

4000F LINE CARD - ISSUE IIIA

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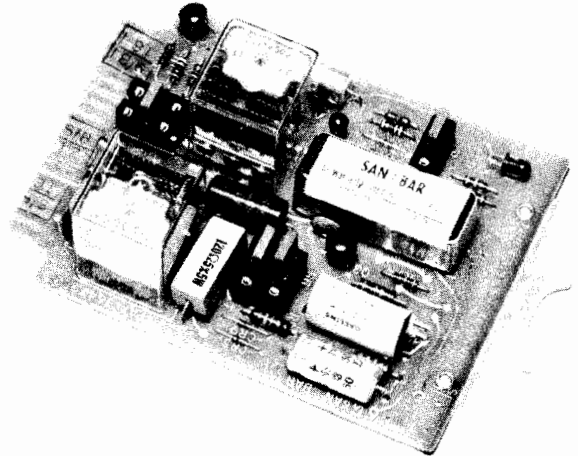


Fig. 1 4000F Line Card

1. GENERAL

1.1 This section provides circuit description, installation and basic testing information for the San/Bar 4000F Line Card.

1.2 The San/Bar 4000F Line Card (Fig.1) is a simplified KTU line circuit designed for full compatibility with all types of key telephone systems working in conjunction with central office or PBX/PABX equipment. Also, the 4000F can be used with STC type interface connecting arrangements.

2. SPECIFICATION

2.1 List of applicable drawings:

- (a) P.C. Board Assembly No. 4000000 (Fig.4)
- (b) Schematic No.4000001F (Fig.3)
- (c) Bill of material No.BM-4000-000

2.2 Electrical Characteristics

2.2.1 Model 4000F

- (a) Source Voltage operates at 18V to 28V DC.
- (b) Operating Environment: Temperature from 0°C to 50°C. Humidity to 90%.
- (c) Current Consumption: There is no idle current consumption. Maximum current consumption is 60 MA.
- (d) Loop Current: 20 MA (minimum)
- (e) Ringing Voltage: Operates at 57V ringing signal.

- (f) Response Time: Guaranteed 200 msec of ringing signal will trigger the ring-in circuitry.
- (g) Ringing Time-out: Two options are furnished either 6 or 15 sec. $\pm 20\%$ (See Schematic and Option Chart).
- (h) False Ringing: Line induced AC Voltage will not cause false ring-in.
- (i) Ringing Option: The unit provides optional STC remote ringing and ringing on Tip respect to GND (TG). The options are strappable by use of U-links and sockets furnished. The unit is factory set for bridge ringing. (See Schematic and Option Chart).
- (j) Parallel Dialing: A remote two wire telephone instrument dialing (on the central office side) will not cause false ringing-in.
- (k) Line Reversal: Unit operation is independent of line polarity.
- (l) Busy light: A light emitting diode is provided to indicate a busy line condition.
- (m) Hold Function: Hold Function switching time 30 ± 10 msec.

2.2.2 Model 4000F-1

Model 4000F-1 has the same characteristics as the model 4000F except a 24V lamp with series momentary switch is furnished to indicate, on demand, the C.O. battery source.

2.3 Physical Characteristics

- (a) Dimensions: 4-3/4" x 3-1/2" x 1-5/16".
- (b) Weight: 6-2/3 oz. approximately.
- (c) Key location: Card must be keyed with slots between pins 5 and 6, and between pins 12 and 13.

3. 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 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 indicates satisfactory performance, the unit may be stored for the future installation. If the system is to be installed at once, make an operational check after the installation is completed.

4 MOUNTING

San/Bar 4000F circuit card is the same physical size and has the same tap key and lock capability as the standard WE400 line card and will mount in any standard 300 series mounting shelf. For those installations where only two (2) units are required, the San/Bar 302A apparatus box may be used.

