

**SB4100A MULTIPLE STATION LINE CARD
 ISSUE 8**

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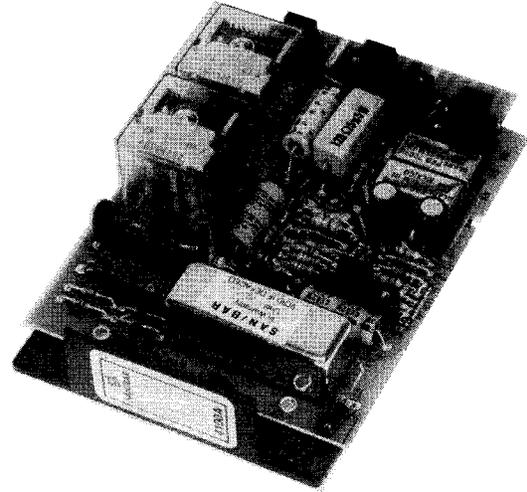


FIGURE 1 SAN/BAR 4100A LINE CARD

1.0 GENERAL

- 1.1 This section provides circuit description, installation and basic testing information for the SAN/BAR 4100A Multiple Station Line Card.
- 1.2 The SAN/BAR 4100A Line Card, as shown in Figure 1, is a simplified KTU line card designed for full compatibility with all types of key telephone systems working in conjunction with a central office or EPBX/PABX equipment. A special additional feature of this card is its ability to control key telephones at two or more distant locations which share the same lines. The SB4100A provides simultaneous lamp supervision for key telephones by using an additional control pair between locations (1800 ohms max. each conductor). See Figure 2
- 1.3 The ISSUE 8 Line Card has the additional feature of now being compatible with the W.E. 620A Panel (see Figure 5). The 4100A also provides MOH compatibility with Comkey systems plus an option for 50/500 ms Delayed Hold Release.

