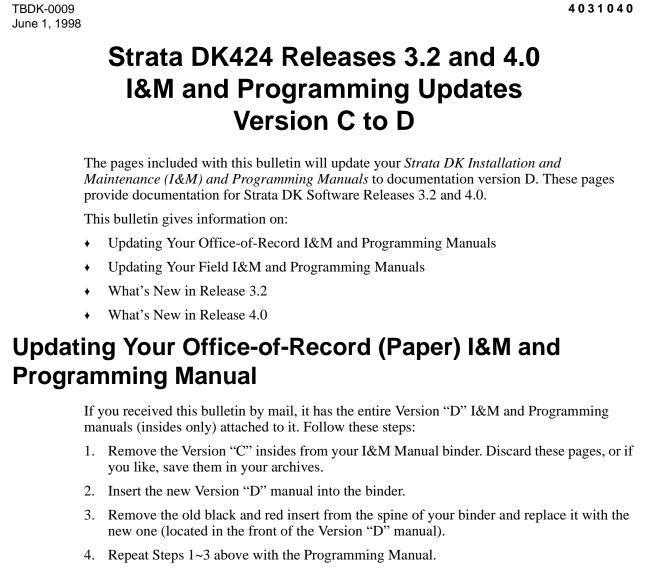
Strata[®] DK Technical Bulletin



Updating Your Field (Paper) I&M and Programming Manual

Method #1:

Refer to the I&M and/or Programming Update Pages Checklist in this section. Copy the pages listed from the updated office-of-record copy and insert them into your manual. Create your own tabs as required.

Method #2

Use the electronic update package on the Strata DK Library CD-ROM, Version B, June 1998:

- 1. Follow the instructions on the DK Library to access AdobeTM Reader[®] and the Home Page.
- 2. I&M: from the Home Page, click Installation & Maintenance, then click "Version C to Version D I&M Update Pages."
- 3. Click File, then Print. If your printer is capable of duplex printing, be sure to select the two-sided setting. Or, print single-sided sheets and make two-sided photocopies.
- 4. Programming: from the Home Page, click Programming, then click "Version C to Version D Programming Update Pages." Repeat Step 3.
- 5. Create your own tabs as required.

I&M Manual Update Pages Checklist

Replace the existing tabs with the enclosed tabs, which include ISDN and HMIS. Also, replace or insert the enclosed pages to update your *Strata DK I&M Manual* for Releases 3.2 and 4.0:

Chapter/Section	Updated Pages	Description	خ
Cover Page, Table of Contents, Introduction	Replace entire sections	Updated for Releases 3.2 and 4.0.	
Chapter 4	Replace the entire chapter	Updated for Release 4.0. Includes E911 and ISDN information.	
Chapter 5	5-47~5-62	Revised for Release 4.0.	
	7-1/7-2	Updated for Release 4.0. Added E911 CAMA Trunk (RCMU/ RCMS) information.	
Chapter 7	7-21/7-22	Correction.	
	7-55~7-58	Updated for Release 4.0. Added E911 CAMA Trunk (RCMU/ RCMS) information.	
Chapter 8	8-27/8-28	Updated for Release 4.0. Added E911 wiring diagram.	
Chapter 13	13-5~13-16	Updated for Release 3.2. Added System Open Architecture Interface (OAI) information.	
Chapter 14	Add new chapter	Updated for Release 4.X. ISDN information.	
Chapter 15	Add single page	Reserved for future Hospitality Management Information System (HMIS) chapter.	
Glossary	Replace Glossary	Includes ISDN, E911 terms.	
Index	Replace Index	Updated for Releases 3.2 and 4.0.	

Important! The update files mentioned in the previous steps are intended for printing only. Therefore some buttons, hypertext links and extended search capabilities do not function.

Programming Manual Update Pages Checklist

Replace the existing tabs with the enclosed tabs, which include ISDN and E911. Also, replace or insert the enclosed pages to update your *Strata DK Programming Manual* for Releases 3.2 and 4.0:

Chapter/Section	Updated Pages	Description	5
Cover Page, Table of Contents, Introduction	Replace entire section	Updated for Releases 3.2 and 4.0.	
Chapter 1	1-1~1-10	Updated for Releases 3.2 and 4.0.	
	3-7~3-8	Program 03 – Updated for Release 4.0. Added ISDN cards.	
	3-19~3-20	Program 5 – Updated for Release 3.2.	
	3-25~3-36	Programs 10-1, 10-2, 10-3 – Updated for Releases 3.2 and 4.0.	
	3-39~3-40	Program 12 – Correction.	
Chapter 3	3-45~3-46	Program 15 – Updated for Release 3.2.	
	3-73~3-76	Program 30 – Updated for Releases 3.2 and 4.0.	
	3-97~3-102	Program 35 – Correction.	
	3-111~3-128	Program *38 (new), Program 39 updated for Releases 3.2 and 4.0.	
	3-139~3-142	Program 59 – Updated for Release 4.0.	
	3-161~3-162	Program 76-2 – Correction.	
	3-177~3-178	Program *80 – Updated for Release 3.2.	
Chapter 4	4-29~4-40	Toll Restriction – Added Program *45-4.	
Chapter 5	5-3~5-24	Revised for HMIS.	
Chapter 6	6-7~6-8	Updated for Release 4.0. Added ISDN information.	
Chapter 7	Add new chapter	Updated for Release 4.0. Added ISDN information.	
Chapter 8	Add new chapter	Updated for Release 4.0. Added E911 CAMA information.	
Glossary	Replace Glossary	Updated for Release 4.X. Added ISDN, E911 terms.	
Index	Replace Index	Updated for Releases 3.2 and 4.0	

Note Some of the Programming information for Release 3.2 was already updated in the Version "C" Programming Manual.

What's New in Strata DK Release 3.2

The following contains an explanation of the new items provided in DK424 Release 3.2 software available on all RCTU, R3 processors.

Important! When upgrading RCTU3 hardware from Release 2.0, 3.0 or 3.1 software to Release 3.2, you must initialize the RCTU (Program 91-9) and restore the customer database after you change to Release 3.2 ROMs. For detailed Release 3.2 upgrade instructions, refer to bulletin TBDK-0012.

Station Control of Ground/Loop Start CO Line Call Forward

This feature enables the installer to assign the station which controls Call Forward for each ground and loop start line. The station that controls CO line Call Forward must be the only station assigned to ring in the ringing assignment for the forwarded line. This feature also enables a group of stations to ring and answer CO line calls. If the calls are not answered, they can be sent to voice mail.

 Program *80-Call Forward Station Ring Assignment (new program) defines the CO line Call Forward ringing assignment (Immediate, Delay1, or Delay2) for the Day, Day2, and Night Ring modes. This record sheet provides an example of how to control Call Forward for ground/loop start CO line calls.

Once assigned, the CO line follows the Call Forward setting (Busy, No answer, etc.) of the designated control station. This feature does not apply to Tie, DID ANI, or DNIS lines which ring to a particular Directory Number (DN) and follow the Call Forward setting of the DN.

Standard Telephone Tandem Connection/Drop Out

This feature enables standard telephones and Voice Mail/Auto Attendant ports to set up a conference with two CO lines (tandem) and then drop out of the conference leaving the two CO lines connected.

The station that sets up the two CO line connection can reconnect to the tandem connection by dialing a pickup code (**#5#79**). If more than one tandem connection is set up by a station, the pickup code reconnects that station to the tandem connection that has the lowest CO line number as a priority.

Prior to Release 3.2 software, standard telephones could set up two CO line conferences, but they could not drop out of the connection. The Pickup Code function applies only to the station that sets up the tandem connection; a station cannot pickup a tandem connection which was set up by another station.

No new special programming is required to enable this feature; however, stations, VM ports and CO lines that must be allowed in tandem connections must be enabled in:

- + Program 15–Ground/Loop/tie/DID Line Options, Code 5
- + Program 31-Station Class of Service, LED 09 must be OFF for VM ports
- + Program 10-1–System Assignments, LED 19 and 20 must be on station and VM ports

Fixed-Call-Forward Destination Enhancement

Distributed Hunt and Phantom Directory Numbers (PhDNs) can be assigned as a station's Fixed-Call-Forward destination. Prior to R3.2 software, only Primary Directory Numbers (PDNs) could be assigned as a station's Fixed-Call-Forward destination.

• **Program 36–Fixed-Call-Forward** assigns Distributed Hunt DN and PhDN Fixed Call Forward destinations

Ring Transfer Privacy Mode Enhancement

If Transfer Privacy is enabled in Program 10-1 (LED 08 OFF), a call that is ringing (or blind transferred) to a multiple appearing DN or CO **Line** button only rings on the DN of the primary or owner station. For example, for PDNs, this is the primary station and for PhDNs, it's the station designated as the PhDN owner in Program *33.

The transferred call rings on all stations having the transferred-to DN per Programs *71, *72, and *73 before the transferring station releases (hangs-up) the call; but, rings only on the primary/owner station after the call is released.

Prior to Release 3.2 software, a transferred call rang all stations having the transferred-to DN per Programs *71, *72, *73, even after the transferring station released the call.

Program 10-1–System Assignments, LED 08 OFF invokes Transfer Privacy

Voice Mail Control During Analog CO Line Conference Calls

This feature enables Toshiba digital and electronic telephones to transmit Dual-Tone Multifrequency (DTMF) tones during CO line conference calls. The basic application of this feature enables a user to call voice mail during a conference call and play messages to all parties in the conference. This feature operates with analog ground, loop, DID and Tie lines, but not with any type of T1 (RDTU) lines.

DTMF tones can be sent from any station in the conference. When DTMF tones are sent, all parties in the conference (CO lines and telephones) receive the tones. An analog CO line must be in the conference in order for DTMF tones to be sent during a conference call. Prior to Release 3.2, DTMF tones could not be sent during any type of conference call.

No programming is required for this feature.

Camp-on Tone During I-Hold and Exclusive Hold

This enhancement sends a camp-on tone to a telephone when the telephone receives any type of call while having the DN that receives the call on I-hold or exclusive hold. The camp-on tone is two muted ring tones three seconds apart.

Prior to Release 3.2, if a DN received a call while it was on hold there was no audible or visual indication that another call was camped on to the DN. This assumed that there were no idle appearances of the DN, which would ring if called, while another appearance of the DN was on hold or exclusive hold.

No programming is required for this feature.

Disable Hold Display Scroll Option

This feature enables an installer to disable or enable the Hold Display Scroll feature independently for each telephone. When more than one call is on hold, the Hold Display Scroll feature enables a user to scroll through the held lines. When scrolling held lines, the selected held line flashes at a faster rate than the other held lines and its number displays on the telephone's LCD.

This flashing rate difference between held lines is confusing to some users. By using this option to turn off the Hold Display Scroll feature, held lines all flash at the same rate unless the held line recalls the telephone.

Prior to Release 3.2 software, Hold Display Scroll was enabled on all telephones and could not be disabled.

• **Program 35–Station Class of Service**, LED 6 enables/disables Hold Display Scroll.

Selective Pickup of All Call Page

This option enables pickup code **#5#30** to pick up All Call Page (and External Page depending on LED 15 in Program 10-2), exclusive of ringing line pickup. If this option is ON, the **#5#30** pickup code picks up All Call Page and External Page only; it does not pick up ringing station-to-station or door phone calls.

Prior to Release 3.2, the pickup code **#5#30** would pick up a ringing station-to-station or door phone call as a priority over All Call Page, if the internal call was ringing at the same time as the AC or External Page needed to be picked up.

- **Program 30–Station Class of Service,** LED 04 assigns selective pickup of All Call Page.
- + **Program 10-2–System Assignments**, LED 15 specifies External Page pickup.

System Open Architecture Interface (OAI) Port

With Release 3.2, an optional system-wide RS-232 application processor interface port can send caller information, plus ANI, DNIS, and Caller ID data for ACD calls, only to a centralized LAN application computer.

This application requires special software in the application computer. This port is provided for third-party developers to connect their applications when developed.

- Program 76-1–WSIU, TSIU and RSIU/RSIS/RMDS Port Assignments specifies the OAI port
- + Program 76-2–WSIU, TSIU and RSIU/RSIS/RMDS Baud Rate Assignments
- Program 77-4–RSIU Open Architecture Interface (OAI) Data Output Assignments, LED 01 and 02 enables/disables DNIS and Caller ID/ANI independently

LCR + Toll Restriction After Dialing Special Codes

Prior to Release 3.2, calls with special dialing codes always went out as a local call using LCR. This feature enables users to dial special CO feature access codes that begin with * or **#**, plus a telephone number. Then the call is either routed via LCR or toll restricted, depending on the assigned treatment for the dialed digits. This feature is added to Program *45-3.

Example: A user can dial access code *67, to block Caller ID, plus the telephone number. The call then routes via LCR or toll restricted according to the telephone number.

Music-on-hold or Ring Back Tone for Transferred Calls

Prior to Release 3.2, transferred parties would hear Music-on-hold (MOH) or silence. With Release 3.2 and higher, transferred parties can hear MOH or Ring Back Tone (RBT). Either option is set in Program 10-2, LED 05. When LED 05 is ON, MOH plays for transferred parties; if LED 05 is OFF, RBT is sent.

What's New in Strata DK Release 4.0

Strata DK424 Release 4.0 includes Integrated Services Digital Network (ISDN) compatibility; enhanced 911 CAMA trunk interface; Hotline Service (Emergency Ringdown); hookswitch flash operation on T1 two-way DID, ground start, and Tie lines. Another feature of Release 4.0 is that DID and Tie lines no longer require station ports in software, thus enabling higher potential capacities when using digital or analog DID or Tie lines.

Refer to the ISDN sales bulletin SBDK-0018, literature number 4027074, for more information on Release 4.0 features. Refer to bulletin TBDK-0012 for detailed instructions on upgrading to Release 4.0. Release 4 ISDN capabilities will be released in three phases:

- Release 4.0 supports **ISDN PRI** and the other general new features.
- Release 4.1 will support **ISDN S/T BRI** capabilities. This is scheduled to become available a few weeks after Release 4.0.
- Release 4.2 will support **ISDN U BRI** and some additional PRI services. This is scheduled to become available a few months after Release 4.1.



Digital Business Telephone Solutions

Installation and Maintenance Manual



Software Release 3.1



Software Release 3.1



Software Releases 3.2, 4.0 and ACD

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 (714) 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.

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.

Version A, December 1996 Version A.1 (Update TB16-0003), February 1997 Version B, April 1997 Version C, October 1997 Version D (Update TBDK-0009), June 1998 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 DK40 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.
- 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.)



LISTED

Important Notice — Music-On-Hold

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Introduction

This manual provides detailed step-by-step instructions for installing and maintaining the Strata DK14 / DK40 / 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 4.0 information for the DK424. It also contains some pre-release information for software beyond Release 4.0.

Important! Information beyond Release 4.0 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., DK40 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:

- General Description provides an overview of the Strata DK systems and associated hardware.
- 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 DK40 Configuration explains how to configure a Strata DK40 system. It also provides space to record the hardware and station devices that make up the system.
- Chapter 3 DK40 Installation covers site requirements and cabinet installation information. Defines the installation site requirements necessary to ensure a proper operating environment for the Strata DK40. 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 DK40.
- Chapter 7 DK Universal Slot PCBs provides procedures for Strata DK40/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 DK40 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 DK40 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 DK40.
- 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) (This chapter will be issued upon release of the product.)
- Appendix A Technical Bulletins provides a place for your updates and bulletins.
- + Glossary/Index

Conventions

This manual uses these conventions:

- **Note** Elaborates specific items or reference 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.

Extra Bold	represents telephone buttons.				
[DN]	any Directory Number button (also known as an Extension or Intercom Number).				
[PDN]	Primary Directory Number button (the Extension Number for the telephone).				
[SDN]	Secondary appearance of a [PDN]. A [PDN] which appears on another telephone is considered an [SDN].				
[PhDN]	Phantom Directory Number button (an additional Directory Number).				
Courier	shows a computer keyboard entry or screen display. "Type" indicates entry of a string of text. "Press" indicates entry of a single key.				
Example of both: Type prog then press Enter .					
 shows a multiple PC keyboard or phone button entry. Entries with spaces between them show a simultaneous entry. 					
Example: Delete+Enter.					
Entries with spaces between them show a sequential entry.					
	Example: # + 5 .				
~	means "through".				
>	denotes the beginning of step-by-step instructions.				

> denotes the step in a one-step procedure.

Why Are Some Cross References and Text Grey in the Paper Version?

Grey cross references and text in the paper version of this manual indicate the blue hypertext links in the electronic version (DK Library CD-ROM or FYI Internet download). They are included in the paper version to help speed up locating these links when using in conjunction with the electronic version.

Related Documentation

The following is a list of Strata DK reference documents:

- Strata DK Programming Manual provides all instructions necessary to program the system and system record sheets, including ACD. It also contains the user guides in a reduced-size format.
- **Digital Telephone User Guide** provides necessary procedures to operate Toshibaproprietary digital and digital Liquid Crystal Display (LCD) telephones. It also includes operating instructions for add-on modules and DSS consoles.
- **Digital Telephone Quick Reference Guide** provides a quick reference for frequentlyused digital telephone features.
- Electronic Telephone User Guide provides necessary procedures to operate Toshibaproprietary electronic and electronic Liquid Crystal Display (LCD) telephones. It also includes operating instructions for add-on modules and HDSS consoles.
- Electronic Telephone Quick Reference Guide provides a quick reference for frequentlyused electronic telephone features.
- **Standard Telephone User Guide** gives procedures to operate rotary dial and push-button standard telephones.
- **Cordless Telephone User Guide** shows how to use the DKT2004-CT cordless digital telephone as a single unit or in conjunction with a digital telephone.
- **PC Attendant Console User Guide** provides necessary procedures to operate the Toshiba-proprietary PC Attendant Console.
- **PC Attendant Console Quick Reference Guide** provides a quick reference for frequently-used PC Attendant Console features.
- PC/Data Interface User Guide explains all the procedures necessary to operate standalone data interface units while in the data mode of the Integrated Personal Computer Interface. Also provides instructions on connecting to Telephone Application Programming Interface (TAPI).
- PC Digital Telephone User Guide provides installation and operation information for Toshiba's Personal Computer Digital Key Telephone (PC-DKT) system working with Strata DK systems. The PC Digital Telephone works with Microsoft[®] Windows[®] software.
- System Administrator's 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.
- **Feature Description Manual** describes each feature associated with the Strata DK systems. Also describes compatible Toshiba-proprietary telephones and peripherals.
- **DKQuote Guide** shows how to use this interactive software with an IBM-compatible PC, to assist you with configuration and pricing worksheets.
- + **DKBackup/Admin Guide** explains how to use the DKBackup storage and retrieval administration software, which enables you to backup and restore Strata DK customer programmed data and save the data on an IBM-compatible PC. This guide also describes how to use DKAdmin, an interactive software application that lets you easily and quickly custom program and update all Strata DK systems with a user-friendly PC display.

- Keyprint 2000 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 60button digital DSS consoles.
- Strata DK Library CD-ROM enables you to view, print, navigate and search publications for Strata DK14, DK40 and DK424 Digital Business Telephone Systems.
- 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.

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.

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 IBMcompatible 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® 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.

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

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 (see Table 4-1 below).
- 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 Capacity

Processor in DK424 Base Cabinet ¹	DK424 Expansion Cabinets Allowed	Universal Slots allowed in DK424 Base Cabinet	Universal Slots allowed per DK424 Expansion Cabinet	Universal Slots per 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, 4-3):

Processor in DK280 Base Cabinet	Expansion Cabinets Allowed	Universal Slots allowed in Base Cabinet	Universal Slots allowed per Expansion Cabinet	Universal Slots per 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 4-2 DK280 Base with DK280 and/or DK424 Expansion Cabinets

Table 4-3 Dł	K424 Base with DK280 and/or DK424 Expansion Cabinets
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Processor in DK424 Base Cabinet	Expansion Cabinets Allowed	Universal Slots allowed in Base Cabinet	Universal Slots allowed per Expansion Cabinet	Universal Slots per 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	61	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.

	Cabinet	Total Universal	PDKU2 Data and Speaker	RDTU/Vacant Slots				
No.	Туре	Slots	OCA Slots		10/vacant S	015		
1	DK424 (base)	6	11, 12, 13, 14, 15, 16	13 /14 ¹	15 /16 ¹			
2	DK280	6	21, 22, 23, 24, 25, 26,	21 /22 ¹	23 /24 ¹	25 /26 ¹		
2	DK424	8	21, 22, 23, 24	21 /22 ¹	23 /24 ¹	25 /27 ² /26 ³		
3	DK280	6 31, 32		31 /32 ¹	33 /35 ² /34 ³			
3	DK424	8 31, 32, 37, 38		31 /32 ¹	33 /35 ² /34 ³	37 /38 ¹		
4	DK280	6	41, 42	41 /42 ¹	43 /45 ² /44 ³			
4	DK424	8	41, 42, 47, 48	41 /42 ¹	43 /45 ² /44 ³	47 /48 ¹		
5	DK280	6	51, 52	51 /52 ¹	53 /55 ² /54 ³			
5	DK424	8	51, 52, 57, 58	51 /52 ¹	53 /55 ² /54 ³	57 /58 ¹		
6	DK280	6	61, 62	61 /62 ¹	63 /65 ² /64 ³			
6	DK424	8	61, 62, 67, 68	61 /62 ¹	63 /65 ² /64 ³	67 /68 ¹		
7	DK280	6	Cannot be seventh cabinet					
7	DK424	8	No Data & Spkr OCA	71 /77 ² /72 ³	73 /75 ² /74 ³			

Table 4-4 DK424 Base Cabinet with RCTU3/F with MBJU Removed

¹ Slot must be vacant for RDTU channels 17-24 (2-slot RDTU positions).

² Slot must be vacant for RDTU channels 9-16 (3-slot RDTU positions).

³ Slot must be vacant for RDTU channels 17-24 (3-slot RDTU positions).

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

 $^1\,$ Slot must be vacant for RDTU channels 17-24 (2-slot RDTU positions).

 $^2\,$ Slot must be vacant for RDTU channels 9-16 (3-slot RDTU positions).

³ Slot must be vacant for RDTU channels 17-24 (3-slot RDTU positions).

Notes

Applies to Tables 4-4 and 4-5:

- RCTUA does not support RDTU.
- RCTUB and RCTUBA/BB supports Cabinet 1 and 2 only.

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 5-54.

