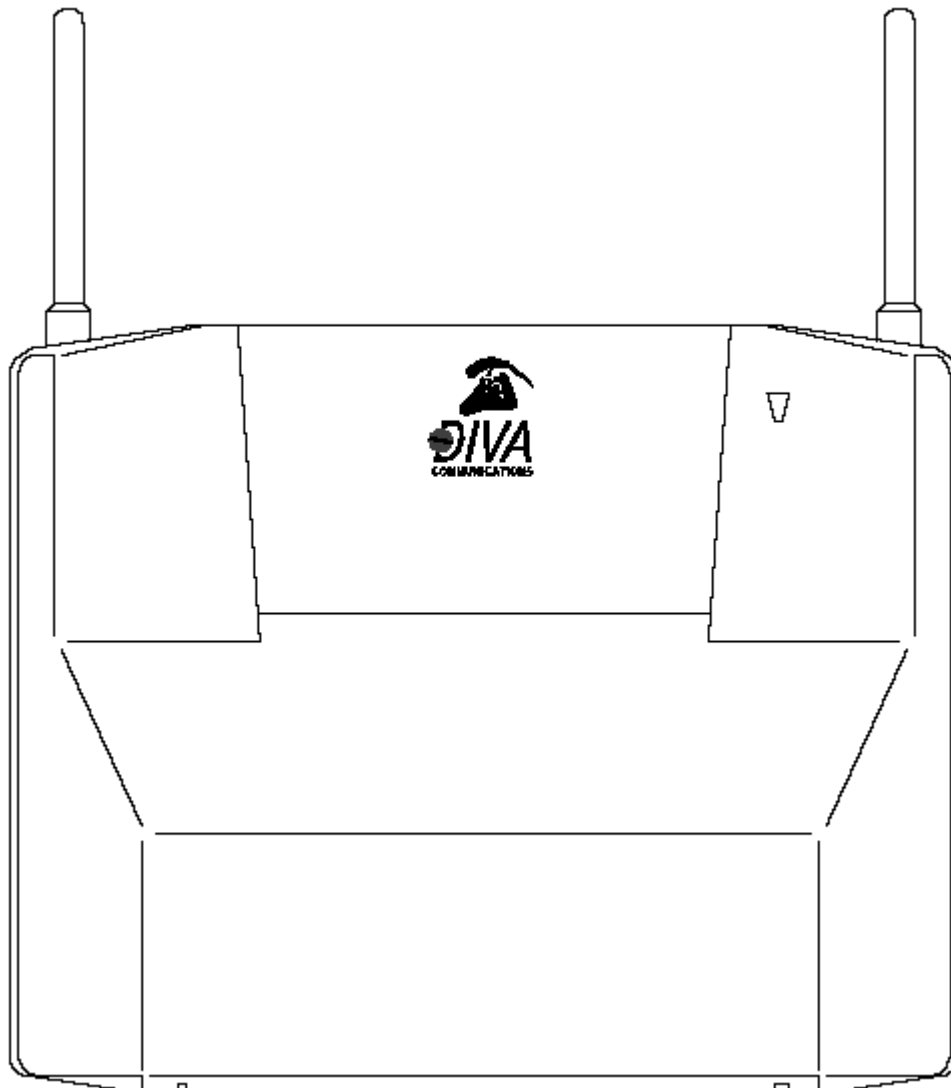


DIVA-2000 Wireless Local Loop

Model SU-200/SU-250 Single-Line Subscriber Unit

User Guide



PUBLICATION NUMBER 610-00120-01 B

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RF INTERFERENCE

The equipment described in this document generates, uses, and can radiate radio frequency energy. Operation of this equipment in a residential area is likely to cause radio interference, in which case the user, at the user's own expense, may be required to take whatever measures necessary to correct the interference.

