Strata AirLink™

Digital Business Telephone Systems

Wireless Systems
Installation Guide

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Introduction

This installation guide describes Strata AirLink™ wireless systems. It provides detailed step-by-step instructions for installing, maintaining and troubleshooting the product line. It is intended for qualified Service Technicians (Installers).

Organization

This guide contains the following information:

♦ **Chapter 1 – The Grand Tour** covers the Strata AirLink system components.

♦ **Chapter 2 – Pre-installation** gives procedures that must be performed prior to installing the Strata AirLink system.

♦ **Chapter 3 – BSIA System Installation** contains information on installing the Strata AirLink External Wireless system.

♦ **Chapter 4 – RWIU System Installation** contains information on installing the Strata AirLink Integrated Wireless system.

♦ **Chapter 4 – Maintenance and Troubleshooting** provides instructions for basic maintenance and troubleshooting operations for the Strata AirLink systems.

♦ **Appendix – Specifications** covers Base Station and Handset specifications, grounding requirements, and FCC, UTAM, Inc. and Underwriters Laboratories (UL) regulations.

♦ **Glossary/Index**

Conventions

This manual uses these conventions:

Conventions	Description
Note	Elaborates specific items or references other information. Within some tables, general notes apply to the entire table and numbered notes apply to specific items.
Important!	*Calls attention to important instructions or information.*
CAUTION!	**Advises you that hardware, software applications, or data could be damaged if the instructions are not followed closely.**
WARNING!	**Alerts you when the given task could cause personal injury or death.**
`Courier`	Shows a computer keyboard entry or screen display.

Conventions	Description
Helvetica Bold	represents tokens. For example: **M( )**.
Italics	represent parameter and menu/screen field names, and book titles. For example: *hot_box* parameter, *Extension* field.
"Type"	Indicates entry of a string of text.
"Press"	Indicates entry of a single key. For example: Type **prog** then press **Enter**.
Plus (+)	Shows a multiple PC keyboard or phone button entry. Entries without spaces between them show a simultaneous entry. Example: **Esc+Enter**. Entries with spaces between them show a sequential entry. Example: **# + 5**.
Tilde (~)	Means "through." Example: 350 ~ 640 Hz frequency range.
➤	Denotes the step in a one-step procedure.
➤	Denotes a procedure.
See Figure 10	Grey words within the printed text denote cross-references. In the electronic version of this document (Library CD-ROM or FYI Internet download), cross-references appear in blue hypertext.

Action/Response Table

1. *Actions* you perform appear in this column. They can consist of either a single step or a series of numbered steps.

2. When the action you perform results in a screen, menu, etc., the screen displays to the right.

The *immediate response to the action* performed appears in this column. Additional notes and comments are also included.
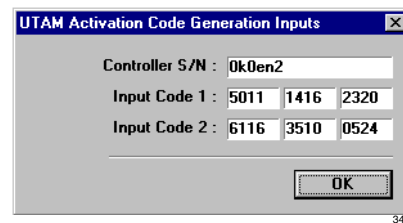
Related Documents/Media

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

General Description

♦   Strata DK General Description

Installation and Programming

♦   Strata DK Installation & Maintenance Manual

♦   Strata DK Programming Manual

Feature Description

♦   Strata DK Feature Description Manual

User Guides/Quick Reference Guides for:

♦   Strata AirLink External Wireless Handset User Guide

♦   Strata AirLink External Wireless Quick Reference Guide

♦   Strata AirLink Integrated Wireless Handset User Guide

♦   Strata AirLink Integrated Wireless Quick Reference Guide

CD-ROM

♦   Strata DK Library CD-ROM

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

The Grand Tour 1

This chapter tells you how wireless calls take place and gives you the basic system configurations.There are two available configurations:

♦ **Strata AirLink External Wireless System –** The basis for this system is the Base Station Interface Adapter (BSIA) system that interfaces to Strata DK systems and many non-Toshiba systems using the standard telephone ports.

♦ **Strata AirLink Integrated Wireless System –** The basis for the integrated version is the RWIU system that interfaces to Strata DK16, DK16e, DK40, DK40i, DK280, DK424 and DK424i using a proprietary RWIU Printed Circuit Board (PCB).

Strata AirLink operates in single building and campus environments in the 1920~1930 MHz band. This bandwidth is designated by the Federal Communication Commission (FCC) for unlicensed operation, and an FCC license is not required to install and operate the system.

How Wireless Calls Take Place

Wireless telephone calls are similar to other calls that take place in a telephone system, except that a Radio Frequency (RF) link is used from a Base Station.

The BSIA/RWIU and handset are assigned unique identification (ID) numbers. The handset must have a BSIA/RWIU ID before it can communicate with a Base Station. Up to eight system IDs can be programmed into a handset enabling operation in multiple wireless systems.

Receive Calls

The BSIA/RWIU receives a call for a specific handset and sends the call to all Base Stations. The handset responds to the Base Station to which it is locked. The Base Station establishes an RF link to the BSIA/RWIU, and the call proceeds like any other call.

Make Calls

When you make a call, the handset locks onto a channel on the Base Station. The Base Station transmits the calling information to the BSIA/RWIU, and the call proceeds as any other call.

Terminate Calls

When you end a call, a signal is sent to the BSIA/RWIU freeing a voice channel and changing the handset to standby. The BSIA/RWIU sends a release message to the Base Station and the RF link is terminated.

System Configurations

The BSIA system supports up to two Base Stations and one BSIA or controller. The RWIU system supports up to four Base Stations and interfaces directly to the Strata DK system without using a controller. Both systems support up to 32 handsets.

Base Station

Each Base Station (see Figure 1) provides 4 or 8 simultaneous speech paths and up to 320,000 square feet of calling coverage for either system. Since handsets are not in continuous conversation, a system can support more than 8 handsets, up to a maximum of 32. Multiple systems can be active simultaneously.

The Base Station has radio transmitters and receivers that relay calls between the BSIA or RWIU, handsets, other telephones and trunks. It has four external antennas that enable the best choice for receiving and transmitting the strongest signal.

Figure 1   Base Station

The Base Stations can be mounted on walls or ceilings up to 2,000 feet from the system, using twisted-pair continuous cable. They receive power directly or locally. If powered locally, they can be installed up to 3,300 feet from the system. LEDs provide diagnostic information for System Administrators or technical personnel (see Table 23 on Page 82).

In typical office environments, each Base Station has a broadcast range (see Figure 2) of up to 300 feet. They can also be placed one meter apart in the same coverage area to increase traffic capacity without interference.

The Base Station software is easily upgraded from the BSIA or RWIU, simplifying system administration and eliminating the need to remove the Base Stations for system upgrades.
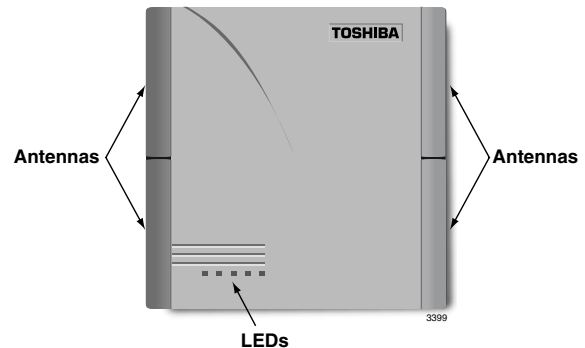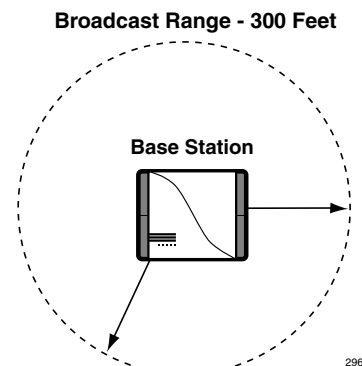
Figure 2   Broadcast Range

Handset

The handset is small, lightweight, and easy to use. Its Liquid Crystal Display (LCD) shows alphanumeric information and icons that report status. It has many features depending upon the interfacing telephone system. The handsets used with the RWIU system have many of the same Strata DK Digital Telephone (DKT) features.

Unique Electronic Serial Numbers (ESNs) are programmed into the handsets at the factory and are automatically configured the first time a call is made.

Wireless Manager Software

There is a version of manager software for each of the wireless systems: Strata AirLink BSIA Manager Software and RWIU Manager Software. The software enables you to configure the wireless system from a PC desktop. See Step 7, "Install Strata AirLink Manager Software" on Page 24 and Step 12, "Install RWIU Manager" on Page 52 for installation instructions.

Strata AirLink BSIA Manager Software

The Strata AirLink BSIA Manager software is a Windows 95 application that includes:

♦ Easy-to-use Desktop Toolbar for navigation

♦ Configuration Window for setting system parameters and handset features

♦ Status Window to view system alarms

♦ Upgrade icon for immediate upgrades to the BSIA and Base Stations

♦ Viewable or printable log files

♦ Online Help

Desktop Toolbar

When you open the Strata AirLink BSIA Manager software from its Program Group, the Desktop Toolbar displays (shown at the right).

Use this toolbar to easily configure the system, access the Status Window, upgrade the system, edit and save log files, access online Help, and exit the program. The toolbar can be placed anywhere on your desktop.
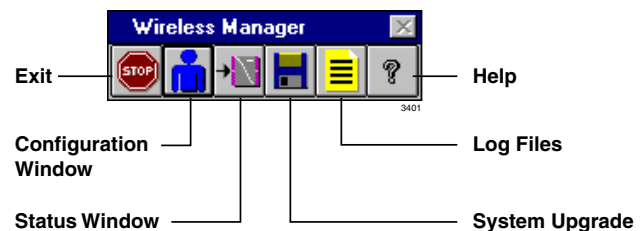
Configuration Window

The Configuration Window accesses the databases that set system parameters, user settings, and feature button sequences. The button sequences enable the handsets to use the office telephone system features.

Status Window

The Status Window, accessed from the Desktop Toolbar, gives you valuable system activity information. It is an excellent troubleshooting tool. You can check the status of Base Stations, lines, and calls. You can also clear critical alarms and make a software version inquiry.

Strata AirLink RWIU Manager Software

The Strata AirLink RWIU Manager software is a Windows 95 application that includes:

♦ Easy-to-use Desktop Toolbar for navigation

♦ Configuration Window for setting the system ID, handset IDs, time and date, and communication ports

♦ Status Window to view software versions, log messages, reset the Base Stations and/or the RWIU

♦ Software Upgrade Window for immediate upgrades to the RWIU and Base Stations

Desktop Toolbar

When you open the Strata AirLink RWIU Manager software from its Program Group, the Desktop Toolbar displays (shown at the right).

Use this toolbar to easily configure the system, access the Status Window, upgrade the software, activate UTAM, and exit the program. The toolbar can be placed anywhere on your desktop.

Pre-installation

2
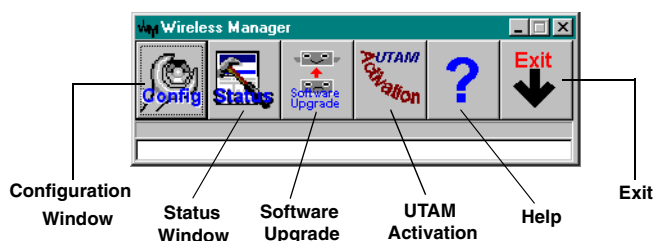
This chapter provides common step-by-step pre-installation procedures and several sample configurations for both Strata AirLink Wireless systems. The configurations range from a single system with one or two Base Stations to multiple-overlapping systems. The anticipated coverage of 320,000 square feet per Base Station and a maximum number of 32 users for each system was used to layout the samples.

It is highly recommended that a site survey and BER test be conducted to assist in the careful planning of Base Station placement, ensuring the highest possible quality of coverage. The survey should include:

♦ Location of Base Stations

♦ Maximum broadcast range required from any Base Station

♦ High traffic areas and general coverage areas, such as conference rooms, cafeterias, and manufacturing floors

♦ Obstructions between Base Stations and handsets

♦ Office locations and number of handsets within each location

♦ Construction materials used in walls, including the insulation, and floors between multistory buildings

♦ Window coatings and coverings

♦ Large metal objects, such as equipment, doors, and fluorescent lamp shades

♦ Distance of Base Stations from the BSIA or RWIU

There are special installation requirements to meet Underwriters Laboratories (UL) 1459 regulations in the United States that are explained in the "Underwriters Laboratories (UL)" on Page 102.

Step 1: Check System Hardware and Software Requirements

Table 1 lists the minimum hardware and software that your PC must have to use the Strata AirLink Manager software.

Table 1   Hardware and Software Requirements

	Minimum	**Recommended**
Hardware	386DX 33 MHz	486DX2 66 MHz
Hard Drive	1.5MB	3MB
Random Access Memory (RAM)	4MB	8MB
Video	VGA	SVGA
Mouse	Any supported by Windows	Same
Floppy Drive	1.44 MB 3.5 inch	Same
Software	Microsoft Windows 3.11/3.1	Windows 98/95

Important!   *Windows 3.11/3.1 is a 16-bit application and the Manager software is 32-bit. To run the Manager software, a special 32-bit support expansion is required.*

Step 2: Review System Component Placement

A review of component placement before installation will help to reduce or eliminate attenuation. Attenuation is loss of RF signal strength due to distance, antenna positioning, and/or obstructions. The loss is measured in decibels (dBs).

Increases or reductions of three dBs result in doubling or halving signal strength. Try to limit the total loss to 100 dBs (see Figure 3).

dB

| Power: | -30 | -50 | -62 | -78 | -90 |
| Loss: | 40 | 60 | 72 | 88 | 100 |

Base Station

| 1 | 10 | 20 | 50 | 100 |

Distance in Meters

2974
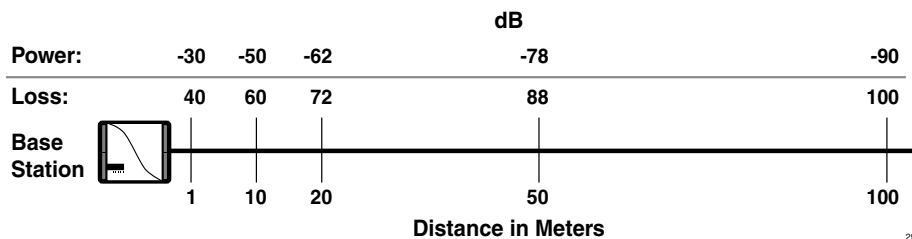
Figure 3   Loss of Signal Strength by Distance (Direct Line of Sight)

Table 2 shows attenuation obstruction caused by common materials in a building.

Table 2   Signal Attenuation Obstruction

Object	Approximate dB Loss
Concrete	20
Concrete with metal siding	30
Brick	15
Plaster	10
Walls with windows	10
Walls with metal coating	20
Venetian blinds Open Closed	 10 20
Soft partitioning	3 to 4

➤ **To reduce or eliminate attenuation and fading**

1. Begin the signal path without obstructions even though signals can travel through obstacles (see Figure 4).

2. If obstructions cannot be avoided, do not place the Base Stations:

    ♦ On or near metallic objects or on walls that have metallic content such as metal girders or foil-backed insulation.

    ♦ Near large obstructions; for example, doors that could temporarily obstruct antennas when the doors open.

3. Place components in locations that ensure clear line of sight signaling between the Base Station and handset.
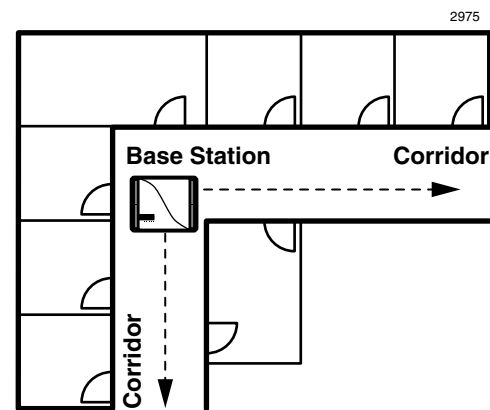
Figure 4   Maximum Line of Sight

Note   In general, for optimum coverage and reduced signal fading, it is recommended that the coverage by the Base Station overlap by approximately 25 percent. Base Stations are designed to automatically use frequencies that are not already in use, so interference between the Base Stations is not a problem.

4. Plan coverage for each floor separately in multi-story environments. A single Base Station can support multiple floors. The guidelines for ensuring proper broadcast ranges and maximum traffic must be followed.

5. Consider the high traffic areas and install the number of Base Stations required to meet the estimated traffic demand. When multiple Base Stations are needed in the same location, you can mount Base Stations as close as one meter apart.

Each Base Station can support eight or more simultaneous conversations. Figure 5 shows 2 Base Stations supporting 32 handsets in a manufacturing area.

6. Use corridors because they can act as natural pathways for RF signals. When trying to cover two types of areas, place a Base Station near a corridor to optimize coverage in both areas.

Note Handoff does not operate between Base Stations connected to different wireless systems.
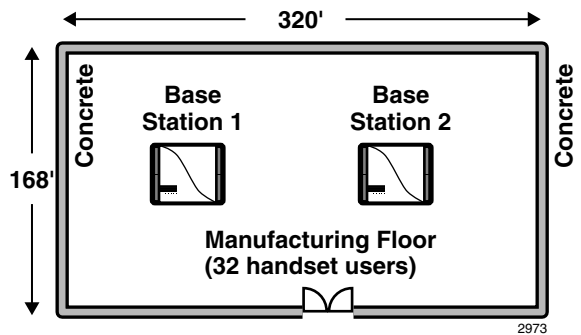
Figure 5   **Increasing Traffic Capabilities**

Step 3: Review Possible System Configurations

It is highly recommended that you follow the installation guidelines and examples in this step. The maximum number of Base Stations that the BSIA system supports is two, and the RWIU system, four.

Some configurations are:

♦ Single BSIA system with two Base Stations or single RWIU system with four Base Stations

♦ Multiple BSIA systems as a single system

♦ Multiple overlapping systems

♦ Factory with adjoining offices

♦ Manufacturing plant

♦ Cubicles, walled offices, and conference rooms

Single BSIA System with Two Base Stations/Single RWIU System with Four Base Stations

Single BSIA system with two Base Stations (see Figure 6) or single RWIU system with four Base Stations (see Figure 7). The Base Stations are placed in locations that optimize the requirements of the system. For example, the Base Stations could be placed in the same general area or on separate floors, but with overlapping coverage
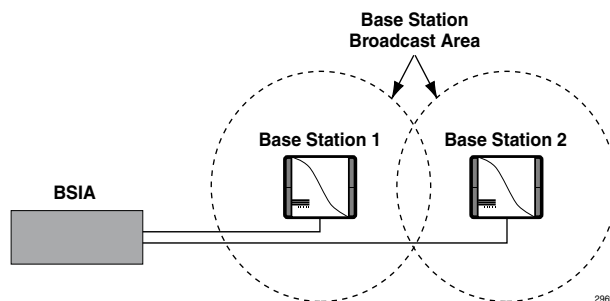
Figure 6   **BSIA System with Two Base Stations**
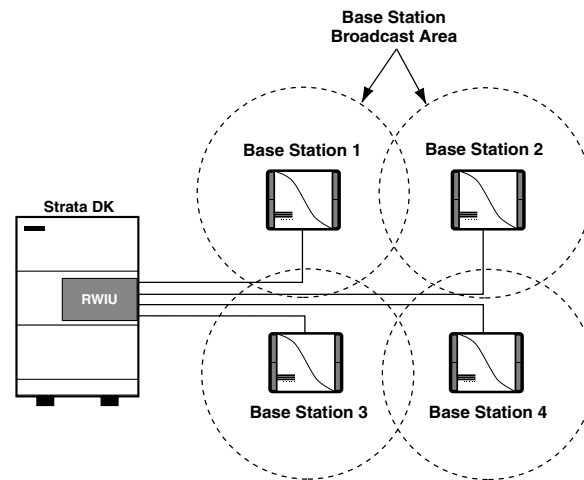
3731

Figure 7   RWIU System with Four Base Stations

Multiple BSIA Systems as Single System

This configuration (see Figure 8) creates a system with greater coverage area. The handsets must be programmed with both system IDs. Users can place and receive calls, although handoff does not automatically operate between Base Stations connected to different BSIAs. Manually invoke handoff by using **FLSH** to hold the call while moving between Base Station 4 and 2, for example.

System Identification numbers (SIDs) for both BSIAs must be programmed in the handset for this operation.)
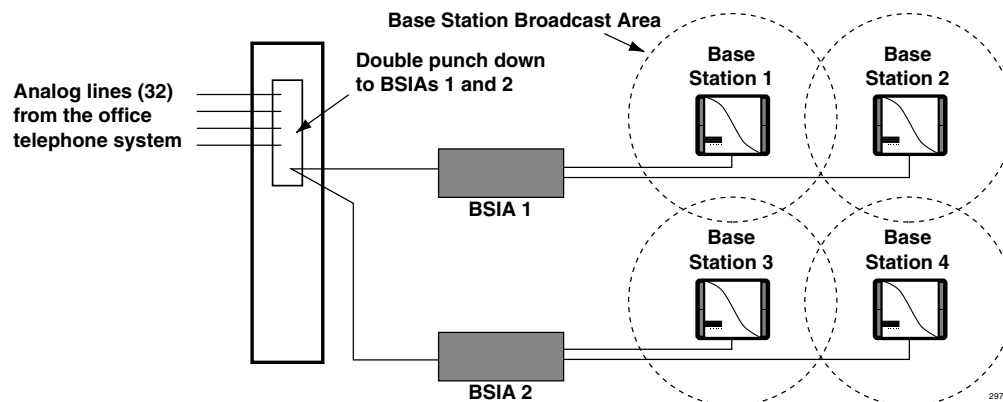
2971

Figure 8   Multiple BSIAs in One System

Multiple Overlapping Systems

Multiple overlapping configurations (see Figure 9) create a system with greater user capacity. This configuration works for the BSIA or RWIU systems.

Use Table 3 to determine how many Base Stations are needed to accommodate the numbers of users at different traffic levels.

Note   It is assumed that users have access to all Base Stations in a high-traffic environment where only one call is blocked out of 100 attempts.
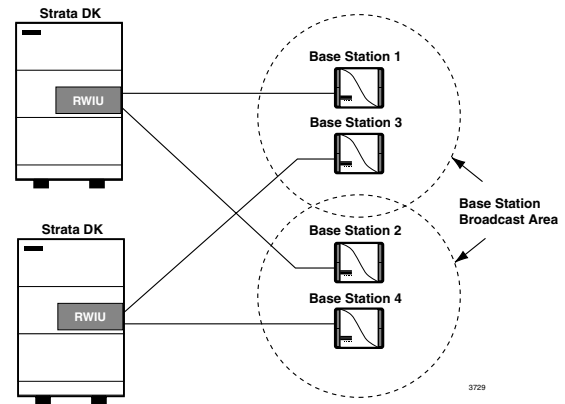
Figure 9   Multiple Overlapping Systems

Table 3   Base Station Traffic Requirements

Erlangs[1] Per User	Number of Users	Total Erlangs	Equivalent CCS[2]	Required Channels	Base Stations Required
.1	10	1	36	5	1
	20	2	72	6	1
	30	3	108	8	1
	32	3.2	115.20	8	1
.15	10	1.5	54	6	1
	20	3	108	8	1
	32[3]	4.8	172	11	2
.2	10	2	72	6	1
	16	3.2	115.20	8	1
	32[3]	6.4	230.4	13	2

1. Typical usage assumes .1, .15, and .2 Erlangs (6 minutes, 9 minutes, and 12 minutes, respectively, where 1 Erlang equals 60 minutes of usage) per line during the busiest hour of the day.

2. CCS stands for centi-call seconds, or 100 seconds of telephone conversation.

3. Assumes Base Stations are co-located.

Factory with Adjoining Offices

Both Base Stations are placed in the factory area (see Figure 10) to accommodate the greater number of users in that area.

Place Base Station 2 closer to the offices, maximizing line of sight signal through the doorway.

This is especially important if the wall between the offices and factory is concrete.

The Base Stations are also mounted on the ceilings and away from any potential obstructions to the antennas.

If a second area was available to the left of the factory, moving Base Station 1 to that location would broaden the coverage to users in that area also.
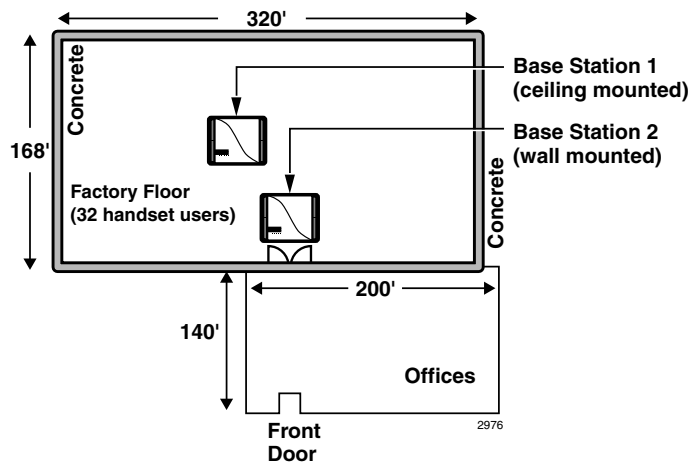
Figure 10   System with a Factory and Adjoining Offices

Manufacturing Plant

The entrance from the manufacturing area into the cafeteria is a high-traffic area.

