be provided to connect battery and ground to the screw terminals on TB1 (Fig. 4) from the key telephone equipment or a separate −24 volt power supply. When battery and ground connections are made directly to screw terminals on TB1, disconnect the (G-R) wire from the screw terminal on TB1 and the (S-W) wire from terminal 6 (wire-wrap terminal) on connector J1; insulate and store.

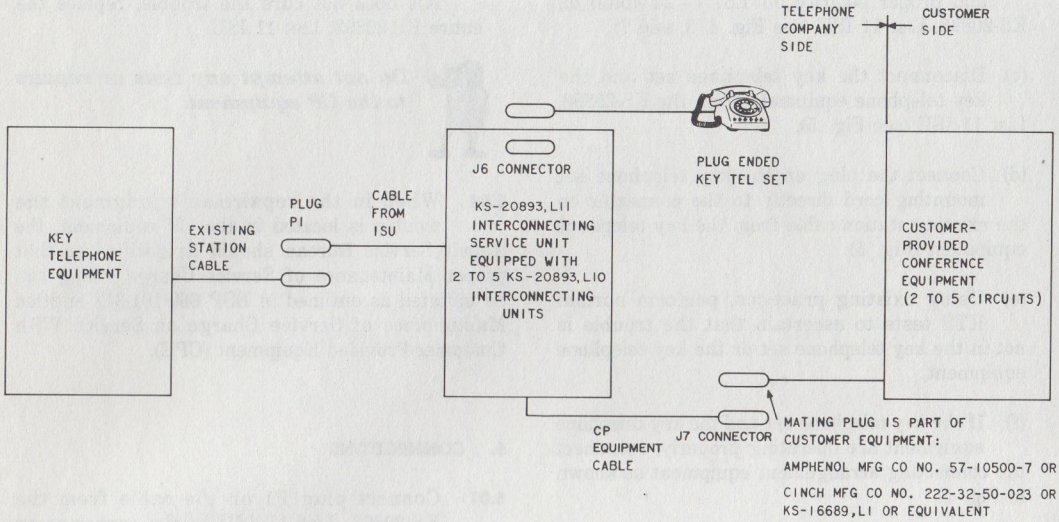
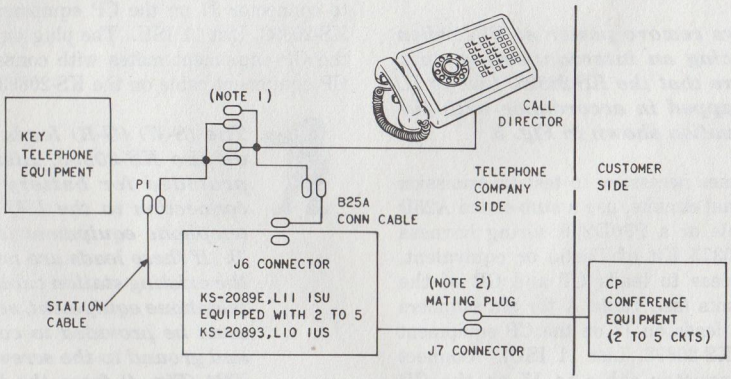
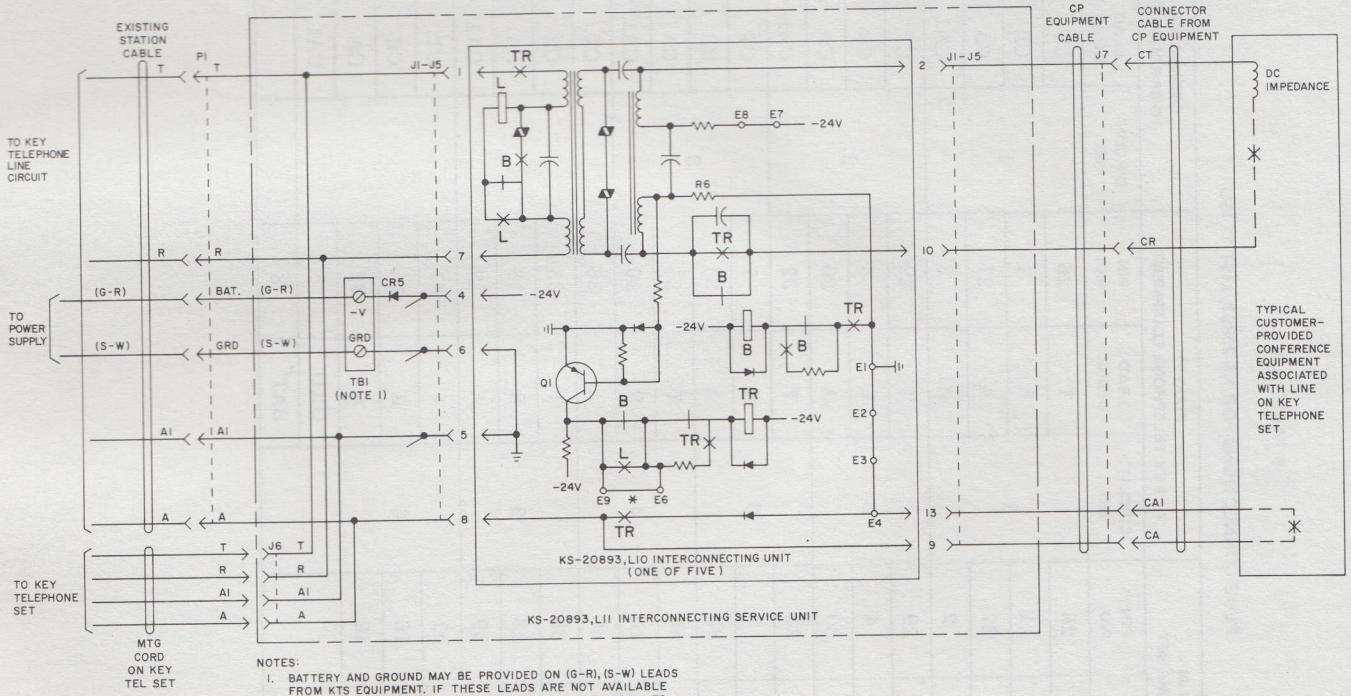


