Strata S*e* & VI*e*

RELEASE 2

INSTALLATION INSTRUCTIONS

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01 GENERAL

01.01 This section describes the installation procedures necessary to ensure proper operation of the STRATA S_e & VI_e systems. Installation procedures for the two systems vary only in relation to size; all other factors are the same.

02 PACKING

02.00 Inspection

02.01 When a system is received, examine all packages and carefully note any visible damage. If any damage is found, bring it to the attention of the delivery carrier and make the proper claims.

02.02 Check the number of cartons and the contents of the shipment against the purchase order and packing slip. If it is determined that any cartons are missing, contact your delivery carrier immediately. If it is determined that any equipment within a carton is missing, contact your Toshiba supplier immediately.

02.03 After unpacking (prior to beginning the installation), inspect all equipment for damage. If any damage is detected, contact your delivery carrier immediately. If possible, retain all the original packing material.

CAUTION!
When handling (installing, removing, examining, etc.) a printed circuit board, do not touch the back (soldered) side or the pin connector. Always hold a PCB by its edge.

02.04 When packing or storing a SCCU (or VCCU), ensure the following:

- **Do not** use plastic or any type of conductive material for packing a SCCU (or VCCU). Use plain paper.

CAUTION!
Conductive packing material may cause the internal backup battery to discharge and damage the PCB.

02.05 Whenever storing or shipping, always ensure that the battery strap is in the **OFF** position (Figure 1). The SMAU/VMAU is a "host" board for the SCCU/VCCU (which is required) and they are shipped as an assembled unit.

NOTE:
*Always make sure the battery strap on the SCCU/VCCU is in the **ON** position prior to instalation. If not, the **SET LED** on the **HKSU** cannot operate.*

03 HKSU REQUIREMENTS

03.00 Cabling Considerations

03.01 The HKSU must be located so that all stations are within 1,000 cable feet (305 M) of it. Acceptable cable is 22 or 24 AWG inside telephone station cable, jacketed but not shielded, having two or more twisted wire pairs (three pair required for off-hook call announce).

03.10 Environmental Factors

03.11 Sufficient ventilation should exist to allow dissipation of heat generated by the power supply and HKSU.

03.12 Humidity at the HKSU location should be within 20 ~ 80% without condensation, and the temperature should be relatively constant within a range of 32 ~ 122° F (0 ~ 50° C). Exposure to dust and airborne chemicals should also be minimized.

03.20 Power Requirements

03.21 Power for the HKSU (both S_e & VI_e) is provided by the power supply (HPSU), which in turn requires power from a grounded 117 VAC outlet. The outlet should be separately fused (dedicated) and rated at 15 amps

FIGURE 1—SCCU/VCCU BATTERY STRAP

03.30 Main Distribution Frame Requirements

03.31 To determine the Main Distribution Frame (MDF) space requirements, refer to the following paragraphs:
- Mounting the HKSU: Paragraph **04.00**
- Station Wiring: Paragraph **06.00**
- CO Line Connections: Paragraph **06.20**
- Installation of Options (External): Paragraph **09**
- HKSU Connections: Paragraph **10**

04   HKSU INSTALLATION

04.00   Mounting the HKSU

1) Remove both side covers from the HKSU (Figure 2) by pressing in on the two small ribbed sections on each side cover to free the holders.
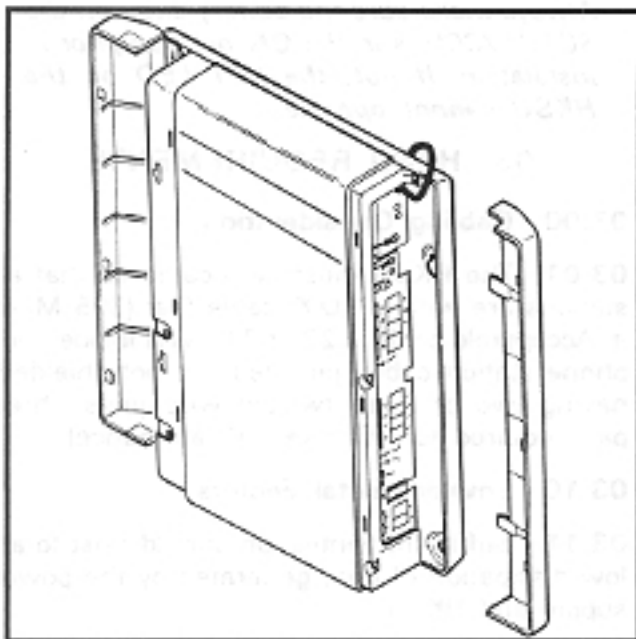
FIGURE 2—HKSU SIDE COVERS

2) Hold the HKSU against the wall in its planned location and mark the screw locations through the centers of the two keyholes on the upper sides of the HKSU (Figure 3).

3) Lay the HKSU aside for the moment and start two screws into the wall at the marked locations. Use 1¼" panhead wood screws and stop when they have penetrated to half their depth.

4) Hang the HKSU on the two screws and start
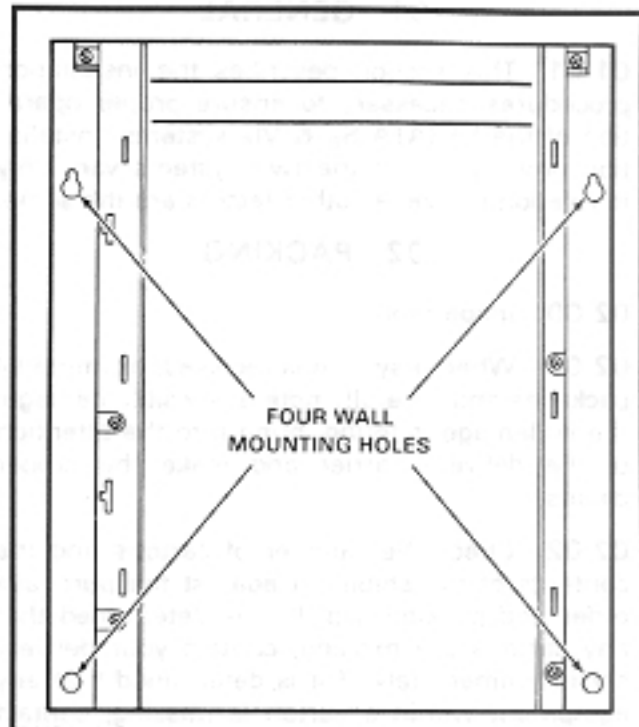
FIGURE 3—HKSU WALL MOUNTING

two additional screws in the lower two holes (Figure 3). Tighten all four screws.

5) Knockouts are provided on top and bottom of the side covers to permit cables to enter the HKSU. Remove the appropriate knockouts.

6) Reinstall the side covers.

04.10   Power Supply Installation

04.11 The power supplies used with both systems are very similar in appearance but provide different current levels:
- S_e = HPSU 6120
- VI_e = HPSU 7120

04.12 The system requires 24 VDC, which is provided by the internal, factory-installed power supply (HPSU 6120/7120). The HPSU requires 117 VAC, 60 Hz, with a permissible AC input voltage range of 90 ~ 130 VAC.

04.13 In both systems, the HKSU is shipped with the power supply installed. Use the following procedures if it becomes necessary to remove or replace a power supply:

STRATA S_e:

1) Turn the system **OFF** and **unplug** the power cord.

remove the power supply cable connector at P7 in the upper left of the SMAU PCB. (It may be necessary to remove the SEPU PCB before doing this.)

3) Remove the ground straps on the right and left side panels of the HKSU as well as the two screws at the top corners of the power supply.

4) Pull the top of the power supply forward and lift the power supply out of the HKSU.

5) Test the power supply using the procedure in Paragraph **04.14**.

6) Install the new power supply in the HKSU.

7) Replace the screws and ground straps removed in step 3.

8) Reconnect the power supply cable connector to P7 on the SMAU PCB. (Reinstall the SEPU PCB if it was removed.)

9) Plug the power cord in and turn the system ON.

STRATA VI$_e$:

1) Turn the system **OFF** and **unplug** the power cord.

2) Remove the power supply cable connector from P1 in the top center of the VMAU PCB.

3) Remove the ground straps on the right and left side panels of the HKSU as well as the two screws at the top corners of the power supply.

4) Pull the top of the power supply forward and lift the power supply out of the HKSU.

5) Test the power supply using the procedure in Paragraph **04.14**.

6) Install the new power supply in the HKSU.

7) Replace the screws and ground straps removed in step 3.

8) Reconnect the power supply cable connector at P1 on the VMAU PCB.

9) Plug the power cord in and turn the system ON.

04.14 If power supply problems are suspected or if a new power supply is being installed, the following voltage check should be performed:

STRATA S$_e$:

1) Turn the power supply **OFF** and disconnect the system power cord.

2) Remove the HKSU front cover.

3) Disconnect the power supply cable connector at **P7** in the upper left corner of the SMAU PCB.

4) Reconnect the power cord and turn the power **ON**.

5) Using a voltmeter, check the power supply output voltages at the power supply cable connector (**P7**) per the diagram below.

6) Verify that the voltages fall within the following ranges:

Nominal	Range
+24	+23 ~ +29
+12	+10.8 ~ +13.2
+5	+4.75 ~ +5.25

7) If the voltages are correct, go to step 8. If not, replace the power supply and recheck voltages.

8) Turn **OFF** the power.

9) Connect the power supply cable connector back to **P7** on the SMAU PCB.

10) Reinstall the HKSU cover, and turn the power back **ON**.

STRATA VI$_e$:

1) Turn **OFF** the power and **unplug** the power cord from facility power.

2) Remove the front cover from the HKSU.

3) Disconnect the power supply cable connector P1 at the top center of the VMAU PCB (just below the power supply).

4) Reconnect the power cord and turn the power **ON**.

5) Using a voltmeter, check the power supply output voltages at the power supply cable connector (**P1**) per the diagram below:

6) Verify that the voltages fall within the following ranges:

Nominal	Range
+24	+23 ~ +29
+12	+10.8 ~ +13.2
+5	+4.75 ~ +5.25

7) If the voltages are correct, go to step 8. If not, replace the power supply and recheck voltages.

8) Turn **OFF** the power.

9) Connect the power supply cable connector back to **P1** on the VMAU PCB.

10) Reinstall the HKSU cover, and turn the power back **ON**.

04.15 Optional power backup units are available for both systems:
- S_e: HPFB
- VI_e: HPBU-7

STRATA S_e:

The HPFB is a separate unit that connects to the left side panel of the HKSU via a 2-wire connector (Figure 4).
- Up to three HPFB modules may be connected together in parallel to extend the power backup time. With the optional battery backup assembly installed, the system will continue to operate after a facilities power failure. The actual time period depends on the system configuration/application and number of battery backup modules used.
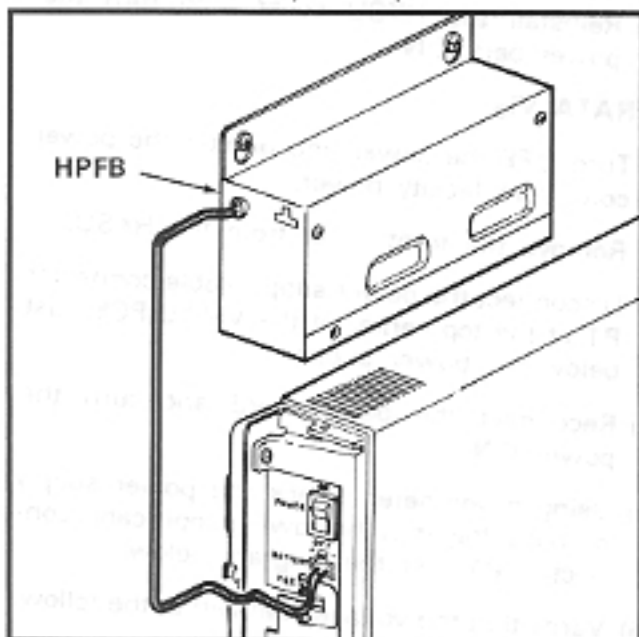
FIGURE 4—HPFB INSTALLATION

STRATA VI_e:

The HPBU-7 is a PCB that mounts inside the power supply housing (Figure 5) and is connected to the female 3-prong connector inside the power supply's case. Secure the HPBU with the two provided screws.
- The HPBU is then connected via the terminal block to the recommended battery pack (which is customer-supplied, consisting of two 12 VDC, maintenance-free, automobile-type batteries—80 amp/hour maximum rating). With the battery backup assembly installed, all functions of the system will continue to operate for several hours after a facilities power failure (the actual time period is in direct ratio to the type and size of batteries selected).
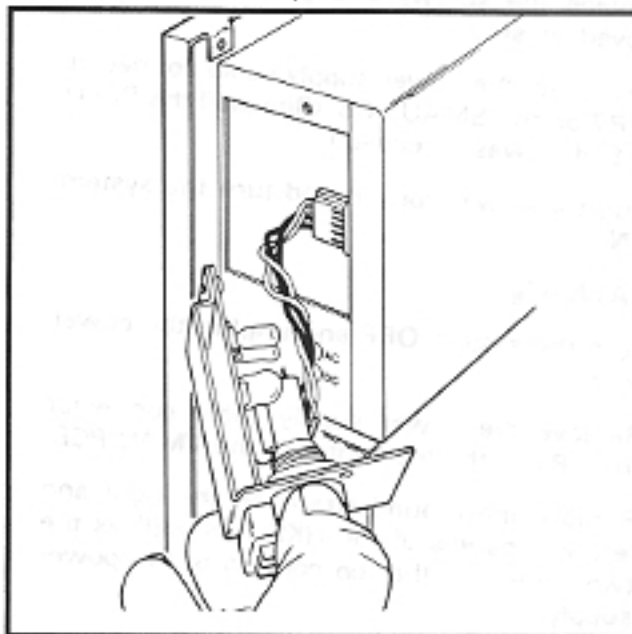
FIGURE 5—HPBU INSTALLATION

04.16 When installing or removing the HPBU, perform the following:

WARNING!
When installing the HPBU-7 in the power supply, care must be taken against accidental shorts that may injure the installer or damage the power supply.

1) Turn **OFF** the power and **unplug** the system power cord.

2) Remove the front cover from the HKSU.

3) Remove the metal plate on the left side of the power supply case (two screws).

4) Connect the 4-wire connector extending from the rear of the HPBU-7 inside the power supply case as shown in Figure 5.

5) Mount the HPBU-7 with the two screws removed in step 3.

6) Connect the positive terminal on one battery to the negative terminal of the other battery (in series).

7) Connect the free negative battery terminal to the negative terminal on the HPBU-7.

8) Connect the free positive battery terminal to the positive terminal on the HPBU-7.

04.20 System Ground Check

04.21 Both Toshiba telephone systems require a solid earth ground. Failure to provide such a ground may lead to confusing trouble symptoms in the system and, in extreme cases, circuit board failure. In most installations (within the continental United States), the ground provided by the "third wire ground" at the commercial power outlet will be satisfactory for all system requirements. However, in a small percentage of installations, this ground may be installed incorrectly. Therefore, prior to installing a system, the third wire ground must be tested for continuity by either measuring the resistance between the third prong terminal (earth ground) and a metal cold water pipe, or by using a commercially available earth ground indicator. If neither procedure is possible, then the following test procedures should be performed.

WARNING!
Hazardous voltage is exposed during the following test. Use great care when working with AC powerline voltage.

1) Obtain a suitable voltmeter and set it for a possible reading of up to 250 VAC.

2) Connect the meter probes between the two main AC voltage points on the wall outlet. The reading obtained should be 90 ~ 130 VAC.

3) Move one of the meter probes to the third prong terminal (GND). Either the same reading or a reading of 0 volts should be obtained.

) If the reading is 0V, leave one probe on the GND terminal and move the other probe to

the second voltage terminal. If a reading of 0V is obtained on both voltage terminals, the outlet **is not** properly grounded. Omit steps 5 through 7 and proceed directly to step 8.

5) If a reading of 0V on one terminal and a reading of 90 ~ 130 VAC on the other terminal is not obtained, the outlet **is not** properly grounded. Omit steps 6 and 7 and proceed directly to step 8.

6) If a reading of 0V on one terminal and a reading of 90 ~ 130 VAC on the other terminal is obtained, remove both probes from the outlet.

7) Set the meter on the "OHMS/Rx1" scale, place one probe on the GND terminal and the other probe on the terminal that produced a reading of 0V. A reading of less than 1 ohm should be obtained. If a reading of more than 1 ohm is obtained, the outlet **is not** adequately grounded.

8) If the above tests show the outlet is improperly grounded, that condition should be corrected by a qualified electrician (per Article 250 of the National Electrical Code) before the system is connected.

05 PRINTED CIRCUIT BOARD INSTALLATION

05.00 General

05.01 Complete with all available options, both systems utilize up to ten (S$_e$) or eight (VI$_e$) printed circuit boards internally and various option modules. The names and functions are as follows

05.02 The SMAU/VMAU and SCCU/VCCU are factory-installed in the HKSU.

05.03 If any optional PCBs (SSTU, SEPU, STMU, SMOU, SPFU, SVCU, SDTU or SCOU/VCOU) are required, refer to Figure 6 and remove the HKSU cover as follows:

1) Remove both side covers by pressing in on the two small ribbed sections on each cover to free the holders.

2) Remove three screws from each side of the HKSU per Figure 6.

3) Lift the HKSU cover off.
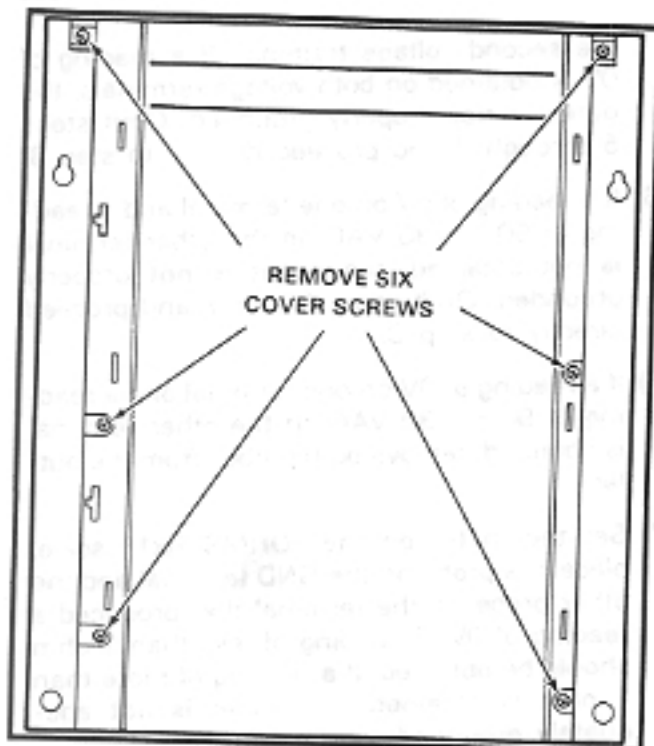
FIGURE 6—HKSU COVER REMOVAL

05.10   Factory-Installed PCBs

05.11   SMAU/VMAU: The main printed circuit board of the key service unit consists of the following three functions:

a) **Station Interface:** An interface between the key service unit and up to four stations (S_e) or up to eight stations (VI_e), which includes the solid-state, space-division matrix used for voice connections between the stations and the CO/PBX lines. Two-pair wiring is required for each station; one pair carrying voice and the other pair carrying control data to and from the station.

b) **CO Interface:** An interface between the key service unit and the public telephone network or PBX for up to two lines (S_e) or up to three lines (VI_e). Ring detection, hold and dial outpulsing for these lines are performed by this board. Depending upon local CO requirements, each incoming line can be separately connected and programmed to provide DTMF or rotary-dial outpulsing.

c) **Tone:** Performs a number of miscellaneous system functions:
   - Generates system tones.
   - Provides the switching matrix for the de-

livery of tones for both paging and intercom connections.