Placing a Base Station (see Figure 11) in the entry area of the cafeteria blocks the line of sight to the other areas in the cafeteria.

Locate Base Station 2 centrally in the cafeteria and Base Station 1 in the manufacturing area. Align Base Station 2 with the entrance of the cafeteria to provide coverage into that area.
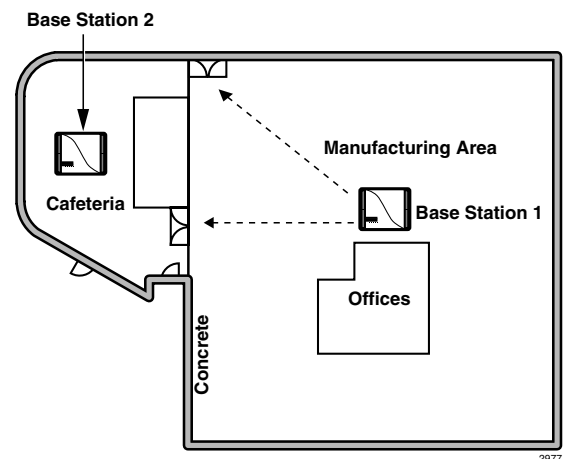
Figure 11   System in a Manufacturing Area

Cubicles, Walled Offices, and Conference Rooms

Although the number of Base Stations in this environment would depend on the number of handsets, the Base Stations are aligned with corridors to maximize the line of sight (see Figure 12).

Instead of placing both Base Stations close to each other, place Base Station 1 near the conference rooms and entrance area to accommodate greater potential traffic in these areas.
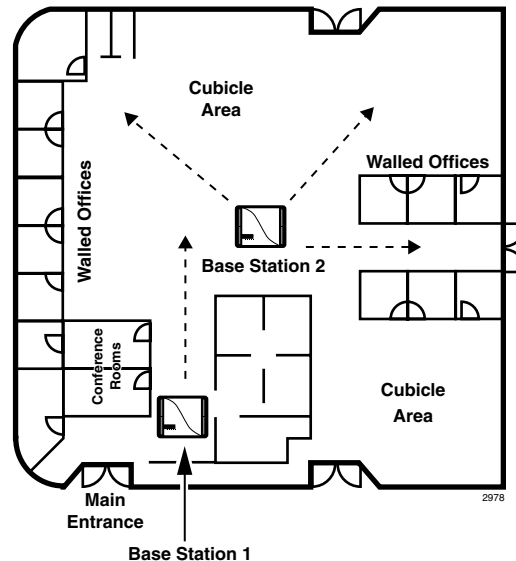
Figure 12   Office Area with Cubicles and Walls

Step 4: Unpack Shipment

1. Inspect all packages carefully and note any visible damage when the system first arrives. If any damage is found, do not open the packages. Contact the delivery carrier immediately and make the proper claims.

2. Unpack all of the packages.

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

Step 5: Check Equipment List

1. Before installation, check the system components against the packing list and inspect all equipment for damage. If equipment is missing or damaged, contact the supplier immediately.

2. Ensure that the following Toshiba-supplied equipment was delivered:

   ♦ BSIA or RWIU PCBs

   ♦ PC cable with DB9 or DB25 adapter (BSIA)

   ♦ RWIU Manager interface cable (6-pin connector)

   ♦ Power supplies

   ♦ Optional power supply for locally powered Base Stations

   ♦ Base Stations, handsets, and Charger Bases

   ♦ Strata AirLink Manager and RWIU Manager software (two floppy disks)

Step 6: Purchase Additional Equipment

➤ Ensure that the following equipment has been purchased:

♦ PC (for the Strata AirLink Manager software)

♦ BSIA grounding wire (for gauge requirements, see Table 37 on Page 99)

♦ BSIA external alarm (see Page 21 for specifications)

♦ Cable for the Base Stations (see Page 20 for specifications)

♦ ONEAC five-pin analog protector for outside Base Station installation

Step 7: Select Suitable Locations

1. Pick locations for your system components that are dry and clean, well ventilated and illuminated, and easily accessible.

   The indoor/outdoor locations must not be subject to:

   ♦ Extreme heat or cold

   ♦ Corrosive fumes, dust, or other airborne contaminants

   ♦ Excessive vibration

2. Do not place the components next to televisions, radios, or high-frequency equipment.

Step 8: Set Up Temporary Installation

Important! *It is recommended that you use the Toshiba Stand-alone Base Station Test Stand instead of setting up a temporary installation. If the test stand is used, skip this step and go to Step 2.*

Setting up a temporary installation helps to determine proper Base Station placement without permanently cabling any components. A BER test can be easily conducted to determine the proper Base Station placement for maximum signaling. The BER test is a password-protected function of an initialized handset.

One BSIA or RWIU, one Base Station, and one handset is all that is required to conduct the BER test. To initialize the BSIA system, see Steps 7~9 on Page 24. To initialize the RWIU system, see Step 2 on Page 52.

Step 9: Use Stand-alone Base Station Test Stand

The Stand-alone Base Station Test Stand verifies the Base Station positioning prior to system activation or during the site survey. It generates an audible tone for the handset to lock onto, verifies BER status, and can be moved to validate the best locations for each Base Station.

Substep A: Before You Begin

➤ Ensure that the following materials are available:

♦ Strata AirLink Stand-alone Base Station Test Stand

♦ Base Station power supply with cord

♦ One or more handsets with batteries fully charged

♦ Floor plan of the facility to survey

Substep B: Set Up Base Station

1. Determine the best location for a Base Station. See "Review System Component Placement" on Page 6 for more information.

2. Temporarily place the Stand-alone Base Station Test Stand as close as possible to the selected Base Station location with the proper orientation (vertical or horizontal).

Note When testing with a Base Station, be sure to rotate all four antennas to a 90° angle.

3. Plug the Base Station power supply into the +5VDC connector of the test stand (located on the bottom) and into a 110VAC outlet.

4. Watch the LEDs on the front of the test stand until all red LEDs are out and only the green LED is lit.

Substep C: Set Up Handsets

1. Make sure that your handsets are fully charged.

2. Press **PWR** to turn on a handset.

3. Enter **10** and press **FCN** to access System Configuration.

```
S Y S T E M
C O N F I G
            1 2 : 1 5
[====]        |||||
```

4. Press **FCN** again.

```
S I D # 0
            1 2 : 1 5
[====]        |||||
```

5. Enter **7171**.

6. Press ▼ (right of **ABC**).

```
H I D # 0
            1 2 : 1 5
[====]        |||||
```

7. Enter **1**.

8. Press **END**. The handset returns to idle.

9. Repeat Substeps 1~8 for each handset, substituting a different HID number (for example, 2, 3, 4, 5, etc.) in Substep 7.

Substep D: Audio Coverage Test

Important! *Strata DK must recognize DTMF signaling, if you have a BSIA. Strata DK requires a DTMF receiver PCB to support the RSTU ports.*

1. Press **PWR** to turn on the handset.

2. Press **CALL**.

3. Listen for continuous tone while walking around the facility observing coverage area boundaries.

4. Mark the floor plan where the continuous tone "warbles" (indicating the beginning of a handoff overlap area) and where the continuous tone "breaks" or stops (indicating the end of the coverage area).

5. Press **END**. The handset returns to idle.

Substep E: Perform Handset Bit Error Rate (BER) Test

1. Simulate real use rather than trying to get the best readings by:

   ♦ Perform tests in all possible areas that users may carry their handsets.

   ♦ Remain in an area long enough to get an accurate reading. BER readings can take a few seconds to register. It is recommended that you stand still for an accurate reading.

   ♦ Test specific Base Stations. Handsets do not perform handoff during BER tests so that you can test each Base Station

2. In idle mode, press **##****.

3. Press **ABC**, then **CALL**.
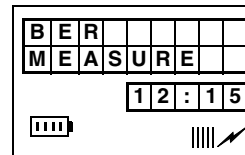
4. Make a 360 degree circle to check the signal from different directions.

```
┌───────────────────┐
│ H S │ │ │ │ M A X │
│ B S 0 2 │ G O O D │
│     │ 1 2 : 1 5 │
│ ▭▭ │     ▥▥▥╱ │
└───────────────────┘
```
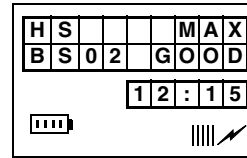
See Table 4 for BER test readings. In the example above, **02** indicates the Base Station ID, **MAX** is the handset receive signal, and **GOOD** is the Base Station receive signal.

5. Keep the handset slightly raised.

Important! *Mark the floor plan where the LCD permanently changes from **MAX** to **GOOD** (indicating the beginning of the handoff overlap area) and where the LCD permanently changes from **GOOD** to **POOR** (indicating the end of the coverage area).*

6. Walk while performing the test, but pause occasionally for the best readings.

7. Press **END**.

Table 4   Explanation of Possible BER Test Results

BER Result	Description
Max or Good	Values required for clear conversation.
Poor	Call setup is not advisable, although calls in progress could survive.
Bad	Area is not sufficiently covered to support call traffic. Relocate other Base Stations or put up another Base Station.
Mismatched values (e.g., good/bad)	Faulty equipment or interference close to the handset or Base Station.

Step 10: Mount Base Stations

1. Determine a location (see "Set Up Temporary Installation" on Page 13) that provides the best coverage before mounting the Base Station permanently.

2. Use locations that reduce attenuation and create a clear line of sight.

3. Always mount the Base Stations in a centralized location in open, symmetrical areas.

Note   Base Station placement guidelines are provided in "Review Possible System Configurations" on Page 8.

➤ **To ceiling mount the Base Station**

1. Rotate Base Station antennas to expose the mounting tabs (see Figure 13).

2. Mark the mounting tab position on the ceiling by holding the Base Station in place to use as a guide for drilling.

3. Drill the four holes in the ceiling.
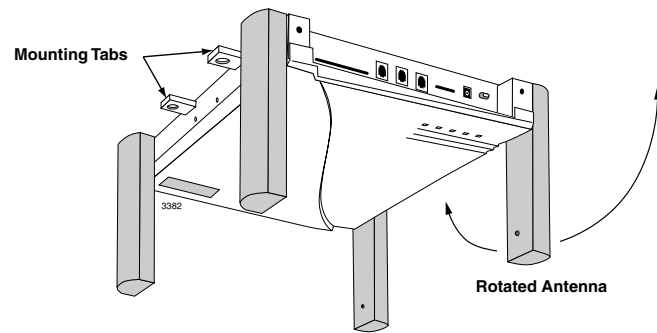
Figure 13   Mounting Tabs Location on the Base Station

Important!   *Do not mount Base Stations on movable surfaces such as acoustic drop ceilings. Mounting a Base Station above a non-metallic dropped ceiling is acceptable.*

4. Insert anchors into the drilled holes.

5. Insert #8 screws in the anchors, leaving a gap between the ceiling and screw head.

6. Mount the Base Station on the screws and tighten the screws.

7. Rotate the antennas so that they are perpendicular to the Base Station (facing down).

➤ **To wall mount the Base Station**

1. Choose a location that is in a corridor or non-symmetrical area and faces the greatest coverage area.

2. Mount the Base Station midway between the floor and permanent ceiling, but above any obstructions such as cubicle walls.

3. Rotate the Base Station antennas to expose the mounting tabs (see Figure 14).

4. Mark the mounting tab position on the ceiling by holding the Base Station in place to use as a guide for drilling.

5. Drill the four holes in the wall.

6. Insert anchors into the drilled holes.

7. Insert #8 screws in the anchors, leaving a gap between the wall and screw head.

8. Mount the Base Station on the screws and tighten the screws.

9. Rotate the Base Station antennas so that they are perpendicular to the wall
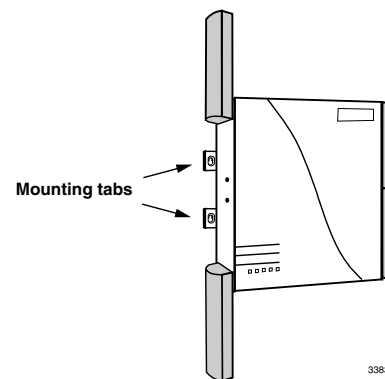
Figure 14   Location of Mounting Tabs

For specific installation procedures for the BSIA system, see Chapter 3 – BSIA System Installation and for the RWIU system, see "Maintenance and Troubleshooting" on Page 71.

BSIA System Installation 3

This chapter describes specific installation steps for the BSIA system. It interfaces to Strata DK16, DK16e, DK40, DK40i, DK280, and DK424 and many non-Toshiba telephone systems using standard telephone ports.

Step 1: Install Analog Line Module (ALM)

Note   Skip this step and go to Step 2 if ALM PCB was not purchased.

The BSIA motherboard comes configured to support a maximum of 8 handset users (upgradeable to 16, 24, or 32). Additional groups of eight users can be installed using the ALM PCB.

CAUTION!   **When installing, removing, or examining PCBs, do not touch the soldered (back) side or "gold" plate at the edge of the PCB.**

---

1. Remove the screws securing the cover of the BSIA (see Figure 15) and lift the cover off the BSIA.

2. Align the ALM with DIN connector J5 (see Figure 16).

3. Gently press the PCB into the DIN connector.

4. Connect the standoffs.

5. Replace the BSIA cover and re-install the screws.

Cover Screws

2985
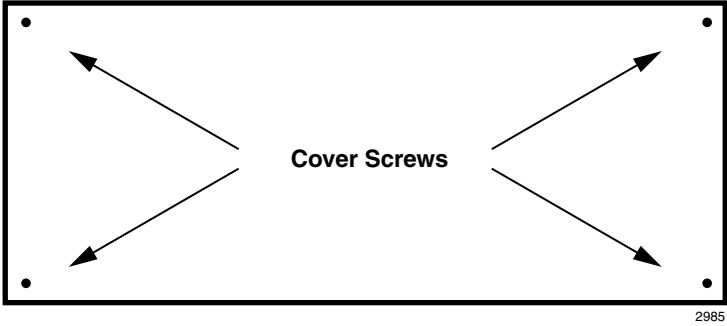
Figure 15   Location of Screws on the BSIA Cover

Important!   *Do not power on the BSIA at this point.*

Amphenol Connector
(Circuits 1~16)

Amphenol Connector
(Circuits 17~32)

DIN Connector J5
(Circuits 17~24)

DIN Connector J6
(Circuits 25~32)

ALM Plugged into
DIN Connector J4 (Circuits 9~16)

Standoffs
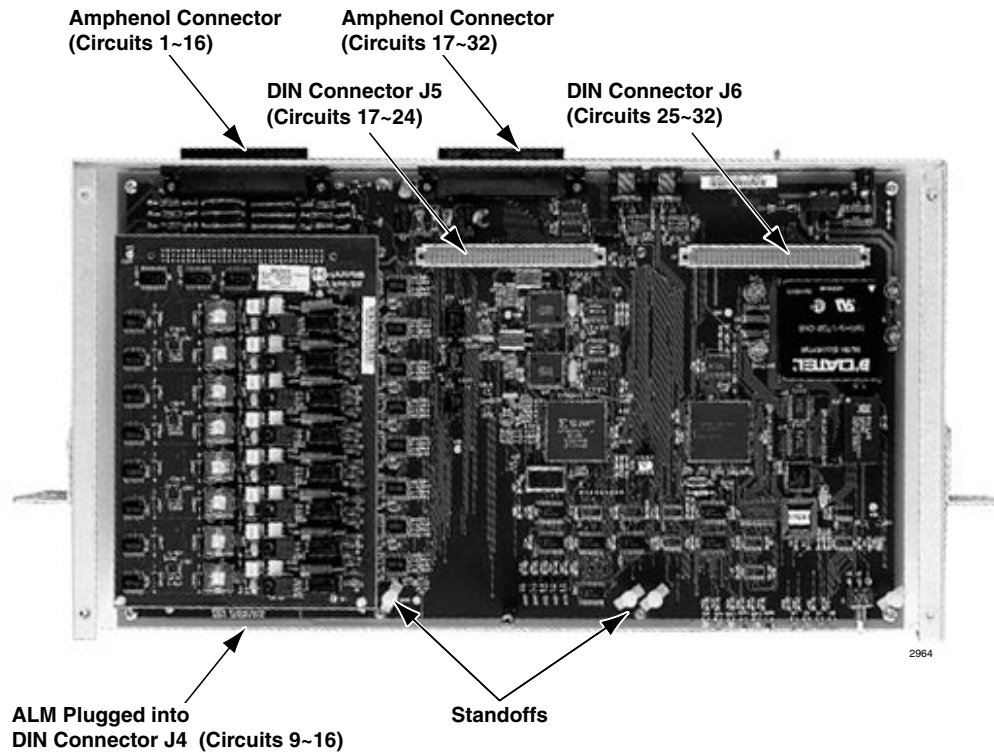
Figure 16   ALM Connections on the BSIA

Step 2: Run Cable

1. Run the cable from the Base Stations to the BSIA, using the following maximum cabling distances:

    ♦   2,000 feet for line power

    ♦   3,300 feet for local power

2. Use Category 5 cable. Using a mix of Categories 2, 3, 4, and 5 is acceptable, but can affect the total possible cable length. See Figure 19 on Page 22 for the wiring diagram.

3. Connect the *transmit* cable (pair 21 or 25) to the receive side (see Figure 17).

4. Connect the *receive* cable (pair 20 or 24) to the transmit jack (see Figure 17).

Transmit Jack

Receive Jack

Debug (not used)

Antenna

Power Cord
Strain Relief

+5VDC Local Power

Antenna
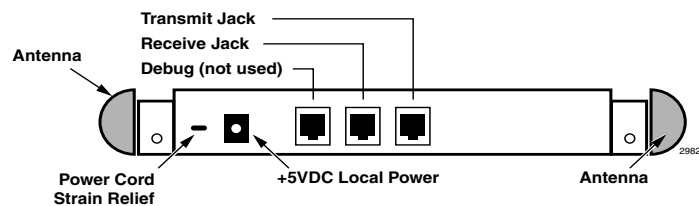
Figure 17   Location of Transmit and Receive Jacks

Step 3: (Optional) Activate External Critical Alarm

Note   The BSIA system is not equipped with an external critical alarm. If one was not purchased, skip this Step.

1. Connect pair 22 on connector block P1 to one input on the external alarm device (see Figure 18).

2. Connect tip (normally closed) or ring (normally open) of pair 23 on P1 to the other input of the alarm device.

Lamp or Buzzer

Maximum Switched Power 60W
0.5 A, 125VAC Resistive
1.0 A, 48VDC Resistive

Pair 22 - Relay Common
Pair 23, Tip - Normally Closed Contact
Pair 23, Ring - Normally Open Contact

2981
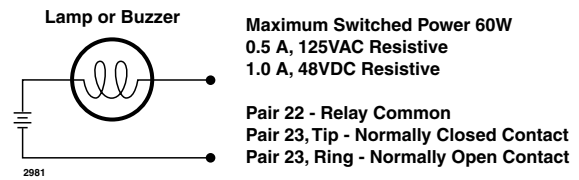
Figure 18   Wiring for External Critical Alarm

Step 4: Determine Base Station Power Supply

A Base Station can receive input (line) power from the BSIA or an optional local power supply. Using a local power supply increases the distance Base Stations can be located from the BSIA.

Toshiba provides an optional universal 110/230VAC, 50/60 Hz power supply with a barrel-jack connection to the Base Station (see Figure 20 on Page 23).

Customers with 220VAC outlets can:

♦ Purchase another power cord to fit the universal connector (three-pronged IEC 320 power inlet) on the power supply.

♦ Replace the 110VAC plug on the cable with an appropriate 220VAC plug.

♦ Connect a North American 220VAC adapter to the 110VAC plug.

Base Station

TOSHIBA

PWR — GND RX TX

4128

To P1
of BSIA

Yellow/Grey

(Pair 20)   RX

Grey/Yellow

GN

R

Standard Silver
Satin Line Cord

Violet/Blue

(Pair 21)   TX

Blue/Violet

GN

R

Base Station

TOSHIBA

PWR — GND RX TX

Violet/Brown

(Pair 24)   RX

Brown/Violet

GN

R

Standard Silver
Satin Line Cord

Violet/Slate

(Pair 25)   TX

Slate/Violet

GN

R
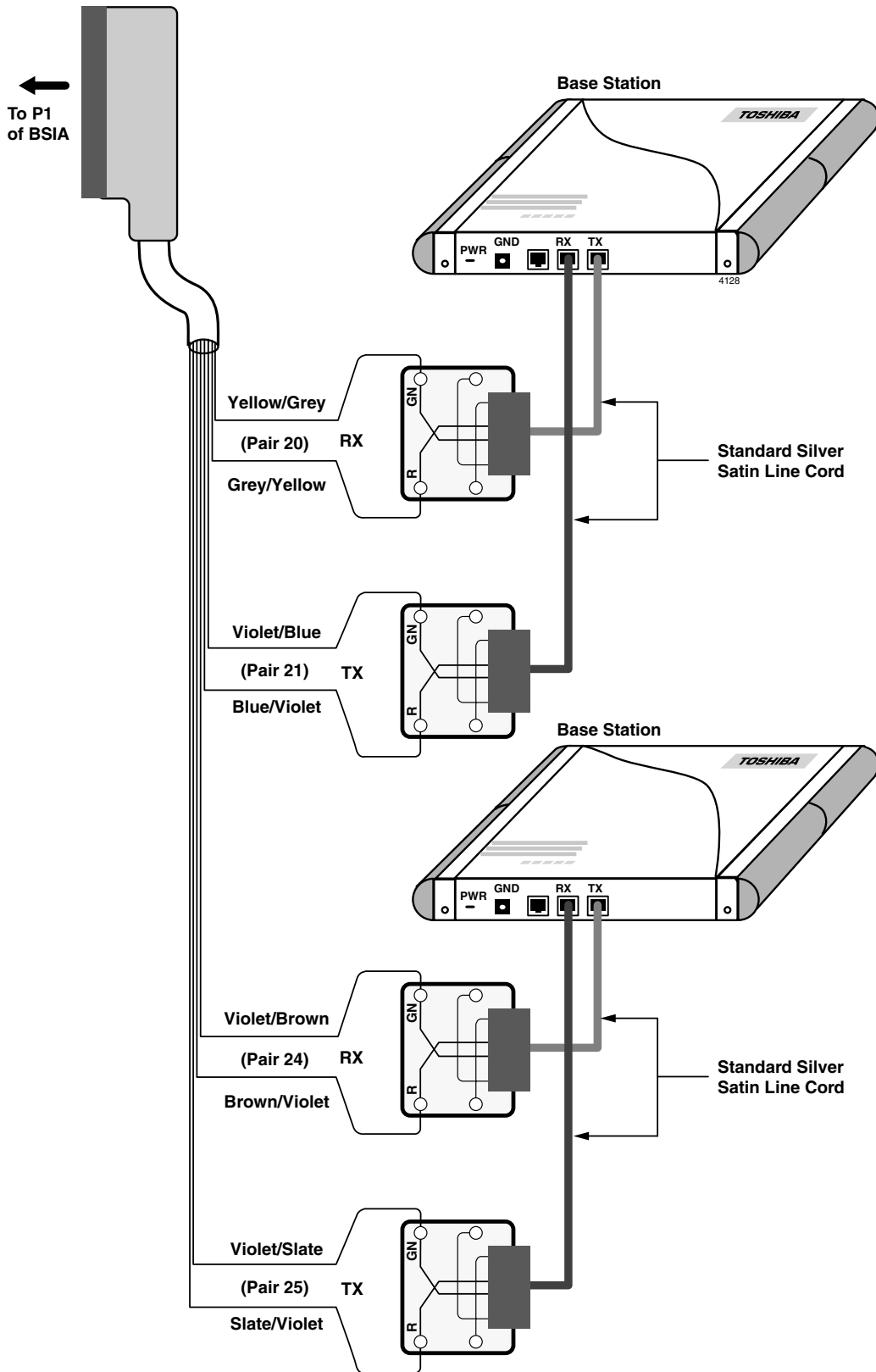
Figure 19   Base Station to BSIA Wiring Diagram

Step 5: Connect Power Supply

➤ For AC power, use the power supply that comes with the BSIA system. It has a universal input (110/220VAC), operates at 50~60 Hz, and provides -48VDC.