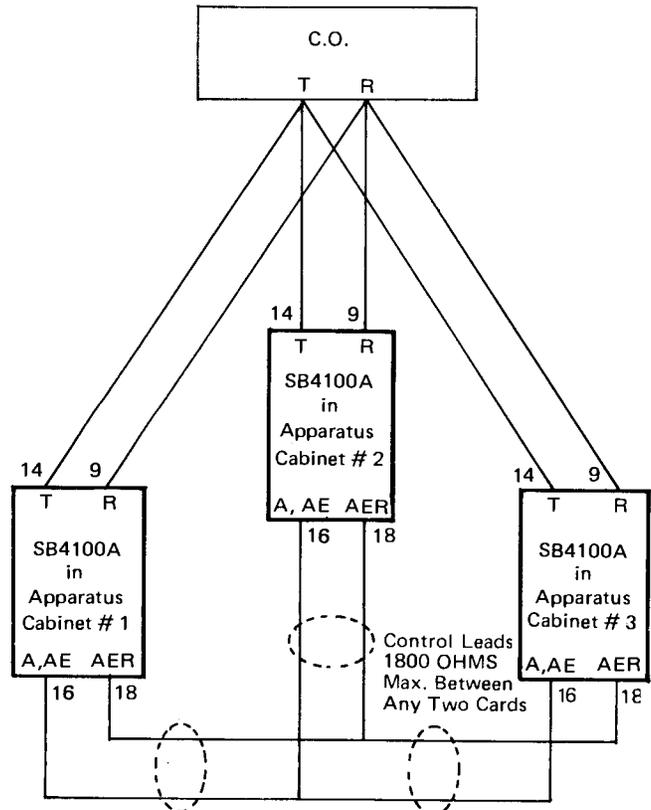


FIGURE 2 Block Diagram for Three Locations

2.0 SPECIFICATIONS

2.1 List of Applicable Drawings

- a) Schematic Drawing: SD-4100-000 (Fig. 7)
- b) Equipment Drawing: ED-4100-000

2.2 Electrical Characteristics

- a) Power Requirements: 18 to 28 VDC
- b) Current Consumption:
 - 0 mA Idle Current
 - 180 mA Maximum
- c) Operating Environment:
 - 0 C to 60 C, to 90% Humidity
- d) Loop Current Requirements:
 - 20 mA minimum
- e) Control Lead Resistance:
 - (AE, AER): 1800 ohms max. each
- f) Ringing Voltage: Operates with 57 VAC ringing signal; will not operate with 25 VAC noise or ringing signal.
- g) Ring-In Response Time: ring-in circuitry responds within 200 milliseconds.
- h) Ringing Timeout: returns to idle within 5 to 9 seconds after ringing stops.
- i) Parallel dialing: A remote two wire telephone instrument dial on the C.O. side will not cause false ringing.
- j) Line Reversal: Unit operation is independent of line polarity.
- k) Busy Indicator: An LED is on the card to give busy indication to the installer.

2.3 Physical Characteristics

- a) Dimensions: 3.5" W x 4.75" L x 1.3" H conforming to standard line card dimensions.
- b) Key Location: 18 pins on non-component side, keyed between pins 5 and 6 and between pins 12 and 13.
- c) Pin Spacing: 0.150 inches between centers.
- d) Weight: 7.0 oz.

3.0 INSPECTION

- 3.1 Inspect the unit thoroughly, as soon as possible after delivery. If any part of the unit has been damaged in transit, report the extent of the damage to the transportation company immediately. If the unit is to be stored for some time before installation, make an operational check at once. The purpose of this check is to make sure that the unit is in proper working order as received from the factory. If the check indicated satisfactory performance, the unit may be stored for future installation.

If the system is to be installed at once, make an operational check after the installation is completed.

4.0 MOUNTING

SAN/BAR 4100A circuit card is the same physical size and has the same tap key and lock capability as the standard WE 400 line card or S/B 4000 Line Card, and will mount in any standard Key Service Panel such as the SB319A. For mounting techniques, see the SAN/BAR equipment mounting shelf brochure.

5.0 INSTALLER CONNECTIONS

- 5.1 The SAN/BAR 4100A has all pin assignments compatible with shelf wiring for line cards except one cable pair between itself and the companion unit remotely located. The cable pair is to be terminated at A & AE (pin # 16) and AER (pin # 18) of the 4100A associated with the central office or PABX line to be used. See Figure 3.

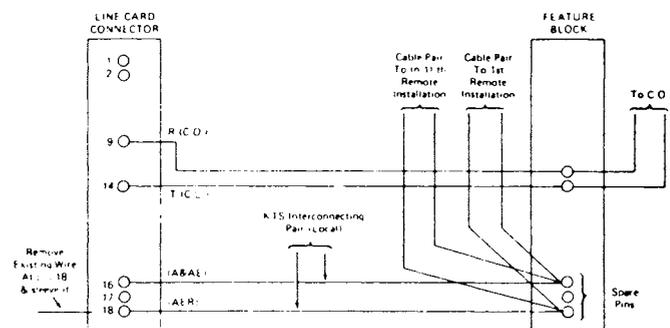


FIG. 3 Installation Information (n stations)

- 5.2 With an SB4100A installed in the KTU panel at each location, each card performs all line card functions in the same manner as a WE400D line card. Once the control lines connect pin 16 of each line card together and pin 18 of each line card together, the line cards will operate together to provide lamp supervision at each location sharing the same telephone line.
- 5.3 In areas of high thunderstorm activity, the following information is offered: Continued and extensive tests of line card failures due to lightning damage indicates that the best protection is to have a separate earth ground (water pipe) for the KTU power supply and not to use an adjacent or easily available AC circuit ground for this Purpose.

