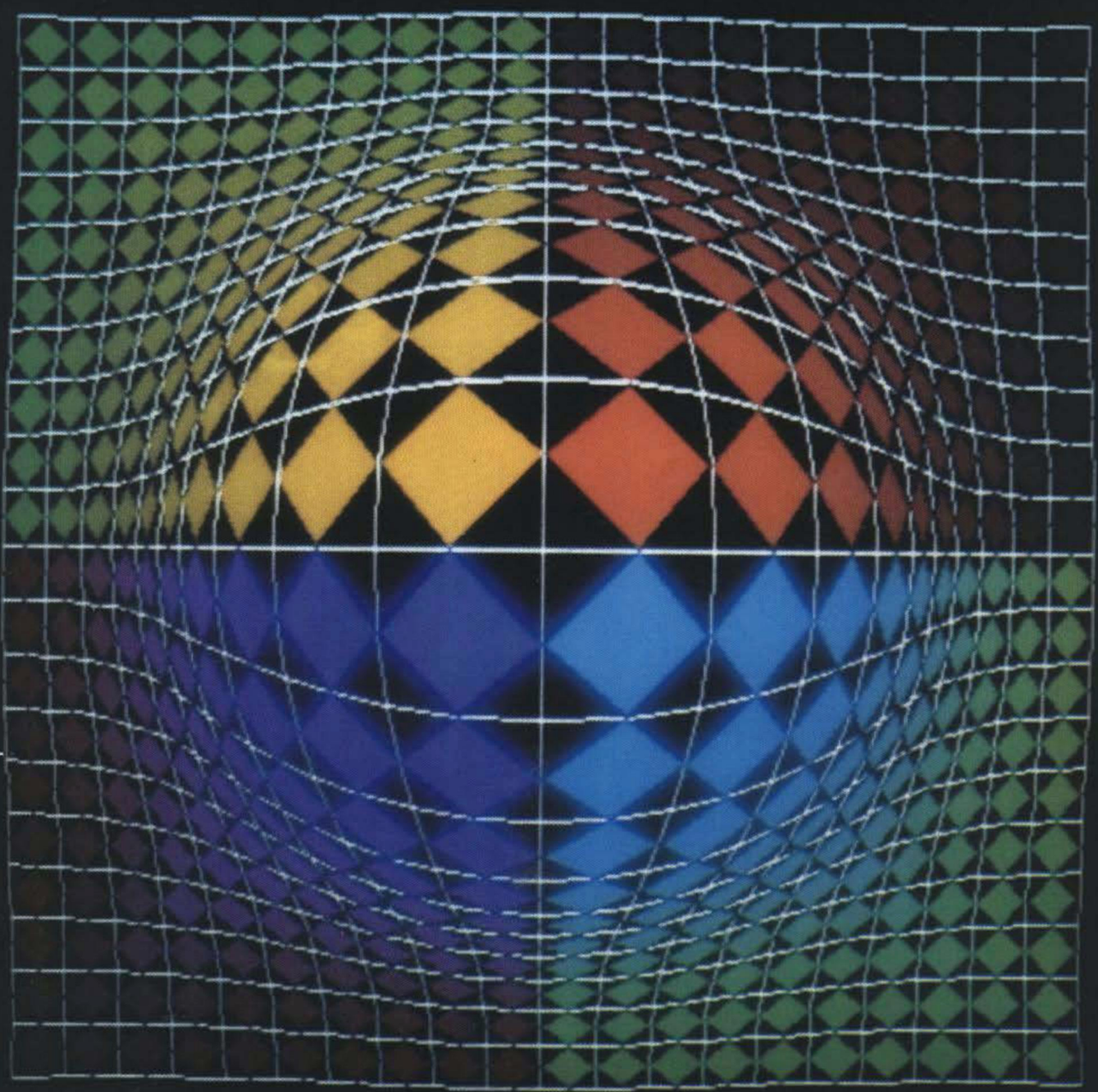
Technics

DIGITAL

DIGITAL AUDIO

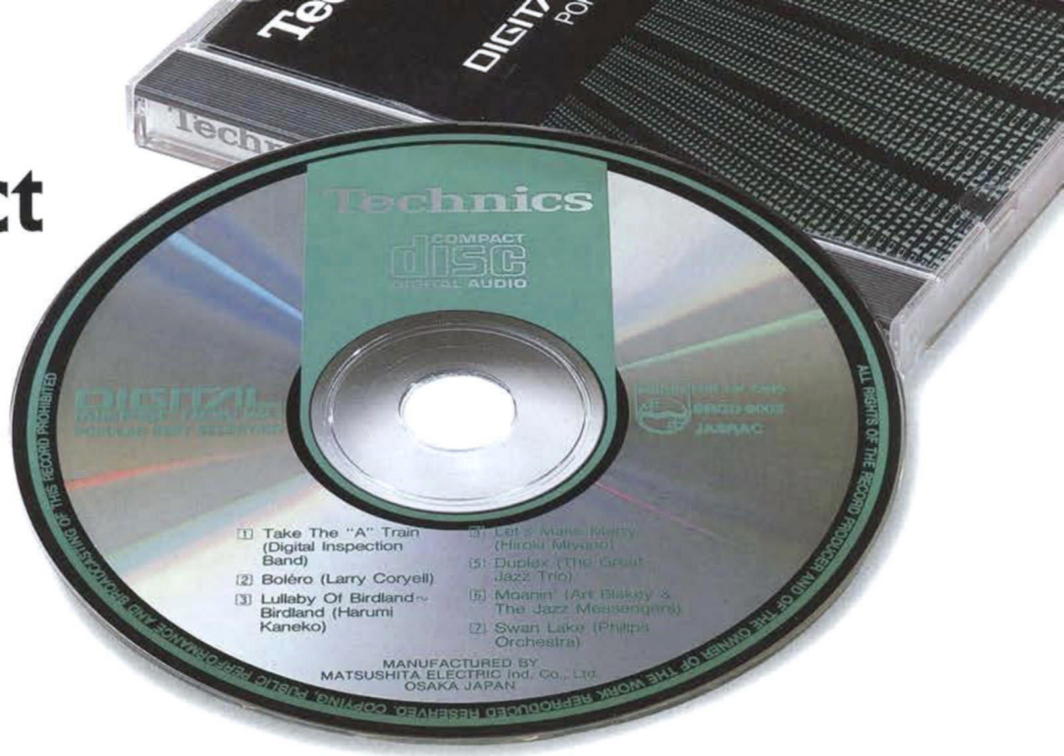


A Complete Component Line-up Dedicated to the Highest Fidelity— Digital Audio from Technics

To bring concert hall realism into the listening room has long been a primary goal of high end audio manufacturers and audiophiles alike. Individual instrumental detail, stereo imaging, dynamic range, ambience... these are some of the factors that go into hi-fi realism.
In the over 100 years of recorded sound, man has made remarkable progress towards this goal. But there is a limit to what conventional, analog, media can attain. Now we are entering a new phase in audio recording and reproduction. It's name is "digital" and it promises fidelity higher than ever before. To keep the digital audio promise, we at Technics have dedicated ourselves to developing the necessary fusion of state-of-the-art technology and imaginative applications.
Already this has brought forth three of the most exciting new products in recent audio history:
the SL-P10 compact disc player system, featuring outstanding sound quality and operational convenience; the SV-100 digital audio processor, the lightest in the world; and the SV-P100 digital audio cassette recorder, combining VHS cassette mechanism and processor in one compact unit. This is only the beginning—in the years to come you can depend on Technics to keep bringing you the best in digital audio performance.


Technics
Digital Audio Cassette Recorder SV-P100
PCM
Digital Recording Demonstration Tape
Program
1. SWAN LAKE
Philips Orchestra
2. TAKE THE A TRAIN
Harumi Kaneko
Technics
This recorder accepts standard video tape cassettes
Technics
AC Power Unit
DIGITAL Audio processor SV-100
playback
Technics
