

## SB 710B EXCLUSION CIRCUIT

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#### 1.0 GENERAL

The SAN/BAR 710B Exclusion Circuit provides the user of shared key telephone lines all the privacy enjoyed by the private telephone user. When all the telephones sharing the same telephone lines are each equipped with an SB710B, the first person to seize a particular line excludes all others from using or listening to that line. If it is desired to let someone else share the line for conferencing, a release circuit may be set using the hold button or privacy release button. The next person attempting to access that line is allowed in, after which the release circuit resets to exclude all others. Lamp supervision is provided to the hold button to show the user when the release circuit has been set. The SB710B utilizes the line card "A" lead for operation rather than detecting the tip-ring line condition. Both tip and ring are opened when exclusion occurs.

#### 2.0 SPECIFICATIONS

##### 2.1 List of Applicable Drawings

- a) Schematic Drawing SD-0710-000
- b) Equipment Drawing ED-0710-000

##### 2.2 Electrical Specifications

- a) Power Requirements: 18 to 30 VDC
- b) Current Consumption: There is no idle current consumption. Maximum current consumption is 55mA.
- c) Operating Environment: 0 C to 60 C  
Humidity to 90%.

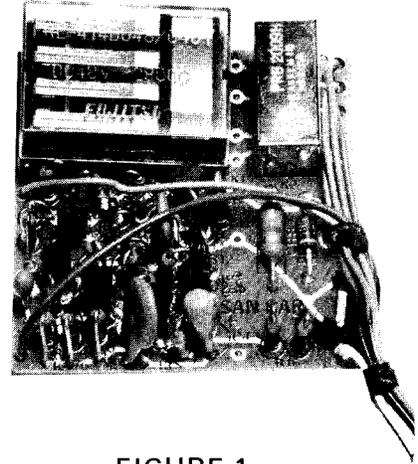


FIGURE 1

- d) "A" lead Resistance: the SB710B operates properly with line card resistance of from 900 ohms to 100K ohms.
- e) Relay Contact Ratings: 1A, 200 volts peak..
- f) Response Time: exclusion occurs within 200 milliseconds after attempted access.

##### 2.3 Mechanical Specifications

- a) Circuit Size: 2.2" L x 1.9" W x 0.6" H
- b) Method of Connection: Eleven color coded wires terminated with spade lugs.
- c) Microswitch Option: For key telephones having the capability to depress more than one line button at a time, a microswitch and mounting bracket is added to the SB710B to form the SB710B-1.

#### 3.0 INSPECTION

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.

#### 4.0 MOUNTING

The SB710B may be mounted in any convenient location inside the telephone. The color coded wires are about eleven inches long to allow connection to any point in the telephone. A mounting strap is provided to localize the position of the unit.

| W.E. | I.T.T. | S.C. | A.E. |
|------|--------|------|------|
| 564  | 564    | 1704 | 102  |
| 565  | 565    | 1714 | 186  |
| 2564 | 2564   |      | 186A |
| 2565 | 2565   |      |      |
|      | 830    |      |      |
|      | 831    |      |      |
|      | 832    |      |      |
|      | 833    |      |      |
|      | 834    |      |      |
|      | 2830   |      |      |
|      | 2831   |      |      |
|      | 2832   |      |      |
|      | 2833   |      |      |
|      | 2834   |      |      |

#### 5.0 INSTALLER CONNECTIONS

##### 5.1 Compatible Models

The SB710B was specifically designed to work with the following models:

For models not listed above please consult SAN/BAR Corporation.

