

TRUEMATCH RMC

REFERENCE MICROPHONE CONVERTER • REFERENCE MASTER CONVERTER



THE HIGH-END A/D CONVERTER APPROPRIATE TO THE 28-BIT WORLD

- no microphone-signal clipping possible at the inputs; processes a dynamic range of $-131\text{dBu} \dots 22\text{dBu}$
- 100 % earth-free inputs, CMR 140 dB@50 Hz, so microphone splitting is feasible with no active splitter
- automatic synchronization to external wordclock without signal interruption
- processing time only 0.6 ms
- 8...24-channel versions available
- remote control using PC-Remote, with level monitoring
- internal input-channel routing to digital outputs using PC-Remote supported*
- all standard digital output formats available – AES/EBU, S/PDIF, MADI, ADAT, TDIF, Y2 ...
- 4 analog outputs for talkback and studio-out applications optionally available
- also available as 8-channel 24-bit line version for surround-workstation applications
- line-version: extra 8-channel D/A converters optional
- optimal for installation close to the recording location as no fan is included

28 BIT RESOLUTION • 96 KHZ SAMPLE RATE • 153 DB DYNAMIC



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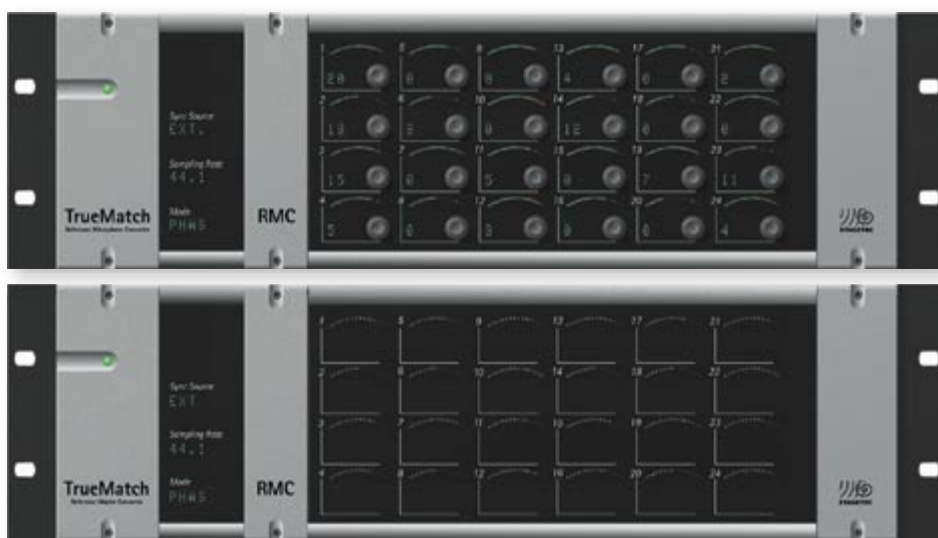
TrueMatch® Reference Microphone Converter – STAGETEC's high-end A/D converter for accurate and optimum sound imaging features an excellent 28-bit resolution and a dynamic range of 153 dB (A) with sample rates of up to 96 kHz*. Microphones are connected straight to the TrueMatch RMC – the use of conventional analog microphone preamps and A/D

Features such as the linearity and the extended dynamic range are the bases of the neutral and natural sound produced by the TrueMatch RMC. This becomes obvious especially in multitrack-sound applications where the artifacts produced by traditional systems are multiplied by the number of channels. Compared to conventional technologies, the benefits of the TrueMatch RMC become immediately obvious: now, it is just the microphone that shapes the sound.

The TrueMatch RMC standalone converter can be supplied with the most versatile output formats: AES/EBU, S/PDIF, ADAT, TDIF, Y2, or MADI. There is another version that features 24-bit line inputs, thus introducing the TrueMatch technology in areas where only line-level signals are present.

The TrueMatch technology is not only available with the TrueMatch RMC but also with the NEXUS routing system and the CANTUS mixing-console system by STAGETEC.

** version-dependent*



*»... the TrueMatch RMC is the first A/D converter I encountered that is able to convert complex analog signals without any perceivable artefacts. This is my new reference!«
Günther Pauler*

converters has become a matter of the past. Our patented TrueMatch conversion technology shows a lower digital noise floor than the thermal noise of any microphone: at last, it is the microphone that determines the sound – not the preamp or the converter.

Further, the outstanding resolution of the conversion technology employed with the TrueMatch RMC allows for using the input noise of the microphone as »natural« dithering and for avoiding quantization noise while the TrueMatch RMC itself does affect the sound in no respect.