rec muting
power push on

The World of the Compact Disc



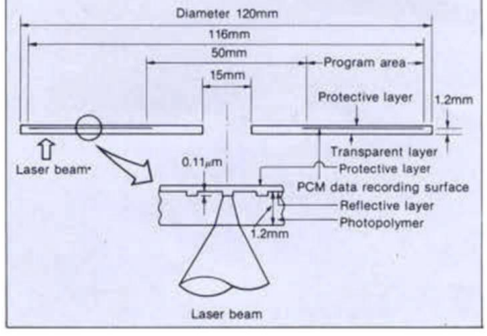
COMPACT disc DIGITAL AUDIO

The Compact Disc or CD is a new audio source that takes up where the LP left off. Faithful to its name, the CD is compact—only 12cm in diameter. Think of the saving in record storage space. Music is recorded on only one side of the disc, so you can enjoy over 60 minutes of uninterrupted listening; you never have to turn the record over. The actual music signal is on an internal layer protected by a tough plastic coating, so you don't have to worry about dust, dirt, or fingerprints. Nor is there any wear, because the laser pickup system never contacts the disc. Besides the music signal, each disc contains special information to allow programmed play and other automatic functions including digital display of track position and playing time. For example, you can listen to any songs in any order that you like.

So far, we've been describing the convenience of the Compact Disc. It's fantastic, and so is the sound quality. That's because the CD is a digital source. Instead of the wavy grooves of an LP, the CD has chains of pits, each pit representing a one or a zero in binary code. This code is called PCM (pulse code modulation) and it contains all of the information of the original (analog) music signal. The microscopic pits are coated with a highly reflective aluminum film sandwiched between protective surface layers.

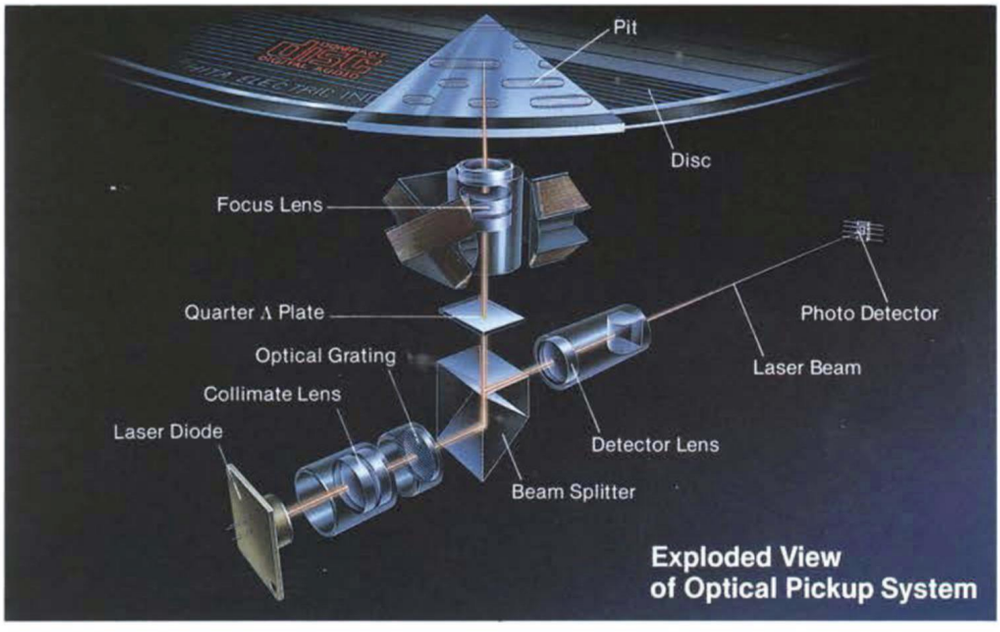
As the disc rotates at high speed, a laser beam is focused onto the pits and a pickup reads the reflected information. This is converted back into an analog signal (by a digital-to-analog or D/A converter) which can be reproduced by your amp and speakers.

