


RAC 104


Remote Volume and Tone Controller



Safety Instructions


Safety Instructions • English


WARNING: This symbol, , when used on the product, is intended to alert the user of the presence of uninsulated dangerous voltage within the product's enclosure that may present a risk of electric shock.

ATTENTION: This symbol, , when used on the product, is intended to alert the user of important operating and maintenance (servicing) instructions in the literature provided with the equipment.

For information on safety guidelines, regulatory compliances, EMI/EMF compatibility, accessibility, and related topics, see the Extron Safety and Regulatory Compliance Guide, part number 68-290-01, on the Extron website, www.extron.com.


Sicherheitsanweisungen • Deutsch


WARNUNG: Dieses Symbol , auf dem Produkt soll den Benutzer darauf aufmerksam machen, dass im Inneren des Gehäuses dieses Produktes gefährliche Spannungen herrschen, die nicht isoliert sind und die einen elektrischen Schlag verursachen können.

VORSICHT: Dieses Symbol , auf dem Produkt soll dem Benutzer in der im Lieferumfang enthaltenen Dokumentation besonders wichtige Hinweise zur Bedienung und Wartung (Instandhaltung) geben.

Weitere Informationen über die Sicherheitsrichtlinien, Produkthandhabung, EMI/EMF-Kompatibilität, Zugänglichkeit und verwandte Themen finden Sie in den Extron-Richtlinien für Sicherheit und Handhabung (Artikelnummer 68-290-01) auf der Extron-Website, www.extron.com.


Instrucciones de seguridad • Español


ADVERTENCIA: Este símbolo, , cuando se utiliza en el producto, avisa al usuario de la presencia de voltaje peligroso sin aislar dentro del producto, lo que puede representar un riesgo de descarga eléctrica.

ATENCIÓN: Este símbolo, , cuando se utiliza en el producto, avisa al usuario de la presencia de importantes instrucciones de uso y mantenimiento recogidas en la documentación proporcionada con el equipo.

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
Instructions de sécurité • Français


AVERTISSEMENT : Ce pictogramme, , lorsqu'il est utilisé sur le produit, signale à l'utilisateur la présence à l'intérieur du boîtier du produit d'une tension électrique dangereuse susceptible de provoquer un choc électrique.

ATTENTION : Ce pictogramme, , lorsqu'il est utilisé sur le produit, signale à l'utilisateur des instructions d'utilisation ou de maintenance importantes qui se trouvent dans la documentation fournie avec le matériel.

Pour en savoir plus sur les règles de sécurité, la conformité à la réglementation, la compatibilité EMI/EMF, l'accessibilité, et autres sujets connexes, lisez les informations de sécurité et de conformité Extron, réf. 68-290-01, sur le site Extron, www.extron.com.


Istruzioni di sicurezza • Italiano


AVVERTENZA: Il simbolo, , se usato sul prodotto, serve ad avvertire l'utente della presenza di tensione non isolata pericolosa all'interno del contenitore del prodotto che può costituire un rischio di scosse elettriche.

ATTENZIONE: Il simbolo, , se usato sul prodotto, serve ad avvertire l'utente della presenza di importanti istruzioni di funzionamento e manutenzione nella documentazione fornita con l'apparecchio.

Per informazioni su parametri di sicurezza, conformità alle normative, compatibilità EMI/EMF, accessibilità e argomenti simili, fare riferimento alla Guida alla conformità normativa e di sicurezza di Extron, cod. articolo 68-290-01, sul sito web di Extron, www.extron.com.


Instrukcje bezpieczeństwa • Polska


OSTRZEŻENIE: Ten symbol, , gdy używany na produkcie, ma na celu poinformować użytkownika o obecności izolowanego i niebezpiecznego napięcia wewnątrz obudowy produktu, który może stanowić zagrożenie porażenia prądem elektrycznym.

UWAGI: Ten symbol, , gdy używany na produkcie, jest przeznaczony do ostrzegania użytkownika ważne operacyjne oraz instrukcje konserwacji (obsługi) w literaturze, wyposażone w sprzęt.

Informacji na temat wytycznych w sprawie bezpieczeństwa, regulacji wzajemnej zgodności, zgodności EMI/EMF, dostępności i Tematy pokrewne, zobacz Extron bezpieczeństwa i regulacyjnego zgodności przewodnik, część numer 68-290-01, na stronie internetowej Extron, www.extron.com.


Инструкция по технике безопасности • Русский


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ВНИМАНИЕ:  Этот символ информирует пользователя о наличии в руководстве по эксплуатации и в документации, прилагаемой к продукту, важных инструкций по эксплуатации и обслуживанию.

Для получения информации о директивах безопасности, выполнении нормативных требований, совместимости электромагнитной, доступности и связанных темах, пожалуйста, обратитесь к Руководству по выполнению нормативных требований и безопасности Extron, ссылка 68-290-01, на сайте Extron, www.extron.com.

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注意:  产品上的这个标志意在提示用户设备随附的用户手册中有重要的操作和维护(维修)说明。

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安全上のご注意・日本語

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安全上のご注意、法規遵守、EMI/EMF適合性、その他の関連項目については、エクストロンのウェブサイト www.extron.com より『Extron Safety and Regulatory Compliance Guide』(P/N 68-290-01) をご覧ください。

안전 지침 · 한국어

경고: 이 기호 ⚠️ 가 제품에 사용될 경우, 제품의 인클로저 내에 있는 접지되지 않은 위험한 전류로 인해 사용자가 감전될 위험이 있음을 경고합니다.

주의: 이 기호 ⚠️ 가 제품에 사용될 경우, 장비와 함께 제공된 책자에 나와 있는 주요 운영 및 유지보수(정비) 지침을 경고합니다.

안전 가이드라인, 규제 준수, EMI/EMF 호환성, 접근성, 그리고 관련 항목에 대한 자세한 내용은 Extron 웹 사이트(www.extron.com)의 Extron 안전 및 규제 준수 안내서, 68-290-01 조항을 참조하십시오.

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FCC Class A Notice

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC rules. The Class A limits provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause interference. This interference must be corrected at the expense of the user.

NOTE: For more information on safety guidelines, regulatory compliances, EMI/EMF compatibility, accessibility, and related topics, see the [Extron Safety and Regulatory Compliance Guide](#) on the Extron website.

Conventions Used in this Guide

Notifications

The following notifications are used in this guide:

CAUTION: Risk of minor personal injury.

ATTENTION : Risque de blessure mineure.

ATTENTION:

- Risk of property damage.
- Risque de dommages matériels.

NOTE: A note draws attention to important information.

Software Commands

Commands are written in the fonts shown here:

```
^ARMerge Scene,,Op1 scene 1,1 ^B51 ^W^C.0  
[01] R000400300004000080000600 [02] 35 [17] [03]  
Esc X1 *X17* X20* X23* X21CE ←
```

NOTE: For commands and examples of computer or device responses used in this guide, the character “0” is used for the number zero and “O” is the capital letter “o.”