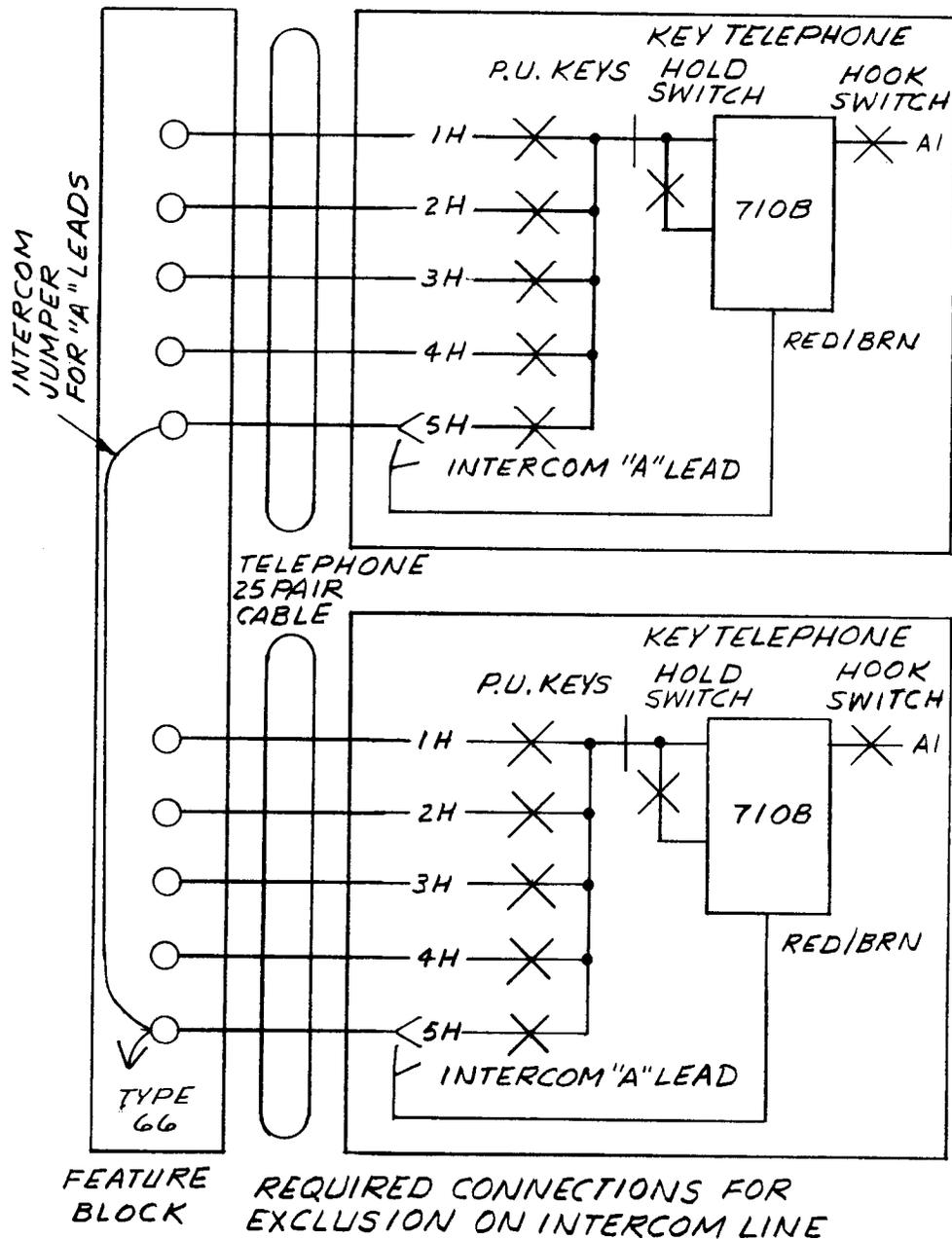


FIGURE 2

5.2 Placement of Unit

The SB710B has an insulated protective covering so that it can be placed in any convenient location, such as over the ringer coil. A piece of double-sided tape is provided on the bottom of the unit to allow placement on the telephone baseplate when room allows. A tie wrap is also provided which may be snipped off if not used to secure the unit.

5.3 General Installation Instructions

Specific installation instructions for the A.E. type 102A telephone appears in Appendix "A", and for the W.E./I.T.T. 565 telephone in Appendix "B". The following instructions show in a general way how the Exclusion Circuit installs into a key telephone: (See Figure 3).

- a) Locate the "tip" wire (usually green) coming from the common tie point of the pick up keys. In a rotary phone this wire terminates at the "F" network terminal. In a M.F. tone telephone this wire terminates on a tie point screw terminal. Disconnect this wire from the screw terminal and connect it to the BROWN-YELLOW wire coming from the SB710B, using one of the Dracon connectors provided. Connect the SLATE-YELLOW wire coming from the SB710B to the screw terminal located above.

