R

T+A

Actually we’re scientists ...

... because T+A stands for Theory and Application in the field of audio technology. That means that we conceive, refine and manufacture Hi-Fi components of the very highest quality, with the aim of developing consummate High-End products for our customers all over the world. Since 1978 our enterprise has been based at Herford in Eastern Westphalia, and this is the focal point of all our thoughts and actions. When considering our products we set ourselves no limits, and spare neither cost nor effort in order to achieve perfection in sound. The results speak for themselves in our products: extremely long product cycles, extended lifespans and a wide range of retro-fit options make a T+A system a sound investment for the future.

Maßstab 1:1


SRC
I / II
USB IN
Jamie Cullum
Music is throug
aptX
IN 1
IN 2
IN 3
IN 4
IN 5
IN 6
MP
PH
MP 2000 R
28
XLR


h
Xperia Z3c
FAV
MENU
SELECT
TONE
MENU
FLAT
VOL

The R-series

The R-series is T+A's oldest and most important product group. First presented in the year 1992, the system's technology, operating philosophy and appearance were immediately convincing in every respect, and we were determined to introduce revisions only when genuine improvements were possible. The new R-series is a completely new development, and for this reason the models bear new type numbers: 2000 R for the low-profile cases, and 2500 R for the taller versions. The series consists of the PA 2000 R integrated amplifier, the large PA 2500 R integrated amplifier, the MP 2000 R multi-source player and the G 2000 R turntable.
During the initial stage of development we leaned towards the concepts, circuits and technologies which make our exclusive High-Voltage (HV) range so outstanding. Although the R-series cases are significantly smaller, we have succeeded in realising very high output powers. The amplifier stages are of discrete construction, and are based on the HV principle, making them extremely linear, with a very wide frequency range and outstanding transient response. One of our aims was to achieve high output power, and this required us to develop a mains power supply of very high efficiency, capable of remaining totally stable even when handling peak loads. The new members of the R-series are equipped with high-performance ARM processors whose task is to control the machines and their inter-communication. The R2-Link control and communication bus which exploits the processors operates about 200 times faster than the R-Link bus employed by the preceding generation of equipment, and makes it possible to operate all the devices conveniently using the system remote control handset, the radio remote control or alternatively the T+A Control App in conjunction with the MP 2000 R multi-source player. Our remote control handset FM 2000 is of metal construction and is included as standard, while the FD 100 with integral screen is an optional extra.

An Ethernet port for software updates and connection to Home Automation systems is also present.

Although the earlier range of R-series machines had already set the standard for superb quality of casework, the new series surpasses the standard once more. The entire case, including base cradle, consists of thick-walled aluminium, its components machined from solid metal blocks and extrusions. The result is that we are able to guarantee consistent temperature and working conditions for all modules and components, combined with very effective shielding. Our basic principle is the exclusive use of non-magnetic materials for components and case parts, a principle which totally eliminates the potential problem of magnetically induced distortion, which can have an adverse effect on sound quality. The aluminium case feet are fitted with integral neoprene isolating rings; these fittings are also a new in-house development.

The external case components are meticulously brushed by hand before being given their hard-anodised finish. All the members of the R-series are available in two colours: silver aluminium and black aluminium.

The amplifiers and the multi-source player are equipped with high-quality symmetrical and asymmetrical inputs and outputs, and offer a large number of connection facilities. The multi-source player is our universal playback device, capable of coping with a vast range of digital music formats; once again it is based on the technology of our HV series. It can process and reproduce all music formats, including DSD, to the highest standards of quality. The large, bright integral screens fitted to the machines offer very high contrast, making them clearly legible even from a distance, although they can be dimmed individually as required.


Jamie Cullum
Music is through
aptX
Xperia Z3
MP 2000 R
XLR
28
FAV
MENU
SELECT
TONE
MENU
FLAT
VOL

PA 2000 R
Integrated amplifier

Nominal output

Into 4 Ohms 200 Watts

Into 2 Ohms 300 Watts

Frequency response +0/-3 dB

1 Hz – 150 kHz

Inputs

3 × symmetrical (XLR)
3 × high level (RCA)

Construction

Double-mono with HV technology

Building neat, compact integrated amplifiers offering high output power and superb sound quality is an art at which T+A has no peer. As proof of this claim we present the PA 2000 R integrated amplifier. It is incredibly dynamic, powerful and incisive. There are two reasons behind these characteristics: the extremely linear output stages with very low negative feedback, which are a completely new development, and the new form of mains power supply employed. We designed the latter specifically for audio devices, to ensure that they are ultra-stable under load, with no danger of collapse even when handling extremely high peak levels. The result is that the PA 2000 R can deliver a continuous power of more than 200 Watts per channel into 4 Ohms loudspeakers, enabling it to drive impedance-critical speakers whilst maintaining effortless control. Gas-tight gold-contact relays are employed to switch loudspeakers, inputs and internal signal circuits with total precision and zero losses. Separate tone controls are present for each channel, and they and the Loudness function can be by-passed completely. An optional audiophile phono pre-amplifier module for MM or MC can simply be plugged in. For operation in a surround system the amplifier can be set to Surround Pass Through mode, selected by a trigger signal.

The PA 2000 R forms the perfect control centre for a High-End system. It is equipped with three professional symmetrical inputs (XLR), three high-quality Cinch inputs (RCA), a pre-amplifier output (RCA) and heavy-duty speaker terminals machined from ultra-pure non-magnetic brass. A headphone socket is fitted to the front panel.