Dimensions of the Compact Disc



Thanks to error correction circuitry and Quartz-locked time base correction, the recovered musical information is a virtually exact replica of the original. There is no wow & flutter, no audible noise or distortion, and extremely wide dynamic range. The digital system also overcomes the problem of crosstalk between the left and right channels. And it assures the same high quality reproduction from the beginning to the end of the disc. Compare this with a regular LP where crosstalk is inevitable and sound quality deteriorates towards the end (center) of the disc. (In a CD player, the pickup moves from the center outwards and disc rpms are steadily decreased to maintain the same scanning speed.)

To bring out the full benefits of the Compact Disc, Technics has developed an extremely sophisticated semiconductor laser pickup system, new direct drive motor, advanced programming system, and multi-function display—all featured in the new SL-P10 Compact Disc player system.



Exploded View of Optical Pickup System

The World of Digital Audio Tape

Just as the Compact Disc provides a dramatically improved alternative to the LP, the video cassette offers the benefits of digital audio for home recording and playback. Video cassettes are used because ordinary tape does not have the capacity to store the vast quantity of digital information.

In conventional, analog, tape recording, the audio signal is stored as magnetic patterns which are analogous to the original waveform. This means that the signal can be easily distorted by the inherently nonlinear characteristics of the tape heads and the tape's magnetic coating.

You also have the problem of dropouts, uneven tape-to-head contact (causing modulation distortion), wow & flutter, irregular frequency response, print-through, and the fact that sound quality rapidly deteriorates when you make copies. In other words, recording and playback quality are subject to the electronic, magnetic, and mechanical limitations of the tape recorder's heads, transport system, circuitry (amp, bias, and EQ), and the tape itself.

In digital recording using video cassette tape, the audio signal is converted into a digital pulse code. This analog-to-digital conversion includes three basic steps: sampling of the analog signal, quantization, and encoding.

The final result is a series of pulses (representing ones and zeros in binary code) which are modulated onto an NTSC video signal and recorded on the video tape by a conventional video recording system (VHS, etc.).

This makes the encoded audio information independent of the nonlinear characteristics of the heads, tape, transport mechanism, and so forth.

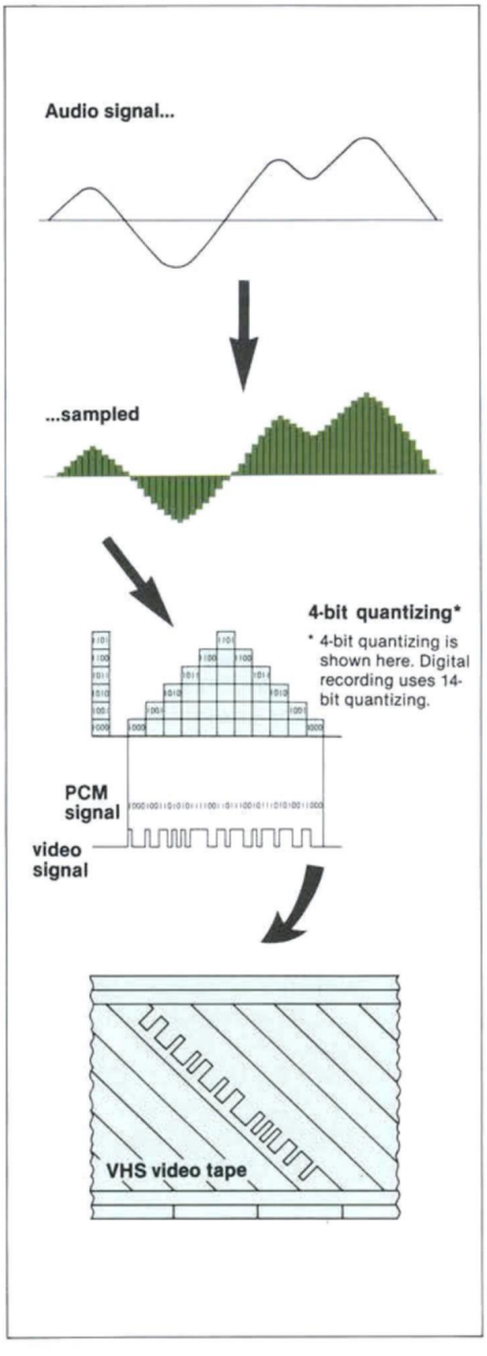
As long as the pulses can be retrieved, the original music can be reproduced in all its detail.

Compared with analog recording, digital provides the following benefits:

1) No tape hiss. Dynamic range improved by over 20dB.
2) Frequency response is ruler flat, regardless of input level, and extends into the extreme low range (theoretically to DC or 0Hz).
3) No modulation noise.
4) No wow & flutter.
5) Copies (and copies of copies) are virtually exact replicas of the original master tape (assuming that the digital signal is copied directly without conversion back to analog form).

One more point. Digital recording on video tape is more economical that analog recording on open reel tape.

Technics offers all these benefits in the SV-100 digital audio processor (used with a VCR) and the SV-P100 digital audio cassette recorder.



