INTER-TEL. SPK® SYSTEM

INSTALLATION AND
MAINTENANCE PRACTICES

680.1002

PRACTICES DOCUMENTATION KEY

STORED PROGRAM KEY SYSTEM (SPK)

INFORMATION: This practice documentation key explains the STORED PROGRAM KEY SYSTEM (SPK) Product Line documentation system and represents the latest status of the sections. All sections and changes listed here are in effect. Always refer to the latest issue of the key.

Item No.	Title	Section	Issue Date
1.	Description	680-100-100	Issue 4, April 1983
2.	Features	680-100-200	Issue 4, April 1983
3.	Installation	680-100-300	Issue 4, April 1983
4.	Programming	680-100-400	Issue 4, April 1983
5.	Online Monitor (ONMN)	680-100-401	Issue 3, April 1983
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All Distributors must complete the following before connecting the INTER-TEL® SPK telephone system to the switched telephone network. FCC regulations require that the following information be provided to the end user in writing.

(1) Notify the telephone company of the line numbers to which the direct connection is to be made and provide them with the system model number 680.00 INTER-TEL® SPK telephone system which is to be installed. Be sure to include the registration number and ringer equivalence number which is listed for the equipment. The FCC registration number for the INTER-TEL® SPK telephone system model number 680.00 is BE287V-69771-MF-E. The ringer equivalence number is 0.4B. The customer is responsible for giving notice to the telephone company upon final disconnection of the equipment.

(2) Give notice to the telephone company of the means for connecting the equipment to the telephone network, specifically, the universal service ordering code (USOC) number of the jack installed by the telephone company. The jack that shall be installed is type RJ21X.

(3) When trouble is experienced, the customer shall disconnect the equipment from the telephone line to determine if it is malfunctioning, and if so, the equipment shall not be used until the malfunction has been corrected. Return all malfunctioning equipment to the manufacturer.

(4) Do not connect the equipment to party lines unless equipment is provided with a Telco coupler. Equipment shall not be used on coin telephone lines.

(5) The telephone company may make changes in its communications facilities. If such changes can be reasonably expected to render any customer's terminal equipment incompatible with the telephone company's facilities, or require modification, the customer shall be given adequate notice in writing to allow the customer an opportunity to maintain uninterrupted service.

(6) Provide the customer with a copy of the service manual.

(7) All wiring between the Key Service Unit and Central Office Lines must be less than 25 feet in length. Any ancillary devices added to the system must be FCC-approved and all station wiring to the KSU must be in accordance with the 3rd Report and Order requirements.

(8) The end user shall not make any in-warranty or out warranty repairs. These repairs must be done by INTER-TEL or the installing dealer.

WARNING: This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. As temporarily permitted by regulation it has not been tested for compliance with the limits for Class A computing devices pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

WARRANTY

INTER-TEL EQUIPMENT, INCORPORATED warrants its products (except for fuses and lamps) to be free of defects in materials and/or workmanship. This warranty shall extend for a period of one (1) year from the date the product was originally shipped. All shipping costs incurred in connection with warranty work will be paid by the buyer/customer. INTER-TEL EQUIPMENT'S warranty does not apply to products that have been damaged due to and/or subjected to improper handling by shipping companies, negligence, accidents, improper use, or alterations not authorized by INTER-TEL EQUIPMENT, INCORPORATED.

This warranty is in lieu of and excludes all other warranties, expressed or implied and in no event shall INTER-TEL EQUIPMENT, INCORPORATED be liable for any anticipated profits, incidental or consequential damages, loss of time or other losses incurred by the buyer/customer in connection with the purchase, operation or use of the product.

DESCRIPTION

1.00   INTRODUCTION

1.01   General

The INTER-TEL Stored Program Key (SPK) telephone systems are designed to meet the needs of the small to medium key system installations where growth potential and system versatility are essential. INTER-TEL offers two SPK systems, SPK/I and SPK/II, identical in function and features, but different in capacity to meet diverse business communications requirements. The INTER-TEL SPK/I centrally switches and controls a maximum of 16 incoming or outgoing Central Office (C.O.) lines and 64 keysets. The INTER-TEL SPK/II system switches and controls a maximum of 24 incoming and outgoing C.O. lines, 8 outgoing-only C.O. lines, 80 keysets and 48 single line instruments. The features in both systems are essentially identical. A variety of optional features and equipment is available, such as Station Message Detail Recording (SMDR) of all placed calls. Also, optional Direct Station Selector/Busy Lamp Field (DSS/BLF) units for easy intercom dialing and system-wide station status may be connected to any keyset.

While both of the INTER-TEL systems are small in physical size, this has not limited the features available in the systems. By placing a microprocessor in every keyset (i.e., "distributed microprocessing"), it is possible to free the central microprocessor (located within the common equipment cabinet) from such tasks as reading keyboards and controling lamp status of keysets within the system. Once freed, the central microprocessor can be heavily utilized to provide increased features and options. For those requiring limited feature service on some stations, the SPK/II offers low cost single line instruments in addition to the full featured key telephone sets.

The various models of the INTER-TEL key telephone set appear to be typical key telephone sets with typical multiple line keys, standard keyboards, and LED lamps. In reality, they are computer stations controlled by the central computer of an interface/switcher called a "Key Service Unit" or simply "KSU." The heart of the KSU is the central microprocessor. The single line stations are single line electronic models (SLE) or single line 2500 style models. These single line stations are only available on SPK/II and do not contain an internal microprocessor.

The single line stations are also interfaced and controlled by the KSU, as are all of the optionally available equipment. The key and single line stations cannot be used directly on telephone lines. The key stations are interchangeable on SPK/I and SPK/II.

The SPK system KSU will connect any station to any loop start outside C.O. line, any other station or all stations (intercom all-page) when the station user presses the appropriate keys on the station or optional DSS/BLF. When an incoming call is sensed by the SPK system, the system will ring stations programmed to ring in on the particular line, and then seize and connect the line to the station pressing the appropriate line key. All calls in progress are monitored by the KSU and can be transferred to other stations when the station user presses the appropriate keys. The KSU monitors transferred calls and calls placed on hold for a programmable time period. Calls not accessed within the time period automatically ring back the station that placed them on hold or to the operator.

The SPK system will display C.O. line status and feature status on the station LED lamps, as well as station status on the DSS/BLF lamps. All keysets contain an internal speaker for handsfree conversations. The called party can answer with any reasonable voice distance (as much as 20 to 30 ft.) from the station. Optional external talkback speakers and paging speakers for use in large areas, such as warehouses, are also available. The SPK system may be programmed on-site to prevent individual station access of C.O. lines, changing of station numbers, and dialing of all or selected telephone numbers. It may also be programmed to provide continual hard copy printout of call details for business control of internal telephone records, and other special features on a system-wide or individual station basis. In the SPK system one station is programmed to be the system operator station and the same or a different station as the system message

center for features which require an operator or message center function.

All power requirements may be centralized in the KSU. Only the DSS/BLF may require individual AC power at the station depending on the quantity of units installed. The on-site programming (referred to as the "data base") has battery back-up as a standard feature. An optional system battery back-up is available.

The SPK systems are modular in design: the systems can start small and grow as demand requires. Also due to the modular design, failure in one unit may affect only a part of the system and not the entire system. Servicing of a failed station or of Printed Circuits Boards (PCB's) of the KSU can be accomplished by module replacement.

1.02 Technology

A. Distributed Microprocessor Control Technology. The SPK system employs a distributed microprocessor control technology with individual station processors reporting to a central processor. The audio signals are processed by digitizing using Continuously Variable Slope Delta Modulation (CVSD) and assigning each conversation 1 of 41 time slot channels in a Time Division Multiplexed (TDM) time frame under the control of the central processor. The 41 time slot channels in the time frame are allocated as follows:

- 32 time slot channels for C.O. conversations
- 8 time slot channels for intercom calls
- 1 time slot channel for the music-on-hold audio source

B. Key Telephone Set Design. Key Telephone Sets have been developed from a common design and vary essentially in the amount of feature controls and C.O. lines each may access. Each keyset contains a microprocessor to process individual station data such as key closures and lamp updates. Station data is then transmitted to the central processor in the KSU via three-pair cable every time a station is polled by the KSU. Stations are configured in a star or home run configuration around the KSU central processor. Each keyset also contains an internal speaker to allow full-duplex, handsfree intercom capability and one-way paging.

C. Single Line Electronic (SLE) Station Design. Single line electronic sets are station sets utilizing a single special function key closure to access a limited amount of keyset capabilities on a single line set. SLE keypad and special key data are processed by the central processor and DTMF decoders within the KSU, communications to the KSU is via three-pair cable. SLE stations are configured in a star or home run configuration around the KSU central processor.

D. Single Line (Standard 2500 Style) Usage. Single line sets provide basic C.O. and intercom calling capabilities. Keypad data for these station sets is processed at the KSU. These stations are connected in a star or homerun configuration around the KSU and require only a single pair cable. Station ringing is provided via battery reversal or an optional High Voltage Ring Adapter (HVRA). These may also be used on Class A and B telephone C.O. lines for Off-Premise Station (OPS) applications. If an HVRA is not used, a DC-powered ringer must be installed in each 2500 set.

E. Call Switching and Control Functions. The system's fundamental call switching and control functions are performed in the KSU utilizing various interface PCB's to execute these functions. The KSU cardfile contains an integral bus highway and PCB plug-in back panel connectors (backplane). A key system may be tailored into a particular configuration by inserting the appropriate number of interface and special function PCB's. Currently available PCB's include the Central Processor Unit (CPU) PCB, the Station A (keyset) PCB, the Station B (2500 style set) PCB, the Station C (Single Line Electronic set) PCB, the COU (Central Office Unit) PCB, the CNF (Conference) PCB, the MOD I (Modem, DTMF) PCB, and the MOD II (Modem, DTMF, Talkback) PCB.

F. Power Supply Design. The system power supply is housed within the KSU cabinet and provides power to the KSU cardfile and all stations. A limited number (see Section 1.05, "Hardware Description") of optional DSS/BLF units which are typically powered from individual wall plug-in transformers may also be powered from the system power supply. The power supply provides switched +5VDC and -12VDC, an unregulated +30VDC and a series pass or unregulated

battery charger, depending on the power supply used.

G. RS-232C Compatibility. An RS-232C interface on the CPU PCB allows an external RS-232C-compatible communications device to access diagnostic, maintenance and Station Message Detail Recording (SMDR) routines with the SPK software; it also allows access to the data base to tailor a system to individual specifications.

1.03   Installation

The SPK system physical space requirements include the area required for each station and the KSU. All system components may be readily handled by the person installing the system, without disruption of business at the installation site. System installation is facilitated by the use of standard telephone industry 3-pair and 25-pair cabling. All SPK systems require a dedicated AC power circuit. SPK installation requires installing personnel trained in SPK installation. INTER-TEL offers installation training on a scheduled basis.

On-site programming must be performed by personnel trained in SPK systems. Programming is entered on an external communications device connected to the CPU RS-232C interface. The system prompts the installation personnel in a logical sequence through the system and station programming in the service routine, and allows for monitoring and revision of the system data base. The data base is stored in the KSU RAM memory and is battery-protected. A fully charged battery will keep the programmed data base intact during power outages and CPU removal from the KSU for approximately 25 days. Keysets and DSS/BLF's are additionally programmed via DIP switches in each station to provide additional station features.

1.04   Servicing

Service time is minimized due to the modular system design: station sets and KSU PCB's are plug-in units and may be serviced independently without turning off power. All lamps are Light Emitting Diodes (LED) and as such require minimal servicing. Every attempt has been made to utilize standard telephone industry components in the SPK system; this has resulted in a system composed of components readily available from telephone and electronic supply houses.

Software maintenance has been simplified by the inclusion of maintenance and test routines as an integral part of the system's software. These routines may be accessed on-site via an online external communications device or off-site via a modem connection.

CAUTION: The maintenance and test routines mentioned above are for trained personnel use only. Indiscriminate use of these routines may result in interruption of service.

1.05   Hardware Description

The SPK systems consist of the following hardware:

A. Main Cabinet. The main cabinet is identical for SPK/I and SPK/II. Only the number of slots on the KSU backplane is different. The components are as follows:

1. Key Service Unit (KSU)

   - SPK/I cardfile (27 slot) and backplane (15 slot).
   - SPK/II cardfile (27 slot) and backplane (27 slot).
   - Interconnects the plug-in Central Processing Unit (CPU) PCB, Station A (STN-A) PCB's, Central Office Unit (COU) PCB's, Conference (CNF) PCB, and either a Modem I (MOD I) or Modem II (MOD II) PCB.

2. System Power Supply

   - SPK/I power supply outputs nominal voltages of +5VDC at 25 amp maximum, −12VDC at 0.5 amp maximum, +32VDC at 10.8 amp maximum, +27.5VDC battery float voltage at 2.0 amp maximum.
   - SPK/II power supply outputs nominal voltages of +5VDC at 40 amp maximum, −12VDC at 1.0 amp maximum, +29VDC at 12 amp maximum, +34.5VDC battery float voltage at 2.0 amp maximum.
   - Supplies power to the KSU, all stations, and a limited number of DSS/BLF units.
   - Battery circuit to provide a constant voltage limited battery charge and to switch in batteries when the power supply voltage drops below a predetermined level preventing loss of service.

CAUTION: *The system power supply should not be shipped or moved any great distance mounted in the cabinet.*

- Fuses: All distributed power is protected with fuses accessible from the front of the power supply. All fuses are standard, easily replaceable, and available from most electronic supply outlets.

3. Central Processing Unit (CPU) PCB (See Figure 1-1)

- One per system.
- Plugs into SPK/I or SPK/II KSU cardfile slot marked "CPU" with components facing left.
- Provides the central processor up to 40K bytes of ROM storage, 6K bytes of RAM storage, an RS-232C I/O port, system clocks, and a music-on-hold channel.
- Provides central software control for the KSU by functioning under the control of a generic program stored in its ROM memory section.
- LED lamps on the front edge of the PCB indicate clock status (first, second, and third from top), system watchdog timer status (bottom).
- The momentary switch on the front edge of the PCB is used to reset the system.
- The 25-pin subminiature "D" type female connector on the front edge of the PCB provides the RS-232C interface, which is used to allow programming of the system and SMDR output.
- The 1/8-inch subminiature phono jack on the front of the PCB provides the input connection for an external music-on-hold interface. A radio is the recommended audio source. The recommended connection is to the ear piece jack of the radio. The MOH circuit provides an AGC circuit which automatically holds the volume to a predetermined level that is slightly lower than the normal voice audio volume as required by FCC regulations. Optimal input level is 1VRMS.
- The Batt-Open jumper on the PCB is used to protect the battery during shipment (shipped out of circuit — Open position). If the PCB is to be moved temporarily and the battery is fully charged, the programmed data base will remain intact for a maximum of 25 days with the jumper in the "Batt" position.
- The 300-9600 jumper on the PCB selects the baud rate of the RS-232C interface for 300 or 9600 baud.
- The ROM-RAM jumper is used to protect the programmed data base. When in the RAM position, the SPK system can be programmed for system data; when moved to the ROM position, the data cannot be changed via the RS-232C port, or externally via the modem. Also, environmental noise effects on the system can be greatly minimized.

4. Station A (STN-A) PCB's (See Figure 1-2)

- SPK/I 1 to 8 STN-A PCB's per system.
- SPK/II 1 to 10 STN-A PCB's per system.
- Each STN-A PCB provides the interface between the KSU and 1 to 8 keysets. The interface provides data interface between the stations and the CPU PCB located in the KSU, a four-wire voice path into the audio exchange of the KSU, and a two-wire power path between the stations and system power supply. The data and voice paths are multiplexed on the same wires. One DSS/BLF may be powered via the STN-A PCB.
- Plugs into the SPK/I KSU cardfile slots marked "STN-A 1-8" with the components facing left.
- Plugs into the SPK/II KSU cardfile slot marked "STN-A 1-10" with the components facing left.
- LED lamps on the front edge of the PCB indicate power-up status (top), and the usage of each station (bottom eight).
- Each of the eight circuits of a PCB are assigned a circuit number by the PCB's physical location in the KSU and the circuit location on the PCB. Circuit numbers are initially assigned an intercom number by the generic program; however, the intercom number for a circuit number may be reassigned programmatically. (See the programming section for a complete description.)
- 25-pair amphenol male plug on the front of the PCB to access the stations.
- Fuses: The STN-A PCB has two fuses (2 amp slow blow) to protect the KSU from foreign voltages/currents from the stations connected to it. The fuses are easily

replaceable from electronic supply out-
lets.

5. Station B (STN-B) PCB's (SPK/II only, see
Figure 1-3)

- SPK/II: 1 to 6 STN-B PCB's per system
(see STN-C PCB's).

- Each STN-B PCB provides the interface
between the KSU and 1 to 8 single line
2500 type stations.

- Provides the interface to detect off-hook
status and activate the D.C. ringing; also
provides a two-wire voice path into the
audio exchange of the KSU.

- Plugs into SPK/II KSU cardfile slot
marked "STN-B/STN-C 1-6" or "STN-B1-
B6" with components facing left.

- LED lamps on the front edge of the PCB
indicate power-up status (top), and usage
of the stations (bottom eight).

- Each of the eight circuits of a PCB are
assigned a circuit number by the PCB's
physical location in the KSU and the cir-
cuit location on the PCB. Circuit numbers
are initially assigned a station number by
the generic program; however intercom
number to circuit number assignment may
be reassigned programmatically. (See the
programming section for a complete
description.)

- 25-pair male amphenol connector on the
front of the PCB to access the stations.

6. Station C (STN-C) PCB's (SPK/II Only, see
Figure 1-4)

- SPK/II 1 to 6 STN-C PCB's per system.
However, only a total of six STN-B or
STN-C PCB's per system.

- Each STN-C PCB provides the interface
between the KSU and 1 to 8 single line
electronic stations.

- Provides the interface to single line elec-
tronic telephone sets in order to detect
off-hook status, detect special (SPCL)
key closure, activate D.C. ringing, and
provide four-wire voice path into the audio
exchange.

- Plugs into SPK/II KSU cardfile slot
marked "STN-B/STN-C 1-6" or "STN-B1-
B6" with components facing left.

- LED lamps on the front edge of the PCB
indicate power-up status (top), and usage
of the stations (bottom eight).

- Each of the eight circuits of a PCB are
assigned a circuit number by the PCB's
physical location in the KSU and the cir-
cuit location on the PCB. Circuit numbers
are initially assigned a station number by
the generic program; however, intercom
number to circuit number assignment
may be reassigned programmatically.
(See the programming section for a com-
plete description.)

- 25-pair male amphenol connector on the
front of the PCB to access the stations.

7. Central Office Unit (COU) PCB (See Figure
1-5)

- SPK/I: 1 to 4 COU PCB's per system.
- SPK/II: 1 to 8 COU PCB's per system.
- Each COU PCB provides interface be-
tween the KSU and 1 to 4 outside loop-
start Central Office (C.O.) lines. A ground
start C.O. line with a ground start to loop
start adapter placed between the C.O.
line and the COU may be required if the
C.O. is a step-by-step office which only
supplies a 15 msec loop release. The SPK
requires a 100 msec loop release to drop a
line which is not internally dropped. Lines
are not internally monitored with 2 out/1
in conferences where the inside party
hangs up, and with DISA lines where
DISA accesses another C.O. line. The
ground start to loop start adapters are
available from most telephone supply
outlets.

- Provides KSU interface to loop start C.O.
lines to detect ring-in and loop holding
current, to provide loop seizure, and to
send network control signaling by either
DTMF or dial pulse.

- DTMF or dial pulse can be selected by
inserting or removing integrated circuit
chips on plug-in sockets. However,
INTER-TEL sells the COU PCB as either a
DTMF or dial pulse unit.

- Plugs into SPK/I KSU cardfile slot marked
"COU 1-4" with components facing left.

- Plugs into SPK/II KSU cardfile slot
marked "COU 1-8" with components fac-
ing left.

- LED lamps on the front edge of the PCB
indicate power-up status (top), and usage
of the COU lines (bottom four).

- Each of the four circuits on the COU PCB
is assigned a line number by the physical

location of the PCB in the KSU and the circuit location on the PCB. The PCB inserted into COU slot 1 is assigned lines 1 to 4, top to bottom respectively, as indicated by the PCB LED lamps. Slot 2 is assigned lines 5 to 8, top to bottom respectively, etc. The line number to circuit number assignment may not be individually reassigned except by the tenant service optional feature, which is explained in detail in the programming section.

- 25-pair male amphenol plug on the front of the PCB to access the C.O. lines and easily disconnect problem national telephone network lines from the SPK system or problem SPK lines from the national telephone network, as required by FCC regulations.

8. Optional Conference (CNF) PCB (See Figure 1-6)

- SPK/I and SPK/II one per system.
- Provides the necessary circuitry for the conference feature. One inside and two outside parties, or two inside and one outside party may be conferenced. The conference feature is activated when the PCB is inserted into the KSU.
- A maximum of four conferences can be in progress simultaneously.
- Provides the necessary circuitry for the Direct Inward System Access (DISA) feature. The DISA feature is activated when the PCB is inserted into the KSU and the data base is programmed for DISA service.
- Plugs into SPK/I or SPK/II KSU cardfile slot marked "CNF" with components facing left.
- LED lamps on the front edge of the PCB indicate power-up status (top), and usage status (last three of the top set for the first conference, and three more sets of three LED's for the second, third, and fourth conferences circuits, counting top to bottom.

9. Optional Modem I (MOD I) PCB (See Figure 1-7)

- SPK/I and SPK/II: one per system. Only one MOD PCB can be used.
- Contains a 110 or 300 baud modem link to

the CPU for remote system access via the C.O. lines.
- Provides two DTMF (Dual Tone Multi-Frequency) detection circuits and dial tone injection for single line stations.
- Provides the necessary interface for DISA DTMF signaling.
- Plugs into SPK/I or SPK/II KSU cardfile slot marked "MOD" (some KSU's are marked "MIS") with components facing left.
- LED lamps on the front edge of the PCB indicate the following:

  1. Power-up status
  2. DTMF 1
  3. DTMF 2
  4. Modem

10. Optional Modem II (MOD II) PCB (See Figure 1-8)

- SPK/I and SPK/II one per system. Only one MOD PCB can be used.
- Contains a 110 or 300 baud modem link to the CPU for remote system access via the C.O. lines.
- Provides two DTMF (Dual Tone Multi-Frequency) detection circuits and dial tone injection for single line stations.
- Provides the necessary interface for DISA DTMF signaling.
- Provides KSU interface to control three external paging zones utilizing a common low level paging output line. The output line is suggested for use as an input to a 70V PA system.
- Provides KSU interface to night signal control equipment for night transfer and special signaling when the system is in night mode.
- Provides an interface to five talkback circuits providing half-duplex communications through an 8 ohm speaker (500 mW output).
- 25-pair male amphenol plug on the front edge of the PCB interfaces the various speakers and external amplifiers.
- Plugs into SPK/I or SPK/II KSU cardfile slot marked "MOD" (some of the KSU's are marked "MIS") with components facing left.
- LED lamps on the front edge of the PCB indicate the following (where "1" is the top LED):

1. Power-up Status
2. DTMF 1
3. DTMF 2
4. MODEM
5. External Page Unit Assignment
6. External Page 1
7. External Page 2
8. External Page 3
9. Talkback Speaker 1
10. Talkback Speaker 2
11. Talkback Speaker 3
12. Talkback Speaker 4
13. Talkback Speaker 5

B. Multi-Line Keysets. For SPK/I, the maximum number of keysets is 64; for SPK/II, the maximum number of ketsets is 80. Any of the various keysets can be used on either system in any combination. All are interfaced by the STN-A PCB. The keysets are as follows:

1. Model 2480T Keyset (See Figures 1-9 and 1-10)

   • 24 C.O. line keys each with an LED to show status of line.

NOTE: Line key 24 can be programmed to access the rotary group lines 24 to 32.

   • 4 special feature keys each with an LED to show status of a feature.
   • A standard DTMF keypad.
   • A handset for private conversations, and a standard telephone coiled dual 4-pin modular handset cord.
   • An internal speaker for handsfree conversations.
   • A voice volume dial for handsfree speaker volume control
   • A tone volume dial for on- and off-hook tone volume control.
   • A reversible base for desk or wall mount.
   • By removing the faceplate and keyboard, access is gained to a set of programmable DIP switches for setting or resetting some of the optional station features. Also, access to the station +5VDC power voltage setting is gained. The +5VDC setting requires removal of the top housing, making it difficult for a user to change this setting.

   • All the necessary cables to connect to a standard 6-pin modular telephone jack.
   • A set of labels to mark the line and special feature keys plus the station number. Enough blanks have been provided to allow these to be custom-made by the user if so desired.

2. Model 1664T Keyset (See Figures 1-10 and 1-11)

   • 16 C.O. line keys each with an LED to show the status of line.

NOTE: Line key 16 can be programmed to access the rotary group lines (24-32).

   • 4 special feature keys each with an LED to show status of a feature.
   • A standard DTMF keypad.
   • A handset for private conversations, and a standard telephone coiled dual 4-pin modular handset cord.
   • An internal speaker for handsfree conversations.
   • A voice volume dial for handsfree speaker volume control.
   • A tone volume dial for on- and off-hook tone volume control.
   • A reversible base for desk or wall mount.
   • By removing the faceplate and keyboard, access is gained to a set of programmable DIP switches for setting or resetting some of the optional station features. Also, access to the station +5VDC power voltage setting is gained. The +5VDC setting requires removal of the top housing, making it difficult for a user to change this setting.

   • All the necessary cables to connect to a standard 6-pin modular telephone jack.
   • A set of labels to mark the line and special feature keys as well as the station numbers. Enough blanks have been provided to allow these to be custom-made by the user if so desired.

3. Model 1232T Keyset (See Figures 1-12 and 1-13)

   • 12 C.O. line keys each with an LED to show status of line.

NOTE: Line key 12 can be programmed to access the rotary group lines (24-32).

- 4 special feature keys each with an LED to show status of a feature.
- A standard DTMF keypad.
- A handset for private conversations and standard telephone coiled dual 4-pin modular handset cord.
- An internal speaker for handsfree conversations.
- A voice volume control for handsfree speaker volume control.
- A tone volume dial for on- and off-hook tone volume control.
- A versible base for desk or wall mount.
- By removing the faceplate and keyboard, access is gained to a set of programmable DIP switches for setting or resetting some of the optional station features. Also, access to the station +5VDC power voltage setting is gained. The +5VDC setting requires removal of the top housing, making it difficult for a user to change this setting.
- All the necessary cables to connect to a standard 6-pin modular telephone jack.
- A set of labels to mark the line and special feature keys as well as the station extension numbers. Enough blanks have been provided to allow these to be custom-made by the user if desired.

4. Model 1032T Keyset (See Figures 1-14 and 1-15)

- 10 C.O. line keys each with an LED to show status of a line.
- A special key (SPCL) for accessing out-of-range lines and an LED to show status of usage as well as access to the rotary group lines, if so programmed.
- 4 special feature keys each with an LED to show status of the feature.
- A standard DTMF keypad.
- A handset for private conversations and standard telephone coiled dual 4-pin modular handset cord.
- An internal speaker for handsfree conversations.
- A voice volume dial for handsfree speaker volume control.
- A reversible base for desk or wall mount.
- By removing the faceplate and keyboard, access is gained to a set of programmable DIP switches for setting or resetting some of the optional station features. Access to

the tone volume control for on- or off-hook tone volume is gained. Also, access to the station +5VDC power voltage setting is gained. The +5VDC setting requires removal of the top housing making it difficult for a user to change this setting.

- All the necessary cables to connect to a standard 6-pin modular telephone jack.
- A set of labels to mark the line and special feature keys as well as the station numbers. Enough blanks have been provided to allow these to be custom-made by the user if so desired.

5. Model 416T Keyset (See Figures 1-15 and 1-16)

- 4 C.O. line keys each with an LED to show status of line.

NOTE: *Out-of-range lines cannot be accessed on this station. Its main use on SPK is for the tenant service feature, which uses 4 lines as a base.*

- 4 special feature keys, each with an LED to show status of a feature.
- A standard DTMF keypad.
- A handset for private conversations, and a standard telephone coiled dual 4-pin modular handset cord.
- An internal speaker for handsfree conversations.
- A voice volume dial for handsfree speaker volume control.
- A reversible base for desk or wall mount.
- By removing the faceplate and keyboard, access is gained to a set of programmable DIP switches for setting or resetting some of the optional station feature. Access to the tone volume control for on- or off-hook tone volume is also gained, as well as access to the station +5VDC power voltage setting. The +5VDC setting requires removal of the top housing, making it difficult for a user to change this setting.
- All the necessary cables to connect to a standard 6-pin modular telephone jack.
- A set of labels to mark the line and special feature keys as well as the station

numbers. Enough blanks have been pro-
vided to allow these to be custom-made
by the user if so desired.

C. Single Line (SL) Stations. Single line (SL) sta-
tions can only be used on SPK/II. The maximum
number of SL stations is 48. These are in addi-
tion to the maximum of 80 keysets. The two
types of SL stations can be used in any combi-
nation of groups of one to eight because of the
interface PCB's in the KSU.

1. Single Line Electronic (Model SLE) Station
(See Figures 1-17 and 1-18)

- Interfaced to the STN-C PCB in the KSU.
- Will automatically be assigned one of the
rotary group C.O. lines when the user lifts
the handset and dials 9. Other features
are described in the feature section.
- A special key (SPCL) without an LED
lamp is used to activate some of the fea-
tures as described in the feature section.
- A standard DTMF keypad.
- A handset for private conversations, and
a standard telephone coiled dual 4-pin
modular handset cord.
- A two-position tone volume switch
(HI-LO).
- A reversible base for desk or wall mount.
- All the necessary cables to connect to a
standard 6-pin modular telephone jack.
- A set of labels to mark the special feature
key as well as the station numbers.
Enough blanks have been provided to
allow these to be custom-made by the
user if so desired.

2. Single Line 2500 Style Set (2500)

NOTE: The 2500 is not designed by INTER-TEL.
Any standard "off the shelf" 2500 style tele-
pone with a D.C. ringer installed will be con-
sidered a 2500 station. Alternately, an
unmodified 2500 type set may be used on the
SPK system with the use of an HVRA (Exter-
nal High Voltage Ring Adapter) and power
supply.

- Used on SPK/II only.
- Interfaced to the Station B (STN-B) PCB
in the KSU.
- Will automatically be assigned one of the
rotary group C.O. lines when the user lifts
the handset and dials 9.

- For features of the 2500, see the manufac-
turer's documents of the 2500 station
being used.
- An off-premise 2500 station may require a
High Voltage Ring Adapter (HVRA) pro-
duced by INTER-TEL. (See Figure 1-19.)

D. Optional Direct Station Selector/Busy Lamp
Field (DSS/BLF). If the DSS/BLF is powered
from a plug-in wall transformer, every keyset in
the system can have two DSS/BLF units. This
would be a maximum of 128 units for SPK/I and
160 units for SPK/II. If powered from the sys-
tem, a maximum of two DSS/BLF's per Station A
(STN-A) PCB and four per system is recom-
mended. This is, of course, dependent on the
number of stations and equipment being run by
the system power supply and on the current
carrying capability of the STN-A PCB and KSU
backplane.

1. Model 6460D DSS/BLF (See Figures 1-20
and 1-21)

- 60 station keys to allow a single button
access to a station.
- 60 station lamps to display the status of
the associated stations, (i.e. busy, in do-
not-disturb, idle or recall).
- 4 special feature keys tp transfer to hold;
transfer complete; to initiate the call wait-
ing indication; and to set message lamps.
These are located left to right respectively
on the DSS.
- By removing the faceplate and the key-
board, access is gained to a set of DIP
switches for station number assignment
mode of the 60 DSS/BLF station keys and
lamps. The three modes are:

a. 10 to 69 with 10 in the upper left
corner and 69 in the lower right
corner.
b. 10 to 59 same as 1 but the last row
#10 to #19 (NOTE: #XX ARE SL
STATIONS)
c. 70 to 89 and #10 to #49 with 70 in
upper left corner and #49 in lower
right corner. This is typically the
second DSS/BLF. Stations #50 to #57
may not be accessed by a DSS/BLF at
the present time.
Also, access is gained to the +5VDC
power voltage setting which is set at
the factory prior to shipment.

- AC plug-in wall transformer and cable to power DSS/BLF. Not required if modified to run off the system.
- A reversible baseplate for desk or wall mount.
- All the necessary cables.
- A set of labels to mark the special feature keys as well as the station numbers. Enough blanks have been provided to allow these to be custom-made by the user if so desired.

2. Model 3532D DSS/BLF (See Figures 1-22 and 1-23)

- 32 station keys to allow single button access to stations 10 to 41, where 10 is in the upper left corner and 41 is the second key from the left on the bottom row.
- 32 station lamps to display the status of the associated station key (i.e. busy, in do-not-disturb, idle or recall).
- 3 special feature keys for: transfer-to-hold, transfer complete, and immediate camp-on. These are the three right-most keys on the bottom row, with the functions left to right respectively.
- By removing the faceplate and keybord, access is gained to a +5VDC power voltage setting, which is set at the factory prior to shipment.
- AC plug-in wall transformer and cable to power DSS/BLF. Not required if modified to run off the system.
- A reversible base for desk or wall mount.
- All necessary cables.
- A set of labels to mark the special feature keys as well as the station extension numbers. Enough blanks have been provided to allow these to be custom-made by the user if so desired.

3. Model 3030D DSS/BLF (See Figures 1-24 and 1-21)

- One per key station.
- 30 station keys to allow single button access to stations 10 to 39, where 10 is the upper left and 39 is the lower right.
- 30 station lamps to display the status of the associated station key (i.e. busy, in do-not disturb, idle or recall).
- By removing the faceplate and keyboard, access is gained to a +5VDC power vol-

tage setting, which is set at the factory at time of shipment.
- AC plug-in wall transformer and cable to power DSS/BLF. Not required if modified to run off the system.
- A reversible baseplate for desk or wall mount.
- All necessary cables.
- A set of labels to mark the station extension numbers. Enough blanks have been provided to allow these to be custom-made by the user if so desired.

E. Optional Station Message Detail Recording (SMDR) Unit. The SMDR unit can be any 300 or 9600 baud rate RS-232C-compatible recording device. This could be a printer, tape recorder or even a disk drive. A 300 baud rate printer for this unit, as well as a higher speed (up to 9600 baud rate) cassette recorder is commercially available. Processing of the data recorded on the cassette is not performed by INTER-TEL at the present time. However, many software houses can accommodate the formatting of the data to the specific customer's requirements at a nominal cost.

- One SMDR unit per system.
- The INTER-TEL SMDR printer uses standard 3⅛ in. adding machine roll paper available through INTER-TEL or office supply outlets. The printer is powered from standard 115 VAC, 15 amp power service. Actual power dissipation may vary depending on the unit presently being marketed. All necessary connecting cables are shipped with the INTER-TEL SMDR printer.
- Data is sent to the SMDR unit in a standard ASCII right-justified columnar format.

F. Batteries. The battery on the CPU PCB for data base protection is of the NI-CAD regargeable type and is not replaceable but will give years of service.

Batteries for system back-up will give continuous, uninterrupted power to the entire system during periods of brownout or total loss of AC power(except for the DSS/BLF's and their associated key stations when powered from a plug-in wall transformer).

- 24VDC batteries (typically two 12VDC batteries with the same current rating) are required for the SPK/I.

- 30VDC batteries (typically two 12VDC and one 6VDC batteries with the same current rating) are required for the SPK/II system.
- Typical installations with sufficient battery backup to provide five hours of battery protection require batteries with capacities of approximately 100 amp/hour rating.
- Batteries are not sold by INTER-TEL but are standard "off-the-shelf" batteries available from most electrical supply outlets.

CAUTION: Batteries should be placed in a well-ventilated area and not mounted in the main cabinet due to outgasssing and the corrosive nature of the batteries.

- The SPK system power supply will maintain the system and the onboard battery at full charge, however 24 to 48 hours is required to bring the batteries to full charge.

G. High Voltage Ring Adapter (HVRA) Unit. An unmodified 2500 type station requires an HVRA circuit. (See Figure 1-19.)

- One circuit required for each SL-2500.
- Two circuits per HVRA unit.
- When used as an Off-Premise Station (OPS) application, the FCC registration is the same as SPK with a Service Code 9.0F. The HVRA unit may interface with Class A-0L13A, Class B-0L13B or Class C-0L13C OPS lines. This is marked on the HVRA and should be checked for any changes after this manual is issued.
- Wall Mountable.
- An external ringing signal generator and power supply is required with HVRA's. These are not available from INTER-TEL, but may be found in most telephone supply outlets.

H. Connectors

- All wall telephone receptacles are standard 6-pin or 4-pin modular jacks available from electronic supply outlets.
- The required connectors for interfacing to the KSU STN and COU PCB's and the HVRA are standard 25-pair female amphenol connectors available from electronic supply houses. One is required for each.
- The CPU PCB requires a 25-pin subminiature "D" male plug. Also, a ⅛-inch subminiature

phono plug is required for an external music source. Both are available from electronic supply houses.
- The interface to the telephone C.O. lines for demarcation, as required by FCC regulations, is a standard telephone punch-down block.
- All other connectors are supplied by INTER-TEL with the equipment.

1.06   Specifications

A.   SPK/I Capacities:

- 64 stations (64 keysets).
- 16 C.O. lines (16 two-way).
- 8 intercom channels.
- 4 conference calls.
- 1 RS-232C port.
- 128 DSS/BLF units (maximum 2 per key station).
- 25-day CPU-programmed data base battery back-up.
- System battery back-up (capacity dependent on battery selection).

B.   SPK/II Capacities

- 128 stations (80 key + 48 single line).
- 32 C.O. lines (24 two-way + 8 outgoing).
- 8 intercom channels.
- 4 conference calls.
- 1 RS-232C port.
- 160 DSS/BLF units (maximum 2 per key station).
- 25-day CPU programmed data base battery back-up.
- System battery back-up (capacity dependent on battery selection).

C. Physical Dimensions (approximate)

1. KSU

    Height — 25.5 in.
    Width — 27 in.
    Depth — 18 in.
    Power cord — 6 ft.

2. Key Stations (Models 1664T or 2480T)

    Height — 4.5 in.
    Width — 10.5 in.
    Depth — 9.0 in.
    Handset cord — 6 ft. coiled
    Mounting cord — 6 ft. straight

3. Stations (Models 416T, 1032T, and SLE)

    Height — 4.5 in.
    Width — 8 in.
    Depth — 9 in.
    Handset cord — 6 ft. coiled
    Mounting cord — 6 ft. straight

4. SMDR Printer

    Height — 6.5 in.
    Width — 10.5 in.
    Depth — 13.0 in.
    Power cord — 6 ft.
    Paper — 3⅛" adding machine roll
    Mounting cord — 4 ft.

5. DSS/BLF (6460D)

    Height — 3.5 in.
    Width — 10.0 in.
    Depth — 9.0 in.
    Station cord — 2 fT. straight
    Power cord — 6 fT.
    Power supply — Class 2 transformer

6. DSS/BLF (3532D)

    Height — 3.5 in.
    Width — 8.0 in.
    Depth — 10.0 in.
    Station cord — 2 ft. straight
    Power cord — 6 ft.
    Power supply — Class 2 transformer

7. DSS/BLF (3532D)

    Height — 3.5 in.
    Width — 10.0 in.
    Depth — 9.0 in.
    Station cord — 2 ft. straight
    Power cord — 6 ft.
    Power supply — Class 2 transformer

8. HVRA

    Height — 5.5 in. with cable attached
    Width — 5.5 in.
    Depth — 2 in.

9. Punch-Down Blocks plus other wall mount
    equipment
    Wall space = 4x8 ft. maximum.

D. Technology

   * Continuously Variable Slope Delta Modula-
      tion (CVSD).

   * TDM clock frequency: 8.0 MHz.
   * Time slot channels: 41 (125 nsec each).
   * Microprocessor: Motorola MC 6801.
   * Operating frequency: 1 MHz.

E. Electrical Characteristics

1. Telephone station loop limits using 24 AWG
    wire.

    SPKII (680.08 power supply)

    2480T   68 ohms or 1313 ft.
    2480T with one 6460D DSS/BLF
                                 20 ohms or 387 ft.
    2480T with two 6460D DSS/BLF's
                                 9 ohms or 171 ft.
    1664T   75 ohms or 1457 ft.
    1664T with one 6460D DSS/BLF
                                 20 ohms or 405 ft.
    1664T with two 6460D DSS/BLF's
                                 9 ohms or 177 ft.
    1032T   78 ohms of 1525 ft.
    416T   84 ohms or 1628 ft.
    SLE   300 ohms or 5800 ft.
    2500   800 ohms or 16000 ft.
    Modem II Talkback Speakers
                                 50 ohms or 1000 ft.

SPK/I (680.07 power supply)

2480T	39 ohms or 750 ft.
2480T with one 6460D DSS/BLF	
	9 ohms or 187 ft.
2480T with two 6460D DSS/BLF's	
	3 ohms or 49 ft.
1664T	43 ohms or 836 ft.
1664T with one 6460D DSS/BLF	
	10 ohms or 197 ft.
1664T with two 6460D DSS/BLF's	
	3 ohms or 53 ft.
1032T	45 ohms of 877 ft.
416T	48 ohms or 939 ft.

NOTE: When other than 24 AWG or longer lengths are required, 14VDC must be maintained at the station and DSS/BLF inputs. Excessive and/or high resistance connections will reduce these loop limits. Using larger gauge (smaller AWG number) or multiple 24 AWG wires will increase these loop limits. If more than 6000 ft. is required, loaded cable is recommended. DSS/BLF units do not significantly affect the described loop limits for keysets when powered from the transformer unit.

2. System Power Requirement

   a. SPK/I model 680.07, 105/125 VAC, 50/60 Hz, 4.8 amps

   b. SPK/II model 680.08, 105/125 VAC, 50/60 Hz, 5.6 amps
      205/230 VAC, 50/60 Hz 2.8 transformer

   c. DSS/BLF
      Input — 120VAC 16 Watts
      Output — 16VAC 0.7 amps

3. Central Office Line protection

   Tip to ring: 800V transient
   To ground: 1500 VAC RMS

4. Central Office Characteristics

   SPK FCC Registration: BE287V-69771-MF-E
   Ringing Voltage: 45 VAC minimum
   COU PCB Ringer Equivalence: 0.94 REN
   COU PCB has no effect on longitudinal balance.
   0 dB loss from telephone network to C.O. line.
   2500-HVRA OPS: FCC REGISTRATION — same as SPK registration with SERVICE
      CODE 9.0F
      CLASS A — OL13A
      CLASS B — OL13B
      CLASS C — OI13C

5. Environmental Requirements

   Ambient Operating Temperature:

      Recommended ambient temperature not to exceed 29 deg C/90 deg F for an extended period of time.

   Storage Temperature:
      -55 to 50 deg C
      -67 to 122 deg F

   Humidity:

      No condensation
      95% maximum relative
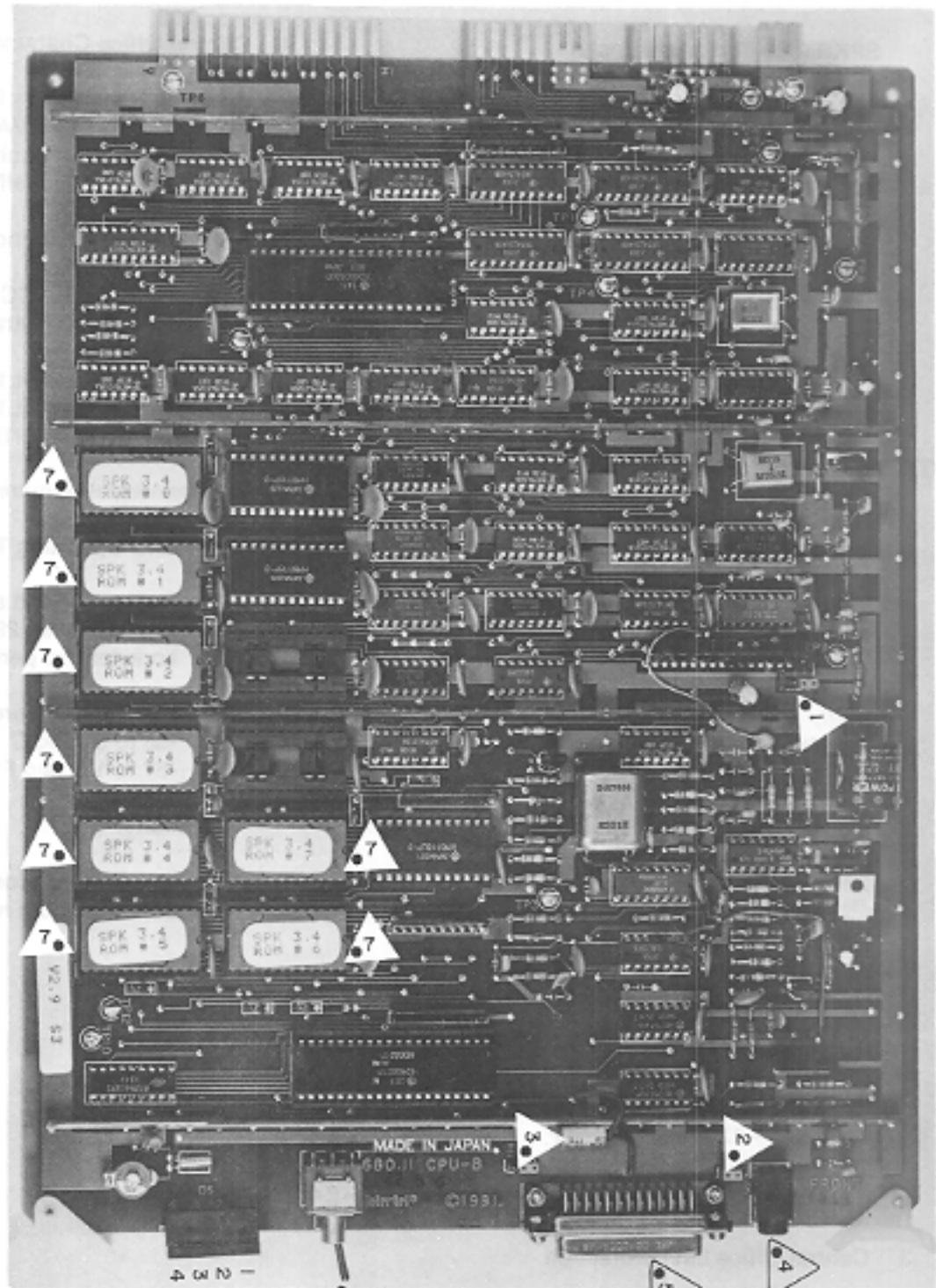
Figure 1-1. SPK CPU-B PCB

Figure 1-2. SPK STN-A PCB

LED LAMPS
POWER-UP
1 CIRCUIT 1
2 CIRCUIT 2
3 CIRCUIT 3
4 CIRCUIT 4
5 CIRCUIT 5
6 CIRCUIT 6
7 CIRCUIT 7
8 CIRCUIT 8

AMPHENOL
CONNECTOR
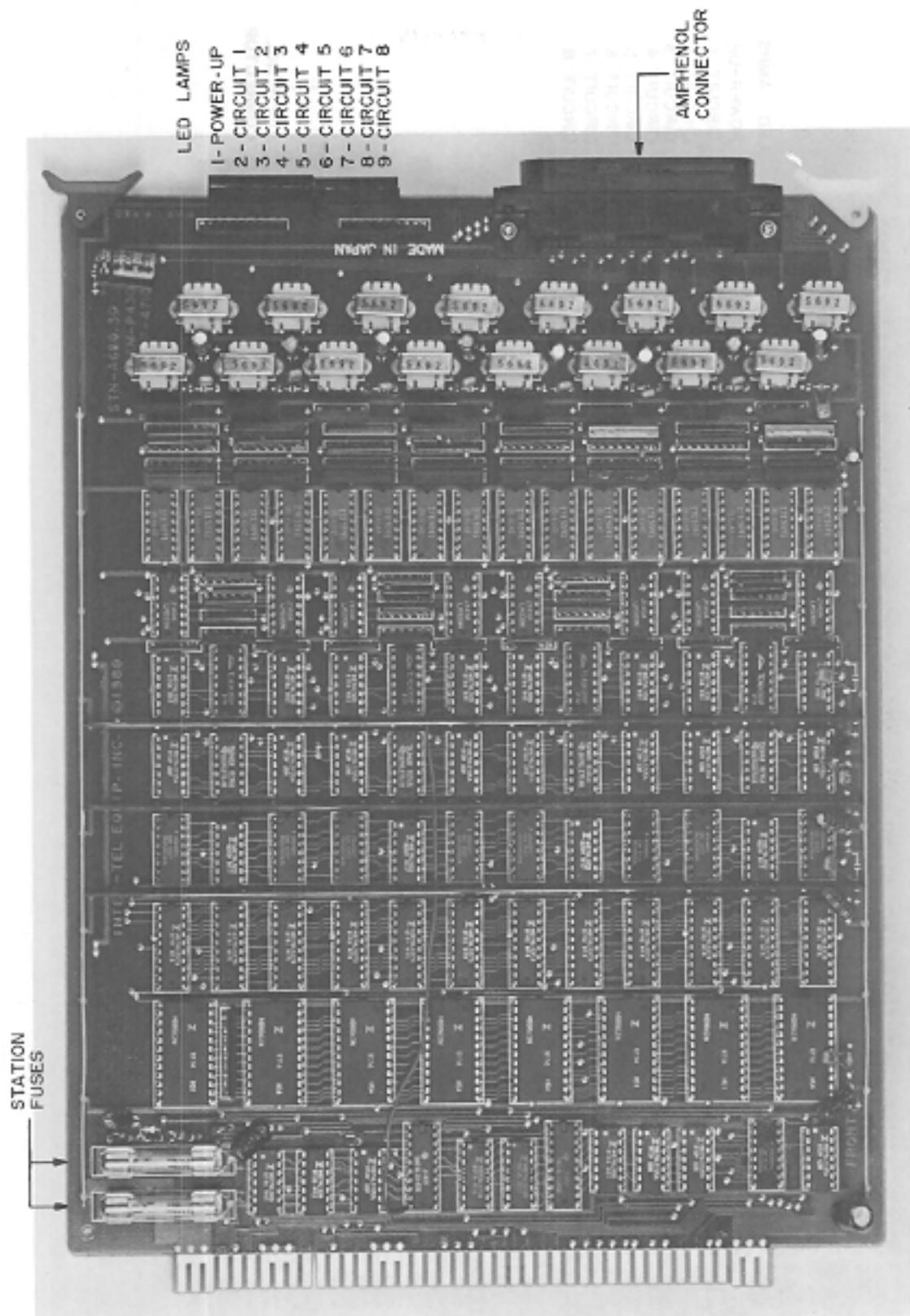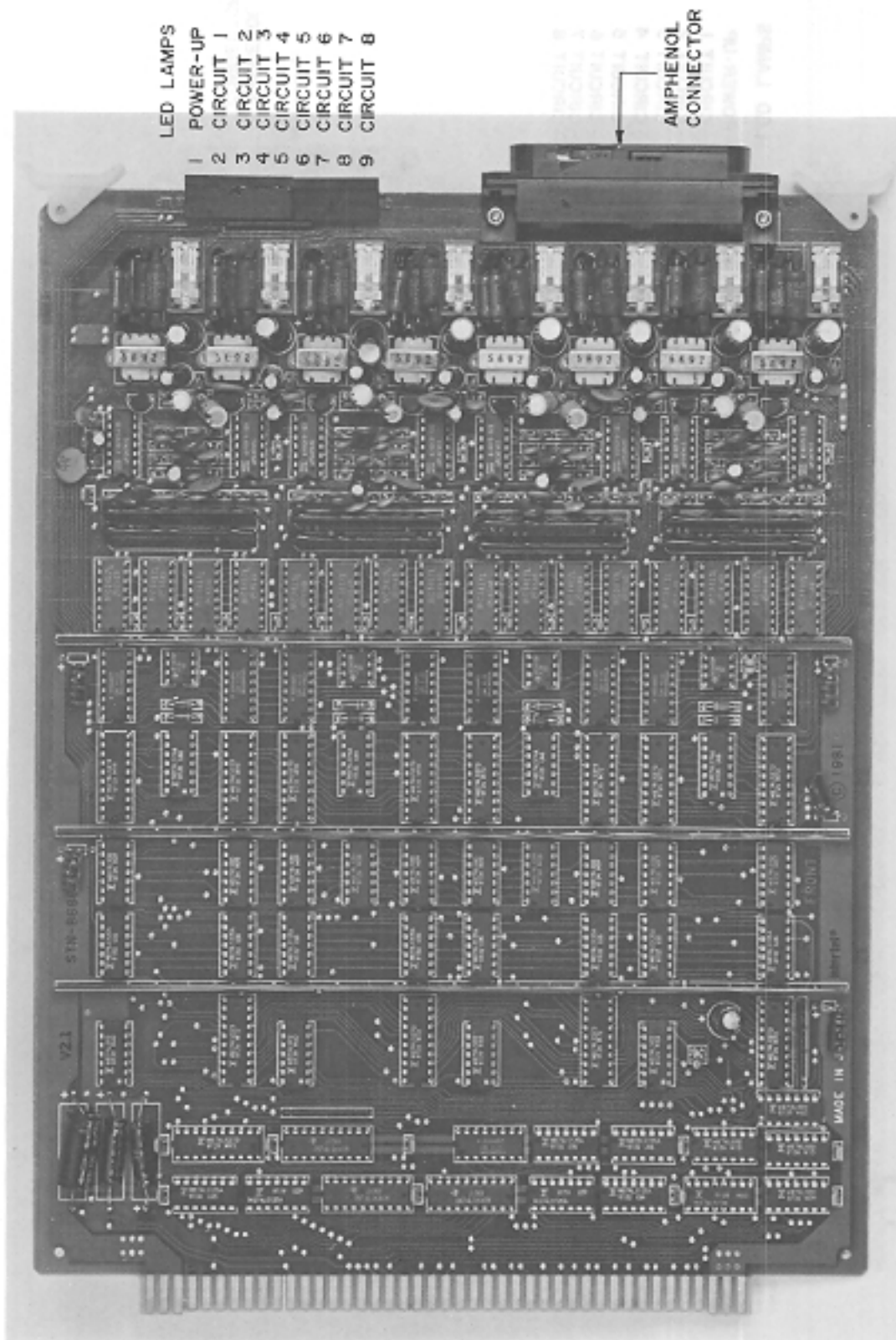
Figure 1-3. SPK STN-B PCB