PA 2500 R
Integrated amplifier

Twice as tall, higher output power and even more connection facilities – the PA 2500 R exceeds the specification of the PA 2000 R in many areas, but its character in terms of sound quality is in no way inferior to its smaller sibling. This by no means goes without saying, because very powerful amplifiers often forfeit the finer points of dynamics and detail tracery. Our PA 2500 R integrated amplifier circumvents this danger: its basic circuit is the same as that of the PA 2000 R, and even the circuit board layouts are identical. However, its heat-sinks are twice the size, and the case accommodates two of our new high-performance mains power supply units, with the result that it can deliver more than 280 Watts of continuous power per channel into 4 Ohms loudspeakers. The amplifier is therefore effortlessly capable of controlling speakers which are extremely critical in terms of phase and impedance. The PA 2500 is even more powerful than the smaller machine, but retains exactly the same dynamism and cultured sound.

The PA 2500 R is fitted with three professional symmetrical XLR inputs, of which one can be configured as Surround Pass Through, four high-quality Cinch inputs (RCA), symmetrical (XLR) and asymmetrical (RCA) pre-amplifier output sockets, and two pairs of loudspeaker outputs with heavy-duty terminals machined from ultra-pure non-magnetic brass with rhodium-plated contact surfaces. A headphone socket is present on the front panel.

Nominal output

Into 4 Ohms 280 Watts

Into 2 Ohms 560 Watts

Frequency response +0/-3 dB

1 Hz – 150 kHz

Inputs

3 × symmetrical (XLR)
4 × high level (RCA)

Construction

Double-mono with HV technology, two mains power supplies

MP 2000 R MK II
Multi-source player

Sources

CD mechanism; FM-, FM HD-, DAB+ tuner; Bluetooth streaming; Digital Connecting Board; High Res Streaming Client with music services Tidal, Deezer, qobuz.

D/A converter

PCM	double-differential quadruple converter with four 32-bit D/A converters per channel up to 384 kSps
DSD	T+A True 1-bit converter; direct DSD signal path up to DSD 512

Output stage

Doppel Mono »State of the Art«; 100 kHz limit frequency

The MP 2000 R is a genuine multi-talent. At first glance the casual observer may think it is just a classic CD player, but its true capabilities extend far beyond this. At its heart lies one of the world's latest and most sophisticated digital – analogue converters (DAC). This converts PCM signals up to 384 kSps with the help of the quadruple converter – another in-house development – and even DSD files up to DSD 512. The MP 2000 R is therefore able to exploit every digital music format in order to deliver music to the amplifier in the highest possible quality. Our multi-source player houses a first-class CD mechanism; a high-performance digital tuner offering FM, FM-HD and DAB+ reproduction; a high-quality Bluetooth streaming module for receiving music from mobile devices, a streaming client with Internet radio and music services for connection to the home network via LAN and WLAN, USB Master Mode and HD streaming plus a digital connecting board with inputs for external sources (one USB device mode and four HD-S/P-DIF). The wide range of connections allows external equipment to exploit the machine's superb converter to the full.

Please note: the MP 2000 R is not a computer; it is a first-class audio device incorporating many supplementary functions designed to ensure that all modern digital sources can be reproduced to the highest possible standard of quality. In pursuing this aim our engineers insisted on complete separation between the digital signal processing section and the analogue circuitry, and developed an ultra-modern, high-bandwidth analogue output stage which delivers the signal to the symmetrical (XLR) or asymmetrical (RCA) output sockets by the shortest possible path. If you use the F 100 remote control with screen, or the T+A Control App, the whole system can be controlled via the MP 2000 R.

The MP 2000 R delivers a stunning experience in sound reproduction, and finally exploits the full potential of high-resolution music.

G 2000 R
Turntable

Contrary to all the predictions, the vinyl disc has managed to sustain and even consolidate its right to exist over a period of several decades. Back in the 1990's, when the medium was almost completely swamped by the CD, there were many who lamented its lost qualities; especially the almost tactile sound, with its subjectively warmer nature. In comparison with the CD there is no doubt that vinyl is impractical and space-consuming, but precisely for this reason it had something which the new media lacked: a distinctive character.

The old R-series G 1260 R turntable was a very successful design, and we have carried out further development work on it and introduced a number of improvements. The unit now joins the new R-series as a means of reproducing high-quality analogue sound media, capable of setting standards with its sound quality and its unique design features. Although the vinyl disc is an »old« medium, modern turntables have to be designed and developed with great sophistication if the full potential of the disc is to be exploited. For this reason we concentrated on minimising all external mechanical and electrical influences. One area of development aimed at designing a drive motor for the G 2000 R which was completely consistent and smooth-running; another was the creation of an overall system which was totally damped in order to minimise structural sound, resonance effects and vibration. The result of our labours is superb sound: absolutely transparent, extremely dynamic and forceful. Our turntable is available in various versions. We strongly recommend the installation of our PHE-G R phono pre-amplifier module in the turntable chassis itself. As standard we install a modified pressure-cast aluminium tone arm made by Rega, fitted with the Ortofon 2M Bronze moving magnet system, but a High-End version featuring a modified tone arm and MC pickup from Clearaudio is also available. Naturally we can also supply the G 2000 R without arm or pickup if you prefer.

