DATA SHEET

RPM 88 / 44 / 22

PROGRAMMABLE MULTIPROCESSORS

Software Features

- Drag Net™ setup & control software for Windows® XP
- Signal flow and critical settings in plain view on one screen
- Fully programmable processing configurations
- Expandable collection of processing blocks
- Firmware upgrades via Ethernet connection
- Download the latest Drag Net now at www.rane.com

See the Drag Net Data Sheet for software details.

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Drag Net is a trademark of Rane Corporation

Hardware Features

- RPM 88 has 8 balanced analog I/O plus AES3 stereo digital I/O
- RPM 44 has 4 balanced analog I/O plus AES3 stereo digital I/O
- RPM 22 has 2 balanced analog I/O plus AES3 stereo digital I/O
- Powerful DSP, up to 48-bit precision processing
- 106 dB dynamic range for line levels
- Studio grade mic/line preamplifiers on all analog inputs
- 48 volt phantom power
- Presets recall via contact closures
- Versatile Input Port for remote control via voltage
- Versatile Output Port provides relay drive
- 10Base-T Ethernet control
- RS-485 control supports Rane Smart Remotes
- UL/CSA/CE internal power supply (100-240 VAC)

See the RPM 26z, RPM 2, RPM 2m, and Smart Remote Data Sheets for more Drag Net products.

General Description

The RPM 88, 44, and 22 are *100% drag and drop configurable* DSP-based devices, set up and controlled using Rane's new Drag Net™ software. Industry standard 10Base-T Ethernet is used to communicate between Drag Net devices and any Ethernet-equipped PC running Microsoft Windows®. Drag Net offers the ultimate in signal processing flexibility, allowing you to draw the system you need without signal flow restrictions. Familiar Windows file management tools and Shortcuts are incorporated into Drag Net, allowing complete project management within a single interface.

The RPM 88 provides eight balanced, studio-grade analog inputs (selectable mic or line level), and eight balanced analog outputs. The RPM 44 and 22 offer the same high-quality analog I/O, in 4 and 2 channel configurations respectively. A two-channel AES3 digital input and two-channel AES3 digital output are also provided on each, making the RPM 88 a true 10-input, 10-output device, (and the RPM 44 a 6-in 6-out, and the RPM 22 a 4-in 4-out). All I/O, including the AES3 I/O, has its own, 100% user-defined signal processing path. The RPM's analog inputs feature software-controllable mic preamps with an equivalent input noise (EIN) of -128 dBu, satisfying even the most demanding audio applications.

Cost-effective end user control is possible using optional Rane accessories in conjunction with the RW 485 Remote Interface Port and Versatile Input and Output logic Ports. Whether your application requires contact closure Preset recall, remote level control using a potentiometer on a wall, or multi-zone source selection and smart, reconfigurable volume controls, Drag Net and the RPM 88 / 44 / 22 keep the user interface easy *and* inexpensive.

Euroblock connectors are provided for audio I/O, logic I/O and the RW 485 port. Grounding screws for direct connection to the metal chassis are provided for solving EMI problems due to shield wiring. Also found on the rear panel are standard XLR-type connectors for the AES3 I/O, an RJ-45 Ethernet connector for computer control and an IEC AC power input.

