



# APPLICATION Note

## RAD-1A Applications

March 29, 2007

TELECOM SOLUTIONS FOR THE 21ST CENTURY

### Line Powered Remote Access Device

The **RAD-1A**, remote access device, gives authorized users remote access to PABX, Centrex and Electronic Key system features. It can also provide bridging to a second central office line. With two levels of access and programmable toll restriction, the **RAD-1A** provides the security required to help prevent phone system and toll abuse.

The **RAD-1A** answers on the first ring and disconnects on CPC, call time out, silence time out or by dialing #7. Separate 600 ohm audio and telephone line outputs are provided, allowing connection to audio amplifiers, digital announcers, telephone lines or analog PABX extensions. For "line extender" applications, the user does not have to hang up and redial the **RAD-1A** to make another call. The **RAD-1A** will also provide a hookswitch flash on the telephone line out ports to access PABX, Centrex or Electronic Key system features.



*This product does not eliminate the possibility of toll fraud! To further protect against fraudulent calls, use with a TR-1 Toll Restrictor (Fax Back Document 705).*

**IMPORTANT:** This Application Note is designed to be used in conjunction with the RAD-1A Technical Practice, Fax Back Document 410.

**Sales...715.386.8861**

### Features

- **Status LED turns on when the unit is active and brightens to indicate the presence of audio**
- Programmable 6 digit security code
- Programmable 6 digit access code
- Two programmable levels of access
- Programmable toll restriction
- Allows 1-8XX and 911 calls
- **Separate 600 ohm audio and telephone line outputs**
- **Disconnects on CPC, call time out, silence time out, busy or by dialing #7**
- **Programmable 2 hour call timer**
- **Programmable 1-99 second silence timer**
- **Alternate screw terminal connection for phone line out**
- Provides a 500ms hookswitch flash to access features on PABX, Centrex or C.O. lines
- Provides a 2 second disconnect for new calls
- Connects phone line to the 600 ohm input/output of one-way paging amplifiers, digital announcers and other audio programs
- Relay contacts available for systems that need a dry contact closure (activate whenever the unit's output is active)
- Non-volatile memory (no batteries required)

### Applications

#### Remote Access To:

- Paging systems (Viking's **CPA-7B** or **PA-2A**)
- Service observers (Viking's **SO-24A**)
- PABX, Centrex or Key System features (DISA with security)
- Voice mail, dictation equipment or modems
- WATS, FX or TIE lines (through a PABX or as a line extender)
- Digital announcers, dictation equipment
- Advertisements, radio or church programs
- Audio monitoring for security purposes

[info@vikingelectronics.com](mailto:info@vikingelectronics.com)

<http://www.vikingelectronics.com>

### Specifications

**Power:** Telephone Line Powered (24V DC 20mA minimum)  
**Dimensions:** 133mm x 89mm x 44mm (5.25" x 3.5" x 1.75")  
**Shipping Weight:** 1.13 kg (2.5 lbs)  
**Environmental:** 0°C to 32°C (32°F to 90°F) with 5% to 95% non-condensing humidity  
**Relay Contact Ratings:** .5A @ 125VAC / 1A @ 30VDC  
**Audio Loss (through unit):** 1 dB  
**Connections:** (2) RJ11 modular jacks, 7-position screw terminal strip

# Applications

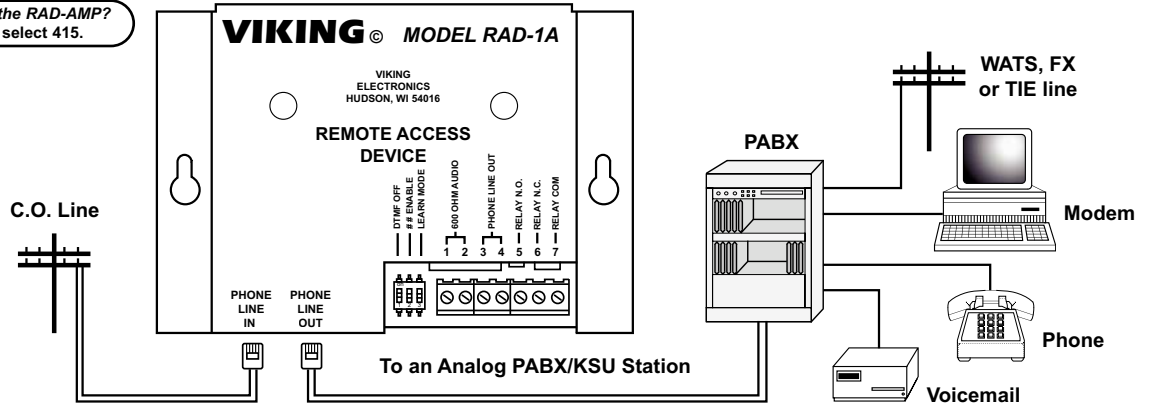
Connect your local incoming line to the modular jack labeled **PHONE LINE IN** and connect the modular jack labeled **PHONE LINE OUT** to an unused analog station, telephone line or 600 ohm audio device. Some typical applications are shown in the following sections **A - C**.

