Strata® DK

Digital Business Telephone Solutions

Installation and Maintenance Manual

DK14

Software Release 3.1

DK40i

Software Release 4.1

DK424

Software Release 4.1 and ACD

May 1999

Strata DK
General End User Information

The Strata DK Digital Business Telephone System is registered in accordance with the provisions of Part 68 of the Federal Communications Commission's Rules and Regulations.

FCC Requirements

Means of Connection: The Federal Communications Commission (FCC) has established rules which permit the Strata DK system to be connected directly to the telephone network. Connection points are provided by the telephone company—connections for this type of customer-provided equipment will not be provided on coin lines. Connections to party lines are subject to state tariffs.

Incidence of Harm: If the system is malfunctioning, it may also be disrupting the telephone network. The system should be disconnected until the problem can be determined and repaired. If this is not done, the telephone company may temporarily disconnect service. If possible, they will notify you in advance, but, if advance notice is not practical, you will be notified as soon as possible. You will be informed of your right to file a complaint with the FCC.

Service or Repair: For service or repair, contact your local Toshiba telecommunications distributor. To obtain the nearest Toshiba telecommunications distributor in your area, call Toshiba America Information Systems, Inc., Telecommunication Systems Division in Irvine, CA (949) 583-3700.

Telephone Network Compatibility: The telephone company may make changes in its facilities, equipment, operations, and procedures. If such changes affect the compatibility or use of the Strata DK system, the telephone company will notify you in advance to give you an opportunity to maintain uninterrupted service.

Notification of Telephone Company: Before connecting a Strata DK system to the telephone network, the telephone company may request the following:

1. Your telephone number.
2. FCC registration number:
    - Strata DK may be configured as a Key or Hybrid telephone system. The appropriate configuration for your system is dependent upon your operation of the system.
    - If the operation of your system is only manual selection of outgoing lines, it may be registered as a Key telephone system.
    - If your operation requires automatic selection of outgoing lines, such as dial access, Least Cost Routing, Pooled Line Buttons, etc., the system must be registered as a Hybrid telephone system. In addition to the above, certain features (tie Lines, Off-premises Stations, etc.) may also require Hybrid telephone system registration in some areas.
    - If you are unsure of your type of operation and/or the appropriate FCC registration number, contact your local Toshiba telecommunications distributor for assistance.
      DK14 and DK40i
      Key system: **CJ6MLA-74479-KF-E**
      Hybrid: **CJ6MLA-74478-MF-E**
      DK424
      Hybrid: **CJ69XA-10243-MF-E**
      Key system: **CJ69XA-10242-KF-E**
      PBX: **CJCHN-22757-PF-E**
3. Ringer equivalence number: 0.3B. The ringer equivalence number (REN) is useful to determine the quantity of devices which you may connect to your telephone line and still have all of those devices ring when your number is called. In most areas, but not all, the sum of the RENs of all devices connected to one line should not exceed five (5.0B). To be certain of the number of devices you may connect to your line, as determined by the REN, you should contact your local telephone company to ascertain the maximum REN for your calling area.
4. Network connection information USOC jack required: RJ1CX, RJ2EX, RJ2GX, RJ48C, RJ48X, RJ11, RJ14C, RJ21X (see Network Requirements in this document). Items 2, 3 and 4 are also indicated on the equipment label.

Radio Frequency Interference

Warning: This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the manufacturer's instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case, the user, at his/her own expense, will be required to take whatever measures may be required to correct the interference.

This system is listed with Underwriters Laboratory.

UL Requirement: If wiring from any telephone exits the building or is subject to lightning or other electrical surges, then secondary protection is required. Secondary protection is also required on DID, OPS, and tie lines. (Additional information is provided in this manual.)

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Important Notice — Music-On-Hold

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CP01, Issue 8, Part I Section 14.1
Notice: The Industry Canada label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective, operational and safety requirements as prescribed in the appropriate Terminal Equipment Technical Requirements document(s). The Department does not guarantee the Equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be coordinated by a representative designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

CAUTION! **Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate.**

CP01, Issue 8, Part I Section 14.2
Notice: The Ringer Equivalence Number (REN) assigned to each terminal device provides an indication of the maximum number of terminals allowed to be connected to a telephone interface. The terminal on an interface may consist of any combination of devices subject only to the requirement that the sum of the Ringer Equivalence Numbers of all the Devices does not exceed 5.

Publication Information

Toshiba America Information Systems, Inc., Telecommunication Systems Division, reserves the right, without prior notice, to revise this information publication for any reason, including, but not limited to, utilization of new advances in the state of technical arts or to simply change the design of this document.

Further, Toshiba America Information Systems, Inc., Telecommunication Systems Division, also reserves the right, without prior notice, to make such changes in equipment design or components as engineering or manufacturing methods may warrant.

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Introduction

This manual provides detailed step-by-step instructions for installing and maintaining the Strata DK14 / DK40i / DK424 digital business telephone systems. It is intended for qualified service technicians and system programmers. At the time of this printing, this book contains Release 4.1 information for the DK424. It also contains some pre-release information for software beyond Release 4.1.

Important! *Information beyond Release 4.1 is preliminary and given prior to product release. Be careful when using this information as the software will change and updates/ additions will be required upon final release.*

Use this manual in conjunction with the *Strata DK Programming Manual* which covers the programs related to the Strata DK systems discussed in this book.

Organization

In this manual, information specific to one system is clearly marked for that system whether in a chapter title or within a chapter (e.g., DK40i CO Line/Digital Telephone Interface Unit (KCDU) found in Chapter 7). Unmarked information should be considered to be general to all Strata DK systems discussed in this book.

This manual is organized into these sections/chapters for your convenience:

- **Chapter 1 – DK14 Installation** covers site requirements and explains how to install Strata DK14 Key Service Unit (KSU). Includes power requirements, cable lengths/network and grounding requirements.
- **Chapter 2 – DK40i Configuration** explains how to configure a Strata DK40i system. It also provides space to record the hardware and station devices that make up the system.
- **Chapter 3 – DK40i Installation** covers site requirements and cabinet installation information. Defines the installation site requirements necessary to ensure a proper operating environment for the Strata DK40i. Also included are input power requirements, cable lengths/network requirements, and grounding requirements. Explains how to install both the Base Key Service Unit (KSU) and the Expansion KSU. Instructions are also provided on how to remove and replace cabinets on installed systems.
- **Chapter 4 – DK424 Configuration** explains how to configure a Strata DK424 system. It also provides worksheets for determining hardware and station equipment placement and requirements.
- **Chapter 5 – DK424 Installation** covers site requirements and cabinet installation information. Defines the installation site requirements necessary to ensure a proper operating environment for the Strata DK424. Also included are input power requirements, cable lengths/

network requirements, and grounding requirements. Explains how to install both the Base and the Expansion Cabinets. Instructions are also provided on how to remove and replace cabinets on installed systems.

- **Chapter 6 – DK424 T1** provides information on T1/DS-1 interfacing for the DK424. T1/DS-1 interfacing is not available for the DK14 and DK40i.
- **Chapter 7 – DK Universal Slot PCBs** provides procedures for Strata DK40i/DK424 system Printed Circuit Boards (PCBs) for installation into universal slots. It includes installation instructions, optional configuration information, and wiring and programming considerations for each PCB.

Note PCBs that cannot be installed into universal slots can be found in the installation chapter for the system (e.g., Chapter 3 – DK40i Installation).

- **Chapter 8 – DK Universal Slot PCB Wiring** contains point-to-point wiring diagrams for connection of telephones, lines, peripheral equipment, and power supplies to the Strata DK systems.

Note Wiring diagrams for PCBs that cannot be installed into universal slots can be found in the installation chapter for the system (e.g., Chapter 3 – DK40i Installation).

- **Chapter 9 – Station Apparatus** provides instructions on how to connect telephones to the Strata DK systems and how to configure and upgrade them for optional features. Procedures for installing direct station selection consoles, PC and conventional attendant consoles, and door phones also appear.
- **Chapter 10 – Peripheral Installation** provides connection procedures for optional peripheral equipment to Strata DK systems. The instructions for each option include hardware requirements, PCB configuration, interconnection/wiring requirements, and programming considerations.
- **Chapter 11 – DK424 ACD Installation** includes installation instructions for Automatic Call Distribution (ACD) and Management Information System (MIS) for the Strata DK424 (applies to all common control processors except the RCTUA). Includes installation instructions for Call Center Viewer. ACD and MIS is not available to the DK14 and DK40i.
- **Chapter 12 – Fault Finding** for troubleshooting and fixing problems.
- **Chapter 13 – Computer Telephony Integration (CTI)** contains CTI, TAPI, and System Open Architecture Interface information. CTI application notes can be inserted here.
- **Chapter 14 – ISDN** contains an overview of the ISDN hardware with specific information on the ISDN Primary Rate Interface (PRI) and Basic Rate Interfaces (BRI). It includes instructions for installation, hardware requirements, wiring requirements, and some programming considerations.
- **Chapter 15 – Hospitality Management Information System (HMIS)** gives you information about HMIS, including installation, the Setup Utility, maintaining the HMIS databases and software, and troubleshooting.
- **Chapter 16 – Strata AirLink Systems** gives information about the external and integrated wireless systems (BSIA and RWIU), including system components, installation of hardware and software, and troubleshooting.
- **Glossary/Index**

Conventions

Conventions	Description
Note	Elaborates specific items or references other information. Within some tables, general notes apply to the entire table and numbered notes apply to specific items.
Important!	*Calls attention to important instructions or information.*
CAUTION!	**Advises you that hardware, software applications, or data could be damaged if the instructions are not followed closely.**
WARNING!	**Alerts you when the given task could cause personal injury or death.**
[DN]	Represents any Directory Number button, also known as an extension or intercom number.
[PDN]	Represents any Primary Directory Number button (the extension number for the telephone).
[SDN]	Represents any Secondary appearance of a PDN. A PDN which appears on another telephone is considered an SDN.
[PhDN]	Represents any Phantom Directory Number button (an additional DN).
Arial Bold	Represents telephone buttons.
`Courier`	Shows a computer keyboard entry or screen display.
"Type"	Indicates entry of a string of text.
"Press"	Indicates entry of a single key. For example: Type **prog** then press **Enter**.
Plus (+)	Shows a multiple PC keyboard or phone button entry. Entries without spaces between them show a simultaneous entry. Example: **Esc**+**Enter**. Entries with spaces between them show a sequential entry. Example: **#** + **5**.
Tilde (~)	Means "through." Example: 350 ~ 640 Hz frequency range.
➤	Denotes the step in a one-step procedure.
➤	Denotes a procedure.
■ **03**	Used in a programming sequence to denote a variable LED button. A number on the black button represents a specific LED button.
• • •	Indicates continuation of a series of numbers entered.
See Figure 10	Grey words within the printed text denote cross-references. In the electronic version of this document (Library CD-ROM or FYI Internet download), cross-references appear in blue hypertext.

Related Documents/Media

Note Some documents listed here may appear in different versions on the CD-ROM, FYI or in print. To find the most current version, check the version/date in the Publication Information on the back of the document's title page.

The following documents and CD-ROMS can be used to reference further information about the Strata DK systems.

- **Digital Telephone User Guide** provides all the procedures necessary to operate Toshiba-proprietary digital telephones, including Liquid Crystal Display (LCD) features. It also includes instructions for using the add-on module/DSS console.
- **Digital Telephone Quick Reference Guide** provides a quick reference for frequently-used digital telephone features.
- **Digital Single Line Telephone User Guide** provides all the procedures necessary to operate Toshiba-proprietary digital single line telephones.
- **Electronic Telephone User Guide** explains all the procedures necessary to operate Toshiba-proprietary electronic telephones, including all LCD features. Does not apply to the Strata DK14 system. It also includes instructions for using the electronic DSS console.
- **Electronic Telephone Quick Reference Guide** provides a quick reference for frequently-used electronic telephone features. Does not apply to the Strata DK14 system.
- **Standard Telephone User Guide** explains all the procedures necessary to operate rotary dial and push-button standard telephones.
- **Strata AirLink External Wireless Handset User Guide** shows how to use the wireless handset configured to standard ports of the Strata DK telephone system and many non-Toshiba systems.
- **Strata AirLink External Wireless Quick Reference Guide** contains instructions for operation of commonly used Strata AirLink External Wireless Handset features.
- **Strata AirLink Integrated Wireless Handset User Guide** shows how to use the wireless handset configured to digital ports of the Strata DK telephone system.
- **Strata AirLink Integrated Wireless Quick Reference Guide** contains instructions for operation of commonly used Strata AirLink Integrated Wireless Handset features.
- **System Administrator Guide** gives instructions for the System Administrator to manage the system. Contains instructions for Station Relocation, System Speed Dial, and other features only activated by the System Administrator.
- **PC/Data Interface User Guide** explains all the procedures necessary to operate stand-alone data interface units while in the data mode for printer sharing and modem pooling. Also provides instructions on connecting to a Personal Computer with Telephone Application Programming Interface (TAPI).
- **Cordless Telephone User Guid**e provides instructions on using the DKT2004-CT cordless digital telephone as a single unit or in conjunction with a digital telephone.
- **PC-DKT User Guide** provides installation and operation information for the Personal Computer Digital Key Telephone system.
- **Strata DK Feature Description Manual** describes each feature associated with the Strata DK424, DK40i and DK14. Also provides descriptions of compatible Toshiba-proprietary telephones and peripherals.

- **Keyprint 2000 User Guide** provides instructions for the Keyprint 2000 software printing package which allows you to print and store custom button label keystrips for Strata DK 2000-series 10-button or 20-button digital telephones, 20-button add-on modules, and 60-button digital DSS consoles.
- **Strata DK Programming Manual** provides all instructions necessary to program the system and system record sheets, including ACD.
- **Strata DK Installation & Maintenance Manual** provides installation instructions for configuring and installing the Strata DK14, DK40i and DK424. It also includes T1/DS-1 interface installation and configuration instructions, as well as fault finding flowcharts to troubleshoot the systems. An ACD Section provides instructions for installing ACD into the Strata DK424.
- **Strata AirLink External Wireless System Installation Guide** provides step-by-step hardware and software installation instructions. It includes examples of system configurations, information on performing a site survey, and troubleshooting techniques.
- **Hospitality Management Information System (HMIS) General Description** provides an overall view of the system's hardware, software, applications and features. The HMIS is a PC-based solution, designed to meet the specific operational needs of small- to medium-sized hotel/motels and includes both the PC and software.
- **Hospitality Management Information System (HMIS) User Guide** describes the product's many software features and gives step-by-step instructions for using them.
- **Strata DK Library CD-ROM** enables you to view, print, navigate and search publications for Strata DK14, DK40 and DK424 digital business telephone systems. It also includes Strata DK424 ACD Documentation, including the *Strata DK424 Call Center Solutions General Description, ACD Agent Guide, ACD Supervisors Guide.* ACD Installation and Programming instructions are included in the *Strata DK Installation and Maintenance Manual* and *Programming Manual.*
- **Strata DK HMIS CD-ROM** contains a copy of all HMIS documentation/bulletins and enables you to view, print, navigate and search publications.
- **StrataControl CD-ROM** contains the StrataControl software, that enables viewing, downloading, editing, and uploading Strata DK programmed data on a PC. This software also provides a method of creating custom lists and user guides based on information from the Strata DK system. The CD-ROM contains the *StrataControl User Guide.*
- **DKQuote CD-ROM** contains the DKQuote application and the *DKQuote User Guide* that shows how to use this interactive software to assist you with Strata DK Systems configuration and pricing worksheets.
- **DKAdmin/DKBackup CD-ROM** includes the programs that let you easily and quickly custom program and/or update the Strata DK14/DK40/DK424 with a user-friendly PC display. The CD-ROM also contains the *DKAdmin/DKBackup User Guide* that explains how to use the DKAdmin/DKBackup interactive software applications. The current version does not support DK40i.

The following documentation and media applies to the Strata DK424 system only.

- **Strata DK424 Call Center Solutions General Description** provides a system overview, including hardware and feature information. Highlights the technology employed in operating the ACD Strata DK424 system.
- **ACD Agent Guide** describes the ACD agent feature operation along with step-by-step procedures for using features.
- **ACD Supervisor Guide** provides instruction on how to use the ACD supervisor features.

- **Insight DK CD-ROM** which includes Insight DK software, the upgrade to Insight DK Plus, Demo software, Insight DK documentation and training modules.
- **Insight DK Installation Guide** explains how to set up the network, install the server software, install clients and explains how the data files are organized.
- **Insight DK Supervisor Guide** provides instructions for using the Strata DK Insight and Insight DK Plus MIS for the Supervisor of a call center. Instructions for creating and using Real Time Displays, Reports, Alarms, and Wallboards are also included.
- **Insight DK inView Quick Reference Guide** provides instructions for viewing and customizing the on-screen wallboard and large character views of the real time call center data.
- **PC Attendant Console User Guide** explains the procedures necessary to operate the PC Attendant Console.
- **PC Attendant Console Quick Reference Guide** provides a quick reference for frequently-used PC Attendant Console features.
- **Call Center Viewer User Guide** describes how to install and operate the Call Center Viewer application on a PC. It explains how to view and customize ACD group and agent status information.
- **Software MIS (SMIS) Supervisor Manual** provides descriptions, examples, and instructions on using the Software MIS application.

For authorized users, Internet site FYI (http://fyi.tsd.toshiba.com) contains all current Strata DK documentation and enables you to view, print, and download current publications.

DK14 Installation 1

This chapter explains how to install the Strata DK14 system. It includes information on site requirements, wiring diagrams, and step-by-step instructions on how to install the unit(s), the ground wiring, AC power cabling, reserve power (battery backup) cabling, and PCB cabling.

Inspection

1. When the system is received, examine all packages carefully and note any visible damage. If any damage is found, do not open the packages. Contact the delivery carrier immediately and make the proper claims.
2. After unpacking (and before installing), check the system against the packing list and inspect all equipment for damage. If equipment is missing or damaged, contact your supplier immediately.
3. Be sure to retain original packaging materials for re-use when storing or transporting system hardware.

Packaging and Storage

CAUTION! **When handling (installing, removing, examining) PCBs, do not touch the back (soldered) side or edge connector. Always hold the PCB by its edges.**

➤ When packaging and storing the system, remove PCBs from the system cabinet (the power supply may remain installed in the cabinet for storage and shipment). PCBs should be packaged in their original antistatic bags for protection against electrostatic discharge. Be sure to package equipment in its original shipping containers.

Site Requirements

This section defines the installation site requirements necessary to ensure a proper operating environment for the DK14. Also included are grounding requirements. (Table 1-1 for electrical/ environmental characteristics.)

Input Power

The system requires an input power source of 115VAC ± 10VAC, 50/60 Hz, 10 amps. The AC outlet is recommended to be dedicated and unswitched, with a solid third-wire ground. (See "AC Power and Grounding Requirements" on Page 1-3 for details).

This is to eliminate interference from branch circuit motor noise or the like, and to prevent accidental power-off. To avoid accidental power turn-off, Toshiba recommends that you do *not* use an ON/OFF wall switch on this dedicated AC circuit.

For the DK14, a reserve power source (two customer-supplied 12-volt batteries) may be connected to the system to serve as a power failure backup.

Clearance and Location

The minimum clearance requirements for the DK14 KSU are shown in Figure 1-1. The HPFB should be mounted directly above the D14 KSU.

Consider the following conditions when selecting a location for the KSU(s):

The location *must be*:

- Dry and clean
- Well ventilated
- Well illuminated
- Easily accessible

The location *must not be*:

- Subject to extreme heat or cold
- Subject to corrosive fumes, dust, or other airborne contaminants
- Subject to excessive vibration
- Next to television, radio, office automation, or high frequency equipment

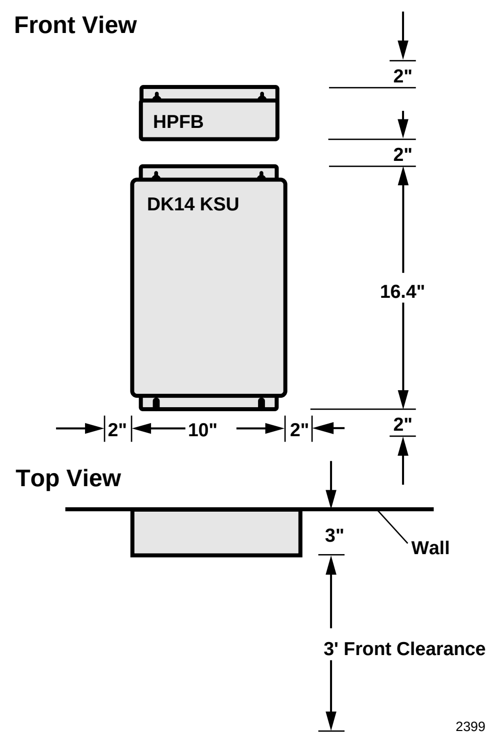


Figure 1-1 DK14 KSU Clearance Requirements

Table 1-1 Summary of Electrical/Environmental Characteristics

DK14 Primary Power	
Input AC (Power Supply Specification) AC frequency Power AC Current	85~135VAC 50/60 Hz 75 watts maximum <0.7 amps maximum
Environmental Specifications	
Operating temperature Operating humidity Storage temperature	32~104° F (0 ~40° C) 20~80% relative humidity without condensation -4~158° F (-20~70° C)
Power Supply	
DC voltage output specification	+24VDC (+26.3~+27.8VDC) +5VDC (+4.5~+5.5VDC) +5VDC converter on KSU PCB
QSTU2 (Circuits 1 and 2)	
Ring Voltage	Square wave output with high/low option jumper: Low position 130 ± 20VDC peak-to-peak (no-load) High position, 190 ± 25VDC peak-to-peak (no-load)
Ringing capability	2 ringers maximum per circuit, high or low position
QSTU2 modem interface data rate	14,400 bps maximum

AC Power and Grounding Requirements

The DK14 requires a solid earth ground for proper operation. The AC power cord contains a conductor for the “third-wire ground” provided by the commercial power outlet.

The third-wire ground should be the only ground necessary for the DK14; this ground must originate at the buildings main power distribution panel and have a solid connection to earth ground. (See Figure 1-2.)

AC Voltage Range:

- 115VAC ± 10VAC
- 0.7 amp. max

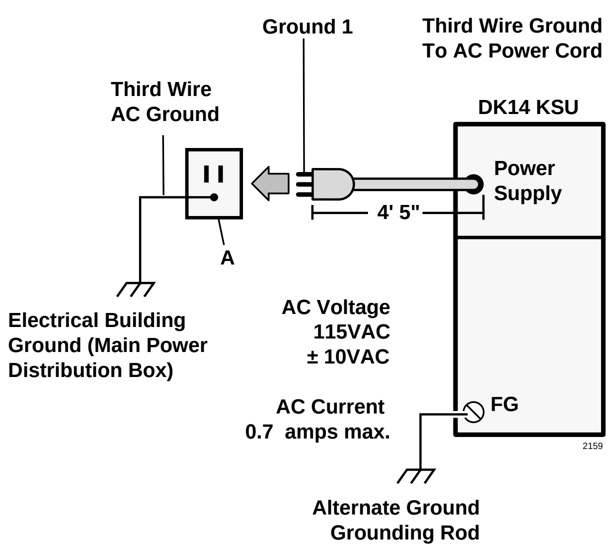


Figure 1-2 DK14 Grounding Diagram

CAUTION! **Lack of proper ground may cause improper operation and, in extreme cases, system failure.**

AC Power and Third-wire Ground Test

Test the "third-wire ground" for continuity by either measuring the resistance between the third prong terminal (earth ground) and a metal cold water pipe (maximum: 1 ohm), or by using a commercially available earth ground indicator. If neither procedure is possible, perform the following earth ground test procedure.

WARNING! **Hazardous voltages that may cause death or injury are exposed during the following test. Use great care when working with AC power line voltage.**

➤ **To perform the earth ground test procedure**

1. Obtain a suitable voltmeter, and set it for a possible reading of up to 250VAC.
2. Connect the meter probes between the two main AC voltage terminals (white and black wires) on the wall outlet. The reading obtained should be between 100~125VAC.
3. Move one of the meter probes to the third terminal (green wire ground). Either the same reading or a reading of zero volts should be obtained.
4. If the reading is zero volts, leave one probe on the ground terminal and move the other probe to the second voltage terminal.

CAUTION! **If a reading of zero volts is obtained on both voltage terminals (white wire to green wire, black wire to green wire), the outlet is not properly grounded. Omit Steps 5 and 6, and see following CAUTION!**

5. If a reading of zero volts on one terminal, and a reading of 105~125VAC on the other terminal is obtained, remove both probes from the outlet.
6. Set the meter to the "OHMS/Rx1" scale. Place one probe on the ground terminal, and the other probe on the terminal that produced a reading of zero volts. The reading should be less than 1 ohm.

CAUTION! **If the reading is more than one ohm, then the outlet is not adequately grounded. If the above tests show the outlet AC voltage is not in range or is not properly grounded, the condition should be corrected (per Article 250 of the National Electrical Code) by a qualified electrician before the system is connected.**

Alternate or Additional Ground

If the "third-wire" AC ground can not practically be improved or if extreme motor noise or other disturbance causes system malfunction, or if local area lightning storms exist, a separate direct ground may be warranted.

Connect a separate earth ground from a cold water pipe or earth grounding rod directly to the FG screw terminal on the DK14 power supply (see Figure 1-2).

This chapter provides the instructions necessary to mount the DK14 Key Service Unit (KSU). Instructions are also provided on how to remove and replace the power supply.

KSU Mounting Considerations

The KSU is designed to be mounted on a wall or other vertical surface. Toshiba recommends using the following method.

Pre-installation

1. Loosen the screws on the front cover of the KSU, and remove the cover (Figure 1-3).
2. Move the SW1 RAM Storage Battery jumper plug strap on the motherboard to the ON position (Figure 1-4).
3. If the DK14 is less than one mile from the central office (or PBX), set the CO line PAD switches, SW401 and SW451, to the PAD position to provide a 3db level loss to avoid excessive loudness.
4. Install all optional PCBs per instructions later in this chapter.

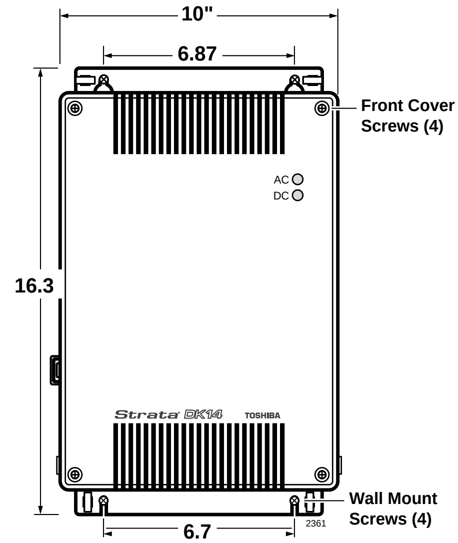


Figure 1-3 DK14 Dimensions

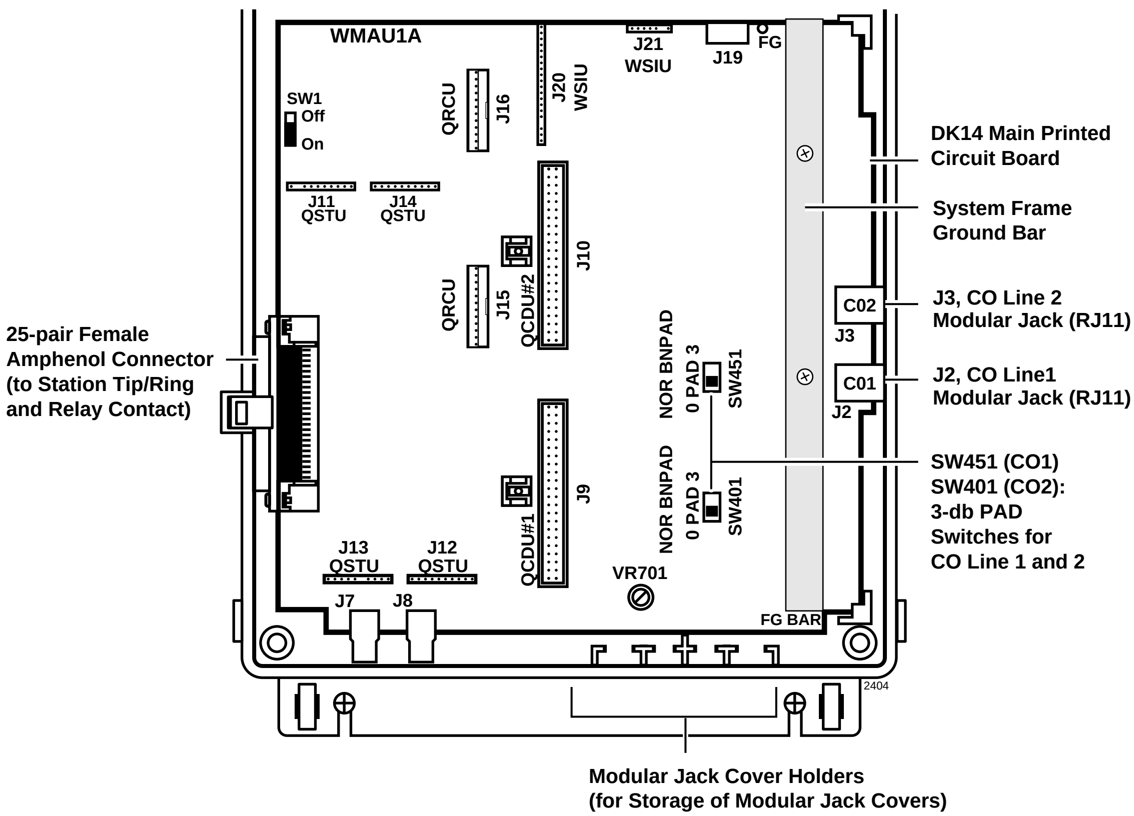


Figure 1-4 DK14 Interior View

Mounting the KSU

1. Make sure the power supply switch is turned OFF.
2. Place the KSU on the desired location on the mounting surface and mark the location of the four screw holes (there is one on each corner). See Figures 1-3 and 1-5.
3. Make sure the location of the KSU meets the minimum clearance requirements.
4. Drill holes on these marks.
5. Secure screws approximately two thirds of the way into the top two holes on the mounting surface.
6. Hang the unit from the top two screws and then secure the screws completely into the mounting surface.
7. Finish securing the unit to the mounting surface by completely screwing the bottom two screws into the wall.
8. Ground system according to previous "AC Power and Grounding Requirements" on Page 1-3 instructions**.**
9. Connect applicable wiring (modular CO line cords, 25-pair amphenol connector cable, etc.) to the KSU. Route the wiring as shown in Figure 1-6, and then fasten wiring to the unit with the tie wraps that come with the KSU. (See Figures 1-16~1-18 for additional wiring details.)

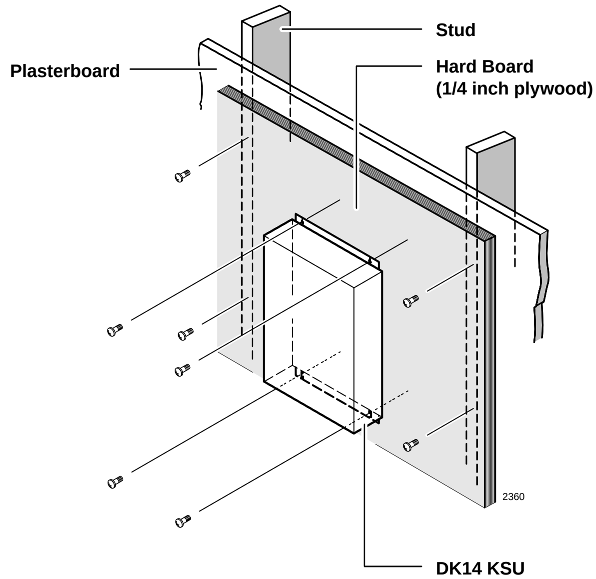


Figure 1-5 DK14 KSU Wall Mount Method

Note Figure 1-6 shows cables routed to the right; they may also be routed to the left, depending on the location of the MDF.

10. If the Reserve Power Battery and Charger (HPFB) is going to be installed, refer to the following section. If not, proceed to Step 11.
11. Plug the AC power cable into an outlet and then turn ON the DC power supply switch.
12. Reinstall the front cover onto the KSU.

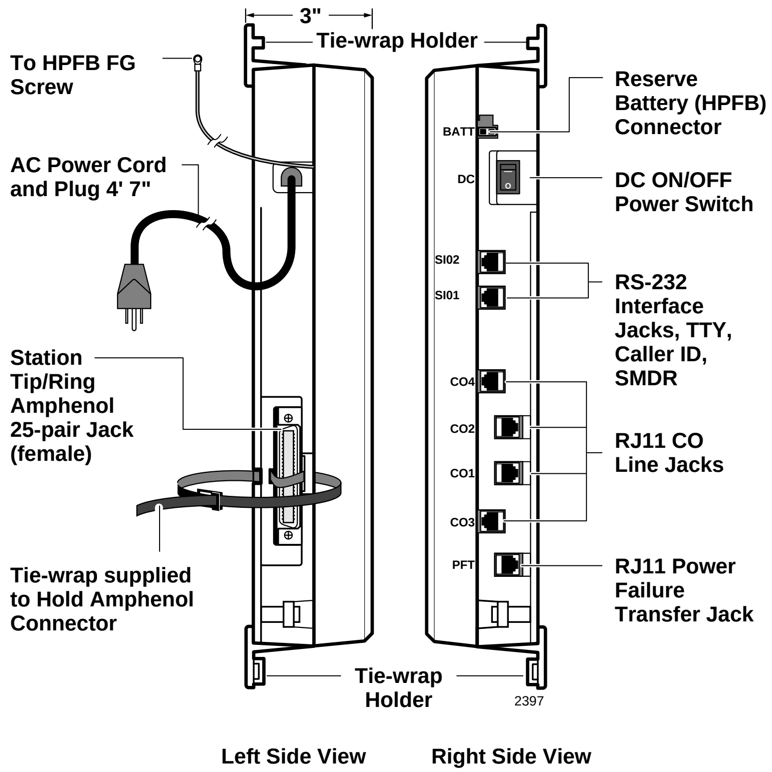


Figure 1-6 DK14 Side View and Jack Locations

Reserve Power Battery

A second HPFB can be installed directly above the unit to supply backup reserve power.

➤ **To install the Reserve Power Battery and Charger (HPFB)**

1. Place the HPFB directly above the DK14 KSU (Figure 1-7).
2. Mark the location of the two screw holes, then drill holes.
3. Screw the two screws two-thirds into the mounting surface.
4. Hang the HFPU on the screws then tighten the screws into the mounting surface.
5. Plug the first HPFB connector into BATT connector on the right side of the KSU.
6. Connect a ground wire from the HPFB “FG” screw to the DK14 QPSU8 screw labeled “HPFB6.” The ground wire can be fed through the opening by the AC power cord.

Note The DK14 should be plugged into AC power and the DC power switch should be turned ON. The HFPU will not start to operate if AC power is not available during the initial installation.

7. The 24VDC LED on the HPFB should light. If it does not light, press the battery OFF switch with a pencil point or other small-tipped object.

8. Dress and tie-wrap the HPFB cables.
9. To mount a second HPFB, repeat Steps 1~4, then plug the second HPFB connector in the first HPFB and connect an FG wire between each HPFB FG screw.
10. To test the HPFB, remove the DK14 AC plug from the AC outlet. The DK14 AC LED will go out, but the DK14 DC LED remains on. Also the system remains in normal working order and the HPFB 24V LED remains on.
11. If it is desired to turn off the HPFB (after loss of AC power), use a pencil or other sharp object to press the Battery OFF switch.

CAUTION! **Once the HPFB is turned OFF or unplugged (during AC power loss) it will not operate again until AC power is restored to the DK14 KSU.**

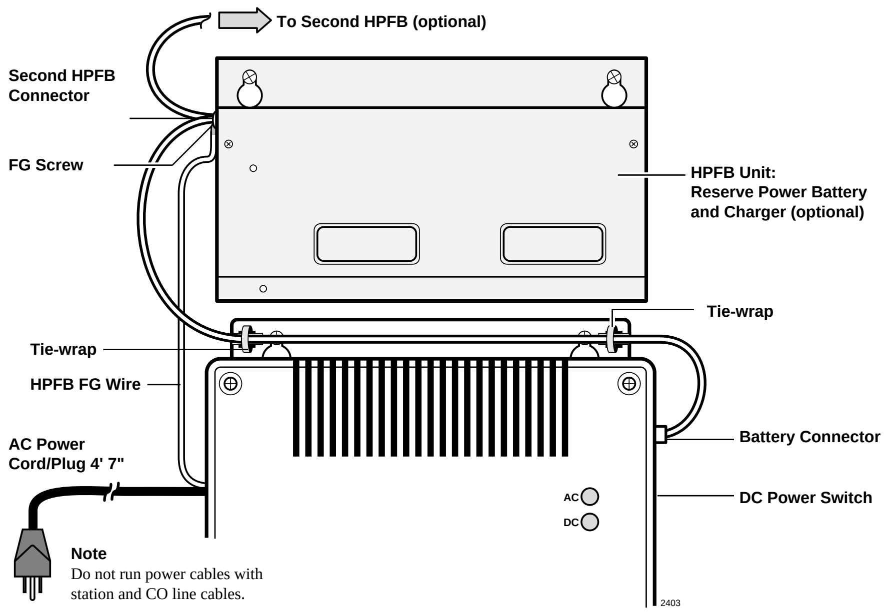


Figure 1-7 DK14 Reserve Power Installation

Power Supply Removal and Replacement

The power supply comes factory-installed in the KSU; if necessary, it can be removed and replaced.

Power Supply Removal

1. Make sure that the power supply switch is OFF and that the AC power cable is not plugged into an outlet. Confirm that green AC LED is not lit. See Figure 1-8.
2. Loosen the screws on the front cover of the KSU, and remove the cover.
3. Unplug HPFB cable from BATT connector of power supply and disconnect the HPFB ground wire.

4. Unplug the AC cable from the CN1 connector on the power supply.
5. Remove the FG screw, and disconnect the green third wire ground ring terminal.
6. Unplug the DC cable from the CN3 connector on the power supply.
7. Remove the top two, and bottom left corner screws that attach the power supply to the KSU. Remove power supply.

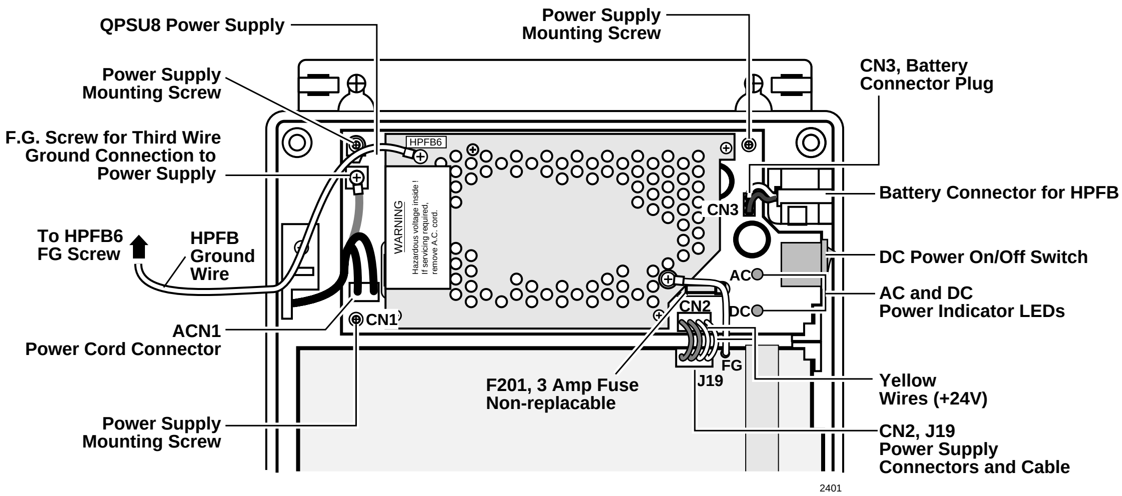


Figure 1-8 DK14 Power Supply

Power Supply Replacement

1. Set the power supply in its proper place in the KSU. See Figure 1-8.
2. Secure the power supply to the KSU with the top two, and bottom left corner screws.
3. Install the green third wire ground ring terminal with the FG screw.
4. Plug the AC cable into the CN1 connector on the power supply.
5. Plug the DC cable into the CN3 connector on the power supply.
6. Plug the AC power cable into an outlet and turn ON the power supply switch.
7. Test QPSU8 power supply according to Chapter 12-Fault Finding, “DK14 Hardware Fault Isolation procedure.”
8. Plug HPFB cable into BATT connector of power supply and reconnect the HPFB ground wire.
9. Reinstall the cover on the KSU.

Printed Circuit Board (PCB) Installation

This section provides procedures for installation of Strata DK14 system optional printed circuit boards (PCBs) into the KSU. This includes installation instructions, optional configuration information, and wiring and programming considerations for each PCB.

Be sure the ground has been checked. (See "AC Power and Grounding Requirements" on Page 1-3.)

PCB Installation Considerations

The Strata DK14 KSU comes standard with four digital telephone circuits (ports) and two CO line circuits. These circuits, along with the common control unit, are built into the motherboard.

KSU Option PCBs

The DK14 KSU can support up to four optional PCBs, including:

- A maximum of two QCDU2s: each one provides one CO line circuit and two digital telephone circuits.
- A QSTU2 which provides two standard telephone circuits (ports).
- A QRCU2 which provides three circuits to receive DTMF tones (required for DISA and devices connected to QSTU2s), and three circuits to detect busy tone (required for the ABR feature).
- A WSIU which provides a port for either a Station Message Detail Recording (SMDR) device or a maintenance terminal or modem, or Caller ID interface.
- The KSU does not come from the factory with any option PCBs installed. Each of the option PCBs must be installed in specific locations. (See Figure 1-9.)

PCB Option Considerations

PCBs may be configured for a variety of hardware and software options. Hardware options are defined as either internal (generally related to optional PCB subassemblies) or external (related to connection of peripheral equipment such as background music, voice mail, etc.). Hardware and software options for each PCB are identified in the individual PCB installation procedures in this chapter.

PCB Hardware Options. Each PCB must be configured for the applicable hardware options prior to installation of the PCB. Configuration instructions for internal hardware options are provided in the individual PCB installation procedures in this chapter. Configuration instructions for external hardware options are provided in Chapter 10 – Peripheral Installation.

PCB Software Options. After installation of the PCBs in the KSU, configure the PCBs for software options through programming. A programming overview for each PCB is provided in the individual PCB installation procedures in this chapter. Refer to the *Strata DK Programming Manual* for detailed instructions.

PCB Installation/Power Supply Considerations

Whenever removing or installing PCBs it is recommended that the power supply be OFF.

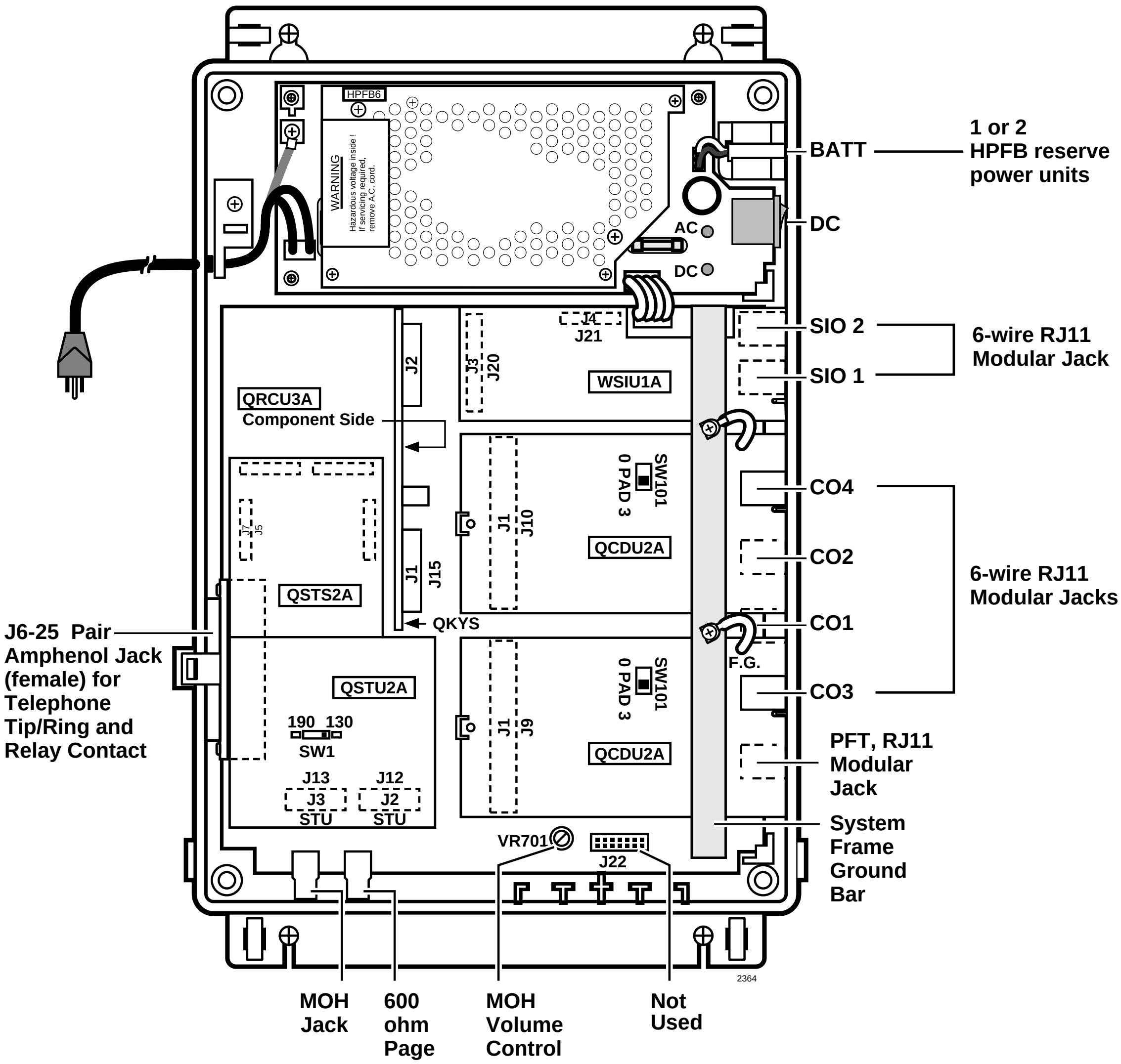


Figure 1-9 DK14 PCB Installation

Built-in CO Line, Digital, Telephone, and Other Circuits

The KSU comes standard with two CO lines and four digital telephone circuits already installed on the motherboard (WMAU). See Figure 1-4 for an illustration of the WMAU.

Built-in CO Line Circuits

The two standard loop start CO line circuits are integrated into the KSU motherboard WMAU and are identical to the QCDU2 CO line circuits.

CO lines that receive Caller ID must be cross-connected to the TC-1041 (MLX-41) Caller ID interface box (See Page 1-19 for address). See Figure 1-18 for wiring.

Built-in Digital Telephone Circuits

The four digital telephone circuits that come standard with the system are integrated into the motherboard in the KSU. These circuits are identical to the digital circuits found on the QCDU2. The motherboard does not have to be configured for the digital circuits to operate.

KSU Motherboard CO Line/Digital Station Circuit Wiring

See Figures 1-15~1-17 for details.

Power Failure Telephone Installation

1. Remove the RJ11 cover (Figure 1-11) from the PFT jack and store the jack cover.
2. Connect the power failure telephone (500/2500-type standard telephone to the PFT jack. Figure 1-17 shows the DK14 MDF to CO Line Wiring.

Music-On-Hold (MOH)/Background Music (BGM) Source Connection

Connect the MOH/BGM source to the MOH RCA jack (Figures 1-9 and 1-16) in accordance with Music Source Configuration A in Chapter 10 – Peripheral Installation.

External Page Output Connection

Connect the external page system to the 600ohm PAGE RCA output jack (Figure 1-9) to an external amplifier in accordance with the External Page Installation guidelines in Chapter 10 – Peripheral Installation.

QCDU2
CO Line Digital Telephone Interface Unit

Circuits per PCB: *one loop start CO line circuit and two digital telephone circuits*

Interfaces with: *digital telephones*
PDIU-DIs/PDIU-DI2s/RPCI-DI
ADMs connected to the telephones and PDIU-DSs
Does not support a DDSS console or DDCB

Older Version(s): *QCDU1A*

QCDU2 Configuration

The QCDU2 may have to be configured to control excessive loudness if the system is close to a CO or installed behind a PBX telephone system. It does not have to be configured for anything else. The decibel (db) PAD switch, SW101 controls the loudness by providing a 3 db signal level drop to, or from, the PBX or CO when set to the PAD position. The switch comes from the factory set at 0 (for no PAD) meaning no PAD loss.

QCDU2 Installation

A maximum of two QCDU2 PCBs can be installed in the KSU.

➤ **To install the QCDU2**

1. If the system is located within one mile of the CO or PBX telephone system, set db PAD switch SW101 to the PAD position.
2. Make sure that the power supply switch is OFF.
3. Slide QCDU2's front edge and FG wire under the System Frame Ground Bar; align and insert the QCDU2 connector J1 into the motherboard connector (J9 for CO3 first, J10 for CO4 second). (See Figure 1-10**)**

   Apply firm, even pressure to ensure proper mating of the connectors. Make sure the QCDU2's connector edge next to the connector J1 snaps firmly into the standoffs on the KSU motherboard. (See Figure 1-4).
4. Connect the Frame Ground (FG) lead from the QCDU2 to the screw nearest the QCDU2 located on the system Frame Ground bar. Remove the "knock-out" from the KSU cover CO3 or CO4 access slot, and store the "knock-out" in the slots provided in the KSU base. (See Figure 1-11.)

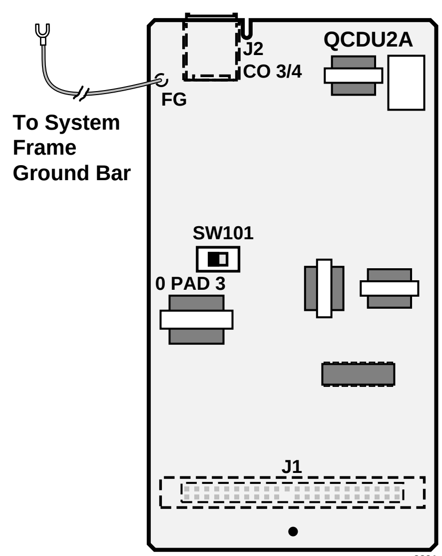


Figure 1-10 QCDU2 Printed Circuit Board

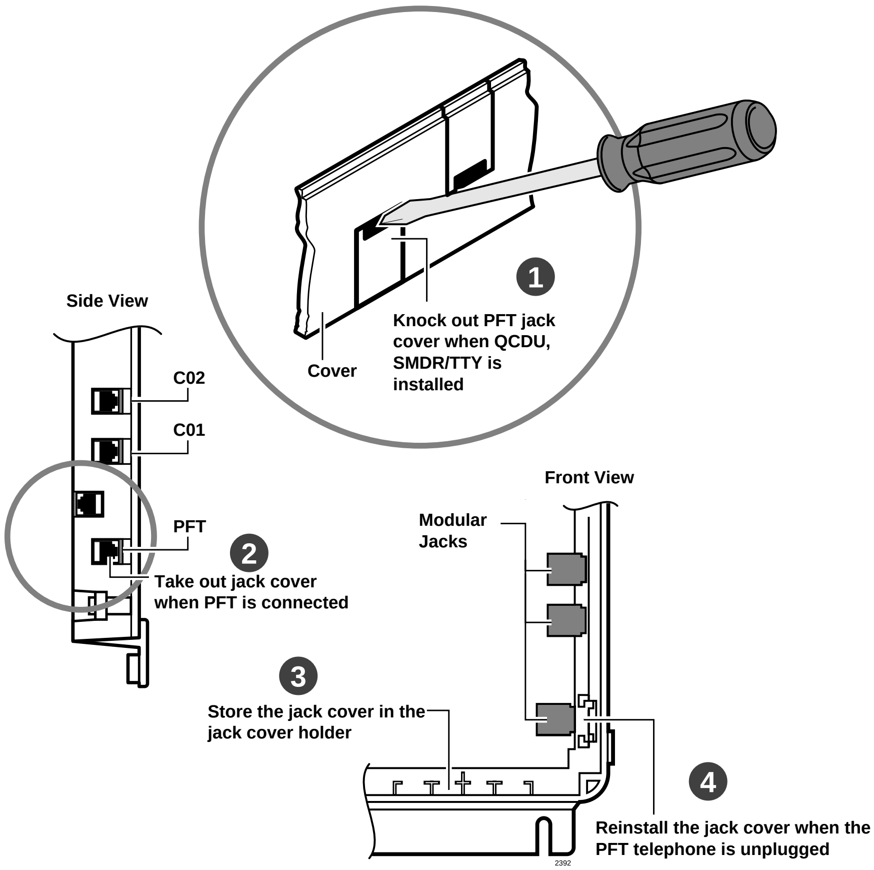


Figure 1-11 Modular Jack Cover

QCDU2 Programming

The following parameters may be specified through programming for the QCDU2.

Program 10-1: Allows/denies two-CO Line Conference and Direct Inward System Access (DISA).

Program 15: Auto Release detection; DISA, and other attributes to the CO line.

Program 16: Assigns CO line to groups 81~84, and dial 9 group.

Program 40: Assigns stations access to CO line (incoming and outgoing access).

Program *50: Assigns Caller ID CO lines to Caller ID interface CO line.

Program *51: Assigns station to Caller ID, Lost Call memory.

QSTU2A
Standard Telephone Interface Unit

Circuits per PCB: *two standard telephone circuits*

Interfaces with: *standard telephones*
Auto Attendant devices
separate BGM source connection
voice mail machines
facsimile machines

Older Version(s): *QSTU1A*

Note For the system to recognize the Dual-Tone Multi-Frequency (DTMF) tones generated by standard telephones (or any other device connected to a QSTU2 port), a QRCU3 must be installed.

The QSTS2 PCB is factory-installed on the QSTU.

QSTU2 Configuration

The QSTU2 does not require configurations for the ring generator voltage level. Most standard telephones and two-wire devices require 190; however, some devices may experience ring-trip at 190, and should be set at 130.

QSTU2 Installation

1. Make sure the power supply switch is OFF.
2. Align the QSTU2 connectors J1, J2, J3, and J4 to the motherboard connectors J11, J12, J13, and J14 respectively. Apply firm, even pressure to ensure proper mating of the connectors (see Figure 1-12).

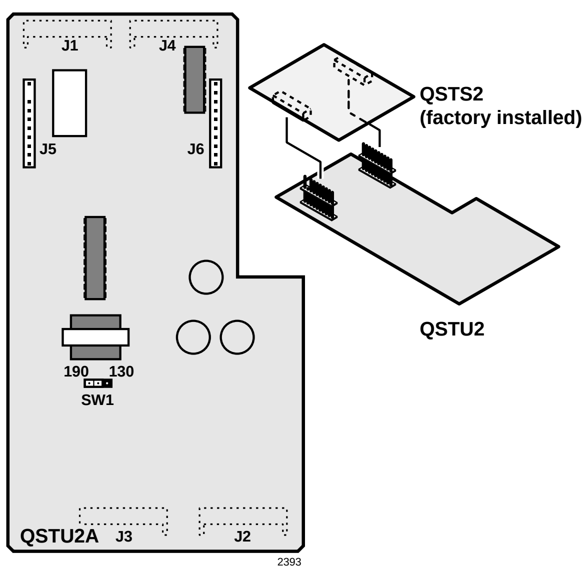


Figure 1-12 QSTU2/QSTS2 Printed Circuit Boards

QSTU2 Programming

The following parameters can be specified for the QSTU2:

Program 31: Used to configure all QSTU2 ports connected to voice mail (see Chapter 7 – DK40i/DK424 Universal Slot PCBs for voice mail installation).

Program 10-2: Used to set standard telephone ringing option and separate BGM assignment.

Note QSTU2 ports are fixed. They are assigned even if a QSTU2 is not installed.

QSTU2 Wiring

Refer to DK14 MDF to KSU Amphenol Wiring in Figure 1-16 for QSTU2 wiring.

The QSTU2 must be connected to a OL13A (or equivalent) type lines for off-premises stations. (300 ohms loop resistance max., including the telephone or other devices DC off hook resistance.)

QRCU3
DTMF Receiver/ABR Tone Detector Unit

System: *DK14*

Circuits per PCB: *3 DTMF/ABR Tone Receivers*

Interfaces with: *two-wire devices such as standard telephones*
Auto Attendant devices, separate BGM source connection
voice mail machines
Facsimile machines.

Older Version(s): *QRCU1/QRCU2*

The QRCU3 must be installed to recognize Dual-Tone Multi-Frequency (DTMF) tones generated by a standard telephone (or any other device connected to a standard telephone circuit (QSTU2), and it is required for Direct Inward System Access (DISA) calls. The QRCU3 circuits are also used to detect busy tone for the Automatic Busy Redial (ABR) feature and must be installed to allow ABR to operate.

QRCU3 Configuration

The QRCU3 does not have to be configured for operation.

QRCU3 Installation

1. Make sure that the power supply switch is OFF.
2. Align and insert the QRCU3 connectors J1 and J2 (see Figure 1-13 into the motherboard connectors J15 and J16 respectively (note the component side placement in Figure 1-4). Apply firm, even pressure to ensure proper mating of connectors. Push down until the connectors lock together.

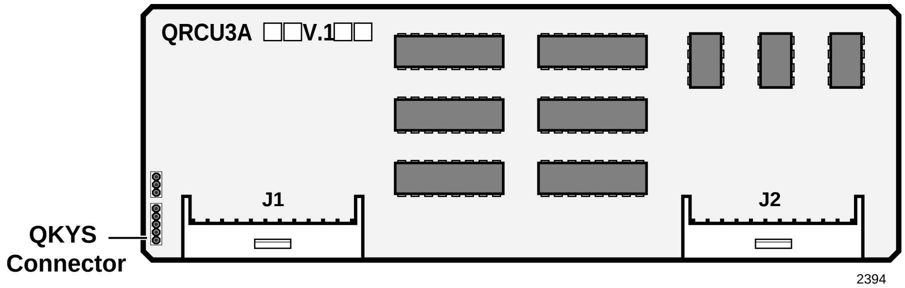


Figure 1-13 QRCU3 Printed Circuit Board

QRCU3 Programming

The following parameters can be specified:

Program 12: Set QRCU3 release time.

Program 15: Sets QRCU3 operation after CO line flash.

Built-in Auto Attendant

DK14 Built-in Auto Attendant software is enabled by installing a QKYS1 Key (chip) onto the QRCU3 PCB.

➤ **To install the QKYS1 Key**

1. Make sure that the DKSU14 power supply switch is OFF.
2. Install the QKYS1 into the QKYS1 connector on the QRCU2 PCB (see Figure 1-13).
3. The QKYS1 does not require Program 03 assignments.

Programming

Refer to "Auto Attendant (Built-in)" in the Overview section of the *Strata DK Programming Manual.*

WSIU1
Serial Interface Board

System: *DK14*

Circuits per PCB: *two serial interface ports*

Interfaces with: *SMDR connection for call accounting device*
Caller ID Interface Box, Interface for local connection of DKAdmin PC
customer-provided external modem for remote maintenance from a PC with DK Admin

Older Version(s): *none*

The WSIU1 PCB enables the DK14 system to connect to various hardware devices. *It does not have an internal modem and does not support IMDU or RMDS.*

Only one WSIU1 can be installed per DK14 system. When installed, the WSIU1 port functions are identified and enabled automatically when power is turned on. See Program 76-1 for initialized data.

CO lines that receive Caller ID must be cross-connected to the TC-1041 (MLX-41) Caller ID interface box. See Figure 1-18 for wiring.

The TC-1041 (MLX-41) is available from TEL-CONTROL, Inc., P.O. Box 4087, Huntsville, AL 35815-4087. Phone (205) 881-4000.

The communication parameters for TTY and Caller ID (WSIU1 SI01 or SI02) ports are:

- Data word bits = 7
- Parity = even
- Stop bits = 1

The communication parameters for SMDR (WSIU SI01 or SI02) are:

- Data word bits = 8
- Parity = None
- Stop bit = 1

WSIU1 Installation

1. Make sure that the power supply switch is OFF. See Figure 1-14.
2. Slide the front edge under the System Frame Ground Bar. Align and insert WSIU connector J4 into the motherboard connector J21, and J3 into J20. Apply firm, even pressure to ensure proper making of the connectors. Make sure the edge of the WSIU is next to the connector J1 and J2.
3. Remove the "knock-out" from the KSU cover SI01 or SI02 access slot, and store the "knock-out" in the slots provided in the KSU base. (See Figure 1-11.)

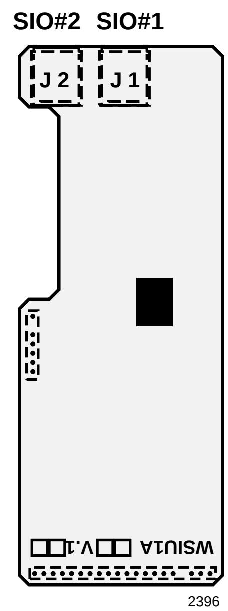


Figure 1-14 WSIU Printed Circuit Board

WSIU Programming

Program 03: No assignment is necessary. WSIU1 is automatically enabled when installed and power is turned ON. It is not assigned to a slot.

Program 76-1X-Y: Assigns each installed WSIU1 port to a function. Where X identifies the WSIU1 port number (1~2) and Y identifies the WSIU1 port function:

- Y=1, RS-232 TTY (Program 77-1, LED 14 OFF)
- Y=2, SMDR
- Y=4, SMDI
- Y=6, Caller ID Interface
- Y=0, No function - this should be used for any WSIU1 ports that are not used.

Program 76-2X-Z: Assigns each installed WSIU1 port to operate at a specified transmission rate. Where X identifies the WSIU1 Port number (1, 2). Z identifies the WSIU1/port transmission rate in bits-per-second (bps):

- Z=1; 9600
- Z=2; 4800
- Z=3; 2400
- Z=4; 1200

Note The sum of WSIU1 port 1 and port 2 bps rate cannot exceed 9600 bps.

WSIU Wiring

Note Refer to Chapter 10 – Peripheral Installation, SMDR and TTY for WSIU wiring/interconnecting details. See Figure 1-18 for Caller ID interface box to WSIU wiring.

DK8/DK14 Compatibility

Generally, Strata DK components are upward compatible to make upgrading cost-effective. Furthermore, there is a lot of cross-compatibility between similar systems. Most of the PCBs that were introduced for the DK14 can also be used in the DK8 system (see Table 1-2). Also, a number of DK8 PCBs can be used in the DK14 (see Table 1-3).

Table 1-2 DK14 PCBs Compatible with the DK8 System

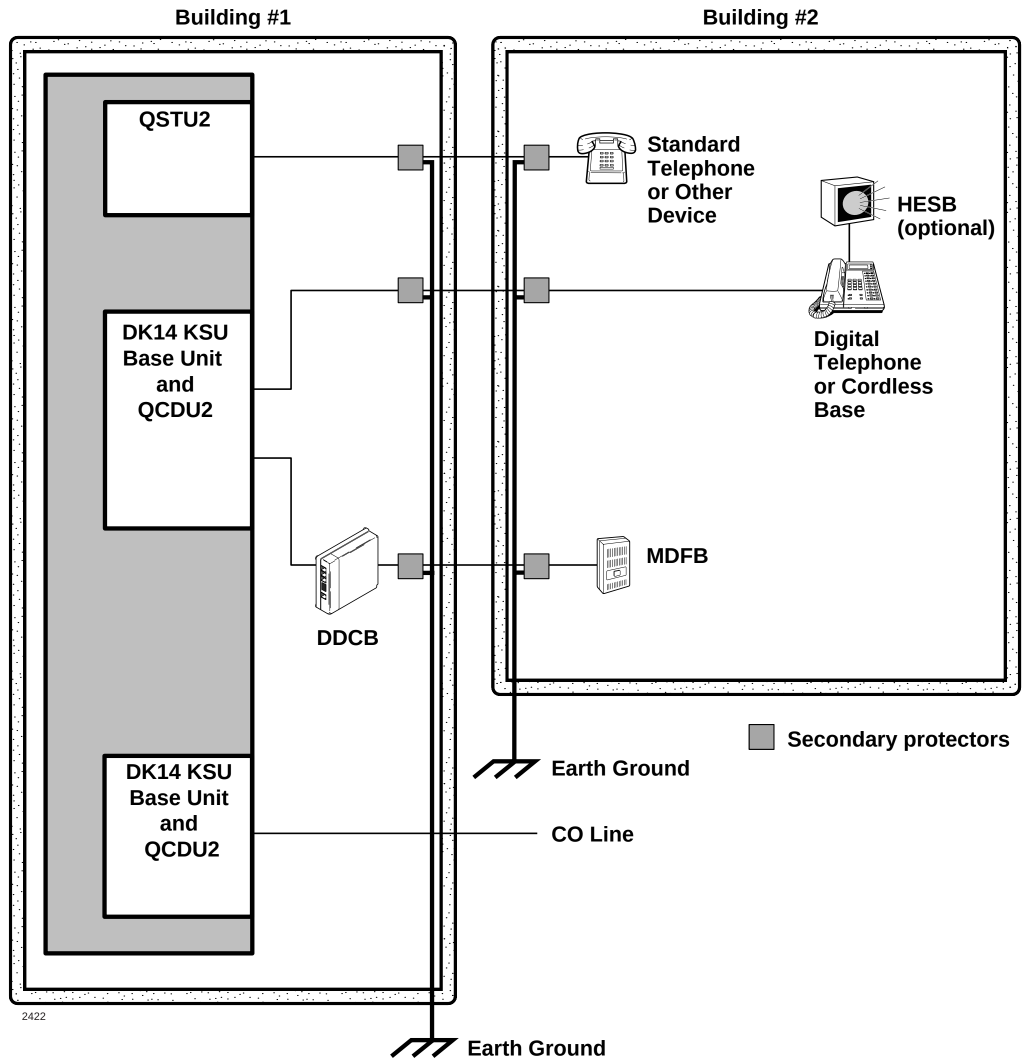
DK14 PCBs	Compatibility (Use in DK8)	Standard	Optional	Function
DKSU14A	-	X		Base Unit
QMAU2A	NO	X		Common Control/2-Loop Start CO Lines and 4-Digital Telephones Interface Unit
QPSU8A2	YES	X		Power Supply
QCDU2A	YES		X	1-Loop Start CO Line and 2-Digital Telephones Interface Unit
QRCU3A	YES		X	3-DTMF/ABR Tone Detection Receiver Unit
QSTU2A	YES		X	2-Standard Telephones Interface Unit
WSIU1A	NO		X	2-Serial I/O Interface Unit
QKYS1A	YES		X	Auto Attendant Feature Key

Table 1-3 DK8 PCBs Compatible with the DK14 System

DK8 PCBs	Compatibility (Use in DK14)	Standard	Optional	Function
DKSU8A	-	X		Base Unit
QMAU1A	NO	X		Common Control/2-Loop Start CO Lines and 4-Digital Telephones Interface Unit
QCNU1A	NO	X		Conference IC Unit
QPSU8A	YES	X		Power Supply
QCDU1A	NO		X	1-Loop Start CO Line and 2-Digital Telephones Interface Unit
QRCU2A/1A	NO		X	3-DTMF/ABR Tone Detection Receiver Unit
QSTU1A	NO		X	2-Standard Telephones Interface Unit
QSMU1A	NO		X	1-SMDR/TTY Interface Unit
QKYS1A	YES		X	Auto Attendant Feature Key

DK14 Secondary Protection

The following diagram (see Figure 1-15) shows where secondary protectors must be installed for outside wiring.



Important! *To protect against transient voltages and currents, solid state secondary protectors must be installed if there is outside wiring. These protectors, which contain fast semiconductors in addition to fuses, shall comply with the requirements for secondary protectors for communication circuits, UL497A.*

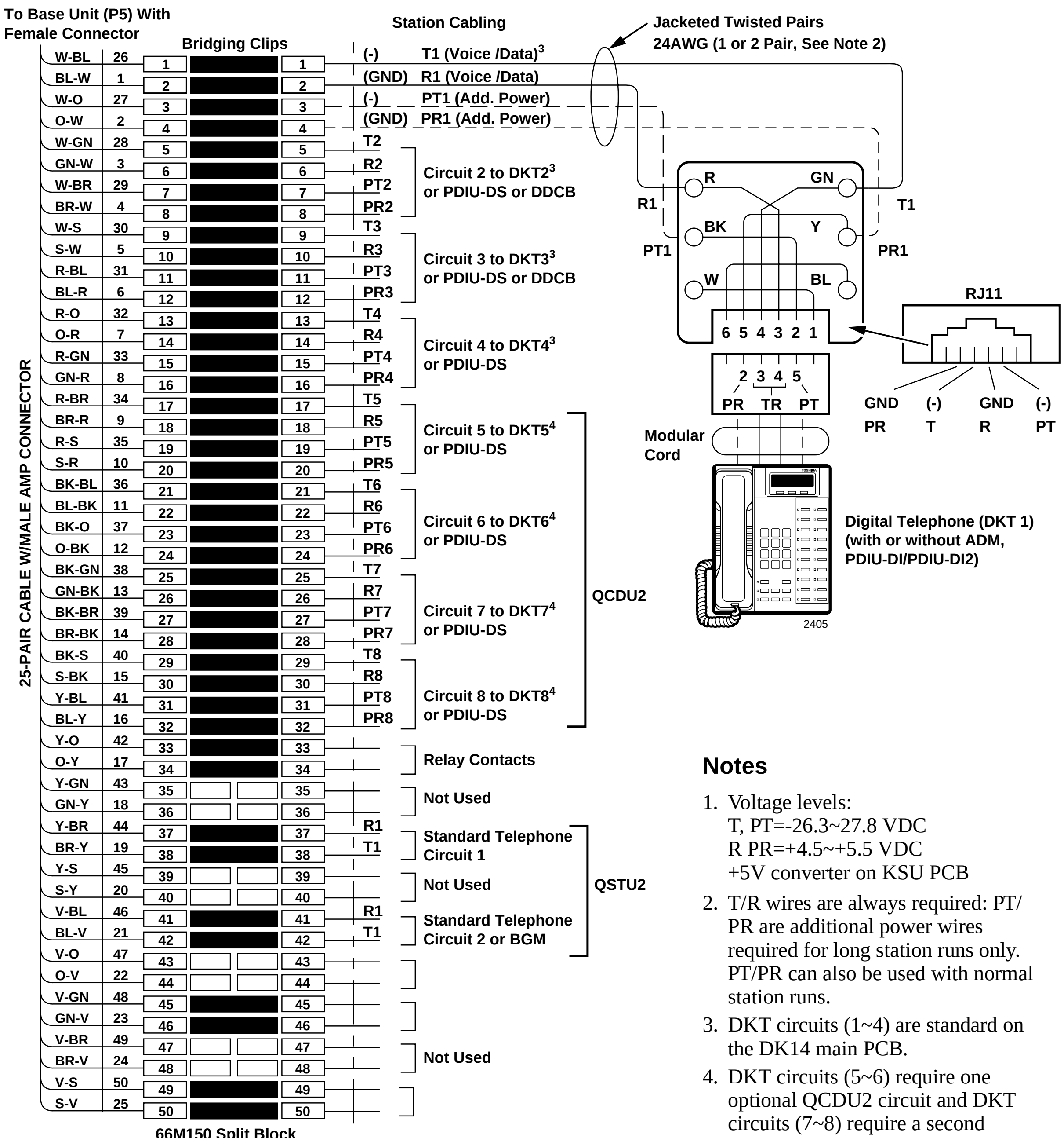
Care must be taken to ensure that they are very well grounded to a reliable earth ground. Recommended protectors are available in the fast Series 6 line from ONEAC® Corp., Libertyville, Illinois 60048, (800) 327-8801. Install and test the secondary protectors precisely to the installation instructions of thee manufacturer.

Figure 1-15 DK14 Secondary Protector Diagram

DK14 Wiring Diagrams

Wiring diagrams for the DK14 (listed below) are shown in Figures 1-16~1-18.

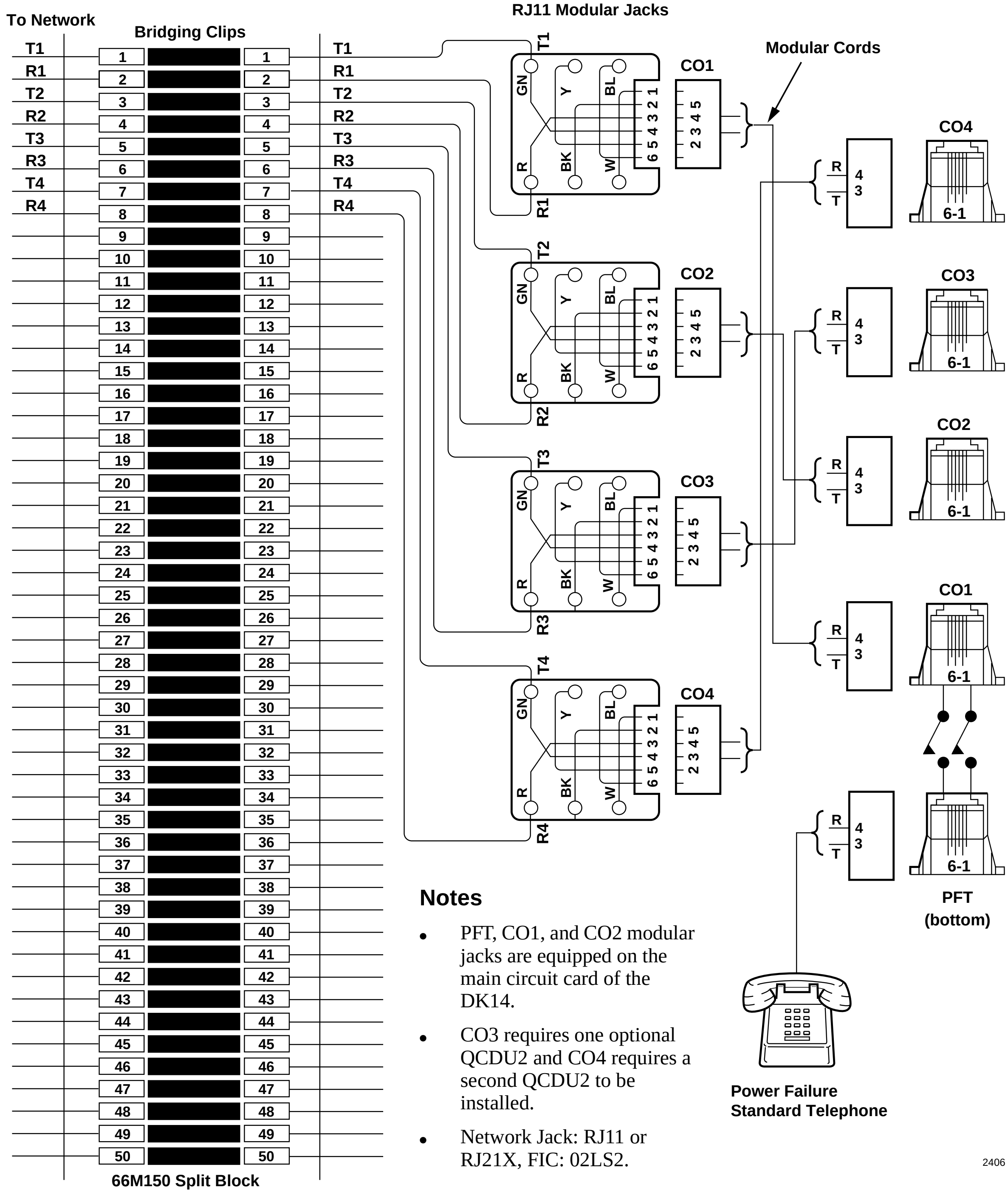
- ♦ DK14 MDF to Station Wiring (QCDU2 and QSTU2)
- ♦ DK14 MDF Wiring to CO Lines (KSU and QCDU)
- ♦ DK14 MDF Wiring to Caller ID Interface (WSIU)



Notes

1. Voltage levels:
   T, PT=-26.3~27.8 VDC
   R PR=+4.5~+5.5 VDC
   +5V converter on KSU PCB
2. T/R wires are always required: PT/PR are additional power wires required for long station runs only. PT/PR can also be used with normal station runs.
3. DKT circuits (1~4) are standard on the DK14 main PCB.
4. DKT circuits (5~6) require one optional QCDU2 circuit and DKT circuits (7~8) require a second QCDU2 to be installed.

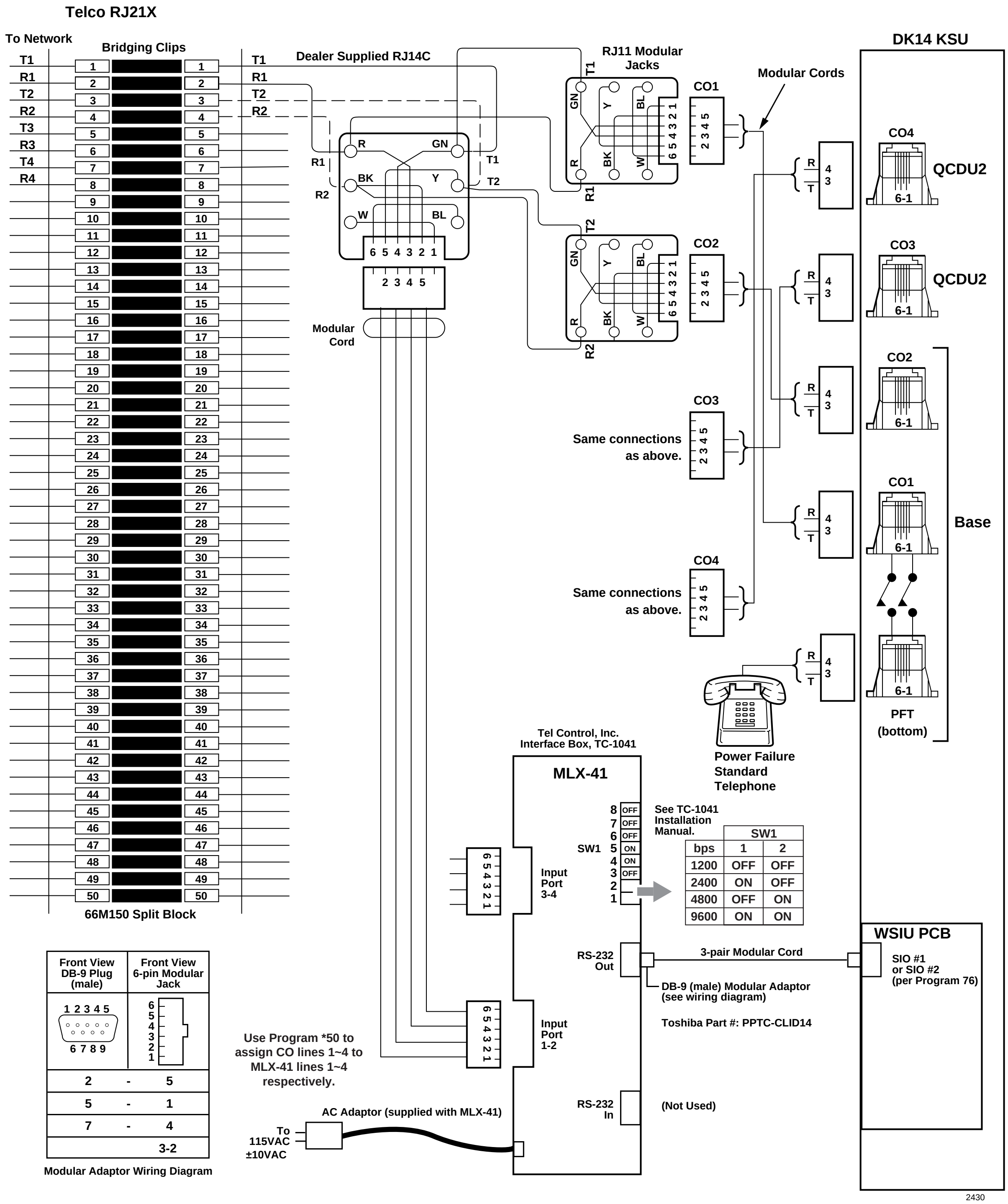
Figure 1-16 DK14 MDF to Station Wiring (QCDU2 and QSTU2)



Notes

- PFT, CO1, and CO2 modular jacks are equipped on the main circuit card of the DK14.
- CO3 requires one optional QCDU2 and CO4 requires a second QCDU2 to be installed.
- Network Jack: RJ11 or RJ21X, FIC: 02LS2.

Figure 1-17 DK14 MDF Wiring to CO Lines (KSU and QCDU)



	SW1	
bps	1	2
1200	OFF	OFF
2400	ON	OFF
4800	OFF	ON
9600	ON	ON

Front View DB-9 Plug (male)	Front View 6-pin Modular Jack
2 -	5
5 -	1
7 -	4
	3-2

Figure 1-18 DK14 MDF Wiring to Caller ID Interface (WSIU)

DK40i Configuration 2

This chapter explains how to configure a Strata DK40i system. It also provides tables for recording the hardware and station devices that make up the system.

Base Key Service Unit (KSU)

Station and CO Lines

The DK40i Base KSU comes equipped with eight digital telephone station circuits. One of three optional PCBs can be added to provide either four loop start or DID lines, or two ISDN BRI S/T circuits (Table 2-1). An optional TCIU2 Printed Circuit Board (PCB) can be added to the Base KSU loop start line PCB to provide Caller ID interface. An optional KSTU2 PCB can be added to provide four standard telephone circuits (ports).

Note An Expansion KSU can be added to the DK40i to increase the system capacity to 28 station ports and 12 lines.

Peripherals

The DK40i Base KSU can support a number of peripherals, which are not considered as stations or lines and do not affect the maximum station and line capacities. The DK40i Base KSU comes standard with built-in interfaces for connecting the following dealer-supplied equipment: an amplifier and speaker for paging and night ringing, Music-on-Hold (MOH) source, reserve power batteries, and emergency standard telephone for system power failure occurrences when using loop start lines in the base cabinet.

A relay contact is also provided to control one of the following peripherals: MOH source, night bell, or page amplifier mute control.

An optional KSTU2 PCB provides an alternate background music source interface. The music plays through Toshiba telephone speakers, as opposed to the external page speakers.

The optional TSIU PCB provides two RS-232 interface ports to connect two of three options: a DKAdmin PC (or external modem for remote maintenance); or VM SMDI; or an SMDR port to connect a call accounting device or printer. An Expansion Unit RS-232 interface PCB is required if all three features are needed.

Table 2-1 DK40i Base KSU Components

Item	Supports	Connector Type	Standard	Optional
Digital telephone circuits (8) Base KSU main PCB (TMAU2)	Digital telephones (with or without RPCI-DI or ADM) Stand-alone Data Interface Units (PDIU-DS) Door Phone Lock/Control Unit (DDCB) Digital Direct Station Selection Console (DDSS) Cordless Digital Telephone (DKT2004-CT)	25-pair Amphenol	✔	
CO or DID line circuits (4) (TCOU or TDDU)	Loop start or DID lines	RJ11 modular		✔
BRI (S/T) circuits (2) (TBSU)[1]	2 BRI (S/T) circuits configure as BRI lines or station ports. BRI lines require a dealer supplied NT-1.	8-pair modular		✔
Power Failure Transfer Interface (TCOU only)	Standard telephone (one)[2]	RJ11 modular	✔	
Battery Backup Interface with built-in charger	Two 12-volt batteries	Proprietary connector/ cable	✔	Cable & batteries
Music-on-Hold/BGM Interface	Music-on-Hold/BGM source[2]	RCA jack	✔	
600 Ohm page Interface	Amplifier/speaker	RCA jack	✔	
Standard Telephone Interface Unit (four-circuit, KSTU2)	Standard telephones (no message waiting)[2] Other single-line devices[2] Alternate BGM source[2] Fax machine[2] Voice mail/auto attendant devices	25-pair Amphenol		✔
DTMF/ABR Receiver (K4RCU3, K5RCU, or K5RCU2)[3]	Automatic busy redial Standard telephone ports Interprets DTMF tones DISA, DID, Tie lines, or auto attendant Voice Mail	Internal		✔
Automated Attendant (KKYS)	Built-in automated attendant	Internal		✔
Control Relay	Choice of one: MOH Source Control Night Bell Control BGM Mute Control	25-pair Amphenol	✔	
Caller ID (TCIU2)	TCOU Caller ID interface	Internal T/R to TCOU		✔
RS-232 ports (TSIU)	Provides up to two ports for: Maintenance PC or External modem interface Voice Mail SMDI interface SMDR interface The TSIU does not support a built-in modem.	3-pair modular		✔

1. Each circuit can be set independently for line or station side S/T BRI.
2. Customer-supplied equipment not offered by Toshiba Telecommunication Systems Division.
3. K4RCU provides four DTMF circuits. K5RCU and K5RCU2 provide five DTMF circuits. Also, K5RCU2 provides the Mu law/A law jumper.

Base/Expansion KSU Compatibility

Expansion Units that are compatible with various Base KSUs are shown in Table 2-2.

Table 2-2 Compatible Base KSUs and Expansion Units

Base KSU	Expansion Unit		
	DK40i	DK16e	DK16
DK16	X	X	X
DK16e	X	X	
DK40	X	X	
DK40i	X	X	

X = Expansion Unit is compatible with Base KSU.

Station, Lines, and Stratagy DK Voice Mail

The optional DK40i Expansion KSU has four universal slots which can support Stratagy DK, loop and ground start lines, DID and Tie lines, ISDN BRI S/T lines and stations, Toshiba and analog stations, and option interface PCBs. PCBs that support lines and can be installed in the expansion unit are the RCOU/RCOS, KCDU, REMU, RBSU, or RDDU (see Table 2-3).

PCBs that can support stations and be installed in the expansion unit are the PDKU2, RDSU, PEKU, RSTU2, PESU, RBSU/RBSS, RWIU, and KCDU. PCBs that can interface SMDR, SMDI, and a local or remote DKAdmin Personal Computer are PIOU, PIOUS, and RSSU (see Table 2-4).

Table 2-3 DK40i Expansion KSU Components

PCB	Circuits per PCB	Interfaces	Connector
KCDU	2 CO line circuits/ 4 digital telephone circuits	Central office loop start lines	RJ14C modular (CO Line circuits)
		Digital circuits same as PDKU2, except no DDSS	25-pair Amphenol (digital telephone circuits)
PDKU2	8 digital telephone circuits	Digital telephones (with or without RPCI-DI or ADM) DDSS console PDIU-DSs DDCB Cordless Digital Telephone (DKT2004-CT)	25-pair Amphenol
PEKU	8 electronic telephone circuits	Electronic telephones HDSS console Alternate BGM source EOCU PCB for OCA External conference amplifier HDCB	25-pair Amphenol
PESU	2 standard telephone circuits/ 4 electronic telephone circuits (standard/ electronic telephone ports)	Standard: same as RSTU (no MW) Electronic: same as PEKU, except PESU does not support HDSS console	25-pair Amphenol

Table 2-3 DK40i Expansion KSU Components *(continued)*

PCB	Circuits per PCB	Interfaces	Connector
PIOU, PIOUS, RSSU	A PIOU or PIOUS can use an IMDU. See Table 2-4 for details.		25-pair Amphenol (PIOU, PEPU) Spring clip terminal (PIOUS)
RBSU	2 ISDN BRI S/T circuits (station or line)[1]	ISDN BRI S/T TE-1s and Terminal Adaptors and ISDN BRI S/T line circuits connected to an NT-1 adaptor.	RJ-45
RBSS	Two ISDN BRI S/T circuits (station only)	ISDN BRI S/T TE-1s and Terminal Adaptors.	RJ-45
RWIU	8 or 16 digital circuits for Strata AirLink	Up to four base stations (16 handsets max.)	RJ-12 (6-wire modular jack)
RCIU2	4 Caller ID circuits 8 circuits with RCIS	Loop or ground start lines with Caller ID. Requires: RCOU, RGLU2 or PCOU.	RJ14C modular
RCOU	4 CO line circuits (lines)	Central office loop start lines	RJ14C modular
RDDU	4 Direct Inward Dialing (DID) circuits	DID lines	RJ14C modular
RDSU	Without RSTS: 2 Standard telephone/ 4 Digital telephone circuits With RSTS: 4 Standard telephone/ 4 Digital telephone circuits	Digital: Same as PDKU2, except no DDSS Console Standard: Same as RSTU2 (standard telephone message waiting not available)	25-pair Amphenol
REMU	4 Tie line circuits	E&M Tie lines 2- or 4-wire transmission Type I Signaling Type II Signaling Immediate start Wink start	REMU (8-wire modular jack) USOC RJ1CX modular, 2- or 4-wire/Type I or II
R48S	8 standard telephone circuits	Optionally interfaces to the RSTU2 and RDSU to extend loop length of standard telephones from 600 ohms to 1200 ohms.	25-pair Amphenol
RGLU2	4 Line circuits	Loop or ground start lines	RJ14C modular
RSTU2	8 Standard telephone circuits	Standard telephones Voice mail ports Off-premises stations Other similar devices Alternate BGM source Auto attendant digital announcer Message waiting lamp generator	25-pair Amphenol
Stratagy DK	2 VM ports 4 VM ports 6 VM ports 8 VM ports All the above Stratagy DK systems use 8 station ports in the DK40i software.	None	None

1. Each circuit can be set independently for line or station side (S/T BRI).

Peripherals

An Expansion KSU can support PIOU, PIOUS, RSSU and PEPU PCBs (see Table 2-4 for a list of options).

PIOU or PIOUS

The PIOU/PIOUS provides one dedicated RS-232 port for Station Message Detail Recording (SMDR) connection to a call accounting device and one of the following:

- a TTY/RS-232 port which can connect to a customer-provided VM SMDI or external modem for remote maintenance, or to a local PC with DKAdmin
- connectors for an internal modem (IMDU) for remote maintenance and administration

RSSU

The RSSU provides one TTY/RS-232 port for a connection to a VM SMDI or customer-provided external modem for remote maintenance, or to a local PC with DKAdmin. The RSSU does not support SMDR or IMDU.

Any device that connects to the PIOU, PIOUS, or RSSU should not be considered a station and does not affect the system’s station capacity.

Table 2-4 DK40i Interface PCB Options

Interface Options[1]	RSSU	PIOU	PIOUS	PEPU	TSIU	DK40i Base [2]
Zone page interface (unamplified, 4 zones)		X				
Unamplified page output (single zone, 600 Ω, duplex)						X
Night transfer or Music-on-hold control relay		X	X	X		X
Door lock or external amplifier control relay		X	X	X		X
IMDU disables TTY output when piggy-backed onto PIOU or PIOUS cards		X	X			
Remote Maintenance using customer-provided external modem, StrataControl and/or DKAdmin PC (requires TTY output port)	X	X	X		X	
SMDR output (RS-232/6-wire modular connector)		X	X		X	
Alarm sensor		X	X			
Voice Mail SMDI (requires TTY output port)	X	X	X		X	

1. Amplified page output (single zone, 3 watts, 8 ohms) on the PIOU and PEPU is not available on the DK40i.
2. These functions are standard (built-in) to the DK40i Base KSU.

Feature Capacities

The DK40i line, system feature and station capacities are shown in Tables 2-5~2-7.

Table 2-5 DK40i Line Capacities and Universal Printed Circuit Board Slots

Lines and PCB Slots	DK40i
Universal slots[1]	4[1]
CO lines – loop start	12
CO lines – ground start	12
DID lines (analog)[2]	12
Tie lines (analog)[2]	12
ISDN BRI S/T type line circuits (each circuit requires an NT-1 device)[2]	6 circuits (12 B-channel/lines)
Squared System Maximum (ground/loop lines + stations)	12 lines + 12 stations
Squared System Maximum (Tie/DID lines + stations)	12 lines + 12 stations

1. There are four universal slots in the DK40i expansion unit.
2. In the D40i, DID, Tie, and BRI lines do not use up station ports as in DK40 and the DK424, R3. Each BRI line circuit uses up to two CO lines of system capacity

Table 2-6 DK40i System Feature Capacities

Features	DK40i
Amplified Conferencing[1]	2
Auto Attendant (built-in) simultaneous calls in dialing queue	5
Caller ID/ANI Abandoned Call Numbers - stored per station	10~100
Caller ID/ANI Abandoned Call Numbers - stored per system	200
CO Line Groups	8
Distributed Hunt (DH) Calls in Queue per Groups	10
DH Groups	16
DH stations per Group	28
DNIS Network Routing Numbers	100
DNIS Numbers	200
DTMF receivers	5
External Page Zones	4
Call Park Orbits - general	20
Call Park Orbits - individual	28
Personal LCD Messages per DKT[2]	10
Personal Message DKTs	16
[PhDNs] per System	28
[PDNs] per System	28
Ring Tones	3
Simultaneous Party Conferencing (4-party)	3
Simultaneous Two-CO Line conferencing (3-party)	4
Station Speed Dial	40
Stratagy DK Systems (per tenant group)	1

Table 2-6 DK40i System Feature Capacities *(continued)*

Features	DK40i
Stratagy DK Systems (per system)	2
System LCD Messages	40
System Speed Dial	40
Telephone Page Groups	5
Telephone Group Page – simultaneous stations paged	28
Telephone Pickup Groups	20
Tenants	2
Toll Restriction (AC/OC) Table	8
Toll Restriction Classes	4
Verified Account Codes	300
Voice Mail Simplified Message Desk Interface (SMDI)	Yes

1. Requires additional customer-supplied hardware.
2. Personal Messages includes: timed reminder memo and station speed dial memo.

Table 2-7 DK40i Station and Peripherals Capacities

Stations	DK40i
Add-on modules (DADM)	12
Attendant consoles	0
DKT 2004-CT Cordless Telephones (simultaneous calls)	9
DKT 2004-CT Cordless Telephones	28
Door locks	3
Door phones	9
DSS consoles	3
Handset OCA stations	28
Off-premise stations	20
PDIU-DS[1]	24
RPCI-DI used for data + TAPI (per system)	24
RPCI-DI used for TAPI only (per system)[1]	24
Speaker OCA stations[1]	28
Standard stations	20
Telephones – DKT	28[2]
Telephones – EKT	16[2]
ISDN Terminal Adapters and/or TE-1s combined	10 circuit (20 devices)[3]
Telephones – Strata Airlink Handsets	16

1. Speaker OCA, PDIU and RPCI capacity is determined by PDKU 2B channel slot availability and power supply limits.
2. To install the maximum of 28 total DKTs and EKTs, up to 16 of the stations can be EKTs and at least 8 of the stations must be DKTs.
3. In the DK40i, BRI station circuits do not use up CO line numbers as in the DK424, R4. Each BRI station circuit uses up to two station ports of system capacity. Toshiba BRI (S/T) station circuits are passive and allow up to two devices to share a circuit.

Station Considerations

For configuration purposes, any device which is connected to a dedicated telephone circuit is considered a “station.” Although the words “telephone” and “station” are often used interchangeably in Strata DK40i documentation, devices other than telephones—such as Stand-alone Data Interface units (PDIU-DSs)—should also be considered stations when configuring a system since they require a dedicated telephone circuit. A station apparatus overview is shown in Table 2-8.

Table 2-8 Strata DK40i Station Apparatus Overview

Station	Type/Number of Circuits Required	PCB or Interface	Circuit(s)	Base Unit Capacity	Base & Expansion Unit Combined Capacity
Digital telephone (DKT without ADM or RPCI-DI) or Cordless Digital Telephone (DKT2004-CT)	Digital, one for each DKT	Base KSU PDKU2 KCDU RDSU	1~8 1~8 1~4 5~8	8	28
Stand-alone Data Interface Unit (PDIU-DS)	Digital, one for each PDIU-DS	Base KSU PDKU2 KCDU RDSU	1~8 1~8 1~4 5~8	7	27
Digital Direct Station Selection Console (DDSS)	Digital, one for each DDSS	Base KSU PDKU2	8 8	1	3
Digital Door Phone/Lock Control Unit (DDCB)	Digital, one for each DDCB	Base KSU PDKU2 or first KCDU	5 1 1	1	3
Electronic Telephone (EKT)	Electronic, one for each EKT	PEKU PESU	1~8 5~8	0	16
Electronic Direct Station Selection Console (HDSS)	Electronic, two for the HDSS	PEKU	7 and 8	0	2
Conference amplifier	Electronic, two for the amplifier	PEKU PESU	6 and 7 6 and 7	0	2
Single-wire-pair devices: Standard telephone Voice mail device Facsimile machine Modem Dictation equipment	Standard, one for each device (voice mail devices may require more than one circuit)	KSTU2 RSTU2 PESU RDSU RDSU/RSTS	1~4 1~8 1~2 1~2 1~4	4	20
Alternate BGM source May require interface transformer, see Chapter 10 – Peripheral Installation	Standard or electronic, one for the source	KSTU2 PEKU PESU RSTU2	2 3 8 2	1	1

Telephone Circuit (Port) Types

There are four types of telephone circuits to which stations can be connected: digital, electronic, and standard telephone circuits. Also, there are ISDN (S/T) type telephone circuits, terminal equipment (TE-1) and terminal adaptor circuits.

Digital Telephone Circuit Connections

The Strata DK40i Base KSU and the PDKU2 PCB each provide eight digital telephone circuits. Each KCDU and RDSU PCB provides four. The RWIU PCB provides circuits to support up to 16 wireless digital telephones.

Note A maximum of four KCDU PCBs can be installed. If installed, KCDUs should be installed per configuration tables. The following devices can be connected to digital telephone circuits (see Table 2-9). Telephones connected to KCDU PCBs cannot be relocated or swapped using the station relocation feature.

Table 2-9 Digital Telephone Circuits

Digital Device	Circuits Required	Comments
Digital telephones (2000- and 1000-series, Cordless Digital Telephone-DKT2004-CT)	1	Each digital telephone circuit can support a digital telephone. Only one of the following options can be installed on a 2000-series digital telephone: RPCI-DI, DVSU (SP-OCA) or ADMs. **Note** The RPCI-DI) and the Add-on Module (ADM) do not require a dedicated circuit. They share a circuit with the telephone.
Stand-alone Data Interface Units (PDIU-DS)	1	Any digital telephone circuit, except for circuit 8 on a PDKU21, can support a PDIU-DS. **Note** There are two versions of the PDKU2: PDKU21 and PDKU2. The versions are identical, except that circuits 1~8 on the PDKU2 can each support PDIU-DSs/RPCI-DI, while only circuits 1~7 on a PDKU21 can support PDIU-DSs/RPCI-DIs.
Digital Direct Station Selection Console (DDSS)	1	DDSS consoles can connect only to circuit 8 in the Base KSU and circuit 8 on a PDKU2. The KCDU cannot support a DDSS console.
Digital Door Phone/Lock Control Box (DDCB)	1	DDCBs can only connect to Port 04 in the Base KSU, and Ports 12 and/or 20 on either the PDKU2 or KCDU.
Wireless Integrated Handsets	1	Each RWIU supports up to 32 Strata AirLInk integrated handsets.

Electronic Telephone Circuit Connections

There are no electronic telephone circuits in the Base KSU, and none can be added to it. However, either the PEKU PCB, which has eight electronic telephone circuits, or the PESU, which has four electronic telephone circuits, can be installed in the Expansion KSU.

The following devices can be connected to electronic telephone circuits (see Table 2-10).

Table 2-10 Electronic Telephone Circuits

Electronic Device	Circuits Required	Comments
Electronic telephones (6500-, 6000-, 3000-, 2000-series)	1	Each electronic telephone circuit can support an electronic telephone.
Electronic Direct Station Selection Console (HDSS)	2	The system supports only one HDSS console. The console must be connected to both circuits 7 and 8 on the PEKU. The PESU will not support an HDSS console.
Alternate BGM source	1	The system supports an alternate BGM source which can be heard over digital and electronic telephone and external page speakers. This source can be connected to either circuit 3 on a PEKU, circuit 8 on a PESU, or circuit 4 on a KSTU2 or PSTU PCB.
Conference amplifier	2	Up to three amplifiers for two CO line conferencing can be connected to ports 9 and 10; 17 and 18; and 24 and 25 on a PEKU or PESU.

CAUTION! **You must always calculate the Power Factor (PF)—see Worksheet 2. Exceeding the PF will cause the power supply to fail. If PF is exceeded, replace EKTs with DKTs.**

Standard Telephone Circuit Options

In addition to supporting standard telephones, each of the standard telephone circuits can support any one of a number of single-wire-pair devices, including voice mail/Auto Attendant devices and modems (see Table 2-11).

Table 2-11 Standard Telephone Circuits

	Base KSU	Expansion KSU			
Standard Telephone Circuits	**KSTU2**	**RSTU2**	**PESU**	**RSTU1 or PSTU**	**RDSU/ RSTS**
Number of Standard Telephone Circuits	4	8	2	8	2/2
Supports Message Waiting Lamps on SLTs	No	Yes	No	No	No

ISDN Station Devices

ISDN station devices must be S/T type. Each device requires a DK40i BRI circuit configured for station side, as opposed to line side. Two BRI circuits are provided by each of the ISDN PCBs: TBSU, RBSU, and RBSS. ISDN station devices include ISDN telephones, modems, terminal adaptors, video cards, etc. A maximum of 10 BRI circuits can be provided for ISDN stations.

Worksheet 1 – System PCB Assignment Guide

Customer: ______________________

Location: ______________________

This worksheet helps you configure the system. Use the following tables to record the hardware that comprises the system. To ensure that the system port/line capacity is not exceeded, consult Configuration Tables 2-13~2-16 when you fill out Tables 2-13 and 2-14 below. After configuring the system, use Worksheet 2 to ensure that the system power factors are not exceeded.

Be sure to consult “Example Configuration Tables” on Page 2-13 when filling out these tables.

Table 2-12 Hardware Configuration

<table>
<tr><th colspan="6">Base Cabinet</th><th colspan="4">Expansion Cabinet</th></tr>
<tr><th>Slot No.</th><th>00</th><th>11</th><th>12</th><th>13</th><th>14</th><th>15</th><th>16</th><th>17</th><th>18</th></tr>
<tr><td rowspan="4">PCB Type</td><td rowspan="4">None or K4RCU3, K5RCU or K5RCU2</td><td rowspan="4">8 DKTs</td><td>None</td><td rowspan="2">None</td><td rowspan="2">None</td><td rowspan="4">Universal PCB</td><td rowspan="4">Universal PCB</td><td rowspan="4">Universal PCB</td><td rowspan="4">Universal PCB (except Stratagy DK)</td></tr>
<tr><td>TCOU (4 Loop Start Lines)</td></tr>
<tr><td>TDDU (4 DID Lines)</td><td rowspan="2">KSTU2
4 SLT</td><td rowspan="2">TCIU2
4 CLID</td></tr>
<tr><td>TBSU (2 BRI Ckts.)</td></tr>
</table>

Base Cabinet Port/Line Capacity Check

Table 2-13 Strata DK40i Base Cabinet Station Port Configuration

Installed (Yes/No)	PCB Type	Port Type	Port Total
Yes	Motherboard	Digital Telephone (8 ports)	8
	KSTU2	Standard Telephone (4 ports)	
	TBSU circuit #1	ISDN station side (2 ports)	
	TBSU circuit #2	ISDN station side (2 ports)	
		Total Base Ports (16 ports max.) =	

Table 2-14 Strata DK40i Base Cabinet Line Configuration

Installed (Yes/No)	PCB Type	Number of Line Types	Line Total
	TCOU	Loop start (4 lines)	
	TDDU	Direct Inward Dial (4 lines)	
	TBSU circuit #1	ISDN line side (2 lines)	
	TBSU circuit #2	ISDN line side (2 lines)	
		Total Base Lines (4 lines max.) =	

Expansion Capacity

Table 2-15 Strata DK40i Expansion PCB Port/Line Capacity Reference Table

Expansion PCB	Port/Line Type	No. of Ports	No. of Lines
PCOU	Loop Start Lines	0	4
RCOU	Loop Start Lines	0	4
RCOU/RCOS	Loop Start Lines	0	8
RGLU	Ground or Loop Start Lines	0	4
RDDU	Direct In Dial Lines	0	4
REMU	E&M Tie Lines	0	4
PEMU	E&M Tie Lines	0	4
KCDU	Digital Ports/Loop Lines	4	2
PDKU2	Digital Telephone Ports	8	0
RSTU2	Standard Telephone Ports	8	0
RWIU	Strata AirLink Wireless Interface	8 or 16	0
Stratagy DK	Built-in Voice Mail System	8	0
RDSU	2 Standard/4-Digital Telephone Ports	8	0
RDSU/RSTS	4 Standard/4 Digital Telephones ports	8	0
PEKU	Electronic Telephone Ports	8	0
PESU	2 Standard/4 Electronic Telephone Ports	8	0
RBSU	2 ISDN BRI S/T circuits, station side or line side in any combination shown below:		
	• Both circuits line side	0	4
	• Both circuits station side	4	0
	• 1 station and 1 line circuit	2	2
RBSS	2 ISDN BRI S/T circuits	4	0

Base and Expansions Cabinet Port/Line Capacity Check

Refer to Tables 2-13~2-15 when filling in Table 2-16 to determine the DK40i Expansion Capacity.

Table 2-16 Strata DK40i Base and Expansion CO Line Configuration

Expansion Slot No.	PCB Installed	Port Type or Line Type	Ports	Lines
15				
16				
17				
18				
		Total Ports and Lines in Expansion slots (15~18)		
		Total Base Unit ports and lines (from Tables 2-12 and 2-13)		
		Total DK40i Base/Expansion ports and lines (28 ports/12 lines max.)		

Example Configuration Tables

Table 2-17 Hardware Configuration Example

Base Cabinet						Expansion Cabinet			
Slot Number	**00**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**
PCB Type	K5RCU2	8 DKTs	TBSU	KSTU2 4 SLT	None	PDKU2	RBSU/ RBSS	RCOU	PIOU

Table 2-18 Strata DK40i Base Cabinet Station Port Configuration Example

Installed (Yes/No)	PCB Type	Port Type	Port Total
Yes	Motherboard	Digital Telephone (8 ports)	8
Yes	KSTU2	Standard Telephone (4 ports)	4
Yes	TBSU circuit #1	ISDN station side (2 ports)	2
–	TBSU circuit #2	ISDN station side (2 ports)	–
		Total Base Ports (16 ports max.) =	**14**

Table 2-19 Strata DK40i Base Cabinet Line Configuration Example

Installed (Yes/No)	PCB Type	Number of Line Types	Line Total
No	TCOU	Loop start (4 lines)	–
No	TDDU	Direct Inward Dial (4 lines)	–
–	TBSU circuit #1	ISDN line side (2 lines)	–
Yes	TBSU circuit #2	ISDN line side (2 lines)	2
		Total Base Lines (4 lines max.) =	**2**

Note One TBSU circuit is configured a s a station-side BRI and one circuit is line-side BRI.

Table 2-20 Strata DK40i Base and Expansion CO Line Configuration Example

Expansion Slot No.	PCB Installed	Port Type or Line Type	Ports	Lines
15	PDKU	8 Ports	8	–
16	RBSU/ RBSS	4 Ports and 4 Lines	4	4
17	RDDU	4 Lines	–	4
18	PIOU	None	–	–
		Total Ports and Lines in Expansion slots (15~18)	12	8
		Total Base Unit ports and lines (from Tables 2-17 and 2-18)	14	2
		Total DK40i Base/Expansion ports and lines (28 ports/12 lines max.)	26	10

Note Two RBSU circuits are line-side BRI and two RBSS circuits are station-side BRI.

Configuration Considerations

The following considerations should be taken into account when filling out the tables in "Worksheet 1 – System PCB Assignment Guide".

Base Cabinet

1. Only one line PCB (TCOU, TDDU, or TBSU) can be installed in the Base cabinet.
2. If TBSU is installed, each circuit can be configured independently as a station side or line side S/T BRI circuit.
3. Each TBSU ISDN BRI circuit uses two station ports and no line numbers if the circuit is configured for the station side.
4. Each TBSU ISDN BRI circuit will use two line numbers and no station ports if the circuit is configured for the line side.
5. TDDU provides four DID lines and does not use station ports.
6. Install TCIU2 for Base KSU CO (TCOU) Caller ID Lines.

CAUTION! To prevent system malfunction, do not install TCIU1 in the DK40i system.

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7. K5RCU, K5RCU2 or K4RCU3 must be installed when using built-in automated attendant, Voice Mail, ABR, Stratagy DK, standard telephone ports, Tie lines, DISA, or DID Lines.
8. TSIU can be used for an RS-232 Maintenance (TTY) port, SMDI or SMDR port. RSIU cannot be used.

Expansion Cabinet

1. Each RDDU provides four DID lines and does not use station ports. This is different from the DK424, DK40 and DK16e in which each DID circuit used a line number and station port.
2. Each REMU to PEMU provides the four Tie lines and does not use station ports. This is different from the DK424, DK40, and DK16e in which each Tie line circuit used a line number and station port.
3. Stratagy DK can be installed in the expansion unit to provide two, four, six or eight built-in Automated Attendant/Voice Mail circuits. Always install Stratagy DK in slot 15, 16, or 17; do *not* install Stratagy DK in slot 18. Program the Stratagy VM ports as if they were standard telephone ports connected to an external VM device. All models of Stratagy DK use up eight station ports.
4. Install RCIU2/RCIS in *slot 17 (only)* for Expansion KSU (RCOU/RCOS or RGLU2) Caller ID Lines.

CAUTION! To prevent system malfunction, do no install RCIU1 in DK40i, and RCIU2 must *not* be installed in slot 18.

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5. If required, install PIOU, PIOUS, and RSSU in any slot.
6. Speaker OCA and RPCI/DIU data applications can only be installed on digital telephone ports in the DK40i Base KSU and slots 15 and 16 of the DK40i Expansion KSU (24 maximum).

7. Each Tie or DID line PCB installed provides four Tie or DID lines and does *not* use four station ports as in the DK40 (PEMU, REMU, RDDU, and RDDU).
8. RWIU can be installed in any of the expansion cabinet slots (15, 16, 17, and 18) to support up to 8 StrataLink handsets. If there are 9 to 16 handsets, the RWIU must be installed in slot 15 and slot 16 must be vacant. This system cannot support 24 or 32 handsets because of a port limitation.

DK40i ISDN

Configure DK40i, ISDN BRI PCBs (RBSU, RBSS and TBSU) with the following rules

1. TBSU installs in the base cabinet to provide 2 BRI S/T circuits, each circuit can be station side or line side in any combination.
2. If a TBSU is installed, TDDU or TCOU cannot be installed. Only one PCB (TSBU, TCOU or TDDU) can be installed in the DK40i base cabinet for a given DK40i configuration.
3. RBSU installs in any expansion unit slot to provide 2 BRI S/T circuits which can be station side or line side in any combination.
4. RBSS installs on an RBSU in any expansion unit slot to provide 2 BRI S/T circuits, which can be station side only.
5. Each RBSU, RBSS and TBSU ISDN BRI circuit uses two station ports and no line numbers if the circuit is configured for station side. This is different from the DK424 ISDN in which each BRI circuit uses two station ports and two line numbers when the circuit is configured for station side.
6. Each RBSU and TBSU ISDN BRI circuit will use two line numbers and no station ports if the circuit is configured for the line side. This is different from DK424 ISDN, in which each BRI circuit uses two station ports and two line numbers when the circuit is configured for line side.
7. Total maximum BRI S/T circuits on the station side is 10 (20 ports/B-channels max.).
8. Total maximum BRI S/T circuits on the CO line side is 6 (12 lines/B-channels max.).

Worksheet 2 – System Power Factor Check

The DK power supply was engineered for maximum cost efficiency to provide power for the most configurations. Because of this design, some power limitations exist when using old electronic-type telephones, telephone option hardware, or newer PCBs, such as RWIU, TBSU, RBSU/RBSS.

Telephone/Device PFs

The power supply of each KSU supplies a limited amount of power. For each KSU, calculate the total Telephone/Device Power Factor (PF) and add it to Table 2-23. (See Table 2-12 for PCB quantity and type.)

The TBSU, RBSU/RBSS and RWIU PCBs require more power from +5VDC than other PCBs; therefore, it is necessary to calculate the +5VDC and -24VDC PF on DK40i.

Important! *A system PF check must be performed for* ***all*** *configurations. See* Table 2-21 *for the power supply +5VDC and -24VDC PFs for the DK40i system.*

Table 2-21 DK40i System Power Factor

Power Supply	Max+5VDC PF	Max -24VDC PF	AC Input Current
TPSU16A	14	39	1.8A

Note AC current limitation by National Electric Code.

Important! *The -24VDC system PF is Expansion KSU PCBs and all telephone/options connected to the Base and Expansion KSUs. Base KSU option PCBs are already covered for -24VDC PF.*

System Power Factors PCB/Telephone Device

Use the information in Table 2-22 to complete Tables 2-25 and 2-26.

Table 2-22 DK40i PCB's Power Factors

PCB Type	+5VDC PF	-24VDC PF
K5RCU2	0.6	NR
K5RCU	0.6	NR
K4RCU3	0.6	NR
TSIU	0.6	NR
TCOU	1.6	NR
TBSU	2.5	NR
KSTU2	1.0	NR
TDDU	1.8	NR
TCIU	0.4	NR
PDKU1, 2	8.0	0.3
KCDU	1.5	1.2
PSTU/RSTU (-24V)	2.0	0.5
RSTU2/R48S (-48)	3.5	1.0
RSTU2	3.5	0.5
RDSU (-24V)	1.5	0.3
RDSU (-48V)	1.5	0.5
RCOU	2.5	2.0
RCOU + RCOS (8 CO)	4.5	4.0
PCOU1, 2	2.0	2.0

PCB Type	+5VDC PF	-24VDC PF
RWIU	9.2	0.0
PIOU	2.5	6.5
PIOUS	2.0	4.0
IMDU	0.3	0.16
RSSU	0.6	0.3
RCIU2	0.6	0.2
RCIS	0.3	0.1
PEKU	2.5	0.7
PESU	1.6	0.5
RMCU	0.6	0.3
RMCS	0.6	0.3
REMU2/PEMU	1.5	7.5
RDDU	3.0	7.0
RGLU2	2.5	2.5
RBSU (2TE)	2.5	1.0
RBSS (2NT)	0.6	0.3
RBSU/R40S (2NT)	2.5	3.8
RBSU/RBSS/R40S (4 NT)	3.1	4.1

Worksheet Examples

Table 2-23 DK40i Telephone/Device 24 Volt Power Factor Worksheet Example (Base/Expansion KSU)

Telephone Devices	Quantity	X	24VDC PF	=	24VDC Total
2000-series Digital Telephone (any series)	16	**X**	**1.0**	**=**	**16.0**
Cordless Digital Telephone (DKT2004-CT)		**X**	**1.0**	**=**	
2000-series Electronic Telephone		**X**	**2.0**	**=**	
3000-series Electronic Telephone		**X**	**2.5**	**=**	
6000-series Electronic Telephone		**X**	**2.0**	**=**	
6005-series Electronic Telephone		**X**	**2.0**	**=**	
6500-series Electronic Telephone		**X**	**1.0**	**=**	
DDCB/HDCB (w. MDFB)		**X**	**1.2**	**=**	
DDSS/HDSS Console		**X**	**0.8**	**=**	
Add-on Module		**X**	**0.4**	**=**	
RPCI-DI	8	**X**	**0.5**	**=**	**4.0**
PDIU-DI2 and PDIU-DS		**X**	**0.8**	**=**	
Standard Telephone (-48VDC)		**X**	**1.0**	**=**	
Standard Telephone (-24VDC)		**X**	**0.5**	**=**	
Power Failure Unit (DPFT)		**X**	**3.0**	**=**	
HHEU		**X**	**0.1**	**=**	
Stratagy DK		**X**	**1.0**	**=**	
Total -24VDC PF all Telephone Devices				**=**	**20.0**

Note It is not necessary to consider the 5 volt PF for telephone devices.

Table 2-24 DK40i PCB and Power Factors Worksheet Example

In the following example, the total DK40i PFs, 10.2 PF for the +5VDC PF category and 26.5 TPSU16 maximum +5VDC PF = 14; Maximum -24VDC PF = 39.

Base PCBs	PCB Installed		+5VDC PF	-24VDC PF
	Yes	No		
K5RCU2	X		0.6	NR
K5RCU		X		NR
K4RCU3		X		NR
TSIU		X		NR
TCOU		X		NR
TBSU	X		2.5	NR
KSTU2	X		1.0	NR
TDDU		X		NR
TCIU		X		NR
Expansion Unit PCBs	**PCB Name**			
Slot 15	RBSU (2TE)		2.5	3.8
Slot 16	RBSS (2NT)		0.6	0.3
Slot 17	KCDU		1.5	1.2
Slot 18	KCDU		1.5	1.2
Telephone Devices from Table 2-23	N/R		N/R	20.0
	Total DK40i PF =		**10.2**[1]	**26.5**[1]

1. Power factors are within limits. If power factors are exceeded, the system size must be reduced to stay within PF limits.

PCB and Power Factor Worksheets

See examples on previous pages.

Table 2-25 DK40i Telephone/Device Power Factor (Base/Expansion KSU)

Telephone Devices	Quantity Installed	X	-24VDC PF	=	-24VDC PF Total
2000-series Digital Telephone (any series)		X	1.0	=	
Cordless Digital Telephone (DKT2004-CT)		X	1.0	=	
2000-series Electronic Telephone		X	2.0	=	
3000-series Electronic Telephone		X	2.5	=	
6000-series Electronic Telephone		X	2.0	=	
6005-series Electronic Telephone		X	2.0	=	
6500-series Electronic Telephone		X	1.0	=	
DDCB/HDCB (w. MDFB)		X	1.2	=	
DDSS/HDSS Console		X	0.8	=	
Add-on Module		X	0.4	=	
RPCI-DI		X	0.5	=	
PDIU-DI2 and PDIU-DS		X	0.8	=	
Standard Telephone (-48VDC)		X	1.0	=	
Standard Telephone (-24VDC)		X	0.5	=	
Power Failure Unit (DPFT)		X	3.0	=	
HHEU		X	0.1	=	
Stratagy DK		X	1.0	=	
			Total -24VDC PF of all Telephone Devices	=	

Table 2-26 Power Factor Worksheet

Base PCBs	PCB Installed		+5 Volt PF	-24 Volt PF
	Yes	No		
K5RCU2				
K5RCU				
K4RCU3				
TSIU				
TCOU				
TBSU				
KSTU2				
TDDU				
TCIU				
Expansion Unit PCBs	**PCB Name**			
Slot 15				
Slot 16				
Slot 17				
Slot 18				
-24VDC PF of telephones/devices from Table 2-25				
	Total DK40i PF =			

Note If power factors exceed the maximum (+5VDC= 14, -24VDC = 39), the system size must be reduced to stay within PF limits.

DK16/DK16e/DK40/DK40i Component Compatibility

The Strata DK16 Base KSU cannot be upgraded to a DK16e, DK40 or DK40i and the DK16 Expansion Cabinet is not compatible with the DK16e, DK40 or DK40i. The Strata DK40i is not a modification of the DK40, but rather a completely new system.

The DK40i uses the DK40 expansion cabinet. The DK16e can be upgraded to DK40 by changing a ROM chip, but not to a DK40i. The DK40 base cabinet cannot be upgraded to a DK40i.

The original DK16 two-loop start CO line and four-digital station interface unit (KCDU1A) is forward compatible with the DK16e or DK40i.

Most DK16 PCBs are not compatible with the DK40i, including the four-port Standard Station Interface Unit (KSTU1A), four-circuit DTMF/ABR Tone Detection Receiver Unit (K4RCU1A or K4RCU2A), and the Auto Attendant feature cartridge (KFCU1A).

Four of the Strata DK40i PCBs are backward compatible with the DK16, DK16e and DK40. They are: KSTU2A, K4RCU3A, K5RCU and K5RCU2. The DK40i Expansion Cabinet is also backward compatible with the DK16.

Table 2-27 shows the component compatibility between the Strata DK16 components with the DK16, DK16e, DK40 or DK40i systems.

Table 2-27 Strata DK16 Components

Strata DK16 Components		Compatible			
Part	**Description**	**DK16**	**DK16e**	**DK40**	**DK40i**
DKSUB16A	DK16 Base Cabinet	X			
KSTU1A	4-Standard Telephone Interface Unit	X			
K4RCU1A & K4RCU2A	4-DTMF/ABR Tone Receiver	X			
KFCU1A	Auto Attendant Feature Cartridge	X			
DKSUE16A	DK16 Expansion Cabinet	X			
KCDU1A	2-Loop CO AND 4-DKT Interface Unit	X	X	X	X
KPSU16A	Replacement Power Supply for DK16	X			

Table 2-28 shows the component compatibility between the Strata DK16e, DK40 and DK40i components with the DK16, DK16e, DK40 or DK40i systems.