Figure 1-4. SPK STN-C PCB

LED LAMPS
1 – POWER-UP
2 – CIRCUIT 1
3 – CIRCUIT 2
4 – CIRCUIT 3
5 – CIRCUIT 4

AMPHENOL CONNECTOR
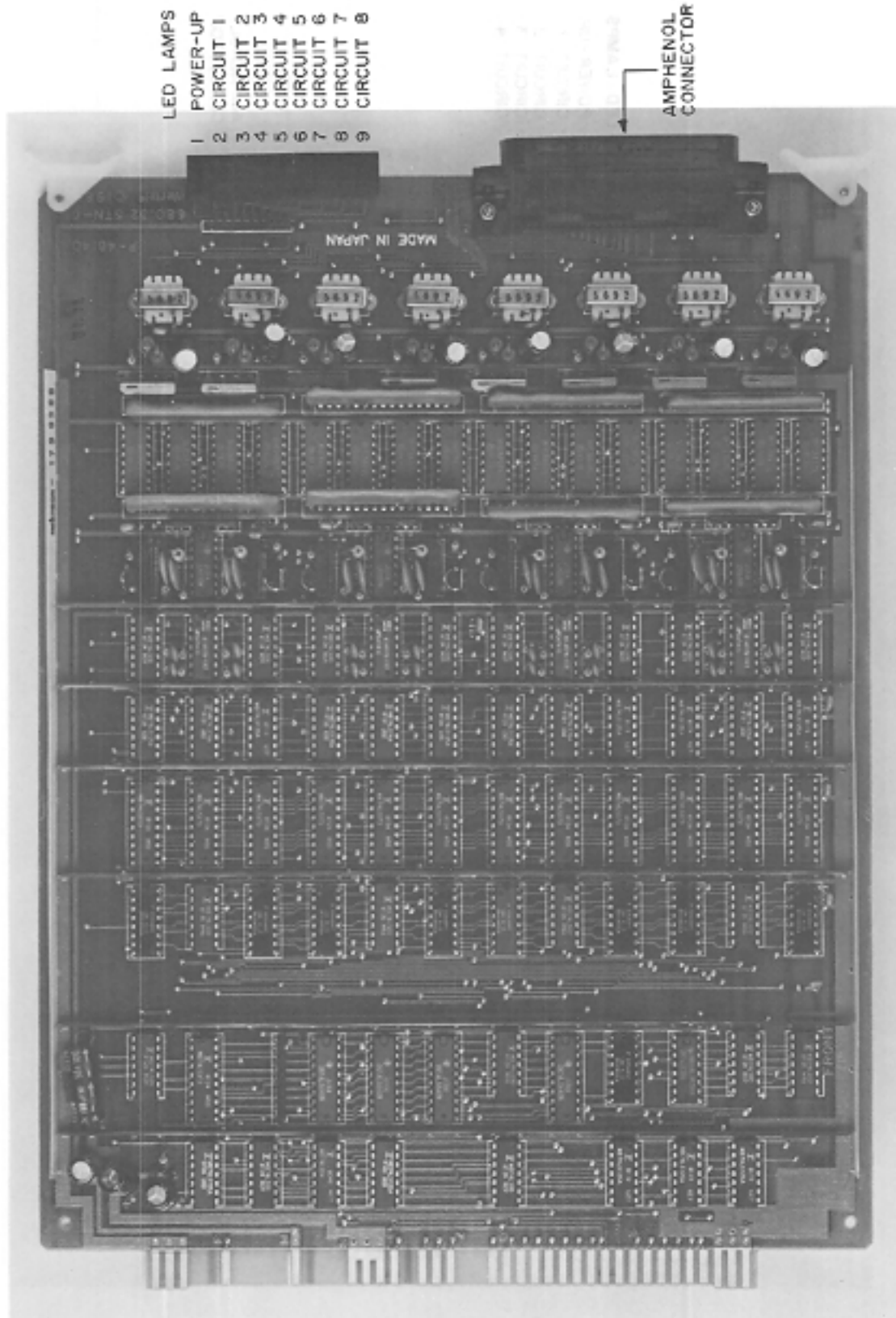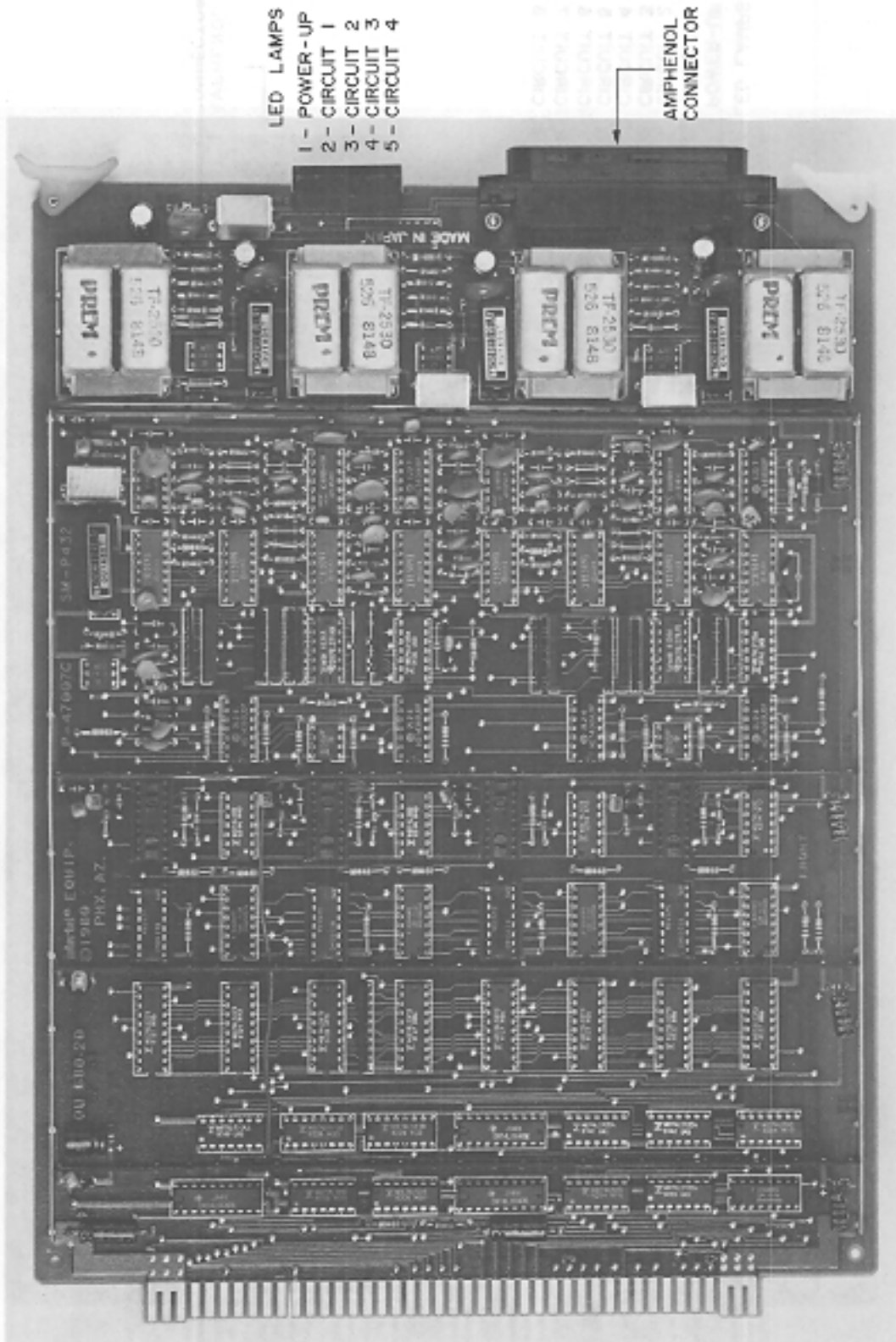
Figure 1-5. SPK COU DTMF PCB
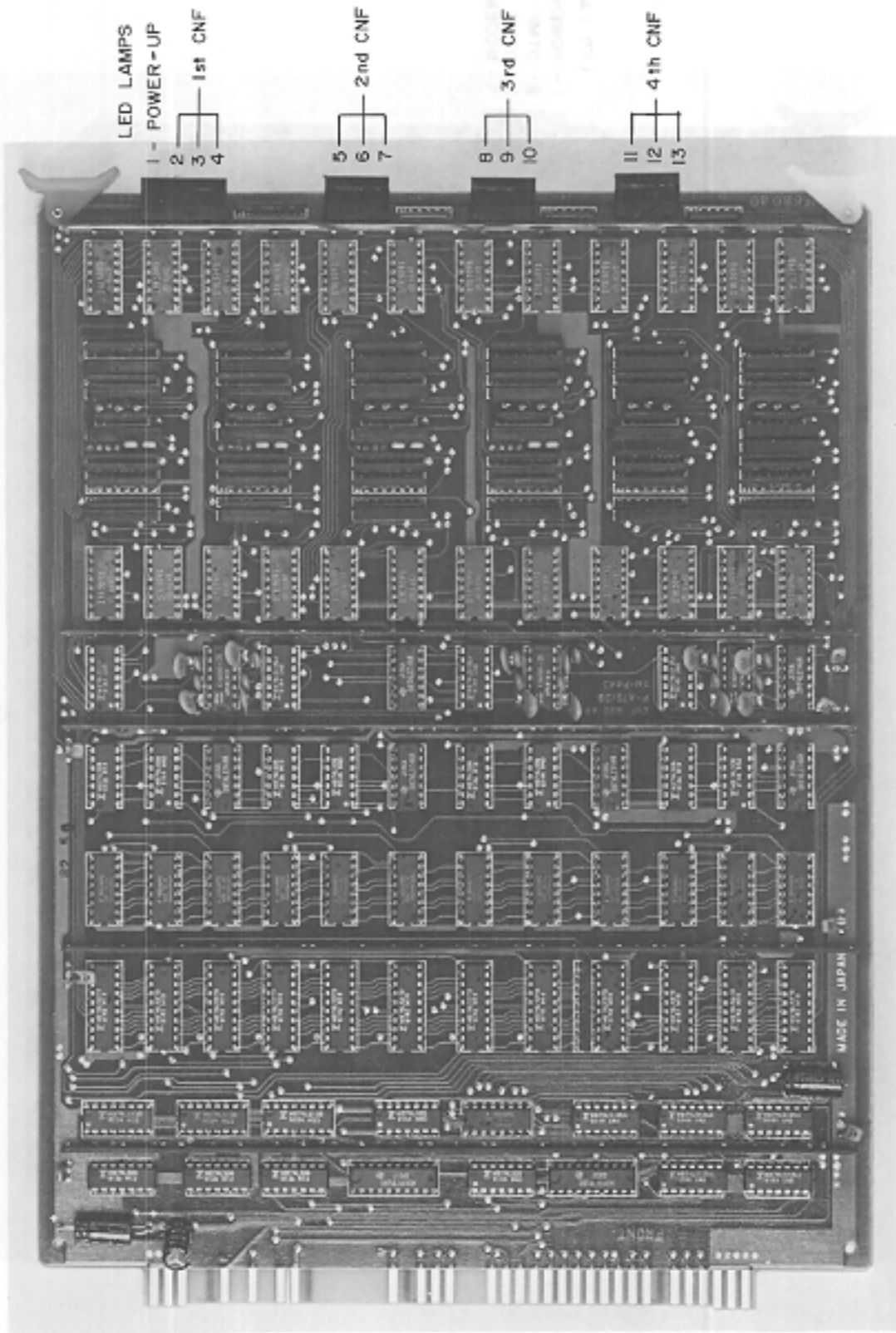
Figure 1-6. SPK CNF PCB

Figure 1-7. SPK MOD I PCB

LED LAMPS
1 — POWER-UP
2 — DTMF 1
3 — DTMF 2
4 — MODEM
5 — EXT. PAGE ASSIGN
6 — EXT. PAGE 1
7 — EXT. PAGE 2
8 — EXT. PAGE 3
9 — TKBK SPKR 1
10 — TKBK SPKR 2
11 — TKBK SPKR 3
12 — TKBK SPKR 4
13 — TKBK SPKR 5

AMPHENOL
CONNECTOR

BAUD RATE JUMPER

Figure 1-8. SPK MOD II PCB

△1	PUSH BUTTON KEYPAD	△4	4 SPECIAL FEATURE KEYS
△2	TONE / VOICE VOLUME CONTROLS	△5	INTERNAL SPEAKER
△3	24 C.O. LINE KEYS		

Figure 1-9. SPK/II 2480T Keyset
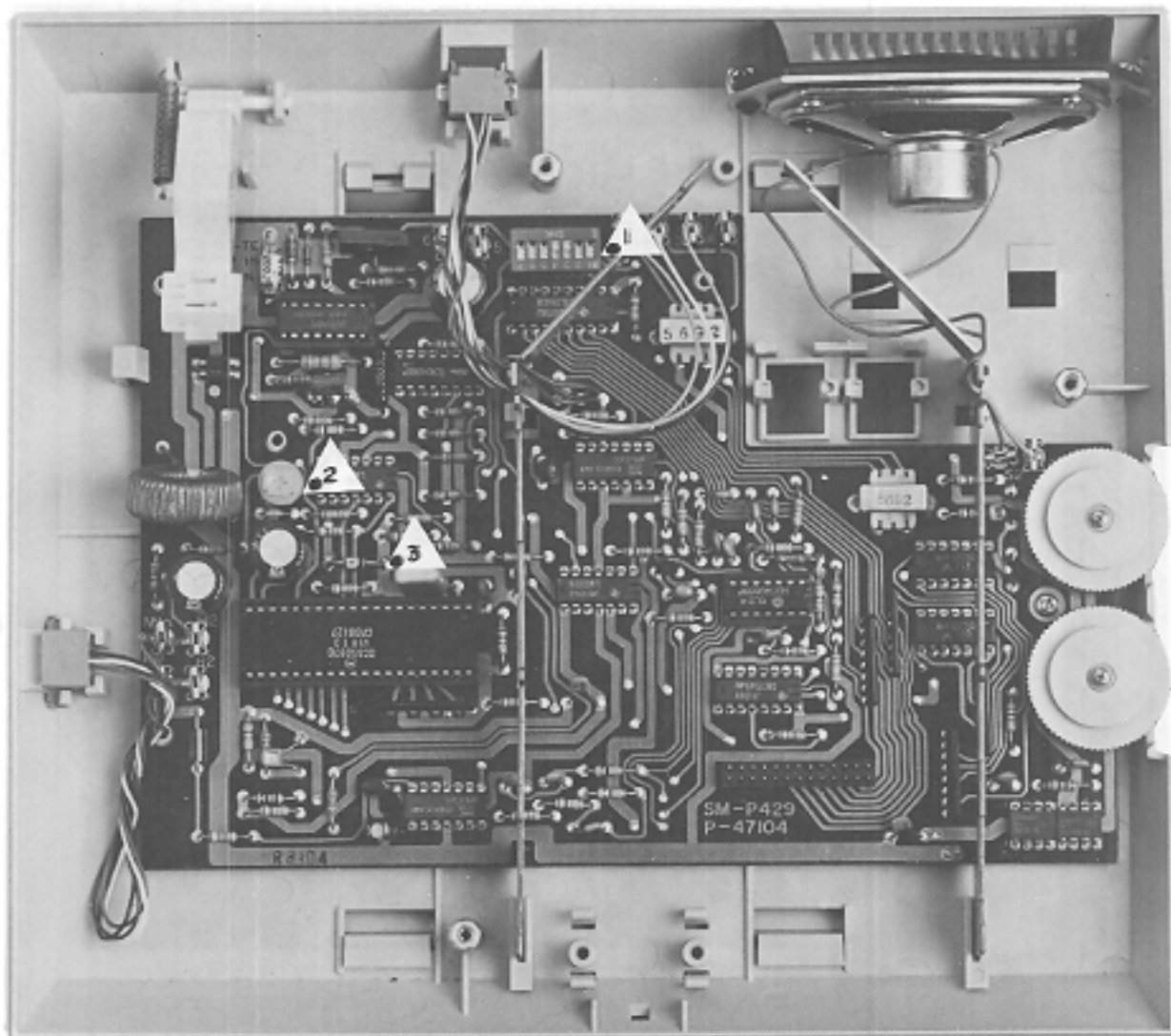
1. DIP SWITCHES

2. 5.0V ADJUST (R76)

3. 5.0V T.P. (VR2)

Figure 1-10. 1664T/2480T Keyset Control PCB

Figure 1-11. SPK/I 1664T Keyset

1. PUSH BUTTON KEYPAD

4. 4 SPECIAL FEATURE KEYS

2. TONE/VOICE VOLUME CONTROLS

5. INTERNAL SPEAKER

3. 16 C.O. LINE KEYS

/1\ PUSH BUTTON KEYPAD	/4\ 4 SPECIAL FEATURE KEYS
/2\ TONE / VOICE VOLUME CONTROL	/5\ INTERNAL SPEAKER
/3\ 12 C.O. LINE KEYS	

Figure 1-12. 1232T Keyset
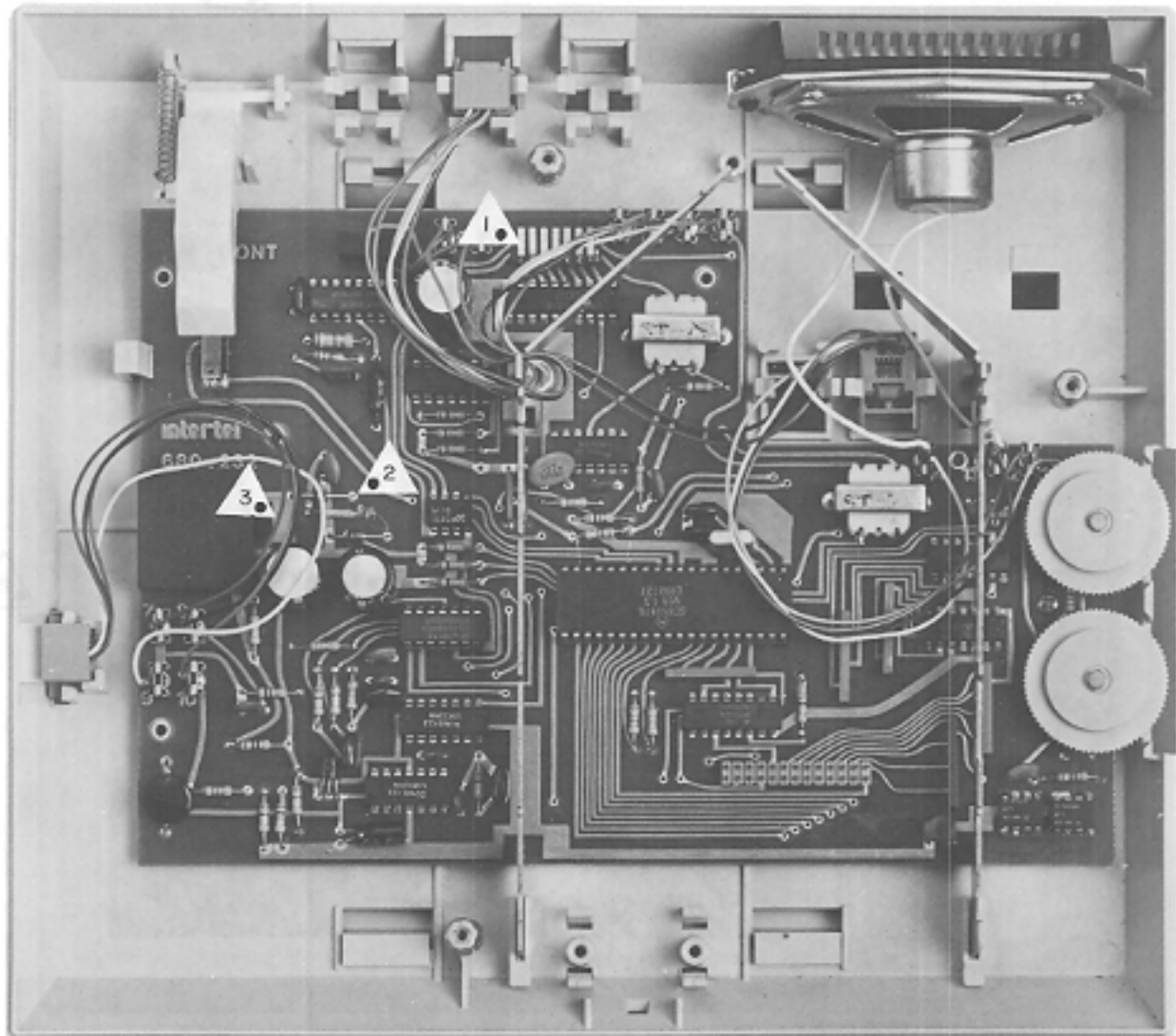
1. DIP SWITCHES

2. 5.0V T.P. (CRI)

3. 5.0V ADJUST (RI5)

Figure 1-13. 1232T Keyset Control PCB
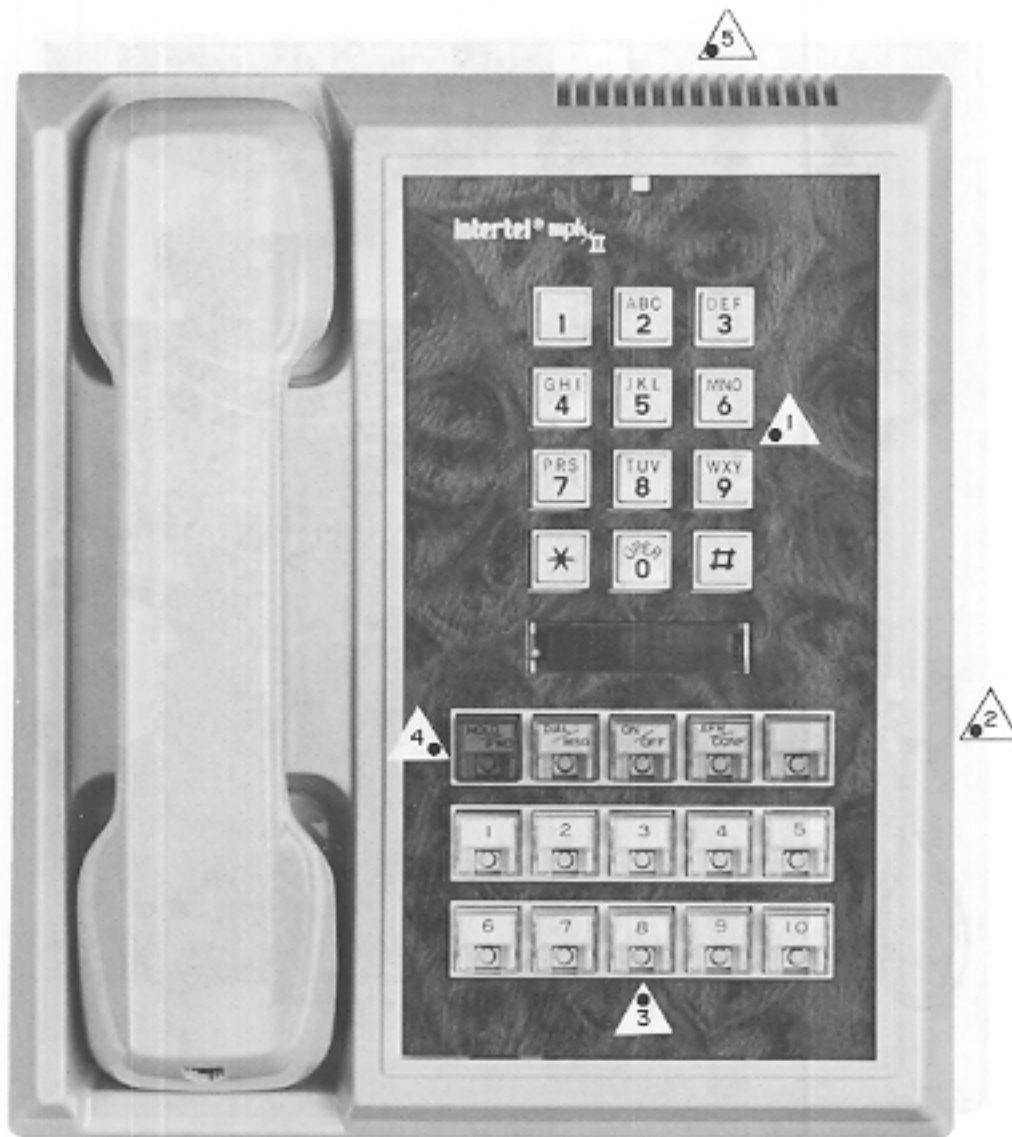
△1	PUSH BUTTON KEYPAD	△4	5 SPECIAL FUNCTION KEYS
△2	VOICE VOLUME CONTROL	△5	INTERNAL SPEAKER
△3	IO C.O. LINE KEYS		

Figure 1-14. MPK/II 1032T Keyset
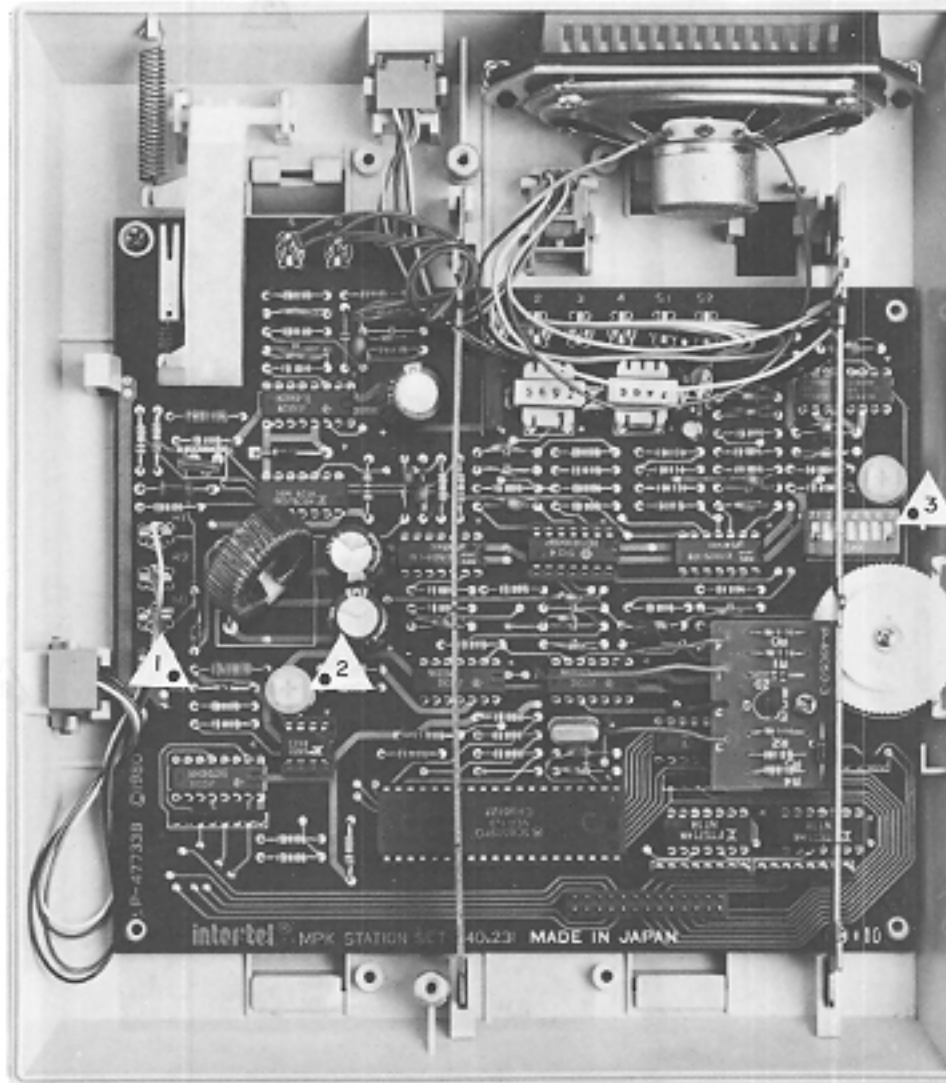
/1\ 5.0V T.P. (VR2)

/2\ 5.0V ADJUST (R67)

/3\ DIP SWITCHES

Figure 1-15. 416T/1032T Keyset Control PCB
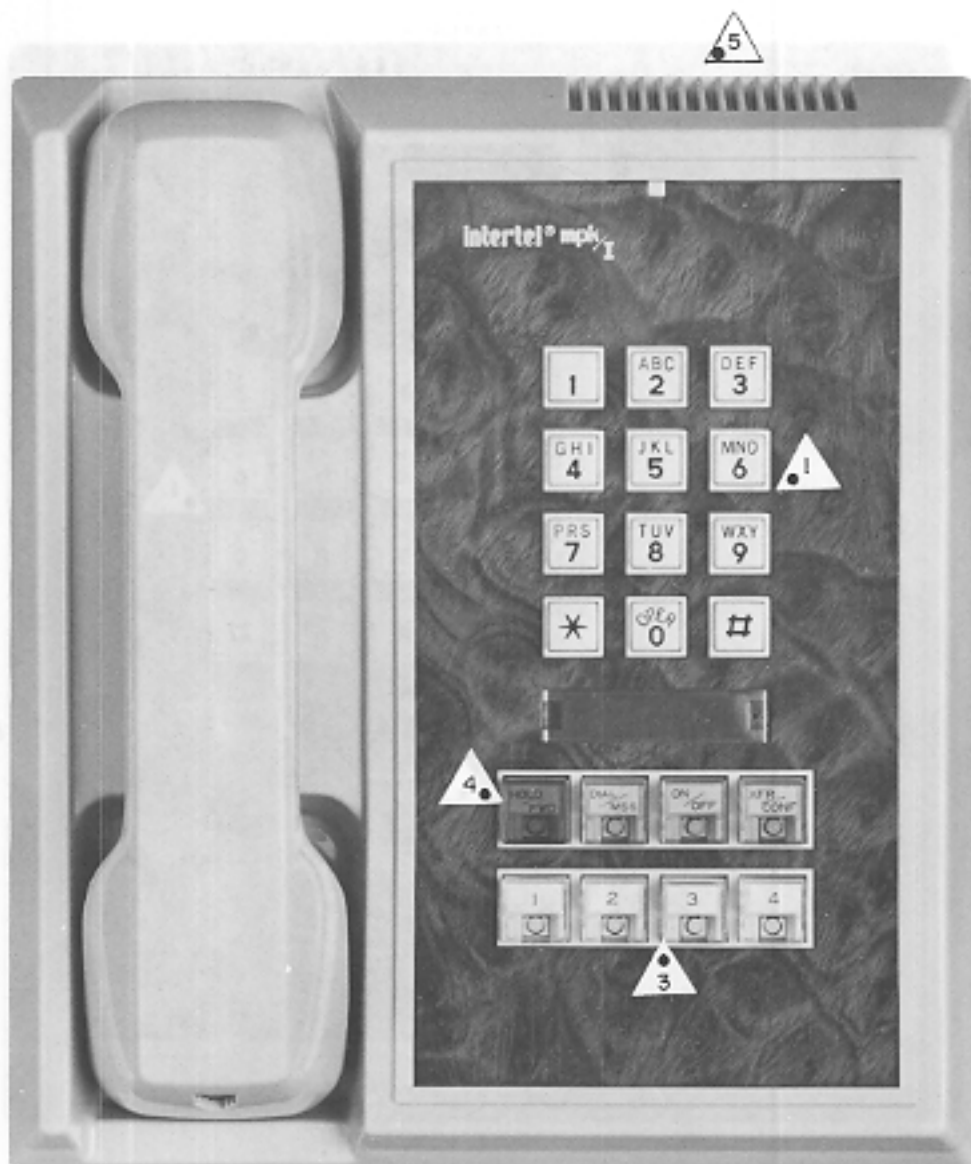
△1	PUSH BUTTON KEYPAD	△4	4 SPECIAL FEATURE KEYS
△2	VOICE VOLUME CONTROL	△5	INTERNAL SPEAKER
△3	4 C.O. LINE KEYS		

Figure 1-16. MPK/I 416T Keyset

1	PUSH BUTTON KEYPAD
2	TONE VOLUME SWITCH
3	SPECIAL KEY

Figure 1-17. SPK/II 680 SLE Instrument
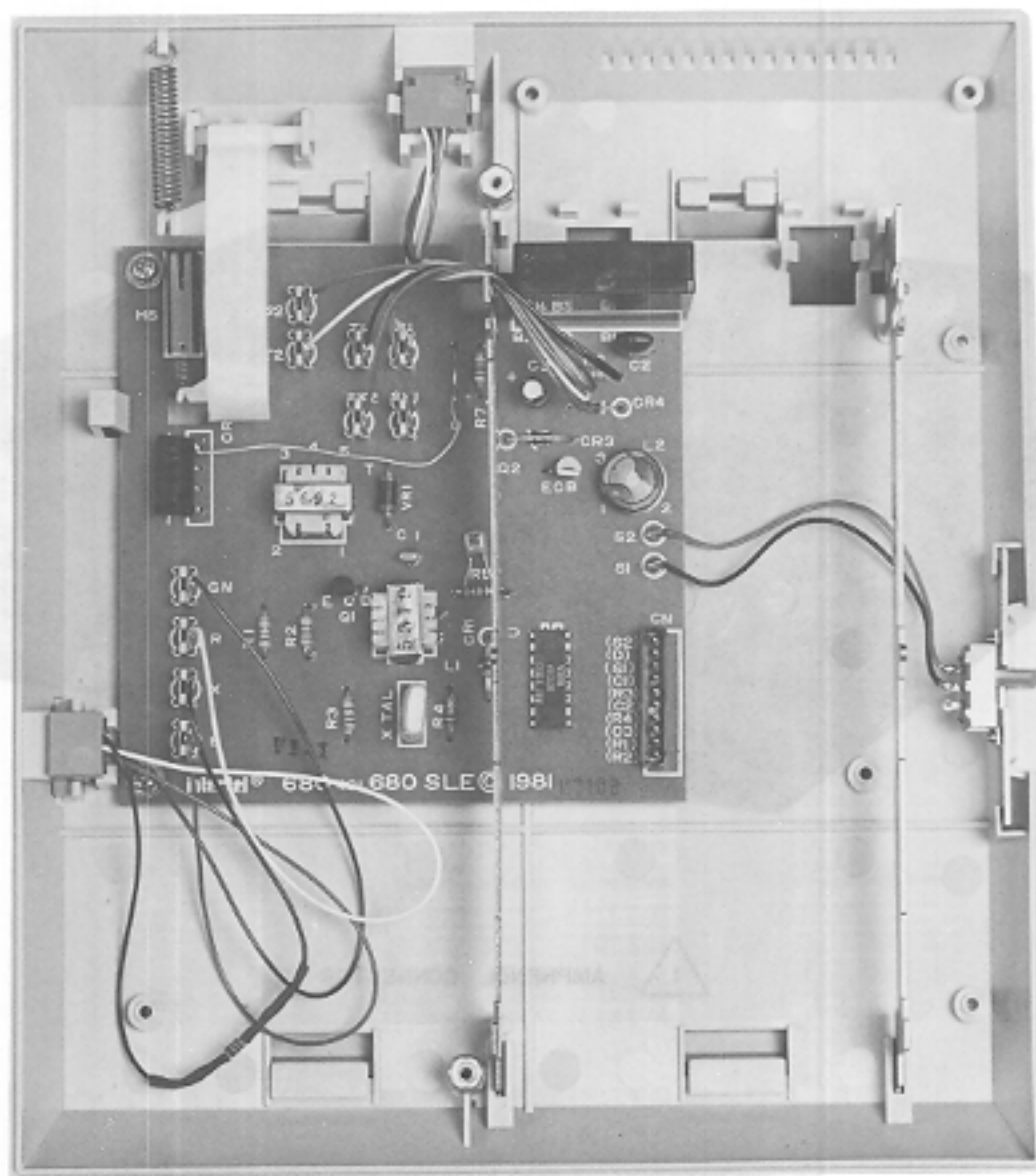
Figure 1-18. SPK/II 680 SLE Instrument Control PCB
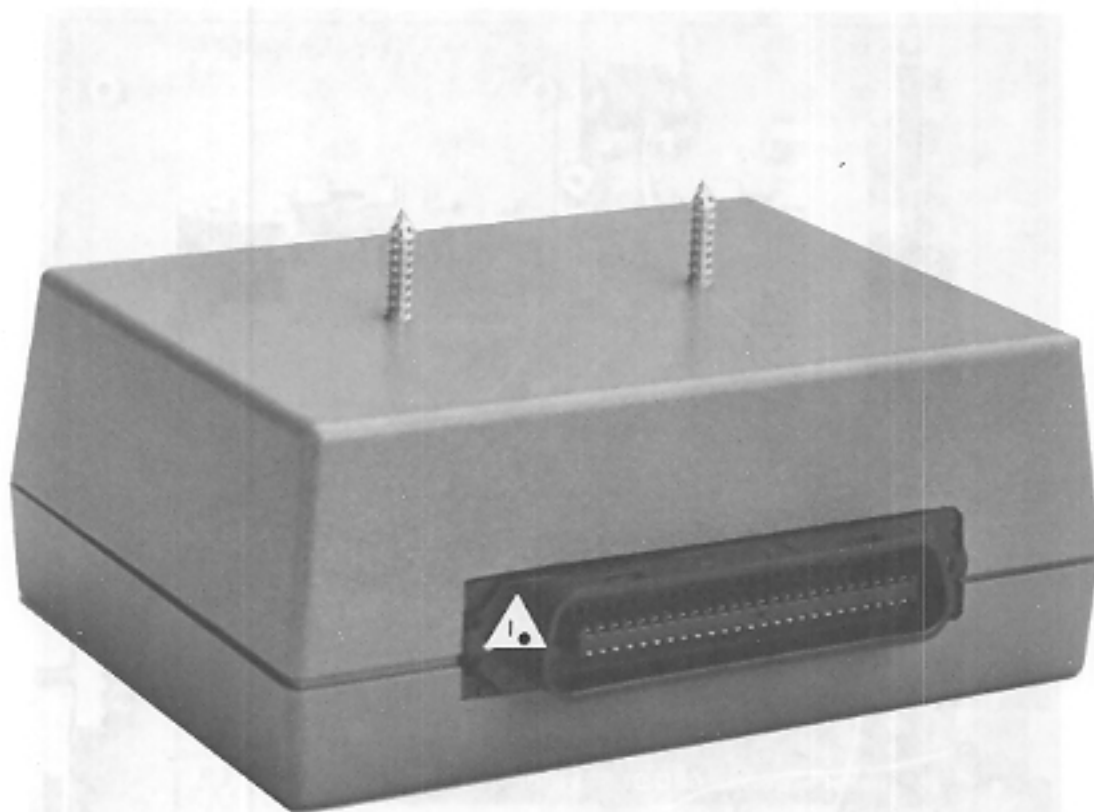
△| AMPHENOL CONNECTOR

Figure 1-19. HVRA Unit
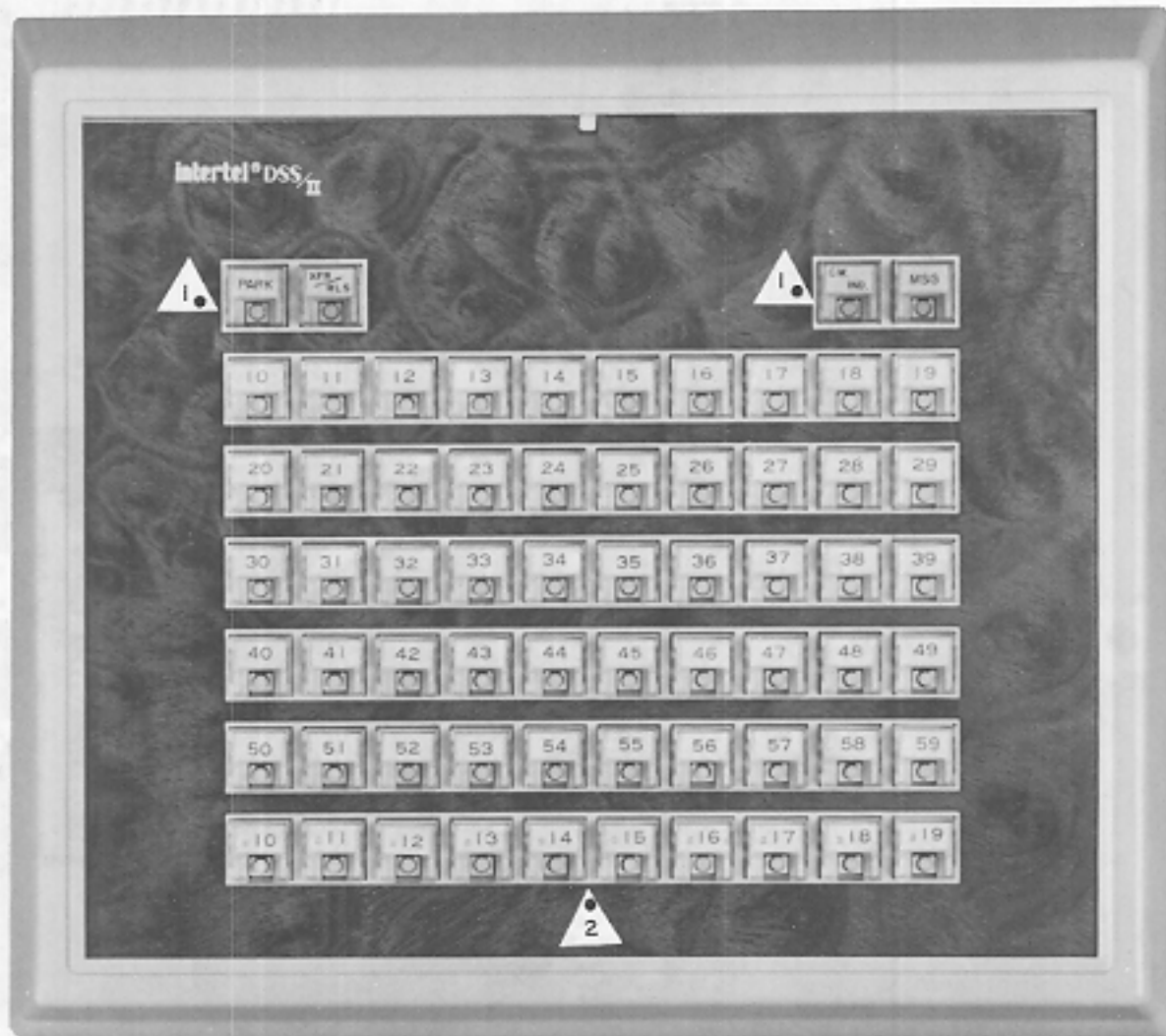
△1 4 SPECIAL FUNCTION KEYS

△2 60 DIRECT STATION SELECT KEYS
     AND STATUS LAMPS

Figure 1-20. 6460D DSS/BLF
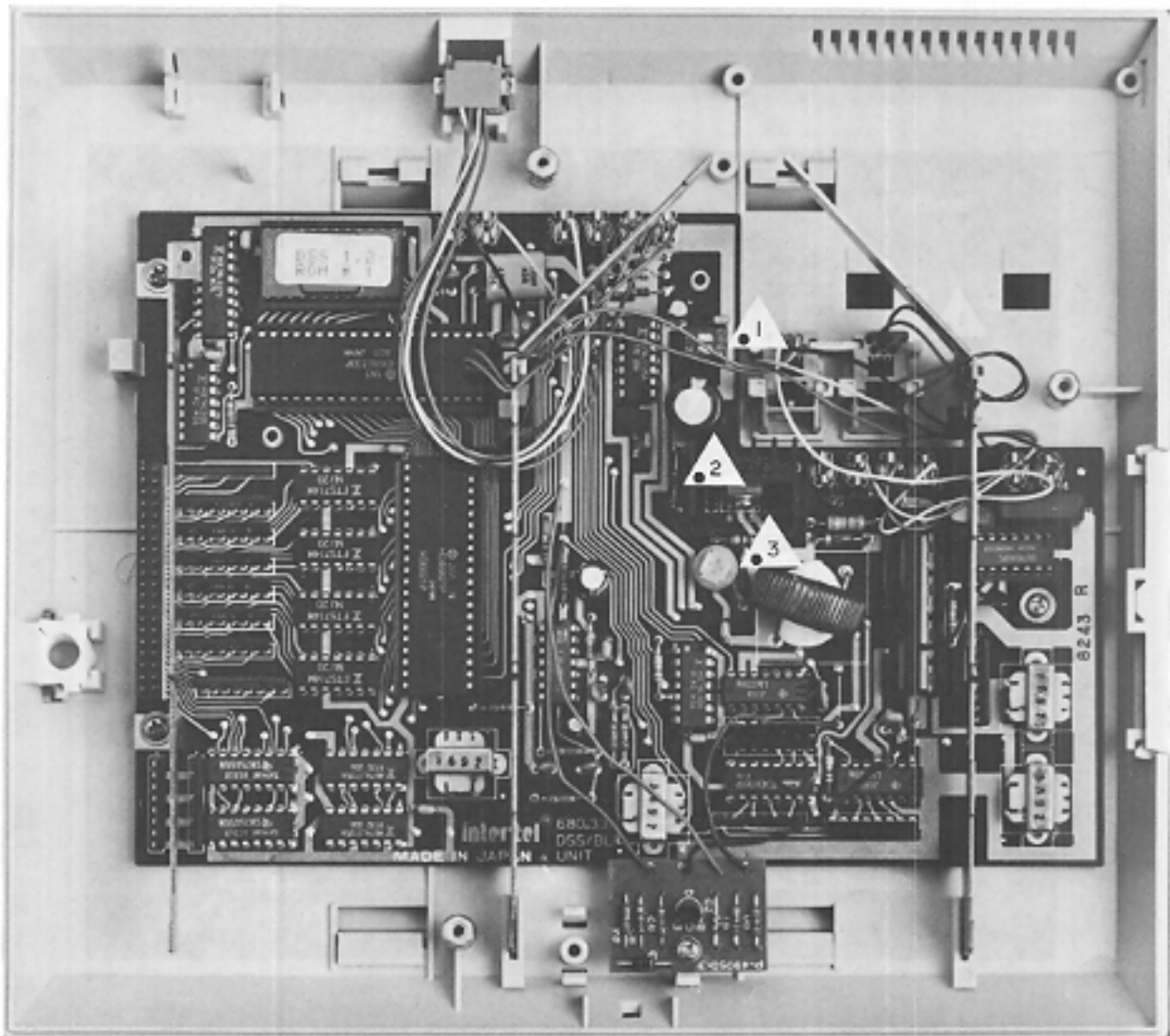
Figure 1-21. 6460D/3030D DSS/BLF Control PCB
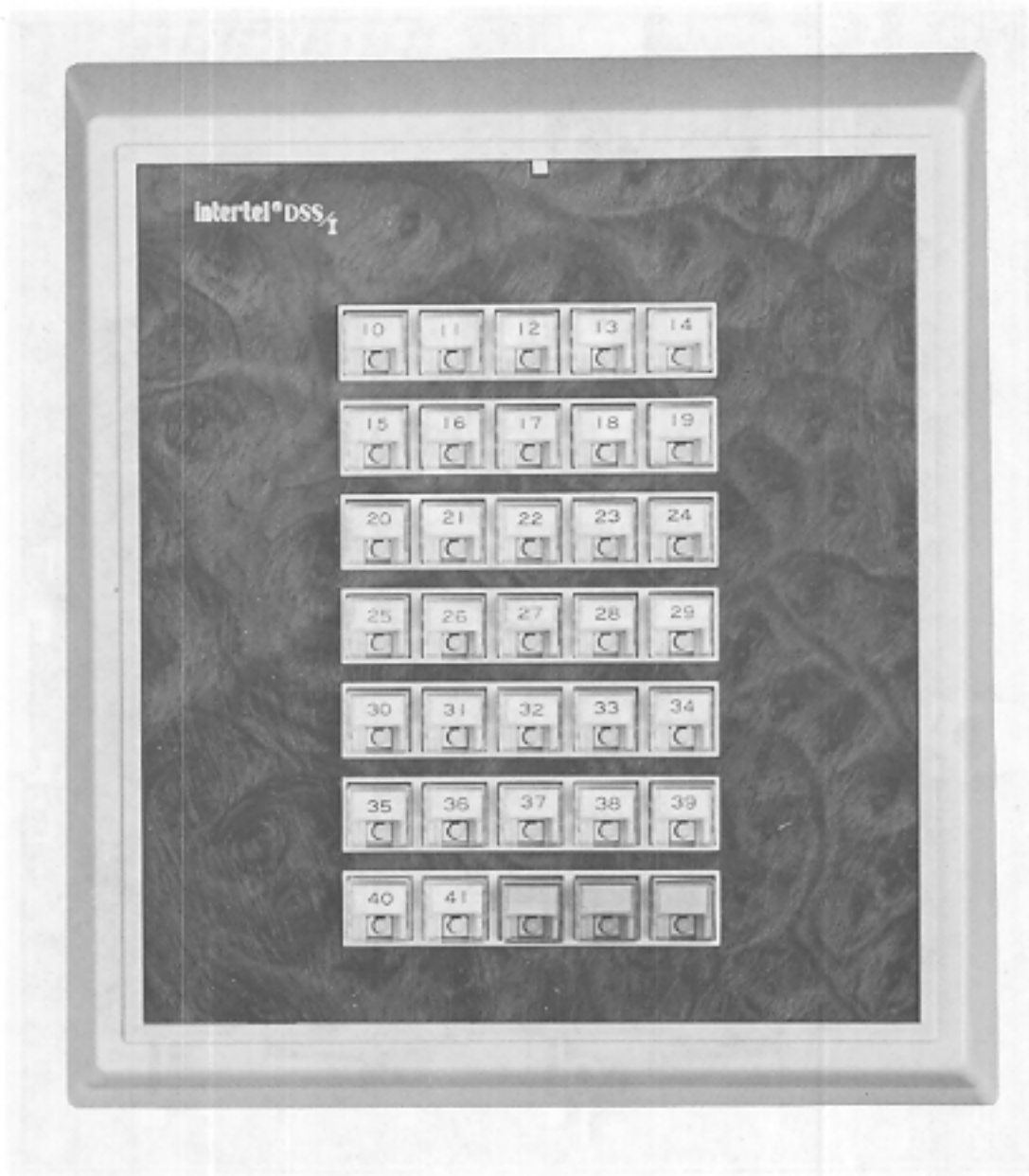
32 DIRECT STATION SELECT KEYS

AND STATUS LAMPS

Figure 1-22. 3532D DSS/BLF
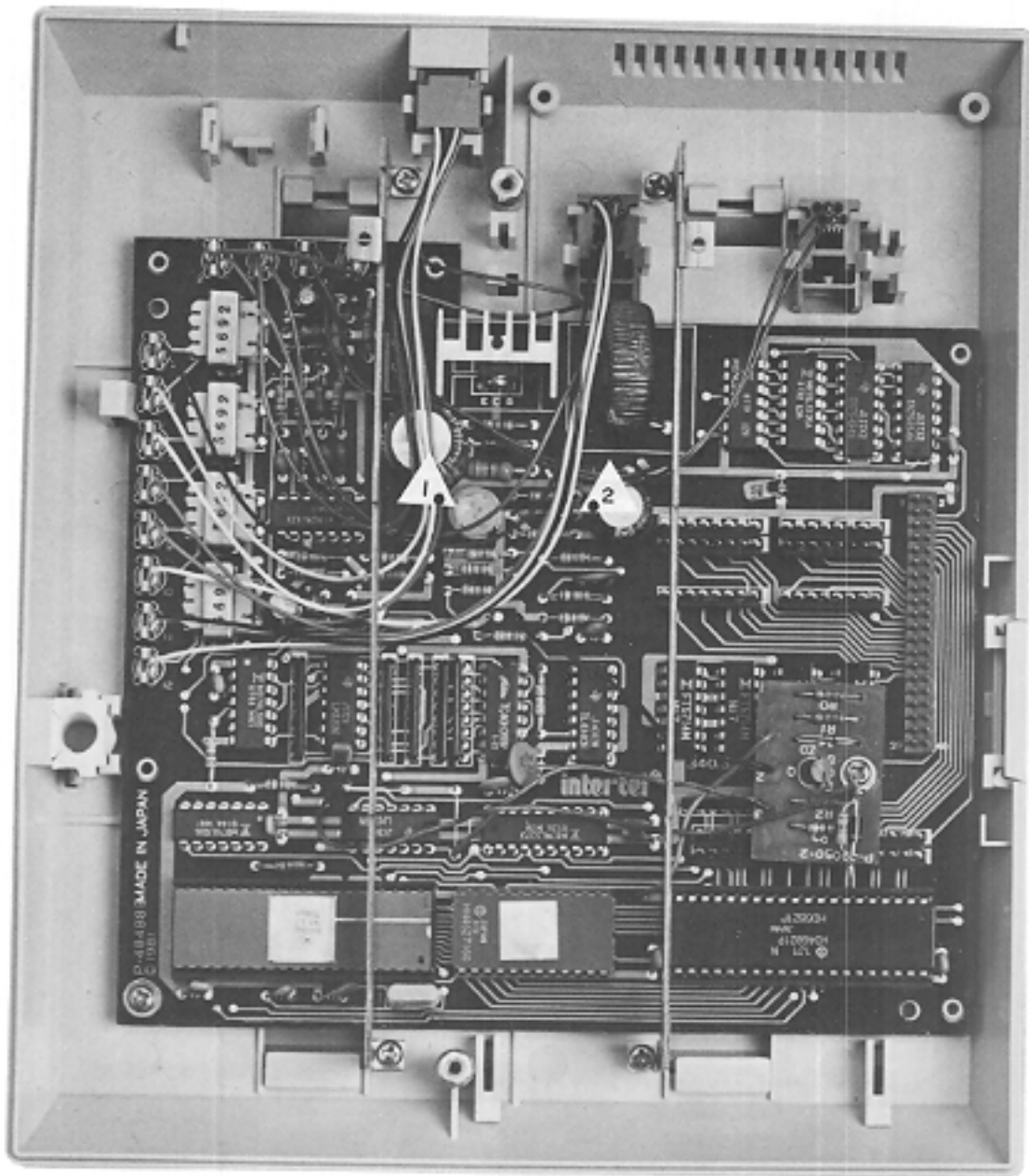
5.0V ADJUST (R5)

5.0V T.P. (CR4)

Figure 1-23. 3532D DSS/BLF Control PCB

30 DIRECT STATION SELECT KEYS
AND STATUS LAMPS

Figure 1-24. 3030D DSS/BLF

50 DIRECT STATION SELECT KEYS
AND STATUS LAMPS

Figure 1-24, 3000D DSS-BLF

FEATURES

1.00 INTRODUCTION

This section contains the purposes, definitions and operating instructions associated with all operational features of the INTER-TEL Stored Program Key (SPK) system. Where practical, general telephone terminology is used to describe the precise operation of the system. More condensed feature operating instructions can be found in the *SPK User Guide* also available from INTER-TEL under separate cover.