05.12   SCCU/VCCU: All system control functions are performed by the single-chip microprocessor on this printed circuit board. The system program stored in ROM, RAM for system operation, and the RAM for system data storage are also located on this circuit board. A battery on this board protects system memory should a power occur.

05.13   See Figure 1 and verify that the battery strap on the SCCU/VCCU is in the on position.

05.14   The SMAU/VMAU and SCCU/VCCU PCBs are factory-installed in the HKSU. If repair of either PCB is necessary, the HKSU should be replaced and returned to your supplier.

05.20   SCOU/VCOU

05.21   An optional interface between the SMAU/VMAU and one/three additional CO line(s). Depending upon local CO requirements, the SCOU/VCOU is programmed to provide DTMF or rotary-dial outpulsing. The SCOU serves one CO line; the VCOU serves up to three CO lines, and both serve up to three off-premises lines.
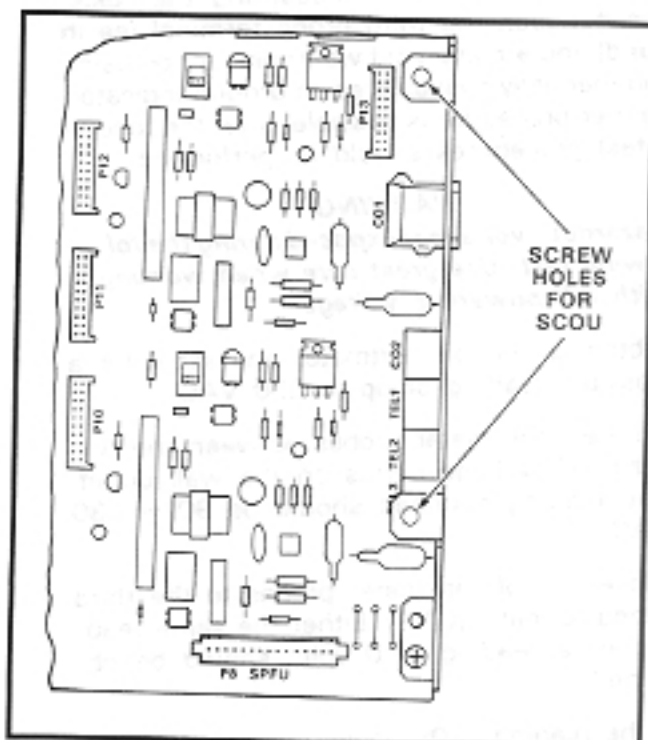
FIGURE 7—SCOU and SPFU LOCATIONS

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STRATA S_e:

05.22 The SCOU PCB mounts on four 10-pin connectors at the bottom of the SMAU PCB into P10, P11, P12 and P13 connectors (Figure 7). Secure the SCOU PCB to the right side panel with the two provided screws.

STRATA VI_e:

05.23 The VCOU PCB mounts on four 10-pin connectors and one plastic standoff at the bottom of the VMAU PCB (Figure 8). Install the VCOU's three 10-pin connectors into the VMAU's P6, P7 and P8 connectors. Secure the VCOU to the left and the right side panels with two provided screws on each side.
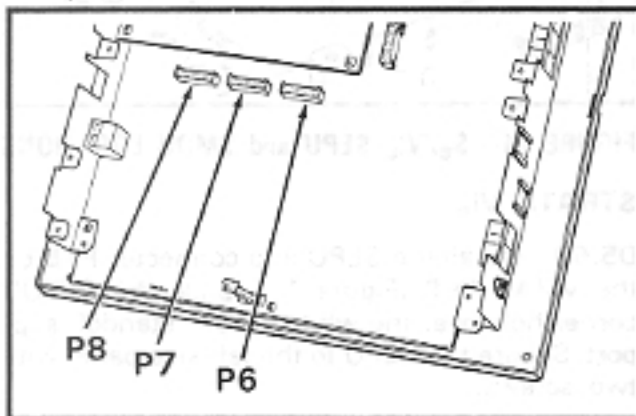
FIGURE 8—VCOU LOCATION

05.30 **SPFU (S_e only)**

05.31 An optional PCB with relays to connect the CO lines to three standard telephones if a power failure occurs.

05.32 Install into the connector marked **SPFU** at the bottom of the SMAU PCB (Figure 7).

05.40 **SSTU**

05.41 An optional interface between the key service unit and stations 14 ~ 17 (stations 18 ~ 25 on STRATA VI_e). Each SSTU PCB serves up to four stations. Two- or three-pair wiring is required for each station; one pair carrying voice and the other pair carrying control data to and from the station (the third pair is required for OCA).

STRATA S_e:

05.42 For adding stations 14 ~ 17, refer to Figure 9, and insert the three SSTU 10-pin connec-

tors into P14, P15 and P16 connectors on the SMAU PCB. Secure the SSTU PCB to the right side panel with the two provided screws. Route the provided jumper cable from the SSTU P19 connector to the P19 connector on the SMAU to provide crosspoints for stations 14 ~ 17.

NOTE:
Jumper cable is necessary only when OCA is equipped.
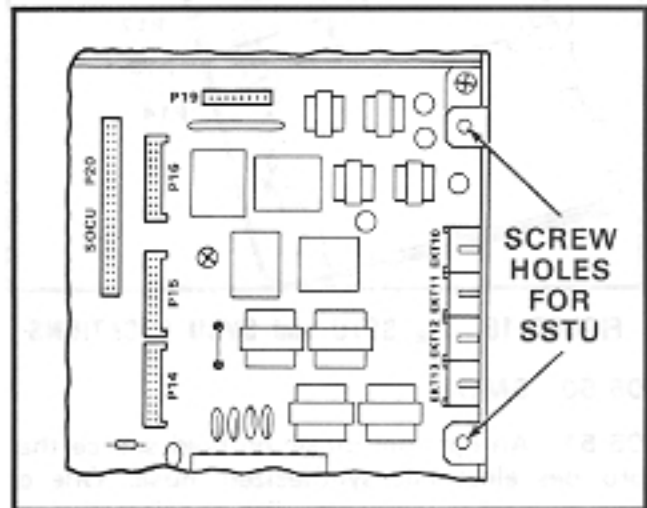
FIGURE 9—S_e SSTU and SVCU LOCATIONS

STRATA VI_e:

05.43 For adding stations 18 ~ 21, refer to Figure 10, and insert the three SSTU 10-pin connectors into P9, P10 and P11 connectors on the VMAU PCB. Secure the SSTU PCB to the right side panel with the two provided screws. (For stations 22 ~ 25, insert the three 10-pin connectors on another SSTU into P12, P13 and P14 connectors on the VMAU PCB. Secure the SSTU PCB to the right side panel with the two provided screws.)

a) Route the provided jumper cable from the SSTU P19 connector to the P21 connector on the VMAU to provide crosspoints for stations 18 ~ 21.

b) Route the provided jumper cable from the SSTU P19 connector to the P23 connector on the VMAU to provide crosspoints for stations 22 ~ 25.

NOTE:
Jumper cable is necessary only when OCA is equipped.

FIGURE 10—VIe SSTU and SVCU LOCATIONS
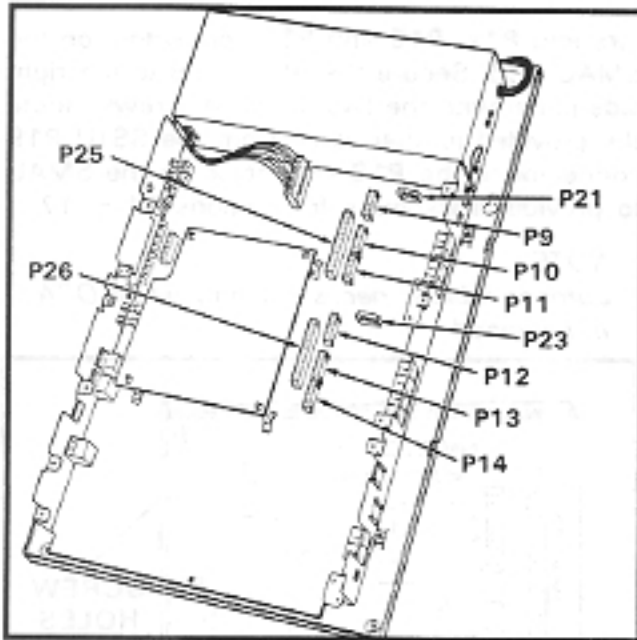
FIGURE 11—Se/VIe SEPU and SMOU LOCATIONS

05.50 SMOU

05.51 An optional music-on-hold source that provides electronic synthesized music. One or two musical tunes are available, selected via a switch on this board. The SMOU is connected to the SMAU/VMAU via a 7-pin connector.

STRATA Se:

05.52 Install the SMOU PCB into connector P6 on the upper center of the SMAU PCB (Figure 11).

STRATA VIe:

05.53 Install the SMOU PCB into connector P16 on the upper center of the VMAU PCB (Figure 11).

05.60 SEPU

05.61 An optional 3-watt amplifier for external paging, using a customer-supplied 8-ohm speaker (connected to the SMAU/VMAU via a 10-pin connector).

STRATA Se:

05.62 Install the SEPU into connector **P5** on the SMAU PCB (Figure 11). Slide the SEPU's corner hole over the white, plastic standoff support. Secure the SEPU to the left side panel with two screws.

STRATA VIe:

05.63 Install the SEPU into connector P15 on the VMAU PCB (Figure 11). Slide the SEPU's corner hole over the white, plastic standoff support. Secure the SEPU to the left side panel with two screws.

05.70 SVCU

05.71 The Off-hook Call Announce interface that mounts on the main PCB of the key service unit to provide OCA access. One SVCU is required for every eight stations requiring OCA. (Adds two intercom lines and two OCA paths in STRATA VIe.)

STRATA Se:

05.72 Insert connector P1 on the SVCU into the **P20** connector on the SMAU (Figure 9).

STRATA VIe:

a) To provide OCA to stations 10 ~ 17, refer to Figure 10, and insert connector **P1** on the SVCU into the **P25** connector on the VMAU.

b) To provide OCA to stations 18 ~ 25, insert connector **P1** on the SVCU into the **P26** connector on the VMAU.

05.80 SDTU

05.81 Provides Remote Administration/Main-

tenance access via its built-in 300/1200 bps modem. One SDTU per system is required for Remote Administration/Maintenance.

STRATA S$_e$:

05.82 Insert connectors **P1** and **P2** on the SDTU into the **P8** and **P9** connectors on the SCCU (Figure 12). Route the provided jumper cable from the SDTU **P3** connector to the **P22** connector on the SMAU.
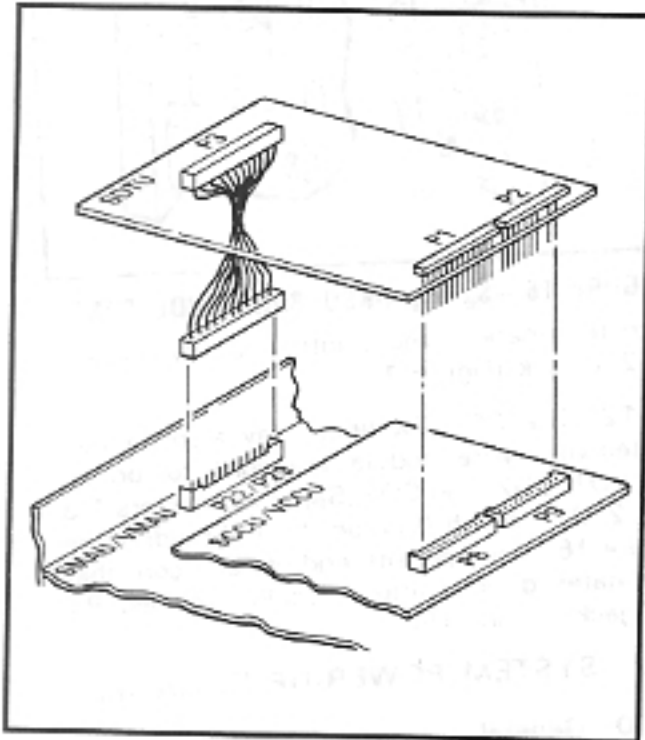
FIGURE 12—S$_e$/VI$_e$ SDTU LOCATION

STRATA VI$_e$:

05.83 Insert connectors **P1** and **P2** on the SDTU into the **P8** and **P9** connectors on the VCCU (Figure 12). Route the provided jumper cable from the SDTU **P3** connector to the **P29** connector on the VMAU.

05.90   STMU (STRATA S$_e$ only)

05.91 Required for connection to an HSMB to provide SMDR for a STRATA S$_e$ HKSU.

05.92 Refer to Figure 13, and insert connectors **P4** and **P5** on the STMU into the **P4** and **P5** connectors on the SCCU. Route the provided jumper cable from the STMU **P23** connector to the **P23** connector on the SMAU.

P23 is actually hidden but shown here for clarity
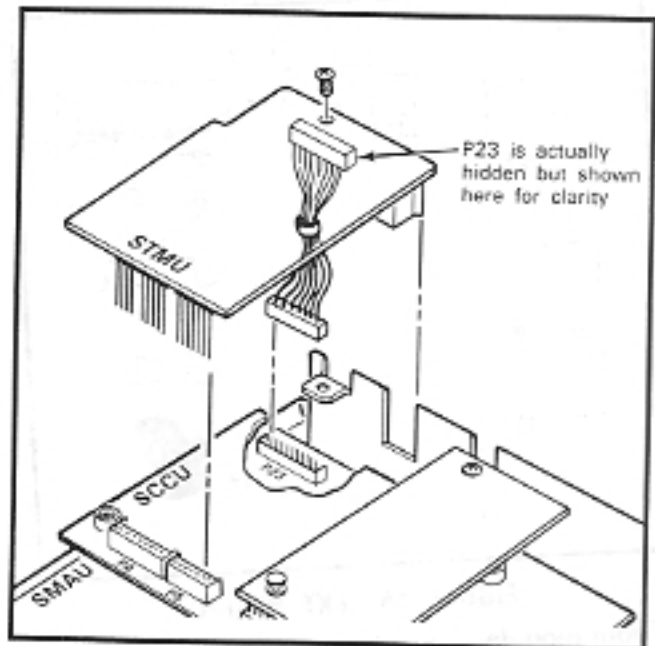
FIGURE 13—STMU LOCATION

06   BASIC CABLING REQUIREMENTS

06.00   Station Wiring

06.01 Intercom codes (station numbers) are assigned permanently to specific cable appearances in the system. Make sure the station cables are connected to the proper terminals.

06.02 Using the industry-standard color code sequence, terminate the individual 2- or 3-pair station cables consecutively on the MDF (3-pair cabling required for OCA). Connect the HKSU cable pairs to the station cable pairs.

WARNING!
When installing station cable, do not run parallel to and within 3' of an AC power line. Such power lines should be crossed at right angles (90°) only.

06.03 At the station locations, terminate the station cable in a conventional 4- or 6-conductor modular station connector to accommodate the modular line cord from the EKT. The standard modular EKT cord length is 7', while the maximum allowed length is 25'. Figure 14 shows the EKT wiring arrangement.

06.04 Various manufacturers of modular station blocks have employed different color codes to indicate the sequence of pairs in their blocks. However, the color code most commonly used is shown in Figure 15. Verify the configuration
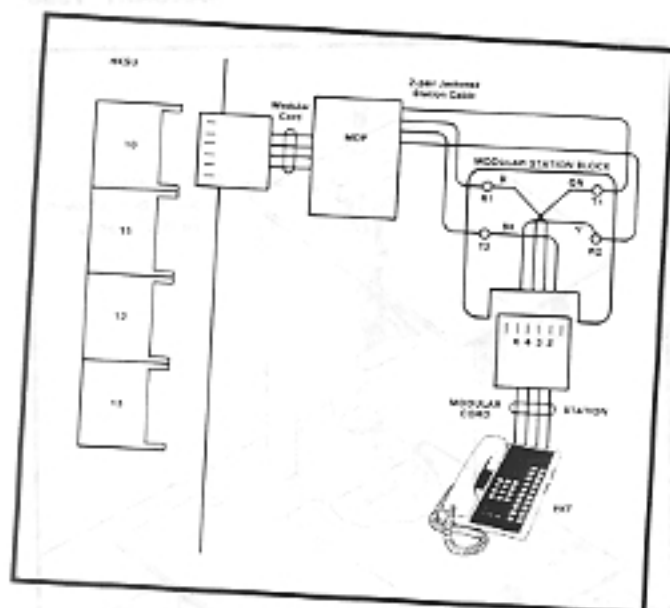
FIGURE 14—EKT WIRING

of your modular blocks before connecting the station cables.

NOTE:

White and blue (T3 & R3) are used for OCA voice pair on station line connectors.
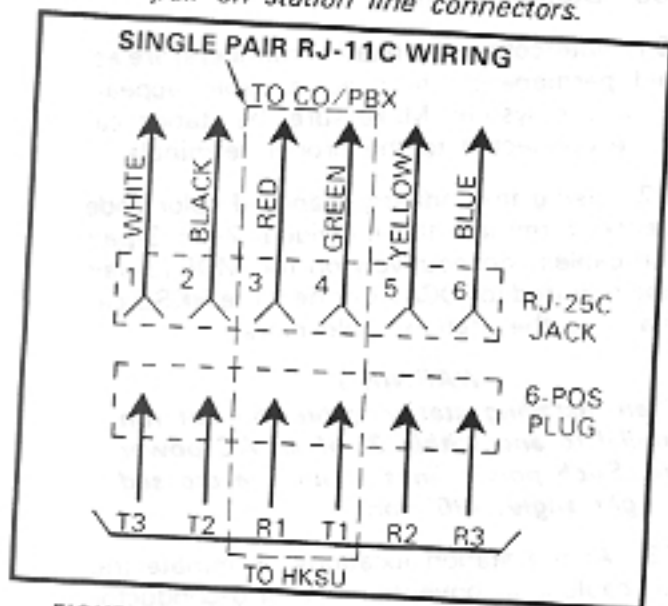
FIGURE 15—RJ-11C/RJ-25C COLOR CODE

06.10 CO Line Connection

06.11 The CO/PBX lines are connected to the system via 6-wire modular line cords (no longer than 25') that are connected directly to the HKSU's right side panel (Figure 16)—CO1 modular connector on S_e; 1-3 and 4-6 modular connectors on VI_e. The opposite end of each cord
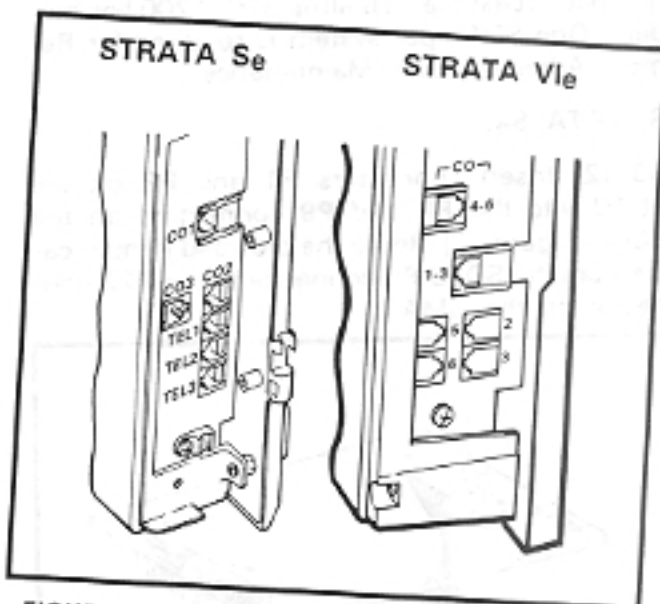
FIGURE 16—S_e/VI_e HKSU RIGHT SIDE PANEL

then terminates directly into a locally provided RJ-25C jack (Figure 15).