- b) Locate the "ring" wire (usually SLATE-BROWN) coming from the line switch (hookswitch) and terminating at the "C" network terminal. Disconnect this wire from the screw terminal and connect it to the BROWN-BLACK wire coming from the SB710B, using a Dracon connector. Connect the SLATE-BROWN wire coming from the SB710B to the "C" network terminal.
- c) Locate the wire (usually SLATE-GREEN) coming from the line switch and connecting to the screw terminal that the wiper of the hold switch is hand wired to. This terminal will also have the N.O. contact of the hold switch (usually ORANGE-BLACK) connected to it. Disconnect the line switch wire from this terminal and connect it to the BLACK wire coming from the SB710B, using a Dracon connector. Connect the GREEN wire coming from the SB710B to this screw terminal. Disconnect the N.O. contact wire (usually ORANGE-BLACK) from this terminal and connect it to the WHITE wire coming from the SB710B, using a Dracon connector.
- d) Locate a spare wire in the cable bundle and connect it to a spare termination screw. Connect the RED wire coming from the SB710B to this termination screw. Connect the other end of the

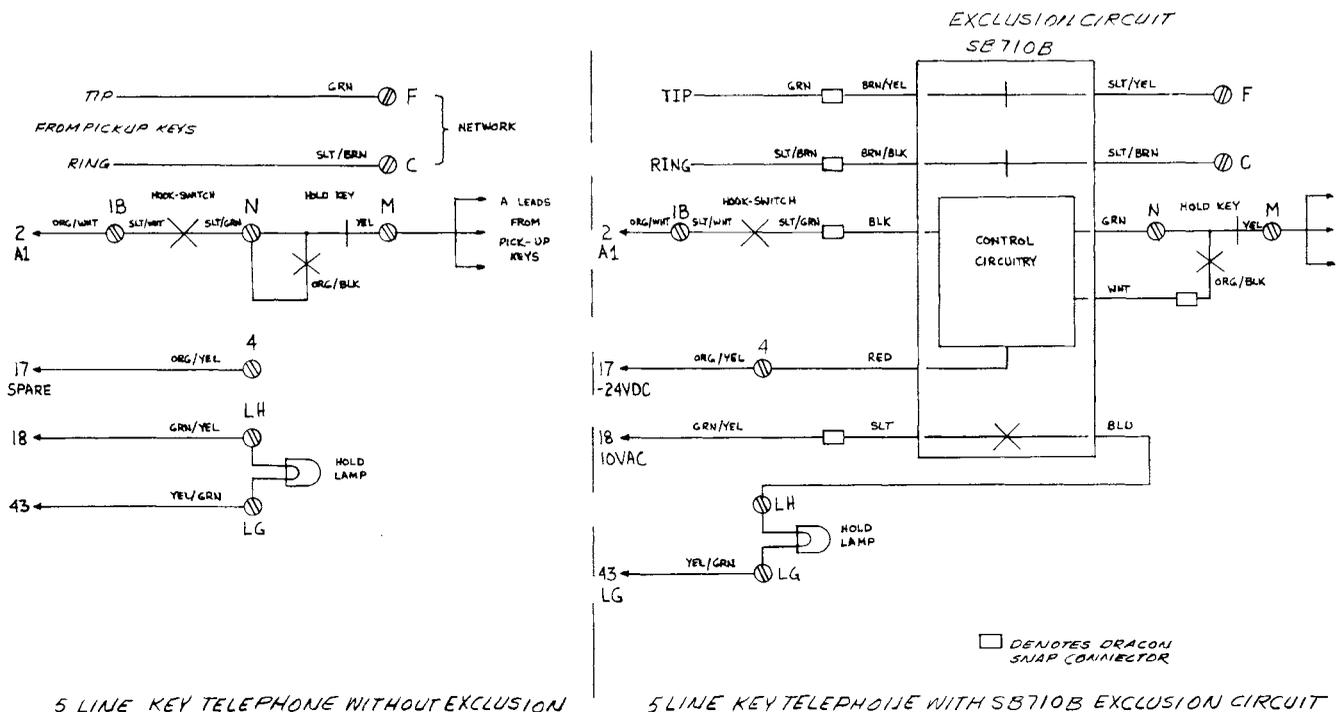


FIGURE 3

spare wire to a spare quick connect terminal at the type 66 block. Connect 24VDC (used to power the associated line cards) to this spare wire at the quick connect termination.

