

Coral FlexAir

Installation Procedure and Hardware Reference Manual

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1 About this Manual

1 Document Description

The *FlexAir Installation Guide and Hardware Reference Manual* is designed for field use by Coral system service personnel. It provides all the necessary information for successful installation and maintenance of the FlexAir wireless systems. This manual describes how to install the FlexAir system. The FlexAir system is designed to be installed into existing Coral systems. Technicians installing the FlexAir must be familiar with Coral systems. A brief summary of each chapter can be found in the table below.

Where is it?	What is it about?	When to use it?
<i>Chapter 2</i>	<i>About the Coral FlexAir System</i>	To learn about: <ul style="list-style-type: none"> • The Coral FlexAir system • System terminology • Installation steps • System planning • RBS placement • Recommendations • SKK and RBS interconnections
<i>Chapter 3</i>	<i>SKK Wireless Station Interface Card</i>	<ul style="list-style-type: none"> • To learn /To install SKK cards into slots and set card jumper straps • To upgrade the SKK software
<i>Chapter 4</i>	<i>RBS Radio Base Station</i>	<ul style="list-style-type: none"> • To learn /To mount RBS, indoors or outdoors
<i>Chapter 5</i>	<i>External Connections</i>	<ul style="list-style-type: none"> • To connect SKK cards to each other and to RBS
<i>Chapter 6</i>	<i>FlexAir Repeaters</i>	<ul style="list-style-type: none"> • To learn /To mount the repeater, indoors or outdoors
<i>Chapter 7</i>	<i>SKK Card Configuration and Setup</i>	<ul style="list-style-type: none"> • To define the master card location • To define the number of cards in the cluster • To perform cable delay measurement
<i>Chapter 8</i>	<i>Wireless Handset</i>	<ul style="list-style-type: none"> • To prepare the handset for use
<i>Chapter 9</i>	<i>PI Database Programming</i>	<ul style="list-style-type: none"> • To program the PI database
<i>Chapter 10</i>	<i>Installation Tests</i>	<ul style="list-style-type: none"> • To learn about the installation tests
<i>Chapter 11</i>	<i>Troubleshooting</i>	<ul style="list-style-type: none"> • To troubleshoot and understand what diagnostic indications mean
<i>Chapter 12</i>	<i>Post-Installation Checklists</i>	<ul style="list-style-type: none"> • Provides a checklist for installation activities
<i>Chapter 13</i>	<i>Specifications</i>	<ul style="list-style-type: none"> • Provides FlexAir Wireless specifications

2 Related Documentation

For further information about the FlexAir system not covered by this manual, refer to the following documentation:

<i>Subject</i>	<i>Manual</i>
General Description	Coral FlexiCom and IPx Product Description
8SKK and 16SKK cards Connections to MDF and RBS	•Chapter 5, Coral Installation Manual (see below)
SKK card installation guidelines	• Chapter 2, Coral Service and Peripheral Cards Installation Manual
Coral Installation and Hardware Reference Manual	<ul style="list-style-type: none"> •Coral FlexiCom 200 Base Unit •Coral FlexiCom 200 Expansion Unit •Coral FlexiCom 300, 400, 5000 •Coral FlexiCom 6000 •Coral IPx 500 •Coral IPx 800 •Coral IPx 3000 •Coral IPx 4000 Installation and Hardware Reference Manual
Program Interface (Coral database)	Program Interface and Database Reference Manual
Handset Operation	Handset User's Guide (included in the package)
RBS Operation	DECT Base Station (RFP) - User's Guide (included in the package)
Repeater Operation	Repeater User's Guide (included in the package)
Alarm Function	Contact the manufacturer*
External Antenna	Contact the manufacturer

*The alarm function is not a stand-alone product. It should be accompanied by a server and an alarm software application. Contact the manufacturer's representative for the Software Development Kit (SDK) for application development.

3 Special Symbols Used in this Manual

WARNING!

There is a danger to life or a risk of personal injury.

CAUTION!

There is a risk of damage to the Coral system.



NOTE:

Indicates important information demanding special attention.



Tips:

Advice that makes it easier to follow the steps of a procedure.

NOTES:

A page that is intentionally left blank. It may be used for the readers notes.

NOTES:

2 About the Coral FlexAir System

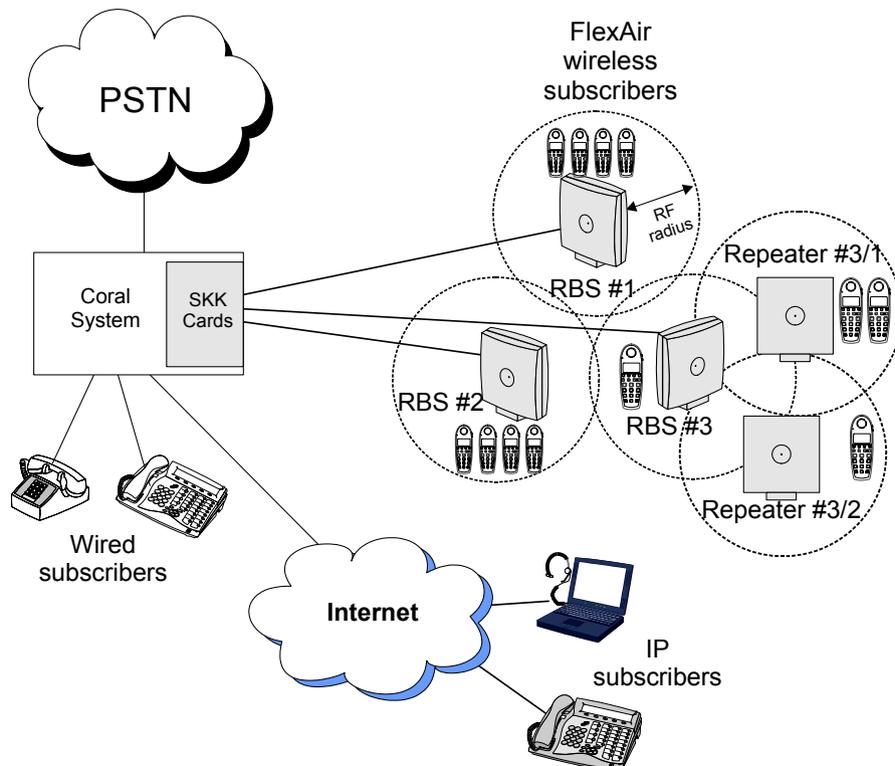
The FlexAIR Wireless is a communication system that allows portable handsets to be integrated within the Coral system. The wireless handsets provide most of the functions supported by standard wired keysets (FlexSets). This chapter provides a general description of the FlexAIR Wireless PABX and specific instructions for carrying out complete installation in the field.

1 FlexAir Wireless Configuration

A typical FlexAir configuration, shown in *Figure 1*, includes a number of the following components, in addition to the Coral platform:

- SKK cards (8SKK, 16SKK, and 8SKKipx)
- RBS - Radio Base Stations (antennas) and optional repeaters
- Portable handsets and accessories

Figure 1 Typical System Configuration



2 FlexAir Terminology

Wireless Bands

The FlexAir Wireless System supports two wireless bands, allowing operation in various countries and regions. Supported wireless bands are:

- ETSI DECT (1880-1900 MHz band), referred to as DECT
- ISM (2418-2457 MHz band), referred to as ISM

The wireless band used by a FlexAir Wireless System is determined by the RBS units and wireless handsets ordered with the system. The SKK cards are not affected by the opening frequency.

Station Key Interface (SKK) Card

The SKK card is a Coral I/O peripheral card that provides up to sixteen (8SKK cards up to eight) digital ports for connection to RBS units. The SKK card can be ordered in a number of configurations. Refer to [Table 6, on page 22](#) for a list of the various card types.

Radio Base Station (RBS)

The RBS is a compact device that contains RF circuitry and antennas. The main function of the RBS is to provide communication of audio and data signals between the mobile handsets and the Coral system via the SKK card. FlexAir supports up to four simultaneous calls per RBS unit.

Repeaters

The repeater extends the coverage area of an existing RBS unit without increasing the number of channels over the extended area. Repeaters are useful for applications where there are few additional subscribers over the extended area and the number of channels provided by the RBS can support all of the subscribers within the entire area.

External Antenna

An optional, external antenna can be attached to each RBS unit and repeater to extend its coverage area. The external antenna is not within the scope of this manual.

Portable Handset (T-304, T-402, T-404, T-408)

The mobile handset is a lightweight, ergonomically designed wireless unit that includes an LCD display and keypad.

Each handset is a portable unit that can be ordered to operate with either the DECT GAP standard or the ISM standard.

The portable unit is designed to provide the subscriber with most of the features available for a wired Coral FlexSet, in addition to its roaming and handover capabilities.

Roaming and Handover

Roaming refers to the ability to move between the coverage areas of different RBS units while still being able to make and receive calls. *Handover* refers to the ability to move between the coverage areas of different RBS units while talking, without interruptions in the conversation. FlexAir systems with clusters do not support handover; roaming between clusters includes a 30 second delay.

Clusters

A single SKK master card or a combination of one master card and its SKK slave cards is defined as one SKK cluster. Every cluster can consist of up to 8 SKK cards daisy chained together enabling a maximum of 128 Radio Base Stations (RBS) for a FlexAir cluster. An SKK cluster can also be installed in a Coral remote shelf. A Coral system supports up to eight clusters.

Clusters enable customer separation by supporting separate wireless systems within the same Coral system. Although clusters are effectively separate wireless systems, handsets can be subscribed to more than one cluster.

Coral Hardware Requirements for 3-way Conference Calls

To enable wireless station users to participate in a Coral 3-way conference call and to operate other features, such as break-in, Silent Monitoring and the Coral Message Center's Silent Record feature, the Coral system must be equipped with 3-way bridges. Six 3-way bridges are standard in all Coral systems (FlexiCom 200 requires CNSsl). Additional 3-way bridges are available via additional CNF or 8DRCF cards.

Related Equipment

The following cards support several 3-way conference bridges simultaneously:

- CNF card (in C3WAY mode) - 8 bridges
- 8DRCF - 6 bridges
- CNSsl - 6 bridges
- The Coral IPx 500M main cage - 6 bridges (built-in)

The 3-way cards can be installed as defined in [Table 1](#).

Table 1 CNF Card Installation into Coral Systems

<i>System</i>	<i>Requirement</i>
Coral FlexiCom 200 Base Unit	CNSsl (single card only)
Coral FlexiCom 300, 400, 5000, 6000	CNF* or 8DRCF
Coral IPx 800, 3000, 4000	
Coral IPx 500 with 800X Expansion Cage	
Coral FlexiCom 200 Expansion Unit	

*For a CNF card, in the *Card List (Route: CLIS)* branch of the PI database, define the CNF card as C3WAY card type in the P_TYPE field. For further information refer to [page 80, Card List \(Route: CLIS\)](#).

3 Installation Steps

The Installation procedure for the FlexAir system includes the following steps:

- ***Site survey***, including planning and placement of RBS units and an RF site survey.
- ***SKK Card Installation***, including jumper configuration and installation of SKK cards into the Coral universal I/O card slots
- ***RBS installation***, including mounting the RBS indoors and/or outdoors
- ***External I/O connections***, including all connections from the RBS units to the SKK cards and the connections between SKK cards
- ***Repeater installation***, including mounting and installing the repeater and synchronizing it to an RBS unit
- ***SKK card configuration*** including cable delay measurement
- ***Wireless handset configuration and setup***, including handset subscription, programming, and charging
- ***PI database programming***, including all FlexAir parameters that need to be programmed within the Coral system

4 System Planning and Site Survey

System Planning

A well planned Coral FlexAir Wireless system should start with an RF coverage site survey. A site survey is designed to determine the optimal location for RBS units and the amount of wireless voice traffic to be supported by the system (i.e., how many wireless handsets can maintain voice conversations at the same time, in any given area).

Due to the unexpected nature of RF propagation in an indoor environment, an actual on-site test must be performed before the installation is complete. While an extensive guide to effective RF coverage planning is outside the scope of this manual, the following points should be taken into consideration when planning the site, prior to RBS installation:

- The RBS provides typical RF coverage of up to 150 feet (50 meters) in a typical indoor office environment and up to 450 feet (150 meters) in an open area (line-of-site), extending in all directions from the RBS. The exact coverage range depends on the building architecture and wall material.
- A single RBS unit provides up to four voice conversations simultaneously (on four wireless handsets).
- A Coral FlexAir Wireless system can support up to eight clusters.
- A maximum of eight 8SKK or 16SKK cards can be installed per cluster.
- A Coral FlexAir Wireless system can support a maximum of thirty-two 8SKK or 8SKKipx cards.
- A Coral FlexAir Wireless system can support a maximum of sixteen 16SKK cards.
- A Coral FlexAir Wireless system can support a maximum of 1535 portable handsets. The actual number of stations is defined in the SIZES branch of the PI.
- The RBS coverage can be extended by an additional four repeaters (without increasing the number of channels).
- The maximum number of RBS units per cluster is 128. The combined maximum number of RBS units and repeaters per cluster is 256. If more than 128 repeaters are installed within a cluster, the number of RBS units that can be installed is reduced by the same amount.
- The maximum number of RBS units per FlexAir system is 256. The combined maximum number of RBS units and repeaters per FlexAir system is 2048.
- Handset roaming and handover: wireless handsets can move between coverage areas of different RBS units while receiving continuous service and maintaining conversations in progress. There is no handover between clusters.

- For efficient handover of conversations between RBS units, deploy the RBS units with wide **overlap** between them (i.e., plan for some areas to be covered by more than one RBS. Repeaters can be used to increase the coverage). Overlaps are necessary, since handover requests can generate increased call traffic in certain areas. A good example may be a cafeteria during lunch hour where temporary concentrations of wireless handsets may occur. The overlap carries the excess call load to adjacent RBS to provide uninterrupted services to subscribers.
- Typically, installations such as office buildings, hotels and hospitals should be equipped with RBS units on several floors to create uniform and complete RF coverage.
- Open areas can be covered with a sparse network of RBS units. In such applications, the RBS units cover an extended range due to the extended line-of-sight RF propagation capability.
- The SKK cards can reside in both remote and host FlexLITE shelves. This means that FlexAir users can communicate with each other from different geographical locations that are up to 21 miles (35 km) apart.

Site Survey

Due to the complex nature of RF propagation in an indoor environment, the actual number of RBS units and their placement should be tailored to the specific building or location. This is done prior to the final wiring by using the FlexAir Wireless Site Survey Kit's measurement capabilities and the handset's RF indication facilities.



NOTE:

The site survey kit is not provided as standard issue and must be ordered separately. Contact your dealer for details.

1. Obtain a floor plan of the building and pay special attention to the following details:
 - Wall type: concrete, brick, or plaster
 - Windows: with or without metal coating
 - Venetian blinds: soft partitioning
 - Ceiling and floor type: floating or metallic
 - Corridors: width and location
 - Passages
 - Large metallic objects
2. Mark sections according to:
 - Coverage requirement - importance of the area (for example, board rooms or executive suites)

- Traffic - number of potential users (for example, conference rooms or cafeteria)
3. Mark potential locations for RBS units by drawing an overlay grid pattern of lines spaced by the average RBS range for the building in question according to:
 - RF coverage required by traffic
 - The number of potential users and the population expected in this area
 - Physical limitations: the possibility of placing an RBS in the desired location and position.



NOTE:

Additional potential locations for installation of RBS units should be located in order to provide alternative options for the final placement.

4. Place the test RBS in the actual location and position (as close as possible) and plot cell limits on the drawings by using the actual test measurement options.
5. Select the final placement according to the following guidelines:
 - Good coverage according to the number of simultaneous calls expected
 - Overlap coverage of about 10% to 20% especially in corridors or other passages (where calls can be maintained while on the move)
 - Overlap coverage of all section in places where the expected traffic is high. The overlapping RBS units should be installed close to each other. This will help in the coverage of the other sections



NOTE:

Do not place RBS units less than 1 meter (3 feet) apart. The final placement of the RBS units should allow the enlargement of the coverage area (by additional RBS units) with minimum movement of all other RBS units. Read the recommendations [on page 13](#) before making the final decisions.

5 Recommendations for RBS Placement

- In multi-story buildings, RBS units may be installed on opposite sides of the floors to take advantage of the floor-to-floor coverage. The coverage design cannot rely entirely on floor-to-floor propagation; each case must be verified due to variations in local attenuation patterns.
- If the building contains a central open space area with windows to the other areas, RBS units may be installed in this open space to provide a good coverage for the rooms in the inner circle on all floors (e.g. hotels).
- If an RBS hangs vertically on a wall, the RF coverage in front of the RBS units is twice as large as the coverage at the rear. When an RBS is installed on the outside of an outer wall, the RF coverage behind it is strongly attenuated by the wall.
- RBS units should not be installed near large metallic objects.
- Reinforced concrete structures have a high attenuation factor inside the building. They decrease the RF coverage range of the RBS units and therefore requires a higher number of RBS units in the building. Lighter types of construction require fewer RBS units since attenuation figures are considerably lower.

6 Connections Between the SKK Cards and the RBS

Connections from the SKK Cards to the RBS

Connections between the RBS and the SKK card are made as follows: (see [page 47, External Connections](#))

- **8SKKipx** - via the top panel connections
- **8SKK and 16SKK** - via the MDF

Cable Length between SKK Card and RBS Unit

The RBS is designed to operate over line distances using internal power supplied by the Coral SKK card. The maximum line length used to connect the Coral main system to the RBS is 1500m (4500ft).



NOTE:

Communication between an RBS unit and a synchronized repeater is wireless and requires no cable connection.

3 SKK Wireless Station Interface Card

1 Unpacking

Inspect for Damage

1. Inspect the shipping carton for evidence of physical damage or mishandling prior to opening.
2. Inspect all parts for damage.
3. Report any damage to the carrier immediately.
4. If it is necessary to make a damage claim for the carrier, do not move the shipping carton until it has been examined by a representative of the carrier.
5. Dispose of empty cartons in accordance with local regulations.

Unpacking the Shipping Container

The following items should be present in every box containing an SKK card:

- One SKK card
- One SKK LINK cable (required for SKK-slave cards only). See [page 27, SKK LINK Input/Output Wiring Connections](#) for a description of cables.

2 SKK Card Description

The SKK is a Coral peripheral I/O interface card that provides a number of digital ports for connection to RBS units.

The main functions of the SKK card are:

- Handling communications with the Coral voice and control buses (via CPU 1)
- Handling communications with the RBS units, including voice channels, synchronization and data control (via CPU 2)

Front panel diagnostic indicators display the connection status between the SKK card and the RBS. The system diagnostic indicator displays whether the card has been properly accepted by the Coral system. For more information, see [page 21, LED Indicators](#).

I/O connections to the SKK card can be made via the MDF (Coral IPx 800, 3000, 4000, and Coral FlexiCom 300, 400, 5000, 6000) or via RJ-45 connectors located on the top panel (Coral FlexiCom 200 and Coral IPx 500). For more information, see [page 47, External Connections](#).

There are two card types: Type A includes DIP switches. Type B includes jumpers. Additional configuration options are determined either by setting the jumpers or DIP switches. For more information, see [page 22, Setting the Card to Boot or Normal Mode](#).

3 SKK Master/Slave Cards

A Coral FlexAir cluster can be either a single card cluster or a multi-card cluster. In a multi-card cluster, SKK cards operate in one of two configuration options: the SKK slave card or the SKK master card. This configuration defines whether the SKK card acts as master or slave as well as how many slaves are attached to it.

SKK slave cards must be daisy-chained to the SKK-Master during installation. This procedure is described on [page 27, SKK LINK Input/Output Wiring Connections](#).

- If there is only one SKK card in the cluster, it will automatically be configured as a master card.
- If there are several SKK cards in the cluster, the first one will appear as a master and the rest of the SKK cards will appear as slaves.
- It is possible to install up to eight SKK master cards.

4 SKK Card Layout, Front, and Top Panel Features

The 8SKK and 16SKK cards are illustrated in [Figure 2](#) and [Figure 3](#).

The 8SKKipx card is illustrated in [Figure 4](#).



NOTE:

The 8SKKipx card is installed in Coral FlexiCom 200 and Coral IPx 500 systems.

The SKK card front panels provide the following interface ports and diagnostic indicators:

Table 2 8/16 SKK
Front Panel Card
Functions

Function	What is it for?
Card ejectors	Two ejectors (on the top and bottom of the front panel) used to remove the card from the cage or shelf
System Diagnostic indicator (red)	Used to indicate whether or not the card is functional. See page 21, LED Indicators .
CPU #1 CPU #2 indicators (green)	Used to indicate whether the card software is functional CPU #1 - Application CPU (interfaces with the Coral) CPU #2 - DECT/KGAP CPU (interfaces with the RBS) See page 21, LED Indicators .
RJ-11 connector marked RBS 0	Used for debugging purposes by qualified technician authorized by the manufacturer
Input/output RJ-45 Connectors	Used to link all SKK cluster cards together in a daisy chain link. See page 27, SKK LINK Input/Output Wiring Connections .
RBS DIP switches	Used to configure which RBS units are connected (left) and which RBS units are not connected (right). See page 23, RBS Configuration (RBS 0-7, 8-15) .
Indicators (adjacent to RBS DIP switches)	Used to indicate a problem (red) or an inactive RBS unit (blank), or an active RBS unit (green). See page 21, LED Indicators .
SIO RS-232 connector	(Serial Input Output) data terminal port, used to connect RS-232 serial cable for CPU #1 / CPU #2 card software upgrade and to configure the card. For cable connection and pin assignment see page 30, SIO RS-232 Front Panel Programming Port .