Computer responses and directory paths that do not have variables are written in the font shown here:

```
Reply from 208.132.180.48: bytes=32 times=2ms TTL=32  
C:\Program Files\Extron
```

Variables are written in slanted form as shown here:

```
ping xxx.xxx.xxx.xxx -t  
SOH R Data STX Command ETB ETX
```

Selectable items, such as menu names, menu options, buttons, tabs, and field names are written in the font shown here:

```
From the File menu, select New.  
Click the OK button.
```

Specifications Availability

Product specifications are available on the Extron website, www.extron.com.

Extron Glossary of Terms

A glossary of terms is available at <http://www.extron.com/technology/glossary.aspx>.



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Introduction

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About this Guide

This manual provides installation and operation instructions for the Extron RAC 104.

About the RAC 104

The Extron RAC 104 is a high-performance, four-channel remote audio controller that adjusts volume and tone for stereo or mono audio signals. Adjustments are made via the RAC 104 front panel controls or through a device connected to the RS-232 port.

The four channels on the RAC 104 can be used as four discrete mono channels or can be tied into pairs as stereo channels. All channels input and output balanced or unbalanced signals on 5-pole captive screw connectors.

The unit features smooth volume adjustment and three presets for each channel. An external 100-240 VAC power supply is included with the unit.

Features

- **Inputs: Captive screw connectors**
- **Outputs: Captive screw connectors**
- **Volume, bass, and treble controls** — Adjust these three settings using the RAC 104 front panel controls or an RS-232 device. Set upper and lower limits for volume and tone using an RS-232 device.
- **Four discrete channels** — Versatile input/output configuration can accommodate mono audio, stereo audio, or a combination of the two.
- **Speed-sensitive volume knob** — Turn the knob quickly to make coarse adjustments or slowly to make fine adjustments.
- **Smooth volume adjustment** — No audible “stairstepping” or jumps when volume is adjusted.
- **Input gain adjustment** — Using an RS-232 device, adjust the input gain to reduce variations in volume between channels and set an upper volume limit for each channel.
- **Presets** — Save and recall up to three presets for each channel via an RS-232 device. Each preset saves volume, bass, treble, and input gain settings.
- **Balanced/unbalanced inputs and outputs** — The RAC 104 is compatible with both balanced and unbalanced audio, and can be used as a balanced-to-unbalanced audio converter.

- **Consumer and professional audio compatibility** — Input and output line level can be set to consumer (-10 dBV) or professional (+4 dBu).
- **Front panel security lockout**
- **Rack-mountable 1U, quarter rack width metal enclosure**
- **Extron Everlast Power Supply is covered by a 7-year parts and labor warranty.**

Application Diagram

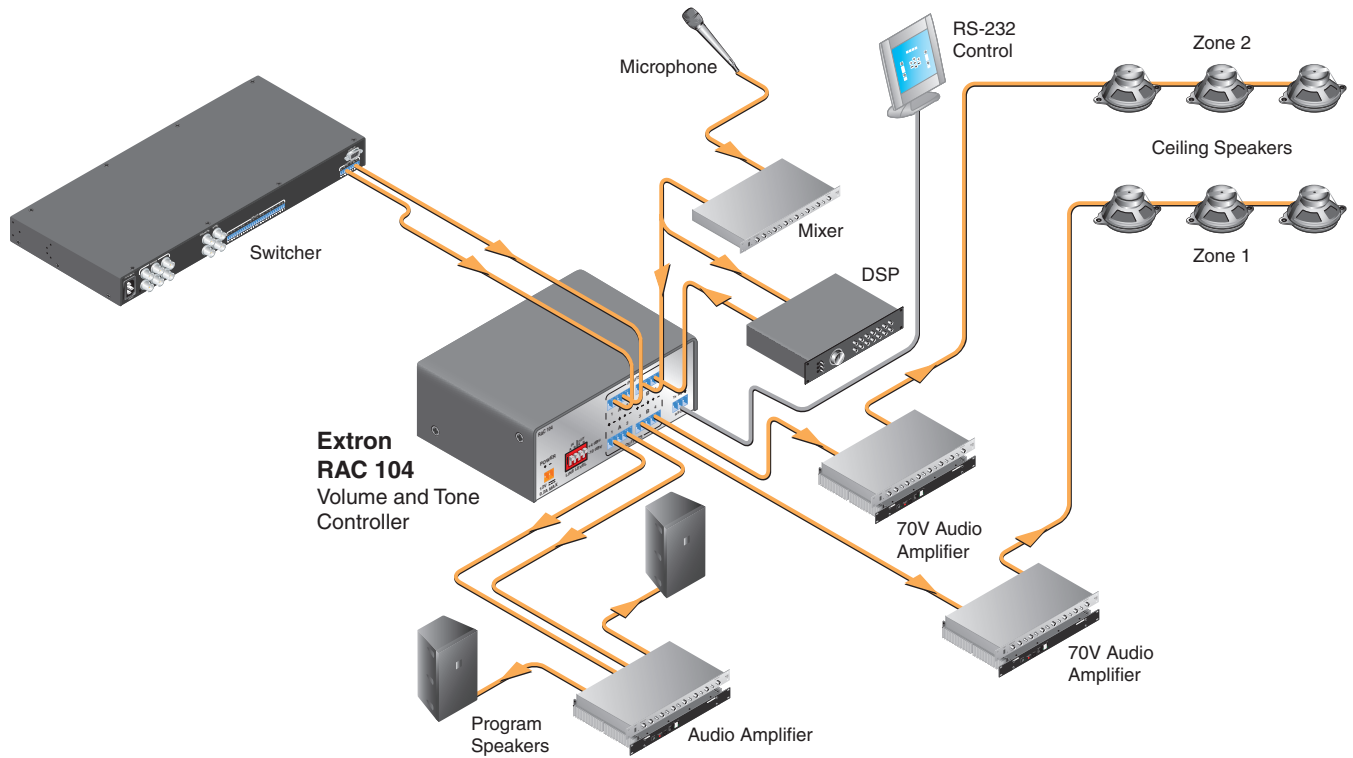


Figure 1. Typical RAC 104 Application

Installation and Operation

This section describes the installation of the RAC 104, including:

- [Installation Overview](#)
- [Rear Panel Features and Cabling](#)
- [Front Panel Controls](#)

Installation Overview

ATTENTION: Risk of property damage: Installation and service must be performed by authorized personnel only. This product should be used with a UL approved electrical box.

ATTENTION : Risque de dommages matériels : L'installation et la maintenance du système doivent être exclusivement effectuées par le personnel autorisé. Ce produit devrait être utilisé avec un boîtier électrique certifié UL.

To install and set up the RAC 104 , follow these steps:

1. **Turn off all equipment and disconnect it** from the power source.
2. **Mount the RAC 104** (if applicable) or affix the rubber feet to the bottom of the unit for tabletop use (see [Mounting the RAC 104](#) starting on page 21).
3. **Attach the cables to the audio input and output devices.** Wire the connectors (see [figure 3](#) on page 4 and [figure 4](#) on page 4).
4. **If the RAC 104 is to be connected to a computer or host controller for remote control**, connect the host RS-232 cable to the RAC 104 3-pole captive screw RS-232 connector. Wire the connector as shown in [figure 5](#) on page 4 (see [Remote Control](#) starting on page 10 for more information on remote control).
5. **Set the line level selector DIP switches to** -10 dBV (unbalanced, consumer line level) or +4 dBu (balanced, professional line level).
6. **Connect power cords.** Wire the RAC 104 power connector as shown in [figure 6](#) on page 5.
7. **Turn all the equipment on.**
8. **Set volume, bass, and treble levels using** the front panel controls, Simple Instruction Set commands (see [Volume, bass, and treble range limit settings](#) on page 16), or the Extron Audio Products Control Program (see [Setup and Control Software](#) on page 17 for more information).