06.12 The CO/PBX lines may also be connected via 2-wire modular line cords to connectors CO1, CO2, and CO3 (S_e) or connectors 1-3, 4-6, 2, 3, 5 and 6 (VI_e) on the right side panel (Figure 16). The opposite end of each cord then terminates directly into a locally provided RJ-11C jack (Figure 15).

07 SYSTEM POWER-UP INITIALIZE

07.00 General

07.01 A list of standard system data assignments (stored in ROM) can be entered at any time by performing the initialize sequence outlined below. The system must be initialized when it is first installed or whenever the SCCU/VCCU PCB is changed. This will allow the system to be tested and any faults to be corrected before time is spent on programming.

NOTE:

Do not *initialize if using a preprogrammed, battery-protected SCCU/VCCU.*

07.02 Refer to Figure 17 and verify that the battery on the SCCU/VCCU is connected to ensure that data changes entered after initialization will not be lost due to power failure.

NOTE:

The SET LED will not function if the SCCU/VCCU battery is not connected.

-10-
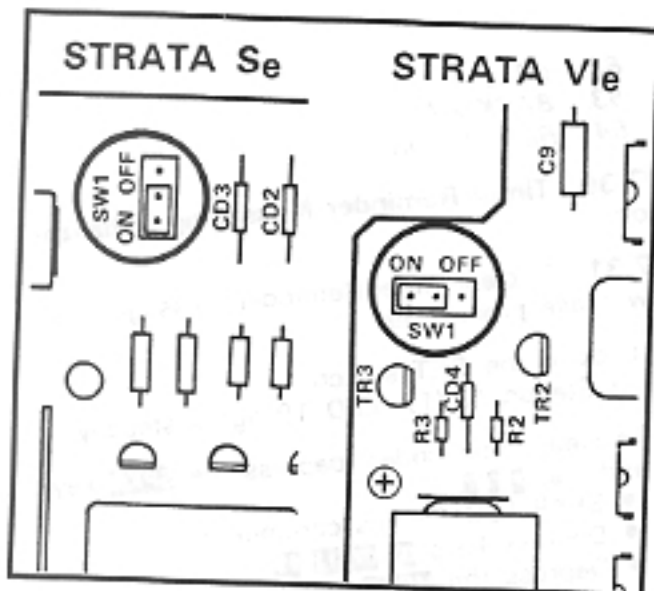
FIGURE 17—SCCU/VCCU BATTERY STRAP

07.03 To initialize STRATA S$_e$ system data memory, refer to Figure 18, temporarily connect a 20-key EKT to station 13, and perform the following:
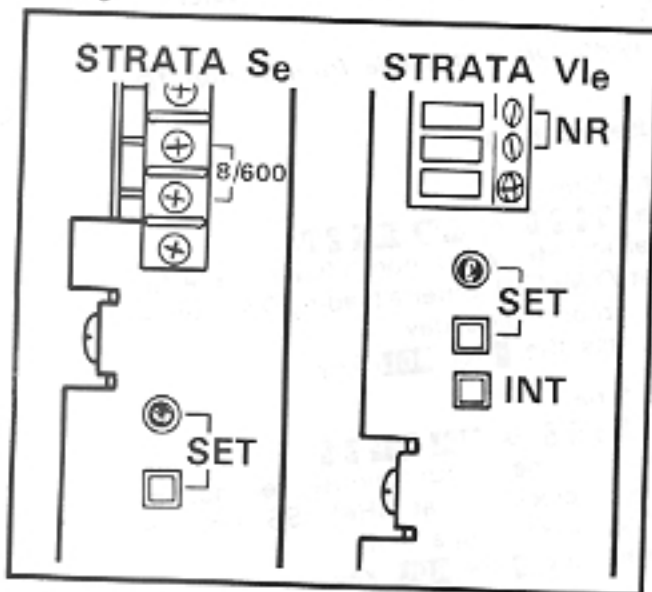
FIGURE 18—S$_e$/VI$_e$ INITIALIZING SWITCHES

1) Place the system power switch in the ON position.

2) Depress the SET switch and allow it to lock.
   - SET LED goes on.
   - Station 13: LED 19 goes on.

   Depress the SPKR key on station 13.
   - Station 13: SPKR LED goes on.

4) Dial ◼ ◼ ◼ on the dial pad.

5) Depress the 01 and 03 keys on station 13.
   - The corresponding LEDs go on.

6) Depress the HOLD key on station 13.
   - Station 13: All LEDs (except SPKR and MIC) begin blinking.

7) Depress and release the SET switch again.
   - SET LED goes off.
   - Station 13: LEDs go off.

8) Cycle the power switch OFF and ON.

07.04 To initialize STRATA VI$_e$ system data memory, refer to Figure 18, temporarily connect a 20-key EKT to station 17, and perform the following:

1) Place the system power switch (POW) in the ON position.

2) Depress the INT switch on the left side panel, and hold it in.

3) Depress the SET switch and allow it to lock.
   - SET LED goes on.
   - Station 17: All LEDs except SPKR and MIC flash continuously.

4) Depress and release the SET switch again.
   - SET LED goes off.
   - Station 17: All LEDs go off.

5) Release the INT switch.

6) Cycle the power switch OFF and ON.

07.10 Clearing Automatic Dialing

07.11 The Automatic Dialing memory contains random numbers when the system is powered up initially. Therefore, it is necessary to clear the memory to prevent meaningless numbers from being dialed.

IMPORTANT!
Station 13/17 may be equipped with either a 10- or a 20-key EKT. Prior to performing the procedure that follows (if a 10-key is to be used), refer to Paragraph 02.20/Figure 1, Programming Procedures, Section 500-036-300, for instructions on using a 10-key EKT for programming.

07.12 To clear the Automatic Dialing (-System and -Station) memory (up to 40 numbers), proceed as follows:

1) Lock in the **SET** switch.
   - Station 13/17: LED 19 lights steadily.

2) To clear station automatic dialing, depress the **SPKR** key and dial **#** **1** **1**.
   - SPKR LED flashes continuously.
   - Depress keys **01** **05** **09** **13**.
   - Depress the **HOLD** key.

3) To clear system automatic dialing, depress the **SPKR** key and dial **#** **1** **3**.
   - SPKR LED flashes continuously.
   - Depress keys **03** **07** **11** **15**.
   - Depress the **HOLD** key.

4) Release the **SET** switch.
   - The SET LED and LED 19 on station 13/17 go off.

07.20 Alphanumeric Messaging Initialization

NOTE:
There are 40 messages available in system memory (60 ~ 99), and 10 available at each station (10 ~ 19).

07.21 To initialize system alphanumeric messages, follow these procedures:

1) Lock in the **SET** switch.
   - Station 13/17: LED 19 lights steadily.

2) To clear codes 60 ~ 99, depress the **SPKR** key and dial **#** **1** **4**.
   - SPKR LED flashes continuously.
   - Depress keys **00** **04** **08** **12**.
   - Depress the **HOLD** key.

07.22 To initialize station alphanumeric messages, follow these procedures:

1) Lock in the **SET** switch.
   - Station 13/17: LED 19 lights steadily.

2) To clear codes 10 ~ 19, depress the **SPKR** key and dial **#** **1** **5**.
   - SPKR LED flashes continuously.
   - Depress keys **01** **05** **09** **13**.
   - Depress the **HOLD** key.

NOTE:
System messages can only be programmed or changed at station 10. When the system is initialized, five messages are automatically stored in memory:
60: OUT TO LUNCH
61: IN A MEETING

62: CALL
63: BACK AT
64: RETURN ON

07.30 Timer Reminder Messaging Initialization

07.31 To clear Timer Reminder messages, follow these procedures:

1) Lock in the **SET** switch.
   - Station 13/17: LED 19 lights steadily.

2) To clear timer codes, depress the **SPKR** key and dial **#** **1** **7**.
   - SPKR LED flashes continuously.
   - Depress keys **03** **07** **11** **15**.
   - Depress the **HOLD** key.

07.40 System Real-Time Clock/Calendar Adjustment

07.41 The following procedures detail how to set the date, time and day in the system.

NOTE:
This operation is possible from station 10 only.

1) Handset on-hook.

2) To set date:
   a) Dial **#** **1** **5** **1** (or **RDL** **REP** **5** **1**).
   b) Dial in date (year/month/day) in the format YYMMDD. Enter a leading 0 for single-digit month and day.
   c) Depress the **#** (or **RDL**) key.

3) To set time:
   a) Dial **#** **1** **5** **2** (or **RDL** **REP** **5** **2**).
   b) Dial in time (hour/minute/second) in 24-hour clock format HHMMSS. Enter a leading 0 for single digit.
   c) Depress the **#** (or **RDL**) key.

4) To set day:
   a) Dial **#** **1** **5** **3** (or **RDL** **REP** **5** **3**).
   b) Dial in the day (**1** represents Sunday, **2** Monday, etc., through **7** for Saturday).
   c) Depress the **#** (or **RDL**) key.

08 EKT INFORMATION

08.00 General

08.01 Eight different electronic key telephones (EKTs) may be used in the system. See the *General Description* for complete descriptions of the EKTs.

08.02 All EKTs share the same dimensions:
Height: 3.7" (94 mm)
Width: 7.1" (180 mm)
Depth: 9.5" (241 mm)

08.03 All EKTs feature modular handset cords and are connected to the system via 4-conductor modular line cords. With the exception of the single-line EKT, all EKTs are also equipped with an additional modular headset connector. In addition, each EKT model may be used at any or all stations.

08.10 HVSU Installation

08.11 All Toshiba EKTs may originate Off-hook Call Announce (OCA) calls via intercom dialing, transfer/conference dialing, or Direct Station Selection. There are no special requirements to enable EKTS to originate OCA calls.

08.12 However, EKTs which are able to receive OCA calls:
● Must be equipped with an HVSU PCB.
● Must be equipped with a 3-pair modular cord.

08.13 Follow the instructions below to install an HVSU.

1) Loosen the four screws holding the bottom cover of the EKT and remove the cover.

2) Remove the HVSU label from the HVSU and attach it to the EKT label.

   NOTE:
   This step is very important so that an equipped EKT may be easily identified.

3) Plug the HVSU into the **P5** connector on the bottom of the EKT main board (Figure 19).

4) Reinstall the EKT bottom cover and tighten the four screws.

08.20 EKT Wall Mounting

08.21 All EKTs are mounted in the same manner, and they may be mounted on a wall or any other flat, vertical surface to which the base can be secured. When selecting the mounting site, consider the EKT's weight and the additional stresses to which the mounting will be subjected.

08.22 Mounting screws or mollies, appropriate for the surface on which the telephone is to be secured, must be provided by the installer.
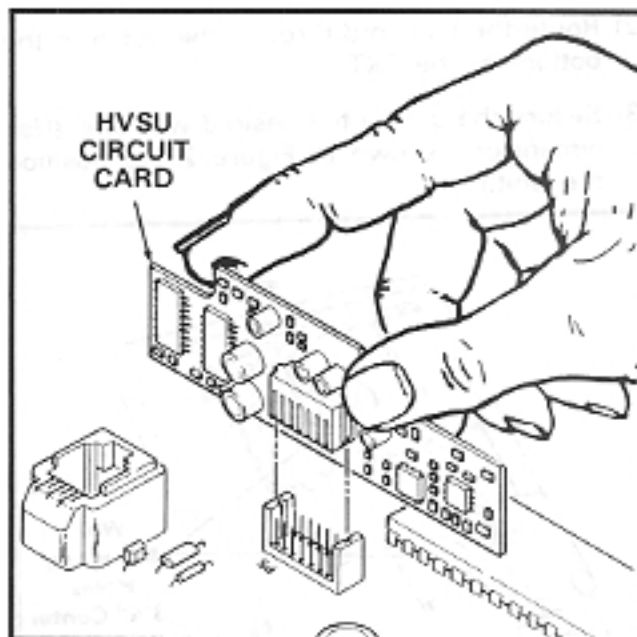
FIGURE 19—HVSU LOCATION

08.23 Locking tabs secure the EKT's base. The direction in which the base is attached to the EKT determines whether it is used as a desk unit or wall unit (it is factory-configured as a desk unit). To wall-mount an EKT, perform the following steps:

1) Disengage the locking tabs by pushing downward on the base (Figure 20), and then rotate the base 180° and insert it into the lower four locking slots.
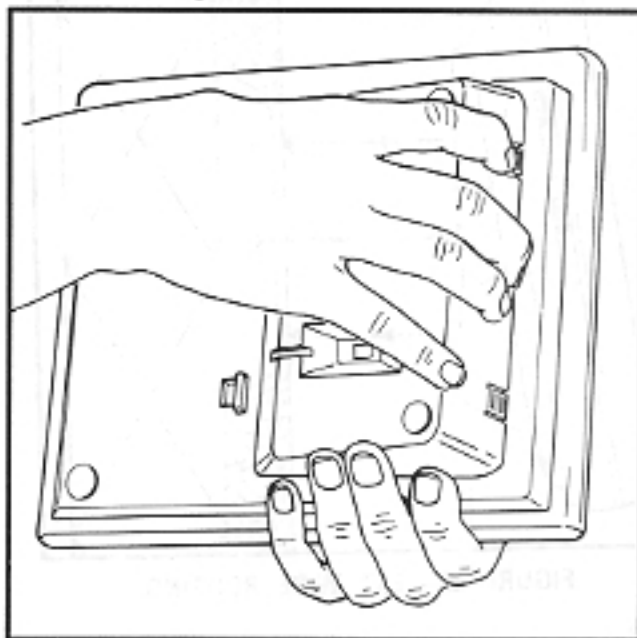
FIGURE 20—REMOVING EKT BASE

2) Route the line cord through the notch in the bottom of the EKT.

3) Secure the unit to the desired wall site. (Use dimensions shown in Figure 21 to position the unit.)
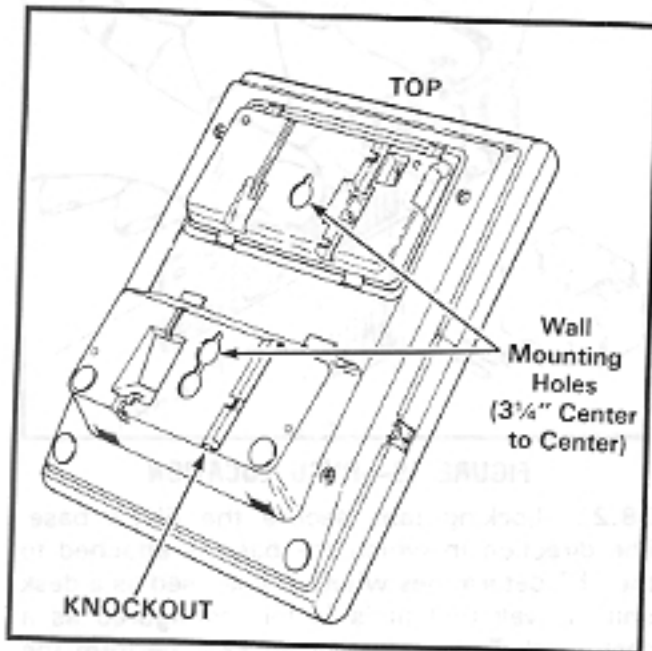
FIGURE 21—EKT MOUNTING HOLES

4) Route the tail cord through the holes in the base and secure the EKT (Figure 22).
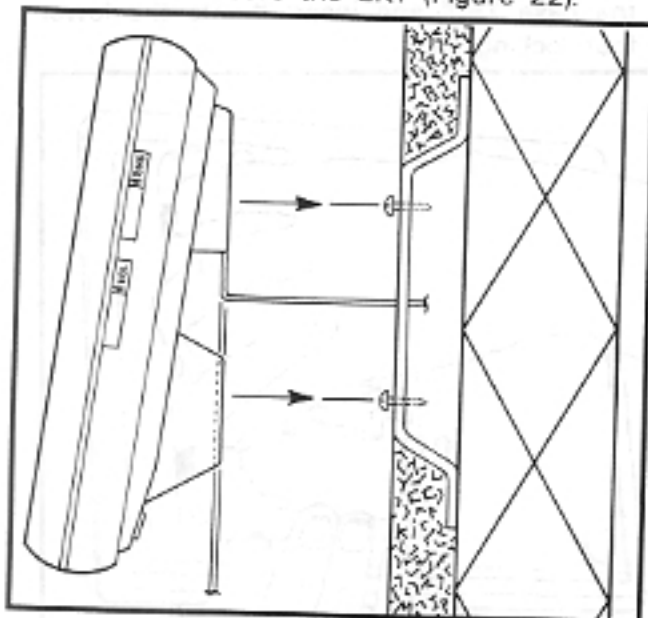
FIGURE 22—EKT WIRE ROUTING

5) To reposition the handset hanger, insert a piece of wire (such as a paper clip, etc.) into

the cutout just above the hanger (Figure 23), disengage the hanger's locking tabs, and slide the hanger out. Rotate the hanger 180° and reinsert it. Note that the hanger mates with the notch in the handset.
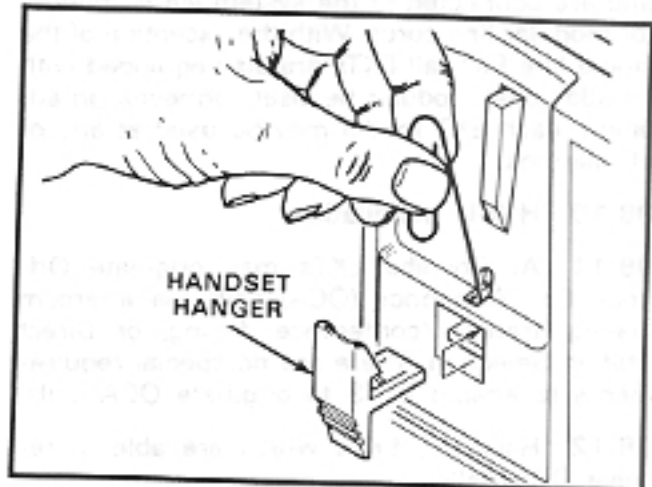
FIGURE 23—HANDSET HANGER

08.24 An optional 13′ handset cord is available from your Toshiba supplier, and it is suggested that this cord be used when wall mounting an EKT.

08.30 EKT Connections

08.31 Connect the appropriate length line cord to the modular connector, route the cord to the EKT and connect to the EKT modular jack. Test the EKT per Paragraph **08.50**.

08.40 Carbon Handset Installation

08.41 All 6000-series EKTs are factory-equipped with dynamic handsets. If a carbon handset is desired, an EKT modification is necessary. With the exception of the single-line EKT, the following modification is applicable to all 6000-series EKTs:

1) Remove the four screws holding the base cover, and remove the base cover.

2) On the exposed PCB, cut jumpers marked "CARBON" (see Figure 24).

   NOTE:
   Figure 24 shows the locations of the carbon resistors for both handsfree answerback (HFU) and speakerphone (SPF) EKTs.