Table 3 8/16 SKK
Card Component Side
Functions

Function	What is it for?
Configuration DIP switches (or jumpers)	Used to set the card to "normal" operational mode or to "boot" mode (during software upgrade). See page 22, Setting the Card to Boot or Normal Mode
Reset button	Used to reset the card after software upgrade
RJ-45 connector on card	Data terminal port, used to connect RS-232 serial cable for CPU #1 card software upgrade. For cable connection and pin assignment see page 32, RJ-45 RS-232 Component Side Programming Port

Figure 2 8SKK Card

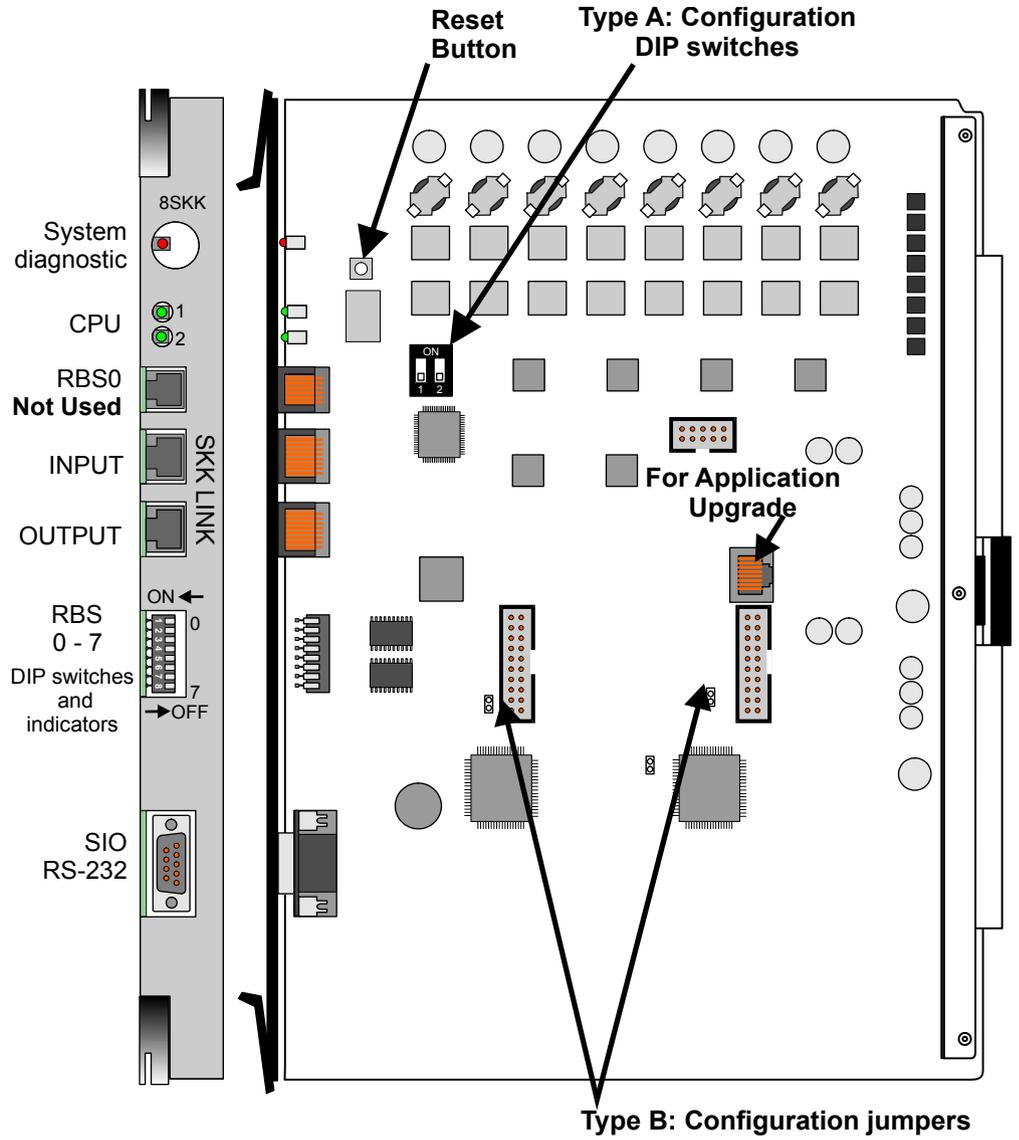
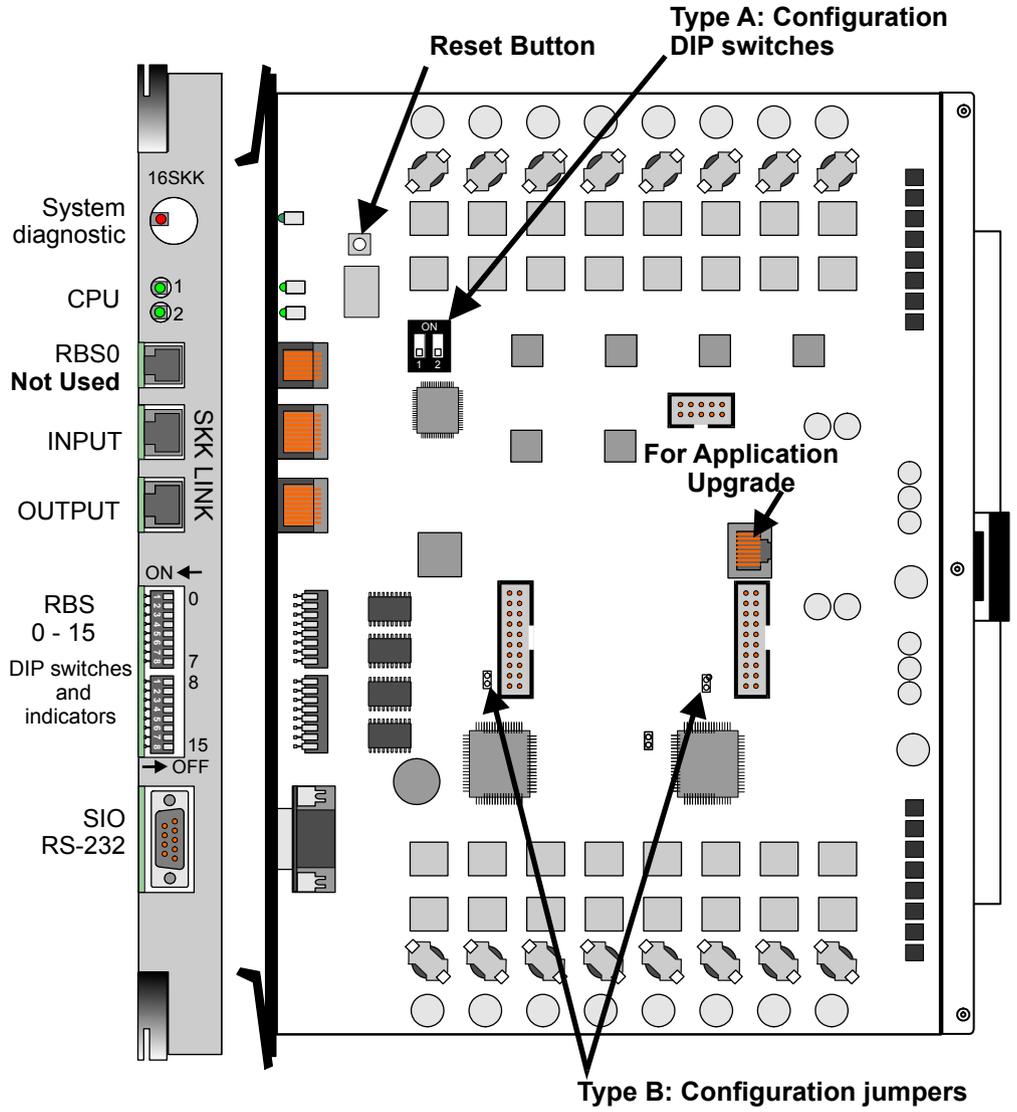


Figure 3 16SKK Card

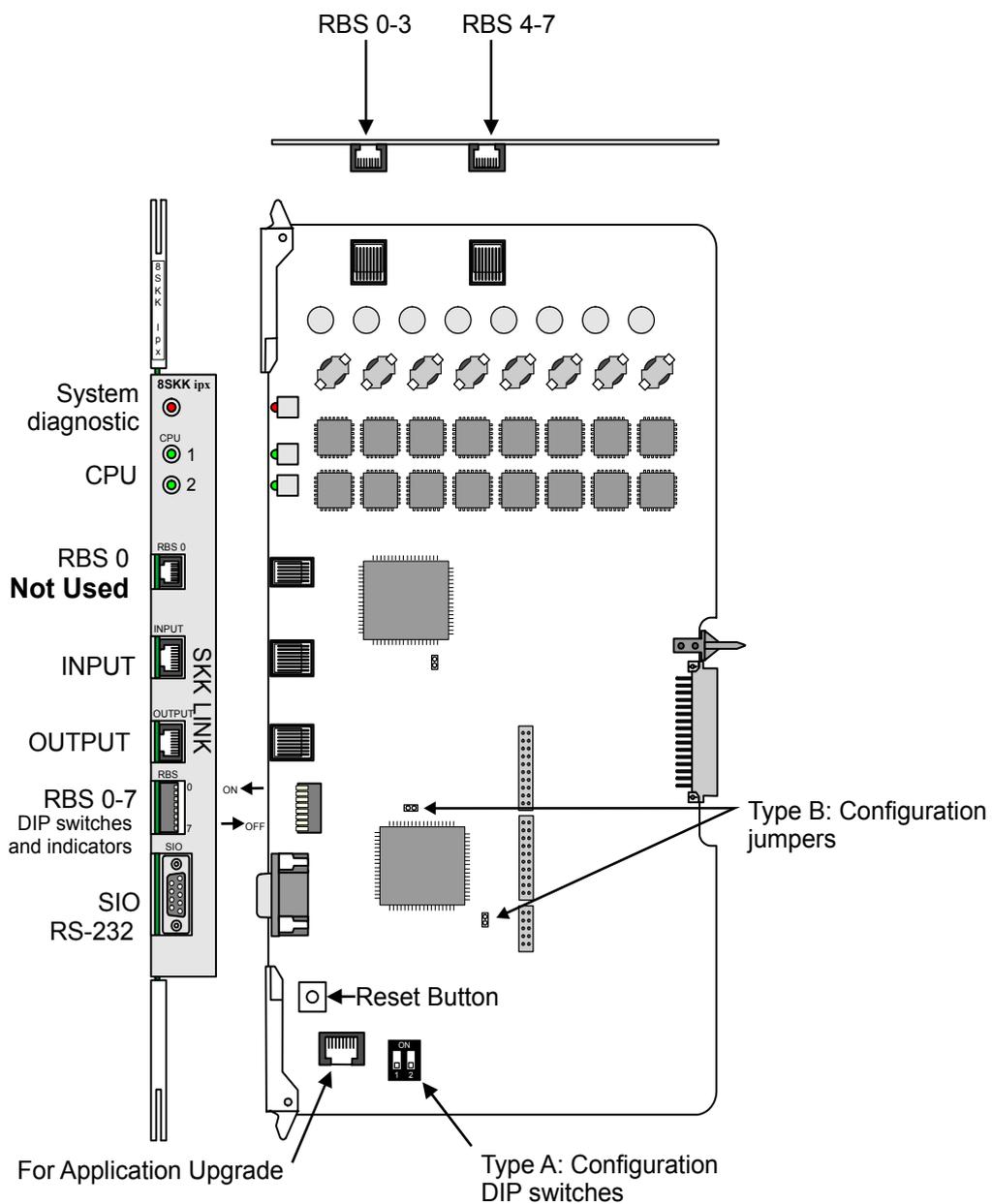


The 8SKKipx card top panel provides the following interface ports.

Table 4 8SKKipx Top Panel Card Functions

Function	What is it for?
RJ-45 connectors on top panel	The top panel includes two RJ-45 connectors that are used to connect the card to RBS units 0 through 3, and 4 through 7, respectively. For pinout details, see Figure 30 on page 48 . The connector closest to the front panel connects to RBS 0-3. The connector furthest from the front panel connects to RBS 4-7.

Figure 4 8SKKipx Card



5 LED Indicators

Figure 2, Figure 3 and *Figure 4* illustrate the front panel of the SKK cards. *Table 5* lists the various indicators and their settings.

Table 5 SKK Front Panel Card Indicator Status

<i>Indicator</i>	<i>State</i>	<i>Description</i>
System Diagnostic (Red)	OFF	Functional
	ON	Malfunction See <i>Coral Service and Peripheral Cards Installation Manual</i> for further instructions and <i>Step 7 on page 26</i> .
	Flashing	Diagnostic test failed by circuitry on the card
CPU (Green)	Flashing rapidly	Initializing
	Flashing normally (1 second intervals)	Normal operation
	Continuously ON	Malfunction
	Continuously OFF	Malfunction
	Flashing rapidly without stopping	Malfunction
RBS 0-7 RBS 8-15	OFF	DIP switch is turned to the right (OFF) and the RBS is inactive or not connected.
	Red	DIP switch is switched to the left (ON) and RBS is not connected or not initializing
	Green	DIP switch is switched to the left (ON) and the RBS is operating properly

6 SKK Card Types

The SKK card can be ordered in a number of configurations, as listed in [Table 6](#).

Table 6 **SKK Catalog Numbers**

Card	Maximum Number of RBS units
8SKK Card	8
8SKKipx Card	8
16SKK Card	16

7 Setting the Card to Boot or Normal Mode

DIP Switches (Type A)

For type A cards, there are two DIP switches (1 and 2) that are marked ON (above the upward configuration). Both DIP switches are set to ON (upward) during software upgrade. Both DIP switches are set to OFF (downward) during normal operation.

Table 7 **DIP Switch Configuration**

Status	1	2
Boot	ON	ON
Normal	OFF	OFF

Jumpers (Type B)

For type B cards, there are two jumpers on each card **component** sidemarked:

- "BOOT" on the 8SKK card ([Figure 2](#)) and the 16SKK card ([Figure 3](#))
- "ALT BOOT" on the 8SKKipx card ([Figure 4](#))

The jumpers are used to configure the system either to Normal or Boot mode. The Boot mode is configured during Software Upgrade. See [page 34, SKK Card Software Upgrade](#). Verify that both jumpers are set to Normal mode. See [Figure 5](#) and [Figure 6](#).

Figure 5 Jumper Configuration for 8SKK and 16SKK Cards (Type B)

Function	Layout PCS2*	Layout PCS3, PCS4
Software Upgrade		
Normal Operation		

Figure 6 Jumper Configuration for 8SKKipx Cards (Type B)

Function	8SKKipx Card
Software Upgrade	
Normal Operation	

8 RBS Configuration (RBS 0-7, 8-15)

The DIP switches, located on the front panel of the SKK card, are used to define which RBS unit is connected to the card.

- For every active RBS, set the corresponding DIP switch to the left.
- For every non-active or non-connected RBS, set the corresponding DIP switch to the right.

NOTE:

If a non-active DIP switch is set to the left, its corresponding diagnostic indicator will be continuously ON (red).

9 SKK Card Distribution among Shelves

Each Coral system can support up to thirty-two 8SKK, 8SKKipx cards or sixteen 16SKK cards. The SKK LINK cable is 4" (10cm) long. Therefore, a maximum of two cards can be positioned on a Coral shelf between each SKK card. While it is advisable to position the cards of one cluster on a single shelf, they can be distributed over two shelves by connecting an SKK card on one shelf to an SKK card on another shelf with a locally fabricated SKK LINK cable that is up to 36" (100cm) long. For more information, see [page 27, SKK LINK Input/Output Wiring Connections](#).

The SKK cards can be installed in any one of the following card slots:

- Coral IPx 500: 8SKKipx can be installed in any peripheral slot
- Coral IPx 800, 3000 and 4000: 8SKK and 16SKK can be installed in any universal I/O card slot
- Coral FlexiCom 200: 8SKKipx can be installed in slots 1, 2 and 3
- Coral FlexiCom 300, 400, 5000 and 6000: 8SKK and 16SKK can be installed in any universal I/O card slot
- Coral FlexLITE system: 8SKK and 16SKK can be installed in any universal I/O slot in any local or remote peripheral shelf

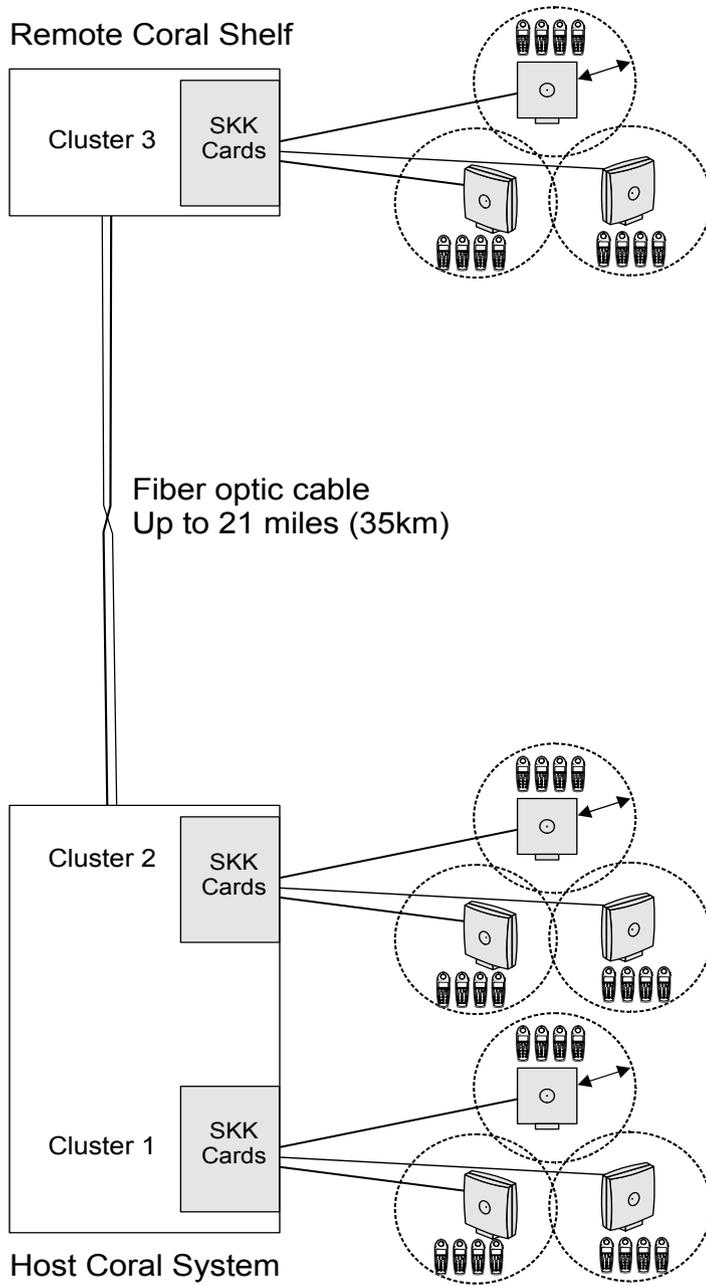
Clusters

A single SKK master card or a combination of one master card and its SKK slave cards is defined as one SKK cluster. Every cluster can consist of up to 8 SKK cards daisy chained together enabling a maximum of 128 Radio Base Stations (RBS) for a FlexAir cluster. An SKK cluster can also be installed in a Coral remote shelf. A Coral system supports up to eight clusters.

Integrating FlexAir and FlexLite Systems

Complete wireless coverage can be achieved for campus environments that are up to 21km (35m) apart. By integrating SKK cards within host and remote cabinets of Coral FlexLite systems, a FlexAir subscriber from one campus can communicate with another subscriber from a different campus. See [Figure 7](#).

Figure 7 Typical FlexAir System Combined with a Remote FlexLITE Shelf



10 Inserting the SKK Cards into the Coral Shelf or Cage

CAUTION!

- Circuit cards contain static-sensitive circuitry and may be damaged or destroyed by electro-static discharge (ESD).
- Always wear the static dissipating wrist strap connected to the system cabinet or card cage while handling circuit cards.
- Hold cards by their edges and avoid touching contact surfaces. Handle with care and do not drop.

Insert the SKK cards in the cards cage as follows:

1. Connect the static dissipating wrist strap connector to the cage and put on the strap.
2. Prior to inserting the SKK card into the Coral card cage, verify that its jumpers are configured for “Normal Operation” as described on [page 22, *Setting the Card to Boot or Normal Mode*](#).
3. Select a slot for the SKK card as defined on [page 24, *SKK Card Distribution among Shelves*](#).
4. Grasp the card with both hands, with your fingers on the edge of the card near the front panel, and your thumbs against the ejectors at the top and bottom of the front panel. Verify that the card is oriented correctly (the red diagnostic indicator on front panel is positioned near the top of the card).
5. Align the edges of the circuit card with the card edge guides in the card cage, and gently slide the card straight into the card slot. A slight resistance will be felt as the multi-pin connectors on the circuit card meet mating connectors on the backplane and engage.
6. Push against the ejectors until the front panel of the card is flush with the front frame of the card cage.

CAUTION!

Do not force the circuit card into the slot. If more than slight resistance is encountered, remove the circuit card and examine the connectors for bent pins or interfering debris.

7. Verify that the system diagnostic indicator on the front panel lights up and then extinguishes. This indicator turns on to indicate card initialization and then goes out upon successful completion. If the indicator remains lit or flashes, see *Coral Service and Peripheral Cards Installation Manual* for further instructions.

11 SKK LINK Input/Output Wiring Connections

SKK cards within each cluster are “daisy-chain” linked together during installation in the following manner: the two SKK front panel RJ-45 jacks labeled **Input** and **Output** are used to link the cards. Each SKK card is supplied with one SKK LINK cable. The output connector of the master card is connected by a cable to the input connector of a slave card. The output connector of the slave card is connected to the input connector of the next slave card, and so on.

The SKK LINK cable provided by the manufacturer is 4” (10cm) long. See [Figure 8](#). If the SKK cards of a cluster need to be distributed over two shelves, **one** 36” (100cm) SKK LINK cable can be fabricated by the customer to facilitate this connection. The pinout for the SKK LINK cable is displayed in

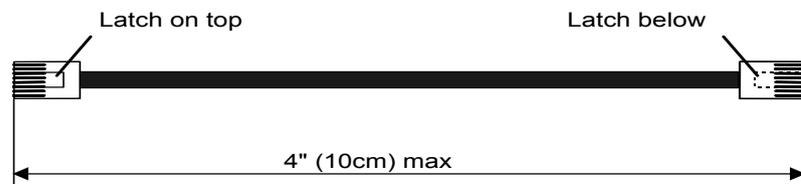
[Figure 10](#).



NOTE:

The SKK LINK cable provided by the manufacturer is designed to interconnect the SKK cards with minimal attenuation. Longer cables will increase the attenuation and could prevent the system from functioning properly. Do not install more than one locally fabricated SKK LINK cable. If a locally fabricated SKK LINK cable is installed, verify that it is no more than 36” (100cm) long.