- e) Locate the GREEN/YELLOW and YELLOW/GREEN wires in the key telephone cable bundle. These wires normally connect to screw terminals for the hold lamp. Verify that the YELLOW/GREEN wire terminates at the same screw terminal as one side of the hold lamp (usually labeled "LG"). Locate the terminating screw associated with the other side of the hold lamp. Remove the GREEN/YELLOW wire from this screw terminal and connect the BLUE wire coming from the SB710B to this screw terminal.
- f) The user has the option of using either 10VAC or 24VDC to power the hold lamp. A 350 ohm resistor is provided to allow 24VDC to operate a 10V lamp (earliest production units excepted). The YELLOW wire is for 24VDC and the SLATE wire is for 10VAC. Select the desired wire, YELLOW or SLATE, coming from the SB710B (tape and store the other unused wire) and connect it to the GREEN/YELLOW wire in part (e) above, using a Dracon connector. The other ends of the GREEN/YELLOW and YELLOW/GREEN wires should terminate at a type 66 quick connect block. The selected 10VAC or 24VDC must be connected to these two wires at the quick connect termination.
- g) This completes the installation and wiring of the SB710B. If exclusion is to be extended to the intercom system, see section 5.6. Otherwise tape and store the BROWN/RED lead.

#### 5.4 Key Telephones Without SB710B

For those key telephones which are not to be equipped with an exclusion circuit, but share lines with key telephones which are equipped with exclusion circuits, the following steps must be executed to modify the key telephone without exclusion:

- a) Connect three rectifier diodes (IN4002 or equiv.) in series, cathode to anode (see section 5.5).
- b) Connect a spade lug to ends of the diodes.
- c) Locate the wire (usually SLATE/GREEN) coming from the line switch and connect-

ing to the screw terminal that the wiper of the hold switch is hard wired to. This is the same screw terminal identified in section 5.3, (c). Remove this wire and connect the cathode (banded) end of one of the diodes to the wire using a Dracon Connector. Connect the anode end of the other diode to the screw terminal.

- d) This places the diodes in series with the "A" lead and provides the 2.1VDC drop needed in the "A" lead for proper operation. The user of the "non-exclusion" phone will now have privacy but will not exclude other users already using a line. To allow in an excluded party for conference, the "non-exclusion" user places the call on hold. He enters the line again when he observes that the winking lamp goes steady, which indicates the other party is on line.

#### 5.5 Installing the Diode String Option, SB710B-2.

The three diode string is available from SAN/BAR Corporation as the SB710B-2. The WHITE wire is the cathode end, and the BLACK wire is the anode end. Use the instructions in sections 5.4, starting with part (c),

#### 5.6 Intercom Connections

To extend exclusion to the intercom system connect the BROWN/RED wire coming from the SB710B to the "A" lead screw terminal associated with the intercom line (usually 4H or 5H). See Figure 2. At the quick connect feature block, each "A" lead associated with the intercom line must be jumpered to every other intercom "A" lead in the same intercom group. If exclusion is not required for intercom, it is necessary to connect only the BROWN/RED wire.