3) Reinstall the base cover and its four screws.
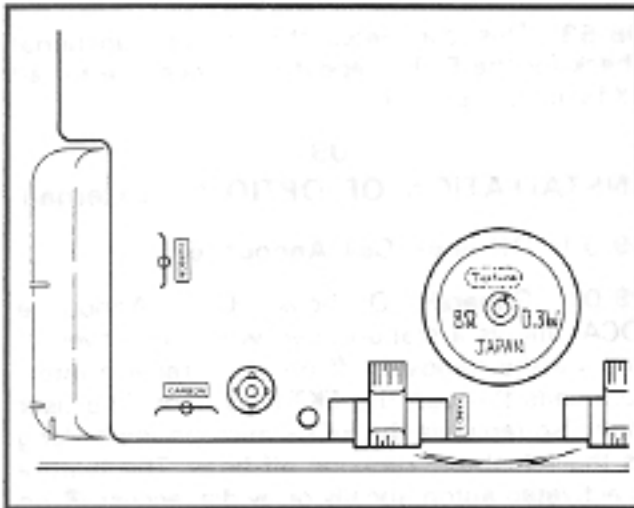
FIGURE 24—CARBON HANDSET MODIFICATION

4) Replace the dynamic handset with the carbon handset.

08.50 EKT Functional Check

08.51 In order to verify basic system functions, and confirm the proper functioning of the EKT itself, perform the following test procedures at each station. Begin with the lowest numbered station, and continue through all stations.

08.52 With handset on-hook:

a) Depress the **INT** key.
- INT LED: In-use flash.
- SPKR LED: on steady.
- MIC LED: on steady.
- Listen for intercom dial tone via EKT speaker.

b) Adjust speaker volume with the lower control on the right side of the EKT.

c) Depress the **CO1** key.
- CO1 LED: In-use flash.
- SPKR & MIC LEDs: on steady.
- Listen for CO/PBX dial tone via the EKT speaker.

d) Dial any digit (**2** ~ **9**) on the dial pad and dial tone stops.

e) Depress the **MW/FL** key.
- Listen for circuit break followed by dial tone after approximately 2 seconds.

f) Continue to depress each **CO** key in order on every EKT; the following should occur:
- CO LED: In-use flash.

- SPKR & MIC LEDs: on steady.
- Listen for CO/PBX dial tone via the EKT speaker.

NOTE:
If no CO/PBX facility is connected to a **CO** *key, dial tone cannot be heard but the LED is still functional.*

g) When CO testing is complete on each EKT, continue the EKT test by depressing the **SPKR** key.
- SPKR & MIC LEDs: off.
- EKT speaker off.

h) Depress the **DND** key.
- DND LED: on.

i) Depress the **DND** key.
- DND LED: off.

j) Depress the **CO1** key.
- CO1 LED: In-use flash.
- SPKR & MIC LEDs: on steady.
- Listen for CO/PBX dial tone via the EKT speaker.

k) Depress the **HOLD** key.
- CO1 LED: On-hold flash.
- Speaker off (no dial tone).
- SPKR & MIC LEDs: off.

l) Depress the **CO1** key.
- CO1 LED: In-use flash.
- SPKR & MIC LEDs: on steady.
- Listen for CO/PBX dial tone via the EKT speaker.

m) Depress the **CONF** key.
- CO1 LED: Conference call flash rate.
- Dial tone continues.

n) Depress the **CO1** and **SPKR** keys.
- CO1 LED: off.
- SPKR & MIC LEDs: off.
- Dial tone: off.

o) Call the EKT that is being tested from another station.
- Called station's INT LED: Incoming Call flash.
- Listen for the caller's voice via the called EKT's speaker after the single tone signal.

p) Dial **1** at calling station.
- Tone signalling heard via the called station's speaker.

-15-

q) Adjust tone signalling volume with upper control on the right side of the EKT.

r) Depress the **INT** key.
  - INT LED: In-use flash.
  - SPKR & MIC LEDs: on steady.
  - Listen for intercom dial tone via the EKT speaker.

s) Lift handset.
  - SPKR & MIC LEDs: off.
  - Speaker off.
  - Listen for dial tone via handset receiver.

t) Call another station and talk into the handset transmitter.
  - Verify that your voice can be heard via the called EKT's speaker.

u) Hold down the **SPKR** key, and set the handset back on-hook.
  - INT LED: In-use flash.
  - SPKR & MIC LEDs: on steady.

v) Tap the EKT microphone and verify that the sound can be heard via the called EKT's speaker.

w) Depress the **MIC** key while tapping the microphone and verify that the sound cannot be heard via called the EKT's speaker.
  - MIC LED: off while **MIC** key is depressed.

x) Depress the **SPKR** key.
  - INT LED: off.
  - SPKR & MIC LEDs: off.

NOTE:
Continue this portion of the EKT testing for any stations equipped with OCA. If the system has no OCA stations, continue to Paragraph 08.53.

y) Busy-out an OCA-equipped station.

z) Call that station from another EKT.

aa) After receiving busy tone, dial **2**.

NOTE:
If the system is programmed for automatic OCA, it is not necessary to dial 2—step bb) is in effect immediately after dialing the busy station.

bb) The called station receives a tone burst through its speaker, after which a speech path exists between the two stations.

08.53 This completes the station functional check for the EKTs; repeat the procedure for all EKTs in the system.

09
INSTALLATION OF OPTIONS (External)

09.00 Off-hook Call Announce

09.01 General: Off-hook Call Announce (OCA) allows a station user, while in conversation via the handset (off-hook), to receive intercom calls through the EKT's speaker. The user may also reply via the EKT's microphone as long as the telephone remains off-hook. The feature is activated automatically or by dial access (**2**) on a programmable station-by-station basis (see Figure 25).

NOTE:
If the station user is involved in a hands-free conversation (on-hook), the caller receives a busy signal.

09.02 Programming: Verify the proper programming via **Programs 01** and **5XX** in *Programming Procedures*, Section 500-036-300 (LED 00 in **Program 01** must be set to voice first for OCA to function).

09.03 Hardware Requirements: Ensure the HKSU has part number 605 (S_e) or 705 (VI_e), and install:
  - SVCU PCB per Paragraph **05.70**.
  - Jumper cables on SSTU PCB per Paragraphs **05.40** and **05.70**.

09.04 EKT Requirements: Any Toshiba EKT, off-premises extension or HIOB station may *originate* an OCA call in a STRATA$_e$ Release 2 system, as there are no special hardware requirements. But OCA calls may be *received* by EKTs meeting the following criteria only:
  - 6XX5 series
  - Connected with 3-pair wiring
  - Equipped with HVSU PCB.

09.05 To Test OCA: Connect three stations (station A is equipped for OCA), and conduct the following:

1) Go off hook with station A and make an intercom call to station B, verify the speech path.

2) Use station C to call station A via the intercom:
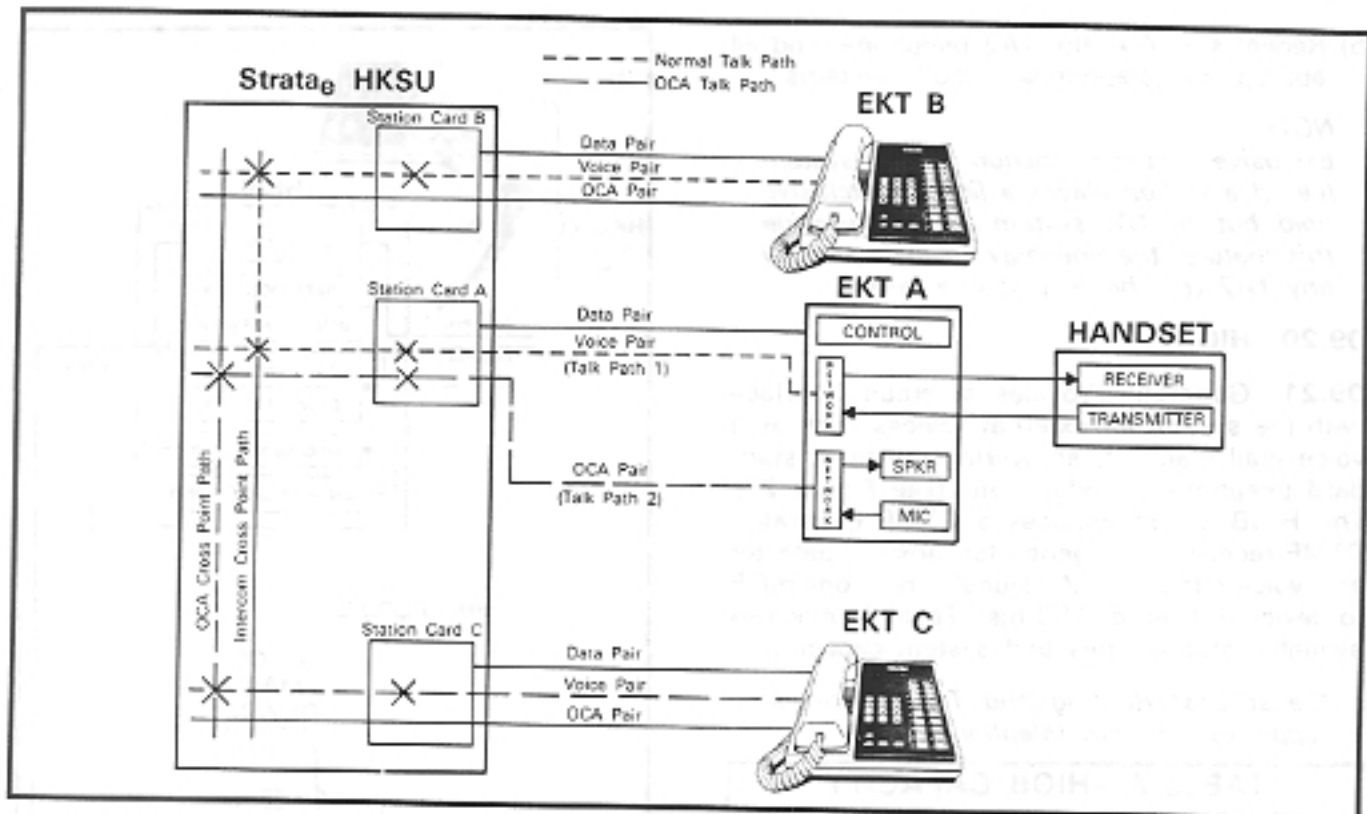
FIGURE 25—OFF-HOOK CALL ANNOUNCE FUNCTIONAL BLOCK DIAGRAM

- If in automatic mode*: Station A receives a single tone burst (an OCA speech path exists between stations A and C via the EKT's speaker and microphone—verify).
- If in dial **2** mode: Station C receives busy tone, then dials **2** to establish an OCA speech path between stations A and C—verify.

*Program **5XX** *LED 12 determines the mode of the originating station.*

09.10 HCNB

09.11 General: Provides 1A2 Interface for the system. Each HCNB supports three CO/1A2 interface line circuits. The HCNB provides line supervision between the HKSU and the 1A2 equipment. The maximum distance between these units is determined by the 1A2 Interface line circuit specifications. To install, follow the procedures listed below:

1) Connect tip/ring, lamp and A lead connections per Figure 26.

2) Using the provided 4-pair modular cord, connect the HKSU to the HCNB.

3) Connect the MDF to the modular blocks with 24 AWG wire.

4) Connect the supplied field ground wire.

NOTE:
Connecting the jumper wires **W1** *and* **W9** *is not necessary.*

09.12 Programming: Verify the correct programming for 1A2 interface via **Program 0#7**.

09.13 To Test 1A2 Interface: Conduct the following test on each incoming line:

1) Depress each **CO** line key on an EKT.
   - Verify that the corresponding lamp lights on a 1A2 telephone.

2) Make a test call from the EKT.
   - Verify that the call may be monitored at the 1A2 telephone.

3) Repeat steps 1 and 2 at the 1A2 telephone.

4) Place each CO line (one at a time) on hold at an EKT.
   - Verify that the CO appearance on the 1A2 telephone is on hold.

5) Repeat step 4 at the 1A2 telephone, and all appropriate telephones in both systems.

NOTE:
Exclusive hold is a function of each system (i.e., if a station places a line on exclusive hold, but the 1A2 system does not provide this feature, the line may be picked up by any 1A2 telephone (and vice versa).

09.20 HIOB

09.21 **General:** Provides a circuit interface with the system for external devices such as a voice mail machine, answering machine, standard telephone*, modem, etc. (see Figure 27). The HIOB circuit includes a DTMF generator, DTMF receiver, ring generator, answer detector and voice circuit (DTMF signal time from HIOB to device is fixed at 160 ms). Table A indicates available station lines and system capacities.

Least Cost Routing and Toll Restriction apply to standard telephones.

TABLE A—HIOB CAPACITY		
SYSTEM	Q'TY	STATIONS
S_e	4	14 ~ 17
VI_e	8	18 ~ 25
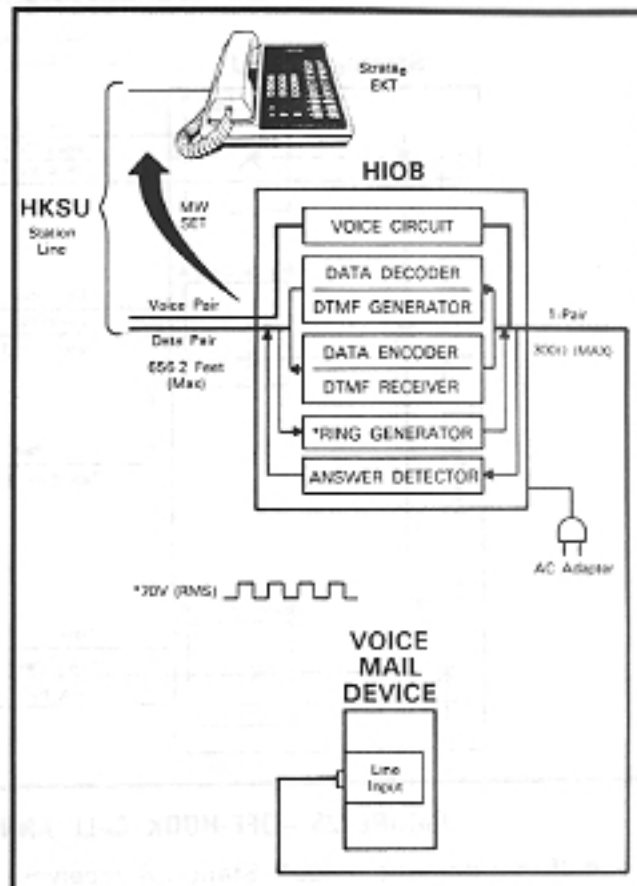
FIGURE 27—HIOB FUNCTIONAL BLOCK DIAGRAM
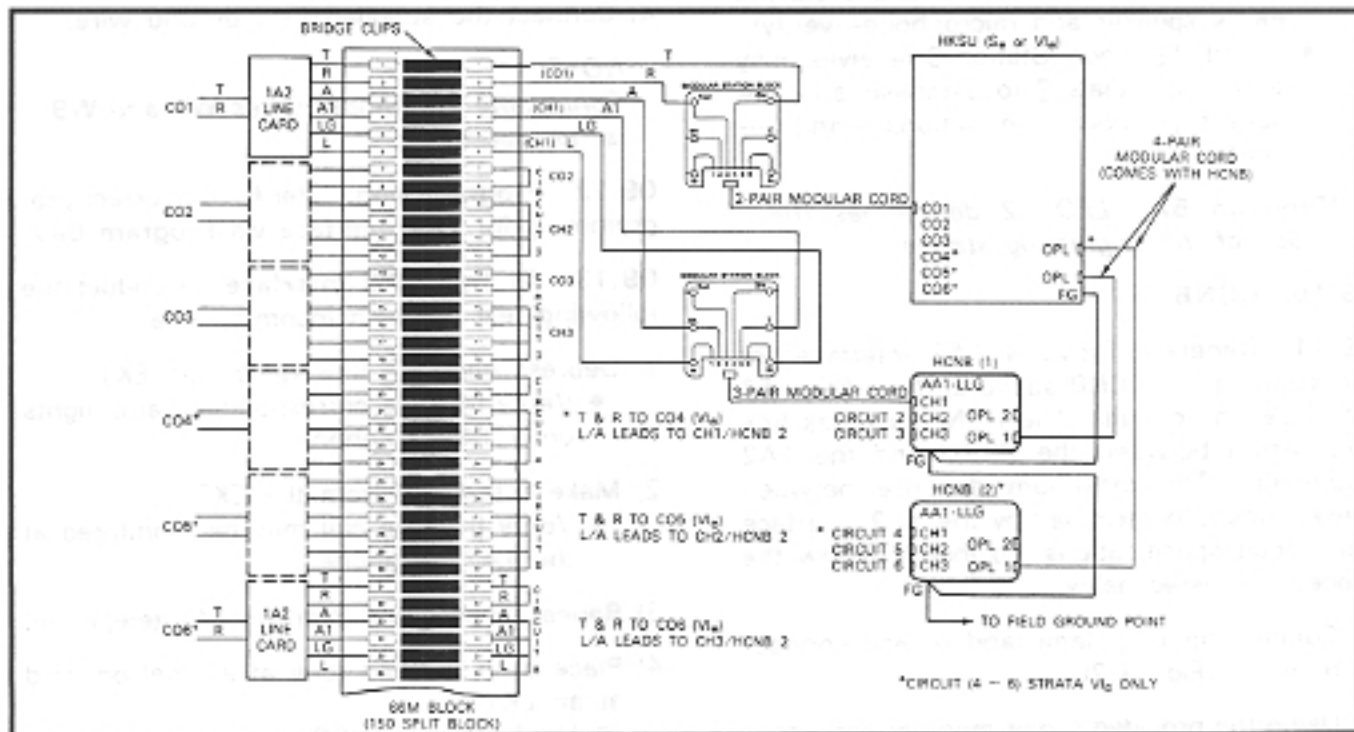
FIGURE 26—HCNB CONNECTIONS

09.22 **Wall Mounting:** Mount the HIOB on a flat surface with the four provided screws. The dimensions are 4.6 x 6.8" (117 x 172 mm). Using the HIOB as a template, mark the four screw locations, create "starter" holes and secure the module.

09.23 **Cabling:** Each HIOB is connected to a station line via 2-pair 24 AWG wiring (Figure 28). It is connected to the peripheral device via single- or 2-pair (only the tip and ring are used) wiring. The maximum distance between the HKSU and the HIOB is 650' (200 M). The loop limit between the HIOB and the device is 300 ohms (including the resistance of the device).

09.24 **Power and Ground:** To complete the HIOB installation, refer to Figure 28, and perform the following:

1) Connect the provided 24 V converter to the HIOB and plug it into a 120 VAC outlet.

2) Connect a ground wire to the installation site's common ground and to **FG** on the HIOB.

09.25 **Programming:** Verify the proper programming via several selections in **Program 3#XX** in *Programming Procedures*, Section **500-036-300**.

09.26 **Option Switches:** There are two switches (Figure 29) on the HIOB that may have to be set.