Principle

Belt-driven High-End mechanism in special heavy chassis

Drive system

Crystal-controlled synchronous motor with DSP-controlled motor voltage

Rotational speed

33 ⅓ and 45 rpm, electronically switched

Wow and flutter

+/– 0,02 %

Disc platter

Pressure-cast aluminium weighing 3.8 kg, with silicone rubber disc mat

Bearing technology

Hardened, polished steel shaft, close-tolerance plain brass bearing


33
45
SRC
USB IN
aptX
PRE
IN 1
IN 2
IN 3
IN 4
IN 5
IN 6

Scale 1:1

Technology

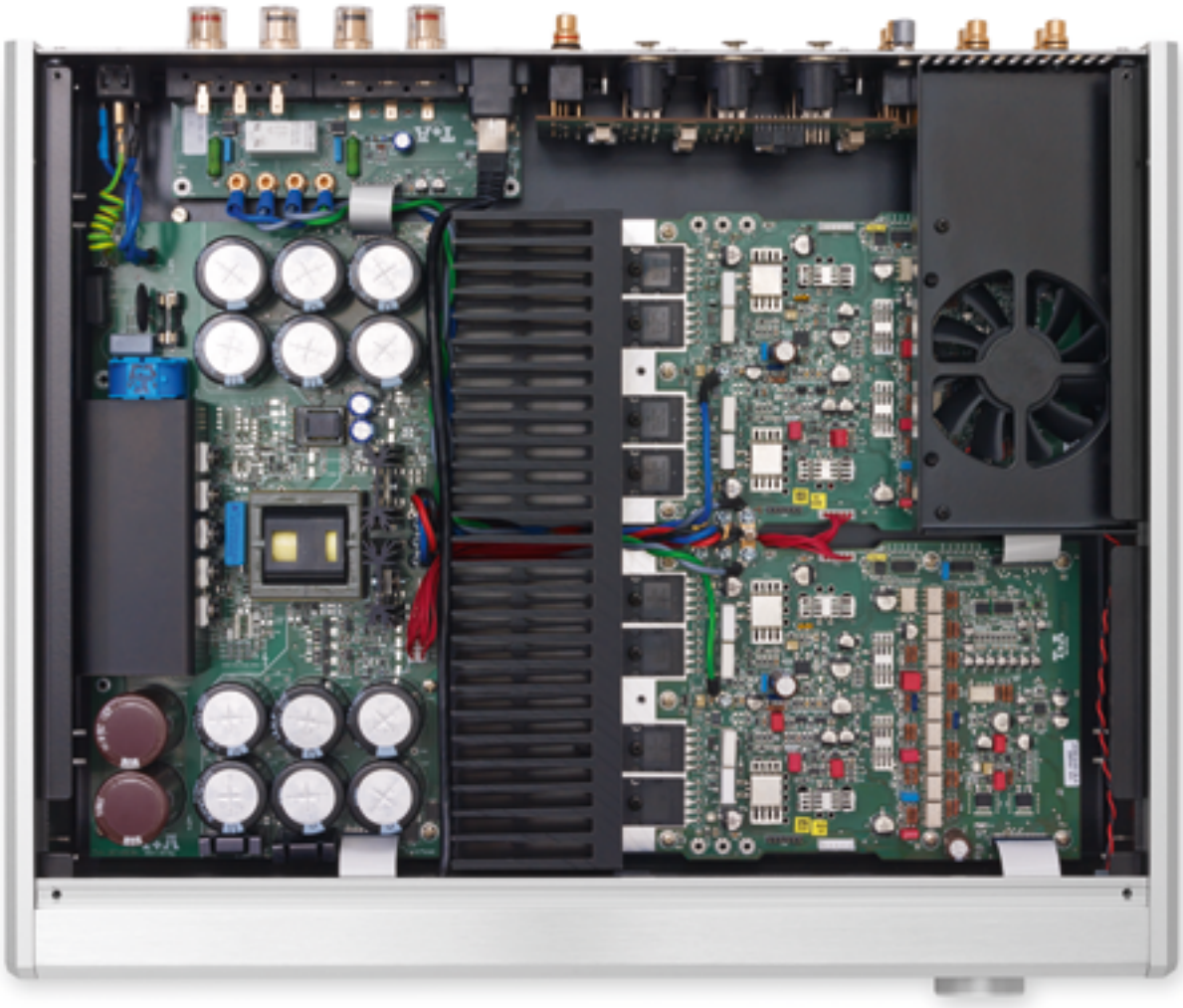
Integrated amplifiers
PA 2000 R
PA 2500 R

The construction, circuit layout, components and sub-assemblies of the two R-series integrated amplifiers are identical, but they differ in output power, connection facilities and case size. The input and output sections are equipped with professional sockets (XLR and RCA) made of non-magnetic materials, and all feature hard gold-plated contact surfaces. All sockets are screwed permanently to the solid aluminium back panel. In the R-series the volume control and input select functions are entrusted to sealed gas-tight gold-contact relays, which are not prey to contact problems caused by corrosion, dust or ageing effects even after many years of operation. Integrating the relays directly into the circuit allows the signal paths to be as short as possible, and the signals pass from the input sockets to the pre-amplifier circuit boards without crosstalk. As an option, input 4 can also be fitted with one of two high-quality phono pre-amplifier modules; they feature different circuit topologies optimised for MM or MC pickups. R-series pre-amplifiers and power amplifiers are constructed in accordance with the double-mono principle. This means that we completely isolate the left and right channels from each other – even in mechanical terms – and use identical circuit boards, so that the sound quality of both channels is identical. The two separate amplifier circuit boards – with input section, volume control, high-voltage amplifier and current amplifier stage – are housed in the right-hand half of the case, where they are shielded from the mains power supply and the output section by the massive heatsink. As with our HV-series machines, the circuit topology of the input stage is based on a cascoded differential amplifier with hand-selected audio J-FET transistors and stages of completely discrete construction, without operational amplifiers (op-amps). This overall circuit design, combined with the high quality of the components employed, virtually eliminates the need for overall negative feedback. The result is that the amplifier boasts excellent linearity combined with an extremely wide dynamic range. Signals up to 60 Vss can be processed without any hint of distortion. The volume control takes the form of discrete precision resistors and bi-stable gold-contact relays, resulting in absolutely exact channel matching combined with the shortest possible signal paths; this in turn virtually eliminates noise and distortion.

The following voltage amplifier stage and current amplifier are completely isolated from each other galvanically. This uncompromising design completely avoids the danger of feedback effects from the loudspeaker currents into the voltage amplifier stages, and also precludes adverse effects from the loudspeaker load.