5.4 STC Connections

Figure 4 shows wiring details for installing the SB4100A behind an STC Voice Coupling Arrangement

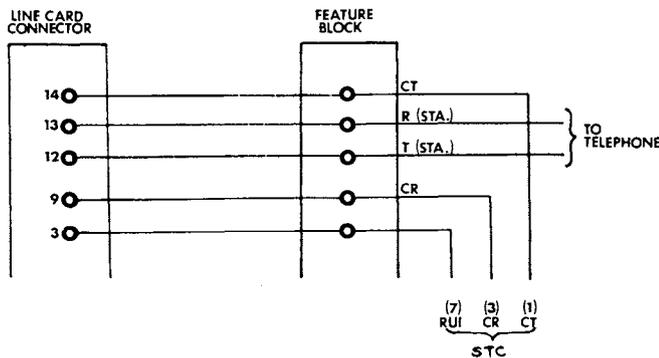


FIGURE 4

6.0 CIRCUIT DESCRIPTION (See Figure 5)

6.1 Incoming Call:

An incoming call will apply ringing voltage to T(C.O.) and R(C.O.) and this is rectified in the bridge CR1-CR4 to operate K3 relay through coil R. Contact K3-A closes and energizes K5 in the companion line card, closure of K5-A (of both line cards) applies positive potential to the base of Q3. Q3 applies negative potential to the base of Q1 through R5 and R8 and Q1 conducts to energize K1. Contacts K1-A through K1-F operate to afford the following functions:

- a) K1-F connects line card pin 5 and 6 (ST and LG) to start the interrupter.
- b) K1-E connects lamp flash (pin 7) to lamp (pin 8) and line button on teletest flashes.
- c) K1-D connects ring control voltage (pin 1) via pin 11 to bell/buzzer in teletest.
- d) K1-A applies the timeout capacitor C8 to maintain a hold condition for open loops of 50 or 500 milliseconds.
- e) K1-B prepares Q1 for switching to non-conductive state.
- f) K1-C prepares for hold condition when K2-B closes through resistor R2 across T and R of line card unit.

6.2 Abandoned Call:

If the incoming ringing ceases, due to the caller hanging up, resistor R3 determines the time out charge of C3 and the holdover time before relay K1 releases.

6.3 Call Answered:

When the telephone receiver is off-hook and the calling line button is depressed, a ground is applied to A & AE (pin 16). Relay K4 is energized and K4-A is closed. Removal of the receiver also loops the T and R leads and the resulting C.O. or PBX loop current flow will trip the incoming ringing.

Since A & AE (pin 16) is linked to a companion card A & AE terminal, the K4 relay there is also energized and its K4-A contact closes. The resulting control and indicating display are duplicated. The closure of K4-A contact operates Q4 through R11 and CR11. Q4 then operates Q2 through R19. Q2, in turn, applies ground to R7, CR5, and CR6. The ground through R7 operates Q3, the ground through CR5 operates the K2 relay, and the ground through CR6 forces off Q8 which releases the K1 relay. Relay contacts K2-A through K2-F operate and afford the functions indicated below:

- a) K2-A applies an alternate ground to the K2 relay to hold it if K4 is released when the A lead is opened in the hold condition.
- b) K2-B connect R2 to tip line to prime for hold condition if and when K1-C closes later. K2-B contact removes short condition from K3 (L winding) and loop current energizes L winding.
- c) K2-E removes the ring detect circuit.
- d) K2-F breaks ringing control voltage from the bell/buzzer circuit.
- e) K2-C breaks lamp flash.
- f) K2-D gives lamp steady state.

The telephone circuit is now established and a telephone conversation effected. The line button lamp will be steadily illuminated until the subscriber goes off the line.

6.4 Hold Condition

In a hold condition, the ground potential from the "A" lead is removed. The relay K4 is thus de-energized and the contact K4-A is opened to remove the ground potential from the base terminal of transistor Q4 through R11 and CR11. Q4 and Q2 run off, removing ground from R7, CR5 and CR6. Loop current through K3-L winding maintains K3-A and K5-A closed. Thus, Q3 remains conductive and K2 remains operated. With the ground at CR6 removed a negative potential is

applied to the base of Q1 through R5 and R8, causing Q1 and K1 to operate, establishing R2 across the line. A similar sequence occurs in the companion card.