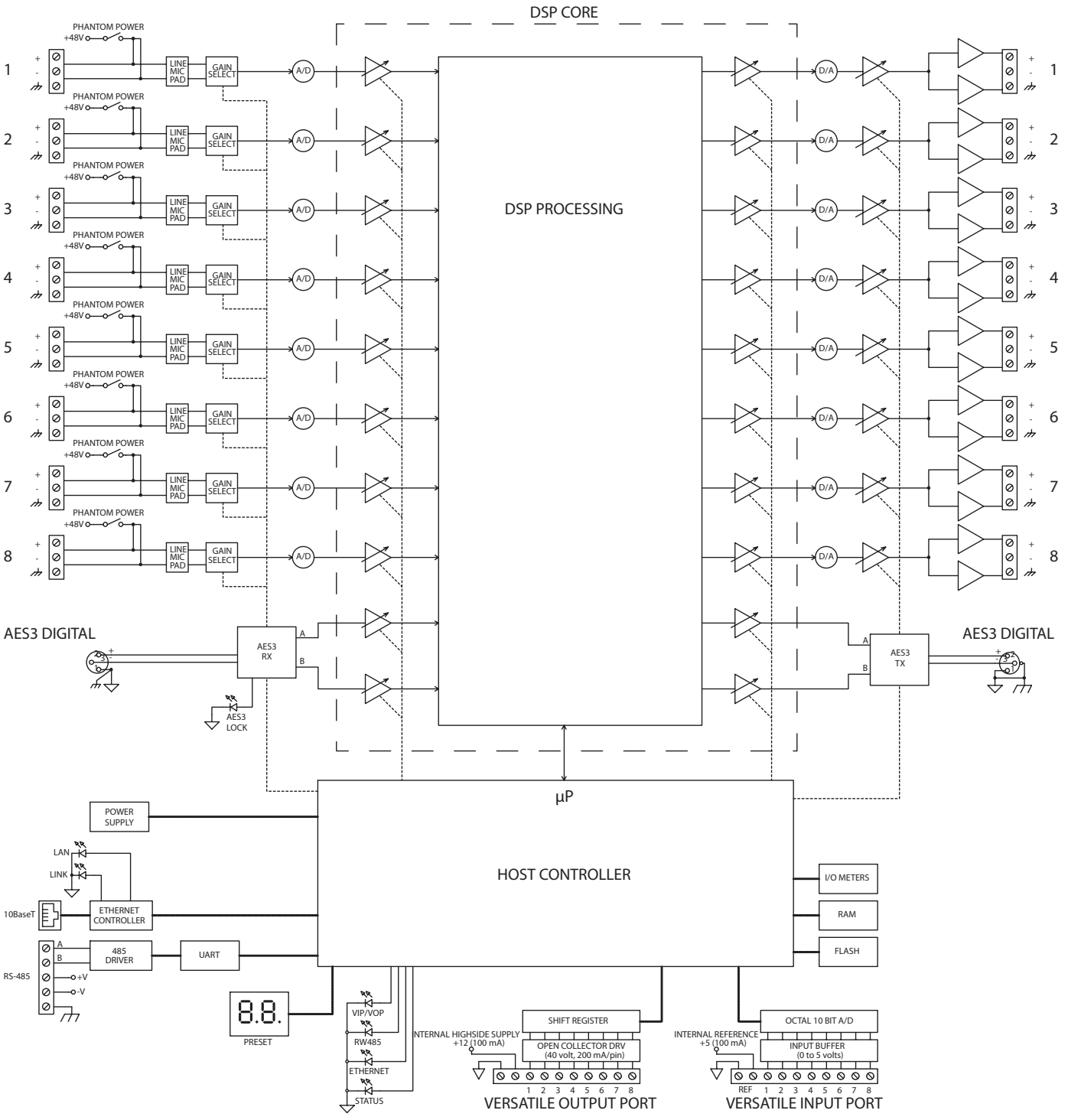
All DSP algorithms are not created equally and textbook DSP algorithms miss the mark where the rubber meets the road. Rane's team of audio-savvy DSP mathematicians – a rare breed itself – in conjunction with our industry-leading analog signal processing gurus have combined forces to offer superlative digital *and* analog audio performance. With 24-bit converters, greater than 106 dB throughput dynamic range and double-precision 48-bit internal DSP "math," the RPM 88 / 44 / 22 offers the best DSP algorithms and audio performance available. *These ain't no Internet appliances!* For example, the RPM 88's 400 MIPs translate into 225 fully parametric EQ filters, should you need multiple channels of 15 band parametrics and nothing else. (The RPM 44 and 22 each employ 200 MIPs, translating into 125 parametrics.)