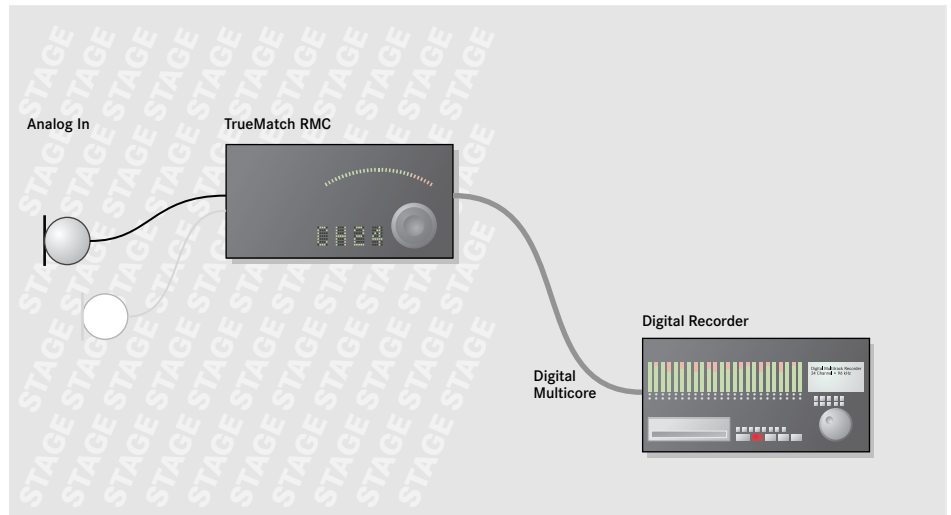
No existing A/D-converter circuit is perfect; however, thanks to the TrueMatch system, which constantly traces and eliminates all circuit-related inaccuracies, the TrueMatch RMC produces a perfectly linear result.

The large dynamic range provides for processing all conventional analog studio signals between -128...+22 dBu, with no need for enabling a PAD function. Clipping of microphone as well as line signals is virtually impossible. This makes live recording safe and simple.



PHILOSOPHY

»... the susceptible analog microphone signals need to be transferred to the converter unit only via short cables while the digital outputs are directly connected to a hires recording device – there is no need for more equipment.«



FEATURES

The outstanding TrueMatch converters made by STAGETEC are also available in a stand-alone unit: The TrueMatch RMC. This device allows the utilization of 24/28-bit processing capabilities wherever heaviest demands are made on analog signals:

LIVE RECORDING There is always enough space for a TrueMatch RMC unit because it consumes only an incredible 3 U for its 24 channels. Thus, the susceptible analog microphone signals need to be transferred to the converter unit only via short cables while the digital outputs are directly connected to a hires recording device – there is no need for more equipment.

If AES/EBU is used as digital output format, spanning distances of 100 meters (330 ft) can be achieved. With MADI, fiber-optic lines can even span 2 kilometers (1¼ miles). Thanks to the high dynamic range of the recording, level-setting procedures are postponed to the post-processing stages.

RE-MASTERING The TrueMatch RMC converts the analog output signals of a multi-track machine. This high-quality digital signal can then be stored to a modern small and cost-efficient digital medium with a resolution of 24/28 bits.

MUSIC PRODUCTION The low-cost converters incorporated in many digital consoles are bypassed using a Reference Mastering A/D unit inserted into the signal path.

UTILIZATION

Using the TrueMatch RMC is simple. An external sync signal applied to the wordclock input is recognized immediately, and all microphone-input settings are made using encoder/indicator sets.

More configuration options are available when using the supplied computer software.

A/D CONVERTERS

At the moment, a multitude of low-budget digital desks and recorders is available on the market that promise professional features such as audio-signal processing and storage with 24-bit quality. However, if present at all, the implemented analog interfaces cannot handle the analog signals in an adequate way in terms of dynamics.

However, thanks to its exceptional audio-processing capabilities, STAGETEC's TrueMatch RMC constitutes an analog 28/24-bit front-end device that will meet even the heaviest demands put on audio quality.

FORMATS

The TrueMatch RMC is shipped in a variety of versions in order to cover a large range of individual applications. Line and microphone inputs are as well available as digital outputs for all prevailing audio format such as AES/EBU (S/PDIF), ADAT, TDIF, Y2, SDIF, or MADI.

D/A CONVERTERS

Expand your TrueMatch RMC with optional D/A-converter boards and use the digital inputs for converting ADAT/TDIF/Y2/MADI-format signals to feed analog devices (such as talkback units), or as high-quality outputs of a digital workstation.

The TrueMatch RMC AES/EBU version, too, may be equipped with D/A converters. The required AES/EBU digital inputs are provided using separate XER boards.

CONCEPT

LEVEL AND DYNAMICS

For the first time, the dynamic range of a microphone is not limited by a subsequent A/D converter – thanks to the TrueMatch RMC.

The ambition to provide optimum audio quality has been realized on the basis of the TrueMatch technology: The input stage is part of the 28-bit converter, while further signal-processing measures such as subsonic filtering, phase inversion, clip limiting, and gain setting are performed solely on the digital domain.

The input stage features a noise level of -137 dBu (@ 0 ohm input impedance) and can process signal levels of up to 22 dBu without clipping, thus providing a dynamic range of 159 dB. This dynamic range can theoretically be converted to even 26.5 bits.

In addition, the 28-bit conversion method deployed in the Reference Mastering A/D allows using the intrinsic noise as »natural« dithering for avoiding quantization noise.

With 26.5 bits used, quantization noise equals the A/D-converter noise, resulting in a total deterioration of 3 dB. By increasing the resolution to 28 bits, the quantization-noise level is approximately 10 dB below converter noise and is practically not perceivable anymore. This scenario does not consider the microphone noise yet – this is at least 6 dB above the converter noise floor.