### 6.0 CIRCUIT DESCRIPTION

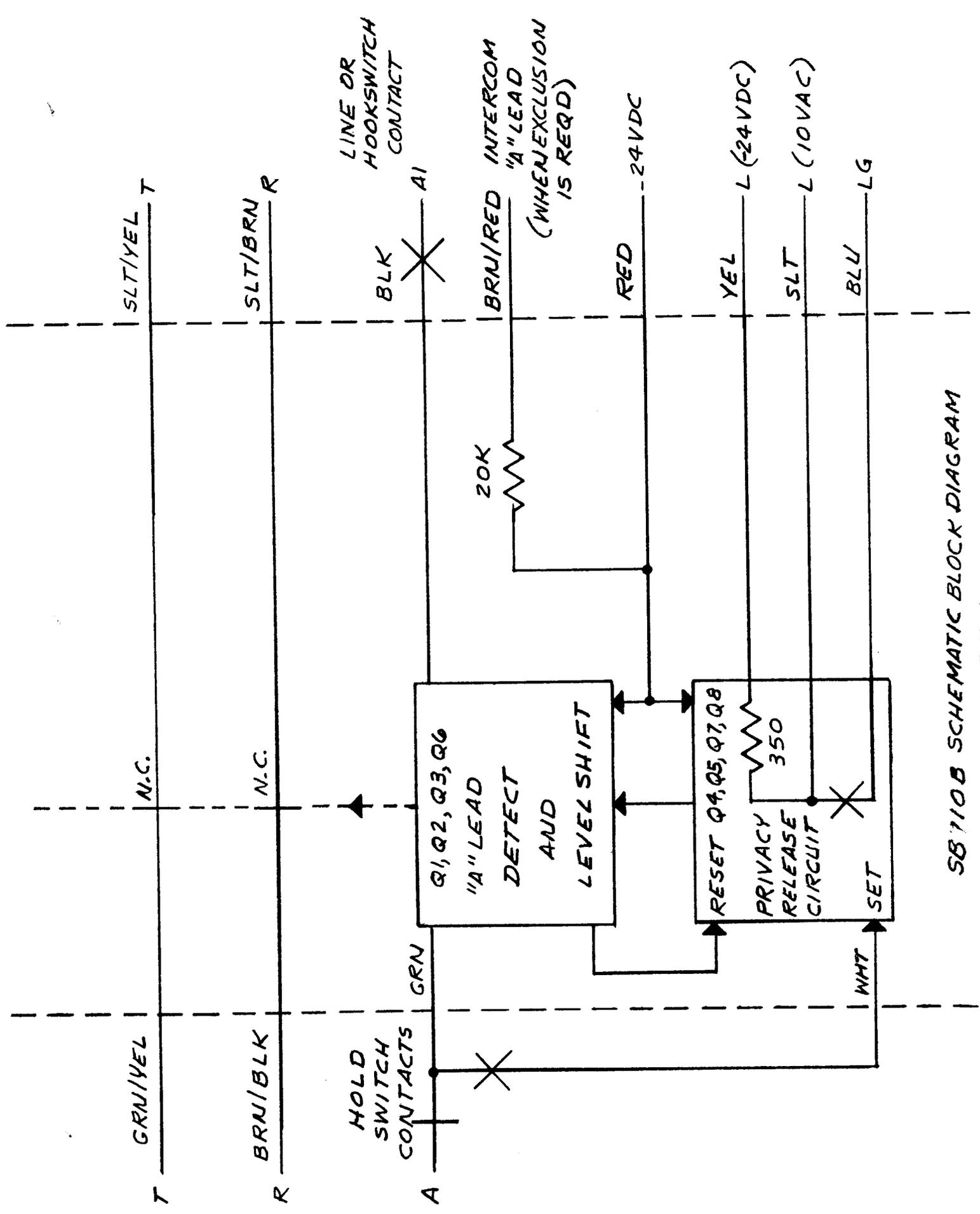
Please refer to Figure 4 for the following description.

#### 6.1 Idle Condition

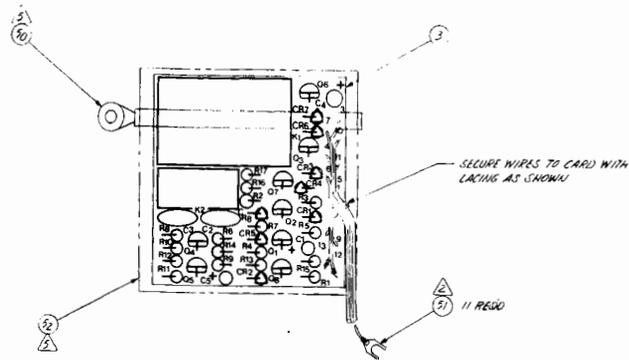
With the "A" lead hook switch contact open, no ground is applied to the BLACK wire, and all transistors are off. Therefore, no current is drawn from the -24VDC supply in the idle mode.

#### 6.2 Off Hook Condition

With a ground (A1) applied through the hook switch contact to the BLACK wire,



SB 710B SCHEMATIC BLOCK DIAGRAM  
FIGURE 4



- 8. ENCLOSE LUG CONNECTORS (ITEM 53) IN POLY BAG (ITEM 54) & SHIP WITH UNIT.
  - 7. INSTALL COMPONENTS WITH BODY ON BOARD & UPPER LEAD WITH A .100 MAX. RADIUS
  - 6. WHILE SLEEVING IS HOT TRIM & SEAL ENDS
  - 5. SLEEVE ASSY WITH ITEM 52 & INSTALL ITEM 50 OVER SLEEVING
  - 4. UNIT TO BE THOROUGHLY TESTED PRIOR TO SLEEVING
  - 3. Ⓞ DENOTES CATHODE END OF DIODE
  - 2. LUG ITEMS 37 THRU 47 WITH ITEM 51 PER WL-0710-000
  - 1. COMPONENTS MAY BE FLOW SOLDERED
- NOTE: UNLESS OTHERWISE SPECIFIED

FIGURE 5

the SB710B exclusion circuit is powered up. Depressing a line button on the telephone applies a line card "A" lead via the pick up key and hold contact to the GREEN wire of the SB710B. "A" lead current flow through the GREEN wire establishes a voltage on the GREEN wire of about -3.4 VDC and turns on transistors Q1, Q3, and Q2 sequentially. These transistors form the "A" lead detect circuitry. As Q2 turns on, the voltage on the GREEN wire raises from -3.4VDC to about -1.5VDC. It is this level shift which prevents the Q1, to Q3 transistors in other exclusion circuits from turning on. With these transistors held off, a 200 millisecond timeout occurs to operate Q6 and the exclusion relay. The normally closed (N.C.) contacts in the tip and ring open and exclude the interfering user from the conversation. This condition persists until one of the users hangs up.

