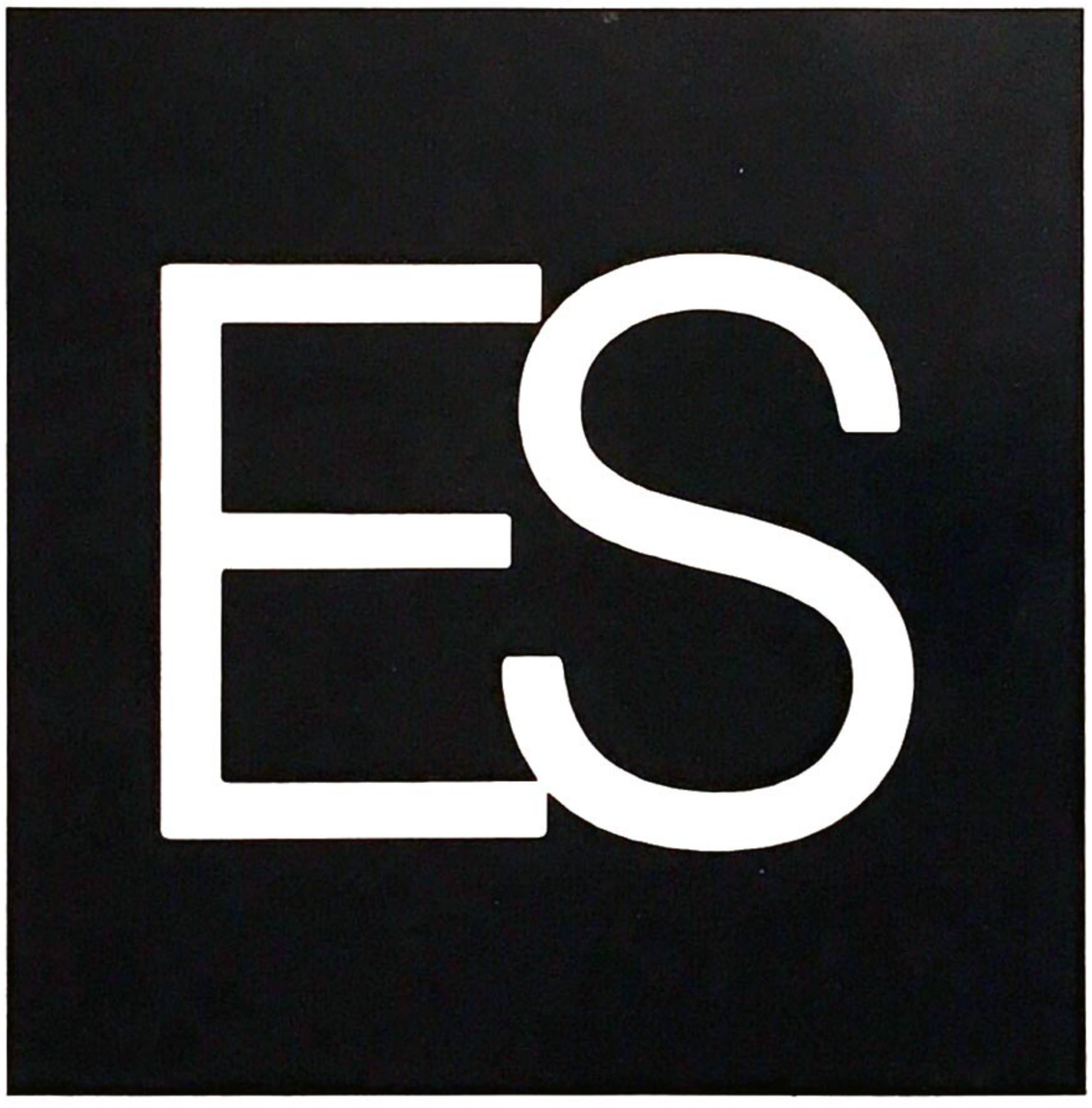
SONY

ES HIGH FIDELITY
COMPONENTS

Presenting An Elevated Standard Of Audio Performance



30 Years in America

PLAY BACK DIGITAL AUDIO THE SAME WAY IT WAS RECORDED. ON SONY.

It presents everything from the trumpeter's uptake of breath to the full thunder of an orchestral fortissimo. It delineates everything from the pedal notes of a massive pipe organ to the most delicate overtones of the harpsichord. And it renders everything against a background of seamless silence.

Of course, it's digital audio, the technology that in the last ten years has done more than any other to elevate the performance of audio systems. And no one has done more to establish and advance the standards of digital audio than the engineers of Sony ES.

After all, these were the engineers that amazed the world with the very first digital high fidelity component: the legendary Sony PCM-1. These were the ones who created the Sony digital studio equipment that records, mixes and masters today's music. And these same engineers changed the course of audio history with the invention of the digital Compact Disc player.

Having done so much to bring digital music into the home, Sony wasn't about to entrust its reproduction to anyone else. So we brought together our finest audio engineering minds to create the ES Series. It's an exclusive line of CD Players, Receivers, Cassette Decks and Separate Components– all creations to which we proudly entrust digital music reproduction. And we back all of them with a three-year limited warranty on parts and labor. (Your dealer has details.)

Sony makes the majority of digital studio recorders that account for the spectacular sound of many of today's Compact Discs.