The addition of the input-stage and converter noise floors sums up to a level of -134 dBu, which is equivalent to the noise level produced by a 60-ohm resistor. With an impedance of 200 ohm, a microphone already produces a noise level of approximately -128 dBu caused by such resistor; and the microphone-amplifier noise is not considered yet. Thus, the microphone-noise level clearly predominates within the total noise! The specified dynamic range of 150 dB is therefore the result mainly of the intrinsic noise of the microphone.

TARGET FORMATS

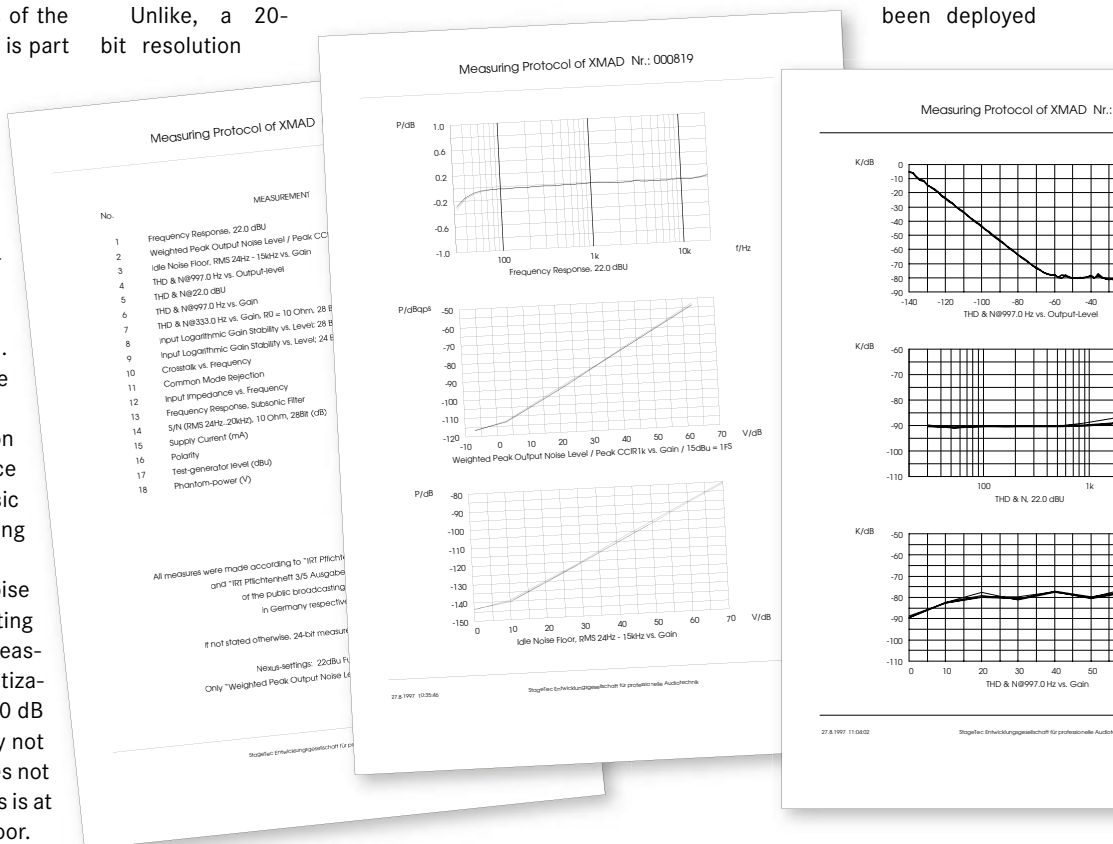
When recordings are made on the target system with a 16-bit resolution, gain must be set accordingly to utilize the limited 16-bit dynamic range of 96 dB. Usually, no headroom will be set during recording to optimally exploit this low resolution. Therefore, the 16-bit format

should be utilized for the production preparation of consumer objects such as CD or MD only; it is generally not advisable to produce recordings in this format with the intention of processing them further.

Unlike, a 20-bit resolution

TRUEMATCH

STAGETEC's patented TrueMatch A/D-converter technology is based on a Delta-Sigma conversion method including 128 times oversampling. It has been deployed



provides a dynamic range of 120 dB. The gain settings are less critical in this case since there is still an effective dynamic range of 100 dB even if headroom of 20 dB is set.

This significantly reduces the likelihood of clipping or noise problems.

However, when utilizing a 24-bit resolution, the dynamic range already exceeds the one of the microphone! The signal provided by the microphone can be recorded without any further processing. Gain setting, equalization, and even the employment of a subsonic filter can be suspended until post-recording processing. Digital clipping spoiling recordings is now over and done with – an ideal tool for live recording, live interviews and reports, and theaters; not to mention O.B. vans.

successfully in STAGETEC's CANTUS and NEXUS products since 1995 and is now available for the TrueMatch RMC, too.

With the TrueMatch system, the analog input signal is fed to multiple converters of different sensitivities. However, unlike the gain-ranging method where converter operation depends on the input level, a DSP permanently monitors the converter outputs and traces and eliminates any conversion errors. More than 45 parameters are considered in this process.