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

Table 4-6 System Feature Capacities

				DK	424	
Features	DK14	DK40	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
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.

			DK424					
Lines and PCB Slots	DK14	DK40	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		

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

1. There are four universal slots in the DK40 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

				DI	<424	
Stations	DK14	DK40	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	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	16	40	64
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
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 eight 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 DK40, 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.

The following table assumes one cabinet slot is used for an Optional Interface PCB.

2 Cabinets 1 Cabinet 3 Cabinets 4 Cabinets 5 Cabinets 6 Cabinets 7 Cabinets **RCTUB** or RCTUC/D RCTUA RCTUC/D RCTUC/D RCTUC/D **RCTUE/F RCTUBA/BB** CO СО СО со со со со Stations Stations Stations Stations Stations Stations Stations Lines Lines Lines Lines Lines Lines Lines

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

Tables 4-10~4-12 assume one cabinet slot is used for an Optional Interface PCB.

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

1 Cal RC1	binet FUA		oinets BA/BB	3 Cat RCT	oinets UC/D		oinets UC/D		oinets UC/D		oinets UC/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 Capaciti	Table 4-11	CO Ground Start with Caller ID, DID and/or	r Tie Analog Lines Maximum Combined Capacities
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1 Cal RCT	binet FUA		oinets BA/BB		oinets UC/D		oinets UC/D		oinets UC/D		oinets UC/D		oinets UE/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

	oinets BA/BB		oinets UC/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*	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
* The m		number o	f PRI line	s for 2 ca	binets is 4	47, 3~6 c	abinets is	141 and	7 cabinets	s is 188.	

• 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.

Tables 4-13~4-16 show system maximum capacity examples with ISDN BRI (S/T and/or U) circuits.

Table 4-13 RCTOA Maximum Capacity Examples with ISDN BRI (S/T and/or U-type) 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			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 BRI Line BRI Line Circuits ³ Circuits ⁴ 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	48 6 12		20
8	16	56	56 4 8		24
8	16	56	56 2 4		28
6	12	56	6	12	24
6	12	56	56 4 8		28
6	12	64	64 2 4		32
4	8	64	64 4 8		32
4	8	64	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 two 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.

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	8 ²	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 4-15 RCTUC/D Maximum Capacity Examples with ISDN BRI (S/T and/or U-type) Circuits

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	192	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		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		2 ISDN BRI, U point circuits (2B+D each). Host for the RBUS. (Future release)	 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. (Future release)	 Network and/or station side 1 RBUS subassembly per RBUU. 	RJ45, ISDN TIA-568A	
RDTU2		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		E911 CAMA trunk main PCB. Host for the RCMS.	E911 CAMA lines	None	
attaches to RMCU	RCMS	2 CAMA circuits	Up to 2 RCMSs per RMCU for 4 CAMA lines max.	RJ11C	
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	
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		

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	KJ14C Modular
RDDU		4 DID circuits	4 DID circuits DID Lines	
RGLU2		4 line circuits	Loop or ground start lines	RJ14C
PIOU, PIOUS, PEPU, RSSU		A PIOU or PIOUS can use an IMDU	 ACD/SMIS (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
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 	25-pair amphenol (All PCB amphenol connectors are female)
attaches to RSTU2 and RDSU	R48S	48 volt 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
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		4 PC attendant PC console circuits	PC attendant consoleConventional attendant console	25-pair amphenol
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

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

PCB	Subassembly	Circuits	Interface Options	Connector
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
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) System Open Architecture 	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 System Open Architecture SMDR Local or Remote Maintenance for DKAdmin or DKBackup PC. 	One 3-pair modular per RSIS (RS-232), RMDS (Modem/RS-232)

Table 4-17	PCB Circuits, Interface C	ptions and Connectors	(Continued)
			(Continucu)

Feature Key Upgrades (RKYS1, 2, 3, and 4)

The system can be upgraded for built-in AA, Automatic Call Distribution (ACD), Software Management Information System (SMIS) for ACD, and for System Open Architecture Interface (OAI) port with the following 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	RKYS4	Common Control Unit
Built-in Auto Attendant	Х	Х	Х	Х	Applies to all RCTUs
ACD		Х	Х	Х	RCTUBA/BB, RCTUC/D or RCTUE/F
ACD with a SMIS application			Х	Х	RCTUBA/BB, RCTUC/D or RCTUE/F
System OAI				Х	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	RSSU¹	PIOU	PIOUS	PEPU	RSIU/RSIS¹
Zone page interface (unamplified, 4 zones)		×			
Unamplified page output (single zone, 600 ohms, duplex)		×	X	Х	
Amplified page output (single zone, 3 watts, 8 ohms)		×		Х	
Night transfer or Music-on-hold control relay		×	Х	Х	
Door lock or external amplifier control relay		×	X	X	
Alarm Sensor		×	X		
Remote maintenance modem subassembly (IMDU or RMDS) (disables TTY output when they are piggy-backed onto the PIOU/ PIOUS or RSIU/RSIS cards) ³		X (IMDU)	X (IMDU)		X (RMDS)
Remote Maintenance using customer-provided external modem (requires TTY output port) ³	X	×	×		×
SMDR output (RS-232/6-wire modular connector)		X ²	X ²		×
SMIS for ACD (requires TTY output port) ^{3, 4}	Х	×	X		×
Voice Mail SMDI (requires TTY output port) ³	Х	X	Х		X
DKAdmin PC (requires TTY output port) ³	Х	X	Х		X
System OAI (requires TTY output port) ⁵					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 SMDR output will function simultaneously on the same PIOU or PIOUS with one of the following: DKAdmin, remote modem, SMIS for ACD, or SMDI features.

³ Maintenance modem, ACD/SMIS, 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.

⁴ SMIS for ACD requires that the system processor (RCTU PCB) must be equipped with an RKYS3 or RKYS4 feature key.

⁵ The system processor (RCTU PCB) must be equipped with RKYS4 feature key to support the System Open Architecture Interface (OAI) Port (available with Release 3.2 and higher).

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 or the number of options per RCTU processor.

• **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 (see Table 4-17).

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. (See Table 4-20 for configuration considerations.)
- 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.

Option Unit	Interface/ PCB	DK424 Capacity	Function
DDSS	PDKU2 (Circuit 8)		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.
		8-RCTUE/F	It has 60-buttons which are flexibly assigned as CO line, speed dial, and DSS (no [PDN] or [PhDN]).
			Electronic DSS console (HDSS) provides a 60-button console that functions with digital or electronic telephones.
HDSS	PEKU (Circuits 7	3-RCTUA 4-RCTUBA/BB 8-RCTUC/D 8-RCTUE/F	Buttons are flexibly assigned as CO line, speed dial, and DSS (no [PDN] or [PhDN]).
	and 8)		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.
	PDKU or RDSU (Circuit 5)	4 per system: RCTUBA/BB and RCTUC/D, RCTUE/F 3 per system: RCTUA 4 per system:	Each Digital Door Phone/Lock control (DDCB) interfaces with up to three door phones (MDFBs) or two MDFBs and one door lock.
DDCB			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.
			Each Electronic Door Phone/Lock control (HDCB) provides interface for up to three door phones (MDFBs) or two MDFBs and one door lock.
HDCB	PEKU or PESU (Circuit 5)	RCTUBA/BB and RCTUC/D, RCTUE/F	DDCBs/HDCBs can only be connected to Ports 004, 012, 020, and 028, normally in slots 11, 12, 13, and 14, respectively.
	(Chrouk C)	RCTUA	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 and RCTUC/D, RCTUE/F	Door phone (MDFB) with two-way talk path to system telephones. Includes microphone for talkback amplifier with HESB.
/	11000	9 per system: RCTUA	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, see Table 4-21 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 4-21), but may require a plywood backboard (see Chapter 3 – Cabinet Installation).

Table 4-22 Cabinet Power, Reserve	Power, and Floor Mount Hardware Assemblies
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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).
PBIC-SIVI		A licensed electrician must install this item to retain UL listing and/or local electrical code compliance.
		Distributes reserve power when three or more cabinets require reserve power (floor or wall mount).
RBDB2	Battery Distribution Box	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.

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)		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.)
or	Conduit Connection Box	RCCB2 is required instead of RCCB1 for seven cabinet floor mount installations.
RCCB2 (7 cabinets)		A licensed electrician must install this item to retain UL listing and/or local electrical code compliance.
	Three-outlet AC Power Strip	One RPSB1 required when installing three or four cabinets (wall or floor mount).
RPSB1		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).

Table 4-22	Cabinet Power, Reserve Power, and Floor Mount Hardware Assemblies	(Continued)
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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-Н		
2010-SD		
2020-S		
2020-SD		
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 Tables 4-4, 4-5.)
- One door phone control box (DDCB) supports three door phones (MDFBs). (See Table 4-20.)

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 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) =

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 4-12).
- 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 4-19 (example) for slot limitations.
- 2. Total standard ports divided by 8 (round up) =

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–DK40/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 RSTU2 PCB slots required

Total PDKU2 PCB slots required

Total RDSU PCB slots required

Total RSTS PCB slots required

Note 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 ele	ectronic ports divided by 8 (round up) =	Total PEKU PCB slots required	
	Note	PEKU provides eight electronic telephone ports (circuit 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 PEKU.	finalizing this number.)	
5.	ports ne	or less electronic ports or two or less standard eded? ESU can be used.	Total PESU PCB slots required	
	Note	PESU provides two standard telephone ports (circuits) a four electronic telephone circuits (ports). Circuit 5 (whe associated with Ports 004, 012, 020, and 028) can only interface with an HDCB (see Table 4-20).	n	
6.	Add tota	als from Steps 1~5 =	Total Station PCB slots required	
СС) Line	PCBs/Slots Required		
1.	Determi	ne analog loop start line PCB slot requirements.		
		pp start lines (with/ without Caller ID) divided und up) =		
	Total	RCOU/RCOS PCBs (slots) required		
		op start lines (with/without Caller ID) divided und up) =		
	Total	RGLU2/RCOU/PCOU PCBs (slots) required	(PCOU existing)	
		Total analo	g loop start line PCB slots required	
	Notes			
	• RGL	J2 can provide loop or ground start lines.		
	config	U provides four loop start CO lines in its basic guration. An RCOS can be attached to the RCOU to adc nore loop start CO lines for a total of eight per slot.		
	• PCO	U2 provides four loop start CO lines.		
		PCOU1 and the PCOU2 are identical in fit, form, and ion for the U.S. market.		
2.	Determi	ne analog ground start line PCB slot requirements.		
		bund start lines (with/without Caller ID) Total by 4 (round up) =	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)
		Tot	al RMCU/RCMS CAMA PCB slots required
	Note	The RMCU supports two subassemblies (RCM provide a total of up to four ports.	S) that
4.	Determ requirer	ine Caller ID (FSK) receiver/decoder PCB slot ments.	
		op and ground start lines (with Caller ID) by 8 (round up) =	Total RCIU2/RCIS PCB slots required
	Note	RCIU2 provides four caller ID receiver/decoder RCIU2 with RCIS subassembly provides eight receiver/decoder circuits. Always use RCIU2 w for up to eight circuits as opposed to using two PCBs. These circuits do not use up station port software assignments.	caller ID ith RCIS RCIU
5.	Determ	ine analog tie line PCB slot requirements.	
	Total ar divided	alog tie lines (with or without ANI/DNIS) by 4 =	Total REMU/PEMU PCB slots required
	Notes		
		IU provides four E&M tie trunks (Type I or II signation mediate Start, 2- or 4-wire transmission).	ling, Wink
		PEMU1 can also be used. The PEMU only provid aling, 2- or 4-wire transmission and Immediate St	
	Rele line a	Table 4-8 for REMU/PEMU maximum quantities. ase 4, each REMU or PEMU reduced system sta and capacity by four ports and four lines. With Rel do not use station ports.	ition port
6.	Determ	ine analog DID line PCB (slot) requirements.	
	Total ar divided	nalog DID lines (with or without ANI/DNIS) by 4 =	Total RDDU PCB slots required
	Notes		
	Rele capa	U provides four Direct Inward Dialing lines. (Prio ase 4, each RDDU reduces system station port a city by four ports and four lines.) With Release 4 of use station ports.	and line
	• See	Table 4-8 for RDDU (DID analog lines) maximum	quantities.
7.	Determ lines).	ine RDTU T1 PCB (slot) requirements (loop/grou	nd/tie/DID

		Total loop start lines		(channels)	
	Total ground start lines			(channels)	
	Total tie lines (with/without ANI/DNIS)			(channels)	
Т	otal DID	lines (with/without ANI/DNIS)		(channels)	
				Total RDTU lines required	
	Note	Contact the T1 provider (Tel determine exact T1 channel		npany) to	
8.	Determ	ine RDTU PCB (slot) requiren	nents.		
	Tota	Il 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				
	next	n installing 16 or 24 channel F slot or two slots may not be u es 4-4, 4-5 and Worksheet 2.			
	on pi groui RDT	U provides either 8, 16, or 24 rogramming. Each channel ca nd start CO, loop start CO, or U tie line or DID line reduces capacity by one port.)	n be set for either tie line operation.	n DÌD, . (Each	
	oper two v	nany as six RDTU PCBs can b ating with the RCTUC/D comr with RCTUB operated systems ort RDTU.	non control unit, a	as many as	
	capa	to Release 4, each tie or DID city by one port. With Release station ports.			
9.	Add tota	als 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 personal computer

Total needed for SMDI

Total needed for SMDR (existing PIOU)

Total needed for OA (future release)

Total needed for miscellaneous options (See Table 4-21)

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 4-23)

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

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

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

Cabinets Required

Total system slots divided by 6 or 8 =

Total Cabinets required

Important! To determine the type of RCTU PCB required, use Table 4-8. 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 4-4 and 4-5 for OCA/RPCI and T1/DS-1 configuration requirements.

Cabinet	Туре (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, 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.

DK424 Co	nfigu	ration
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Cabinet 1 (Type: ¹)	R11	RCTU	S11	S12	S13	S14	S15	S16
РСВ Туре									
Port Nos.									
Line Nos.									
Option/Note									
Cabinet 2 (Type: ¹)	S21	S22	S23	S24	S25	S26	S27 ²	S28 ²
РСВ Туре									
Port Nos.									
Line Nos.									
Option/Note									
Cabinet 3 (Type: ¹)	S31	S32	S33	S34	S35	S36	S37 ²	S38 ²
РСВ Туре									
Port Nos.									
Line Nos.									
Option/Note									
Cabinet 4 (Type: ¹)	S41	S42	S43	S44	S45	S46	S47 ²	S48 ²
РСВ Туре									
Port Nos.									
Line Nos.									
Option/Note									
Cabinet 5 (Type: ¹)	S51	S52	S53	S54	S55	S56	S57 ²	S58 ²
РСВ Туре									
Port Nos.									
Line Nos.									
Option/Note									
Cabinet 6 (Type: ¹)	S61	S62	S63	S64	S65	S66	S67 ²	S68 ²
РСВ Туре									
Port Nos.									
Line Nos.									
Option/Note									
Cabinet 7 (Type: ¹)	S71	S72	S73	S74	S75	S76	S77 ²	S78 ²
РСВ Туре									
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

Number Required	Comments
	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.
	If built-in AA ACD, ACD/MIS, or System OA port is required, one RKYS option key is required see Table 4-18.
	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.
	One RMDS PCB may be installed on the RSIU PCB to provide built-in remote maintenance modem for the Strata DK424 system.
	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, Local Maintenance (TTY) Port for DKAdmin/Backup Personal Computer and/or, System Open Architecture (OA).
	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.
	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 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, System OA, 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.
		Battery distribution box required when connecting reserve power batteries to three or more cabinets (wall or floor mount).
RBDB2		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.
		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.)
RCCB1 or RCCB2		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.
		Floor mount fixture kit is required when floor mounting any number of cabinets.
RFIF		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.
		Three-outlet AC Power Strip-one RPSB1 required when installing three or four cabinets (wall or floor mount).
RPSB1/RPSB2		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.
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.

Option	Number Required	Comments
PC Attendant Consoles (with RATI and RATHC) DKAdmin/ Backup SMIS for ACD System OAI		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
		One EOCU must be installed on each PEKU and/or PESU that is connected to electronic telephones which are equipped to receive OCA.
EOCU		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
PDIU-DI		Digital Telephones.
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 power supply has a positive PF (+65). The sum of the telephones' PFs and PCBs connected to a signal cabinet must not exceed –65. The sum of the calculated cabinet PFs must not exceed the values provided on Page 4-37. Table 4-23 shows the PF for PCBs and the RPSU280. PF numbers for telephones and devices are shown on the following page.

РСВ Туре	PF	РСВ Туре	PF	РСВ Туре	PF
RCTUA	1.0	RCTUB	1.0	RCTUC/D, RCTUE/F	1.9
RCTUBA/BB	1.9	RRCS-4	0.3	RRCS-8	0.5
RRCS-12	1.0	PCOU1, 2	2.0	RDTU	1.0
PDKU1, 2	0.3	PEKU	0.7	PESU	0.5
RATU	0.3	RCIU2	0.2	RCIS	0.1
IMDU	0.16	RDSU (-24V)	0.3	PSTU/RSTU2 (-24V)	0.5
RCOU (4 CO)	2.0	RCOU + RCOS (8 CO)	4.0	REMU2/PEMU	7.5
RGLU2	2.5	RDDU	7.0	RDSU + R48S (-48V)	0.5
RSTU + R48S (-48V)	1.0	PEPU	6.5	PIOU	6.5
PIOUS	4.0	RSIU	0.3	RSIS	0.15
RMDS	0.16	RSSU	0.3	RPTU	1.0
RBSU	1.0	RBSS	0.3	RBUU	1.0
RBUS	0.3	RMCU	0.3	RCMS	0.3
	•		•	Power Supply	PF
				RPSU 280	65.0

Table 4-23 PCB and Power Supply Power Factors

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 4-37.

Telephone/Device		ase Cabir (1)	net	Expansion Cabinet (2)			Expa	ansion Ca (3)	binet	Expansion Cabinet (4)		
	Qty.	PF	Total	Qty.	PF	Total	Qty.	PF	Total	Qty.	PF	Total
Digital Telephone (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		x 2.0 =			x 2.0 =			x 2.0 =			x 2.0 =	
3000-series Electronic Telephone		x 2.5 =			x 2.5 =			x 2.5 =			x 2.5 =	
6000-series Electronic Telephone		x 2.0 =			x 2.0 =			x 2.0 =			x 2.0 =	
6005-series Electronic Telephone		x 2.0 =			x 2.0 =			x 2.0 =			x 2.0 =	
6500-series Electronic Telephone					•						•	
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 (w.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 =	1		x 3.0 =			x 3.0 =	1
HHEU		x 0.1 =			x 0.1 =			x 0.1 =			x 0.1 =	
Total Power Factor (PF)		•			•			•	•		•	
Note PF varies by nu for DKT telepho								of 120 te	elephon	ies. Alv	ways use	÷"1.0"

Telephone/Device	Ехра	ansion Ca (5)	binet	Ехра	nsion Ca (6)	binet	Expansion Cabinet (7)			
	Qty.	PF	Total	Qty.	PF	Total	Qty.	PF	Total	
Digital Telephone (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		x 2.0 =			x 2.0 =			x 2.0 =		
3000-series Electronic Telephone		x 2.5 =			x 2.5 =			x 2.5 =		
6000-series Electronic Telephone		x 2.0 =			x 2.0 =			x 2.0 =		
6005-series Electronic Telephone		x 2.0 =			x 2.0 =			x 2.0 =		
6500-series Electronic Telephone						•			•	
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 =	1		x 3.0 =		
HHEU		x 0.1 =			x 0.1 =	1		x 0.1 =		
Total Power Factor (PF)		I	<u> </u>		L	ı		I	<u> </u>	
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.										

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.

								Cabine	ets						
		1 2 3					4	4 5				6			
		РСВ Туре	PF	РСВ Туре	PF	РСВ Туре	PF	РСВ Туре	PF	РСВ Туре	PF	РСВ Туре	PF	РСВ Туре	PF
	1														
	2														
	3														
Slots	4														
SIS	5														
	6														
	7														
	8														
	Cabine (subto														
r Factor	Teleph PF (Page	none/Device 4-35)													
Power	Cabin	et PF (total)													
Ğ	Max. F (all ca combi	PF Allowed binets ned)	65		130		195		260		325		390		455

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

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 - DK424 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 CabinetCurrent Version:RCTUA3, RCTUBA3/BB4, RCTUC3/D4, RCTUE3/F4Older Version(s):RCTUA1, RCTUB1&2, RCTUC/D1&2, RCTUB3, 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.

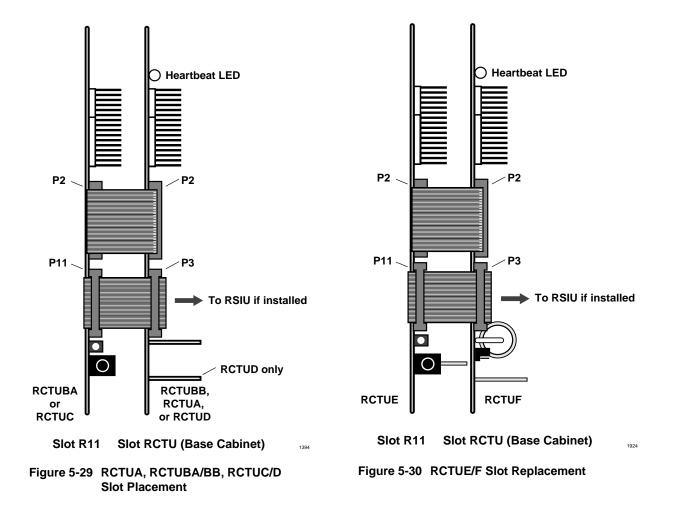
The RCTU PCBs also provide busy tone detection as a standard feature for Auto Busy Redial (ABR) and interfaces with optional RRCS DTMF receivers, feature keys (RKYS1, 2, 3 or 4) for Auto Attendant (AA), Automatic Call Distribution (ACD), Management Information System (MIS) for ACD, Toshiba proprietary RS-232 and SMDI voice mail interfaces, and System Open Architecture Interface (OAI).

ACD and attendant consoles requires the RCTUBA/BB, RCTUC/D and RCTUE/F processors. System OAI requires DK424 R3.2 or above processors and an RSIU option PCB.

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 Figures 5-29 and 5-30).
- 2. It is recommended that the power supply be OFF, whenever possible, when removing or installing the other PCBs.