Multiple units are controlled from a single computer using low-cost Ethernet switches. The recessed Default button on the rear panel recalls Preset 1 in case of communications failure. The front panel has three-segment LED meters for each input and output, allowing fast and intuitive signal flow verification without a computer. Control Port, Power, Ethernet and Status indicators are also on the front panel. Powered from an internal UL recognized, CSA and CE certified power supply, the RPM 88 / 44 / 22 is compatible with any installation mandating agency compliance.

RPM Family Comparison

Model	Analog Inputs	Analog Outputs	AES3 Input	AES3 Output	Total Inputs	Total Outputs
RPM 2	2 line	2	no	no	2	2
RPM 2m	2 mic/line	2	no	yes	2	4
RPM 26z	2 line	6	yes	no	4	6
RPM 22	2 mic/line	2	yes	yes	4	4
RPM 44	4 mic/line	4	yes	yes	6	6
RPM 88	8 mic/line	8	yes	yes	10	10

RPM 88 Block Diagram



The RPM 44 uses the same Block Diagram, with four analog inputs and four analog outputs.

The RPM 22 uses the same Block Diagram, with two analog inputs and two analog outputs.

Features and Specifications

Parameter	Specification	Limit	Units	Conditions/Comments
Analog I/O	Active Balanced			Euroblock connectors
Input Trim range	+16 to -20 (plus mute)		dB	1 dB steps
Mic Gain Settings	+15 to +60	1	dB	15, 30, 45, 60 dB @ 1 kHz
.....Input Impedance	2.53k	1%	Ω	@ 1 kHz, each leg to ground
.....Phantom Power	+48	4%	VDC	10 mA max / channel
.....Equivalent Input Noise	-128	max	dBu	20-20 kHz, 150 Ω source, 60 dB gain
.....THD+N	<0.03	typ	%	*
.....Maximum Input	+4		dBu	Input gain at +15 dB
Line Gain Settings	-5, +10	1	dB	
.....Input Impedance	3.38k	1%	Ω	@ 1 kHz, each leg to ground
.....THD+N	0.005	typ	%	*
.....Maximum Input	+24	typ	dBu	Input gain at -5 dB
Output Trim range	+16 to -30 (plus mute & polarity invert)		dB	½ dB steps; gain above unity is digital, attenuation below unity is analog
.....Impedance	100		Ω	Each leg to ground
.....Maximum Level	+23 (+24 unloaded)		dBu	@ 1 kHz, 2 kΩ load
Frequency Response	10 Hz to 22 kHz	+0/-1	dB	
Dynamic Range	106	min	dB	Input Gain at -5 dB, A-weighted
IM Distortion (SMPTE)	<0.01	0.01	%	60 Hz / 7 kHz, 4:1, +4 dBu
Crosstalk	100	typ.	dB	1 kHz bandpass, any channel
Input & Output RFI Filters	Yes			
Audio Converters	24 bit			
Audio Processing	24 bit and higher			48 kHz sample rate
Propagation Delay	1.58	min	ms	Analog I/O, no processing blocks
Internal Memory	Non-volatile			Flash and NOVRAM or FRAM
DSP MIPs: RPM 88	400	2%	MIPs	MIPs = Millions of Instructions Per Second
.....RPM 44 and 22	200	2%	MIPs	
AES3 digital Input				2-channels, balanced
Connector	XLR-type, female			ANSI S4.40-192; IEC 60958-4 standards
Max cable length	328 feet / 100 meters		See RaneNote "Interfacing AES3 to S/PDIF"	
Trim range	+16 to -20 (plus mute)		dB	1 dB steps
Sample rate conversion range	16 to 96		kHz	
Supported Word lengths	up to 24 bits per word			
AES3 digital Output				2-channels, balanced
Connector	XLR-type, male			ANSI S4.40-192; IEC 60958-4 standards
Max cable length	328 feet / 100 meters		See RaneNote "Interfacing AES3 to S/PDIF"	
Level range	+16 to -30(plus Mute & polarity invert)		dB	1 dB steps
Sample rate	48 kHz			
Word length	24 bit			
Communications Interface				
Ethernet	10Base-T			10 mega bit/sec; RJ-45 connector
Max cable length	328 feet / 100 meters		Standard Ethernet CAT 5 cable length limits	