Note The power supply includes a cable with a barrel-jack connection (see Figure 20) to the BSIA and 110VAC cable.

CAUTION! **Connect to power, but do not power on until the entire system is cabled.**

➤ **To connect to power when -48VDC is required**

1. For DC power, a power cord with the following is required:
   - 18 AWG wire
   - 2.1mm ID x 5.5mm barrel jack (Switchcraft, Inc. S765 or equivalent) with minus (–) potential center lead and positive (+) shield lead

2. Connect the barrel jack to the BSIA at J1 (see Figure 20).

Note Battery source requirements are -44VDC to -56VDC @2 amps. An inline, slow-blow fuse rated 3 amps @250VAC must be installed as close as possible to the battery source on the minus potential side.

3. To prevent accidental removal of the power cord connected to J1 on the BSIA, tie wrap the power cord to the power strain relief above the ground screw on the BSIA (see Figure 22).

Figure 20   Barrel-jack Connection

Step 6: Connect PC

1. Insert one end of the RS-232-C cable with a DB9 or DB25 adapter into the serial port in the back of the PC (see Figure 21).
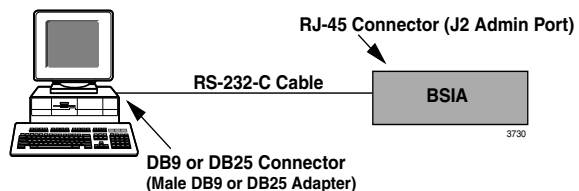
Figure 21   PC to BSIA Connection

2. Insert the RJ-45 connector into the back of the BSIA (J2) (see Figure 22)
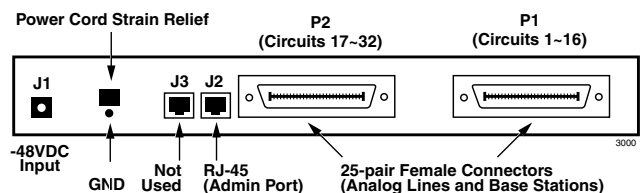
Figure 22   BSIA RJ-45 Jack (back side)

Step 7: Install Strata AirLink Manager Software

1. Check the PC hardware/ software against the required minimums.

   Refer to "Check System Hardware and Software Requirements" on Page 6.

2. Close any open applications in Windows.

3. Insert the Strata AirLink Manager software floppy disk into the A:\ drive.

4. In Windows 98/95, click Start and Run

   ...or in Windows 3.11/3.1, open Program Manager and click File and Run.

   A dialog box displays requesting the location of the setup disk.

5. Click File and Run.

   A dialog box displays requesting the location of the setup disk.

6. Type **A:\Setup** and click OK.

   The Windows setup screen appears and warns you to close other Windows applications.

7. Click Yes

   A dialog box displays, recommending a destination path of C:\Wireless.

   ...or No if you need to close applications.

8. Click OK

   C:\Wireless is accepted as the destination directory.

   ...or change the destination drive and directory.

9. Click OK.

   A dialog box displays asking for verification of the software location (its program directory or the Windows system directory). It is recommended that the program directory is used.

10. Select the program directory.

11. Click OK.

    The files are copied to the hard disk. A program group is created.

Step 8: Copy Upgrade Software

1. Place the Strata AirLink floppy disk #2 into drive A:\.

2. In Windows 98/95, double-click the My Computer icon

   ...or in Windows 3.11/3.1, open Program Manager.

3. Navigate to the A:\ drive.
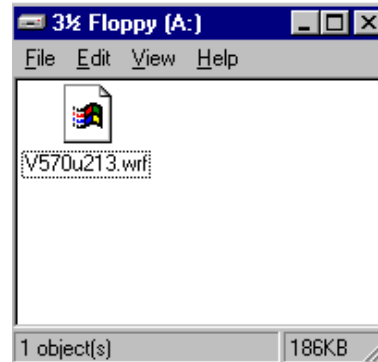
3332

4. From the A:\ drive, highlight the file to be copied.

5. From the Edit pull-down menu, double-click Copy.
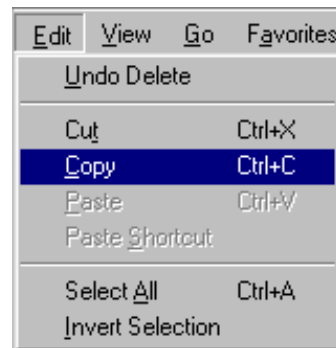
3505

All of the highlighted files are copied to the clipboard.

6. Navigate to the C:\Wireless\Software subdirectory.

7. From the Edit pull-down menu, double-click Paste.

All of the files on the clipboard are pasted to the subdirectory.

8. Close all the windows and return to the Strata Airlink Manager application.

Step 9: Configure System

1. Make sure the PC is connected to a BSIA.	
2. Turn on the PC.	Windows automatically starts.
3. Double-click the Strata AirLink Manager Desktop icon.	This displays only once when the system is initialized.

3327

4. Type the name, organization (company name) and the password.	**Important!** *If the password is forgotten, the software must be reloaded. The password can be changed after initialization of the system.*
5. Click Continue.	The Password Verification dialog box appears.
6. Enter the same password and click OK.	The Setup dialog box displays again.
7. Click Continue.	The software starts and requests your password.
	Important! *If a warning message that the manager cannot open port 1 or 2 is received, check the software port configuration against the hardware configuration.*
8. Enter the password and click OK.	

3289

Substep A: Activate UTAM

	1. From the Desktop Toolbar, click the Status icon.

3484
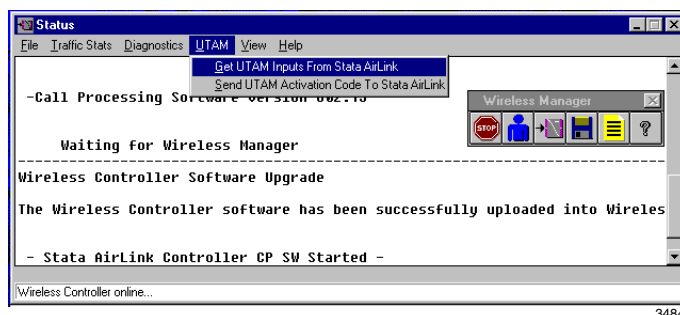
2. Click Get UTAM Inputs from Strata Airlink.

3. Make a note of the BSIA serial number and input codes before calling the Strata AirLink Activation Desk because the staff will request these numbers.

3485

Note   The hours of operation are: Monday through Friday, 8:00 a.m. to 5:00 p.m., Pacific Standard Time.

After the BSIA serial number and input codes are given to the activation desk, the technician will give you the UTAM system activation code.

4. Call the Strata AirLink Activation Desk, (949) 598-4980 for the activation code.

5. Close the Get UTAM Inputs From Strata AirLink window.

The Status window displays.

6. From the Status window, highlight UTAM.
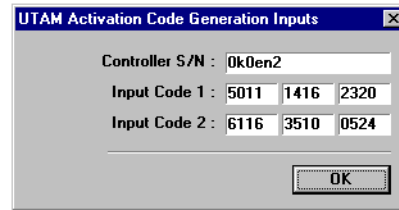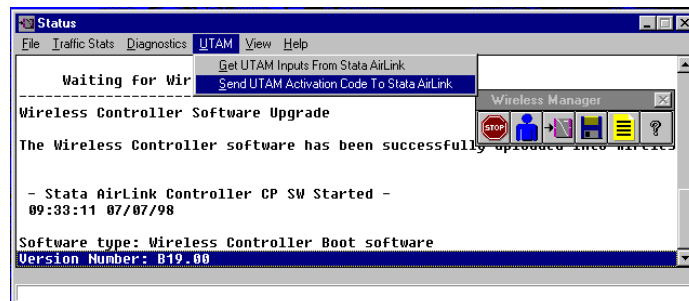
3486

7. Select Send UTAM Activation Code to Strata AirLink.

8. From the UTAM Activation Code dialog box, enter the UTAM Activation Code.

3487

9. Click OK.
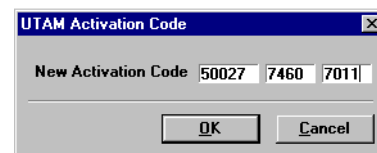
The message "Wireless system has been activated" displays at the bottom of the Status window.

Important!   *Install the UTAM code in one hour or a new one must be obtained.*

Normal LED indications display on the BSIA (PWR and Master LEDs ON) and Base Stations (PWR LED ON). Several messages display (below) on the PC screen as Strata AirLink Manager tests the installation.
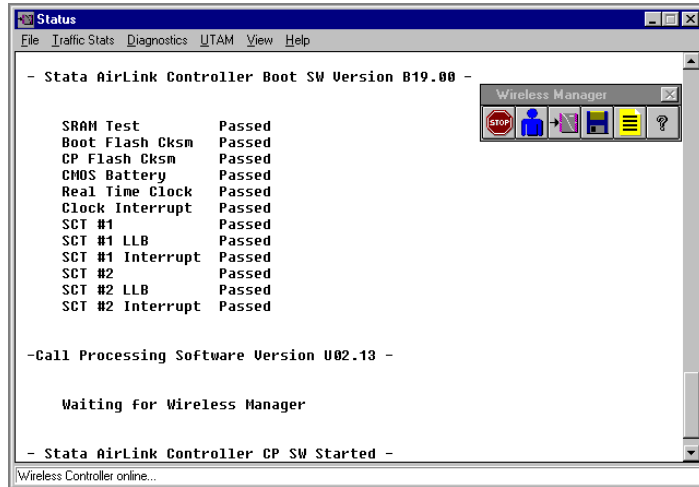
```
Status                                                    _ □ ×
File  Traffic Stats  Diagnostics  UTAM  View  Help

 - Stata AirLink Controller Boot SW Version B19.00 -
                                          Wireless Manager    ×
                                          [STOP] [icons]  ?
      SRAM Test          Passed
      Boot Flash Cksm    Passed
      CP Flash Cksm      Passed
      CMOS Battery       Passed
      Real Time Clock    Passed
      Clock Interrupt    Passed
      SCT #1             Passed
      SCT #1 LLB         Passed
      SCT #1 Interrupt   Passed
      SCT #2             Passed
      SCT #2 LLB         Passed
      SCT #2 Interrupt   Passed


 -Call Processing Software Version U02.13 -


      Waiting for Wireless Manager


 - Stata AirLink Controller CP SW Started -

Wireless Controller online...
```

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Important!   *If the message "Waiting for Wireless Manager" does not appear in the Status window before the progress bar times out, or LED S2 remains lit after a reboot, the BSIA has not been upgraded. Repeat Substeps 1~9.*

Substep B: Set System Time and Date

1. Click the Configuration icon.

```
Configure Window                                          _ □ ×
File  Preferences  Select Database  Help
 D  │ Time and Date  Ctrl+T │ NAME    │ Last modified on │ Last sent to
    │ Password              │         │      Disk        │  Wireless
Syst│ Port Setting   Ctrl+P │
User Database
Feature Table
```

3282
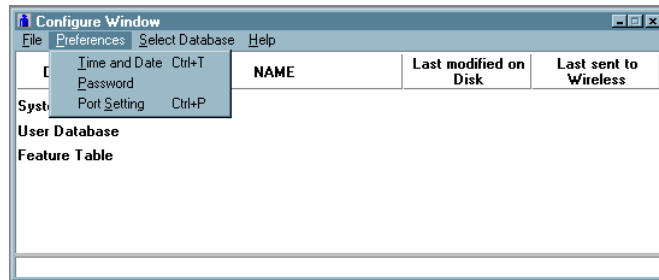
2. Highlight Preferences.

3. Click Time and Date.

3274

4. Enter the time and date.

5. Click "Automatic daylight savings time adjustment," if needed.

6. Send the new data to the configuration file.

7. Click Close.
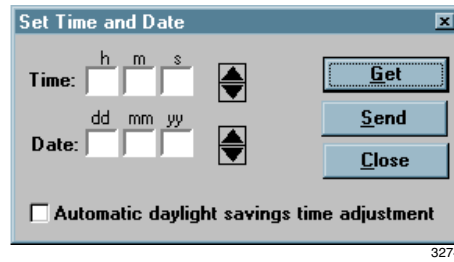
Substep C: Enter System Settings

1. Complete the System Settings form.

See Table 5 on Page 34.

2. Open the Strata AirLink Manager program.

3289

3. Click the Configuration icon.

4. Highlight Select Database.

3270
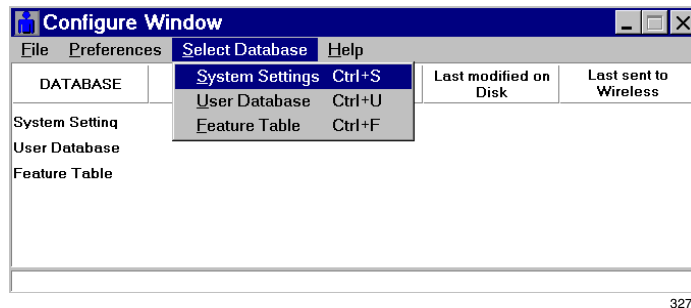
5. Click System
   Settings
   ...or double-click
   "System Settings" in
   the active window.

System Settings		
System ID:		
Base Station 1 ID:		
Base Station 2 ID:		
Stop Ringing Time:		x100ms
Dial Tone Delay:		x100ms
DTMF Cycle Duration:		x10ms
DTMF Off Duration:		x10ms
Hook Flash Duration:		x100ms
FT Pause Duration:		x100ms
FT Inter-Event Pause Duration:		x100ms
Second BS Service Enabled:		

3271
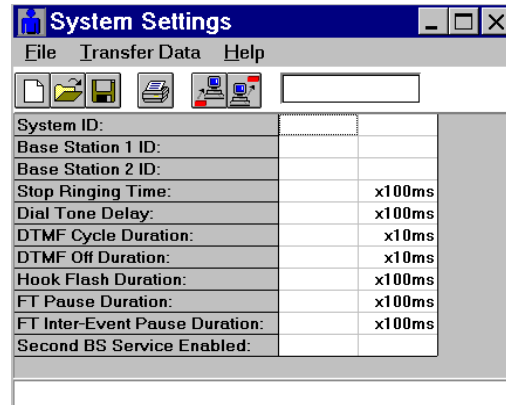
6. Click the Get icon.   The current data from the BSIA displays.

7. Verify previous
   settings.

8. Enter the System and   The recommended timing intervals are:
   Base Station IDs, and
   timing intervals.

   ♦   Stop ringing time – 4500 ms

   ♦   Dial tone delay – 200 ms

   ♦   DTMF cycle duration – 200 ms

   ♦   DTMF off duration – 100 ms

   ♦   Hookflash duration – 500 ms

   ♦   FT pause duration – 1000 ms

   ♦   FT inter-event pause – 100 ms

9. Click the Send icon.   The new data is sent to the BSIA.

10. Save the file (file
    extension is .sdb).

Substep D: Configure Handsets

1. Complete the User Settings form.	See Table 6 on Page 35.
2. Ensure that each handset ID corresponds to the correct connector pair.	
3. Open the Strata AirLink Manager program.	
4. Click the Configuration icon.	
5. From the Configure Window, click Select Database and User Database.	
6. Click the Get icon.	The current data from the BSIA displays.
7. Verify the previous BSIA settings.	
8. Enter the handset ID.	
9. Save the file (file extension is .udb).	
10. Click the Send icon.	The new data is sent to the BSIA.
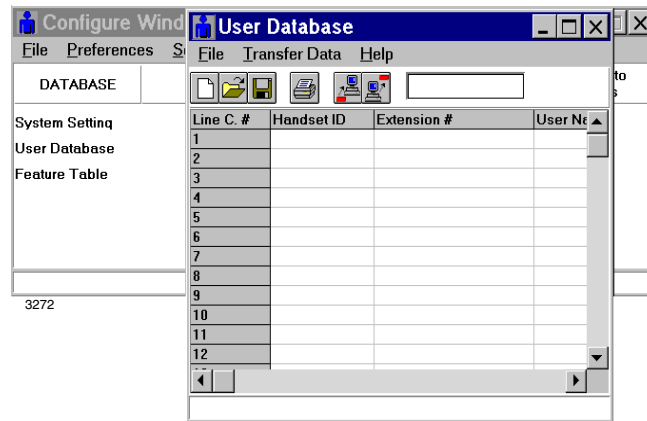
Substep E: Program Button Sequences

1. Complete the Programming Button Sequences form.

2. Enter events 1~20 using the command codes or text displays.

3. Open the Strata AirLink Manager program.

4. Click the Configuration icon.

5. From the Configure Window, click Select Database and Feature Table.
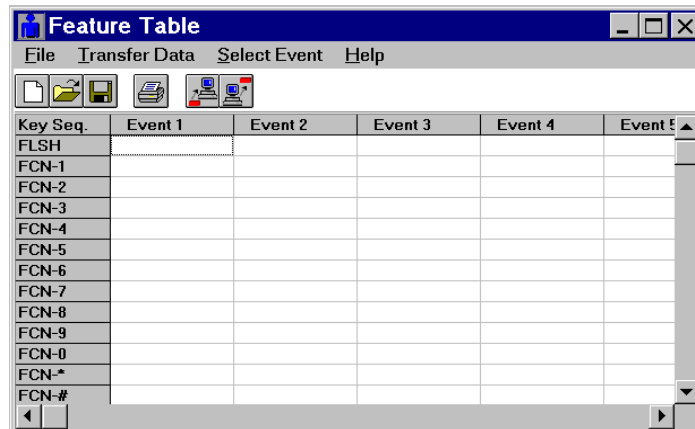
6. Click Select Event and Commands.

Consider the order in which commands and text displays should occur during the execution of a telephone feature. See Table 7 on Page 36.

3289

3273
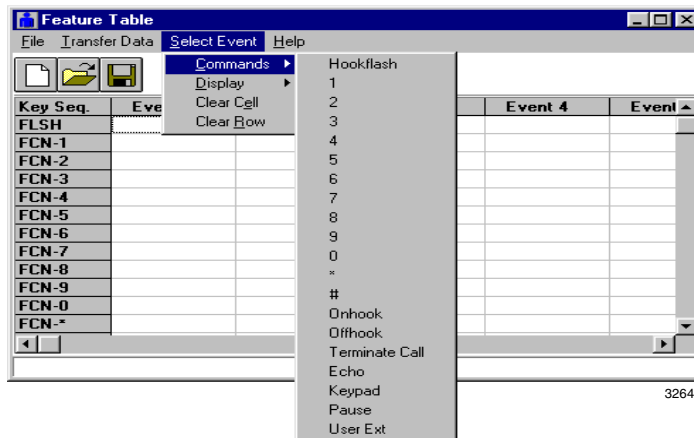
3264

7. Click a command (**Hookflash**, **1~0**, *****, **#**, etc.).

The command appears in the designated column (labeled Event 1~20). The Select Event pull-down menu displays.

8. Highlight Display.
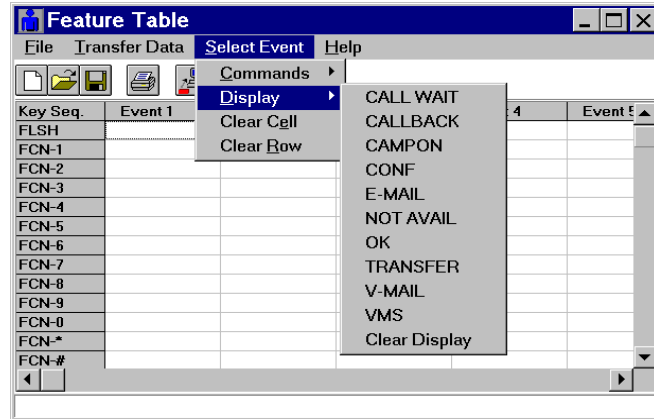
3265

9. Click an LCD message (**CALL WAIT**, **CALLBACK**, **CAMPON**, etc.).

The message appears in the designated column (labeled Event 1~20). A completed Feature Table looks like this:
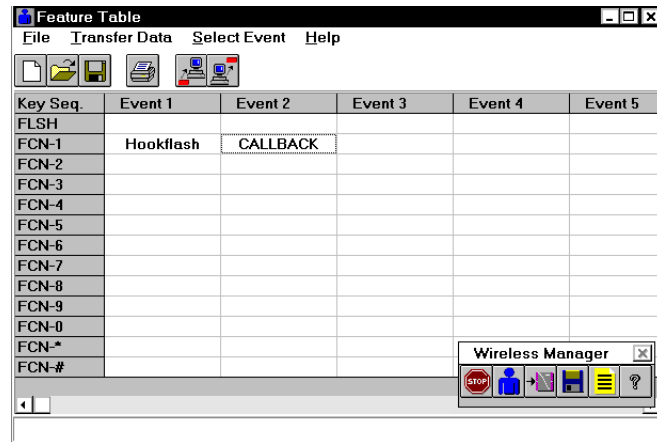
3258

10. Repeat Substeps 1~5 as necessary.

11. Save the file (file extension is .fdb).

12. Click the Send icon.

The new data is sent to the BSIA.

Programming Sheets

Table 5   System Settings

Parameter	Description	Units/ Range	Suggested Setting	Your Setting
System ID	ID for the system (written on the RWIU label).	1~5		
Base Station 1 ID	ID of the first Base Station.	0~31		
Base Station 2 ID	ID of the second Base Station.	0~31		
Stop Ringing Time	Length of time the RWIU waits after last detection of ring voltage on a line before it stops the ring.	100 ms[1]	45	
Dial Tone Delay[2]	Time delay between pressing **CALL** and outpulsing DTMF tones.	100 ms[1]	2	
DTMF Cycle Duration	Duration of the full DTMF cycle (length of tone plus length of silence between tones) for dialing and other telephone system operations.	10 ms[3]	20	
DTMF Off Duration	Duration of silence between DTMF tones.	10 ms[3]	10	
Hookflash Duration	Duration of the hookflash in signaling the office telephone system.	100 ms[1]	5	
FT Pause Duration	Duration of pause events in the Feature Table.	100 ms[1]	10	
FT Inter-event Pause	Duration of pause between events in the Feature Table.	100 ms[1]	1	
Second Base Station Service Enabled	Enables service for a second Base Station. TRUE if a second Base Station is installed. FALSE if only one Base Station is installed or out of order.	NA		

1. For example, a setting of 2 means 2 x 100 ms or 200 ms.

2. The Dial Tone Delay eliminates the possibility of a user dialing before the office telephone system is ready.

3. For example, a setting of 2 means 2 x 10 ms or 20 ms.

Table 6   User Settings

Line	Amphenol Connector/ Pair	Handset ID (1 - 1535)	Extension # (1 - 10 digits)	User Name/Comment (1 - 12 characters)
1	P1, Pair 1			
2	P1, Pair 2			
3	P1, Pair 3			
4	P1, Pair 4			
5	P1, Pair 5			
6	P1, Pair 6			
7	P1, Pair 7			
8	P1, Pair 8			
9	P1, Pair 9			
10	P1, Pair 10			
11	P1, Pair 11			
12	P1, Pair 12			
13	P1, Pair 13			
14	P1, Pair 14			
15	P1, Pair 15			
16	P1, Pair 16			
17	P2, Pair 1			
18	P2, Pair 2			
19	P2, Pair 3			
20	P2, Pair 4			
21	P2, Pair 5			
22	P2, Pair 6			
23	P2, Pair 7			
24	P2, Pair 8			
25	P2, Pair 9			
26	P2, Pair 10			
27	P2, Pair 11			
28	P2, Pair 12			
29	P2, Pair 13			
30	P2, Pair 14			
31	P2, Pair 15			
32	P2, Pair 16			

Table 7   Feature Table

Button Sequence	Events 1 - 20 (Use the Commands or Text Displays Listed Below)																			
FLSH																				
FCN 1																				
FCN 2																				
FCN 3																				
FCN 4																				
FCN 5																				
FCN 6																				
FCN 7																				
FCN 8																				
FCN 9																				
FCN 0																				
FCN *																				
FCN #																				

Substep F: Store IDs in Handset

1.	Press **PWR**.	The handset turns on.

2.	Press **FCN**.	`MENU`
		`OPERATION`
		`12:15`

3.	Press ▼ until **SYSTEM CONFIG.** displays	`SYSTEM`
		`CONFIG.`
		`12:15`

	...or **10** + **FCN**.	
4.	Press **FCN**.	`SID#0` `12:15`
5.	Enter the proper System ID (SID).	**Note** The SID must match the data entered in the system settings.
6.	Press **CLR** to make corrections.	
7.	Press ▼.	`HID#0` `12:15`
8.	Enter the handset ID (four digits) for the system ID entered in Substep 5.	`HID#1` `12:15`
9.	Press ▼ for other systems.	
10.	Repeat Substeps 1~11 to enter all the system and handset IDs required.	A maximum of eight system IDs and associated handset IDs can be stored in handset memory.
11.	Press **END**.	The ESN displays momentarily.
12.	Press **CALL**.	The handset ESN is stored in the BSIA.
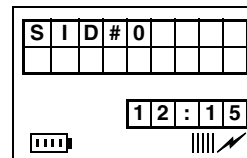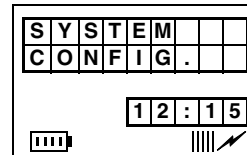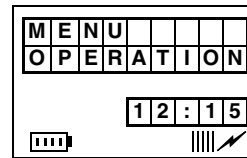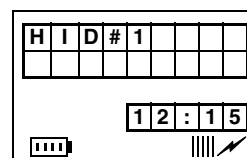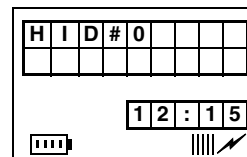
BSIA Additional Information

The following tables have additional information unique to the BSIA system and cover:

♦ BSIA (controller) specifications – Table 8

♦ Adapter and BSIA pinouts – Tables 9 and 10

♦ ALM removal

♦ Initial configuration change

♦ Password change

♦ Base Station additions

♦ Communication port change

BSIA (Controller) Specifications

Table 8   BSIA Specifications

Name	Description
Dimensions	16.84 x 9.29 x 1.75 inches
Weight	4.6 lbs. without ALM
Mount	Wall or industry-standard rack mount
Input Power	-48VDC or 110/220VAC with optional power supply
Temperatures	Operating: 10°~40°C Storage: -20°~53°C Operating Humidity: 20 to 80% non-condensing Storage Humidity: 5 to 95% non-condensing
Altitude	Operating: 4,920 ft. **Note** Systems operating above 4,920 ft. in low humidity areas could require additional cooling. Storage: 940 to 9,400 ft.