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Important Safety Instructions

When using your telephone equipment, basic safety precautions should always be followed to reduce the risk of fire, electric shock, and injury, including the following:

- Read and understand all instructions.
- IF THIS PRODUCT EXHIBITS ANY UNEXPECTED, UNUSUAL, OR UNSAFE CONDITIONS SUCH AS EMISSION OF SMOKE, ACID, FUMES, LIQUIDS, OR OTHER SUBSTANCES:
 - stop using it immediately
 - turn the power switch OFF
 - disconnect it from all power sources
 - remove the telephone line from the RJ-11C telephone jack
 - contact your telephone service provider
- UNPLUG THIS PRODUCT FROM THE WALL OUTLET OR ANY OTHER SOURCE OF POWER AND IMMEDIATELY HAVE IT SERVICED BY A QUALIFIED SERVICE PROVIDER IF:
 - the power supply cord or plug is damaged or frayed
 - liquid has been spilled into the product
 - the product has been exposed to rain or water
 - the product has been dropped or the cabinet has been damaged
 - the product exhibits a distinct change in performance
- DO NOT INSTALL THE SUBSCRIBER UNIT OUTDOORS.
- TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT ATTEMPT TO OPEN, REPAIR, DISASSEMBLE, OR ADJUST THE SUBSCRIBER UNIT. TAKE THE SUBSCRIBER UNIT TO A QUALIFIED SERVICE PROVIDER IF SERVICE OR REPAIR WORK IS REQUIRED. OPENING OR REMOVING COVERS MAY EXPOSE YOU TO DANGEROUS VOLTAGE OR OTHER RISKS. INCORRECT RE-ASSEMBLY CAN CAUSE ELECTRIC SHOCK WHEN THE PRODUCT IS SUBSEQUENTLY USED.

- Do not drop the Subscriber Unit.
- Do not place the Subscriber Unit on an unstable cart, stand, or table. The Subscriber Unit may fall, causing serious damage to the product.
- Do not use this product near water; for example, near a bathtub, washbowl, kitchen sink or laundry tub, in a wet basement, or near a swimming pool.
- Use the Subscriber Unit only with the AC adapter provided. If your Subscriber Unit does not have one or if the one that came with it does not work properly, contact your telephone service provider.
 - If this product is provided with a grounded attachment plug: as a safety feature, this product is equipped with a three-wire plug which has a third pin to provide a safety ground. This plug will fit only into a grounded power outlet. If you are unable to insert the plug into the outlet, contact your electrician to replace your existing outlet. It is unsafe to plug this unit into any other power outlet.
 - If this product is provided with a polarized attachment plug: as a safety feature, this product is equipped with a polarized line plug, which has one blade wider than the other. This plug will fit into the power outlet only one way. If you are unable to insert the plug fully into the outlet, try flipping the plug. If the plug still does not fit, contact your electrician to replace your existing outlet. It is unsafe to plug this unit into any other power outlet.
- Do not allow anything to rest on the power cord. Do not install this product where people will walk on the power cord. Do not twist, kink, bend, or permit the power cord to be twisted, kinked, or bent.
- The Subscriber Unit should be installed with at least 20 cm/8 inches clearance on all exposed sides. The Subscriber Unit should never be placed over a radiator or heat register. Do not place the Subscriber Unit in a built-in installation unless proper ventilation is provided.
- To avoid risk of fire or electric shock, do not overload wall outlets and extension cords.
- Never spill liquid of any kind on the product.
- Unplug this product from the wall outlet before cleaning. Do not use liquid cleaners or aerosol cleaners. Use a damp cloth for cleaning.

- Do not use the telephone to report a gas leak in the vicinity of the leak.
- Use of this product may interfere with radio or television transmissions.
- Do not place this product around machinery or equipment generating an electrical field.
- The Subscriber Unit uses a rechargeable, sealed lead-acid battery to provide a backup in the event of power outage. Do not attempt to remove, recharge, or use the battery in any way other than as installed in the Subscriber Unit. After approximately two years, contact your telephone service provider to replace the Subscriber Unit's backup battery.

The Model SU-200/SU-250 Single-Line Subscriber Unit

The Model SU-200 and Model SU-250 Single-Line Subscriber Units are designed to provide you with telephone service via radio. The Model SU-200 Single-Line Subscriber Unit supports standard voice communications, while the Model SU-250 Single-Line Subscriber Unit supports standard Group 3 facsimile machines and V.22*bis* data modems in addition to standard voice communications. The label on the back of the Subscriber Unit will identify which model you have.

This User Guide will help you install and operate the Subscriber Unit. After it is installed, you can connect and use any standard telephone with the Subscriber Unit. Proper operation of the Subscriber Unit, however, requires that service to your Subscriber Unit has been authorized and activated by your telephone service provider.