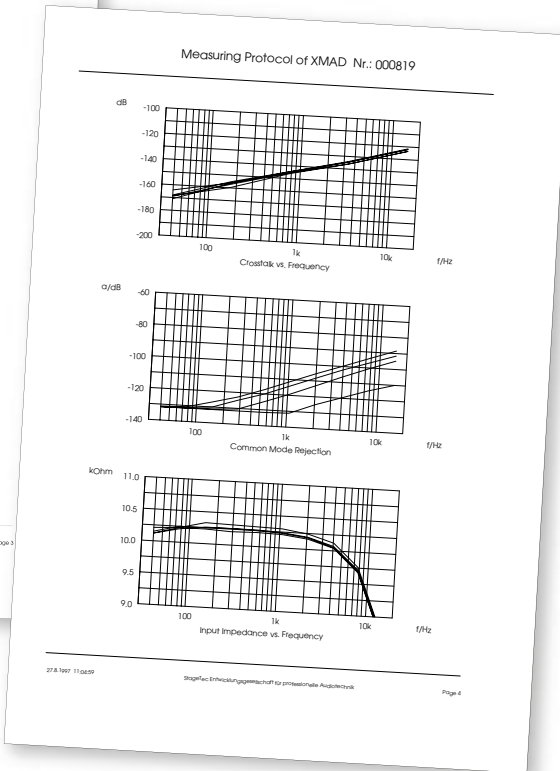
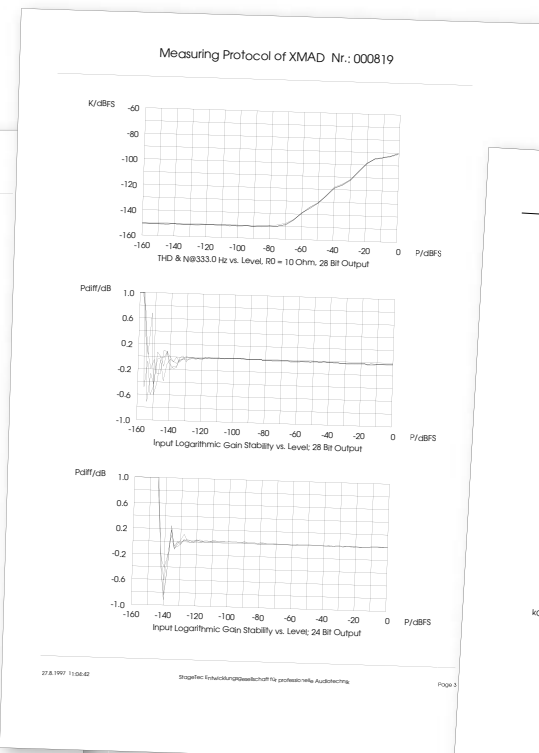
First-class analog circuit design and state-of-the-art DSP technology produce significant improvements compared to conventional 24-bit converters.

LARGE DYNAMIC RANGE The dynamic range provides sufficient headroom even in critical situations.

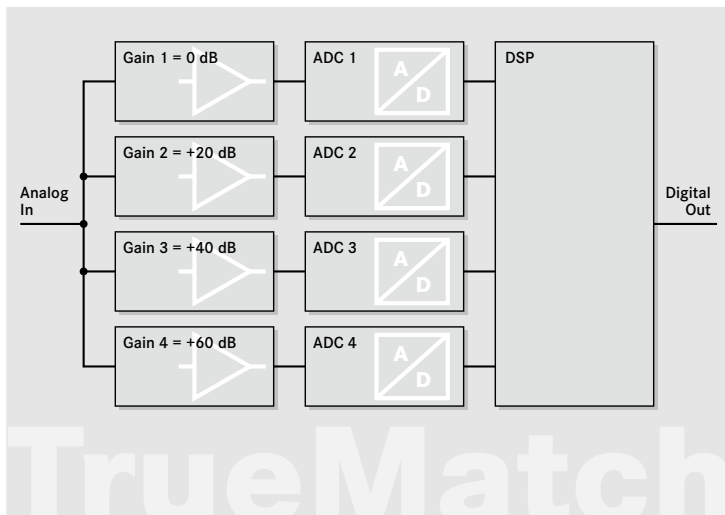
HOMOGENOUS NOISE SPECTRUM Thanks to the homogenous noise distribution, intrinsic

noise is practically not perceptible even at very low input levels.

MINIMIZED CONVERSION ERRORS TrueMatch converters feature a permanent sample-based conversion correction, resulting in a stable and almost perfect conversion curve even at ultra-low levels.