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 (Processor)	Number of Cabinets	Maximum Lines	Maximum 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 5-32.

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).

Feature Key Upgrades (RKYS1~4)

The system can be upgraded for built-in AA, ACD, MIS for ACD, and for System OAI port with the following feature keys that attach to the common control unit.

Table 5-6 RKYS Features

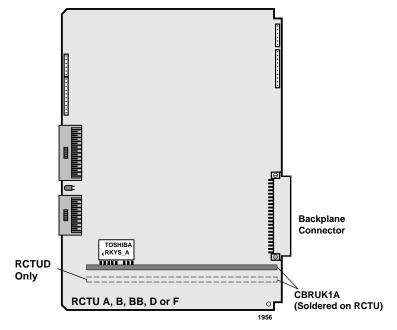
Feature Key	Common Control Unit	Feature(s) Provided
RKYS1	Applies to all RCTUs	 Built-in Auto Attendant
RKYS2	RCTUBA/BB, RCTUC/D, or RCTUE/F	Built-in Auto AttendantACD
RKYS3	RCTUBA/BB, RCTUC/D, or RCTUE/F	 Built-in Auto Attendant ACD with an MIS application
RKYS4 (Release 3.2 and higher)	RCTUBA/BB, RCTUC/D, or RCTUE/F	 Built-in Auto Attendant ACD/MIS System OAI

► To install the RKYS (1, 2, 3 or 4)

▶ Insert the RKYS into the socket on the appropriate RCTU PCB (see Figure 5-31).

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 5-31 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 5-32) 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 (Figure 5-32) 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 5-33.)

RCTUBA connectors are P3, P4, P5, P6. (See Figure 5-34.)

RCTUC connectors are P3, P4, P5, and P6; RCTUD connectors P5, P6, P7, P8. (See Figures 5-36, 5-37.)

RCTUE connectors are P6, P7, and P9; RCTUF3 are P8, P9, and P10. (See Figures 5-38, 5-39.)

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 5-32 RRCS Printed Circuit Board

RSIU Installation

See "DK424 RCIU1 or RCIU2 Installation" on Page 7-22.

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 5-32~5-39).
- 2. Ensure the RCTU has been configured for the appropriate hardware options (i.e., RRCS or RKYS). See "Internal Hardware Options" on Page 5-50.
- 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 7-44).

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.

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).

 Table 5-7
 RCTUA Controls, Indicators, and Interface Connectors

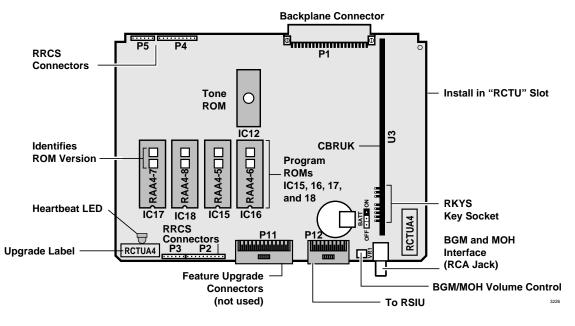


Figure 5-33 RCTUA PCB

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.

 Table 5-8
 RCTUBA Controls, Indicators, and Interface Connectors

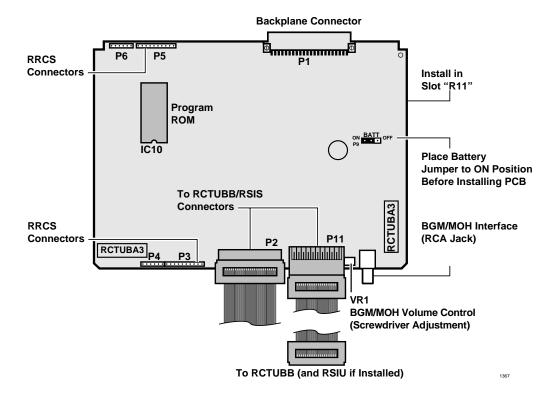


Figure 5-34 RCTUBA PCB

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).

 Table 5-9
 RCTUBB Controls, Indicators, and Interface Connectors

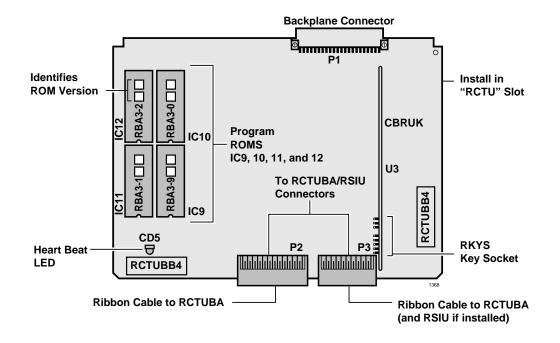


Figure 5-35 RCTUBB PCB

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.

 Table 5-10
 RCTUC3 Controls, Indicators, and Interface Connectors

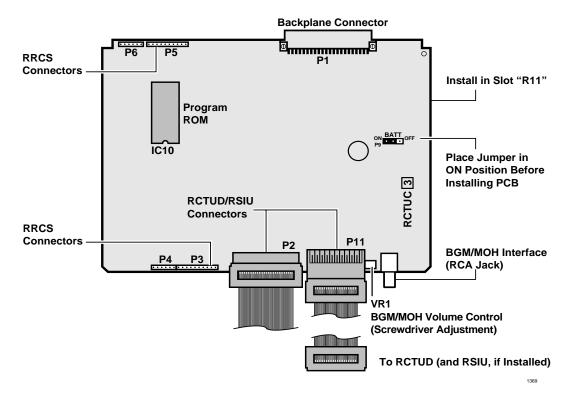


Figure 5-36 RCTUC PCB

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 for optional DTI subassembly (RRCS).	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).

Table 5-11 RCTUD3 Controls, Indicators, and Interface Connectors (for Release 3)

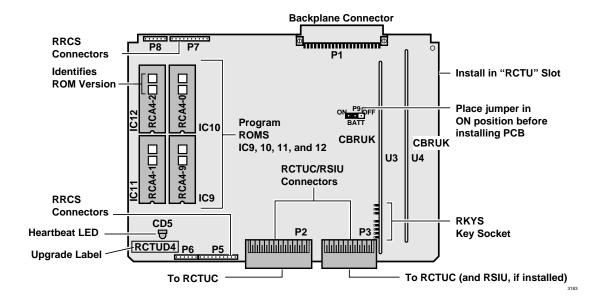
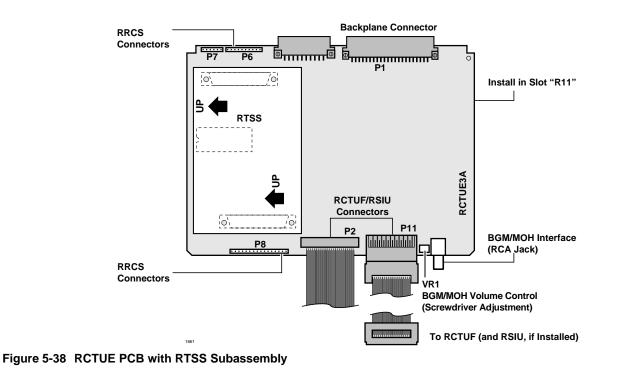


Figure 5-37 RCTUD PCB

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.

Table 5-12	RCTUE3 Controls, Indicators, and Interface Connectors
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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.

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		
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.	

Table 5-13 RCTUF4 Controls, Indicators, and Interface Connectors

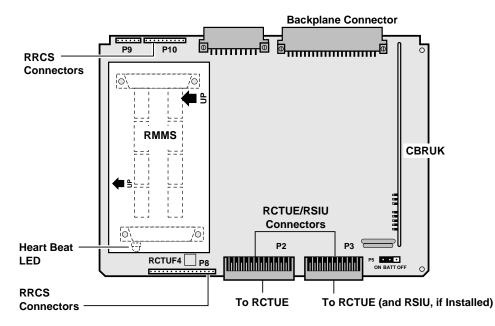
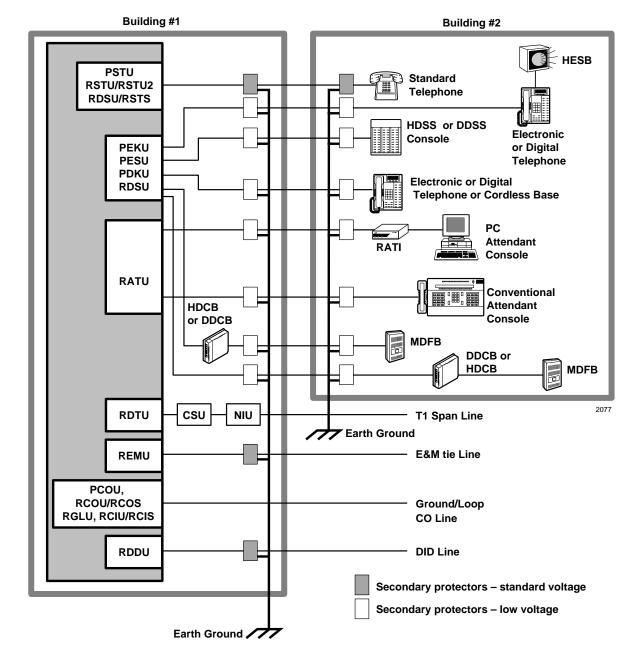


Figure 5-39 RCTUF PCB with RMMS Subassembly

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 5-40 DK424 Secondary Protector Diagram

DK40/DK424 Universal Slot PCBs

This chapter contains information on Printed Circuit Boards (PCBs) which can be used in the universal slots of either the Strata DK40 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 DK40 Expansion KSU, you must install them in the universal slots designated in Chapter 2–DK40 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 DK40 system appears in Chapter 3–DK40 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.

РСВ	Compatible with DK40	Compatible with DK424	Function	
EOCU	х	х	Speaker Off-hook Call Announce Unit (See PEKU for installation/programming instructions.)	
IMDU	x	х	Remote Maintenance Modem Unit (See PIOU, PIOUS for installation/programming instructions.)	
KCDU	Х		CO Line/Digital Telephone Interface Unit	
PCOU1,2	Х	Х	(See RCOU for installation/programming instructions.)	
PDKU2	Х	Х	Digital Telephone Interface Unit	
PEKU	Х	Х	Electronic Telephone Interface Unit	
PEMU	Х	Х	See REMU.	
PEPU	Х	Х	External Page Interface Unit	
PESU	Х	Х	Standard/Electronic Telephone Interface Unit	
PIOU, PIOUS	Х	х	Option Interface Units	
PSTU	Х	Х	(See RSTU2 for installation/programming instructions.)	
RATU		Х	Attendant Console Interface Unit	

The following is a list of PCBs that appear in this chapter:

РСВ	Compatible with DK40	Compatible with DK424	Function	
RCIS	Х	Х	Adds four additional Caller ID lines to RCIU2.	
RCIU1		Х	(See RCIU2 for installation/programming instructions.)	
RCIU2	Х	Х	Caller ID Interface	
RCMS			Adds two ports per card (maximum of two) to E911 CAMA Trunk Direct Interface card (RMCU)	
RCOS	x	х	Adds four loop start lines. (See RCOU for installation/ programming instructions.)	
RCOU	Х	Х	Four-Circuit Loop Start CO Line Interface Unit	
RDDU	Х	Х	Direct Inward Dialing Line Interface Unit	
RDSU	Х	Х	Digital/Standard Telephone Interface Unit	
RDTU		Х	T1 Interface Unit (See Chapter 6.)	
REMU	Х	Х	E&M Tie Line Unit	
RGLU2	Х	Х	Loop/Ground Start CO Line Interface Unit	
RMCU		Х	CAMA E911 Trunk Direct Interface card	
RMDS		х	Optional built-in modem. (See RSIU for installation/ programming instructions.)	
RSIS		х	Optional RS-232 ports. (See RSIU for installation/ programming instructions.)	
RSIU		Х	RS-232/Modem Interface Unit	
RSSU	Х	Х	PC Interface Unit	
RSTS	x	Х	Optional Standard Telephone Interface Subunit (See RDSU for installation/programming instructions.)	
RSTU2	Х	Х	Standard Telephone Interface Unit	

RATU Attendant Console Interface Unit

System:DK424Circuits per PCB:four attendant console circuitsInterfaces with:up to four conventional and/or PC attendant consolesOlder Version(s):none

RATU controls and indicators are illustrated in Figure 7-10 and described in Table 7-7.

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 7-7	RATU Controls, Indicators, and Connectors
-----------	--

Control/Indicator/Connector	Type of Component	Description	
Console 1 indicator CD3		Lights when a PC or conventional console is	
Console 2 indicator CD4	Red LED	not operating. The LED will turn off when the console is operational. The LED temporarily	
Console 3 indicator CD5	Red LED	flashes when the console is first installed and the DK424 RCTU processor and attendant	
Console 4 indicator CD6		console or RATI initialize.	

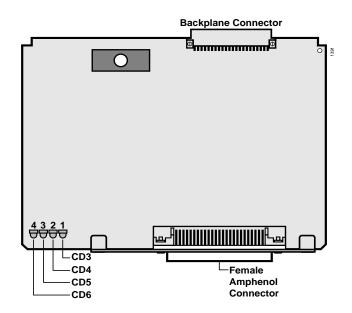


Figure 7-10 RATU PCB

RCIU1, RCIU2, RCIS Caller ID Interface

System:	RCIU1–DK424 RCIU2 –DK40 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 DK40 systems.

CAUTION! To prevent system malfunction, DO NOT install RCIU1 in the DK40 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 (DK40 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 bridgewired across its corresponding ground or loop start CO line tip/ring on the MDF (see Figure 8-27 in Chapter 8–Universal Slot PCB Wiring). Each RCIU/RCIS modular jack provides interface for two Caller ID circuits.

DK40 RCIU2 Installation

▶ Install RCIU2 in *slot 17 only* (see Figure 7-11 and Chapter 2–DK40 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.

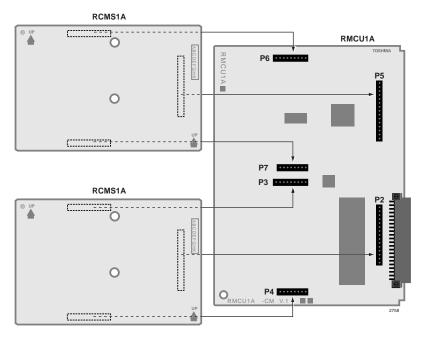


Figure 7-29 Placement of RCMS Subassemblies on the RMCU Interface Card

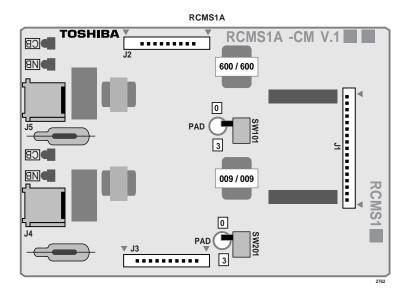


Figure 7-30 RCMS Subassembly (stand-alone)

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		Jacks to connect to RMCU.
J2	Connector Blocks	Jacks to connect to RMCU.
J3		Jacks to connect to RMCU.
RJ11	6-pin modular connector Network interface jack to CAM	

Table 7-18 RCMS Subassembly Controls, Indicators, and Connectors

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 7-31.
- 4. Test the CAMA trunk and set the 3-dB PAD switches, SW101 and SW 201, for the appropriate volume level.

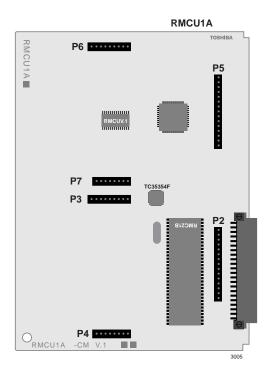


Figure 7-31 RMCU Interface Card

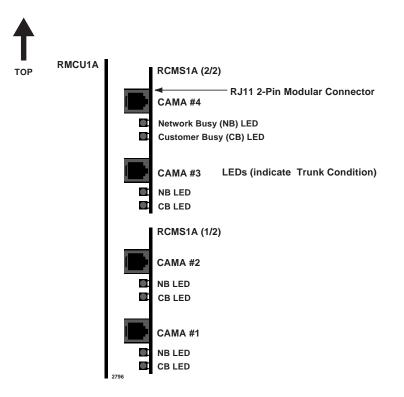


Figure 7-32 Location of the RCMS LEDs

Table 7-19	LED Indications (Normal Operation)
------------	------------------------------------

	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.	OFF	ON
	Network is connected and the RMCU MF sending dial tone.		
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.	ON	ON
	Network is connecting and the RMCU is communicating.		
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

* 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.

• Network could be open - broken wire.

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.

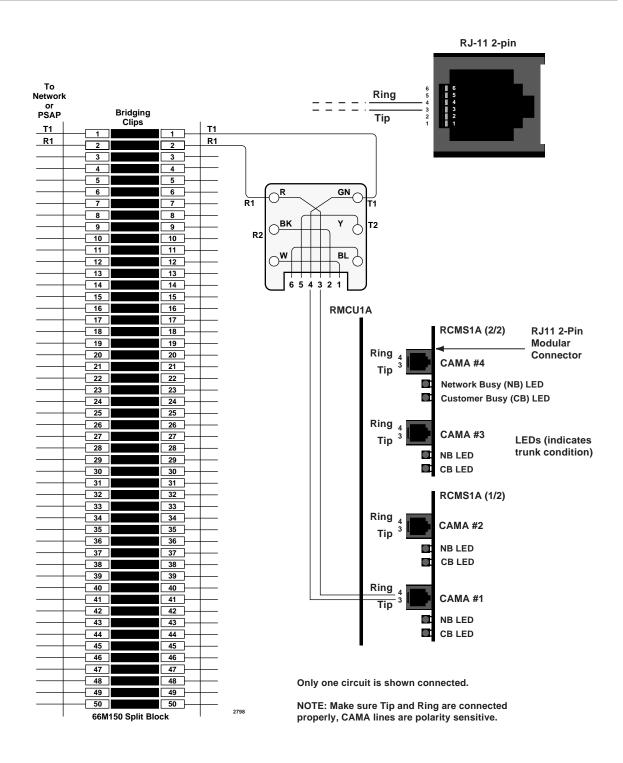
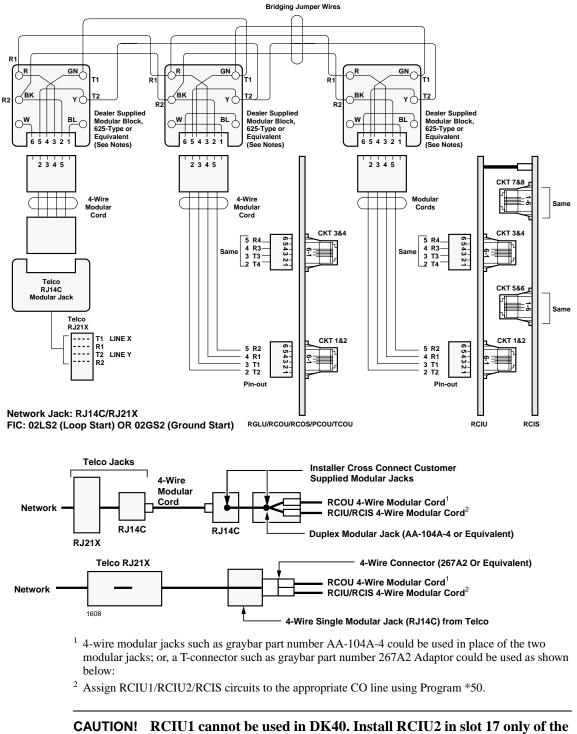


Figure 8-26 RMCU/RMCS Wiring Diagram



DK40 Expansion Unit; it must never be installed in slot 18.

Figure 8-27 RCIU1/RCIS or RCIU2/RCIS MDF Wiring Diagram

- 9. Click on Configure Keys to define the functions assigned to each of the telephone buttons.
- 10. Select a button.
- 11. Choose a function from the list.
- 12. Name the button to match the name on the telephone. Repeat for each button to be used (see table below).

DKT 10 Key Configurat	ion		×
Speed Dial Do Not Disturt CO Line 7 CO Line 6 CO Line 5	Key Type: Name:	Intercom 201-1	
CO Line 4 CO Line 3 CO Line 2			OK Cancel
201-2 201-1			<u>H</u> elp

Note Strata Link uses the label to create the customizing Trigger Rules. Unique button names allows rules that apply individually to that button. Buttons with the same name will have the same rule applied. For example, the two PDN buttons will follow any rule If {Call Ringing} on PDN then {Pop Goldmine}". All other buttons will not respond to this rule.

13. Click OK.

Toshiba recommends the following assignments:

DK Button	Use
PDN/Intercom	Primary Line
SDN	Secondary Appearance
PhDn	Primary Line
CO Line	CO Line
Speed	Speed Dial
All Others	Feature Key

System Open Architecture

The Strata DK system offers a communications port that provides control of calls on any phone within the system and call status information for all calls handled by Call Centers. With System Open Architecture, the information from this port can be used by Computer Telephony applications for monitoring calls and coordinating screen information for delivery of the call to an agent. System Open Architecture is available to DK424 systems with Release 3.2 and higher.

The Open Architecture Interface (OAI) port provides two different services depending upon the option key (RKYS1~4) installed in the Strata DK system's processor. Only the RKYS4 key supports the system OAI port; but, the ability to control telephones using the Phone Control Commands (see Page 13-13) is available with any RKYS key.

An equivalent interface is available from each digital phone on the Strata DK using the RPCI-DI option module and Extended Services capabilities of the TAPI interface. This interface provides a complete call control interface for the connected phone only.

The TAPI Extended Services offered provides a complete snapshot of the controls on the phone and a message each time an update takes place as well as key commands to control the phone from the desktop PC.

Installation/Setup

To set up the OAI Port for operation, you need a communications port card in the Strata DK. It is recommended that this card be the RSIU interface card to allow for greater than 1200 baud operation.

In order to receive Caller ID/ANI and Called ID information, the RKYS4 key must be installed on the RCTU card. Any RKYS key (1~4) can be used for controlling outbound calls.

System OAI Programming

Only two Strata DK programs are involved to make the OAI link operational.

- In Program 76, define one of the RSIU ports for OAI operation (Kind = 5) and the speed of the link.
- In Program 77-4, set LEDs 01 and 02 to send Caller ID/ANI information and Called ID (DNIS) information over the OAI link.