Rear Panel Features and Cabling

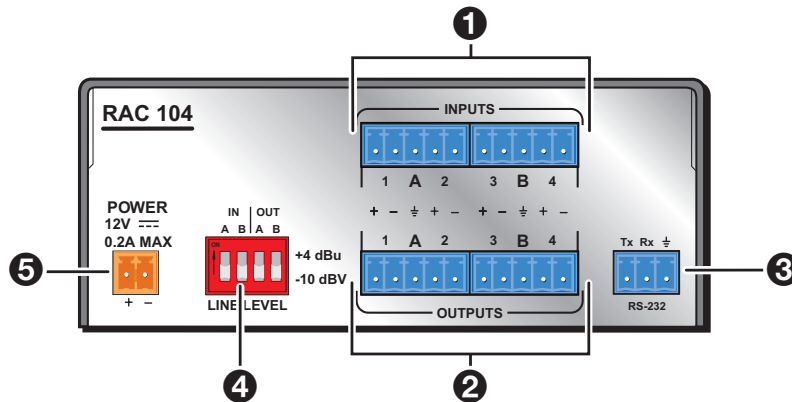


Figure 2. RAC 104 Rear Panel Connectors

- 1 Input connectors** — Plug the audio input devices into these two 5-pole captive screw connectors. One stereo device or two mono devices can be connected to each captive screw connector. Wire the connectors as shown below.

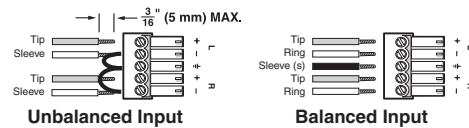


Figure 3. Wiring the Audio Input Connectors

- 2 Output connectors** — Plug the audio output devices into these two 5-pole captive screw connectors. One stereo device or two mono devices can be connected to each captive screw connector. Wire the connectors as shown below.

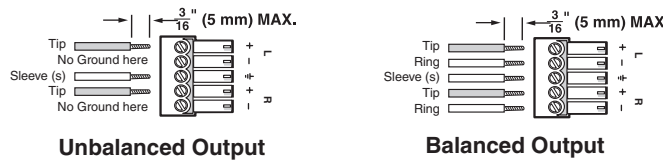


Figure 4. Wiring the Audio Output Connectors

ATTENTION:

- Connect the sleeve to ground (Gnd). Connecting the sleeve to a negative (-) terminal will damage the audio output circuits.
- Connectez le manchon à la borne de terre (Gnd). Connecter le manchon à une borne négative (-) endommagera les circuits de la sortie audio.

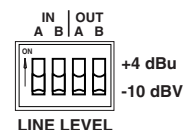
- 3 RS-232 connector** — Plug an optional RS-232 device into this 3-pole captive screw connector. Wire the connector as shown below.

Pin	RS-232 function	Description
1	Tx	Transmit data
2	Rx	Receive data
3	Gnd	Signal ground



Figure 5. Wiring the RS-232 Connector

- 4 Line level selector DIP switches** — Set these switches to -10 dBV (unbalanced, consumer line level) or +4 dBu (balanced, professional line level). There are four switches, one for each input group and output group.



- 5 **Power connector** (see **figure 5** on the previous page)— An external 12 V power supply is included with the unit. Plug it into this 2-pole captive screw connector. Wire the connector as shown below.

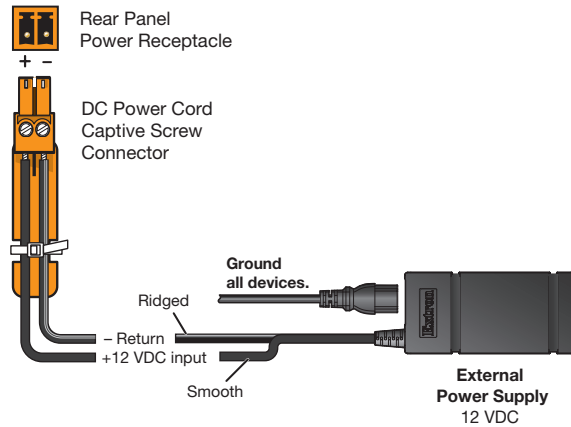


Figure 6. Rear Panel 12 VDC Power Connector

CAUTION: The DC output cables must be kept separate from each other while the power supply is plugged in. Remove power before wiring

AVERTISSEMENT : Les câbles de sortie CC doivent être séparés les uns des autres tant que la source d'alimentation est branchée. Coupez l'alimentation avant d'effectuer les raccordements.

ATTENTION:

- **Do not** connect power to the switcher until you have read the ATTENTION notifications.
- Ne branchez pas l'alimentation au avant d'avoir lu les mises en garde «ATTENTION ».
- Always use a power supply supplied and or specified by Extron. Use of an unauthorized power supply voids all regulatory compliance certification and may cause damage to the supply and the end product.
- Utilisez toujours une source d'alimentation fournie ou recommandée par Extron. L'utilisation d'une source d'alimentation non autorisée annule toute conformité réglementaire et peut endommager la source d'alimentation ainsi que le produit final.
- If not provided with a power supply, this product is intended to be supplied by a power source marked "Class 2" or "LPS" and rated at 12 VDC and a minimum of 0.5 A.
- Si le produit n'est pas fourni avec une source d'alimentation, il doit être alimenté par une source d'alimentation certifié UL de classe 2 ou LPS, avec une tension nominale 12 Vcc, 0.5 A minimum.
- The installation must always be in accordance with the applicable provisions of National Electrical Code ANSI/NFPA 70, article 725 and the Canadian Electrical Code part 1, section 16. The power supply shall not be permanently fixed to building structure or similar structure.
- Cette installation doit toujours être conforme aux dispositions applicables du Code américain de l'électricité (National Electrical Code) ANSI/NFPA 70, article 725, et du Code canadien de l'électricité, partie 1, section 16. La source d'alimentation ne devra pas être fixée de façon permanente à une structure de bâtiment ou à une structure similaire.