Sony ES technology brings audible benefits to every kind of music. From the french horns of the Blue Danube to the mandolin of the Blue Grass Boys. From rock fusion to Rachmaninov, music simply sounds better on the Sony ES Series. The leading components for the digital age. Created by The Leader In Digital Audio.™

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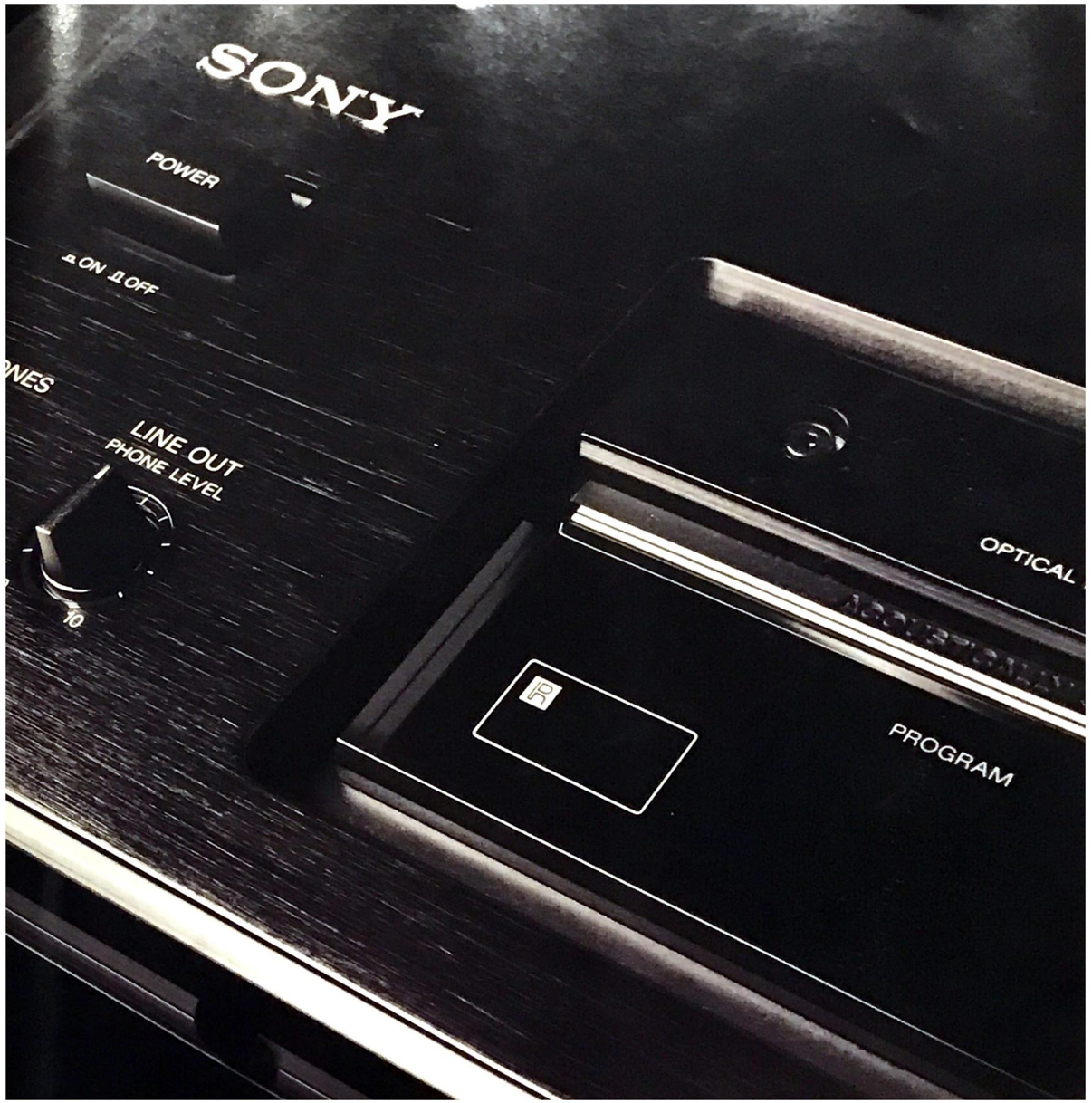


NOT THE FIRST TIME SONY HAS HAD THE LAST WORD IN DIGITAL AUDIO.

When Sony invented the Compact Disc, the world was astonished by what it heard. From the softest musical overtones to the most emphatic orchestral climaxes, the Compact Disc overturned every previous limitation in home music reproduction.

Yet even in those early days, Sony engineers recognized the potential for meaningful improvement. Years of experience in professional digital recorders and processors had taught us where to look. This understanding has led to a continuous series of Sony refinements, culminating in an entirely new and dramatically different digital processing technology for the 90s: Sony's High Density Linear Converter™ (HDLC) System.

The first to incorporate many new digital concepts such as Digital Sync™, the CDP-R1 and DAS-R1 comprise Sony's Reference Standard CD playback system.

The HDLC system replaces the ladder-type digital-to-analog converter used on nearly every CD player built to date. In its place, a Sony-designed 45 MHz pulse converter reproduces music with measurably less noise and distortion. And Sony has allied it to the Digital Sync technology first used in Sony's Reference Standard CDP-R1/DAS-R1 playback system. You'll hear audibly greater depth and transparency. It's a difference that will soon persuade ardent audiophiles to trade in their CD players.

In typical ES fashion, the High Density Linear Converter is offered on every ES single-disc player and both ES 5-disc changers. The HDLC is matched to Sony's own high-order oversampling digital filters. And configured in chassis and cabinets of exceptionally robust, anti-resonant design.

We invite you to audition the ES Compact Disc players for yourself. Judge them against the very best the competition has to offer. Because the more carefully you listen, the more completely you'll recognize their outstanding value.

CDP-X77ES COMPACT DISC PLAYER

Sony's High Density Linear Converter: Dramatically new, audibly different.

Audiophiles, audio critics and university researchers agree: the key limitation in CD player sound quality is the circuit that translates the digital codes of the Compact Disc into analog output–the digital-to-analog converter. Yet nearly every CD player built to date uses *the same fundamental converter type*–subject to the same fundamental conversion problems. Sony's High Density Linear Converter represents a completely new and proprietary approach–one that achieves a superiority you can hear every time you listen.