Figure 8 SKK LINK Cable Length (Provided)



- For Coral IPx 800, 3000, 4000, 6000, FlexiCom 300, 400, and 5000 installation, see [Figure 11](#) for 8SKK and 16SKK card master-slave wiring.
- For Coral IPx 500 and FlexiCom 200 installations, see [Figure 12](#) master-slave wiring for 8SKKipx cards.

To link the SKK cards:

1. Connect one end of the SKK LINK cable into the **output** (lower) jack of the SKK master card.
2. Connect the other end of the same cable into the **input** (upper) jack of the next SKK slave card.
3. Connect all remaining cards in the same manner, connecting the input jack on the previous card to the output jack on the next card.
4. The number of cards per cluster is defined later, as described on [page 63, Defining the Number of Cards per Cluster \(Master card ONLY\)](#).

Recognizing an RJ-45 Straight SKK LINK Cable

You can recognize a straight cable by comparing the two modular ends of the cable. Hold the cables side-by-side with the latch facing away from you. The straight cable wire colors are in the same sequence at both ends of the cable.

Figure 9 **SKK LINK**
Cable Identification

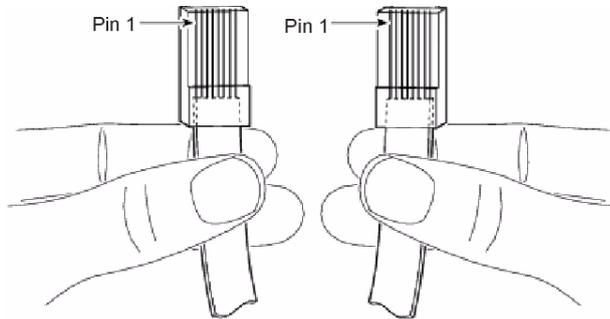


Figure 10 **SKK LINK**
Cable Pinout

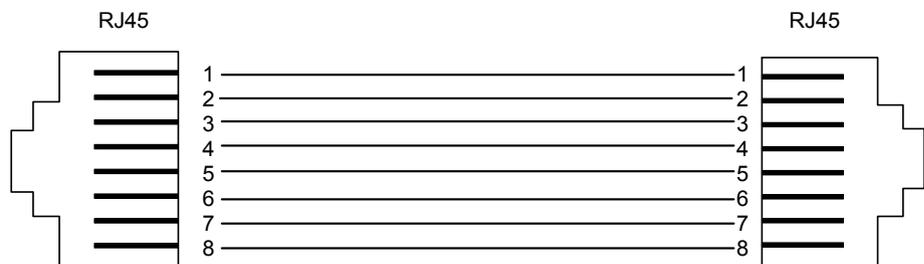


Figure 11 **Master**
Slave Daisy Chain Wiring
via 8SKK and 16SKK
Front Panel

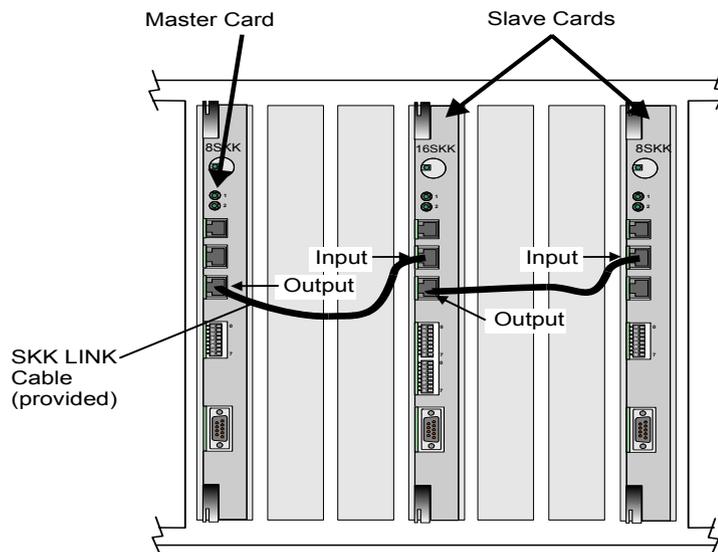
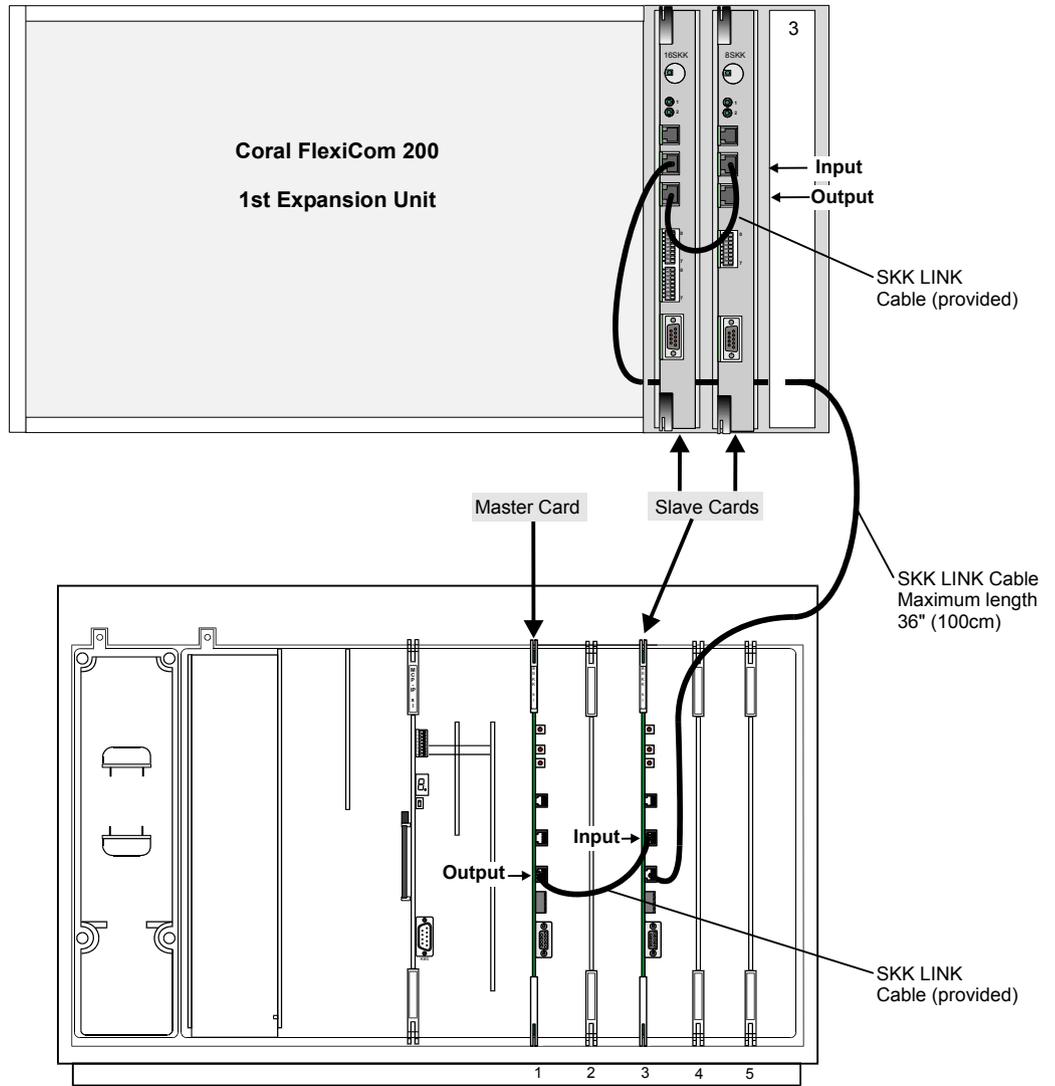


Figure 12 Master Slave Daisy Chain Wiring via SKKipx Front Panel of Coral FlexiCom 200 Systems



12 SIO RS-232 Front Panel Programming Port

The SIO (Serial Input Output) data terminal port is used to connect the RS-232 serial cable for CPU #1 and CPU #2 card software upgrade and to configure the card.

The serial interface of the SIO programming port on the SKK front panel conforms to the EIA RS-232 specification. It is wired as a Data Terminal Equipment (DTE) device using a popular 9-pin, male, D-type connector. The interface allows connection of a common, asynchronous, ASCII data terminal, or personal computer for programming the various features of the Coral FlexAir system. *Figure 13* illustrates the cable connection to serial port on workstation. *Table 8* lists the pin numbers.

Figure 13 SKK Card SIO RS-232 Connection to Serial Port on Workstation

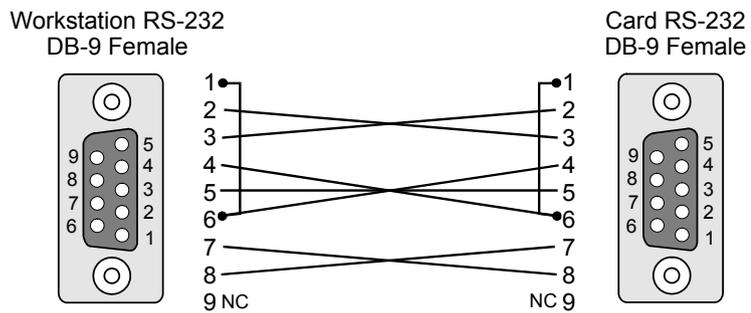


Table 8 SKK Card SIO RS-232 Connection to Serial Port on Workstation

Workstation Pin #	Card Pin #
1,6	4
2	3
3	2
4	1,6
5	5
7	8
8	7
9 - Not Connected	9 - Not Connected

SIO RS-232 COM Port Settings

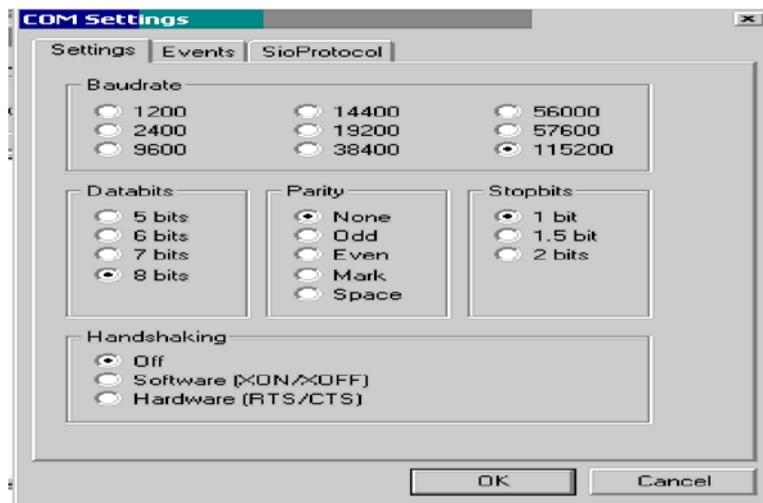
The default SIO port settings are as follows:

- Baud rate - 115200
- Parity - none
- Data bit - 8
- Stop bits - 1

To change the default setting:

1. In the WinSio application, select **Connection** and then **Settings**. The **COM Settings** window opens.

Figure 14 SKK Card
SIO RS-232 COM settings
Window



2. Make the changes as required and press **OK**.

SIO Applications

[page 63, Defining the Number of Cards per Cluster \(Master card ONLY\)](#)

[page 69, Cable Delay Measurement \(for all SKK Cards\)](#)

[page 34, SKK Card Software Upgrade](#)

13 RJ-45 RS-232 Component Side Programming Port

Data terminal port, used to connect RS-232 serial cable for CPU #1 card software upgrade.

The serial interface of the RJ-45 programming port on the SKK component side conforms to the EIA RS-232 specification. It is wired as a Data Terminal Equipment (DTE) device using an RJ-45 8-pin connector. The interface allows connection of a common, asynchronous, ASCII data terminal, or personal computer for programming the various features of the Coral FlexAir system. *Figure 15* illustrates the cable connection to serial port on workstation. *Table 9* lists the pin numbers.

Figure 15 SKK Card RJ-45 RS-232 Connection to Serial Port on Workstation

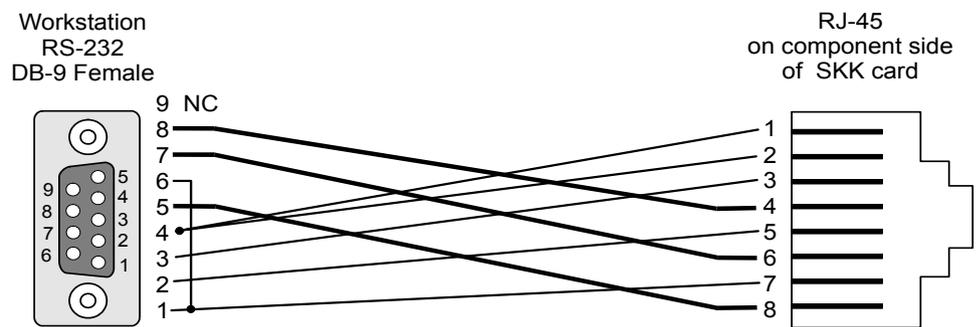


Table 9 SKK Card RJ-45 RS-232 Connection to Serial Port on Workstation

Workstation RS-232 Connection Pin #	SKK card, Component Side, RJ-45 Connection Pin #
1, 6	7
2	5
3	3
4	1, 2
5	8
7	6
8	4
9 - Not Connected	N/A

RJ-45 RS-232 COM Port Settings

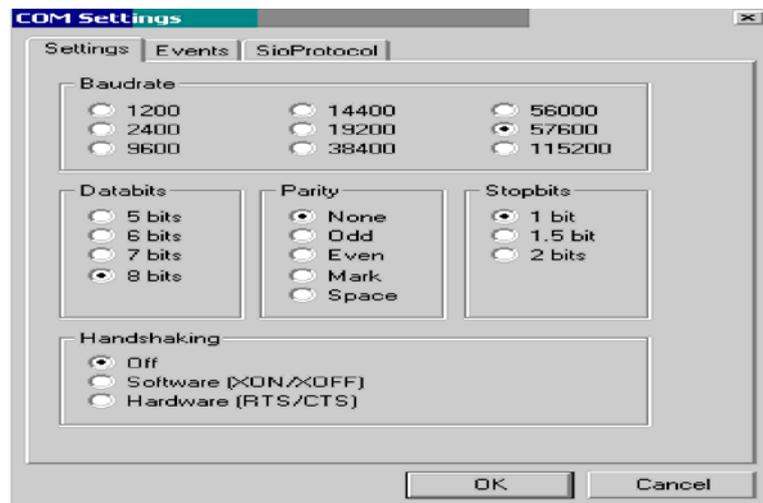
The default RJ-45 port settings are as follows:

- Baud rate - 57600
- Parity - none
- Data bit - 8
- Stop bits - 1

To change the default setting:

1. In the WinSio application, select **Connection** and then **Settings**. The **COM Settings** window opens.

Figure 16 **SKK Card**
RJ-45 RS-232 COM
Settings Window



2. Make the changes as required and press **OK**.

RJ-45 RS-232 Applications

page 34, SKK Card Software Upgrade

14 SKK Card Software Upgrade

The SKK card houses two CPUs (Central Processing Units):

- CPU #1 the application CPU, which interfaces with the Coral main processor
- CPU #2 the DECT CPU, which interfaces with the handsets and the RBS units

Periodically the software on these CPUs needs to be upgraded. Both CPUs can be upgraded by connecting a standard null modem cable between the serial port of a workstation and the RS-232 connector on the front panel of the SKK card. In addition, the application software can be upgraded using an RS-232 to RJ-45 cable connected between a workstation and the RJ-45 connection on the component side of the SKK card. See [page 30, SIO RS-232 Front Panel Programming Port](#) and [page 32, RJ-45 RS-232 Component Side Programming Port](#). This cable is not provided by the manufacturer.

Table 10 Connections between the SKK Card and the Workstation for Software Upgrade

Software	Can it be upgraded using the SIO RS-232 connector (described on page 30)?	Can it be upgraded using the RJ-45 connector (described on page 32)?
CPU #1 Application	Yes	Yes
CPU #2 DECT	Yes	No



Tips:

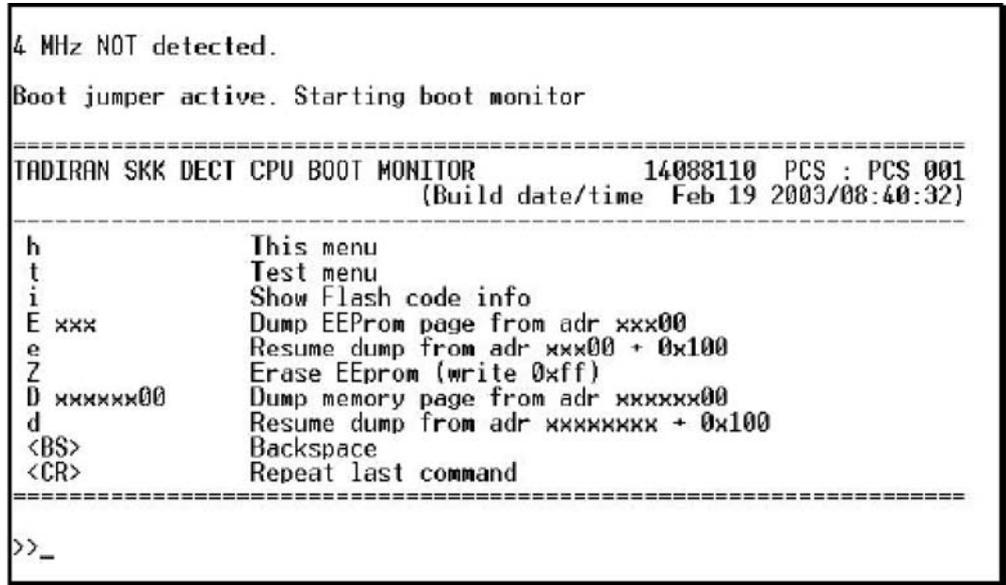
Using two workstations, you can upgrade CPU#1 and CPU#2 simultaneously by connecting one workstation to the SIO RS-232 connector on the front panel, of the SKK card and the other workstation to the RJ-45 connector on the component side of the SKK card.

The following procedure is identical for both Application CPU#1 upgrade and DECT CPU#2 upgrade. The order of upgrading is not important. After upgrading the first CPU, repeat the entire procedure for the other CPU.

1. Change the Jumper to boot mode, see [page 22, Setting the Card to Boot or Normal Mode](#).
2. Make one of the following connections between the SKK card and the workstation(s) as necessary. See [Table 10](#).
 - For SIO, verify that the SIO RS-232 cable is connected between the connector marked as SIO on the SKK card front panel and the COM port on the laptop. The default port is COM1. To change to COM2, activate the program with a specific note SIO.EXE/C2. See [page 30, SIO RS-232 Front Panel Programming Port](#).

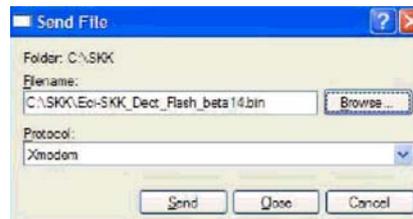
- For RJ-45, verify that the RJ-45 RS-232 cable is connected between the connector on the SKK card component side and the COM port on the laptop. See [page 32, RJ-45 RS-232 Component Side Programming Port](#).
3. Press the reset button on the card or remove and insert the SKK card in the Coral system. A boot menu should appear on the terminal as shown in [Figure 17](#).

Figure 17 **Boot Menu**



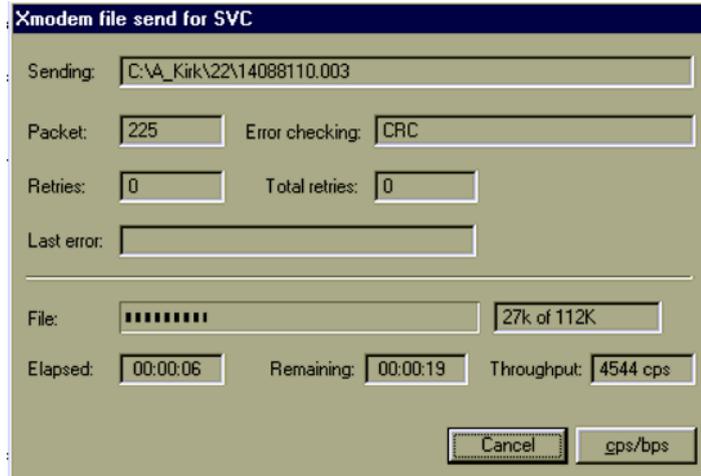
4. In the command line prompt (>>) type X and then press Enter. The following prompt appears: **ccccccc . . . >>**. Select the designated protocol from the terminal.
5. From *Transfer*, select **Send File from HyperTerminal**.
6. Click the **Browse** button, and select one of the following:
 - ECI-SKK_APP_FLASH_VER(X).bin (Application CPU#1), or
 - ECI-SKK_DECT_FLASH_VER(X).bin (DECT CPU#2)

Figure 18 **Send File Window**



7. The **Send File** dialog box opens with the selected file displayed in the **Rename** text box. From the **Protocol** options box, select to 1K Xmodem or Xmodem, and click **Send**.
8. The file is loaded to the CPU with the progress indicated as shown below.

Figure 19 Xmodem file send for SVC Window



- When it has finished loading, the HyperTerminal displays the following:
Xmodem OK... Received xxxxxx bytes as shown in [Figure 20](#). Wait for the Send operation to finish and the >> prompt to displays. See [Figure 20](#).