ATTENTION:

- Power supply voltage polarity is critical. Incorrect voltage polarity can damage the power supply and the unit. The ridges on the side of the cord (see figure 6) identify the power cord negative lead.
- La polarité de la source d'alimentation est primordiale. Une polarité incorrecte pourrait endommager la source d'alimentation et l'unité. Les stries sur le côté du cordon (voir figure 6) permettent de repérer le pôle négatif du cordon d'alimentation.
- To verify the polarity before connection, plug in the power supply with no load and check the output with a voltmeter.
- Pour vérifier la polarité avant la connexion, brancher l'alimentation hors charge et mesurer sa sortie avec un voltmètre.
- The length of the exposed (stripped) copper wires is important. **The ideal length is 3/16 inch (5 mm).** Longer bare wires can short together. Shorter wires are not as secure in the connectors and could be pulled out.
- La longueur des câbles exposés est primordiale lorsque l'on entreprend de les dénuder. **La longueur idéale est de 5 mm (3/16 inches).** S'ils sont trop longs, les câbles exposés pourraient se toucher et provoquer un court circuit. S'ils sont trop courts, ils peuvent être tirés facilement, même s'ils sont correctement serrés par les borniers à vis.
- Unless otherwise stated, the AC/DC adapters are not suitable for use in air handling spaces or in wall cavities.
- Sauf mention contraire, les adaptateurs CA/CC ne conviennent pas à une utilisation dans les espaces d'aération ou dans les cavités murales.
- Remote power is intended for indoors use only. No part of a network that uses remote power can be routed outdoors.
- L'alimentation à distance est exclusivement réservée à un usage en intérieur. Un réseau utilisant une alimentation à distance ne peut pas être routé en extérieur.

NOTE: After making any adjustments to the RAC 104, either via the front panel controls, SIS commands, or the Extron Audio Products Control Program, wait at least 10 seconds after making those changes before disconnecting power to the RAC 104. Failure to observe the 10-second timeout may result in those adjustments not being saved.

Front Panel Controls

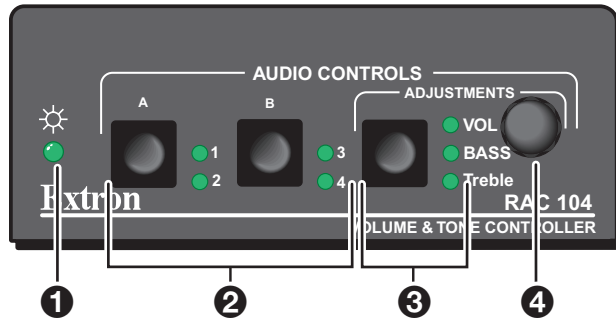


Figure 7. RAC 104 Controls and Indicators

- 1 Power LED** — Lights to indicate that the RAC 104 is on.
- 2 Channel selector buttons and LEDs** — The RAC 104 has two channel selector buttons, one for channel group A (channels 1 and 2) and one for channel group B (channels 3 and 4). Press and release these buttons to select the channel or channels to adjust. When a channel is selected, the corresponding LED lights.

Pressing the buttons repeatedly cycles through four possible selections:

- Both LEDs on** — Both channels selected (tied, for stereo audio).

NOTE: When both channels in a group are selected, they will be tied together once the user turns the adjustment knob. The RAC 104 automatically sets both channels to the same volume and tone levels and any future changes will affect both channels simultaneously. To cancel a tie, press and release the channel selector button again and then turn the adjustment knob (see Channel Ties for more information).

- LED 1 (or 3) on** — Mono channel 1 (or 3) or the left stereo channel selected.
- LED 2 (or 4) on** — Mono channel 2 (or 4) or the right stereo channel selected.
- Both LEDs off** — No channel selected.

NOTE: Groups A and B cannot be adjusted at the same time. Pressing the button for one group will cause the LEDs for the other group to turn off.

- 3 Adjustment selector button and LEDs** — Press and release this button to select volume, bass, or treble adjustment. When an adjustment is selected, the corresponding LED lights. If after 10 seconds you do not make any other adjustments or selections on the front panel, this selector will default to volume.

NOTE: The adjustment selector button will not function unless you have first selected one or more channels (see 2).

- 4 Adjustment knob** — Turn this knob to adjust the volume, bass, or treble for the channel or channels you selected using the channel selector buttons. When you reach the upper or lower limit of the allowable adjustment range, the adjustment selector LED flashes three times (see [Volume, bass, and treble range limit settings](#) on page 16, for instructions on setting volume and tone limits).

NOTE: The volume adjustment is speed sensitive. Turn the knob quickly to make coarse volume adjustments or slowly to make fine volume adjustments.

Channel Ties

The user can tie the two channels in a group together for stereo audio.

Creating a tie

To tie channels together:

1. Press the channel selector button until both LEDs are on.
2. Press the adjustment selector button to select either volume, bass, or treble and turn the adjustment knob in either direction.

The RAC 104 automatically sets both channels to the same volume or tone level using the following criteria:

- **For volume** — The unit changes the volume setting for the channel with the highest volume to match that of the other channel.

For example, if the volume on channel 1 is set to 85 and the volume on channel 2 is set to 50, the unit will change channel 1's volume setting to 50 when the user ties them together.

	Channel 1	Channel 2
Volume before tie	85	50
Volume after tie	50	50

- **For bass and treble** — The unit changes the tone setting for the channel with the tone setting farthest from 7 (0dB) to match that of the other channel.

For example, if the treble on channel 1 is set to 6 and the treble on channel 2 is set to 10, the unit will change the channel 2 treble setting to 6 when the user ties them together.

	Channel 1	Channel 2
Treble before tie	6	10
Treble after tie	6	6

Volume, bass, treble, and mute adjustments can now be made to both channels simultaneously. The user can continue to adjust the gain settings independently using the SIS commands (see [Command and Response Table for SIS Commands](#) on page 13) or the [Windows-Based Program Control](#) (see page 17) via the RS-232 connector.

Ties can also be made using the SIS or the Windows-based control program (see [Tie channels together](#) on page 15 or [Channel Ties](#) on page 8 for more information).

Cancelling a tie

To cancel a tie, press and release the channel selector button again so that only one channel selector LED is on, then turn the knob.

Ties can also be cancelled using the SIS or the Windows-based control program (see [Tie channels together](#) starting on page 15 or [Cancelling a tie](#) starting on page 8 for more information).

Resetting the RAC 104

To return the RAC 104 to its default settings, press and hold the adjustment selector button for 10 seconds. All the LEDs will light and then turn off. The default settings are:

- **Volume** — 70 (-30 dB)
- **Gain** — 0 dB
- **Bass** — 7 (0 dB)
- **Treble** — 7 (0 dB)

Any volume and tone limits are cancelled (see **Remote Control** starting on page 10 or **Setup and Control Software** starting on page 17 for information on limits).

The unit can also be reset using the SIS commands (see **System reset** on page 15 for more information) or the Windows-based control program (see **Setup and Control Software** on page 17).

Locking the Front Panel

To prevent accidental changes to the controller settings, the front panel controls can be locked using one of two executive modes. The user turns the executive modes on and off using either the SIS commands or the Windows-based control program via the RS-232 connector (see **Front panel lockout (Executive modes)** on page 15 or **Front Panel Security Lockout (Executive Modes)** starting on page 20 for more information).

If the user presses a front panel button that is locked, the LED corresponding to that button flashes three times.

Remote Control

Use Simple Instruction Set (SIS) commands to configure the RAC 104. This section provides information about using those commands. The following topics are discussed:

- [RS-232 Link](#)
- [Host-to-device Communication](#)
- [Using the Command and Response Tables](#)
- [Command and Response Table for SIS Commands](#)

RS-232 Link


The RAC 104 can be controlled remotely via the RS-232 port using the Extron Simple Instruction Set (SIS). The RS-232 port on the RAC 104 is a 3-pole captive screw connector, with one pole for transmitting data, one for receiving data, and one for the ground.