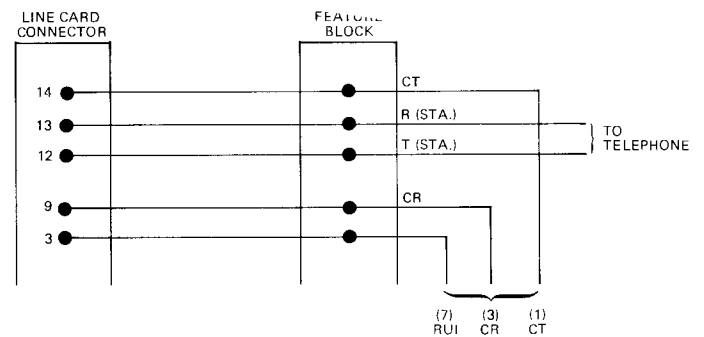
5. INSTALLER CONNECTIONS

- 5.1 The San/Bar 4000F has all pin assignments compatible with shelf wiring for line cards.
- 5.2 The San/Bar 4000F line cards are factory set for:
 - (a) Bridged ringing "BR"
 - (b) "W" ringing audible option
 - (c) "Y" flashing option for the hold condition.
 - (d) "P" six second time-out on an abandoned call.
- 5.3 In areas of high thunderstorm activity, the

following information is offered:

Continued and extensive test of line card failure 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 Remote Ringing



- 1. Disconnect, cap and store any shelf wiring connected to pin 3 of the line card connector.
- 2. Connect a new wire from pin 3 of the line card connector to a spare pin on the feature block.
- 3. Connect RUI, CT and CR as shown below.
- 4. Move the shorting strap of socket J1 on the line card BR to RR.

Fig.2 STC Installation Information.

6. CIRCUIT DESCRIPTION

See Schematic No. 4000001F as shown in Fig.3.

- 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 bridged CR1-CR4 to operate K3 relay through coil R. Contact K3-A closes and applies negative potential to the base of Q1 through R5 and R8, Q1 conducts to energize K1. Contacts K1-A through K1-F operate and afford the following function:

 - (a) K1-A connects line card pin 5 and 6 (ST and LG) to start the interrupter.
 - (b) K1-B connects lamp flash (pin 7) to lamp (pin 8) and line button on teleaset flashes.
 - (c) K1-C connects ring control voltage (pin 1) via pin 11 to bell/buzzer in teleaset.
 - (d) K1-D no function.

- (e) K1-E prepares Q1 for switching to non-conductive state .
 - (f) K1-F prepares for hold condition when K2-B closes applying resistor R2 across T and R of line card unit.
- 6.2 Abandoned Call:
If the incoming ringing ceases due to the caller hang up, Resistor R3 and R4, depending on the option used, determines the time out charge of C3 and the hold over 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" lead (pin 16). 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. Ground potential at "A" lead renders Q1 non-conductive and also energizes relay. K2 Relay contact 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 "A" lead is removed from ground in the hold condition.
 - (b) K2-B connects R2 to tip line to prime for hold condition if and when K1-F closes later.
 - (c) K2-C contact removes short condition from K3 (L winding) and loop current energizes L winding, thus operating relay K3 and contact K3-A closes.
 - (d) K2-D breaks ringing control voltage from the bell/buzzer circuit.
 - (e) K2-E breaks lamp flash.
 - (f) K2-F 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. Light emitting diode LED lights.
- 6.4 Hold Condition:
In a hold condition, the ground potential from the "A" lead is removed. The transistor Q1 as a result again rendered conductive by the negative potential applied to the base terminal thereof through the closed contact K3-A and relay K1 is energized. K2 will remain energized through K2-A contact. Re-operation of the relay K1 will:
- (a) Loop the T and R leads into the hold condition via the resistor R2 which will hold the relay K3 by the loop current.
 - (b) Re-operate the interrupter motor.
 - (c) Connect the steady lamp or lamp wink. Light emitting diode LED lights.
- 6.5 Retrieval from hold condition:
This is effected by a release of the hold button which applies ground to the "A" lead to make Q1 non-conductive. Relay K1 de-energizes. In the majority of telephone exchange areas, when an outgoing call is placed into the hold condition, it will so remain until released by the re-operation of the associated line button in the keyset. However, in those telephone office areas where "Force Release" or "Called Party Release" equipment is installed, a line disconnect condition may be given to the circuit which will release the K3 relay from the "L" winding and return the unit to the idle state.
- 6.6 Drop from hold:
In certain types of Central Offices, there is a momentary opening of the loop to the hold circuit when the distant party hangs up. The relay K3 is accordingly de-energized and K3-A contact opens. K1 and K2 relays will also de-energize, returning the circuit to the idle condition.
- 6.7 Outgoing Calls:
A subscriber can place an outgoing call by depressing the appropriate line button and removing his telephone receiver to an off-hook condition. Relay K3 energizes. The relay K2 will be energized by the application of ground potential to the "A" lead. No ringing occurs at the telephone unit. For outgoing calls, as with incoming calls, the line button lamp will be controlled simultaneously and will go off when the subscriber is off line and the line card circuit is permitted to be restored to an idle condition.
- 7 TESTING
- 7.1 If trouble is encountered with the oper-