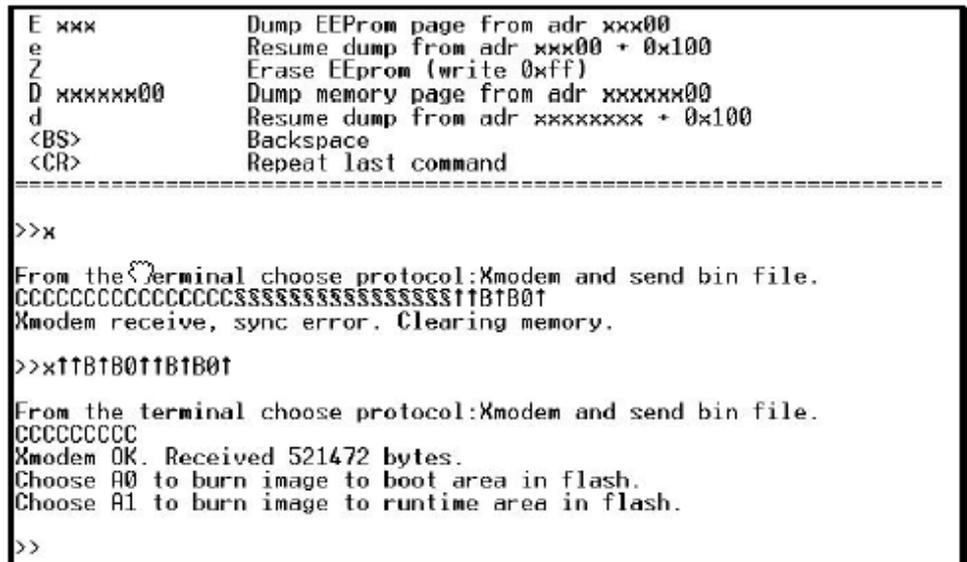
From the SKK menu, select A1 to burn an image to the runtime area in flash (A1 is case-sensitive). While the image is burning, the following progress message will be displayed:

Burning RAM image to flash

After the burning process is completed the following message will appear:

Burning Complete. Card will now restart

Figure 20 Burning Complete Message



- When the flash programming process is complete, reconfigure the jumper position to "run" mode. See [Figure 5](#) and [Figure 6](#). Reset the card.
- Repeat the procedure for either Application or DECT CPU as necessary.

4 RBS Radio Base Station

1 Unpacking

Inspect for Damage

1. Inspect the shipping carton for evidence of physical damage or mishandling prior to opening.
2. Inspect all parts for damage.
3. Report any damage to the carrier immediately.
4. If it is necessary to make a damage claim for the carrier, do not move the shipping carton until it has been examined by a representative of the carrier.
5. Dispose of empty cartons in accordance with local regulations.

Unpacking the Shipping Container

The following items should be present in every box containing an RBS:

- One (1) RBS unit
- One (1) bracket template
- Two (2) mounting screws
- Two (2) anchors (wall plugs)

For outdoor installations, an outdoor enclosure box for the RBS should be supplied, including:

- Four (4) mounting screws
- Two (2) mounting hooks including two screws, two anchors, and two disks per hook

2 RBS Description

RBS provides RF Channels to Portable Handsets

The RBS is a compact device that contains RF circuitry and transmit/receive antennas. The main function of the RBS is to provide audio and data communication between the portable handsets and the Coral via the SKK card. The RBS supports four RF channels.



NOTE:

The RBS is also sometimes known as the RFP (Radio Fixed Part).

The RF communication is provided according to the band standard at the site:

- RBS-DECT provides four RF channels of 1.88 GHz, DECT standard, used in Europe, Australia and South America.
- RBS-ISM provides four RF channels of the 2.4 GHz band used in the USA.

The RBS Can be Installed Wherever It Fits Best

The RBS can be installed either indoors or outdoors.

- **Indoors** - the RBS is suitable for mounting indoors on a wall, only. See [page 41, RBS Indoor Installation](#).
- **Outdoors** - the RBS can be placed in a weatherproof, environmentally protected unit suitable for installation on external walls, poles etc. See [page 43, RBS Outdoor Installation](#).

RBS Distance from the Coral

The Coral system supplies power to the RBS up to 1,500m (4,500ft) cable length. To increase the coverage, it is possible to connect a repeater. See [page 49, FlexAir Repeaters](#).

RBS Traffic Support

An RBS supports four (4) RF channels simultaneously. All channels are used for both audio conversation detectable by portable handsets.

Table 11 **RBS Types**

Part
RBS-DECT 1.8 GHz (conforms with standard DECT markets)
RBS-ISM 2.4 GHz (for North America)

3 RBS Appearance and Components

The RBS unit includes the following components:

Front Panel

An indicator on the front panel that displays the operational status of the RBS. See [Figure 21](#) for the front view of the RBS unit. See [Table 12](#) for a description of the RBS indicator status.

Rear Panel

The rear panel includes (See [Figure 22](#)):

- A knock-out opening for connecting an external antenna (not in the scope of this manual)
- An RJ-11 6-pin jack used to connect the communication wire pair that is routed to the SKK card. Pins 3 and 4 are used.
- Four plastic hooks designed to be inserted into the mounting template.

Figure 21 Front View of RBS

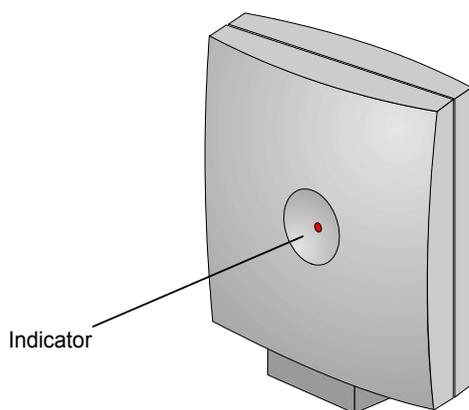
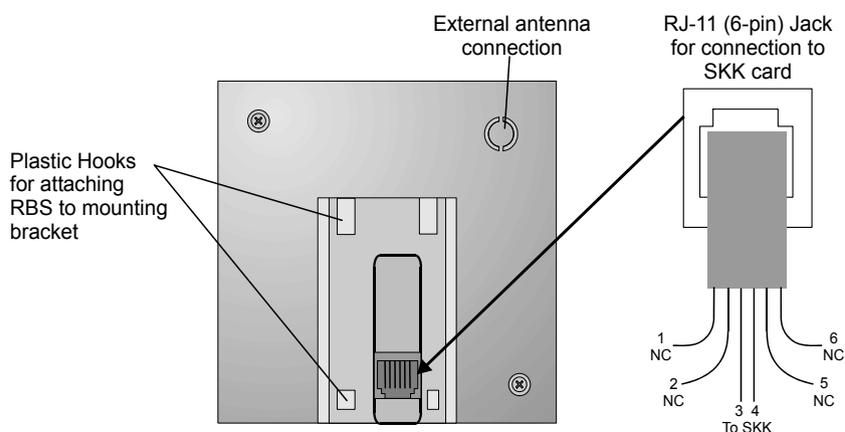


Figure 22 Rear Panel of RBS unit



RBS Diagnostic Indicators

The RBS front panel has one red indicator describing the RBS operational status. See [Table 12](#).

Table 12 RBS Red Indicator Status

Status	Description
OFF	One or more of the following: <ul style="list-style-type: none">• SKK card removed• SKK DIP switch switched OFF (to the right)• Cable disconnected
ON	RBS is operating properly
Flashing	Initializing

RJ-11 Jack

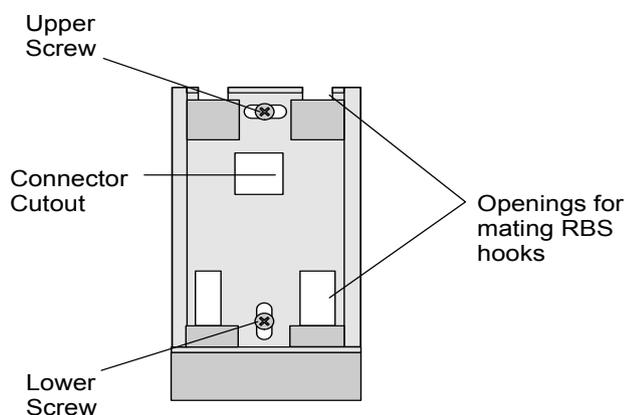
The RJ-11 jack houses the cable connector from the SKK card. [Figure 22](#) displays the pinout between the RBS unit and the SKK card. For a connection description, see [Figure 29](#) and [Figure 30 on page 48](#).

Bracket Template

The bracket template includes (see [Figure 23](#)):

- Two mounting holes that allow it to be affixed to the wall or to the outdoor enclosure box.
- Four openings designed to mate with the four plastic hooks on the rear panel of the RBS.
- The connector cutout, for routing the cable through the mounting template to the rear panel of the RBS.

Figure 23 Bracket Template Mounted onto the Wall



4 RBS Indoor Installation

For best RF coverage, the RBS must be mounted vertically, on walls.

CAUTION!

The RBS must not be installed at any other angle other than vertical. The RBS might not transmit or receive effectively if it is installed at an incline or is attached to the ceiling.

Installation RF Coverage

The RBS propagation pattern is extended in front of the RBS and diminished behind it.

CAUTION!

Do not mount the RBS on soft surface walls such as those covered with canvas or sponge-like materials.

To install the RBS indoors:

The FlexAir is easily wall mounted with the bracket template. Using the anchors and screws provided, mount the bracket template onto the wall as follows:

1. Place the bracket template on the wall in the spot where you wish to mount the RBS.
2. Make a mark on the wall at the middle of the upper cutout and at the middle of the lower cutout on the bracket, as indicated in [Figure 25](#).
3. Use a small drill bit 0.197" (5mm) or smaller to drill two holes into the wall for the mounting screws. The hole drilled should be wide enough to allow the anchors (wall plugs) to enter snugly, not loosely.
4. Insert the two anchors (wall plugs) into the holes.
5. Route the cable (routed from the MDF or SKK card) through the connection cutout on the bracket template. **Do not** mount the bracket onto the wall before routing the cable. See [Figure 24](#).
6. Place the bracket template on the wall.
7. Tighten the two screws into the wall plugs. See [Figure 23](#).

Figure 24 Cable Routed through the Bracket Template

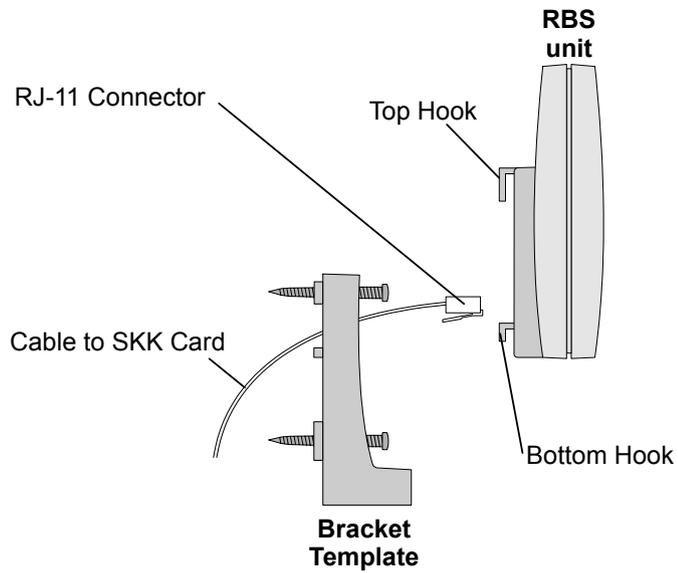
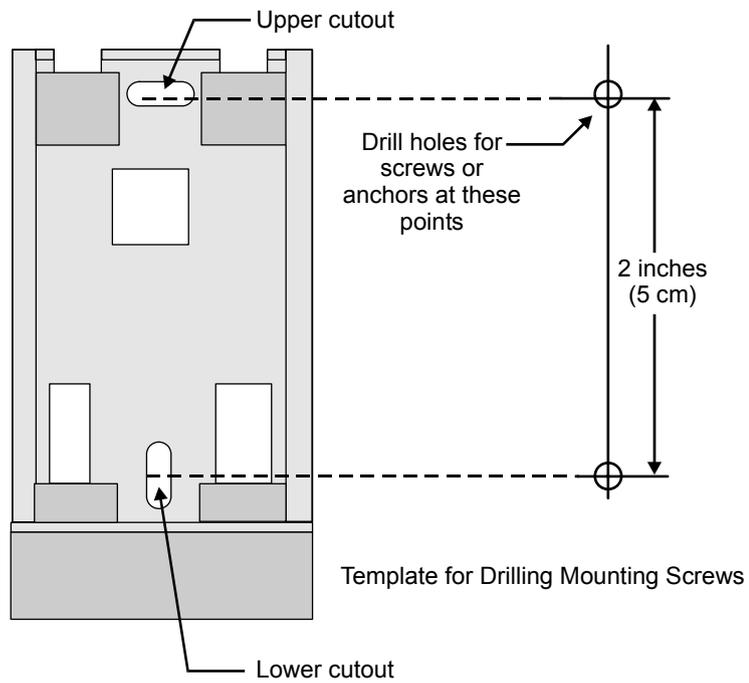


Figure 25 Bracket Template



8. Connect the cable into the RJ-11 jack on the RBS. For a description of the RJ-11 pinout, see [Figure 22](#).
9. Insert the plastic hooks on the rear panel of the RBS unit into the bracket template and push the RBS down until it clicks into place. See [Figure 24](#).

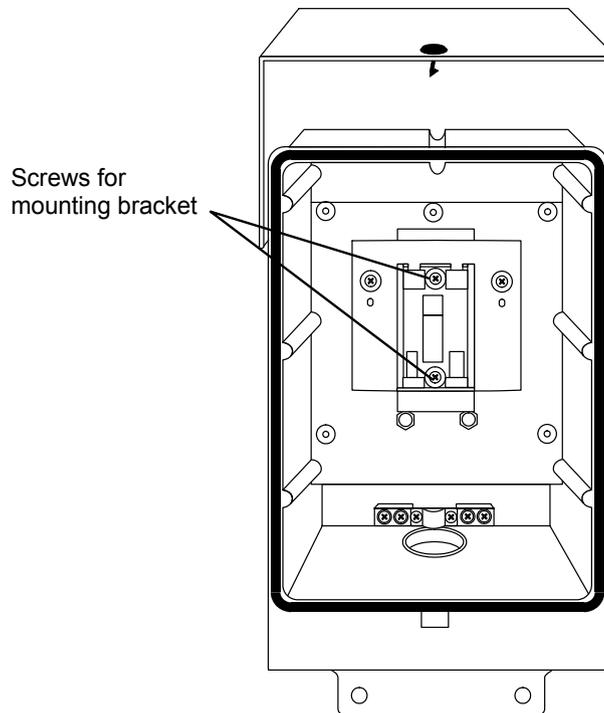
5 RBS Outdoor Installation

Outdoor installation requires an outdoor protective enclosure box in which the RBS is installed.

This box is designed to allow a great flexibility of installation place and position. It must be mounted vertically, on poles, walls, pipes, etc.

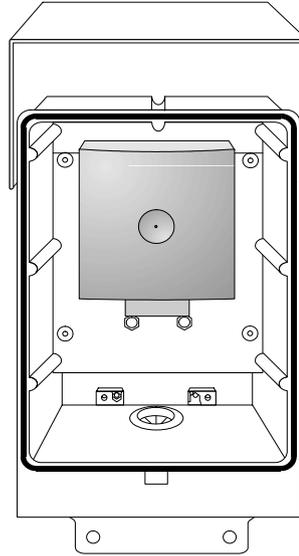
1. On the bottom of the protective rubber plug (positioned at the bottom of the outside enclosure box). Cut a hole large enough to insert the cable routed from the MDF or SKK card.
2. Insert the cable through the rubber plug cut in the previous step.
3. Insert the cable through the mounting bracket. **Do not** mount the bracket onto the outside enclosure box before routing the cable. See [Figure 24](#).
4. Fasten the mounting bracket onto the inside surface of the enclosure box. See [Figure 23](#) and [Figure 26](#).

Figure 26 **Outdoor Enclosure Box without RBS**



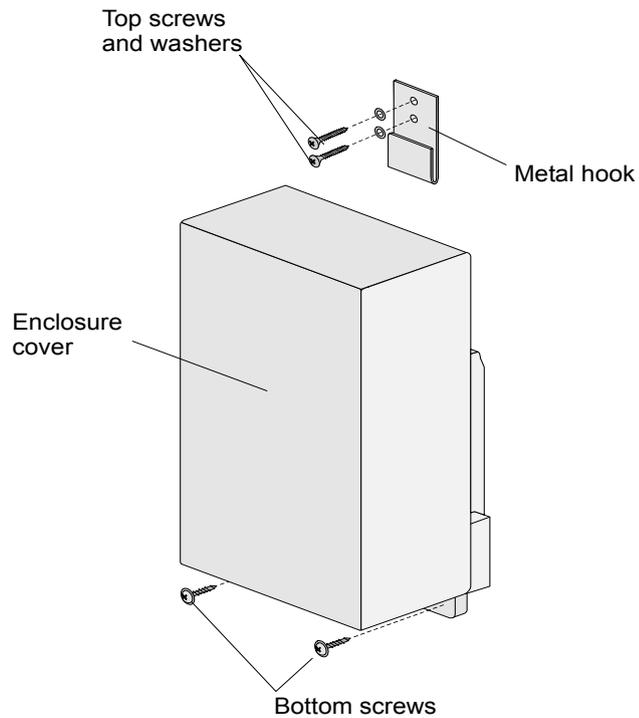
5. Connect the cable into the RJ-11 Jack on the RBS. For a description of the RJ-11 pinout, see [Figure 22](#).
6. Insert the plastic hooks on the rear panel of the RBS unit onto the mounted bracket and push the RBS down until it clicks into place. See [Figure 24](#) and [Figure 27](#).

Figure 27 **Outdoor Enclosure Box with RBS**



7. Using the enclosure as a template, drill four 0.24" (6mm) holes into the wall.
8. Using the anchors and screws provided, mount the metal hook on the outside wall.

Figure 28 **RBS Enclosure Box Mounting onto Outside Wall**



9. Mount the outdoor enclosure box onto the hook and fasten the bottom of the box to the wall with the two screws provided.
10. Close the enclosure box cover.

6 Connecting the RBS to the SKK Card

Verifying SKK Card Configuration

Verify that the RBS ports to be used have been enabled via the appropriate SKK card DIP switches. Switch the DIP switches left or right accordingly. See [page 23, RBS Configuration \(RBS 0-7, 8-15\)](#).

Connecting to the MDF or SKK

Perform the wiring procedure between the MDF or SKK card as described on [page 14, Connections Between the SKK Cards and the RBS](#) and [page 47, External Connections](#).

Recording the Installation Information

After completing the installation of the RBS units, record the location of each RBS. See [Table 19, on page 92](#).

Checking the Indicators

- Verify that the RBS indicator is continuously on, indicating that the RBS is functional. See [Figure 21 on page 39](#).
- Verify that the relevant SKK card DIP switch indicators are green, indicating that every RBS unit is functional. See [Table 5 on page 21](#).



After installing the corresponding SKK card, it may take up to 15 minutes for the RBS indicator to light continuously and for the SKK DIP switch indicators to light green.

Cable Delay Measurement

As the length of cable increases between the SKK and the RBS, so does the attenuation. Because RBS units are installed at different distances from the Coral system, the losses between each RBS unit and the SKK card is different, resulting in different power inputs to each RBS unit. Cable delay measurement (performed by the SIO application) measures the cable length and compensates for the losses between the SKK card and each RBS, resulting in a consistent power output from each RBS unit.

Perform the cable delay measurement for each SKK card in the system using the SIO application. See [page 69, Cable Delay Measurement \(for all SKK Cards\)](#).

7 Powering the RBS

The SKK card provides power to its RBS units from the main Coral power supply. The power is supplied on the feed pair in phantom mode.

5 External Connections

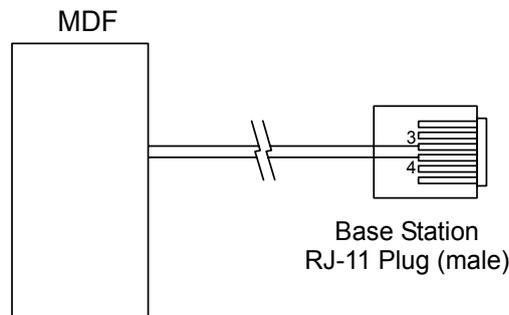
Connecting the SKK Card to the RBS

This section describes the instructions for connecting RBS to SKK cards. Connections between the SKK card and the RBS are made via one pair of *Category 4 Twisted telephone cable* or higher. These carry the digital connection transmit and receive signals. The maximum line length is 1500m (4500ft).

1 Coral IPx 800, 3000, 4000 and FlexiCom 300, 400, 5000, 6000

The 8SKK and 16SKK cards are connected to the RBS units via the MDF. [Figure 29](#) shows the wiring between the MDF and the RBS and the pinout assignments for the RBS RJ-11 connectors. See [page 2, Related Documentation](#) for Chapter 5 of the relevant Coral system.

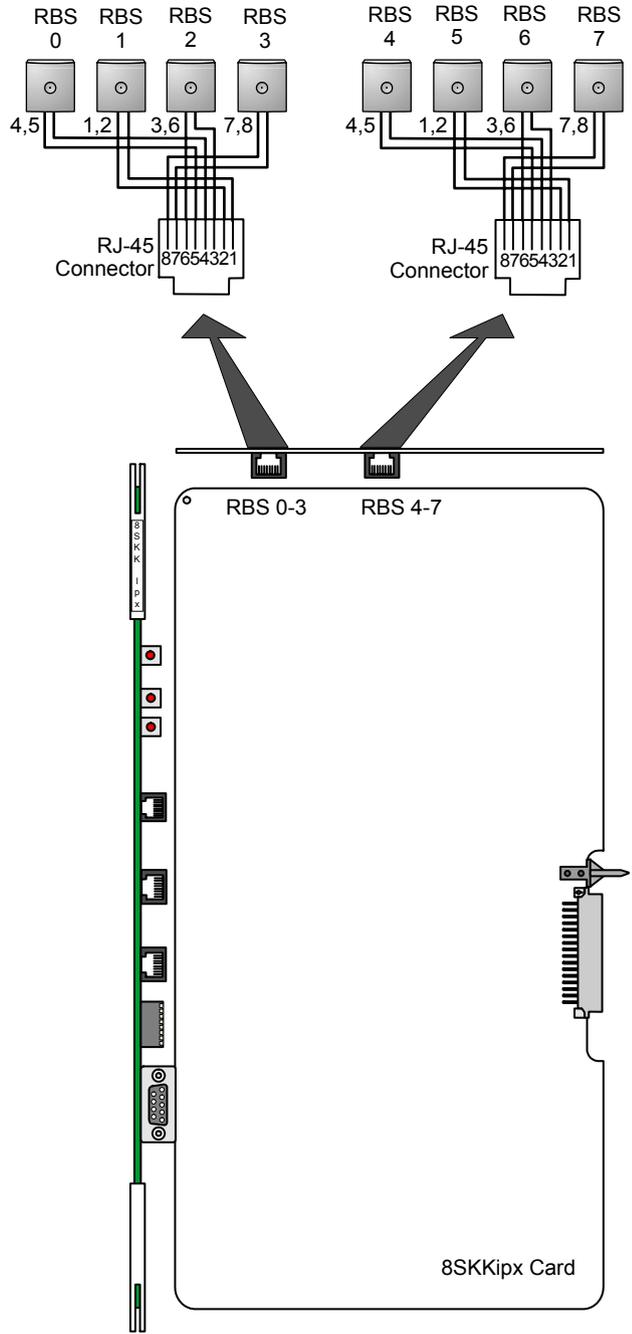
Figure 29 8SKK and 16SKK Card to RBS Wiring via MDF



2 Coral IPx 500 and FlexiCom 200 Installations

The connections to the RBS are always accessed via the top panel of the 8SKKipx cards. The cable from the RJ-45 connection is connected directly to the RBS or to the MDF. [Figure 30](#) shows the wiring between the 8SKKipx and the RBS and the pinout assignments for the 8SKKipx card top panel RJ-45 connectors. [Figure 29](#) shows the pinout assignments for the RBS RJ-11 connectors.