Table 2-28 Strata DK16e/DK40i Components

Strata DK16e/DK40/DK40i Components		Compatible			
Part	**Description**	**DK16**	**DK16e**	**DK40**	**DK40i**
TCOU1A	4-Loop CO Line Interface Unit		X	X	X
TDDU1A	4-DID CO Line Interface Unit		X	X	X
TCIU2A	Caller ID Interface Unit		X	X	X
TSIU1A	2-I/O Serial Interface Unit		X	X	X
KSTU2A	4-Standard Telephone Interface Unit	X	X	X	X
K4RCU3A, K5RCU1A or K5RCU2A[1]	4- or 5-DTMF/ABR Tone Receiver (only 4 DTMF receivers will operate on DK16 and DK16e)	X	X	X	X
KKYS1A	Auto Attendant Feature Key		X	X	X
DKSUE16A	DK16 Expansion Cabinet	X			
DKSUET16A	DK16e Expansion Cabinet	X	X	X	X
DKSUE40A	DK40i Expansion Cabinet	X	X	X	X
KCDU1A	2-Loop CO and 4-DKT Interface Unit	X	X	X	X
TPSU16A	Replacement Power Supply for DK40i		X	X	X
TBSU1A	2-circuit ISDN BRI S/T Unit				X
RBSU1A	2-circuit ISDN BRI S/T Unit				X
RBSS1A	2-circuit ISDN BRI S/T Unit				X

1. For 9~12 DID and/or Tie lines, use K5RCU1A or K5RCU2A, not the K4RCU3A.

DK40i Installation 3

This chapter explains how to install the Strata DK40i system. It includes information on site requirements, wiring diagrams, and step-by-step instructions on how to install the unit(s), the ground wiring, AC power cabling, reserve power (battery backup) cabling, and PCB cabling.

Inspection

1. When the system is received, examine all packages carefully and note any visible damage. If any damage is found, do not open the packages. Contact the delivery carrier immediately and make the proper claims.
2. After unpacking (and before installing), check the system against the packing list and inspect all equipment for damage. If equipment is missing or damaged, contact your supplier immediately.
3. Be sure to retain original packaging materials for re-use when storing or transporting system hardware.

Packaging and Storage

CAUTION! **When handling (installing, removing, examining) PCBs, do not touch the back (soldered) side or edge connector. Always hold the PCB by its edges.**

➤ When packaging and storing the system, remove PCBs from the system cabinet (the power supply may remain installed in the cabinet for storage and shipment). PCBs should be packaged in their original antistatic bags for protection against electrostatic discharge. Be sure to package equipment in its original shipping containers.

Site Requirements

This section defines the installation site requirements necessary to ensure a proper operating environment for the DK40i. Also included are grounding requirements.

Input Power

The system requires an input power source of 115VAC ± 10VAC, 50/60 Hz, 15 amps. The AC outlet is recommended to be dedicated and unswitched, with a solid third-wire ground. (See "AC Power and Grounding Requirements" on Page 3-4.)

This eliminates interference from branch circuit motor noise or the like, and to prevent accidental power-off. To avoid accidental power turn-off, Toshiba recommends that you do *not* use an ON/OFF wall switch on this dedicated AC circuit.

For the Strata DK40i, a reserve power source (two customer-supplied 12-volt batteries) may be connected to the system to serve as a power failure backup.

Clearance and Location

The minimum clearance requirements for the Strata DK40i Base and Expansion KSUs are shown in Figures 3-1 and 3-2. Refer to Page 3-5 for DK40i KSU mounting instructions.

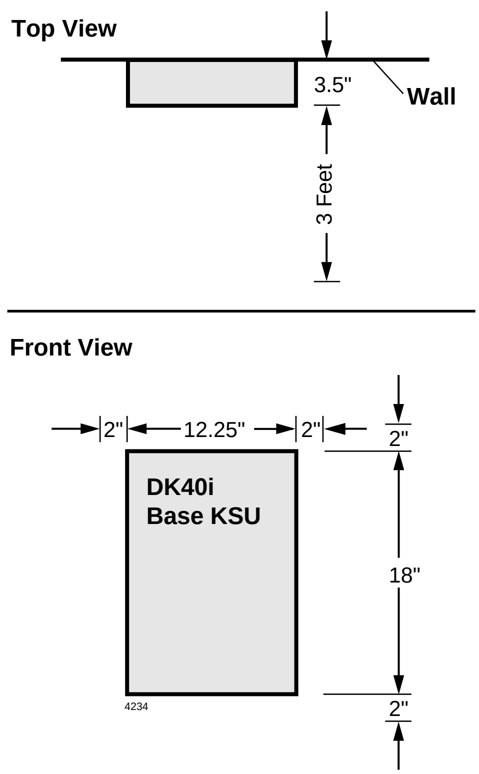

Figure 3-1 DK40i Base KSU Clearance Requirements

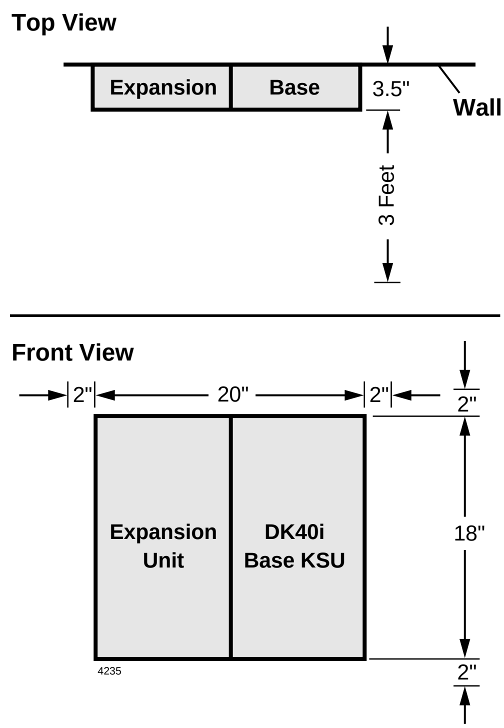

Figure 3-2 DK40i Base KSU and Expansion KSU Clearance Requirements

Consider the following conditions when selecting a location for the KSU(s):

The location *must be*:

- Dry and clean
- Well ventilated
- Well illuminated
- Easily accessible

The location *must not be*:

- Subject to extreme heat or cold
- Subject to corrosive fumes, dust, or other airborne contaminants
- Subject to excessive vibration
- Next to television, radio, office automation, or high frequency equipment

If reserve power is to be installed for the Strata DK40i, the batteries will require a well-ventilated location close (within nine feet) to the DKSUB40 (the optional Toshiba-supplied battery cable is nine feet in length).

Table 3-1 provides a summary of the electrical and environmental characteristics

Table 3-1 Summary of Electrical/Environmental Characteristics

DK40i Primary Power	
Input AC (Power Supply Specification) AC frequency Power AC input current	85~135VAC 50/60 Hz DK40i - 75 watts maximum 1.8A maximum
Environmental Specifications	
Operating temperature Operating humidity Storage temperature	32~104° F (0 ~40° C) 20~80% relative humidity without condensation -4~158° F (-20~70° C)
Power Supply	
DC voltage output specification	-24VDC (-25.94~-28.66VDC) +5VDC (+4.5~+5.5VDC) -5VDC (-4.5~-5.5VDC) - Expansion KSU only
Battery Charger Characteristics	
	Charger: current limiting Nominal float voltage: 2.275 volts/cell Charge current: 0.7 amps maximum Battery discharge cut-off voltage: 20.5 ±0.5VDC
KSTU2, PSTU or PESU (Circuits 1 and 2)	
Ring Voltage	Square wave output with high/low option jumper: Low position 130 ± 20VDC peak-to-peak (no-load) High position, 190 ± 25VDC peak-to-peak (no-load)
Ringing capability	2 REN maximum per circuit, high or low position
KSTU2, PSTU, or PESU modem interface data rate	14,400 bps maximum
RSTU, RSTU2 or RDSU	
Ring Voltage	80V RMS sine wave
Ringing capability	1.5 REN per circuit, with or without Message Waiting
RSTU2 Message Waiting Voltage	-90VDC/one telephone per circuit (max.)
RSTU, RSTU2, or RDSU modem interface data rate	14,400 bps maximum
Traffic Rating Characteristics	
9 CCS per station system-wide	

AC Power and Grounding Requirements

The DK40i requires a solid earth ground for proper operation.

The AC power cord contains a conductor for the "third-wire ground" provided by the commercial power outlet. The third-wire ground should be the only ground necessary for the DK40i; this ground must originate at the buildings main power distribution panel and have a solid connection to earth ground. (See Figure 3-3.)

CAUTION!	**Lack of proper ground may cause improper operation and, in extreme cases, system failure.**

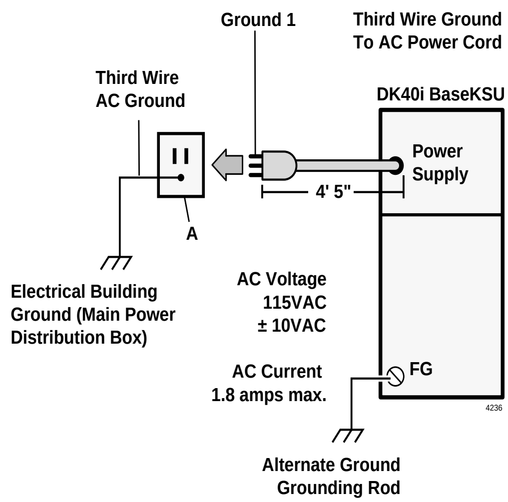

Figure 3-3 DK40i Grounding Diagram

AC Power and Third-wire Ground Test

Test the "third-wire ground" for continuity by either measuring the resistance between the third prong terminal (earth ground) and a metal cold water pipe (maximum: 1 ohm), or by using a commercially available earth ground indicator. If neither procedure is possible, perform the following earth ground test procedure.

WARNING!	**Hazardous voltages that may cause death or injury are exposed during the following test. Use great care when working with AC power line voltage.**

➤ **To perform the earth ground test procedure**

1. Obtain a suitable voltmeter, and set it for a possible reading of up to 250VAC.
2. Connect the meter probes between the two main AC voltage terminals (white and black wires) on the wall outlet. The reading obtained should be between 100~125VAC.
3. Move one of the meter probes to the third terminal (green wire ground). Either the same reading or a reading of zero volts should be obtained.
4. If the reading is zero volts, leave one probe on the ground terminal and move the other probe to the second voltage terminal.

CAUTION!	**If a reading of zero volts is obtained on both voltage terminals (white wire to green wire, black wire to green wire), the outlet is not properly grounded. Omit Steps 5 and 6, and see following CAUTION!**

5. If a reading of zero volts on one terminal, and a reading of 100~125VAC on the other terminal is obtained, remove both probes from the outlet.

6. Set the meter to the "OHMS/Rx1" scale. Place one probe on the ground terminal, and the other probe on the terminal that produced a reading of zero volts. The reading should be less than 1 ohm.

CAUTION! **If the reading is more than one ohm, then the outlet is not adequately grounded. If the above tests show the outlet AC voltage is not in range or is not properly grounded, the condition should be corrected (per Article 250 of the National Electrical Code) by a qualified electrician before the system is connected.**

Alternate or Additional Ground

If the "third-wire" AC ground can not practically be improved or if extreme motor noise or other disturbance causes system malfunction, or if local area lightning storms exist, a separate direct ground may be warranted.

Connect a separate earth ground from a cold water pipe or earth grounding rod directly to the FG screw terminal on the DK40i power supply (see Figure 3-3).

KSU Mounting Considerations

The Base KSU and the optional Expansion KSU are both designed to be mounted on a wall or other vertical surface. Toshiba recommends using method 1 or 2 (see Figure 3-4).

Prior to Installation

1. Loosen the screws on the front cover and the side cover of the Base KSU, remove the covers (see Figure 3-5). Figure 3-6 on Page 3-11 details the interior.
2. Place the BATT jumper plug to the ON position.
3. Install a CO line board, either the TDDU or TCOU onto the TMAU board **(**see Figure 3-7).

   The TCOU provides four loop start CO lines and can accommodate the Caller ID interface unit.

   The TDDU provides four DID lines.
4. Set CO line card switches.

   TCOU: Set the TCOU PAD switches (SW400-SW475) to the appropriate position (see Figure 3-21 on Page 3-32). The factory setting is NORMAL. If CO lines are connected to a PBX or are in close proximity to the central office the PAD position may be required.

   TDDU: Set the TDDU PAD switches to the appropriate position. Also, set the high/low voltage jumper plugs as required for proper dial pulse operation. See Figure 3-22 on Page 3-35.
5. If you are not installing a TCIU2, skip to Step 6. To install the TCIU2 (see Figure 3-20 on Page 3-29), align the prongs P20, P21, and P22 over P120, P121, and P122 of the TCOU and gently press down. Slip the plastic stand-off hook through the hole.

CAUTION! **To prevent system malfunction, DO NOT install TCIU1 in the DK40i system.**

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6. The TCOU or TDDU cards have a green and yellow wire with a two-prong spade on the end. Slip the spade under the second screw from the right on the power supply (see Figure 3-7).
7. If applicable, install KSTU2 Standard Telephone Interface Unit. The KSTS2 comes pre-installed onto the KSTU2. Then install both boards into the DK40i Base KSU (see Figures 3-17~3-19, beginning on Page 3-26).
8. If applicable, install the K5RCU or K5RCU2 or K4RCU3 (which provides Automatic Busy Redial and DTMF tone detection) into the Base KSU (see "K4RCU, K5RCU or K5RCU2 Installation" on Page 3-23).
9. If applicable, install the KKYS (which provides built-in Auto Attendant) onto the K5RCU or K5RCU2 or K4RCU3.
10. If applicable, install the TSIU Serial Interface PCB into the KSU (Figure 3-23 on Page 3-37). If the TSIU is used for SMDR or TTY, then the PIOU/PIOUS SMDR/TTY output is not active.

Testing the System's Power Supply

If the "AC" or "DC" LEDs fail to light in Steps 1 or 3, see TPSU16 Circuit Breaker Reset Procedure–Case 1.

1. Plug the AC power cable into an outlet (see Figure 3-8). The "AC" LED on the power supply lights green.
2. Turn ON the DC power switch for the TPSU16 power supply (see Figure 3-6). The "DC" LED on the power supply lights green.
3. Using a voltmeter or other device which checks voltage, measure the voltages referenced to frame ground (FG) at the P16 connector pins (test points) located on the motherboard. The voltages should fall within the ranges below.
    - ♦ Yellow-green, black, and green wires: 0V
    - ♦ Two yellow wires: -27V
    - ♦ Range: -25.94V~-28.66V

    If the voltages do not fall within the ranges, unplug the DC power pins from the P16 connector and measure again at the same location; if the ranges remain unacceptable. See TPSU16 Circuit Breaker Reset Procedure–Case 2.

TPSU16 Circuit Breaker Reset Procedure

Case 1

If the AC and DC LEDs on the TPSU16 power supply in the Strata DK40i Base KSU do not light, even though the AC power plug is inserted into the wall outlet and the TPSU16 DC power switch is turned on, the AC overvoltage circuit breaker may have opened.

➤ **To reset the AC overvoltage circuit breaker**

1. Remove the AC power plug from the wall outlet, turn the DC power switch OFF, and wait six minutes.
2. After six minutes, insert the AC plug back into the wall outlet and turn the DC power switch ON. The AC and DC LEDs should turn on and the system should operate.

   If the system fails to operate, either the wall outlet is not providing AC power or the system's power supply is defective.
3. If the AC power checks good, replace the power supply (see "Power Supply Removal and Replacement" on Page 3-19).

Case 2

If the TPSU16 power supply AC and DC LEDs light, but the system does not operate, the TPSU16 DC output overcurrent circuit breaker may have opened because of a DC short circuit.

➤ **To reset the DC output overcurrent circuit breaker**

1. Turn the DC power switch OFF for 15 seconds and then turn it back on. The system will go back to normal operation if the overcurrent breaker resets.
2. If the system continues to fail, press in the two -24VDC circuit breakers located on the bottom left corner of the TPSU16 power supply.

   If, then, the system does not return to normal operation, the TPSU16 power supply may be defective or an optional PCB may be shorting out the TPSU16.
3. Remove all optional PCBs and the Expansion KSU to locate the short, then repeat Steps 1 and 2 and perform the power supply test.
4. If the power supply fails the test, replace the power supply (see "Power Supply Removal and Replacement" on Page 3-19 for more information.). If the power supply passes the test, the DK40i Base KSU is probably defective.

Mounting the Base KSU

WARNING! To prevent electrical shock, make sure the power supply switch is turned OFF.

➤ To mount the Base KSU

1. Place the Base KSU on the desired location on the mounting surface and mark the location of the four screw holes (there is one on each corner). See Figure 3-6.

   Make sure the location of the Base KSU meets the minimum clearance requirements specified in Figure 3-1 on Page 3-2.

Note The Base KSU AC power cord is 4 feet 5 inches long.

2. Drill holes on these marks.

   If mounting the KSU directly to a wall, align screws with studs behind the wall. If using a hard board between the KSU and the wall, install screws first to the hard board, and then secure the hard board to the wall, making certain that screws are aligned with studs.

3. Secure screws approximately two thirds of the way into the top two holes on the mounting surface.
4. Hang the unit from the top two screws and then secure the screws completely into the mounting surface.
5. Finish securing the unit to the mounting surface by completely screwing the bottom two screws into the wall.
6. Ground system according to "AC Power and Grounding Requirements" on Page 3-4.
7. Connect applicable wiring (e.g., modular CO line cords, 25-pair amphenol connector cable–see Figure 3-25 on Page 3-41) to the Base KSU and then fasten wiring to the unit with the tie wrap that comes with the Base KSU (see Figure 3-8 on Page 3-13). Remove amphenol connector clamp from plastic bag that comes with the Base KSU. Fasten the clamp to hold the amphenol connector.
8. Connect Reserve batteries and plug battery cable into BATT connector of the KPSU16 power supply (see "Reserve Power Option" on Page 3-17).
9. If the Expansion KSU is going to be installed, refer to "Mounting the Expansion KSU" on Page 3-9. If not, proceed to Step 1.
10. Plug the AC power cable into an outlet and then turn ON the power supply switch.
11. Reinstall the front and side covers onto the Base KSU.

Mounting the Expansion KSU

Important! *For purposes of identification, the labels appear on the boxes and Expansion KSUs (see Table 3-2).*

Table 3-2 Expansion Unit Labels

	DK40i	DK40	DK16e	DK16
Expansion Unit Box Labels	DKSUBI40A	DKSUB40A	DKSUBT16A	DKSUB16A
Expansion KSU Model No. (expansion case bottom)	Model DKSUE40A[1] Strata DK40	Model DKSUE40A Strata DK40	Model DKSUET16A Strata DK16e	Model DKSUE16 Strata DK16

1. Strata DK40 may appear on a label.

WARNING! To prevent electrical shock, make sure the power supply switch is turned OFF.

➤ **To mount the Expansion KSU (see Figures 3-4, 3-6, 3-8~3-11)**

1. Make sure the side cover is removed from the Base KSU. Turn Base KSU DC power switch OFF.
2. Set the Expansion KSU on the Base KSU's hinge mounts, making sure that the Expansion KSU sets properly in place.
3. Remove the safety lock from plastic bag that comes with the Expansion KSU. Install safety lock to the Base KSU as shown.
4. Pull out on the safety lock until it can no longer be moved, securing the Expansion KSU to the Base KSU. Do not detach the lock from the Base KSU.
5. Connect the Expansion KSU ribbon cable to the connector on the Base KSU. Close ribbon cable connector lock on Base KSU.
6. Connect Expansion KSU green/yellow ground wire plug (FG2) to TB1 of the Base KSU. (Make sure the plug locks on FG2.)
7. Making sure that the Expansion KSU is flush against the mounting surface, mark the location of the Expansion KSU mounting screw hole.
8. Swing the Expansion KSU away from the mounting surface, and drill a hole at the mark made in Step 7.
9. Install the PCBs per "Worksheet 1 – System PCB Assignment Guide" on Page 2-11 and slide the slot lock to the lock position.
10. Swing the Expansion KSU back to the mounting surface and secure it to the surface with a screw.
11. Connect the wiring (e.g., modular CO line cords, 25-pair amphenol connector–per Chapter 8 – DK40i/DK424 Universal Slot PCB Wiring) to the PCBs.
12. Fasten the wiring with Tie wraps (supplied) to the bottom of the expansion and Base KSUs.
13. Knock out the tab on the bottom of the side cover.
14. Plug the AC power cable into an outlet and then turn ON the power supply switch.
15. Install the side cover to the Expansion KSU.

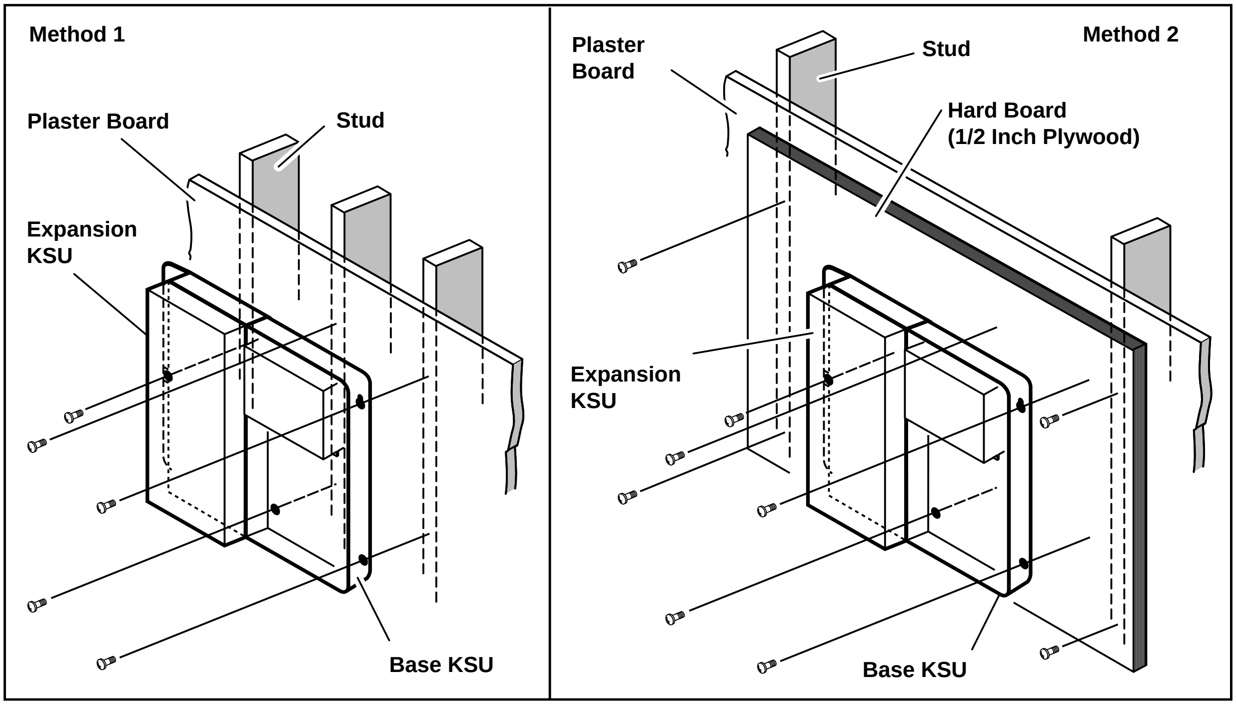


Figure 3-4 KSU Wall Mounting

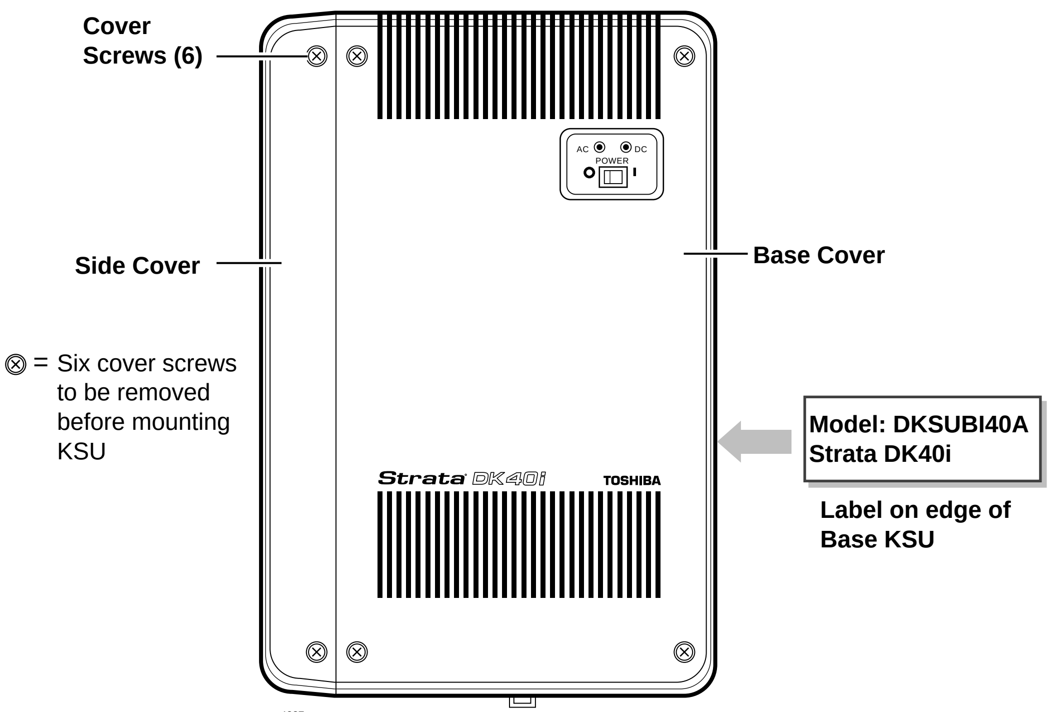


Figure 3-5 Base KSU Exterior

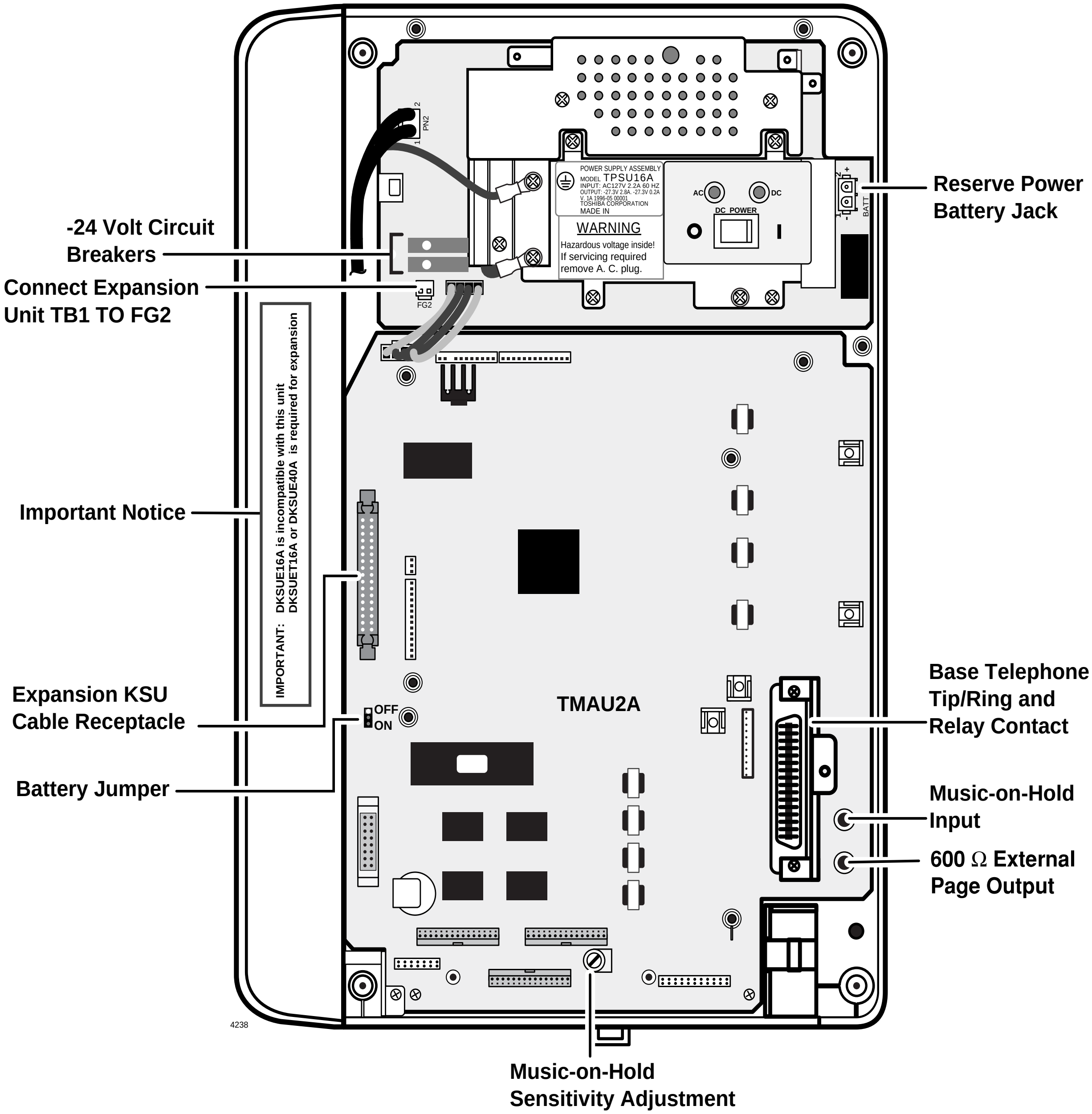


Figure 3-6 DK40i Base KSU Interior

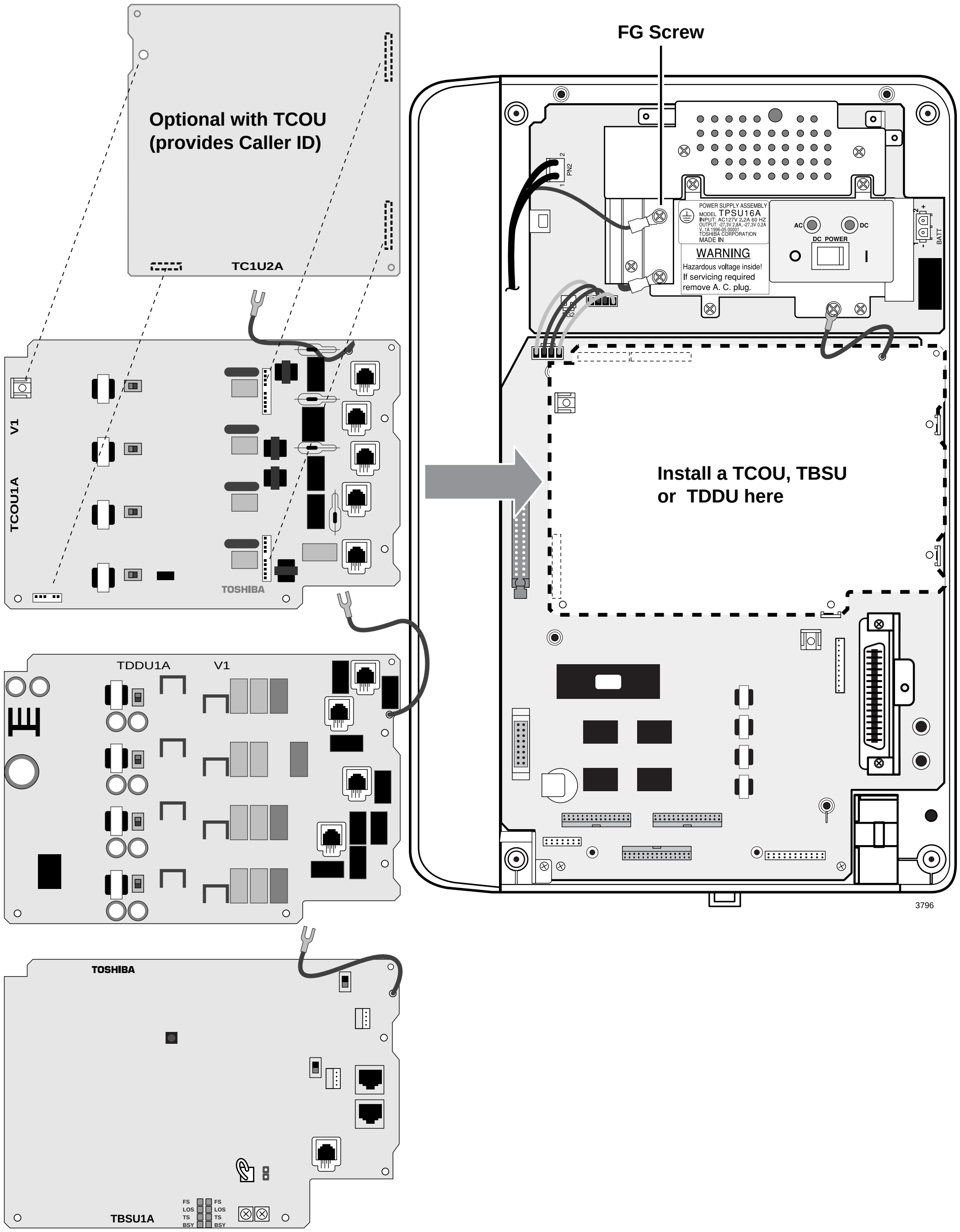


Figure 3-7 CO Line Board Installation into DK40i Base KSU

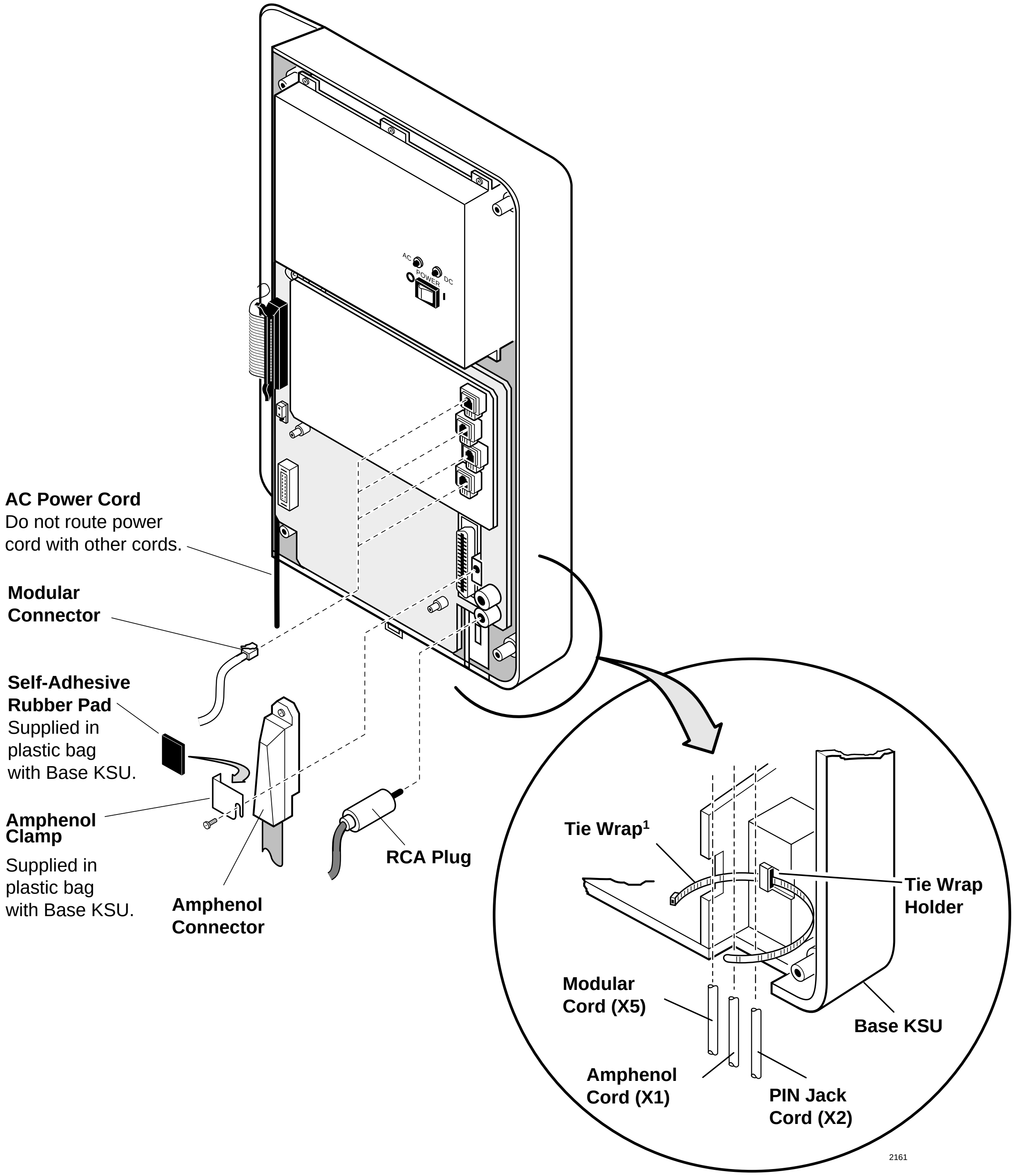


Figure 3-8 Base KSU Cables and Connectors

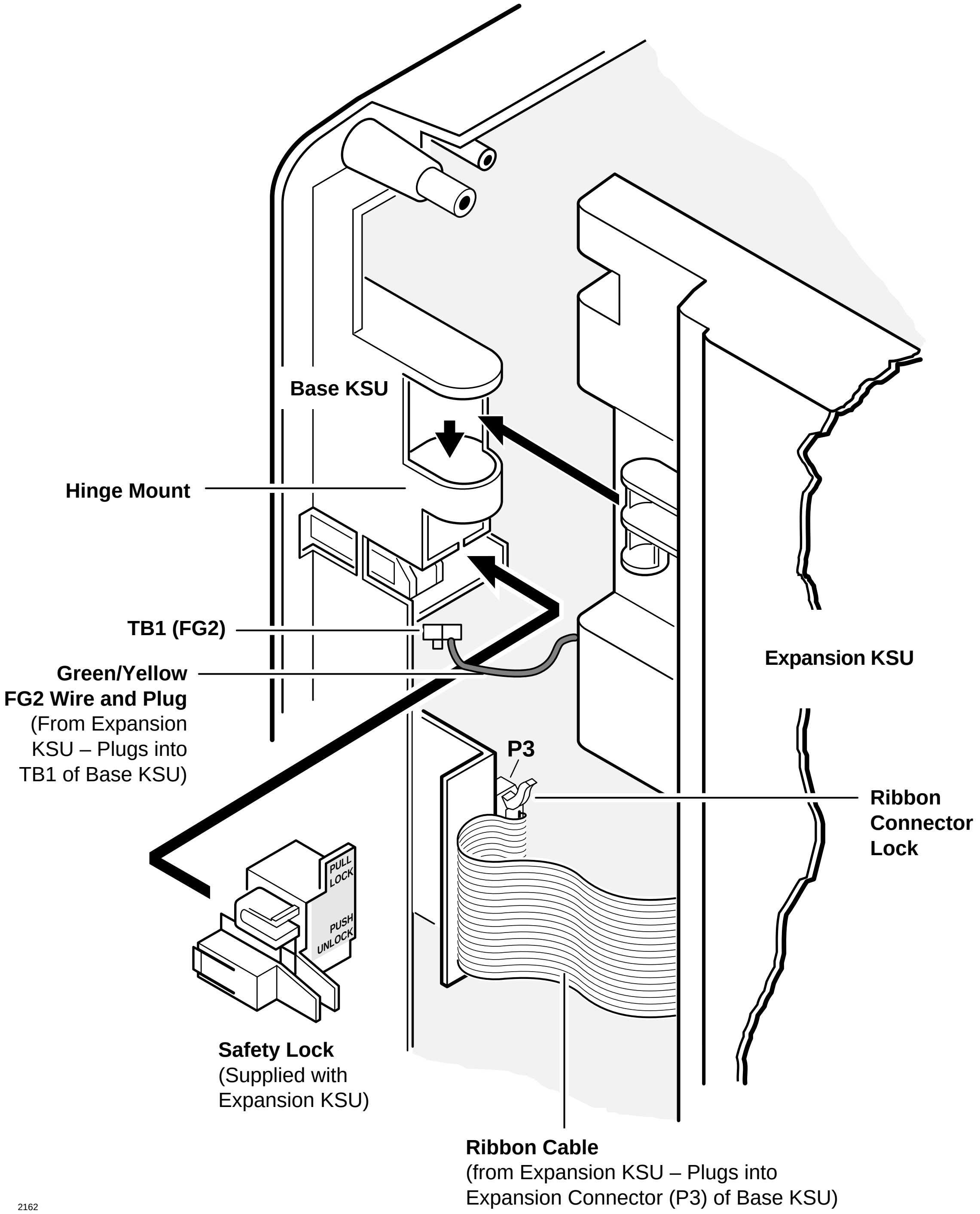


Figure 3-9 Base to Expansion KSU Connection

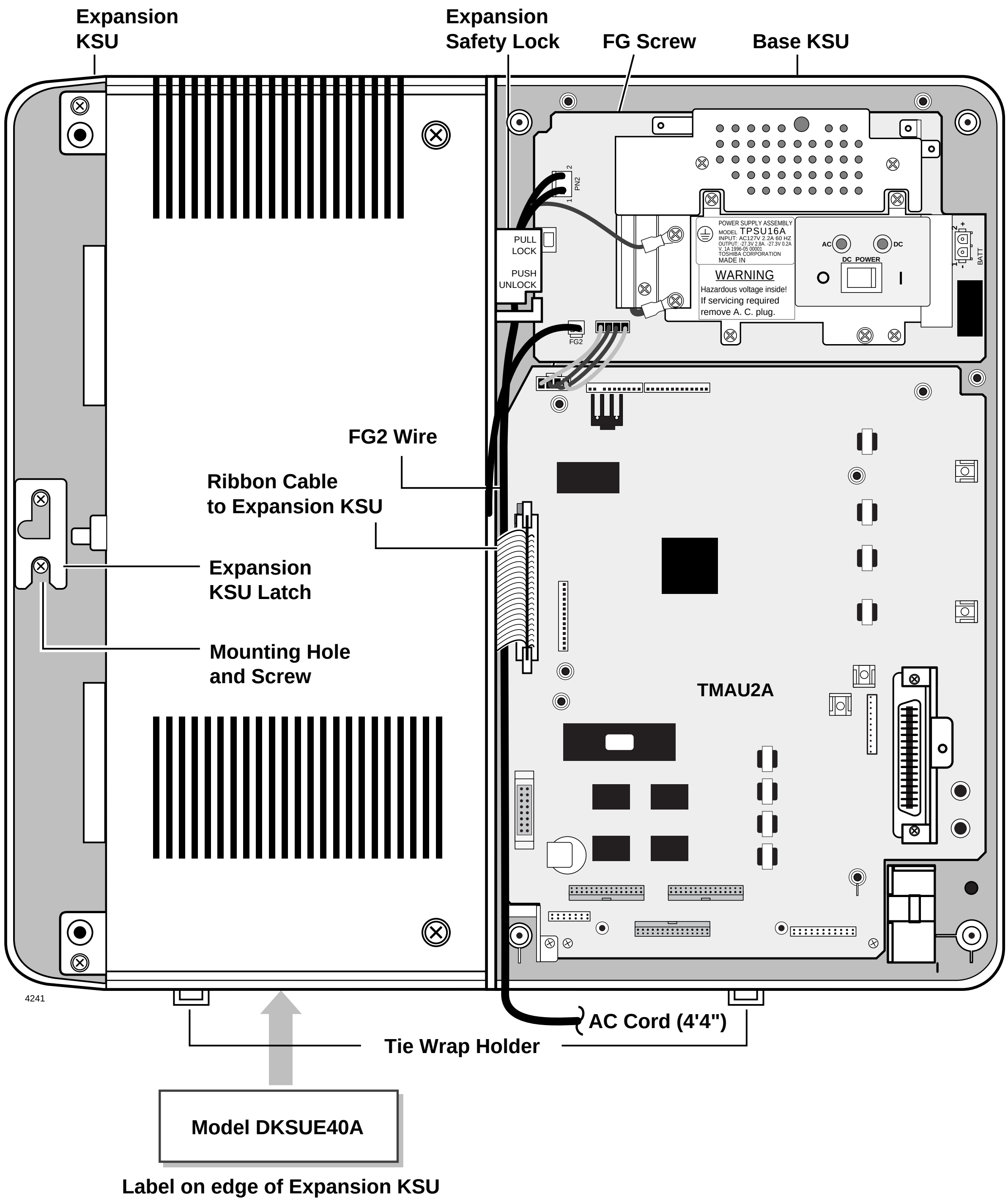


Figure 3-10 Expansion KSU Mounting and Connections

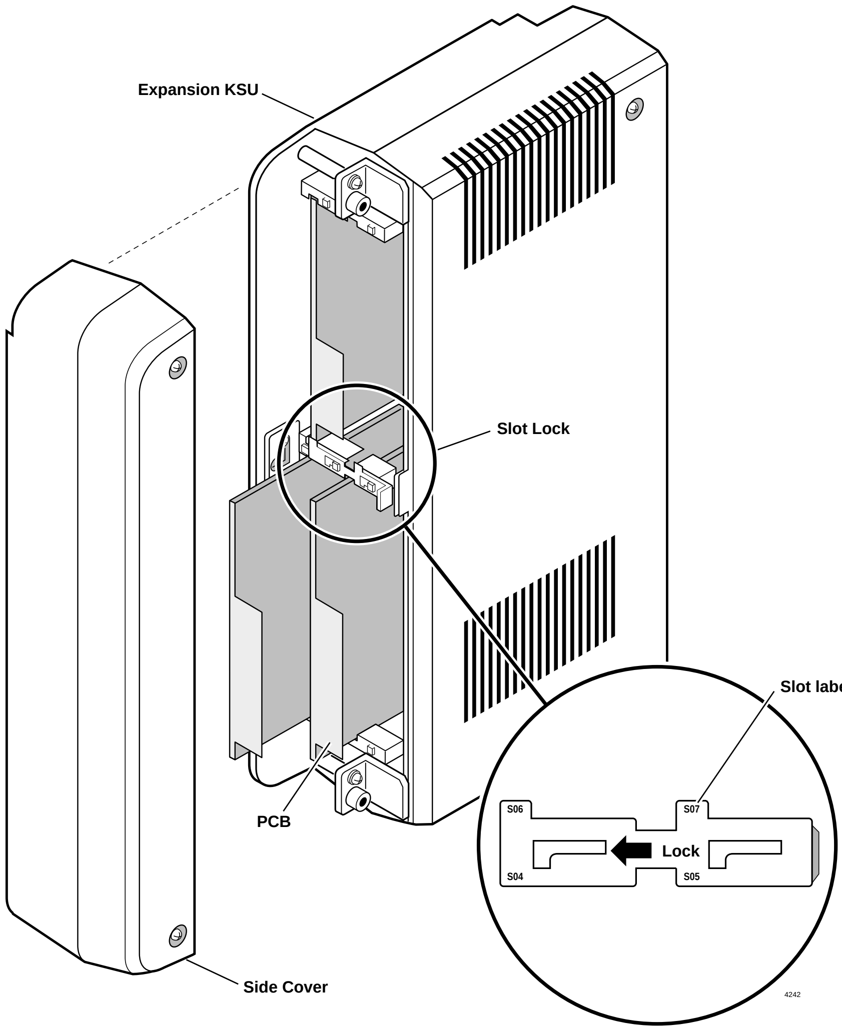


Figure 3-11 Expansion KSU Slot Lock

The DK16e Expansion Cabinet can be used on the DK40i Base Unit. The DK16e and DK40i Expansion Cabinet slot labels are different from the Program 03 slot numbers. Table 3-3 provides the slot labels and Program 03 slot numbers.

Table 3-3 DK16e and DK40i Expansion Cabinet Slot Names

DK40i Slot Label	DK40i Prg 03 Slot Number
S04	S15
S05	S16
S06	S17
S07	S18

Reserve Power Option

A reserve power source (two customer supplied 12-volt batteries) can be connected to the DK40i power supply to ensure uninterrupted system operation in the event of a power failure. A pre-assembled interface cable for installation of the Reserve Power option is available from Toshiba (PBTC-3M), see Figure 3-12.

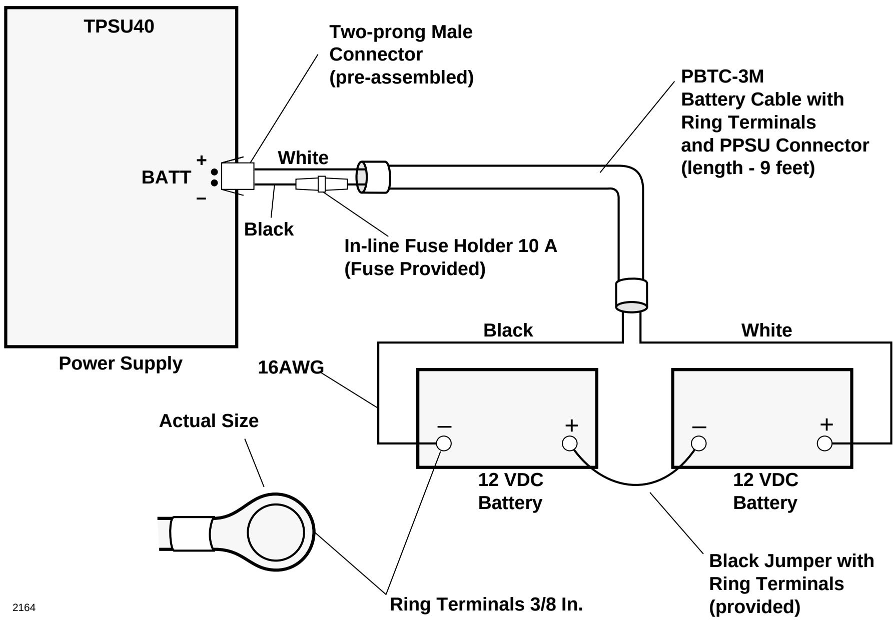


Figure 3-12 System Power Supply Wiring

Important! *Local ordinances may dictate battery type and installation details.*

The batteries require a well-ventilated location within nine feet of the system (the interface cable is nine feet long).

WARNING! **To reduce the risk of fire or injury to persons, read and follow these instructions:**

- **Use only 12-volt, gelcell batteries.**
- **Do not dispose of the batteries in a fire. The cells may explode. Check with local codes for possible special disposal instructions.**
- **Do not open or mutilate the batteries. Released electrolyte is corrosive and may cause damage to the eyes or skin. It may be toxic if swallowed.**
- **Exercise care in handling batteries in order not to short the battery with conduction materials such as rings, bracelets, and keys. The battery or conductor may overheat and cause burns.**
- **Charge the batteries provided with or identified for use with this product only in accordance with the instructions and limitations specified in this manual.**
- **Observe proper polarity orientation between the batteries and battery charger.**

Reserve Power Installation

1. Connect the PBTC-3M black jumper wire from the positive terminal of one 12VDC battery to the negative terminal of the second 12VDC battery. See Figure 3-12.
2. Ensure that a serviceable 10-ampere fuse is installed in the in-line fuse holder of the PBTC-3M battery cable.
3. Connect the white lead of the PBTC-3M battery cable to the open positive terminal of the 12VDC battery. Connect the black lead to the open negative terminal of the second 12VDC battery.

Important! *The KSU must be connected to the live operating (hot) AC power source, and the power supply ON/OFF switch set to ON prior to the final step of connecting the reserve power batteries to the power supply via the BATT +/- receptacle. If the batteries are connected after AC power is lost, reserve power will not function.*

4. Connect the PBTC-3M battery cable two-prong male plug to the power supply BATT +/- receptacle.
5. To test reserve power operation, disconnect the system AC power plug with the power supply power ON/OFF switch in the ON position. The system should continue to operate without any interruption.
6. Plug the AC power cable into PN2.
7. Plug the AC power cable into an outlet and turn ON the power supply switch.
8. See “Prior to Installation” to confirm that the power supply is working properly.
9. Plug reserve battery cable into BATT connector of power supply.

Power Failure Emergency Transfer Option

To enable this option, a dedicated standard telephone must be connected to the Power Failure Transfer Interface (PF1) of a DK40i Base KSU equipped with a TCOU.

Note During normal operation, this telephone cannot be used and does not count as a station (does not reduce the number of system’s available stations).

If there is a power failure, the telephone automatically is connected to CO Line 1. When power is restored, the system resumes normal station and CO line assignments, and the dedicated telephone becomes inoperative again.

Important! *This is not available on a DK40i system with a TDDU installed.*

Installing Power Failure Emergency Transfer

➤ Connect a standard telephone to the PF1 connector in the Base KSU (see Figure 3-13).

Testing Power Failure Emergency Transfer

1. Turn the system power switch OFF.
2. Lift the emergency standard telephone handset, and verify that there is CO dial tone.

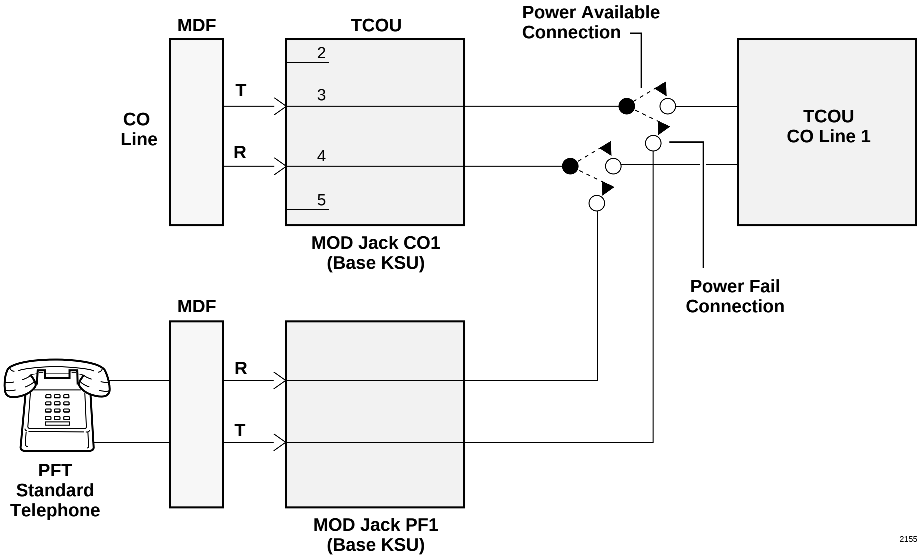


Figure 3-13 Base KSU Power Failure Transfer (PFT) Circuit Diagram

Power Supply Removal and Replacement

The power supply (TPSU16A) comes factory-installed in the Base KSU; if necessary, it can be removed and replaced.

Power Supply Removal

1. Make sure that the power supply switch is OFF and that the AC power cable is not plugged into an outlet. Confirm that the green AC LED is not lit (see Figure 3-14).

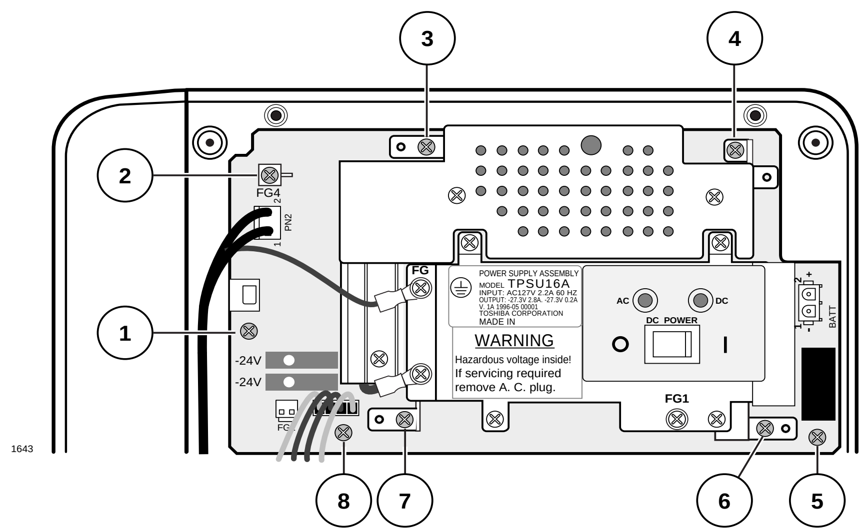


Figure 3-14 Power Supply (TPSU16A)

2. Unplug reserve battery cable from BATT connector of power supply.

DK40i Installation

3. Unplug the FG2 plug from the Expansion KSU ground wire.
4. Unplug the DC cable from the DC OUT connector (P16).
5. Remove the FG screw from left side of power supply to free FG wire/terminal and building ground wire.
6. Unplug the AC power cord from PN2.
7. Remove the seven screws that attach the power supply to the Base KSU. Remove the power supply.

Power Supply Replacement

1. Set the power supply in its proper place in the Base KSU (see Figure 3-14).
2. Secure the power supply to the Base KSU with the seven screws.
3. Connect the FG1 wire from the TCOU or TDDU to the FG1 screw on the power supply.
4. Plug the DC cable into the DC OUT connector. The green/yellow wire is on right-hand side.
5. Fasten FG green wire ring terminal and building ground wire to the left side of the power supply with the FG screw.
6. Plug the Expansion KSU green/yellow ground wire into FG2.

Printed Circuit Board (PCB) Installation

This section details Strata DK40i system PCBs installation into the Base and Expansion KSUs. Also described are optional configuration information and programming considerations for each PCB.

Base KSU PCBs

The Strata DK40i processor is built into the motherboard (TMAU2) and comes with eight digital telephone circuits (ports). The line circuits are on the TCOU or TDDU PCBs, which attach to the P10, P11 and P12 connectors on the TMAU. The PCBs that can be installed into a DK40i KSU are shown in Table 3-4.

Table 3-4 DK40i Base KSU PCBs

<table>
<tr><th>PCB</th><th>Provides</th><th>Installs On</th><th>Comments</th></tr>
<tr><td>TCOU</td><td>Four loop start CO line circuits</td><td rowspan="3">TMAU2 motherboard</td><td rowspan="3">Only one TCOU, TBSU or TDDU can be installed on the motherboard.</td></tr>
<tr><td>TDDU</td><td>Four DID line circuits</td></tr>
<tr><td>TBSU</td><td>2 BRI (S/T) circuits</td></tr>
<tr><td>TCIU2</td><td>Four caller ID circuits</td><td>TCOU</td><td>To prevent system malfunction, do not install a TCIU1 in the DK40i system.</td></tr>
<tr><td>KSTU2</td><td>Four standard telephone circuits</td><td rowspan="3">TMAU2 motherboard</td><td></td></tr>
<tr><td>TSIU</td><td>Up to two serial interfaces (TTY and SMDR)</td><td>Only one TSIU can be installed per DK40i system. When installed, the TSIU does not use a slot.</td></tr>
<tr><td>K5RCU2, K5RCU or K4RCU3</td><td>Recognizes DTMF tones generated by a standard telephone and is required for DISA, Tie and DID lines and the DK40i built-in Auto Attendant. Also used to detect busy tone for the ABR feature.</td><td></td></tr>
<tr><td>KKYS</td><td>Automated Attendant</td><td>K5RCU2, K5RCU or K4RCU3</td><td></td></tr>
</table>

Toshiba recommends installing the Base KSU option PCBs, K5RCU2, K5RCU or K4RCU3 and/or KSTU2, before mounting the Base KSU on the wall. Install the Expansion KSU per Page 3-9, then install the Expansion KSU option PCBs.

The Base KSU slots 00~14 are automatically assigned the following codes in Program 03 when the system is turned on and the Base KSU PCBs are installed.

Slot 00: Code 91 without K4RCU3; Code 92 with K4RCU3; Code 98 with K5RCU2 or K5RCU

Slot 11: Code 62 eight digital telephones with OCA/DIU, 64 for OCA/DIU/DSS.

Slot 12: Code 11 for TCOU, 16 for TDDU or 77 for TBSU (four loop, four DID lines or two BRI circuits).

Note If installing TBSU, set each BRI circuit for station side or line side before installing more PCBs. Each BRI station circuit uses two station ports and each BRI line circuit uses two CO lines.

Slot 13: Code 31, four KSTU2 ports

Slot 14: Code 81, four TCIU2 circuits

Expansion KSU PCBs

A DK40i Expansion KSU from the factory does not come with any PCBs installed. (See Table 2-3 on Page 2-3 for a list of PCBs supported by the DK40i Expansion KSU and Chapter 7 – DK40i/DK424 Universal Slot PCBs for detailed descriptions/installation instructions.) Toshiba recommends that PCBs which support electronic, digital or wireless telephones be installed into slots 15 and 16 because slots 17 and 18 cannot support speaker Off-hook Call Announce (OCA) or Data Interface Units (DIUs) or more than 8 wireless handsets. See "Base/Expansion KSU Compatibility" beginning on Page 2-3 for configuration information for DK40i PCBs.

PCB Hardware/Software Options

PCBs can be configured for a variety of hardware and software options. Hardware options are defined as either internal (generally related to optional PCB subassemblies) or external (related to connection of peripheral equipment, such as background music, voice mail, etc.). Hardware and software options for each PCB are identified in the individual PCB installation procedures in this chapter.

PCB Hardware Options

Each PCB must be configured for the applicable hardware options prior to installation of the PCB. Configuration instructions for internal hardware options are provided in the individual PCB installation procedures in this chapter and Chapter 8 – DK40i/DK424 Universal Slot PCB Wiring. Configuration instructions for external hardware options are provided in Chapter 10 – Peripheral Installation.

PCB Software Options

After installation of the PCBs in the KSU, configure the PCBs for software options through programming. A programming overview for each PCB is provided in this chapter. Refer to the *Strata DK Programming Manual* for more detailed programming instructions.

PCB Installation/Power Supply Considerations

WARNING! **To avoid electrical shock, make sure that the power supply is OFF whenever removing or installing PCBs.**

Before installing any PCBs, make sure the power supply has been tested, and the ground has been checked. (See "AC Power and Grounding Requirements" on Page 3-4.)

PCB Wiring

See "MDF Wiring Diagrams" on Page 3-41 in this chapter for DK40i Base KSU wiring and Chapter 8 – DK40i/DK424 Universal Slot PCB Wiring for Expansion KSU wiring. See Chapter 16 – Strata AirLink Systems for RWIU wiring.

Digital Telephone Circuits

The eight digital telephone circuits that come standard with the system are integrated into the DK40i motherboard in the Base KSU. These circuits are identical to the digital circuits found on the PDKU. The motherboard does not have to be configured for the digital circuits to operate. For wiring, see "MDF Wiring Diagrams" on Page 3-41.

K4RCU3, K5RCU and K5RCU2 DTMF Receiver/ABR Tone Detector Unit

System: *DK40i Base KSU*

Circuits per PCB: *K4RCU3: four DTMF receivers and four ABR busy tone detectors*
K5RCU, K5RCU2: five DTMF receivers and five ABR busy tone detectors.

Interfaces with: *automatic busy redial (ABR)*
interprets DTMF tones
DISA, DID, Tie lines
built-in auto attendant

Older Version(s): *K4RCU (not compatible with DK40i)*
K4RCU3 or K5RCU (compatible with DK16 and DK40i

The K4RCU3, K5RCU or K5RCU2 must be installed to recognize Dual-Tone Multi-Frequency (DTMF) tones generated by a standard telephone (or any other device connected to a standard telephone circuit) and to enable ABR to operate. The K5RCU2 is the same as the K5RCU, except that it has jumper settings for A law and Mu law, which makes it applicable to more countries.

Configuration

The K4RCU3, K5RCU, or K5RCU2 does not have to be configured for operation. If built-in auto attendant is required, see auto attendant KKYS installation.

K4RCU, K5RCU or K5RCU2 Installation

1. Make sure that the power supply switch is OFF.
2. Make sure SW1 is set for Mu law if installing K5RCU2. The jumper must be set for Mu law in the U.S. and Canada.
3. Making sure that the component side of the K4RCU3, K5RCU or K5RCU2 is face down (toward the power supply), plug the K4RCU3, K5RCU P602A and P602B female connectors into the P2A and P2B (K4RCU3, K5RCU or K5RCU2) connectors on the motherboard. See Figure 3-15.

K4RCU, K5RCU or K5RCU2 Programming

➤ Program 03: Enter code 92 for Slot 00 if K4RCU3 is installed or Code 98 with K5RCU or K5RCU2.

Program 12: Sets K4RCU3, K5RCU or K5RCU2 release time.

Program 15: Sets K4RCU3, K5RCU or K5RCU2 operation after CO line flash. Assigns DTMF/ Dial Pulse dialing, DISA, and additional attributes to each line.

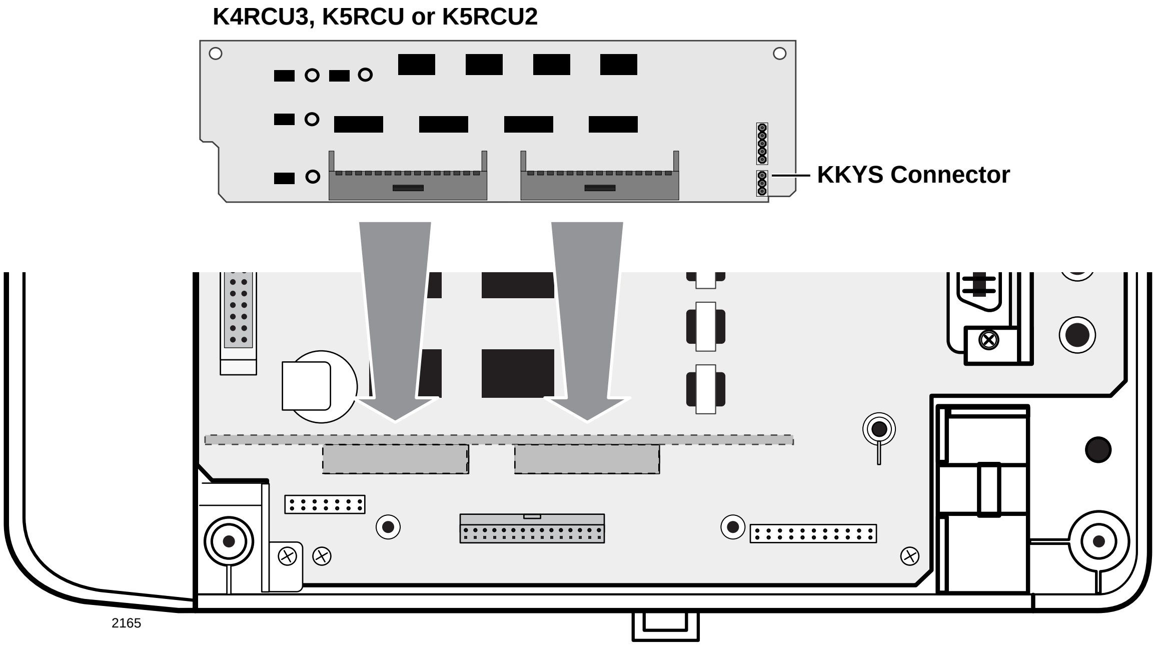


Figure 3-15 Auto Busy Redial/DTMF Receiver Board (K4RCU3, K5RCU or K5RCU2) Installation

KKYS Auto Attendant

System: *DK40i Base KSU*
Circuits per PCB: *one*
Interfaces with: *optional built-in auto attendant*
Older Version(s): *none*

The KKYS installs onto the K5RCU2 card in the Base KSU. (See Figure 3-16.)

KKYS Installation

➤ Install the KKYS onto the K5RCU2 to add the optional built-in auto attendant feature.

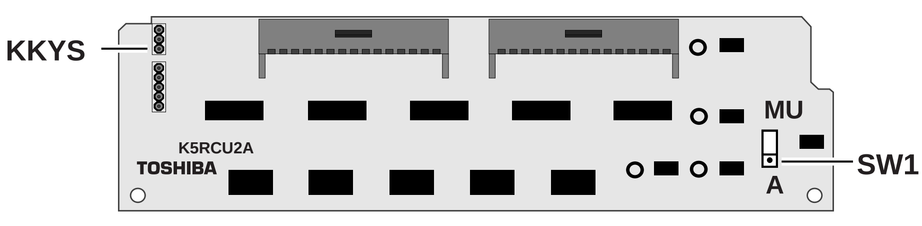


Figure 3-16 K5RCU2 Printed Circuit Board

KSTU2
Four-circuit Standard Telephone Interface Unit

System: *DK40i Base KSU*

Circuits per PCB: *four standard telephone circuits*

Interfaces with: *standard telephones (no message waiting)*
other single-line devices
alternate BGM source (circuit 4)
fax machine
voice mail devices

Older Version(s): *KSTU1 (not compatible with DK40i–KSTU2 is compatible with DK16 and DK40i)*

KSTU2 controls and indicators are illustrated in Figures 3-17 and 3-18 and described in Table 3-5 on Page 3-27.

Note For the system to recognize the Dual-Tone Multi-Frequency (DTMF) tones generated by standard telephones (or any other device connected to a KSTU2 port), a K4RCU3 must be installed in the Base KSU.

KSTU2 Configuration

The KSTU2 hardware has to be configured only for the square wave ring generator voltage level, nothing else.

KSTU2 Installation

1. Make sure that the power supply switch is OFF.
2. Before installing the KSTU2 in the Base KSU, set the SW1 ring generator to 130V P-P or 190V P-P.

Note Most standard telephones and two-wire devices require 190; however, some devices may experience ring-trip at 190, and should be set at 130.

3. Plug the KSTU2 cable into the P4 connector on the motherboard in the Base KSU. The red wire on the cable should match up with pin 1 on the lower side of the connector.
4. Plug the KSTU2 P508 female connector into the P8 male connector on the motherboard.
5. Secure the KSTU2 to the standoffs with the two provided screws.

KSTU2 Wiring

Refer to DK40i Base KSU KSTU2 wiring in Figure 3-25 on Page 3-41.

The KSTU2 must be connected to a OL13A (or equivalent) type lines for off-premises stations (300 ohms loop resistance max., including the telephone or other devices DC off hook resistance).

KSTU2 Programming

Program 03: Specify code 31 for KSTU2 slot.

Program 31: Configures all KSTU2 ports connected to voice mail (see Chapter 8 – DK40i/DK424 Universal Slot PCB Wiring for voice mail installation).

Program 10-2: Not required for Background Music (BGM) connection.

Program 19: BGM connection to KSTU2 Port 11.

CAUTION! **Port numbers in the Expansion KSU shift by four ports if KSTU2 or TDDU is installed (or removed after it is installed). This determines whether or not the DDCB can be connected on the KCDU in slot 15.**

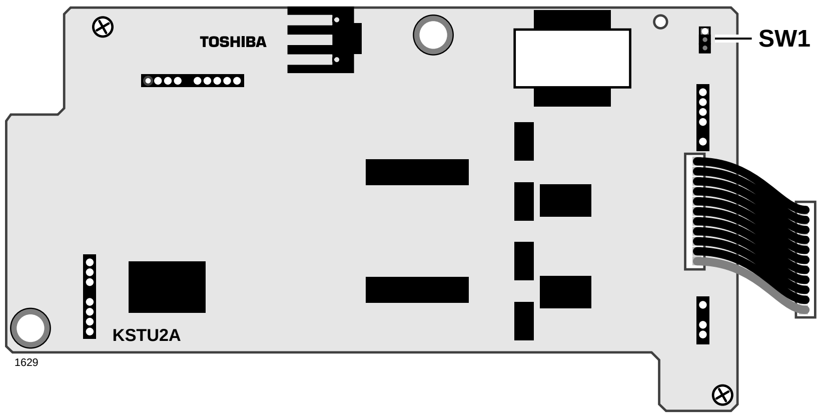


Figure 3-17 Standard Telephone Interface Board (KSTU2)

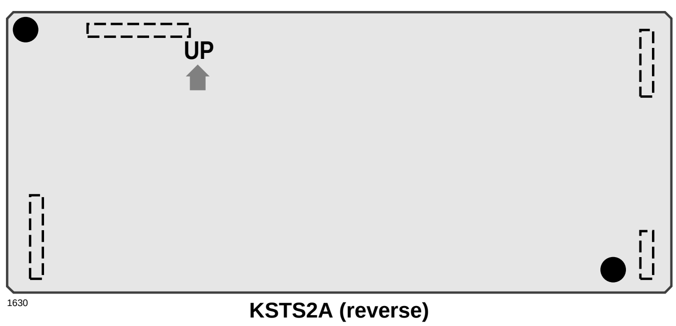


Figure 3-18 Standard Telephone Interface Subunit (KSTS2)

Table 3-5 KSTU2 Controls and Interface Connectors

Control/Indicator/Connector	Type of Component	Description
Ring voltage jumper plug SW1	3-terminal jumper	Sets ring generator voltage level for all circuits: H = 190V P-P L = 130V P-P
Connector cable P504	Cable	Connects to P4 connector on the motherboard
P10 (connects to KSTS2 P20)	7-pin connector	Interface connector for optional KSTS2. The KSTS2 arrives installed onto the KSTU2 from the factory.
P11 (connects to KSTS2 P21)	9-pin connector	
P12 (connects to KSTS2 P22)	3-pin connector	
P13 (connects to KSTS2 P23)	5-pin connector	

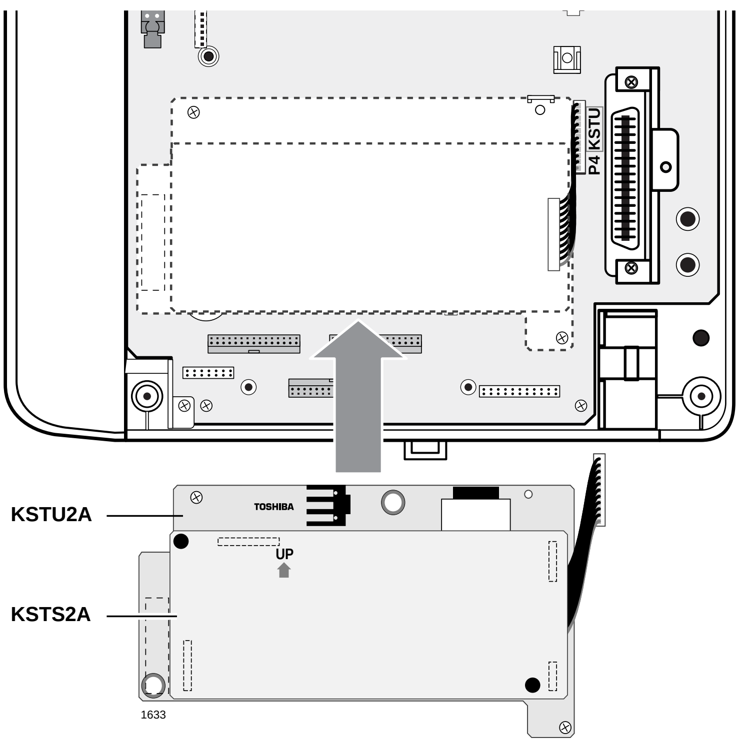


Figure 3-19 KSTU2/KSTS2 Installation

TBSU

See "RBSU/RBSS and TBSU Interface Units" on Page 14-18 in Chapter 14 – ISDN Interfaces for TSBU installation documentation.

TCIU
Caller ID

System: *DK40i Base KSU (mounts on TCOU)*

Circuits per PCB: *four caller ID circuits*

Interfaces with: *caller ID*
loop start CO lines

Older Version(s): *none*

To receive Caller ID, a TCIU2 circuit must be available to each line. (See Figure 3-20.)

CAUTION! To prevent system malfunction, do not install TCIU1 in the DK40i system.

Each TCIU2 Caller ID circuit has a two-wire tip/ring interface which must be bridge-wired across its corresponding ground or loop start CO line tip/ring. This is done automatically by the PCB connectors when the TCIU2 is mounted on the TCOU. However, if installing an RCOU/RCIU2 in the Expansion KSU, the connection is made on the Main Distribution Frame (MDF). See the RCIU wiring diagram in Chapter 8 – DK40i/DK424 Universal Slot PCB Wiring.

TCIU2 Installation

1. Turn power OFF.
2. Install the TCIU2 onto the TCOU PCB by aligning the three sets of connectors marked TCOU or TCIU2, depending on the card.
3. Press down evenly and firmly on the TCIU2 card.

TCIU2 Programming

Program 03: Automatically assigns TCIU2 (Caller ID circuit) to slot 14 (code 81) when the TCIU2 is installed and power is turned on.

Note TCIU2 Caller ID circuits are numbered automatically in numerical order starting from 01~04 when the TCIU2 is installed. Slots with code 81 will increment the Caller ID circuit numbers by four circuits on the DK40i.

Program *50: Assigns TCOU lines that will receive Caller ID to the associated TCIU2 Caller ID circuit number. TCIU2 circuits 1~4 must be assigned to TCOU circuits 1~4, respectively. RCIU circuits 5~8 should be assigned RCOU or RGLU circuits 5~8.

After assigning CO lines to Caller ID circuits, turn system power OFF for approximately five seconds and then back on or run Program 91-2 to activate Program *50 assignments.

Program *51: Sets the Caller ID (CLID)/Automatic Dialed Number Identification (ANI) memory allocation for the appropriate stations. This memory is used to save CLID/ANI telephone numbers for calls that are received but not answered (abandoned calls). CLID/ANI numbers are not saved in station memory if they are answered. Stations can be allocated with memory to save up to 100 numbers in 10-number increments.

The total memory allocated to all stations in a system is 200 numbers.

Note When a CO line rings multiple stations, a station must be the owner of the Caller ID or ANI CO line to be able to save abandoned call (Caller ID and/or ANI) telephone numbers. (See Program *52.)

Program *52: Assigns stations as owners of Caller ID CO lines. These stations will store the Caller ID telephone numbers received on abandoned (not answered) calls for the lines which they own. Typically all common CO lines are assigned to one designated telephone or attendant console and private lines are assigned to individual private line telephones.

Note A station must also be allocated with Caller ID/ANI storage memory in Program *51 to store abandoned call telephone numbers.

Program 39, Code 462: Assigns the Caller ID/ANI Lost Call Auto Dial button to LCD telephones that store Caller ID and/or ANI abandoned call telephone numbers. A user can scroll through the stored abandoned call phone numbers and auto dial the selected number using this button.

Program 60-1, Key 01: Determines which information will be sent out the system SMDR port, e.g., system Account Codes or CLID and/or ANI telephone numbers.

➤ Turn LED 01 ON if CLID and/or ANI information should be sent out the SMDR port.

➤ Turn LED 01 OFF if Account Codes information should be sent out the SMDR port.

Note The system will initialize with LED 01 OFF, e.g., Account Codes information will be sent out the SMDR port.

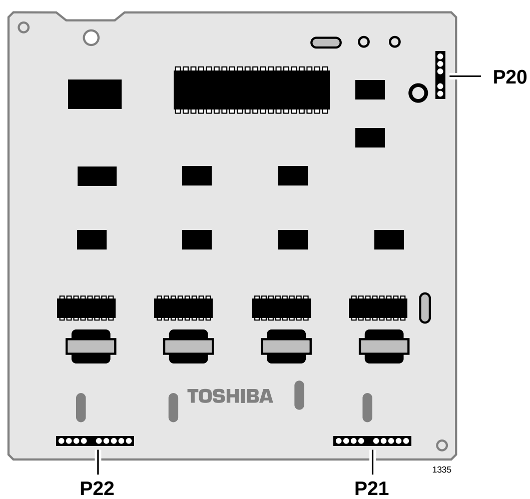


Figure 3-20 DK40i Caller ID Interface Unit (TCIU2)

Table 3-6 TCIU2 Controls, Indicators, and Connectors

Control/Indicator/Connector	Type of Component	Description
P20	5-pin plug	To P120 of TCOU
P21	9-pin plug	To P121 of TCOU
P22	9-pin plug	To P122 of TCOU

DK40i Installation

TCOU
Four-circuit Loop Start CO Line Board

System: *DK40i Base KSU (mounts on KSU TMAU)*
Circuits per PCB: *four loop start CO line circuits*
Interfaces with: *loop start lines*
Older Version(s): *none*

The optional TCOU PCB installs onto the TMAU motherboard. (See Figure 3-21 and Table 3-7 for information on controls, indicators and connectors.)

Note Only one TCOU or TDDU can be installed on the motherboard.

TCOU Hardware Options

The TCOU PCB accepts the optional Caller ID (TCIU2 not TCIU1) board. When the TCIU2 is installed on the TCOU, the tip/ring of the TCOU circuits 1~4 are automatically connected to the tip/ring of TCIU2 circuits 1~4 respectively.

TCOU Installation or Replacement

1. Make sure the power supply (TPSU16A) DC power switch is OFF.
2. Mate the TCOU male connectors P110, P111, P112 to P10, P11 and P12 respectively on the TMAU. Apply firm, even pressure to ensure proper connection. See Figure 3-7 for installation information and Figure 3-27 on Page 3-43 for wiring.
3. Secure the three plastic stand-off tabs and install screws in upper right and lower left corners.
4. Set decibel (dB) PAD switches SW101, SW201, SW301, and SW401 to the appropriate position. In most cases set to the normal position (NOR). Switches are factory set at the 0 (0 dB signal level drop) position. If CO lines are connected to a PBX or are in close proximity to the central office, set the PAD positions to 3 to provide a -3 dB signal level drop between the PBX and CO.
5. Slip the spade connected to the green/yellow wire under the second screw from the right on the TPSU power supply (see Figure 3-21). Tighten the screw until the spade is snugly secured.

TCOU Removal

If you need to remove/replace the TCOU, make sure the power supply (TPSU16A) DC power switch is turned OFF.

➤ **To remove the TCOU**

1. Loosen the screw on the TPSU power supply and free the spade.
2. Loosen and remove screws securing the TCOU to the TMAU (see Figure 3-21).
3. Pull back the three plastic stand-off tabs and pull up on the TCOU until P110, P111 and P112 are unplugged.

TCOU Programming

Program 03: Code 11 is specified automatically when TCOU is installed.

Program 10-1: Enables or disables line-to-line Conference and Direct Inward System Access (DISA).

Program 15: Assigns DTMF/Dial Pulse dialing, DISA, and additional attributes to each line. Automatic Release (AR) assignments only need to be made for loop start lines; AR is automatically enabled for ground start CO lines.

Program *15: Makes tenant assignments.

Program 16: Assigns lines to line groups.

Program 39: Assigns line access buttons to digital and electronic telephones.

Program 40: Assigns station access to lines (incoming and outgoing).

Program 41: Assigns station access to lines (outgoing only).

Programs 45~48: Defines Toll Restriction for any line.

Programs 50~56: Defines Least Cost Routing assignments.

Program 78: Assigns special ringing of lines: includes Night Ring Over Page, DISA, Remote Maintenance via the Internal Maintenance Modem (IMDU), and Integrated Auto Attendant.

Programs 81~89

- Assigns lines to ring selected stations and DH groups.
- Assigns Delayed Ringing to any line.

Programs *81, *84, *87: Assigns which [DN] will flash when the CO line rings a telephone.

Program 93: Assigns names to lines.

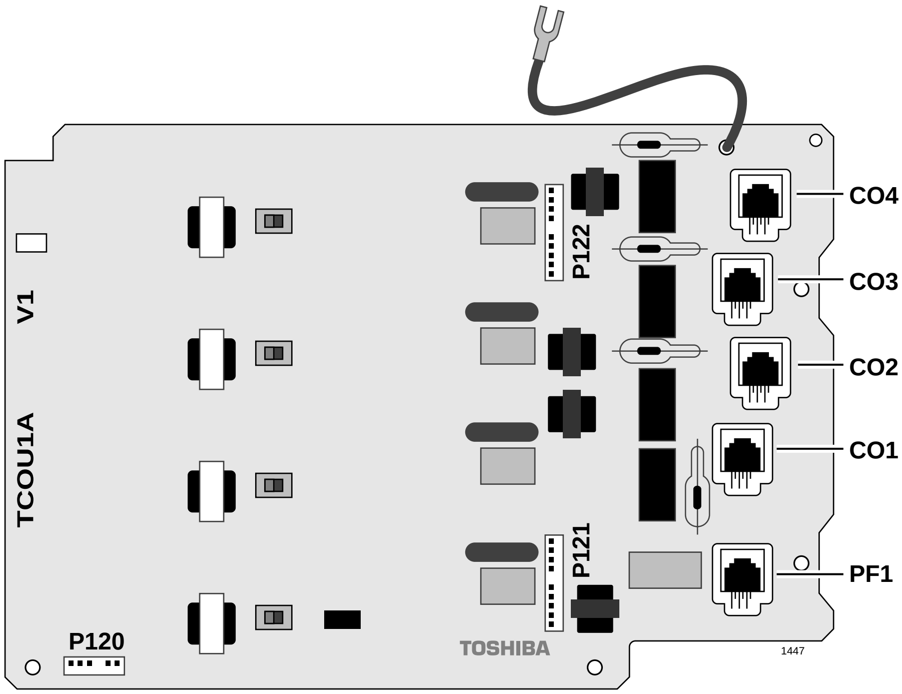


Figure 3-21 DK40i Loop Start CO Line Board (TCOU)

Table 3-7 TCOU Controls, Indicators, and Connectors

Control/Indicator/Connector	Type of Component	Description
CO line connectors 1~4	Modular connector	Interface connector for CO line circuits.
PF1	Modular connector	Power Failure Telephone Interface
PAD switch SW202, SW302, SW402 (circuits 1~4)	2-position slide switch	Enables -3 dB signal level drop for CO line circuit
P120	6-pin connector	To P20 of TCIU2
P121	10-pin connector	To P21 of TCIU2
P122	10-pin connector	To P22 of TCIU2

TDDU
Four-circuit DID Line Digital Telephone Interface Unit

System: *DK40i Base KSU (mounts on KSU TMAU)*
Circuits per PCB: *four DID line circuits*
Interfaces with: *DID lines*
Older Version(s): *none*

The optional TDDU PCB installs onto the TMAU motherboard. (See Figure 3-22 and Table 3-8 for information on controls, indicators and connectors and Figure 3-27 for wiring.)

Note Only one TCOU or TDDU can be installed on the motherboard.

TDDU Installation

1. Make sure the power supply (TPSU16A) DC power switch is OFF.
2. Mate the TDDU male connectors P110, P111, P112 to the TMAU female connectors. Apply firm, even pressure to ensure proper connection. (See Figure 3-7 on Page 3-12 for installation and Figure 3-27 on Page 3-43 for wiring.)
3. Secure the three plastic stand-off tabs and install screws in the upper right and lower left corners.
4. Set decibel (dB) PAD switches SW101, SW201, SW301, and SW401 to the appropriate position. Switches are factory set at the 0 (0 dB signal level drop) position. If CO lines are connected to a PBX or are in close proximity to the central office, set to the PAD positions to 3 to provide a -3 dB signal level drop between the PBX and CO.
5. Sensitivity jumpers SW102~SW402 are used mostly for dial pulse operation to adjust for dial pulsing at different loop lengths. If close to the CO, the sensitivity should be set to low (L). As the loop length increases, set it to high (H).
6. Insert the TDDU into the appropriate slot and apply firm, even pressure to ensure proper mating of connectors.

TDDU Programming

Program 03: Specify Code 16 for slots that will support TDDUs. Make sure DTMF operation is enabled.

Note Program 03 can be skipped and Program 91 run instead.

Program *09: Assigns DID line extensions to route to station [PDNs].

Program 10-1: Enables or disables Two-line Conference.

Program 15: Assigns DTMF/Dial Pulse dialing, and additional attributes to each line.

Program *15: Makes tenant assignments.

Program 16: Assigns lines to line groups.

Program *17: Assigns intercept port for DID calls to wrong or vacant numbers.

Program 17: Tie and DID line options.

- Assigns Immediate or Wink start to DID lines and auto camp-on and no-dial tone return for DID lines.
- Assigns DID lines to route per DNIS and ANI options (Program 71 and 72) or DID numbers (Program *09).

Program 30: Disables RRCS for dial pulse operation.

Program 40: Assigns station access to lines (incoming and outgoing).

Program 41: Assigns station access to lines (outgoing only).

Program 42-0, 1~8: Assigns behind PBX/Centrex operation to each line.

Programs 45~48: Defines Toll Restriction for any line.

Programs 50~56: Defines Least Cost Routing assignments.

Programs 71 (1~5): Assigns DNIS or ANI option to DID lines.

Programs *71~*73: Assigns telephone to ring called [DN].

Program 93: Assigns names to lines.

The TDDU provides four DID lines and uses four station ports when installed.

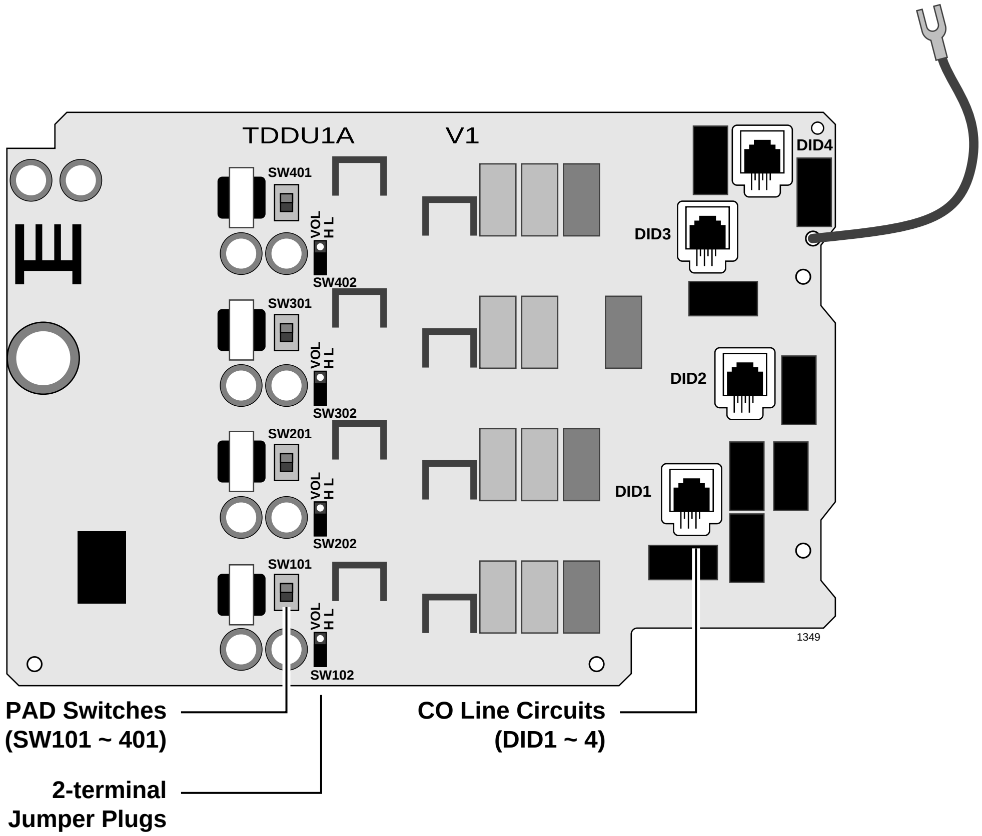


Figure 3-22 DK40i DID CO Line Board (TDDU)

Table 3-8 TDDU Controls, Indicators, and Connectors

Control/Indicator/Connector	Type of Component	Description
CO line busy LEDs 1~4 (DID1~DID4)	Red LED	Lights to indicate DID line circuit is operating. Trunk indicator will not light unless TDDU is connected to a DID line.
CO line connector (DID)	Modular connector	Interface connector for CO line (DID) circuits.
PAD switch SW202, SW302, SW402 (circuits 1~4)	Two-position slide	Enables 3dB signal level drop for CO line circuit (when set in PAD position).
SW102, SW202, SW302, SW402 (circuits 1~4)	2-terminal jumper plug	Adjusts for dial pulsing at different loop lengths.

CAUTION! **Port numbers in the Expansion KSU shift by four ports if KSTU2 or TDDU is installed (or removed after it is installed). This determines whether or not the DDCB can be connected on the KCDU in slot 15.**

TSIU
Serial Interface Board

System:	*DK40i Base KSU (plugs into KSU main PCB)*
Circuits per PCB:	*two TTY/RS-232 interface ports*
Interfaces with:	*SMDR connection for call accounting device* *customer-provided external modem for local/remote maintenance from a PC with DK Admin*
Older Version(s):	*none*

The TSIU PCB enables the DK40i system to connect to various hardware devices. It does not have an internal modem and does not support IMDU. (See Figure 3-23.)

Only one TSIU can be installed per DK40i system. When installed, the TSIU port functions are identified and enabled automatically when power is turned on and the PIOU can still be installed for zone paging. Port 01 is TTY (Program 76-1, code 1) and Port 02 is disabled (Program 76-1, code 0). If the same function is programmed for an TSIU port and a PIOU or PIOUS port, only the TSIU port functions.

The communication parameters for all TSIU TTY ports are:

- Data word bits = 7
- Parity = even
- Stop bits = 1

The communication parameters for a TSIU SMDR port is:

- Data word bits = 8
- Parity = none
- Stop bits = 1

TSIU Installation

➤ See Figure 3-23 for installation.

TSIU Programming

Program 03: No assignment is necessary. TSIU is automatically enabled when installed and power is turned ON. It is not assigned to a slot.

Program 76-1X-Y: Assigns each installed TSIU port to a function. Where X identifies the TSIU port number (1~4) and Y identifies the TSIU port function:

- Y=1, RS-232 TTY (Program 77-1, LED 14 OFF)
- Y=2, SMDR
- Y=4, SMDI
- Y=0, No function - this should be used for any TSIU ports that are not used.

Note Function codes set in Program 76-1X-Y override PIOU and/or PIOUS function codes 41 set in Program 03.

Program 76-2X-Z: Assigns each installed TSIU port to operate at a specified transmission rate. Where X identifies the TSIU Port number (1, 2). Z identifies the TSIU/port transmission rate in bits-per-second (bps):

- Z=1; 9600
- Z=2; 4800
- Z=3; 2400
- Z=4; 1200

Note The sum of TSIU port 1 and port 2 bps rate cannot exceed 9600 bps.

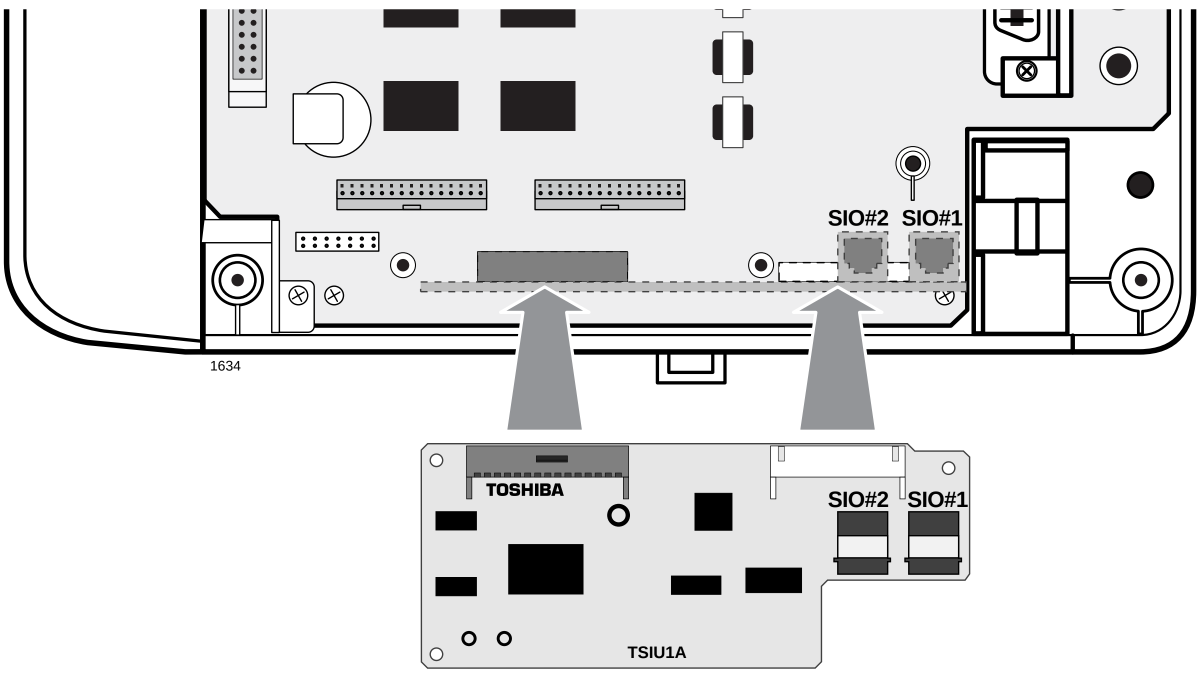


Figure 3-23 Serial Interface Board (TSIU) Installation

Universal Slot PCBs

The following PCBs can be used in the universal slots of either the Strata DK40i Expansion KSU or the Strata DK424 cabinets (see Table 3-9).

Table 3-9 Universal Slot PCB Descriptions

PCB	Title	Description	Page
KCDU	CO Line/Digital Interface Unit	Provides two loop start CO line circuits and four digital telephone circuits.	7-4
PDKU	Digital Telephone Interface Unit	Provides eight digital telephone circuits that can support the same peripherals as the digital circuits in the Base KSU.	7-6
PEKU	Electronic Telephone Interface Unit	Provides eight electronic telephone circuits that can interface with electronic telephones, an alternate BGM source, an HDSS, an external amplifier for DISA or two CO line conferencing.	7-8
PESU	Standard/Electronic Telephone Interface Unit	Provides two standard telephone or two-wire device circuits/four electronic telephone circuits in the Expansion KSU.	7-13
PIOU and PIOUS	Option Interface Unit	Provides interfaces for SMDR, IMDU and external zone paging - (PIOU only).	7-17
RCOU	CO Line Interface Unit	Adds four CO lines to the system and can only be installed in the Expansion KSU. Assigns Delayed Ringing to any CO line. You cannot piggy-back a RCOS.	7-28
RDDU	DID Line Unit	Provides four Direct Inward Dialing (DID) lines. Each line can have one office code and a block of extensions.	7-33
RDSU	Digital/Standard Telephone Interface Unit	Provides two standard telephone circuits and four digital telephone circuits.	7-36
REMU	E&M Tie Line Unit	Provides four Tie line circuits.	7-39
RGLU2	Loop/Ground Start CO Line Interface Unit	Provides four line circuits.	7-43
RSSU	PC Interface Unit	Provides two RS-232 connections.	7-51
RSTU2	Standard Telephone Interface Unit	Has eight circuits that support single-line devices, such as: rotary and push-button standard telephones, fax machines, dictation equipment, modems, a separate BGM source, off-premises stations, Toshiba voice mail (Stratagy, Stratagy DK or VP), digital announcement devices for the optional built-in auto attendant feature and customer-supplied voice mail devices.	7-53
RWIU	Strata AirLink Unit	Supports Digital Wireless Handsets: same as PDKU, except no DDSS console, Stand-alone Cordless Telephone, PDIU-DS, or DDCB.	16-36
Stratagy DK	Stratagy Voice Mail Unit	The Stratagy voice mail systems come with 2, 4, 6, or 8 voice mail ports. All of the Stratagy DK systems use 8 station ports in the DK40i and DK424 software.	10-42
RBSU/ RBSS	ISDN S/T-type Basic Rate Interface Unit and Basic Rate Interface Subassembly	RBSU provides two BRI S/T circuits. Each circuit provides two simultaneous voice and/or data connections with a single interface. The RBSS attaches to the RBSU to provide two additional BRI S/T type circuits that can be used for station-side connections only.	14-18

Loop Limits

This section provides the maximum loop lengths for connection of telephones, lines, peripheral equipment, and power supplies. The following information applies to only the Strata DK40i system (see Table 3-10). Diagrams that are applicable to all systems, including the DK40i, can be found in Chapter 8 – DK40i/DK424 Universal PCB Wiring.

Table 3-10 Digital Telephone/DIU/DDSS Console/ADM/Loop Limits

<table>
<tr><th rowspan="3">Mode</th><th rowspan="3">DK40i KSU or Battery Backup[1]</th><th colspan="5">Maximum line length (24 AWG)</th></tr>
<tr><th colspan="2">1 Pair</th><th colspan="2">2 Pair[2]</th><th rowspan="2">1 Pair plus external power[3]</th></tr>
<tr><th>feet</th><th>meters</th><th>feet</th><th>meters</th></tr>
<tr><td rowspan="2">DKT or Cordless base Ringing (Volume Max)</td><td>DK40i KSU</td><td>1000</td><td>303</td><td rowspan="7">1000</td><td rowspan="7">303</td><td rowspan="20">1000 feet
303 meters</td></tr>
<tr><td>Battery Backup</td><td>675</td><td>204</td></tr>
<tr><td rowspan="2">DKT with DVSU (OCA)</td><td>DK40i KSU</td><td>1000</td><td>303</td></tr>
<tr><td>Battery Backup</td><td>495</td><td>150</td></tr>
<tr><td rowspan="2">DKT with HHEU or Carbon Handset</td><td>DK40i KSU</td><td>1000</td><td>303</td></tr>
<tr><td>Battery Backup</td><td>330</td><td>100</td></tr>
<tr><td rowspan="2">DKT with PDIU-DI/ PDIU-DI2/RPCI-DI</td><td>DK40i KSU</td><td>495</td><td>150</td></tr>
<tr><td>Battery Backup</td><td>165</td><td>50</td><td>675</td><td>200</td></tr>
<tr><td rowspan="2">PDIU-DS</td><td>DK40i KSU</td><td>1000</td><td>303</td><td>1000</td><td>303</td></tr>
<tr><td>Battery Backup</td><td>675</td><td>204</td><td>1000</td><td>303</td></tr>
<tr><td rowspan="2">DKT with HHEU and RPCI-DI/PDIU-DI/PDIU-DI2</td><td>DK40i KSU</td><td>495</td><td>150</td><td>1000</td><td>303</td></tr>
<tr><td>Battery Backup</td><td>33</td><td>10</td><td>330</td><td>100</td></tr>
<tr><td rowspan="2">DDSS2060A</td><td>DK40i KSU</td><td>1000</td><td>303</td><td rowspan="8">1000</td><td rowspan="8">303</td></tr>
<tr><td>Battery Backup</td><td>500</td><td>151</td></tr>
<tr><td rowspan="2">DDCB</td><td>DK40i KSU</td><td>1000</td><td>303</td></tr>
<tr><td>Battery Backup</td><td>500</td><td>151</td></tr>
<tr><td rowspan="2">DKT with DVSU and HHEU</td><td>DK40i KSU</td><td>1000</td><td>303</td></tr>
<tr><td>Battery Backup</td><td>165</td><td>50</td></tr>
<tr><td rowspan="2">DKT with ADM</td><td>DK40i KSU</td><td>675</td><td>204</td></tr>
<tr><td>Battery Backup</td><td>165</td><td>50</td></tr>
</table>

1. Battery backup applies to instances when the system is being powered by batteries exclusively.
2. Digital telephones and other digital devices can operate at maximum lengths with two pair wiring or an external power source.
3. Digital cable runs must *not* have the following:
   Cable splits (single or double)
   Cable bridges (of any length)
   High resistance or faulty cable splices

DK40i Installation

DK40i Secondary Protection

The following diagram (see Figure 3-24) shows where secondary protectors must be installed for outside wiring.

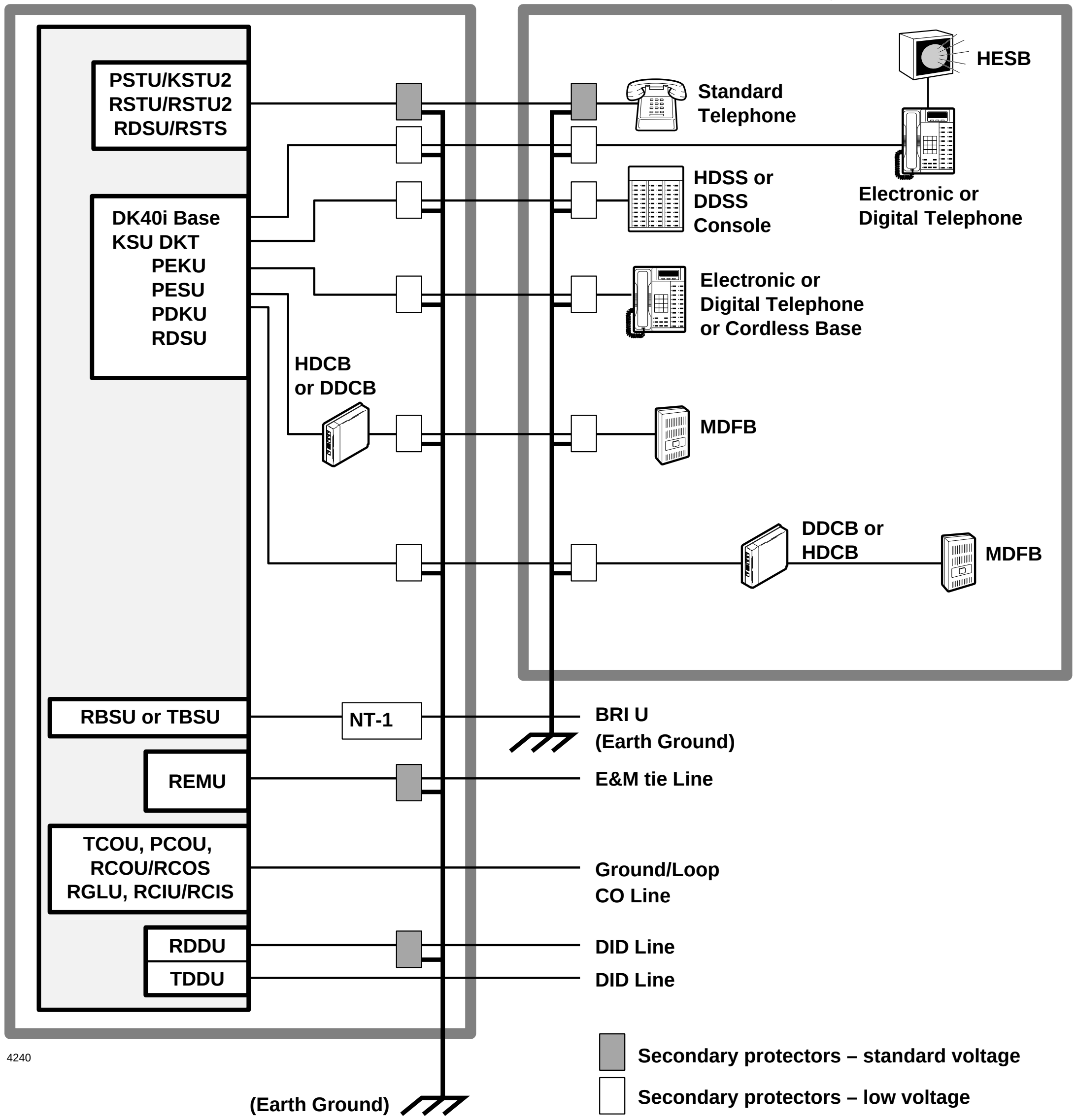


Figure 3-24 DK40i Secondary Protector Diagram

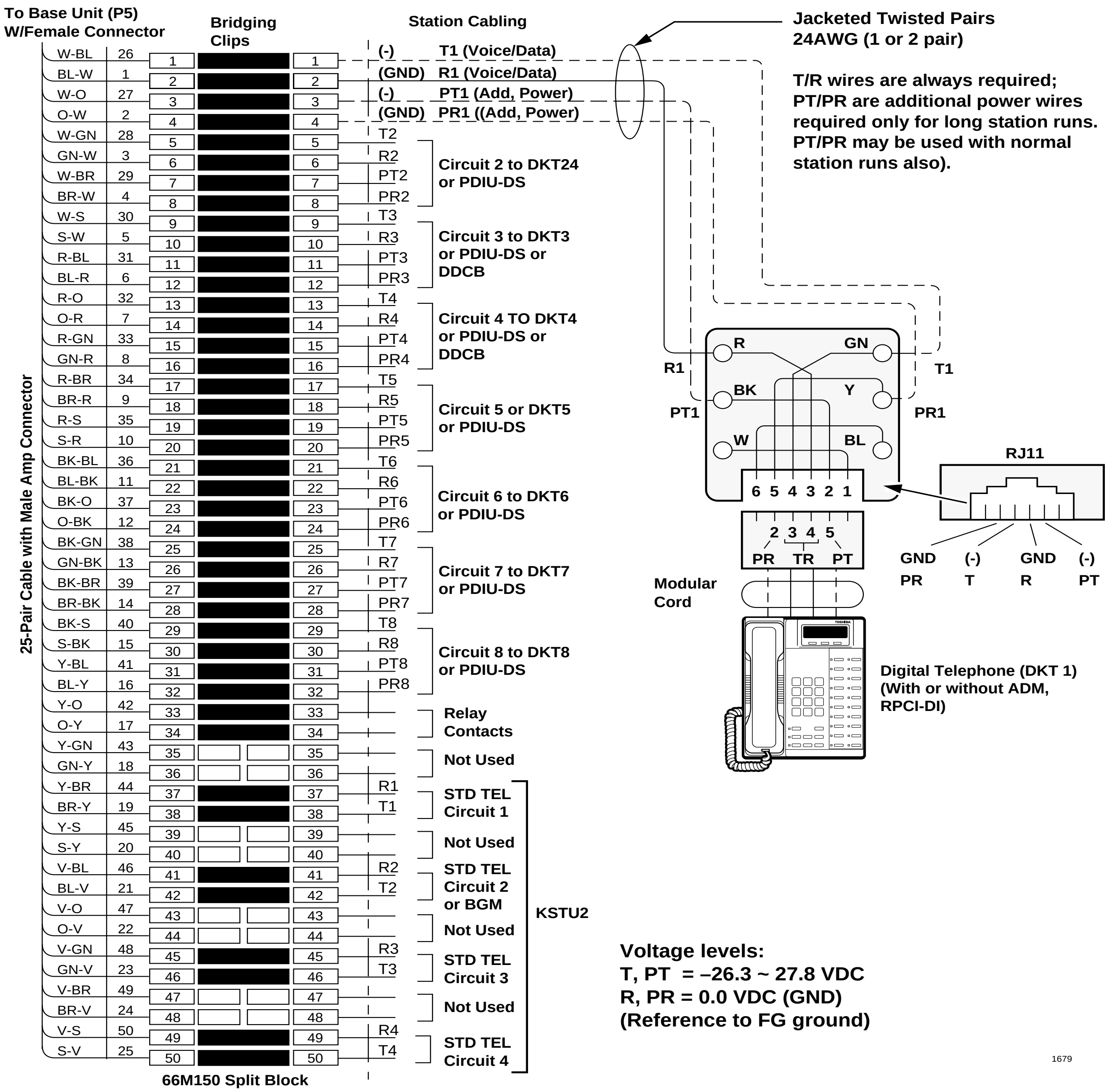
Important! *To protect against transient voltages and currents, solid state secondary protectors must be installed if there is outside wiring, and on all DID and E&M Tie lines. These protectors, which contain fast semiconductors in addition to fuses, shall comply with the requirements for secondary protectors for communication circuits, UL 497A. Care must be taken to ensure that they are very well grounded to a reliable earth ground. Recommended protectors are available in the fast Series 6 line from ONEAC Corp., Libertyville, Illinois 60048, (800) 327-8801. Install and test the secondary protectors precisely to the installation instructions of thee manufacturer.*

MDF Wiring Diagrams

Wiring diagrams for the DK40i (listed below) are shown in Figures 3-25~3-27.

- MDF Wiring to KSU & Amphenol Station and Relay Connectors (KSTU2)
- MDF Wiring to CO Lines and Digital Telephones (KCDU)
- MDF Wiring to CO Lines (TCOU and TDDU)

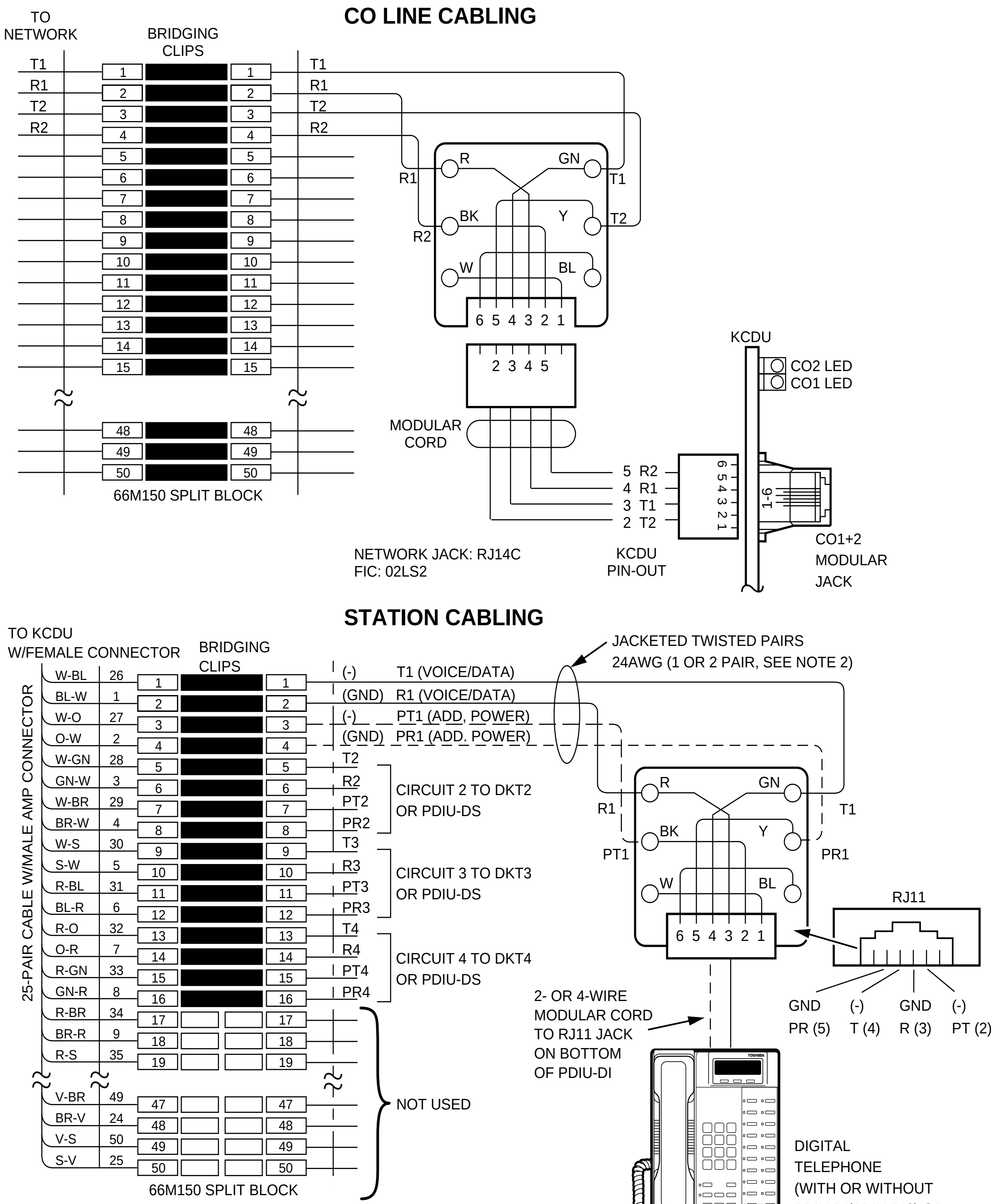
See Chapter 8 – DK40i/DK424 Universal Wiring Diagrams for more information.



Note See Table 3-10 on Page 3-39 for loop limits.

Figure 3-25 MDF Wiring to KSU & Amphenol Station and Relay Connectors (KSTU2)

DK40i Installation



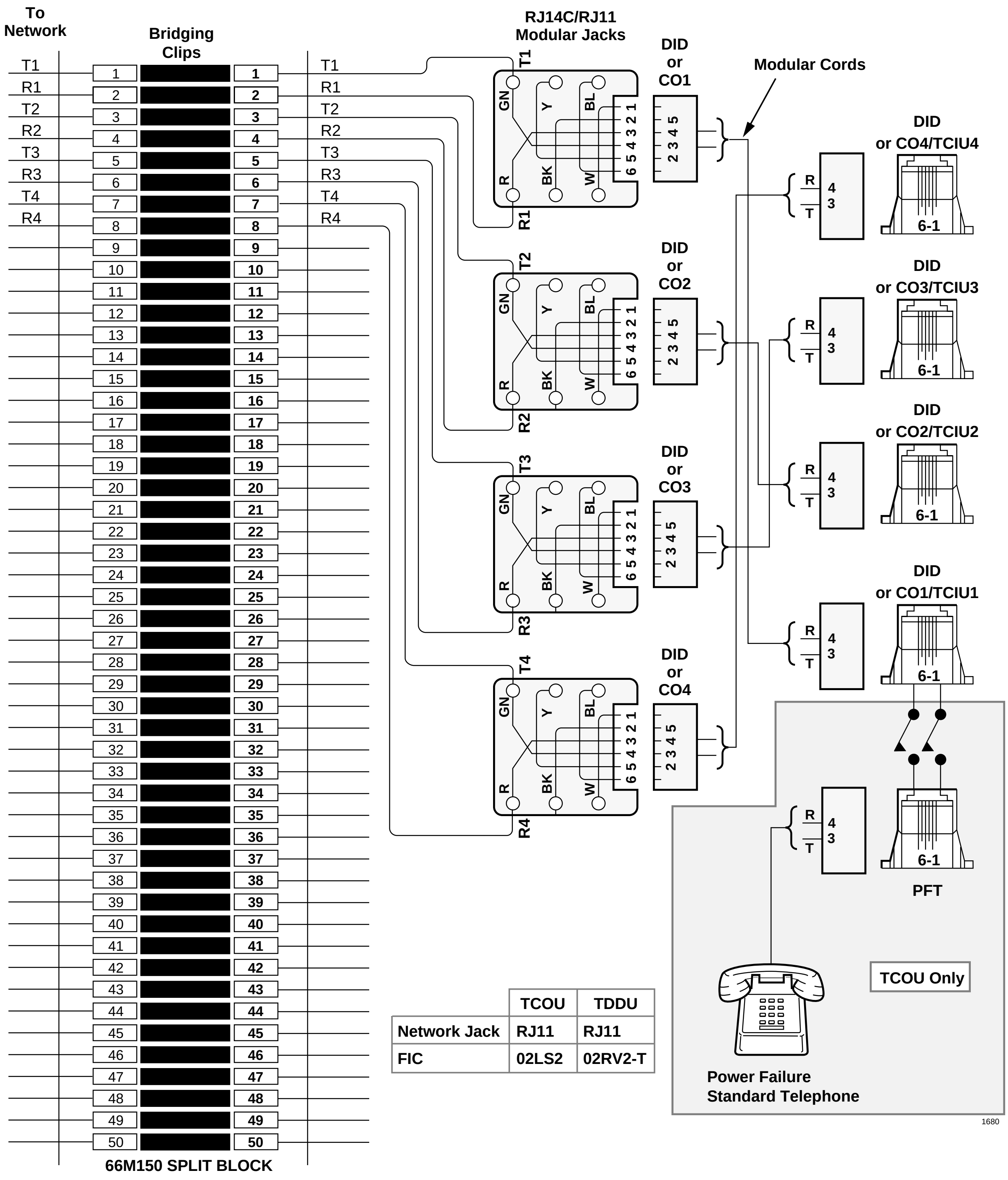
Notes

1. Voltage levels:

   T, PT = -26.3 ~ 27.8 VDC
   R, RP = 0.0 VDC (GND) (Reference to SG ground)

2. T/R wires are always required; PT/PR are additional power wires required only for long station runs or when operating on reserve power per Table 3-10. PT/PR may be used with normal station runs also.

Figure 3-26 MDF Wiring to CO Lines and Digital Telephones (KCDU)



	TCOU	TDDU
Network Jack	RJ11	RJ11
FIC	02LS2	02RV2-T

Figure 3-27 MDF Wiring to CO Lines (TCOU and TDDU)

DK424 Configuration 4

This chapter explains how to configure the Strata DK424 system. The system has a modular design which enables it to support a number of station and CO line configurations. The main component of the system is the common control unit (RCTU) Printed Circuit Board (PCB).

The focus of this chapter is a series of worksheets, providing a systematic procedure for determining the system's size. The worksheets also provide space to record the hardware and station devices that make up the system. Tables and example worksheets are included to assist you in filling out the worksheets.

Important! *Prior to Release 4, Tie and DID lines used station ports. With Release 4.0 and higher processors, these lines do not use station ports, allowing larger capacity systems when Tie and DID lines are required.*

System Configuration

Important!

System Configuration can be complex and time consuming. For best results:

- *Use DKQuote to provide easy, fast, automated configuration. It runs on an IBM-compatible Pentium® PC or higher, equipped with a 110MB or larger hard drive, a 3.5" 1.44 MB high density floppy disk drive, 16MB RAM, and Windows® 98/95 or Windows NT®. See the DKQuote User Guide for more information.*
- *If the above software is not available, use the Worksheets in this chapter.*

The DK424's main components are: the DK424 Base Cabinet (DKSUB424), DK424 Expansion Cabinets (DKSUE424), and four system processors (RCTUA4, RCTUBA3/BB4, RCTUC3/D4, and RCTUE3/F4). The processor used in the system depends on the features and number of telephones and CO lines required. Each cabinet is shipped with its required Power Supply (RPSU280); the same power supply used in DK280 cabinets.

See Chapter 5 – DK424 Installation for detailed information on installing RCTU PCBs.

Base Cabinet

The DK424 Base Cabinet provides two designated slots for the RCTU processor and six universal slots for station, line, and feature PCBs. It provides six connectors for expanding the system to a maximum of six Expansion Cabinets. It comes with a Motherboard Jumper Unit (MBJU) installed between the R11 and RCTU slot on the front side of the backplane motherboard. The MBJU is removed only when RCTUE/F is installed. MBJU is installed for all other DK Release 1~4 RCTU processor PCBs.

Expansion Cabinets

Cabinet and Universal Slot Capacity: Up to six DK424 Expansion Cabinets can be connected to a DK424 Base Cabinet. The number of DK424 Expansion Cabinets allowed depends on which processor is installed in the DK424 Base Cabinet.

The DK424 Expansion Cabinets support either six or eight universal slots, depending on which processor is installed in the DK424 Base Cabinet.

- All Expansion Cabinets are six slot cabinets except DK424 Expansion Cabinets. DK424 Expansion Cabinets provide eight slots, but only when connected to a DK424 Base Cabinet controlled by an RCTUE3/F3 processor with the MBJU removed.
- No DK424 Expansion Cabinets are allowed when connected to the DK424 Base Cabinet with an RCTUA processor installed.
- One DK424 Expansion Cabinet provides six universal slots when connected to the DK424 Base Cabinet with an RCTUBA/BB processor installed.
- Up to five DK424 Expansion Cabinets provide six universal slots each, when connected to the DK424 Base Cabinet with an RCTUC/D processor installed.
- Up to six DK424 Expansion Cabinets provide eight universal slots each, when connected to a DK424 Base Cabinet with an RCTUE/F processor installed.