- 6.5 Caller abandons call on hold:
 In the event that the calling or distant party hangs up or otherwise abandons a call when the telephone circuit is in a hold condition, the flow of loop current ceases. The relay K3 is accordingly de-energized and the consequent opening of the contact K3-A causes the subsequent de-energization of the relay K5 which is followed by de-energization of the relays K2 and K1 due to the opened contact K5-A. This series of events is duplicated in the companion line card circuit since the opening of the contact K3-A also removes the

negative potential applied over the conductor AER to the companion circuit. With strap option J3 in the "L" position components C8, R16 and R20 will maintain the hold condition for at least 430 milliseconds after an open loop occurs. With J3 in the "S" position, R17 reduces the time constant to 50 milliseconds. If the open loop continues beyond the timeout the line card will return to the idle condition.

For outgoing calls, as with incoming calls, the line button lamps at the companion stations will be controlled simultaneously and will both go off when both the subscribers are off-line and the line card circuits are permitted to be restored to an idle condition.

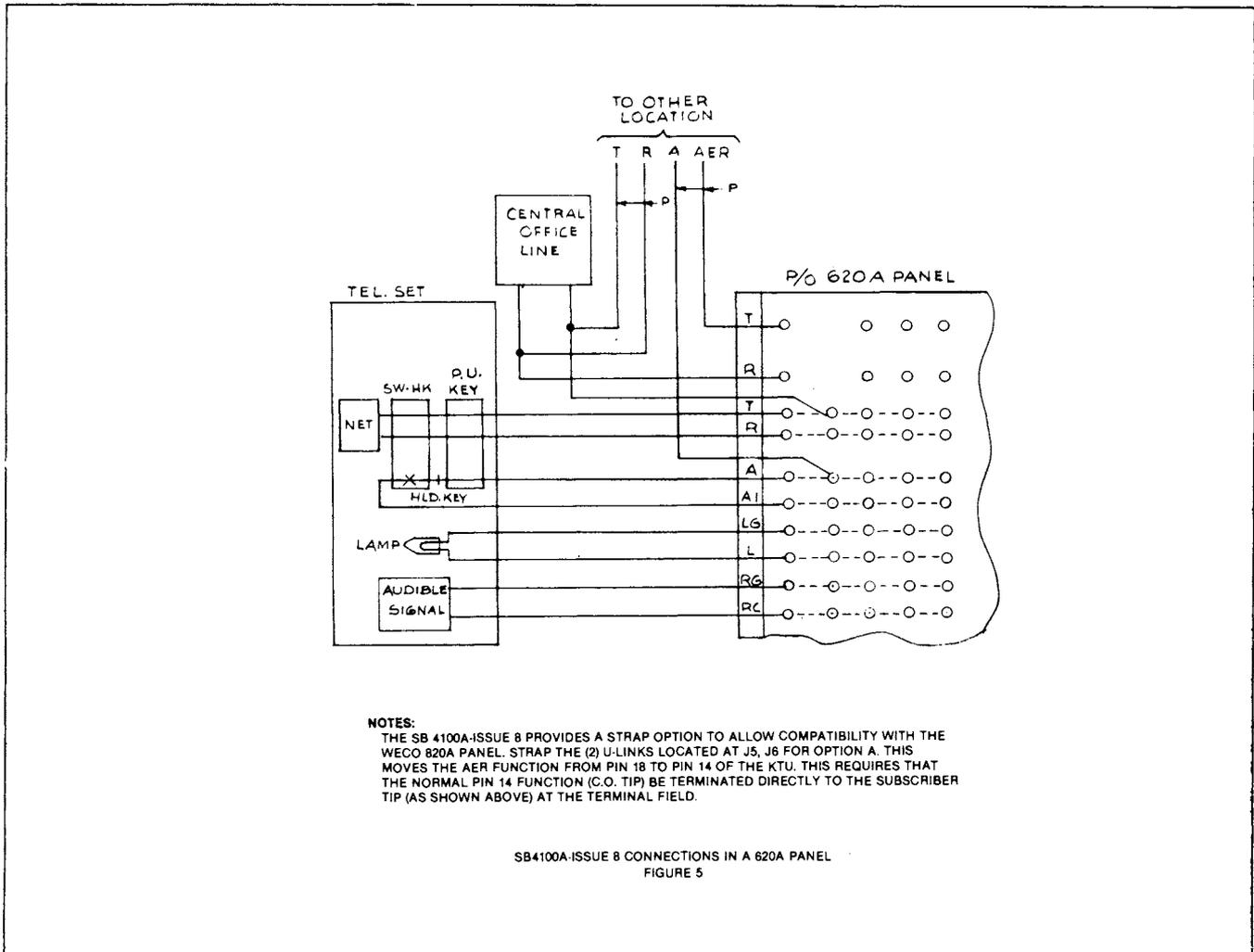


FIGURE 5

7.0 TESTING

- 7.1 If trouble is encountered with the operation of the 4100A line cards, check that all installer connections and strapping have been properly made. Make certain that the 4100A unit is making good connection with the mounting assembly card connector, snap the 4100A out and in several times.