Adapter and BSIA Pinouts

Tables 9 and 10 list the adapter and BSIA pinouts.

Table 9   DB9 and DB25 Adapter Pinouts

8-Pin Jack	DB9-F	DB25-F	8-Pin Jack	DB9-F	DB25-F
1/BLU	Not Used	Not Used	5/GRN	3	2
2/ORG	7	4	6/YEL	5	7
3/BLK	8	5	7/BRN	Not Used	Not Used
4/RED	2	3	8/WHT	Not Used	Not Used

Table 10   BSIA Pinouts

Pair	P1	P2
1	Tip, ring — station 1	Tip, ring — station 17
2	Tip, ring — station 2	Tip, ring — station 18
3	Tip, ring — station 3	Tip, ring — station 19
4	Tip, ring — station 4	Tip, ring — station 20
5	Tip, ring — station 5	Tip, ring — station 21
6	Tip, ring — station 6	Tip, ring — station 22
7	Tip, ring — station 7	Tip, ring — station 23
8	Tip, ring — station 8	Tip, ring — station 24
9	Tip, ring — station 9	Tip, ring — station 25
10	Tip, ring — station 10	Tip, ring — station 26
11	Tip, ring — station 11	Tip, ring — station 27
12	Tip, ring — station 12	Tip, ring — station 28
13	Tip, ring — station 13	Tip, ring — station 29
14	Tip, ring — station 14	Tip, ring — station 30
15	Tip, ring — station 15	Tip, ring — station 31
16	Tip, ring — station 16	Tip, ring — station 32
20	Receive from Base Station 1	
21	Transmit to Base Station 1	
22	Tip, ring — external alarm connection	
23	Tip, ring — external alarm connection	
24	Receive from Base Station 2	
25	Transmit to Base Station 2	

ALM Removal

1. Power off the BSIA.

2. Remove the screws securing the cover of the BSIA case.

3. Lift the cover off of the BSIA.

4. Unplug connectors J4, J5, or J6.

CAUTION!   Do not apply diagonal pressure to the DIN connectors (see Figure 16 on Page 20**).**

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5. Disconnect the ALM from the standoffs on the BSIA PCB.

6. Gently lift the ALM out of the BSIA.

7. Replace the BSIA cover and re-install the screws.

Initial Configuration Change

It is highly recommended that you get the current configuration and save it to a file on the PC as the working copy. Then, open and edit the working copy – not the original file. Using this method ensures that the original configuration file is not corrupted while adding or editing existing data. Once the new information is saved, the BSIA uses the new data immediately.

Important! *Sending configuration information to the BSIA overwrites existing information. Make sure that the sent data contains all of the required configuration information, not just the few additions or changes that were made.*

Password Change

1. From the Desktop Toolbar, click the Configuration icon.

2. Open the Configure Window.

3. Select Preferences from the menu bar and Password.

4. Enter the old and new password and click OK.
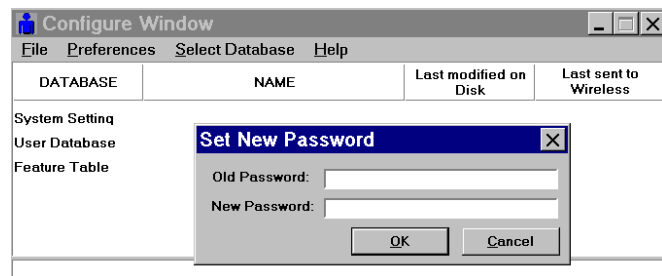
Base Station Addition

1. From the Desktop Toolbar, click the Configuration icon.

2. Open the Configure Window.

3. Click Select Database and System Settings.
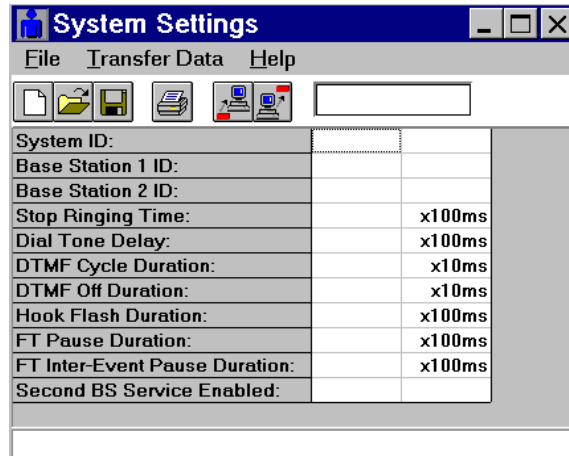
3271

4. Click the Get icon. | The current data from the BSIA displays.

5. Enter TRUE in Second Base Station Service Enabled. | **Important!** *Do not perform this step without getting the current system settings first, or all data is overwritten.*

6. Save the file and close the Configure Window. | The Desktop Toolbar displays.

7. Double-click the Upgrade icon. | The Base Station is upgraded.

Communications Port Change

1. From the Desktop Toolbar, click the Configuration icon.

2. Click Preferences and Port Setting.
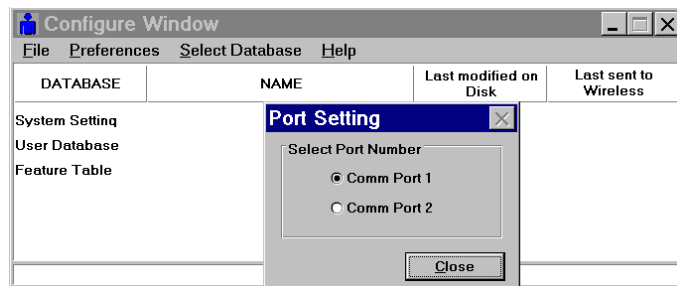
3281

3. Click the new port and Close. | **Important!** *Click close immediately (before 10 seconds have elapsed) or the change does not take effect.*

RWIU System Installation 4

This chapter describes the specific installation steps for the RWIU PCB.

Step 1: Check DIP Switches and Jumpers on PCB

CAUTION! **The RWIU and WWIS come from the factory already assembled. Remove the WWIS carefully to check the DIP switches on the RWIU, keeping the pins on it straight. After checking the DIP switches, but before aligning the two PCBs, be sure that the connectors are not bent. This causes irreparable damage to both PCBs.**

The RWIU has three DIP switches. The location of each is shown in Figure 23. The factory default positions are given in the following steps.
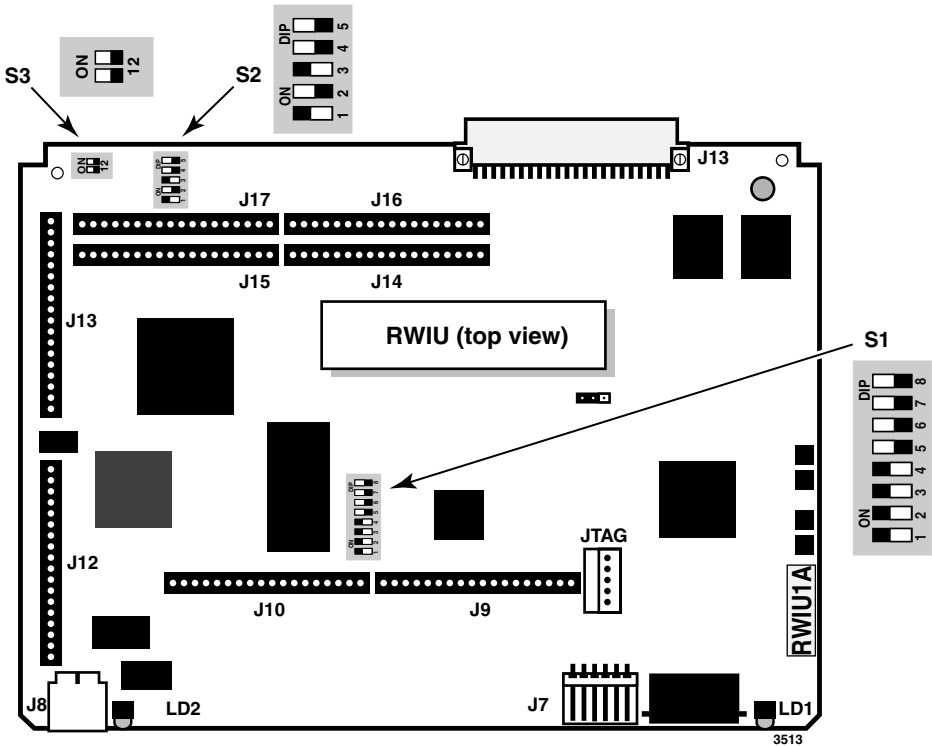
Figure 23   Location of RWIU DIP Switches S1~S3

1. Check DIP Switch S1. Table 11 gives the factory settings - defaults are in bold.

Table 11   S1 Factory Default Positions

Position	S1 DIP Switch Number							
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
On	Base Station 1 Inactive	Base Station 2 Inactive	Base Station 3 Inactive	Base Station 3 Inactive	Spare	Spare	Spare	Disable Download
Off	Base Station 1 Active	Base Station 2 Active	Base Station 3 Active	Base Station 4 Active	Spare	Spare	Spare	Force Download

Important!

- *Switch 8 is used to recover the RWIU in the event of a software load failure. Turn Switch 8 to its off position to force a download of the stored factory default software.*

- *If any Base Station is not used, put its corresponding S1 switch in the on (inactive) position. If the switch is in the off position, the WWIS subassembly LED 1 and 2 remain lit and the RWIU tries to initialize that Base Station every 40 seconds.*

2. Check DIP Switch S2. Table 12 gives factory settings - defaults are in bold:

Table 12   S2 Factory Default Positions (RF Signals)

Position	S2 DIP Switch Number				
	1	**2**	**3**	**4**	**5**
On	Slave[1]	DECT[2] Disabled	PCS[3] Disabled	Four Ports	Spare
Off	Master	DECT Enabled	PCS Enabled	Two Ports	Spare

1. RWIU must be in the master setting to operate.

2. DECT = Digital European Cordless Telecommunications

3. PCS = Personal Communication Service

3. Check DIP Switch S3 settings to ensure that the correct number of handsets are enabled (see Table 13).

Table 13   S3 Factory Default Positions (Number of Handsets)

S3 DIP Switch Number		Number of Handsets
1	**2**	
On	On	8
Off	On	16
On	Off	24
Off	Off	32

4. Verify that the Watch Dog Timer (WDT) is jumpered correctly as shown in Figure 24.

Step 2: Mount WWIS onto RWIU

CAUTION! Before aligning the two PCBs, be sure that the connectors are not bent. This causes irreparable damage to both PCBs.

1. Carefully align the connectors of the WWIS (P9~P10 and P12~P17) to the terminals on the RWIU (J9~J10 and J12~J17) (shown in Figure 24).
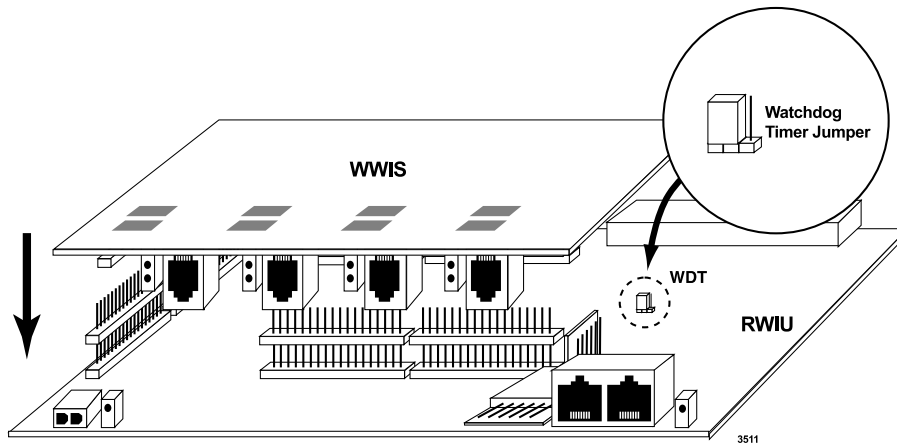
Figure 24   Alignment of the WWIS onto the RWIU

2. Gently press the WWIS onto the RWIU. Ensure that the connections are solid by gently pulling the WWIS away from the RWIU. If the connectors are properly seated, a slight resistance is felt.

Step 3: Determine Proper Strata DK Slot Configuration

➤ Use Table 14 to determine the physical slot configuration for the RWIU in Strata DK424i. The RWIU PCB can provide up to 16 or 32 Strata AirLink Handsets, depending on where it is placed. The RWIU slot provides eight handsets. Each additional set of eight handsets requires that an additional cabinet slot adjacent to RWIU be vacant.

RSTU or RDSU: Each RSTU or RDSU PCB connected to BSIA requires one slot. These PCBs cannot occupy a slot that is left vacant to provide capacity for RDTU, RPTU, or RWIU, as shown in Table 14. Each RSTU PCB provides circuits for up to eight Strata AirLink Handsets; each RDSU/RSTS provides circuits for four Strata AirLink Handsets.

Table 14   Strata AirLink RWIU PCB Cabinet Slot Configuration

Handsets Needed	Slots Needed	RWIU PCBs Needed[1]	RWIU Cabinet Slot Placement
Base Cabinet with any processor			
1~8	1	1	S103-RWIU1
9~16	2		S104-vacant[2]
17~24	3	2	S105-RWIU2
24~32	4		S106-vacant*
33~40	5	3	S107-RWIU3
41~48	6		S108-vacant*
Second cabinet with B2CAU/CBU processor			
1~8	1	1	S201-RWIU1
9~16	2		S202-vacant[2]
17~24	3	2	S203-RWIU2
24~32	4		S204-vacant[2]
33~40	5	3	S205-RWIU3
41~48	6		S206-vacant[2]
Second and third cabinet with B3CAU/CBU; or second through fifth cabinet with B5CAU/CBU			
1~8	1	1	S_07-RWIU1
9~16	2		S_08-vacant[2]
17~24	3		S_09-vacant[2]
24~32	4		S_10-vacant[2]
33~40	5	2	S_01-RWIU2
41~48	6		S_02-vacant[2]
49~56	7	3	S_03-RWIU3
57~64	8		S_04-vacant[2]
65~72	9	4	S_05-RWIU4
73~80	10		S_06-vacant[2]

1. RWIU PCBs do not have to be installed in the order shown in this table. Example: If only one RWIU is needed, it can be installed in any RWIU slot shown in the table so long as the slot is supported by the installed processor.

2. The slot occupied by RWIU supports 8 handsets, for each additional 8 handsets an additional slot adjacent to RWIU must be vacant.

Important!   *For Strata DK40i, if there are eight handsets, the RWIU can be installed in any of the expansion cabinet slots (15, 16, and 18). If there are 16 handsets, the RWIU must be installed in slot 15 and Slot 16 must be vacant. This system cannot support 24 or 32 handsets because of a port limitation.*

Step 4: Install RWIU/WWIS into Strata DK

1. Insert the RWIU (WWIS and components facing right) into the appropriate slot of the Strata DK and apply firm, even pressure to ensure proper mating of connectors.

CAUTION! **Strata DK power must be off before inserting the RWIU.**

---

2. After installing the RWIU, gently pull the PCB outward. If the connectors are properly seated, a slight resistance is felt.

Step 5: Run Cable

1. Do not exceed these cabling distances between the Base Stations and WWIS for Category 5, 24 AWG:

   ♦ 2,000 feet for line power

   ♦ 3,300 feet for local power

2. Use Category 5 cable. Using a mix of Categories 2, 3, 4, and 5 is acceptable but can effect the total possible cable length.

3. Connect one end of each cable into the RJ45 jacks on the RWIU/WWIS (Point B in Figure 26) and the other end (reversed) into the EMI box (Point A in Figure 26). The RJ-45 transmit and receive pins are shown in Figure 25.

4. Connect each end of the other set of cables into the RJ-45 jacks of the EMI box (Point C - To Base Stations in Figure 26) and run the opposite end out to the Base Stations.
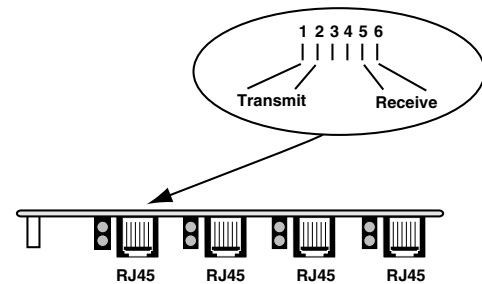
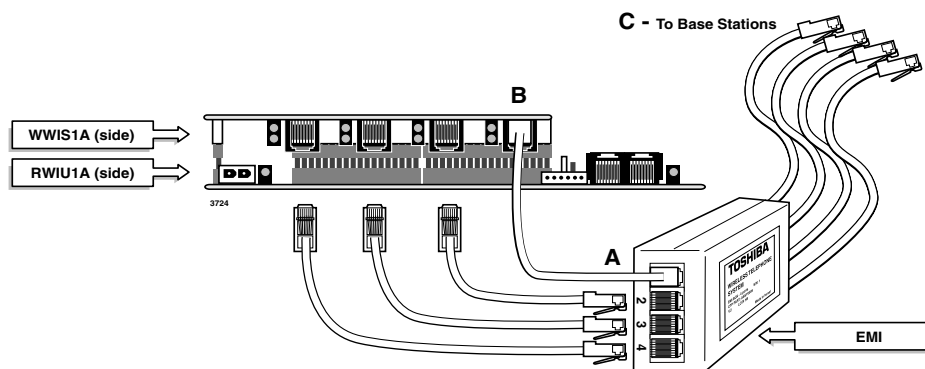**Figure 25**   **RJ-45 Pin Configuration**

Figure 26   **EMI Connections to the RWIU/WWIS**

CAUTION!

♦ **Do not use current-limiting (fuse style) primary protectors on the transmit and receive pairs between the RWIU and Base Stations.**

♦ **Do not connect the RWIU to power at this point.**

Step 6: Determine Base Station Power Supply

A Base Station can receive input (line) power from the RWIU or an optional local power supply. Using a local power supply increases the distance Base Stations can be located from the RWIU.

Customers with 220VAC outlets can:

♦ Purchase another power cord to fit the universal connector (three-pronged IEC 320 power inlet) on the power supply

♦ Replace the 110VAC plug on the cable with an appropriate 220VAC plug

♦ Connect a North American 220VAC adapter to the 110VAC plug

Step 7: Connect Power Supply

The maximum available PBX power for each RWIU PCB is one amp (+5VDC).

1. Use the external power supply (see Figure 27) to increase the amps for each Base Station.

   The power supply has a -40VDC power connector for direct connection to the RWIU.

2. Connect to 110VAC power, but do not power on.

Step 8: Use Proper Power Factor (PF)

➤ Check the +5VDC PF using Table 15 as a reference. Calculation examples are shown in Tables 16 and 17.

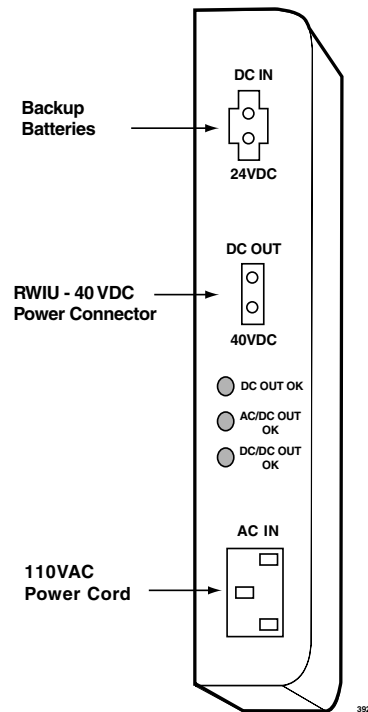**Note** The maximum voltages for the RPSU280A Power Supply are 25.0 (+5VDC) and 65.0 (-24VDC).

Figure 27   RWIU Power Supply

Table 15   Strata DK40i and DK424 PCB and Power Supply PFs

PCB Type	+5VDC PF	-24VDC PF	Notes
IMDU	0.1	0.16	
PCOU1, 2	1.9	2.0	
PDKU1, 2	0.8	0.3	With 8 DKTs.
PEKU	1.6	0.7	With 8 EKTs.
PEPU	1.1	6.5	
PESU	1.5	0.5	With 4 EKTs and 2 SLTs.
PIOU	2.0	6.5	
PIOU2	1.1	6.5	
PIOUS	0.75	4.0	
RSTU/RSTU2 (-24VDC)	1.4	0.5	With 8 SLTs.
R40S	0.0	2.8	Does not use +5VDC.
RATU	1.7	0.3	
RBSS	0.6	0.3	
RBSS2	0.0	0.3	Does not use +5VDC.
RBSU + RBSS	3.2	0.3	
RBSU	2.5	1.0	
RBSU2	0.0	1.0	Does not use +5VDC.
RBUS	0.0	0.3	Does not use +5VDC.
RBUU	0.0	1.0	Does not use +5VDC.
RCIS	0.3	0.1	
RCIU, RCIU2	0.7	0.2	
RCMS	0.6	0.3	
RCOS, RCOS2	1.7	2.0	
RCOU (4 CO)	2.5	2.0	
RCOU + RCOS (8 CO)	3.6	4.0	
RCOU, RCOU2	1.9	2.0	
RCTUA	2.0	1.0	
RCTUB	4.0	1.0	
RCTUBA/BB	4.0	1.9	
RCTUC/D	4.5	1.9	
RCTUE/F	10.0	1.9	
RDDU	2.6	7.0	
RDSU/RDSS (-24VDC)	1.1	0.3	With 4 DKTs and 4 SLTs.
RDSU + R48S (-48VDC)	1.1	0.5	
RDTU	1.8	1.0	
REMU2/PEMU	1.0	7.5	
RGLU, RGLU2	2.1	2.5	
RMCU	0.7	0.3	

Table 15 **Strata DK40i and DK424 PCB and Power Supply PFs** *(continued)*

PCB Type	+5VDC PF	-24VDC PF	Notes
RMDS	0.35	0.16	2400 bps MODEM.
RPTU	2.6	1.0	
RRCS-12	1.5	1.0	
RRCS-4	0.4	0.3	
RRCS-8	1.0	0.5	
RSIS	0.35	0.15	
RSIU	1.0	0.3	
RSSU	0.7	0.3	
RSTU + R48S (-48VDC)	1.4	1.0	With 8 SLTs.
RSTU2	4.0	2.3	With 8 MWs.
RWIU	9.2	0.0	With 8, 16, 24, or 32 handsets.