Some features are fixed by the version number of the software; others are hardware switch-selectable or software programmable by installation personnel. All features may be divided into the following categories:

A. Internal Communications. These features are associated with station-to-station communications within the same SPK system. Refer to Section 2.00.

B. External Communications. These features are associated with calls that are connected to C.O. lines. Refer to Section 3.00.

C. Moving Calls and Locating Personnel. These features are associated with transferring calls within the system and locating personnel. Refer to Section 4.00.

D. DSS/BLF Station Special Features. These features are associated with the optional Direct Station Selector and Busy Lamp Field (DSS/BLF). Refer to Section 5.00.

E. On-Site Programming. These features include the programming parameters provided for the SPK system. Refer to Section 6.00.

F. Programmable Station Hardware Features. These features include those programmable by hardware switches inside a keyset. Refer to Section 7.00.

G. Diagnostics and System Self-Testing. These features include those associated with diagnostics and testing of the SPK system. Refer to Section 8.00.

H. System RS-232 Outputs. These features include those associated with the RS-232 port outputs. Refer to Section 9.00.

I. Single Line Electronic Set Features. These features include those associated with the single line electronic sets. Refer to Section 10.00.

J. Type 2500 S/L Sets. These features include those associated with standard 2500 S/L sets. Refer to Section 11.00

K. Keyset Line Access. These features include those associated with line access on the variety of SPK keysets. Refer to Section 12.00.

2.00 INTERNAL COMMUNICATIONS

This section defines the features associated with station-to-station communications, including:

    Automatic Intercom Availability
    Private Multi-Path Intercom Calls
    Two-Digit Dialing or Single Key DSS/BLF
    Three-Digit Dialing or Single Key DSS/BLF
    Incoming Intercom Alert Tone
    Full-Duplex Handsfree Intercom Calls
    Microphone ON/OFF Indication
    Private Intercom Calls
    Automatic Intercom Callback
    Handset/Handsfree Control
    Called Party Forced Release
    Intercom Camp-On
    Call Waiting Signal
    Call Forwarding
    Consultation Hold
    Preset Call Forwarding (Station Programmable)
    Intercom Transfer
    Intercom Security Tone (System Programmable)
    Do-Not-Disturb

2.01 Automatic Intercom Availability

Easy availability of an intercom dialing system provides for for rapid and efficient access to pushbutton dialing and the many other possible system features.

On the SPK system, automatic intercom availability means that a free intercom is automatically available for dialing any time you take the handset off-hook and hear an intercom dial tone over the handset; or, press the ON/OFF key, and hear an intercom dial tone over the internal speaker. (Intercom dial tone may be differentiated from outside dial tone by its higher frequency.)

If there are eight intercom channels in use, any caller trying to place an intercom call receives an "all circuits busy" signal (short single tones).

2.02 Private Multi-Path Intercom Calls

The private multi-path intercom calls feature guarantees that your voice path cannot be broken into by any other caller. Instead, the SPK system allows the introduction of special tones into the voice path to signal that a call is camped-on or waiting on hold to communicate with you.

The SPK system supports up to eight private intercom calls simultaneously. After you access the

intercom and complete dialing, the system automatically selects an intercom path and completes the private call. If there are eight calls active, any caller trying to place an intercom call receives an "all circuits busy" signal (short single tones). Also with eight intercom calls active, any outside call ringing into the operator cannot be transferred to another station since the transfer requires an intercom path.

2.03 Two-Digit Dialing or Single Key DSS/BLF for Multi-Line Sets

Two-digit or single key dialing boosts rapid access to communication paths. By simply dialing a two-digit number (10-89) on a keyset, or by pressing a single key on the optional DSS/BLF, you may place an intercom call to any keyset in the SPK system. The two-digit extension number is programmable.

2.04 Three-Digit Dialing or One Digit DSS/BLF for Single Line Sets

All single line stations can be accessed by pressing the pound (#) key before the two-digit station code, ranging from 10 to 57. All single line stations except the last eight can be accessed by a single key on an optional DSS/BLF. The three-digit station number is programmable.

2.05 Incoming Intercom Alert Tone

An intercom alert tone provides a reliable means of alerting you to an incoming call. By taking advantage of this feature you can eliminate the possibility of any invasion of privacy which might be incurred by having your microphone turned on without your knowledge.

The SPK incoming intercom alert tone is an audible double beep which occurs at a station receiving an incoming intercom call. After the incoming intercom alert tone, the caller may request the desired party by name.

2.06 Full-Duplex Handsfree Intercom Calls

Full-duplex handsfree intercom calls allow called parties to communicate freely without the handset and without the need for either party to wait to talk until another has stopped talking ("voice switching").

To acknowledge a full-duplex intercom call handsfree, simply answer "Yes" in a normal voice after hearing the intercom alert tone and the voice an-

nouncement of the caller. You may carry on conversation in a normal voice.

2.07 Microphone ON/OFF Indication

A microphone ON indication confirms the precise transmission of your voice over the microphone in the handsfree mode. It functions with the incoming intercom alert tone (see Section 2.05) to further safeguard the privacy of your conversation against unwanted listeners.

The SPK microphone ON indication consists of a lamp under the ON/OFF key which lights whenever the amplification level of the handset microphone is elevated to operate in the handsfree mode. This occurs when receiving an intercom call on any keyset, unless station option 4 (ring intercom first —see Section 680-100-400) is programmed. It will also occur when placing an intercom or outside call from a station set that has switch 3 closed (full-duplex speakerphone) inside the keyset. When switch 3 is closed, pressing the ON/OFF key is the same as lifting the handset and all station communication may be conducted handsfree. To terminate calls in this mode, press the ON/OFF key a second time. This will act the same as hanging up the receiver.

NOTE: On stations which have been adapted for full-duplex speakerphone operation (DIP switch 3 closed), an external speaker must be connected to eliminate feedback.

2.08 Private Intercom Calls

The private intercom calls feature ensures that the receiving party answers your call manually, and that there is no voice announcement.

To place a private intercom call, simply press the pound (#) key after dialing the extension number and waiting for a double beep. This causes the called party's phone to ring with short continuous beeps, a signal that the caller wishes to speak privately. To answer, the called party must lift the handset or press the ON/OFF key.

NOTE: If the called party elects to press the ON/OFF key, privacy is, of course, eliminated on the receiving end.

You may also receive privately all intercom calls arriving at your station by programming station

option 4 (ring intercom first). In this case, you must always answer by lifting the handset or pressing the ON/OFF key, regardless of whether the calling party desires a private call. See Section 680-100-400.

2.09 Automatic Intercom Callback

Automatic intercom callback assures you of access to a busy station as soon as that station becomes available. This feature differs from intercom camp-on (see Section 2.12) in that waiting off-hook is not necessary.

After reaching a busy party and hearing a busy signal, you may queue onto that extension by pressing the pound (#) key, listening for intercom dial tone and hanging up. You will then receive continuous short double beeps from the station when the called party becomes available. Pick up the handset or press the ON/OFF key and you will be automatically connected. If the callback is not answered within 15 seconds, the callback is canceled.

The maximum number of callbacks allowed is 25 per system (intercom or C.O. line) and 1 per station.

NOTE: If the executive priority option (DIP switch 2) is closed, callbacks will not be allowed from that station.

2.10 Automatic Handset/Handsfree Control

Automatic handset/handsfree control maximizes system versatility by allowing you to switch easily between handset and handsfree operation.

Switch 3 inside the keyset should be closed for this feature to function properly. To switch from handset to handsfree control during an outgoing intercom call, simply press the ON/OFF key and hang up. To switch from handsfree to handset control, lift the handset.

NOTE: On some station models which have switch 3 closed, an external speaker must be connected to eliminate feedback.

To switch between handset and handsfree control during an incoming intercom call, simply hang up or pick up the handset. The ON/OFF key will light to advise you when you are in the handsfree mode.

2.11 Called Party Forced Release

Called party forced release helps you to switch

quickly from an intercom call received by your station to a C.O. line.

After a handsfree conversation, release the called party by pressing any unused line key.

2.12 Intercom Camp-On

When calling a party that is busy, you may use the "camp-on" feature to assure you of communication with the party as soon as the station becomes free.

To camp on, simply wait until the busy signal (short single beeps) ceases after calling the busy extension. Note that the busy signal may not cease if another party is already camped-on. You will receive music-on-hold or tic-tone (if either is implemented for your system) until the called party answers.

NOTE: A continuous interrupted beep indicates that a previous camp-on is in effect.

2.13 Call Waiting Signal

The call waiting signal ensures that important attempts to communicate with you will not go unnoticed.

The SPK call waiting signal is a fast-flashing HOLD/FWD key and one double tone heard which can be heard on the handset during a call. This indicates that there is another call "camped-on" or waiting to be answered. Note that the calling party will not hear or see any of these signals.

Station DIP switch 5 must be enabled to hear the call waiting signal on the handset.

2.14 Call Forwarding

The call forwarding feature frees you from forced attendance at a particular station by allowing you to forward all your calls to another keyset.

To forward all your calls, simply lift the handset, press the HOLD/FWD key, dial the extension number where you wish to receive the calls, and hang up. The HOLD/FWD key will flash at a medium rate (1 per sec, 60 IPM), indicating that all calls have been forwarded to another station.

Only the station receiving the forwarded calls can reach the station which initiated the call forwarding.

To release a phone from the call forward mode, lift the handset, press the HOLD/FWD key and hang up. The HOLD/FWD lamp will go out; queues and ring-in lines will not forward; and a call on hold will not forward on recall.

2.15 Consultation Hold

Consultation hold grants ready access to all the consultation resources available to your system during an intercom call, without need to disconnect and redial.

To place an intercom call on hold in order to "consult" with another station, press the HOLD/FWD key and then dial (within 4 seconds) the desired intercom number, or (for an outside call) a line number and the outside number of the party that you wish to consult. The HOLD/FWD lamp will flash. When the party you are consulting hangs up, you will be reconnected to the call on hold. Replacing the handset will connect you handsfree to the waiting party.

NOTE: Consultation on hold can only be used with both stations off-hook.

2.16 Preset Call Forwarding (Station Programmable)

When a preset forward extension is specified with station options 7 and 8, calls will be forwarded to that station based on the station options set and the station activity.

Intercom calls may be forwarded only when the station is busy. Central Office (C.O.) calls, however, may be forwarded when the station is busy or when there is no answer within approximately 16 seconds.

2.17 Intercom Transfer

By pressing the XFR/CONF key during an intercom call, you may transfer the intercom call to another station. This applies to both outgoing and incoming intercom calls with both parties in the off-hook mode of operation.

2.18 Intercom Security Tone (System Programmable)

If this system option is selected, the called party on a handsfree call will hear a tone every 30 seconds to indicate an active microphone.

2.19 Do-Not-Disturb

A station in the do-not-disturb mode will not receive any paging announcements or incoming calls. The outgoing features, however, will still be operational, as will C.O. lines set to ring at that station.

By going off-hook, pressing the HOLD/FWD key followed by the asterisk (*) key and hanging up, you can place your station in the do-not-disturb mode. As a signal to the operator, the DSS key for your station (if the system is equipped with an optional DSS/BLF) will flash at a slow rate and an attempted call will produce a busy signal. Switch 1 inside the keyset must be closed for the do-not-disturb feature to function.

A station will ring in the night mode (for incoming C.O. calls, but not for intercom calls) if switch 4 (night station) inside the phone has been set in the closed position when the station is in the do-not-disturb mode. If a station in do-not-disturb has a preset forward station, the preset forward station will receive the calls for the station in do-not-disturb.

To release do-not-disturb, lift the handset and press the HOLD/FWD key.

Placing the operator's station in do-not-disturb places the system in night ring mode.

3.00 EXTERNAL COMMUNICATIONS

This section defines the features associated with calls that are connected to C.O. lines. Features discussed include:

Line Status Indicators
Outgoing Call Multi-Line Key Selection
C.O. Line Queuing
Privacy on C.O. Lines
All Pushbutton Dialing
Last Number Redial
Speed Dialing of Frequently Dialed Numbers
Outside Dial Tone Restore (System
 Programmable)
Line Key Skipping
Automatic Handset/Handsfree Control
On-Hook Monitoring/Dialing
Music-On-Hold (Optional)
Automatic C.O. Line Release (System
 Programmable)
Hold Recall Time (System Programmable)
Operator's Recall Time (System Programmable)
Intercom Incoming Call Waiting Signal

Call Splitting
Call Hold
Conference Calls (Two Inside and One Outside,
    Optional Conference PCB Required)
Conference Calls (Two Outside and One Inside,
    Optional Conference PCB Required)
Distinctive Central Office Ring Indications
Dial "9" Line Access (2500 and SLE Only)
Line Key 24 Outgoing Rotary (System
    Programmable)
Tenant Service (Station Programmable)
MPK Station Line Control
Direct Inward System Access (DISA)
Preset Forward — No Answer
Preset Forward — Busy
1664T Option
C.O. Line/Station Monitoring (Station
    Programmable)
Background Music
Night Ring

3.01 Line Status Indicators

Line status indicators communicate quickly and precisely the status of each C.O. line in the system, thereby eliminating the need for guesswork or time-consuming trial-and-error methods.

The status of lines 1-24 are indicated by the light-emitting diode (LED) located in each line key. The various flashing rates of the LED's indicate the status of each line where "IPM" is Interruptions Per Minute:

Double flash - Indicates a line you have accessed.

Slow flash - Indicates an incoming or
(every 2 secs, transferred call is
30 IPM) on that line.

Medium flash - Indicates the line is on hold on
(every sec, your station set.
60 IPM)

Fast flash - Indicates that a line placed on hold
(twice a sec, or transferred is recalling back to
120 IPM) the station.

Steady light - Indicates that the outside line is in
use by another station.

Slowest flash - Indicates that you are in
(every 4 secs, conference on this line.
15 IPM)

3.02 Outgoing Call Multi-Line Key Selection

Multi-line key selection reduces waiting time for initiating important outside communications. The SPK system allows you to choose one of 4, 10, 12, 16 or 24 line keys (depending on your keyset) to place an outside call. On any but the 4- and 10-line keysets, the last key accesses the 9-line rotary group if the 9-line rotary option is selected. On the 10-line keyset, the SPCL key access the 9-line rotary group.

3.03 C.O. Line Queuing

Use of the C.O. line queuing feature ensures your access to a busy line as soon as it becomes available.

Queue onto a line by lifting the handset, pressing the busy line key (you will hear a busy signal), pressing the pound (#) key and hanging up. The station set will produce long bursts of tone and the line key will flash at a slow rate (once every 2 seconds, 30 IPM) when the line becomes available. To place a call, lift the handset, press the line key flashing at the slow rate and dial the desired number.

There may be one line queue per station or a maximum of twenty-five queues per system. In the rare instance where a ring-in occurs during the 1.2-second disconnect of the C.O. line you are queuing, you may hear the C.O. line ring-in on your station before it is disconnected, and you are re-entered in the queue.

3.04 Privacy on C.O. Lines

Privacy on C.O. lines safeguards your conversations from unwanted access by other parties.

To ensure privacy, any C.O. line which is in use may not be accessed by any other station unless the conferencing feature (see Sections 3.19 and 3.20) is utilized.

3.05 Pushbutton Dialing

Pushbutton dialing, faster and more convenient than conventional rotary system dialing, has become a standard of most modern key systems. This feature is standard on all SPK keysets. The pushbutton dialing on this system can be serviced by non-DTMF Central Offices.

3.06 Last Number Redial

Last number redial saves dialing time when you reach a busy outside number and wish to redial automatically. You may also use last number redial if you have not hung up but have been disconnected and wish to re-establish the connection.

To use the last number redial feature after dialing a busy number or being disconnected, simply press the DIAL/MSG key without hanging up. This causes the system to automatically drop and reaccess the C.O. line, and to redial the number.

To redial the last number dialed after hanging up; lift the handset; select an outside line key; and press the DIAL/MSG key and the asterisk (*) key. The system will automatically redial the last number dialed. Note that this feature will not work if the last number dialed manually was longer than 10 digits.

3.07 Speed Dialing of Frequently Dialed Numbers

To save you dialing time, each multi-line station may store up to 10 frequently-dialed numbers (each up to 10 digits in length) which may then be dialed automatically by pressing the DIAL/MSG key followed by a single digit on the dial pad.

Numbers are stored with the handset on hook by pressing the DIAL/MSG key, any single digit 0-9 on the dial pad for the memory location, followed by the frequently-used number that you wish to store. Repeat for all numbers that you wish to store, choosing a new memory location for each number. Then press the ON/OFF key.

Stored numbers are erased by disconnecting the line cord to the station set or KSU, or by entry of a new number in a specific memory location. Onboard battery back-up cannot prevent loss of these numbers if power to the station is lost. System battery back-up can prevent the numbers from being lost during AC power outages.

To dial a stored number, simply lift the handset, select an available line key, press the DIAL/MSG key and the memory code. Forgetting to press an available line key before pressing the DIAL/MSG key and the memory code, will erase the stored number.

3.08 Outside Dial Tone Restore

Outside dial tone restore prevents others from accessing a line which you wish to keep in order to place another call.

After making an outside call, simply press the line key a second time instead of hanging up. The system will automatically restore the outside dial tone. On rare occasions, you may be connected to an incoming call at this point.

3.09 Line Key Skipping

Line key skipping saves you from having to hang up and wait for dial tone each time you finish a call and want to start another.

While on an outside line, you may select another line by pressing a second outside line key. This will automatically release the first line and connect you to the second.

3.10 Handset/Handsfree Control

Optional handset/handsfree control provides added system versatility for external communications as well as for internal communications (see also Section 2.06).

Switch 3 inside the keyset should be closed for this feature to function properly. To switch from handset to handsfree control during an out-going call, simply press the ON/OFF key and hang up. To switch from handsfree to handset control, lift the handset.

NOTE: On some station models which have switch 3 closed, an external speaker must be connected to eliminate feedback.

To switch between handset and handsfree control during an incoming call, simply hang up or pick up the handset. The ON/OFF key will light to advise you when you are in the handsfree mode.

3.11 On-Hook Monitoring/Dialing

With the on-hook monitoring feature, stations not equipped with optional external speakers may be used to monitor handsfree an outside line such as time, weather, recorded messages and waiting on hold.

To monitor on-hook, simply press the ON/OFF key and a line key, then dial the outside number.

When this feature is in use, the handset microphone is not activated. For this reason, you may not speak to

an outside party although the station speaker is connected to amplify the receiving part of the call.

3.12   Music-On-Hold

Music-on-hold not only reassures possible customers that they are still connected, but also serves to make the wait as pleasant as possible.

Any SPK station or outside line placed on hold will receive music-on-hold, if so optioned. The audio tuner must be customer-provided.

3.13   Automatic C.O. Line Release (System Programmable)

Automatic C.O. line release allows you to help dictate the conditions under which the system will retain or release a C.O. line.

The SPK automatic C.O. line release feature ensures that only 100 millisecond interruptions on a C.O. line that is on hold will automatically release that line. This can be optionally set at 1.2 seconds by entering system option 6 (1.2 second loop release) into the system.

3.14   Hold Recall Time (System Programmable)

The capability to program a hold recall time not only ensures that calls placed on hold will not go unanswered, but also ensures that the hold recall time for returning an unanswered call on hold to the sender is the most appropriate for your particular office environment.

Because of the programmable hold recall time feature, a C.O. call that has been placed on hold on a station will ring back to that station after a programmable hold recall time period has expired. This time is initially set to 60 seconds but may be reprogrammed from 1 to 255 seconds. See also Section 3.15.

3.15   Operator's Recall Time (System Programmable)

The operator's recall time functions with the hold recall time to ensure doubly that no call goes unanswered. This time is initially set to 60 seconds but may be reprogrammed from 1 to 255 seconds.

Because of this feature, a C.O. call that has been placed on hold will automatically ring back to the operator after ringing the station, if no action at the station was taken within the second programmable

hold recall time parameter. The call may ring at the operator's station for up to 10 minutes.

If the system is in night mode, a call will not automatically return to the operator but will remain ringing at the original station for 10 minutes.

3.16   Intercom Call Waiting Signal

An intercom call waiting signal alerts you to a waiting intercom call without jeopardizing the privacy of your C.O. call.

The intercom call waiting signal feature causes a station on an intercom call or a C.O. call to receive one double beep over its handset (not audible to the outside party). The HOLD/FWD key will flash at a fast rate (twice per second) when an intercom call is incoming to the station (camped-on). As soon as the outside call is terminated, the intercom call will be connected automatically or the station may split (see Section 3.17) between the two calls.

Switch 5 in the keyset must be in the closed position to hear the intercom call waiting signal.

3.17   Call Splitting

Call splitting allows you to switch easily between an ongoing outside call and a camped-on intercom call.

To use this feature during an outside call, simply press the HOLD/FWD key. This places the outside call on hold and connects the intercom call to the station. To return to the outside call, press the line key flashing at the medium rate (once a second, 60 IPM). This returns the intercom call to a camped-on condition and reconnects the outside call that was placed on hold.

3.18   Call Hold

With the call hold feature, a station may be used in any other available manner during a C.O. call.

Place a C.O. call on hold by pressing the HOLD/FWD key. The line key of the held call will flash at a medium rate (once a second, 60 IPM) on your key station and you will hear an intercom dial tone. All keysets will flash if system option 4 is enabled.

3.19 Conference Calls (Two Inside Parties, One Outside Party, Optional Conference PCB Required)

Using the versatile SPK conference call feature, two inside parties and one outside party can share a conversation on the same line.

To set up a conference call between two inside parties and one outside party while you are on an outside call, ask the outside party to hold. Then press the XFR/CONF key and dial the extension number of the inside party to be conferenced. After you instruct the inside party to lift the handset, press the XFR/CONF key. This will bring all parties together in a conference. Your XFR/CONF lamp will be lit steady and the XFR/CONF lamp of the second party will be flashing. To end the conference call, press the asterisk (*) key and replace the handset. All parties will be disconnected.

If necessary you may split to another incoming intercom call by pressing the HOLD/FWD key. You may then re-enter the conference by pressing the XFR/CONF key, hookflashing and pressing the XFR/CONF key again.

NOTE: If the outside party chooses to hang up while you are still split to the intercom call, the conference will be dropped.

To eliminate only yourself from the conference call, hang up. The outside party will still be connected to the remaining inside station set.

Only one conference at a time can be set up from a station. If you choose to leave the conference temporarily, press the HOLD/FWD key. You can re-enter the conference by pressing the XFR/CONF key.

To drop the second inside party only, place the outside party on hold by pressing the HOLD/FWD key. Pressing the line key will then reconnect you to the outside line.

If the second inside party in a conference goes on-hook, presses the HOLD/FWD or certain other keys twice, the second inside party cannot re-enter the conference and the outside party will be connected to the other inside party.

3.20 Conference Calls (Two Outside Parties, One Inside Party, Optional Conference PCB Required)

The conference call feature can also be used to set up a conference between two outside parties and one inside party (see also Section 3.19).

To arrange a conference call between two outside parties and one inside party, select an available line key and dial the first outside party. Ask the party to hold, press the HOLD/FWD key, call the second outside party to be conferenced and press the HOLD/FWD key again. With both outside parties holding, press the XFR/CONF key. This will bring all parties together in a conference. To end the conference, press the asterisk (*) key and replace the handset. All parties will be disconnected.

To split to an incoming intercom call waiting, just hang up. You will be automatically connected to the incoming intercom call. To split to another incoming C.O. call, hookflash and press the slow (once every two seconds, 30 IPM) flashing line key.

To eliminate only yourself from the conference call, simply hang up. The other two parties will still be connected until either party hangs up. (Because of the loop start function, it may be necessary to press the asterisk [*] key as well.) To re-enter, pick up the handset and press the XFR/CONF key.

Only one conference at a time can be set up from a station. If you choose to place the other parties on hold, you can re-establish the conference by pressing the XFR/CONF key. This will conference the calls on hold on the two lowest number line keys.

If either outside party hangs up during conferencing, dial tone will be heard by both remaining parties. To eliminate the dial tone, place the remaining outside party on hold and press the medium (once a second, 60 IPM) flashing line key to resume conversation.

3.21 Distinctive Central Office Ring Indications

An incoming C.O. call beeps distinctively for two seconds every three seconds when the station is on-hook. If the station is off-hook and station DIP switch 5 has been set, the call will beep once every 15 seconds through the handset. However, only the inside party will hear the beeping tone.

3.22 Dial "9" Line Access (2500 and SLE only)

Single line stations may make outgoing central office calls by going off-hook, waiting to hear dial tone and

then pressing 9. This selects an outgoing-only line from lines 24 through 32 (25 through 32 if system option 9 is not in effect).

3.23 Line Key 24 Outgoing Rotary (System Programmable)

If this system option is programmed, the last line key on an SPK keyset or the SPCL key on an MPK/II keyset may select the last 9 lines for outgoing calls only. These calls may be held or transferred to other stations if so desired. If this option is not selected, calls within the outgoing rotary group may not be transferred to SPK stations and are available for use only on single line extensions.

3.24 Tenant Service (Station Programmable)

Tenant service allows the customized distribution of C.O. lines among stations so as to prevent overuse of certain lines and underuse of others. This is especially useful for keysets with fewer than 24 line keys; or, when these keysets are divided among different businesses with a common KSU but which do not wish to use the same lines. Without tenant service all these keysets would use the same subset of total lines available and completely neglect the others.

How the C.O. lines are distributed on a given station determines to which tenant group the station belongs.

The first 20 lines may be assigned in groups of 4 to appear in order on line keys 1-20 in the following sequence:

Tenant 1 — 1-4, 5-8, 9-12, 13-16, 17-20 (Normal)

Tenant 2 — 5-8, 9-12, 13-16, 17-20, 1-4

Tenant 3 — 9-12, 13-16, 17-20, 1-4, 5-8

Tenant 4 — 13-16, 17-20, 1-4, 5-8, 9-12

Tenant 5 — 17-20, 1-4, 5-8, 9-12, 13-16

3.25 MPK Station Line Control (Station Programmable)

When an MPK/II keyset is used with the SPK system, lines 11-32 may be transferred to the MPK station under the SPCL key. This is possible even though the MPK station may only make outgoing calls on lines 1-10. Lines 24-32 may be used if system option 9, outgoing rotary is enabled.

3.26 Direct Inward System Access (DISA)

By dialing into the system on a C.O. line that has been dedicated to DISA access, you may make intercom calls or select outside lines. This feature will allow system access (DTMF telephones) from a remote location. You will be placed on hold during the time the system is signalling the call. If an outside line is selected, a direct connection is established to the line if it is available.

To place a DISA call, dial the 7-digit number of the line used for DISA and then dial the number of the station you wish to access. To access a C.O. line, press the pound (#) key twice followed by the two-digit line number (01-24) after dialing the 7-digit line used for DISA.

3.27 Preset Forward — No Answer

If so optioned in the data base, a C.O. line or lines which are programmed to ring-in on a station may be forwarded after 15 seconds to a predetermined station. Any C.O. call transferred to the station will forward to the preselected extension after the transfer recall time has expired.

3.28 Preset Forward — Busy

If so optioned in the data base, calls (C.O. or intercom) which are programmed to ring-in to a station may be forwarded if busy to a predetermined station.

3.29 1664T Option

If so desired, the system may be configured for use with Model 1664T keysets only. This option allows the 16th line key to function as line 16. Otherwise, the 16th key will function as line 24 of a Model 2480T keyset. Station option 3 may not be specified for any stations if system option 16 is enabled.

3.30 C.O. Line/Station Monitoring (Station Programmable)

Any station on which station option 2 is enabled may monitor C.O. lines from which it is not restricted. To monitor, specify the special access code followed by either the appropriate line key or the station number using the line. You may listen to both sides of the conversation with no indication to either party that the call is being overheard.

C.O. line/station monitoring may not be activated when the selected station is not being used on a C.O. call.

3.31 Background Music

Any station may listen to the music-on-hold source via the speaker in the station by entering a special access code. Normal calling functions are not disrupted when this feature is enabled. The music may be turned off by the same access code.

3.32 Night Ring

This feature provides flexible system operation after hours. Placing the operator's station in the do-not-disturb mode enables night ring. When the system is in night ring, all incoming calls flash on all keysets and audibly ring on those keysets with DIP switch 4 enabled. An incoming call may be answered from any station during night ring operation.

With the addition of the optional MOD II PCB, external night ring is provided. The MOD II PCB provides both external night ring contacts and night transfer contacts.

The external night ring contacts (RC1 and RC2) provide a convenient installation point for attaching any external ringing equipment. These contacts are a "dry" pair which follows the ring cycle of a C.O. line during night ring. All external ringing equipment must be customer-provided; RC1 and RC2 provide only a contact closure.

The night transfer contacts (NTRB, NTRS, NTRM) provide a contact closure during night ring. During the day, the closure is between NTRB and NTRS. When the system is in night ring, the closure is between NTRM and NTRS. This closure may be used to enable such ancillary equipment as outside lighting fixtures or sprinkler systems.

4.00 MOVING CALLS AND LOCATING PERSONNEL

This section defines the features associated with transferring calls within the system and locating personnel. The features discussed include:

Call Transfer
Call Transfer to Hold
Transfer Recall Time (System Programmable)
Reverse Transfer
Transfer Cancel (Call Screening)
Transfer Search

Paging Zone 1-6 (System Programmable)
Message Waiting Indication
Message Center (System Programmable)
Executive Priority Call Waiting
External Paging Speakers
Account Codes
Multiple Speed Dialing
Talkback Speaker Paging (Optional MOD II PCB Required)
Station Transfer Security Number

4.01 Call Transfer

The call transfer feature allows any C.O. call to be transferred to any other station in your SPK system, even if the station is busy.

To transfer a call, answer the call (press the slow flashing line key); press the XFR/CONF key and dial the desired extension number on the keypad. Voice announce the call, if desired, and then hang up.

4.02 Call Transfer to Hold

The call transfer to hold feature allows any C.O. call to be transferred to hold at any other station in your SPK system. The transferred call will hold without ringing at the station until answered.

To transfer a call to hold, answer the incoming call (press the slow flashing line key), press the XFR/CONF key dial the desired extension on the keypad. When you press the HOLD/FWD key, the call will appear on hold at the dialed extension. You will be returned to the intercom dial tone; you can then hang up.

4.03 Transfer Recall Time (System Programmable)

A transfer recall time, like the hold recall time discussed in Section 3.14, helps ensure that no call goes unattended. A transferred call that has not been answered within a specific programmable time limit (the "transfer recall time") will automatically ring back to the station that made the transfer.

4.04 Reverse Transfer

Reverse transfer allows you the freedom to move from station to station without risking the loss of your calls.

With the reverse transfer feature, you can answer from any station any C.O. call that is ringing or was

transferred to hold at another station, unless the station is in the do-not-disturb mode.

To reverse transfer a call, lift the handset at any station, dial the extension where the call is ringing or holding and press the XFR/CONF key. The call will then appear at the station on hold (medium flashing line key, 60 IPM). To establish connection, press the line key flashing at the medium rate.

Reverse transfer is allowed for calls which are ringing at the operator's station but a single line set cannot be used to make the reverse transfer.

4.05 Transfer Cancel (Call Screening)

The transfer cancel feature may be used to return transferred calls to your station (call screening) if the party to which the call is transferred is not there or refuses the call.

If the party requested refuses the transferred call (before going on-hook to complete the transfer) or is unavailable, press the medium flashing line key (once a second, 60 IPM) instead of the hookswitch. This action will cancel the transfer and reconnect the outside party to your station set.

4.06 Transfer Search

The transfer search feature allows a station to search through a series of extensions to locate a party before transferring a call.

After answering the outside call, press XFR/CONF and dial the first extension. Announce the call and hang up or (to continue the search), press XFR/CONF and dial another extension. Repeat as desired until you have found the party, then hang up.

4.07 Paging Zone 1 through 6 (System Programmable)

Any MPK station may also be used as a versatile public address device. Paging announcements may be made to all or specific pre-determined groups of key stations.

To make a paging announcement, lift the handset and press the asterisk (*) key followed by any single digit on the keypad. The digit pressed will select the group of stations or external devices to receive the announcement. Unless prgrammed otherwise, all stations are assigned to page zone 1 only.

Digits Pressed	Extensions Accessed
* 1 - * 6	Internal page zones
* 7 - * 9	External page zones
* 0	All external areas and talkback speakers

After you hear the double beep on an internal page, you have approximately 12 seconds to make the announcement. On an external page you may make your announcement immediately after dialing the zone.

Single line sets may not be paged but may place a page to any zone.

4.08 Message Waiting Indication

The message waiting indication feature can be used to leave and receive messages at the message center station.

When the DIAL/MSG lamp on a station flashes at a fast flash rate (twice a second, 120 IPM) it indicates that there is a message waiting at the message center. To activate this signal at another station, lift the handset, dial the extension and press the DIAL/MSG key. This will activate the message waiting lamp on the dialed extension and automatically transfer you to the message center where you may leave a message.

To release the message waiting indication, lift the handset and dial the message center. The message lamp will stop flashing as soon as the handset is lifted.

4.09 Message Center (System Programmable)

A message center provides a convenient and reliable central location where messages may be given or received.

Any station may be the message center (the operator's station is the default message center). Messages may be received for stations which are unattended or busy when a calling extension presses the DIAL/MSG key (see Section 4.08, Message Waiting Indication). The unattended or busy station will then receive a visual message waiting signal (DIAL/MSG key flashes twice a second, 120 IPM).

4.10 Executive Priority Call Waiting

Executive priority allows you to signal, without invading the privacy of a busy station, that you wish to talk.

To use executive priority call waiting, DIP switch 6 inside the keyset must be closed. After dialing the busy extension, press the pound (#) key to signal the station. The station will receive a double beep for each time you press the key (but no more than once every 4 seconds). The station HOLD/FWD will also flash at a fast rate (twice per second, 120 IPM). You will not hear the double beep. As soon as the busy station is free, you will be automatically connected.

Executive priority call waiting cannot be used to signal a station that has a call camped-on or that is in the do-not-disturb mode.

Stations with executive priority call cannot use the intercom callback function.

4.11 External Paging Speakers

External paging zones 7, 8, and 9 may be accessed via paging codes, *7, *8, *9. The MOD II PCB is necessary for external paging. If so desired, all these zones plus all the talkback speakers may be paged simultaneously by dialing *0.

4.12 Account Codes

This programmable feature is intended for those users requiring tracking or billing on a day-to-day basis.

The SPK system will output an account code in the righthand column of the dialed number field of a Station Message Detail Recording (SMDR — See Section 680-100-601). The total dialed number field is six characters long.

To enter the account code during an outside call, press the asterisk (*) followed by the account code. When the call is terminated, the called telephone number and account code will be printed.

4.13 Multiple Speed Dialing

The speed dialing section of the SPK multi-line keyset may be used to dial multiple numbers in series. This feature should be used for Specialized Common Carrier type calls.

To make a Specialized Common Carrier Call, often a sequence of three or more numbers are needed: the Specialized Common Carrier number, an account code and the long distance number to be dialed. Therefore, three speed dial storage locations must be used to make one call. However, when the DIAL/MSG key, which normally redials the most recently dialed number, is pressed a second time, the present line is dropped and re-accessed. This problem is solved by enabling the system 12-second redial option (option 5). This will allow multiple stored number locations to be sent before the line is re-accessed. The station DIP switch option (switch 1) must be removed if the Specialized Common Carrier does not accept a leading 1.

To use the multiple speed dialing feature, select a line key. Press the DIAL/MSG key and the first stored number location. Repeat for the remaining stored number locations.

NOTES: 1) Calls of approximately 10 seconds duration will not be recorded on the SMDR when system option 5 is on.

2) Twelve seconds must elapse after multiple speed dialing before last number redial may be used.

4.14 Talkback Speaker Paging (Optional MOD II PCB Required)

Up to five talkback speakers may be accessed by dialing an access code (#60-#64). A two-way conversation may then take place over the dialed speaker. The MOD II amplifiers are designed to access 8-ohm speakers.

4.15 Station Transfer Security Number

Calls may be transferred to unequipped extensions which are used as parking codes. The reverse transfer feature may be used to recover the calls. For any calls not answered, recall times will transfer the call back to the originator or operator.

5.00 DSS/BLF STATION SPECIAL FEATURES

This section defines the special features that you may use in addition to those basic to call processing. Features discussed are listed below. They include those of the DSS/BLF, Direct Station Selector and Busy Lamp Field, an optional device especially developed for convenient and efficient processing of calls.

Key Functions of the DSS/BLF
Visual Indications of the DSS/BLF
Intercom Calling with the DSS/BLF
Call Transfer with the DSS/BLF
Call Transfer to a Busy Station with the
  DSS/BLF
Call Transfer to Hold with the DSS/BLF
Reverse Transfer with the DSS/BLF
Call Screening with the DSS/BLF
Message Waiting Indication on the DSS/BLF

5.01   Key Functions of the DSS/BLF

Three DSS/BLF models are available for use with the SPK system: the 6460D, the 3532D, and the 3030D. Each of these is described in the following sections:

A. The 6460D DSS/BLF. This model has 60 station keys and 4 special function keys. The station keys may be assigned to keyset or SLE station extensions in three different arrangements. DSS/BLF arrangement assignment is done by setting DIP switches within the DSS/BLF. The first arrangement assigns all 60 keys, beginning with the upper left-hand key in the 60-key field and progressing downward from left to right, to keysets 10 through 69. The second arrangement assigns the first 50 keys to key stations 10 through 59, and the remaining 10 keys to single line stations #10 through #19. The third arrangement assigns the first 20 keys to key stations 70 through 89 and the remaining 40 keys to single line stations #10 through #49. This arrangement is generally used as a second DSS/BLF option.

DSS/BLF keys may not be assigned to single line extensions #50 through #57. The special function keys are permanently assigned the transfer to hold, transfer complete, call waiting, and message waiting functions, from left to right respectively, regardless of the DSS/BLF arrangement.

B. The 3532D DSS/BLF. This model has 32 station keys and 3 special function keys. The DSS/BLF operates in only one arrangement, asssiging the station keys to keyset extensions 10 through 41, beginning with the upper left hand key and progressing downward left to right. The remaining three keys are special function keys assigned to transfer to hold, transfer complete, and call waiting respectively.

C. THE 3030D DSS/BLF. This model has 30 station

keys. The DSS operates in only one arrangement, assigning the station keys to keyset extensions 10 through 39, beginning with the upper left hand key and progressing downward left to right. There are no special function keys.

Two DSS/BLF's are required for fully equipped systems of more than 60 stations, more than 10 SLE instruments or more than 59 stations with SLE instruments.

5.02   Visual Indications of the DSS/BLF

The DSS/BLF provides information about the status of the system with a single glance at the key lamp display. Since each keyset in the system has an assigned key on the DSS/BLF, steady or flashing states of the individual lamps beneath the keys indicate a wide variety of useful information.

A steady lamp on the DSS/BLF indicates that the station is in use. A lamp on the DSS/BLF flashing at a slow rate (once every two seconds, 30 IPM) indicates that the station is in the do-not-disturb mode. A station lamp flashing at a fast rate, (twice a second, 120 IPM) indicates that there is a line recalling from that station. The fast-flashing line key on the associated keyset indicates which line is recalling from the station. This will occur when the recall times have expired.

5.03   Intercom Dialing with the DSS/BLF

To further reduce access time, all stations (except the last eight 2500's or SLE's) may be accessed by pressing a single key on the DSS/BLF.

To place an intercom call from a DSS/BLF, lift the handset of the associated keyset and press the key on the DSS/BLF of the desired extension number. The system will automatically dial the extension and the called party will hear the incoming intercom alert tone.

To place a private intercom call, press the pound (#) key on the associated keyset after pressing the desired extension on the DSS/BLF and hearing a double beep. The called party will then hear a continuous double beep and can either pick up the handset or press the ON/OFF key before answering.

NOTE: If the called party elects to press the ON/OFF key, privacy is, of course, eliminated.

5.04 Call Transfer with the DSS/BLF

An outside call may be transferred to another station using a DSS/BLF, by pressing the key of that extension on the DSS/BLF requested by the outside party and hanging up. (The user transferring the call may voice announce the call before hanging up, if so desired).

5.05 Call Transfer to a Busy Station with the DSS/BLF

Any call can be transferred to a busy station using the DSS/BLF. While on an outside call, press the key of the DSS/BLF that is associated with the desired extension. After you hear the busy signal, complete the transfer by hanging up. This will automatically transfer the call to the busy station. If DIP switch 5 is enabled, the busy station will hear a single tone every 15 seconds as notification that a call is waiting.

5.06 Call Transfer to Hold with the DSS/BLF

To transfer an outside call to hold with the DSS/BLF, answer the outside call, press the key of the DSS/BLF that is associated with the requested extension, voice announce the call, if desired, and press the SPCL 1 key.

5.07 Reverse Transfer with the DSS/BLF

To reverse transfer with the DSS/BLF, pick up the handset and press the extension key from which you wish to retrieve the call. Wait for a double beep and then press the XFR/CONF key. Finally, press the medium flashing (1 per sec, 60 IPM) line key.

5.08 Call Screening with the DSS/BLF

To screen calls with the DSS/BLF, transfer the call to the desired extension. If the called party does not answer or refuses the call, do not hang up. Instead, press the medium flashing line key and ask to take a message before hanging up.

5.09 Message Waiting Indication On the DSS/BLF

To activate the message waiting indication, pick up the handset, press the extension where you wish to leave the message and wait for the tone. Then press the DIAL/MSG key and hang up.

6.00 ON-SITE PROGRAMMING

SPK features the following programs for helping you

to set up and maintain a data base: TEST, INIT, REST, TIME, DISP, and SERV. The SERV program additionally provides seven subprograms: STA (station class of service), SYS (system class of service), OPT (option listing), NUM (intercom number change), CIR (intercom number/circuit assignment cross reference), VER (verify) and EQU (equipped) to aid you in adapting the SPK system to your particular office environment.

6.01 TEST Program

The TEST program checks the Read Only Memory (ROM) and the Random Access Memory (RAM) located on the CPU PCB. This test provides for the installer a printout of the status of the memories and the progress of the test. System operation is disrupted by this routine.

NOTE: When the TEST mode is entered, all user defined programming is erased. A full power off and subsequent INIT will be required.

6.02 INIT (Initialize) Program

Initializing the SPK system with the INIT program establishes the basic status of certain system features. The initialized status of these features is:

1. All keysets can gain access to all outside lines.

2. The operator's extension is 10.

3. The message center is extension 10.

4. All multi-line stations are in paging zone 1.

5. All multi-line stations are in tenant group 1.

6. Station option 6 (toll restriction) is set for SLE's.

7. System option 9 (line key 24 rotary selection) is enabled.

8. The only allowed area code is 800.

9. The transfer recall time is 60 seconds.

10. The hold recall time is 60 seconds.

11. Lines 1 through 24 are set to ring at the operator's station only.

12. All lines are assumed to be equipped.

13. All intercom numbers are assigned sequentially beginning with extension 10 on circuit 1.1 and SL #10 on circuit 11.1.

6.03 REST (Restart) Program

The REST program resets all the hardware in the SPK system without affecting the data base or cycling power.

NOTE: Use of this program will cause all calls and other system activity to be dropped.

6.04 TIME (Set System Clock) Program

This program allows display and change of the system real time clock.

6.05 DISP (Display) Program

This program displays station activities by displaying the ASCII characters transmitted by any one or all stations which correspond to their functions.

6.06 SERV (Service Programming) Program

This program is composed of seven subprograms useful for programming individual stations or for the system as a whole.

A. STA (Station). This SERV subprogram is used to enable or disable feature options (see Section 6.08) for individual stations.

B. SYS (System). This SERV subprogram is used to set up or delete the system-wide options (see Section 6.09).

C. OPT (Option Listing). This SERV subprogram is used to list all codes used to program the system and station feature options.

D. NUM (Intercom Number Change). This SERV subprogram is used to change the intercom extension assignments in order to provide for station moves.

E. CIR (Intercom Number/Circuit Assignment Cross Reference). This SERV subprogram is used to provide a listing of the intercom numbers corresponding to the circuit assignments in order to identify the physical circuit to which an extension code has been assigned.

F. VER (Verify). This SERV supbprogam examines the data base for unassigned, duplicate and invalid intercom extension assignments.

G. EQU (Equipped). This SERV subprogram specifies the C.O. lines actually equipped.

6.07 Programmable Station Features

The STA subprogram of the SERV routine allows you to program an individual station for a wide variety of features.

A. Lines Restricted. Used to restrict a station from certain C.O. lines.

B. Ring-In From Lines. Used to program C.O. lines to ring on any individual station.

C. Station Options. Used to list by code number the software options incorporated for an individual station. Choices include:

Multi-Line Stations

1 — OPX Ring Intercom Always
2 — C.O. Line Monitoring
3 — MPK/II Station
4 — Ring Intercom First
5 — Not Assigned
6 — Toll Restrict
7 — Preset Forward - Busy
8 — Preset Forward - No Answer (C.O. Ring Forward)

SL Stations

1 — OPX Ring Intercom Always
2 — Not Assigned
3 — Not Assigned
4 — Ring Intercom First
5 — Not Assigned
6 — Toll Restrict
7 — Not Assigned
8 — Not Assigned

Code	Explanation
1 —	OPX Ring Intercom Always. Used to force an outgoing private intercom call to always ring the called extension.
2 —	C.O. Line Monitoring. Used to monitor without detection a C.O. line call.

3 — MPK/II. Enables use of an MPK/II keyset on an SPK system. Lines not existing on the MPK/II station may be transferred to the keyset accessed by using the SPCL key. This option may not be enabled if system option 16 is specified.

4 — Ring Intercom First. Used to force a repeated intercom ring on incoming intercom calls; prevents handsfree announcement.

6 — Toll Restrict. Used to inhibit a station from making any long distance calls unless it meets an exception in the master toll restrict table which is incorporated in the SYS program.

7 — Preset Forward - Busy. Used with the preset forward function. If this station is busy when there is an incoming or transferred call, the call will automatically be forwarded to a preset specified station. This option negates the camp-on and queuing feature on the station.

8 — Preset Forward - No Answer. If not answered within 15 seconds, an incoming C.O. call will be forwarded to another specified station after several rings.

D. Paging Zone. Used to place an individual station in a predetermined zone or zones for paging.

E. Preset Forward Extension. Used to identify an alternate extension for automatic forwarding of calls. Station option 7 or 8 or both must be enabled to preset forward an extension.

F. Tenant Number. Used to select the tenant group for a station. See Section 3.24.

6.08 Programmable System Features

The SYS subprogram of the SERV program allows the programming of a wide variety of features affecting all the stations in the system.

Of special note are the following options F through L which compose the system's master toll restrict table. All of these options provide ways of restricting a station's ability to make certain types of calls or to access specified C.O. lines. (Tenant number of the station option listing in Section 3.24, also provides a way of restricting calls.)

A. Operator's Extension Number. Used to identify the extension number of the operator. Initially set at 10.

B. Message Center. Used to identify the extension number of the message center. Initially set at 10.

C. System Options. Used to list by code the software feature options for the system. Choices include:

Code	Explanation

1 — Allows station message detail recording to list only dialed numbers of 7 digits or more, after an outside call has been more than 30 seconds in duration. Any call with an account code will still be printed.

2 — Allows station message detail recording to list only dialed numbers of 8 digits or more, after an outside call has lasted more than 30 seconds. Any call with an account will still be printed.

NOTE: If neither option 1 or 2 is specified, all outgoing and incoming calls will be recorded.

3 — Allows system diagnostic error printout to locate defective extensions.

4 — Allows calls holding or ringing in to flash on all keysets.

5 — Inhibits the last number redial key (DIAL/MSG) from reselecting a line until 12 seconds have elapsed with no dialing. This is necessary to allow chained speed dialed calls.

6 — Allows held loop release of 1.2 seconds for use with ESS offices.

7 — Allows a 600 millisecond hookflash for use behind a PABX system.

8 — Allows tic-tone to be used in place of music-on-hold.

9 — Allows line key 24 to be used to rotary select outgoing calls on lines 24 through 32.

10 — Allows single line SMDR printout and toll monitoring (single line station list on SMDR). System must be programmed for toll-restricted single line station.

11 — Allows programmed night service (only those lines programmed to ring on the station lines are affected during night ring).

12 — Allows intercom security tone (beeps once every 30 seconds during handsfree calls).

13 — Allows the external bell to ring for all incoming calls (day and night).

14 — Disables C.O. line reseize.

15 — Allows the asterisk (*) code to be sent over a C.O. line as a tone. The * is muted during normal operation for account number entry.

16 — Causes line 16 of 1664T stations to access line 16 at the KSU. Normally this line acts like line key 24. No station may specify station option 3 (MPK/II) if this option is set.

D. Transfer Recall Time (Programmable 1 to 255 Seconds). Used to specify the programmable recall time limit for a transferred call. After this time limit has expired, the call returns to the transferring station and rings at that station for the hold recall time. The call will then recall to the operator.

E. Hold Recall Time (System Programmable 1 to 255 Seconds). Used to specify the programmable recall time for a held call. After this time limit has expired, the call will ring for the hold recall time. The call will then recall to the operator.

F. WATS Line Identification (Toll Restricting Option). Used to determine lines that are reserved for special service. Toll calls may be made on these lines by toll-restricted stations.

G. Day DISA Lines (Toll Restricting Option). Used to define which lines will be automatically answered with system dial tone when the system is not in the night mode.

H. Night DISA Lines (Toll Restricting Option).

Used to define which lines will be automatically answered with system dial tone when the system is in the night mode.

I. Absorbed Digit (Toll Restricting Option). Used to define a digit that certain central offices disregard. In effect, the SPK ignores this digit if it is the first one dialed. By ignoring this digit, the toll-restricted station cannot process a long distance call. (Maximum of one absorbed digit.)

J. Allowed Long Distance Numbers (Toll Restricting Option). Used to specify long distance numbers which toll-restricted stations may dial. A maximum of two 10-digit numbers may be specified.

K. Allowed Area Codes (Toll Restricting Option). Used to specify the area codes which toll-restricted stations may dial. A maximum of 20 three-digit codes may be programmed.

L. Forbidden Office Codes (Toll Restricting Option). Used to specify the central office prefixes which will be forbidden to any toll-restricted station. A maximum of 20 three-digit codes may be programmed.

7.00 PROGRAMMABLE STATION HARDWARE FEATURES

An additional set of feature options is controlled by switches located within each keyset. These are programmed by setting the appropriate switches, disconnecting the station for three seconds, and reconnecting. No special tools are required to make these changes. Additional user controls are supplied on keysets and single line instruments.

These switches activate functions for an individual station only.

7.01 Do-Not-Disturb — Switch 1

When activated, this switch enables you to put your station in the do-not-disturb mode by pressing the HOLD/FWD and the asterisk (*) keys.

7.02 Executive Priority Call Waiting — Switch 2

When this switch is activated, the station has the ability to signal a station that is busy every time a pound (#) is entered.

Note that activating this feature disables the queuing feature.

Stations in the do-not-disturb mode cannot be signaled with executive priority call waiting.

7.03 Full-Duplex — Switch 3

When activated, this switch allows the connection of an external speaker for handsfree conversations on C.O. calls.

7.04 Night Station — Switch 4

This switch, when activated, allows incoming C.O. calls to ring in on a station after the operator enters night mode.

7.05 Off-Hook Ring — Switch 5

When activated, this switch allows incoming C.O. calls to audibly ring in on the station. These calls will ring in only after the operator enters the night ring mode.

7.06 Speed Transfer — Switch 6

When activated, this switch allows you to transfer calls by dialing only the extension number. NOTE: This eliminates the possibility of dialing outside calls except for speed dialing.