- 7.2 If the trouble persists, use the procedure in 7.3 to determine a bad line card or a bad system. Figure 7 parts location is provided as an aid.
- 7.3 Using a multimeter (Simpson 263 or Equ.) test the 4100A as follows: (Both Stations if necessary)
- Connect the multimeter (set to 60V DC scale) across pin 15 (GRD) and pin 17 (-24V) of the card connector. The multimeter should indicate $+24 \pm 4V$ DC.
 - Connect the multimeter (set to the 60V DC scale) across pin 16 (A & AE) and pin 17 (-24V) of the card connector, in the Answer Mode. The multimeter

- should indicate $+24 \pm 4V$ DC.
- Connect the multimeter (set to the 60V DC scale) across pin 18 (AER) and pin 15 (GRD) of the card connector. The multimeter should indicate $+24V$ DC approximately.
 - Connect the multimeter (set to the 15V AC scale) across pin 4 ($\pm 10V$) and pin 15 (GRD) of the card connector. The multimeter should indicate $10 \pm 2V$ AC.
 - Take the 4100A off the card connector, set the multimeter to the R x 100 ohm scale and measure across pin 12T (STA) and pin 13R (STA) of the line card. The multimeter should indicate infinity (00).

- 7.4 Field repairs involving replacement of components within a module are not recommended. All SAN/BAR products are warranted for 2 years from the date of purchase. Return to SAN/BAR Corporation, 17422 Pullman Street, Irvine, California, 92714. For technical assistance call (714) 546-6500.

