REGISTER NO. 3000

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## BT-1530/2250 KEY TELEPHONE SYSTEM

#### INTRODUCTION

Fresho of Tell Plus Gmm. 5030 N. First Fresho (A 93410 (209) 222 666 2

This Technical Manual provides the Distributor/Installer with the procedures for Installing/Maintaining the BT1530/2250 Key Telephone Systems.

The Technical Manual is recommended reading prior to the installation of the first system to familiarize the Distributor/ Installer with the basic operation of the BT1530/2250 Key Telephone System.

The T.M. is divided into four (4) Categories:

I GENERAL INFORMATION

II INSTALLATION

III MAINTENANCE

IV ILLUSTRATIONS/SCHEMATIC DIAGRAMS

The first Category provides an Equipment Listing, feature highlights, and operational guide. The second Category consists of installation instructions for both Standard and Optional Equipment. The fourth Category provides illustrations, schematics, and parts lists of the various assemblies that make up the OMEGA II BT1530/2250 Key Telephone Systems.

Each Category includes its own Table of Contents. The APPENDIX includes electronic component description and specifications. Provided also is a familiarization with the Circuit Description symbols and wire wrap techniques.

Each T.M. is registered. The Register No. appears at the top right hand corner of this page. A record is maintained by SHIMCOM of each T.M. holder so that a suitable number of revisions/ supplements are issued to each T.M. holder.

The original REGISTRATION blank on the following page must be filled out and returned to IWATSU Customer Service in order to receive any revisions/supplements. Copies of the Registration will not be accepted. Only one of each revisions/supplements will be issued for each T.M. on hand.

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# BT-1530/2250 KEY TELEPHONE SYSTEM TECHNICAL MANUAL REGISTRATION FORM

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## BT-1530/2250 KEY TELEPHONE SYSTEM

I. GENERAL

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## BT-1530/2250 KEY TELEPHONE SYSTEM

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### BT-1530/2250 KEY TELEPHONE SYSTEM

#### GENERAL DESCRIPTION

#### 1.00 INTRODUCTION

- 1.01 The Omega-Phone II Key Telephone System is a new multiple line key telephone system featuring from thirteen (13) up to twenty (20) CO line capacity and thirty-two to fifty-eight extensions. The Omega-Phone II Key Telephone instrument is a compact, low profile, modern styled telephone. Made from white re-inforced ABS plastic, the instrument features a rugged housing and hook switch assembly to thwart breakage. Two models are offered: a BT1530-sixteen (16) button telephone set, and a BT2250 twenty-four (24) button telephone set. Both instruments can utilize fifty (50) pair telephone cable and can be interconnected.
- 1.02 Each instrument features Light Emitting Diode (LED) line lamp indicators, large rectangular line keys with integral dust cap and label, multiple function buttons, and a built-in station directory tray. Standard W.E. 500 type components are utilized for handset components allowing for easy replacement. Provision is made in the telephone for addition of any accessory equipment such as an operator's headset, hands-free telephone, memory dialer, etc. Optional color faceplates are available for color co-ordination with any interior decor. The telephone is adaptable for wall mounting by the addition of an optional wall mount adapter.
- 1.03 The Omega-Phone II Key Service Unit (KSU) is a one piece wall or floor mounted cabinet featuring a removable power supply and individual circuit card mounting for circuit functions. The KSU also features an inner door assembly for ease of servicing and installation of optional assemblies.
- 1.04 The basic KSU unit is prewired for the model BT1530 telephone capacity. Expansion of both CO Lines and Intercom extensions are easily accomplished in the same cabinet. All CO and Intercom line cards feature LED line status indicators showing the operational status of the individual line circuits. All circuit cards are keyed to prevent improper insertion of the individual circuit card. All volume controls are plainly marked and are adjustable from the front panel. The common circuit cards provide all necessary circuit for visual and audible control signals as well as dial intercom. The system is modified for pushbutton dialing by adding two (2) circuit cards into prewired card files.

- Amphenol connectors are provided for connection to the house 1.05 utilized for connection cables while a FCC standard connector is to the CO Lines or Intertace devices. Audio connectors are utilized for connection to a Background Music (BGM) source and Public Address (PA) Amplifier input. Provision is made for hookup of external mechanical ringers to operate during a local power failure. Wire wrap terminals are used throughout the KSU.
- The basic BT1530 power supply is incorporated into the KSU cabinet with external viewing of the indicator lamp and fuse holders. An auxilary lamp power supply is available for full system capacity operation.
- 2.00 EQUIPMENT LISTING
- BT1530/2250 Station Equipment is listed in Table A. 2.01
- Optional Station associated equipment is listed in Table B. 2.02
- BT1530/2250 Switching Equipment is listed in Table C. 2.03
- Optional KSU associated equipment is listed in Table D. 2.04
- Optional System Components are listed in Table E. 2.05
- 3.00 **FEATURES**
- In addition to the standard Key Telephone features, the Omega 3.01 Phone II provides the following features as standard:
  - a. Rotary or Omega-Tone Dial
  - b. Individual Line button designation
  - c. Light Emitting Diode (LED) Line Illumination
  - d. Automatic Line Key Restoration
  - e. Tone Ring or Voice Calling Intercom signalling w/individual volume control
  - f. Secretary Transfer/Don't Disturb Function Key
  - g. Alternate Point Answering Intercom
  - h. "Hot Line" Extension All Call channel with PA connection
  - i. Standard W.E. 500 type Components
  - j. Capacity for thirteen (13) or twenty (20) CO Lines
  - $\bar{k}$ . Prewired instruments for two (2) Intercom Lines, expandable up to four (4) Intercom Lines
  - 1. Prewired for connection to a Busy Lamp Field (BLF) or Direct Station Selection (DSS) Unit
  - m. Provision for Headset Jack
  - n. PA connection with individual Volume Control for paging/BGM
  - o. Thirty-two (32) Extension capacity provided as standard, expandable up to fifty-eight (58) Extensions
  - p. Dial Access to Special Features
  - q. Built-in slide Extension Directory Tray
  - r. Dial Restriction on CO Lines
  - s. Group Calling on Intercom Lines
  - t. Night Service-CO Audible ringing transfer
  - u. Private conversation on CO lines
  - v. BGM through station speaker with Off-Hook Cutoff.
  - w. "Meet Me" conference circuit

TABLE A BT1530/2250 STATION EQUIPMENT

MODEL NO.	ORDER NUMBER	DESCRIPTION
BT1530(P) BT1530(P)C	013 Note 1 023	Rotary Dial 16 Button Desk Key Telephone equipped with Station Priv. Unit
BT1530T(P) BT1530T(P)C	014 Note 1 024	Omega-Tone Dial 16 Button Desk Key Telephone equipped with Station Priv. Unit
BT2250(P) BT2250(P)C	015 Note 1 025	Rotary Dial 24 Button Desk Key Telephone equipped with Station Priv. Unit
BT2250T(P) BT2250T(P)C	016 Note 1 026	Omega-Tone Dial 24 Button Desk Key Telephone equipped with Station Priv. Unit

TABLE B OPTIONAL STATION ASSOCIATED EQUIPMENT

MODEL NO.	ORDER NUMBER	DESCRIPTION
OTD-1 PRV WOM-1 HFS-1 TRR ORD TRT LST HJB AHC CPR1530 CPT1530 CPT2250 CPT2250 NPC SPA-S OTD-S OTD-OP OTD-OM	125 131 143 113 139 124 140 136 116 100 150 150 150 150 150 150 150 150 128 127 126	OMEGA-TONE DIAL (ROTARY CONVERSION) CO LINE PRIVACY UNIT (REPLACEMENT) WALL MOUNT ADAPTER (CONVERSION) EXTENSION HANDSFREE TALKBACK ADAPTER EXTENSION TOLL RESTRICTOR-ROTARY DIAL ROTARY DIAL (REPLACEMENT) EXTENSION TOLL RESTRICTOR-DTMF LOUD SPEAKER TELEPHONE UNIT HEADSET JACK ASSEMBLY AUXILARY HOOKSWITCH CONTACT BT1530 COLOR PANEL-ROTARY DIAL BT1530T COLOR PANEL-OMEGA-TONE DIAL BT2250 COLOR PANEL-OMEGA-TONE DIAL NON-PRIVACY CONNECTOR LOUD SPEAKER TELEPHONE ADAPTER LOUD SPEAKER TELEPHONE TONE DIAL OUTPULSE DIAL

SUFFIX C INDICATES COCOA BROWN COLOR HOUSING WOODGRAIN FACEPLATES - ORDER NUMBER 155 Note 1.

TABLE C
BT1530/2250 SWITCHING EQUIPMENT (KSU)

y Dial Key Service Unit,
ped with 32 Extension Dial com, Common Control circuits, nnection, and PSA-1530 Power y; prewired for up to Thirteen CO Lines and Four (4) Intercom, Omega-Tone Receiver and -on-Hold.  y Dial Key Service Unit, ped with 32 Extension Dial com, Common Control circuits, nnection, and PSA-1530 Power y; prewired for up to Twenty CO Lines, Four Intercom Lines, tensions, Omega-Tone Receiver,

TABLE D
OPTIONAL KSU ASSOCIATED EQUIPMENT

MODEL NO.	ORDER NUMBER	DESCRIPTION
UCOL COL-1 ICL-1	141 106 119	UNIVERSAL CO LINE CARD STANDARD CO LINE CARD INTERCOM LINE CARD MUSIC-ON-HOLD CARD
MOH   RCD-1   RCV-1   HFK-1	121 132 133 112	OMEGA-TONE DECODER CARD OMEGA-TONE RECEIVER CARD HANDSFREE TALKBACK AMPLIFIER CARD
EEX-1 STL PCC-1	111 137 130	EXTENSION EXPANSION CARD AND AUTO RINGDOWN CIRCUIT CARD INDIV. CO LINE EXP. CONN. CO LINE EXPANSION TERMINAL
KTB MTL PSA-1530-1 PSB-1530-1	120 123 007 008	OFF-PREMISE EXTENSION CARD SYSTEM POWER SUPPLY (REPLACEMENT) AUXILARY LAMP POWER SUPPLY
CCE-L CCE-S IAP	102 103 118	CIRCUIT CARD EXTENDER - LARGE CIRCUIT CARD EXTENDER - SMALL KSU COMMON CIRCUIT CARD KSU COMMON CIRCUIT CARD
DCR SEC TNS	107 134 138	KSU COMMON CIRCUIT CARD KSU COMMON CIRCUIT CARD KSU COMMON CIRCUIT CARD PAGE 4

TABLE E
OPTIONAL SYSTEM COMPONENTS

MODEL NO.	ORDER NUMBER	DESCRIPTION
DSS-1 DSS-K1 BLF-B UEX-B ZPA-B-1	108 109 101 142 145	DIRECT STATION SELECTION CONTROL KSU CIRCUIT CARD FORTY-EIGHT (48) STATION LAMP FIELD UNIVERSAL EXTENSION ADAPTER THREE ZONE PAGE ADAPTER

#### NOTES

1. A letter suffix on the BT1530/2250 Color Panel indicates color of panel.

*WG	WOODGRAIN
*BE	BEIGE
GR	GREEN
*BR	BROWN
*GL	GOLD
ВĻ	BLUE
RD	RED

- 2. IAI reserves the right to make changes without notice.
- 3. Asterisk (\*) indicates only faceplates available on DSS-1.

#### SECTION 1001, ISS 3

- 3.02 The following features are offered as optional:
  - a. Direct Station Selection (DSS) Call Announcing
  - b. Dedicated Attendant Intercom Line
  - c. Busy Lamp Field
  - d. Universal CO Line card
  - e. Individual Station Toll Restriction-Rotary or Omega-Tone Dial
  - f. Handsfree Talkback on Intercom/DSS calls.
  - g. Music-on-Hold
  - h. Station Outpulse Dial Unit
  - i. Expansion up to twenty (20) CO Lines
  - j. Expansion up to fifty-eight (58) Extensionsk. Full Feature Intercom Extension Adapter

  - 1. Zone Paging Adapter (PA)
  - m. Multi-Trunk Conferencing
  - n. Off-Premise Capability
  - o. Night Transfer-CO Line signalling
  - p. Interchangeable Color Face Plates
  - q. Auxilary Lamp Power Supply
  - r. Loudspeaker Telephone Adapter

#### 4.00 DESCRIPTION OF FEATURES

#### Station Operation 4.01

- a. CO Line calls-Any station can originate and receive calls on the CO Line Key functions. Incoming calls are indicated by a 15 IPM (3 sec off, 1 sec on) audible signal and a corresponding line lamp flashing at 60 IPM (50% on-50% off). Each CO Line can be placed on "HOLD", the corresponding line lamp then flashes at 120 IPM (50% on-50% off). off). Any other station can release the "Holding" condition by pressing the corresponding line key. A steady line lamp indicates that the line is busy.
- b. Intercom Line calls-Each station can originate and receive Intercom Line calls. Two (2) Intercom Lines are standard and can be expanded up to four (4). Each Intercom Line requires an individual line key. Line lamps indicate the status of the Intercom Lines, a flashing line lamp indicates that another extension is dialing an Intercom call while a steady lamp indicates that the Intercom Line is Ringback and busy condition tones indicating the status of the called extension are provided for the calling extension. The incoming extension calling audible tone signal is discernable from the incoming CO audible tone to avoid confusion. Individual Station Paging is available by dialing a third digit after the extension number.

#### 4.02 Explanation of Features-Standard

- a. Private Conversation on CO Lines-A CO Line privacy unit (PRV) is provided standard in each BT1530/2250 Key Telephone. This allows the first extension that enters a CO Line to exclude all other extensions from that line. An extension CONF (Exclusion Release) Key is provided to allow additional extensions into the conversation. If required, any extension can be arranged for automatic entry into a busy CO Line (Executive Priority).
- b. Rotary or OMEGA Tone Dial-Each telephone can be equipped for rotary or push-button dialing. Each dial can be substituted at any time. The OMEGA Tone Dial features a 12 button pad assembly, meeting all MF tone signalling criteria required.
- c. The BT1530 telephone is wired for thirteen (13) CO and two (2) Intercom lines. The BT2250 is wired for twenty (20) CO and two (2) Intercom lines. Both telephones can be expanded to utilize up to four (4) Intercom Lines and are wired with 50 pair telephone cable.
- d. Light Emitting Diodes (LED) are utilized for line lamp indicators. The LED provides low current requirements and long life, eliminating lamp burnout problems and resulting service calls.
- e. Individual Line Button Designation-Each CO/Intercom Line Key is provided with its own designation label. All pressure sensitive labels are provided on a single sheet for ease in typing the individual line key designations.
- f. Automatic Line Key Restoration-Each line key restores to its rest position upon placing the handset on hook. This eliminates inadvertantly taking a CO Line call off of "Hold" and interference with exixting calls.
- g. Wall or Desk Capability-Each telephone can be wall or desk mounted. No modification of any internal mechanisms is required for wall mounting. An optional wall mounting kit is offered, consisting of a wall mounting plate and hanger cup assembly.
- h. When dialing another extension on the Intercom, either Voice Paging (individual station) or Tone Ringing can be used to signal the called extension. By arranging straps in the KSU, either Individual Station Paging or Tone Ringing can be operated by dialing two digits, with the remaining function operated by dialing the third digit.

This allows for end-user preference of which method should operate first. A volume control is provided on each telephone to control the voice/tone level of the station speaker. Each telephone comes equipped with switch-hook cutoff of the station speaker on internal calls. A strapping option is included to allow for Intercom signalling when the extension is off-hook and busy on a CO Line call.

- i. Secretary Transfer/Don't Disturb-Each station is equipped with a "Transfer" switch which allows the incoming Intercom extension signal to be switched to a pre-determined extension. This feature can also be used as a "blocking" switch preventing any other extension from signalling (Voice or Tone Calling).
- j. Alternate Point Answering (APA)-Each station is equipped with an APA feature whereby the extension can answer an Intercom call of another station. The CONF Key is pressed to silence the station ringing (or Voice calling) and free the Intercom Line for voice conversation.
- k. "Hot Line" All Call with PA Connection-An "All Call" function key is provided standard. To make an "All Call" to all extensions in the system, the PAGE Key is pressed and the voice message is recited into the handset. Simultaneously, the "page message" will be heard at all extensions in the system as well as through a PA system (if the system is so equipped). It is not necessary to be on a CO or Intercom Line to utilize the "All Call", as a separate channel is provided for this feature. When engaged on a conversation on a CO or Intercom Line, the PAGE Key can be used for conference initiation or call transfer. All other parties on the CO or Intercom Line do not hear the "page message". The CO or Intercom Line is automatically "held" while the Page Key is pressed
- Standard W.E. 500 type components-Each telephone instrument uses standard 500 type voice components. This allows for easy replacement of handset, coil cord, etc., as well as addition of options such as hard of hearing handset, long coil cords, etc.
- m. Prewired for BLF and DSS-Each extension is prewired for hookup to a Busy Lamp Field (BLF) or Direct Station Selection (DSS) with its integral Busy Lamp Field.
- n. Provision for Headset Jack-Each extension is equipped for mounting an optional Headset Jack assembly. Cutout indications are provided on the telephone housing for jack installation. Terminals are provided for headset jack wiring.

- o. PA Connection provision is made for system connection to a Public Address system. A separate input with an individual volume control is provided for a music source (BGM). A separate volume control is provided for controlling the PA voice input. The PA connection is operated when the PAGE Key is pressed. Spare relay contacts are provided for controlling special functions during the "page" interval. No amplification is provided for external PA/BGM speakers, a separate PA amplifier must be used.
- p. Thirty-two (32) Extension Capacity The basic system control unit provides capacity for 32 dial intercom extensions.
- q. Dial Access to Special Features Special Features such as group calling (Pre-Set Conferencing) or Zone Paging can be accessed through the dial intercom circuit.
- r. Built in slide Directory Tray Each station contains a built in slide Directory Tray where extension numbers are listed. The Directory labels are pressure sensitive and are supplied on a backing suitable for Typewriter operation.
- s. Group Calling (Pre-Set Conference) Any extension number can be arranged to simultaneously ring a pre-determined group of extensions.
- t. Dial Restriction on CO Lines-Any extension can be arranged to prevent dialing of calls on CO Lines on an individual CO Line basis.
- u. Night Service CO audible ring transfer Provision is made for transfer of the CO Line audible ringing signal to pre-determined extension(s) or all extensions in the system for Night Service, peak periods, breaks or alternate answering points.
- v. "Meet Me" Conference When the PAGE Key is pressed while on an ICM Line, the ICM dial register is automatically released allowing the calling extension immediate access to the PA/All Call system. The calling extension can then call the desired party to the ICM Line.
- w. Station BGM Backgroung music can be played through individual or all stations in the system. When the station handset is taken off-hook, the BGM is automatically cut-off.

- 4.03 Explanation of Features-Optional... It is recommended that each feature be thoroughly reviewed for correct system operation. Some optional features cannot be supplied simultaneously with other optional features. The feature installation section should be consulted for any particular problem that will be encountered with the addition of a specific optional feature in the system.
  - a. Direct Station Selection An optional Direct Station Selection (DSS) unit is available for the Attendant (Line Answering) position. Momentary push-button keys are provided to direct signal (by tone or voice) individual or groups of extensions in the system. "Automatic Hold Release" of the associate telephone extension CO Line Key is provided allowing one step operation of the DSS function. A busy Lamp Field (BLF) is provided on the DSS unit to show switch-hook status of the extension in the system. LED indicators are utilized for the BLF functions. The DSS call has call priority if both an ICM call and a DSS call occur simultaneously at an extension.
  - Dedicated Attendant Line A dedicated line can be provided for the Attendant for two way handset communication with the called extension(s). This allows the Attendant to talk with any extension without using the Dial Intercom Lines. This frees the dial ICM Lines for internal traffic and permits the Attendant to transfer calls without being delayed by busy ICM Lines. The Attendant (ATTD) Line uses a spare CO Line pick-up key at each extension. This still allows expansion of the Dial ICM Lines to four (4). When the Attendant utilizes the ATTD Line, the ATTD Line lamp flashes at the extensions indicating a call. When the answering extension presses the ATTD Line Key, the line lamp goes steady. The conversation between the Attendant and the called extension is private, additional extensions being added by pressing the extension CONF Key. The ATTD Line can be used with the PAGE Key on the associated Attendant station as a "Meet Me" Line.
  - c. Universal CO Line Card-A Universal CO Line Card (UCOL) is available, whereby the line card can be used for any type of VCA or direct wire hookup. The UCOL line card interfaces directly with BELL STC. STP, CD9, or C2A Voice Connection Arrangements. No additional equipment is required.
  - d. Busy Lamp Field-A busy Lamp Field (BLF) is available, similar in style to the standard station. Long life LED lamps are utilized for extension indicators. Thirty-two (32) and forty-eight (48) line units are available. No additional power supply or auxilary equipment is required.
  - e. Individual Station Toll Restriction- An extension toll restrictor for rotary or tone (separate models) are offered.

- f. Handsfree Talkback on Intercom- Individual or call extensions can be modified to operate with "Handsfree" (HF) reply on either ICM Line or DSS calls. A HF Microphone Unit is installed in each station that will operate Handsfree and one common circuit card is added to the KSU. When one extension calls another equipped with HF, a warning tone is heard both at the called and calling extension indicating a HF call. The called party can now talk to the calling extension without using the station handset. A "time out" circuit is provided limiting the conversation to approximately forty (40) seconds. After the "time out", the ICM Dial Register releases and the HF circuit disconnects. The called party must use the handset and press the ICM Line Key to talk to the calling extension.
- g. Handsfree Talkback on DSS When the extensions are equipped for HF Talkback, the Attendant can call a HF extension with the extension answering HF. No "time out" circuit is provided on DSS-HF calls. If the HF circuit is busy on an Extension to Extension ICM call, the Extension to Extension call, after a warning tone reverts to one way voice calling during the DSS call duration. If the DSS calls a non-HF extension, any HF circuit call in progress on the ICM Register is undisturbed. When the DSS calls a HF extension, both the Attendant and the called extension receive a tone burst indicating a HF call in progress.
- h. Station Outpulse Dial Unit-The Station Outpulse Dial Unit provides push-button dialing in rotary dial Central Offices.
- i. Extension Expansion The basic 1530 KSU cabinet can be expanded to fifty-eight (58) extensions by addition of the EEX expansion circuit card and harness assembly. Wire wrap terminals are used exclusively for installion of all KSU wiring options. An auxilary Power Supply Model PSB-1530 must be added to meet the additional lamp battery requirements.
- j. CO Line Expansion The basic 1530 KSU cabinet is expandable up to twenty (20) CO Lines individually or up to a maximum of seven (7). A wiring harness is provided for wire wrap connection of the printed circuit board connectors.
- k. Full Feature Intercom Extension Adapter The Extension Adapter provides full Intercom features inculding two (2) dial Intercom Lines, Paging, Alternate Point Answering, and Buzzer when used in conjunction with a standard wall or desk 500 type telephone.

#### SECTION 1001, ISS 3

- 1. Zone Page Adapter The Zone Page Adapter provides for up to three (3) zones of paging in a PA system. The unit is accessed through the dial intercom circuit and features "Time-Out" to prevent register tie up. The DSS unit also has access to Zone Paging through individual DSS Keys.
- m. Multi-Trunk Conferencing This feature allows for talking to more than one CO Line at the same time. The CO Line Key switches in the individual extension can be strapped so that more than one CO Line can be connected simultaneously to the station voice circuit. No amplification is provided and the conversation voice level is limited by local telephone line conditions as well as distance of the outside CO line parties.
- n. Off-Premise Circuits Two (2) Tie Line circuits are offered. The model STL can be used as an Automatic (or Manual) Ringdown circuit between the system and a single line station or KTS off premise.

The Model MTL provides full ICM features to a Dial Intercom OPX. The OPX can access any of two ICM Lines and dial local extensions. DSS signalling and Call Splitting, OPX BLF indication, DSS CO Line Add-on, Night Service, and OPX Dial Access to CO Line (2) are all provided as standard.

- o. Night Transfer The Attendant station can be modified such that the "Transfer" switch is used to switch the incoming CO ringing signal to a designated group of stations or all stations in the system for "Night Operation."
- p. Auxilary Lamp Power Supply An auxilary lamp power supply (PSB-1530) is available to supply power for the additional line lamps when the system extension capacity exceeds thirty-two (32).
- q. Interchangable Color Face Plate A variety of different color face plate is available for end-user color preference.
- r. Loudspeaker Adapter An adapter is offered to convert the telephone station for "handsfree" calls both on CO and ICM Lines. A "handsfree" unit such as the Northern Telecom "Companion II" or the Precision Components PC-4A can be used.
- s. Additional Hookswitch Assembly An additional hookswitch assembly can be added to the telephone station for controlling special features.

### BT-1530/2250 KEY TELEPHONE SYSTEM

#### SYSTEM OPERATION

- 1.00 RECEIVING AN OUTSIDE CO LINE CALL
- 1.01 When an outside CO Line call is received at the telephone line answering point, the particular CO Line lamp flashes at the "Incoming" rate (60 IPM) at all extensions in the system. The line answering extension's (Attendant) tone ringer gives an audible warning (modulated 450hz at 15 IPM) of the incoming call.
- 1.02 The CO Line call is then answered by taking the handset off-hook and pressing the corresponding line key. The line lamp goes steady and the audible tone ringing ceases. Conversation can now take place.
- 1.03 Alternate CO Line answering extensions are available throughout the system. All incoming CO Line calls can be answered at any extension that the line terminates on. Simultaneous ringing can occur at any group of extensions in the system. Provision is made for switching the "Incoming" signal control to the designated extension(s) during off-duty hours, peak service hours, or night operation.
- 2.00 PLACING A CO LINE ON "HOLD"
- 2.01 When an outside call is to be placed on "Hold", the distant party is informed that the call is to be placed on "Hold". The HOLD Key is then pressed and upon release, the CO Line Key will restore and the line lamp will flash at a fast rate (120 IPM).
- 3.00 TRANSFERRING A CO LINE CALL TO THE DESIRED PARTY
- 3.01 After the CO Line call is placed on "Hold", the line answering position (Attendant) has three (3) means available for transferring the call to the desired party.
- 3.02 The Attendant can voice page the local party by pressing the PAGE Key and reciting the page message into the handset, telling the local party that a call is waiting on a particular CO Line. The PAGE Key can also be used in conjunction with an Intercom line if the desired party has to be located and voice communication is required.

- 3.03 If the Attendant desires direct communication with the local party, the Attendant can select an available Intercom Line, dial the extension number of the local party, and use either individual voice station paging or tone ringing to signal the extension. When the extension answers, the message can be relayed.
- 3.04 As an optional alternative, the Attendant may be equipped with a Direct Station Selection (DSS) Unit. With the DSS Unit, the Attendant can direct signal any extension in the system without utilizing the Intercom Lines. The DSS Unit is equipped with a Busy Lamp Field (BLF) which shows the switch-hook status of the extension. Along with the DSS, the Attendant can use a dedicated voice line for voice communication with the particular extension.
- 4.00 MAKING AN OUTSIDE CO LINE CALL
- 4.01 The extension that wishes to make an outside CO Line call first selects an available CO Line. The line lamp indicates the status of the line. When the lamp is steady or flashing, that particular line is busy.
- 4.02 The handset is lifted off-hook and the line key of the available outside line is pressed. The line lamp now glows steady, and dial tone is heard in the handset. The telephone number of the distant party can now be dialed in its entirety.
- 4.03 When the dialing is completed, the standard telephone signals for distant station ringing or busy will be heard in the handset. When the conversation is concluded, the line lamp will estinguish when the handset is placed on-hook and the line key will restore to its rest (up) position.
- 5.00 DIALING ANOTHER EXTENSION ON THE INTERCOM
- 5.01 When an extension wishes to make an Intercom call, an Intercom line that is not busy is selected. Upon taking the handset off-hook and pressing the Intercom Line Key, the line lamp will flash at a slow rate (30 IPM). Dial tone (450hz) is then heard in the handset. Any other extension can now be dialed and voice/tone calling used to signal the individual extension.
- 5.02 Upon completion of dialing the extension number, the calling party will hear ringback tone (15 IPM) if the called extension is not busy or busy tone (450hz at 120 IPM) if the called extension is busy.
- 5.03 Tone signalling is standard for two digit dialing with individual voice paging accessed by dialing the third digit "l".

  Strapping options are available in the KSU to reverse the order if individual station paging is desired first and tone ringing controlled by dialing any digit after the extension number.

- 5.04 At the called extension, the Intercom signalling tone (450hz at 60 IPM) is heard through the station speaker. The called party then checks which Intercom Line the call is on by noting the flashing line lamp, and presses the particular line key. Upon lifting the handset off-hook at the called extension, the tone ringing stops, the ringback tone is disconnected, the line lamp glows steady and conversation can take place.
- 5.05 The calling party, if he chooses, can initially voice page the called extension by dialing "1" after the extension number. If the called extension was busy, however, the voice page would not operate and busy tone would be heard in the calling party handset.
- 5.06 If the called extension was initially busy (off-hook) when the extension was first dialed, busy tone will be heard by the calling party. However, the calling party can wait a maximum of 20-40 seconds for the called party to go on-hook and then automatically start to receive tone ringing, with busy tone changing to ringback tone at the calling party.
- 5.07 If the called party does not answer or the calling party waiting exceeds the 20-40 seconds the Dial Intercom register disconnected and becomes available for use by another extension. The calling party must then hang-up and re-dial the extension number. The "time-out" feature is provided so that no extension can tie up the Intercom dial register for an extended period of time, preventing other extensions from dialing a call.
- 5.08 If the called party was not at the telephone, the call could be answered at another extension in the system by depressing the Intercom Key Line, taking the handset off-hook, and then pressing the CONF Key. Upon pressing the CONF Key, the tone ringing (or voice calling) is disconnected, the ringback tones become disconnected, and conversation can take place between the calling party and the answering party. This feature is commonly referred to as Alternate Point Answering (APA).
- 6.00 UTILIZING THE PAGE KEY
- 6.01 The PAGE Key provides an All Call to each extension in the system as well as a voice connection to a PA system if the telephone system is so equipped. The PAGE Key can be used for one way message between the calling party and any extension in the system as well as used for trying to locate a particular party in the system. Because the page message is heard at all extensions and through the PA system, the desired party can be called to a particular CO or Intercom line.
- The caller takes the handset off-hook, presses an available Intercom Line, then press the PAGE Key, recites the message in the handset, and releases the PAGE Key. The called party can now go to any extension in the system and answer the page call by picking up a phone on the Intercom Line that the caller is waiting.

- 6.03 If no reply is required or a "Call-back" message is given, no line key has to be selected. The handset is taken off-hook the PAGE Key pressed, and the message recited into the headset.
- 6.04 If an extension is engaged in a conversation on a CO or Intercom Line, and wishes a third party to join, the extension user presses the PAGE Key and calls the third party on the line. While the PAGE Key is pressed, the CO or Intercom Line remains connected, the party on the CO or Intercom Line will not hear the page message.
- 6.05 If an extension wishes to call another extension and sees that the dial Intercom is busy (some other extension is in the process of making a dial Intercom call) as determined by noticing the flashing line lamp on another Intercom Line, the PAGE circuit can still be utilized. The caller first presses an unused Intercom Line Key, then lifts the handset off-hook. The line lamp will glow steady and no dial tone will be heard. The PAGE Key can now be pressed, the called party contacted, and conversation takes place on the Intercom Line.
- 7.00 ATTENDANT OPERATION OF THE OPTIONAL DIRECT STATION SELECTION (DSS) UNIT
- 7.01 Upon answering a CO Line call and determining call requirements, the Attendant views the BLF indicator of the desired extension on the DSS unit. This will tell the Attendant if the extension is busy on another call. If the extension is busy, the Attendant can inform the calling (distant) party or transfer the call to another extension. Also, the Attendant can still inform the original extension requested of the waiting call in a more precise manner so as not to disturb the call already in progress.
- 7.02 When the Attendant calls the local extension on the DSS, the CO Line call automatically goes on "Hold" and the pick-up Key restored when the Extension Key is pressed on the DSS unit. The ATTD Line Lamp starts flashing at a slow rate (60 IPM). Either voice paging or tone ringing can be utilized for DSS Signalling by presetting to the particular mode of operation desired. While the Key is pressed, the Attendant's voice (or tone) is heard at the called extension. The extension, upon hearibg the "page" message, can either answer the call that is waiting or press the Attendant Line. which lamp is flashing at a slow rate (60 IPM). When the extension becomes steady. If the called extension was busy on another line, the line could be placed on "Hold" before switching to the Attendatn Line.
- 7.03 If the DSS call and the Intercom call from another extension in the system occur simultaneously at the extension, the DSS call has priority. After the Attendant informs the extension of the nature of the waiting call, either the extension or the Attendant can re-enter the CO Line and talk to the waiting party. When the Attendant goes on-hook or switches to another CO Line, the DSS disconnects.

- 7.04 The PAGE Key at the Attendant station can be utilized with the ATTD Line. Upon pressing the station PAGE Key, the CO Line call automatically goes on "Hold" and the pick-up Key restored. The ATTD Line lamp starts to flash at a slow rate. The page message is then recited and the PAGE Key released. When the called party picks up a phone at any extenison in the system and presses the ATTD Line pick-up key, the line lamp goes steady and conversation can take place.
- 7.05 If the DSS call an extension equipped with HF talkback, the extension can reply HF to the DSS calls. The Attendant holds the DSS Station Key pressed during the conversation. No "time-out" period is included in HF DSS calls. If the called extension wishes, it can switch to private handset conversation by taking the handset off-hook and pressing the ATTD Line Key. The Attendant then releases the DSS Station Key.

  8.00 OPERATION OF EXTENSION EQUIPPED WITH CO LINE PRIVACY
- 8.01 If all extensions in the system are equipped with the optional "Privacy Unit", once an extension has entered into a free CO Line, the line becomes private to that extension.
- 8.02 If the extension desires to have another extension enter the line, the CO Line is placed on "Hold", the extension then informs the add-on party by dialing or paging the desired party, informing the line to enter. The extension again presses the CO Line Key, taking the line off "Hold", then presses the CONF Key which causes the line lamp to flash at 120 IPM. When the add-on party enters the line, the line lamp becomes steady, the CO Line now becomes private to the two (2) extensions.
- 8.03 If a third extension is to be added, both previous extensions must press and hold their CONF Key until the third party enters the conversation.
- 9.00 INTERCOM OPERATION WITH THE OPTIONAL HANDSFREE TALKBACK
- 9.01 If an extension is equipped with the optional "Handsfree Talkback Unit", an Intercom caller to that particular extension has the ability of two way voice communication without the called extension using the handset.
- 9.02 When the "Handsfree" extension is dialed and individual station paging utilized, a momentary warning tone will be transmitted to the "Handsfree" extension, signalling that an incoming Intercom call is in progress. The caller can now talk to the called extension, the called extension answering "Handsfree". The call can only last the duration of the "Time-out" (20-40 second maximum) because the Intercom dial register connection is maintained for the duration of the call. When "Time-out" function is exceeded, the register frees itself and the call becomes disconnected.

- 9.03 If the "Handsfree" station wishes to talk to the called party longer than the 20-40 second period, the called extension picks up the handset and presses the flashing Intercom Line Key (the line lamp remained flashing during the talkback period), the register disconnects, the line lamp glows steady and the conversation renews.
- 9.04 If a HF extension to extension call on the ICM Register is taking place and the DSS then initiatea a call to any HF equipped extension, the extension to extension call on the ICM Register after receiving a warning tone reverts to one way voice calling. When the DSS HF call releases, the HF connection resumes between extensions as long as the "time out" period is not exceeded. If the DSS make a call to a non-HF extension, any HF call taking place on the ICM Register is undisturbed.
- 10.00 UTILIZING THE OPTIONAL ZONE PAGE ADAPTOR
- 10.01 The Zone Page Adapter is used in conjunction with an external PA system. The Zone Page Adapter provides three (3) individual zones of paging, plus "all page".
- 10.02 To access the Zone Paging, the extension selects an available Intercom Line, dials the specific extension number for the individual zone, then recites the "page" message. The caller then goes on-hook and waits for the reply. The Zone Page Adapter also becomes disconnected when the "Time-out" period is exceeded or if the CONF Key is press (APA is utilized).
- 10.03 If another extension makes a page (All Call) by using the PAGE Key, the Zone Page is momentarily disconnected during the "All Call" interval.
- 10.04 If the system is equipped with the optional DSS, the Attendant can operate the Zone Paging directly from the DSS unit. The Attendant presses the DSS Key assigned to the individual Zone and speaks into the handset. The Attendant line lamp starts to flash when the DSS Key is pressed. Upon release of the Key, the Zone Page disconnects.
- 11.00 UTILIZING THE OPTIONAL INDIVIDUAL EXTENSION ADAPTER
- 11.01 The Individual Extension Adapter (UEX-B) provides all features on the intercom circuit as does the BT1530/2250 key telephones. The PAGE, CONF and Intercom dial selection operation is exactly the same as the multiline Key telephones.



BT-1530/2250 KEY TELEPHONE SYSTEM

II. INSTALLATION

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- 1.02 This Section will be revised on issuance of a new or revised Section for the Category as described in the Table of Contents.
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### BT-1530/2250 KEY TELEPHONE SYSTEM

#### GENERAL INFORMATION

- 1.00 SPECIFICATIONS
- 1.01 Electrical Characteristics

a. Telephone Voice Network: Equiv. to U.S. 500 type

b. Rotary/Tone Dial: Meets all TELCO specifications

c. Power Supply:  $117VAC \pm 10\%$ , 50-60hz, Input;

24VDC, 5VDC Output

d. CO Line Sensitivity: 20hz ringing, 65VRMS through

3 Kohm operation

e. Max Loop Resistance

KSU-Key Telephone: 40 ohms

f. Operating Temperature: -10° to 50° C

- 1.02 Mechanical Characteristics
  - a. STATION EQUIPMENT: BTT530/2250 TELEPHONES
    - Dimensions: 10½ in. X 10 in. X 4 in. (LxWxH)
    - Weight: 6 Lbs.
    - Shipping Weight: 7 Lbs
  - b. CENTRAL EQUIPMENT: BT1530KSU (EXPANDABLE)
    - Dimensions: 9½ in. X 21 in. X 31 in. (LxWxH)
    - Weight: 64 Lbs.
    - Shipping Weight: 77.2 Lbs.
  - c. POWER SUPPLY: PSA-1530
    - · Dimensions: 7½ in. X 9 in. X 12¼ in. (LxWxH)
      - Weight: 34 Lbs
      - Shipping Weight: 36 Lbs.
  - d. POWER SUPPLY: PSB-1530:
    - Dimensions: 6½ in. x 8¼ in. x 6½ in (LxWxH)
    - Weight: 19 Lbs
    - Shipping Weight: 20.4 Lbs.

#### 2.00 AUDIBLE/VISUAL INDICATIONS

2.01 CO Line Audible/Visual Supervisory Signals are shown in Table A.

TABLE A

CO Line Audible/Visual Supervisory Signals

FUNCTION	LAMP	AUDIBLE SIGNAL
CO Incoming	60 IPM	450hz (modulated) at 15 IPM
Answering	Steady	NONE
Hold	120 IPM	NONE

<sup>2.02</sup> Intercom Line Audible/Visual Supervisory Signals are shown in Table B.

TABLE B Intercom Line Audible/Visual Supervisory Signals

FUNCTION	LAMP	AUDIBLE SIGNAL
Intercom Calling	30 IPM	450hz Dial Tone
Busy Tone	30 IPM	450hz interrupted at 30 IPM
Ringback	30 IPM	450hz (modulated) at 15 IPM
Handsfree Warning	30 IPM	450hz. 1-2 sec.
Answering	Steady	NONE

#### 3.00 Extension Numbering Plan

- a. Standard BT1530 KSU: 11-18, 21-28, 31-38, 41-48 b. BT2250 KSU: 11-18, 21-28, 31-38, 41-48, 51-58, 61-68,

71-78, 81-82

- c. BT1530 KSU Equipped with optional Extension Expansion Circuit (EEX): Same as BT2250 KSU
- POWER SUPPLY SPECIFICATIONS 4.00
- Power Supply PSA-1530-1 Electrical Characteristics shown in 4.01 Table C.

TABLE C
PSA-1530-1 ELECTRICAL CHARACTERISTICS

FUNCTION	VOLTAGE
Input	117 VAC + 10% 50/60hz
Output	+L (LAMP) 24 VDC + 6V @ 6A, Filtered +R (RELAY) 24 VDC + 6V @ 3A, Filtered +P (TALK) 24 VDC + 6V @ 2.5A, Filtered +I (IC) 5VDC + 0.25v @1.2A, Regulated

4.02 Power Supply Fusing for PSA-1530-1 is shown in Table D.

TABLE D
PSA-1530-1 FUSES

FUNCTION	FUSE	DESIGNATION
117 AC Line	5 AMP 3AG SLO BLO	F1
Lamp Battery (+L)	2 AMP 3 AG x4	F2, F3, F4, F5
Relay Battery (+Ŕ)	3A 3AG	F6
Talk Battery (+P)	3A 3 AG	F7
IC Battery (+I)	1.5A 3AG (FAST BLOW	) F8
Regulator Circuit	2A 3AG SLO BLO .	F9

NOTE F9 is located PSA cabinet. Remove top of PSA for service.

4.03 Power Supply PSB-1530-1 (Expansion) Electrical Characteristics are shown in Table E.

TABLE E
PSB-1530-1 ELECTRICAL CHARACTERISTICS

FUNCTION	VOLTAGE
Input	117 VAC + 10%, 50/60HZ
Output	+L (LAMP) 24 VDC + 6V @ 6A, Filtered

4.04 Power Supply Fusing for PSB-1530 is shown in Table F

TABLE F

## PSB-1530-1 FUSES

FUNCTION	FUSE	DESIGNATION
117 AC Line	3 AMP (SLOBLO)3AG	F1
Lamp Vattery(+L)	2 AMP 3AG x4	F2,F3,F4,F5

- 5.00 PREPARATIONS
- 5.01 Prior to installation of the system, preparations should be made to insure a smooth installation process.
- 5.02 The layout of the system should be inspected. A survey of the site should be made to determine: the best location for central equipment; particular hazards or obstructions that could be encountered in installation; location of distribution boxes; cable runs; etc.
- 5.03 A layout drawing of the site should be used with markings indicating: location of the KSU; cable distribution boxes; cable runs; and station equipment location. The layout information should also include extension number designations as well as any special features that apply to the individual extensions i.e. Busy Lamp Field, Call Diverters, etc.
- 5.04 An extension Program Sheet should be prepared for the installer to program the individual extensions to the exact requirement. Specific information should be noted for each extension including CO Line capability and special features or wiring.
- 5.05 An equipment list should be prepared. This list includes all central and station equipment; cable; accessory equipment and special tools/equipment required for the installation process.
- 5.06 Cross-Connect charts should be prepared for the Main Distributor Frame (MDF) as well as for any other distribution boxes in the system. This allows the Installer to program the individual extension cables in minimum amount of time.
- 5.07 All station, central, and accessory equipment should be checked for shipping damage. All equipment should be tested for proper operation prior to installation on the job site.
- 5.08 Extension cables, distribution frame cables and any other wiring should be tagged for immediate identification.
- 6.00 CABLING REQUIREMENTS
- 6.01 Both the BT1530 and BT2250 Key Telephones can utilize 50 pair cable for connection to the MDF and/or Distribution Terminal boxes. No 24 AWG guage wire can be used, the cable normally being the standard U.S. telephone type, utilizing a connector and the standard wire color code.
- READ
  6.02 The "modified cartwheel" or "star" type of cable distribution
  is recommended on site. In this method, Extensions are connected
  to the KSU by either direct home run cables or through Distribution
  Terminal boxes located through the system. Extension cables should not
  be "looped" as this has a tendency to result in cross talk and noise

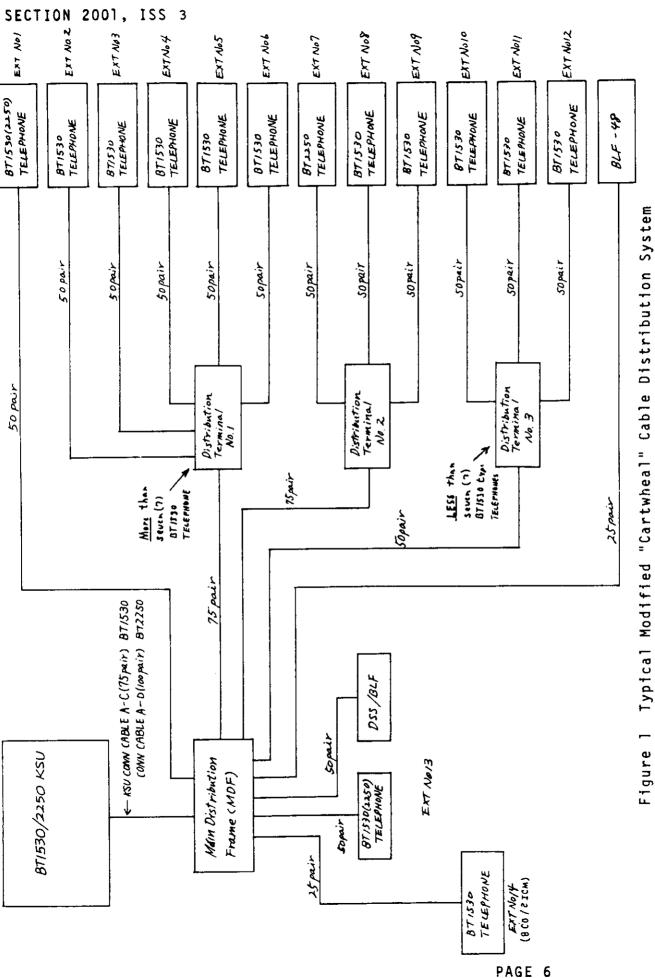
on the system. In cases where Extensions are bridged, adequate spare conductors in the connecting cable should be insured in case of any selective wiring requirement for each extension.

6.03 When Distribution Terminals are utilized, it may be necessary to provide spare conductors in a separate cable (or binder) for connecting the selective wiring functions of each Extension (connected to the Distribution Terminal) to the MDF. Both the BT1530 and BT2250 Telephones have up to five selective wiring functions that are determined by the individual Extension features programmed.

- READ a. The BT2250 Key Telephone contains one (1) spare conductors in the Extension connecting cable. When the BT2250 is connected to a Distribution Terminal, 75 pair cable must be used to connect the Distribution Terminal Box to the MDF due to the buildup of selective wire functions at each Distribution Terminal.
- D. The BT1530 Key Telephone contains twenty-nine (29) spare conductors in the Extension connecting cable when 50 pair telephone cable is used. When a group of BT1530 Key Telephone is connected to a Distribution Terminal, these spares can be assigned to the selective wires so that 50 pair cable may be used to connect the Distribution Terminal to the MDF. However, when more than seven BT1530 Key Telephones or one or more BT2250 Key Telephones (along with the BT1530) are terminated in the same distribution box, an additional 25 pair cable is required for connecting the Distribution Terminal to the MDF. This allows all unused Line Key and optional functions to be installed so that they will be available for future expansion.
- 6.04 In instances where a limited number of CO Lines (Maximum of eight) and no further expansion is required, 25 pair cable can be utilized to connect the BT1530 to the MDF or Distribution Terminal box.

READ

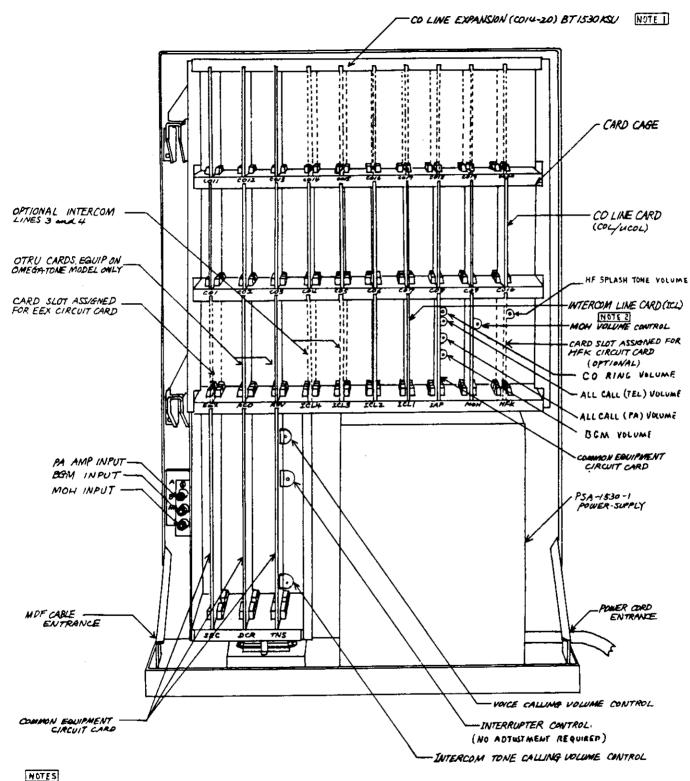
- 6.05 Certain optional system assemblies such as the DSS unit or Busy Lamp Field require separate connecting cables to the MDF. Refer to the installation instructions of the individual assembly to determine the cable requirements.
- 6.06 Figure 1 illustrates a typical "modified cartwheel" distribution system. Shown are typical cable requirements for each feature as well as cable requirements for Distribution Terminals.
  - a. EXT No. 1 illustrates cable requirements when the BT1530/2250 Telephone is connected by a home run to the MDF.



- b. Distribution Terminal No. 1 illustrates the requirement for a 75 pair connecting cable to the MDF when more than seven BT1530 telephones are connected or future expansion is anticipated.
- c. Distribution Terminal No. 2 illustrates the requirement for a 75 pair cable when BT2250 Telephones are connected to a Distribution Terminal.
- d. Distribution Terminal No. 3 illustrates the use of 50 pair cable for connection of a Distribution Terminal to the MDF when a limited number of BT1530 Telephones are connected and no future expansion is anticipated. Associated with Extension No. 12 is a Busy Lamp Field (BLF-48) that requires a 25 pair cable. This cable can be a separate home run to the MDF or can be included in the Distribution Terminal No. 3 connecting cable if 75 pairs are utilized.
- e. Extension No. 13 illustrates a home run connecting cable for both the Extension and associated DSS unit. Both require 50 pair cables. If the DSS unit is associated with an Extension connected to a Distribution Terminal, a separate 50 pair home run is required between the DSS and the MDF.
- f. Extension No. 14 illustrates the connection of a BT1530 Telephone with 25 pair cable when a limited number of CO Lines (eight maximum) is required and no future expansion is anticipated.

#### 7.00 KSU CONSTRUCTION

- 7.01 Figure 2 shows a front view of the BT1530 KSU with its circuit card, PSA-1530 Power Supply, and Terminal(s) placement. The Installer should become familiar with the items described in Figure 2 as they are referred to throughout the Technical Manual.
- 7.02 Figure 3 shows a view of the BT1530 KSU with the card cage open. The various Terminals and Connectors, as noted, are referred to throughout the Technical Manual.



TES!
1. BT-2250KSU is equipped with premired Co14-C020 card slots.

2. Equip for number of Intercom Lines required.

Figure 2 BT 1530 KSU Front View

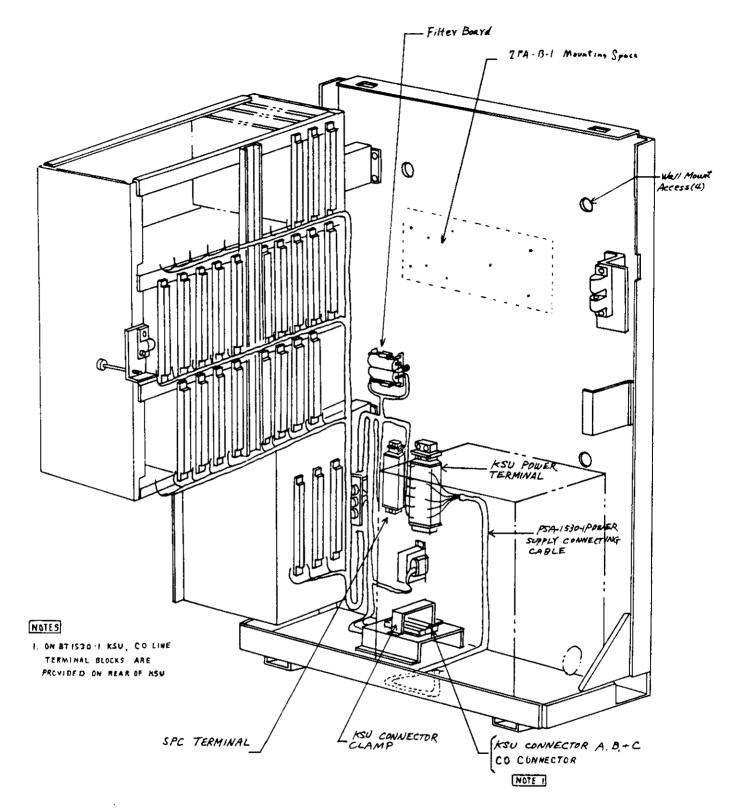


Figure 3 BT 1530 KSU Back Panel View



## 

# BT-1530/2250 KEY TELEPHONE SYSTEM

## KSU INSTALLATION

- 1.00 LOCATING THE KSU
- 1.01 The KSU should be installed in an accessible place with room for associated equipment, terminal blocks and Voice Connection Arrangements (VCA). The area should be dry and exhibit a relatively low, constant temperature. The area should be relatively dust and vibration free, and ventilated. The area should be accessible only to those requiring entrance.
- 1.02 The area should contain a suitable number of electrical outlets for commercial power. A separately fused AC power line should be utilized for all telephone associated equipment.
- 1.03 The KSU and associated equipment should be wall mounted on a suitable backboard. Key hole slots are provided on the rear panel of the KSU for wall mounting.
- 1.04 The KSU can be floor mounted as long as it is mounted on a stand, preventing possible damage from water or mechanical equipment.
- 2.00 POWER SUPPLY INSTALLATION
- 2.01 The PSA-1530 Power Supply is provided as a separate assembly and must be installed in the KSU cabinet. Tapped screw holes are provided on the base of the KSU cabinet to hold the power supply in place.
- 2.02 A GROUND post is provided on the power supply. The Ground Strap from the BT1530 KSU should be connected to the GROUND terminal on the PSA-1530.
- READ DO NOT ATTEMPT TO EARTH GROUND ANY INDIVIDUAL POWER SUPPLY VOLTAGE(S).
- 2.03 A wiring harness is provided to connect the power supply to its associated terminals on the KSU. A Power Terminal Strip is provided on the rear panel of the KSU cabinet. Figure 1 shows the connection of the PSA-1530 Power Supply to the KSU Power Terminal.

- READ

  2.04 DO NOT MAKE ANY CONNECTIONS TO THE KSU POWER TERMINAL WITH
  THE POWER SUPPLY TURNED ON. KEEP THE POWER SUPPLY UNPLUGGED
  WHILE MAKING CONNECTIONS. CHECK THE POWER SWITCH TO MAKE SURE IT
  IS IN THE "OFF" POSITION BEFORE PLUGGING POWER CORD INTO THE AC OUTLET.
- 2.05 Care should be exercised such that no loose objects, wire pieces, etc., fall into the ventilated area of the power supply. As the power supply gets hot during operation, no objects should be left on top of the power supply.

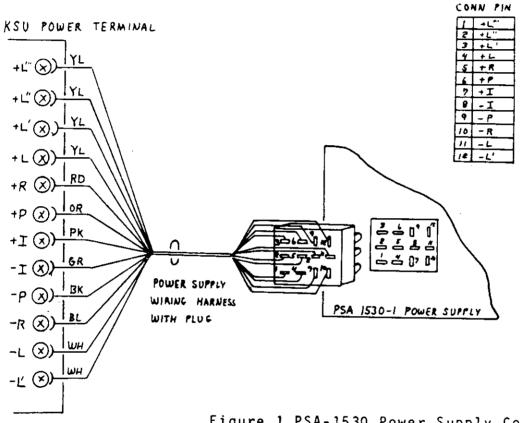


Figure 1 PSA-1530 Power Supply Connection

#### 3.00 GROUNDING

- 3.01 A GROUND post is provided on the KSU cabinet for an Earth ground connection. A cold water pipe or electrical ground rod should be used to establish an Earth ground. If both are unavailable, a heavy copper conductor No. 14 AWG or better should be used to connect to the nearest Earth ground point.
- 3.02 The third conductor of the commercial power cord should not be used to establish the Earth ground. Also, electrical conduit should not be used to establish an Earth ground.

- 3.03 The GROUND post on the PSA-1530 Power Supply is installer connected to the GROUND post on the KSU cabinet with the jumper strap provided
- 3.04 No Earth ground should be derived from associated TELCO equipment or terminations. It is acceptable to utilize same Earth ground point.
- 4.00 KSU CONNECTOR CABLES
- 4.01 Seventy-five pair plug-ended cable is required to connect the standard BT1530 KSU to the MDF. Amphenol connectors for cables A, B and C (1st, 2nd, 3rd binders) are provided on the KSU. Individual male-ended amphenols and No 24 AWG wire may be utilized.
- 4.02 A connector clamp is provided on the KSU to hold the individual Amphenol connectors securely in place.
- 4.03 An additional Amphenol connector (KSU CONN D) is required when the KSU is equipped with the Extension Expansion Card (EEX). An additional 25 pair connecting cable is required. KSU TERMINAL BLOCK D terminates the KSU CONN Cable D. Consult Section 2004, 7.06 for connection of KSU CONN D wiring harness.
- 4.04 Each KSU CONNECTOR cable (or binder) is terminated to a 66 type terminal block, typically a Siemons 66B4-25 or equivalent. Required loop connections are made to associated blocks to conserve terminals for attachment to branch (or extension) cables. Two individual conductors should not be terminated on the same 66 block terminal clip. Figure 2 illustrates a typical MDF Terminal Block Arrangement.
- 4.05 Table A illustrates KSU CONN CABLE A,B, and C conductor and terminal designations.
- READ IT SHOULD BE NOTED THAT CABLE (BINDERS) A & B, ALTHOUGH SIMILAR IN SOME RESPECTS, DIFFER FROM THE STATION EQUIPMENT TAIL (DROP) CABLE. A STATION TAIL CABLE SHOULD NOT BE PLUGGED DIRECTLY INTO THE KSU AMPHENOL CONNECTORS WITHOUT AN ADAPTER ARRANGEMENT.
- 4.06 Terminal designations used for each CO Line Function are:

T.....Tip (Voice) of CO Line R.....Ring (Voice) of CO Line

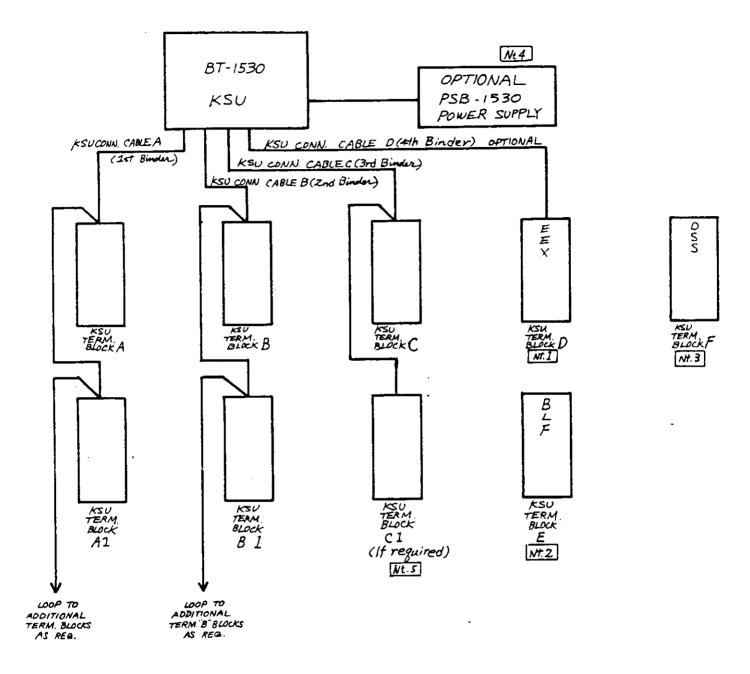
H.....Hold (Control) of CO Line

L....Lamp (Control) of CO Line

- 4.07 Terminal designations used for each Intercom Line Function are:
  - Pl....Tip (Voice) of Intercom Line
  - P2....Ring (Voice) of Intercom Line

P3....Control of Intercom Line

P4...Lamp (Control) of Intercom Line



#### NOTES

- NI.1. Standard on BT2250 KSU, Optional on BT1530 KSU when equipped with EEX.
- N1.2. Required when BLF-B or DSS-1 is equipped.

  Refer to Section 2007; 2.00-3.00 for terminal assignment.
- Nt.3. Required when DSS-1 is equipped. Refer to Section 2007; 3.00 for terminal assignment.
- Nt.4. Required when system extension capacity exceeds thirty-two (32).
- NES Required if ICM3/ICM4 is equipped.

Figure 2 Typical MDF Terminal Block Arrangement

BT 1530 KSU CONN CABLE A, B, and C Terminal Designation and Assignment TABLE A

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4.08 Terminal designations used for Common Functions are:

←P ....Talk Battery ←R ....Relay Battery ←D ....+Lamp Battery

PB.....Page (All Call) Key Control

BO.....Common Incoming CO Ring Audible

BN....All Call (Night Service)

Bl-B5.. Individual Incoming CO Ring Audible

BA.....All Call

HFa....Handsfree Input

Z.....Extension Dial Code Assignment TR....Night Service Transfer Control

- 4.09 KSU TERMINAL BLOCKS A and B terminate CO and Intercom Line multiples as well as common control and battery functions. Terminations are assigned on KSU TERMINAL BLOCK B for the full twenty (20) CO Lines (CO 14 to CO 20) capacity in event the standard BT1530 KSU CO Line.capacity is expanded.
- 4.10 KSU CONN CABLE A and B should be looped from KSU TERMINAL BLOCK A and B to KSU TERMINAL BLOCKS Al and Bl to provide an adequate number of terminals for all extensions (or branch) cables. Additional KSU TERMINAL BLOCKS A and B can be added as required. LAMP BATTERY (+L) FEEDS SHOULD NOT BE LOOPED FROM KSU TERMINAL BLOCK A TO KSU TERMINAL BLOCK Al.
- 4.]] Figure 3 illustrates Lamp and Relay Battery distribution for the standard BT1530 at the KSU TERMINAL BLOCKS. KSU CONN CABLE A and C provide Lamp Battery (L) feeds. The Lamp Battery feeds should be evenly distributed among the extension (branch) connections.
- READ NO MORE THAN FOUR (4) INDIVIDUAL EXTENSION LAMP BATTERY +D LEADS SHOULD BE CONNECTED TO EACH KSU LAMP BATTERY +D FEED.
- 4.12 Lamp Battery (+1) terminations appearing on KSU TERMINAL BLOCK A should not be looped to KSU TERMINAL BLOCK Al. For convenience it is suggested that Lamp Battery (+1) terminations appearing on KSU TERMINAL BLOCK C be strapped to KSU TERMINAL BLOCK Al. This allows for easier routing and termination of extension (branch) cable Lamp Battery (+1) leads.
- 4.13 For Lamp Battery (L) distribution when KSU CONN D and PSB-1530 is equipped (BT 2250 KSU) refer to Section 2004; 7.12-13, 8.00 INSTALLATION OF OPTIONAL KSU ASSEMBLIES.
- 4.14 KSU TERMINAL BLOCK E is assigned for termination of the extension Busy Lamp Field (BLF) leads. Refer to Installation-Optional System Equipment for instruction on connection of Busy Lamp Field.

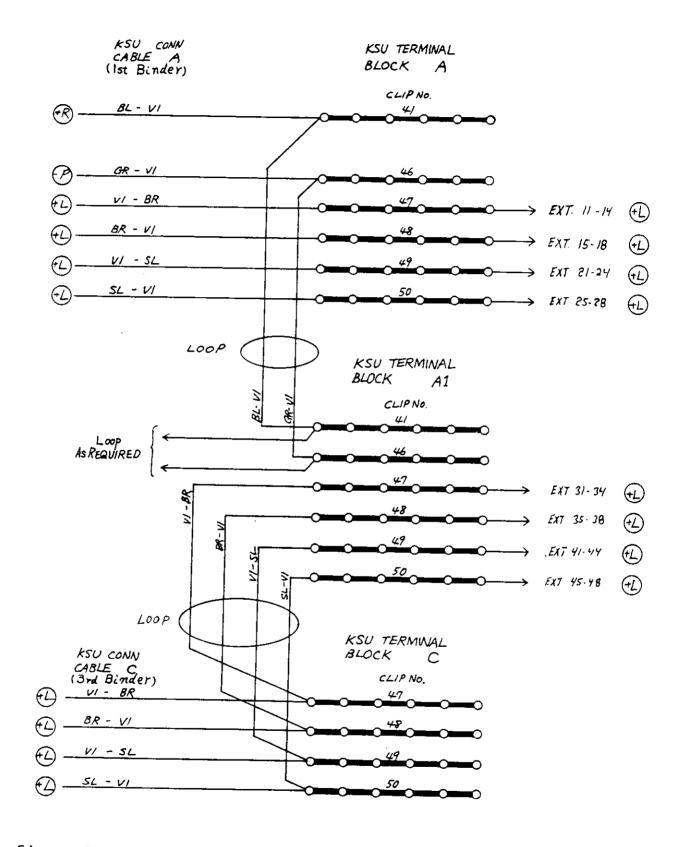
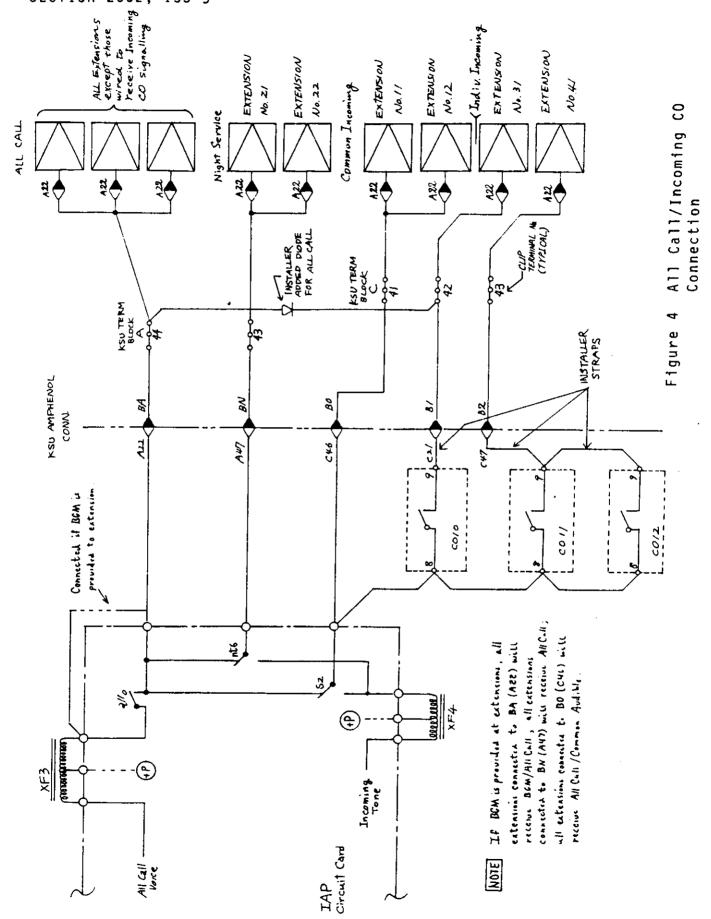


Figure 3 Lamp/Relay Battery Distribution at the MDF

- 4.15 KSU TERMINAL BLOCK F is assigned for termination of the optional Direct Station Selection (DSS) Unit. Refer to Installation-Optional System Equipment for instruction on connection of DSS Unit.
- 4.16 Optional Intercom Lines No. 3 and 4 appear on KSU TERMINAL BLOCK C. If they are being equipped, loop connections to KSU TERMINAL BLOCK C1 is required to insure adequate terminal clips for all extension (branch) cables. C0 Lines 12 and 13 for the standard BT1530 KSU or C0 Lines 19 and 20 of the C0 Line Extension for the BT2250 Telephone should be left connected at KSU TERMINAL BLOCK B (B1) as they can be used to provide private lines, special features, etc.
- 5.00 EXTENSION INTERCOM DIAL CODE NUMBER ASSIGNMENT
- 5.01 KSU TERMINAL BLOCK C provides "Z" connections for the standard BT1530 KSU Intercom extension capacity. Refer to Table A, KSU CONNECTOR C for specific Intercom dial codes and terminal assignments.
- 5.02 Individual "Z" leads of extension (branch) cables are cross connected to the KSU "Z" leads on KSU TERMINAL BLOCK C for assignment of Intercom dial codes.

## READ

- 5.03 If the system is equipped with both HF Talkback and DSS Call Announcing, refer to Section 2007 for details regarding assignment of dial codes for HF extensions.
- 6.00 INCOMING CO AUDIBLE RING DISTRIBUTION
- 6.01 Provision is made on the standard BT1530 KSU for Common CO Audible Indication (Day Connection), Night Service or Audible Signal Transfer, or installer programming of the Individual CO Line Incoming Audible signal for selected extensions in the system.
- 6.02 All connections are made to the individual extension "B" lead for enabling CO Line audible at the extension. Figure 4 shows typical connections of the extension "B" lead for various configurations.
- 6.03 A volume control marked "INCOMING" is provided on the IAP circuit card for control of Incoming CO Audible Signal tone levels.
- 6.04 Provision is made for "All Call" at each extension to receive CO Incoming Ringudible. If both occur simultaneously, CO ring indication has priority and the "All Call" signal is preempted.
- 6.05 Common Incoming COudible Signal (Day Connection)
  - a. When a Common Incoming CO Audible signal for all CO Lines is required, the "BO" lead (KSU TERMINAL BLOCK C) is connected to the extension(s) "B" lead that is to receive Incoming CO Line ring indication.
  - b. Figure 4 shows extensions No. 11 and 12 wired to receive the Common Audible CO Incoming ring signal.



## 6.06 Common Incoming Audible Signal (Night Connection)

- a. When a common audible signal for all CO Lines is required for Night Service (or peak hours, breaks, etc.), the "B" lead of extensions that are to receive the CO ringing indication during Night Service is connected to the "BN" lead at KSU TERMINAL BLOCK A.
- b. All extensions equipped for Night Service will receive All Call as standard during regular service. During the transfer condition, All Call will be preempted during the CO ringing interval if both occur simultaneously.
- c. Figure 4 shows extension No. 21 and 22 connected for Night Service operation.
- d. Refer to Section 2005; 8.04 for arranging the Extension TRANS (TRANSFER) Key to make Night Service operational.
- e. The Night Transfer Control Extension(s) TRS lead (EXTEN-SION CONN A46) is connected to TR on KSU TERMINAL BLOCK A to operate the Night Transfer.

## 6.07 Individual (Group) CO Incoming Audible Signal

- a. Five (5) Individual CO Incoming Audible signal indications are available on the standard BT1530 KSU. Up to fourteen (14) Individual Audible signals are available when the KSU is equipped with the optional KSU CONNECTOR D.
- b. Each Individual CO Line Audible is installer programmed to meet individual (or group) Incoming CO Audible Signaling requirements by connection of the Individual CO Line Signal "B" lead (B1-B5 on the BT1530 KSU) to the individual CO Line(s) assigned. Connections are made at the individual CO Line card PCC connectors wire wrap TERMINAL No. 9 to the selected B1-B5 function lead(s) (KSU TERMINAL BLOCK C). CO Lines are grouped together by looping the card connector TERMINAL No. 9 of each CO Line that is to form a group and then connecting to an available B1-B5 lead of KSU CONNECTOR CABLE C (BT1530 KSU) or B6-B15 lead on KSU CONNECTOR CABLE D (when equipped).
- c. The Individual Siganl leads B1-B5 of KSU CONN CABLE C are located bundled on the hinged side of the card cage. The wire straps are of sufficient length for connection to the individual CO Line card connectors. TABLE B lists the conductor colors for the Individual CO Signal control leads of the standard BT1530 KSU and optional equipped KSU CONN D.