7.07 Digit 1 Dial — Switch 7

When activated, this switch dials the digit 1 before speed dialing a long distance call. Any 10-digit number stored in the station will automatically be preceded by the digit 1.

7.08 Tone/Volume Control

This station control adjusts the ring-in volume of the station. This control is a thumb wheel dial on keysets and a two-position switch on SLE stations.

7.09 Voice Volume Control

This thumb wheel control adjusts the volume of the handsfree announcements at each keyset.

8.00 DIAGNOSTICS AND SYSTEM SELF-TESTING

Any RS-232-compatible terminal connected to the CPU RS-232 port can be used to take advantage of the diagnostic and self-testing features of the SPK system.

8.01 TEST Program

This routine will test the Read Only Memory (ROM) and the Random Access Memory (RAM) of the SPK system. (See also Section 6.00.)

8.02 Online Monitor (ONMN)

You may use this program to gain access to and change the contents of the SPK system memory. For this reason, it should be used by qualified personnel only. (See also Section 680-100-401, Online Monitor.)

8.03 DISP (Display) Program

This routine displays in ASCII characters the activity of the SPK system or of an individual station on the terminal or printer. Using this feature, station dialing and command entries may be monitored.

To display the DSS/BLF commands, the terminal must be set to display normally nonprintable ASCII control characters. (Not all terminals have this capability.) See also Section 680-100-401, Online Monitor.

8.04 Enable Error Messages

This diagnostic routine will identify a malfunctioning station. See also Section 680-100-601, SMDR.

8.05 REST (Restart) Program

This program restarts the SPK system. All calls in progress and the non-data base Random Access Memory (RAM) entries in the SPK system are cleared by this function.

8.06 Remote Access and Diagnostics

All of the programming functions (except TEST and REST) may be accessed remotely.

8.07 DUMP Program

This program will dump the system data base so that it may be stored in a memory terminal or other suitable storage device. In this way the program provides a back-up for the data base when used in conjunction with the LOAD program.

8.08 LOAD Program

When data has been saved in a storage device using the DUMP command, this routine will allow the system to load the saved data onto the system data base. This routine uses a handshake mode of operation when loading from a remote site via the system modem. Otherwise, the system is taken offline and a high speed load may be performed.

9.00 SYSTEM RS-232 OUTPUTS

9.01 Station Message Call Detail Recording (SMDR)

The SMDR prints the following information:

- Station
- Number dialed
- Elapsed time
- Time of Day
- C.O. Line Number
- Account Code (Optional)

An SMDR printout message may be up to 40 characters in length. Information is transmitted to the device connected to the RS-232 port on the CPU PCB.

9.02 Error Messages

The SPK system displays an error message when improper information is received from the station. Refer to Section 680-100-601.

9.03 Diagnostic Printout on the SMDR

When enabled, this routine dumps information about stations which are sending bad or intermittent data to the KSU. Station number and time of day are recorded. Also, the time (in seconds) calls take to be answered from the ring-in condition is recorded.

9.04 End-of-Day Printout on the SMDR

At the end of a 24-hour cycle (23 hours, 59 minutes, 59 seconds), the system prints a day and date log together with special control characters and a page header for the next day's calls. It also resets to 0 hours, 0 minutes, 0 seconds.

10.00 SINGLE LINE ELECTRONIC SET FEATURES

The INTER-TEL Single Line Electronic (SLE) set is designed to be used in the SPK/II system in areas where the full complement of features offered by a multi-line keyset are not required.

The maximum number of single line sets per SPK/II system is 48. These are in addition to the maximum of 80 keysets. The two types of single line sets (for 2500 sets, refer to Section 11.00) can be used in any combination of groups of one to eight because of the interface PCB's in the KSU.

The INTER-TEL SLE instrument contains a tone dial pad and a single red special function (SPCL) key. A switch located on the right side of the instrument allows you to select either LOW or HIGH level ring tone. Extension numbers available for use on the SLE (and the 2500 type) sets are #10 through #57.

10.01 Key Functions

A. Special (SPCL) Key. The SPCL key has a variety of functions:

- To place an outside call on hold
- To transfer outside calls to another station
- To reterse transfer outside calls from another station
- To intiate a conference call

B. Keypad. The digits 0-9, the asterisk (*) and the pound (#) keys are used to enter numbers and special functions.

10.02 Audible Signals

A. Intercom Dial Tone. You will hear intercom dial tone:

- When the handset is lifted and there is no outside call on your set.

- When the SPCL key is pressed while on an outside call.

B. Outside Dial Tone. When a line is available, you will hear outside dial tone with the handset lifted and the keypad digit 9 pressed.

C. Busy Tones. You will hear busy tone:

- When all outside lines are in use after dialing 9.
- When the called station is in use.

- When a called station is in do-not-disturb (you will hear four busy tones and then music-on-hold, if so provided).

D. Holding Tone. You will hear holding tone when an outside call is placed on hold. This is a single beep once every 15 seconds.

E. Off-Hook Tones. Off-Hook tones include:

- A single tone (once every 15 seconds) for an outside call waiting on the SLE.

- A double tone (once every 15 seconds) for an intercom call waiting on the SLE.

F. Audible Tone Recognition. The following list may be used as an aid in audible tone recognition:

Intercom call ringing	– – –	Short double tones
Outside call ringing	– – –	Long single tones
Busy signals	- - - -	Short single tones
Holding call	-	Single tone every 15 seconds

10.03 Placing and Receiving Intercom Calls

To place an intercom call on an SLE, lift the handset, wait for intercom dial tone and dial the station number desired. A called party with a keyset will be able to talk immediately; a called party with an SL instrument must pick up the handset before talking.

To answer an intercom call, pick up the handset after hearing continuous double beep tones on your station.

10.04 Intercom Call Waiting

To initiate the intercom call waiting signal, lift the handset, wait for dial tone and dial the desired station number. You will hear a busy tone, but do NOT hang up. After 10 seconds a double beep will be generated to the called station. You will hear music or tic-tone until your call is connected.

10.05 Automatic Intercom Callback

Automatic intercom callback is used to notify you when a busy SLE or keyset becomes available.

To use this feature, lift the handset, wait for dial tone and dial the desired station number. When you hear the busy tone, press the pound (#) key immediately and hang up. You will hear continuous double beep tones on your station set when the station you called becomes available.

NOTE: The callback will be cancelled if not answered within approximately 15 seconds.

10.06 Paging

To page, lift the handset, press the code listed below for the desired area:

∗ 1 - ∗ 6 — Internal page zones
∗ 7 - ∗ 9 — External page zones (requires MOD II card)
∗ 0 — All external areas and talkback speakers

You will not hear any tones but will be connected automatically to the paging zone desired. Make your announcement in a normal voice and hang up. The announcement may last up to 12 seconds.

10.07 Placing Outside Calls

To place an outside call, lift the handset, wait for the intercom dial tone and dial 9. Wait for the outside dial tone and dial the telephone number.

NOTE: The modem PCB contains two touch tone decoders which allow two SLE or 2500 type sets to dial simultaneously. If system option 10, SMDR printout for single line stations is used, the decoder monitors all digits and is then released. If station option 6, toll restriction, is used the decoder will monitor two digits only, then release. With neither option, the decoder releases after the digit 9 is dialed.

10.08 Receiving Outside Calls

To answer an outside call, lift the handset after hearing continuous single beeps. Transfer recall time applies if the call is not answered at the called extension. The call recalls to the transferring party after the programmed time elapses.

To answer an outside call at night, lift the handset after hearing outside ring tones (which may be on other keysets or external night ring speakers). Wait for intercom dial tone and press the pound (#) key and 8. The lowest numbered C.O. line ringing in will be connected to your station. The programmed night service (system option 11) will control access to lines ringing in.

10.09 Placing Outside Calls on Hold

To place an outside call on hold, press the SPCL key and then hang up the handset. You will hear a single tone every 15 seconds. The outside call will hear music or tic-tone. Lift the handset when you wish to speak to the party.

Hold recall time applies if the call is not removed from hold. The call will hold on your station set for the programmed time, then ring back to you. If the call is not answered, it will go back to the operator.

10.10 Outside Line Queuing

To queue an outside line, lift the handset, wait for intercom dial tone and dial 9. When you hear a busy tone, press the pound (#) key immediately before hanging up.

You will hear long single beeps when an outside line becomes available. Lift the handset, wait for the outside dial tone and dial the number.

NOTE: The system cancels the queue if the recalling line is not answered within 15 seconds.

10.11 Acknowledgement of Calls Waiting

When a station is in use, audible indications of calls waiting will be given. You will hear double beeps to signal waiting intercom calls and single beeps for waiting outside calls. These beeps will be heard at 15 second intervals.

To split to an intercom call while you are on an outside call, press the SPCL key. To split to a waiting outside call while you are on an outside call, press the SPCL key and hookflash. Each time you press the SPCL key and hookflash, you will be connected to the other call. (See Section 10.12, "Call Splitting.")

10.12 Call Splitting

When two outside calls are on your station at the same time, you may "split" from one to the other. Simply

press the SPCL key and hookflash. Each time you do this you will be connected to another call. If you are on an intercom call with a C.O. call waiting, you may split to the C.O. call by hookflashing. The intercom call is then terminated. If you are on a C.O. line with an intercom call waiting, split to the intercom call waiting by pressing the SPCL key.

10.13 Call Transfer

To transfer an outside call, press the SPCL key, wait for the intercom dial tone and dial the station to which you want to transfer the call. If the destination station is a multi-line keyset, you may voice announce the call handsfree. If the destination is a single line station, the handset must be raised to voice announce. When you hang up, the call will be transferred.

NOTE: Calls may be transferred (camped-on) even if the called extension is busy.

10.14 Reverse Transfer

To reverse transfer a call, lift the handset, dial the station where the call is holding or ringing, and press the SPCL key.

The lowest numbered outside line ringing will be the line transferred. If no lines are ringing, the lowest line on hold is transferred.

Reverse call transfer is not allowed for calls ringing in, holding or recalling to the operator's station.

10.15 Call Screening

To screen a call that is on your station, press the SPCL key, listen for intercom dial tone and dial the station to which the call is to be screened. If the inside party is not available or refuses the call, press the SPCL key and hookflash. This reconnects you to the outside party. If the inside party does accept the call, hang up.

10.16 Conference Calls

To conference one outside and two inside parties while you are on an outside all, ask the party to hold. Press the SPCL key, wait for intercom dial tone and dial the station number of the additional inside party. Then instruct the party to lift the handset and press the SPCL key. This will connect the conference.

When one of the two inside parties hangs up, the outside call is transferred to the remaining station.

An SLE cannot initiate a conference with two outside parties.

11.00   TYPE 2500 S/L SETS

Industry standard single line type 2500 sets modified with a DC ringer may be directly connected to the INTER-TEL SPK system. Use of type 2500 sets not only provides for off-premise extension (OPX) operation, but may even provide for yet another method to control expense when full featured multi-line keysets are not required.

Type 2500 sets modified with a DC-powered ringer (in place of the standard high voltage AC ringer) are typically used for on-premise stations. Unmodified type 2500 sets are typically used for extended distance OPX operation. A High Voltage Ringing Adaptor (HVRA), a power supply and a ringing source are required in this configuration. Extension numbers available for use on single line (and SLE) instruments are #10 through #57.

11.01   Key Functions

The digits 0 through 9, the asterisk (*) and the pound (#) symbols are used to enter numbers and special functions.

11.02   Audible Signals

A. Intercom Dial Tone. You will hear intercom dial tone when the handset is lifted and there is no outside call on your set.

B. Busy Tones. You will hear busy tones:

- After dialing 9, when all outside lines are in use.

- When the intercom extension called is in use.

- When a called station is in do-not-disturb (you will hear four or five busy tones and a pause, etc.)

11.03   Audible Tone Recognition

The following list may be used as an aid in audible tone recognition:

Intercom call ringing	-- -- --	Short double tones
Outside call ringing	— — —	Long single ones
Busy signals	- - - -	Short single ones

11.04   Placing Intercom Calls

To place an intercom call, lift the handset, wait for intercom dial tone and dial the desired station number. If the called party has a multi-line keyset, the called staion will be able to talk immediately. Otherwise, the called station must pick up the handset before talking.

11.05   Receiving Intercom Calls

To receive an intercom call, simply pick up the handset after hearing the continuous double beeps on your station.

11.06   Intercom Call Waiting

To initiate the intercom call waiting signal, lift the handset, wait for dial tone and dial the desired station number. When you hear a busy tone, do not hang up. After 10 seconds a double beep will be generated to the called station. You will hear music or tic-tone until your call is connected.

11.07   Automatic Intercom Callback

Automatic intercom callback can be used to notify you when a busy intercom becomes available. To use this feature, lift the handset, wait for the intercom dial tone and dial the desired station number. When you hear a busy tone, press the pound (#) key immediately and hang up. You will hear double beeps on your set when the station you called becomes available. Simply lift the handset and the system will automatically dial the station you called.

The system will cancel the queue if the call is not answered within approximately 15 seconds.

11.08   Paging

To page, lift the handset, press the asterisk (*) key and the code listed below for the desired area:

* 1 - * 6 — Internal page zones
* 7 - * 9 — External page zones (requires MOD II PCB)
  * 0   — All external areas and talkback speakers (requires MOD II PCB)

You will not hear any tones but will be connected

automatically to the paging zone desired. Make your announcement in a normal voice and hang up. The announcement may last up to 12 seconds.

11.09   Placing Outside Calls

To place an outside call, lift the handset, wait for the intercom dial tone and dial 9. Wait for the outside dial tone and dial the desired number.

Only two single line station sets may dial at a time.

NOTE: *The modem PCB contains two touch tone decoders which allow two SLE or 2500 type sets to dial simultaneously. If system option 10, SMDR printout for single line stations is used, the decoder monitors all digits dialed and is then released. If station option 6, toll restriction, is used the decoder will monitor two digits only, then release. With neither option, the decoder releases after the digit 9 or a valid intercom number is dialed.*

11.10   Receiving Outside Calls

To receive an outside call, lift the handset after hearing continuous single beeps.

Transfer recall time applies if the call is not answered at the called extension. The call recalls to the transferring party after the programmed time elapses.

To answer an outside call during night ring, lift the handset after hearing outside ring tones (which may be on other keysets or external night ring speakers). Wait for intercom dial tone and press the pound (#) key and 8. The lowest numbered C.O. line ringing in will be connected to your set.

11.11   Outside Line Queuing

To queue an outside line, lift the handset, wait for intercom dial tone and dial 9. When you hear a busy tone, press the pound (#) key immediately before hanging up.

You will hear single beeps when an outside line becomes available. Lift the handset, wait for the outside dial tone and dial the number.

NOTE: *The system cancels the queue if the recalling line is not answered within 15 seconds. Single line sets (SLE or 2500) cannot call talkback speakers #60 through #64.*

12.00   KEYSET LINE ACCESS

12.01   Keysets Used on the SPK/II System

The variety of keysets offered by the SPK/I and SPK/II systems provide increased flexibility and control over the access of lines.

NOTE: *System option 16 (SPK/I 1664 system) must not be enabled on an SPK/II system.*

2480T — This keyset accesses directly every two-way line (1 through 24) on the SPK/II system. With system option 9 (line key 24 rotary selection), line key 24 accesses the outgoing-only rotary lnes, 24 through 32. Lines 1 through 23 remain two-way lines. Any or all of the 24 two-way lines can be programmed to ring in on this keyset unless system option 9 (line key 24 rotary selection) is enabled. Then lines 1 through 23 only may be programmed to ring in on this keyset.

1664T — This keyset accesses directly lines 1 through 15. Line key 16 will access line 24. Any line 16 through 23 that is transferred to this keyset is inaccessible. If line 24 is transferred to this keyset, it can be accessed with line key 16. Lines 1 through 15 can be programmed to ring in on this keyset. Also, if line 24 is programmed to ring in, it can be accessed with line key 16. With system option 9 (line key 24 rotary selection), line key 16 accesses the outgoing-only rotary lines 24 through 32. Also with system option 9, any of the outgoing-only lines 24 through 32 transferred to this keyset are picked up on line key 16. Only lines 1 through 15 can be programmed to ring in on this keyset when system option 9 is enabled.

1032T — This keyset accesses directly lines 1 through 10. With station option 3 (MPK/II), any line greater than 10 that is transferred to this station may be answered with the SPCL key.

With system option 9 (line key 24 rotary selection), the SPCL key accesses the outgoing-only rotary lines

24 through 32. The SPCL key has the same flash rates as other keyset line keys. Only lines 1 through 10 can be programmed to ring in on this keyset.

416T — This keyset accesses directly lines 1 through 4. Any line greater than 4 transferred to this station is inaccessible. Only lines 1 through 4 can be programmed to ring in on this keyset.

680SLE — This instrument accesses directly the outgoing-only rotary lines (25 through 32) when 9 is dialed. With system option 9 (line key 24 rotary selection), this instrument accesses directly the outgoing-only rotary lines 24 through 32 when 9 is dialed. Any line transferred to this station may be answered. No lines can be programmed to ring in on this instrument.

2500 — This instrument accesses directly the outgoing-only rotary lines (25 through 32) when 9 is dialed. With system option 9 (line key 24 rotary selection), this instrument acesses directly the outgoing-only rotary lines 24 through 32 when 9 is dialed. Any line transferred to this station may be answered. No lines can be programmed to ring in on this instrument.

12.02 Keysets Used on the SPK/I System

NOTE: *System option 16 (SPK/I 1664 system) must be enabled; and system option 9 (line key 24 rotary selection), and station option 3 (MPK/II) must not be enabled on an SPK/I system.*

2480T — This keyset accesses directly all the SPK/I 16 two-way lines with the first 16 line keys. Only lines 1 through 16 can be programmed to ring in on this keyset. Line keys 17 through 23 are not functional.

Pressing either line key 24 or line key 16 acesses line 16. Line key 24 functions and flashes in the same manner as line key 16.

1664T — This keyset accesses directly all 16 two-way lines on the SPK/I system. Lines 1 through 16 can be programmed to ring in on this keyset.

1032T — This keyset accesses directly lines 1 through 10. This keyset also accesses line 16 when the SPCL key is pressed. Any line greater than 10 that is transferred to this station is inaccessible except line 16 which can be picked up under the SPCL key. Lines 1 through 10 can be programmed to ring in on this keyset. If line 16 is programmed to ring in, it can be accessed with the SPCL key.

416T — This keyset accesses directly lines 1 through 4. Any line greater than 4 that is transferred to this station is inaccessible. Lines 1 through 4 can be programmed to ring in on this keyset.

NOTE: *The 680 SLE and the 2500 instruments cannot be used on the SPK/I system.*

INSTALLATION

1.00 INTRODUCTION

1.01 General

This section describes the procedures required to ensure correct installation of the SPK system. Detailed instructions provide for: cabling, PCB's, multi-line keysets, Single Line Electronic (SLE) instruments, Direct Station Selector/Busy Lamp Fields (DSS/BLF), terminal requirements, battery back-up and the Station Message Detail Recorder (SMDR).

1.02 Unpacking

After unpacking the SPK system, check the packing slip against the equipment received. If equipment is missing or damaged, contact INTER-TEL Order Processing.

Check all Printed Circuit Board assemblies (PCB's) upon unpacking. All PCB's are fully loaded, except the Central Office Unit PCB (COU) and the Central Processor Unit (CPU) PCB. The COU PCB may have four vacant Integrated Circuits (IC) sockets (see Fig. 3-1) if the card is equipped for Dual-Tone Multi-Frequency (DTMF) dialing. The CPU PCB has IC's missing from sockets U42 and U43. If any additional IC's are missing, contact INTER-TEL Field Service.

NOTE: The PCB assemblies contain static-sensitive components. Keep all PCB's in their protective plastic bags until they are installed in the Key Service Unit (KSU). Handle all PCB's not in the protective bags by the edges only.

1.03 KSU Location

The following conditions are required for the KSU location:

A. Availability to 105-125V 60 Hz, 15 amp, or 230V ± 10%, 47-63 HZ, 7 amp single phase power.

B. Location within 25 feet of the C.O. line term-
inations.

C. The ambient temperature ranges does not ex-
ceed 32° F to 100° F. (80° maximum room temp-
erature.)

D. The KSU is not located near any strong mag-
netic field, such as heavy motors or large copy
machines.

E. AC power from a dedicated circuit breaker.

F. Placement of the KSU more than 4 inches from
any wall.

NOTE: Do not place anything on top of the KSU;
the KSU is convection cooled.

1.04 Power Supply Installation

To install the power supply (680.07 or 680.08),
proceed as follows:

1. Remove the KSU front door.

2. Remove the power supply screws shipped with
the KSU.

3. Position the power supply unit above the
cardfile.

4. Install the mounting screws. Refer to
Figure 3-3 or 3-4.

NOTE: It may be desirable to lay the cabinet on its back
to install the power supply.

CAUTION: Care must be taken to protect the
battery leads from shorting if battery
back-up is not used.

5. Connect the end of the power cable to the power
supply as specified in Fig. 3-5.

1.05 Power Supply Voltage Check

To ensure correct operation of the SPK System, the
power supply voltages must be within tolerance.
The power supply (680.07 or 680.08) is factory-
adjusted, but variations may occur because of
vibration during shipment or different climate
conditions. Before applying power to the system,
perform the electrical check as described in the
following steps:

A. System Electrical Activation. To power up the
system, proceed as follows:

1. Check the value of the following fuses for
the 680.07 power supply:

F1 — 10A 115 VAC Slow Blow

F2 — 10A 30 VDC

F3 — 15A 30 VDC

F4 — 1A 30 VDC

F5 — 25A 30 VDC

For the 680.08 power supply:

F101 — AGC 2.5 amp 250V

F102 — ABC 15 amp 250V

F103 — ABC 15 amp 250V

F104 — ABC 30 amp 32V

F105 — 115VAC Input
MDA-10 amp 250 VAC

F106 — 230VAC Input
MDA-5 amp 250 VAC

2. Observe the condition of the Battery and
Line (ON/OFF) switch. ENSURE BOTH ARE
OFF.

3. Apply power to the system (with PCB's
removed) by connecting the power cord
into a 105-115 VAC, 60 Hz, 15 amp source.

4. Turn on the LINE switch. The red indicator
lamp should light.

B. System Electrical Check. To perform the elec-
trical check of the system, proceed as follows:

NOTE: A digital voltmeter of ±0.25% accuracy is
required for the following measurements.

1. Measure the following voltages on the rear
of the backplane. See Figure 3-6 or 3-7 for
voltage test point locations.

+5V ±0.1V TP1 to TP5

−12V ±2.5V TP3 to TP5

+30V ±6V (unregulated) TP4 to TP2

2. Turn off power to the KSU.

2.00 CABLING

2.01 General Requirements

Select the proper equipment location to minimize cable run length and to provide proper environmental conditions.

2.02 Starting the Cabling

Standard floor plans should be developed to aid in proper station wiring. A cable identification plan must be utilized. Station circuit number use is recommended — 1.1, 1.2, 1.3, etc. (Refer to Figure 3-8 and Figure 3-9.)

Using telephone industry standard three-pair cable, place a run to each location shown on the floor plans. Both ends of every cable must have identical markings to prevent cable interchange. Avoid cable runs parallel to light fixtures or AC lines not in conduit.

Terminate the station end of the cable on standard modular connecting blocks, either surface-mount or flush-mount. (Refer to Figure 3-10.)

A plywood backboard of adequate size should be provided to facilitate mounting up to nineteen 66M1-50 blocks (maximum system size). Refer to Figure 3-8 for the main distribution frame layout. If the MDF requirements are less than the maximum system size, space should be left for expansion.

2.03 MDF Layout

Telephone industry standard 25-pair cable is required to connect the KSU to the MDF. A 25-pair female amphenol type connector must terminate each cable at the KSU end.

A special cable must be made to facilitate termination of C.O. lines. The KSU cables should be marked on both ends with the circuit card numbers COU 1-4, COU 5-8, etc. Terminate the special cable on the left side of the C.O. line blocks. (Refer to Figure 3-8 and 3-11.)

Feed the KSU connecting cables under the KSU cardfile and then through the access cutout on the side or the bottom of the cabinet (see Figure 3-12).

Terminate the station cables on the left of 66M1-50-type STN-A blocks (refer to Figure 3-8). Extreme care should be taken to terminate station cables in sequential order. Cable 1.1 terminates first on STN-A Block 1.1-1.8, then cable 1.2, etc.

2.04 Crossconnecting

Install standard type bridge clips on all lines and station blocks to be used.

NOTE: *To eliminate random data problems, unused station cables without instruments connected must not be bridge-clipped to KSU equipment but must be terminated as shown in Figure 3-13.*

2.05 Grounding Requirements

Using a #10 wire with proper connector, connect an approved cold water pipe ground to the lug provided on the floor of the KSU. Remove the black jumper wire on rear of power supply (680.07) between the chassis to eliminate the ground loop potential. (Refer to Figure 3-14.)

NOTE: *If a difference of potential exists between the third wire lead on the local electrical circuit and cold water ground, noise may develop on the system. If a potential exists, consult an electrician.*

The recommended AC power connection is through a two-conductor cheater plug. On the MDF, a four terminal ground lug is recommended for connection to: 1) the KSU ground lug, 2) the third wire ground, 3) the earth ground, and 4) the TELCO ground. See Fig. 3-14.

NOTE: *The ground lug accepts only one 14 gauge wire.*

3.00 PRINTED CIRCUIT BOARD INSTALLATION

3.01 Central Processor Unit PCB (CPU)

A. Install the CPU PCB (680.11) as follows:

Check the rear (solder side) of the PCB to ensure there is no shipping foam or tape attached.

1. Ensure that the following jumpers are installed properly. Refer to Figure 3-2 for jumper locations.

   Jumper E1 — Strap the center to 300 baud or 9600 baud depending on the baud rate of your programming terminal.

NOTE: The baud rate of the system must be the same as the baud rate of the terminal.

   Jumper E2 — Place jumper from center terminal to the RAM position.

   Jumper E3 — Place jumper from center terminal to the BATT position.

2. Inspect the CPU PCB for shorted component leads.

3. Install the CPU PCB with the components facing left, in the cardfile slot labeled "CPU." Refer to Figure 3-3.

B. Apply power to the KSU.

C. Obtain a reading of +5.0 VDC ±0.1V on the cardfile (TP1 to TP2). If the voltmeter does not read +5.0VDC, remove AC power to the KSU and take out the PCB. After the PCB is removed, repeat the check for shortened components. If the +5.0VDC is within tolerance, proceed to step D.

D. Observe the LED's located on the CPU PCB for the following indications:

   LED DSI — (Topmost LED) — Flashes at regular intervals of approximately 5 times a second.

   LED DS2 — (2nd LED down) — Flashes at regular intervals of approximately 2 or 3 times a second.

   LED DS3 — (3rd LED down) — Indicates almost steady on.

   LED DS4 — (bottom most LED) — Off indication.

E. If LED DS4 is illuminated, a watchdog timer interrupt has occurred in the system.

   1. This illuminated LED indicates that the system has not completed a program operation within the required time period, and that the watchdog timer has reset the system.

2. Turn off the KSU power. After waiting approximately 10 seconds, restore the KSU power. If the fourth LED lights again, replace the CPU PCB and repeat Steps C through E.

3. If the fourth LED lights again, see Section 680-100-600.

3.02 Central Office Unit PCB (COU)

A. To install the Central Office Unit PCB (680.20 or 680.21 COU), proceed as follows:

   1. Inspect the COU PCB for shorted component leads. Correct any found.

   2. Install the COU PCB in the first available COU slot to the right of the CPU PCB with components facing left. The power-up (top) LED will light for 1 to 2 seconds and then go out. Refer to Figure 3-3.

   3. Obtain a reading of +5.0VDC ±0.1 on the cardfile. If the voltmeter does not read +5.0VDC, turn off AC power to the KSU and take out the COU PCB. Then check for shorted components. If the +5VDC is within tolerance, proceed to step 4.

   4. Repeat this procedure for each additional COU PCB in the system.

NOTE: Each COU PCB contains four circuits.

B. To connect the COU PCB to the MDF, proceed as follows:

   1. Route the COU cable from the MDF to the COU PCB. Refer to Figure 3-8.

   2. Repeat step 1 for each additional COU PCB.

C. To crossconnect the MDF to the C.O. distribution block, install bridging clips for all active C.O. lines.

3.03 Station-A PCB (STN-A)

A. To install the STN-A PCB (680.30), proceed as follows:

   1. Inspect the fuses (F1 and F2) located at the top rear of the PCB (next to the edge connector). Verify that they are not open.

2. Inspect the STN-A PCB for shorted component leads.

3. Install the STN-A PCB in the first available slot from the left of the cardfile labeled "STN-A" with components facing left. The power-up (top) LED will light for 1-2 seconds, then go out. Refer to Figure 3-3.

4. Obtain a meter reading of +5.0VDC ±0.1 on the cardfile. If the voltmeter does not read +5.0VDC, turn off AC power to the KSU and take out the STN-A PCB. Then check for shorted components. If the +5.0VDC is within tolerance, proceed to step 5.

NOTE: Each STN-A PCB contains eight circuits.

5. Install each additional STN-A PCB in the next available slot to the right of the first STN-A PCB. A maximum of 10 STN-A's may be installed in the SPK system.

NOTE: Do not skip slots between PCB's.

B. To connect the STN-A PCB (680.30) to the MDF, proceed as follows:

1. Route the STN-A cable from the MDF to the STN-A PCB. See Figure 3-8.

2. Repeat for each additional STN-A PCB. Refer to Figure 3-10.

3.04 Station B PCB (STN-B)

A. To install the STN-B (680.31) for single line stations, proceed as follows:

1. Inspect the STN-B PCB for shorted component leads.

2. Install the STN-B PCB in the first slot from the left labeled "STN-BC." The power-up (top) LED will light for 1 to 2 sec and then go out. See Figure 3-3 for PCB location.

NOTE: The cardfile positions labeled "STN-BC" are dual purpose. Either a STN-B or a STN-C PCB may be inserted.

3. Obtain a meter reading of +5.0VDC ±0.1 on the cardfile. If the voltmeter does not read +5.0VDC, turn off AC power to the KSU and

take out the STN-B PCB. Then check for shorted components. If the +5.0VDC is within tolerance, proceed to part B.

NOTE: Each STN-B PCB contains eight circuits.

B. To connect the STN-B PCB to the MDF (see Figure 3-8), proceed as follows:

1. Route the STN-B cable from the MDF to the STN-B PCB.

2. Each cable uses eight pairs.

3. Repeat for each additional STN-B PCB. Refer to Figure 3-8.

3.05 Station C PCB (STN-C)

A. To install the STN-C (680.32) for SPK single line electronic instruments proceed as follows:

1. Inspect the STN-C PCB for shorted component leads.

2. Install the STN-C in the first available slot from the left labeled "STN-BC" with the components facing left. The power-up (top) LED will light for 1-2 sec, then go out. See Figure 3-3.

NOTES: 1) The cardfile positions labeled "STN-BC" are dual purpose. Either a STN-B or a STN-C PCB may be inserted.

2) Each STN-C PCB contains eight circuits.

3. Obtain a meter reading of +5.0VDC ±0.1 on the cardfile. If the voltmeter does not read +5.0VDC, turn off AC power to the KSU and take out the COU PCB. Then check for shorted components. If the +5.0VDC is within tolerance, proceed to step 4.

4. Repeat for each additional STN-C PCB. Refer to Figure 3-8.

NOTE: Do not skip slots between PCB's.

B. To connect the STN-C PCB to the MDF, proceed as follows:

1. Install the STN-C cable from the MDF to the STN-C PCB. See Figure 3-8.

2. Repeat for each additional STN-C PCB. Refer to Figure 3-15.

3.06 Modem I (MOD I) PCB and Modem II (MOD II) PCB

NOTE: The MOD I PCB (680.50) contains the modulator/demodulator circuitry necessary for remote programming and diagnostics. Also contained are two DTMF decoders which are necessary for single line, Single Line Electronic (SLE), or DISA (Direct Inward System Access) operation. The MOD I card does not require any MDF connection.

The MOD II card (680.51) contains all the circuits found on the MOD I. Additionally, the MOD II contains circuits for connection to the MDF as follows:

5 Talkback speakers
1 External page control (three zone)
1 Night transfer contact
1 External night ring contact

A. To install either the MOD I or the MOD II PCB, proceed as follows. (Refer to Figure 3-3 and 3-16.)

1. Inspect the MOD PCB for any shorted component leads. Correct any found.

2. Install the MOD PCB in the slot labeled "MISC/MOD" with components facing left. The power-up LED will light for 1-2 sec and then go out. Refer to Figure 3-3 for PCB location.

3. Obtain a meter reading of +5.0VDC ±0.1 on the cardfile. If the voltmeter does not read +5.0VDC, turn off AC power to the KSU and take out the COU PCB. Then check for shorted components. If the +5.0VDC is within tolerance, proceed.

B. To connect the MOD II PCB to the MDF (see Figure 3-8), proceed as follows:

1. Route a connecting cable from the male amphenol connector on the front of the MOD II PCB to the MDF.

NOTE: This cable uses twelve cable pairs.

C. To install the miscellaneous equipment cables to the auxiliary equipment, proceed as follows:

1. Determine where the auxiliary equipment is to be located. Then route the cable from the MDF to the auxiliary equipment. Refer to Figure 3-16.

3.07 Conference PCB (CNF)

A. To install the CNF PCB (680.40), proceed as follows:

1. Inspect the CNF PCB for any shorted component leads.

2. Install the CNF PCB in the slot marked "CNF" with components facing left. The power-up (top) LED will light for 1-2 sec and then go out. Refer to Figure 3-3.

3. Obtain a meter reading of +5.0VDC ±0.1 on the cardfile. If the voltmeter does not read +5.0VDC, turn off AC power to the KSU and take out the CNF PCB. Then check for shorted components. If the +5.0VDC is within tolerance, proceed.

NOTES: 1) The CNF PCB contains four conference circuits.

2) The CNF PCB is required for DISA use.

4.00 MULTI-LINE KEYSETS

4.01 Keyset Options

A. Figure 3-17 defines the switch positions and options available in the multi-line instrument. To set the keyset options, proceed as follows:

1. Disconnect the instrument line cord.

2. Remove the faceplate via the spring-loaded tab located on the top of the instrument.

3. Set the option switches.

4. Replace the faceplate.

5. Reconnect the keyset line cord.

4.02 Keyset Installation

CAUTION: *Multi-line keysets are interfaced to STN-A PCB's. Single Line Electronic (SLE) instruments are interfaced to STN-C PCB's. Single line sets (2500) should be connected to STN-B PCB's. Improper connection may cause damage to equipment.*

A. To install multi-line keysets, proceed as follows:

1. Verify that the modular jack assembly is correctly wired to a STN-A PCB via the MDF. Refer to Figure 3-10.

2. Verify that the modular jack assembly is wired with the proper polarity. The RED wire of the jack should measure +30 volts (±6VDC) with respect to the GREEN wire.

NOTE: *If the power pair is reversed, installing a keyset will damage a fuse on the STN-A PCB. This will affect operation of all multi-line keysets interfaced to that STN-A PCB.*

3. Install the multi-line instrument by inserting the line cord into the modular jack assembly.

4.03 Keyset Voltage Regulator Setting

A. Remove the keyset faceplate.

B. Remove the top cover of the keyset.

C. Refer to Figure 3-18 or 3-19. With a digital voltmeter, measure across diode VR-2. Adjust the potentiometer R67 (R15) until a reading of +5.0 ±0.01 VDC is obtained.

D. Re-assemble the instrument.

4.04 Speakerphone Installation

A. To convert a multi-line keyset for full-duplex speakerphone operation, proceed as follows:

1. Remove the faceplate and the modular shorting plug.

2. Remove the faceplate.

3. Carefully remove the keyboard assembly via the two locking tabs located on either side of the tone pad (press the tabs to the left and lift the keyboard).

4. Remove the existing speaker wires from S1 and S2 (12 and 13). Refer to Figure 3-18 or 3-19. Tape and store these leads.

5. Remove the unused modular plug wires from 5 and 6. Tape and store these leads.

6. Connect the male end of the external cord to the modular plug in the base of the keyset.

7. Set DIP switch 3 as described in Figure 3-17.

8. Reset the keyset by disconnecting and then reconnecting the line cord.

9. Re-assemble the keyset.

4.05 Station Loop Resistance Test

Any instrument interfaced to the SPK system must not exceed the following loop limits (using 24 AWG wire):

SPK/II (680.08 power supply)

2480T	68 ohms or 1313 ft.
2480T with one 6460D DSS/BLF	20 ohms or 387 ft.
2480T with two 6460D DSS/BLF's	9 ohms or 171 ft.
1664T	75 ohms or 1457 ft.
1664T with one 6460D DSS/BLF	20 ohms or 405 ft.
1664T with two 6460D DSS/BLF's	9 ohms or 177 ft.
1032T	78 ohms or 1525 ft.
416T	84 ohms or 1628 ft.
SLE	300 ohms or 5800 ft.
2500	800 ohms or 16000 ft.

Modem II Talkback Speakers

50 ohms or 1000 ft.

SPK/I (680.07 power supply)

2480T	39 ohms or 750 ft.
2480T with one 6460 DSS/BLF	9 ohms or 187 ft.
2480T with two 6460D DSS/BLF's	3 ohms or 49 ft.
1664T	43 ohms or 836 ft.
1664T with one 6460 DSS/BLF	10 ohms or 197 ft.
1664T with two 6460 DSS/BLF's	3 ohms or 53 ft.
1032T	45 ohms or 877 ft.
416T	48 ohms or 939 ft.

NOTE: When other than 24 AWG wire is used or longer lengths are required, 14VDC must be maintained at the station and DSS/BLF inputs. Excessive and/or high resistance connections reduces these loop limits. Using larger gauge (smaller AWG number) or multiple 24 AWG wires for the power pair (white/blue — blue/white) increases these loop limits. DSS/BLF units do not significantly affect the described loop limits for keysets when powered from the transformer unit.

With the power off, measure the resistance from the YELLOW wire to the BLACK wire (or from the BLUE wire to the WHITE wire) at the modular jack. (On 2500 instruments measure from the RED wire to the GREEN wire at the modular jack.) The resistance of the loop from the modular jack to the STN PCB and back should not exceed the loop resistances specified.

When using multiple power pairs to extend the DSS/BLF loop limit, turn off the system power. Then short the power pair at the MDF and measure the loop resistance from the keyset modular jack.

5.00 SINGLE LINE ELECTRONIC (SLE)

5.01 Installation

To install SLE instruments, proceed as follows:

1. Verify that the modular jack assembly is correctly wired to a STN-C PCB via the MDF. Refer to Figure 3-15.

CAUTION: Interfacing an SLE instrument to a STN-A PCB and then pressing the SPCL key will damage the SLE instrument and the fuse. This damage is not covered under warranty.

2. Install the SLE instrument by inserting the line cord into the modular jack assembly. (Refer to Figure 3-16.)

6.00 SINGLE LINE INSTRUMENTS (2500-TYPE)

6.01 Installation

To install 2500-type instruments, proceed as follows:

1. Verify that the modular jack assembly is correctly wired to a STN-B PCB via the MDF. Refer to Figure 3-20.

2. Disassemble the 2500 instrument and disconnect the AC ringer.

3. Install a 24-volt DC ringer in the instrument as shown in Figure 3-21, using a 1N4001 diode. A suitable ringer (Model PBX-22, "Low-Pitch PBX DC Ringer") may be obtained from:

    Floyd Bell Assoc.
    P.O. Box 12327
    Columbus, Ohio 43212
    614/488-3193

4. Re-assemble the 2500 instrument.

5. Install the instrument by inserting the line cord into the modular jack assembly.

6.02 Off-Premise Station (OPS)

In applications where an Off-Premise Station (OPS) is necessary, an HVRA (High Voltage Ringing Adapter) may be used to interface the SPK system with a standard 2500 type instrument.

The HVRA, with a customer supplied -48VDC (280 mA required per HVRA unit) and a 110VAC ringing supply (also customer supplied), converts the DC ringing used in the SPK system to the AC ringing used in standard 2500 instruments.

The HVRA interfaces with a Class A, OL13A; a Class

B, OL13B; or a Class C, OL13C OPS line. If the impedance does not exceed 800 ohms, a customer-provided line may be used.

A. To install the HVRA at the system end, proceed as follows:

1. Disassemble the HVRA by removing the four base screws.

2. Mount the HVRA on the MDF by putting screws through the two holes in the top of the HVRA.

3. Re-assemble the HVRA.

4. Mount a 25-pair termination block on the MDF next to the HVRA.

5. Mount the power and ringing supply on the MDF.

B. To connect the HVRA to the MDF, proceed as follows:

1. Install a cable from the male amphenol connector of the HVRA to the HVRA distribution block.

2. Repeat for each additional HVRA.

C. To connect the peripheral equipment cables to the HVRA distribution block (refer to Figure 3-23), proceed as follows:

1. Connect the power and ring supply voltages to the HVRA distribution block.

2. Connect the local power ground cables to the power neutral ground and/or the cold water ground.

3. Connect the STN-B circuits to the HVRA distribution block.

4. Connect the telephone company OPS line(s) to the HVRA distribution block.

7.00 DIRECT STATION SELECTOR/BUSY LAMP FIELD (DSS/BLF)

The DSS/BLF (6460D) allows the operator to transfer calls to the final destination by pressing a single key.

7.01 Installation

To install the DSS/BLF in the SPK system, proceed as follows:

1. Remove the wall mount adapter from the DSS/BLF.

2. Connect one end of the 24-inch 3-pair cable to the receptacle labeled "TO STA," and the 6-ft. power cable to the receptacle labeled "TO POW." Refer to Figure 3-23.

3. Connect the line cord from the KSU to the receptacle labeled "KSU" on the DSS/BLF.

4. Connect the 24-inch 3-pair cable from the "TO STA" receptacle on the DSS/BLF to the instrument line jack.

5. Attach the spade lugs on the DSS/BLF power cable to the screw connectors marked "LOAD" on the step-down transformer supplied with the DSS/BLF.

6. Remove the DSS/BLF faceplate.

7. Remove the DSS/BLF cover.

8. Carefully remove the keyboard assembly by removing the phillips head screw at the top left of the keyboard, and releasing the locking tab at the top right of the keyboard assembly.

9. Refer to Figure 3-24 for the DSS/BLF DIP switch setting.

10. Connect the step-down transformer to a 117VAC 60 Hz outlet.

7.02 Installation with Optional System Battery Back-Up or Without AC Outlet

For a system with optional system battery back-up, or for a system without access to an AC outlet, perform the following:

1. From the base of the DSS/BLF, remove the transformer and the transformer power cable. (See Figure 3-25.)

2. From inside the DSS/BLF, remove the two-wire power connector from the housing labeled "TO POW."

3. Complete the removal of the power connector by removing the RED wire and the GREEN wire from connectors 13 and 14.

4. Run jumpers from connector 1 to connector 13 and from connector 2 to connector 14.

7.03 Voltage Regulator Setting

A. Measure the voltage across CR4 with a DVM (refer to Figure 3-25). Adjust the potentiometer R5 to set the level at 5.0VDC (±0.01V).

B. Re-assemble the DSS/BLF unit and install the button labels and caps. Refer to Figure 3-24.

7.04 Tandem DSS/BLF Operation

If system size requires more than 60 stations, 2 DSS/BLF units are required (refer to Figure 3-24 for installation and DIP switch settings).

8.00 TERMINAL REQUIREMENTS FOR THE SPK SYSTEM

On-site programming of the SPK is accomplished by connecting a computer terminal to the CPU PCB. The terminal requirements are:

A. RS-232C serial interface

B. Asynchronous Communications

C. Full-Duplex operation

D. ASCII Code, 300 or 9600 baud rate

8.01 Terminal Connections

A. Apply power to the computer terminal.

B. Set terminal baud rate to 300 or 9600. Set CPU baud rate to match terminal baud rate. Refer to Figure 3-2.

C. Connect the 25-pin RS-232 interface connector to the CPU connector.

D. Press the SPACE bar on your terminal.

E. The terminal will display:

SPK X.Y COPYRIGHT 1982, INTER-TEL EQUIPMENT INC.

ENTER: SERV,TIME,DISP,TEST,INIT, REST OR ONMN =.

NOTE: The X indicates software version level, and the Y indicates the revision level.

F. If no information is displayed, re-check the wiring of the RS-232 interface cable and the baud rate of both the terminal and the CPU PCB. Refer to Figure 3-25.

9.00 OPTIONAL BATTERY BACK-UP

9.01 General

The SPK system may be provided with battery back-up. Battery back-up supplies power automatically to the KSU if the main AC voltage drops below the KSU power supply regulator limit.

9.02 Installation of Battery Back-Up

To install battery back-up, proceed as follows:

CAUTION: Make sure that the 680.07 power supply is ON (or that the 680.08 power supply is OFF) before connecting battery back-up to the KSU. Do not place batteries inside the KSU cabinet or a sealed container. Adequate ventilation must be maintained because batteries give off gas.

A. Make sure that the (+) and (-) battery wires are connected to the power supply.

B. Turn on AC power to the 680.07 power supply; OR, turn off AC power to the 680.08 power supply.

C. Measure and adjust the float voltage to +27 ±0.1VDC on the 680.07 supply unit (no adjustment is necessary for the 680.08 power supply).

NOTE: The float voltage should be measured at the polarized connector located on the battery. Adjust this voltage with a DVM which has an accuracy of ±.01VDC. Refer to Figure 3-6 or 3-7.

Figure 3-27 is provided to determine the battery ampere/hour rating to be used per system configuration.

D. Make sure the battery switch is OFF.

E. Connect the polarized connector to the batteries
    pack. Note: The 680.07 power supply requires a
    24-V battery pack and the 680.08 power supply
    requires a 30-V battery pack. These batteries
    should be of the gell-cell type.

NOTE: For the 680.07 power supply, two 12V batter-
        ies can be connected in series. For the
        680.08 power supply, two 12V batteries and
        one 6V battery can be connected in series.
        All batteries connected in series must be of
        the same amp/hour rating and also be of the
        same level of charge/discharge.