SL-P10: Compact Disc Player System

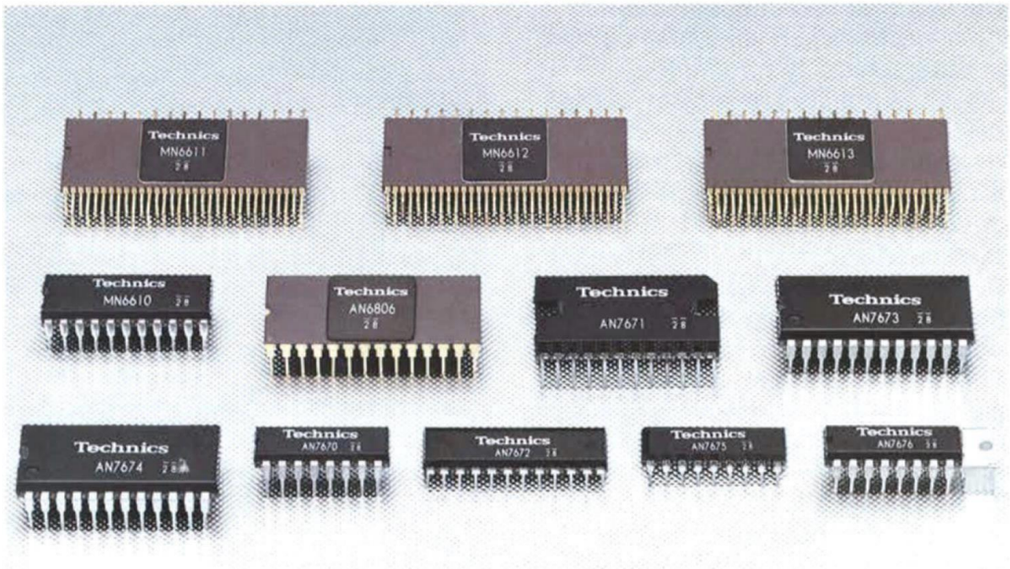
After years of research and development the Technics compact disc player is finally available. Not only does this attractive unit give you all the basic benefits of compact disc reproduction, we've also included advanced features for extra convenience and dependability not available elsewhere. For example, the large multi-function display shows you every possible kind of information, from track position to programming sequence. And our original semiconductor laser pickup and exclusive LSI circuitry assure incredibly sophisticated performance in a compact package.

Advanced Original LSI Circuitry

The SL-P10 features true state-of-the-art semiconductor circuitry with 12 new original LSIs and ICs designed specifically for compact disc reproduction. The digital signal processing circuitry uses 3 LSIs for demodulation, error correction and CIRC control. Error detection and correction are based on the exclusive "Technics Super Decoding Algorithm" system.
The D/A (digital-to-analog) converter is perhaps the single most important device in digital audio. It must convert the 65536-step digital signal into an accurate replica of the original analog signal. Here the SL-P10 uses a newly developed 16-bit high speed D/A converter that delivers extremely high performance with no more than ±0.002% nonlinear distortion. Other ICs are used for spindle motor servo control, head amp, actuator drive, auto focus, signal processing, programmed play, laser power control, and traverse motor drive.

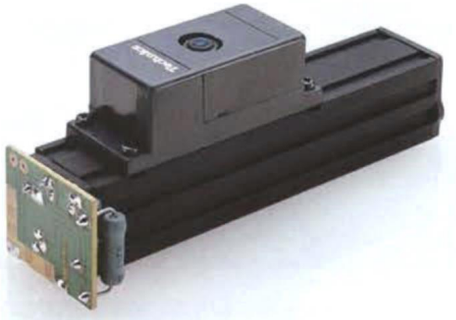
Precision Mechanisms with Sophisticated Microcomputer Control

In addition to the above mentioned high density LSIs and ICs, the



New Original LSIs and ICs

SL-P10 employs four microcomputers for centralized random access system control, FL display drive, digital slicer, and optical pickup position control. This sophisticated circuitry supports the precision mechanisms of disc rotation and laser pickup operation. In the compact disc player, mechanical precision is of the highest importance since accurate pickup of the micron sized pits which contain the digital information is a prerequisite for subsequent signal processing. The long experience of Technics in the hi-fi audio field provides the technical basis for the advanced electromechanical systems employed in the SL-P10.



Laser Pickup

DD Spindle Motor

The pickup system includes a semiconductor laser, actuator, lens, prism, and photodetector in a precision integrated aluminum body of rugged construction for the highest reliability.

The actuator (lens drive mechanism for focus and tracking) features a twin parallel damper, derived from our advanced phono cartridge technology, which enables extremely smooth and accurate focusing and tracking servo performance. A 3-beam tracking servo is employed to assure the highest operational stability.

The 12cm wide Compact Disc rotates at a rate of 500 to 200 times per minute. Therefore the turntable drive motor must be of a different type from that used for conventional phono turntables.

One important point is that the motor must be designed to prevent shaft rolling. This is achieved by employing an ultra-compact brushless DD motor newly developed based on the long experience of Technics in direct drive technology.

In the SL-P10 compact disc player system, this DD motor and the turntable are mounted extremely close together to assure the required rotational stability.

The pickup, its drive mechanism, and the turntable drive mechanism must all be assembled together with the highest precision. In the SL-P10, all of these mechanisms are manufactured by us, making possible precision integrated construction of an "optical deck" in an aluminum diecast chassis. This keeps all these precision electromechanical devices in optimum alignment to bring out their full potential and that of the system as a whole.