1) **SW1** selects DTMF tones or dial pulse to be **received from** the peripheral device. Set **SW1**, if necessary (factory-set to MF), to **DP** or **MF** (DP = dial pulse, MF = DTMF).
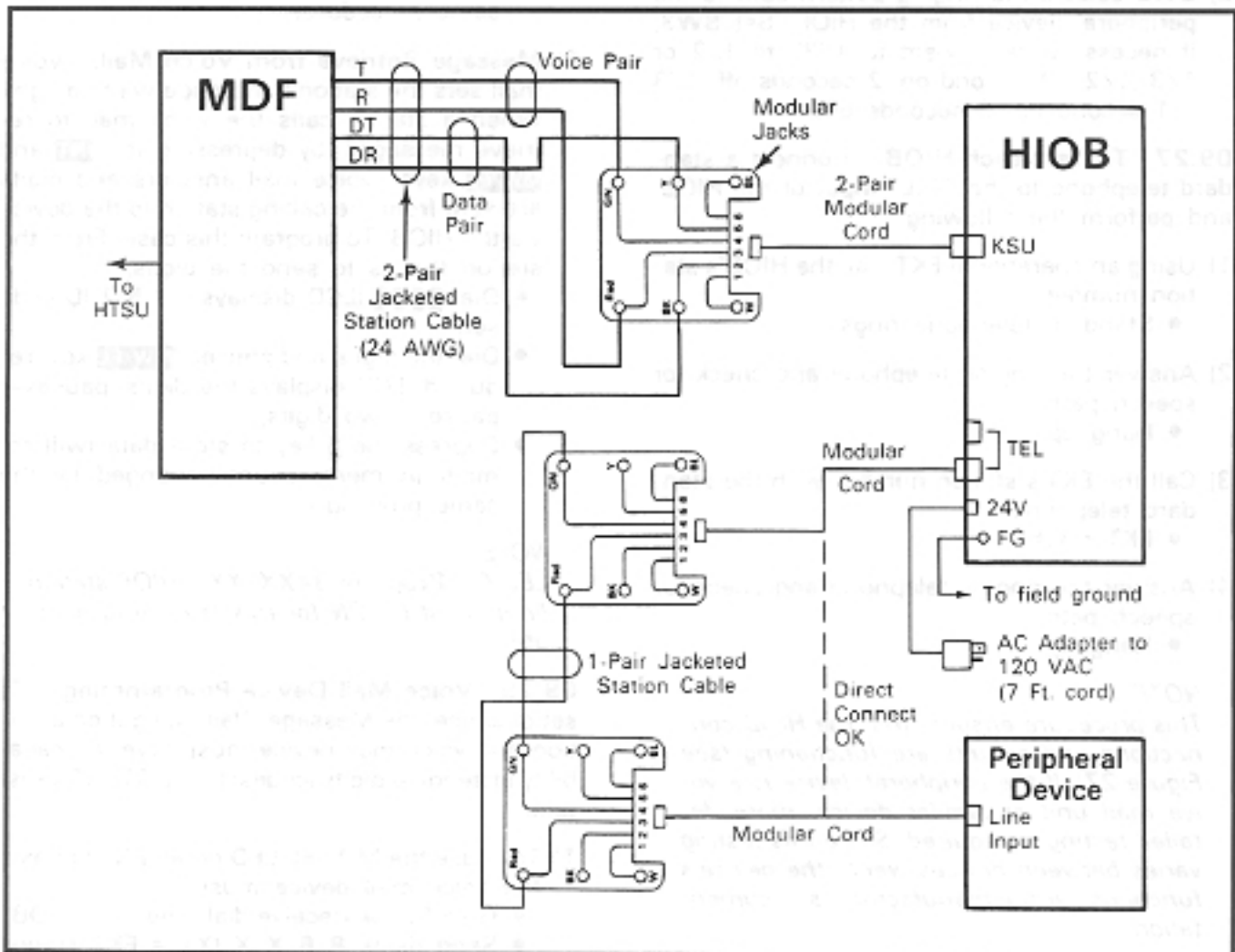
FIGURE 28—HIOB WIRING DIAGRAM
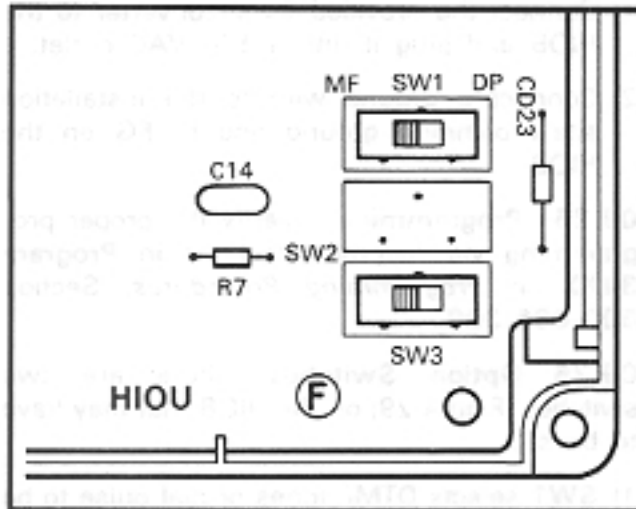
FIGURE 29—HIOB SWITCHES

2) **SW3** selects the ringing pattern sent to the peripheral device from the HIOB. Set **SW3**, if necessary (factory-set to 1/3), to 1/2 or 1/3 (1/2 = 1 second on, 2 seconds off; 1/3 = 1 second on, 3 seconds off).

09.27 To Test each HIOB: Connect a standard telephone to the "TEL" input of the HIOB, and perform the following:

1) Using an operational EKT, call the HIOB's station number.
   - Standard telephone rings.

2) Answer the ringing telephone and check for speech path.
   - Hang up.

3) Call the EKT's station number with the standard telephone.
   - EKT rings.

4) Answer the ringing telephone and check for speech path.
   - Hang up.

NOTE:
This procedure ensures that the HIOB connections and circuits are functioning (see Figure 27). If the peripheral device is a voice mail unit or similar device, more detailed testing is required. Since this testing varies between devices, verify the device's functions per the manufacturer's documentation.

09.28 Voice Mail Application: Stations may be programmed to automatically send digits (via the HIOB) to a voice mail device to step callers through voice mail prompts directly to the station's mail box. There are two cases where these digits will be sent. In each case, a different digit string may be programmed (16 digits maximum). The two cases are:

1) **Call Forward to Voice Mail:** Calls are forwarded to the voice mail box. When calls are answered, digits are sent from the called station via the HIOB. To program this case: From the station that is to send the digits:
   - Dial **# * 5 6** (LCD displays # * 5 6 ID code set)
   - Dial the digits and pauses (**MW/FL** key) required (LCD displays the digits/pauses—pause = two digits)
   - Depress the **#** key to store data (will remain in memory until changed by the same procedure).

2) **Message Retrieve from Voice Mail:** Voice mail sets the station's message waiting light. When a station calls the voice mail to retrieve messages (by depressing the **INT** and **MW/FL** keys), voice mail answers and digits are sent from the calling station to the device via the HIOB. To program this case: From the station that is to send the digits:
   - Dial **# * 5 7** (LCD displays # * 5 7 ID code set)
   - Dial the digits and pauses (**MW/FL** key) required (LCD displays the digits/pauses—pause = two digits)
   - Depress the **#** key to store data (will remain in memory until changed by the same procedure).

NOTE:
LED 07, Program 3#XX (XX = HIOB station line), must be ON for this feature to operate.

09.29 Voice Mail Device Programming: To set or cancel the Message Waiting light on a station, the voice mail device must have the capability of sending digits (codes) to the STRATA system.

1) To cause the MW/FL LED on an EKT to flash, the voice mail device must:
   - Go off-hook (receive dial tone from HIOB).
   - Send digits **8 6 X X** (XX = EKT station number).
   - Go on-hook.

2) To cancel the MW/FL LED, the voice mail device must:
 - Go off-hook (receive dial tone from HIOB).
 - Send digits **8 7 X X** (XX = EKT station number).
 - Go on-hook.

09.30 HOXB

09.31 General: Serves as an interface between the key service unit and conventional, standard telephones or off-premises extension (OPX) lines. Each HOXB serves two extensions, replacing two station assignments, and will operate with either DTMF or rotary-dial telephones. An MRGU (a ring generator and -48 VDC power supply) is required with each three HOXBs.

 - S_e: Two HOXB modules may be installed; using stations 14 ~ 17.
 - VI_e: Four HOXB modules; using stations 18 ~ 25.

NOTE:
LCR will function (VI_e only) when a 2500-type telephone is attached to the HOXB.

09.32 Wall Mounting: An HOXB may be mounted on any vertical surface.

1) Locate the two mounting holes on the left-hand side.

2) Remove the module's right side cover to expose the two right-hand mounting holes.

3) Properly position the module adjacent to the HKSU with regards to wiring needs.

4) Secure the module to the mounting surface with provided screws.

09.33 Option Switches: Remove the cover of the HOXB and locate the two operational mode straps on the HOXU PCB (mounted to the HOXB base). As shown in Figure 30, the straps are located in the center of the PCB (**SW1**

FIGURE 30—HOXB CONNECTION STRAPS
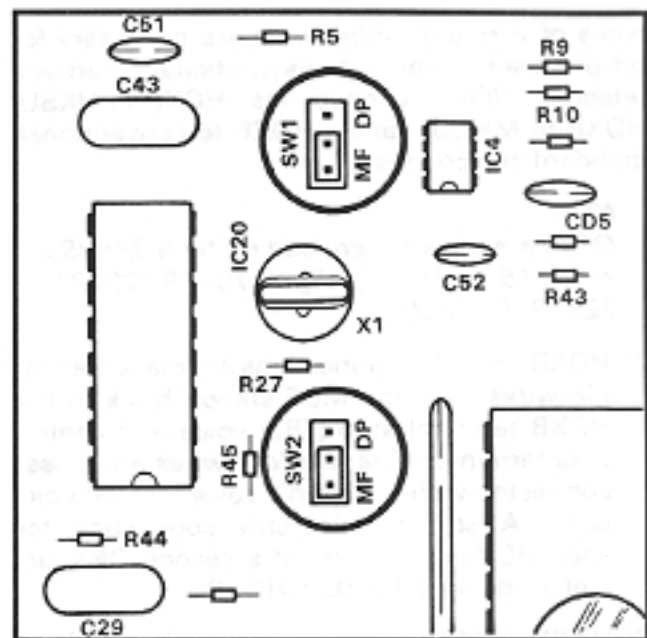
controls the operation of OPX telephone #1; **SW2** controls OPX telephone #2). Set each switch to **DP** for dial pulse or **MF** for DTMF tone output, as required. After setting the straps, reinstall the cover and secure it to the base. The MF position does not allow Toll Restriction for the OPX station.

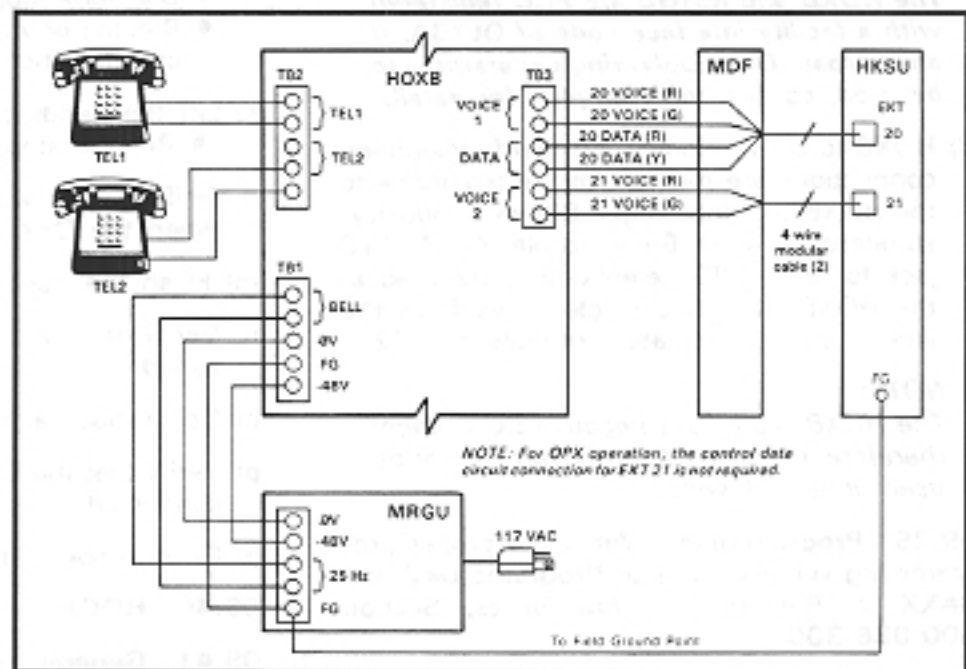**09.34 Cabling:** Refer to Figure 31, three

FIGURE 31—HOXB WIRING

types of wiring arrangements are necessary for off-premises extension/conventional, standard telephone (OPX) connections: HOXB-to-HKSU, HOXB-to-MRGU and HOXB-to-conventional, standard telephones.

NOTE:
OPXs are paired even/odd to the HOXB (S_e = 14/15 & 16/17; VI_e = 18/19, 20/21, 22/23 & 24/25).

1) HOXB-to-HKSU connections are made via single wires from the MDF station block to the HOXB terminal strip (TB3) voice and control data terminals. The first four wires are cross-connected with a station's voice and data circuits. A station voice-only connection for each HOXB is required if a second OPX circuit is desired for that HOXB.

2) HOXB-to-MRGU connections are made from the MRGU output terminal strip to the HOXB terminal strip (TB1).
   a) Connect the 80 VAC, 25 Hz output on the MRGU to the BELL input on HOXB.
   b) Connect the -48 VDC and 0 V battery terminals on both units, observing the correct polarity (see Figure 31).
   c) Connect **FG** from MRGU to **FG** on HOXB.
   d) **Must** connect **FG** on HOXB to HKSU.

IMPORTANT FCC INFORMATION:
The HOXB and MRGU are FCC registered with a facility interface code of OL13A. If an alternate DC supply/ring generator is to be used, contact your supplier for details.

3) HOXB-to-conventional, standard telephone connections are made from the telephone to the HOXB terminal strip (TB2) with industry-standard 2-, 4- or 6-wire cable. An RJ-11C jack for each OPX telephone is required at the HOXB. Run two single wires from the jack to the appropriate terminals on TB2.

NOTE:
The HOXB requires a negative DC voltage; therefore, the main HKSU power cannot be used (it is +24 volts).

09.35 **Programming:** Verify the proper programming via selections in **Programs 0#2** and **3#XX** in *Programming Procedures*, Section 500-036-300.

09.36 **To Test:** Perform the following procedures at each Off-Premises Extension/Conven-

tional Telephone (OPX) location:

a) Lift the OPX handset and listen for intercom dial tone.

b) Dial the number of another station.
   • Dial tone stops when first digit is dialed.
   • Ringing or voice paging can be heard at the called station.

c) Lift the handset at the called station.
   • Ringing stops.

d) Verify that a 2-way voice connection exists between the OPX and the called station.

e) Go on-hook at both stations.

f) Lift the OPX handset and listen for intercom dial tone.

g) Dial CO line access code.
   • Listen for CO dial tone.
   • An idle line, from the group defined by **Program 09** (or **91 ~ 98**), is seized.

h) Dial a test call.
   • Verify that a 2-way voice connection is established.

i) Flash the hookswitch on the OPX and listen for intercom dial tone.

j) Dial the number of another station.
   • Dial tone stops when first digit is dialed.
   • Ringing or voice page can be heard at the called station.

k) Lift the handset at the called station.
   • Ringing stops.

l) Verify that a 2-way voice connection exists between the OPX and the called station.

m) Flash the hookswitch on the OPX.

n) Verify that a 3-way conference is established.

o) Go on-hook at the OPX.

p) Verify that the CO line and called station are connected.

q) Go on-hook at the called station.

09.40 **HDCB**

09.41 **General:** Provides Door Phone/Monitor Stations, Door Lock and Alarm features. To equip the system with up to six Door Phone/

Monitor Stations and/or the Door Lock and Alarm features, install one or two HDCB external modules. The A, B and C modular connections provide the following functions:

- 11/13A & 12/14A: Door phones
- 11/13B & 12/14B: Door phones or door lock contacts.
- 11/13C & 12/14C: Door phones or alarm* detect.

Alarm detect is available on door phone 11/13C only, and the alarm reset key may be assigned only to station 10.

09.42 Wall Mount: An HDCB may be mounted on a wall only. Perform the following:

1) Locate the two mounting holes on the right-hand side.

2) Remove the module's left side cover to expose the two left-hand mounting holes.

3) Properly position the module adjacent to the HKSU with regards to wiring needs (17' maximum).

4) Secure the module to the mounting surface with the provided screws.

09.43 Option Switches: Remove the HDCB cover and locate (per Figure 32) **SW2** and **SW1** in the upper left corner (**SW1** controls output C; **SW2** controls output B).
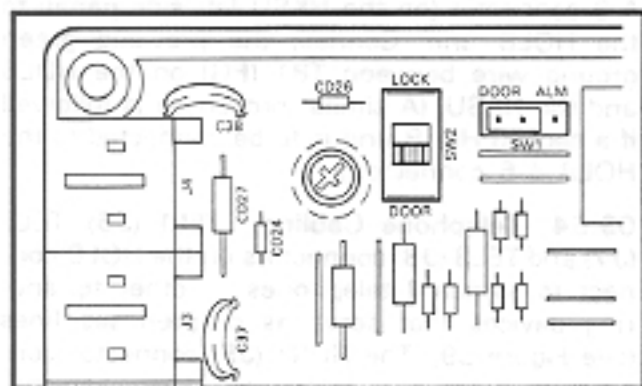
FIGURE 32—HDCB CONNECTION STRAPS

1) On the HDCB connected to station 11/13 only, when **SW1** is in the **DOOR** position, output C connects to a door phone/monitor station. When strapped in the **ALM** position, output C will detect a closure across its two leads (a short) and provide an alarm signal to all idle stations. The signal may be turned off with an **ALRM** key on station 10 only.

2) When **SW2** is in the **DOOR** position, output B connects to a door phone/monitor station. When strapped in the **LOCK** position, output B will provide a dry contact closure for indirect control of a door lock or other device. The closure will be for a period of 3 or 6 seconds (programmable) when an EKT's door lock (**DRLK**) key is depressed.

09.44 Cabling: The door phone control unit (HDCB) is connected to the HKSU at EKT 11/13 and/or 12/14 (program-controlled). Each door phone/monitor station (MDFB) is connected to the HDCB via a 2-wire modular connector at the HDCB and a split ring connector at the MDFB using screw terminals 1 and 2 (L1 and L2 are not used). Figure 33 shows the HDCB and MDFB wiring arrangement.

NOTE:
When using output B for the Door Lock feature, an appropriate modular connector must be used to interface the HDCB to the door lock devices.

FIGURE 33—HDCB/MDFB CONNECTION

09.45 Programming: The following programs must be set for door phone, door lock and/or alarm operation:

- Door phone assignments: **Program 0#1**
- Door lock key assignments: **Program 4#XX** (codes 71 ~ 74)

- Station 10 alarm reset (**ALRM**) key: **Program 4#XX** (code "*"—lowest **AD** key) and **Program 03** (LED 10 on)
- Door phone/EKT ringing assignment: **Program 9#XX**
- First digit in station number may be changed via **Program *X#** (Flexible Numbering).

NOTE:
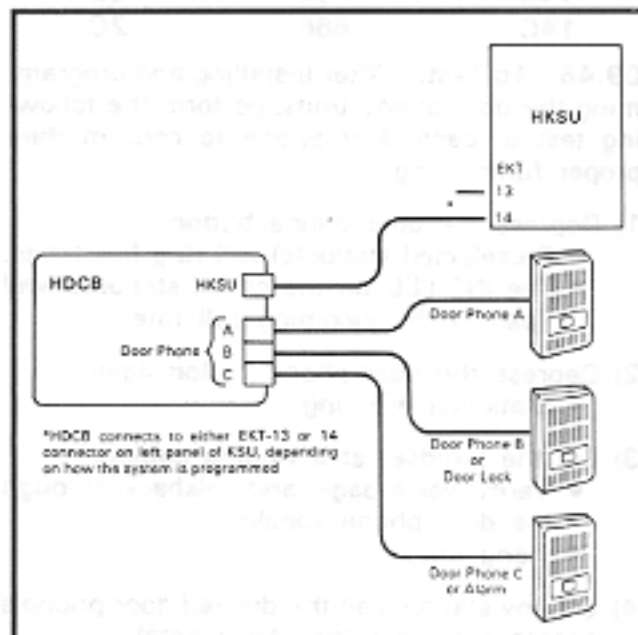*The door phone station numbers (used to call the door phones via the intercom) are as follows:*

- *HDCB on station 11/13 only:*

Door Phone	Station No.	LCD Display
11/13A	66	1A
11/13B	67	1B
11/13C	68	1C

- *HDCB on stations 11/13 ~ 12/14:*

13A	661	1A
13B	662	1B
13C	663	1C
14A	664	2A
14B	665	2B
14C	666	2C

09.46 To Test: After installing and programming the door phone units, perform the following test at each door phone to confirm their proper functioning:

1) Depress the door phone button.
   - Preselected station(s) will ring five times.
   - The INT LED on the called station(s) will flash at the incoming call rate.