Confirm Subscriber Unit Components

Verify that you have all of the following items:

- Model SU-200 or Model SU-250 Single-Line Subscriber Unit
- mounting bracket
- one (1) thumb screw and washer to secure the Subscriber Unit to the mounting bracket
- three (3) screws to secure the mounting bracket to a wall
- AC adapter
- power cord
- this User Guide

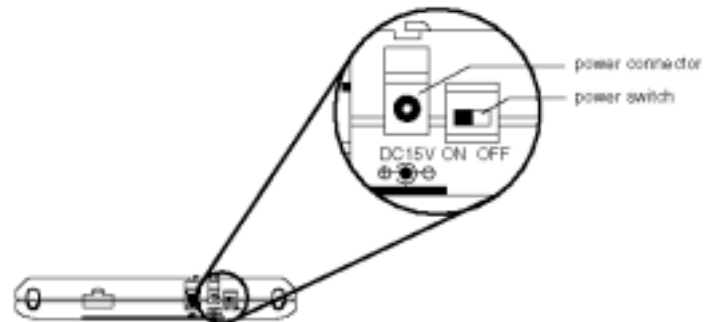
If the Subscriber Unit appears damaged or if any item is missing, do not attempt to install or use it. Return the Subscriber Unit, its packaging, and all the package contents to your telephone service provider for replacement.

POWER CONNECTOR

Power is provided to the Subscriber Unit by connecting the barrel plug of the AC adapter to the power connector. Use only the AC adapter supplied with the Subscriber Unit.

POWER SWITCH

The power switch controls the Subscriber Unit's power. The Subscriber Unit is shipped with the switch in the OFF position. The power switch must be set to the ON position to use the Subscriber Unit.

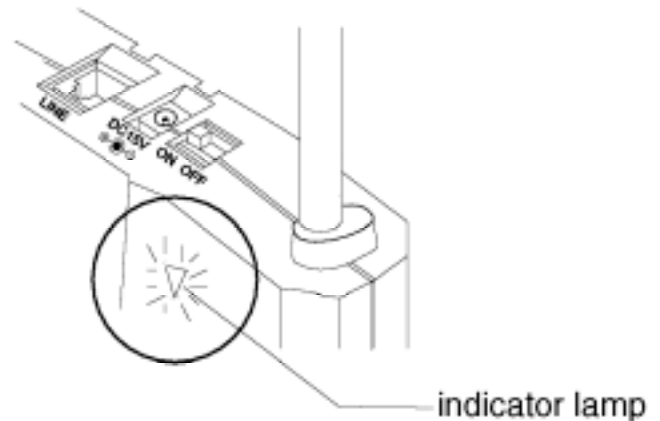


INDICATOR LAMP

An indicator lamp is located on the front of the Subscriber Unit to provide information concerning installation and operation.

If you experience problems with your telephone service, you should check the indicator lamp first to see if there is a problem with the Subscriber Unit.

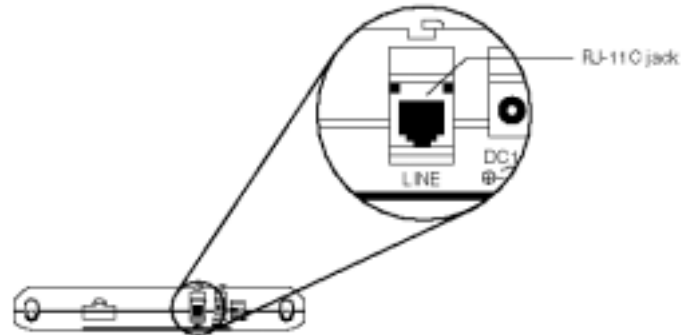
You will find suggestions for using the indicator lamp to diagnose problems in the Using the Indicator Lamp section of this User Guide.



TELEPHONE JACK

The telephone jack accepts an RJ-11C modular connector and allows a standard telephone to be connected to the Subscriber Unit.

