

 **Technics**

RS-9900US

High Fidelity Stereo Cassette System with
Closed-Loop, Double-Capstan 3-Motor Drive,
Separate Amplifier Unit

 DOLBY SYSTEM



RS-9900US

High Fidelity Cassette Equipment Now Has to Be Measured against A New Standard.

While over the past years cassette equipment (and the cassettes themselves) have become increasingly sophisticated, there has not been a cassette deck that could in good faith be considered the definitive unit delineating the limits of cassette technology. In an all-out engineering effort, Technics has now created this "ultimate" cassette deck; an engineering effort that began with a re-examination of basics and, while it progressed, mobilized human and technological resources available only to a company with the stature and experience of Technics. With the Technics RS-9900US, tape transport and record/reproduce amplifier electronics have been divided into two separate units, as they basically serve different tasks, and also in the interest of easier placement or transporting.

The transport unit is equipped with a 3-motor double-capstan closed-loop drive which, by applying constant and uniform tape tension and by isolating the tape section between the two capstans completely from any outside influences, assures the smoothest possible tape travel, intimate and uniform tape-to-head contact, and minimized wow & flutter ratings. A true 3-head system with separate recording and reproducing heads, the RS-9900US also permits tape monitoring as in professional open-reel equipment.

The record/reproduce amplifier unit, connected to the transport via two multi-pole cables, provides complete facilities for matching the electromagnetic characteristics of any cassette tape now on the market, but also is equipped with peak reading level meters of studio standards, a calibration oscillator for head azimuth adjustments, and of course Dolby* noise reduction circuitry. Together, the two units form what must, without exaggeration, be considered the highest grade of cassette technology presently available in the world, regardless of price, regardless of intended use, and regardless of manufacturer.

Closed-Loop 3-Motor Double-Capstan Tape Transport Unit



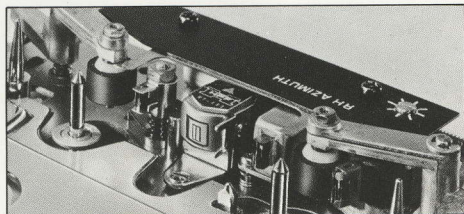
Record/Reproduce Amplifier Unit



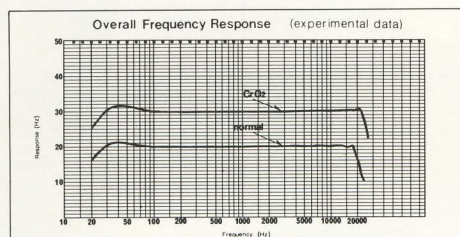
*Dolby and "Double D" devices are the trademarks of the Dolby Laboratories Inc.

3-Head Configuration with HPFTM Heads

The superiority of Technics-developed HPFTM heads in terms of service life and electrical characteristics is by now a well-known fact. For the RS-9900US, new HPFTM heads were especially developed in view of the restrictions that the cassette format imposes on 3-head designs.



Frequency Response 25—20,000 Hz ± 3 dB (with CrO₂ Tape)



As a benefit of the HPFTM heads, the intimate tape-to-head contact, and the great care with which all electronic

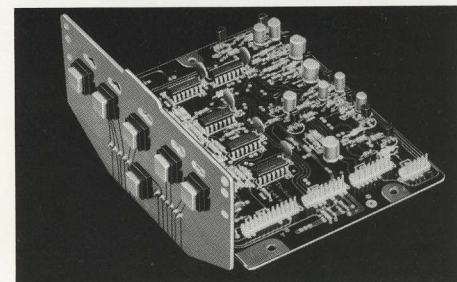
systems were designed, the RS-9900US achieves a frequency response that was possible in the past only with top grade open-reel equipment. Using CrO₂ cassettes, frequency response was measured as 25—20,000 Hz, also a result of the 0.8 micron thin gap of the reproducing head.

User-Adjustable Head Azimuth

A great deal of care went into the design of the tape compartment, to make sure that cassettes of slightly varying dimensions are always held in optimum playing position. Heads are safely protected from damage by accidental misuse, but are on the other hand easily accessible for cleaning. With the help of the built-in 8 kHz oscillator, the user can record his own test tape and then proceed to adjust the recording head azimuth for optimum high end frequency response. For this, a small special screwdriver is supplied.