2) Depress the door phone button again.
   - Station(s) will ring.

3) Lift the handset at a ringing station.
   - Verify voice-page and talkback through the door phone speaker.
   - Hang up.

4) On any station, call the desired door phone's access code (see the above note).
   - Verify voice-page and talkback through the door phone speaker (there is no warning tone when accessing the door phone).
   - Hang up.

09.50 HOLB

09.51 General: An off-premises line module that allows the bridging of a CO line, which ap-

pears in the system, with a conventional telephone; supervision is provided. Each HOLB provides three circuits, all three of which may be directed to an answering machine (or similar device) attached to the HUNT connector. (Requires an HPLU PCB instead of an HCOU for each HOLB module desired.)

09.52 Wall Mount: An HOLB may be mounted on a wall only. Perform the following:

1) Locate the two mounting holes on the right-hand side.

2) Remove the module's left side cover to expose the two left-hand mounting holes.

3) Position the module adjacent to the HKSU with regards to wiring needs (17' maximum).

4) Secure the module to the mounting surface with the provided screws.

NOTE:
Internal HOLB strapping is not required.

09.53 Cabling: When using the HOLB unit, the CO lines are connected to the CO1, CO2, CO3 connectors (**J2, J3,** and **J4**) on the HOLB unit (Figure 34). Then, a 6-wire cable from the CO1, 2, 3 OUT (**J1**) connector on the HOLB is connected to the CO1-3 modular connector on the right side panel of the HKSU. Connect the provided 8-wire modular cable from the HOLB 1-3 connector (on the HKSU left side panel) to the HOLB unit. Connect the provided green ground wire between TB1 (**FG**) on the HOLB and the HKSU. (A similar procedure is followed if a second HOLB unit is to be connected to the HOLB 4-6 connector.)

09.54 Telephone Cabling: TEL1 (**J6**), TEL2 (**J7**) and TEL3 (**J8**) connectors on the HOLB connect to standard telephones or other tip-and-ring devices that serve as off-premises lines (see Figure 39). The HUNT (**J9**) connector connects to a standard telephone, answering machine or other device to which OPL calls hunt.

09.55 Programming: See Program 0#9, OPL Hunting.

09.56 To Test: Perform the following procedures on each OPL/CO line pair:

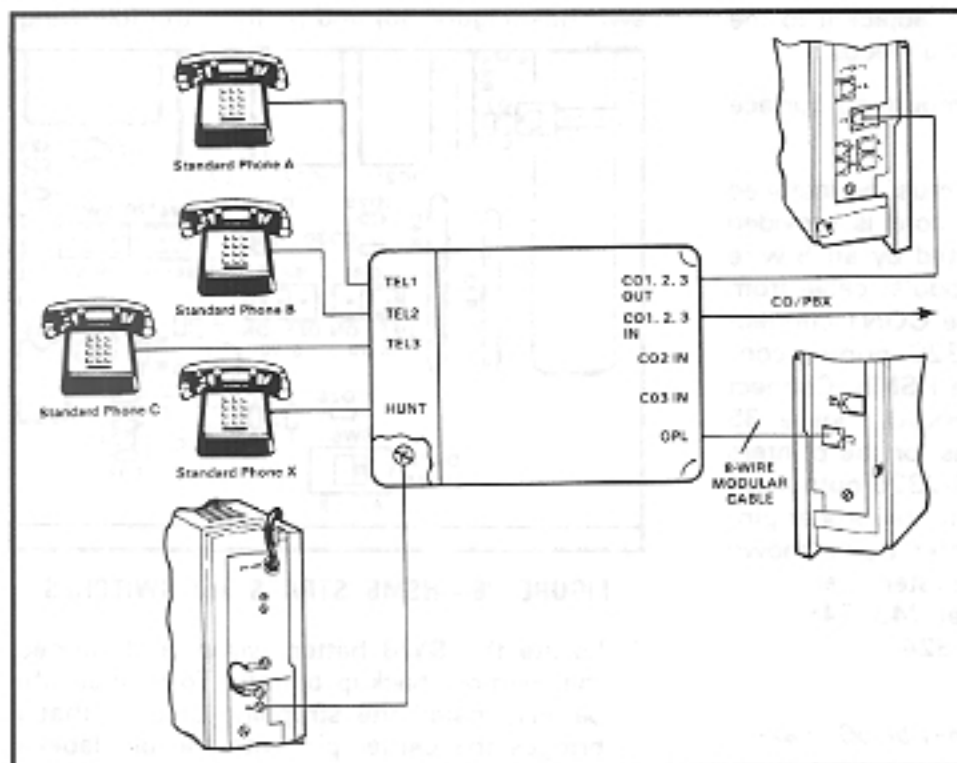a) Lift the OPL telephone handset and listen for CO dial tone.

FIGURE 34—HOLB WIRING

*If OPL hunting is programmed for the line being tested, the call always rings OPL station #1 if it is idle.

k) Lift OPL telephone's handset to answer call.
 • Ringing stops.
 • EKT LED(s) light steadily.
 • Verify that a 2-way voice connection is established.

l) Depress OPL **CO** key on an EKT.
 • Verify that privacy feature prevents access.

m) Go on-hook at the OPL telephone.

b) Verify that the corresponding CO line LED lights on the system EKTs.

c) Dial a test call from the OPL telephone.
 • Verify that a 2-way voice connection is established.

d) Depress the corresponding line key on an EKT.
 • Verify that privacy feature prevents access.

e) Go on-hook at OPL telephone.

f) Depress the OPL CO line key on an EKT and listen for CO dial tone.

g) Dial a test call from the EKT.
 • Verify that a 2-way voice connection is established.

h) Lift the OPL telephone handset.
 • Verify that a 3-way voice connection is established.

i) Go on-hook at both stations.

j) Make an incoming call to the OPL CO line.
 • Appropriate EKT LED(s) flash.
 • Appropriate EKT(s) ring.
 • OPL telephone rings.*

n) Make another incoming call to the OPL CO line.

o) Answer the call using an EKT.
 • Verify that a 2-way voice connection is established.

p) Lift the OPL telephone handset.
 • Verify that a 3-way voice connection is established.

q) Go on-hook at both stations.

09.60 HSMB

09.61 General: Serves as an interface between the key service unit and a printer or storage device used for the SMDR feature. The module (one per system) is equipped with an RS-232C interface for the printer connection and connects to the HKSU via two supplied 8-wire modular cords.

09.62 Wall Mount: An HSMB may be mounted to any vertical surface.

1) Locate the two mounting holes on the left-hand side.

2) Remove the module's right side cover to expose the two right-hand mounting holes.

3) Properly position the module adjacent to the HKSU with regards to wiring needs.

4) Secure the module to the mounting surface with the provided screws.

09.63 Cabling: The HSMB must be installed within 17' of the HKSU (a 7' cord is provided with the module), and connected by an 8-wire modular cable. Connect the modular cable from **J1** (CONT) on the HSMB to the **CONT** connector on the HKSU. The RS-232C printer connector is installed at **J3** on the HSMB. Connect **FG** on the HSMB and the HKSU. Figure 35 shows the detailed connections for the printers listed above. Verify that the RS-232C output cable is connected to the PCB with the proper pin-out connections (A or B). Printer types known to be compatible with these systems are:

> Texas Instruments Model 743/745
> OKI Data Model 82A
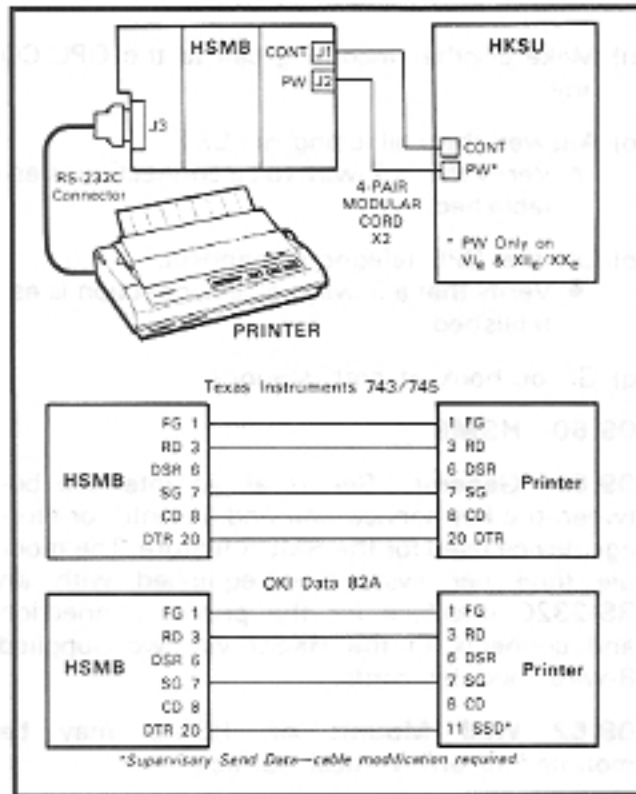
NOTE:
The female RS-232C cable may be 50' maximum.

FIGURE 35—HSMB/PRINTER CABLING

09.64 Option Switches: Remove the HSMB cover and locate the various straps and

switches (Figure 36) and perform the following:
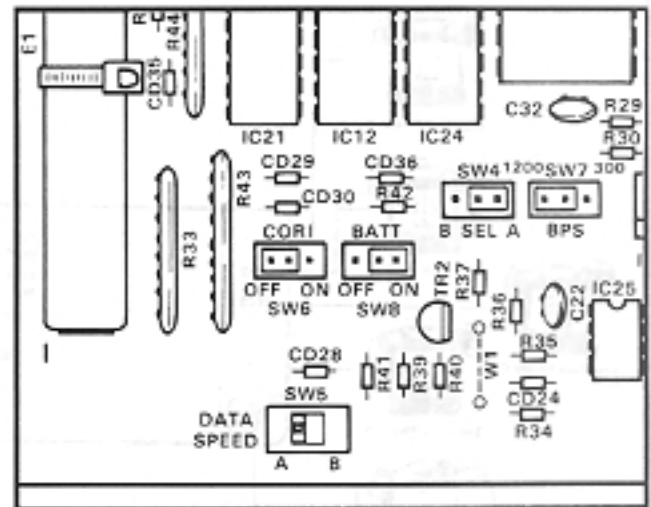
FIGURE 36—HSMB STRAPS and SWITCHES

1) Locate the **SW8** battery strap, and connect the memory backup battery. To connect the battery, install the strapping plug so that it bridges the center pin with the pin labeled **ON**.

2) Select the data output speed using the **SW7** strap. The speed may be set at 300 or 1200 bps by installing the strapping plug so that it bridges the center pin with the pin labeled **300** or **1200**.

3) Two other switches (**SW4** and **SW5**) located on the HSMB are normally set at position A. In position B, the HSMB can accommodate other printer types. See Table B to determine the RS-232C pin connections for positions A and B.

TABLE B
RS-232C (Female) PIN CONNECTIONS

Position A		Position B	
3	RD	2	RD
20	DTR	3	STATUS
6	DSR	6	DSR
7	SG	7	SG
8	CD	8	CD

4) The SMDR feature prints out records of both incoming and outgoing calls or only outgoing calls. This option is selected by the SW6 strap. Installing the strapping plug so that it bridges the center pin with the terminal labeled **OFF** causes both incoming and out-

going calls to be recorded. Bridging the center pin with the terminal labeled **ON** causes only outgoing calls to be recorded.

5) Data output is in 7-bit ASCII code with one start bit, one parity bit (even parity) and one stop bit.

09.65 Clock/Calendar Information: One of the functions of the HSMB is to provide a calendar and clock for showing time, date and duration of recorded calls. This clock and calendar must be set when the system is first placed into service. The HSMB automatically adjusts for 30- and 28-day months and leap year. It is equipped with three buttons and two LED displays (Figure 37). Looking from top to bottom; the functions of the buttons are as follows:
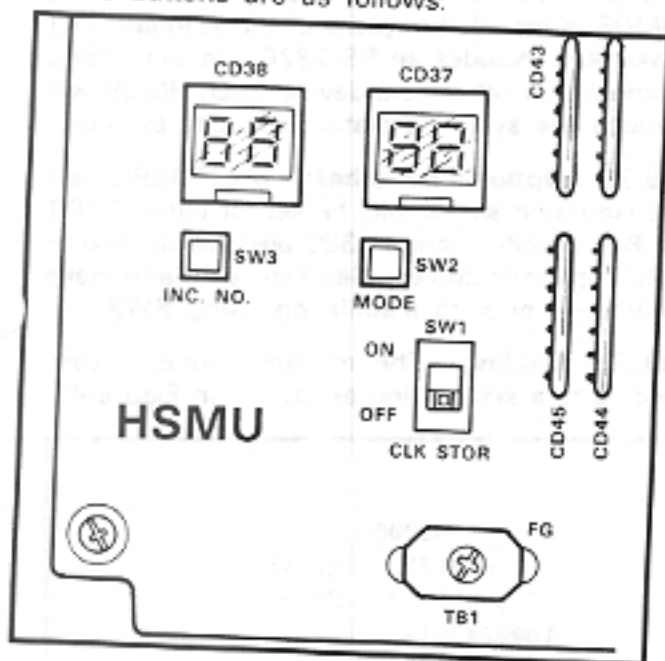

FIGURE 37—HSMB BUTTONS

STR: Writes data into memory once it is properly displayed.

MOD: Selects items to be adjusted. Multiple depressions of the **MOD** button cause item numbers to be displayed sequentially by LED 1. The possible displays are:
Off
1 = year
2 = month
3 = day
4 = hour
5 = minute
6 = start

INC: Selects the data (hour, minute, day, etc.) for the item number selected by the **MOD** button and displayed by LED 1. LED 2 displays data selected by the **INC** button.
- Depressing the **INC** button once increments data by 1.
- Depressing and holding the **INC** button causes data to increase continuously until the **INC** button is released.

09.66 To Set Clock and Calendar:

1) Verify that the battery is connected on the HSMB (Figure 36).

2) Depress the **MOD** button once.
- LED 1 displays 1 (year).
- LED 2 displays current data.

3) Use the **INC** button to correct data in LED 2 display.

4) Depress the **MOD** button once.
- LED 1 displays 2 (month).
- LED 2 displays current data.

5) Use the **INC** button to correct data in LED 2 display.

6) Depress the **MOD** button once.
- LED 1 displays 3 (day).
- LED 2 displays current data.

7) Use the **INC** button to correct data in LED 2 display.

8) Depress the **MOD** button once.
- LED 1 displays 4 (hour).
- LED 2 displays current data.

9) Use the **INC** button to correct data in LED 2 display.

10) Depress the **MOD** button once.
- LED 1 displays 5 (minute).
- LED 2 displays current data.

11) Use the **INC** button to correct data in LED 2 display.

12) Depress the **MOD** button once.
- LED 1 displays 6 (start).
- LED 2 has no display.

13) Slide the **STR** button to **ON** and then back to **OFF**.
- LEDs go off.
- Data is transferred to working memory and time keeping starts.

NOTE:
If LED 1 is changed to OFF before STR is operated, existing data will not be changed, regardless of adjustments made in previous steps.

09.67 To Test: Verify the proper functioning of the SMDR feature:

a) Connect the printer to the HSMB.

b) Set data speed and select type of calls to be recorded per Paragraph **09.64**.

c) Make an outgoing call from any EKT.

d) Enter an account code as follows:
  • Dial the access code (⚹ 5 0).
  • Dial the account code (6 digits).

e) Hang up after the call has been active for at least 10 seconds (calls of less than 10 seconds duration are not recorded).
  • The call record is output to the printer in the format shown in Figure 38.

f) Take the printer "off-line" (DTR signal "off").

g) Make an outgoing call.

h) Hang up after the call has been active for at least 10 seconds.
  • Call record is not output.

i) Put the printer "on-line" (DTR signal "on").
  • Call record is output.

j) Make an incoming call to the system and delay answering it for several rings.

k) Answer the call.

l) Enter an account code as in step d.

m) Hang up.
  • Call record is output to the printer in the format shown in Figure 39.

09.70 HMDB Installation

09.71 General: An integrated modem unit which allows simultaneous voice/data switching to be controlled via an associated EKT. The HMDB is installed in place of the standard EKT base, and includes an RS-232C connector for a computer or other data device. Each HMDB will reduce the system's station capacity by one.

09.72 Optional Switches: The HMDB's data transmission speed may be set for either CCITT or Bell specifications at 300 bps (full duplex) or 1200 bps (half duplex). See Figure 40 and make selections prior to installation using **SW2**.

09.73 Cabling: The modem phone is connected to a station line as shown in Figure 41.

```
      MM/DD/YY

  01    10    HH:MM    00:30;51                2305000
  02    14    HH:MM    00:02;39                8531212      123456
  04    18    HH:MM    00:01;37             12135551212     654321
  03    15    HH:MM    00:04;51             18002436161
  07    19    HH:MM    00:02;25                2731750
```

FIGURE 38—SMDR PRINTOUT EXAMPLE (Outgoing Call)

```
      MM/DD/YY

  01    10    HH:MM    00:01;13    00:02
  02    14    HH:MM    00:02;30    00:04
  03    11    HH:MM    00:03;36    00:10              654321
```

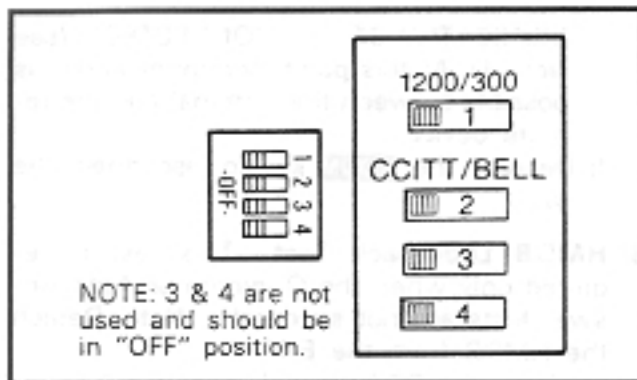**FIGURE 39—SMDR PRINTOUT EXAMPLE (Incoming Call)**
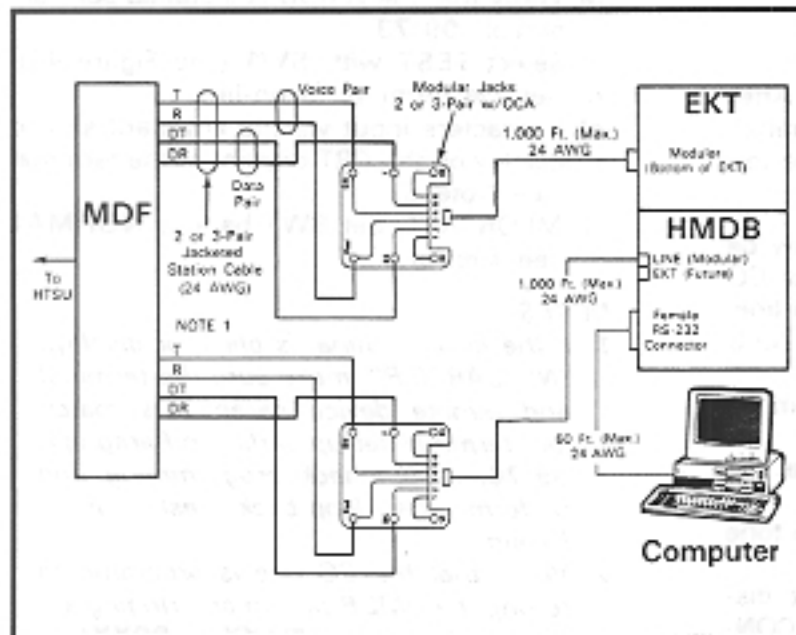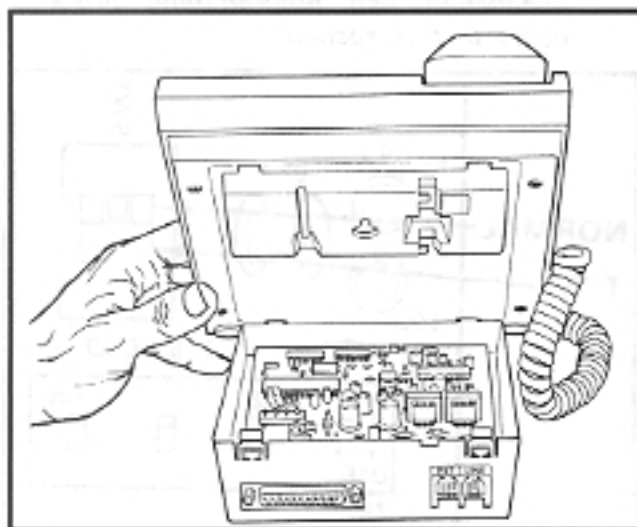
FIGURE 40—HMDB EXTERNAL SWITCHES

FIGURE 41—HMDB WIRING

FIGURE 42—HMDB INSTALLATION

NOTE:
There are no internal connections between the modem and the associated EKT.