Users of the Model SU-250 Single-Line Subscriber Unit may also connect a standard facsimile machine or data modem. Consult the appropriate manuals concerning use of your facsimile machine or data modem to ensure that it is configured properly to support Group 3 facsimile communications or V.22*bis* data communications

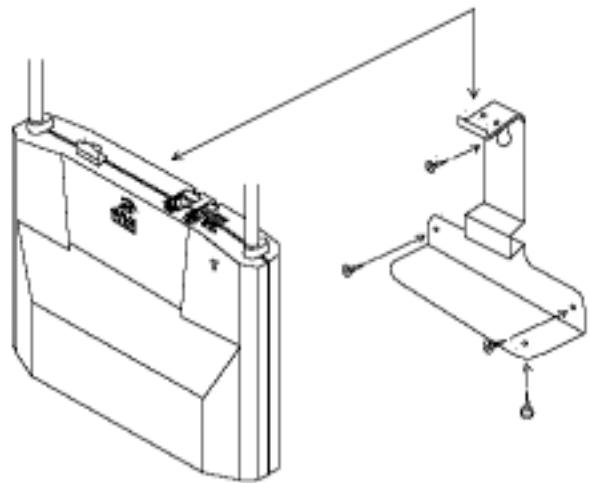


MOUNTING SLOT

The mounting slot on the rear of the Subscriber Unit allows you attach the Subscriber Unit to the mounting bracket.

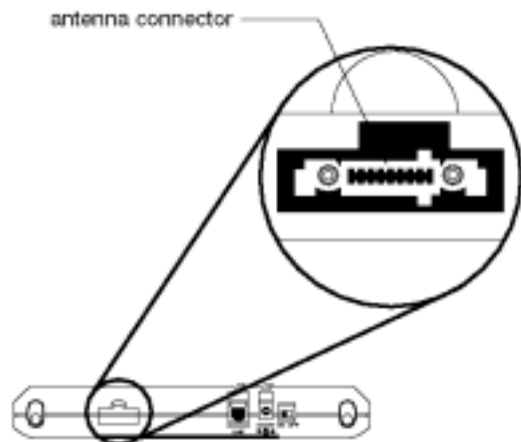
MOUNTING BRACKET

A mounting bracket and three (3) mounting screws allow the Subscriber Unit to be mounted to a wall. A thumb screw secures the Subscriber Unit to the mounting bracket through the screw hole in the bottom of the Subscriber Unit.



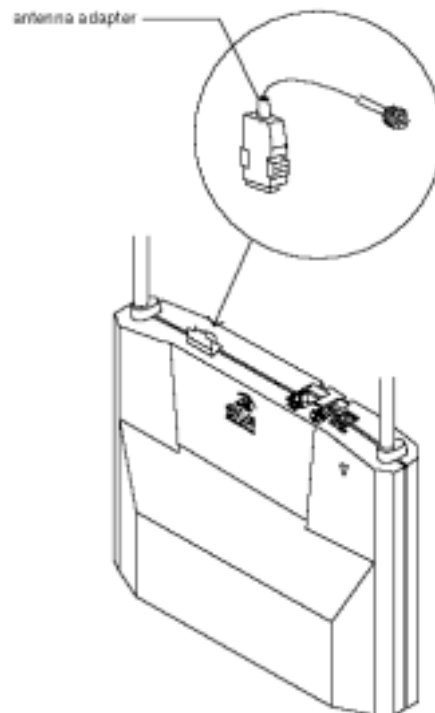
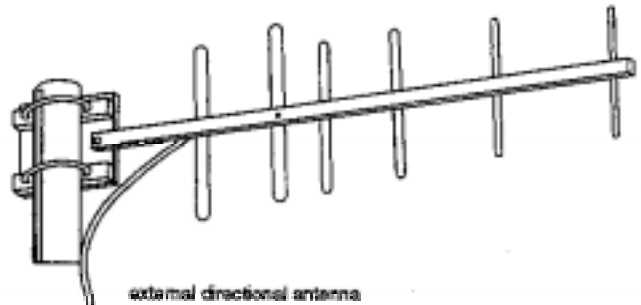
ANTENNA CONNECTOR

If an external antenna and antenna adapter are provided to you by your telephone service provider, you will need to use the antenna connector to connect the antenna adapter to the Subscriber Unit. If you do not require the use of an external antenna, you should keep the antenna connector cover closed.