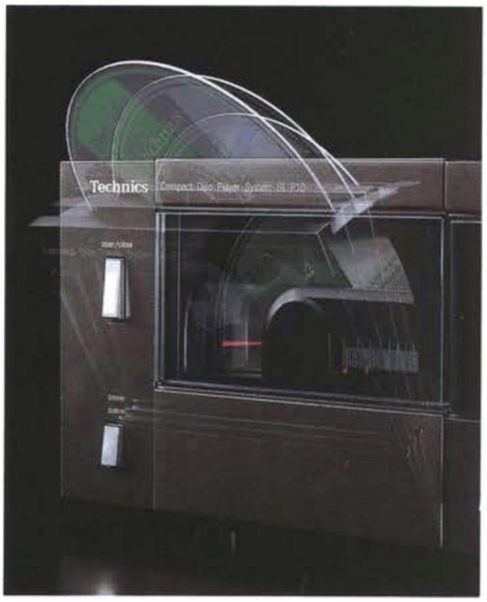
Unique Multi-function Display and Versatile Operation

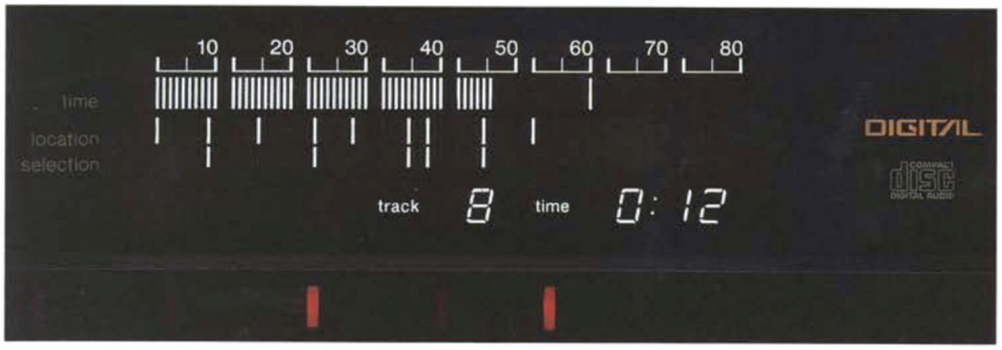
The SL-P10 front panel boasts a large multi-function FL display measuring 5cm by 14cm with 290 FL (fluorescent) segments. Indication capability far exceeds that of other compact disc players. When you put a Compact Disc into the SL-P10, it begins spinning automatically and the pickup reads the data recorded at the center of the disc. The location of the beginning of each band is then shown on the display. As the disc is played, pickup position is indicated as elapsed playing time (up to a maximum of 80 minutes) in one minute steps. This provides an approximation of the direct visibility that has become familiar with ordinary phonograph records. To make programming easy and give a clear indication of preset contents and location, the display has a complete program readout of band number and time.

The SL-P10 features 63 step random access programming capability. This lets you play any particular sections of the disc after setting the band number and/or the precise beginning and end points in minutes and seconds (with one second precision). This provides the flexibility of a conventional manual turntable, plus the automatic convenience of a fully automatic unit, and much more—all in one versatile component.

Other Features

- Intro-skip plays first few seconds of each song, so you can easily check disc contents.
- Repeat function for entire disc or program contents.
- Pickup position indicator in disc holder section (as well as in FL display).
- Control key indicators.
- Handsome design to match other Technics high quality audio components.
- Automatic disc loading.



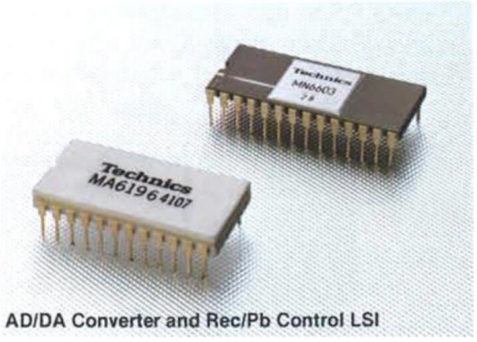


SV-100: Digital Audio Processor

Designed for use with a VCR, the SV-100 provides very high quality digital audio processing for digital audio recording and playback.
Not only is the SV-100 compact, it weighs only 2.9kg (net) making it the world's lightest digital audio processor.
This means that the SV-100 is ideally suited for portable use, especially when combined with the matching Panasonic NV-100 VCR.
Its attractive styling also complements other high quality audio components when used in a home hi-fi system.

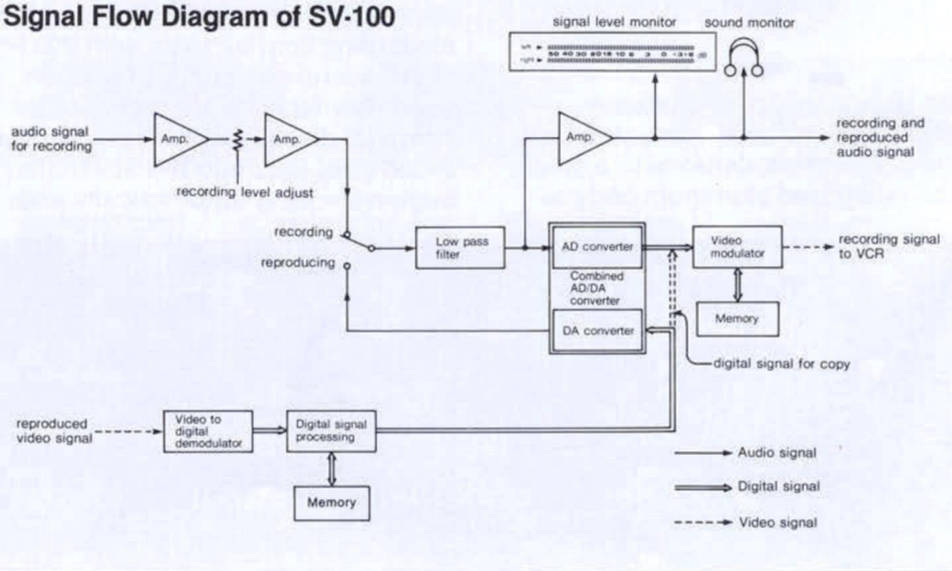
Advanced Semiconductor Circuitry for Compact Size