A landmark in digital audio. Sony's CXD-2552 contains the essence of Sony's new High Density Linear Converter™ system.

The source of the problem.

Nearly all CD players use the "ladder-type" digital-to-analog converter. In its simplest form, this system uses 16 switches, controlling 16 calibrated circuits arranged like rungs on a ladder, to convert the disc's 16-bit digital audio codes into analog current.

In theory, the ladder converter can do a perfect job. But in the real world, getting all 16 circuits perfectly aligned is a thorny problem. When the current produced by the bigger circuits is even a fraction of a percent off, it creates an audible distortion called "differential non-linearity." When the 16 switches fall out of perfect sync, they create momentary disturbances called "glitches." And when all 16 switches flip at the audio signal's zero cross, the result is a particularly nasty form of crossover distortion.

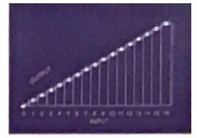
Audio critics in England, Germany, America and Japan don't simply rave about Sony ES Compact Disc players. They often keep Sony players as their personal reference standard. To find out why, simply listen to the Sony CDP-X77ES. Unrivalled sonic transparency makes this the CD player for the most critical listener.

- **High Density Linear Converter™ system operating at 45 MHz in complementary mode**
- **Sony 45-bit digital filter**
- **Noise shaping**
- **Direct Digital Sync™**
- **Die-cast aluminum linear motor**
- **Servo Stabilizer™ Circuit**
- **Shielded, separate digital and analog transformers**
- **Copper-shielded, dual-wall aluminum Frame and Beam construction**
- **Optical & coaxial digital outputs**
- **Remote control**
- **Custom File™ for 227 discs**
- **Balanced line outputs**
- **Shuffle Play**
- **Index search**
- **Simulated wood side panels**

CDP-X55ES COMPACT DISC PLAYER

In a world where "good enough" is the motto and compromise is the order of the day, the Sony CDP-X55ES is a glittering exception. With Frame and Beam construction worthy of a battleship, and high-speed digital processing that most computers would envy, this player exemplifies Sony's ES philosophy.

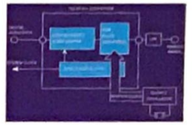
- **High Density Linear Converter™ system operating at 45 MHz**
- **Sony 45-bit digital filter**
- **Noise shaping**
- **Direct Digital Sync™**
- **Linear motor transport**
- **Servo Stabilizer™ Circuit**
- **Separate digital and analog transformers**
- **Copper-shielded Frame and Beam construction**
- **Optical digital output**
- **Gold-plated outputs**
- **Remote control**
- **Peak level search**
- **Custom File™ for 185 discs**
- **Remote-variable line out**
- **Variable Fader**
- **Shuffle play**
- **Seven-way repeat**
- **Index search**
- **Simulated wood side panels**



The superlative linearity of the HDLC system ensures countless hours of listening without fatigue.

These concerns, inherent in the ladder converter, were not discovered yesterday. In fact, many of the CD technologies you may have read about–"de-glitcher" circuits, laser trimming, hand adjusted bits, push/pull converters, 18-bit, 20-bit, even 22-bit converters–are all designs that successfully moderate these very problems. In dramatic contrast, Sony eliminates these problems once and for all with the HDLC System.

At 45 MHz, the pulse of a new idea.



Sony's unique HDLC pulse converter incorporates noise shaping and Sony's Direct Digital Sync™ circuitry.

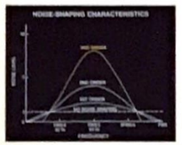
The heart of the HDLC system is a Sony Pulse Length Modulation (PLM) digital-to-analog converter. Instead of requiring 16 or more switches, a single switch generates a train of pulses, the duration of which carries the analog waveform. To create the analog waveform in all its complexity, Sony operates this single switch at 45,158,400 times per second (45 MHz). Not only is this the world's fastest CD conversion system, it's 2,258 times faster than the highest musical frequency.

The benefit is this: no 16 circuits to get out of alignment. No glitches. No "differential non-linearity." No crossover distortion. Just the cleanest, quietest, purest sound ever to come off Compact Disc. As applied in Sony's CXD-2552 integrated circuit, the pulse converter achieves an

unprecedented Total Harmonic Distortion and noise specification: less than 0.001%.

The Noise Shaping of things to come.

Sony's 45 MHz converter works in conjunction with fast, effective third-order noise shaping. Thanks to noise shaping, the converter's dynamic range is 124 dB– substantially better than the 98 dB maximum dynamic range of the Compact Disc itself!



Extended, third-order noise shaping is the key to the low noise of Sony's HDLC system.

Achieving synchronicity: Sony's Digital Sync™.

For all their advantages over ladder-type converters, pulse converters do have one disadvantage. They require perfect synchronization to do their job properly. Any amount of the time-base error, called digital jitter, will cause audible degradation. Digital jitter modulates the analog output–significantly muddying the sound.

That's precisely why Sony built proprietary Digital Sync™ circuitry directly into our converter chip. Thus located, Direct Digital Sync™ eliminates jitter–giving Sony an audible advantage over other pulse converters.

Filtering out unpleasantness.

To complement the High Density Linear Converter, all ES players incorporate Sony 8x oversampling digital filters. Digital filters perform countless arithmetic operations on each of the CD's 16-bit samples. If this arithmetic were conducted in 16-bit word lengths, the accumulation of errors would result in far less than full 16-bit accuracy. That's why Sony's top-of-the-line CD players compute to an amazing 45 bits of accuracy.

CDP-X33ES COMPACT DISC PLAYER

Music lovers may wonder whether digital technology has progressed to the point where it makes sense to replace their existing CD players. Such people should beware the Sony CDP-X33ES. With its new High Density Linear Converter™, this CD Player will readily convert idle curiosity into avid ownership.