Operation

This interface can collect information about received calls as long as they are directed to an ACD group. One way to accomplish this is to use an Auto Attendant type of operation where each port on the Auto Attendant is logged in as an ACD Agent. These calls send a message (CIT message) to the application connected to the OAI port showing the trunk number, Caller ID (DNIS) number received, and the ACD group for the Auto Attendant. A second message follows (JT message) with the trunk number, Caller ID/ANI number, and Caller ID Name, if provided.

Outbound call control can be operated in one of two modes, DKT priority or PC priority. The DKT priority mode enables calls to be made while the phone is working at a given location. The PC can still perform many operations as if pushing the buttons on the phone directly, all controls such as hookswitch, ring volumes, etc., are controlled by the phone itself.

The PC priority mode enables the PC to take control of the phone, including hookswitch and muting the speaker so that calls can be made and controlled by the PC without disturbing the person at the desk.

In either mode, the software application needs to know the functions of the buttons on the phone being controlled since the interface is simulating the pushing of buttons as the dialing procedure.

Since most Strata DK features have dial codes, as well as flexible buttons for feature access, it is assumed that most applications would dial the codes rather than map the buttons for this purpose. Some functions do not have a dial code and thus these keys need to be mapped to use that feature, e.g., Do Not Disturb.

OAI Port Messages

The following paragraphs provide the formatting for different types of system OAI messages that can be sent from the RS-232 port of the DK424. In these messages, the first alphacharacter identifies the type of message. Following that, there are types and subtypes that further define the information sent from the RS-232 port.

Format of Messages from the OAI Port

The Strata DK passes messages over the selected COM Port using ASCII characters.

STX	Seq #	Data		ETX	BCC
02H code	(02H~7fH)	x = Message Type (see below)	ASCII characters 20H ~ 7fH . The number of characters depends on the message type. All fields are right-justified with blank fill characters (spaces). Six successive blanks = a NULL character.	03н code	XOR of sequence through ETX

The external system needs to respond with either an ACK (06H) or NAK (15H) code.

Note If the Strata DK does not receive the ACK or NAK codes, it automatically sends the data message two more times.

Message Type	Message	Message Size (bytes)
A	Agent Status Record	14
С	Call Information Record	23
D	Database Record	22
G	Gate Status Record	9
J	Caller ID/ANI Record	34
I	Initialization Indication Record	13
М	Administration Database Record	21
R	Request Database Record	8
Т	Time Record	13
0~3	Call Control Message	6

Call Information Records

Call Sequence Record (Type C)

These messages contain statistics concerning calls. Call Sequence Records begin with a "C," followed by two letters that define subtypes. In the example below, "CAT" represents a Call Sequence Record, where the owner (originator) is a Trunk Group.

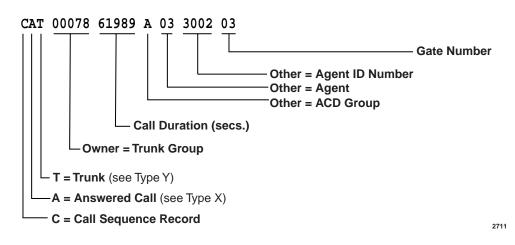


Figure 13-1 Call Sequence Record Example

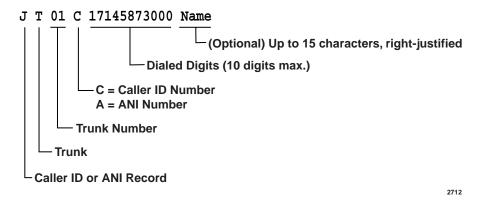
Туре	Owner	Time	Gate				
схү c=Call	Agent ID, Trunk or *DNIS, or Station.	Number of seconds	Agent ID, Trunk or	Generally, the Gate field defines the ACD group for the call offered:			
Sequence		since the start of the	*DNIS, or Station.	Gate Code	Field Value	Subtype	
Record (See X and Y below.)	 normally precedes a DNIS number. 		* normally	W	-	Work Units.	
Delow.)	T * Ringing Notification.		precedes a DNIS number.	A	99	Call was diverted to a non-ACD station.	
				Ι	99	Call overflowed to a non-ACD group.	

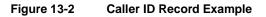
Туре Х	Message
п	Inbound call origination sequence
0	Outbound call origination sequence
Т	Terminate a call
G	Offer call to an ACD group
А	Answer the call
х	Transfer a call
D	Drop out of a consultation call
W	Work unit

Туре Ү	Message	
Т	Trunk	
А	Agent	
S	Station	
	None	

Caller ID and Automatic Number Identification (ANI) Information

Caller ID and ANI information begins with a "J" in the type field. An example is:





ACD OAI Messages

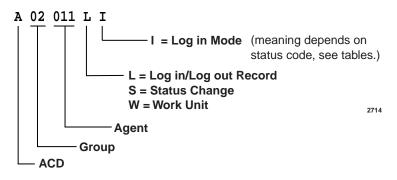
The following examples show the status for ACD agents and groups. For more information on ACD, see Chapter 11 - DK424 ACD Installation.

ACD Port Messages

These messages are 14 bytes long and have three subtypes. All ACD Agent status messages begin with an "A." The group and agent ID follows, then a one-character status code (L, S or W) follows, then the status mode and other information may display.

Agent Login/Logout Record

An example of a typical agent Log in/Log out string is:





Agent Call Record

An example of an Agent Login string: A01222LI

Туре	XX	XXX	L	I, O	
$\mathbf{A} = ACD$	Group	Agent	$\mathbf{L} = Login/Logout$	I = Login	Display
	Ager	nt ID		O = Logout	

Agent Status Change

An example of an Agent Status string is: A01222SA

Туре	XX	XXX	S	A, U, W, G, P, R	
$\mathbf{A} = ACD$	Group	Agent	S = Status	A = Available	Display
	Age	nt ID	Change	U = Unavailable	
	C C			W = After Call Work	
				G = Gate Call	
				$\mathbf{P} = PBX Call$	
				R = Agent Phone Ringing	

Display: Application dependent text (four characters) used in displays.

Agent Work Unit

Туре	XX	XXX	W		
$\mathbf{A} = ACD$	Group	Agent	W = Work	Blank Spaces	Work Unit
	Age	ent ID	Unit		Number

ACD Group (Gate) Status Record

This record is sent each time a call enters or is removed from an ACD queue.

Туре	Gate No.	Call Wait Count	Call Wait Time
G = Group	XXXX = Gate No.	XX	XXXX

Time Record

This message is typically sent every 30 seconds. It generally indicates the data link is operational. If time messages stop for a period of time, it should be assumed that the data link is down. This time record example translates to Jan. 3, 1998, 10:30: **T010398103000**

Туре	ΥY	ММ	DD	HH	MM	SS
T = Time Record	Year	Month	Day	Hr	Min.	Sec.
	Date				Time	

Database Records

Request Record

This message is sent to the Strata DK to request the return of the specified information.

Туре	Subtype	Subtype Group Ager	
R = Request	C = Complete Download Requested	Agent ID	
Record	A = One Agent Download		

Туре	Subtype C	
R = Request	A = Agent Record	Don't Care
Record	F = Finished Sending Records	

Record Update

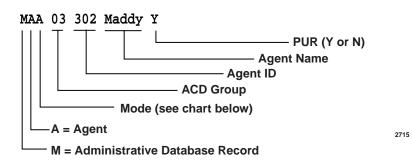
The database record is sent in response to a request from the connected system. If a complete data file is requested, all data assignments are sent followed by an Update Complete message.

Туре	Subtype	Mode	Group by	Group	Agent	Agent Name	Stat
D = Record Update		A = Add or ChangeD = Delete	Records remain- ing for group		P	gent Informatio	n

Туре	Subtype	Mode	
D = Record Update	F = Finished sending records	A = Add or Change	Don't Care
	A = Agent Record	\mathbf{D} = Delete	

ACD Administrative Database Record

These messages are used by the Strata DK or the external system to send changes to the ACD Agent and Group databases. A typical ACD Agent Administrative Database record is:





Туре	Sub	Mode	Group	Agent ID	Name	PUR	Reas
M = Administrative	A =	A = Add/Change	Agent Information			Y or	
Database Record	Agent	$\mathbf{D} = Delete$				N	
		R = Data Request					
		G = Data Accepted					
		B = Data Rejected					
		P = Allow/Deny Call Pickup					
		U = Allow/Deny Call Pickup by others					
		R = Allow Remote Agent Log in					

An example of a ACD Group Administrative Database record is: MGG

Туре	Sub	Mode	Overflow	AW	Destination	After Shift	Reas
M = Administrative	$\mathbf{G} = ACD$	A = Add/Change	Group				
Database Record	Group	$\mathbf{D} = \text{Delete}$					
		R = Data Request					
		G = Data Accepted					
		B = Data Rejected					

Code

K11

K12

K13

Phone Control Commands

This link provides a method for the application to control any electronic or digital phone connected to the Strata DK system. This is done by addressing the port and sending the key codes as if the user were pressing the keys on the phone.

Station Port No.	Key Code
000~335	See below

Code
S
М
Н
С
G
R
m
р
S
U1
U0
D1
D0

Key Codes

Dial Pad Keys

1

2

3 4

5

6 7

8 9

0

4 #

Feature Buttons	Code		Feature Buttons
01	K01		11
02	K02		12
03	K03		13
04	K04		14
05	K05		15
06	K06		16
07	K07		17
08	K08		18
09	K09		19
10	K10		20

K14 K15 K16 K17 K18 K19 K20 ٦

Commands to Switch to PC Call Control

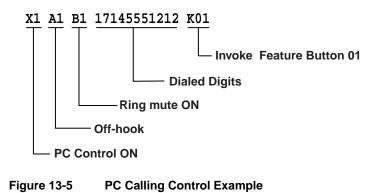
Two commands require using a Mode switch command to determine whether the phone or the PC is in control of the command. These controls are the Hookswitch control and Ring Mute control.

Sent to PBX	Code
PC Control ON	X1
PC Control OFF	X0

Off-Hook	A1
On-Hook	A0
Ring Mute ON	B1
Ring Mute OFF	B0

Response from PBX	Code
PBX Responds	x1
PBX Responds	x0

To instruct the PC to dial the number 17145551212, enter:



2713

Initialize Indication Record

This message is sent when the Strata DK is initialized. This informs the external application of this process so the external application can take the appropriate actions.

Туре	ΥY	ММ	DD	HH	ММ	SS
I =	Year	Month	Day	Hr	Min.	Sec.
Initialization Record		Date			Time	

CTI Application Bulletin Contents

The list below gives you the current application bulletins available for understanding, installation and operation of third-party software applications with your Toshiba telephone system.

As you get future updates and new bulletins, simply replace older ones with the updates and/or add the additional bulletins. Updates and additions that may affect the list below will also include an update to this Contents page.

+	AB50-0001	January 10, 1997	Using ACT! Phone Link with Strata DK
+	AB50-0002	January 10, 1997	Installing ACT! Trial Size Demo Software
+	AB50-0003	April 1, 1997	TSPI Description V2.15
+	AB50-0004	April 1, 1997	Using StrataLink for CTI Connections
+	AB50-0005	April 1, 1997	Golden Gate Pager Client/Server user StrataLink
+	AB50-0006	April 1, 1997	Using Commence V2.0 with StrataLink
+	AB50-0007	April 1, 1997	Using DayTimer Organizer V2.0 with StrataLink
+	AB50-0008	April 1, 1997	Using Goldmine 95 with StrataLink (use AB50-0013)
+	AB50-0009	April 1, 1997	Using TeleMagic Enterprise V2.2 with StrataLink
+	AB50-0010	September 15, 1997	Using ACT! 2.0 with StrataLink
+	AB50-0011	September 15, 1997	Using ACT! 3.0 with StrataLink
+	AB50-0012	September 15,1997	TSPI Description V2.26
+	AB50-0013	September 15, 1997	Update for Using Goldmine 95 with StrataLink (Replaces AB50-0008, April 1, 1997)

- Understanding Computer Telephony in a Business Phone System, April 1, 1997
- **Note** All of the above application bulletins have been sent to you in previous mailings. Place them after this page. If you do not have these bulletins, they can be found on the *Strata DK Library CD-ROM*.

This chapter covers information on the ISDN Primary Rate Interface (PRI) and Basic Rate Interfaces (BRI).

• PRI is available on DK424 Release 4.0 systems with RCTUBA3/BB4, C3/D4, and E3/F4 processors; but unavailable for any other Strata DK systems or processors.

For PRI services, the Strata DK424 uses an RPTU PCB to connect to a Public Switched Telephone Network (PSTN) PRI line using a UL listed Channel Service Unit (CSU) in most locations in the U.S. Each RPTU provides 23B + D channels. The B-channels support CO speech and data connections on the PSTN side only. The RPTU PCB is shown in Figure 14-2 on Page 14-6.

 BRI S/T is available for all DK424 Release 4.1 processors including RCTUA4, but not for any other DK systems.

For BRI S/T services, the DK424 uses an RBSU PCB. The RBSU provides two BRI S/T circuits to connect to the PSTN BRI line using an external UL listed NT1; or, on the station-side, connect to:

- * S-type ISDN telephones and Terminal Equipment (TE-1-S)
- * S-type Terminal Adapters (TA-S) with non-ISDN devices

Each TE-1-S and TA1-S device can support voice and/or RS-232 switched-circuit data as shown in Figure 14-1. The station-side BRI S/T circuits are point-to-multipoint.

A subassembly (RBSS) can be attached to the RBSU for two additional BRIs for S-type station-side connections only. The RBSU PCB and the RBSS subassembly are shown in Figures 14-16 and 14-17 on Page 14-22. The combination of RBSU and RBSS uses only one slot to provide up to four BRI S/T circuits.

- **Note** Each installed RBSU or RBSS circuit provides a 2B + D connection and uses a system capacity of two station ports and two CO lines regardless of the circuit application, even if the circuit is not actually connected.
- BRI U is available for all Release 4.2 processors for the DK424 including RCTUA4 but not on any other DK systems.

For BRI U services, the Strata DK424 uses an RBUU PCB. The RBUU provides two BRI U circuits that connect directly to PSTN BRI lines; or, on the station side, connect to:

- U-type ISDN telephones and Terminal Equipment (TE-1-U)
- U-type Terminal Adapters (TA-U) with non-ISDN devices

Each TE-1-U and TA-U device can support voice and/or RS-232 switched-circuit data depending on the device (see Figure 14-1). The station-side BRI U circuits are point-to-point.

A subassembly (RBUS) can be attached to the RBUU for two additional BRIs for PSTN and/or U-type station connections. The RBUU PCB and the RBUS subassemblies are shown in Figures 14-30 and 14-31 on Page 14-35. The combination of RBUU and RBUS uses only one slot to provide up to four U-type BRI circuits.

Note Each installed RBUU or RBUS circuit provides a 2B + D connection and uses a system capacity of two station ports and two CO lines regardless of the circuit application, even if the circuit is not actually connected.

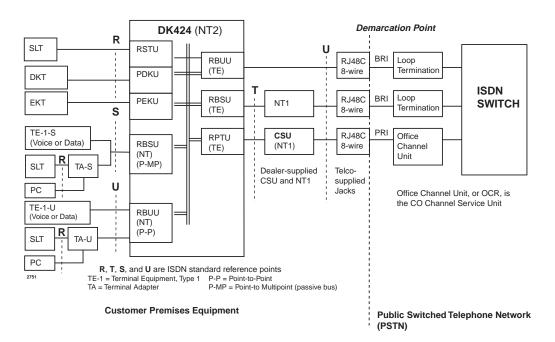


Figure 14-1 DK424 ISDN Reference Model

RPTU Interface Unit

System:DK424 Release 4.0Circuits per PCB:24 channelsInterfaces with:ISDN PRIOlder Version(s):None

The DK424 Release 4.0 system supports the RPTU according to the common control units resident in the system.

Note The RPTU cannot be installed in a system operating with the RCTUA4.

The RPTU requires installation of a customer-provided CSU in most locations of the U.S. Refer to "CSU Requirements" for CSU installation.

Testing procedures (local and remote loop back) are in "Loop-back Testing" on Page 14-10.

The RPTU's LEDs indicate a continuous status of its operation. They are shown in Figure 14-3. Table 14-5 lists the functions for each LED.

Switches, jumpers, and interface connectors are described in Table 14-4.

RPTU Overview

The RPTU is a DS-1 divided into 24 TDM channels using standard T1 electrical signal format. The RPTU's D-channel is typically the 24th channel and can control the signaling of 23 of its own B-channels and 24 B-channels of another designated RPTU. Each RPTU can also use its own D-channel for control.

The RPTU's in-service bit rate is 1.544 mbps (\pm 4.6 ppm), but during a maintenance session, the rate may vary \pm 32 ppm. The RPTU provides Binary 8-Zero Substitution (B8ZS) and ESF with Framing Pattern Sequence (FPS) and Cyclical Redundancy Check (CRC) error checking in the framing bits.

Note The Embedded Operations Channel (EOC) which carries alarm notifications, statistics, and error indications is *not* available with DK Release 4.0 software.

Extracting the Stratum-1 clock from the ISDN PRI, BRI, or T1 provider is the most common method used to synchronize the RPTU PCB and the DK time switch to the public telephone network. One RPTU, RBSU, RBUU, or RDTU T1 must extract the clock from the ISDN or T1 provider. The selected unit is designated as the "Primary" timing source in system Program *41-1. For more information, refer to "Timing and Synchronization" on Page 14-11.

A dealer-supplied CSU must be installed between the ISDN PRI network line and the RPTU PCB as shown in Figure 14-1. Some telephone companies supply the CSU and call it the Network Interface Unit (NIU).

CSU Requirements

In the U.S., the CSU must be UL listed and comply with Part 68 of the FCC rules. It must also comply with the limits for a Class A digital device, pursuant to Part 15 of FCC Rules. In Canada, the CSU must be CSA certified.

The CSU is transparent to data, clock, and framing. It acts as a repeater, not a controller, for timing. The CSU also acts as a signal regenerator and must be able to perform loop-back tests and maintenance to both the network and DK RPTU. The CSU is the same type as used for T1 circuits although it performs the function as NT1 for PRI ISDN in the ISDN reference model as shown in Figure 14-1.

Slot Assignments

Up to eight RPTU PCBs can be installed in a DK424 system providing up to 188 PRI lines (B-channels). If RPTU (PRI) and RDTU (T1) PCBs are installed in the same DK424, the maximum combined PCBs cannot exceed the numbers provided in Table 14-1. The PCBs must be placed in designated slots in each of the DK424 cabinets per Tables 14-2 and 14-3. The next highest slot adjacent to the RPTU slot must be vacant.

Program 03, code 79 designates which cabinet slots contain RPTU PCBs. The maximum number of cards and lines is listed in Table 14-1.

Table 14-1 Maximum Number of RPTU PCBs, Lines, and Stations

Processor	Max. PCBs	Max. Lines
RCTUA (1~4)	0	Not Applicable
RCTUBA3/BB4	2	47 B-Channels
RCTUC3/D4	6	141 B-Channels
RCTUE3/F4	8	188 B-Channels

Table 14-2 DK280 or DK424 Base Cabinets with BA3/BB4, or C3/D4 with MBJU; or DK280 Base with RCTUE3/F4

DK280 or DK424 Cabinet No.	RP	FU ¹ /Vacant Sl	ots ²
1 (base)	13 ¹ /14 ²	15 ¹ /16 ²	
2	21 ¹ /22 ²	23 ¹ /24 ²	25 ^{1/} 26 ²
3	31 ¹ /32 ²		
4	41 ¹ /42 ²		
5	51 ¹ /52 ²		
6	61 ¹ /62 ²		

¹ Allowed RPTU slots.

² Slots must be vacant.

Cabinet			RPTU ¹ /Vacant Slots ²	
No.	Туре		RPTU'/vacant Slots ²	
1	DK424 (base)	13 ¹ /14 ²	15 ¹ /16 ²	
2	DK280	21 ¹ /22 ²	23 ¹ /24 ²	25 ¹ /26 ²
2	DK424	21 ¹ /22 ²	23 ¹ /24 ²	
3	DK280	31 ¹ /32 ²		
3	DK424	31 ¹ /32 ²	37 ¹ /38 ²	
4	DK280	41 ¹ /42 ²		
4	DK424	41 ¹ /42 ²	47 ¹ /48 ²	
5	DK280	51 ¹ /52 ²		
5	DK424	51 ¹ /52 ²	57 ¹ /58 ²	
6	DK280	61 ¹ /62 ²		
0	DK424	61 ¹ /62 ²	67 ¹ /68 ²	
7	DK280	Does not ha	Does not have a seventh cabinet.	
	DK424	None		

Table 14-3 DK424 Base Cabinet with RCTUE3/F4 with MBJU Removed

¹ Allowed RPTU slots.

² Slots must be vacant.

RPTU Installation

Before installing a RPTU PCB into a DK424, a number of system programs should be run. This enables the RPTU to function immediately upon insertion. It is recommended that you run these programs in the order listed in the *DK Programming Manual* (refer to the ISDN section) before beginning installation.

► To install an RPTU PCB

- 1. Set the jumper wire plugs JP1 and JP2 (LB) to the OFF position.
- 2. Turn the DK424 system power OFF.
- 3. Insert the RPTU (component side facing right) into the appropriate slot (see "Slot Assignments" on Page 14-4) and apply firm, even pressure to ensure proper seating of connectors.
- 4. After installing the RPTU, gently pull the PCB outward. If the connectors are properly seated, a slight resistance is felt.

Note For cabling information and requirements, refer to "Cabling" on Page 14-8.

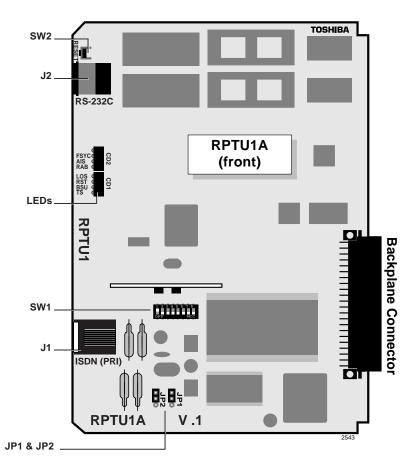


Figure 14-2 RPTU PCB

Table 14-4	RPTU Switches, Jumpers, and Connectors
------------	---

Switches/Jumpers/Connector	Description
SW1 (Line length adjustment switch)	Matches the RPTU impedance to the impedance of the line (length between the CSU and the RPTU). Refer to Table 14-6 on Page 14-8.
SW2 (Reset switch) ¹	Resets or initializes the RPTU firmware. Press this switch to correct an out-of-service condition, or just prior to connecting to the Network PRI.
JP1 & JP2 (Loop-back jumpers)	Makes loop-back tests of the cabling between the ISDN Network switch, CSU, and RPTU.
J1 8-pin Modular Connector (RJ-45)	Connects the RPTU to the CSU/network PRI ISDN line.
J2 6-pin Modular Connector (RJ-11)	Connects the RPTU to a terminal or PC to monitor D-channel data.