Figure 30 **8SKKipx Card to RBS Wiring**



6 FlexAir Repeaters

1 Unpacking

Inspect for Damage

1. Inspect the shipping carton for evidence of physical damage or mishandling prior to opening.
2. Inspect all parts for damage.
3. Report any damage to the carrier immediately.
4. If it is necessary to make a damage claim for the carrier, do not move the shipping carton until it has been examined by a representative of the carrier.
5. Dispose of empty cartons in accordance with local regulations.

Unpacking the Shipping Container

For indoor installations, the following items should be present in every box containing a repeater:

- One (1) repeater unit
- One (1) bracket template for indoor installation
- Two (2) mounting screws
- Two (2) anchors
- One (1) programming cable
- One (1) external power supply unit
- One (1) dual adaptor

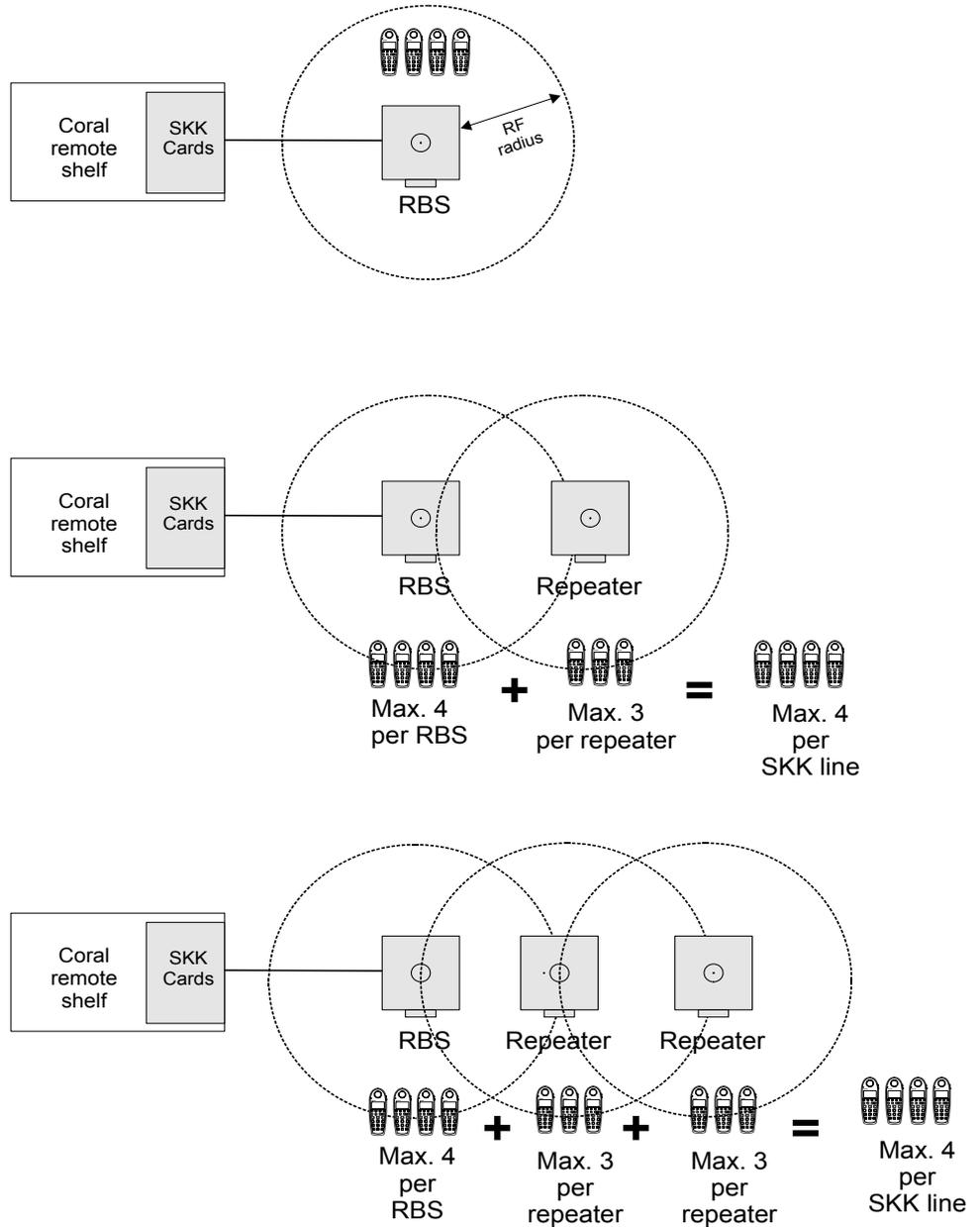
For outdoor installations, an outdoor enclosure box for a repeater should be supplied, including:

- Four (4) mounting screws
- Four (4) anchors
- Two (2) mounting hooks including two screws, two anchors, and two disks per hook

2 Repeater Description

The FlexAir repeater is an antenna that extends the coverage area of an RBS unit without increasing the number of air channels. The FlexAir repeater provides versatile and cost-effective solutions for situations that have traffic requirements that do not need to be met by increasing the overall number of air channels in the system. See [Figure 31](#).

Figure 31 **Typical FlexAir System Configuration with Repeaters**



The repeater is identical in appearance to the RBS with the exception that it includes a power supply connection. The FlexAir repeater is programmed locally with a PC and is synchronized to an RBS unit in an adjacent cell.

The RF communication is provided according to the band standard at the site:

- DECT-compatible repeaters provide four RF channels (per RBS) of 1.88 GHz, DECT standard, used in Europe, Australia and South America.
- ISM-compatible repeaters provide four RF channels (per RBS) of the 2.4 GHz band used in the USA.

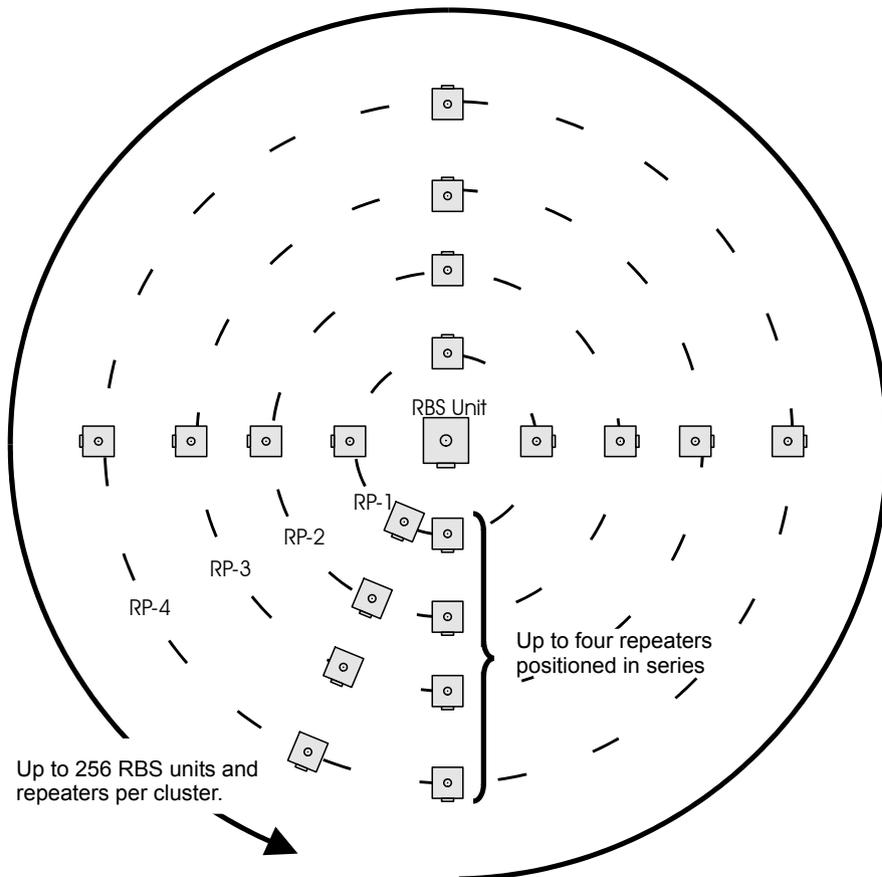
The Repeater Can be Installed Wherever it Fits Best

Similar to the RBS, the repeater can be installed either indoors or outdoors. See [page 41, RBS Indoor Installation](#) and [page 43, RBS Outdoor Installation](#).

The repeater must be installed within the coverage radius of its RBS unit: 150m (450ft) outdoors and 50m (150ft) indoors. For more information, see [page 2, Related Documentation](#).

Each cluster can support a combination of up to 256 RBS units and repeaters. In other words, a cluster with only one RBS unit could support up to 255 repeaters, with each repeater supporting up to three additional repeaters. See [Figure 32](#).

Figure 32 Cluster including One RBS Unit with the Maximum Number of Repeaters



Repeater Power

The repeater is powered by a 115VAC/230VAC power supply unit provided. The repeater must be installed near a power outlet.

Repeater Traffic Support

A repeater simultaneously supports:

- Two RF channels with handover, and
- Three RF channels without handover.

All channels are used for both audio conversation detectable by portable handsets.

Table 13 **Repeater
Types**

<i>Part</i>
DECT Repeater 1.8 GHz (conforms with standard DECT markets) Including power supply and dual adaptor
ISM Repeater 2.4 GHz (for North America) Including power supply and dual adaptor
Repeater programming kit (ordered at specific customer request)

3 Repeater Appearance and Components

The repeater is identical in appearance to the RBS unit with the exception that the RJ-11 jack on the rear panel houses a 4-pin connector. See [Figure 33](#), [Figure 34](#) and [Figure 23 on page 40](#).

The RBS unit includes the following components:

Front Panel

An indicator on the front panel that displays the operational status of the repeater. See [Figure 33](#) for the front view of the repeater unit. See [Table 14](#) for a description of the repeater indicator status.

Rear Panel

The rear panel includes (See [Figure 34](#)):

- A knock-out opening for connecting an external antenna (not in the scope of this manual)
- An RJ-11 4-pin jack used to connect the external power supply and the dual adaptor.
- Four plastic hooks designed to be inserted into the mounting template.

Figure 33 Front View of Repeater

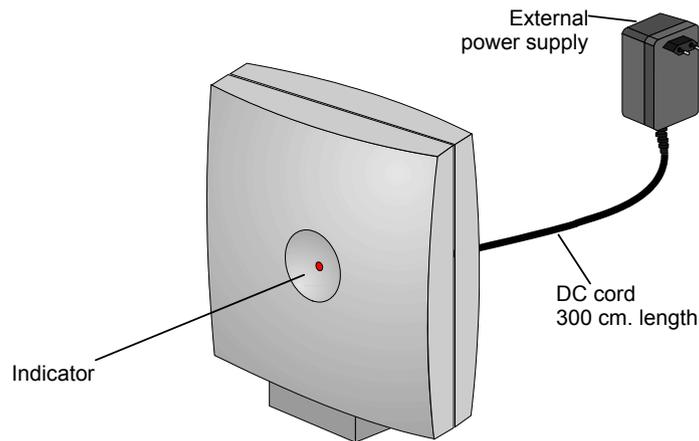
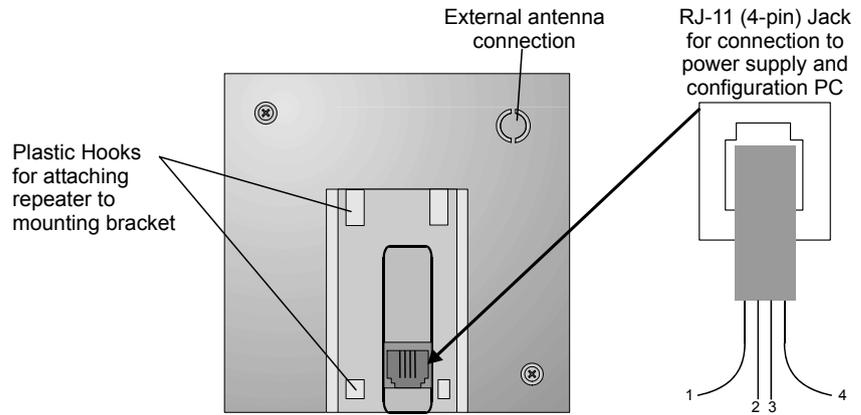


Figure 34 Rear Panel of Repeater unit



Repeater Diagnostic Indicators

The repeater front panel has one red indicator describing the repeater operational status. See [Table 14](#).

Table 14 Repeater Red Indicator Status

Status	Description
OFF	One or more of the following: <ul style="list-style-type: none"> • Corresponding SKK not powered • Corresponding SKK card DIP switch turned OFF (to the right) • Cable disconnected • Repeater not powered • Synchronized RBS or repeater not powered • Power cable disconnected
ON	The repeater is synchronized with an RBS unit
Two Flashes	A subscriber has initiated a call

RJ-11 Jack

The RJ-11 jack houses the cable connector from the external power supply and the dual adaptor. For a connection description, see [Figure 35](#) and [Figure 38 on page 59](#).

CAUTION!

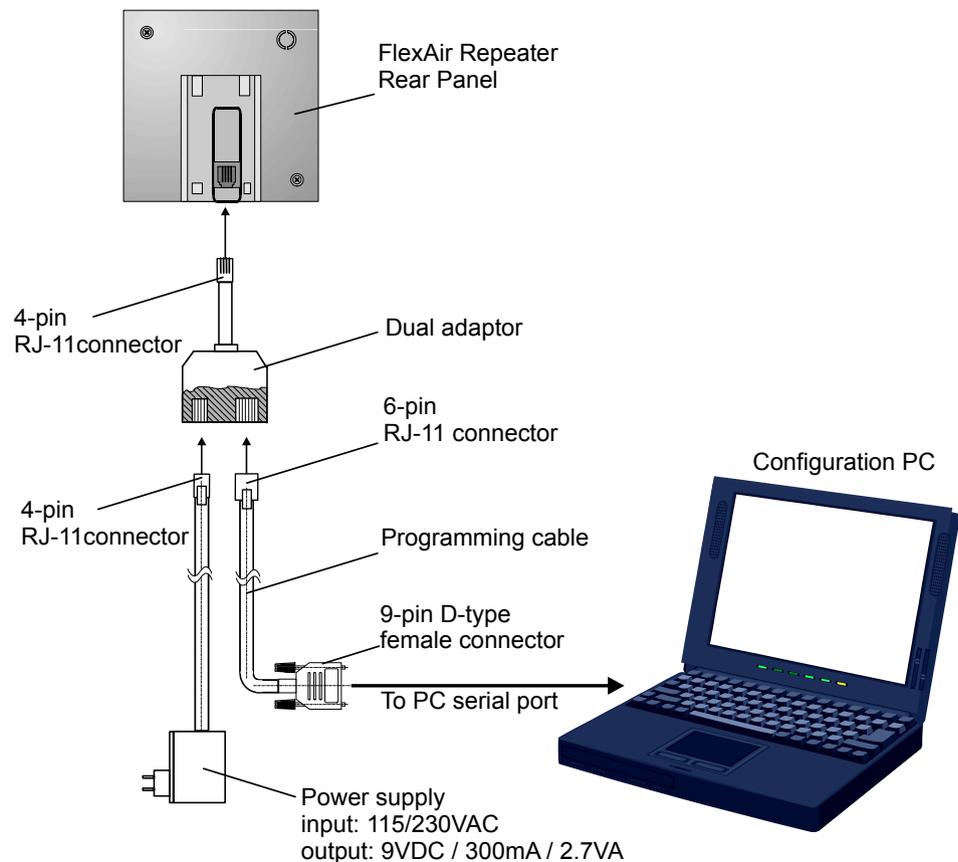
Do not connect any component to the rear panel of the repeater other than that supplied by the manufacturer. The manufacturer does not assume responsibility for damage caused to equipment due to non-standard connections.

4 Configuring the Repeater

The repeater programming kit (ordered separately by the customer) includes the dual adaptor and the 9-pin, D-type female connector.

1. Verify that the selected repeater location is within the cover range of an RBS or another repeater and is close to an AC power outlet.
2. Use the repeater programming kit to connect the repeater to PC and AC power outlet as displayed in *Figure 35*:
 - a. Insert the 4-pin RJ-11 connector of the dual adaptor into the mating jack on the rear panel of the repeater.
 - b. Insert the 6-pin RJ-11 connector of the programming cable into the mating jack of the dual adaptor.
 - c. Connect the 9-pin D-type female connector of the programming cable to the serial COM port of the PC.
 - d. Insert the 4-pin RJ-11 connector of the power supply cable into the mating jack of the dual adaptor.
 - e. Connect the power supply to an AC outlet.

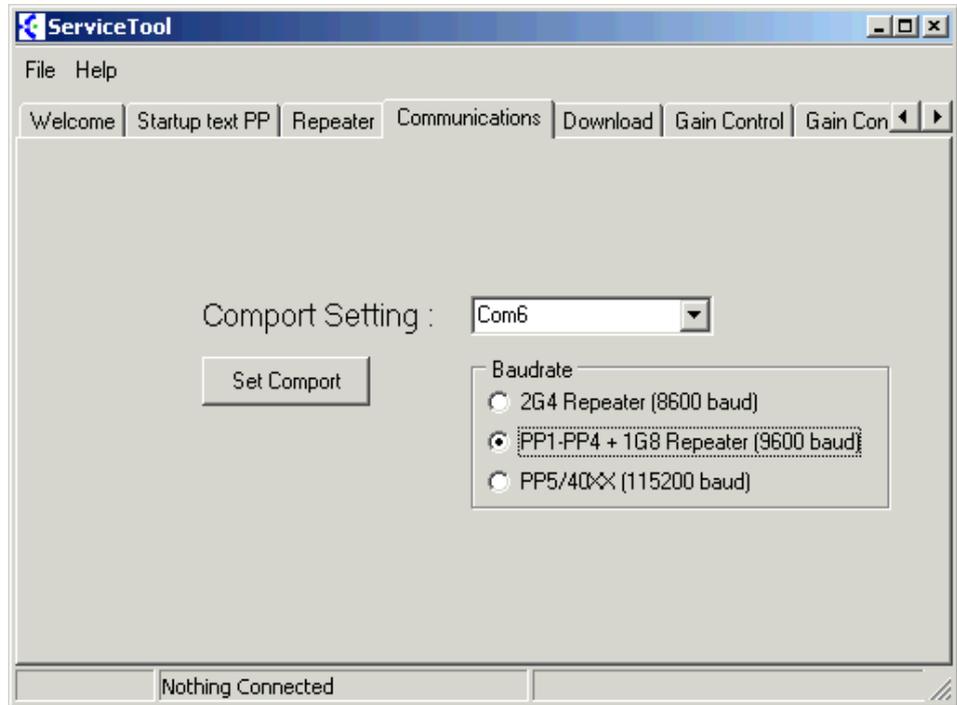
Figure 35 Repeater Configuration Connection



3. In any standard browser, in the address bar, type <http://www.kirktelecom.dk/>. The Kirk home page opens.
4. Click **Installersite**. The **Installersite** page opens.
5. Click **Software downloads**. The **Software downloads** page opens.
6. Click **KIRK tools**. The **Software downloads KIRK tools** page opens.
7. Click **Download** in the **KIRK tool Windows Program** row. The **File Download** dialog box opens.
8. Select the **Save this file to disk** options, and then click **OK**. The **Save As** dialog box opens with **Service Tool** with the version number displayed.
9. In the **Save in:** options box, select the location to save the **Service Tool** file to, and then click **Save**. The file is saved to the selected location.
10. Unzip **Service Tool X.x.zip** to the require location, and then open the Service Tool application. **Service Tool** opens.

11. Select the **Communications** tab. See [Figure 36](#).

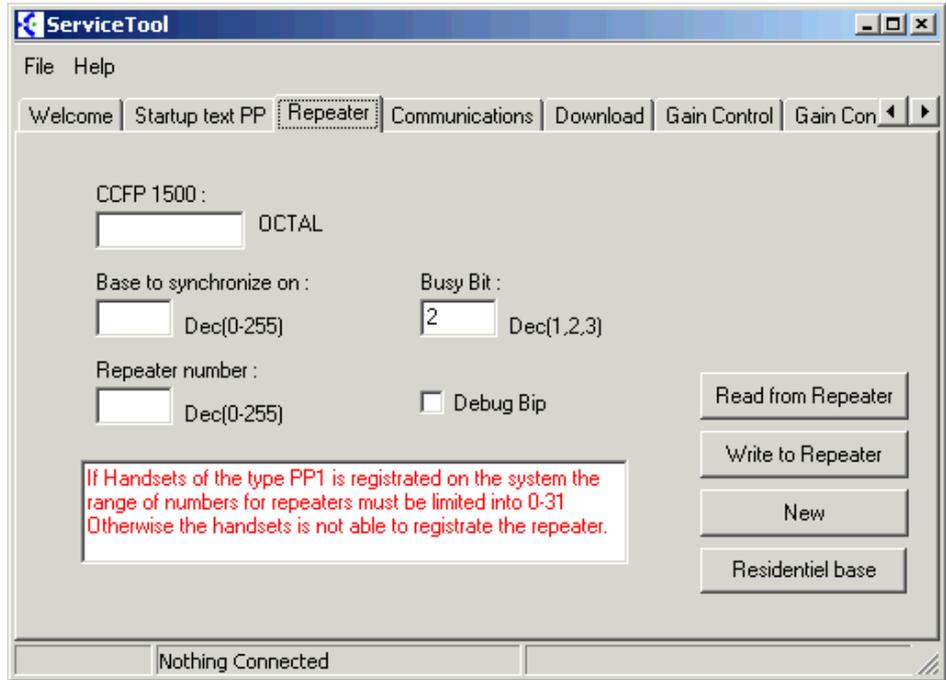
Figure 36 **Service Tool Communications Tab**



12. From the **Comport Setting** options box, select the required COM port. In the Baudrate pane, select the **PP1-PP4 + 1G8 Repeater (9600 baud)** option, and then click **Set Comport**. Communication is established between the PC and the Repeater.
13. Select the **Repeater** tab and configure the repeater settings as follows. See [Figure 37](#):
 - In the **CCFP 1500** text box, type the system ARI number (an octal number located on the master card label positioned on the printed side of the card).
 - In the **Base to synchronize on** text box, type the RBS unit or repeater RF number on which the repeater will synchronize. See [Table 19 - SKK Card and RBS Locations, on page 92](#).
 - In the **Repeater number** text box, type the unique RF number (a decimal number). Recommended practise: enter 255 for the first repeater and subtract a number for each additional repeater. For example, for the first repeater, enter 255. For the second repeater, enter 254, and so on.
 - In the **Busy Bit** text box, type the number of channels the repeater utilizes (a decimal number - up to two with handover, and up to three without handover).
 - Verify that the **Debug Bip** checkbox is not selected.