F. Make sure that the battery light is on.

G. Turn battery supply switch ON.

H. Wait approximately 2 hours for the battery pack
    to partially charge.

I. Turn OFF the AC power to the KSU.

J. Make sure that the battery light is ON and that the
    system is operating.

K. Turn on the AC power.

10.00 OPTIONAL STATION MESSAGE DETAIL RECORDING (SMDR)

10.01 Installation

Connect the standard INTER-TEL printer cord with
the RS-232 connector directly into the receptacle on
the front of the CPU PCB. (Refer to Figure 3-3.)
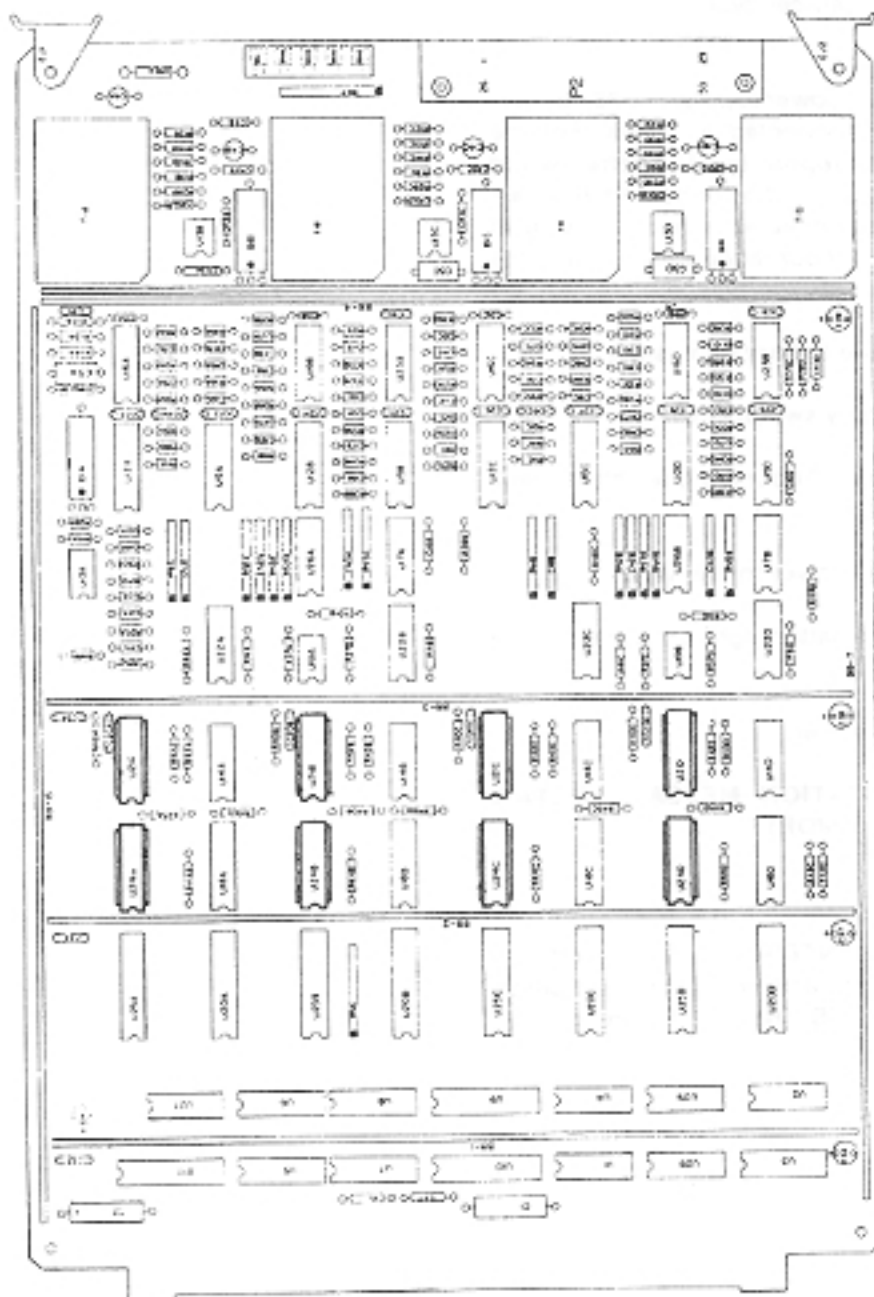
Figure 3-1. COU PCB
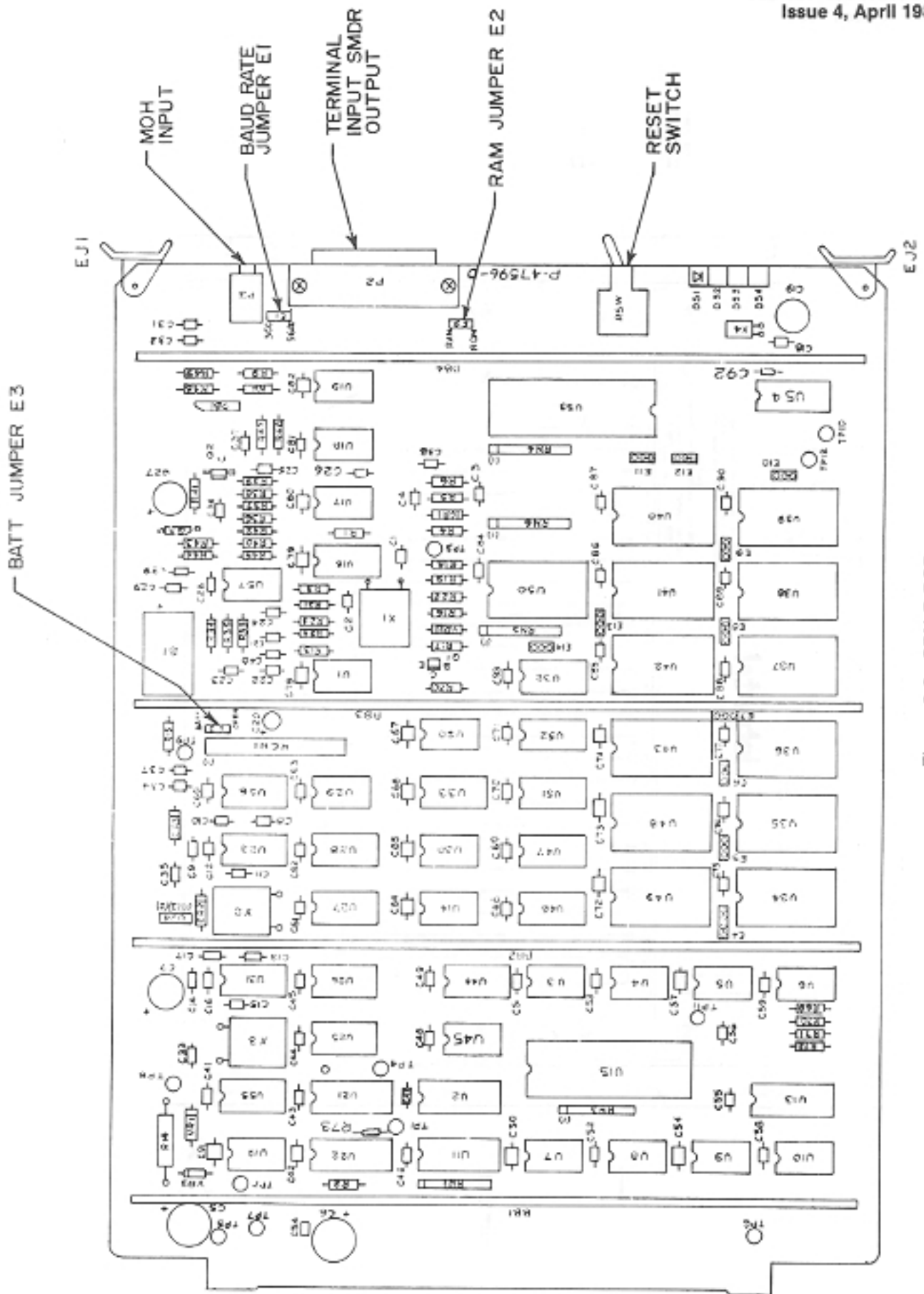
Figure 3-2. CPU-B PCB
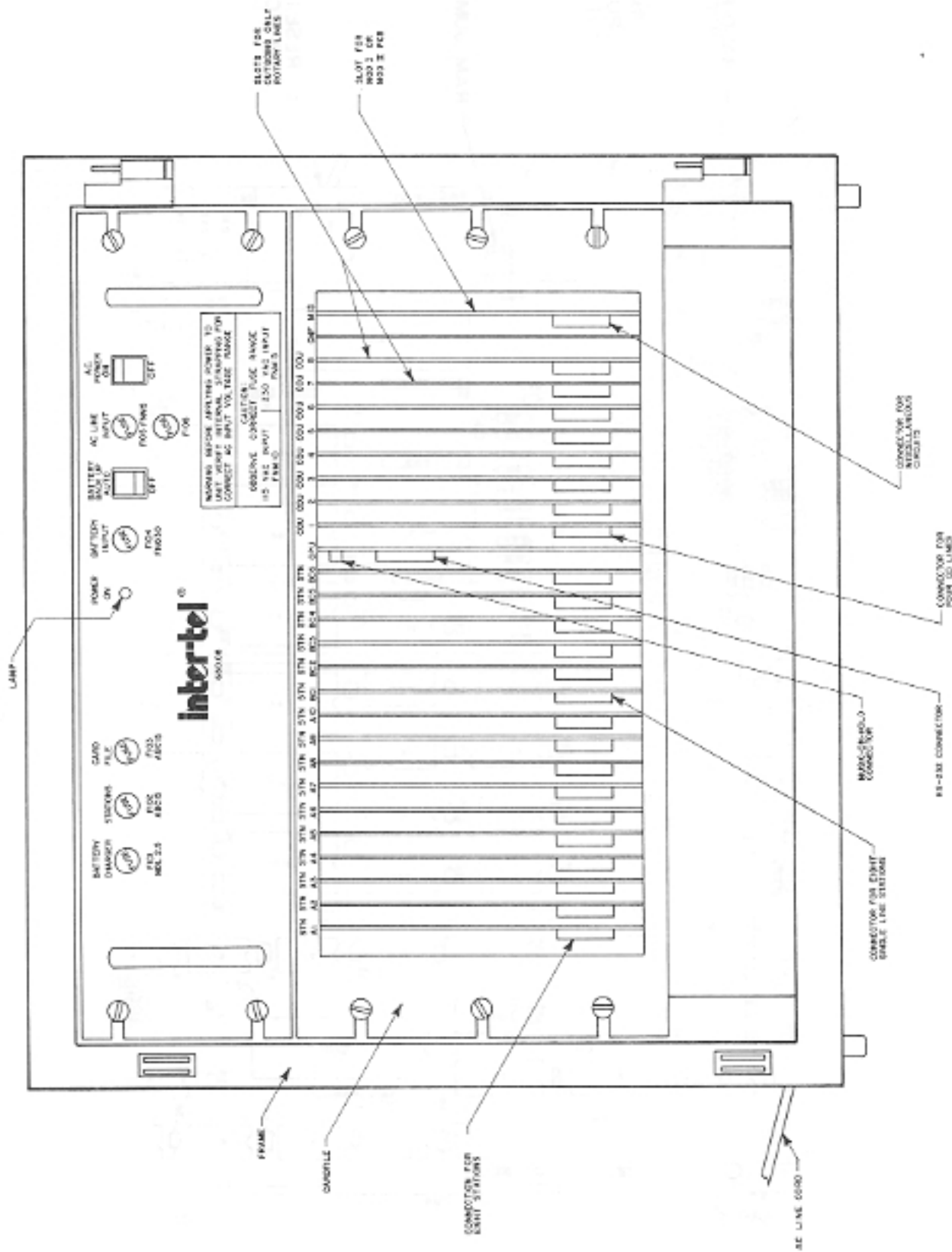
Figure 3-3. SPK/II Cabinet Layout (680.08)
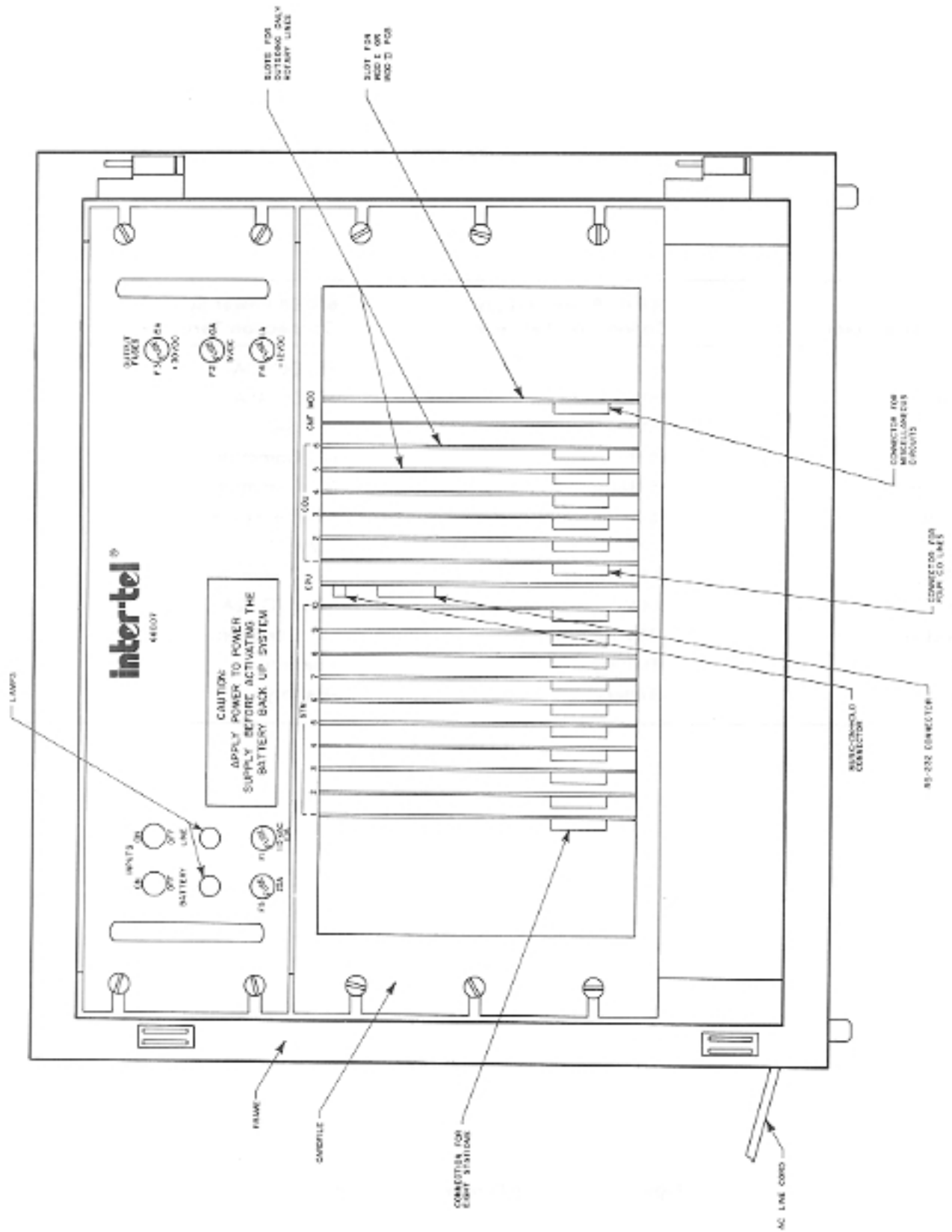
Figure 3-4. SPK/I Cabinet Layout (680.07)

Power Cable Color	680.07 Power Supply Connection Terminal	ᵛ680.08 Power Supply Connection Terminal
Blue	+5V	+5VDC 40A
Orange	+5V	+5VDC 40A
Green	+5V Sense	+5V Sense
Blue/Black	+5 Return	DC Common
Orange/Black	+5 Return	DC Common
Green/Black	+5 Sense Return	+5V Sense Return
Red	-12V	-12V 1A
Red/Black	-12V Return	DC Common
White	+30V	+29VDC 12A
White/Black	+30V Return	DC Common
Black	+Battery	+Battery
Black/White	-Battery	-Battery

Figure 3-5. Power Supply Connections
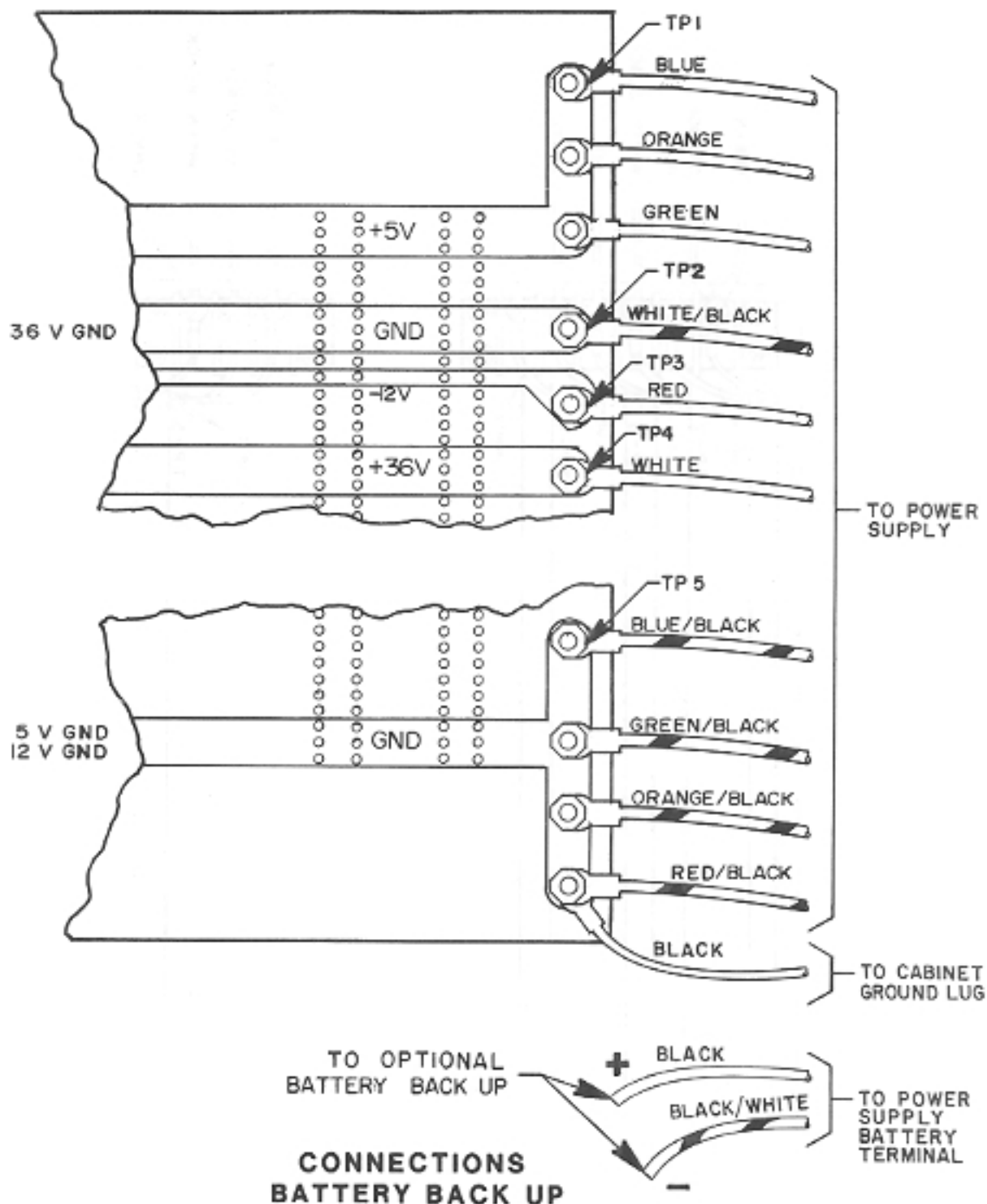
Figure 3-6. Voltage Test Point Locations for the SPK/II System
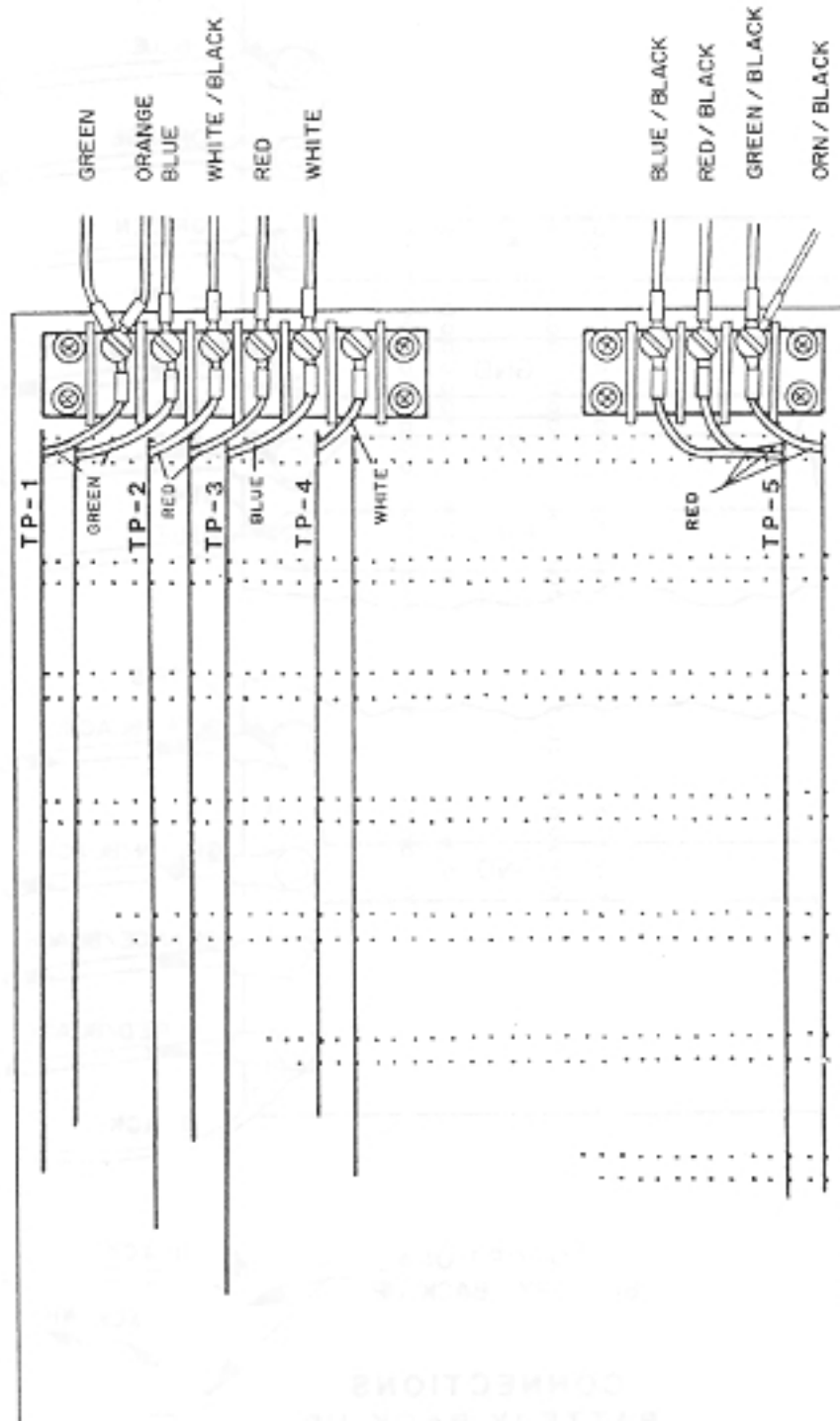
Figure 3-7. Voltage Test Point Locations for the SPK/I System

TO CENTRAL OFFICE LINES

TO STATIONS

| CO LINES 1-24 | | | STN-A 2.1 ... 2.8 | STN-A 6.1 ... 6.8 | STN-A 10.1 ... 10.8 | STN B/C 14.1 ... 14.8 |
| TO KSU | TO TELCO | | | | | |

CO LINES 25-32

STN-A 3.1 ... 3.8

STN-A 7.1 ... 7.8

STN B/C 11.1 ... 11.8

STN B/C 15.1 ... 15.8

MOD II — KSU CABLE

STN-A 4.1 ... 4.8

STN-A 8.1 ... 8.8

STN B/C 12.1 ... 12.8

STN B/C 16.1 ... 16.6

STN-A 1.1 — STN CABLES / KSU CABLE — 1.8

STN-A 5.1 ... 5.8

STN-A 9.1 ... 9.8

STN B/C 13.1 ... 13.8

CABLES TO KSU
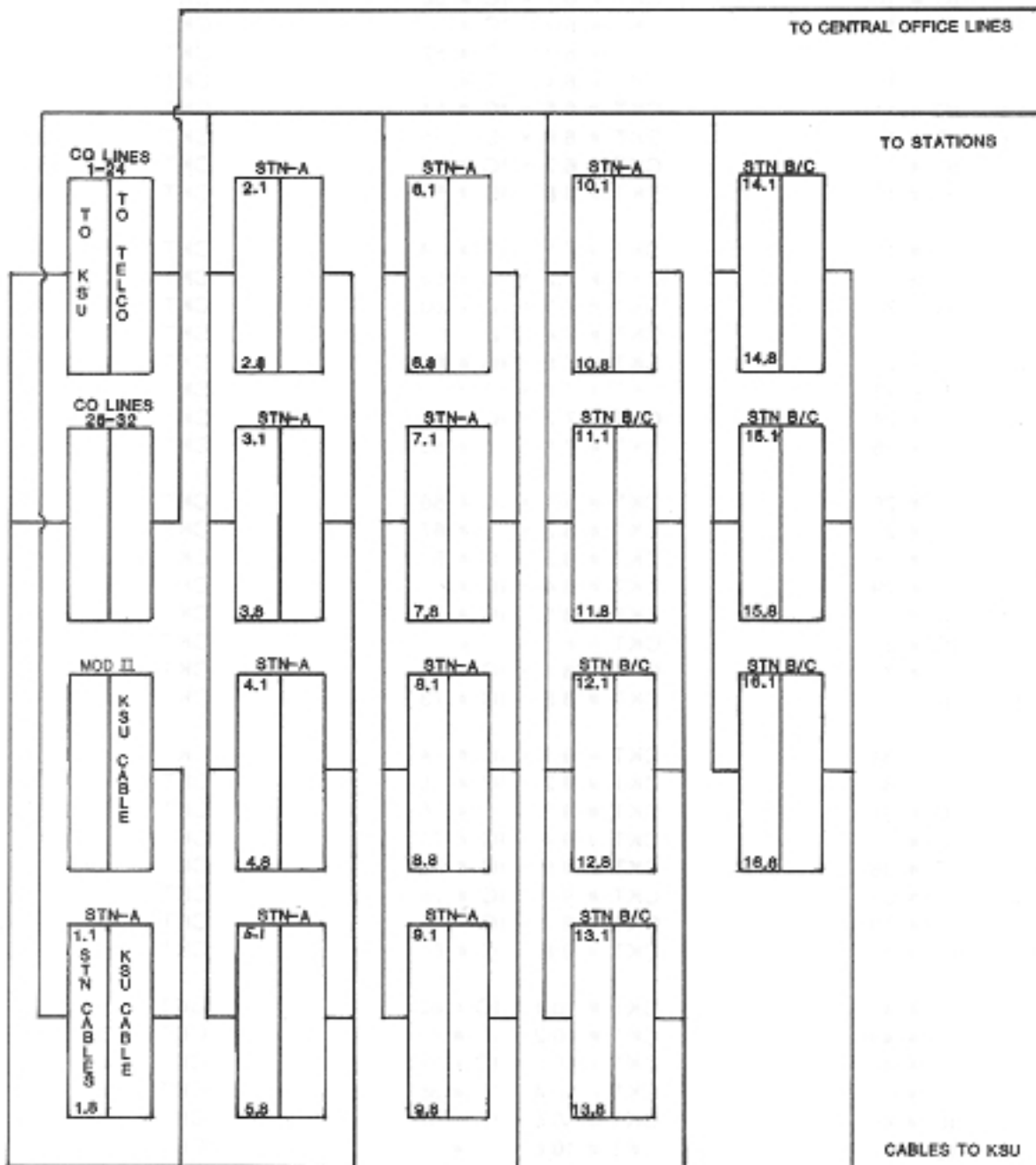
NOTE: ALL BLOCKS ARE 66M150 TYPE

Figure 3-8. Main Distribution Frame Layout and Cable Assignments

CKT # = STATION CIRCUIT NUMBER; IC # = INTERCOM NUMBER

CKT # 1.1 = IC # 10	CKT # 6.1 = IC # 50	CKT # 11.1 = IC # #10
CKT # 1.2 = IC # 11	CKT # 6.2 = IC # 51	CKT # 11.2 = IC # #11
CKT # 1.3 = IC # 12	CKT # 6.3 = IC # 52	CKT # 11.3 = IC # #12
CKT # 1.4 = IC # 13	CKT # 6.4 = IC # 53	CKT # 11.4 = IC # #13
CKT # 1.5 = IC # 14	CKT # 6.5 = IC # 54	CKT # 11.5 = IC # #14
CKT # 1.6 = IC # 15	CKT # 6.6 = IC # 55	CKT # 11.6 = IC # #15
CKT # 1.7 = IC # 16	CKT # 6.7 = IC # 56	CKT # 11.7 = IC # #16
CKT # 1.8 = IC # 17	CKT # 6.8 = IC # 57	CKT # 11.8 = IC # #17
CKT # 2.1 = IC # 18	CKT # 7.1 = IC # 58	CKT # 12.1 = IC # #18
CKT # 2.2 = IC # 19	CKT # 7.2 = IC # 59	CKT # 12.2 = IC # #19
CKT # 2.3 = IC # 20	CKT # 7.3 = IC # 60	CKT # 12.3 = IC # #20
CKT # 2.4 = IC # 21	CKT # 7.4 = IC # 61	CKT # 12.4 = IC # #21
CKT # 2.5 = IC # 22	CKT # 7.5 = IC # 62	CKT # 12.5 = IC # #22
CKT # 2.6 = IC # 23	CKT # 7.6 = IC # 63	CKT # 12.6 = IC # #23
CKT # 2.7 = IC # 24	CKT # 7.7 = IC # 64	CKT # 12.7 = IC # #24
CKT # 2.8 = IC # 25	CKT # 7.8 = IC # 65	CKT # 12.8 = IC # #25
CKT # 3.1 = IC # 26	CKT # 8.1 = IC # 66	CKT # 13.1 = IC # #26
CKT # 3.2 = IC # 27	CKT # 8.2 = IC # 67	CKT # 13.2 = IC # #27
CKT # 3.3 = IC # 28	CKT # 8.3 = IC # 68	CKT # 13.3 = IC # #28
CKT # 3.4 = IC # 29	CKT # 8.4 = IC # 69	CKT # 13.4 = IC # #29
CKT # 3.5 = IC # 30	CKT # 8.5 = IC # 70	CKT # 13.5 = IC # #30
CKT # 3.6 = IC # 31	CKT # 8.6 = IC # 71	CKT # 13.6 = IC # #31
CKT # 3.7 = IC # 32	CKT # 8.7 = IC # 72	CKT # 13.7 = IC # #32
CKT # 3.8 = IC # 33	CKT # 8.8 = IC # 73	CKT # 13.8 = IC # #33
CKT # 4.1 = IC # 34	CKT # 9.1 = IC # 74	CKT # 14.1 = IC # #34
CKT # 4.2 = IC # 35	CKT # 9.2 = IC # 75	CKT # 14.2 = IC # #35
CKT # 4.3 = IC # 36	CKT # 9.3 = IC # 76	CKT # 14.3 = IC # #36
CKT # 4.4 = IC # 37	CKT # 9.4 = IC # 77	CKT # 14.4 = IC # #37
CKT # 4.5 = IC # 38	CKT # 9.5 = IC # 78	CKT # 14.5 = IC # #38
CKT # 4.6 = IC # 39	CKT # 9.6 = IC # 79	CKT # 14.6 = IC # #39
CKT # 4.7 = IC # 40	CKT # 9.7 = IC # 80	CKT # 14.7 = IC # #40
CKT # 4.8 = IC # 41	CKT # 9.8 = IC # 81	CKT # 14.8 = IC # #41
CKT # 5.1 = IC # 42	CKT # 10.1 = IC # 82	CKT # 15.1 = IC # #42
CKT # 5.2 = IC # 43	CKT # 10.2 = IC # 83	CKT # 15.2 = IC # #43
CKT # 5.3 = IC # 44	CKT # 10.3 = IC # 84	CKT # 15.3 = IC # #44
CKT # 5.4 = IC # 45	CKT # 10.4 = IC # 85	CKT # 15.4 = IC # #45
CKT # 5.5 = IC # 46	CKT # 10.5 = IC # 86	CKT # 15.5 = IC # #46
CKT # 5.6 = IC # 47	CKT # 10.6 = IC # 87	CKT # 15.6 = IC # #47
CKT # 5.7 = IC # 48	CKT # 10.7 = IC # 88	CKT # 15.7 = IC # #48
CKT # 5.8 = IC # 49	CKT # 10.8 = IC # 89	CKT # 15.8 = IC # #49
		CKT # 16.1 = IC # #50
		CKT # 16.2 = IC # #51
		CKT # 16.3 = IC # #52
		CKT # 16.4 = IC # #53
		CKT # 16.5 = IC # #54
		CKT # 16.6 = IC # #55
		CKT # 16.7 = IC # #56
		CKT # 16.8 = IC # #57

Figure 3-9. Initialized Intercom Number Assignments
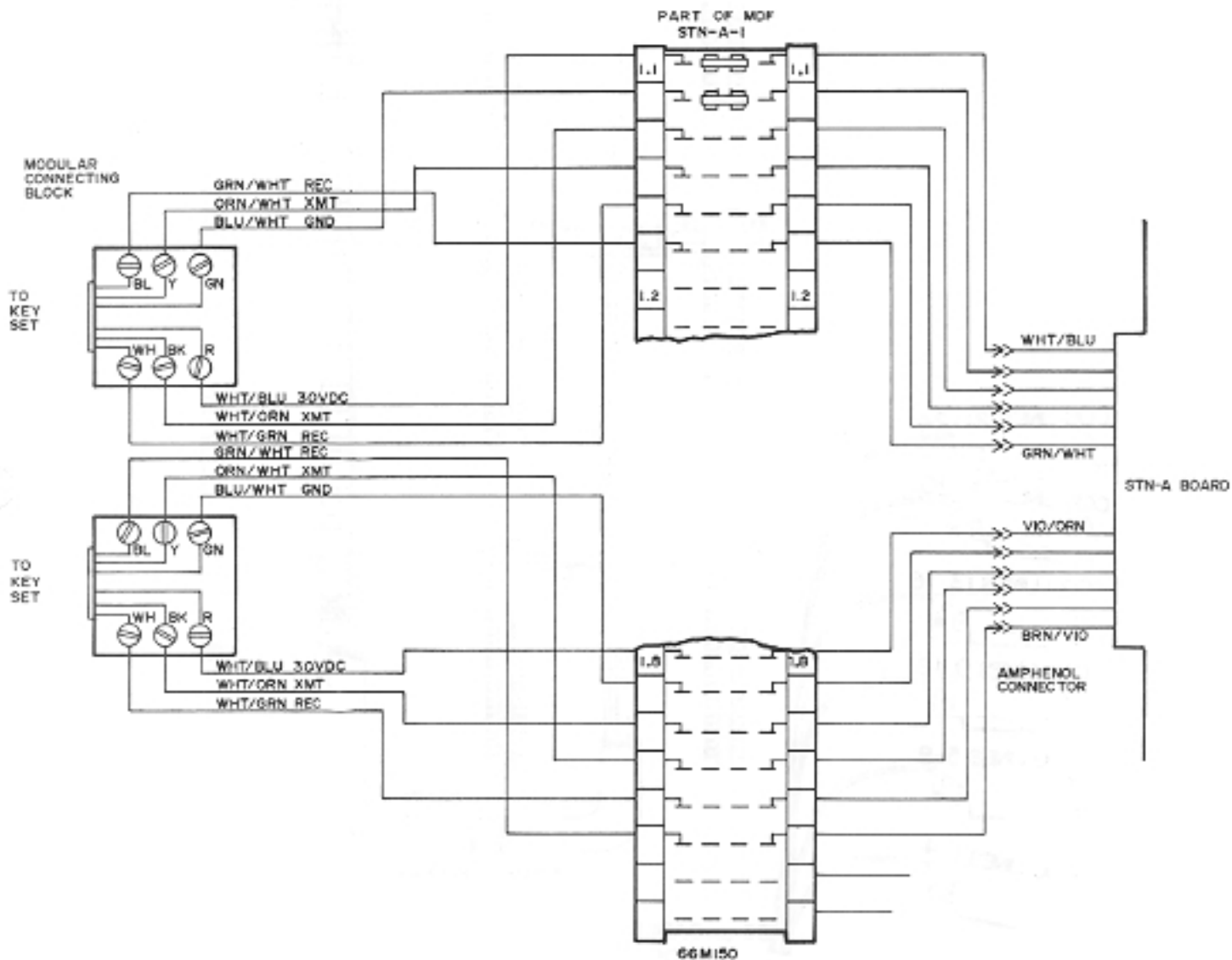
Figure 3-10. Typical STN-A and Station Cable Termination

FEMALE AMPHENOLS

CENTRAL OFFICE
LINES 1-24
(PART OF MDF)

66M150

COU LINES 21-24
COU LINES 17-20
COU LINES 13-16
COU LINES 9-12
COU LINES 5-8
COU LINES 1-4

25 pr.CABLE
TO MDF

TO KSU

SPECIAL COU CABLE

TO TELCO
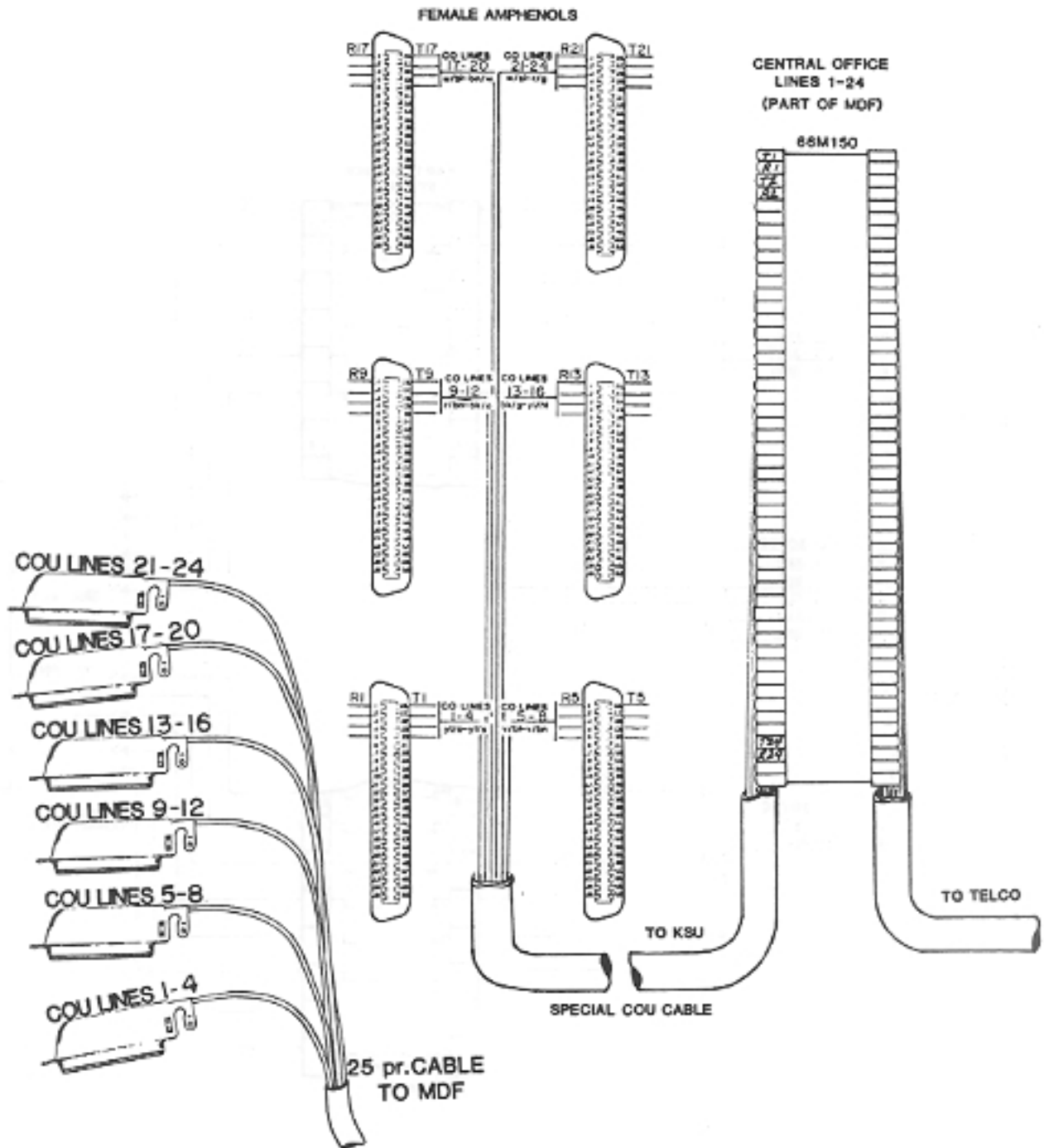
Figure 3-11. Termination of Central Office Lines

CABLES TO MDF

FEED CABLES UNDER CARDCAGE
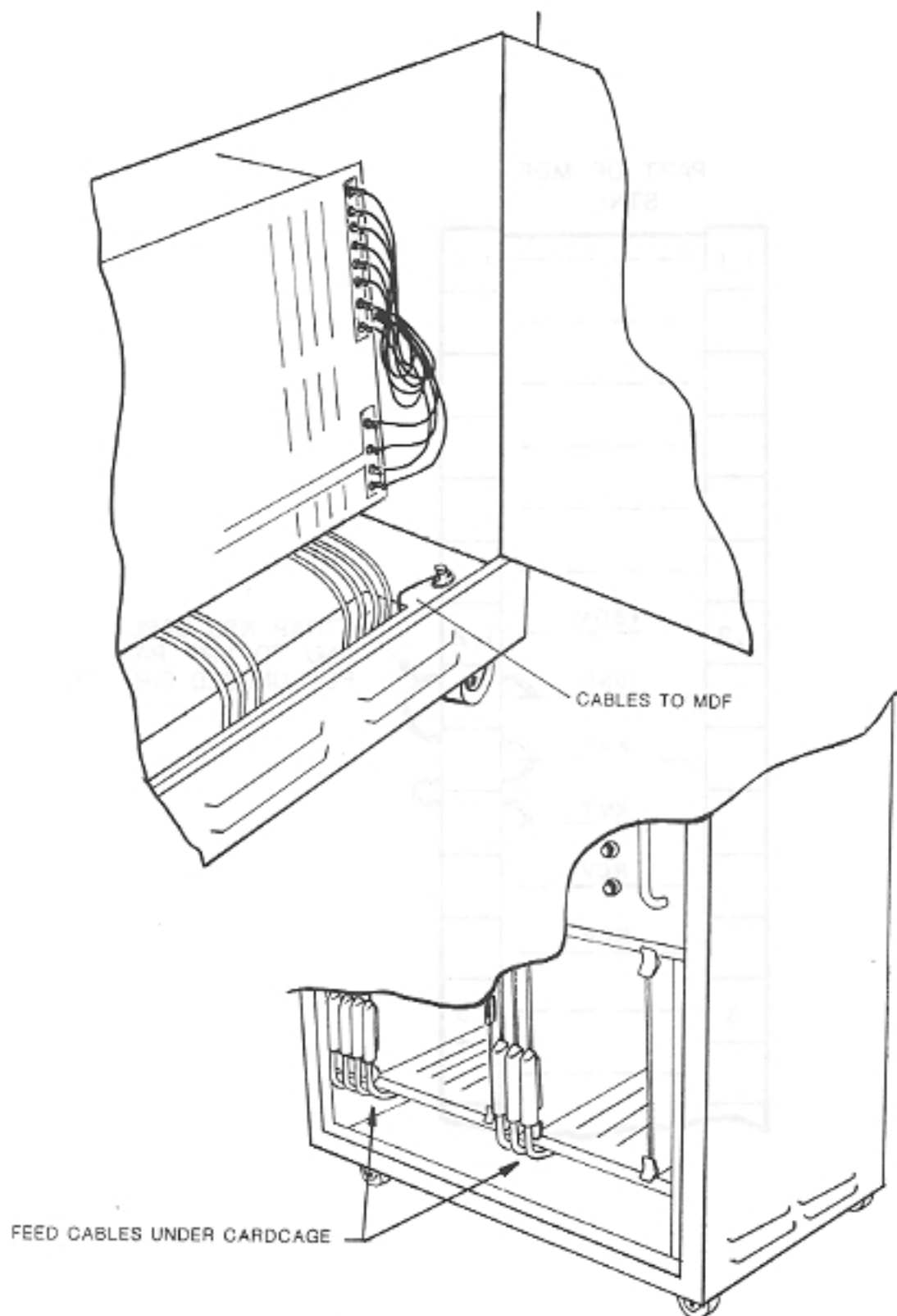
Figure 3-12. Cabinet Cable Feed
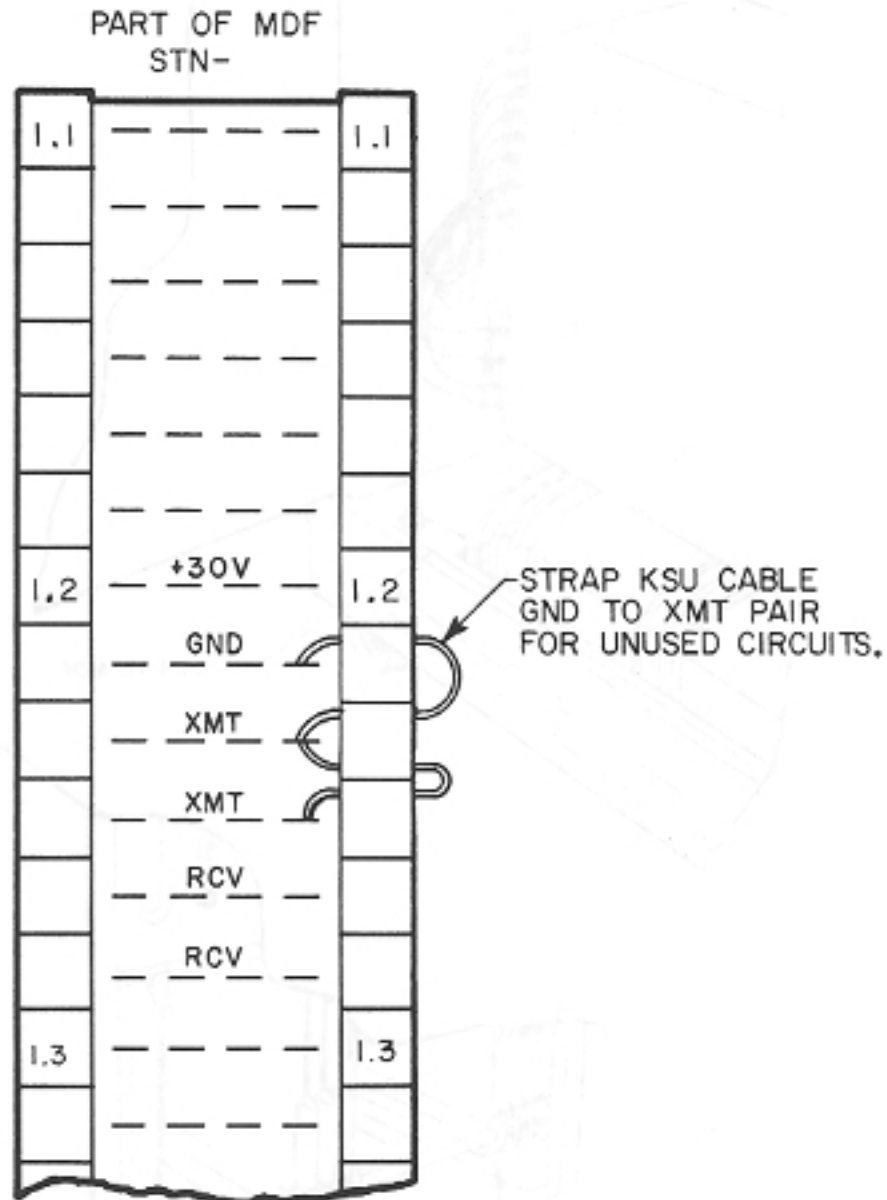
Figure 3-13. Termination of Unused Circuits
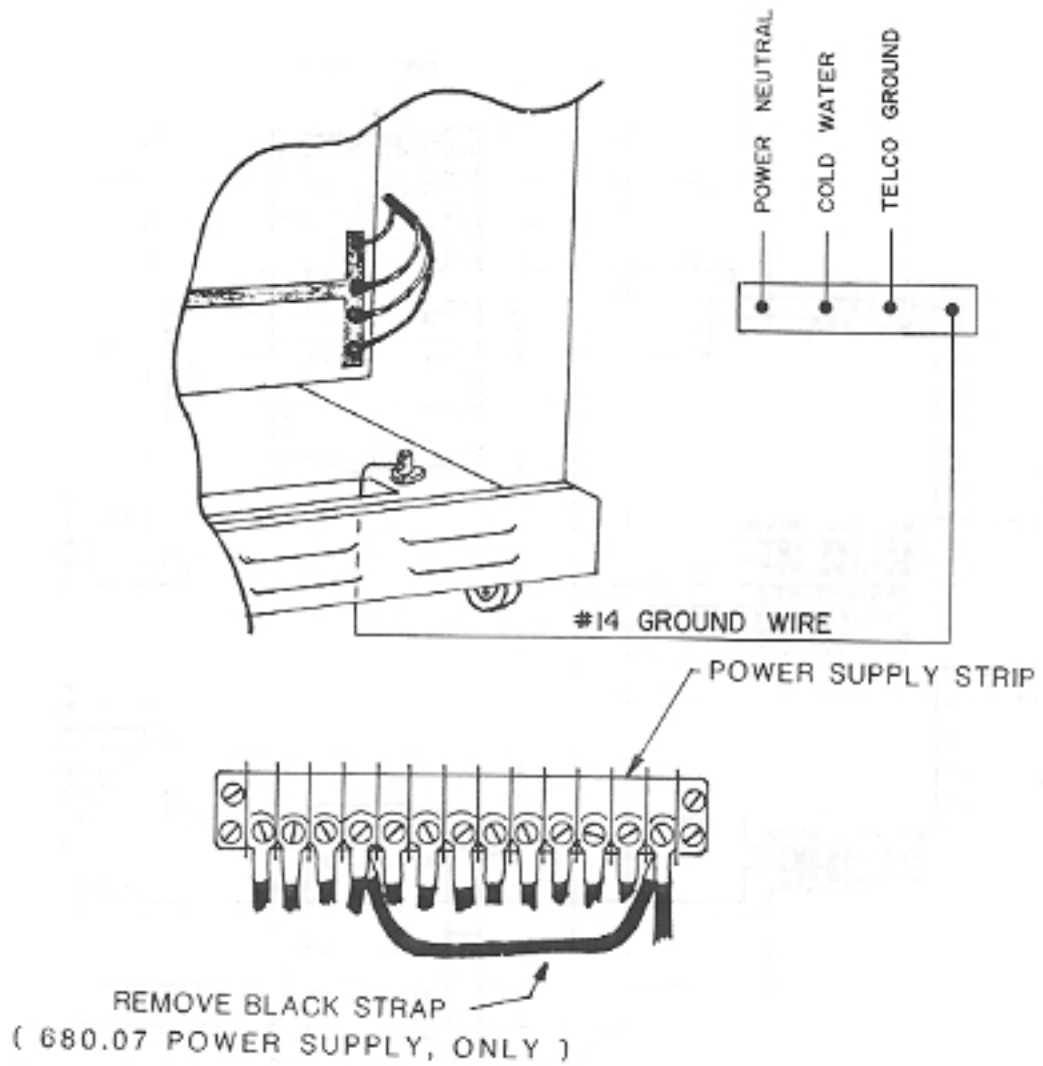
Figure 3-14. KSU Grounding
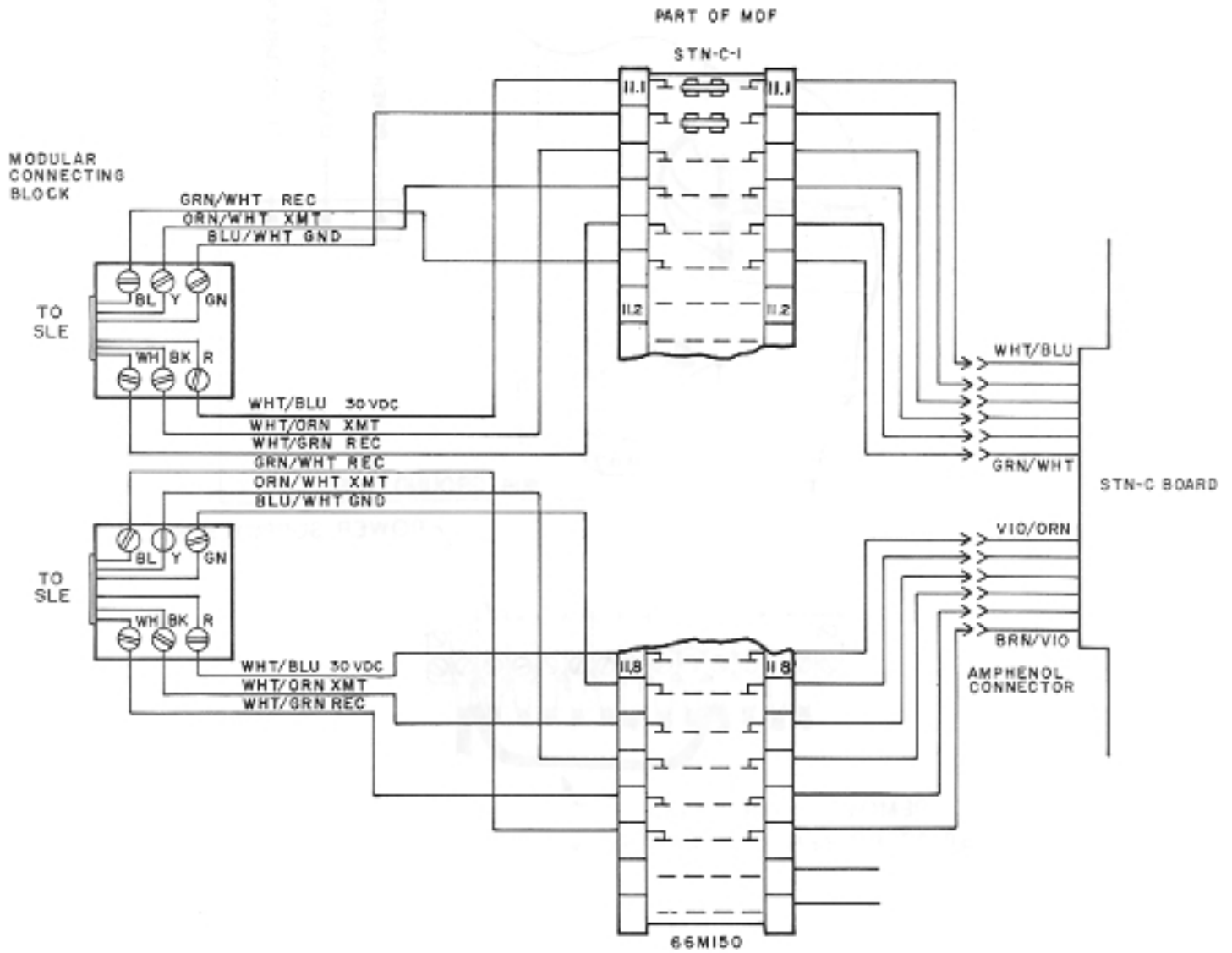
Figure 3-15. Single Line Electronic Instrument and STN-C Termination
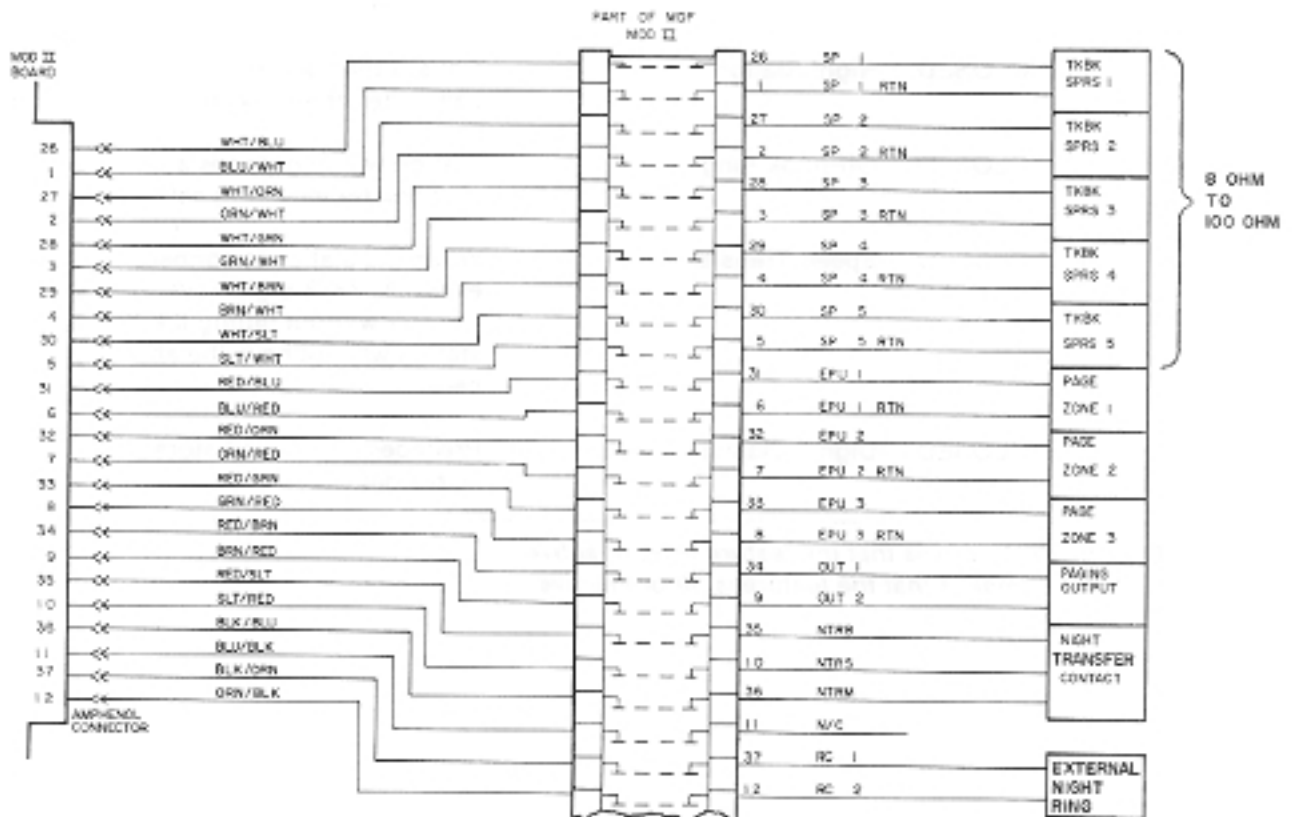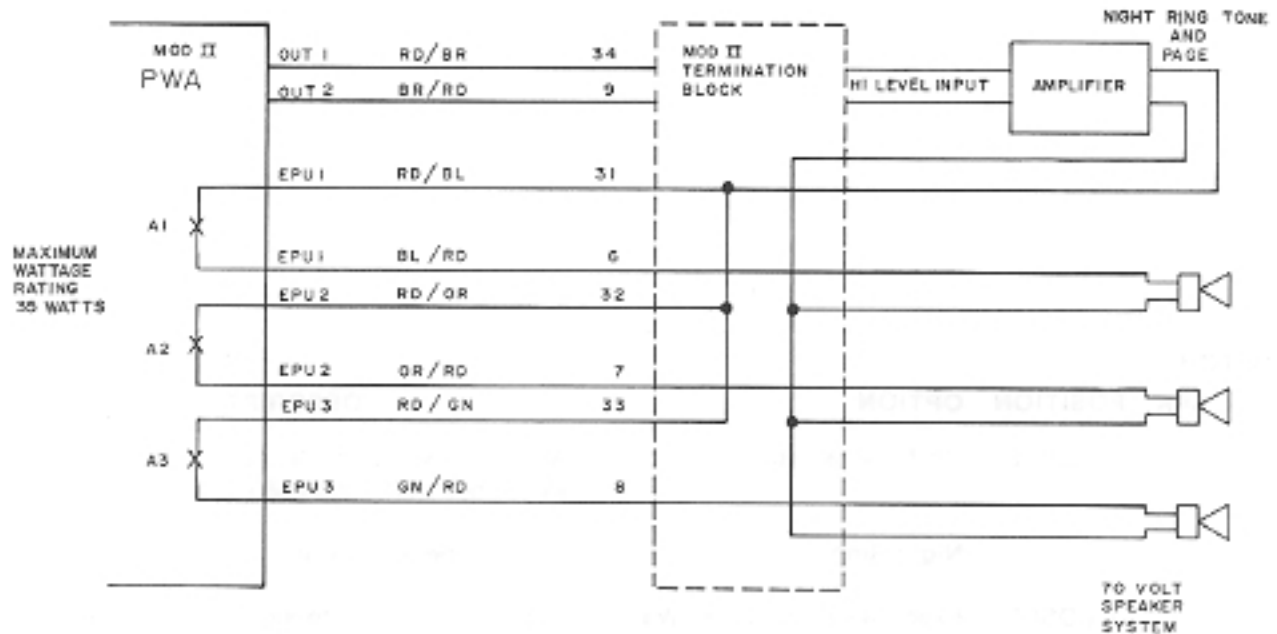
Figure 3-16. Modem PCB Termination

SWITCH				
MPK	SPK	POSITION	OPTION	DESCRIPTION
7	1	CLOSED	Do-Not-Disturb	Allows the station to be placed in Do-Not-Disturb as defined in Practice 680-100-200
			Night Ring	For the operator's station only.
6	2	CLOSED	Executive Priority Call Waiting	Allows the station to signal busy extensions by pressing the # key. Intercom callback is disabled.
5	3	CLOSED	Full-Duplex Speakerphone	Enables the station's microphone so that an optional external speaker may be connected for a full-duplex speakerphone on outside calls.
4	4	CLOSED	Night Station	Causes the station to ring directly for all outside calls when the system is in the night mode.
3	5	CLOSED	Off-hook Ring	Station will ring (tones are in the handset) when off hook for incoming calls.
2	6	CLOSED	Speed Transfer	When the station is connected to an outside line every 2- or 3-digit keystroke entry initiates a transfer without hitting the XFR/CONF key. This station will not have the ability to initiate outside calls.
1	7	CLOSED	Digit 1 Dialing	Precedes all 10-digit stored speed dial numbers with a digit 1.