¹ If this switch on the Primary Clock source RPTU is pressed (Program *42-1), the clock source will automatically revert to the Secondary Clock source PCB (Program *42-2).

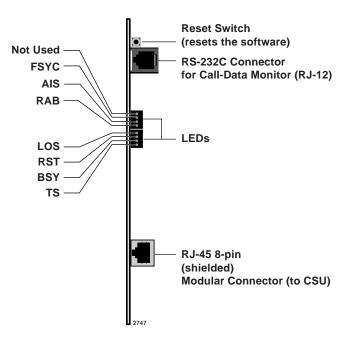


Figure 14-3	RPTU LEDs and Connectors
inguic if o	

Table 14-5 LED Functions

LED	Functions	
FSYC	Frame SynchronizationON:Frame alignment is lost.OFF:Frame alignment is working properly.	
AIS	Alarm Indication SignalON:Receiving an alarm from the CO.OFF:Circuit is working properly.	
RAB	Remote AlarmON:Receiving a remote alarm from the CO.OFF:Circuit is working properly.	
LOS	Loss of Signal ON: IC signal cannot be detected. OFF: Circuit is working properly.	
RST	Reset ON: CPU is resetting the software. OFF: Circuit is working properly.	
BSY	Busy ON: One or more B-channels are busy. OFF: All B-channels are idle.	
TS	Timing SignalON:Circuit is secondary timing source.OFF:Circuit is not used for system timing.Flashing:Circuit is primary timing source.	

Cabling

To meet Part 15 of FCC Rules, ISDN PRI equipment must be connected using CAT5, Shielded Twisted-Pair (STP) cabling between the CSU and the RPTU. CAT5 STP protects against cross talk, Radio Frequency Interference (RFI), and/or Electro Magnetic Interference (EMI). STP protects ISDN signal data while being transmitted through the cable and keeps the cable itself from emitting EMI and RFI.

Important! To avoid ground loops, connect only the RPTU end of the shielded cable to ground. The DK grounds the CAT5 cable shield between the DK and CSU at the RPTU RJ-45 jack. You do not have to connect the CSU ground drain. The CSU ground should not be connected to the cable shield.

Shield continuity must be maintained from the RPTU to the CSU, particularly if using extension connecting cables. Keep the cable as short as possible between the CSU and the PRI Demarcation jack, because there is no shield between the CSU and the Demarcation jack.

Toshiba provides a cable kit (Part No. RPRI-CBL-KIT), that contains all that you need to connect the network ISDN jack to the network side of most CSUs and the equipment side of the CSU to the RPTU PCB. Depending on the manufacturer, the CSU may use DB15 or modular jacks. If the CSU is equipped with the modular jacks, the DB15/modular adapters are not used. If this is the case, make sure the CSU modular jacks are not shielded jacks. Refer to Figure 14-4 for more information.

A detailed pinout diagram for the RJ-45 jacks (USOC RJ-48C or RJ-48X) and the modular cords/adaptors is shown in Figure 14-5.

Cable Length

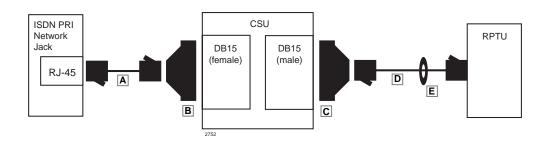
The distance between the RPTU and CSU or RPTU and other Customer Premise Equipment (CPE) may vary (0~655 ft). The RPTU must be equalized and its impedance must match the impedance of the connecting cable. Set SW1 on the RPTU for the proper cable length as shown in Table 14-6. Refer to Figure 14-2 for switch locations.

Table 14-6 SW1 Settings

SW1	Short (0 - 150 ft.)	Medium (150 - 450 ft.)	Long (450 - 655 ft.)
1	ON	OFF	OFF
2	OFF	ON	OFF
3	OFF	OFF	ON
4	OFF	ON	OFF
5	OFF	OFF	ON
6	OFF	ON	OFF
7	OFF	OFF	ON
8	Not Used	Not Used	Not Used

Cable Installation

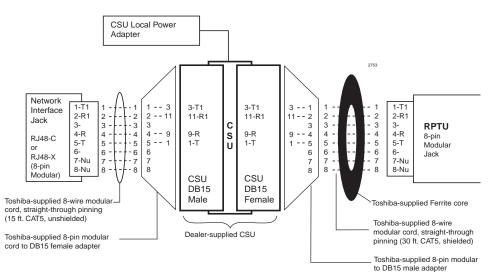
The RPTU PCB is shipped with a Toshiba RPRI cable kit for connection of the RPTU to a CSU. Install the kit as shown in Figure 14-4.



ltem	Description
A*	Fifteen feet of CAT5 unshielded cable
В	One DB15 modular adapter (CSU to network jack)
С	One DB15 modular adapter (CSU to RPTU)
D*	Thirty feet of CAT5 shielded cable
E	One Ferrite core

* Cable A and D are straight-pinned data cables, not cross-pinned telephony cables.

Figure 14-4 Cable Kit



Network Jack/RPTU Modular Jack		
Pin	Function	
1	Tip – Receives from the network (NT – TE)	
2	Ring – Receives from the network (NT – TE)	
3	Not Used	
4	Ring – Transmits to the network (TE – NT)	
5	Tip – Transmits to the network (TE – NT)	
6	Not Used	
7	Not Used	
8	Not Used	

Figure 14-5 Detailed Pinouts for ISDN PRI Cabling

Notes

- The modular pins are numbered left to right when looking into the jack cavity with the locking clip down.
- Shield continuity must be maintained between the RPTU and the CSU, particularly on extension cords. Since there is no shield continuity across the CSU and network jack, the cable should be kept as short as possible.

Ferrite Core

Install the Ferrite core provided with the RPRI cable kit as shown in Figure 14-6. This core is needed to comply with FCC requirements.

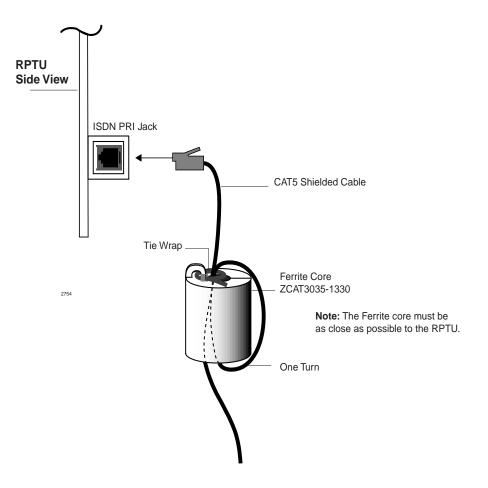


Figure 14-6 Ferrite Core Installation

RPTU Testing and Troubleshooting

Loop-back Testing

The RPTU has loop-back test jumpers that enable physical connections (cables/jacks/plugs) between the RPTU, CSU, and the network PRI line to be tested (see Figure 14-7). The tests check that the CSU receives and transmits the PRI signal properly in both directions. The test signals, generated by the Network PRI provider, pass through the CSU and loop around the RPTU. The RPTU sends the received test signal back through the CSU to the Network and the Network detector checks for a valid signal.

► To perform the loop-back test

- 1. Remove the PRI modular cord from the RPTU RJ-45 jack and remove the RPTU from its card slot.
- 2. Place the JP1 and JP2 jumpers to the LB-ON position. Install the RPTU with the DK power OFF and the PRI modular disconnected from the RPTU RJ-45 jack.

- 3. Turn the DK power ON and connect the PRI modular cord to RPTU RJ-45.
- 4. After the PRI line and RPTU are synchronized, have the CO generate the loop-back test sign (all "1s" or "0s").

CAUTION! Do not have the CO do a QRS loop-back test, because the test signal may cause the DK to drop all calls and/or stop operating.

5. If the loop-back test fails, perform tests to isolate the problem with an ISDN test set, such as the Sunbird, ISDN, or Trend DUET. In this case, the network PRI line is disconnected and the test set is connected to the CSU network input jack. For testing details, refer to the ISDN test set operating procedures.

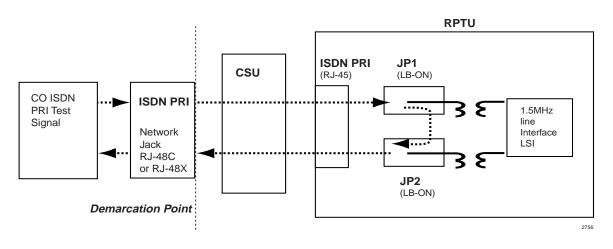


Figure 14-7 Loop-back Test

Timing and Synchronization

The Digital Network is connected by timing clocks that synchronize the network and have various degrees of precision (stratum levels). There are four stratum levels -1 is the highest and 4 is the lowest. They are associated with the following sources:

- **Stratum 1**: Public Telephone Network clock
- Stratum 2: #4 ESS Toll Switches
- Stratum 3: #5 ESS Central Offices
- Stratum 4: Digital PBXs

In the DK424, one PRI, BRI, or T1 PCB can be programmed to extract the Stratum clock signal. It uses the signal as the DK system Primary clock reference. The clock provider should be a reliable source, such as a Telco or common carrier (AT&T). All other PRI, BRI, or T1 lines connected to the DK424 will be synchronized to the same clock provider. If the PRI, BRI, or T1 are not synchronized to the same clock provider, the DK424 could experience "slip" problems.

Timing reference assignments for PRI, BRI, and T1 are made with the Program *42 series. The timing or synchronization program determines how the DK424 digital voice or data transmission path is synchronized with the far-end digital path. For proper PRI, BRI, and T1 operation, the equipment at each end of the line must be synchronized.

The RCTU time switch is synchronized as the slave to the PRI, BRI, or T1 line (Line 1 in Figure 14-8). The DK424 PRI, BRI, or T1 in any slot number can be assigned as the Primary reference (Program *42-1, DATA=1 for this PRI, BRI, or T1).

If a malfunction occurs and Primary reference synchronization is lost, the DK424 automatically switches modes and synchronizes to the Secondary reference, provided that there is another PRI, BRI, or T1 installed in the DK424. The Secondary reference PCB is assigned in Program *42-2.

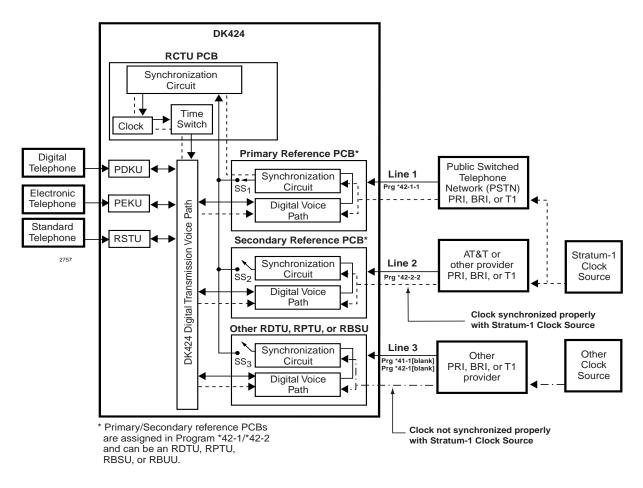


Figure 14-8 Primary and Secondary References

Figure 14-8 shows the Primary reference PCB. The clock signal from Line 1 passes through the PCB Software Switch (SS_1) and the synchronization circuit of the RCTU PCB. The RCTU clock passes the clock source through the time switch and synchronizes the DK424 digital transmission voice or data path.

The Secondary reference is activated if the Primary reference fails. The DK424 automatically *switches over* to the Secondary reference PCB by opening its synchronization circuit (SS_1) and closing the synchronization circuit (SS_2) . When this occurs, the digital voice or data path of the DK424 is synchronized to the Line 2 clock source.

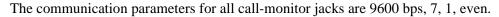
If the path is not synchronized to the Stratum -1 clock source, calls connected through that path experience "slipping" or "jitter" in the digital voice or data path (channels). Figure 14-7 shows an unsynchronized signal from Line 3. The unsynchronized signal produces a clicking or popping sound that is heard by the people connected through this path or causes data errors on data transmissions.

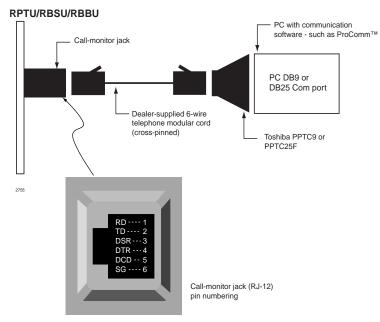
RPTU Call Monitoring (PRI)

The RPTU provides an RS-232 monitor function that enables you to monitor the ISDN PRI D-channel call progress layer two and three messages (setup, connect, and release). This data can be monitored live, saved to a file, and/or printed using a PC with communication software.

The hardware connections and communication parameters for the RPTU monitor port are shown in Figure 14-9. Once this connection is setup and established, call monitoring data continues to be sent (on the fly) as PRI calls are originated or received.

Two sample printouts from the RPTU monitor are provided. Figure 14-10 shows typical ISDN PRI start-up and synchronization sequences that occur at connection and power on. Figure 14-11 shows typical ISDN PRI outgoing call setup and release sequences.





Note: The RPTU, RBSU, and RBUU ISDN interface PCBs each have a call-monitor jack. The pin numbering and communication parameters are the same for each call-monitor jack. The call-monitor jack on each PCB provides data only for the circuits of the PCB on which it appears.

Figure 14-9 Call-monitor Jack for the RPTU, RBSU, and RBUU

/*_____*/

```
Copyright(C) 1997
 TOSHIBA Corporation
 All rights reserved
 RPTU Ver.1G
 [Reset]
/*----*/
<U1>00;00 016 Act.
                   (F1)
/*_____*/
 Copyright(C) 1997
 TOSHIBA Corporation
 All rights reserved
 RPTU Ver.1G
 [Reset]
/*____*/
<U1>00;00 016 Act. (F1)
<U1>00;09 634 LOS
                    (F3)
<U1>00;12 109 Act.
                    (F1)
/*----*/
 Copyright(C) 1997
 TOSHIBA Corporation
 All rights reserved
 RPTU Ver.1G
 [Reset]
/*_____*/
<U1>00;00 017 Act. (F1)
<U1>00;06 619 Tx :[SAPI]00 C [TEI]000 [FRAME]SABME P
<l
<U1>00;07 236 Rx:[SAPI]00 C [TEI]000 [FRAME]SABME P
<U1>00;07 245 Tx :[SAPI]00 R [TEI]000 [FRAME]UA
                                          F
<U1>00;11 754 LOS (F3)
<U1>00;14 228 Act.
                    (F1)
<U1>00;14 415 Tx :[SAPI]00 C [TEI]000 [FRAME]SABME P
<U1>00;14 427 Rx:[SAPI]00 R [TEI]000 [FRAME]UA
                                          F
<U1>00;14 753 Tx :[SAPI]00 C [TEI]000 [FRAME]SABME P
<U1>00;14 765 Rx:[SAPI]00 R [TEI]000 [FRAME]UA F
<U1>00;24 275 Tx :[SAPI]00 C [TEI]000 [FRAME]INF0 [N(S)]000 [N(R)]000
            PD = Q.931(08)
            CR = 02 \ 0002
            MT = SETUP(05)
            04 03 80 90 A2 18 03 A9 83 97 70 08 C1 35 38 33 .....p..583
           33 30 30 31
                                                      3001
<U1>00;24 292 Rx:[SAPI]00 R [TEI]000 [FRAME]RR
                                            [N(R)]001
<U1>00;28 315 Tx :[SAPI]00 C [TEI]000 [FRAME]INFO [N(S)]001 [N(R)]000
           PD = Q.931(08)
            CR = 02 \ 0002
            MT = SETUP(05)
            04 03 80 90 A2 18 03 A9 83 97 70 08 C1 35 38 33
                                                      33 30 30 31
                                                      3001
<U1>00;28 333 Rx:[SAPI]00 R [TEI]000 [FRAME]RR
                                            [N(R)]002
<U1>00;43 812 Rx:[SAPI]00 C [TEI]000 [FRAME]INF0 [N(S)]000 [N(R)]002
            PD = Q.931(08)
            CR = 02 8002
           MT = CONN(07)
```

Figure 14-10 Start-up and Synchronization Sequences

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2760

Figure 14-11 Outgoing Call Connect and Release

<U1>01;14'460 Rx:[SAPI]00 R [TEI]000 [FRAME]RR F [N(R)]004 <U1>01;19'450 Tx :[SAPI]00 C [TEI]000 [FRAME]INFO [N(S)]004 [N(R)]002 PD = Q.931(08)CR = 02 0003 MT = SETUP(05)04 03 80 90 A2 18 03 A9 83 97 70 08 C1 35 38 33p..583 33 30 30 31 3001 <U1>01;19'466 Rx:[SAPI]00 R [TEI]000 [FRAME]RR [N(R)]005 <U1>01;19'878 Rx:[SAPI]00 C [TEI]000 [FRAME]INFO [N(S)]002 [N(R)]005 PD = Q.931(08)CR = 02 8003 MT = CALL PROC(02)18 03 A9 83 97 <U1>01;19'888 Tx :[SAPI]00 R [TEI]000 [FRAME]RR [N(R)]003 <U1>01;19'924 Rx:[SAPI]00 C [TEI]000 [FRAME]INFO [N(S)]003 [N(R)]005 PD = Q.931(08)CR = 02 8003 MT = ALERT(01)18 03 A9 83 97 <U1>01;19'932 Tx :[SAPI]00 R [TEI]000 [FRAME]RR [N(R)]004 <U1>01;25'464 Rx:[SAPI]00 C [TEI]000 [FRAME]INFO [N(S)]004 [N(R)]005 PD = Q.931(08)CR = 02 8003 MT = CONN(07)18 03 A9 83 97 <U1>01;25'476 Tx :[SAPI]00 R [TEI]000 [FRAME]RR [N(R)]005 <U1>01;25'785 Tx :[SAPI]00 C [TEI]000 [FRAME]INFO [N(S)]005 [N(R)]005 PD = Q.931(08)CR = 02 0003 MT = CONN ACK(0F)<U1>01;25'799 Rx:[SAPI]00 R [TEI]000 [FRAME]RR [N(R)]006 <U1>01;46'127 Rx:[SAPI]00 C [TEI]000 [FRAME]INFO [N(S)]005 [N(R)]006 PD = Q.931(08)CR = 02 8003 MT = DISC(45)08 02 80 90 <U1>01;46'138 Tx :[SAPI]00 R [TEI]000 [FRAME]RR [N(R)]006 <U1>01;46'449 Tx :[SAPI]00 C [TEI]000 [FRAME]INFO [N(S)]006 [N(R)]006 PD = Q.931(08)CR = 02 0003 MT = REL(4D)08 02 80 90 <U1>01;46'464 Rx:[SAPI]00 R [TEI]000 [FRAME]RR [N(R)]007 <U1>01;46'784 Rx:[SAPI]00 C [TEI]000 [FRAME]INFO [N(S)]006 [N(R)]007 PD = Q.931(08)CR = 02 8003 MT = REL COMP(5A)08 02 80 90 <U1>01;46'795 Tx :[SAPI]00 R [TEI]000 [FRAME]RR [N(R)]007 <U1>02;16'659 Tx :[SAPI]00 C [TEI]000 [FRAME]RR P [N(R)]007 <U1>02;16'670 Rx:[SAPI]00 R [TEI]000 [FRAME]RR F [N(R)]007 <U1>02;22'661 Rx:[SAPI]00 C [TEI]000 [FRAME]INFO [N(S)]007 [N(R)]007 PD = Q.931(08)CR = 02 0004

<U1>01;14'446 Rx:[SAPI]00 C [TEI]000 [FRAME]RR P [N(R)]004
 <U1>01;14'449 Tx :[SAPI]00 C [TEI]000 [FRAME]RR P [N(R)]002
 <U1>01;14'456 Tx :[SAPI]00 R [TEI]000 [FRAME]RR F [N(R)]002

Performance Monitoring

The performance of the RPTU can be monitored using the Data Dump Mode. This requires:

- RSIU, RSIS, PIOU or PIOUS PCB TTY port.
- ASCII terminal or PC with communications software (such as ProComm).
- IMDU or RMDS modem or Hayes compatible modem for remote monitoring.

The RPTU monitoring feature provides a download of PRI errors detected as shown in Figure 14-12. This data can be stored to a file and/or printed when using a PC with communications software.

There are no time parameters for the error report, so the time between error-count increments must be monitored manually. The counter is reset after 15 registrations and begins again from zero. Basically the error count of any error category should not increase within 24-hour periods.

• To dump the data (PRI ERROR DISPLAY) from a terminal or PC (local or remote)

- 1. Establish communications between the DK TTY port and the terminal or PC using a communications software.
- 2. Enter the security code, and press **Enter** (or **Return**).
- 3. At the **>MODE** prompt, type **DUMP** (must be all caps), and press **Enter** (or **Return**). The **>D** prompt displays on your screen.
- 4. At the >D prompt, type PRIERR and press Enter (or Return). The display (see Figure 14-12) shows all RPTU PCBs (PRI NO=1~PRI NO=8), even if the associated RPTU (1~8) is not installed. The ERROR counter can only be reset by turning the DK424 OFF and ON.

► To exit the dump mode

> At the >D prompt, type **QUIT**, press **Enter** (or **Return**); the **>MODE** prompt displays.