- Sony's High Density Linear Converter™ system operating at 45 MHz
- Sony 45-bit digital filter
- Noise shaping
- Direct Digital Sync™
- Linear motor transport
- Servo Stabilizer™ Circuit
- Independently, regulated power supplies
- Rigid Frame and Beam construction
- Optical digital output
- Gold plated outputs
- 20-key Direct Access™ Remote Control
- Peak level search
- Custom File™ for 185 discs
- Remote variable line output
- Time/Program Edit
- Variable Fader
- Shuffle play
- Seven-way repeat
- Index search

CDP-209ES COMPACT DISC PLAYER

With distortion, dynamic range and signal-to-noise specifications that put previous CD players to shame, the Sony CDP-209ES is not simply a marvel on the test bench. Effortless musicality makes it a marvel in the listening room, as well.

- Sony's exclusive High Density Linear Converter™ system operating at 45 MHz
- Sony 8x oversampling digital filter
- Noise shaping
- Direct Digital Sync™
- Servo Stabilizer™ Circuit
- Independently, regulated power supplies
- Rigid monocoque chassis with aluminum front panel
- Optical digital output
- Remote control
- Peak level search
- 24-track programming
- Multi-disc time/program edit
- Remote variable line output
- Programmable fader
- Shuffle play with delete
- Six-way repeat
- Index search

Sony's landmark CXD-1244 digital filter makes it possible.

Sony's High Density Linear Converter: One audition and you'll be converted.

To evaluate Sony's High Density Linear Converter, use the test equipment located on either side of your head. Simply take a familiar, well-recorded Compact Disc to your Sony ES dealer. And listen. You'll hear greatly enhanced detail on each instrumental voice. A broader presentation of the stereo soundstage. And a subtly warmer, less clinical sound that rewards hour after hour of uninterrupted listening.

Solid as a Rock.

While pulse conversion is certainly Sony's newest CD technology, it's hardly the only one that contributes to better sound. Early on in the development of CD players, Sony engineers discovered that air-borne, shelf-borne and internal vibrations subtly degraded sound quality.

In a world of indifferent construction quality, the Sony ES Compact Disc players are masterful exceptions.

That's why Sony's Frame and Beam (FB) chassis forms a special enclosure that protects the player from vibration. In addition, a special beam spans the unit from front to back for further reinforcement. Selected players also benefit from copper shielding, a heavy aluminum top plate, a die-cast aluminum Linear Motor subchassis and a G-Base unit made of Sony's "G" compound–anti-resonant calcium carbonate reinforced with glass fiber. So you get clean, clear vibration-free performance. There's much, much more to the Sony CD Player story. To read it, please turn to Page 9.

WE'LL CHANGE YOUR MIND ABOUT CD CHANGERS.

If you think of CD changers as second-class citizens of the digital domain, take a second look. There's simply no technical reason why you can't have first-quality construction, first-rate electronics and first-class sound in a CD changer. Nothing but the timidity of hi-fi companies has held back the sonic maturity of changers.

Fortunately for music lovers, Sony has never been timid. Early on, we understood that pushbutton access to hours of favorite music would be a new and powerful force in home high fidelity. The ES changers offer convincing testimony as to just how seriously we take this force.

We're fitting these CD changers with our High Density Linear Converter, an important step forward in the reproduction of full dynamic range from CDs. You'll also see our Servo Stabilizer Circuit employed to track even problematic discs with new assurance and stability.

But of course, what distinguishes the changer is its unique ability to entertain you for hours on end.

The 5-disc carousel design, a Sony innovation, is unequalled among CD changers for operating convenience and fast disc access.

Sony's 5-disc carousel changers were the first of their type, and today they are the most advanced. And Sony's DiscJockey* 10-disc changer accepts exactly the same 10-disc magazine as the growing family of DiscJockey compatible CD changers for the car. Which means you can freely interchange magazines between home and car. Exactly what we had in mind when we invented the DiscJockey system.

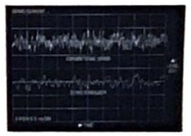
CDP-C85ES 5-DISC CHANGER

How can Sony possibly introduce the company's newest CD technology in a 5-disc changer? Simple. We make our own laser transports and optics, our own CD changer mechanisms, our own digital filters and our own digital-to-analog converters. All of which gives us the unique ability to build a machine like the CDP-C85ES.

- Sony's 5-disc carousel system
- High Density Linear Converter™ system operating at 45 MHz
- Sony 8x oversampling digital filter
- Noise shaping
- Direct Digital Sync™
- Servo Stabilizer™ Circuit
- Independently, regulated power supplies
- Optical digital output
- 5 + 20-key Direct Access™ Remote Control
- Custom File™ for 185 discs
- Peak level search
- 32-track programming
- Programmable Fader
- Remote variable line output
- Programmable fader
- Six-way repeat
- Simulated wood side panels

Keeping the laser servo on track.

Thanks to the Sony ES design philosophy, Sony ES multi-disc changers enjoy the same technological advantages as Sony single-disc players (see pages 4 through 7). Among these advantages is Sony's Servo Stabilizer™ Circuit.



Thanks to Sony's Servo Stabilizer Circuit, Sony's tracking and focusing circuit radiates less noise.

The laser tracking servo is an essential element of any CD player. Years ago, Sony engineers noticed that the tracking servo had the unfortunate side effect of radiating extraneous noise into the analog output section. What to do? Sony created a re-designed servo with a low-pass filter that permitted outstanding servo tracking—even of defective discs—while blocking the radiation of noise. It's another way Sony engineering ensures high performance that's trouble-free.

With Sony ES, no detail is unimportant.