TABLE B

INDIVIDUAL CO INCOMING AUDIBLE KSU HARNESS WIRE COLOR

FUNCTION	WIRE COLOR	LOCATION
B1	BR-WH	CONN C21
B2	OR-WH	C47
В3	SL-WH	C22
B 4	GR-WH	C48
B 5	RD-WH	C23
В6	BL-WH	CONN D39
B7 P	RD-WH	D14
B8 T	OR-WH	D40
B9 I	BK-WH	D15
B10 N	GR-WH	D41
B11 A	PK-WH	D16
B12 L	BR-WH	D42
B13	YL-WH	D17
B14_	SL-WH	D43

- d. When Individual CO Line Incoming ringing is utilized. the Common Audible signal control lead "BO" can still be used. However, both the Common CO Line Audible and Individual CO Line Audible will operate when an incoming call is received on the CO Line wired for individual signalling. If this condition cannot be tolerated, one of the five Individual Audible control leads must be installer wired as a Common Audible function, omitting all CO Lines programmed to ring individually or in selected groups.
- e. Figure 4 illustrates Extension No. 31 programmed to receive Individual CO Line Incoming Audible from CO Line 10, while Extension No. 41 is wired to receive Individual CO Line Audible from CO Lines 12 and 13.

- f. Any extension wired to receive Individual (or group) Incoming CO Audible Signal (Bl, B2, etc.) can receive All Call by diode connection of the Bl-B5 to the All Call (BA) control lead. Figure 4 illustrates a typical arrangement where Extension No. 31 is wired to receive Individual CO Incoming (Bl) and All Call while Extension No. 41 will receive Individual CO Incoming (B2) and no All Call.
- g. All extensions programmed to receive Individual CO Line Audible will receive All Call in a normal manner except when the programmed CO Line Audible and All Call occur simultaneously. At that time, the All Call will be preempted and only CO audible heard.

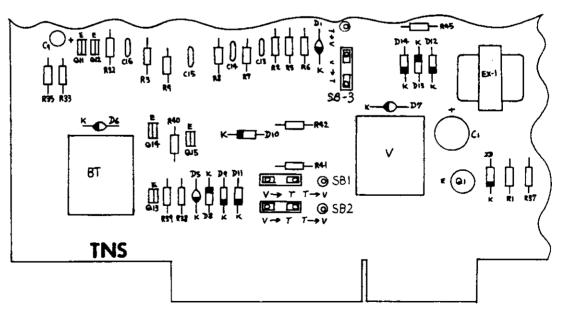
#### 7.00 ALL CALL/PA CONNECTION

- 7.01 The All Call function and PA Connection operate simultaneously when the Extension PAGE Key is pressed. The All Call function requires no additional amplification while the PA function requires a separate PA Amplifier, the rating determined by the system speaker load requirements.
- 7.02 The All Call control lead "BA" (KSU TERMINAL BLOCK A) is connected to the individual "B" lead of all extensions that will receive All Call. The All Call volume control, located on the front of the IAP circuit card, controls All Call and voice page levels.
- 7.03 Extensions wired for "Common CO Incoming Audible Signal" (BO) or "Night Connection (BN) are automatically connected to the All Call function.
- 7.04 Standard "Phono" jack audio connectors are provided to connect the Public Address/Music functions to the KSU. Standard "Phono" plugs such as the Switchcraft type 3502 can be used to connect to the PA Amp/Music Input.
- 7.05 Any standard Public Address Amplifier can be used. Connections are made to the PHONO or AUX input (10-20K ohm) on the Public Address (PA) Amplifier. The IAP circuit card PA connection is normally supplied with a transformer output connected for 10k ohm impedance. A low impedance (600 ohms) output is available by Installer strapping wire wrap TERMINALS 8A and 9A on the IAP Printed Circuit Card PC Connector.
- 7.06 A separate Music Source connection is provided with an individual Volume control to connect Background Music to the PA system. During the All Call interval, the Music automatically cuts off and only the voice page is heard through the PA system. Any standard FM Tuner or Tape Deck high impedance output can be connected to the Music Source connection on the KSU. If the BGM input is not used, the BGM volume control on the IAP circuit card should be turned OFF to eliminate possible hum on the PA system.

## READ

- 7.07 Refer to Paragraph 8.05 for connection of All Call functions when BGM is connected to individual extension speakers.
- 7.08 Spare relay contacts are available for connection of auxiliary relays for control of external speakers during the music or paging interval. Connections are made at the assigned terminals on the SPC Terminal.

  Refer to the SPC on the Condensed System Drawing No. 1 for relay contact location.
- 8.00 INSTALLER OPTIONS
- 8.01 Tone/Voice Calling Dial Access Priority
  - a. The operation of Tone or Voice Calling on Intercom can be arranged for individual system preference.
  - b. The KSU is factory supplied with Tone Calling standard after dialing two digit extension codes. Voice Calling is accessed by dialing any digit after the Extension dial code.
  - c. To reverse operation, Strapping Options SBI-SB3 are supplied on the TNS circuit card.
  - d. Figure 5 illustrates Strapping Options SB1-SB3 location on TNS circuit card for Voice-Tone calling assignment.



Note. Voice Calling Two Digit Access shown,
For Tome Calling, short T + V at SBI and SB2 (SB3 for HF systems)

Figure 5 Tone/Voice Dial Access Strapping Option SB1-SB3 on TNS Circuit Card

e. Strapping Option SB3 on the TNS circuit card is used when the optional KSU Handsfree Amplifier (HFK) circuit is equipped. Refer to SECTION 2004, Installation of Optional KSU Assemblies for instructions on arranging SB3.

#### 8.02 Intercom Time Out

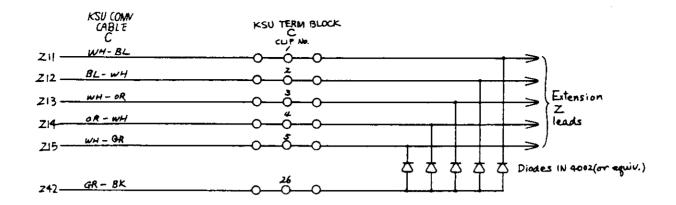
- a. During an Intercom call, a "Time-Out" function limits the Voice or Tone signalling duration to a maximum of 20 or 40 seconds. Connect SHORTING BAR on DCR card for desired time limit.
- b. The "Time-Out" can be disabled by cutting a wire strap at DCR circuit card PC connector TERMINAL 27a.

#### 8.03 Group Calling (Pre-Set Conference)

- a. A pre-determined group of extensions can be dialed on the Intercom circuit utilizing a two digit dial code. Tone or Voice calling can be used to signal the group of extensions.
- b. The number of extensions to be called simultaneously should not exceed five (5). There is no limit to the number of individual groups in a system other than the availability of individual dial codes for each group.
- c. No special circuit cards or KSU modification are required for programming extensions for group calling. All programming is accomplished on KSU TERMINAL BLOCK C (and D if system is so equipped) by strapping "Z" leads through Diodes to the specific group calling two digit access code "Z" lead.
- d. Figure 6 illustrates a typical group calling arrangement. Polarity of the Diodes must be observed. Diodes equivalent to a 1N4002 may be utilized for strapping the "Z" leads.

READ

e. IF AN EXTENSION ARRANGED FOR GROUP CALLING DIALS THE EXTENSION NUMBER ASSIGNED TO THE SAME GROUP, THE INTERCOM REGISTER RELEASES AFTER COMPLETION OF DIALING THE "GROUP CALL" NUMBER. THIS IS DUE TO THE OFF HOOK INDICATION OF THE CALLING EXTENSION DETECTED BY THE REGISTER. TO PREVENT THIS OCCURENCE, SPECIAL WIRING IS REQUIRED. CONSULT THE IAI ENGINEERING DEPARTMENT FOR APPLICATION ASSISTANCE.



Note: Z 42 assigned to Group Call Ext. 11-15

Figure 6 Typical Group Calling Arrangement

### 8.04 POWER FAILURE OPERATION

- a. Line Bells (ringers) can be installed for Incoming CO Line ringing indication during local power failure conditions. Connection of the individual line bells are made at the BT-BR terminals of each CO Line to be equipped.
- b. The CO Line BT-BR Terminations are located on Terminals 10-14 of each CO Line PC connector. Wire wrap connections should be used to connect the bells (ringers) to the individual CO Line card connectors. Care should be exercised to insure proper routing of connecting cables within the KSU cabinet to prevent damage when the equipment is closed.
- c. Bells (ringers) utilized should contain an integral line coupling capacitor for isolation of line talk battery from the bell (ringer) coils. Ringers such as the standard station C4A type or ITT type 148 require external capacitors while ITT type 136, 137 and 139 can be connected directly.
- d. When Direct Connection of CO Lines is used, the line bells (ringers) are powered by the telephone line itself.
- e. When the BELL STC and STP Voice Connecting Arrangements (VCA) are used for CO Line connections, the VCA supplies power to the bells (ringers) only if the VCA power supply is unaffected by commercial power failure or standby batteries are used to power the VCA when commercial power disruption occurs.

- f. When the BELL CD-9/C2A-CP Voice Connection Arrangement is used, DC bells (ringers) must be used since the CD-9/C2A normally supplies direct ringing. Becuase of the current requirements, inductive effects, and availability of a DC ringer, it is recommended that the STC or STP type Voice Connection Arrangement be utilized in event of the Line Bell (ringer) requirement.
- g. Figure 7 illustrates the Line Bell connection and operating circuit. Note that the connection of the Line Bell is automatic when local Relay Battery +R fails during power failure due to the release of RELAY T on the COL (UCOL) circuit card.

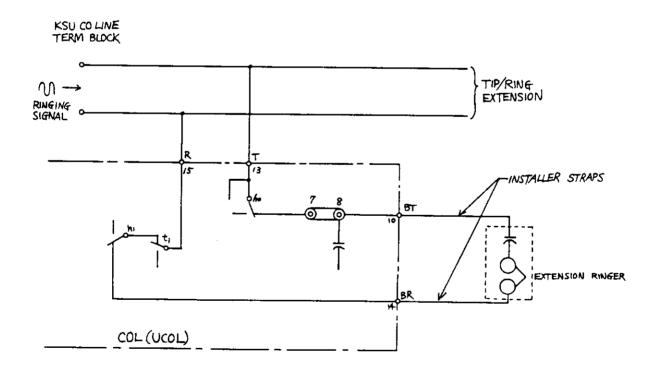


Figure 7 Line Bell Connection and Operating Circuit

### 8.05 BGM through Extension Speakers

- a. BGM can be provided to any individual extension, group of extensions or an entire system on an installer option basis. A BGM source with a high impedance (low level) output is connected to the BGM input on the KSU. This input serves both as the input for the BGM through the extension speakers as well as the local PA system (if equipped). The BGM Volume Control on the IAP circuit card serves as the master control for both functions.
- b. When BGM is installed in a system with individual extension speakers to be connected, Installer straps are required on the IAP circuit card connector as shown on Figure 8.

## NOTES

- 1. Connect BM to all extensions with BGM/All Call
- 2. Connect BN to all extensions with All Call only.

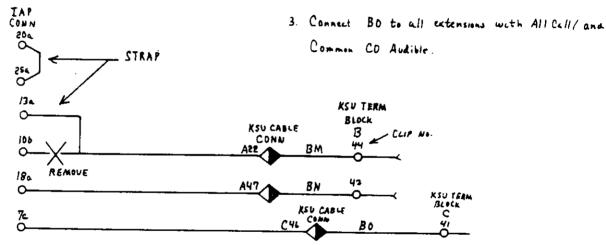
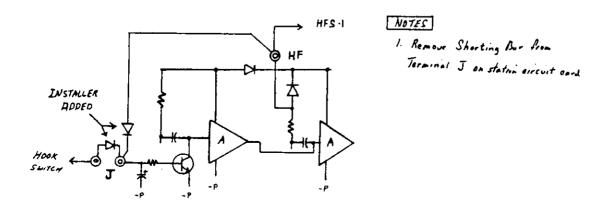


FIGURE 8 IAP Card Connector Strap Requirements for BGM.

READ c. All extensions that will be programmed to receive BGM/All Call must have its "B" lead A22 connected to the BM (formerly BA) of the KSU CONN TERM BLOCK A (A22). All extensions that will receive All Call only are connected in multiple to BN (A47) of KSU TERM BLOCK A.

- READ d. The "B" lead of the extension(s) to receive Common Bell (Incoming CO) and All Call are connected to "BO" on KSU TERM BLOCK C on the MDF. Since the hookswitch cutoff of the extension "B" function affects the Incoming CO Audible at the extension, the SHORTING BAR "J" on the extension circuit card must be removed when the extension is wired for Incoming CO Audible. Therefore it is recommended that these extensions not be wired to receive BGM as the BGM will not cut off when the station is off-hook.
- READ e. If an extension is arranged for Individual Incoming CO Audible and nequires All Call, the Individual CO Signal card (B1...) is connected through a diode to BN rather than BA as shown in Paragraph 6.07 of this section. As with extensions that receive the Common Bell (BO), the Shorting Bar "J" must be removed at the extension and BGM not connected.
  - f. If BGM is provided to the extension speakers and is not required through an existing PA system, remove the strap between TERMINAL 14A and 20A on the IAP card connector and strap TERMINAL 14A to 26 A on the IAP card connector to short the PA input in the idle condition.
- READ g. If Night Service is equipped, refer to Section 2005, Paragraph 8.05 rather than Section 2002 Paragraph 6.06 when BGM through the extension speaker is provided. This is required since "BN" which is normally used for Night Service is utilized for All Call only station. If all stations that receive All Call only will ring during Night Service, the instructions in Section 2002 Paragraph 6.06 can be followed.
- READ h. If BGM is provided an extension that is equipped with a a station HF Talkback unit, interference will result in HF ICM calls to the extension unless modified as shown in Figure 9.



## 

# BT-1530/2250 KEY TELEPHONE SYSTEM

## CO LINE CONNECTION

- 1.00 GENERAL
- 1.01 The OMEGA-PHONE II KTS provides for connection to CO Lines through various configurations. Prior to June 1, 1978, systems were either DIRECT CONNECTED by local telephone operating companies or connected behind TELCO Voice Protective Arrangements (VCA's) by distributors of telephone interconnect equipment. Provision was made for connection behind the TELCO STP, STC, and CD-9/C2ACP Voice Connection Arrangements. However, due to the April release of the FCC Third Report and Order, effective June 1, 1978, systems can be DIRECT CONNECTED providing certain requirements are met.
- 1.02 Two methods are provided to connect the CO Lines to the BT 1530 KSU. For the BT 1530-1 KSU, 66E type (punch type) terminals are provided for connection of CO line functions while a ribbon connector (amphenol) is provided on BT 1530-3 KSU's in order to comply with subsequent FCC registration.
  - a. For BT 1530-1 KSU's, four (4) terminals are provided for each CO Line appearance. The designations used are: CT, CR, CS, and C2. These terminals are used either for DIRECT CONNECTION or connection behind a TELCO STP and STC type VCA. The use of the TELCO C2A/CD-9 type VCA requires two (2) addition terminals (C1 and CG) that are connected in multiple to all CO Lines.
  - b. The revised BT 1530-3 KSU uses a ribbon connector (amphenol) to connect the CO Line circuits in place of the 66E type terminals on the BT 1530-1 KSU (Ref. ENG. BULLETIN 78-010). The CO line ribbon connector is located on the base of the KSU along with the connectors for the MDF wiring. The CO Line connector is labeled as "CO". Connection of the BT 1530-3 KSU to the CO Line circuits are accomplished in accordance with TABLE A.

BT 1530-3 CO LINE RIBBON CONNECTOR WIRING										
CO LINE #	CO CONN PIN NO.	CO CONN WIRE COLOR	KSU HARNESS COLOR							
1 T 1 R 2 T 2 R 3 T 3 R 4 T 4 R 5 T 5 R 6 T 6 R 7 T 8 R 9 T	26 1 27 2 28 3 29 4 30 5 31 6 32 7 33 8	WH/BL BL/WH WH/OR OR/WH WH/GR GR/WH WH/BR BR/WH WH/SL SL/WH RD/BL BL/RD RD/OR OR/RD RD/GR GR/RD RD/BR	OR OR/WH GR GR/WH BR BR/WH RD RD/WH BL BL/WH OR OR/WH GR GR/WH GR GR/WH BR							
9R 10T 10R 11T 11R 12T 12R 13T 13R 14T 14R	9 35 10 36 11 37 12 38 13 39	BR/RD RD/SL SL/RD BK/BL BL/BK BK/OR OR/BK BK/GR GR/BK BK/BR BR/BK	RD/WH BL BL/WH OR OR/WH GR GR/WH BR BR/WH RD RD/WH							
15T 15R 16T 16R 17T 17R 18T 18T 19T 19R 20T 20R	40 15 41 16 42 17 43 18 44 19 45 20	BK/SL BK/SL SL/BK YL/BL BL/YL YL/OR OR/YL YL/GR GR/YL YL/BR BR/YL YL/SL SL/YL	BL BL/WH OR OR/WH GR GR/WH BR BR/WH RD RD/WH BL BL/WH							

- 2.00 DIRECT CONNECTION TO CO LINES
- 2.01 For DIRECT CONNECTION to CO lines, either the standard COL or universal UCOL CO line card can be used with the BT 1530-1 (-3) KSU.
- READ The DIRECT CONNECTION of these line cards to the TELCO CO Line circuits if performed by any person other than an installer (agent) of the TELCO requires procedures outlined in the FCC Third Report and Order. ENGINEERING BULLETIN 78-013 should be referred to by Installation Supervisors or Installers (if the same person) prior to DIRECT CONNECTION to the CO lines.
- [READ] The DIRECT CONNECTION of CO lines to the BT 1530-1 KSU whereby 66E type terminals are utilized for the cable connection between TELCO and the KSU can be utilized only until July 79 (as amended) All subsequent installations must use FCC registered equipment that uses a ribbon connector and registered cable for connection between TELCO and the BT 1530 KSU (Ref. ENG BULLETIN 78-013).
- 2.02 DIRECT CONNECTION of CO Lines using the COL/UCOL type CO Line Card
  - a. Both the COL/UCOL type line card are factory wired for DIRECT CONNECTION. It is recommended that the strapping options of each card be inspected before each card is placed in service. FIGURE 1 illustrates the correct strapping option on the COL/UCOL circuit card for DIRECT CONNECTION using bridged ringing.

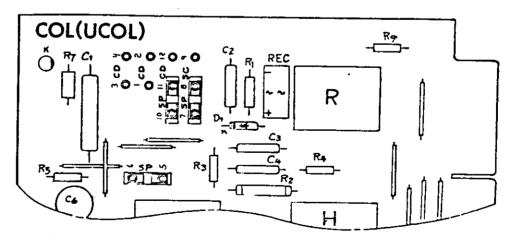


Figure 1 Strapping Option on COL (UCOL) Circuit Card for Direct Connection of CO Lines

b. Figure 2 illustrates the CO Line circuit when DIRECT CONNECTION is utilized.

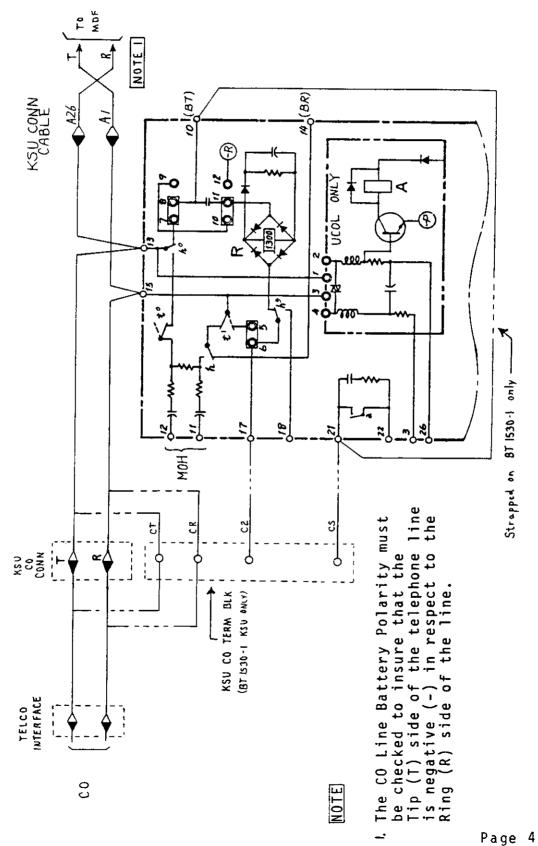


Figure 2 CO Line Circuit - Direct Connection

- c. Connection to the local network CO lines are accomplished by use of the TELCO (USOC Code) type RJ2IX connecting arrangement. This consists of a female 25 pair ribbon (amphenol) connector which provides for up to 25 CO line circuits. This connector will be installed within twenty-five (25) feet of the KSU. The RJ2IX connector should be connected by a cable directly to the KSU to eliminate any possible harm to the network.
  - When utilizing the BT 1530-1 KSU, the connecting cable between the network interface connector (RJ2IX) is punched down on the KSU CO TERM BLOCKS A-C.
  - When utilizing the BT 1530-3 KSU, the connecting cable between the RJ2IX and KSU is plugged in the ribbon connector (amphenol) labeled CO on the KSU.
- READ Until the BT 1530 KSU is FCC registered, the connecting cable between the KSU and the network interface (RJ2IX) can be supplied and made up by the local distributor. After the system is registered, the cable becomes a part of the registered equipment and is either supplied or specified as to type by the manufacturer.
  - d. When using the TELCO RJ2IX, the arrangement of the CO Lines (line number, type of service, etc.) must be specified at time of request for service. Rearrangement of the lines can be accomplished on the MDF (EXTENSION) side of the KSU.
- READ The above procedures are to be followed in accordance with the rules/regulations concerning DIRECT CONNECTION outlined in ENG BULLETIN 78-013.
  - e. When utilizing the COL/UCOL type line card, the polarity of the line circuit must be such that the TIP side of the line is negative in respect to the RING side of the line. This polarity is opposite to that supplied on the TELCO network interface in that the TIP side of the line is normally GROUND (+) and the RING is BATTERY (-) potential. To determine whether the polarity is correct, a BT 1530/2250 telephone or VOM can be used.

- If a VOM is used, the DC volt scale grater than 50 volts must be used. The POS lead of the meter is connected to the TIP side and NEG lead connected to the RING side of the CO Line on the MDF (EXTENSION) side of the KSU. If the meter reads reverse polarity, transpose Tip/Ring connections on the KSU Conn cable for the respective CO line.
- If a telephone (rotary or tone) is used, attempt to break CO dial tone. If dial tone remains after dialing a digit, reverse the Tip/Ring connections on the KSU CONN CABLE at the MDF for the respective CO line.

When DIRECT CONNECTION is used on certain types of CO exchanges that reverse battery before completion of dialing (e.g. a toll call on some step by step exchanges, a polarity guard must be installed between the KSU and CO line appearance of the extensions. The polarity guard is also required when TRUNK CONFERENCING (Ref SECTION 2005, Para. 9.04) is utilized with CO exchanges that reverse battery after completion of dialing and retain battery on incoming calls. FIGURE 3 illustrates connection of the line polarity guard.

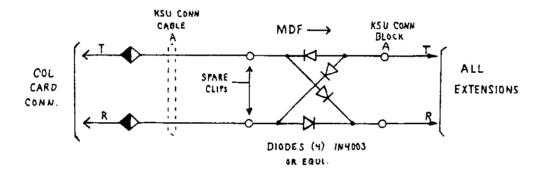


Figure 3 CO Line Polarity Guard

2.03 DIRECT CONNECTION to CO lines utilizing the COL-2 line card.

READ The following information applies to FCC Registered equipment only. The COL-2 line card must be installed in accordance with FCC requirements governing equipment that incorporates "protective circuitry" (Ref. ENG BULLETIN 78-013). An ENG BULLETIN will be issued when the COL-2 is available and authorized for DIRECT CONNECTION by the FCC.

a. The COL-2 line card is a new line card developed for OMEGA II KTS incorporating "protective circuitry" as defined by FCC rules/regulations concerning DIRECT CONNECTION. The COL-2 line card provides transformer isolation between the network interface and OMEGA II KTS. Local system battery is used for talk supply on the extension voice circuit. Direct ringing is used for CO incoming signalling, no 20-30 hz ringing is available on the equipment side of the isolation transformer. CO incoming signalling by means of loud ringing bells or similar devices will be covered under an APPLICATION BULLETIN.

READ

- b. The COL-2 cannot be installed in the FCC Registered BT 1530-3 KSU until two (2) installer straps are made on each CO Line card connector.
  - The installer must remove one connection on pin 13 and pin 15 on the CO line card connector that is a part of KSU CONN CABLE A (and/or B) wire harness and strap the wire to pin 18 and pin 17 (respectfully) of the connector.
  - Table B indicates the wire color coding for each CO line card connector that must be installer strapped.
- c. Connection to the TELCO network interface is made through a cable assembly that is registered as a part of the OMEGA II system. This connectorized cable is used with the TELCO type (USOC CODE) RJ2IX standard connector. No terminal blocks can be used between the RJ2IX unless they are registered with the FCC as part of the system. Since rearrangement of the CO lines can be accomplished on the MDF (station) side of the KSU, no cross-connect blocks will be initially registered as part of the OMEGA KTS. Any subsequent registration will be announced by an ENG BULLETIN.
- d. Figure 4 illustrates the CO line circuit when the COL-2 is DIRECT CONNECTED.
- e. In event of power failure, the BT 1530/2250 extensions cannot initiate or receive CO Line calls unless telephone instruments are provided on the TELCO side of the isolation transformer in the COL-2. The telephone instruments for use during power failure can either be TELCO or customer provided. If customer provided instruments are used, the telephones should be FCC registered and connected to the CO by modular jacks or any other standard means of connection.

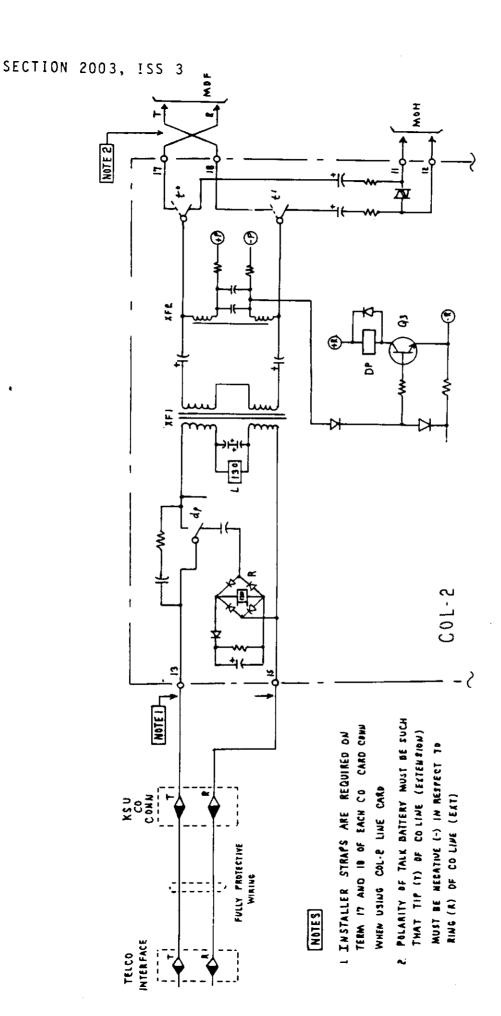


Figure 4 COL-2 CO Line Circuit

TABLE B

					(	0 0	CONNECTOR	WIRIN	V G					
co	(1)		BL/WH	CO	(6)		BL BL/WH	CO	(11)13 15	BL BL/WH	CO	(16)		GR /GR/W
СО	(2)	13 ( 15 (	OR OR/WH	CO	(7)		OR OR/WH	со	(12)13 15	OR OR/WH	со	(17)		BR BR/W
СО	(3)	13 ( 15 (	GR GR/WH	CO	(8)		OR GR/WH	co	(13)13 15	GR GR/WH	со	(18)		RD RD/W
СО	(4)		BR BR/WH	CO	(9)		BR BR/WH	СО	(14)13 15	BL BL/WH	со	(19)	13 15	BL/W
СО	(5)		RD RD/WH	CO	(10		OR RD/WH	CO		OR OR/WH	CO	(20)		OR OR/W

- 3.00 CONNECTION TO CO LINES USING VCA's
- NOTE Although it is anticipated that OMEGA II KTS will be installed using the DIRECT CONNECTION procedures, the following information is provided for maintenance of system installed using VCA's that are either TELCO or customer owned.
- 3.01 Connect of CO Line to TELCO type STP Voice Connection Arrangement
  - a. The standard COL or universal UCOL CO line card can be used for connection to the STP type VCA. Connection to the individual CO Line VCA is similar to DIRECT CONNECTION in that TIP/RING of each line circuit is cross connected to the respective VCA.
  - b. Both the COL and UCOL CO Line card are factory strapped for STP operation. It is recommended that the installer check the strap options by referring to FIGURE 1 of this section.
  - c. When using the BT 1530-1 KSU, the installer cross connects the STP circuit CT/CR to the respective CT/CR connection on the punch black type CO LINE TERMINAL BLOCK on the rear of the KSU. If the BT 1530-3 KSU is used, the installer connects the STP CT/CR pair through an amphenol ended cable to the KSU in accordance with TABLE A of this section.
  - d. FIGURE 5 illustrates the CO line circuit when the TELCO type STP Voice Connection Arrangement is used.
- READ e. When using the STP type VCA, the installer must reverse the TIP/RING connections of each CO Line at the KSU in order to break dial tone.

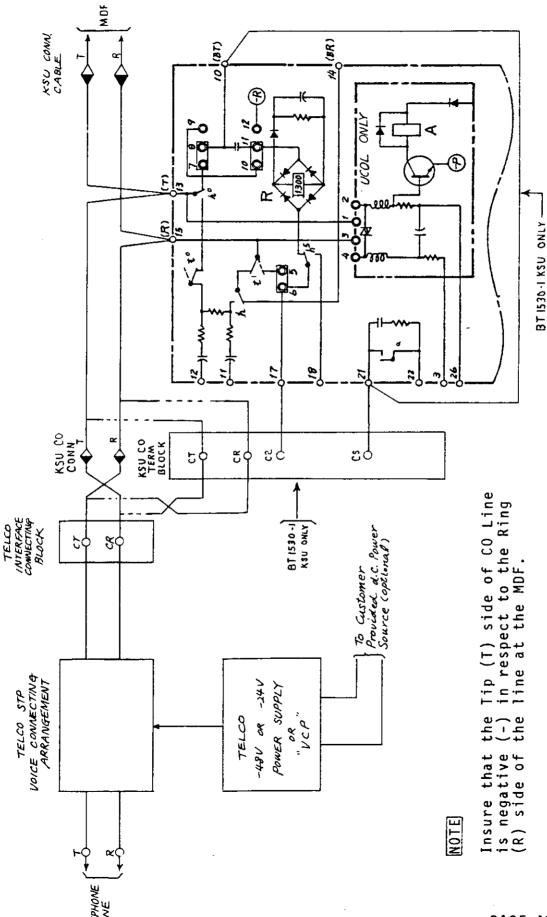


Figure 5 CO Line Circuit - STP

PAGE 10

- 3.02 Connection to the TELCO type STC Voice Connection Arrangement
  - a. The COL or UCOL CO line card can be used for connection to the TELCO type STC VCA. Three (3) conductors are required for each STC used. A connector (Cinch type DA-51225-1 or equi.) must be provided for use with some types of STC VCA.
  - b. Both the COL and UCOL CO Line card must be strapped to correspond to the STC signalling requirements. FIGURE 6 illustrates the correct strap position for each type card. To prevent possible damage to the card, it is recommended that the strap options of each card be inspected before it is placed in service.

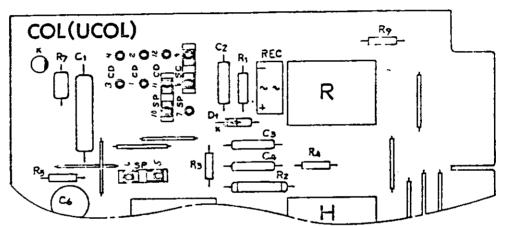
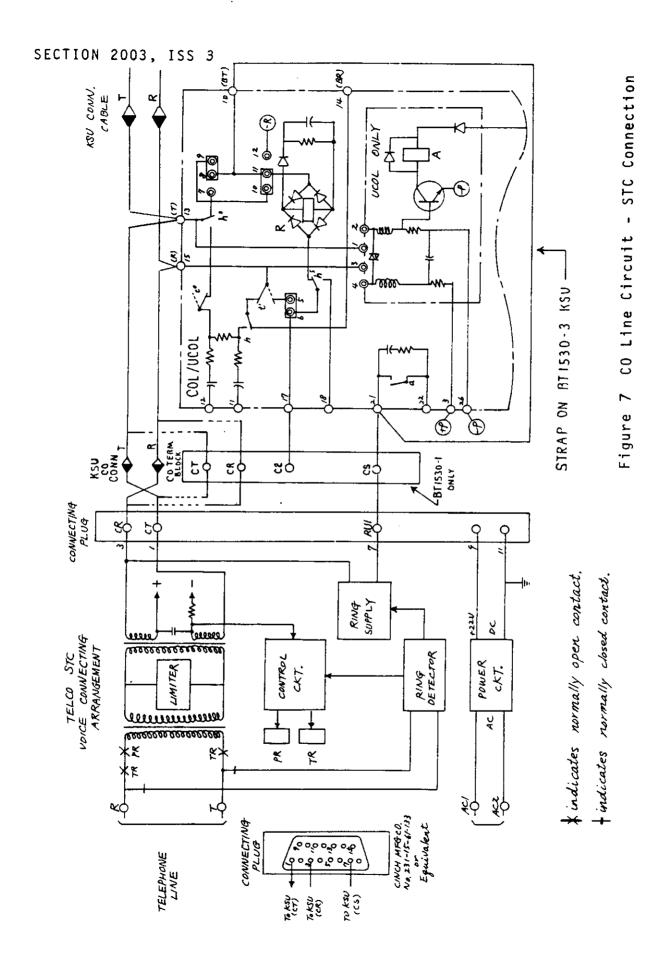


Figure 6 Strapping Option on COL (UCOL) Circuit Card for STC Connection

- c. Connection of the STC type VCA to the BT 1530 KSU:
  - When using the BT 1530-1 KSU, the installer cross connects the CT,CR, and RUI terminal of each VCA to the respective terminals for the CO Line appearance on the KSU CO LINE TERMINAL BLOCK A-C on the rear of the KSU.
  - When using the BT 1530-3 KSU, the installer connects the CT/CR terminals of each VCA through an amphenol ended cable to the respective CO Line on the KSU in accordance with TABLE A. In addition, the installer must strap between RUI of the VCA to Pin 10 of the respective CO Line card connector.
- d. FIGURE 7 illustrates the CO Line circuit when using the STC type VCA.



- e. Caution should be exercised about powering the STC type VCA. The STC type VCA can be powered either by individual 2012B transformers or common power supply (TELCO type 19 or 20). Care should be taken to insure that the supply outputs are not EARTH GROUNDED and no other function derives power from the same source.
- 3.03 Connection to the TELCO type C2A/CD-9 VCA.
  - a. The UCOL type CO line card must be used with the TELCO type C2A/CD-9 VCA. The UCOL line card provides the talk battery and controls to interface directly with the VCA. Six (6) conductors (3 pair) is required for each VCA circuit.
  - b. The UCOL line card is factory strapped for two wire (direct) connection. The strapping option bars on the UCOL must be rearranged for C2A/CD-9 operation. FIGURE 8 illustrates the correct position of the shorting bars.

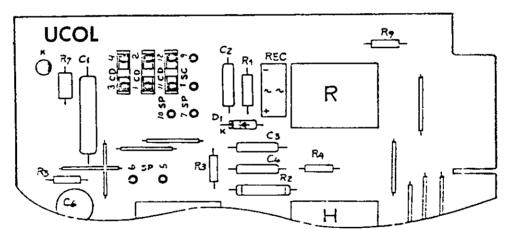


Figure 5 Strapping Option on UCOL Circuit Card for CD-9/C2-A Connection

c. Connection of the C2A/CD-9 VCA to the BT 1530 KSU:

When using the BT 1530-1 KSU, the installer connects the CT, CR, C2 and CS terminals of each VCA to the respective terminals for each CO line at KSU CO TERMINAL BLOCK A-C on the rear of the KSU. Also, terminals C1 and CG of each VCA are connected in multiple and cross-connected to terminals C1 and CG on KSU CO TERMINAL BLOCK C.

When using the BT 1530-1 KSU and the UCOL line card for CD-9/C2A type VCA, the installer must remove a strap between pin number 10 to pin number 21 on each CO Line card connector.

• When utilizing the BT 1530-3 KSU, the installer connects the CT/CR of each VCA to the KSU amphenol connector in accordance with TABLE A. In addition, the installer must strap the connections indicated in FIGURE 9 for each VCA to the pin numbers indicated on the respective CO Line card connector.

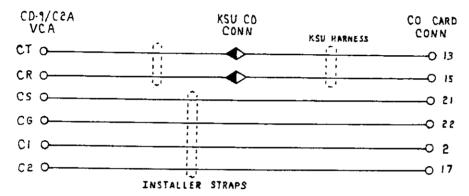
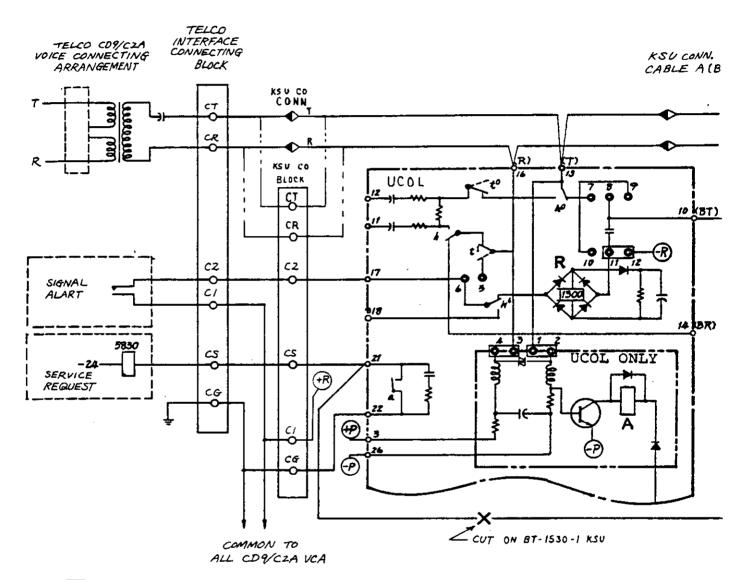


Figure 9 Installer Straps for CD-9/C2A Operation

d. FIGURE 10 illustrates the CO Line circuit when using the C2A/CD-9 type VCA



NOTE ON BT1530-3 KSU, STRAPS ARE REQUIRED BETWEEN CZ, CI, CS, + CF OF VCA TO RESPECTIVE PIN NUMBERS SHOWN ON UCOL CARD CONNECTOR.

Figure 10 CO Line Circuit - CD-9/C2-A Connection

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# BT-1530/2250 KEY TELEPHONE SYSTEM

## INSTALLATION OF OPTIONAL KSU ASSEMBLIES

- 1.00 INTRODUCTION
- 1.01 This section covers installations of optional KSU assemblies.

  Reference should be made to Section 2006-Installation of
  Optional Station Equipment-when corresponding equipment must be
  installed in the associated extensions for operation of the
  optional features.
- 2.00 INSTALLATION OF OMEGA-TONE RECEIVER (OTRU)
- 2.01 The Omega-Tone Receiver Unit consists of two individual circuit cards, the Tone Detector circuit card (RCV) and the Tone Decoder circuit card (RCD).
- 2.02 Prewired card files on the KSU are supplied as standard.

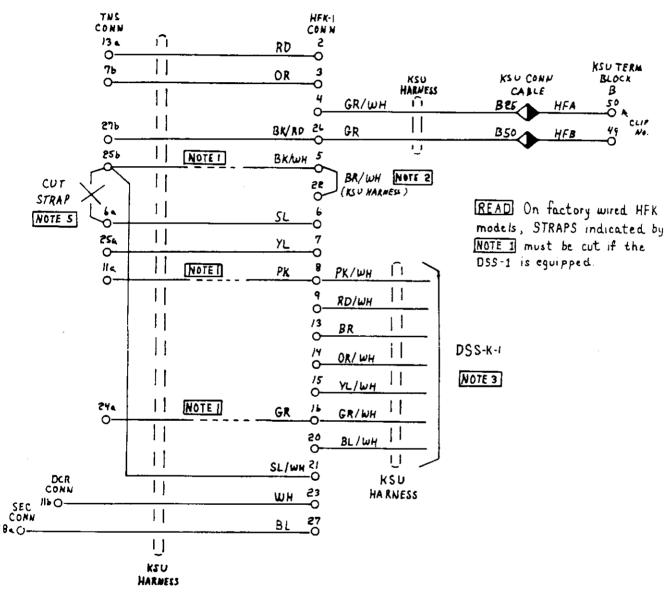
  No modifications of the KSU wiring is required for addition of the OTRU to the system.
- 2.03 Each OTRU is factory supplied, pre-tuned to detect the standard MF tone signals. Care should be taken to prevent damage to the circuit cards during handling and installation. The cards should be inserted into the KSU card files only when the power switch is in the OFF position to prevent possible damage to the circuits.
- READ
  2.04 Because of the precise adjustment requirements for MF tone signalling discrimination, it is suggested that in case of difficulty, the OTRU circuit cards be returned to the supplier for maintenance. Spare circuit cards should be carried in inventory for servicing of defective equipment.
- 3.00 INSTALLATION OF INTERCOM LINES THREE (3) AND FOUR (4)
- 3.01 Intercom Lines Three (3) and Four (4) can be added to the standard BT1530 KSU by insertion of the standard Intercom Line Card (ICL) into the prewired card files on the KSU. No modification of existing KSU wiring is required when expanding the number of Intercom Lines.

- 3.02 Intercom Lines Three (3) and Four (4) P1, P2, P3, and P4 connections appear on KSU TERMINAL BLOCK C. Extension (branch) cables must be cross connected to KSU TERMINAL BLOCK C for operation.
- 3.03 Extension Telephone line keys must be modified for operation on the third and fourth Intercom Lines. Refer to Section 2005-Installation of Station Equipment-for required station modifications.

- 3.04 Extension (branch) cable connections to ICM 3 and ICM 4 at KSU TERMINAL BLOCK C are different for the BT1530 and 2250 telephone. Consult Table A and B, Section 2005 for wiring color codes for each type of telephone.
- 4.00 INSTALLATION OF THE MUSIC-ON-HOLD (MOH) CIRCUIT CARD
- 4.01 The Music-on-Hold (MOH) circuit card provides background music/program source to the holding party on the CO Lines. Any standard FM tuner/tape deck high impedance output can be connected to the MOH input.

- 4.02 When the Music-on-Hold (MOH) circuit card is added to a standard BT1530 KSU, a wiring harness strap across the MOH PC connector TERMINALS 15-16 must be cut in order for the MOH to operate. Any BT1530 KSU placed in service without the MOH unit installation should be wired with the strap across TERMINALS 15-16 in order to prevent cross talk during the "Hold" interval.
- 4.03 A high/low impedance strapping option is provided on the MOH circuit card. The high impedance input is 10 Kohm while the low impedance input is 600 ohm. Input sensitivity is 10db.
- 4.04 A Volume Control is provided on the front of the MOH circuit card to adjust the MOH level. Maximum level on the individual CO Lines is 8dbm average for a 3 second period measured at the CT-CR terminal of each CO Line when VCA's are used. In practice, the MOH level should be such to insure no crosstalk between lines.
- 4.05 Standard "Phono" jack audio connectors are provided for connection of the MOH input to the Music Source. A standard "Phono" plug such as the Switchcraft type 3502 can be used.
- 4.06 If the same Music Source is used for BGM through the PA system, the MOH input can be bridged to the Music Source (BGM) Input. Care should be taken to insure that the source impedance are the same (both high impedance) for the MOH and Music Source Input.

- 4.07 Spare contacts are provided on the MOH control relay for control of Music Source start/stop. The SPC Terminal on the rear panel of the KSU is provided for connection of the Music Source Control leads. The AC Line Voltage for the Music source should not be switched on/off by these contacts, as high voltage circuits could cause system noise and misoperation. Refer to Section 4002; BT1530 KSU Wiring Diagram for location of the MOH relay contacts on the SPC TERMINAL BLOCK.
- 5.00 INSTALLATION OF KSU HANDSFREE AMPLIFIER UNIT (HFK-1)
- 5.01 The KSU Handsfree Amplifier Circuit Card (HFK-1) is required when any Extension in the system will be equipped for "Hands-free Talkback" on Intercom/DSS calls. Once the HFK-1 circuit card has been added to the KSU, any number of Extensions can be equipped for "Handsfree".
- 5.02 Refer to Section 2006-Installation of Optional Station Equipment- for modification requirements on station equipment for operation with the "handsfree" (HF) feature.
- 5.03 Initial production models of the KSU Handsfree Talkback
  Amplifier circuit card HFK (Series 0) had no provision for
  handsfree talkback on DSS calls. The HFK-1 (Series 1) provides
  this feature. Since addition of the DSS call HF Talkback capability
  required circuit redesign, the two circuit cards are not pin for pin
  compatible. Therefore:
  - a. Series O HFK circuit cards will be carried in inventory for additions/replacement of such units already in service. Specific requests for such units must be made under Order Number 5206. No new systems should be ordered with the SERIES ) type.
  - b. Request ENG BULLETIN NO. 4 for Installation Practic Description and Schematic/Parts List of the HFK (Series 0) circuit card if service of such equipment is necessary.
  - c. Request ENG BULLETIN NO. 5 for conversion of systems using SERIES O type HFK equipment to SERIES 1 if system conversion to HF Talkback on DSS calls is required.
  - d. All BT1530/2250 T.M. for SERIES 0 equipment are separately updated with SERIES 1 information.
- 5.04 The HFK-1 circuit card is installed in the HFK card file on the third tier of the KSU. The circuit card connector supplied with the HFK-1 assembly is mounted in the card file and connected to the KSU common cards by the wiring harness bundled near the HFK card file. Carefully remove the insulation around the bundled conductors and install following the connections illustrated in Figure 1.



## NOTES

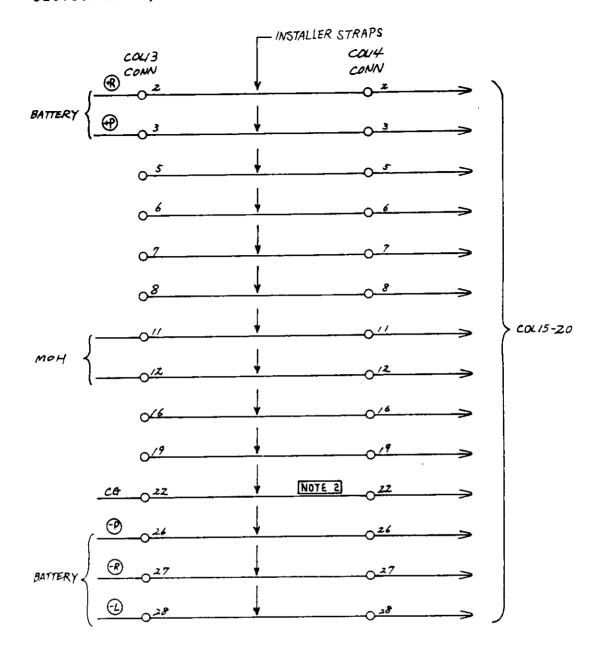
- 1. Required only when DSS Subsystem is NOT equipped
- 2. Required only when DSS Subsystem is equipped.
- 3. Required only when DSS Subsystem is equipped
- 4. THS SEC and DCR card connector is premired.

READ 5. Strap on TNS connector MUST be out any time HFK-1 is equipped.

- NOTE On all production models of the BTIS30 KSV after SEPT 77, the HFK-1 card connector will be factory wired. When HF Talkback is equipped, the Installer will be required only to insert the HFK-1 card and remove/connect certain straps depending upon system requirements. An Engineering Bulletin will be issued when such a change is implemented.
- 5.05 The HFK-1 amplifier circuit is factory adjusted for voice switching control functions. No adjustment is required when the HFK-1 is installed in a system. In case of difficulty, it is recommended that the HFK-1 circuit card be returned to the supplier for corrective measures.

- 5.06 On any KSU previously modified for HF, the strap between TERMINAL 6a and 25b on the TNS circuit card must be reconnected if the HFK-1 circuit card is pulled from the KSU card file. Also, if the HFK-1 circuit card is returned for repair and no spare HFK-1 card is available, the strap should be installed teill the HFK-1 card is returned to service.
- 5.07 Tone Calling at HF equipped extensions
  - a. Provision is made for Tone Calling on the dial ICM Line(s) to HF equipped extensions. SHORTING BAR SB3 on the TNS circuit card must be arranged in accordance with the digit access set on the ICM register for Tone Calling. If Tone Calling is to be two (2) digit dial access, SB3 must be placed in the Tone (T) positions (this is the factory wired position). If Voice (HF) Calling is to be two (2) digit, SHORTING BAR SB3 as well as SB1 and SB2 on the TNS circuit card must be placed in the Voice (V) position.
  - b. At both HF and Non-HF equipped extensions, a warning tone is heard at the called extension when the HF Talkback (or Voice Calling) mode is accessed by the calling extension.
- 5.08 When HF Talkback is added to a system with DSS, precautions must be undertaken when assigning ICM dial codes Refer to Section 2007; Para 3.10; Page 13 for details.

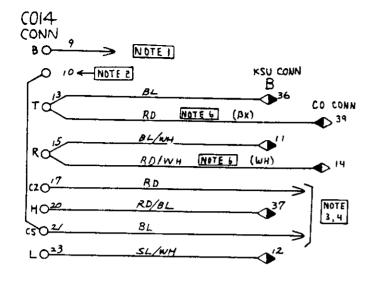
- 6.00 EXPANSION OF CO LINES ON THE BT 1530 KSU
- 6.01 CO Lines capacity on the standard BT 1530 KSU can be expanded individually to a maximum of twenty (20) CO lines. When expanding the CO Lines, one model PCC Card Connector is required for each CO that is added.
- READ On Model BT 1530-1 KSU, a model KTB CO TERMINAL BLOCK is required for every five (5) CO Lines that are added. Two (2) KTB's are required for full capacity.
- 6.02 The BT 1530 KSU harness contains all necessary pre-wiring for connection of CO Lines 14-20 to KSU CONN B and KSU TERM BLOCK B on the MDF. All wires appear bundled on the top tier of the KSU card shelf.
- 6.03 The number of CO Lines on the BT 1530 KSU is expanded as follows:
  - Each PCC card connector is mounted in the first spare card file with the hardware provided. Attach the KTB's (if required) to the KSU rear panel.
  - b. Common connection between the line cards are established by strapping the jumpers on the PCC to the preceeding wired connector. Figure 2 illustrates common wire connections between CO Line 13 and the added CO.
  - c. CO line 14-20 selective wire connections to KSU CONN B, KSU CO Conn (-3 type KSU), KSU PWR TERM, and CO Line TERM BLOCK D and E (-1 type KSU) are illustrated in Figure 3
  - d. Connections to the CO Line TERMINAL BLOCK D AND E (KTB) for the BT 1530-1 KSU is shown in Figure 4.



NOTE 1. Common strapping to COU3 CHANGES when CC 13 is equipped with DSS-K-1 circuit card

2. Required only when CRA/CD-9 type UCA is used for CO Line

Figure 2 CO Line Expansion Common Connections to CO Line 13 Card Connector



(015 (0NN (P) 0 <sup>2</sup> (P) 0 <sup>3</sup> (B) 0 <sup>4</sup>	OR NOTE I	KSU PWR TERM		
<b>∕</b> 010 <del>&lt;</del>	NOTE 2		KSU COMN B	
- 13		OR		CD CONN
TO	·	BL No	EL (BK)	
15,	···	OR/WH	3	
R∞		BL/WH [	OTEL (WH)	15
c2017		RD		 ১
H 020		RD/OR	39	NOTE
(E) 2/	-	BL		3,4
LO <sup>23</sup>		BK/WH	~~~~	ソ
(A) 026	BK \		•	
9	$\frac{\beta \lambda}{\beta L}$			
® 0 <sup>27</sup>	\ K	SU PWR TER	th/I	
(1) Oz8	<del>- WH -&gt;</del>	NOTE 5		
	_			

-1 028 WH	> NOTE 5		
CONN CONN			
	NOTE		
010 ← NOTE 2	GR NOTE	KSU COMW B (Bk)	CO CONN
RO <sup>15</sup>	GR/WH NO	TEL (WH)	16
0017	RD		
HO20	RD/GR		NOTE 3,4
LO <sup>23</sup>	BL PK/wm		•)
		<b>─</b>	

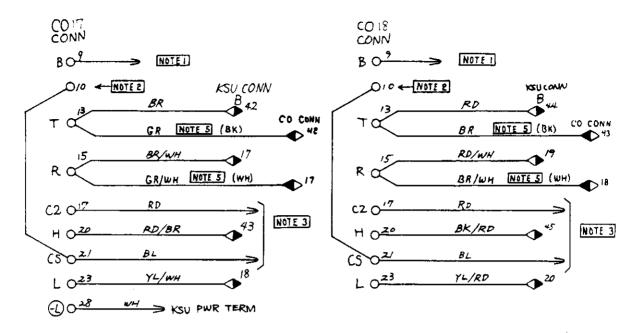
	COLDR	CHART	
BL	BLUE	34	SLATE
WH	WHITE	OR	ORANGE
ak [	BLACK	PK	PINK
RD	RED	GR	GREEN
YL	YELLOW	BR	BROWN

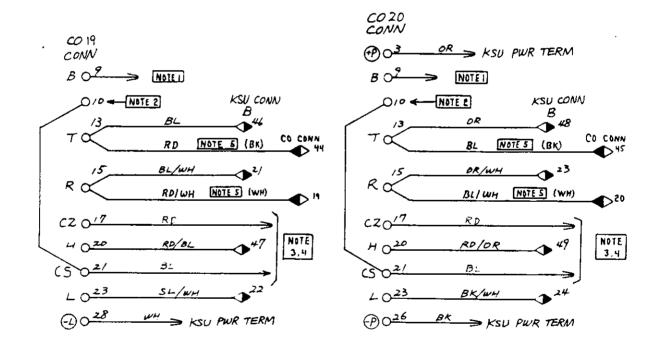
#### NOTES

- .1. Individual CO Incoming Audible, Strap to BI-BIS as per Section 2002: 6.00 if required.
- 2. Strap on all CO LINE CONN added when equipped for STC type Voice Connection Arrangement.
- 3. Refer to Figure 4, Connection of KSU CO Line Terminal Block Dand E
  KTB Wiring Harness (BT 1530-1 KSU only).
- 4 All connecting wire for KSU COL 14-20 to KSU CO TERM BLOCK Dand E are Provided on PCC harness assembly.
- 5. Connect Battey Lead of KSU Wire Harness only to CO Line Card Siot indicated.
- 6. On BT 1530-1 KSU, strap wire color indicated in parenthesis to CO Line TERMINAL BLOCK D (KTB).

Figure 3a

CO Line 14-16 Selective Wire Connections to KSU Wire Harness





co	LOR CHART
54	BLUE
WH	WHITE
3K	BLACK
20	RED
76	YELLOW
26	SLATE
04	ORANGE
~~	PINK
3R	GREEN
24	Banen

NOTE

- 1. Individual CO Incaming Audible, Strap to BI-BIS as per Section 2002: 600 if sequired.
- 2. Strap on all CO LINE CONN added under equipped for STC type Voice Connection Arrangement.
- 3 Refor to Figure 4, Connection of KSU CO Line Terminal Block D and E.
- 4. Additional KTB required when CO Line 19-20 is equipped on BT 1530-1 KSU.
- 5. On BT1530-1 KSU, strap wire color indicated in parenthesis to CO Line TERMINAL BLOCK D ena E.

Figure 3b CO Line 17-20 Selective Wire Connections to KSU Wire Harness

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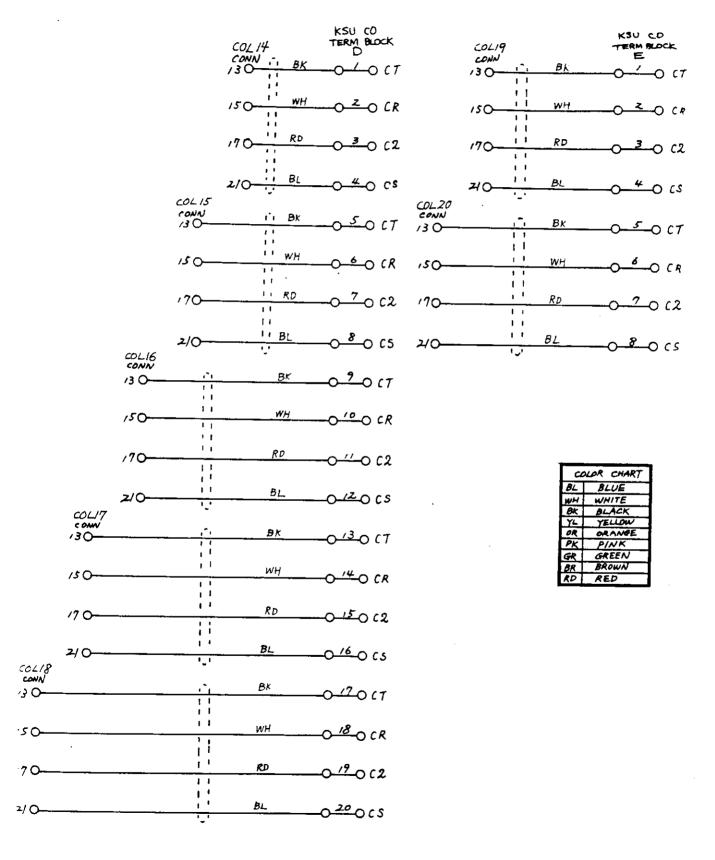


Figure 4 KTB Wiring Harness Connection at KSU CO LINE TERMINAL BLOCKS D and E (BT 1530-1 KSU only)

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- 6.04 Individual CO Incoming Audible Control leads (B1-B5) are connected to CO Line 14-20 as described in Section 2002;
  6.07b. If no Individual CO Incoming Audible is required, all expanded CO Lines (14-20) are automatically connected to operate theommon CO Incoming Audible Control (B0).
- 6.05 Refer to Section 4002; BT2250 KSU Wiring Diagram for complete wiring diagram of CO Lines 14-20.
- 6.06 Refer to Section 2002; Basic KSU Installation; Table A for terminations on KSU CONN B and TERM BLOCK B for CO Lines 14-20.

- 6.07 POWER SUPPLY PSB-1530 is not required when the BT1530 KSU is expanded to twenty (20) CO Lines when the extension capacity remains at thirty-two (32).
- 7.00 INSTALLATION OF THE EXTENSION EXPANSION (EEX-1) ASSEMBLY IN THE BT1530 KSU
- 7.01 The BŦ1530 KSU can be expanded to increase the number of extensions to a maximum of fifty-eight (58) by the addition of the EEX Extension Expansion Assembly. The EEX assembly consists of one EEX circuit card; one circuit card connector w/hardware; and KSU CABLE CONN D wire harness w/Amphenol connector. Wire wraps are used to establish connections.
- 7.02 Installation of the EEX-1
  - a. Mount the EEX circuit card connector in the card file marked EEX with the hardware provided.
  - b. Connections to the existing KSU wiring harness is required. Figure 5 illustrates cross connections required between the existing KSU wiring harness and the EEX card connector.
  - c. KSU CONN D Wire Harness must be installed alongside the existing KSU wire harness. Figure 6 illustrates the KSU CONN D wiring harness construction while Figure 6a illustrates the routing of the KSU CONN D wire harness along the existing wire harness of the KSU

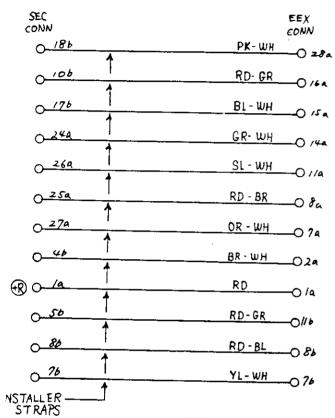
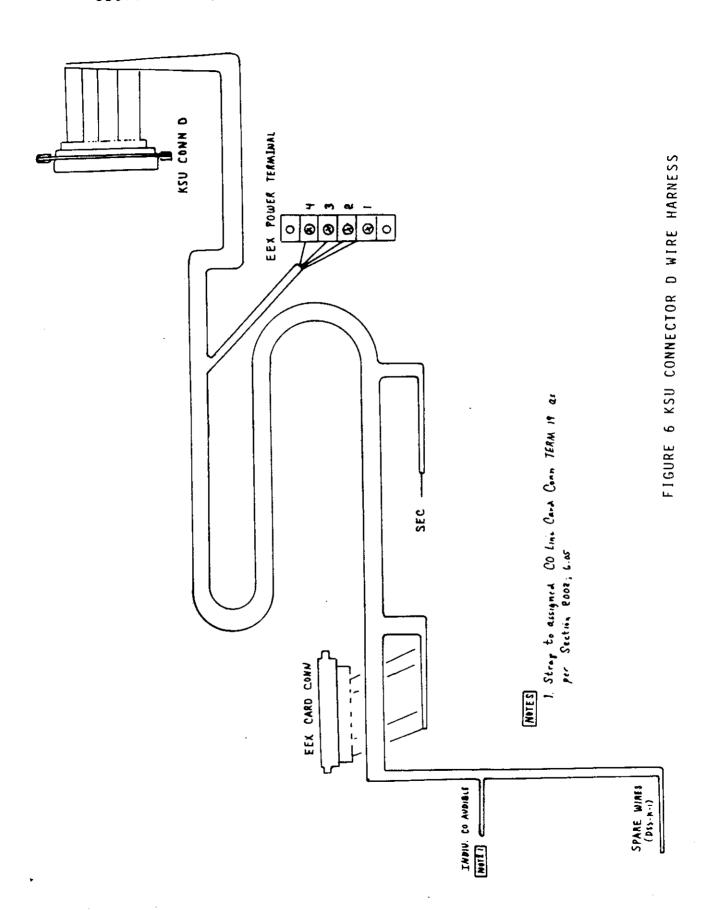


Figure 5 Connection of the EEX Card Connector to the Existing KSU Wire Harness

- d. Care must be taken when installing the KSU CONN D wire harness to prevent damage to the harness when the KSU card cage is closed. Cable ties should be used to hold the new harness securely in place against the existing harness. KSU CONN D Amphenol connector should be mounted securely in place on the KSU Amphenol mounting bracket.
- e. Connections on the KSU CONN D wire harness to the EEX-1 circuit card connector are shown in Figure 7. KSU CONN D Wiring Diagram is illustrated in Figure 8.
- f. Mount, with the hardware provided, the EEX-1 POWER TERMINAL on the KSU back cabinet at the tapped holes located just above the KSU GROUND POST.

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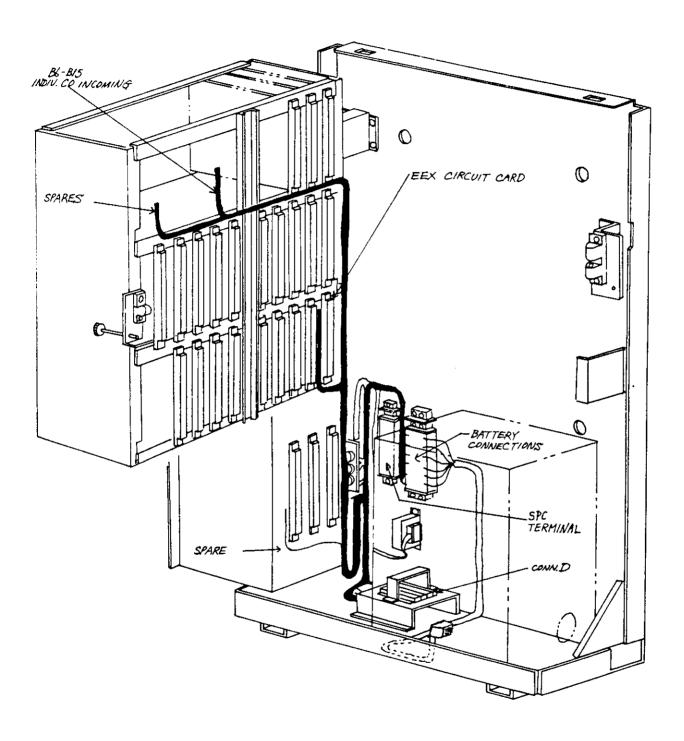


Figure 6a Routing of KSU CONN D Wiring Harness in KSU

	CONNECT	OR D WIRING H	AKNESS	
FUNCTION	CONN PIN NO.	HARNESS CABLE COLOR	KSU TERMINAL CONNECTION	NOTE
	2.6	BL / WH	EEX TA	
	,	RD / WH	EEX 10a	
	27	OR / WH	EEX /24	
	2	BK WY	EEX /3a	
	28	GR / WH	EEY 50	
	3	PK / WH	EEX 60	
	29	BR / WH	EEX 101	
EXTENSION	4	YL / WH	EEX /36	
EXTENSION	30	SL / WH	EEX 46	
25/-Z82	5	RD / BL	EEX 44	
	3/	RD / OR	EEX 3a	
	6	RD / BR	EEX 26	

WH / WH

/ WH

/ WH

/ RD

1 RD

WH

WH

WH

WH

WH

84

WH

WH

WH

/ WH

/ WH / WH

BK

81

RP

RD

OR

BK

EEX

EEX EEX EEX EEX 240

EEX EEX 25a EEX 96

EEX 156

EEX 174

SEX 146

EEX 264 EEX 234

EEX 19a EEX 22a

. INDIV CO

SPARE

EEX PWR TERMINAL

INCOMING

Nt.1

Nt. 3

Nt.Z

16

3

34

35 10

36

//

37

/3 39

14

40

41

16

42

43 18

44

45

20

44

2/

47 22

48

49 24

50

86 87 88

810

8// B/2

B/3

8/4

815

SPARE

LAMP

BATTERY

<del>(</del>2)

COL	COLOR CHART					
BL	BLUE					
RD	RED					
OR	ORANGE					
D/A	BLACK					
OR	GREEN					
PK	PINK					
BR	BROWN					
YL	YELLOW					
SL	SLATE					
WH	WHITE					

Figure 7 KSU CONNECTOR D Wire Harness

NI 1 Connect to CO Line PCC Connector Terminal 9 at each CO Line assigned for Individual Incoming Signal Control.

NC. 2 Connect to SPC Power Terminal De Lamp Battery for operation with the PSB-1530 Power Supply.

NO 3 There leads may be assigned to DSS-K-1 functions Refer to Section 2007; 3.00

SECTION 2004, ISS 3 EEX HARNESS KSU CONN COLOR RD/GR <u>Z65</u> 026 RD/BR <u> Z64</u> 03a RD/OR *Z{*3 030 RD/WH **Z68** <del>9</del>a RD/BL Z62 SL/WH 046 261 05a RD/SL Z66 0.5b GR/WH Z55 BL/WH <u>Z6</u>7 0.6b PK/WH Z56 O ga BL/WH **Z**5/ YL/WH **2**58 O/0A RD/WH <u>Z5</u>2 <u> 25</u>7 (B. 0/06 BR/WH 750 0/20 OR/WH <u> 25</u>3 O-13a BK/wH <u>Z5</u>4 PK/WH <u>z7</u>4 0/46 YL/WH <u> 27</u>6 BK/WH 15b <u> 272</u> 0/9a BK/RD Z81 YL/RD 0.224 Z82 0<sup>23</sup>a RD/BL <u> 27</u>8 O 24a OR/WH <u>z7</u>/ <del>G</del>R/WH O<sup>254</sup> *27*3

	COLU RD GR BR OR WH BL SL PK YL BK	WHI BLI SLA PIA	EN NGE TE JE TE VK	
SU ERI BLOC D	1 K			
		•		

Figure 8 Connection of KSU CONN D Wiring Harness
to EEX Card Connector PAGE 16

SL/WH

BRIWH

D 37

<u> 27</u>7

0264

0<sup>27a</sup>

	CONNECTOR D (4th Binder)								
FUNCTION	LEAD DESIG.	MENESS CABLE COLOR	CONU.	CABLE COLOR	CLIP No	Note			
<u> </u>	25/	BL - WH	346	WH BL	7	†			
	52	AO - WH	,	BL WH	Z	1			
	5.3	OR - WH	27	WH OR	3	1			
İ	54	BK - WH	· 2	OR WH	4	1			
	7:5	GR - WH	28	NH GR	\$	1			
	3%	PK WH	3	GR - WH	6	1			
	547	BR WH	29	WH BR	2	1			
EXTENSON	148	YL WH	4	DR WH	8	1			
EXILITION	26:	SL WH	30	WH SL	9	1			
1	62	RD BL	5	SL WH	10	]			
	63	RD - AR	3/	RD - BL	11				
ASSIGN-	14	RD - BR	6	BL - RD	12	j			
MENT	65	RO GR	32	RD - DR	/3	1			
,,,_,	66	RD - 5L	7	OR - RD	14	1			
	67	BL - WH	33	RD GR	15	1			
Į.	68	RD WH	8	GR RD	16	1			
J	271	DR - WH	34	RD BR	17	1			
Ì	72	AK - WH	9	BR - RD	18	1			
i	73	GR · WH	35	RD - 54	19	1			
	74	PK - WH	10	SL - RD	20	1			
	75	BR - WH	36	BK BL	2/	1			
	76	YL - WH	11	BL - BK	2د	1			
	77	SC - WH	37	BK - DR	23	ì			
	78	RD - BL	12	OR BK	24	]			
	.Z 8:/ ¨	BK RD	38	BK GR	کد				
	82	YL - RD	/3	GR · BK	26				
j	B 6	3L - WH	3.5	BK BR	27				
עוסמו,	87	RD WH	14	BR · BK	مد	]			
<b>.</b>	88	OR · WH	40	BK - SL	29				
co	89	DK WH	15	sc bk	30	j			
SIGNALIALG	810	OR WH	41	YL BL	3/	]			
3.0	8//	PK - WH	16	AL YL	32	1 1			
!	8/2	BR WH	47	YL OR	33	Į i			
	8/3	YL WH		OR · YL	34	1 1			
	8/4	SL - WH	#3	YL GR	35				
<u> </u>	B15	AD BL	18	GR · YL	36				
		BL . WH	44	YL - BR	37				
		OR	19	BR · YL	38				
SPARE		BL RD · WH	4.5	YL SL	37				
(DES-K-1)	ĺ		10	SC YL	Yo				
[		OR - WH	_	V1 - BL	42				
	+4-	BK - WH	2/ #7	BL . VI		$\vdash \vdash \vdash$			
AUX	+ 4	YL YL	12		44	i i			
1	+ L		72 78	~~~		l į			
LAMP	74	YL YL	<del>ومر</del> 3 د	GR - VI	45	l			
BATTERY	+2	YL	49	77 · <b>BR</b>	47	ĺ			
	+4	YL	24	BR · VI	48	J			
i t	+_	YL	50	VI · 5L	69				
	+4	YL	35	SL - VI	30	1			
	_	,-		<u> , , , , , , , , , , , , , , , , , , </u>	1				

COL	COLOR CHART						
94	BLÜE						
RD	RED						
OR	ORANGE						
8K	BLACK						
GR	GREEN						
PK	PINK						
BR	BROWN						
YL	YELLOW						
54	SLATE						
WH	WHITE						

TABLE B KSU CONN D (4th Binder)
Terminal Designation and Assignment

- 7.04 Table B shows KSU CONN D color code and terminal assignment at the MDF. A fourth (4th) twenty-five (25) pair cable (or binder) is required to connect the KSU CONN D to the MDF. KSU CONN D terminates at KSU TERM BLOCK D on the MDF.
- 7.05 KSU CONN D wiring harness provides ten (10) additional Individual Incoming CO Audible Control leads (B6-B15) as well as six (6) additional spare KSU lead-ins for optional functions. The Individual Incoming CO Audible Control leads (B6-B15) are connected to the CO Lines as described in Section 2002; 6.00 are left bundled for future use. The spare lead-in wires on KSU CONN D should be bundled for future use.
- 7.06 Individual "Z" leads of the expanded extensions are cross connected to KSU TERM BLOCK D for assignment of dial codes in accordance with the dial codes listed in Table B.