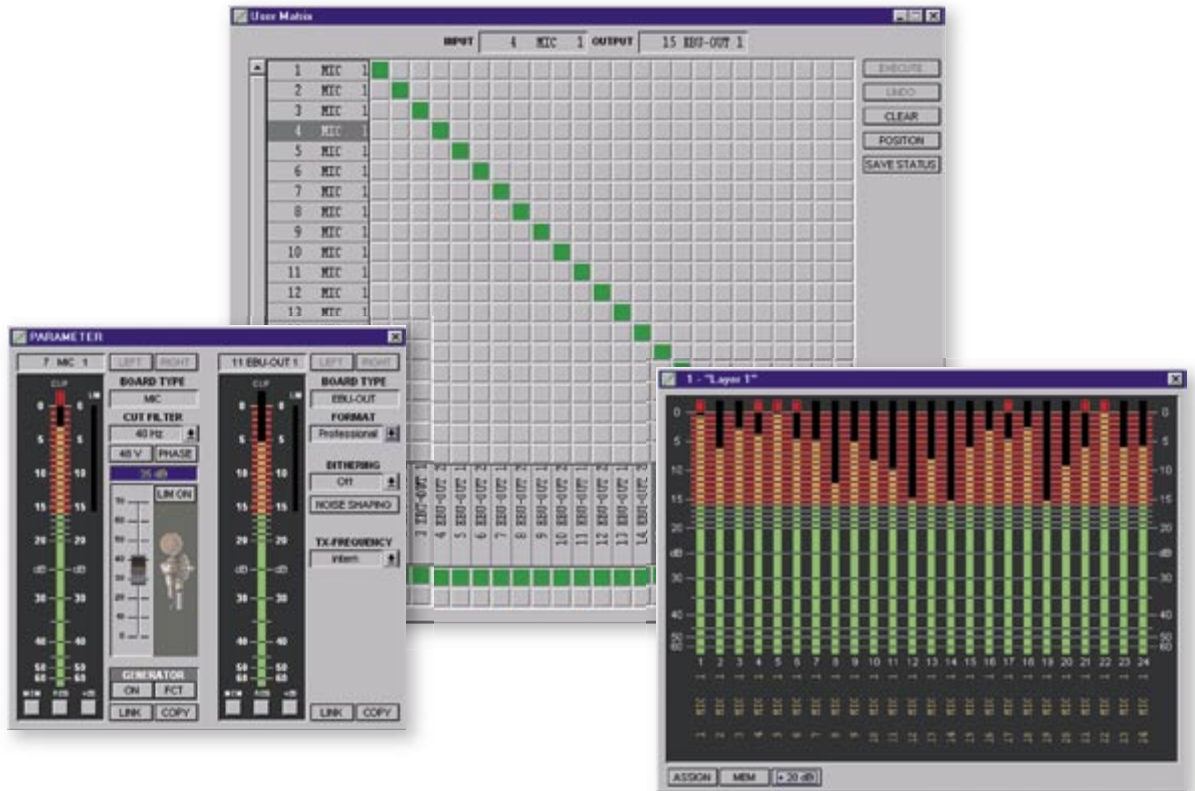


- The dynamic range of the TrueMatch converter exceeds the respective values of any conventional microphones.
- The 28-bit resolution includes the entire utilizable signal – from the intrinsic noise up to the clipping threshold of the microphone.
- Featuring a maximum input voltage of 22 dBu, the converter can virtually not be overdriven (@0 dB) and can therefore be used as line input for conventional studio devices, too.
- Even low levels are digitized with high resolution.
- Gain and signal-processing settings are made on the digital domain after A/D conversion, thus not affecting the signal quality. The settings merely tweak the signal level to be suitable for subsequent processing and recording.



TECHNOLOGY

Multichannel-metering and dialog box where the parameters of an I/O couple are set

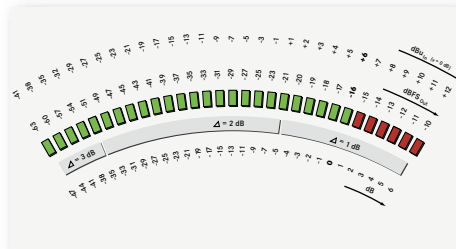


CONTROLS

The TrueMatch RMC is designed as stand-alone unit and hardly requires the user's attention in operation.

For the version equipped with microphone-input boards, parameters such as input sensitivity, subsonic filter, phantom power, and phase inversion are set using the digital encod-

These stylish arc displays show the level settings with utmost precision - meeting IRT recommendations!



ers on the front panel. The line-input sensitivity can be configured using an external control computer; the setting will then be stored to the device itself.

The output levels are displayed via the analog-like LED arcs.

An external signal fed to the wordclock input is immediately recognized and indicated on the front panel. If the sync source fails, the previous sync frequency will be generated internally and thus maintained; the device will directly change to internal synchronization. The frequency setting will be memorized when the device is turned off and will be recalled immediately after switch-on again.