Full IC Logic Control of All Transport Functions

Feather-touch sensor buttons act upon solid state switches, and IC logic circuits control all transport modes so that the transport can be switched from any mode directly to any other without the slightest danger of stress on the tape. There are no relays that could cause electrical noise. The extremely small travel stroke and fine responsiveness of the buttons make the RS-9900US a joy to operate.



Pitch Control Varies Tape Speed by up to $\pm 5\%$

A side benefit of the direct drive DC motor construction is the possibility of varying tape speed. With the pitch control, travel speed in reproducing can be adjusted within a range of $\pm 5\%$. This corresponds to almost half a tone of musical pitch in either direction, permitting accurate "tuning" of the cassette deck to a musical instrument that is being played with it.

Tape Time Meter Indicates Remaining Program Time

In addition to a conventional digit-type tape counter, the RS-9900US is equipped with a newly developed tape time meter that indicates how much program time is left. Indication is in minutes, with three scales provided for C-90, C-60/C-45 and large-hub cassettes. The meter receives its information from an ingenious detection circuit which monitors

Recording Amplifier of Extremely Large Dynamic Range

In microphone recording, the mic head amp circuit gives a dynamic range of 55 dB (at -72 dB sensitivity). This has become possible through the use of a 2-stage direct coupled circuit design using low-noise PNP transistors and low-noise metal film resistors. The gain of this stage is 30 dB; it can be bypassed by the mic attenuator switch, giving an additional improvement in the noise figure and dynamic range. The recording equalizer amplifier is again a 2-stage design forming a "peaking" circuit. Bass equalization is 3180 μ sec.

Reproducing Amplifier Boasts 132 dB Signal-to-Noise Ratio

Careful circuit engineering and the use of only strictly selected, high grade components (such as tantalum capacitors, for instance) results in a signal-to-noise

figure of 132 dB (against referenced input).

Tape Selector Switch

Establishes correct bias and equalization for normal (ferric), CrO₂ and ferri-chrome tapes.

Oscillator Switch

The built-in oscillator can supply 400 Hz and 8 kHz signals for purposes of level calibration and head azimuth adjustment.

Dolby Noise Reduction Switch

Position "in" provides Dolby encoding in recording, and decoding in playback. Position "FM" is for recording Dolbyized FM broadcasts in their encoded form, while monitoring is possible through the decoder, retrieving the original signal.

MPX Filter

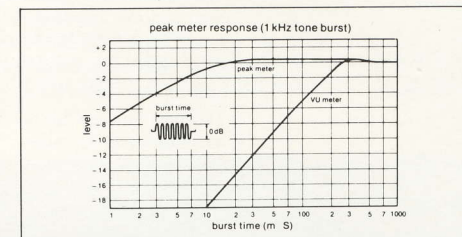
A low-pass filter that eliminates 19 and 38 kHz carrier leaks when recording from FM stereo. (Such leak components could otherwise cause malfunctions in Dolby tracking).

All Switching by Transistors

No mechanical switches or relays of any kind. All switching is done by solid state devices which cause no mechanical or electrical noise.

Peak Indicating Meters to DIN Professional Standards

Genuine peak meters, these instruments. A OVU reading corresponds to the red mark at the -8 dB point ($= 160\text{nWb/m}$). Response speed is extremely high: 10 ms for -1 dB, 3 ms for -4 dB. Four operation amp ICs are used exclusively for the meter drive circuit.

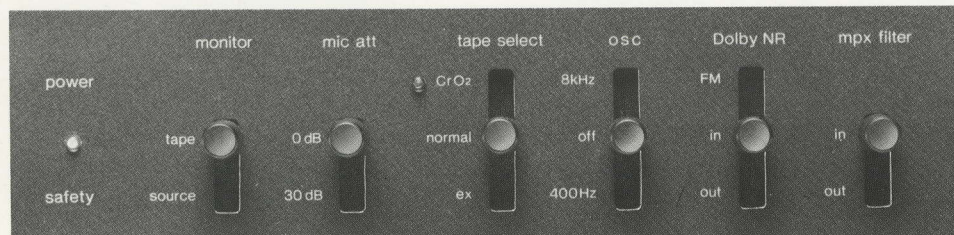


Detent-Type Output Level Control with 2 dB Steps

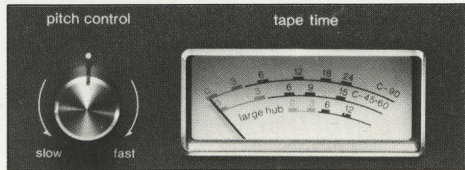
A precision 2-ganged digital type detent potentiometer, this level control permits accurate, reproducible level settings in 2 dB steps.