The RAC rear panel 3-pole, 3.5 mm, Host RS-232 connector (see [figure 2](#) on page 4) can be connected to the RS-232 serial port output of a host device such as a computer running the DataViewer utility or a control system.

The default protocol for both ports is as follows:

- 9600 baud
- 8-bit
- No parity
- 1 stop bit
- No flow control


Host-to-device Communication

The RAC 104 accepts SIS commands through the RS-232 port. SIS commands consist of one or more characters per command field. They do not require any special characters to begin or end the command character sequence. Each controller response to an SIS command ends with a carriage return and a line feed (CR/LF = ) , which signals the end of the response character string.

RAC-Initiated (Unsolicited) Messages

The following copyright message is initiated by the controller when it is first powered on. Vx.xx is the firmware version number.

Boot V1.00, (c) 2003, ? to Enter

(c) Copyright 2003, Extron Electronics, RAC 104, Vx.xx 
(for RS-232 connection)

Error Messages

When the RAC 104 receives an SIS command and determines that it is valid, it performs the command and sends a response to the host device. If the controller is unable to perform the command because the command is invalid or contains invalid parameters, the controller returns an error response to the host. The error response codes are:

- E01 — Invalid channel number (too large)
- E10 — Invalid command
- E13 — Invalid value (out of range)
- E14 — Invalid setting at this time (setting outside the upper or lower value limit)
- E23 — Firmware update failure

Using the Command and Response Tables

When programming in the field, certain characters are most conveniently represented by their hexadecimal rather than their ASCII values. Lowercase letters are acceptable in the command field except where indicated for the gain and attenuation commands. The table below shows the hexadecimal equivalent of each ASCII character:

		ASCII to Hex Conversion Table																Esc	1B	CR	0D	LF	0A
Space	→	20	!	21	"	22	#	23	\$	24	%	25	&	26	'	27							
		(	28	)	29	*	2A	+	2B	,	2C	-	2D	.	2E	/	2F						
		0	30	1	31	2	32	3	33	4	34	5	35	6	36	7	37						
		8	38	9	39	:	3A	;	3B	<	3C	=	3D	>	3E	?	3F						
		@	40	A	41	B	42	C	43	D	44	E	45	F	46	G	47						
		H	48	I	49	J	4A	K	4B	L	4C	M	4D	N	4E	O	4F						
		P	50	Q	51	R	52	S	53	T	54	U	55	V	56	W	57						
		X	58	Y	59	Z	5A	[	5B	\	5C	]	5D	^	5E	_	5F						
		`	60	a	61	b	62	c	63	d	64	e	65	f	66	g	67						
		h	68	i	69	j	6A	k	6B	l	6C	m	6D	n	6E	o	6F						
		p	70	q	71	r	72	s	73	t	74	u	75	v	76	w	77						
		x	78	y	79	z	7A	{	7B	|	7C	}	7D	~	7E	DEL	7F						

Figure 8. ASCII to Hex Conversion Table

Symbol Definitions

↵ = Carriage return with line feed

| or ↵ = Pipe character or carriage return (no line feed) can be used interchangeably.

• = Space character

W or [Esc] = W or Escape key can be used interchangeably.

[x1] = 0 through 100, output volume; attenuation (dB) = [x1] - 100. Default = 70 (-30 dB)

[x2] = 1 through 4, channel numbers

1 = group A, channel 1

2 = group A, channel 2

3 = group B, channel 3

4 = group B, channel 4

[x3] = 0 or 1

0 = off

1 = on

[x4] = 0 through 14, bass adjustment range (+/- 14 dB; 2 dB increment/decrement, bass in dB = [bass number minus 7] times 2; default = 7 [0 dB]).

[x5] = 0 through 14, treble adjustment range (+/- 14 dB; 2 dB increment/decrement, treble in dB = [treble number minus 7] times 2; default = 7 [0 dB]).

x6 = Front panel executive modes

0 = off

1 = executive mode 1

2 = executive mode 2

x7 = Controller software version to second decimal place.

x8 = A or B, group number

Group A = channels 1 and 2

Group B = channels 3 and 4

x9 = Preset number, 1 through 3

x10 = -12 through +12 (audio gain or attenuation in dB)

x11 = 0 through 12 (audio gain in dB)

x12 = 1 through 12 (audio attenuation in dB)

x13 = 000 through 015, decimal number indicates settings for the four input and output line level DIP switches. DIP switch settings are shown in the table below.

		x13															
DIP Switch	Group	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	Input A	Off	Off	Off	Off	Off	Off	Off	Off	On	On	On	On	On	On	On	On
2	Input B	Off	Off	Off	Off	On	On	On	On	Off	Off	Off	Off	On	On	On	On
3	Output A	Off	Off	On	On	Off	Off	On	On	Off	Off	On	On	Off	Off	On	On
4	Output B	Off	On	Off	On	Off	On	Off	On	Off	On	Off	On	Off	On	Off	On

Off = -10 dBV (unbalanced, consumer level)

On = +4 dBu (balanced, pro level)

Timeout

Pauses of 10 seconds or longer between command ASCII characters result in a timeout. The command operation is aborted with no other indication.

Command	ASCII Command (host to unit)	Response (unit to host)	Additional Description
Bass adjustment			
Specify bass level	$\boxed{x2}*\boxed{x4}>$	Bas $\boxed{x4}\leftarrow$	Set bass level for channel $\boxed{x2}$ to $\boxed{x4}$.
Increment bass level	$\boxed{x2}+>$	Bas $\boxed{x4}\leftarrow$	Increment bass level for channel $\boxed{x2}$ by 2 dB.
Decrement bass level	$\boxed{x2}->$	Bas $\boxed{x4}\leftarrow$	Decrement bass level for channel $\boxed{x2}$ by 2 dB.
View bass level	$\boxed{x2}>$	$\boxed{x4}\leftarrow$	View bass level for channel $\boxed{x2}$.
KEY: $\boxed{x2}$ = 1 through 4, channel numbers 1 = group A, channel 1, 2 = group A, channel 2, 3 = group B, channel 3 4 = group B, channel 4 $\boxed{x4}$ = 0 through 14, bass adjustment range (+ / - 14 dB; 2 dB increment/decrement, bass in dB = [bass number minus 7] times 2; default = 7 [0 dB]).			
Treble adjustment			
Specify treble level	$\boxed{x2}*\boxed{x5}<$	Trb $\boxed{x5}\leftarrow$	Set treble level for channel $\boxed{x2}$ to $\boxed{x4}$.
Increment treble level	$\boxed{x2}+<$	Trb $\boxed{x5}\leftarrow$	Increment treble level for channel $\boxed{x2}$ by 2 dB.
Decrement treble level	$\boxed{x2}-<$	Trb $\boxed{x5}\leftarrow$	Decrement treble level for channel $\boxed{x2}$ by 2 dB.
View treble level	$\boxed{x2}<$	$\boxed{x5}\leftarrow$	View treble level for channel $\boxed{x2}$.
KEY: $\boxed{x2}$ = 1 through 4, channel numbers 1 = group A, channel 1, 2 = group A, channel 2, 3 = group B, channel 3 4 = group B, channel 4 $\boxed{x5}$ = 0 through 14, treble adjustment range (+ / - 14 dB; 2 dB increment/decrement, treble in dB = [treble number minus 7] times 2; default = 7 [0 dB]).			
Preset save and recall			
Save preset	$\boxed{x2}*\boxed{x9},$	Spr $\boxed{x2}*\boxed{x9}\leftarrow$	Save preset $\boxed{x9}$ for channel $\boxed{x2}$.
Recall preset	$\boxed{x2}*\boxed{x9}.$	Rpr $\boxed{x2}*\boxed{x9}\leftarrow$	Recall preset $\boxed{x9}$ for channel $\boxed{x2}$.
View preset status	$\boxed{x2},$	$\boxed{x3}\bullet\boxed{x3}\bullet\boxed{x3}\leftarrow$	View preset status for channel $\boxed{x2}$ (see note below).
	<i>Example:</i> 3.	0 1 1 \leftarrow	For channel 3, preset 1 is empty, preset 2 is used, and preset 3 is used.
NOTE: Each of the four channels has three presets. The View Preset command response tells the user which presets for a particular channel have been used to save settings and which are empty. The response consists of a sequence of three digits. The first, second, and third digits indicate the status of presets 1, 2, and 3, respectively. A 0 in the sequence indicates an empty preset, a 1 indicates a used preset.			
KEY: $\boxed{x2}$ = 1 through 4, channel numbers 1 = group A, channel 1, 2 = group A, channel 2, 3 = group B, channel 3 4 = group B, channel 4 $\boxed{x3}$ = 0 or 1 0 = off, 1 = on $\boxed{x9}$ = Preset number 1 through 3			