ation of the 4000F line card, check that all installer connections and strappings have been properly made. Make certain that the 4000F unit is making good connection with the mounting assembly card connector, snap the 4000F 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.

7.3 Using a multimeter (Simpson 263 or equivalent) test the 4000F as follows:

- (a) Connect the multimeter (set to the 60V DC scale) across pin 15 (GRD) and pin 17 (-24V) of the card connector. The multimeter should indicate $+24 \pm 4V$ DC.
- (b) Connect the multimeter (set to the 60V DC scale) across pin 16 (GRD) and pin 17 (-24V) of the card connector, in the Answer Mode. The multimeter should indicate $+24 \pm 4V$ DC.
- (c) Connect the multimeter (set to the 15V AC scale) across pin 4 ($\pm 10V$) and pin

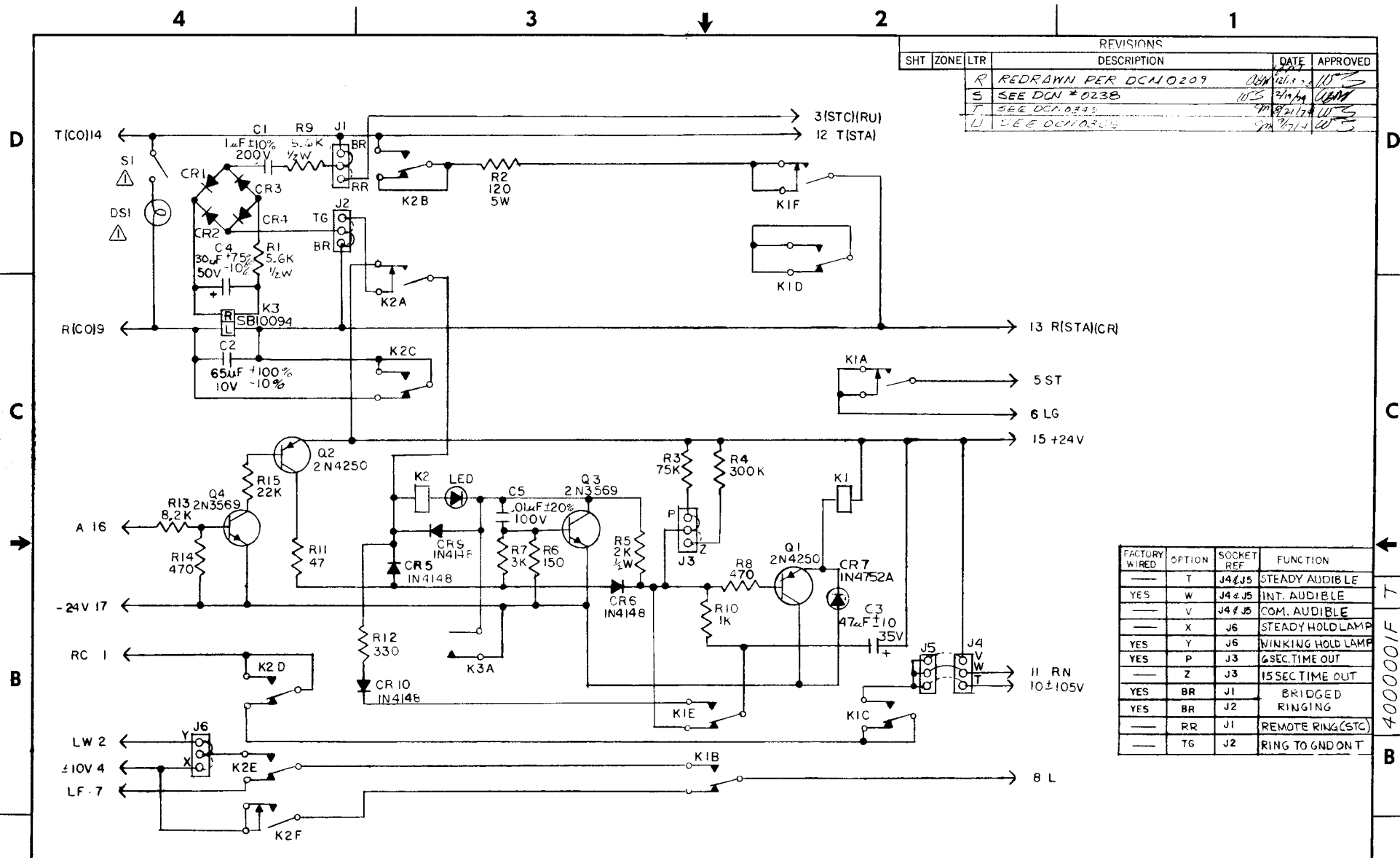
6 (LG) of the card connector. The multimeter should indicate $10 \pm 2V$ AC.