### 6.3 Allowing in Another Party

Once the line has been accessed all other extensions sharing that line and equipped with an SB710B are excluded from access. There are two ways to allow access to the line by another party. One way is to simply place the call on hold. As the pick-up key is released with the hold button, anyone accessing that line retrieves the call from hold and assumes control to the line to the exclusion of all others. The second method allows sharing of the line with another ext-

ension phone. As before, the user places the call on hold by depressing the hold button, but also holding down the line pick-up key. Then, the hold button is released, while continuing to depress the pick-up key for the line in use. Used in this manner, the hold button acts as a "privacy release" button. As the hold button is depressed, the normally closed (N.C.) contact opens to release the line card "A" lead. This would normally allow Q1, Q2 & Q3 to turn off, but the normally open (N.O.) contact of the hold button closes first to connect the WHITE and GREEN wires together of the SB710B. Therefore, Q1 through Q3 remain on via current flow through the WHITE wire. This current flow also sets a "flip-flop" circuit formed by Q4, Q5, and Q8. This flip-flop circuit operates transistor Q7 which operates a relay to light the hold lamp. In addition, the flip-flop forces the voltage on the GREEN wire to return to its -3.4VDC level. The user then releases the hold button and then releases his finger from the line pick-up key, which remains depressed. This action disconnects the SB710B WHITE wire and reconnects the GREEN wire to the line card "A" lead. The next person to access the line is allowed in by virtue of the fact that the GREEN wire is still at the -3.4VDC level. That person's exclusion circuit pulls up the "A" lead line (and GREEN wire of each exclusion circuit) to -1.5VDC. This time, however, the level

shift resets the first person's flip-flop circuit which assures both parties access to the telephone line. The resetting of the flip-flop also causes the first person's hold lamp to extinguish, indicating the second party has accessed the line.

#### 6.4 Microswitch Option

For telephones which allow more than one line pick-up key to be depressed at one time, a microswitch must be added to detect when a line button has been depressed. This is necessary to prevent the exclusion circuit from being defeated. An option kit is available to install this microswitch and bracket to the pick-up key assembly.

### 7.0 TESTING

#### 7.1 Troubleshooting Procedure

Should difficulty be encountered after installation, the following procedure may be used:

- a) Check for loose connections and wiring errors.
- b) Verify that 24VDC is present between the BLACK (+) and RED (-) wires com-

ing from the SB710B with the telephone off hook. Verify that the 24VDC is not across these wires with the phone on hook.

- c) Momentarily disconnect the BLACK wire coming from the SB710B. Select an available line and check for dial tone. A "dead" line indicates a wiring error in the tip-ring connections associated with the BROWN/YELLOW, BROWN/BLACK, SLATE/YELLOW, and SLATE/BROWN wires coming from the SB710B. Reconnect the BLACK wire.
- d) If setting the privacy release circuit fails to light the hold lamp, verify the presence of 10VAC across the SLATE and BLUE wires coming from the SB710B.
- e) If trouble persists return the unit to SAN/BAR Corporation, 17422 Pullman St., Irvine, California, 92714. For technical assistance call SAN/BAR (714) 546-6500.

#### 7.2 Warranty

The SB710B is warranted for one year against defects in materials or workmanship.