Command	ASCII Command (host to unit)	Response (unit to host)	Additional Description
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Information requests

Request DIP switch settings	I / i	$\overline{x13}$ ↵	
Request for part number	N / n	xx - xxx - xx↵	60 - 561 - 01
Query software version	Q / q	$\overline{x7}$ ↵	

KEY: $\overline{x7}$ = Controller software version to second decimal place.
 $\overline{x13}$ = 000 through 015, decimal number indicates settings for the four input and output line level DIP switches. DIP switch settings are shown in the table below. Off = -10 dBV (unbalanced, consumer level), On = +4 dBu (balanced, pro level)

DIP Switch	Group	$\overline{x13}$															
		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	Input A	Off	Off	Off	Off	Off	Off	Off	Off	On	On	On	On	On	On	On	On
2	Input B	Off	Off	Off	Off	On	On	On	On	Off	Off	Off	Off	On	On	On	On
3	Output A	Off	Off	On	On	Off	Off	On	On	Off	Off	On	On	Off	Off	On	On
4	Output B	Off	On	Off	On	Off	On	Off	On	Off	On	Off	On	Off	On	Off	On

Volume, bass, and treble range limit settings

Set volume lower limit	$\overline{x2}*\overline{x1}*21\#$	V11 $\overline{x2}*\overline{x1}$ ↵	Set volume lower limit for channel $\overline{x2}$ to $\overline{x1}$.
Set volume upper limit	$\overline{x2}*\overline{x1}*22\#$	Vu1 $\overline{x2}*\overline{x1}$ ↵	Set volume upper limit for channel $\overline{x2}$ to $\overline{x1}$.
View volume lower limit	$\overline{x2}*21\#$	$\overline{x1}$ ↵	View volume lower limit setting for channel $\overline{x2}$.
View volume upper limit	$\overline{x2}*22\#$	$\overline{x1}$ ↵	View volume upper limit setting for channel $\overline{x2}$.
Set bass lower limit	$\overline{x2}*\overline{x4}*23\#$	B11 $\overline{x2}*\overline{x4}$ ↵	Set bass lower limit for channel $\overline{x2}$ to $\overline{x4}$.
Set bass upper limit	$\overline{x2}*\overline{x4}*24\#$	Bu1 $\overline{x2}*\overline{x4}$ ↵	Set bass upper limit for channel $\overline{x2}$ to $\overline{x4}$.
View bass lower limit	$\overline{x2}*23\#$	$\overline{x4}$ ↵	View bass lower limit setting for channel $\overline{x2}$.
View bass upper limit	$\overline{x2}*24\#$	$\overline{x4}$ ↵	View bass upper limit setting for channel $\overline{x2}$.
Set treble lower limit	$\overline{x2}*\overline{x5}*25\#$	T11 $\overline{x2}*\overline{x5}$ ↵	Set treble lower limit for channel $\overline{x2}$ to $\overline{x5}$.
Set treble upper limit	$\overline{x2}*\overline{x5}*26\#$	Tu1 $\overline{x2}*\overline{x5}$ ↵	Set treble upper limit for channel $\overline{x2}$ to $\overline{x5}$.
View treble lower limit	$\overline{x2}*25\#$	$\overline{x5}$ ↵	View treble lower limit setting for channel $\overline{x2}$.
View treble upper limit	$\overline{x2}*26\#$	$\overline{x5}$ ↵	View treble upper limit setting for channel $\overline{x2}$.

KEY: $\overline{x1}$ = 0 through 100, output volume; attenuation (dB) = $\overline{x1}$ - 100. Default = 70 (-30 dB)
 $\overline{x2}$ = 1 through 4, channel numbers 1 = group A, channel 1, 2 = group A, channel 2, 3 = group B, channel 3, 4 = group B, channel 4
 $\overline{x4}$ = 0 through 14, bass adjustment range (+ / - 14 dB; 2 dB increment/decrement, bass in dB = [bass number minus 7] times 2; default = 7 [0 dB]).
 $\overline{x5}$ = 0 through 14, treble adjustment range (+ / - 14 dB; 2 dB increment/decrement, treble in dB = [treble number minus 7] times 2; default = 7 [0 dB]).

Setup and Control Software

This section describes the Windows-based Extron Audio Products Control Program, including:

- **Windows-Based Program Control**
- **Front Panel Security Lockout (Executive Modes)**
- **Presets**
- **Mute**

Windows-Based Program Control

The Windows-based Extron Audio Products Control Program is compatible with Windows 2000 and Windows XP and provides remote control of the volume, gain, and tone adjustment, and other RAC 104 features.

NOTE: The audio control software works with Windows 7 and Windows 10, but the Help File is not accessible in these newer versions of the operating system.

Updates to this program can be downloaded from the [Extron website](#).

RS-232 Links

The RAC 104 can be controlled remotely via the rear panel 3-pole, 3.5 mm RS-232 port (see [figure 2](#) on page 4) connected to the RS-232 serial port output of a host device, such as a computer running the DataViewer utility, a control system, or the Extron Windows-based control program.

The default protocol for this port is as follows:

- 9600 baud
- 8-bit
- No parity
- 1 stop bit
- No flow control

Installing the Software

The program can be downloaded from www.extron.com. To download the software:

1. Hover over **Download** tab on the Extron website.
2. Click **Software** from the dropdown window.
3. Scroll down to **Audio Products** and click on **Download** (see figure 9, ①).