Mic/Aux and Line Input Level Controls

Mixing of two types of sources is easily possible.



the speed of the supply reel motor and translates this into remaining program time.



Memory Rewind, Memory Play

Quick return to a preselected point on a tape is made easy by the memory feature. After rewind, the tape will automatically stop at point 999 of the tape counter, or it can be made to stop and then automatically resume playback.

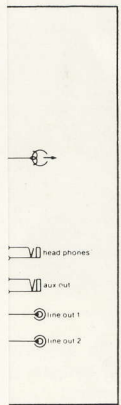
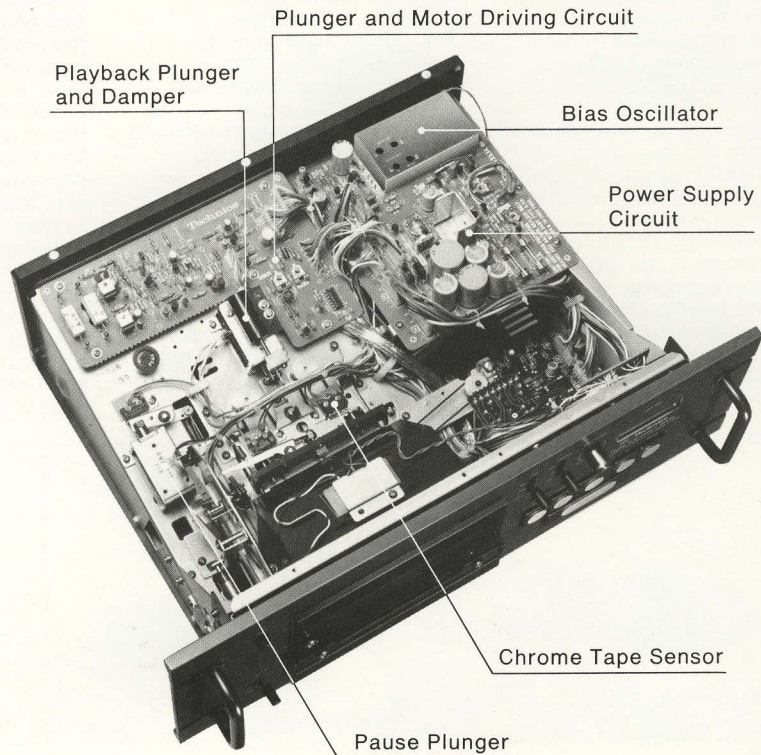
Unattended Recording with Timer

With a time switch connected to the RS-9900US, radio programs can be recorded automatically at a preset time, or the unit can be set to start playing at a preselected time in "wake up with music" fashion.

Lovingly Constructed—Down to the Smallest Detail

The controls and their relative locations; the "feel" of switches and controls; the readability of the meters; the cassette compartment with its softly opening pneumatically damped door; the additional input and "through-out" jacks on the amp unit; the clean, logically arranged wiring inside; the use of only selected components throughout. Wherever you look, whatever you touch,

and, most importantly, whatever you record and hear on the RS-9900US, you will realize immediately that here is the finest example of technology built with an ingredient that is uniquely Technics: love.



Microphone Attenuator

In position -30 dB, the mic head amp is bypassed, resulting in 30 dB less gain and an improvement in signal-to-noise ratio. To be used with high output microphones handling high sound pressure levels.

Headphone Volume Control and Jack

A special headphone output amplifier supplies a signal of sufficiently high level to drive even headphones of high impedances.

Monitor Switch

Being a true 3-head design, the RS-9900US permits professional tape/source monitoring.

Aux Input and Output Jacks

Convenient input and output access for temporary connections.