**! IMPORTANT:** Electronic devices are susceptible to lightning surges from the telephone line. It is recommended that a surge protector be installed to protect against such surges. Contact Panamax at (800) 472-5555 or Electronic Specialists Inc. at (800) 225-4876.

## A. Access PABX Features (DISA)

The **RAD-1A** can be used to access your phone system remotely. **Note:** For best performance, the **RAD-AMP** is recommended.

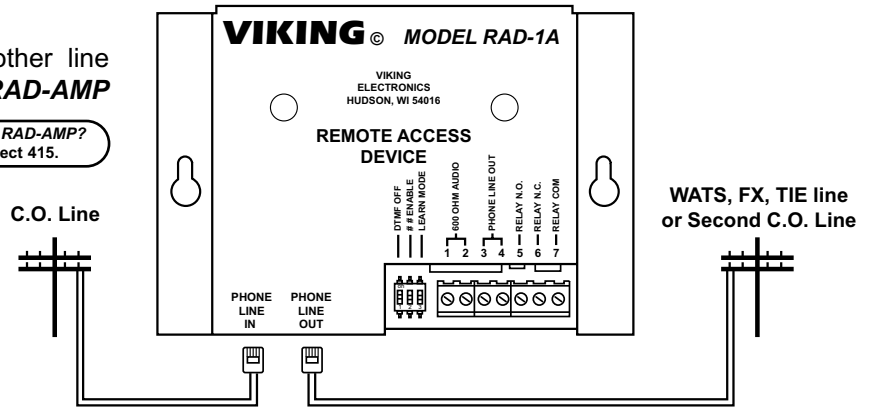
**? Need More Information on the RAD-AMP?**  
Call (715) 386-4345 and select 415.



## B. Line Extender

The **RAD-1A** can be used to access another line remotely. **Note:** For best performance, the **RAD-AMP** is recommended.

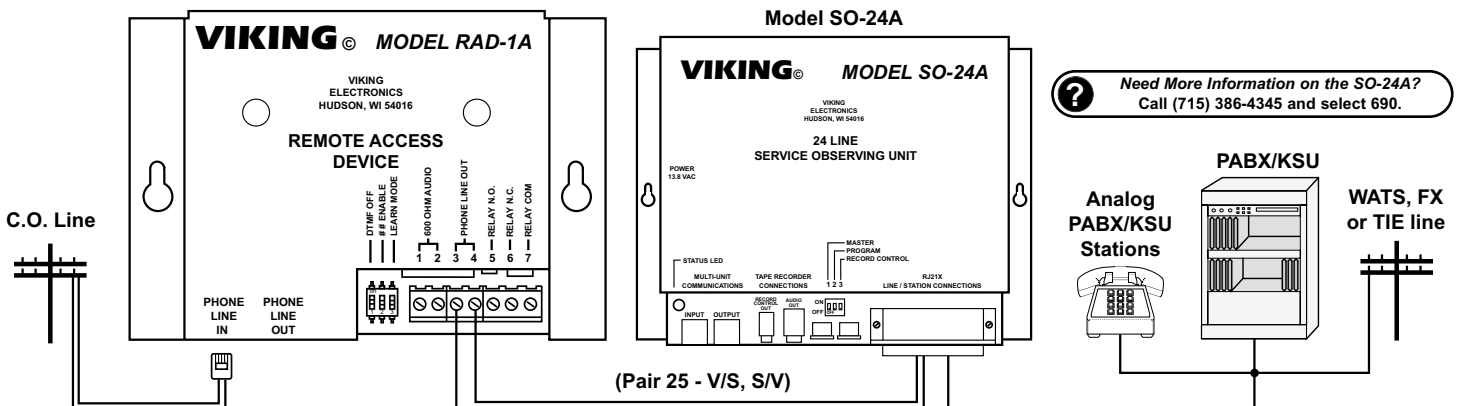
**? Need More Information on the RAD-AMP?**  
Call (715) 386-4345 and select 415.