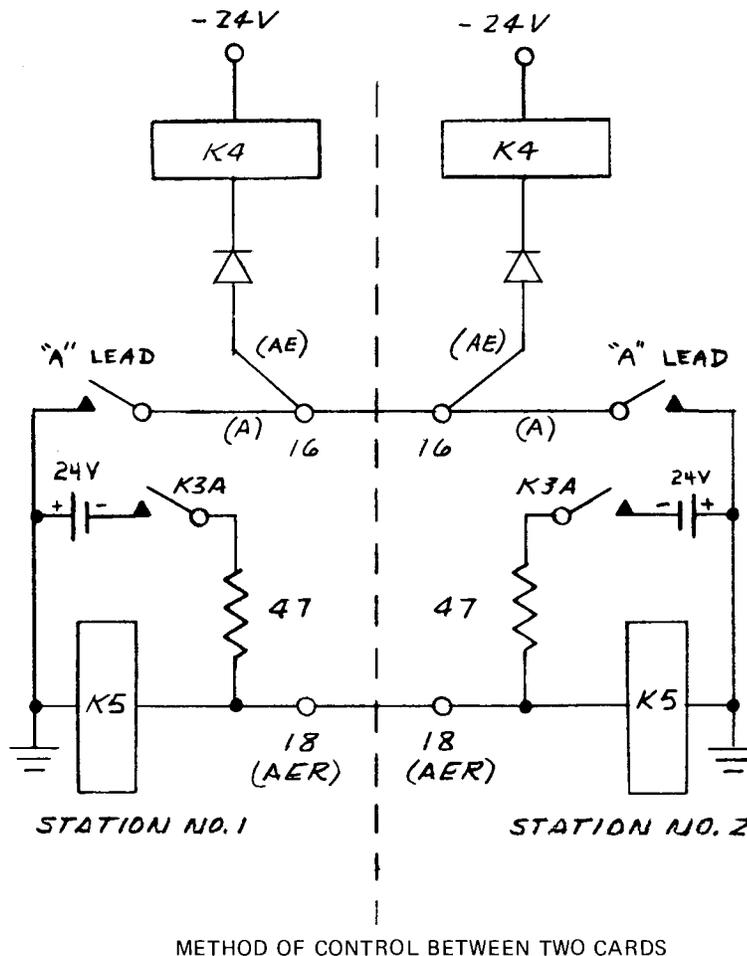
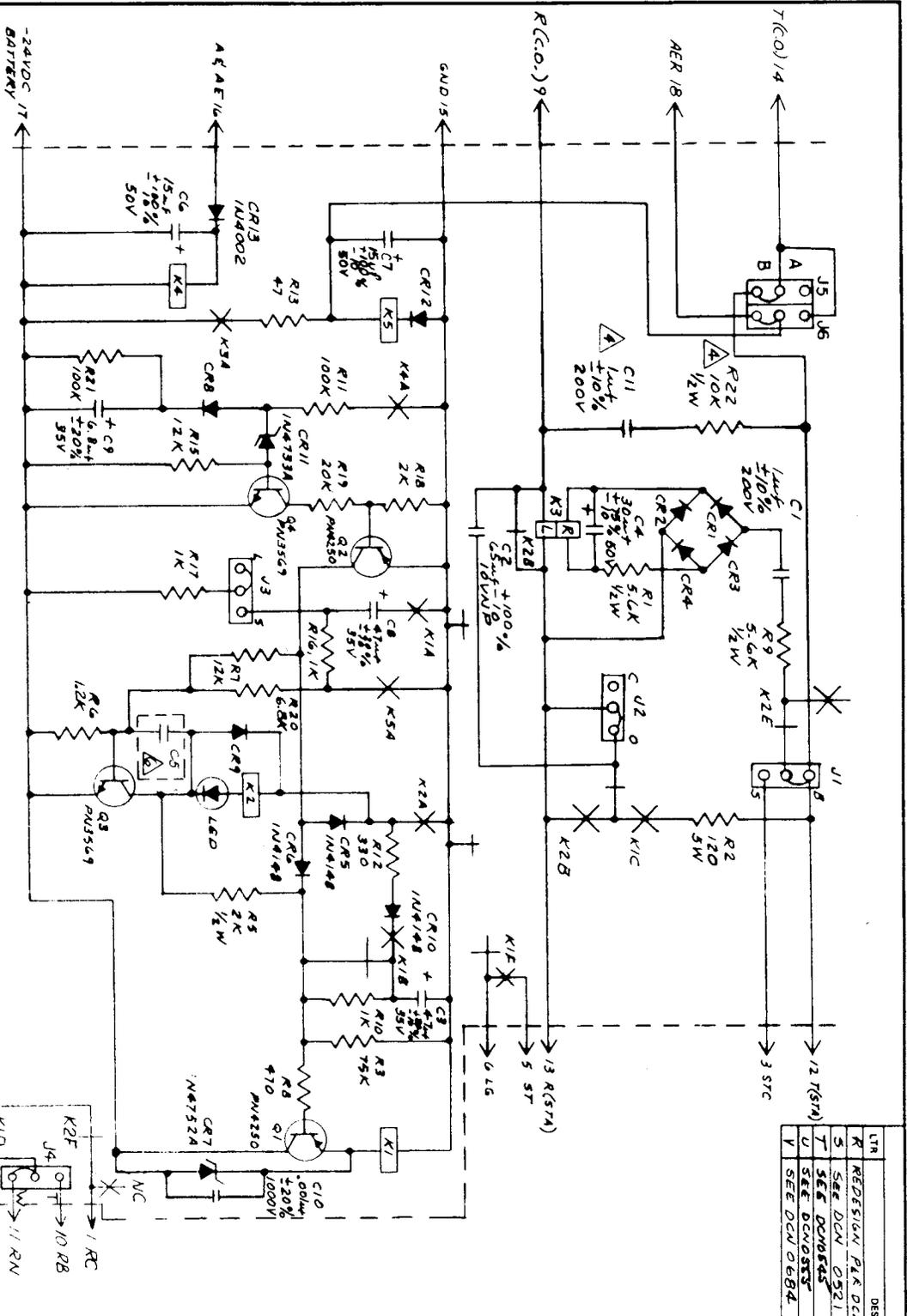