Click the **Write to Repeater** button. The repeater is now synchronized to the specific RBS.

Figure 37 **Service Tool**
Repeater Tab



5 Mounting the Repeater

The repeater is mounted in the same manner as the RBS with the exception that the cable used for an RBS is replaced by the power supply cable. For further information, see [page 41, RBS Indoor Installation](#) and [page 43, RBS Outdoor Installation](#).

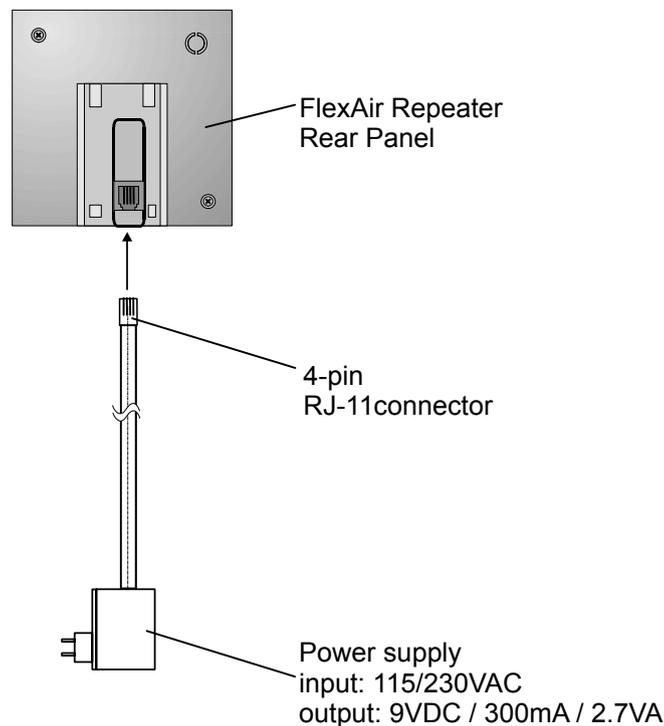
6 Powering the Repeater

The repeater is powered by a 9VDC/300mA power supply unit connected to a local AC outlet. This power supply is provided by the manufacturer with the repeater.

Connect the power supply as displayed in [Figure 38](#):

1. Insert the 4-pin RJ-11 connector of the power supply cable into its mating jack on the rear panel of the repeater.
2. Connect the power supply to an AC outlet. Verify that the repeater indicator illuminates continuously indicating that it is initialized.

Figure 38 Repeater Power Supply Connection



7 Repeater Post-Installation Tests

Recording the Installation Information

After completing the installation of the repeater units, record the location of each repeater. See [Table 20, on page 93](#).

Checking the Indicators

Verify that the repeater indicator is continuously on, indicating that the repeater is functional. See [page 54, Repeater Diagnostic Indicators](#).

7 SKK Card Configuration and Setup

The following section describes how to:

- Define the shelf (or cage) and slot that contains the master card ([on page 61](#))
- Define the number of cards in a cluster ([on page 63](#))
- How to execute the cable delay measurement ([on page 69](#))

1 Link Master Card - PI Programming

The Link Master Card parameter designates the SKK card that defines the DECT System ID for the whole FlexAir system. This is the first SKK card on the RS485 link, and is the only SKK card in the system that has no input link (its input connector is empty). See [Figure 11](#).

This card is used as the paging (i.e. search) destination of the FlexAir system. It manages the RS485 synchronization link between the SKK cards in a multi-card system.

To set the link master card:

1. In the PI, type *SFE*; the following appears:

```
(SFE)
0-TRUNK_CALLS_OUTGOING
1-TRUNK_CALLS_INCOMING
2-STATION_OPTIONS
3-INTERCEPT/INCOMPLETE
4-CALL_FORWARDING
5-CAMP_ON
6-HOTEL
7-MESSAGING
8-TONES
9-DIAGNOSTICS
10-ISDN
11-NETWORK
12-WIRELESS
```

2. Type *12*; the following appears:
choose mode

- 0 - UPDATE
- 1 - DISPLAY

3. Type *0*; the following appears:

Wireless

System ID# - 56

Number of clusters (0-8) - 2

Cluster #1 - Link master card: (Shelf,Slot) (0, 16)

Cluster #2 - Link master card: (Shelf,Slot) (4, 8)

The system ID # has no significance in the FlexAir system.

- 4. Type in the exact number of clusters from which your system is built.
- 5. For each cluster, type in the shelf and slot location of the SKK master card.
- 6. Press Enter; the Coral system has been updated to recognize the shelf and slot of the master cards.

2 Defining the Number of Cards per Cluster (Master card ONLY)

The number of cards “daisy-chained” within the cluster must be programmed into the master SKK card. This number is programmed in the master card *only*, using the SIO utility software. This procedure is performed on all master cards within the systems.

The RJ-45 *output* from the master card should be connected to the RJ-45 *input* connection on the next card in the sequence. See [page 27, SKK LINK Input/Output Wiring Connections](#).

CAUTION!

Each time there is a software upgrade, the master card is replaced, or the number of cards in the cluster is changed, this procedure must be performed. Performing this procedure will interrupt normal operation. No service will be available.



Verify that you have an SIO RS-232 9-pin cable and a PC with the latest version of the SIO (Serial Input Output) software installed. For cable connection and pin assignment see [page 30, SIO RS-232 Front Panel Programming Port](#). This cable is supplied by the manufacturer at specific customer request.

Verify that the latest version of the SIO software is installed on your PC.

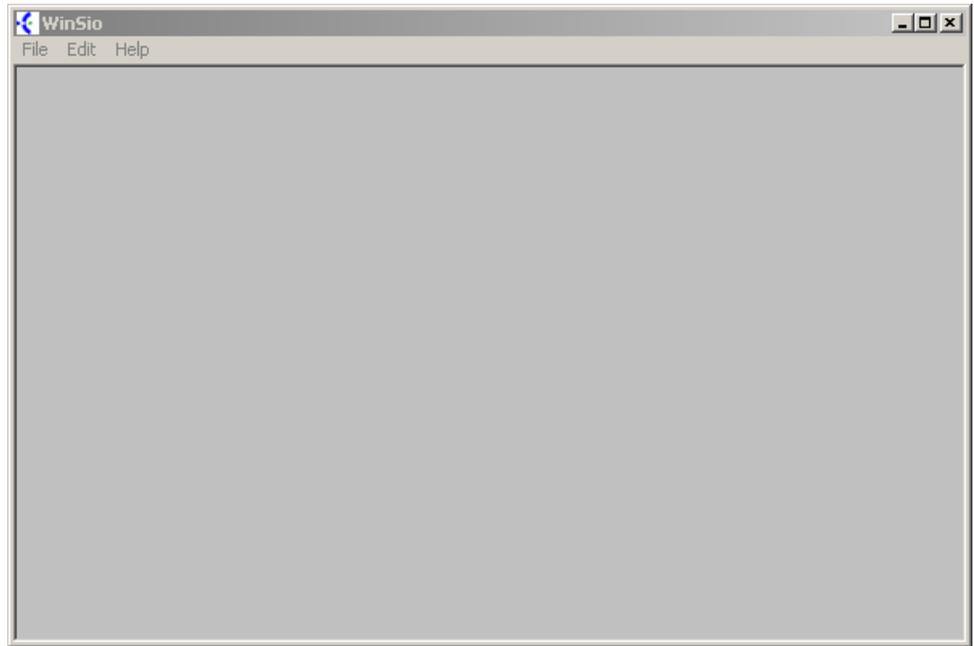
Use one of the following options to define the number of cards per cluster:

- [Using the WinSio Application on page 64](#) “RECOMMENDED”
- [Using the Command Prompt Window SIO Application on page 67](#)

Using the WinSio Application

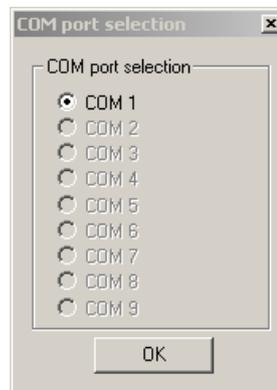
1. Verify that the SIO RS-232 cable is connected between the connector marked as SIO on the SKK master card front panel and the COM port on the laptop. The default port is COM1. See [page 30, SIO RS-232 Front Panel Programming Port](#).
2. To open the WinSio application, on the Desktop, double click the WinSio icon. The main **WinSio** window opens. See [Figure 39](#).

Figure 39 **WinSio Main Window**



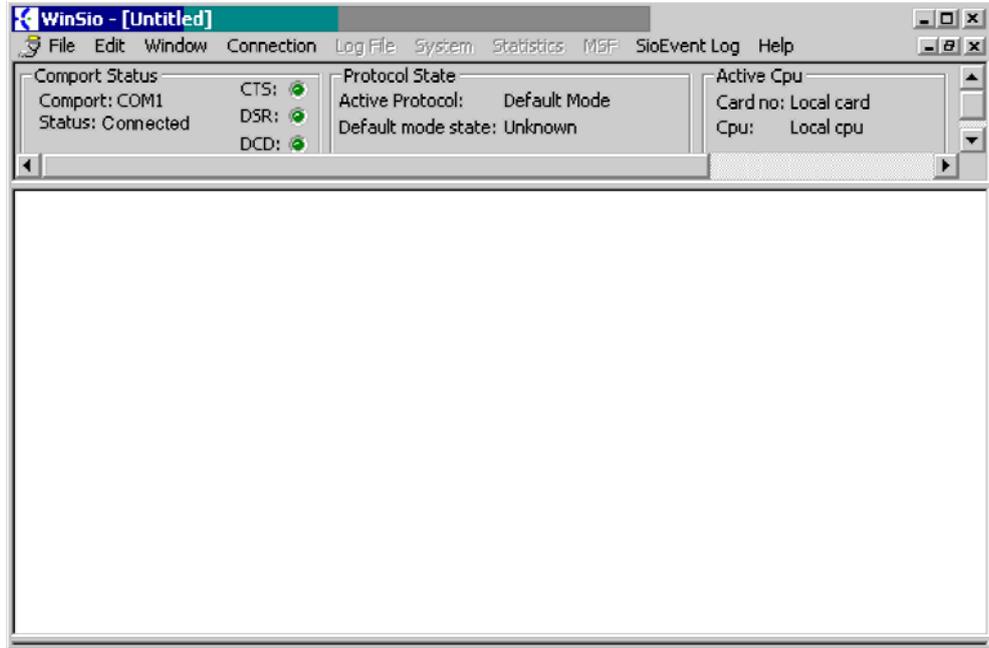
3. On the **File** menu, click **New**. The **COM port selection** dialog box opens.

Figure 40 **COM Port Selection Window**



4. Select the required **COM** port, and then click **OK**. The main **WinSio** window is enabled. See [Figure 41](#).

Figure 41 **Active WinSio Window**



5. On the **Connection** menu, click **Connect**. In the **Comport Status** pane, **Connected** displays next to **Status**.
6. On the **System** menu, select **MultiLinkControl** and then click **Set**. the **Dialog** box opens.

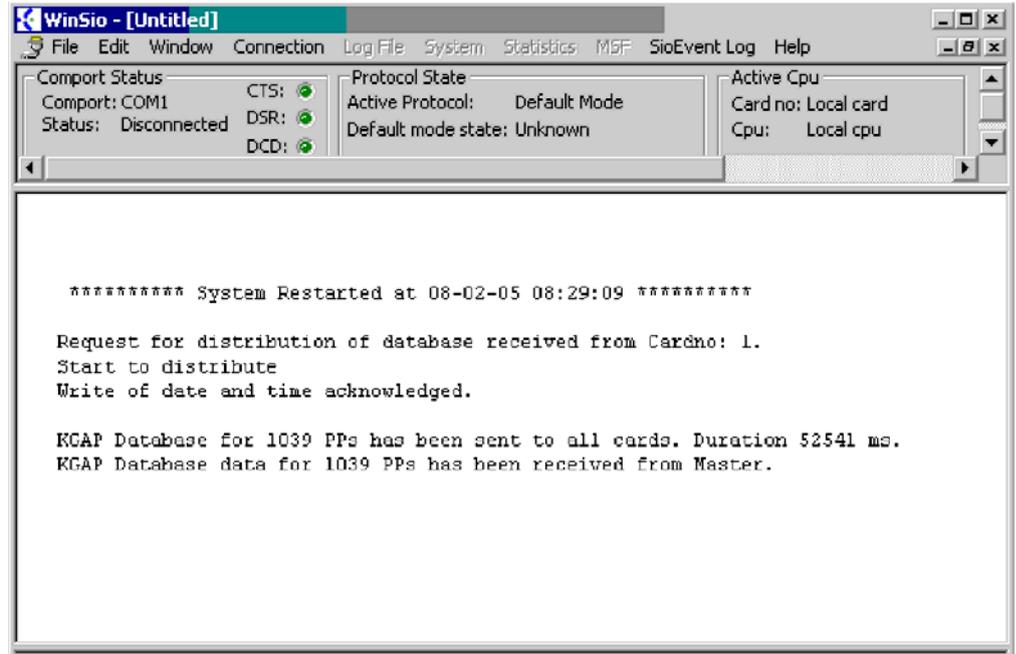
Figure 42 **Card Number Dialog Box**



7. From the **Last card in link** option box, select the total number of cards in the cluster (master and slave) to be configured.
For example, if there are five slave cards and one master card in the cluster, enter **6** in the **Last card in link** field.
8. Click **OK**. The **Dialog** box closes.

9. Verify that the following message is displayed in the main *WinSio* window (see [Figure 43](#)):

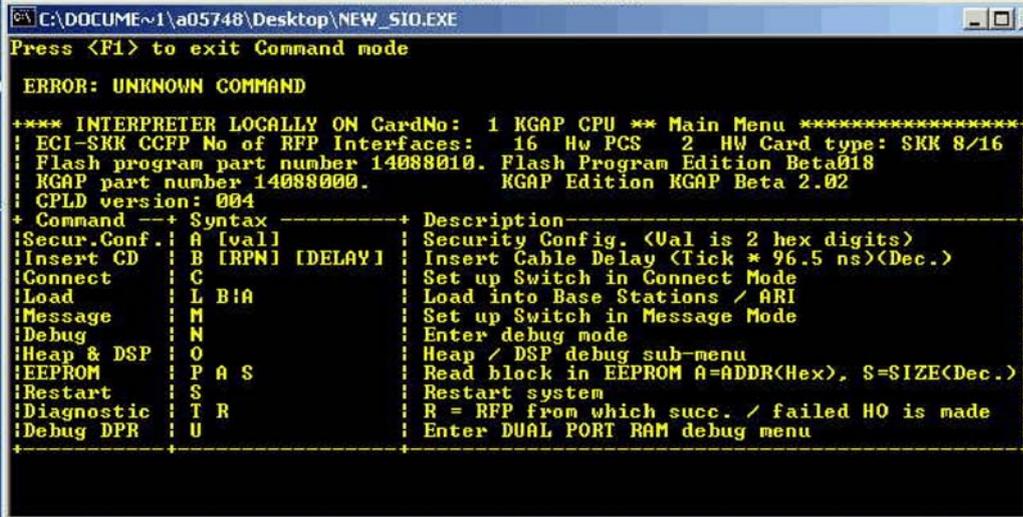
Figure 43 **Multilink**
Output



Using the Command Prompt Window SIO Application

1. Verify that the SIO RS-232 cable is connected between the connector marked as SIO on the SKK master card front panel and the COM port on the laptop. The default port is COM1. To change to COM2, activate the program with a specific note SIO.EXE/C2. See [page 30, SIO RS-232 Front Panel Programming Port](#).
2. Set the number of SKK cards using the SIO program, as follows:
 - a. On the keyboard press Alt+Home; the following window opens.

Figure 44 **Card Definition Via Program Interface**



```
C:\DOCUMENTS\1\05748\Desktop\NEW_SIO.EXE
Press <F1> to exit Command mode

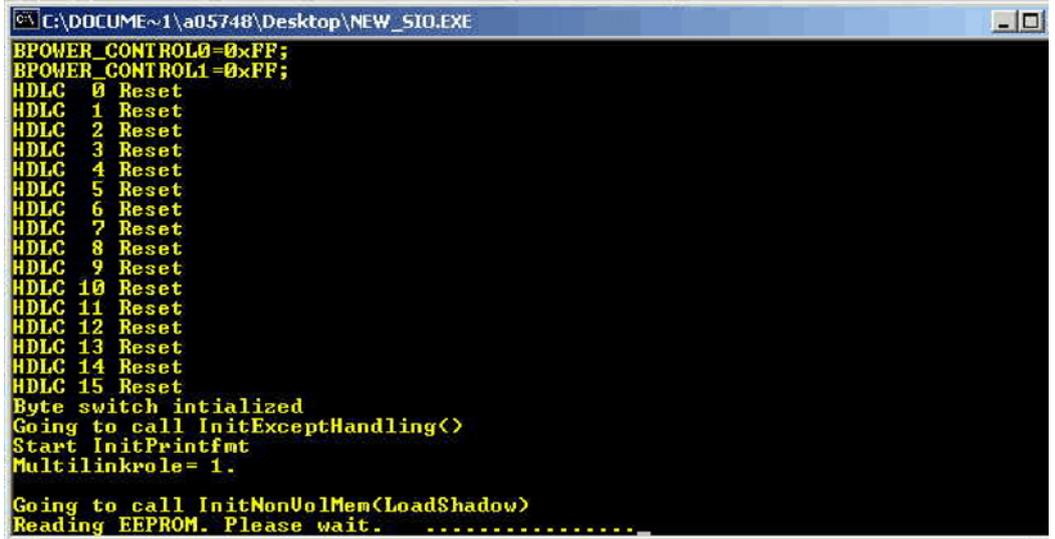
ERROR: UNKNOWN COMMAND

+*** INTERPRETER LOCALLY ON CardNo: 1 KGAP CPU ** Main Menu ****+
| EC1-SKK CCFP No of RFP Interfaces: 16 Hw PCS 2 Hw Card type: SKK 8/16
| Flash program part number 14088010. Flash Program Edition Beta018
| KGAP part number 14088000. KGAP Edition KGAP Beta 2.02
| CPLD version: 004
+-----+-----+-----+
| Command | Syntax | Description |
+-----+-----+-----+
| Secur.Conf. | A [val] | Security Config. (Val is 2 hex digits) |
| Insert CD | B [RPM] [DELAY] | Insert Cable Delay (Tick * 96.5 ns)(Dec.) |
| Connect | C | Set up Switch in Connect Mode |
| Load | L B!A | Load into Base Stations / ARI |
| Message | M | Set up Switch in Message Mode |
| Debug | N | Enter debug mode |
| Heap & DSP | O | Heap / DSP debug sub-menu |
| EEPROM | P A S | Read block in EEPROM A=ADDR(Hex), S=SIZE(Dec.) |
| Restart | S | Restart system |
| Diagnostic | T R | R = RFP from which succ. / failed HO is made |
| Debug DPR | U | Enter DUAL PORT RAM debug menu |
+-----+-----+-----+
```

- b. From the **Command** pane, select Heap & DSP: O and press Enter.
- c. In the command line, type **RS485LASTCARD 8** (if there are eight cards in the cluster) or **RS485LASTCARD 1** (if there is only one card in the cluster) and press Enter.

A message, **LASTCARD in RS485Link X** will be displayed, where X is the number of SKK cards in the cluster. For example, if there are five slave cards and one master card in the cluster, enter **6**.
- d. In the Command line, type Return and press Enter to return to the previous menu.
- e. Type **S** and press Enter at the command line to start the master card.
- f. To display the number of current configured cards, type **RS485LASTCARD** and then press Enter; the number of cards in the cluster is displayed.

Figure 45 Card Definition Via Program Interface



```
C:\DOCUME~1\A05748\Desktop\NEW_SIO.EXE
BPOWER_CONTROL0=0xFF;
BPOWER_CONTROL1=0xFF;
HDLC 0 Reset
HDLC 1 Reset
HDLC 2 Reset
HDLC 3 Reset
HDLC 4 Reset
HDLC 5 Reset
HDLC 6 Reset
HDLC 7 Reset
HDLC 8 Reset
HDLC 9 Reset
HDLC 10 Reset
HDLC 11 Reset
HDLC 12 Reset
HDLC 13 Reset
HDLC 14 Reset
HDLC 15 Reset
Byte switch intialized
Going to call InitExceptHandling()
Start InitPrintfmt
Multilinkrole= 1.
Going to call InitNonVolMem(LoadShadow)
Reading EEPROM. Please wait. ....
```

3 Cable Delay Measurement (for all SKK Cards)

This procedure is performed at the first system installation and every time an RBS unit is relocated, or new cards and/or software is installed. The following procedure is performed for every card installed in the Coral system.

CAUTION!

Performing this procedure will interrupt normal system operation. No service will be available.



NOTE:

Verify that you have an SIO RS-232 9-pin cable and a PC with the latest version of the SIO (Serial Input Output) software installed. For cable connection and pin assignment see [page 30, SIO RS-232 Front Panel Programming Port](#). This cable is supplied by the manufacturer at specific customer request.

Verify that the latest version of the SIO software is installed on your PC.