EXTERNAL ANTENNA AND ANTENNA ADAPTER

An external antenna and antenna adapter may be provided to you by your telephone service provider. The antenna adapter connects an external antenna to the Subscriber Unit. The external antenna is intended to be mounted outdoors to improve radio signal quality.



Equipment Required to Install the Subscriber Unit

The following items are required to install and use the Subscriber Unit:

- An AC power outlet: check to see that the outlet will accept the plug of the power cord provided with your Subscriber Unit. If the plug is not compatible, contact your telephone service provider.
- One or more telephones: the Subscriber Unit may be used with any standard telephone employing either tone or pulse dialing. More than one telephone extension may be connected to the Subscriber Unit by using the appropriate connectors.
- Telephone line: the telephone(s) must be connected to the Subscriber Unit by a line equipped with an RJ-11C modular connector. This line is not supplied with the Subscriber Unit.
- Phillips screwdriver: a screwdriver will be needed to secure the mounting bracket to a wall or other structure.
- *If you have a Model SU-250 Single-Line Subscriber Unit*, a standard Group 3 facsimile machine or V.22bis data modem may be connected to the Subscriber Unit and used in its normal fashion. These devices will not function properly if connected to a Model SU-200 Single-Line Subscriber Unit.

Installation Procedures

Observe the following steps to install the Subscriber Unit safely and correctly.

Step 1 *Select a Location* —

Select a suitable location for installing the Subscriber Unit.

Choose a location that is:

- indoors
- as high as possible
- near a window
- out of direct sunlight
- not exposed to extremes of heat and cold
- with at least 20 cm clearance on all exposed sides of the Subscriber Unit
- near an AC power outlet

You can position the Subscriber Unit on a shelf or table or use the mounting bracket to mount it to a wall. Be prepared to select an alternative location if the received radio signal is not strong enough. The Subscriber Unit must always be located so that it can transmit and receive radio signals to the telephone service provider.

Even with a strong radio signal, voice quality may be affected by nearby objects.

Although convenient, mounting the Subscriber Unit to a wall could result in poor voice quality. You might find it necessary to experiment with different locations to find the best one.

Select a Location for the External Antenna

Your telephone service provider may have issued you an external antenna and antenna adapter to use with the Subscriber Unit. If so, your service provider will specify the direction in which to point the antenna according to your location within the service area. The external antenna should be mounted outside as high as possible.

The mounting location for the external directional antenna should allow it to be pointed in the proper direction without any nearby obstructions in the straight-line path from the antenna. The installation locations of the Subscriber Unit and the external antenna must allow the antenna cable to reach the Subscriber Unit.

Step 2 *Prepare the Subscriber Unit* —

Prepare the Subscriber Unit for installation by following these steps:

- Connect the power cord to the AC adapter.
- Connect the AC adapter to the power connector on top of the Subscriber Unit.
- Plug the power cord into an AC outlet.
- Switch the power switch to ON. If the Subscriber Unit is receiving power, the indicator lamp will light while the Subscriber Unit conducts a self-test.
 - If the indicator lamp is red and is not blinking, the Subscriber Unit has failed its self-test. Contact your telephone service provider.
 - If the indicator lamp is either orange or green, the Subscriber Unit is operating properly.

Install the External Antenna

If your telephone service provider has issued you an external antenna and antenna adapter to use with the Subscriber Unit, follow these steps:

- Carefully mount the external antenna according to the instructions that accompany it.
- If you have been issued a directional antenna, point the external directional antenna in the direction specified by your telephone service provider.
- Carefully screw the antenna cable to the antenna adapter.
- Open the antenna connector cover and plug the antenna adapter into the antenna connector on top of the Subscriber Unit. Please note that the antenna adapter and antenna connector are keyed such that you can only connect the antenna adapter by correctly lining it up with the antenna connector.

DO NOT FORCE THE ANTENNA ADAPTER INTO THE CONNECTOR.

Step 3 *Check the Radio Signal* —

Make sure that the Subscriber Unit is receiving a strong radio signal. Use the indicator lamp to determine if the received signal is sufficient. If the received signal is strong, the indicator lamp will display a constant or slowly blinking orange or green light. If the received signal is weak, the light will blink faster.