### OPERATIONAL INSTRUCTIONS for the SAN/BAR SB710A EXCLUSION CIRCUIT

1. The first person to seize a line excludes all others from the use of that line.
2. Should it be desirable to allow another person to share the line for conferencing the following steps must be followed:
  - a) Fully depress and hold down the red hold button.
  - b) Place another finger on the line button in use (already depressed), and hold it down.
  - c) Release the hold button while holding down the line button.
  - d) The lamp under the hold button will come on, indicating that "Privacy Release" has been set.
  - e) The second person may now access the line without being excluded.  
NOTE: It is important that the second person NOT be on line at the time the first person sets his privacy release button.
3. Should it be desirable to allow a third person on the line for conferencing the following steps must be followed:
  - a) Both parties already on line must depress and hold down the red hold button. The red hold buttons need not be depressed at the same instant, but they must both be down before the privacy release lamp will light on the individuals phones.
  - b) Both parties must hold their line buttons depressed as they release their hold button, as in Step (c) above.
  - c) Once the privacy release lamp is illuminated on both phones, the third party may be invited to access the line.
4. If the exclusion circuit was wired-in for the intercom line the following call procedure must be observed:
  - a) When calling outside your own group (such as in multi-link intercom systems), simply dial the number.
  - b) When calling a station within your own group (common talk path) it is necessary to follow the procedure in Step 2 above, before dialing.

## APPENDIX "A"

### INSTRUCTIONS FOR INSTALLATION OF THE SB710B-1 EXCLUSION CIRCUIT INTO THE A.E. TYPE 102A CONFERENCE KEY TELEPHONE (DESK MODEL).

1. Remove the housing and fold back the Touch Call or rotary mounting plate to expose the spade lug terminal board.
2. Place the SB710B Exclusion Circuit in the right rear corner of the base plate under the pick up key assembly. Route all the leads toward the terminal board and transmission network.
3. (Touch Call) Remove the BROWN wire (coming from the Touch Call pad) from terminal Board no. 6 and connect it to the SLATE/YELLOW wire coming from the SB710B (use a Dracon snap connector).
3. (Rotary) Remove the GREEN "tip" wire (2 wires in 20 button phones) from network screw terminal no. 11 and insert it (them) into spare terminal board no.45.
4. (Touch Call) Connect the BROWN/YELLOW wire coming from the SB710B to terminal board no. 6.
4. (Rotary) Connect the BROWN/YELLOW wire coming from the SB710B to terminal board no. 46. Connect the SLATE/YELLOW wire coming from the SB710B to network screw terminal no. 11.
5. (Touch Call) Remove the RED "hook switch" wire from terminal board no. 46 and connect it to the SLATE/BROWN wire coming from the SB710B (use a Dracon snap connector).
5. (Rotary) Remove the RED "hook switch" wire from terminal board no. 6 and connect it to the SLATE/BROWN wire coming from the SB710B (use a Dracon snap connector).
6. (Touch Call) Connect the BROWN/BLACK wire coming from the SB710B to terminal board no. 46.
6. (Rotary) Connect the BROWN/BLACK wire coming from the SB710B to terminal board no. 6.
7. Remove the BLACK "hook switch" wire from terminal board 48 and connect it to the BLACK wire coming from the SB710B (Use a Dracon connector).
8. Connect the GREEN wire coming from the SB710B to terminal board no. 48.
9. Locate the ORANGE/BLACK wire coming from the "hold" switch. Connect this wire to the WHITE wire coming from the SB 710B (use the Dracon connector).
- 10: Locate the YELLOW/GREEN and GREEN/YELLOW wires coming from the lamp associated with the "HOLD" switch. These wires are to be connected to either a 10VAC source or 24VDC source in accordance with the following instructions.
- 10A. (10VAC) Connect the YELLOW/GREEN wire from the "HOLD" lamp to terminal board no. 60.
- 10A. (24VDC) Connect the YELLOW/GREEN wire from the "HOLD" lamp to terminal board no. 49.
- 10B. (10VAC) Connect the SLATE wire coming from the SB710B to board terminal no. 18. The ORANGE/YELLOW or VIOLET/BLUE wire also connected to terminal 18 runs through the cable back to the key system panel. 10VAC must be applied to the appropriate wire (ORANGE/YELLOW or VIOLET/BLUE).