Table 4-1 shows DK424 cabinet and slot capacities for Release 3 and 4 processors.

Table 4-1 DK424 Cabinet and Expansion Slot Capacities

Processor in DK424 Base Cabinet[1]	DK424 Expansion Cabinets Allowed	Universal Slots allowed per...		
		Base Cabinet	Expansion Cabinet	System
RCTUA	0	1~6	0	6
RCTUBA/BB	1	1~6	1~6	12
RCTUC/D	5	1~6	1~6	36
RCTUE/F	6	1~6	1~8[2]	54

1. All cabinets are DK424.
2. Only the RCTUE/F processor allows up to eight universal slots in the DK424 Expansion Cabinet.

DK424 and DK280 Compatibility

DK424 cabinets replace DK280 cabinets in the DK product line structure. DK424 Expansion Cabinets began shipping in June 1995 and DK424 Base Cabinets in February 1997. All old DK280 Release 1~3 processors and DK280 Base/Expansion Cabinets can be mixed with new DK424 Base and Expansion Cabinets with the following criteria (see Tables 4-2 and 4-3):

Table 4-2 DK280 Base with DK280 and/or DK424 Expansion Cabinets

Processor in DK280 Base Cabinet	Expansion Cabinets Allowed	Universal Slots allowed per...		
		Base Cabinet	Expansion Cabinet	System
RCTUA1, RCTUA3, RCTUA4	0	1~6	0	6
RCTUB1, RCTUB2, RCTUBA3/BB3 or RCTUBA3/BB4	1	1~6	1~6	12
RCTUC/D2, RCTUC3/D3, RCTUE3/F3 RCTUE3/F4	5	1~6	1~6	36

Table 4-3 DK424 Base with DK280 and/or DK424 Expansion Cabinets

Processor in DK424 Base Cabinet	Expansion Cabinets Allowed	Universal Slots allowed per...		
		Base Cabinet	Expansion Cabinet	System
RCTUA1, RCTUA3, RCTUA4	0	1~6	0	6
RCTUB1, RCTUB2, RCTUBA3/BB3 or RCTUBA3/BB4	1	1~6	1~6	12
RCTUC/D2, RCTUC3/D3, RCTUC3/D4	5	1~6	1~6	36
RCTUE3/F3 RCTUE3/F4	6[1]	1~6	1~6 for DK280 Exp. Cabs. 1~8 for DK424 Exp. Cabs.	36~54[2]

1. Last Expansion Cabinet must be a DK424.
2. Depends on the combination of Expansion Cabinets.

- DK424 and DK280 Cabinets can be mixed in any combination, with one exception. If seven cabinets are required, an RCTUE/F processor *must* be installed in a DK424 Base Cabinet and the sixth Expansion Cabinet must be a DK424. In this case DK280 Expansion Cabinets provide six universal slots and DK424 Expansion Cabinets provide eight universal slots.
- DK280 and DK424 Base Cabinets provide six universal slots maximum in any configuration and any RCTU processor can be installed.
- DK280 Expansion Cabinets provide six universal slots maximum in any configuration.

- DK424 Expansion Cabinets provide six universal slots maximum in any configuration with a DK280 Base Cabinet, including a DK280 Base Cabinet with an RCTUE/F processor.
- DK424 Expansion Cabinets provide eight universal slots in one configuration only: when connected to a DK424 Base Cabinet controlled by an RCTUE/F processor (MBJU jumper must be removed - see installation for details). DK424 cabinets provide six universal slots in all other configurations.
- An RCTUE/F processor can be installed in a DK280 Base Cabinet. When an RCTUE/F processor is installed in a DK280 Base, only five Expansion Cabinets (DK424 and/or DK280) can be installed. These Expansion Cabinets provide only six universal slots.
- All older DK280 Release 1~3 processors will function in the DK424 Base Cabinet. The features available depend on the respective release and type of the RCTU. These processors include RCTUA1, RCTUA3, RCTUB1, RCTUB2, RCTUBA3/BB3, RCTUC1/D2 and RCTUC3/D3.
    - When an older processor is installed in the DK424 Base Cabinet, the DK424 and DK280 Expansion Cabinets provide six universal slots and the MBJU jumper must be installed - see RCTU installation for details.
    - RCTUA in a DK424 Base allows no Expansion Cabinets.
    - RCTUB or RCTUBA/BB in a DK424 Base allows one DK424 or DK280 Expansion Cabinet with six universal slots.
    - RCTUC/D in a DK424 Base allows up to five DK424 and DK280 Expansion Cabinets in any combination. These Expansion Cabinets provide six universal slots.

Designated Speaker OCA, DIU Data, and T1 slots

DK424 systems require that PDKU2 PCBs that support Speaker Off-Hook-Call-Announce (OCA) and PDIU-DS and RPCI-DI PCBs for data applications must be placed in the slots designated in Tables 4-4 and 4-5.

Note PDKU2s that support Handset OCA and RPCI TAPI-only can operate in any slot.

Additionally, to enable T1/DS-1 interface, the RDTU PCB(s) must be placed in certain slots, with corresponding slots left vacant. (The operation of certain channels necessitates vacant slots.) RDTU PCBs can be placed in the slots in bold type; the vacant slots are not in bold in the following tables.

Example: for cabinet 1, if an RDTU is placed in slot 13 and you want to use RDTU channels 17~24, then slot 14 must be left vacant. If you installed a second RDTU, it would go into slot 15; slot 16 must also be vacant if you want to use RDTU channels 17~24.

Table 4-4 DK424 or DK280 Base Cabinet with MBJU Removed

Cabinet		Total Universal Slots	PDKU2 Data and Speaker OCA Slots	RDTU[1]/Vacant Slots		
No.[2]	Type					
1	DK424 (base)	6	11, 12, 13, 14, 15, 16	**13**/14[3]	**15**/16[3]	
2	DK280	6	21, 22, 23, 24, 25, 26,	**21**/22[3]	**23**/24[3]	**25**/26[3]
2	DK424	8	21, 22, 23, 24	**21**/22[3]	**23**/24[3]	**25**/27[4]/26[5]
3	DK280	6	31, 32	**31**/32[3]	**33**/35[4]/34[5]	
3	DK424	8	31, 32, 37, 38	**31**/32[3]	**33**/35[4]/34[5]	**37**/38[3]
4	DK280	6	41, 42	**41**/42[3]	**43**/45[4]/44[5]	
4	DK424	8	41, 42, 47, 48	**41**/42[3]	**43**/45[4]/44[5]	**47**/48[3]
5	DK280	6	51, 52	**51**/52[3]	**53**/55[4]/54[5]	
5	DK424	8	51, 52, 57, 58	**51**/52[3]	**53**/55[4]/54[5]	**57**/58[3]
6	DK280	6	61, 62	**61**/62[3]	**63**/65[4]/64[5]	
6	DK424	8	61, 62, 67, 68	**61**/62[3]	**63**/65[4]/64[5]	**67**/68[3]
7	DK280	6	Cannot be seventh cabinet			
7	DK424	8	No Data & Spkr OCA	**71**/77[4]/72[5]	**73**/75[4]/74[5]	

Table 4-5 pertains to a DK424 Base Cabinet with RCTU-A1, A3, A4, B2, BA3/BB3 or BA3/BB4, C1/D2, C3/D3 or C3/D4 with MBJU or a DK280 Base Cabinet with RCTU-A1, A3, A4, B2, BA3/BB3, BA3/BB4, C1/D2, C3/D3, C3/D4, E3/F3, E3/F4.

Table 4-5 DK424 or DK280 Base Cabinet with MBJU

Cabinet		Total Universal Slots	PDKU2 Data and Speaker OCA Slots	RDTU[1]/Vacant Slots		
No.[2]	Type					
1	DK424 or DK280 (base)	6	11, 12, 13, 14, 15, 16	**13**/14[3]	**15**/16[3]	
2	DK424 or DK280	6	21, 22, 23, 24, 25, 26	**21**/22[3]	**23**/24[3]	**25**/26[3]
3	DK280 or DK424	6	31, 32	**31**/32[3]	**33**/35[4]/34[5]	
4	DK280 or DK424	6	41, 42	**41**/42[3]	**43**/45[4]/44[5]	
5	DK280 or DK424	6	51, 52	**51**/52[3]	**53**/55[4]/54[5]	
6	DK280 or DK424	6	61, 62	**61**/62[3]	**63**/65[4]/64[5]	

These footnotes apply to Tables 4-5 and 4-6:

1. RCTUA does not support RDTU.
2. RCTUB and RCTUBA/BB supports cabinets 1 and 2 only.
3. Slot must be vacant for RDTU channels 17-24 (2-slot RDTU positions).
4. Slot must be vacant for RDTU channels 9-16 (3-slot RDTU positions).
5. Slot must be vacant for RDTU channels 17-24 (3-slot RDTU positions).

DK280 to DK424 Upgrades

To upgrade an existing DK280 Base Cabinet to a DK424 Base Cabinet with an RCTUE/F processor, see “DK280 to DK424 Base Cabinet Upgrade Considerations” on Page 5-52.

Features Capacities

The features and capacities of DK424 system processors are provided in Tables 4-6~4-8.

Table 4-6 System Feature Capacities

			DK424			
Features	**DK14**	**DK40i**	**RCTUA**	**RCTUBA/BB**	**RCTUC/D**	**RCTUE/F**
Amplified Conferencing [1]	0	2	4	4	4	4
Auto Attendant (built-in) simultaneous announcements	3	5	12	12	24	24
Caller ID/ANI/CNIS Abandoned Call Numbers: stored per station	10~100	10~100	10~100	10~100	10~100	10~100
Caller ID/ANI/CNIS Abandoned Call Numbers: stored per system	200	200	200	400	1000	2000
CO Line Groups	4	8	8	8	16	16
Distributed Hunt (DH) Calls in Queue per Groups	10	10	10	10	10	10
DH Groups	16	16	16	16	16	16
DH stations per Group	8	28	32	32	32	32
DNIS Network Routing Numbers	0	100	100	200	300	300
DNIS Numbers	0	200	200	350	500	500
DTMF receivers	3	5	12	12	24	24
External Page Zones	0	4	4	4	4	8
Call Park Orbits - general	20	20	20	20	20	20
Call Park Orbits - individual	10	28	32	80	240	336
Personal LCD Messages per DKT [2]	10	10	10	10	10	10
Personal Message DKTs	8	16	16	32	96	96
[PhDNs] per System	10	28	32	80	240	336
[PDNs] per System	10	28	32	80	240	336
Ring Tones	3	3	3	3	3	3
Simultaneous Party Conferencing (4-party)	2	3	3	7	7	14
Simultaneous Two-CO Line conferencing (3-party)	2	4	4	10	10	20
Station Speed Dial	40	40	40	40	40	40
Stratagy DK Systems (per tenant group)	1	1	1	1	1	1
Stratagy DK Systems (per system)	0	2	2	2	4	4
System LCD Messages	40	40	40	40	40	40
System Speed Dial	40	40	40	100	100	800
Telephone Page Groups	5	5	5	5	9	9
Telephone Group Page – simultaneous stations paged	8	28	32	80	120	120
Telephone Pickup Groups	8	20	20	20	20	20
Tenants	2	2	2	4	4	4
Toll Restriction (AC/OC) Table	8	8	8	8	16	16
Toll Restriction Classes	4	4	4	4	8	8
Verified Account Codes	300	300	300	300	300	500
Voice Mail SMDI	Yes	Yes	Yes	Yes	Yes	Yes

1. Requires additional customer-supplied hardware.
2. Personal Messages includes: timed reminder memo and station speed dial memo.

Table 4-7 Line Capacities and Universal Printed Circuit Board Slots

			DK424			
Lines and PCB Slots	**DK14**	**DK40i**	**RCTUA**	**RCTUBA/BB**	**RCTUC/D**	**RCTUE/F**
Universal slots	0	4 [1]	6	12	36	54
CO lines – loop start	4	12 [2]	16 [2]	48 [2]	144 [2]	200 [2]
CO lines – ground start	0	12	16 [2]	40 [2]	136 [2]	200 [2]
DID lines (analog)	0	12	16 [3]	40 [3]	136 [3]	200 [3]
Tie lines (analog)	0	12	16 [3]	40 [3]	136 [3]	200 [3]
T1 (DS-1) lines each)	0	0	0	48[4]	144 [4]	192 [4]
ISDN BRI (S/T or U) B channel lines	0	0	8[5]	16 [5]	16 [5]	16 [5]
ISDN PRI (T) B channel lines	0	0	0	47 [6]	141 [6]	188 [6]
Squared System Maximum (lines + stations)	4 lines + 4 stations	12 lines + 12 stations	16 lines + 16 stations	48 lines + 48 stations	144 lines + 144 stations	200 lines + 200 stations

1. There are four universal slots in the DK40i expansion unit.
2. All CO line capacities assume a PIOU, PIOUS, PEPU, RSSU, or RSIU is installed for RCTUBA/BB, RCTUC/D or RCTUE/F, but no Caller ID RCIU2/RCIS PCBs.
3. Limits apply to analog DID and Tie lines, not T1 DID/Tie lines.
4. T1 lines can be loop start, ground start, Tie, or DID (maximum 24 lines per unit, any type or combination).
5. BRI lines provide CO line services, including Caller ID, DID and Direct Inward Lines (DIL).
6. PRI lines provide CO line services, including Caller ID, ANI, DID, Tie, POTS, FX and DIL.

Table 4-8 Station and Peripherals Capacities

			DK424			
Stations	**DK14**	**DK40i**	**RCTUA**	**RCTUBA/BB**	**RCTUC/D**	**RCTUE/F**
Add-on modules (DADM)	8	12	12	40	120	200
Attendant consoles	0	0	0	2	4	4
DKT 2004-CT Cordless Telephones	8	28	32	80	240	336
DKT 2004-CT simultaneous calls	8	9	9	9	9	9
Door locks	2	3	4	5	5	5
Door phones (MDFB)	6	9	9	12	12	12
DSS consoles	0	3	3	4	8	8
ISDN BRI station circuits TE-1 and TA (2B+D per circuit) [1]	0	0	8	24	48	72
Handset OCA stations	8	28	32	80	240	336
Off-premise stations	2	20	32	80	232	328
PDIU-DS [2]	7	24	31	79	160	208
RPCI-DI used for data + TAPI, per system [2]	8	24	32	80	144	200
RPCI-DI used for TAPI only: per cabinet [2]	N/A	N/A	32	40	40	40
RPCI-DI used for TAPI only: per system [2]	8	24	32	80	186	280
Speaker OCA stations [2]	8	28	32	80	160	208
Standard stations	2	20	24	72	232	328
Telephones – DKT	8	28 [3]	32 [4]	80 [4]	240 [4]	336 [4]
Telephones – EKT	0	16 [3]	32 [4]	80 [4]	240 [4]	328 [4]

1. ISDN BRI TE-1 and TA include ISDN telephones, modems, video conference interfaces, etc. Up to two stations (TE-1 and/or TA) can connect to and share one BRI S-type circuit. Only one station can connect to a BRI U-type circuit.
2. Speaker OCA, PDIU and RPCI capacity is determined by 2B channel slot availability and power supply limits.
3. To install the maximum of 28 total DKTs and EKTs in the DK40i, up to 16 of the stations can be EKTs and at least 8 of the stations must be DKTs.
4. Maximum capacity of DKT/EKT stations per DK424 cabinet is 62, less for EKT 2000, 3000 (Power Factor limitation).

System Capacity

The number of CO lines and stations needed determine the size of the system. Tables 4-9 and 4-12 show the station and line capacities for eight-port RCOU/RCOS CO line PCBs.

There is a trade-off between stations and lines. Every group of eight stations installed decreases the CO line capacity of the system by eight, and vice versa. The exact hardware requirements depend on the features required.

Tables 4-9~4-12 assume one cabinet slot is used for an Optional Interface PCB.

Table 4-9 Strata DK424 Expansion Cabinet Configuration for Eight-Port CO Line PCBs Without Caller ID

1 Cabinet RCTUA		2 Cabinets RCTUB or RCTUBA/BB		3 Cabinets RCTUC/D		4 Cabinets RCTUC/D		5 Cabinets RCTUC/D		6 Cabinets RCTUC/D		7 Cabinets RCTUE/F	
CO Lines	Stations	CO Lines	Stations	CO Lines	Stations	CO Lines	Stations	CO Lines	Stations	CO Lines	Stations	CO Lines	Stations
16	32	48	40	72	64	96	88	120	112	144	136	200	224
		44	40	68	64	92	88	116	112	140	136	196	224
		40	48	64	72	88	96	112	120	136	144	192	232
		36	48	60	72	84	96	108	120	132	144	188	232
		32	56	56	80	80	104	104	128	128	152	184	240
		28	56	52	80	76	104	100	128	124	152	180	240
		24	64	48	88	72	112	96	136	120	160	176	248
		20	64	44	88	68	112	92	136	116	160	172	248
		16	72	40	96	64	120	88	144	112	168	168	256
		12	72	36	96	60	120	84	144	108	168	164	256
		8	80	32	104	56	128	80	152	104	176	160	264
				28	104	52	128	76	152	100	176	156	264
				24	112	48	136	72	160	96	184	152	272
				20	112	44	136	68	160	92	184	148	272
						40	144	64	168	88	192	144	280
						36	144	60	168	84	192	140	280
						32	152	56	176	80	200	136	288
						28	152	52	176	76	200	132	288
						24	160	48	184	72	208	128	296
								44	184	68	208	124	296
								40	192	64	216	120	304
								36	192	60	216	116	304
								32	200	56	224	112	312
										52	224	108	312
										48	232	104	320
										44	232	100	320
										40	240	96	328
												92	328
												88	336
												84	336

Table 4-10 CO Loop Start Analog Lines with Caller ID Maximum Capacities

1 Cabinet RCTUA		2 Cabinets RCTUBA/BB		3 Cabinets RCTUC/D		4 Cabinets RCTUC/D		5 Cabinets RCTUC/D		6 Cabinets RCTUC/D		7 Cabinets RCTUE/F	
Lines	Stations	Lines	Stations	Lines	Stations	Lines	Stations	Lines	Stations	Lines	Stations	Lines	Stations
8	24	24	40	40	56	56	72	72	88	88	104	136	152
		16	56	32	72	48	88	64	104	80	120	128	168
		8	72	24	88	40	104	56	120	72	136	120	184
				16	104	32	120	48	136	64	152	112	200
						24	136	40	152	56	168	104	216
								32	168	48	184	96	232
										40	200	88	248
												80	264

Table 4-11 CO Ground Start with Caller ID, DID and/or Tie Analog Lines Maximum Combined Capacities

1 Cabinet RCTUA		2 Cabinets RCTUBA/BB		3 Cabinets RCTUC/D		4 Cabinets RCTUC/D		5 Cabinets RCTUC/D		6 Cabinets RCTUC/D		7 Cabinets RCTUE/F	
Lines	Stations	Lines	Stations	Lines	Stations	Lines	Stations	Lines	Stations	Lines	Stations	Lines	Stations
8	16	20	24	32	40	44	48	56	64	68	72	104	112
		16	40	28	48	40	64	52	72	64	88	100	120
		8	64	24	64	36	72	48	88	60	96	96	136
				16	88	32	88	44	96	56	112	92	144
				12	96	28	96	40	112	52	120	88	160
						24	112	36	120	48	136	84	168
						20	120	32	136	44	144	80	184
						16	136	28	144	40	160	76	192
								24	160	36	168	72	208
										32	184	68	216
										28	192	64	232
												60	240
												56	256

Table 4-12 Digital, Tie, DID, Ground/Loop Start Digital T1 and ISDN PRI Lines Maximum Combined Capacities

2 Cabinets RCTUBA/BB		3 Cabinets RCTUC/D		4 Cabinets RCTUC/D		5 Cabinets RCTUC/D		6 Cabinets RCTUC/D		7 Cabinets RCTUE/F	
Lines	Stations	Lines	Stations	Lines	Stations	Lines	Stations	Lines	Stations	Lines	Stations
48	56	72	88	112	112	120	152	144	144	192[1]	240
40	64	64	96	96	120	112	160	120	168	184	248
24	72	48	104	88	128	96	168	112	176	168	264
16	80	40	112	72	136	88	176	96	192	160	272
		24	120	64	144	72	184	88	200	144	288
		16	128	48	152	64	192	72	216	136	296
				40	160	48	200	64	224	120	312
				24	168	40	208	48	240	112	320
				16	176	24	216	—	—	96	336

Notes
- T1 lines can be in increments of 8, 16 and/or 24.
- PRI channels can be in increments of 23B+1D or 47B + 1D. Each B channel represents a PRI CO line.

1. The maximum number of PRI lines for 2 cabinets is 47, 3~6 cabinets is 141 and 7 cabinets is 188.

DK424 Configuration

Tables 4-13~4-18 show system maximum capacity examples with ISDN BRI (S/T and/or U) circuits.

Table 4-13 RCTUA Maximum Capacity Examples with ISDN BRI (S/T and/or U-type) Circuits

BRI Station Circuits[1]	BRI Station B channels[1]	Other Station Circuits[3]	BRI Line Circuits[4]	BRI Line B channels[4]	Other Line Circuits[5]
8 [2]	16 [2]	16	0	0	0
6	12	16	2	4	0
5	10	16	3	6	0
4	8	16	4 [2]	8 [2]	0
4	8	16	2	4	4
3	6	16	1	2	8
2	4	24	2	4	8
1	2	28	1	2	12

Table 4-14 RCTUBA/BB Maximum Capacity Examples with ISDN BRI (S/T and/or U-type) Circuits

BRI Station Circuits [1]	BRI Station B channels [1]	Other Station Circuits [3]	BRI Line Circuits [4]	BRI Line B channels [4]	Other Line Circuits [5]
16 [2]	32 [2]	32	8 [2]	16 [2]	0
12	24	40	8	16	8
10	20	40	8	16	12
8	16	48	8	16	16
8	16	48	6	12	20
8	16	56	4	8	24
8	16	56	2	4	28
6	12	56	6	12	24
6	12	56	4	8	28
6	12	64	2	4	32
4	8	64	4	8	32
4	8	64	2	4	32
2	4	72	2	4	40

1. Each BRI circuit (S/T and/or U-type) provides two B channels plus one D channel and reduces the system capacity by two station ports and two CO lines. Each (S/T) BRI station circuit allows up to eight TE-1 and TA devices to share the BRI B channels (two simultaneous calls maximum per BRI circuit.). Each BRI-U circuit supports one TE-1 or TA device.
2. Maximum BRI capacity.
3. Other stations include Toshiba digital and electronic telephones, or attendant consoles, standard telephones and devices.
4. BRI S/T circuits are available with RBSU/RBSS PCBs and BRI-U circuits are available with RBUU/RBUS PCBs. ISDN BRI PCBs will be available with a future release of DK424 software. Each BRI line circuit (S/T or U) provides two BRI CO lines (B channels) for incoming/outgoing calls.
5. Other lines include analog and digital (T1 or PRI) loop start, ground start, DID, and Tie lines.

Table 4-15 RCTUC/D Maximum Capacity Examples with ISDN BRI (S/T and/or U-type) Circuits

BRI Station Circuits [1]	BRI Station B channels [1]	Other Station Circuits [3]	BRI Line Circuits [4]	BRI Line B channels [4]	Other Line Circuits [5]
40 [2]	80 [2]	144	82	16 [2]	48
30	60	164	8	16	68
20	40	184	8	16	88
16	32	192	8	16	96
12	24	200	8	16	104
8	16	208	8	16	112
8	16	216	4	8	120
8	16	216	2	4	124
4	8	228	2	4	132

Table 4-16 RCTUE/F Maximum Capacity Examples with ISDN BRI (S/T and/or U-type) Circuits

BRI Station Circuits [1]	BRI Station B channels [1]	Other Station Circuits [3]	BRI Line Circuits [4]	BRI Line B channels [4]	Other Line Circuits [5]
64 [2]	128 [2]	19 [2]	8 [2]	16 [2]	56
50	100	216	8	16	84
40	80	240	8	16	104
30	60	256	8	16	124
20	40	280	8	16	144
16	32	288	8	16	152
8	16	304	8	16	168
8	16	312	4	8	176
8	16	312	2	4	180
4	8	320	4	8	184
4	8	320	2	4	188
2	4	328	2	4	192

1. Each BRI circuit (S/T and/or U-type) provides two B channels plus one D channel and reduces the system capacity by two station ports and two CO lines. Each (S/T) BRI station circuit allows up to eight TE-1 and TA devices to share the BRI B channels (two simultaneous calls maximum per BRI circuit). Each BRI-U circuit supports one TE-1 or TA device.
2. Maximum BRI capacity.
3. Conventional stations include Toshiba digital and electronic telephones, or attendant consoles, standard telephones and devices.
4. BRI S/T circuits are available with RBSU/RBSS PCBs and BRI-U circuits are available with RBUU/RBUS PCBs. ISDN BRI PCBs will be available with a future release of DK424 software. Each BRI line circuit (S/T or U) provides two BRI CO lines (channels) for incoming/outgoing calls.
5. Conventional lines include analog and digital (T1 or PRI) loop start, ground start, DID, and Tie lines.

Printed Circuit Boards

The system interfaces with CO lines, stations, and peripheral devices via PCBs that plug into the Base and Expansion Cabinet slots and subassembly PCBs, that mount onto the plug-in type PCBs.

Refer to Table 4-17 for a list of station and console PCBs supported by the DK424.

Table 4-17 PCB Circuits, Interface Options and Connectors

PCB	Subassembly	Circuits	Interface Options	Connector
RPTU		(DK424 only) 1 circuit/ISDN PRI (23 B channels/1 D channel)	POTS FX Tie (senderized) Tie (cut through) OUTWATS (intra-LATA) OUTWATS (inter-LATA) InWATS	RJ48C or RJ48X ISDN TIA-568A
RBSU		2 ISDN BRI S/T point circuits (NT or TE). Each circuit is 2B+1D. (Host for the RBSS)	Network and/or station side	RJ45, ISDN TIA-568A
attaches to RBSU	**RBSS**	2 ISDN BRI, S point circuits (2B+D each)	Station side only 1 RBSS subassembly per RBSU	RJ45, ISDN TIA-568A
RBUU		(DK424 only) 2 ISDN BRI, U point circuits (2B+D each). Host for the RBUS. (Release 4.2)	Network and/or station side	RJ45, ISDN TIA-568A
attaches to RBUU	**RBUS**	2 ISDN BRI, U point circuits (2B+D each) subassembly for the RBUU. (Release 4.2)	Network and/or station side 1 RBUS subassembly per RBUU.	RJ45, ISDN TIA-568A
RDTU2		Applies to DK424 only. 1~8, 1~16, or 1~24 channels (lines), depends on system programming	Loop start lines Ground start lines Tie lines (wink or immediate) DID/DOD lines (wink or immediate)	2-pair amphenol RJ48M (All PCB amphenol connectors are female)
RMCU		2 E911 CAMA circuits with the 1 RCMS or 4 with 2 RCMSs	E911 CAMA lines	RJ11C modular
attaches to RMCU	**RCMS**	2 E911 CAMA circuits	Up to 2 RCMSs per RMCU for 4 CAMA lines max.	
REMU		4 Tie line circuits	E&M Tie lines 2- or 4-wire transmission Type I signaling Type II signaling Immediate start Wink start	REMU (8-wire modular jack) 2- or 4-wire/type I or II
KCDU		(DK40i only) 2 CO line circuits/ 4 digital telephone circuits	CO loop start lines Digital circuits same as PDKU, except no DDSS	RJ14C modular (CO Line circuits) 25-pair amphenol (digital phone circuits)
RCOU		4 CO line circuits (lines) With RCOS: 8 CO line circuits (lines)	CO loop start lines	RJ14C modular
attaches to RCOU	**RCOS**	Provides four additional Loop Start CO lines.	1 RCOS subassembly per RCOU	

Table 4-17 PCB Circuits, Interface Options and Connectors *(continued)*

PCB	Subassembly	Circuits	Interface Options	Connector
RCIU2		4 circuits With RCIS: 8 circuits	Loop or Ground Start Lines with Caller ID. Requires: RCOU, RGLU2 or PCOU	RJ14C modular
attaches to RCIU2	**RCIS**	Used with RCOU/RCOS, PCOU, and RGLU2 CO line PCBs to provide 4 Caller ID circuits.	1 RCIS subassembly per RCIU2	
RDDU		4 DID circuits	DID Lines	RJ14C modular
RGLU2		4 line circuits	Loop or ground start lines	RJ14C modular
PIOU, PIOUS, PEPU, RSSU		A PIOU or PIOUS can use an IMDU	ACD/SMIS (DK424 only, except RCTUA) SMDI for Voice Mail SMDR printer or call accounting machine PC or maintenance terminal (local or remote)	25-pair amphenol (PIOU or PEPU) Spring clip terminal (PIOUS) Two 3-pair modular (TTY/ SMDR/SMDI/SMIS) (All PCB amphenol connectors are female)
attaches to PIOU and PIOUS	**IMDU**		Provides remote maintenance 300 bps or 1200 bps full-duplex modem for DKAdmin or DKBackup. 1 per PIOU/PIOUS.	None
RSTU2		8 standard telephone circuits	Standard telephones Voice mail ports Off-premises stations Other similar devices Alternate BGM source Auto Attendant digital announcer Message Waiting lamp (RSTU2 only) Fax machines ACD Announcer Strata Airlink wireless telephones	25-pair amphenol (All PCB amphenol connectors are female)
attaches to RSTU2 and RDSU	**R48S**	48VDC circuit for up to 8 standard telephone circuits	Optionally interfaces to the RSTU2 and RDSU to extend loop length of standard telephones from 600 ohms to 1200 ohms.	None
RDSU		Without RSTS: 2 standard telephone/ 4 digital telephone circuits With RSTS: 4 standard telephone/ 4 digital telephone circuits	Digital: same as PDKU, except no DDSS console Standard: same as RSTU (standard Message Waiting not available)	25-pair amphenol
attaches to RSTU2 and RDSU	**RSTS**	Provides two additional standard telephone circuits	1 maximum per RDSU	None
PESU		2 standard telephone circuits/ 4 electronic telephone circuits (standard/electronic telephone ports)	Standard: same as KSTU2 Electronic: same as PEKU, except PESU does not support HDSS console	25-pair amphenol
RATU		(DK424 only) 4 PC attendant PC console circuits	PC attendant console Conventional attendant console	25-pair amphenol

Table 4-17 PCB Circuits, Interface Options and Connectors *(continued)*

PCB	Subassembly	Circuits	Interface Options	Connector
PDKU2		8 digital telephone circuits	Digital telephones (with or without RPCI-DI, DVSU, DADMs, or digital cordless telephone) Stand-alone digital cordless telephone DDSS console PDIU-DS DDCB	25-pair amphenol
Stratagy DK		2, 4, 6, or 8 VM ports All of the above Stratagy DK systems use 8 station ports in the DK40i and DK424 software	None	None
PEKU		8 electronic telephone circuits	Electronic telephones HDSS console Alternate BGM source EOCU PCB for OCA External conference amplifier HDCB	25-pair amphenol (All PCB amphenol connectors are Female)
attaches to PEKU or PESU	**EOCU**	Provides Speaker OCA path for 8 circuits on PEKU or 4 circuits on PESU. (Handset OCA is not available on EKTs.)	1 for PEKU or PESU that supports Speaker OCA	
RSIU (DK424 only)		Up to 4 interface ports when installed with the optional RSIS or RMDS piggy-back PCBs.	ACD/SMIS SMDI for voice mail SMDR printer or call accounting machine PC or maintenance terminal (local or remote)	One 3-pair modular (TTY/ SMDR/SMDI/SMIS)
attaches to RSIU	**RSIS, RS-232 interface** **RMDS** (Modem/ RS-232) (DK424 only)	Up to 3 RSISs ...or 1 RMDS and 2 RSISs per RSIU	Provides up to four interface ports (RS-232 and modem) for system interface with: RMDS (1200 or 2400 bps) Voice Mail SMDI ACD/SMIS SMDR Local or Remote Maintenance for DKAdmin or DKBackup PC.	One 3-pair modular per RSIS (RS-232), RMDS (Modem/RS-232)
RWIU		4 RJ11 jacks to support 4 Strata AirLink Integrated Base Stations	Digital Wireless Handsets: same as PDKU, except no DDSS console, Stand-alone cordless telephone, PDIU-DS, or DDCB	None

RKYS Feature Key Upgrades

The system can be upgraded for built-in AA, Automatic Call Distribution (ACD), Software Management Information System (SMIS) for ACD with feature keys that attach to the common control unit. See Table 4-18 for a list of features provided by RKYS feature keys.

Table 4-18 RKYS Features

Feature(s) Provided	RKYS1	RKYS2	RKYS3	Common Control Unit
Built-in Auto Attendant	X	X	X	Applies to all RCTUs
ACD		X	X	RCTUBA/BB, RCTUC/D or RCTUE/F
ACD with a SMIS application			X	RCTUBA/BB, RCTUC/D or RCTUE/F

Option Interface PCBs for the DK424 are listed in Table 4-19. Refer to Chapter 10 – Peripherals for further information on these options.

Table 4-19 DK424 Interface PCB Options

Interface Options	RSSU[1]	PIOU[1]	PIOUS[1]	PEPU	RSIU/ RSIS[1]
Zone page interface (unamplified, 4 zones)		X			
Unamplified page output (single zone, 600 ohms, duplex)		X	X	X	
Amplified page output (single zone, 3 watts, 8 ohms)		X		X	
Night transfer or Music-on-hold control relay		X	X	X	
Door lock or external amplifier control relay		X	X	X	
Alarm Sensor		X	X		
Remote maintenance modem subassembly (IMDU or RMDS) (disables TTY output when they are piggy-backed onto the PIOU/PIOUS or RSIU/RSIS cards)[2]		X (IMDU)	X (IMDU)		X (IMDU)
Remote Maintenance using customer-provided external modem (requires TTY output port)[2]	X	X	X		X
SMDR output (RS-232/6-wire modular connector)		X[3]	X[3]		X
MIS for ACD (requires TTY output port)[2, 4]	X	X	X		X
Voice Mail SMDI (requires TTY output port)[2]	X	X	X		X
StrataControl and/or DKAdmin PC (requires TTY output port)[2]	X	X	X		X

1. PIOU, PIOUS, and RSSU each provide one TTY port which can be flexibly programmed for the features marked with X. RSIU/RSIS can provide up to four flexible TTY/SMDR ports.
2. Maintenance modem, ACD/SMIS, Insight DK, Voice Mail, SMDI and DKAdmin PC Interface each require a separate TTY output. PIOU, PIOUS, and RSSU provide one TTY output each. RSIU with RSIS PCBs provides up to four TTY outputs.
3. SMDR output will function simultaneously on the same PIOU or PIOUS with one of the following: DKAdmin, remote modem, SMIS for ACD, Insight DK, or SMDI features.
4. Insight DK, Call Center Viewer and SMIS for ACD requires that the system processor (RCTU PCB) must be equipped with an RKYS3 or higher feature key.

DK424 Configuration

Telephones

The DK424 system supports Toshiba Proprietary Digital (DKT) and older series Electronic Telephones (EKTs). Standard telephones (500 or 2500 series) and devices that require a standard telephone line interface (fax, modem, VM, etc.) can also be connected to DK424.

Toshiba provides the following 2000-series Digital Telephones for Strata DK424 systems.

- ♦ DKT-2020SD–20-button speakerphone with LCD
- ♦ DKT-2010SD–10-button speakerphone with LCD
- ♦ DKT-2020S–20-button speakerphone
- ♦ DKT-2010H–10-button handsfree answerback telephone

Toshiba telephones can be equipped with optional subassemblies (listed on Page 4-33).

Attendant Position Options

The DK424 provides three options for attendant positions which answer system incoming calls. See Table 4-8 for the number of options per RCTU processor. See Table 4-20 for configuration considerations.

- ♦ **PC Attendant Console**–used for medium-to-heavy traffic systems where an attendant must answer and transfer incoming calls. The PC Attendant Console requires a customer-provided PC plus the RATU PCB.

  Up to two consoles can be connected on systems with RCTUB or RCTUBA/BB or four with RCTUC/D (Release 2 and 3) and RCTUE/F PCBs. The RATU PCB uses four station ports in system software. RCTUC/D Release 1 and all RCTUAs do not support the attendant console.
- ♦ **Direct Station Select (DSS) Console**–used for medium traffic systems where an attendant must answer and transfer incoming calls. The DSS console must connect to circuit 8 on a PDKU PCB.
- ♦ **Digital Add-On-Module (DADM)**–used for medium traffic, smaller systems, where an Attendant must answer and transfer incoming calls. The ADM connects to any 2000-series digital telephone. The DADM shares the associated telephones circuit so it does not require a designated PCB or circuit port (see "DADM" on Page 4-33.)

Direct Station Selection (DSS) Consoles and Door Phones (MDFBs)

Up to 12 door phones can be installed in a system with DK424 RCTUB, RCTUC/D and RCTUE/F, nine with RCTUA. Each is connected to a DDCB or HDCB door phone control box. See Table 4-20 for door phone configuration considerations.

Table 4-20 DSS Console and Door Phone Configuration

Option Unit	Interface/ PCB	DK424 Capacity	Function
DDSS	PDKU2 (Circuit 8)	3-RCTUA 4-RCTUBA/BB 8-RCTUC/D 8-RCTUE/F	Digital DSS console (DDSS) can be flexibly assigned to designated electronic and digital telephone stations: Up to 8-DSS consoles may be assigned to a designated electronic or digital telephone station. It has 60-buttons which are flexibly assigned as CO line, speed dial, and DSS (no [PDN] or [PhDN]).
HDSS	PEKU (Circuits 7 and 8)	3-RCTUA 4-RCTUBA/BB 8-RCTUC/D 8-RCTUE/F	Electronic DSS console (HDSS) provides a 60-button console that functions with digital or electronic telephones. Buttons are flexibly assigned as CO line, speed dial, and DSS (no [PDN] or [PhDN]). DSS consoles can be flexibly assigned to designated electronic and digital telephone stations: Up to 8-DSS consoles may be assigned to a designated electronic or digital telephone station.
DDCB	PDKU or RDSU (Circuit 5)	4 per system: RCTUBA/BB and RCTUC/D, RCTUE/F 3 per system: RCTUA	Each Digital Door Phone/Lock control (DDCB) interfaces with up to three door phones (MDFBs) or two MDFBs and one door lock. DDCBs/HDCBs can only be connected to Ports 004, 012, 020, and 028, normally in slots 11, 12, 13, and 14, respectively. Always install DDCB/HDCB station PCBs (PDKU, RDSU, PEKU, or PESU) in slots that have lower slot numbers than RDDU, PEMU, REMU2, RATU, or RDTU PCBs.
HDCB	PEKU or PESU (Circuit 5)	4 per system: RCTUBA/BB and RCTUC/D, RCTUE/F 3 per system: RCTUA	Each Electronic Door Phone/Lock control (HDCB) provides interface for up to three door phones (MDFBs) or two MDFBs and one door lock. DDCBs/HDCBs can only be connected to Ports 004, 012, 020, and 028, normally in slots 11, 12, 13, and 14, respectively. Always install DDCB/HDCB station PCBs (PDKU, RDSU, PEKU, or PESU) in slots that have lower slot numbers than RDDU, PEMU, REMU2, RATU, or RDTU PCBs.
MDFB (Door Phone)	DDCB or HDCB	12 per system: RCTUBA/BB, RCTUC/D, RCTUE/F 9 per system: RCTUA	Door phone (MDFB) with two-way talk path to system telephones. Includes microphone for talkback amplifier with HESB. Doorbell rings designated digital and electronic telephones.

Notes

DSS (DDSS and HDSS) Console

- No additional hardware is required for DSS consoles.
- DSS consoles are assigned to associated digital and electronic telephones in programming.
- DSS consoles cannot be connected to RDSU or PESU electronic circuits.

Door Phone

- DK424 can support as many as 12 MDFBs. See Table 4-8.
- Each DDCB requires one circuit (Circuit 5) on a PDKU or RDSU, and each HDCB requires one circuit (Circuit 5) on either a PEKU or PESU.
- One door lock control can be configured on each DDCB and HDCB in place of one door phone.

AC and Reserve Power Hardware

Detailed information for AC and reserve battery power installation is described in Chapter 5–DK424 Cabinet Installation. These optional assemblies may be required, see Table 4-21.

- RBTC1A-2M and PBTC-3M–Battery connecting cables.
- RC7C1A-1.7M–Seventh cabinet battery and data cable kit.
- RBDB2–Battery power distribution box for up to seven cabinets.
- RPSB1 and RPSB2–three-outlet AC power strips, for requirements.

Table 4-21 Power Strip (RPSB) Requirements

	Quantity of RPSB1 and RPSB2 Power Strips Needed[1]						
Local Electric Code Requirement	1 Cabinet	2 Cabinets	3 Cabinets	4 Cabinets	5 Cabinets	6 Cabinets	7 Cabinets
Two AC power cords allowed from system.	0 - RPSB1 0 - RPSB2	0 - RPSB1 0 - RPSB2	1 - RPSB1 0 - RPSB2	1 - RPSB1 0 - RPSB2	2 - RPSB1 0 - RPSB2	2 - RPSB1 0 - RPSB2	2 - RPSB1 1 - RPSB2
Only one AC power cord allowed from system.	0 - RPSB1 0 - RPSB2	1 - RPSB1 0 - RPSB2	1 - RPSB1 0 - RPSB2	1 - RPSB1 1 - RPSB2	1 - RPSB1 1 - RPSB2	2 - RPSB1 1 - RPSB2	N/A

1. High current carrying capacity cord for application where local electric codes (or user) requires only one AC cord to exit four or more cabinets. Toshiba highly recommends using the RPSB2 for two-cabinet installations.

Floor Mount Installation Hardware

Floor mounting DK424 requires RFIF and RCCB hardware assemblies; wall mounting DK424 does not require special hardware (see Table 4-22), but may require a plywood backboard (see Chapter 3 – Cabinet Installation).

Table 4-22 Cabinet Power, Reserve Power, and Floor Mount Hardware Assemblies

Assembly	Description	Function
RBTC1A-2M	Reserve Power Cable - RBDB2 to Battery Terminals	Two cables are required for up to six cabinet systems and three are required for seven cabinet reserve power installations (for current carrying capacity) when connecting reserve (battery) power to three or more cabinets (wall mount). RBDB2 is also required–see “RBDB2” below. A licensed electrician must install this item to retain UL listing and/or local electrical code compliance.
PBTC-3M	Reserve Power Cable - Cabinet Power Supply to Battery Terminals	One cable is required for each Cabinet if connecting reserve power to one or two cabinets (wall or table mount). A licensed electrician must install this item to retain UL listing and/or local electrical code compliance.
RBDB2	Battery Distribution Box	Distributes reserve power when three or more cabinets require reserve power (floor or wall mount). Six RBTC2A-1.5M cables are provided with the RBDB2 distribution box to connect up to six DK424 power supplies to the battery distribution box. RC7C1A-1.7M is also required for the seventh cabinet.

Table 4-22 Cabinet Power, Reserve Power, and Floor Mount Hardware Assemblies *(continued)*

Assembly	Description	Function
RC7C1A-1.7M	Cabinet 7 Cable Kit - Data and Battery Cables	Used for seven cabinet installations only. Provides long data cable to connect the sixth Expansion Cabinet to the DK424 Base Cabinet. Provides a long battery cable to connect RBDB2 battery distribution box to the sixth Expansion Cabinet power supply.
RFIF (up to 7 cabinets)	Floor Mount Fixture Kit	Provides two metal stands for mounting three or more cabinets on floor. Three pairs of wall brackets (RWBF) are supplied with RFIF. Wall brackets are needed to secure floor mounted systems to the wall for safety purposes (not required to wall mount cabinets).
RCCB1 (up to 6 cabinets) ...or RCCB2 (7 cabinets)	Conduit Connection Box	Conduit box required for AC and battery power connection to three or more floor-mounted cabinets. (Not required for mounting two cabinets on a table or any number of cabinets on a wall.) RCCB2 is required instead of RCCB1 for seven cabinet floor mount installations. A licensed electrician must install this item to retain UL listing and/or local electrical code compliance.
RPSB1	Three-outlet AC Power Strip	One RPSB1 required when installing three or four cabinets (wall or floor mount). Two RPSB1s required when installing five, six, or seven cabinets (wall or floor mount). Two AC cords will exit the cabinets in some configurations.
RPSB2	Three-outlet AC Power Strip - heavy cord	High current carrying capacity cord for application where local electric codes (or user) requires only one AC cord to exit four or more cabinets. It is highly recommended to use the RPSB2 for two-cabinet installations to accommodate further growth. Must be ordered for seven cabinet systems.
RWBF	Wall bracket pair	Required for seven cabinet systems when the system is floor mounted. Secures the seventh cabinet to the wall for safety purposes (not required to wall mount cabinets – see RFIF).

Worksheets

The worksheets help you configure the system. Designed to make the system configuration as orderly as possible, they also provide room to record the hardware - cabinets, PCBs, stations, and options - that comprise the system.

Copy the worksheets as required, then fill them out in the order they are given.

- Worksheet 1 – System PCB Slot Requirements
- Worksheet 2 – System Cabinet Assignment Guide
- Worksheet 3 – System PCB Assignment Guide
- Worksheet 4 – Option Configuration Guide
- Worksheet 5 – System Power Factor (PF) Check

Worksheet 1 – System PCB (Slot) Requirements

Customer ____________________

Location ____________________

Digital Ports Required

Digital Telephones (DKTs)

2010-H ________

2010-SD ________

2020-S ________

2020-SD ________

2004-CT ________

2001-SLT ________

WRLS-HS ________

1020-H ________

1020-SD ________

Total Digital Telephones (DKTs)	________	1 port per Digital Telephone (1 X Total)	________
Total DDSS Consoles	________	1 port per Digital DDSS Console (1 X Total)	________
Total PDIU-DS	________	1 port per Digital PDIU-DS (1 X Total)	________
Total Digital Door Phone/Lock Units (DDCB)	________	1 port per Digital DDCB (1 X Total)	________
		Total Digital Ports	________

Notes

- Digital telephones equipped with RPCI-DI, PDIU-D12 or ADM only require one digital port. (See Table 4-8.)
- One door phone control box (DDCB) supports three door phones (MDFBs). (See Table 4-20.)
- WRLS-HS is the same part number for Digital or Analog (depends on the type installed).

Electronic Ports Required

Electronic Telephones (EKTs)

6510-S ________

6510-H ________

6520-S ________

6520-SD ________

Total Electronic Telephones (EKTs)	________	1 port per Electronic Telephone (1 X Total)	________
Total HDSS Consoles	________	2 ports per HDSS Console (2 X Total)	________
Total Electronic Door Phone/Lock Unit (HDCB)	________	1 port per HDCB (1 X Total)	________
Total BGM Source Extend Amplifiers	________	2 ports per amplifier (2 X Total)	________
Total Alternate BGM Source	________	1 port per Alternate BGM Source (1 X Total)	________
		Total Electronic Ports	________

Standard Ports Required

Standard Telephones			
On Premise	______		
Off Premise	______		
Total Standard Telephones	______	1 port per Standard Telephone (1 X Total)	______
Total Analog Wireless Handsets	______	1 port per Analog Wireless Handset (1 X Total)	______
Total Voice Mail Ports	______	1 port per Voice Mail Port (1 X Total)	______
Total Fax or Modem Devices	______	1 port per fax/modem device (1 X Total)	______
Total ACD/Auto Attendant Digital Announcement Devices	______	1 port per device (1 X Total)	______
Total Alternate BGM Source	______	1 port per Alternate BGM Source (1 X Total)	______
Total Other Devices	______	1 port per device (1 X Total)	______
		Total Standard Ports	______

Notes

- Isolation transformer may be required for the Alternate BGM Source, see Chapter 10 – Peripheral Installation.
- Other devices include dictation equipment, etc.

Station PCBs/Slots Required

1. Total digital ports divided by 8 (round up) = Total PDKU2 PCB slots required ________

   Notes

   - PDKU2 provides eight digital telephone ports (circuits). Circuit 5 (when associated with ports 004, 012, 020, and 028) can only interface with a DDCB. Circuit 8 can only interface with a DDSS console (see Page 4-17).
   - The PDKU1 can also be used. The PDKU1 can only support Data Interface Units (DIUs) on circuits 1~7, while the PDKU2 can support DIUs on all eight circuits. See Table 4-20 (example) for slot limitations.

2. Total standard ports divided by 8 (round up) = Total RSTU2 PCB slots required ________

   Notes

   - The PSTU2 or PSTU1 can also be used. These earlier version PCBs can interface with the same devices that the RSTU can, but they have different ring generators and cannot support MW. See the RSTU/PSTU section in Chapter 7 – DK40i/DK424 Universal Slot PCBs for more details.
   - The RSTU2 provides eight standard telephone ports (circuits). Circuit 2 only can connect to a separate Background Music (BGM) source. The RSTU can be equipped with an R48S to extend the loop length of the RSTU from 600 ohms to 1200 ohms (see Table 4-17).
   - RSTU2 is required to operate message waiting lamps on a standard telephone.

3. Are four or less digital or standard ports needed?
   If so, RDSU (RSTS) can be used. Total RDSU PCB slots required ________

   Total RSTS PCB slots required ________

   - RDSU provides two standard telephone ports (circuits) and four digital ports (circuits) in its basic configuration. The optional RSTS can be attached to the RDSU to provide two more standard telephone ports. The RSTU2 can be equipped with an R48S to extend the loop length of the RSTU2 standard telephone ports from 600 ohms to 1200 ohms (see Table 4-17).

4. Total electronic ports divided by 8 (round up) = Total PEKU PCB slots required ________

   (Refer to Step 5 before finalizing this number.)

   Note PEKU provides eight electronic telephone ports (circuits). Circuit 5 (when associated with ports 004, 012, 020, or 028) can only interface with an HDCB. The HDSS consoles requires two PEKU (see Table 4-20). Each conference amplifier requires use of circuits 2 and 3 of a PEKU.

5. Are four or less electronic ports or two or less standard ports needed?
   If so, PESU can be used. Total PESU PCB slots required ________

   Note PESU provides two standard telephone ports (circuits) and four electronic telephone circuits (ports). Circuit 5 (when associated with Ports 004, 012, 020, and 028) can only interface with an HDCB (see Table 4-20).

6. Add totals from Steps 1~5 = **Total Station PCB slots required** ________

CO Line PCBs/Slots Required

1. Determine analog loop start line PCB slot requirements.

   Total loop start lines (with/ without Caller ID) divided by 8 (round up) =

   Total RCOU/RCOS PCBs (slots) required ____________

   Total loop start lines (with/without Caller ID) divided by 4 (round up) =

   Total RGLU2/RCOU/PCOU PCBs (slots) required ____________ (PCOU existing)

   Total analog loop start line PCB slots required ___________

   Notes

   - RGLU2 can provide loop or ground start lines.
   - RCOU provides four loop start CO lines in its basic configuration. An RCOS can be attached to the RCOU to add four more loop start CO lines for a total of eight per slot.
   - PCOU2 provides four loop start CO lines.
   - The PCOU1 and the PCOU2 are identical in fit, form, and function for the U.S. market.

2. Determine analog ground start line PCB slot requirements.

   Total ground start lines (with/without Caller ID) divided by 4 (round up) =

   Total analog ground start line PCB slots required ___________

   Note RGLU2 provides four CO lines that can be individually configured as loop start or ground start.

3. Determine E911 CAMA line PCB slot requirements.

   Total RMCU/RCMS PCBs (1 slot) required ____________ (RMCU existing)

   Total RMCU/RCMS CAMA PCB slots required ___________

   Note The RMCU supports two subassemblies (RCMS) that provide a total of up to four ports.

4. Determine Caller ID (FSK) receiver/decoder PCB slot requirements.

   Total loop and ground start lines (with Caller ID) divided by 8 (round up) =

   Total RCIU2/RCIS PCB slots required ___________

   Note RCIU2 provides four caller ID receiver/decoder circuits. RCIU2 with RCIS subassembly provides eight caller ID receiver/decoder circuits. Always use RCIU2 with RCIS for up to eight circuits as opposed to using two RCIU PCBs. These circuits do not use up station port or CO line software assignments.

5. Determine analog Tie line PCB slot requirements.

Total analog Tie lines (with or without ANI/DNIS) divided by 4 = Total REMU/PEMU PCB slots required ________

Notes

- REMU provides four E&M Tie trunks (Type I or II signaling, Wink or Immediate Start, 2- or 4-wire transmission).
- The PEMU1 can also be used. The PEMU only provides Type 1 signaling, 2- or 4-wire transmission and Immediate Start.
- See Table 4-7 for REMU/PEMU maximum quantities. Prior to Release 4, each REMU or PEMU reduced system station port line and capacity by four ports and four lines. With Release 4, Tie lines do not use station ports.

6. Determine analog DID line PCB (slot) requirements.

   Total analog DID lines (with or without ANI/DNIS) divided by 4 = Total RDDU PCB slots required ________

   Notes

   - RDDU provides four Direct Inward Dialing lines. (Prior to Release 4, each RDDU reduces system station port and line capacity by four ports and four lines.) With Release 4, DID lines do not use station ports.
   - See Table 4-7 for RDDU (DID analog lines) maximum quantities.

7. Determine RDTU T1 PCB (slot) requirements (loop/ground/Tie/DID lines).

Total loop start lines	________	(channels)
Total ground start lines	________	(channels)
Total Tie lines (with/without ANI/DNIS)	________	(channels)
Total DID lines (with/without ANI/DNIS)	________	(channels)

   Total RDTU lines required ________

   Note Contact the T1 provider (Telco or Carrier company) to determine exact T1 channel/line needs.

8. Determine RDTU PCB (slot) requirements.

Total 8-channel RDTU PCB/slots	________	
Total 16-channel RDTU PCB/slots	________	(include skipped slots) -2 slots
Total 24-channel RDTU PCB/slots	________	(include skipped slots) -2 slots

   Total RDTU PCB slots required ________

Notes

- When installing 16 or 24 channel RDTU PCBs into a slot, the next slot or two slots may not be usable for other PCBs (Tables 4-4 and 4-5 and Worksheet 2.)
- RDTU provides either 8, 16, or 24 channels (lines), depending on programming. Each channel can be set for either DID, ground start CO, loop start CO, or Tie line operation. (Each RDTU Tie line or DID line reduces the system line and station port capacity by one port.)
- As many as six RDTU PCBs can be installed in systems operating with the RCTUC/D common control unit, as many as two with RCTUB operated systems. The RCTUA does not support RDTU.
- Prior to Release 4, each Tie or DID line reduced system station capacity by one port. With Release 4, Tie and DID lines do not use station ports.

9. Add totals from Steps 1~7. **Total CO Line PCB slots required** ____________

Attendant Console Slots Required

➤ Enter one slot for each attendant console required (1~4 consoles maximum).

Total RATU PCB slots required ________

PIOU/PIOUS/RSIU/RSSU Option Slots Required

➤ Enter number of option PCBs required.

Total needed for MIS for ACD (required new) ______

Total needed for remote/local maintenance with DKAdmin/DKBackup PC ______

Total needed for SMDI ______

Total needed for SMDR (existing PIOU) ______

Total needed for miscellaneous options (see Table 4-19) ______

Total PIOU/PIOUS/RSIU/RSSU PCB slots required ________

Notes

The following subassembly PCBs do not required additional cabinet slots:

- The IMDU subassembly plugs onto PIOU or PIOUS to provide a remote maintenance modem.
- The RMDS subassembly plugs onto the RSIU to provide a remote maintenance modem.
- Up to three RSIS subassemblies can plug onto RSIU to provide any option listed in this Step.

PEPU Page Option PCB Required

➤ Enter total number of PEPU PCBs needed.

Total PEPU PCB slots required ________

Note PEPU provide 600-ohm interface or 3-watt page output for external page/BGM operation.

System Slots Required

➤ List the number of slots for each of the following:

Total number of Station PCB slots required (see Page 4-22) ________

Total number of CO Line PCB slots required (see Page 4-25) ________

Total number of attendant console slots required (see Page 4-26) ________

Total number of option slots required (see Page 4-26) ________

Total number of page option slots required (see Page 4-26) ________

Total system slots required ________

Cabinets Required

➤ Total system slots divided by 6 or 8 = **Total Cabinets required** ________

Important! *To determine the type of RCTU PCB required, use Table 4-7. The total Universal slots and features required determine the RCTU PCB needed.*

Worksheet 2 – System Cabinet Assignment Guide

DK424 and DK280 Base and Expansion Cabinets are interchangeable. The only system considerations are:

- OCA/RPCI configuration requirements
- Channel (8, 16, and 24) RDTU (T1/DS-1 interface) slot configuration requirements
- Number of system slots required. (See "System Slots Required" on Page 4-27.)

See Tables 4-7 and 4-8 for OCA/RPCI and T1/DS-1 configuration requirements.

Cabinet	Type (DK424 or DK280)	Number of Slots Available
1		
2		
3		
4		
5		
6		
7		
	Total Number of Slots Available	
	Number of Slots Required	

Worksheet 3 – System PCB Assignment Guide

Fill in Worksheet 3 by recording PCBs in the following order (see Worksheet 1 for PCB type and quantities):

1. Write in the Cabinet Type.
2. Enter the RCTU PCBs as required:
    - RCTUBA, RCTUC, or RCTUE in slot R11
    - RCTUA, RCTUBB, RCTUD, or RCTUF in slot RCTU
3. Enter PDKU, PEKU, or RSIU in slot 11.

    ...and/or if an RSIU is installed in slot 11, install a PDKU or PEKU in slot 12.
4. Starting with the lowest empty slot (S12 or S13), record all station, attendant console, loop start, ground start PCBs from lower to higher numbered slots (left to right). Record the appropriate port numbers used by each. Do not leave empty slots except when installing RDTU PCBs (see Tables 4-4 and 4-5).
5. After all station, attendant console, and ground/loop start line PCBs are recorded, write in all DID and Tie line PCBs starting from the first numbered empty slot to the highest needed (in left to right order). Record the line numbers. Do not leave empty slots except when installing RDTU PCBs.

    The maximum number of station ports used by station, PC attendant console, Tie, and DID PCBs can not exceed the following quantities:

Processor	Maximum Ports (Station, Tie and DID)
RCTUA	32
RCTUB or RCTUBA/BB	80
RCTUC/D	240
RCTUE/F	336

    In some rare configurations, when using RDTU (T1) Tie or DID lines in systems, the maximum number of stations allowed may be reduced because the RDTU PCB takes up two or three cabinet slots. Each RDTU, REMU, or RDDU Tie/DID line uses one station port. RCIU/RCIS PCBs do not use station ports or CO line software time slot assignments.
6. Write in the PIOU, PIOUS, PEPU, RSSU, RCIU2/RCIS and RCIU2/RCIS PCBs in any convenient vacant slot, preferably in the last slots. Record any Caller ID circuit numbers.
7. Write in any Interface PCB Options.

Cabinet 1 (Type:[1])	R11	RCTU	S11	S12	S13	S14	S15	S16
PCB Type								
Port Nos.								
Line Nos.								
Option/Note								
Cabinet 2 (Type:[1])	**S21**	**S22**	**S23**	**S24**	**S25**	**S26**	**S27[2]**	**S28[2]**
PCB Type								
Port Nos.								
Line Nos.								
Option/Note								
Cabinet 3 (Type:[1])	**S31**	**S32**	**S33**	**S34**	**S35**	**S36**	**S37[2]**	**S38[2]**
PCB Type								
Port Nos.								
Line Nos.								
Option/Note								
Cabinet 4 (Type:[1])	**S41**	**S42**	**S43**	**S44**	**S45**	**S46**	**S47[2]**	**S48[2]**
PCB Type								
Port Nos.								
Line Nos.								
Option/Note								
Cabinet 5 (Type:[1])	**S51**	**S52**	**S53**	**S54**	**S55**	**S56**	**S57[2]**	**S58[2]**
PCB Type								
Port Nos.								
Line Nos.								
Option/Note								
Cabinet 6 (Type:[1])	**S61**	**S62**	**S63**	**S64**	**S65**	**S66**	**S67[2]**	**S68[2]**
PCB Type								
Port Nos.								
Line Nos.								
Option/Note								
Cabinet 7 (Type:[1])	**S71**	**S72**	**S73**	**S74**	**S75**	**S76**	**S77[2]**	**S78[2]**
PCB Type								
Port Nos.								
Line Nos.								
Option/Note								

1. Type = DK280, DK424, or NR (not required). Double-check after completing all worksheets, particularly Worksheet 5 - System Power Factor Check.
2. Cabinets 2~7: Last two slots are available on the DK424 using RCTUE/F processors, with MBJU removed.

Worksheet 4 – Option Configuration Guide

Option	Number Required	Comments
RRCS PCB RRCS-4 RRCS-8 RRCS-12		An RRCS (-4, -8 or 12 DTMF receiver circuits) must be installed on the RCTUA, RCTUB, RCTUBA/BB, RCTUC/D, or RCTUE/F if the customer has: DTMF DID, Tie, ANI, DNIS, DISA lines (remote change of call forward destination), DNIS External Call Routing, using DTMF standard telephones, or voice mail-type devices with DTMF interfaces ...or if the customer has built-in AA connected to RDSU, RSTU, RSTU2, PSTU, or PESU standard telephone ports. Both the RCTUC/D and RCTUE/F can support one RRCS on each PCB, 2 RRCSs total (maximum 24 DTMF receivers). For normal traffic, an RRCS-4 is sufficient. However, for extremely high traffic, use an RRCS-8, -12, or multiple RRCSs for large systems.
RKYS1, 2, or 3		If built-in AA ACD, or ACD/MIS is required, one RKYS option key is required see Table 4-18.
PIOU/RSIU Subassembly PCBs IMDU PCB		One IMDU PCB may be installed on the PIOU or PIOUS PCB to provide built-in remote maintenance modem capability for the Strata DK system.
RMDS PCB		One RMDS PCB may be installed on the RSIU PCB to provide built-in remote maintenance modem for the Strata DK424 system.
RSIS		Up to three RSIS PCBs may be installed on the RSIU PCB to provide one or more of the following RS-232 interface ports: MIS for ACD, SMDR, SMDI, and/or Local Maintenance (TTY) Port for DKAdmin/Backup PC.
HESC-65A		One HESC-65A modular connecting cable is required to connect the HESB to the HHEU in each digital telephone and 6500-series electronic telephone requiring the Loud Ringing Bell option.
HESB Amplifier/ Speaker		One HESB is required for each digital and electronic telephone providing the Loud Ringing Bell option. One HESB is optional to provide single-zone external page connected to either a PIOU, PIOUS, or PEPU (customer-supplied amplifiers/speakers may be used in place of the HESB). One HESB is optional to provide a talkback amplifier/page speaker connected to a PIOU, PIOUS, or PEPU (a customer-supplied talkback amplifier/page speaker may be used in place of HESB).
PPTC/PPTC9 Adapter (Modular to RS-232) PPTC (25-pin) PPTC-9 (9-pin)		PPTC adapter is used to connect an external modem DB25 female connector to a PIOU/ PIOUS/RSIU/RSIS modular jack. If a PPTC is used, a null modem adapter is also required. PPTC9 adapter is used to connect a personal computer DB9 male COM port connector to a PIOU/PIOUS/RSIU/RSIS modular jack. These adaptors are required for: SMIS for ACD, SMDI, SMDR, and system maintenance PC or terminal interface.

Option	Number Required	Comments
DPFT Unit		The DPFT provides a means to connect eight selected CO lines to standard telephones in the event of a power failure (each DPFT requires an RSTU or PSTU PCB). There is no limit to the number of DPFTs installed, provided that the system power factor is not exceeded.
MDFB		The MDFB door phone option plugs into the DDCB or HDCB control box to provide a door phone. Three MDFBs can be connected to each DDCB or HDCB. The MDFB may also be connected to the HESB amplifier/speaker to provide page talkback.
RBDB2		Battery distribution box required when connecting reserve power batteries to three or more cabinets (wall or floor mount). Six RBTC2A-1.5M cables are provided with the RBDB2 to connect up to six DK424 power supplies to the battery distribution box. Another cable is required for the seventh cabinet. See RC7C1A-1.7M in this table.
RCCB1 or RCCB2		Conduit connection box required for AC and battery power connection to three or more floor-mounted cabinets. (Not required for mounting two cabinets on a table or any number of cabinets on a wall.) Use RCCB1 for one to six cabinet floor installations. Use RCCB2 for seven cabinets. RCCB conduit box is required for floor mount installations of three or more Cabinets.
RFIF		Floor mount fixture kit is required when floor mounting any number of cabinets. Provides two metal stands for mounting three or more cabinets on floor. Three pairs of wall brackets (RWBF) are supplied with RFIF. Wall brackets are needed to secure floor-mounted systems to the wall for safety purposes.
RPSB1/RPSB2		Three-outlet AC Power Strip–one RPSB1 required when installing three or four cabinets (wall or floor mount). Two RPSB1s required when installing five, six, or seven cabinets (wall or floor mount). Two AC cords will exit the cabinets in some configurations. RPSB2 is a high current carrying capacity cord for application where local electric codes (or user) requires only one AC cord to exit four or more cabinets. It is highly recommended to use the RPSB2 for two-cabinet installations to accommodate further growth. Must be ordered for seven cabinet systems.
RBTC1A-2M		Two reserve power cables (for current carrying capacity) are required for three to six cabinets and three are required for seven cabinets when connecting reserve power battery terminals to three or more cabinets (wall mount). RBDB2 is also required–see “RBDB2” below.
PBTC-3M		One reserve power cable is required for each cabinet if connecting reserve power for one or two cabinets (wall or table mount). Cable connects cabinet power supply to battery terminals.
RC7C1A-1.7M		Two cables used for seven cabinet installations only. Provides long data cable to connect the sixth Expansion Cabinet to the DK424 Base Cabinet. Provides a long battery cable to connect RBDB2 battery distribution box to the Base Cabinet power supply.

Option	Number Required	Comments
Stratagy or VP Voice Mail		Refer to Toshiba Stratagy or VP documentation for detailed information about the VM machines and to C2 of Worksheet 2 in this chapter for DK424 VM port requirements.
PC Attendant Consoles (with RATI and RATHC) DKAdmin/ Backup SMIS for ACD		These features require customer-supplied personal computers. See feature user guides for individual personal computer requirements.
Other Customer-supplied Items		

Telephone Subassembly Option	Number Required	Comments
EOCU		One EOCU must be installed on each PEKU and/or PESU that is connected to electronic telephones which are equipped to receive OCA. Place the PEKU or PESU where it will provide the most efficient use of the 8-circuit EOCU: The PESU only provides 4 electronic telephone ports; HDSS consoles use s ports on a PEKU; HDCBs use 1 port on a PESU or PEKU.
DVSU		One DVSU is required for each digital telephone (2000, 1000-series) that should receive telephone speaker OCA. Not required for Handset/Headset Speaker OCA.
HVSU2		6500-series Electronic Telephones equipped with one HVSU2 to receive Speaker OCA calls.
HVSU/HVSI		Electronic Telephones equipped with the older HVSU and HVSI subassemblies (one per telephone) to receive OCA calls.
HHEU		One HHEU PCB must be installed in each digital (2000, 1000 series) and electronic telephone (6500, 6005 series) that supports a headset or connects to an HESB providing a loud ringing bell.
PDIU-DI2		One PDIU-DI2 or PDIU-DI data calling interface can be installed on a 2000-series Digital Telephones.
PDIU-DI		
RPCI-D1		2000-series Digital Telephones must be equipped with an RPCI-DI to transmit and receive voice and data calls and/or interface with a TAPI PC application interface. One RPCI-DI per telephone.
DADM		One or two Add-on Modules can be attached to 2000-series Digital Telephones to provide an additional 20 or 40 buttons. Any combination of CO **Line**, **DSS**, and **SD** (Speed Dial) buttons can be added to DADMs.

Worksheet 5 – System Power Factor Check

The Strata DK power supply was engineered for maximum cost efficiency to provide power for the most configurations. Because of this design, some power limitations exist when using old electronic-type telephones and/or telephone option hardware.

For example, only 24 3000-series telephones can be installed in a cabinet. Each telephone and PCB has a negative Power Factor (PF) and the RPSU424 or RPSU280 power supply have a positive PF (+65). The sum of the telephones' PFs and PCBs connected to a signal cabinet must not exceed –65. In the case of +5VDC, the power factor must not exceed 25.

The sum of the calculated cabinet PFs must not exceed the values provided on Page 4-38. Table 4-23 shows the PF for PCBs and the RPSU280. PF numbers for telephones and devices are shown on the following page.

Note The maximum number of RWIUs must not exceed one for the Base Cabinet and two for the Expansion Cabinets.

Table 4-23 PCB and Power Supply Power Factors

PCB Type	+5VDC	-24VDC	Notes
IMDU	0.1	0.16	
PCOU1, 2	1.9	2.0	
PDKU1, 2	0.8	0.3	With 8 DKTs.
PEKU	1.6	0.7	With 8 EKTs.
PEPU	1.1	6.5	
PESU	1.5	0.5	With 4 EKTs and 4 SLTs.
PIOU	2.0	6.5	
PIOU2	1.1	6.5	
PIOUS	0.75	4.0	
Power Supply RPSU280 or RPSU424	25.0	65.0	
R40S1A	0.0	2.8	Does not use +5VDC.
RATU	1.7	0.3	
RBSS1A	0.6	0.3	
RBSS2A	0.0	0.3	Does not use +5VDC.
RBSU + RBSS	3.1	0.3	
RBSU1A	2.5	1.0	
RBSU2A	0.0	1.0	Does not use +5VDC.
RBUS1A	0.0	0.3	Does not use +5VDC.
RBUU1A	0.0	1.0	Does not use +5VDC.
RCIS1A	0.3	0.1	
RCIU1A/2A	0.7	0.2	
RCIU2		0.2	
RCMS1A	0.6	0.3	
RCOS1A/2A	1.7	2.0	
RCOU (4 CO)	2.5	2.0	
RCOU + RCOS (8 CO)	3.6	4.0	
RCOU1A/2A	1.9	2.0	
RCTUA	2.0	1.0	

Table 4-23 PCB and Power Supply Power Factors *(continued)*

PCB Type	+5VDC	-24VDC	Notes
RCTUB	4.0	1.0	
RCTUBA/BB	4.0	1.9	
RCTUC/D	4.5	1.9	
RCTUE/F	10.0	1.9	
RDDU	2.6	7.0	
RDSU (-24VDC)	1.1	0.3	With 4 DKTs and 4 SLTs.
RDSU + R48S (-48VDC)	1.1	0.5	
RDTU	1.8	1.0	
REMU2/PEMU	1.0	7.5	
RGLU1A/2A	2.1	2.5	
RMCU1A	0.7	0.3	
RMDS1A	0.35	0.16	2400 bps MODEM.
RPTU	2.6	1.0	
RRCS-12	1.5	1.0	
RRCS-4	0.4	0.3	
RRCS-8	1.0	0.5	
RSIS1A	0.35	0.15	2400 bps.
RSIU1A	1.0	0.3	9600 bps.
RSSU	0.7	0.3	
RSTU/RSTU2 (-24VDC)	1.4	0.5	With 8 SLTs.
RSTU1 + R48S (-48VDC)	1.4	1.0	With 8 SLTs.
RSTU2 + R48S (-48VDC)	4.0	2.3	With 8 MWs.
RWIU	9.2	0.0	With 8, 16, 24, or 32 handsets.

Note Power factor calculation samples are shown in Tables 4-24 and 4-25.

Table 4-24 Strata DK424 Base Cabinet

PCB	Quantity	+5VDC	-24VDC
PDKU2A	2	1.6	0.3
RBSU1A + RBSS1A	1	3.2	0.3
RCOU1A + RCOS1A	1	3.6	4.0 (8 COs)
RCTUA3A	1	2.0	1.0
RRCS1A-4	1	0.4	0.3
RWIU	1	9.0	0.0
Total	7	19.8	5.9

Table 4-25 Strata DK424 Expansion Cabinet

PCB	Quantity	+5VDC	-24VDC
RBSU1A + RBSS1A	1	3.2	0.3
RCOU1A + RSOU1A	1	3.6	4.0 (8 COs)
RWIU	2	18.0	0.0
Total	4	24.8	4.3

Telephone/Device Power Factors

The power supply of each cabinet supplies a limited amount of power. For each cabinet, calculate the total Telephone/Device PF and add it to the appropriate cabinet in "Cabinet Power Factor, PCB/Telephone Device" on Page 4-38.

Telephone/Device	Base Cabinet (1)			Expansion Cabinet (2)			Expansion Cabinet (3)			Expansion Cabinet (4)		
	Qty.	PF	Total	Qty.	PF	Total	Qty.	PF	Total	Qty.	PF	Total
Digital Telephone (DKT, any series)												
1~120 Telephones		x 1.0 =			x 1.0 =			x 1.0 =			x 1.0 =	
121~240 Telephones		x 0.6 =			x 0.6 =			x 0.6 =			x 0.6 =	
2000-series Electronic Telephone (EKT)		x 2.0 =			x 2.0 =			x 2.0 =			x 2.0 =	
3000-series EKT		x 2.5 =			x 2.5 =			x 2.5 =			x 2.5 =	
6000-series EKT		x 2.0 =			x 2.0 =			x 2.0 =			x 2.0 =	
6005-series EKT		x 2.0 =			x 2.0 =			x 2.0 =			x 2.0 =	
6500-series EKT												
1~120 Telephones		x 1.0 =			x 1.0 =			x 1.0 =			x 1.0 =	
121~240 Telephones		x 0.6 =			x 0.6 =			x 0.6 =			x 0.6 =	
DDCB/HDCB (with MDFB)		x 1.2 =			x 1.2 =			x 1.2 =			x 1.2 =	
DDSS/HDSS Console		x 0.8 =			x 0.8 =			x 0.8 =			x 0.8 =	
Add-on Module (DADM)		x 0.4 =			x 0.4 =			x 0.4 =			x 0.4 =	
Integrated PDIU-DI		x 0.5 =			x 0.5 =			x 0.5 =			x 0.5 =	
Integrated RPCI-DI		x 0.5 =			x 0.5 =			x 0.5 =			x 0.5 =	
Stand-alone Data Interface Unit		x 0.8 =			x 0.8 =			x 0.8 =			x 0.8 =	
Standard Telephone (-48V)		x 1.0 =			x 1.0 =			x 1.0 =			x 1.0 =	
Standard Telephone (-24V)		x 0.5 =			x 0.5 =			x 0.5 =			x 0.5 =	
Attendant Console		x 4.0 =			x 4.0 =			x 4.0 =			x 4.0 =	
Power Failure Unit (DPFT)		x 3.0 =			x 3.0 =			x 3.0 =			x 3.0 =	
HHEU		x 0.1 =			x 0.1 =			x 0.1 =			x 0.1 =	
Total Power Factor (PF)												

Note PF varies by number of telephones because of station paging limit of 120 telephones. Always use "1.0" for DKT telephones when calculating PFs for individual cabinets.

Telephone/Device	Expansion Cabinet (5)			Expansion Cabinet (6)			Expansion Cabinet (7)		
	Qty.	**PF**	**Total**	**Qty.**	**PF**	**Total**	**Qty.**	**PF**	**Total**
Digital Telephone (DKT, any series)									
1~120 Telephones		x 1.0 =			x 1.0 =			x 1.0 =	
121~240 Telephones		x 0.6 =			x 0.6 =			x 0.6 =	
2000-series Electronic Telephone (EKT)		x 2.0 =			x 2.0 =			x 2.0 =	
3000-series EKT		x 2.5 =			x 2.5 =			x 2.5 =	
6000-series EKT		x 2.0 =			x 2.0 =			x 2.0 =	
6005-series EKT		x 2.0 =			x 2.0 =			x 2.0 =	
6500-series EKT									
1~120 Telephones		x 1.0 =			x 1.0 =			x 1.0 =	
121~240 Telephones		x 0.6 =			x 0.6 =			x 0.6 =	
DDCB/HDCB (w.MDFB)		x 1.2 =			x 1.2 =			x 1.2 =	
DDSS/HDSS Console		x 0.8 =			x 0.8 =			x 0.8 =	
Add-on Module		x 0.4 =			x 0.4 =			x 0.4 =	
Integrated PDIU-DI		x 0.5 =			x 0.5 =			x 0.5 =	
Integrated RPCI-DI		x 0.5 =			x 0.5 =			x 0.5 =	
Stand-alone Data Interface Unit		x 0.8 =			x 0.8 =			x 0.8 =	
Standard Telephone (-48V)		x 1.0 =			x 1.0 =			x 1.0 =	
Standard Telephone (-24V)		x 0.5 =			x 0.5 =			x 0.5 =	
Attendant Console		x 4.0 =			x 4.0 =			x 4.0 =	
Power Failure Unit (DPFT)		x 3.0 =			x 3.0 =			x 3.0 =	
HHEU		x 0.1 =			x 0.1 =			x 0.1 =	
Total Power Factor (PF)									

Note PF varies by number of telephones because of station paging limit of 120 telephones. Always use "1.0" for DKT telephones when calculating PFs for individual cabinets.

DK424 Configuration

Cabinet Power Factor, PCB/Telephone Device

Calculate the total PF of each cabinet (must be less than 65). See Worksheet 2, Table 4-9 for PCB quantity and type, and Table 4-23 for PF numbers.

The Total Cabinet PF must not exceed the limits shown in Max. PF Allowed, at the bottom of this chart.

		Cabinets													
		1		2		3		4		5		6		7	
		PCB Type	PF	PCB Type	PF	PCB Type	PF	PCB Type	PF	PCB Type	PF	PCB Type	PF	PCB Type	PF
Slots	1														
	2														
	3														
	4														
	5														
	6														
	7														
	8														
Power Factor	Cabinet PF (subtotal)														
	Telephone/ Device PF (Page 4-36)														
	Cabinet PF (total)														
	Max. PF Allowed (all cabinets combined)		65		130		195		260		325		390		455

Note Cabinets 2~7: Last two slots are available on the DK424 (RCTUE/F).

DK424 Installation 5

This chapter explains how to install the Strata DK424 system. It includes information on site requirements and provides installation instructions for various cabinet configurations. It also explains how to install ground wiring, AC power cabling, reserve power (Battery Backup) cabling, and Printed Circuit Board (PCB) cabling.

Inspection

When the system is received, examine all packages carefully and note any visible damage. If any damage is found, do not open the packages. Contact the delivery carrier immediately and make the proper claims.

After unpacking (and before installing), check the system against the packing list and inspect all equipment for damage. If equipment is missing or damaged, contact your supplier immediately.

Be sure to retain original packaging materials for re-use when storing or transporting system hardware.

Packaging and Storage

CAUTION! **When handling (installing, removing, examining) PCBs, do not touch the back (soldered) side or edge connector. Always hold the PCB by its edges.**

When packaging and storing the system, remove PCBs from the system cabinet (the power supply may remain installed in the cabinet for storage and shipment). PCBs should be packaged in their original antistatic bags for protection against electrostatic discharge. Be sure to package equipment in its original shipping containers.

Site Requirements

Input Power

The DK424 requires an input power source of 115VAC ± 10 VAC, 50/60 Hz, 17.5 amps. The system requires one or two AC outlets that must be dedicated to system use, fused, and grounded. See "Power Supply Installation" on Page 5-8 for complete AC power cabling, ground wiring and battery installation instructions.)

CAUTION! **To avoid accidental power turn-off, it is recommended that an ON/OFF wall switch not be used on AC circuits dedicated for the use of DK424.**

A reserve power source (two or four customer-supplied 12-volt batteries) may be connected to the DK424 to serve as a backup in case of power failure.

Clearance and Location

The Base and optional Expansion Cabinets may be either floor or wall mounted. Figure 5-1 shows the minimum clearance requirements. See "Wall Mounting the Base Cabinet" on Page 5-11 and "AC Power Distribution for Six Cabinets" on Page 5-36 for details.

Notes

- Floor mounting requires the following additional hardware:
  - RFIF – floor mounting stands and brackets.
  - RCCB – electrical conduit box, if three or more cabinets are installed.
- Wall mounting may require a plywood (3/4 inch thick) backboard.

When selecting a location for the cabinets, the location *must be:*

- ♦ Dry and clean
- ♦ Well-ventilated
- ♦ Well-illuminated
- ♦ Easily accessible

The location *must not be*:

- ♦ Subject to extreme heat or cold
- ♦ Subject to corrosive fumes, dust, or other airborne contaminants
- ♦ Subject to excessive vibration
- ♦ Next to television, radio, office automation, or high frequency equipment

Optional customer-supplied reserve batteries require a well-ventilated location close (within nine feet) to the DK424 cabinets.

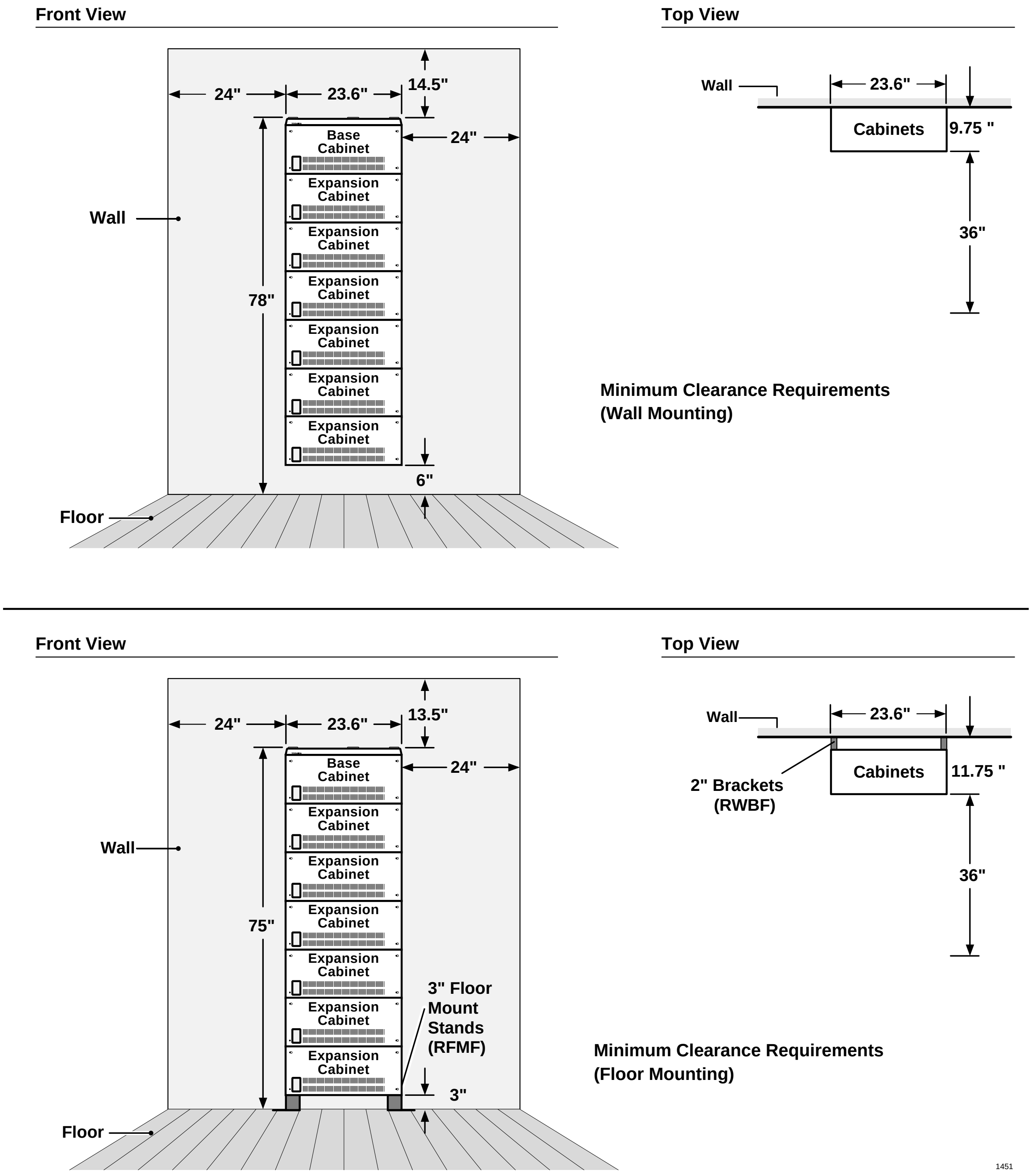


Figure 5-1 DK424 Minimum Clearance Requirements

Electrical/Environmental Requirements and Characteristics

See Table 5-1 for the DK424 electrical/environmental requirements and characteristics.

Table 5-1 Summary of Electrical/Environmental Characteristics

DK424 Primary Power	
Input AC AC amps for seven-cabinet system AC frequency Watts per cabinet (continuous) Watts for six cabinet system (continuous)	115VAC ± 10VAC 20 amp circuit 50/60 Hz 180 845
DK424 Maximum Peak AC Input Current	
1 cabinet – 2.5 amps 2 cabinets –5.0 amps 3 cabinets – 7.5 amps 4 cabinets – 10.0 amps	5 cabinets – 11.5 amps 6 cabinets –15.0 amps 7 cabinets – 17.5 amps
Environmental Specifications	
Operating temperature Operating humidity Storage temperature	32~104° F (0~40° C) 20~80% relative humidity without condensation -4~158° F (-20~70° C)
Power Supply	
DC voltage output specification	-24VDC (-26.3~-27.8VDC) +5VDC (+4.5~+5.5VDC) -5VDC (-4.5~-5.5VDC) - Expansion Cabinet only
Battery Charger Characteristics	
	Charger: current limiting Nominal float voltage: 2.275 volts/cell Charge current: 0.7 amps maximum Battery discharge cut-off voltage: 20.5 ±0.5VDC
PESU (Circuits 1 and 2)	
Ring voltage	Square wave output with high/low option jumper: Low position 130 ±20VDC peak-to-peak (no-load) High position, 190 ±25VDC peak-to-peak (no-load)
Ringing capability	2 ringers maximum per circuit, high or low position
RSTU2 or RDSU	
Ring voltage	80V RMS sine wave
Ringing capability	1.5 REN per circuit, with or without Message Waiting
RSTU2 Message Waiting voltage	-90 VDC/one telephone per circuit (max.)
RSTU2 or PESU modem interface data rate	14,400 bps maximum
BTU Rating	
PDKU (5) RCOU/RCOS (1) RCTUB (1) DKTs (40)	190 BTUs (56 watt hours) per cabinet
Traffic Rating Characteristics	
9 CCS per station system-wide 36 CCS per ACD/SMIS station **Note** There are system limits for the number of simultaneous Agents depending on traffic. See the *Strata DK424 Call Center Solutions General Description* for details.	

Cable Lengths

The Base and optional Expansion Cabinets must be placed within the allowed maximum distance of each other as designated by Table 5-2.

Table 5-2 Station Loop Requirements

<table>
<tr><th>Device</th><th>Interface PCB Circuits</th><th>No. of Wire Pairs (use 24 AWG twisted pair)</th><th>Max Loop Resistance (including device)</th><th>Maximum Distance from Cabinet to Device</th></tr>
<tr><td>Digital telephones[1]</td><td>PDKU (1~8)
or
RDSU (5~8)</td><td rowspan="4">1-pair</td><td rowspan="10">40 ohms</td><td rowspan="10">1000 ft. (303 m)</td></tr>
<tr><td>DDSS consoles</td><td>PDKU (8)</td></tr>
<tr><td>PDIU-DS</td><td>PDKU (1~8)
or
RDSU (5~8)</td></tr>
<tr><td>DDCB</td><td>PDKU or
RDSU (5)</td></tr>
<tr><td>Attendant Console</td><td>RATU (1~4)</td><td rowspan="2">2-pair</td></tr>
<tr><td>HDCB</td><td>PEKU (5) or
PESU (5)[2]</td></tr>
<tr><td>Electronic telephones</td><td>PEKU or PESU</td><td>2-pair (3-pair required for OCA)</td></tr>
<tr><td>RPCI-DI
or
PDIU-D12</td><td>PDKU (1~8)
or
RDSU (5~8)</td><td rowspan="2">Shares digital telephone wire-pair[1]</td></tr>
<tr><td>DADM</td><td>PDKU (1~8)
or
RDSU (5~8)</td></tr>
<tr><td>RATI</td><td>RATU (1~4)</td><td>1 or 2-pair</td></tr>
<tr><td>HDSS consoles</td><td>PEKU (7 & 8)</td><td>2-pair</td><td>20 ohms</td><td>500 ft. (152 m)</td></tr>
<tr><td rowspan="3">Standard telephones, voice mail, Auto Attendant, etc.</td><td>PSTU (1~8)
or
PESU (1 & 2)[1]</td><td rowspan="3">1-pair</td><td>300 ohms</td><td>Approx. 3000 ft. (909 m) with 150 ohm device.[3]</td></tr>
<tr><td>RSTU (1~8)
RDSU/RSTS (1~4)
without R48S option</td><td>600 ohms</td><td>Approx. 9000 ft. (2727 m) with 150 ohm device.[3]</td></tr>
<tr><td>RSTU (1~8)
RDSU/RSTS (1~4)
with R48S option</td><td>1,200 ohms</td><td>Approx. 21000 ft. (6363 m) with 150 ohm device.[3]</td></tr>
</table>

1. Two-pair wiring or optional telephone power supply is required to achieve maximum range with DADM, OCA, Headset, or Data Interface Unit.
2. PESU circuits 3 and 4 are not used.
3. See manufacturer's product specifications for exact resistance of device.

Network Requirements

The system network requirements are provided in Table 5-3.

Table 5-3 DK424 Network Requirements

PCB/Interface	Facility Interface Code	Network Jack	Ringer Equivalence	Universal Service Order Code
PESU/RSTU2/RDSU[1] (Off-premises Station)	OL13A (PESU)	RJ21X	N/A	9.0F
	OL13B (RSTU2, –24V)			
	OL13C (RSTU2, RDSU with R48S-48V)			
RCOU/RCOS (loop start line)	02LS2	RJ14C/RJ21X	0.3B	N/A
RDDU	02RV2-T	RJ14C/RJ21X	0.0B	AS.2
REMU type 1 or type 2	TL11M, 2-wire TL31M, 4-wire TL12M, type 2, 2-wire TL32M, type 2, 4-wire	RJ2EX RJ2GX RJ2FX RJ2HX	Not Available (N/A)	9.0F
RGLU2 (ground or loop start line)	02GS2 (ground) 02LS2 (loop)	RJ14C/RJ1CX	0.3B	N/A
RDTU (DS-1/T1)[2]	(See last bullet note on Note 2 below.)	RJ48C/RJ48X/ RJ48M	N/A	6.0P
RCIU2/RCIS (Caller ID)	N/A	RJ21X/RJ14C	0.3B	N/A
RPTU (PRI)[3]	04DU9-1SN	RJ48C/RJ48M	N/A	6.0P
RBSU/RBSS (S/T, BRI)[3]	02IS5	RJ48C/RJ48X	N/A	
RBUU/RBUS (U, BRI)[3]	02IS5	RJ48C/RJ48X	N/A	
RCMU/RCMS (CAMA)	02RV2-O	RJ11C/RJ21-X	N/A	

1. Only PESU circuits 1 and 2, and RDSU circuits 1~4 provide Off-premises Station (OPS) capability. PESU must use OL13A or equivalent line conditioning for OPS connection. RDSU must use OL13A or OL13B if providing –24 volt loop voltage. If equipped with the –48 volt loop option PCB (R48S), OL13A, OL13B, or OL13C may be used for OPS connection.
2. When ordering DS-1/T1 circuits, six items must be specified:
   - The number of channels per T1 circuit, fractional increments are normally 8, 12, or 16 channels, full service is 24 channels. Unused channels must be bit-stuffed.
   - Type of CO line assigned to each channel: Loop Start, Ground Start, Tie (Wink or Immediate Start), DID (Wink or Immediate).
   - Frame Format Type: Super Frame (SF) or Extended Super Frame (ESF). The T1 provider normally specifies the Frame Format to be used, either is adequate for DK424 CO digital voice lines. ESF provides a higher level of performance monitoring, but requires trained personnel and the ESF CSU normally costs more than an SF only CSU.
   - Line Code Type: Alternate Mark Inversion (AMI) or Bipolar 8 Zero Substitution (B8ZS). The T1 provider normally specified the Line Code to be used, either is adequate for DK424 T1 CO digital voice lines.
   - The customer may have to provide the Channel Service Unit (CSU) to interface the DK424 T1 circuit to the Telco T1 circuit. (CSUs are a Telco requirement.)
   - RDTU Network Channel Interface Codes: 04DU9-BN, 04DU9-DNZZ, 04DU9-1SN, 04DU9-1KN, 04DU9-1ZN.
3. For information on how to order ISDN PRI/BRI circuits, you should refer to the Toshiba ISDN Training CBT. ISDN circuits may require a customer-provided CSU for PRI and/or Terminal Adapter or Network Terminal units for BRI. In U.S. CSU/TAs must be UL-listed in the U.S. In Canada, they must be CSA certified.

Cabinet Installation Considerations

The Base (DKSUB424) and Expansion Cabinets (DKSUE424) can be wall or floor mounted. To make it easier to add cabinets (after the initial installation) when a customer needs to expand, install the Base Cabinet on top for wall-mount installations and on the bottom for floor-mount installations.

The dimensions of the Base and Expansion Cabinets are:

Height: Base Cabinet: 11 3/4 inches

Height: Expansion Cabinet: 10 inches

Width: 23 5/8 inches

Depth: 9 3/4 inches

Weight: approx. 30.5 lbs. (14 kg.)

Note The weight approximates a cabinet completely filled with PCBs. Weight may vary slightly, depending on PCBs.

Recommended Installation Sequence

Step	Reference Information
1. Install power supplies in cabinets.	"Power Supply Installation" on Page 5-8.
2. Mount cabinets on floor or wall.	"Wall Mounting the Base Cabinet" on Page 5-11.
	"Cabinet Floor Mounting" on Page 5-21.
3. Install ground wiring.	"AC Power and Third Wire Ground Test" on Page 5-29.
4. Install AC power cabling to cabinets.	"AC Power Cabling Installation" on Page 5-30.
5. Install reserve power cabling.	"Reserve Power Installation" on Page 5-32.
6. Install PCBs and PCB cabling.	Figures 5-10, 5-12, and 5-21.

Note Each cabinet requires four wood screws (#12X 1.25 inch size) for wall mount installation. Wood screws are not provided with the system.

Power Supply Installation

The Base and Expansion Cabinets are shipped from the factory without the power supply installed. The DK424 cabinets use the same power supply (RPSU280 and/or RPSU424) as the DK280.

Note RPSU280 and RPSU424 are fit, form, and functionally the same. They can be interchanged and mixed in DK280 and DK424 systems.

➤ **To install power supplies in cabinets of new or installed systems**

1. Remove the power supply from its box. The box should also contain a plastic bag with two jumper plugs for the power supply DKSUB or DKSUE connector. An AC power cord and the power supply mounting screws are provided with the KSU cabinet.
2. Make sure that the front and right side covers are removed from the cabinet (see Figure 5-2**)**.
3. Slide the power supply into the right side of the cabinet so that its four mounting holes align with the four cabinet mounting holes (see Figure 5-3**)**. (Make sure that the two backplane FG wires are positioned between the FG wire holder and the power supply.)

Note The backplane FG wires are not safety grounds: they are required for proper system CO line operation.

4. Plug the DC OUT cable plug into the DC OUT connector on the power supply. (The plug has a guide key on it to ensure that it is plugged in correctly.)
5. Secure the FG wire spade lug to the power supply with the FG screw.
6. Secure the power supply to the cabinet with the four provided screws.
7. If the cabinet is the Base Unit, plug the jumper plug that has a wire connected into the "DKSUB" jumper connector on the power supply.
8. If the cabinet is an Expansion Unit (DKSUE), plug the jumper plug that does not have a wire connected into the "DKSUE" jumper connector.

Important! *The power supply with the "DKSUB" jumper plug (plug with wire) installed is the master and has ON/OFF control over all other power supplies, which are designated as slaves. If the master power supply is turned OFF or ON, all other power supplies will automatically turn OFF or ON. (Individual power supplies must be turned on.)*

Power supplies that have the "DKSUE" jumper plugs (plug without wire) installed will not control other power supplies, but can be turned OFF or ON individually with their own ON/OFF switch. (The master power supply must be on and the intercabinet "Data" ribbon cable must be installed to allow a slave power supply to be turned ON.)

9. See Figure 5-3 to ensure that the power supply is properly installed.
10. Install power supplies in all cabinets, using Steps 1~9.
11. Install the Base and optional Expansion Cabinets, ground wiring, AC and reserve power cabling, and PCB cabling per the "Recommended Installation Sequence" on Page 5-7.

Note Power Supply testing procedures are provided in the Fault Finding chapter, which should be referred to if it is suspected that the power supply does not work properly.

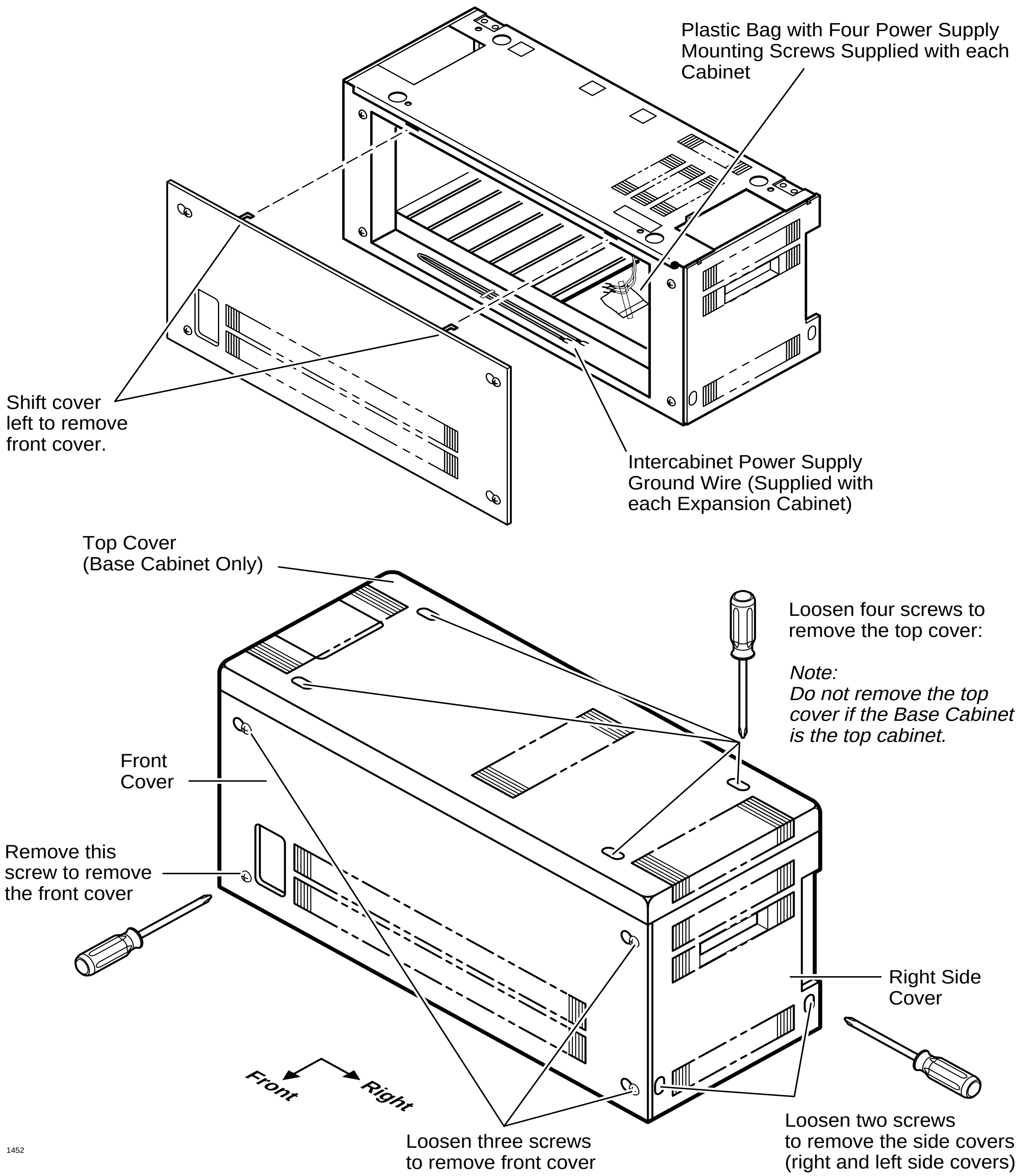
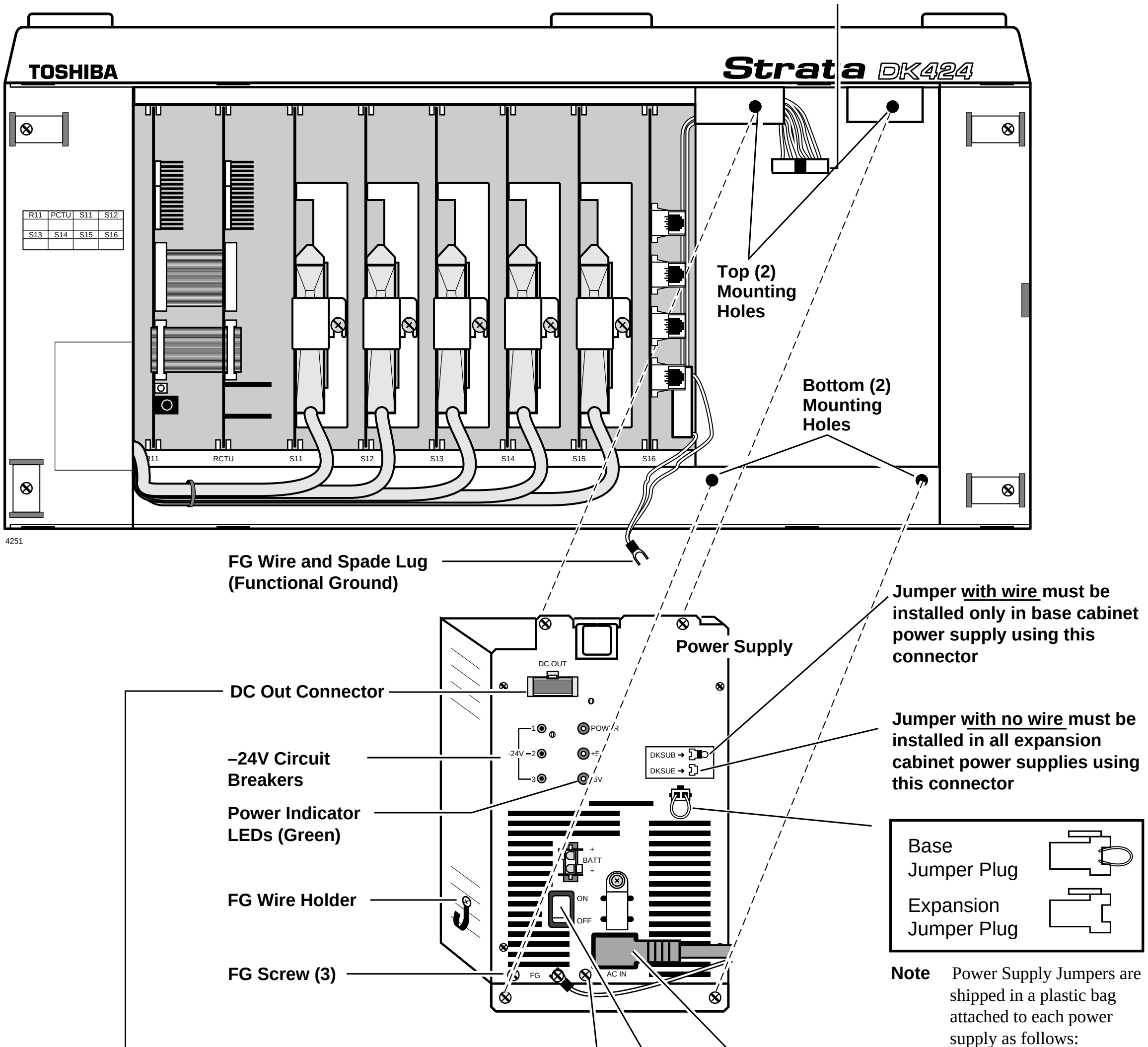
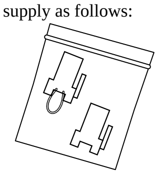


Figure 5-2 DK424 Cabinet Front, Side, and Top Cover Removal and Installation





DC Voltage Pins				
Red Wire	No Wire	Blue Wire	White Wire	Green Wire
+5V	0V	–5V	+5V	0V
Green Wire	Green Wire	Yellow Wire	Yellow Wire	Yellow Wire
0V	0V	–24V	–24V	–24V

DC Voltage Specification		
+5V (+4.5 ~ +5.5)	BATT (Volts)	
-5V (–4.5 ~ –5.5), Expansion Cabinet only	+	0
-24V (–26.3 ~ –27.8)	–	–26.3 ~ –27.8*

On RPSU424, the BATT output is 0 volts unless connected to good batteries

24V Circuit Breaker Assignments:

Base Cabinet	
24V-1	S15, S16
24V-2	S13, S14
24V-3	S11, S12

EXP. Cabinet	
24V-1	SX1, SX2
24V-2	SX3, SX4, SX5
24V-3	SX6, SX7, SX8

Figure 5-3 DK424 Power Supply (RPSU280 or RPSU424) Installation

Power Supply (RPSU280 or RPSU424) Removal

1. Remove the front and right side covers (Figures 5-2 and 5-3) from the cabinet where the power supply will be removed. Remove the right side covers of other cabinets as necessary to disconnect wiring.
2. Turn the power supply OFF, and disconnect the AC power cord, all ground wiring and reserve power cabling that is connected to the power supply.
3. Disconnect the DC OUT cable plug from the DC OUT connector.
4. Loosen the four mounting screws securing the power supply to the cabinet and remove the power supply.

Power Supply Replacement

➤ Install the replacement power supply per “Power Supply Installation” on Page 5-8.

Wall Mounting the Base Cabinet

If the cabinet mounting holes align with wall studs, the cabinet can be installed directly on the wall (see Figure 5-4). For more than two cabinets, a wooden backboard between the cabinet and the wall is highly recommended (see Figure 5-5).

Base Cabinet (DKSUB424) Installation

1. If using a backboard: Obtain a board, such as plywood, that is at least 3/4 of an inch thick. The board should be at least 6-1/2 feet high (completely expanded systems with seven cabinets require this much height) and two feet wide (minimum).

   Secure the board to the wall with wood screws with the bottom edge of the board is six inches above the floor. (If there are wall studs, make sure the screws align with the studs.)
2. Remove the front, back, and side covers from the Base Cabinet (see Figure 5-6).

Note The bottom left screw must be completely removed. The two screws on each side cover and the three screws on the front cover should only be loosened and the covers slid to the right for removal.

3. Hold the Base Cabinet back cover against the wall or backboard so that its two top mounting holes are approximately 6-1/2 feet (78 inches) above the floor. This allows seven cabinets to be installed (top-down) with a six-inch clearance between the floor and bottom cabinet (see Figures 5-7 and 5-8).
4. Use a level to make sure that the back cover is held level.
5. Trace the upper arch of the top mounting holes with a pencil.
6. Remove the back cover from the wall.
7. Draw a line between the top two marking hole marks.
8. Drill holes on the line in the middle of the arch tracing.
9. Screw #12 X 1.25 inch size wood screws into the two drilled holes, leaving about 1/8 of an inch clearance between the screw heads and the wall.
10. Hang the Base Cabinet back cover from the top two screws and secure the screws into the wall.

11. Drill holes at the bottom two mounting holes of the back cover, and secure #12 X 1.25 inch wood screws into the two holes.
12. If installing just a Base Cabinet: Position the Base Cabinet on the back cover cabinet hangers, slide the cabinet to the right to the proper mounting position, and secure the cabinet to the back cover with two screws on the right side of the cabinet. If installing Expansion Cabinets, skip to "Cabinet Floor Mounting" on Page 5-21.
13. Install ground wiring, AC and reserve power cabling, and PCB cabling per the "Recommended Installation Sequence" on Page 5-7.
14. Fill out the slot identification label on the cabinet (see Figure 5-11).
15. Reinstall the front cover, top cover, and side covers onto the cabinet.

Expansion Cabinet Installation (DKSUE424)

Note Toshiba recommends installing cabinets (see Figure 5-5~5-10 and 5-27) from the top down, with the Base Cabinet on top, the first Expansion Cabinet below it, the second Cabinet below that, etc.

1. Remove the front, back, and side covers from the Expansion Cabinets.

Note The bottom left screw must be completely removed. The two screws on each side cover and the three screws on the front cover should only be loosened and the covers slid to the right for removal.

2. Hold an Expansion Cabinet back cover against the wall so that its top locating parts align with the bottom locating parts of the Base Cabinet back cover. To secure the Expansion Cabinet back cover to the wall or wall board, repeat Steps 5~11 from "Base Cabinet (DKSUB424) Installation" on Page 5-11.
3. To install additional Expansion Cabinet back covers, repeat Step 2 above.
4. Starting with the top Expansion Cabinet back cover (which is fastened to the wall), position an Expansion Cabinet on the back cover cabinet hangers. Slide the cabinet to the right to the proper mounting position, and secure the cabinet to the back cover with two screws to the right side of the back cover. Repeat for all other Expansion Cabinets.
5. Loosen the bonding connection plates fastened on both sides of the first Expansion Cabinet, then fasten the plates between the Base Cabinet and the first Expansion Cabinet. Repeat to connect the first Expansion Cabinet to the second Expansion Cabinet, etc.
6. Loosen data cable door locking screws and open data cable doors; then connect the first Expansion Cabinet data cable to the "CAB 2" (top) data cable connector on the Base Cabinet. Install data cables in appropriate connectors for all other Expansion Cabinets).
7. After all data cables are installed, close data cable doors and secure with the locking screw.

Important! *Data cable door screws must be firmly tightened for proper system operation.*

8. Install ground wiring, AC and reserve power cabling, and PCB cabling per the "Recommended Installation Sequence" on Page 5-7.
9. Fill out cabinet/slot identification labels on each cabinet.
10. Reinstall covers onto cabinets.

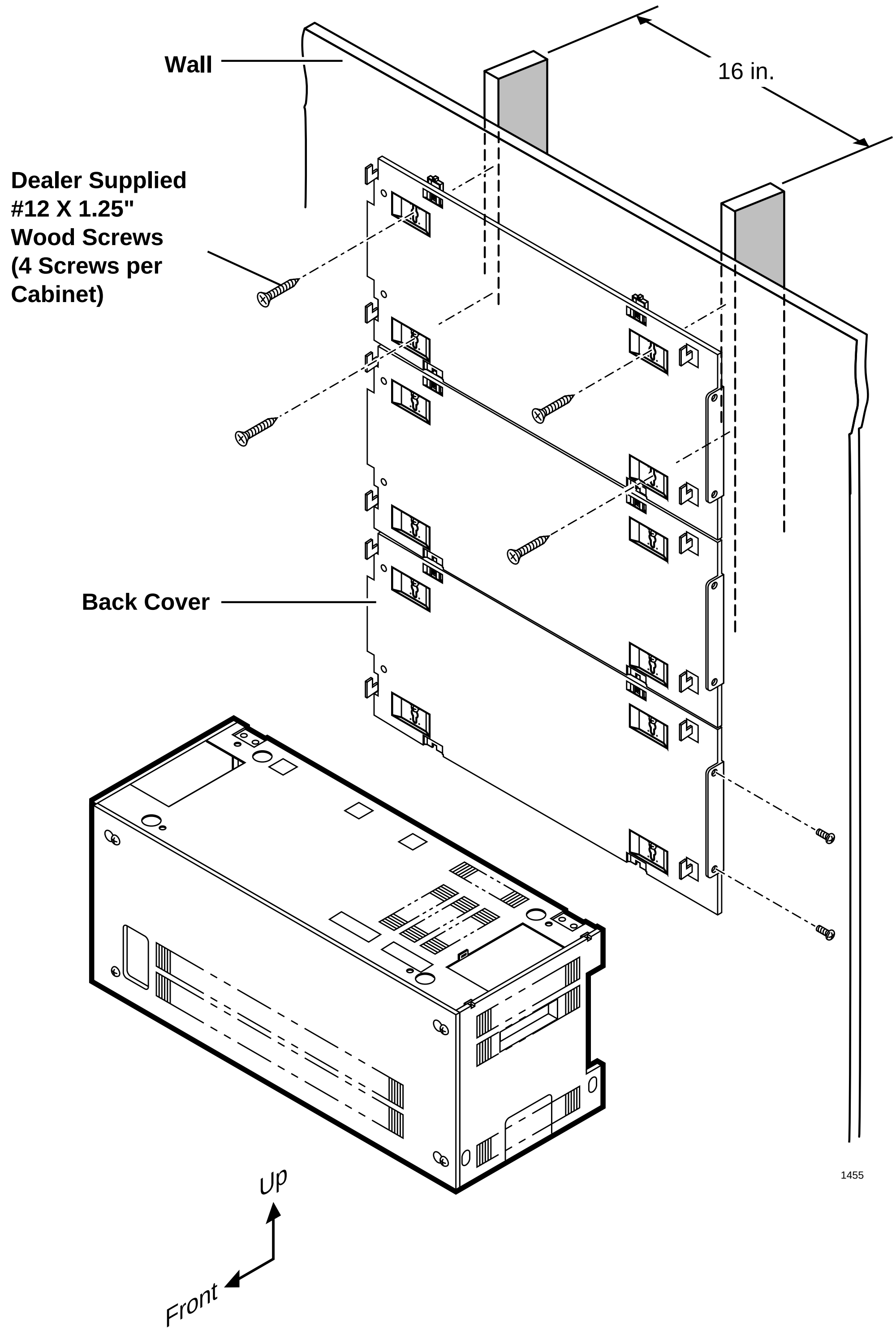


Figure 5-4 DK424 Cabinet Mounting Surface Diagram (Directly on the Wall)

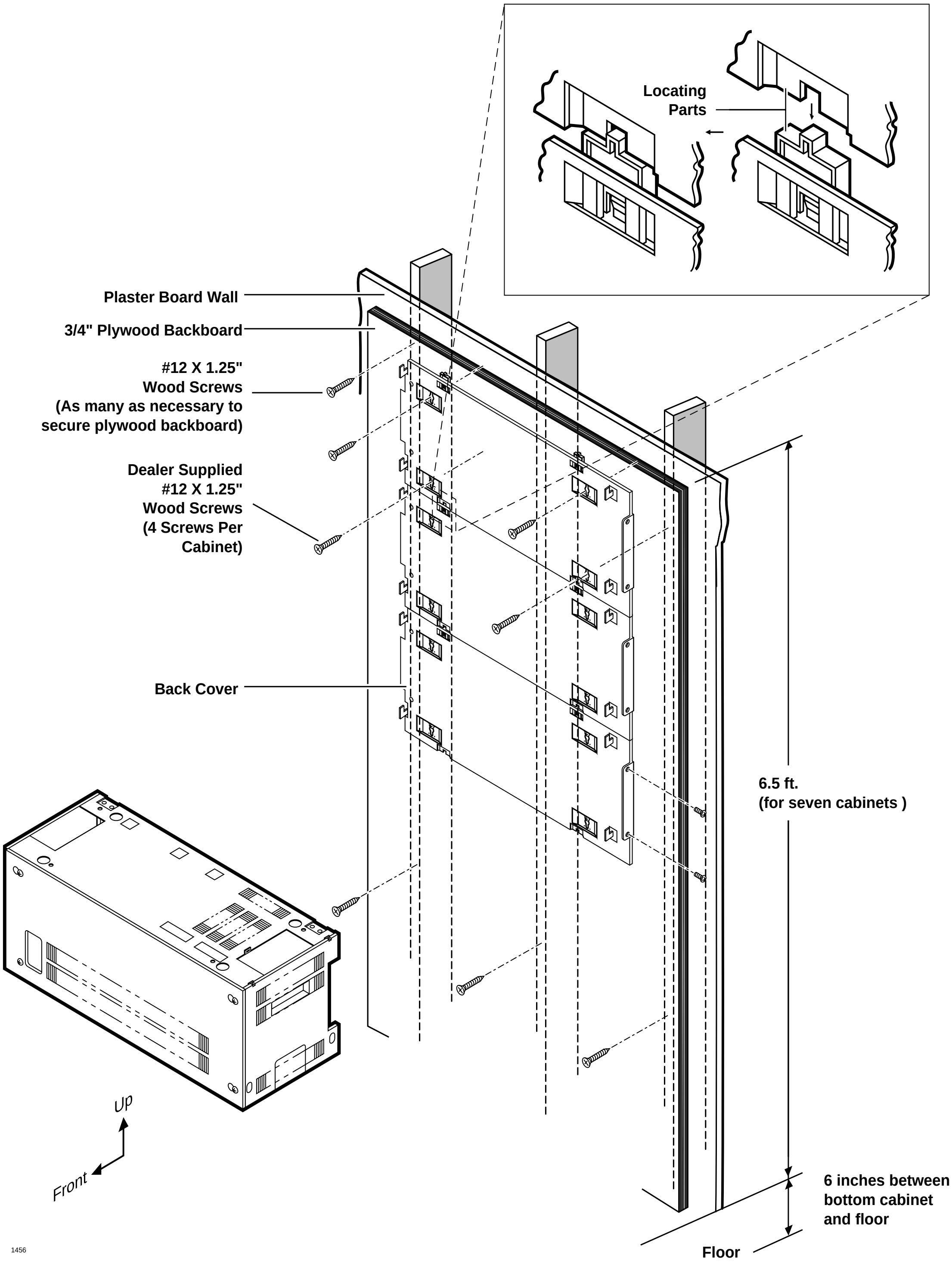


Figure 5-5 DK424 Cabinet Mounting Surface Diagram (with Plywood Backboard)

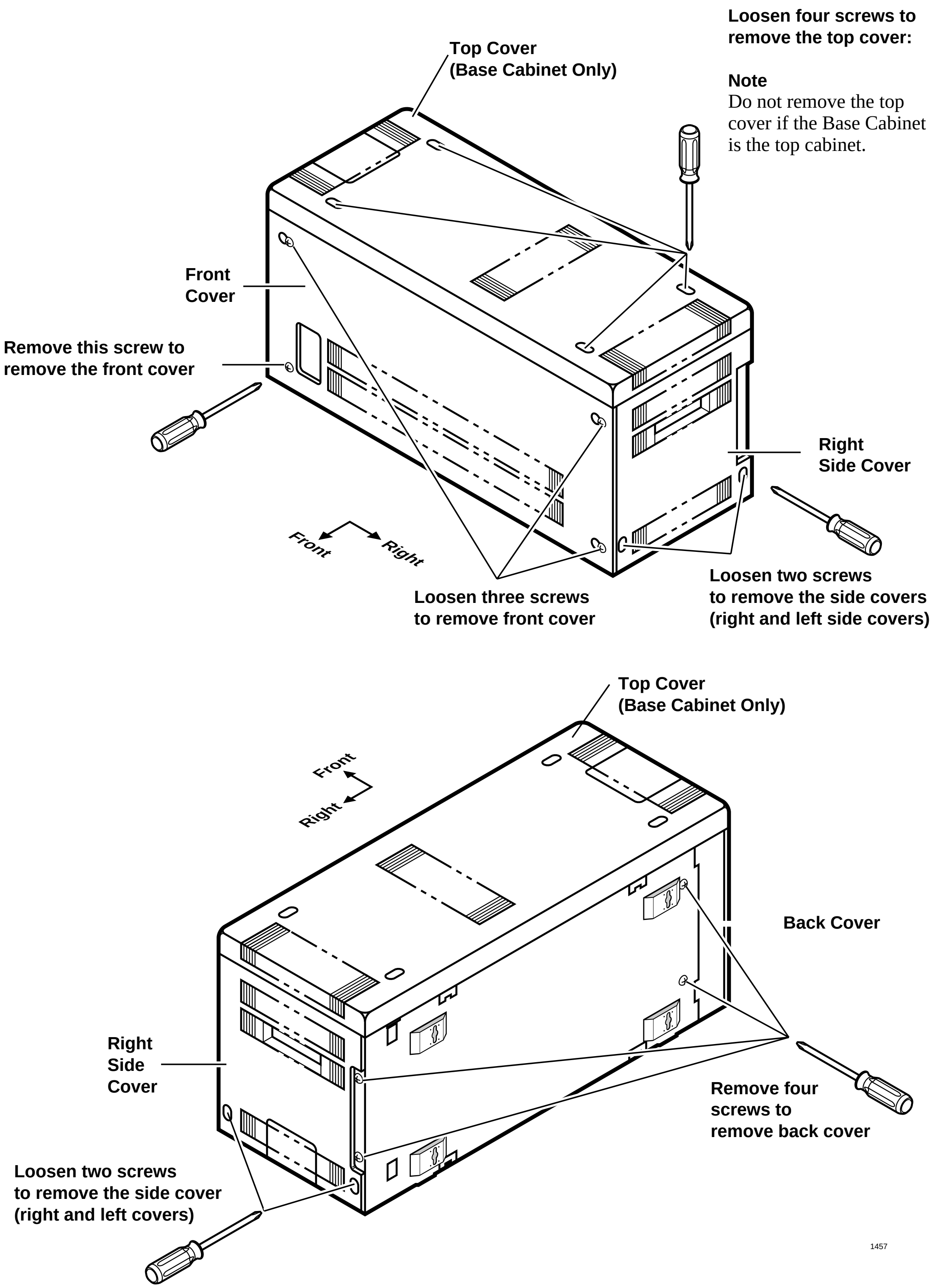


Figure 5-6 DK424 Cabinet Cover Removal and Installation

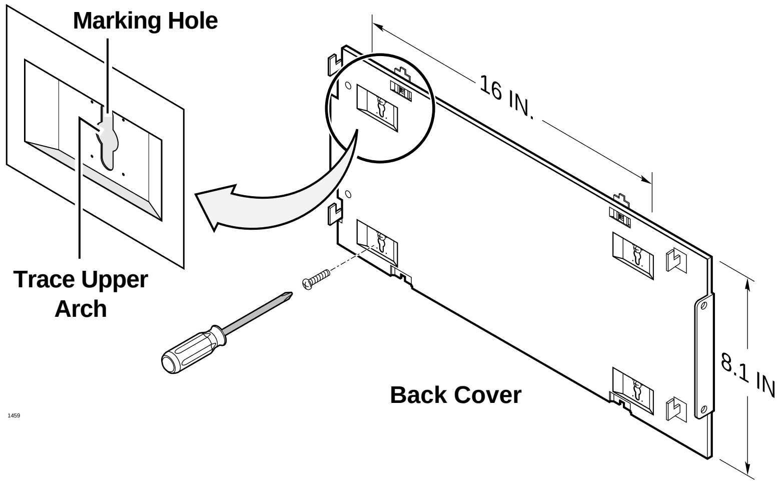


Figure 5-7 DK424 Back Cover Mounting Holes

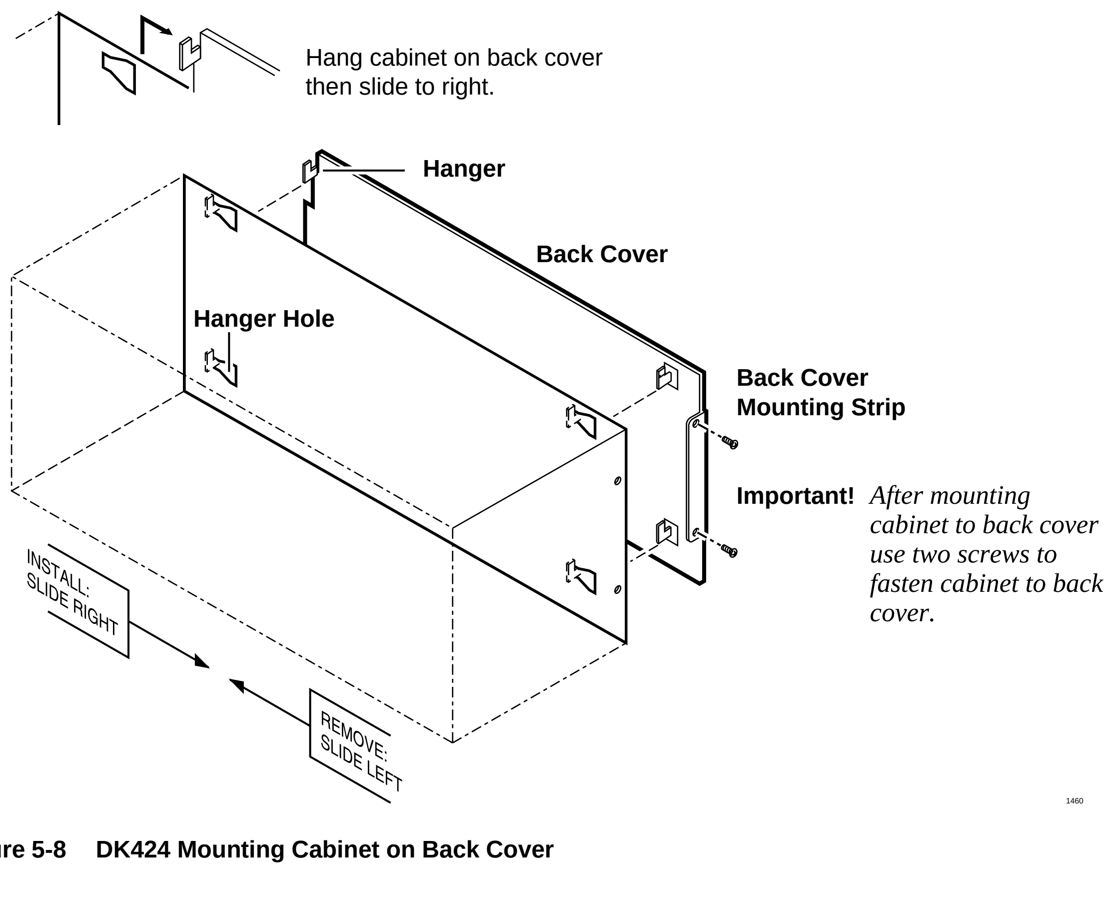


Figure 5-8 DK424 Mounting Cabinet on Back Cover

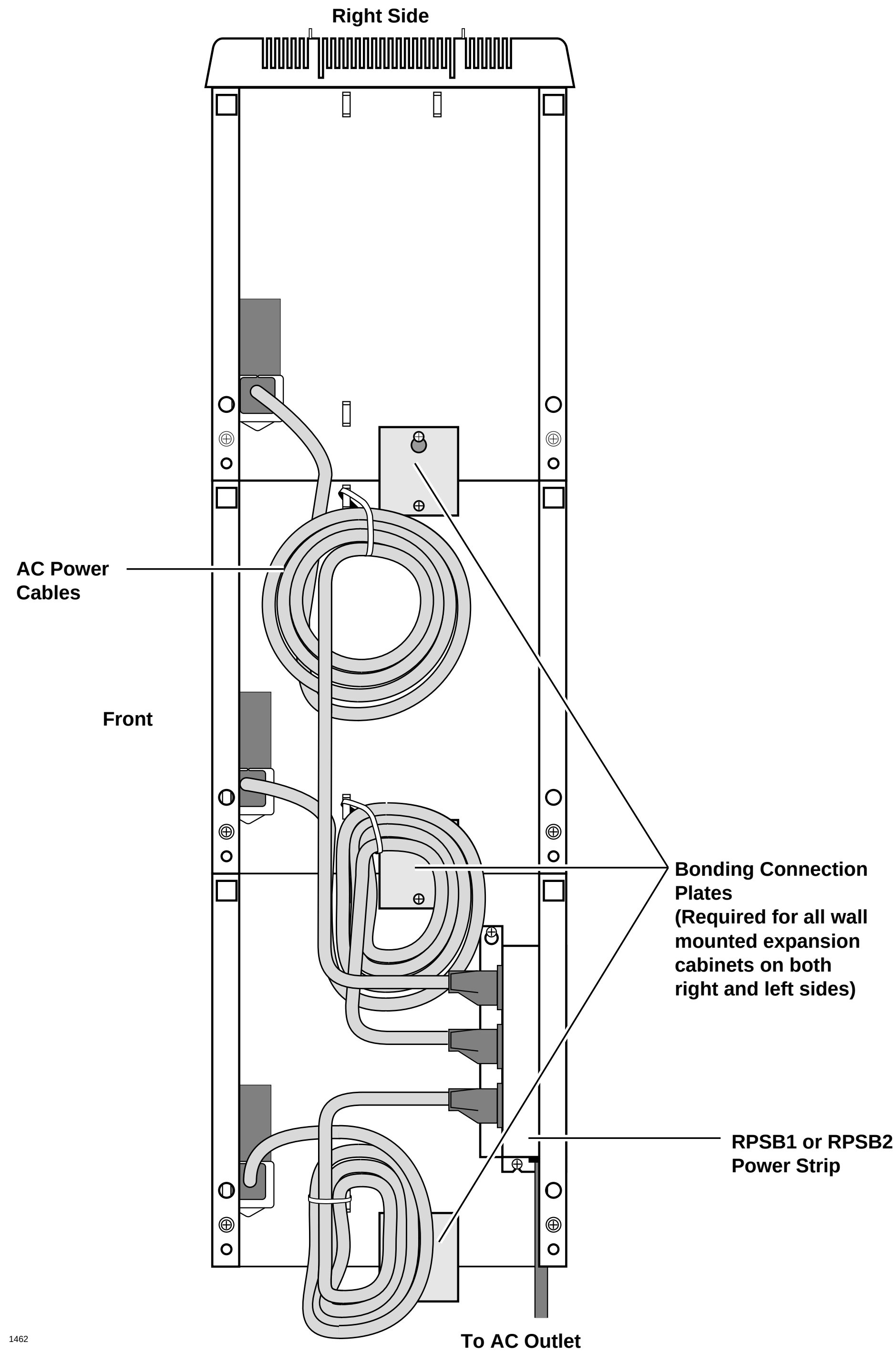


Figure 5-9 Right Side View of Cabinet Interior

Note See "Outlet Strip (RPSB1 and RPSB2) Installation" on Page 5-34 for RPSB1 and RPSB2 cabinet locations.