From the materials used for the front panel to the secondary windings on the power transformers, Sony ES builds complete CD players. Everything that can have a bearing on performance is checked, improved, evaluated and refined. That's why every ES player features independent power supplies for the digital, analog, servo, and display circuits. That's why they all offer optical digital outputs, which connect directly to digital preamplifiers like our TA-E1000ESD. And that's why a look inside any Sony ES component reveals a level of build quality and refinement that is all too rare today.

Sony creates a Custom File™ of your Compact Discs.

Here's a little-known fact: every Compact Disc can be recognized

by its own unique Table-of-Contents Timing Code. As inventor of the Compact Disc format, Sony took this information and created the Custom File™. It's a way of storing all kinds of information about the way you like to play up to 185 of your favorite discs.

Sony's Custom File™ system stores and displays information for up to 185 of your favorite discs.

For example, Disc Memo lets your CD player display a ten-character message about each disc. Just imagine seeing a display of disc title, artist name, or purchase date. The Program Bank lets you preset up to a 24-track program for each disc—so you can always hear the hit songs, and always skip the misses. With Custom Index, you can pick up to 10 starting points anywhere on the disc—even in the middle of a symphonic movement—and access them at any time. If you find yourself setting a different volume level for different discs, you'll really appreciate Sony's Level File. It stores your preferred output level setting for each disc! And finally, Sony's Last Mode Memory stores whatever special playback modes you've selected for each disc. Your choices include a range of repeat modes, fade time, Auto Space, and more.

Edit like a pro with Sony's Custom Edit features.

If you edit music onto cassette tape, you'll immediately appreciate a group of features Sony calls Custom Edit. One such feature is Peak Level Search, an intelligent feature that uses Digital Signal Processing (DSP) to automatically find the loudest level on the CD. Peak Level Search enables you to set perfect recording levels every time.

On single-disc CD players, Sony's Multi-Disc Program lets

CDP-C75ES 5-DISC CHANGER

With our exclusive High Density Linear Converter, the Sony CDP-C75ES out-performs dozens of single-disc players in its price class. So you can think of its 5-disc carousel capability as a bonus. With the ability to load, play, and remotely access five discs, it's a bonus anyone would be happy to live with.

- Sony's 5-disc carousel system
- Sony's exclusive High Density Linear Converter™ system operating at 45 MHz
- Sony 8x oversampling digital filter
- Noise shaping
- Direct Digital Sync™
- Servo Stabilizer™ Circuit
- Independently, regulated power supplies
- Optical digital output
- 5 + 20-key Direct Access™ Remote Control
- Custom File™ for 185 discs
- Peak level search
- Programmable Fader
- 32-track programming
- Remote variable line output
- Six-way repeat

CDP-C9ESD 10-DISC CHANGER

Drivers are making Sony's DiscJockey® 10-disc magazine format the number one choice in car CD changers. So our CDP-C9ESD DiscJockey CD Changer is an obvious choice for the home. You can take the 10-disc magazines out of the C9ESD and slip them into a Sony car changer. So you can have your favorite music to stay or to go.

- Dual 18-bit linear digital-to-analog converters
- 8x oversampling digital filter
- Noise shaping
- Servo Stabilizer™ Circuit
- Separate, regulated power supplies
- Optical digital output
- Sony's DiscJockey 10-disc magazine changer system; compatible with Sony autosound DiscJockey changers
- 10-key Direct Access™ Remote Control
- Remote fader control
- 20-track programming
- Shuffle play
- Four-way repeat play
- Music Calendar™ front-panel display
- Scan Search

you edit a sequence of up to 24 favorite songs from up to 6 different discs. During programming, the player automatically displays accumulated time. During editing, the player's front panel display will prompt you with such messages as "DISC 1," "NEXT DISC," and "END."

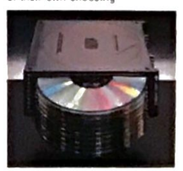
Time Edit arranges the music on a disc to fit a specific amount of time. Program Edit helps you record songs in any sequence by inserting a convenient pause between sides of the tape. For a professional touch, Sony's Variable Time Fade will fade the music out. The fader can also be set to automatically fade-in or fade-out each song, over a fade time of 2 to 10 seconds.

Shuffling the disc.

To refresh your enjoyment of even the most familiar CDs, Sony offers Shuffle Play. As the name implies, the feature surprises you by playing songs in a shuffled sequence. And Sony's Delete option lets you skip over the songs you don't like.

Seven ways to repeat yourself.

For an added bit of pleasure with your ES Compact Disc player you have as many as seven different repeat modes. You can repeat a single track, the entire disc, or your preprogrammed selections. That's three. You can repeat a shuffled sequence and a shuffle sequence with songs deleted. That's five. Finally, music students can repeat indexed selections within a symphonic movement, or repeat any part of the disc between A and B points of their own choosing.



The CDP-C9ESD uses the same 10-disc magazine that works with all Sony DiscJockey® changers for the car.

FOR ES SEPARATES, DIGITAL AUDIO IS NOT A CHALLENGE. IT'S AN OPPORTUNITY.

Since its inception in the early 1970's, digital audio has completely reconfigured the professional tape recorder. Reconstructed the recording studio. And transfigured the concept of audio discs. Now digital audio is bringing comparable advances to the realm of high fidelity separate components.

Of course, digital's exemplary dynamic range, low noise, and ruler-flat response put preamplifiers, power amplifiers and even tuners to the ultimate test. But the advent of digital audio is also revealing bold new opportunities such as digital interface, digital delay, and–most significant of all–Digital Signal Processing (DSP).

And the company behind these innovations? Sony. At a time when others raised their eyebrows, we were the first to offer an outboard digital-to-analog converter. Now such converters are an accepted part of the high fidelity scene. We led the way with digital delay. And now we're offering the most comprehensive, most advanced Digital Signal Processing in high fidelity, embodied in the Sony TA-E1000ESD Preamplifier.