The voltage amplifier is an extremely linear design with a wide bandwidth, consisting of a cross-coupled cascoded differential amplifier, followed by a single-ended Class A large signal stage – a design principle renowned for its high sound quality. The fully symmetrical current amplifier stage (output stage) is equipped with MOSFET drivers and the latest »thermal tracking« bi-polar output transistors. This arrangement provides a very harmonious, audiophile sound image combined with a tremendous ability to deliver current. The output transistors incorporate integral temperature monitoring diodes, which we exploit to ensure absolutely constant working conditions for the power transistors, regardless of temperature. The distortion behaviour is therefore controlled perfectly, no matter what the load. The amplifiers are fitted with separate tone controls for each channel, and the function can be completely by-passed by means of gold-contact relays. A loudness circuit is present which can be adjusted to match the efficiency of the loudspeakers.

The exemplary layout of the PA 2000 R illustrates the tremendously sophisticated mechanical and electronic construction. This is the only way to obtain such good sound combined with such high power in such a small case.



The quality of any output stage is determined to a very great extent by the mains power supply as well as the circuit topology. Mains power supply units must be as stable and resilient as possible, to ensure that the voltage they generate does not collapse even when very high peaks are encountered. In conventional equipment this requires very large transformers, but the limited space available in the low-profile R-series machines spurred on our engineers to develop an ingenious alternative solution: a regulated high-frequency sine-wave mains power supply with generous reservoir capacity, capable of delivering up to 1200 Watts without problem. The mains power supply can deliver very large quantities of current extremely quickly, even when the gradient of the peak signals is steep. Our experience in building amplifiers over a period of thirty years has taught us the importance of the quality of audiophile modules for the final outcome in terms of sound quality, and that is why we choose our components with great care and then select them according to strict criteria, to ensure optimum characteristics for each specific application.
We use low-loss mica capacitors with silver electrodes, zero-induction resistors, precision low-noise audio resistors, and nickel-free gold- or rhodium plated terminals specially manufactured for T+A. Many of these components were developed for military applications, and therefore fulfil exacting requirements in terms of quality and durability.

All the electronic circuitry for controlling the machines is recessed into the solid aluminium front profile, where the shielding effect is outstanding. The front panel features a bright, dimmable screen (VFD) and control knobs with variable lighting.

Another in-house development for the latest R-series is a completely new and very fast data bus for data exchange between the devices, which makes it possible to control a whole system with a single remote control handset. Alternatively, if the system includes an MP 2000 R, the equipment can be controlled using the T+A App for iOS or Android. Both amplifiers are equipped with a sophisticated protective circuit which is situated outside the signal path, and therefore cannot possibly have any adverse effect on sound quality. The protective circuit constantly compares the input signal before the output stage with the output signal, and instantaneously switches off the output relays if it detects the slightest deviation (clipping, distortion, etc.). The protective circuit is also triggered if overheating occurs, or if a short-circuit is present at the outputs.

The back panel of the MP 2000 R shows the comprehensive facilities provided by the multi-source player. It is equipped with a High-End analogue output in the form of symmetrical (XLR) and asymmetrical (RCA) sockets, and also features a jitter-free digital output. The digital connecting board includes five high-quality digital inputs for converting external digital sources, such as set-top boxes or PCs. The LAN, WLAN and USB ports are assigned to the streaming client, while the aerial socket is intended for the digital tuner. The optional F 100 radio remote control can be connected to the machine, and the whole system can be controlled via the R2-Link data bus. An Ethernet port is present for software updates and incorporation in a Home Automation system.

Multi-source player
MP 2000 R MK II

T+A was one of the first High-End manufacturers to expand its CD players to include additional digital sources. This was an unusual idea, but has proved to be a consistent and logical approach. We refer to this category of machine as multi-source players, and have introduced them into all our equipment ranges.
The sound quality of a digital music source is largely determined by the quality of the digital – analogue converter employed. Since T+A disc players have always had very good converters, it made obvious sense to equip them with additional internal digital sources – such as a network streaming client, a tuner and various inputs for external digital sources – instead of building a separate case for each individual source. This makes economic as well as technical sense, since it saves the expense of additional cases, converters, mains power supplies and cable connections.
The MP 2000 R features a high-quality CD mechanism boasting very fast access times, and its error correction is outstandingly good. Although the CD has been very largely superseded by streamed content, it is very clear that our customers still harbour the wish to be able to play CDs. We have developed a sealed disc mechanism featuring refined mechanical design. The mechanism itself is carried in a floating suspension, and is powered by heavy-duty motors. The mechanism housing consists of resonance-damped multiple laminations in order to prevent any form of interaction between the moving parts of the mechanism and the remainder of the player. The CD drawer runs on two accurately machined stainless steel pushrods, while the disc rests in a high-quality cradle made of aluminium and ABS.

The machine's second digital source is the streaming client (SCL), which takes the form of a network-enabled processor board designed with audiophile sound performance in mind. It features USB Master mode ports (one on the back panel, a second on the front panel) as well as WLAN and LAN ports. The board creates a high-quality connection to networks and the Internet, and is capable of streaming audio data using UPnP at up to HD quality (192/24). We deliberately eschewed a standard computer solution, as its high-frequency interference signals would have had an adverse effect on sound quality. The SCL is a T+A development and supports high-resolution formats, music services and media servers, and includes the convenient airable Internet radio service at no charge.