PC INTERFACE

The configuration options are enhanced when using a standard IBM-PC or compatible. The control program running on the computer can access the parameters of the Reference Mastering A/D via the serial interface. A version including an RS422-interface port for spanning larger distances can be supplied on request. The following settings can be viewed and changed:

- free I/O routing, storable*
- sample rate
- peak-level indication for individual channels
- shared multi-channel meters for all channels
- routing of the internal test-tone generator
- phase inversion for individual channels
- settings of the XMA board such as gain, subsonic filters, and phantom power
- AES/EBU output format (professional/consumer)
- output parameters for other formats

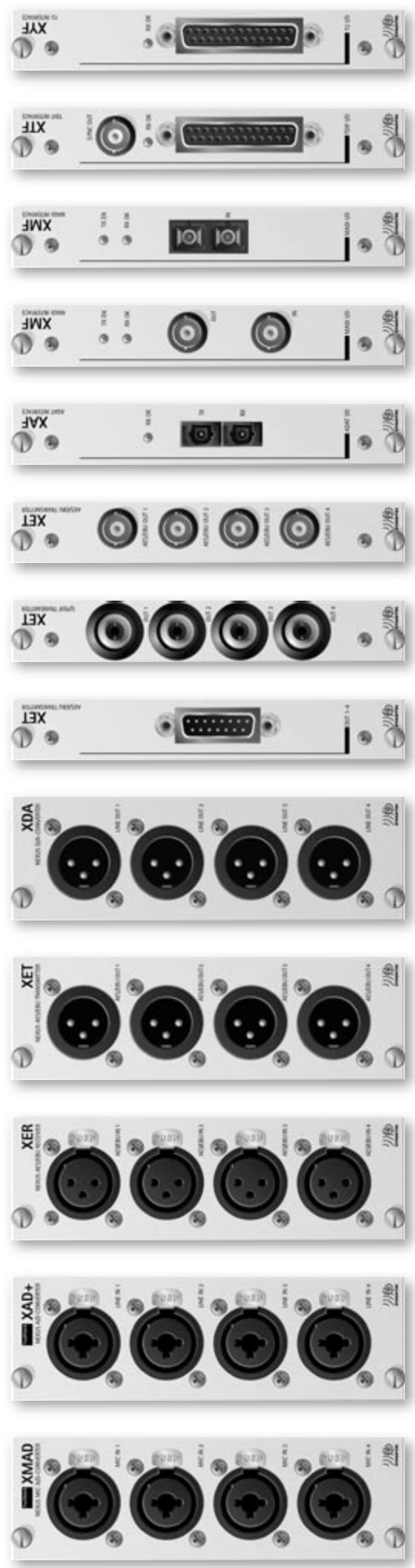
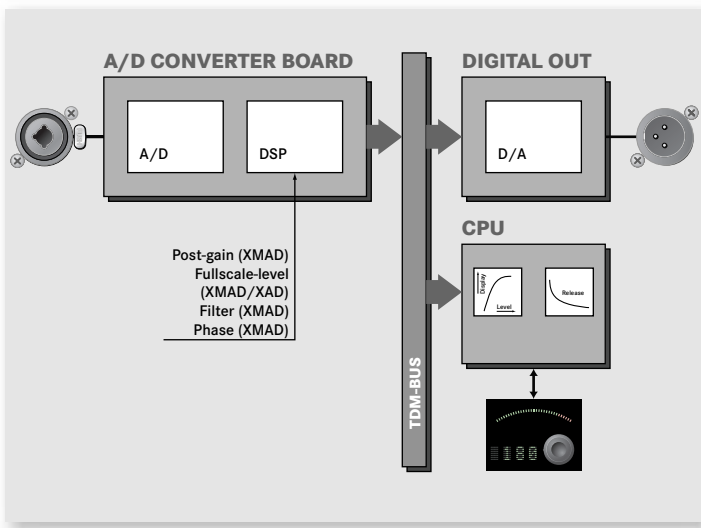
TECHNOLOGY

TrueMatch RMC has a modular structure and consists of I/O modules for the respective audio formats. System control and operation are performed using additional modules that may also be used for communicating with an optional configuration computer. All modules (including the power-supply unit) are made as slot boards and are mounted in a 19" carrier frame (3 U).

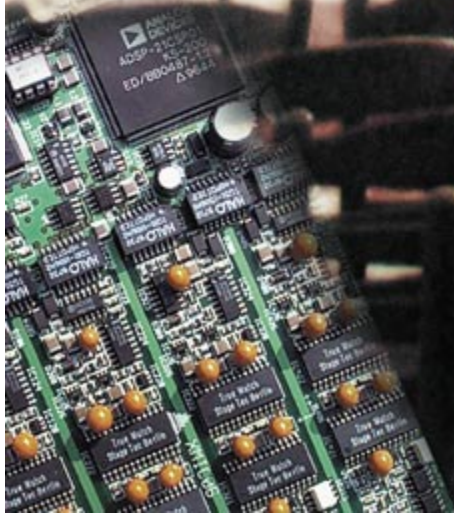
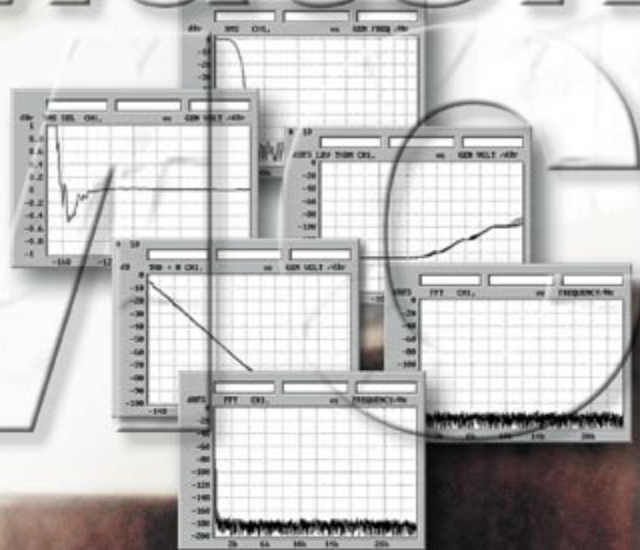
All standard connectors are available on the rear panel of the device, thus avoiding a need for special adaptors.