## C. Remote Service Observation

The **RAD-1A** can be used to access the **SO-24A** Service Observation Unit. **Note:** For best performance, the **RAD-AMP** is recommended.

**? Need More Information on the RAD-AMP?**  
Call (715) 386-4345 and select 415.



# Programming

## A. Accessing the Programming Mode

The RAD-1A can be programmed from any Touch Tone phone using a C.O. line, analog PABX/KSU station, or a DLE-200B Line Simulator.

**?** Need More Information on the DLE-200B? Call (715) 386-4345 and select 605.

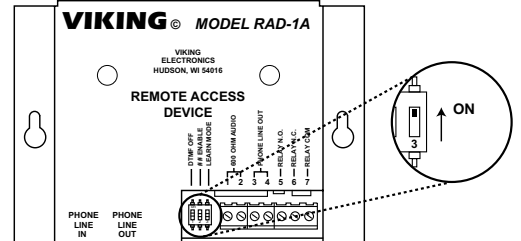
### 1. Using the Security Code

<b>Step 1.</b>	From a Touch Tone phone, call the line attached to the RAD-1A's <b>PHONE LINE IN</b> jack.
<b>Step 2.</b>	When the RAD-1A answers, enter *, plus the 6-digit security code (factory set to <b>845464</b> , see section B). A double beep should then be heard indicating you have entered the programming mode.

**Note:** While programming, if no Touch Tones are entered for 20 seconds, the RAD-1A will give 3 beeps and disconnect.

### 2. Without the Security Code

<b>Step 1.</b>	Set DIP switch 3 to <b>ON</b> as shown to the right. Incoming calls will enter the Programming mode without a security code.
<b>Step 2.</b>	From a Touch Tone phone, call the line attached to the RAD-1A's <b>PHONE LINE IN</b> jack.
<b>Step 3.</b>	When the RAD-1A answers, a double beep will be heard and the RAD-1A will automatically enter the programming mode.
<b>Step 4.</b>	When finished programming, set DIP switch 3 back to <b>OFF</b> .

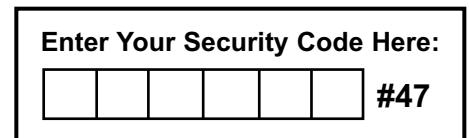


**Note:** While programming, if no Touch Tones are entered for 20 seconds, the RAD-1A will give 3 beeps and disconnect.

## B. Security Code

The security code allows the user/installer to program the RAD-1A. The factory set security code is 845464 (V-I-K-I-N-G). It is recommended that the factory security code be changed. **Example:** To store 123456 as the security code:

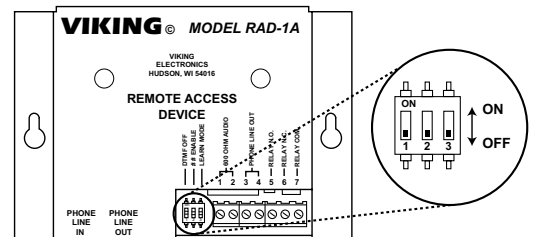
<b>Step 1.</b>	Access programming as shown in <b>Programming</b> section A.
<b>Step 2.</b>	Enter <b>123456 #47</b> .
<b>Step 3.</b>	Hang-up.