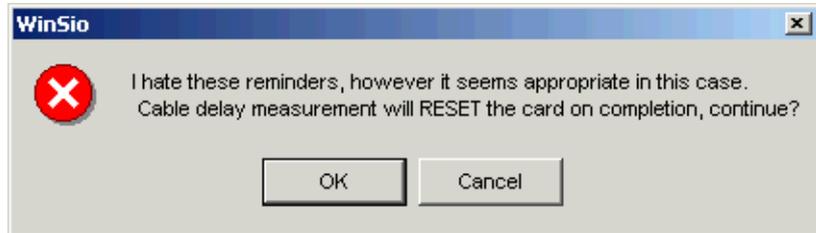
Use one of the following options to perform this procedure:

- *Using the WinSio Application (on page 70) “RECOMMENDED”*
- *Using the Command Prompt Window SIO application (on page 71)*

Using the WinSio Application

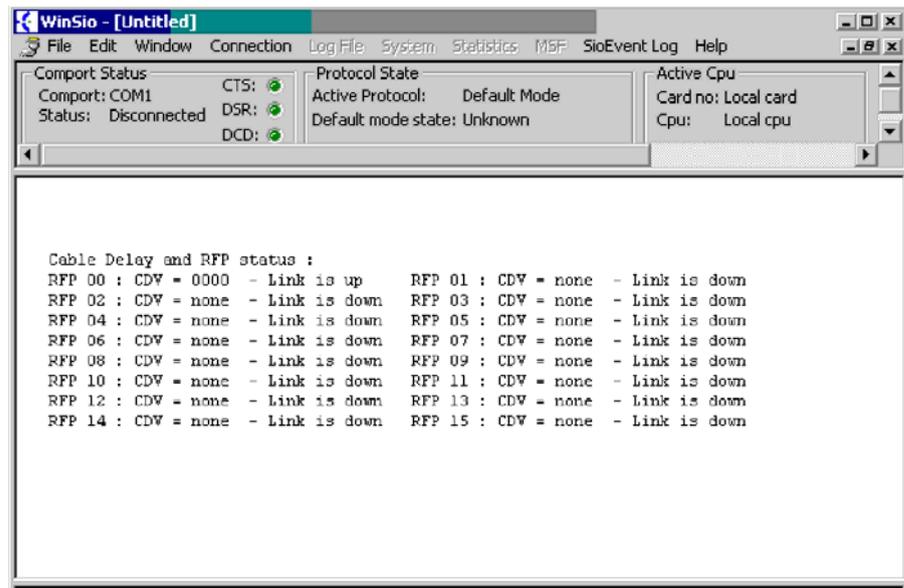
1. Perform [Step 1 on page 64](#) through [Step 5 on page 65](#).
2. On the **System** menu, select **Cable Delay**, and then click **Measure**. The Windows-based SIO application measures the lines to the RBS delay according to the specific length and other parameters. The following message displays.

Figure 46 WinSio Reset Message



3. Click **OK**; the application performs Cable Delay Measurement and resets the SKK card. The following output appears on the main WinSio screen. See [Figure 47](#).
4. On the **System** menu, select **Cable Delay**, and then click **Read**. The cable **Delay** and **RFP** (i.e. RBS) status report displays.

Figure 47 Cable Delay Measurement Output



NOTE:

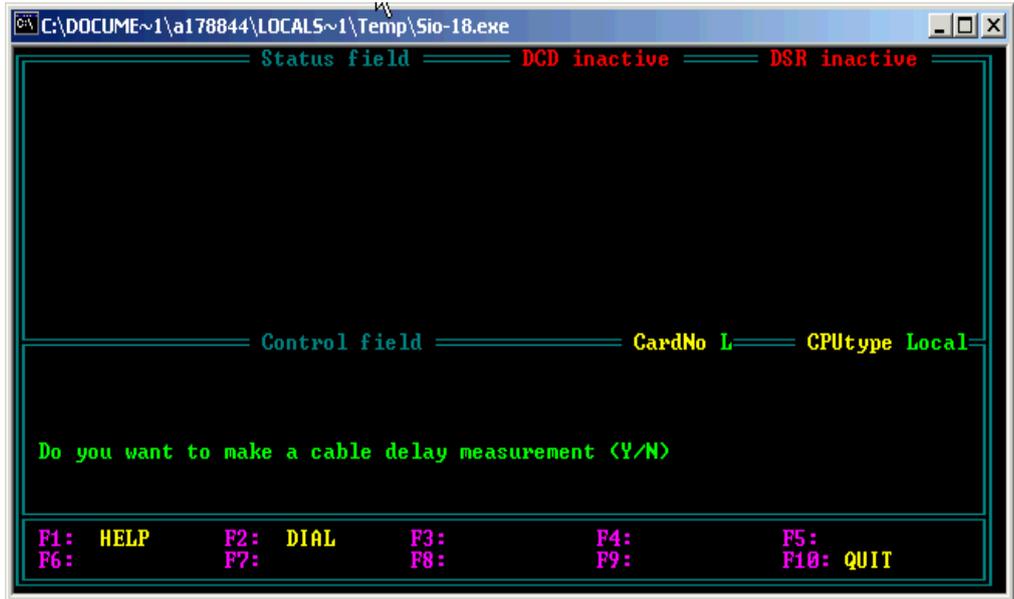
This procedure takes up to 20 minutes depending on the number of RBS units connected to a card. You do not need to wait for the process to complete before connecting to the next card.

5. Repeat this procedure for all SKK cards.
6. After performing cable measurement for all the cards, reset the entire FlexAir system by removing and reinserting all SKK cards.

Using the Command Prompt Window SIO application

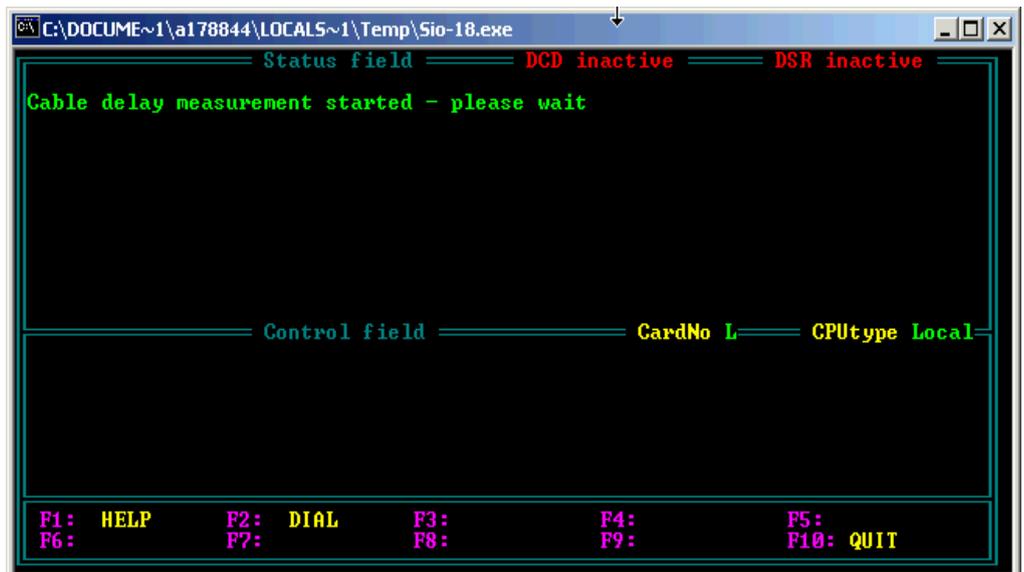
1. Press Ctrl + F7; the following prompt appears:
Do you want to make a cable delay measurement (Y/N)

Figure 48 Cable Delay Measurement Via the Program Interface



2. Type **Y**; the SIO application measures the lines to the RBS delay according to the specific length and other parameters.

Figure 49 Cable Delay Measurement Via the Program Interface





NOTE:

This procedure takes up to 20 minutes to complete depending on the number of RBS units installed in the system. You do not need to wait for the process to complete before connecting the laptop to the next card. Repeat this procedure for all cards in the system.

3. After performing cable measurement for all the cards, reset the entire FlexAir system by removing and reinserting all SKK cards.

Cable Delay Measurement from the Master Card to the Entire FlexAir System



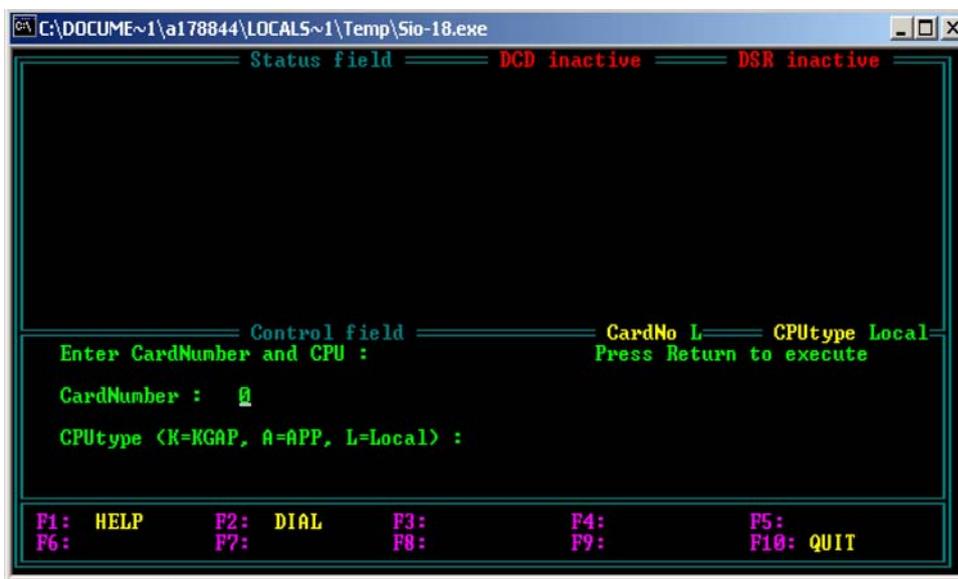
NOTE:

You can perform the Cable Delay Measurement procedure simultaneously from the master SKK card on all other cards in the FlexAir cluster by setting the CardNum parameter to 0 (zero).

To perform Cable Delay Measurement on all cards simultaneously, do one of the following:

1. Using the WinSio application, perform [Step 1 on page 67](#) through [Step on page 70](#).
2. Using the Command Prompt Window Sio Application, in the main window of the SIO application:
 - a. On the keyboard, press F7. The following prompt is displayed:
Enter CardNumber and CPU:Press Return to Execute
CardNumber: 0
CPUtype <K=KGAP, A=APP, L=Local>

Figure 50 Cable Delay Measurement for the Entire FlexAir System via Master Card



- b. Perform [Step 1 on page 71](#) through [Step 3 on page 72](#).

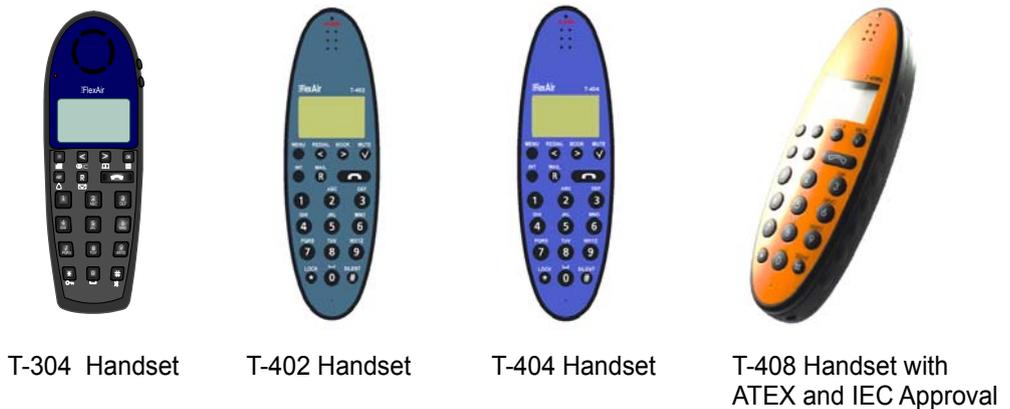
8 Wireless Handset Installation

1 Unpacking

1. Inspect the shipping carton for evidence of physical damage or mishandling prior to opening.
2. Inspect all parts for damage.
3. Report any damage to the carrier immediately.
4. If it is necessary to make a damage claim for the carrier, do not move the shipping carton until it has been examined by a representative of the carrier.
5. Dispose of empty cartons in accord with local regulations.

Figure 51 displays the the different handsets supplied with the FlexAir system. Only one type of handset should be ordered.

Figure 51 FlexAir Handset Units



2 Handset Chargers

Each handset is equipped with one of the following compact desktop chargers:

- **Normal charger**, supplied with the T-304 unit at specific customer request performs charging, only. See [Figure 52](#).
- **Charger with programmer**, supplied with all units (T- 304, T-402, T-404, and T-408) at specific customer request, can charge and program the handset at different times. See [Figure 52](#).
- **Charger with docking station**, supplied with the T-304 unit at specific customer request, can both charge and program the handset simultaneously. See [Figure 53](#).

Figure 52 **Battery
Charger and AC Adaptor**

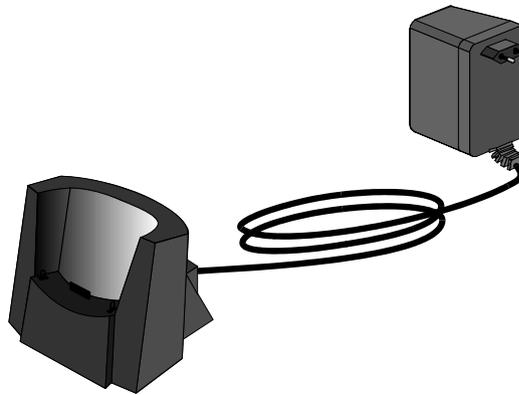


Figure 53 **Battery
Docking Station and AC
Adaptor**

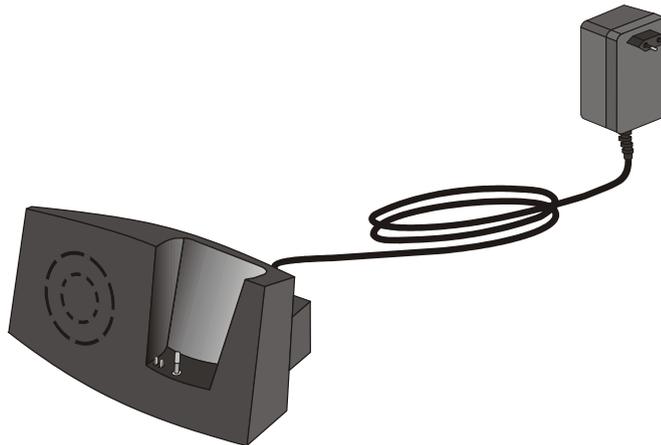


Table 15 FlexAir Handset Charger and Programming Accessories

Handset Accessories		T- 304	T- 402	T- 404	T- 408
One of the following:	Charger	•			
	Charger w/programmer base	•	•	•	•
	Docking station	•			
Power supply unit		•	•	•	•
Programming cable		•	•	•	•

The handset charger is a compact desktop unit designed to charge and automatically maintain the correct battery charge levels and voltage. The charger performs battery diagnostic functions. It can also switch between charge and discharge functions when required in order to prolong battery life. The charger is powered by an AC (115VAC or 230VAC) adaptor that supplies the 9VDC at 230mA charger requirement. In addition, chargers with programmers and docking stations enable the subscriber to download and upload information from the handset. For more information, see [the manufacturer's documentation](#).

Charging the handsets

Place the handset in the charger; the handset screen displays a progress indicator bar that shows how fully charged the battery is.



NOTE:

Before initial use, the handset must be charged for approximately 3½ hours prior to use.

The battery capacity progress indicator can also be displayed when the handset is not resting in the charger. To display the battery capacity progress indicator:

1. Press the **MENU** button on the handset and then press the < or > buttons until MENU BATTERY appears.
2. Press the **MUTE** button; BATTERY CAPACITY appears on the screen, indicating how full the battery is.

3 Handset Subscription

Handset subscription is performed twice: once to its designated cluster or clusters, and once to the Coral system. Subscription must be performed on clusters before it can be performed on the Coral system.

Handset Subscription to a Cluster

This process describes how to subscribe a handset within a cluster. Clusters enable customer separation by supporting separate wireless systems within the same Coral system. However, although clusters are separate wireless systems, handsets can be subscribed to more than one cluster. To subscribe a handset to a cluster, it must be within the coverage range of each cluster, and it must be subscribed to each cluster individually. In other words, the handset must be moved from location to location in order to subscribe it to different clusters. The handset is subscribed to each cluster using the handset buttons and screen displays. The buttons for each handset may differ from handset to handset. For further information, see the [the manufacturer's documentation](#).

Clusters do not support handover, but do support roaming after a delay of 30 seconds for handsets that are subscribed to both clusters. In other words, a call will be terminated if the subscriber moves from one cluster area to another, but the handset will synchronize onto the new RBS unit, enabling the subscriber to make another call.

1. Verify that you are within the RF coverage area of the designated cluster.
2. On the handset, press the  or the  icon to turn the handset ON.
3. Press the **MENU** button and then press the < or > button until MENU LOGIN appears, and then press the **MUTE** button; MENU SELECT LOGIN appears.
4. Press the < or > button until SUBSCRIPTION CREATE appears on the screen, and then press the mute button; SUBSCRIPTION SERCH ID: appears on the handset screen along with the cluster identification number.
5. Press the **MUTE** button; the following appears on the handset screen:
CREATE
SYSTEM 01
AC: _____
6. Press the **MUTE** button; after several seconds, the handset beeps, and the screen displays your telephone number along with the  icon, indicating that subscription to the cluster has been successful.
7. Repeat [Step 1](#) through [Step 6](#) to subscribe to all relevant clusters within the system.



NOTE:

If any problems arise during subscription, see [page 89, Troubleshooting](#).

Handset Subscription within the Coral System

Subscription within the Coral system is performed after subscription to the cluster.

The Identification Number of the Handset - Electronic Serial Number (ESN)

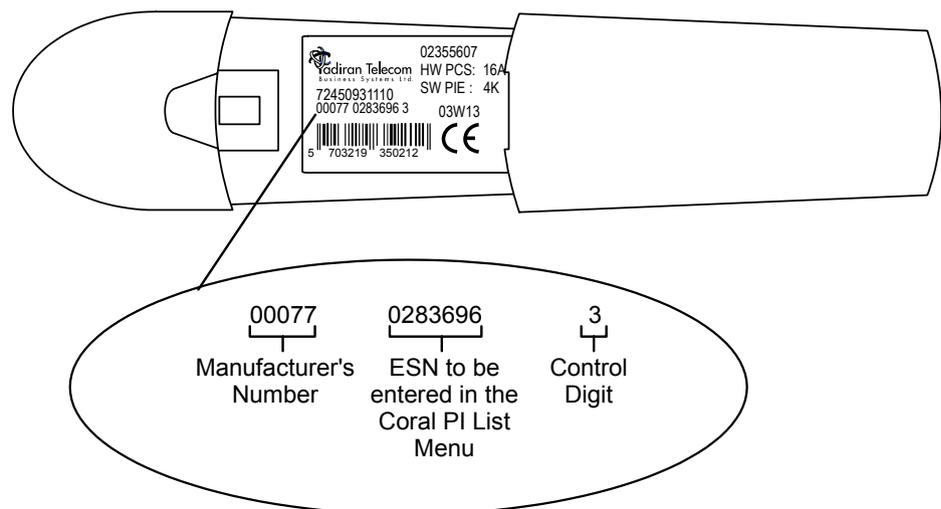
Each wireless handset in a Coral FlexAir Wireless system must be programmed with the ESN identification parameter before it can operate. This parameter must be registered in the Coral system PI database. See [page 82, Wireless Stations \(Route: WST\)](#).

ESN numbers are a unique fingerprint of each wireless handset. The ESN is programmed into the handset during the manufacturing process and can not be changed by field personnel. The Coral system does not provide any service to a handset whose ESN number is not registered in the PI database. The ESN number of each handset must be programmed into the PI.

Retrieving the ESN Number of the Handset

To enable service to the handset, the ESN must be programmed into the Coral system database via the PI. The ESN of each handset is printed on the label on its back, under the battery. See [Figure 54](#).

Figure 54 Rear Panel of Handset Unit



Displaying the ESN Number

If the ESN number is not available, you can display it by pressing *99984* and then OK; the ESN number appears on the handset display.

Recording the Installation Information

After completing the subscription of the handset units, record the ESN and check the relevant clusters of each handset. See [Table 17, on page 85](#).

4 Supported Handset Units

It is strongly recommended that the FlexAir Kirk T-304 handset includes a software version 4I or higher (preferably 4N) and that the T-402 and T-404 include software version 3G or higher.

9 PI Database Programming For Wireless Systems

1 Overview

Installing the FlexAir System in the Coral system has a considerable impact on the system database. Refer to the *Program Interface Reference Manual, Version 14.66* and later for more information. Use the Coral Program Interface (PI) to verify that each of the parameters detailed below is set correctly.

Programming forms for planning the SKK cards/RBS and for planning the wireless handsets are provided in [Table 17](#) through [Table 20](#).

2 PI Setting Required For Wireless System Configuration

PI database programming for the FlexAIR wireless station involves the following:

- Authorizing the FlexAir System (Route: FEAT, 1)
- Specifying the potential number of wireless handsets (ports) in the system, System Sizes (Route: SIZ)
- Defining the number of clusters in the system (Route: SFE, 12)
- Specifying the dial numbers and related index numbers of the wireless ports in the system, (Route: NPL, 0) WIRELESS [40]. Fill in the dial numbers in [Table 17 on page 85](#).
- Registering the ESN of each wireless handset in the FlexAir system (Route: WST). Fill in the ESN numbers in [Table 17 on page 85](#).
- Specifying the port names (full and short) of each wireless handset (Route: PLIS, 1). Record the names in [Table 17 on page 85](#).
- Configure each wireless handset, with the Keyset Definition parameter (Route: KEY).
- Program buttons (Route: PROG) with buttons #0 through #7.
- Preference (Route: PDB, 2,1)
- Class Of Service configuration (Route: COS, 0) and Tennant Class Of Service configuration (COS, 1)

When all these settings are made, all handsets are recognized and the system is ready to operate.

3 Configuring the PI

Feature Authorization (Route: FEAT, 1)

The following two authorization items are relevant to the FlexAir system and should be checked:

FlexAir SKK

This authorization item must be set to YES to allow SKK cards in the system. If it is not set as desired, contact your dealer.