(d) Take the 4000F 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 4000F line card. The multimeter should indicate infinity (∞).

(e) Measure the coil resistance of K1, K2 and K3 on the 4000F line card, (set the multimeter to the R x 100 ohm scale). The resistance of K1, K2 winding should measure 750 ohms $\pm 10\%$, R winding of K3 should measure 1740 ohms $\pm 10\%$ and L winding of K3 should measure 70 ohms $\pm 10\%$ on the meter.

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 Corp. 17422 Pullman Street, Santa Ana, Calif. 92711; for technical assistance, call (714)546-6500.

REVISIONS					
SHT	ZONE	LTR	DESCRIPTION	DATE	APPROVED
R			REDRAWN PER DCN 0209	08/21/73	W.S.
S			SEE DCN # 0238	10/5/73	W.S.
T			SEE DCN 0245	11/21/73	W.S.
L			SEE DCN 0305	12/7/73	W.S.



FACTORY WIRED	OPTION	SOCKET REF	FUNCTION
---	T	J4 & J5	STEADY AUDIBLE
YES	W	J4 & J5	INT. AUDIBLE
---	V	J4 & J5	COM. AUDIBLE
---	X	J6	STEADY HOLD LAMP
YES	Y	J6	WINKING HOLD LAMP
YES	P	J3	6 SEC TIME OUT
---	Z	J3	15 SEC TIME OUT
YES	BR	J1	BRIDGED
YES	BR	J2	RINGING
---	RR	J1	REMOTE RING (STC)
---	TG	J2	RING TO GND ON T

3. ALL DIODES ARE IN4002
 2. ALL RESISTORS ARE IN OHMS, ±5% 1/4W
 ΔSI & DSI ARE OPTIONAL COMPONENTS
 NOTES: UNLESS OTHERWISE SPECIFIED

UNLESS OTHERWISE SPECIFIED DIM. IN INCHES TOLERANCES		
xx ± .015		
.xxx ± .010		
ANGLES ± 0.5°		
MACH. FIN.		
DASH NO.	NEXT ASSY	USED ON
	APPLICATION	

CONTR. NO. DR <i>Fun Book</i> 12-3-73			
SAN/BAR ELECTRONICS CORP. 17422 Pullman Street Santa Ana, Calif. 92711			
SCHEMATIC - KTU LINE			
CARD			
MODEL 4000F (ISSUE 3-A)			
SIZE	CODE IDENT NO.	DWG. NO.	LTR
C	27412	400000IF	U
SCALE NONE			SHEET