* +4 dBu, 1 kHz, 20 kHz bandwidth, for all input gain settings, input trim = 0 dB, output trim = +5 dB

Parameter	Specification	Limit	Units	Conditions/Comments
VIP (Versatile Input Port)	8-bit A/D Converter ½ LSB			
Connector	10-pin Euroblock			8 Inputs, plus REF voltage & GND
Input Range	Vref + 0.3, GND - 0.3 volts			
.....Filter	15	5%	Hz	Low-pass 2nd-order Butterworth
.....Passive Pull-up	100k	1%	Ω	To Vref
Vref	5	4%	VDC	100 mA maximum
Vref Load Regulation	5 mA to 100 mA	1%		RPM 88
Preset recall time	500	typ	ms	Via software or contact closure. The unit recalls quickly, software may take longer
VOP (Versatile Output Port)	Open-collector			
Connector	10-pin Euroblock			8 Outputs, +12V, GND
High-side Voltage	40	max	VDC	
Current per pin	100	max	mA	
Vce saturation	1.1	typ	V	I out = 100 mA
Internal Supply	+12		V	Shared with RW 485 +V power; See below
RW 485				
Connector	5-pin Euroblock			
Electrical Interface	RS-485			EIA standard; Minimal termination
Impedance	4.23k	typ	Ω	Receive mode
Baud rate	38.4k; RW 485 baud rate	<1%	bps	See SR 2, SR 3 or SR 4 Manual
Data format	N81			No parity, 8 data bits, 1 stop bit
Internal Supply	14.5	typ	V	No load
.....RPM 88 Voltage	12.6	10%	V	load between 20 mA and 350 mA
.....RPM 44 or 22 Voltage	15	10%	V	
.....RPM 88 Max current	375		mA	Shared with VOP +12 power
.....RPM 44 or 22 Max current	1		A	Shared with VOP +12 power
Drive Distance	1000 feet / 304 meters	max	Star or daisy-chain wiring; see SR 2, SR 3 or SR 4	
Unit				
Power Supply Requirement	100 to 240	±10%	VAC	50/60 Hz, 1.25 to 0.9 amp
Ambient Temperature	50	max	°C	Minimal external loading
	40	max	°C	Maximum external loading
Agency Listing	Safety			
.....UL	UL6500			File E193164
.....cUL (Canada)	CAN/CSAE60065-00			
.....CE	LVD 73/23/EEC			EN60065
EMI: CE				EMC directive 89/336/EEC
.....FCC	Part 15B			Class B Device
Construction	All Steel			
.....Size	3.5"H x 19"W x 8.5"D		2U	(8.9 cm x 48.3 cm x 21.6 cm)
.....Weight: RPM 88	9 lb			(4.1 kg)
.....Weight: RPM 44 or 22	8 lb			(3.7 kg)
Shipping: Size	4.5" x 20.3" x 13.75"			(11.5 cm x 52 cm x 35 cm)
.....Weight: RPM 88	13 lb			(5.9 kg)
.....Weight: RPM 44 or 22	12 lb			(5.5 kg)

Architectural Specifications

RPM 88 Specific - The device shall provide eight, balanced, mic/line inputs and eight balanced analog outputs.

RPM 44 Specific - The device shall provide four, balanced, mic/line inputs and four balanced analog outputs.

RPM 22 Specific - The device shall provide two, balanced, mic/line inputs and two balanced analog outputs.

All units - The microphone inputs shall provide -128 dBu equivalent input noise and shall be 100% controllable via software, including gains and phantom power selection. An industry-standard, two channel AES3 digital expansion input and output shall be provided via XLR-type connectors. Audio inputs and outputs shall be accessible via rear panel Euroblock connectors. A standard, low-cost Ethernet switch shall be used to network and control multiple units via 10Base-T.

