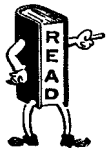


1A1 KEY TELEPHONE SYSTEM
233A KEY TELEPHONE UNIT
CO OR PBX LINE CIRCUIT (TEN CIRCUITS)
CONNECTIONS

1.00 GENERAL

- 1.01 This section covers the connections required on a 233A KTU.
- 1.02 The circuit drawing (Fig. 1) and a description of operation are included as an aid to installation and maintenance.
- 1.03 Fig. 2 shows connections to the 25-pair connector cable, strapping, terminating cables for telephone sets or pickup keys, power sources, and other key telephone units.



Necessary strapping between line circuits is done at the cable distribution point.

2.00 DESCRIPTION OF OPERATION

INCOMING CALL

Signaling

2.01 **Grounded Ringing, V or W Wiring** — When ringing current is applied to the ring of the line on an incoming call, the ac component flows through contact B4 of relay AH, capacitor R, thermistor R, and the secondary of relay R to ground on one half of the cycle, and through diode R to ground on the other half cycle. Contacts B4 and B5 of relay AH shunt the windings of relay H and serve to bypass ringing current and prevent the establishment of a false hold condition which might otherwise occur when a number of ringers are bridged across the station side of the line. The 317A diode R1 protects diode R and ther-

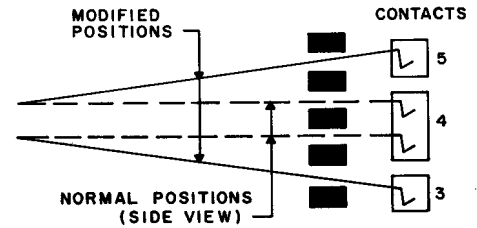
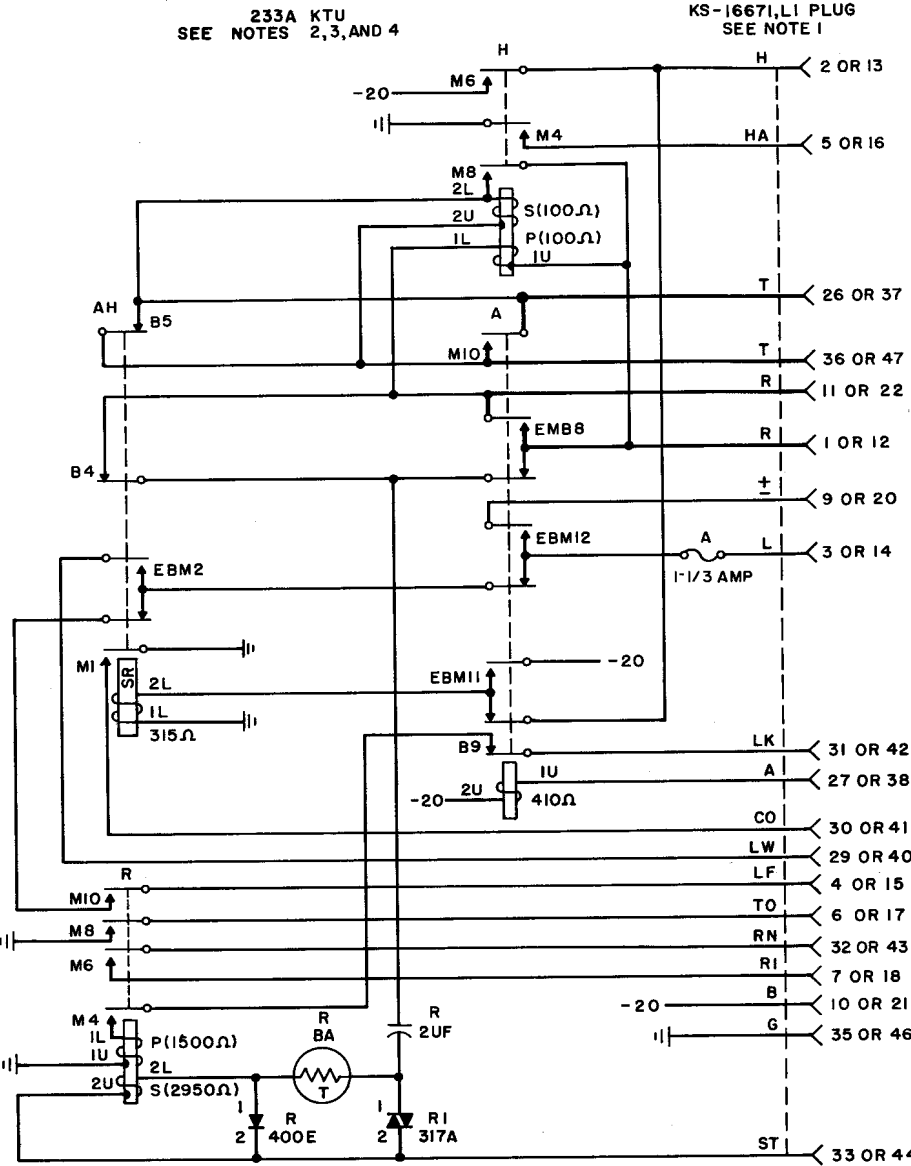
mistor R from transient currents. The thermistor has a cold resistance in the order of 50,000 ohms which prevents relay R from operating when ringing current is first applied, preventing false operation on disconnect or other transients. Power absorbed from the ringing current increases the temperature of the thermistor and reduces its resistance to the order of 3,000 ohms in about 1/2 second, permitting sufficient current to flow to operate the R relay on the half-wave rectified current due to diode R. Relay R locks operated on its primary winding under control of relay A and the LK lead. Operation of relay R connects ground to the TO lead to start the time-out and lamp flashing functions in the visual and audible signal circuit, connects the signal lamp lead to the flashing circuit, and closes the circuit to the common audible signal circuit.