NOTE: "CLOSED" means that the feature is on or active.
"OPEN" means that the feature is off or inactive.

Figure 3-17. Multi-Line DIP Switch-Selectable Options
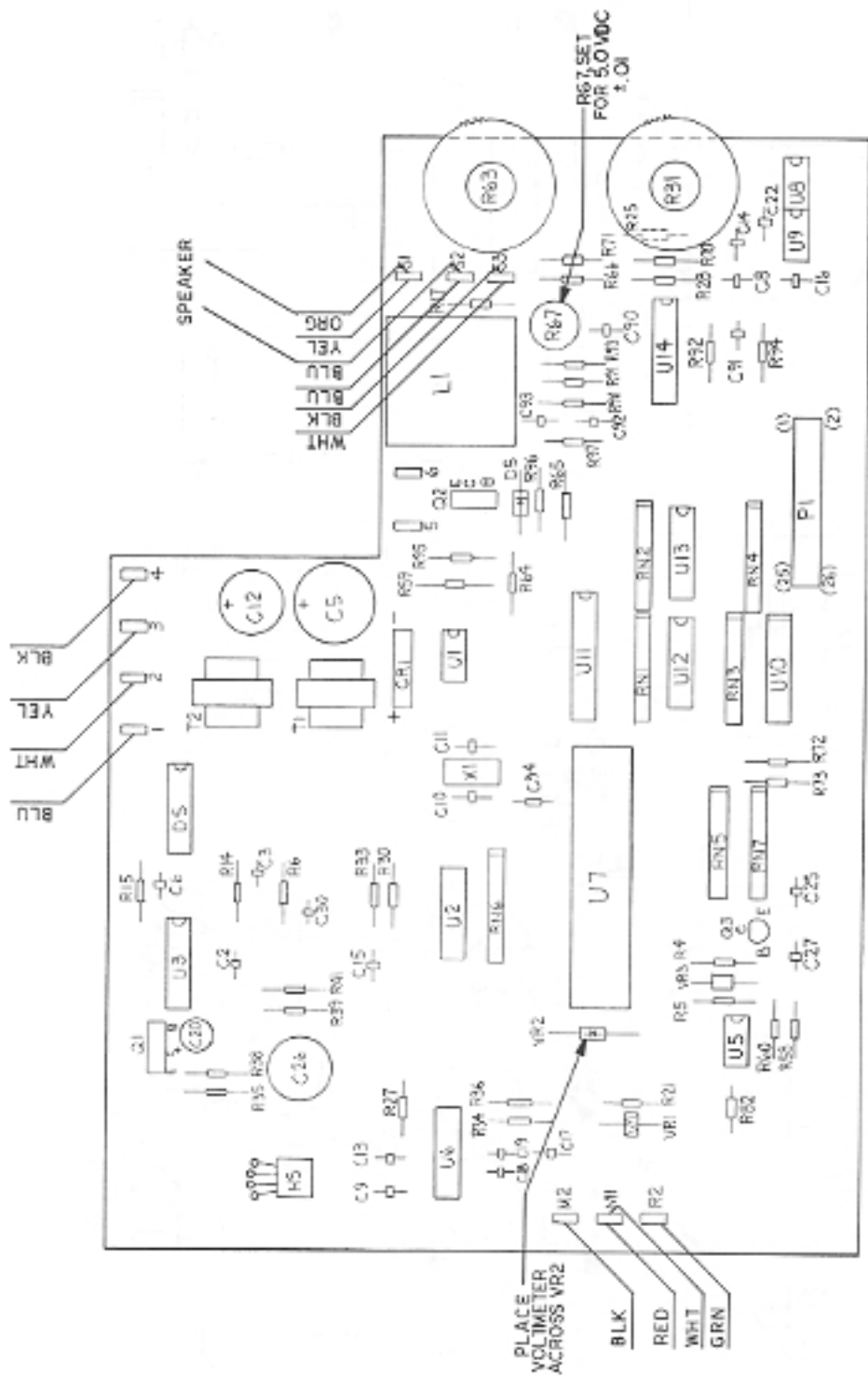
Figure 3-18. SPK Multi-Line Keyset (680.231-2) Voltage Adjustment

SPEAKER

VR2

RI5

MEASURE ACROSS HERE

ADJUST TO 5.0 VDC±.01
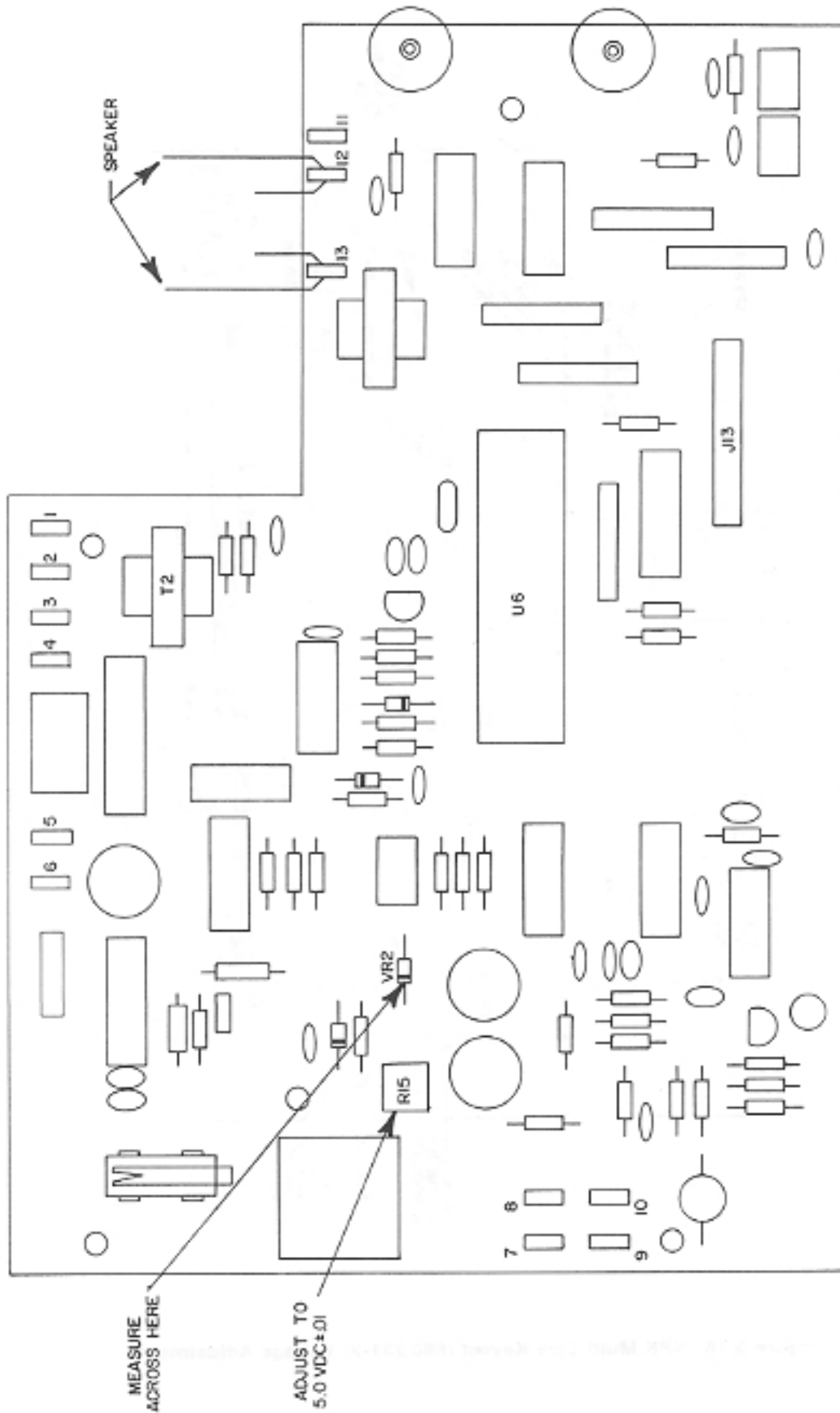
Figure 3-19. SPK Multi-Line Keyset (680.232) Voltage Adjustment
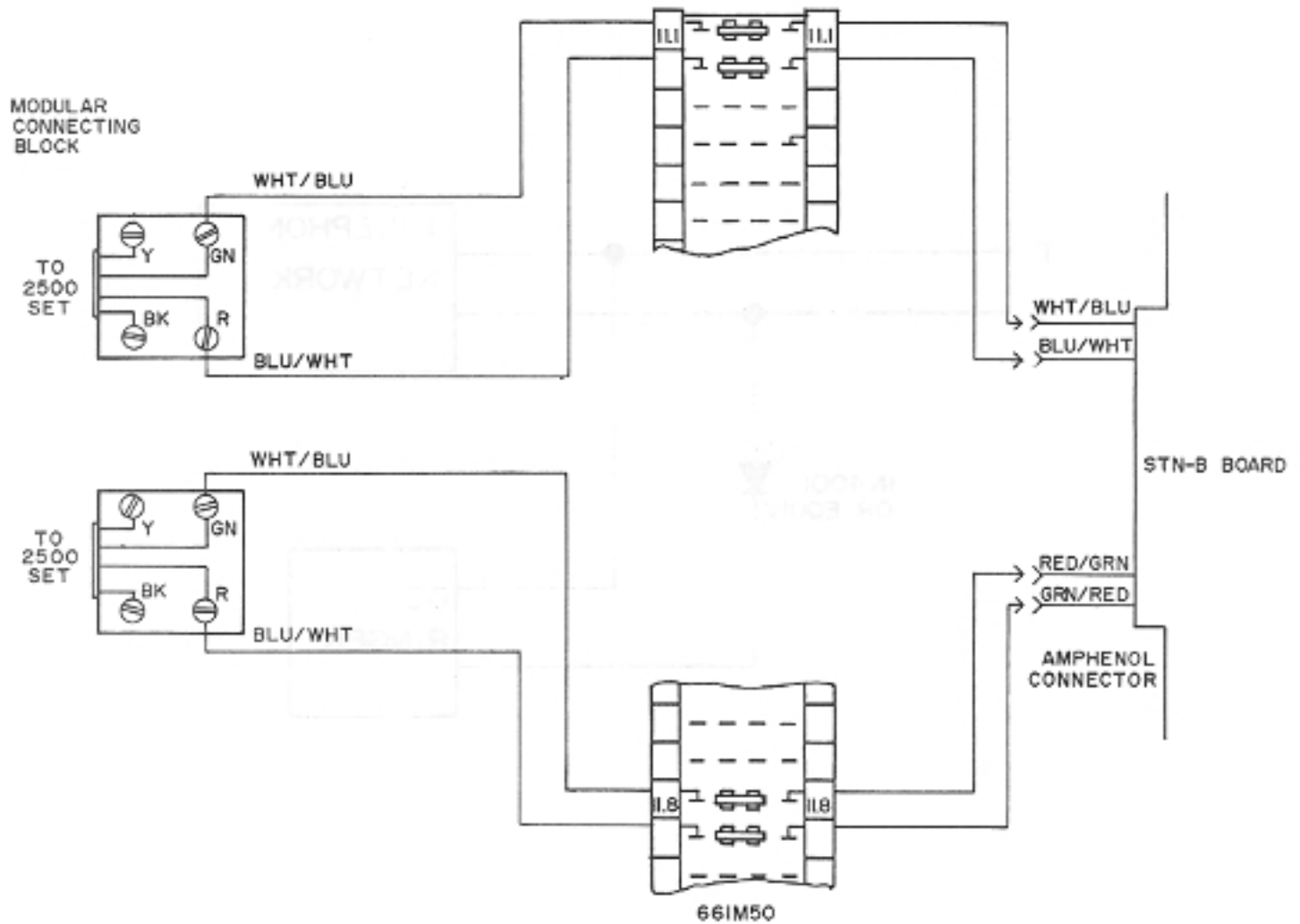
Figure 3-20. Typical STN-B and Station Cable Termination
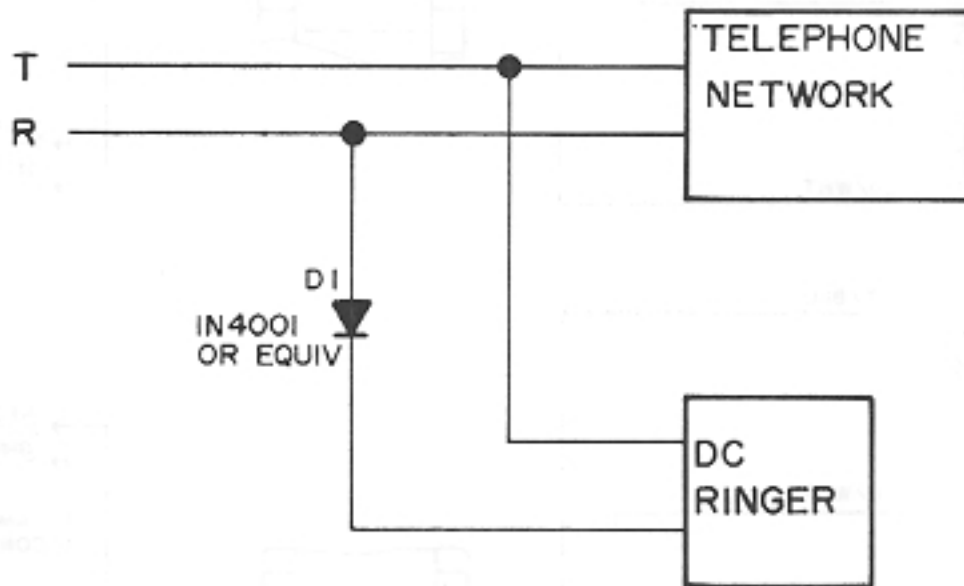
Figure 3-21. D.C. Ringer Connection to 2500 Type Instrument
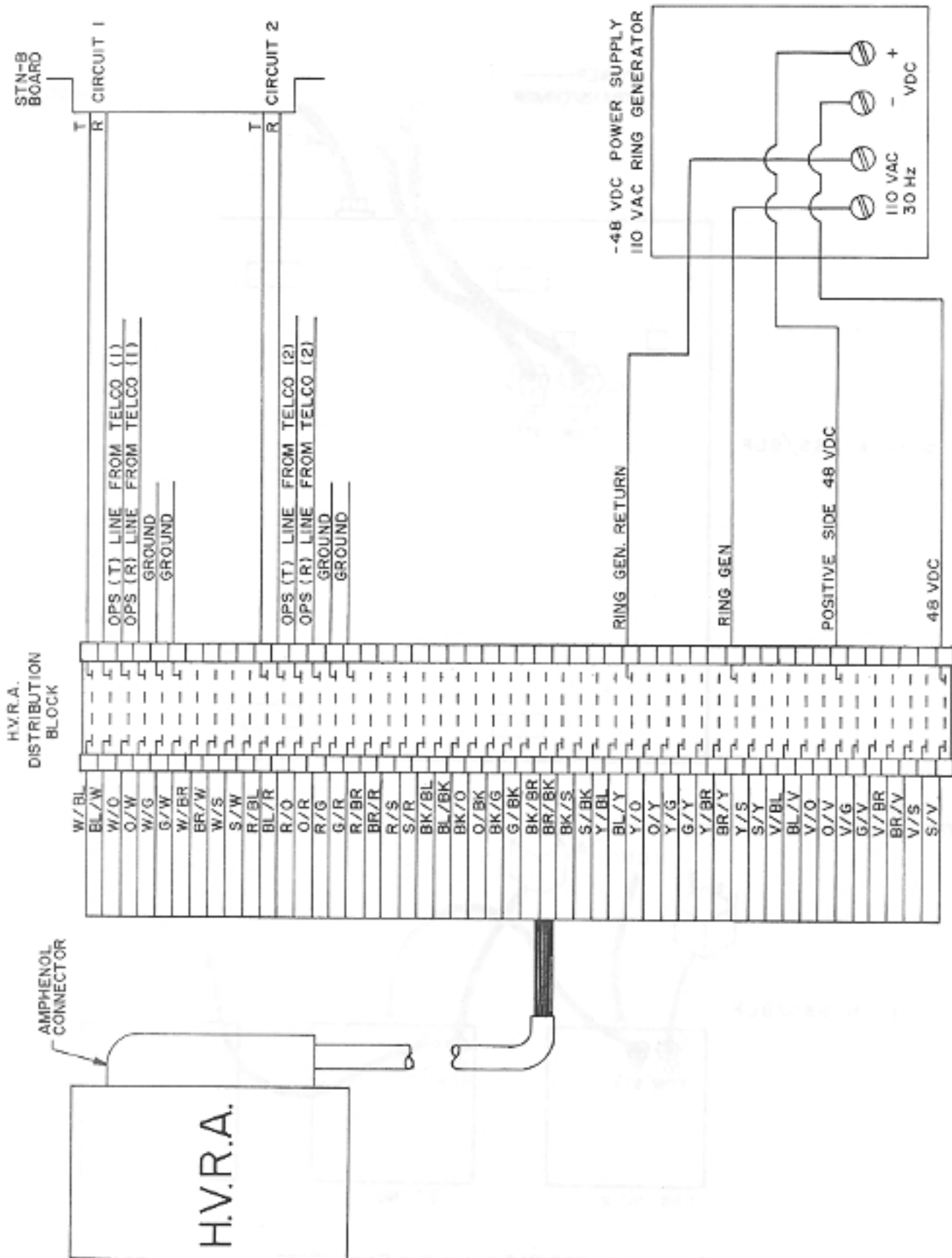
Figure 3-22. HVRA Connection to the MDF

TO MULTI-LINE SET

POWER TRANSFORMER

FROM KSU

SINGLE DSS/BLF

TO POW   TO STA

POWER TRANSFORMER

KSU

TANDEM DSS/BLF

TO POW STA   TO POW STA

DSS NO. 2   DSS NO. I   MULTI-LINE SET
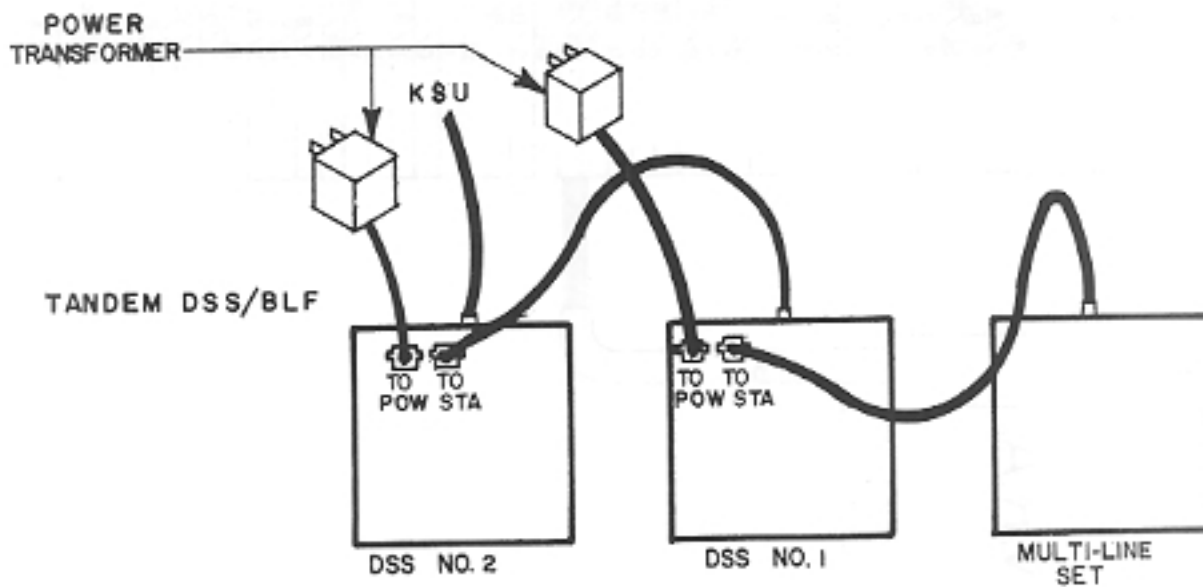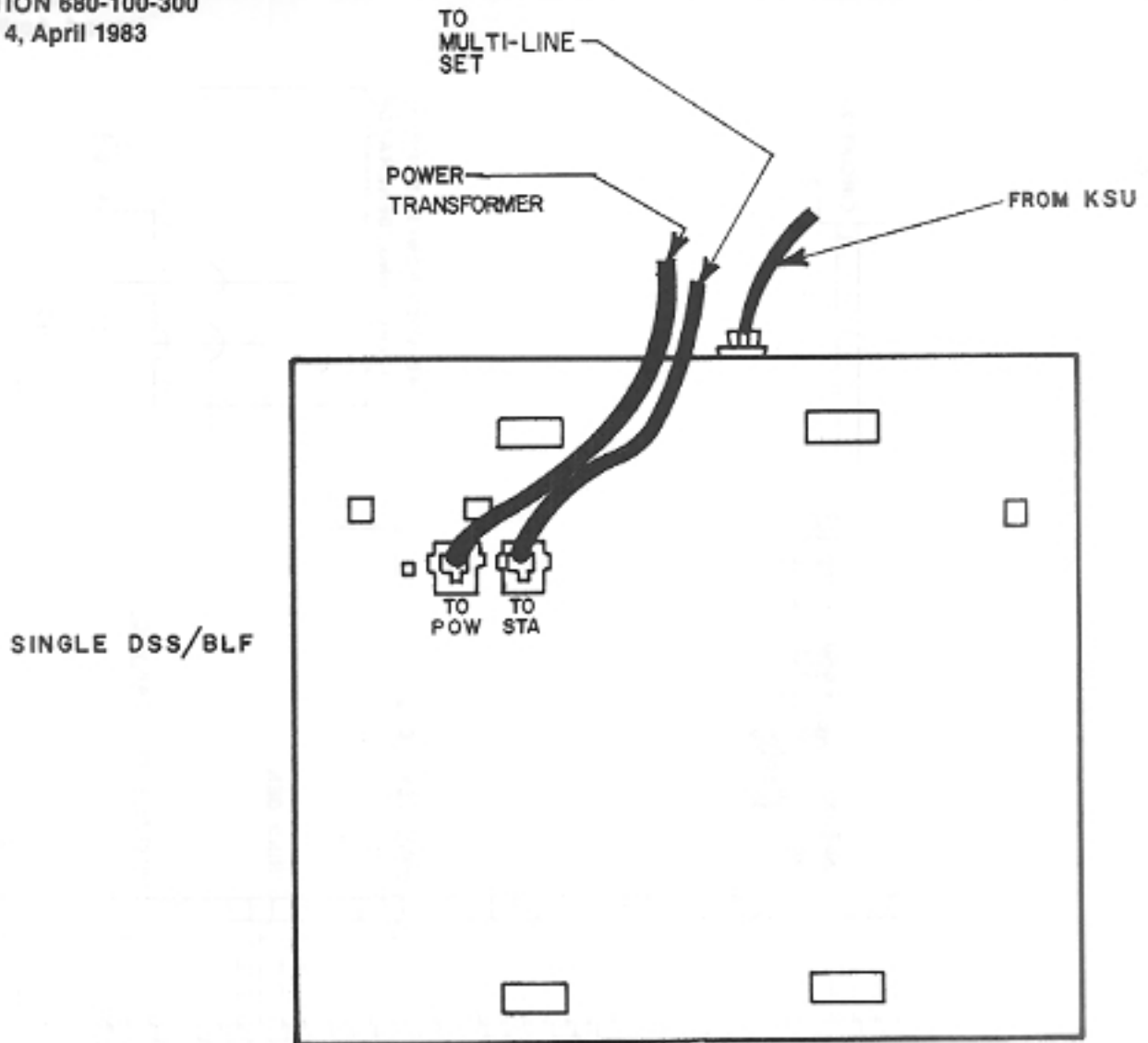
Figure 3-23. DSS/BLF Installation Connections

EXAMPLE No. 1
1 DSS/BLF Sw 1 Closed Sw 2 Closed

SPCL 1	SPCL 2							SPCL 3	SPCL 4
10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29
30	31	32	33	34	35	36	37	38	39
40	41	42	43	44	45	46	47	48	49
50	51	52	53	54	55	56	57	58	59
60	61	62	63	64	65	66	67	68	69

EXAMPLE No. 2 TANDEM DSS/BLF APPLICATION

Sw 1 Closed Sw 2 Closed

SPCL 1	SPCL 2							SPCL 3	SPCL 4
10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29
30	31	32	33	34	35	36	37	38	39
40	41	42	43	44	45	46	47	48	49
50	51	52	53	54	55	56	57	58	59
60	61	62	63	64	65	66	67	68	69

Sw 1 Open Sw 2 Closed

SPCL 1	SPCL 2							SPCL 3	SPCL 4
70	71	72	73	74	75	76	77	78	79
80	81	82	83	84	85	86	87	88	89
#10	#11	#12	#13	#14	#15	#16	#17	#18	#19
#20	#21	#22	#23	#24	#25	#26	#27	#28	#29
#30	#31	#32	#33	#34	#35	#36	#37	#38	#39
#40	#41	#42	#43	#44	#45	#46	#47	#48	#49

EXAMPLE No. 3
1 DSS/BLF 10 single lines 50 multi-lines
Sw 1 Closed Sw 2 Open

SPCL 1	SPCL 2							SPCL 3	SPCL 4
10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29
30	31	32	33	34	35	36	37	38	39
40	41	42	43	44	45	46	47	48	49
50	51	52	53	54	55	56	57	58	59
#10	#11	#12	#13	#14	#15	#16	#17	#18	#19

Example No. 4
1 DSS/BLF 20 multi-lines 40 single lines
Sw 1 Open Sw 2 Closed

SPCL 1	SPCL 2							SPCL 3	SPCL 4
70	71	72	73	74	75	76	77	78	79
80	81	82	83	84	85	86	87	88	89
#10	#11	#12	#13	#14	#15	#16	#17	#18	#19
#20	#21	#22	#23	#24	#25	#26	#27	#28	#29
#30	#31	#32	#33	#34	#35	#36	#37	#38	#39
#40	#41	#42	#43	#44	#45	#46	#47	#48	#49

Figure 3-24. DSS/BLF Configurations
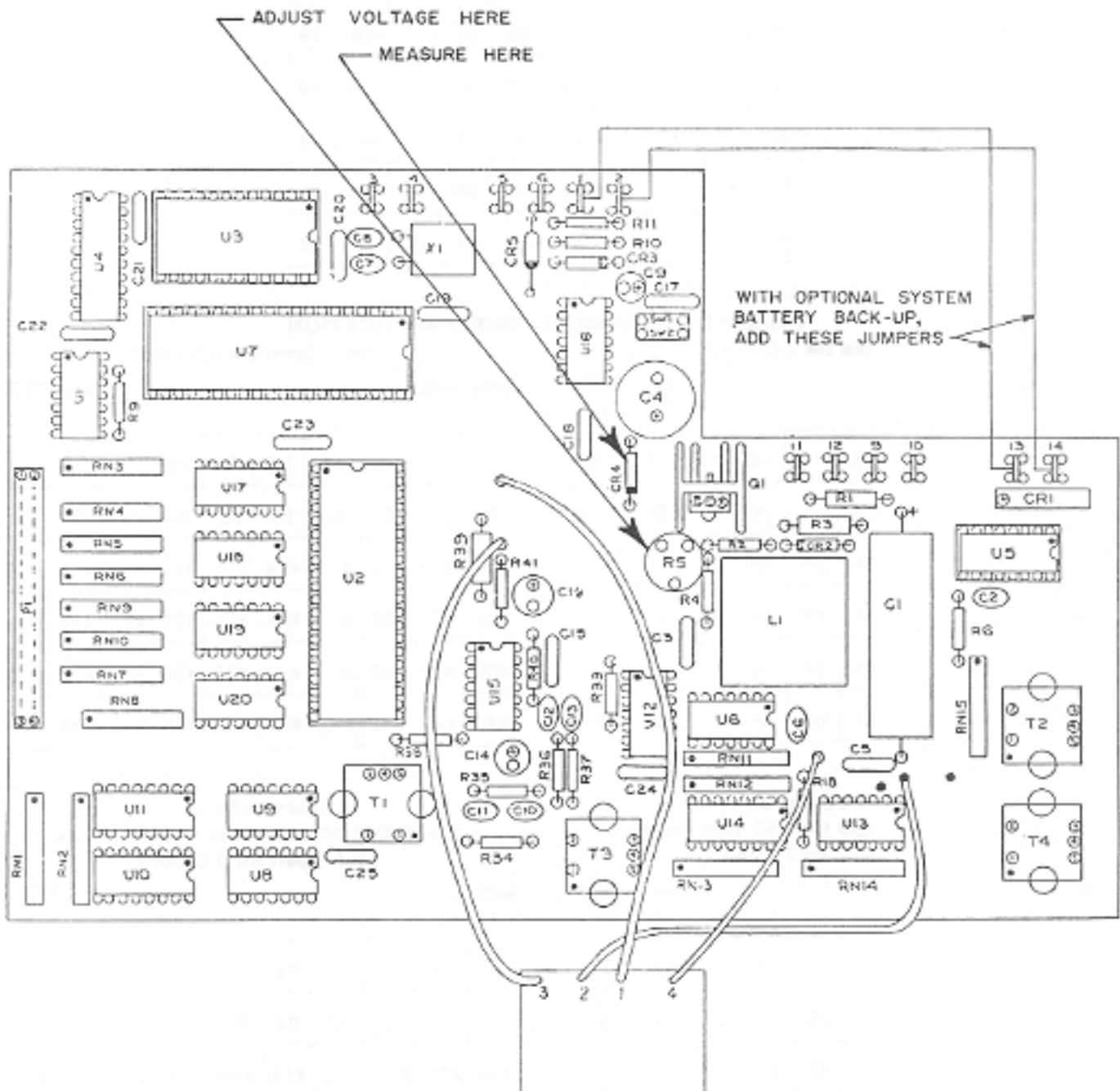
Figure 3-25.   3030D/6460D DSS/BLF (With Fast Reset Voltage Adjustment and Optional Battery Back-Up)

SPK   TERMINAL

                                              22-PIN RS-232   15-PIN RS-232
                                                INTERFACE   INTERFACE

GND   1 ⟩———————————————— 1   I

RCV DATA   2 ⟩———————————————— 3   14

XMIT DATA   3 ⟩———————————————— 2   3

CLEAR TO SEND   5 ⟩———————————————— 5   2

DATA SET READY 6 ⟩———————————————— 6   9

GND   7 ⟩———————————————— 7   15

CARRIER DETECT 8 ⟩———————————————— 8   4

DATA TERMINAL 20 ⟩———————————————— 20   8
READY
                 CONNECTOR TYPE
            AMPHENOL P/N 17-20250-1
               OR EQUIVALENT
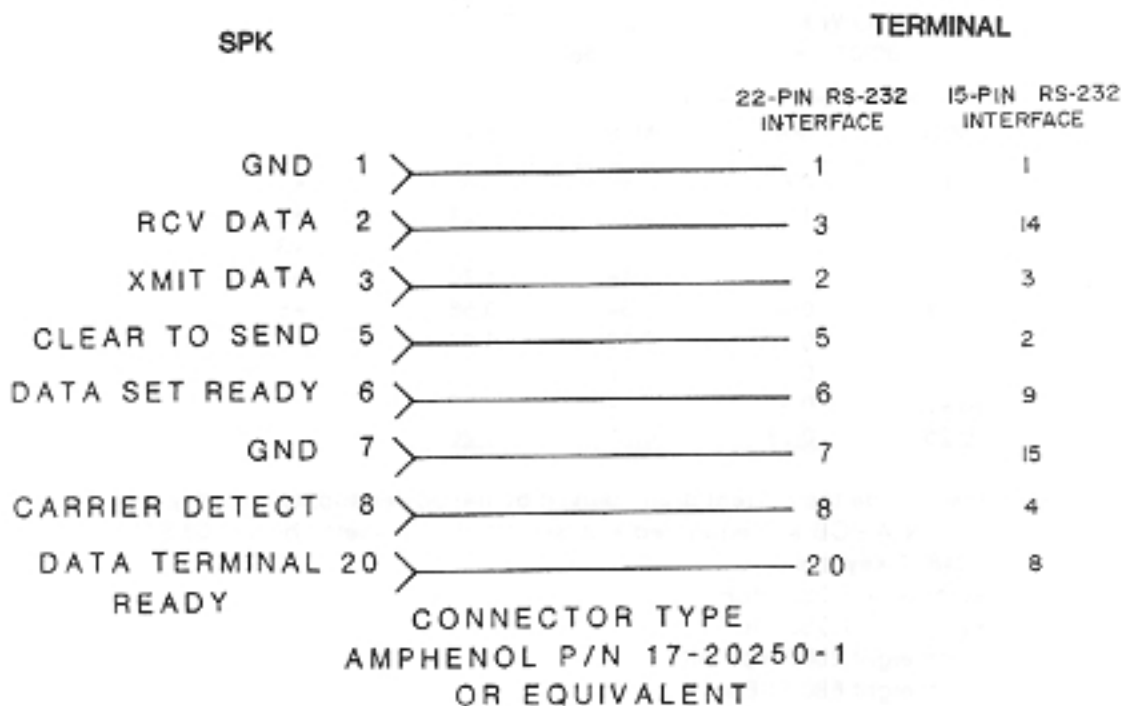
Figure 3-26. RS-232 Cable Connection

Current Requirements (amperes)

PCB	POWER SUPPLY TYPE 680.07 ★7		680.08 ★8		
	MIN	MAX	MIN	MAX	
CPU	0.63	0.63	0.60	0.60	★1
STN-A	1.1	1.38	0.94	1.24	★2
STN-A+1D	1.18	1.68	1.04	1.44	★3
STN-A+2D	- - - -	- - - -	1.18	1.70	★4
STN-B	0.34	0.48	0.34	0.56	★5
STN-C	0.32	0.56	0.32	0.62	★6
MOD I	0.26	0.28	0.22	0.24	
MOD II	0.42	0.48	0.34	0.36	
CNF	0.25	0.28	0.21	0.26	

★1 — CPU figures include the current drain caused by the power supply circuitry.

★2 — The 680.07 STN-A PCB was equipped with eight 1664T keysets, the 680.08 STN-A PCB was equipped with eight 2480T keysets.

★3 — Same as ★2 plus one DSS/BLF.

★4 — Same as ★2 plus two DSS/BLF's.

★5 — Equipped with eight 2500 type sets.

★6 — Equipped with eight 680 SLE's.

★7 — 24 volt battery.

★8 — 30 volt battery.

NOTE: The minimum values represent the circuitry in an idle condition, i.e., no calls in progress, no LED's on.

The maximum values represent the circuitry in an active condition, i.e., calls in progress, all station LED's, keyset LED's and DSS LED's on.

Figure 3-27. Back-Up Battery Amp/Hour Calculation

Figure 3-27. *Continued*

Required Battery Back-Up Capacity

(amp/hours)

Back-Up Time (Hrs)

		1	2	3	4	5	6	7	8	9	10
	1	2	3.5	4	5.5	6	8.5	9.5	10	10.5	11
	2	4	7	8	10.5	12	17	19	20	21	22
	3	6	10	12	16	18	25	28	30	31.5	33
	4	8	14	16	21	24	34	37	40	42	44
	5	10	17	20	27	30	42	46	50	52	54
	6	12	20	24	32	36	50	55	60	63	66
	7	14	24	28	37	42	59	64	70	73	76
	8	16	27	32	43	47	67	73	80	84	87
	9	18	31	36	48	53	75	82	90	94	98
	10	20	34	40	53	59	84	91	100	105	109
Battery	11	22	37	44	58	65	92	100	110	115	120
Current	12	24	40	48	64	71	100	109	120	125	131
(amps)	13	26	44	52	69	77	109	119	130	136	142
	14	28	47	56	74	83	117	128	140	146	153
	15	30	50	60	79	89	125	137	150	157	163
	16	32	54	64	85	95	134	146	160	167	174
	17	34	57	68	90	100	142	155	170	177	185
	18	36	60	72	95	106	150	164	180	188	196
	19	38	64	76	100	112	159	173	190	198	207
	20	40	67	80	106	118	167	182	200	209	217
	21	42	70	84	111	124	175	191	210	219	229
	22	44	74	88	116	130	184	200	220	230	240
	23	46	77	92	121	136	192	209	230	240	250
	24	48	80	96	127	142	200	219	240	250	261
	25	50	84	100	132	147	209	228	250	261	272
	26	52	87	104	137	153	217	237	260	271	283
	27	54	90	108	142	159	225	246	270	282	294
	28	56	94	112	148	165	234	255	280	292	305
	29	58	97	116	153	171	242	264	290	302	316
	30	60	100	120	158	177	250	273	300	313	326

SPK SYSTEM PROGRAMMING GUIDE

1.00 INTRODUCTION

1.01 General

This section describes how to program the SPK system to perform features and functions unique to the individual customer. This procedure must be performed on initial set up or after power has been off for more than 25 days. Normally, the automatically recharged internal battery will protect the programmed information for approximately 25 days. The system can be reprogrammed without affecting operation. Any changes made while a call is in progress will not become active until after the call is completed. Some maintenance programming can affect system operation; therefore, a certain degree of caution must be exercised when programming.

1.02 Programming Terminal

The programmer will need an input and output device such as a keyboard and CRT terminal or a keyboard and printer terminal. These input and output devices are connected to the CPU PCB and must be RS-232 compatible. See Section 680-100-300, 8.00.

NOTE: For remote programming, the programming terminal must be connected to a modem.

The keys on the terminal keyboard will produce standard ASCII code required to program the SPK system. The terminal must be online and in the full-duplex mode with the baud rate set to 300 or 9600 baud as determined by the CPU PCB setting for local programming, or 110 or 300 baud as determined by the setting on the MOD I or MOD II PCB for remote programming.

1.03 Remote Programming

The SPK system may be remotely programmed by calling the system operator, giving any special passwords to the operator, and asking for extension 90. Extension 90 is the modem on the MOD I or MOD II PCB. This type of programming will require a remote Bell System 103A modem or equivalent. The BAUD rate of 110 or 300 is selectable on the MOD I or MOD II PCB's.

2.00 SYSTEM LEVEL PROGRAMMING

2.01 KSU Setup

The CPU PCB has four programming options available to it. These options are:

A. RESET SWITCH. The reset switch resets the software and hardware. It is a momentary switch located on the front of the CPU PCB board. Although this switch may be activated at any time, the caution below should be heeded.

CAUTION: Calls in progress will be dropped when the RESET switch is activated.

B. BAUD RATE STRAP. The BAUD RATE STRAP allows the user to select either 300 or 9600 BAUD for communications with the RS-232 type terminal or printer. It has no effect on the normal system operation.

C. ROM-RAM STRAP. The ROM-RAM strap MUST be in the RAM position during system programming. If it is in the ROM position, the memory will act as Read Only Memory and will not accept programming changes. This strap may be moved to the ROM position after programming.

D. Battery ON/OFF Jumper. The battery ON/OFF jumper is shipped in the OFF position. After

placing the jumper in the ON position and allow-
ing time for the battery to charge (two days for
full charge), power may be removed from the
CPU without loss to data. The battery will pro-
vide protection for the programmed data base
for approximately 25 days with a fully charged
battery.

2.02 Operating the Terminal

The following areas are of special note when pro-
gramming the SPK system. Refer to the designated
areas for detailed information.

1. SIGN-ON MESSAGE: — See Section 2.02A.

2. EQUAL SIGN (=) — See Section 2.02 B.

3. COMMAND LINE AND CARRIAGE RETURN
   (CR) — See Section 2.02 C.

4. TIME-OUT MESSAGE — See Section 2.02 D.

5. DEL Or RUBOUT KEY — See Section 2.02 E.

6. CTRL-D KEY — See Section 2.02 F.

7. CTRL-X KEY — See Section 2.02 G.

8. ERROR MESSAGE — See Section 2.02 H.

9. QUIT — See Section 2.02 I.

10. MISC PROGRAM AIDS — See Section 2.02 J.

A. SIGN-ON MESSAGE. After the power to the
SPK system and the terminal is turned on, the
terminal may display the date and nominal prin-
tout data. To acquire access to the SPK pro-
gramming functions, press the space bar. The
space bar instructs the SPK to begin to accept
the programming and to activate a 10-line buffer
which saves Station Message Detail Record-
ing (SMDR) information while the system is in
the programming mode. This buffer will be
printed after programming is complete. Because
of the limited buffer space, only the first 10
SMDR entries are saved.

The programmer will see the following prompt
when the system has first entered the program-
ming mode.

SPK X.Y COPYRIGHT 1981 INTER-TEL
EQUIPMENT INC.

ENTER: SERV, TIME, DISP,TEST, INIT,
REST OR ONMN

NOTE: The "X.Y." indicates the version and revi-
sion of the software running the system.
The first digit, "X," indicates the version
level, while the second digit, "Y," specifies
the revision cycle.

B. EQUAL SIGN (=). The equal sign (=) prompt at
the extreme left column of the programming
terminal indicates that the major programming
areas of the system may be accessed. These
areas are explained in Section 2.03.

C. COMMAND LINE AND CARRIAGE RETURN
(CR). The SPK system uses the command line
format for the system data entry. A command
entered in this format is not executed until the
carriage return is pressed. This format allows
the programmer to check the command just
entered for errors before execution.

NOTE: In the following text, the symbol (CR) rep-
resents the carriage return key or the enter
key.

D. TIME-OUT MESSAGE. The INTER-TEL SPK
system contains a built-in timer which is acti-
vated during any of the programming modes.
This timer is reset each time information is
entered on the programming terminal. If no
information is entered in a 4 min, 15 sec period,
the SPK will disengage from the programming
terminal. Any time this happens, the program-
mer must re-display the sign-on message by
pressing the space bar to continue program-
ming. If a time-out occurs, any programming
done up to that point will be executed.

E. DEL OR RUBOUT. The DEL or RUBOUT key
serves as a backspace key during data entry. If
the programmer detects an error in the current
input line (before a carriage return is pressed)
the DEL or RUBOUT key will cause the preced-
ing character to be removed from the input line.

F. CONTROL-D KEYS. The CONTROL-D func-
tion is a combination of two keys that are
pressed simultaneously: the CONTROL (CTRL)
key and the D key. This combination allows the
programmer to re-display the current line
(before a terminating carriage return is pressed).
If the input line has had several characters
deleted (see DEL or RUBOUT paragraph E.),

the line may be unreadable. The CTRL-D keys can be used to show a "clean" copy of the line for the programmer's inspection. The fresh line will be shown on the line following the current input line. Programming input is not terminated with the CTRL-D key. Any remaining input must still be supplied, as well as the terminating carriage return.

G. CONTROL-X KEYS. The CONTROL-X function is also a combination of two keys being pressed simultaneously: the CONTROL (CTRL) key and the X key. This combination is used to cancel the input line entered by the programmer before a carriage return is pressed. Any characters entered on the current input line will be deleted, and the input command can be resumed from the beginning of the line. A carriage return, line feed, and prompt will be sent to the terminal so that the programmer will have positive feedback that the line has been canceled.

H. ERROR MESSAGE. An error message generated by the INTER-TEL SPK will indicate that the format used to enter data into the SPK is incorrect. The ERROR MESSAGE will be indicated by the word "WHAT" followed by a question mark (?). An example of the error message is given below:

    WHAT?

When the error message is displayed, the SPK system will automatically redisplay the prompt in response to which the error was made.

I. QUIT COMMAND. The QUIT command will terminate a programmng mode or end the entire programming function in the SPK system. This command may only be entered after the SERV prompt ("Enter programming area desired") or after the equal sign prompt (=). The BREAK may be pressed at any time during programming to initiate the equal sign prompt.

J. MISC PROGRAMMING INFORMATION. The information that is listed below will aid in the operation of the terminal which will be used to program the SPK system.

1. Only upper case letters are accepted by the SPK system.

2. During programming, the terminal recog-

nizes the following methods of entering a series of numbers:

a. The hypen (-) may be used to list a series of numbers. For example, list the lines restricted as 1-8 instead of 1,2,3,4,5,6,7,8.

b. The comma (,) must be used to list a series of non-consecutive numbers. For example list the lines restricted as 2,3,5,6,8,10.

3. To erase any data in a particular field and display the next prompt, press the space bar, then the carriage return.

4. When you correct data and find that one field need not be changed, press the carriage return. This will cycle the terminal to the next command line entry without altering any data in the skipped-over field.

5. The symbols X,XX and XY are used throughout the following procedure to indicate numeric variables.

6. In the documentation of the programming procedure, specific command entries have been indicated. These entries have been emphasized by the use of parentheses ( ). After encountering parentheses, recognize them as emphasis notations and DO NOT enter them into the command line data.

7. For accurate results, respond to all questions displayed by the system.

9. To terminate any programming mode, press the BREAK key. "QUIT" or any other programming mode may then be entered.

2.03 Major Programming Areas

The SPK system contains nine major programming areas which may be accessed by the programmer. SERV, TIME, and INIT are used for configuring features. DISP, TEST, and ONMN are diagnostic commands. REST is a maintenance command. DUMP and LOAD are data base transfer routines. The functions of the programming areas are:

SERV (SERVICE). Programming the operating features — See Section 2.03 F.

TIME (TIME). Setting the time and the date —
See Section 2.03 D.

DISP (DISPLAY). Displaying system or station
activity — See Section 2.03 E.

TEST (TEST). Testing the ROM and the RAM of
the CPU — See Section 2.03 A.

INIT (INITIALIZE). Setting programmed data
base to the initial configuration — See Section
2.03 B.

REST (RESTART). Resetting the Hardware Only
— See Section 2.03 C.

ONMN (ONLINE MONITOR). Monitoring
changes and debugging the SPK system. This
program should be used only by qualified per-
sonnel. See Section 680-100-401.

DUMP/LOAD. Dumping data from the CPU and
loading data into the CPU via the RS-232 input
port primarily from a larger computer system
which is remotely located. More information
about Dump and Load can be found in Section
680-100-402.

After the sign-on message and equal sign prompt (=)
have been displayed, one of the nine major pro-
gramming areas may be entered. A major program-
ming area is entered by typing the four-letter name
shown above and a carriage return (CR).

The programmer can also terminate the session by
using the QUIT command. This will place the RS-
232 data port in the SMDR mode and will cause the
display of any SMDR information in the SMDR
buffer.

Figure 4-1 shows the programming sequence recom-
mended for installing the INTER-TEL SPK system.

NOTE: To alter any programmed data, the ROM/-
RAM jumper E2 on the CPU PCB must be in
the RAM position. (See Section 680-100-
100, Fig. 1-1.) If this jumper is in the ROM
position when an attempt is made to alter
the SERV DATA base, the terminal dis-
plays: "THE ROM/RAM JUMPER MUST BE
MOVED TO ALLOW UPDATES."

A. TEST (TEST). This program tests the Random
Access Memory (RAM) and the Read-Only
Memory (ROM) on the CPU PCB. To do a com-

plete test of all RAM, CPU jumper E2 must be in
the RAM position. Placing jumper E2 in the
ROM position protects the programmed data
base while TEST is performed. See note below.

The command to start TEST is:

TEST (CR)

The terminal will respond with:

SYSTEM WILL HALT ON THIS
COMMAND, ARE YOU SURE (Y/N) ?

To perform the test, enter Y (CR)

The terminal will display:

X ROM & RAM CHECK
X ROM CHECK X
X RAM CHECK X
$1000 - $1FFF . . . PASS
$5000 - $57FF . . . PASS
TURN POWER-SUPPLY SW OFF, THEN
ON!!

CAUTION: The power supply must be turned OFF
and then ON again when indicated by
the terminal display. This resets certain
parts of memory which INIT or REST do
not REST.

NOTES: 1) If the E2 jumper is in the ROM position,
the RAM check ($5000 - $57FF) will fail
and error printouts will be displayed.
Press the space bar to halt the error
printout.

2) If the response is not as shown above,
contact INTER-TEL's Field Service.

Turn the power supply off, wait 5 seconds and
turn the power supply on.

Press the space bar. The sign-on message will
be displayed, and you may begin programming.

CAUTION: The TEST program must always be fol-
lowed by the Initialize program to
ensure your data base.

B. INITIALIZE (INIT). This program sets the SPK
system in a standard software configuration.
The command to start INIT is as follows:

INIT (CR)

The terminal will respond with:

OPT RAM INITIALIZING
INITIALIZATION COMPLETE
=

All previously programmed data is erased and the data base will be in the configuration shown below.

1. Operator's station number is 10.

2. Message center is station 10.

3. All keysets can gain access to all outside lines.

4. All multi-line keysets are in paging zone 1.

5. All multi-line keysets are in tenant group 1.

6. Option 6 (Toll Restriction) is enabled for SLE instruments.

7. System option 9 (line key 24 rotary selection) is enabled.

8. All other options are off.

9. The only allowed area code is 800.

10. The transfer recall time is 60 seconds.

11. The hold recall time is 60 seconds.

12. All intercom numbers are assigned sequentially beginning with extension 10 on circuit 1.1.

13. Lines 1-24 are set to ring in at the operator's extension only.

14. All lines are assumed equipped.

C. RESTART (REST). This program resets all the hardware in the SPK system without cycling power or affecting the data base. It is primarily a maintenance routine and is not used in general programming. The command to start the restart functions is as follows:

REST (CR)

The terminal will respond with:

JUMP TO NMI VECTOR! (DATE)

CAUTION: REST drops all calls in progress.

Press the space bar to display the sign on message and to continue programming.

D. TIME (TIME). This program displays and changes the date or time used on the SMDR printout. The command to change the date or time is:

TIME (CR)

The terminal will respond with:

THE DATE AND TIME IS NOW:
(The current date and time will be shown)

CORRECT?

If correct, enter Y (CR). The terminal will return to the = prompt.

To change either the date or time, enter N (CR)

The terminal will respond with:

ENTER NEW DATE AND TIME

DAY OF WEEK = Enter the two-letter abbreviation, i.e. TU (CR).

MONTH = Enter the two-digit number of the month, i.e., 02 for February (CR).

DAY OF MONTH = Enter the two-digit number for the day of the month (CR).

YEAR =Enter the last two digits of the year (CR).

HOUR = Enter the two digits (00-23) for the hour (CR).

MINUTE = Enter the two-digit number (CR).

SECONDS ARE PRESET TO ZERO!!

=

The clock will start after the minutes are entered.

E. DISPLAY (DISP). The Display program displays the ASCII character (see Figure 4-2) of the activity of the SPK system or of an individual station on the terminal. This is often useful for testing the station, the function, or the DSS/BLF. The command line to start this program is as follows:

DISP (CR)

The terminal will respond with:

DISPLAY IN PROGRESS!

The terminal will now display the activity of the entire system.

To monitor the activity of a single station

ENTER:

DISP XX (CR) (for multi-line sets)

OR

DISP #XX (CR) (for single line sets)

NOTE: XX is the extension number desired.

The terminal will respond with:

DISPLAY IN PROGRESS ! XX

If the terminal has the capability, it will beep every 15 seconds as a reminder that the input/output port is tied up with this function and no SMDR is possible. To terminate this programming area, press the space bar.

NOTE: The DISP program will not time out. It is necessary to terminate DISP when finished by pressing the space bar.

F. SERVICE (SERV). The service program will help you to program features available to the INTER-TEL SPK system. These options may be system-wide affecting all stations or affecting individual stations only. The command to start the SERVICE function is as follows:

SERV (CR)

The terminal will respond with a list of the following options:

FIELD PROGRAMMING ACCESS

STA-STATION SET OPTIONS — See Section 2.03, E; 3

SYS-SYSTEM OPTIONS — See Section 2.03, E; 2

EQU-EQUIPPED LINES — See Section 2.03, E; 6

OPT-OPTION CODE LISTING — See Section 2.03, E; 1

NUM-NUMBER CHANGE (INTERCOM) — See Section 2.03, E; 4

CIR-CIRCUIT # IC # ASSIGNMENT LISTING — See Section 2.03, E; 5

VER-VERIFY CIRCUIT ASSIGNMENTS — See Section 2.03, E; 7

These subprograms are part of the SERV routine and can only be accessed after the SERV prompt which is:

ENTER PROGRAMMING AREA DESIRED=

These subprograms may also be accessed by entering the batch command, SERV, space and the subprogram name. For example:

SERV STA

Attempting to enter these subprograms improperly will result in the error message: WHAT?