The signal processing configuration shall be 100% user programmable using Windows™ XP software. The control software shall provide complete display and control, in graphical form, of all signal processing configurations and functions. Downloadable via a rear panel, industry-standard, Ethernet 10Base-T control port, the signal processing configurations shall be 100% drag and drop configurable (not fill in the blanks) utilizing a variety of digital signal processing algorithms, including but not limited to:

- Input & output gains with meters.
- Parametric bandpass, all-pass, high & low shelf & cut filters.
- Feedback suppression.
- Graphic equalization with Perfect-Q™ response.
- Linkwitz-Riley, Butterworth, Bessel crossovers.
- Compression (with side-chain), limiting, automatic gain control, auto mixer/ducker, ambient noise compensation.
- Mix, select, level control, delay.
- Pink noise and sine wave generators.

Control ports shall include 8 logic inputs for contact closure Preset recall or potentiometer level controls; 8 logic outputs shall provide relay or LED open collector drive; and an RW 485 port shall support Preset recall and Level control via accessory remotes. The control ports shall support Class 2 wiring.

There shall be 24 internal, non-volatile Presets to store settings for later recall using a dedicated on-site computer or via external contact closure, making the computer optional once the unit is programmed. Contact closure ports shall be able to be paralleled for recalling the same Preset number across multiple units. A recessed, rear panel default switch shall provide recall of Preset 1 to restore the unit to a known state in the event of communications failure.

All processing settings shall always be stored in non-volatile memory within the unit, thus allowing for power or computer failure without loss of settings.

Data conversion shall be 24-bit, 48 kHz sampling rate using up to 48-bit internal DSP processing with a minimum 106 dB dynamic range.

The unit shall have no front panel controls, but shall provide 3-segment LED meters for each input and output for level and signal flow indication without need for a computer. There shall be front panel Power, Status, Ethernet, RW 485 and logic port communications indicators. A front panel display shall indicate the most recently recalled Preset. The rear panel shall provide Ethernet Link and LAN indicators.

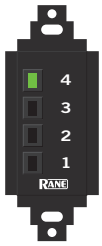
The device shall have certified compliance with FCC Part 15J for a Class B computing device and EMCD 89/336/EEC (CE certified). The device shall feature a built-in universal voltage power supply capable of operating from 100 to 240 VAC, 50-60 Hz. The unit shall feature an IEC socket line cord. The unit shall meet UL/CSA and CE safety requirements. The unit shall be constructed of cold-rolled steel and mount into a standard 19" 2U EIA rack.

The unit shall be a Rane RPM 88, RPM 44, or RPM 22 Programmable Multiprocessor.

Remotes

MRS 4 Memory Recall Switch

The MRS 4 provides a simple solution to recalling Memories from a remote location for any of the RPM series with a VIP (Versatile Input Port). The MRS 4 allows up to 4 Memories to be recalled by contact closure. These are radio buttons: engaging one button (*in, changing to green*) causes any of the other three to disengage (*out, changing to black*). Space is provided next to each button for labelling.



LRS 4 Level Recall Switch

The LRS 4 provides a simple interface to operators requiring four predetermined volume levels (may include mute) when used in conjunction with devices equipped with voltage-controlled level inputs (the Versatile Input Port). Four volume levels can be set during installation. Any button may be set to any gain between unity and mute. Typically, 4 is set for the highest gain with 3, 2, 1 graduating down to mute, if available. The LRS 4 contains four radio buttons: engaging one button (*in, changing to green*) causes any of the other three to disengage (*out, changing to black*).

VR 2 Volume Remote

The VR 2 provides a simple 'pot on a wall' remote volume control. It contains a linear taper potentiometer with a single Euroblock screw terminal for each of the pot's three conductors, the Vr terminal, the Vc wiper terminal, and the ground terminal, connecting to the VIP (Versatile Input Port) of any RPM unit.