Stated simply, DSP maintains the integrity of Compact Disc sound from input to output, while giving you comprehensive digital control over dynamics, equalization, and SoundField™ conditions. You get a combination of sonic accuracy and control that's quite simply unmatched by any other preamplifier the world has to offer.

For Sony ES, establishing digital audio accuracy in the preamp was only the beginning. It was then necessary to create power amplifiers with an unsurpassed ability to generate prodigious quantities of current on demand. These amplifiers also take the Sony philosophy of "simple and straight" signal transfer and bring it to fruition in aluminum, silicon, copper and carbon. So you hear sound that is always smooth and transparent–never tiring. Sound that's waiting for you. Now. At your ES dealer.

TA-E1000ESD DSP PREAMPLIFIER

In 1982, Sony engineers astonished the world with the Compact Disc, the first giant step for digital high fidelity. Now, the Digital Signal Processing (DSP) of Sony's TA-E1000ESD preamplifier represents the second step: bringing the digital technology of Compact Disc to the rest of your system.

- Digital Dolby Surround Sound with Pro Logic™
- Up to six distinct channels of surround sound output
- Sony High Density Linear Converter™ circuit for A/D converter
- DSP digital dynamic compression/expansion with 18 discrete settings
- Digital parametric equalization with 91 center frequencies, 4 selectable slopes, and 3 bands
- Digital surround sound with ten factory preset SoundField™ environments
- 10 programmable SoundField memory positions
- 10 adjustable SoundField parameters: room size, wall reflectivity, seat, row & number (2,500 available seats), early reflection time, reflection level, initial reverb delay, reverb time, reverb density, spread level, and effect level
- 8x oversampling digital filter with 18-bit D/A converter
- Automatic switching for 32, 44.1 and 48 kHz digital signals
- Optical digital output
- 3 digital audio inputs
- 12 analog audio inputs (3 with video and S-Video, 4 with video, 4 line-level audio, 1 phono)
- Rec Out Selector
- Programmable audio/video remote control
- Simulated wood side panels

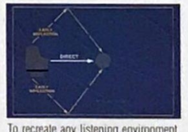
The DSP concept.

For decades, the world has used analog processing to achieve such necessary functions as equalization, delay and reverberation. While analog signal processing has undergone years of improvement, it entails three intrinsic drawbacks: noise, distortion and phase response errors. With Digital Signal Processing, Sony cuts through these old limitations in a single master stroke. You get all of the power and control of signal processing with none of the sonic shortcomings.

Two landmark Sony DSP integrated circuits accept digital signals directly in the digital domain. So there's no degradation of the Compact Disc signal from input to output. But Sony also provides High Density Linear Converter™ circuitry to transform your analog sources into digital. So even your LPs, cassettes and radio broadcasts can receive the full DSP treatment.

Digital SoundField™ control.

Because your listening room was never designed to contain the Vienna Philharmonic, Sony's digital surround sound places you in an acoustic space that was. You have your choice of symphony hall, movie theater, stadium, studio or small club. Unprecedented digital adjustments let you choose room depth, width, wall absorbancy, reflection times—even the row and number of your seat!



To recreate any listening environment, you can make separate delay adjustments for direct sound, early reflections, and reverberation.

Digital parametric equalization.

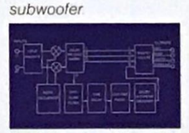
Conventional tone controls tend to be inaccurate and inconsistent. That's why Sony developed digital parametric equalization. It's simple, effective, and free from the inherent shortcomings of analog EQ. With any of 91 center frequencies, four slope settings, and boost or cut in 0.1 dB increments, you have a choice of several trillion EQ curves. Which is more than enough boosting, peaking, shelving and tweaking to overcome acoustical deficiencies.

Digital dynamic compression and expansion.

DSP puts you in full digital control of dynamic range, with 18 discrete steps of compression and expansion. So you can finally do a proper job of fitting live music within the limitations of analog cassettes. You can also optimize recordings for your car by raising soft passages above the road noise. And DSP expansion brings your analog sources closer to digital standards.

Digital Dolby® Surround Sound.

The TA-E1000ESD is Sony's premier audio/video control center. Which means it has Sony's most complete facilities for processing motion picture sound tracks. For Dolby® Stereo movies, our Digital Dolby Surround Sound uses Dolby Lab's advanced Pro Logic™ "steering" system for superior stereo separation. Sony provides digital delay, as well as preamp outputs for two front pairs of speakers, a rear pair, a center "dialog" channel, and an 80 Hz low-pass filtered output for your subwoofer.



The adaptive matrix and steering logic of Pro Logic is the secret behind a dramatic improvement in channel separation.

YOU'LL NEVER HAVE TO STAND IN LINE FOR TICKETS TO THESE CONCERTS.

Imagine your living room transformed. It's a smokey jazz club where you can reach out and touch the alto sax. Or seventh row center for a Beethoven gala at Symphony Hall. It's a stadium concert where the bass is powerful enough to excite every nerve ending. Or a great stone cathedral where organ fugues resound.

What was once a music lover's fantasy is now a practical reality with Sony ES. For sonic purity at the source, start with an ES Compact Disc Player. Add the TA-E1000ESD Preamplifier, with Digital Signal Processing to give you total control over your acoustic environment. Choose the effortless power of ES amplifiers. Round out your system with a tuner and cassette deck. And connect a set of great speakers. You'll have more than a high-calibre audio system. You'll have an unlimited number of command performances.

Low-Impedance Drive: Real power for real loudspeakers.