Audio Products Control software for the MVC 121 and RAC 104.	29-075-01	1.3	Apr. 14, 2004	2.8 MB	① Download
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Figure 9. Audio Products Download

Using the software

To run the software:

1. Double click the **Audio Products Control Program** icon in the Extron Electronics program group.

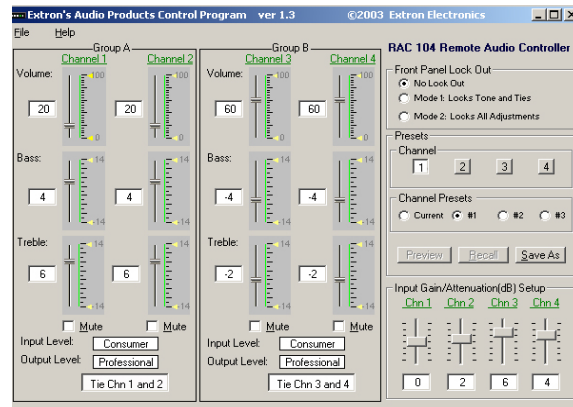


Figure 10. Windows-based Control Program Main Window

2. Click the comm port that is connected to the RAC 104 remote connector.
3. Click **OK**. The Audio Products Control Program main window displays the current volume, tone, and gain/attenuation settings for each channel and allows the user to adjust them. The window also contains channel tie, channel mute, front panel lock out (executive modes), and preset controls.

Input/Output Level fields

The Input Level and Output Level fields display the current settings for the line level selector DIP switches (see [Rear Panel Features and Cabling](#) on page 4 for more information).

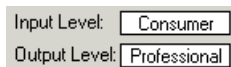


Figure 11. Input/Output Level Fields

Preset Preview button

To view a preset before recalling it, select a channel and preset number, then click and hold the **Preview** button.

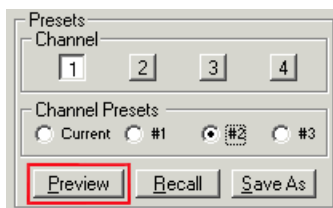


Figure 12. Preset Preview Button

Setting volume and tone limits

Volume and tone limits allow you to specify the range of allowable volume, bass, and treble values. To set upper and lower volume and tone limits:

1. On the File menu, click **Advanced Setup**, then click **Set Limits**. A check mark appears next to Set Limits.

2. In the **Volume and Tone** adjustment area of the main window, click and drag the yellow arrows up or down to change the upper and lower limits (see figure 13). Limits for channels tied together will change simultaneously.

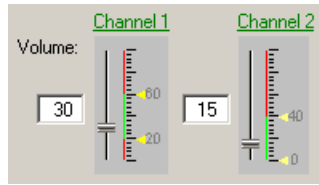


Figure 13. Volume and Tone Adjustment Panel

3. To lock the limits to the values you selected in step 2, click **Advanced Setup** on the **File** menu, then click **Set Limits**. The check mark next to **Set Limits** disappears.

Using the Help System

For information about program features, you can access the help program in any of the following ways:

- From the Extron Electronics program group, double-click the **Audio Products Help** icon.
- From within the Audio Products Control program, click **Help** on the task bar.
- From within the Audio Products Control program, press the **F1** key.

Updating the firmware

Firmware updates will periodically become available on the Extron website. To load a firmware update:

1. Download the update file from the [Extron website](#).
2. Run the Audio Products Control Program.
3. On the **File** menu, click **Update Firmware**. The **Firmware Loader** window appears.

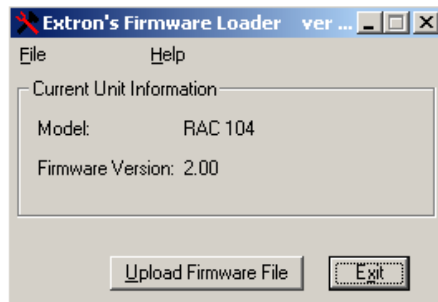


Figure 14. Firmware Loader Window

4. Click the **Upload Firmware File** button.
5. Locate and select the update file you downloaded from the website and click **Open**. The **Firmware Loader** loads the update.

The RAC 104 front panel LEDs flash intermittently during the loading process. Once loading is complete, all the LEDs flash simultaneously for 10 seconds and then return to their default settings.

NOTE: The firmware update file must have an **.s19** extension. If it does not have that extension it will not work properly.

6. After the update has completed loading, click **Exit**.

Front Panel Security Lockout (Executive Modes)

To prevent accidental changes to the controller settings, the front panel controls can be locked using one of two executive modes. The user turns the executive modes on and off using either the SIS command (see [Front panel lockout \(Executive modes\)](#) on page 15) or the Windows-based control program via the RS-232 connector. While an executive mode is on, the locked controls can be adjusted through the RS-232 device only.

- **Executive mode 1** locks the tone controls and channel selector buttons only. The user can continue to change the volume via the front panel.
- **Executive mode 2** locks all the front panel controls.

Presets

The user can program up to three presets for each channel using the SIS commands (see [Preset save and recall](#) on page 14) or the Windows-based control program via the RS-232 connector. The presets allow the user to save the current input gain and output volume, bass, and treble settings for recall at a later time.

When two channels are tied together, selecting a preset for either channel will set the volume, bass, treble, and gain for both channels. Input gain for tied channels can be adjusted independently.

Mute

The user can mute each channel using the SIS commands (see [Mute](#) on page 13) or the Windows-based control program via the RS-232 connector.

- Volume and tone settings can still be adjusted while a channel is muted.
- When two channels are tied together, selecting mute or unmute for one channel will mute or unmute both.
- When the user ties a muted channel to a channel that is not muted, the RAC 104 unmutes the muted channel automatically.

Reference Information

Mounting the RAC 104

The RAC 104 can be set on a table or mounted on a rack shelf, under a desk or tabletop, or on a projector mount (go to www.extron.com for optional mounting kits).

Tabletop Use

Four self-adhesive rubber feet are included with the RAC 104. For tabletop use, attach one foot at each corner of the bottom side of the unit and place the unit in the desired location.

Rack Mounting

UL rack mounting guidelines

The following Underwriters Laboratories (UL) guidelines pertain to the safe installation of the RAC 104 in a rack:

- 1. Elevated operating ambient temperature** — If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient temperature. Therefore, install the RAC 104 in an environment compatible with the maximum ambient temperature ($T_{ma} = +122\text{ °F}, +50\text{ °C}$) specified by Extron.
- 2. Reduced air flow** — Install the equipment in a rack so that the amount of air flow required for safe operation of the equipment is not compromised.
- 3. Mechanical loading** — Mount the equipment in the rack so that a hazardous condition is not achieved due to uneven mechanical loading.
- 4. Circuit overloading** — Connect the equipment to the supply circuit and consider the effect that circuit overloading might have on overcurrent protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.
- 5. Reliable earthing (grounding)** — Maintain reliable grounding of rack-mounted equipment. Pay particular attention to supply connections other than direct connections to the branch circuit (for example, use of power strips).

For rack mounting, do not install the rubber feet. Mount the RAC 104 on an optional Extron 1U rack shelf (see [figure 15](#) on the next page):

1. Remove rubber feet if they were previously installed on the bottom of the RAC 104.
2. Mount the unit on the rack shelf, using two 4-40 x 3/16 inches screws in opposite (diagonal) corners to secure the unit to the shelf.
3. Install blank panel(s) or other unit(s) on the rack shelf.
4. Attach the rack shelf to the rack using the supplied bolts.