Control is transferred from the SERV program to the major programming area selection level (the = prompt) by typing QUIT (CR).

The SPK is a circuit-oriented system. Each STN PCB (STN-A, STN-B, STN-C) contains eight circuits. Circuit numbers are asigned to these individual circuits in the form of "XX.Y;" where "XX" identifies the position of the STN PCB in the cardfile (counting from left to right), and "Y" indicates the circuit (1 through 8) on that specific PCB.

Examples: Circuit number 1.1 indicates the first circuit on the STN-A PCB in the leftmost STN

slot of the cardfile. Circuit number 1.8 identifies the eighth circuit on this PCB. Circuit number 2.1 indicates the first circuit of the STN-A PCB plugged into the second slot (counting left to right) in the cardfile. Circuit number 11.1 identifies the first circuit of the PCB plugged into the eleventh slot (counting left to right) in the cardfile.

As a result of the INIT routine performed in Section 2.03, B, intercom numbers are assigned as shown in Figure 4-3.

1. SERVICE SUBPROGRAM OPTION CODE LISTING (OPT). The Option Code Listing subprogram will list the options that are available in the SPK system. These listings are divided into station options and systems options as described in detail in Section 2.04 and Section 2.05. In front of each option will appear the number by which to reference that option when you use the SYS and STA subprograms. The command line to enter this subprogram is as follows:

OPT (CR)

The terminal will respond with the station and system options available. These are:

STATION OPTION CODE LISTING

1 — OPX RING INTERCOM ALWAYS
2 — LINE MONITORING
3 — MPK/II
4 — RING INTERCOM FIRST
6 — TOLL RESTRICT
7 — FORWARD ON BUSY
8 — C.O. RING FORWARD

SYSTEM OPTION CODE LISTING

1 — PRINT MDR 7-DIGITS AND MORE 30SEC.
2 — PRINT MDR 8 DIGITS AND MORE 30SEC.
3 — ENABLE ERROR MESSAGES
4 — DISABLE I-HOLD
5 — 12SEC. RE-DIAL TIMING
6 — HELD CALL LOOP RELEASE = 1.2SEC.
7 — 600 MSEC HOOKSWITCH FLASH
8 — TIC-TONE
9 — LINE KEY 24 ROTARY SELECTION
10 — SL SMDR PRINT/TOLL MONITOR
11 — PROGRAMMED NIGHT SERVICE
12 — INTERCOM SECURITY TONE
13 — EXTENDED EXTERNAL BELL

14 — C.O. LINE RESEIZE DISABLE
15 — DISABLE C.O. ACCOUNT CODE
16 — SPK/I 1664 SYSTEM

ENTER PROGRAMMING AREA DESIRED =

NOTE: Refer to Section 2.04 for option definitions.

2. SERVICE SUBPROGRAM SYSTEM FEATURES (SYS). The System Features subprogram will set up or delete system-wide features available in the INTER-TEL SPK system. These options will affect all stations that are connected to the system. The command line to start the system features subprogram is as follows:

SYS (CR)

The terminal will respond with the features that had been preset into the system when initialized; or, if updating the system, the information that was previously entered. The format that will be used for listing the features and their values is:

SYSTEM STATUS
OPERATOR EXT=10
MESSAGE CENTER EXT=10
SYSTEM OPTIONS=9
TRANSFER RECALL TIME=60 SECONDS
HOLD RECALL TIME=60 SECONDS
WATS LINE ID=
DISA LINE ID (DAY)=
DISA LINE ID (NIGHT)=
ABSORBED DIGIT ID=
ALLOWED LONG DISTANCE #=
ALLOWED AREA CODE= 800
FORBIDDEN OFFICE CODES=
CORRECT?

NOTE: Section 2.05 and Section 2.06 contain an explanation of these options.

ENTER: Y (CR) or N (CR)

If Y (CR) is entered, the terminal will return to the SERV program level and display:

ENTER PROGRAMMING AREA DESIRED=

If N (CR) is entered, the terminal will respond with:

ENTER REVISED SYSTEM FEATURES
SYSTEM STATUS
OPERATOR EXT=

ENTER: The new operator's extension (CR).

The terminal will respond with:

MESSAGE CENTER EXT=

ENTER: The new message center extension (CR).

The terminal will respond with:

SYSTEM OPTIONS=

ENTER: The system option numbers desired for this installation (CR). (See Section 2.05.)

The terminal will respond with:

TRANSFER RECALL TIME=

ENTER: The new recall time of 1 to 255 seconds (CR).

The terminal will respond with:

HOLD RECALL TIME=

ENTER: The new recall time of 1 to 255 seconds (CR).

The terminal will respond with:

WATS LINE ID=

ENTER: The line key number(s) designated for WATS lines (CR).

The terminal will respond with:

DISA LINE ID (DAY)=

ENTER: The lines assigned to day DISA service (CR).

(If none, leave blank.)

The terminal will respond with:

DISA LINE ID (NIGHT)=

ENTER: The lines assigned to night DISA service (CR). (If none, leave blank.)

The terminal will respond with:

ABSORBED DIGIT ID=

ENTER: The digit the central office will absorb (CR).

The terminal will respond with:

ALLOWED LONG DISTANCE #=

ENTER: Up to two 10-digit numbers that all toll-restricted stations may call (CR).

The terminal will respond with:

ALLOWED AREA CODES=

ENTER: The area codes all toll-restricted stations may call (CR).

The terminal will respond with:

FORBIDDEN OFFICE CODES=

ENTER: Up to 20 three-digit office codes (the first three digits of a seven-digit telephone number) that all toll-restricted stations may NOT CALL (CR).

The terminal will respond with:

CORRECT?

ENTER: Y (CR) or N (CR)

IF Y (CR) is entered, the terminal will respond with:

ENTER PROGRAMMING AREA DESIRED=

At this point, enter QUIT or any other SERV command.

If N (CR) is entered, the terminal will respond with:

ENTER REVISED SYSTEM FEATURES
SYSTEM STATUS
OPERATOR EXT=

NOTE: *By entering N (CR) the terminal will automatically cycle back through the SYS subprogram.*

3. THE SERVICE SUBPROGRAM NUMBER CHANGE subprogram will change or exchange the extension number of any station. The command line to start this subprogram is as follows:

NUM (CR)

The terminal will respond with:

INTERCOM NUMBER ASSIGNMENT CHANGE
ENTER CIRCUIT # OF INTERCOM TO BE CHANGED=

ENTER: the circuit number of the extension you wish to change (CR).

The terminal will respond with:

CKT # X.Y   OLD IC #= XX   NEW IC #= (multi-line sets)

OR

CKT # X.Y   OLD IC #= #XX   NEW IC #= (single line sets)

ENTER: Intercom number to be assigned to this station (CR).

NOTE: *Single line extension numbers cannot be exchanged with multi-line extension numbers.*

If the intercom number is already assigned elsewhere in the system, the terminal will respond with:

NOTICE.... NEW IC # ALREADY ASSIGNED TO CKT # X.Y OK?

ENTER: Y (CR) or N (CR)

If N (CR) is entered, the terminal will respond with:

CKT #X.Y OLD IC#=XX.   NEW IC #=

If Y (CR) is entered, the terminal will respond:

CONTINUE?

If Y (CR) is entered, the program will cycle to the next higher circuit number in sequence. If N (CR) is entered, the program will return to SERV prompt.

ENTER PROGRAMMING AREA DESIRED=

CAUTION: *The system is not designed to allow duplicate or unassigned intercom numbers. All intercom number assignment changes should be made in pairs. The subprogram Verify may be used to assist in locating duplicate or unassigned numbers. Refer to section 7.*

4. SERVICE (SERV) SUBPROGRAM STATION SET FEATURES (STA). The Station Features subprogram is used to set up or delete the features of individual stations. The command line to start this subprogram is as follows:

STA (CR)

The terminal will respond with:

STATION STATUS
ENTER CIRCUIT #

ENTER: The circuit number X.Y of the extension you wish to check (CR). Then proceed to subsection a for multi-line stations or subsection b for single line stations.

a) FOR MULTI-LINE STATIONS (Circuits 1.1-10.8)

The terminal will respond with:

CKT # X.Y IC # XX
LINES RESTRICTED=
RING IN FROM LINES=
OPTIONS=
PAGING ZONES=
PRESET FWD. EXTENSION=
TENANT NUMBER=
CORRECT?

ENTER: Y (CR) or N (CR).

If Y (CR) is entered, the terminal will respond with:

CONTINUE?

If Y (CR) is entered after the "CONTINUE?" prompt, the terminal will automatically cycle to the next higher circuit number in sequence. If N (CR) is entered, the terminal will respond with:

ENTER PROGRAMMING AREA DESIRED=

If N (CR) is entered after the "CORRECT?" prompt, the terminal will respond with:

ENTER REVISED STATION FEATURES
LINES RESTRICTED=

ENTER: The C.O. lines that are to be restricted on this station (CR).

The terminal will respond with:

RING IN FROM LINES=

ENTER: The C.O. lines that are to ring in to this station (CR).

The terminal will respond with:

OPTIONS=

ENTER: The option number(s) separated by commas or a hyphen that are to be assigned to this station (CR). See Section 2.04.

The terminal will respond with:

PAGING ZONES=

ENTER: The paging zones that are to be assigned to this station (CR)

NOTE: Any station that has a circuit equipped by a STN-A PCB, but has no keyset on that circuit, must be programmed out of all paging zones.

The terminal will respond with:

PRESET FWD. EXTENSION=

ENTER: The station's preset forward extension (only one is allowed per station). Refer to Section 2.04, station options 7 and 8.

NOTE: Entering the extension number of the station being programmed causes the error

message "ILLEGAL PRESET." This error message also displays when two stations preset forward to each other ("reciprocal preset"). It is, however, acceptable for one station to preset forward to a second, which presets forward to a third, which presets forward to the first.

The terminal will respond with:

TENANT NUMBER=

ENTER: The number that will be assigned to this station for tenant service (CR). See Section 2.06.

The terminal will respond with:

CORRECT?

ENTER: Y (CR) or N (CR)

If N (CR) is entered in response to the "CORRECT?" prompt, the terminal will automatically cycle back through this STA subprogram circuit to allow for the correction of any mistakes.

If Y (CR) is entered, the terminal will respond with:

CONTINUE?

ENTER: Y (CR) or N (CR)

If Y (CR) is entered, the terminal will cycle to the next higher circuit number in sequence. If N (CR) is entered, the terminal will respond with:

ENTER PROGRAMMING AREA DESIRED=

At this point, enter QUIT, or any other SERV command.

b) FOR SINGLE LINE SETS (CIRCUITS 11.1 - 16.8) The terminal will respond with:

CKT S.S IC # #XX
OPTIONS = 6
CORRECT?

ENTER Y (CR) or N (CR).

If N (CR) is entered, the terminal will respond
with:

ENTER REVISED STATION FEATURES
OPTIONS =

ENTER: a 6 (CR) to toll restrict the station
and/or a 1 to ring the intercom first on out-
going calls, or press the space (CR) to remove
the toll restriction.

The terminal will respond with:

CORRECT?

If Y (CR) is entered after the "CORRECT?"
prompt, the terminal will respond with:

CONTINUE?

If Y (CR) is entered after the "CONTINUE?"
prompt, the terminal will automatically cycle
to the next higher circuit number in sequence.

If N (CR) is entered, the terminal will respond
with the SERVice prompt:

ENTER PROGRAMMING AREA DESIRED=

At this point, enter QUIT or another SERV
command.

5. THE SERVICE SUBPROGRAM CIRCUIT (CIR).
    The Circuit Number Intercom Number Assign-
    ment Listing subprogram cross references any or
    all of the intercom numbers to their respective
    circuit numbers. The command line to start this
    subprogram is as follows:

    CIR (CR)

    The terminal will respond with:

    CIRCUIT #/IC ASSIGNMENT LISTING
    ENTER DESIRED INTERCOM NUMBERS=

    ENTER: The intercom numbers you
    wish to cross reference separated by
    commas (not a hyphen) (20 maximum).

    NOTE: If you wish to list all the intercom numbers,
    enter ALL (CR).

The terminal will list the intercom number(s). To
stop the listing, press the space bar. The termi-
nal will finish printing the STN PCB it has
started and then return to the SERV prompt.

6. THE SERV SUBPROGRAM EQUIPPED LINES
    (EQU). The service subprogram Equipped Lines
    displays and specifies the outside lines availa-
    ble to the system. This is important information
    when designating the outgoing-only lines.

    The command to start this subprogram is:

    EQU (CR)

    The terminal will respond with:

    LINES EQUIPPED: (list of line numbers cur-
    ently equipped)

    CORRECT?

    ENTER: Y (CR) to return to the SERV level or N
    (CR) to change the data. If N (CR) is entered,
    terminal will request the new lines and return
    to the SERV level when the data is entered.

7. THE SERVICE SUBPROGRAM VERIFY (VER).
    The verify subprogram causes the data base to
    be searched for duplicate and unassigned ex-
    tension numbers. This subprogram performs a
    check and generates the appropriate warning
    messages. The data base is not altered. The
    command line to start this subprogram is:

    VER (CR)

    If the data base is configured properly, the
    response will be:

    DATA BASE CONFIGURATION EDIT
    CONFIGURATION EDIT COMPLETED

    ENTER PROGRAMMING AREA DESIRED=

    If the data base is configured incorrectly, the
    display will show:

    DATA BASE CONFIGURATION EDIT
    XX UNASSIGNED
    XX DUPLICATE ASSIGNMENT

    CONFIGURATION EDIT COMPLETED

THE "UNASSIGNED" numbers designate unassigned circuits. The "DUPLICATE ASSIGNMENT" numbers identify extension numbers which are assigned to a common circuit. The service subprogram NUM is used to correct this situation.

2.04 Station Option Code Definitions

The following paragraphs define the options that are available in the INTER-TEL SPK system.

OPTION 1 — OPX RING INTERCOM ALWAYS

Causes outgoing intercom calls to ring intercom first. Typically used by off-premise extensions.

OPTION 2 — LINE MONITORING

Enables the station to monitor C.O. calls in progress by pressing the keypad code #7. While monitoring, the station's transmitter is muted. The station can not monitor lines from which it is restricted. (See Section 680-100-200.)

OPTION 3 — MPK/II

When an MPK/II station is used with the SPK/II system, lines 11-32 may be transferred to the MPK station and be picked up under the SPCL key. This is possible even though the MPK/II station may only make outgoing calls on lines 1 to 10 and 24 to 32. This option identifies the MPK/II station to the system.

OPTION 4 — RING INTERCOM FIRST

Causes all incoming intercom calls to ring until answered. The called party may answer by picking up the handset or pressing the ON/OFF key for speakerphone conversations. If not set, all intercom calls will be handsfree.

OPTION 5 — Not used.

OPTION 6 — TOLL RESTRICT

The allowed L.D. number allowed area code, and restricted office code entries will determine the exact class of L.D. service that the station is allowed.

NOTE: Toll restriction is not checked for WATS line usage.

OPTION 7 — PRESET FORWARD — BUSY

This option is used with the preset forward feature and will automatically forward any incoming intercom calls or transferred C.O. calls to the preselected extension when the first extension is busy.

OPTION 8 — C.O. RING FORWARD

This option is used with the PRESET FORWARD feature. If the station does not answer an incoming C.O. call within 15 sec (or a transferred call within the transfer recall time) the call will be forwarded to the preset extension specified in the SERV STA subprogram.

2.05 System Option Code Definitions

OPTION 1 — PRINT SMDR — 7 DIGITS OR MORE AND 30 SEC. OR LONGER

The station message detail recording will print any number of seven digits or more after an outside call 30 seconds or longer in duration.

OPTION 2 — PRINT SMDR — 8 DIGITS OR MORE AND 30 SEC. OR LONGER

The station message detail recording will print any number of 8 digits or more after an outside call 30 seconds or longer in duration.

OPTION 3 — ENABLE ERROR MESSAGES

Provides for a system diagnostic printout on the SMDR printer to identify defective extensions. The SMDR diagnostic printout is explained in Section 680-100-601.

OPTION 4 — DISABLE I-HOLD

Allows all stations to answer all calls placed on hold or ringing in. These calls will be indicated by their respective flashes on all keysets when this option is enabled.

OPTION 5 — 12 SEC REDIAL TIMING

Inhibits the last number re-dial feature for 12 seconds. This allows speed dialed numbers to be chained if the new number is dialed within the 12 second delay.

OPTION 6 — HELD CALL LOOP RELEASE = 1.2 SEC

Increases the normal 0.1 second held call interrupt

time to 1.2 seconds. This time is the length of an interrupt in the central office loop current of a C.O. line for calls on hold before they will disconnect. This option is sometimes required when the system is serviced by an Electronic Switching System (ESS) central office.

OPTION 7 — 600 MS HOOKSWITCH FLASH

Provides for the generation of a 600 msec flash (normally 1.2 sec) on any line by pressing the line key in use. If this option is not enabled, pressing the line key will cause the call in progress to be discontinued by opening the line for 1.2 seconds. This option is intended for system use behind a PABX. This overrides system option 14.

OPTION 8 — TIC-TONE

Allows the user to have an internal tic-tone instead of the music-on-hold feature for outside calls placed on hold.

OPTION 9 — LINE KEY 24 ROTARY SELECTION

Provides for multi-line key stations to access the rotary outgoing-only lines (24-32) by selection of the last line key (line key 24 on a 2480T and line key 16 on a 1664T). Provides for MPK/II stations to access these lines via the SPCL key. When this option is selected, the outgoing rotary group contains 9 lines (24-32). Otherwise, line 24 is a two-way line. Do not use system option 16 with this option.

OPTION 10 — SL SMDR PRINT/TOLL MONITOR

Provides for calls placed by a single line set to be included in the SMDR printout. Also provides for toll restriction of single line sets.

OPTION 11 — PROGRAMMED NIGHT SERVICE

Allows C.O. lines programmed to ring in on the operator's station to be placed in the night access mode. C.O. lines not programmed to ring in on the operator's station will not be placed in night access mode.

OPTION 12 — INTERCOM SECURITY TONE

Sends a beep tone every 30 sec to a handsfree intercom station to indicate that the microphone is active.

OPTION 13 — EXTENDED EXTERNAL BELL

Causes the night ring bell (MOD II PCB) to ring for all incoming calls. Normally, it rings only if the operator is in the night ring mode. Also causes the night ring contacts to connect NTRS to NTRM.

OPTION 14 — C.O. LINE RESEIZE DISABLE.

Disables the outside dial tone restoration feature. Option 7 operates a 600 ms hookflash even with option 14 enabled.

OPTION 15 — DISABLE C.O. ACCOUNT CODE

Causes the asterisk (*) to be sent over C.O. lines as a tone (useful for telebanking, as an example). Normally, the asterisk mutes the following six digits entered on the keypad and causes them to be printed in the SMDR account field.

OPTION 16 — SPK/I 1664T SYSTEM

Used only with an SPK/I system comprised of 1664T stations. This option causes line 16 of the 1664T to access line 16 at the KSU only. Normally, this key accesses the outgoing only rotary lines which do not exist on the SPK/I system.

NOTE: Do not use this option with system option 9 or station option 3. MPK 1032T and 416T keysets can be used but only their respective lines can be accessed.

2.06 Programmable System Features

This section describes the system features which are set by the INIT program and customized by the SERV SYS subprogram.

OPERATOR EXTENSION

This may be any extension 10-89. There may be only one operator extension. The programmed operator: 1) sets the system in night ring; 2) is accessed by dialing 0 on I.C. calls; 3) is the final recall station.

MESSAGE CENTER EXTENSION

This may be any extension 10-89 including the operator. This is the extension which is dialed automatically by the system when the DIAL/MSG key is pressed after calling an extension. There may be only one message center.

SYSTEM OPTIONS

These are the options selectable at the systems level via the SERV SYS subprogram as described in Section 2.03. Multiple options may be entered during programming by separating the numbers with commas.

TRANSFER RECALL TIME

THE TIME DELAY (1-255 sec) before an unanswered transferred call will return to the station which originated the transfer, or will forward to the preset forward extension. (See also, "HOLD RECALL TIME.")

HOLD RECALL TIME

The time delay (1-255 sec) before a call placed on hold will recall at the station. Or, the time delay (1-255 sec) before a recalled tranferred call, or recalled call on hold will transfer to the operator.

As a result of the transfer recall time and hold recall time, a call may be placed on hold for a maximum of 8 min 30 sec before returning to the operator. If the operator does not answer the recall, it will be droped after 10 minutes.

Entering 0 for either the transfer or hold recall times will result in a default time of 60 seconds. Entering values greater than 255 results in the time being set to a 255 second default.

WATS LINE ID

These identify the C.O. lines which are WATS lines. The WATS ID is required to allow toll-restricted stations that are not restricted from the WATS line to dial long distance numbers without being cut off. A maximum of 24 WATS LINE ID's are allowed and these may only be for lines 1-24.

DISA LINE ID (DAY)

Any line may be programmed to be a daytime Direct Inward System (DISA) line. A DISA line gives the outside callers the ability to dial directly intercom extension numbers and the ability to access outgoing C.O. lines by pressing the pound (#) key twice followed by the 2-digit line number (01-24) on the outside phone. The outside phone must be a push-button phone. A maximum of 24 DISA LINE ID's are allowed and these may only be for lines 1-24.

DISA LINE ID (NIGHT)

This is the same at the DISA line ID (day) except that it operates only when the system is in the night mode.

ABSORBED DIGIT ID

This is any digit that the central office absorbs. This feature is to prevent a person who knows this number from defeating the system's toll restriction feature by dialing this digit followed by a 0 or 1 to make long distance calls. There may by only 1 absorbed digit (2 through 9) programmed for the system.

ALLOWED LONG DISTANCE NUMBERS

These are 10-digit telephone numbers that toll-restricted stations may call. There is a maximum of two numbers allowed. These numbers must be separated by commas during program entry.

Entering an X as part of a number allows any digit 0 to 9 in that location.

For example, XXX5551212 allows directory assistance for any area code.

ALLOWED AREA CODES

These are the area codes which toll-restricted stations MAY call. There may be a maximum of twenty such 3-digit codes separated by commas.

Entering an X as part of a number allows any digit 0 to 9 in that location.

For example, 31X allows all area codes from 310 to 319.

FORBIDDEN OFFICE CODES

These are local telephone exchanges that all toll-restricted stations MAY NOT call. There may be a maximum of twenty such 3-digit codes separated by commas.

Entering an X as part of a number allows any digit 0 to 9 in that location.

For example, 93X forbids office codes from 930 to 939

2.07 Tenant Service

Allows the shifting of the mapping of lines to line keys. The first 20 lines in the system may be moved in consecutive groups of 4 (i.e. one COU PCB). Assigning a station to a tenant group controls which COU PCB will appear under line keys 1-4 on that station. The other COU PCB's will appear consecutively after that with the exception of PCB No. 6, lines 21-24, which is never shifted.

Entering an X as part of a number allows any digit 0 to 9 in that location.

NOTE: A keyset may belong to one tenant group only.

EXAMPLE: In tenant group 4, line key 7 will access KSU line number 19.

Tenant service is expecially useful for multiple users sharing a common KSU. In this instance, it is possible to use telephone sets with less than 24 line keys. (Refer to Section 680-100-200; 3.00)

NOTE: There will only be one operator when using tenant service and keysets having less than 24 line keys. The operator must have a keyset with a key for each line at the KSU.

2.08 SPK System Programming Sheet

Refer to Figures 4-4 and 4-5 for samples of a suggested format to be used as a programming aid for the installer.

3.00 KEYSET PROGRAMMING

3.01 Keyset Options

There are seven options controlled by seven individual switches, located within the keyset. These switches must be set to complete the system programming. To activate a specific option, remove the faceplate via the spring-loaded tab located at the top of the telephone instrument. Then place the corresponding switch element in the closed position, unplug the station for 3 seconds, and reconnect. Figure 4-6 defines the switch positions and options determined by keyset programming.

4.00 DSS/BLF PROGRAMMING

4.01 DSS/BLF Options

There are two options that are controlled by two individual switches located within the DSS/BLF which must be set to complete the system programming. The proper switch positions are determined by the number of DSS/BLF's at the station and the extensions to be accessed. Figure 4-7 defines the switch positions required for proper operation of the DSS/BLF.

INSTALL SYSTEM

↓

PERFORM ELECTRICAL
CHECK OF SYSTEM

↓

PROGRAM KEY
STATION'S DIP
SWITCHES

↓

PROGRAM DSS/BLF'S
DIP SWITCHES

↓

PERFORM SELF TEST
(TEST) PROGRAM

↓

PERFORM INITIALIZE
(INIT) PROGRAM

↓

PERFORM TIME
(TIME) PROGRAM

USE DISPLAY (DISP)
PROGRAM TO TEST
STATIONS (OPTIONAL)

↓

ENTER SERVICE
(SERV) PROGRAM

↓

PERFORM OPTION
(OPT) SUBPROGRAM
OF SERVICE (SERV)

↓

PERFORM SYSTEM
(SYS) SUBPROGRAM
OF SERVICE (SERV)

↓

PERFORM NUMBER
CHANGE (NUM) SUB-
PROGRAM OF SERVICE
(SERV). CIRCUIT NUM-
BER (CIR) SUBPROGRAM
OF (SERV) MAY BE
NEEDED.

↓

PERFORM STATION
(STA) SUBPROGRAM
OF SERVICE (SERV)
FOR EACH STATION

↓

PERFORM LINES
EQUIPPED (EQU)
SUBPROGRAM OF
SERVICE

PERFORM VERIFY
(VER) SUBPROGRAM
OF SERVICE

↓

ENTER QUIT (QUIT)
TO EXIT SERVICE
(SERV)

↓

ENTER QUIT (QUIT)
TO EXIT PROGRAM—
MING

↓

SYSTEM IS NOW
ACTIVATED

↓

RECORD ANY SMDR
OUTPUT

↓

CONNECT SMDR IF
SO EQUIPPED

↓

COMPLETE

Figure 4-1. Programming Sequence

STATION COMMAND CODE DEFINITIONS

Encoded Character	Action	Encoded Character	Action
!	CALL FORWARD	=	LINE KEY 13 PRESSED
"	DO-NOT-DISTURB	>	LINE KEY 14 PRESSED
#	RESET CFD/DND	?	LINE KEY 15 PRESSED
$	STACK INTERCOM CALL	@	LINE KEY 16 PRESSED
%	RECONNECT INTERCOM CALL	A	LINE KEY 17 PRESSED
&	CONF. ACCESS	B	LINE KEY 18 PRESSED
'	CONF. RELEASE	C	LINE KEY 19 PRESSED
(	CALL BACK	D	LINE KEY 20 PRESSED
)	EXEC. PRIORITY	E	LINE KEY 21 PRESSED
*	CALL TRANSFER	F	LINE KEY 22 PRESSED
+	OFF-HOOK	G	LINE KEY 23 PRESSED
,	ON-HOOK	H	LINE KEY 24 PRESSED
—	STATION POWER-UP	I or $	HOLD/FWD KEY
.	CANCEL ENTRY	J or Y	DIAL/MSG KEY
/	INTERCOM TONE RING	+ or ,	OFF/ON KEY
0	PAGE COMMAND	& or *	XFR/CONF KEY
1	LINE KEY 1 PRESSED	0 (zero)	* KEY
2	LINE KEY 2 PRESSED	N	0
3	LINE KEY 3 PRESSED	O	1
4	LINE KEY 4 PRESSED	P	2
5	LINE KEY 5 PRESSED	Q	3
6	LINE KEY 6 PRESSED	R	4
7	LINE KEY 7 PRESSED	S	5
8	LINE KEY 8 PRESSED	T	6
9	LINE KEY 9 PRESSED	U	7
:	LINE KEY 10 PRESSED	V	8
;	LINE KEY 11 PRESSED	W	9
<	LINE KEY 12 PRESSED	X or / or)	#
		Y	SPEED DIAL

DSS/BLF COMMAND CODE DEFINITIONS

Encoded Character	Action
Z	DSS/BLF SENDS THIS CODE AS A KEY FUNCTION KEY CODE ($00-$4F, $50-$7F)
[	DSS/BLF SENDS THIS CODE AS SPECIAL AND KEY CODE ($38-$3F)
8	DSS/BLF SPECIAL KEY 1
9	DSS/BLF SPECIAL KEY 2
:	DSS/BLF SPECIAL KEY 3
;	DSS/BLF SPECIAL KEY 4
<	DSS/BLF SPECIAL KEY 5
=	DSS/BLF SPECIAL KEY 6
>	DSS/BLF SPECIAL KEY 7
?	DSS/BLF SPECIAL KEY 8

NOTE: Single line electronic (SLE) and 2500 stations will not display hookswitch action (+ ,). Also SLE stations will not display any SPCL key action.

Figure 4-2. Station and DSS/BLF Command Code Definitions

CKT # = STATION CIRCUIT NUMBER; IC # = INTERCOM NUMBER

CKT # 1.1 = IC # 10	CKT # 6.1 = IC # 50	CKT # 11.1 = IC # #10
CKT # 1.2 = IC # 11	CKT # 6.2 = IC # 51	CKT # 11.2 = IC # #11
CKT # 1.3 = IC # 12	CKT # 6.3 = IC # 52	CKT # 11.3 = IC # #12
CKT # 1.4 = IC # 13	CKT # 6.4 = IC # 53	CKT # 11.4 = IC # #13
CKT # 1.5 = IC # 14	CKT # 6.5 = IC # 54	CKT # 11.5 = IC # #14
CKT # 1.6 = IC # 15	CKT # 6.6 = IC # 55	CKT # 11.6 = IC # #15
CKT # 1.7 = IC # 16	CKT # 6.7 = IC # 56	CKT # 11.7 = IC # #16
CKT # 1.8 = IC # 17	CKT # 6.8 = IC # 57	CKT # 11.8 = IC # #17
CKT # 2.1 = IC # 18	CKT # 7.1 = IC # 58	CKT # 12.1 = IC # #18
CKT # 2.2 = IC # 19	CKT # 7.2 = IC # 59	CKT # 12.2 = IC # #19
CKT # 2.3 = IC # 20	CKT # 7.3 = IC # 60	CKT # 12.3 = IC # #20
CKT # 2.4 = IC # 21	CKT # 7.4 = IC # 61	CKT # 12.4 = IC # #21
CKT # 2.5 = IC # 22	CKT # 7.5 = IC # 62	CKT # 12.5 = IC # #22
CKT # 2.6 = IC # 23	CKT # 7.6 = IC # 63	CKT # 12.6 = IC # #23
CKT # 2.7 = IC # 24	CKT # 7.7 = IC # 64	CKT # 12.7 = IC # #24
CKT # 2.8 = IC # 25	CKT # 7.8 = IC # 65	CKT # 12.8 = IC # #25
CKT # 3.1 = IC # 26	CKT # 8.1 = IC # 66	CKT # 13.1 = IC # #26
CKT # 3.2 = IC # 27	CKT # 8.2 = IC # 67	CKT # 13.2 = IC # #27
CKT # 3.3 = IC # 28	CKT # 8.3 = IC # 68	CKT # 13.3 = IC # #28
CKT # 3.4 = IC # 29	CKT # 8.4 = IC # 69	CKT # 13.4 = IC # #29
CKT # 3.5 = IC # 30	CKT # 8.5 = IC # 70	CKT # 13.5 = IC # #30
CKT # 3.6 = IC # 31	CKT # 8.6 = IC # 71	CKT # 13.6 = IC # #31
CKT # 3.7 = IC # 32	CKT # 8.7 = IC # 72	CKT # 13.7 = IC # #32
CKT # 3.8 = IC # 33	CKT # 8.8 = IC # 73	CKT # 13.8 = IC # #33
CKT # 4.1 = IC # 34	CKT # 9.1 = IC # 74	CKT # 14.1 = IC # #34
CKT # 4.2 = IC # 35	CKT # 9.2 = IC # 75	CKT # 14.2 = IC # #35
CKT # 4.3 = IC # 36	CKT # 9.3 = IC # 76	CKT # 14.3 = IC # #36
CKT # 4.4 = IC # 37	CKT # 9.4 = IC # 77	CKT # 14.4 = IC # #37
CKT # 4.5 = IC # 38	CKT # 9.5 = IC # 78	CKT # 14.5 = IC # #38
CKT # 4.6 = IC # 39	CKT # 9.6 = IC # 79	CKT # 14.6 = IC # #39
CKT # 4.7 = IC # 40	CKT # 9.7 = IC # 80	CKT # 14.7 = IC # #40
CKT # 4.8 = IC # 41	CKT # 9.8 = IC # 81	CKT # 14.8 = IC # #41
CKT # 5.1 = IC # 42	CKT # 10.1 = IC # 82	CKT # 15.1 = IC # #42
CKT # 5.2 = IC # 43	CKT # 10.2 = IC # 83	CKT # 15.2 = IC # #43
CKT # 5.3 = IC # 44	CKT # 10.3 = IC # 84	CKT # 15.3 = IC # #44
CKT # 5.4 = IC # 45	CKT # 10.4 = IC # 85	CKT # 15.4 = IC # #45
CKT # 5.5 = IC # 46	CKT # 10.5 = IC # 86	CKT # 15.5 = IC # #46
CKT # 5.6 = IC # 47	CKT # 10.6 = IC # 87	CKT # 15.6 = IC # #47
CKT # 5.7 = IC # 48	CKT # 10.7 = IC # 88	CKT # 15.7 = IC # #48
CKT # 5.8 = IC # 49	CKT # 10.8 = IC # 89	CKT # 15.8 = IC # #49
		CKT # 16.1 = IC # #50
		CKT # 16.2 = IC # #51
		CKT # 16.3 = IC # #52
		CKT # 16.4 = IC # #53
		CKT # 16.5 = IC # #54
		CKT # 16.6 = IC # #55
		CKT # 16.7 = IC # #56
		CKT # 16.8 = IC # #57

Figure 4-3. Initialized Intercom Number Assignments

SPK SYSTEM PROGRAM

Left-side programming fields:

- OPERATOR EXT
- MESG CTR EXT
- TRANSFER RECALL
- WATS ID
- allowed ID
- allowed AC
- P.O. CODES
- DISA NITE
- DISA DAY
- HOLD RECALL
- ABSORBED DIGIT ID

SYSTEM OPTIONS (1–20): SMDR 7 (1), SMDR 6 (2), NO I HOLD (4), 12 SEC REDIAL (5), LOOP RLS (6), 600 FLASH (7), TIC TONE (8), LINE 24 SEL (9), SL PRINT (10), NITE SERV (11), SEC TONE (12), EXT BELL (13), NO CO RESEIZE (14), DISC AC (15), 16, 17, 18, 19, 20

INTERNAL PAGE: ZONE 1 (A.P), ZONE 2, ZONE 3, ZONE 4, ZONE 5, ZONE 6

STA OPTIONS: RING I.C. ALWAYS (1), LINE MON (2), MPK II (3), RING I.C. 1st (4), (5), TOLL REST (6), FWD ON BUSY (7), CO RING FWD (8), PRESET FWD, TENANT SERV

SPK/MPK KEYSET OPTION: DND, EXEC PGM, CO RING, NITE STA, SPEED TRANS, SPEAKERPHONE, DIGIT (1) DIAL

CIRCUIT NUMBER	STATION NUMBER	LINES RESTRICTED	LINES TO RING	STN MODEL
1.1	18	15		2480T
1.2	19	15		"
1.3	12	15		"
1.4	13	15		"
1.5	14	15		"
1.6	15	15		"
1.7	16	15		"
1.8	17	15		"
2.1	10	1-32	1-14, 16-20	"
2.2	11	1-32		"
2.3	20		15	"
2.4	21	15		"
3.1	22			1032T
3.2	23			"
3.3	24			"
3.4	25			"
3.5	26			"
11.1 #10	#10			SLE
11.2 #11	#11			"
11.3 #12	#12			"
11.4 #13	#13			"
12.1 #20	#20			2500
12.2 #21	#21			"

Notations in the System Options area: DSS/BLF Model 6460D, DSS/BLF Model 6460D

NOTES: Lines 25-28 are outgoing rotary for SLE's.

Figure 4-4. INTER-TEL SPK Sample Programming Sheet

CUSTOMER:

DATE:

JOB #

SPK SYSTEM PROGRAM

LINES EQUIPPED

SYSTEM OPTIONS

1	SMDR 7		
2	SMDR 8		
3	NO 1 HOLD		
4	12 SEC REDIAL		
5	LOOP RLS		
6	600 FLASH		
7	TIC TONE		
8	LINE 24 SEL		
9	SL PRINT		
10	NITE SERV		
11	SEC TONE		
12	EXT BELL		
13	NO CO RESEIZE		
14	DISC AC		
15			
16			
17			
18			
19			
20			

INTERNAL PAGE
- ZONE 1 (A/P)
- ZONE 2
- ZONE 3
- ZONE 4
- ZONE 5
- ZONE 6

STA OPTIONS
- TENANT SERV
- PRESET FWD
- 8 CO RING FWD
- 7 FWD ON BUSY
- 6 TOLL REST
- 5
- 4 RING I.C. 1st
- 3 MPK II
- 2 LINE MON
- 1 RING I.C. ALWAYS

SPK KEYSET OPTION
- DIGIT (1) DIAL
- SPEAKERPHONE
- SPEED TRANS
- NITE STA
- OH RING
- EXEC PGM
- DND

STN MODEL

OPERATOR EXT
MESG CTR EXT
TRANSFER RECALL
DISA NITE
DISA DAY
HOLD RECALL
ABSORBED DIGIT ID
WATS ID
allowed ID
allowed AC
F.O. CODES
LINES TO RING
LINES RESTRICTED

STATION NUMBER

CIRCUIT NUMBER

NOTES:

Figure 4-5. INTER-TEL SPK Sample Blank Programming Sheet

SWITCH				
MPK	SPK	POSITION	OPTION	DESCRIPTION
7	1	CLOSED	Do-Not-Disturb	Allows the station to be placed in Do-Not-Disturb as defined in Practice 680-100-200
			Night Ring	For the operator's station only.
6	2	CLOSED	Executive Priority Call Waiting	Allows the station to signal busy extensions by pressing the # key. Intercom callback is disabled.
5	3	CLOSED	Full-Duplex Speakerphone	Enables the station's microphone so that an optional external speaker may be connected for a full-duplex speakerphone on outside calls.
4	4	CLOSED	Night Station	Causes the station to ring directly for all outside calls when the system is in the night mode.
3	5	CLOSED	Off-hook Ring	Station will ring (tones are in the handset) when off hook for incoming calls.
2	6	CLOSED	Speed Transfer	When the station is connected to an outside line every 2- or 3-digit keystroke entry initiates a transfer without hitting the XFR/CONF key. This station will not have the ability to initiate outside calls.
1	7	CLOSED	Digit 1 Dialing	Precedes all 10-digit stored speed dial numbers with a digit 1.

NOTE: "CLOSED" means that the feature is on or active.
"OPEN" means that the feature is off or inactive.

Figure 4-6. Multi-Line DIP Switch-Selectable Options

EXAMPLE No. 1
1 DSS/BLF Sw 1 Closed Sw 2 Closed

SPCL 1	SPCL 2							SPCL 3	SPCL 4
10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29
30	31	32	33	34	35	36	37	38	39
40	41	42	43	44	45	46	47	48	49
50	51	52	53	54	55	56	57	58	59
60	61	62	63	64	65	66	67	68	69

EXAMPLE No. 2 TANDEM DSS/BLF APPLICATION

Sw 1 Closed Sw 2 Closed

SPCL 1	SPCL 2							SPCL 3	SPCL 4
10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29
30	31	32	33	34	35	36	37	38	39
40	41	42	43	44	45	46	47	48	49
50	51	52	53	54	55	56	57	58	59
60	61	62	63	64	65	66	67	68	69

Sw 1 Open Sw 2 Closed

SPCL 1	SPCL 2							SPCL 3	SPCL 4
70	71	72	73	74	75	76	77	78	79
80	81	82	83	84	85	86	87	88	89
#10	#11	#12	#13	#14	#15	#16	#17	#18	#19
#20	#21	#22	#23	#24	#25	#26	#27	#28	#29
#30	#31	#32	#33	#34	#35	#36	#37	#38	#39
#40	#41	#42	#43	#44	#45	#46	#47	#48	#49

EXAMPLE No. 3
1 DSS/BLF 10 single lines 50 multi-lines
Sw 1 Closed Sw 2 Open

SPCL 1	SPCL 2							SPCL 3	SPCL 4
10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29
30	31	32	33	34	35	36	37	38	39
40	41	42	43	44	45	46	47	48	49
50	51	52	53	54	55	56	57	58	59
#10	#11	#12	#13	#14	#15	#16	#17	#18	#19

Example No. 4
1 DSS/BLF 20 multi-lines 40 single lines
Sw 1 Open Sw 2 Closed

SPCL 1	SPCL 2							SPCL 3	SPCL 4
70	71	72	73	74	75	76	77	78	79
80	81	82	83	84	85	86	87	88	89
#10	#11	#12	#13	#14	#15	#16	#17	#18	#19
#20	#21	#22	#23	#24	#25	#26	#27	#28	#29
#30	#31	#32	#33	#34	#35	#36	#37	#38	#39
#40	#41	#42	#43	#44	#45	#46	#47	#48	#49

Figure 4-7. DSS/BLF Configurations

ONLINE MONITOR (ONMN)

CONTENTS   PAGE

1.00 INTRODUCTION

1.01 General

The Online Monitor (ONMN) feature of the SPK system allows the display and alteration of the system memory. This feature is intended for the advanced installer or engineer, when debugging and maintaining the SPK system. It is not intended for customer usage.

CAUTION: *Indiscriminate use of the Online Monitor can cause data base errors and system execution errors resulting in the need for reprogramming of the data base or a system reset. The Online Monitor cannot cause permanent system or hardware damage.*

1.02 Description

With the ONMN routine, you can monitor the SPK system, as well as change its state by altering memory storage locations. These memory storage locations include the control block contents, which are described in Section 3.00. The ONMN routine displays the contents of these control blocks and allows altering of bytes with the use of ONMN commands.

2.00 COMMANDS

To use the Online Monitor, type ONMN and press the carriage return. The following is a list of commands which may now be used after the characteristic # (pound) prompt. Be sure to press the carriage return (where indicated by the symbol <CR>) after typing each command.

2.01 Memory Display M <CR>

Typing M, a hexadecimal memory address in upper case and a carriage return, displays the 16-byte area of memory starting at that memory address. The cursor remains at the end of the line, awaiting any of the following:

<CR>   —Pressing the carriage return displays the next 16-byte block of memory.

\ <CR>   —Pressing a backslash and a carriage return displays the previous 16 bytes of memory.

CTRL X   —Pressing X while holding down the CTRL key redisplays the current 16 bytes of memory.

Any Other   —Entering any other ONMN command
ONMN Command   mand (such as Change, Quit or Control Block Display) will perform the functions indicated in the following sections.

2.02 Change C <CR>

Typing C, a space, a hexadecimal memory address (xxxx) in upper case and a carriage return displays the contents of memory at that address. The system then waits for any of the following to be typed:

0 to FF <CR>   —Entering a hexadecimal value from 0 to FF followed by a carriage return writes that value in memory at the specified address. The system then verifies that the new value is written in the correct location and, if true, displays the next memory location. Otherwise, the system displays the message, "WHAT?" and the value of the memory location. This error may result from a ROM/RAM jumper in the ROM position or specifying an address which is not in RAM memory.

\ <CR>   —Entering a backslash and a car-
           riage return displays the con-
           tents of memory at the previous
           address.

,<CR> or <CR> —Entering a comma and a car-
           riage return or simply a car-
           riage return, displays the con-
           tents of the next consecutive
           memory address.

CTRL X   —Pressing X while holding down
           the CTRL key redisplays the
           current memory address.

.<CR>   —Pressing a period and the car-
           riage return ends the change
           feature.

2.03   Quit Q <CR>

Pressing Q and the carriage return exits the On-
line Monitor. The monitor does not time out; only the
Quit command exits the monitor properly to permit,
for example, removal of the display device.

Typing the entire word QUIT followed by a carriage
return exits the Online Monitor and the terminal
display mode so that the SMDR printout may continue.

2.04   Control Block Display x nn<CR>

Control blocks are areas in memory which contain
formatted information useful for controlling certain
system functions. Typing the designator letter (x)
for the type of control block, any allowed number
value (nn) for that type of control block (see Figure
5-1), and then pressing the carriage return, displays
the control block in the following form:

BB AAAA DDDDDDDDDDDDDDDDDDDDDDDDDD
        DDDDDDDDDDDDDDDDDDDD

WHERE:

    BB   is the hexadecimal number of the
         requested block

    AAAA is the hexadecimal RAM address of
         the start of the requested block

    DDD..D is the contents of the control block in
         hexadecimal. Two characters are dis-
         played for each hexadecimal data
         byte in the block.

Designator Letter	Name	Number
B	Call back queue entry	1-25
D	DTMF	1-2
E	Single line station	10-57
F	Conference	1-4
I	Intercom Channel	1-8
L	C.O. line	1-32
S	SPK/MPK station	10-89
T	SPK/MPK station data base options. Located in battery back-up memory.	10-89
U	S/L station data base	10-57
X	System statistics	(R=reset)

Figure 5-1. Available Control Blocks

The number of control blocks available varies with
the type of control block. Values requested outside
of the actual range of the number available for that
type of control block default to the first block of that
type.

Examples:

S or S1 or S 1   —Displays the control block for the
                 first station

S10 or S 10   —Displays the control block for the
                 first station

S89 or S 89   —Displays the last station

S99 or S 99   —Displays the first station

S#10   —Displays the same display as
                 E10

After displaying the requested control block, the
system waits for a memory display command, a
change command, a QUIT command or any of the
following:

<CR>   —Entering a carriage return dis-
           plays the next block of the current
           type

\ <CR>   —Entering a backslash and a car-
           riage return displays the preced-
           ing control block of the same
           type

CTRL X   —Pressing X while holding down
the CTRL key redisplays the current block

3.00 CONTROL BLOCK FORMATS

The following figures list the control block formats and definitions.

BYTE	LABEL	BIT 7	6,5,4	BIT 3	2,1,0
00	LS0		1		2
01	LS1		3		4
02	LS2		5	BMUSIC	6
03	LS3		7		8
04	LS4		9		10
05	LS5		11		12
06	LS6		13		14
07	LS7		15		16
08	LS8		17		18
09	LS9		19		20
0A	LS10		21		22
0B	LS11		23		24
0C	LS12		HD		RD
0D	LS13		ON/OFF		CF
0E	CTL0	Station Control			
0F	CTL1	Flags			
10	DBUF	STN Data			
11	SWORK	Work Area			
12	STIME	.1 Second Timer			
13	RTAH	Software			
14		Break Point			
15	LACON	Last Channel Connected			
16	CTL2	Software Control Flags			
17	FWD	Call Forward Stations			
18	OPT	STN Options DIP SW			

Figure 5-2. S — Station Control Block

Line Lamp Status

LS0-LS11:

0 — OFF
1 — Recall
2 — Hold
3 — Ring In
4 — Unused
5 — Line Seized on Station
6 — Conference
7 — Line In Use

HOLD/FWD (HD) Lamp Status

1 — I.C. Call Holding
2 — Call Forward/DND

Redial/MSS Lamp Status

1 — Message Waiting

CONF/TRANS Lamp Status

1 — Executive Monitor
2 — Second Party Conference
7 — Origin of Conference

Station Option DIP Switches

80 — SPK Station — Not MPK/II
40 — Do-Not-Disturb
20 — Executive Priority

10 — DSS Position
08 — Night Ring
04 — Off-Hook Tones
02 — Speed Transfer

01 — Digit 1 Dial: Long Dist.

sp	-	20	- No data (idle)
!	-	21	- Call Forward
"	-	22	- Do-Not-Disturb
#	-	23	- Reset CFWD/DND
$	-	24	- Stack Intercom Call
%	-	25	- Reconnect Intercom
&	-	26	- Conf. Access
'	-	27	- Conf. Release
(	-	28	- Call Back
)	-	29	- Exec. Priority
*	-	2A	- Call Transfer
+	-	2B	- Off-Hook
,	-	2C	- On-Hook
-	-	2D	- Power-Up
.	-	2E	- Cancel Entry
/	-	2F	- Intercom Tone Ring
0	-	30	- Page Command
1	-	31	- Line Key 1
2	-	32	- Line Key 2
3	-	33	- Line Key 3
4	-	34	- Line Key 4
5	-	35	- Line Key 5
6	-	36	- Line Key 6
7	-	37	- Line Key 7
8	-	38	- Line Key 8
9	-	39	- Line Key 9
:	-	3A	- Line Key 10
;	-	3B	- Line Key 11
◁	-	3C	- Line Key 12
=	-	3D	- Line Key 13
▷	-	3E	- Line Key 14
?	-	3F	- Line Key 15

@	-	40	- Line Key 16
A	-	41	- Line Key 17
B	-	42	- Line Key 18
C	-	43	- Line Key 19
D	-	44	- Line Key 20
E	-	45	- Line Key 21
F	-	46	- Line Key 22
G	-	47	- Line Key 23
H	-	48	- Line Key 24
I	-	49	- Hold Key
J	-	4A	- Redial Key
K	-	4B	- ON/OFF Key
L	-	4C	- XFR/CONF Key
M	-	4D	- T/T*
N	-	4E	- T/T 0
O	-	4F	- T/T 1
P	-	50	- T/T 2
Q	-	51	- T/T 3
R	-	52	- T/T 4
S	-	53	- T/T 5
T	-	54	- T/T 6
U	-	55	- T/T 7
V	-	56	- T/T 8
W	-	57	- T/T 9
X	-	58	- T/T #
Y	-	59	- Repeat Dial Start
Z	-	5A	- DSS SPCL Key Flag
[	-	5B	- DSS SPCL Key Flag
\	-	5C	- Unused
]	-	5D	- Unused
⌂	-	5E	- Unused
_	-	5F	- Unused

**Station Control Flags
CTL 0**

40 - Incoming IC
20 - In IC Ringing
10 - In C.O. Ringing
04 - In IC Complete
02 - Monitor
01 - Call Xfrring
80/08 Bits Will Not be Transmitted to
      Any SPK Stations

**Station Control Flags
CTL 1**

40 - Out IC Busy
20 - Out IC Complete
10 - Out IC Ringing
04 - Out C.O. Complete
02 - Force Release
01 - Clear to Send

**Software Contol Flags
CTL 2**

80 - STN Is On-Hook
40 - Offline Error Count
20 - Offline Error Count
10 - Offline Error Count
08 - DSS XFR To Hold Active
04 - DSS ID Is Next DBUF
02 - Out IC Connected
01 - Conference Active

Figure 5-3. Station Command Code Definitions — DBUF / DISP Command / Error SMDR

BYTE	LABEL	DEFINITION
00	COMD	Command (Right)
01	COST	Status (Below)
02	COST1	Status (Below)
03	STN	Station ID
04	OLD	Transfer Origin
05	TIME (2)	Call Duration 1 Sec Timer
07	Time1 (2)	Recall Time Remaining — 1 Sec Timer
09	TIME2	5 Millisecond Tone Control
0A	TIME3	5 Millisecond Loop Current
0B	DIAL	Dialed Digit
0C	DIAL1 (12)	Dial Buffer
18	POINT	Dial Buffer Index
19	RCTR	Ring Counter
1A	ACT1 (3)	Account Buffer
1D	BKP (2)	Program Return Address

Command Codes — COMD

0 - No Command
1 - Seize Line
2 - Re-Seize Line
3 - Release Line
4 - Disable Mute
5 - Dial Number
6 - Redial Buffer
7 - Hold Line

8 - Transfer Line
9 - Park
A - Conference
B - Unused
C - Unused
D - Unused
E - Modem

F - DISA

10 - C.O. Callback Active
11 - Immediate XFR
12 - MPK/II Ring XFR to L24

Status — Cost

80 - MOH Connection Made
40 - Std Connection Made
20 - Loop Current Timer
10 - Ring In Timer Set
08 - Call Complete
04 - Ring Acknowledge
02 - Ringing In
01 - Good Connection

Status — Cost1

80 - Outgoing Call
40 - Reverse XFER Ringing-In
20 - Ringing-In Refreshed
10 - '40' Previously Encountered
08 - Toll Restrict Edit Complete
04 - Unused
02 - Lamp Refresh Flag
01 - Ring-In Time Out (FWD)

Figure 5-4. L — C.O. Line Control Block

BYTE	LABEL	DEFINITION
00	EXTN	Requesting Station
01	PORT	Requested Resource

If the requested resource value exceeds 200 ($C8), then it is a C.O. line.
The C.O. line number is always offset by $C8. Otherwise the value indicates a station ID.

Figure 5-5. B — Callback Queue Entry

BYTE	LABEL	DEFINITION
00	DFSTAT	Time Slot ID
01	DFTONE	Tone Control Byte
02	DFSTN	Station ID
03	DFTIME	Timer
04	DFBUF1	Dialed Digits
05	DFBUF2	(These Digits Have
06	DFBUF3	Not Been Processed)

Tone Control Byte

80 - Generate Tone
40 - Collect Digits
20 - Unused
10 - Unused
08 - Short-Long Tone (Unused)
04 - I.C. Ringing Out
02 - Busy Tone
01 - Dial Tone

Figure 5-6. D—DTMF (Single Line Touch Tone Detector)

BYTE	LABEL	DEFINITION
00	SSTNS	Status
01	BKPT	Software Break
02		Point
03	Lacons	Last Connection

LACONS has the same meaning as the LACON field in the SPK station block.