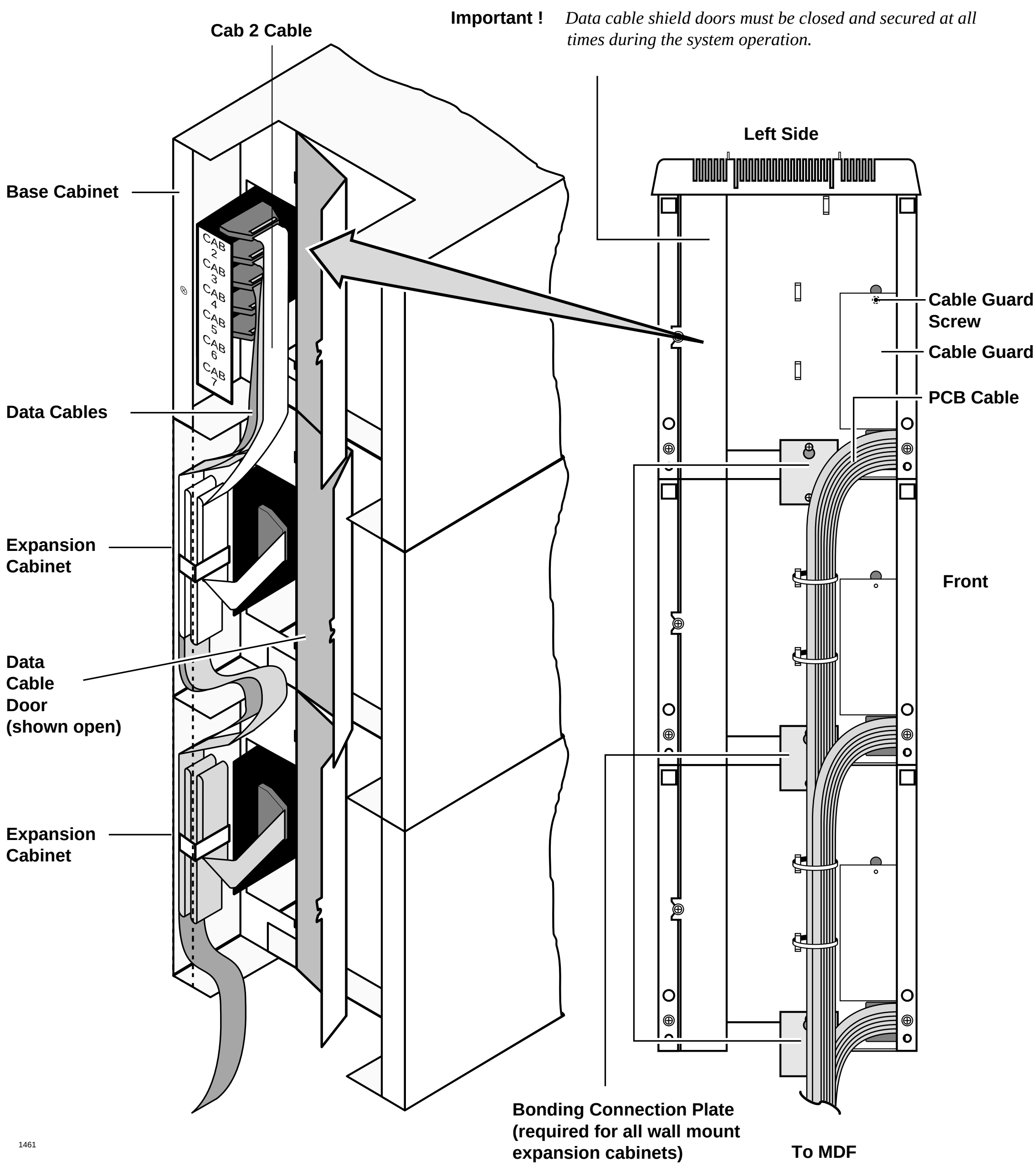


Figure 5-10 Left Side View of Cabinet Interior

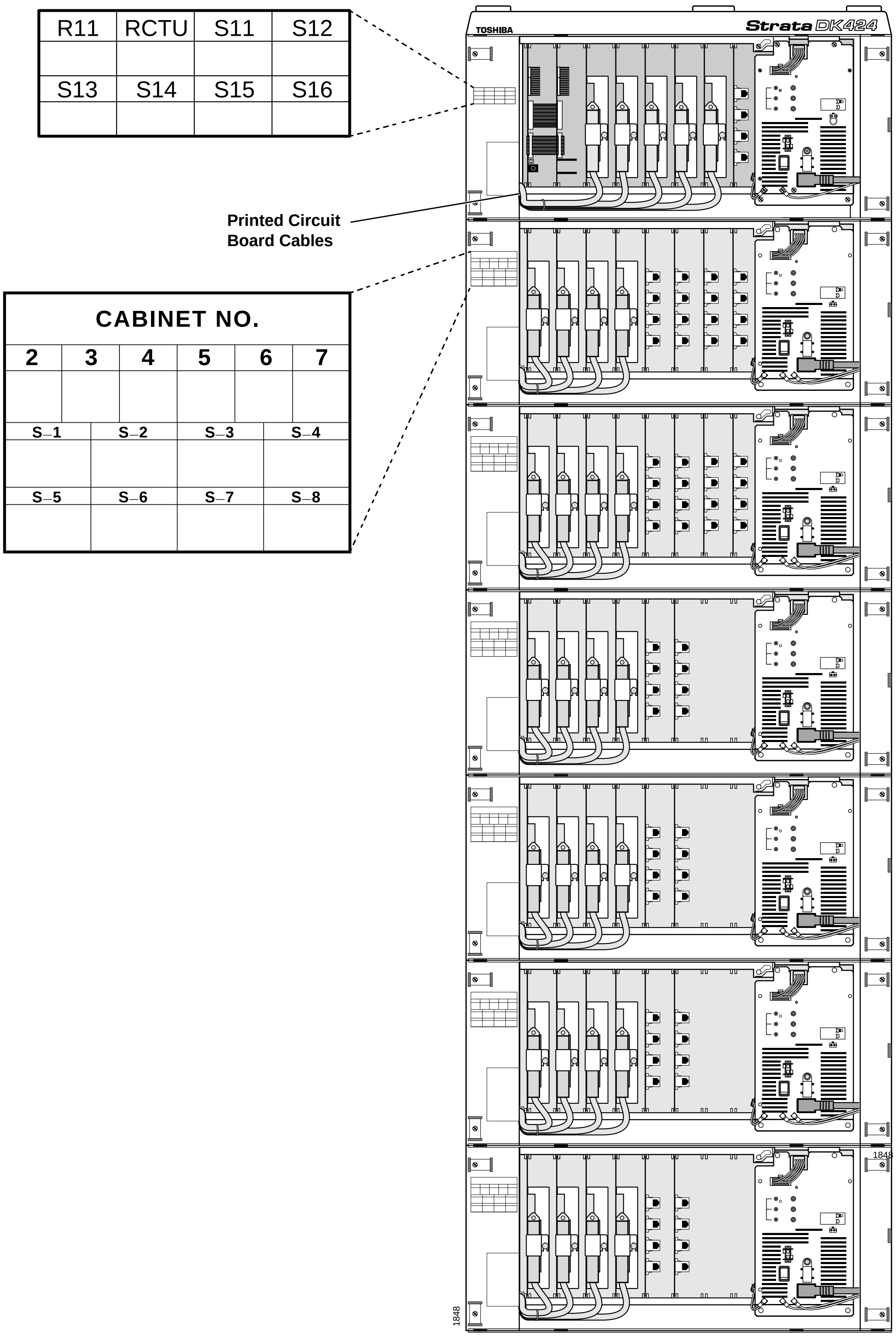


Figure 5-11   Front View of DK424 Cabinet Interior

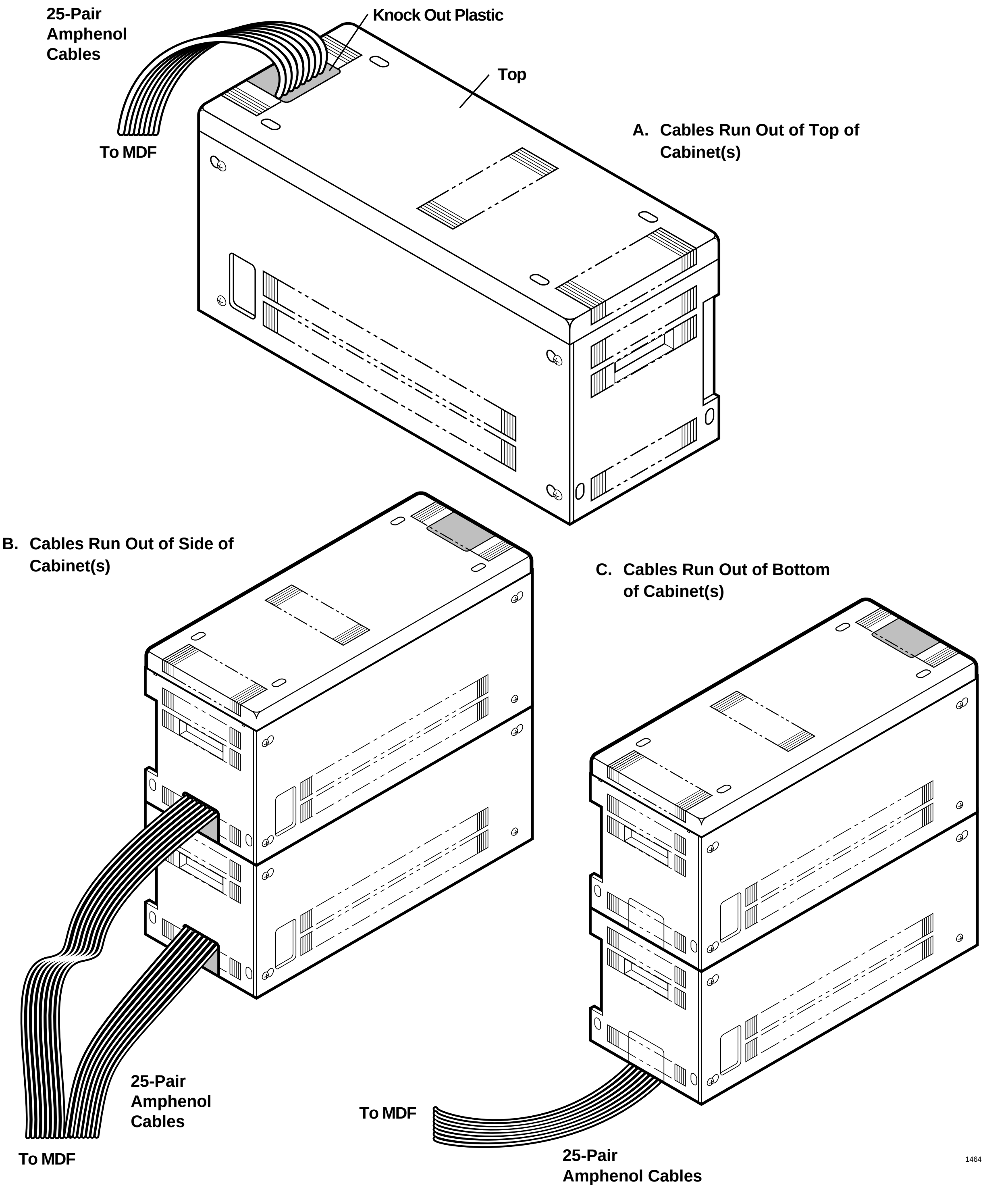


Figure 5-12 DK424 Cabinet Cable Routing

Cabinet Floor Mounting

One or Two Cabinets

1. Remove front, side, and top covers from cabinet(s) (Figure 5-2). Remove plastic locating parts from all cabinet back covers using a Phillips screwdriver (Figure 5-6).
2. Make sure that cabinet power supplies (RPSU280) are installed per "Power Supply Installation" on Page 5-8.
3. If installing just one cabinet, install the RFMF fixtures on each side of the bottom of the cabinet (Figure 5-13) and place the cabinet where it should be installed (go to Step 6).
4. If installing two cabinets, install a floor fixture (RFMF1) on each side of the cabinet that will be the bottom cabinet, making sure that the fixture is inside of the cabinet edge.
5. If installing two cabinets:
   - Set the bottom cabinet on the floor or mount surface, then set the top cabinet on the bottom cabinet.
   - Fasten the two cabinets together with the four screws provided: (two screws at front "A" and two at back "B" of cabinet. Place cabinet where it should be installed.
   - Connect the Expansion Cabinet data cable to the "CAB. 2" data cable connector on the Base Cabinet (Figures 5-10 and 5-28).
6. Install ground wiring, AC and reserve power cabling, and PCB cabling per the "Recommended Installation Sequence" on Page 5-7.
7. Fill out cabinet/slot identification labels on cabinet(s) (Figure 5-11).
8. Reinstall covers on to cabinet(s).

Three or More Cabinets

This section shows you how to mount three or more cabinets to a concrete, wood or computer room floor. Use the General Steps for all of these methods first, then the specific steps that follow for each method.

1. Make sure that cabinet power supplies (RPSU280) are installed per "Power Supply Installation" on Page 5-8.
2. Remove front, side, and top covers from all cabinets (Figure 5-2).

   Remove plastic locating parts from all cabinet back covers using Phillips screwdriver (Figure 5-5).
3. Install a floor fixture (RFMF1) on each side of the bottom cabinet. (Make sure that the fixture is inside of the cabinet edge. For Steps 3~10, see Figures 5-13~5-18.
4. Place cabinet two on top of the bottom cabinet and connect them together at points A and B with the screws provided.
5. Place cabinet three on top of cabinet 2 and connect them together at points A and B with the screws provided.
6. If installing more than three cabinets, install wall brackets (RWBF1) on the top of cabinet 3. Position the 3 cabinets parallel to the wall (2 inches from the wall) and secure the wall brackets to the wall with customer-provided wood screws and wall anchors as required.

7. For systems with just three cabinets, secure the floor fixtures (already attached to the bottom cabinet) to the floor with the customer-provided floor bolts.
8. Refer to the following sub-sections and anchor the system to concrete, wood, or computer room floor. After completing those steps, proceed to Step 12. For systems with four or more cabinets, skip this step and proceed to Step 9.
9. Add remaining cabinets, making sure that the cabinets are connected together at points A and B with the screws provided.
10. For systems with four or more cabinets, make sure that wall brackets (RWBF1) are installed on both sides of the top cabinet, in addition to cabinet three.
11. Check to make sure the cabinets are parallel to the wall. Secure the floor fixtures attached to the bottom cabinet to the floor with the customer-provided floor anchors.
12. Connect the data cable of each Expansion Cabinet to the applicable data cable connector on the Base Cabinet (Figures 5-10 and 5-28). (The data cable from the first Expansion Cabinet should be connected to the connector labeled “CAB. 2”, the cable from the second Expansion Cabinet to the “CAB. 3” connector, etc.)
13. Install ground wiring, AC and reserve power cabling, and PCB cabling per the “Recommended Installation Sequence” on Page 5-7.
14. Fill out cabinet/slot identification labels on each cabinet and reinstall covers on the cabinets. (The top cover should be installed on the top cabinet.)

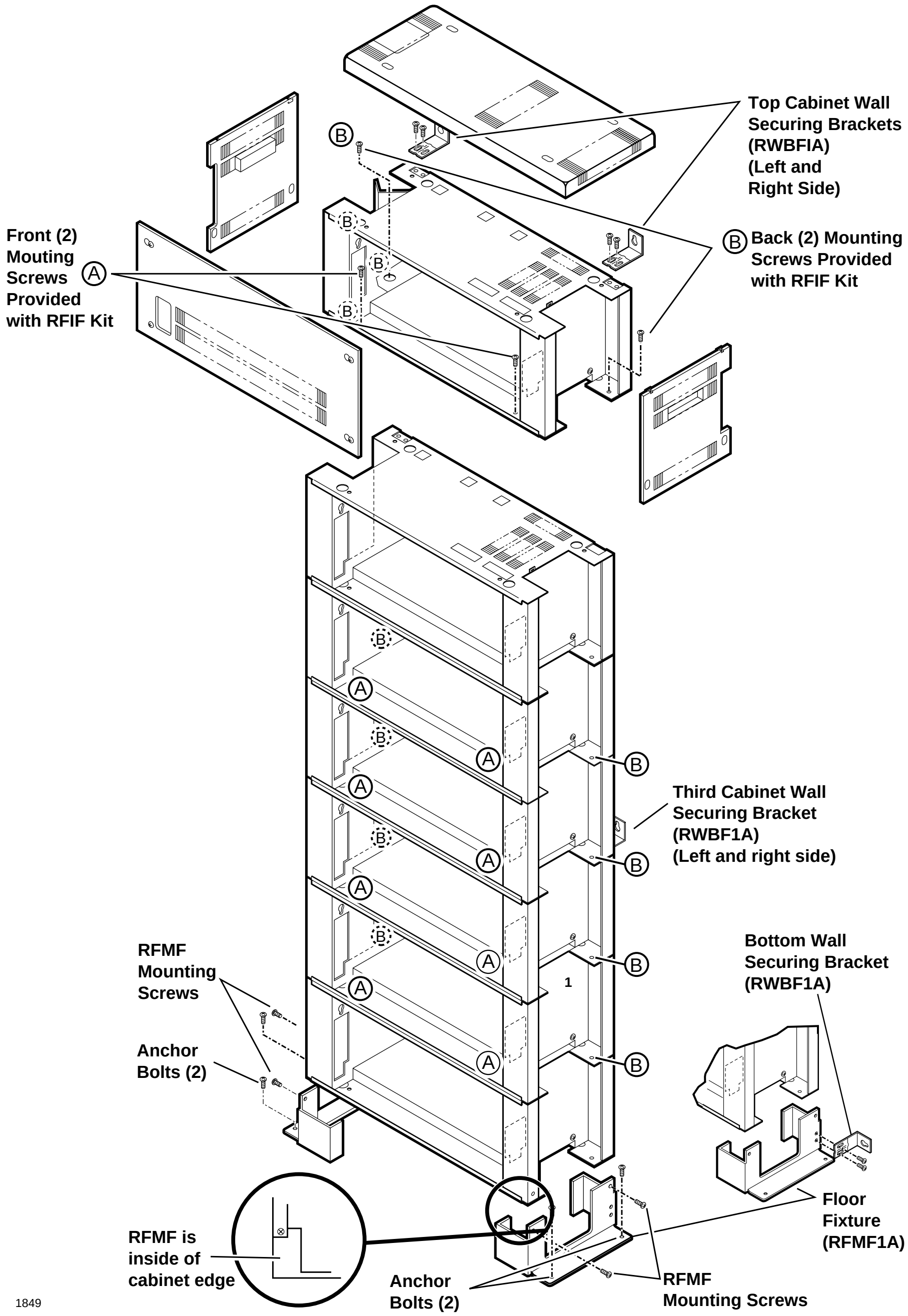
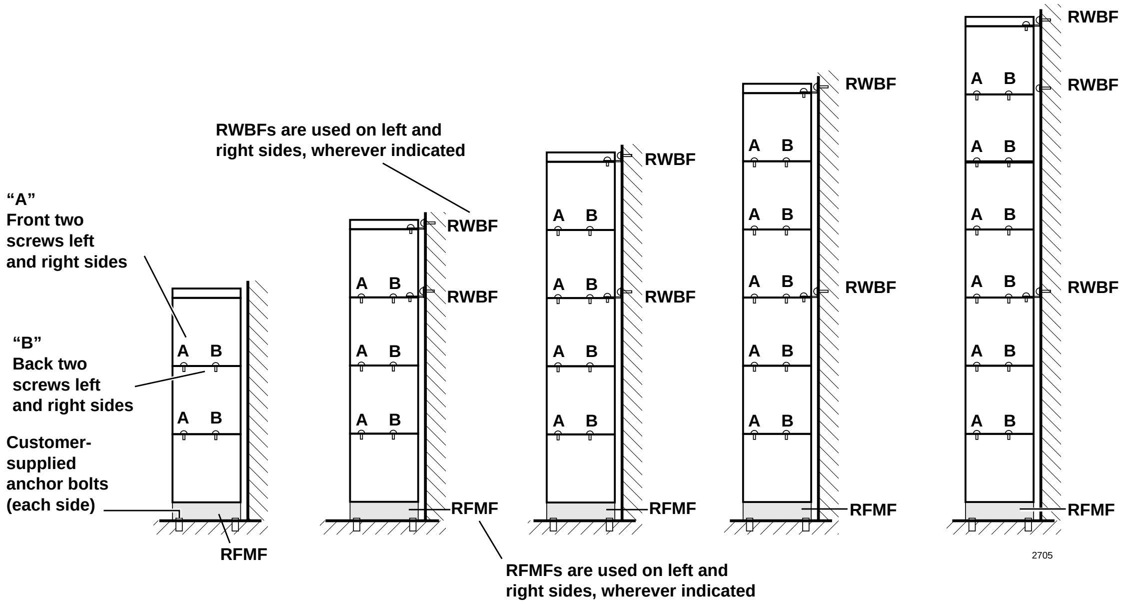


Figure 5-13 DK424 Cabinet Floor Installation

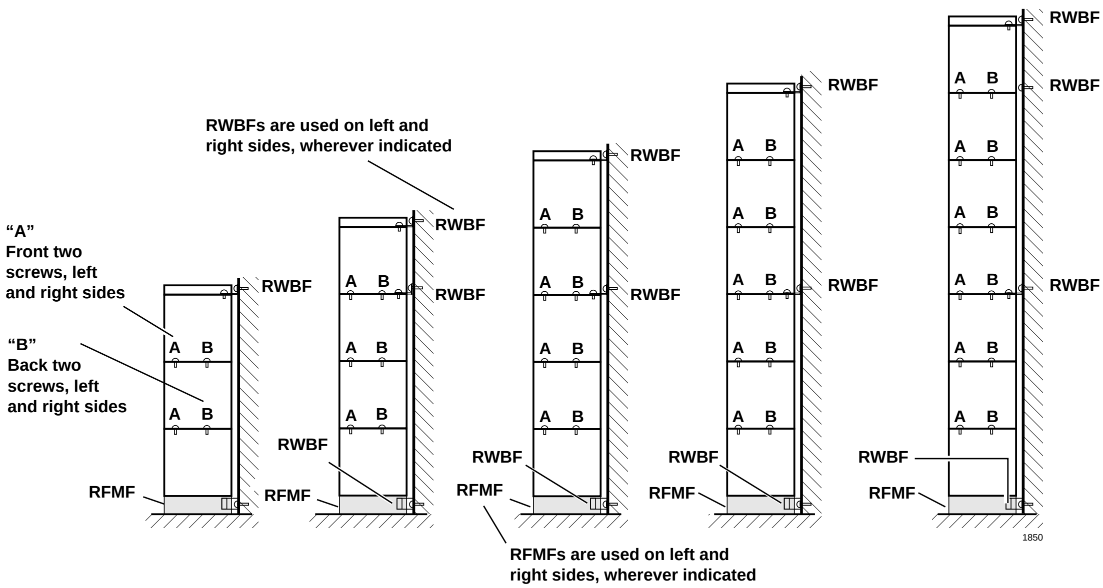
Important!

- *RFMF1A (two-each) and RWBF1A (six-each) are supplied with the floor installation kit RFIF*
- *Upper and third cabinets must be fixed to the wall with RWBFS on each side (use #12 x 1.25 wood screws and wall anchors, as required)*
- *Floor fixture (RFMF) must be fixed to floor by either anchor bolts, or wall by RWBF wall brackets (see Figures 5-14 and 5-15).*



Note RWBF1A (3-pairs) and RFMF1A (1-pair) are supplied with floor installation kit RFIF.

Figure 5-14 Floor Mounting Cabinets (Bolted to the Floor)



Note RWBF1A (3-pairs) and RFMF1A (1-pair) are supplied with floor installation kit RFIF.

Figure 5-15 Floor Mounting Cabinets, (Not Bolted to the Floor)

Bolt Cabinets to a Concrete Floor

1. Mount the DK424 Base Cabinet on Floor Mount Fixtures (see Figures 5-13 and 5-16).
2. Position the Base Cabinet at the selected installation location.
3. Mark the floor where holes will be drilled. Move the Base Cabinet prior to drilling.

Note Cover the Base Cabinet with a drop cloth to protect the power equipment from dust created during drilling.

4. Use a hammer drill to make holes for 3/8-inch bolt anchors.
5. Install the bolt anchors, with plugs, in the drilled holes.
6. Using the driving tool and a hammer, drive each bolt anchor into the floor.
7. Move the Base Cabinet into position on the equipment room floor.
8. Secure the Base Cabinet to the floor using bolts, lock washers, and flat washers.

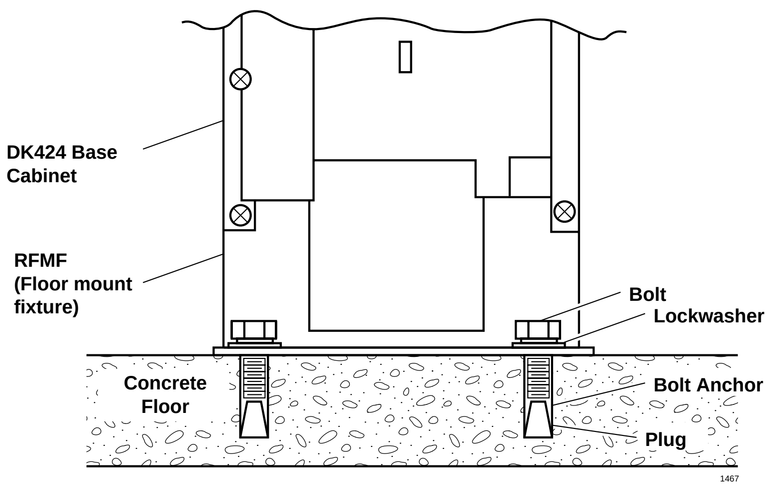


Figure 5-16 Floor Mount Installation – Concrete Floor

Bolt Cabinets to a Wooden Floor

1. Mount the DK424 Base Cabinet on Floor Mount Fixtures (RFMF). See Figures 5-13 and 5-17.
2. Position the Base Cabinet at the selected installation location.
3. Mark the floor where holes will be drilled. Move the Base Cabinet prior to drilling.

Note Cover the Base Cabinet with a drop cloth to protect the power equipment from dust created during drilling.

4. Drill pilot holes to make insertion of 3/8 inch lag bolts easier, and to prevent splitting of wood flooring.
5. Move the Base Cabinet into position on the equipment room floor.
6. Secure the Base Cabinet to the floor using lag bolts, lock washers, and flat washers.

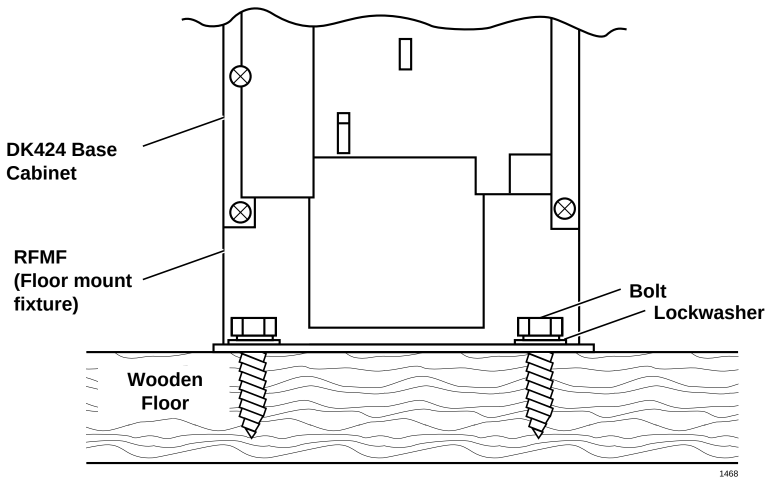


Figure 5-17 Floor Mount Installation – Wooden Floor

Bolt Cabinets to a Computer Room Floor

1. Mount the DK424 Base Cabinet on Floor Mount Fixtures (RFMF). See Figures 5-13 and 5-18.
2. Position the Base Cabinet at the selected installation location.
3. Mark the floor where holes will be drilled. Move the Base Cabinet prior to drilling.

Note Cover the Base Cabinet with a drop cloth to protect the power equipment from dust created during drilling.

4. Drill holes through tile for 3/8-inch threaded rods.
5. After the tiles have been drilled, insert threaded rods through the holes in the tile and mark the concrete floor directly beneath the holes in the tiles.
6. Remove the tiles. Use a hammer drill to make holes for 3/8-inch bolt anchors.
7. Install the bolt anchors with plugs in the drilled holes.
8. Using the driving tool and a hammer, drive each bolt anchor into the floor.
9. Screw threaded rods into each bolt anchor.
10. Install a hex nut, lock washer, and flat washer on each threaded rod. Screw the nuts down far enough to allow floor tiles to be replaced over the threaded rods.
11. Replace tiles over threaded rods in their original positions on the floor.
12. Reach under the tiles, and screw the hex nuts upward until the flat washers are touching the bottom of the tile.
13. Use a hack saw to cut the threaded rods at a height of approximately 1.5 inches above the floor tile.
14. Move the Base Cabinet into position over the threaded rods.
15. Secure the Base Cabinet to the floor using flat washers, lock washer, and hex nuts on each threaded rod.

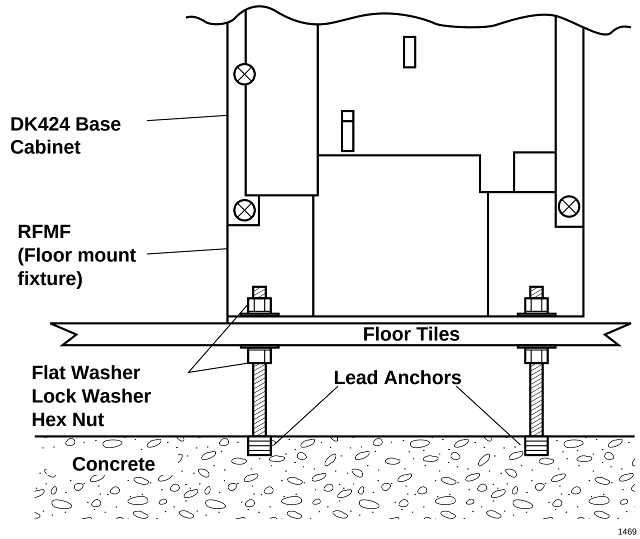


Figure 5-18 Floor Mount Installation – Computer Room Floor

Mount Cabinets to Computer Room Floor (Unbolted)

1. Make sure that cabinet power supplies (RPSU280) are installed per "Power Supply Installation" on Page 5-8.
2. Remove front, side, and top covers from all cabinets (Figure 5-2).

Note As shown in Figure 5-18, the two screws on each side cover and the three screws on the front cover (the bottom left screw must be completely removed) should only be loosened and the covers slid to the right for removal.

Remove plastic locating parts from all cabinet back covers using a Phillips screwdriver (Figure 5-5).

3. Install a floor fixture (RFMF1) on each side of the bottom cabinet (Figures 5-12 and 5-14), making sure that the fixture is inside of the cabinet edge.
4. Secure a wall bracket (RWBF1) to both floor fixtures with the screws provided. Secure the wall brackets to the wall with customer-provided wood screws and wall anchors.
5. Place a cabinet on top of the bottom cabinet and connect the cabinets together at points A and B with the screws provided.
6. Install wall brackets (RWBF1) on the top of cabinet three and secure them to the wall with customer-provided wood screws and wall anchors.
7. Add remaining cabinets, making sure that the cabinets are connected together at points A and B with screws provided.
8. For systems with four or more cabinets, make sure that wall brackets (RWBF1) are installed on both sides of the top cabinet, in addition to cabinet three.
9. Connect the data cable of each Expansion Cabinet to the applicable data cable connector on the Base Cabinet (Figures 5-10 and 5-28). The data cable from the first Expansion Cabinet should be connected to the connector labeled "CAB. 2", the cable from the second Expansion Cabinet to the "CAB. 3" connector, etc.)

10. Install ground wiring, AC and reserve power cabling, and PCB cabling per the "Recommended Installation Sequence" on Page 5-7.
11. Fill out cabinet/slot identification labels on each cabinet (see Figure 5-11), then reinstall covers on the cabinets. (The top cover should be installed on the top cabinet.)

Cabinet Removal – Floor-Mounted Systems

This procedure is written on the presumption that the Base Cabinet is the bottom cabinet of systems with two or more cabinets.

1. Turn the system power OFF, and remove the front and side covers from the cabinet to be replaced and any cabinets above it. Remove the top cover from the top cabinet if it is to be replaced (Figure 5-6).
2. Unplug the AC power cord of the cabinet and any reserve power cabling connected to the power supply. Repeat this procedure for each cabinet above the cabinet to be replaced.
3. If a power strip (RPSB1 or RPSB2) (Figure 5-19), Conduit Connection Box (RCCB1 or RCCB2), or Battery Distribution Box (RBDB1 or RBDB2) is connected to the cabinet, remove it (Figures 5-23 and 5-26).
4. If the cabinet to be replaced is the Base Cabinet (DKSUB424), disconnect all data cables connected to the Base Cabinet data cable connector.
5. If the cabinet to be replaced is an Expansion Cabinet (DKSUE424), disconnect the data cable of the cabinet from the data cable connector on the Base Cabinet. Repeat this procedure for all Expansion Cabinets above the cabinet to be replaced.
6. Disconnect any intercabinet ground wiring or system ground wiring connected to the cabinet. Repeat this procedure for any cabinets above the cabinet to be replaced.
7. Remove any cabinets above the cabinet to be replaced, and then remove the cabinet to be replaced.

Cabinet Replacement

➤ To replace cabinets, refer to "Cabinet Floor Mounting" on Page 5-21.

AC Power and Grounding Requirements

The system requires a solid earth ground for proper operation and safety. The AC power cord(s) already contains a conductor for the "third wire ground" provided by the commercial power outlet. An insulated conductor must connect the frame ground terminal on the Base Cabinet (or the bottom Expansion Cabinet) to a cold water pipe or the building ground.

Notes

- The "third wire ground" ("A" in Figure 5-28) must be dedicated. The conductor connected to the frame ground must comply with the general rules for grounding contained in Article 250 of the National Electrical Code, NFPA 70, but must not depend on the cord and plug of the system.

WARNING! Failure to provide ground may be a safety hazard or lead to confusing trouble symptoms and, in extreme cases, system failure.

AC Power and Third Wire Ground Test

Test each "third wire ground" separately for continuity by either measuring the resistance between the third prong terminal (earth ground) and a metal cold water pipe (maximum: 1 ohm) or by using a commercially available earth ground indicator. If neither procedure is possible, perform the following procedure.

➤ **To test each "third wire ground" for continuity**

WARNING! Hazardous voltages that may cause death or injury are exposed during the following test. Use great care when working with AC power line voltage.

1. Obtain suitable voltmeter, and set it for a possible reading of up to 250VAC.
2. Connect the meter probes between the two main AC voltage terminals (white and black wires) on the wall outlet. The reading obtained should be between 100 ~ 125VAC.
3. Move one of the meter probes to the third terminal (green wire ground, point A in Figure 3-19). Either the same reading or a reading of zero volts should be obtained.
4. If the reading is zero volts, leave one probe on the ground terminal and move the other probe to the second voltage terminal.

CAUTION! If a reading of zero volts is obtained on both voltage terminals (white wire to green wire, black wire to green wire), the outlet is not properly grounded. Omit Steps 5 and 6, and proceed directly to Step 7.

5. If a reading of zero volts on one terminal and a reading of 100 ~ 125VAC on the other terminal is obtained, remove both probes from the outlet.
6. Set the meter to the "OHMS/Rx1" scale. Place one probe on the ground terminal, and the other probe on the terminal that produced a reading of zero volts. The reading should be less than one ohm.

CAUTION! If the reading is more than one ohm, then the outlet is not adequately grounded. If the above tests show the outlet AC voltage is not in range or is not properly grounded, the condition should be corrected (per Article 250 of the National Electrical Code) by a qualified electrician before the system is connected.

➤ **To test the frame ground conductor for continuity**

WARNING! Hazardous voltages that may cause death or injury are exposed during the following test. Use great care when working with AC power line voltage.

1. Disconnect the AC plug(s) of the system to make sure that the separate earth ground paths are separated.
2. With a suitable volt/ohm meter, perform a reading between points "A" and "B" shown in Figures 5-28, 5-21 and 5-22. Verify that the readings do not exceed the figures listed below. If they do, the condition must be corrected by a qualified electrician before the system is connected.

A to B: 1 volt maximum then A to B: 1 ohm maximum

Intercabinet Ground

Connect intercabinet ground wires (supplied with each cabinet) between cabinets in systems with two or more cabinets (Figures 5-21 and 5-22).

AC Power Cabling Installation

The system requires an input power source of 50/60 cycles, 115VAC ± 10 VAC, and up to 17.5 amps AC to operate. AC power cabling requirements vary, depending on the method of cabinet installation and the number of cabinets. Refer "Summary of Electrical/Environmental Characteristics" on Page 5-4 for electrical power requirements.

Some floor-mounted configurations and all wall-mounted configurations require AC outlets, which must be dedicated to system use, fused, and grounded. To avoid accidental turn off, do not configure the outlet with an ON/OFF switch.

AC Power for One or Two Cabinets (Wall Mount)

Refer to the following instructions to install AC power cabling to floor or wall-mounted systems with just one or two cabinets:

1. Make sure all power supply (RPSU280) switches are in the OFF position.
2. If two cabinets are installed and local electrical code allows only one AC power cord from the system, install the RPSB2 in the bottom cabinet per Figures 5-19 and 5-20.
3. For AC power cords that will be plugged directly into a wall outlet: Undo the tie wrap that keeps the cord coiled. Plug female end of the cord into the power supply, and plug the male end into the wall outlet.
4. For AC power cords that will be plugged into power strips: Do not undo the tie wrap that keeps the cord coiled. Plug female end of the cord into the power supply, and plug the male end into the RPSB power strip. Plug the power strip power cord into a wall outlet (see Figure 5-9).

Note Power Supply testing procedures are provided in Chapter 12 – Fault Finding, which should be referred to if it is suspected that the power supply does not work properly.

AC Power for Three or More Cabinets (Wall Mount)

Local electrical codes specify that a maximum of one or two AC power cords from the system can be plugged into wall outlets. Systems with three or more cabinets must be equipped with power strips (RPSB1 or RPSB2) to adhere to this requirement. Each power strip has three outlets and an AC power cord.

Three- or four-cabinet systems require one power strip, while five- to seven-cabinet systems require two or three power strips, depending on local electrical code requirements pertaining to the number of AC power cords (one or two) allowed from the system.

➤ **To install AC power cabling to wall-mounted systems with three or more cabinets**

Refer to Figures 5-19~5-22 and follow these steps:

1. Make sure all power supply (RPSU280) switches are in the off position.
2. Secure power strips to applicable cabinets.
3. For AC power cords that will be plugged directly into a wall outlet: Undo the tie wrap that keeps the cord coiled. Plug female end of the cord into the power supply, and plug the male end into the wall outlet.
4. For AC power cords that will be plugged into power strips: Do not undo the tie wrap that keeps the cord coiled. Plug female end of the cord into the power supply, and plug the male end into the power strip. Plug the power strip power cord into a wall outlet.

Note Power Supply testing procedures are provided in Chapter 12 – Fault Finding, which should be referred to if it is suspected that the power supply does not work properly.

AC Power for Three or More Cabinets (Floor Mount)

UL specifies that floor-mounted systems with three or more cabinets require the installation of a Conduit Connection Box (RCCB1 or RCCB2) to connect AC power cabling (and reserve power) to the system. AC power cabling for floor-mounted systems with three or more cabinets requires the installation of one or two power strips (RPSB1and RPSB2), depending on the number of cabinets installed.

➤ **To connect AC power cabling to floor-mounted systems with three or more cabinets**

Refer to Figures 5-19~5-19, 5-22, 5-26 and 5-27, and follow these steps:

1. Make sure that the conduit connection box is installed on the bottom cabinet. The box can be installed by the regular system installer.
2. Have a *licensed electrician* install conduit and cabling from the AC power source to the conduit connection box and local electrical codes. The remaining steps in this procedure can be performed by the regular system installer.
3. Make sure all power supply (RPSU280) switches are in the off position.
4. Secure power strips to applicable cabinets.
5. For each power supply: Plug the female end of the provided AC power cord into the power supply, without removing the tie wrap that keeps the cord coiled. Plug the other end of the cord into a power strip.
6. Plug power strip power cords into the conduit connection box.

Reserve Power Installation

Two or four customer-supplied, 12VDC batteries (80 amp hours maximum) can be connected to the system as a power failure backup. In the event of a power failure, the system automatically switches over to battery power without any interruption to existing calls or other normal system functions.

The length of time reserve power operates depends on the system, size and number of batteries provided, and the system load. Typical reserve power duration estimates and battery specifications are estimated with the following considerations (see Table 5-4):

- Batteries have full charge at start of operation.
- Two or four batteries connected per Figure 5-25.
- Batteries are 12VDC, rated at 80 amp/hours each.
- System is operating at full load traffic with LCD phones.
- Batteries used for this test are gel-cell and maintenance-free. Reserve duration will vary depending upon battery type, age, and manufacturer. These figures should only be used as an estimate.

Table 5-4 Typical Reserve Power Duration Estimate

Number of Cabinets	1	2	3	4	5	6	7
Estimated operation time Two-battery configuration	16.0 hr	8.0 hr	5.0 hr	3.7 hr	3.0 hr	2.5 hr	0.5 hr
Estimated operation time Four-battery configuration	32.0 hr	16.0 hr	10.0 hr	7.5 hr	6.0 hr	5.0 hr	2.0 hr
DC Current Drain (-24 VDC)	3.5 amps	6.7 amps	9.9 amps	13.1 amps	16.3 amps	19.5 amps	22.7 amps
AC Input Current (AC Current Limitation by National Electric Code)	2.5 amps	5.0 amps	7.5 amps	10.0 amps	11.5 amps	15.0 amps	17.5 amps

WARNING! Some batteries can generate explosive gases. Therefore...

Ensure that batteries are located in a well-ventilated area.

Do not smoke near batteries.

Avoid creating any electrical sparks near batteries.

Use commercially available battery enclosures to reduce risk to nearby people and equipment.

The procedure for installing reserve power varies, depending on the number of cabinets in the system and the mounting method employed in installing the cabinets. The following text details reserve power battery installation requirements.

WARNING! Battery cables that exit the cabinet(s) are not UL listed because of possible incorrect installations. Have a licensed electrician install these cables.

Reserve Power for One or Two Cabinets (Wall Mount)

1. Connect the black jumper wire (supplied with the PBTC-3M cable) from the positive terminal of one 12VDC battery to the negative terminal of the second 12VDC battery (Figure 5-20).
2. Ensure that a serviceable 10-amp fuse is installed in the in-line fuse holder of the PBTC-3M cable.
3. Connect the PBTC-3M battery cable white lead to the open positive terminal of the 12VDC battery. Connect the black lead to the open negative terminal of the second 12VDC battery.

Important! *The cabinet(s) must be connected to the (live) AC power source, and the power supply ON/OFF switch set to ON prior to the final step of connecting the reserve power batteries to the power supply via the BATT+/- receptacle. If the batteries are connected after AC power is lost, reserve power will not function.*

4. Connect the PBTC-3M battery cable two-prong male plug to the Base Cabinet power supply BATT +/- receptacle.
5. Repeat Steps 3 and 4 to connect a PBTC-3M to the Expansion Cabinet.
6. To test reserve power operation, disconnect system AC power plugs with power supply ON/OFF switches in the ON position. The system should continue to operate without interruption.

Note If connecting four batteries, follow the wiring diagram in Figure 5-25.

Reserve Power for Three or More Cabinets (Wall Mount)

1. Install the Battery Distribution Box (RBDB1A or RBDB2) to the bottom cabinet.
2. Connect two Cable "C" jumper wires from the positive terminal of one 12VDC battery to the negative terminal of the second 12VDC battery (Cable "C" is supplied with the RBTC1A-2M cable).
3. Ensure that a serviceable 12-amp fuse is installed in the in-line fuse holder of the RBTC1A-2M battery cable.
4. Connect the white lead of the RBTC1A-1.5M or RBTC2A-1.7M battery cable to the open positive terminal of the 12VDC battery. Connect the black lead to the open negative terminal of the second 12VDC battery.
5. Connect a second RBTC1A-1.5M or RBTC2A-1.7M in parallel to the first RBTC1A-2M cable per Steps 2, 3 and 4 instructions.
6. Plug the two RBTC1A-1.5M or RBTC2A-1.7M battery cables into the Battery Distribution Box.

Important! *The cabinets must be connected to the (live) AC power source, and the power supply ON/OFF switches set to ON prior to the final step of connecting the reserve power batteries to the power supplies via the BATT +/- receptacle. If the batteries are connected after AC power is lost, reserve power will not function.*

7. Connect the RBTC1A-1.5M or RBTC2A-1.7M cables from the Battery Distribution Box to the BATT +/- receptacle of individual power supplies (6-RBTC1A-1.5M cables are supplied with an RBDB distribution box). RBTC2A-1.7M is required for the seventh cabinet. It must be ordered with part number RCTC1A-1.7A.
8. To test reserve power operation, disconnect the system AC power plugs with the power supply ON/OFF switches in the ON position. The system should continue to operate without interruption.

Note If connecting four batteries, follow the wiring diagrams in Figure 5-25.

Reserve Power/AC Wiring for Three or More Cabinets (Floor Mount)

Floor-mounted systems with three or more cabinets require a Conduit Connection Box (RCCB) to connect reserve power cabling and AC power cabling to the system. Only a qualified electrician can install cabling between the reserve power source and AC power cabling to the conduit connection box. All other steps required to install reserve power, including installation of the Battery Distribution Box (RBDB), can be accomplished by the normal system installer.

➤ **To connect reserve power to floor-mounted systems with three or more cabinets**

See Figures 5-23 and 5-26~5-28 and follow these steps:

1. Make sure that the Conduit Connection Box is installed on the bottom cabinet. The box can be installed by the regular system installer.
2. Have a licensed electrician install conduit and battery cabling to the Conduit Connection Box and local electrical codes. The remaining steps in this procedure can be performed by the regular system installer.
3. Install the Battery Distribution Box on the second cabinet (the cabinet directly above the bottom cabinet).
4. Plug the two Conduit Connection Box cables (coming from the left side of the RCCB box) into the Battery Distribution Box.

Important! *The cabinets must be connected to the (live) AC power source, and the power supply ON/OFF switches set to ON prior to the final step of connecting the reserve power batteries to the power supplies via the BATT +/- receptacle. If the batteries are connected after AC power is lost, reserve power will not function.*

5. Connect RBTC1A-1.5 and RBTC2A-1.7 cables from the (RBDB or RBDB2) Battery Distribution Box to the BATT +/- receptacle of individual power supplies (6 RBTC1A-1.5 cables come with each RBDB distribution box). RBTC2A-1.7 is a longer cable, required for the seventh cabinet. It must be special ordered with part number RCTC1A-1.7M.
6. To test reserve power operation, turn off the system AC power circuit breaker with power supply ON/OFF switches in the ON position. The system should continue to operate without interruption.

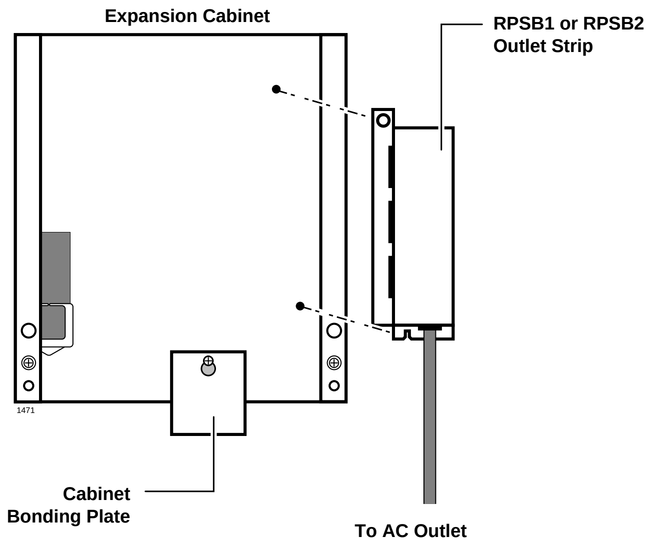


Figure 5-19 Outlet Strip (RPSB1 and RPSB2) Installation

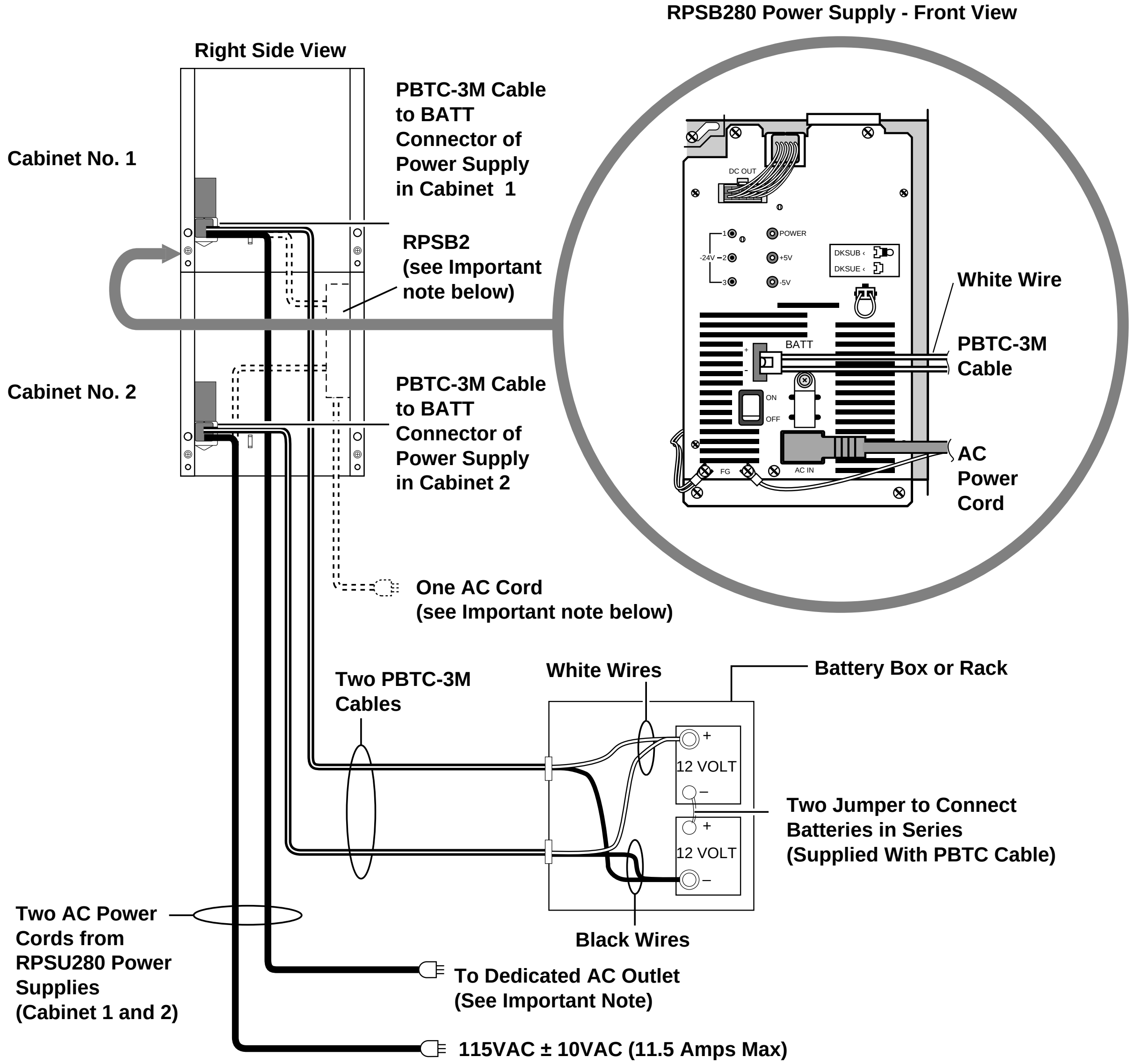
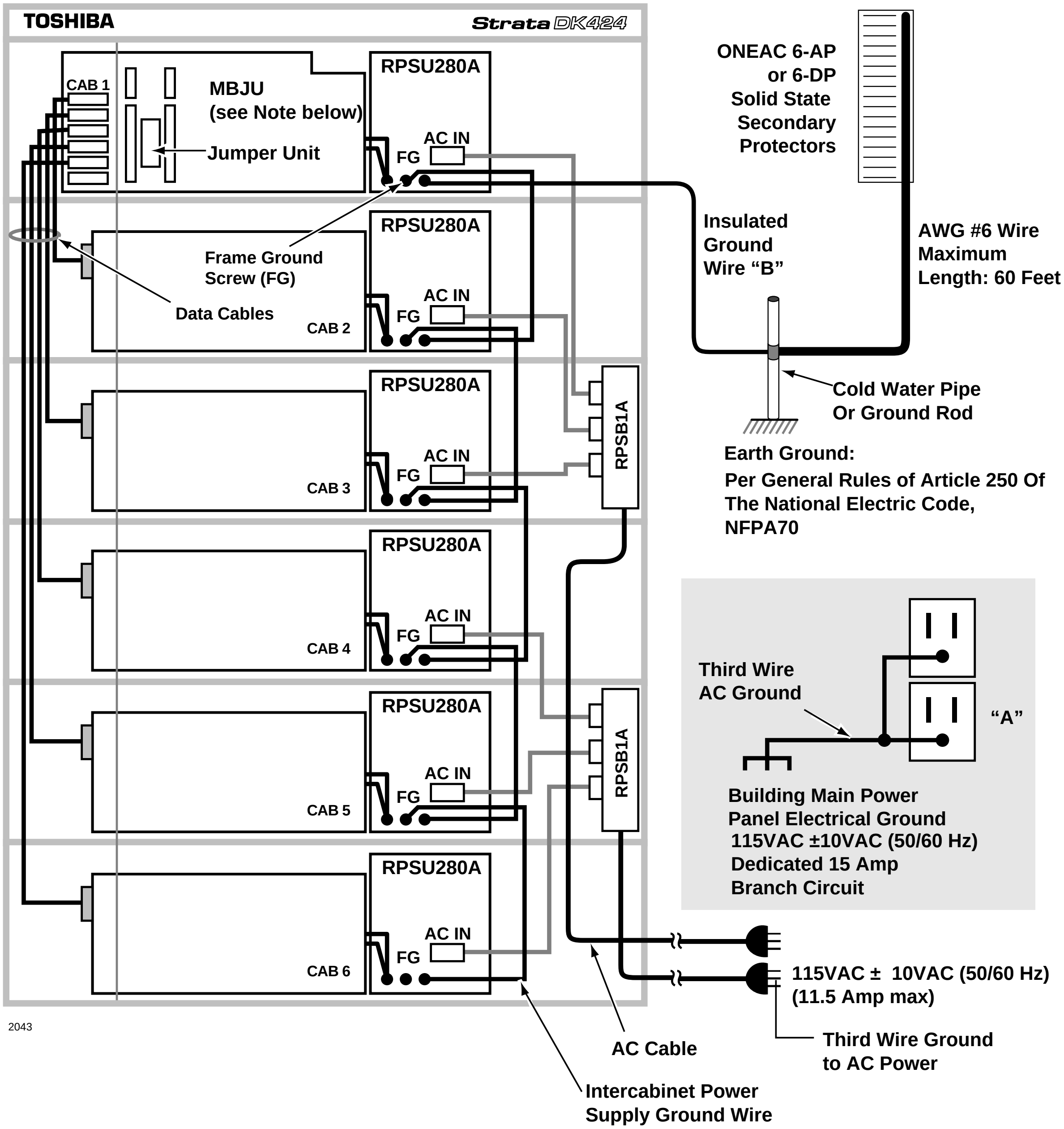


Figure 5-20 AC and Reserve Power, One or Two Cabinets, Wall or Floor-mounted

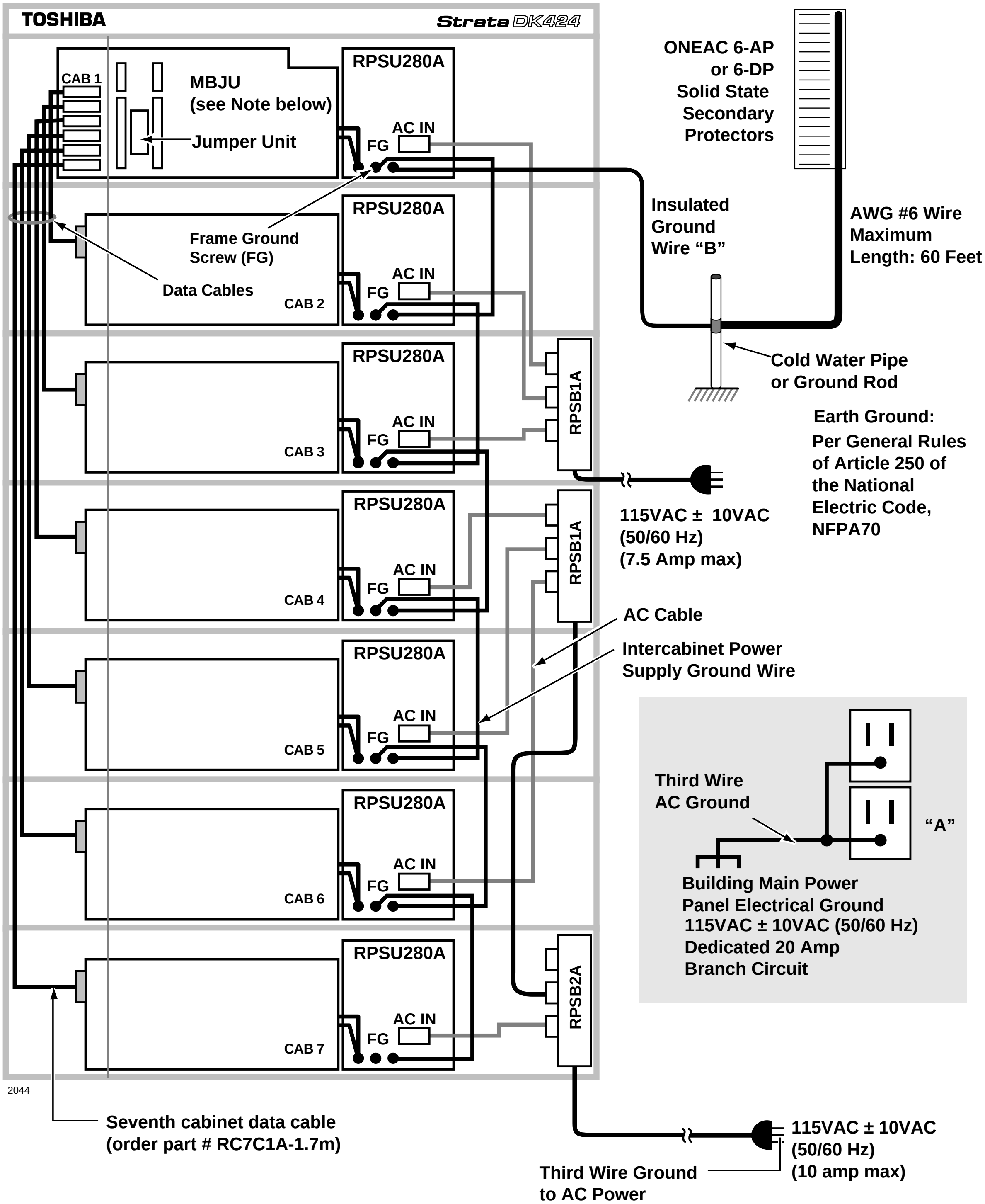
Important! *If local electric code allows only on AC cord from the system, install a RPSB2 in the bottom cabinet (per Figure 5-23). Plug power supplies into the RPSB2 and plug the RPSB2 into the dedicated wall outlet.*

DK424 Installation



Important! *Remove MBJU only when RCTUE/F is installed.*

Figure 5-21 AC Power Distribution for Six Cabinets



Important! *Remove MBJU only when RCTUE/F is installed.*

Figure 5-22 AC Power Distribution for Seven Cabinets

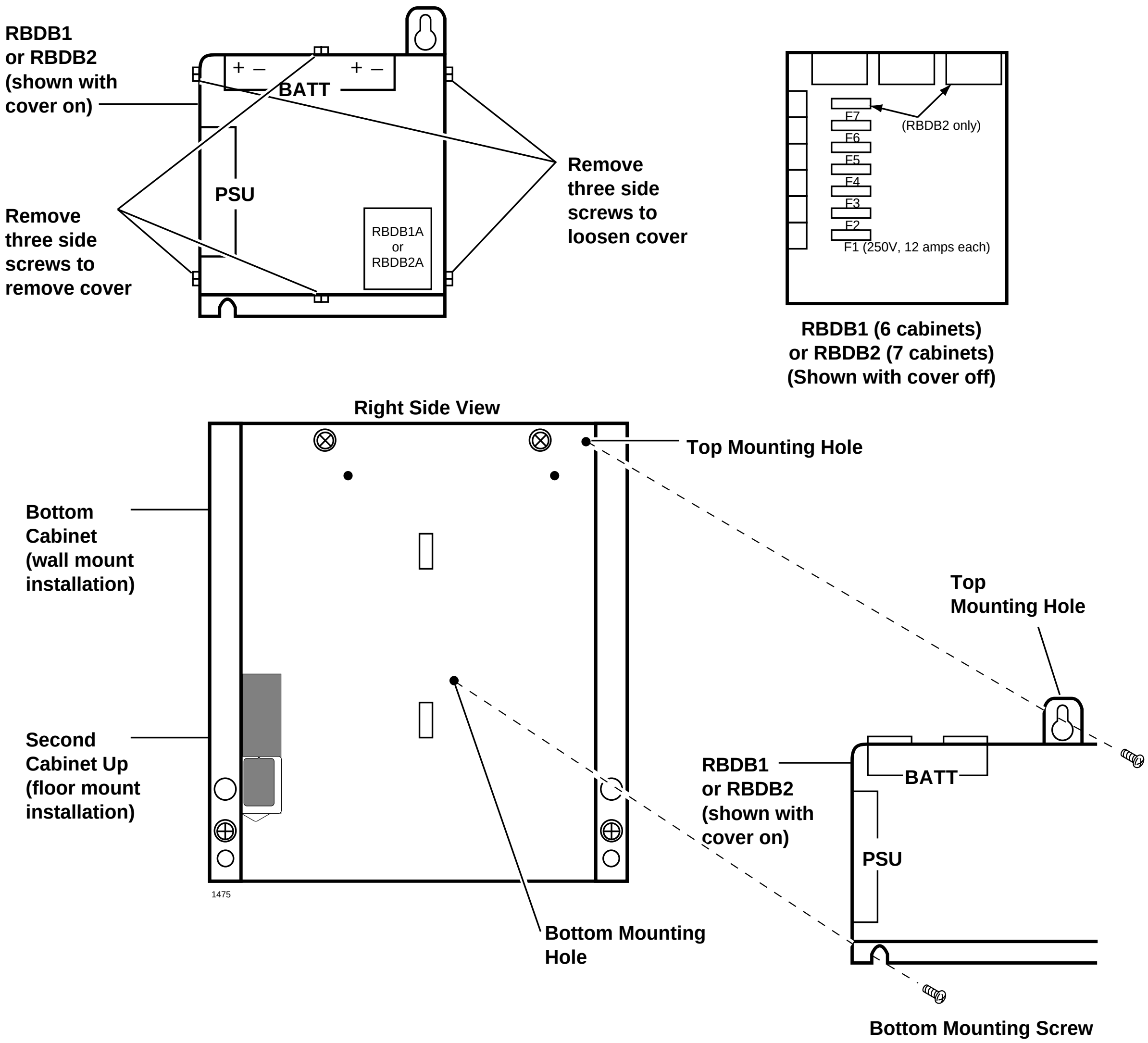
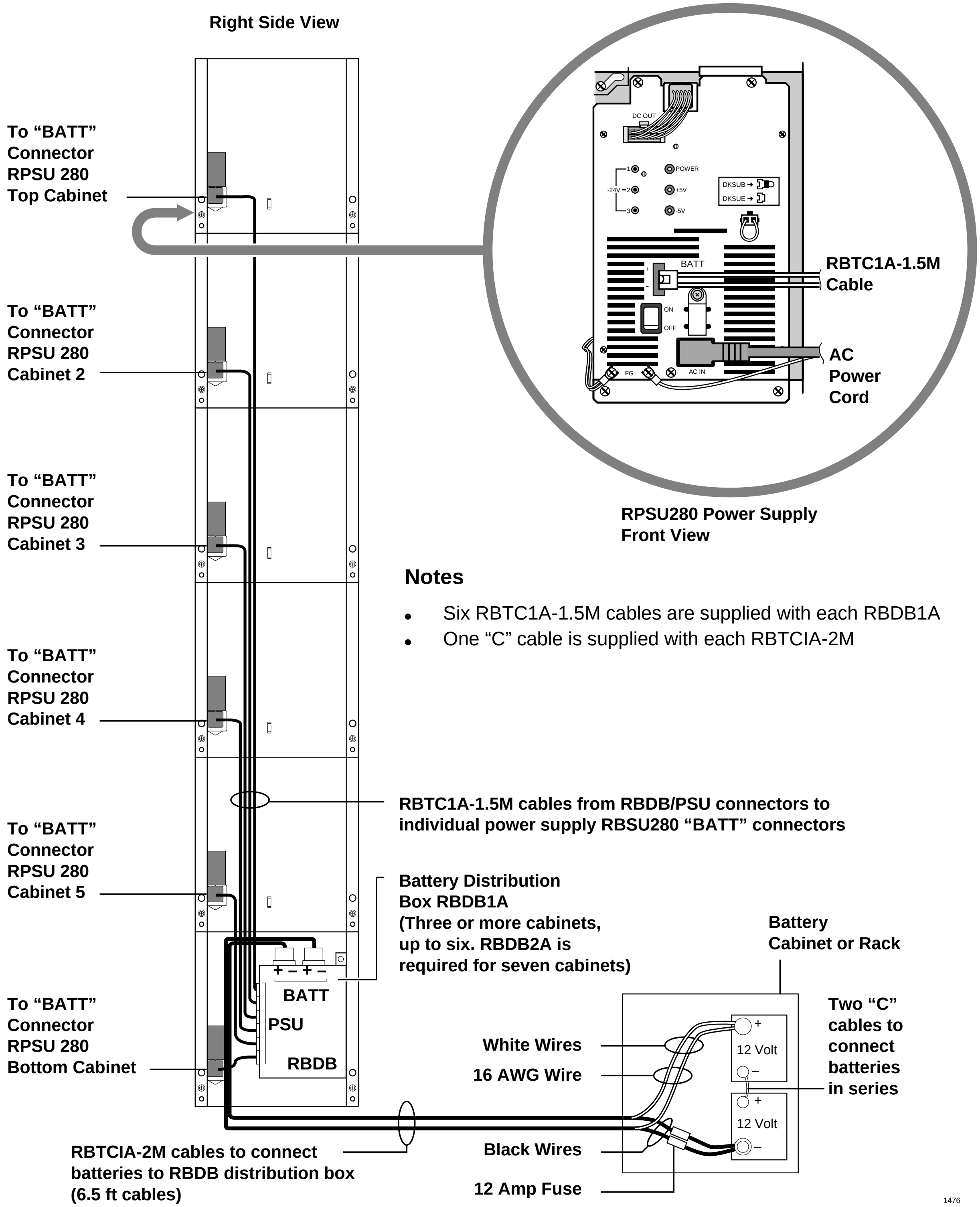
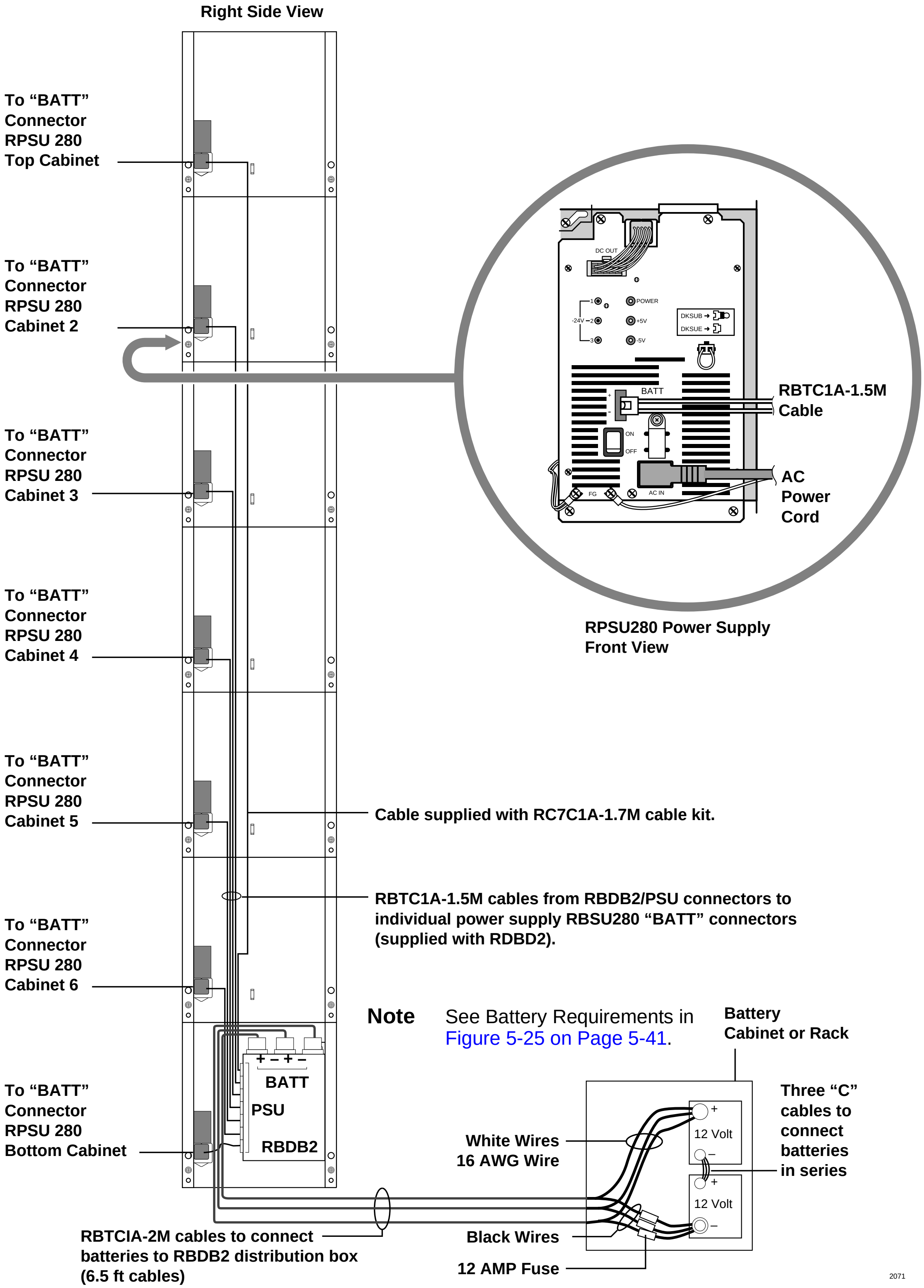


Figure 5-23 Battery Distribution Box (RBDB) Installation Wall/Floor Mount, Three or More Cabinets with Reserve Battery Back Up



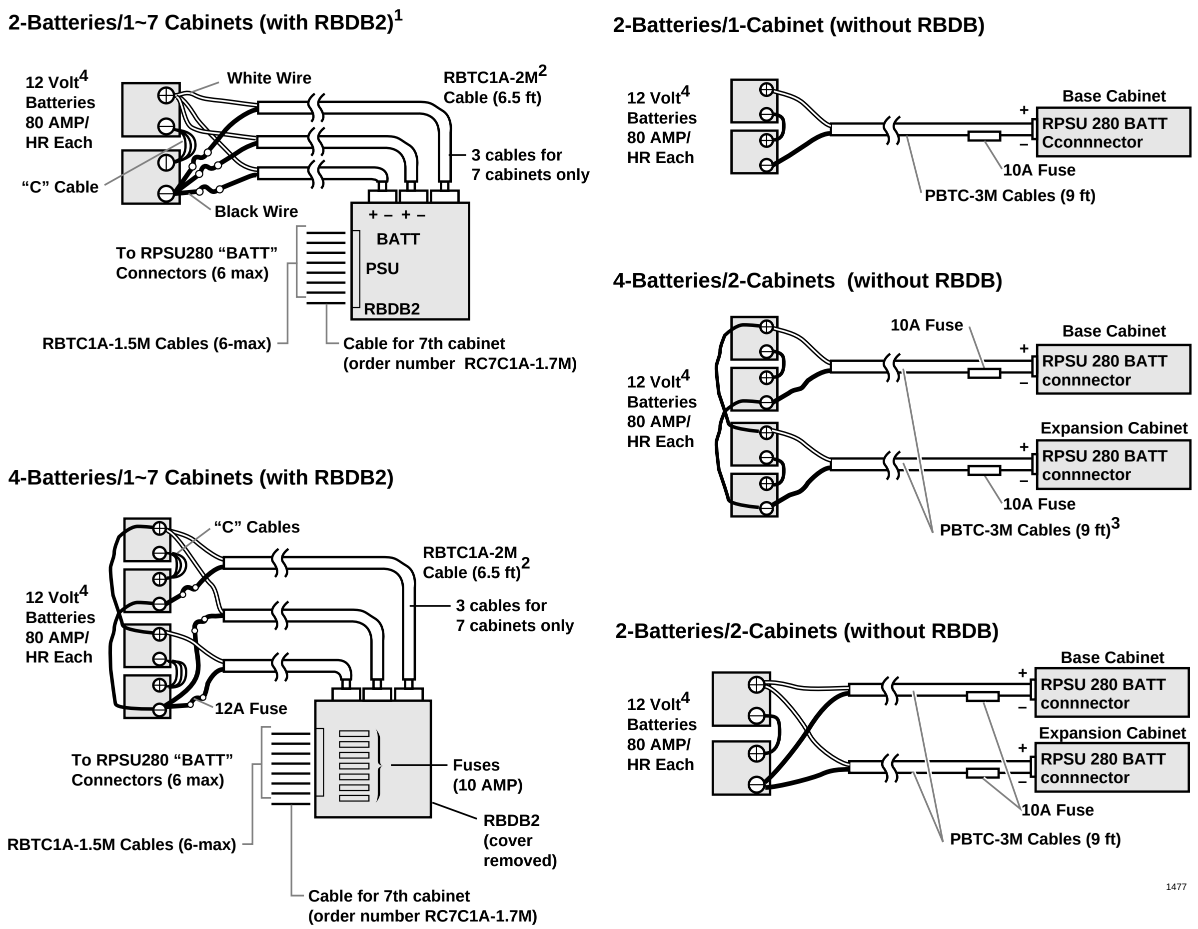
Note See Battery Requirements in Figure 5-25 on Page 5-41.

Figure 5-24 Six Cabinet Reserve Power, Three to Six (Wall Mounted Cabinets)



Note See Battery Requirements in Figure 5-25 on Page 5-41.

Figure 5-25 Seven Cabinet Reserve Power (Wall Mounted Cabinets)



1. When floor mounting the DK424, the batteries must be installed by a licensed electrician per local electric code using conduit. (See Figures 5-25, 5-21 and 5-22 DKSUE424.)
2. RBTC1A-2M cable current ratings: discharge, 12 amps max./charge, 3.9 amps max.
3. PBTC-3M and RBTC1A-15M cable current ratings: discharge, 4.9 amps max./charge 0.6 amps max.
4. Batteries should be installed in a customer-supplied commercial battery box or enclosed rack.

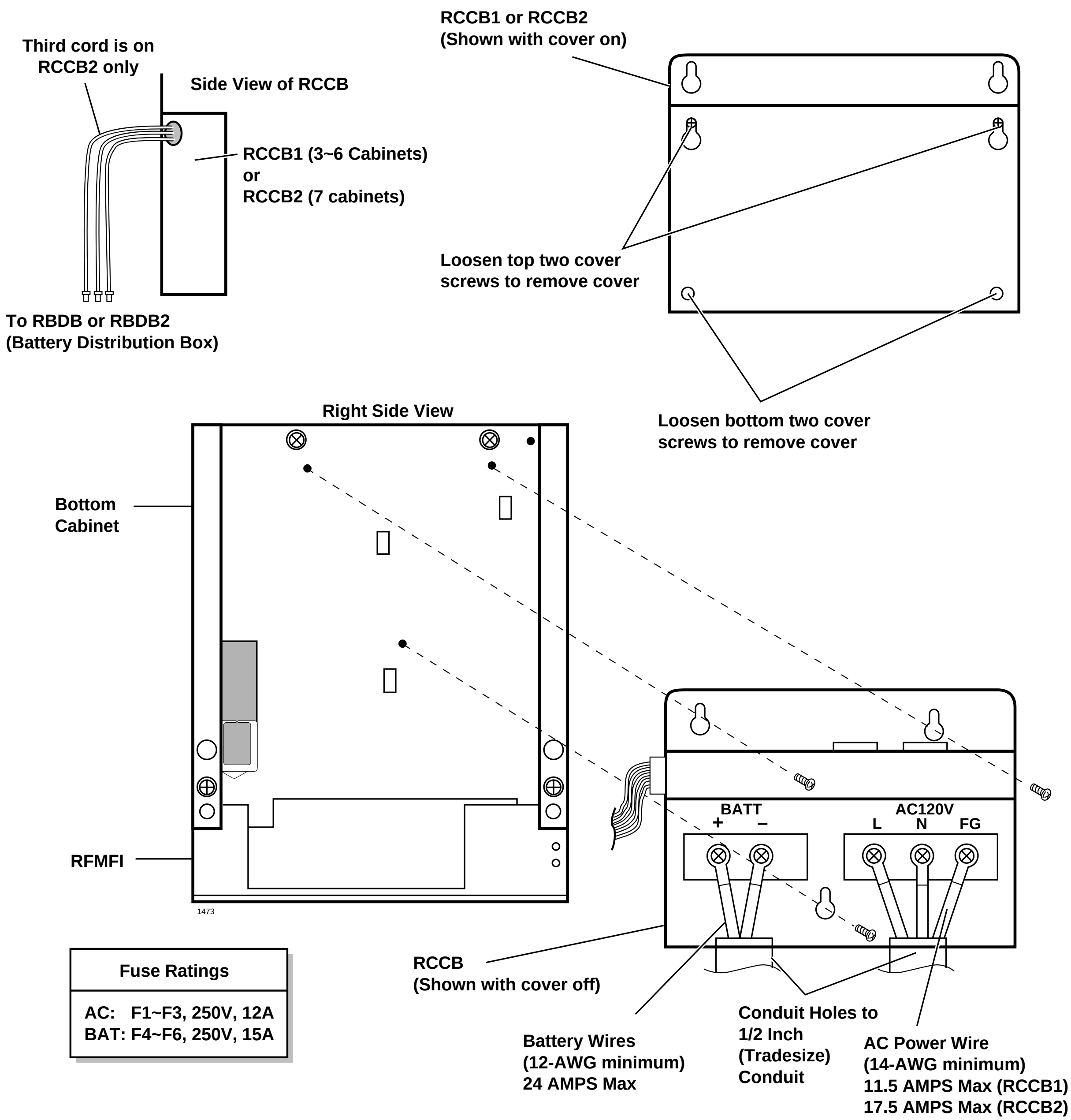
Figure 5-25 Battery Wiring Diagram (Two or Four Batteries) Wall Mount Only

Notes

- PBTC-3m cables are used for one or two cabinets installations (see Figure 5-21); two RBTC1A-2M cables are used for three or more cabinet installations (DKSUE424).

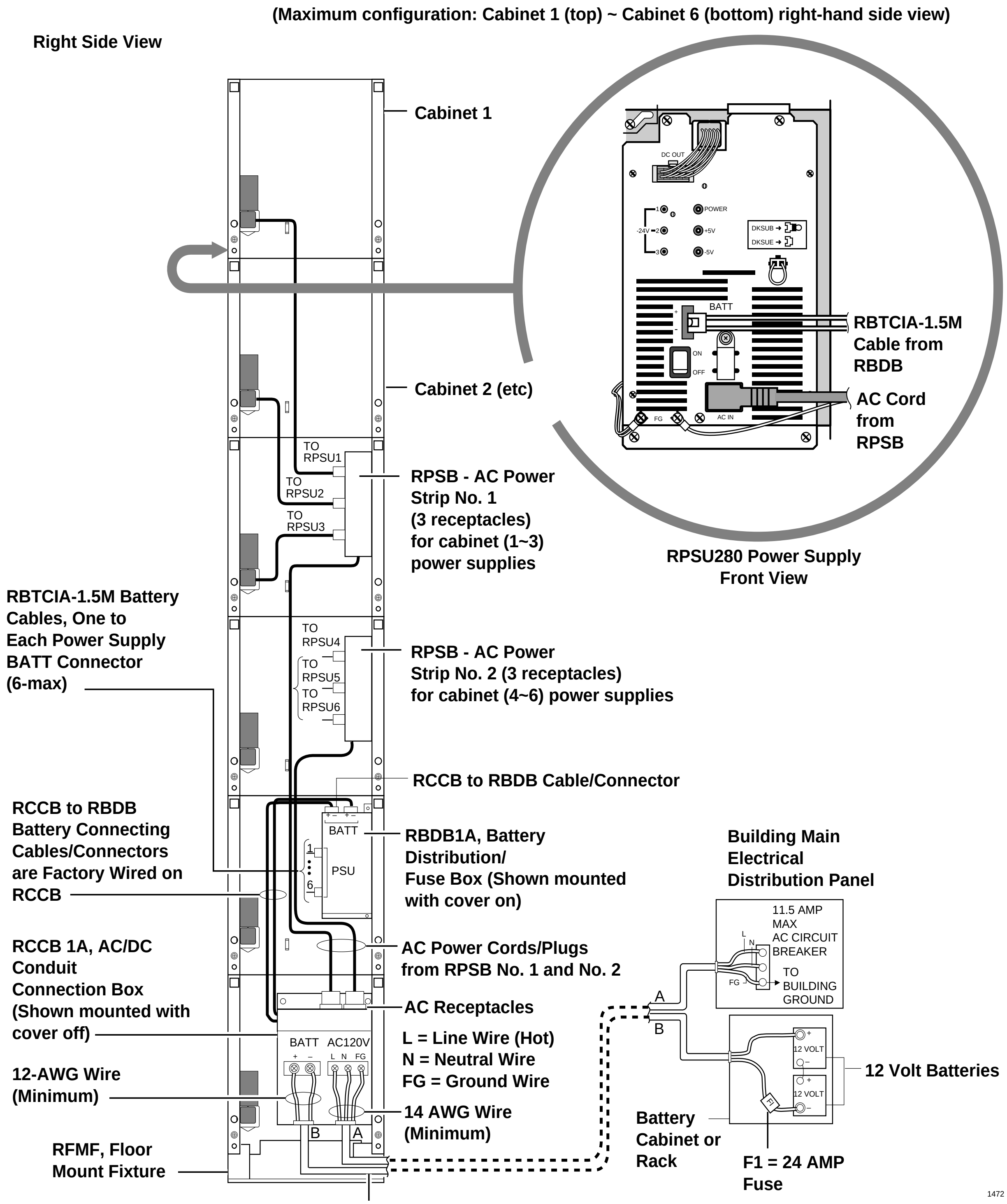
Important! *Since these cables are not UL listed, a licensed electrician should install them.*

Cables connecting to batteries must be 16 AWG minimum.



Fuse Ratings
AC: F1~F3, 250V, 12A
BAT: F4~F6, 250V, 15A

Figure 5-26 Conduit Connection Box (RCCB) (Required to Floor Mount Three or More DK424 Cabinets Only)



Note AC/DC wiring and conduit “A” and “B” must be installed by a licensed electrician per local electrical code (conduit trade size is 1/2 inch).

See Figure 5-25 on Page 5-41 for battery specifications and wiring guidelines.)

Figure 5-27 Reserve Power/AC Wiring for Three to Six Cabinets (Floor Mount)

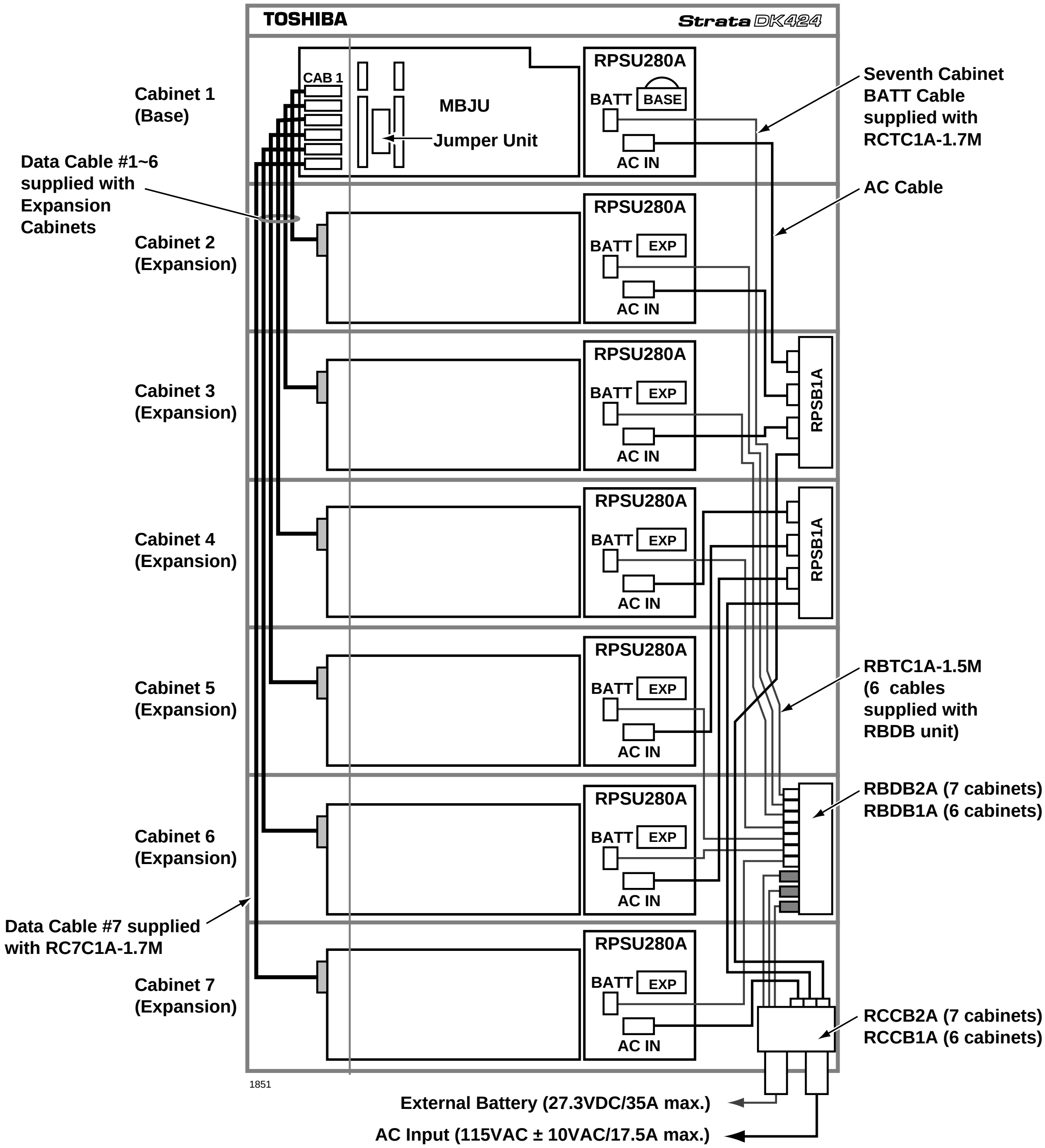


Figure 5-28 Reserve Power/AC Wiring for Three to Seven Cabinets (Floor Mount)

Printed Circuit Board (PCB) Installation

This section provides procedures for the installation of DK424 Base and Expansion Printed Circuit Boards (PCBs). It includes installation instructions, optional configuration information, wiring, and programming considerations for each PCB.

The DK424 system Base and Expansion Cabinets are shipped empty. The power supplies and PCBs are not installed at the factory. PCBs must be installed according to the configuration information obtained and developed in Chapter 4 – Configuration.

- Install PCBs only after installing the Base Cabinet and, if applicable, Expansion Cabinets per the Cabinet Installation section in this chapter.
- Be sure the power supply has been tested and the ground has been checked.
- Install universal slot PCBs per the DK424 configuration guidelines.

Note Information in this section applies to both the Release 3 and Release 4 RCTU PCBs, unless specified otherwise.

PCB Installation Considerations

The Base Cabinet has eight slots. The first two slots, labeled “R11” and “RCTU” are reserved for the common control unit and future feature upgrades. The remaining six slots (labeled “S11,” “S12,” “S13,” “S14,” “S15,” and “S16”) are universal and capable of hosting any of the station, line, and option interface PCBs compatible with the DK424 systems. (If needed, RSIU must be installed in slot 11.)

The Expansion Cabinets have eight universal slots, labeled “S_1,” “S_2,” S_3,” “S_4,” “S_5,” “S_6,” “S_7,”“S_8,” where the blank space of the label represents the number of the Expansion Cabinet. Like the universal slots in the Base Cabinet, these universal slots are capable of hosting any of the station, line, and option interface PCBs (except RSIU which can only be installed in slot 11).

The DK424 Expansion Cabinet slots labeled “S_7” and “S_8,” can only be used when an RCTUE/F processor is installed in the DK424 Base Cabinet. When the RCTUE/F processor is installed in the DK424 Base Cabinet, the MBJU PCB must be removed from the Base Cabinet to allow S_7 and S_8 to function in the DK424 Expansion Cabinets (see Figure 5-28 to locate MBJU).

If RCTUA, BA/BB, or C/D are installed in the DK424 Base Cabinet, only slot S_1~S_6 can be used in DK424 or DK280 Expansion Cabinets. When these processors are installed in the DK424 Base Cabinet, the MBJU PCB must be installed on the Base Cabinet (see Figure 5-28 to locate MBJU).

Cabinets are numbered from 1 to 7. The Base Cabinet is numbered 1; the first Expansion Cabinet, number 2; the second Expansion Cabinet, number 3; etc. See the DK424 Configuration and Universal Slot PCB section for details regarding PCB installation.

PCB Option Considerations

DK424 PCBs may be configured for a variety of hardware and software options. Hardware options are defined as either internal (generally related to optional PCB subassemblies) or external (related to connection of peripheral equipment such as background music, voice mail, etc.). Hardware and software options for each PCB are identified in the individual PCB installation procedures in this chapter.

Hardware Options

Some PCBs must be configured for hardware options prior to installation of the PCB in the cabinet. Configuration instructions for internal hardware options are provided in the individual PCB installation procedures in this chapter. Configuration instructions for external hardware options are provided in Chapter 10 – Peripheral Installation.

Software Options

PCBs are configured for software options through programming, following the installation instructions of the PCBs. A programming overview for each PCB is provided in the individual PCB installation procedures in this chapter. Refer to the *Strata DK Programming Manual* for detailed programming instructions.

RCTUA, RCTUBA/BB, RCTUC/D, RCTUE/F Common Control Units

System:	*DK424 Base Cabinet*
Current Version:	*RCTUA3, RCTUBA3/BB4, RCTUC3/D4, RCTUE3/F4*
Older Version(s):	*RCTUA1, RCTUB1&2, RCTUC/D1&2, RCTUBB3, RCTUD3, RCTUF3*

The common control unit provides centralized control for the system. It incorporates a 16 or 32 bit, 68000-type microprocessor and contains a custom time switch and conference Large Scale Integration (LSI) circuitry.

The processor operating software is programmed on four read-only-memory (ROM) chips on the RCTUA3 or RCTUA4, BB3 or BB4, and D3 or D4 PCBs and on the Flash Memory PCB RMMS on the RCTUF3 or F4 PCBs. The operating software (ROM or RMMS) is factory-installed.

The RCTU PCBs also provide busy tone detection as a standard feature for Auto Busy Redial (ABR) and interfaces with optional RRCS DTMF receivers, feature keys (RKYS1, 2, or 3) for Auto Attendant (AA), Automatic Call Distribution (ACD), Management Information System (MIS) for ACD, Toshiba proprietary RS-232 and SMDI voice mail interfaces.

ACD and attendant consoles requires the RCTUBA/BB, RCTUC/D and RCTUE/F processors.

Important! *When installing RCTUE/F, you must remove the Motherboard Jumper Unit (MBJU) from the DK424 Base Cabinet (between R11 and RCTU slot on the front side of the cabinet motherboard), see Figure 5-28 to locate MBJU. If installing an RCTUA, BA/ BB, C/D, the MBJU must be installed on the DK424 Base Unit.*

PCB Installation Power Supply Considerations

1. The power supply must be OFF whenever removing or installing the common control unit—RCTUA, RCTUBA/BB, RCTUC/D and RCTUE/F (see Figure 5-29).
2. It is recommended that the power supply be OFF, whenever possible, when removing or installing the other PCBs.

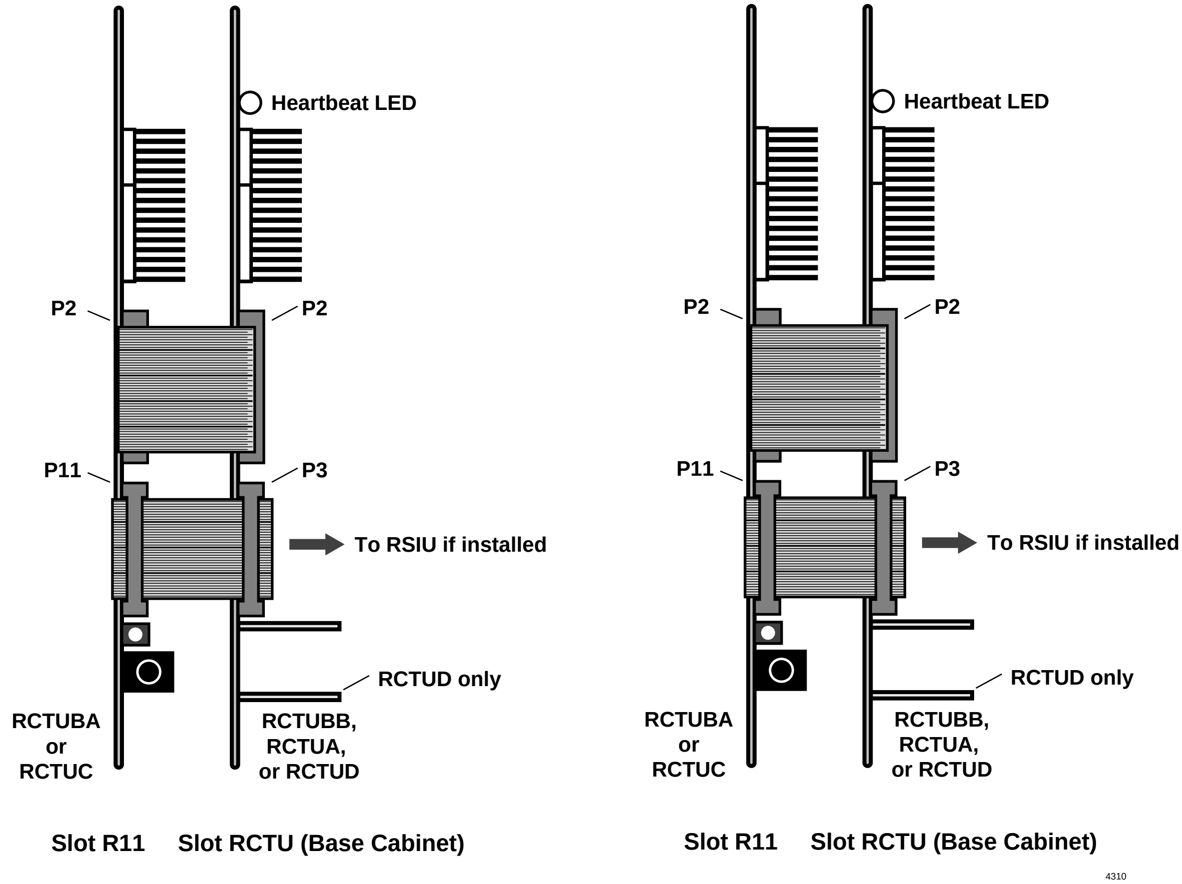


Figure 5-29 RCTU Slot Placement

Maximum Line Capacities

Configurations for a fully-expanded system can range from 40 lines/ 336 stations to a squared system of 200 outside lines/192 stations.

Table 5-5 Maximum Line Capacities by Processor Type

Common Control Unit	Number of Cabinets	Maximum	
		Lines	Stations
RCTUA	one Cabinet (Base Cabinet)	16	32
RCTUBA/BB	up to two Cabinets (Base Cabinet plus one six-slot Expansion Cabinet)	48	80
RCTUC/D	up to six Cabinets (Base Cabinet plus up to five more six-slot Expansion Cabinets)	144	240
RCTUE/F	up to seven Cabinets (Base Cabinet plus up to six more eight slot Expansion Cabinets)	200	336

Additionally, each of the common control units can support a separate set of features. Refer to Chapter 4 – Configuration for more information.

Each of the common control units (except RCTUBB) may be equipped with an RRCS (4, 8, or 12) to interpret Dual-Tone Multi-Frequency (DTMF) signals transmitted from Tie/DID lines, built-in AA and standard telephone ports. The common control units also provide an interface (along with a volume control) for a Music-on-hold (MOH)/Background Music (BGM) source.

RCTU PCBs are described later in this chapter.

Internal Hardware Options

The RCTU common control units support the following hardware options:

DTMF Receiver Unit (RRCS-4, RRCS-8, RRCS-12)

There are three RRCSs: the RRCS-4 has four DTMF receiver circuits; the RRCS-8 has eight receiver circuits; and the RRCS-12 has 12 receiver circuits.The RRCS is shown in Figure 5-31.

The RCTUA can support up to 12 DTMF receiver circuits; RCTUBA has up to 12 circuits; the RCTUC/D has up to 24 circuits (one RRCS on RCTUC and one RRCS on RCTUD), and the RCTUE/F has up to 24 circuits (one RRCS on RCTUE and one RRCS on the RCTUF).

RKYS Feature Key Upgrades

The system can be upgraded for built-in AA, ACD, and MIS for ACD with the following feature keys that attach to the common control unit.

Table 5-6 RKYS Features

Feature Key	Common Control Unit	Feature(s) Provided
RKYS1	Applies to all RCTUs	• Built-in Auto Attendant
RKYS2	RCTUBA/BB, RCTUC/D, or RCTUE/F	• Built-in Auto Attendant • ACD
RKYS3	RCTUBA/BB, RCTUC/D, or RCTUE/F	• Built-in Auto Attendant • ACD with an MIS application

➤ **To install the RKYS (1, 2, or 3)**

➤ Insert the RKYS into the socket on the appropriate RCTU PCB (see Figure 5-30).

Note Only one RKYS socket is available on the card.

It is not necessary to run any special programs (i.e., Program 03) when RKYS is installed. RKYS can be installed before or after system initialization, and, before or after the customer database is entered. The feature(s) provided by the RKYS are immediately enabled when the RKYS is installed. However, configuration programs for AA and ACD must be run for the feature to operate.

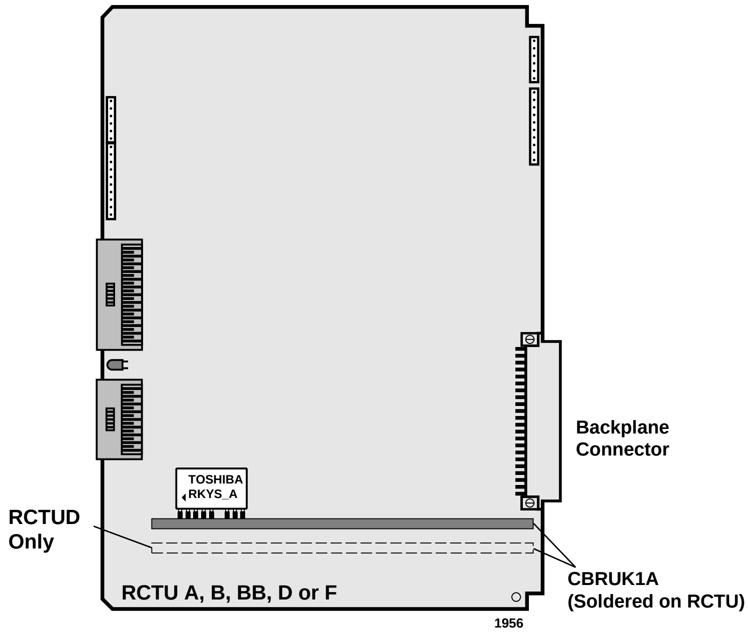


Figure 5-30 RKYS Feature Key Installation

Music-on-hold/Background Music Volume Control (External Options)

Each of the common control units (except RCTUBB, RCTUD and RCTUF) has a trim potentiometer (VR1) to adjust the volume of the MOH/BGM source connected to the Music-on-hold (MOH)/Background Music (BGM) RCA jack interface, which is also on the common control unit. The volume control potentiometer and the MOH/BGM interface are on the RCTUA, RCTUBA3, RCTUA4, RCTUC, RCTUE3 and RCTUE4 PCBs.

The VR1 potentiometer does not control the volume of alternate BGM sources connected to either the RSTU2, RDSU, PSTU, PEKU, PESU, or other BGM source interfaces.

➤ To install the MOH/BGM source to common control unit

➤ Adjust the VR1 potentiometer to the desired volume level while listening to MOH or BGM (see Chapter 6 – Peripheral Installation).

RRCS

The DTMF receiver subassembly (RRCS) translates DTMF signals to data signals and attaches to common control units with 4, 8, or 12 receiver circuits.

RRCS (4, 8, or 12) Installation onto RCTUA

➤ Mate RRCS connectors J1, J2, J3, and J4 (Figure 5-31) with RCTUA connectors P2, P3, P4, P5. Apply firm, even pressure to the RRCS to ensure proper mating of the connectors.

RRCS Installation onto RCTUBA, RCTUC/D, and RCTUE/F

RCTUBA provides up to 12 DTMF receiver circuits because an RRCS PCB can be installed on RCTUBA only and not on RCTUBB.

➤ To install an RRCS onto RCTUA, RCTUBA/BB, RCTUC/D, or RCTUE/F

➤ Mate RRCS connectors J1, J2, J3, and J4 (See Figure 5-31) with the applicable RCTU PCB. Apply firm, even pressure to the RRCS to ensure proper mating of the connectors.

RCTUA connectors are P2, P3, P4, P5. (See Figure 5-32.)

RCTUBA connectors are P3, P4, P5, P6. (See Figure 5-33.)

RCTUC connectors are P3, P4, P5, and P6; RCTUD connectors P5, P6, P7, P8. (See Figures 5-35, 5-36.)

RCTUE connectors are P6, P7, and P9; RCTUF3 are P8, P9, and P10. (See Figures 5-37, 5-38.)

Note The RRCS connectors on these PCBs are positioned to allow installation of the RRCS only in the proper position.

The combined RCTUC/D and RCTUE/F common control unit can support up to 24 DTMF receiver circuits. Both the RCTUC or RCTUE and the RCTUD or F PCBs can be equipped with the RRCS (4, 8, or 12).

RRCSs can be installed on both the RCTUC or RCTUE and the RCTUD or RCTUF at the same time. If only one RRCS is installed, the RRCS must be on the RCTUC. Always install the RRCS on the RCTUC before RCTUD and the RCTUE before RCTUF.

Note The RRCS connectors on these PCBs are positioned to allow installation of the RRCS only in the proper position.

Figure 5-31 RRCS Printed Circuit Board

RSIU Installation

See "DK424 RCIU1 or RCIU2 Installation" on Page 7-23.

RCTU Installation

CAUTION!

1. **Do not remove the plastic insulation shield from the back of the RCTU PCB. If the shield comes off, do not allow the back of the PCB to contact metal.**
2. **The RCTU PCBs are shipped from the factory with the battery jumper in the "OFF" position. Ensure it is moved to the "ON" position before installing the RCTU to protect customer configuration information stored in the RCTU RAM.**
3. **The power supply must be off when installing the RCTU PCB or damage to the board could result.**

1. Set the P5, P8 or P9 battery jumper on the RCTUA, BA3, C3, D3, or RCTUF3 to the "ON" position (see Figures 5-31~5-38).
2. Ensure the RCTU has been configured for the appropriate hardware options (i.e., RRCS or RKYS). See "Internal Hardware Options" on Page 5-48.
3. Insert the RCTUA, RCTUBB, RCTUD, or RCTUF (1, 2 or 3) into the "RCTU" slot in the Base Cabinet. If RCTUA and RSIU is installed, you must also install a ribbon cable between them ("RSIU, RSIS, RMDS RS-232/Modem Interface Unit" on Page 7-45).

   Ensure the component side of the RCTU PCB is facing right when installing it in the Base Cabinet.
4. Insert the RCTUBA, RCTUC, or RCTUE PCB into slot R11.
5. After installing the RCTU PCBs, gently pull it outward. If the connectors are properly mated, a slight resistance will be felt.
6. Connect the supplied ribbon cables between RCTUA, RCTUBA and BB and RSIU, if installed; or RCTUC/D, RCTUE/F, and RSIU, if installed.

Note Do not adjust the C14 or C15 trimmer capacitor. The capacitor is factory-calibrated.

CAUTION! **When transporting the RCTU PCBs, keep the P8 or P9 battery jumper in the "ON" position in order to save the configuration data stored in RCTU RAM. (The battery will protect RAM for approximately six years.) Otherwise, to conserve the lithium battery, move the jumper to the "OFF" position.**

When packaging the RCTU PCB, use only a nonconducting material enclosure, such as plain cardboard. Conductive material can cause the internal battery to discharge and erase memory in the RCTU PCB.

RCTU Programming

After initially installing a new and unused common control unit, all on-board RAM memory needs to be erased and initialized by running Program 91-9 twice after all other PCBs are installed. If RAM contains configuration or feature data from previous programming that should be retained, do not run Program 91-9. See the *Strata DK Programming Manual.*

If installing a RCTU PCB perform a processor RAM test using Program 00, part 2. On new RCTU installations, the RAM test should be run after RCTU initialization and before entering the customer database.

The following parameters can be specified, through programming, for the RCTU PCB.

Program 00, part 2: RCTU RAM test.

Program 03:

- For RCTUA, RCTUBA3, RCTUC/D, RCTUE/F—assign the appropriate slot code for each PCB: slot code 00 for RCTUA, RCTUBA, RCTUC or RCTUE; slot code 01 for RCTUD and RCTUF.
- Assign the appropriate code for each PCB:
  - Code 91 – no RRCS
  - Code 92 – four RRCS circuits
  - Code 93 – eight RRCS circuits
  - Code 94 – 12 RRCS circuits

Notes

- System Power must be cycled or Program 91-2 must be run after Program 03.
- If there are no options on the RCTU, Program 03 can be skipped and Program 91-1 or 91-9 can be run instead.

- Program *03: For RCTUE/F only. Run program to identify DK424 and DK280 cabinets.
- Program 12: Select the seize time of the RRCS circuits.
- Program 90, 91, 92: RCTU initialization programs.

DK280 to DK424 Base Cabinet Upgrade Considerations

1. Remove MBJU from the DK424 Base Cabinet motherboard.
2. After installing and initializing the RCTUE/F, run Program *03 to identify the DK280 and DK424 cabinets.
   - DK280 Expansion Cabinet slots S_1 to S_6 operate; S_7 and S_8 do not.
   - DK424 Expansion Cabinets slots S_1 to S_8 operate.

Important! *If installing station and/or CO line PCBs in slots S_7 and S_8, the ports and/or lines will shift by 4, 8, 16, or 24, depending on the PCBs installed in S_7 and/or S_8. Toshiba recommends moving the existing 25-pair and modular cables backward, in order, to the newly installed PCBs to keep the port and CO line numbers matched with the cable pairs.*

Table 5-7 RCTUA Controls, Indicators, and Interface Connectors

Control/Indicator/Connector	Type of Component	Description
DTMF Receiver Connector P2	10-pin male connector	Interface connector for optional DTMF receiver subassembly (RRCS). Used in conjunction with P3, P4 and P5.
DTMF Receiver Connector P3	6-pin male connector	Used in conjunction with P2, P4 and P5.
DTMF Receiver Connector P4	10-pin male connector	Used in conjunction with P2, P3 and P5.
DTMF Receiver Connector P5	6-pin male connector	Used in conjunction with P2, P3 and P4.
BATT Battery Jumper P8	3-terminal jumper	Interface connector for on-board lithium battery that protects configuration data stored in system RAM.
MOH/BGM Source Connector	RCA jack	Interface connector for MOH/BGM source.
Future Feature Upgrade Connector P11 & P12	Connector for ribbon cable	Connector for connection with future feature upgrade PCB.
MOH/BGM Source Volume Control VR1	Trim potentiometer	Adjusts volume for MOH/BGM source connected to RCTUA.
Heart Beat indicator CD11	Red LED	Flashes to indicate operation (1/4 second ON – 1/4 second OFF).

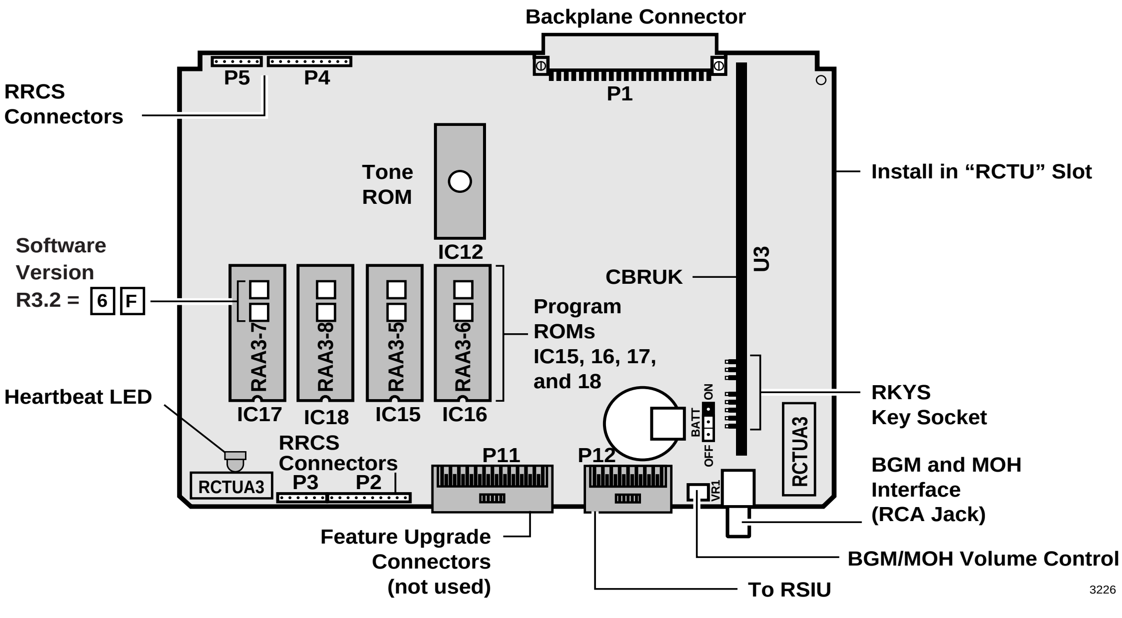


Figure 5-32 RCTUA PCB

Table 5-8 RCTUBA Controls, Indicators, and Interface Connectors

Control/Indicator/Connector	Type of Component	Description
RCTUBA ribbon cable Connector P2	Connector and ribbon cable	Ribbon cable connector for connection to RCTUBB. Used in conjunction with P2.
DTMF Receiver Connector P3	10-pin male connector	Interface connector for optional DTMF receiver subassembly (RRCS). Used in conjunction with P4, P5, and P6.
DTMF Receiver Connector P4	6-pin male connector	Used in conjunction with P3, P5, and P6.
DTMF Receiver Connector P5	10-pin male connector	Used in conjunction with P3, P4, and P6.
DTMF Receiver Connector P6	6-pin male connector	Used in conjunction with P3, P4, and P5.
BATT Battery Jumper P9	3-terminal jumper	Interface connector for on-board lithium battery that protects configuration data stored in system RAM.
MOH/BGM Source Connector	RCA jack	Interface connector for MOH/BGM source.
RCTUBA ribbon cable Connector P11	Connector and ribbon cable	Ribbon cable connector for RCTUBA and RSIU. Used in conjunction with P2.
MOH/BGM Source Volume Control VR1	Trim potentiometer	Adjusts volume for MOH/BGM source connected to RCTUBA.