09.74 Installation: To install the HMDB on the bottom of an EKT, refer to Figure 42, and perform the following:

1) Remove the standard EKT base.

2) Insert the HMDB's front tabs into the matching holes in the bottom of the EKT.

3) Press the HMDB's rear tabs into the matching holes in the EKT. Continue pressing until the HMDB snaps into place.

09.75 Programming: Verify programming via **Programs 4#XX** and **3#XX**, *Programming Procedures*, Section **500-036-300**. Three keys must be programmed on the associated station. These keys control the modem phone operation.

● **Modem (MODM) Key:** Transfers calls from the EKT's **INT** or **CO** keys to the modem phone. It is also used to disconnect modem calls. The modem LED is on whenever the modem is in use.

● **Answer/Call (ANS/C) Key:** Selects the modem mode (answer or originate call); the mode switches each time the key is depressed (LED = answer/on; originate/off).

● **Manual/Auto (MA/M) Key:** Selects the modem mode (manual or auto answer); the mode switches each time the key is depressed (LED = auto/on; manual/off).

09.76 Terminal/Computer (PC) Installation:

1) Connect the RS-232C cable (50' maximum) to the HMDB's DB-25 female connector.

RS-232C Pin-outs

Pin No.	Name	Pin No.	Name
2	TD	7	SG
3	RD	8	CD
4	RTS	20	DTR
5	CTS	22	CI
6	DSR		

2) Connect the other end to a serial communications port on the PC (or the EIA RS-232C connector on the terminal).

3) A communication software package (such as Crosstalk, etc.) should be installed in the PC.

4) If necessary, set the following parameters on the PC/terminal to match the device with which the PC/terminal will be communicating.
   - Parity
   - Word length
   - Stop bits
   - Baud rate
   - Full/half duplex

09.77 Modem Phone (HMDB) Test: After installing and programming the PC/terminal, HMDB, and associated station, perfrom the following test:

1) **Originate Modem Call Test:** Calls may be originated from the station's intercom or CO line and then transferred to the modem line.
   a) Set the **ANS/C** key to the call mode (LED off).
   b) Set the **MA/M** key to the manual mode (LED off).
   c) Call another modem/device set via the CO or intercom line.
   d) Depress the **MODM** key when modem tone is received from the other end.
   e) Place the local terminal on-line—it displays "COMMUNICATIONS" or "CONNECTED" when the connection becomes successful (see Note 1). At this point, communications is possible between the terminal and the remote device.
   f) Depress the **MODM** key to disconnect the call.

2) **Auto Answer Call Test:** The modem may be set to auto answer calls directed to CO lines programmed to ring the HMDB or intercom calls directed to the modem line (not the associated station line).
   a) Set the local terminal to on-line.
   b) Using the **ANS/C** key, set to answer mode (LED on).
   c) Using the **MA/M** key, set to auto mode (LED on).
   d) Call the HMDB from another modem/terminal set-up.
   e) When the call rings in, the MODM LED turns on and the terminal displays "COM-

MUNICATIONS" or "CONNECTED" (see Note 1). At this point, communications is possible between the terminal and the remote device.
   f) Depress the **MODM** key to disconnect the call.

3) **HMDB Loop-back Test:** This test is required only when the Originate or Auto Answer tests are not successful. Note: Detach the HMDB from the EKT.
   a) Verify the PC/terminal is installed as instructed in Paragraph **09.76**.
   b) Verify that the HMDB is installed per Paragraph **09.73**.
   c) Select **TEST** with **SW1** (see Figure 43).
   d) Set the terminal to on-line.
   e) Characters input via the keyboard should display on the CRT or print at the terminal (see Note 3).
   f) IMPORTANT: Set **SW1** back to **NORMAL** (see step c)

NOTES:

1. *If the local terminal is blank or displays "NO CARRIER", make sure the terminal and remote device parameters match (per terminal set-up earlier in Paragraph 09.76. Also, check programming and perform the loop-back test outline herein.*

2. *Verify that the CO line is programmed to ring the HMDB port in one ringing assignment program (81XX ~ 89XX).*

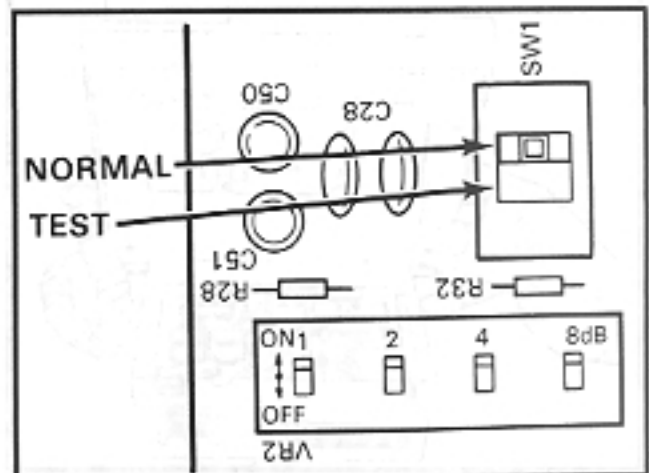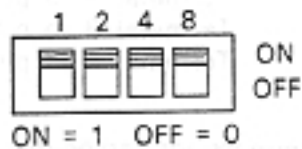3. *If this test is not successful, verify the installation and programming procedures in this section.*

FIGURE 43—HMDB INTERNAL SWITCHES

TABLE C—VR2 SETTINGS

```
  1  2  4  8
 ┌──┬──┬──┬──┐   ON
 │  │  │  │  │
 └──┴──┴──┴──┘   OFF

  ON = 1   OFF = 0
```

dB	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1
2	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1
4	0	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1
8	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1

NOTES:

1. **VR1** *is factory-adjusted, please do not alter setting.*
2. **VR2** *is used to set the HMDB's transmission level in 1dB increments (0 ~ -15dB). It is shipped with **VR2** set for the **normally required** -15dB. See Table C for **VR2** settings.*

09.80 Amplified Conference

09.81 General: Two Amplified Conference connections may be installed in the system, which requires a customer-supplied two-way amplifier. The Lorain VFR 5050 (R-TEC Systems) is known to be compatible.

09.82 Cabling: Refer to Figure 44 and the amplifier's installation procedures from the manufacturer and connect each amplifier between the voice leads (T and R) of stations 16/17 (S_e only) and 18/19 & 24/25 (Vl_e only).

09.83 Programming: Ensure that these stations have been programmed for Amplified Conference via **Program 02**, *Programming Procedures*, Section **500-036-300**.

09.84 To Test: The amplifier is automatically connected once the conference is established. Amplification exists between any two outside CO lines used as well as between the second CO line selected and the station (no amplification between the first CO line and the station). If Trunk-to-Trunk connections are allowed in the system (**Program 02**), the CO line-to-CO line connection will be amplified. There are two Amplified Conference connections available that are established on a first-come/first-served basis only.

09.90 HESB

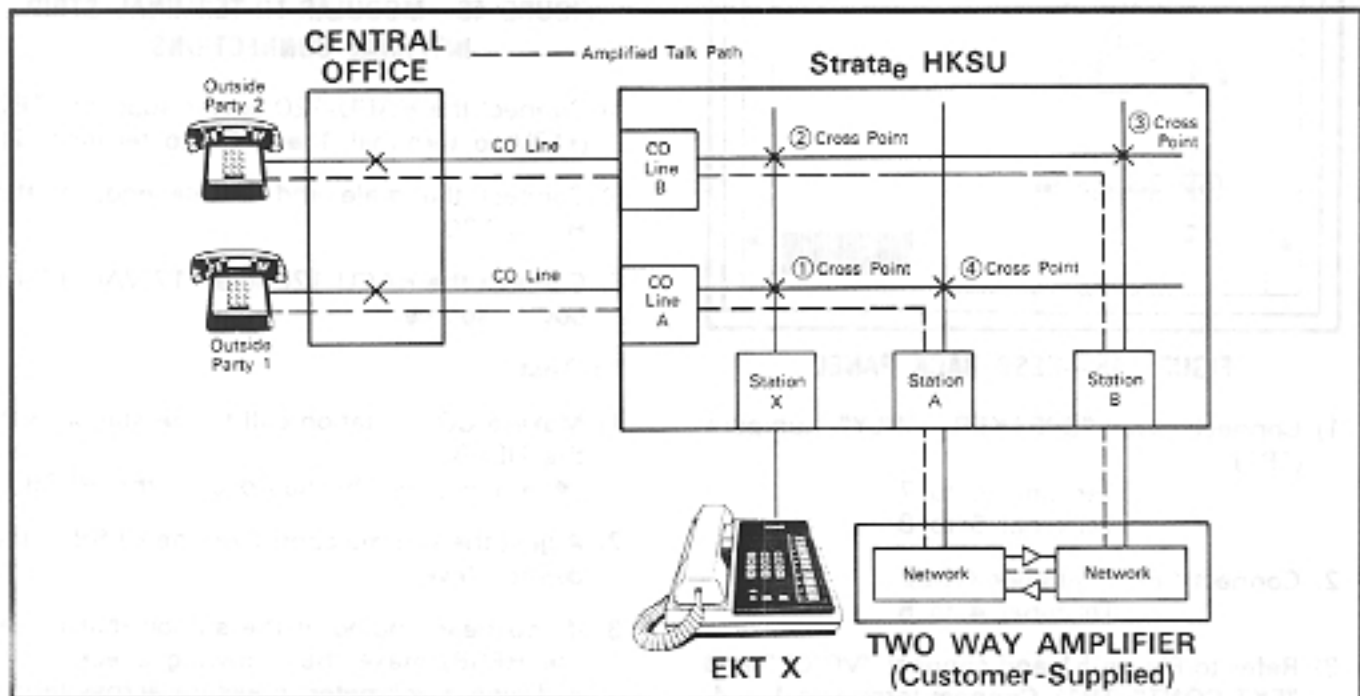**09.91 General:** An external amplified speaker (HESB) may be connected in any one of the following three applications:

FIGURE 44—AMPLIFIED CONFERENCE FUNCTIONAL BLOCK DIAGRAM

- Loud Ringing Bell—Allows you to amplify the tone of an EKT ring (except the single-line EKT).
- Amplified Speaker—Allows you to use the HESB as a paging speaker.
- Talkback Amplified Speaker—Allows you to provide a talkback speaker where an EKT is not needed.

09.92 Power Requirements: The HESB is a 6" 3-watt speaker with an amplifier that is built into a wooden speaker box. A +12 VDC power supply (HACU-120), which connects to the back panel via an 8' cord, is shipped with each HESB.

09.93 Cabling—Loud Ringing Bell Application: Refer to Figure 45 and make the following connections between the back of the HESB and the second modular jack on the left side of the EKT:
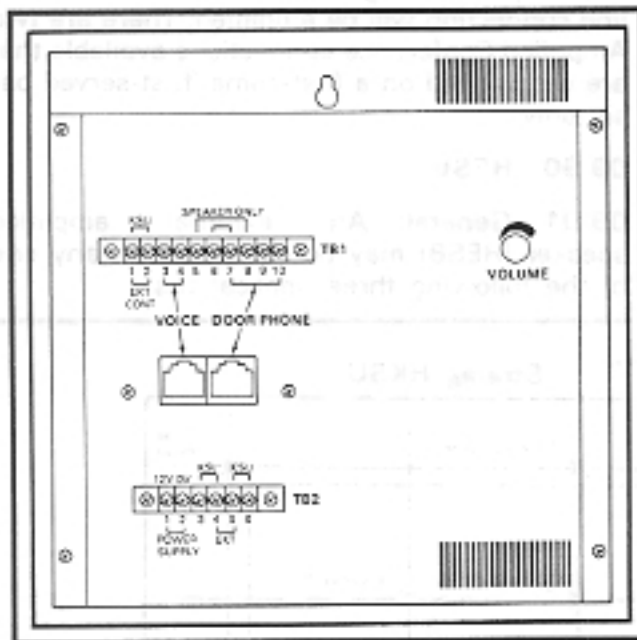

FIGURE 45—HESB BACK PANEL

1) Connect two "SPEAKER ONLY" jumpers (TB1):

>Terminal 6 to 7.
>Terminal 5 to 8.

2) Connect "EKT" jumper (TB2):
>Terminal 4 to 5.

3) Refer to Figure 51 and connect "VOICE" and "EKT CONT" (TB1). Connect terminals 1 — 4, respectively, to the indicated pins on the EKT modular connector:

>Terminal 1 to pin 1
>Terminal 2 to pin 6
>Terminal 3 to pin 3
>Terminal 4 to pin 4

NOTE:
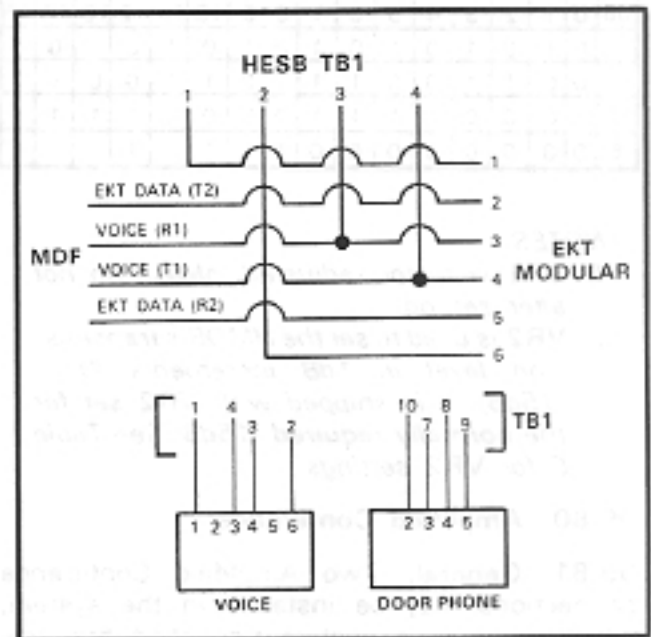*These connections can be made to the "VO-ICE" modular connector (instead of TB1), as shown in Figure 46.*

FIGURE 46—MODULAR-TO-TERMINAL STRIP INTERNAL CONNECTIONS

4) Connect the HACU-120 power supply to TB2 (+12V to terminal 1 and 0V to terminal 2).

5) Connect the male and female ends of the HACU-120.

6) Connect the HACU-120 to a 117 VAC, 60 Hz power source.

To Test:

1) Make a CO or station call to the station with the HESB.
- Ringing will be heard over the HESB.

2) Adjust the volume control on the HESB to the desired level.

3) If you hear ringing at the station (but not at the HESB) make the following check:
a) Using a voltmeter, measure across terminals 1 and 2 of TB1.
- With the "plus lead" on terminal 1, the

reading should be approximately 4.5 ~ 5.0 volts DC.

NOTE:
Ringing stops once the call is manually answered. There will be NO voltage potential across terminals 1 and 2.

b) If voltage does not appear across terminals 1 and 2 during ringing, check that the EKT wire connections have been made correctly (see Figure 46). (The wires to terminals 1 and 2 may be reversed.)

09.94 Cabling—Amplified Speaker Application: Refer to Figure 45 and make the following connections on the back of the HESB:

1) Connect "KSU" jumper (TB1):
   Terminal 1 to 2.

2) Connect two "SPEAKER ONLY" jumpers (TB1):

   Terminal 6 to 7.
   Terminal 5 to 8.

3) Connect two "KSU" jumpers (TB2):
   Terminal 3 to 4.
   Terminal 5 to 6.

→) Connect the voice output from the external speaker or paging circuit on the system to terminals 3 and 4 on TB1 ("VOICE").

5) Connect the HACU-120 power supply to TB2 (+12V to terminal 1 and 0V to terminal 2).

6) Connect the male and female ends of the HACU-120.

7 Connect the HACU-120 to a 117 VAC, 60 Hz power source.

To Test:

1) Make an external page.
   ● You will hear your voice over the HESB.

2) Adjust the volume control to the desired level on the back of the HESB.

09.95 Cabling—Talkback Amplified Speaker Application: Refer to Figure 45 and make the following connections on the back of the HESB:

1) Connect "KSU" jumper (TB1):
   Terminal 1 to 2.

2. ʋnnect two "KSU" jumpers (TB2):

Terminal 3 to 4.
Terminal 5 to 6.

3) Connect "Door Phone" (TB1)—connect the following terminals to the indicated pins on the door phone unit (MDFB):
   Terminal 9 to pin 1
   Terminal 10 to pin 2
   Terminal 8 to pin L1
   Terminal 7 to pin L2

NOTE:
These connections can be made to the "DOOR PHONE" modular connector (instead of TB1), as shown in Figure 45.

4) Connect terminals 3 and 4, on TB1 ("VOICE"), to the 600-ohm terminals.

NOTE:
Set the 8/600-ohm switch to the 600-ohm position on the system.

5) Connect the HACU-120 power supply to TB2 (+12V to terminal 1 and 0V to terminal 2).

6) Connect the male and female ends of the HACU-120.

7) Connect the HACU-120 to a 117 VAC, 60 Hz power source.

To Test:

1) Make an external page.

2) Verify that your voice is heard over the HESB.

3) Verify that someone speaking into the door phone unit (MDFB) can be heard at the paging station.

10   EQUIPMENT CONNECTIONS

10.00 Wiring Connections

10.01 All connections to miscellaneous equipment are made via the terminal strip mounted on the left side panel as shown in Figure 47.

10.10 MOH/BGM Source

10.11 Music-on-Hold requires either the SMOU PCB, which generates electronic melodies, or a customer-provided external music source, such as an FM radio. If the SMOU is used, it must be installed per Paragraph 05.50.