7.07 The Auxilary Power Supply PSB-1530-1 is required when the EEX-1 circuit card is equipped on the system KSU and the number of operating extensions exceed thirty-two (32). Any dial code numbers derived from the EEX circuit card used for special features such as Zone Paging (ZPA-B) or group calling do not necessitate use of the PSB-1530-1 Power Supply Thirty-two (32) is the limit of extension telephones that can operate primarily on the PSA-1530-1 Power Supply.

## READ

7.08 When KSU CONN D is equipped, special consideration must be given to proper current distribution for Lamp Battery for the group of expanded extensions. Refer to Para. 8.02 for connection of the expansion extension Lamp Battery + leads on KSU TERM D when the PSB-1530-1 is equipped.

- 8.00 INSTALLATION OF THE PSB-1530-1 POWER SUPPLY TO THE BT1530/2250 KSU.
- 8.01 The auxilary KSU Power Supply PSB-1530-1 provides additional Lamp Battery when the BT1530 (or BT2250) KSU is equipped with the EEX circuit card and system capacity exceeds thirty-two (32) extensions.
- 8.02 Figure 9 illustrates the connection of the PSB-1530·1 the BT1530/2250 KSU and Lamp Battery +L current distribution for all extensions.

- a. Care should be taken to insure that the PSB-1530-1 Lamp Battery is not connected in multiple with the Lamp Battery of the PSA-1530-1 Power Supply.
- b. KSU CONN A and B provide a total of eight (8) Lamp Battery +1 feeds while KSU CONN D provides an additional eight (8) Lamp Battery +1 feeds.
- c. Each Lamp Battery +L feed should be connected to not more than four (4) individual Extension +L leads. If branch cable terminates in a Distribution box, care should be taken to insure that the branch cable +L feed is not connected to more than four (4) extensions +L leads at the Distribution Terminal.
- d. The following extension Lamp Battery +L connection assignments are recommended (as depicted in Figure 10).
  - Extensions 11-18 and 21-28 are connected to KSU TERM BLOCK A.
  - Extensions 31-38 and 41-48 are connected to KSU TERM BLOCK C (A1).
  - Extensions 51-58, 61-68, 71-78 and 81-82 are connected to KSU TERM BLOCK D.

- 8.03 Determining requirement for the addition of the PSB-1530-1 Power Supply to the BT1530/2250 Key Telephone System.
  - a. The PSB-1530-1 Power Supply is required when the optional EEX-1 circuit card is equipped and the total number of operating extensions (including extensions that are bridged) exceeds thirty-two (32).
  - b. The PSB-1530-1 is not required when the optional EEX-1 circuit card is equipped if the dial codes derived from the EEX-1 are used for special functions such as Zone Paging, Group Calling, Off-Premise Extensions or remote control functions.
  - c. The PSB-1530-1 is not required when the BT1530 KSU is expanded to Twenty (20) CO Lines.

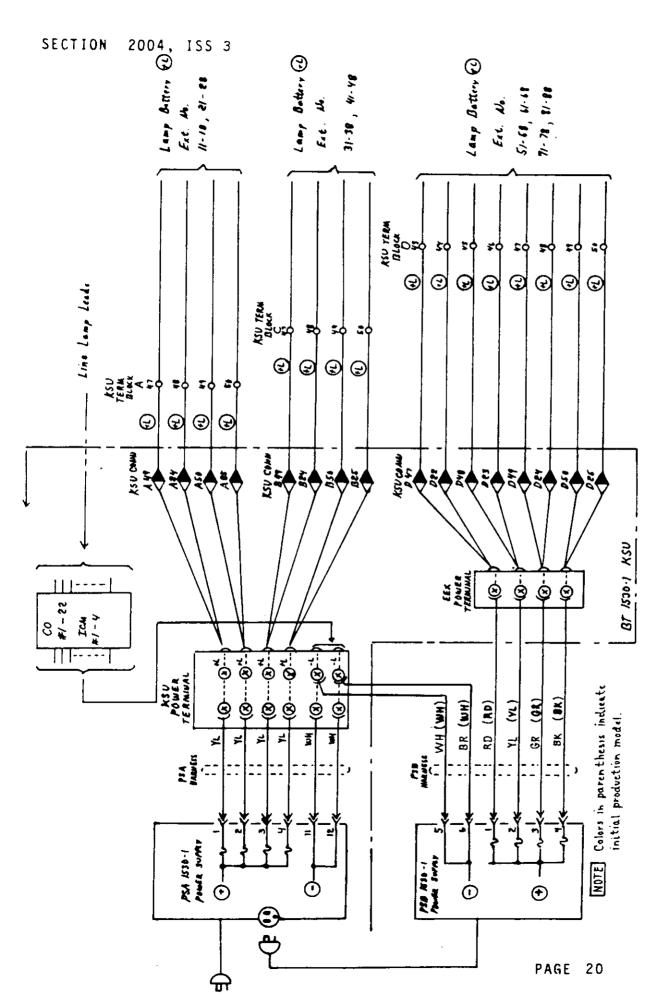


FIGURE 9 POWER SUPPLY PSB-1530-1 CONNECTION TO THE KSU AND EEX POWER TERMINAL

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## 

# BT-1530/2250 KEY TELEPHONE SYSTEM

## KEY TELEPHONE INSTALLATION

- 1.00 GENERAL
- 1.01 The BT1530 and BT2250 Key Telephones provide thirteen (13) and twenty (20) CO Lines as well as two (2) Intercom Lines. Each telephone can be expanded to operate on up to four (4) Intercom Lines at the expense of two (2) CO Lines. Both telephone instruments provide the same standard and optional features, differing only in CO Line capacity. Each telephone can be installer programmed to meet individual system requirements.
- 1.02 Intercom tone or voice calling through the local station speaker is provided standard. A Volume Control, located on the base of the telephone, sets the extension voice/tone levels. A small electrical screw driver is required for adjustment.
- 1.03 When installed, the telephone instruments should not be placed in direct sunlight as the line lamp indicators may be difficult to visualize. Also, because of the various solid state circuits utlized within the instrument, the telephones should not be placed above any radiator or other heat source.
- 2.00 EXTENSION (BRANCH) CABLE CONNECTION TO THE MDF
- 2.01 Tables A and B list the BT1530/2250 Key Telephone lead designation and conductor assignment.
- 2.02 Table C lists the BT1530/2250 extension functions that are connected in multiple with their corresponding terminal at the MDF.
- 2.03 Table D lists the individual extension functions that require selective wiring or dedicated connection at the MDF. The selective connections required are determined by the features programmed for the individual extension.
- 2.04 Wiring Plans/Cable Requirements.
  - a. WIRING PLAN A: An individual BT1530/2250 Key Telephone can be connected to the MDF by a single fifty (50) pair telephone cable in instances when no additional telephones

		CONNECTOR	A				C	ONNECTOR	B		
FUNCTION	DESIG.	TAIL CABLE	CONN PIN NO.	HOUSE CABLE	MOTE	FUNCTION	LEAD DESIG.	TAIL CABLE COLOR	DIN NO.	HOUSE CAULE	<i>X:07</i> <u>=</u>
	177 1R	BL	22	MH - 8F			97	WH - BL	24	WH - BL	1 —
COL /	14	OR .		BL - WH	<u> </u>	COL 9	28	WH - BK	. /	BL - WH	1-
		GR	27	WH OR		( )	24	WH - YL	27	WH - OR	1
	14	BR	2	OR - WH		L	7 4	WH - OR	2	OR - WH	
	27	34	28	WH - GR	L		107	AZ - WH	20	WH - GR	<del>                                     </del>
COL 2	2 R	100	3	OR - WH		COL 10	10 R	AE - 8K	3	GR - WH	<del> </del>
	2 <i>H</i>	8K	29	WH - BR		LUL IU	10 H	AZ - YL	29	WH BR	
	2.	YL	4	BR - WH	i		10 L	AZ - OR	4	BR - WH	1
	37	/K	30	WH - SL			117	BL-WH-WH	30	WH SL	1
COL 3	3.6	1 V/	5	5L - WH		COLII	118	BL - BK- BK	5	SL WH	<del>                                     </del>
	3 <i>H</i>	WH	3/	RD - BL		٠,٠	11 H	BL-YL-YL	3/	AD . BL	<del></del>
	3 /_	AZ	6	BL - RD			IIL	BL-GR-GR	6	BL - RD	
	4.7	BL - WH	3.2	RD OR			12 TM	OR - WH -WH	7.2.	AD OR	
COL 4	48	BL - BK	7	OR - RD		-0.10	/2 R/12	OR-BK-BK	7	OR . RD	
	4 H	BL - YL	33	RD - GR		COL/2	12 Hm	OR-YL-YL	33	RD OR	<u> </u>
<del></del>	#4	BL - GR	8	GR - RD		(1NT4)	12 LM	OR-GR-GR	8	GR - RP	
	57	OR - WH	34	RD - BR			/3700	GR-WH-WH	34	RD - BR	
COL 5	5 R	0 / - BK	9	BR - RD		COL /3	13 RM	GR-BK-BK	9	BR - RD	
	5 H	OR - YL	35	KD - SL		/INT3	/3 H0s	GR-YL-YL	35	RD - SL	
	5 L	OR - GR	10	SL - RD		(NT2)	/3 LOV	GR-RD-RD	10	SL · RD	
	67	GR-WH	36	BK - BL					36	BK . BL	
COL 6	6 R	GR - BK	11	BL - BK					77	BL · BK	
_	6 H	GR - YL	37	BK - OR				37	BK · OR		
	64	GR - RD	/2	OR - BK		[			/2	OR - BK	-
	77	<u> BR - WH</u>	38	BK - OR					38	BK - GR	
COL 7	7R	BR - BK	/3	GR - BK		Ī			/3	GR · BK	-
	74	BR - YL	39	BK - BR					39	BK - BR	
	74	BR - GR	14	8R - BK					14	BR - BK	
٠ إ	87	SL - WH	4.0	BK · SL					40	BK SL	
COL 8	- 8 R	<u>SL - B</u> K	15	SL BK					15	SL · BK	
	84	SL - YL	4/	YL - BL					41	YL - 8L	
	84	SL - GR	16	BL - YL					16	BL · YL	
ļ	P1(2)	AD -WH	42	YL OR					42	YL · OR	
INT 2	P2(4)	RD - BK	17	OR - YL		<u> </u>			17	OR - YL	
	P3(2)	RD - YL	43	YL GR		Г			43	YL - GR	
	P4(2)	RD - GR	18	GR YL		Г	<u> </u>		18	dR - YL	
,	PIO	BK - WH	44	YL - BR	$\Box$				44	YL - BR	
INT /	P2(1)	BK - OR	19	BR - YL					19	BR - YL	
ŀ	P3(1)	BK - YL	45	YL - SL		Γ			45	YL SL	
TRANS	P4(1)	BK PK	20	SL - YL					20	54 · YL	
ATTERY	TRS	YL - GR	46	V/ - BL					46	V1 - 8L	$\neg$
	+R	YL - 8k	2/	BL - VI					2/	BL - V/	
DSS D	<i>D</i> \$5	V1 - BK	47	V / - OR					47	V/ - OR	
PAGE	B	PK - 8K	2.2	OR VI					2.2	OR - V/	$\neg$
ATTERY	PB	YL - RD	48	V1 - GR		I			48	V/ - OR	
PARE	<u></u> /	YL - WH	23	GR . V/		Γ			23	GR - V/	$\neg$
Z	<u> </u>	V/ - WH	49	VI - BR						V/ - BR	
ATTERY	Z	PK - WH	24	BR VI		Г				BR - V/	<b></b>  i
	+L B:F	PK - YL	50	V/ - SL			HFB	VI - GR		V/ - Si	─-1.
BLF	حن ت	PK - GR	25	SL - V/	1	FREE 7	1FA	V/ YL		s2 - v7	

	COLOR	CHAR	:T
WH	WHITE	RD	RED
BL	BLHE	BK	BLACK
OR	ORANGE	YL	YELLOW
OR	<b>GREEN</b>	VI	VIOLET
BR	BROWN	PK	PINK
54	SLATE	AZ	AZURE

M.1. Spare wire pair (unterminated) is provided in tail cable.

Nt.2. CO LINE KEY 12 and 13 are convertible to Intercom Lines No.3. and No.4 on BT-1530. Intercom 3 and 4 on BT-2250 Telephone Connector Ferminals differ from BT-1530 Telephone.

TABLE A BT 1530 Telephone Terminal Designation and Assignment

<u> </u>	CC	NNECTOR	A	<del></del>			α	ONNECTOR	В		
FUNCTION	LEAD DESIG	TAIL CATLE	CONN PIN NO.	HOUSE CABLE	.M07E	FUNCTION	DESM.	TAIL CABLE COLOR	PIN NO.	COLOR	HOTE
	17	BL	36	BL . WH		COL 9	7 T	WH BK	2.6	BL - WH	
COL 1	14	GR	27	WH OR		327	94	WH YL	27	DR - WH	+-
	27	SL SL	2-8	OR - WH	<u> </u>	<del>                                     </del>	107	AZ - WH	20	WH - GK	=
COL 2	2 R	RD BK	3 29	GR WH	-	COL 10	10 R	AZ TL	27	GR WH	<u> </u>
	24	YL	4	BR WH		1	117	AZ - PR	30	BR - WH	<del> </del> -
COL 3	3 T	P.K	30	SL - WH		COLII	118	BL-BK-BK	3/	SL - WH RD - BL	1
	3H	AZ.	3/	RD - BL BL - RD	├	1	11 H	BL-YL-YL BL-GR-GR	6	BL RD	
	47	84 - WH	32	RD - OR OR - RD	-		127	OR-WH-WH OR-BK-BK	7	RD - OR	
COL 4	4 R 4 H	BL - YL	33	RD - OR		COL12	/2 H	OR-YL-YL	33	RD - GR GR · RD	Ι
	# L 5 T	BL - GR OR WH	34-	GR - RD RD - BR		<del> </del>	12 L 13 T	OR-GR-GR GR-WH-WH	34	RD · BR	
c015	5 R	OR - BK	9 35	BR - RD RD · SL		COL13	13 R	GR-BK-BK GR-YL-YL	3.5	BR - RD RD - 3L	1
	5 L	OR - GR	36	SL - RD BK - BL		<del> </del>	134	GR-RD-RD BR-WH-WH	36	SL - RD	<del> </del>
COL 6	6 R	GR - BK	11	BL BK		COL 44	142	BR - BK - BK BR - YL - YL	37	BL BK	Ţ
	6 H	GR RD	12	BK - OR OR - BK			14L	BR-GA-GR	/2	OR BK	
	7 T	BR - WH BR - BK	/3	BK - OR GR - BK		COL 15	15T	SL-BK-BK	/3	BK · GR GR · BK	
COL 7	74	BR - YL BR - GR	39	BK - BK BR - BK	<del>  -</del> -	-	15H	SL-YL-YL SL-GR-GR	39	BR BK	<del> </del>
	27	SL - WH	40	BK - SL SL - BK	-		16T	RD-WH-WH	40	BK SL SL BK	1
COT 8	3 R 3 H	SL - YL	41	YL - 8L		COL 16	16H	RD-YL-YL	41	BL YL	
<del></del>	8 L P1(2)	SL - GR	42	YL · OR			161	RD-GR-OR BK-WH-WH	42	YL - OR	<u> </u>
/NT 2	PZ(4) P3(k)	RD - BK	43	YL - GR	-	COL 17	17R	BK-OR-OR BK-YL-YL	<i>/7 43</i>	YL - GR	<u> </u>
	P4(2)	RD - GR	18	GR - YL		<del>                                      </del>	17L 187	BK-PK-PK YL-WH-WH	18	GR - YL YL - BK	_
INTI	P2(1)	BK - OR	19	DR · YL	-	COL 18	187	YL-BK-BK YL-RD-RD	19	BK - YL	-
	P#(1)	BK PK	20	SL - YL	<u> </u>	1	18L 19T(PI)	YL-GR-GR PK-WH-WH	20	SL - YL	<del>-</del>
BATTERY	TRS → R	YL GR YL - BK	2/	8L · V/	<u> </u>	COL19	19R(P2)	PK-BK-OK	2/	BL - V!	<b></b>
DSS B	DSS B	PK - BK	22	0R . V/		ATZ	194(13)	PK-YL-YL PK-GR-GR	47 23	0R - V/	
PAGE	PB	YL - RD YL - WH	48	V/ - GR GR - V/		COL 20	207(P1) 20R(P2)	V/-WH-WH V/-RK-BK	48 23	V1 - GR GR - V1	<del>                                     </del>
SPARE	Δ	V/ - WH	#9	V / - BR	1	(AT 3)	20H (P3) 20L (P4)	VI-YL-YL	49	VI - BR	
2 JATTERY	Z →L	PK - WH PK - YL	50	V) SL		HANDS	HF3	V/-an	50	V / - SL	#
BLF	BLF	PK - GR	25	SL - V/	<u> </u>	FREE	HFA	V /- YL	25	SL · V/	Ц

	COLOR	CHAR	Ť
u/µ	WHITE	RD	RED
BL	BLUE	BK	BLACK
^R	ORANGE	YL	YELLOW
GR	GREEN	VI	VIOLET
BR	BROWN	Pk	PINK
SL	SLATE	AZ	AZURE

Nt. 1 Spare wire pair (unterminated) is provided in tail cable.

Nt. 2 30 LINE KEY 19 and 20 are convertible to Intercon line 3 and 4. Intercom 3 and 4 on BT-1530 Connector Terminal differ from BT-2250 Telephone.

TABLE B BT 2250 Telephone Terminal Designation and Assignment

are planned, or no Distribution Terminal is anticipated.

- Figure 1 illustrates the connections at the MDF of the BT1530/2250 Key Telephone branch cable when a direct home run cable is used.
- When a fifty pair home run cable is used, the cable can be terminated at a Distribution Terminal Block at a later date and converted to WIRING PLAN B.

READ

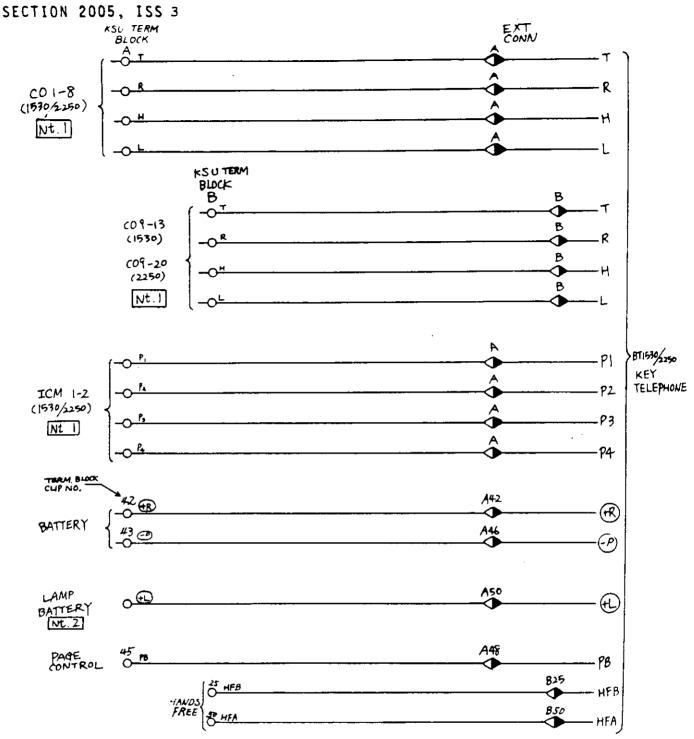
Twenty-five (25) pair telephone cable can be used to connect the BT1530 Key Telephone to the MDF when the Extension does not require more than eight (8) CO Lines. All features except for Handsfree Talkback are available at the Extension when twenty-five pair cable is used.

TABLE C
EXTENSION MULTIPLE CONNECTIONS AT THE MDF

FUNCTION	DESIGNATION	DESCRIPTION
CO Lines (13-BT1530) (20-BT2250)	T R H L	Tip (TALK) of CO Line Ring (TALK) of CO Line Hold (CONTROL) of CO Line Lamp (CONTROL) of CO Line
Intercom Lines (2)	P1 P2 P3 P4	Tip (TALK) of Intercom Line Ring (TALK) of Intercom Line ANS (CONTROL) of Intercom Line Lamp (CONTROL) of Intercom Line
Battery	+R -P +L	Plus (+) Relay Battery Minus (-) Talk Battery Plus (+) Lamp Battery
Common	PB HFA/HFB	All Call/(PAGE) Control Handsfree Input

TABLE D EXTENSION SELECTIVE CONNECTIONS AT THE MDF

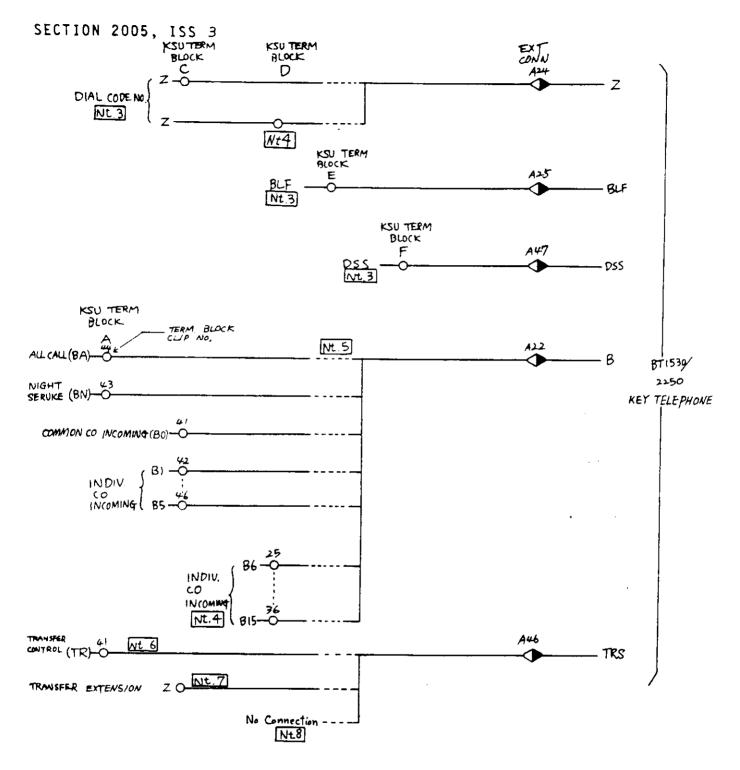
FUNCTION	DESIGNATION	DESCRIPTION
Standard	Z B	Intercom Dial Code Assignment All Call/Incoming CO Audible
Optional	DSS BLF TRS	Direct Station Selection Control Busy Lamp Field Control Transfer Key Control



#### NOTES

- 1. Connections are determined by Pickup Key Terminal assignment per line.
- 2. Connect to @ Battery on KSU TERM BLOCK A, C, or D as described in Section 2002, 4.11.

Figure la Extension Multiple Connections at the MDF



## NOTES

3 Terminal Assignment is determined by Dial Code No assigned to Extension.
4: Standard on BT2250 KSU, optional on BT1530 KSU.
5. Terminal Assignment is determined by function assigned to Extension. B" lead.

Connect when Extension is wired to operate as Night Service Control.

Connect to Transferred Extension "Z" lead., Terminal Assignment is determined by Dial Code No assigned to Transferred Extension.

8. Do not terminate in multiple with other extension TRS lead. Insulate and bundle for future use.

Figure 1b Extension Selective Connections at the MDF

- b. WIRING PLAN B: When a Distribution Terminal Block is required, a fifty (50) pair cable can be used to connect the Distribution Terminal to the MDF if no BT2250 Key Telephones are terminated at the Distribution Terminal. Also, due to the buildup of selective extension wiring functions as the extensions are connected to the Distribution Terminal, no more than SEVEN (7) BT1530 Key Telephones can be connected to the same Distribution Terminal.
  - Figure 2a lists the Distribution Terminal Block connections to the MDF. Figure 2b illustrates the individual extension cable connections at the Distribution Terminal.
  - The Distribution Terminal branch cable CONN A (1st Binder) is connected in multiple with KSU TERMINAL BLOCK A (or Al) at the MDF. CONN B (2nd Binder) requires multiple connections at KSU TERMINAL BLOCK B for CO Line functions as well as selective connections at KSU TERMINAL BLOCK C (or D), E, and F for Intercom Dial Code Assignment, DSS, and BLF control.
  - The spare conductors in CONN B (2nd Binder) of the branch cable are assigned to selective wiring functions that are listed in Table D. Selective extension wiring functions are cross connected at the MDF to the corresponding KSU TERMINAL BLOCK for the particular function. The terminal connection at each KSU TERM BLOCK is determined by the Dial Code assigned the particular extension.
  - Distribution Terminal Blocks should not be looped (a branch cable connection between two or more Distribution Terminals) unless the total number of extensions connected to these Distribution Terminals does not exceed SEVEN (7).

- c. WIRING PLAN C: When a Distribution Terminal is required for the connection of BT2250 Key Telephones (or future expansion to the BT2250); or the number of BT1530 Key Telephones connected to the terminal exceeds SEVEN (7); a seventy-five (75) pair cable is required to connect the Distribution Terminal to the MDF.
  - Figure 3a lists the Distribution Terminal Block connections to the MDF. Figure 3b illustrates the individual extension cable connections at the Distribution Terminal.
  - The Distribution Terminal branch cable CONN A (1st Binder) is connected in multiple with KSU TERM BLOCK A (or A1) at the MDF. CONN B (2nd Binder) is connected in multiple with KSU TERM

-	CONN	ECTOR	R A (1st B	inder	.)		CONNE	ECTOR	B (2nd	Bund	(س		
FUNCTION	LEAD DESIG	CONN PIN No.	CABLE	DISTR. TERM. CLIP	Mole	FUNCTION	LEAD DESIG.	CONN	CABLE COLOR	DISTR. TERM. CLIP	ANTA		
	17	24	WH - BL	No.			97	No.		NO.	┺		
00//	18		BL - WH	2		۱ ۵	98	24	84 - 8L	2	<b>∤</b> T		
COLI	/ H	27	WH - OR	3		COL 9	94	27	84 - NH WH - OR	1-3	1		
	14	2.	OR . WH	u			94	2	OR - WH	14	1 [		
	27	28	WH - GR	5			107	18	WH - GR	5	1		
COL 2	2.8	3	AR - WH	6		COLIO	108		GR - WH		11		
	24	29	BR - WH	7		1	104	29	NH - BR	2	1 1		
	37	30	WH - 5L	8		<del></del>	102	7.0	BR - WH	8	4 1		
	3 8	5	SL · WH	10		l	118	30	WH - SC SC - WH	10	{ '		
COL 3	3 44	3/	RD - BL	1,,		COL!!	1111	3/	RD - BL	11	1		
	3 4	- 2	BL RD	12			114	6	BL - RD	1/2	1 ,		
COL 4	47	32	RD - OR	13			127	يدو	RD - OR	13	1		
	4 R	7	OR - RD	14	! .	COLIZ	12R	2	OR - RD	14	]		
	4 H	33	RD · GR	15			12H	33	RD - GR	15	!		
COL E	57	34	GR - RD RD - BR	17			124	8	GR - RD	16	↓ ↓		
	5 R	9	3R - RD	1/2			/37	34	RD - BR BR - RD	17	1 1		
COL 5	54	35	RD - SL	7.9		COL/3	13R 13H	<i>9</i> 35	BR - RD RD - SC	18	i I		
	5 4	10	54 - RD	20			/3L	10	SL - RD	20			
	67	36	BK - BL	2/			Z-E/	36	BK - BL	2/	*		
COL 6	6 R		BL - BK	22		DIAL	Z-E2	11	BL - BK	22			
_	64	37	<u> BK - OR</u>	23		CODE	Z-E3	37	BK - DR	2.3			
	27	38	<u> </u>	2.4 2.5			Z.E.	/2	OR - BK	24	2		
	7 R	/3	OR - BK	24		ASS/GN.	Z-E5 Z-E6	<i>38</i> /3	BK - OR	2.5	1		
COL 7	7 H	39	BK - BR	127			Z.57	39	OK - OK	26			
	7 4	14	BR - BK	18	- 1		BLF-E/	14	BR - BK	22	<del>*</del>		
	87	40	8K - SL	15	ı	B / E	BLF-EZ	40	BK - SL	29			
COL8	8 R	15	SL - 8K	30		BLF	BLF-E3	15	54 - BK	30			
	8 H	4/	<u> </u>	3/	- 1	CONTROL	BU-E4	4/	YL - BL	3/	3		
<del></del>	<i>8 ← P /(2)</i>	- / 6	BL - YL	32	i		BLF-E5	16	K YL	32	- 1		
1.153	P2(2)	12	YL - OR OR - YL	33			BLF-ET	12	YL - OR	33	- 1.		
INT2	P3 (2)	43	YL - OR	35	- 1		DSS-E/	4/3	DR - YL YL - GR	34	*		
	P4(2)	18	GR - YL	36	1		055-E2	18	OR - YL	36			
	P1 (1)	44	YL - BR	37	ŀ	DSS	AT-EJ	иц	YL - BR	37	- 1		
INTI	(ابدم	/9	BR - YL	38	ı	CONTROL	PSS-E4	19	BR - YL	38	4		
,	P3 (1)	20	YL - SL	37	1		255-E5	45	YL - 5L	39	- 1		
TRANS	<b>アマリ</b>	44	56 - YC VI - BC	40			DSS-E6 DSS-E7	46	3L - YL V/ - BL	40			
BATTERY	+R	2/	BL - VI	段	ŀ	SPARE	D33-27	2/	N/ - BL BL - VI	<u>4/</u>	<u> ¥</u>		
NIGHT	BN	47	VI - OR	43	1	COMMON	30	47	VI - OR	<i>K</i> 3	4		
ALLCALL	BA	22	0R - VI	44	ſ	(410/1/	8/	22	0R - V/	44			
PAGE	PB	48	VI - GR	45	I	INDIV.	82	48	v/ - GR	ХГ	5		
	- p + L	23	GR - V/	16	l	INCOMME	B3	23	GR - V/	16	,		
BATTERY	74	24	29 V/ - 8R 47 24 BR - V/ #8				94	49	v/ - 8R	¥7			
DATTERT	+4	50 VI - SL 49			ŀ	HANDS	BS HFB	50	V/ - SL	<del>149</del> 49	₩.		

cox	OR CHART
WH	WMITE
BL	BLUE
ar	ORANGE
OR	GREEN
BR	BROWN
54	SCATE
RD	RED
BK	BLACK
YL	YELLOW
V/	VIOLET

Notes 1. Connect in multiple to KOU TERM. BLOCK B at the MOF.

- 2. Connect to assigned Intercom Dial Code Number(Z) at kSV TERM. BLOCK C (or D if equipped.)
- 3. Connect to assigned BLF terminal on KSU TERM BLOCKE at the MDF. Terminal on KSU TERM BLOCK E is determined by Dial Code assigned to corresponding extension.
- 4. Connect to assigned DSS terminal on KSU TERM BLOCK F at the MOF. Terminal on KSU TERM BLOCK F is determined by Dial Code assigned to corresponding extension.
- 5. Connect to Incoming CO Audible Control on KOU TERM BLOCK C at the MOF.
- 6. D indicates spare conductor that should not be utilized for any function.

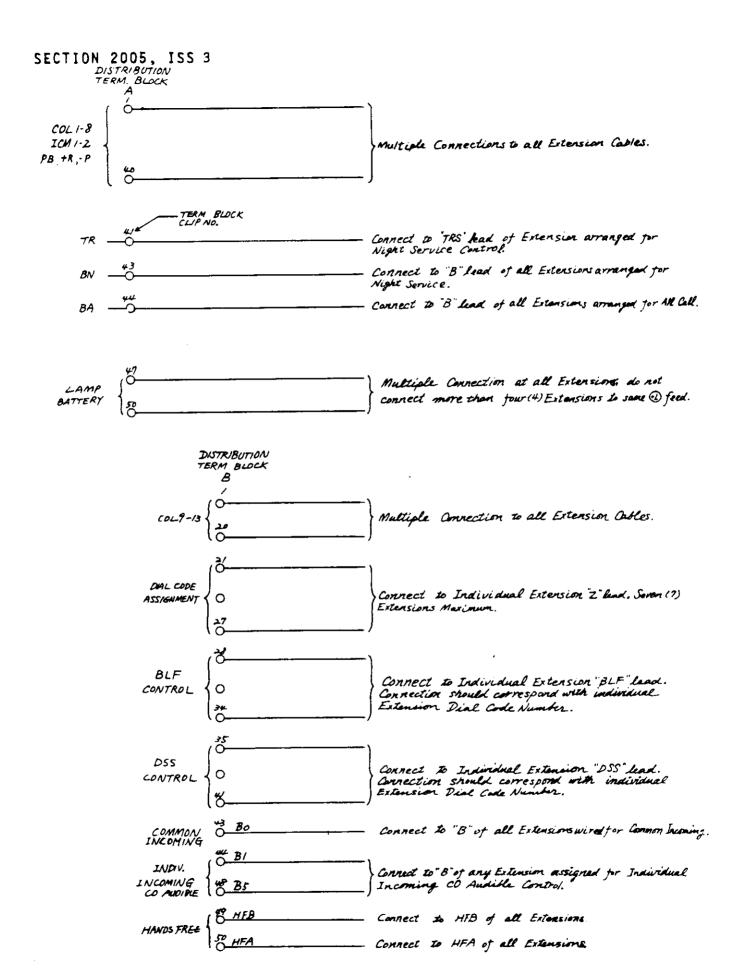


Figure 2b Connection of Extension Cable to Distribution Terminal, Wiring Plan B

OLDR CHART

SECTION 2005,

ISS 3

or BT-1530W/ CO LLAR Expension 15 1. Equipped on BT-2250 KSU

connect to assigned Intercom Net Code(z) at KSV TERM NOCK C(orD if equipped).

Connect to assigned RLF terminal on KSU TERM Block E at the MDF. Terminal on KSU TERM BLOCK E is beternined by Dal Code assigned to corresponding extension.

Connect to assigned DSS terminal on kSV TERMINAL BLOCK F SI THE MOF TERMINAL ON KSV TERMINAL BLOCK F is determined by Duel Code assigned to corresponding extension.

connect to Incoming CO ERM BLOCK C OF THE MOF. I indicates spare conductor that should not be utilized for any function.

	3 3	86	\$ P	15	9	ø	<b>½</b>			Votes			ું જ	P.	787		mi mi	ا ب <u>د</u>	Ų,	ટ્રે ફે		}		ફ. ડે. ફ	<b>%</b>	12	36	ď	3		بر. 6.	Ť	12	•	5. 4	₹.	ō					
7	Ţ	Abre	K			_		- {	ā -	_		_		*	=	_	_		- ;	<u>.</u>	_	_	_		<b>\</b>	<b>-</b>				. 3	_	_		_	_	*	_		<u>-</u>		×	_
Ringer	20078	15.0M	\$	7	~]3		٦	7		1		3	~	*	<u>,                                    </u>	,	0/	1,9	1	$\neg \neg$	3	2	4	7 7	30	7	2	7	33	3	_	2	2	2,3	/ 1	3 5	2 3	3	3	5	3	100
74.5	ıI.	ય જૂ	78 -	- WH	- 04	3 9		8	ž		L 24	da.	80	٩	400	80	- AD	36	- 40	8 8	8	78	¥	1 8K	- 8K		- 84	- 76		7 8	7	<b>6</b> 6 ;	י גר	7,	70	2/3	¥0 '	- 64		-00	7	
0	١,٠	COLOR	- i	- 78	1	× ×	1	1 1		- 1	100	1 1	YO.	80	400		BR						¥	OK -	- 88		12		; ;;	77	30	- 1	2	- 75	7	- 1		1		1/2		75
708	NOV	2/4	7	`	7	٩	<u></u>	35	1/2	٥١٠	1	,9	32	,	2	9	•	35	0	;   	17	7	4	39	*/	9 4	7 3	1	7 6	2	0	* -	, ¢	٥٢	77	1	, 7	20 3	7	2 2	٥	27
CONNECTOR	IEAD	DESIG.	2 . E /	Z - E Z	2.83	7.5	2.56	2.67	Z-E3	7 2 7	2.5//	2.5/7	2.6/3	2.6/4	(F-E2	(F-F3	42.5h	1.F-ES	2 - 2 - 2	815 EP	12-57	BUE-EIO	1/2-6/	(f-E/3	Y-8/4	755-E/	255-67	255-64	3	255-67	13-556	755- 67	DS-611	25-E/1	255-E/3	1 6	200	78	83	38		ľ
8			$\dagger$	ш		1_	J	ш			٦	Ш			1 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4																					П		-	Ĺ 4			
		FUNCTION					DIAC	CODE	4551G.	٠								86F		2								226		CONTROL						9	;	NONI	INCOMING	ļ	1	SPARE
3		Yet.	$\downarrow$		_	_	7	_	<del>- ; -</del>	_	_				_	,		_	*		_	_						W.E. I.	_		_					_	_	_	_	$\rightarrow$		
Binder)	12.0	7,75 6,75 6,75		۲'	א	5	•	1	e 0	0	\	7/	? !	* 5	1	17	10	1	1	13	7	3	۲	77	*P •	7	ì	32	2 2	Ļ	36	3	9	2	3	W #	2	5	9#	4 20	675	દ
(2nd	١	<u>~</u>	70-	H/H	X 3		W.H	BR	ī	HW	78	AD	30	3 9	- AD	BR	OY-	7 3	3 2	BK	80	*	28	18	¥ i	Z X	70-	7 5	, 02 7	- 98	7,	77	56	7,0	1 3	Yo	- 11	- 98	7	, V/	24	11
8	CAR! E	COLOR	WH	78	,			, ,	ב ב ב		1	. 78		200	36	- 08			18		, 0 1	20	¥	36	XI:	4 4	72			ı ı	, & >		1 1	*		;			- 1	BR -	- 1	- 75
STOR	CONN	ğ Ş.	76		٦	22	PF)	2.0	3 0	5	3 (	9	32	33	66	34	~ \	3	36	;	37	7 00	8	7	2	15	3	•	,	2	2 3	6/	2	2 3	1	4.2	77	g,	7 :	3	2	7
CONNECTOR	LEAD	DE5/6.	1	× :	12	T01	YOU	7 01	10,	4//	111	711	17/	/HZ/	77/	137	*	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	1 2	<b>/</b>	H 4	12.7	151	137	1,2	16.8	H9/	79,	17.8	HU	7,4	JAK.	181	76,	861	1461	7//	107	× 3 5	707	11.50	
0	F		1	<u> </u>	.1		7 0/70 J	L- :	$\dagger$		ш	$\dagger$		C02/12	┨	_1	7	1	$\dagger$	4/700	_1_	+	ال ري ريد		$\dagger$	1	Ц	$\dagger$	Ц,	ш	$\dagger$	<b>–</b>	Ġ H		<u>1</u>		4			4		4
L	_	FUNCTION		700			Ü	) 		,	3			COT		_	COLIS			Š	_	L	?	<u> </u>		7/ /07	}		60.70	<u>.</u>		ò	3		61.100	}			C 707		FOFF	
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Binder	150	CLIP		* *	*	\$	7	*	3	0/	//	7	*	٦/	>	7	*	13	7	7 7	7 7	17	1		1	2	⇉	3,5	ş	*	2 2	2	٦	2	2	7	\$	3 3		9		
Clst B	CABLE	COLOR	70	2 2	W.H.	4R	HA	¥ 3	72	- 10/14	79	2 9	\$ 2	- 6.K	a Y	X	12 12	- AD	- 84	¥ 8	¥	*	4	*	25	¥	4	4	ء 17	× ×	- 0x	7/	3	78 :	<u>'</u>	8	7	, GX	- 84	30	3	
4	2	3	*	7 3	80	1/1	48	*	HM	ş	48	7	8	Y	8	2	\$ 2	35	84	78	8	ž	G.R.	38	79	ĸ	<u>,</u>	7 7	OR.	7 6	12	9.K	취:	2	. 76	>	*	100		38		
TOR	CONN	\$ 6.	97	27	7	2 8	7	£ 7	30	÷	'n	٥	1	33	0	3	3.2	0/	36	//	, 7	3.5	?	2 2	20	47	1	42	//	24	40	•	50	77	72	604	77		63	37	, , ,	
CONNECTOR	UEAD	DEST 6.	1	1 2	7/	7.7	2 %	77	3.7	3.8	I,	177	4 R	4 4	11		7.5	75	6.7	¥ 3	70	1/2	200	77	87	7.	X A	(4)/	27	33	610)	32	33	TR	*	NO	700	3	1	11	1,1	
7		rdACTION	_ <b>4.</b> .	/ 700			2702			60/3			7 % 7				5 700			9 700	•		COL 7 1	1		200			/NT 2			////		TRANS	MITTERY	WENT	7000	1	; ; ;	BATTER!	<u>.</u>	

Distribution Terminal Block Wiring Plan C Figure 3a

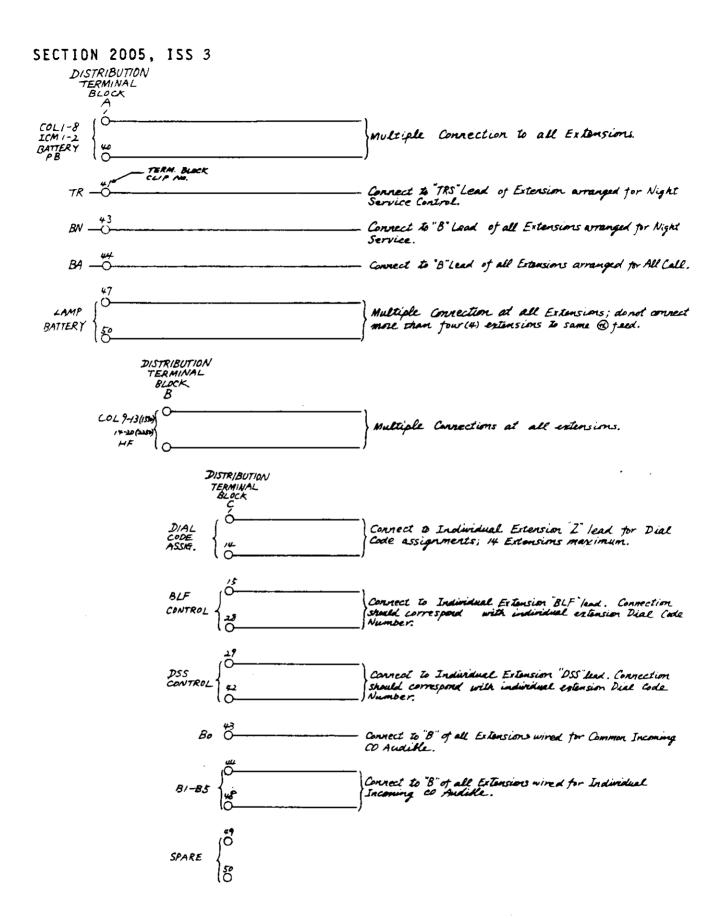


Figure 3b Connection of Extension Cable to Distribution Terminal, Wiring Plan C

BLOCK B (or B1) at the MDF. CONN C (3rd Binder) of the branch cable requires selective connections at KSU TERM BLOCK C (or D), E, and F for Intercom Dial Code Assignment, DSS, and BLF control.

- Table D lists the specific conductors on BT 1530/2250 Key Telephone(s) branch cable(s) that are assigned to selective wiring functions. Extension selective wiring functions are cross connected at the MDF to the corresponding KSU TERM BLOCK for the particular function. The terminal connection at each KSU TERM BLOCK is determined by the Dial Code assigned the particular extension.
- When the number of extensions connected to the same Distribution Terminal exceeds FOURTEEN (14), an additional twenty-five (25) pair cable is required for the branch connection. The conductor assignment would be similar to that of CONN C (3rd Binder).
- Distribution Terminal Blocks should not be looped (a branch cable connection between two or more Distribution Terminals) unless the total number of extensions connected to these Distribution Terminals does not exceed FOURTEEN (14).
- READ BOTH WIRING PLAN B AND WIRING PLAN C INSTRUCTIONS AND CONDUCTOR/TERMINAL ASSIGNMENT REFLECT FULL SYSTEM CAPACITIES/FEATURES OPERATION. THE WIRING PLANS CITED ARE INTENDED TO SERVE AS A GUIDELINE IN DETERMINING ACTUAL SYSTEM CABLING REQUIREMENTS. VARIATIONS CAN BE MADE TO THE PLANS INDICATED BASED UPON ACTUAL SYSTEM CAPACITIES/FEATURES UTILIZED AND FUTURE EXPANSION ANTICIPATED.
- 2.05 Each extension telephone or distribution (branch) cable should be appropriatly marked at the MDF.
- Care should be exercised to insure proper distribution of Lamp Battery (+L) current at each Distribution Terminal and the MDF. Distribution Terminal branch cable CONN A (1st Binder) connections at the MDF should be divided between KSU TERMINAL BLOCK A and BLOCK Al to insure use of all available KSU Lamp Battery 🕕 power feeds.
- READ 2.07 When Wiring Plan B and/or Wiring Plan C is used, the DC Resistance of any conductor between the MDF and Distribution Terminal should not exceed two (2) ohns.
- 3.00 INCOMING CO LINE AUDIBLE RING CONNECTION
- 3.01 For the extension to receive the Common CO Incoming Audible, the extension "B" lead is connected to "BO" on KSU TERMINAL BLOCK C. Refer to Section 2003; 6.00--Incoming CO Audible Ring Distribution for the terminal assignment on KSU TERMINAL BLOCK C

READ

READ

3.02 For the extension to receive the Individual CO Incoming Audible, the extension "B" lead is connected to B1-B5 on KSU TERMINAL BLOCK C (or B6-B15 on KSU TERMINAL BLOCK D if so equipped). Refer to Section 2003; 6.00 Incoming CO Audible Ring Distribution for terminal assignment.

READ

- 3.03 For the extension to receive the CO Incoming Common Audible only during the Night Service Operation, the extension "B" lead is connected to "BN" on KSU TERMINAL BLOCK A. Refer to Section 2003; 6.00 Incoming CO Audible Ring Distribution for terminal assignment.
- 4.00 ALL CALL CONNECTIONS

READ

4.01 For connection to the All Call function, the "B" lead of any extension that is not receiving any CO ringing is connected to the "BA" terminal on KSU TERMINAL BLOCK A. If All Call is not required, insulate and tie back for future use.

READ

4.02 Any extension that is wired to receive Common Incoming CO Audible (BO on KSU TERMINAL BLOCK C) will receive All Call except during the CO Incoming ring interval.

READ

4.03 Any extension that will be wired to receive CO Incoming during the Night Service (BN on KSU TERMINAL BLOCK A), will receive All Call at all times except during the Night Service operation when CO Incoming will be having priority at the extension when both CO Incoming and All Call occur simultaneously.

READ

4.04 Any extension wired to receive Individual Incoming CO Audible will not receive All Call unless installer connected DIODES are wired to connect the All Call function to the Individual Incoming CO Audible Control lead. Refer to Section 2003; 6.00 Figure 4 — Typical CO Incoming/All Call Terminations for connections of DIODES to provide All Call at Indiv. CO Line Audible equipped extensions.

READ

- $4.\overline{05}$  When an extension is programmed to receive Individual CO Incoming and All Call, All Call will be heard at all times except during the Individual CO Incoming interval.
- 5.00 INTERCOM DIAL CODE NUMBER ASSIGNMENT

READ

5.01 For the Intercom Dial Code assignment, the individual extension "Z" lead is connected to the assigned dial code on KSU TERMINAL BLOCK C (or KSU TERMINAL BLOCK D when equipped).

### SECTION 2005, ISS 3

- 5.02 Refer to Section 2002; 5.00 Extension Intercom Number Assignment for connections at KSU TERMINAL BLOCK C and D.
- 6.00 BUSY LAMP FIELD CONNECTION
- 6.01 The individual extension Busy Lamp Field (BLF) lead is connected to KSU TERMINAL BLOCK E if a Busy Lamp Field is utilized. Refer to Section 2007; Busy Lamp Field for terminal designations on KSU TERMINAL BLOCK E.

#### **IREAD**

- 6.02 IF NO BUSY LAMP FIELD IS UTILIZED, THE INDIVIDUAL EXTENSION "BLF" LEAD CANNOT BE MULTIPLED BUT MUST BE TERMINATED INDI-VIDUALLY ON SPARE MDF TERMINALS, OR INSULATED AND TIED BACK FOR FUTURE USE.
- 7.00 DIRECT STATION SELECTION CONNECTION
- 7.01 The individual extension Direct Station Selection (DSS) lead is connected to KSU TERMINAL BLOCK F if a Direct Station Selection Unit is utilized. Refer to Section 2007 Direct Station Selection, for terminal designations on KSU TERMINAL BLOCK F.

### READ

- 7.02 IF NO DIRECT STATION SELECTION UNIT IS UTILIZED, THE INDIVI-DUAL EXTENSION "DSS" LEAD CANNOT BE MULTIPLED WITH OTHER EXTENSIONS BUT MUST BE TERMINATED INDIVIDUALLY ON SPARE MDF TER-MINALS, OR ISOLATED AND TIED BACK FOR FUTURE USE.
- 8.00 TRANSFER KEY OPERATION
- 8.01 Standard Connections

### READ

- a. The extension TRAN Key is a locking key that may be used for a number of optional services for Intercom and CO Line functions. At no time can both services be provided from the same extension.
- b. The extension TRAN Key is factory equipped shorted so that inadvertant operation of the TRAN Key during normal service will not prevent operation of any standard feature. When the switch is to be used for some optional service, the shorting strap across the switch contacts must be cut by the Installer.

#### READ

- c. IF NO TRANSFER KEY FUNCTIONS ARE TO BE USED ON THE INDI-VIDUAL EXTENSIONS, THE EXTENSION "TRS" LEAD CANNOT BE MULTIPLED WITH OTHER EXTENSIONS BUT MUST BE TERMINATED INDIVIDUALLY ON SPARE MDF TERMINALS OR INSULATED AND TIED BACK FOR FUTURE USE.
- 8.02 TRANSFER Key used for Intercom Calls

- a. Any extension(s) can be wired to transfer an Intercomcall to any predetermined extension(s).
- b. The shorting strap on the TRAN Key switch at the extension(s) that will transfer the call is cut by the Installer.
- c. The "TRS" lead of the extension(s) is connected at the MDF to the "Z" lead of the extension that will receive the transferred Intercom call.
- d. Any number of extensions can transfer the Intercom call to the same extension. Any number of transfer arrangements can be placed in the system as long as the extension "TRS" leads are isolated and connected to assigned "Z" lead at the MDF.
- e. Figure 4 shows Extension 11 arranged to transfer Intercom calls to Extension 21.

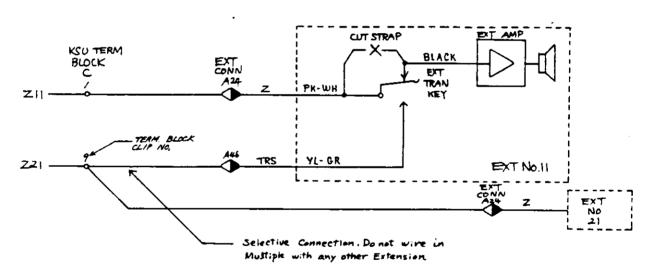


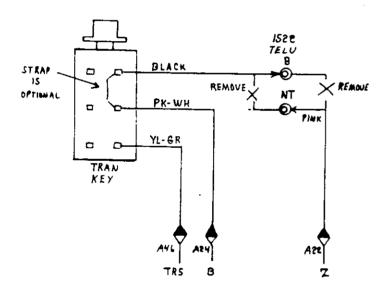
Figure 4 Transfer of Intercom Calls to a Predetermined Extension

### 8.03 TRANSFER Key used as a "Privacy Key"

- a. The TRAN Key can be wired for use as a "Privacy" Switch to prevent any Intercom calls at the extension(s). Busy tone is returned to the caller when the Privacy feature is operated.
- b. The shorting strap on the TRAN Key of the Extension(s) to be wired for "Privacy" is cut by the Installer. The Extension(s) "TRS" lead is then isolated and left unterminated at the MDF.

### SECTION 2005, ISS 3

- 8.04 Using the Extension TRAN Key to Operate the Night Service Feature (system without DSS).
  - a. The TRAN Key at any extension arranged for Incoming CO Audible can be wired to operate the Night Service. The TRAN Key is pressed and remains operated.
  - b. To operate the Night Service Feature, the following action is accomplished at the controlling extension:
    - \*At the controlling extension circuit card, swap the connection at TERM "NT" and "B". Push-on type terminals are used.
    - At the MDF, swap the "Z" lead (A24) and "B" lead (A22) connections on KSU TERM BLOCK C of the station cable that will control the Night service.
    - Figure 5 illustrates the circuit at the extension(s).



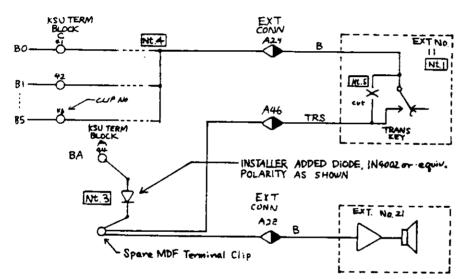
- 1. Swap connections at TERM "NT" and "B" on extension circuit cark
- 2. CONN ARY changes to "B" lead and CONN ARE changes to "Z" lead
- 3. Swap extension ARY and ARR on MOF
- 4. Isolate extension TRS (A4L) and connect to TR on KSU TERM BLOCK A.

#### FIGURE 5

MODIFICATION OF EXTENSION TRAN KEY FOR NIGHT SERVICE CONTROL

- c. The controlling extension "TRS" lead (A46) is isolated from all other extension "TRS" lead and is connected to "TR" on KSU TERM BLOCK A on the MDF.
- d. Any number of extensions can be wired to operate the Night Service. However, on such a case, all extensions' TRAN Key must be restored before Day Service can resume.
- e. The TRAN Key of an extension <u>CANNOT</u> be wired for Night Service and ICM Transfer simultaneously since both functions use the extension "TRS" lead.

- 8.05 Using the TRANSFER Key to Switch Incoming CO Audible to Predetermined Extension(s).
  - a. The TRANSFER Key of any extension arranged to receive Incoming CO Line Audible can be wired to transfer the Audible to a pre-determined extension(s).
  - b. The extension TRANSFER Key must be modified by the Installer as per paragraph 8.04
  - c. Figure 6 shows the extension "TRS" lead circuit and connection for transferring the Incoming CO Audible. A DIODE, IN4002 or equiv., must be used to isolate the extension "B" functions when this feature is connected.



#### NOTES

- Nt. 1. Extension Not1 TRAN KEY Wired par Para 8.04.
- Nt. 2 Extension Noz1 (e.8) wired to receive All Callond Incoming CO when TRAN KEY operated.
- Nt. 3 No diode required if Ext No. 2169) is not fired for A11 Call.
- Nt.4: Connection is determined by Incomings CO Assignment.
- Hts. Cut strap only if one (1), not both, extensions will ring when TARN Keris aperated

Figure 6 Extension TRAN Key Modified for Transferring Incoming CO Audible to a Predetermined Extension

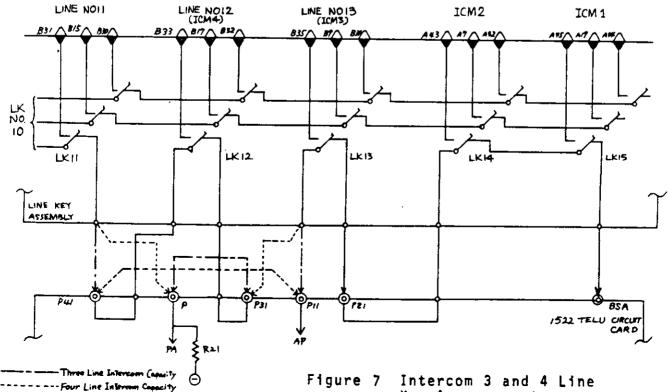
### 9.00 ADDITIONAL INSTALLER OPTIONS

- 9.01 Expansion of the Intercom Lines on the BT1530/2250 Key Telephone
  - a. Both the BT1530 and BT2250 can be wired to operate on up to four (4) Intercom Lines. Each Intercom Line that is added reduces the number of CO Lines by one (1).
  - b. Table E lists the modification procedures for increasing the number of Intercom Lines to three (3) or four (4) on the BT1530 and BT2250 Key Telephones. Figure 7 shows the Extension Line Key circuit for three (3) or four (4) Intercom Lines.

TABLE E MODIFICATION TO BT1530/2250 CIRCUIT CARD CONNECTIONS FOR EXPANSION TO THREE (3) OR FOUR (4) INTERCOM LINES

Intercom Capacity	Step	Lead Color	Lead Location	ACTION TO BE TAKEN
3	1 2 3 4	Slate Red Orange Slate	P21 (1522 TELU) P (1522 TELU) P31 (1522 TELU) Loose	REMOVE and Leave Loose REMOVE and connect to P21 (1522 TELU) REMOVE and connect to P (1522 TELU) Connect to P31 (1522 TELU)
4	1 2 3 4	Slate Red Blue Slate	P21 (1522 TELU) P (1522 TELU) P41 (1522 TELU) Loose	REMOVE and leave loose REMOVE and connect to P21 (1522 TELU) REMOVE and connect to P (1522 TELU) Connect to P41 (1522 TELU)

c. Refer to Tables A and B, BT1530/2250 CONNECTOR Wire assignments. Note that the Intercom Three (ICM 3) and Four (ICM 4) wire color code assignments are different for the BT1530 and BT2250 Key Telephone. This is due to the added CO Line capacity of the BT2250 Key Telephone.

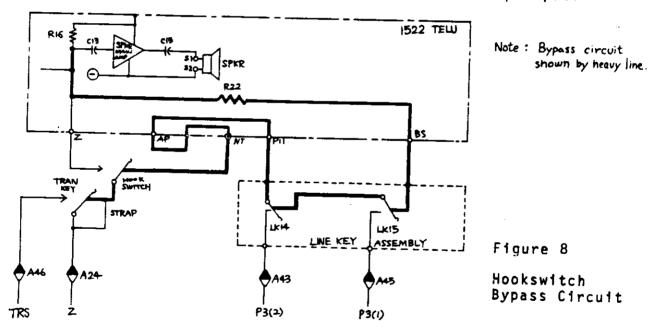


Note Model 1530 shown, connections are same on 1522 TELU for 87.2250

Key Arrangement

PAGE 18

- d. Intercom Three (ICM 3) and Four (ICM 4) are connected to the MDF at KSU TERMINAL BLOCK C. CO Lines 12 and 13 (1530) or 19 and 20 (2250) should be left connected at KSU TERMINAL BLOCK B as they may be used for special service such as private lines to individual extensions.
- 9.02 Hookswitch Bypass (Signalling a Busy Extension)
  - a. Each extension can be installer wired to receive incoming Intercom Line call indication when off-hook on a CO Line call. When off-hook on another Intercom Line, busy tone will be returned to the caller.
  - b. To bypass the extension hookswitch, Yellow wire on TERM BSA in the extension is connected to the station circuit card Terminal "BS". Figure 8 shows the revised wiring arrangement for Hookswitch Bypass. Note that the Extension "Z" function is routed through the Intercom Line Keys (LK14-15) and returns to the Extension Amp input.



- c. When the extension is called, the Tone (or Voice) calling will be heard through the extension speaker at a lower level so as not to disturb the conversation taking place.
- 9.03 Dial Restriction CO Lines

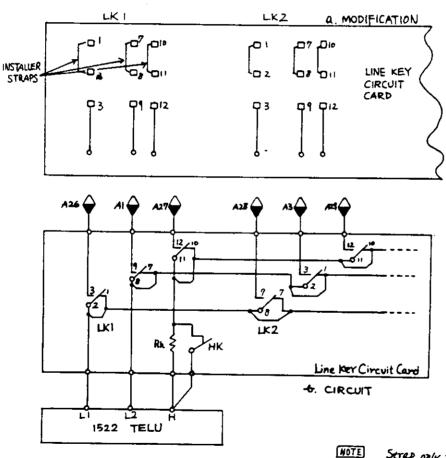
- a. The CO Line(s) at any extension(s) can be arranged for Dial Restriction. This prevents the extension user from dialing a call on the particular CO Line(s). Modifications for both the Rotary Dial and Omega-Tone dial model telephones are the same.
- b. To restrict the individual CO Line(s) at any extension(s), the restricted extension(s) TIP-RING conductors for the restricted CO Line(s) are reversed at the extension(s) branch cable termination on KSU Term. Block A(orB) at the MDF.
- c. If all extensions are to be restricted from dialing on the CO Line(s) (Incoming Service Only), the individual CO Line(s) TIP-RING connections are reversed on the KSU CONNECTOR CABLE termination on the MDF.

#### 9.04 CO LINE CONFERENCING

- a. By strapping the individual CO Line Keys, an extension can conference with two CO Lines. The two CO Line Keys that are to Conference are pressed simultaneously
- b. Each CO Line Key that can be Conferenced requires straps across individual line key switch contacts. Figure 9 illustrates Line Key straps and circuit diagram for Conferencing.
- READ c. When conferencing of CO Lines is accomplished by this method, TIP-RING Battery for each CO Line to be Conferenced must be the same polarity.
  - d. No equalization or amplification is provided by this method. CO Line voice levels will be affected by individual CO Line characteristics as well as loop length.
- READ

  e. When CO Line Keys are strapped to achieve CO Line Conferencing, the extension CO Line Keys MUST NOT remain operated (un-intensional or mischievously) while the handset is ON-HOOK as the CO Line remain conferenced. This results in interference with normal operation by other extension.
- other extension. 9.05 Mic Cutoff (Privacy) When Equipped with HF
  - a. When an extension is equipped with Handsfree Talkback (HF) on the Intercom Line, the extension microphone circuit (HFS) can be cutoff by installer rewiring of the extension TRAN Key. This allows for the extension user to become aware of an incoming Intercom call, yet prevents eavesdropping by the caller.
- READ b. The extension TRAN Key cannot perform two (2) functions at the same time since both functions will operate simultaneously. The TRAN Key can be modified for Mic cutoff

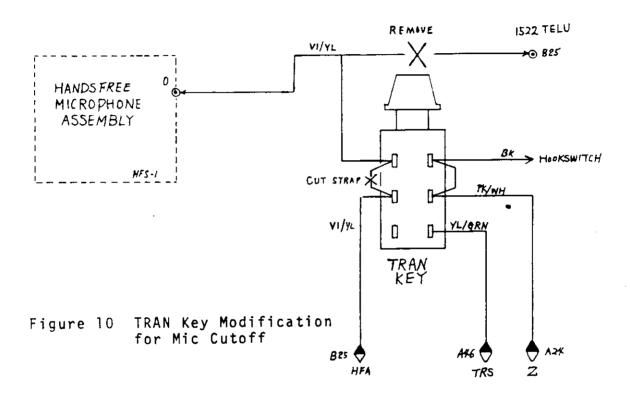




Strap only those Line Keys which are to be "Confevenced". Do not strap any Intercom (ICM) Line Keys or Line Key Thirteen (LK/3) on the BT-1530 Telephone or Line Key Twenty (LK20) on the BT-2250 Telephone.

Figure 9 CO Line Conferencing Line Key Modification and Circuit

- only if no other function is operated or if interference with another function can be tolerated.
- c. Figure 10 illustrates the wiring modification for converting the TRAN Key for Mic cutoff.



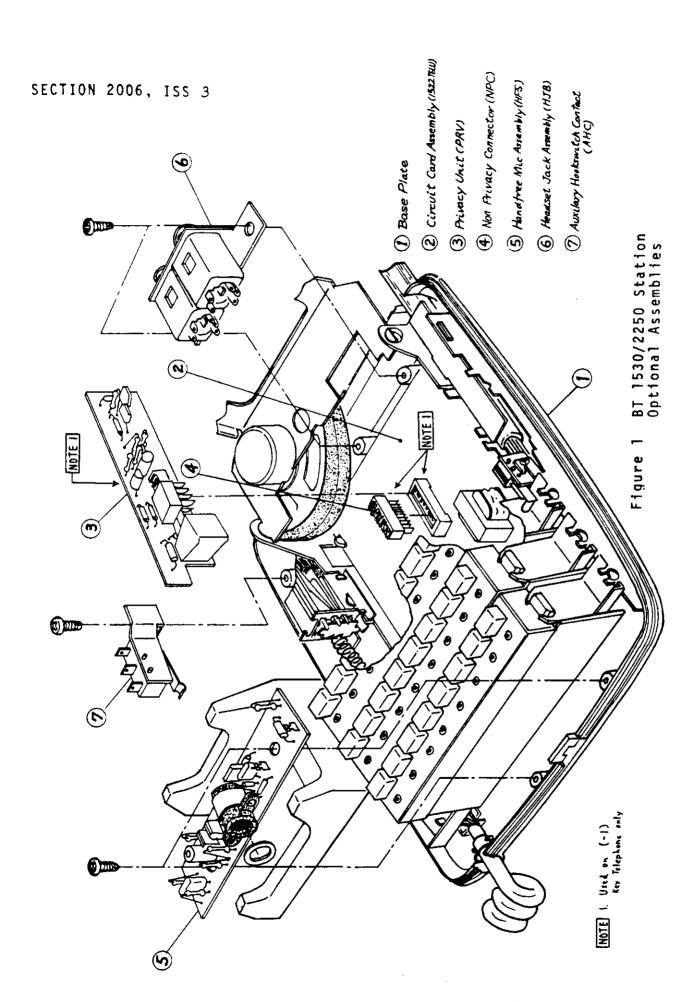
- d. Refer to Section 2006, 5.00 INSTALLATION OF HFS for familiarization with the HFS circuit operation.
- 9.06 Hookswitch Cutoff of the All Call/CO incoming Audible when Off-Hook
  - a.
    The All Call/CO Incoming Audible is factory wired to cut-off when the handset is taken off-hook. This eliminates the extension being called by the All Call or BGM on the station speaker while talking on a CO or ICM Line
  - b.At any extension that receives the Common CO Incoming Audible the hookswitch cutoff should be eliminated by removing the SHORT BAR strap at TERM J on the extension circuit card.
- READ c. At any extension wired for private line service or Individual CO Incoming Audible, the cutoff may or may not be disabled depending upon user preference.

# 

# BT-1530/2250 KEY TELEPHONE SYSTEM

# INSTALLATION OF OPTIONAL STATION ASSEMBLIES

- 1.00 GENERAL
- 1.01 Both the BT 1530 and BT 2250 Key Telephone have available a number of optional assemblies that are used for special functions or applications. This section describes installation of any OPTIONAL KSU ASSEMBLIES for any corresponding equipment or modifications that are required at the KSU when the particular station assembly is installed.
- 1.02 Refer to the APPENDIX for familiarization with disassembly of the BT 1530/2250 Key Telephone.
- 1.03 Refer to Section 3002 CIRCUIT DESCRIPTION OF OPTIONAL FEATURES for description of the circuit operation
- 2.00 STRAPPING THE STATION FOR EXECUTIVE PRIORITY
- 2.01 Each BT 1530/2250 station is factory wired for CO line privacy (exclusion). Once an extension seizes a CO Line, the line becomes private to that extension and the CONF key pressed to allow another extension to enter the line. An extension can be arranged to automatically defeat the privacy as well as still retain privacy (except for extension so equipped).
- 2.02 To arrange an extension to defeat the privacy, a shorting bar is removed from TERMS PR-RP on the station circuit card.
- READ On BT 1530-1 station instruments, the station Privacy Unit is removed and replaced with a model NPC Non-Privacy Connector as illustrated in Figure 1.
- 3.00 OMEGA TONE DIAL INSTALLATION (CONVERSION)



PAGE 2

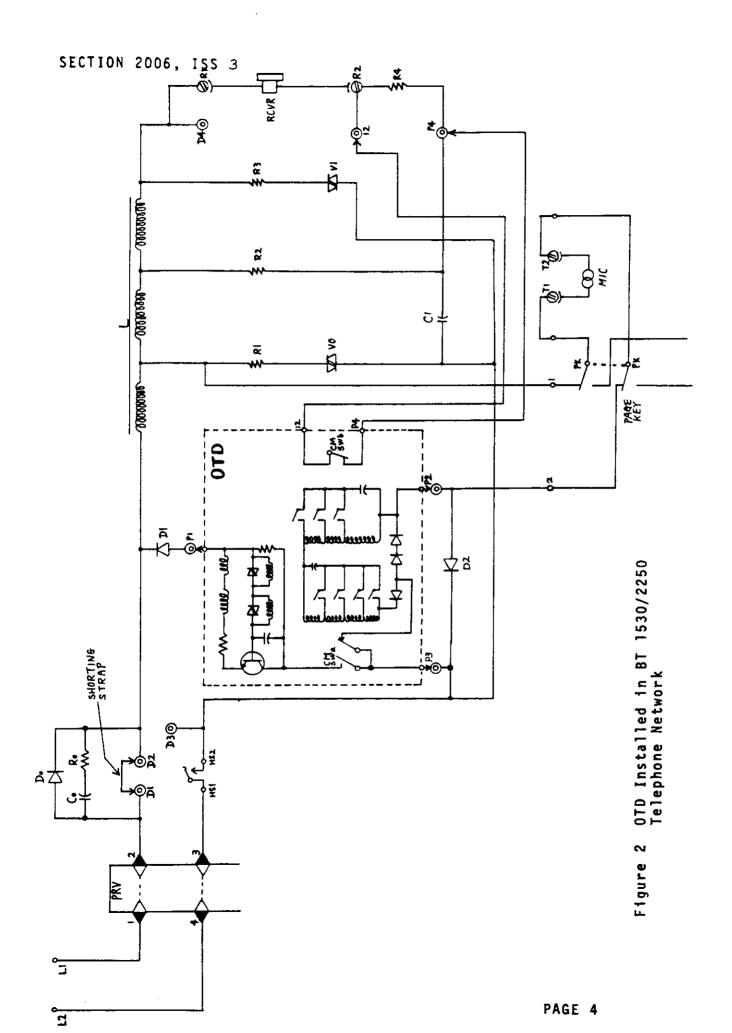
- 3.01 Any rotary dial model BT1530/2250 Key Telephone can be modified for push-button dialing by addition of the Omega-Tone Dial (OTD Push-on connectors are provided for ease of installation. The OTD dial is installed in the same manner for extensions with or without the CO Line Privacy Unit (PRV).
- 3.02 Procedures for Installation of the OTD into a rotary dial telephone
  - a. After removing the telephone housing and accessing the extension 1522 TELU circuit card, remove the six (6) yellow wires from TERMINALS D1, D2, D3, D4, P4, 12 and the shorting bar at P2-P3 on the extension circuit card.
  - b. Remove the Rotary Dial and Mounting Plate assembly from the Dial Support Bracket by straightening the tabs that hold the Mounting Plate and lifting the dial out of place.
  - c. Install the Omega-Tone Dial on the Dial Support Bracket from the front by loosening the OTD mounting screw and inserting the OTD dial into the Support Bracket Keyway. Tighten the OTD mounting screws to hold the OTD securely in place.
  - d. Table A lists the OTD wire connections to the 1522 TELU circuit card.