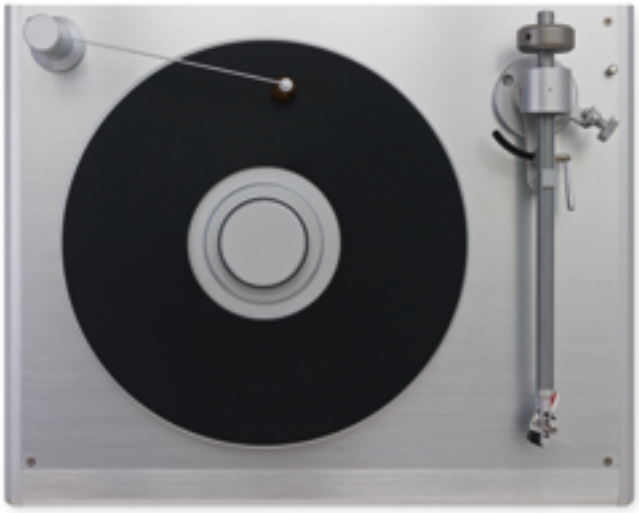
The digital tuner is the third of the MP 2000 R's digital sources. Fully digital intermediate frequency (IF), demodulation and stereo decoder stages ensure that the tuner provides outstanding sound quality. It has excellent sensitivity, high crosstalk attenuation and overload margins, and sounds excellent when using cable and aerial systems. The tuner delivers FM, FM-HD and DAB+ radio services, and offers Radiotext, presets and various supplementary functions depending on the service selected.
A high-quality Bluetooth receiver module forms the fourth digital source. Its purpose is to transfer music files from mobile devices at very high quality using aptX® technology. This process makes it possible to transfer data – such as uncompressed FLAC files – even using the limited bandwidth available with a Bluetooth radio link.
The fifth digital source is the digital connecting board featuring five digital inputs. This is used to connect any external sources – such as set-top boxes, drives, digital recorders and players – at HD quality. The computer PC USB input offers particularly

The High-End disc mechanism of the MP 2000 R is equipped with absolutely top-class components: heavy-duty Mabuchi motor, sub-chassis with floating suspension, stainless steel pushrods and disc drawer made of laminated aluminium and ABS.
The entire mechanism is installed in a resonance-damped aluminium housing, to ensure that no external sounds can influence the sensing of the laser unit.

high quality, and processes high-resolution PCM data at up to 384 kSps, as well as DSD data streams at up to DSD 512. The following inputs are available: four SP/DIF (two high-quality RCA co-ax, two optical TOS-Link) and USB Class 2 Mode up to max. 384 kSps / 32-bit and DSD 512, including support for asynchronous data transfer, for High-End PC connections.

Within the MP 2000 R the data from the five digital sources pass through the same digital signal processing route, which offers all the usual ground-breaking T+A features: T+A DSP oversampling with optimised algorithms, and clock generation with jitter elimination and re-synchronisation. Jitter is one of the most severe problems, and is generated in the source device – especially in computers – and at the data transfer point between source and converter. For high-quality reproduction all traces of jitter must be removed from the data before the information is converted into analogue signals by the DAC. That is why we have developed a unique two-stage process for clock generation (jitter elimination): in the first stage the received data are processed and decoded. In this stage a basic clock is extracted from the received data stream, which undergoes an initial cleaning process in a PLL circuit aimed at removing coarse jitter generated by the source device and the transfer. This clock is now analysed extremely intensively by the micro-processor. If it fulfils certain minimum criteria in respect of frequency and stability, the D/A converters are switched to an internally generated, extremely precise Master Clock with extremely low phase noise. This clock is completely isolated from the source device, and therefore carries no trace of the jitter interference from the source and the transfer link. The local Master Clock is generated by two separate quartz oscillators which are adjusted to extremely precise tolerances: one for the clock family 44.1/88.2/176.4/352.8 kHz, and one for 48/96/192/384 kHz. This extreme sophistication ensures that the clock is absolutely precise for all frequencies from 44.1 kHz upwards.
If the received signal cannot be switched to the local clock oscillators, a second PLL stage (2nd jitterbug) is employed instead of the crystal oscillators. This second process puts the final polish on the first jitterbug stage, reducing the residual jitter after the first stage by a factor of four. Once the clock has been generated, the PCM data are converted by the quadruple converter, which itself has undergone further improvement. The converter is based on a high-performance 56-bit signal processor, and offers four switchable oversampling algorithms. Each channel is assigned four of the latest 32-bit converter chips in a quadruple, double symmetrical circuit, which compensates very accurately for any lack of linearity, and reduces the residual noise – which is actually absolutely minimal with the 32-bit converters employed – by about a further 6 dB. The result is a level of dynamism, linearity and freedom from distortion which is virtually matchless – even in critical music passages, and with the most minute of musical details.
To cater for DSD data which arrive via the PC USB input we have fitted the MP 2000 R with the unique T+A True 1-bit DSD converter – a genuine analogue single-bit converter. Other manufacturers use the DSD mode of a PCM converter, but we eschew that route to ensure that DSD data are processed in a genuine one-bit stream absolutely without coloration and the harmful effects of additional conversion. Like our converters, the analogue output stage also takes the form of separate channels (double-mono), and is galvanically isolated from the digital section by means of jitter-free transformers. This arrangement ensures that external source devices cannot possibly deliver interference, and even the hideous computer interference is rendered innocuous. The output stage offers an extremely wide bandwidth of 100 kHz. Clearly this design is extremely sophisticated, but the results are worth the effort: totally natural, uncoloured sound, free of all the limitations usually associated with digital sources. The MP 2000 R constitutes a universal and genuinely audiophile device for digital music sources.

Another optional accessory is a disc brush (PB 10) made of solid turned brass; the brush itself consists of genuine horse-hair. It is carefully balanced and removes dust particles without harming the disc surface. The pressure weight (AG 10) weighs 0.7 kg and is also turned from solid brass. Using the weight ensures that the disc makes solid contact with the platter.