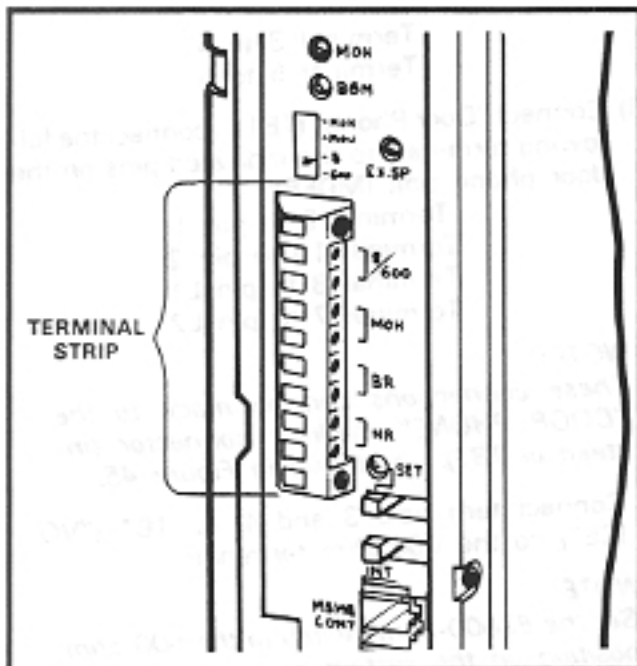**10.12** If an external music source is used for

FIGURE 47—TERMINAL STRIP

FIGURE 48—IMPEDANCE SWITCH

Music-on-Hold, its output leads must be connected to the **MOH** terminals on the HKSU.

10.13 Adjust the MOH volume with the **MOH** volume control on the HKSU. Maximum volume is limited by internal circuits in order to comply with FCC regulations. See Paragraph **10.70** for the correct volume setting sequence.

10.14 Background music is provided via the same source as music-on-hold. Either the SMOU or an external source may be used.

10.20 **External Paging Connections**

10.21 The system provides access to an external paging speaker. This speaker is also used for background music. The single output connection is made via the **EXP** or **600** terminals on the HKSU, and can be used in one of three ways:

1) To operate a customer-provided speaker directly via an internal 3-watt amplifier located on the SEPU PCB.

2) If more than 3 watts are required, an external customer-provided amplifier can be connected to operate the external speaker (**600** terminal).

3) If talkback capability is required, a customer-provided talkback amplifier/speaker can be connected (**600** terminal).
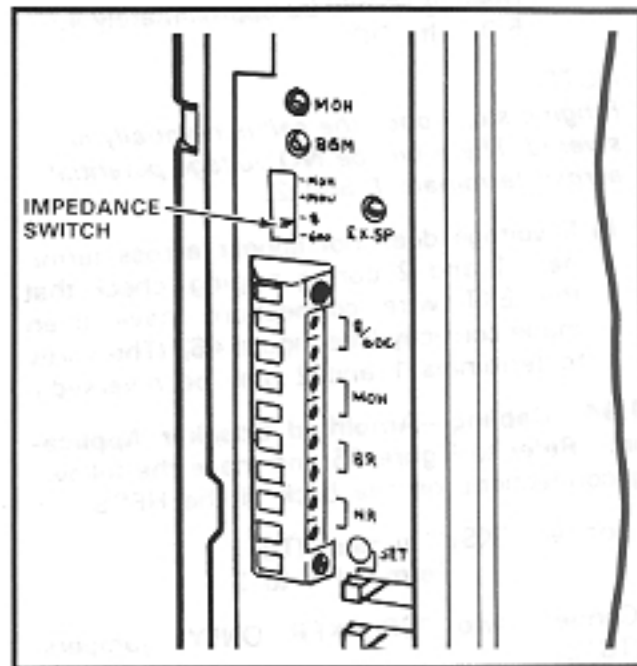
10.30 **Direct External Speaker Connection**

10.31 The exact number of speakers that may be connected to the 8-ohm, 3-watt output is dependent on the type of speaker used, conductor resistance, and desired volume.

10.32 The 8-ohm output impedance must be selected with switch **SW2** on the HKSU (Figure 48). The switch must be on the side labeled 8.

10.33 Connect the external speaker to the two 8/600 terminals on the left side panel terminal strip.

10.34 Adjust the speaker volume with the **EX.SP** volume control on the left side panel.

10.40 **External Amplifier**

10.41 If more power is required than the SEPU amplifier can deliver, a customer-provided external amplifier may be connected to the 8/600 terminals on the left side panel (connect external speakers to the external amplifier).

10.42 Determine which output impedance is most suitable for the amplifier being used, and make the selection with **SW2**.

10.43 If 8-ohm impedance is chosen, the **EX.SP** volume control may be used to control input level to the external amplifier. If 600-ohm impedance is chosen, the level is fixed and input

must be controlled by the external amplifier. See Paragraph **10.70** for the correct volume setting sequence.

10.50 Talkback Amplifier

10.51 A customer-provided talkback amplifier/ speaker may be connected to the external page (8/600) terminals on the left side panel.

10.52 For talkback operation, **SW2** must be set at "600". The SEPU amplifier is not used for the 600-ohm mode in order to permit a 2-way voice path.

10.53 The **EX.SP** volume control on the left side panel does not function in the 600-ohm mode.

10.60 Background Music

10.61 BGM uses the music-on-hold program source that is connected to the MOH input terminals on the left side panel of the internal MOH source (SMOU). It is broadcast through all EKT speakers (under the individual control of each station user) and will be heard if the **SPKR** key is operated with the handset on-hook and no line selected.

10.62 As a programmable option, the BGM from the MOH source can be heard via the external speaker (see Section **500-036-300**, *Programming Procedures*).

10.63 BGM is automatically pre-empted when a page or ringing signal must be output from an EKT speaker or the external speaker.

10.64 Overall system BGM volume is set with the **BGM** volume control on the left side panel of the HKSU (see Paragraph **10.70** for the correct volume setting sequence). The volume at individual stations is set with the lower volume control on the right-hand side of the EKTs.

10.65 If a separate BGM source is connected via an external amplifier on the external page, it can be heard from the external amplifier/ speaker only. If required, the system can provide a dry contact control signal for muting the external BGM when a page is in progress.

10.66 To provide external BGM control, connect the BR terminals on the left side panel of the HKSU to the control terminals (mute, MIC switch, etc.) on the amplifier (see Figure 49).
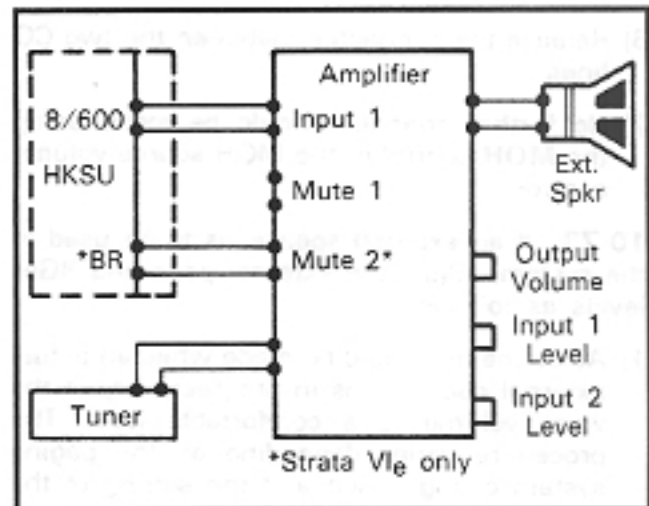

FIGURE 49—EXTERNAL AMPLIFIER HOOK-UP

10.70 Volume Setting Sequence

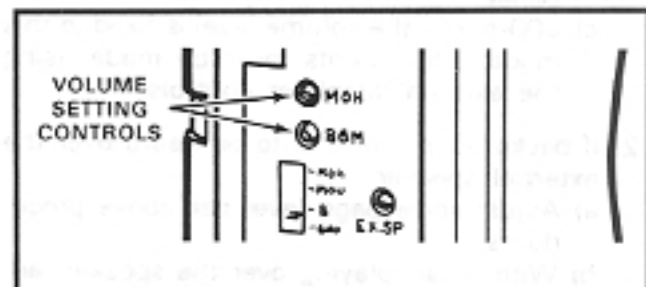**10.71** Refer to Figure 50 and adjust the volume for MOH, BGM and External Page in the sequence outlined in Paragraph **08.92**.

FIGURE 50—VOLUME SETTING CONTROLS

10.72 Adjust the MOH level first using the following procedure:

1) Set the **MOH** volume control to its lowest level (counterclockwise).

2) Lift the handset on one station and call another station using two CO/PBX lines.

3) At the called station, put the incoming call on hold, and listen on the handset (not the speaker) of the calling EKT.

4) Using the volume control on the MOH source, adjust MOH to the most comfortable level without distortion.

5) If a higher level is needed than can be provided by the MOH source, turn the **MOH** volume control slowly clockwise to achieve the most comfortable level without distortion.

6) Release the connection between the two CO lines.

7) No further changes should be made using the **MOH** control or the MOH source volume control.

10.73 If an external speaker is to be used in the system, adjust the external page and BGM levels as follows:

1) Adjustments should be made while an actual external page test is in progress. Adjust the voice volume to a comfortable level. The procedure varies depending on the paging system configuration and the setting of the 8/600-ohm switch (**SW2**):
   a) 8-ohm with no external amplifier—adjust output level using the **EX.SP** volume control on the left side panel.
   b) 8-ohm with external amplifier—adjust output level using the **EX.SP** volume control along with the controls on the external amplifier.
   c) 600-ohm—the volume level is fixed in this mode; adjustments must be made using the external amplifier controls.

2) If background music is to be heard over the external speaker:
   a) Adjust voice page level per above procedures.
   b) With music playing over the speaker, adjust the volume to a comfortable level using only the **BGM** control on the left side panel of the HKSU. Do not tamper with the **EX.SP** control, external amplifier or MOH adjustments.
   c) If background music is connected directly to the external amplifier instead of through the system, all adjustments must be made on the external amplifier.

10.74 If no external speaker is to be used in the system, adjust the BGM level as follows:

1) Using an EKT in speakerphone mode, make a call on a CO line, and adjust the EKT speaker volume to a comfortable level.

   NOTE:
   This should be done in an area that has background noise that is about average for that particular installation.

2) Using the **SPKR** key, disconnect the CO call and activate BGM at the EKT.

3) Using only the **BGM** volume control, adjust the BGM to a comfortable level. Do not use the EKT volume control.

10.80 Night Relay Service (VIe only)

10.81 As an option, a dry contact can be provided for the purpose of controlling an external loud ringing bell (or similar device) or an answering machine when the system is in the "NITE" mode.

10.82 To provide this service, connect the external device to the **NR** contacts on the left side panel (see Figure 51).
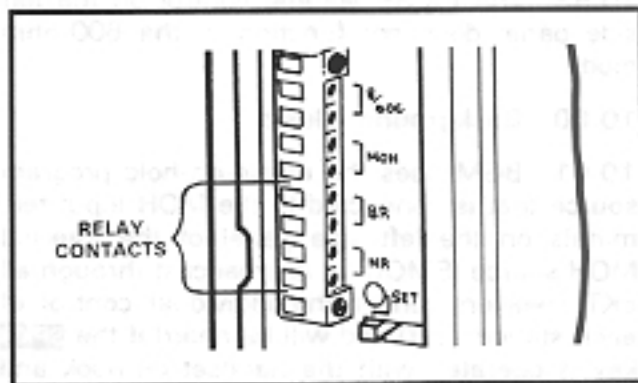

FIGURE 51—RELAY CONTACTS

IMPORTANT!
The NR and BR relay contacts are rated at 24 VDC/1 amp and are not intended to operate high power devices directly. If the power required for the device being controlled exceeds the contact ratings, an external slave relay must be used.

10.83 The **W3** strap option on the VMAU (see Figure 52) allows the NR relay to function in one of two modes:

1) Answering Machine Control—if the **W1** strap remains intact, the relay is operated continuously when the system is in Night Service. This mode is intended for indirect control of an answering machine.

2) Night Bell Control—if the **W3** strap is cut, the relay pulses at a 1-second on, 3-seconds off rate when the system is in Night Service and an incoming call is ringing the system. The mode is intended to be used for indirect control of an external night bell.
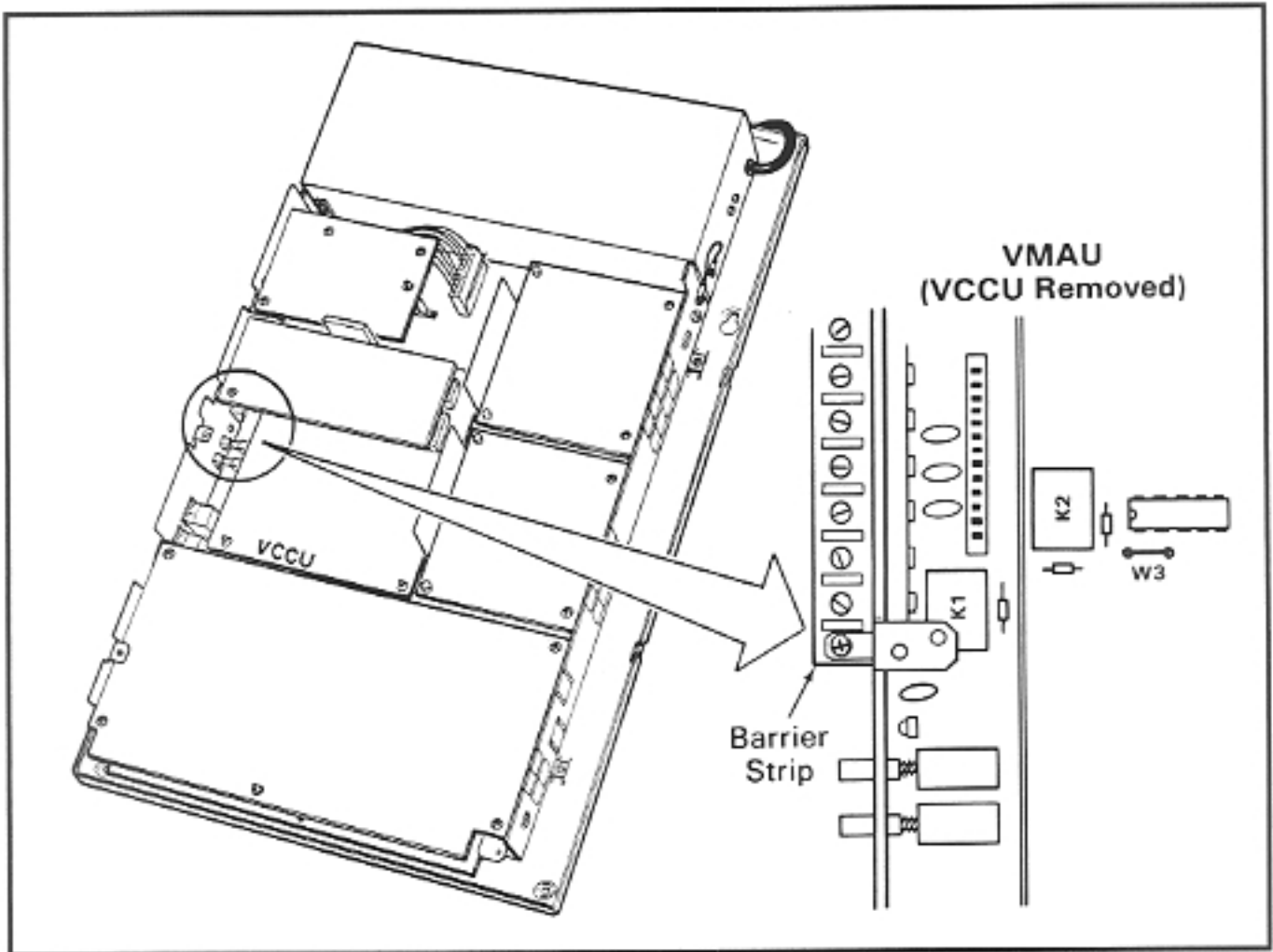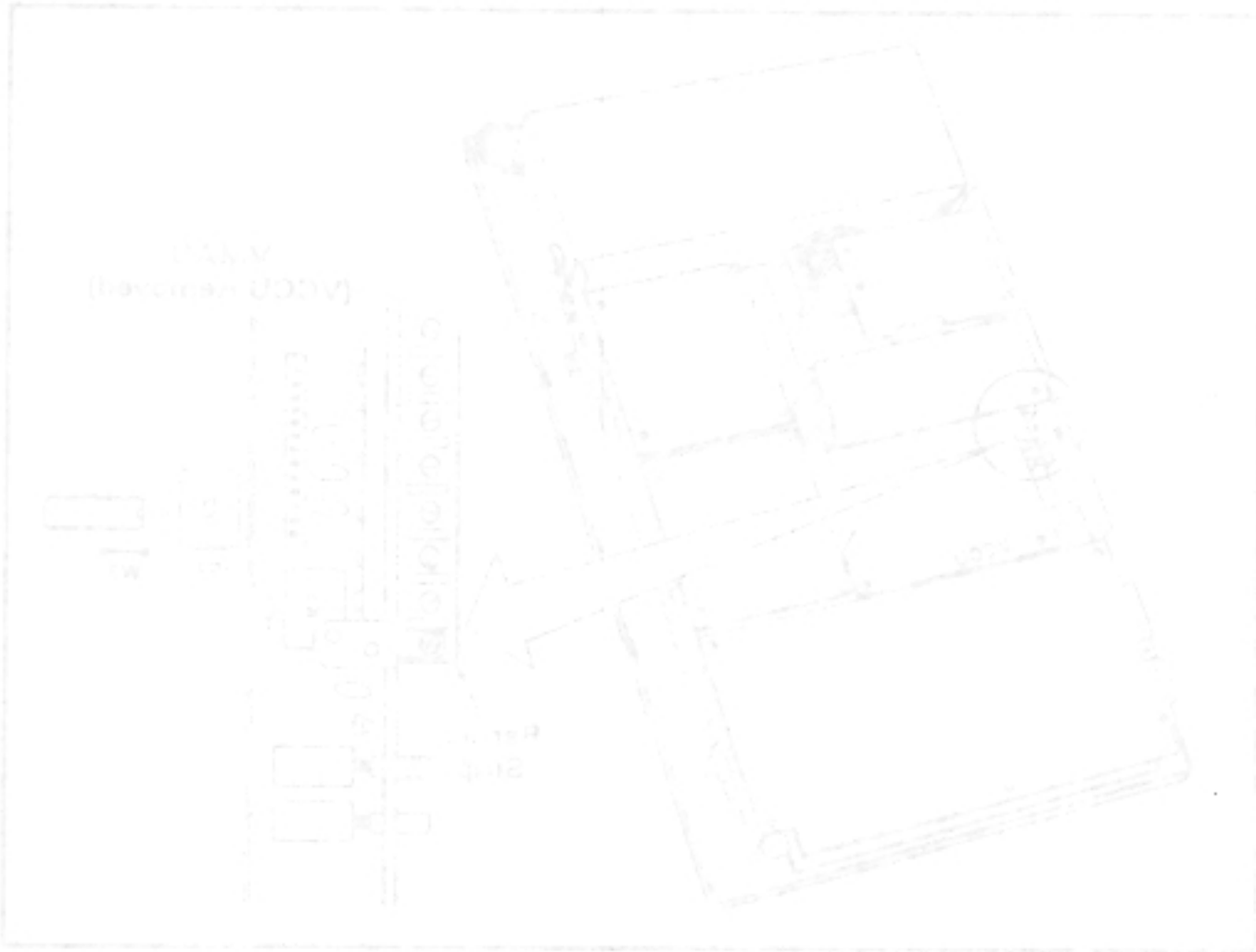
FIGURE 52—NIGHT RELAY STRAPPING

FIGURE ... RIGHT RELAY STRAPPING