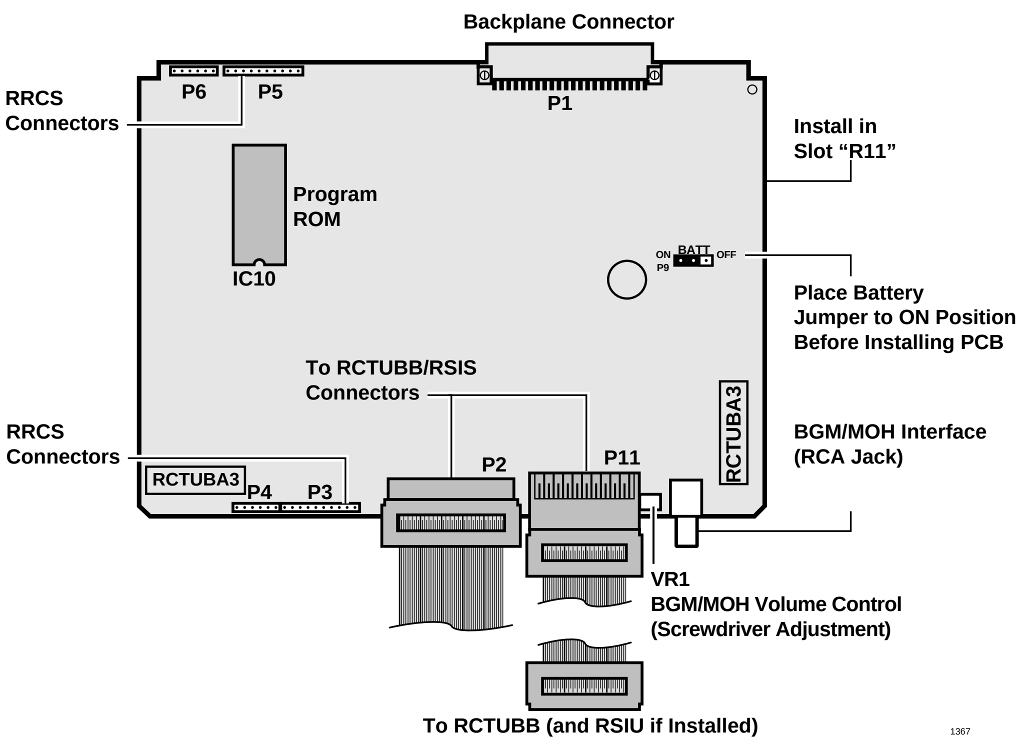


Figure 5-33 RCTUBA PCB

Table 5-9 RCTUBB Controls, Indicators, and Interface Connectors

Control/Indicator/Connector	Type of Component	Description
Connector P2	Connector for ribbon cables	Connector for RCTUBA ribbon cables. Used with P2.
Connector P3	Connector for ribbon cables	Connector for RCTUBA and RSIU ribbon cable. Used with P11.
Heart Beat indicator CD11	Red LED	Flashes to indicate operation (1/4 second ON — 1/4 second OFF).

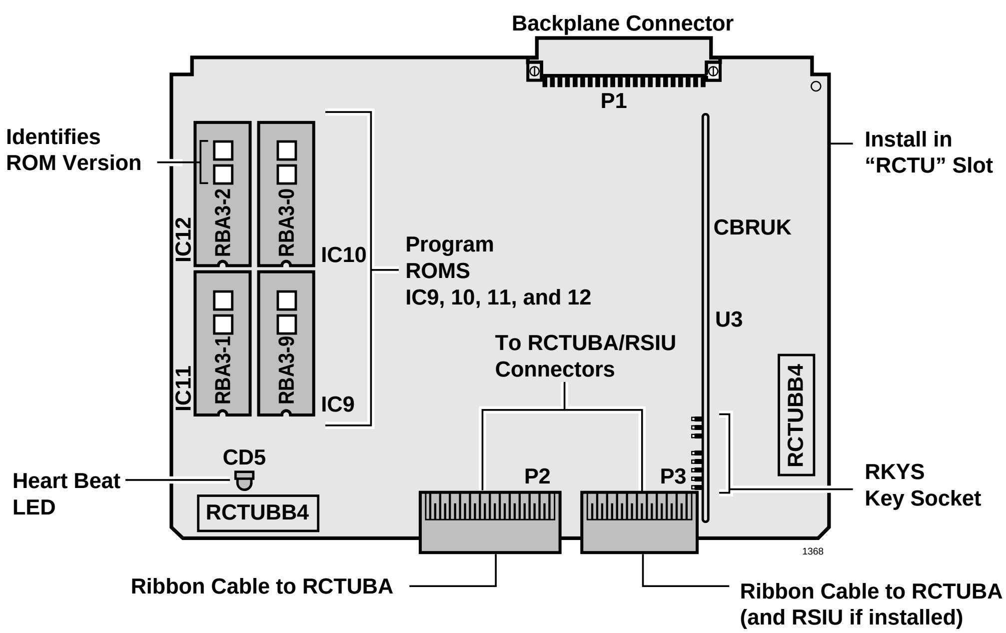


Figure 5-34 RCTUBB PCB

Table 5-10 RCTUC3 Controls, Indicators, and Interface Connectors

Control/Indicator/Connector	Type of Component	Description
RCTUC Ribbon Cable Connector P2	Connector and ribbon cable	Ribbon cable connector for connection to RCTUD. Used in conjunction with P2.
DTMF Receiver Connector P3	10-pin male connector	Interface connector for optional DTMF receiver subassembly (RRCS). Used in conjunction with P4, P5, and P6.
DTMF Receiver Connector P4	6-pin male connector	Used in conjunction with P3, P5, and P6.
DTMF Receiver Connector P5	10-pin male connector	Used in conjunction with P3, P4, and P6.
DTMF Receiver Connector P6	6-pin male connector	Used in conjunction with P3, P4, and P5.
BATT Battery Jumper P9	3-terminal jumper	Interface connector for on-board lithium battery that protects configuration data stored in system RAM.
MOH/BGM Source Connector	RCA jack	Interface connector for MOH/BGM source.
RCTUC ribbon cable Connector P11	Connector and ribbon cable	Ribbon cable connector for RCTUD and RSIU. Used in conjunction with P2.
MOH/BGM Source Volume Control VR1	Trim potentiometer	Adjusts volume for MOH/BGM source connected to RCTUC.

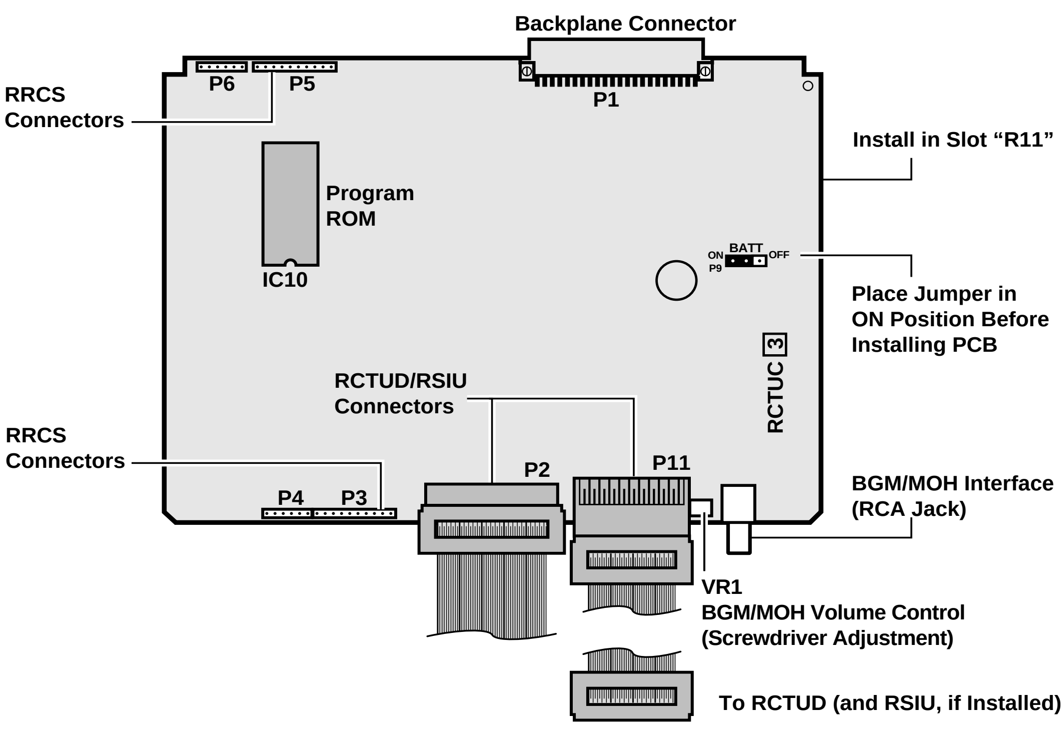


Figure 5-35 RCTUC PCB

Table 5-11 RCTUD3 Controls, Indicators, and Interface Connectors (for Release 3)

Control/Indicator/Connector	Type of Component	Description
RCTUD Connector P2	Connector for RCTUC ribbon cables	Used with P2.
RCTUD Connector P3	Connector for RCTUC ribbon cables	Used with P11.
BATT Battery Jumper P9	3-terminal jumper	Interface connector for on-board lithium battery that protects configuration data stored in system RAM.
DTMF Receiver Connector P5	6-pin male connector	Interface connector for optional DTMF receiver subassembly (RRCS). Used in conjunction with P6, P7, and P8.
DTMF Receiver Connector P6	10-pin male connector	Used in conjunction with P5, P7, and P8.
DTMF Receiver Connector P7	10-pin male connector	Used in conjunction with P5, P6, and P8.
DTMF Receiver Connector P8	6-pin male connector	Used in conjunction with P5, P6, and P7.
Heart Beat Indicator CD5	Red LED	Flashes to indicate operation (1/4 second ON, 1/4 second OFF).

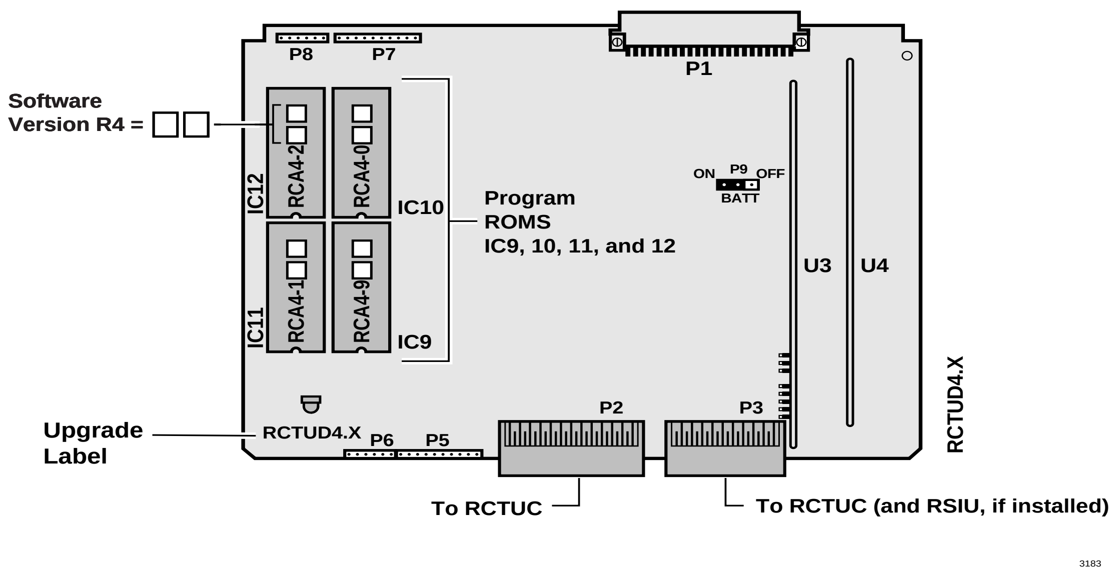


Figure 5-36 RCTUD PCB

Table 5-12 RCTUE3 Controls, Indicators, and Interface Connectors

Control/Indicator/Connector	Type of Component	Description
RCTUF Connector P2	Connector and ribbon cable	Ribbon cable connector to RCTUF and RSIU. Used in conjunction with P2.
RRCS Connector P8	10-pin male connector	Interface connector for optional DTMF receiver subassembly (RRCS). Used in conjunction with P6 and P7.
RRCS Connector P7	3-pin male connector	Interface connector for optional DTMF receiver subassembly (RRCS). Used in conjunction with P6 and P9.
RRCS Connector P6	6-pin male connector	Interface connector for optional DTMF receiver subassembly (RRCS). Used in conjunction with P7 and P9.
MOH/BGM Source Connector	RCA jack	Interface connector for MOH/BGM source.
RCTUF Connector P11	Connector and ribbon cable	Ribbon cable connector to RCTUF and RSIU. Used in conjunction with P11.
MOH/BGM Source Volume Control VR1	Trim potentiometer	Adjusts volume for MOH/BGM source connected to RCTUF.

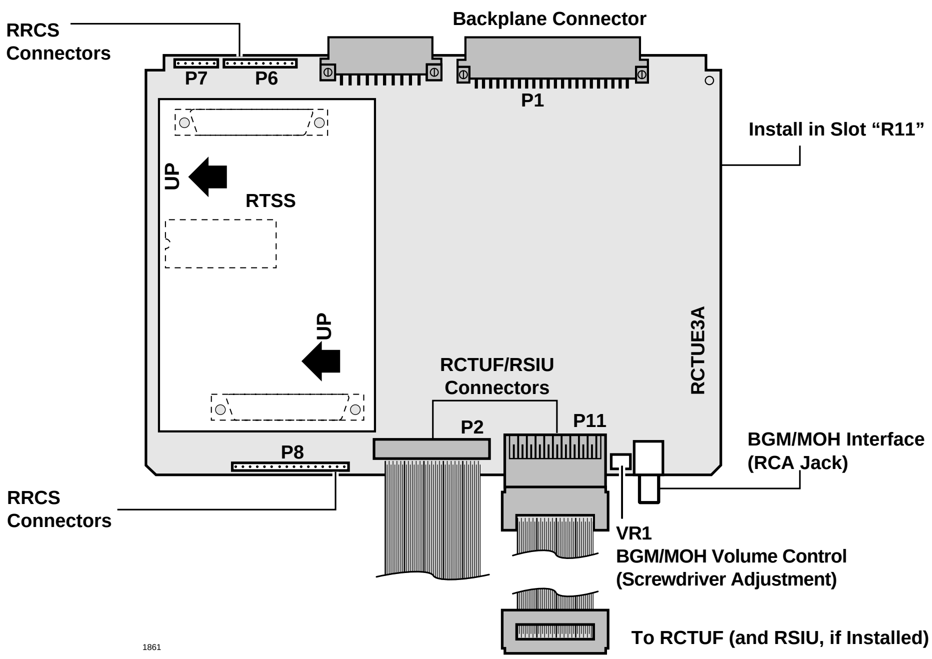


Figure 5-37 RCTUE PCB with RTSS Subassembly

CAUTION! **When removing the RTSS from RCTUE3, take off the RTSS slowly, rocking back and forth in the direction of the arrows in the diagram.**

Table 5-13 RCTUF4 Controls, Indicators, and Interface Connectors

Control/Indicator/Connector	Type of Component	Description
RCTUE Connector P2	Connector and ribbon cable	Ribbon cable connector to RCTUE and RSIU. Used in conjunction with P2.
RCTUE Connector P3	Connector and ribbon cable	Ribbon cable connector to RCTUE and RSIU. Used in conjunction with P3.
DTMF Receiver Connector P8	10-pin male connector	Interface connector for optional DTMF receiver subassembly (RRCS). Used in conjunction with P6, P7, and P9.
DTMF Receiver Connector P9	6-pin male connector	Used in conjunction with P5, P7, and P9.
DTMF Receiver Connector P10	10-pin male connector	Used in conjunction with P5, P6, and P9.
Heart Beat Indicator CD5	Red LED	Flashes to indicate operation (1/4 second ON, 1/4 second OFF).
BATT Battery Jumper P5	3-terminal jumper	Interface connector for on-board lithium battery that protects configuration data stored in system RAM.

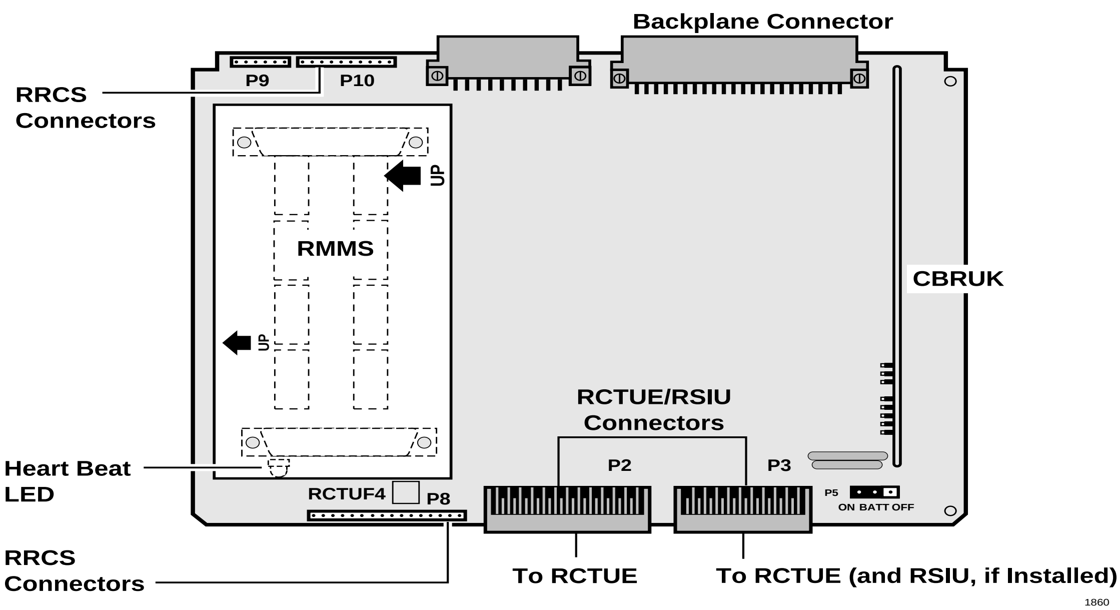
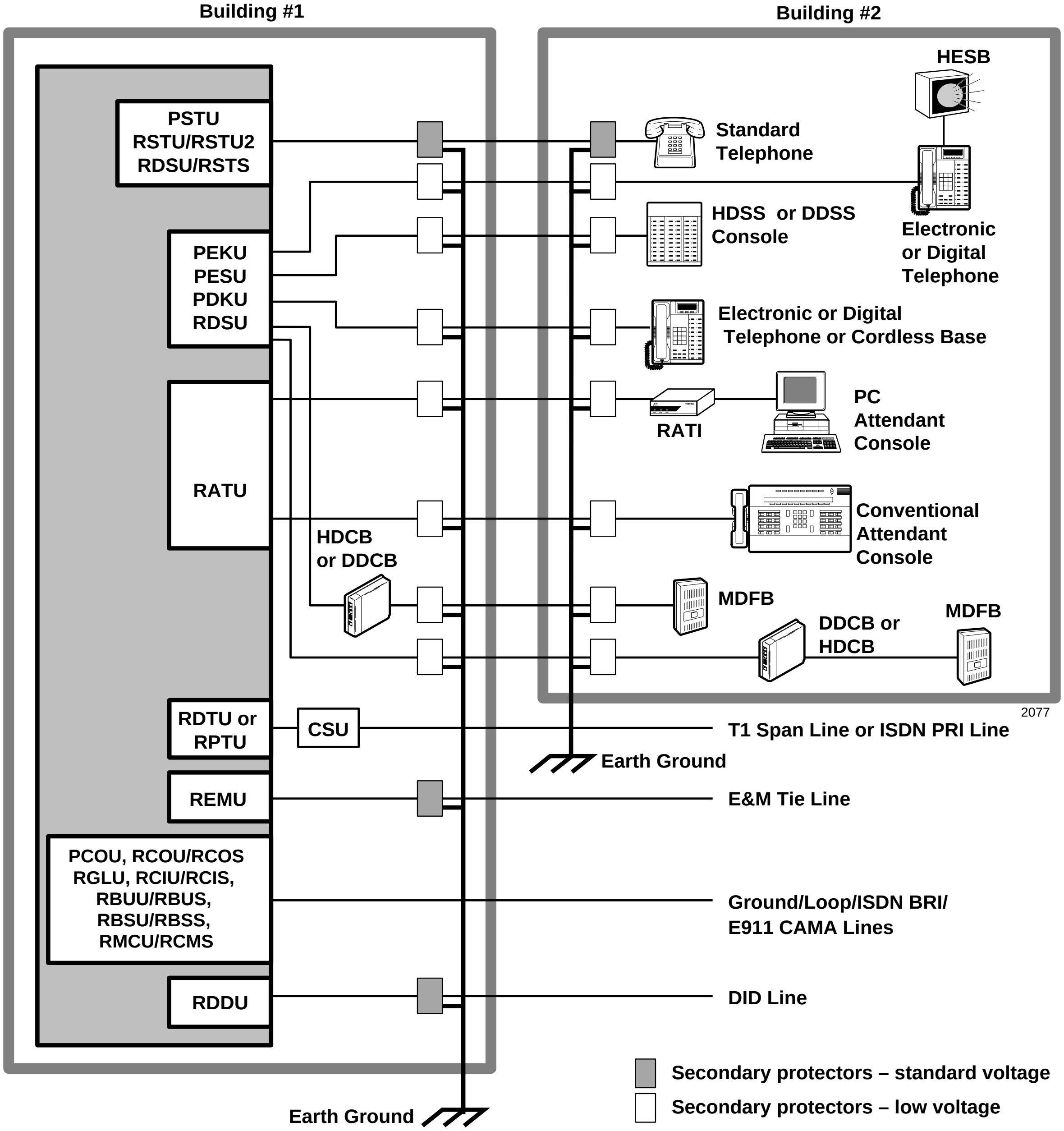


Figure 5-38 RCTUF PCB with RMMS Subassembly

CAUTION! **When removing the RMMS from RCTUF, take off the RMMS slowly, rocking back and forth in the direction of the arrows in the diagram.**



Important! *To protect against transient voltages and currents, solid state secondary protectors must be installed if there is outside wiring, and on all DID and E&M Tie lines. These protectors, which contain fast semiconductors in addition to fuses, shall comply with the requirements for secondary protectors for communication circuits, UL 497A. Care must be taken to ensure that they are very well grounded to a reliable earth ground. Recommended protectors are available in the fast Series 6 line from ONEAC Corp., Libertyville, Illinois 60048, (800) 327-8801. Install and test the secondary protectors precisely to the installation instructions of thee manufacturer.*

Figure 5-39 DK424 Secondary Protector Diagram

DK424 T1 6

This chapter covers information on using T1/DS-1 interfacing. It is available for the DK424. T1/DS-1 interfacing is not available for the DK14 and DK40i.

Channelization

The Strata DK424 RDTU PCB provides T1/DS-1 interface for up to 24 channels. Each channel can be individually set for loop start, ground start, Tie, or DID line operation (voice only, not data lines). Each RDTU can be set in system programming to activate (1~8), (1~16), or (1~24) channels (lines). Fractional increments of 4, 12, and 20 are also possible but the RDTU will still assign 8, 16, or 24 channels respectively in system software.

Example: If only 12 channels of fractional T1 are used, assign RDTU as a 16 channel RDTU. The system will assign 16 CO lines to the RDTU even though only 12 CO lines will be used. To busy out unused RDTU channels (see “System Programming for T1” on Page 6-3, Step 4). Use Program 03 to set the quantity of RDTU channels.

Slot Assignments

Up to eight RDTU PCBs can be installed in a DK424 to provide up to 192 lines. RDTU PCBs can be installed in the same cabinets that have analog type CO line PCBs installed. RDTU PCBs must be placed in designated slots in each of the DK424 cabinets. (See Tables 4-4 and 4-5 in Chapter 4 – DK424 Configuration for RDTU slot installation rules)

If an RDTU is installed in a cabinet (in some cases one or two slots to the right of the RDTU may not be used in that cabinet) the number of unusable slots in a cabinet (none, 1 or 2) depends on which slot the RDTU occupies and how many lines (8, 16, or 24) the RDTU is programmed to provide. Use Program 03 to set the RDTU slot assignments and Channel quantities (Code 71 = 8 ch., Code 72 = 16 ch., and Code 73 = 24 ch.).

RDTU
T1 Interface Unit

System: *DK424*

Circuits per PCB: *8, 16, or 24 channels*

Interfaces with: *ground start CO lines*
loop start CO lines
DID or Tie lines

Older Version(s): *none*

RDTU is configured for Tie or DID lines and an RRCS must be installed for DTMF operation. LEDs on the RDTU show a continuous status of RDTU operation.

Note Each Tie or DID line decreases the system's station port and CO line capacity by one.

A Strata DK424 system operating with an RCTUE/F can support up to eight RDTU PCBs. RCTUC/D common control unit supports up to six RDTU PCBs. The RCTUB and RCTUBA/BB support up to two RDTU PCBs. The RDTU cannot be installed in a system operating with the RCTUA.

RDTU controls and interface connectors are shown in Figure 6-1 and described in Table 6-1.

The RDTU requires installation of a customer-provided Channel Service Unit (CSU). Refer to "Installation Guidelines" on Page 6-10 for CSU installation.

Testing procedures (local loop back and remote loop back) are in "Loop Back Testing" on Page 6-16.

SW1 Equalizer Switch and Loop Back Jumpers (Internal Option)

The distance between the DK424 cabinets and the CSU (or other customer premise T1 circuit) determines the setting of the SW1 Equalizer Switch. The SW1 switch consists of a bank of smaller switches, S1~S7.

➤ Set the SW1 switch as follows:

Mode	Feet from DK424	S1	S2	S3	S4	S5	S6	S7	S8
Short	0~150	ON	OFF	OFF	OFF	OFF	OFF	OFF	N/A
Medium	151~450	OFF	ON	OFF	ON	OFF	ON	OFF	N/A
Long	450~655	OFF	OFF	ON	OFF	ON	OFF	ON	N/A

Note The maximum distance between the RDTU and the CSU or other T1 circuits can not be more than 655 feet (see "RDTU to PBX T1 (Separated More Than 655 ft.)" on Page 6-11).

RDTU Installation

Installing an RDTU (T1) into a Strata DK424 requires a number of system programs to be run. Toshiba recommends running these programs in the order listed before actually installing the RDTU into the system. This allows the RDTU to function immediately, including self-check loop back testing and normal operation, when it is inserted into the system.

➤ To install an RDTU PCB

1. Set jumper wire plugs P1 (LB), P2, P3, and P4 to the OFF position. See "Loop Back Testing" on Page 6-16 for loop back testing procedures.

   See "SW1 Equalizer Switch and Loop Back Jumpers (Internal Option)" on Page 6-2 for the appropriate SW1 equalizer switch setting.
2. Insert the RDTU (component side facing right) into the appropriate slot and apply firm, even pressure to ensure proper mating of connectors. (See "Slot Assignments" on Page 6-1 and Chapter 4 – DK424 Configuration, Worksheet 2 for RDTU slot assignment recommendations.)
3. After installing the RDTU, gently pull the PCB outward. If the connectors are properly mated, a slight resistance is felt.

System Programming for T1

1. Run Program 03: Assign the number of RDTU channels used and the cabinet slot number into which the RDTU will be installed (see "Channelization" and "Slot Assignments" on Page 6-1). If 1~8 channel are required, assign code 71, if 1~16 channels are required, assign code 72, or if 1~24 channels are required, assign code 73 to the RDTU slot. Also, assign RRCS code to RCTU if RDTU Tie/DID channels are DTMF.

Important! *Special consideration must be taken when installing Tie or DID T1 channels (see Worksheets in* 6.

2. Run Program *41-2: Assign each channel for loop start, ground start Tie (Immediate or Wink), or DID (Immediate or Wink). See Program *41-2 record sheet (unused channels can remain as initialized—loop start).
3. Turn system power supply OFF (five seconds) and ON to activate Program 03 and *41-2 program data.

Note These are the only programs relating to RDTU operation that require system power to be cycled OFF and ON.

4. Run Programs 16, 40, 39: If an RDTU is connected to a fractional T1 circuit and all the RDTU channels (8, 16, or 24) are not used, busy-out the unused CO lines from all line groups (Program 16), all telephone buttons (Program 39), and restrict all stations from accessing the unused lines (Program 40).

   Example, if the Network fractional T1 provides 12 channels, set the RDTU connected to this T1 for 16 channels in Program 03 (with code 72). If this RDTU is the first CO line PCB in the system, the RDTU CO lines will be numbered 001~016. Use Programs 16, 39 and 40 to deny use of all unused lines (i.e., lines 13, 14, 15, and 16). In this case the first 12 lines are usable; lines 13, 14, 15, and 16 cannot be used. The CO lines on the next CO line PCB (any type) following the RDTU PCB will start numbering at line 017.
5. Run Programs 15 and 30: If RDTU Tie and/or DID are dial pulse: Run Program 15-1, LED ON for each DP Tie/DID line and run Program 30, LED 11 ON for each Tie/DID station port.

6. Run Program 17.

    - LED 01: For RDTU Tie lines, set LED01 to allow (ON) or deny (OFF) Page and Voice Announce on incoming calls to DK424 stations from the far end T1 Tie line stations. This option (LED01) does not apply to RDTU DID lines—Page and Voice Announce is always denied to incoming DID calls because of FCC “answer supervision” rules.
    - LED 02 (Wink/Immediate): This assignment is for RDDU, REMU, and PEMU lines only; it does not apply to RDTU Tie or DID lines. Use Program *41-2 to assign RDTU lines for wink or immediate start.
    - LED 03: Toshiba recommends turning this LED ON (initialized state) for all RDTU DID lines to enable incoming DID calls to camp-on busy stations. This is also necessary to allow more than one DID line to ring into a station simultaneously. LED03 does not apply to RDTU Tie lines.
    - LED 04: For RDTU Tie lines, LED04 is normally OFF to enable dial tone to be received from the far end Tie line when calling DK424 stations. For DID lines LED04 is normally ON so RDTU DID lines do not send dial tone to the CO Run *41-1: Use this program to assign the RDTU (T1) Line Coding method (B8ZS or AMI) and signal Framing format (SF or ESF). Contact the account representative of the company that is providing the T1 span line (Local Central Office or Long Distance Provider) to determine which line Coding and Frame format will be used.
    - Line Coding: The DK424 RDTU supports T1/DS-1 transmission of Voice and Analog Data (using modems) using Alternate Mark Inversion (AMI) with Zero Code Suppression (ZCS) or Bipolar Eight Zero Substitution (B8ZS) line coding. B8ZS provides clear channel capability, which allows frame information bits to carry any combination of ones and zeros—a feature needed for T1/DS-1 transmission of digital DATA (DK424 does not support transmission of digital DATA over RDTU T1/DS-1 at this time).
    - As of this writing, most Telcos provide AMI line coding which is adequate for DK424 RDTU voice transmission; however, B8ZS may be required by some long distance providers, college campus private networks, or customer premise end to end T1 connections. AMI and B8ZS are adequate for DK424 Voice T1/DS-1 transmission.
    - Framing: As of this writing, D3/D4 Superframe (SF), or Type I and Extended Superframe (ESF), or Type II T1/DS-1 is offered by most all local Telcos and Long Distance Providers. Normally the local Telco will provide SF, which is adequate for DK424 voice (and modem type data) transmission. Long distance providers may offer either SF or ESF.

    ESF provides a more enhanced method of error checking that SF; however, the Channel Service Unit (CSU) must be compatible with ESF and may cost more than a SF only CSU. ESF circuits have the additional power of Cyclic Redundancy Checking (CRC), which allows end-to-end monitoring of T1 circuit performance. ESF, T1 performance monitoring normally requires that a person be specially trained for this function. SF and ESF Frame format is adequate for DK424 Voice (and modem type data) T1/DS-1 transmission.

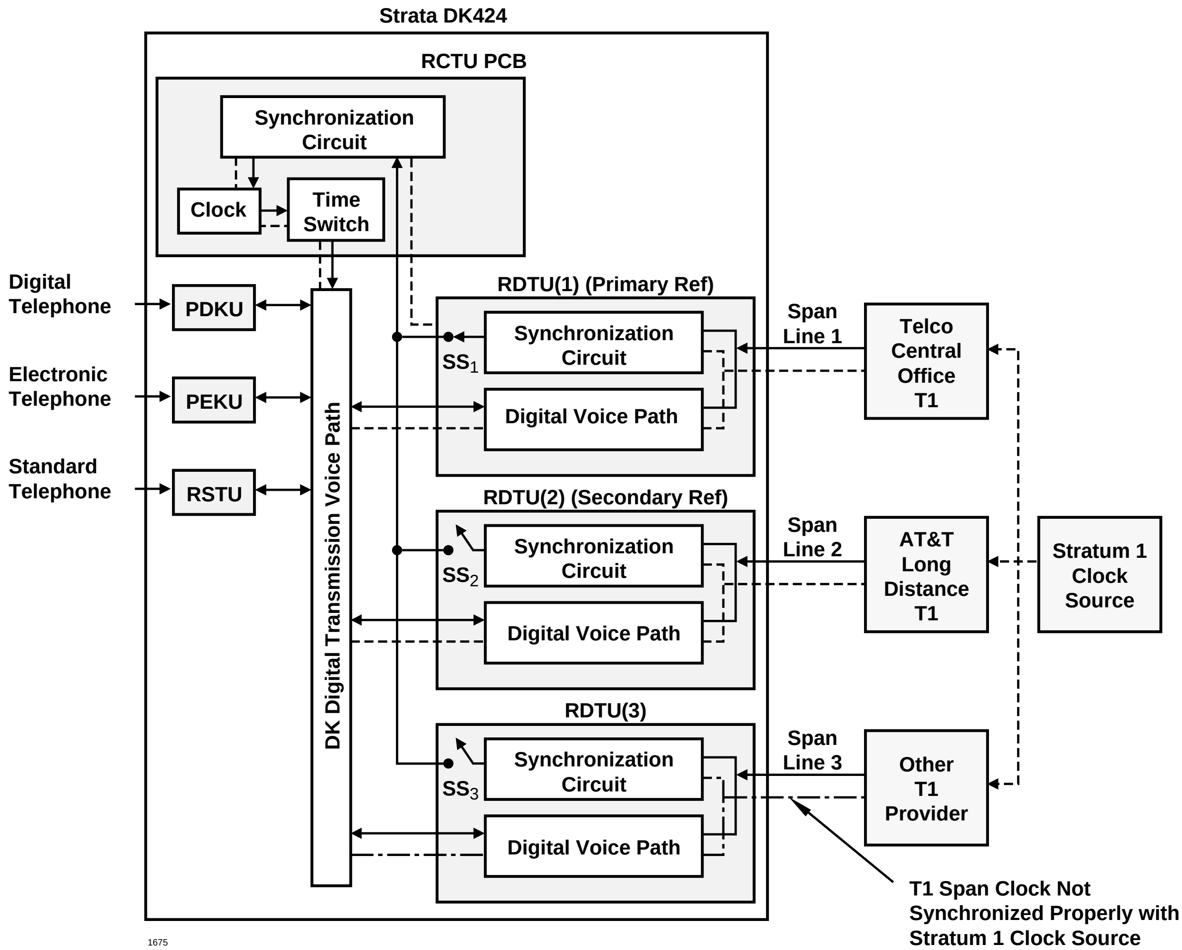
7. Run Programs *41-3 and -4: These programs allow the RDTU Transmit and Receive (Volume) level to be adjusted by changing the RDTU built-in digital PAD value between +6 decibels (dB) and –15 dB. Transmit and Receive levels are individually adjustable on each RDTU (all channels will have the same level). Toshiba recommends using the initialized levels (Receive –3 dB/Transmit –6 dB) upon initial installation. Adjust the RDTU digital PAD as required while testing each RDTU T1 channel.

8. Run Program *42 Series—T1 Span Timing Reference Assignments

    Timing references for T1 RDTU PCBs are made with the Program *42 series. The RDTU (T1) timing (or synchronization) program options determine how the DK424 system digital voice transmission path (time-switch) is synchronized with the far end digital system transmission path. For proper T1 operation, the equipment at each end of a T1 span line must be synchronized.

The DK424 time-switch is synchronized (as slave) to the T1 span equipment on the other end of the T1 line by the RDTU PCB designated as the Primary Reference in Program *42-1. When a RDTU is connected to a Telco or Long Distance Provider T1 span line, the RDTU in the lowest slot number should be assigned as the Primary Reference RDTU (*42-1, DATA = 1 FOR THIS RDTU).

If a malfunction occurs and Primary Synchronization is lost, the DK424 automatically switches modes and synchronizes to the T1 span connected to the RDTU PCB designated as the Secondary Reference (provided that there are two RDTU PCBs installed in the DK424) (see Figure 6-1).



Notes

- Primary Reference Synchronization:
  In this diagram RDTU(1) is the primary reference, its synchronization circuit sends the clock reference from the TELCO T1 span to the DK424, to the RCTU synchronization circuit, via RDTU1 Software Switch (SS). The RCTU(1) clock synchronizes the DK424 digital transmission voice path (via RCTU time switch) to the TELCO/STRATUM1 clock source.
- Secondary Reference Switch-Over:
  If the primary reference T1 RDTU(1) fails, the DK424 will automatically open the RDTU(1) primary synchronization circuit (SS1) and close the RDTU(2) secondary synchronization circuit (SS2). At this time, the DK424 digital voice path will be synchronized to the AT&T/ STRATUM1 clock source.
- Slip example:
  In the above diagram the “Other T1 Provider” is not synchronized to the STRATUM1 clock source properly – Slip problems will occur on RDTU(3) T1 channels.

Figure 6-1 RDTU Primary/Secondary Reference Block Diagram

If there are two RDTU PCBs installed, it is recommended not to install the Primary and Secondary Reference RDTU PCBs in the same DK424 cabinet if possible (although both Primary and Secondary Reference RDTU PCBs can be installed in the same cabinet). The Secondary Reference RDTU should also be connected to a Telco or Long Distance Provider T1 span (*42-2, Data = 2 for this RDTU).

If the equipment on the other end of the DK424 T1 lines should synchronize to the DK424 clock source, then blanks should be entered in Program *42. In this case, the DK424 clock runs free and is considered the Master Synchronization provider. The DK424 can be assigned as the Master (free run) clock provider if the far end equipment connected to the RDTU T1 span is a Customer Premise type equipment and it is not synchronized to some other T1 provider (i.e., PBX, Channel Bank, Key/Hybrid or other DK424). In this case (when the Telco network is not connected), either the DK424 RDTU span or the far end equipment can be the Master (synchronization clock provider).

- ♦ Program *42-1, Primary Timing Reference Assignment: Assign the Primary Timing Reference with this program.
- ♦ Program *42-2, Secondary Timing (Backup) Reference Assignment: Assign the Secondary (Backup) Timing Reference with this program.
- ♦ To assign RDTUs for the Master Clock Provider, leave Programs *42-1 and *42-2 blank. Press button/LED01 to enter blanks.

Important! *The Digital Network is connected to clocks with various degrees of precision called stratum levels from Stratum 1 (highest level of accuracy) to Stratum 4 (lowest level) as follows:*

- *Stratum 1—Public Telephone Network clock located in Hillsboro, Missouri.*
- *Stratum 2—Normally associated with #4 ESS Toll switches.*
- *Stratum 3—Normally associated with #5 ESS Central offices.*
- *Stratum 4—Normally associated with Digital PBXs.*
- *If a DK424 RDTU is programmed as the Primary Synchronization Clock reference, the clock provider connected to this RDTU should be a reliable clock provider, such as a Telco or common carrier (Example—AT&T). All other T1 span lines connected to RDTUs in the DK424 must be synchronized to the same clock source as the AT&T span line. If a T1 span line is not synchronized with the primary clock provider (AT&T, for this example), then DK424 lines assigned to this T1 span line (RDTU) may experience "slip" problems.*

9. The programs in Steps 1~8 are described for specific RDTU application programming. Also refer to "System Programming for T1" on Page 6-3. Run the programs as they apply to RDTU CO line applications.

RDTU Programming

The following programs select the number of channels supported by the RDTU and assign line operation for the individual channels.

Notes

- RDTU Tie lines can route per Program 04 [DN] assignment or Program 71 and 72 DNIS assignments (see Program 17, LED 05).
- RDTU DID lines can route per Program *09 assignments or Program 71 and 72 DNIS assignments (see Program 17, LED 05).

Program 03: Specify Code 71 for an 8-channel RDTU, Code 72 for a 16-channel RDTU, or Code 73 for a 24-channel RDTU. (The 8-channel RDTU is the default.) Also, the Dual-Tone Multi-Frequency receiver (RRCS) must be installed and assigned if RDTU Tie and/or DID lines are DTMF.

Note If the T1 is 8 channels, skip Program 03 and run Programs 91, 91-1 or 91-9 instead.

Program 04: Tie line digit translation (if T1 channel is Tie). Also see Programs 17 and 71~72.

Program *09: Use to translate DID digits to ring designated stations. Also see Programs 17 and 71~72.

Program 10-1: Use to enable or disable Two-Line Conference and Direct Inward System Access (DISA).

Program 15: Use to assign DTMF/Dial Pulse dialing, DISA, and additional attributes to each line. Automatic Release (AR) assignments only need to be made for loop start lines; AR is not needed for ground start lines. Also use to enable DID lines with DNIS and ANI options.

Program *15: Use to make tenant assignments.

Program 16: Use to assign lines to line groups.

Program 17: Use to assign Tie/DID Auto Camp-on, and second dial tone.

Program *17: Use to assign intercept port for DID line calls to wrong or vacant numbers.

Program 30: If RDTU Tie and/or DID lines are Dial Pulse (DP—Program 15-1), then Program 30, LED 11 should be ON for the Tie/DID station port numbers; if they are DTMF, LED 11 should be OFF.

Program 39: Use to assign line access buttons to digital and electronic telephones.

Program 40: Use to assign station access to lines (incoming and outgoing).

Program 41: Use to assign station access to lines (outgoing only).

Program *41 Series: Run to assign RDTU channel line operation, and coding and framing modes.

Program 42-0, 1~8: Use to assign behind PBX/Centrex operation to each line.

Program *42 Series: Use to assign timing reference for RDTUs.

Programs 45~48: Use to define Toll Restriction for any line.

Programs *50, *51, *52: Use to define Caller ID/ANI assignments.

Programs 50~56: Use to define Least Cost Routing assignments.

Program 59: Use to assign T1 lines to attendant console buttons.

Program 71~74: These programs are used in place of Program *09 to assign DID/Tie/DNIS line ringing destinations.

Program 71 (1~5): Tie/DID DNIS assignment (optional used in place of *09. Also see Program 04).

Program *71~*73: Tie/DID telephone/[DN] ring assignments.

Program 78: Use to assign special ringing of lines: includes Night Ring Over Page, DISA, Remote Maintenance via the Internal Maintenance Modem (IMDU), and Built-in Auto Attendant.

Programs 81~89: Use to assign loop and ground start RDTU CO lines to ring selected stations on incoming calls.

Programs *81, *84, *87: Assigns [DN] LEDs to flash when CO line rings a telephone.

Table 6-1 RDTU Controls, Indicators, and Connectors

Control/Indicator/Connector	Type of Component	Description
SW1 Equalizer Setting Switch	8 2-position slide switches	Sets line length between RDTU and CSUs or other T1 (max 655 ft.).
P3 (not used)	3-terminal jumper plug	This jumper plug is reserved for future use.
P4 Remote Loop Remote Mode jumper plug	3-terminal jumper plug	Sets RDTU for Remote Loop Back mode test procedure.
P1 and P2 Loop Back jumper plug	3-terminal jumper plug	Sets RDTU for self check or Network/CSU loop back check.

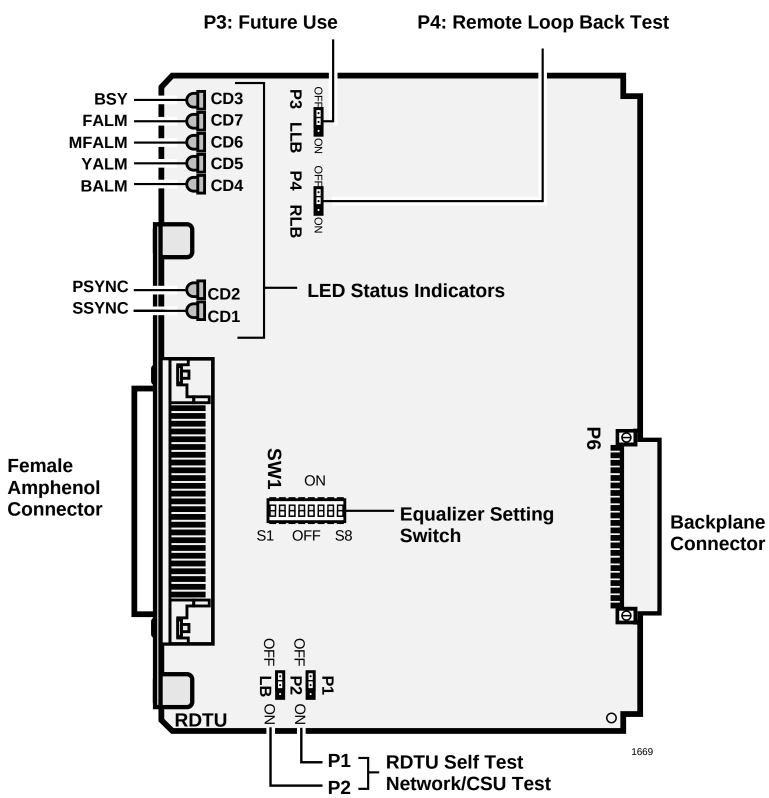


Figure 6-2 RDTU Printed Circuit Board

DK424 T1

Installation Guidelines

1. Read "Channelization" on Page 6-1 before proceeding to Step 2.
2. Run RDTU T1 related system programs as described in "Applications" on Page 6-11.
3. Set P1 and P2, loop back jumper to the ON position for RDTU self test (see "RDTU Self Test" on Page 6-16). Refer to "Hardware and Cabling" on Page 6-13 for the appropriate SW1 Equalizer Switch setting and set SW1 to the setting that matches the RDTU cable length.
4. Install the RDTU PCB per instructions Page 6-3.

Note Ensure the RDTU's component side is facing right when installing it in the cabinet.

5. Run the RDTU self check per "Network/CSU T1 Span Test" on Page 6-17. After self check passes, put P1 and P2 to the OFF position for normal operation and insert the RDTU PCB back into the appropriate slot.
6. Install CSUs and wire them to the RDTU and Network Interface Unit (NIU) or Customer Premises T1 circuit as required. See "System Programming for T1" on Page 6-3.

Note Before connecting the CSU to the Telco line, notify the T1 provider. You should also notify the T1 provider before disconnecting the CSU.

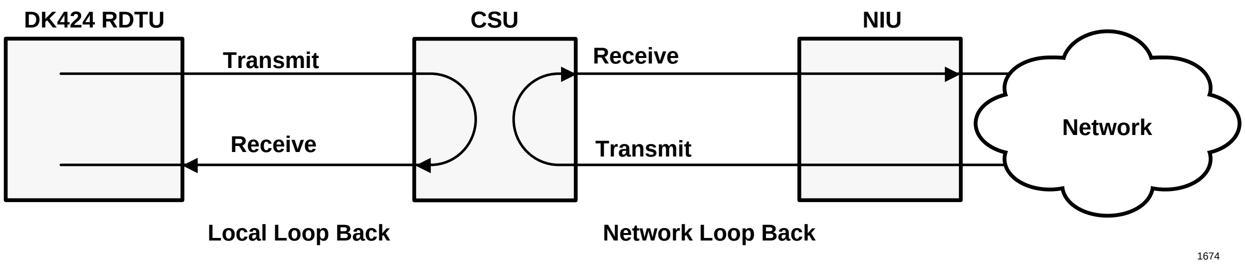


Figure 6-3 CSU Local and Network Loop Back Tests

7. Perform CSU to RDTU and CSU to Network loop back testing per CSU documentation and "Loop Back Testing" on Page 6-16.

Notes

- Local loop back and network loop back test cannot be performed simultaneously.
- CSU local/network loop back is a function of the CSU, not all CSUs provide this function – see CSU I&M documentation for CSU loop back test procedures.

8. After loop back testing is complete and synchronized with the far end T1 circuit, perform test calls on all RDTU lines. (Use the troubleshooting procedures in "T1 Fault Isolation" on Page 6-20 to help correct problems.)
9. Check T1 performance periodically for transmission errors using the "T1ERR" test. This requires a local or remote maintenance terminal connected to the PIOU or PIOUS PCB (local) and IMDU or Hayes-compatible modem (remote).

Applications

Each RDTU T1 PCB requires the following connecting equipment and cables to provide service (see the following sections and Figure 6-4).

RDTU to Network

If the RDTU must interface to a public telephone network or common carrier T1 circuit, the RDTU must be connected to a CSU. Use the NDTU cable (30 ft. cable supplied with RDTU) to connect the RDTU to the CSU. The function of the CSU is to provide the required interface between the RDTU PCB and the Public Telephone or Carrier Network. The interface created by the CSU normally provides protection and capabilities for loop back testing both the Network equipment and the RDTU PCB.

Connecting the CSU to the Network Interface Unit (NIU) is specified by the CSU manufacturer—see CSU installation documentation. Toshiba does not supply the cables and connectors required to connect the CSU to the NIU (see "RDTU Cable Installation").

RDTU to PBX T1 (Separated More Than 655 ft.)

If the RDTU must interface to a customer's premises T1 circuit (PBX, key/hybrid, or another DK424) to provide Tie line service, the RDTU must be connected to a CSU (with Toshiba NDTU cable) if the other customer premise T1 equipment is more than 655 ft. from the RDTU. The T1 span on the other end must also connect to a CSU.

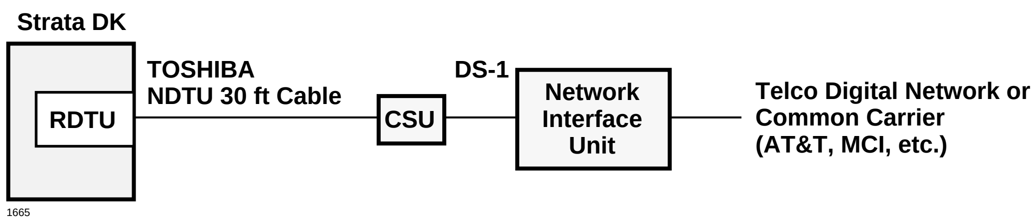


Figure 6-4 RDTU Connection to Digital Network or OCC

The RDTU equalization switch (SW1) must be set for "SHORT" cable length because RDTU will be connected to the CSU with the 30 ft. NDTU cable (see Table 6-2).

Connecting CSU to CSU and CSU to the far-end PBX T1 is specified by the CSU manufacturer—see the CSU installation documentation. Toshiba does not supply cables or connectors to connect CSU to CSU (Cable A) or CSU to the far end PBX (Cable B).

RDTU to PBX T1 (Separated Less Than 655 ft.)

If the RDTU is within 655 ft. of the far-end PBX T1 circuit, a CSU is not required. However, connecting a RDTU T1 span to another PBX or Key/Hybrid T1, in a Tie line configuration at a distance less than 655 ft. (without a CSU) will require a customer provided special cable. The transmit and receive pair of this span cable must be separated by at least five cable pairs and the wires must be 24 AWG, twisted pair, otherwise 22 AWG, ABAM type cable must be used. See "RDTU Cable Installation" on Page 6-14.

CSUs are not required if the RDTU is less than 655 ft. from the channel bank (see Figure 6-5).

Two CSUs (customer provided) are required if the RDTU is more than 655 ft. from the customer premise channel bank (see Figure 6-6).

In Figures 6-5 and 6-6, special cable and connectors are customer-provided.

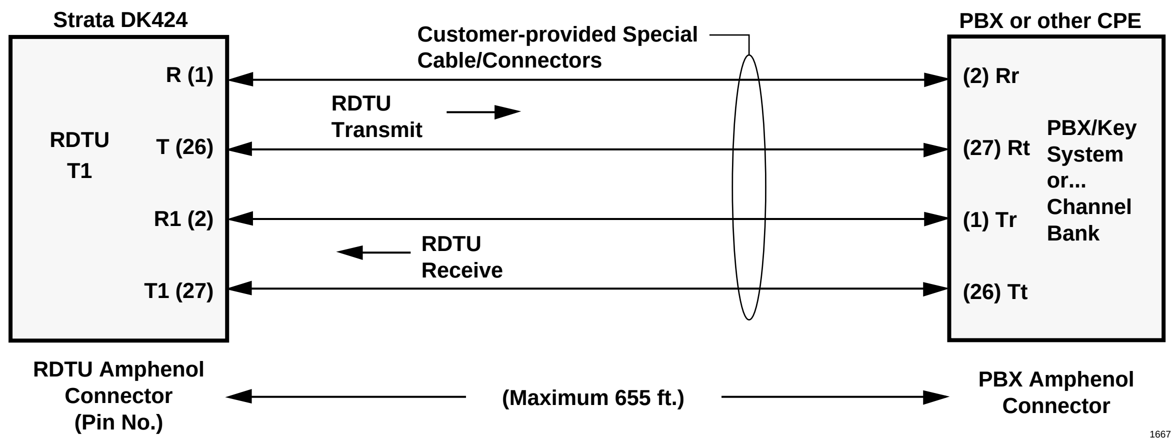


Figure 6-5 Required Cables/Connectors for RDTU Connection at Distances of Less than 655 (200 Meters)

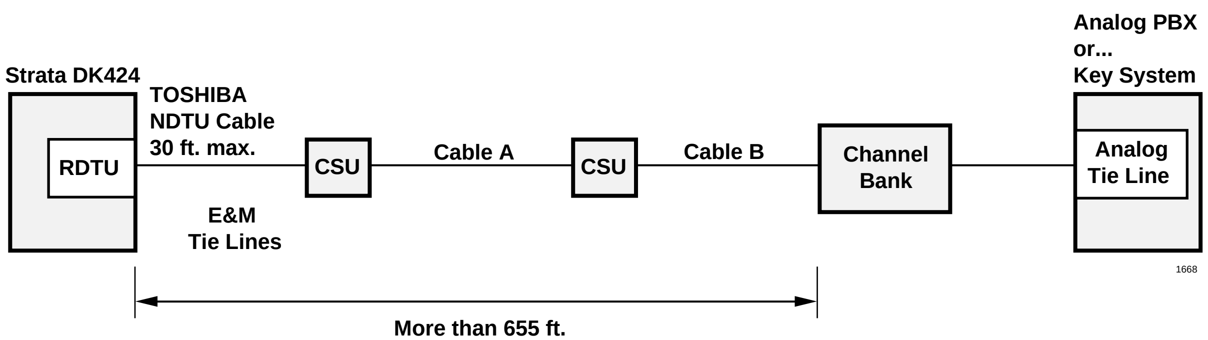


Figure 6-6 RDTU Connection via CSU and Channel Bank

Hardware and Cabling

RDTU Cable Length Switch

The distance between the DK424, RDTU and CSU or RDTU to other Customer Premise Equipment (CPE) T1 may vary (0~655 ft.) as shown. (See Figures 6-4, 6-5, and 6-6.) The RDTU interface transmitter must be equalized and its impedance must be matched to the cable length connecting the RDTU to the CSU or other CPE, T1.

RDTU transmit equalization/ impedance matching is accomplished by setting RDTU SW1 for the proper cable length (see Figure 6-5 for SW1 location and "SW1 Equalizer Switch and Loop Back Jumpers (Internal Option)" on Page 6-2 for SW1 setting instruction).

RDTU Loop Back Jumper Plugs

The RDTU PCB provides jumper plugs for loop back testing. Loop back tests are described in "Loop Back Testing" on Page 6-16.

RDTU Front Panel Indicators

The RDTU PCB provides seven LED indicators to show the status of RDTU: Busy or Idle condition, Alarm status, and Synchronization status. See Table 6-2 for the function of each status LED. Figure 6-2 shows the LED locations.Busy LED (BSY)—Turns on when one or more RDTU channels (lines) are in use. Also, when the RDTU does not receive the far end 1.544 mbs carrier signal, the RDTU will cause the BSY to be on steady.

Alarms are used to indicate potentially serious telephone network problems. Example: when monitoring a T1 network, if a Blue or Yellow alarm is indicated, it can be concluded that there is a cable fault or some other serious transmission impairment.

- Frame Alarm (FALM)—This LED turns ON steady if the RDTU has not achieved synchronization or when the span cable is not connected.
- Multi-Frame Alarm (MFALM)—LEDs turn ON steady if the RDTU receives the 1.554 mbs T1 carrier from the far end, but has not achieved Frame synchronization or when the span cable is not connected. Also, if the RDTU is set for SF and the far end is sending ESF (or vice versa), the MFALM LED will be ON steady.
- Red Alarm (FALM and MFALM)—When FALM and MFALM are both ON steady, a Red alarm condition exists. This indicates that the RDTU does not detect a proper carrier signal (1.544 mbs T1) on its receive pair and the RDTU is not synchronized. When the Red alarm condition exists, the RDTU should turn the BSY LED ON steady and attempt to send a Yellow alarm signal (RDTU YALM LED flashes) to the far end T1 circuit.
- Yellow Alarm (YALM)—When the far end network or CPE T1 does not detect the RDTU transmitted 1.544 mbs T1 carrier signal on its receive pair the far end T1 sends a Yellow alarm signal pattern to the RDTU—the RDTU should turn on the YALM LED (the YALM repeats the signal it receives from the far end—flashing or steady). If the RDTU does not receive the far end carrier signal, the RDTU sends the Yellow alarm signal to the far end and causes the BSY and YALM LEDs to flash.
- Blue Alarm (BALM)—The Blue alarm, also known as the Alarm Indication Signal (AIS), is detected by the RDTU. This signal is sent by the Far End Network equipment to RDTU when it loses the carrier from a Network T1 circuit (other than RDTU). This signal assures that the RDTU maintains synchronization when there is a problem between two Network Nodes. The RDTU BALM also lights if the far end sends a Blue alarm signal during loop back. The RDTU sends a Blue alarm signal when loop-back test is being performed.

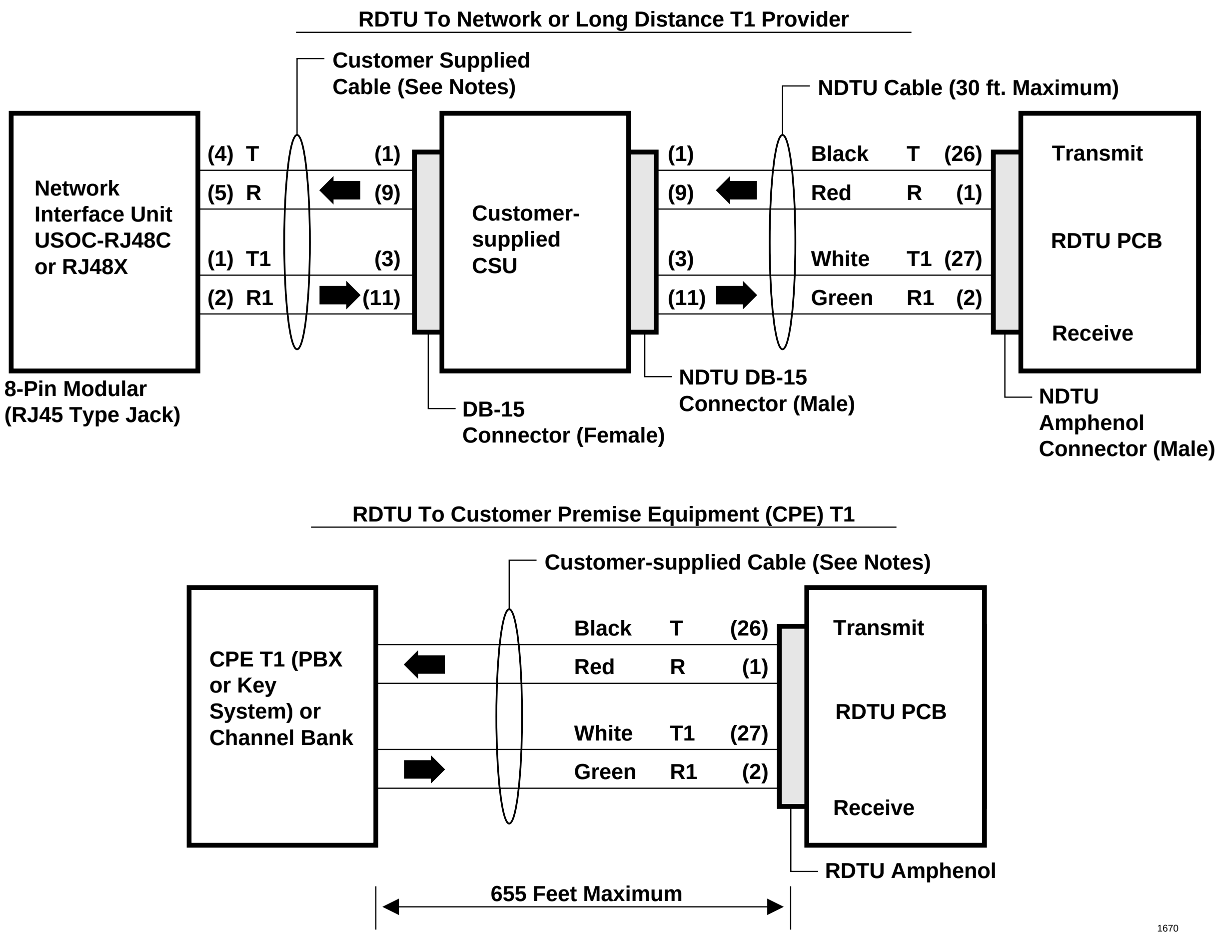
Synchronization LEDs

- Primary Synchronization (PSYNC) LED (see Figure 6-1 on Page 6-6) – If one RDTU PCB is assigned as the Primary Timing T1 PCB in Program *42, the PSYNC LED of this RDTU PCB flashes when it is synchronized with the far end T1 span line clock provider. If the Primary RDTU is not synchronized with the clock provider, the PSYNC LED will be ON steady. The SSYNC LED of the Primary sync RDTU PCB should always be OFF. The Primary sync RDTU PCB synchronizes the RTCU (time-switch) to the clock signal it receives from the T1 span circuit to which it is connected. The RTCU then synchronizes the DK424 PCM talk path (time-switch) to the far end PCM talk path.
- Secondary Synchronization (SSYNC) LED – If an RDTU PCB is assigned as the Secondary time T1 PCB in Program *42, its SSYNC LED will be ON steady (standby mode) when the DK424 is synchronized to the Primary T1 clock provider. In the event of a loss of Primary synchronization (when 4 out of 12 consecutive frame timing bits are in error) the DK424 switches from synchronizing to the Primary RDTU span line clock to the span line clock connected RDTU designated as the Secondary Timing Reference. When the DK424 is synchronized to the Secondary Reference RDTU, the PSYNC LED on the Primary Reference RDTU turns on steady and the SSYNC LED on the Secondary Reference RDTU will flash.
- Run Free (PSYNC/SSYNC) – If the RDTU PCB is the clock provider to the Far-end T1 span circuit both the PSYNC and SSYNC LEDs are always OFF.

RDTU Cable Installation

The RDTU PCB is shipped with a Toshiba NDTU cable for connecting the RDTU PCB to a CSU. The NDTU is a 30 ft. cable and is specially made to conform with EIA specifications (see Figure 6-7).

All other cables required to connect the T1 span line to the RDTU PCB are customer-supplied and must conform with EIA specification, see the Notes of Figure 6-7. Almost all CSU manufacturers supply cables that comply with T1 span specifications for connecting the CSU to customer premise equipment (like DK424, RDTU) to the Network Interface equipment.



Notes

- Pins 2 and 4 of the DB-15 connector in most CSUs are frame ground. No connection is required.
- NDTU cable is supplied with RDTU PCB (30 ft. maximum).
- Set RDTU SW1 switch for proper loop length per DK14.
- Customer-supplied span cables must be 22 AWG, ABAM cable or, if using standard 24 AWG twisted pair, the transmit pair must be separated from the receive pair by at least 5-cable pairs. Most CSU manufacturers supply cables to connect the CSU to the Network Interface Unit or other CPE equipment.

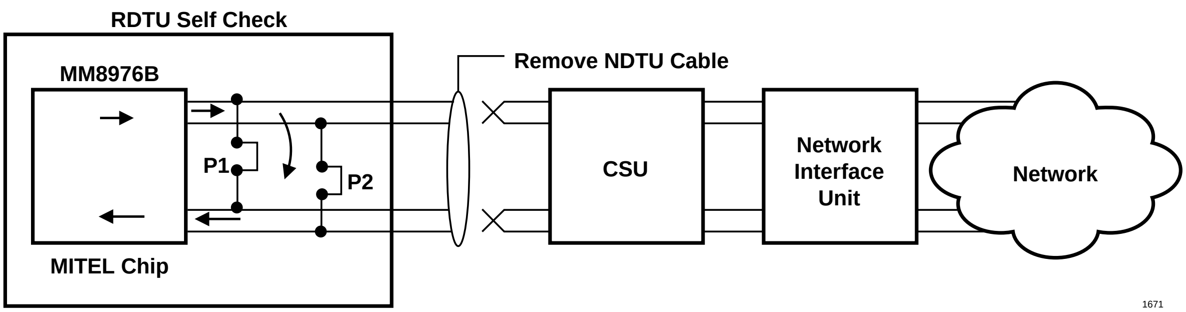
Figure 6-7 RDTU Cable Connections

Loop Back Testing

The RDTU provides three loop back test configurations. These loop back tests should be performed as required in conjunction with CSU loop back tests (see CSU loop back test documentation).

RDTU Self Test

This test should be performed upon initial installation of a RDTU PCB. Program the RDTU per "System Programming for T1" on Page 6-3; then perform the RDTU loop back test, per the instructions in Figure 6-8, before connecting the far end (CSU, Network, or CPE) T1 span line.



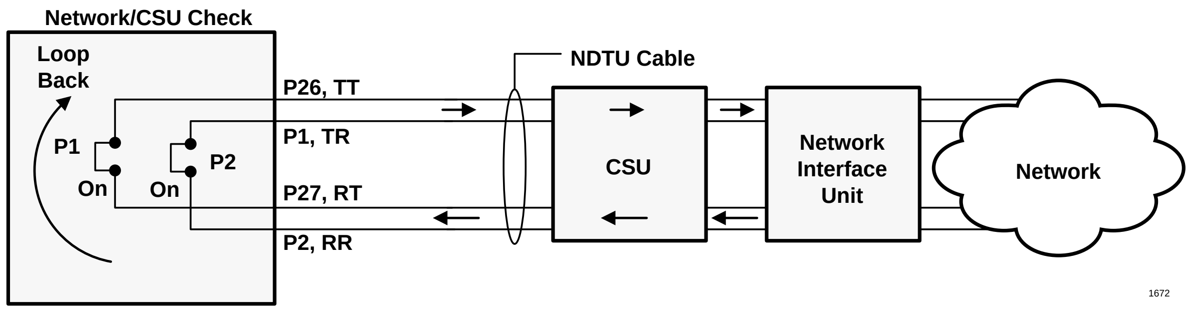
Notes

- P1 and P2 to ON position (see Figure 6-2).
- Remove NDTU cable from RDTU amphenol connector.
  - After about 12 seconds, all RDTU LEDs (except PRI/SEC SYNC) turn OFF.
  - Appropriate primary or secondary sync. LED flashes if RDTU is Primary or Secondary reference.
  - If RDTU is not a primary or secondary reference, then the Primary and Secondary sync LEDs should turn OFF.

Figure 6-8 RDTU Self Test

Network/CSU T1 Span Test

This test will verify that the far end (CSU, Network, or CPE) T1 equipment and span cabling is functioning properly. This test checks all T1 span cabling including the RDTU Amphenol cable and connector. Guidelines for this test are provided in Figure 6-9.



Notes

- P1 and P2 to ON position (see Figure 6-2).
- Unplug RDTU from DK424 back plane.
- CSU or Network T1 equipment should receive its own transmitted signal.
- Indications and results depend on CSU and/or Network equipment.

Figure 6-9 Network/CSU T1 Span Test

Network/CSU/RDTU Span Test

This test checks all equipment that is checked with the test in the above paragraph, but this test also checks that the RDTU Mitel LSI chip is functioning. Guidelines for this test are described in Figures 6-8~6-10.

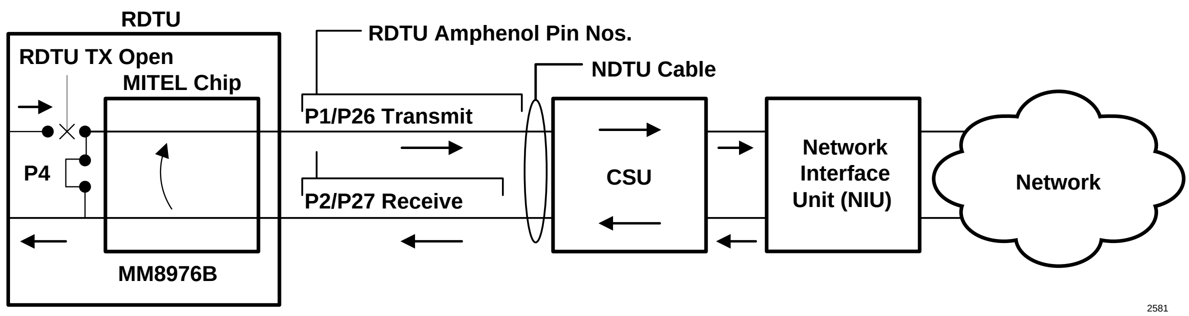
Note Loop back tests with CSU and Network equipment can also be performed when connecting the RDTU PCB directly to a customer premise (PBX, Key Hybrid, Channel bank) T1 circuit.

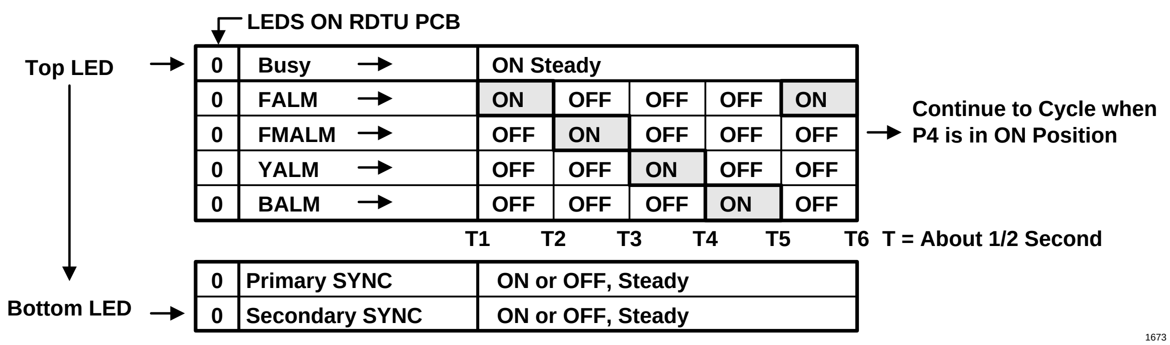
The RDTU Self Test is an active test of the RDTU circuit.

The Network/CSU Test checks all cables, the Network and CSU equipment (RDTU is not active).

The Remote Loop Back (RLB) Test is an Active test of RDTU (LSI MM8976B), CSU, Network equipment and all cables.

Refer to Figure 6-3 and the CSU manufacturer’s Installation and Maintenance manual for information on CSU Local/Network Loopback Tests.





Performance Monitoring

The performance of the RDTU can be monitored using the Data Dump Mode. This requires an RSIU, RSIS, PIOU or PIOUS PCB, an ASCII terminal (or PC) and, if monitoring RDTU performance from a remote location, an IMDU or RMDS modem or Hayes compatible modem is required.

The RDTU monitoring feature provides a printout (or CRT display) of RDTU detected T1 errors as shown in Figure 6-10. There are no time parameters given with this error report so the time between error count increments must be monitored manually. Basically the error count of any error category should not increase within 24-hour periods (see Table 6-2 on Page 6-21).

```
                              T1 ERROR DISPLAY
T1ERR
DTU NO = 1
   SYNCHRO BIT ERROR        = XXXX TIMES (1 TIME = 1024 ERRORS)
   BIPOLAR VIOLATION ERROR  = XXXX TIMES (1 TIME = 256 X 256 ERRORS)
   SLIP ERROR               = XXXX TIMES (1 TIME = 256 ERRORS)
   CRC ERROR                = XXXX TIMES (1 TIME = 256 ERRORS)
DTU NO = 2
   SYNCHRO BIT ERROR        = XXXX TIMES (XXXX = 0~9999)
   BIPOLAR VIOLATION ERROR  = XXXX TIMES
   SLIP ERROR               = XXXX TIMES
   CRC ERROR                = XXXX TIMES
DTU NO = 3                  = XXXX TIMES
   SYNCHRO BIT ERROR        = XXXX TIMES
   BIPOLAR VIOLATION ERROR  = XXXX TIMES
   SLIP ERROR               = XXXX TIMES
   CRC ERROR                = XXXX TIMES
DTU NO = 4
   SYNCHRO BIT ERROR        = XXXX TIMES
   BIPOLAR VIOLATION ERROR  = XXXX TIMES
   SLIP ERROR               = XXXX TIMES
   CRC ERROR                = XXXX TIMES
DTU NO = 5
   SYNCHRO BIT ERROR        = XXXX TIMES
   BIPOLAR VIOLATION ERROR  = XXXX TIMES
   SLIP ERROR               = XXXX TIMES
   CRC ERROR                = XXXX TIMES
DTU NO = 6
   SYNCHRO BIT ERROR        = XXXX TIMES
   BIPOLAR VIOLATION ERROR  = XXXX TIMES
   SLIP ERROR               = XXXX TIMES
   CRC ERROR                = XXXX TIMES
```

Figure 6-10 RDTU Performance Monitor Printout

The error categories are as follows:

- Synchro Bit Error: This counter increments each time the RDTU detects 1024 synchronization bit errors.
- Bipolar Violation Error: This counter increments each time the RDTU detects 6.55 x 104 bipolar violations.
- Slip error: This counter increments each time the RDTU detect 256 slips.
- CRC Errors: Cyclical Redundancy Check counter increments each time the RDTU detects 256 CRC-6 errors. This is only available when the RDTU is in the Extended Super Frame mode.

➤ **To receive the "T1 ERROR DISPLAY" from a terminal (local or remote)**

1. Establish communication with the terminal or PC using a communication software (e.g., Procomm®).
2. Enter the security code, and press **`Enter`** (or **`Return`**).
3. At the **`>MODE`** prompt, type **`DUMP`** (must be all caps), press **`Enter`** (or **`Return)`**. The **`>D`** prompt displays on your screen.
4. At the **`>D`** prompt, type **`T1ERR`** and press **`Enter`** (or **`Return`**). The display (see Figure 6-10) shows all RDTU PCBs (DTUNO=1~DTUNO=8) even if the associated RDTU (1~8) is not installed. The ERROR counter can only be reset by turning the DK424 OFF and ON.

   Use Table 6-2 for recording customer's problems.

➤ **To exit the dump mode**

➤ At the **`>D`** prompt, type **`QUIT`**, press **`Enter`** (or **`Return`**); the **`>MODE`** prompt displays.

T1 Fault Isolation

T1 fault troubleshooting can be complex and may require expensive test equipment to perform the necessary fault isolation. Because of the high cost, many dealers have not purchased T1 test equipment. As a result, on a cutover when an RDTU does not synchronize or CO lines simply do not function, the site technician can only check wiring and cabling. Without proper test equipment, there is very little that can be tested.

This section provides some procedures that can be done without T1 test equipment to help find the cause of a failure, or at least determine if system hardware is functioning properly.

The DK424 also provides T1 "in-service" monitoring which allows maintenance personnel to detect line errors without introducing any disturbances on the line. This method of testing permits maintenance personnel to monitor T1 performance without the expense of test equipment or without taking the T1 circuit out of service. The T1 error check is particularly useful for monitoring the T1 circuit for intermittent problems that may become more serious as time progresses (see "RDTU Performance Monitor Printout" on Page 6-19).

If experiencing problems with an RDTU span circuit, refer to Flowcharts 6-1~6-3 to isolate the fault. The flowcharts in this section use the same logic symbols as those used in DK. Document error information in Table 6-2, "RDTU T1 Error Record" on Page 6-21.

Table 6-2 RDTU T1 Error Record

Customer: ______________________________

Date	Time	Latest Strata DK424 Power Off/On Reset	Syncro Bit Error	Bipolar Violation Error	Slip Error	CRC Error

Notes

- Latest DK424 Power On/Off Reset: Use this column to record whether the DK424 Power was reset On or Off, and the date and time that it was reset.
- Use the Synchro Bit Error, Bipolar Violation Error, Slip Error, and CRC Error columns to record the error number, and the date and time that they occur.

Flowchart Symbols

Five symbols are used in the flowcharts, which are identified in Figure 6-11.

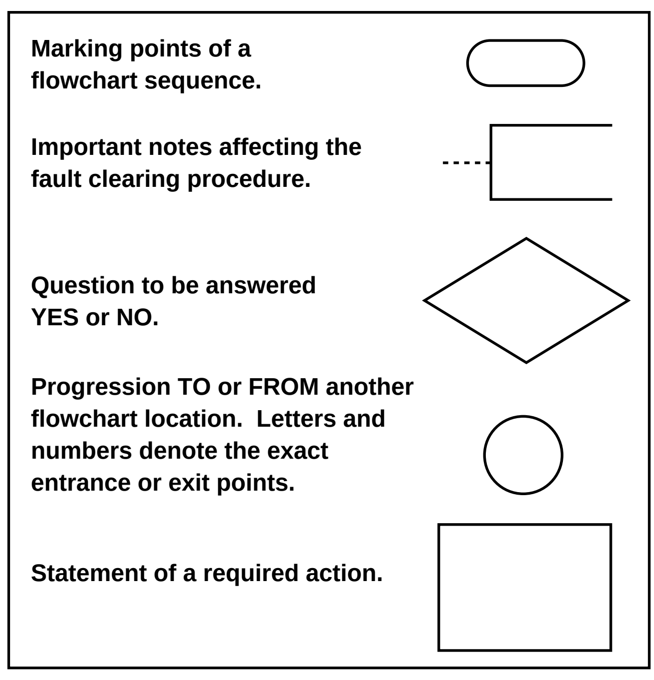
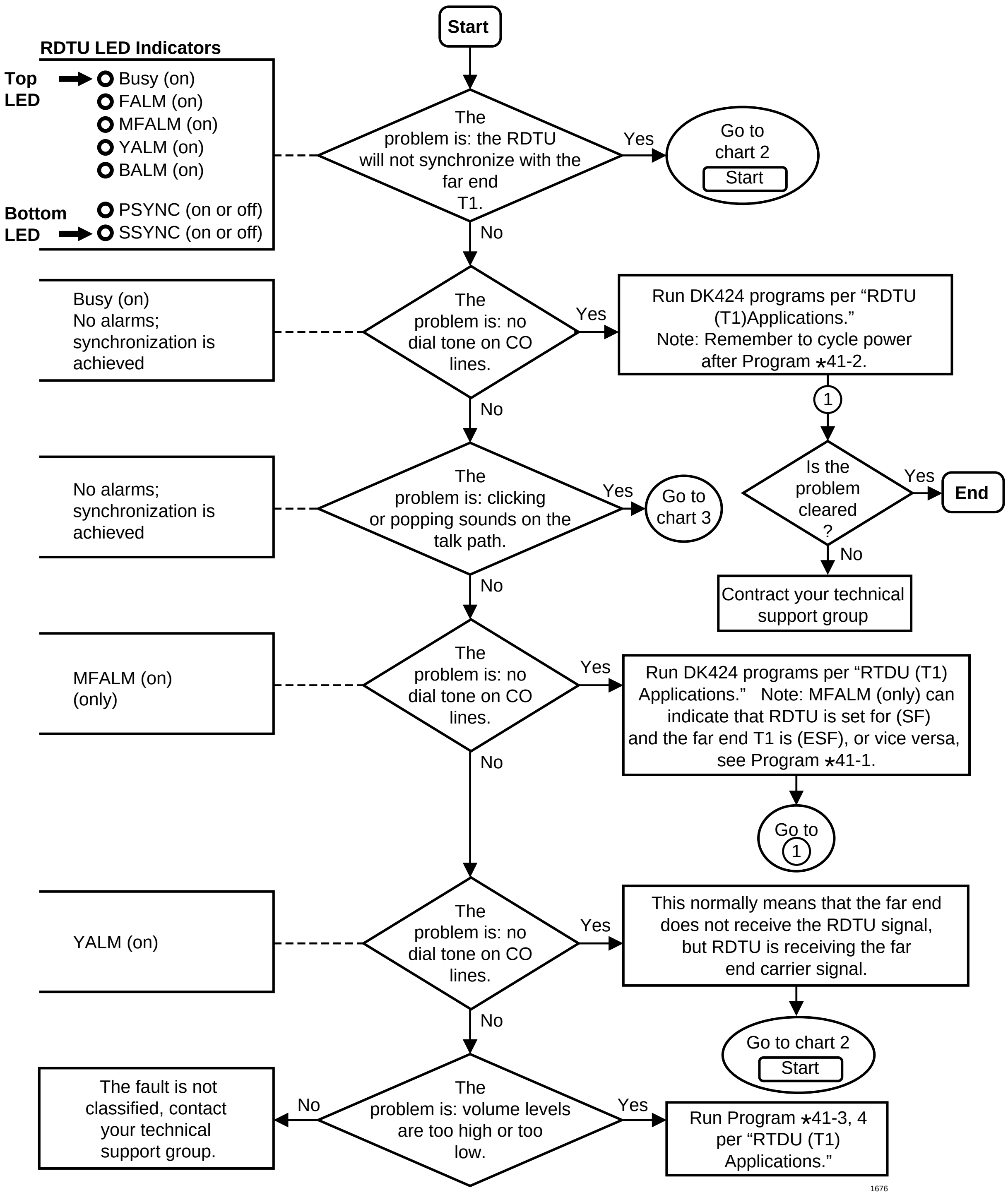
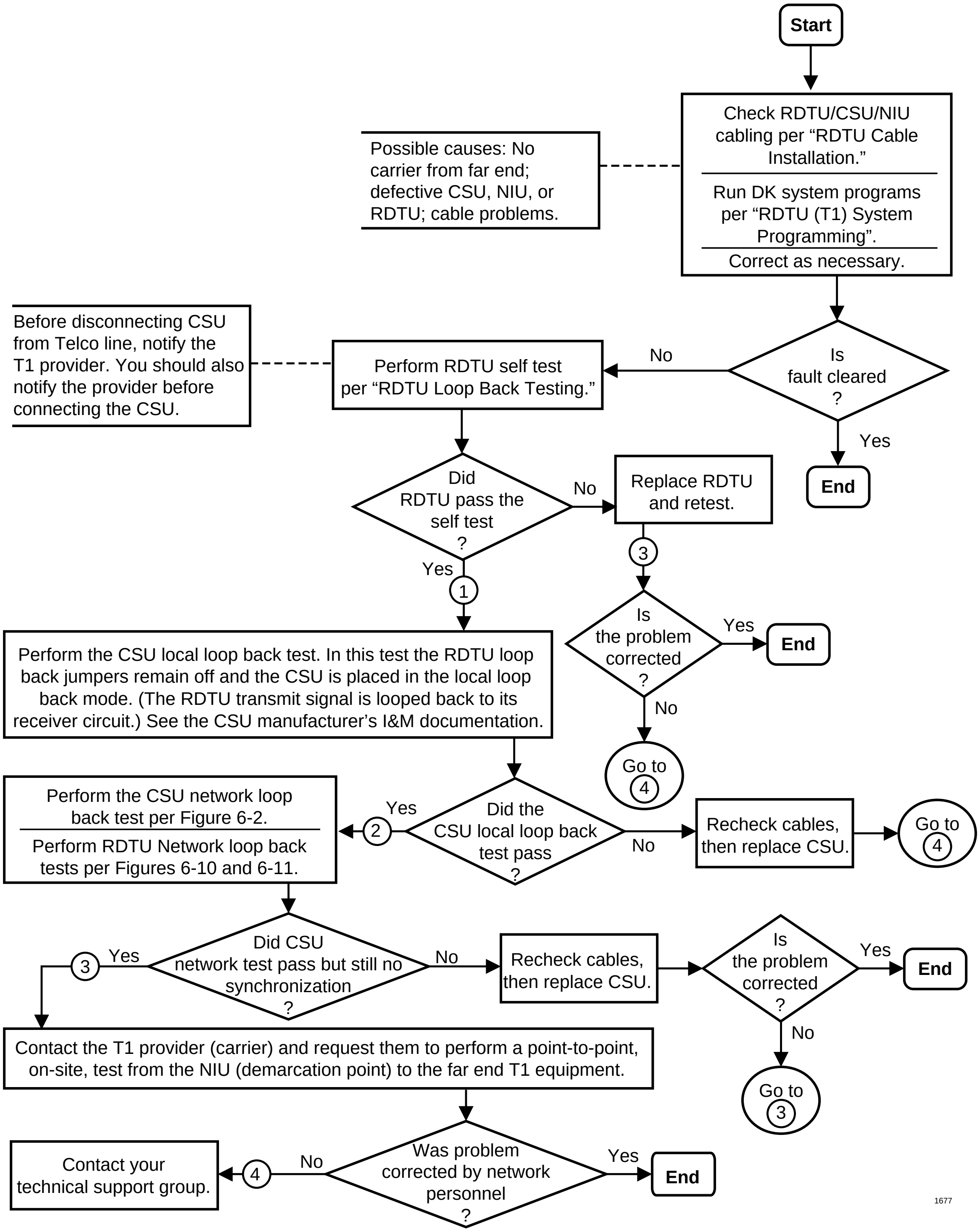


Figure 6-11 Flowchart Symbols

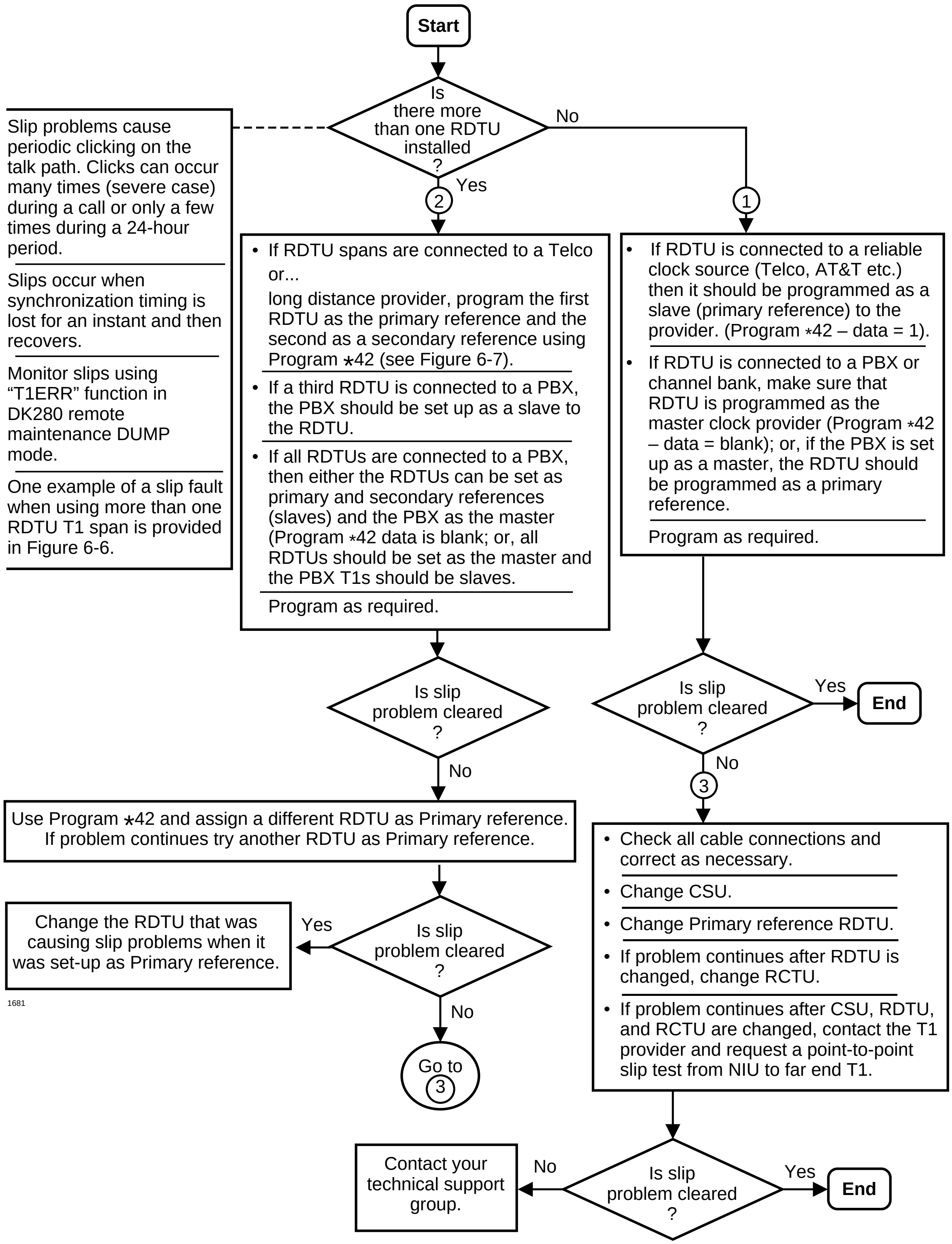
Flowchart 6-1 Fault Classification



Flowchart 6-2 No Synchronization



Flowchart 6-3 Synchronization Slip Problems



DK40i/DK424 Universal Slot PCBs 7

This chapter contains information on Printed Circuit Boards (PCBs) which can be used in the universal slots of either the Strata DK40i Expansion KSU or the Strata DK424 cabinets. Although the system architecture of these systems is very different, the PCBs described in this chapter are common to both systems.

Important! *When installing these circuit boards in the DK40i Expansion KSU, you must install them in the universal slots designated in Chapter 2 – DK40i Configuration.*

PCBs which are not installed in the universal slots of the system can be found in the installation chapter for the system. For example, the TCOU PCB for the DK40i system appears in Chapter 3 – DK40i Installation. Paragraph headings identify information which is specific to a particular system and minor exceptions are mentioned in text.

Note Prior to PCB installation, the power supply must be tested and the ground checked.

PCB Compatibility

The following is a list of PCBs that appear in this chapter:

PCB	Compatible with DK40i	Compatible with DK424	Function
EOCU	X	X	Speaker Off-hook Call Announce Unit (See PEKU for installation/programming instructions.)
IMDU	X	X	Remote Maintenance Modem Unit (See PIOU2, PIOUS2 for installation/programming instructions.)
KCDU	X		CO Line/Digital Telephone Interface Unit
PCOU1,2	X	X	(See RCOU for installation/programming instructions.)
PDKU2	X	X	Digital Telephone Interface Unit
PEKU	X	X	Electronic Telephone Interface Unit
PEMU	X	X	See REMU.
PEPU	X	X	External Page Interface Unit
PESU	X	X	Standard/Electronic Telephone Interface Unit

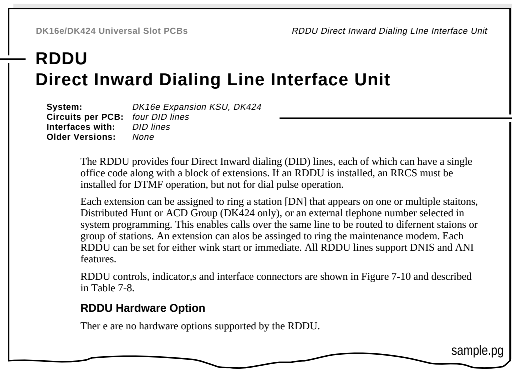
PCB	Compatible with DK40i	Compatible with DK424	Function
PIOU2, PIOUS2	X	X	Option Interface Units
PSTU	X	X	(See RSTU2 for installation/programming instructions.)
RATU		X	Attendant Console Interface Unit
RCIS	X	X	Adds four additional Caller ID lines to RCIU2.
RCIU1		X	(See RCIU2 for installation/programming instructions.)
RCIU2	X	X	Caller ID Interface
RCMS			Adds two ports per card (maximum of two) to E911 CAMA Trunk Direct Interface card (RMCU)
RCOS	X	X	Adds four loop start lines. (See RCOU for installation/ programming instructions.)
RCOU	X	X	Four-Circuit Loop Start CO Line Interface Unit
RDDU	X	X	Direct Inward Dialing Line Interface Unit
RDSU	X	X	Digital/Standard Telephone Interface Unit
RDTU		X	T1 Interface Unit (See Chapter 6.)
REMU	X	X	E&M Tie Line Unit
RGLU2	X	X	Loop/Ground Start CO Line Interface Unit
RMCU		X	CAMA E911 Trunk Direct Interface card
RMDS		X	Optional built-in modem. (See RSIU for installation/ programming instructions.)
RSIS		X	Optional RS-232 ports. (See RSIU for installation/ programming instructions.)
RSIU		X	RS-232/Modem Interface Unit
RSSU	X	X	PC Interface Unit
RSTS	X	X	Optional Standard Telephone Interface Subunit (See RDSU for installation/programming instructions.)
RSTU2	X	X	Standard Telephone Interface Unit
RWIU	X	X	Strata AirLink Wireless Interface Unit (see Chapter 16 – Strata AirLink Systems)

PCB Chapter Layout

Each PCB outline begins with the PCB's designation and title (the outline appears in the chapter in alphabetical order by designation). A brief synopsis of the PCB appears next and includes a notation of the system(s) that the PCB can be used in, the circuits supplied by the PCB, what equipment the PCB interfaces with, and a list of the PCB's older version(s) with a brief description of their differences.

Installation and programming instructions follow the synopsis with a table showing the PCB's controls, indicators and connectors and an illustration of the board.

PCB Title



DK16e/DK424 Universal Slot PCBs   *RDDU Direct Inward Dialing LIne Interface Unit*

RDDU
Direct Inward Dialing Line Interface Unit

System: *DK16e Expansion KSU, DK424*
Circuits per PCB: *four DID lines*
Interfaces with: *DID lines*
Older Versions: *None*

The RDDU provides four Direct Inward dialing (DID) lines, each of which can have a single office code along with a block of extensions. If an RDDU is installed, an RRCS must be installed for DTMF operation, but not for dial pulse operation.

Each extension can be assigned to ring a station [DN] that appears on one or multiple staitons, Distributed Hunt or ACD Group (DK424 only), or an external tlephone number selected in system programming. This enables calls over the same line to be routed to difernent staions or group of stations. An extension can alos be assinged to ring the maintenance modem. Each RDDU can be set for either wink start or immediate. All RDDU lines support DNIS and ANI features.

RDDU controls, indicator,s and interface connectors are shown in Figure 7-10 and described in Table 7-8.

RDDU Hardware Option

Ther e are no hardware options supported by the RDDU.

sample.pg

System:
Gives the type of system that is compatible with the given PCB. Be sure to read this information before attempting to use a PCB with your system application.

Circuits per PCB:
Type and number of circuits available on the PCB.

Interfaces with:
Type of line/hardware the PCB can accept.

Older Version(s):
Describes older version or versions of the PCB.

KCDU
CO Line/Digital Telephone Interface Unit

System:	*DK40i Expansion KSU*
Circuits per PCB:	*two CO loop start/four digital telephone circuits*
Interfaces with:	*central office loop start lines* *digital telephones (with or w/o RPCI-DI or ADM)* *PDIU-DS* *DDCB* *cordless digital telephone (DKT2004-CT)*
Older Version(s):	*none*

One or two KCDU PCBs may be installed in the Expansion KSU. For controls, connectors, and indicators, see Figure 7-1 and Table 7-1.

KCDU Configuration

The KCDU may have to be configured to control excessive loudness if the system is close to a CO or installed behind a PBX telephone system. It does not have to be configured for anything else. The decibel (dB) PAD switches, SW501 (CO1) and SW601 (CO2), control the loudness by providing a 3 dB signal level drop to, or from, the PBX or CO when set to the PAD position. The switch comes from the factory set at NOR (for normal) meaning no PAD loss.

KCDU Installation

1. If the system is located within one mile of the CO or PBX telephone system, set dB PAD switches SW501 and SW601 to the PAD position.
2. Insert the KCDU into the appropriate slot in the Expansion KSU, per tables in Chapter 2 – DK40i Configuration. Apply firm, even pressure to ensure proper mating of the connectors.
3. After installing the KCDU, gently pull the PCB outward. If the connectors are properly mated, a slight resistance will be felt.

Note If KCDU CO lines receive Caller ID, RCIU2 must be installed.

KCDU Programming

See "RCOU Programming" on Page 7-29 and "PDKU2 Programming" on Page 7-6 for KCDU programming information. When running Program 03 for the KCDU slot(s), specify code 65 if the KCDU does not support OCA or PDIU-DI telephones or code 66 if the KCDU supports OCA or PDIU-DI telephones. Do not specify code 11, 61, 62, or 64.

Table 7-1 KCDU Controls, Indicators, and Connectors

Control/Indicator/Connector	Type of Component	Description
CO line circuit 1 indicator SW501	Red LED	Lights to indicate CO line circuit is in operation.
CO line circuit 2 indicator SW601	Red LED	
J7 connectors	Modular connector	Interface connector for CO line circuits,1 and 2.
PAD switch SW501	Two-position slide	Enables 3 dB signal level drop for CO line circuit 1 (when set in PAD position).
PAD switch SW601	Two-position slide	Enables 3 dB signal level drop for CO line circuit 2 (when set in PAD position).

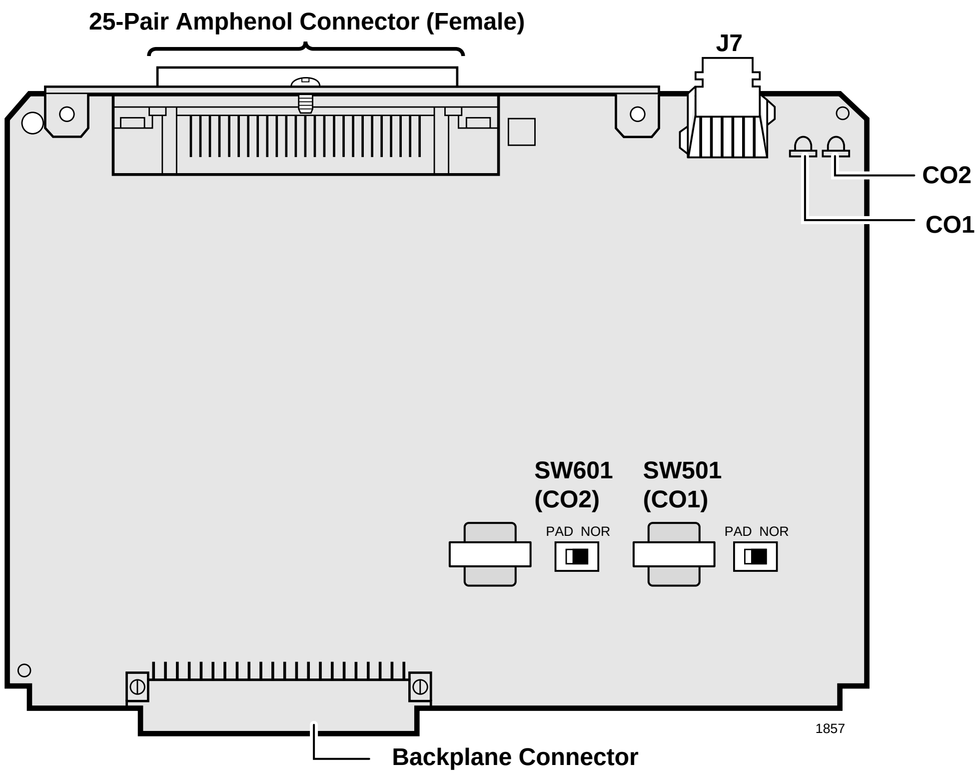


Figure 7-1 KCDU PCB

PDKU2
Digital Telephone Interface Unit

System:	*DK40i Expansion KSU, DK424*
Circuits per PCB:	*eight digital telephone circuits*
Interfaces with:	*digital telephones (with or w/o RPCI-DI or ADM)* *DDSS console (circuit 8 only)* *PDIU-DS (must have dedicated circuit)* *DDCB (circuit 5 only–ports 004, 012, 020, and 028)* *cordless digital telephone (DKT2004-CT)* *DKT2001 single line digital telephones (see Note below)*
Older Version(s):	*PDKU1 (identical to PDKU2 except it does not support continuous DTMF tones w/DKT2000-series telephones, DIUs can only be connected to circuits 1~7)*

PDKU2 Hardware Options

PDKU2 does not have to be configured for any option. Refer to Chapter 9 – Station Apparatus for instructions on how to connect digital telephones, DDCBs, and DDSS consoles to the PDKU2, as well as how to upgrade digital telephones with these options: an Integrated Data Interface Unit (PDIU-DI, RPCI-DI), a Speaker Off-hook Call Announce upgrade (DVSU), and a Headset/Loud Ringing Bell Interface (HHEU). Refer to Chapter 10 – Peripheral Installation to connect the Stand-alone Data Interface Unit (PDIU-DS) to the PDKU.

Note DKT2001 telephones do not support HHEUs, DADMs, DDSSs, RPCI-DIs, or DVSUs.

There are no controls or indicators on the PDKU (Figure 7-2).

PDKU2 Installation

1. Insert the PDKU2 (component side facing right) into the appropriate slot, and apply firm, even pressure to ensure proper mating of connectors. (For DK40i, PDKU2 must be installed per tables in Chapter 2 – DK40i Configuration.)
2. After installing the PDKU, gently pull the PCB outward. If the connectors are properly mated, a slight resistance is felt.

PDKU2 Programming

Program 03

- Specify Code 61 to indicate a station line PDKU2.
- Specify Code 62 to indicate a PDKU2 supporting Speaker Off-hook Call Announce (OCA) and/or DIUs and RPCI-DI Data mode.
- Specify Code 64 to indicate a PDKU2 supporting a DDSS console, Speaker OCA, DIUs, and RPCI-DI Data mode.
- For RPCI-DI TAPI mode only and Handset OCA, code 61 can be used and the PDKU2 can be in any universal cabinet slot.

Note If there are no PDKU2 options, Program 03 can be skipped, and Program 91-1 or 91-9 can be run instead.

Programs 20, 21, and 22: Configures DIUs and RPCIs.

Programs 28 and 29: Digital Direct Station Selection Consoles (DDSS) assignments.

Program *29: Enables ADMs on 2000-series digital telephones.

Program 27: Adjusts initial off-hook volume level for digital telephone handsets.

Programs 30, 31: Enables OCA.

Programs 77-1, 77-2, 79, *79: Digital Door Phone/Lock Control Unit (DDCB) and door phone ringing assignments.

Program 92-5: Initializes initial ringing, speaker, and muted ring volume levels of digital telephones.

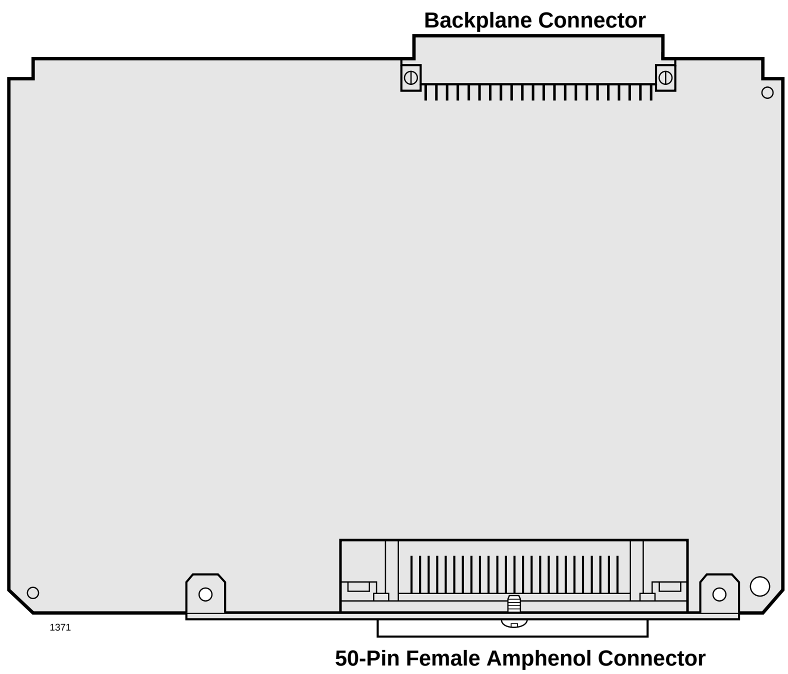


Figure 7-2 PDKU2 PCB

PEKU
Electronic Telephone Interface Unit

System: *DK40i Expansion KSU, DK424*

Circuits per PCB: *eight electronic telephone circuits*

Interfaces with: *electronic telephones*
HDSS console (circuits 7 and 8 only–each console requires two circuits)
alternate BGM source (circuit 3 only)
EOCU PCB for OCA
external conference amplifier (circuits 2 and 3 only–ports 09 and 10, 17 and 18, 25 and 26, 33 and 34–each amplifier requires two circuits)
HDCB (circuit 5 only–ports 004, 012, 020, and 028)

Older Version(s): *none*

PEKU controls and interface connectors are shown in Figure 7-4 and described in Table 7-2.

Speaker Off-hook Call Announce Unit (EOCU) Installation onto the PEKU (Internal Option)

Note PEKU connectors P10, P20, P40, P50, and P60 are positioned to allow installation of the EOCU only in the proper position (Figure 7-3).

1. Mate EOCU connectors J10, J20, J40, J50, and J60 with PEKU connectors P10, P20, P40, P50, and P60.
2. Apply firm, even pressure to EOCU to ensure proper mating of connectors.
3. Use a three-pair cable for making connections between the PEKU and the speaker OCA electronic telephone.
4. Refer to "Electronic Telephone Upgrades" on Page 9-16 for procedures to upgrade electronic telephones for Speaker OCA.

Note Electronic telephones do not support handset OCA.

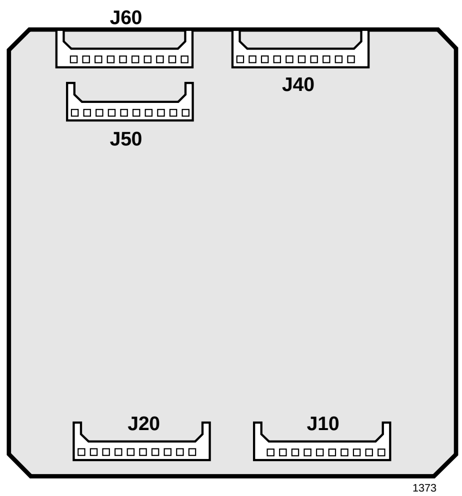


Figure 7-3 Off-Hook Call Announce Unit (EOCU) Installation

External Options

Note Refer to Chapter 9 – Station Apparatus and Chapter 10 – Peripheral Installation for installation of electronic telephones (including the following upgrades: HVSU2 or HVSU, HVSI for Off-hook Call Announce and HHEU for headset and/or loud ringing bell interface) and external options, respectively.

PEKU Configuration to Support an HDSS Console Option

1. Set the SW1 switch to DSS.
2. See "HDSS Console" on Page 9-21 for console installation instructions. Each HDSS console requires dedicated use of circuits 7 and 8 of a particular PEKU PCB.

PEKU Configuration to Support Door Phone/Lock Control Unit (HDCB)

1. Cut the W9 Door Phone jumper wire on the PEKU PCB.
2. Refer to "Door Phone (MDFB)" on Page 9-22 for HDCB, associated Door Phones (MDFBs) and door lock control installation procedures. Only circuit 5 of a PEKU associated with ports 004, 012, 020, and 028 can support HDCBs.

PEKU Configuration to Support Separate BGM Source Connection

1. Cut the W5 (BGM) jumper wire on the PEKU PCB.
2. Refer to Chapter 10 – Peripheral Installation for installation procedures for BGM connection. Only circuit 3 can support a BGM source.
3. In Program 10-2, set LED 09 on to enable the PEKU (Port 002) BGM source to be sent to digital and electronic telephone speakers and/or PIOU2, PIOUS2, PEPU PCBs.
4. Use Program 19 to identify the slot in which the PEKU supporting the BGM source will be installed.

PEKU Installation

1. Make sure the PEKU has been configured for the appropriate hardware options. See previous pages for more information.
2. Insert the PEKU (component side facing right) into the appropriate slot, and apply firm, even pressure to ensure proper mating of connectors. (For DK40i, the PEKU can be installed only in place of the RSTU2, PDKU, or RDSU. See Chapter 2 – DK40i Configuration.)
3. After installing the PEKU, gently pull the PCB outward. If the connectors are properly mated, a slight resistance will be felt.

PEKU Programming

Program 03: Door phones, the BGM source connection, and external amplifiers do not require a special code.

➤ Specify Code 21 to indicate a non-optioned station line PEKU.

➤ Specify Code 22 to indicate a PEKU configured for Speaker OCA.

➤ Specify Code 23 to indicate a PEKU configured for an HDSS console.

➤ Specify Code 24 to indicate a PEKU configured for Speaker OCA and an HDSS console.

Note If there are no PEKU options, Program 03 can be skipped, and Program 91 can be run instead.

Programs 10-2 and 19: BGM connection.

Programs 10-3: Assigns external amplifiers to ports.

Programs 28 and 29: HDSS console assignments.

Programs 77-1, 77-2, 79: HDCB and door phone ringing assignments.

Table 7-2 PEKU Controls, Indicators, and Connectors

Control/Indicator/Connector	Type of Component	Description
Off-hook call announce P10	10-pin connector	Interface connector for optional Off-hook Call Announce subassembly connector (used with P20, P40, P50, and P60).
Off-hook call announce P20		Used with P10, P40, P50, and P60.
Off-hook call announce P40		Used with P10, P20, P50, and P60.
Off-hook call announce P50		Used with P10, P20, P40, and P60.
Off-hook call announce P60		Interface connector for optional Off-hook Call Announce subassembly connector (used with P10, P20, P40, and P50).
DSS/EKT HDSS Console/ Electronic Telephone SW1 Switch	2-position slide switch	Configures PEKU for operation with an HDSS console or electronic telephones.
Door phone W9 jumper wire	White jumper wire	When cut, configures PEKU for installation of an optional HDCB.
BGM source connection W5 jumper wire		When cut, configures PEKU for BGM source connection.

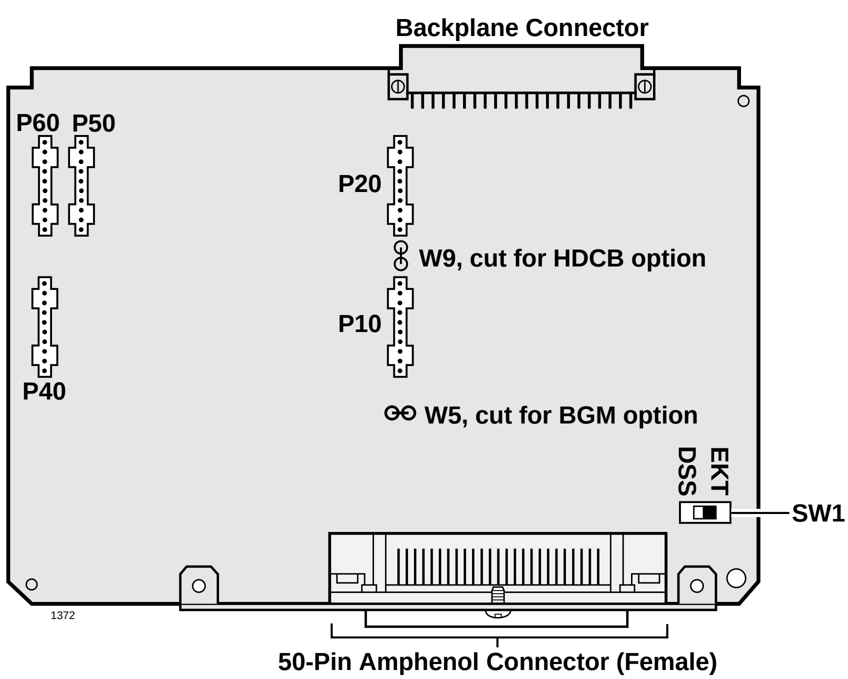


Figure 7-4 PEKU PCB

PEPU2
External Page Interface Unit

System:	*DK40i Expansion KSU, DK424*
Circuits per PCB:	*(see interfaces)*
Interfaces with:	*built-in paging amplifier or page speaker* *door lock control* *external amplifier control* *external paging 600 ohm (duplex) interface (one zone)* *MOH control* *night relay control*
Older Version(s):	*none*

The PEPU is similar to the PIOU2 and PIOUS2, but supports fewer peripherals than both PCBs. PEPU controls, indicators, and interface connectors are illustrated in Figure 7-5 and described in Table 7-3.

PEPU does not support the following PIOU2 and PIOUS2 options:

- Alarm sensor
- Four-zone page
- SMDR port
- Remote maintenance modem or ASCII terminal connector
- IMDU connection

Note Refer to Chapter 10 – Peripheral Installation and Chapter 8 – DK40i/DK424 Universal Slot PCB Wiring for installation of external options.

PEPU2 Installation

1. Make sure P15 is in the Mu Law position for U.S. and Canada.
2. Ensure the PEPU2 has been configured for the appropriate hardware options. (Refer to Chapter 10 – Peripheral Installation.)
3. Insert the PEPU2 (component side facing right) into the last slot (S16) of the Base KSU/cabinet if the system has only a Base KSU/cabinet and no Expansion KSUs/cabinets. If there are Expansion KSU/cabinets, install the PEPU2 in the highest slot number of the highest numbered KSU/cabinet. Apply firm, even pressure to ensure proper mating of connectors.
4. After installing the PEPU2, gently pull the PCB outward. If the connectors are properly mated, a slight resistance is felt.

PEPU2 Programming

Program 03: Specify Code 41 for the slot that will support a PEPU.

Program 10-2: Activates External Page with All Call Page (with access code **#39** only, not with **All Call Page** button).

Program 77-1: Assigns relay control options.

Program 78: Sets Night Ringing over External Page.

Table 7-3 PEPU Controls, Indicators, and Connectors

Control/Indicator/Connector	Type of Component	Description
M/B make/break jumper plug P10	3-terminal jumper plug	External page/door lock control relay make or break jumper plug.
M/B make/break jumper plug P11		Night/hold relay make or break jumper plug.
SPI/SPO internal/external amplifier switch SW4	2-position slide switch	Selects built-in 3-watt amplifier (SPI) or 600-ohm output (SPO) for external page/BGM operation.
Volume control VR1	Trim potentiometer	Adjusts volume of built-in 3-watt amplifier.

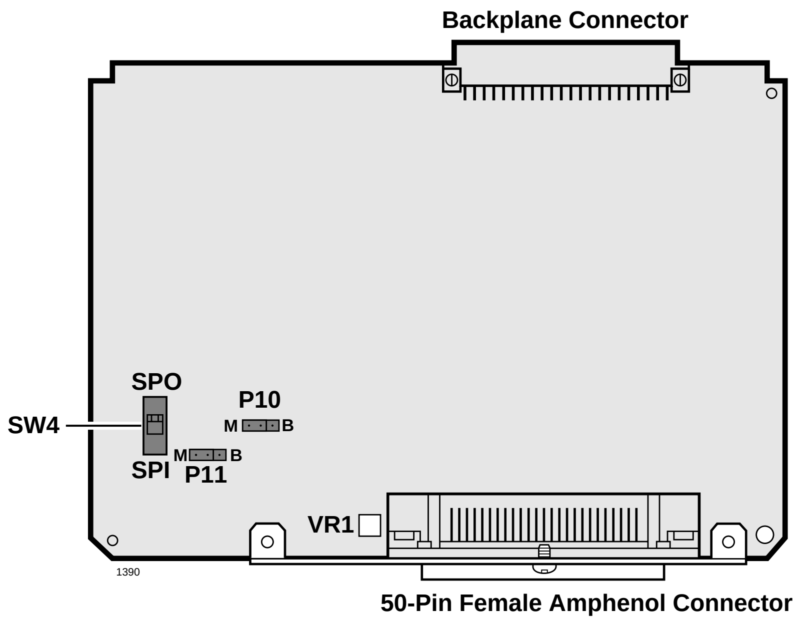


Figure 7-5 PEPU PCB

PESU
Standard/Electronic Telephone Interface Unit

System: *DK40i Expansion KSU, DK424*

Circuits per PCB: *two standard telephone or two-wire device circuits (circuits 1,2)/ four electronic telephone circuits (circuits 5~8)*

Interfaces with:
standard telephone circuits
standard telephones
voice mail ports
off-premises stations
alternate BGM source
auto attendant digital announcer

electronic telephone circuits
electronic telephones
alternate BGM source (circuit 8 only)
EOCU PCB for OCA
HDCB (circuit 5 only–ports 004, 012, 020, and 028)
external conference amplifier

Older Version(s): *none*

The PESU provides a ring generator that can be set for either 130V P-P or 190V P-P for the two standard interface circuits. PESU circuits 3 and 4 are nonfunctional, but they are each assigned a port in system programming.

Note For the system to recognize the DTMF tones generated by a standard telephone (or any other device connected to a standard telephone port), a DTMF receiver unit (RRCS4, 8, or 12) must be installed on the DK40i K4RCU3 or the DK424 common control unit.

PESU controls and interface connectors are shown in Figure 7-6 and described in Table 7-4.

DK40i General Information

The PESU must be installed in the DK40i Expansion KSU in place of RDSU, RSTU or PDKU. See Chapter 2 – DK40i Configuration.

CAUTION! To prevent system malfunction, DO NOT install the PESU in slot 18 of the DK40i system.

Installing the Speaker Off-hook Call Announce Unit (EOCU) (Internal Option)

1. Mate the EOCU connectors J10, J20, J40, J50, and J60 (Figure 7-6) with the PESU connectors P10, P20, P40, P50, and P60.

Note PESU connectors P10, P20, P40, P50, and P60 are positioned to allow installation of the EOCU only in the proper position.

2. Apply firm, even pressure to the EOCU to ensure proper mating of connectors.
3. Use three-pair cable for connecting the PESU and the Speaker OCA electronic telephone. Refer to Chapter 8 – DK40i/DK424 Universal Slot PCB Wiring for wiring/ interconnecting details.

4. See "PDIU-DI Installation into 1000-series Digital Telephone" on Page 9-9 for procedures to add required speaker OCA upgrade to electronic telephones.

External Options

Note Refer to Chapter 9 – Station Apparatus to connect electronic telephones (including the following upgrades: HVSU2 or HVSU/HVSI for Off-hook Call Announce and HHEU for headset and/or Loud Ringing Bell interface), standard telephones, and HDCBs to the PESU. See Chapter 10 – Peripheral Installation to connect peripherals.

PESU Configuration to Support Door Phone/Lock Control Unit (HDCB)

1. Cut the W9 door phone jumper wire on the PESU PCB.
2. See "Door Phone/Lock Programming" on Page 9-24 for installation procedures for the HDCB and associated door phones (MDFBs) and door lock control.
3. Each HDCB requires dedicated use of circuit 5 of a particular PESU PCB.

PESU Configuration to Support Background Music (BGM) Source

1. Cut the W7 (BGM) jumper wire on the PESU.
2. Refer to Chapter 10 – Peripheral Installation for BGM installation procedures.

PESU Configuration for Square Wave Ring Generator

➤ Ensure the P90 jumper plug is set to the "H" (190V P-P) position for initial installation. The "L" (130V P-P) position is used if devices connected to the PSTU1 or PSTU2 experience ring trip.

PESU Installation

1. Make sure that the PESU subunit (ESTS) is securely attached to the PESU (Figure 7-6).

WARNING! The protective shield on the back of the PESU is designed to protect the installer from potentially hazardous ring voltage. Do not remove this shield.

2. Ensure the PESU has been configured for the appropriate hardware options. "PESU Controls, Indicators, and Connectors" on Page 7-15.
3. Insert the PESU into the appropriate slot, and apply firm, even pressure to ensure proper mating of connectors.

CAUTION! To prevent system malfunction, DO NOT install the PESU in slot 18 of the DK40i system.

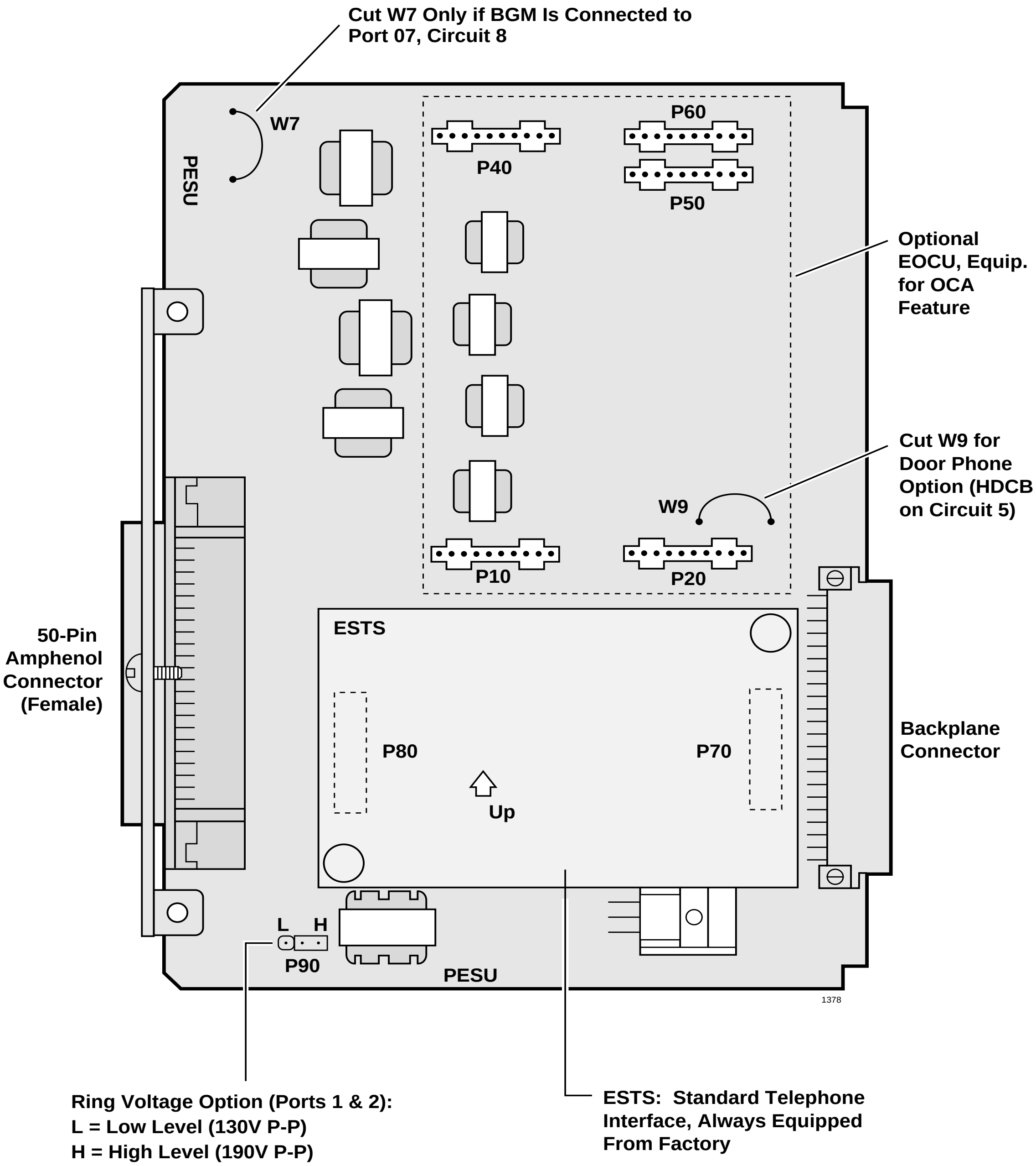
4. After installing the PESU, gently pull it outward. If the connectors are properly mated, a slight resistance will be felt.