TABLE A

# OMEGA-TONE DIAL (OTD) CONNECTIONS TO 1522 TELU CIRCUIT CARD

Terminals on 1522 TELU	OTD Wire Color	OTD Terminals
P1 P2 P3 P4 12 D1-D2	Yellow Yellow w/Dotted Black Yellow Yellow Yellow w/Black Stripe Yellow Strap w/Shorting Bar	P1 P2 P3 P4 12

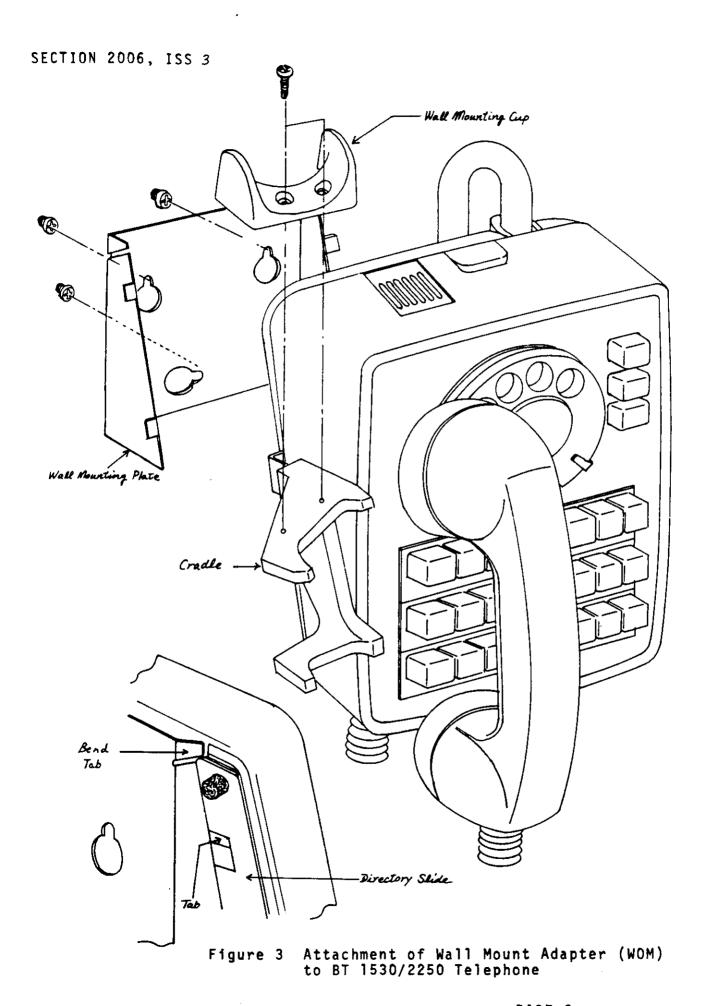
- e. Figure 2 illustrates the circuit diagram of the OTD dial in BT1530/2250 Telephone network.
- 4.00 INSTALLATION OF WALL MOUNT ADAPTER (WOM)
- 4.01 Both the BT1530 and BT2250 Key Telephones can be modified for wall mounting by addition of the Wall Mounting Adapter (WOM). No change in the telephone hookswitch mechanism is required.

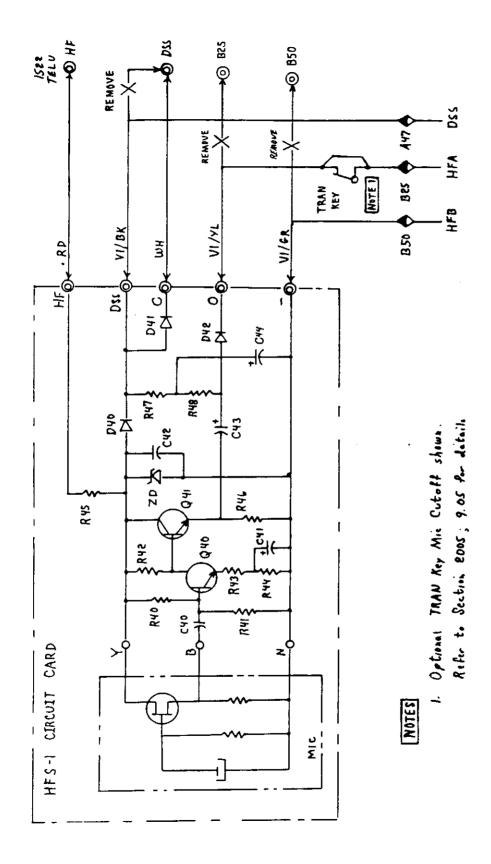


- 4.02 Procedures for converting any extension to a wall model.
  - a. Attach the Wall Mounting Cup to the handset cradle using the screws provided with the WOM unit.
  - b. Attach the Wall Mounting Plate to the wall, low side up. Keyhold slots are provided on the plate for ease of fastening.
  - c. Remove the Extension Directory Tray. Hold the station tail cable flat against the bottom pan of the telephone and insert the Wall Mounting Plate tabs into the Directory Tray Slide.
  - d. Apply pressure vertically, sliding the extension until it firmly seats on the Wall Mounting Plate.
- 4.03 Figure 3 Illustrates the method for attaching the WOM unit.
- 5.00 INSTALLATION OF THE EXTENSION HANDSFREE MICROPHONE ASSEMBLY (HFS)
- 5.01 The BT1530/2250 Key Telephone can be wired to operate with HF Talkback on ICM/DSS calls. A station handsfree unit Model must be added to each extension that will operate HF. This feature does not include HF reply on CO Line calls.

### READ

- 5.02 Initial Production models of the station handsfree talkback circuit card HFS (SERIES 0) has no provision for handsfree talkback on DSS calls. The model HFS-1 (SERIES1) provides this feature. Since addition of the DSS HF Talkback feature required circuit changes, the two circuit cards are not totally interchangable therefore:
  - a. SERES O HFS circuit cards will be carried in inventory for additions/replacement of such units already in service. Specific requests for such units should be requested under Order Number 1206.
  - b. Request ENG BULLETIN NO. 6 for Installation Practice, Circuit Description, and Schematic/Parts List of the model HFS (SERIES 0) circuit card if service of such equipment is necessary.
  - c. Request ENG. BULLETIN NO. 5 for conversion of systems using SERIES O type HFS equipment to SFRIES 1 if system conversion to HF Talkback on DSS calls is required.
  - d. All previously issued BT1530/2250 T.M. for SERIES 0 type equipment are separately updated for SERIES 1 type equipment.





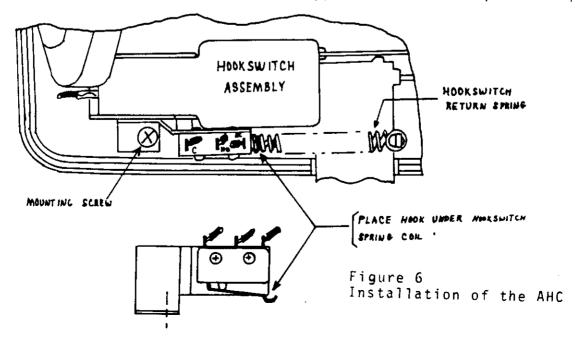
HFS-1 CIRCUIT CARD CONNECTOR TO EXTENSION CIRCUIT CARD FIGURE 4

PAGE 7

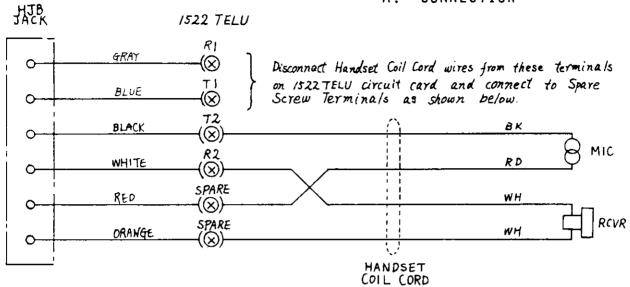
- 5.03 Procedures for Connection of Station Handsfree Talkback Unit (HFS-1) in the BT1530/2250 Key Telephone.
  - a. Remove the station housing and locate TERMINALS B25, B50, DSS, and HF on the 1522 TELU station circuit card.
  - b. Fasten, with the screws provided, the HFS circuit card on the station base mounting posts as shown in Figure 1. Do not yet fasten the HFS circuit card securely in place.
  - c. Peel the paper guard off the Microphone Baffle on the HFK circuit card. Press the pressure sensitive backing on the Microphone Baffle firmly against the Microphone access holes on the telephone base. While holding securely in place, tighten the screws that hold the HFS circuit card to the telephone base.
  - d. Remove the VIO-GR wire from TERM B50 on the station circuit card and connect to TERM on the HFS-1 circuit card.
  - e. Remove the VIO-YL wire from TERM B25 on the station circuit card and connect to TERM O on the HFS-1 circuit card.
  - f. Remove the VIO-BK wire from TERM DSS on the station circuit card and connect to TERM DSS on the HFS-1 circuit card.
- READ On SERIES O type HFS, the DSS lead from the station circuit card was formerly connected to TERM C on the HFS. Care should be taken to insure proper connection when HFS-1 (SERIES 1) is used.
  - g. Strap TERM HF on the station circuit card to TERM HF on the HFS-1 with the RED strap provided.
  - h. Strap TERM DSS on the station circuit card to TERM C on the HFS-1 with the WHITE strap provided.
- 5.04 Figure 4 illustrates the HFS circuit card connection to the 1522 TELU station circuit card.
- 5.05 No adjustment in the Station Handsfree Amplifier is required.
  An automatic gain control is incorporated into the HFK circuit card on the KSU to insure adequate "talkback" speach levels.
- 6.00 INSTALLATION OF THE HEADSET JACK ASSEMBLY (HJB)
- 6.01 The Headset Jack Assembly (HJB) provides for operation of the BT1530/2250 with any Headset utilizing a standard 396A or equivalent connector plug.
- 6.02 Plugging the Headset into the HJB jack automatically disconnects the telephone handset from the extension voice network. No provision is made on the HJB for visual/mechanical indication of Headset operation.
- 6.03 The telephone handset must remain off-hook during the Headset operation interval. This is required so as to maintain the PAGE 8

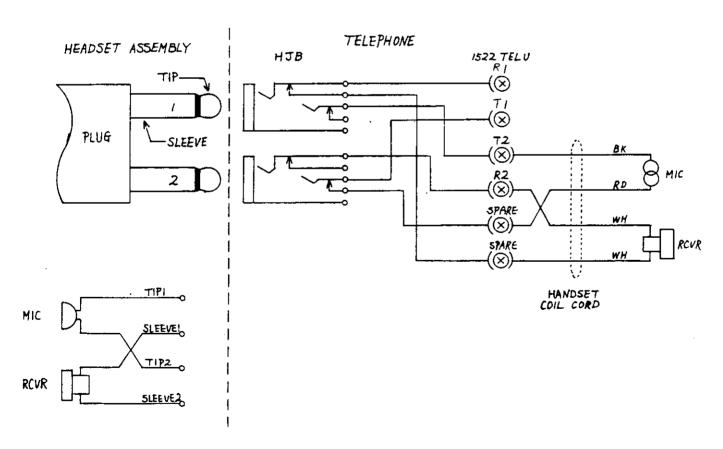
CO Line "H" lead control through the extension hookswitch as well as proper operation of the extension Privacy Unit (PRV) if so equipped.

- 6.04 Installing the HJB in the BT1530/2250 extension.
  - a. Figure 1 illustrates the location of the HJB mounting posts on the base of the BT1530/2250 telephone. Attach the HJB bracket to the mounting posts with the screws provided.
  - b. On the BT1530/2250 Telephone housing, cutout indications are provided for the HJB Access holes. Remove the cutouts with a drill bit or round file.
  - c. Figure 5 illustrates the extension wiring modifications for Headset connection to the BT1530/2250 Voice Network.
- 7.00 INSTALLATION OF THE SPA-S LOUDSPEAKER TELEPHONE ADAPTER
- 7.01 The SPA-S provides a terminal strip for cross-connection of the BT1530/2250 Key Telephone network/control functions to various loudspeaker telephone adapters. Tone dial model telephones require replacement of the standard OTD-1 dial with the model OTD-S dial.
  - a. Figure 6 illustrates mounting of the spare Hookswitch Contact assembly in the telephone. Care should be taken to insure proper operation of the spare hookswitch contact.
  - b. Figure 7 illustrates mounting the SPA-S in the telephone.
  - c. Figure 8 illustrates connection of the SPA-S to the Northern Telecom COMPANION II handsfree telephone adapter.
  - d. Figure 9 illustrates connection of the SPA-S to the Precision Components 4A type handsfree telephone adapter.



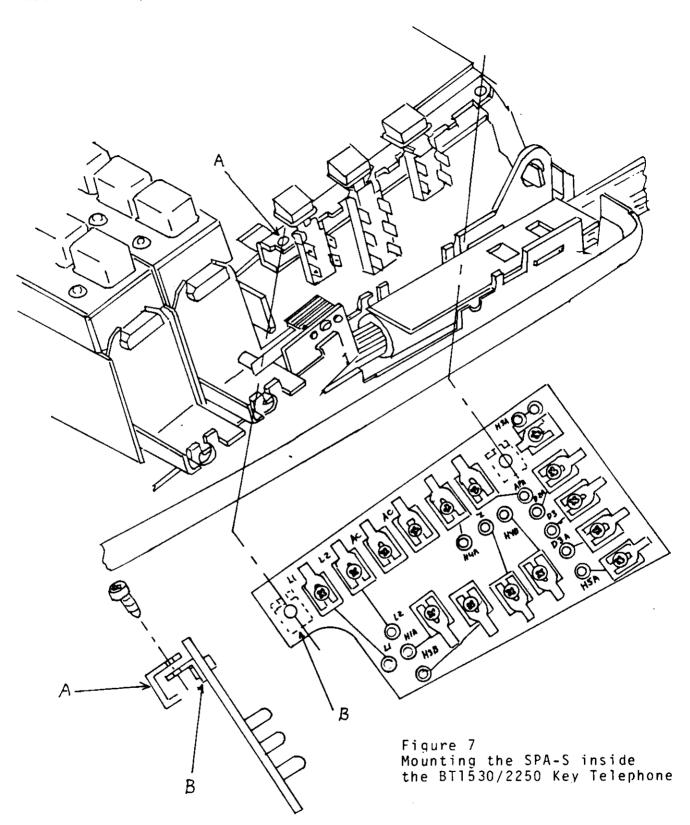
#### A. CONNECTION



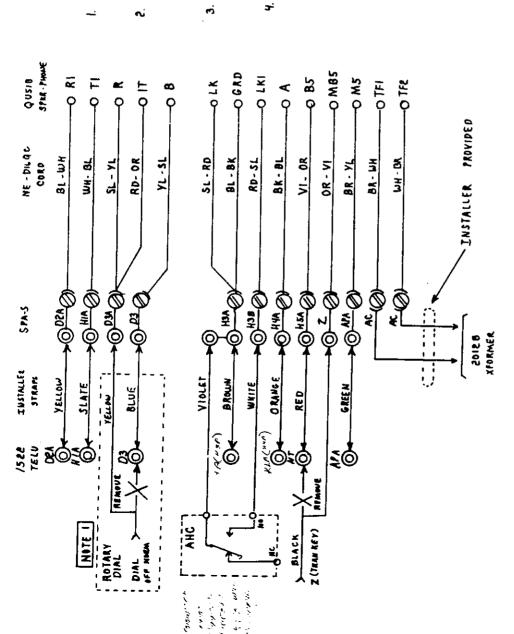


B. CIRCUIT

Figure 5 Extension Headset Jack (HJB)
Connection and Circuit



PAGE 11



42. (400)

6.0.0

2. ON TONE DIAL MODELS, CONNECT BLUE LEADS 4. INSULATE AND STATE CONDUCTORS OF DIGGE CORP WIRE FROM D3 AND COMMECT TO D3A OF SPA-S. OF OID-S DIAL TO D3 OF STATION AND D3A 3. REMOVE BLACK WIRE FROM NT AND CONVECT 1. ON ROTARY DIAL MODELS, REMOVE YELLOW NOT BEING UTILIZED DF SPA-S OF SPA-S 0

Figure 8 Connection of the SPA-S to the COMPANION II.

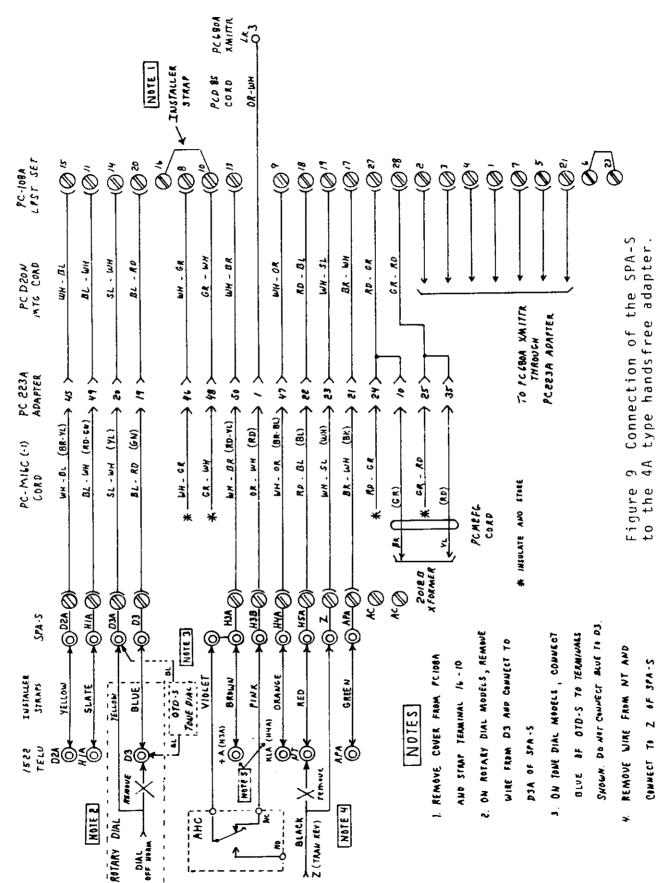
NOTE 2

7000 - S 7006 010L

B. \*000

TONE DIAL MODEL

**::::** ::



S. ( ) INDICATES TERMINAL ON -1 TELEPHONE

- 8.00 Installation of the OTD-OP Outpulse Dial
- 8.01 The OTD-OP Outpulse Dial provides push-button dialing on rotary dial CO Line services. The OTD-OP is system battery powered, no effect is felt on voice transmission at the telephone extension equipped for outpulse. The OTD-OP can be installed in either a rotary or tone dial equipped station, a tone dial face-plate required when coverting rotary dial models. When outpulse dialing is utilized in place of tone dialing, no OTRU DTMF Tone Receiver is required for the KSU.
- 8.02 Installing the OTD-OP in the BT 1530/2250 Key Telephone
  - Preparation for installing the OTD-OP in a rotary dial model telephone.
    - After removing the telephone faceplate and housing, remove the six (6) YELLOW and SLATE wires of the rotary dial from TERMINALS D1, D2, D3, D4, P4 and 12 on the station circuit card.
    - Remove the rotary dial and dial mounting plate from the dial support bracket by straightening the two (2) metal tabs that hold the dial mounting plate in place and lifting out the dial assembly.
  - b. Preparation for installing the OTD-OP in a tone dial model telephone
    - After removing the telephone faceplate and housing, remove the five (5) YELLOW wires on TERMINAL P1, P2, P3, P4 and 12 on the station circuit card.
    - Remove the tone dial by loosening the two (2) screws that hold the dial to the dial support bracket and lifting the tone dial out of place.
    - Remove the SHORTING BAR across TERMINAL D1-D2 and connect across TERMINALS P2-P3
  - c. Installing the OTD-OP in the telephone
    - Table B lists the OTD-OP wire connections to the station circuit card

TABLE B

OTD-OP DIAL CONNECTIONS TO K22 TELU CARD						
TERM (1533 TELU)	OTD-OP WIRE COLOR	OTD-OP TERMINAL				
D1 D2 D4 P4 12 H4A (LKA)	Yel w/Blk Yel Slate w/Rd Slate Slate w/Dotted Rd Red Black	D1 D2 D4 P4 P4 ⊕				

- Mounting screws (2) are supplied with the OTD-OP. After starting the mounting screws, place the OTD-OP into the dial support bracket from the front by inserting the screws into the keyway on the support bracket. Tighten the two screws to hold dial firmly in place and attach housing and faceplate
- Verify operation of the dial by calling designated check numbers
- d. Utilizing the OTD-OP Telephone Loudspeaker Adapter (SPA-S)
  - Provision is made for using the OTD-OP with telephone loudspeaker adapters such as the Companion II or PC-4A. The OTD-OP can be used to dial calls while in the loudspeaker mode. The dial pulse noise will be shunted during dialing.
  - To utilize the OTD-OP, connect TERMINAL SP on the OTD-OP to TERMINAL D3A on the SPA-S Loudspeaker Adapter.

## 

# BT-1530/2250 KEY TELEPHONE SYSTEM

## INSTALLATION OF OPTIONAL SYSTEM ASSEMBLIES

- 1.00 GENERAL
- 1.01 This section describes installation of the optional BT1530/ 2250 Key Telephone System assemblies (apparatus) that provide supplementary features.
- 1.02 Refer to Section 2002-BASIC KSU INSTALLATION and Section 2005-BT1530/2250 KEY TELEPHONE INSTALLATION for any corresponding equipment/modifications required at the KSU or station equipment when the particular system option is equipped.
- 1.03 Refer to Section 3003-CIRCUIT DESCRIPTION OF OPTIONAL SYSTEM ASSEMBLIES for description of the operating circuit.
- 2.00 INSTALLATION OF THE BUSY LAMP FIELD (BLF-B)
- 2.01 The BLF-B provides visual indication of an extension in service (off-hook) on a CO or Intercom Line call. The BLF-B provides for up to forty-eight (48) extensions. Twenty-five (25) pair No. 24AWG cable is required to connect the BLF to the Main Distribution Frame (MDF) at KSU TERMINAL BLOCK E (ref. Section 2002-BASIC KSU INSTALLATION).
- 2.02 Table A lists the BLF-B wiring/terminal designation and terminal clip number at KSU TERMINAL BLOCK E.
- 2.03 Each Extension "BLF" lead is terminated with its associated Intercom dial code number on KSU TERMINAL BLOCK E. The BLF-B lamp common (-R) is cross connected to the (-R) terminal on the KSU POWER TERMINAL STRIP. Figure 1 illustrates the typical Busy Lamp Field operating circuit.
- 2.04 More than one Busy Lamp Field can be used in the same system. Each Busy Lamp Field connecting cable is wired in multiple on KSU TERMINAL BLOCK E.
- 2.05 No provision is made on the BLF-B for wall mounting. The BLF-B should not be installed in direct sunlight or high ambient light areas as the individual LED indicators may be difficult to view.

BUSY LAMP FIELD (BLF) CONNECTOR A						
FUNCTION	LEAD DESIGN	TAIL CABLE	CONN PIN NO.	HOUSE CABLE	CLIP NO.	NOTE
	BLF 11	8L	36	WH - BL	/	
	/2	OR .	- /	BL - WH	Z	
	/3	GR	_27_	WH - OR	3	
	14	8 R	2	OR - WH	4	
	15	34	28	WH OR	5-	
	16	RP	3	GR WH	6	
	17	8K	25	WH BR	7	1
	18	YL	4	BR - WH	8	1
	27	PK	30	WH - SL	9	1
'	22	V/	5-	SL · WH	10	ĺ
•	23	WH	3/	RD - BL	11	1
	24	AZ	6	BL · RP	12	Ţ
	25	BL - WH	32	RD - OR	/3	]
EXTENSION	26	BL - BK	7	OR RD	14	1
	27	BL - YL	33	RD GR	15	1
BLF	18	BL - GR	8	GR - RD	16	1
, J_	3/	OR - WH	34	RD - BR	17	1
LEAD	32	OR - BK	9	8R - RD	18	1
	33	DR - YL	35	RD - SL	19	1
	34	DR - AR	10	SL RD	مد	i
	35-	GR - WH	36	BK - BL	2/	1
ļ	36	OR - BK	11	BL - BK	22	]
t	37	OR - YL	37	BK - OR	2-3	
	38	OR - RD	/ 入	OR - 8K	44د	
	4/	8R - WH	38	BK - GR	حرد	Ì
l	(2)	BR - BK	/3	GR - BK	26	1
ł	43	BR - YL	39	BK BR	27	]
	44	BR - GR	14	BR · BK	28	]
1	<b>F5</b>	SC - WH	40	BK - 54	19	ļ
i	46	SC - BK	15	SL BX	30	1
	47	CC - YC	4/	Y_ BL	3/	
1	#8	SL - AR	/6	BL YL	32	<del> </del>
1	5/	RD - WH	<u>""</u>	YL OR	33	4
1	5.7	RD - BK	<u> </u>	OR - YL	3//_	1
	73	RD - YL	43	YL - GR	35	4
	54	RD - GR	18	GR - YL	36	1
	75	BK - WH	144	YL - BR	37	1
	56	BK - OR	19	BR - YL	38 39	1
ł	5.7	BK - YL	45	71 · 54	40	1
1	58	BK - PK	7.0	5L - YL V/ - BL	41	1
İ	6/	0.0	<del>مم</del>	BL - V/	14.2	1
	63	YL - 8K	47	VI OR	43	1
	64	YL - OR	22	OR · VI	411	1
Į.	35	PK - WH	48	VI · GR	45	1
	1 2	PK - BK	133	GR · VI	46	1
	67	PK - YL	49	VI - BR	47	]
1	68	PK - OR	14	BR · VI	48	<u> </u>
RELAY	- R	V1 - WH	50	VI SL	49	NE I
BATTERY	-R	VI - BK	25	54 · VI	30	776

	COLOR	CHA	RT.
BL	BLUE	BK	BLACK
OR	ORANGE	YL	YELLOW
OR	AREEN	PK	PINK
BR	BROWN	U/	VIOLET
SZ.	SLATE	WH	WHITE
RD	RED	ΛĒ	AZURE

NOTE

1. Do not connect to Deany Battery.

TABLE A BLF-B CONNECTOR CABLE
Terminal Designation and Assignment

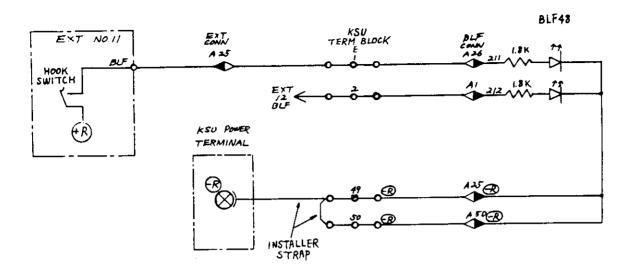


Figure 1 Typical Busy Lamp Field Circuit

- 3.00 INSTALLATION OF THE DIRECT STATION SELECTION (DSS-1) UNIT
- 3.01 The Direct Station Selection (DSS) Unit provides a means for the Attendant (CO Line Answering Position) to Direct Signal an individual extension (or group of extensions) without using an Intercom Line. Non-locking Keys are provided on the DSS unit, each Key assigned to signal a particular extension (or group of extensions) or operate an individual ancillary function. Individual labels are provided for each DSS Key for designation purposes.

### READ

- 3.02 Initial production models of the Direct Station Selection unit model DSS-32 (SERIES 0) has no provision for Handsfree Talkback on DSS call to HF equipped extension. The Model DSS-1 (SERIES 1) provides this feature. Since addition of the DSS/HF feature required circuit changes, the two models are not compatible. Therefore:
  - a. SERIES O Model DSS-32 units will be carried in inventory for addition/replacement. Specific requests for such units must be made under Order Number 8001. No new systems should be ordered with SERIES O type.
  - b. Request ENG BULLETIN NO. 7 for Installation Practice, Circuit Description, and Schematic/Parts List for the Model DSS-32 (SERIES 0) unit if service of such equipment is necessary.
  - c. Request ENG BULLETIN NO. 5 for conversion of systems using SERIES O type equipment to SERIES 1 if system conversion to HF Talkback on DSS calls becomes a requirement.
  - d. All BT1530/2250 T.M. for SERIES 0 type equipment are separately updated for SERIES 1 type.

- 3.03 The DSS-T Control Station can either be wall or desk mounted. For wall mounting, the optional Wall Mount Adapter (WOM) must be used.
- 3.04 In addition to providing a direct voice or tone signalling path from the Attendant telephone extension, the DSS can be wired to provide the following additional features:
  - ATTENDANT INTERCOM LINE......A dedicated talk path available to the ATTENDANT to carry on both way voice conversation with the called extension. The ATTND ICM Line utilizes one spare CO Line pick-up key on each extension. The maximum number of standard dial ICM Lines remains at four (4).
  - b. HF TALKBACK.......When the DSS is used to call an extension equipped with HF Talkback, the called extension can reply HF to the DSS call. the DSS/HF call has priority over any other HF calls taking place simultaneously, such that if both extension to extension and a DSS to any extension call occur simultaneously, the extension to extension call reverts to one way voice calling till the DSS completes its call.
  - c. AUTOMATIC HOLD RELEASE..........When the ATTENDANT presses a DSS Station Key on the DSS-T Control unit, the CO Line that the ATTENDANT has answered automatically goes on "hold" and the CO Line pick-up key restores.
  - d. BUSY LAMP FIELD......Each extension Signal Key on the DSS-T Control Station is equipped with a LED busy lamp indicator.
  - e. ATTENDANT MEET-ME......The PAGE Key on the ATTENDANT telephone can be wired to operate in conjunction with the ATTND ICM Line. When the PAGE Key is pressed, the ATTND ICM Line lamp flashes, the CO Line call answered goes automatically on "hold", and ATTND voice is heard over the PA/ALL CALL system. Upon releasing the PAGE Key, the ATTENDANT can wait on the ATTND ICM Line till the called party answers.
  - f. ZONE PAGE ACCESS......The ATTENDANT can operate the optional Zone Page Adapter (ZPA-B) directly from the DSS-T control station.
  - 9. NIGHT SERVICE......The DSS-T Control Station provides a NIGHT SERVICE switch. This switch is used to operate the Assigned Night Answering feature. The "TRAN" Key on the associated ATTENDANT can be utilized for Audible Ring transfer to predetermined extension(s).
  - h. TONE CALLING......Instead of voice calling from the DSS, Tone Calling can be used to signal the individual

extensions. The ATTND ICM Line can be used for voice communications with the extensions.

- 3.05 The DSS-1 subsystem consists of three assemblies which include: (1) a DSS-T Control Station with thirty-two (32) signal keys, (2) a DSS-K-1 Line card that is installed in the KSU, and (3) a MRL Solenoid Release Unit that is mounted in the ATTENDANT telephone.
  - a. When the system capacity exceeds thirty-two (32) extensions or the number of extensions and signal keys assigned for group calling/zone paging exceeds thirty-two (32), two (2) DSS-T Control Stations are required at the ATTND position.
  - b. When more than one ATTENDANT position is required, consult the IAI ENGINEERING DEPARTMENT for details.
- 3.06 Installation of the DSS-K-1 Line Card in the BT-1530 KSU.
- The SERIES 1 DSS-K-1 Line Card must not be confused with the SERIES 0 Model DSS-K Line Card. The two cards are not pin for pin compatible. ENG. BULLETIN No. 7 describes the model DSS-K (SERIES 0) Line Card.
  - a. The DSS-K-1 Line Card is supplied with a card connector that is mounted in a spare CO Line card file on the top tier of the KSU. To minimize wiring changes, the DSS-K-1 card connector should be mounted in the card file next to the last wired CO Line appearance or in the Twentieth (20th) CO Line slot.
    - If the DSS-K card connector is mounted in the card file next to the last wired appearance, the GREEN wire straps on the DSS-K-1 card connector are installer connected to the respective pin number on the preceding CO Line card connector.
    - If the number of wired CO Line card slots are to be increased in the future, the DSS-K-1 card connector should be wired in the Twentieth (20th) CO Line card slot in order to facilitate future wiring of the PCC card connectors for additional CO Line appearances.
  - b. When the DSS-K-1 card is assigned a card file, the Installer must refer to SECTION 2004; Figure 3 for connection of the respective KSU wire harness Line appearance connections. The line appearance connections are located bundled at each empty CO Line appearance.
    - SECTION 2004; Figure 3 illustrates the strap connection required at the DSS-K-1 card connector for each CO Line appearance that the DSS-K-1 can be mounted.

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READ

NOTE

- The connections shown for the T,R,H,L, and any POWER TERMINAL function are required on the DSS-K-1 card connector. The connections designated by NOTES 1-2 and the BK, WH, RD, and BL wires to KSU CO TERM BLOCK D (E) can be disregarded.
- Provided in the BT-1530 KSU wire harness are the С. cross-connect straps required to connect the DSS-K-1 to the KSU common cards (as well as optional HFK-1HF Talkback card). The Installer connections required at the DSS-K-1 card connector are illustrated in Figure 2.
  - ullet If TONE or VOICE Calling with  $\underline{\mathsf{NO}}$  HF Talkback is equipped, certain connections illustrated on Figure 2 are not required. These connections can be accomplished in anticipation of the future use of HF Talkback in the system.
  - Figure 2 illustrates the assignment of the DSS VI lead to either the VOICE or TONE Calling connection on the DSS-K-1 card connector. The Installer must strap the VI lead to either terminal.

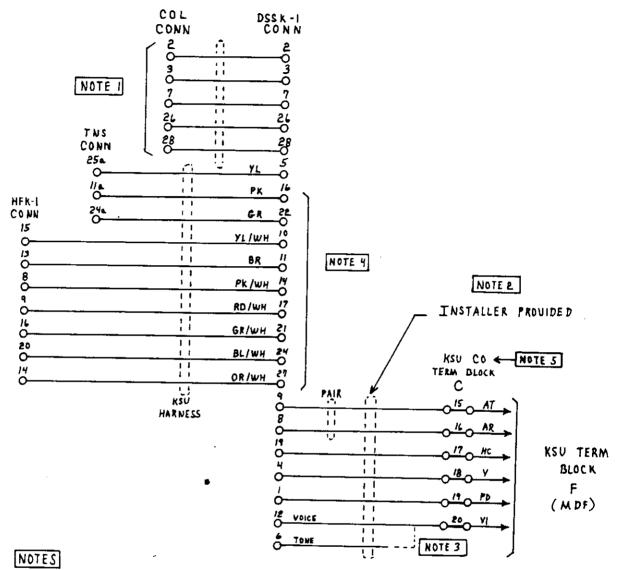
NOTE

- On some early models of the DSS, a separate lead designated TN was provided for a separate TONE Calling input at the DSS-T Control Station. In such a case. the VI and TN leads were each assigned to respective pins on the DSS-K-1 card connector. Refer to ENG. BULLETIN EB77-002 for details.
- d. Cross-connections are required between the DSS-K-1 card connector and the MDF. Two methods are available:

NOTE 2

- ullet Figure 2 illustrates the use of the spare terminal clips on KSU CO LINE TERM C located on the rear panel of the KSU. The spare terminal clips are used as a bridging point for a separate cable that is connected to KSU TERM BLOCK F on the MDF.
- As an alternative when the optional KSU CONN D (EEX) wire harness is installed in the KSU, the spare wires at TERM PIN 44 through PIN 21 on KSU CONN D can be used as an entrance cable into the KSU from the MDF. Assuming  $\mathsf{KSU}$  CONN D is cut down completely on  $\mathsf{KSU}$  TERM BLOCK D on the MDF, Figure 2a illustrates the cross-connects required.

- NOTES 1. ON BT 1530-3 KSU, DO NOT CONNECT TIP/RING OF CO CONNECTOR TO CARD FILE CONNECTOR ASSIGNED TO DSS-K.
  - 2. ON BT 1530 I KSU ONLY



- 1. Installer Strafs required when com co 20 card file utilized for mounting DSS-K CARD CONNECTOR IN KSU.
- 2. SPARE WIRES OF KSU CONN D CABLE ASSEMBLY CAN BE USED FOR THESE FUNCTIONS; REFER TO FIGURE 2A.
- 3. CONNECT TO VI OF DSS-T CONTROL STATION IN PLACE OF DSS-K CONN PIN IS WHEN TONE CALLING ONLY IS USED.
- 4. THESE CONNECTIONS ARE NOT REQUIRED IF HANDSFREE TALKBACK IS NOT EQUIPPED.
- 5. CO TERM BLOCK PROVIDED ON BT 1530 -1 KSU ONLY

FIGURE 2 DSS-K-I CROSS CONNECTIONS IN ASU

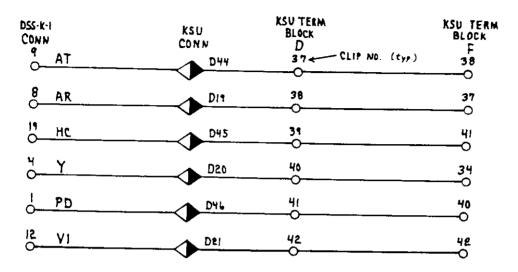
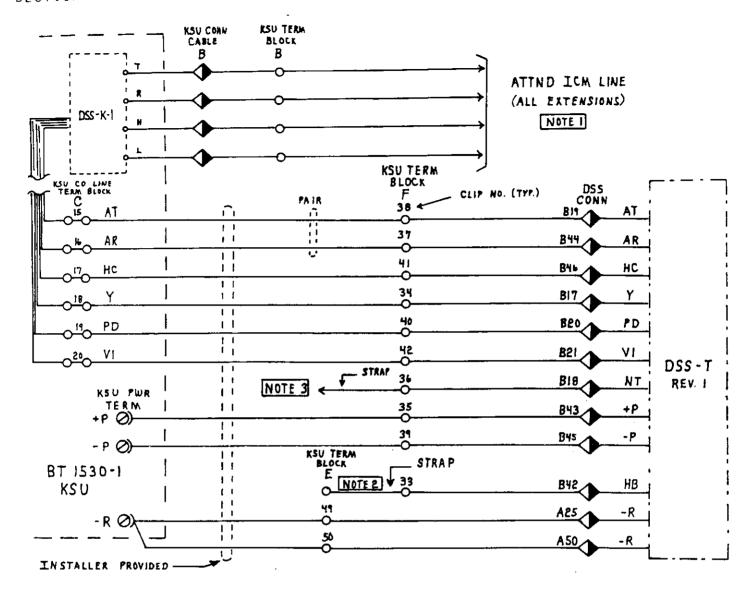


Figure 2a CONN D Spare Conductors Assigned as DSS-K-1 Lead In

- 3.07 Installation of the DSS Connecting Cable at the MDF.
  - a. A fifty (50) pair cable is required to connect the DSS-T Control Station to the MDF. TABLE B lists the DSS-T Control Station connecting cable wire color and terminal assignment.
    - DSS CONN A (1st Binder) contains all extension BUSY LAMP FIELD (BLF) leads. It is connected to KSU TERM BLOCK E (Ref. SECTION 2002; Para. 4.14) in accordance with the TERM BLOCK E clip number designated. DSS CONN A (1st Binder) color code follows that of the BUSY LAMP FIELD (BLF-B) color code.
    - DSS CONN B (2nd Binder) contain all DSS control functions as well as the individual extension DSS leads. DSS CONN B (2nd Binder) is connected to KSU TERM BLOCK F in accordance with the TERM BLOCK F clip number designated.
    - Figure 3 illustrates the BLF (BLOCK E) and DSS (BLOCK F) control functions cross-connection required on TERM BLOCK E and F at the MDF.
- READ
- Particular attention must be given to TERM HB (B42) of DSS CONN B. The HB MUST be cross connected to the BLF lead of the ATTENDANT telephone.
- b. When more than one DSS-T Control Station is required, an additional fifty (50) pair cable is required to connect the second DSS-T Control Station to the MDF. Another



NOTES

- 1. If ATTNO ICM LINE is equipped, connect all extension line pickup assigned to ATTNO ICM to DSS-K line appearance on KSU TERM BLOCK B on the MDF.
- [READ] 2. Connect to BLF lead of ATTND Extension on KSU TERM BLOCK E.
- READ 3. STRAP to TR on KSU TERM BLOCK A for NIGHT SERVICE control
- CAUTION All DSS-T Control Stations bearing P.N. 11935-28-03 have no provision for Night Service Control. DSS CONN BIB is assigned as Tone Input (TN) and is connect to TERM 6 of the DSS-K-1 card connector.
- Figure 3 Cross-Connections at MDF for DSS-T Installation

	_											
CHART	VHITE	3070	RANGE	CREEN	OKONA	SLATE	AEO	LACA.	M61134	VIOLET	PINK	ALURE
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								_				
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KOTE

NOWE CADLS
COLOR
WH. BL
BL - WH

LEAD DESIG.

FUNCTION

( 1st Broder

⋖

CONNECTOR

2	•	3	Ę	9
INTIAL PRODUCTION MADELS	A 930 PAG DSS-T PROVIDED A	"TONE /VOICE" SELECT 1 WITCH 1#	PLACE OF THE "MIGHT" SWITCH;	DSS CORN 18 WAS ASSIGNED
3	5	Ξ	Ē	×
ξ	<u>.</u>	ELEC	Ē	3
₫	55.	5	Ĭ	=
こ	9	76.7	8	ž
Ξ	Ξ	7	ű	ŭ
f	96	Ē	5	SQ
<b>∹</b>				

NOTES

BLF

ų.	
CEAD	>
TO "BLF" LE	EN3101
è.	EXT
STRAP	ATTND
-:	

	ပ		ΛВ	( End Binder	`.	
FUNCTION	CEAD DESIG.	TAIL CABLE	COUR.	House thous	ςς. <b>8</b> 6.	Note
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		٠.	5	HM - 78	٤	
	£		7,	RO - 54	=	
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Correspond	¥	Ι.	77	RO - 0R	2	
	7.6	Pr. Br	7	40.80	*	
22.0	:	PR. V.	11	RD - CR	: '	
:	3	Pk - 64	•	20. 60	:   :	
50437	16 350	A.V. Y.	34	10.01		
		AA - 61 - 61	-	ar- AD	=	
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	2	N: 64		44-80	2	
	-	Jan Jan	3,6	97.07	-	
	=	NH - 8K		01. OX	2	
	;	7A - 400	33	BK . OR	2	
	38	M4 - 94	1/	AG - NO	64	
	14 350	A2 - W4		34 · GR	58	
	2/	42 - OX	1.3	70.83	14	
	43	AZ - YL	34	3A - DA	62	
	44	¥2 - 2¥	λ,	8A - BK	7.	
	45	Dt. len. long	4.0	8X - 5L	2	
	\$	BL- BK - BK	15	St. 01	•	
	Ç	8t - 7t - 7t	1,4		=	
	5	DT- 64. CX	*	Bi · Ye	ĭ	
744744	H.8	OR-LAK-LAK	\$	Yt. 04	2	2
	λ	04-8h-BK		0A - YC	2	
BATTERY	7.0	OR. VL. VC	5	¥2 - 24	2	
71017	¥	19-23-70	7	CA . YL	ۃ	-
POICE	AR	CR-PW-DR	*	٧٤ - ۵٨	-	
	¥Υ	CR. Bt. 8K	=	BA . VL	-	
DALLEAD	•	CR- 74 - 74	5	72 - 50		
	9	CK-KP-KD	:	34 - 46	\$	
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			\$	71-08	5	
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8A · 6K 8A · 6K 8A · 6K 81 · 6A 71 · 6K 71

DSS CONNECTOR CABLE Terminal Designation and Assignment <u>\_</u> TABL E

VI - WH

MDF TERM BLOCK is required for #2 DSS CONN A (BLOCK E1) and #2 DSS CONN B (BLOCK F1). Figure 4 illustrates the cross connects required between the two DSS-T Control Station TERM BLOCK on the MDF.

READ

 No additional DSS-K-1 Line card is required for #2 DSS-T.

READ

 The DSS/Ext. control cable and MRL unit connection are not required for the second DSS-T Control station.

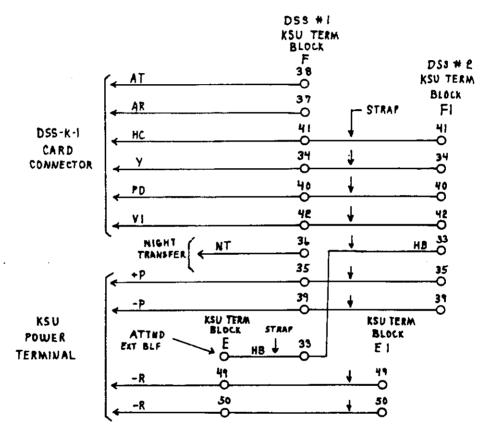


Figure 4 MULTIPLE DSS-T CONTROL STATION INSTALLATION

- c. The system can be equipped with additional BUSY LAMP FIELD (BLF-B) units. Each BLF is connected in multiple to DSS CONN A (1st Binder) on KSU TERM BLOCK E.
- 3.08 Connection of the Extension BLF/DSS leads and ATTND ICM Line at the MDF.
  - The individual extension BLF/DSS leads are connected to their assigned terminals corresponding to their dial codes on TERMINAL BLOCK E and F on the MDF.

INOTE

The DSS/BLF lead of the ATTENDANT (DSS) telephone is not required. However, the BLF lead of the ATTND telephone must be connected to TERM HB of the DSS.

The ATTND ICM Line appearance on the MDF is located at the CO Line appearance on KSU TERM BLOCK B in which the DSS-K-1 card is mounted. To connect the extensions to the ATTND ICM Line, the line pickup key on the extension to be assigned to the ATTND ICM Line (usually next to the last ICM appearance on the extension) is cross-connected to the line appearance on the MDF assigned to the DSS-K-1. The Tip (T), Ring (R), Hold (H), and Lamp (L) of the extension pickup key is cross-connected to the respective terminal. No connections are required for the pickup key on the ATTND telephone.

The ATTND ICM Line appearance at the extensions is optional. If no handset, to handset voice communications to the ATTND is required, the ATTND Line appearance on KSU TERM BLOCK B should not be cross-connected to the extension.

- c. To call a group of extensions with a single DSS Station Key, the extension DSS leads must be connected through DIODES to the DSS Station Key as shown in Figure 5. A maximum of five (5) extensions can be connected in one group.
- d. To direct access the ZPA-B Zone Page Adapter, the DSS Signal Key is connected to the ZPA-B wire harness as illustrated in Figure 9 of SECTION 2007. In addition, the ATTND AT and AR functions must be cross-connected to the ZPA-B per NOTE 2 on Figure 9.

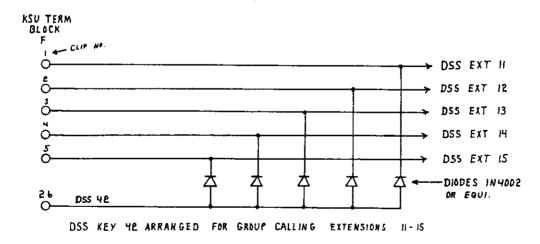


Figure 5 DSS Group Calling

#### SECTION 2007, ISS 3

- 3.09 Connecting the DSS Control Station to the associated ATTND Key Telephone.
  - a. An eight (8) conductor cable is provided with the DSS-T to connect the control station to the associated telephone. Prior to installing the cable, the MRL Solenoid Release Unit must be mounted in the telephone.

#### READ

- On the DSS extension, NO station HF Talkback unit (Model HFS-1) can be installed due to the mounting of the MRL. If HF Talkback at the DSS extension is required, the HFS-1 can be installed in the DSS-T Control Station. Consult the IAI ENG. DEPARTMENT for details.
- Figure 6a illustrates mounting the MRL on the base of the DSS extension.
- Figure 6b illustrates the connections required for the DSS cable on the MRL unit and station circuit card. The DSS cable is routed through the cable entry port located on the rear of the station housing.
- b. If the PAGE Key on the ATTND telephone is to be used with the ATTND ICM Line and operate the Auto-Hold feature, connect the YEL of the DSS cable to PZ on the station circuit card. Otherwise, disregard the connection and insultate/store YEL wire inside the ATTND telephone.

#### READ

- The ATTND telephone, if connected for CÖ Trunk Conferencing, interferes with operation of the DSS such that the ATTND must go ON-HOOK after each DSS call to allow for operation of the MTL on the next call. Consult the IAI ENG. DEPARTMENT for details.
- 3.10 Assignment of the DSS Signal Keys to HF and Non-HF equipped extensions.

#### READ

- a. In order to eliminate interference with HF Talkback calls taking place on the ICM Register in the KSU when the DSS station initiates a call, provision is made for identifying HF and Non-HF equipped extension automatically on DSS unit.
  - Each DSS-T station consists of four (4) Signal Key Assemblies of eight (8) keys each. Hence, the thirty-two (32) station capacity. Each Signal Key Assembly is installed assigned to HF or non-HF equipped extensions by strapping options inside the DSS-T control station.
  - Shorting Bar SB1-SB4 assign each respective Signal Key Assembly. As supplied from the factory, Signal Key Assembly to No. 1 (EXT 11-18) is assigned to HF equipped

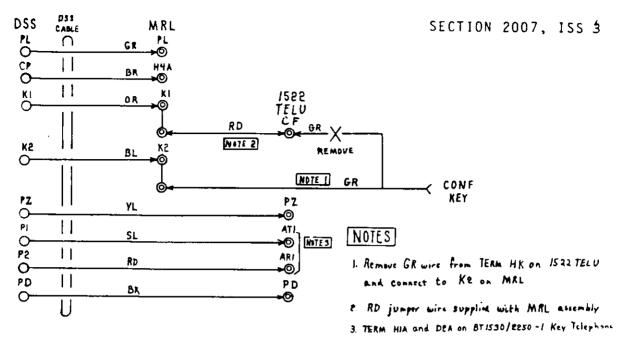
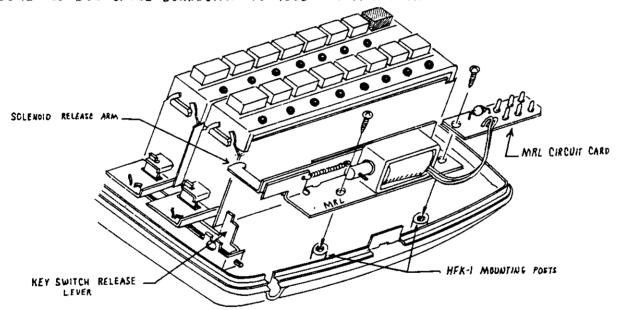


FIGURE 66 DSS CABLE CONNECTION TO 1522 TELU AND MAL



- OTES
- I. The MRL unit is installed in the associated DSS station utilizing the station base mounting posts normally used for mounting the Handsfree unit HFS-1.
- 2. Fasten with the screws provided the MRL and MRL circuit card as in the sketch above. Do not fully tighten the two screws in place.
- 3. With the handset off-hook, place the Solenoid Release Arm against the Key Switch Release Lever, slowly tighten the two screws that hold the MRL in place, making sure that the Key Switch Release Lever does not move from its normal rest position.
- 4. Check the operation of the handset release mechanism and station privacy unit to insure normal button restroration operation. If either function does not operate correctly, loosen the two screws that hold the MRL in place and repeat 3 (above).

extension and No. 2, No. 3, and No. 4 to Non-HF equipped extension. Additional HF capability can be added by removing the Shorting Bar from TERM 2-3 on the DSS-T circuit card and connecting to the respective TERM 1-2. If no extension in the system is assigned HF functions or if TONE Calling is used, remove SB1 from TERM 1-2 and connect to the TERM 2-3.

- When the HF equipped extension are assigned ICM Dial Codes, the corresponding codes are connected to the DSS-T control station such that all HF equipped codes are connected to the same Signal Key Assembly. All Non-HF equipped extensions are connected to the same Signal Key Assembly(s) on the DSS unit.
- READ c. If the entire system is equipped with HF extensions or the number of Non-HF equipped extension is proportionally small, all the shorting bar options on the DSS-T unit can be arranged for HF extension operation.
- 3.11 TONE/VOICE Calling Volume Controls.
  - The DSS Volume Control for VOICE or TONE Calling is located on the DSS-T Control Station. The Volume Control is accessed by a hole through the base. On some model equipped with both VOICE and TONE Calling, separate Volume Controls are provided.
- 4.00 INSTALLATION OF THE OPTIONAL ZONE PAGE ADAPTER (ZPA-B-1)
- 4.01 The Zone Page Adapter (ZPA-B-1) provides for three individual zones of paging through a PA system. Provision is made for All Call priority and DSS Zone Page access.
- 4.02 The ZPB-B-1 is mounted in the KSU cabinet. A ZPA-B-1 Connector Cable Assembly is provided to connect the ZPA to the individual KSU circuit card connectors. Screw terminal strips are provided for connection to the PA Amplifier and Zone Speaker Cables.
- The SERIES 1 ZPA differs from the SERIES 0 ZPA mainly in that the SERIES 0 is mounted external to the KSU while the SERIES 1 mounts internally. The SERIES 0 may be utilized with SERIES 0 KSU equipment by following the SERIES 0 Installation Practice.
  - a. The ZPA-B-1 Circuit Cardonnector, PA Terminal, and SC Terminal are mounted on the rear of the KSU cabinet just above the KSU CO LINE TERM BLOCK using the mounting holes provided.
  - b. The ZPA-B-1 CONN CABLE must be installed along the existing KSU wire harness. Care should be taken when routing the ZPA cable along the harness to prevent damage to the harness when the card cage door is closed. Cable ties should be used to hold the ZPA cable securely in place. Figure 7 illustrates the mounting and routing of the ZPA components.

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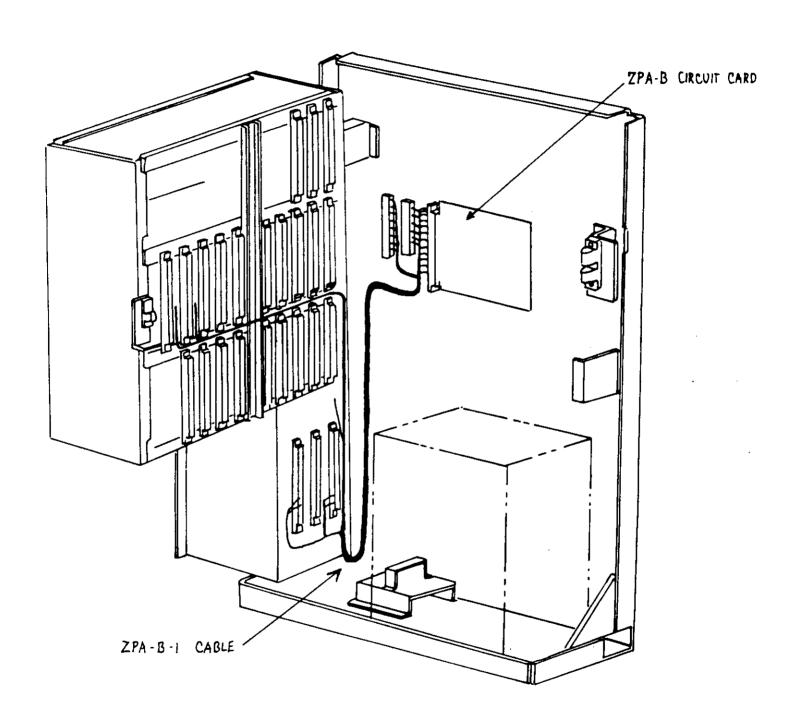


Figure 7 Mounting and Routing of ZPA-B-1 Connecting Cable

PAGE 15

4.03 A Volume Control is provided on the ZPA-B to control the Zone Page input level to the PA Amplifier.

READ

4.04 Zone Paging is accessed from any extension by dialing the Two Digit Intercom dial code number assigned to the specific zone. A Shorting Bar (SB) option is provided on the ZPA circuit card to provide two digit dial access to the ZPA regardless of the Tone/Voice Calling priority set on the KSU. Table C indicates the Shorting Bar (SB) connection for the particular setting of Tone/Voice Calling dial access.

TABLE C
ZPA-B SHORTING BAR (SB) ARRANGEMENT

Terminal	Mode of Operation
1 - 2	Tone Calling Two Digit Access
1 - 3	Voice Calling Two Digit Access

- 4.05 Connecting the ZPA to the KSU
  - a. Figure 8 illustrates the ZPA-B-1CONNECTOR CABLE ASSEMBLY
  - b. Figure 9 illustrates the ZPA-B-1 CONNECTOR CABLE connections when the DSS unit is equipped.
- 4.06 If the Busy Lamp Field (BLF) indication is required at the DSS when the Zone Page Adapter is busy, DIODES (IN4002 or equi.) are connected to each Intercom Dial Code "Z" lead assigned to the individual zones as illustrated in Figure 10.
- 4.07 The PA Amplifier Output (Constant Voltage or Constant Impedance Output) is connected to the PAGE AMP OUTPUT screw terminals on the ZPA-B. The individual zone speaker cables (3) are connected to the associated Zone Spkr. screw terminals. It is recommended that when Zone Paging is equipped, the Constant Voltage (25 or 70 volt) method for speaker distribution is utilized to prevent varying page volume levels between zones due to unequal speaker line impedances.

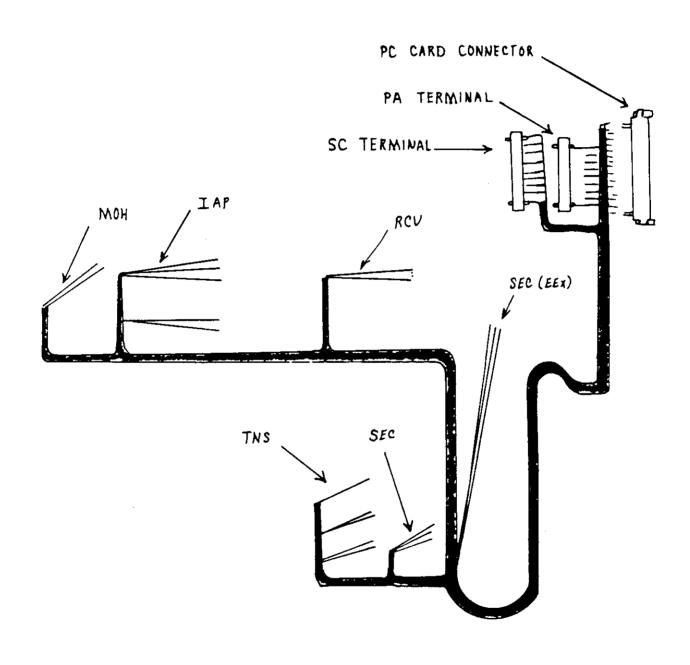
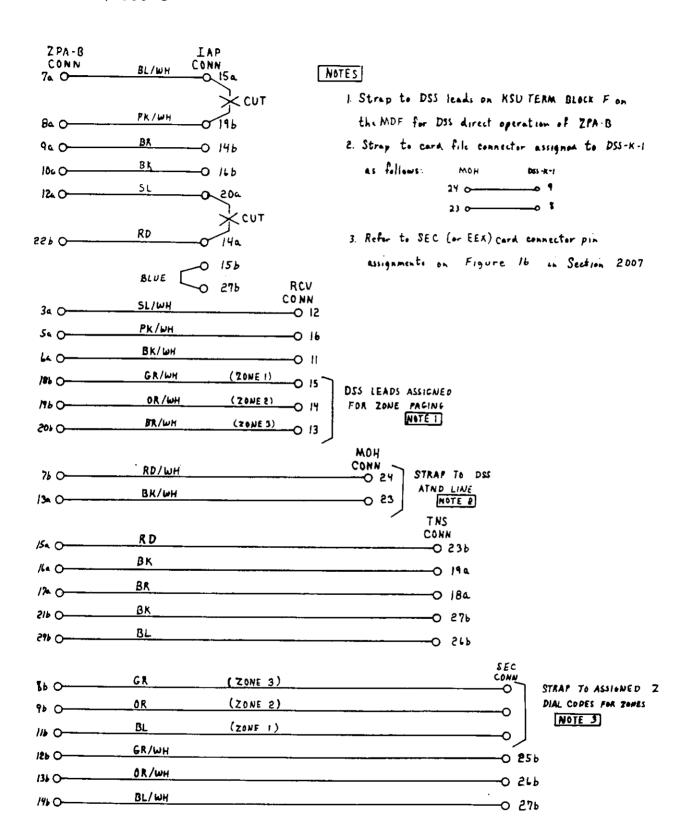
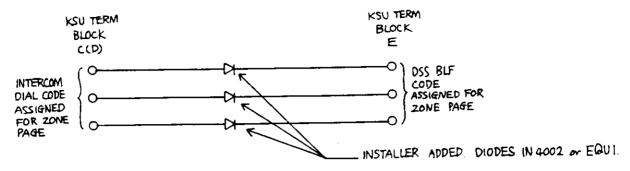


Figure 8 ZPA-B-1 Connecting Cable Assembly

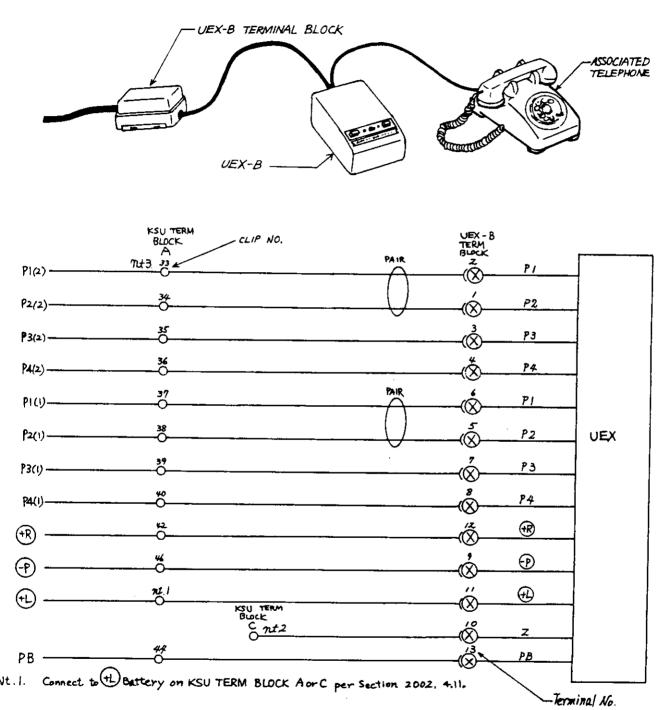




Note Clip Terminal on KSU Term C(D) and E is determined by dial code numbers assigned for ZPA-B.

# Figure 10 DSS Unit BLF Indication of Zone Page Area

- 4.08 When an extension makes a Zone Page Call, the register connection is maintained during the paging interval. The Zone Page is disconnected by either the caller pressing the CONF Key when the message is completed, or exceeding the Register Time Out period, or by going on-hook.
- 4.09 During the Zone Page interval, the operation of the All Call (PAGE) function at another extension or the DSS Zone Page Access causes the Zone Page connection to be preempted and a busy tone to be sent to the calling extension. When the All Call or DSS connection is released, the calling extension connection is restored and the Zone Page can be completed.
- 5.00 INSTALLATION OF THE UNIVERSAL EXTENSION ADAPTER (UEX-B)
- 5.01 The Universal Extension Adapter (UEX-B) is used with any standard 500 (2500) type telephone instrument to provide full Intercom features at an extension equipped for Intercom service only. The UEX-B can either be wall or desk mounted. The unit features a PAGE Key, CONF (APA) Key, Two Intercom Lines with LED indicators, and a mechanical Buzzer for Intercom signaling.
- 5.02 Seven (7) pair cable is required to connect the individual UEX-B extension to the MDF. Screw terminals are provided on the UEX-B for the house cable connections. All connections are connected (except for the Intercom Dial Code "Z" function) with their associated function on KSU TERMINAL BLOCK A and B as shown in Figure 11.
- 5.03 Any number of UEX-B extensions can be equipped. Each extension "Z" lead is assigned a different Intercom Dial Code number on KSU TERMINAL BLOCK C (or D if so equipped) if dial access to the UEX-B extension is required.
- 5.04 Screw Terminals are provided on the UEX-B for connection to the associated telephone instrument. A four (4) pair cable is required for connection of the UEX-B to any 500 (2500) type telephone. Figure 12 illustrates the connection of the UEX-B to a ITT, NE, Northern Electric, or Stromberg Carlson 500 Type Telephone, while Figure 13 illustrates a ITT, N.E., or S.C. 2500 Type Telephone.



Nt. 2. Connect to assigned dial code (2) number on KSU TERM BLOCK C if Intercom signalling is equipped.

Nt.3. Connect UEX-B Terminal Block Pin No. 1-8 to KSU TERM BLOCKB if ICM 3-4 is used for UEX-B Extension.

Figure 11 UEX-B Connection to KSU TERM Blocks on the MDF

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20000

Connection of UEX-B to Standard 500 type (Rotary Dial) Telephone Figure 12

PAGE 21

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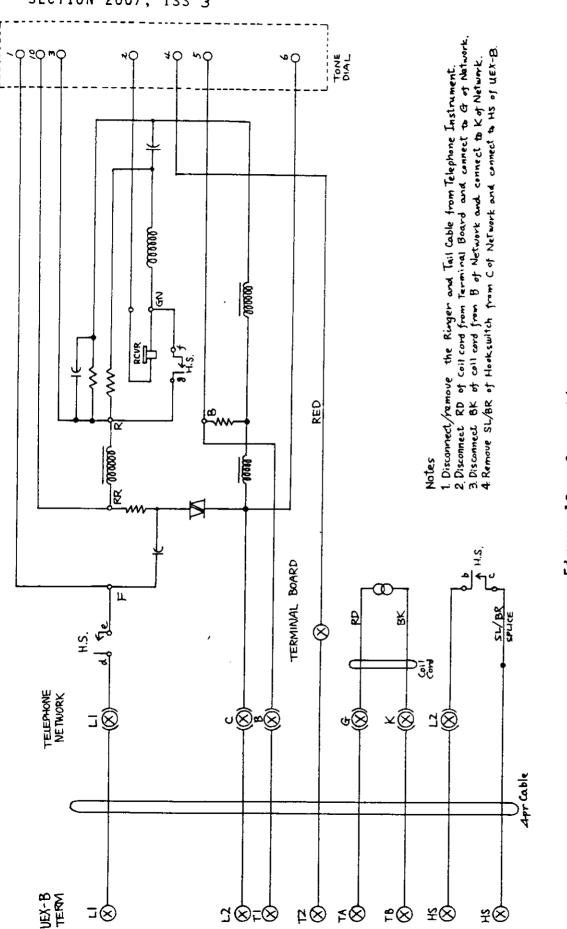


Figure 13 Connection of UEX-B to Standard 2500 type ( Tone Dial ) Telephone

PAGE 22

- 6.00 INSTALLATION OF THE OPX ADAPTER (MTL)
- 6.01 The Model MTL Off-Premise Extension (OPX) adapter provides a two wire interface to a TELCO provided private line circuit connected to either single line station equipment or a Key Telephone System. When a single line station is required, the station equipment must be customer owned. When a Key Telephone System (KTS) is connected, the KTS can either be Customer Owned (COE) or TELCO supplied, and a spare line circuit and pickup (P.U.) Key is required.

Check local TELCO tariffs to ascertain if Illumination and CO Audible are provided on a TELCO provided KTS when connected as an OPX to a COE provided KTS.

- 6.02 The MTL provides the following features:
  - a. Dial access from the OPX to any extension in the KTS on either of two (2) ICM Lines.....The OPX, upon going off hook and hearing a dial tone, can dial any extension number in the system, including another OPX (if so equipped). Voice Announcing or Tone Ringing can be used by the OPX to call any extension in the system while only machine ringing can be used to call another OPX. The MTL automatically selects a free ICM Line to connect the OPX to the KSU ICM Dial Register. At the called extension, the ICM call operates in a normal manner, the ICM register timing out after 20-40 seconds if the call goes unanswered.
  - b. Dial access from any extension to the OPX on any of two (2) ICM Lines....To call the OPX, an extension selects a free ICM Line (predetermined for OPX operation) and dials the extension number assigned to the OPX. At the OPX, 15 IPM ringing is heard. The OPX, upon going off-hook, is connected to the calling extension. If the OPX is busy, standard busy-back tone is heard by the calling extension.
  - C. Busy Tone provided to the OPX when the ICM Lines and/or ICM Dial Register is busy....When either the ICM Lines or the ICM Dial Register is busy, the OPX hears Busy Tone upon going off-hook. The OPX can wait off-hook and immediately be connected to the first available ICM Line.
  - d. Tone-Rotary Dial Off-premise Instruments....Either rotary dial or DTMF dial (if the KTS is so equipped) station(s) can be used at the OPX.
  - e. Direct Access to the OPX from the DSS....The DSS (ATTND) can direct signal the OPX by pressing a DSS EXT. Key assigned to the OPX. The DSS (ATTND) can then talk with the OPX on the ATTND ICM Line Circuit.
  - f. BLF Indication of the OPX Status.... The OPX, when off-hook, provides a BLF control signal to indicate off-hook status.

- g. CO Line Add-On to the OPX....The MTL provides the capability for the OPX to be connected to either of two (2) predetermined CO Lines. Additional CO Line capacity can be achieved through the use of extra relay circuits that are field installed. Details of the relay circuit are given in the MTL installation instructions.
- h. OPX Dialing of CO Line Calls....The OPX, when connected to a CO Line, can dial a CO call from the OPX telephone. Provision is made to restrict such dialing on an individual CO Line basis if rotary dial OPX instruments are used.
- i. Direct Night Answering by the OPX....Provision is made for the OPX to answer directly CO Line incoming calls at the KTS. Upon receiving an incoming CO Line call, both the main system and OPX can be signalled with the OPX automatically connected to the CO call upon going off-hook.
- 6.03 Design specifications of the MTL are:
  - a. Max Loop Resistance:
    24 volt Talk Battery: 1000 ohms\* @ 25 ma loop
    48 volt Talk Battery: 2000 ohms\* @ 25 ma loop
    - \*Does include telephone set; on HF Talkback systems, HF Talkback operation at KTS is limited to approximately 700 ohm loops.
  - Type signalling:
     1. OPX to KTS
     Loop start; rotary or DTMF dialing;
     24-48 VDC Talk Battery.
    - 2. KTS to OPX

      Bridged ringing; 20-30 hz., 105v.

      (nom.); no ring-trip during ringing cycle.
  - c. Max Loop Voice Attenuation (Recommended): 5.5 db\*
    - \*No amplification provided in add-on mode; Voice level to CO depends upon local loop conditions.
- 6.04 Installation of the MTL in the BT1530 KSU
  - a. Installation material requirements
    - One MTL assembly OPX circuit
  - NOTE 1 Check local TELCO specifications to determine if only 20 hz. ringing can be used.

- One spare CO Line card file for each MTL installed in the BT 1530 KSU. A card connector/wire harness if provided with each MTL. Installer straps are required to connect the dedicated ICM Lines as well as control functions to the MTL. Aprox. installation time: 1½ hrs. first MTL, 1 hr. each additional.
- One 24/48v Battery depending upon loop limits. A standard 1A2 KTS 24v power supply "A" Battery can be used. Installation time: ½ hr.
- A 20-30 hz. 105v Ring Supply (Can be the 30 hz. ring supply on standard 1A2 Power Supply). Estimated installation time: ½ hr.
- ●CO Line Add-on requires one (1) additional hour installation time each OPX. For expansion beyond the two (2) CO Line wired on the MTL, one external 4PDT 24 VDC Relay is required for each CO with one (1) hr. estimated installation time for each CO.
- b. Mounting the MTL card connector in the BT 1530 KSU
  - Each MTL assembly is provided a fifty-six (56) pin card connector and mounting hardware. The card connector is installer mounted in a spare CO Line card file of the top tier of the KSU. When mounting the connector, insure that the card connector is mounted such that the pin numbers read from top to bottom (1 to 28).
  - The CO Line card file chosen should allow for possible CO Line expansion or MTL appearance expansion. The first choice for installation should be CO Line slot #19 (assuming that CO #20 is being utilized for the DSS-K circuit card). Any additional MTL circuit to be equipped should be installed adjacent to the first MTL appearance
- c. MTL Harness installation/strapping requirement

# CAUTION All connections of the MTL harness to the KSU common control function <u>must</u> be made with the SYSTEM BATTERY turned OFF!

- Figure 14 illustrates the mounting and routing of the MTL connector and cable harness. Cable ties should be used to hold the cable harness securely in place.
- Figure 15 illustrates the harness connections required on the MTL card connector and KSU control functions. Care should be taken to insure proper terminations.
  - 1. Not all connections illustrated in Figure 15 are required. If the DSS or CO Line Add-on functions are not utilized, the connections illustrated for these functions can be disregarded.