Input and output boards can be replaced during operation (hot swap). Failure of any board does not affect the remaining boards.

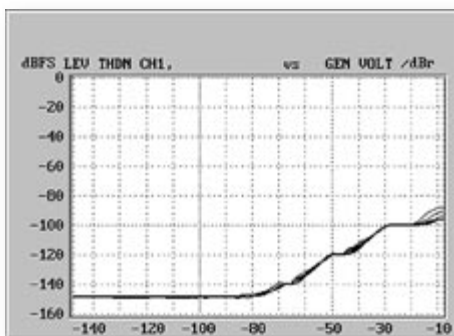
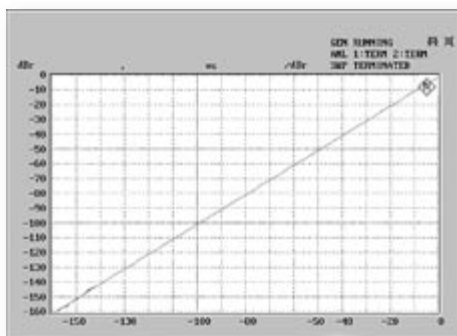
Particular features such as the combo XLR/line connectors or handy operation smooth the user's everyday work.



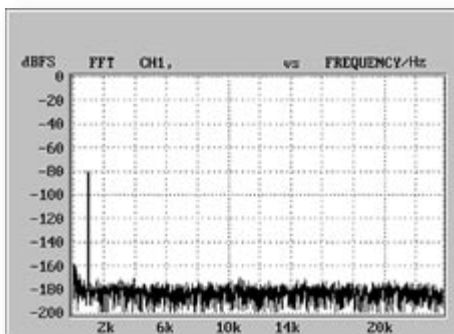
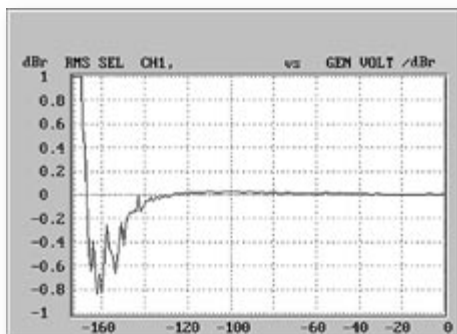
TrueMatch RAW



SPECIFICATIONS



left: Converter-linearity vs. Level
right: THD+N vs. Level -140...0 dBBr (0 dBBr = 22 dBu) vs. Frequency 40...20 000 Hz



left: Input Logarithmic-gain Stability
right: Low-level Noise at Signal (997 Hz, -80 dBFS)

Inputs:	8/12/16/24 analog inputs, transformer-insulated, balanced (XLR/¼" combo connector)
Meters:	precisely operating quasi-analog LED peak meters (31 segments each)
Synchronization:	word-clock out (BNC), external-sync input (BNC)
Internal clock generator:	frequency accuracy better than ±10 ppm (as defined in AES 11, Grade 2)
PC interface:	serial PC interface, RS-232 (25-pole, D-Sub) and USB; on request RS-422
Sample rates:	44.1 kHz, 48 kHz, 88,2 kHz, 96 kHz (version-dependent)
Group delay:	< 0.6 ms@48 kHz sample rate
Modulation noise (microphone inputs):	typ. -155.5 dBFS CCIR-RMS
Modulation noise (line inputs):	typ. -129 dBFS CCIR-RMS
THD+N (microphone inputs):	typ. 0.003%@22 dBu input level, < 0.01% typ.@-50...+22 dBu
THD+N (line inputs):	typ. 0.001%@22 dBu input level, < 0.02% typ.@-30...+22 dBu
Dynamic (microphone inputs):	> 152.5 dB (A)@200 Ohm, > 159 dB (A)@0 Ohm
Dynamic (line inputs):	typ. 133 dB (A)@0 Ohm
Frequency response (mic. inputs):	40...20,000 Hz, ±0.1 dB
Frequency response (line inputs):	20...20,000 Hz, ±0.05 dB
Input impedance:	> 10 kOhm (1 kHz)
CMR (microphone inputs):	typ. 140 dB@50 Hz, 115 dB@1 kHz
CMR (line inputs):	typ. 115 dB@100 Hz, 100 dB@1 kHz
Crosstalk attenuation:	> 100 dB@20...20,000 Hz
HF resistance:	HF-demodulation resistant according to IRT standards (Pflichtenheft 3/5) and European standards
Outputs:	8/16/24 outputs (depending on the format option)
AES/EBU output:	professional/consumer formats (meeting EBU Rec. 3258, ANSI 4.40-1985, S/PDIF, and IEC 958); XLR male
ADAT output:	optical (TosLink)
MADI output:	MADI, compliant with AES 10-1991 (ANSI S4.43-1991), AES 10id-1995; BNC or SC (optical fiber)
Sony-SDF2 output:	25-pole D-Sub, female (on request)
Tascam-TDIF:	25-pole D-Sub, female
Y2/MEL2 output:	25-pole D-Sub, female
Operating voltage:	100...230 V AC
Power dissipation:	approx. 50 W
Dimensions:	19" module, 3 U (W x H x D: 482,6 x 132.5 x 450 mm)
	If not otherwise indicated, the specifications refer to a 48-kHz sample rate and a level of 22 dBu; some specifications depend on the actual version.