2.02 **Metallic Ringing, X Wiring** — Operation of the circuit using metallic-ringing return (X wiring) is the same as that for grounded ringing as described in 2.01, except that ringing is returned to the tip of the line instead of to the ground. This arrangement is designed to reduce noise due to cooling of the R thermistor and/or potential differences.

Answering an Incoming Call

2.03 An incoming call is answered by operating the pickup key associated with the line being rung and removing the handset from its mounting. Operation of the switch hook contacts connects ground through the pickup key to the A lead operating relay A.

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R Relay Contacts (See Note 4)

Note 1: Terminals 1 to 11 and 26 to 36 are for odd numbered circuits. Terminals 12 to 22 and 37 to 41 are for even numbered circuits.

Note 2: The power supply leads and the leads to the central office or PBX line are connected to the terminals of the plug as shown below:

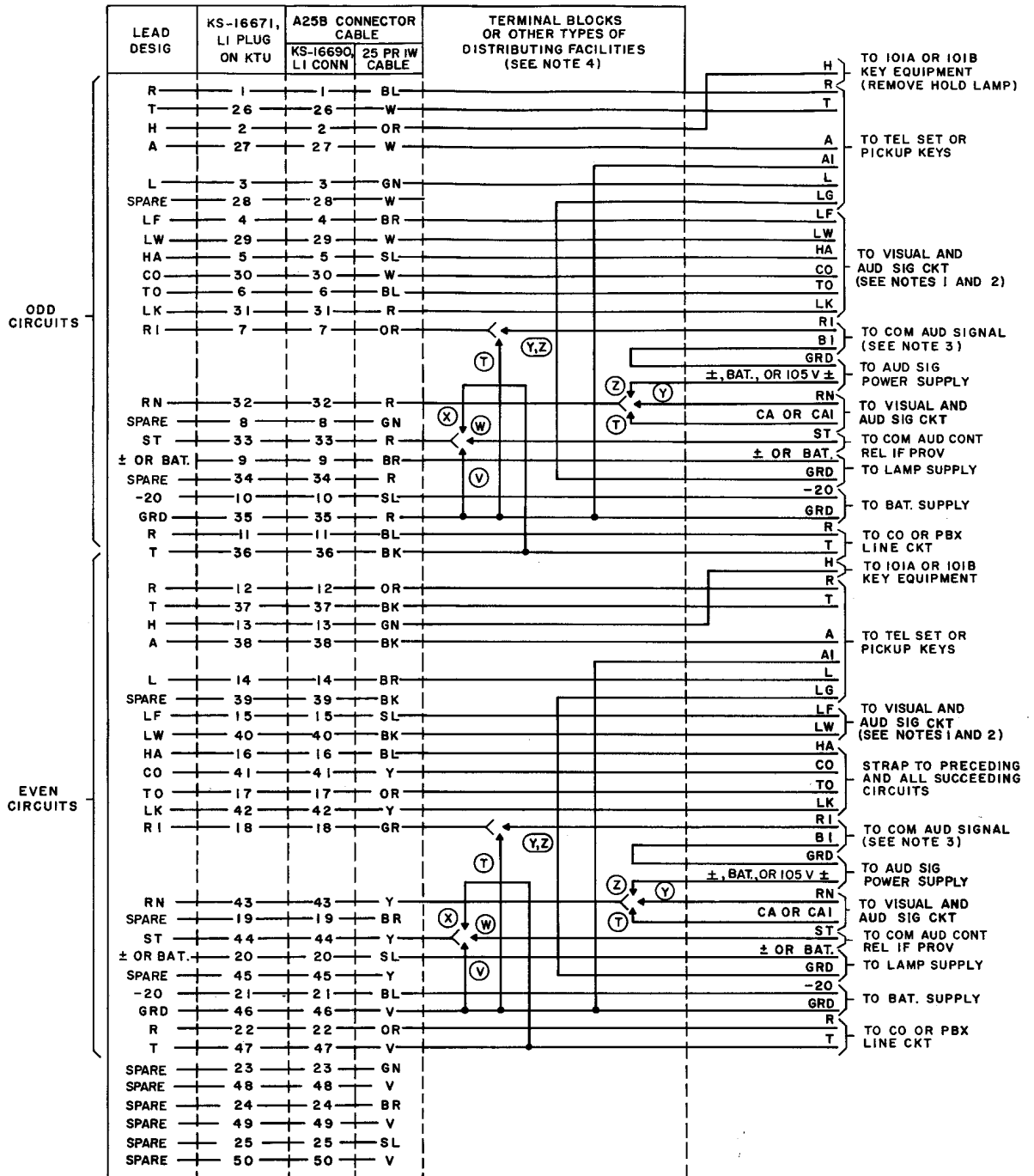
	Lead	Circuits	
		1-3-5-7-9	2-4-6-8-10
CO or PBX	T	36	47
	R	11	22
Lamp Supply	Grd		
	± or Bat.	9	20
Bat. Supply	Grd	35	46
	-20	10	21