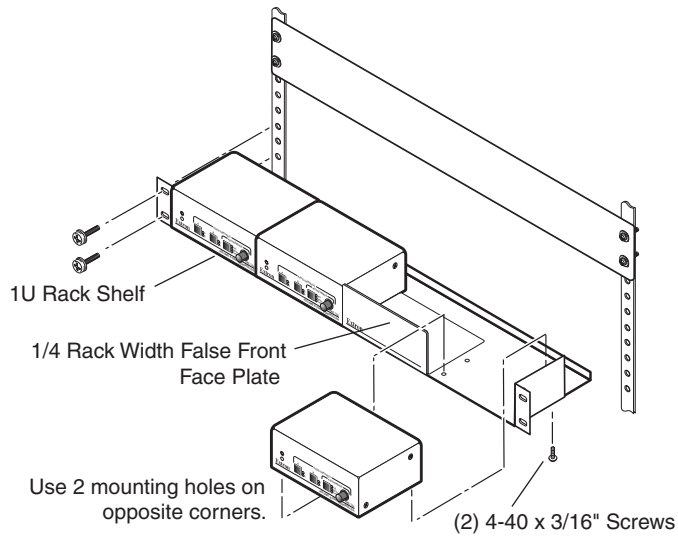


Figure 15. Mounting the RAC 104 on a RSF 123 Rack shelf

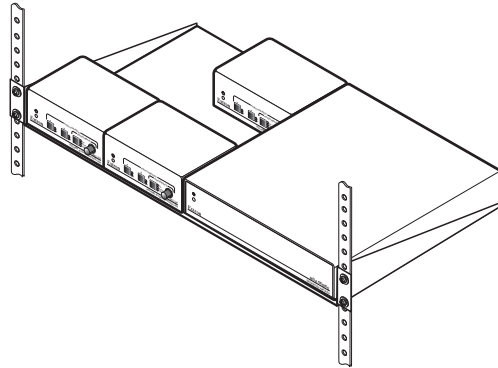


Figure 16. Mounting the RAC 104 on a RSU 129 Rack Shelf

Furniture Mounting

Furniture mount the RAC 104 using the optional mounting kit as follows (see [figure 17](#) on the next page):

1. Remove rubber feet if they were previously installed on the bottom of the RAC 104.
2. Attach the furniture mounting brackets to the RAC 104 with the machine screws provided.
3. Hold the RAC 104 with the attached brackets against the underside of the table or other furniture. Mark the location of the screw holes of the bracket on the mounting surface.
4. Drill 3/32 inch (2 mm) diameter pilot holes, 1/4 inch (6.3 mm) deep in the mounting surface at the marked screw locations.
5. Insert #8 wood screws into the four pilot holes. Tighten each screw into the mounting surface until just less than 1/4 inch of the screw protrudes.
6. Align the mounting screws with the slots in the brackets and place the RAC 104 against the surface, with the screws through the bracket slots (see [figure 17](#) on the next page).
7. Slide the RAC 104 slightly forward or back, then tighten all four screws to secure the unit in place.

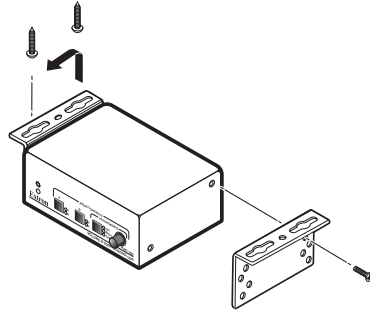


Figure 17. Mounting the RAC 104 Under Furniture

Projector mounting

Projector mount the RAC 104 using the optional pole mount kit as follows:

1. Remove rubber feet if they were previously installed on the bottom of the RAC 104.
2. Attach the projector mounting bracket to the RAC 104 with the machine screws provided.
3. Secure the RAC 104 to a projector mount or other surface by inserting the mounting bolt through the bracket slotted hole, as shown in figure 18.

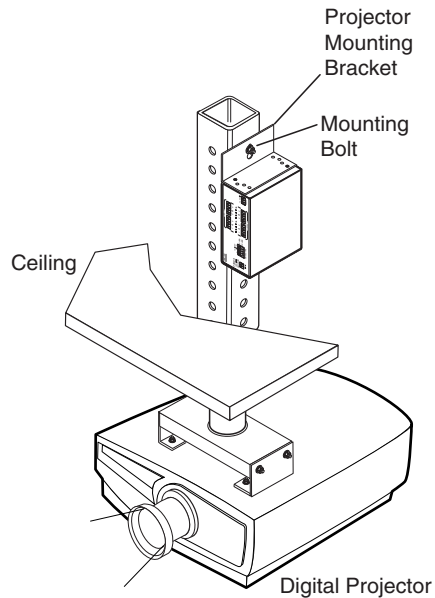


Figure 18. Mounting the RAC 104 on a Projector Mount

Extron Warranty

Extron Electronics warrants this product against defects in materials and workmanship for a period of three years from the date of purchase. In the event of malfunction during the warranty period attributable directly to faulty workmanship and/or materials, Extron Electronics will, at its option, repair or replace said products or components, to whatever extent it shall deem necessary to restore said product to proper operating condition, provided that it is returned within the warranty period, with proof of purchase and description of malfunction to:

**USA, Canada, South America,
and Central America:**

Extron Electronics
1230 South Lewis Street
Anaheim, CA 92805
U.S.A.

Japan:

Extron Electronics, Japan
Kyodo Building, 16 Ichibancho
Chiyoda-ku, Tokyo 102-0082
Japan

Europe and Africa:

Extron Europe
Hanzeboulevard 10
3825 PH Amersfoort
The Netherlands

China:

Extron China
686 Ronghua Road
Songjiang District
Shanghai 201611
China

Asia:

Extron Asia Pte Ltd
135 Joo Seng Road, #04-01
PM Industrial Bldg.
Singapore 368363
Singapore

Middle East:

Extron Middle East
Dubai Airport Free Zone
F13, PO Box 293666
United Arab Emirates, Dubai

This Limited Warranty does not apply if the fault has been caused by misuse, improper handling care, electrical or mechanical abuse, abnormal operating conditions, or if modifications were made to the product that were not authorized by Extron.

NOTE: If a product is defective, please call Extron and ask for an Application Engineer to receive an RA (Return Authorization) number. This will begin the repair process.

USA: 714.491.1500 or 800.633.9876
Asia: 65.6383.4400

Europe: 31.33.453.4040
Japan: 81.3.3511.7655

Units must be returned insured, with shipping charges prepaid. If not insured, you assume the risk of loss or damage during shipment. Returned units must include the serial number and a description of the problem, as well as the name of the person to contact in case there are any questions.

Extron Electronics makes no further warranties either expressed or implied with respect to the product and its quality, performance, merchantability, or fitness for any particular use. In no event will Extron Electronics be liable for direct, indirect, or consequential damages resulting from any defect in this product even if Extron Electronics has been advised of such damage.

Please note that laws vary from state to state and country to country, and that some provisions of this warranty may not apply to you.