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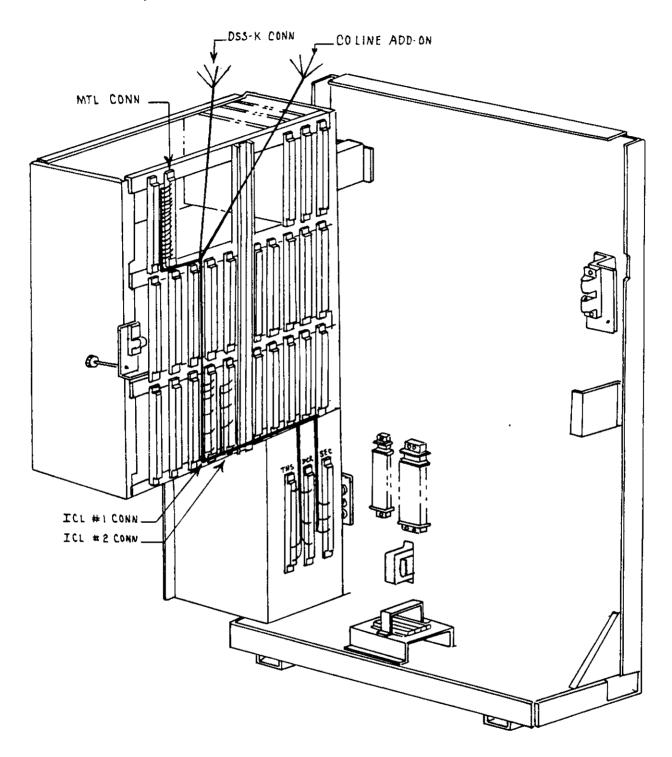
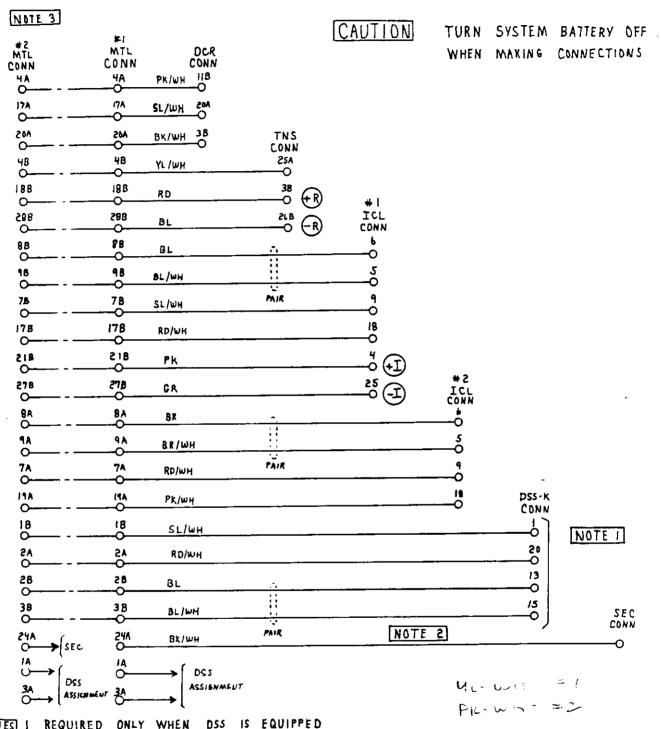


FIGURE 14 MTL WIRE HARNESS



NOTES ! REQUIRED ONLY WHEN

- 2 ASSIGN ICM DIAL CODE TO DPX
- 3. CONNECTOR MULTIPLE WIRING SHOWN FOR BAR MTL APPEARENCE

MTL CARD CONNECTOR WIRING FIGURE 15

READ

2. The MTL wire harness is formed assuming that the DSS-K card is mounted in CO Line slot #14 and the two CO Line Add-on circuits are using CO Line slots #12 and 13. The harness connections illustrated for these functions may be disregarded and individual installer straps provided for these connections if different CO Line slots are being utilized for these functions.

READ

- 3. If more than one (1) MTL circuit card is equipped, the MTL wire harness for only the first MTL appearance is required. Common connections between MTL card connectors can be connected in multiple for the terminals indicated.
- d. Assignment of the MTL to station/DSS codes

READ

 Connect the ICM dial code assigned to the OPX by strapping MTL CONN pin 24A (BK-WH if wire harness is used) to the respective pin assignment on the SEC or EEX (if so equipped) card connector. Figure 16 illustrates dial code/pin assignments on the SEC/EEX circuit card connector.

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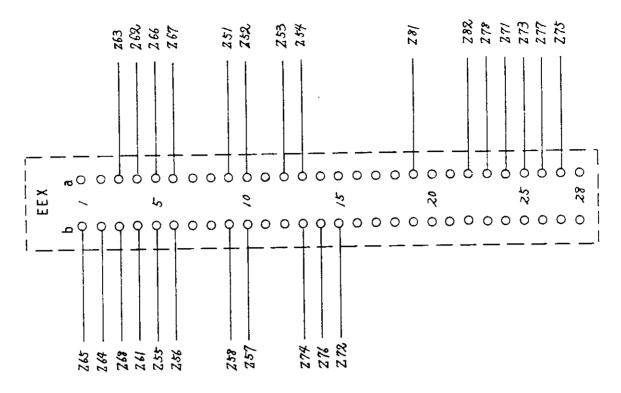
- Connect MTL CONN Pin 1A to the DSS-T Signal Lead corresponding to the ICM dial code selected to call the OPX.
   Connect MTL CONN Pin 3A to the BLF Lead of the DSS signal Key selected to call the OPX.
- e. Connection of the CO Line Add-on circuits
  - Figure 17 illustrates the connections required for the CO Line Add-on circuits. Two CO Line circuits are prewired with each MTL.

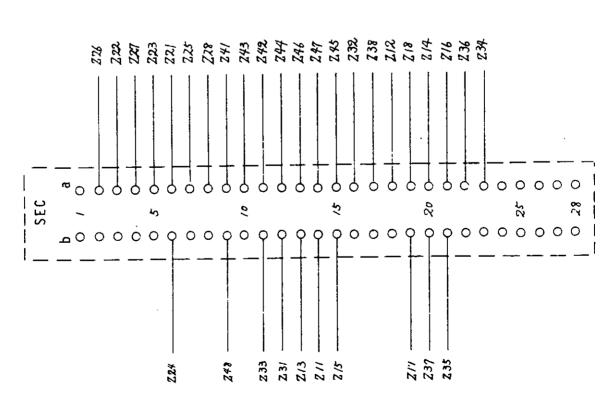
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- To allow the OPX direct access to the CO Lines, the following straps are required.
  - 1. Strap MTL CONN Pin 3A to MTL CONN Pin 15A
  - Assign each CO Line Add-on circuit to an un-used ICM dial code by strapping MTL CONN Pin 23B (YL-WH of harness) and MTL CONN Pin 22B (PK-WH of harness) to the assigned dial code on the SEC or EEX (if equipped) circuit card for CO Line Add-on #1 and #2 (respectively).

READ

- To allow the ATTND to control the CO Line Add-on, the following straps are required:
  - Strap MTL CONN Pin 23B (CO #1) and CONN Pin 22B (CO #2) to individual DSS signal keys.





SEC and EEX Card Connector Connections at Each Extension Pin for Figure 16

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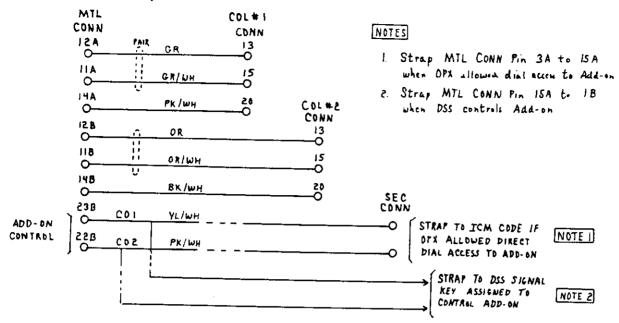
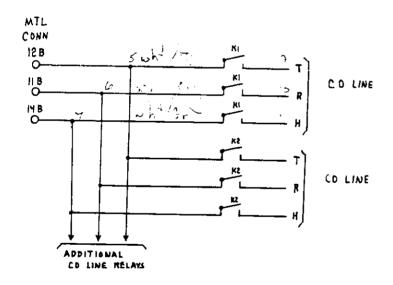


FIGURE 17 CO LINE ADD-ON CONNECTIONS



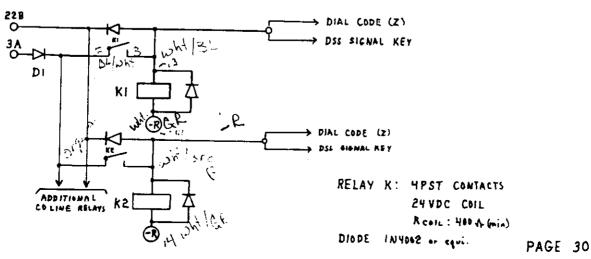


FIGURE 18 EXPANSION OF COLINE ADD-01

 If only the ATTND (DSS) can control the add-on, disregard the installer strap between MTL CONN Pin 3A and CONN Pin 15A and connect MTL CONN Pin 15A to CONN Pin 1B.

#### CAUTION

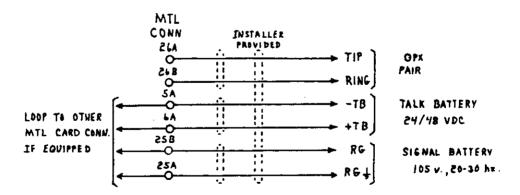
If more than one (1) MTL is equipped, each MTL must be assigned a different dial code. All add-on control codes (both ICM and DSS) must be different for each MTL since a different dial code (as well as DSS Key) must be used to connect the CO Line to the respective MTL.

- To increase the number of CO Line add-on circuits, auxiliary relays can be used. Figure 18 illustrates the connections required. For every additional CO Line add-on, one 24VDC 4 Form C (transfer) relay is required. One MTL wired CO add-on circuit is utilized as the voice input for the relay circuits while the second CO add-on circuit is wired in normal manner.
- f. Connection of the OPX Talk/Signal Battery and Private Line

#### CAUTION

Before connection of the MTL·Talk/Signal Battery, insure that both batteries are turned off.

- The OPX Talk and Ring Battery are connected directly to the MTL Card Connector pins by installer provided cable. Insure that the cable is fastened to prevent possible damage to the lead-in wire then opening/closing the KSU Card Cage.
- Connection of the MTL to the Talk/Ring Battery and TELCO Private Line Circuit is shown in Figure 19.



CAUTION BOTH +TB AND RG MUST BE CONNECTED TO EARTH GROUND FOR PROPER OPERATION.

Figure 19 Connection of Talk/Ring Battery to the MTL Connector

- Both the MTL Talk Battery Plus and the Ring Battery Ground should be EARTH GROUNDED.
- ◆ Because battery polarity on the OPX Tip/Ring is critical in applications where Dial Long Line units (DLL) or carrier services are utlized, a means of providing battery (-) on either the Tip (factory wired) or Ring of the TELCO pair is provided. An eight (8) position dip switch is provided on the MTL to switch polarity of both the Talk and Signal (Ring) Battery.

READ

● Either 24 or 48VDC Talk Battery is required. For loop lengths up to 1000 ohms, a 24VDC Battery can be used. For loop lengths up to 2000 ohms, a 48VDC Talk Battery must be used and a wire jumper (J3) must be cut on the MTL circuit card.

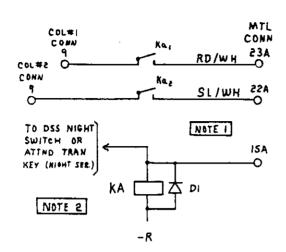
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- ◆ The factory wiring of the MTL is such that Battery (-) will appear on the RING (R) side of the OPX Line and GND (+) on the TIP (T) side. To change the configuration remove the plastic cover on the MTL Dip Switch.
  - 1. Switch circuits one (1) and two (2) to the OFF position for Talk Battery reversal and circuits seven (7) and eight (8) for Signal Battery reversal.
  - Operate (turn on) circuits three (3) and four (4) to connect Talk Battery and circuits five (5) and six (6) for Signal Battery.

READ

Factory wiring of the MTL line polarity will be suitable in most cases. Rearrangement of line battery polarity may be only required if difficulty is encountered on long line circuits.

- g. Additional wiring options
  - Dial Restriction is available such that the OPX can operate the CO Line Add-on but be restricted only to receiving calls. For dial restriction on the CO, reverse the CO Line Tip/Ring connections for each CO Line to be restricted. A rotary dial station instrument must be used as the OPX telephone.
  - During the Night Service, the OPX can be signalled directly by the MTL that a CO call is incoming on either of two dedicated night service lines. Figure 20 illustrates the connection required for night service operation.



#### NOTES

- I. MTL CONN PIN 15A MUST BE CONNECTED TO DSS N19H1 KEY OR +R BATTERY IN ORDER FOR ADD-ON TO OPERATE AUTOMATICALLY DURING N19HT SERVICE.
- 2. NO RELAY IS REQUIRED IF ONLY ONE (1) CO-LINE IS ARRANGED FOR MIGHT SERVICE, USE RELAY NT SPARE CONTACTS ON THE SPC TERMINAL.

RELAY KA ..... 2PST (FORM A), 24VDC COIL
DIODE DI ..... IN4002 or equi.

# Figure 20 OPX Night Service Connections

### 6.05 Operational testing of the MTL

- a. After all connections have been established, inspect all installer straps and card connectors to insure no shorts or wiring errors before turning System Battery and OPX Battery on. Because IC's are utilized on the MTL and connections are established on DCR functions, considerable damage can be done by shorts or miswiring.
- b. After turning all battery on, use a local test set connected to the OPX pair to check ICM and CO Add-on operation of the individual MTL. Check each MTL individually, plugging in one circuit at a time to avoid compounded problems.
  - 1. With ICM Register free, go off-hook with test telephone. The first ICM Line Lamp should flash and dial tone heard in the test set. Dial an extension number to verify proper ICM calling. Perform the same test again by making the first ICM busy and going off-hook on the OPX circuit, seizing the second ICM Line.
  - 2. With the OPX on-hook, dial the OPX Extension Code on both ICM Lines to verify calling out operation. The Ring Generator (Signal) Battery should be heard or measured on the OPX circuit. With the OPX going off-hook, ringing should stop.

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- 3. Make Busy both ICM Lines on the system and verify presence of Busy Tone when the OPX goes off-hook.
- 4. CO Line Add-on Operation is verified by dialing the ICM codes wired for add-on or operation of the add-on by the DSS.
- 5. DSS Operation of the OPX is verified by pressing the OPX Signal Key to cause ringing at the OPX. Going off-hook with the test set should connect the OPX to the ATTND ICM Line.



BT-1530/2250 KEY TELEPHONE SYSTEM

III. MAINTENANCE

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# 

# BT-1530/2250 KEY TELEPHONE SYSTEM

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- 1.02 This Section will be revised on issuance of a new or revised Section for the Category as described in the Table of Contents.
- 2.00 TABLE OF CONTENTS

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# BT-1530/2250 KEY TELEPHONE SYSTEM

### CIRCUIT DESCRIPTION STANDARD FEATURES

- 1.00 INTRODUCTION
- 1.01 This section describes the circuit operation of the various standard operational features of the BT1530/2250 Key Telephone System. Some individual features, although classified as standard are, in essence, installer options and are described in Section 3002 with other optional features. Consult the Table of Contents for listing of the features described in this section.
- 1.02 Reference should be made to the Condensed System Drawings No. 1 and 2. Section 4001 for circuit diagrams of the features described.
- 1.03 Reference should be made to APPENDIX II for explanation of the symbols used in the circuit description sequence drawings.
- 1.04 Reference should be made to APPENDIX III for familiarization of the digital electronic circuits used in the Omega-Phone II Common Control circuits.
- 2.00 CQ LINE OPERATION
- 2.01 Power On
  - a. RELAY T operates on all CO Line cards through the following circuit:

COL

- b. Power is supplied to all Interrupters and Tone sources.
- 2.02 Incoming CO Line Call-Direct Connection (Bridged Ringing)
- a. When the Central Office (CO) 20hz ringing signal oppears
  COL at the Tip/Rin, terminals of the KSU CO LINE TERMINAL
  RELAY R of the COL (UCOL) operates as follows:

IAP

IAP

COL

> b. When the RELAY R operates, contact ro causes the common incoming detector RELAY S on the IAP circuit card to operate through the following circuit:

RELAY S latches RELAY R on the COL(UCOL) by switching  $\in \mathbb{R}$  battery through s (CO 1-10) or s3 (CO 11-20) contact to RELAY R hold winding 3-4.

- c. RELAY S remains operated for 15 seconds by battery supplied by ro contact and discharge of CAPACITORS Cl and C2 through TRANSISTOR Ql. As a result, RELAY R on the COL (UCOL) will remain operated until RELAY S releases if the call goes unanswered. When RELAY S releases and subsequently releases R, the next 20hz ringing signal from the CO will operate RELAY R again, causing the S to operate once more.
- d. When RELAY R operates, the CO Line Lamp starts to flash at a 60 IPM rate. TRANSISTOR Q1 on the COL (UCOL) circuit card switches minus Lamp battery on to the Lamp Line, Q1 being turned ON-OFF by the following circuit:

e. The Common Incoming Audible Control function (B0) is connected to the CO Incoming Tone Ringer (450hz modulated by 16hz) and Plus (+) Battery to turn on all extension amplifiers wired to receive Incoming indication through TRANSFORMER XF4 on the KSU rear panel. The CO Incoming Tone Ringer output is interrupted at 15 IPM by ANALOG GATE AG1 on the TNS circuit card, turned ON for one (1) second, OFF for three (3) seconds by the 15 IPM Interrupter on the DCR circuit card. The CO Incoming Tone Ringer is connected to TRANSFORMER XF4 through the following circuit:

- f. Figure 1 illustrates the CO Incoming Tone circuit to all extensions equipped for CO Ringing Indication.
- 2.03 Answering the Incoming CO Line Call
  - a. When an extension goes off-hook and the CO Line Key is pressed, RELAY H on the COL (UCOL) operates through the following circuit:

NOTE: Refer to Para 6.00 for PRV equipped models.

COL

Even through relay contact  $h_{\Delta}$  momentarily interrupts RELAY T holding circuit, RELAY T on the COL (UCOL) remains operated due to the slow release circuit of R5-C5 across  $T_{1-2}$  coil.

- b. When RELAY H operates,  $h_4$  contact causes RELAY R to release. R release causes RELAY S on the IAP circuit card to release. When both R and S RELAY release, the Line Lamp becomes steady, (+R) battery being supplied to the base of Q1 through  $h_4$  contact, and the extension audible signal is disconnected by the  $s_1$  and  $s_2$  relay contacts.
- c. The voice transmission network of the extension is connected across the TIP-RING of the CO Line through the Line Key (LK), causing the ringing to stop. Conversation can now take place.
- 2.04 Placing the CO Line Call on Hold
  - a. By pressing the HOLD Key (HK) at the extension, RELAY H and T on the COL (UCOL) circuit card are connected in series with a 1 kohm RESISTOR (Rh) through the following circuit:

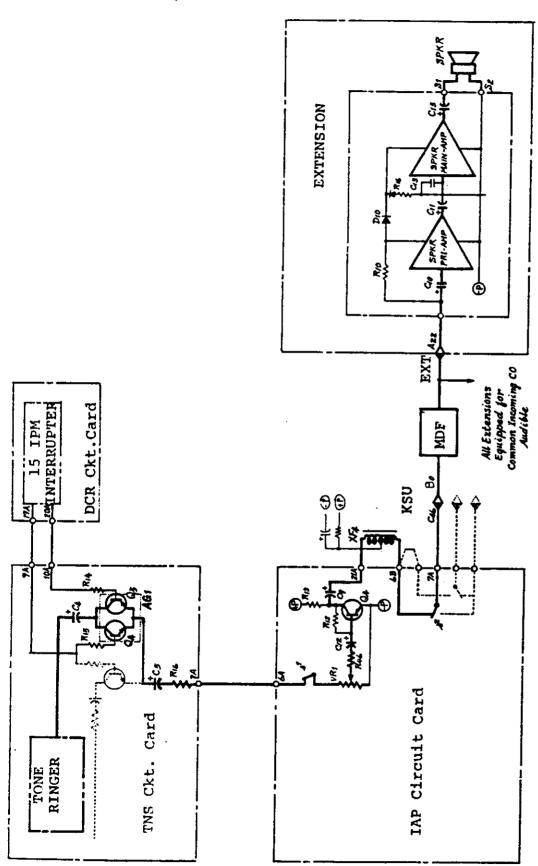


Figure 1 CO Incoming Tone Circuit

COL

b. DIODE D2 becomes reversed biased because of reduced +R battery on the H lead. RELAY T is released due to reverse phasing of T secondary winding 4-3 by the following circuit:

c. Upon release of the HOLD Key (HK) at the extension, all battery is taken off the HOLD (H) Lead since the Line Key (LK) restores to its rest position. RELAY H remains operated through the following circuit:

d. The line lamp starts to flash at the HOLD rate (120 IPM) operated by supplying 120 IPM +L to TRANSISTOR Q1 by the following circuit:

COL

e. A DC holding bridge (R2) is placed across the TIP-RING of the CO Line by relay contacts  $t_1-h_1$  and  $t_0-h_0$  on the COL (UCOL) circuit card.

2.05 Reanswering

COL

a. When the call is reanswered, +R battery is placed on the HOLD (H) lead by the circuit described in 2.02a. DIODE D2 becomes forward biased causing RELAY T to operate due to +R battery across RELAY H winding 1-2.

2.06 Completion of Call

COL

- a. When the handset goes on-hook, the Line Key (LK) restores.

  (+R) battery is disconnected from the "H" lead and the H releases.RELAY T remains operated due to its slow release during the RELAY H release interval and remains operated due to the circuit described in Para. 2.01a.
- 2.07 Dialing a CO Line Call
  - a. When an extension goes off-hook on a free CO Line, the Line Key (LK) connects the extension voice network to the TIP-RING, dial tone is returned by the CO, and the call then dialed.

- b. RELAY H on the COL (UCOL) card operates as described in Para. 2.02a, providing a steady line lamp and disconnecting the ringing detector circuit on the COL (UCOL) Line card.
- 3.00 CO Line Calls Utilizing Voice Connection Arrangements (VCA)
- 3.01 CO Line Call-STC Operation
  - a. When the CO 20hz ringing on the TELCO CO Line operates the Ringing Generator in the STC, RELAY R on the COL (UCOL) Line card is operated through the following circuit:

COL KSU STC R - CR

UCOL

- b. Operation of all other incoming circuits is the same as previously described. When the extension goes off-hook on the CO Line, the STC detects the DC path across the TIP-RING, disconnects the Ringing Generator, and supplies Talk Battery for conversation.
- 3.02 CO Line Call- CD-9/C2A Operation (UCOL only)
  - a. When the CO 20hz ringing on the TELCO CO Line is detected by the CD-9/C2A VCA, the CD-9/C2A provides a contact closure for incoming ring indication. RELAY R on the UCOL is operated by the following circuit:

b. When the extension goes off-hook on the CO Line, the UCOL detects the DC path across the Tip-Ring, causing RELAY A to operate. RELAY A provides a contact closure across CS-CG of the CD-9/C2A, disconnecting the ringing. RELAY A operates through the following circuit:

$$\frac{\text{UCOL}}{\text{HD-R9-RET}_{4-3}\text{-}4\text{-}3\text{-}115} - \frac{\text{A 1}}{\text{KSU}} - \frac{\text{MDF}}{\text{MDF}} - \text{cable} - \frac{\text{A 1}}{\text{EXT}} - \frac{\text{A 1}}{\text{EXT}}$$

con't

UCOL

- c. RELAY H operates as previously described in Para. 2.02a. During dialing of an outgoing call, RELAY A detects dial pulses, repeating the dial pulses across the CD-9/C2A CS-CG terminals.
- d. All other circuit functions are as previously described.
- 3.03 CO Line Call-STP Operation
  - a. Operation of the circuit utilizing the STP VCA is the exact operation as previously described for Direct Connection of CO Lines except that all CO Ringing and Talk Battery functions are provided by the VCA.

#### 4.00 INTERCOM CALLS

- 4.01 Seizing the Register (Register not busy) | Note 1
  - a. When the Intercom Line Key is pressed and the handset removed, Q2 and Q3 on the ICL card detects an extension off-hook condition through the following circuit:

- ICL
- b. Both TRANSISTOR Q2 (ST) and Q3 (DPD) outputs go LOW. NOR Gate G1, arranged as an Inverter (INV), connects  $\overline{ST}$  with delay to NOR Gate G2. Because of the delay of the  $\overline{ST}$  input from G1 and  $\overline{ST}$  input at NOR Gate G2, a HIGH pulse output is connected to NAND Gate G3 input. All other inputs to NAND Gate G3 are HIGH when the Register is idle.
- c. NAND Gate G3 is connected to NAND Gate G4 and G5 which operates as a SET-RESET Flip Flop (RSFF). NAND Gate G5 input is controlled by NOR Gate G6 output which goes HIGH when both ST is low and NAND Gate G12 is LOW. Both ANS (ANSWER) and TO (TIME OUT) are HIGH when the Register is idle.

Note 1

Refer to Para 6.00 for connection of the extension voice network to the Intercom Line on PRV equipped models.

- d. Because the Register is idle, REG is LOW. REG is then HIGH (Inverted by NAND Gate Gll on each ICL circuit card). When the HIGH Pulse arrives from NOR Gate G2, causing NAND Gate G3 to go LOW, the RSFF (Gates G4 and G5) are allowed to change output states. NAND Gate G4 output becomes HIGH while G5 output goes LOW. NAND Gate G3 output returns to HIGH after the pulse.
- e. When the RSFF changes state, the Intercom Line has now seized the Register and audible/visual control signals are activated.
- f. The Intercom Line Lamp starts flashing at 30 IPM, controlled by NAND Gate G8 and G9. Since ST is HIGH and NAND Gate G4 output is now HIGH, NAND Gate G8 output is controlled by the 30 IPM Interrupter output. NAND Gate G10 output is HIGH since the RSFF G5 output is LOW. Since NAND Gate G10 enables NAND Gate G9, G9 output varies directly with the 30 IPM Interrupter output, causing the Darlington connected TRANSISTOR Q5 and Q6 to turn the line lamp on-off at 30 IPM.
- g. RSFF G5 LOW output causes NAND Gate G1 on the DCR circuit card to change state, REG goes HIGH. When REG goes HIGH all other Intercom Lines are locked out by NAND Gate G11 on each ICL circuit card by preventing the RSFF on each ICL to change state when the Intercom Line is seized.
- h. Dial Tone is connected to the calling extension by turning ON TRANSISTOR QI by the RSFF G4 HIGH output on the ICL circuit card, connecting TRANSFORMER XFI on the TNS circuit card to the Intercom Voice path through the following circuit:

- i. When REG goes HIGH, NAND Gate G3 on the DCR circuit card goes LOW (DCl is HIGH) causing NAND Gate G4 to go HIGH. NAND Gate G4 and G19 control the Dial Tone/Busy Tone to the calling extension by operating (turning ON) ANALOG GATE AG2 on the TNS circuit card.
- j. Dial Tone is connected to TRANSFORMER XFl on the TNS circuit card by the following circuit:

ICL

l DCR

ICL

DCR

TNS

DCR

k. During the Register idle period, all Digit Counter and Supervise Flip Flops (FF) have been RESET ( $\overline{Q}$  is HIGH) by the 3840 IPM Interrupter through NOR Gate G2. When REG goes HIGH, the RESET function is disabled by NOR Gate G2 (going LOW. Also, G2 starts the 36-40 second timer for the Time Out (TO) function.

## 4.02 DIALING THE INTERCOM CALL (ROTARY DIAL)

- a. When the RSFF G4 output goes HIGH on Register Seizure, NAND Gate G7 on the ICL circuit card is enabled. Dial Pulse Detector (DPD) TRANSISTOR Q3 output can now pass through NAND Gate G7.
- b. When the extension dials the first digit of the called extension, ST remains LOW during the dial break period because of the slow discharge of CAPACITOR C3 through R5 causing TRANSISTOR Q2 to remain ON. The Dial Pulse Detector (DPD) TRANSISTOR Q3 will turn ON-OFF corresponding to the Dial Pulse train.
- c. DP1 on the ICL circuit card will go LOW for each dial pulse break causing NAND Gate G5 output to go HIGH. G5 output (DP) is connected to the 1st and 2nd Digit Dial Pulse Counter through NOR Gates G6, G7, and G8 as well as the Digit Supervision Control Monostable Flip Flop MM1 on the DCR circuit card.

d. NAND Gates G9 and G10 control which digit counter the Dial Pulses (DP) will enter. Because all Digit Supervision Flip Flop (FFl and FF2) have been RESET (Q is HIGH) because the Register was idle, NAND Gate G9 output is LOW, enabling NOR Gate G7, while NAND Gate G10 output is HIGH, disabling NOR Gate G8.

- e. Upon the first HIGH dial pulse (DP), Flip Flop FF3 of the lst Digit Counter changes state ( $\overline{Q}$  goes LOW) and at the same time Monostable Flip Flop MMl goes LOW. Monostable Flip Flop MMl, because of the C2, R18 time constant, remains LOW longer than the Dial Pulse (DP) HIGH interval and will retrigger on the next Dial Pulse (DP).
- f. Monostable Flip Flop MM2 (utilized during MF tone dialing) output is HIGH. When MMI output goes LOW, NAND Gate Gll will go HIGH causing NOR Gate Gl2 to go LOW. When Gl2 goes LOW, NOR Gate Gl3 will go HIGH since Digit Control Three (DC3) is LOW until the third (3rd) digit is dialed. NOR Gate Gl3 will remain HIGH during the entire 1st digit Dial Pulse (DP) train.

ICL

DCR

DCR

- g. First (1st) Digit Counter Flip Flop FF3, FF4 and FF5 are connected as a binary counter. NOR Gate Transistor-Relay Driver G15, G16 and G17 output is held LOW by the Second (2nd) Digit Supervise Flip Flop FF2. In this manner, the extension relay tree on the SEC circuit card is operated only on the completion of the 2nd Digit Pulse.
- h. Table A lists the First (1st) Digit Counter output for each 1st digit number that can be dialed.

TABLE A
FIRST DIGIT COUNTER OUTPUT

No. Dialed	FF3	FF4	FF5
RESET 1 2 3 4 5 6 7 8	HIGH LOW HIGH LOW HIGH LOW HIGH	HIGH HIGH LOW HIGH HIGH LOW LOW	HIGH HIGH HIGH LOW LOW LOW HIGH
9 0 (Oper)	NOT VAL		

- DCR
- i. Upon completion of the First (1st) Digit Dial Pulse, MM1 will return to the HIGH level during the dial pulse interdigit time (600 ms.min.) causing NAND Gate G11 to go LOW, NOR Gate G12 to go HIGH, and NOR Gate G13 to go LOW.
- j. When NOR Gate G13 goes LOW, First Digit Supervision FLIP FLOP FF1 will change state (Q goes HIGH,  $\overline{Q}$  goes LOW). When FF1 Q output goes HIGH, NAND Gate G9 becomes disabled and causes NOR Gate G7 to become disabled (hold LOW), allowing no more Dial Pulses (DP) to enter the First Digit Counter. NAND Gate G10 output goes LOW enabling NOR Gate G8, allowing 2nd Digit Dial Pulse (DP) to enter the Second Digit Counter.
- k. When FF1 changed state, Digit Control One (DC1) NOR Gate G18 goes LOW. DC1 going LOW cause NAND Gate G3 to go HIGH and subsequently NAND Gate G4 to go LOW. This cuts off dial tone at the calling extension by causing ANALOG GATE AG2 on the TNS circuit card to turn OFF.
- When the first Dial Pulse (DP) of the 2nd Digit number is received, Monostable Flip Flop MM1 once again goes LOW,

held LOW (by the C2, R18 time constant) longer than the dial pulse break interval and retriggers on the next Dial Pulse (DP). MMI will remain LOW during the entire Second Digit Pulse train.

- m. When MM1 goes LOW, NAND Gate G11 will go HIGH, NOR Gate G12 goes LOW and NOR Gate G13 will go HIGH. NOR Gate G13 output will remain HIGH as long as MM1 remains LOW.
- n. At the same time, Dial Pulses (DP) pass through NOR Gate G8 causing the Second Digit Counter Flip Flops FF6, FF7 and FF8 to advance on each Dial Pulse (DP) received. NOR Gates G20, G21, and G22 are controlled by Second Digit Supervision Flip Flop FF2, each output being held HIGH so that the extension relay tree on the SEC circuit card is not operated until the Second Digit Pulses are completed. Table B lists the output of the Second Digit Counter for each 2nd digit number that is dialed.

TABLE B
SECOND (2nd) DIGIT COUNTER OUTPUT

No. Dialed	FF6	FF7	FF8
RESET	HIGH	HIGH	HIGH
1	LOW	HIGH	HIGH
2	HIGH	LOW	HIGH
<b>.</b> 3	LOW	LOW	HIGH
4	HIGH	HIGH	LOW
5	LOW	HIGH	LOW
6	HIGH	LOW	LOW
7	LOW	LOW	LOW
8	HIGH	HIGH	HIGH
9	NOT VAL	. I D	
0 (Oper)	NOT VAL	.ID	

DCR

- o. When the Second (2nd) Digit Dial Pulse train is completed, MMl will return to the HIGH state, causing NAND Gate G11 to go LOW, NOR Gate G12 to go HIGH and NOR Gate G13 to go LOW. NOR Gate G13 going LOW causes FLIP FLOP FF1 to change state (Q goes LOW,  $\overline{Q}$  goes HIGH). FF1 Q going LOW causes FLIP FLOP FF2 to change state (Q goes HIGH,  $\overline{Q}$  goes LOW).
- p. When FF2  $\overline{Q}$  output goes LOW, NAND Gate G10 output goes HIGH causing NOR Gate G8 to be held LOW, preventing any additional Dial Pulses from entering the Second Digit Counter.
- q. If a Third Digit is dialed (for Voice/Tone Calling option), MM1 will again go LOW causing Gate Gll, Gl2 and Gl3 to

change state (G13 going HIGH). When MM1 returns to HIGH (after completion of the dial pulse), NOR Gate G13 goes LOW. This causes FF1 to change state (Q goes HIGH, Q goes LOW).

DCR

r. When FF1  $\overline{\mathbb{Q}}$  goes LOW, both inputs to NOR Gate G18 are LOW, causing its output Digit Control Three (DC3) to go HIGH. HIGH on DC3 disables NOR Gate G13, holding its output LOW, preventing anymore change in the Digit Supervise FLIP FLOP FF1 and FF2.

#### 4.03 DIALING THE INTERCOM CALL (OMEGA-TONE DIAL)

TNS

RCV

- a. When Dial Tone is connected to the calling extension through TRANSFORMER XF1 on the TNS circuit card (ref 3.01h) one winding of XF1 is connected to the OMEGA-TONE Discriminator Circuit Card (RCV) input.
- b. The RCV circuit card contains the tone detection and discrimator circuits for the standard MF tone signalling frequencies. The OMEGA-TONE Decoder Circuit Card (RCD) provides the interface and coded outputs to the First and Second Digit Counters on the DCR circuit card. Figure 2 illustrates the OMEGA-TONE Receiver functional diagram.
- c. Since the OMEGA-TONE Discriminator Circuit Card (RCV) circuit operation is highly technical and beyond the scope of this section, all references should be made to the RCV circuit card output connections L1-L3 and H1-H3 which connects to the RCD circuit card. All the RCV Discriminator outputs are normally LOW, except when a MF dial tone is detected and two of the six outputs corresponding to the number dialed go HIGH. Table C lists the particular output for each digit number that can be dialed.

TABLE C
OMEGA TONE CIRCUIT CARD RCV OUTPUT

No. Dialed	L1	L2	L3	H1	H2	Н3
1	Х			Х		
2	X				X	X
4	^	Х		X		
5		X	:		X	٧
7		^	х	<b>X</b> -		^
8			Χ		<u> </u>	
9 0 (Oper)	NOT V NOT V					

X- HIGH OUTPUT

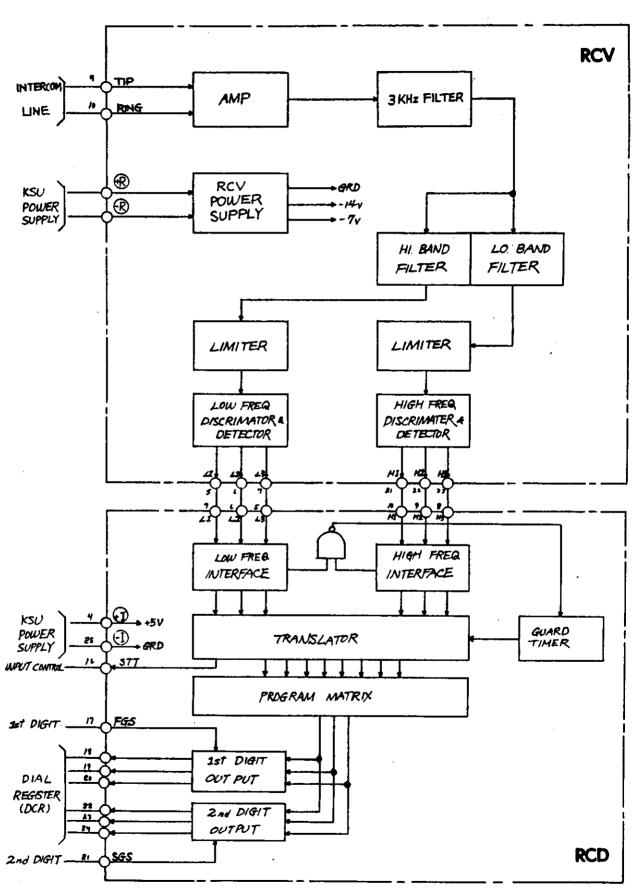


Figure 2 Omega-Tone Receiver (OTRU) Unit

- d. When the caller presses a digit Key on the OMEGA-TONE Dial, the RCV circuit card two-of-six output is interfaced to the RCD circuit card logic by TRANSISTOR Q1-Q6. A HIGH Input on the L1-L3, H1-H3 Inputs causes the respective TRANSISTOR to turn ON, providing a LOW
- e. The INVERTER Gates G1-G6 output are translated to the "decimal equivalent" of the number dialed by NAND Gates G7-G14. The NAND Gate output corresponding to the "deci-
- f. When one of the eight NAND Gates (G7-G14) goes LOW, NAND Gate G18 output goes HIGH. This operates the Output Timer so that when a valid MF tone signal is detected, only one 10 msec. pulse is supplied to the register counter circuit on the DCR circuit card each time a digit button is pressed at the calling extension.
- g. NAND Gates G15, G16 and G17 convert the decimal equivalent number into Binary form, to parallel load the First or Second Digit Counter FLIP FLOP (FF) on the DCR circuit card. The outputs of NAND Gates G15, G16 and G17 are LOW except when a valid MF tone is detected. Table D lists the NAND Gate G15-G17 outputs for each number that can be dialed.

# TABLE D

CD

# NAND GATES G15-G17 OUTPUT CHARACTERISTICS

No. Dialed	GI/ OUTP	UT CHARAC	TERISTICS
RESET	G15	G16	G17
1 2 3 4 5 6 7 8 9 0 (Oper)  The outputs of NAM	LOW HIGH LOW HIGH LOW HIGH LOW NOT VAL	LOW LOW HIGH LOW HIGH HIGH HIGH LOW	LOW LOW LOW HIGH HIGH HIGH HIGH LOW

h. The outputs of NAND Gate G15-17 are connected in parallel to the First and Second Digit Counter Driver Output. First and Second Digit Output sections are controlled separately, FGS from the DCR circuit card controlling the First Digit and SGS from DCR circuit card controlling

RCD

- i. Because FGS is LOW and SGS is HIGH during the First (1st) Digit, the First Digit Output is enabled and Second Digit Output is disabled. The Output Timer provides a 10 msec. HIGH pulse at the output of NAND Gate G29. This causes the respective First Digit Output NAND gates to go LOW for 10 msec., parallel loading the First Digit Counter on the DCR circuit card.
- j. At the same time, NAND Gate G21 on the RCD circuit card provides a LOW 10 msec. pulse on the STT control line to the Digit Supervise Monostable MM2 and NAND Gate G14 on the DCR circuit card. MM2 switches LOW, held low by the R17-C1 time constant, causing NAND Gate G11 to go HIGH, NOR Gate G12 to go LOW, and NOR Gate G13 to go HIGH.

DCR

- k. When MM2 returns HIGH, NOR Gate G13 goes LOW causing Digit Supervise Flip Flop FF1 to change state (Q goes HIGH,  $\overline{Q}$  goes LOW). This, in turn causes NAND Gate G9 (FGS) to go HIGH and NAND Gate G10 (SGS) to go LOW.
- 1. When FF1 Q goes HIGH, NOR Gate G18 (DC1) goes LOW. DC1 going LOW causes NAND Gate G3 to go HIGH and subsequently NAND Gate G4 to go LOW. This cuts off dial tone at the calling extension because G4 and G19 control ANALOG GATE AG2 on the TNS circuit card.
- m. When the Second Digit MF tone signal is detected by the RCV circuit card, a two-of-six HIGH output is provided on the L1-L3, H1-H3 terminals. The respective TRANSISTORS Q1-Q6 are turned ON, providing LOW output to the respective INVERTER Gates G1-G6. The HIGH outputs of the corresponding INVERTER Gates G1-G6 (two-of-six) is translated into the "decimal" equivalent by NAND Gates G7-G14. A LOW output on one of Gates G7-G14 causes NAND Gate G18 to go HIGH preparing the Output Timer for a 10 msec. pulse. NAND Gates G15-G17 convert the "decimal" output from G7-G14 into "Binary" form and load the Second Digit Counter Output.

RCD

- n. Since SGS is LOW after the First Digit is completed, the Second Digit Output is enabled by NAND Gate G20. The Output Timer provides a 10 msec. HIGH pulse at the output of NAND Gate G29. This causes the particular output(s) of the Second Digit Output NAND Gates corresponding to the number dialed to go LOW for 10 msec., parallel loading the Second Digit Counter on the DCR circuit card.
- o. At the same time, NAND Gate G21 provides a LOW 10 msec. pulse on the STT control line to the Digit Supervise Monostable FLIP FLOP MM2 and NAND Gate G14 on the DCR circuit card.

- p. MM2 switches LOW, held LOW by the R17-C1 time constant, causing NAND Gate G11 to go HIGH, NOR Gate G12 to go LOW, and NOŘ Gate G13 to go HIĞH.
- q. When MM2 output returns HIGH, NOR Gate G13 goes LOW\_ causing FLIP FLOP FF1 to change state (Q goes LOW, Q goes HIGH). FF1 Q output going LOW causes FLIP FLOP FF2 to change state (Q goes HIGH, Q goes LOW).
- r. When FF2 Q output goes HIGH, NAND Gate G10 (SGS) goes HIGH, disabling the Second Digit Output on the RCD circuit card. The First and Second Digit Outputs on the RCD circuit card are both disabled, preventing any change in the Counters on the DCR circuit card.
- s. If a Third Digit MF tone signal is detected by the RCV circuit card, the two-of-six HIGH output is sent to the RCD circuit card. The RCD circuit card decodes the number dialed, a LOW output appearing on the corresponding TRANSLATER NAND Gate G7-G14.
- t. Because both FGS and SGS are HIGH, the First and Second Digit outputs are disabled, no digit information is passed to the Counters on the DCR circuit card.
- u. The Output Timer NAND Gate G18 goes HIGH, causing a 10 msec. LOW pulse to appear on the STT control lead.
- v. The 10 msec. LOW pulse on the STC control lead causes Monostable FLIP FLOP MM2 to go LOW, causing G11 to go HIGH, G12 to go LOW, and G13 to go HIGH. When MM2 returns to HIGH, NOR Gate G13 goes LOW causing FLIP FLOP FF1 to change state (Q goes  $\overline{\text{HIGH}}$ ,  $\overline{\text{Q}}$  goes  $\overline{\text{LOW}}$ ).
- w. When Q of FF1\_goes\_LOW, NOR Gate G18\_goes\_HIGH\_because both inputs (Q of FF2 is LOW) are LOW. NOR Gate G18 (DC3) HIGH output holds NOR Gate G13 output LOW, preventing any other change in the Digit Supervise FLIP FLOPS FF1 and FF2.
- Connecting the Called Extension (Extension Not Busy)
  - a. When Digit Control Two (DC2) goes HIGH on completion of the Second Digit, the First and Second Digit Counter NOR Gates G15-G17, G20-G22 are enabled. The outputs of the First and Second Digit Counters cause their respective NOR Gates to go HIGH
  - b. A HIGH output on the NOR Gates G15-G17, G20-G22 cause their respective TRANSISTOR RELAY DRIVER Q1-Q6 on the SEC circuit card to turn ON, causing the RELAYS to

PAGE 16

DCR

RCD

CR

operate. Table C lists the Relay operation on the SEC and optional EEX circuit card for each counter output.

in water 12

TABLE C
RELAY OPERATION ON SEC-EEX CIRCUIT CARD

S	E	C/
E	E	X

First Digit	Second Digit	SEC	EEX
Counter	Counter	Card	Card
FF3 FF4 FF5		A B	
	FF6	1A,1B	1 C
	FF7	2A	2 B
	FF8	4A,4B	4 C , 4 D

c. When the SEC relays (and EEX relays if so equipped) operate, a circuit path is made through the relay tree to the called extension "Z" lead. The Extension Detector circuit is operated through the following circuit: (Extension No. 15 is dialed E.G.)

d. When the called extension is not busy (on-hook), Q13 on the TNS circuit card conducts because of P battery from the extension amplifier circuit. TRANSISTOR Q14 is enabled because DC2 on the DCR circuit card is HIGH, reverse biasing DIODE D9. RESISTOR R41 forward biases Q14 causing Q14 to turn ON. RELAY BT operates through the following circuit:

TNS

Once RELAY BT has operated, it remains energized through a holding path by contact closure  $bt_1$ .

e. Relay contacts bt<sub>3</sub> connects the extension relay tree to the Tone/Voice Signal TRANSFORMER XF2. Besides audio coupling the tone/voice signals, TRANSFORMER XF2 supplies +P battery to the called extension, turning the extension amplifier circuit ON. Figure 3 illustrates the circuit through which the called extension is supplied calling tone/voice and Battery through XF2.

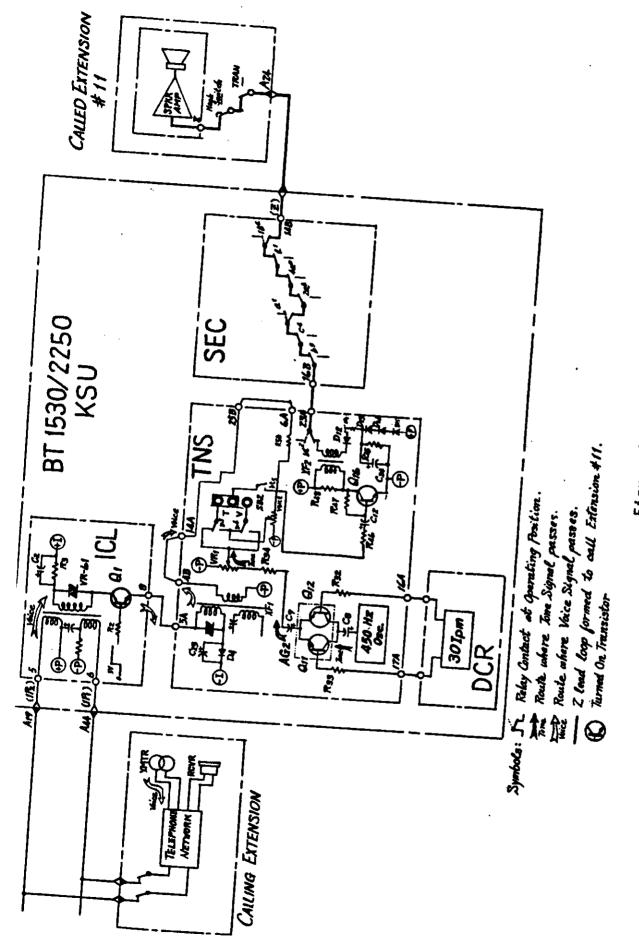


Figure 3 Intercom Tone/Voice Signalling and Control Circuit

PAGE 18

- f. When the DC2 on the DCR circuit card goes HIGH on completion of the Second Digit, NAND Gate G24 is enabled. When RELAY BT on the TNS circuit card operates, bto provides a LOW on the BT lead control. A LOW on BT causes NAND Gate G28 to be held HIGH, disabling the Gate. Also, NAND Gate 26 (connected as an INVERTER) goes HIGH enabling NAND Gate G27. The remaining input to NAND Gate G27 is connected to the 30 IPM Interrupter through NAND Gate G28 (connected as an INVERTER). The output of NAND Gate G27 is controlled by the 30 IPM Interrupter, providing an Inverted Interrupter input to NAND Gate G29.
- g. NAND Gate G24 output is controlled by the 30 IPM Interrupter. Because REG is LOW (Register is seized), NAND Gate G3 output is HIGH. This enables NAND Gate G24 to pass the 30 IPM Interrupter signal. NAND Gate G4 (plus the Inverted output at NAND Gate G34) control the turn on of the ANALOG GATE AG2 on the TNS circuit card, turning AG2 ON for one (1) second, OFF for one (1) second. AG2 controls the output of the 450hz Osc. which provides Dial Tone, Busy Tone to the calling extension and Ringing Tone to the called extension.
- 4.05 Operation with Tone Calling Arranged for Two (2) Digit Access
  - a. When DC2 on the DCR circuit card goes.HIGH, 30 IPM Ringing Tone is sent to the called extension through TRANS-FORMER XF2 by the following circuit:

- b. At the calling extension, Ringback Tone (modulated 450hz at 15 IPM) is heard. The Ringback tone is controlled by the 15 IPM Interrupter Output NAND Gates G30 and G31 on the DCR circuit card.
- c. The 15 IPM Interrupter controls ANALOG GATE AG1 and TRANSISTOR Q17 on the TNS circuit card allowing the tone to pass through the gate for one (1) second, off for three (3) seconds. Ringback Tone is connected to the calling extension through TRANSFORMER XF1 by the following circuit:

DCR

DCR

TNS

- d. The calling extension hears the Ringback tone through the same circuit that provided Dial Tone to the calling extension. (REF Para. 4.01h)
- e. If the calling extension dials a Third Digit (Rotary or Tone) Digit Control Three (DC3) on the DCR circuit card goes HIGH (REF Para. 4.02r-s, 4.03s-w). This causes RELAY V on the TNS circuit card to operate since DIODE Dll is no longer forward biased and TRANSISTOR Q15 ON.
- f. Relay contact v<sub>2</sub> disconnects the Ringback Tone from the calling extension. A "voice" path is now open from TRANS-FORMER XF1 to the Intercom Line voice path using the circuit described in Para. 4.10h. Voice paging from the calling extension is connected to the called extension through TRANSFORMER XF2 by the following circuit:

- g. The "Voice" signal is connected to the called extension through TRANSFORMER XF2 by the same circuit path that the "Tone" signal was connected (REF Para. 4.04e).
- 4.06 Operation with Voice Calling Arranged for Two (2) Digit Access
  - a. Upon completion of dialing the Second Digit, "Voice" paging to the called extension is accessed through TRANSFORMER XF1 by the following circuit:

- b. "Voice" from the Intercom Line circuit is connected to TRANSFORMER XF1 through the same circuit path that Dial Tone was accessed (REF Para. 4.01h).
- c. If the calling extension dials a Third Digit (Rotary or Tone), Digit Control Three (DC3) on the DCR circuit card goes HIGH (REF Para. 4.02r-s; 4.03s-w). This causes RELAY V on the TNS circuit card to operate since DIODE D11 is no longer forward biased and holding TRANSISTOR Q15 OFF.

TNS

TNS

d. Fifteen (15) IPM Interrupter Ringback Tone (modulated 450 hz) is connected to the calling extension through TRANS-FORMER XF1 by the following circuit:

TNS

e. Because ANALOG GATE AG2 is turned ON (REF Para. 4.04g), Ringing tone interrupted at 30 IPM is sent to the called extension through TRANSFORMER XF2 by the following circuit:

## 4.07 Answering the Intercom Call

a. When the called extension presses the Intercom Line Key and takes the handset off-hook, the Intercom Line Card (ICL) detects the off-hook (answer) condition through the following circuit: (Calling Ext. No.15 on ICM1 e.g.)

- b. Plus P (+P) battery on the Intercom Line P3 lead causes TRANSISTOR Q4 (ANS) to turn ON. This provides a LOW input to NAND Gate G12. ANS going LOW causes G12 to go HIGH, which in turn causes NOR Gate G6 to go LOW (ST is LOW).
- ICL

  c. When NOR Gate G6 goes LOW, the SET-RESET FLIP FLOP (RSFF) composed of NAND Gates G4 and G5 can change state since the input to G4 is HIGH (Ref Para. 4.10d) and the input to G5 has changed from HIGH to LOW.
  - d. When the output of RSFF NAND Gate G5 goes HIGH, NAND Gate G10 goes LOW (ST is HIGH). Because of G10 is LOW, NAND

Gate G7 goes HIGH causing TRANSISTOR Q5 and Q6 to turn ON steady, which in turn causes the Intercom Line Indicator Lamp to burn steady.

ICL

DCR

- e. The LOW output on NAND Gate G4 disables NAND Gate G7, preventing any additional dial pulses from entering the Register. Also, TRANSISTOR Q1 is turned OFF, disconnecting the voice/tone path from the Register.
- f. When the NAND Gate G5 on the ICL circuit card goes HIGH, NAND Gate G1 (REG) on the DCR circuit card goes LOW. REG going LOW disables NAND Gate G3, preventing any more tone signals from passing through ANALOG GATE AG2 on the TNS circuit card.

- g. REG going LOW enables NOR Gate G2, allowing it output to  $g_0$  HIGH at approx. a 3840 IPM rate. When NOR Gate G2, is HIGH, both NOR Gate G32 and G33 (connected as INVERTERS) go LOW. This causes the First and Second Digit Counters FLIP FLOPS FF3-FF8 as well as the Digit Supervise FLIP FLOPS FF1-FF2 to RESET ( $\overline{Q}$  output goes HIGH).
- h. With NOR Gate G2 going HIGH, the 36-40 TIME OUT (TO) counter is continually RESET.
- i. When the First and Second Digit Counter (FLIP FLOP FF3-FF8) are RESET, NOR Gates G15-17, G20-22 go LOW causing RELAYS on the SEC (and EEX if equipped) card to release, disconnecting the called extension "Z" lead from the register.
- j. When the Digit Supervise FLIP FLOP FF1-FF2 are RESET, DC1 goes HIGH while DC2 and DC3 go LOW on the DCR circuit card.

TNS

k. RELAY BT on the TNS circuit card is released when DC2 goes LOW, causing TRANSISTOR Q14 to turn OFF. RELAY V is released because DC3 going LOW causes TRANSISTOR Q15 to turn OFF.

## 4.08 Connecting the Called Extension (Extension Busy)

a. When DC2 on the DCR circuit card goes HIGH after the end of the Second Digit, the relay tree on the SEC (and EEX if equipped) circuit card operate, connecting the called extension "Z" lead to the Extension Detector circuit as described in Para. 4.04c.

TNS

b. If the called extension is Busy (off-hook), no —R battery is available to turn TRANSISTOR Q13 ON, preventing operation of RELAY BT on the TNS circuit card. Because RELAY BT does not operate, the called extension "Z" lead is not connected to the Tone/Voice signal source, TRANSFORMER XF2, but remains connected to the "detector" circuit.

- c. Because DC2 is HIGH on the DCR circuit card, NAND Gate G24 is enabled. Because BT remain HIGH, NAND Gate G25 is enabled, passing the 120 IPM Interrupter signal. Also, BT being HIGH causes NAND Gate G26 (connected as an INVERTER) to go LOW, disabling NAND Gate G27 by causing it to go HIGH.
- d. Because G27 is HIGH, NAND Gate G29 is enabled, passing the 120 IPM Interrupter signal through to NAND Gate G24. Because G24 was enabled by DC2 going HIGH, G24 passes the 120 IPM Interrupter to NAND Gate G4.
- e. NAND Gate G4 is enabled because DC1 is LOW after the First Digit causing NAND Gate G3 to go HIGH. NAND Gate G4 passes the 120 IPM Interrupter signal. Both NAND Gate G4 and G34 control the ANALOG Gate AG2 on the TNS circuit card, turning the AG2 on-off at a 120 IPM rate.
- f. Busy Tone is sent to the calling extension through TRANS-FORMER XF1 by the following circuit:

#### 

- g. The Intercom Line Voice path is connected to TRANSFORMER XF1 through winding 3-4.
- h. If the called extension returns on-hook, the extension "detector" circuit is supplied —P battery by the called extension amplifier unit by the circuit described in Paragraph 4.04c.RELAY BT on the TNS circuit card operates, causing Voice/Tone Signals to be supplied to the called extension as outlined in Paras. 4.04, 4.05 and 4.06.
- i. When RELAY BT operates, BT goes LOW, disabling NAND Gate G28 on the DCR circuit card, disconnecting the AG2 driver circuit from the 120 IPM Interrupter, allowing AG2 to be controlled by Voice/Tone calling function.

## 4.09 Alternate Point Answering (APA)

- a. If the called party is not at the called extension, the call can be answered at any other extension by using the CONF (APA) Key.
- b. When the Intercom Line Key is pressed and the handset taken off-hook at the answering extension, the CONF Key is pressed. This releases the KSU Intercom Register by placing +R battery on the Intercom P3 lead and operating the ANS detector through the following circuit:

DCR

TNS

T9-R12-Q4<sub>b-e</sub>- (1)

NOTE: The EXTENSION circuit does not take into account the PRV unit

c. Plus R (+R) battery on the P3 leads cause TRANSISTOR Q4 (ANS) on the ICL circuit card to turn ON. This provides a LOW input to NAND Gate G12. ANS going LOW caused the Register to release and Intercom Line clearing as described on Para. 4.07b-1.

#### 4.10 Time Out Function

- a. When REG on the DCR circuit card goes HIGH, NOR Gate G72 goes LOW. LOW on the output of G72 enables the 36-40 sec. Time Out (TO) circuit.
- b. The called extension must answer the call before the 36-40 sec. period. Also, if the called extension is busy (off-hook) the calling extension can wait only the duration of the time-out period before the Register is RESET.
- c. The Time Out (TO) FLIP FLOPS FF9-FF12 is controlled by the 15 IPM Interrupter. When both inputs to NAND Gate 634 are HIGH, G34 output goes LOW.
- d. When NAND Gate G34 goes LOW after 36-40 seconds, NAND Gate G12 on the ICL goes HIGH. This causes NOR Gate G6 to go LOW. When NOR Gate G6 goes LOW, the RSFF changes state and the Register RESETS as described in Para. 4.07c-k.

## 4.11 Completion of Call

- a. When both parties go on-hook, the DC path across P1-P2 of the Intercom Line is opened. Plus P (+P) battery is no longer connected through R4, D1, and R5 to the base of TRANSISTOR Q2 (ST) on the ICL circuit card. This causes CAPACITOR C3 to discharge, through R5, R6 and Q2<sub>b-e</sub>. The discharges hold ST LOW till Q2 is no longer forward biased and turns OFF.
- b. When Q2 turns OFF, ST goes HIGH. ST going HIGH causes

ICL

DĊR

ICL

ICL

ICL

ICL

INV Gate G1 to go LOW. G1 going LOW causes NAND Gate G10 to go HIGH. G10 going HIGH causes NAND Gate G9 to go LOW (NAND Gate G8 is HIGH). G9 going LOW turns OFF TRANSISTOR Q5 and Q6, extinguishing the Line Lamp.

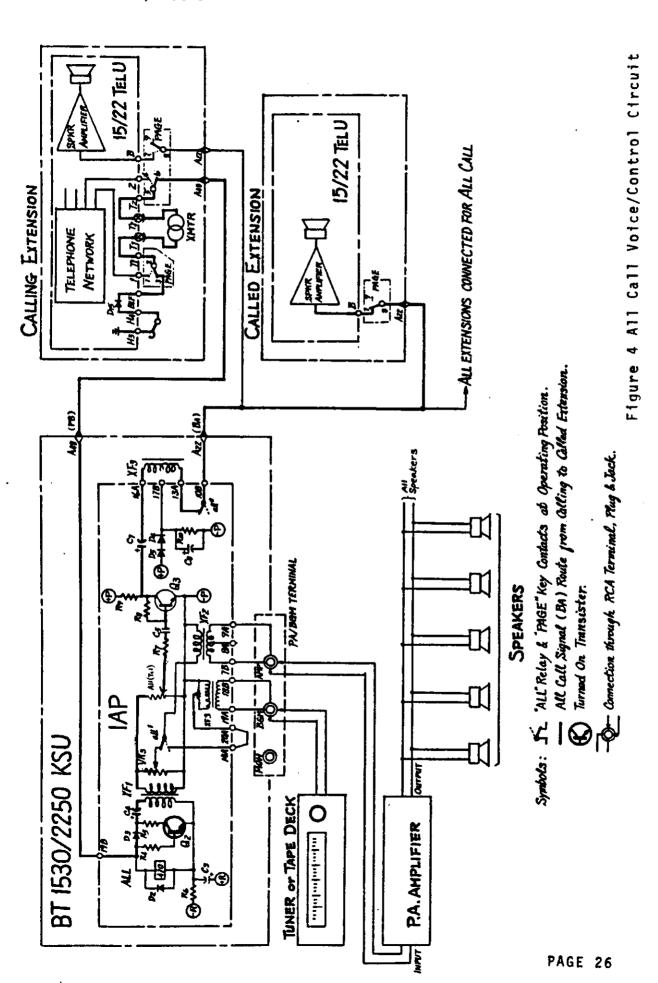
### 4.12 Abandoning the Call

- a. If the calling extension abandons the call before the called party answers, the DC path across Pl-P2 of the Intercom Line is opened. TRANSISTOR Q2 in the ICL Line card turns OFF as described in Para. 4.11a.
- b. When Q2 turns OFF, ST goes HIGH. ST going HIGH causes NOR Gate G6 to go LOW (G12 is LOW since both ANS and TO are HIGH). When G6 goes LOW, the RSFF composed of NAND Gate G4 and G5 can change state since the input to G4 is HIGH (REG is HIGH causing G11 to go LOW and G3 to go HIGH).
- c. The RSFF changes state, NAND Gate G5 is HIGH and G4 is LOW. The Registor is then released by the circuit operation described in Para. 4.07d-k.
- d. The Intercom Line Lamp extinguishes by the circuit described in Para. 4.11b.
- 5.00 USING THE PAGE (ALL CALL) KEY
- 5.01 Making an All Call to the Extensions
  - a. Pressing the PAGE Key at the calling Extension operates RELAY ALL on the IAP circuit card through the following circuit:

b. When RELAY ALL operates, voice from the calling extension is coupled through TRANSFORMER XF1 on the IAP circuit card, connected by relay contact all to TRANSISTOR Q3. Q3 amplifies the voice and couples the voice through CAPACITOR C7 to the All Call TRANSFORMER XF3.

IAP

c. TRANSFORMER XF3 supplies both plus (+) battery and voice to the All Call output control lead "BA". Battery and voice are connected to those extensions wired for All Call as shown in Figure 4.



IAP

d. Those extensions arranged for Night Service receive All Call on the Night Service lead "BN" (A47) through relay contact  $\rm nt_0$  on the IAP circuit card.

- e. Extension arranged for Individual CO Line Audible receive the All Call through the external installer provided DIODES that are forward biased by +P battery through TRANSFORMER XF3. When a CO Line Incoming Ring occurs, the individual DIODE becomes reversed biased due to greater +P battery potential through TRANSFORMER XF4 than through XF3 due to the series voltage drop of DIODES D and D5
- f. At the calling extension, PAGE Key contacts PK7\_9 disconnect the B control lead (A22) to prevent "feedback" from occurring.

#### 5.02 PA Connection

IAP

- a. The Background Music Source (BGM) input is connected through its own VOLUME CONTROL (VR2) and relay contact all to the PA Amp. Input TRANSFORMER XF2. When RELAY ALL operates (through the circuit described in Para. 5.01a), XF2 is disconnected from the BGM source and connected to the page input.
- b. At the same time the calling extension page is heard through the All Call, the voice page is heard through the external PA system.
- c. Figure 4 illustrates the PA Connection operating circuit.

#### 6.00 PRIVACY UNIT OPERATION

- 6.01 Operation of the Privacy Unit (PRV) on a Free CO Line.
  - a. When any handset is taken off-hook, (+R) battery is supplied to the PRV unit through Hookswitch contact HS3\_4 Because no (R) battery is available through the Line Key (LK), TRANS-ISTOR Q30 is OFF, holding TRANSISTOR Q31 OFF.
  - b. Because Q31 is OFF, TRANSISTOR Q32 is turned ON due to current flow through RESISTOR R34, R35 and R36. When Q32 turns ON, RELAY K operates, disconnecting the voice network from the Extension Line Key assembly.
  - c. When a CO Line Key (e.g. CO 1) is pressed, (R) battery through RELAY H on the COL (UCOL) turns TRANSISTOR Q30 on through the following circuit:

HS<sub>4-3</sub>- ⊕®

COL

- d. When TRANSISTOR Q30 turns ON, Q31 turns ON. When Q31 turns ON, forward bias is supplied to Q30 through RESISTOR R33 to hold Q30 ON. Also, current now flows through DIODE D31 and Q31 causing a low voltage drop to appear across RESISTOR R35 and R36. TRANSISTOR Q32 then turns OFF, releasing RELAY K. The Extension's Voice Network is now connected across the CO Line TIP-RING.
- e. When TRANSISTOR Q30 turns ON, DIODE D30 is forwarded biased causing (R) battery to appear at RELAY H coil on the COL (UCOL) circuit card. RELAY H now operates.
- f. (+R) battery less the series voltage drop of DIODE D14 and D30 holds RELAY H operated

#### 6.02 Exclusion of Other Extensions on a Busy CO Line

- a. When another extension equipped with a PRV unit presses the CO Line Key of the busy CO Line, TRANSISTOR Q30 of the second extension PRV unit remains OFF due to (+R) battery on the "H" lead. RELAY K on the PRV of EXT. No. 2 remains operated, keeping the extension voice network disconnected from the CO Line TIP-RING.
- b. COMMON Key Sw contacts  $CMK_{1-2}$  prevent defeating the local extension PRV unit when a  $C\bar{Q}$  Line is busy by causing TRANSISTOR Q30 to turn OFF (subsequently causing Q32 to turn ON and operating RELAY K) when switching from CO Line to CO Line.

## 6.03 Privacy Release Operation

a. When EXT No. 1 wishes to let another Extension (No. 2) enter the conversation, the CONF Key is pressed at EXT No. 1. This causes a minus (-) potential to appear on the "H" leaf due to the voltage divider set up by the insertion of RESISTOR RH in series with the (R) battery in the "H" lead circuit.

COL

b. TRANSISTOR Q30 of the PRV unit at EXT No. 1 still remains turned ON due to R33, allowing (R) battery to still remain on the "H" lead, sufficient to hold RELAY H on the COL (UCOL) operated. However, due to the lower positive (+) potential appearing across RELAY H coil, DIODE D2 on the COL (UCOL) card becomes reversed biased and RELAY T releases due to the reverse phasing of its winding through the circuit described in Section 3001; 2.04b. The line lamp starts to flash at a fast rate (120 IPM) controlled by the circuit as described in Section 3001 2.04d.

PRV EXT 1

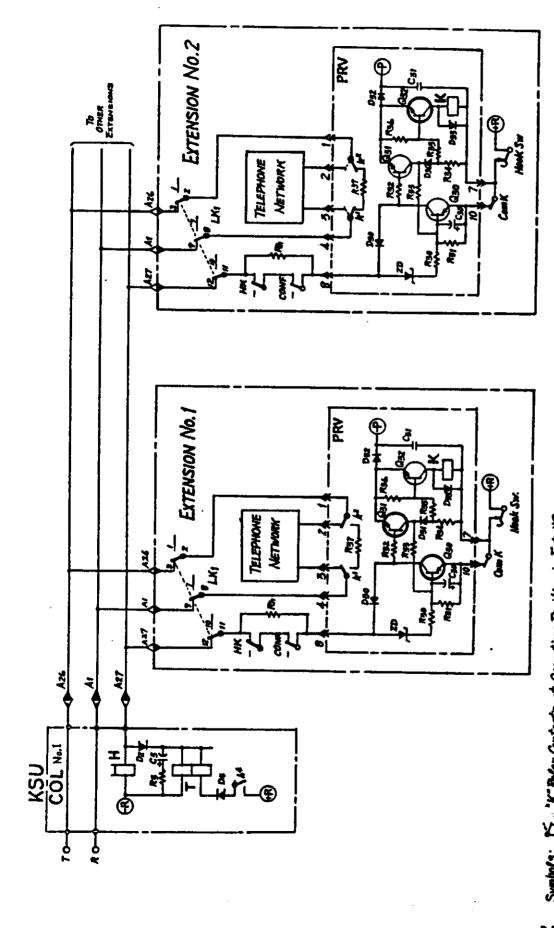
c. TRANSISTOR Q30 remaining ON hold TRANSISTOR Q31 ON and Q32 OFF, keeping the PRV Privacy RELAY K not operated.

PRV EXT 2

- d. Sufficient —R battery is now available on the "H" lead to cause TRANSISTOR Q30 on EXT No. 2 PRV unit to turn ON. This in turn causes Q31 to turn ON, providing forward bias through RESISTOR R33 to hold Q30 ON. Q31 turning ON causes the voltage drop across RESISTOR R35 and R36 to go LOW turn TRANSISTOR Q32 OFF and prevents operation of RELAY K.
- e. When Q30 on the PRV unit at EXT No. 2 turns ON, the voltage divider on the "H" lead is bypassed by Q30 providing direct (R) battery less the voltage drop of Q30, D30 and D14 on the "H" lead.

COF

- f. Direct (+R) battery on the "H" lead causes DIODE D2 on the COL (UCOL) circuit card to become forward biased, causing RELAY T to operate and the line lamp to return to steady.
- g. The CONF Key is released at EXT No. 1 and both Extension Voice Network are connected across the TIP-RING of the CO Line. If a third extension is to enter the line, both EXT No. 1 and EXT No. 2 pressing their respective CONF Key cause the voltage divider to appear on the "H" lead. Enough minus (-) voltage appears on the "H" lead allowing TRANSISTOR Q30 of the PRV unit on EXT No. 3 to turn ON.
- h. Figure 3 illustrates the Privacy Unit operating circuit with Extension No. 1 and No. 2 connected to CO Line No. 1.
- 6.04 Defeating the Privacy Unit on the Intercom Line
  - a. When the handset is taken off-hook, RELAY K on the PRV unit operates as described in Para. 6.01a-b. When the Intercom Line Key is pressed, Pbattery from RESISTOR R21 turns TRANSISTOR Q30 ON through the circuit as shown in Figure 4.
  - b. Q30 turning ON prevents the Privacy RELAY K from operating as described in Para. 6.01d.



Symbols: J.L. \*K" Melay Contacts at Operating Position in Est. #2.

(C) Turned On Transistor.