Record Indicator Lamp

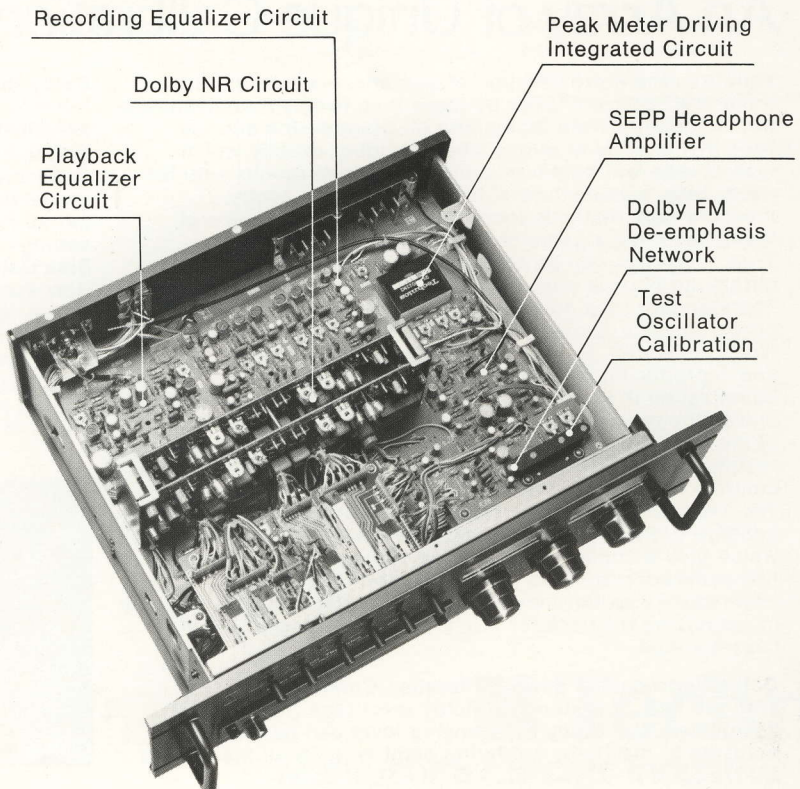
Lights up when transport unit is in recording mode.

Level, Bias and Equalization Calibration Controls

For a discussion of these very flexible controls that permit perfect matching to any type/brand of cassette tape, see the page next to the specifications.

Top Panel

A block diagram as well as some characteristic performance graphs are printed on the top panel for easy reference.

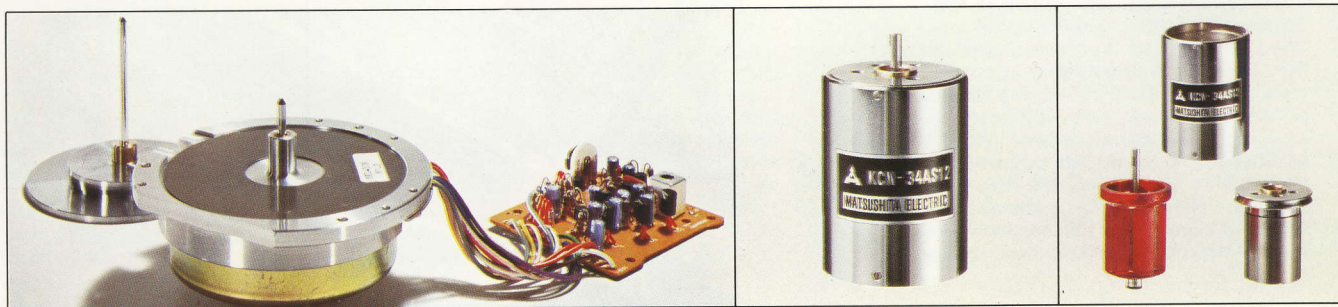


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Closed-Loop 3-Motor Transport System

The RS-9900US cassette deck possesses one of the most advanced and sophisticated transport systems available in any high fidelity tape system, open-reel systems included. Technics has made maximum use of the D.D. principle, originally developed for turntable use, which brought about a revolution in turntable design. For the cassette deck, an 8-pole, 24-slot direct-drive motor is used, providing an extremely low but precisely held rotational speed of 5.5 revolutions-per-second. An extension of the rotor shaft serves as the capstan which pulls the tape over the heads. Through a flexible belt the D.D. motor drives a second capstan/flywheel which pulls the tape from the supply reel. The tape is thus held in a "closed-loop," decoupled from the outside influences of the supply and take up reels of the cassette. Not only is the section of the tape passing over the recording/reproducing heads isolated from the rest of the drive system, it is held in perfect, constant tension by virtue of the elasticity of the drive belt to the second of the two capstan/pinch roller pairs. Precise tension control allows the tape to achieve an extremely stable wrap on the heads, without requiring high tension at the same time. The relatively low tension of the decoupled section of tape means less wear on the tape and heads, and decreased stress in the tape base. The tendency toward modulation noise caused when a tightly stretched tape is transported over the heads is also removed with the closed-loop system.