FIGURE 3
5

400000IF T

A

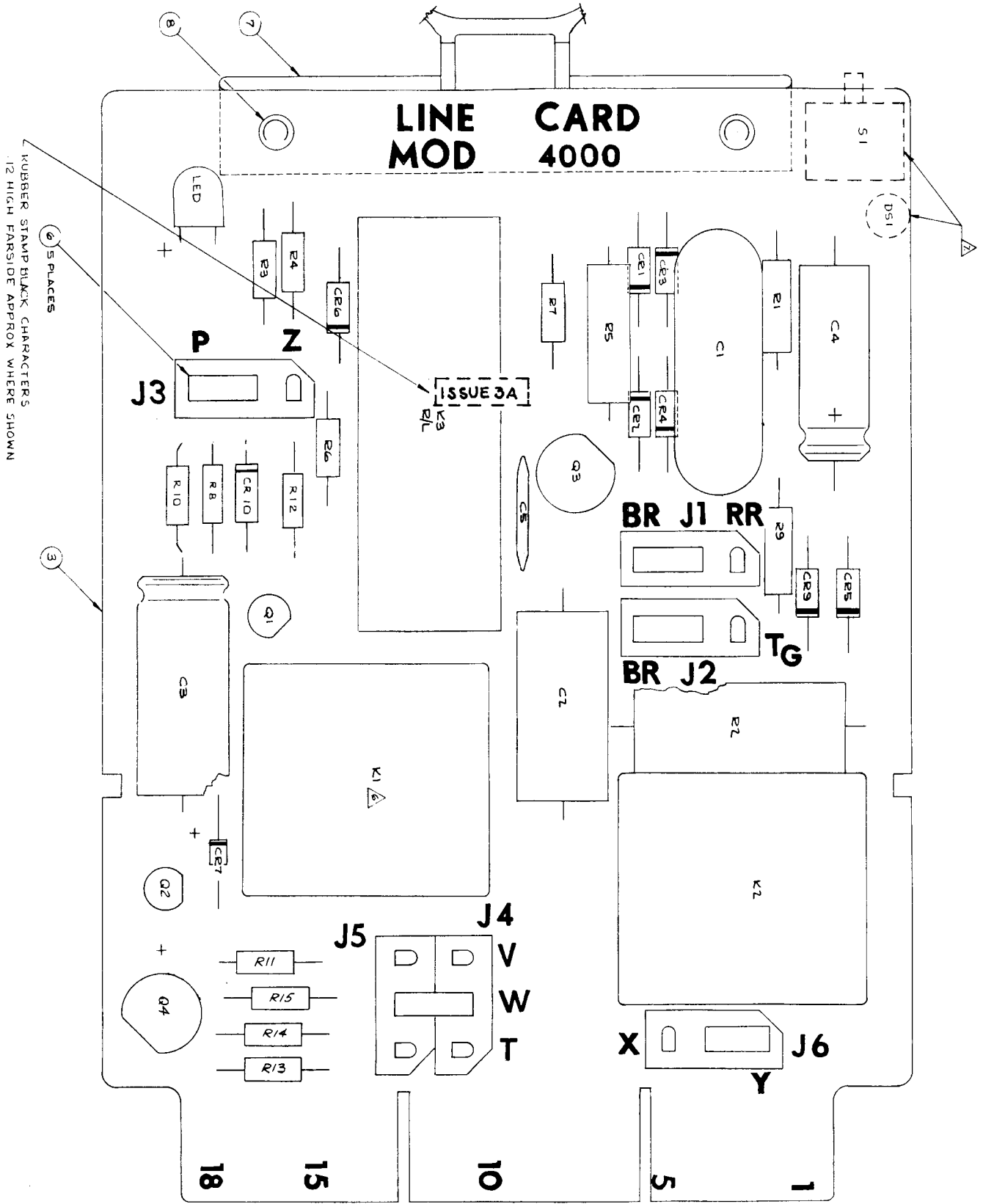


Fig. 4