FlexAir SMS (Short Message Service)

This authorization item must be set to YES to enable receipt of SMS messages within the system either from handset to handset, or from application to handset.

System Sizes (Route: SIZ)

The system database allocates resources to manage the operation of a wireless station based on the value entered in the WIRELESS field.

The number of wireless handsets is not directly related to the number of SKK cards or RBS units in the system. See [Chapter 2](#) for more details.

If insufficient resources have been allocated in sizes, the entry must be increased or the handsets will not operate. See [Chapter 4, Size Definition](#) of the *Program Interface Reference Manual*, for more information.

STATIONS:
Maximum stations

WIRELESS

Set this entry to accommodate the total number of wireless handset expected to be used in your system.

CAUTION!

Modification of the System Sizes initializes the entire system database in Coral system and requires the re-entry of all database information after Sizes have been modified.

Card List (Route: CLIS)

Verify that the SKK card is properly identified and initialized in the Card List branch. See [Chapter 6](#) in the *Program Interface Reference Manual* for details.

Enter the card location information in [Table 19 on page 92](#).

P_TYPE

The card should identify itself as one of the following:

8SKK 8SKK/8SKKipx slave or master cards

16SKK 16SKK slave or master cards

The PI displays the two different configurations (master or slave) for each card, as follows:

- **8SKK/M04.** This signifies that the card has eight base stations per SKK card, is a master card, and includes four channels per RBS.
- **8SKK/S04.** This signifies that the card has eight base stations per SKK card, is a slave card, and includes four channels per RBS.
- **16SKK/M04.** This signifies that the card has 16 base stations per SKK card, is a master card, and includes four channels per RBS.
- **16SKK/S04.** This signifies that the card has 16 base stations per SKK card, is a slave card, and includes four channels per RBS.

STATUS

One of the following messages may be displayed:

Table 16 Card Status Messages

<i>Card Status*</i>	<i>Meaning</i>
ACTIVE	Indicates that the card is installed properly and is ready to function.
NO_RESOURCES	Indicates one of the following: <ul style="list-style-type: none"> ■ System Sizes are insufficient to support the card. The entry must be increased. See System Sizes (Route: SIZ) on page 80. ■ There are more than 256 RBS units in the Coral system. The system cannot support this additional card. Verify that the number of RBS units are within this limit.
NO_AUTHORIZED	Indicates that there is no authorization to use wireless interface cards in the system. See Feature Authorization (Route: FEAT, 1) on page 80 OR Contact your dealer.

*If the card status is different than **Active**, perform the steps listed in [Table 16](#).



NOTE:

The card identifies itself as a shared service card although I/O connections are available.

KeySet Definition (Route: KEY)

SMS

The SMS item must be set to Yes for using the SMS feature in the handset.

Numbering Plan (Route: NPL, 0)

In the Pattern Numbering Plan, WIRELESS [40] field, each portable station is assigned a dial number; the dial number should be entered in [Table 17 on page 85](#). For more information see *Chapter 5* in the *Program Interface Reference Manual*.

Wireless Stations (Route: WST)

Use the WST branch to enter the ESN of each wireless handset used in the system into the Coral PI database.

Each handset in the system must be identified in the system by its ESN or service will not be enabled for it. Failure to enter the proper ESN into the Coral's Portable Unit list results in failure of all call attempts to and from the handset.

The ESN numbers can be entered in the PI by designating the index numbers, (*Route: WST,0*) or by dial numbers allocated to the wireless units (*Route:WST,1*).

Index Access (Route: WST, 0)

To enter the ESN by accessing index numbers, proceed as follows:

From / To Index

Enter the range of wireless station index numbers. FROM indicates the lowest index number. TO indicates the highest index number. Use *Route NPL,0,5,40* to identify the index numbers associated with the wireless units.

DIAL # Display Only

The dial number for the wireless handset associated with the index number above is displayed.

ESN Code

Enter the ESN code of the wireless handset defined with the above dial number. To find out the ESN code for a specific wireless handset, refer to [Chapter 8](#).

Add the information to [Table 17 on page 85](#).

Dial Numbers Access (Route: WST,1)

To enter the ESN by accessing dial numbers, proceed as follows:

From / To Dial

Enter the range of wireless station dial numbers. **From** indicates the lowest dial number. **To** indicates the highest dial number. Use *NPL,0,5,40* to identify the wireless dial numbers.

Index

The dial number for the wireless handset associated with the index number above is displayed.

ESN Code

Enter the ESN code of the wireless handset defined with the above dial number. To find out the ESN code for a specific wireless handset, refer to [Chapter 8](#).

Add the information to [Table 17 on page 85](#).

Button Programming (Route: PROG)

Use this branch to define the operation of each handset dial button #1 to #8. The equivalent button index# are #0 through #7. They can be defined as any Coral feature keys or destination numbers for transfers.

Enter *N* for non-programmable via the telephone. Program the handset dial button #7 for the SMS Alarm address.

Port List (Route: PLIS, 1)

Use this branch to assign a name for each port. Each station may be assigned two port names. Up to five characters may be entered in the short field and up to 16 in the full field. Record the assigned names in [Table 17](#).

Number of Clusters (Route: SFE, 12)

Defines the number of clusters in the FlexAir system. Up to eight clusters may be defined per system (n =1-8).

Tones (Route: SFE, 8)

FlexAir Search Tone

Defines a search tone to be sounded for callers to a FlexAir handset.

Enter *T* for a tick tone.

Enter *S* for silence (no tone).

Other Settings

The wireless handsets can be assigned with the various PI parameters that apply to any port in the Coral system. Therefore, the following entries may be relevant:

- **Class Of Service (Route: COS, 0)** Use this branch to determine calling and feature privileges, to which each wireless station is assigned.
- **Keyset Definition (Route: KEY)** Use this branch to define an operating profile for each wireless station.

Table 17 Form for Handset Programming

Index	Wireless Stations Route: (WST)	Numbering Plan Route: (NPL,0) [40]	Port List Route: (PLIS,1)		Handset Subscription to Clusters								
	ESN Code	Default Dial Number Starts from 5700	Short Name up to 5 ch.	Full Name up to 16 ch.	1	2	3	4	5	6	7	8	
00													
01													
02													
03													
04													
05													
06													
07													
08													
09													
10													
11													
12													
13													
14													
15													
16													
17													
18													
19													

10 Installation Tests for Wireless Systems

1 Indicator Verification

After installing the FlexAir system, verify, on the SKK cards, that:

- The system diagnostic indicator is off
- The two green CPU indicators are flashing, AND
- The indicators corresponding to the active RBS units are green.



NOTE:

After SKK card installation, it can take up to 15 minutes for its red RBS indicator to light continuously and for its DIP switch indicators to light green.

2 Handset and RBS Reception Measurements

RSSI (Remote Single Strength Indicator) defines the reception of the handset.

Q (Quality) defines the reception of the RBS. See [Table 18](#) for further details.

Table 18 **Handset and RBS Reception Measurement**

Measurement	Description	Range
RSSI	Reception quality of handset. 100 is the best possible reception. 50-55 usually necessitates handover.	0-100
Q	Reception quality of RBS. 64 is the best possible reception.	0-64

1. To obtain RSSI & Q value, in the handset, key in the sequence *99989* and then press the **MUTE** button; the following information is displayed:

Figure 55 **RSSI and Q Measurements**

```
RPN: 06 11 05      Alternate RBS
RSS: 87 80 72      Corresponding RSSI
0E 64 95 4AB      Current RBS, corresponding RSSI, and handset Q
```

2. Exit RSSI mode by pressing <.

NOTES:

11 Troubleshooting Instructions

1 Solving Problems in Wireless Systems

The FlexAir Wireless System provides alarm indications for the wireless components of the Coral system on the service terminal (PI) as well as any other keyset console (FlexSet, FlexSet-IP, etc.) in the system. The Coral system continuously monitors and reports alarms for the following FlexAir Wireless components:

- SKK cards
- RBS units
- The SKK LINK connection between Master and Slave cards

Alarm messages and indications of the wireless system are identical to those of the other Coral subsystems.

This section describes wireless troubleshooting procedures only. It is divided between SKK card problems, RBS problems and Handset problems. However, when one component is faulty, it is important to check the other parts of the system as well.

Following is a summary of faults that may be encountered during a FlexAir Wireless system installation and the appropriate corrective actions. It is assumed that all other parts of the Coral system are in order and that the user is familiar with the standard Coral troubleshooting procedures.

2 FlexAir Device Indicator List

For a complete list of FlexAir indicators and messages, see the following:

- [Table 5 - SKK Front Panel Card Indicator Status on page 21](#)
- [Table 12 - RBS Red Indicator Status on page 40](#)
- [Table 14 - Repeater Red Indicator Status on page 54](#)
- [Table 16 - Card Status Messages on page 81](#)

3 Alarms

The following alarms are displayed in the PI interface.

Diagnostic Alarms (Route: ROOT, 1, 1)

- Problems with the RS485 link are displayed on screen as **RS485 Communication**.
- The following pop up alarm message appears if there is a problem with the RBS unit: **Card Subunit Alarm**.
****card subunit fault** 28 Oct 4 8:37 am**
SKW SHELF #0 SLOT #16 CKT #15
- The following display will appear in the active alarm menu and will remain until cleared by a technician after an RBS fault.
CARD SUBUNIT
1) SKW shelf 0 slot 16 CKT 15
DIAL NUM __28/10/04 08:37
error type: INTERNAL DIAGNOSTIC OH"



NOTE:

The CKT parameter, which indicates to the relevant RBS, is numbered here with numbers 1 to 16, corresponding to 0-15 on the SKK card front panel.

For more information, see the *Program Interface (PI) Reference Manual, Chapter 22*.

12 Post-Installation Checklists

This chapter includes all checklists to be completed upon installation of Coral FlexAir equipment. Prior to filling out the checklists described in this chapter, verify that all SKK cards, RBS units, and repeaters have been installed. See [Chapter 3, SKK Wireless Station Interface Card](#), [Chapter 4, RBS Radio Base Station](#), and [Chapter 6, FlexAir Repeaters](#).

SKK and RBS Locations

The SKK and RBS Locations checklist ([Table 19](#)) displays all information relating to the RBS and SKK cards to which they are connected. Each column in [Table 19](#) refers to a specific SKK card and the RBS units connected to it. Record the following information:

1. Record the cluster sequential number (from 1 to 8) in the Subject row.
2. Record the cluster system ID number in the Subject row. The ID number is an 11-digit number that appears on a label on the master SKK card.
3. In the Card Type row, check the card type to which the corresponding RBS units are connected: either 8SKK, 16SKK, or 8SKKipx for every card installed in the cluster.
4. In the (Shelf, Slot) row, record the physical location (shelf and slot) of each SKK card within the Coral system.
5. In the following RBS rows, record:
 - a. The sequential RF number of the RBS unit (from 0 up to a maximum possible of 255).
 - b. The physical location of each RBS unit (for example, first floor - corridor).

Repeater Locations

The number of repeaters per RBS unit is unlimited. Up to three repeaters may be added to each repeater. See [Figure 32](#). The Repeater Locations checklist ([Table 20](#)) displays the location and sequential RF number of all repeaters and the RBS units to which they are synchronized. Record the following information:

1. In the RBS column, record the sequential RF number and location of the RBS units that include a repeater.
2. In the Repeater columns, record the sequential RF number and location of the repeaters corresponding to the RBS units.

Table 19 SKK Card and RBS Locations

Subject	Cluster# (1-8): _____								
	System ID#: _____								
	1-Master	2-Slave	3-Slave	4-Slave	5-Slave	6-Slave	7-Slave	8-Slave	
Card Type	<input type="checkbox"/> 8SKKipx <input type="checkbox"/> 8SKK <input type="checkbox"/> 16SKK								
(Shelf,Slot)	(,)	(,)	(,)	(,)	(,)	(,)	(,)	(,)	
RBS# 0	RF#0	RF#							
RBS# 1	RF#1	RF#							
RBS# 2	RF#2	RF#							
RBS# 3	RF#3	RF#							
RBS# 4	RF#4	RF#							
RBS# 5	RF#5	RF#							
RBS# 6	RF#6	RF#							
RBS# 7	RF#7	RF#							
RBS# 8	RF#								
RBS# 9	RF#								
RBS# 10	RF#								
RBS# 11	RF#								
RBS# 12	RF#								
RBS# 13	RF#								
RBS# 14	RF#								
RBS# 15	RF#								



NOTE:

This table can be duplicated for multi clusters.

Example of Completed Checklists

The following example displays a typical customer's site, with facilities spread out over three buildings. See [Figure 56](#). Table

Figure 56 Map of Typical Customer Site

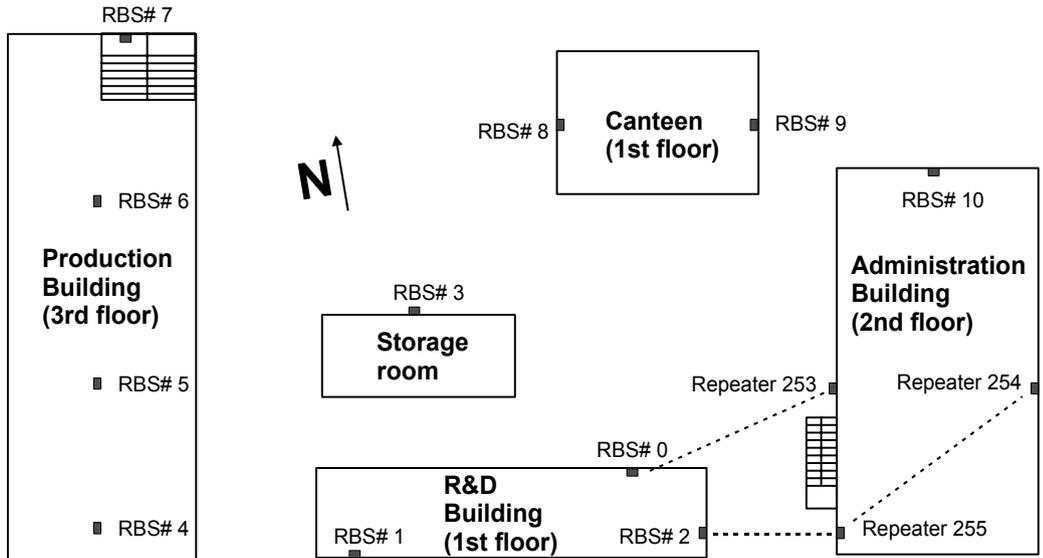


Figure 57 FlexAir Card Placement in Coral System

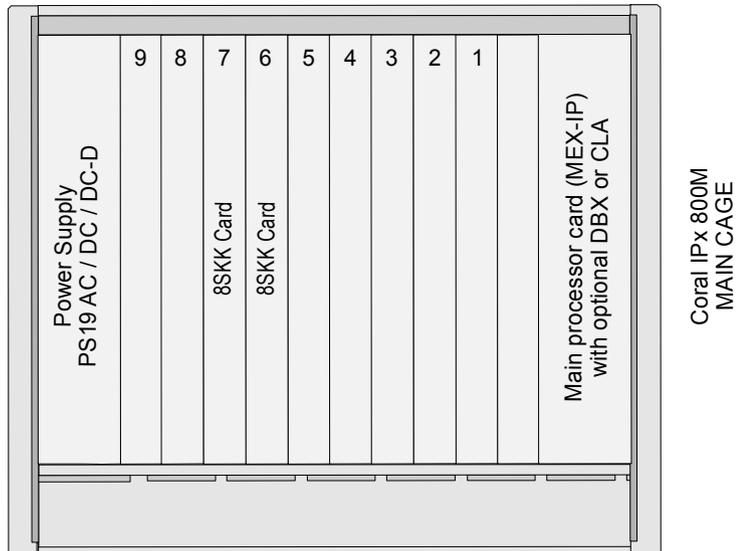


Table 21 **Example of SKK Card and RBS Locations**

Subject	Cluster# (1-8): 1								
	System ID#: 34252367456								
	1-Master	2-Slave	3-Slave	4-Slave	5-Slave	6-Slave	7-Slave	8-Slave	
Card Type	<input type="checkbox"/> 8SKKipx <input checked="" type="checkbox"/> 8SKK <input type="checkbox"/> 16SKK	<input type="checkbox"/> 8SKKipx <input checked="" type="checkbox"/> 8SKK <input type="checkbox"/> 16SKK	<input type="checkbox"/> 8SKKipx <input type="checkbox"/> 8SKK <input type="checkbox"/> 16SKK						
(Shelf,Slot)	(1, 6)	(1, 7)	(,)	(,)	(,)	(,)	(,)	(,)	
RBS# 0	RF#0 R&D north east	RF# 8 Canteen - west	RF#	RF#	RF#	RF#	RF#	RF#	
RBS# 1	RF#1 R&D south west	RF#9 Canteen - east	RF#	RF#	RF#	RF#	RF#	RF#	
RBS# 2	RF#2 R&D south east	RF#10 Adm - north	RF#	RF#	RF#	RF#	RF#	RF#	
RBS# 3	RF#3 Stor. ext. north	RF#	RF#	RF#	RF#	RF#	RF#	RF#	
RBS# 4	RF#4 Prod - south	RF#	RF#	RF#	RF#	RF#	RF#	RF#	
RBS# 5	RF#5 Prod - central	RF#	RF#	RF#	RF#	RF#	RF#	RF#	
RBS# 6	RF#6 Prod - north	RF#	RF#	RF#	RF#	RF#	RF#	RF#	
RBS# 7	RF#7 Prod - stairs	RF#	RF#	RF#	RF#	RF#	RF#	RF#	
RBS# 8	RF#	RF#	RF#	RF#	RF#	RF#	RF#	RF#	
RBS# 9	RF#	RF#	RF#	RF#	RF#	RF#	RF#	RF#	
RBS# 10	RF#	RF#	RF#	RF#	RF#	RF#	RF#	RF#	
RBS# 11	RF#	RF#	RF#	RF#	RF#	RF#	RF#	RF#	
RBS# 12	RF#	RF#	RF#	RF#	RF#	RF#	RF#	RF#	
RBS# 13	RF#	RF#	RF#	RF#	RF#	RF#	RF#	RF#	
RBS# 14	RF#	RF#	RF#	RF#	RF#	RF#	RF#	RF#	
RBS# 15	RF#	RF#	RF#	RF#	RF#	RF#	RF#	RF#	

13 Specifications

For FlexAir Wireless System and Components

1 FlexAir Wireless System

Maximum number of wireless handsets	1,535
Maximum number of clusters per system	8
Maximum number of SKK cards per cluster	8
Maximum number of 8SKK, 8SKKipx cards per system	32
Maximum number of 16SKK cards per system.....	16
Maximum number of RBS units per cluster	128
Maximum number of repeaters per cluster	255
Maximum number of RBS units and repeaters per cluster.....	256
Maximum number of RBS units and repeaters per Coral system	2048
Maximum number of repeaters in series	4
Maximum number of simultaneous calls:	
per RBS	4
per SKK card	32
per cluster	256 (and limited by the number of Timeslots per Coral system)
per Coral system ...	2048 (and limited by the number of Timeslots per Coral system)
RF Characteristics - DECT	
Standard	DECT GAP
Operating frequency	1880-1900 MHz
RF Characteristics - ISM	
Standard	ETSI 300-328
Operating frequency	2418-2457 MHz
RF Multiple access method	TDMA/FDMA/TDD
RF coverage radius	
Typical office	50 meters (150 ft.)
Line of sight	150 meters (450 ft.)

2 SKK Card

.....

Number of SKK cards supported

Per FlexAir Cluster.....	8 max.
8SKK, 8SKKipx per Coral system	32 max.
16SKK per Coral system	16 max.

Number of RBS supported

8SKK, 8SKKipx.....	8 max.
16SKK.....	16 max.

Simultaneous calls:

8SKK, 8SKKipx.....	32 max.
16SKK.....	32 max.

3 RBS

.....

Physical specifications

Dimensions.....	1.6" deep x 4" long x 4" wide (4cm/10cm/10cm.)
Weight	0.38 lb (172 gr.)
Installation	vertical (wall-mounted)

Electrical specifications

Average RF power output	5 mW
Maximum power output.....	250 mW

Other characteristics

Simultaneous conversations	4
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RF band types compatibility

RBS (DECT).....	1.88 - 1.9 GHz European DECT Standard
RBS (ISM).....	2.4 GHz

Connectors

.....	one RJ-11 6-pin socket
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Cables to Coral

.....	1 twisted pair of 24/26 AWG wires Category 4 or higher
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Maximum distance from Coral System.....

.....	1,500 meters (4,500 ft.)
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RBSs per Coral System.....

.....	256 max.
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RBSs per FlexAir Cluster.....

.....	128 max.
-------	----------

RF coverage radius

Typical office	50 meters (150 ft.)
Line of sight	150 meters (450 ft.)

4 FlexAir Repeater

Physical specifications

Dimensions..... 1.6" deep x 4" long x 4" wide (4cm/10cm/10cm.)

Weight 0.38 lb (172 gr.)

Installation vertical (wall-mounted)

Electrical specifications

Average RF power output 5 mW

Maximum power output..... 250 mW

Maximum number of channels

with handover..... 2

without handover..... 3

RF band types compatibility

DECT 1.88 GHz

ISM..... 2.4 GHz

External power supply

Output 9V, 300mA, 2.7VA

Input 115VAC/230VAC

Length of cord..... approximately 36" (3m)

Cable to Coral..... no telephony cable required

Connectors one RJ-11 4-pin socket

RF coverage radius

Typical office 50 meters (150 ft.)

Line of sight 150 meters (450 ft.)

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5 Wireless Handsets

Specifications See *Chapter 3, Coral FlexiCom and IPx Product Description*

Battery

Type..... 3.6 NMH rechargeable

Talk time 16 hours

Standby time 150 hours

Charging time (empty to full battery)..... 3.5 hours (normal time)

Includes temperature compensation charging

NOTES:



International Headquarters
Tadiran Telecom Ltd.
18 Hasivim Street P.O.Box 7607
Petach Tikva 49170 Israel
Tel. +972-3-9262000, Fax. +972-3-9262310

USA Headquarters
Tadiran Telecom, Inc.
4 Tri Harbor Court
Port Washington, NY 11050
Tel. +1-516-632-7200, Fax. +1-516-632-7210

Visit us at our website <http://www.tadirantele.com>
Email: coral@tadirantele.com

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