PESU Programming

Enter Code 25 in Program 03 for a non-optioned PESU or Code 26 for a PESU supporting Off-hook Call Announce. To program the PESU standard telephone ports, see “PESU Programming” on Page 7-15. To program the PESU electronic telephone ports, see “PESU Programming” on Page 7-15. If there are no PESU options, skip Program 03 and run Program 91 instead.

Table 7-4 PESU Controls, Indicators, and Connectors

Control/Indicator/Connector	Type of Component	Description
Off-hook call announce P10	10-pin connector	Interface connector for optional Off-hook Call Announce subassembly connector (used with P20, P40, P50, and P60).
Off-hook call announce P20		Used with P10, P40, P50, and P60.
Off-hook call announce P40		Used with P10, P20, P50, and P60.
Off-hook call announce P50		Used with P10, P20, P40, and P60.
Off-hook call announce P60		Used with P10, P20, P40, and P50.
Ring voltage jumper plug P90	3-terminal jumper	Sets ring generator voltage level for circuits 1 and 2. H=190V P-P (factory setting) L=130V P-P
Door phone W9 jumper wire	White jumper wire	When cut, configures PESU, circuit 5 for installation of an optional HDCB.
BGM W7 jumper pack		When cut, configures PESU, port 07, circuit 8, for BGM source connection (slot 01 only with PCTU2 and PCTU1).



Note Connect two ringers maximum per port (H or L).

Figure 7-6 PESU PCB

PIOU2, PIOUS2
Option Interface Units

System:	*DK40i Expansion KSU, DK424*
Circuits per PCB:	*(see interfaces)*
Interfaces with:	*night transfer/music hold control relay* *door lock/external amplifier control relay* *remote maintenance (IMDU)* *TTY port–terminal, modem, SMDI, ACD/MIS (DK424 only)* *SMDR output* *alarm sensor* *zone page interface–four zones (PIOU2 only)* *built-in paging amplifier (PIOU2 only)* *unamplified page output*
Older Version(s):	*none*

The PIOU2 and PIOUS2 both provide a circuit interface with the system peripheral options. A maximum of three PIOU2 or PIOUS2 PCBs can be installed in the system. (see "PIOU2, PIOUS2 Installation" on Page 7-18).

DK40i General Information: On the DK40i, the Base KSU provides the 600 ohm page output; the 600 ohm page output on the PIOU2, PIOUS2 is not used on the DK40i.

PIOU2 controls, indicators, and interface connectors are shown in Figure 7-8 and described in Table 7-6. PIOUS2 information is provided in Figure 7-9 and Table 7-7.

IMDU Compatibility with PIOU and PIOUS

The compatibility of the IMDU1 and IMDU2A PCBs are shown in Table 7-5.

Table 7-5 IMDU and PIOU/PIOUS Compatibility

PIOU/PIOUS	IMDU1	IMDU2A
PIOU1A/PIOUS1A	Available	Available
PIOU2A/PIOUS2A	N/A	Available

IMDU2 Installation onto a PIOU2 or PIOUS2 (Internal Option)

1. Make sure IMDU2 P3 is set for PCM Mu Law operation in the U.S and Canada.
2. Make sure IMDU2 P1, modem transmit gain is set on L in the U.S and Canada.
3. Make sure IMDU2 P2, modem receive gain is set on L in the U.S and Canada.
4. On the PIOU2 or PIOUS2, set the SW3 switch to the "MODEM" position for IMDU2 operation.
5. Set the P13 jumper plug on the PIOU2 or PIOUS2 to the "BELL."

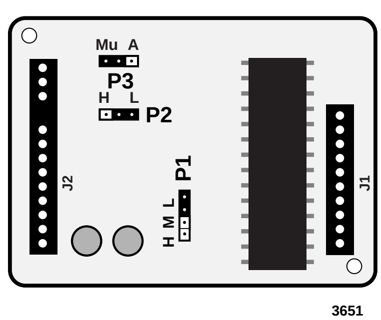


Figure 7-7 Remote Maintenance Modem (IMDU2) Installation

6. Mate IMDU2 connector J1 with PIOU2 or PIOUS2 connector P1 and IMDU2 J2 with P2 and P3 (see Figure 7-7).

Note PIOU2 or PIOUS2 connectors P1, P2, and P3 are positioned to allow installation of the IMDU2 only in the proper position.

7. Refer to the *Strata DK Programming Manual* and turn LED 14 on in Program 77-1 to enable IMDU2 operation.

Note The IMDU2 default station intercom or [DN] is #19.

8. Apply firm, even pressure to the IMDU2 to ensure proper mating of connectors.
9. Set the SW2 baud rate switch on the front panel to 300 or 1200, as appropriate, after the PCB has been installed in the KSU/cabinet (in for 300 bps, out for 1200 bps).

Note Refer to Chapter 10 – Peripheral Installation for external option installation procedures.

PIOU2, PIOUS2 Installation

1. Make sure that P15 is in the Mu Law position for USA and Canada.
2. Ensure that the PIOU2 or PIOUS2 has been configured for the appropriate hardware options. (Refer to Chapter 10 – Peripheral Installation for more details.)
3. Insert the PIOU2 or PIOUS2 (component side facing right) into the last slot ("S16") of the Base KSU/cabinet if the system only has a Base KSU/cabinet and no Expansion KSUs/cabinets. If there are Expansion KSUs/cabinets, install the PIOU2 or PIOUS2 in the highest slot number in any KSU/cabinet. Apply firm, even pressure to ensure proper mating of connectors.

Note In DK40i, PIOU2 or PIOUS2 can be installed in any available Expansion KSU.

4. After installing the PIOU2 or PIOUS2, gently pull the PCB outward. If the connectors are properly mated, a slight resistance is felt.

PIOU2, PIOUS2 Programming

Program 03: Specify Code 41, 42, or 43 for the slot that will support a PIOU2 or PIOUS2. (See "Multiple Serial Port Installation" on Page 11-2)

Note Program 76 assignments for RSIU, RSIS, RMDS will override Program 03 assignments (41, 42, and 43) for SMDI, SMDR, TTY, and maintenance modem.

Program 10-2: Activates External Page with All Call Page (with access code #39 only, not with **All Call Page** button).

Program 60: Assigns SMDR options.

Program 77-1: Assigns relay control and IMDU2 options.

Program 78: Sets Night Ringing over External Page

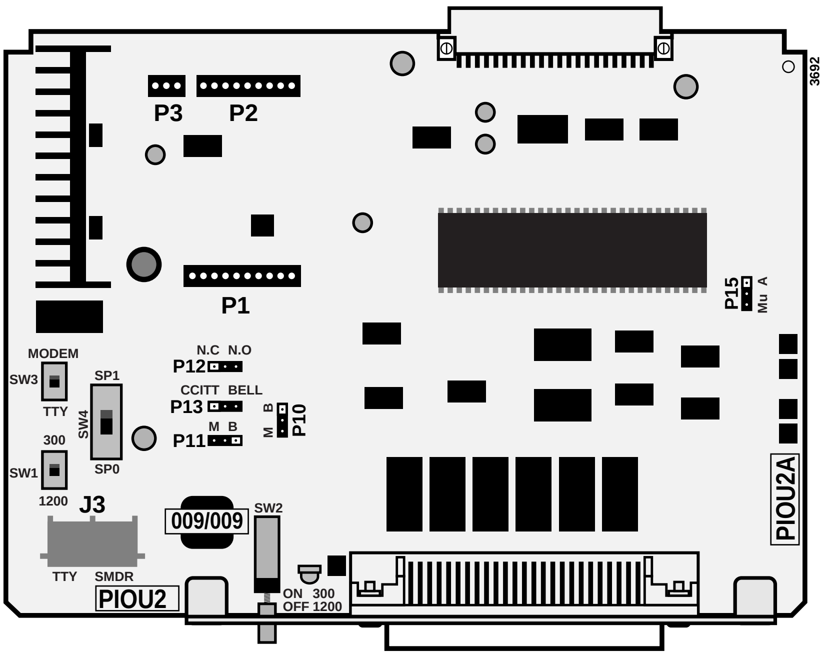


Figure 7-8 PIOU2 PCB

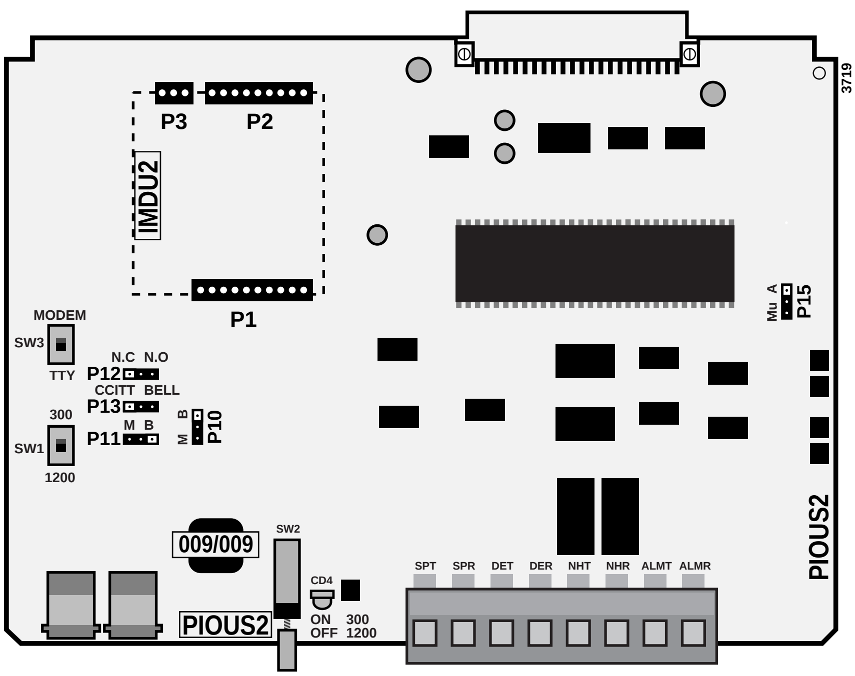


Figure 7-9 PIOUS2 PCB

Table 7-6 PIOU2 Controls, Indicators, and Connectors

Control/Indicator/Connector	Type of Component	Description
SMDR/TTY interface connector J3	Dual modular connector	Interface connector for SMDR printer/call accounting device and maintenance terminal/ modem.
IMDU2 connector P1	10-pin connector	Interface connector for remote maintenance modem piggy-back module.
IMDU2 connector P2	9-pin connector	
IMDU2 connector P3	3-pin connector	
M/B make/break jumper plug P10	Plastic jumper	External Page/Door Lock Control Relay Make or Break jumper plug.
M/B make/break jumper plug P11		Night/Hold Relay Make or Break jumper.
Alarm sensor N.O./N.C. jumper plug P12		Alarm sensor normally open or closed jumper.
CCITT/BELL plug P13		IMDU2 or external modem operating specification jumper plug.
SMDR baud rate switch SW1	2-position slide switch	Selects baud rate (300 or 1200 bps) for SMDR printer or call accounting device.
TTY baud rate switch SW2	2-position locking push-button switch	Selects baud rate (300 or 1200 bps) for Remote Maintenance Modem piggy-back module (IMDU2) or external TTY jack.
Modem/TTY switch SW3	2-position slide switch	Enables PIOU2 for operation with IMDU2 modem or TTY jack.
SPO/SP1 internal/external amplifier switch SW4		Selects built-in 3-watt amplifier (SPI) or 600-ohm output (SPO) for external page/BGM operation.
Volume control VR1	Trim potentiometer	Adjusts volume of built-in 3-watt amplifier.
PCM A Law/Mu Law option P15	3-terminal jumper plug	Default set for Mu Law standard (applies to the U.S., Canada and Japan). A Law is used in Mexico, the United Kingdom, and other parts of Europe and Asia.
*Most modems in USA require BELL specification. **Top modular is TTY and Bottom modular is SMDR.		

Table 7-7 PIOUS2 Controls, Indicators, and Connectors

Control/Indicator/Connector	Type of Component	Description
SMDR/TTY interface connector J3	Dual modular connector (top modular is TTY, bottom is SMDR)	Interface connector for SMDR printer/call accounting device and maintenance terminal/ modem.**
IMDU2 connector P1	10-pin connector	Interface connector for remote maintenance modem piggy-back module.
IMDU2 connector P2	9-pin connector	
IMDU2 connector P3	3-pin connector	
M/B make/break jumper plug P10	3-terminal jumper plug	External Page/Door Lock Control Relay Make or Break jumper plug.
M/B make/break jumper plug P11		Night/Hold relay make or break jumper plug.
Alarm sensor N.O./N.C. jumper plug P12		Alarm sensor normally open or normally closed jumper plug.
CCITT/BELL jumper plug P13		IMDU2 or external modem operating specification jumper plug.
SMDR baud rate switch SW1	2-position slide switch	Selects baud rate (300 or 1200 bps) for SMDR printer or call accounting device.
TTY baud rate switch SW2	2-position locking push-button switch	Selects baud rate (300 or 1200 bps) for Remote Maintenance Modem piggy-back module (IMDU) or external TTY jack.
Modem/TTY switch SW3	2-position slide switch	Enables PIOUS2 for operation with IMDU2 modem or TTY jack.
PCM A Law/Mu Law option P15	3-terminal jumper plug	Default set for Mu Law standard (applies to the U.S., Canada and Japan). A Law is used in Mexico, the United Kingdom, and other parts of Europe and Asia.
*Most modems in USA require BELL specification. **Top modular is TTY and Bottom modular is SMDR.		

RATU
Attendant Console Interface Unit

System: *DK424*
Circuits per PCB: *four attendant console circuits*
Interfaces with: *up to four conventional and/or PC attendant consoles*
Older Version(s): *none*

RATU controls and indicators are illustrated in Figure 7-10 and described in Table 7-8.

RATU Installation

1. Insert the RATU (component side facing right) into the slot following the last station PCB. Apply firm, even pressure to ensure proper mating of connectors (consoles will assume the next four station port numbers). (See Worksheets in Chapter 4 – DK424 Configuration for RATU slot assignment recommendations.
2. After installing the RATU, gently pull the PCB outward. If the connectors are properly mated, a slight resistance is felt.

Table 7-8 RATU Controls, Indicators, and Connectors

Control/Indicator/Connector	Type of Component	Description
Console 1 indicator CD3	Red LED	Lights when a PC or conventional console is not operating. The LED will turn off when the console is operational. The LED temporarily flashes when the console is first installed and the DK424 RCTU processor and attendant console or RATI initialize.
Console 2 indicator CD4		
Console 3 indicator CD5		
Console 4 indicator CD6		

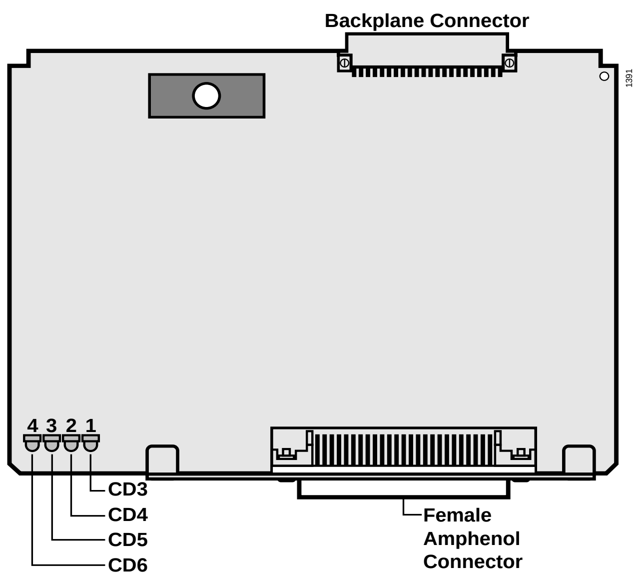


Figure 7-10 RATU PCB

RCIU1, RCIU2, RCIS Caller ID Interface

System:	*RCIU1–DK424* *RCIU2 –DK40i Expansion KSU, DK424* *RCIS–DK424*
Circuits per PCB:	*four Caller ID circuits*
Interfaces with:	*loop or ground start lines w/Caller ID (requires RCOU or RGLU2)*
Older Version(s):	*none*

The RCIU1, RCIU2 PCB provides the Caller ID feature, also known as Calling Number Delivery (CND). There are two types of RCIU PCBs, RCIU1 and RCIU2. RCIU1 can be used in DK424 systems. RCIU2 can be used in DK424 and DK40i systems.

CAUTION! **To prevent system malfunction, DO NOT install RCIU1 in the DK40i system.**

Caller ID can be provided on analog loop start lines (PCOU, KCDU, RCOU PCBs) and analog ground start lines (RGLU2 PCB) only. It is not available on any other type of analog lines (RDDU/DID and/or REMU, PEMU Tie) or any type of digital lines (RDTU- T1, including ground start, loop start, DID and Tie lines).

An RCIU1/RCIS or RCIU2/RCIS circuit must be available in addition to each RCOU, RGLU, etc., line that is to receive Caller ID. When ordered from the factory, the RCIU1, RCIU2 PCB comes equipped with four caller ID circuits.

RCIS PCB

An RCIS piggy-back PCB can be installed onto the RCIU to provide an additional four caller ID circuits. Hence, an installed RCIU/RCIS can provide a maximum of eight caller ID circuits per cabinet slot.

To provide up to eight circuits, always install RCIS onto RCIU1 (DK424 only) or RCIU2 (DK40i and DK424) instead of installing two RCIU PCBs (Program 03 code 81 always assigns each RCIU slot with eight software caller ID circuits).

Each RCIU/RCIS Caller ID circuit has a two-wire tip/ring interface which must be bridge-wired across its corresponding ground or loop start CO line tip/ring on the MDF (see Figure 8-27 on Page 8-28). Each RCIU/RCIS modular jack provides interface for two Caller ID circuits.

DK40i RCIU2 Installation

➤ Install RCIU2 in *slot 17 only* (see Figure 7-12 and Chapter 2 – DK40i Configuration.)

DK424 RCIU1 or RCIU2 Installation

➤ Install the RCIU1/RCIU2 PCBs in any universal cabinet slot of the DK424 (except slot 11 or slot 12 if the RSIU is installed in slot 11).

Note It is not necessary to install the RCIU1, RCIU2, RCIU1/RCIS, or RCIU2/RCIS PCBs in the same cabinet as their associated CO lines or in slots adjacent to the lines.

DK424 RCIU1/RCIS or RCIU2/RCIS Installation

1. Install the RCIS onto the RCIU1 or RCIU2 as required (see Figures 7-11 and 7-13).
2. Install the RCIU1/RCIS or RCIU2/RCIS into the appropriate cabinet slot. The circuit modular jack numbering and the tip/ring cross connect wiring of RCIU1/RCIS or RCIU2/RCIS to RCOU, PCOU, or RGLU is shown in Figure 8-25 on Page 8-26.

Note It is not necessary to install the RCIU1, RCIU2, RCIU1/RCIS, or RCIU2/RCIS PCBs in the same cabinet as their associated CO lines or in slots adjacent to the lines.

RCIU1, RCIU2, RCIS Programming

Program 03: Program each RCIU1, RCIU2, RCIU1/RCIS or RCIU2/RCIS (four or eight Caller ID circuit) slot with code 81.

Note RCIU1/RCIS or RCIU2/RCIS caller ID circuits are numbered automatically in numerical order starting with the RCIU1/RCIS or RCIU2/RCIS installed in the lowest slot number. Slots with code 81 increment the Caller ID circuit numbers by eight circuits even if RCIS is not installed on the RCIU1 or RCIU2.

Program *50: Assigns CO lines that will receive Caller ID to an associated RCIU1/RCIS or RCIU2/RCIS Caller ID circuit number. This assignment is flexible, i.e., any RCOU, PCOU, RGLU Caller ID CO line can be assigned to any RCIU1, RCIU2 or RCIS caller ID circuit number.

Note After assigning CO lines to caller ID circuits, turn system power OFF for approximately five seconds and then back ON or run Program 91-2 to activate Program *50 assignments.

Program *51: Sets the Caller ID (CLID)/Automatic Dialed Number Identification (ANI) memory allocation for the appropriate stations. This memory is used to save CLID/ANI telephone numbers for calls that are received but not answered (abandoned calls). CLID/ANI numbers are not saved in station memory if they are answered. Stations can be allocated with memory to save up to 100 numbers in 10-number increments.

The total memory allocated to all stations in a system is:

- RCTUE/F = 2000 numbers
- RCTUC/D = 1000 numbers
- RCTUBA/BB = 400 numbers
- RCTUA and DK40i = 200 numbers

Note When a CO line rings multiple stations, a station must be the owner of the Caller ID or ANI CO line to be able to save abandoned call (Caller ID and/or ANI) telephone numbers. (See Program *52.)

Program *52: Assigns stations as owners of Caller ID CO lines. These stations will store the Caller ID telephone numbers received on abandoned (not answered) calls for the lines which they own. Typically all common CO lines are assigned to one designated telephone or attendant console and private lines are assigned to individual private line telephones.

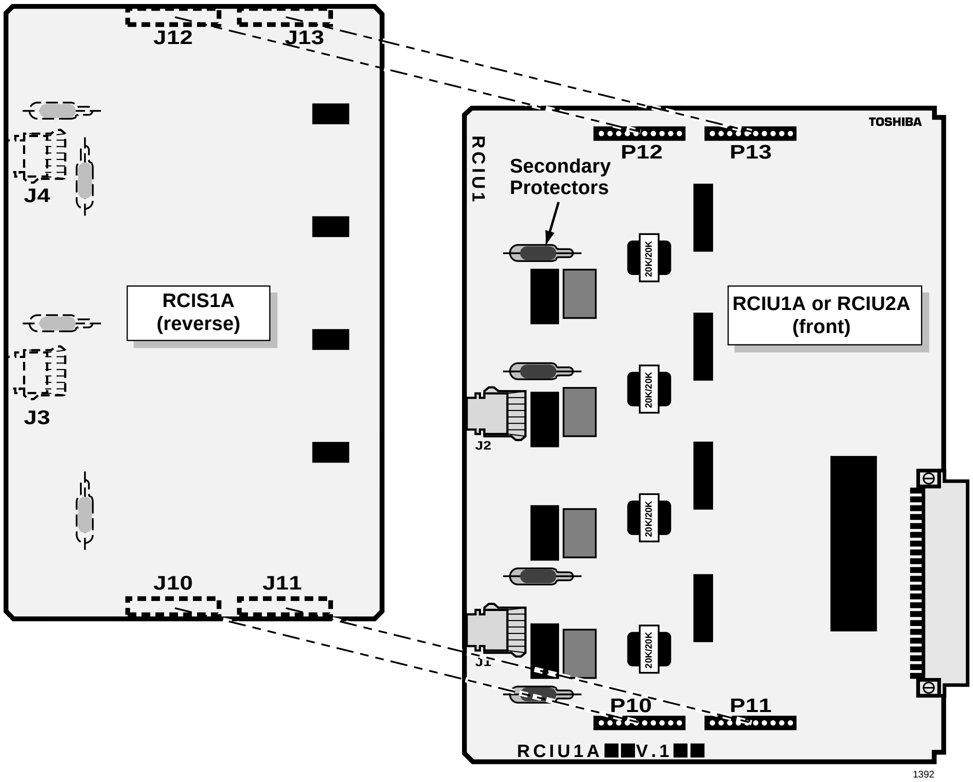


Figure 7-11 DK424 RCIU1/RCIS or DK40i RCIU2/RCIS PCB Installation

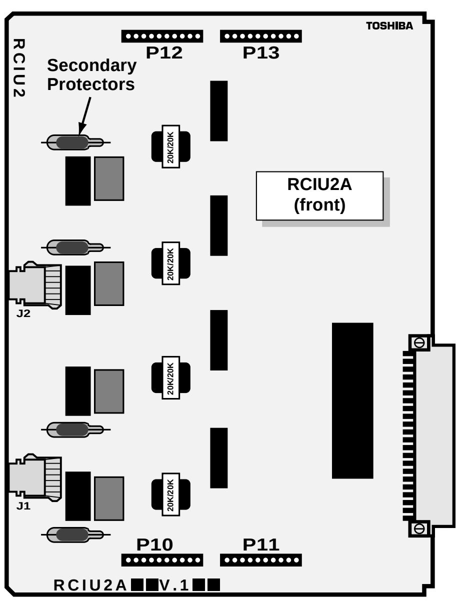


Figure 7-12 DK40i RCIU2 PCB Installation

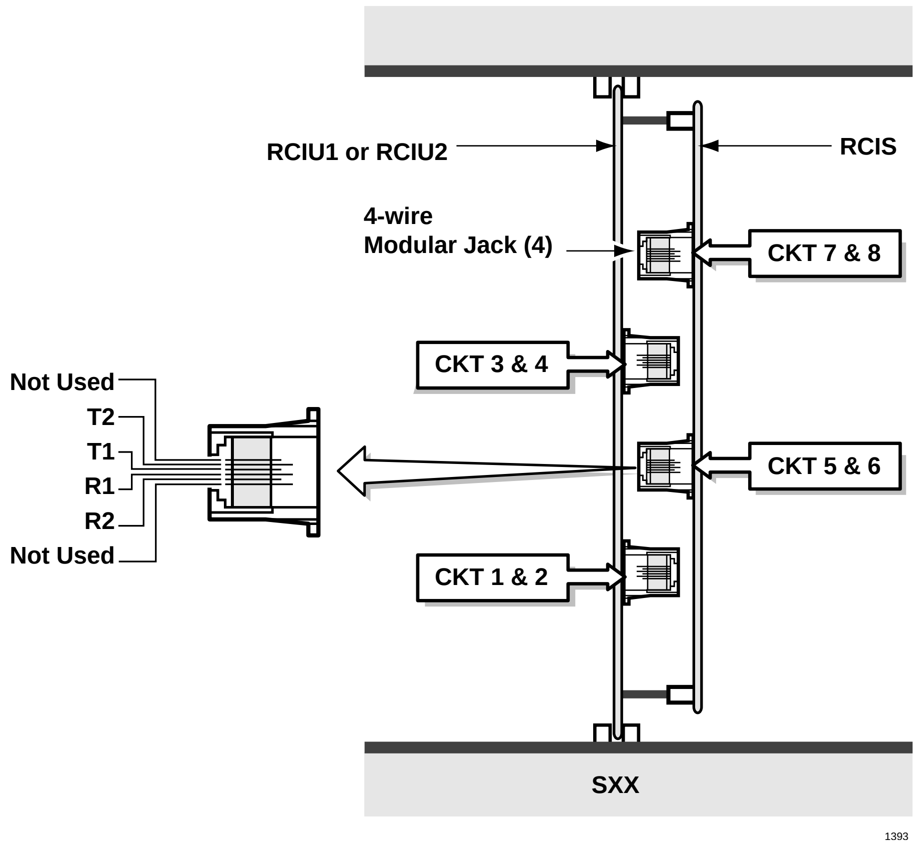


Figure 7-13 DK424 RCIU1/RCIS or RCIU2/RCIS PCB Modular Jack Positions

Note A station must also be allocated with Caller ID/ANI storage memory in Program ⁎51 to store abandoned call telephone numbers.

Program 39, Code 462: Assigns the Caller ID/ANI **Lost Call Auto Dial** button to LCD telephones that store Caller ID and/or ANI abandoned call telephone numbers. A user can scroll through the stored abandoned call telephone numbers and auto dial the selected number using this button.

Program 59, Code 462: Assigns the CLID/ANI **Lost Call Auto Dial** button to the attendant consoles that store Caller ID and/or ANI abandoned call telephone numbers. A console user can scroll through the stored abandoned call telephone numbers and auto dial the selected number using this button.

Program 10-3, Key 08: Determines if CLID and/or ANI telephone numbers will be sent out the system SMDI port:

- ➤ Turn LED 08 ON if the CLID and/or ANI numbers received should be sent out the system SMDI port.
- ➤ Turn LED 08 OFF if the CLID and/or ANI numbers received should not be sent out the system SMDI port.

Note The system will initialize with LED 01 OFF, i.e., no CLID/ANI information will be sent out the SMDI port.

Program 60-1, Key 01: Determines which information will be sent out the system SMDR port, i.e., system Account Codes or CLID and/or ANI telephone numbers:

- ➤ Turn LED 01 ON if CLID and/or ANI information should be sent out the system SMDR port.
- ➤ Turn LED 01 OFF if Account Codes information should be sent out the system SMDR port.

Note The system will initialize with LED 01 OFF, i.e., Account Codes information will be sent out the SMDR port.

Program 77-4, LED 01/LED 02 (DK424 Release 3.2 and above): Enables CLID, ANI, and/or Dialed Number Identification Service (DNIS) information to be sent from the RSIU Open Architecture (OA) port on ACD calls only:

- ➤ Turn LED 01 ON if the OA port should send CLID and/or ANI information.
- ➤ Turn LED 01 OFF if the OA port should not send Caller ID/ANI.
- ➤ Turn LED 02 ON if the off port should send DNIS information.
- ➤ Turn LED 02 OFF if the OA port should not send DNIS information.

Notes

- Program 77-4 allows LED 01 and LED 02 to be turned ON simultaneously to allow CLID, ANI, and DNIS information to be sent from the OA port on ACD calls.
- The system will initialize with LED 01 and LED 02 OFF, i.e., no CLID, ANI, or DNIS information will be sent from the OA port on ACD calls.

RCOU, RCOS
Four-Circuit Loop Start CO Line Interface Unit

System:	*RCOU–DK40Expansion KSU, DK424* *RCOS–DK40i, DK424*
Circuits per PCB:	*four loop start CO line circuits*
Interfaces with:	*loop start lines*
Older Version(s):	*PCOU2 (does not have ABR circuitry, uses RCTU, K4RCU ABR circuits)* *PCOU1(has ABR circuitry, identical and interchangeable w/PCOU2)*

The RCOU also provides ring detection, dial outpulsing, and hold circuitry. Each RCOU line can be programmed for DTMF or dial pulse signaling and gas tube secondary protection.

RCOU PCBs are shown in Figure 7-14 and described in Table 7-9.

RCOS Installation (Internal Option)

An RCOS PCB can be installed on the RCOU of the DK40i and DK424 for four more loop start lines (for a total of eight lines–the RCOS circuits provide the same options as the RCOU). Each RCOS circuit has gas tube secondary protection.

Excessive loudness which is caused by close proximity to a CO or PBX telephone can be fixed through the RCOS and RCOU decibel (dB) PAD switches. RCOS dB switches SW501, SW601, SW701, and SW801 and RCOU dB switches SW101, SW201, SW301, and SW401 provide a -3 dB signal level drop between the PBX and CO when set to position 3. Switches are factory-set at the 0 (0 dB signal level drop) position.

See Figure 7-12 and Table 7-10 for RCOS controls, indicators, and interface connectors.

➤ To install an RCOS PCB

1. If the Strata DK system is within one mile of the PBX or CO, set the RCOS dB PAD switches SW501, SW601, SW701, and SW801 to the 3 (-3 dB signal level drop) position. Set the RCOU dB PAD switches to position 3 also.

Note RCOU male connectors P11, P12, P13, and P14 are positioned to allow installation of the RCOS only in the proper position.

2. Mate the RCOS female connectors J11, J12, J13, and J14 (Figure 7-16) to the RCOU male connectors P11, P12, P13, and P14 (Figure 7-14).
3. Apply firm, even pressure to the RCOS to ensure proper mating of connectors.

RCOU Installation

Note The decibel (dB) PAD switches SW101, SW201, SW301, and SW401 control excessive loudness resulting from close proximity to a Central Office or PBX telephone office by providing a -3 dB signal level drop to, or from, the PBX or CO when set to the 3 position. Switches are factory-set to the 0 (0 dB signal level drop) position.

➤ **To install an RCOU PCB**

1. If the Strata DK system is within one mile of the PBX or Central Office, set the RCOU dB PAD switches SW101, SW201, SW301, and SW401 to the 3 (-3 dB signal level drop) position.
2. Insert the RCOU (component side facing right) into the appropriate slot and apply firm, even pressure to ensure proper mating of connectors. PCOU2 can be installed in place of RCOU, see Chapter 2 – DK40i Configuration.
3. After installing the RCOU, gently pull the PCB outward. If the connectors are properly mated, a slight resistance is felt.

RCOU Programming

Program 03: Specify Code 11 for each slot that will support an a four-circuit RCOU (without an RCOS). Specify Code 17 for each slot that will support an RCOU equipped with an RCOS.

Note Program 03 can be skipped, and Program 91 can be run instead. Program 91 recognizes the RCOS.

Program 10-1: Enables or disables line-to-line Conference and Direct Inward System Access (DISA).

Program 15: Assigns DTMF/Dial Pulse dialing, DISA, and additional attributes to each line. Automatic Release (AR) assignments only need to be made for loop start lines; AR is automatically enabled for ground start CO lines.

Program *15: Makes tenant assignments.

Program 16: Assigns lines to line groups.

Program 39: Assigns line access buttons to digital and electronic telephones.

Program 40: Assigns station access to lines (incoming and outgoing).

Program 41: Assigns station access to lines (outgoing only).

Program 42-0, 1~8: Assigns behind PBX/Centrex operation to each line.

Programs 45 ~ 48: Defines Toll Restriction for any line.

Programs 50 ~ 56: Defines Least Cost Routing assignments.

Program *50: Assigns Caller ID circuits (RCIU1, RCIU2, RCIS) to CO lines.

Program *52: Caller ID line owner station assignment.

Program 78: Assigns special ringing of lines: includes Night Ring Over Page, DISA, Remote Maintenance via the Internal Maintenance Modem (IMDU), and Integrated Auto Attendant.

Programs 81 ~ 89:

- Assigns lines to ring selected stations and DH groups.
- Assigns Delayed Ringing to any line.

Programs *81, *84, *87: Assigns which [DN] will flash when the CO line rings a telephone.

Program 93: Assigns names to lines.

Table 7-9 RCOU Controls, Indicators, and Connectors

Control/Indicator/Connector	Type of Component	Description
CO line circuit 1~4 indicators	Red LED	Lights to indicate that line circuit is in operation. (CO line indicator will not light unless RCOU is connected to a CO line).
J1 connector	Modular connector	Interface connector for CO line circuits 1 and 2.
J2 connector	Modular connector	Interface connector for CO line circuits 3 and 4.
PAD switch SW101 (circuits 1)	2-position slide switch	Enables -3dB signal level drop for CO line circuit.
PAD switch SW201 (circuit 2)		
PAD switch SW301 (circuit 3)		
PAD switch SW401 (circuit 4)		
RCOS connector P11, P12, P13, P14	10-pin male connector	Interface connector for RCOS 4-circuit loop start CO line unit.

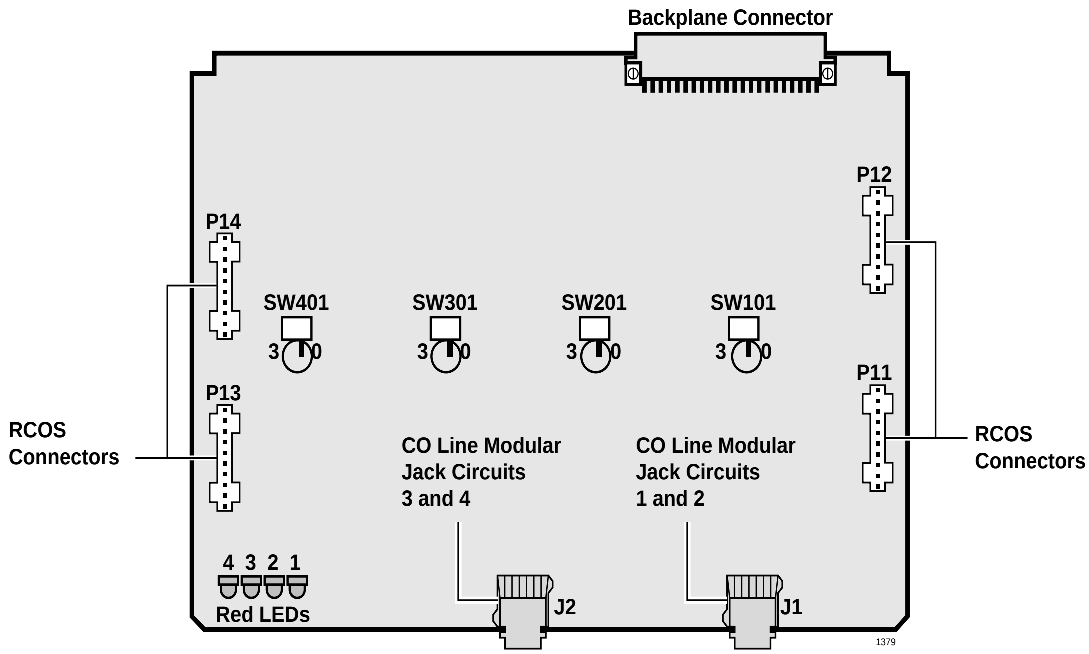


Figure 7-15 RCOU PCB

Table 7-10 RCOS Controls, Indicators, and Connectors

Control/Indicator/Connector	Type of Component	Description
CO line circuit 5~8	Red LED	Lights to indicate that line circuit is in operation. (CO line indicator will not light unless RCOU is connected to a CO line).
J3 connector	Modular connector	Interface connector for CO line circuits 5 and 6.
J4 connector	Modular connector	Interface connector for CO line circuits 7 and 8.
PAD switch SW501 (circuit 1)	2-position slide switch	Enables -3dB signal level drop for CO line circuit.
PAD switch SW601 (circuit 2)		
PAD switch SW701 (circuit 3)		
PAD switch SW801 (circuit 4)		
RCOU connector J11, J12, J13, J14	Female connector	Interface connector for RCOU 4-circuit loop start CO line unit.

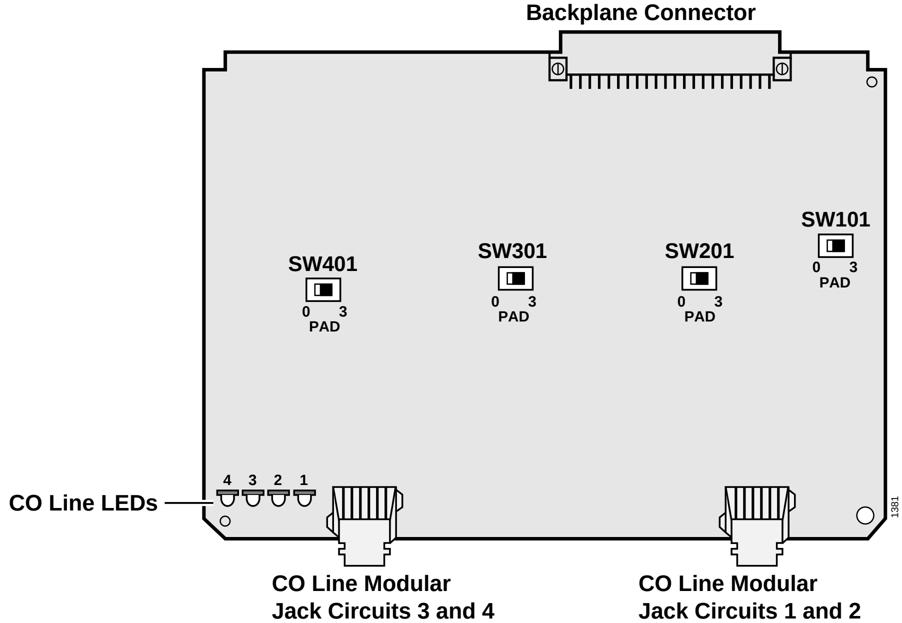


Figure 7-16 DK40i and DK424–RCOS Controls, Indicators, and Connector

Table 7-11 PCOU2 Controls, Indicators, and Connectors

Control/Indicator/Connector	Type of Component	Description
CO line circuit 1 CD112	Red LED	Lights to indicate that line circuit is in operation. CO line indicator will not light unless PCOU is connected to a CO.
CO line circuit 2 CD212		
CO line circuit 3 CD312		
CO line circuit 4 CD412		
J1 connector	Modular connector	Interface connector for CO line circuits 1 and 2.
J2 connector		Interface connector for CO line circuits 3 and 4.
PAD switch SW101 (circuit 1)	2-position slide switch	Enables -3dB signal level drop for CO line circuit.
PAD switch SW201 (circuit 2)		
PAD switch SW301 (circuit 3)		
PAD switch SW401 (circuit 4)		

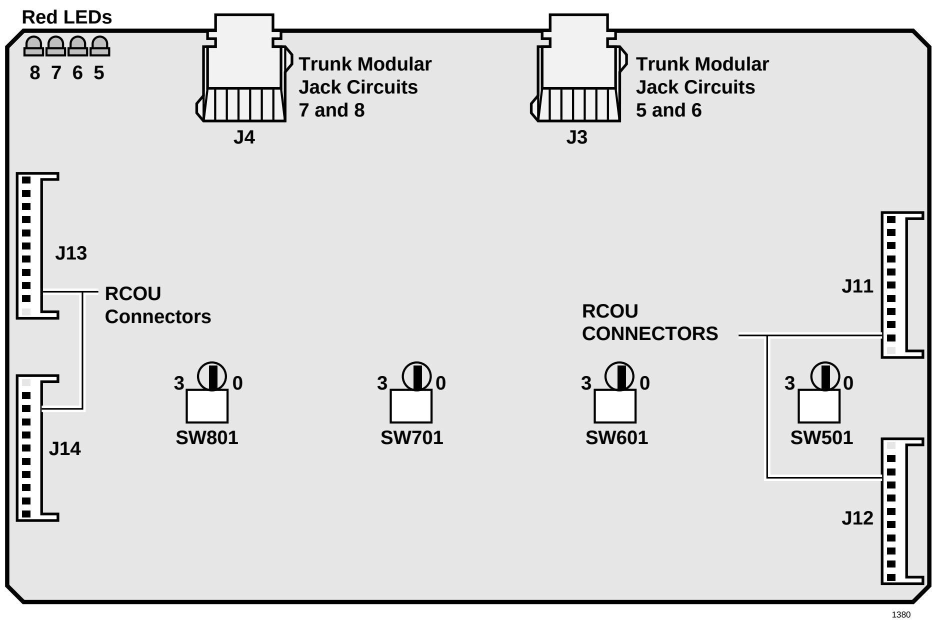


Figure 7-17 DK424 – PCOU2 PCB

RDDU
Direct Inward Dialing Line Interface Unit

System: *DK40i Expansion KSU, DK424*
Circuits per PCB: *four DID lines*
Interfaces with: *DID (one or two-way) lines*
Older Version(s): *none*

The RDDU provides four Direct Inward Dialing (DID) lines, each of which can have a single office code along with a block of extensions

Note For the system to recognize the DTMF tones generated by incoming DID lines a DTMF Receiver Unit (RRCS -4, -8, or -12) must be installed on the DK40i Base KSU K4RCU3 or on any DK424 RCTU.

RRCS is not required for RDDU dial pulse operation (see Program 30, LED 11).

Each extension can be assigned to ring a station [DN] that appears on one or multiple stations, Distributed Hunt or ACD Group (DK424 only), or an external telephone number selected in system programming. This enables calls over the same line to be routed to different stations or groups of stations. An extension can also be assigned to ring the maintenance modem. Each RDDU can be set for either wink start or immediate. All RDDU lines support DNIS and ANI features.

RDDU controls, indicators, and interface connectors are shown in Figure 7-18 and described in Table 7-12.

RDDU Installation

Note Switches are factory-set to the 0 (0 dB signal level drop) position.

1. If the KSU is located within one mile of the PBX or CO, set dB PAD switches SW101 through SW401 to the 3 (-3 dB signal level drop) position to c*ontrol excessive loudness resulting from close proximity to the PBX or CO.*
2. Sensitivity jumpers P101~P401 are used mostly for dial pulse operation, to adjust for dial pulsing at different loop lengths. If close to the central office, the sensitivity should be set for low (L); as the loop length increases, it should be set to medium (M), then high (H).
3. Insert the RDDU (component side facing right) into the appropriate slot and apply firm, even pressure to ensure proper mating of connectors. (For DK40i, RDDU must be installed per tables in Chapter 2 – DK40i Configuration.)

Important! *Each RDDU PCB uses four station ports in software. See Worksheets in Chapter 2 – DK40i Configuration for recommended RDDU slot assignments.*

4. After installing the RDDU, gently pull the PCB outward. If the connectors are properly mated, a slight resistance is felt.

RDDU Programming

Program 03: Specify Code 16 for slots that support RDDUs and make sure RRCS is enabled for DTMF operation. Program 03 can be skipped, and Program 91 can be run instead.

Program *09: Assigns DID line extensions to route to station [PDNs] and IMDU or RMDS Remote Maintenance (see Program 17 below).

Program 10-1: Enables or disables two-line conference.

Program 15: Assigns DTMF/dial pulse dialing, and additional attributes to each line.

Program *15: Makes tenant assignments.

Program 16: Assigns lines to line groups.

Program *17: Assigns intercept port for DID calls to wrong or vacant numbers.

Program 17: Assigns immediate or wink start to DID lines. Also used to assign Auto camp-on and no-dial tone return for DID lines. Program 17 also Assigns DID lines to route per DNIS and ANI options (Program 71 and 72) or DID numbers (Program *09).

Program 30: Disables RRCS for dial pulse operation.

Program 39: Assigns line access buttons to digital and electronic telephones.

Program 40: Assigns station access to lines (incoming and outgoing).

Program 41: Assigns station access to lines (outgoing only).

Program 42-0, 1~8: Assigns behind PBX/Centrex operation to each line.

Programs 45~48: Defines toll restriction for any line.

Programs 50~56: Defines least cost routing assignments.

Programs 71 (1~5): Assigns DNIS or ANI option to DID lines.

Programs *71~*73: Assigns telephone to ring called [DN].

Program 93: Assigns names to lines.

Table 7-12 RDDU Controls, Indicators, and Connectors

Control/Indicator/Connector	Type of Component	Description
PAD switch SW101 (circuit 1)	3-position slide switch	Enables -3 dB signal level drop for line circuit.
PAD switch SW201 (circuit 2)		
PAD switch SW301 (circuit 3)		
PAD switch SW401 (circuit 4)		
J1 connector	Modular connection	Interface connector for DID line circuits 1 & 2
J2 connector	Modular connection	Interface connector for DID line circuits 3 & 4
DID line circuit 1 CD122	Red LED (top)	Lights to indicate line circuit is in operation. (Trunk indicator will not light unless RDDU is connected to a DID line.)
DID line circuit 2 CD222	Red LED	
DID line circuit 3 CD322	Red LED	
DID line circuit 4 CD422	Red LED (bottom)	
Jumper plug P101	3-terminal jumper plug	Adjusts for dial pulsing at different loop lengths.
Jumper plug P201		
Jumper plug P301		
Jumper plug P401		

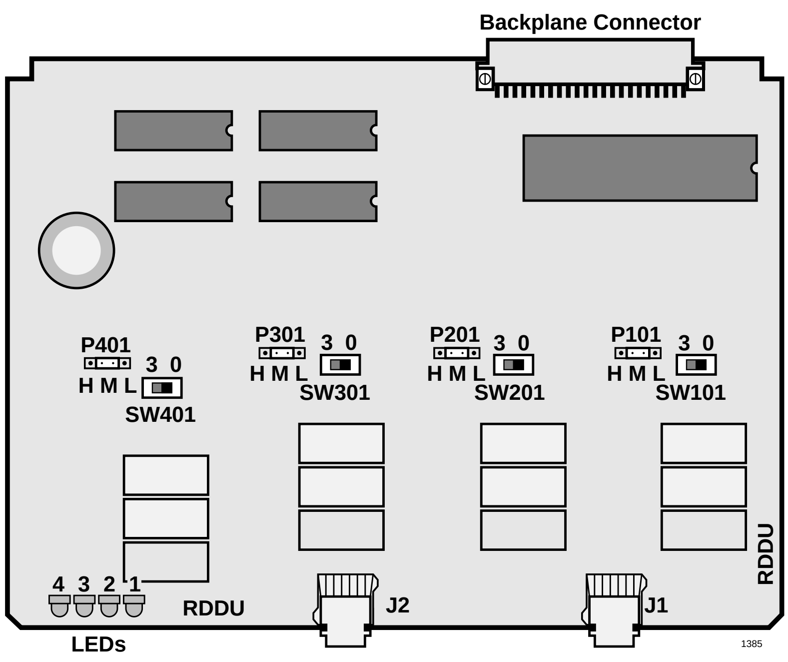


Figure 7-18 RDDU Controls, Indicators, and Interface Connectors

RDSU
Digital/Standard Telephone Interface Unit

System:	*DK40i Expansion KSU only, DK424*
Circuits per PCB:	***(with RSTS)*** *four standard telephone (circuits 1~4)/four digital telephone (circuits 5~8)* ***(without RSTS)*** *two standard telephone circuits (1 and 2)/four digital telephone circuits*
Interfaces with:	***digital circuits*** *digital telephones (with or w/o RPCI-DI or ADM)* *PDIU-DS* *DDCB (circuit 5 only–ports 004, 012, 020, 028)* *cordless digital telephone (DKT2004-CT)* ***standard circuits*** *standard telephones* *voice mail ports* *off-premises stations* *other similar devices* *alternate BGM source (circuit 2 only)* *auto attendant digital announcer* *message waiting lamp*
Older Version(s):	*none*

An optional Standard Telephone Interface Subunit (RSTS) can be attached to the RDSU to provide two more standard telephone ports (circuits 3 and 4).

RDSU and RSTS controls and interface connectors are shown in Figure 7-19. RDSU interface connectors are described in Table 7-13.

Note For the system to recognize the DTMF tones generated by incoming DID lines a DTMF Receiver Unit (RRCS -4, -8, or -12) must be installed on the DK40i Base KSU K4RCU3 or on any DK424 RCTU.

CAUTION! **To prevent system malfunction, DO NOT install the RDSU in slot 18 of the DK40i system.**

Installing R48S Ring Generator (Internal Option)

An optional R48S unit can be connected to the RDSU or RSTU to change the standard telephone loop voltage from -24VDC to -48VDC, extending the standard telephone circuit loop length (including the resistance of the phone) from 600 ohms to 1200 ohms. The features provided by the R48S apply to the RSTS circuits as well as the basic RDSU standard telephone circuits.

➤ To install the R48S on the RDSU

➤ Mate the R48S connectors R6 and R7 with the RDSU connectors R6 and R7. RDSU connectors P6 and P7 are positioned to allow installation of the R48S only in the proper position (Figure 7-26).

Installing RSTS (Internal Option)

➤ Mate the RSTS connectors P2~P5 with the RDSU connectors P2~P5. RDSU connectors P2~P5 are positioned to allow installation of the RSTS only in the proper position (Figure 7-19).

RDSU Installation

1. Ensure the SSTU subunit and optional subassemblies are securely attached to the RDSU (Figure 7-19).

> **WARNING! The protective shield on the back of the RDSU is designed to protect the installer from potentially hazardous ring voltage. Do not remove this shield.**

2. Insert the RDSU into the appropriate slot, and apply firm, even pressure to ensure proper mating of connectors. (See Figure 8-22 on Page 8-23.)

CAUTION! To prevent system malfunction, DO NOT install the RDSU in slot 18 of the DK40i system. See Chapter 2 – DK40i Configuration.

3. After installing the RDSU gently pull the RDSU outward. If the connectors are properly mated, a light resistance is felt.

RDSU Programming

➤ Enter Code 27 in Program 03 for a non-optioned RDSU, or enter Code 28 for an RDSU that support off-hook call announce and data interface units. To program the RDSU standard telephone ports (including the RSTS), see "RDSU Programming" on Page 7-37. To program the RDSU digital telephone ports, see "PDKU2 Programming" on Page 7-6.

➤ If there are no RDSU options, skip Program 03 can be skipped, and run Program 91 instead.

Table 7-13 RDSU, RSTS Controls, Indicators, and Connectors

Control/Indicator/Connector	Type of Component	Description
RSTS connector P2/P3	10-pin connector	Connector for RSTS subassembly that provides two standard telephone circuits.
RSTS connector P4/P5		
R48S connector to P6	8-pin connector	Interface connector for R48S.
R48S connector to P7	6-pin connector	

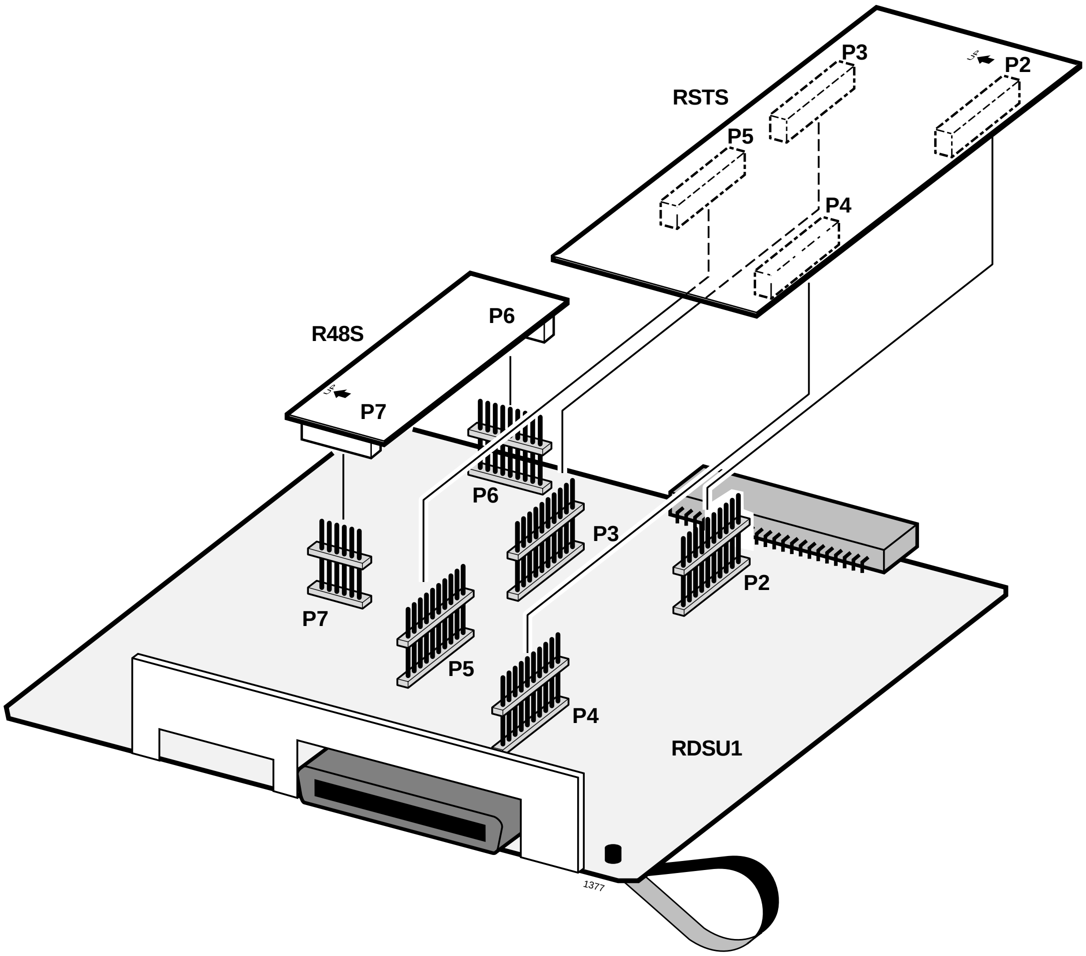


Figure 7-19 RDSU, RSTS PCBs

RDTU T1 Interface Unit

See Chapter 6 – DK424 T1 for RDTU PCB installation and programming information.

REMU Tie Line Unit

System:	*DK40i Expansion KSU, DK424*
Circuits per PCB:	*four Tie line circuits*
Interfaces with:	*E&M Tie lines* *2- or 4-wire transmission* *Type I and II Signaling* *Immediate and Wink Start*
Older Version(s):	*PEMU (Type I signaling & immediate start only, does not provide PAD switches)*

With DK424, Tie lines can route per Program 04 [DN] assignments or Program 71 and 72 DNIS/ANI assignments (see Program 17).

The REMU has four decibel (dB) PAD switches which can be set to reduce excessive loudness resulting from close proximity to a central office or PBX by providing a -3 dB signal level drop to the PBX or central office. (PAD is for Transmit and Receive for 2W operation, and Transmit only is for 4W operation.)

Note For the system to recognize the DTMF tones generated by incoming DID lines a DTMF Receiver Unit (RRCS -4, -8, or -12) must be installed on the DK40i Base KSU K4RCU3 or on any DK424 RCTU.

RRCS is not required for REMU dial pulse operation (see Program 30, LED 11).

REMU controls, indicators, and interface connectors are shown in Figure 7-20 and described in Table 7-14.

PEMU controls, indicators, and interface connectors are shown in Figure 7-21 and described in Table 7-15.

REMU Installation

1. Set the 2W/4W jumper plugs SW103~SW403 to the appropriate positions.
2. Set the P102/104, P202/204, P302/304, and P402/404 jumper plugs for Type 1 or Type 2 signaling.
3. If the system is located within one mile of the PBX or central office, set the REMU dB PAD switches SW101, SW201, SW301, and SW401 to the 3 (-3 dB signal level drop) position.
4. Insert the REMU (component side facing right) into the appropriate slot and apply firm, even pressure to ensure proper mating of connectors. (For DK40i, the REMU, PEMU can be installed only in place of the RDDU per tables in Chapter 2 – DK40i Configuration.)

Important! *Each REMU decreases the maximum system CO line and station ports by four each. See Worksheets in Chapter 2 – DK40i Configuration for recommended REMU slot assignments.*

5. After installing the REMU, gently pull it outward. If the connectors are properly mated, a slight resistance is felt.

PEMU Installation

1. Determine if the E&M Tie lines will be configured for 2- or 4-wire transmission.
2. Set the 2W/4W jumper plugs P103, P203, P303, and P403 to the appropriate positions.
3. Set the FG jumper plug P3 to the “2-3” position.
4. Set all GND/BAT jumper plugs to the “BAT” position for connection to the telephone network.

Note The “GND” position is used to connect PEMU circuits back-to-back on premises only, 1000 feet maximum (E&M lead wires must be crossed).

5. Insert the PEMU (component side facing right) into the appropriate slot and apply firm, even pressure to ensure proper mating of connectors.(For DK40i, the REMU, PEMU can be installed only in place of the RDDU per tables in Chapter 2 – DK40i Configuration.)

Important! *Each PEMU decreases the maximum system CO line and station ports by four each. See Worksheets in Chapter 2 – DK40i Configuration and Chapter 4 – DK424 Configuration for recommended PEMU slot assignments.*

6. After installing, gently pull the PEMU outward. If the connectors are properly mated, a slight resistance is felt.

PEMU, REMU Programming

Program 03: Specify Code 13 for slots that support PEMUs and make sure RRCS is enabled for DTMF operation.

Program 04: Specifies [PDNs]. These are also the numbers that must be received by incoming Tie lines to route calls to the proper telephones (see Program 17, LED 05).

Program 10-1: Enables/disables two-line conference.

Program 15: Assigns tandem connections and dial pulse option to Tie lines.

Program 17: Assigns immediate or wink start to REMU Tie lines.

Important! *Also used to turn on Tie line dial tone return.*

Note When a PEMU or REMU is installed in a system, it automatically assumes the next four consecutive CO line and station port numbers.

Program 30: Disables RRCS for dial pulse operation.

Program 71 (1~5) and Program 72: Tie/DID DNIS assignments.

Program *71~*73: DH/Tie/DID to [DN] ringing assignments.

Program 93: Assigns a name to a Tie line

Table 7-14 REMU Controls, Indicators, and Connectors

Control/Indicator/Connector	Type of Component	Description
Tie trunk circuits 1~4 (CD102, 202, 302, and 402)	Red LED	Lights to indicate that Tie line is in operation.
E&M Tie trunk connector circuits 1~4 (J101, 201, 301, and 401)	Modular connector	Interface connector for E&M Tie line circuit.
PAD switch SW101 (circuit 1)	2-position slice switch	Enables -3 dB signal level drop for line circuit.
PAD switch SW201 (circuit 2)		
PAD switch SW301 (circuit 3)		
PAD switch SW401 (circuit 4)		
TYP1/TYP2 jumper plugs P102/104	3-terminal jumper	Enables line circuit to be set for Type 1 or Type 2 signaling.
TYP1/TYP2 jumper plugs P202/204		
TYP1/TYP2 jumper plugs P302/304		
TYP1/TYP2 jumper plugs P402/404		
2W/4W switch 102 (circuit 1)	2-position slice switch	Selects 2- or 4-wire configuration for E&M Tie line circuit.
2W/4W switch 202 (circuit 2)		
2W/4W switch 302 (circuit 3)		
2W/4W switch 402 (circuit 4)		

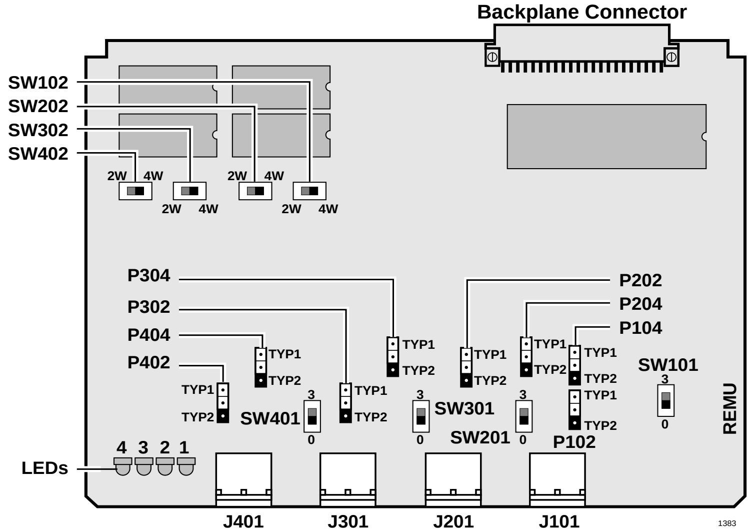


Figure 7-20 REMU PCB

Table 7-15 PEMU Controls, Indicators, and Connectors

Control/Indicator/Connector	Type of Component	Description
Tie trunk circuit 1~4 (CD102, 202, 302, and 402)	Red LED	Lights to indicate that Tie line is in operation.
E&M Tie line connector J101, 201, 301,and 401 (circuit 1~4)	Modular connector	Interface connector for E&M Tie line circuit.
FG jumper P3	3-terminal jumper	Enables or disables -48VDC ground to FG.
GND/BAT jumper P101	3-terminal jumper (Tie line 1)	Enables -3 dB signal level drop for line circuit.
GND/BAT jumper P102		
GND/BAT jumper P201	3-terminal jumper (Tie line 2)	
GND/BAT jumper P202		
GND/BAT jumper P301	3-terminal jumper (Tie line 3)	M-lead origination for Tie line (must be in BAT position per FCC requirements.
GND/BAT jumper P302		
GND/BAT jumper P401	3-terminal jumper (Tie line 4)	
GND/BAT jumper P402		
2W/4W switch P103, 203, 303, and 402 (circuit 1~4)	3-terminal jumper	Selects 2- or 4-wire configuration for E&M Tie line circuit.

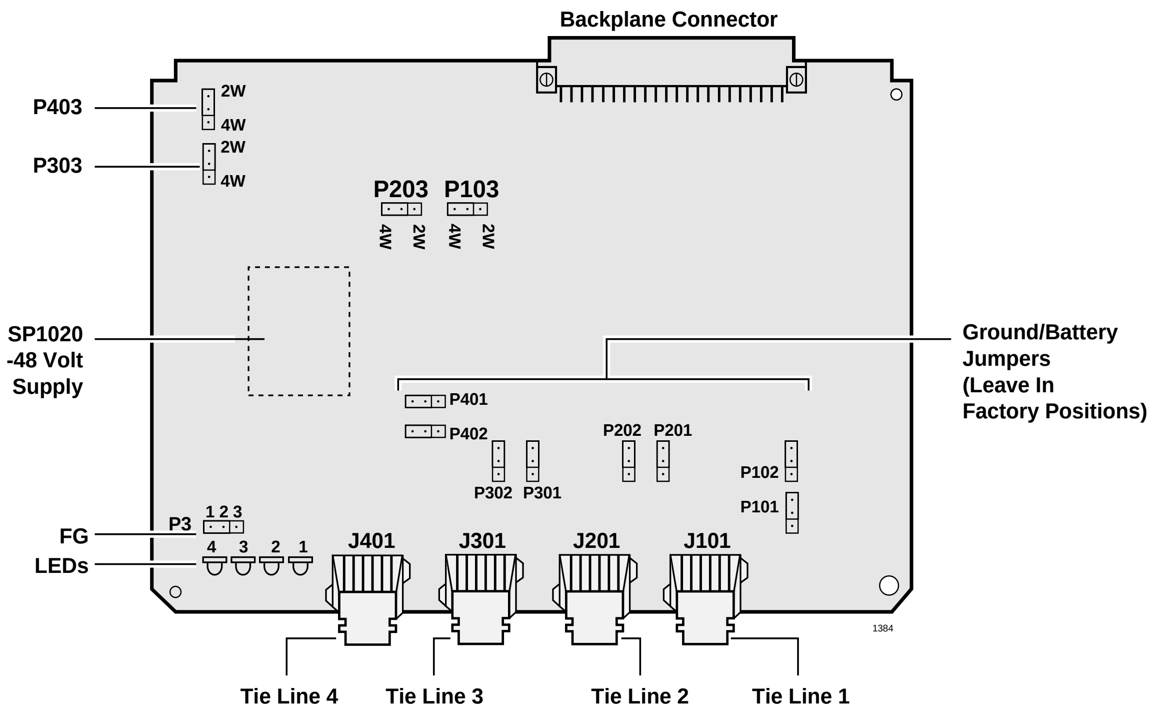


Figure 7-21 PEMU PCB

RGLU2 Loop/Ground Start CO Line Interface Unit

System: *DK40i Expansion KSU, DK424*
Circuits per PCB: *four line circuits*
Interfaces with: *loop or ground start lines*
Older Version(s): *RGLU1 (does not have hookflash to CO)*

The RGLU2 also provides ring detection, dial outpulsing, and hold. Each RGLU2 line can be programmed for DTMF or dial pulse signaling and gas tube secondary protection.

RGLU2 controls, indicators, and interface connectors are shown in Figure 7-22 and described in Table 7-16.

RGLU2 Installation

Note The decibel (dB) PAD switches SW101, SW201, SW301, and SW401 control excessive loudness resulting from close proximity to a central office or PBX telephone office by providing a -3 dB signal level drop to, or from, the PBX or central office when set to the 3 position. Switches are factory set to the 0 (0 dB signal level drop) position.

➤ **To install an RGLU2 PCB**

1. If the DK KSU is within one mile of the PBX or central office, set the dB PAD switches SW101, SW201, SW301, and SW401 to the 3 (-3 dB signal level drop) position.
2. Set each line for ground start (GND) or loop start (LOOP) by setting the following jumper plugs: SW103 for line 1, SW203 for line 2, SW303 for line 3, and SW403 for line 4.
3. Insert the RGLU2 (component side facing right) into the appropriate slot and apply firm, even pressure to ensure proper mating of connectors. RGLU2 can be installed in place of RCOU, per tables in Chapter 2 – DK40i Configuration.
4. After installing the RGLU2, gently pull the PCB outward. If the connectors are properly mated, a slight resistance is felt.

RGLU2 Programming

Programming for the RCOU and RGLU2 is essentially the same. See "RCOU Programming" on Page 7-29, for an overview of RGLU2 programming.

Table 7-16 RGLU2 Controls, Indicators, and Connectors

Control/Indicator/Connector	Type of Component	Description
Line circuit 1	Red LED	Lights to indicate that line circuit is in operation. CO line indicator will not light unless RGLU2 is connected to a line.
Line circuit 2		
Line circuit 3		
Line circuit 4		
J1 connector	Modular connector	RJ14 modular Interface connector for trunk circuits 1 and 2.
J2 connector	Modular connector	RJ14 modular Interface connector for trunk circuits 3 and 4.
PAD switch SW101 (circuit 1)	2-position slice switch	Enables -3dB signal level drop for trunk circuits.
PAD switch SW201 (circuit 2)		
PAD switch SW301 (circuit 3)		
PAD switch SW401 (circuit 4)		
LOOP/GND jumper SW103 (configures line 1)	3-terminal jumper	Used to configure line for loop or ground start.
LOOP/GND jumper SW203 (configures line 2)		
LOOP/GND jumper SW303 (configures line 3)		
LOOP/GND jumper SW403 (configures line 4)		

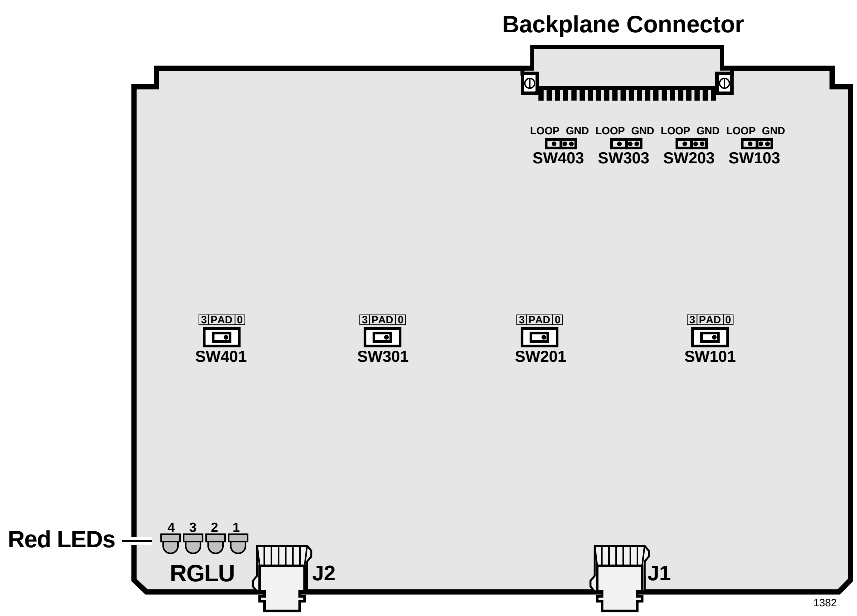


Figure 7-22 RGLU2 PCB

RSIU, RSIS, RMDS RS-232/Modem Interface Unit

System: *DK424*

Circuits per PCB: *four interface ports*

Interfaces with: *SMDI or Toshiba Proprietary RS-232 voice mail*
ACD SMIS computer
SMDR printer or SMDR call accounting machine
DKAdmin/DKBackup PC or maintenance terminal (locally or remotely)
Open-architecture application computer system–receives ANI, DNIS or CLID digits from the DK424 on ACD calls

Older Version(s): *none*

The RSIU is a standard plug-in type PCB that must be installed into the first universal slot of the DK424 base cabinet. The RSIU PCB provides one standard RS-232 port (modular jack) when ordered from the factory; this port can be configured in system programming to support any one of the hardware options listed above.

The RSIU can be equipped with up to three more optional RS-232 ports (total of four RS-232 ports) or with two optional RS-232 ports and one modem port (total of three RS-232 ports and one modem port). The optional RS-232 ports are provided by installing RSIS piggy-back PCBs onto the RSIU PCB. The optional built-in modem is provided by installing an RMDS piggy-back PCB onto the RSIU (see Figure 7-38 in Chapter 8 – DK40i/DK424 Universal Slot PCB Wiring).

The RSIS PCB can support any one of the hardware devices listed above via its RS-232 modular jack. The RMDS PCB can function two ways: the RMDS can operate like an RSIS allowing it to support any one of the hardware devices listed above locally from its RS-232 modular jack; or, the RMDS can operate as a 1200 bps (bits-per-second) or 2400 bps system remote maintenance modem.

The RMDS PCB function (modem or RS-232 port) is set in a system program option. The RMDS can be set for one function only; it cannot support both functions simultaneously. When configured as a modem, the RMDS PCB supports only the DK424 remote maintenance, ASCII terminal, or DKBackup, and DKAdmin functions, and does not simultaneously support SMDI, SMIS, SMDR, etc. (See Figure 8-36 on Page 8-37.)

The total bits-per-second (bps) data rate of the four RSIU, RSIS, RMDS (RS-232/modem) ports combined cannot exceed 9600 bps. The RSIU, RSIS RS-232 ports can be individually set in system programming to operate at 1200 bps, 4 ports max.; 2400 bps, 3 ports max.; 4800 bps, 2 ports max.; or 9600 bps, 1 port max.; or, any other combination that does not exceed 9600 bps. The RMDS modem function can be set to operate at 1200 bps or 2400 bps; however, if the RMDS port is used as a RS-232 port instead of a modem, it can also be set for 4800 bps or 9600 bps.

The TTY and modem function cannot operate on separate RSIU, RSIS, RMDS ports simultaneously. If both functions are programmed at the same time on separate ports, the function of the lowest numbered RSIU, RSIS, RMDS port (TTY or modem) will be active.The communication parameters for all RSIU, RSIS, RMDS port function types except the SMDR are:

- Data word bits = 7
- Parity = even
- Stop bits = 1

The communication parameters for an RSIU, RSIS SMDR port is:

- Data word bits = 8

- Parity = none
- Stop bits = 1

Only one RSIU can be installed per DK424 system. When the RSIU PCB is installed, the RSSU, PIOU2, PIOUS2, IMDU modem, and PEPU PCBs can still be installed with all of their respective paging, modem, and RS-232 port functions available; however, five RS-232/modem ports can be installed in one DK424 system.

When installed together in the same DK424 system, the RSIU, PIOU2, PIOUS2, RSSU port functions are identified and enabled (turned ON/OFF) in system programming. If the same function is programmed for an RSIU port and a PIOU2, PIOUS2, RSSU port, only the RSIU port will function.

RSIS, RMDS Piggy-Back Installation

1. Install all RSIS and RMDS PCBs on the RSIU PCB before installing the RSIU into the DK424. Each RSIS or RMDS piggy-back PCB is installed on the RSIU PCB as shown in Figure 4-38.

   Up to three RSIS PCBs can be installed on the RSIU PCB; only one RMDS PCB can be installed on the RSIU. The function and bit-per-second (bps) data rate of each RSIS and RMDS circuit port is set in Program 76 as described in the Programming Part that follows.

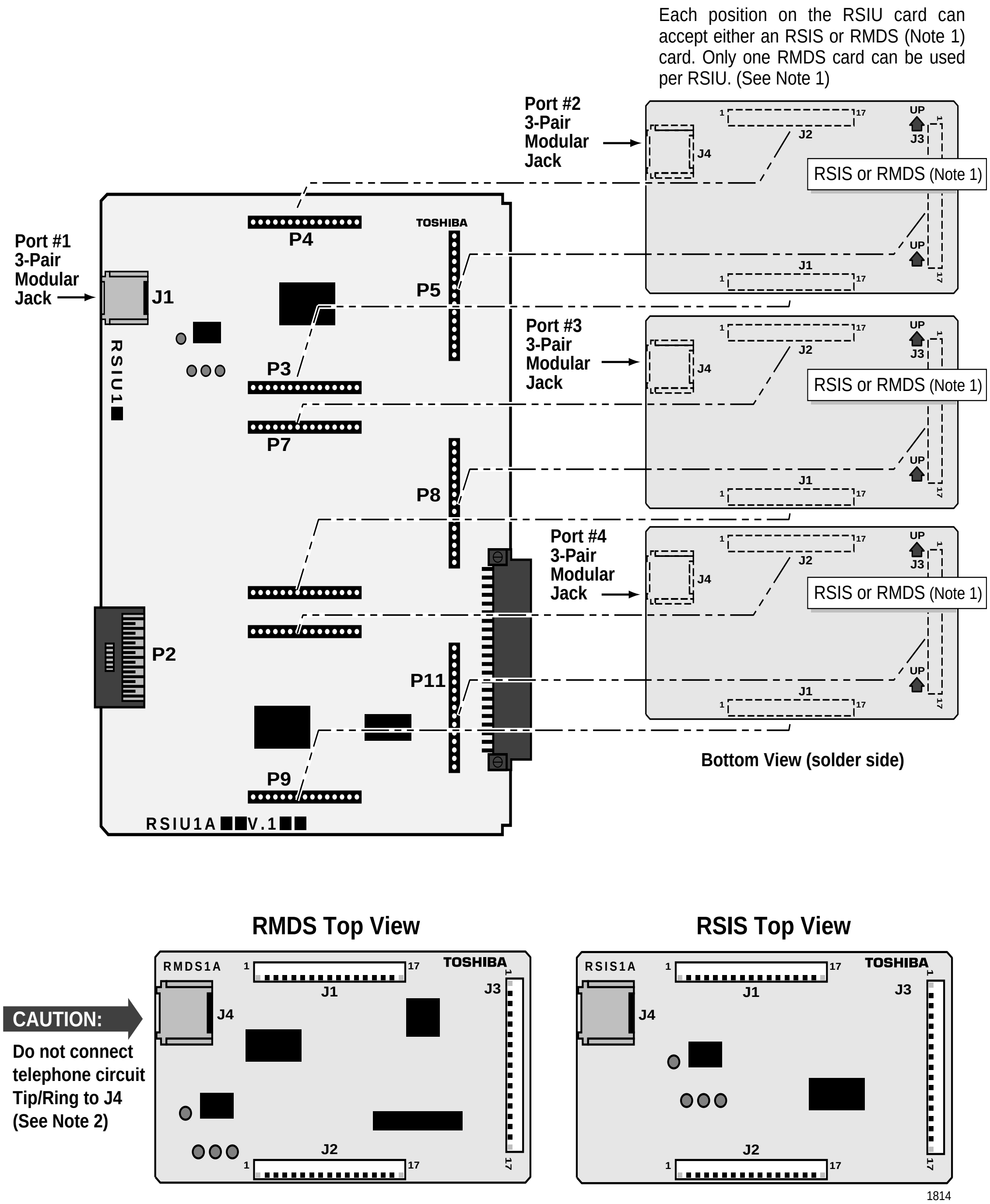
2. After installing all RSIS, RMDS PCBs, install the RSIU into the DK424 per the following instructions.

RSIU Installation

1. The RSIU must be installed only in slot 11 of the base cabinet (see Figure 7-23 to install the RSIU PCB).
2. A PDKU or PEKU PCB must be installed in slot 12 of the base cabinet to support the programming telephone.
3. The first 8-station ports (000-007) appear on the PDKU or PEKU as installed in slot 12. The programming telephone will then be on the 6th circuit (port 005; or, 013 until Program 03 Code 49 is set for slot 11) of the PDKU in slot 12.

   The function and bit-per-second (bps) data rate of the RSIU or RMDS, RS-232 circuit port is set in Program 76 as described in the *Strata DK Programming Manual.*

All information provided in the “RSIU Installation” on Page 7-46 applies to installing an RSIU in an existing system. Hence, most PCBs must be moved to the next highest slot.



Notes

1. Maximum of one RMDS per RSIU, maximum of three RSIS per RSIU.
2. On RMDS, is not used for modem, operation. It is used when RMDS is configured for TTY, SMDI, or MIS operation like RSIS.

Figure 7-23 RSIU, RSIS, RMDS PCB Installation

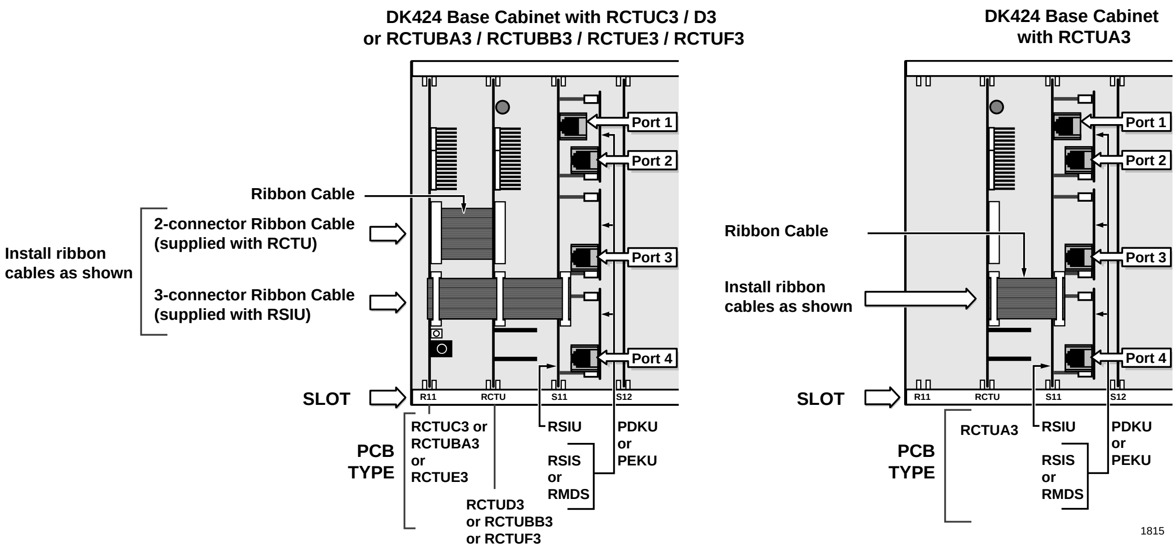


Figure 7-24 RSIU Installed into an Existing System without DID and/or Tie Lines

➤ To move the PCB to the next highest slot

1. Identify (mark) the attendant console and all station PCB wiring connectors so they can be removed and then reinstalled on the same PCB later (console station PCBs include: PDKU, RDSU, PEKU, PESU, RSTU, PSTU and RATU PCBs).
2. Turn system power OFF.
3. Disconnect the connectors from the attendant console and all station PCBs listed in Step 1.
4. Remove all station PCBs listed in Step 1.
5. Install each PCB that was removed in Step 4 into the next highest empty station PCB slot number. Skip over all other types of PCBs that were not removed. Example: If a PDKU was originally in slot 11 and a PSTU was in slot 12, the PDKU is moved to slot 12 and the PSTU is moved to slot 13. The programming telephone will then be on the 6th circuit (port 005; or, 013 until Program 03 Code 49 is set for slot 11) of the PDKU in slot 12.
6. Connect all PCB connectors that were removed back into the same PCBs they were removed from in Step 3.
7. Turn the system power ON and note that the programming telephone is on port 13 and all other ports are shifted up by eight ports. Program slot 11 with Code 49 and all other slots with the appropriate codes using Program 91-1 and/or 03.

   Next, cycle system power OFF (five seconds) and ON, or, run Program 91-2 to transfer Program 03 data from temporary to working memory. At this time the programming telephone changes from port 13 to port 005 and all other ports shift down by eight ports.

➤ **To install an RSIU PCB into an existing system with DID and/or Tie lines**

Note The steps in "RSIU Installation" on Page 7-46 apply to installing an RSIU into an existing system. Hence, most PCBs must be moved to the next highest slot using the following steps.

1. Identify (mark) all PCB wiring connectors so they can be removed and then reinstalled onto the same station PCB later.
2. Turn system power OFF.
3. Disconnect the connectors from all PCBs except PIOU2, PIOUS2, RSSU, PEPU, RCIU, and RCIS.
4. Remove all PCBs except PIOU2, PIOUS2, RSSU, PEPU, RCIU, and RCIS.
5. Each PCB that was removed must be installed into the next highest empty PCB slot number. Skip over all other types of PCBs that were not removed.

Note This step may have to be modified for the RDTU PCB, depending on the configuration to meet the requirements of RDTU slot assignments per tables in Chapter 6 – DK424 T1.

6. Connect all PCB connectors that were removed back into the same PCBs from which they were removed.
7. Turn the system power on and note that the programming telephone is on port 13 and all other ports are shifted up by eight ports. Program slot 11 with Code 49 and all other slots with the appropriate codes using Program 91-1 and/or 03.

   Next, cycle system power OFF (5 seconds) and on or, run Program 91-2 to transfer Program 03 data from temporary to working memory. At this time the programming telephone changes from port 13 to port 005 and all other ports shift down by eight ports.

RSIU, RSIS, RMDS Programming

Program 03: Programs slot 11 with code 49 to identify that the RSIU PCB is installed in slot 11.

Program 76-1X-Y: Assigns each installed RSIU port to a function. Where X identifies the RSIU port no. 1~4 (see Figure 7-23 for RSIU port number configuration) and Y identifies the RSIU port function:

- Y=1, RS-232 TTY (Program 77-1, LED 14 OFF)
- Y=1, RMDS modem (Program 77-1, LED14 ON)
- Y=2, SMDR
- Y=3, MIS or SMIS
- Y=4, SMDI
- Y=5, Open Architecture
- Y=0, No function - this should be used for any of the four RSIU, RSIS, RMDS ports that are not used.

Notes

- Function codes set in Program 76-1X-Y will override RSSU, PIOU2, and/or PIOUS2 function codes (41, 42, 43) set in Program 03.

- The TTY and modem function cannot operate on separate RSIU, RSIS, RMDS ports simultaneously. If both functions are programmed at the same time on separate ports, the function of the lowest numbered RSIU, RSIS, RMDS port (TTY or modem) will be active.
- When uploading Program 76-1 with DKAdmin or DKBackup, the data will not change until the system power is cycled.

Program 76-2X-Z: Assigns each installed RSIU port to operate at a specified transmission rate. Where X identifies the RSIU port no. 1~4 (see Figure 7-23 for RSIU port number configuration) and Z identifies the RSIU, RSIS, RMDS port transmission rate in bits-per-second (bps).

Notes

- The sum of the used RSIU, RSIS, RMDS ports transmission rates cannot exceed 9600 bps. Ports assigned as “non-function” (code 0) in Program 76-2X-Y will not be included in the transmission rate sum. The RMDS will only function at 1200 or 2400 bps.
- When uploading Program 76-2 with DKAdmin or DKBackup make sure that Program 76-2 bps rate for the TTY/ modem port is set the same in: DKAdmin communications setup, DKAdmin customer database, and any DK424 RCTU. If the bps rate is not the same in all three areas, uploading will fail on Program 76

Program 77-1, LED 14: Enables the RMDS modem function. If the RMDS should function as a modem, turn ON LED 14. If the RMDS should function as a RS-232 port, turn OFF LED 14.

Program 77-1, LED 15: Sets the RMDS communications standard type to CCITT/V.22bis (2400 bps) or Bell 212A (1200 bps). The standard set in this program must match the standard of the modem communicating with the DK424 RMDS.

If the RMDS modem standard should be CCITT/V.22bis, turn LED 15 ON. If the RMDS standard should be Bell 212A, turn LED 15 OFF. Most Hayes compatible modems will function with either standard. Check with the modem manufacturer’s documentation to verify which protocol should be used. When the system is initialized the Bell 212A standard is set (LED 15 OFF).

Program 77-4, LED 01/LED 02: Enables CLID, ANI, and/or DNIS information for ACD calls to be sent from the RSIU OA port.

➤ Turn LED 01 ON if the OA port should send CLID and/or ANI information for ACD calls.

➤ Turn LED 02 ON if the OA port should send DNIS information for ACD calls.

Program 77-4 allows LED 01 and LED 02 to be turned ON simultaneously, allowing CLID, ANI, and DNIS information to be sent from the OA port for ACD calls.

The system will initialize with LED 01 and 02 OFF–no CLID, ANI, or DNIS information will be sent from the OA port for ACD calls.

RSSU
PC Interface Unit

System: *DK40i Expansion KSU, DK424*
Circuits per PCB: *one RS-232 connection*
Interfaces with: *TTY jack*
Older Version(s): *none*

The RSSU contains one RS-232 serial port for connecting an SMDI, SMIS processor, DKAdmin/DKBackup PC or external modem.

One optional RSSU maintenance interface PCB can be used for connecting a maintenance PC or external modem (local or remote) to the DK40i.

A maximum of three RSSU cards can be supported per DK424.

The RSSU controls, indicators, and interface connectors are shown in Figure 7-25 and described in Table 7-17.

RSSU Installation

1. Insert the RSSU (component side facing right) into the last slot (“S16”) of the Base KSU/cabinet if the system only has a Base KSU/cabinet and no Expansion KSUs/cabinets. If there are Expansion KSUs/cabinets, install the RSSU in the highest slot number in any KSU/cabinet. Apply firm, even pressure to ensure proper mating of connectors.

Note In DK40i, RSSU can be installed in any available Expansion KSU.

2. After installing the RSSU, gently pull the PCB outward. If the connectors are properly mated, a slight resistance is felt.

RSSU Programming

Program 03–Specify Code 41, 42 and 43 for slots that support RSSUs.

Table 7-17 RSSU Controls, Indicators, and Connectors

Control/Indicator/Connector	Type of Component	Description
TTY interface connector J3	Dual modular connector	Interface connector for maintenance terminal/ external modem.

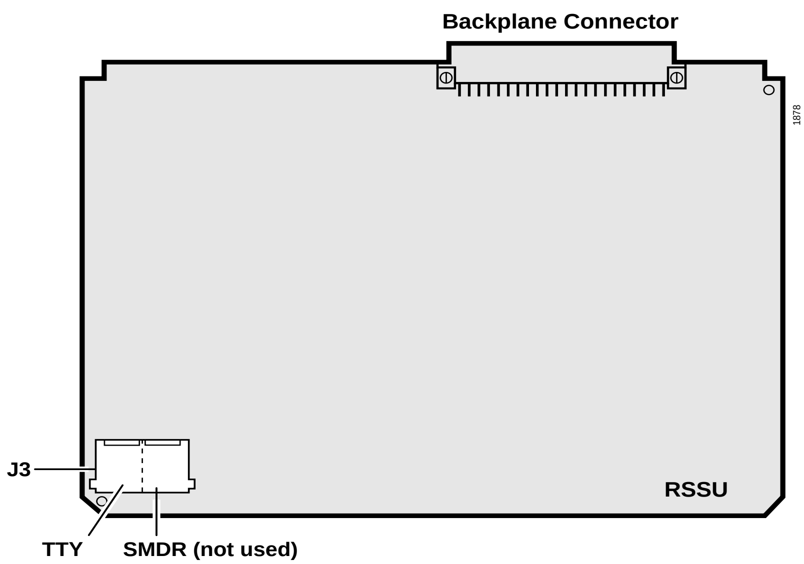


Figure 7-25 RSSU PCB

RSTU2
Standard Telephone Interface Unit

System: *DK40i Expansion KSU, DK424*

Circuits per PCB: *eight standard telephone circuits*

Interfaces with: *standard telephones*
voice mail ports
off-premises stations
other similar devices
alternate BGM source (circuit 2 only)
auto attendant digital announcer
message waiting lamp (RSTU2 only)

Older Version(s): *RSTU1–80-VRMS sine wave ring generator, optional R48S unit increases the loop voltage from -24VDC to -48VDC, extending the loop length (including the resistance of the phones) from 600 ohms to 1200 ohms.*
PSTU2–190V P-P or 130V P-P W1 jumper
PSTU1 v.3–square wave ring generator fixed at 190V P-P
PSTU1 v.4–square wave ring generator set at 190V P-P or 130V P-P with the W1 jumper

Only one telephone (or device) can be connected to a RSTU2 port. If more than one telephone or device is connected to a port, ringing or message waiting may not function. RSTU2 only provides a 90-volt square wave message waiting generator to drive standard telephone 90V message waiting lamps.

Notes

- For the system to recognize the DTMF tones generated by a standard telephone (or any other device connected to a standard telephone port), a DTMF Receiver Unit (RRCS-4, -8, or -12) must be installed on any DK424 RCTU or the DK40i K4RCU3.
- Most standard telephones and two-wire devices require the 190V P-P level; however, some devices may experience ring-trip with 190V P-P and should be set for 130V P-P.

See Figure 7-27 for an illustration of the PSTU1, PSTU2. Figure 7-28 shows the RSTU2. See Table 7-18, for details of the PSTU and RSTU2 controls and indicators.

R48S -48 Volt Supply Installation (Internal Option)

➤ Mate the R48S connectors P6 and P7 (Figure 7-26 and Figure 7-28) with the R48S connectors P6 and P7 on the RSTU or RSTU2.

Note RSTU connectors P6 and P7 are positioned so that the R48S only fits in the proper position.

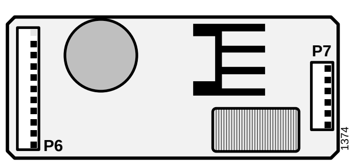


Figure 7-26 R48S Interface Connectors

External Options

W1 Ring Generator Switch Configuration (PSTU1 and PSTU2)

➤ On the PSTU1 or PSTU2, ensure the W1 switch is set to the “H” (190V P-P) position for initial installation. The “L” (130V P-P) position is used if devices connected to the PSTU1 or PSTU2 experience ring trip.

Standard Telephone Message Waiting Lamp Control

No steps required here.

RSTU2 Installation

1. Make sure the factory-installed SSTS or SSTU subunit is securely attached to the RSTU2 (Figure 7-27 and Figure 7-28).

WARNING! The shield on the back of the RSTU2 is designed to protect the installer from potentially hazardous ring voltage. Do NOT remove this shield.

2. Insert the RSTU2 (component side facing right) into the appropriate slot, and apply firm, even pressure to ensure proper mating of connectors. RSTU2 must be installed per tables in Chapter 2 – DK40i Configuration.
3. After installing the RSTU2, gently pull the RSTU2 outward. If the connectors are properly mated, a light resistance is felt.

Table 7-18 RSTU2 Controls, Indicators, and Connectors

Control/Indicator/Connector	Type of Component	Description
Ring voltage W1 jumper (PSTU1 (V.4) and PSTU2 only)	3-terminal jumper	Sets ring generator voltage level for all circuits. H=190V P-P, L=130V P-P.
R48S connector P6 (RSTU or RSTU2 only)	9-pin connector	Interface connector to P6 of R48S.
R48S connector P7 (RSTU or RSTU2 only)	6-pin connector	Interface connector to P7 of R48S.

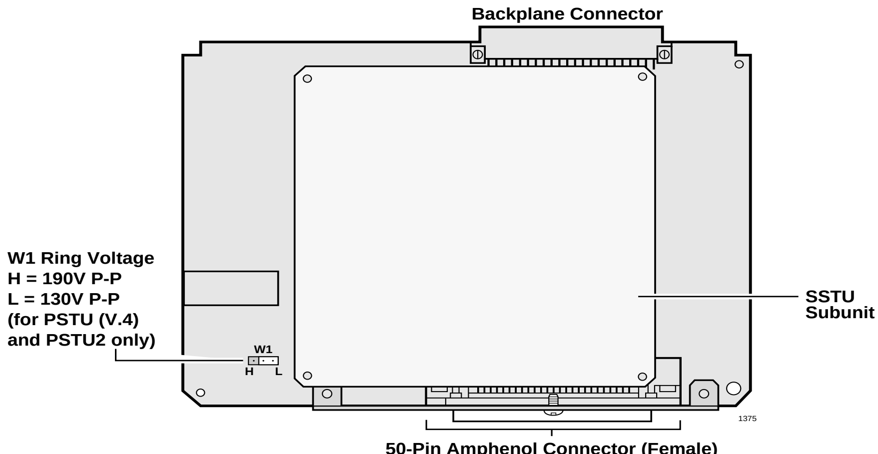


Figure 7-27 PSTU and Subunit (SSTU)

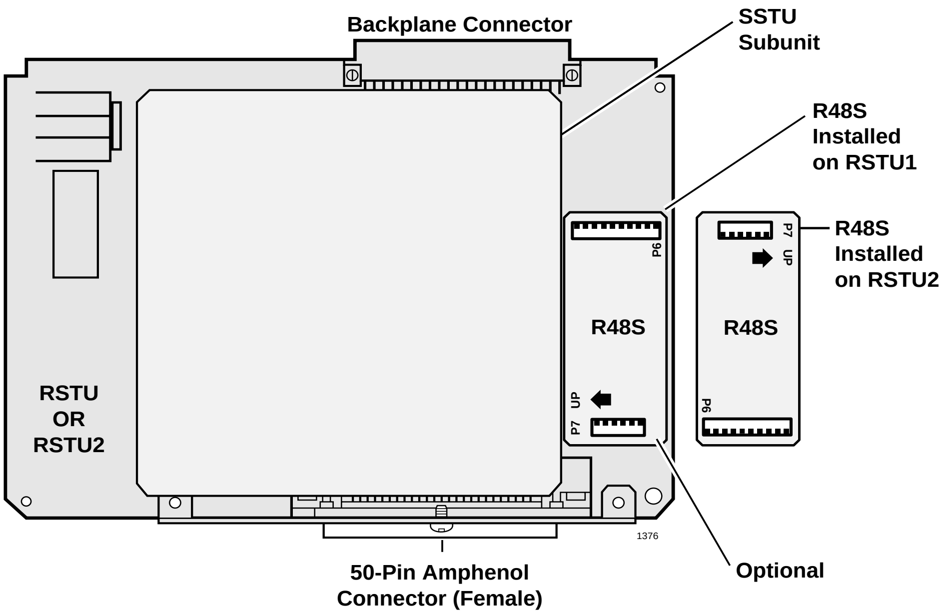


Figure 7-28 RSTU2 Controls and Interface Connectors

RSTU2 Programming

Program 03: Specify code 31 for all slots that have RSTUs and PSTUs installed.

Note If there are no RSTU, RSTU2 or PSTU options, Program 03 can be skipped, and Program 91-1 or 91-9 can be run instead.

Program 10-2: Sets standard telephone ringing option.

Program 19: Used for BGM connection.

Program 21: Assigns standard telephone ports to modem pools.

Programs 10-3, 23, 24, 25, 26: Integrated Auto Attendant Digital Announcer assignments.

Program 31: Configures all RSTU, RSTU2 and PSTU ports connected to voice mail or external Auto attendant devices.

Program *34, LED 01: Standard telephone Camp-on/Busy Override tone option.

Program 35, LED 03: Standard telephone message waiting lamp control option.

RMCU/RCMS E911 CAMA Trunk Direct Interface

System: *DK424*
Circuits per PCB: *four circuits*
Interfaces with: *enhanced 911 locator services*
Older Version(s): *none*

The E911 CAMA Trunk Direct Interface card (RMCU) enables cost-effective connection to the Enhanced 911 locator services without third-party equipment. Figure 7-31 shows the RMCU. The RMCU supports two subassemblies (RCMS) that provide a total of up to four ports as shown in Figure 73.

The RMCU has no CAMA circuits. It requires one RCMS subassembly to provide one or two CAMA trunks and two RCMS PCBs to provide up to four CAMA trunks.

When RMCU code 19 is entered for a slot in Program 03, that slot assumes the next four consecutive CO line numbers in the system. Only one RMCU PCB can be installed in a DK424 system. If more than one slot is programmed with code 19 in Program 03, the lowest slot having code 19 will be the CAMA trunk active slot.

The controls, indicators, and connectors for the RCMS are listed in Table 90.

Location of the RCMS LEDs are shown in Figure 76.

Functions of the RCMS LEDs are given in Table 91.

A wiring diagram is shown in "RCMS Subassembly (stand-alone)" on Page 7-57.

RCMS Subassemblies Installation

1. Attach one or two subassemblies (RCMS) to the connectors on the RMCU as shown in Figure 7-29. If only one RCMS is to be installed, install it in the bottom position.
2. Apply firm even pressure to ensure that the connectors are properly seated in the RMCU connector blocks. If they are seated properly, a light resistance is felt when you pull the units away from the RMCU.

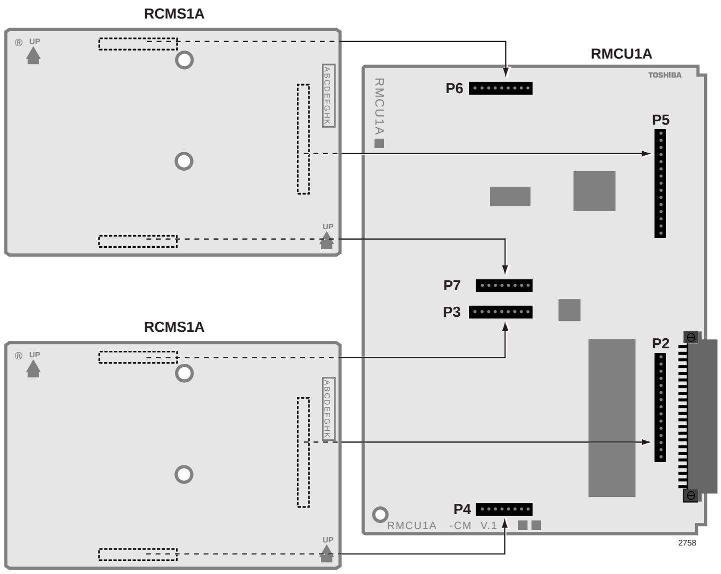


Figure 7-29 Placement of RCMS Subassemblies on the RMCU Interface Card

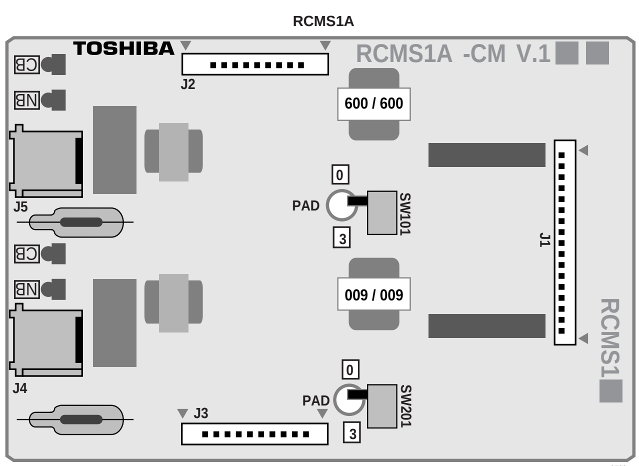


Figure 7-30 RCMS Subassembly (stand-alone)

Table 7-19 RCMS Subassembly Controls, Indicators, and Connectors

Controls, Indicators, & Connectors	Type of Component	Description
SW101	Switch	3-dB PAD switch for circuit 1 or 3.
SW201	Switch	3-dB PAD switch for circuit 2 or 4.
J1	Connector Blocks	Jacks to connect to RMCU.
J2		Jacks to connect to RMCU.
J3		Jacks to connect to RMCU.
RJ11	6-pin modular connector	Network interface jack to CAMA trunk.

RMCU Installation

1. Insert the RMCU (component side facing right) into the appropriate slot, and apply firm, even pressure to ensure proper seating of the connectors.
2. Gently pull the unit outward. If the connectors are properly seated, a light resistance is felt.
3. Wire the RCMS jacks, J4 and J5, to the network CAMA trunks per Figure 8-26 on Page 8-27.
4. Test the CAMA trunk and set the 3-dB PAD switches, SW101 and SW 201, for the appropriate volume level.

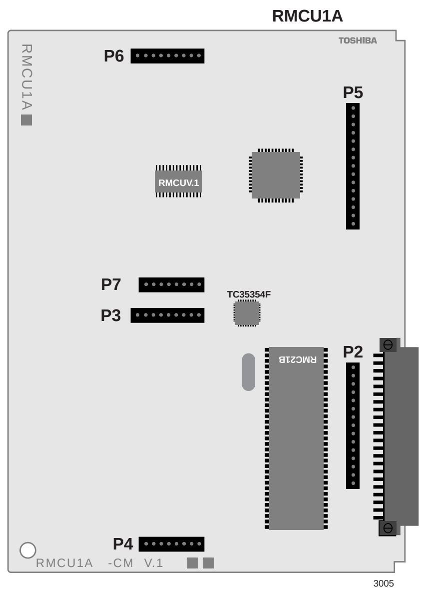


Figure 7-31 RMCU Interface Card

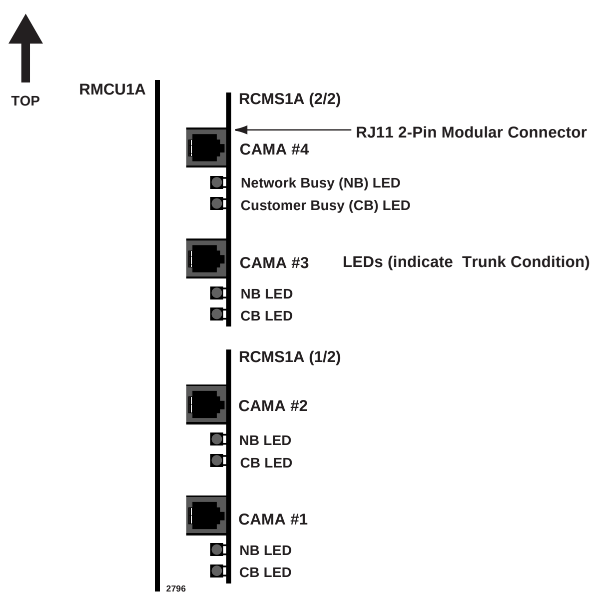


Figure 7-32 Location of the RCMS LEDs

Table 7-20 LED Indications (Normal Operation) *(continued)*

Status		NB LED	CB LED
1	No network connection. RMCU is in stand-by mode.	ON	OFF
2	Network connected. RMCU is in stand-by mode.	OFF*	OFF
3	Network is in stand-by mode and the RMCU is off hook. Network is connected and the RMCU MF sending dial tone.	OFF	ON
4	Network is seizing and the RMCU is off-hook.	Flashing	ON
5	Network is connecting, before ANI is sent, and the RMCU is sending. Network is connecting and the RMCU is communicating.	ON	ON
6	Network is disconnecting first and then the RMCU disconnects.	ON then OFF	ON then OFF
7	RMCU is disconnecting first and then the network disconnects.	ON then OFF	ON then OFF

1. If the NB LED stays ON, even if the modular connector of the network is connected, check the following:
   - Tip and Ring could be reversed.
   - Network could be busy.

RMCU/RCMS Programming

Program 03: Specify code 19 for the RMCU slot.

Program *11, *12, *13: Refer to the E911, CAMA trunk tab in the *Strata DK Programming Manual* and set Programs *11, *12, and *13 as required.

Note Program *10 is required only when using third-party adjunct CAMA interface and not used with RMCU CAMA interface.

DK40i/DK424 Universal Slot PCB Wiring 8

This chapter contains point-to-point wiring diagrams for connection of telephones, lines, peripheral equipment, and power supplies for the universal slot PCBs of both the Strata DK40i Expansion KSU and DK424 systems.

Wiring diagrams are divided into groups according to the PCB which provides the interface for, or controls the operation of, the associated equipment, as listed below:

- Station Wiring:
    - Digital Stations
    - Electronic Stations
    - Attendant Consoles
    - Analog Stations
- Power Failure Cut-through (DPFT) Pin-outs
- CO Line Wiring
- DID and Tie Line Wiring
- Option Interface PCBs

Note Before using the Connect Record Sheets (following each Wiring Diagram), make copies for future use.

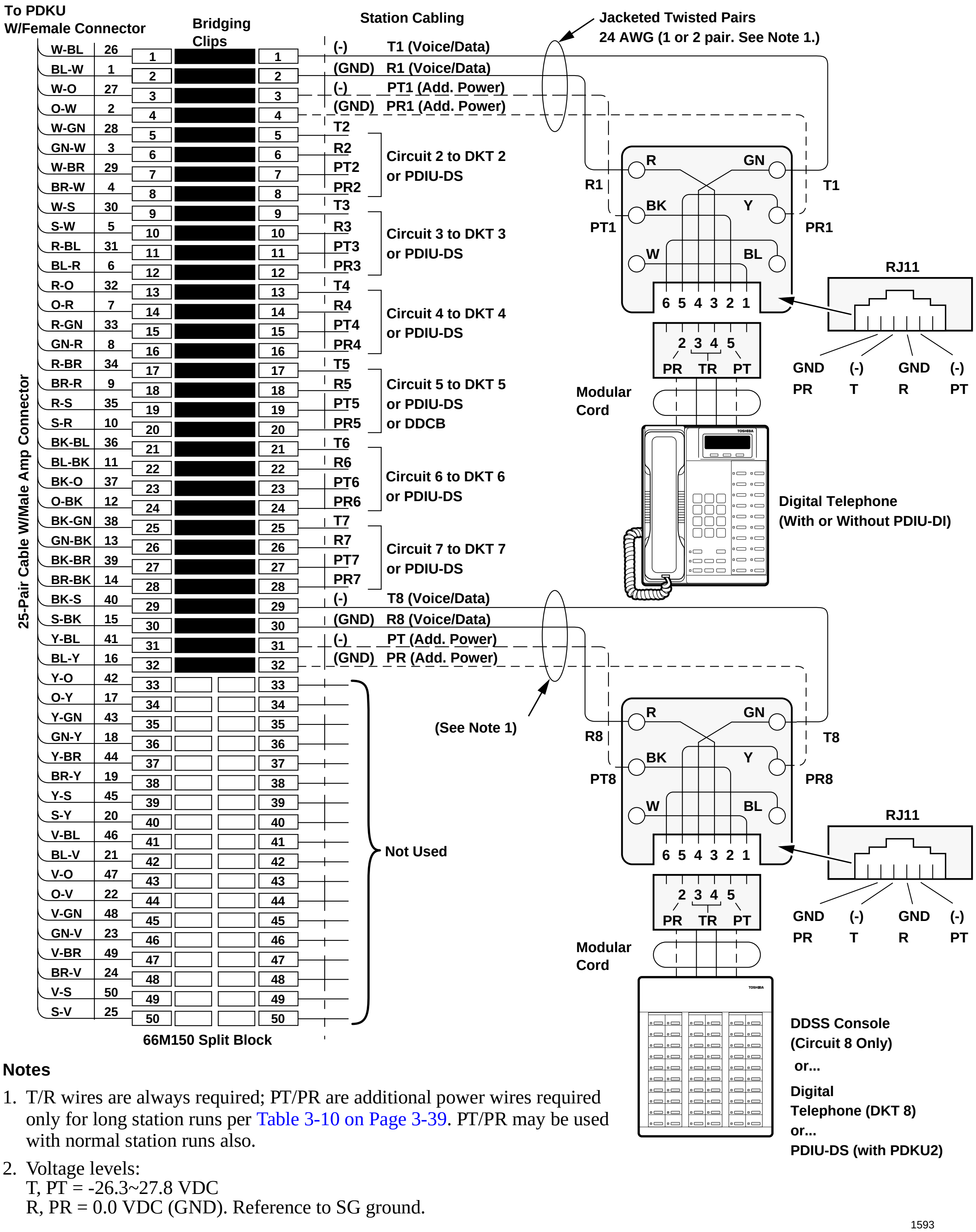
Diagrams which apply to only one system (e.g., DK40i) are in the installation chapter which relates to the system. Wiring diagrams appear at the end of these two chapters:

- Chapter 1 – DK14 Installation
- Chapter 2 – DK40i Installation

The RDTU cable connection information (DK424 only) is in Chapter 6 – DK424 T1.

Station Wiring Diagrams

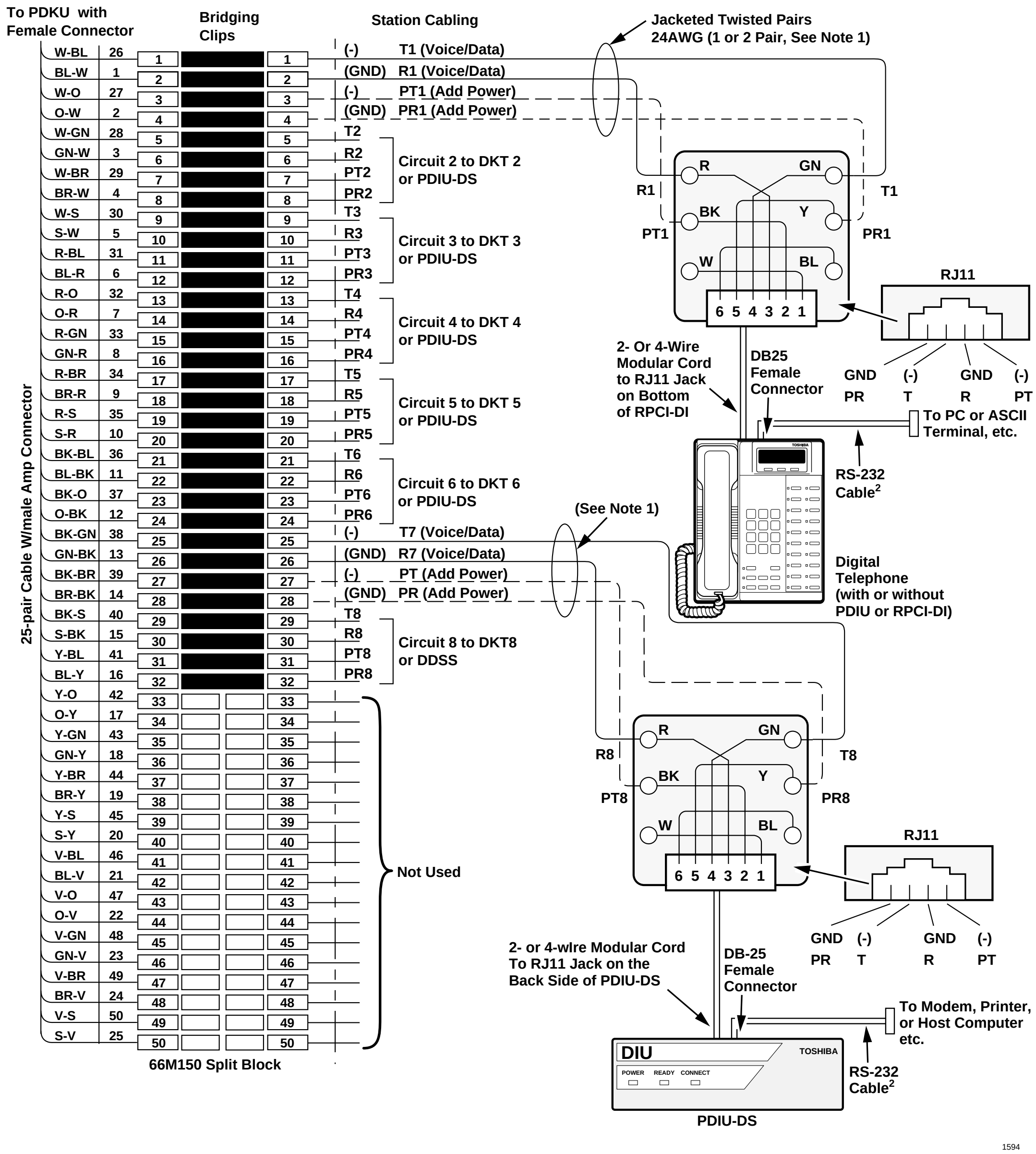
Digital Station Wiring



Notes

1. T/R wires are always required; PT/PR are additional power wires required only for long station runs per Table 3-10 on Page 3-39. PT/PR may be used with normal station runs also.
2. Voltage levels:
   T, PT = -26.3~27.8 VDC
   R, PR = 0.0 VDC (GND). Reference to SG ground.

Figure 8-1 MDF Wiring for Digital Telephones (DKTs) and DDSS Console to PDKU



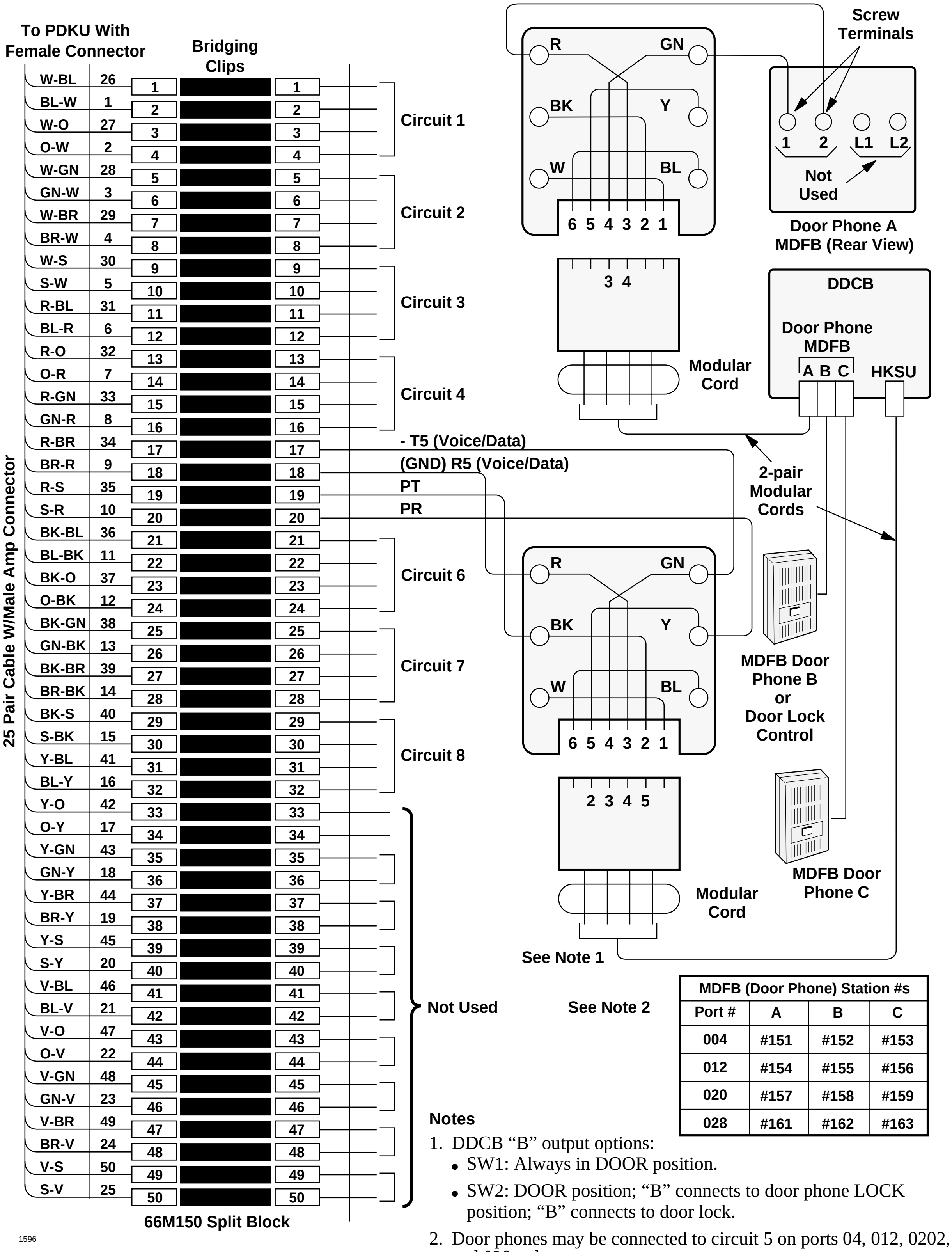
Notes

1. T/R wires are always required; PT/PR are additional power wires required only for long station runs per Table 3-10 on Page 3-39. PT/PR may be used with normal station runs also.
2. RS-232 cable length is max 50 ft. with 24 AWG wire. See Chapter 10 – Peripheral Installation.

General Notes

- Voltage levels:
  T, PT = -26.3~27.8 VDC
  R, PR = 0.0 VDC (GND). Reference to SG ground.
- DIUs can be connected to Circuits 1~7 only if connected to PDKU1; or Circuits 1~8 on PDKU2.
- DK40i: Slots 15 and 16 only support data applications.
- KCDU provides circuits 1~4 only. See Tables 4-4 and 4-5 in Chapter 4 – DK424 Configuration for allowed data slots.