In order to get repeatable, reliable specifications, power amplifiers are usually tested when hooked up to 8-ohm laboratory resistors. While the results may look fine on a spec sheet, they simply ignore an undeniable fact. Real loudspeakers–even those nominally rated at 8 ohms–simply refuse to behave like laboratory resistors.

While the resistor presents a simple impedance that's constant at all audio frequencies, the speaker presents a complex impedance that varies dramatically. In fact, the typical "8-ohm" loudspeaker can have impedance peaks higher than 30 ohms and impedance dips lower than 3 ohms! And here's the catch: as impedance drops, more and more current is demanded from the amplifier.

Thanks to large power transformers, generous power supplies, big output transistors, and massive heat sinks, Sony amplifiers produce this current in casual disregard of loads that would cause lesser amplifiers distress. Sony amps handle the toughest low-impedance and complex-impedance speakers with reassuring stability and effortless ease.

Spontaneous Twin Drive: Satisfying your hunger for power.

In conventional amplifiers, the demands of the power-hungry output stage can interfere with the supply of voltage to the sensitive input stage. Sony eliminates this interference by giving the input and output stages separate power supplies. Each is independently rectified and filtered with large capacitors. This solution, called Spontaneous Twin Drive, eliminates power supply fluctuations for the early voltage amp stages even when the power output stage is drawing heavy current.

TA-N77ES POWER AMPLIFIER

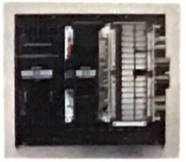
As an introduction to the TA-N77ES, try this simple experiment. Pick it up. You'll feel the unmistakable presence of an oversized power transformer. Massive chimney-style heat sinks. Super-rigid G-Chassis™ construction. And large, discrete transistors. There may be cheaper ways to build power amps. But none better.

- Spontaneous Twin Drive (STD) power supply
- Low impedance drive for 270 watts/ch. continuous at 4 ohms, 20–20,000 Hz, 0.006% THD; 200 watts/ch. continuous at 8 ohms, 20–20,000 Hz, 0.004% THD
- Dynamic headroom of 2.8 dB at 4 ohms
- Monaural operation delivers 580 watts at 8 ohms, 20–20,000 Hz, 0.007% THD
- Discrete output transistors
- Large chimney-style heat sinks
- Sony G-Chassis™ construction
- Fixed and variable inputs
- Two protection circuits
- Peak level power meters
- Parallel A and B speaker terminals
- Simulated wood side panels

TA-N55ES POWER AMPLIFIER

All amplifiers in this class are powerful. However, the TA-N55ES is powerful where it counts: the real world of music reproduction. Thanks to its uncompromised power supply, output transistors, heat sinks and chassis, this amplifier excels at reproducing highly dynamic music through virtually all loudspeakers.

- Spontaneous Twin Drive (STD) power supply
- Low impedance drive for 150 watts/ch. continuous at 4 ohms, 20–20,000 Hz, 0.006% THD; 110 watts/ch. continuous at 8 ohms, 20–20,000 Hz, 0.004% THD
- Dynamic headroom of 2.8 dB at 4 ohms
- Monaural operation delivers 300 watts at 8 ohms, 20–20,000 Hz, 0.007% THD
- Discrete output transistors
- Oversized heat sinks
- Sony G-Chassis™ construction is 2,000 times more rigid than steel
- Fixed and variable inputs
- Parallel A and B speaker terminals
- Simulated wood side panels



The robust internal construction of these Sony ES separates sets them apart from ordinary components.

Spontaneous Twin Drive results in consistent amplifier performance from the softest musical passages to the loudest. The sound is clear and non-fatiguing with vivid reproduction of musical dynamics.

Discrete output transistors: individual and incomparable.

In preference to inexpensive integrated circuit "power packs," Sony ES insists on individual (discrete) output transistors. Sony's carefully-selected discrete transistors cost more. But their enhanced cooling, proven reliability and superior frequency response make them more than worth the cost.

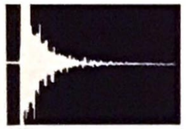
G-Chassis™ construction: solid as marble.

Resonance and vibration are facts of life in any audio system. Look inside an amplifier, and you'll find power transformers, power transistors and other parts that vibrate during normal operation. Look around the room and you'll see speakers that transmit vibration through the floor, the shelf, even the air. Many music lovers know that such vibration causes distortion in a turntable or cassette deck. Fewer realize it can also disrupt the signal of an amplifier.

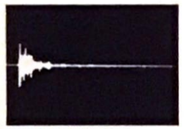
The distortion occurs in the transistors and capacitors that handle low-level signals. These sensitive parts convert vibration into electrical interference that can modulate the music, robbing it of sonic purity. To keep the audio signal pristine, Sony developed a comprehensive anti-resonant design.

We started with G-Chassis construction, named after our

proprietary "G" material. Made of calcium carbonate reinforced with glass fibers, the unique G-compound is similar in composition to marble. It's molded at high temperature into a single structure approximately 2,000 times more rigid than the conventional steel chassis. On this firm foundation, Sony provides separate mounts for the power transformer, heat sinks, and printed circuit board assemblies–thus arresting the spread of vibration.



STANDARD CHASSIS VIBRATION



G-CHASSIS VIBRATION SUPPRESSION

Sony's G-Chassis is not only exceptionally immune to vibration, but also totally non-magnetic. Distortions and colorations caused by magnetic fields are dramatically reduced. Sony ES Series amplifiers thus achieve a purity in sound that cannot be matched by amplifiers of conventional chassis design.

On the track of better FM: Super Sound Tracking.

Sony's "Wave Optimized" design begins in the RF front end. Any FM tuner that tunes too broadly lets in all sorts of interference. If it's too narrow, the desired station is distorted. Sony resolves this age-old trade-off with Super

TA-N110 POWER AMPLIFIER

Sony presents the ideal companion for the ES Preamplifier: the TA-N110. It's the perfect rear-channel amp and the perfect extension-speaker amp. It can run in mono for a center "dialog" channel and its built-in low-pass filter is great for a subwoofer. Which means the N110 plays in total harmony in any ES System.