Table 16 **Example of Strata DK424 Base Cabinet Configuration with RCTUA4A**

PCB	Quantity	+5VDC PF	-24VDC PF
RCTUA4A	1	2.0	1.0
RRCS-4	1	0.4	0.3
PDKU2	2	1.6	0.3
RCOU + RCOS	1	3.6	4.0 (8 COs)
RBSU + RBSS	1	3.2	0.3
RWIU	1	9.0	0.0
Total	**7**	**19.8**	**5.9**

Table 17 **Example of Strata DK40i Expansion Cabinet Configuration**

PCB	Quantity	+5VDC PF	-24VDC PF
RCOU + RSOU	1	3.6	4.0 (8 COs)
RBSU + RBSS	1	3.2	0.3
RWIU	2	18.0	0.0
Total	**4**	**24.8**	**4.3**

Step 9: Program Strata DK

Important!   *Do not use a DKT that has an intercom button for Speed Dial programming.*

1. Determine how many handsets, PDKU ports, and available slots are required before programming the Strata DK. Up to 32 handsets per RWIU are allowed.

2. Use the following programs:

    ♦   Program 03 for Code 61 (slot assignments).

    ♦   Program 32 for Auto Preference.

    ♦   Program 39 for flexible button assignments.

♦ Programs 81~89 for line ringing on the handsets.

♦ Program 91-9 for automatic PCB recognition.

♦ Programs *71~73 for DID ringing on specific handsets.

Refer to *Strata DK Programming Manual* for specific information and Table 18 for available Strata DK station features.

Table 18   Available Station Features

Feature Name	
Account Code	Continuous DTMF Tones
Automatic Call Distribution (ACD)	DISA Security Code Revision
Automatic Busy Redial (ABR)	Do Not Disturb (DND)
Automatic Call Back (ACB)	DND Override (receive)
Automatic Hold	Exclusive Hold
Automatic Line Selection	Door Phone
Busy Override/Busy Station Transfer/Busy Station Ringing	Headset Interface
Call Forward:	Headset Receiver Volume Control
• All Calls	Hearing Aid Compatible
• Busy	Liquid Crystal Display (LCD)
• No Answer	Message Waiting Indication
• Busy/No Answer	Multiple Message Waiting
• Fixed	Microphone Control (fixed) - Mute Only
• External	Microphone Sensitivity Control
Call Park Orbits:	Loud Ringing Bell (headset)
• Park/Page	Night Lock
Call Pickup:	Night Transfer
• Night Bell	Off-hook Call Announce (OCA) - Handset Mode
• Tenant Ringing Lines (four groups)	Page Access
• Station Groups (20 groups, all call types)	Phantom Message Waiting Indication
• Any Ringing LIne	Pooled Line
• Directed Station (all call types)	Private CO Lines
• Held CO Lines (selectively)	Push-button Dialing
• Parked Call	Release and Release/Answer
• External Page	Remote Retrieval of Held/Parked Calls
Centrex/PBX Compatible	Ringing Line Preference
CO/Centrex	Saved Number Redial
Conferencing	Timed Reminders
Dial Pulse DTMF Mode Change	Toll Restriction Override Code Revision
Direct Station Selection (DSS)	User Programmable Feature Buttons
DSS Console Features	

Step 10: Connect PC

➤ Run the RS-232-C cable to the back of the PC (COM port 1) and insert the 6-pin connector into the RWIU jack (see Figure 4-1).

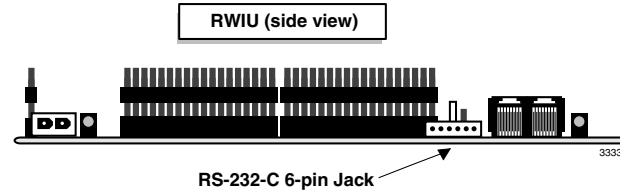RWIU (side view)

RS-232-C 6-pin Jack

3333

Figure 4-1   RWIU 6-pin Jack

Step 11: Initialize RWIU

1. Open the RWIU Manager software.

2. Turn on the Strata DK. The RWIU checks Base Station status and connections.

3. Check the LEDs on the Base Stations. If all the LEDs are OFF, the initialization is complete.

4. Check the handsets for dial tone. If there is dial tone, the initialization is complete.

Step 12: Install RWIU Manager

|	
1. Check the PC hardware/ software against the required minimums.	Refer to "Check System Hardware and Software Requirements" on Page 6.
2. Close any open applications in Windows.	
3. Insert the RWIU Manager floppy disk into the A:\ drive.	
4. In Windows 98/95, click Start and Run	
...or in Windows 3.11/3.1, open Program Manager and click File and Run.	A dialog box displays requesting the location of the setup disk.
5. Type **A:\Setup** and click OK.	The Windows setup screen warns Windows applications should be closed.
6. Click Yes	A dialog box displays recommending a destination path of C:\Wireless.
...or No if applications need to be closed.	
7. Click OK	C:\Wireless is accepted as the destination directory.
...or change the destination drive/directory.	

8.	Click OK.	A dialog box displays requesting verification of the software location (its program directory or the Windows system directory). Using the program directory is recommended.
9.	Select the program directory.	
10.	Click OK.	The files are copied to the hard disk. A program group is created.

Step 13: Start RWIU Manager

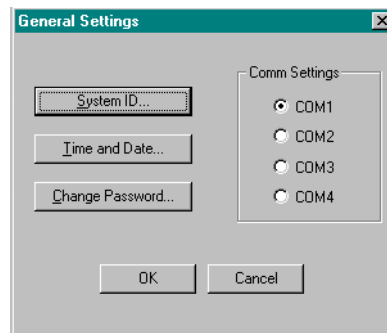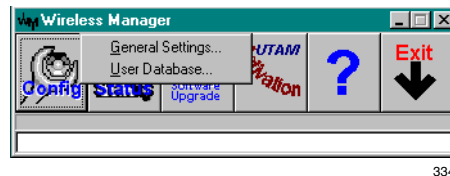| 1.	Make sure that the PC is connected to the RWIU.	
2.	From the RWIU program group, double-click on the Manager icon.	After a few seconds, the Desktop Toolbar displays. 3347
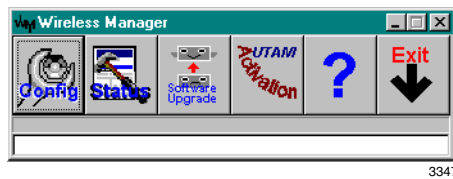
Step 14: Set General Settings
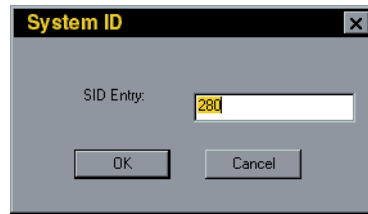
	1. From the Desktop Toolbar, click the Config icon.	3348
	2. Click General Settings and assign COM port 1.	3349
	3. Click OK.	

4. Click System ID.

3351

5. Enter the System ID.

6. Click OK.   General Settings window displays.

7. Click Time and Date.
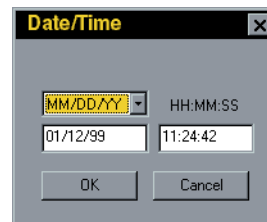
3354

8. Enter the Date and time.

9. Click OK.

Step 15: Enter Handset IDs

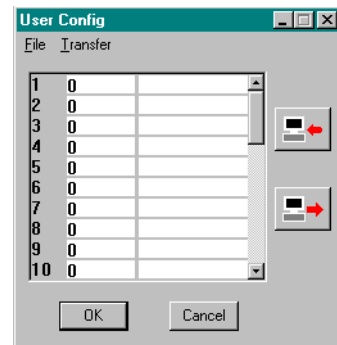1. From the Desktop Toolbar, click the Config icon.

2. Click User Database.

3. Download the settings from the RWIU.

Default IDs display.

Handset IDs do not have to be in numerical order and can be changed at any time.

3746

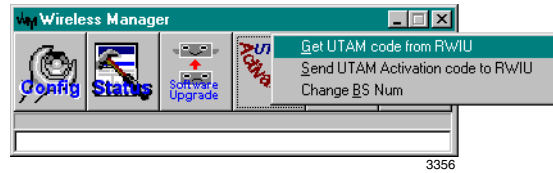4. Click OK.   The Desktop Toolbar displays.

5. Upload the settings to the RWIU.

The new IDs are saved.

Step 16: Enable UTAM

1. From the Desktop Toolbar, click the UTAM Activation icon.

3356

2. Click Get UTAM Code from RWIU.

3. Enter the password LABUTAM.

4. Click OK twice.

The Desktop Toolbar displays.

5. Click Get UTAM code from RWIU.

The new 20-digit UTAM activation code displays. Call the UTAM Activation desk at (949) 598-4980 between the hours of 8:00 a.m. and 5:00 p.m. (Pacific Standard Time), Monday through Friday with this number.

6. Click OK.

The Desktop Toolbar displays.

7. Click Send UTAM Activation Code to RWIU.

3357

8. Input the 10-digit code given to you by the Activation Desk

3358

9. Press Enter.
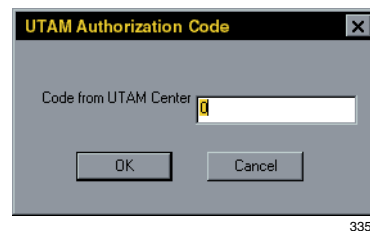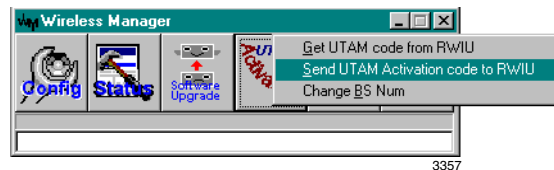
"Permission granted successfully" displays. If an error message displays, repeat Steps 1~7.

Note If UTAM is required, the Base Stations have one power LED ON (green), two (center) transmission LEDs ON (red), and four additional LEDs that are red.

Step 17: Store IDs in Handset

1. Press **PWR**.

    The handset turns on.

2. Press **FCN**.

```
M E N U
O P E R A T I O N

            1 2 : 1 5
[====]          |||||/
```

3. Press ▼ until **SYSTEM CONFIG.** displays

```
S Y S T E M
C O N F I G .

            1 2 : 1 5
[====]          |||||/
```

    ...or **10** + **FCN**.

4. Press **FCN**.

```
S I D # 0

            1 2 : 1 5
[====]          |||||/
```

5. Enter the proper System ID (SID).

    Note The SID must match the data entered in the system settings.

6. Press **CLR** to make corrections.

7. Press ▼.

```
H I D # 0

            1 2 : 1 5
[====]          |||||/
```

8. Enter the handset ID (four digits) for the system ID entered in Substep 5.

```
H I D # 1

            1 2 : 1 5
[====]          |||||/
```

9. Press ▼ for other systems.

10. Repeat Substeps 5~7 to enter all the system and handset IDs required.

    A maximum of eight system IDs and associated handset IDs can be stored in handset memory.

11. Press **END**.

    The ESN displays momentarily.

12. Press **CALL**.
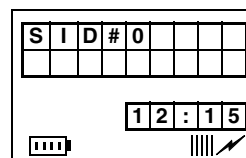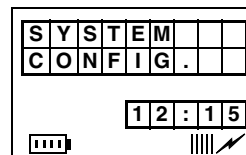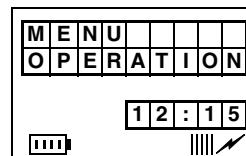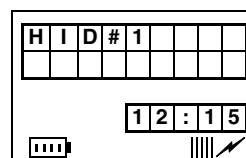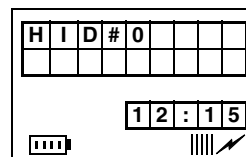
    The handset ESN is stored in the BSIA.

RWIU Additional Information

The following paragraphs describe:

♦ RWIU/WWIS interface unit

♦ Changing the initial configuration

♦ Changing the communications port

♦ Checking the RWIU and Base Station software versions

♦ Viewing log messages

♦ Resetting the Base Stations and RWIU

♦ Upgrading the RWIU and Base Stations

♦ Changing the Base Station number

RWIU/WWIS Interface Unit

The Strata AirLink Wireless System interfaces to Strata DK16, DK16e, DK40, DK40i, DK280, and DK424 systems with an RWIU Interface Unit. The RWIU PCB (shown in Figure 28) functions as a protocol converter between the Base Stations on one side and the Strata DK system on the other. The RWIU is the "master" PCB, generating timing and synchronization signals and the WWIS PCB is the "slave."

The PCBs have LEDs that indicate a continuous status of operation for both. They are shown in Figure 29 on Page 16-59. The switches and jumper are described in Tables 11~13 on Page 44.

The PCB has an Intel® 80C186EC, 25 MHz (provided by a 50 MHz oscillator), 16-bit Complementary Metal Oxide Semiconductor (CMOS) embedded Central Processing Unit (CPU) with the following:

♦ External 16-bit data bus and 20-bit address bus

♦ Four Direct Memory Access (DMA) channels

♦ Three programmable timer counters

♦ Eight programmable external interrupt controller inputs

♦ Two integrated communication channels Universal Asynchronous Receiver/Transmitter (UARTS)

♦ Integrated Watch Dog Timer (WDT)

♦ Two flash memories (expandable by two)

♦ Two CMOS Static Random Access Memories (SRAMs) (expandable by two)

♦ In-circuit test points

The RWIU has the following interfaces:

♦ Backplane (P1)

♦ Synchronous RS485 bus (J5)

♦ Serial line (J7)

♦ External power supply (J8)

♦ JTAG Mach programming (J11)

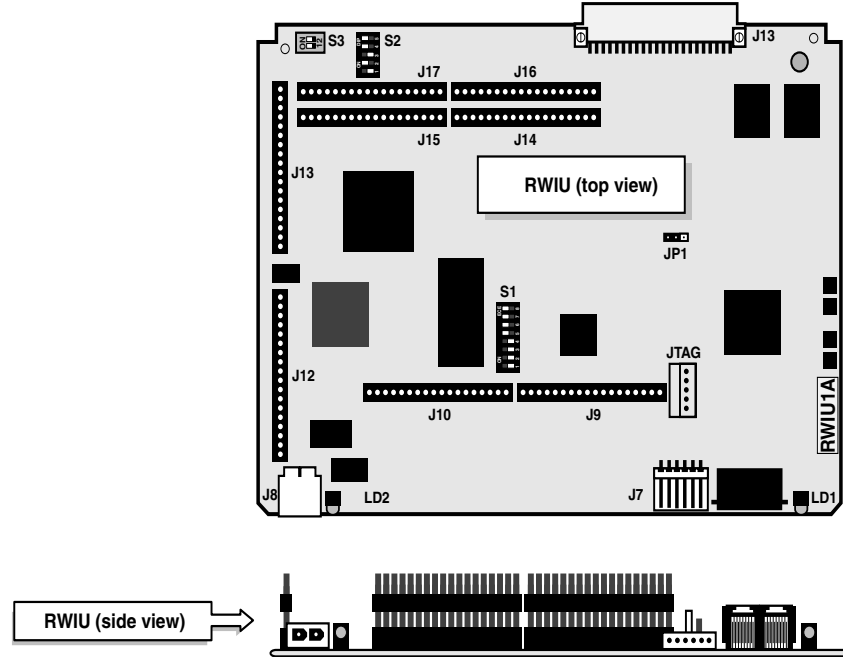The WWIS has four Base Station interface connectors (J1~J4).

Figure 28   Top and Side View of the RWIU

The CPU addresses come from three octal latches that are also address buffers while the data bus addresses are buffered by a pair of bidirectional octal transceivers connected to the various peripheral devices.

There are eight external interrupt signals:

♦   INT0 – connects to the data highway receive (RX) and transmit (TX) interrupt output or to the RX interrupt output of internal serial channel one (optional).

♦   INT1 – connects to the TX interrupt output of internal serial channel one.

♦   INT2 – connects to interrupt output of the DMA channel N0 (DMA0).

♦   INT3 – connects to interrupt output of the DMA channel N1 (DMA1).

♦   INT4 – connects to N0~3 interrupt output.

♦   INT5 – connects to the RX interrupt output of internal serial channel one or to the data highway RX and transmit TX interrupt output (optional).

♦   INT6 – connects to the general device interrupt output.

♦   INT7 – connects to the interrupt output of the optional external UART device.

The CPU has two flash (boot) memories, 128KB each, operating at 55 ns and mounted on 32-pin sockets. The memory is expandable to two optional flash memories (512KB each, 55 ns). The total size of program memory is 256KB or 1024KB using two memories.

The Random Access Memory (RAM) consists of two CMOS SRAM chips, 128KB (55 ns), used as main data memories. It is expandable to 512KB (55 ns) using two additional chips. The total size of the data memory of the CPU is 512KB.

The WWIS PCB (see Figure 29) has the following components:

♦ Four E1 transceivers with crystals, line transformers, protectors, and electronic circuit breakers

♦ Two LEDS for each transceiver

♦ Eight elastic buffers, two for each E1 interface

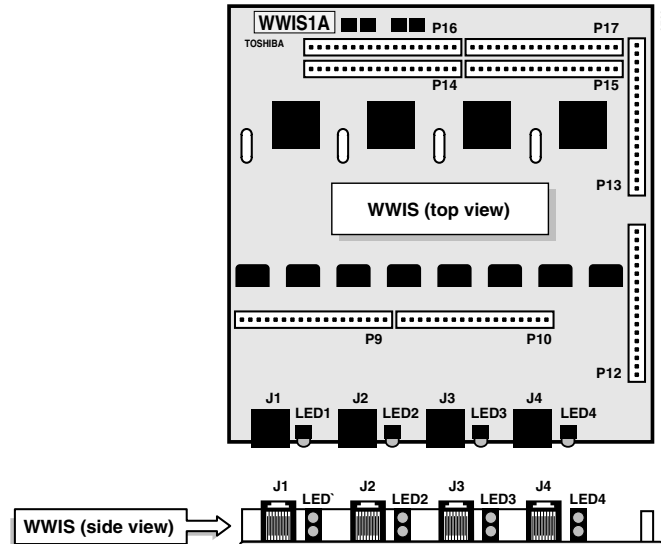♦ Surface Mount Technology (SMT) resistors and capacitors

Figure 29   Top and Side View of WWIS

The thickness of the RWIU is 1.6 mm and the maximum distance between the WWIS PCB (including the height of the mounted components) is 30 mm.

Signaling

A high density Mach decoder generates all the chip select signals and control signals for Erasable Programmable Read Only Memory (EPROM), flash and RAM memories, peripherals, and Input/Output (I/O) devices. The Mach device includes a serial interface on connector J7 for on-board programming.

The digital I/O block has two digital input buffers and four output D flip-flops for the digital output signals. All input buffers and output flip-flops connect to the CPU lower data bus using a bidirectional transceiver. All control signals are generated to the I/O devices by the Mach decoder.

A power ON external reset generator is provided by an internal WDT chip. There is also a power-fail circuit that alerts the CPU when the voltage falls below 4.75V. This feature is necessary because the CPU stores data in the backup memory of the RTC during a power failure.

An RTC chip mounts on the RWIU PCB only. It has an internal Lithium battery and an internal backup 2KB of SRAM memory, powered by the same Lithium battery.

The RWIU interfaces to the Strata DK system using a 32 time slot, 2.048 MHz Pulse Code Modulator (PCM) channel. The PCM channel has the following signals:

♦ PHOUT – 32 time slots (receiving data)

♦ PHIN – 32 time slots (transmitting data)

♦ PHFS – 8 KHz frame synchronization output

♦ PHCLK - 2.048 MHz clock input

♦ 4MCLK - 4.096 MHz clock input

The interface with the voice channel has the following signals:

♦ PCM matrix memory time switch device

♦ Digital I/O buffers (output enable)

The PHOUT connects to the matrix PCM input signal using a digital input buffer. The PHIN connects to the output signal using a digital output buffer. It is enabled only during the transmission phase of the data by the matrix. A time-slot assignment logic enables the output buffer of the PHIN signal during the right time segment.

There are five hardwired address pins coming from the backplane connector (P1) of the RWIU and one additional two-position DIP switch (S3). These are connected to seven input pins to control the time-slot assignment logic for the various configurations. The CPU reads the status of these hardwired addresses and the state of the two-position DIP switch (S3). An additional five-position DIP switch (S2) selects various RWIU configurations and synchronizes the clock with the 8 KHz frame synchronization pulse.

The receive data signal from the main PCM voice channel connects to input N0 (IN0) of the matrix. The transmit data signal from the main PCM voice channel comes from output N0 (OUT0). The signal connects to a buffer that generates the external buffered transmit data signal available on the backplane connector P1. Table 19 describes the four internal synchronous 2.048 PCM busses generated by the matrix.

Table 19   Generated Internal Synchronous PCM Signal

PCM Bus Number	E1 Interface	Signal
1	N1	RD01 internal synchronous PCM channel N1 receive data.
		XDI1 internal synchronous PCM channel N1 transmit data signal, derived from input N1 (IN1) of the matrix while the output signal is derived from output N1 (OUT1) of the same matrix.
2	N2	RD02 internal synchronous PCM channel N2 receive data.
		XDI2 internal synchronous PCM channel N2 transmit data signal, derived from input N2 (IN2) of the matrix while the output signal is derived from output N2 (OUT2) of the same matrix.
3	N3	RD03 internal synchronous PCM channel N3 receive data.
		XDI3 internal synchronous PCM channel N3 transmit data signal, derived from input N3 (IN3) of the matrix while the output signal is derived from output N3 (OUT3) of the same matrix.
4	N4	RD04 internal synchronous PCM channel N4 receive data.
		XDI4 internal synchronous PCM channel N4 transmit data signal, derived from input N4 (IN4) of the matrix while the output signal is derived from output N4 (OUT4) of the same matrix.

Timing and Synchronization

To comply with FCC part 15D clock and frame synchronization requirements, the clock and frame frequency accuracy must be ± 10 parts per million (ppm). To meet this requirement without adding cost, the system uses the Strata DK system as the primary clock source. The analog, digital, and Stratum 3 trunks were considered as possible configurations.

To continue using only one single interface between the RWIU and the Base Stations, the clock signal is sent through the E1 interface using a 320 ms synchronization pulse. The Base Stations lock onto the RWIU clock signal and the Portable Unit Board (PUB) extracts the clock from the Base Stations. The RWIU provides a signal to all other PCBs for a simple insertion into the E1 time slot 17.

Backplane Interface Connector

The RWIU has a 44-pin Deutsche Institut fur Normung (DIN) connector (P1) that connects to the backplane of the Strata DK system. The connector has two rows with 22 pins in each row.

PBX Data Highway Interface

The PBX data highway control channel uses an integrated UART controller running at 312.5 kbs. The control channel uses the following signals that originate from the backplane connector P1:

♦ DHOUT - receive signal (input) and connects to RX

♦ DHIN - transmit signal (output) and connect to TX

The UART debug serial channel connects to the integrated serial channel N0, and the asynchronous multi-drop communication channel connects to serial channel N1. The UART internal serial channels connect to the debug serial channel and the asynchronous multi-drop communication channel. The debug serial channel connects to N0, and the asynchronous multi-drop communication channel connects to the external UART device.

An RS-485 asynchronous multi-drop communication link between the RWIU and the WWIS occurs because the UART connects to the CPU external bus. The UART is not physically mounted on the RWIU, but uses the 28-inch PLCC socket on the RWIU.

The UART receives its operating frequency from the output of the internal timer N0 of the CPU. N0 is programmed to divide the internal 25 MHz operating frequency of the CPU by a factor of 5 to obtain the UART 5 MHz operating frequency. It is possible to use N0 for other software applications by substituting an optional external 5 MHz crystal.

Base Station Interface Connectors (E1s)

Four identical long-haul E1 (2048 kbs) PCM interfaces connect the RWIU PCB to each Base Station (N0~N3) using a standard pulse (see Table 20). Each interface has:

♦ Primary access transceiver devices

♦ Two elastic buffers for each E1 channel

♦ RX and TX line transformers with protectors

♦ 320 ms synchronization signal insertion logic (channel N17)

♦ Loop back controls

♦ RWIU generated Base Station reset (relays K1~K4)

♦ RFI protectors (common mode chokes - optional)

♦ Electronic circuit breakers for each E1 channel

Table 20   Connector J1~J4 Descriptions

J4			
Pin No.	**Base Station**	**Name**	**Description**
1	1	TX_TIP_BS1	E1 interface (transmission output from TX line transformer)
2		TX_TIP_BS1	
3			Not used
4			Not used
5		RX_TIP_BS1	E1 interface (transmission output from RX line transformer)
6		RX_TIP_BS1	
J3			
1	2	TX_TIP_BS2	E1 interface (transmission output from TX line transformer)
2		TX_TIP_BS2	
3			Not used
4			Not used
5		RX_TIP_BS2	E1 interface (transmission output from RX line transformer)
6		RX_TIP_BS2	
J2			
1	3	TX_TIP_BS3	E1 interface (transmission output from TX line transformer)
2		TX_TIP_BS3	
3			Not used
4			Not used
5		RX_TIP_BS3	E1 interface (transmission output from RX line transformer)
6		RX_TIP_BS3	
J1			
1	4	TX_TIP_BS4	E1 interface (transmission output from TX line transformer)
2		TX_TIP_BS4	
3			Not used
4			Not used
5		RX_TIP_BS4	E1 interface (transmission output from RX line transformer)
6		RX_TIP_BS4	

The four primary access transceivers (U7, U13, U25, and U35) use the E1 (31 B + D) interface to each Base Station. Not all of the 32 time slots of the E1 (32 B + D) frame are used. The format is called 8 B + D and organized as follows:

♦ Time slot N0 – synchronization time slot

♦ Time slots N1~N8 – voice channels time slots

♦ Time slots N9~N15 – idle (free) time slots

♦ Time slot N16 – signaling CCS time slot

♦ Time slot N17 – multiframe 320 ms synchronization pulse time slot

♦ Time slots N18~N31 – idle (free) time slots

The E1 devices receive each processed (but not formatted) 31 B + D frame from the CPU and transmits it (after formatting) to its Base Station through its TX line transformer. The same is true from the receiving side. The CPU performs the protocol conversion. Both TX and RX transfers are actuated in DMA mode by the CPU.