**Note:** The security code must be 6 digits and cannot include a \* or a #.

## C. DIP Switch Programming

Switch	Position	Description
1	ON	Disables all DTMF (Touch Tone) detection
1	OFF	Enables all DTMF (Touch Tone) detection (factory default)
2	ON	Operating features require ##
2	OFF	Operating features require # only (factory default)
3	ON	No security code required to enter the programming mode
3	OFF	Security code required to enter the programming mode (factory default)



## D. Programming and Remote Access Features (requires a Touch Tone phone)

If a valid Touch Tone sequence is entered while programming, a double beep will be heard. Three beeps indicate an error. To begin programming, call the **RAD-1A**. When the **RAD-1A** answers, you have 20 seconds to enter \* followed by your 6 digit security code (a double beep should be heard). The **RAD-1A** may now be programmed. **Note:** *While programming, if no Touch Tones are entered for 20 seconds, the **RAD-1A** will give 3 beeps and disconnect.*

### Quick Programming Features

	Enter Digits	- then -	Enter Memory Location
Security code (6 digits, 0-9) (factory set to 845464) .....	<b>6 digits</b>	then	<b>#47</b>
Outside line access (used with priority 2 and toll restriction) (factory disabled) .....	<b>6 digits</b>	then	<b>#44</b>
Priority 1 Access Code (6 digits, 0-9, no digits disables) (factory disabled) .....	<b>6 digits</b>	then	<b>#45</b>
Priority 2 Access Code (6 digits, 0-9, no digits disables) (factory disabled) .....	<b>6 digits</b>	then	<b>#46</b>
Call timer (0-1 hrs, 00-59 mins, 00-59 secs) (factory disabled, 3 sec minimum) .....	<b>5 digits</b>	then	<b>#48</b>
Silence time out (01 - 99 seconds) (factory disabled) .....	<b>2 digits</b>	then	<b>#49</b>
<b>Note:</b> <i>To disable or eliminate the use of any of the above features, enter the # + location number (45, 48, or 49) without any preceding numbers.</i>			
To restrict 1-900, 976, 1-976, 1-xxx-976 (factory setting) .....	* 1		
To allow 1-900, 976, 1-976, 1-xxx-976 .....	* 2		
To restrict 1 + long distance, 1-0 (1-8xx always allowed) (factory setting) .....	* 3		
To allow 1 + long distance, 1-0 .....	* 4		
To restrict 0 + dialing (factory setting) .....	* 5		
To allow 0 + dialing .....	* 6		
To restrict 555, 1-555, 1-xxx-555, 411, 1-411 (factory setting) .....	* 7		
To allow 555, 1-555, 1-xxx-555, 411, 1-411 .....	* 8		
Alert tones on (factory setting) .....	* 9		
Alert tones off .....	* 0		
<b>SO-24A</b> mode enabled .....	* *		
<b>SO-24A</b> mode disabled (factory setting) .....	* #		
Exit Programming and disconnect .....	# 7		
Set all programming features to factory settings .....	###		

### Operating Features

	DIP Switch 2:	OFF	or	ON
500 ms hookswitch flash on <b>PHONE LINE OUT</b> port .....	# 1		or	##1
2 second momentary disconnect on <b>PHONE LINE OUT</b> port .....	# 2		or	##2
Hang up <b>PHONE LINE IN</b> and <b>PHONE LINE OUT</b> port .....	# 7		or	##7

## E. Programming Examples

### 1. For Accessing PABX Features (see Applications section A)

To Program the RAD-1A to...	Enter Digits:
1. ...set the outside line access for this PABX to 9	9 #44
2. ...set the "Priority 1" access code to 123456	123456 #45
3. ...set the "Priority 2" access code to 234567	234567 #46
4. ...disable the call timer	#48

### 2. For Line Extender (see Applications section B)

To Program the RAD-1A to...	Enter Digits:
1. ...disable outside line access number	#44
2. ...disable the "priority 1" access code	#45
3. ...set the "Priority 2" access code to 345678	345678 #46
4. ...set the call timer to 20 minutes	02000 #48
5. ...restrict 1-900, 976, 1-976 and 1-xxx-976	*1

### 3. Remote Service Observation (see Applications section C)

To Program the RAD-1A to...	Enter Digits:
1. ...disable outside line access	#44
2. ...set the "Priority 1" access code to 456789	456789 #45
3. ...disable the "Priority 2" access code	#46
4. ...enable SO-24A mode	**

## Operation

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The **RAD-1A** allows remote access to loop start C.O. lines, analog PABX stations or any other 600 ohm audio device. This can be very useful for many applications including using a local line to access an inexpensive WATS line (line extending), utilizing your PABX/KSU features (DISA), service observing with Viking's **SO-24A**, or remote access to paging systems.