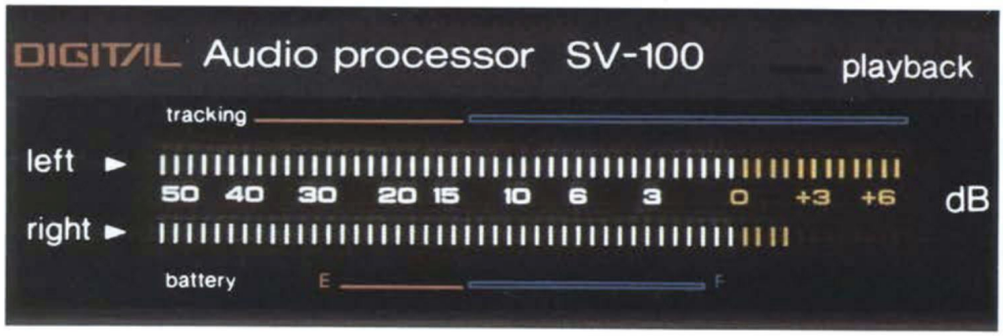
Sophisticated original LSI and microprocessor technology contributes to this processor's surprisingly compact size and light weight.
The PCM signal processing LSI (MN6601) contains about 10,000 elements in a 6.08 × 5.58mm chip; the playback LSI (MN6602) has about 15,000 elements in a 6.46 × 6.18mm chip; the recording/playback control LSI has about 6,000 elements in 4.48 × 3.62mm chip.
Together, these three LSIs are equivalent to about 320 logic ICs.
Instead of the conventional separate A/D and D/A converters, a single AD/DA converter is used for conversion from analog to digital and vice versa.
This revolutionary circuitry also means more dependable performance.



AD/DA Converter and Rec/Pb Control LSI

Signal Flow Diagram of SV-100





Convenient Portable Operation Indoors and Out

Designed for Quick Precise Control

For quick and accurate adjustment, the SV-100 has a master level control and a stereo balance control. This unusual system is actually the most practical for most purposes such as recording FM broadcasts or Compact Discs. In both cases it is easiest to adjust the left and right channels at the same time and no stereo balance adjustment is usually needed. The same goes for live recording where the left and right channel microphones are normally matched. Furthermore, the less used controls are of the slide switch type, so there is little danger of accidental misoperation.

2-Color FL Meters for Accurate Indication

In digital as in analog recording, accurate meters are essential for correct recording level setting. However, with digital audio, it is all the more important not to set recording level too high. Therefore, the SV-100 is equipped with precision FL meters that extend all the way from −50dB to +6dB. Since clipping occurs above 0dB, this wide-range metering system lets you see exactly where you should set recording level to avoid distortion. Compare this with other digital audio processors that give only an "over" indication if recording level is too high.

Versatile Connection Facilities

The SV-100 has two complete sets of video input/output jacks, one set on the side and one on the rear panel. This lets you use the SV-100 in a vertical or horizontal position. The matching Panasonic NV-100 VCR has similar connection facilities so that the two are ideally suited for portable use. Of course, the SV-100 can be used with virtually any home VCR (or 3/4-inch U-matic type VCR).

VCR Tracking Check and Battery Check Functions

A front panel slide switch lets you change the display from recording/playback level indication to VCR tracking and battery check indication. The VCR tracking readout tells you how well the video tape recorder's heads are tracing the recorded tracks during playback. You can then adjust the VCR to obtain optimum playback quality. This is particularly important if the tape is being played back on a different VCR from that used for recording. The battery check readout tells you how full the battery is and whether it needs charging.

Supplied AC Power Unit with Handy Video/Audio Switch

The SV-100 is ready to use right away since it comes with its own AC power unit for home use. This compact unit is designed to simplify connections while supplying power to the SV-100. It also works as a battery charger for the optional battery packs available for the SV-100. On the AC power unit's front panel is a "recording" switch that lets you use your VCR for recording TV programs or for PCM digital recording without having to change any connections.

Other Valuable Features

- Built-in high quality mic amp.
- Digital copy output jack.
- Mute cancel switch lets you hear sound in VCR's cue and review modes.
- Headphone volume control.
- Playback mode switch for optimum matching with VCR signal characteristics.
- Rec mute switch.

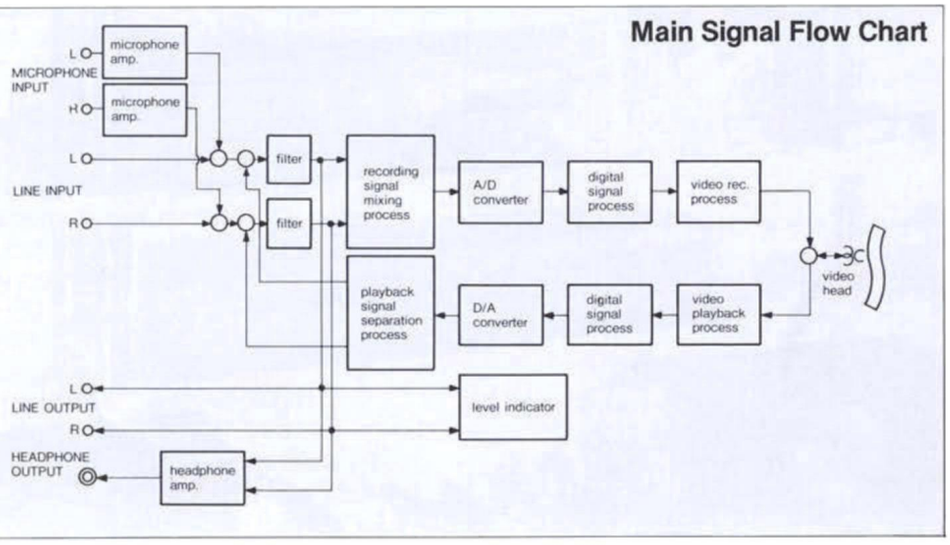
SV-P100: Digital Audio Cassette Recorder