CO Line Privacy Unit (PRV) Circuit

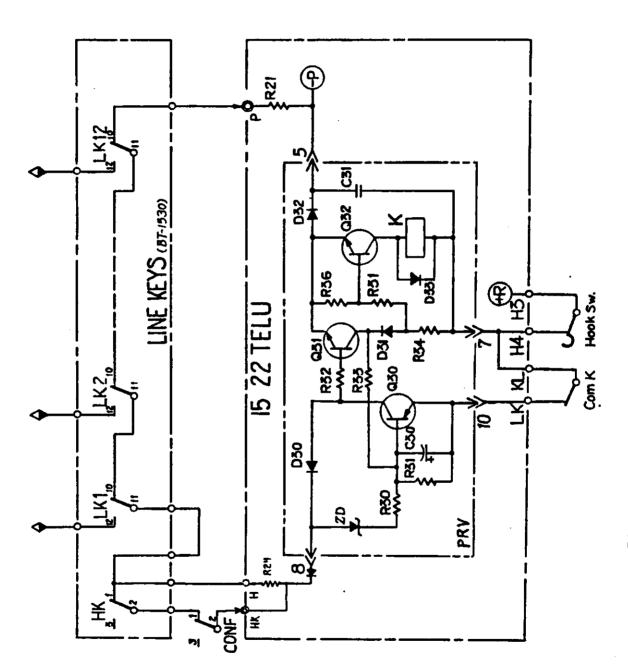


Figure 4 Privacy Unit (PRV) Operation on Intercom Lines

# **OMEGA**III

# BT-1530/2250 KEY TELEPHONE SYSTEM

# CIRCUIT DESCRIPTION OPTIONAL FEATURES

- 1.00 INTRODUCTION
- 1.01 This section describes the circuit operation of various optional or Installer programmed features of the BT 1530/2250 Key System. Refer to the Table of Contents for a listing of the individual features described.
- 1.02 Refer to Condensed System Dwg. No. 1 and 2, Section 4000 for wiring diagrams of the features described.
- 1.03 Condensed circuit diagrams are provided in this section for clarity in some instances. Refer to Section 4000 for complete schematic diagrams of the feature(s) described.
- 2.00 HANDSFREE TALKBACK OPERATION
- 2.01 Accessing the KSU Handsfree Circuit Card (HFK-1) control/voice amplifier circuit.
  - a. When a HFS-I equipped extension is called on the ICM and Voice Calling is accessed, the HFK-I circuit card is operated through the following circuit:

- NOTE If the called extension is Busy, the HFK-1 circuit card is not operated because of relay contact bt<sub>3</sub> on the TNS circuit card is not operated.
- b. +R battery on TERM T16 of the HFK-1 circuit card causes RELAY AM to operate momentarily due to CAPACITOR C22 charging current causing TRANSISTOR Q19 to turn ON. When C stops charging, Q19 turns OFF. This causes RELAY AM to operate for only 1-2 seconds.

Assuming the Shorting Bars on the TNS circuit card are in the Tone Call two digit access mode, the Calling Extension is sent a momentary warning tone through TRANSFORMER XF2 on the TNS circuit card by the following circuit:

- d. The 450 hz warning tone is connected to the Called Extension through TRANSFORMER XF2 on the TNS and the HFK-1 amplifier as shown in Figure 1
- e. At the Called Extension, +P Battery from TRANSFORMER XF1 on the TNS circuit card causes the extension amplifier to turn ON. At the same time, +P Battery turns on the extension HF microphone
- 2.02 Operation of the HF Voice Circuit
  - a. The output of the Called Extension Mic Amplifier is connected through the HFK-1 circuit card to the Calling Extension by the circuit illustrated in Figure 2.
  - b. The Hybrid circuit on the HFK-1 circuit card connects the Bi-directional Transmit/Receiver Amplifiers of the HFK-1 to the ICM Voice path. Figure 2 illustrates the function diagram of the HFK-1 circuit card since the electronic operation of the HF circuit is beyond the scope of this discussion.
- 2.03 Disconnect of the HF Voice Circuit
  - a. During the HF Talkback interval, the ICM Dial Register remains operated. The Time Out Function is energized, limiting the time duration of the HF Talkback call.
  - b. If either the Calling Extension goes ON-HOOK, the Called extension goes OFF-HOOK on the ICM line, or the ICM Register releases due to operation of the Time Out Function, +P Battery disconnects from the Extension Z line. RELAY BT on the TNS circuit card release also causes RELAY HF release on the HFK-1 circuit card.

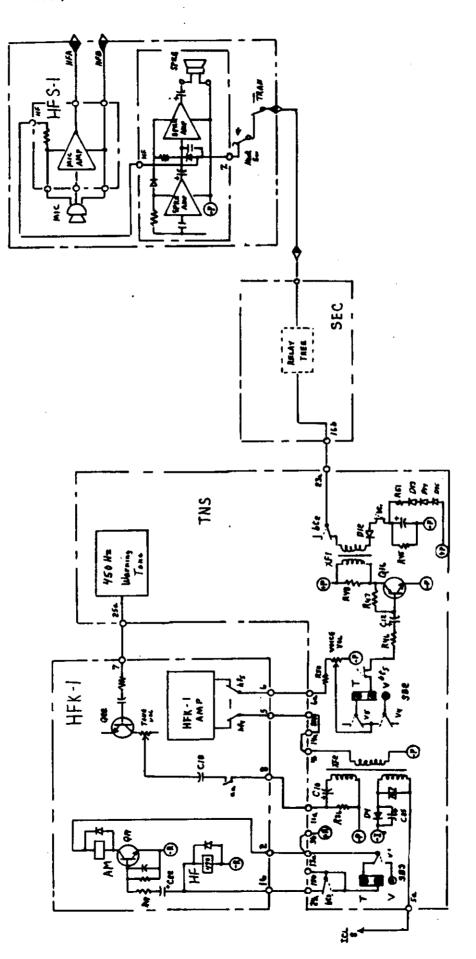


FIGURE 1 HF Voice and Tone Control Circuits

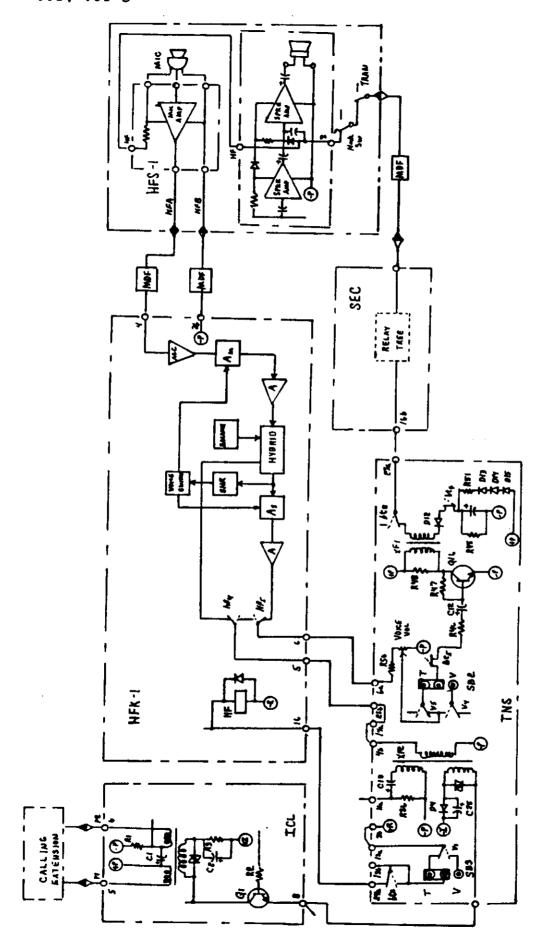
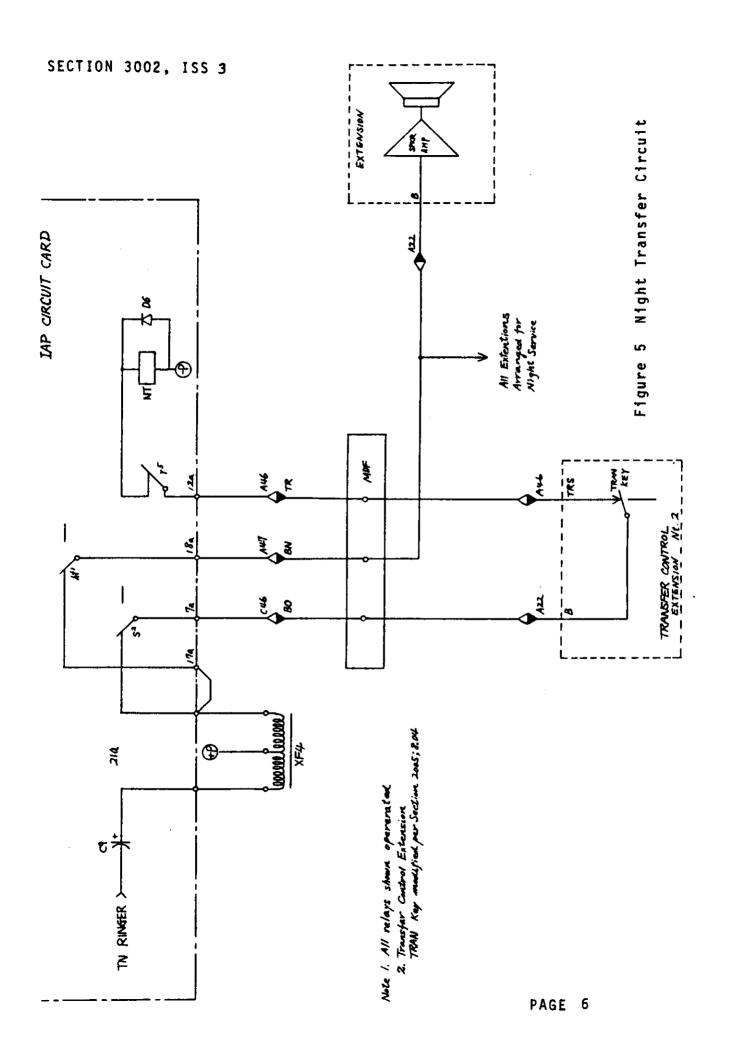


Figure 2 Voice Connection Between Calling and Answering Extension when HF is Operated

PAGE 4

- 3.00 MUSIC-ON-HOLD OPERATION
- 3.01 When the HOLD Key (HK) is pressed at the extension, RELAY T on the COL (UCOL) circuit card releases while RELAY H remains operated through the circuit described in Section 3001, 3.04.
- 3.02 When the RELAY T releases, RELAY HA on the MOH circuit card is operated through the following circuit:

- 3.03 RELAY HA can be used to control the START/STOP operation of the MOH source through contacts hal and hal.
- 3.04 At the same time, the MOH input is connected to the MOH amplifier through TRANSFORMER XF1. The MOH Output TRANSFORMER XF2 isolates the MOH battery from the CO Lines and connects the MOH audio through relay contacts  $h_0 \! \! t_0$  and  $h_1 \! \! t_1$  on the COL (UCOL) card to the held party on the CO line.
- 4.00 OPERATION OF THE NIGHT SERVICE
- 4.01 Figure 5 illustrates the operation of RELAY NT on the IAP circuit card during Night Service.
- 4.02 The Night Service control Extension TRAN Key must be modified in accordance with Section 2005; 8.04 for operation of this feature.
- 4.03 Circuit Operation
  - a. (P) battery from TRANSFORMER XF1 on the Common Incoming CO Audible Control (BO) is switches through the control extenstion TRAN Key to the TR function on KSU TERMINAL BLOCK A. +P battery on TR causes RELAY NT on the IAP circuit card to operate.
  - b. When RELAY NT operates, relay contact nt switches the Night Service Control lead (BN) to the output of TRANS-FORMER XF1, causing all extensions connected to "BN" to ring.

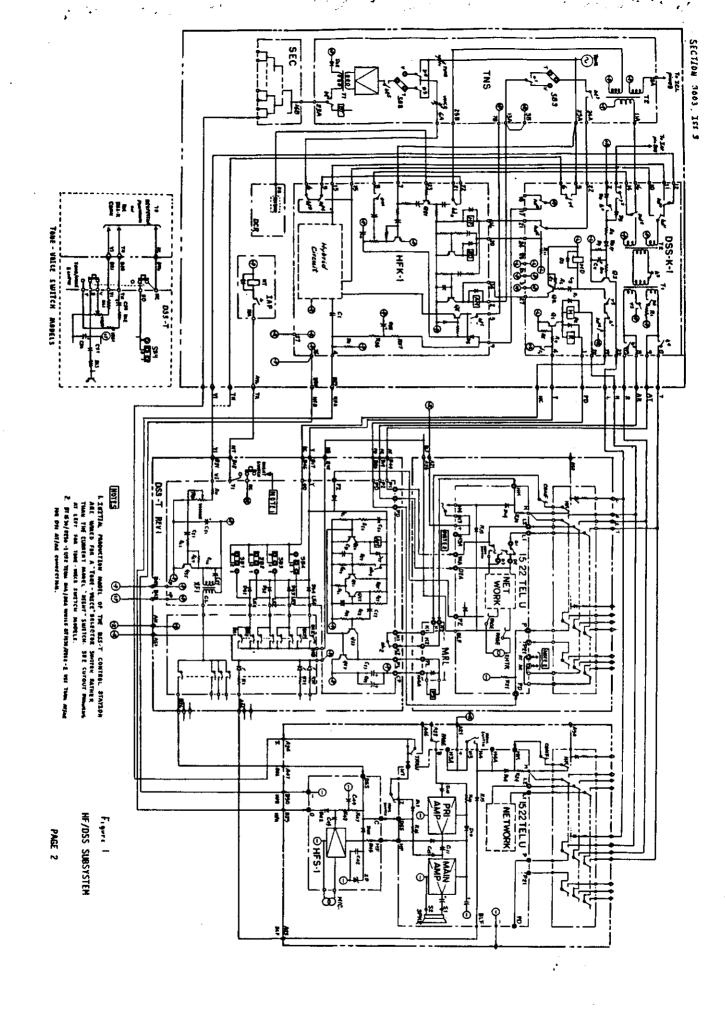


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# BT-1530/2250 KEY TELEPHONE SYSTEM

# CIRCUIT DESCRIPTION OPTIONAL SYSTEM FEATURES

- 1.00 INTRODUCTION
- 1.01 This section describes the circuit operation of optional BT1530/2250 Key Telephone System assemblies that provide supplementary features. Refer to the Table of Contents for a listing of the individual features described.
- 1.02 Refer to the APPENDIX II for explanation of the symbols used in the circuit description sequence drawings.
- 1.03 Condensed circuit diagrams of the individual features are provided in some instances for clarity purposes. Refer to Section 4001, Condensed System Drawing No. 1 and 2 and individual assembly drawings for complete diagrams of the features described.
- 2.00 DIRECT STATION SELECTION (DSS) CIRCUIT OPERATION
- 2.01 Figure 1 illustrates the DSS subsystem operating circuit. Refer to Section 4004 for complete diagrams of the DSS Control Station and DSS-K Line card circuit.
- 2.02 Connection of the Attendant Voice circuit to the DSS circuit.
  - a. After the Attendant answers a CO Line call and presses a DSS station key, (R) voltage on the HB lead of the DSS unit derived from the Attendant station BLF lead is connected to TERM Y of the DSS unit. (R) voltage on Y causes RELAY AH on the DSS unit to operate momentarily. Relay contact ah2 causes the CO line appearing at the Attendant station to go on HOLD due to placing RESISTOR R24 in series with the HOLD (H) lead.
  - b. Relay contact  $ah_1$  also causes the SOLENOID on the MRL circuit card to operate restoring the CO line key on the Attendant station to the normal (up) position.
  - c. When the Attendant Line Keys are all restored, plus voltage appears on PD of the Attendant telephone from the station privacy unit. This allows RELAY R on the DSS-K circuit card to operate due to both the +R voltage appearing on the Y lead turning on TRANSISTOR Q1 of the DSS-K and plus voltage on RELAY R coil from PD.





- d. When RELAY R operates, the DSS Tip/Ring (AT/AR) is connected to the DSS Talk Battery on the DSS-K by relay contacts  $r_3$  and  $r_4$ . TRANSFORMER XF1 connects the DSS Voice through relay contact  $h_5$  to the DSS/HF Voice circuit.
- e. When RELAY R operates, relay contact re connects the 60 IPM Interrupter to TRANSISTOR Q3 on the DSS-K circuit card, in turn causing the Attendant Line Lamp to flash at 60 IPM at all extensions.
- f. Relay contact r<sub>1</sub> connects the Tone Source on the TNS circuit card to the TN lead of the DSS unit if Tone Calling is used instead of Voice Calling. The Tone/Voice circuit on the DSS unit is wired such that either Tone or Voice is used. When in the Tone Call mode, the DSS unit will have no effect on the ICM Register.
- 2.03 Operation of the DSS Voice/Control Circuits.
  - a. Calling a HF equipped extension by the DSS unit
    - When RELAY R on the DSS-K operates, relay contact rs connects TERM HC (Pin 19 of the DSS-K) to RELAY HD. When the SHORTING BAR(SBI) on the DSS unit is arranged for HF extension calling, Plus Voltage is connected to TERM HC (B46) when the DSS station Key is pressed.
    - Plus Voltage on HC causes RELAY HD on the DSS-K to operate as well as RELAY AM on the HFK-l card to operate due to TRANSISTOR Q2 turning ON momentarily. RELAY AM momentary operation causes the HF warning tone to be heard at both the DSS and the called extension.
    - The Attendant Voice (P1/P2) is connect to TERM VI of the DSS unit by the following circuit:

- Relay contact hd<sub>3</sub> supplies (+P) battery for the HFK-1 Hybrid/ Amplifier circuit through TRANSISTOR Q5 on the HFK-1 circuit card.
- Relay contact hds releases RELAY HF on the HFK-1 if an ICM call was taking place when the DSS unit seized the HF circuit. Relay BD operates momentarily connecting busy tone to the calling extension on the ICM Register indicating that the HF circuit has been seized by the DSS. The ICM call then reverts to one way Voice Calling due to RELAY HF on the DSS-K release.

- b. Calling a Non-HF extension by the DSS unit.
  - When RELAY R on the DSS-K card operates, relay contact r5 connects TERM HC (Pin 19 of the DSS-K) to RELAY HD. When the DSS station key is pressed, RELAY HD on the DSS-K does not operate because no plus voltage appears on HC due to the SHORTING BAR placed in the Non-HF position.
  - The Attendant Voice (P1/P2) is connected to TERM VI of the DSS unit by the following circuit:

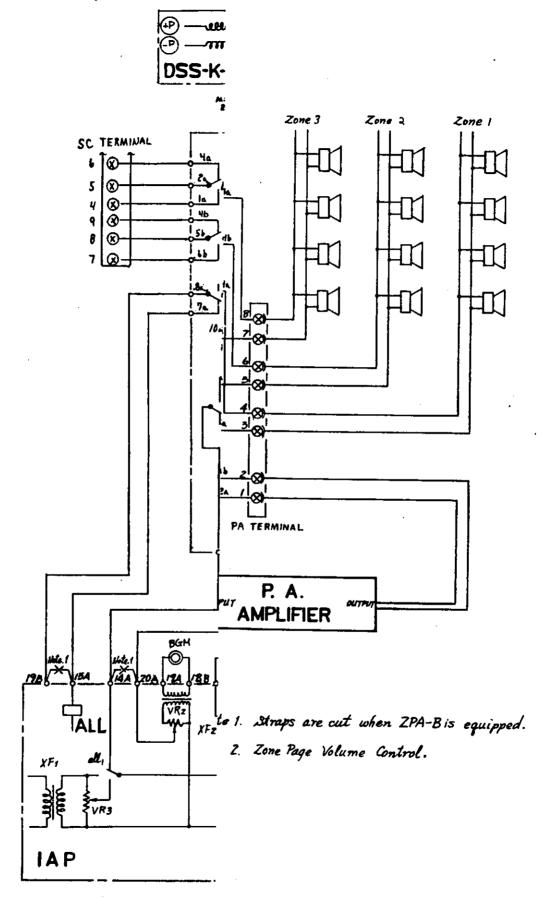
Since RELAY HD on the DSS-K does not operate, no effect is made on any ICM call using the HF circuit if both DSS calling and a ICM call occur simultaneously. The callers voice on the HF ICM call is connected to the Voice pre-amplifer on the TNS circuit card by the following circuit:

- c. Voice on the TERM VI is connected through a volume control and pre-amplifier on the DSS unit through TRANSFORMER XFI to the DSS station key. When the DSS station key is pressed, both voice and ⊕ battery are supplied the called extension amplifier (and HF microphone unit if equipped).
  - If the extension called is equipped for HF Talkback, the DSS control voltage on the DSS lead is higher than the ICM call DC voltage on the Extension Z lead, thereby cutting off DIODE D13 and allowing the DSS voice to be heard only. DC power is also supplied to the extension HF unit. RESISTOR R47 and R48 connect the higher DC voltage to TERM HFA thereby cutting off any other extension HF unit by reverse biasing DIODE D42 of the other HF unit. The voice reply from the called extension is connected by the HFA/HFB leads to the Hybrid/Amplifier unit on the HFK-1 circuit card.
  - If an extension is equipped with no HF unit, the DSS Voice/tontrol voltage is connected directly to TERM DSS on the station amplifier unit. Any ICM Voice/Tone calling taking place at the extension is then cut off due to reverse biasing DIODE D13 on the station circuit card.

- d. Answering the DSS call on the Attendant Line
  - When the called extension goes OFF-HOOK on the Attendant ICM line, ←R battery on the HOLD (H) lead causes RELAY H on the DSS-K to operate. Relay contacts h₁ cause RELAY HD to release, disconnecting the DSS Voice circuit from the HF circuit. Relay contact h₅ disconnects the Attendant Line voice from Transformer XF2.
  - Although RELAY R on the DSS-K remains operated, the Attendant Line Lamp goes steady due to relay contact ho place steady (+R) voltage on the base of TRANSISTOR Q3 of the DSS-K.
  - $\bullet$  Relay contact  $h_2$  and  $h_4$  connect the Attendant Line circuit battery to the called extension allowing voice conversation to take place.
- e. Releasing the DSS Connection

When the Attendant presses any line key or goes ON-HOOK, RELAY R of the DSS-K releases disconnecting DSS talk battery and releasing RELAY H.

- 2.04 Attendant Line Operation in Conjunction with the Attendant PAGE Key
  - a. When a CO has been answered and the Attendant PAGE key pressed to call a party to the Attendant ICM line, (+R) voltage on PZ of the ext. is connected to Y of the DSS unit.
  - b. Plus voltage on Y causes both RELAY AH on the DSS unit to operate as well as RELAY R on the DSS-K card to operate when plus voltage appears on PD.
  - c. The circuit then operates as previously described.
- 2.05 Operation of the DSS Busy Lamp Field
  - a. Operation of the DSS Busy Lamp Field is the same as illustrated in Figure 1, Section 2007-Installation of Optional System Assemblies.
- 3.00 ZONE PAGE ADAPTER (ZPA-B-1) OPERATION
- 3.01 Figure 2 illustrates the ZPA-B operating circuit. Refer to Section 4004 for detailed schematic of the ZPA-B.
- 3.02 Extension Dial Access to Zone Paging (Voice Calling Arranged for Two Digit Access on the KSU)
  - a. When an extension dials the two digit dial code ( e.g. No. 41) assigned for an individual zone page, the Intercom Register operates as described in Section 3001; 3.00-3.03.
  - b. Upon completion of the second digit of the two digit dial code, the Relay tree on the SEC (and EEX if so equipped) circuit card operates, connecting the "Z" (41) lead to the Detector circuit on the TNS circuit card as described in Section 3001; 3.04a-c.
  - c. If the ZPA-B is not busy (not engaged in a call from the DSS or RE& #2), -R Battery through both RELAY 1Z and A (in series with D14, D15) on the ZPA-B cause TRANSISTOR Q13 on the TNS circuit card to turn ON. RELAY BT then operates as described in Section 3001; 3.04d.
  - d. Once RELAY BT has operated, relay contact bt, connects the "Z" lead (Z41) to +P Battery through TRANSFORMER XF2 and DIODE Di2, Di3, and Di4 on the TNS circuit card.
  - e. P Battery on the "Z" lead (Z41) causes RELAY A and 1Z on the ZPA-B to operate.



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# BT-1530/2250 KEY TELEPHONE SYSTEM MAINTENANCE/REPAIR POLICIES

- 1.00 INTRODUCTION
- 1.01 This section covers maintenance and repair procedures as well as the Service Policy of IWATSU regarding the BT1530/2250 Key Telephone Systems.
- 1.02 Although the most stringent quality control measures have been maintained by the manufacturer, a component may subsequently fail during system operation. The electrical characteristics of the BT1530/2250 Key Systems, as described in Section 3001-03, may not be extensive enough for on-site repair of a defective assembly by local maintenance personnel. Replacement of a card/assembly may be required for return to normal operation. Guidelines for the repair/return of defective material to IWATSU are provided for varying types of situations.
- 1.03 All repairs/replacements as well as returned goods are subject to the IWATSU Warranty Policy as listed in Table A.
- 2.00 RECOMMENDED SPARE PARTS
- 2.01 Because the BT1530/2250 Key Telephone Systems utilize the latest electronic components/circuit techniques, replacement of individual circuit card assemblies may be required for return to normal service. It is the responsibility of the distributor to maintain a spare parts inventory of BT1530/2250 assemblies to provide a minimum time delay in system malfunction.
- 2.02 Table B lists the recommended parts inventory. Additional quantities of the individual assemblies should be ordered as the number of installed systems increases or as the customer maintenance program warrants.

## TABLE A

### WARRANTY POLICY

All the equipment, components and parts to be furnished (hereafter "Equipment"), by IWATSU AMERICA INC. (hereafter IWATSU ) carry the warranty described in the official manual and Service Bulletin(s), WHICH IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, and for no other implicit representation except title.

IWATSU will, at its option, either repair or replace defective Equipment returned to it by the original PURCHASER (transportation charges prepaid) within a period of one (1) year from the date of shipment to the original PURCHASER, provided such returns are made in accordance with the prescribed procedures set forth in the official manual and Service Bulletin(s) and such inspection discloses to the satisfaction of IWATSU that the said defects are as claimed by the PURCHASER.

In addition to the foregoing statement of the warranty, Equipment to be furnished from U.S. manufacturers will bear the warranty of those manufacturer.

This warranty does not include labor and other services with respect to the installed equipment. IWATSU will separately bill the Purchaser on a time and expense basis for all on-site services provided by IWATSU which may be required to determine the existence of or to verify and defects in material or workmanship, and to repair or replace any defective items. IWATSU shall not be obligated to repair or replace any Equipment which has been repaired by others, abused or improperly installed, altered or used with equipment other than the Equipment and material described in the official manual and Service Bulletin(s), and IWATSU will not be obligated to repair or replace Equipment otherwise misused or damaged in any manner.

## NOTE:

The warranty stated above is in lieu of all other obligations or liabilities on the part of IWATSU, and IWATSU neither assumes nor authorizes any other person to assume for it any other liability. The Purchaser expressly waives any right, claim or cause of action that might otherwise arise out of the purchase and use of the Equipment and services related thereto. In no event shall IWATSU be liable for special, indirect, or consequential damages of any nature (including, without limitation, any loss or damage resulting from the interruption or failure in the operation of the Equipment) with respect to any Equipment sold and delivered, or any service rendered hereunder.

TABLE B RECOMMENDED SPARE PARTS: BT1530/2250 KEY TELEPHONE SYSTEM

ITEM	MODEL	DESCRIPTION	QUAN.	NOTE
1.	IAP	Incoming, All Call, PA Circuit	1	
2.	TNS	Card Interruptor, Tone Function Gene-	'	!
		rator, Detector Circuit Card	1	1
3.	DCR	Intercom Dial Register Circuit		
	050	Card		!
4.	SEC	Extension Relay Circuit Card	!!	!
5. 6.	COL	CO Line Card (Standard)	4	2
<u>6</u> .	UCOL	Universal CO Line Circuit Card	4	2 2 3 4 5 5 4 4
7.	ICL	Intercom Line Circuit Card	2 .	3
8.	MOH	Music-on-Hold Circuit Card	]	4
9.	RCV	Omega-Tone Receiver Circuit Card	] '	5
10.	RCD	Omega-Tone Decoder Circuit Card	1	5
11.	HFK	Handsfree Talkback Circuit Card	1 1	4
12.	EEX	Extension Expansion Circuit Card	l i	4
13.	PSA-1530	Standard BT1530 KSU Power Supply	li	
14.	PSB-1530	Expansion BT1530/2250 KSU Power		
		Supply	1	4
15.	HFS	Handsfree Talkback (Mic.) Circuit	ļ	
		Card	2	4
16.	OTD	Omega-Tone Dial (Replacement)	2 2	5
17.	BT1530(P)	Rotary Dial BT1530 Key Telephone	-	
'' '	5,,,,,	with Privacy	2	6
18.	BT1530T(P)	Omega-Tone Dial BT1530 Key Tele-	-	
1 '0'	B113301(F)	phone w/PRV		
		phone w/rkv	, ,	_
19.	DT0050(D)	Dodowy Diel DIOCEO V T	2	6
19.	BT2250(P)	Rotary Dial BT2250 Key Telephone	_	
		w/PRV	2	6
20.	BT2250T(P)	Omega-Tone Dial BT2250 Key Tele-		
1		phone w/PRV	2	6

#### Notes:

- 1. Common cards on BT1530/2250 KSU
- 2. Either COL or UCOL circuit cards should be stocked depending on card utilization. Quantity of cards to be stocked depend on the number of systems being serviced.
- 3. Quantity of circuit cards to be stocked depend upon the number of systems to be serviced.
- 4. Optional assemblies-stock only as required.5. Required only when Omega-Tone models are provided. These cards require qualified technicians and precision test equipment for service maintenance.
- 6. Stock of telephone(s) depends on the number of systems serviced.

### 3.00 SERVICE PROCEDURES

## 3.01 NORMAL SERVICE

- a. NORMAL SERVICE is classified as any condition which requires replacement of the defective unit(s) in the system.
- b. The defective assembly should be immediately returned to IWATSU for repair/replacement. The following procedure is to be adhered to:
  - Call or write IWATSU Customer Service and request a Return Authorization Form (illustrated in Figure 1).
  - Information related to the quantity, description, and disposition of the equipment to be returned to IWATSU must be indicated at the time of the Return Authorization request.
  - On receipt of the Return Authorization Form, follow the instructions on the form and return the equipment (with copy of form) to IWATSU The Return Authorization number(s) must appear on all cartons and shipping documents. IWATSU will accept all such returns freight prepaid only.
  - To evoedite handling, it is recommended that the IWATSU Return Authorization Number be clearly notated on each item being returned.
- c. On receipt by IWATSU the assembly will be repaired (or replaced at IWATSU'S option) and returned promptly to the Sender.
- d. Table A, BT1530/2250 Key Telephone System Warranty, indicated IWATSU liabilities under warranty conditions.
- e. Defective equipment returned, under warranty conditions, will be repaired (or replaced) by IWATSU Warranty shall be null and void under the following conditions:
  - Equipment that has been repaired by other than TWATSU or Equipment that has been abused, neglected, improperly installed or returned to IWATSU without proper authorization.
  - Equipment received by IWATSU in a damaged condition, for whatever reason, remains the liability of the owner.
  - Equipment altered or used with third party equipment other than that recommended in the Technical Manual (TM).

IWATSU AMERICA	NC.	R.A.Number
120 West Commercial Avenue, Moonachie,		All correspondence
	RN AUTHORIZATION	should be refered to this number
KEIU	KN AUTHORIZATION	
ISSUED	SEND TO	
	·	,
Authorized by Date	Customer P.O.	S.O.Number
Item Authorized Quan.	Description	Reason Quan. Number Shipped
Quan.		Wallock Stripped
]		
Reason for return 1 Cred N 2 Repa	it less handling charg ir and Return(P.O.Numb	e. er attached)
Place in reason \ 3 Repl	acement(Defective or w	rong material shipped)
	anty repair r(Explain)	·····
V		
INSTRUCTION: The above is	an Authorization by I	watsu to return only
	tems. All items return ection, Iwatsu shall	
repair, at i	ts option, any part th t inspection of the sa	at is defective
defects as c	l inspection of the sa laimed by the Purchase	me items contain the r.
All returns	must be shipped freigh	t prepaid. All returns
must be prop	erly packaged to preve	nt damage during tran-
sit. Items d still in eff		will void any warranty
All deams as		wmad must tasluda
Customer P.O	t in warranty and retu .Number and P.O.Author	ization Signature.
All cartons	must be marked with th	e Return Authorization
Number. A co	py of this Authorizati	
as a Packing	Customer	10-4-2
Customer F.O.	Signature	Date

- Any equipment whose Warranty markings are destroyed or altered.
- f. Return Authorizations are valid for up to thirty (30) days after date of issue. Equipment returned for repair will be limited to that on the specific Return Authorization. Any additional equipment must be supported by another IWATSU authorization, including thereto additions to the original Return Authorization. In all such cases, IWATSU will acknowledge receipt of and assume responsibility for only such equipment as listed on the original Return Authorization. Any other equipment returned to IWATSU remains the property of the Buyer, and is subject to handling charges on return to the Buyer.
- g. Any equipment returned for repair/replacement during the Warranty period which, when found, performs satisfactorily, will be subject to handling charges.
- h. Equipment not within the Warranty period is subject to parts, labor and freight charges as applicable.

## 3.02 EMERGENCY SERVICE

- a. Any system failure which requires IWATSU support is defined as EMERGENCY SERVICE.
- b. Procedures to follow for EMERGENCY SERVICE:
  - During regular business hours (Eastern Time), advise IWATSU Customer Service for Engineering assistance.
  - Outside of regular business hours, call IWATSU and leave your telephone number and best time(s) for returning call. Otherwise, a return call will be made the following day.
  - The Service Engineer will attempt to trouble shoot the problem via phone. To insure minimum down time, the local maintenance personnel must be familiar with the system operation as outlined in Section 3001-03 and have attempted corrective action before calling for assistance.
  - Should replacement parts be deemed necessary, the Service Engineer will expedite shipment by fastest transport. Every effort will be made for prompt delivery.

- READ In most cases, an adequate inventory of components reduces system down-time and minimizes the necessity for EMERGENCY SERVICE.
  - Upon receipt of the replacement(s), return the defective unit(s) with the Return Authorization to IWATSH as outlined in Para. 3.01b.
  - c. All items in Warranty returned to IWATSU after emergency replacement are subject to the provisions of the Warranty Policy (Table A) and that of Para. 2.01d-f.
- READ d. If, within thirty (30) days after EMERGENCY SERVICE, the defective parts are not received by IWATSU, then the replacements will be billed as new parts with no credit authorization for the rejected part(s) in question.
  - e. All equipment, in or out of Warranty, returned to IWATSU shall be subject to IWATSU inspection prior to credit authorization. Equipment not deemed suitable for re-stock and/or resale due to abuse, poor installation, damage, etc., will be cause for credit refusal by IWATSU Notice of such rejection will be forwarded to the Sender requesting disposition, i.e., repair or return. On Sender's approval, such equipment will be repaired or replaced and subject to parts, labor and handling charges.

## 3.03 ENGINEERING CHANGES-MANDATORY

- a. Changes to the BT1530/2250 required for Quality Assurance by the manufacturer are classified as MANDATORY.
- b. MANDATORY changes are supplied on a no-charge basis. Appropriate equipment/components that are required will be supplied to each distributor. IWATSU shall, in no manner, be liable for any charges, direct or indirect, in the implementation of the MANDATORY ENGINEERING CHANGES.
- c. When the MANDATORY ENGINEERING CHANGE consists of an individual assembly replacement, a Return Authorization Form will be supplied with the assembly. The old assembly as well as the Return Authorization must be returned within thirty (30) days after issuance of the replacement or the replacement shall be billed as a new unit to the original purchaser and no credit shall be issued for the replacement assembly.
- d. In all cases, the returned original assembly shall be subject to the same terms and conditions as outlined in Para. 3.02e.

- e. It shall be the responsibility of the Distributor to insure total implementation of the MANDATORY ENGINEERING CHANGE in all applicable equipment. Formal release and issuance of the replacement components shall constitute the limit of IWATSU liability.
- f. The Service Bulletins, as issued, should be retained in the Technical Manual. Applicable revisions (when required), should be noted in the Technical Manual. The number of Service Bulletins that are issued to an individual Distributor is determined by the number of Technical Manuals on hand at each Distributor level.
- g. In all cases, IWATSU reserves the right to make changes in the equipment without prior notice.

## 3.04 ENGINEERING CHANGES-OPTIONAL

- a. OPTIONAL ENGINEERING CHANGES are defined as those changes recommended for product improvement or expansion. Also, as production is maintained, various refinements may become applicable.
- b. OPTIONAL ENGINEERING CHANGES will be published in the Service Bulletins. Implementation of such changes is at the Distributor's discretion. Where applicable, modification kits as specified in the Service Bulletin can be ordered from IWATSU

### 4.00 ENGINEERING ASSISTANCE

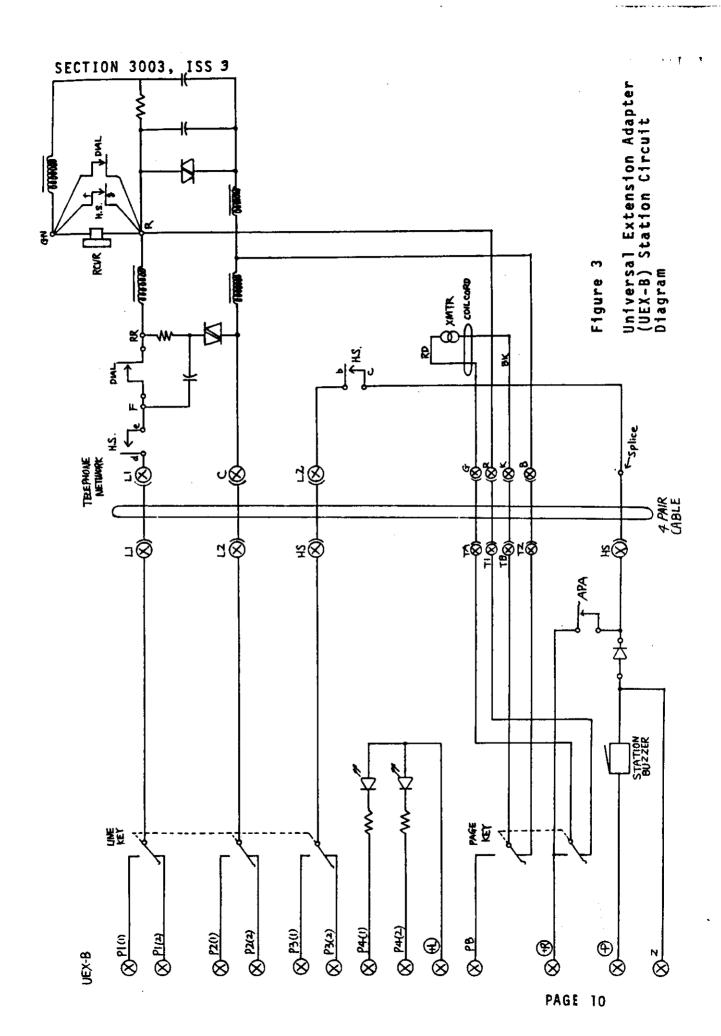
- 4.01 When required, IWATSU. will provide Engineering Assistance in cases where local maintenance personnel cannot correct system operation. IWATSU reserves the right to bill the Distributor/Installer for time and expenses in all cases where Engineering Assistance is required, even when the equipment requiring assistance is within the stated Warranty period. When equipment is out of the Warranty period, charge for repair, replacement of defective equipment as well as any Engineering Assistance is applicable.
- 4.02 Service Bulletins as well as Application Bulletins will be issued to all Distributors. All Bulletins should be filed with the Technical Manual to insure current information on accessories.
- 4.03 Application Bulletins are issued upon information furnished to IWATSU by support manufacturers. In cases where third party equipment is utilized, the information is only intended to serve as a guide for the particular application. IWATSU shall not be liable in any manner for information not correct, changes that occur, or problems that result due to any misinformation concerning the application of third party equipment.

- f. +P Battery through RELAY A coil causes TRANSISTOR Q1 on the ZPA-B to turn ON. When Q1 turns ON, -R Battery through Q1 and relay contact a4 causes TRANSISTOR Q15 on the TNS circuit card to remain OFF, preventing RELAY V from operating if a third digit is dialed.
- g. The voice circuit from the Intercom Line to TRANSFORMER XF1 on the TNS circuit card is the same as previously described in Section 3001; 3.01h. TRANSFORMER XF1 is connected to Volume Control VR1 on the ZPA-B when RELAY A operates through relay contact a and a Relay contact a breaks the Music Input from the PA Amp Input. Volume Control VR1 controls the voice level that feeds the PA Amp Input through relay contact alli on the IAP circuit card.
- h. RELAY 1Z operation connects the output of the PA Amplifier to the individual zone speaker lines.
- i. Because the Intercom Dial Register is not reset (No +P) Battery on the Intercom Line P3 lead), the line lamp remains flashing and the Time Out (T0) function allows the Zone Page call to last a maximum of 36-40 seconds. The ZPA-B connection is released upon operation of the Time Out (T0) function as well as when the CONF Key is pressed at the calling extension as described in Section 3001; 3.09b-c.

### 3.03 All Call Priority

- a. When an extension activates the All Call while another extension is connected to the ZPA-B, the individual zone relay is momentarily released during the All Call due to R Battery interrupted by relay contact all on the IAP circuit card. The PA Amplifier is automatically connected to the three zones during the All Call interval RELAY A on the ZPA-B remains operated. Relay contact all connects the all call voice on the PB lead to the PA Amp Input.
- b. Relay contact all<sub>5</sub> places Battery through the ZPA-B on TRANSISTOR Q14 on the TNS circuit card, causing Q14 to turn OFF, releasing RELAY BT. Busy Tone (450hz interrupted at 120 IPM) is then heard at the extension connected to the ZPA-B during the All Call interval.
- c. When the All Call releases, RELAY ALL on the IAP circuit card releases. The individual zone relay (12-32) on the ZPA-B then re-operates, connecting the calling extension to the ZPA-B.

- 3.04 DSS Operation of the Zone Page Adapter.
  - a. When the DSS Key for the individual zone page area is pressed, +P Battery through the DSS Key and Diode D24 (Zone 1 e.g.) operates RELAY 1Z on the ZPA-B. +P Battery from the DSS also operates RELAY DS on the ZPA-B.
  - b. The Attendant Line Talk circuit is connected to the input of the PA Amplifier through relay contact  ${\rm ds}_0$  and  ${\rm ds}_1$ .
  - c. Relay contact ds disconnects the All Call circuit so that no All Call can disrupt the DSS Zone Call.
  - d. Relay contact ds disconnects R Battery from the 12-32 RELAY holding circuit, releasing any Zone relay if the ZPA-B was connected to an extension when the DSS call occurs. R Battery through relay contact ds also turns OFF TRANSISTOR Q14 on the TNS circuit card, causing RELAY BT to release. When BT releases, busy tone is connected to the calling extension during the DSS Zone Call interval.
  - e. When the Zone Page DSS Key is released on the DSS Control Unit, RELAY DS and 1Z (e.g.) release on the ZPA-B. The calling extension connection is reestablished to the ZPA-B.
  - 4.00 OPERATION OF THE UNIVERSAL EXTENSION ADAPTER
  - 4.01 figure 3 illustrates a standard 500 type telephone connected to the UEX-B Adapter.
  - 4.02 Operation of the Intercom Voice Circuit
    - a. The Intercom Voice circuit (PI-P2) is connected through the Intercom Line Switch on the UEX-B to the Voice Network of the associated telephone instrument.
    - b. The associated telephone handset microphone is wired through the PAGE Key on the UEX-B for operation of the All Call.
  - 4.03 Receiving an Intercom Call
    - a. When a call is made to a UEX-B Extension, \( \delta \) on the "Z" lead causes the extension buzzer to sound continuously.



- b. When the call is answered by the extension going off-hook on the Intercom Line that the call is on, +P Battery from the "Z" lead is connected through HS -HS of the extension telephone and the Intercom Line Select switch on the UEX-B to the P3 lead of the Intercom. This silences the ringing by causing the Intercom Register to reset as described in Section 3001; 4.07 b-k.
- 4.04 Operating the APA (CONF) Key
  - a. When the CONF Key is pressed, the Intercom Register is reset due to +P Battery placed on the Intercom P3 lead as previously described in Section 3001, 4.09 c.

#### 5.00 TRAINING

5.01 IWATSU shall conduct training sessions at locations to be announced. In all cases, responsibility for all costs incurred, namely expenses, training aids, etc., shall be the responsibility of the Distributor.



BT-1530/2250 KEY TELEPHONE SYSTEM

TV. ILLUSTRATIONS/SCHEMATIC DIAGRAMS

# 

1.00 INTRODUCTION

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	<ul> <li>COL - Figure 4</li> <li>UCOL - Figure 5</li> <li>ICL - Figure 6</li> <li>IAP - Figure 7</li> <li>TNS - Figure 8</li> <li>SEC - Figure 9</li> <li>DCR - Figure 10</li> <li>Optional Components/Assemblies</li> <li>RCV - Figure 11</li> <li>RCD - Figure 12</li> <li>MOH - Figure 13</li> <li>EEX - Figure 14</li> <li>HFK - Figure 15</li> <li>PCC - Figure 16</li> <li>KTB - Figure 17</li> </ul>	13 15 18 21 24 27 29 31 34 36 38 40 44
4.00	POWER SUPPLIES	
	4.01 Figure 18, PSA-1530 4.02 Figure 19, PSB-1530	45 46
SECTION	4003 STATION EQUIPMENT/OPTIONS DRAWINGS	
1.00	INTRODUCTION	1
2.00	STATION EQUIPMENT	
	2.01 BT-1530 Key Telephone a. Figure 1, BT-1530 Components b. Figure 2, BT-1530 Schematic c. Figure 3, BT-1530 Wiring Diagram 2.02 BT-2250 Key Telephone a. Figure 4, BT-2250 Components b. Figure 5, BT-2250 Schematic c. Figure 6, BT-2250 Wiring Diagram	2 5 6 9 12 13
3.00	BT-1530/2250 Optional Assemblies  a. Figure 7, Privacy (PRV) Unit b. Figure 8, Tone Dial (OTD) c. Figure 9, Handsfree Microphone(HFS d. Figure 10, Headset Jack (HJB) e. Figure 11, Speaker Adapter (SPA-S) f. Figure 12, Outpulse Dial OTD-OP g. Figure 13, Toll Restrictor/Rotary (TRR) h. Figure 14, Toll Restrictor/Tone (TRT)	16 17 1)19 20 21 22

SECTION 4004 OPTIONAL SYSTEM EQUIPMENT DRAWINGS

## SECTION 4000, ISS 3

- 1.00 INTRODUCTION
- 2.00 OPTIONAL SYSTEM EQUIPMENT
  - Figure 1 Busy Lamp Field (BLF-B) 2
    Figure 2 DSS Assembly (DSS-1) 4
    Figure 3 Univ. Ext. Adapt. (UEX-B) 10
    Figure 4 Zone Page Adapt. (ZPA-B) 12 b. c.

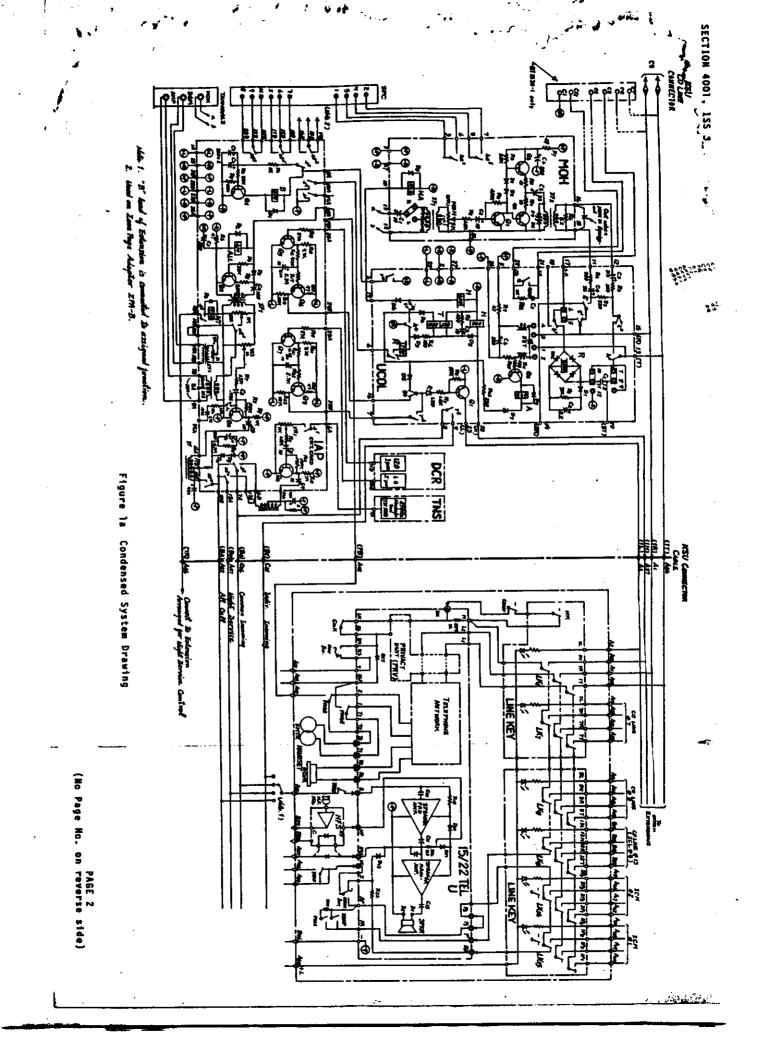
**JULY 78** 

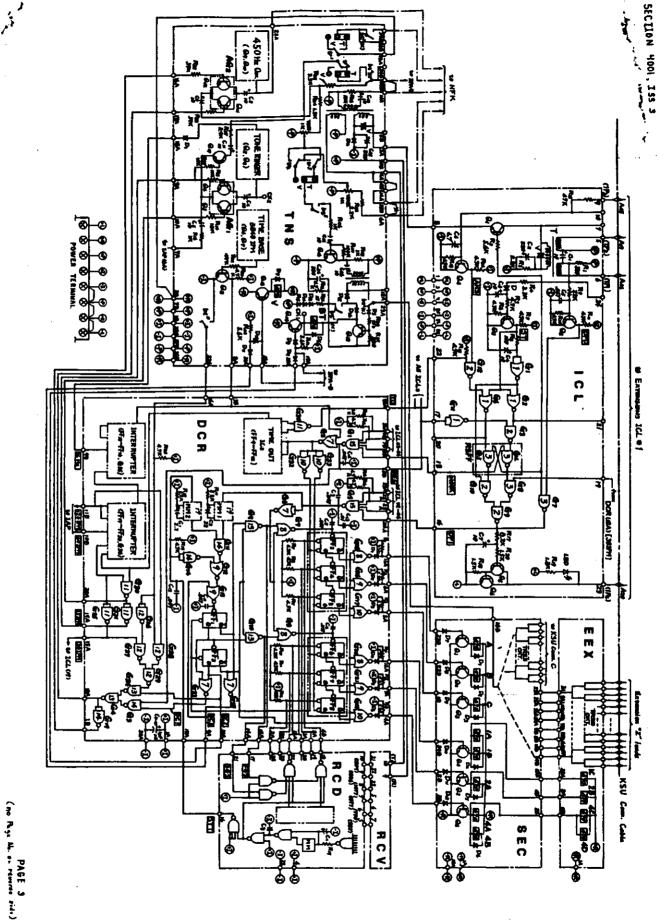
# OMEGARI

# BT-1530/2250 KEY TELEPHONE SYSTEM

# CONDENSED SYSTEM DRAWINGS

- 1.00 INTRODUCTION
- 1.01 This section provides condensed system diagrams of the BT1530/2250 Key Telephone System for convience in understanding and troubleshooting circuit operation.
- 1.02 Refer to Section 4002--004 for complete illustrations, circuit diagrams, and components lists for the assemblies described.
- 2.00 CONDENSED SYSTEM DIAGRAM
- 2.01 Figure 1 illustrates the BT1530/2250 Key Telephone System operating circuit.
  - a. Figure la shows the CO Line associated circuits as well as the All Call.
  - b. Figure 1b shows the Dial Intercom, Power Supply and Handsfree Talkback circuits.
- 2.02 Figure 2 shows the Omega-Tone Receiver/Decoder operation with the Intercom Dial Register.





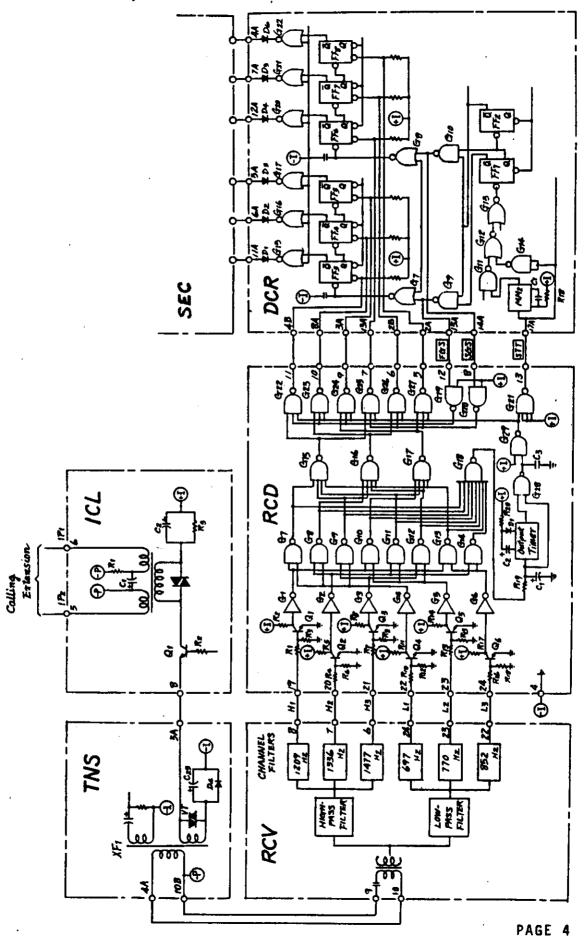


Figure 2 Omega-Tone Receiver Operating Circuit

### 

# BT-1530/2250 KEY TELEPHONE SYSTEM

## KSU COMPONENT/ASSMBLY DRAWINGS

- 1.00 INTRODUCTION
- 1.01 This section provides illustrations, circuit diagrams, wiring diagrams, and parts list of the BT 1530/2250 KSU components and optional assemblies.
- 2.00 BT 1530/2250 KSU WIRING DIAGRAMS
- 2.01 Figure 1 illustrates the BT 1530 KSU wiring plan.
- 2.02 Figure 2 illustrates the BT 2250 KSU wiring plan for CO Lines No. Fourteen (14) to Twenty (20).
- 2.03 Figure 3 illustrates the BT 2250 KSU wiring plan for the EEX Expansion card connector and KSU CONNECTOR CABLE D.
- 3.00 KSU COMPONENTS/ASSEMBLIES
- 3.01 The Standard and Optional BT 1530/2250 KSU components/assemblies illustrations are provided in the figure indicated.
  - a. Standard Components/Assemblies

•	COL	Figure	4
•	UCOL	Figure	5
•	ICL	Figure	6
		Figure	7
		Figure	8
		Figure	9
		Figure	10

b. Optional Components/Assemblies

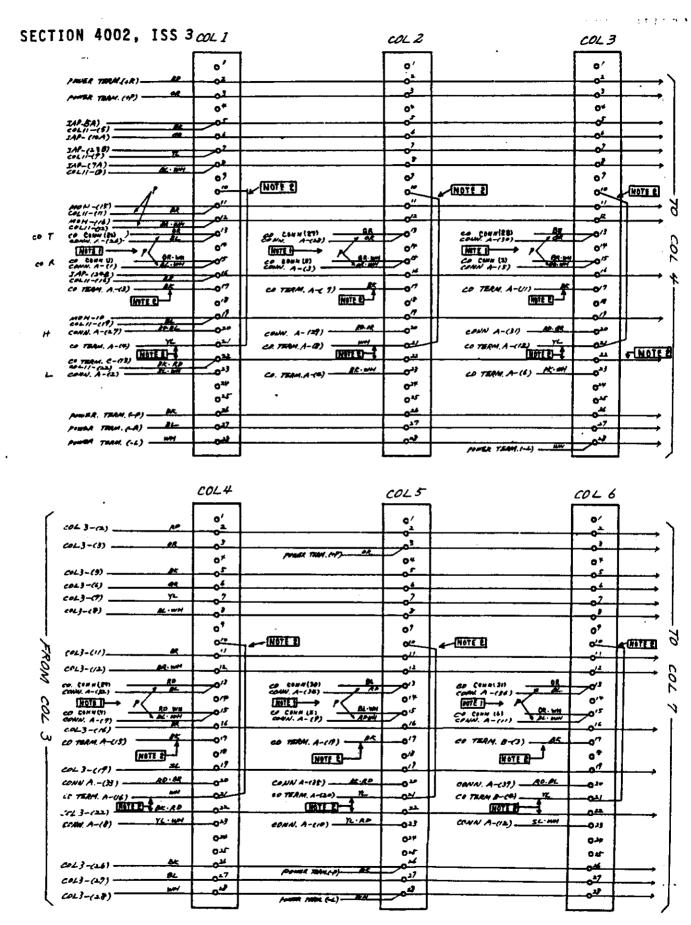
•	RCVFigure	11
•	RCDFigure	12
•	MOHFigure	13
•	EEXFigure	14
•	HFKFigure	15
•	PCCFigure	16
•	KTBFigure	17

- 4.00 POWER SUPPLIES
- 4.01 The PSA-1530 Power Supply is illustrated in Figure 18.
- 4.02 The optional PSB-1530 Power Supply is illustrated in Figure 19.

READ The following NOTES refer to FIGURE 1 and FIGURE 2 of this section.

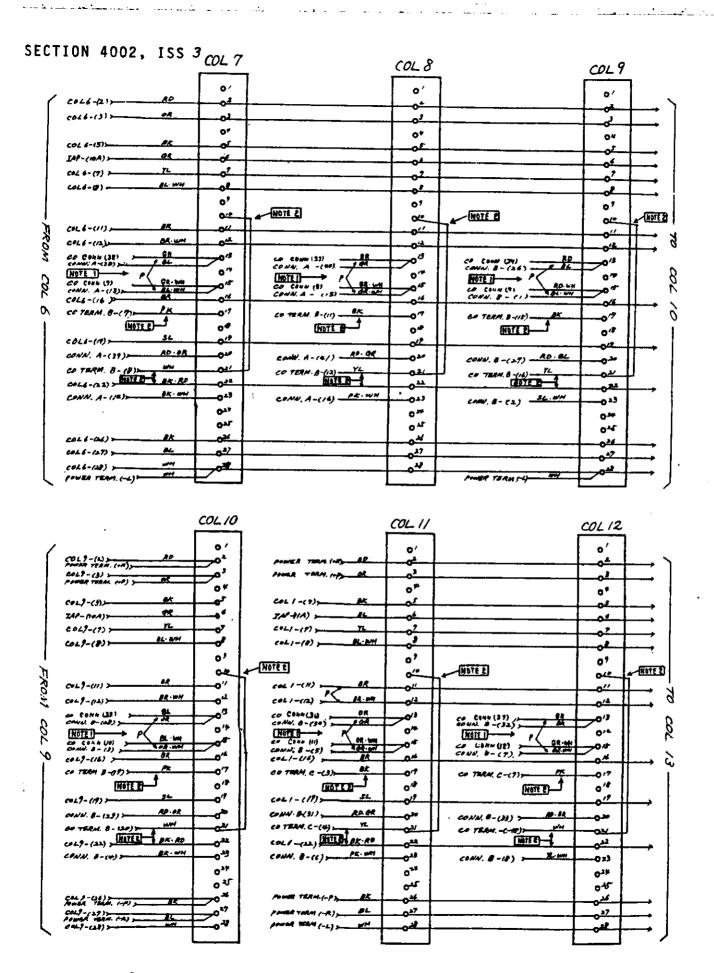
### NOTE

- 1. On Model BT 1530-1 KSU, the wiring indicated for TERM 13 and 15 for KSU CONNECTOR CABLE A (CO 1-10) and CABLE B (CO 11-20) is m to the KSU CO TERMINAL BLOCKS. The Model BT 1530-3 KSU provides an "amphenol" type connector in place of the KSU CO TERMINAL BLOCKS and is wired in accordance with the color coding indicated.
- 2. Connections indicated by NOTE 2 are provided only on the Model BT 1530-1 KSU.



Note. P indicates wire pair

Figure 1a BT 1530 KSU Wiring Diagram PAGE 3



Note: P indicates wire pair

PAGE 4

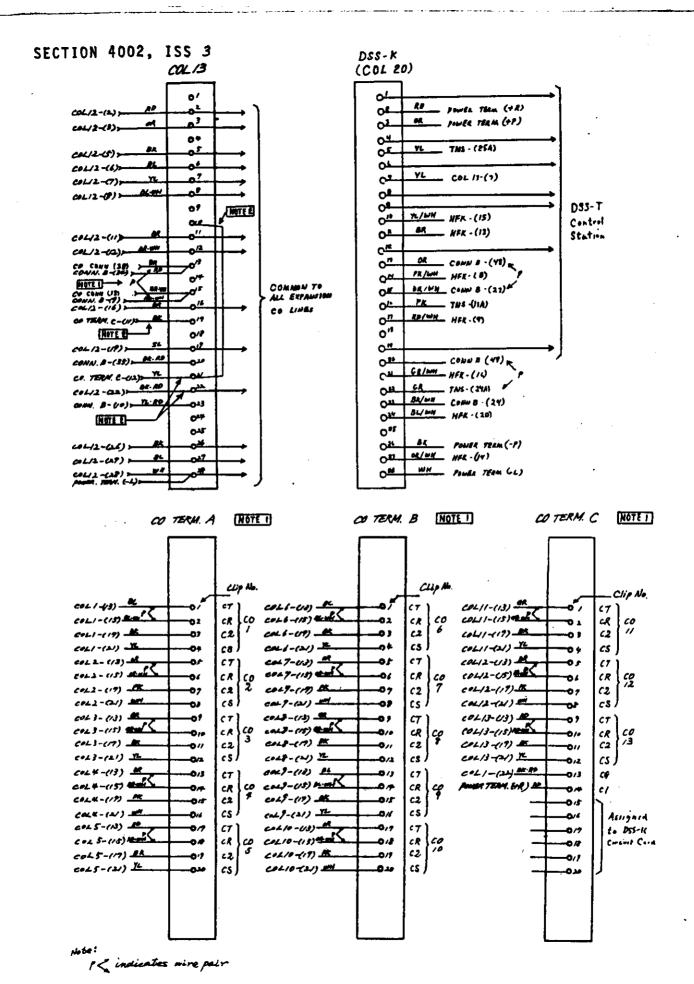
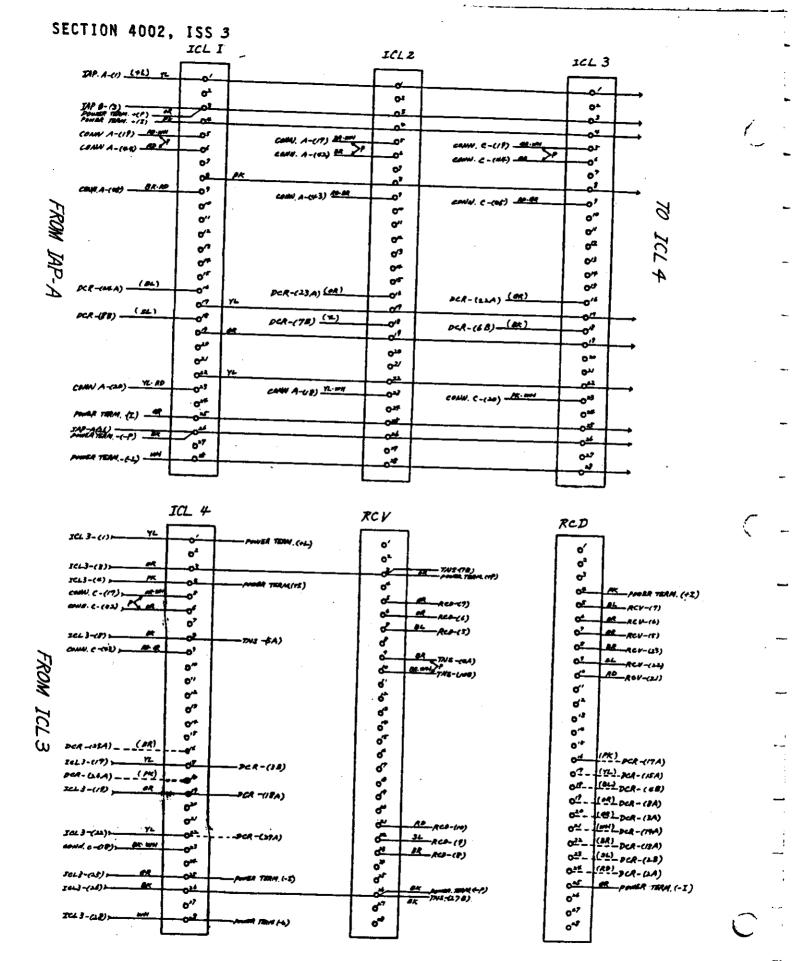
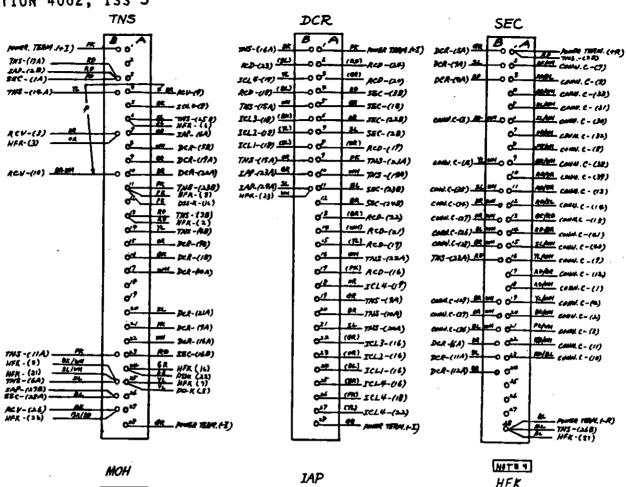
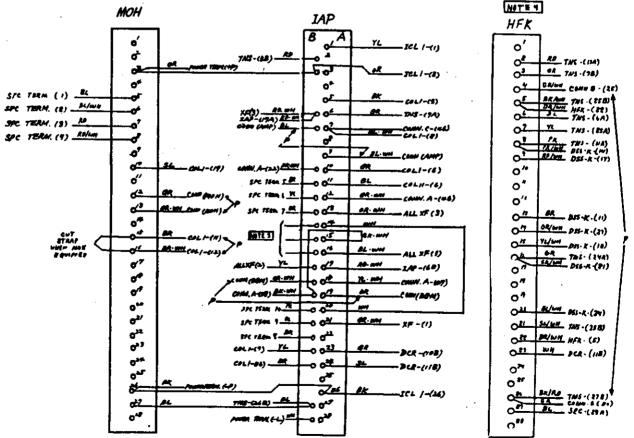