- If you are not using an external antenna, position the Subscriber Unit so that the indicator lamp is constantly on or blinks as slowly as possible. You may need to move the Subscriber Unit to a different location so that you achieve the best reception.
- If you are using an external antenna, position the antenna so that the indicator lamp is constantly on or blinks as slowly as possible. If issued a directional antenna, adjust the antenna in the direction specified by your telephone service provider

Step 4 *Connect the Telephone* —

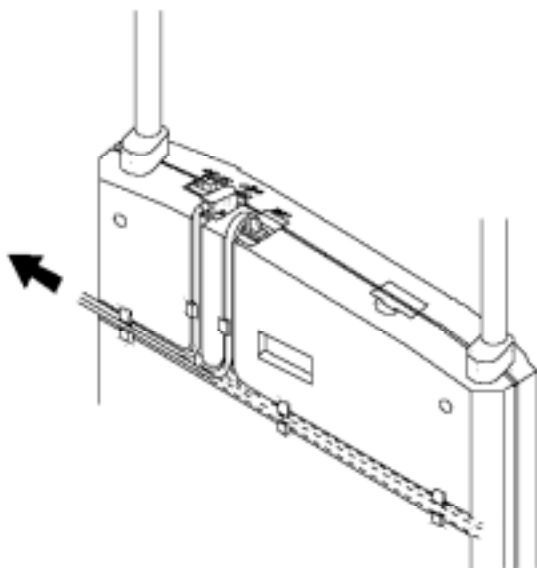
Once the best possible location for radio reception has been determined, the Subscriber Unit must be connected to your telephone and secured into its position.

- Connect the telephone line to the RJ-11C telephone jack on the top of the Subscriber Unit.
- Check that the telephone and AC adapter connectors are fully inserted into the Subscriber Unit.
- Ensure that the power and telephone lines are routed and secured so that the connectors cannot be pulled from the Subscriber Unit once it is in its final position. This step is especially important if the Subscriber Unit is not wall-mounted. Use the channels on the back of the Subscriber Unit to secure the lines.
- The phone and power lines may be guided through either of the two channels on the back of the Subscriber Unit. For the best results and clearest sound quality, however, route the telephone line to follow the channel out from the left side of the back of the Subscriber Unit, as shown in the figure below.

You can connect more than one telephone to the Subscriber Unit to use as extensions. You must connect all telephones through the RJ-11C telephone jack on top of the Subscriber Unit. Use the appropriate telephone connectors if you use more than one telephone. The number of extensions and the total length of telephone line which can be connected to the Subscriber Unit are limited. Typically, as many as five telephone

extensions can be supported. If all telephones do not ring or if the voice volume is too low, the number of extensions should be reduced or the total length of telephone line should be decreased.

If you have a Model SU-250 Single-Line Subscriber Unit, you may connect a standard Group 3 facsimile machine or V.22***bis*** data modem. Observe the same care in routing the telephone line.



Step 5 *Mount the Subscriber Unit to a Wall* —

If you wish to mount the Subscriber Unit to a wall, follow these steps:

- Using a Phillips screwdriver, screw the top mounting screw into the wall, leaving enough clearance for the mounting bracket to hang on the screw. Depending on the construction of the wall, drilling or reinforcement may be required.
- Hang the mounting bracket from the screw by its top keyhole-shaped hole.
- Screw the two remaining screws into the wall through the two screwholes on the bottom of the bracket.
- Hang the Subscriber Unit from the mounting bracket by inserting the top of the bracket into the mounting slot on the rear of the Subscriber Unit.
- Secure the Subscriber Unit to the bracket by inserting the thumb screw into the hole in the bottom of the bracket and screwing it tightly into the Subscriber Unit.

After the Subscriber Unit Is Installed

You may use a telephone connected to your Subscriber Unit as you would use any telephone. To make a call, lift the telephone handset from its cradle. Initially, you will hear the pre-dial tone (a low-volume clicking sound), followed quickly by the dial tone (a constant tone), indicating that you may now dial a number.

Once you hear the dial tone, you may make a call by dialing the number. After dialing, you will either hear a ringing tone, or, if the other party is using his or her telephone, you will hear a busy tone.