- 10B. (24VDC) Connect the YELLOW wire (not available in early units) coming from the SB710B to terminal board no. 62. If a SLATE/WHITE wire coming from the wire bundle is not already on terminal 62, then -24VDC must be provided to this terminal using a spare wire from the key system panel.
- 10C. Connect the GREEN/YELLOW wire coming from the "HOLD" lamp to the BLUE wire coming from the SB710B. (Use a Dracon connector).
11. Locate terminal board no. 62. If a SLATE/WHITE wire is on this terminal, then -24VDC is available. In the absence of the SLATE/WHITE wire, -24VDC must be supplied to this terminal using a spare wire in the wire bundle.
12. Connect the RED wire coming from the SB710B to terminal board no. 62.
13. If an intercom line exists, you must connect the BROWN/RED wire coming from the SB710B to the "A" lead wire for the intercom line. If exclusion is desired on intercom, it is also necessary to jumper together the "A" leads for that line at a common point such as the feature block.
14. Remove the two screws securing the left side of the key assemblies. Using the longer screws provided install the microswitch and bracket so the microswitch lever (1" long) resets against the common interlock bar operated by the hook switch. Adjust (bend) the lever with a pair of long nosed pliers so that the microswitch operates and releases near the interlock bar's center of travel. This adjustment must be made with the handset removed from the hook switch.
15. Connect the SLT/BLK and SLT/WHT wires from the microswitch to the same colored wires from the SB710B (using two Dracon connectors).
16. Restore the dial mounting plate and plastic housing.

NOTE: For those key telephones which are not to be equipped with an exclusion circuit, but share lines with key telephones which are equipped with exclusion circuits, the following steps must be executed to modify the key telephone without an exclusion circuit.

- a) Connect three rectifier diodes (1N4002 or equivalent) in series, cathode of one to anode of the next.
- b) Connect a spade lug to each of the two free ends of the diodes.
- c) This diode string is available already prepared from SAN/BAR Corporation. To order, specify SB710B-2.
- d) Remove the ORANGE/WHITE wire at terminal board no. 50 and connect it to the anode end (BLACK wire of the SB710B-2) of the diode string.
- e) Connect the cathode end (WHITE wire of the SB710B-2) of the diode string to terminal board no. 50.

## APPENDIX "B"

### Instructions for installation of the SB710B EXCLUSION CIRCUIT into a W.E./I.T.T. Type 565 Key Telephone

1. Remove the telephone housing and rotary dial to allow access to the terminal board screws.
2. Remove the GREEN "tip" wire (coming from the pick-up keys) from network screw terminal "F" and connect it to the BROWN/YELLOW wire coming from the SB710B. Use a Dracon snap connector.
3. Connect the SLATE/YELLOW wire coming from the SB710B to network screw terminal "F".
4. Remove the SLATE/BROWN wire from network screw terminal "C" and connect it to the BROWN/BLACK wire coming from the SB710B. Use a Dracon connector.
5. Connect the SLATE/BROWN wire coming from the SB710B to network screw terminal "C".
6. Remove the SLATE/GREEN wire (coming from the hookswitch) from terminal board screw "N" and connect it to the BLACK wire coming from the SB710B. Use a Dracon connector.
7. Remove the ORANGE/BLACK wire (I.T.T. is YELLOW/BLACK) from terminal board screw "N" and connect it to the WHITE wire coming from the SB710B. Use a Dracon connector.
8. Connect the GREEN wire coming from the SB710B to terminal board screw "N".
9. Locate a spare wire in the 25 pair cable. Connect this wire to the RED wire coming from the SB710B. The other end of the spare wire should terminate on a type 66 quick connect feature block. It is necessary to route -24VDC from the key system supply to the spare wire.
10. Locate the screw terminals associated with the hold lamp labeled "L6" (or "LH") and LG. Verify that the YELLOW/GREEN wire from the 25 pair cable is terminated at the "LG" screw terminal. Remove the GREEN/YELLOW wire from "LG" (or "LH"). If it is desired to operate this lamp from 10VAC, connect the GREEN/YELLOW wire to the SLATE wire coming from the SB710B. The 10VAC lamp may be powered with 24VDC through a 350 ohm resistor provided on the SB710B. If this is preferred, connect the GREEN/YELLOW wire to the YELLOW wire coming from the SB710B. (Earliest units do not offer this option.)
11. Connect the BLUE wire coming from the SB710B to screw terminal "L6" (or "LH").
12. The GREEN/YELLOW (pin 18) and YELLOW/GREEN (pin 43) wires terminate at the key system panel at a quick connect feature block. Either 10VAC or 24 VDC must be connected to these wires to power the hold lamp depending on the selection made in step 10 above. Connect 10VAC or -24VDC to the GREEN/YELLOW wire and 10VAC ground or 24VDC ground to the YELLOW/GREEN wire.
13. If an intercom line exists, you must connect the BROWN/RED wire coming from the SB710B to the "A" lead screw terminal for the intercom line (usually 4H or 5H). If exclusion is desired on intercom, it is also necessary to jumper together the "A" leads for that line at a common point such as the feature block.
14. Tape and store the remaining wires.
15. Replace the dial and housing.