SSTNS — Status

80 - IC Incoming Waiting
40 - C.O. Incoming Waiting
20 - Unused
10 - C.O. Call On Hold
08 - Unused
04 - Unused
02 - SPCL Key Pushed
01 - Station Is Off-Hook

Figure 5-7. E — Single Line Extension

BYTE	LABEL	DEFINITION
00	CFST	Status
01	CEX	Controlling STN
02	CP1	CHNL.1 (C.O. Line)
03	CP2	CHNL.2 (C.O. or STN)

Status — CFST

80 - 2-STN Mode
40 - Origin Is In CONF
20 - CP2 Is Known Gone
      (SPK May Drop Out)

01 - Block Is Active

Figure 5-8. F — Conference Control Block

BYTE	LABEL	DEFINITION
00	CHMD	Command
01	CHST	Status
02	IN	Calling Party
03	Out	Called Party
04	BKCH	Software Break
05		Point
06	TIMEX	.1 Msec. Timer

CHST — Status

80 - Out Is Busy
40 - In Camped On — MOH
20 - Old Just Reversed IC
10 - Out Is Off-Hook
08 - Out Has IC Ring
04 - Camp-On Is Causing Background
      Incoming C.O. Ring
02 - Connection Granted
01 - Out Is Do-Not-Disturb

NOTE: The in field set to zero indicates an available
      channel.

Channel Command Codes

00 - OPEN (See Note on In)
01 - Connect to STN
02 - RECON
03 - DROP
04 - XFR
05 - Ring Called Party
06 - Stack On Called Party
07 - Stack On Called Party

08 - Double Tone Ring Called
09 - Page
0A - Conference
0B - Unused
0C - Unused
0D - Drop SLE
0E - DSS Tone Command
0F - Unused

Figure 5-9. I — Intercom Channel Block

BYTE	LABEL	DEFINITION
00	L1.8	This is a 3-byte field with
01	L9.16	the leftmost bit indicating
02	L17.24	line 1 and the rightmost bit indicating line 24. This is the line restriction table.
03	R1.8	This is a 3-byte field with
04	R9.16	the leftmost bit indicating
05	R17.24	line 1 and the rightmost bit indicating line 24. This is the station ring-in table.
06	OPTION	Station Options
07	ZONES	Paging Zones
08	NUMB	Station ID
09	PRSTFW	Preset Forward
08	LOFST	Tenant Number — 1

Options

80 - 1:OPX ID

40 - 2:Exec. Monitor
20 - 3:MPK/II Station Type
10 - 4:Ring-IC-First (RIF)
08 - 5:Unused
04 - 6:Toll Restricted
02 - 7:Forward on Busy
01 - 8:C.O. Forward on No Answer

Figure 5-10. T — SPK/MPK Station Data Base

BYTE	LABEL	DEFINITION
00	OPTNS	Station Options
01	NUMBS	Station ID

S/L Station Options

1 - 1:OPX ID
4 - Ring-IC-First (RIF)
6 - Toll Restricted

NOTE: Setting other options in this byte may cause unpredictable software errors.

Figure 5-11. U — Single Line Data Base Options

BYTE	LABEL	DEFINITION
00	SXTSTN	Maximum Station Loop Duration
02	SXTLNE	Maximum Line Loop Duration
04	SXLMIN	Minimum Line Loops Between Station Loops
05	SXLMAX	Maximum Line Loops Between Station Loops
06	SFTCTR	Soft Resets Available (Maximum: Ten)
07	SFTOTL	Soft Reset Count Since Last Power-Up Or 'REST'

All Times Are In Milliseconds.

The available soft reset count (SFTCTR) is reset to ten (OA) approximately every 3 hours after any hard reset and at power-up. The count of soft reset occurrences is initialized to zero on power-up and when the 'REST' command is entered.

Typing either CTRL-X or return after typing the X command will repeat the statistics display.

Typing 'X R' will cause the statistics values to be re-initialized.

Figure 5-12. X — System Statistics Area

DUMP/LOAD

1.00 INTRODUCTION

1.01 General

The SPK software provides the user with the ability to perform online dumps and offline loads of the system data base.

The DUMP command allows the user to dump valuable system parameters and options from KSU battery back-up RAM to an external storage device. At a later time, the system data base can be reloaded by invoking the LOAD command from the KSU system console.

The recommended storage device to be used in conjunction with the DUMP and LOAD commands is the Texas Instruments Silent 700 terminal (763/765) equipped with online bubble memory. The following discussion will deal with instructions for successfully using the Silent 700 to dump and reload the SPK system data base.

1.02 Requirements

You will need a good understanding of the following Silent 700 commands:

     STATUS
     CREATE
     CHANGE

     ERASE
     RECORD
     PLAYBACK

2.00 INITIALIZING THE SILENT 700

2.01 General

Before invoking the DUMP and LOAD commands, the Silent 700 terminal must be properly initialized. The following sections describe the sequence of steps in initialization:

2.02 Creating a Memory File

Before the Silent 700 can be used as a storage device, a bubble memory file structure must be created. This file can be initialized with any unique name desired. For the purposes of this discussion, we will name the file DMPLOD.

The command sequence to create the DMPLOD file is as follows:

    1.   Press the CMD key to enter command mode.

    2.   Type "CREATE DMPLOD L 60 80."

This command will create an "L" type memory file named DMPLOD. The file will consist of 60 records of 80 characters each. These 60 records should be sufficient to completely dump the SPK data base. If more records are needed, simply change the file size parameter in the CREATE command line.

2.03 Declaring the Record File

Before data can be recorded into the newly created DMPLOD file, it must be declared as the RECORD file to the Silent 700 terminal. This declaration is accomplished as follows:

    1.   Press the CMD key to enter command mode.

    2.   Type "CHANGE RECORD TO DMPLOD."

This command causes the Silent 700 to record data into the DMPLOD file each time the RECORD ON keys (FCTN and 2) are pressed simultaneously at the keyboard.

2.04   Declaring the Playback File

Before data can be played back from the newly created DMPLOD file, it must be declared as the PLAYBACK file to the Silent 700 terminal. This declaration is accomplished as follows:

1.   Press the CMD key to enter command mode.

2.   Type "CHANGE PLAYBACK TO DMPLOD."

This command will cause the Silent 700 to play back data from file DMPLOD each time the PLAYBACK ON keys (FCTN and 1) are pressed simultaneously on the keyboard.

2.05   Declaring the Terminal Port

Before the Silent 700 can be used as the SPK console terminal, it must be set up to use its external Electronic Industry Association (EIA) port. This can be done as follows:

1.   Press the CMD key to enter command mode.

2.   Type "CHANGE PORT TO EIA."

2.06   Declaring the Baud Rate

The recommended transmission rate for offline loads is 300 baud. This minimizes possible data errors and should eliminate any problems with checksum errors during the load. Changing the baud rate on the Silent 700 can be accomplished as follows:

1.   Press the CMD key to enter command mode.

2.   Type "CHANGE SPEED TO 300."

2.07   Setting the KSU Console Baud Jumper

In order to use 300 baud communications between the Silent 700 terminal and the KSU system console EIA port, the baud rate jumper on the KSU CPU board must be in the 300 baud position.

2.08   Enabling the External Device Control

The SPK software takes advantage of the Silent 700 external device control feature. When a data base LOAD from the Silent 700 has been completed, the software sends a DC3 character to the terminal to automatically turn playback off.

It is necessary to enable the external device control mode of the Silent 700 terminal in order for this automatic feature to work properly. This can be accomplished as follows:

1.   Press the CMD key to enter command mode.

2.   Type "CHANGE EDC TO ON."

3.   Press the CMD key to enter command mode.

4.   Type "CHANGE DC1.3 TO ON."

3.00   PERFORMING AN SPK DUMP

At this point, the Silent 700 terminal should be ready to record data from an SPK system DUMP. The following describes the sequence of events during execution of a typical DUMP.

In order to execute the DUMP command, the Silent 700 terminal must be plugged into the KSU console EIA port and the SPK system must be in command mode. The following prompt should appear on the terminal:

"ENTER: SERV, TIME, DISP, TEST, INIT, REST OR ONMN"

At this point, you should prepare the Silent 700 terminal for recording in the following manner:

1.   Press the CMD key to enter command mode.

2.   Type "ERASE DMPLOD."

3.   Rewind the Record function by pressing the FCTN key and the 6 key at the same time.

4.   Enable the Record function by pressing the FCTN key and the 2 key at the same time.

5.   The SPK system data base dump can now be initiated by typing "DUMP" and then pressing CR at the terminal.

At this point, the SPK software will begin dumping data from the KSU backup RAM to the Silent 700 terminal. When the DUMP command has completed, it will terminate and print out the SPK "=" prompt. After the prompt has been printed, turn off the Silent 700 Record function as follows:

1.   Turn off the Record function by pressing the FCTN key and the 4 key at the same time.

The SPK data base DUMP is now complete and the data has been stored in Silent 700 bubble memory. This data is non-volatile and will remain in memory even after the terminal has been powered off. The data can be reloaded into the SPK system from the terminal at any time by using the offline LOAD command from the KSU console.

4.00 PERFORMING AN SPK OFFLINE LOAD

The SPK LOAD command initiates an offline load of the SPK system data base. In order to guarantee that the load proceeds correctly, all contention for KSU resources is eliminated by halting the SPK system during the LOAD. After the load is completed, the SPK system is restarted automatically by the LOAD software. System operation resumes normally with a new data base.

In order to execute the LOAD command, the Silent 700 terminal must be plugged into the KSU console EIA port and the SPK system must be in command mode. The following prompt should appear on the terminal:

"ENTER: SERV, TIME, DISP, TEST, INIT, REST OR ONMN"

At this point you must prepare the Silent 700 terminal in the following manner:

1. Rewind the Playback function by pressing the FCTN key and the 5 key at the same time.

2. Start the SPK system data base load by typing "LOAD" and then pressing <CR> at the terminal.

At this point, the SPK system will print out the following message:

"SYSTEM WILL HALT ON THIS COMMAND, ARE YOU SURE (Y/N)?"

If you type "Y" in response to this question, the SPK system will halt processing and the KSU load software will start looking for data base data in MOTOROLA "S" record format. After this point, the only way to restore SPK service is to follow the HALT with either valid data base data or a KSU hardware reset. The SPK system will be automatically restarted only by completion of a valid load sequence.

If you type "N" in response to the question, the SPK system assumes that a load will not be performed and returns to command level with an "=" prompt.

After you have entered the LOAD command and have halted the SPK system, the KSU is ready to receive data from the Silent 700 terminal. You can enable the terminal's playback mode as follows:

3. Initiate the Playback function by pressing the FCTN key and the 1 key at the same time.

The Silent 700 terminal will begin to replay the data that was recorded during the previous DUMP sequence. The terminal will also replay the DUMP command that was entered while the terminal was in record mode. This is acceptable to the loader because it ignores all data that is not in correct "S" Record format.

When the terminal has completed playback of the data base dump, the loader software will automatically turn off playback if the EDC and DC 1.3 options have been properly enabled (see the preceding). If they have not been enabled, you may have to turn off playback manually as follows:

4. Terminate the Playback function by pressing the FCTN key and the 3 key at the same time.

Following the LOAD sequence, the loader software will automatically restart the SPK system by resetting it. You should see an "=" prompt appear on the terminal after the reset has occurred.

The SPK system is now back online with a new system data base.

4.01 Checksum Error Handling

It is possible that during the LOAD sequence a checksum error may be detected. If this happens, the loader software will disable the Silent 700 Playback mode and print the following message:

"CHECKSUM ERROR DETECTED RESTART LOAD (Y/N)?"

If you answer "Y" to this question, the loader software will restart the load sequence. At this point, the user should rewind the Silent 700 playback option and restart it. The terminal will replay the DMPLOD

file and when the load is complete it will reset the SPK system.

If you answer "N" to the question, the loader software will reset the SPK system and not retry the LOAD sequence. If you elect not to restart the LOAD sequence, it is suggested that the SPK system data base be re-initialized to default values via the "INIT" command. This will guarantee that the data base be intact after the checksum error has occurred.

TROUBLESHOOTING

1.00 INTRODUCTION

1.01 General

This section describes the troubleshooting procedures that should be followed in the event of system malfunction. System troubleshooting and repair will be confined to module replacement (e.g., printed circuit board, power supply, keyset, etc.). Repair beyond module replacement is not within the scope of this manual.

2.00 DEFECTIVE UNIT RETURN POLICY

2.01 Return Authorization Tags

To return a unit, obtain a Return Authorization Tag and attach it to the defective unit. Proper documentation of the Return Authorization Tag will ensure the rapid repair and return of the equipment. Adhere to the following guidelines when filling out a Return Authorization Tag.

NOTE: INTER-TEL does not accept the return of defective units without return authorization tags.

A. Obtain a repair authorization number from your INTER-TEL order processing clerk.

B. Identify the unit by the equipment name, part number, and serial number.

C. Describe the defect and, if applicable, the circuit number related to the defect.

D. Document the estimated service time prior to failure.

E. Attach the upper portion of the tag to the defective equipment. Retain the bottom portion for your files.

3.00 TROUBLESHOOTING PROCEDURE

3.01 Preliminary Troubleshooting Checklist

Before starting the system troubleshooting procedures, complete the following checklist. This check list may save you time and possibly eliminate the need for detailed troubleshooting.

CHECKLIST:

A. Verify that the problem is not related to user error or equipment that has been disconnected or disabled.

B. If the defect is related to an optional feature, make sure that the option has been enabled.

C. Check that all printed circuit boards and equipment cables are securely seated or connected.

D. Check all LED's for proper indication. See Section 3.03, Light-Emitting Diode Indications, for proper indications.

E. If any optional external equipment (e.g., auto-dialers, headsets, loud ringing adapter, etc.) is connected to the system, verify that this equipment is not responsible for the problem.

F. Each multi-line keyset contains a microprocessor that is essential to the functions of the keyset. The supply voltage to the microprocessor is CRITICAL and must be set at the correct voltage level to ensure proper operation of the keyset. For correct voltage adjustment, refer to Section 680-100-300, Installation.

If the problem is still present after completing the Preliminary Troubleshooting Checklist, proceed to Section 3.02, System Troubleshooting Procedures."

3.02 System Troubleshooting Procedures

This portion of the troubleshooting procedures is designed to assist the technician in the event of an equipment failure. The troubleshooting procedures have been divided into four separate categories: feature failure, internal communications, external

communications, and system malfunctions. The troubleshooting charts in this section list the symptom, the possible cause, and the corrective action for the symptom. After locating the symptom listing which corresponds to the problem being experienced within the system, perform the corrective action steps in the order indicated in the procedures. If the problem is not corrected by following the procedure, contact INTER-TEL's Field Service for assistance.

A. Feature Failure. Before starting this troubleshooting procedure, refer to Section 680-100-200, Features, and perform the function which is reported to be defective. This is to ensure that the trouble is not the result of misoperation of the keyset by the user. Once proper operation has been confirmed, remove the keypad portion of the keyset. Examine the contacts under the feature button for dirt or dust and clean if necessary. If proper feature operation is still not possible, proceed to the FEATURE FAILURE TROUBLESHOOTING CHART, Figure 7-1.

B. Internal Communications. This portion of the troubleshooting section deals with internal calls only. Refer to Figure 7-2, Internal Communications Troubleshooting Chart.

C. External Communications. This portion of the troubleshooting section deals with external calls only. Refer to Figure 7-3, External Communications Troubleshooting Chart.

D. System Malfunctions. This portion of the troubleshooting section is designed to isolate a malfunction which appears throughout the system. Refer to Figure 7-4, System Malfunctions Troubleshooting Chart.

3.03 Light-Emitting Diode Indications (LED)

Each PCB in the INTER-TEL SPK system contains light-emitting diodes. These LED's will indicate specific functions related to that PCB. Figure 7-5 and Figure 7-7 indicate the normal condition of the LED's when the SPK is operating. If the LED's are not as stated, perform the troubleshooting procedures as described in Sections 3.02B, 3.02C, or 3.02D when the problem involves a specific circuit or circuits. If the power reset LED will not illuminate and extinguish after a reset condition or power up, remove that PCB, wait 10 seconds, and re-insert the PCB. If power interrupt indications are still incorrect, replace that PCB with a known good PCB. If the

NMI LED is illuminated on the CPU, connect a terminal, sign on, and enter the restart (REST) program function to extinguish the LED.

NOTE: Use of the restart (REST) function will disconnect any calls in progress. If the NMI LED lights frequently, contact INTER-TEL's Field Service for assistance.

If the first three LED's on the CPU are not flashing at their respective rates (refer to Installation Section 680-100-300:301D for proper flash rates), check the +5VDC on the KSU power supply and adjust if necessary. After checking the voltage and making any necessary adjustments, turn the system power off, wait for 10 seconds, and re-apply system power. If problem still exists, contact INTER-TEL's Field Service for assistance.

3.04 The Display Function

The display function displays by ASCII character, the activity of the INTER-TEL SPK system or of an individual station on the termninal. Refer to Figure 7-6 for the command code listing.

A. The command line to start the system display function is as follows:

DISP (CR)

The terminal will respond with:

DISPLAY IN PROGRESS !!

This will display the activity of the entire system.

B. The command line to start the display function on a single keyset and DSS/BLF (if attached) is as follows:

DISP XX (CR)

"XX" is the extension number desired.

The terminal will respond with:

DISPLAY IN PROGRESS !! XX

The terminal will beep every 15 seconds as a reminder that the input/output port is tied up with this function. Pressing the space bar will terminate this function.

NOTE: The following symptoms are isolated to one keyset only. For identical problems involving more than one keyset, refer to Section 3.02; D SYSTEM MALFUNCTIONS.

SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
Cannot place a call on hold	a. User error	a. Refer to Section 680-100-200 and verify feature operation.
	b. 5.0V regulator out of tolerance	b. Set the 5.0V regulator as outlined in Section 680-100-300.
	c. Defective keyset	c. Replace the keyset with a known good keyset.
	d. Defective CPU	d. Contact INTER-TEL's Field Service for assistance.
Cannot put the keyset into call forwarding	a. User error	a. Refer to Section 680-100-200 and verify feature operation.
	b. Defective keyset	b. Replace the keyset with a known good keyset.
	c. Defective CPU	c. Contact INTER-TEL's Field Service for assistance.
Cannot put the keyset in do-not-disturb	a. User error	a. Refer to Section 680-100-200 and verify feature operation.
	b. Switch-selectable option not enabled	b. Enable the DIP switch setting as outlined in Section 680-100-300, Installation.
	c. Defective keyset	c. Replace the keyset with a known good keyset.
	d. Defective CPU	c. Contact INTER-TEL's Field Service for assistance.

Figure 7-1. Feature Failure Troubleshooting Chart

Figure 7-1. *Continued*

SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
Re-dial last number inoperative	a. User error	a. Refer to Section 640-100-200 and verify the feature operation.
	b. Improper usage	b. The redial function cannot be used for redialing numbers stored in the keyset's memory.
	c. Defective keyset	c. Replace the keyset with a known good keyset
Redial busy number inoperative	a. User error	a. Refer to Section 680-100-200 and verify feature operation.
	b. Defective keyset	c. Replace the keyset with a known good keyset.
Keyset stored number memory lost or inoperative	a. User error	a. Refer to Section 680-100-200 and verify feature operation.
	b. A line key was not accessed prior to activating one of the stored number memory locations.	b. Reprogram the memory storage location and ensure that the line key is accessed prior to using the stored number.
	c. Power to keyset was removed.	c. Verify that the keyset has power and then re-program the numbers.
	d. Defective keyset	d. Replace the keyset with a known good keyset.
Cannot activate another keyset's message waiting lamp	a. User error	a. Refer to Section 680-100-200 and verify feature operation.
	b. Defective keyset	b. Replace the keyset with a known good keyset. (Check the called party's keyset to ensure it is operating properly.)
	c. Defective CPU	c. Contact INTER-TEL's Field Service for assistance

Figure 7-1. *Continued*

SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
Full-Duplex speakerphone inoperative	a. Defective speaker or speaker cable	a. Check the speaker cable with an ohmmeter. If the speaker is still inoperative, replace the speaker.
	b. Switch-selectable option not enabled	b. Enable DIP switch 5 inside the phone. Refer to Section 680-100-300.
	c. Defective keyset	c. Replace the keyset with a known good keyset.
Cannot transfer outside calls to other keysets	a. User error	a. Refer to Section 680-100-200 and verify feature operation.
	b. Called station is in do-not-disturb	b. Standard operating procedure. Any keyset in do-not-disturb cannot receive calls from a transferring station.
	c. Defective keyset	c. Replace the keyset with a known good keyset. (Check the called party's keyset to ensure it is operating properly.)
	d. Defective CPU	d. Contact INTER-TEL's Field Service for assistance.
Cannot initiate a conference	a. User error	a. Refer to Section 680-100-200 and verify feature operation.
	b. System is not equipped for conferencing	b. The system must have optional conference board.
	c. Defective keyset	c. Replace the keyset with a known good keyset. (Check the C.O. line status to ensure that external parties are being put on a hold status while setting up the conference.)
	d. Defective conference PCB	d. Replace conference PCB with a known good PCB.
	e. Defective CPU	e. Contact INTER-TEL's Field Service for assistance.

Figure 7-1. *Continued*

SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
Cannot initiate a page	a. User error	a. Refer to Section 680-100-200 and verify feature operation.
	b. No paging zones in the program	b. Verify that the stations are programmed for paging through the station feature program subroutine.
	c. Defective keyset	c. Replace the keyset with a known good keyset. (If the keyset cannot receive a page, ensure that the keyset is in the appropriate paging zone.)
Paging times out in less than 12 seconds	a. User error	a. Refer to Section 680-100-200 and verify feature operation.
	b. STN PCB has unterminated extensions	b. Terminate the unused extensions. Refer to Section 680-100-300:2.04 for instruction.
	c. Defective CPU	c. Contact INTER-TEL's Field Service for assistance.

NOTE: Speed transfer, digit 1 dial, night station ringing, executive priority, and off-hook tones are switch-selectable features enabled for an individual phone. If the proper settings have been confirmed, replace the keyset with a known good keyset.

NOTE: The following symptoms are isolated to one keyset only. For identical problems involving more than one keyset, refer to Section 3.02D System Malfunction, and Figure 7-4.

SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
No intercom dial tone	a. Defective cabling	a. Verify correct cable connections.
	b. Defective keyset	b. Replace the keyset with a known good keyset.
	c. Defective station PCB	c. Determine which PCB corresponds to the affected station and replace with a known good PCB.
Cannot place intercom calls	a. Defective keyset	a. Replace the keyset with a known good keyset.
	b. Defective station PCB	b. Determine which PCB corresponds to the affected station and replace with a known good PCB.
Data noise in keyset	a. Defective cabling or connections	a. Check for loose or open connections, or crossed data wires.
	b. Defective keyset	b. Replace keyset with a known good keyset.
	c. Defective station PCB	c. Replace the corresponding PCB with a known good PCB.
Keyset inoperative	a. Defective or misadjusted keyset	a. Check the internal 5.0VDC setting and adjust if necessary. Replace the keyset if still inoperative. (See Section 2.00.)
	b. Defective cabling	b. Check for loose or open connections in corresponding cabling.
	c. Defective station PCB	c. Replace the corresponding PCB with a known good PCB.
Other station conversations can be heard on the station	a. Defective station PCB	a. Replace the corresponding station PCB with a known good PCB.
	b. Defective CPU PCB	b. Contact INTER-TEL's Field Service for assistance.

Figure 7-2. Internal Communications Troubleshooting Chart

NOTE: The following symptoms are isolated to one keyset only. For identical problems involving more than one keyset, refer to Section 3.02D System Malfunctions, and Figure 7-4.

SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
Cannot obtain C.O. dial tone (intercom works)	a. C.O. line(s) restricted	a. Check the station option sheet and compare with the station programming for that keyset.
	b. Defective keyset	b. Replace the keyset with a known good keyset.
Cannot place an outside call. C.O. dial tone present (intercom works)	a. Keyset is toll restricted	a. Check the station option sheet and compare with the station programming for that keyset.
	b. Speed transfer switch-selectable option is enabled in the keyset	b. Standard operating procedure. Disable the DIP switch setting in the keyset if speed transfer is not desired.
	c. Defective keyset	c. Replace the keyset with a known good keyset.
	d. Defective CPU	d. Contact INTER-TEL's Field Service for assistance.
Outside calls being dropped during conversation or upon answering C.O. call	a. Line key is pressed by user after initial connection is established	a. Standard operating procedure. Pressing a line key after the connection has been made will automatically drop the call in progress and re-access that C.O. line. The reseize option may be used to alleviate this problem. However, the reseize feature is then lost to the system.
	b. Loop current interrupt from Central Office	b. Incorporate system option 6 (1.2 second held call loop release) into system programming.
	c. Insufficient loop current is supplied by the Central Office	c. Central Office must supply 20 mA loop current minimum.
	d. Defective keyset	d. Replace the keyset with a known good keyset.

Figure 7-3. External Communications Troubleshooting Chart

SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
All keysets in the system will not operate. No LED indications when a line key is pressed	a. Main power +30VDC fuse open	a. Examine the fuse and replace it if necessary. *CAUTION: Do not exceed maximum rating of fuse.*
	b. Open connection in the cable between power supply and KSU cardfile	b. Remove power from the system. Use an ohmmeter to check the cable connector and replace or repair the faulty cable.
	c. Defective station PCB	c. Remove all station PCB's from the KSU. Check the voltage on the terminal block of the power supply. If the voltage returns to the correct indication, replace the PCB's one at a time until the defective PCB is isolated. If the voltage is still incorrect, proceed with step d.
	d. Defective power supply	d. Use a voltmeter and check the voltage at terminal block of the power supply. If the voltage is not 30V ± 6VDC, replace the power supply.
A group of eight keysets will not operate. No LED indications when a line key is pressed. All eight sets are located on one station	a. Defective fuse on the station PCB	a. Remove the station PCB from the KSU and replace the fuse.
	b. Defective station PCB	b. Replace the station PCB with a known good station PCB.
	c. Defective receptacle on KSU backplane	c. Replace the KSU cardfile.
C.O. line inoperative throughout system	a. Defective C.O. line from Central Office	a. Disconnect the C.O. line from the C.O. PCB. Use a test set to verify the C.O. connection.
	b. Defective C.O. PCB	b. Replace the C.O. PCB with a known good PCB.
	c. Defective CPU	c. Contact INTER-TEL's Field Service for assistance.

Figure 7-4. System Malfunctions Troubleshooting Chart

Figure 7-4. *Continued*

SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
No music on hold or background music. (External music source is connected)	a. External music source turned off or inoperative	a. Check the external music source for proper operation.
	b. Defective cable between music source and CPU	b. Relace or repair the connecting cable.
	c. Defective CPU	c. Contact INTER-TEL's Field Service for assistance.
Terminal will not communicate with CPU	a. Baud rates of the terminal and the CPU are not the same	a. Match the baud rates of the printer and the CPU. Set for either 300 baud or 9600 baud.
	b. Miswired or defective cable	b. Repair or replace connecting cable. (For proper pinout of RS-232 connector, refer to Figure 3-26 of Section 680-100-300.)
	c. -12VDC fuse defective	Check the -12VDC fuse and replace it if necessary.
	d. Defective power supply	d. Check the -12VDC with a voltmeter on the terminals of the power supply. Also check the cable between the power supply and the KSU cardfile.
	e. RS-232 interface on the CPU PCB is faulty	e. Examine RS-232 interface for faulty solder connections or broken pin. Contact INTER-TEL's Field Service if assistance is required.

Figure 7-4. *Continued*

SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
Repeated occurrence of dropped calls	a. The AC line is not dedicated	a. Have a dedicated AC line installed by a qualified electrician from the main power panel with a third wire ground. Ensure telephone power is on its own circuit breaker.
	b. Equipped but unterminated data lines (no keyset connected at the end of the cable) STN-A PCB's only	b. Locate any unused circuits on the main distribution block. Terminate the OR-WH *pair* to the BL-WH *wire* of each unused circuit.
	c. +5VDC low	c. Re-adjust +5.0VDC to proper specifications using the +5VDC ADJ on the back of the power supply. For assistance, contact INTER-TEL's Field Service.
	d. KSU located near a strong magnetic field. (e.g., high voltage power transformers or copying machines)	d. Relocate the KSU to an isolated room a minimum of 20 feet away from any magnetic field-producing equipment.
	e. Defective CPU	e. Contact INTER-TEL's Field Service for assistance.

NOTE: See Figure 7-7 for the locations of the LED lamps.

PRINTED CIRCUIT BOARD	LAMP LOCATION	DESCRIPTION
STN-A, STN-B and STN-C	A	Power reset LED (normally OFF) 1. Indicates that the PCB has been acknowledged and electronically reset by the CPU. 2. Indicates that a power interrupt has occurred on that PCB.
	B through I	Circuit LED's (OFF when not in use) 1. Indicates that the station associated with that circuit is in use.
CPU	N through P	Data LED's 1. Indicates that the CPU is functioning. The rate of flash indicates the amount of activity on the system. Refer to Installation Section for proper flash rates.
	Q	NMI LED (normally OFF) 1. Indicates that the watchdog timer has had an interrupt.
COU	A	Power Reset LED (normally OFF) 1. Indicates that the PCB has been acknowledged and electrically reset by the CPU. 2. Indicates that a power interrupt has occurred on that PCB.
	B and E	1. Loop current indicator. Will light when the associated C.O. line is accessed.

Figure 7-5. Light-Emitting Diode Indications

Figure 7-5. Continued

PRINTED CIRCUIT BOARD	LAMP LOCATION	DESCRIPTION
CNF	A	Power Reset (normally OFF)
		1. Indicates that the PCB has been acknowledged and electrically reset by the CPU.
		2. Indicates that a power interrupt has occurred on that PCB.
	B through D	Conference circuit 1 (normally OFF)
		1. Lights when circuit is activated.
	E through G	Conference circuit 2 (normally OFF)
		1. Lights when the circuit is activated.
	I through K	Conference circuit 3 (normally OFF)
		1. Lights when circuit is activated.
	L through N	Conference circuit 4 (normally OFF)
		1. Lights when the circuit is activated.

Figure 7-5. Continued

PRINTED CIRCUIT BOARD	LAMP LOCATION	DESCRIPTION
MODEM II	A	Power Reset LED (normally OFF)
		1. Indicates that the PCB has been acknowledged and electrically reset by the CPU.
		2. Indicates that a power interrupt has occurred on that PCB.
	B	DTMF 1 (normally OFF)
		1. Will light when single line station is dialing.
		2. Will light when DISA is accessed.
	C	DTMF 2 (normally OFF)
		1. Will light when single line station is dialing.
		2. Will light when DISA is accessed.
	D	MODEM (normally OFF)
		1. Will light when the modem is used.
	E	External paging unit (normally OFF)
		1. Will light when any external paging zone is activated
	F	External paging unit #1 (normally OFF)
		1. Lights when external paging zone 1 is activated.
	G	External paging unit #2 (normally OFF)
		1. Lights when external paging zone 2 is activated.
	H	External paging unit #3 (normally OFF)
		1. Lights when external paging zone 3 is activated.
	I through M	External talkback speakers 1 through 5 (normally OFF)
		1. Will light when speaker is used.

PRINTED CIRCUIT BOARD	LAMP LOCATION	DESCRIPTION
MODEM I	A	Power Reset LED (normally OFF)
		1. Indicates that the PCB has been acknowledged and electrically reset by the CPU.
		2. Indicates that a power interrupt has occurred on that PCB.
	B	DTMF 1 (normally OFF)
		1. Will light when a single line station is dialing.
		2. Will light when DISA is accessed.
	C	DTMF 2 (normally OFF)
		1. Will light when a single line station is dialing.
		2. Will light when DISA is accessed.
	D	MODEM (normally OFF)
		1. Will light when modem is in use.

STATION COMMAND CODE DEFINITIONS

Encoded Character	Action	Encoded Character	Action
!	CALL FORWARD	=	LINE KEY 13 PRESSED
"	DO-NOT-DISTURB	>	LINE KEY 14 PRESSED
#	RESET CFD/DND	?	LINE KEY 15 PRESSED
$	STACK INTERCOM CALL	@	LINE KEY 16 PRESSED
%	RECONNECT INTERCOM CALL	A	LINE KEY 17 PRESSED
&	CONF. ACCESS	B	LINE KEY 18 PRESSED
'	CONF. RELEASE	C	LINE KEY 19 PRESSED
(	CALL BACK	D	LINE KEY 20 PRESSED
)	EXEC. PRIORITY	E	LINE KEY 21 PRESSED
*	CALL TRANSFER	F	LINE KEY 22 PRESSED
+	OFF-HOOK	G	LINE KEY 23 PRESSED
,	ON-HOOK	H	LINE KEY 24 PRESSED
—	STATION POWER-UP	I or $	HOLD/FWD KEY
.	CANCEL ENTRY	J or Y	DIAL/MSG KEY
/	INTERCOM TONE RING	+ or ,	OFF/ON KEY
0	PAGE COMMAND	& or ^	XFR/CONF KEY
1	LINE KEY 1 PRESSED	0 (zero)	* KEY
2	LINE KEY 2 PRESSED	N	0
3	LINE KEY 3 PRESSED	O	1
4	LINE KEY 4 PRESSED	P	2
5	LINE KEY 5 PRESSED	Q	3
6	LINE KEY 6 PRESSED	R	4
7	LINE KEY 7 PRESSED	S	5
8	LINE KEY 8 PRESSED	T	6
9	LINE KEY 9 PRESSED	U	7
:	LINE KEY 10 PRESSED	V	8
;	LINE KEY 11 PRESSED	W	9
<	LINE KEY 12 PRESSED	X or / or)	#
		Y	SPEED DIAL

DSS/BLF COMMAND CODE DEFINITIONS

Encoded Character	Action
Z	DSS/BLF SENDS THIS CODE AS A KEY FUNCTION KEY CODE ($00-$4F, $50-$7F)
[	DSS/BLF SENDS THIS CODE AS SPECIAL AND KEY CODE ($38-$3F)
8	DSS/BLF SPECIAL KEY 1
9	DSS/BLF SPECIAL KEY 2
:	DSS/BLF SPECIAL KEY 3
;	DSS/BLF SPECIAL KEY 4
<	DSS/BLF SPECIAL KEY 5
=	DSS/BLF SPECIAL KEY 6
>	DSS/BLF SPECIAL KEY 7
?	DSS/BLF SPECIAL KEY 8

NOTE: Single Line Electronic (SLE) and 2500 stations will not display hookswitch action (+ .). Also SLE stations will not display any SPCL key action.

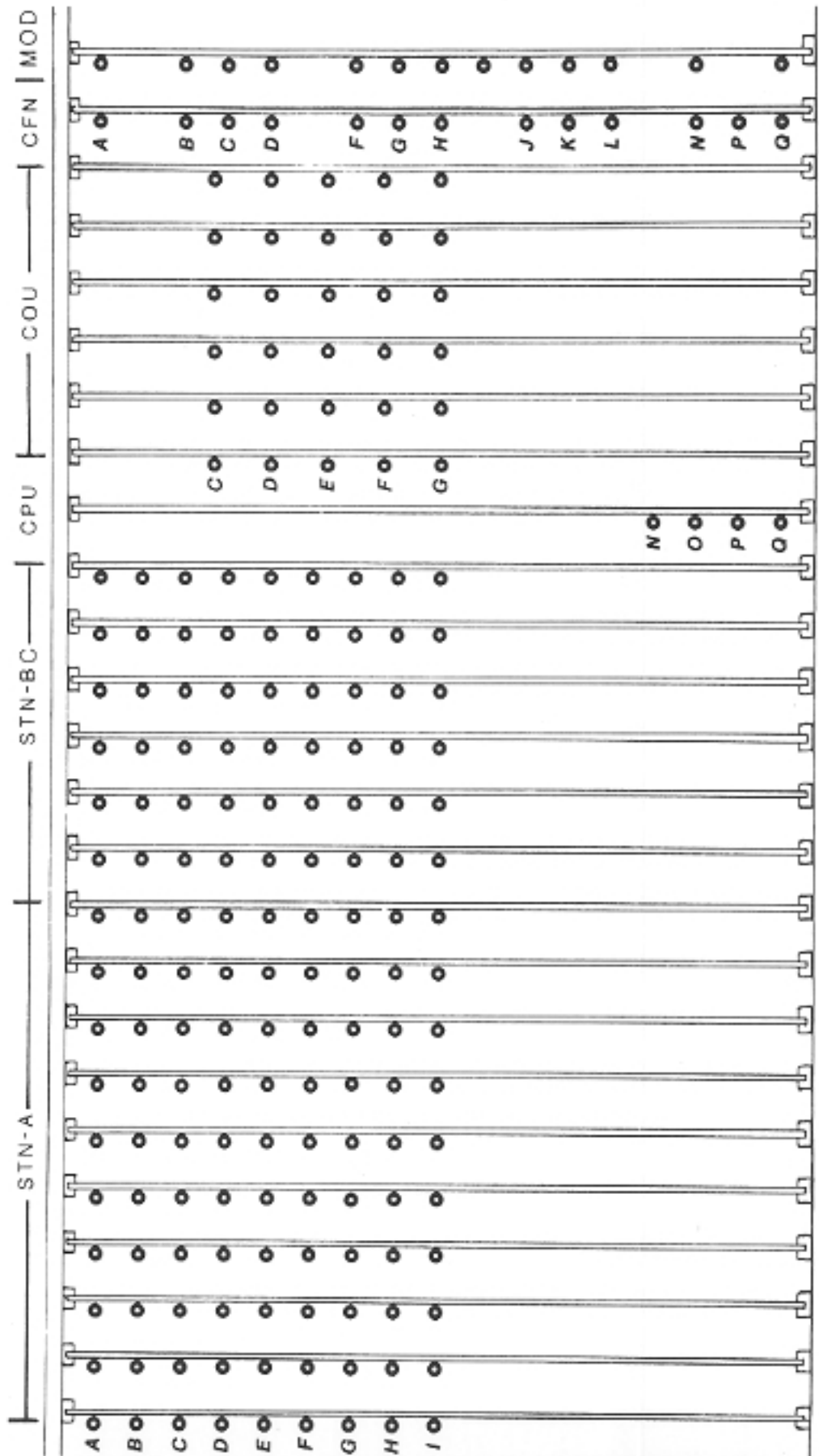**Figure 7-6. Code List for SPK System**

Figure 7-7. LED Locations

STATION MESSAGE DETAIL RECORDING (SMDR)

CONTENTS   PAGE

1.00 INTRODUCTION

This section defines the message format and code definitions that are used in the Station Message Detail Recording (SMDR) printout produced by the INTER-TEL SPK system. The formats and codes defined are for the Station Message Detail Recording, error mesages, and end-of-day printouts.

2.00 STATION MESSAGE DETAIL RECORDING

All incoming C.O. calls will generate a RING message in an ERROR MESSAGE format if system option 3 is set.

All SPK-generated C.O. calls in excess of 5 seconds (unless qualified by system options 1 or 2) will generate on the SMDR the call details shown in Figure 8-1.

Figure 8-1. SMDR Printout

EXAMPLE:

```
 2 0         1 6 0 2 6 9 5 0 9 1 1        2    1 0 2 4   0 1   1 2 3 4 5 6

# 1 0        1 6 0 2 6 9 5 0 9 1 1      1 0 0    9 2 4   0 2
```

2.01 Printout Field Description

A. The EXTENSION NUMBER is a three-character field. Valid character output includes the extension numbers 10 through 89 and #10 through #57.

B. The DIALED NUMBERS area is a 24-character field. Valid output includes the digits 0 through 9, the pound (#) sign and the asterisk (*) sign. The asterisk is output on the C.O. line only when system option 15 (DISABLE C.O. ACCOUNT CODE) is set. DISA-originated calls will contain DSA* in this field.

C. The ELAPSED TIME in minutes is a four-character field. Valid output includes the digits 0 through 9. Calls exeeding 255 minutes will be indicated as ***.

D. The TIME OF DAY is a four-character field. Valid output includes the digits 0 through 9.

E. The C.O. LINE NUMBER is a two-character field. Valid output includes C.O. line numbers 1 through 32.

F. The ACCOUNT CODE is a six-character field. Valid output includes the digits 0 through 9 and the pound (#) sign.

G. All blanks are ASCII spaces ($20).

H. Each line of printout ends in a CR/LF.

3.00 ERROR MESSAGE FORMAT

Figure 8-2 shows the format that is used for the SMDR printout of user and system errors. Error codes, with the exception of the *NMI message, are only generated if system option 3 is set.

Figure 8-2. Error Message Format

Information contained in the SMDR ERROR MES-SAGE fields will be defined as follows:

A. XXX

The XXX message field indicates the station where the error was detected. Valid output for this field includes the extension numbers 10 through 89 (keyset stations), #10 through #57 (single line or single line electronic) and *** in an unanswered RING message. The NMI error code will use a different format discussed later.

B. DDDD

This field location contains the error type. The error messages used in the SPK system are RING, ONHK, OFHK, DROP, OFLN, CURR, DLAY, DATA, and *NMI.

1. RING

The RING code indicates that a C.O. call rang in for the time specified under the ring duration field MM:SS. If the call was answered, the station answering the call is printed in the XXX field; if the call was not answered, a *** is printed.

EXAMPLES:

10 RING	....	2:26	1424	3
***RING	....	0:35	1530	7
***RING	....	0:35	1530	7
#13 RING	....	1:01	2359	16

2. ONHK

The ONHK code indicates that data other than the off-hook command was received while the station was on-hook.

NOTE: *Indiscriminate pressing of keyset buttons may cause lockout of the station until the station generates a hook-flash.*

For example, pressing the 2 on the keypad on station 39 while on-hook will generate an ONHK P error message.

EXAMPLE: 39 ONHK P.............. 1528

3. OFHK

The OFHK code indicates that erroneous data was received from a station while the station was off-hook and not in use. For example, an OFHK + indicates that the off-hook command was received with the station already off-hook.

EXAMPLE: 24 OFHK + ... 2312

4. DROP

The DROP code indicates that a station has been placed offline due to excessive data errors. If the data portion of this message contains a character, that character indicates the connection lost due to the change in station status. If there is no data field, then the station was not connected at the time it was dropped. In previous software this message only appeared for active stations which caused a C.O. line or an intercom connection to be lost.

Drop code definitions are listed in Figure 8-3.

DROP CODE	DESIGNATES
01-0F	Lines 1-15
10-1F	Lines 16-31
20	Line 32
!	IC Channel 1
"	IC Channel 2
#	IC Channel 3
$	IC Channel 4
%	IC Channel 5
&	IC Channel 6
'	IC Channel 7
(	IC Channel 8

Figure 8-3. Drop Code Definitions

EXAMPLE: 20 DROP 7.............. 0810

5. OFLN

The OFLN code will indicate that a previously offline (dropped) station has been reconnected to the system, powered up and is communicating with the KSU. Typical output to the SMDR is an OFLN 20 referring to a station powered up in the idle state.

EXAMPLE: 38 OFLN 20............... 1527

6. CURR

The CURR error type will indicate that the loop current was lost due to the C.O. call being dropped by the telephone company network or by the ouside party going on-hook. The FF field will indicate the C.O. line on which the loop current was lost.

EXAMPLE: #10 CURR OB............. 1621

For other examples, see the above drop code table.

7. DLAY

The DLAY error is printed whenever station data has not been transferred from the input area prior to the data collection processor starting a new station polling cycle. In this case a station lamp update cycle will be inserted into the polling sequence to allow the station data processor additional time for the transfer. Nothing is lost as a result of this condition and the message is displayed for performance measurement purposes only. The data code of "L" indicates that the delay was the result of slow handling of the previous station data. The absence of a code indicates that the data has been processed but that the processing of other system functions did not allow a prompt transfer out of the input area. The blank data code condition occurs frequently and is displayed only if system option 24 is enabled.

8. DATA

This message is displayed for any online station data errors in the ranges $00 to $19 and $80 to FE from an online SPK station. System option 24 must be enabled to display these messages. This message includes all such errors regardless of the current station state, as well as any messages which were previously displayed as ONHK with the same data error contents.

EXAMPLE: 14 DATA 15..............

9. *NMI

The *NMI error code indicates that a Non-Maskable Interrupt has occurred. *NMI errors are normally generated when software does not reset the system timer or when a hardware error, such as a power spike or improper PCB insertion, occurs. An *NMI will interrupt normal operation, record the condition of the system and automatically reset. The system will continue to process calls and handle existing calls in the following manner: C.O. lines that are on hold, transfer, park, and in conference will be placed on hold; C.O. lines that are seized, being reseized, dialing or redialing will remain seized; and IC calls will remain connected. The *NMI error code and system status at the time of the *NMI are displayed in Figure 8-4.
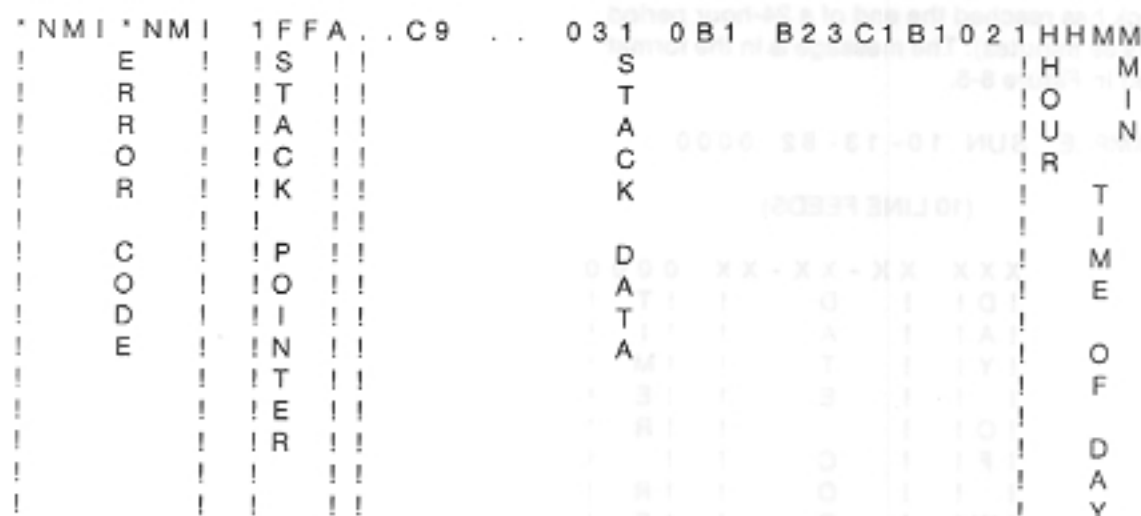
```
*NMI *NMI   1FFA..C9  ..  031  0B1  B23C1B1021HHMM
 !     E   !  !S  ! !         S                !H    M
 !     R   !  !T  ! !         T                !O    I
 !     R   !  !A  ! !         A                !U    N
 !     O   !  !C  ! !         C                !R
 !     R   !  !K  ! !         K                !     T
 !         !  !   ! !                          !     I
 !     C   !  !P  ! !         D                !     M
 !     O   !  !O  ! !         A                !     E
 !     D   !  !I  ! !         T                !
 !     E   !  !N  ! !         A                !     O
 !         !  !T  ! !                          !     F
 !         !  !E  ! !                          !
 !         !  !R  ! !                          !     D
 !         !  !   ! !                          !     A
 !         !  !   ! !                          !     Y
```

Figure 8-4. *NMI Error Code Format

The *NMI must be a "software-generated" error, i.e., a hardware-generated *NMI, generally caused by inserting a PCB incorrectly, will contain no significant data in the error message.

NOTE: *The stack data displayed has been altered to always reflect the 14 bytes of stack data at the high address of the stack. This means that the stack data will always reflect the system stack data contents regardless of what actions may have altered the value of the stack pointer.*

C. FF

This field contains the data (IC channel assignment, C.O. channel assignment, etc.) related to the above error types. The data may be either a single ASCII character or a two-digit hex value representing the ASCII character. (Refer to Figure 8-3.)

D. MM:SS

The field location will contain the ring duration of an incoming call and the duration of a completed C.O. call. The ring duration is expressed in minutes (MM) and seconds (SS); the C.O. call duration is expressed only in minutes (rounded up to the next minute).

E. HHMM

This field contains the time of day the printout occurred expressed in 24-hour military time. This does not represent the time of the event.

F. LL

This field will contain the C.O. line in use when the error occurred. If none were in use, or they do not apply to the error type, this field is left blank.

4.00 END-OF-DAY PRINTOUT

An end-of-day message is printed out when the real time clock has reached the end of a 24-hour period (23 hours 59 minutes). The message is in the format displayed in Figure 8-5.

EXAMPLE: SUN 10- 13- 82 0000

(10 LINE FEEDS)

```
XXX    XX - XX - XX    0 0 0 0
!D!    !      D      !  !T !
!A!    !      A      !  !I !
!Y!    !      T      !  !M !
! !    !      E      !  !E !
!O!    !             !  !R !
!F!    !      C      !  !  !
! !    !      O      !  !R !
!W!    !      D      !  !E !
!E!    !      E      !  !S !
!E!    !             !  !E !
!K!    !             !  !T !
! !    !      !      !  !  !
! !    !      !      !  !T !
! !    !      !      !  !O !
! !    !      !      !  !  !
! !    !      !      !  !Z !
! !    !      !      !  !E !
! !    !      !      !  !R !
! !    !      !      !  !O !
```

Figure 8-5. End-Of-Day Message Format

The End-of-Day message is followed by any call details or error messages that occured during the message printout. The message will also be displayed when the system is powered on.

A. The End-of-Day message is preceded by 10 line feeds.

B. The Day of the Week is a three-character field containing the day of the week and one of the following abbreviations:

SUN MON TUE WED THU FRI SAT

C. The Date Code is an eight-character field with the day, month, and year each being a two character code and separated from each other by a dash.

REPLACEMENT PARTS

CONTENTS   PAGE

1.00 INTRODUCTION

1.01 General

This section provides the necessary technical data and information necessary for ordering replacement parts for the INTER-TEL SPK system. All major units or assemblies are labeled with identification numbers and can be ordered using this information.

2.00 ORDERING PROCEDURE

To order replacement parts for the INTER-TEL SPK system, the following information is necessary:

1. Name of your company

2. Purchase order number

3. Required shipment date

4. Method material should be shipped

5. Part number of requested material

6. Quantity required

3.00 REPLACEMENT PARTS LIST

Figure 9-1 lists all the parts authorized for replacement in the INTER-TEL SPK system. Parts other than the ones listed are not authorized for replacement in the field.

4.00 SPARE PARTS

It is recommended that a spare parts inventory be kept on hand. This will ensure proper coverage of any problem except total system failure. It is also recommended that one CPU PCB be held in inventory for each version obtained. Figure 9-2 will give a recommended inventory set up based on 10 systems.

Part Number	Description
2480T	Keyset — 24 Line Key
1664T	Keyset — 16 Line Key
680SLE	Keyset — Single Line Key
6460D	Direct Station Selector/Busy Lamp Field
813.1002	Line Cord
813.1001	Handset Cable
817.3003	Handset Assy. — 2480T and 1664T
817.3005	Tranceiver for Handset (817.3003) 2480T and 1664T
817.3001	Handset Assy. — 680 SLE Type
817.3006	Tranceiver, Carbon Transmitter, 680 SLE
810.4003	Red Plastic Button Cap for Keyset
810.4001	Clear Plastic Button Cap for Keyset
817.4002	Amber Plastic Button Cap for Keyset
810.5011	Faceplate, 2480T
810.5009	Faceplate, 1664T
810.5004	Faceplate, 680SLE
810.5013	Faceplate, 6460D
680.230	Keyset — Keyboard and LED — 2480T
680.240	Keyset — Keyboard and LED — 1664T
680.231	Keyset — Printed Circuit Control PCB Assembly —1664T and 2480T
680.430	Keyset — Keyboard and LED — SLE
680.431	Keyset — Printed Circuit Control PCB — SLE
680.331	6460D DSS/BLF Printed Circuit PCB
680.330	6460D DSS/BLF Keyboard and LED
806.1009	Step-Down Transformer, DSS/BLF
680.05	KSU (SPK/II 80 Station Capability) (80 STN-Not Available) 32/128 STN, 16/64 STN same KSU
680.02	Cardfile — 128 SPK/II Station Capability
680.09	64 STN Cardfile KSU SPK/I
680.11	CPU-B PCB
680.20	DTMF Central Office Interface PCB (DTMF COU)
680.21	Rotary Central Office Interface PCB (Rotary COU)
680.30	Station A PCB (STN-A)
680.31	Station B PCB (STN-B)
680.32	Station C PCB (STN-C)
680.40	Conference PCB (CNF)
680.50	Mod I PCB
680.51	Mod II PCB
680.08	Power Supply — SPK/II
680.07	Power Supply — SPK/I
680.73	HVRA
680.72	HVRA PCB

Figure 9-1. Replacement Parts List

Part Number	Description	Quantity
680.20 or 680.21	COU PCB	2
680.30	STN-A PCB	2
680.31	STN-B PCB	1
680.32	STN-C PCB	1
680.40	CNF PCB	1
680.50	MOD I PCB	1
680.51	MOD II PCB	1
680.08	Power Supply	1
2480T	Keyset — 24 line key	4
680.11	CPU-B PCB	2

Figure 9-2. Recommended Spare Parts Inventory

Part Number	Description	Quantity
680.20 or 680.21	COU PCB	2
680.30	STN-A PCB	2
680.31	STN-B PCB	1
680.32	STN-C PCB	1
680.40	CNF PCB	1
680.50	MOD-I PCB	1
680.51	MOD-Y PCB	1
680.08	Power Supply	1
2480T	Keyset — 24 line key	4
680.11	CPU-B PCB	2

Figure 5-2. Recommended Spare Parts Inventory

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