G 2000 R with modified Clearaudio tone arm

G 2000 R with modified Rega tone arm

Turntable
G 2000 R

Turntables are amongst the most delicate of all playback devices. This susceptibility is inherent in the system, as disc pickups are mechanical sensors which are required to be as sensitive as possible to allow them to follow even the most minute variations in the vinyl disc's groove. Naturally the pickup is also vulnerable to all other mechanical and electrical influences, any of which can have an adverse effect on the source signal. For this reason it is absolutely essential to make every effort to eliminate or at least minimise these external influences. That's why T+A has carried out further development in two different directions: the one targeted the drive motor, which is required to runs as smoothly and steadily as possible, while the second aimed at avoiding structural sound, resonances and vibration in the system as a whole.

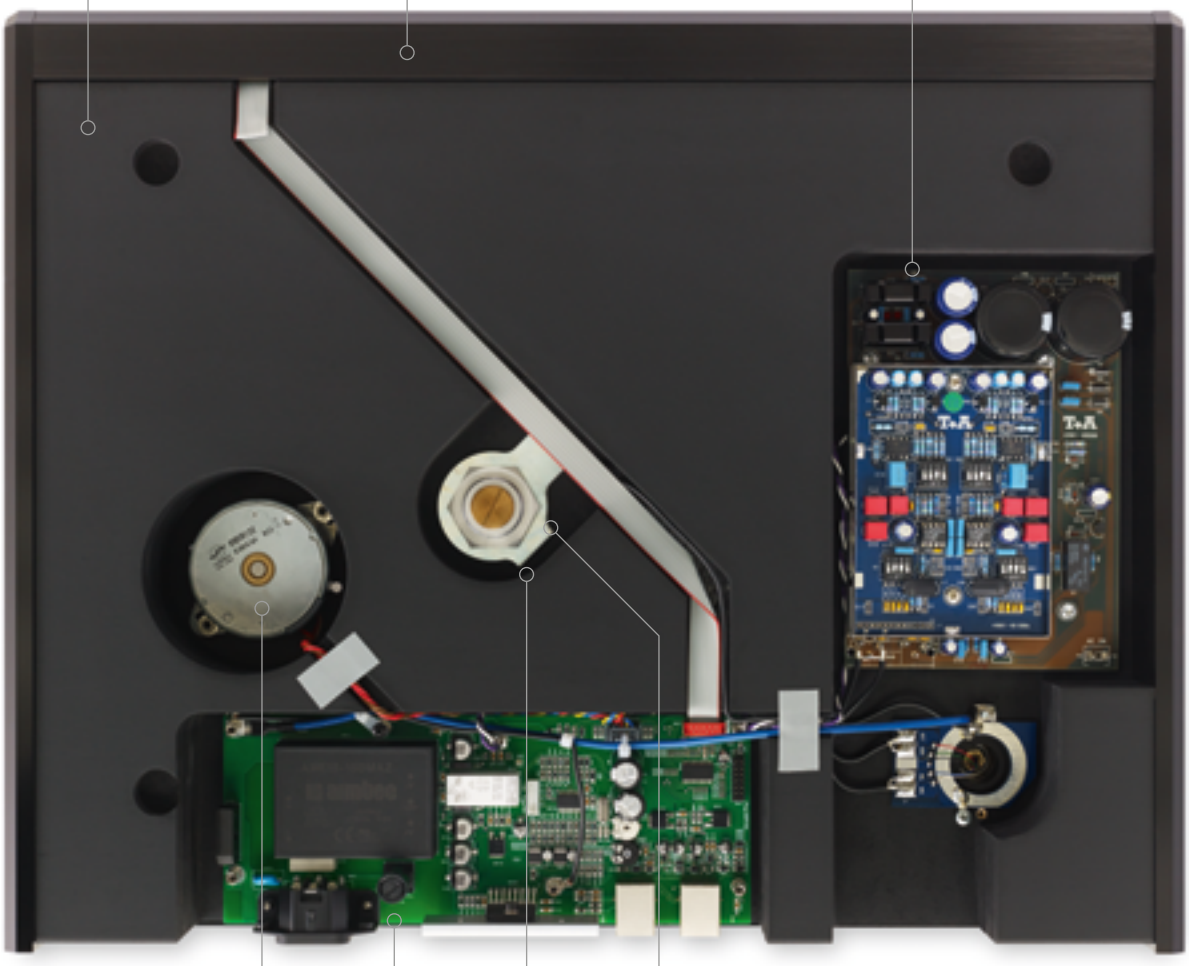
We use a high-quality synchronous motor, whose accurately machined belt pulley drives the disc platter by means of a special ground rubber belt. This arrangement has proved excellent in many applications, and is employed by many other manufacturers of High-End turntables. However, we were not satisfied with this, and decided to tackle the basic problem of uneven rotational speed right at the root. In contrast to pure vinyl specialists we have great competence in electronic development, which has given us vast experience in using digital signal processors to control complex processes. Our T+A development team came up with the ingenious idea of using a DSP to fine-tune the curve of the motor coil voltage, with the aim of persuading the motor to run completely smoothly and evenly, devoid of jerks and vibration. Even the initial rotation of the heavy disc platter is smooth and even, achieved by controlling motor torque. Motor speed fluctuations – known as wow and flutter – are no longer measurable, with the result that the interference commonly associated with uncontrolled motors is completely absent. Uncontrolled motors are also at the mercy of fluctuations in mains frequency and voltage, but DSP motor control also eliminates this problem. The innovative system also offers a further major advantage in the form of direct control of rotational speed: the belt no longer needs to be re-positioned manually for the available rotational speeds of 33 and 45 rpm.