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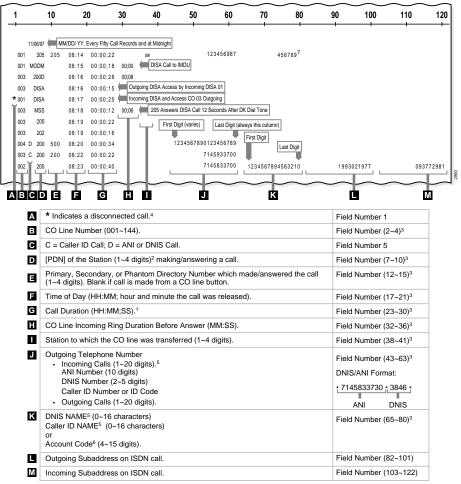
PRI ERROR DISPLAY	
PRIERR	
PRI NO = 1	
SYNCHRO BIT ERROR	= XX TIMES (1 TIME = 1024 ERRORS)
BIPOLAR VIOLATION ERROR	= XX TIMES (1 TIME = 256 X 256 ERRORS)
SLIP ERROR	= XX TIMES (1 TIME = 256 ERRORS)
CRC ERROR	= XX TIMES (1 TIME = 256 ERRORS)
PRI NO = 2	
SYNCHRO BIT ERROR	= XX TIMES (XX = 00~15)
BIPOLAR VIOLATION ERROR	= XX TIMES
SLIP ERROR	= XX TIMES
CRC ERROR	= XX TIMES
PRI NO = 3	= XX TIMES
SYNCHRO BIT ERROR	= XX TIMES
BIPOLAR VIOLATION ERROR	
SLIP ERROR	= XX TIMES
	= XX TIMES
PRI NO = 4	
SYNCHRO BIT ERROR	= XX TIMES
BIPOLAR VIOLATION ERROR	= XX TIMES
SLIP ERROR	= XX TIMES
CRC ERROR	= XX TIMES
PRI NO = 5	
SYNCHRO BIT ERROR	= XX TIMES
BIPOLAR VIOLATION ERROR	= XX TIMES
SLIP ERROR	= XX TIMES
CRC ERROR	= XX TIMES
PRI NO = 6	
SYNCHRO BIT ERROR	= XX TIMES
BIPOLAR VIOLATION ERROR	
	= XX TIMES
	= XX TIMES
PRI NO = 7	
	= XX TIMES
BIPOLAR VIOLATION ERROR	
	= XX TIMES
	= XX TIMES
PRI NO = 8	
SYNCHRO BIT ERROR	
BIPOLAR VIOLATION ERROR	
SLIP ERROR	= XX TIMES
CRC ERROR	= XX TIMES

Error Message	Action
Synchro Bit Error	Increments each time the RPTU detects 1024 synchronization bit errors.
Bipolar Violation Error	Increments each time the RPTU detects 6.55 x 104 bipolar violations.
Slip Error	Increments each time the RPTU detects 256 slips.
CRC Error	Increments each time the RPTU detects 256 CRC-6 errors. The RPTU must be in the ESF mode.

Figure 14-12 RPTU Performance Monitor Printout

SMDR Output for ISDN

The SMDR information includes the subaddress of each incoming and outgoing ISDN call if a subaddress is received or sent on the call. Subaddresses may or may not be received/sent on all ISDN calls. Figure 14-9 below identifies the SMDR format for an ISDN subaddress.



- ¹ Call Duration (incoming, outgoing, or transfer) must be 1 or 10 seconds (minimum) to generate a call record printout. It can be set to 1.0 or 10 seconds using Program 60-2.
- ² "MSS": designates a Direct Inward System Access (DISA) or External Call Forward CO call to a station that is not answered; or, answered after 1 or 10 seconds per Program 60-2. The call will register as a normal incoming call if answered before the threshold time (1.0 or 10 seconds depending on Program 60-2). DISA calls always register 05~06 seconds ring before answer duration time.
- ³ Field column information is provided for SMDR output formatting purposes.
- ⁴ A "*" in the first column indicates that the call was disconnected by the Central Office Calling Party Control (CPC) or Automatic Release (AR) signal. Loop start CO lines must have Programs 15-0 and 15-3 enabled to be dropped by the CPC signal.
- ⁵ ANI, DNIS, and Caller ID information is sent out the SMDR port for Answered Calls only. Abandoned calls; ANI, DNIS, and Caller ID information is not sent out the SMDR port, but it can be stored in station memory. See Program *51 and *52.
- ⁶ See Program 60-1.
- ⁷ Strata DK sends a Carriage Return (CR) and Line Feed (LF) ASCII symbol after each line of data.

General Notes

- "MODM": designates a call to the IMDU, Remote Maintenance Modem.
- "DISA": designates a DISA or External Call Forward call through the system via CO to CO connection.
- The call record data is ASCII-formatted, 8 bits; no parity, 1-stop bit.
- Special dial printout: Tone = "T", Long pause = "L", Flash = "F", Pause = "P"

Figure 14-13 SMDR Output

RBSU/RBSS Interface Unit

System:	DK424, Release 4.1 and above
Circuits per PCB:	2 circuits (2B + D each circuit)
Interfaces with:	ISDN BRI S/T when connected to the Public Network or a BRI S-type, TE-1, or TA devices when connecting to ISDN station equipment
Older Version(s):	None

The Strata DK424 Release 4.1 system supports the RBSU/RBSS interface unit according to the common control units resident in the system shown in Table 14-7.

RBSU/RBSS switches, jumpers, and connectors are shown in Figures 14-16 and 14-17 on Page 14-22 and described in Table 14-8 on Page 14-22.

LEDs on the RBSU/RBSS show a continuous status of RBSU/RBSS operation. Refer to Table 14-9 on Page 14-24 for a list of each LED's status.

Overview

The RBSU and RBSS PCBs provide the Basic Rate Interface (BRI) circuits for DK424, Release 4.1. The RBSU is the main plug-in PCB and RBSS is an optional PCB that plugs onto the RBSU. Each PCB provides two ISDN BRI circuits. Each BRI circuit provides 2 B-channels + 1D channel for voice/data/video applications. An REBU PCB is a piggy-back PCB that plugs onto the RBSU and provides basic functions for RBSU/RBSS circuits so it must always be installed on the RBSU.

RBSU circuits are four-wire S/T type circuits and connect to the Public Switched Telephone Network (PSTN) BRI lines using an Network Terminator unit (NT1); or, on the station side, they can connect to ISDN Terminal Equipment (TE) or Terminal Adapters (TA) as shown in Figure 14-14.

TE devices include any ISDN device (telephone, fax, computer) that connects directly to S/T ISDN BRI circuits. TA devices match the protocol of non-ISDN devices (telephone, fax, computer) to the protocol of S/T ISDN BRI circuits.

The RBSU circuits can be configured two ways:

- ← As BRI TE circuits which connect to Telephone Network BRI lines using a NT1.
- ♦ As BRI NT circuits which connect to ISDN TEs or TAs. These devices must be S-type station devices.

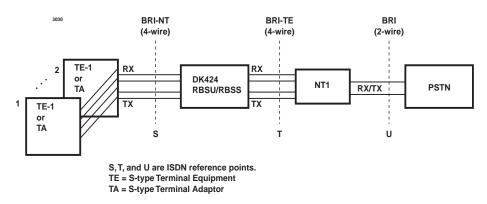
The RBSU connection options (BRI line or ISDN TE-1/TA devices) are selected in DK424 customer database programming and option switches located on the RBSU.

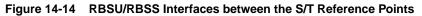
The RBSU circuit that connects to the ISDN network side requires a dealer-supplied NTI interface box to convert the two-wire, U-interface BRI line from the telephone network to the four-wire, T-interface of the RBSU circuit. The NT1 must be UL listed (U.S.) or CSA certified (Canada). The network BRI line connection is a point-to-point connection, which means that the network BRI line can only be connected to one RBSU circuit via the NT1 (T-reference point).

RBSS circuits connect directly to S-type TE-1 or TA ISDN devices only. They do not support BRI-TE telephone network BRI line connections.

The RBSU and/or RBSS circuit that connects to the DK station side, (BRI-NT, S-reference point) allows direct connection of multiple ISDN (TE-1 or TA) devices. The S point of the RBSU/RBSS supports the Toshiba DK passive bus, also known as point-to-multipoint connection. The terminal-side (S-point) of the RBSU/RBSS BRI circuit can have parallel connections of up to two TE-1s or TAs maximum.

When multiple TE-1 and TA devices are installed on a single RBSU/RBSS BRI circuit, the devices must share, or contend for, that circuit's two B-channels. That is to say, a maximum of two simultaneous voice and/or data calls are allowed between both devices connected to the same BRI circuit. The contention rule for the two BRI B-channels is first come, first serve.





Capacity and Cabinet Slot Information

The RBSU/RBSS can be installed in any slot except the programming telephone PDKU or PEKU slot. Each RBSU and/or RBSS contains two circuits and each circuit reduces the system capacity by two station ports and two CO lines (one port/line per B-channel). Therefore, if the RBSU PCB is installed, the station port and CO line count will increment by four ports and four lines at the RBSU cabinet slot.

If the RBSU/RBSS is installed, the station port and CO line count will increment by eight ports and eight lines at the RBSU/RBSS cabinet slot. RBSU and RBSS PCBs can be installed in any combination so long as the number of RBSU PCBs is the same or greater than the number of RBSS PCBs. The total maximum number of RBSU/RBSS circuits allowed in DK424 is shown in Table 14-7.

Table 14-7 RBSU/RBSS, BRI-TE, and BRI-NT Maximums by Type of Processor

Processor	Maximum RBSU/RBSS* PCBs combined	Maximum BRI-TE Circuits	Maximum BRI-TE Channels	Maximum BRI-NT Circuits	Maximum BRI-NT Channels
RCTUA4	4	4	8	8	16
RCTU BA3/BB4	12	8	16	16	32
RCTU C3/D4	24	8	16	40	80
RCTU E3/F4	36	8	16	64	128

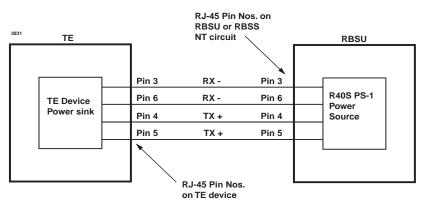
* RBSU circuits can be NT or TE, but RBSS circuits can only be NT.

PS-1 Backup Power Option

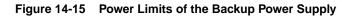
The RBSU provides an optional backup power supply, R40S, that will supply backup power to TE devices in the event of an AC power loss. This power backup option only applies to RBSU or RBSS circuits that are configured in the NT mode. Refer to Figure 14-18 to see how to install the R40S onto the RBSU.

Also the DK system must have battery backup to allow the R40S power backup function to operate. The R40S power supply is an ISDN, PS-1 type power unit which means it supplies power to TE devices on the RBSU/RBSS transmit and receive wire pairs as shown in Figure 14-15. This power arrangement is also known as phantom power.

Each of the four circuits on RBSU/RBSS can be connected to share the R40S using option switches on the PCBs as shown Table 14-8. Before using the R40S as a backup power source, you must make sure that the TE devices do not require more power than the R40S can supply and the TE is compatible with the ISDN PS-1 power arrangement. Figure 14-15 shows the power limits of the R40S.



R40S Power Limits: Voltage: 33.3 VDC to 38.85 VDC maximum Current: 100mA maximum (25mA maximum per each RBSU/RBSS circuit)



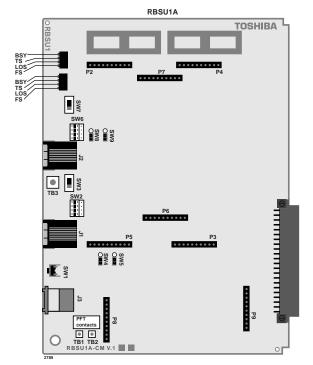
RBSU/RBSS Installation

Step 1: Run Related Programs

Run all ISDN programs related to RBSU/RBSS BRI circuits prior to installation of the PCBs. This enables the circuits to operate immediately upon insertion. ISDN BRI programs are explained in the *Strata DK424 Programming Manual* under the ISDN tab.

Step 2: Set Option Switches/Jumpers

Set all option switches and jumpers on the RBSU and RBSS PCBs before plugging the RBSS onto the RBSU or inserting the RBSU into the system. Switch/jumper information and locations are shown in Figures 14-16, 14-17, and Table 14-8.



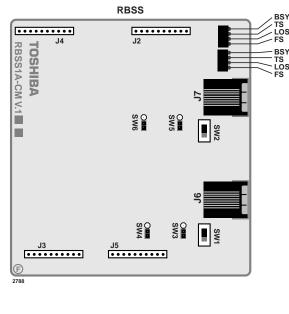


Figure 14-16 RBSU PCB

Figure 14-17 RBSS PCB

	Circuit	Option	Туре	Circuit Type		Description
	Circuit	Switch	туре	TE	NT	Description
	All	SW 1	Pushbutton	N/A	N/A	Resets firmware on all circuits of RBSU/RBSS. Drops calls off the RBSU/RBSS.
	1		Jumper	х	х	Causes the circuit to operate as TE or NT ¹ .
RBSU	1	SW 3	Slide	ON	OFF	Switches a 100-ohm resistor in/out of the circuit.
	1	SW 4, 5	Jumper	N/A	ON	Switches PS-1 in/out of the circuit.
	2	SW 6	Jumper	х	х	Causes the circuit to operate as TE or NT ¹ .
	2	SW 7	Slide	ON	OFF	Switches a 100-ohm resistor in/out of the circuit.
	2	SW 8, 9	Jumper	N/A	ON	Switches PS-1 in/out of the circuit.
	3 (NT only)	SW 1	Slide	ON	OFF	Switches a 100-ohm resistor in/out of the circuit.
RBSS	3 (NT only)	SW 3, 4	Jumper	N/A	ON	Switches PS-1 in/out of the circuit.
	4 (NT only)	SW 2	Slide	ON	OFF	Switches a 100-ohm resistor in/out of the circuit.
	4 (NT only)	SW 5, 6	Jumper	N/A	ON	Switches PS-1 in/out of the circuit.

Table 14-8	RBSU/RBSS Option Switches, Jumpers, and Connectors

 $^1\,$ Also requires Program *60 to be set for TE or NT.

Step 3: Install the REBS

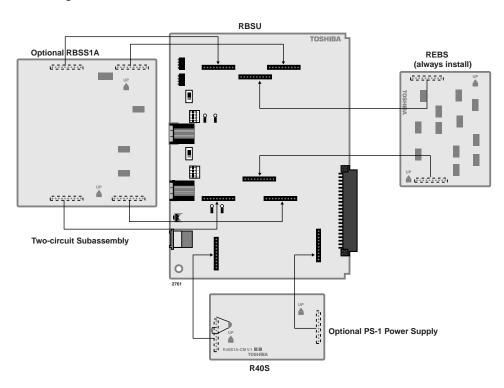
- **Note** The REBS provides a basic part of the RBSU/RBSS circuit functionality; therefore, it must always be installed on the RBSU (see to Figure 14-18).
- 1. Align the two connectors carefully while observing the "UP" arrows on the REBS.
- 2. Plug the REBS onto the RBSU.

Step 4: Install the RBSS

- **Note** If one or two additional BRI-NT circuits are required, install the RBSS (see to Figure 14-18).
- 1. Align the four connectors carefully while observing the "UP" arrows on the REBS.
- 2. Plug the RBSS onto the RBSU.

Step 5: Install the R40S

- **Note** If ISDN PS-1 backup power for TE devices is required, install the R40S (optional PCB) (see Figure 14-18).
- 1. Align the two connectors carefully while observing the "UP" arrows on the R40S.



2. Plug the R40S onto the RBSU.

Figure 14-18 Location of RBSU Plug-on PCBs

Step 6: Install RBSU/RBSS PCBs into Cabinet

After setting the switches and jumpers and installing the plug-on PCBs as described in the preceding paragraphs, the RBSU/RBSS PCBs can be installed in the appropriate cabinet slots. Refer to RBSU/RBSS Capacity and Cabinet Slot Information on Page 14-20. After the RBSU/RBSS is installed in the DK424 cabinet, the status LEDs and connecting jacks are positioned as shown in Figure 14-19.

Table 14-9 RBSU/RBSS LED Indications

LED	Indication
BSY	Circuit Busy ON – Any B-channel is in use. OFF – B-channels are idle.
TS	Timing Source Blinking ON/OFF – The RBSU is extracting the clock from the BRI line and is the Primary synchronization circuit for ISDN and T1. ON – The RBSU is the secondary (backup) synchronization circuit for the ISDN and T1. OFF – The RBSU is not used for ISDN or T1 synchronization.
LOS	Loss of Signal ON – Clock timing cannot be detected from the line. OFF – Normal condition.
FS	Frame Alignment Alarm ON – Frame alignment cannot be established. OFF – Frame alignment is established.

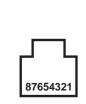
Modular Jack Pin Configurations

BRI Circuit Jack (TE or NT Mode)

The RBSU/RBSS BRI circuit jack is a shielded RJ-45 (8-pin modular) with Transmit (Tx) and Receive (Rx) pin numbers as shown in Table 14-10. The Tx and Rx pin numbers change when the BRI circuit is configured with RBSU/RBSS option switches for TE or NT (Table 14-8). If the R40S is installed, the PS-1 voltage is carried on the Tx/Rx wires with polarity as shown in Table 14-10.

Table 14-10 RJ-45 Pins in the 8-pin Modular Jack

Pin No.	TE Side	NT Side	PS1/R40S Polarity
1	N/C	N/C	N/C
2	N/C	N/C	N/C
3	Тx	Rx	-
4	Rx	Тx	+
5	Rx	Тx	+
6	Тх	Rx	-
7	N/C	N/C	N/C
8	N/C	N/C	N/C



Front View of RJ-45 Jack Cavity Note: The RJ-45 pins are numbered as shown above.

Monitor Jack

The RBSU/RBSS monitor jack is an RJ-12 (6-pin modular). This jack provides an RS-232 output that enables you to monitor the RBSU/RBSS BRI circuit D-channel, layer-2 and layer-3 data. The monitor jack pin configuration and communication parameters are the same as RPTU and RBUU which are shown in Figure 14-9 on Page 14-13. Figures 14-28 and 14-29 on Pages 14-32 and 14-33, respectively, show examples of the RBSU monitor jack output.

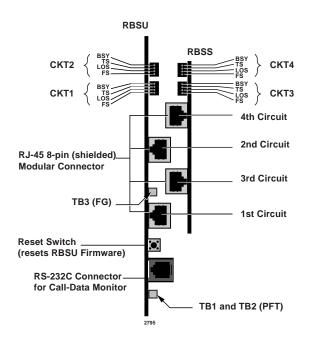


Figure 14-19 Location of LEDs and Connectors

RBSU/RBSS Premise Wiring Guidelines

Power Failure Terminal Screws

TB1 and TB2 are the connecting points that interface a pair of dry contacts that can be used for power failure switching purposes (see Figure 14-19 for the locations). When the DK system (RBSU) has power (from AC source or batteries) there is a short circuit across TB1 and TB2. In the event of no power to the DK424, there is an open circuit across TB1 and TB2. The specifications for TB1 and TB2 contacts are:

- Maximum switchable voltage: 30 VDC
- Maximum switchable current: 80mA
- Short circuit resistance: Approximately 15 ohms

Grounding Terminal Screws

TB3 is a screw terminal that can be used to connect a ground wire to the RBSU PCB (see Figure 14-19 for the location). This ground enables the RBSU/RBSS to meet Electro Magnetic Compatibility (EMC) requirements. As of Release 4.0, RBSU complies with EMC requirements without grounding TB3, so it is not necessary to connect a ground wire to TB3.

BRI Wire Type Recommendations

CAT3 or CAT5 wire is recommended for ISDN BRI customer-premises wiring. While the ISDN BRI signal works for some distance over almost any wire that is suitable for analog voice service, better wire enables longer runs. CAT5 provides better 100-ohm impedance matching (at little extra cost) between the RBSU/RBSS circuit and the station Terminal Equipment (TE-1).

Normally the CAT3 or CAT5 wiring does not have to be shielded when used for ISDN BRI premises wiring. However, the RJ-45 jacks on the RBSU/RBSS BRI circuits are shielded and provide a ground shield in the event that shielded modular plugs and cable are used.

Note If using shielded cable and plugs, cable runs should only be grounded at the DK RBSU/RBSS, RJ-45 Jack. To prevent ground loops, do not ground both ends of shielded cable runs.

RBSU/RBSS BRI Cable Jacks and Connectors

In the U.S., the standard connector for ISDN equipment is the eight-pin RJ jack. Patch cables have eight-pole plugs at both ends. The same pinout applies to both ends of an ISDN cable, which is the practice of the data world. This means that a flat untwisted cable with an RJ modular plug at both ends will have the locking tab of the plug on one end, "up;" and, on the other end, "down," as shown in Figure 14-20.

Note This is the opposite of telephony "silver satin" cables which have locking tabs on both ends facing the same direction. Telephony cables cause the pins at either end to crossover while data cables provide a straight through pin-to-pin connection between modular jacks.

A cord of up to 10 meters connects the ISDN BRI RJ-45 wall jack to the desktop TE-1 or TA RJ-45 jack. Bellcore recommends that all TE-1 and TA devices be attached with the same standard cord to ensure compatibility.

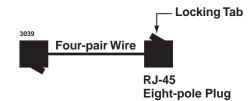


Figure 14-20 Modular ISDN Data Cable

The standard pinouts for ISDN jacks is the TIA-568A or TIA-568B jack as listed in Table 14-11. The variants A and B to the TIA specification are electrically the same, only the wire colors are different. However, you should only use one type TIA jack in a customer installation because mixing the two may cause certain wire pairs to be swapped which would result in line faults.

Pin	Color	Name	Function	
1	Green	T2	Power 3 (not used on DK RBSU/RBSS)	
2	Green/White	R2	Power 3 (not used on DK RBSU/RBSS)	
3	Orange/White	R3	Transmit to Network (NT-1, S/T jack)	
4	Blue/White	R1	Receive From Network (NT-1, S/T jack)	
5	Blue	T1	Receive From Network (NT-1, S/T jack)	
6	Orange	Т3	Transmit to Network (NT-1, S/T jack))	
7	Brown	T4	- Power 2 (not used on DK RBSU/RBSS)	
8	Brown/White	R4	+ Power 2 (not used on DK RBSU/RBSS)	

Table 14-11 TIA-568A (RJ-45) Jack – ISDN Standard Interface Modular Connector Pinout (RBSU-TE mode)

Notes

- Pins are numbered left to right when looking into the jack cavity with the locking tab. down.
- TIA-568B swaps pair two with pair three, changing only the color of the wires on the pins. Electrical performance is the same.