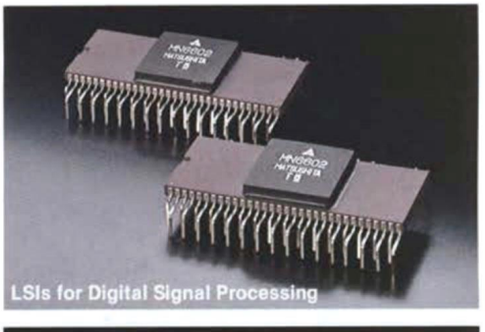
For home and studio digital recording applications Technics presents the SV-P100, a wholly self-contained unit with built-in VHS tape mechanism. The Technics SV-P100 is the most compact digital recording system in existence. It has everything you need to start making the highest quality recordings you've ever heard. Advanced semiconductor circuitry provides outstanding performance in a compact package. Plus you enjoy versatile digital editing features. With all this state-of-the-art technology, you'll be happy to find that the SV-P100 is just as easy to use as an ordinary cassette deck—perhaps easier.

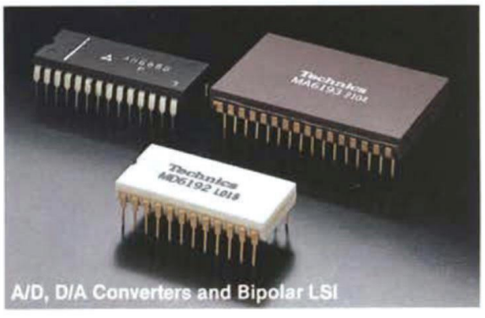
High-Density LSIs for Compact Size

State-of-the-art semiconductor technology is the key to the compact dimensions of the SV-P100, the world's smallest digital recording system. Three original LSI chips handle virtually all of the signal processing including digital-to-analog and analog-to-digital conversion. They also take care of error detection, error correction, video signal modulation, and time-base correction. Since these take the place of thousands of transistors and hundreds of ICs, circuit size is dramatically reduced.

Main Signal Flow Chart

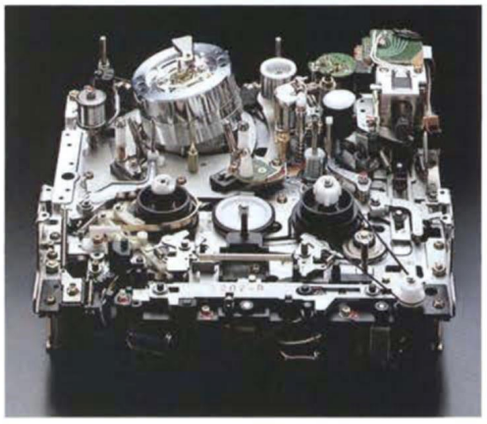



LSIs for Digital Signal Processing


A/D, D/A Converters and Bipolar LSI

Built-in VHS Mechanism

Built into the SV-P100 is a very high quality VHS video tape transport mechanism with advanced video heads and quartz locked direct drive motors. Basic operation is just like on a conventional cassette deck, with the comfort of microcomputer feather-touch control keys. You simply put a cassette into the front loading compartment and press the rec and play buttons together to begin recording. The cassette door is motor driven for smooth, silent operation when you want to load or eject a cassette.



Versatile Editing

Since the digital signal is recorded on the tape's video tracks, the space usually used for audio is left free. The SV-P100 uses these extra tracks for "jump" and "search" marks. This gives you a kind of electronic editing ability that is not possible in ordinary cassette decks.

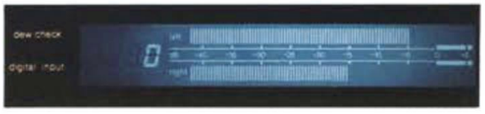
Record a jump mark along a specific section of the tape and the deck will automatically bypass that section at 8 times normal speed. Normal playback resumes after the end of the jump mark. This is useful when you want to skip over undesired portions of a recording.

Search marks let you rapidly locate specific points on the tape. The tape will advanced to the nearest search mark at 8 times normal speed and then stop. If you press the play key with the search key, then playback will begin when the search mark is reached.

You can record as many search and jump marks as you want, using the convenient editing levers. Since these marks remain on the tape, you can take advantage of this convenience every time you listen to a recording. Of course you can also selectively erase search and jump marks (by pressing the "clear" lever) as required.

In addition to all this, you have the "locate" function which serves as a memory linked to the tape counter. But unlike on conventional cassette decks, you don't have to set the counter to zero. This memory stores the actual tape counter number at the instant you press the locate button. The tape will then stop (or begin play) at the memorized position. You can also check the locate memory position by pressing the recall button.

Multi-Function Display



There's a digital LCD tape counter display, bright FL recording/playback level display, and indication for all functions that you might need. The FL level display uses fluorescent display tubes to provide very accurate indication of recording level. Besides instantaneous peak indication, it also has peak-hold which shows you the highest signal peaks reached in each 2-second period. This makes it much easier to set optimum recording level. Another valuable feature is the playback data check indication which gives you a readout of playback signal quality.