Note 3: Each plug provides leads for two line circuits which are arranged according to the following table:

	Plug				
	A	B	C	D	E
Odd Circuits	1	3	5	7	9
Even Circuits	2	4	6	8	10

Note 4: For nonlocking operation of R relay, move the upper wire spring contact from its guide in contact position 4 to the lower guide of contact position 5. Move the lower wire spring contact from its guide in contact position 4 to the upper guide of contact 3. Contact positions 3 and 5 are unequipped and the stationary contacts unwired.

Fig. 1 - Schematic Drawing of the 233A KTU



Note 1: LF leads may be strapped not to exceed 50 lamps per group.

Note 2: LW leads may be strapped not to exceed 50 lamps per group.

Note 3: For common audible signal with Z or Y option, strap all R1 leads.

Note 4: The type of terminating equipment to be used, such as 30-type connecting blocks, bunch blocks, distribution frame, etc, will be governed by the size and needs of a particular installation.

CIRCUIT NOTES

LINE RINGING CIRCUIT	FEATURE OR OPTION		APP OR WIR
	METALLIC		
COMMON AUDIBLE	GROUNDED	COM AUD CONTROL RELAY NOT PROVIDED	V
		COM AUD CONTROL RELAY PROVIDED	W
COMMON AUDIBLE	INTERRUPTED RINGING	VISUAL AND AUDIBLE SIG CKT PROVIDED	T OR Y
		COM AUD CONTROL RELAY PROVIDED	W
	STEADY RINGING		Z

Fig. 2 - Connections for the 233A KTU

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The *A* relay operated:

- Operates the *AH* relay.
- Transfers the lamp lead from flashing to steady.
- Completes shunt around *H* relay.
- Releases *R* relay.

The *AH* relay operated:

- Opens the ringing circuit.
- Prepares a circuit from the *LW* lead to the signal lamp.
- Grounds the *CO* lead, disabling the time-out circuit.

OUTGOING CALL

2.04 The procedure for making an outgoing call is the same for answering an incoming call except that the pickup key, operated, must be associated with the line on which the call is to be made; the *R* relay will be in the released condition. The call is then advanced in the normal manner.

HOLDING

2.05 An incoming or outgoing call can be held by operation of the hold key in the telephone set which opens the ground on the *A* lead and permits relay *A* to release.

The *A* relay released:

- Removes the shunt from the windings of the *H* relay, allowing it to operate over the station loop.
- Prepares a path for holding the *AH* relay operated.
- Transfers the lamp lead from steady to lamp wink.

The *H* relay operated:

- Connects its own windings through contacts *M8* in series across the line as a holding bridge.
- Completes a holding path for the *AH* relay.
- Grounds the *HA* lead.

2.06 Release of the Holding Bridge When the Call is Again Picked Up — When any station of the key telephone system seizes the line by operating the associated pickup key and removing the handset from the mounting, relay *A* is operated, short-circuiting the windings of relay *H*, causing it to release and remove the holding bridge. This restores the circuit to the talking condition.

2.07 Release of the Holding Bridge from the CO or PBX — A permanent signal, caused by the hold circuit not being released by a station, can be released from the *CO* or *PBX* by opening the line momentarily and allowing relay *H* to release and restore the circuit to normal.

DISCONNECTION

2.08 When the station disconnects on either incoming or outgoing calls, the *A* and *AH* relays release and the circuit restores to normal.

OPERATION WITH LOCAL POWER FAILURE

2.09 If all local power fails, incoming calls will operate bridged ringers on the lines. If the local ringing supply is still operative, the common audible with option *Z* will operate but will follow ringing on the line rather than locking in; common audible with option *Y* may or may not operate depending upon the position of the interrupter contacts when the power fails.

REFERENCES:

SD-69270-011
SD-69270-012
SD-69270-013
SD-69288-0138