RBSU/RBSS EMC Ferrite Core Requirement

To ensure that the RBSU/RBSS circuits meet the EMC requirements, it is necessary to run all wire connecting RBSU/RBSS circuits (TE mode and NT mode) through a Ferrite core. Use Toshiba part number, FER-CORE-ISDN, which is shipped with the RBSU. Figure 14-21 shows how to dress the wiring through the Ferrite core.

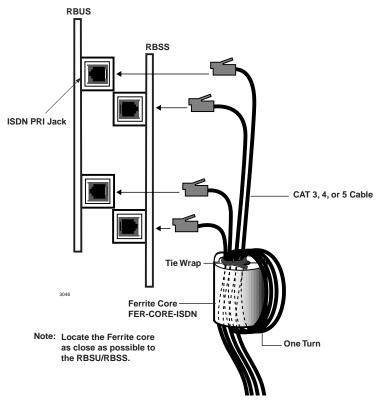


Figure 14-21 RBSU/RBSS Ferrite Core Installation

Connecting RBSU to Network Side (TE-Mode)

The RBSU only, not the RBSS, circuits can be connected to the network side of a BRI line. The RBSU circuit must be configured in the TE-mode (refer to option switches in Table 14-8 on Page 14-22 and Program *60).

In the U.S., the BRI line from the ISDN service provider is a two-wire U-type BRI line. This line connects to the RBSU TE circuit via a customer-provided NT1 as shown in Figure 14-22. The NT1 is necessary to convert the network BRI, two-wire, U interface to the RBSU BRI, four-wire, T interface. The NT1 must be UL listed (U.S.) or CSA certified (Canada).

The NT1 is powered by local AC power via an AC adapter supplied with the NT1. The connection between the NT1 and the RBSU TE circuit is a point-to-point connection, so the NT1 can connect to only one RBSU BRI TE circuit.

A 100-ohm Terminating Resistor (TR) is required on each end of the point-to-point connection. The TR must be switched into the RBSU TE circuit (refer to option switches in Table 14-8 on Page 14-22) and into the NT1 device.

Most NT1 devices have TR option switches; if the NT1 does not have TRs, two 100-ohm TRs must be wired into the NT1 modular jack - one 100-ohm resistor across each pair (Tx and Rx). Refer to the NT1 manufacturers documentation for the maximum loop length between the NT1 and the network jack. The maximum loop length between the NT1 and the RBSU circuit is 1650 feet.

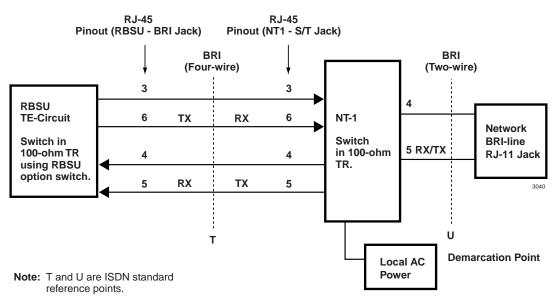


Figure 14-22 RBSU to NT1 Point-to-point Connection

Connecting RBSU/RBSS Station Devices (NT-Mode)

S-type TAs and TE-1s can be connected to the station side of RBSU and RBSS circuits. TA and TE devices must be powered by local AC power using AC adapter supplied with the TA or TE device. The RBSU/RBSS circuits must be configured in the NT mode when connected to TA and TE devices (refer to option switches in Table 14-8 on Page 14-22 and Program *60).

The TA enables you to connect non-ISDN voice and data devices to ISDN BRI circuits. The TA matches the protocol of existing interfaces (R-reference point) to the ISDN S/T protocol (see Figure 14-1 on Page 14-2). TA devices include asynchronous circuit-switched adapters that convert RS-232 async data (like data from a PC COM port) to B-channel 64 kbps sync.

TAs also enable you to connect standard telephones and non-ISDN fax machines to receive and make calls over ISDN circuits. TEs include any user device (telephone, fax, PC video conference board) that is designed to plug directly into the ISDN (S/T) interface without the use of a TA.

There are two types of ISDN TA and TE-1 devices: the U-type and the S/T type. Most manufacturers of ISDN station devices make both types. In DK424 R4.1, the RBSU/RBSS station side, BRI-NT circuits only function with S/T type TA and TE-1 devices. You cannot connect U-type TE-1 or TA devices to the RBSU/RBSS BRI-NT circuits.

Also, connecting an NT1 to the RBSU/RBSS BRI-NT circuit to convert from S/T to U interface is not supported to enable the use of U-type TE-1 or TA device on the station side of the RBSU/RBSS. U-type TE-1 and TA device interface is provided in the DK424 by the RBUU/RBUS BRI circuit only. RBUU/RBUS will be provided in the DK424 Release 4.2.

The RBSU/RBSS BRI-NT circuit supports the National ISDN 2 (NI2) S-Interface "passive bus." It is called a passive bus, because it contains no logical functions. The RBSU/RBSS BRI-NT interface supports a point-to-multipoint connection on two twisted pairs. Up to two TE-1 and/or TA devices can be connected to one RBSU/RBSS, BRI-NT circuit. Using standardized wiring and modular connectors, as explained in previous paragraphs, maintains control of polarity. The pinout from the RBSU/RBSS circuit to a S-type TE-1 or TA device is shown in Figure 14-23 and Table 14-10.

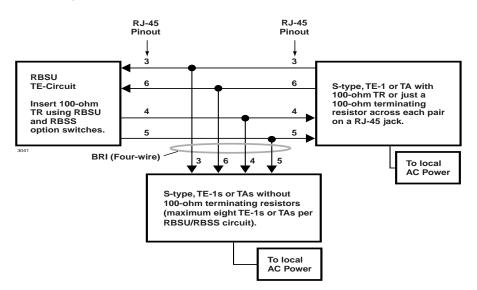


Figure 14-23 RBSU/RBSS NT Circuit Pinout on Passive Bus

As a parallel bus, the RBSU/RBSS BRI-NT passive bus will accept TE-1 and TA devices scattered on the bus; however, the locations of the TE and TA devices on the S bus is limited by timing considerations. Specifically, the round trip propagation delay of a signal from the RBSU/RBSS circuit to one device must be within four microseconds of the delay from any other device on the bus. That is to say, layer-1 frames from the RBSU/RBSS must be received within a two microsecond window. This says nothing about how large the delay can be. In fact, it can be much larger, as long as the differences remain small.

To control electrical characteristics, a 100-ohm terminating resistor (TR) is required at both ends of the passive bus. One resistor should be across the Tx pair and one across the Rx pair at either end of the passive bus. Branch-type passive bus configurations, shown in Figures 14-24~14-27, may only require a TR on the RBSU/RBSS NT circuit side and not on the TE or TA device side of the bus.

The RBSU and RBSS circuits provide an option switch that allows the 100-ohm TR to be switched into the circuit on the DK side of the bus (see Table 14-8 on Page 14-22). Most TE-1 and TA devices also provide option switches to connect 100-ohm terminating resistors as shown in Figure 14-22.

If the TE or TA devices do not provide TRs, they may be permanently wired in place on a RJ-45 jack at the far end of the bus. Only one terminating resistor on each pair should be on the far (TE) end of the passive bus - do not switch in TRs on more than one TE-1 or TA device on the passive bus.

Note The correct placement of TRs on the passive bus is critical to ISDN BRI circuit operation (see RBSU/RBSS Passive bus configurations below).

RBSU/RBSS Passive Bus Configurations

The placement of S-type TE and TA devices on the BRI S-passive bus is critical for good RBSU/RBSS BRI circuit performance. Figures 14-24~14-27 show four passive bus architectures that are known to work. In all installations, follow the guidelines of any of these passive-bus models using the wire, cables, and jacks described in the previous paragraphs.

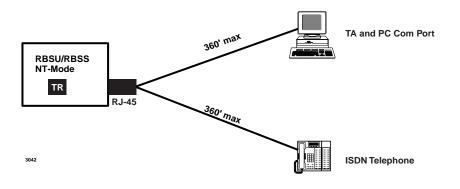


Figure 14-24 Simplified Short-branched Passive Bus

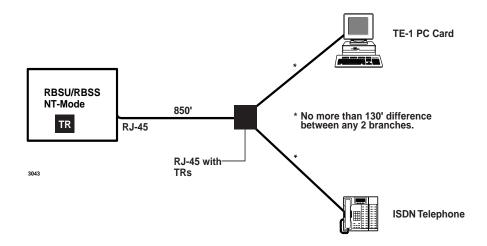


Figure 14-25 Branched Passive Bus

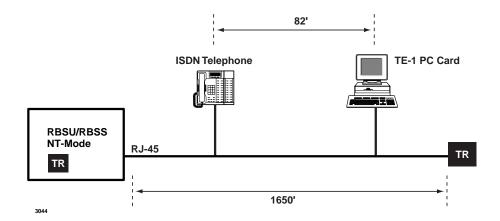


Figure 14-26 Extended Passive Bus

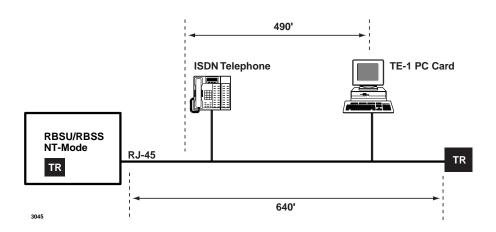


Figure 14-27 Short Passive Bus

RBSU/RBSS BRI Call Monitor

The call-monitor jack located on the RBSU enables you to use a PC or ASCII terminal to monitor the BRI, D-channel call setup, layer-2 and layer-3 data (refer to Figure 14-9 on Page 14-13 for information about connecting the monitor jack). Figures 14-28 and 14-29 provide examples of BRI call setup message information that is available from the RBSU call-monitor jack.

<U3>06;57'958 Tx :[SAPI]00 C [TEI]102 [FRAME]RR P [N(R)]021 <U3>06;57'970 Rx:[SAPI]00 R [TEI]102 [FRAME]RR F [N(R)]019 <u3>07;07'166 Rx:[SAPI]00 C [TEI]102 [FRAME]INF0 [N(S)]021 [N(R)]019 PD = Q.931(08) $CR = 01 \ OF$ MT = SETUP(05)04 03 80 90 A2 6C 05 C1 33 30 37 32 96 7B 01 811..3072.{.. <U3>07;07'217 Tx :[SAPI]00 R [TEI]102 [FRAME]RR [N(R)]022 <u3>07;07'735 Tx :[SAPI]00 C [TEI]102 [FRAME]INFO [N(S)]019 [N(R)]022 PD = Q.931(08)CR = 01 8FMT = SETUP ACK(OD)18 01 89 1E 02 80 88 34 01 00 32 01 C2 95 2A 244..2...*\$ 80 9E 14 44 49 41 4C 20 53 54 41 54 49 4F 4E 20 ...DIAL STATION 4E 4F 2E 20 4F 52 20 9E 0B 41 43 43 45 53 53 20 NO. OR .. ACCESS 43 4F 44 45 CODE <u3>07;07'750 Rx:[SAPI]00 R [TEI]102 [FRAME]RR [N(R)]020 <U3>07;07'866 Rx:[SAPI]00 C [TEI]102 [FRAME]INFO [N(S)]022 [N(R)]020 PD = Q.931(08) $CR = 01 \ OF$ MT = INFO(7B)2C 01 31 ,.1 <U3>07;07'909 Tx :[SAPI]00 R [TEI]102 [FRAME]RR [N(R)]023 <u3>07;08'171 Rx:[SAPI]00 C [TEI]102 [FRAME]INFO [N(S)]023 [N(R)]020 PD = Q.931(08) $CR = 01 \ OF$ MT = INFO(7B)2C 01 30 ,.0 <U3>07;08'192 Tx :[SAPI]00 R [TEI]102 [FRAME]RR [N(R)]024 <u3>07;08'415 Rx:[SAPI]00 C [TEI]102 [FRAME]INFO [N(S)]024 [N(R)]020 PD = 0.931(08) $CR = 01 \ OF$ MT = INFO(7B)2C 01 30 ,.0 <u3>07;08'450 Tx :[SAPI]00 R [TEI]102 [FRAME]RR [N(R)]025 <u3>07;08'658 Rx:[SAPI]00 C [TEI]102 [FRAME]INFO [N(S)]025 [N(R)]020 PD = Q.931(08) $CR = 01 \ OF$ MT = INFO(7B)2C 01 35 ,.5 <u3>07;08'682 Tx :[SAPI]00 R [TEI]102 [FRAME]RR [N(R)]026 <u3>07;08'941 Tx :[SAPI]00 C [TEI]102 [FRAME]INFO [N(S)]020 [N(R)]026 PD = Q.931(08)CR = 01 8FMT = CALL PROC(02)18 01 89 32 01 82 ...2.. <u3>07;08'958 Rx:[SAPI]00 R [TEI]102 [FRAME]RR [N(R)]021 <u3>07;09'086 Tx :[SAPI]00 C [TEI]102 [FRAME]INFO [N(S)]021 [N(R)]026 PD = 0.931(08)CR = 01 8FMT = ALERT(01)18 01 89 1E 02 80 88 34 01 40 95 2A 0B 80 9E 084.@.*... 43 41 4C 4C 49 4E 47 20 CALLING <U3>07;09'106 Rx:[SAPI]00 R [TEI]102 [FRAME]RR [N(R)]022 <U2>07;09'314 Tx :[SAPI]00 C [TEI]112 [FRAME]RR P [N(R)1000 P [N(R)]000 <u4>07;09'318 Rx:[SAPI]00 C [TEI]112 [FRAME]RR <U4>07;09'344 Tx :[SAPI]00 R [TEI]112 [FRAME]RR F [N(R)]000

Figure 14-28 Outgoing Call Setup Output of BRI Call Monitor

```
      <U2>07;40'997
      Rx:[SAPI]00 R
      [TEI]113
      [FRAME]RR
      F
      [N(R)]000

      <U4>07;41'000 Tx:[SAPI]00 R
      [TEI]113
      [FRAME]RR
      F
      [N(R)]000

      <U2>07;41'005
      Rx:[SAPI]00 R
      [TEI]113
      [FRAME]RR
      F
      [N(R)]000

      <U2>07;41'005
      Rx:[SAPI]00 R
      [TEI]113
      [FRAME]RR
      F
      [N(R)]000

      <U3>07;41'168
      Tx:[SAPI]00 C
      [TEI]102
      [FRAME]RR
      P
      [N(R)]027

      <U3>07;41'180
      Rx:[SAPI]00 R
      [TEI]102
      [FRAME]RR
      F
      [N(R)]025

<u3>07;53'481 Tx :[SAPI]00 C [TEI]127 [FRAME]U-INFO
                  PD = Q.931(08)
                  CR = 01 04
                  MT = SETUP(05)
                  04 03 80 90 A2 18 01 89 1E 02 80 83 6C 06 00 83 .....l...
                  31 30 30 35 70 05 80 33 30 37 32 34 01 40 1005p..30724.@
<U3>07;53'514 Rx:[SAPI]00 C [TEI]102 [FRAME]INF0 [N(S)]027 [N(R)]025
                  PD = Q.931(08)
                  CR = 01 84
                  MT = ALERT(01)
                  18 01 89
<U3>07;53'548 Tx :[SAPI]00 R [TEI]102 [FRAME]RR [N(R)]028
<U3>07;55'488 Rx:[SAPI]00 C [TEI]102 [FRAME]INFO
                                                                   [N(S)]028 [N(R)]025
                  PD = Q.931(08)
                  CR = 01 84
                  MT = CONN(07)
<u3>07;55'518 Tx :[SAPI]00 R [TEI]102 [FRAME]RR
                                                                  [N(R)1029
<u3>07;55'781 Tx :[SAPI]00 C [TEI]102 [FRAME]INFO
                                                                   [N(S)]025 [N(R)]029
                  PD = Q.931(08)
                  CR = 01 04
                  MT = CONN ACK(OF)
                  18 01 89 34 01 4F 95 2A 03 80 9E 00
                                                                                 ....4.0.*....
<U3>07;55'792 Rx:[SAPI]00 R [TEI]102 [FRAME]RR
<U3>07;57'585 Rx:[SAPI]00 C [TEI]102 [FRAME]INF0
                                                                   [N(R)]026
                                                                   [N(S)]029 [N(R)]026
                  PD = Q.931(08)
                  CR = 01 84
                  MT = DISC(45)
                  08 02 80 90
<U3>07;57'619 Tx :[SAPI]00 R [TEI]102 [FRAME]RR [N(R)]030
<U3>07;57'942 Tx :[SAPI]00 C [TEI]102 [FRAME]INFO [N(S)]026 [N(R)]030
                  PD = Q.931(08)
                  CR = 01 04
                  MT = REL(4D)
                  08 02 80 90
                                                                                 . . . .
<U3>07;57'959 Rx:[SAPI]00 R [TEI]102 [FRAME]RR [N(R)]027
<U3>07;57'979 Rx:[SAPI]00 C [TEI]102 [FRAME]INF0 [N(S)]030 [N(R)]027
                  PD = Q.931(08)
                  CR = 01 84
                  MT = REL COMP(5A)
<u3>07;58'029 Tx :[SAPI]00 R [TEI]102 [FRAME]RR
                                                                  [N(R)]031
<U1>07;59'447 Await. Sig.(F4)
<U4>08;05'903 Tx :[SAPI]00 C [TEI]112 [FRAME]RR P [N(R)]000
<U2>08;05'928 Tx :[SAPI]00 R [TEI]112 [FRAME]RR F [N(R)]000
<U2>08;05'969 Tx :[SAPI]00 C [TEI]112 [FRAME]RR P [N(R)]000
<U4>08;05'973 Rx:[SAPI]00 C [TEI]112 [FRAME]RR P [N(R)]000
<U4>08;05'989 Tx :[SAPI]00 R [TEI]112 [FRAME]RR F [N(R)]000
```

Figure 14-29 Incoming Call Setup Output of BRI Call Monitor

RBUU/RBUS Interface Unit

System:	DK424, Release 4.2 and above
Circuits per PCB:	2 circuits (2B + D each circuit)
Interfaces with:	ISDN BRI U when connected to the Public Network or a BRI U-type TE-1 or TA devices when connecting to ISDN station equipment
Older Version(s):	None

The DK424 Release 4.2 system supports the RBUU/RBUS interface unit (Figures 14-30 and 14-31) according to the common control units resident in the system.

LEDs on the RBUU/RBUS show a continuous status of operation. Refer to Table 14-12 for a list of each LED's status.

Figure 14-32 shows the location of the LEDs and connectors.

RBUU Installation

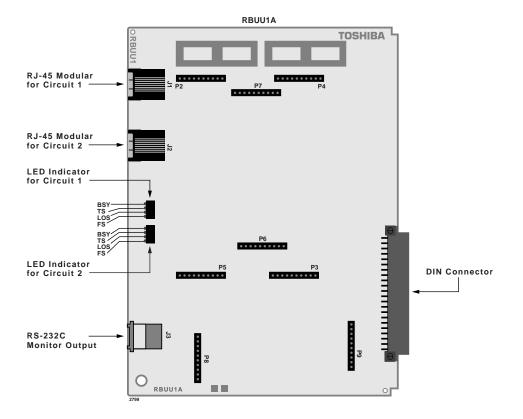
Before installing a RBUU PCB into a DK424, a number of system programs must be run. We recommends running these programs in the order listed before installation. This allows the RBUU to function immediately upon insertion beginning with a self-check loop-back test and then normal operation. Before you can begin installation of the RBUU, you may have to install the subassemblies.

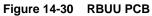
► To install the subassemblies (RBUS)

Place the RBUS card (component side facing down) onto the RBUU connectors. Apply firm, even pressure to ensure proper seating of the connectors. The RBUS card should have been installed at the factory.

► To install an RBUU PCB

- 1. Insert the RBUU (component side facing right) into the appropriate slot and apply firm, even pressure to ensure proper seating of connectors.
- 2. After installing the RBUU, gently pull the PCB outward. If the connectors are properly seated, a slight resistance is felt.





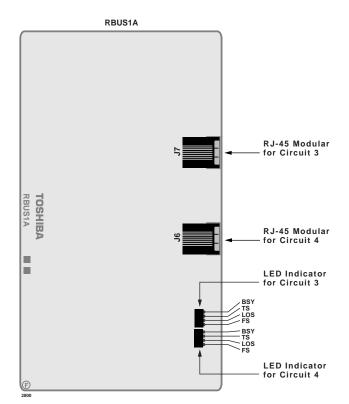


Figure 14-31 RBUS Subassembly

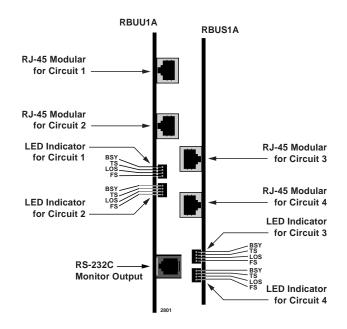


Figure 14-32 Location of LEDs and Connectors (RBUU/RBUS)

Table 14-12 RBUU/RBUS LED Indications

LED	Indication		
BSY	Busy		
TS	Time Synchronization		
LOS	Loss of Signal		
FS	Frame Synchronization		

Hospitality Management Information System (HMIS)

This chapter will be issued upon release of the HMIS product.

Term	Definition
AA	Auto Attendant (built-in or external). This feature acts as an automatic operator that directs incoming callers to stations by offering a menu of dialing prompts.
ACD	Automatic Call Distribution. Allows incoming calls to be distributed to a group of ACD agents. The ACD supervisor's LCD telephone displays ACD Agent and Group information which allows the supervisor to monitor calls and assist agents.
ACD/MIS	Automatic Call Distribution (ACD) with Management Information System (MIS).
ADM	Add-on Module–See DADM.
Amphenol Connector	A 25-pair connector typically used on a multi-button telephone set for interfacing cables to many electronic key and PBX systems.
ANI	Automatic Number Identification–Telephone number of the calling party is sent to the Strata DK system over incoming DID or tie lines. This feature is provided by some long distance telephone service companies.
B-channel	Used in ISDN. Data or voice information is transmitted on the B-channels of an ISDN line at 64kpbs. The B-channel refers to the frequency range of transmissions on a copper pair; it is a logical, rather than a physical channel. Also see BRI and PRI.
BGM	Background Music–Allows customer-supplied music to be sent to telephone speakers and external speakers.
bps	Bits Per Second–Unit of measure that refers to the transmission speed (baud rate) of electronic signals. It is used when describing data interface unit and modem operation.
CAMA	Centralized Automatic Message Accounting. A special trunk provided by the phone company or the E911 Public Safety Answering Point Agency.
CESID	Caller's Emergency Service Identification–Telephone number for specific station or station location which is sent to the CAMA trunk.
CLASS	Custom Local Area Signaling Services–Defines a number of features offered by local telephone companies.