Figure 8-2 MDF Wiring for Digital Telephones with RPCI-DI and PDIU-DS to PDKU

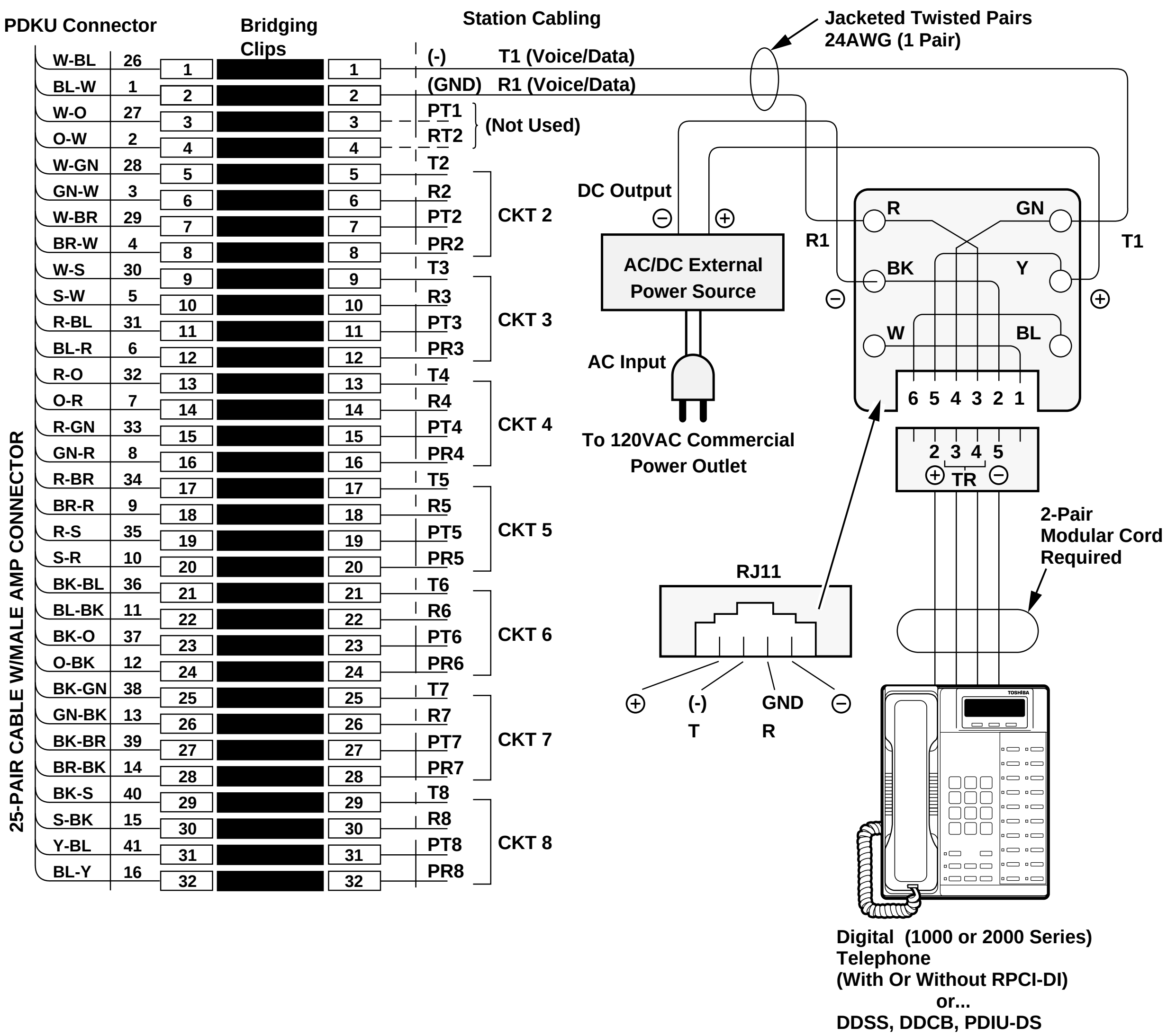


MDFB (Door Phone) Station #s			
Port #	A	B	C
004	#151	#152	#153
012	#154	#155	#156
020	#157	#158	#159
028	#161	#162	#163

Notes

1. DDCB “B” output options:
   - SW1: Always in DOOR position.
   - SW2: DOOR position; “B” connects to door phone LOCK position; “B” connects to door lock.
2. Door phones may be connected to circuit 5 on ports 04, 012, 0202, and 028 only.
3. See Table 3-10 on Page 3-39 for loop lengths.

Figure 8-3 MDF Wiring-DDCB/Door Phone/Lock to PDKU



AC/DC External Power Source Specifications:

AC IN: 120VAC ± 10%
DC OUT: 24VDC ± 10%
160 MA (Min.) DC Current
200 MV P-P (Max) AC Ripple On DC Output

AC/DC power supplies that meet the above requirements are available from most telephone equipment supply houses.

External Power Straps:

If the external power is installed, cut the external power straps located inside the digital telephone DDSS, DDCB, or PDIU-DS.

See Loop Limits at the front of this section for external power requirements.

Figure 8-4 External Power for PDKU Digital Telephone Connection

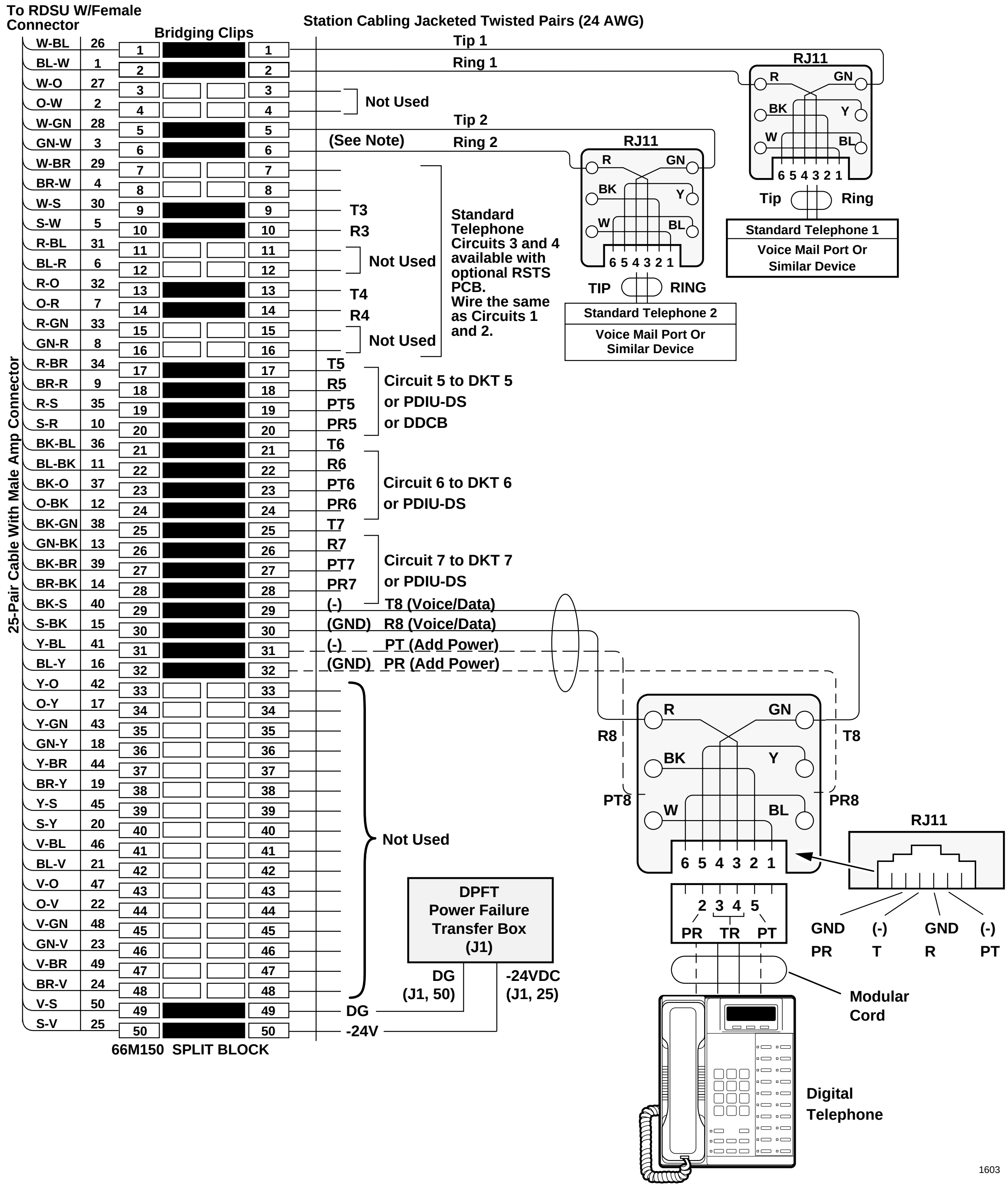
MDF Block Number | | **KSU Slot Number** |

Color Code	Designation	CKT Number	Port Number	Intercom Number	Device/Standard Telephone/Electronic Telephone Location
W-Bl	T	1			
Bl-W	R				
W-O	PRW-T				
O-W	PRW-R				
W-G	T	2			
G-W	R				
W-Br	PRW-T				
Br-W	PRW-R				
W-S	T	3			
S-W	R				
R-Bl	PRW-T				
Bl-R	PRW-R				
R-O	T	4			
O-R	R				
R-G	PRW-T				
G-R	PRW-R				
R-Br	T	5[1]			
Br-R	R				
R-S	PRW-T				
S-R	PRW-R				
Bk-Bl	T	6			
Bl-Bk	R				
Bk-O	PRW-T				
O-Bk	PRW-R				
Bk-G	T	7			
G-Bk	R				
Bk-Br	PRW-T				
Br-Bk	PRW-R				
Bk-S	T	8			
S-Bk	R				
Y-Bl	PRW-T				
Bl-Y	PRW-R				

1. DDCBs connect only to Circuit 5, Ports 004, 012, 020, and 028.

Note Indicate if PDIU-DS, digital telephone (with or without RPCI-DI), DSS console (number 1~8), or DDCB is connected.

Figure 8-5 PDKU Station MDF Cross Connect Record



CAUTION! **To prevent system malfunction, DO NOT install the RDSU in Slot 18 of the DK40i system.**

Figure 8-6 RDSU Wiring

MDF Block Number		KSU Slot Number	

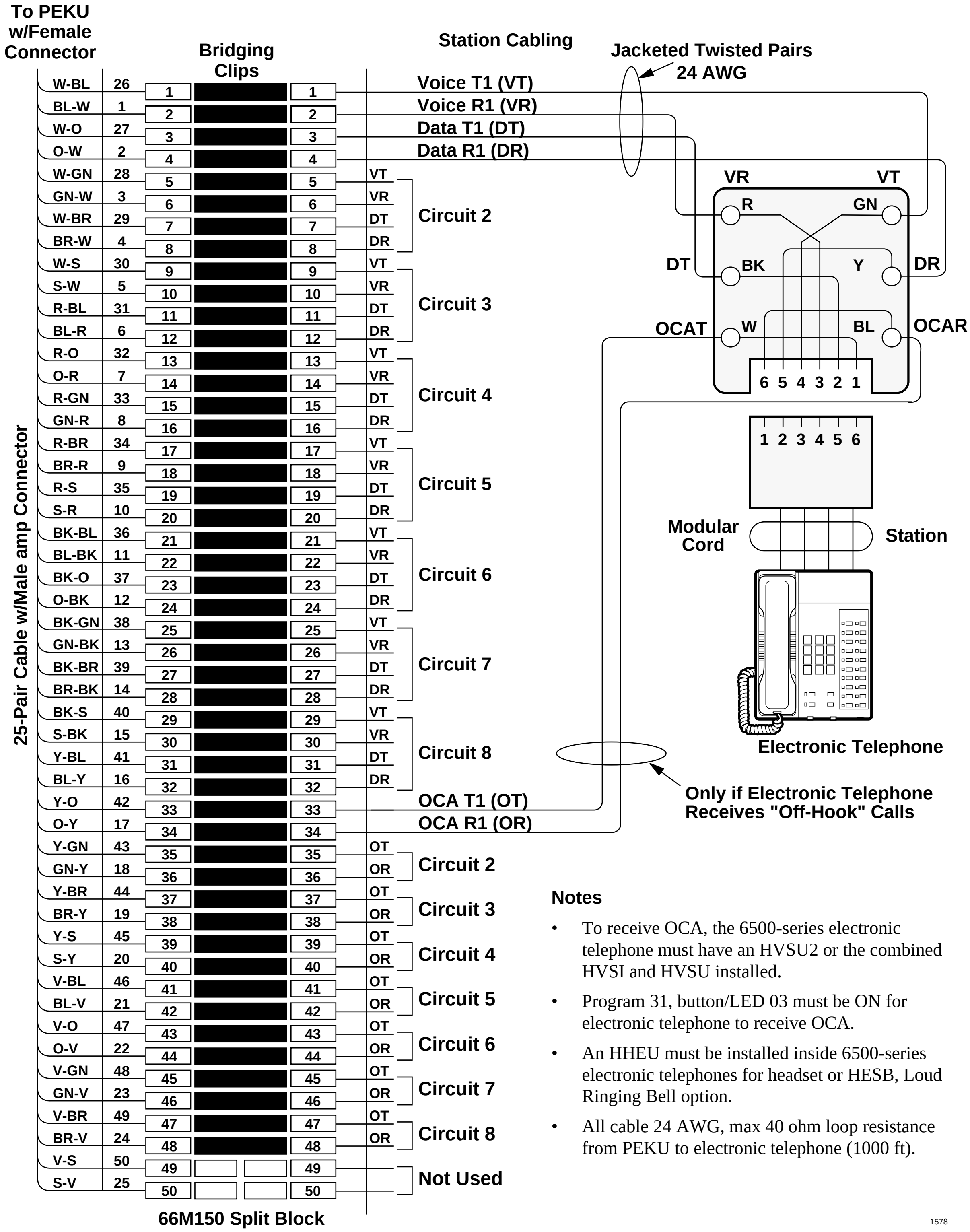
Color Code	Designation	CKT Number	Port Number	Directory Number	Device/Standard Telephone/ Electronic Telephone Location
W-Bl	T	1		(Standard)	
Bl-W	R				
W-O	Not Used				
O-W	Not Used				
W-G	T	2		(Standard)	Indicate if separate BGM source connected to Circuit 2.
G-W	R				
W-Br	Not Used				
Br-W	Not Used				
W-S	T	3		(Standard) (RSTS)	
S-W	R				
R-Bl	Not Used				
Bl-R	Not Used				
R-O	T	4		(Standard) (RSTS)	
O-R	R				
R-G	Not Used				
G-R	Not Used				
R-Br	T	5		(Digital)	DDCBs connect only to Circuit 5, Ports 004, 012, 020, and 028
Br-R	R				
R-S	PWRT				
S-R	PWRR				
Bk-Bl	T	6		(Digital)	
Bl-Bk	R				
Bk-O	PWRT				
O-Bk	PWRR				
Bk-G	T	7		(Digital)	
G-Bk	R				
Bk-Br	PWRT				
Br-Bk	PWRR				
Bk-S	T	8		(Digital)	
S-Bk	R				
Y-Bl	PWRT				
Bl-Y	PWRR				

Note Indicate if standard telephone, voice mail port, etc.

Figure 8-7 RDSU Station MDF Cross Connect Record

DK40i/DK424 Universal Slot PCB Wiring

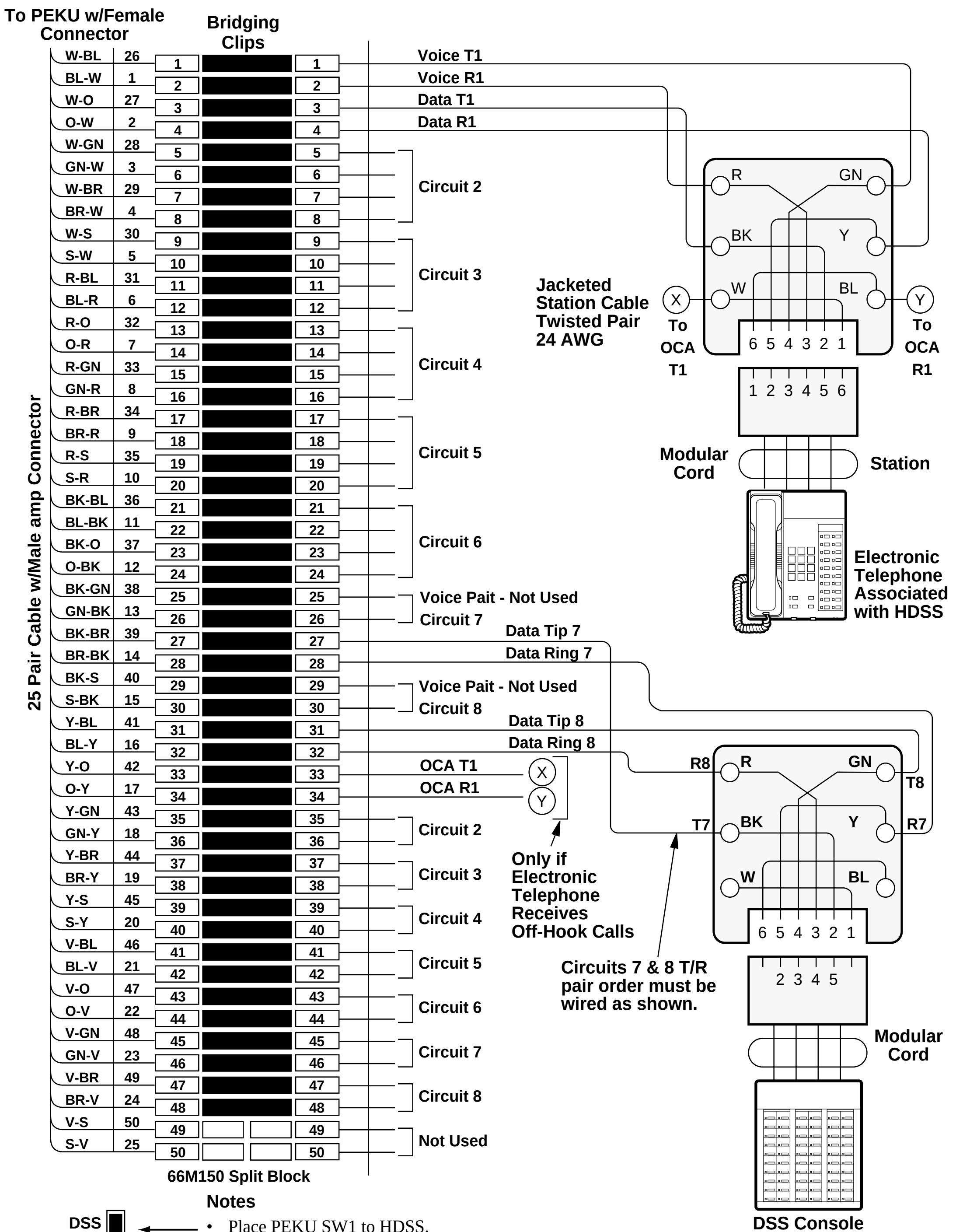
Electronic Station Wiring Diagrams



Notes

- To receive OCA, the 6500-series electronic telephone must have an HVSU2 or the combined HVSI and HVSU installed.
- Program 31, button/LED 03 must be ON for electronic telephone to receive OCA.
- An HHEU must be installed inside 6500-series electronic telephones for headset or HESB, Loud Ringing Bell option.
- All cable 24 AWG, max 40 ohm loop resistance from PEKU to electronic telephone (1000 ft).

Figure 8-8 MDF Wiring/Electronic Telephone to PEKU

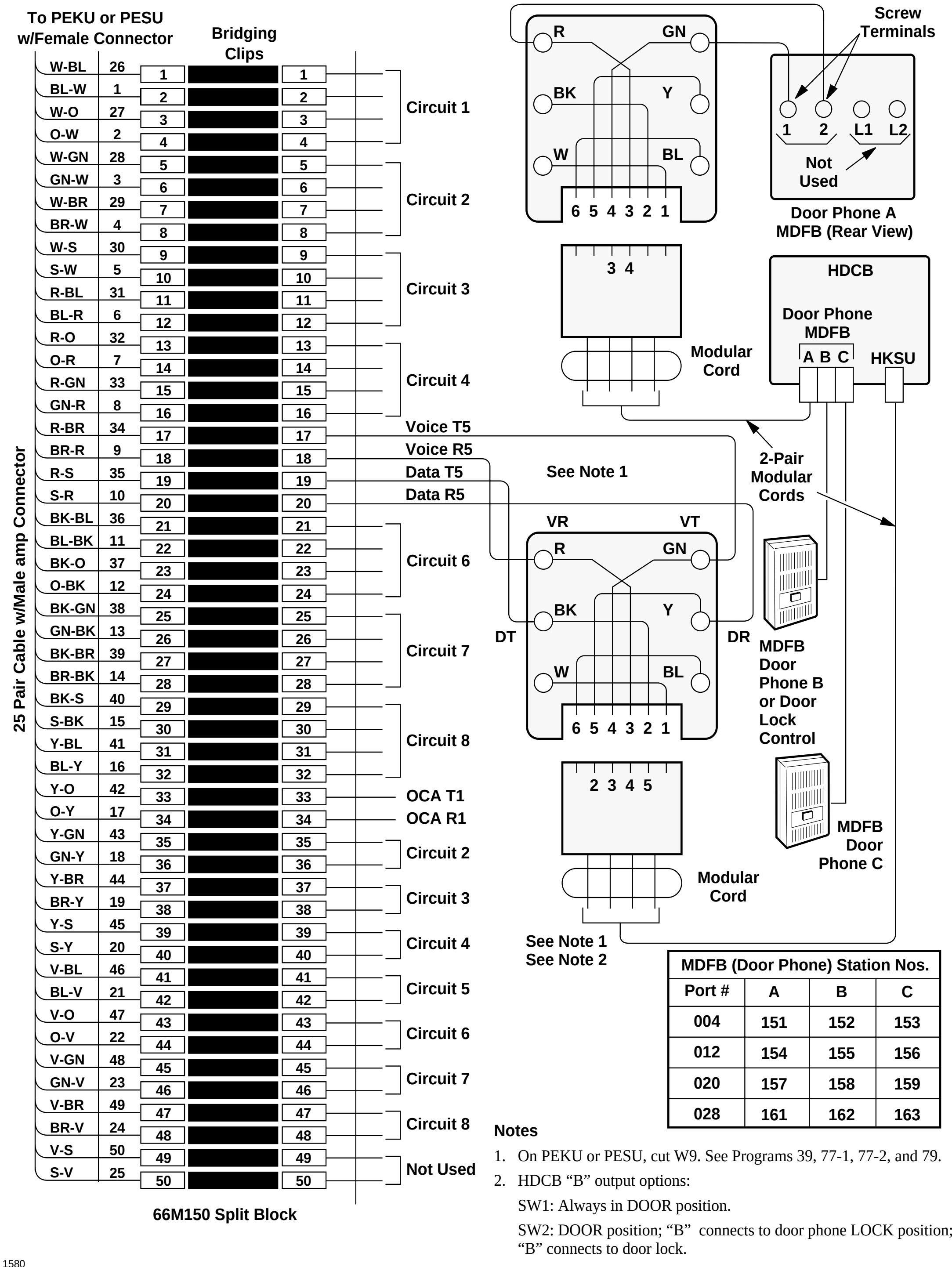


Notes

DSS
EKT
SW1

- Place PEKU SW1 to HDSS.
- All cable 24 AWG max loop resistance: 20 ohms from PEKU to HDSS (500 ft).
- See Program 29 to assign HDSS feature buttons.
- See Program 28 for telephone to HDSS assignments.

Figure 8-9 MDF Wiring/HDSS Console and Associated EKT to PEKU



MDFB (Door Phone) Station Nos.			
Port #	A	B	C
004	151	152	153
012	154	155	156
020	157	158	159
028	161	162	163

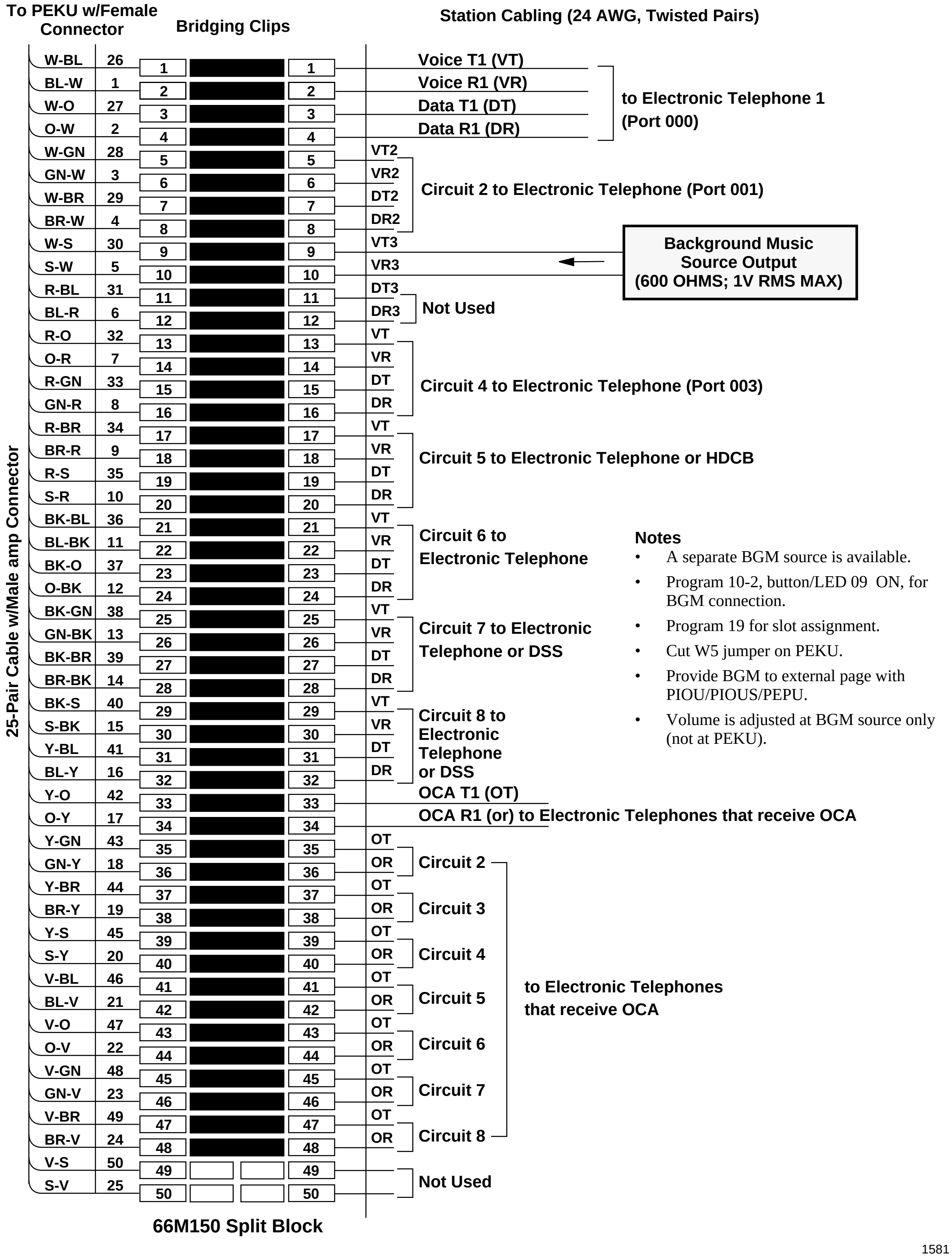
Notes

1. On PEKU or PESU, cut W9. See Programs 39, 77-1, 77-2, and 79.
2. HDCB “B” output options:

   SW1: Always in DOOR position.

   SW2: DOOR position; “B” connects to door phone LOCK position; “B” connects to door lock.
3. Door phones may be connected to Circuit 5 on Ports 004, 012, 020, and 028 only.

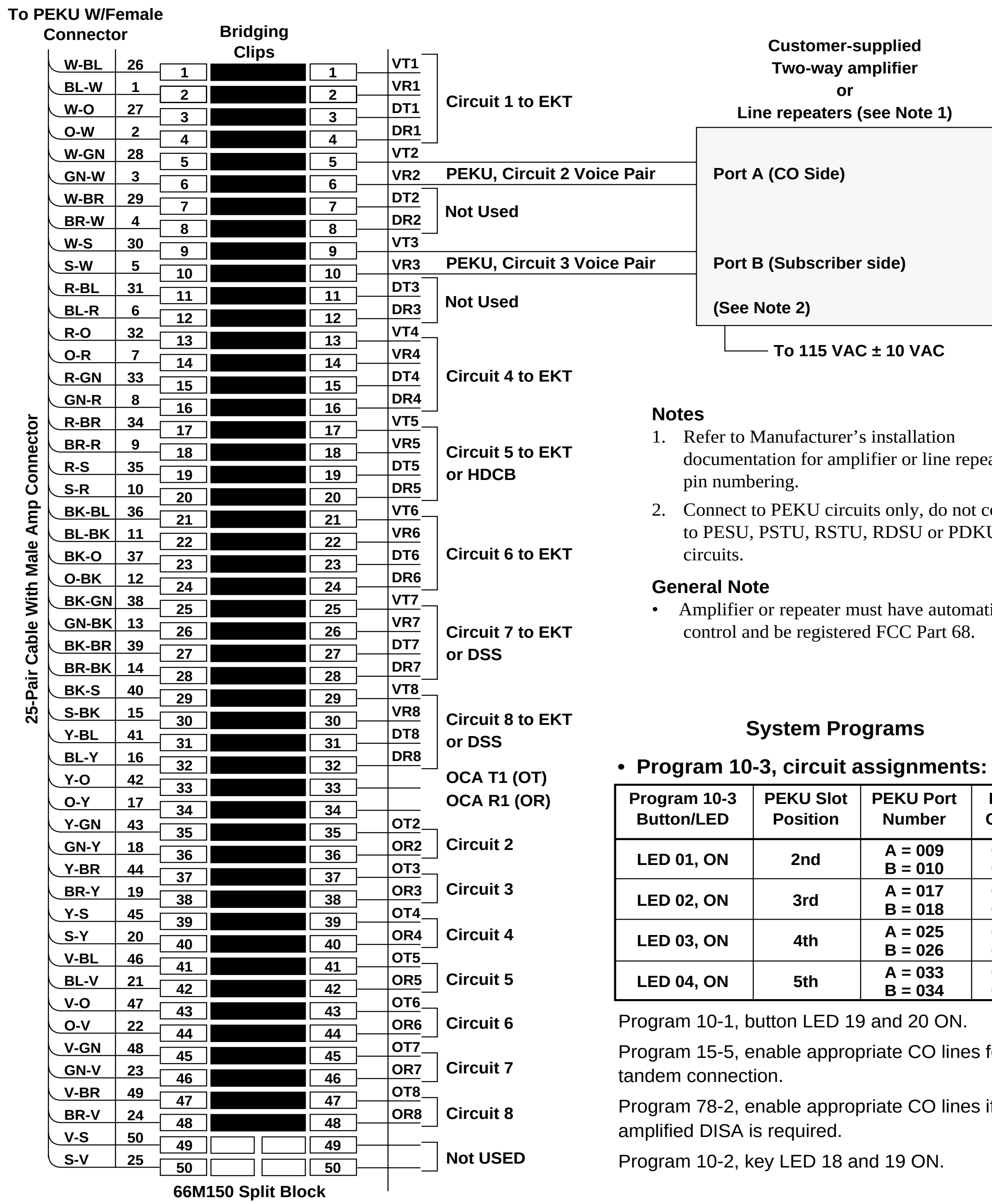
Figure 8-10 MDF Wiring-Door Phone/Lock to PEKU/PESU



Notes

- A separate BGM source is available.
- Program 10-2, button/LED 09 ON, for BGM connection.
- Program 19 for slot assignment.
- Cut W5 jumper on PEKU.
- Provide BGM to external page with PIOU/PIOUS/PEPU.
- Volume is adjusted at BGM source only (not at PEKU).

Figure 8-11 MDF Wiring PEKU Background Music Connection



Notes

1. Refer to Manufacturer's installation documentation for amplifier or line repeater pin numbering.
2. Connect to PEKU circuits only, do not connect to PESU, PSTU, RSTU, RDSU or PDKU circuits.

General Note

- Amplifier or repeater must have automatic gain control and be registered FCC Part 68.

System Programs

- **Program 10-3, circuit assignments:**

Program 10-3 Button/LED	PEKU Slot Position	PEKU Port Number	PEKU Circuit
LED 01, ON	2nd	A = 009 B = 010	CKT2 CKT3
LED 02, ON	3rd	A = 017 B = 018	CKT2 CKT3
LED 03, ON	4th	A = 025 B = 026	CKT2 CKT3
LED 04, ON	5th	A = 033 B = 034	CKT2 CKT3

Program 10-1, button LED 19 and 20 ON.

Program 15-5, enable appropriate CO lines for tandem connection.

Program 78-2, enable appropriate CO lines if amplified DISA is required.

Program 10-2, key LED 18 and 19 ON.

Figure 8-12 MDF Wiring/PEKU Amplified Two-CO Line Conference

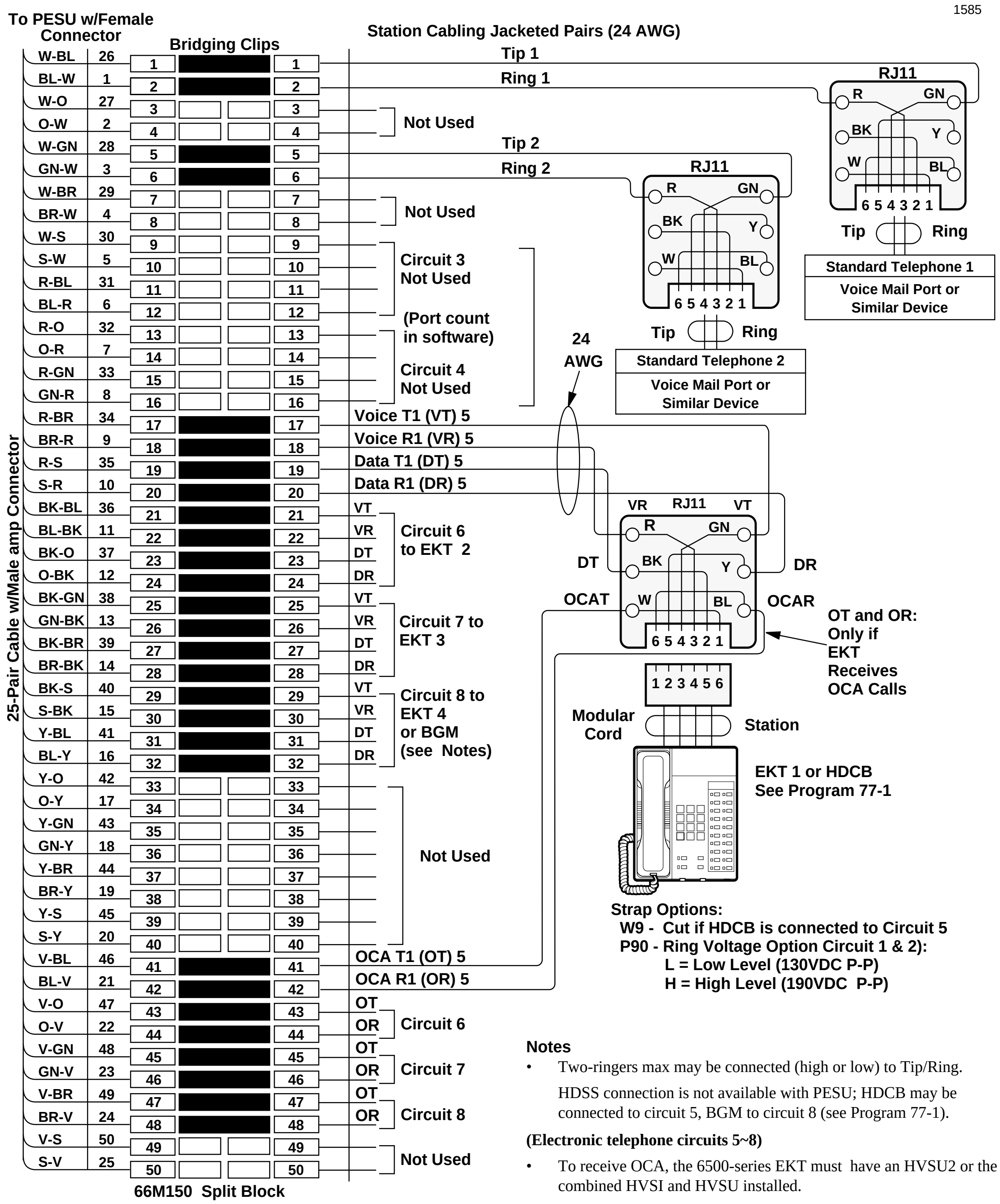
MDF Block Number		**KSU Slot Number**	

Color Code	Designation	CKT Number	Port Number	Intercom Number	Device/Standard Telephone/Electronic Telephone Location
W-Bl	VT	1			
Bl-W	VR				
W-O	DT				
O-W	DR				
W-G	VT	2			See Note 1.
G-W	VR				
W-Br	DT				
Br-W	DR				
W-S	VT	3			See Notes 1 and 2.
S-W	VR				
R-Bl	DT				
Bl-R	DR				
R-O	VT	4			
O-R	VR				
R-G	DT				
G-R	DR				
R-Br	VT	5			See Note 3.
Br-R	VR				
R-S	DT				
S-R	DR				
Bk-Bl	VT	6			
Bl-Bk	VR				
Bk-O	DT				
O-Bk	DR				
Bk-G	VT	7			See Note 4.
G-Bk	VR				
Bk-Br	DT				
Br-Bk	DR				
Bk-S	VT	8			See Note 4.
S-Bk	VR				
Y-Bl	DT				
Bl-Y	DR				

Notes

1. Indicate if two-way amplifier or line repeater
2. Indicate if BGM or electronic telephone is connected (see Program 10-2 and 19); BGM connects to VT and VR, Circuit 3 only (DT and DR not used).
3. Indicate if electronic telephone or HDCB (allowed HDCB port numbers: 004, 012, 020, 028).
4. Indicate if electronic telephone or HDSS Console number (1~8).

Figure 8-13 PEKU Station MDF Cross Connect Record



Notes (Standard telephone circuits 1 & 2)

- All cable 24 AWG; max loop resistance - 300 ohms from PESU to standard telephone/VM port.
- Standard telephones may be on- or off-premises. Off-premises connection is made via OL13A FIC, and RJ21X jack.
- Two ringers max per port.

Notes

- Two-ringers max may be connected (high or low) to Tip/Ring.

  HDSS connection is not available with PESU; HDCB may be connected to circuit 5, BGM to circuit 8 (see Program 77-1).

(Electronic telephone circuits 5~8)

- To receive OCA, the 6500-series EKT must have an HVSU2 or the combined HVSI and HVSU installed.
- Program 31, button/LED 03 must be ON for the EKT to receive OCA.
- An HHEU must be installed inside 6500-series EKTs for headset or HESB; Loud Ringing Bell option.
- All cable 24 AWG, max 40 ohm loop resistance from PESU to electronic telephone (1000 ft).

CAUTION! **To prevent system malfunction, DO NOT install the PESU in Slot 18 of the DK40i system.**

Figure 8-14 PEKU Station MDF Cross Connect Record PESU Wiring Diagram

MDF Block Number		**KSU Slot Number**	

Color Code	Designation	CKT Number	Port Number	Intercom Number	Device/Standard Telephone/Electronic Telephone Location
W-Bl	T	1			
Bl-W	R				
W-O	Not Used				
O-W	Not Used				
W-G	T	2			
G-W	R				
W-Br	Not Used				
Br-W	Not Used				
W-S	Not Used	3		NA	NA
S-W	Not Used				
R-Bl	Not Used				
Bl-R	Not Used				
R-O	Not Used	4		NA	NA
O-R	Not Used				
R-G	Not Used				
G-R	Not Used				
R-Br	VT	5			See Note 1.
Br-R	VR				
R-S	DT				
S-R	DR				
Bk-Bl	VT	6			
Bl-Bk	VR				
Bk-O	DT				
O-Bk	DR				
Bk-G	VT	7			See Note 2.
G-Bk	VR				
Bk-Br	DT				
Br-Bk	DR				
Bk-S	VT	8			See Notes 2 and 3.
S-Bk	VR				
Y-Bl	DT				
Bl-Y	DR				

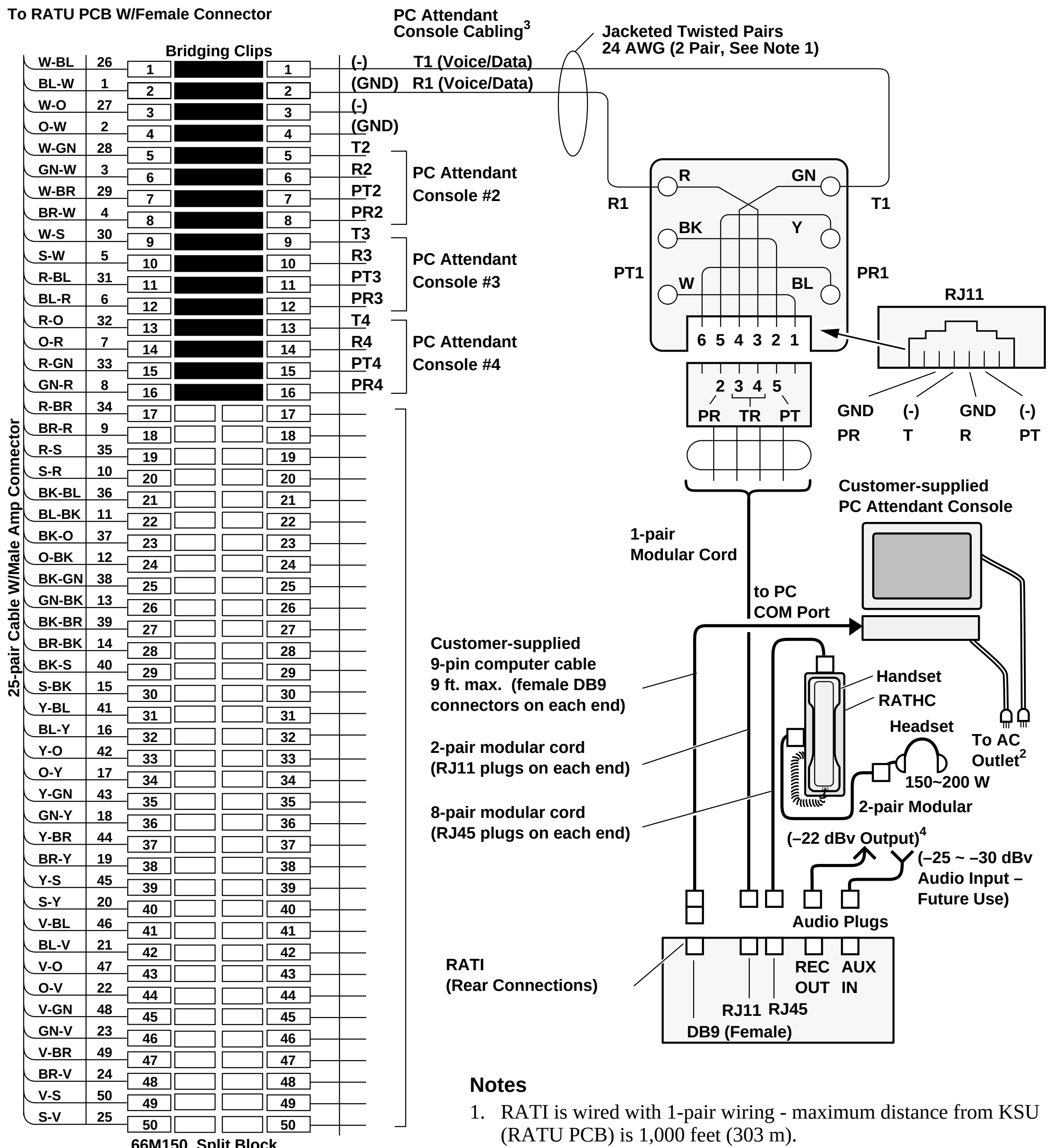
1. Indicate if HDCB or electronic telephone.
2. HDSS console number 1~8 is not allowed.
3. Indicate if BGM or electronic telephone is connected; BGM connects to VT and VR, circuit 8 only (DT and DR not used).

Notes

- Indicate if standard telephone, voice mail port, electronic telephone, HDCB (allowed HDCB port numbers: 004, 012, 020, 028) or separate BGM source.
- OCA wiring not shown, see MDF-to-electronic telephone wiring.

Figure 8-15 PESU Station MDF Cross Connect Record

Attendant Console Wiring Diagrams

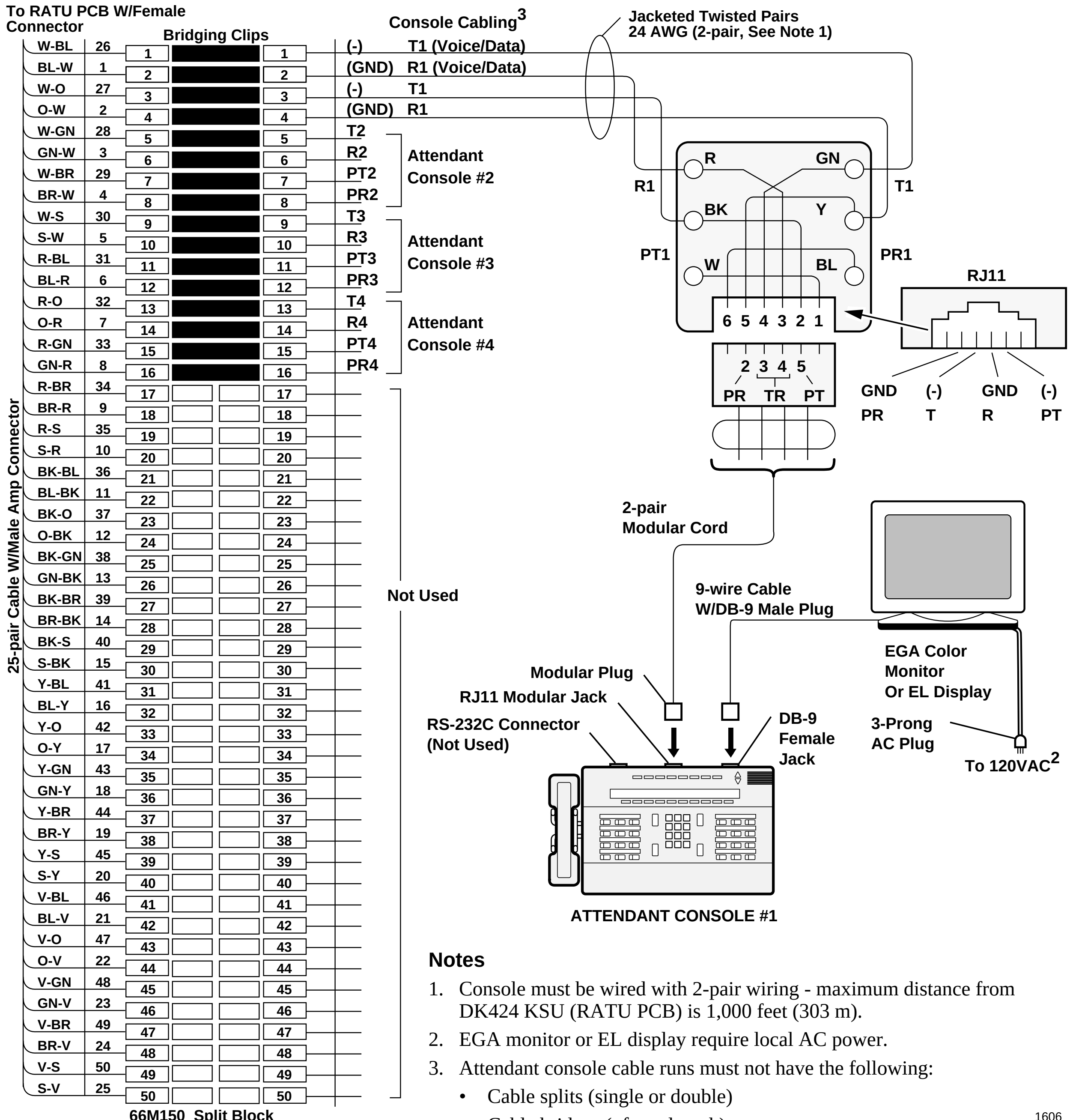


Notes

1. RATI is wired with 1-pair wiring - maximum distance from KSU (RATU PCB) is 1,000 feet (303 m).
2. PC Attendant Console and CRT require local AC power.
3. Attendant console cable runs **must not** have the following:
   - Cable splits (single or double)
   - Cable bridges (of any length)
   - High resistance or faulty cable splices
4. To tape recorder "REC" input.
5. Audio input is for future use.

1607

Figure 8-16 PC Attendant Console MDF Wiring Diagram

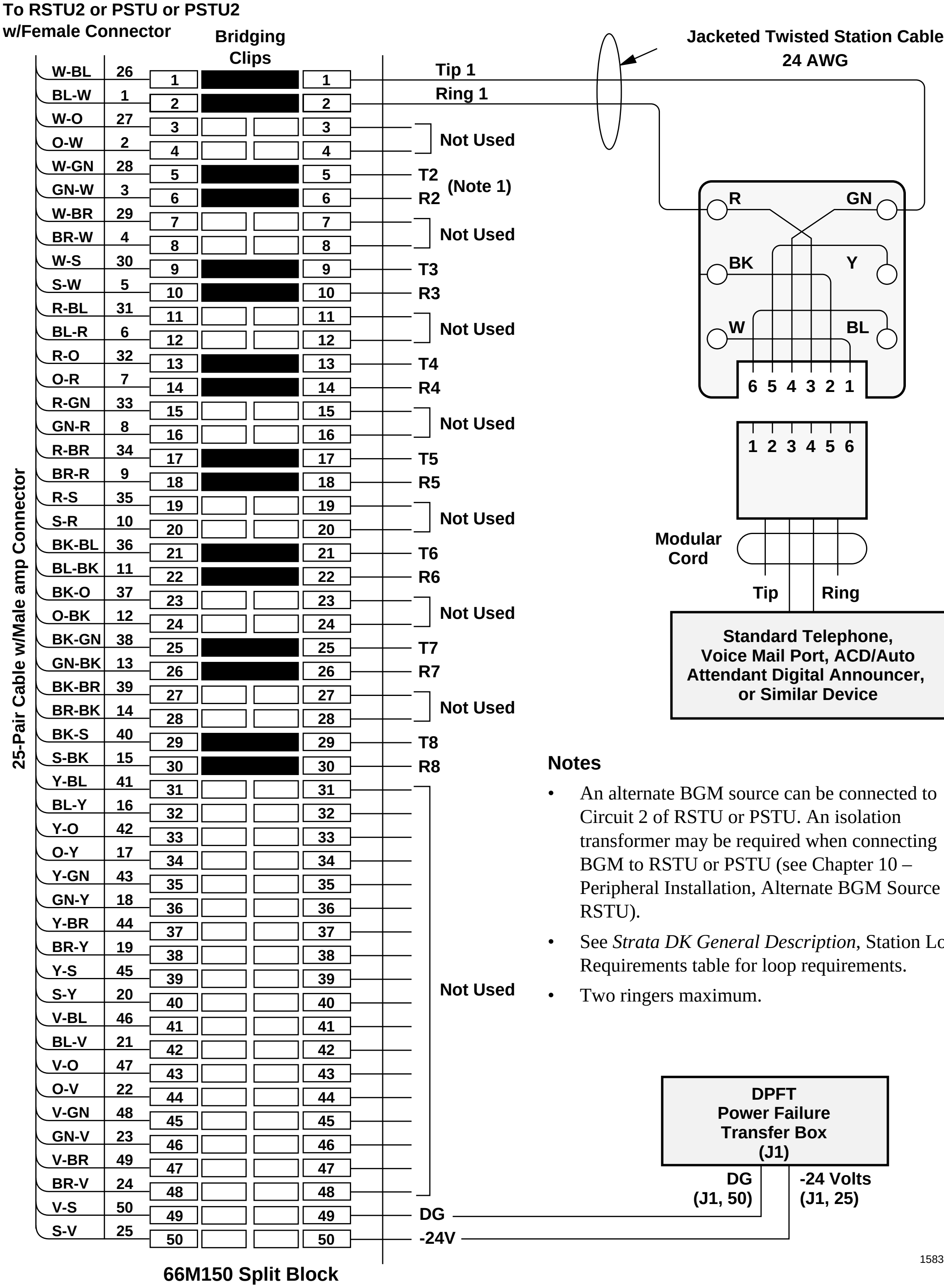


Notes

1. Console must be wired with 2-pair wiring - maximum distance from DK424 KSU (RATU PCB) is 1,000 feet (303 m).
2. EGA monitor or EL display require local AC power.
3. Attendant console cable runs must not have the following:
   - Cable splits (single or double)
   - Cable bridges (of any length)
   - High resistance or faulty cable splices

Figure 8-17 Attendant Console MDF Wiring Diagram

Analog Devices Wiring



Notes

- An alternate BGM source can be connected to Circuit 2 of RSTU or PSTU. An isolation transformer may be required when connecting BGM to RSTU or PSTU (see Chapter 10 – Peripheral Installation, Alternate BGM Source to RSTU).
- See *Strata DK General Description*, Station Loop Requirements table for loop requirements.
- Two ringers maximum.

Figure 8-18 MDF Wiring/Standard Telephone, Voice Mail, DPFT to RSTU/RSTU2/RDSU/RSTS/PSTU/PSTU2

MDF Block Number ______ **KSU Slot Number** ______

Color Code	Designation	CKT Number	Port Number	Intercom Number	Device/Standard Telephone/Electronic Telephone Location
W-Bl	T	1			
Bl-W	R				
W-O	Not Used				
O-W	Not Used				
W-G	T	2			Indicate if separate BGM source.
G-W	R				
W-Br	Not Used				
Br-W	Not Used				
W-S	T	3			
S-W	R				
R-Bl	Not Used				
Bl-R	Not Used				
R-O	T	4			
O-R	R				
R-G	Not Used				
G-R	Not Used				
R-Br	T	5			
Br-R	R				
R-S	Not Used				
S-R	Not Used				
Bk-Bl	T	6			
Bl-Bk	R				
Bk-O	Not Used				
O-Bk	Not Used				
Bk-G	T	7			
G-Bk	R				
Bk-Br	Not Used				
Br-Bk	Not Used				
Bk-S	T	8			
S-Bk	R				
Y-Bl	Not Used				
Bl-Y	Not Used				

Note Indicate if standard telephone, voice mail port, etc.

Figure 8-19 RSTU/RSTU2/RDSU/RSTS/PSTU/PSTU2 Station MDF Cross Connect Record

Power Failure Cut Through (DPFT) Wiring Pin-outs

Pair	Pin	Color Code	Lead Designation	Function		PSTU/RSTU PCB Position
1t	26	W-Bl	T	TIP-TEL	#1	
R	1	Bl-W	R	RING-TEL	#1	
2T	27	W-O	T	TIP-RSTU/RSTU/RDSU	#1	
R	2	O-W	R	RING-PSTU/RSTU/RDSU	#1	
3T	28	W-G	T	TIP-TEL	#2	
R	3	G-W	R	RING-TEL	#2	
4T	29	W-Br	T	TIP-RSTU/RSTU/RDSU	#2	
R	4	Br-W	R	RING-PSTU/RSTU/RDSU	#2	
5T	30	W-S	T	TIP-TEL	#3	
R	5	S-W	R	RING-TEL	#3	
6T	31	R-Bl	T	TIP-RSTU/RSTU/RDSU	#3	
R	6	Bl-R	R	RING-PSTU/RSTU/RDSU	#3	
7T	32	R-O	T	TIP-TEL	#4	
R	7	O-R	R	RING-TEL	#4	
8T	33	R-G	T	TIP-RSTU/RSTU/RDSU	#4	
R	8	G-R	R	RING-PSTU/RSTU/RDSU	#4	
9T	34	R-Br	T	TIP-TEL	#5	
R	9	Br-R	R	RING-TEL	#5	
10T	35	R-S	T	TIP-RSTU/RSTU/RDSU	#5	
R	10	S-R	R	RING-PSTU/RSTU/RDSU	#5	
11T	36	Bk-Bl	T	TIP-TEL	#6	
R	11	Bl-Bk	R	RING-TEL	#6	
12T	37	Bk-O	T	TIP-RSTU/RSTU/RDSU	#6	
R	12	O-Bk	R	RING-PSTU/RSTU/RDSU	#6	
13T	38	Bk-G	T	TIP-TEL	#7	
R	13	G-Bk	R	RING-TEL	#7	
14T	39	Bk-Br	T	TIP-RSTU/RSTU/RDSU	#7	
R	14	Br-Bk	R	RING-PSTU/RSTU/RDSU	#7	
15T	40	Bk-S	T	TIP-TEL	#8	
R	15	S-Bk	R	RING-TEL	#8	
16T	41	Y-Bl	T	TIP-RSTU/RSTU/RDSU	#8	
R	16	Bl-Y	R	RING-PSTU/RSTU/RDSU	#8	
17T	42	Y-O	Spare			
R	17	O-Y	Spare			
18T	43	Y-G	Spare			
R	18	G-Y	Spare			
19T	44	Y-Br	Spare			
R	19	Br-Y	Spare			
20T	45	Y-S	Spare			
R	20	S-Y	Spare			
21T	46	V-Bl	Spare			
R	21	Bl-V	Spare			
22T	47	V-O	Spare			
R	22	O-V	Spare			
23T	48	V-G	Spare			
R	23	G-V	Spare			
24T	49	V-Br	Spare			
R	24	Br-V	Spare			
25T	50	V-S	Spare			
R	25	S-V	Spare			

Figure 8-20 DPFT Connector J2/Terminal Sequence & Designations/Station Line Connection

Pair	Pin	Color Code	Lead Designation	Function		PSTU/RSTU PCB Position
1t	26	W-Bl	T	TIP-CO	#1	
R	1	Bl-W	R	RING-CO	#1	
2T	27	W-O	T	TIP-PCOU/RCOU	#1	
R	2	O-W	R	RING-PCOU/RCOU	#1	
3T	28	W-G	T	TIP-CO	#2	
R	3	G-W	R	RING-CO	#2	
4T	29	W-Br	T	TIP-PCOU/RCOU	#2	
R	4	Br-W	R	RING-PCOU/RCOU	#2	
5T	30	W-S	T	TIP-CO	#3	
R	5	S-W	R	RING-CO	#3	
6T	31	R-Bl	T	TIP-PCOU/RCOU	#3	
R	6	Bl-R	R	RING-PCOU/RCOU	#3	
7T	32	R-O	T	TIP-CO	#4	
R	7	O-R	R	RING-CO	#4	
8T	33	R-G	T	TIP-PCOU/RCOU	#4	
R	8	G-R	R	RING-PCOU/RCOU	#4	
9T	34	R-Br	T	TIP-CO	#5	
R	9	Br-R	R	RING-CO	#5	
10T	35	R-S	T	TIP-PCOU/RCOU	#5	
R	10	S-R	R	RING-PCOU/RCOU	#5	
11T	36	Bk-Bl	T	TIP-CO	#6	
R	11	Bl-Bk	R	RING-CO	#6	
12T	37	Bk-O	T	TIP-PCOU/RCOU	#6	
R	12	O-Bk	R	RING-PCOU/RCOU	#6	
13T	38	Bk-G	T	TIP-CO	#7	
R	13	G-Bk	R	RING-CO	#7	
14T	39	Bk-Br	T	TIP-PCOU/RCOU	#7	
R	14	Br-Bk	R	RING-PCOU/RCOU	#7	
15T	40	Bk-S	T	TIP-CO	#8	
R	15	S-Bk	R	RING-CO	#8	
16T	41	Y-Bl	T	TIP-PCOU/RCOU	#8	
R	16	Bl-Y	R	RING-PCOU/RCOU	#8	
17T	42	Y-O	Spare			
R	17	O-Y	Spare			
18T	43	Y-G	Spare			
R	18	G-Y	Spare			
19T	44	Y-Br	Spare			
R	19	Br-Y	Spare			
20T	45	Y-S	Spare			
R	20	S-Y	Spare			
21T	46	V-Bl	Spare			
R	21	Bl-V	Spare			
22T	47	V-O	Spare			
R	22	O-V	Spare			
23T	48	V-G	Spare			
R	23	G-V	Spare			
24T	49	V-Br	Spare			
R	24	Br-V	Spare			
25T	50	V-S	PFT DG	PFT GROUND (INPUT)		RDSU/RSTU/PSTU/PIN50
R	25	S-V	PFT -24V	PFT -24V (INPUT)		RDSU/RSTU/PSTU/PIN25

Figure 8-21 DPFT Connector J1/Terminal Sequence & Designations/CO Line Connection & DPFT Control

CO Line Wiring Diagrams

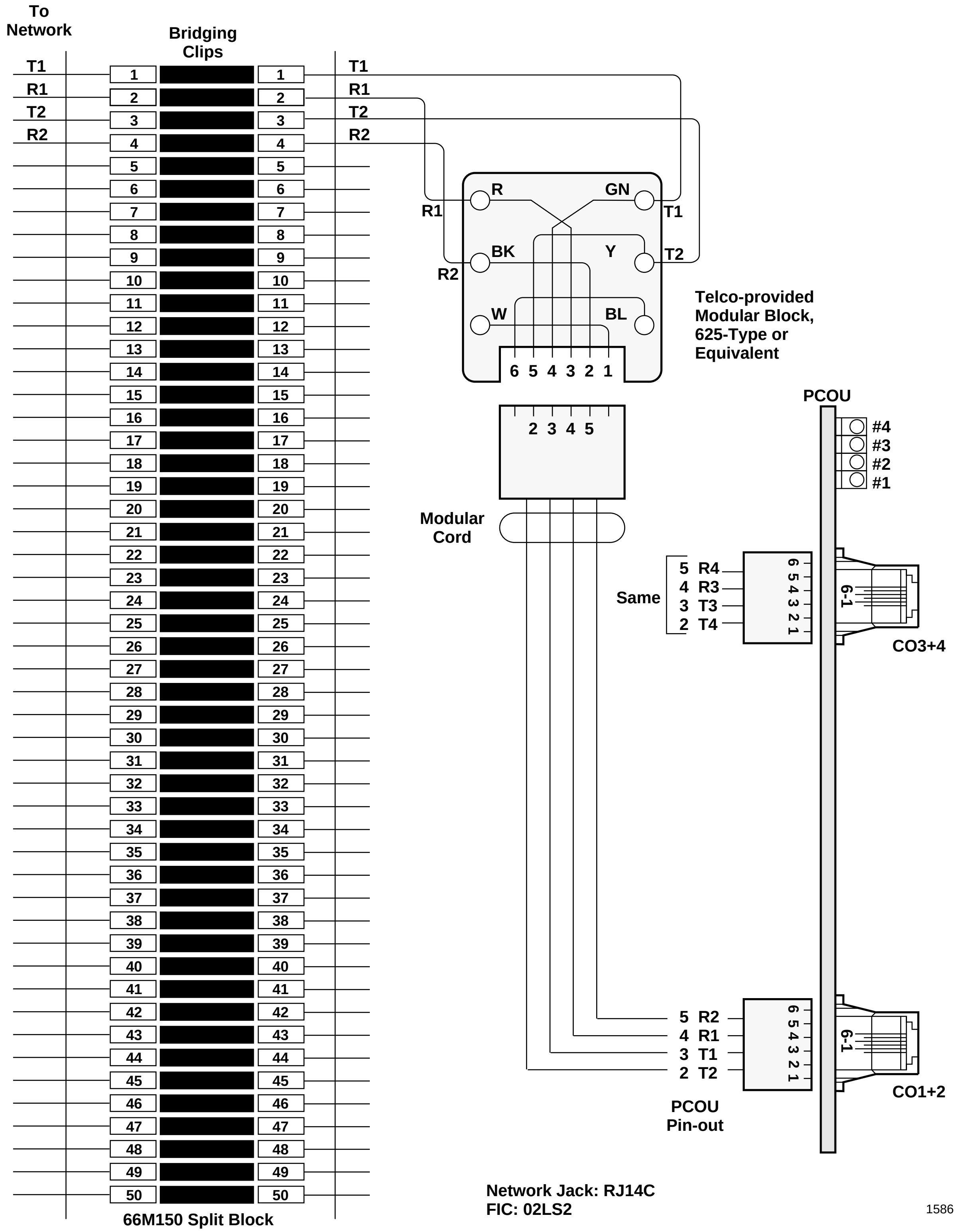


Figure 8-22 MDF Wiring/CO Lines to PCOU

MDF Block Number	CO Line Number	PCB Type and Cabinet Slot Number	MDF Block Number	CO Line Number	PCB Type and Cabinet Slot Number	MDF Block Number	CO Line Number	PCB Type and Cabinet Slot Number

Figure 8-23 CO Line (RCOU/RCOS, RGLU2, RDDU, PEMU, REMU, RDDU, RDTU) MDF Cross Connect Record

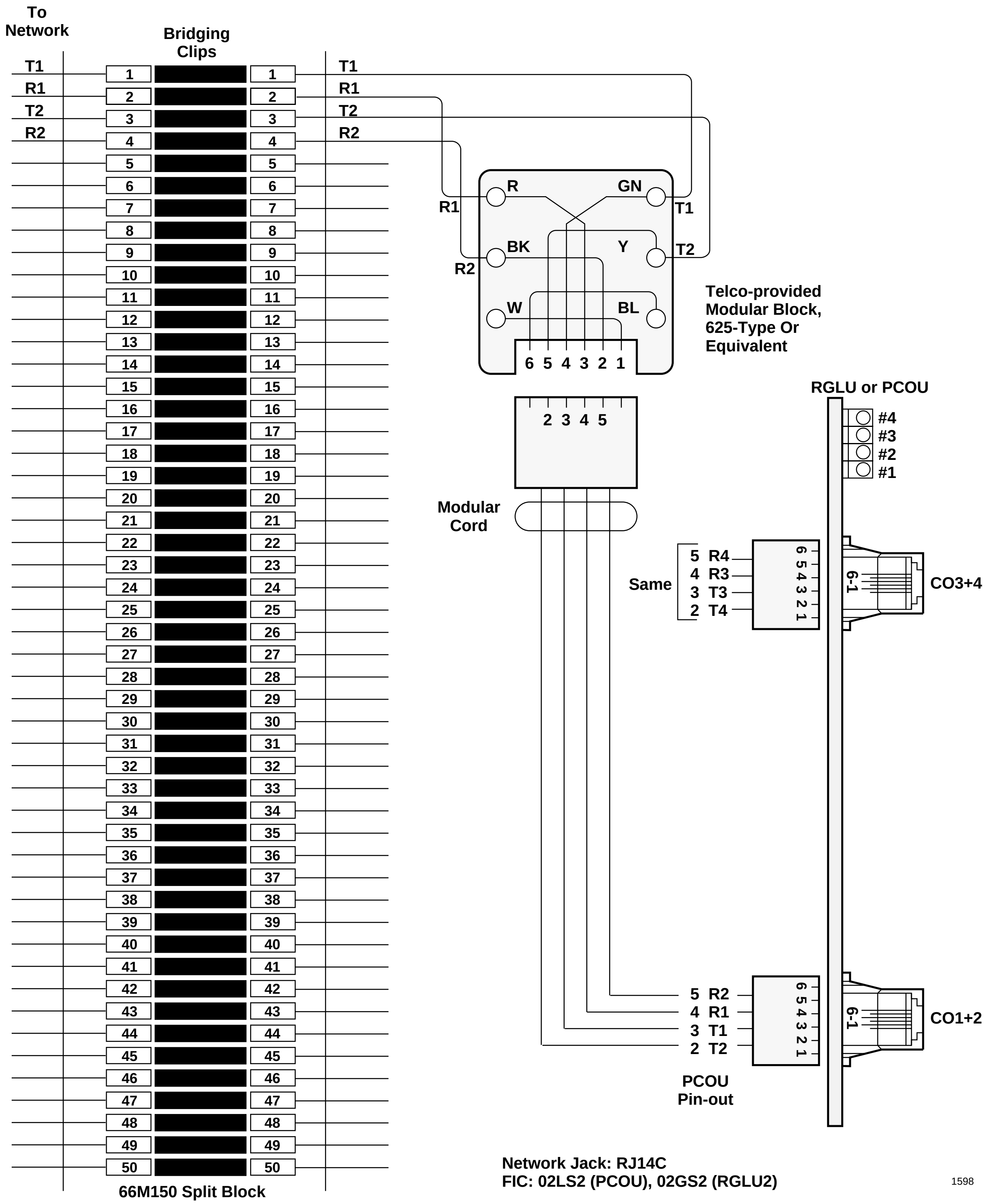


Figure 8-24 MDF Wiring/CO Lines to RGLU2 or PCOU

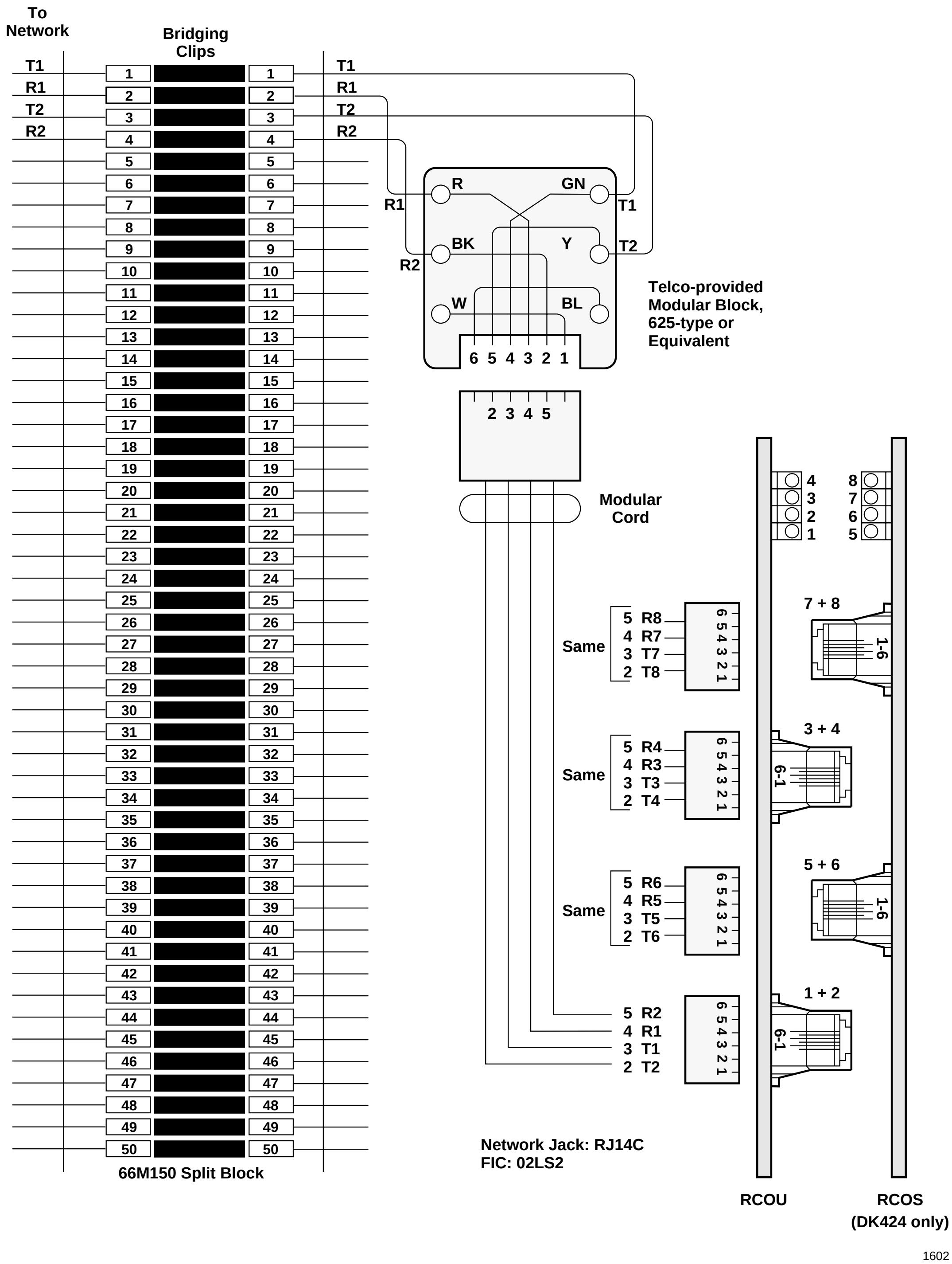


Figure 8-25 MDF Wiring/CO to RCOU/RCOS

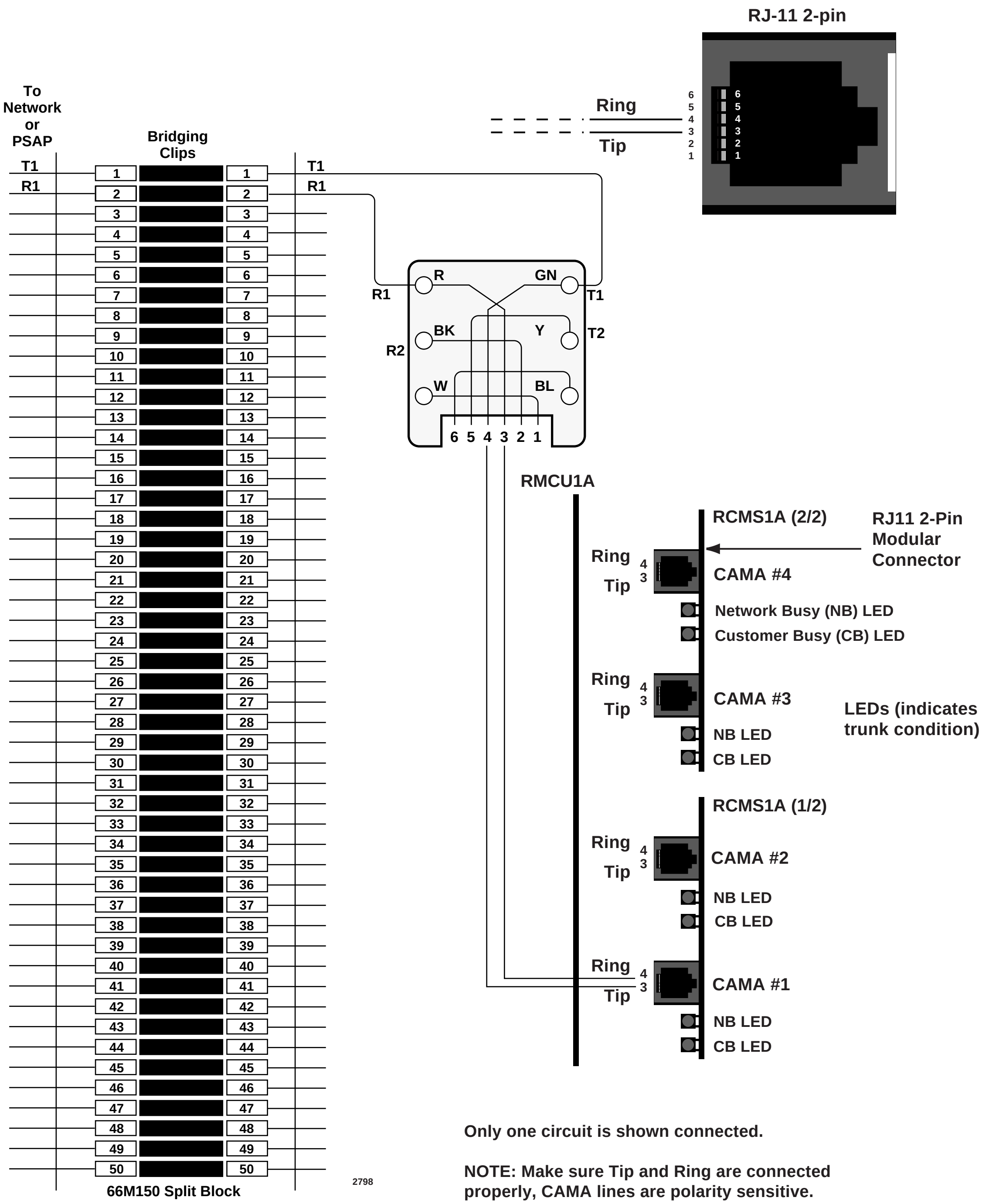
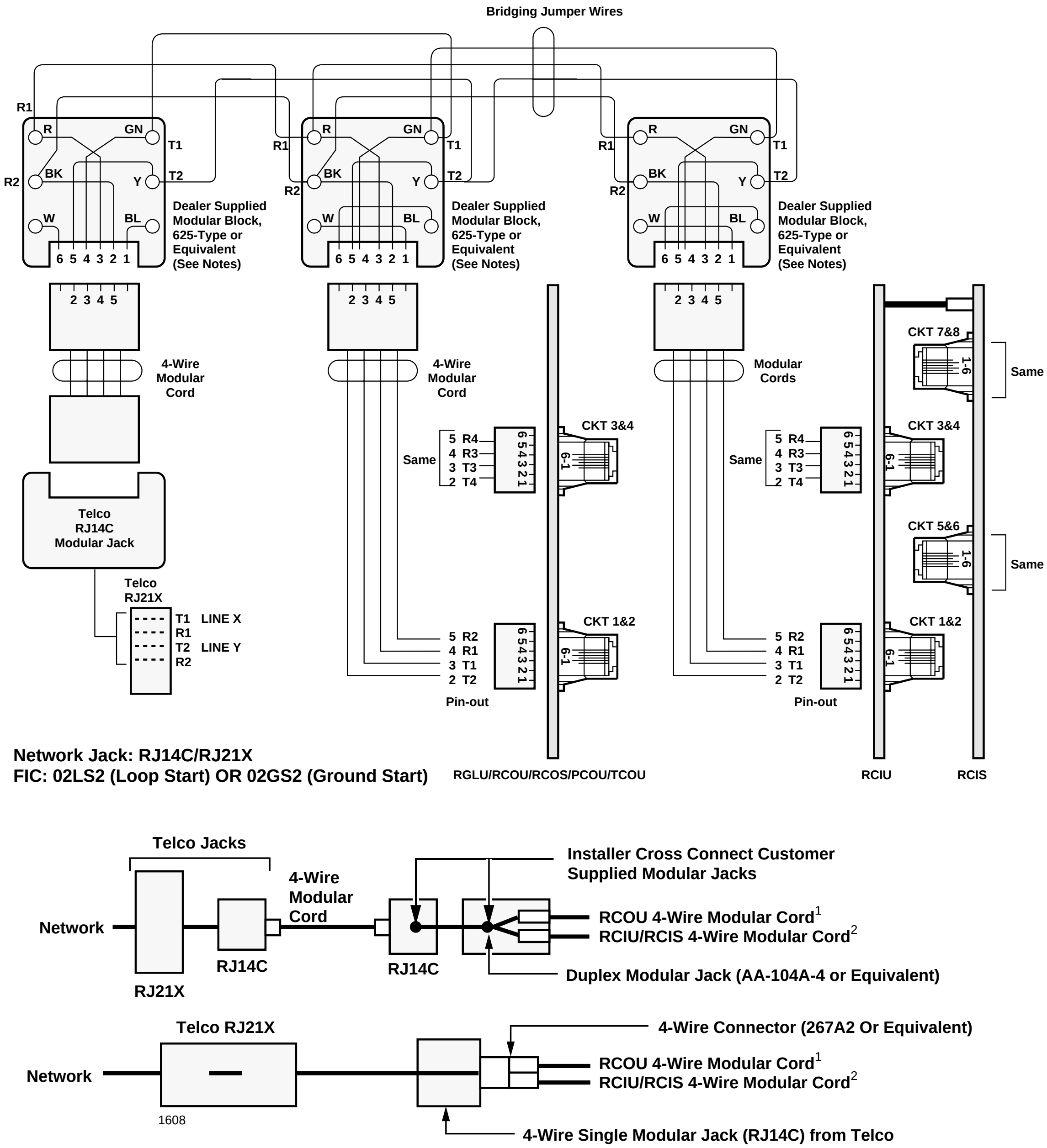


Figure 8-26 RMCU/RMCS Wiring Diagram



1. 4-wire modular jacks such as graybar part number AA-104A-4 could be used in place of the two modular jacks; or, a T-connector such as graybar part number 267A2 Adaptor could be used as shown below:
2. Assign RCIU1/RCIU2/RCIS circuits to the appropriate CO line using Program *50.

CAUTION! **RCIU1 cannot be used in DK40i. Install RCIU2 in slot 17 only of the DK40i Expansion Unit; it must never be installed in slot 18.**

Figure 8-27 RCIU1/RCIS or RCIU2/RCIS MDF Wiring Diagram

DID and Tie Line Wiring

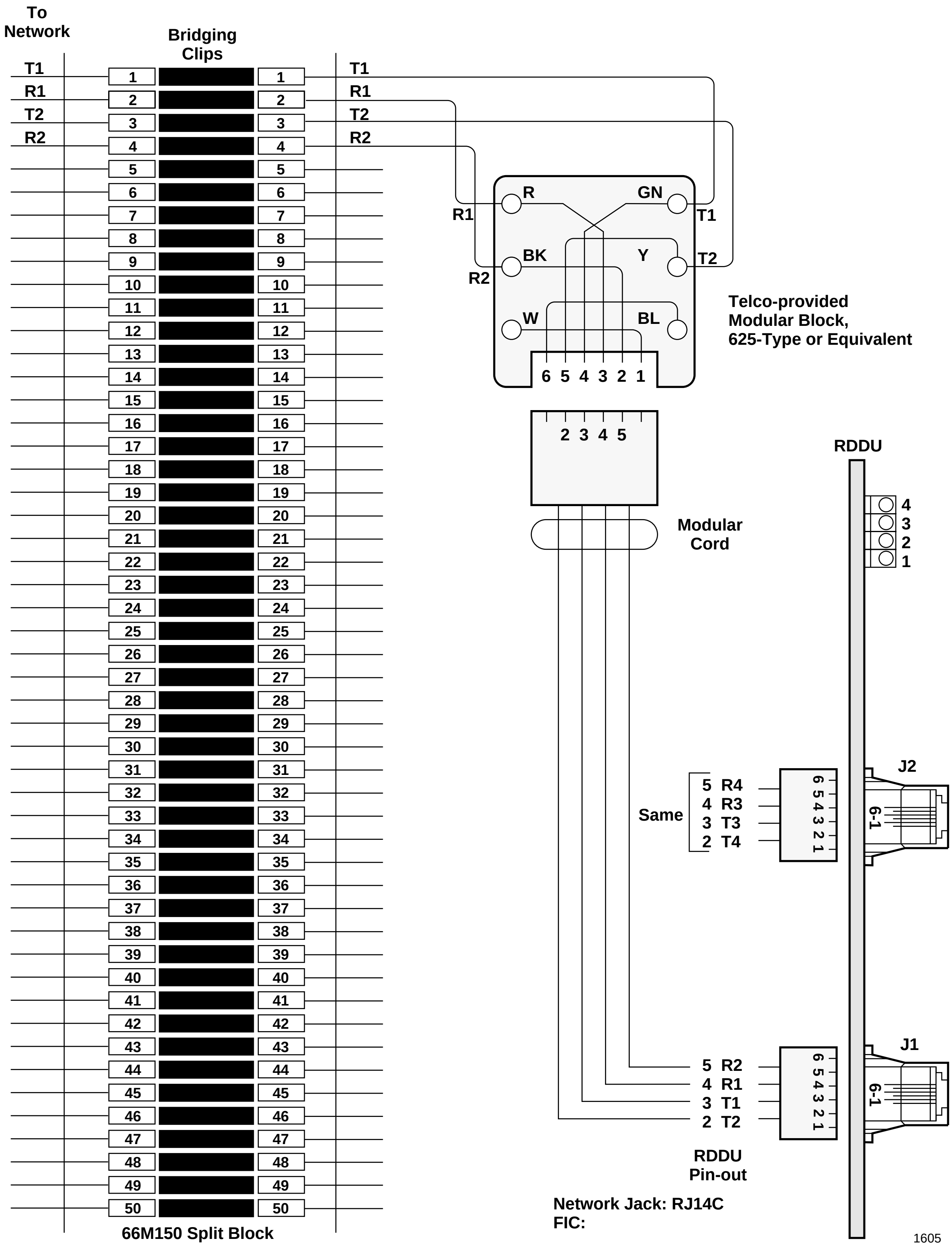


Figure 8-28 MDF Wiring/DID CO Lines to RDDU

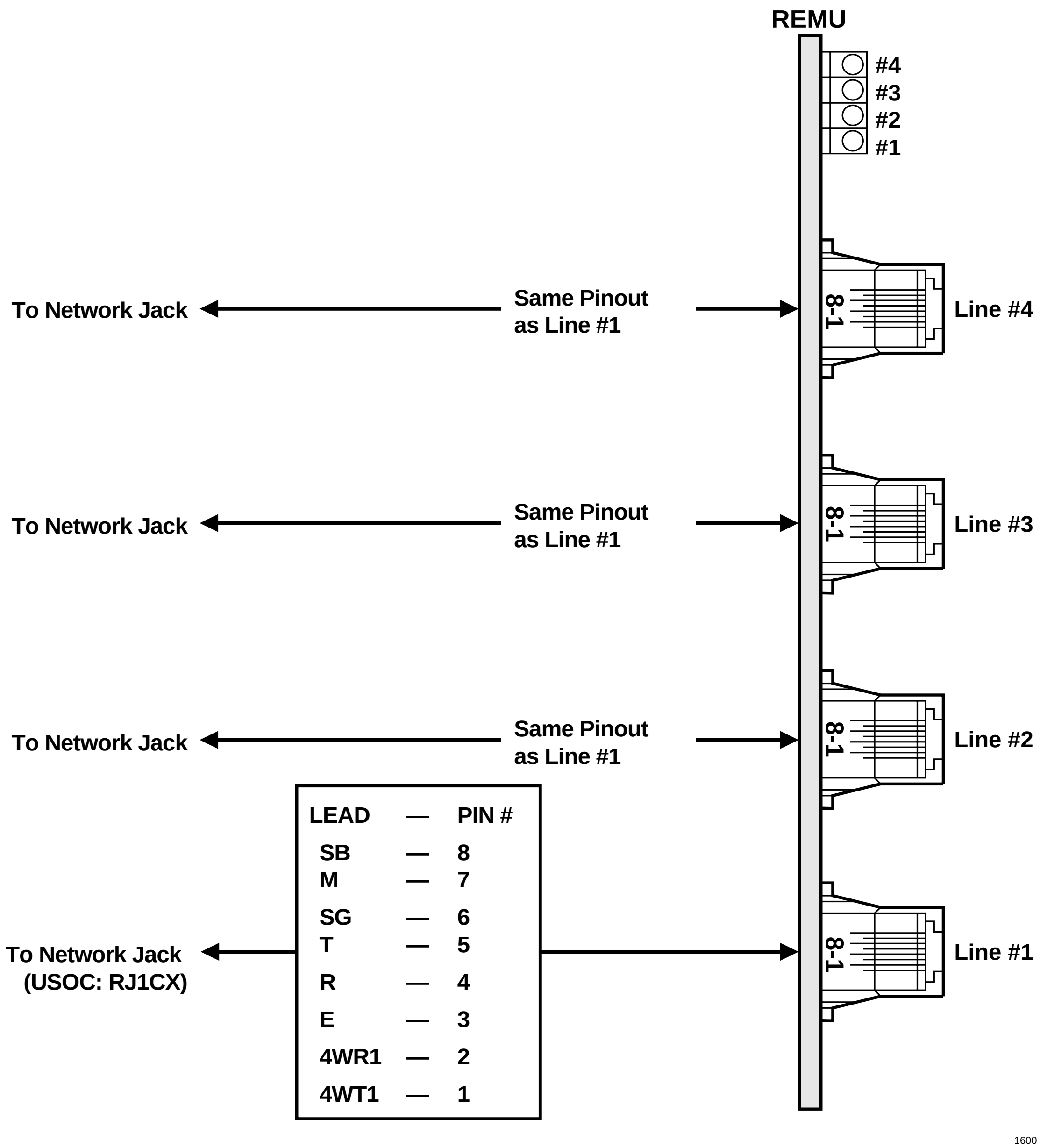


Figure 8-29 MDF Wiring REMU 2/4 Wire Type I/II

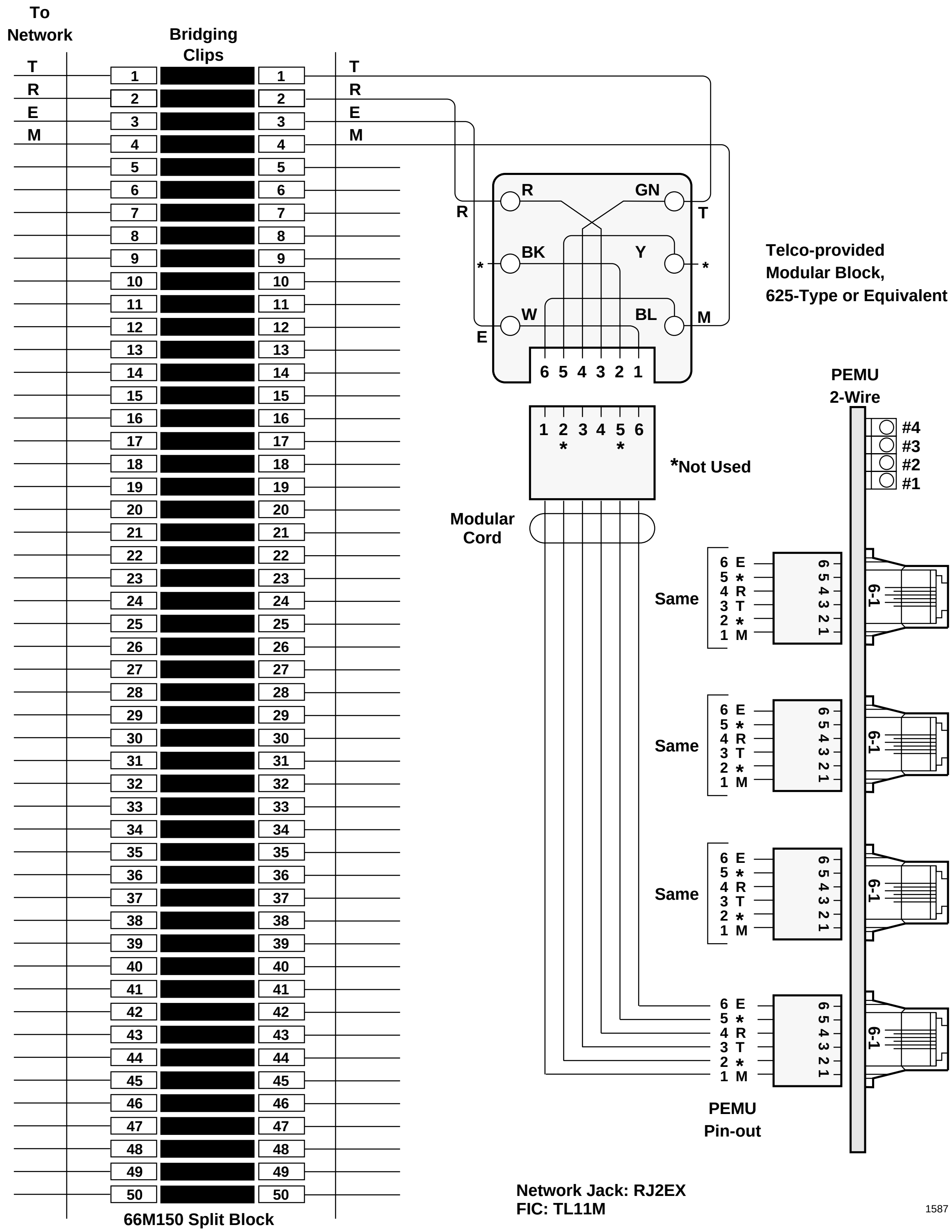
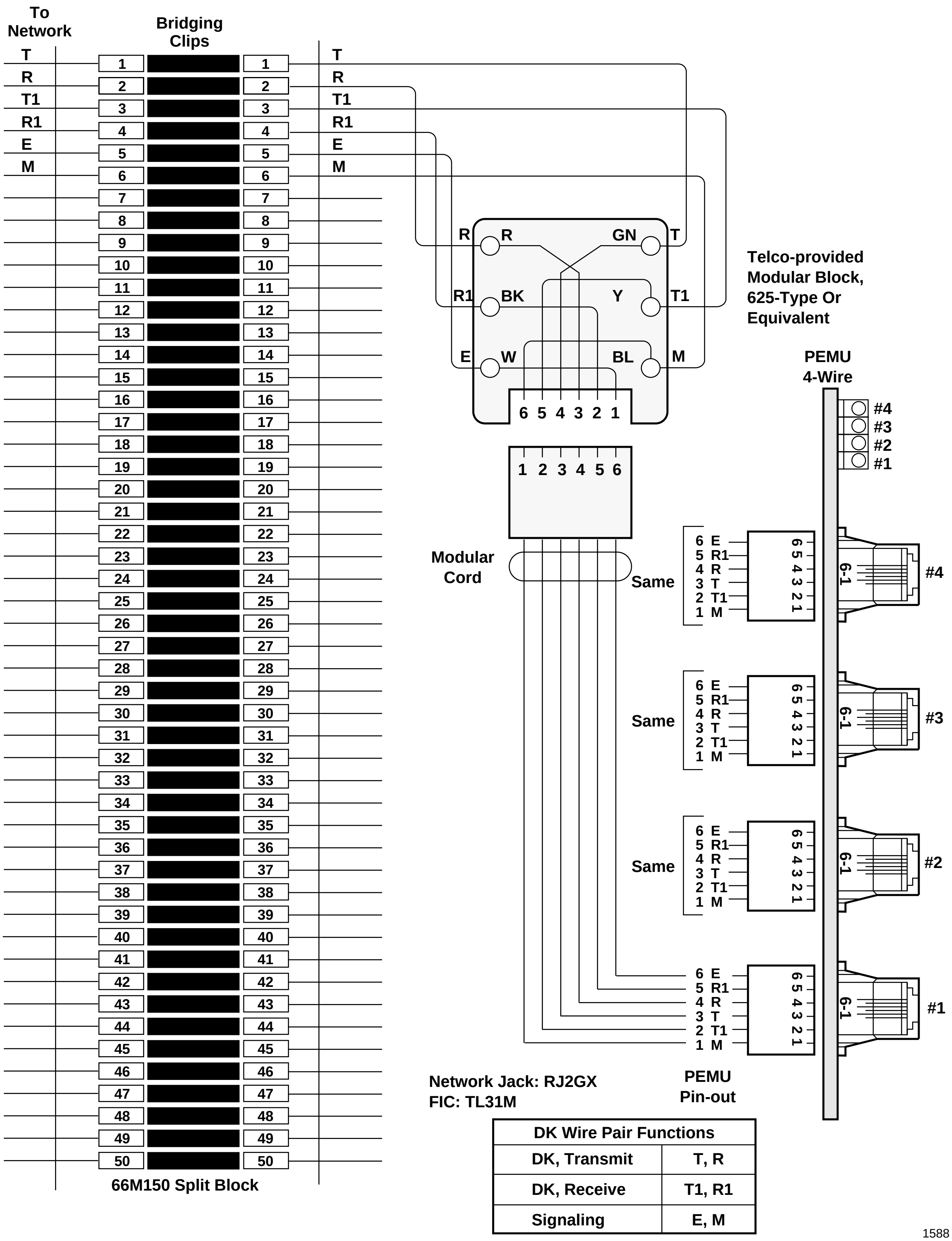


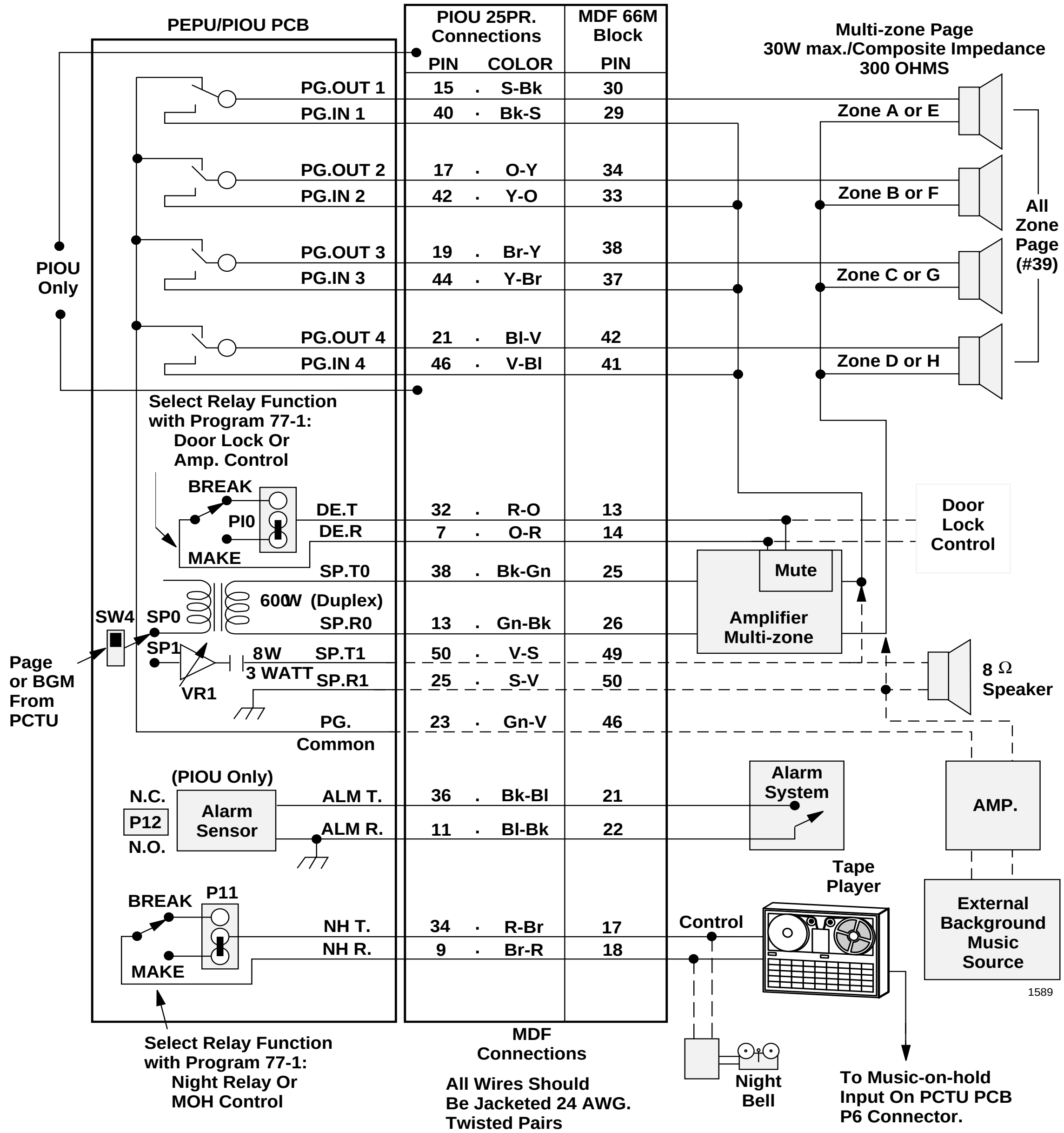
Figure 8-30 MDF Wiring/2-Wire Tie Line to PEMU



DK Wire Pair Functions	
DK, Transmit	T, R
DK, Receive	T1, R1
Signaling	E, M

Figure 8-31 MDF Wiring/4-Wire Tie Line to PEMU

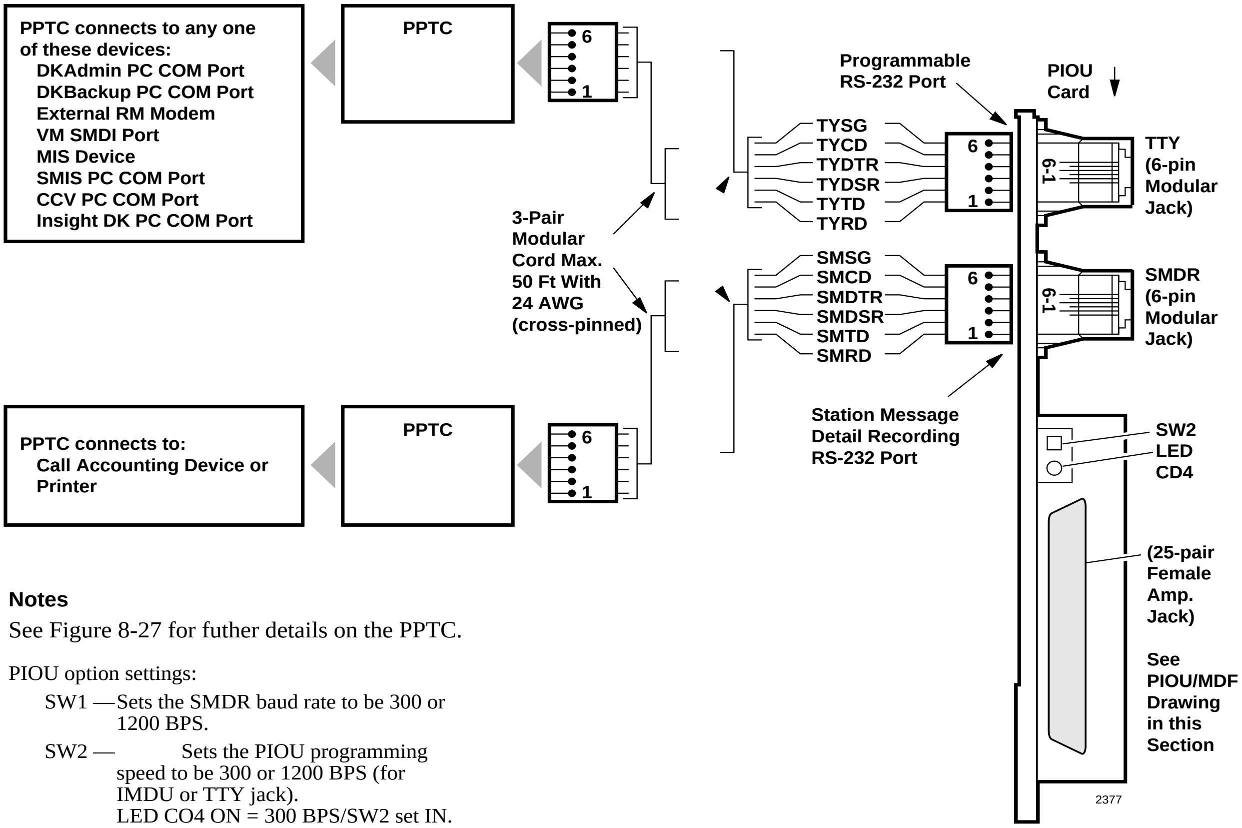
Option Interface PCB Wiring Diagrams



Zones	Access Codes DK40i and DK424 (RCTUA, RCTUBA/BB, RCTUC/D)	Access Codes DK424 (RCTUE/F equipment with a PIOU)
A	#35	#351
B	#36	#352
C	#37	#353
D	#38	#354
E		#355
F		#356
G		#357
H		#358

Note Four-digit access codes are for RCTUE/F only. Zones E~H require a second PIOU PCB.

Figure 8-32 MDF Wiring/PIOU or PEPU Peripherals (25-pair)



Notes

See Figure 8-27 for futher details on the PPTC.

PIOU option settings:

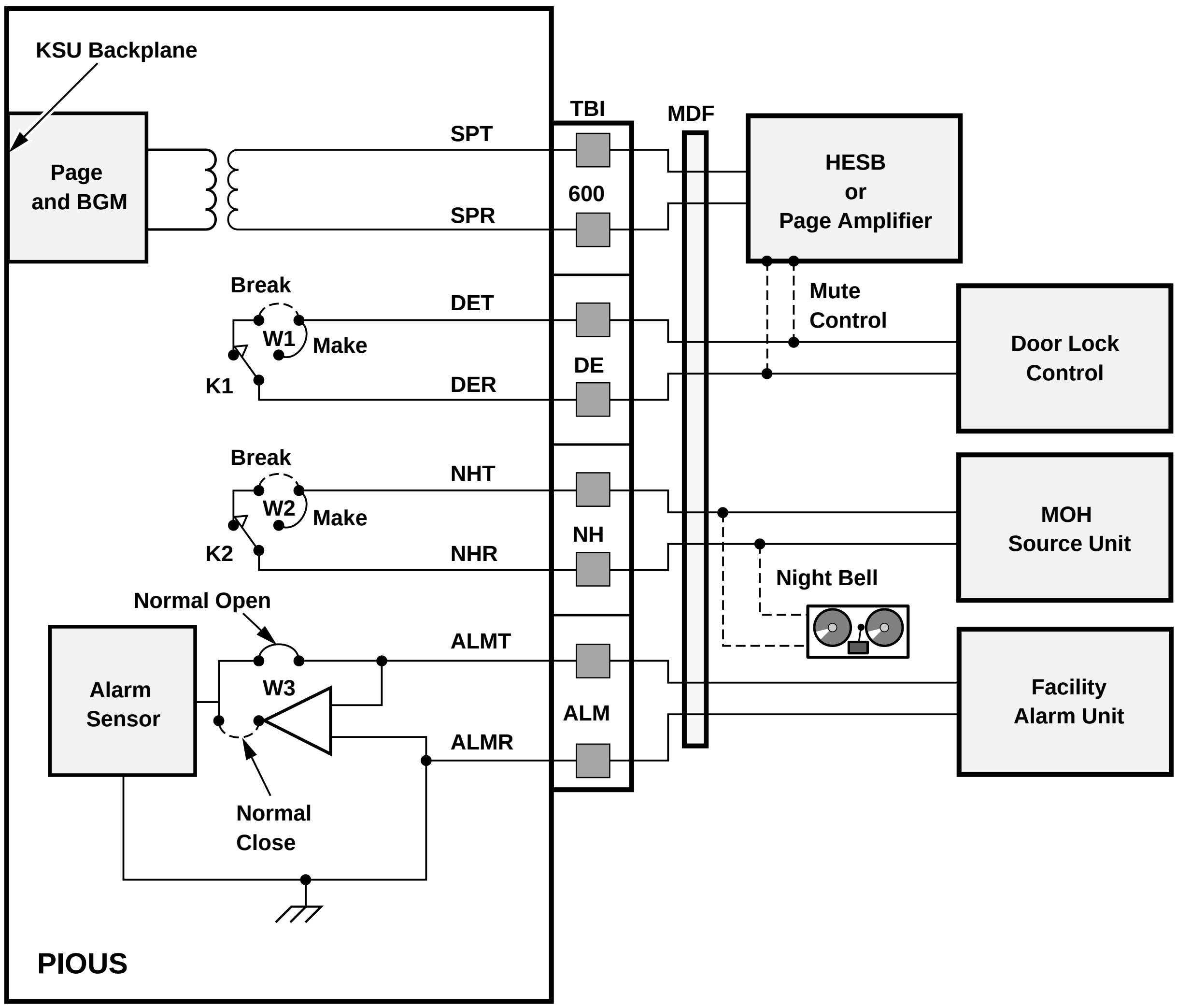
SW1 — Sets the SMDR baud rate to be 300 or 1200 BPS.

SW2 — Sets the PIOU programming speed to be 300 or 1200 BPS (for IMDU or TTY jack).
LED CO4 ON = 300 BPS/SW2 set IN.
LED CO4 OFF = 1200 BPS/SW2 set OUT.

SW3 — Sets the PIOU to operate with the IMDU or an external device connected to the TTY modular jack.
$\boxed{\text{MODEM}}$ — For IMDU operation.
$\boxed{\text{TTY}}$ — For ASCII terminal or external modem.

W4 — Sets the IMDU and TTY jack for bell or CCITT specification.

Figure 8-33 PIOU/TTY and SMDR Wiring (with PPTC Adapter)



Relay Options:

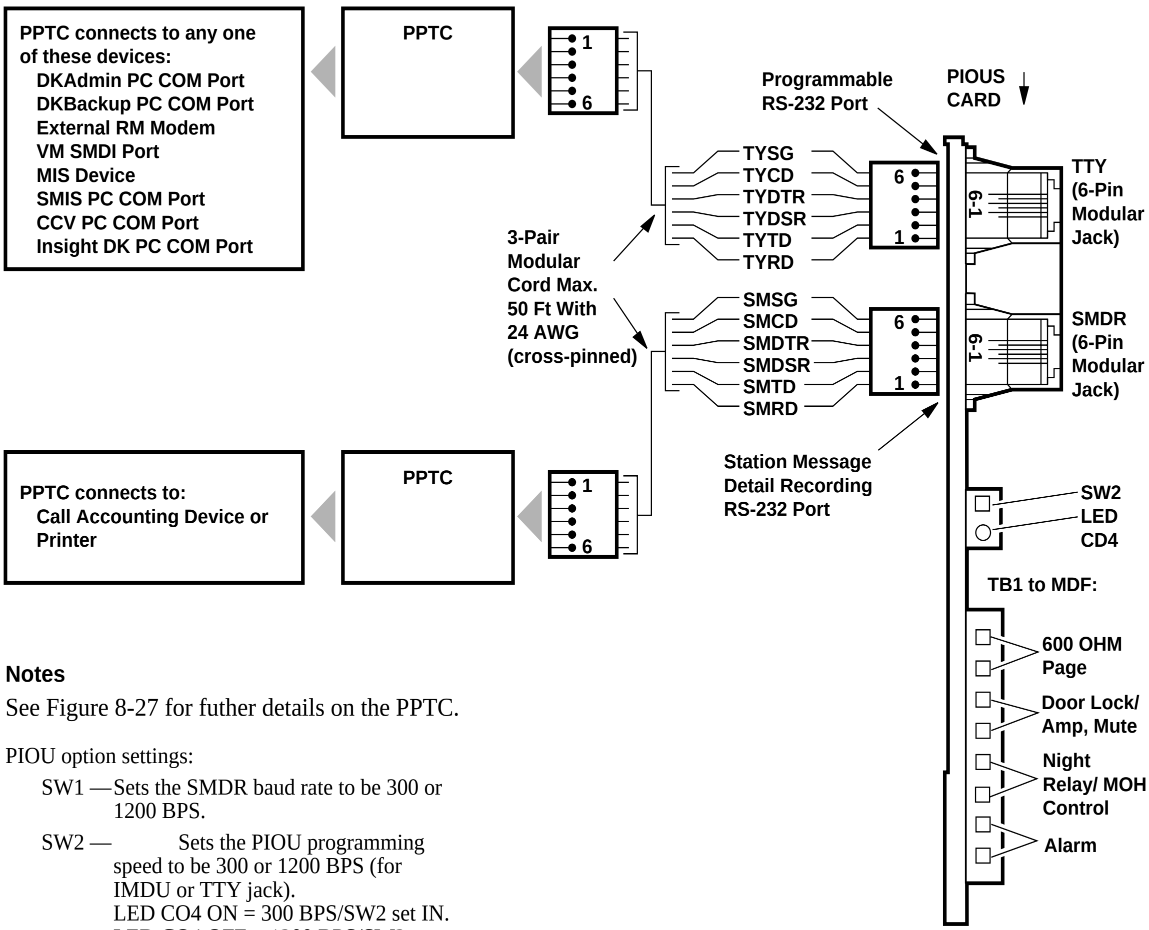
- **K1 (DE): Door Lock or Amp Mute Control; Program 77-1, LED 07**
- **K2 (NH): Night Relay or Music-on-hold Control; Program 77-1, LED 05**
- **K1 & K2: 24 VDC, 1 Amp Maximum**

Notes

- All wiring connections must be 24 AWG twisted pairs.
- Dotted lines show optional connections; only one optional connection is allowed.

1591

Figure 8-34 PIOUS Page/Relay/Alarm Connections



Notes

See Figure 8-27 for futher details on the PPTC.

PIOU option settings:

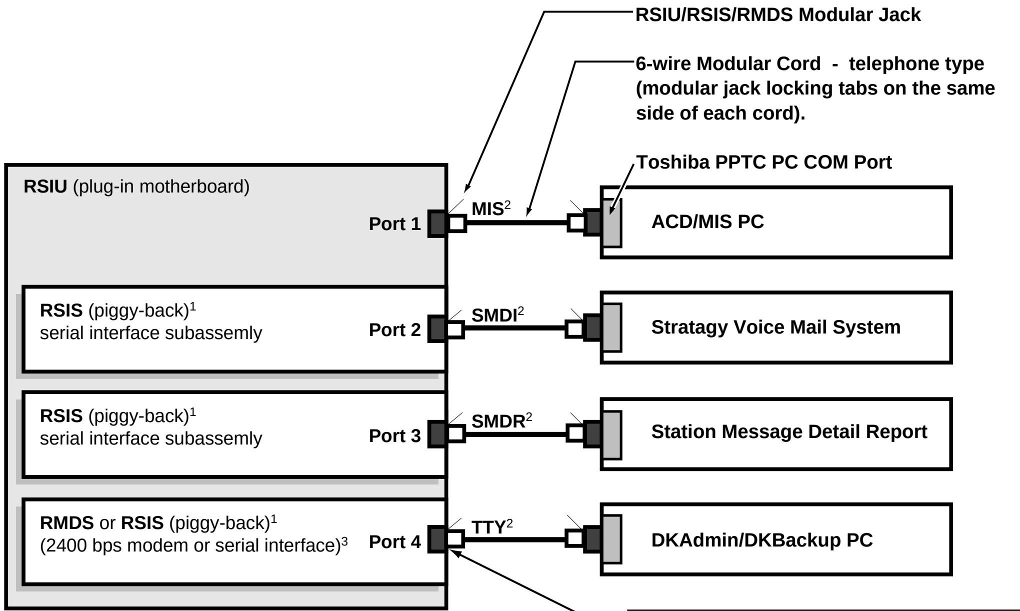
SW1 — Sets the SMDR baud rate to be 300 or 1200 BPS.

SW2 — Sets the PIOU programming speed to be 300 or 1200 BPS (for IMDU or TTY jack).
LED CO4 ON = 300 BPS/SW2 set IN.
LED CO4 OFF = 1200 BPS/SW2 set OUT.

SW3 — Sets the PIOU to operate with the IMDU or an external device connected to the TTY modular jack.
MODEM — For IMDU operation.
TTY — For ASCII terminal or external modem.

W4 — Sets the IMDU and TTY jack for bell or CCITT specification.

Figure 8-35 PIOUS SMDR/TTY Options and Wiring (with PPTC Adapter)



CAUTION! **Do not plug CO line or RSTU tip/ring into RMDS or RSIU modular jack**

Notes

1. The RSIU can be configured with up to three RSIS, or two RSIS and one RMDS (in any position). Use Program 76 to set RSIU/RSIS/RMDS port types.
2. All RSIU/RSIS/RMDS ports are system programmable to allow up to four of any of the functions: SMDR, MIS, CCV, SMDI, TTY, and remote modem.
3. When the RMDS is used as a modem, the modular jack is not used. If the RMDS is used as an RS-232 interface port, the modular jack is used.

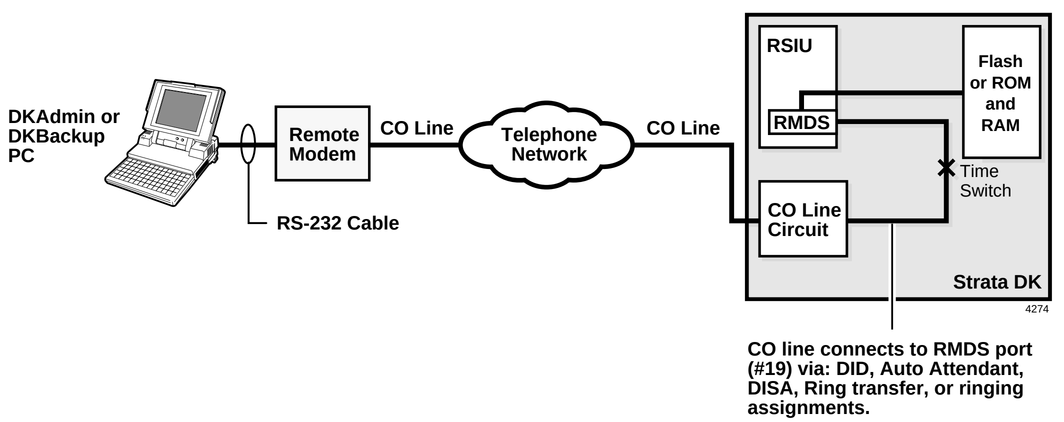
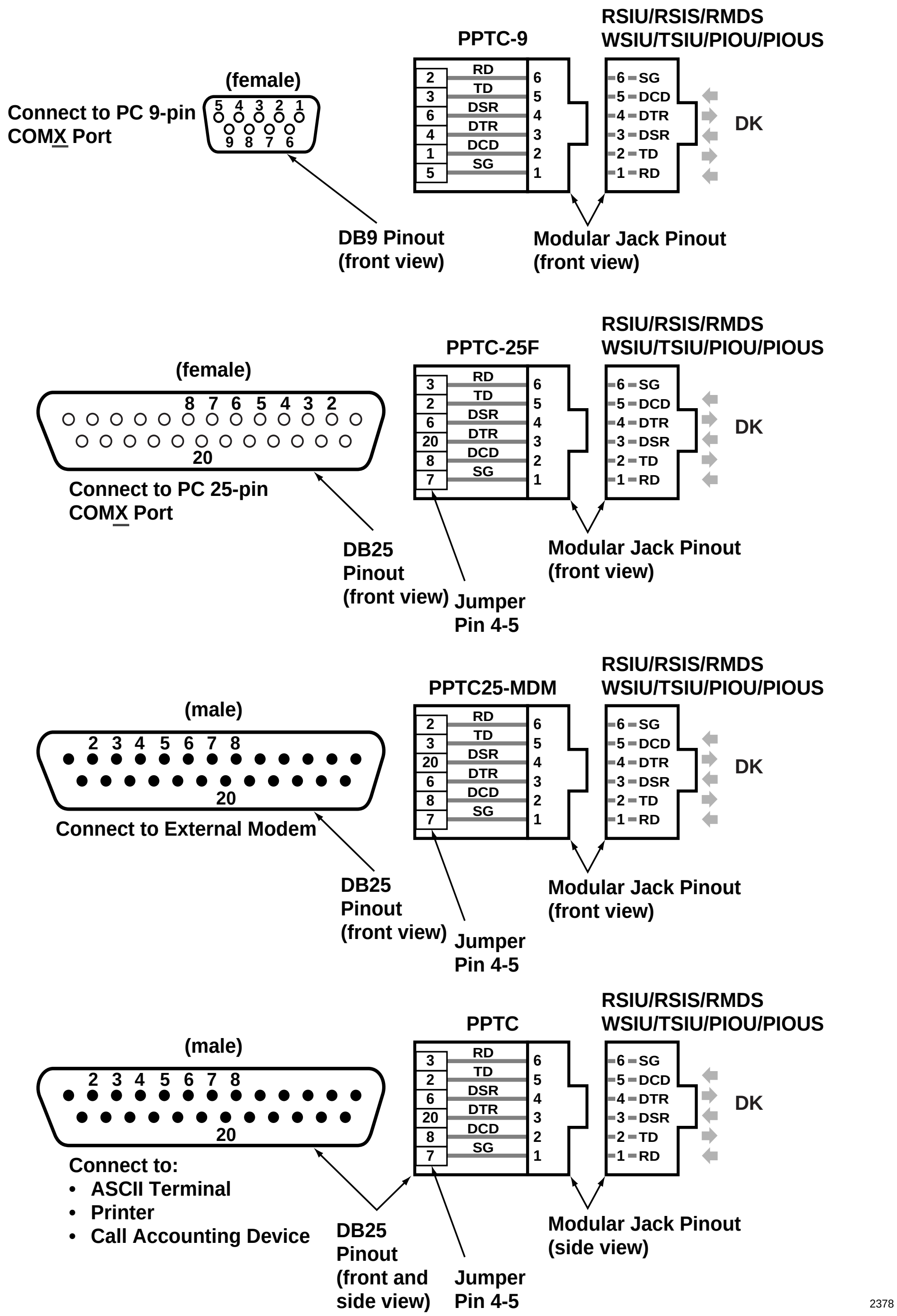


Figure 8-36 DK424 RSIU/RSIS/RMDS Wiring Diagrams



1. The above modular adapters can be used to connect PCs, terminals, and SMDR devices to WSIU, TSIU, RSIU, RSIS, RMDS, PIOU, and PIOUS RS-232 ports.
2. PPTC will not connect directly into a 25-pin PC COM port because they are male gender.
3. All PPTC, PPTC9, PPTC25F connections require a 6-wire, telephone type modular cord (with modular jack locking tabs on the same side of each cord.)
4. See Chapter 1 – DK14 Installation for connection the MLX-41 Caller ID interface box to the WSIU, RS232 port using PPTC-CLID14.

Figure 8-37 DK RS-232 Modular Adapter Pin Configuration

Station Apparatus 9

This chapter provides instructions on how to connect telephones to the Strata DK systems and how to configure and upgrade them for optional features. Procedures for installing direct station selection consoles and door phones also appear in this chapter.

Types of Telephones

The Strata DK systems can support digital, electronic and standard telephones.

Digital Telephones

Installation instructions for digital telephones in this chapter and elsewhere in this manual apply only to the Toshiba 2000- and 1000-series digital telephones. The 2000-series digital telephones consist of four models:

DKT2010-H

The DKT2010-H is a 10-Button Digital Telephone with Handsfree Answerback.

1867

DKT2020-S

The DKT2020-S is a 20-button Digital Speakerphone.

1877

DKT2010-SD

The DKT2010-SD is a 10-Button Digital Speakerphone with Liquid Crystal Display.

3645

DKT2020-SD

The DKT2020-SD is a 20-Button Digital Speakerphone with Liquid Crystal Display.

1869

There are two 1000-series digital telephone models, the DKT1020-H and DKT1020-SD.

Electronic Telephones

The electronic telephone instructions in this manual apply to the Toshiba 6500-series electronic telephones. They consist of four models: the EKT6510-H, EKT6510-S, EKT6520-H, and EKT6520-SD.

Note Other electronic telephones that are compatible with the Strata DK systems are the 2000-, 3000-, and 6000-series telephones.

Important! *When you install 2000-, 3000-, or 6000-series electronic telephones, you must calculate the system power factor using the tables provided in Chapters 2 or 4 to ensure that the system power supply is not overloaded.*

Standard Telephones

500- and 2500-type standard telephones apply whenever standard telephones are mentioned in this manual.

Strata AirLink Wireless Handset

Strata AirLink™ wireless systems add wireless telephone service to Strata DK16 and DK16e, DK40, DK40i, DK280, and DK424 and many non-Toshiba telephone systems. There is one handset model (shown at right) that stores up to eight system and handset IDs that are configured by your System Administrator.