The turntable's case was also designed to eliminate judder and vibration, again with the aim of maximising sound quality. For this reason the G 2000 R is housed in a case made of solid MDF, which has excellent damping characteristics; all the sub-assemblies are located in this component. The turntable body is mounted on four shock absorbers. The external aluminium parts are of sandwich construction in order to absorb structural sound, while the aluminium case cover is bonded to the body, thereby suppressing and absorbing vibration and resonances. The heavy pressure-cast disc platter is manufactured using an accurate machining tool, fine-turned and mounted on an inner zinc platter for isolation. The friction of the large support surface isolates the platter perfectly, and prevents any last trace of structural sound. The heavy disc mat, made of soft silicone rubber, has the same effect, and also avoids damage to the delicate vinyl discs. The net result is that the disc platter is acoustically dead, and offers best possible conditions for the pickup system to make contact with the disc without suffering interference. The zinc platter can only be produced using the very latest automatic CNC machines, since it undergoes a further precision machining process after the platter shaft has been press-fitted. This process ensures absolute precision in the whole mechanical system. The plain brass bush and hardened, polished steel shaft are made to a tolerance of 5 µm.

We can supply superb phono pre-amplifier modules upon request. These are installed exactly where they belong, i.e. at the output of the tone arm itself. This layout nips in the bud any danger of induced interference in the pickup system's highly sensitive output signals. The mains power supply unit features sophisticated stabilisation measures, while effective shielding and individual circuit topology specially tailored to MM and MC pickups ensure extremely low levels of noise and interference. DIL switches are used to match the PH-G10 MM / MC accurately to the pickup system installed.

MDF body for outstanding damping

Solid aluminium case components



Sealed synchronous drive motor

Brass thrust bearing for the disc platter's polished steel shaft

Mains power supply unit and DSP control circuit board

Bearing cradle for the aluminium disc platter, with polished steel spigot


IN 1
IN 2
IN 3
IN 4
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IN 6
MP
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TONE
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PA 2000 R
Integrated amplifier

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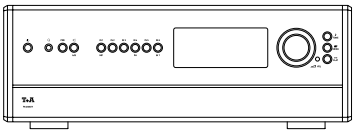
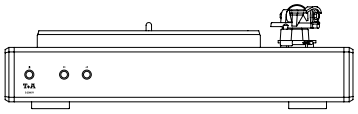
Integrated amplifier



Pre-amplifier stage			
Frequency response +0/–3 dB		0.5 Hz – 300 kHz	0.5 Hz – 300 kHz
Signal : noise ratio, unweighted / A-weighted		105/109 dB	105/109 dB
Total harmonic distortion / Intermodulation		< 0,001 % / < 0,001 %	< 0,001 % / < 0,001 %
Channel separation		> 90 dB	> 90 dB
Loudness		Switchable, variable to suit loudspeaker efficiency	
Tone controls		Switchable, channel-separate	
	Bass	–6 ... +8 dB	–6 ... +8 dB
	Treble	–6 ... +8 dB	–6 ... +8 dB
Nominal input sensitivity			
High-level (RCA)		3 × 250 mV ... 4 V_{eff}/20 kOhms	4 × 250 mV ... 4 V_{eff}/20 kOhms
Symmetrical (XLR)		3 × 500 mV ... 8 V_{eff}/5 kOhms	3 × 500 mV ... 8 V_{eff}/5 kOhms
Phono MM (optional*)		1 – 5 mV, 16 Capacitances	1 – 5 mV, 16 Capacitances
Phono MC (optional*)		60 – 1000 µV, 16 Impedances	60 – 1000 µV, 16 Impedances
*Phono module replaces one high-level input			
Outputs			
Headphone		50 Ohms	50 Ohms
PRE out RCA		Nom 1 V_{eff}, Max 9,5 V_{eff}, 75 Ohms	Nom 1 V_{eff}, Max 9,5 V_{eff}, 75 Ohms
PRE out XLR			Nom 1,45 V_{eff}, Max 19,6 V_{eff}, 75 Ohms
Output stage			
Nominal output per channel	into 8 Ohms	100 Watts	140 Watts
	into 4 Ohms	200 Watts	280 Watts
	into 2 Ohms	300 Watts	560 Watts
Frequency response +0/–3 dB		1 Hz – 150 kHz	1 Hz – 150 kHz
Slew rate		60 V/µs	60 V/µs
Damping factor		> 65	> 65
Total harmonic distortion		< 0,02 %	< 0,02 %
Reservoir capacity		60000 µF	120000 µF
Control interface		R2-Link	R2-Link
Remote control		FM 2000	FM 2000
Mains connection		100 – 120 V or 200 – 240 V, 50 – 60 Hz	
		Max. 1000 Watts	Max. 2000 Watts
Stand-by		< 0.5 W	< 0.5 W
Additional features		Trigger input +5 V ... 20 V via adapter plug for remote power-on Input 3 (symmetrical) or 5 (asymmetrical) can be configured as Surround Pass Through	
Dimensions (H × W × D)		8.2 × 46 × 40 cm / 3.2 × 18.1 × 15.8 inch	16.5 × 46 × 40.5 cm / 6.5 × 18.1 × 15.8 inch
Weight		10.5 kg / 23.2 lbs	14.5 kg / 32 lbs
Finishes		Silver anodised aluminium (43), black anodised aluminium (42), brushed	

G 2000 R
Turntable



Principle	Belt-drive High-End mechanism in special heavy chassis with structural sound absorber and resonance isolation.
Platter motor	Crystal-controlled synchronous motor with precise DSP-controlled optimisation of the motor coil voltage curve.
Rotational speeds	33 ⅓ und 45 rpm, electronically switched
Wow and flutter	+ – 0.02 %
Rumble	82 dB
Disc platter	Pressure-cast aluminium, weight 3.8 kg, with silicone rubber mat
Bearing technology	Hardened, polished steel shaft, close-tolerance plain brass bush