Term	Definition
CLID or CND	Calling Line Identification or Calling Number Delivery–Telephone number or name of the calling party sent to the Strata DK system over incoming ground or loop start CO lines. This feature is one of the "CLASS" features offered by some local telephone companies.
CCVY	Call Center Viewer "Y" Connector–Enables two-way transmissions between the Strata DK and a host PC, or SMIS equipment, and one-way transmissions to other PCs. There are four ports on the Call Center Viewer Connector for one Strata DK, another master port, and two additional ports.
CLID or CND	Calling Line Identification or Calling Number Delivery–Telephone number or name of the calling party sent to the Strata DK system over incoming ground or loop start CO lines. This feature is one of the "CLASS" features offered by some local telephone companies.
CO	Central Office–The facility which houses switching equipment that provides telephone service (CO lines, E & M tie lines, DID lines, Centrex lines, etc.) for the immediate geographical area.
CO Line	A term used to define the Strata DK system hardware circuits that connect to the Central Office network line pair. Each CO line, DID and tie line circuit is assigned a CO line number in system software.
CODECs	Coder/Decoder–Semiconductors that allow the system to process analog-to-digital and digital-to-analog conversions.
D-channel	Used in ISDN. This channel transmits call control information (out-of-band signaling) for B-channels. The D-channel is a logical, not a physical channel.
DADM	Digital Add-on-Module–Optional device that connects to 2000-series digital telephones to provide the telephones with 20 flexible feature buttons that can be assigned individually for Direct Station Selection, System and Personal Speed Dial and CO line access.
DDCB	Digital Door Phone/Lock Control Unit–A peripheral hardware unit compatible with designated digital telephone circuits that supports optional door phones (MDFBs) and provides door lock control.
DDSS	Digital Direct Station Selection Console–A device that helps facilitate the processing of a heavy load of incoming calls. The DDSS connects only to designated digital telephone circuits, and is associated with a digital telephone.
DK Admin	Toshiba's customer database programming and upload/download software package for Strata DK systems.
DK Backup	Toshiba's customer database upload/download software package for Strata DK systems.
DIL	Direct In Line–Refers to two-way, standard CO trunk lines that are assigned to a particular extension or hunt group.
DID Line	Direct Inward Dialing line.

Term	Definition
DISA	Direct Inward System Access–A feature that allows an outside party to access the Strata DK system internal stations or outgoing CO lines without having to go through an operator or automated attendant. An optional security code may be set to prevent unauthorized access to outgoing CO lines for through system calling.
DK	Digital Key.
DK Admin	Toshiba's customer database programming and upload/download software package for Strata DK systems.
DK Backup	Toshiba's customer database upload/download software package for Strata DK systems.
DKT	Digital Telephone.
DKT2000 series	Toshiba proprietary digital telephones consisting of four models: two 10-button models with handsfree answerback and/or LCD display and two 20 button telephones with speakerphone or a speakerphone with LCD display.
DKSU14A	Strata DK14 Key Service Unit (KSU) with power supply. Equipped with two loop start CO line circuits and four digital telephone circuits built-in. Includes external page interface, MOH/BGM interface, power failure transfer and miscellaneous relay control.
DKSUB280 or DKSUB424	Base Cabinet–Unit that houses the Common Control Unit (RCTU), as well as six universal slots for station, line, and option PCBs. The Base Cabinet also contains a power supply that provides power for all of the stations and peripherals connected to the base cabinet PCBs.
DKSUE280 or DKSUE424	Expansion Cabinet–Optional unit that has six universal slots for station, line, and option PCBs. The expansion cabinet has a power supply that furnishes power for all of the stations and peripherals connected to the expansion cabinet PCBs. As many as five expansion cabinets can be added to the system.
DKSUB40	Strata DK40 Base Key Service Unit (KSU) with power supply and battery charger Equipped with eight digital telephone circuits built-in, and no CO line circuits. Includes external page interface, MOH/BGM interface, power failure transfer and miscellaneous relay control.
[DN]	Directory Number.
DNIS	Dialed Number Identification Service–Telephone number of called party is sent to the Strata DK over incoming DID or tie lines. This feature is provided by some lon distance telephone companies.
DPFT	Power Failure/Emergency Transfer Unit–An optional backup unit that provides emergency service during power failures by automatically connecting up to eight standard telephones to designated CO lines.
DSS	Direct Station Selection–Feature which allows a telephone user (as well as a DSS console and ADM user) to call another station with the touch of a flexible feature button.

Term	Definition
DTMF	Dual-tone Multi-frequency–Push-button tone dialing.
DVSU	A subassembly that equips a digital telephone with the capability to receive Speake Off-hook Call Announce (OCA) calls. DVSU is not required to receive Handset OCA (HS-OCA).
ESF	Extended Super Frame.
E911	Enhanced 911 operation that provides more complete locator information to the responding agency.
ЕКТ	Electronic Telephone.
EOCU	Off-hook Call Announce Subassembly–An optional upgrade to the Electronic Telephone Interface Unit (PEKU) or Electronic Telephone/Standard Telephone Interface Unit (PESU) that enables properly configured telephones (see HVSU2) to receive Off-hook Call Announce (OCA) calls.
FCC	Federal Communications Commission–The federal agency which regulates the telecommunication industry. All Toshiba hardware is FCC listed or approved.
HDCB	Electronic Door Phone/Lock Control Unit–A peripheral hardware unit compatible with designated electronic telephone circuits that supports optional door phones (MDFBs) and provides door lock control.
HDSS	Electronic Direct Station Selection Console–A device that helps facilitate the processing of a heavy load of incoming calls. The HDSS console connects only to designated electronic telephone circuits, and is associated with electronic telephones.
HESB	External Speaker Box–A speaker/amplifier that can be configured with the system to provide a variety of functions, such as a paging speaker and/or Background Music (BGM) speaker.
HESC-65A	A cable used to connect an HHEU-equipped digital telephone or an HHEU- equipped electronic telephone to the external speaker box (HESB) for the Loud Ringing Bell feature.
HHEU	Headset/Loud Ringing Bell Interface–Subassembly that fits inside a digital telephone or a 6500-series electronic telephone to allow a headset or an external speaker box (HESB) to be connected to the telephone.
HPFB	Optional Reserve Power Battery Charger (DK14)–One or two can be connected to the power supply to maintain normal operation during a power failure.
HVSU2	Subassembly that fits into a 6500-series electronic telephone enabling it to receive Off-hook Call Announce (OCA) calls. The telephone must be connected to an Electronic Telephone Interface Unit (PEKU) or a Standard Telephone/Electronic Telephone Interface Unit (PESU) equipped with an Off-hook Call Announce Subassembly (EOCU) to receive OCA, and must have three-pair wiring.
ISDN	Integrated Services Digital Network.

Term	Definition
IMDU	Remote Maintenance Modem Subassembly–A subassembly installed on an Option Interface Unit (PIOU or PIOUS) that allows the system to be connected with a remote administration/maintenance terminal or DK Admin/DK Backup personal computer.
K5RCU3	Dual-Tone Multi-Frequency (DTMF) Receiver/ABR Tone Detector Unit–An optional PCB installed on the TMAU motherboard. The K4RCU3A 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 it is required for Direct Inward System Access (DISA) and DID. The K4RCU3A circuits are also used to detect busy tone for the Automatic Busy Redia (ABR) feature and must be installed to allow ABR to operate.
KCDU	CO Line/Digital Telephone Interface Unit (DK40)–The KCDU has two loop start CO line circuits and four digital telephone circuits. The KCDU digital telephone circuits can support all but one of the devices supported by either the PDKU or Base Unit integrated digital telephone circuits: digital telephones, PDIU-DIs/PDIU D12s, PDIU-DSs, ADMs, DDCBs and RPCIs.
KKYS	Modular add-on key or integrated circuit that installs onto the K4RCU3 to add the auto attendant feature to the DK40.
KSTU2	The optional PCB provides four standard telephone circuits and it can only be installed in the base unit. The KSTU2 supports the two-wire devices such as standard telephones, Auto Attendant devices, voice mail machines, and facsimile machines. The KSTU2 can also support an alternate Background Music (BGM) source on circuit four.
LATA	Local Access and Transport Area.
LCD	Liquid Crystal Display–The optional display on digital and electronic telephones that displays calling information.
LCR	Least Cost Routing.
LDI	Long Distance Information.
LED	Light Emitting Diode–Status indicators located on printed circuit boards (PCBs), digital telephones, and electronic telephones.
LSI	Large Scale Integration–Related to circuit design technology. Strata DK system printed circuit boards (PCBs) use LSI circuit design.
MDF	Main Distribution Frame–The wiring frame usually located in a phone closet.
MDFB	Door Phone Box-A peripheral two-way speaker box option.
МОН	Music-on-Hold–Customer-supplied music or announcements can be sent to parties on-hold on CO lines or the intercom.
NDTU	Toshiba 30-foot cable that connects the RDTU to the KSU.

Term	Definition
NT-1	Used in ISDN. Network Termination device that powers a U-interface ISDN line and enables multiple S/T ISDN devices to connect to it. The NT-1 must be UL-listed (U.S.) or CSA-certified (Canada).
OCA	Off-hook Call Announce. There are two types: Handset OCA and Speaker OCA.
OPS	Off-premises Station.
РВТС	A Toshiba-supplied cable used to connect customer-supplied batteries to a cabiner power supply in a one- or two-cabinet system for emergency reserve power for the entire system.
РВХ	Private Branch Exchange–Industry-standard term which refers to a telephone switch, usually on-premises, which serves an individual company, and is connected to a public telephone exchange through the Central Office (CO).
РСВ	Printed Circuit Board.
РСМ	Pulse Code Modulation-A widely-used form of digital telephone switching.
PCOU	CO Line Interface Unit–An optional PCB (an older version of RCOU) that provide the system with four loop start CO lines. Supports Caller ID when used with RCI RCIS circuits.
PDIU-DI2	Integrated Data Interface Unit–Replaces the normal digital telephone base so that the telephone can be used for the transmission and reception of data between a terminal/personal computer connected to the telephone and devices connected to other PDIU-DIs or to modems, printers, and computers which are in turn connected to PDIU-DSs. The PDIU-DI is also used to provide personal computer auto dialir of voice calls without a modem; and, access to outside dial-up data services and/o bulletin boards via modem pooling.
	Note Replaced by RPCI-DI.
PDIU-DS	Stand-alone Data Interface Unit–Used for modem pooling, printer sharing, and accessing host/mainframe computer.
PDKU2	Digital Telephone Interface Unit–An optional PCB that provides the system with eight digital telephone circuits. In addition to digital telephones, the PDKU can support data interface units (stand-alone and integrated), a digital DSS console (DDSS), RPCI, ADM, and a digital door phone/lock control unit (DDCB).
[PDN]	Primary Directory Number.
PEKU	Electronic Telephone Interface Unit–An optional PCB that provides the system with eight electronic telephone circuits, which can support electronic telephones, Background Music source, a door phone/lock control unit (HDCB), an electronic DSS console (HDSS), and amplifiers for two CO-line conference calls. The PEK is also used with older Strata systems.
PEMU	E & M Tie Line Unit–An optional PCB (an older version of REMU) that provide the system with support for four E & M Type I tie lines. The PEMU is also used with older Strata systems.

Term	Definition
PEPU	External Page Interface Unit–An optional PCB that provides support and/or circuit interface mainly for optional hardware peripherals and upgrades associated with external paging functions.
PESU	Standard/Electronic Telephone Interface Unit–An optional PCB that provides the system with a combination of two standard and four electronic telephone circuits. The standard telephone circuits can support standard telephones and optional hardware peripherals, such as voice mail devices and fax machines. Except for the electronic DSS console, the PESU electronic telephone circuits can support the same stations and peripherals that the PEKU does. The PESU is also used with older Strata systems.
[PhDN]	Phantom Directory Number.
PIOU	Option Interface Unit–An optional PCB that provides support and/or circuit interface for optional hardware peripherals and upgrades.
PIOUS	The same as the PIOU, with some exceptions; most notably, the PIOUS has one external paging interface zone, while the PIOU has four.
PORT	A term used to identify a station circuit or CO line circuit location.
PBTC1A-3M	Battery cable that connects reserve power batteries to cabinet RPSU280 power supplies (102 cabinet installations).
РРТС	A Toshiba-supplied adapter–An adapter that is used to connect: an SMDR device, ASCII maintenance terminal, or remote maintenance external modem.
РРТС	A Toshiba-supplied adapter–An adapter that is used to connect: the modular SMDR, SMDI, MIS for ACD, Open Architecture (OA), maintenance ports of the PIOU, PIOUS, RSSU, RSIU, or RSIS to the DB-9 (PPTC-9) connector of a call accounting machine, DK Admin, DK Backup personal computer (PC), SMIS personal computer or Open Architecture personal computer.
РРТС9	Designed to connect directly to the DB9 connector of PC COM ports, while PPTC connects directly to an ASCII terminal female DB25, not a PC COM port male DB25.
PPTC-25F	Used to connect a Call Center Viewer PC or SMIS PC to the RS-232 Strata DK424 MIS port on the PIOU, PIOUS, RSIU, or RSSU.
PSTN	Public Switched Telephone Network.
PSTU2	Standard Telephone Interface Unit–An optional PCB (an older version of RSTU2) with a built-in ring generator that provides interface for eight standard telephones on optional hardware peripherals (voice mail devices, Background Music source, fax machines, etc.). The PSTU2 has a square wave ring generator that can be set for 190V peak-to-peak or 130V peak-to-peak. The PSTU2 is also used with older Strata systems.

Term	Definition
QCDU2	CO Line Digital Telephone Interface Unit (DK14)–Provides one CO line (loop start) circuit and two digital telephone circuits on each PCB. The QCDU2 interfaces with digital telephones, PDIU-DIs/PDIU-DI2s/RPCI-DI, ADMs connected to the telephones and PDIU-DSs, but does not support a DDSS or DDCB console.
QKYS	Auto Attendant Feature Key (DK14)–Provides built-in Auto Attendant software without Program 03 assignments and installs directly onto the QRCU3 PCB.
QSTU2	Standard Telephone Interface Unit (DK14)–Provides two standard telephone circuits (ports) and interfaces with standard telephones, Auto Attendant devices, separate BGM source connections, voice mail machines, and facsimile machines.
QRCU2	DTMF Receiver/ABR Tone Detector Unit (DK14)–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).
RAM	Random Access Memory–Refers to the type of system memory that holds individual system configuration and feature programming. RAM is read/write memory, and can be easily revised in programming.
RATU	Attendant Console Interface Unit–Optional PCB that can support up to four attendant consoles and/or PC attendant consoles.
RBDB	Battery Distribution Box–Interface used to connect reserve power batteries to systems with three or more cabinets (also provides six RBTC1A-1.5M cables to connect RBDB to cabinet RPSU280 power supplies).
RBTC1A-2M	Battery cable that connects reserve power batteries to RBDB battery distribution box (3 or more cabinet installations).
RCCB	Conduit Connection Box–Device required for floor-mounted systems with three or more cabinets to connect AC power and reserve power battery cabling to the system. Cabling from the AC power source and from the reserve power battery source can only be installed by a licensed electrician.
RCIU2/RCIS	Four-circuit plug-in PCB/four-circuit piggy-back PCB, each of which receives and decodes FSK Caller ID (CLID or CND) information from the Central Office ground or loops Caller ID lines. Each RCIU/RCIS circuit works in conjunction with a DK424 RGLU/RCOU/RCOS line PCB circuit.
RCOS	Loop Start CO Line Interface Subassembly–Optional subassembly that attaches to the RCOU PCB to provide four additional CO analog line circuits to the PCB. Supports Caller ID when used with RCIU/RCIS circuits.
RCOU	CO Line Interface Unit–An optional PCB that provides the system with four loop start CO lines. An optional RCOS subassembly can be attached to the RCOU for four more loop start analog CO lines. Supports Caller ID when used with RCIU/RCIS circuits.

Term	Definition
RCTU	Common Control Unit–The system's controller PCB that contains the system's main microprocessor and microprocessor bus, ROM, RAM, time switch logic, busy tone detectors, system tones and MOH/BGM Interface. RCTUs include: RCTUA, RCTUB, RCTUBA/BB, RCTUC/D, and RCTUE/F. Each RCTU supports different station and line capacities. The RCTU PCBs also provide interface for the optional RRCS PCB and RKYS key.
RDDU	Direct Inward Dialing Interface Unit–Optional PCB that provides four analog Direct Inward Dialing line circuits. Supports ANI and DNIS.
RDSU	Digital/Standard Telephone Interface Unit–Optional PCB that provides two standard telephone and four digital telephone circuits in its basic configuration. An RSTS can be attached to the RDSU for two additional standard telephone circuits.
RDTU	T1/DS-1 Interface Unit–Optional PCB that provides up to 24-digital channels that can individually be assigned for loop start CO line, ground start CO line, E & M tie line, or DID line operation. Supports ANI and DNIS.
REMU	E & M Tie Line Unit–An optional PCB that provides the system with support for four E & M Type I or Type II, Immediate or Wink Start tie lines. Supports ANI and DNIS.
RFIF	Floor Mount Installation Kit-Kit that is used to floor mount systems.
RGLU	Analog Ground/Loop Start CO Line Interface Unit–Provides four CO line circuits that can be individually configured for loop start or ground start CO line operation. Supports Caller ID when used with RCIU/RCIS circuits.
RKYS	Feature Key Upgrade (DK424)–Subassembly that attaches to the common control unit to provide the system with optional features. There are four versions of the RKYS: the RKYS1, the RKYS2, the RKYS3 and the RKYS4, each of which provides a distinct set of features.
RMDS	Remote Maintenance Modem Subassembly–A subassembly installed on the RSIU Optional Interface Unit that allows the system to be connected with a remote administration/maintenance terminal or DK Admin/DK Backup personal computer
RPCI-DI	Computer Data Interface Unit–Replaces the normal telephone base and provides all the functions of PDIU-D12. In addition, it can be switched to a second mode automatically and used with a Telephone Application Program Interface (TAPI) software application.
ROM	Read Only Memory–Refers to the type of system memory that holds static software that comprises the mechanics of the features' functions. ROM is only revised by Toshiba software engineers.
RPSB (1 and 2)	Power Strip–Interface between cabinet power supplies and the commercial AC power source. The RPSB provides outlets for three power supplies. One RSPS is required for systems with three or four cabinets, two or three RSPSs for five- or six cabinet systems.

Term	Definition
RPSU280	Cabinet Power Supply–Furnishes power to all of the stations and peripherals connected to the cabinet PCBs. Each Base and optional expansion cabinet has a separate power supply.
RRCS	Dual-tone Multi-frequency Receiver–An optional upgrade to the system common control unit (RCTU) that provides Dual-tone Multi-Frequency (DTMF) receivers for system Direct Inward System Access (DISA) CO lines, E&M tie lines, DID, DNIS and ANI lines, Auto attendant announcement devices, remote change of call forward-external destination, DNIS external call routing, and stations and other peripherals that connect to standard telephone circuits. The RRCS comes in three models: the RRCS-4 (provides four DTMF receivers), the RRCS-8 (eight DTMF receivers), and the RRCS-12 (12 DTMF receivers).
RSIS	Optional RS-232 Serial Interface Unit–A subassembly installed on the RSIU optional interface unit that allows the system to be connected to any of the following features: voice mail SMDI, MIS for ACD, SMDR, local DK Admin/DK Backup personal computer, external maintenance modem, Open Architecture personal computer.
RSIU	Optional RS-232 Serial Interface Unit–An optional PCB that provides interface to any of the following features: voice mail SMDI, MIS for ACD, SMDR, local or remote DK Admin/DK Backup Personal computer, built-in (RMDS) or external system maintenance modem, Open Architecture personal computer. By itself, the RSIU PCB provides one interface port. With up to three RSIU/RMDS subassemblies, it can provide up to four interface ports.
RSTU	Standard Telephone Interface Unit–An optional PCB (an older version of RSTU2) with a built-in ring generator that provides interface for eight-standard telephones or optional hardware peripherals (voice mail devices, Background music source, fax machines, etc.). The RSTU has a built-in 80V RMS sine wave ring generator. The RSTU also has connectors for the R48S, which extends station loop length and is described in this section.
RSTU2	Standard Telephone Interface Unit–An optional PCB functionally identical to the RSTU. RSTU2 also contains a 90-volt DC message waiting/generator/switching circuit to operate standard telephone message waiting lamps.
RWBF1	Wall bracket Fixture–Bracket that is part of an installation kit (RFIF) that is used to floor mount systems.
RFMF	Floor Mount Fixture–Fixture that is part of an installation kit (RFIF) that is used to floor mount systems.
R48S	Optional 48V Power Supply–Subassembly that can be connected to the RSTU or RDSU to extend the loop length of standard telephone circuits (including the resistance of the phone) from 600 ohms to 1200 ohms.
[SDN]	Secondary Directory Number.

Term	Definition
SMDI	Simplified Message Desk Interface: RS-232 link from PIOU, PIOUS, RSSU, RSIS, or RSIU modular jack connected to a voice mail machine to provide Strata DK voice mail integration.
SMIS	Software MIS for ACD.
SSTU	Factory-installed sub-unit board that is "piggy-backed" onto the PSTU or PSTU2.
T1/DS-1	See RDTU.
TCIU2	Caller ID–An optional PCB that provides the Caller ID option in the Strata DK40
TCOU	Four-Circuit Loop Start CO Line Board– An optional PCB providing four loop start CO line circuits in the Strata DK40.
TDDU	Four-Circuit DID Line Digital Telephone Interface Unit– An optional PCB providing four DID line circuits in the Strata DK40.
TSIU	RS-232 Ports–An optional PCB that provides up to two RS-232 interface ports (modular jacks) enabling the DK40 to connect to various hardware devices.
TTY	Flexible RS-232 port which can be used for maintenance SMDI and MIS (ACD).
universal slot	Slots in a telephone KSU/cabinet that are used for a variety of optional PCBs.
WSIU	Serial Interface Board (DK14)–Provides two serial ports for either a Station Message Detail Recording (SMDR) device or a maintenance terminal or modem, or Caller ID interface.

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