The E1 device connects to the matrix using four internal 2048 kbs synchronous PCM buses with the following signals:

♦ RD01 internal PCM channel n1 received data (U7)

♦ XDI1 internal PCM channel n1 transmit data (U7)

♦ RD02 internal PCM channel n2 received data (U13)

♦ XDI2 internal PCM channel n2 transmit data (U13)

♦ RD03 internal PCM channel n3 received data (U25)

♦ XDI3 internal PCM channel n3 transmit data (U25)

♦ RD04 internal PCM channel n4 received data (U35)

♦ XDI4 internal PCM channel n4 transmit data (U35)

The four internal 2048 kbs synchronous PCM busses transfer the data between each E1 device and the matrix. The matrix places the data on the backplane PCM channels.

Protectors

The RX and TX transformers connect to the E1 line through protector devices. Current-limiting resistors are used on both sides of the transformers. Tranazorb U45~U47, U53, U57~U58, and U62~U63 and Gas Tubes G1~G8 devices provide fast protection from lightning by sending sudden surges to the frame around the RWIU PCB.

Additional protection is provided by the secondary line transformers by dual MMBT7000 diodes. All the line transformers RX and TX are breakdown-rated at 1500 Vrms. Loop back controls and Base Station resets are provided for each Base Station by a relay. Each relay is controlled by the CPU using an output port signal. Transistors drive each relay.

Power (-40VDC) transfers from each Base Station to the associated remote Base Station are performed using a standard phantom interface on the central taps of the secondary of each TX and RX transformer of the E1 interface. An electronic circuit breaker with associated power Field Effect Transistor (FET) is used for each Base Station E1 interface.

Important! *In the case of a short circuit on the -40VDC side of one the phantom interfaces, the electronic breaker turns off its associated power FET. After about five seconds, it tries to verify that the short is gone by turning on the power FET for a shorter period (about 200 ms). If the short is gone, the circuit breaker turns on its power FET permanently. If the short is still present, it continues to retry the circuit.*

The same device protects the PCB against a rush current at Base Station power up. Each electronic circuit breaker block is turned on/off by the CPU using the output port that drives the LED of a photocoupler. A short circuit indication flag is provided to the CPU for each electronic circuit breaker. The following are additional protection devices for each E1 interface:

♦ Four slow-blow fuses

♦ One polyswitch

Ring Back Tones Generator

The RWIU PCB incorporates a 32KB EPROM that generates:

♦   440 Hz ring back tone, modulated at 480 Hz

♦   2400 Hz busy override tone

♦   4 tone channels for the U.S.

Each tone generates 800 bytes every 125 ms. The bytes are sent on a specific time slot of the matrix and to the related time slot of the PHIN output.

Serial Line Interface

There is a six-pin serial line interface (J7) that debugs and sets up the system. It is a RS-232 port and connects the PC to the RWIU (see Table 21).

Table 21   Connector J7 Descriptions

Pin No.	Name	Description
1	TXD	RS-232 TX data (from the RWIU)
2	RTS_0	RS-232 RTS data (from the RWIU)
3	RXD	RS-232 RX data (to the RWIU)
4	CTS_1	RS-232 CTS data (from the RWIU)
5		Not used
6	GND	RS-232 Ground (from the RWIU)

Software Architecture

The RWIU software is a real-time embedded software, written in C language designed for the Intel 80186EC processor. Its modules include real-time tasks, service packages, and hardware drivers. Its functions are:

♦   Communication (KSU DHWY and Base Station)

♦   Local debugging

♦   Monitor communication

♦   Call control logic procedures (call origination, delivery and release)

♦   Mobility control (handoff)

♦   Handset text and icon displays

♦   System and Base Station power up controls

♦   RWIU cross connects

♦   Base Station software download

♦   Start-up diagnostics (BIT)

♦   Online diagnostics

♦   Loop tests

♦   System audit and parameter refresh

♦   RWIU and Base Station configuration

♦   Alarm reports and LEDs

♦ System parameters

♦ UTAM activation

The software is built in layers, each implementing a different function. Each layer gets input from the layer below and provides services to the layer above. The hardware drivers layer uses interrupts and API calls interface with the layers above.

The operating system is totally independent of the hardware configuration and uses API calls to interface with the other layers. All other layers use API calls and inter-task communication messages to interface each other.

The operating system main services are:

♦ Task definition and initiation, termination, and context switching

♦ Inter-task communication (message, semaphores)

♦ Message handling (mailbox)

♦ Timers

♦ Memory management (buffer pools)

All access to the operating system is performed using an Operating System Shell (OSS). The shell provides a general API to the operating system services. The software supports the following interrupt-driven protocols:

♦ KSU DHWY communication protocol (addressed ASYNC)

♦ Base Station communication protocol (E1 D channel)

♦ Local debug/monitor communication protocol (RS-232)

The main data structures are:

♦ Port information

♦ Card status

♦ External E1 links state and status

♦ External/internal E1 cross connect configuration

♦ Base Station configuration

♦ System ID

♦ UTAM parameter

The communication protocol layer, using the corresponding hardware drivers, handles external interfaces. Messages from the KSU and the Base Station are converted by the communication protocol layer to inter-task messages and are sent to the corresponding layer or task. The hardware drivers consist of:

♦ CPU (Intel 80186EC)

♦ E1 Transceiver (DALLAS DS2153)

♦ Matrix (MITEL MT8985)

♦ WDT (CPU)

♦ UART (16550 compatible and internal to the CPU)

♦ External UART (16550 compatible)

♦ PIC (8259 compatible and internal to the CPU)

♦ DMA (four channels and internal to the CPU)

♦ RTC

The communication with hardware drivers is performed using package interface procedures. The Init task controls the sequence of card initialization and synchronizes it according to the KSU and Base Station needs.

System management consists of several packages—each a set of functions providing a group of services. The main features are:

♦ Alarm management (send alarm, set alarm severity)

♦ Database services (add Base Station, change status)

♦ Configuration Interfaces (reset Base Station)

♦ Test Control (set loop back, start test, utilities and general services, such as set date and time, set LED)

♦ UTAM procedures

Change Initial Configuration

It is highly recommended that you get the current configuration and save it to a file on the PC as the working copy. Then, open and edit the working copy – not the original file. Using this method ensures that the original configuration file is not corrupted while adding or editing existing data. Once the new information is saved, the RWIU uses the new data immediately.

Important! *Sending configuration information to the RWIU overwrites existing information. Make sure that the sent data contains all of the required configuration information, not just the few additions or changes that were made.*
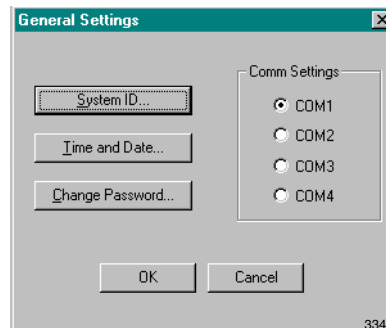
Change Communications Ports

1. From the Desktop Toolbar, click the Config icon.
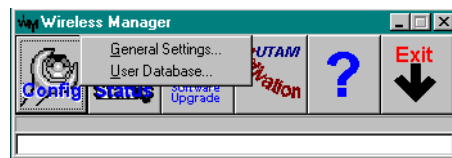
2. Click General Settings.

3. Click the new port and OK. The Desktop Toolbar displays.

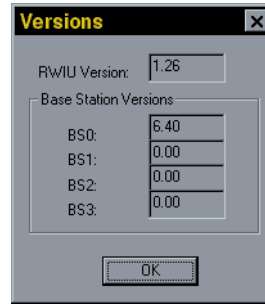## Check RWIU and Base Station Software Versions

1. From the Desktop Toolbar, click the Status icon.
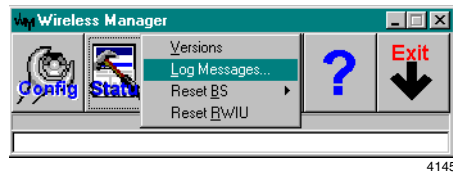

3360

2. Click Versions.

3742

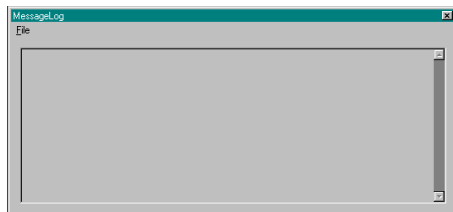## View Log Messages

1. From the Desktop Toolbar, click Status.
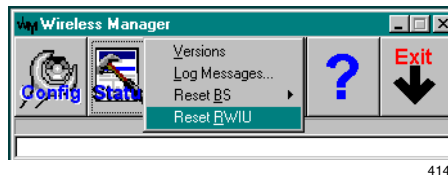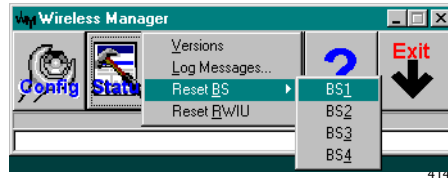

4145

2. Click Log Messages.

Reset Base Stations and RWIU

1. From the Desktop Toolbar, click Status.

2. Click Reset BS

   ...or Reset RWIU.

The selected Base Station or RWIU is reset automatically.
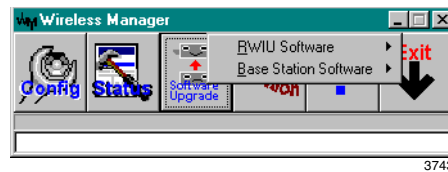
Upgrade RWIU and Base Stations

1. From the Desktop Toolbar, click the Software Upgrade icon.
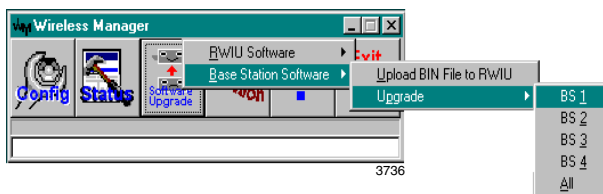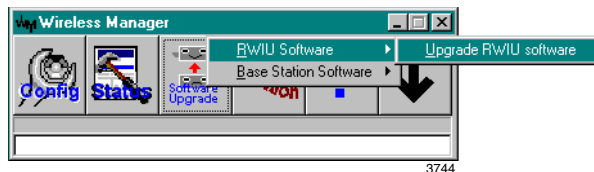

2. Click RWIU Software

The software downloads.

   ...or Base Station Software.

3. Click BS0~BS3
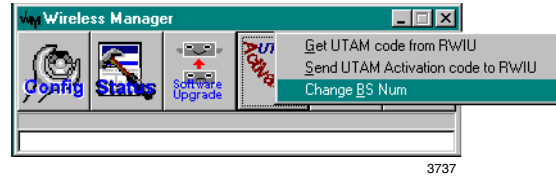
   ...or Download BIN File to RWIU.

The software downloads.

Change Base Station Numbers

1. From the Desktop Toolbar, click the UTAM Activation icon.

3737

2. Click Change BS Num.

You are prompted for a password.

3739

3. Enter the password and click OK.

4. Enter the new Base Station number.

Maintenance and Troubleshooting 5

This chapter describes maintenance procedures and troubleshooting tips for the Strata AirLink Wireless BSIA and RWIU systems. Problems are classified and cleared by replacing the malfunctioning unit and by performing operational tests in the sequences described in this chapter.

Important! *Many wireless system features are assigned, enabled or disabled using software entries as described in "Install Strata AirLink Manager Software" on Page 24 (BSIA) and RWIU System Installation on Page 43 (RWIU). It is very important to verify that the programming is correct and functional before troubleshooting the hardware.*

Before beginning diagnostic and troubleshooting tests, check the following:

♦ System power, polarity, and continuity

♦ BSIA or RWIU LEDs, boot sequence, and alarm relays

♦ Base Station LEDs

♦ Handset and batteries

♦ Strata AirLink and RWIU Manager reports

Maintenance

This chapter covers the following maintenance procedures: charging batteries, discharging batteries, password protection, and upgrading base stations.
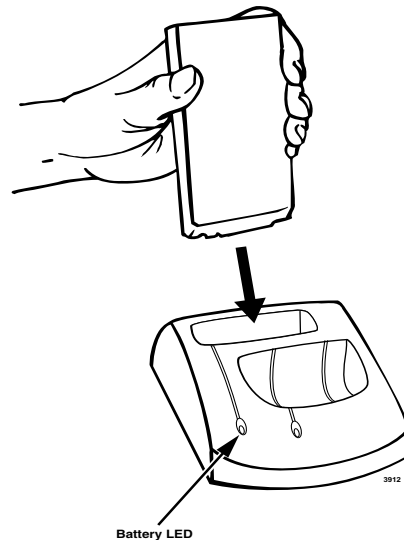
Charge Batteries

1. Insert the handset with the battery (power off) into the Charger Base front pocket.
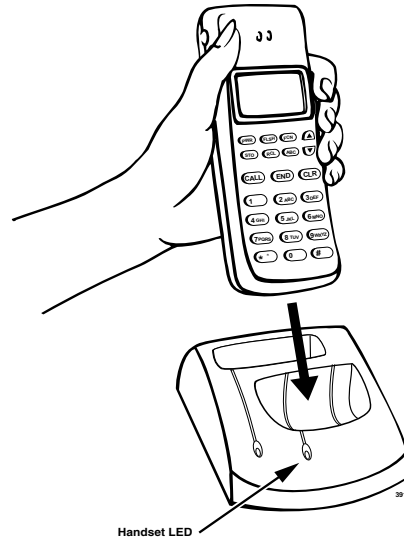
Handset LED

The front pocket LED changes to amber and then changes to red to indicate that rapid charging is in progress.

2. Insert the spare battery into the Charger Base rear pocket.

Battery LED

The rear pocket LED changes to amber while the handset finishes charging or alternates between green and amber, indicating in-progress discharge.

3. When LEDs change to green, charging is complete.

The charger switches to a trickle charge. When the handset is fully charged, the front pocket LED changes to green and the rear pocket LED changes to red, indicating an in-progress charge.

4. Remove the handset or spare battery.

Important!

♦ Do not use an incomplete, charged battery, even if the battery icon shows full strength. The handset will have reduced talk/standby time.

♦ If a fully charged battery is placed in the charger, it will detect the charged condition and cancel rapid charging. The LED changes to amber, red, and then green.

Discharge Batteries

1. Insert the battery into the charger base rear pocket.

If the LED alternates between green and amber, leave the battery in the charger to complete discharging.

After the discharge cycle completes, the LED changes to red to indicate rapid charging is in progress.

2. Remove the battery, when the LED changes to green.

Password Protection

Table 22 lists functions in the handset that are accessed by password. Some of the functions are for use by Toshiba technical support only.

Table 22   Handset Password-protected Functions

| Function	Meaning
Bulker DU	Access to functions.
Unique Base Station	Locks the handset onto a Base Station with a particular ID. Zero (0) means normal operation.
Software version	Displays handset's software version.
Beep on Roam	Causes an idle handset to beep when the Base Station it is locked onto changes.
Handoff by Recall	Enables **RCL** to initiate handoff to another Base Station in the system while a call is in progress.
Reset to factory defaults	Restores the handset to factory default settings. All changes made via the handset menu are removed.

➤ **To access password-protected functions**

1. In idle mode, press **1 2 3 4**.	
2. Press **ABC**, then **FCN**.	

```
┌─────────────────────┐
│ B U L K E R         │
│ D U                 │
│              1 2 : 1 5 │
│ ▭▭▭            ‖‖‖‖ ⟋ │
└─────────────────────┘
```

3. Enter the password.

4. Press ▼ to choose **UNIQUE BASE STATION**

    ...or **SOFTWARE VERSION**

    ...or **BEEP ON ROAM**

    ...or **HANDOFF BY RCL**

    ...or **FLASH MODE**

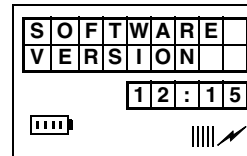   ...or **RESET TO FACT DFLT**.
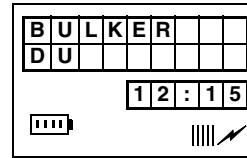
➤ **To lock a handset to a Base Station**

1. Press ▼.

```
┌─────────────────────┐
│ U N I Q U E         │
│ B S                 │
│              1 2 : 1 5 │
│ ▭▭▭            ‖‖‖‖ ⟋ │
└─────────────────────┘
```

2. Enter a Base Station ID (1 or 2)

    ...or 0 to restore a handset to normal operation.
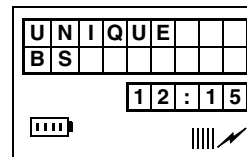
Note RWIU 1, 2, or 3 cannot lock uniquely to Base Station 0 (zero).
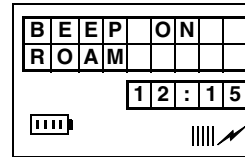
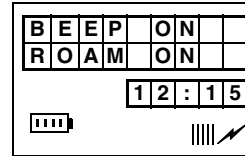➤ **To view the software version**

1. Press ▼.

```
┌─────────────────────┐
│ S O F T W A R E     │
│ V E R S I O N       │
│              1 2 : 1 5 │
│ ▭▭▭            ‖‖‖‖ ⟋ │
└─────────────────────┘
```

2. Press **FCN**.

The software version displays.

➤ **To use the Beep On Roam feature**

1. Press ▼.

```
┌─────────────────┐
│B│E│E│P│ │O│N│ │ │
│R│O│A│M│ │ │ │ │ │
│         │1│2│:│1│5││
│▭▭▭     ‖‖‖‖‖／     │
└─────────────────┘
```

2. Press **FCN**

```
┌─────────────────┐
│B│E│E│P│ │O│N│ │ │
│R│O│A│M│ │O│N│ │ │
│         │1│2│:│1│5││
│▭▭▭     ‖‖‖‖‖／     │
└─────────────────┘
```

...or **FCN** again.

```
┌─────────────────┐
│B│E│E│P│ │O│N│ │ │
│R│O│A│M│ │O│F│F│ │
│         │1│2│:│1│5││
│▭▭▭     ‖‖‖‖‖／     │
└─────────────────┘
```
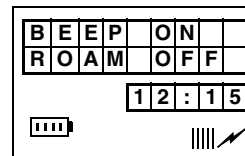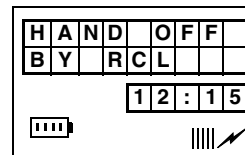
3. Press **END**

    ...or ▼ to go the next password protected function.

➤ **To use the Handoff by Recall feature**

1. Press ▼.

```
┌─────────────────┐
│H│A│N│D│ │O│F│F│ │
│B│Y│ │R│C│L│ │ │ │
│         │1│2│:│1│5││
│▭▭▭     ‖‖‖‖‖／     │
└─────────────────┘
```

2. Press **FCN**.

```
┌─────────────────┐
│H│A│N│D│ │O│F│F│ │
│R│C│L│ │O│N│ │ │ │
│         │1│2│:│1│5││
│▭▭▭     ‖‖‖‖‖／     │
└─────────────────┘
```

...or **FCN** again.

```
┌─────────────────┐
│H│A│N│D│ │O│F│F│ │
│R│C│L│ │O│F│F│ │ │
│         │1│2│:│1│5││
│▭▭▭     ‖‖‖‖‖／     │
└─────────────────┘
```
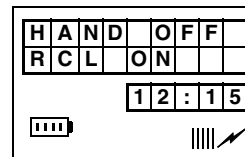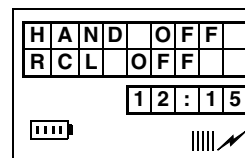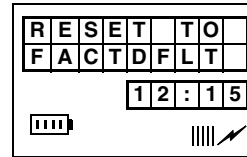
3. Press **END**

    ...or ▼ to go the next password-protected function.

➤ **To reset to factory defaults**

1. Press ▼.

R	E	S	E	T		T	O
F	A	C	T	D	F	L	T

12:15

2. Press **FCN**.

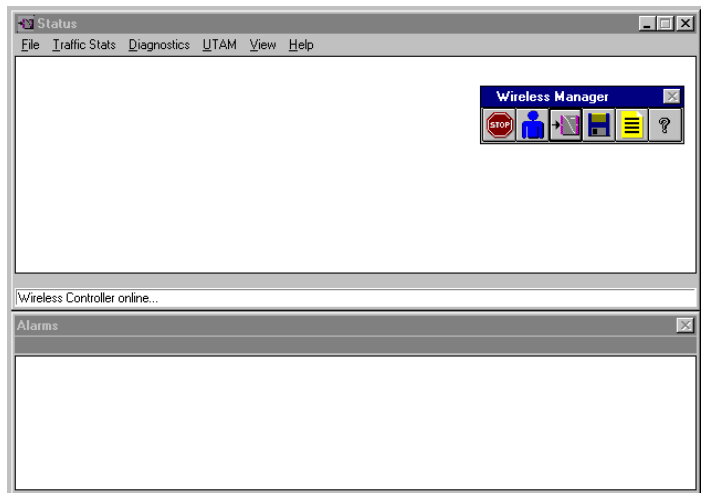| R	E	S	E	T			
D	O	N	E				

12:15
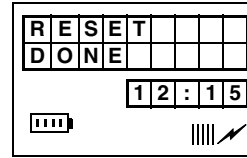
Upgrade Base Stations

CAUTION!   **This procedure should only be performed if technical support requires it. Attempting the procedure without technical support, could destroy the system.**
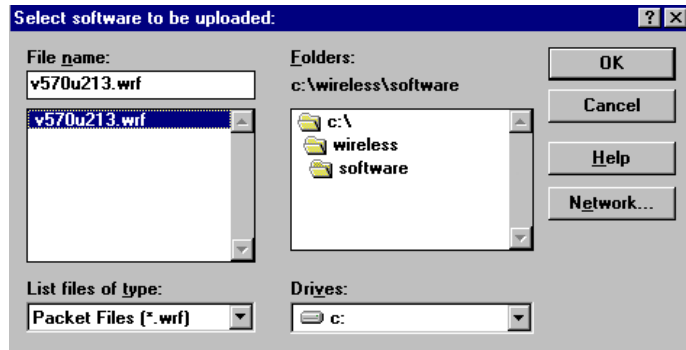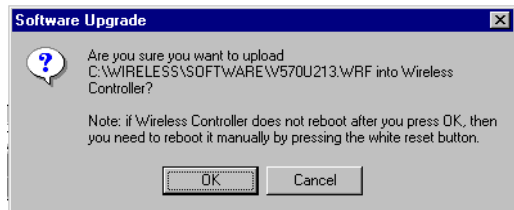
1. From the Desktop Toolbar, click Status.

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Monitor the upgrade by viewing the status messages as the BSIA powers up.

2. From the Desktop Toolbar, click Upgrade.

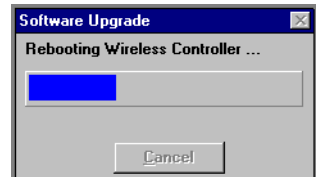3. From the Select software to be uploaded: dialog box, highlight the file and click OK.

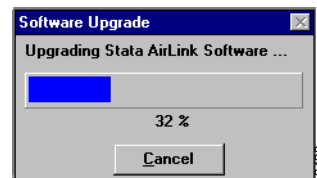4. From the Software Upgrade screen, click OK.

The BSIA boots automatically.

Note If the BSIA does not boot automatically within a few seconds, which occurs sometimes during the initial upgrade, press the reset button on the BSIA.