Pickup system (optional)	MM system: Ortofon 2M Bronze	MC 2 MC system
Output voltage	5.0 mV	0.75 mV
Channel separation, 1 kHz	26 dB	30 dB
Frequency response -3dB	20 Hz – 29 kHz	20 Hz – 45 kHz
Terminal impedance	47 kOhms	100 Ohms
Terminal capacitance	150 – 300 pF	–
Stylus compliance	22 µm/mN	9 µm/mN
Style form	r/R 8/40 µm	Micro Line
Tracking force	15 mN (1.5 g)	20 mN (2 g)
Pickup weight	7.2 g	8 g
Recommended phono amplifier	PHE-G R MM	PHE-G R MC

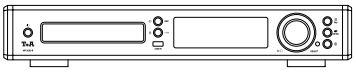
Control interface	R2-Link, automatic power-on via amplifier

Mains connection	100 – 240 V, 50 – 60 Hz, 40 W
Stand-by	< 0.5 W

Optional accessories	Disc weight, disc brush, phono pre-amplifier

Dimensions (H × W × D)	Body 8.2 × 46 × 38 cm / 3.2 × 18.1 × 15 inch, overall 16 × 46 × 38 cm / 6.3 × 18.1 × 15.8 inch
Weight	14 kg / 30.8 lbs
Finishes	Silver anodised aluminium (43), black anodised aluminium (42), brushed

MP 2000 R MK II
Multi-source player



CD-Player		
Formate		CD/DA, CD-R, CD-RW, CD Text
Frequency response + dynamic range		2 Hz – 20 kHz/100 dB
Streaming Client		
Formats		MP3, WMA, AAC, OGG Vorbis, FLAC, WAV, AIFF, ALAC
Data rates		PCM 32...192 kHz,16/24 Bit; MP3 up to 320 kBit, constant and variable Data rate
Features		Gapless Playback for MP3 (Lame), WAV, FLAC T+A Control App for iOS und Android
Standards		UPnP AV, T+A Control
Services		Tidal, Deezer, qobuz. (Subscription required)
Interfaces		LAN: Fast Ethernet 10/100 Base-T, WLAN: 802.11 b/g/n
Digital Connecting Board		
S/P-DIF digital inputs		Two high-quality co-ax and two opt. TOS-Link; 32 kSps; 44.1 kSps; 48 kSps; 88.2 kSps; 96 kSps; 176.4 kSps; 192 kSps; 16/24-bit
USB (Device Mode)		USB Class 2 mode; support for asynchronous data transfer PCM mode: 44.1 kSps; 48 kSps; 88.2 kSps; 96 kSps; 176.4 kSps; 192 kSps; 352.8 kSps; 384 kSps; 16/24/32-bit DSD mode: DSD 64; DSD 128; DSD 256; DSD 512
USB (Master Mode)		Two inputs (1 × front panel, 1 × back panel), formats as Streaming Client formats
Tuner		
FM	Reception standard	FM, FM-HD
	Frequency range	87.5 – 108 MHz (Europe/US version) 76 – 90 MHz (Japan version)
	Sensitivity	Mono (26dB S/N) 0.9 uV, stereo (46 dB S/N) 40 uV
	Overload margin	103 dB uV
	Total harmonic distortion	0.1 %
	Signal : noise ratio, mono/ stereo	72/62 dB
	Stereo channel separation	50 dB
	De-emphasis (Europe/US version)	50/75 us
	Data services	RDS/RDBS, station name (PS), programme type (PTY), radiotext (RT)
DAB	Reception standard	DAB, DAB+
	Frequency range	168 – 240 MHz (band III)
	Sensitivity (BER = 10 – 4)	2.5 uV
	Overload margin	103 dB uV

Bluetooth		aptX® Bluetooth Audio transmission protocol A2DP (Audio) AVRCP 1.4 (Control), MP3, SBC	
Connections			
Analogue outputs	High level (RCA)	2.2 V_{eff} / 50 Ohms	
	Symmetrical (XLR)	4.4 V_{eff} / 50 Ohms	
Digital outputs		1 × coax, IEC 60958 (LPCM)	
D/A-Converter			
PCM		Double differential quadruple converter with four D/A converters per channel, 32-bit sigma-delta, 352.8 kSps/384 kSps Up-sampling: freely programmable signal processor with four selectable oversampling algorithms. FIR short, FIR long, Bezier/IIR, Bezier	
DSD		Direct DSD signal path via T+A True 1-bit converter	
Frequency response		PCM 44.1	kSps:2 Hz – 20 kHz
		PCM 48	kSps:2 Hz – 22 kHz
		PCM 96	kSps:2 Hz – 40 kHz
		PCM 192	kSps:2 Hz – 80 kHz
		PCM 384	kSps:2 Hz – 100 kHz
			DSD 64:2 Hz – 44 kHz
			DSD 128:2 Hz – 60 kHz
			DSD 256:2 Hz – 80 kHz
			DSD 512:2 Hz – 100 kHz
Analogue filter		Phase-linear filter with automatic bandwidth switching 60 ... 120 kHz (according to sample rate)	
Total harmonic distortion		< 0.001 %	
Signal : noise ratio		110 dB	
Channel separation		110 dB	
Control interface		R2-Link	
Remote control		FM 2000, T+A Control APP, optional FD 100 remote control handset with screen	
Mains connection		100 – 240 V, 50 – 60 Hz, 40 VA	
Stand-by		< 0.5 W	
Dimensions (H × W × D)		8.2 × 46 × 40 cm / 3.2 × 18.1 × 15.8 inch	
Weight		8 kg / 17.6 lbs	
Finishes		Silver anodised aluminium (43), black anodised aluminium (42), brushed	


PRE
IN 1
A/B
MP
T+A
PA 2500 R


IN 2
IN 3
IN 4
IN 5
IN 6
PH
IN 7
Phono MC
30

Maßstab 1:1


IN 3
IN 4
IN 5
IN 6
PH
IN 7
Phono MC
30

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