SR Smart Remotes

The Rane SR 2, SR 3 and SR 4 Smart Remotes are generic, wired, RS-485 remote controls with a 31-position LED indicator, data encoder with built in push switch. SR Configurator software (included) sets up each device. Smart Remotes only work with the RPM 22, 44, and 88. Label overlays come with each remote to match white, beige, or black Decora trim covers. Refer to the Smart Remotes Data Sheet for details.

SR 2 Smart Remote

The Rane SR 2 can be used to control two parameters with the built in push switch: Level and Second Level. The encoder can be locked out by grounding the Encoder Lock terminal and enabling Auto Lock in the SR Configurator software.

SR 3 Smart Remote

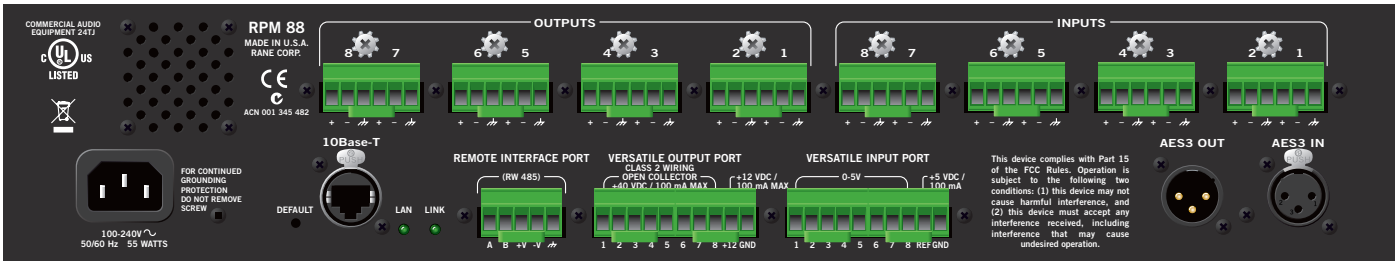
The Rane SR 3 includes a 98 x 64 pixel LCD display with a programmable backlight. Up to 16 bitmaps can be stored locally in the SR 3 EEPROM and can be automatically recalled to correspond with different system modes. Screens are dynamically created using built-in, read-only character fonts. The SR 3 contains two types of fonts: text and symbol. The symbol icons can be used instead of, or in addition to, text and graphics.

SR 4 Smart Remote

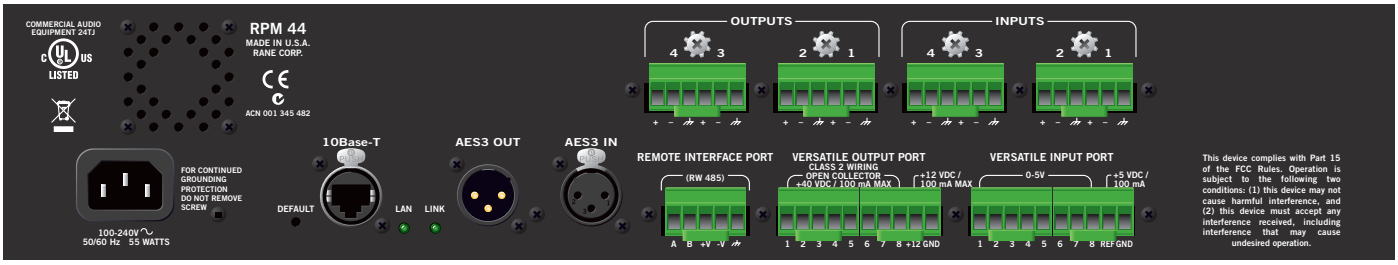
The Rane SR 4 includes eight LEDs, and the push switch allows both source selection and level control. A custom label may be placed behind the lens. A PC utility is provided for designing and printing your own label.

All Remotes mount in a standard single-gang U.S. electrical box with a minimum depth of 2¼ inches, and can be flush covered with a standard Decora® plate cover. See the Data Sheet of each Remote for details.

RPM 88 Rear Panel



RPM 44 Rear Panel



RPM 22 Rear Panel