Other Features

- Large fader knob for smooth fade-in and fade-out effects.
- Digital input and output terminals for making digital tape copies using another SV-P100.
- Angled control panel with status indicator LEDs.
- Headphone and microphone jacks on front panel.
- High quality microphone amp built-in for superior live recording quality.
- Recessed power switch helps avoid accidental on/off switching.
- Automatic recording possible with audio timer.
- Dew (condensation) display and protection circuitry.
- Tracking adjustment for optimum playback of tapes recorded on other equipment.

Digital Audio System

To do justice to the quality of digital source material, you need the most advanced audio components made. And that means Technics. Technics produces amps and speaker systems specifically designed to meet the demands of digital audio reproduction. The components shown here are a prime example. The SU-A6 preamp boasts all class A circuitry with incredible sound quality. The SE-A5 power amp uses New Class A and Linear Feedback circuitry to deliver 120W + 120W, both channels driven into 8 ohms, from 20Hz to 20,000Hz, with no more than 0.002% total harmonic distortion. Then there is the SB-M2 monitor speaker system employing our most sophisticated honeycomb disc drivers to achieve amazingly flat frequency response and linear phase characteristics. To round out the system, you have the ST-S8 quartz synthesizer tuner with all DC circuitry and the SL-QL1 quartz direct drive linear tracking turntable.

Technical Specifications

SL-P10

AUDIO

Number of channels	2 (stereo)
D/A conversion	16 bit linear
Frequency response	4Hz ~ 20kHz
Dynamic range	90dB or more
S/N ratio	90dB or more
Total harmonic distortion	0.004% or less (1kHz, 0dB)
Channel separation	90dB or more
Wow & flutter	Same as quartz crystal oscillator precision

SIGNAL FORMAT

Sampling frequency	44.1kHz
Error correction system	Technics Super Decoding Algorithm

PICKUP

Type	Astigmatic 3-beam
Subjective lens suspension	Twin parallel damper
Beam source	Semiconductor laser
Wavelength	8000Å

FUNCTIONS

Search function	Manual, Auto music search, Intro-skip, Program
Program capability	Maximum 63-step programmability, Band cueing, Random begin play setting (band, minute/second), Random end play setting (band, minute/second)
Display	(140 × 50mm large FL display) Pickup position, Band beginning position, Program, Band number, Playing time
Control keys	7 basic keys, 14 programming keys
Disc loading	Automatic front loading

GENERAL

Output voltage	150mV (– 20dB) adjustable
Dimensions (W × H × D)	430 × 133 × 315mm
Weight	10kg

SV-100

Type	Digital audio processor
PCM standard	File—STC-008 "Consumer Use PCM Encoder-Decoder" of Stereo Technical Committee—Video Technical Committee, EIAJ
Quantization	Linear 14-bit
Decoding	Linear 14-bit
Recording time	Max. 3 hours (when using the NV-E180 video cassette tape)
Channels	2 (L, R)
Frequency response	2Hz ~ 20kHz (±0.5dB)
Harmonic distortion	Less than 0.01% (1kHz, 0dB)
Dynamic range	More than 86dB
Input sensitivity/impedance	Line; 30mV (– 15dB)/50 kilohms Microphone; 0.7mV (– 15dB)/600 ohms Video; 1Vp-p/75 ohms (Video format)
Output level/impedance	Line; 400mV (– 15dB)/600 ohms Video; 1Vp-p/75 ohms (Video format) Digital copy; 1Vp-p/75 ohms

ACCESSORY FUNCTIONS

VCR tracking check, Battery check, VCR playback mode switch (to match VCR characteristics) auto/off playback muting switch, Rec mute switch, Playback (recording) mode indicator, Headphone volume control, Supplied AC power unit has battery charging and video/digital audio switching functions

GENERAL

Power supply	AC/DC/Car battery (DC 12V 1.6A using optional battery pack) Exclusive AC power unit supplied (AC 110/120/220/240V, 50/60Hz)
Dimensions (W × H × D)	238 × 92 × 240mm (Main unit) 78 × 92 × 240mm (AC Power unit)
Weight	Approx. 2.9kg (Main unit) Approx. 2.3kg (AC Power unit)

SV-P100

Type	Digital audio cassette recorder
PCM standard	By Technical File—STC-007 "Consumer Use PCM Encoder-Decoder" of Stereo Technical Committee—Video Technical Committee, EIAJ
Quantization	Linear 14-bit
Decoding	Linear 14-bit
Tape	VHS type video cassette
Signal format	Standard NTSC television signal by VHS standard
Recording time	About 2-hour maximum (Using NV-E180)
Channels	2 (L, R)
Frequency response	2Hz ~ 20kHz (±0.5dB)
Harmonic distortion	Less than 0.01% (1kHz,0dB)
Dynamic range	More than 86dB
Input sensitivity/impedance	Line; 30mV (– 15dB)/50kΩ Microphone; 0.7mV (– 15dB)/600Ω Digital; 1Vp-p/75Ω (Video format)
Output level/impedance	Line; 400mV (– 15dB)/600Ω Digital; 1Vp-p/75Ω (Video format)
Remote control terminal	8-pin DIN terminal
Edit function	Jump, Search, Memory, Memory recall, Playback data check, Tracking adjustment, Timer recording & 1-hour delay recording, Digital recording terminals, Headphone and microphone jacks

GENERAL

Power supply	AC 110/120/220/240V, 50/60Hz
Power consumption	90W
Dimensions (W × H × D)	430 × 278 × 346mm
Weight	21kg

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Matsushita Electric