Figure 1c BT 1530 KSU Wiring Diagram



Note: P indicates were point

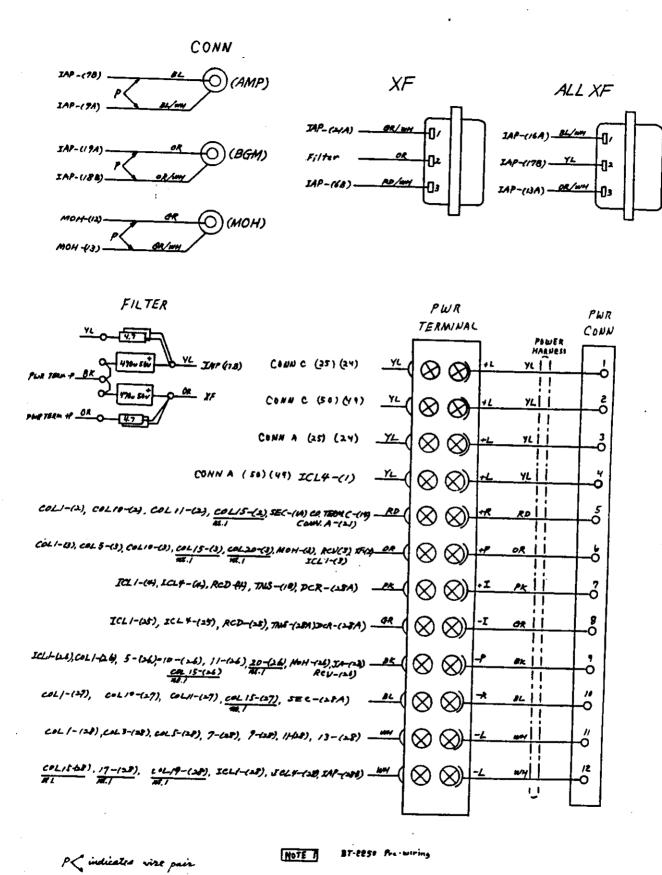




NOTES 3. Assigned for ZPA-B

4. Wired on 87-1520-IN models only

Note: P indicates were pair

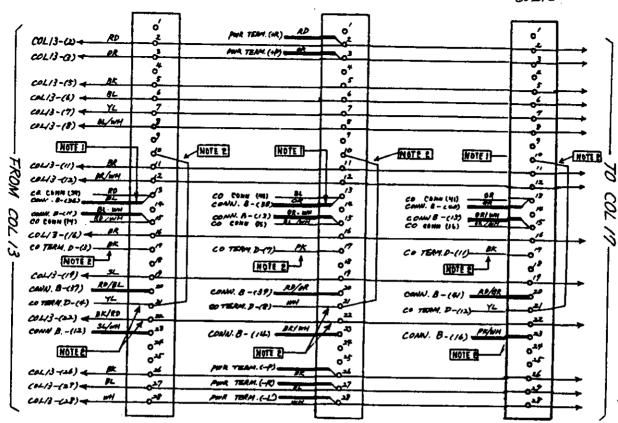


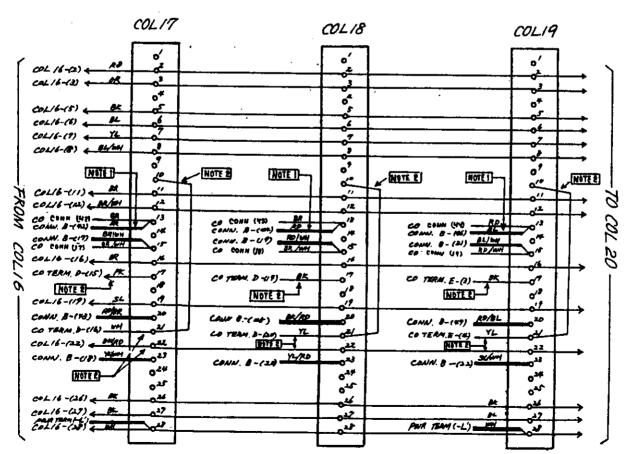
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												r		P-		1
					•							1				
	CON	<i>ν Δ</i>					CON	IA/ 7	2				M	IN C	-	
	COW	,,,					ω/i	'' V	,					"V C	•	
															_	1
MAR THEFT	25	90	<u> </u>	- <b>/MR TERM (+L)</b>		HFK A	π			HFK	PUR TERR (AL) -	٢	25	<b>3&gt;</b>	YL.	BA TENY(4C)
AM TENM (+L) TE-	24	47	<b>*</b>	-Ant 1884 (+L)	CA	الله (لد)- <i>10</i>	24	49	*	~COL 20-QO)	POR TERM(AL)	4	14	47	YL	Pad 1984 (HL)
MITM(-P)	23	#	-	-IN-U18)	0	L24(15) 🏄	23	48	4	0 <i>00</i> 1.20 ~ (/3)	COLIS A	/	ور	#8	-	COLIS
INP-(IOB) PERM	22	#7	<u> </u>	-(AI-(IBA)	c	41-(23)	<b>"</b> 12	47		·al19-(29)	COL15 +3	-	22	47	100	COLIS
PORTERH (HR) 75	2/	#4	N-34	-/Af-(12A)		119-(15) <del>alu</del>	116 -			· c-419-(13)	CA2 15 A		2/	46	01.4M	(AP-12A)
KL1-(23) 12-10	20	K\$	<u> </u>	-ICL/-(9)	c	148-(23)	مد	<b>45</b>	<u> </u>	· COLIB -(20)	ICL 3-(23) TO	-	مد	us	MAR	1623-19)
ICL1-(5)	17	##	200	/CL/-(6)	c	7L18-(15)	19	447	A)	· COLIB -(13)	1CL3-(5)	-	19	64	<i>68</i> .	HCL3-16)
/CL2-(23) Yull	18	43	**	CL2-(9)	C	117(13) • <del>X</del> .1	18	#3	<b>%</b>	·co2/7-(24)	1CL4-(23)		18	43	RPAR	1014-19)
(CL)-(5) MeN	17	42	W_	(CL2-(6)	C	117-(15) <del>[]   1</del>	1/7	<b>/1</b>	₽R.	· co U 9-(13)	ICL4-(5)	<b>19</b>	17	42	R.	EICL4-(6)
COLB-(1) Total	16	#/	MAK.	COLF-(20)	4	146-(23) <del>  K</del> i	16	#4	2	a COL/6-(20)	SEC-(98) #	ΑĐ	16	4/	<i>10-1</i> 1	SEC-(MA)
COL8-(15) (15)	15	40	gr.	CMP-(13)	d	146-(15)	1/5	Ko	<b>6</b> 7	CAL16-(13)	SEC-(/3A)	<b>(8</b> )	15	440	2.46	SEC-USA)
COL7-(23)*****	14	37	AD AR	(017-120)	U	4/5-(23) <del>- (X</del> 4	74	37	<b>*</b>	•COLIS-(20)	SEC-(DA)	×	#	37	ADAR	SEC-(10A)
COL7-(15) 18.44	/3	38	<b>K</b> _	CAL7-C/3)	6	L/5-(/5) <del>4 **</del>	1/3			· COL/5-03)	SEC-(IIA) A	州	13	38	68-111	SEC-(PA)
COL6-(23)	/2	27	10 M	(016-(20)	d	44-(23).	1/2	37	20	0 (01.14-(20)	SEC-(17A) RE	208	/2	37	08 =	4 5E (-(208)
colb-(is) BLAN	//	36	aL.	COLG-(13)	"	L14-(15) ALW	47	36	<u>r</u>	· (01/4-(13)	SEC-(22A) N	) <b>19</b> /	//	36	8: PM	SEC-(218)
COL5-(23) 16-10	10	35	<b>65</b> 0	COL5-(20)	c	L/3-(23) 120	10	35	<u>~</u>	- (243 - (25)	SEC-(23A) 10	E	10	35	31.44	SEC-(118)
(025-(15) 10 W		34	10	CAL5-43)	CO	2L/3-(18)#0#	1	34	AD I	-(04/3-03)	SEC- (/6A) E	***	9	34C	pr.w/	SE C-(128)
COL4-(23) 10.001	8	33	ADAK	Ca(4-(2a)	Co.	LL-(28) 12.4	8	33	<b>1</b> 0.	COL/2-(29)	SEC- [8A] PE	L.	8	33	<b>at-1</b> 11	SEC-14A)
COL4-(15) MAH	2	32	#R	COL 4 - (13)	C	42-(15) <del>#</del> #	1 2	. 32	M.	CO412-(B)	SEC-(2A) BR	W/	1	32	pr pr	SEC-(1A)
COL3-(23)*****	6	3/	AP 61	COL3 (20)	U.	لا//-(ع)) <del>ال</del> اه	1	3/	(R) 17	-(01/1-(20)	SEC-(U) NO		4	3/	N. WI	SEC- (SA)
COL3-(15) (140)	5	30	æ	COL3-(13)	C	0L1/-(15) ##	1 5	30	-	(04/1-(13)	SEC-(3A) NO	- 4	3			-SEC-(6A)
COL2-(23)##	#	27	MAR	COL2-(20)	c	110 (23)	* *	27	42	- (0410-(20)	SEC-(1911) YL		#	29	R-ut	SEC-(198)
COL2-(15)	3	_		COL2-03) T		140-(15)				(0410-43)	SEC-(2/A) A		3			SEC-(158)
_ COL/-(23) STAN	2	27	NO BL	COL1-(20) H		49-(23) <del>211</del>		27		-COL9-(20)	SEC-(201)		2			-SEC-(178)
R COLI-(15) MINT	7	26	<u> </u>	COL/-(13) T	c	al7-05) Mari	# 7			-(047-(13)	SEC-(BA) N		7			-SEC-(14B)
			,							-	-	L				
							1									

p & indicates wire pair

Figure 1q BT 1530 KSU Wiring Diagram

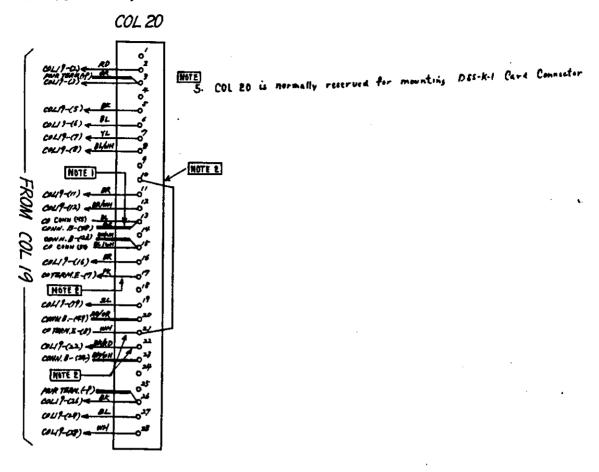




- indicates premiring on BT1880 KSU wiring Harness

Figure 2a BT 2250 KSU COL 14-20 Wiring Diagram (Expanded BT 1530 KSU)

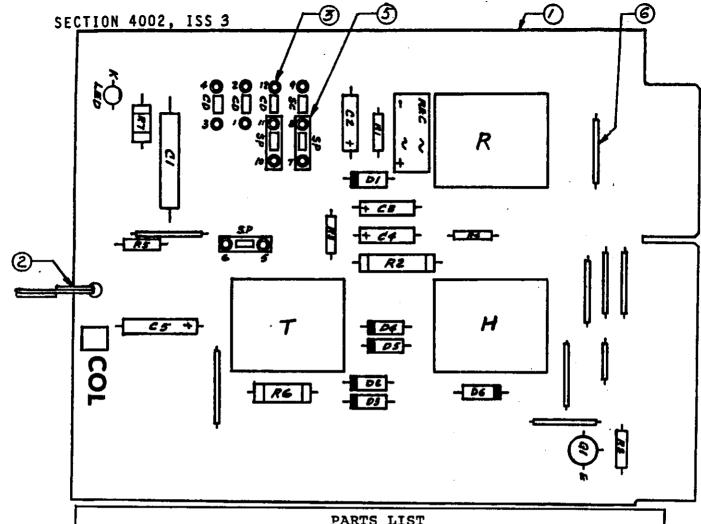
### SECTION 4002, ISS 3



CO TERM. D NOTE!	CO TERM E NOTE!
10 BL COL NA-(13) 20 BL/644 COL 14-(18) 30 BK COL 14-(18) 30 BK COL 14-(17) 40 YL COL 14-(17) 40 YL COL 15-(13) 50 BR COL 15-(13) 60 GR/644 (015-(13) 70 MK COL 15-(17) 70 BR COL 16-(18) 10 GR/644 COL 16-(18) 110 BK COL 16-(18) 110 BK COL 16-(18) 110 BK COL 17-(18) 120 TL COL 16-(18) 130 BR COL 17-(18) 140 BM/644 COL 17-(15) 150 MK COL 17-(21) 170 RB (OL 17-(21)) 170 RB (OL 17-(21)) 170 RB (OL 17-(21)) 170 BK COL 17-(21) 170 BK COL 17-(21) 170 BK COL 17-(17) 170 BK COL 18-(17)	10 BL COL19-03, 20 BL/MH CAL19-(18) 30 BK COL19-(17) 40 YL COL19-(11) 50 BR COL10-(13) 60 BR/MH COL10-(15) 70 RK COL10-(17) 70 RK COL10-(17) 70 PK COL10-(21) 10 11 0 11 0 12 0 13 0 14 0 16 0 17 0 18 0 19 0 11 0 12 0 13 0 14 0 16 0 17 0 18 0 19 0 19 0 19 0 19 0 19 0 19 0 19 0 19

indicates prewiring on 87/330 kSv w2ring Harness

Figure 2b BT 2250 KSU COL 14-20 Wiring
Diagram (Expanded BT 1530 KSU)



			PARTS LIST	··· -	
ITEM NO.	PART NO.	SYM.NO.		DESCRIPTION	ОТУ
1.	TE-101392		P.C.B. COI	4	1
2.	TP-122823		PULL RING		ī
3.	P-114510		TERMINAL N	1-60	12
4.			SCREW 2.6		3
5.	P-118035		SHORTING E		3
6.	P-118169-9		JUMPER WIF		9
		Cl	CAPACITOR:	1.8mf +100-10% 50V	ī
		C2	_]	2.2mf " "	1
		C3,4		3.3mf " 160V	2
		C5		10mf " 50V	1
	P-122539	D1-6	DIODE:	SIR40Z	6
		Ql	TRANSISTOR	R: 2SD78	1
	P-120286	REC	SIRB#OZ	•	1
		LED	LED:	SLP-24B	
		R8	RESISTOR:	10K %W ±10%	1
		R2		220 2W ±5%	1
		R3,4		220 ¼W ±10%	2
		R5		470 " "	1
		R6	_	180 1W ±5%	1
		R7		1.8K ½W "	1
	RL-3799	H	RELAY:	M-173	I
	**	R	.	M-172	1
∤	Ħ	T		M-174	1
1		RI	RESISTOR	39 K %W : 10%	1

Figure 4a COL Line Card Components and Illustration

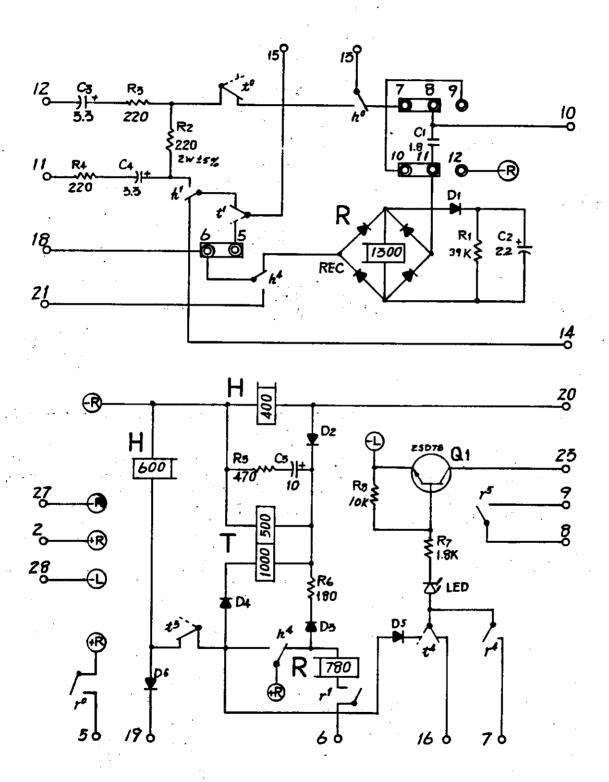


Figure 4b COL Line Card Schematic

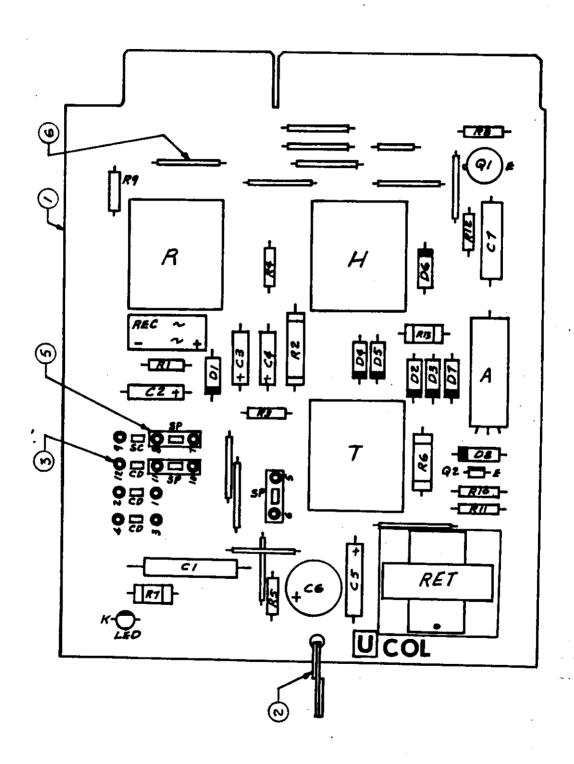


Figure 5a UCOL Line Card Illustration

			PARTS LIST	r	
TEM NO.	PART NO.	SYM.NO.		DESCRIPTION	QT
1.	TE-101392		P.C.B. UCO	6	1
2.	TP-122823		PULL RING		1
3.	P-114510 ·		TERMINAL N		12
4.			SCREW 2.6x4		3
5.	P-118035		SHORTING B		3
6.	P-118169-9		JUMPER WIRE		13
	,	C1	CAPACITOR:	1.8mf +100-10% 50V	1
		C2	_	2.2mf * *	1
		C3,4		3.3mf " 160V	2
		C5		10mf " 50V	1
		C6	<u></u>	220mf " "	1
		C7		.047mf ", 180V	1
	P-122539	D1-8	DIODE:	SIR40Z	8
	:	01	TRANSISTOR:	2SD78	1
		Q2	1	2SC1213A	1
	P-120286	REC	RECTIFIER:	SIRB40Z	1
		RB_	RESISTOR:	10K %W ±10%	1
		R2	] .	220 2W ±5%	$\overline{1}$
		R3,4	7	220 ½W ±10%	2
	·	R5,11	7	470 " "	1 2
		R6		180 1W ±5%	1
	\$ 1.50 m	R7	]	1.8K ½W "	1
1		R9	]	47 " ±10%	1
		R10	]	22 ¼W ±5%	1
	*** ***	R12		1K " ±10%	Ī
		R13	]	220 3W -±5%	ī
		LED	LED:	SLP-24B	ī
	TP-123066	RET	RETARD COIL:		ī
	RL-3799	H	RELAY:	M-173	ī
[	#1	R	1	M-172	ī
	H	T		M-174	ī
-		A	REED RELAY	SRF-12B	ī
		RI	RESISTOR	39K ¼W ± 10%	1
- 1	50 P 10 P	VRI	VARISTOR		i

Figure 5b UCOL Line Card Components

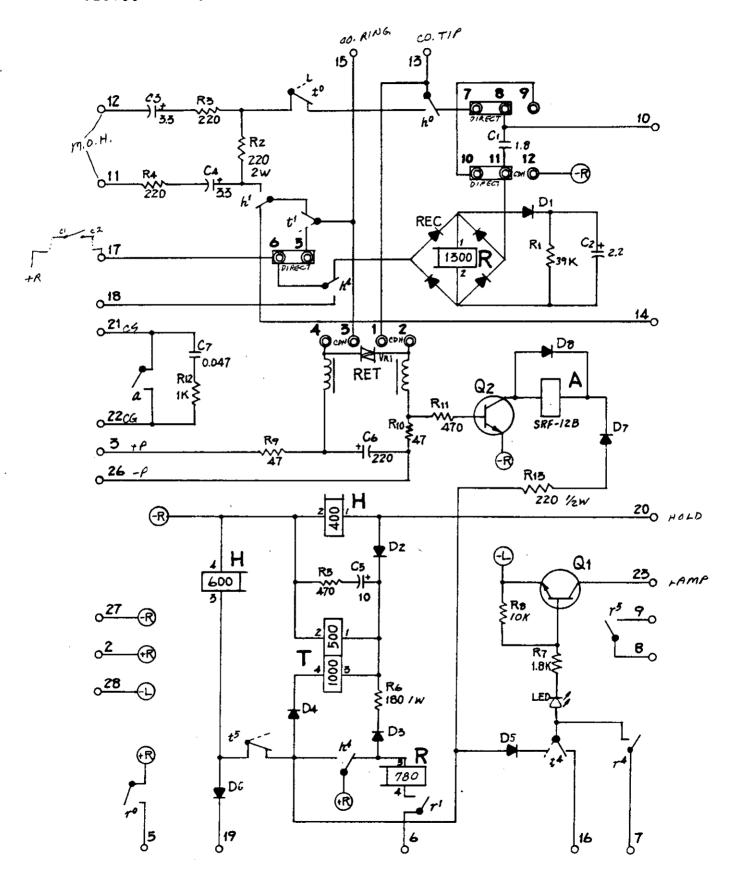


Figure 5c UCOL Line Card Schematic

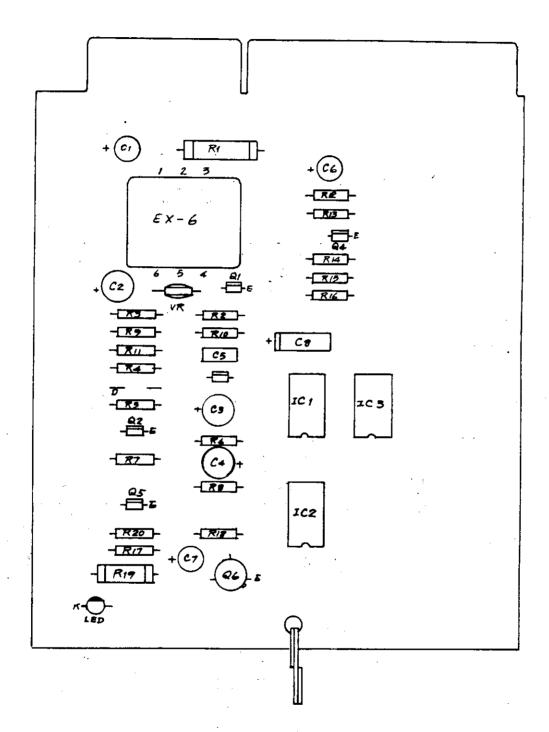


Figure 6a ICL Intercom Line Card Illustration

			PARTS LIST			
ITEM NO.	PART NO.	SYM. NO.	DES	CRIPTION		ОТА
1.	TE-101393		P.C.B. ICL	-	· · · · · · · · · · · · · · · · · · ·	1
2.	TP-122823		PULL RING			1
<del></del> -	12 22333	C1,3,4	CAPACITOR:	10mf +10	0-10% 50V	3
·		C2		220mf	11 17	1
		C5		.047mf	" 180V	1
		C6,7		4.7mf	" 50V	2
	•	C8	(NOISE LIM	TER)   lmf	+100 16V -10%	1
~		Dl	DIODE: 19	32076A		1
		Ω1-5	TRANSISTOR	2SC121	.3A	5
ļ		Ω6		2SD78		1
		VR	VARISTOR:	VR-60		1
		ICl	INTEGRATED	CIRCUT:	HD2511P	1
		IC2,3			HD2503P	2
		LED	LED: SLP-	-24B	•	1_1_
		XFl (Tl)	TRANSFOMER:			1
		Rl	RESISTOR:	330	2W ±10%	1
		R2		5.6K	⅓W ±5%	1
		R3		2.2K	11 11	1
	ĺ	R4		3.3K	01 01	1
İ		R13-16, 5-7,10,11		4.7K	11 19	9
		R8	•	100	<del>11</del> 11	1
1		R9		22K	91 11	1
		R12		47K	11 11	1
1		R17		8.2K	\$F 69	1
i		R18,20		1.5K	71 - II	2
		R19		1.8K	ትW ±10ቄ	1

Figure 6b ICL Intercom Line Card Components

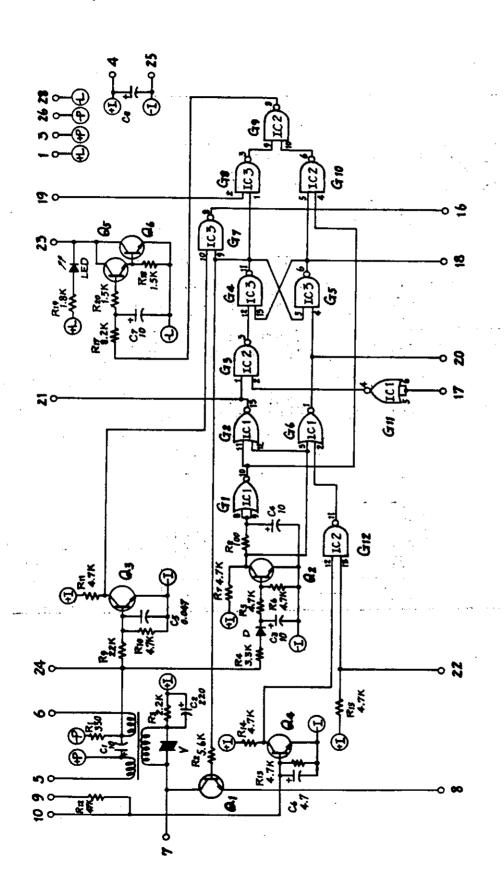


Figure 6c ICL-1 Intercom Line Card Schematic

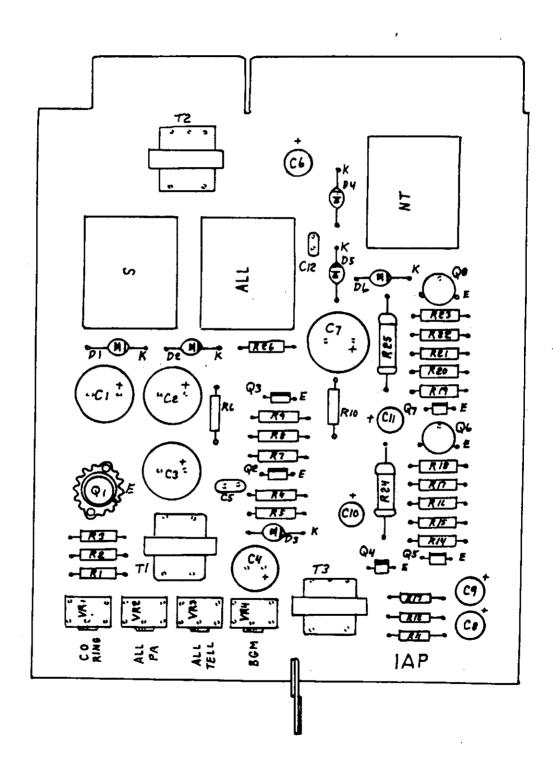
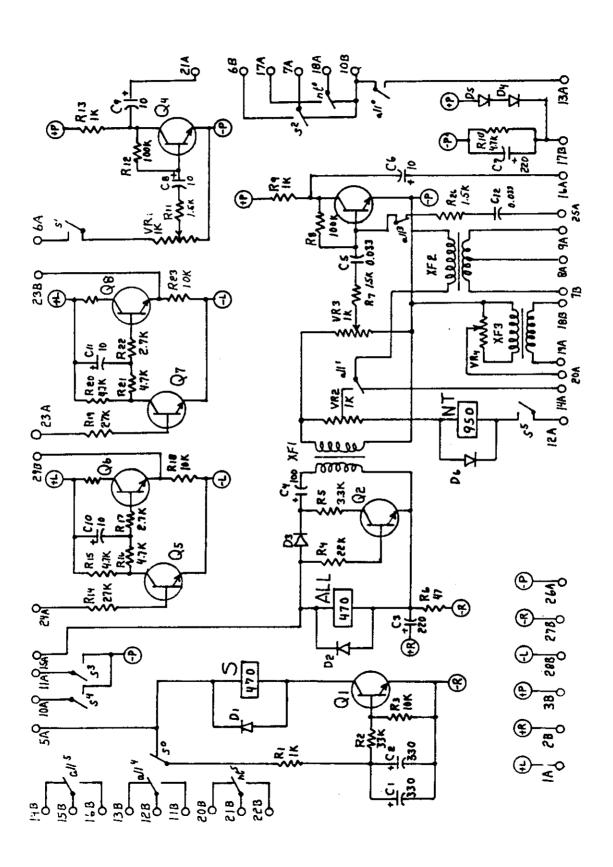


Figure 7a IAP Circuit Card Illustration

			PARTS LIST		·····
NO.	PART NO.	STM. NO.		DESCRIPTION	QTY
1.	TE-101394		P.C.B. IAF	)	1
2.	TP-122823		PULL RING		1
3.			SCREW 2.6)	(45	3
4.	P-121700		HEATSINK N		1
		C1,2	CAPACITOR:		2
j		C3,7		220mf " "	2
ł		C4	<u>.</u>	100mf " "	11
		C5,C12	4	.033mf " 180V	2
		C6,8,9,10		10mf " 50V	6
		11,12	D7005	<u> </u>	
	<del></del>	D1-6	DIODE:	6E SILICON	6
		01	TRANSISTOR		
		02-5,7	4	2SC1213A	5
	<u> </u>	Q6,8	TRANCFORME	2SD78	2
	•	XF1 (T1)	TRANSFORME		_   _1
ł		XF2 (T2) XF3 (T3)	4	EX-2	╼╅╼
	<u> </u>		DOTENTIONE	TER: 1K	3
		VR1,2,3 VR4	POTENTIOME	10K	1 1
	<del></del>	R1,9,13	RESISTOR:		3
1		R2	- KESISIUK.	1K ½W ±5% 33K " "	1
- 1		R3,18,23	-	10K " "	3
- 1		R4.	-	22K " "	<del>                                     </del>
	· .	R5	-	3.3K ½W 10%	1
- 1		R6	-	470	1
		R7,11,26	-	1.5K ¼W ±5%	2
		R8,12	1	100K " "	2
1		R10	1	4.7K " "	1 1
	·	R14,19	1	27K " "	2_
		R15,16,	<b>1</b> .:	4 7K " "	4
		20,21		7.71	
-	1	R17,22	1	2.7K " "	2
ļ		R24,25		47 2W 10%	2
一十	RL-3829	NT	RELAY:	M-101	1
ł	11	ALL	1	M-107	1
ľ	N .	S	1	M-111	

Figure 7b IAP Circuit Card Components



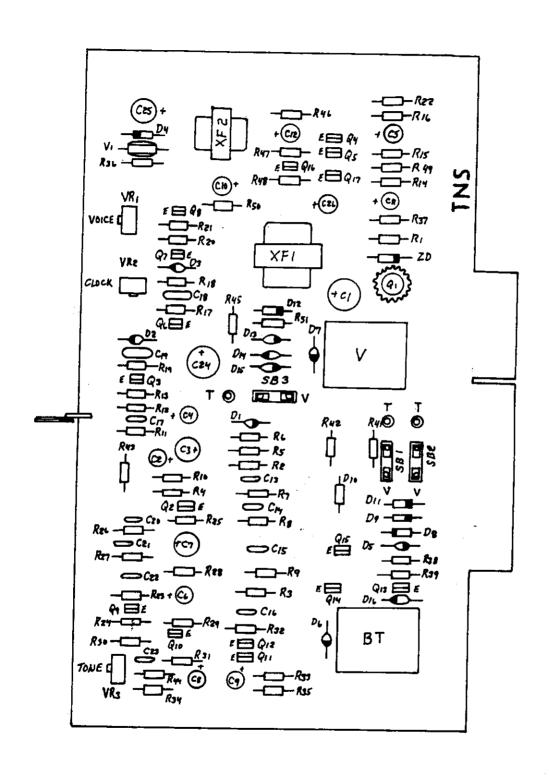


Figure 8a TNS Circuit Card Illustration

TEM			TS LIST	DIDTION	QT
NO.	PART NO.	SYM. NO.	DESC	RIPTION	יץ
1	TE-101391		P.C.B. TNS		1
$\frac{1.}{2.}$	TP-122823		PULL RING		1 1
3.	P-114510		TERMINAL N-6	0	9
4.	P-118035		SHORTING_BA	R	
5.	1 110000		SCREW 2.6X4S		2
6.			JUMPER		]
		C1,	CAPACITOR	100mf +100-10%50V	1
		C2,4-6,8-12,	]	10mf "	11
	!	26	1		
		C3,7	]	33mf " "	2
		C13-16,21,22	]	.015mf + 10% 180V	6
		C24	]	220mf +100-1-%5-V	1 1
	]	C17,20		1000pf +25%	2
	}	C18,19	1	.22mf " 180V	2
	ļ	C23	4	1 .U1MT	+ - 4
_		C25	DIODE	220mf +100-10%10V	1 1
		D1-3,5-7,12-16	DIODE	6E SILICON	10
		D4,8-11	4	1S2076A RD-16AM	1 1
		ZD	TRANSISTOR	2SD78	+ 1
		Q1 Q2-4,6-11	1 1000212101	2SC1213A	12
		14-17		23012130	**
		Q5,12,13	┪	2SA673A	1 3
		XF1 (T1)	TRANSFORMER	EX-1	1
		XF2 (T2)	1	EX-7	1
	K-104096	V1	VARISTOR	VR-60	7 7
	TP-123114-1		POTENTIOMETE		2
	TR-123114-4	VR2		20K	1
		R1,34	RESISTOR	1.5K ¼W +5%	2
	•	R2,3,11,12,	1	100K " "	6
		23,47	_	10V II II	<u>ا</u> ــــــــــــــــــــــــــــــــــــ
		R4,14,15,17	,	10K " "	1 8
		20,24,36,49	4	6 OV " "	+ ,
		R5	4	D. OK	1 5
		R6-9,27	4	15K " " 2.7K " "	1 2
		R10,18	-{	3.3K " "	1
		R16,43,44,46,48	-{	1K " "	1 5
		R37	1	3.9K " "	<u>                                     </u>
		R18,19,32,33	1	39K " "	4
		R21,29,13	1	47K " "	1 3
		R22,45	1	4.7K " "	2
		R25,26	7	8.2K " "	2
	}	R30,31	]	22K " "	2
		R38	]	100 " "	]
		R39		330 " "	] ]
		R41,42		5.6K " "	2
		R50	]	2.2K " "	1
·		R51		10K ½W 10%	1
	RL-3829	V	RELAY	M-107	1
	P-119714-2	BT	1	M-112	1

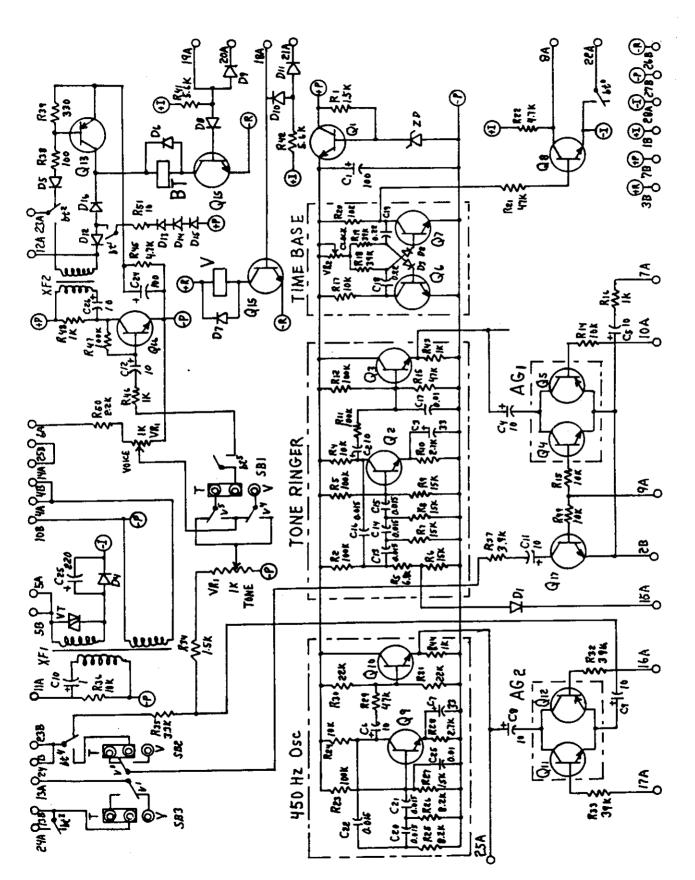
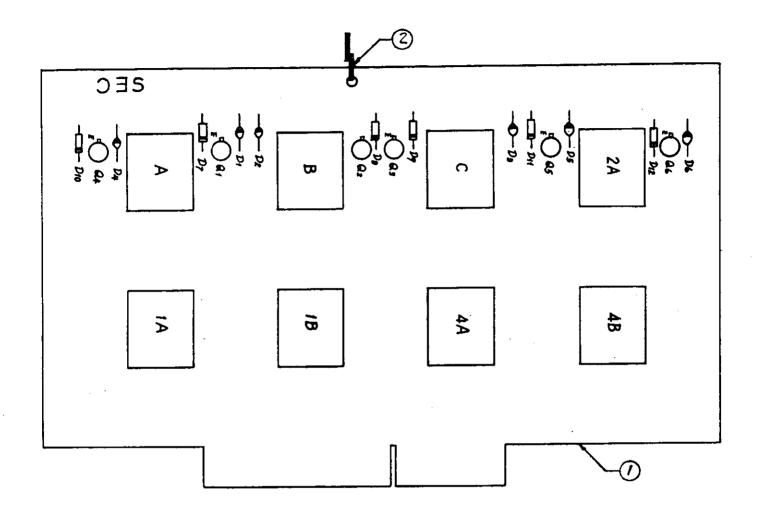


Figure 8c TNS Circuit Card Schematic



			PARTS LIST	?	
TEM NO.	PART NO.	SYM. NO.	D	ESCRIPTION	QTY
1.		<del></del>	P.C.B. SE	C	1
2.	TP-122823		PULL RING		1
3.			SCREW 2.	6 X 4 S	8
	P-119165	D1-6	DIODE:	6E SILICON	6
		D7-12	T 1	152076A	6
		Q1-6	TRANSISTO	R: 2SC1008	6
	RL-3829	A,B,lA, 1B,2A,4A	RELAY:	M-108	6
		C,4B	7 [	M-107	2

Figure 9a SEC Circuit Card Illustration and Components

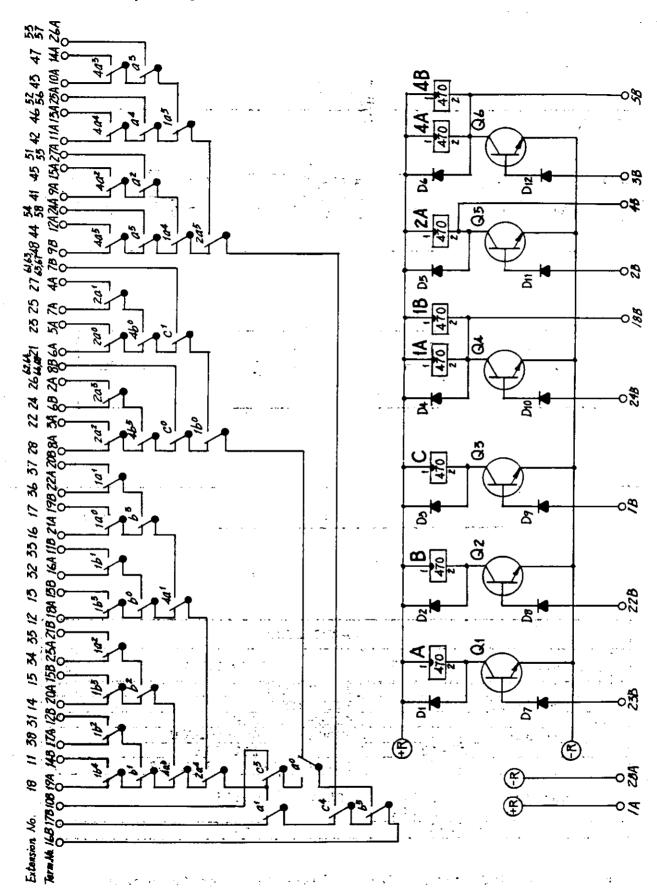
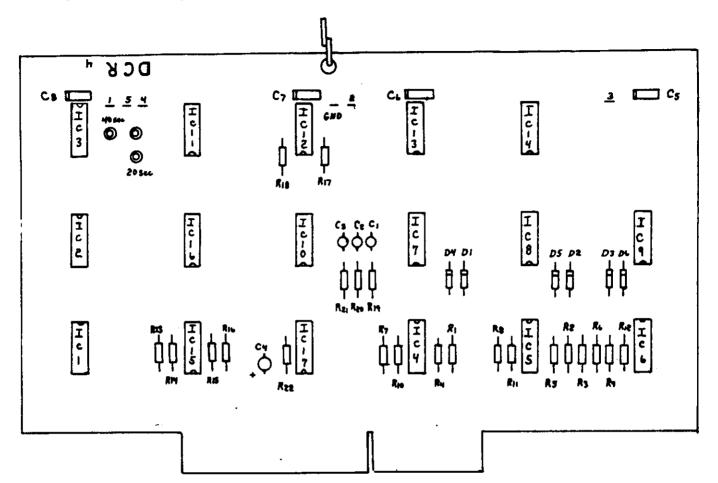
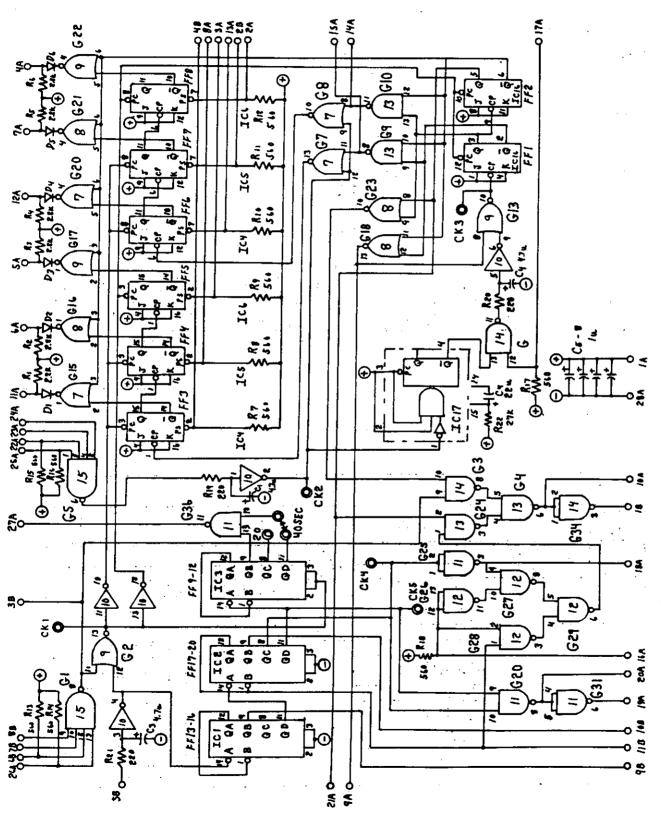


Figure 9b SEC Circuit Card Schematic



		PAR	RTS LIST			
ITEM NO.	PART NO.	SYM. NO.	DESCRIPTION			QTY
1. 2.	TE-101388 TP-122823		P.C.B. DCR PULL RING			
	11-122023	C1-C3 C4 C5-C8	CAPACITOR	4.7mf 22mf 1.0mf	10V 10V 16V	3 1 4
<u> </u>		IC1-IC3 IC4-IC6	DIODE INTEGRATED	1S.2076	HD7493AP HD7476P	6 3 3
		IC7-IC9 IC10 IC11-14	DESTSTOR		HD7402P HD7414P HD7400P	3 1 4
		R7-R18 R19-R21 R1-R6 R22	RESISTOR		560 ¼W 5% 220 ¼W 5% 2.2 ¼W 5% 27K ¼W 5%	3 6

Figure 10a DCR Circuit Card Illustration and Components



igure 10b DCR REV 4 Circuit Card Schematic

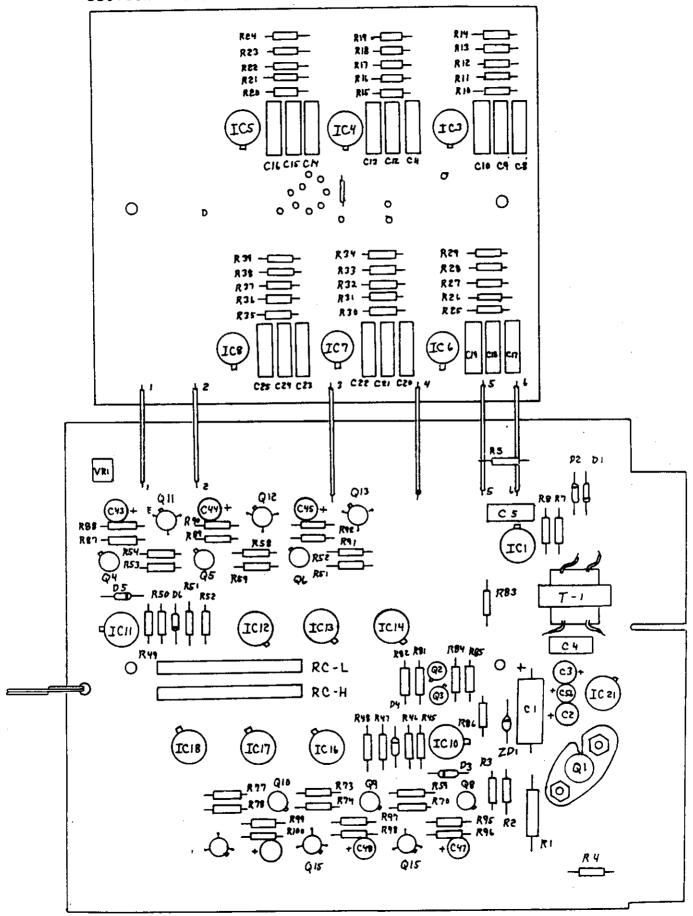
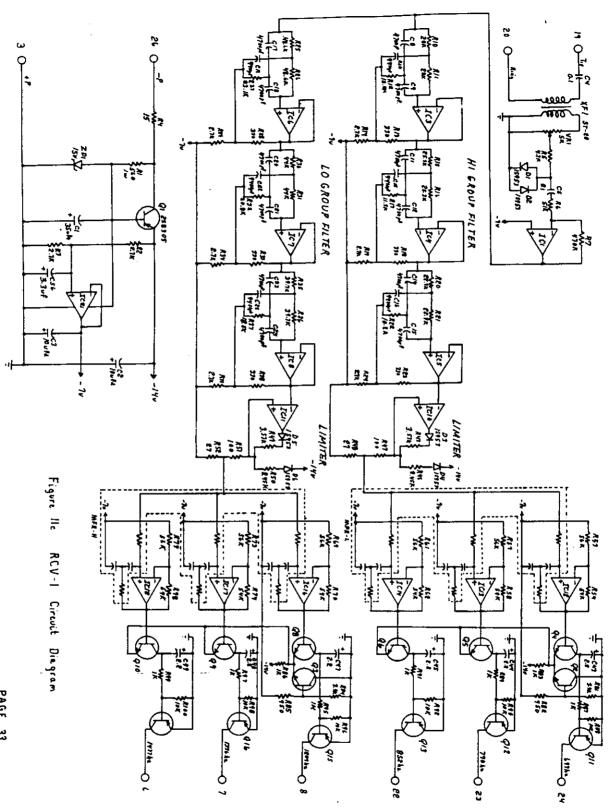


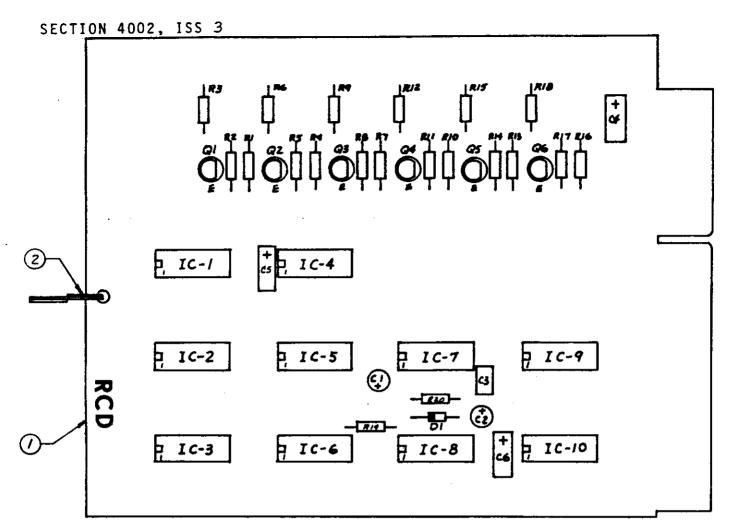
Figure 11a RCV-1 OTRU Receiver Line Card Illustration

T T F BA		1	PARTS LIST	PAGE 1 OF 2	·
NO.	PART NO.	SYM. NO.	D	QTY	
1.	TG-104954		P.C.B. RC	V-1	1
2.	TG-104955		11 (1)	2	1
3.	TP-122823		PULL RING	·	1
		C1	CAPACITOR	33 mf +100-10% 25V	1
		C2,3		10 mf " 180V	2
		C4,5	_	.1 mf " "	2
		C8,9,11,12,		4700pf <u>+</u> 0.25%	12
		14,15,17,18		1	1
		20,21,23,24 C10,13,16,	-	9400pf. "	6
	; j	19 22 25		3400p1.	0
		19,22,25 C43-45,47-49	1	2.2mf " 50V	6
		C56	1	3.3mf " 50V	1
		RC-L	HYBRID	10.000	1 1
		RC-H	1 ·······		<del>  i</del>
		D1-6	DIODE	1S953	6
	<u> </u>	ZD1		ZENER AWO1-15V	i
		Q1	TRANSISTOR		1
i		Q2-6,8-10	1	2SC943	8
		011-13,15-17		2SA603	6
		XF1 (T1)	TRANSFORME		1
		VR1	POTENTIONE		1
-		IC1,3-8,10-14 16-18,21	INTERGRATE	D CIRCUIT HA17741M	16
		R1	RESISTOR	560 1W +5%	1
		R2,3,14,19, 24,29,34,39		2.7K W +1%	8
Ī	•	R4		15 " +5%	1
		R5	†	4.7K " "	ī
	j	R6		51K " "	1
1	-	R7	]	470K " "	1
1		R10,11	]	28K " "	2
		R12		12.8K " +1%	1
		R13,18,23, 28,33,38		330 " "	6
i		R15,16		25.3K " "	2
		R17		11.5K " "	1
		R20,21	1	22.9K " "	2
1		R22	4	10.ZK	1
	· •	R25,26	}	40.01	2
i	}	R27 R30,31	+	23.1K " " 44K " "	2
	}	R32	1	20.8K "	1
1	ŀ	R35,36	1	39.7K " "	2
ŀ	}	R37	† .	18.5K " "	ī
ŀ	· t	R45,49	1	3.57K " "	2
	t	R46,50	1	8.45K " "	2
	ļ	R47,51	]	100 " "	2
		R48,52	]	27 " "	2
			1	1	

			PARTS LIST	<del> </del>		PAGE 2	<u>of</u>
ITEM NO.	PART NO. SYM NO. DESCRIPTION					QTY	
		R53,57,61 69,73,77	RESISTOR	56K	₹W	<u>+</u> 5%	6
		R54,58,62,70 74,78		54K	11	u -	12
		R56,60,64,72 76,80		27K	Ħ	il	6
		R81,84		3.9K	11	H	2
		R82,85		750	<b>\$1</b>	11	2
		R83,86,87,89, 91,95,97,99		1K	11	H	8
:		R88,90,92,96, 98,100		10K	)1	11	6



PAGE 33



			PARTS LIST	
ITEM NO.	PART NO.	SYM. NO.	DESCRIPTION	QTY
I.	TE-101399		P.C.B. RCD	1
2.	TP-122823		PULL RING	1
		Cl	CAPACITOR: 10 mf +100-10%50V	1
		C2	4.7mf " "	l i
		C3	.033mf " 180V	1
		C4,5,6	(noise limiter)   lmf " 16V	3
	P-119497	D1	DIODE: 1S953	1
		Q1-6	TRANSISTOR: 2SC372-Y	6
		ICl	INTEGRATED CIRCUT: HD7404P	1
		IC2,3,7	HD7400P	3
		IC4,5	HD7420P	2
		IC6	HD7430P	1
		IC8	SN74122N	1
		IC9,10	HD7410P	2
		R1,4,7,	RESISTOR: 56K W ±5%	6
	]	10,13,16		l
		R2,3,5,6,	4.7K " "	12
	ĺ	8,9,11,12,		
	<u>'</u>	14,15,17,18	, '	
		R19	220 " "	1
		R20	27K " "	1

Figure 12a RCD Circuit Card Illustration and Components
PAGE 34

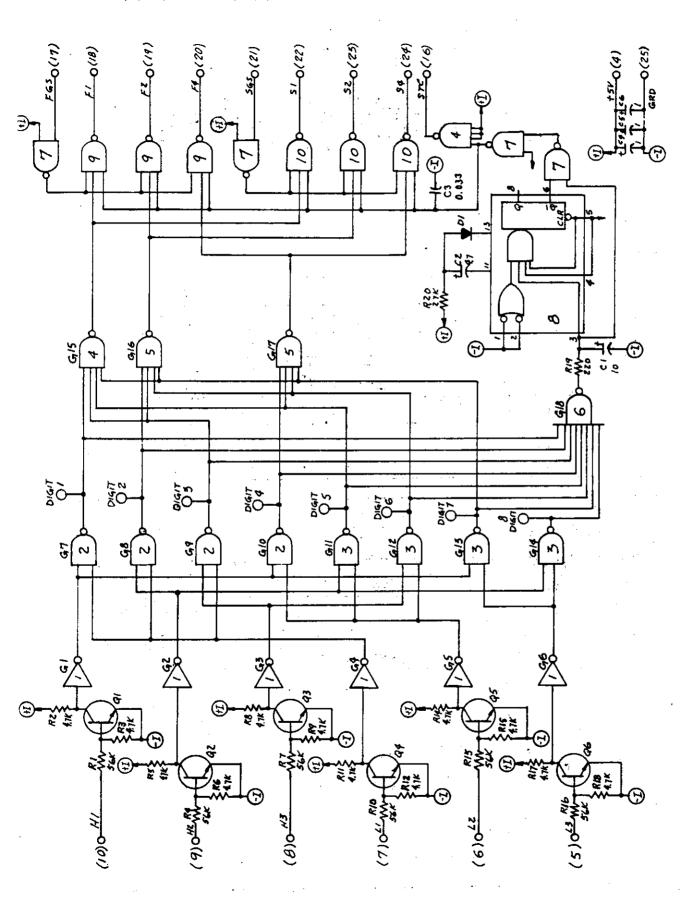


Figure 12b RCD Circuit Card Schematic

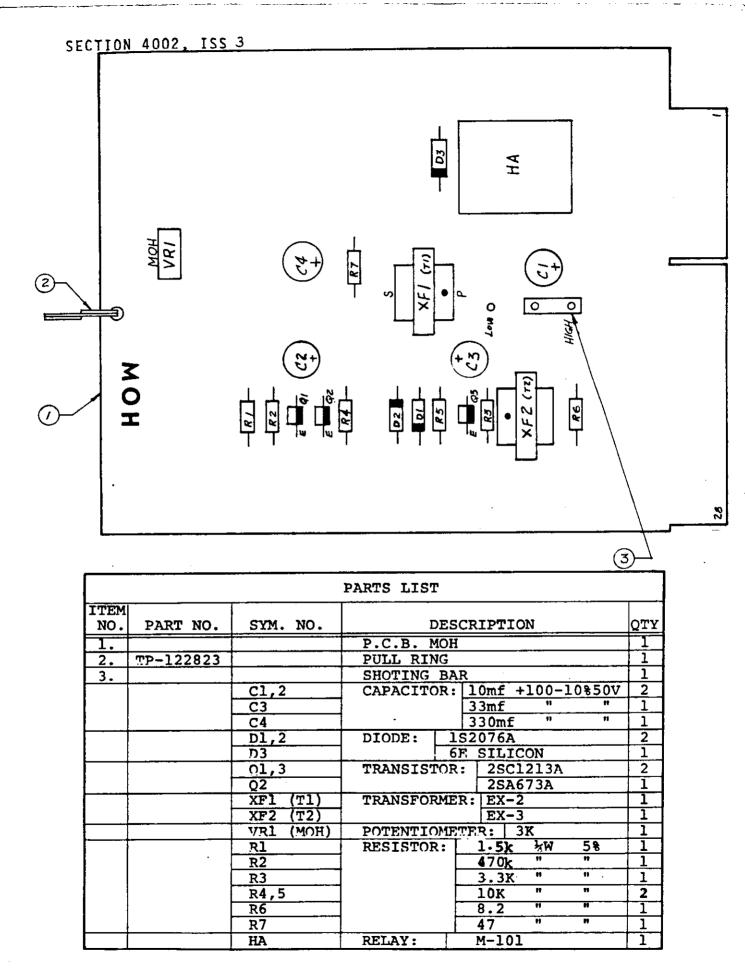


Figure 13a MOH Circuit Card Illustration and Components

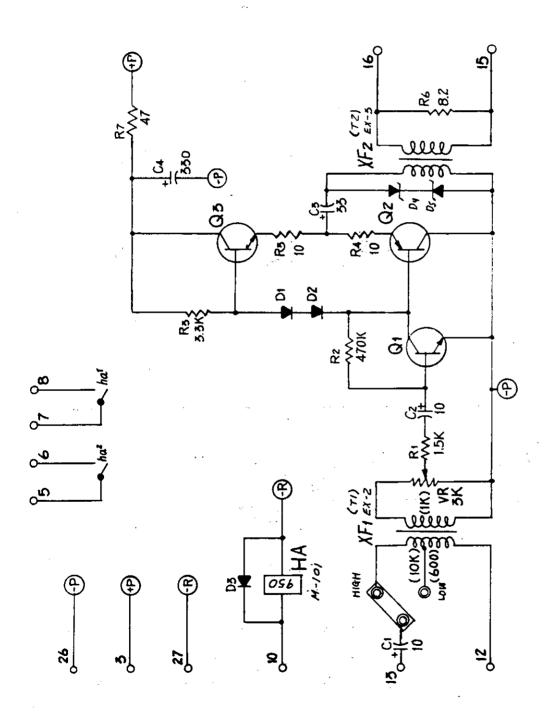
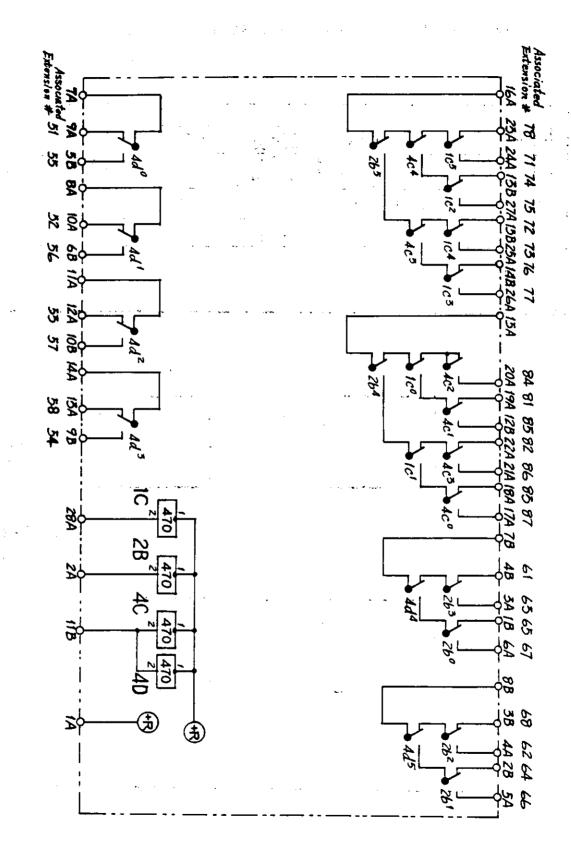
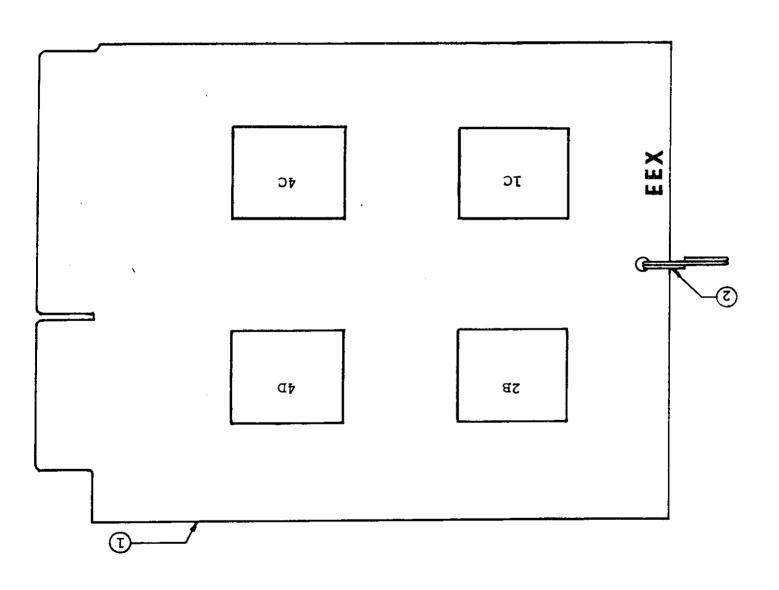


Figure 13b MOH Circuit Card Schematic

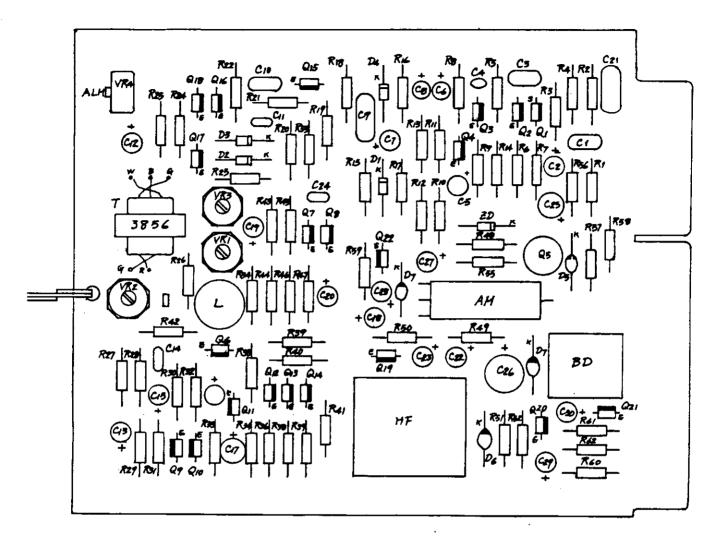
Figure 14b EEX Circuit Card Schematic





Þ	W-108	<b>KE</b> I'YX:	#C'TP	RL-3829	
7		SCEEM 2.6			3.
τ		PULL RING		TP-122823	2.
ī	X	P.C.B. EE			· T
YTQ	ESCRIPTION	ā	ON.MY2	.OM TAAT	ITEM NO.
		TSII STAAG			

Figure 14a EEX Circuit Card Illustration and Components



		PART	S LIST		
ITEM NO.	PART NO.	SYM NO.	DESCR	IPTION	QTY.
1.			P.C.B. HFK		1
2.			PULL RING		
3.			SCREW 2.6 x	45	1
4.			PUSH ON TERM	INAL	1
5.		Q 1	TRANSISTOR:	2SK40	1
		Q2-4,6,7, 9,15,16		2SC458	8
	Ī	Q5		2SC1008	1
Ī		Q8,11,12 17, 19-22		2SC1213A	8

Figure 15a HFK-1 Circuit Card Illustration and Components

ICTION 4002, ISS 3

#### FK-1 COMPONENT LIST

		P.A	RTS LIST	PAGE 2	0F 3
TEM 10.	PART NO.	SYM NO.	nes.	CRIPTION	QTY.
		Q10,13,14	023	2SA673A	4
		18			
7.		ZD	DIODE	RD134M	1
		D1-4		1S2076A	4
		D5-8		6E SILICON	4
8.		C1.3,10	CAPACITOR	.047mf=10% 180v	3
		C2,6,8,15,23		10mf = 100-10% 16v	5
		C5 7 12 12		100 ¥	
		C5,7,12,13 C9,21		lmf " 50 v 0.1mf + 10% 180 v	4 1
		C11		1000pf + 25%	1
		C14,24		.033mf + 10% 180v	2
		C16,18-20,		3.3mf +100-10% 50v	4 4 3 5 1 4 2 1 2
		27 - 30			ັ
		C17		22mf " 25v	1
		C22		10mf "_50v	1
		C25		33mf +100-10% 25v	1
	· · · · · · · · · · · · · · · · · · ·	C26		33mf " 50v	1
7.		VR1	POTENTIOMETER	1K	1
		VR2		10K	1
		VR3 VR4		50K 1K	
10.		R1,50,52,62	RESISTOR	5.1K %W+5%	1 1 4
, U.		R2,4,28	KESISTON	5 1K """	6
		34,43,59			
		R3		30K " "	1
		R5,41		120K " "	2 1
	!	R6		300 " "	
		R7		150K " "	1
		R8,13,21 44,58	-	15K " "	5
		R9,11,36		2.7K " "	3
İ		R10,48,53		2K " "	3
į		R12		120 " "	1
ŀ		R14,15,20	;	100K " "	3
ŀ		R16,46,47		1K " "	3
		R17,18	2001020	7.5K " "	2
11.	•	R19,30,31	RESISTOR	6.2K ¼W 15%	3
		R22,54 R23,57,60		510 " " 3.3K " "	<del>                                     </del>
		KZ3,5/,6U		5.1K ½W "	1 3
ŀ		R24,25 R26,55		620 ¼W "	3 2 3 2 3 2 2 2
	<del>.</del>	R27		2.4K " "	1
		R29,61		24K " "	1 2
		R32		910 " "	1
		R33		8.2K " "	1
-		R 35		36K " "	1

#### SECTION 4002, ISS 3

		P/	ARTS LIST	PAGE 3	0F 3
ITEM NO.	PART NO.	SYM NO.	DESC	RIPTION	QTY.
		R37 R38,39 R40 R42 R45 R49,51		3.6K ¼W 15% 1.8K " " 27K " " 10K " " 3K " " 43K " "	1 2 1 1 2
12.		BD HF	RELAY:	TECK-TT24 M-107	1
13. 14.		AM T	REED RELAY: TRANSFORMER:	SRF-12B 400Hz Matching Trans	1
15.		Į L	CHOKE COIL:	SL1316-563	1

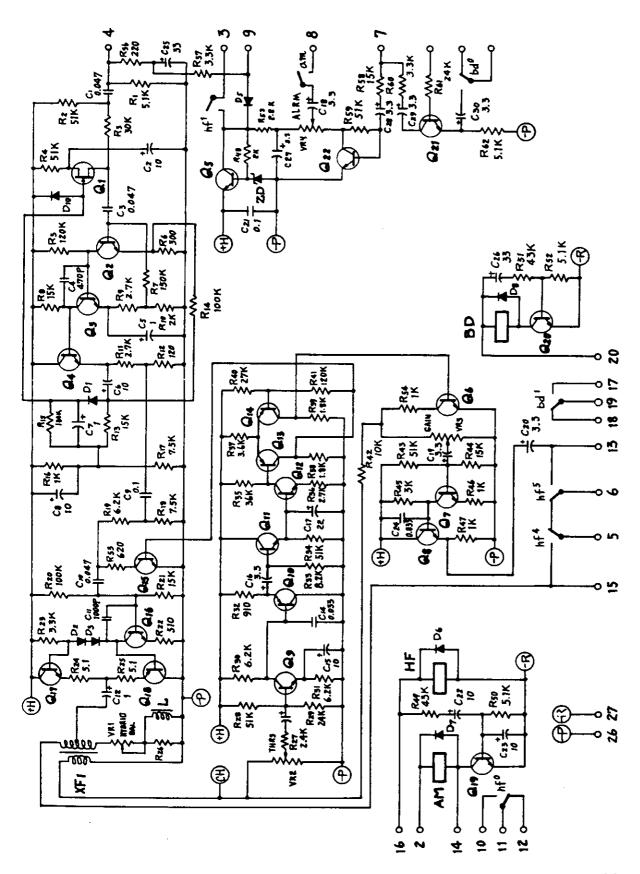
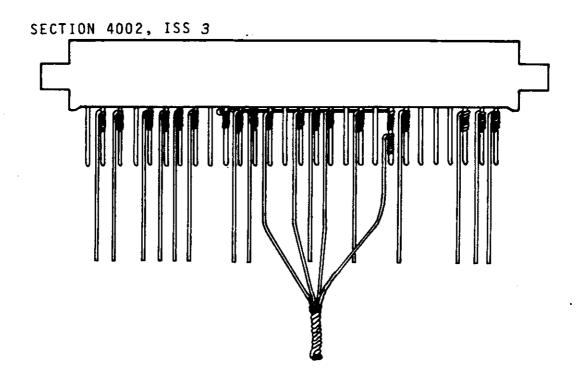
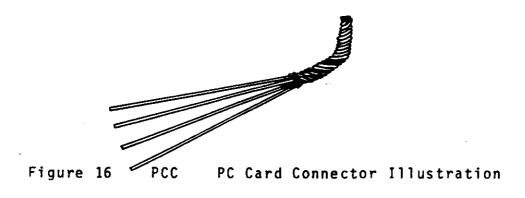


Figure 15c HFK-1 Circuit Card Schematic





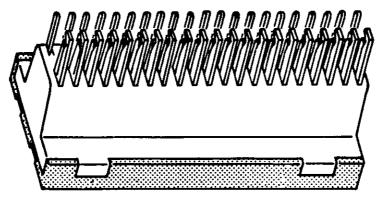
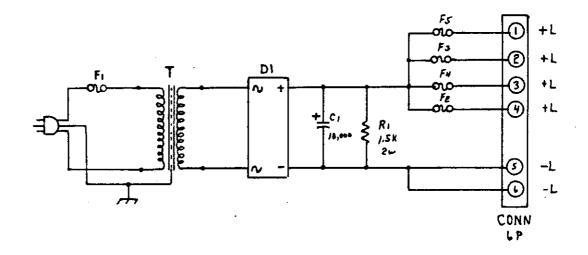


Figure 17 KTB KSU Terminal Block Illustration

		·	
т	DI		3 0 0
PWR SW	C <sub>1</sub> T	RI S I.SK 2w	5 0
ro o to o o o	<u> </u>		<u> </u>
0 33	DE	Ţ,	(P F, (B)
	? 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		9 00 (5)
	CS	Re 1.5K C3 + C3 + C3 + C3 + C3 + C3 + C3 + C3	
3 1 1 1	<b>8</b> ~ − <del>2000</del>	1.5K C1 + 6800 T	(h) (c)
			<u></u>
	(5)-00-12 + +		7
9888888			* <i>9</i> * · · · · · · · · · · · · · · · · · · ·
	400	AVR CL RS	20 R. (8)
			CONN ISP
<del>/ 11</del>			127

			PARTS LIST		
ITEM NO.	PART NO.	SYM. NO.	D	DESCRIPTION	QTY
1.			POWER SUPPL	Y (A)	1
2.	450-AB12F	CONN.	CONNECTOR 1	2 PIN	1_1_
3.			AC OUTLET		1
			POWER CORD/		
	CH-1530	CH		2.5A	1
	MP-017	NL	NEON LAMP		1 1
		SW	POWER SWITC		$\frac{1}{1}$
•		F1		B-3AG - 3AG	4
		F2,F3,F4,F5 F6,F7		- 3AG	2
		F8		5A-3AG	1
		F9		SB-3AG	1
	KBH2502	D1,D2,D3	BRIDGE RECT		3
	LM340T-5	AVR	IC REGULATO	OR (NS)	1
	RD6.2EB	ZD	ZENER DIODE		1
	SC146	TR	TRIAC (GI)		1
	T-1530	T	POWER TRANS	FORMER	1
		C1,C2	CAPACITOR	22000mfd 35V	2
		C3,C4		6800mfd 35V	1
	1	C5	4	0.1mfd 100V 100mfd 25V	$\frac{1}{1}$
	1	C6 C7	4	100mfd 25V	$-\frac{1}{1}$
	<u> </u>	R1,R2,R3	RESISTOR	1.5K 2W	3
	1 .	R4	I KESISION	10 2W	1
		R5	1	1K ½W	1
		R6	1	1 10W	1

Figure 18 PSA-1530 Power Supply Schematic and Components.