Fig. 5—Block Diagram—Voice Connecting Arrangement CEZ (With Key Telephone Set)



NOTES:
1. FOR EACH FIVE CONFERENCE CKTS REQUIRED USE A KS-20893, L11 AND B25A CONN CABLE AS SHOWN.
2. CUSTOMER-PROVIDED MATING PLUG IS AMPHENOL 57-10500-7 OR CINCH MFG CO NO. 222-32-50-023 OR EQUIVALENT.

Fig. 6—Block Diagram—Voice Connecting Arrangement CEZ (With CALL DIRECTOR® Set)



NOTES:

1. BATTERY AND GROUND MAY BE PROVIDED ON (G-R), (S-W) LEADS FROM KTS EQUIPMENT. IF THESE LEADS ARE NOT AVAILABLE FROM THE KTS EQUIPMENT, MAKE CONNECTIONS DIRECTLY TO SCREW TERMINALS ON TBI; WHEN BATTERY AND GROUND CONNECTIONS ARE MADE DIRECTLY TO SCREW TERMINALS ON TBI, DISCONNECT THE (G-R) WIRE FROM THE SCREW TERMINAL ON TBI AND THE (S-W) WIRE FROM TERMINAL 6 (WIREWRAP TERMINAL) ON CONNECTOR J1.
2. SEE TABLE A FOR PIN NUMBERS ON P1, J6, AND J7.

* TERMINALS E9 AND E6 ARE STRAPPED FOR MANUAL DISCONNECT ONLY

Fig. 7—Simplified Schematic—Voice Connecting Arrangment CEZ (One Circuit)

◆ TABLE A ◆

PLUG CONNECTIONS FOR KS-20893, LIST 11 ISU

CONNECTOR J6 TO KEY TELEPHONE SET			PLUG P1 TO KEY TELEPHONE EQUIPMENT			CONNECTOR J7 TO CP EQUIPMENT		
CIRCUIT NO.	LEAD DESIG.	PIN NO.	CIRCUIT NO.	LEAD DESIG.	PIN NO.	CIRCUIT NO.	LEAD DESIG.	PIN NO.
1	T	26	1	T	26	1	CT	26
	R	1		R	1		CR	1
	A	27		A	27		CA	27
	A1	2		A1	2		CA1	2
2	T	29	2	T	29	2	CT	29
	R	4		R	4		CR	4
	A	30		A	30		CA	30
3	T	32	3	T	32		CA1	5
	R	7		R	7	3	CT	32
	A	33		A	33		CR	7
4	T	35	4	T	35		CA	33
	R	10		R	10		CA1	8
	A	36		A	36	4	CT	35
5	T	38	5	T	38		CR	10
	R	13		R	13		CA	36
	A	39		A	39		CA1	11
6	T	41	6	T	41	5	CT	38
	R	16		R	16		CR	13
	A	42		A	42		CA	39
				GRD	5		CA1	14
				BAT	8			