A series of screens display:

♦ Upgrade of the BSIA software:

♦ Upgrade of the Base Station software:

♦ Normal failure of the Base Station upgrade:

Important! *At this point in the upgrade process, input the UTAM system activation code.*

5. From the Software Upgrade screen, click OK.

6. From the Status menu bar, highlight UTAM and pull down its menu.

7. From the UTAM pull-down menu, select Get UTAM Inputs From Strata AirLink.
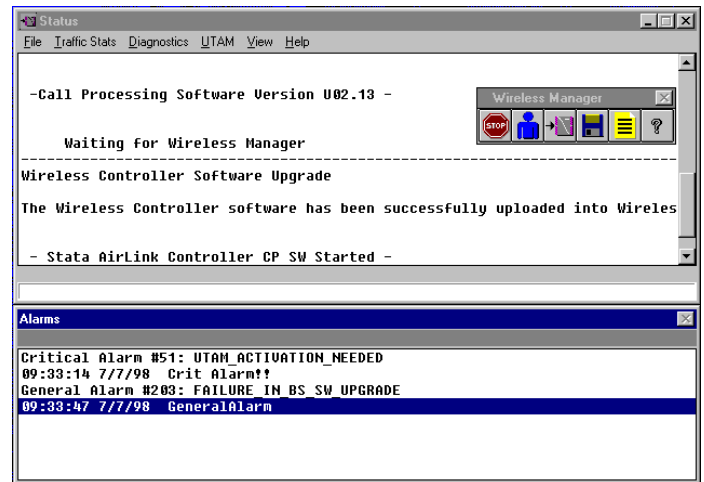
Important! *Make a note of the BSIA serial number and input codes before calling the Strata AirLink Activation Desk because the staff will ask for these numbers.*

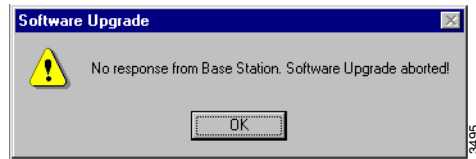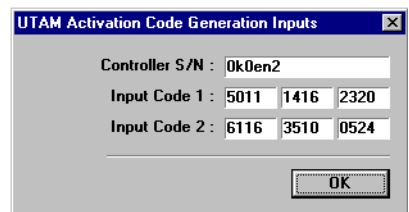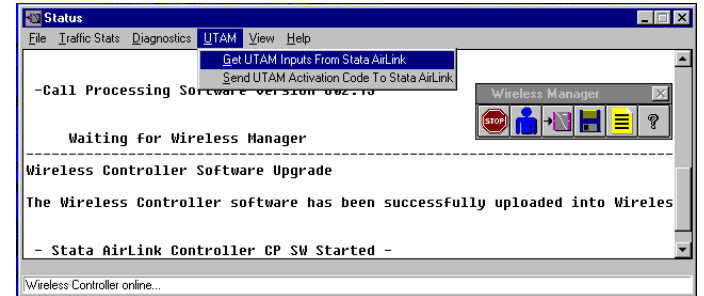8. Call the Strata AirLink Activation Desk, (949) 598-4980 for the activation code.

Note The hours of operation are: Monday through Friday, 8:00 a.m. to 5:00 p.m., Pacific Standard Time.

After the BSIA serial number and input codes are given to the activation desk, the technician will give you the UTAM system activation code.

9. Close the Get UTAM Inputs From Strata AirLink window.

The Status window displays.

10. From the Status window, highlight UTAM and pull down its menu.

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11. From the UTAM pull-down menu, select Send UTAM Activation Code to Strata AirLink.

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12. In the UTAM Activation Code dialog box, enter the UTAM Activation Code and click OK.
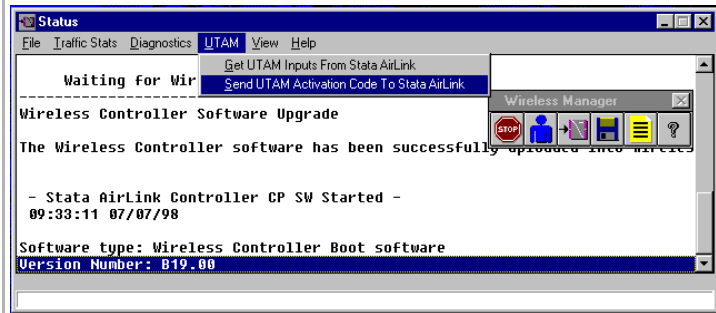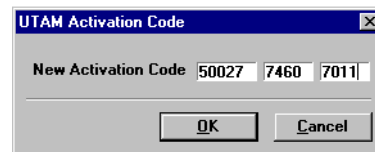
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The message "Wireless system has been activated" is displayed at the bottom of the Status window.

Important! *The UTAM code must be installed in one hour or a new one is required.*

Normal LED indications display on the BSIA (PWR and Master LED ON) and Base Stations (PWR LED ON).

Several messages display (shown at the right) on the PC screen as Strata AirLink Manager tests the installation.
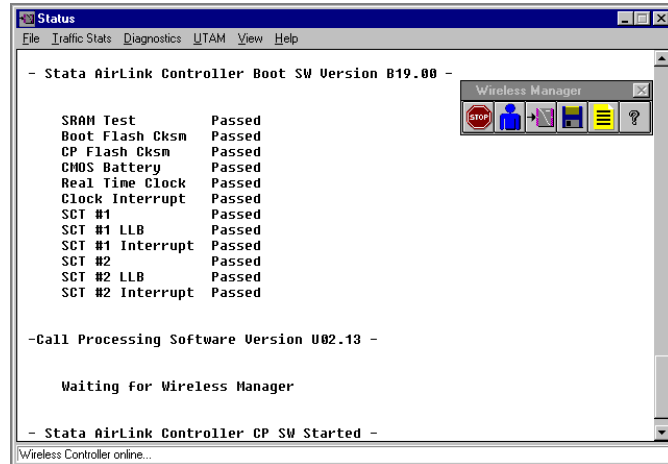

```
Status                                                          _ □ ×
File  Traffic Stats  Diagnostics  UTAM  View  Help

- Stata AirLink Controller Boot SW Version B19.00 -
                                            Wireless Manager        ×
     SRAM Test        Passed
     Boot Flash Cksm  Passed
     CP Flash Cksm    Passed
     CMOS Battery     Passed
     Real Time Clock  Passed
     Clock Interrupt  Passed
     SCT #1           Passed
     SCT #1 LLB       Passed
     SCT #1 Interrupt Passed
     SCT #2           Passed
     SCT #2 LLB       Passed
     SCT #2 Interrupt Passed


-Call Processing Software Version U02.13 -


     Waiting for Wireless Manager


- Stata AirLink Controller CP SW Started -

Wireless Controller online...
```
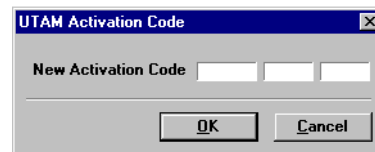
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Important! *If the message "Waiting for Wireless Manager" does not appear in the Status window before the progress bar times out, or LED S2 remains lit after a reboot, the BSIA has not been upgraded. Repeat* Substeps 1~12.

Troubleshooting

System Power, Polarity, and Continuity

It is important to check all power sources, polarity, and continuity before any other troubleshooting begins. Quickly check the LEDs. Check the polarity of the system by ensuring that all transmit and receive pairs are consistently wired throughout the system. Sometimes switching pairs at the Base Station solves a problem quickly.

Components

If only one system component has a problem, try replacing it with a known good one. For example, switch Base Stations, RWIUs, BSIAs, ALMs, or handsets to see if problems persist.

Communications

To check for communication errors (for example, serial port failure), perform a software version query of the Base Station from the software. If the system does not respond to the query, check the cables.

RF Link Termination

The handset can lose its signal from the Base Station because of reduced power, interference, or stepping out of range. Verify that the battery is fully charged and the handset is in range of a Base Station.

Noisy Circuits

If users complain about noisy circuits or problems with dial tone, try switching the user to another circuit on the office telephone system. If a circuit is not operating at all, use a installer test set to check continuity throughout a system.

DC Resistance

The distances between the system and its Base Stations (see Table 28), whether using line power or a local power supply, can be exceeded during an installation. The distances are reflected in the resistance of the line. For specific BSIA information, see "To measure the DC resistance" on Page 86, and for the RWIU, see "" on Page 95.

System Reset

As a last resort, sometimes resetting the system clears up system problems. Before resetting the system, collect as much information as possible in the current log file. Get traffic statistics reports, call status reports, line and Base Station status reports, and alarm reports, if available. Use the Save As command to save the log file.

Activation Code

If the UTAM activation code has not been uploaded, the Base Stations will not operate (refer to "Set Up Temporary Installation" on Page 13 for more information). Contact Strata AirLink Activation Desk at (949) 598-4980 for the code between the hours of 8:00 a.m. and 5:00 p.m. (Pacific Standard Time), Monday through Friday. Voice mail is available for messages after hours.

Base Station

The Base Station has five LEDs (see Figure 30). Four LEDs on the left indicate error conditions during power on, reset, and during the diagnostic tests that run during normal operation. The green LED on the right is the power indicator.

Power On/Reset

Table 23 explains how to interpret Base Station LED readings that occur during power on or reset. The LEDs must be read in combination to understand their meaning. The footnotes to the table contain troubleshooting suggestions.
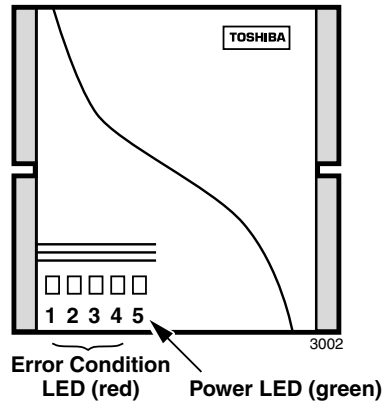
Figure 30   Base Station LED Location

Table 23   Base Station LEDs during Power On/Reset

Failed Test	Red LEDs (In Combination)			
	1	**2**	**3**	**4**
Memory test 1[1]	Off	Off	Off	Blinking
Memory test 2[1]	Off	Off	Blinking	Off
Memory test 3[1]	Off	Off	Blinking	Blinking
Base Station Interface/processor test[1]	Off	Blinking	Off	Off
Base Station Interface external communication test[2]	Off	Blinking	Off	Blinking
ASIC test[3]	Off	Blinking	Blinking	Off
Frequency test[4]	Off	Blinking	Blinking	Blinking
Vocoder Initialization test[1]	Blinking	Off	Vocoder # (0–3)	
			0:Off	Off
			1:Off	On
			2:On	Off
			3:On	On
Signaling channel test[5]	Blinking	Blinking	Off	Off
Memory flash test[4]	Blinking	Blinking	Off	Blinking

1. Indicates a Base Station failure in most cases. Check cable connections or replace transmit/receive cables or local power supply.

2. Check whether the Base Station transmit/receive cables enable another Base Station to initialize.

3. Verify power supply.

4. Test the Base Station on the another BSIA or RWIU Base Station port and with good transmit/receive cables.

5. Reset the BSIA.

Normal Operation

Table 24 explains how to interpret Base Station LED readings that occur during self- diagnostic tests that run during normal operation. The LEDs must be read in combination to understand their meaning. The footnotes to the table contain troubleshooting suggestions.

Table 24   Base Station LEDs during Normal Operation

Test Failed	Red LEDs (In Combination)			
	1	**2**	**3**	**4**
ASIC test[1]	Off	Off	Off	On
Phase lock loop lock test[2]	On	Off	On	Off
Vocoder test[2]	Off	On	Vocoder # (0–3)	
			0:Off	Off
			1:Off	On
			2:On	Off
			3:On	On
Synthesizer unlock test[3]	On	Off	Off	On
Waiting for configuration test[4]	Off	On	On	Off
Phase lock loop initialization test[2]	Off	On	Off	Off
Base Station Interface clock test[2]	On	On	Off	Off
Receive loss[2]	Off	Off	On	On
Loss of control channel[5]	On	Off	Off	Off

1. Test the Base Station on another BSIA or RWIU Base Station port and with different transmit and receive cables.

2. Reset the Base Station on the other BSIA or RWIU. Reset a Base Station by plugging/unplugging its transmit or receive cable. Reset all Base Stations by resetting the BSIA.

3. Test Base Station transmit/receive cables by replacing the Base Station with a functional one.

4. Ensure that the system has been activated or check the BSIA or RWIU configuration. Also try resetting the BSIA.

5. Check for RF interference.

Replace Defective Base Station

1. Disconnect the transmit and receive cables and power supply, if applicable.

2. Lift the Base Station off the mounting screws.

3. Mount the new Base Station and connect the cables and power supply, if applicable.

4. If the Base Station does not come online within a minute, perform a software upgrade using the latest version of software. See "Upgrade Base Stations" on Page 76.

Handset

Table 25 lists handset symptoms and possible solutions.

Table 25   Handset Troubleshooting

Symptoms	Possible Solution
Called party can hear but cannot be heard. Conversation broken up. Handoff clicks occur during conversation.	The handset signal strength is inadequate. Try moving closer to a Base Station. If the problem is reported by many users, try moving the Base Station to a location that provides better coverage. For best results the signal strength icon should show three to five bars. The (BER) test should report Good or Max results. See BER testing on Page 16 for instructions on how to perform this test.
Display does not contain date, time and signal strength.	The handset is not locked onto a Base Station. Try powering off and on or moving to another location closer to a Base Station. **Note** It may take up to a minute for the full display to appear. If the problem persists, check system and handset ID configuration. These symptoms could also occur if the BSIA, RWIU, or Base Station is being reset.
Off-hook icon (📞) flashes when **CALL** is pressed; Handset operated correctly and now cannot make calls.	The handset ESN is improperly configured. Fix this problem by: 1. Reprogramming the handset with proper system and handset IDs. 2. Changing the handset ID configured for the handset to any valid ID not already in use. 3. Changing the handset ID in the User Database to match the ID programmed in the handset. 4. Making a call on the handset to store its ESN in the BSIA or RWIU. 5. Installing the ALM. 6. Performing a maintenance check (system maintenance busy) and loop start line status is activated.

Invalid ESN reported for handset (alarm).	The same handset ID and system ID were programmed into two telephones and databases, and the handset ESNs were associated with the wrong analog line when the first telephone call was made. Fix this problem by:
	
	1. Locating both handsets and correcting the databases.
	
	2. Checking the handset ID configuration in both handsets to make sure they are correct.
	
	3. Changing the ID in the handset and making another call (corrects the ESN configuration for that handset).
	
	4. Correcting the configuration for the handset that reported the invalid ESN. Follow these steps:
	
	  • Open the User Database and change the handset ID configured for the handset to any valid ID not already in use.
	
	  • Change the handset ID in the User Database to match the ID programmed in the handset.
	
	  • Make a call on the handset to store its ESN.

Table 25   Handset Troubleshooting *(continued)*

Symptoms	Possible Solution
No dial tone.	Make sure the handset is locked and check the volume level. If the problem remains, the handset is not locked onto a Base Station. Try powering off and on or moving to another location closer to a Base Station. Check the analog line with a installer's test set to ensure the telephone system is operating properly. If it is, check the wiring between the BSIA or RWIU and the telephone system. Check the BSIA, RWIU, or Base Station for a reset condition because this will interrupt the dial tone.
Weak or delayed dial tone.	Check the handset volume level. Make sure to align the handset with the ear rather than mouth and don't watch the display. Consider using the predial method to make calls by dialing the number and pressing **CALL** (rather than pressing **CALL** and waiting for dial tone).
NO SERVICE! message.	The handset is not locked and it is out of range or all eight channels of the Base Station are being used for other calls. Try powering off and on or moving to another location closer to a system Base Station. Check the BSIA, RWIU, or Base Station for a reset condition because this will cause the NO SERVICE! message. Reset the handset to the factory defaults.
SYSTEM BUSY message.	The handset is locked onto a Base Station and **CALL** was pressed, but the Base Station did not respond. One or more Base Station channels could be in a maintenance busy state or the handset may not be locked well enough to complete the request for service.
Unexpected digits in display.	It is easy to inadvertently press keys on the handset when the handset is not in use. Use the lock feature. To clear digits from the display, use **CLR**.

Battery

Table 26 lists symptoms of battery problems and possible solutions.

Table 26   Battery Troubleshooting

Symptom	Possible Solution
Battery has reduced talk/standby time.	Try discharging and recharging the battery using the instructions 86. The handset has been left unpowered for a long period of time and has drained. Make sure users are not removing batteries from the charger base before the green LED appears. The handset battery strength icon shows full power after a short period of charging. Complete the full charging cycle before using the batteries. Users should also use the handset during the day and recharge it at the end of the day, rather than performing intermittent charging during the day.
Charger has green flashing LED.	Try recharging the battery. If the problem continues, replace the battery.

Charger Base

The Charger Base charges the handset and a spare battery. Do not have to remove the battery from the handset to charge it. The LEDs indicate the status of the charging process as shown in Table 27.

Table 27   Charger Base LED Indications

LED	State	Meaning
Red	Steady	Battery is rapid charging.
	Flashing	Internal battery fault. Charge the battery again. If the problem persists, replace the battery.
Green	Steady	Battery is charged and ready.
	Flashing	Battery is charged, but it could have reduced standby/talk time. Try repeated rapid charging to rejuvenate the battery. Replace the battery, if this fails to remedy the situation.
Amber	Steady	The charger is evaluating the handset or battery state, or waiting for one battery to complete charging.
	Flashing	Short circuit or over-discharged battery is detected. Make sure contacts are clean and allow the battery to remain in the charger until rapid charging starts and completes.
Amber/green	Alternate flashing	Battery is discharging.

BSIA System

Reports

Strata AirLink Manager generates reports with troubleshooting information. Some of the reports are:

♦   Alarm conditions

♦   Traffic statistics

♦   Line, channel, and call status

Analog Line Continuity

To check the analog line continuity throughout the system, use an installer test set at individual MDF/IDF locations. Check for any bridge taps on the Base Station transmit/receive cables and remove. Check all punch downs and cable connections.

DC Resistance

The distances between the system and its Base Stations (see Table 28), whether using line power or a local power supply, can be exceeded during an installation. The distances are reflected in the resistance of the line.

➤   **To measure the DC resistance**

1.   Use a digital multimeter that has resistance measuring capability in ohms and a basic accuracy of better than one percent.

2.   Use an RJ-11 female-to-female line adapter.

3.   Ensure that all permanent wiring is done and all primary protectors are installed, if required. For information on primary protection requirements for UL1459 compliance in the United States, see "Primary and Secondary Protectors" on Page 102.

4. Disconnect the BSIA from power.

5. Disconnect the 25-pair cables from P1 and P2 on the BSIA.

6. Disconnect the transmit and receive cables from the Base Station and connect them into each end of the RJ-11 line adapter.

7. Set the multimeter to the ohms scale.

8. To check the distance to Base Station 1, connect the multimeter probes between pins 20 and 46 of the 25-pair cable that connects to P1 on the BSIA. If no reading or a high resistance is reported, measure between pins 20 and 21. A reading should register at only one of the pairs and must be less than the values listed in Table 28.

Table 28   Cable DC Resistance

Input Power	Wire Gauge	Maximum DC Resistance Allowed for 2,000 feet
Line	22, 24, or mixed	98 ohms
Local	22	66 ohms
	24	104 ohms

9. Based on which pins returned a valid reading in Step 8, check readings between the following pairs:

   ♦ Valid reading pins 20/46 – measure pins 21/45

   ♦ Valid reading pins 20/21 – measure pins 45/46

   The readings between the measured sets of pins should be similar.

10. To check the distance to Base Station 2, connect the multimeter probes between pins 24 and 50. If no reading or a high resistance is reported, measure between pins 24 and 25.

Note   A reading should register at only one of the pairs and must be less than the values listed in Table 28.

11. Based on which pins returned a valid reading in Step 10, check readings between the following pairs:

   ♦ Valid reading pins 24/50 – measure pins 25/49

   ♦ Valid reading pins 24/25 – measure pins 49/50

   The readings between the measured sets of pins should be similar.

12. If the multimeter reports no reading or high resistance, check the readings between any of the other pins specified in Steps 8~11.

   If readings after performing Step 9 are correct, the transmit and receive pairs are probably reversed or shorted somewhere in the installation. If not, there are open connections somewhere in the installation; check and correct all punch-down connections and repeat Steps 8~11.

Status Window

To diagnose problems, there are several reports available that are:

♦ Base Station channels status

♦ Loop start lines status

♦ Call status

♦ Critical alarms

A software query can be performed also, or as a last resort, the BSIA can be rebooted from the Status Window.

Alarms

Table 29 lists possible alarms by its displayed number.

Table 29   Alarm Descriptions by Number

Alarm # (decimal)	Alarm # (hex)	Description
48	30	NO_MSG_BUFFER_AVAILABLE The BSIA attempts a system reboot after this alarm occurs. If the system cannot reset, press the reset button to the right of the LEDs. If the problem persists, contact Toshiba.
49	31	SMX_OS_ERROR The BSIA attempts a system reboot after this alarm occurs. If the system cannot reset itself, press the reset button to the right of the LEDs. If the problem persists, contact Toshiba.
50	32	UTAM_CHECK_FAIL_SYSTEM_CLOCK
51	33	UTAM_ACTIVATION_NEEDED (UTAM_CHECK_FAIL_NORMAL) Contact Toshiba for an UTAM activation code.
138	8A	INVALID_HSID_FROM_BS A handset with invalid handset ID, but valid system ID, tried to make a call. Compare the handset ID against the user database in the Strata AirLink Manager and ensure that they match.
153	99	INVALID_INCOMING_BCC A bad connection exists between the BSIA and Base Station. Check the cable.
161	A1	INVALID_ESN A handset with invalid Electronic Serial Number (ESN) tried to make a call. Check the system settings database in the Strata AirLink Manager software against the handset ESN. Ensure that they are the same.
186	BA	UTAM_ACTIVATION_NOT_NEEDED The UTAM activation code is not required.
194	C2	NO_BS_SANITY_RESPONSE_RECEIVED Check the cable connections between the BSIA and Base Station.
203	CB	FAILURE_IN_BS_SW_UPGRADE The software upgrade process failed. Check the cable connections between the PC and BSIA and try again.

Table 29   Alarm Descriptions by Number *(continued)*

Alarm # (decimal)	Alarm # (hex)	Description
204	CC	TIMEOUT_IN_BS_SW_UPGRADE The software upgrade process failed. Check the cable between the PC and BSIA and try again.
207	CF	INVALID_MSG_BEFORE_UTAM_ACTIV The system must be UTAM activated. See "Set Up Temporary Installation" on Page 13.
208	D0	UTAM_ACTIVITION_CODE_IS_OLD
256	D9	INCOMPATIBLE_BS_SW_VERSION The software version of one of the Base Stations is not compatible with the BSIA software. Upgrade the system software.
N/A	N/A	UTAM_ACTIVATION_FAILED A failure occurred during the UTAM activation process. A new UTAM activation code is needed. Contact Toshiba Activation Desk at (949) 598-4980.

Critical Alarm Relay

When a critical alarm is detected, a relay on the BSIA is triggered and LED S3 flashes. The relay activates an external alarm, if one is installed (see installation instructions and specifications in "Step 3: (Optional) Activate External Critical Alarm" on Page 21).

To reset the alarm relay and determine the cause of the critical alarm, check the critical alarm report in the Strata AirLink Manager. Checking the critical alarm report also stops the flashing LED.

LEDs

There are LEDs on the BSIA (controller) that give continuous system status and assist in diagnosing symptoms. When the BSIA system is powered on, all BSIA LEDs except for PWR, RLOS1, and RLOS2 go through these changes:

♦ LEDs are lit for one second to show that they all work.

♦ LEDs turn OFF for a brief moment.

♦ LEDs light again.

♦ Each LED is turned OFF as the LED passes the test.

♦ If an LED remains lit after the boot tests complete, one or more hardware integrity tests have failed. Call processing software usually starts even if some of the tests fail, although some failures prevent call processing software from starting.

♦ The MASTER LED remains lit during boot up because it does not respond to a boot test.

♦ The PWR LED is always lit when the BSIA has power. The RLOS LEDs flicker during boot tests and are lit when there is a problem with Base Station connections.

Table 30 explains the meaning of the LED states during boot up and normal operation.