When you have finished your call or when the telephone is not in use, hang up the telephone by returning the handset to its cradle. If the telephone is not hung up, you will hear a loud fast repeating tone.

The following table describes the tones that you may hear and explains their meanings.

Signaling Tones You May Hear

TONE	DESCRIPTION	MEANING AND ACTION REQUIRED
pre-dial tone	soft clicking sound	- Subscriber Unit is in process of connecting to the telephone network - wait for dial tone
dial tone	low-frequency tone	- Subscriber Unit is connected to the telephone network - dial telephone number
ringing tone	repeated pattern of one or more medium-frequency tones	- telephone number that was dialed is ringing - wait for answer - hang up if no response
busy tone	repeated medium-frequency tone	- telephone number that was dialed is in use - hang up and call again later
fast busy tone	rapidly repeated medium-frequency tone	- the telephone network is busy - hang up and call again later
out-of-service tone	rapidly repeated high-frequency tone	- Subscriber Unit is unable to connect to the telephone network - hang up and make the call again later - if this condition persists, contact your telephone service provider
hang-up tone	loud rapidly repeated medium-frequency tone	- telephone is not being used to make a call - hang up the telephone
silence	no audible tones	- telephone may be disconnected from Subscriber Unit - check the telephone connection to the Subscriber Unit - if the telephone is properly connected and a call still cannot be made, consult the Troubleshooting section of this User Guide

Use of Standard Facsimile Machines and Data Modems with the Model SU-250 Single-Line Subscriber Unit

If you have a Model SU-250 Subscriber Unit, you may use a standard Group 3 facsimile machine or a standard voiceband data modem. To use these devices, follow normal operating procedures and connect the device to the Subscriber Unit's RJ-11C modular jack. Follow the instructions that accompany the particular facsimile machine or data modem to be used.

Proper facsimile or data communications require that both sides of the connection be appropriately configured. Consult the appropriate manuals concerning use of your facsimile machine or data modem to ensure that it is configured properly to support Group 3 facsimile communications or V.22*bis* data communications and that the communicating device is similarly configured. No special configuration is required with respect to the Model SU-250 Single-Line Subscriber Unit.

Any problems that may result when attempting data communications typically will be due to the configuration at either the remote end or the local end. For example, the settings for parity bits, local echo, and flow control of the data modem connected to the Subscriber Unit must be appropriate for communications with the remote end of the link. The other end of the link must support V.22*bis* data communications at 2400 bps or less; otherwise, the Model SU-250 Single-Line Subscriber Unit and the DIVA-2000 Wireless Local Loop cannot support the data link.

At the local end, the terminal emulator or other software that communicates locally with the modem can be set to a data rate greater than 2400 bps. If so, however, flow control (either RTS/CTS or XON/XOFF) must be enabled. Both the communications software and the data modem must be configured to use the same type of flow control. Some modems may automatically adjust the rate at which they communicate with the local software, in which case DTE baud rate adjustment must be disabled in order to allow local communication at rates greater than 2400 bps. Finally, to achieve end-to-end throughput greater than 2400 bps, V.42*bis* data compression should be enabled.

Operation of a Group 3 facsimile machine should require no special configuration.

Using the Indicator Lamp

In the event that you are not able to use your telephone and Subscriber Unit as expected, the Subscriber Unit has an indicator lamp on its front panel to assist in troubleshooting as shown in the following tables.

INDICATOR MODE	DIAGNOSIS	RECOMMENDED ACTION
steady green light	Subscriber Unit is receiving a strong signal (normal condition)	no action required
blinking green light	Subscriber Unit is receiving a weak radio signal	- the following actions are required only if voice quality is poor or if calls cannot be made dependably: - reposition the Subscriber Unit to obtain a stronger radio signal - contact your telephone service provider to obtain an external directional antenna and antenna adapter if you cannot improve reception - if the Subscriber Unit is using an external directional antenna and voice quality is poor or calls cannot be made dependably: - make sure it is pointed in the direction specified by your telephone service provider without any nearby obstructions in the straight-line path from the antenna - to avoid line-of-sight obstructions, you may need to change the antenna's mounting location - contact your telephone service provider if all attempts to improve reception fail
steady or blinking orange light	Subscriber Unit is receiving a strong radio signal but is not communicating with the telephone network	contact your telephone service provider to activate your service
blinking red light	Subscriber Unit is operating on its internal battery and power is low	- keep telephone conversations short to avoid possible interruption of conversation - when AC adapter is connected and power is available, battery will recharge (a full recharge may require 12 hours or longer)
steady red light	internal fault in Subscriber Unit	contact your telephone service provider

Troubleshooting

Potential performance problems and recommended actions that you may encounter are summarized in the following table.