The reel drive motors employ coreless rotors of a design exclusive to Technics, and possess very sophisticated control systems of their own. In more conventional tape decks, motors of this quality are usually called for in the capstan drive system. Here, they provide unparalleled smoothness of motion and extremely low starting time. The speed control feature provides a heretofore unattainable combination of high fast forward and rewind speeds, without subjecting the tape to dangerous stresses. With this system, the velocity of the tape is regulated in fast forward and rewind, just as in normal play. This is done by varying the rotational speeds of the reels according to the amount of tape wound on them. This means that when rewinding the tape, a fast but safe speed can be maintained for the full length of the tape, eliminating the disadvantages of slow travel at the beginning and excessively fast travel at the end. The result? The audiophile interested in the best performing cassette deck ever produced is probably familiar already with the traditional arguments in favor of the open-reel system, with its relatively reduced mechanical complexities. In the past there has in fact been a hard choice to make, between quality of sound reproduction and convenience of operation. Technics engineers have solved the traditional dilemma with a cassette deck which provides tape action so smooth, and stable, that wow and flutter readings are held to a minute 0.04% WRMS, far superior to those of most open-reel systems available, and certainly on a par with the best of them.



An Array of Unique Calibration Controls

With the recent proliferation of cassettes—we counted over a hundred different types by more than twenty manufacturers, not including private labels and off-brands—the serious recordist is often at a loss when deciding exactly which type of tape will help him achieve optimum results with his deck. Tape manufacturers' literature is often spotty, measurement methods incomparable, and the choice of tapes becomes a game of chance.

True, cassettes can be conveniently grouped into low-noise, chromium dioxide and, a relative newcomer, ferrichrome. The standard tape selector settings provided on all high grade cassette decks will accommodate these common types quite well. But for accurate optimization of all recording and reproducing parameters such as bias current, equalization in the bass and treble ranges, Dolby recording and Dolby reproducing levels as well as fine-adjustment of the head azimuth, the recordist aiming for professional results feels an intense need for easily accessible calibration controls for each of these variables.

The Technics RS-9900US now provides these controls. In addition to the bias and equalization selector switches which give a choice of three fixed settings each, there are five calibration controls plus the built-in 400 Hz/8 kHz oscillator. Together, they give the recordist complete freedom in optimizing his deck for any present (or future) type of cassette tape.

Dolby Reproducing Level Calibration Control

With the help of a standard Dolby level tape (recorded at 200nWb/m), the Dolby reproducing level can be precisely adjusted to the Dolby operating point marked on the meters.

Dolby Recording Level Calibration Control

Permits precise matching of Dolby recording level to the sensitivity of the tape being used.

Variable/Preset Switch

In position "preset", bias and equalization are fixed but switchable by the tape select switch in the upper half of the panel. Position "variable" frees the bias and equalization settings for readjustment by the controls on the right.

Bias Calibration Control

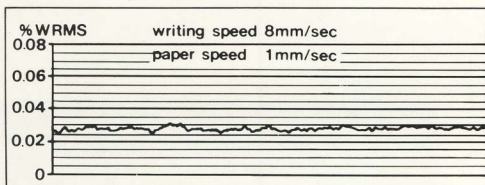
Bias current can be adjusted over a range of -50%, +100% of the normal value. This causes frequency response changes as shown in the graph.

Equalization Calibration Control

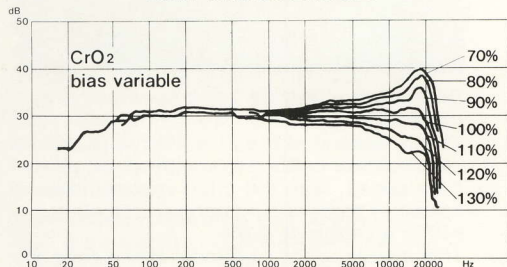
Changes in recording equalization, possible separately for the left and right channels, permit optimum matching with any type of tape.