VERSIONS

TrueMatch RMC
Reference Microphone Converter



TrueMatch RMC
Reference Master Converter



TrueMatch RMC
TMM-24AES-XLR, Rear Panel



The TrueMatch RMC is equipped with XMAD microphone-input boards or XAD line-input boards, depending on the actual version. The converters are available in 8-channel, 16-channel or 24-channel versions. (The »24« in the device name refers to the 24-channel version.) The I/O routing is normally straight but can be reconfigured using the PC software (reconfiguration of the microphone-AES/EBU version on request only). Supplementary information within the output-data stream as well as the output-data format (e.g. re-quantization to 16 or 20 bits, or noise shaping) are set using the software, too. Output signals transferred by the connected device are not recognized, and NEXUS XFOC are not supported.

The specifications do not apply to all of the versions. Special versions are available for an extra charge.

* The 16/24 channels are output via two/three 8-channel output boards.

MICROPHONE-INPUT VERSION

- 8/12/16/24 microphone inputs, 28-bit resolution
 - 153 dB (A) dynamic range
- balanced XLR inputs, transformer-isolated
- controllable phantom power, subsonic filter, phase inversion
 - adjustable digital gain

MADI BNC (75 ohm, coaxial)	
TMM-8MC	8 channels
TMM-12MC	12 channels
TMM-16MC	16 channels
TMM-24MC	24 channels
MADI optical SC (1300 nm, 62.5/125 µm)	
TMM-8MF	8 channels
TMM-12MF	12 channels
TMM-16MF	16 channels
TMM-24MF	24 channels
AES/EBU AES/EBU (S/PDIF), balanced, noise shaping available, re-quantization to 20 or 16 bits with dithering; connectors: XLR male, BNC, D-Sub, TosLink/DNP (optical), RCA	
TMM-8AES-x	8 channels
TMM-12AES-x	12 channels
TMM-16AES-x	16 channels
TMM-24AES-x	24 channels
AES/EBU - budget version XLR balanced, without routing and dithering	
TMM-8AESB	8 channels
TMM-12AESB	12 channels
TMM-16AESB	16 channels
TMM-24AESB	24 channels
TDIF D-Sub (25-pin), noise shaping available, re-quantization to 20 or 16 bits with dithering, word-clock output	
TMM-8T	8 channels
TMM-16T	16 channels*
TMM-24T	24 channels*
ADAT opt. TosLink, noise shaping available, re-quantization to 20 or 16 bits with dithering	
TMM-8A	8 channels
TMM-16A	16 channels*
TMM-24A	24 channels*
Y2 D-Sub (25-pin), noise shaping available, re-quantization to 20 or 16 bits with dithering	
TMM-8Y	8 channels
TMM-16Y	16 channels*
TMM-24Y	24 channels*
EXTENSIONS for TMM	
TMM-TB4	4 extra D/A converters for TMM-xMC, -MF, -T, -A, -Y versions
TMM-TB4AES	4 extra D/A converters for TMM-xAES version

LINE-INPUT VERSION

- 8 line inputs, 24-bit resolution
 - 133 dB (A) dynamic range
- balanced XLR inputs, transformer-isolated
- software-operated controlled phase inversion
 - software-controlled gain

MADI BNC (75 ohm, coaxial)	
TML-8MC	8 channels
MADI optical SC (1300 nm, 62.5/125 µm)	
TML-8MF	8 channels
AES/EBU balanced XLR, noise shaping available, re-quantization to 20 or 16 bits with dithering; connectors: XLR male, BNC, D-Sub, TosLink/DNP (optical), RCA	
TML-8AES-x	8 channels
TDIF D-Sub (25-pin), noise shaping available, re-quantization to 20 or 16 bits with dithering, extra word-clock output	
TML-8T	8 channels
ADAT opt. TosLink, noise shaping available, re-quantization to 20 or 16 bits with dithering	
TML-8A	8 channels
Y2 D-Sub (25-pin), noise shaping available, re-quantization to 20 or 16 bits with dithering	
TML-8Y	8 channels
EXTENSIONS	
TML-DA8	8 D/A converters for TML-8MC, -MF, -T, -A, -Y versions
TML-DA8AES	8 D/A converters for AES version
TML-SCR	sample-rate converter for TML, per XET/XER module (four AES/EBU stereo channels)

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TRUEMATCH RMC

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🇬🇧 English Version

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