		P,	ARTS LIST		
ITEM NO.	PART NO.	SYM NO.	DESCRI	IPTION	QTY.
1			POWER SUPPLY	(B)	1
2.	450-AB6F	CONN	CONNECTOR 6	IN	1
3.			POWER CORD/PL		1
4.		F1	FUSE	3ASB-3AG	1
5.	. '	F2,F3,F4,F5		2ASB-3AG	4
6.	KBH 2502	D1	BRIDGE RECTIF	FIER	1
7.		C1	CAPACITOR	10000 of 35 v	1
8.		R1	RESISTOR	1.5K 2W	11
9.	T-1530EX	1 T	POWER TRANSFO	ORMER	1

Figure 19 PSB-1530 Power Supply Schematic and Components

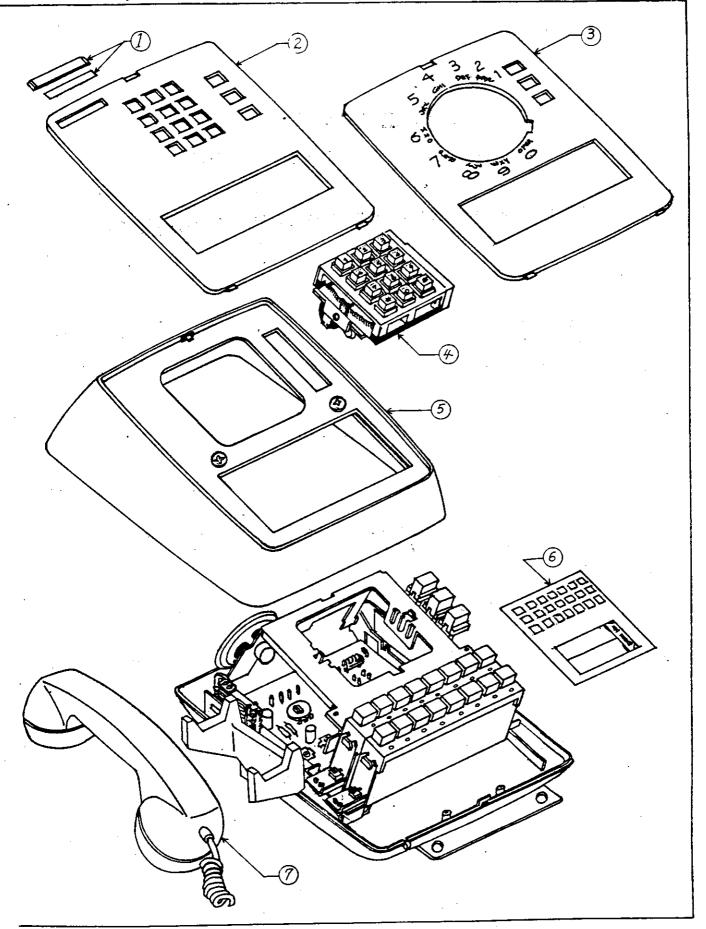
# 

### BT-1530/2250 KEY TELEPHONE SYSTEM

## STATION EQUIPMENT/OPTIONS DRAWINGS

- 1.00 INTRODUCTION
- 1.01 This section provides illustrations, circuit diagrams, wiring diagrams, and parts list of the BT 1530/2250 Key Telephone System Station Equipment.
- 2.00 STATION EQUIPMENT
- 2.01 BT 1530 Key Telephone
  - a. Figure 1 illustrates the BT 1530 Key Telephone components.
  - b. The schematic of the BT 1530 Key Telephone is shown in Figure 2.
  - c. The wiring plan of the BT 1530 Key Telephone is shown in Figure 3.
- 2.02 BT 2250 Key Telephone
  - a. Figure 4 illustrates the BT 2250 Key Telephone components.
  - b. The schematic of the BT 2250 Key Telephone is shown in Figure 5.
  - c. The wiring plan of the BT 2250 Key Telephone is shown in Figure 6.
- 3.00 BT 1530/2250 KEY TELEPHONE OPTIONAL ASSEMBLIES
- 3.01 The optional BT 1530/2250 Key Telephone assemblies are illustrated in the following indicated figures:

• PRVFigure	Ź
• OTDFigure	8
• HFSFigure	9
THUBFigure	10
■ SPA-N Figure	וו
• OTD-OPFigure	12



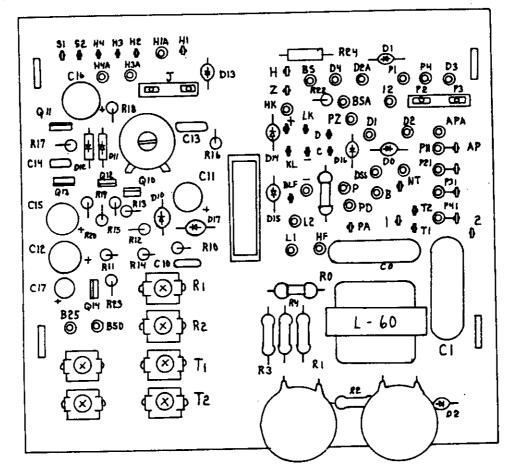
SECTION 4003, ISS 3 (10)

Figure 1b BT 1530 Station Assembly (B)

FIGURE la BT-1530 ASSEMBLY (A)				
ITEM NO.	PART NO.	DESCRIPTION		
1.		NUMBER PLATE		
_ 2.		COLOR PANEL (TONE) CPT-1530		
3.		COLOR PANEL (ROTARY) CPR-1530		
4.		OMEGA-TONE DIAL (OTD)		
5.		HOUSING		
6.		DESIGNATION LABEL		
7.		HANDSET ASSEMBLY		

	FIGUI	RE 1b BT-1530 ASSEMBLY (B)
ITEM NO.	PART NO.	DESCRIPTION
1.		ROTARY DIAL
2.		DIAL MOUNTING BRACKET
3.		CONNECTER CABLE
4.		CONNECTER CABLE CLAMP
5.		SPEAKER
6.		SPEAKER CUP
7.		PRIVACY UNIT (PRV) (-1 only)
8.		NON-PRIVACY CONNECTOR (NPC) (-  only)
9.		TRAN KEY
10.		PAGE KEY
11.		CONF KEY
12.	,	DIAL SUPPORT BRACKET
13.	1	KEY ASSEMBLY A-1530
14.		KEY ASSEMBLY B-1530
15.		KEY CAP
16.		1522-TELU CIRCUIT CARD
17.		CRADLE SWITCH ASSEMBLY
18.		CRADLE SWITCH COVER
19		CRADLE ASSEMBLY
20.		RECEIVER CAP
21.		RECEIVER UNIT
22.		TRANSMITTER CAP
23.		TRANSMITTER UNIT
24.		TRANSMITTER CUP
25.		HANDLE
26.		COIL CORD
.27.	Ì	BASE ASSEMBLY
28.		DIRECTORY TRAY

Figure 1c BT 1530 Station Components



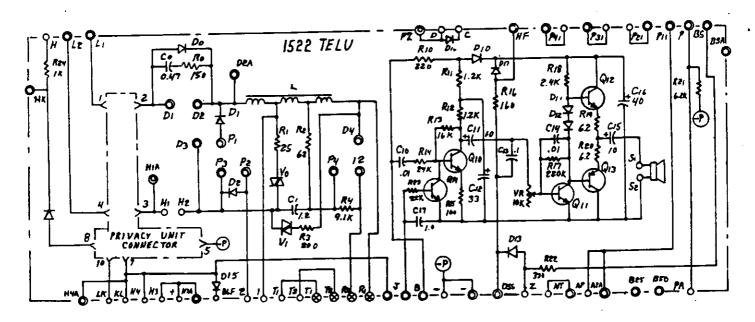
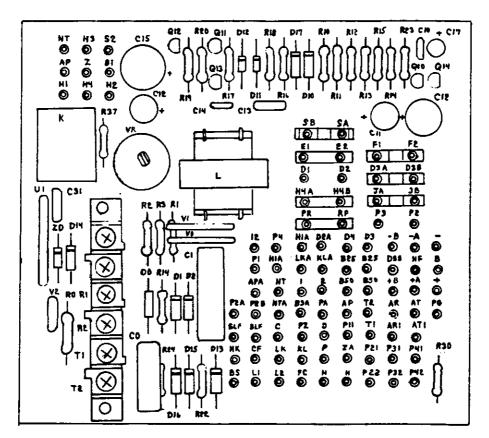


Figure 1b-1 BT 1530/2250 Station Circuit Card (1522 TELU) · Illustration and Schematic



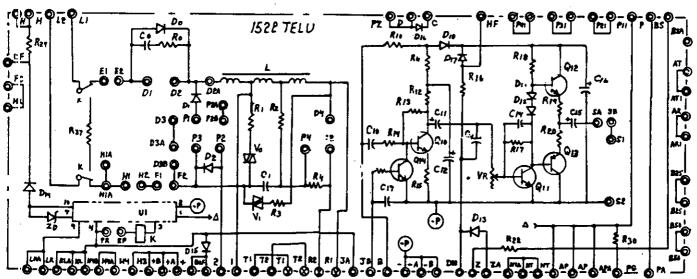
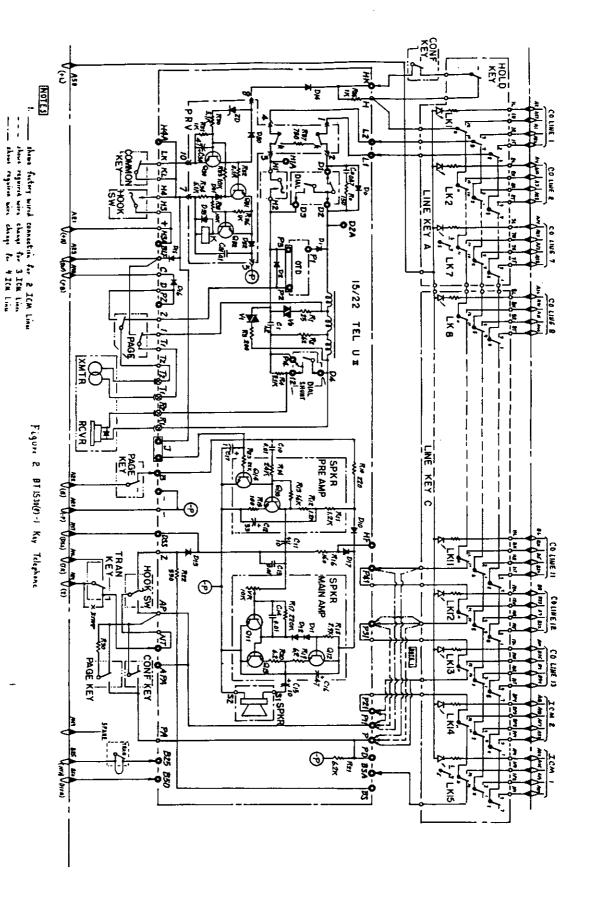


Figure 1b-2 BT 1530/2250-2 Station Circuit Card

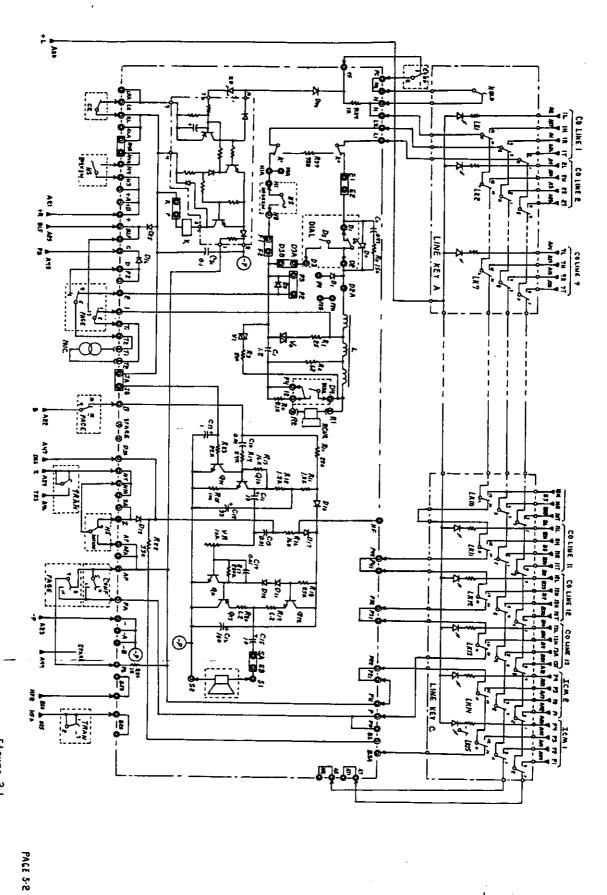
		PARTS LI	ST	· · · · · · · · · · · · · · · · · · ·
ITEM NO.	PART NO.	SYM NO.	DESCRIPTION	QTY
1.	TG-104930		P.C.B. BT-15-22	1
2.	P-114510		TERMINAL-SOLDER (-1)	21
3.	HP-043		PUSHON TERMINAL N-80	91
4.	P-118035		SHORTING BAR	8
5.	TP-122939		TERMINAL M-3 (-1)	6
6.	· · · · · · · · · · · · · · · · · · ·		SCREW TERMINAL (-2)	1
7.		U1	HYBRID (-2)	1_1_
8.		CO	CAPACITOR47mf+100-10%180V	1 1
		C1	1.2MT	1
		C10,14,31	L .UIMT	2
		C11,15	[ TUIIIT	2
		C12	3301	+
		C13	[ . IIII 100 A	1
		C16		1 1
		C17	1 IMT	1
9.		XF1 (L)	TRANSFURMER L-DU	8_
10.		DO-2,10,13·17	DIODE 6E SILICON (-2)	1
		ZD		2
	· · · · · · · · · · · · · · · · · · ·	D11,12	1S2075K TRANSISTOR 2SC458	4
11.		010-12,14 013	TRANSISTOR 2SC458 2SA539L	1 1
12	TP-122976	V0	VARISTOR V308	1
12. 13.	TP-122976	V0 V1	108DZOC	1
14.	TP-122977	VR VR	POTENTIOMETER 10K	1
15.	11-122970	RO	RESISTOR 150 ½W ±5%	1
15.		R1	25 ½W "	1
		R2	62 " "	1
}		R3	200 " "	<del>                                     </del>
		R4	9.1K " "	<del>                                     </del>
		R10	220 " "	<del>  7</del> -
		R11,12	1.2K " "	2
		R13	16K " "	1
		R14	24K " "	$\frac{1}{1}$
		R15	100 " "	1
		R16	160 " "	1
		R17	220K " "	1
		R18	2.4K " "	1
		R19,20	6.2 "	2
		R21	6.2K " "	1
		R22	330 " "	1
	•	R23	22K ½W "	1
		R24	1K 1W "	1
		R30	1K IzW "	1
16.	TP-122980		CONNECTOR U-SA1001 (-I)	1

Figure 1b-3 BT 1530/2250 Station Circuit Card (1522 TELU) Components

NOTE (-1) indicates BT1530/2250-1 only (-2) indicates BT1530/2250-2 only



PAGE 5-1



BT 1530(P)-2 Key Telephone Figure 2-1

LINE	KEY ASSEM	BLY A	
111111	•		
S B B R R R R R R R R R R R R R R R R R	R Y S B	PAY BLYL ORNAL ORN	T-Y-U TEXW
(E) 4 m z (E) 500 (E) 500 (E) 500 (E) 500 (E) 600 (E)	CA (2)		1202F 1203F 1204 (1)

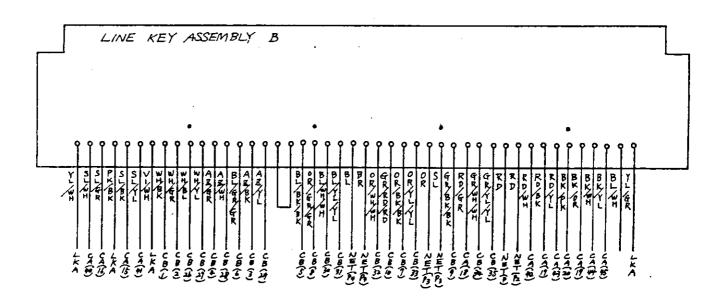


Figure 3a BT 1530 Key Telephone Wiring Diagram

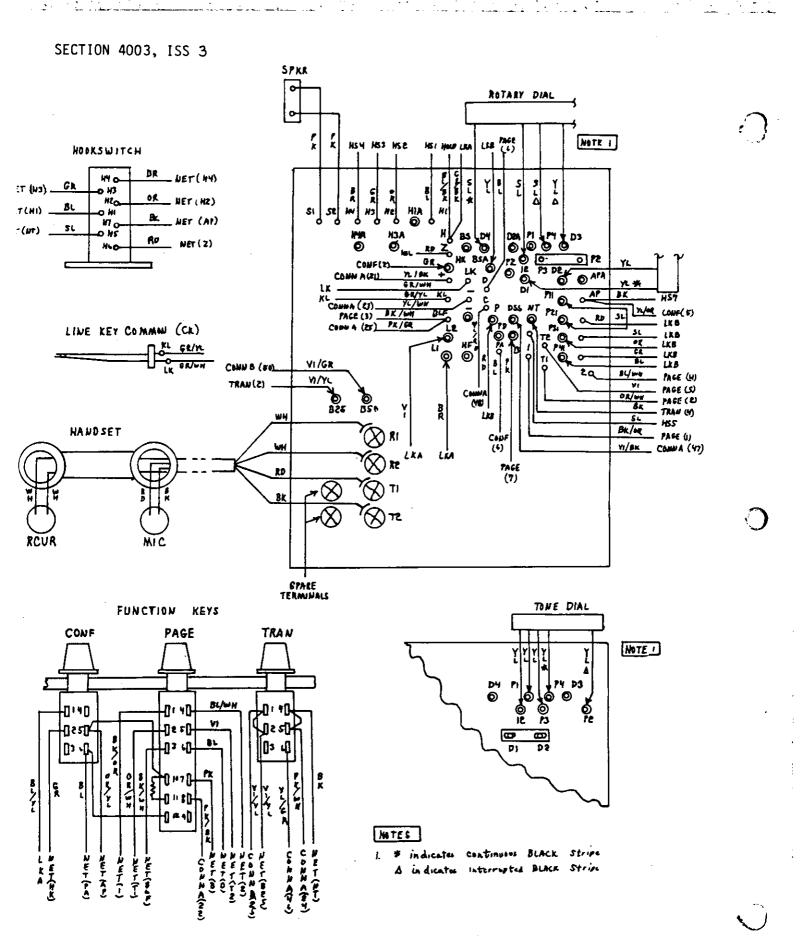


Figure 3b BT 1530 Key Telephone Wiring Diagram (-1 only)

BT 1530/2250 (-2) KEY TELEPHONE WIRING DIAGRAM

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PAGE 7-1

CONN A

CONN B

712			
OR	1	26	BL
<i>BR</i>	2	27	GR
RD	3	28	<u>s</u> L
YL	4	_	BK
y/	├	29	PK
AZ	5	30	
	6	3/	WH
AZ-BK	7	32	BL-WH
AZ-GR	8	33	BL-YL
OR-BK	9	34	OR-WH
OR-AR	10	35	OR-YL
GR-BK	//	36	. GR-WH
GR-RD	12		GR-YL
BR~BK		∺	BR-WH
BR-GR	/3	<u> </u>	BR-YL
SL-BK	14	39	SL-WH
	15	40	
SL-GR	16	4/	<u>SL-YL</u>
	7	<i>4</i> 2	RD-WH
	18	<i>43</i>	RD-YL
BK- OR	19	44	BK-WH
<u> </u>	20	45	BK-YL
YL-BK	2/	46	YL-GR
PK-BK	-/ 22		VI - BK
YL-WH		47	YL-RD
ענט עם	•	48	VI-WH
PK-AR	4د	<del>4</del> 7	PK-YL
	25	50	- /A /E

<u> </u>	7	26	WH-BL
WH-6R	12	27	<u> WH - YL</u>
AZ-BK	3	28	AZ-WH
AZ-GR	4	29	AZ·YL
BL-BK-BK	5	30	BL-WH-WH
BL-GR-GR	6	1	BL-YL-YL
OR-8K-8K	⊢	3/	OR - WH-WH
	7	32	
OR-GR-GR	Lo	33	OR - YL - YL
BK-BK	7	34	GR - WH-WH
<u> </u>	10	35	GR - YL-YL
	11	36	
	12	37	
	13	38	
	Ь—	Ε_	
	_	39	
	15	40	
	16	4./	
	17	42	
	18	43	
	19	44	
	20	45	
	2/	46	
	22	47	
	_		
j	23	48	
	24	49	VI = 60
	عد	50	VI - GR

TAIL CABLE CONNECTORS

Figure 3c BT 1530 Key Telephone Wiring Diagram

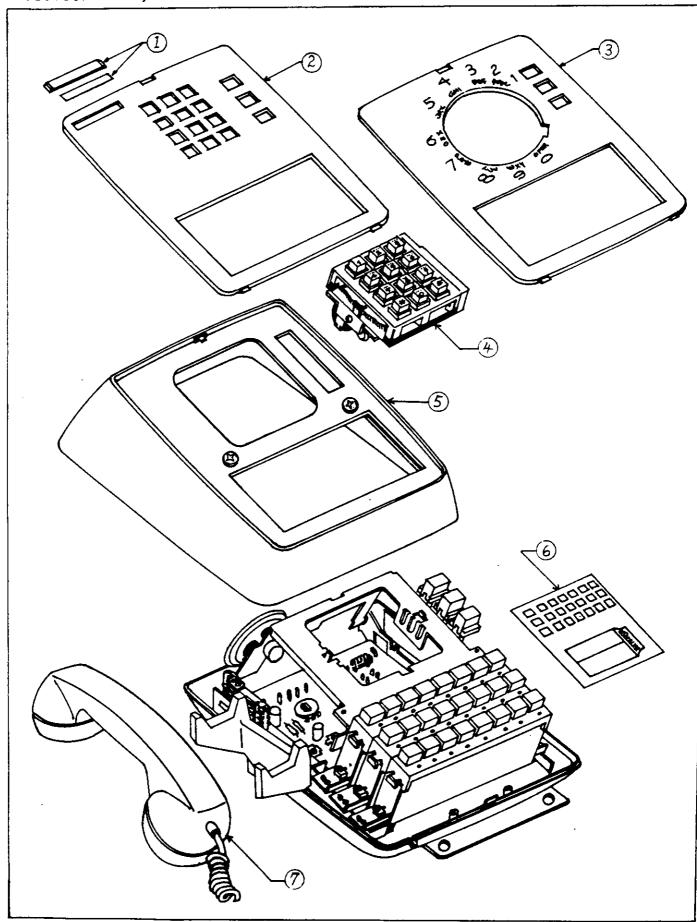


Figure 4a .BT-2250 Station Assembly (A)

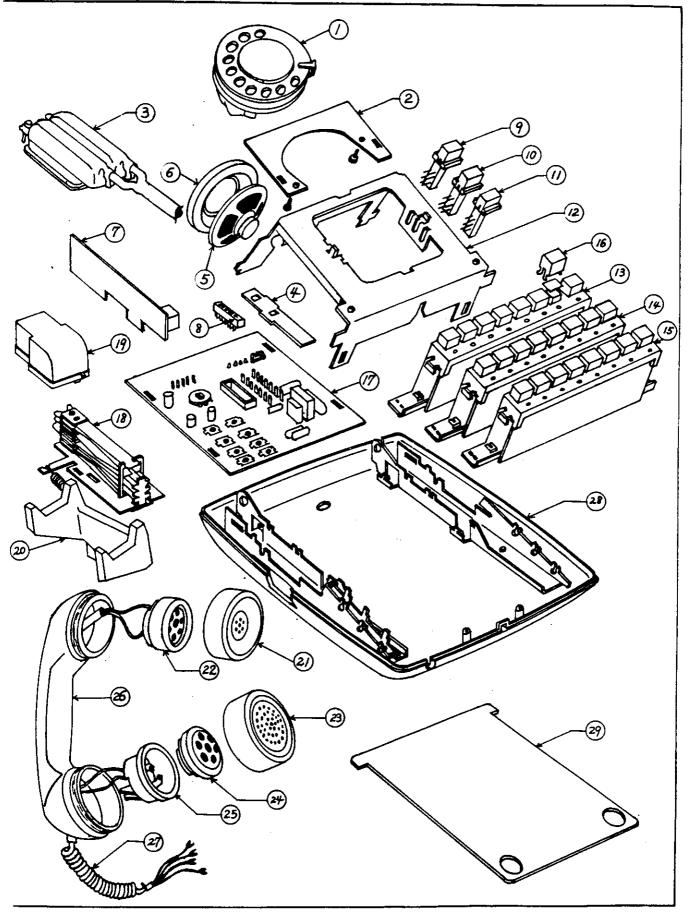


Figure 4b BT-2250 Station Assembly (B)

	FIGURE	4a BT-2250 ASSEMBLY (A)
ITEM NO.	PART NO.	DESCRIPTION
1.		NUMBER PLATE
2.		COLOR PANEL (TONE) CPT-2250
3.		COLOR PANEL (ROTARY) CPR-2250
4.		OMEGA-TONE DIAL (OTD)
5.		HOUSING
6.		DESIGNATION LABEL
7.		HANDSET ASSEMBLY

	FIGUI	RE 4b BT-2250 ASSEMBLY (B)
ITEM NO.	PART NO.	DESCRIPTION
1.		ROTARY DIAL
2.		DIAL MOUNTING BRACKET
3.	,	CONNECTOR CABLE
4.		CONNECTOR CABLE CLAMP
5.		SPEAKER
6.		SPEAKER CUP
7.		PRIVACY UNIT (PRV) (-1 only)
8.		NON-PRIVACY CONNECTOR (NPC) (-  -m/y)
9.		TRAN KEY
10.		PAGE KEY
11.	_	CONF KEY
12.		DIAL SUPPORT BRACKET
13.		KEY ASSEMBLY A-2250
14.		KEY ASSEMBLY B-2250
15.		KEY ASSEMBLY C-2250
16.		KEY CAP
17.		1522-TELU CIRCUIT CARD
18.		CRADLE SWITCH ASSEMBLY
19.		CRADLE SWITCH COVER
20.		CRADLE ASSEMBLY
21.		RECEIVER CAP
22.		RECEIVER UNIT
23.		TRANSMITTER CAP
24.		TRANSMITTER
25.		TRANSMITTER CUP
26.		HANDLE
27.		COIL CORD
28.		BASE ASSEMBLY
29.		DIRECTORY TRAY

Figure 4c BT-2250 Station Components

PAGE 12-1 .

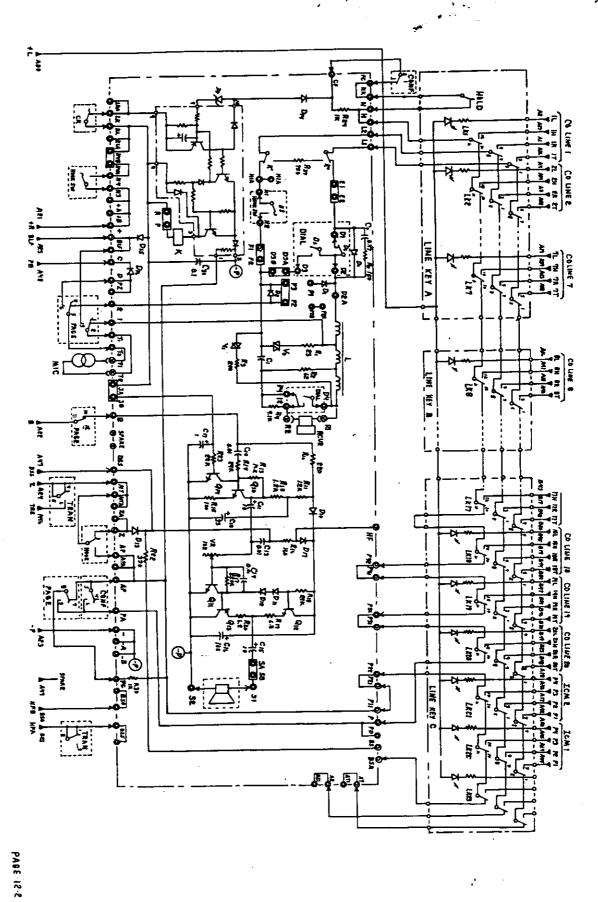


Figure 2-i BT 2250(P)-2 Key Telephone

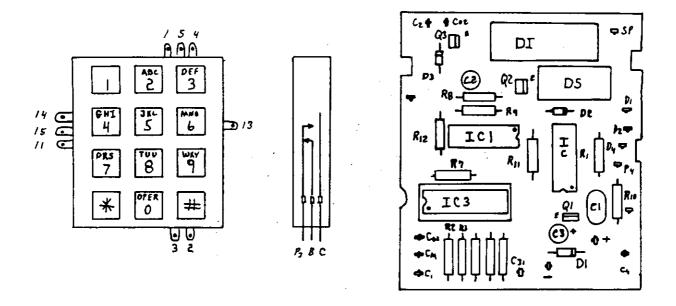
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LINE KEY ASSEMBLY A	
(12) 1 (12) 2	
LINE KEY ASSEMBLY B	
( ( ( ( ( ( ( ( ( ( ( ( ( ( ( ( ( ( (	
LINE KEY ASSEMBLY C	
,	
111111111111111111111111111111111111111	
(4) (5) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1	
Figure 6a BT 2250 Key Telephone Wiring Diagram	

PAGE 13



		PARTS LI	ST			· · ·
ITEM NO.	PART NO.	SYMBOL NO.	DESCRIPTION	·		QTY
1	TG-105634	•	PCB OTD-OP	:		1
2	TP-124549 TP-124550-1 TP-124550-2	IC1 IC2 IC3	Integrated	Circuit	AY-5-9100P MSM 4011 MSM 4013	1 1
3	11-12-4330-2	Q1 Q2 Q3	Transistor	<del></del>	2SD414 2SC458 2SA673	1 1
4		D1 D2-D3	Diode	· · ·	RD15E 1S2076A	1 2
5		R1 R2-R7 R8 R9 R10 R11-R12	Resistor	510K 1 100K 1 11.5K 24K 3a 2K 3aw 30K 3a	ław V	1 6 1 1 2
6		C1 C2 C3	Capacitor	0.1 w	d 50v ofd 450v 50v	1 1 1
7	TP-124552 TP-124551	DS DI	Relay	RZ-24 SRF-30		1
8	TG-104935-G3	SW1	Switch	D-60P3	3	1

Figure 12a Omega Outpulse Dial Model OTD-OP Illustration/Components

CONN A

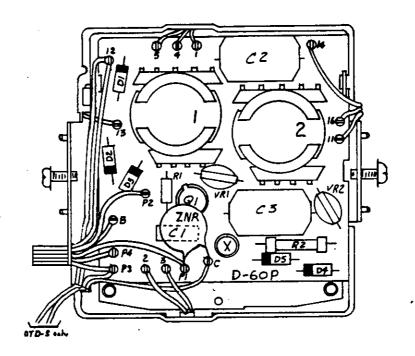
_			- <i></i>
OR	7	26	<u> </u>
BR	12	27	GR
<b>R</b> D	3	28	SL
YL	4	29	BK
V/	5	30	PK
AZ	<u> </u>	<del> </del>	WH
BL-BK	6	3/	BL-WH
BL-GR	12	32	BL-YL
OR-BK	8	33	OR-WH
OR-GR	9	34	OR-YL
GR-BK	10	35	GR-WH
GR-RD	//	36	GR-YL
BR-BK	12	37	BR-WH
BR-GR	/3	38	BR-YL
SL- <i>BK</i>	14	39	
	15	40	SL-WH
SL-6R	16	4/	SL-YL
RD-BK	17	42	RD-WH
7D-6R	/8	43	RD-YL
BK-OR	19	44.	BK-WH
BK-PK	20	45	BK-YL
YL-BK	2/	46	YL-GR
PK-BK	22	47	V/-BK
YL-WH	23	.48	YL-RD
PK- WH	24	49	V/- WH
PK-GR	-	~~	PK-YL

# $\it CONN B$

WH-BK	7	26	WH-BL
WH-GR	2	27	WH - YL
AZ-BK	3	<del>                                     </del>	AZ - WH
AZ-GR	4	29	AZ-YL
BL-BK-BK	5	30	BL-WH-WH
BL-GR-GR	6	3/	BL-YL-YL
OR-BK-BK	2	32	OR - WH - WH
OR-GR-GR	8	33	OR-YL-YL
<u>GR-BK-BK</u>	9	34	GR-WH-WH
GR-RD-RD	10	35	GR-YL-YL
<u> </u>	11	36	BR- WH-WH
<u>BR-6R-GR</u>	12	37	BR-YL-YL
SL-BK-BK	/3	38	SL-WH-WH
SL- GR- GR	14	39	SL-YL-YL
RD-BK-BK	15	40	RD-WH-WH
RD-GR-GR	16	4/	RD-YL-YL
BK-OR-OR	17	42	BK-WH-WH
<u> 3K-PK-PK</u>	18	43	BK-YL-YL
YL-BK-BK	19	44	YL-WH-WH
<u>YL-6R-6R</u>	20	#5	YL-RD-RD
PK- BK- BK	2/	70	PK - WH- WH
PK-GR-GR	ZZ	47	PK-YL-YL
<u>V/-8k-8k</u>	23	#8	VI - WH- WH
<u> </u>	24	49	VI - YL-YL
<u> </u>	25	50	V/- AR

TAIL CABLE CONNECTORS

Figure 6c BT 2250 Key Telephone Wiring Diagram



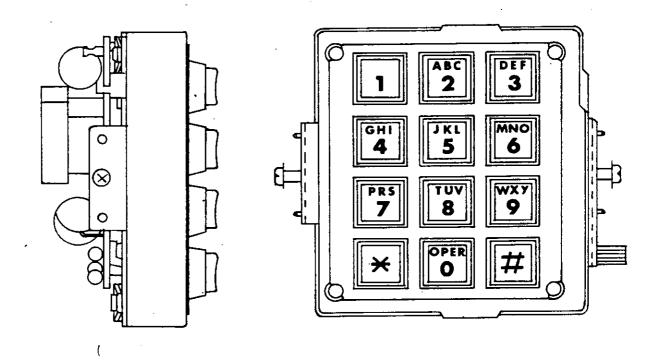


Figure 8a Omega Tone Dial OTD (OTD-S) Illustration

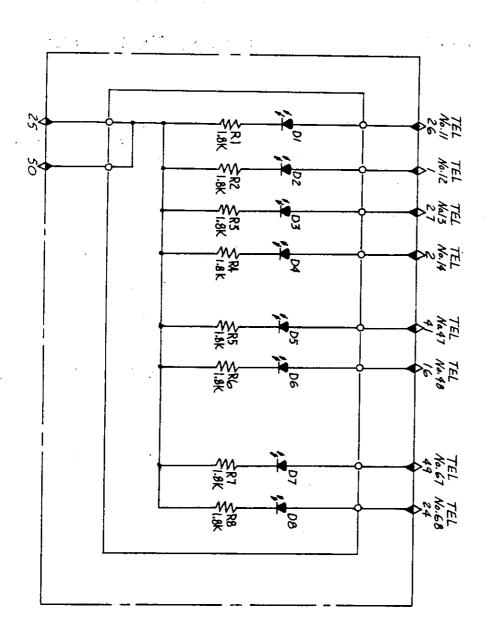
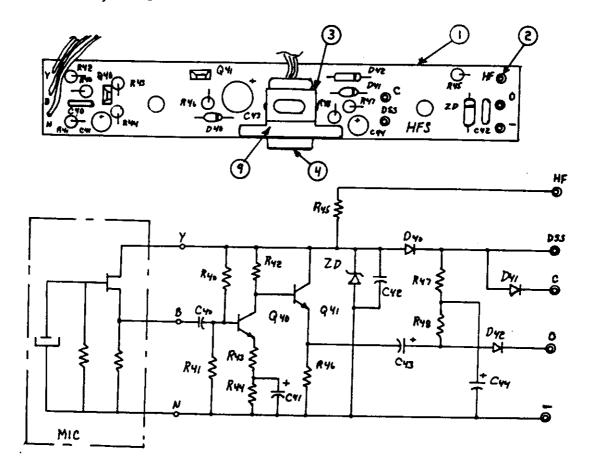
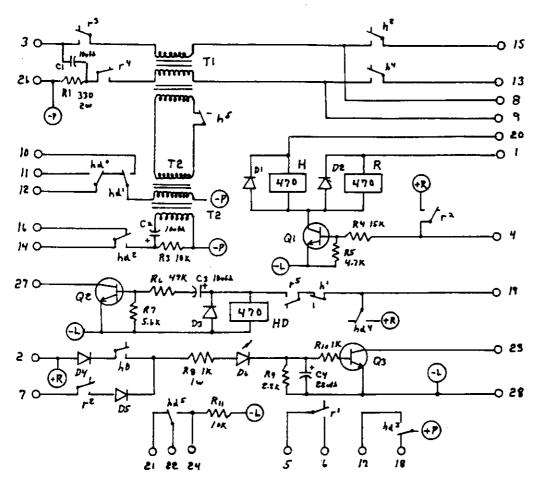


Figure 1a BLF-48 Schematic



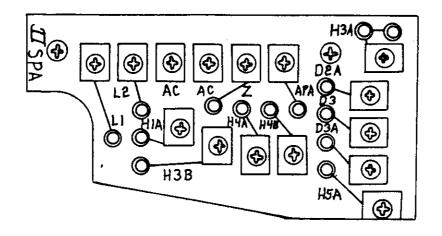
		PARTS I	LIST	<u> </u>
ITEM NO.	PART NO.	SYM NO.	DESCRPIPTION	QTY
1	TK-107754		PCB HFS	1
2	TP-124028		N-60 TERMINAL	+
3			MICROPHONE HOLDER	+ +
4			MICROPHONE TOP	1 1
5	-	C40	CAPACITOR   0.033 ufd 50v	1 1
<b>i</b>		C41	1 ufd 50v	1 1
Į į		C42	0.1 ufd 50v	1
ĺ	•	C43	33 ufd 25v	1
		C44	4.7 ufd 50v	1
6		R40	RESISTOR 100K W	l i
		R41	51K ½W	1
		R42	10K 4W	1
		R43	470 ¼W	1
		R44	8.2K 날W	1
ľ		R45	1.5K ½W	1
		R46	4.3K <sup>1</sup> 4W	1
		R47, R48	2.2K 4W	2
_ /		D40, 41	DIODE 6E	2
j		D42	152076A	1
		ZD	ZENER RD9AL	1
8	70 10000	Q40,41	TRANSISTOR 2SC458	2
9	TP-123103	MIC	MICROPHONE EMB	1

Figure 9 Handsfree Micorphone Assembly HFS-1



	PARTS LIST							
ITEM NO.	PART NO.	SYM NO.	DESC	RIPTION	QTY			
1.	TE-101411		P.C.B. DSS	-K-1	1			
2.			SCREW 2.6	x 4S	3			
3.	TP-112823		PULL RING	•	1_			
4.	P-119714-3	HD,H,R	RELAY	M-108	3			
5.	TP-123065	T2	TRANSOFMER	EX-7	1			
	TP-123064	T1	<u> </u>	EX-6	1			
6.		R10	RESISTOR	1K 4W 5%	1			
		R9		2.2K " "	1			
	ł	R7		5.6K " "	1			
		R6		47K " "	1			
		R5		4.7K " "	1			
		R4.		15K " "	1 1			
		R3, R11		10K " "	2			
	]	R8	] .	1K 1W 10%	1_			
		R1		330 2W 10%	1			
7.	TP-123110-11	C4	CAPACITOR	22_uf35v	1			
	P-119158-10	C1,C2,C3	<u> </u>	10 uf 35v	3			
8.	P-119165	D1-D5	DIODE	6E	_5			
	TP-12304-1	D6	]	SLP-24B	11			
9.	P-122054	Q1, Q3	TRANSISTOR	2SD78	2			
<u></u>	TP-122848	Q2	]	2SC1213	1			

Figure 2a DSS-K-1 Circuit Diagram/ Parts List



SPA-S TERMINAL BOARD

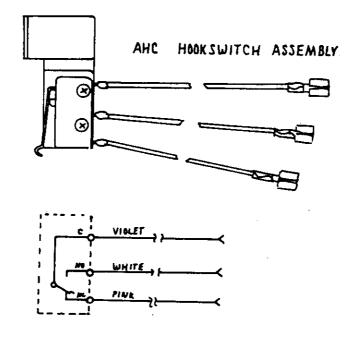
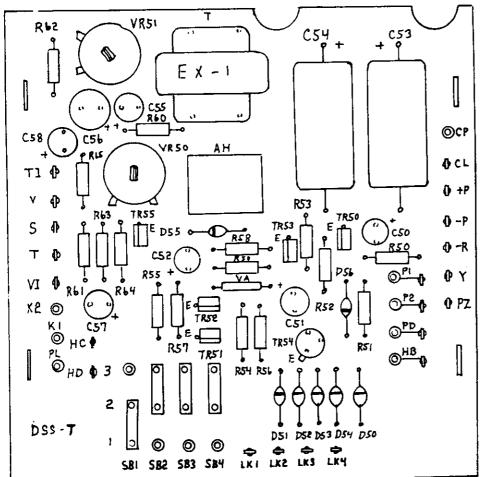


Figure 11 SPA-S Assembly



1							
		DSS-T PARTS LI	ST				
ITEM NO.	PART NO.	SYM NO.	DESCRI	PTION	QTY		
1.	TG-105005		DSS-T PCB		1		
2.	P-114510		N-60 TERMINA		20		
3.	HP-043		SOLDER TERMI	[NAL	21		
4.	P-118035	SB1-4	SHORTING BAR		4		
5.		R50,54,55, 57,59	RESISTOR	10K ⅓W	5% 5		
		R51,R58		4.7K "	" 2		
		R52	Ì	6.8K "	" 1		
	-	R53	Î	22K "	" 1		
		R56,61,62	ľ	470 "	" 3		
		R60		1K "	" 1		
		R63		1.5K _"	" 1		
		R64		100K "	" 1		
		R65		390 "	" 1		
6.	TP-123805	R50,R51	POTENTIOMET	ER 1K	2		
7.		C50,52	CAPACITOR	4.7 ufd.	50v 2		
		C51,55,57,58		10 ufd	50v 4		
ļ		C53,54		330 ufd_	50v 2		
]		56		47 ufd	50v 1		
8.		D50-56	DIODE	6E	7		
9.		Q50-53,55	TRANSISTOR	2SC1213A	5		
		Q54		2SD78	<del></del>		
10.	K-104097	VA	VARISTOR	VR61	- <del></del>		
11.	P-121252	AH	RELAY	TECK-TT24	1		
12.		XF1	TRANSFORMER	EX-1	DACE		

Figure 2d DSS-T Illustration/Parts List

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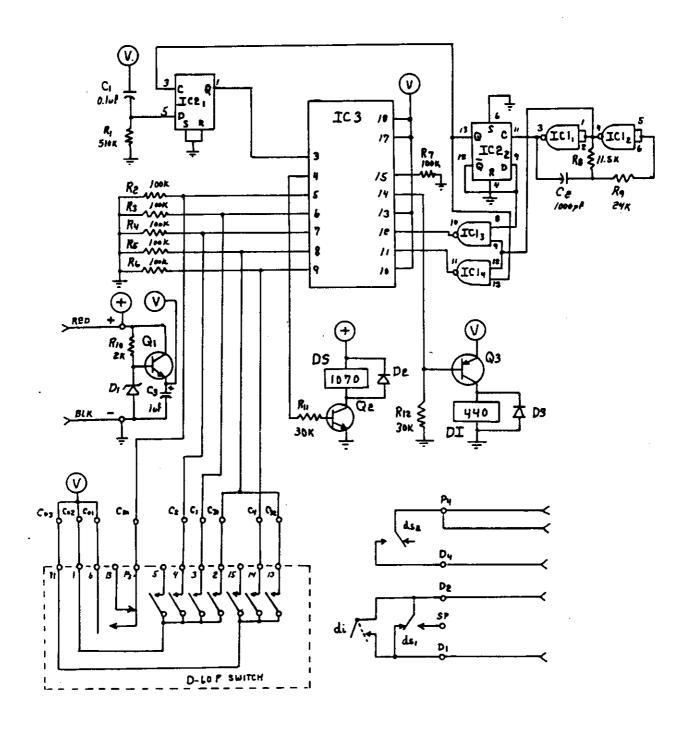


Figure 12b Omega Outpulse Dial Model OTD-OP Schematic

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# BT-1530/2250 KEY TELEPHONE SYSTEM

# OPTIONAL SYSTEM EQUIPMENT DRAWINGS

- 1.00 INTRODUCTION
- 1.01 This section provides complete illustrations, circuit diagrams, wiring diagrams and parts lists of the BT1530/2250 Key Telephone Optional System Components.
- 2.00 OPTIONAL SYSTEM EQUIPMENT
- 2.01 Busy Lamp Field
  - a. The Busy Lamp Field (BLF-B) is illustrated in Figure 1.
- 2.02 Direct Station Selection Unit
  - a. The DSS-1 is illustrated in Figure 2.
- 2.03 Universal Extension Adapter
  - a. The Universal Extension Adapter (UEX-B) is illustrated in Figure 3.
- 2.04 Zone Page Adapter
  - a. The Zone Page Adapter (ZPA-B-1) is illustrated in Figure 4.

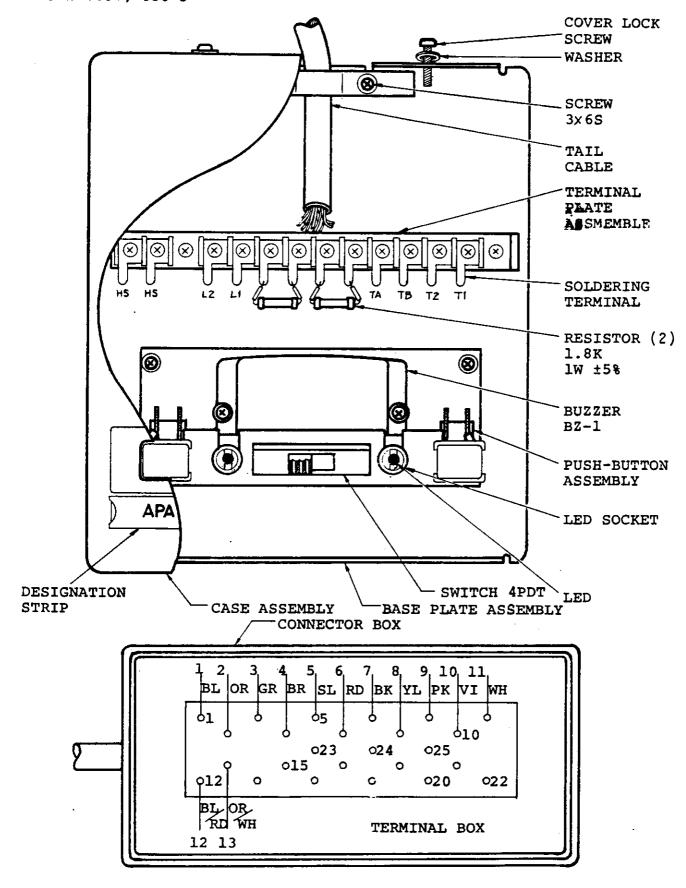


Figure 4a UEX Components

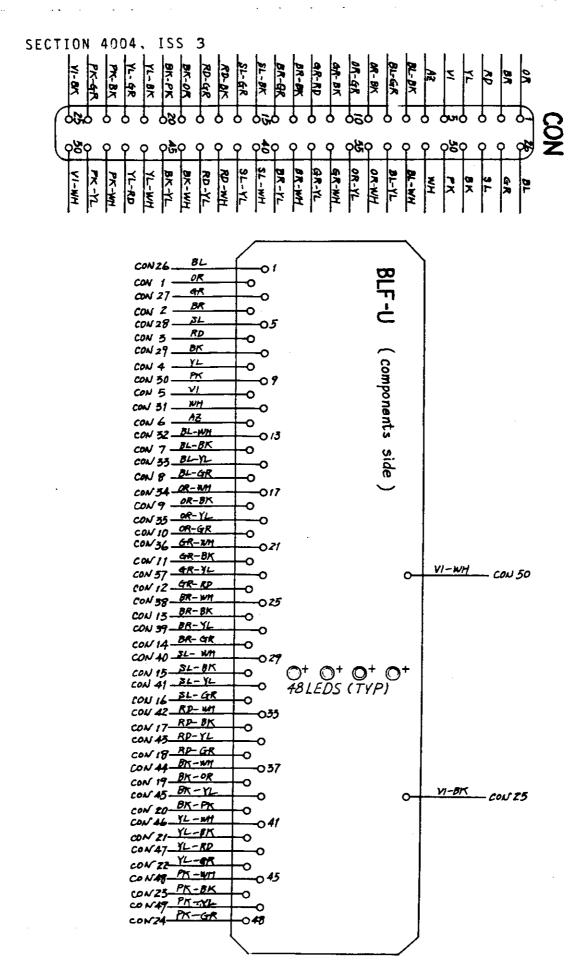
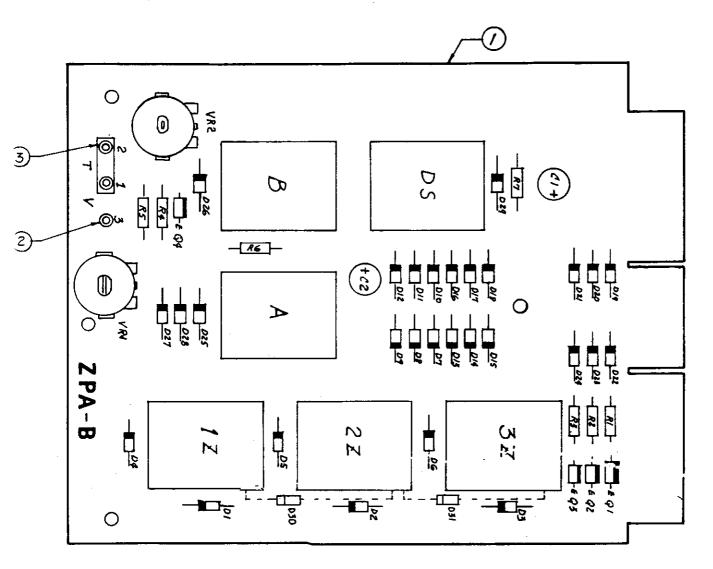


Figure 1b BLF-48 Miring Diagram



			PARTS LIST		
ITEM NO.	PART NO.	SYM. NO.	DESCRIPTIO	N	QTY
1.	TE-101397		P.C.B. ZPA-B		1
2.	P-114510		TERMINAL N-60		3
3.	P-118035		SHORTING BAR		1
4.			SCREW 2.6 X4S		5
-		C1,2	CAPACITOR: 10mf +10	00-10% 50V	2
		D1-31	DIODE: 6E SILICON	7	31
		Q1-4	TRANSISTOR: 2SC12]	L3A	4
		VRI- VR-2	POTENTIOMETER: 3K	<del></del>	2
		R1-3	RESISTOR: 4.7K	W ± 5%	3
		R4,5	470	±10%	2
		R6	lk *	± 5%	1
		R7	2.7K "	11	1
		1z-3z	RELAY: M-111		3
i	i i	A,B,DS	M-108		3

Figure 4a ZPA-B Circuit Card

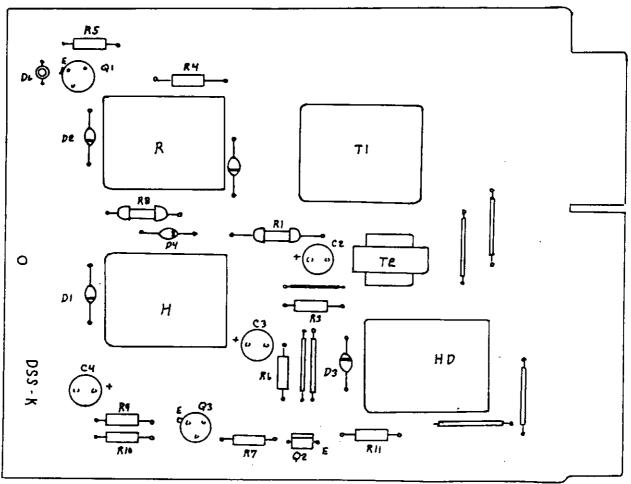


Figure 2b DSS-K-1 Circuit Card Illustration

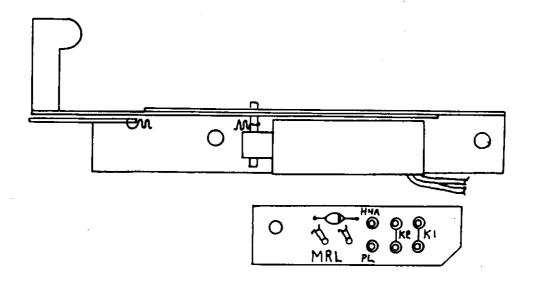


Figure 2c MRL Illustration

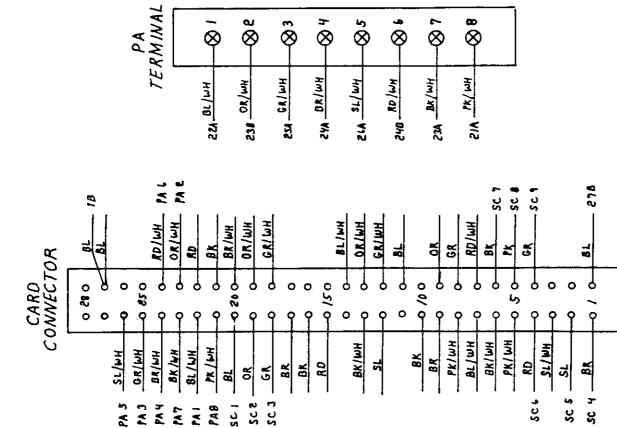
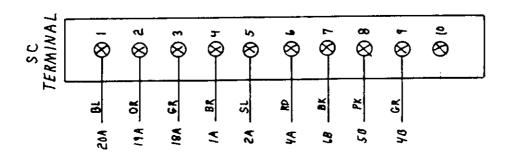


Figure 4c ZPA-B1 Wiring Diagram



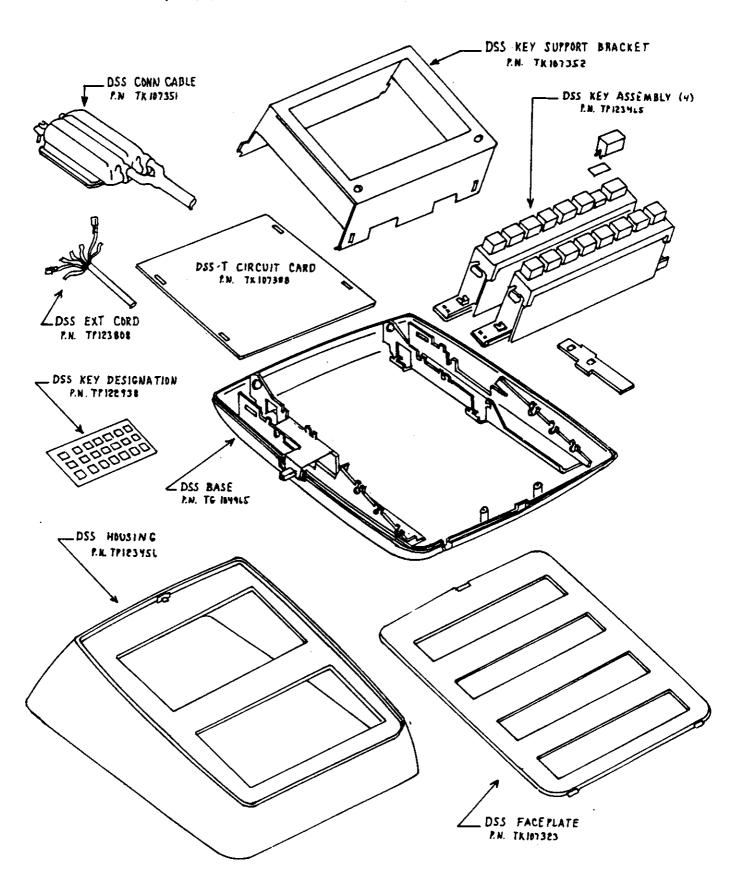
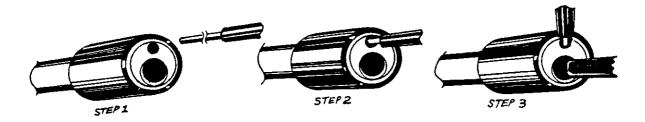


Figure 2e DSS-T Station Assembly

SECTION 4004, ISS 3

3. At least five to six turns are required for each connection. Three individual wire wrap connections can be established at each post.



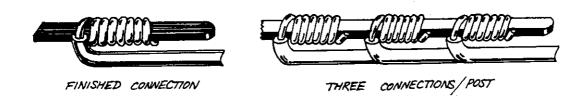


Figure 1 Wire Wrap Techniques

4. Care should be taken to insure proper wire wrap connections. Situations such as overwraps and openwraps as shown in Figure 2 should be avoided.

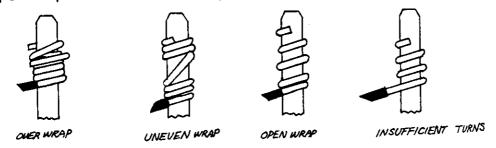


Figure 2 Wire Wrap Errors

## EXPLANATION OF SYMBOLS

CIRCUIT DESCRIPTION SEQUENCE SYMBOLS

## 1. RELAYS

RELAY S; Coil, 470 Ohm DC Resistance. a. S(470) : RELAY H Primary Coil (Coil Term No. 1-2), b.  $H_{1-2}(400)$ :

400 Ohm DC Resistance.

RELAY H Secondary Coil (Coil Term No. 3-4), 600 Ohm DC Resistance. c.  $H_{3-4}(600)$ :

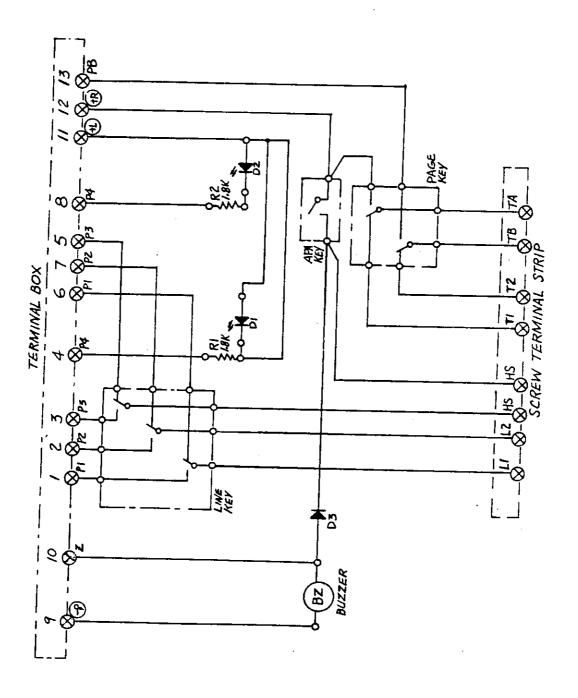
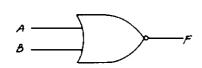


Figure 4b UEX Schematic

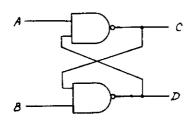
c. NOR GATE



TRUTH TABLE

IN	PUT	OUTPUT
Α	В	F
H	Н	Ļ
H	l L	L
L	H	L :
L	L	Н

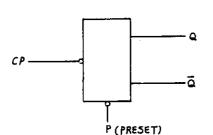
d. SET-RESET FLIP FLOP



TRUTH TABLE

INF	PUT	OUTPUT
A	В	C D
Н	L	H L
L	H	LH
Н	H	NO CHANGE
L	L	NOT ALLOWED

e. J & K FLIP FLOP NOTE:

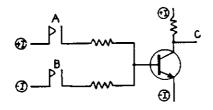


J & K INPUT NOT SHOWN FOR CLARITY

CP L  $H \rightarrow L$ Н Н  $L \rightarrow H$ NO CHANGE Н  $L \rightarrow H$ Н Н

TRUTH TABLE

f. TRANSISTOR



TRUTH TABLE

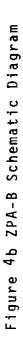
A	В	С
OPEN	OPEN	HIGH
CLOSED	OPEN	LOW
CLOSED	CLOSED	HIGH
OPEN	CLOSED	HIGH

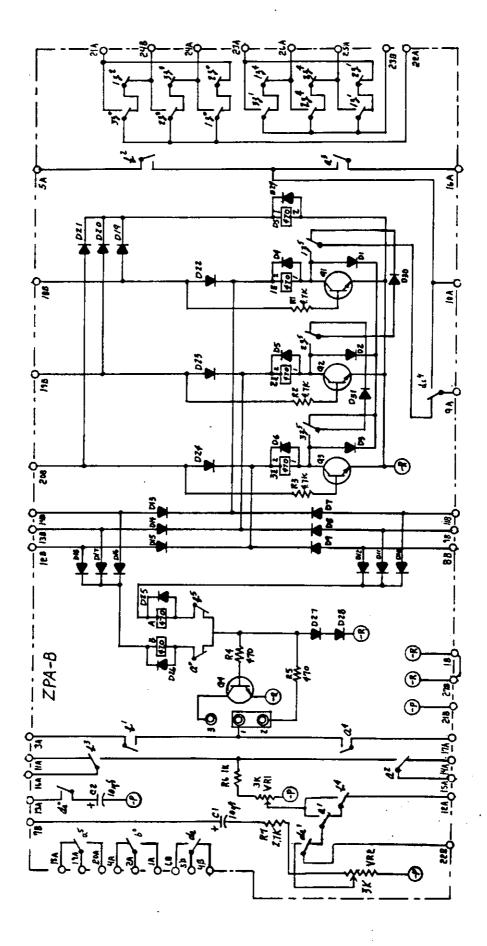
## III CHARACTERISTICS OF COMPONENTS

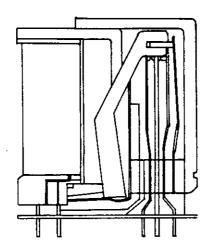
#### RELAYS Α.

- 1. Relay, M-Type

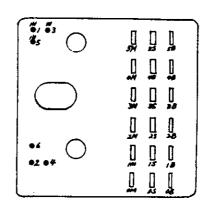
  - a. Relay Table Table Ab. Outline and Pin Arrangement Figure 3







(Figure 3)

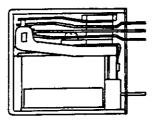


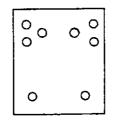
- 2. RELAY, MINIATURE CRADLE TYPE
  - a. Electrical Characteristics
    - 1. Coil

1500 (±10%) Ohms 9.2 ma 24 VDC Resistance:

Current: Voltage:

2. Outline and Pin Arrangement: Figure 4









- 3. RELAY REED type (SRG-12)
  - a. Electrical Characteristics
    - 1. Coil

1450 (±10%) Ohms 8.5 ma Resistance:

Power: 1.0 watts



# BT-1530/2250 KEY TELEPHONE SYSTEM APPENDIX

TABLE D TRANSFORMER ELECTRICAL CHARACTERISTICS

Type	Imp	Impedance		D.C. R.	D.C. Resistance	, K	D.C. C	D.C. Current		5507	Bottom
No.	d	S	Other	d	S	Other	þ	S	Other	(48)	View
Ex-/	ן גע	76			200			160mA		1.5	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
EX-2	Y01	\K	(2-1)							1,5	, o
EX-3	300									1.5	S
EX-4	50	1/4		_	i					8.1	S
EX-5	5K		(1-2) 1.K	(2-3) 2.D			(2-3) SoomA			1.5	S I I I I I I I I I I I I I I I I I I I
EX-6	008	005	$\omega_{50}$	v057	νοςτ	T00T				2.3	1 5 E E S
EX-7	600	(5)	(T) 600		200		30	/0md		1.5	2 5
ST-23	800	8								1.5	S
82-18	200	200	-				01	Sons		2.0	S
E-1SI											
#-ds											
LETTARD CO/L	a3H	0.3H		7a5/	150A		50mB	50mA			P. 29 E . 3

Notes. 1. The value which showed as A.C. Value (Impedance a loss) is measured at 1000 Hortz. 2. The head side of the letter or Letters which is printed on the core cover is secondary or think side.



# 

# BT-1530/2250 KEY TELEPHONE SYSTEM

## **APPENDIX**

## I WIRE WRAP TECHNIQUES

- A. The BT1530/2250 KSU utilizes "wire wrap" connections on all printed circuit card connectors. Some options require the Installer to wire wrap the optional feature(s) circuit card connector to establish circuit connection with existing KSU functions. The following are the requirements:
  - 1. A suitable "wire wrap" tool must be used to make the connection. Several types of tools are available: Air powered, pneumatic, battery or hand operated. The battery or hand operated variety are suitable for use on the BT1530/2250 KSU.
  - 2. The correct tool based upon the size of the wire wrap post on the card connector and guage wire used is required. The card connector uses a .025 X .025 inch post and No. 24 or 26 AWG solid wire.
  - 3. Manual tools such as the OK Manual Wire Wrap tool P.N. HW-2444 or combination Wire Wrap/Un-Wrap tool P.N. HW-UW2444 can be used to establish the wire wrap connection. Tools may be ordered from:

OK Machine and Tool Corp. 3455 Conner Street Bronx, New York 10475

Tel. No. 212-994-6600

- B. Procedures to follow in making "wire wrap" connections.
  - 1. Strip the wire approximately 1 1/2 inches. Insert the bare wire into the bit of the wire wrap tool as illustrated in Figure 1a.
  - 2. Insert the wire wrap tool over the wire wrap post and slowly twist until the wire end is totally wrapped around the connector wire wrap post as shown in Figure 1.

END	17														
	Substitute	Rea SK 3114	RCA 3K3118	Red SK3114	RCA SK 3803		Rea 3x 3044	Rea SK 3124	REA SK 312E		RCA 3K 312E	RCA SK 3024	RCA SK 30 PY	RCA SK311E	
Pakage	Type	No. I.	Net	14.3	No. 4.	No.5	NO.2	No.3	NO.4	No 4	No.3	No.4			·
stics	ft mhz	200	220	50	50		150	230	220	50	50			·	
racter	VCE	-45	-45	-35	-40	-60		30		99		90			
Electrical Characteristics	Ic 80	1.0-	-0.5	-0.5	10	-1	/	0.1	0.5	0.1	0.5				
Electr	Hfe	80	150	150	150	80		(108-670)	150	160	180	80			
	VeBO	-5-	-8	71-	-B	0/-	#	\$	8	B	4	12			
	VCEO	-45	-45	-35	-60	-60		30		90		99		•	
som	Vc80	-80	-60	-38€-	-80	-80	30	30	09	80	35	100			
Maximum Ratings	IC	-0,2	-0,2	-0.5	-0.7	-2	0.1	0.1	20	0.7	0.5	2			
Maximu	1,2	571	150	125	150	175	125	125	150	150	125	175		•	
	Pc	0.25	6.3	70	8.0	15	0.2	0.2	6.3	8.0	70'0	/			
Type	(//2.1)	PNP, S. EP	ANP. Si. EP	PNP. St. EP	PWP, St. E	PWP. Si. EP	NPN. St. EP	NPN. St. EP	NPN, St. EP	MM St. E	NPN. St. EP	NPN. S. E			
Device	No.	284 5394	25A 603	ZSA 673	25A 708	258 525	25C 372Y	785# 282	25C 944.3	250/008	2,SC12/3A	25D 78A	25631	25K 40	

Notes 1. E; Epitaxial Transister EP; Epitaxial Planar Transister Sl:Sillion Transister

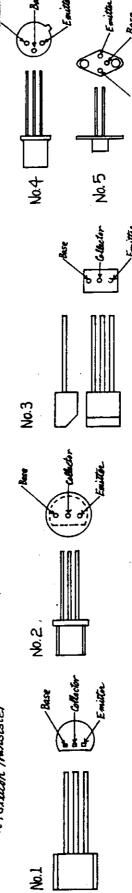


Figure 6 TRANSISTOR OUTLINE AND PIN ARRANGEMENT

#### **APPENDIX**

## 2. LINE KEY AND SWITCHES

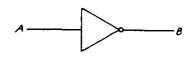
- a.  $LK1_{8-9}$ : LINE KEY No. 1, contact No. 8-9
- b. HK<sub>1-2</sub>: HOLD KEY, contact No. 1-2
- c. HST : Hook-switch contact No. 1

#### 3. OTHER

- a. Qlb-e...TRANSISTOR No. 1, base to emitter junction b. Q2b-c...TRANSISTOR No. 2, base to collector junction c. Cl.....CAPACITOR No. 1
- d. R1.....RESISTOR No. 1
- e. T6a.....TERMINAL No. 6a on card connector
- f. A46.....AMPHENOL CONNECTOR TERM A46
- g. 120 IPM..INTERRUPTER, 120 Impulses per Minute
- h. VR1.....VARIABLE RESISTOR No. 1
- i. XF3.....TRANSFORMER No. 3 j. 450hz....TONE SOURCE, 450hz tone
- k. Cable....Cable connection between KSU and Extension
- 1. MDF.....MAIN DISTRIBUTION FRAME
- m. (+R).....BATTERY, PLUS RELAY

## 4. INTEGRATED CIRCUITS (IC)

## a. INVERTERS

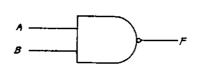


### TRUTH TABLE

INPUT	OUTPUT
Α	B (A)
HIGH LOW	LOW HIGH

NOTE: A Indicates Inverted State

## **b. NAND GATE**



TRUTH TABLE

IN	PUT	OUTPUT
A	В	F
Н	Н	L
Н	ł L	H
L	H	1 н
<u>L</u>	<u>L</u>	H

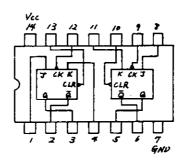
Note: H - HIGH STATE ≅ 5VDC

L - LOW STATE

f. HD2530P

DUAL J & K MASTER-SLAVE

FLIP FLOP



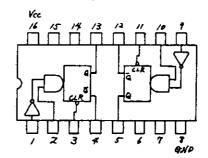
REPLACEMENT:

SN74107

g. HD2561P

DUAL RETRIGGERABLE

Monostable Multivibrator

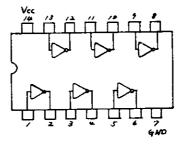


REPLACEMENT:

SN74123

h. HD2522P

HEX INVERTER



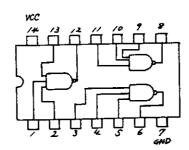
REPLACEMENT:

SN7404

i. HD2507P

TRIPLE 3-INPUT

NAND GATE



REPLACEMENT:

SN7410

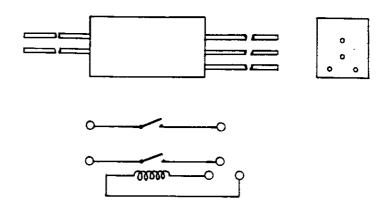
TABLE A RELAY TABLE

		Co	Coils		Min. Op.	Min Hold		Con	Contacks	S	(Note)	2)	
Type No	(o;1 No.1	Coil Diameter No. (mm)	Turns	Resistance (ohms)	Current (mA)	(arrent (mA)	Pile-Up	0		7	E	*	م
	م	60.0	0006	950	13.5		1	į					]
							1017	D Z					B Μ
M- 107	ما	0.09	6500	470			+40%	2	2			i	2
							t LOI	<u>2</u>	Z Z			ž Ž	Ž Ž
ν . Μ	٦	0.09	0059	470	28.2		144		2		1		
							PLAI	e M	E M	βW	BM	BM M	Βχ
	م	0.09	6500	470	29.2		7.007	2.0	4.0	4	2		
							070	0412	Mar	Math	MaB	MAD MAD MAD MAB MAD	H&F
ν. Σ	٩	60.0	6500	014	29.2		+44/		1				;
_							1 ada	MaB	MbB	MaB MBB MBB	M6B	MbB	MaB
M - 172	Ъ	80.0	10300	1300	12.5		/ DC+	:	:			:	
	S	80.0	2400	780		0.61	15/4	Σ	Σ.			Σ	Σ
M - 173	P	0.10	5450	400	30.0	0.//	1						
	S	80.0	3550	009			1014	MaB	MaB			MaB	MaB
M - 174	4	6.00	5800	500	21.5		140%						
_	S	0.08	5800	000/			4.001	Ξ	ВМ			8 M	ω

Note MaB: Make after Break MbB: Make before Break

PAGE 5

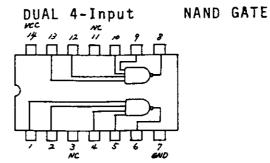
- 2. Contact Rating: 200 ma. (max)
- b. Outline and Pin Arrangement Figure 5



- B. SEMICONDUCTORS
  - 1. TRANSISTORS
    - a. Electrical Characteristics: Table Bb. Outline and Pin Arrangement: Figure 6
  - 2. Diodes
    - a. Electrical Characteristics: Table Cb. Outline and Pin Arrangement: Figure 7
- C. TRANSFORMERS
  - 1. Electrical Characteristics: Table D
- D. INTEGRATED CIRCUITS (IC)
  - 1. DIGITAL INTEGRATED CIRCUITS (IC)
    - a. HD2503P QUAD 2-Input NAND GATE

REPLACEMENT: SN7400

b. HD2504P

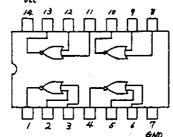


REPLACEMENT: SN7420

c. HD2511P

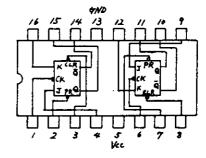
vec QUAD 2-Input

NOR GATE



REPLACEMENT: SN7402

d. HD2516P DUAL J & K MASTER-SLAVE FLIP FLOP

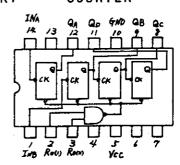


REPLACEMENT: SN74H106

e. HD2520P

4-BIT BINARY

COUNTER



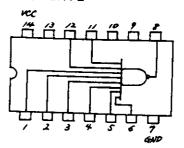
REPLACEMENT: SN7493

		:	

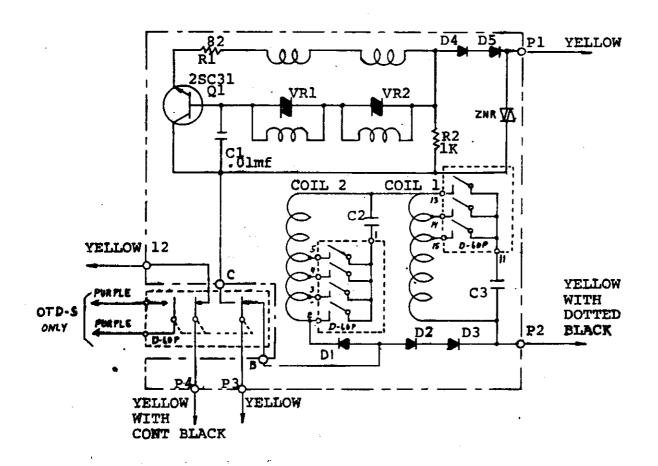
j. HD2508P

8-INPUT

NAND GATE



REPLACEMENT: SN7430



•	1	•	PARTS LIST	•	
ITEM NO.	PART NO.	SYM. NO.	DES	SCRIPTION	QTY
1.			P.C.B. D-60	OP .	1
		Cl	CAPACITOR:		1
		C2,3		NEC 3002HJ	2
		D1-5	DIODE: SD-	-60P	5
		Ql	TRANSISTOR	2SC31	1
		VRl,2	VARISTOR:	VR-60	2
		COl	COIL:		1
		CO2			1
		R1	RESISTOR:	82 %W ±5%	1
		R2	1	1K 2W "	1
		ZNR	† <del> '</del>		1

Figure 8b Omega Tone Dial OTD (OTD-S) Schematic And Components