Table 30   BSIA LEDs during Boot Up and Normal Operation

Bottom Label	Top Label	Color	Meaning When Lit	
			Boot Up	**Normal Operation**
☼	POWER	Green	The power is on.	
9	MASTER	Yellow	This LED should always be lit.	
8	BUSY1	Green	The test that checks the integrity of the connection to Base Station 1 failed.	One or more channels on Base Station 1 are busy. If flashing, a software upgrade is in process.
7	RLOS1	Red	Loss of synchronization occurs on Base Station 1 because of poor connection, bad cable, Base Station or BSIA failure.	
6	BUSY2	Green	The test that checks the integrity of the connection to Base Station 2 failed.	One or more channels on Base Station 2 are busy.
5	RLOS2	Red	Loss of synchronization occurs on Base Station 2 because of poor connection, bad cable, Base Station failure, BSIA failure; or the Second Base Station Service Enabled parameter is set to TRUE in the System Settings database when the system has one Base Station only.	
4	S3	Yellow	The test that checks the integrity of the real time clock failed.	If flashing, a critical alarm has occurred.
3	S2	Yellow	The test that checks the integrity of call processing software stored in non-volatile memory failed. Try reloading the software (see "(Optional) Activate External Critical Alarm" on Page 21).	
2	S1	Yellow	The test that checks the integrity of boot software stored in non-volatile memory failed because there is a hardware failure.	
1	S0	Yellow	The test that checks volatile memory failed because there is a hardware failure.	

Replace Defective Handsets

1. Go to the Configure Window.

2. Pull down the Select Database menu and click User Database.
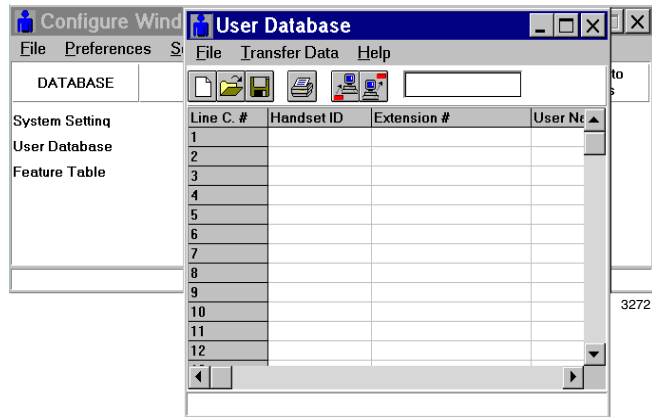
3. From the User Database toolbar, click Get.

   Current information displays.

4. Highlight the handset ID to be replaced and delete the ID.

5. From the User Database toolbar, click Send.

   Strata AirLink Manager prompts for confirmation.

6. Click OK.

   The new data is uploaded.

7. Input the original handset ID.

   Important! *Enter the new SID and HID in the handset by accessing System Configuration (*__10__ *+* __FCN__*).*

8. From the User Database toolbar, click Send.

   Strata AirLink Manager prompts for confirmation.

9. Click OK.

   The data is uploaded.

10. Go off-hook and press **CALL**.

    New ESN is locked into the BSIA.

Log Files

The Strata AirLink Manager creates log files that open in any text editor for viewing. If the log file has blank lines when opened, Strata AirLink Manager is running in the background. Close the software and re-open the log file.

Communication errors (PDQ Comm) occur in the log file when the BSIA is powered on. This has no effect on performance.

If the log file has information about the boot software instead of the Base Station software after an upgrade or when querying the software, try querying the BSIA software version before querying the Base Station software.

Error Messages

There are several error messages that can occur during the initial configuration process and data uploads. Most are self-explanatory. A brief description of each is in Tables 31 and 32.
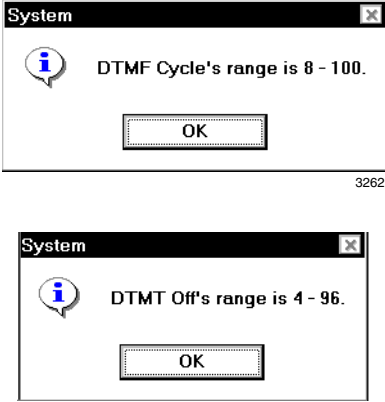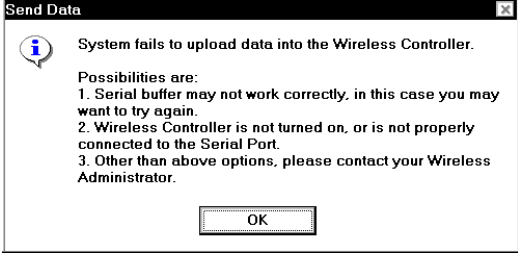
Table 31   System/Base Station ID Troubleshooting
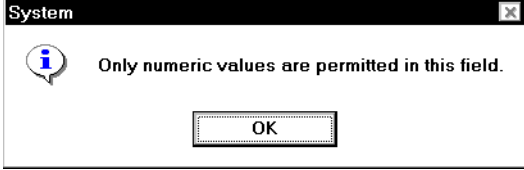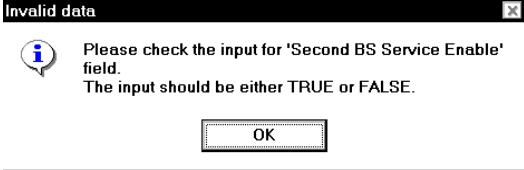
Error Message	Possible Solution
When alpha characters are input instead of numeric characters, this displays: **System** ☒ ⓘ Only numeric values are permitted in this field. OK 3269	Click OK and input numeric values.
When adding a Base Station and a word was entered that Strata AirLink Manager does not recognize in the Second Base Station Service Enable field, the following displays: **Invalid data** ☒ ⓘ Please check the input for 'Second BS Service Enable' field. The input should be either TRUE or FALSE. OK 3278	Click OK and input TRUE or FALSE.
If incorrect DTMF cycle duration ranges have been input, these display: **System** ☒ ⓘ DTMF Cycle's range is 8 - 100. OK 3262 **System** ☒ ⓘ DTMT Off's range is 4 - 96. OK 3263	Click OK and enter the proper number.

Table 32   BSIA Troubleshooting

Error Message	Possible Solution
When uploading data, if this error message displays: **Send Data** System fails to upload data into the Wireless Controller. Possibilities are: 1. Serial buffer may not work correctly, in this case you may want to try again. 2. Wireless Controller is not turned on, or is not properly connected to the Serial Port. 3. Other than above options, please contact your Wireless Administrator. OK 3283	Check the serial port and try again. If it still fails, contact the System Administrator.
If these error messages display during UTAM activation or a software upgrade: • BSIA off-line • System did not boot • Critical alarm #48	Reset the BSIA immediately to clear all errors and try again.
If this error message: "Corrupt Msg from BSIA. Msg length = 31. Pls try again" or "ALM #200. Invalid msg during Base Station sw upgrade" displays	Try the upgrade again.
If the Strata AirLink Manager loses its communication link with the BSIA	Restart the software to re-establish the connection.

RWIU System

LEDs

There are two LEDs for each Base Station jack on the WWIS, and two on the RWIU for the external power jack and system. The Base Station LEDs are for the transmit and receive sides of the Base Stations.

If the LEDs are OFF, they are linked and working. If they are ON, there could be a problem with the cabling or battery. The power LED should be on and the system LED should be blinking. This means that the system is properly linked and working.

If any Base Station is not used, its jumper on DIP switch S1 should be off. If S1 is on, the two LEDs will remain lit and the RWIU will try to initialize that Base Station every 40 seconds.

Replace Defective Handset

1. From the Desktop toolbar, click the Config icon.

   3348

2. Click General Settings.

3. Get current handset IDs.

   4149

4. Highlight the defective handset ID and press Del.

5. Input the new handset ID.

6. Click OK.
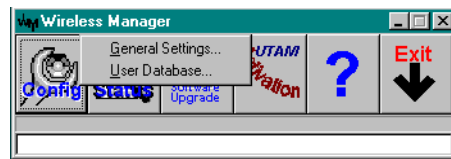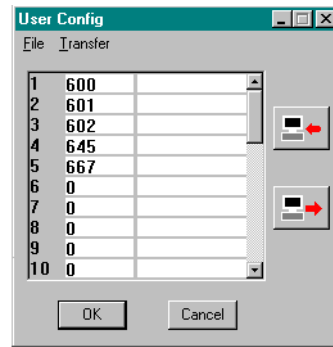
7. Go off-hook and press **CALL**.   New ESN is locked to the RWIU.

Measure DC Resistance

1. Use a digital multimeter that has resistance measuring capability in ohms and a basic accuracy of better than one percent.

2. Use an RJ-11 female-to-female line adapter.

3. Ensure that all permanent wiring is done and all primary protectors are installed, if required. For information on primary protection requirements for UL1459 compliance in the United States, see "Primary and Secondary Protectors" on Page 102.

4. Disconnect the RWIU from power.

5. Disconnect the cables from Base Station 1, 2, 3, and 4.

6. Disconnect the transmit and receive cables from the Base Station and connect them into each end of the RJ-11 line adapter, creating a loop.

7. Set the multimeter to the ohms scale.

8. To check the distance to Base Station 1, connect the multimeter probes between pins 1 and 5 or 1 and 6, depending on the cable polarity.

9. Connect the probes between 2 and 5 or 2 and 6.

Note A reading should register at only one of the pairs and must be less than the values listed in Table 33.

Table 33   Cable DC Resistance

Input Power	Wire Gauge	Maximum DC Resistance Allowed for 2,000 feet
Line	22, 24, or mixed 22/24	98 ohms
Local	22	66 ohms
	24	104 ohms

10. Repeat Steps 4~9 to check all the Base Stations.

11. If the multimeter reports no reading or high resistance, check the readings again.

If the readings are correct after performing Step 9, the transmit and receive pairs are probably reversed or shorted somewhere in the installation. If not, there are open connections somewhere in the installation; check and correct all punch-down connections and repeat Steps 4~9.

Appendix – Specifications

This appendix covers the following:

♦ Base station specifications

♦ Handset specifications

♦ Grounding requirements

♦ FCC

♦ UTAM, Inc.

♦ Underwriters Laboratories (UL)

Base Station Specifications

The following tables list the Base Station and power supply specifications for both wireless systems.

Table 34   Base Station

Item	Description
Dimension	13.25 x 13.25 x 2.5 inches
Weight	4 lbs., 11.5 oz.
Temperatures	Operating: 0°~40°C Storage: -10°~70°C
Channels	8 duplex, 1 control
Antennas	4
Antenna Gain	4 dBi maximum, 3 dBi typical
Mount	Ceiling or wall
Wiring Distances from BSIA/RWIU	Line Power: 1,186 ft. (24 AWG) 2,985 ft. (22 AWG) Local Power: 3,280 ft. (22 and 24 AWG)
Modulation	p/4 differential (QPSK)
Gross Bit Rate	384 kbs (QPSK)
Access Method	FDMA/TDMA/TDD

Table 34   Base Station *(continued)*

Item	Description
Power Requirements	Peak Transmission: 80 milliwatts Average Transmission: 40 milliwatts From PBX: 6.5~13 watts For remote power: 13 watts at 2,300 feet Input: -48VDC line power; +5.2VDC local power Consumption: 11.5 watts (-48VDC) from the PBX
Miscellaneous	Line powered, local power option, voice scrambling.

Table 35   Base Station Power Supply (Local Power Option Only)

Name	Description
Dimensions	5 x 3 x 2.25 inches
Weight	15.5 oz. without cable
Mount	Desktop
Power	Input: 115/230VAC 0.6/0.3 amps (50/60 Hz) Output: 5.2V at 2.5 amps (20 watts maximum)
Temperatures	Operating: 10°~40°C Storage: 0°~50°C

Handset Specifications

Table 36   Handset

Name	Description
Dimension	6.125 x 2.25 x 1.125 inches
Weight	6.4 oz. with battery
Transmission	Peak: 80 milliwatts Average: 5 milliwatts
Antenna	1 internal
Antenna Gain	3 dBi maximum, 2 dBi typical
Modulation	$\pi/4$ (QPSK)
Temperatures	Operating: 0°~40°C Storage: 0°~50°C (without battery) -10°~70°C (with battery)
Ringer	Types: 8 Volumes: 3, plus mute
LCD	2 lines and 9 characters

Grounding Requirements

Table 37 provides the recommended gauges for the distances between the system and the master ground bus of the office telephone system. The proper gauge wire ensures that DC resistance does not exceed 0.25 ohms.

Table 37   Ground Wire Requirements

StrataAirLink:Distance Between BSIA/RWIU & Ground	Recommended Gauge
0~18 feet	16 AWG
0~30 feet	14 AWG
0~46 feet	12 AWG
0~73 feet	10 AWG
0~113 feet	8 AWG

FCC

The Strata AirLink wireless telephone system operates under the FCC Part 15 rules for Unlicensed Personal Communications Service (UPCS) equipment in the 1920~1930 MHz band.

Note   Part 15 ID numbers for the Base Station (BS) and handset are BS-CJ6DT-WRLS-BS-01 and HS-CJ6DT-WRLS-HS-01, respectively. The system complies with UL1459 for safety, and the compliance ID is C86-0345.

Part 68

The Strata AirLink Wireless telephone system complies with Part 68 of FCC rules. Product labels contain, along with other information, the FCC registration number. This information must be provided to the telephone company if they request it.

Note   The FCC Part 68 registration number is 5RYISR-23723-WC-T, and the Ringer Equivalence Number (REN) is 0.6B.

An FCC-compliant telephone cord with modular plug is provided with the system hardware. This equipment is designed for telephone networks or premises wiring using a compatible modular jack that is Part 68 compliant.

If the wireless equipment causes harm to the telephone network, the telephone company will give advance notification. If advance notice is not practical, the telephone company will give notification as soon as possible. Along with the notification, the telephone company will advise of the right to file a complaint with the FCC, if necessary.

To report trouble with the wireless equipment, please contact Toshiba America Information Systems, Inc., Telecommunications Systems Divisions in Irvine, CA, (949) 583-3700 for repair and/or warranty information. If the trouble is causing harm to the public telephone network, the telephone company can request that the wireless equipment be removed from the network until the problem is resolved.

Important!   *Repairs must be made by an authorized representative or the warranty is void.*

Do not install the wireless equipment on public coin service provided by the telephone company. Connection to party line service is subject to state tariffs. Contact the state public utilities commission for information.

It is recommended that an AC surge arrestor be installed in the AC outlet to which the wireless system is connected. This prevents damage to the equipment caused by local lightning strikes and other electrical surges.

The wireless system provides access to interstate providers of operator services through the use of equal access codes. Modifications by aggregators to alter these capabilities is a violation of the telephone operator consumer services improvement act of 1990 and Part 68 of the FCC Rules.

Part 15

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

This equipment generates, uses, and can radiate radio frequency energy. If not installed and used in accordance with this chapter of the *Strata DK Installation and Maintenance Manual*, it can cause harmful interference to radio communications.

Important!

- *Changes or modifications not expressly approved by Toshiba America Information Systems, Inc. can void the authority to operate the equipment.*

- *The 25-pair cable that connects the BSIA to an MDF must be shielded to meet FCC emissions limits under Part 15 Class A.*

UTAM, Inc.

The Strata AirLink system operates in the 1920~1930MHz band, and microwave services are also offered in this band. The FCC has designated UTAM, Inc. to coordinate the transition of microwave services to other frequency bands and the installation of new UPCS equipment, which includes the wireless system, until all microwave users are cleared from the band.

Each device requesting FCC certification must have an affidavit from UTAM stating that the device meets the requirements of Rules 15.307(d), (e), and (h), regarding UTAM location verification and disablement. The basic mandatory requirements are:

♦ The handset must not transmit when it is not within the coverage area of any system Base Station.

♦ A Base Station must not begin operation until it is UTAM confirmed and attached to a permanent structure such as a building so that it cannot be easily relocated.

♦ If the system is removed from its original installed location and re-installed at another location, the system must not begin operation until the new location is UTAM confirmed.

The Frequency Coordination Service Request (sample on Page 101) must be completed and sent to UTAM before activation of the system. Contact the Strata AirLink Desk at (949) 598-4980 for more information between the hours of 8:00 a.m. and 5:00 p.m. (Pacific Standard Time), Monday through Friday. Voice mail is available for messages after hours.

UTAM FREQUENCY COORDINATION SERVICE REQUEST

Part 1 - Installation Status	
Type of Request (circle one): New-Permanent/New-Temporary/Reiteration/Removal/Relocation	
Installation Date:	
If Temporary, Proposed Activation Date:	Removal Date:

Part 2 - Dealer Information	
Dealer Name:	Telephone:
Dealer Contact:	Fax:

Part 3 - Site Information		
Customer Name:	County of Installation:	
Street:	Customer Contact:	
City:	Customer Contact Telephone:	
State:	Zip:	Customer Contact Fax:

Part 4 - Equipment Information	No. of BSIA Controllers:	
No. of Base Stations (antennas) Inside:	Outside:	No. of Handsets:
Max. Height (inch/feet) and/or Floor of Base Stations Inside:		Outside:

DO NOT WRITE BELOW THIS POINT

Part 5 - System Information		
UTAM ID: BSIA CJ6CCLMU00022	Base Station: CJ6DT-WRLS-BS-01	Handset: CJ6DT-WRLS-HS-01
Band: Isochronous	Power/Device (mW) - Fixed: 40mW	Mobile: 5mW
Building Loss: Unknown	Max. Horizontal Distance: 2,000 ft. (default)	
Latitude:	Longitude:	
Zone 1 or Zone 2:	FIPS No.:	
PFC ID (if not a new site)	UTAM Site ID:	

Part 6 - Approvals	
Jeff Parkin	Telephone: (949) 598-4980
Name/Signature of Company Rep./Coordinator:	Fax: (949) 583-3097
Title: Primary Frequency Coordinator	Date:
UTAM Member Contact (if different from above): Paul Keith	

Underwriters Laboratories (UL)

To ensure that installations are fully protected from fire hazards, UL1459 specifies primary and secondary protectors for circuits that interconnect to the telephone network or cables that exit/enter buildings.

Primary and Secondary Protectors

Protectors replace bridge clips when installed across two horizontal 66-block terminals. When using 66-50 connector blocks, it is recommended that protector ITW Linx SCP-9 be used as the secondary protector and out-of-building primary protector. It provides overvoltage protection of 600VAC or DC, overcurrent protection of 350 mA, and installs in series with the telephone loop.

Line circuits do not require protectors unless the circuit is cross-connected to out-of-building circuits. In this case, it is recommended that ONEAC 6-AP200 protectors are used. This is a single, block-mounted protector that provides both primary and secondary protection for out-of-building, single-line circuits.

System Line Circuit Requirements

Line circuits do not require protectors unless the circuit is cross-connected to out-of-building circuits. Out-of-building circuits require primary/secondary protectors, and it is recommended that the ONEAC 6-AP200 be used. This is a single, block-mounted protector that provides both primary and secondary protection for out-of-building, single-line circuits that are terminated to a system.
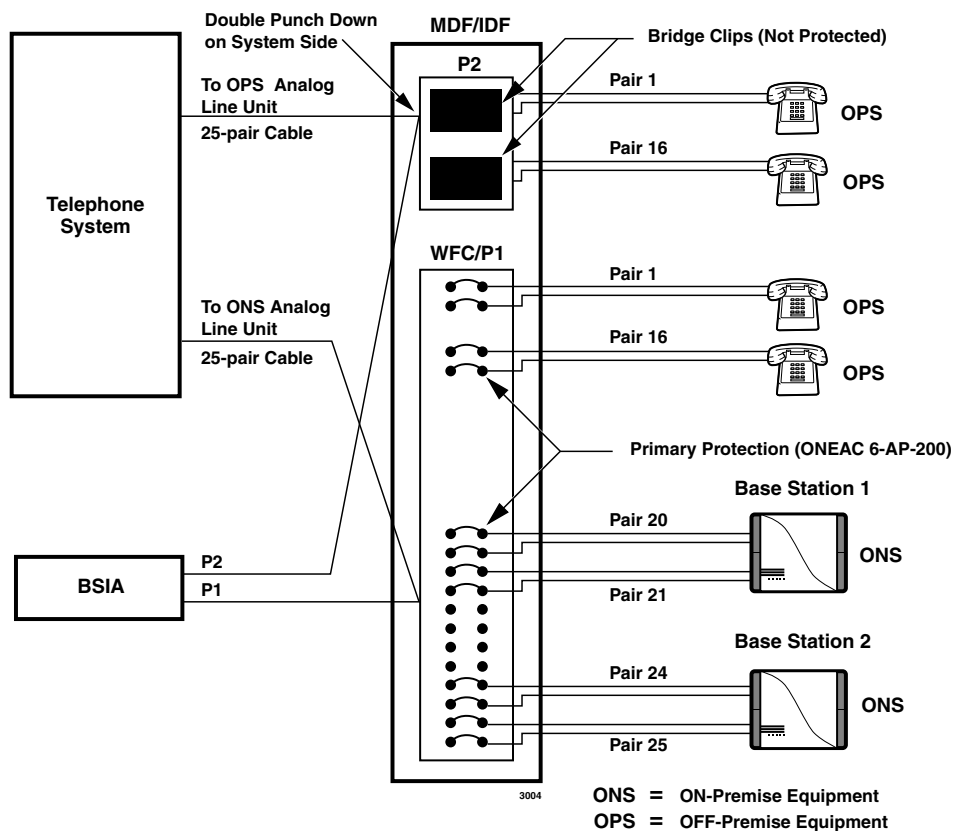
Figure 31   Primary and Secondary Protectors

Glossary

Term	Definition
ALM	Analog Line Module - adds groups of 8 handsets to a maximum of 32.
Attenuation	The loss of strength of an RF signal due to distance, antenna positioning, and obstructions.
AWG	American Wire Gauge - standard measuring gauge for non-ferrous conductors (non-iron, non-steel).
Barrel jack	A connector that is cylindrical and splices two lengths of thick Ethernet coaxial cable.
Beep On Roam	Causes an idle handset to beep when the Base Station it is locked onto changes.
Breakdown-rated	Rated by the amount of voltage that breaks down the insulation between two conductors.
BSIA	Base Station Interface Adapter - The wireless system controller that accommodates up to two Base Stations in the analog system and four Base Stations in the digital system.
CCS	Centi-Call Seconds - 100 seconds of telephone conversation.
CMOS	Complementary Metal Oxide Semiconductor - technology that makes integrated circuits known for requiring less electricity.
CPU	Central Processing Unit - the brain of the computer.
DB9	Standard 9-pin RS-232-C serial port.
DB25	Standard 25-pin connector used for RS-232-C serial data communications.
DC	Direct Current - flow of free electrons in one direction within an electrical conductor.
Dial Tone Delay	Time delay between pressing CALL and outpulsing DTMF tones.
DIN	Duetsche Institut fur Normung.
DMA	Direct Memory Access.
DTMF	Dual-Tone Multi-Frequency.
DTMF Cycle Duration	Duration of the full DTMF cycle (length of tone plus length of silence between tones) for dialing and other telephone system operations.
DTMF Off Duration	Duration of silence between DTMF tones.
EMI	ElectroMagnetic Interference.
EPROM	Erasable Programmable Read Only Memory.

Term	Definition
Erlang	A unit of measurement that equals 60 minutes of usage per line during the busiest hour of the day.
ESN	Electronic Serial Number.
FCC	Federal Communication Commission.
FET	Field Effect Transistor.
FT Inter-event Pause	Duration of pause between events in the Feature Table.
FT Pause Duration	Duration of pause events in the Feature Table.
Handoff by Recall	A handset feature that enables the user to automatically hand-off between base stations.
HID	Human Input Device - a class of the Universal Serial Bus (USB), such as mouse, keyboards, gamepads, and joysticks.
Hookflash Duration	Duration of the hookflash in signaling the office telephone system.
Hz	Hertz - a measurement of frequency in cycles per second. One hertz is one cycle per second.
I/O	Input/Output.
Init task	A task that controls the sequence of card initialization and synchronizes it according to the KSU and Base Station needs.
LED	Light Emitting Diode.
Loop back	A diagnostic test in which a signal is transmitted across a medium while the sending device waits for its return.
PCM	Pulse Code Modulator.
PUB	Portable Unit Board - extracts the clock from the Base Stations.
RAM	Random Access Memory.
RFI	Radio Frequency Interference.
RJ-11	A six-conductor modular jack also called a plug.
RJ-45	An eight-pin connector used for data transmission over a standard telephone wire.
RS-232-C	A set of standards specifying various electrical and mechanical characteristics for interfaces between computers, terminals, and modems.
RWIU/WWIS Interface Unit	A proprietary digital PCB that interfaces directly to Toshiba Strata DK systems to enable digital wireless capability.
RX	Receive.
SMT	Surface Mount Technology.
SRAM	Static Random Access Memory.
Stop Ringing Time	Length of time the RWIU waits after last detection of ring voltage on a line before it stops the ring.
TX	Transmit.
UART	Universal Asynchronous Receiver/Transmitter.
VAC	Voltage Alternating Current.
WDT	Watch Dog Timer.

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