The handset has a two-line Liquid Crystal Display (LCD) that shows alphanumeric information, including the idle message, date, call duration, icons and specific call activity.

For installation instructions of the systems and operation of the handset, see Chapter 16 – Strata AirLink Systems and the *Strata AirLink Handset User Guide.*

Telephone Installation

This section describes the wiring required to connect telephones to the system. Before installing any telephone wiring, read the following warning and caution notes:

WARNING!

- **Never install the telephone wiring during a lightning storm.**
- **Never install the telephone jacks in wet locations, unless the jack is specifically designed for wet locations.**
- **Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.**
- **Use caution when installing or modifying telephone lines.**
- **If telephone, DSS console, door phone control box, or door phone wiring exits the building, external secondary protection is required. See Chapter 8 – DK40i/DK424 Universal PCB Wiring.**

CAUTION! **When installing the station cable, do not run the cables parallel if they are within three feet of an AC power line. AC power lines should be crossed at right (90°) angles only. In particular, avoid running station wire pairs near devices that generate electrical noise, such as neon or fluorescent light fixtures.**

Important! *For DK14, see Figure 1-15 on Page 1-22, for DK40i, see Figure 3-24, and for DK424, see Chapter 5 – DK424 Installation for station apparatus secondary protection information.*

The DKT2000 V.4 series telephones have DIP switches that enable use for the international market. The DIP switches are located underneath the flexible button key strip on the DKT2000 V.4 series telephones (see Figure 9-1). On the DKT2001, the DIP switch is located on the base.

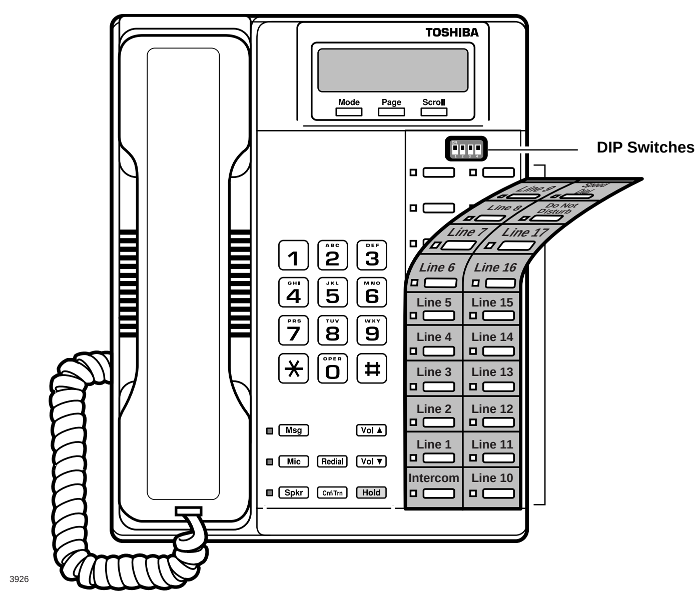
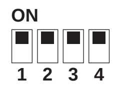
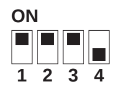
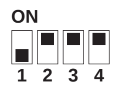
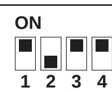


Figure 9-1 DKT 2000-series V.4 DIP Switches

Table 9-1 shows the correct country settings for the DKT2010-S, DKT2020-S, DKT2010-SD, DKT2020-SD, DKT2001 V.4 telephones.

Note The default DIP switch settings are preset for the USA and Canada. Therefore, you do not need to adjust any of these from the default factory settings for North America.

Table 9-1 DKT International DIP Switch Settings

Country	Dip Switch				DIP Switch Position
	1	2	3	4	
USA Canada (Default Setting)	ON	ON	ON	ON	
Mexico	ON	ON	ON	OFF	
Taiwan	OFF	ON	ON	ON	
Hong Kong Thailand*	ON	OFF	ON	ON	
Singapore Malaysia Indonesia Sri Lanka India China	OFF	OFF	ON	OFF	

3925

* The DKT2000 V.4 is not compatible for Hong Kong and Thailand. Use the V.4A or later versions in these two countries.

System Connection

Digital Telephones

The following provides information on how to connect digital telephones to the DK system.

Note Before proceeding, see warning and caution notes in "Telephone Installation".

Digital telephones connect to the digital telephone ports via the MDF with standard twisted-pair jacketed telephone cable. If using 24 AWG cable, single-pair wiring is sufficient in most cases for digital telephones to operate effectively at up to 1000 feet from the system.

Digital telephones that are equipped with Integrated Data Interface Units or ADMs should have two-pair (or external power) to function effectively at this distance. This also applies to digital telephones supported by systems that must operate with battery reserve power – Chapter 5 – DK424 Installation, Table 5-2 on Page 5-5.

To accommodate the digital telephone line cord, the cable should be terminated in a modular station connector block (RJ-11) at the station location. The standard single-pair, modular digital telephone cord that is sent with the telephone is 7 ft. (the maximum allowed is 25 ft.).

Note Digital telephone cable runs must not have cable splits (single or double), cable bridges (of any length), or high resistance or faulty cable splices.

Electronic Telephones

The following provides information on how to connect electronic telephones to the Strata DK system.

Note Before proceeding, see warning and caution notes in "Telephone Installation" on Page 9-3.

Electronic telephones are connected to electronic telephone circuits in the DK40i Expansion Unit on the Electronic Telephone Interface Unit (PEKU) and the Standard/Electronic Telephone Interface Unit (PESU) via the MDF with standard twisted-pair jacketed telephone cable. Two-pair wiring, as a minimum, is required for telephone connection. However, three-pair wiring is recommended for some upgrades, such as OCA.

To accommodate the electronic telephone line cord, the cable should be terminated in a modular station connector block (RJ-11) at the station location. The standard two-pair modular electronic telephone cord length is 7 feet (the maximum allowed length is 25 feet). See Chapter 8 – DK40i/DK424 Universal Slot PCB Wiring for more details.

If using 24 AWG cable, the overall length of the station cable run from the DK40i Base KSU to the telephone must not exceed 1,000 feet (305 meters).

Standard Telephones

The following provides information on how to connect standard telephones to the DK system.

Note Before proceeding, see warning and caution notes in "Telephone Installation" on Page 9-3.

Standard telephones connect to standard telephone circuits of the Standard Telephone Interface PCBs: RSTU, RSTU2, RDSU/RSTS, PSTU, PESU, KSTU2 (DK40i only), and QSTU2 (DK14 only). Standard telephones connect to RSTU, RDSU/RSTS, PSTU or PESU via the MDF with standard twisted-pair jacketed telephone cable. (See single-pair wiring Chapter 8 – DK40i/DK424 Universal PCB Wiring for more details.)

The standard telephone cable's overall loop resistance, connected on- or off-premises, is 300 ohms maximum, (for PSTU, PESU, KSTU2, or QSTU2), 600 ohms for RSTU and RDSU/RSTS with -24VDC (*no* R48S), and 1200 ohms for RSTU and RDSU/RSTS with -48VDC (R48S installed on RSTU, RSTU2, or RDSU PCB), including the telephone resistance. This also applies to all devices connected to standard telephone circuits.

A standard telephone connected off-premises via the telephone network should interface with OL13A, OL13B, or OL13C lines (or equivalent) and connect to an RJ21X, FIC jack or equivalent, (see Chapter 8 – Universal Wiring Diagrams and Table 5-3, "DK424 Network Requirements" on Page 5-6).

Telephone Wall Mounting

This section explains how to mount digital and electronic telephones to a wall or other vertical surface. See the manufacturer's documentation for instructions on mounting standard phones.

Notes

- Digital telephones equipped with PDIU-DIs, RPCI-DIs or PDIU-DI2s cannot be wall mounted.
- Electronic and older digital telephones equipped with an HHEU1 can be wall mounted. 2000-series digital telephones with headsets can only be wall mounted with an HHEU2.

➤ To mount digital and electronic telephones

Refer to Figures 9-2~9-3 and the following steps.

1. Loosen the captive screws, and remove the telephone base.
2. Using a suitable cutter, remove the handset hanger from the base.
3. Insert the handset hanger in the slot on the front of the phone. The hanger fits in the notch on the handset cradle.
4. Rotate the telephone base 180 degrees and secure it to the telephone with its four captive screws.
5. Connect the phone to the wall modular connector with a cord approximately four inches long (available at most telephone supply companies).
6. Route the cord into the hollow portion of the base.
7. Mount the phone on the wall mounting modular connector plate.

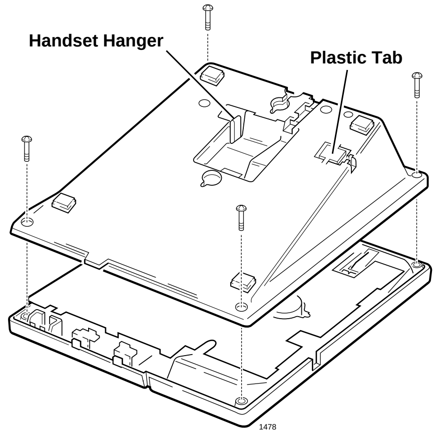


Figure 9-2 Removing the Telephone Base

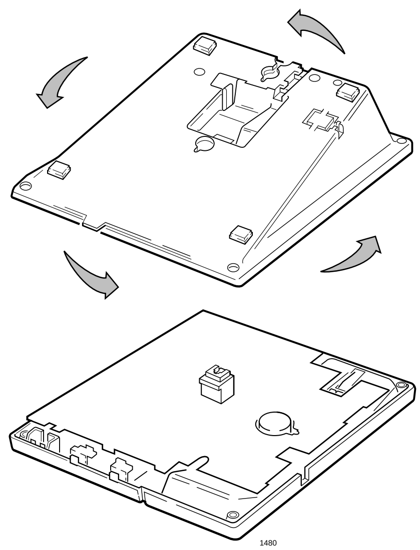


Figure 9-3 Wall Mounting Base Rotation

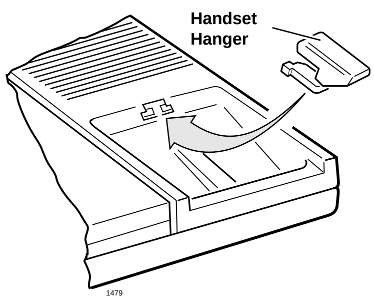


Figure 9-4 Handset Hanger

Telephone Upgrades

Digital and electronic telephones can be upgraded for a number of features; there are no upgrades for standard telephones. Each of these upgrades shares a circuit with the telephone that it is connected to and is not considered a station. See Table 9-2 for more information.

Table 9-2 Telephone Subassembly Upgrades

Subassembly	Host Telephone	Function	Capacity
DVSU[1]	2000- and 1000-series Digital Telephones	Provides interface for digital telephone to receive Speaker Off-hook Call Announce (OCA). Not required for Handset/Headset OCA.	1 per telephone
HHEU	2000- and 1000-series Digital Telephones. 6500- and 6005-series Electronic Telephones.	Provides interface for headset and loud ringing bell to telephone. Can be installed with DVSU, RPCI-DI, or DADM.	
RPCI-DI[1]	2000-series Digital Telephones	Provides TAPI PC application and data calling interfaces.	
DADM[1]	2000-series Digital Telephones	Provides telephone with 20 (or 40 with two DADMs) additional feature buttons for DSS, System or Station speed dial, or CO line appearances.	1 or 2 per telephone

1. Only one of the following subassemblies allowed per telephone: DVSU, RPCI-DI or DADM.

Digital Telephone Upgrades

This section describes how to upgrade and configure 2000- and 1000-series digital telephones for features and options.

TAPI and Simultaneous Voice and Data Upgrades (RPCI-DI, PDIU-DI2 and PDIU-DI)

Both the 2000- and 1000-series digital telephones can be upgraded with an integrated data interface unit to transmit and receive simultaneous voice and data calls. There are three versions of the integrated unit:

- RPCI-DI and PDIU-DI2 for the 2000-series telephones
- PDIU-DI for the 1000-series telephones.

Asynchronous devices, such as PCs and terminals, can be connected to the standard RS-232 connector of the RPCI-DI or PDIU-DI2. Station users are able to transmit and receive RS-232 data over the single-wire pair of the RPCI-DI or PDIU-DI2 equipped telephone.

TAPI/Data Communications Modes

The RPCI-DI can operate in two modes: the TAPI or the data communications mode. The mode is changed by sending the appropriate control signal to the RPCI-DI from the PC to which the RPCI-DI is connected.

TAPI Mode

In the TAPI mode, the PC connected to the RPCI-DI can place telephone calls. The PC can also receive Caller ID, ANI, and DNIS information received by the RPCI-DI telephone. When in the TAPI mode, the RPCI-DI is designed to be compatible with Microsoft TAPI application programs.

For more information, see Chapter 13 – Computer Telephony Integration. If an RPCI-DI only needs to support TAPI (and not data–see Notes below) it can be connected to any digital telephone circuit.

Data Communications Mode

In the data communications mode, data calls can be from a telephone with the **Data Call** button and disconnected with the **Data Release** button. Digital telephones can have a **Modem** button for reserving a modem or monitoring modem availability and status. These feature buttons are assigned to telephones with Program 39. Data and voice calls can be dialed from a terminal or PC using standard "AT" commands.

Notes

- 1000-series digital telephones with an RPCI-DI or PDIU-DI2 cannot be wall-mounted or equipped with an Add-On-Module (ADM) or DVSU for Speaker OCA. A 2000-series digital telephone with a PDIU-DI2 or RPCI-DI can support an HHEU at the same time, but cannot support a DVSU or ADM and can be wall-mounted.
- Only PDKU1 circuits 1~7 can support RPCI-DI or PDIU-DI2s; all PDKU2 and Base Unit digital circuits can support PDIU-DI2 and RPCI-DIs.
- RPCI-DIs and PDIU-DI2s that support data communications mode, must be connected to digital telephone circuits that support 2B channels. The digital circuits that support RPCI-DI data communication are:

  DK14 – all digital telephone circuits.

  DK40i – all digital telephone circuits except those installed in slot 17 and 18 of the expansion unit.

  DK424 – see Tables 4-4 and 4-5 of the Chapter 4 – DK424 Configuration.

RPCI-DI/PDIU-DI2 Installation

See Figures 9-2, 9-5 and 9-6 and follow these steps:

1. Loosen the four screws on the digital telephone base and remove the base.
2. Insert the two integrated unit wire plugs into the connectors on the PCB in the telephone (observing the red wire for correct positioning).
3. Attach the integrated unit to the bottom of the phone. Install the PDIU-DI for 1000-series; install PDIU-DI2 or RPCI-DI for 2000-series phones. Secure with the four captive screws.

Note RPCI-DI V2s require some modification when installed in DKT versions 1~3; RPCI-DI V2s in DKT version 4 or higher do not require any modification.

4. Remove the directory tray from the original telephone base and install it on the integrated unit phone base. Squeeze the tray on its sides so it bows slightly to remove and re-install.
5. See Chapter 5 – DK424 Installation, Table 5-2 on Page 5-5 for loop limits. Install a two-pair house cable (or external power) and a two-pair modular cord (supplied with PDIU-DI), if required for distance.

RPCI, PDIU-DI1/PDIU-DI2 Programming

Program 39: Assigns the **Data Call**, **Data Release**, and **Modem** buttons.

Programs 20 and 22: RPCI and data interface unit assignments.

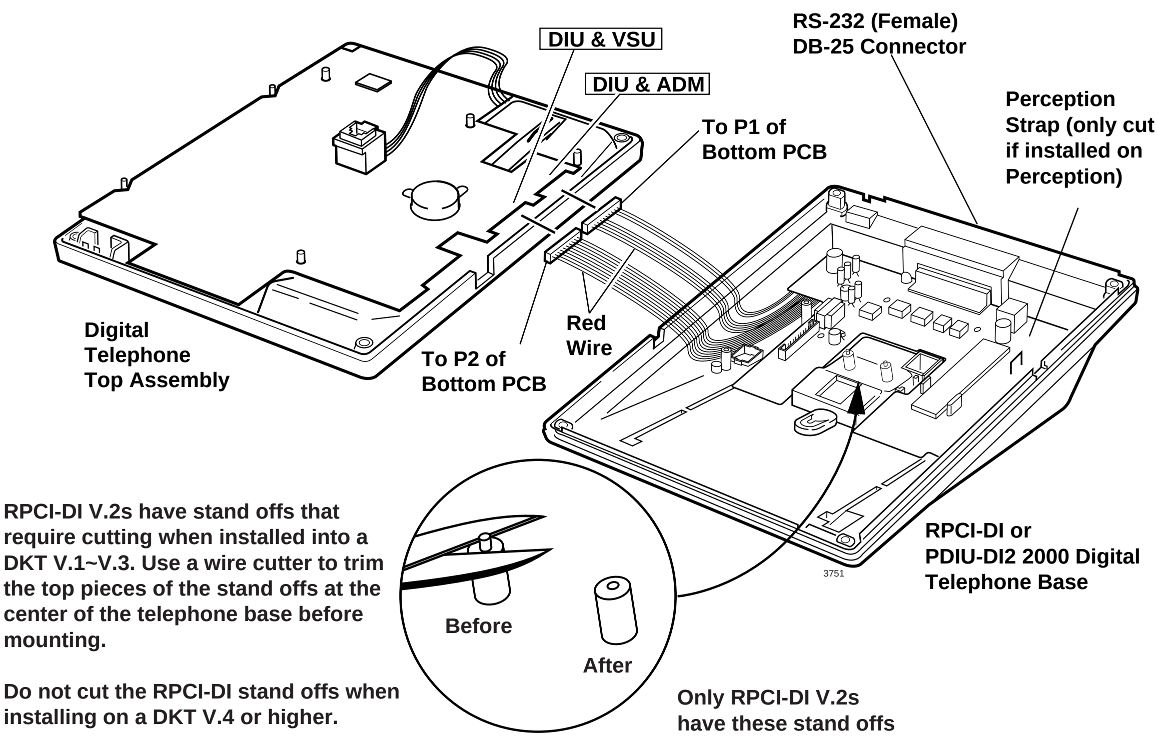
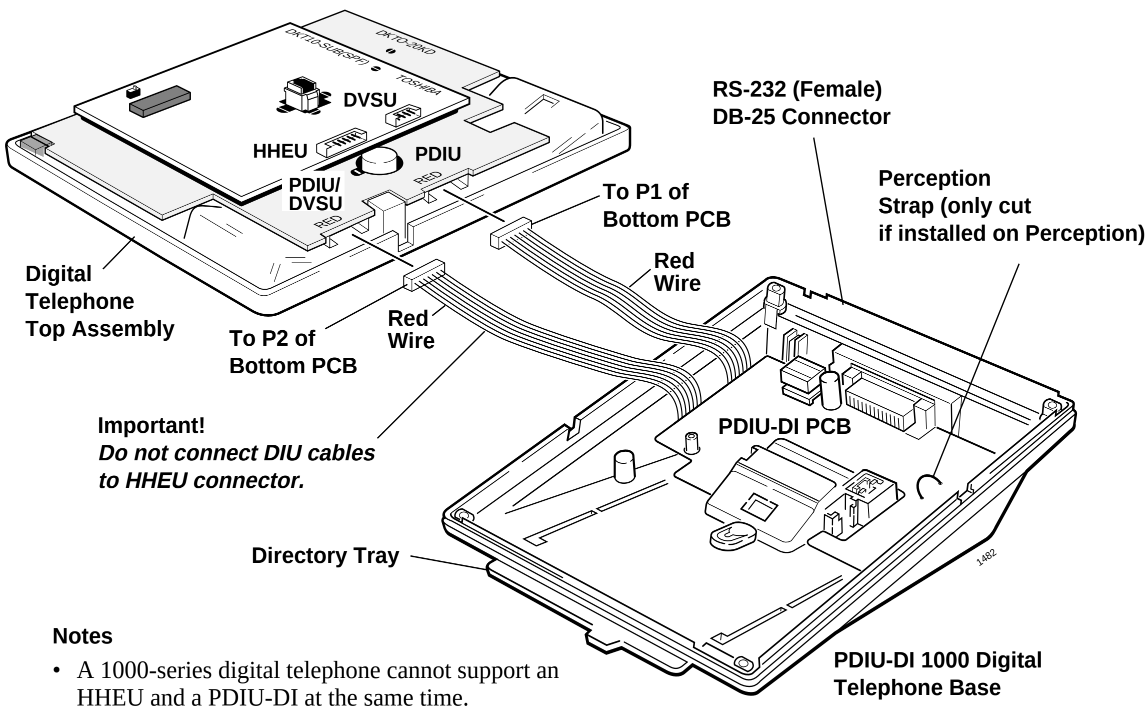


Figure 9-5 RPCI-DI or PDIU-DI2 Installation into 2000-series Digital Telephone



Notes

- A 1000-series digital telephone cannot support an HHEU and a PDIU-DI at the same time.
- 1000-series telephones do not support RCPI-DIs.

Figure 9-6 PDIU-DI Installation into 1000-series Digital Telephone

Telephone Speaker Off-hook Call Announce Upgrade (DVSU)

To receive Speaker Off-hook Call Announce (OCA) calls over the digital telephone speaker, a digital telephone must be upgraded with a DVSU; the telephone making the call does not require a DVSU. In a DK system with release 3 and above software, a DVSU is not required to receive OCA in the telephone handset or headset. An additional wire pair is not required for digital telephones that receive Speaker OCA calls. The DVSU is compatible with both 2000-series and 1000-series digital telephones.

Notes

- Digital telephones cannot be equipped with a DVSU and integrated data interface unit (PDIU-DI, RPCI-DI or PDIU-DI2) or DADMs at the same time.
- Program 03, Code 62 or 64 must be set for the PDKU and Code 28 for the RDSU for telephones that are to receive Speaker OCA and Program 31 LED 03 must be turned ON for telephone ports.
- DVSU is not necessary to receive handset OCA.

DVSU Upgrade Installation

See Figures 9-2 and 9-7~9-10 and follow these steps:

1. Loosen the four captive screws on the telephone base and remove the base.
2. Loosen the four captive screws on the metal plate to the standoffs inside the base. Remove and discard the plate.
3. Position the DVSU PCB on the standoffs), and secure with the four provided screws.
4. If installing the DVSU into a 2000-series digital telephone and then connect the DVSU wire plugs to the DVSU connectors on the PCB inside the telephone.

   ...or if installing the DVSU into a 1000-series digital telephone and connect the DVSU wire plugs to the DVSU connectors on the PCBs inside the telephone.
5. Reinstall the telephone base and secure it with its four captive screws.

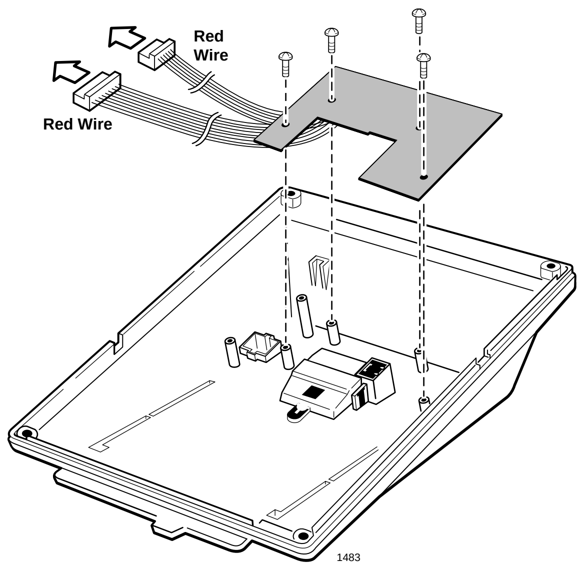


Figure 9-7 DVSU Installation for Digital Telephones

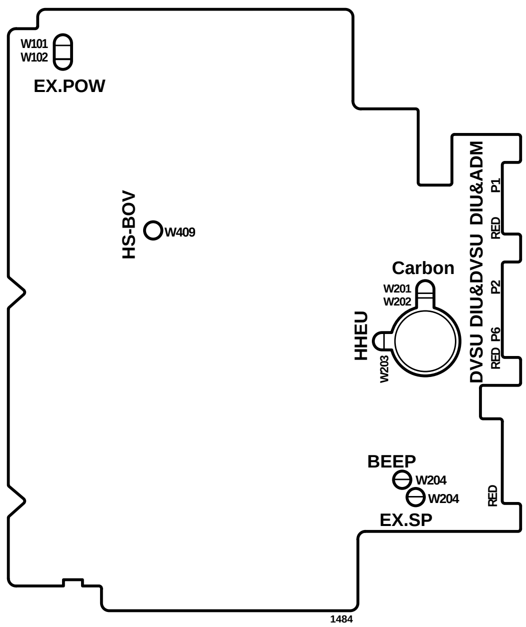


Figure 9-8 DKT2010-H Strap and Connector Locations

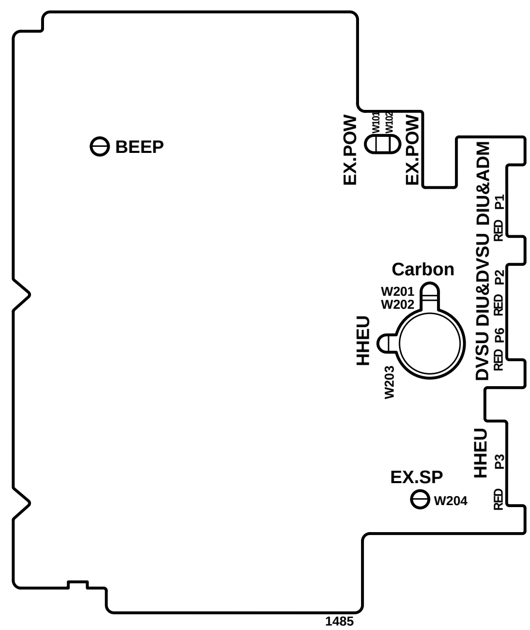


Figure 9-9 DKT2010-SD, DKT2020-S, and DKT2020-SD Strap and Connector Locations

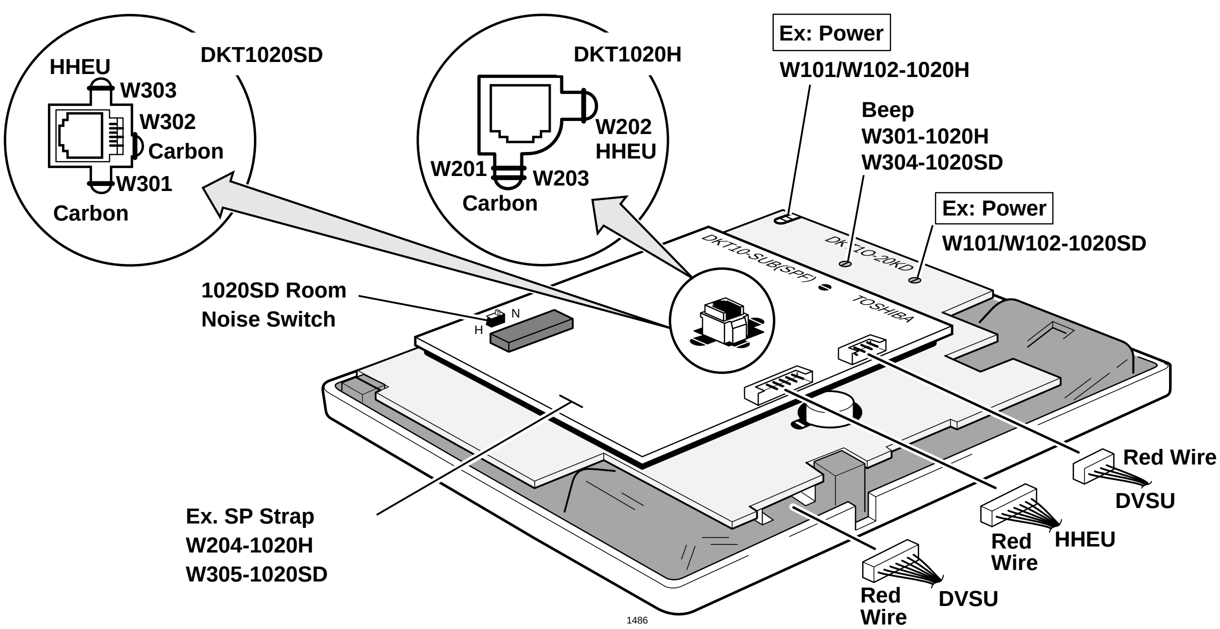


Figure 9-10 1000-series Digital Telephone Strap and Connector Locations

Station Apparatus

Loud Ringing Bell/Headset Upgrade (HHEU)

The Loud Ringing Bell/Headset upgrade (HHEU) enables an external speaker (HESB) for the Loud Ringing Bell feature and/or a headset to be connected to both series of digital telephones.

Notes

- There are two types of HHEUs: the HHEU1 (which has four versions, V.1~V.4) and the HHEU2.
- Both 2000- and 1000-series digital telephones require either an HHEU2 or a V.3 or V.4 HHEU1 for HESB operation; earlier HHEU1 versions are only sufficient for headset operation only.
- Only digital telephones equipped with an HHEU2 can be wall mounted. The HHEU2 is identical to the V.4 HHEU1, except that the HHEU2 has longer wires to accommodate wall mounting.
- A Toshiba HESC-65A cable is required to connect the HHEU in a digital telephone to the HESB.
- 1000-series digital telephones cannot be equipped with the HHEU (any type or version) and the integrated data interface unit (PDIU-DI) at the same time, but 2000-series digital telephones can support an HHEU and a RPCI-DI or PDIU-DI2 at the same time.

HHEU Upgrade Installation

See Figures 9-2 and 9-8~9-12 and follow these steps:

1. Loosen the four captive screws on the telephone base, and remove the base.
2. Use a screwdriver or other suitable tool to remove the plastic tab on the back of the base. (The HHEU modular connector for the headset is accessed through this opening.)
3. If installing a V.3 HHEU1, set the SW601 switch on the HHEU to headset for the headset or loud bell application.

   V.4 HHEU1 and HHEU2 do not have this switch, because they are automatically set for the headset/loud bell application.

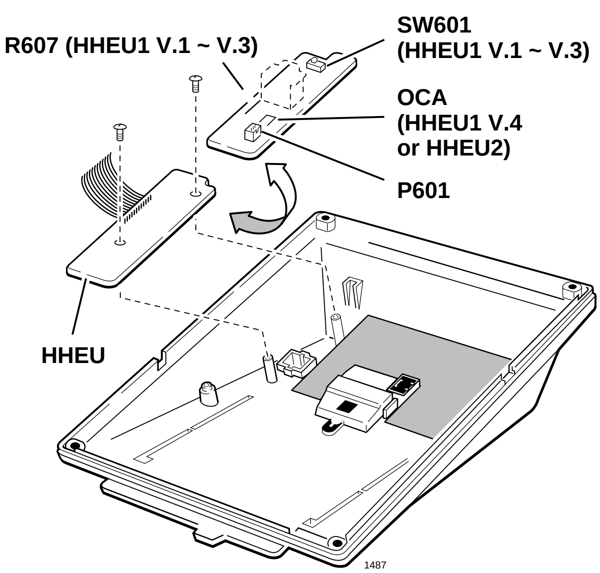


Figure 9-11 HHEU Installation for Digital Telephones

4. Connect the HESC-65A cable to P601 of the HHEU (both HHEU1A versions and the HHEU2 have P601) if the Loud Ringing Bell option is required.

   Refer to Chapter 10– Peripheral Installation for HESB installation procedures.

5. For the V.3 HHEU1: If only the headset is connected to the HHEU, cut both sides of the R607 resistor, then remove the resistor to eliminate electrical contact.

Note Do not cut the R607 resistor if connecting an HESB to the HHEU for the Loud Ringing Bell–even if a headset is also installed on the HHEU.

...or

For the V.4 HHEU1 and the HHEU2: if only the headset is connected to the HHEU, cut the speaker OCA strap.

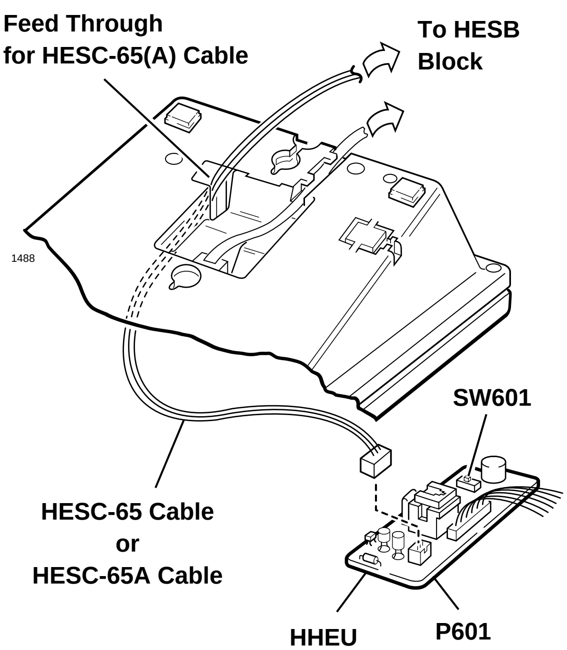


Figure 9-12 HESC-65A Cabling

Note Do not cut the speaker OCA strap if connecting an HESB to the HHEU for the Loud Ringing Bell–even if a headset is also installed on the HHEU.

6. Position the HHEU PCB on the standoffs inside the base, and secure with the two provided screws.

Note See Figures 9-8~9-10 for Steps 7~8.

7. For 2000-series digital telephones. Connect the wire plug of the HHEU PCB to the HHEU connector on the PCB in the phone.

   ...or for 1000-series digital telephones. Connect the wire plug of the HHEU to the HHEU connector on the PCB of the phone.

8. For 2000-series digital telephones: If an HESB will be connected to the HHEU (for Loud Ringing Bell), locate the EX.SP strap on the PCB in the telephone and *cut* the strap.

   ...or for 1000-series digital telephones: If an HESB will be connected to the HHEU, locate and *cut* the EX.SP strap on the upper PCB in the phone.

9. For 2000-series digital telephones: If a headset will be connected to the HHEU, locate and *cut* the HHEU strap on the PCB in the phone.

   ...or for 1000-series digital telephones: a headset will be connected to the HHEU, locate and *cut* the HHEU strap on the upper PCB in the phone

Note If the HHEU PCB is removed from the phone, the HHEU strap must be replaced for proper telephone operation.

10. Reinstall the telephone base; secure with the four captive screws.

➤ **To adjust the volume of the HESB Loud Ringing Bell**

1. Call the telephone connected to the HESB.
2. Adjust the volume control on the back of the HESB and the ring volume control on the telephone.

Carbon Headset/Handset Straps

If a carbon-type handset or headset is connected to the handset jack on the side of the telephone, two jumper straps inside the telephone must be cut.

➤ **To cut the straps**

Note You do not need to cut these straps if the headset is connected to the HHEU.

See Figures 9-2 and 9-8~9-10 and follow these steps:

1. Loosen the four captive screws on the telephone base, and remove the base.
2. For 2000-series digital telephones, and cut the W201 and W202 carbon straps.

   ...or

   For 1000-series digital telephones, cut the carbon straps (W301 and W302 on the DKT1020-SD; W201 and W203 on the DKT1020-H).
3. Reinstall the telephone base, and secure it with its four captive screws.

Beep Strap

A "beep" sounds whenever a dial pad or feature button is pressed on a digital telephone.

➤ **To eliminate the beep sound**

See Figures 9-2 and 9-8~9-10 and follow these steps:

1. Loosen the four captive screws from the telephone base and remove the base.
2. Cut the beep strap.
3. Reinstall the telephone base, and secure it with its four captive screws.

Microphone/Speaker Sensitivity Adjustment (Speakerphones Only)

High ambient noise levels may cause the speaker on some digital telephone speakerphone models to cut off frequently.

➤ **To make the 1000-series digital telephone models less sensitive to loud surrounding noise**

1. Loosen the four captive screws on the 1000-series digital telephone speakerphone base (Figure 9-2), and remove the base.
2. For the 1000-series speakerphone model (DKT1020-SD), see Figure 9-10, and locate the room noise switch. Push the switch carefully to the H (high) position (for low sensitivity) when there is high background noise in the area surrounding the telephone.
3. Reinstall the telephone base.

➤ **To make the 2000-series digital telephone models less sensitive to loud surrounding noise**

➤ Hold down **Mic** button, then press the **Vol** ▲ button. The less-sensitive level will be set after the third flash of the Mic LED.

➤ **To reset the sensitivity back to the normal level**

➤ Hold down the **Mic** button, then press the **Vol** ▼ button. The normal level will be set after the third flash of the Mic LED.

Note On 2000-series digital telephone speakerphone models that are set for low sensitivity, the Mic LED flashes at the in-use rate when the speakerphone is used. When set to normal sensitivity, the Mic LED is on steady when using the speakerphone.

Busy Override and Camp-on Ring Tone Over Handset/Headset Option

Using a 2000-series digital telephone, the busy override and camp-on ring tones can be sent over the telephone handset or headset, in addition to the speaker. Using a 1000-series digital telephone, the tones sound only over the speaker.

➤ **To send busy override/camp-on ring tones over the handset of the DKT2010-H model**

1. Loosen the four captive screws on the telephone base (Figure 9-2), and remove the base.
2. Install a strap in the HS-BOV W409 location (see Figure 9-8).
3. Reinstall the telephone base.

➤ **To send busy override/camp-on ring tones over the handset/headset of the DKT2010-SD/2020-S/2020-SD**

➤ Hold down the **Redial** button and press the **Vol** ▲ button.

➤ **To block the tone over the handset/headset of the DKT2010-SD/2020-S/2020-SD**

➤ Hold down the **Redial** button and press the **Vol** ▼ button.

Note For this to function properly with headsets, make sure the speaker OCA strap or R607 is cut on the HHEU PCB and the HHEU strap is cut on the telephone. (See "Loud Ringing Bell/Headset Upgrade (HHEU)" on Page 9-12)

External Power Straps

Digital telephones equipped with options such as integrated data interface units and ADMs require two-pair wiring or external power to operate efficiently at the maximum-allowed distance from the KSU. Two-pair wiring or external power is also necessary for maximum cable run lengths for digital telephones that are connected to systems that must operate with reserve power. (Table 5-2 on Page 5-5.)

Each digital telephone has two external power straps which must be cut for external power when the cabling of the telephone is connected to an external AC/DC power supply.

➤ **To cut the straps**

See Figures 9-2 and 9-8~9-10 and follow these steps:

1. Loosen the four captive screws on the telephone base and remove the base.
2. Depending on the telephone, locate the W101 and W102 external power straps and cut them.

3. Reinstall the telephone base, and secure it with its four captive screws.

Note Refer to Chapter 8 – DK40i/DK424 Universal Slot PCB Wiring for external AC/DC power supply ordering information and installation instructions.

DKT2000 ADM Installation

See "Digital Add-on Module Installation" on Page 9-29.

Electronic Telephone Upgrades

This section describes how to upgrade and configure electronic telephones for features and options.

Off-hook Call Announce Upgrade (HVSU2 or HVSU/HVSI)

Electronic telephones must be equipped with either the HVSU2 subassembly or the combined HVSU and HVSI subassemblies to receive Speaker Off-hook Call Announce (OCA) calls. These telephones also require three-pair wiring to receive speaker OCA, instead of the standard two-pair. Telephones making speaker OCA calls do not require an upgrade or extra wire pair.

Notes

- See Notes in "PDIU-DI Installation into 1000-series Digital Telephone" on Page 9-9.
- Handset OCA is not available on electronic telephones.

HVSU2 Upgrade Installation

See Figures 9-2 and 9-13 and follow these steps:

1. Loosen the four captive screws on the telephone base and remove the base.
2. Position the HVSU2 on the standoffs inside the base, and secure with the two provided screws.
3. Connect the HVSU2 wire plug to the P2 connector on the PCB in the telephone.

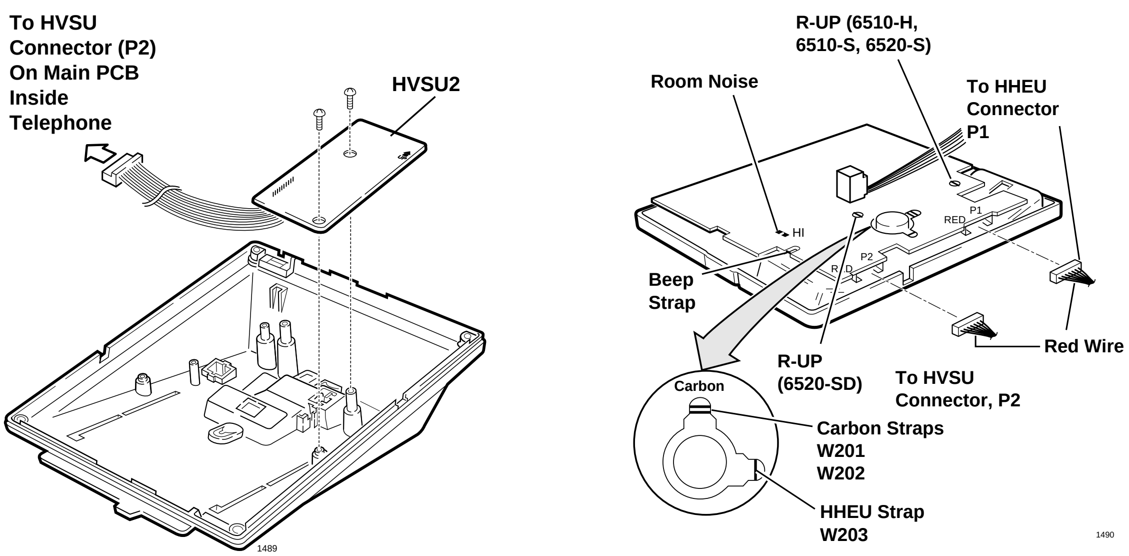


Figure 9-13 HVSU Installation for Electronic Telephones

HVSU/HVSI Upgrade Installation

See Figures 9-2 and 9-13~9-14 and follow these steps:

1. Loosen the four captive screws on the telephone base and remove the base.
2. Align the P5 connector on the HVSI subassembly with the receptacle on the HVSU subassembly.

   Apply firm, even pressure to the PCBs to ensure that the connectors mate properly (they should click).

Note Exercise care when assembling the HVSU to the HVSI to prevent damage to the connector pins; also, verify that the HVSU is aligned with the silk-screened image on the HVSI.

3. Position the HVSU/HVSI subassembly on the standoffs inside the base, and secure with the two screws provided.
4. Connect the HVSU/HVSI subassembly wire plug to the P2 connector on the electronic telephone PCB.
5. Reinstall the electronic telephone base, and secure it with its four captive screws.

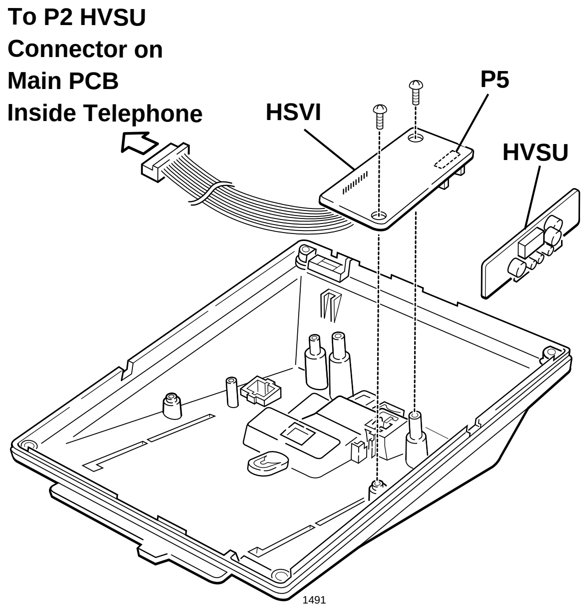


Figure 9-14 HVSI/HVSU Installation for Electronic Telephones

Loud Ringing Bell/Headset Upgrade (HHEU)

The Loud Ringing Bell/Headset upgrade (HHEU) enables an external speaker (HESB) and/or a headset to be connected to the electronic telephone. The HESB serves as a loud ringing bell when connected to a telephone.

Notes

- There are two types of HHEU: the HHEU1 (which has four versions, V.1~V.4) and the HHEU2.
- Only electronic telephones equipped with an HHEU2 can be wall mounted. The HHEU2 is identical to the V.4 HHEU1, except that the HHEU2 has longer wires to accommodate wall mounting.
- A Toshiba HESC-65 or HESC-65A cable is required to connect the HHEU in an electronic telephone to the HESB. Refer to Chapter 10– Peripheral Installation for HESB installation procedures.
- All HHEU versions and types, except for V.1 HHEU1, are compatible with the Speaker Off-hook Call Announce upgrades (HVSU2 and HVSU/HVSI).

HHEU Upgrade Installation

See Figures 9-2, 9-12, 9-13 and 9-15 and follow these steps:

1. Loosen the four captive screws on the telephone base and remove the base.
2. Using a screwdriver or other suitable tool, remove the plastic tab on the back of the base. The HHEU modular connector for the headset will be accessed through this opening.
3. If using a V.3 or earlier HHEU1, set the SW601 switch to the HEADSET position for HESB and/or headset connection. This switch is not on either the V.4 HHEU1 or the HHEU2, because the operation is automatic with these subassemblies.
4. Connect either the HESC-65 or HESC-65A cable to P601 of the HHEU if the Loud Ringing Bell option is required. Refer to Chapter 10– Peripheral Installation for HESB installation procedures.

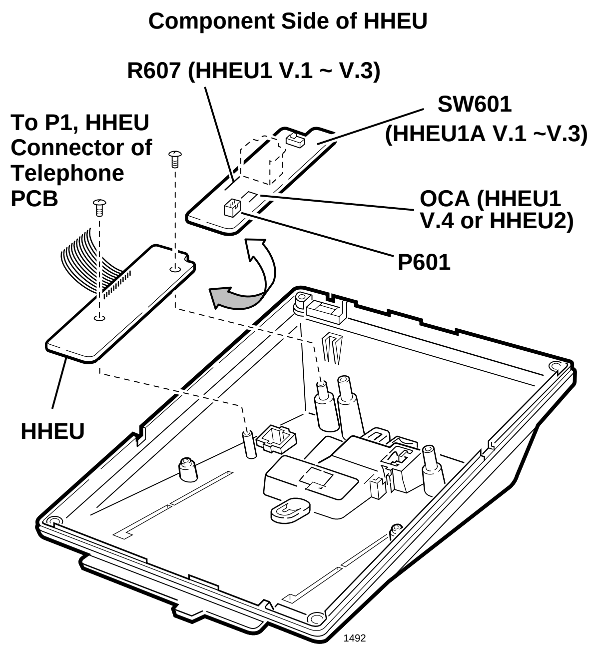


Figure 9-15 HHEU Installation for Electronic Telephones

5. For the V.3 or earlier HHEU1: if only the headset is connected to the HHEU, cut both sides of the R607 resistor on the HHEU and remove the resistor to eliminate electrical contact.

Note Do not cut the R607 resistor if connecting an HESB to the HHEU for the Loud Ringing Bell–even if a headset is also installed on the HHEU.

...or

For the V.4 HHEU1 or the HHEU2: if only the headset is connected to the HHEU, cut the speaker OCA strap.

Note Do not cut the speaker OCA strap if connecting an HESB to the HHEU for the loud ringing bell–even if a headset is also installed on the HHEU.

6. Position the HHEU subassembly on the standoffs inside the base, and secure with the two screws provided.
7. Connect the HHEU subassembly wire plug to the P1 connector on the electronic telephone PCB.
8. Cut the HHEU strap on the telephone PCB.

Note The HHEU strap must be replaced if the HHEU PCB is removed from the telephone.

9. Reinstall the telephone base, and secure it with its four captive screws.

Adjust (HESB) Loud Ringing Bell Volume

1. Call the telephone connected to the HESB.
2. Adjust the volume control on both the back of the HESB and the ring volume control on the telephone.

Carbon Headset/Handset Straps

If a carbon-type handset or headset is connected to the handset jack on the side of the 6500-series electronic telephone, two straps inside the telephone must be cut.

➤ **To cut the straps**

Note It is not necessary to cut these straps if the headset is connected to the HHEU.

See Figures 9-2 and 9-13 and follow these steps:

1. Loosen the four captive screws on the telephone base and remove the base.
2. Locate the carbon straps, W201 and W202 and cut them.
3. Reinstall the telephone base, and secure it with its four captive screws.

Beep Strap

A “beep” sounds whenever a dial pad button or feature button is pressed on an electronic telephone.

➤ **To eliminate the beep**

See Figures 9-2 and 9-13 and follow these steps:

1. Remove the four captive screws on the telephone base to the telephone and remove the base.
2. Locate and cut the beep strap on the telephone PCB.
3. Reinstall the electronic telephone base and secure in place using the four captive screws.

Microphone/Speaker Threshold (Speakerphones only)

High ambient noise levels may cause the speaker on the electronic telephone speakerphone models (the EKT6510-S, EKT6520-S, and EKT6520-SD) to cut off frequently.

➤ **To make these telephones less sensitive to noise and to prevent the cut-off**

See Figures 9-2 and 9-13 and follow these steps:

1. Remove the four captive screws on the base to the telephone, and remove the base.
2. Locate the room noise switch on the PCB inside the telephone, and push it carefully to the HI (high) position.
3. Reinstall the telephone base and secure in place using the four captive screws.

Handset Receiver Volume-up Strap (Version 2 6500-series Telephones Only)

For Version 2 (V.2) 6500-series electronic telephones only, the handset receiver volume can be increased six decibels (dB) by cutting a strap inside the telephone.

➤ **To cut the strap**

See Figures 9-2 and 9-13 and follow these steps:

1. Remove the four captive screws on the telephone base to the telephone, and remove the base.
2. Locate the R-UP strap on the PCB inside the telephone and cut it.
3. Reinstall the telephone base, and secure in place using the four captive screws.

Direct Station Selection (DSS) Console/System Connection

The Strata DK40i can support up to three DSS consoles and the DK424 systems configured with RCTUA can support up to three DSS consoles, RCTUB up to four DSS consoles, RCTUC/D and RCTUE/F up to eight consoles.

There are two types of consoles: the Digital DSS (DDSS) and the Electronic (HDSS) console. The DDSS console can be connected to designated digital telephone circuits, and the HDSS console can only be connected to designated PEKU circuits. This section provides instructions on how to install both types of consoles.

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DDSS Console Connections

The DDSS console, which can operate with a digital telephone (preferably an LCD model), can connect only to circuit 8 of a PDKU digital telephone circuit. Standard twisted single-pair or two-pair jacketed telephone cable (maximum 1000 feet, 303 meters) is used for the connection.

To accommodate the DDSS console connection, the instrument end of the cable should be terminated in a modular station connector block (RJ-11). Refer to Chapter 8 – DK40i/DK424 Universal PCB Wiring for wiring/interconnecting details.

Notes

- DDSS console cable runs must not have cable splits (single or double), cable bridges (of any length) or high resistance or faulty cable splices.
- See Chapter 3 – DK40i Installation for secondary protection information and loop limits.
- See Chapter 5 – DK424 for secondary protection information and loop limits.

CAUTION! **When installing the DDSS cable, do not run the cables parallel if they are within three feet of an AC power line. AC power lines should be crossed at right (90°) angles only. In particular, avoid running station wire pairs near devices that generate electrical noise, such as neon or fluorescent light fixtures.**

DDSS Console Configuration

An RDSU will not support a DDSS.

DDSS Programming

Program 03: Code 64 identifies the slots that support DDSS consoles.

Program 28: Assigns DDSS console(s) to telephones.

Program 29: Assigns button functions for DDSS consoles.

HDSS Console

HDSS Console Connections

The HDSS console must be connected to the data pairs of circuits 7 and 8 on a PEKU with standard two-pair twisted, jacketed telephone cable. To accommodate the connection, the instrument end of the HDSS console cable should be terminated in a modular station connector block (RJ-11). Refer to Chapter 8 – DK40i/DK424 Universal PCB Wiring for wiring/ interconnecting details.

If using 24 AWG cable, the overall length of the cable run from the Expansion Unit (KSU) to the HDSS console must not exceed 500 feet (152 meters). The HDSS console can operate with either an electronic or digital telephone (preferably an LCD model).

CAUTION! **When installing the HDSS console cable, do not run the cables parallel if they are within 3 feet of an AC power line. AC power lines should be crossed at right (90◦) angles only. Avoid running HDSS console wire pairs near devices that generate electrical noise, such as neon or fluorescent light fixtures.**

HDSS Console Configuration

The following considerations should be made when installing an HDSS console:

- A PEKU PCB is required.
- Two PEKU ports are required for the HDSS console (always circuits 7 and 8).
- The PESU does not support the HDSS console.

HDSS Programming

Program 03: Codes 23 and 24 identify the slot that supports a PEKU that interfaces with the HDSS console.

Program 28: Assigns HDSS console to a telephone.

Program 29: Assigns individual button functions for the HDSS console.

Door Phone (MDFB)

This section provides installation instructions for the Door Phone (MDFB). Door Phones can be installed can also with Door Phone/Lock Control Units (see following section).

- **DK14** can have up to 6 door phones
- **DK40i** can have up to nine door phones
- **DK424** can have up to 12 door phones

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Lock Control Unit and Door Phone

This section provides installation instructions for the Digital (DDCB) or Electronic (HDCB) Door Phone/Lock Control Units. Each DDCB or HDCB can support as many as three MDFBs or two MDFBs and one door lock.

DDCBs or HDCBs can only connect to slot 11/port 004, slot 12/ port 012, slot 13/port 020 and slot 14/port 028. DDCBs can only connect to circuit 5 (a PDKU or RDSU PCB and HDCBs can connect only to circuit 5 of a PEKU or PESU PCB).

DDCBs and HDCBs cannot connect to the RSTU2, PSTU, or KCDU.

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DDCB/HDCB and MDFB Cabling

For DDCB, HDCB, and MDFB wiring/interconnecting details and door lock control installation procedures, refer to Chapter 8 – DK40i/DK424 Universal PCB Wiring. If using 24 AWG cable, the length of the cable run from the Strata DK to the MDFB (via the DDCB or HDCB) must not exceed 1,000 feet (305 meters).

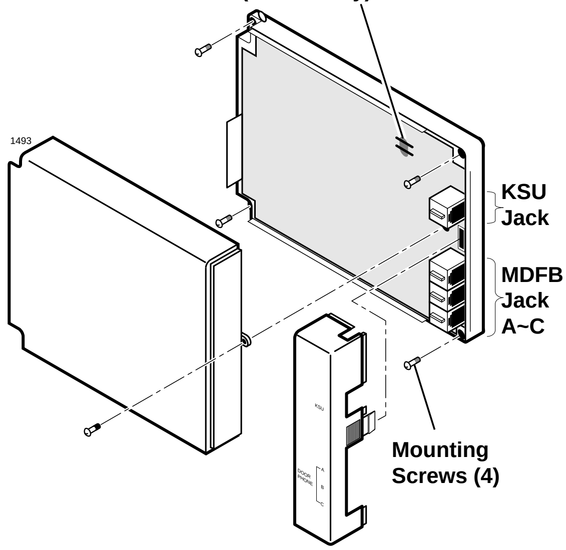
- DDCB or HDCB cable runs must not have cable splits (single or double), cable bridges (of any length) or high resistance or faulty cable splices.
- See Chapters 1, 3 or 5 for Strata DK14, DK40i or DK424 secondary protection information and loop limits.

DDCB/HDCB Wall Mounting

The DDCB and HDCB is designed to be mounted on a wall or other vertical surface.

➤ **To mount the units**

1. Locate the two mounting holes on the right-hand side on the DDCB or HDCB (see Figure 9-16).
2. Remove the side cover from the DDCB or HDCB to expose the two left-hand mounting holes.
3. Position the DDCB or HDCB adjacent to the Base KSU with regard to wiring needs.
4. Secure the DDCB or HDCB to the mounting surface with four one-inch panhead wood screws.



Note See Table 3-9 regarding external power requirements.

Figure 9-16 Door Phone (DDCB or HDCB) Installation

MDFB Wall Mounting

1. Remove the screw from the bottom of the cover. Detach the cover from the base and metal frame (see Figure 9-17).
2. Position the metal frame and base to the mounting surface and secure with two one-inch panhead wood screws.
3. Attach cover to the metal frame and base and secure with the screw which was removed in Step 1.

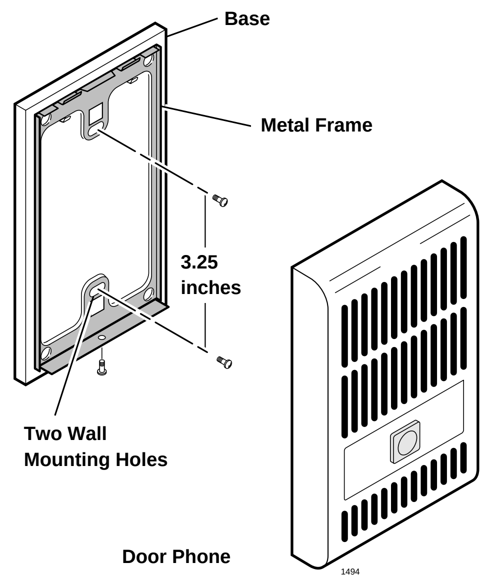


Figure 9-17 Door Phone (MDFB) Installation

MDFB Volume Control Adjustments

1. Remove the screw from the bottom of the MDFB cover.
2. Detach the cover from the base and metal frame.
3. The volume level is changed by a screw adjustment on the back of the MDFB. Turn the screw with a flat-headed screwdriver while ringing the MDFB or while on a call with it. The volume level will change as the screw is turned.

Station Apparatus

Door Phone/Lock Programming

Program 39: Assigns door phone and door lock buttons to digital telephones.

Program 77-1: Assigns DDCBs or HDCB to ports, door phone ringing over external page during the NIGHT mode, and door lock activation time.

Program 77-2: Busy out unused MDFB positions, identifies which DDCBs support the door lock option, and sets the door phone to ring one or five times.

Note Each DDCB/HDCB door lock assignment will reduce the system door phone capacity by one (see Chapter 10 – Peripheral Installation for HDCB, DDCB, and PIOU/PIOUS door lock installation information).

Program 79: Assigns door phone-to-station ringing assignments.

Program ⁎79: Assigns which [DN] flashes on telephones assigned in Program 79.

Cordless Digital Telephone (DKT2004-CT)

The Toshiba DKT2004-CT cordless digital telephone brings mobility and productivity to office telephones. Greater call access cuts down on leaving messages and “telephone tag.” Its compact design enables the user to take it to many locations within the office complex.

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Digital 900 MHz spread spectrum technology provides nine simultaneous channels and represents state-of-the-art design and engineering. Spread spectrum technology provides clarity in unsurpassed range, several times greater than conventional analog cordless telephones.

Spread spectrum technology also provides secure communications between cordless digital telephones and their corresponding base stations within a given environment. Fully charged, the cordless digital telephone provides over three hours of talk time, and 42 hours standby. An extended operation battery is also available to provide over five hours of talk time.

The cordless digital telephone either attaches to a Toshiba DKT2000-series corded digital telephone or is used as a stand-alone. It provides many sophisticated Strata features:

- LCD provides information such as User Name, DNIS and Caller ID
- Four programmable buttons for feature, multiple line or feature access
- Headset jack (headset optional)
- Handset volume adjustment
- Conference/Transfer (**Cnf/Trn**) button
- Message Waiting LED
- **Hold** button
- 20 Speed Dial number memory (in addition to 40 station speed dials)

The DKT2004-CT cordless digital telephone operates from the same digital station port on the Digital Telephone Interface Unit (PDKU) as the DKT2000-series digital telephone which may or may not be attached.

Precautions

Before you read anything else, please observe the following:

WARNING! **Toshiba *does not* represent this unit to be waterproof. To reduce the risk of fire, electrical shock, or damage to the unit, *do not* expose this unit to rain or moisture.**

Rechargeable Nickel-Cadmium Battery Warning

- This equipment contains a Rechargeable Nickel-Cadmium Battery.
- Cadmium is a chemical known to the State of California to cause cancer.
- The Rechargeable Nickel-Cadmium Battery contained in this equipment may explode if disposed of in a fire.
- Do not short circuit the battery.
- Do not charge the Rechargeable Nickel-Cadmium Battery used in this equipment in any charger other than the one designed to charge this battery as specified in this Guide. Using another charger may damage the battery, or cause the battery to explode.

Rechargeable Nickel-Cadmium Batteries Must Be Recycled or Disposed of Properly

- Residents of Minnesota should contact 1-800-225-PRBA for information concerning reclamation and disposal of Rechargeable Nickel-Cadmium batteries.
- Residents outside of Minnesota should contact their local authorities for information concerning reclamation and disposal of Rechargeable Nickel-Cadmium batteries.:

WARNING! **To reduce risk of fire, use only Model EXP9580 or EXP9586 batteries.**

CAUTION! **To power your Toshiba DKT2004-CB Cordless base unit, use only UL Listed AC Adapter Model AD-9500 Class 2 Power Supply.**
Ratings are:
Input:120VAC 14W
Output:0VDC 500mA

Important! *Charge your battery for 10 hours before using your new Cordless Digital Telephone.*

Cordless Telephone Installation

Important! *Your telephone system must be programmed for Auto Preference for your TALK button to work. If there is a shared digital telephone, you receive internal system dial tone automatically after picking up the handset of your deskset. For example, in a DK system, Program 32 must have a setting other than "00." It is best to set Auto Line Preference to access Intercom dial tone.*

➤ **To install the cordless telephone**

1. Select a location for your cordless digital telephone. Avoid excessive heat or humidity.
2. Place the cordless digital telephone's base unit on a desk or tabletop near a standard 120V AC outlet and within reach of the digital telephone line connection to your Strata DK system.

3. Keep the base unit and handset away from sources of electrical noise (motors, fluorescent lighting, etc.).

Important! *Place the cordless telephone to the right of the DKT. If placed on the left of the DKT, the cordless antenna will pick up a tone due to its close proximity to the DKT speaker and electronic parts.*

Telephone Cord Connection

There are two telephone line jacks on the back of the base unit of your cordless digital telephone: “Line In” and “Line Out.” You can connect the cordless digital telephone to both the telephone line and a Strata DK digital telephone.

➤ **To connect cords for use as a stand-alone telephone**

➤ Connect the modular jack labeled “Line In” to the telephone wall jack.

...or

➤ **To connect cords for use with a desk telephone**

1. Unplug the telephone line cord from your desk telephone.
2. Connect this cord to “Line In” of your cordless telephone.
3. Using the two foot modular cord that came with your cordless telephone, connect the jack labeled “Line Out” to the desk telephone.

Connect and Apply Power to Base Unit

The AC adapter furnished with this telephone may be equipped with a polarized line plug (a plug having one blade wider than the other). This plug fits into the power outlet only one way. If you are unable to insert the plug fully into the outlet, try reversing the plug. If the plug still does not fit, contact your facilities coordinator about replacing the obsolete plug. Do not alter the shape of the blades on the polarized plug.

➤ **To connect the cordless telephone using the AC adapter**

1. Plug the AC adapter cord into the AC adapter input jack on the base unit (see Figure 9-18).

CAUTION! Use only the AC adapter supplied with your cordless digital telephone.

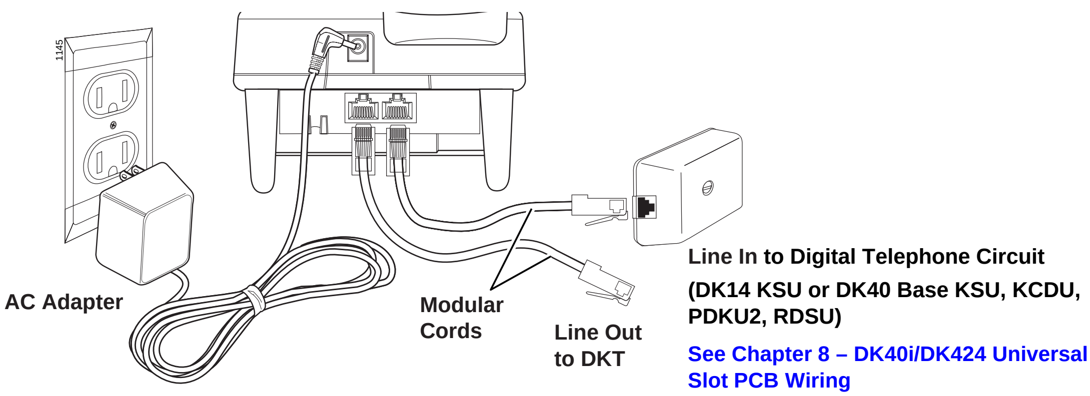


Figure 9-18 Cordless Telephone Connectors

2. Plug the AC adapter into a standard 120VAC wall outlet.
3. Route the power cord where it is not a trip hazard, and where it will not become chafed and create a fire or electrical hazard.
4. Wrap the power cord around the notch on the bottom of the base unit (see Figure 9-19).
5. Check to see that the power LED is on, indicating the telephone has power.
6. Before using your cordless digital telephone, be sure to raise the antenna to the vertical position.

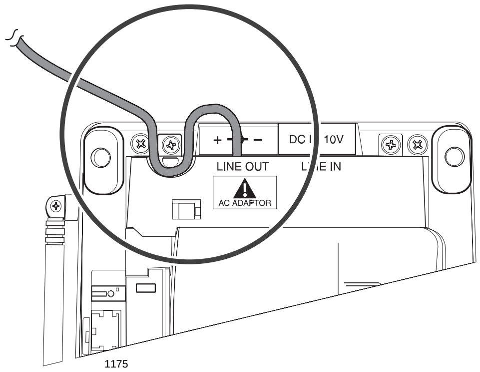


Figure 9-19 Line Out Cord

Attach/Remove Belt Clip to Handset (optional)

➤ **To attach the belt clip to the handset**

1. Snap the tabs of the belt clip into the notches on the sides of the handset.
2. Use the belt clip to attach the handset to your belt or pocket for convenient portability.

➤ **To remove the belt clip**

1. Pry one tab at a time from the notch on the side of the handset.
2. Carefully lift the belt clip off.

The belt clip is designed to fit snugly onto the handset.

Handset Battery Pack Installation

1. Place a charged battery pack onto the handset so that it slides easily along the ridges.

   If your battery is not charged, see “Removing and Charging Your Battery Pack”.
2. Slide the battery pack up onto the handset until it clicks into place.

You are now ready to configure your cordless digital telephone.

Removing and Charging Your Battery Pack

Before using your new cordless digital telephone, the battery must be charged continuously for 6 to 8 hours.

➤ **To remove the handset’s battery pack**

1. Press in on the battery pack release latch.
2. Slide the battery pack off the handset.

Note You may have to pull hard to slide the battery pack off, when the handset is new.

➤ **To charge the handset’s battery pack**

1. Place the handset on the base unit.
2. Make sure the CHARGE LED lights. If it does not light, check to see that the AC adapter is plugged in and that the handset is making good contact with the base unit.

Charging Extra Battery Packs

The base unit of your cordless digital telephone is equipped with a battery charger for charging an extra battery pack. This compartment has a latch that keeps the battery pack in place during charging.

➤ **To charge extra battery packs**

1. Position the battery pack so the inner side is facing toward the top of the base unit.
2. Slide the battery pack into the charging compartment until it clicks into place.
3. Make sure the BATTERY CHARGE LED lights. If it does not light, make sure the AC adapter is plugged in and that the battery pack is seated into the charger.

Note Charge the standard 400 mAh battery pack without interruption for 6-8 hours. Charge the optional 730 mAh extended battery pack without interruption for 8-10 hours.

Tips on Extending Battery Pack Life

All rechargeable nickel cadmium batteries can develop a "memory" (reduced charge capacity) caused by repeated charge and discharge cycles. Batteries that have developed this effect do not operate to their fullest capacity.

➤ **To avoid memory effect**

➤ Operate the unit until the battery pack is completely discharged before recharging. For example, use the handset off the base all day. Only replace the handset on the base at night after a full day of use. Do not "top off" the charge after using the battery for a short time.

➤ **To erase memory effect**

➤ Operate the unit until the battery pack is completely discharged, then recharge it fully. Repeat this process at least three times.

LCD Low Battery Indicator

When the battery pack in the handset is low and needs to be charged you see this message on the display and the handset beeps. Table 9-3 shows symptoms.

Table 9-3 Low Battery Symptoms

On a Call...	In Standby Mode...
Only the **TALK** key operates.	None of the keys operate.
Handset beeps once every three seconds	Handset beeps once.
Complete your call as quickly as possible	Cannot make call.
Replace battery pack.	Replace battery pack before making a call.

➤ **To restore your battery capacity**

➤ Return the handset to the base unit for charging or replace the handset battery pack with another charged one.

Digital Add-on Module Installation

Install one or two DADM 2020s to a 2000-series digital telephone (only).

- **DK14** supports up to 8 DADMs
- **DK40i** supports up to 12 DADMs

The number of DADMs supported by the DK424 depends on the common control PCB:

- **RCTUA** supports 12 DADMs
- **RCTUB** supports 40 DADMs
- **RCTUC/D** supports 120 DADMs
- **RCTUE/F** supports 200 DADMs

The DADM provides DSS buttons, speed dial buttons and CO line buttons.

1870

Notes

- See Chapters 1, 3 or 5 – DK14, DK40i or DK424 Installation for loop length and secondary protection requirements.
- DADMs cannot be installed on telephones that have RPCI-DI on OCA/DVSU installed.

➤ To install DADMs

See Figure 9-20 and follow these steps:

1. Loosen the four captive screws on the 2000-series digital telephone base and remove the base.
2. Remove the base handset hanger.
3. Loosen two captive screws on DADM and remove bases.
4. Put the DADM supplied cable through the telephone and DADM bases.
5. Connect DADM cable connectors to P1 of DADM and P1 of DKT2000 telephone.
6. Install base of DADM and telephone– tuck DADM cable into DADM and telephone base, as necessary, for proper length.
7. Secure DADM to telephone base with DADM connecting plate (using four screws).
8. If required to achieve maximum distance, install 2-pair house cable (or external power) and 2-pair modular cord, supplied with DADM. (See Chapter 8 – DK40i/DK424 Universal PCB Wiring.)
9. If a second DADM should be installed, connect P1 of the second DADM to P2 of the first DADM with the DADM connecting cable.

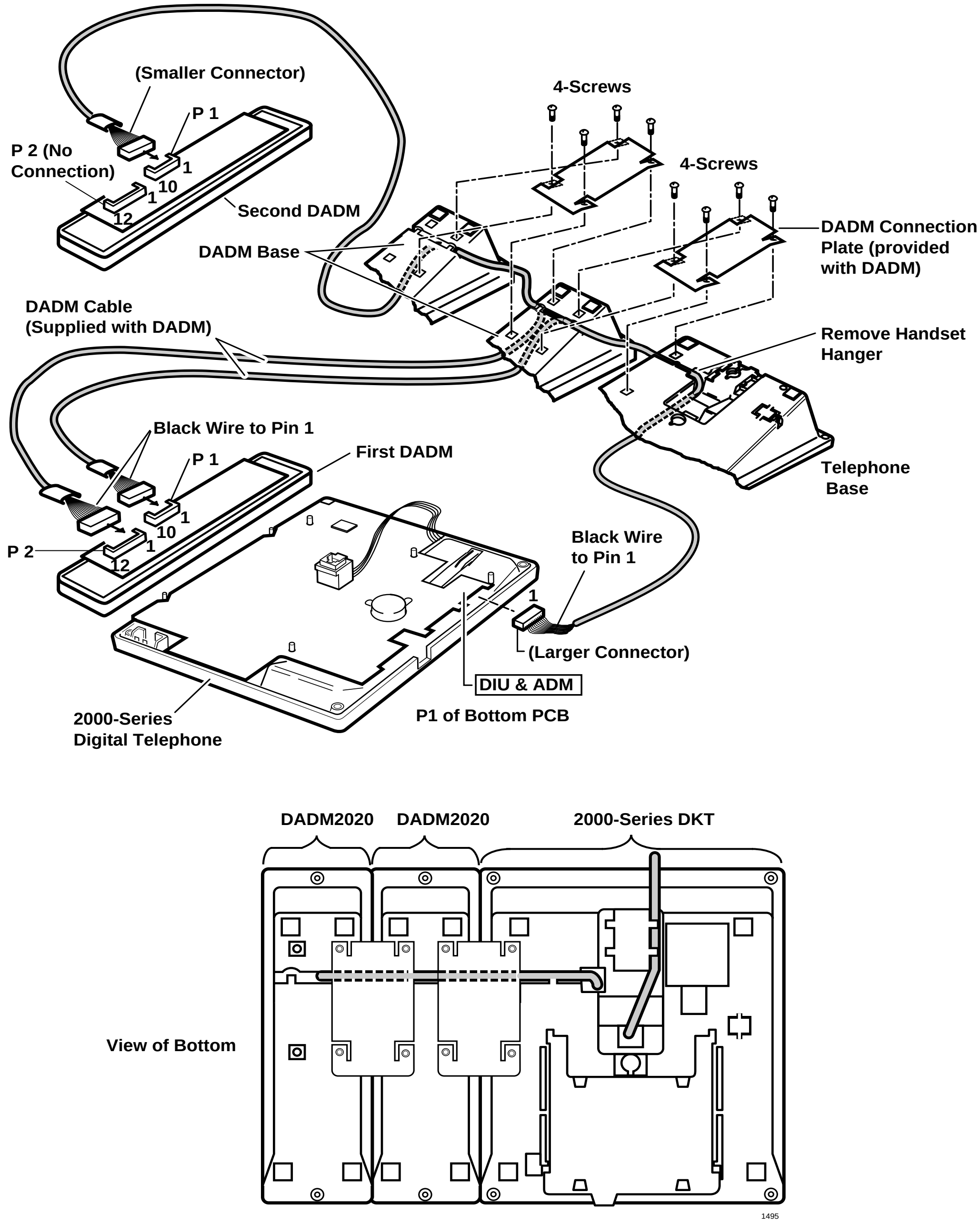


Figure 9-20 Digital Add-On-Module

ADM Programming

ADMs are programmed in Program ⁎29.

Important! *To activate the ADM, Program ⁎29 must be entered for each telephone port equipped with an DADM.*

See the Strata DK programming record sheets in the *Strata DK Programming Manual* for button defaults.

PC Attendant Console

A Strata DK system configured with RCTUB2 or RCTUBA/BB can support two Attendant Consoles, and systems with RCTUC1/D2 or RCTUC3/D3 can support four Attendant Consoles. The RCTUA1, RCTUA3, RCTUB1, or RCTUC/D1 do not support Attendant Consoles.

PC and conventional Attendant Consoles require RCTUB2 or RCTUC/D2 R 2 processors or RCTUBA/BB, RCTUC3/D3, RCTUE3/F3 R3 processors.

The PC attendant console (DK-PCATT) requires a customer-supplied, IBM-compatible PC. A VGA or SVGA monitor and a COM port dedicated to the PC attendant console is required. Toshiba recommends the following for the PC attendant console: Pentium processor/100 MHz, 16 MB RAM, 1.44 MB floppy drive, 200 MB hard drive, and a mouse. A tower that sits on the floor is provides better monitor visibility (as opposed to a desktop model). Microsoft® Windows® 95 software must be resident on the PC. Windows 3.1 will work, but Windows 95 is recommended.

Important! *After the PC attendant console is installed in Windows 95, you can find your old program groups by clicking the Start button (formally Program Manager) and then selecting Programs. Your groups appear as folders. To manage files in Windows 95, click the Start button, select Programs, and then click Windows Explorer (formally File Manager). Your directories appear as folders.*

Hardware Installation

The RATU PCB can support up to four Attendant Consoles in any combination. (See "RATU Installation" on Page 7-22.)

Notes

- The maximum distance from the Strata DK to either attendant console is 1000 ft. (303 m).
- Attendant console cable runs must not have the following:
  - Cable splits (single or double)
  - Cable bridges (of any length)
  - High resistance or faulty cable splices
- See Chapter 8 – Universal Slot PCB Wiring Diagrams for attendant console wiring.
- See Chapter 3 – DK40i Installation or Chapter 5 – DK424 Installation for loop length and secondary protection requirements.

CAUTION! **When installing the PC or conventional attendant console cable, do not run the cables parallel to AC power if they are within three feet of an AC line. AC power lines should be crossed at right (90°) angles only. In particular, avoid running station wire pairs near devices that generate electrical noise, such as neon or fluorescent light fixtures.**

➤ To install the PC attendant console

See Figure 9-21 on Page 9-32 and follow these steps:

1. Connect the RATI to the PC COM port a with a standard RS-232 cable.
2. Use one-pair wiring to connect the MDF to an RJ11 jack at the attendant console location. If you need to use a long cable, use two-pair for more power.
3. Plug in the handset cradle to the RJ45-jack.
4. Plug in the headset (if needed) to the handset base.
5. After programming the Strata DK424 system, install the PC attendant console software and complete the Telephony Setup per the instructions on "PC Attendant Console Software Installation" on Page 9-34.

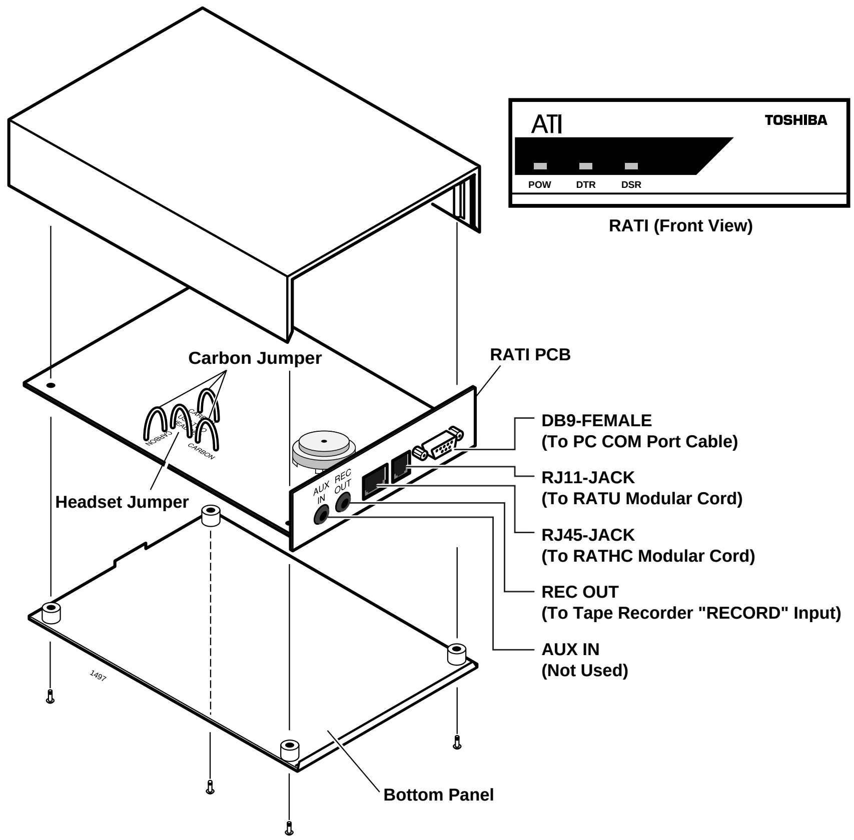


Figure 9-21 RATI Assembly/Disassembly

Notes

- Do not cut HEADSET jumper unless you are connecting two headsets.
- Cut CARBON jumpers if a carbon handset is connected to the RATHC handset cradle.
- "REC OUT" can be used to monitor or record the attendant console talkpath. Both the attendant and connected party will be monitored or recorded. The record level output from the attendant handset or headset is approximately 3 dB below the connected party record level. Use a 1/8" mini audio jack.
- "AUX IN" can be used to send audio to the attendant and connected party. The audio level to the attendant is approximately 10 dB below the audio level sent to the connected party. Audio sent to the outside party is limited to–15 dBv (CO Tip/Ring). Use a 1/8" mini audio jack.
- See Figures 8-16 and 8-17 in Chapter 8 – DK40i/DK424 Universal Slot PCB Wiring for RATI cable wiring information.

PC Attendant Console Programming

Program 03: Code 51 assigns the RATU PCB attendant console cabinet slot number.

Important! *The RATU PCB takes up four station ports in software; each attendant console will be assigned one of the ports in consecutive order. Toshiba recommends installing the RATU PCB in the next highest slot number following the last station PCB installed– do not skip slots. The first port number will be the next consecutive port number following the last station port installed.*

Program 15: If the attendant console is used to set-up trunk-to-trunk (two CO-line or tandem) connections with loop start lines, set Program 15-5 appropriately; if the CO sends the AR-Hold signal, set 15-0 and 15-3 to Detect. If the CO does not send the AR signal, set 15-0 and 15-3 to Ignore. Loop start trunk-to-trunk calls remain on attendant hold loops only if AR-Ignore is set.

Program 58

- 58-1: Sets the attendant console overflow time for each console.
- 58-2: Sets the console display for EL or CRT (EGA) and enables or disables console call waiting tone for each console. (Not used for the PC attendant console).
- 58-4: Sets the console Answer key priority for each console.
- 58-5: Sets the console overflow destination for each console.

Program 59: Assigns attendant console Flexible Buttons (Keys) for each console.

Attendant Console Load Share Programming

Program 81~89: Assigns CO lines (loop, ground, and DID) to share the incoming call load between consoles. (Tie lines load share on Dial “0” calls only, without the use of Programs 81~89.) All incoming CO lines (including DID lines) to be distributed between two or more Attendant Consoles should be assigned to ring each console in Programs 81~89.

Note Delay ring assignments do not apply to DID lines.

Program *09: Assigns the user company’s main listed [DN] (last four digits) to the attendant console if DID lines should ring the console. If the DID lines are assigned to ring multiple attendant console ports in Programs 81~89, DID calls will be distributed between the consoles. Only one console (any one) should be assigned with the main listed [DN] in Program *09.

Programs 71 and 72: Can be used to provide an alternative assignment of DID calls using Program *09. Program 71 assigns the dialed number to ring at different locations during each Night Mode (Day, Day2, Night). DNIS tags can be added for personalized identification of calls. Program 72 provides external forwarding of calls listed in Program 71.

Program *17: Assigns each CO line to an attendant console as the DID line intercept position as required. (Intercept calls do not load share.)

Attendant Console Load Share Programming Example

The user’s company DID line [DN] is 583-3700; this number and other loop start lines should ring in a load sharing manner to each of the Company’s two Attendant Consoles in the Day, Day 2, and Night modes.

Attendant consoles one and two are connected to RATU ports 024 and 025 respectively and should load share 583-3700 calls and other CO line calls. Program the DK424 as shown below:

- In Programs 81, 84, and 87, assign all CO and DID lines to ring ports 024 and 025.
- In Program *81, *84 and *87, assign all CO lines to flash the [PDN] of port 024.

- In Program *09 or 71, assign digits 3700 to port 024, and assign any other selected DID extension number(s) to port 025–note that when the DID extension number assigned to either console is dialed, calls will load share between consoles.

PC Attendant Console Software Installation

Step 1: Install the Software

The PC attendant console requires the installation of software on an IBM-compatible PC which has been connected to the RATI. See “To install the PC attendant console” on Page 9-32.

➤ To install the software

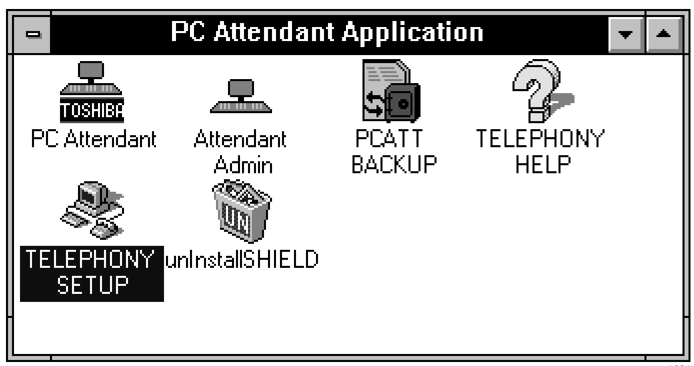
1. Turn on the PC and open the Windows Program.
2. Insert Diskette #1 in drive A (or B).
3. Run A:\setup (or B:\setup) from Windows. The installation process will proceed and request you to remove Diskette #1 and insert Diskette #2 as the program is decompressed and installed.

A new program group will be added to your Windows Program Manager for the PC Attendant. This will include three icons for running the PC Attendant, PCATT BACKUP, and TELEPHONY SETUP (see screen below).

Step 2: Add the Driver

Before the PC attendant console can be used, the driver for the interface to the RATI must be installed and Telephony Setup must be established. The following steps may be skipped if this driver was previously installed.

1. Click the Telephony Setup Icon or respond to the “Go to Telephony Setup box” at the end of the installation process.



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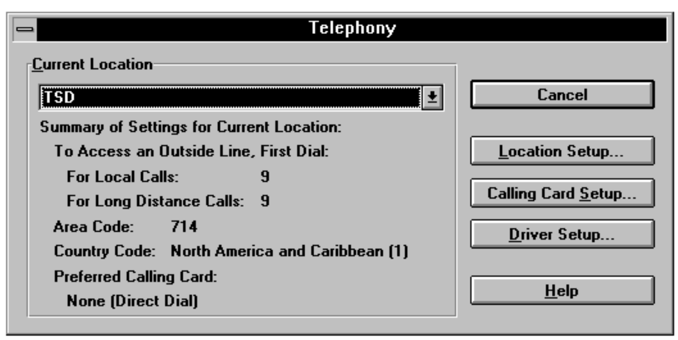
2. From the Telephony dialog box, click the Driver Setup... button.



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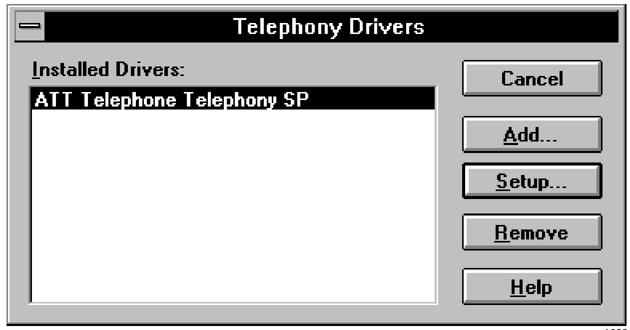
3. In the Telephony Drivers dialog box, if “ATT Telephone Telephony SP” is shown in the driver list, go to Telephony Setup below. Otherwise, click the Add button to display the Add Dialog screen.



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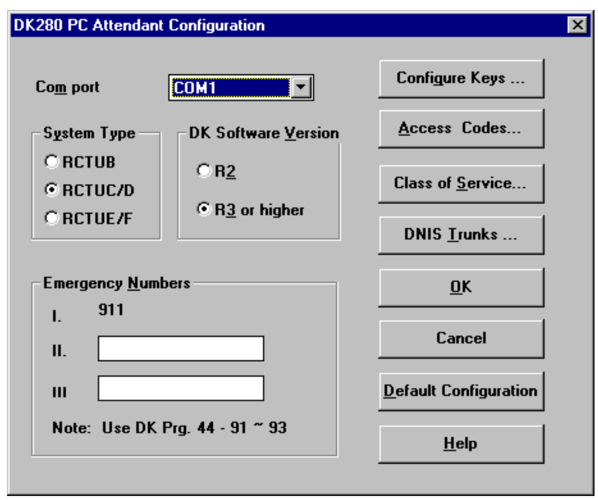
4. From the Add Drivers dialog box, if “ATT Telephone Telephony SP” is in the list, then select it (it should be highlighted) and press Add.

1403

5. If “ATT Telephone Telephony SP” is not listed, press Add and type **`c:\windows\system\att.tsp`** in the edit box. Click OK to return, select it in the list and press Add.

Step 3: Set Up the Telephony Driver

1. From the Telephony Drivers dialog box, click the Setup button.
2. From the DK PC Attendant Configuration dialog box, set the COM port used for the RATI interface (COM1, COM2, COM3, COM4).
3. Choose the processor type for the connected DK424 system (RCTUB or RCTUC/D).
4. Select the DK software version of the system (R2, R3 or higher).
5. Enter emergency numbers as programmed in Program 44-91~93 of the DK424.
6. Click the Default Configuration button. This will set all the parameters to match the default values of the DK424.



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Important! *It is extremely important to match the parameters set in the DK424 with those in the Telephony Setup or the PC attendant console will not know how to operate properly. Before Step 7, go through each of the following telephony setup programs. ALL changes in these following screens must match the corresponding values in the programming of the DK424.*

7. The Default Configuration button will close the DK424 PC Attendant Configuration screen. To make changes, select Setup again, then continue.

Default Key Assignments

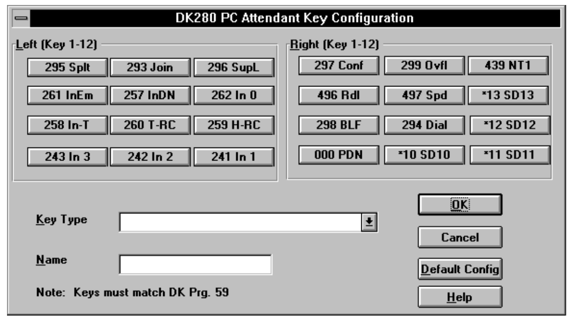
From the DK PC Attendant Configuration screen, the Configure Keys button takes you to the DK PC Attendant Key Configuration screen.The default key assignments are defined for R2 and R3. These key assignments must match Program 59 of the DK. The Default Config button on this screen sets the default keys only, whereas the Default Config button on the previous screen sets the system database defaults.

➤ To assign PC Attendant keys

1. From the PC Attendant Configuration dialog box, select the key that you want to change.

   The Key Type drop-down box shows a list of key names that can be selected for that button. The three-digit program codes are shown in front of the button for convenient programming. If the programming telephone is next to the PC attendant console, you can look at the codes on the PC Attendant screen while you program.

2. Click OK after making your selections.



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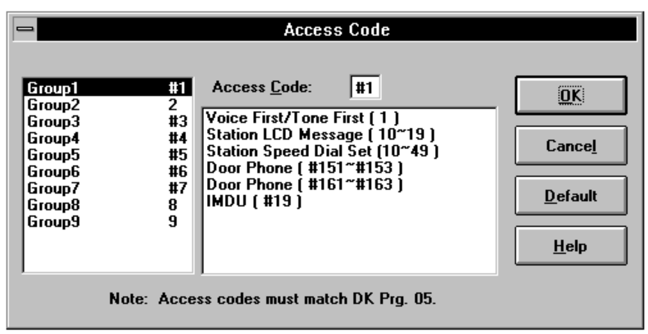
Access Codes

Access Codes are used by the DK424 for dialing features. The access codes (dialing plan) must match to allow the PC Attendant to dial the correct code to activate certain features. This is normally left at default, but if Program 05 is modified, corresponding changes are needed here. If no changes were made to Program 05, skip these steps.

➤ To change access codes to match Program 05

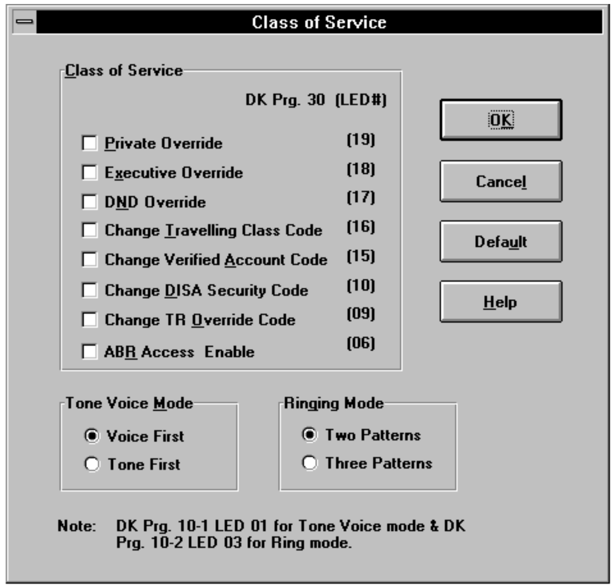
1. From the DK424 PC Attendant Configuration screen, click the Access Code button.
2. In the Access Code dialog box, click OK after making your selections.



1025

Class of Service

The Class of Service settings should reflect the call states and features which are anticipated to be used the most often.



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1. From the DK424 PC Attendant Configuration screen, click the Class of Service button.

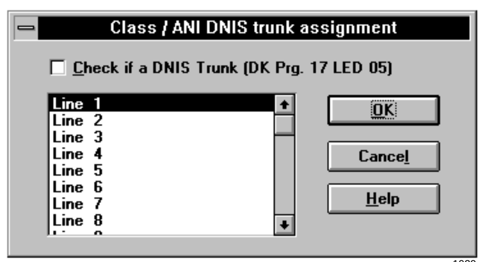
   These contain two items from Program 10 for setting the operation for Tone First or Voice First when calling a [DN] on the system and for setting the system to support two or three Night Transfer modes. The Class of Service for the port assigned to the PC attendant console must match Program 30 of the DK424.
2. In the Class of Service dialog box, click OK.

DNIS Trunks

To allow the DNIS feature to work properly, the PC attendant console needs to know whether trunk ports are being used for DNIS number translation or for CO line circuits. This assignment must follow Program 17 LED 05 in the DK424. (LED ON requires the line to be marked as DNIS.)

➤ To set DNIS trunk identification

1. From the DK PC Attendant Configuration screen, click the DNIS button.
2. From the Class/ANI DNIS Trunk Assignment dialog box, click OK when done.



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➤ To exit Telephony Drivers and Telephony Setup

1. From the DK PC Attendant Configuration screen, click Close to exit the Telephony Drivers box.
2. Click Close again to exit the Telephony Setup box.

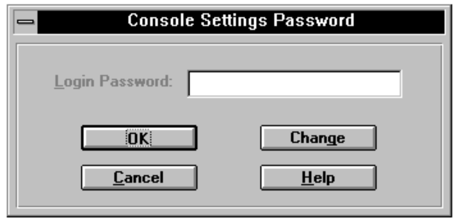
PC Attendant Setup

After Telephony Setup has been completed, then a series of items needs to be configured within the main program. System Settings in the main program can be easily changed since they do not require a corresponding change in the DK424 in order to function. Most of these items are found under the Main Menu heading of Setup.

➤ **To access System Settings**

1. From the Main Menu, select Setup.
2. Click OK or enter a password.

Initially, you can click OK, without entering a password. Store a password if you need to ensure that these settings cannot be changed without authorization. Once a password is entered, you must enter that password to proceed.



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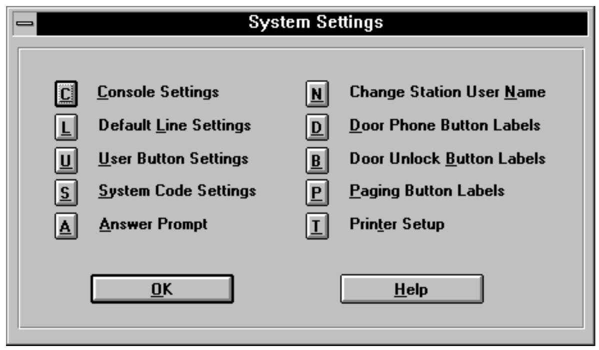
System Settings

Once the password screen is entered, the System Settings menu is presented. The two menu items, System Code Settings and Change Station User Name, allow the Attendant to change System Administration settings in the DK424. Within System Settings, the Attendant can customize the labels for only three menu items: Door Phone, Door Unlock, and Paging.

The following sections cover the main settings needed to make the console work.



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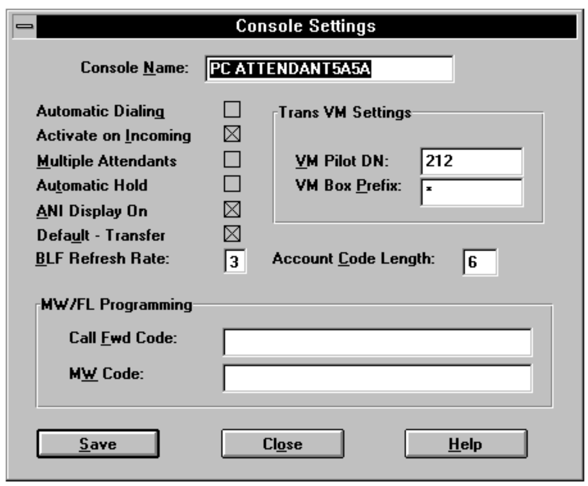
Console Settings

The first selection is Console Settings. This screen defines the PC attendant console main operating features, including:

- Auto Hold and Auto Dialing
- Account code length expected by the DK424
- Pilot number for Voice Mail
- Prefix digits needed to access a mailbox for message taking
- Voice Mail ID codes for message answering
- Call Forwarding to Voice Mail

More details about these settings can be found in the *Strata DK PC Attendant Console User Guide.*



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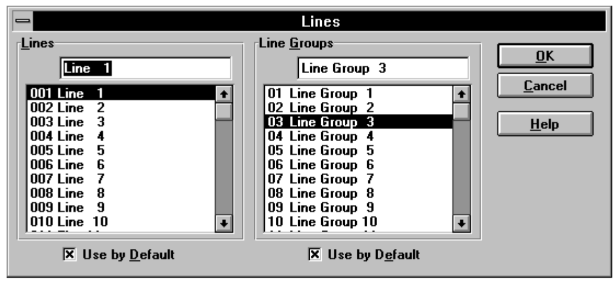
Line Settings

Each line and line group within the system can be renamed to allow for easy identification. For example, a private line for John Smith can be marked "John's Pvt Line". These identifiers are unique to the PC attendant console.

In the Lines dialog box, you can change the names that appear in the Active Call window. The Active Call window names are different from the names that appear in the PC attendant console selection windows.

The Attendant can also define a default line or line group to make dialing more efficient. The default line or line group can be used with the Directory to identify a Tie line group for easy transfer of calls. (See "Setting up the Directory" later in this section).

➤ To change CO line and names



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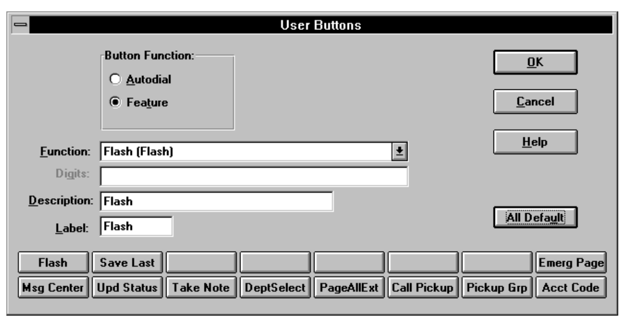
1. From the menu bar, select Setup, Settings... and OK to access the System Settings dialog box. Then select Default Line Settings.
2. From the Lines dialog box, highlight the Line or Line Group to be changed.
3. Select the corresponding edit box and enter a new name.
4. Repeat for all lines or line groups that change names.

User Buttons

The user buttons of the PC attendant console can be customized with features used most often by the Attendant. User buttons can be set to immediately invoke a feature or to open a dialog box associated with the feature. Each button can be programmed with Speed Dial or Feature buttons. (See the *Strata DK PC Attendant Console User Guide* for instructions on clearing buttons.)

➤ To change user buttons



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1. From the System Settings dialog box, select User Buttons.
2. From the User Buttons dialog, select the button to be changed.
3. Select either Autodial or Feature to change the button.
4. Enter a feature code for the list by selecting from the pull down list or selecting the Digits box and entering a number.
5. Select Label to change, if necessary.
6. Select the next button to change and repeat the process.
7. Select the OK button when all changes have been made.

Answer Prompts

Answer Prompts can be entered so that when new calls are presented and answered by the Attendant, the prompts will appear in the information window. Any currently recorded prompts are listed in the Answer Prompts box (shown below) and two selections on the left allow linking the prompts to a DNIS tag or CO line.

Note DNIS applies to R3 and up only.

The DK424 identifies calls to the Attendant position by using the default CO line indication. It can also attach a tag that was recorded in Program 71 for each DNIS number translated by the system.

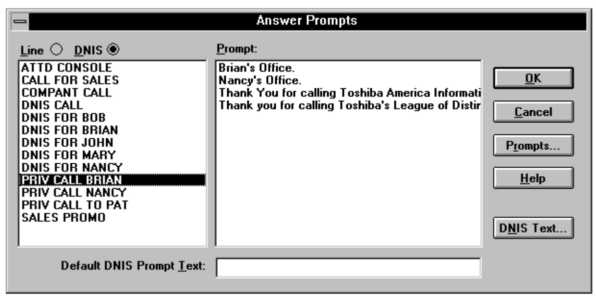
When lines are marked as DNIS in the Telephony Setup (see "PC Attendant Console Software Installation" on Page 9-34), the PC attendant console uses the DNIS tag to select the prompt instead of the line number. The button marked DNIS Text... is used to record the DNIS Tags which should match those listed in Program 71-5.

Toshiba recommends entering DNIS tags when they are programmed into the DK system. This enables the Attendant or System Administrator to create prompts as needed. Even if some DNIS lines are not scheduled to ring at the console, the calls to be forwarded to the Attendant and answers prompts may be used later.

The Answer Prompts can have approximately 110 characters. The edit window, shown below, is the same size as the window on the main screen in order to view the message as it will display.

➤ To write an Answer Prompt

1. From the System Settings dialog box, select Answer Prompt.



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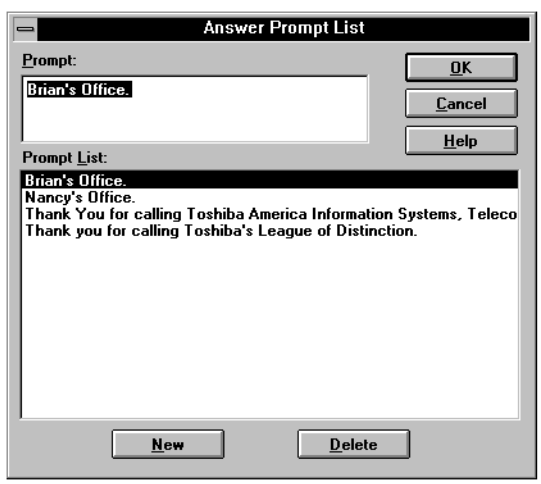
2. From the Answer Prompt dialog, select the Prompts...button.
3. Select the New button.
4. Type in a new prompt message in the Prompt box.
5. Select the New button again to enter another prompt or OK to save those entered.



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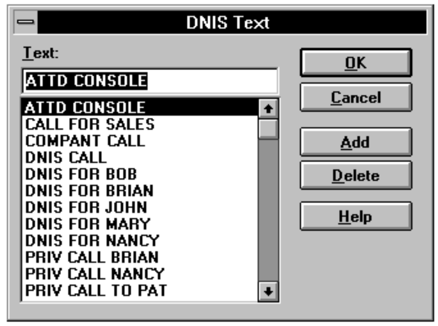
➤ To write a DNIS Answer Prompt

1. From the System Settings dialog box, select Answer Prompt.
2. Select the DNIS Text... button.
3. From the DNIS Text dialog box, select the Add button.
4. Type in the Name Tag as entered in Strata DK System system programming.
5. Select the Add button to enter another prompt or the OK button to save those entered.



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➤ To link a CO line or DNIS tag with an Answer Prompt

1. Click on a line or DNIS tag.
2. Highlight the Prompt.
3. Press OK.

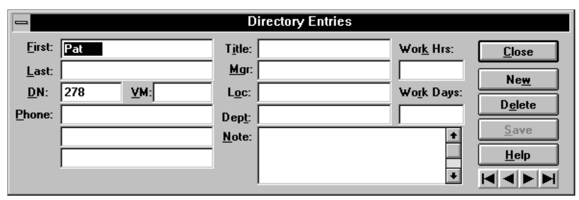
➤ To remove an Answer Prompt from a CO or DNIS line tags

➤ Click to remove the highlight.

See the *Strata DK PC Attendant Console User Guide* for instructions on other Answer Prompt options.

Setting up the Directory

The directory is a central part of the PC attendant console. Information in the directory is used for the following:



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- Auto Dial
- Auto Transfer
- Transfers to Voice Mail
- Recording an individual's status
- Recording messages for people without phones or for transferring to Voice Mail
- Recording individual's work departments so that when a caller asks for someone in "Sales," a list of department members will appear

This is also a place to store information about different individuals and how they may be reached, for example, pagers, home office, car phones, fax, etc. It can also be used to indicate location, work schedule and supervisors of people if needed.

Multiple entries of the same information is allowed.

For example, two people may share the same [DN]. A call to John Smith will ring station 204 and if Sandy Johnson has the same [DN], her telephone will also ring. The same person may be entered twice. For example, John Brady may be entered with [DN] 204 and with a [PhDN] 504.

When there are multiple entries, Auto Dial (includes Auto Transfer) is disabled. In the first example, where two people shared the same [DN], the system would pause if the [DN] is entered. At this point, the Attendant can enter a name and as long as there are no name conflicts, the console will now Auto Transfer. When the system pauses, other calls can still be handled by Auto Dial if there are no conflicts.

It is important to enter names in the same format, otherwise, the directory search function will not work and the individual will have to be selected manually. In other words, avoid entering first names for some people and first and last names for others. For example, if I created an entry for Pat L and another for Pat Long, the first entry would never be selected because the console will look for a match to Pat Long. If an “o” is entered after the “L”, the console will select Pat Long. Avoid using abbreviations in the initial entry.

Use the “Dept” field for grouping people who need to be reached by function. Directory entries with this field left blank will not show in the “Dept Select” feature. Assigning a consistent list allows for all people within a group to show on the list together, offering the Attendant a method to choose the person that can best serve the caller.

See the *Strata DK PC Attendant Console User Guide* for instructions on adding entries into the Directory.

Establishing the Speed Dial List

The Speed Dialing list must be established before the list will show in the Dialing window. This can be done in one of two ways.

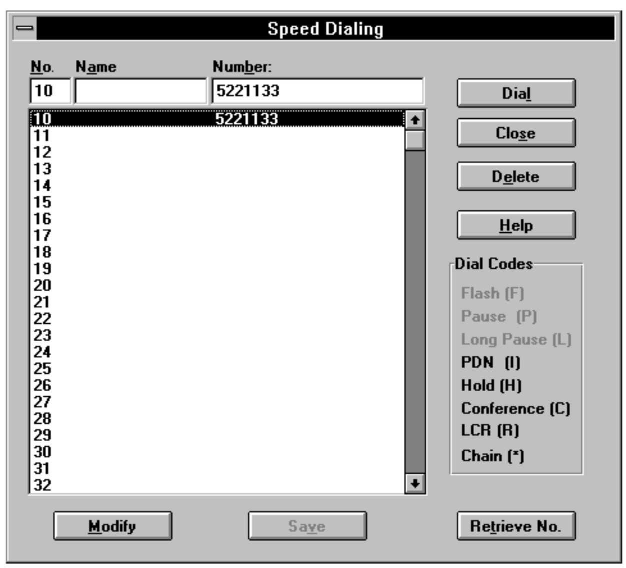
Method 1

With the first method, you transfer a Speed Dial list that was previously entered into the DK system to the PC attendant console. Once you have completed the following procedure, the PC attendant console will store the numbers to match those stored in the system.Then, when the Attendant uses this Speed Dial list, the PC attendant console dials the code for speed dial and the DK system uses the number it has in memory.

➤ To transfer the DK Speed Dial list to the PC attendant console

1. If the Speed Dial list has been entered into the DK system, then select each speed dial entry.
2. Press the Modify button.
3. (optional) Enter a name for the number.

Note This name is stored in the PC attendant console only and is not downloaded into the DK system Speed Dial Memo.



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Method 2

With Method 2, you enter a list of Speed Dial names and numbers from the console. The entered list will automatically re-sort and display alphabetically by name. A second sort is performed by dialed number which also searches for names that are the same.

Do not enter extra spaces after either the first or last names and do not put the full name in only one box. The system searches the names by putting together the First and Last name by adding a space between the first and last.

The system also adds a comma and space after the last and before the first. The Attendant can type names using either first or last name which will be automatically dialed if there is a matching name, but the name must match exactly, including any spaces and commas.

[DNs] are treated as a separate match, thus calls proceed with either a [DN] or name match.

➤ **To enter Speed Dial numbers**

1. Enter each number and name from the console.
2. Click the Save button.

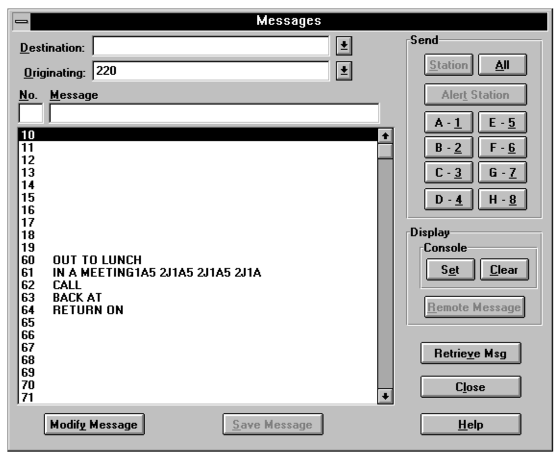
Using LCD Messaging

LCD Messaging uses the system messages and the personal messages (if enabled).

➤ **To display the messages currently programmed in the DK system**

1. Select each message number and press the Retrieve Msg button.
2. Press the Modify or Save button.
3. Press Close.

See the *Strata DK PC Attendant Console User Guide* for more instructions on the messaging features.



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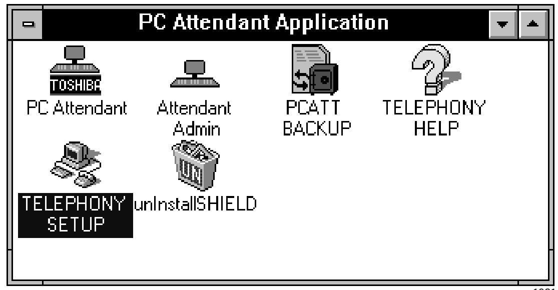
Backup/Restore Configuration

After all the data parameters are entered, the system should be backed up to a floppy diskette for restoring the operation later if needed. This backup diskette can be used to set up additional PC Attendant Consoles to operate with the same directory and settings as the first. This saves time when creating additional consoles and ensures that the buttons and operation of one console matches the next.

➤ To backup or restore PC attendant console setup data

1. Double-click on the PCATT BACKUP icon.



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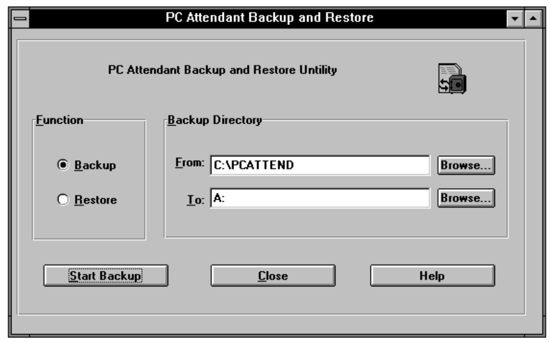
2. From the PC Attendant Backup and Restore dialog box, select Backup or Restore.
3. Enter the appropriate directories.
4. Select the Start Backup or Close buttons.



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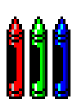
Windows Control Panel

Several items within Windows have an effect on the operation of the PC Attendant console. These controls are within the Main Program Group under the topic of Control Panel.

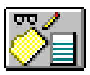
Choose Color Dialog Box

Windows allows the screen to use a variety of colors. PC Attendant console uses the color settings to determine the highlight, title bar and text color of many parts of the program. Choose a color scheme that provides the type of contrast best suited to the user.

	Action	Description
	1. Switch to Program Manager (**`Alt+Tab`**).	The screen will show each window currently open, including the Program Manager.
	2. From the Main Program Group, choose Control Panel.	
	3. From the Control Panel, choose Colors.	
	4. Select a color setting from the list.	A dialog box showing the current color settings and example colors is shown. Using the mouse or Arrow keys, the color settings can be viewed and changed.
	5. Press the OK button when done.	

Choose Desktop Dialog Box

The Desktop defines whether or not the Alt+Tab key combination can be used to switch between open applications on the desktop. The Desktop screen controls: cursor blink rate, whether a screen saver is used, and the timer to invoke the screen saver. Toshiba recommends using a screen saver since this protects the video monitor. When calls come into the PC Attendant when the screen saver is displayed, ringing is heard, but the screen saver remains on until the user takes an action. “Activate on Incoming” does not affect the screen saver.

	Action	Description
	1. Switch to Program Manager (**`Alt+Tab`**).	The screen will show each window currently open, including the Program Manager.
	2. From the Main Program Group, choose Control Panel.	
	3. From the Control Panel, choose Desktop.	
	4. Look at Applications and make certain that “**`Fast Alt+Tab`**” operation is enabled. And choose a screen saver pattern and delay time for the pattern to employed.	A number of settings are possible within the desktop control. Only the “**`Fast Alt+Tab`**” operation and screen saver patterns are used with the PC Attendant.
	5. Press the OK button.	

Choose Keyboard Dialog Box

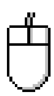
Two controls can be used on the keyboard, the first is the delay needed to hold a key down before the character will repeat and the second is the speed of repetition once the key repeats.

	Action	Description
	1. Switch to Program Manager (**`Alt+Tab`**).	The screen will show each window currently open, including the Program Manager.
	2. From the Main Program Group, choose Control Panel.	
	3. From the Control Panel, choose Keyboard.	

	Action	Description
	4. Choose the Delay before Repeat and Repeat Rate speed desired.	The slide controls offer two speed settings. This affects the rate of change the **`Vol Up/Vol Dn`** keys respond to when a key is held down to adjust the volume. The slower the repetition, the easier it is to distinguish level change. This rate also affects scroll rate for the Arrow keys used in the directory and other lists. Toshiba recommends starting at mid-points of each setting before making adjustments.
	5. Press the OK button when done.	

Choose Mouse Dialog Box

Under the title Mouse, two settings affect the speed of the mouse and the speed of the double click needed to make a selection. If you are currently using a mouse, these settings should be appropriate and need not be changed. If the mouse is new to you, Toshiba recommends each setting to be a slower speed for easier operation. Once you gain experience with the mouse, you can use faster settings.

	Action	Description
	1. Switch to Program Manager (**`Alt+Tab`**).	The screen will show each window currently open, including the Program Manager.
	2. From the Main Program Group, choose Control Panel.	
	3. From the Control Panel, choose Mouse.	
	4. Choose the Tracking and Double Click speed desired.	Two speed settings are possible using a slide control. Slower operation is for beginning users while faster tracking and double click speeds are for experienced users. The control buttons can also be changed to allow for left-handed users of the mouse.
	5. Press the OK button when done.	

Conventional Attendant Console

A Strata DK system configured with RCTUB2 or RCTUBA/BB can support two Attendant Consoles, and systems with RCTUC1/D2 or RCTUC3/D3 can support four Attendant Consoles. The RCTUA1, RCTUA3, RCTUB1, or RCTUC/D1 do not support Attendant Consoles.

PC and conventional Attendant Consoles require RCTUB2 or RCTUC/D2 R 2 processors or RCTUBA/BB, RCTUC3/D3, RCTUE3/F3 R3 processors.

The conventional attendant console can be configured with a Toshiba-supplied base (ATT BASE-1) and an Electroluminescent (EL) or EGA Color CRT.

Installation

Refer to "Hardware Installation" on Page 9-31 and the following steps.

➤ **To install the conventional attendant console**

1. Plug in the EL or CRT display to the base with a nine-pin cable, which is supplied with the display.
2. Plug in the EL or CRT display to a commercial three-prong AC 117V outlet.
3. Use two-pair wiring to connect the MDF to an RJ11 jack at the attendant console location.
4. Plug in the handset to the base RJ45-jack (see Figure 9-21).
5. Plug in the headset (if needed) to the base.

Conventional Attendant Console Programming

Follow the same programming instructions provided for the PC attendant console. See "PC Attendant Console Programming" on Page 9-33. Software Installation and Windows instructions do not apply to the conventional console.

DKT2001 Digital Single Line Telephone

The following provides information on how to connect the DKT2001 Digital Single Line Telephones (SLTs) to the DK system.

Before proceeding, see warning and caution notes in "Telephone Installation".

The digital SLTs connect to the digital telephone ports via the MDF with standard twisted-pair jacketed telephone cable. If using 24 AWG cable, single-pair wiring is sufficient in most cases for DKT2001 model standard telephones to operate effectively at up to 1000 feet from the system.

To accommodate the digital telephone line cord, the cable should be terminated in a modular station connector block (RJ-11) at the station location. The standard single-pair, modular DKT2001 model standard telephone cord that is sent with the telephone is 7 ft. (the maximum allowed is 25 ft.).

Digital telephone cable runs must not have cable splits (single or double), cable bridges (of any length), or high resistance or faulty cable splices.

➤ To wall mount DKT2001 digital SLTs

1. Loosen the screws, and remove the telephone base.
2. Using a suitable cutter, remove the handset hanger from the base.
3. Insert the handset hanger in the slot on the front of the phone. The hanger fits in the notch on the handset cradle.
4. Rotate the telephone base 180 degrees and secure it to the telephone with its four screws.
5. Connect the phone to the wall modular connector with a cord approximately four inches long (available at most telephone supply companies).
6. Route the cord into the hollow portion of the base.
7. Mount the phone on the wall mounting modular connector plate.

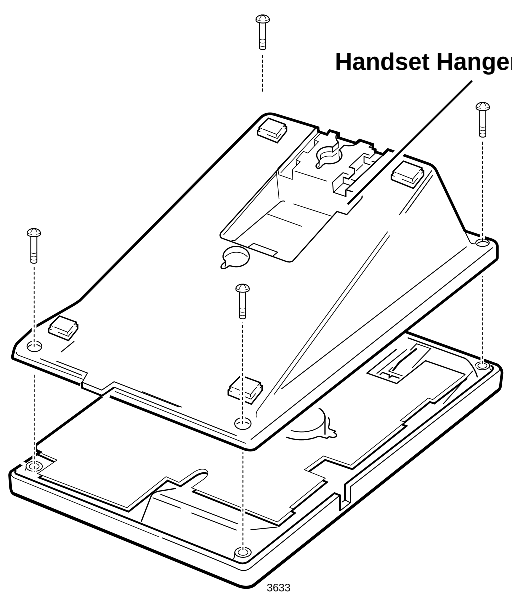


Figure 9-22 Removing the Telephone Base

Installation

1. Set the DIP switches to match Figure 9-23. The DIP switches are preset from the factory for the USA and Canada. Refer to Table 9-1 on Page 9-4 for other country settings.
2. If required to achieve maximum distance (greater than 1000 ft.), install a two-pair house cable (or external power).

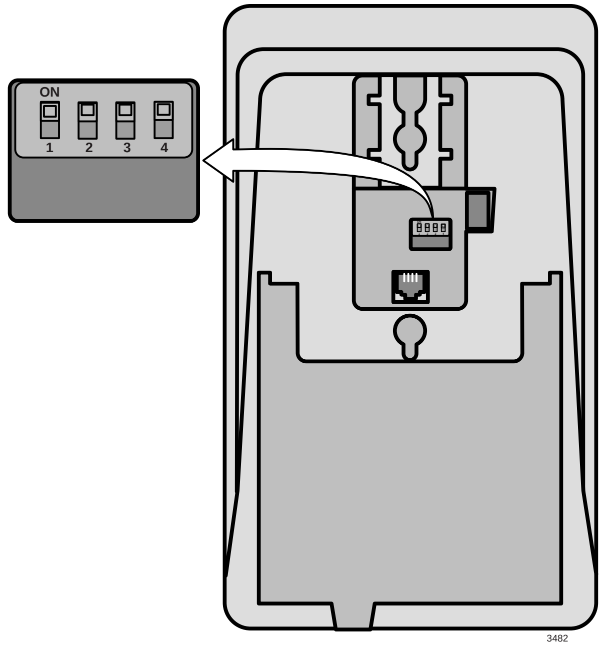


Figure 9-23 DKT2001 DIP Switch Settings

Programming

Program 03: Specify Code 61 to indicate a station line PDKU2.

Program 27: Adjusts initial off-hook volume level for digital telephone handsets.

Program 38: Specify Code 21.

Program 39: Specify button 01 as a [PDN].

Important! *Do not program CO lines or secondary line appearances onto button 01 or in any other position. Since the system assigns CO lines 01~17 by default, be sure to remove any CO line appearances by programming them as Station Speed Dial buttons (code* ✱*).*

Note If the **Speed Dial Select** button is removed, the ✱ key becomes the **Speed Dial Select** button. While on an outside call, the user must press ✱ then **#** to activate the ✱ and **#** DTMF tones for the duration of the call.

Program 92-5: Initializes initial ringing, speaker, and muted ring volume levels of digital telephones.

Also, refer to the Numerical Programming Listing in the *Strata DK Programming Manual* for other station-related programs.

Peripheral Installation 10

This chapter provides connection procedures for optional peripheral equipment to Strata DK Systems. Information in this chapter applies to all systems, unless stated otherwise in text.

Instructions include hardware requirements, PCB configuration, interconnection/wiring requirements, and programming considerations. Peripheral equipment is connected to system PCBs. See Chapter 7 – DK40i/DK424 Universal Slot PCBs installation and configuration information and the appropriate installation section.

Power Failure Options

In the event of a power failure, Strata DK uses these options:

Reserve Power

For information on the Reserve Power Option, see:

- Chapter 1 – DK14 Installation
- Chapter 3 – DK40i Installation
- Chapter 5 – DK424 Installation

DK14/DK40i Single-line Power Failure Emergency Transfer

DK14 and DK40i have a built-in single-line Power Failure Emergency Transfer (requires loop start lines). See Chapter 1 – DK14 Installation and Chapter 3 – DK40i Installation for detailed information.

DK40i/DK424 Power Failure Transfer Unit

An optional Power Failure Transfer Unit (DPFT) can be installed that automatically connects up to eight selected CO lines directly to designated standard telephones in the event of a power failure. The DPFT enables normal operation of the selected CO lines and standard telephones when the system is in service. When power is restored, each telephone is independently reconnected to system standard telephone circuit ports after it is finished with its direct CO line call. The DPFT is normally installed on the MDF.

Figure 10-1 provides a circuit diagram of the DPFT.