FIGURE 6

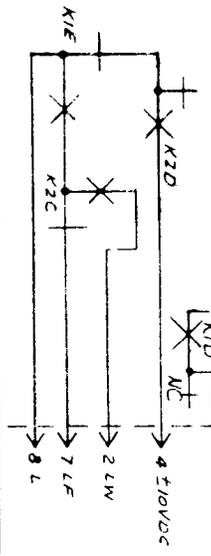
LTN	DESCRIPTION	DATE	APPROVED
R	RED DESIGN P&R DCN 0463	8/21/64	JTS
S	SEE DCN 0521	8/24/64	WTS
T	SEE DCN 0585	8/24/64	WTS
U	SEE DCN 0585	8/24/64	WTS
V	SEE DCN 0684	8/24/64	WTS



- ⓐ NO COMPONENT IS INSTALLED AT C5
- ⓑ THIS STRAP OPTION IS USED ON APPLICATIONS WHERE PIN 18 IS USED FOR OTHER FUNCTIONS THAN HER CONTROL.
- ⓒ AVAILABLE AS A -2 OPTION

- 1. RESISTORS ARE IN OHMS, ±5%, 1/4W
- 2. DIODES ARE IN OHMS, ±5%, 1/4W
- 3.

NOTES UNLESS OTHERWISE SPECIFIED



TRCD	OPT	SPT	FUNCTIONS
W/RED	A	USIG	AER IN/PIN 18
YES	B	U1	BRIDGED RINGING
YES	S	U1	REMOTE RINGING
YES	0	U2	COMKEY M.O.M.
YES	L	U3	500ms ±0.05% HOLD
YES	5	U4	100ms ±0.05% HOLD
YES	W	U4	100ms ±0.05% HOLD

UNLESS OTHERWISE SPECIFIED		CONTR NO		SAN / BAR CORP.	
DR 1/2-5-75	CHK WTS	ENG	PROJ	1722 MILLIKEN STREET SANTA ANA, CALIFORNIA 92701	
DIM. IN INCHES		REL 5/19/74		SCHEMATIC-25TA CONTROL	
TOLERANCES		SIZE CODE IDENT NO LOW NO		500ms ±0.05% HOLD	
XXX ±0.01		C 27412		(ISSUE B) MODEL 4100A	
XXX ±0.10		SCALE		SD-4/100-000	
XXX ±0.50		SHEET 1 OF 1		LTR V	
MACH FIN		APPRO		LTR	
BREAK ALL SHARP EDGES AND CORNERS		SCALE		LTR	
DASH NO	NEXT ASMT	USED ON	APPLICATION	LTR	

FIGURE 7
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