**Important:** It is crucial that the installer and system owner understands the functions and capabilities of both the **RAD-1A** and the lines and/or PABX stations connected to the **RAD-1A**, so that any and all toll fraud and other system abuse possibilities are understood. This enables the installer and owner to make risk managing decisions about the system in which the **RAD-1A** is put into. Viking Electronics Inc. is not able to assume responsibility since it is a function of the entire system assembled by the installer/owner. A Viking **TR-1** Toll Restrictor may be added to help prevent toll abuse if the PABX and **RAD-1A** toll restriction is not adequate.

The **RAD-1A** will answer an incoming call on the first ring. The **RAD-1A** offers either unsecured access, or two levels of secured access, designated "Priority 1" and "Priority 2." "Priority 1" access may be used in applications where the **RAD-1A**'s outbound line is either a CO line or a PABX extension, whereas the "Priority 2" access mode is specific to applications where the **RAD-1A**'s outbound line is a PABX extension.

**Note:** The "Priority 1" and "Priority 2" access codes can work well together. As an example, one group of users can be given the "Priority 2" access code, and hence only have the ability to dial within the PABX system. Another group of trusted users (supervisors, for example) could be given the "Priority 1" access code, and thus have unrestricted remote access to the PABX system, including outbound dialing.

#### A. Unsecured Access

If neither the "Priority 1", nor the "Priority 2" access codes have been programmed, the unit is "Unsecured." In this mode, the **RAD-1A** answers the inbound call, double beeps, bridges the lines together, and the caller is given full and immediate access to the outbound line port. Anybody that calls into the **RAD-1A** is given unlimited access to the extended line and may dial unrestricted phone numbers.

#### B. Priority 1 (unlimited) Access

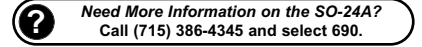
When a "Priority 1" access code has been programmed, the **RAD-1A** answers the inbound call and prompts the caller with a single beep. The caller is then required to enter a 6 digit access code. If the proper access code is not entered within 20 seconds, the **RAD-1A** will triple beep and hang up. When a valid access code has been entered, the **RAD-1A** will double beep and bridge the lines together providing access to the outbound line port. Anybody that calls into the **RAD-1A** and successfully dials the "Priority 1" access code has unlimited access to the extended line and may dial unrestricted phone numbers.

#### C. Priority 2 (limited) Access

This mode is specific to PABX applications. When a "Priority 2" access code has been programmed, the **RAD-1A** answers the inbound call and prompts the caller with a single beep. The caller is then required to enter a 6 digit access code. If the proper access code is not entered within 20 seconds, the **RAD-1A** will triple beep and hang up. When a valid "Priority 2" access code has been entered, the **RAD-1A** will double beep and bridge the lines together providing access to the outbound line port. If the caller attempts to dial the PABX outside line number (programmable, but typically a 9) to place a call outside of the PABX, the caller will hear a triple beep and be immediately disconnected. If no outside line access number is programmed, then toll restrict selections are used. This effectively prevents toll fraud and system abuse. **Important:** If the PABX utilizes any special direct trunk access codes in addition to the outside line number, the **RAD-1A** can not prevent toll fraud and system abuse on a "Priority 2" access call.

When the unit's output has been accessed, several other commands can be used. For a 500ms hookswitch flash on the **PHONE LINE OUT** port, dial **#1 (##1 with DIP switch 2 ON)**. To create a 2 second disconnect on the **PHONE LINE OUT** port for making a new call, dial **#2 (##2 with DIP switch 2 ON)**. To disconnect the **RAD-1A**, dial **#7 (##7 with DIP switch 2 ON)**. The **RAD-1A** will also disconnect when a CPC break occurs on the **PHONE LINE IN** port, after the call timer has expired, or after the silence timer has expired.

The **SO-24A** mode is useful when using the **RAD-1A** with other devices that use Touch Tone commands in their operation, such as the Viking's **SO-24A**. In this mode, the **RAD-1A** will only accept the **#7 (##7 with DIP switch 2 ON)** hang-up command. All other toll restriction functions are disabled.



**Note:** For applications where an audio decibel loss is a problem, the **RAD-AMP** is suggested.

**Product Support Line...715.386.8666**

**Fax Back Line...715.386.4345**

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