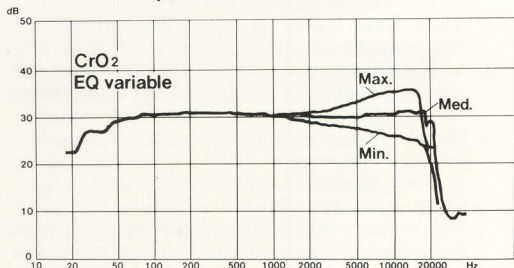
Wow and flutter characteristics



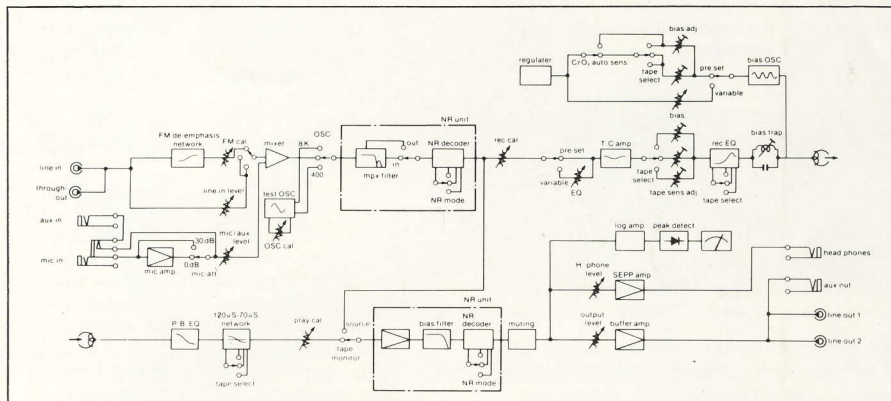
Bias characteristics



Equalizer characteristics



Optional Remote Control Unit: RP-9690



Technical Specifications

Track System: 4-Track, 2-channel stereo recording and playback

Recording System: AC bias (90 kHz), AC erase

Tape Speed: 4.8 cm/s. (1 7/8 ips)

Wow and Flutter: 0.04% (WRMS) ± 0.1% (DIN)

Frequency Response: CrO₂ tape; 25~20,000 Hz (± 3 dB)

20~20,000 Hz (DIN)

Normal tape; 25~18,000 Hz (± 3 dB)

20~18,000 Hz (DIN)

Signal-to-Noise Ratio: Dolby NR in; 67 dB (above 5 kHz)

(signal level=Maximum recording level)

Harmonic Distortion: 1.4% (CrO₂/Normal tape 160nWb/m 333 Hz)

Inputs: Mic; sensitivity 0.25mV/applicable

microphone impedance 200Ω~20 kΩ

Line; sensitivity 60mV/input impedance 150 kΩ

Aux; sensitivity 60mV/input impedance 150 kΩ

Outputs: Line; output level 0.42V/load impedance 47 kΩ over

Through out; output level 0.42V/load

impedance 47 kΩ over

Aux; output level 0.42V/load impedance 47 kΩ over

Headphones; output level 0~900mV/

impedance 8Ω~125Ω

Rec/PB Connection: 5p DIN type; input level 1mV/

impedance 10 kΩ

output level 0.42V/impedance 3.3 kΩ

Fast Forward and Rewind Time: Approx. 70 second with C-60 cassette

tape

Pitch Control: Tape speed variable range ± 5% at playback

Calibration Controls: Play cal; playback level variable range

± 3 dB at 333 Hz

Rec cal; recording level variable range

± 5 dB at 1,000 Hz

Bias; bias current variable range

-50~+100% (100% = standard tape)

EQ; recording equalizer variable range

± 5 dB at 10,000 Hz

Motors: 3-motor closed-loop double capstan system

1-DD DC brushless capstan motor

2-DC coreless motor for reel table drive

3-head system

2-HPF heads for rec/playback

1-double gap ferrite head for erasure

Power Requirements: AC; 110/125/220/240V, 50-60 Hz

Power Consumption: 48W

Dimensions: Transport unit;

48.3cm x 19.3cm x 37.5cm

(19" x 7 5/8" x 14 3/4")

Amplifier unit;

48.3cm x 17.3cm x 37.5cm

(19" x 6 3/4" x 14 3/4")

Weight: Transport unit; 15.0 kg (33 lbs)

Amplifier unit; 9.0 kg (19 1/2 lbs)



Technics

Matsushita Electric Industrial Co., Ltd.

Specifications are subject to change without notice. Printed in Japan