SYMPTOM	DIAGNOSIS	RECOMMENDED ACTION
- voice quality is poor - or - calls cannot be made dependably - or - speed of facsimile or data communications is low [the Model SU-250 Single-Line Subscriber Unit supports Group 3 facsimile communications at a maximum of 9600 bps and V.22bis data communications at a maximum of 2400 bps]	Subscriber Unit is receiving a weak radio signal or signal is obstructed (radio signal quality may change at any time for a variety of reasons; for example, the change of seasons may introduce vegetation that can affect signal quality)	- if Subscriber Unit is using its own body-mounted antennas: - reposition the Subscriber Unit to obtain a stronger radio signal - contact your telephone service provider to obtain an external directional antenna and antenna adapter if you cannot improve reception - if Subscriber Unit is using an external directional antenna: - make sure it is pointed in the direction specified by your telephone service provider without any nearby obstructions in the straight-line path from the antenna - to avoid line-of-sight obstructions, you may need to change the antenna's mounting location - contact your telephone service provider if all attempts to improve reception fail
voice level (volume) is low	telephone line from Subscriber Unit is too long (total loop resistance greater than 600 Ohms)	reduce the length of telephone line used from the Subscriber Unit or use a heavier gauge wire
noise is present during a call	telephone line is not routed correctly from the Subscriber Unit	- check that the telephone line is correctly routed in the cabling channel - ensure that the Subscriber Unit and the telephone line are not close to sources of electrical noise (machines, other communications devices, radios and televisions, etc.)
all connected telephones do not ring	too many telephones connected to Subscriber Unit (greater than 5 REN)	reduce the number of telephones connected to the Subscriber Unit
after 12 hours of charging, SLSU does not operate with AC power disconnected	battery backup is not providing power	- check that the power switch on top of the Subscriber Unit is ON - contact your telephone service provider
line goes dead during	telephone is	check telephone line connections at Subscriber

SYMPTOM	DIAGNOSIS	RECOMMENDED ACTION
a call	disconnected from Subscriber Unit	Unit and at telephone • check telephone line between Subscriber Unit and telephone for breaks
	Subscriber Unit has lost power	• check AC power connection • check that the power switch on top of the Subscriber Unit is ON
	external antenna is disconnected	check external antenna and its connection to the Subscriber Unit
	problem at telephone service provider	wait at least 24 hours to determine if service will resume, then contact your telephone service provider
facsimile or data communications do not work	only the Model SU-250 SLSU can support facsimile machine or data modem traffic	check that your Subscriber Unit is the Model SU-250 SLSU and not the Model SU-200 SLSU
	improper configuration of local facsimile machine or voiceband data modem with respect to remote (communicating) device	• the local facsimile machine or voiceband data modem must be properly configured to communicate with the remote device • common problems — improper configuration of the local data modem with respect to the remote data modem — remote data modem requires higher data rate than can be supported by the DIVA-2000 Wireless Local Loop and the Model SU-250 SLSU (if so, determine if there is a slower access line) • consult the facsimile machine or data modem operation manual and the specifications of the remote device to determine the correct settings for the desired communications link -- the DIVA-2000 Wireless Local Loop and the Model SU-250 Single-Line Subscriber Unit support all standard modes of Group 3 facsimile traffic (up to 9600 bps) and V.22bis data modem traffic (up to 2400 bps)
facsimile or data communications do not work (continued)	improper configuration of local communications software with respect to local voiceband data modem	• flow control (either RTS/CTS or XON/XOFF) must be enabled if the communications software is configured for rates greater than 2400 bps • both the communications software and the data modem must be configured to use the same type of flow control • to achieve end-to-end throughput greater than 2400 bps, V.42bis data compression must be enabled • DTE baud rate adjustment must be disabled to allow the software to communicate with the data modem at greater than 2400 bps