- Output power of 50 watts per channel, continuous at 6 ohms, 20–20,000 Hz, 0.08% THD; 45 watts per channel, continuous at 8 ohms, 20–20,000 Hz, 0.08% THD
- Dynamic headroom of 1.3 dB at 6 ohms
- Monaural operation delivers 100 watts at 8 ohms, 20–20,000 Hz, 0.08% THD
- Switchable, 3-way input for maximum flexibility
- Front panel attenuator control
- Monaural operation for center-channel and subwoofer applications
- Built-in low-pass filter for subwoofer applications
- A and B speaker terminals
- Simulated wood side panels

ST-S730ES AM/FM TUNER

The ST-S730ES AM/FM tuner represents a comprehensive re-thinking of FM performance Sony calls "Wave Optimized" design. As a result, this tuner extracts the full benefit of today's improved FM transmissions. Stated simply, the S730ES makes listening to the airwaves an audio experience of the highest order.

- Low-noise Radial Power Supply
- Automatic microprocessor exclusion circuit
- Super Sound Tracking (SST) front end
- Wave Optimized IF System (WOIS)
- Wave Optimized Direct Detector (WODD) with PLL technology
- Wave Optimized Digital Stereo Decoder (WODSD)
- Direct Comparator circuitry
- Remote Control Capability
- Optically-sensed rotary-dial tuning
- 20 station memory presets
- Switchable IF bandwidth
- High Blend
- 4-station timer program capability with external timer
- Calibration tone
- Simulated wood side panels

Sound Tracking. It continuously shifts an extremely narrow bandpass filter, tracking the modulation of the FM transmission. Even in "crowded" reception conditions, you get unprecedentedly low interference–combined with vanishingly low distortion.

Sony's SST front end achieves near-ideal "high hat" filter characteristics, combining low distortion and low interference.

Lower distortion through linear conversion.

The accuracy of Phase-Lock Loop (PLL) is highly prized in a tuner's stereo decoder section. But conventional PLL designs could never be used in the circuit that converts FM into audio, the tuner's "detector." The problem is non-linearity. Sony's Wave Optimized Direct Detector (WODD) overcomes non-linearity by generating an equal-but-opposite non-linearity that cancels out the first. You get perfectly linear operation for an audio output of greater precision than ever.

Better stereo is spelled "WODSD."

Most stereo decoder circuits let the unwanted stereo pilot frequency pass right through. They require "beat-cut" filters to clean up the noise. Sony's Wave Optimized Digital Stereo Decoder (WODSD) uses sophisticated digital switching to eliminate this noise at the source. So FM stereo reception is remarkably clean and quiet.

ES RECEIVERS: UNCOMMON STRENGTH AT THE HEART OF YOUR SYSTEM

By combining the functions of tuner, preamplifier and power amplifier, the receiver stands at the very core of the audio system. It has the primary responsibility for how sensitive the system is to FM broadcasts. How free the system is from background noise. And of course, how powerful.

At Sony ES, we take this pivotal role seriously. So instead of filling ES Receivers with tinsel and glitter, we furnish them with something infinitely more rewarding. Performance.

For example, Sony ES corrects one perennial weakness among receivers: their inability to drive 4-ohm speakers well enough to qualify for full FTC power rating. Every ES receiver is FTC-rated to drive 4 ohm loudspeakers. We did it by incorporating the same low-impedance drive technology that figures importantly in the ES power amplifiers. The technology entails large, discrete output transistors; massive heat sinks; and a formidable power supply—all of which contribute to cooler, more reliable operation.

Sony receivers also boast the same Spontaneous Twin Drive (STD) circuitry, the same non-metallic G-Chassis™ construction, and the noise-free electronic switching employed in Sony's separate components.

Evidence of Sony optical expertise is found in an innovation called "Opto Legato Linear™ A." It's an outgrowth of Sony Legato Linear technology that delivers the spectacularly low distortion of Class A operation. The circuit varies amplifier bias through four preset levels, depending on the power required. But unlike other variable-bias circuits, Opto Legato Linear™ A is optically decoupled from the audio circuit. So there's never a chance for interference.

Taken together, these technologies place Sony ES receivers in an enviable position. At the center of today's finest high fidelity systems.

STR-GX90ES AM/FM RECEIVER

G-Chassis™ construction: solid as marble.

Resonance and vibration are facts of life in any audio system. Look inside a receiver, and you'll find power transformers, power transistors and other parts that vibrate during normal operation. To prevent these resonances from creating spurious signals in the sensitive transistors and capacitors of input stages, Sony developed the G-Chassis construction of our STR-GX90ES and GX80ES.

It's made of our proprietary "G" material, a unique calcium carbonate compound reinforced with glass fibers. Similar in composition to marble, this G-compound is molded at high temperature into a single structure approximately 2,000 times more rigid than the conventional steel chassis. On this firm foundation, Sony provides separate mounts for the power transformer, heat sinks, and printed circuit board assemblies – thus arresting the spread of vibration.

Sony's G-Chassis is not only exceptionally immune to vibration, but also totally non-magnetic. Distortions and colorations caused by magnetic fields are dramatically reduced. The top ES Series receivers thus achieve a purity in sound that cannot be matched by receivers of conventional chassis design.

Ahead in the ratings: FTC-rated for 4-ohm loads.

You can tell much about receivers from their FTC power specifications. (You know: the ones that read, "so many watts continuous, both channels driven, from 20 to 20,000 Hz into so many ohms, at so much percent THD.") While most receivers are FTC-rated into 8-ohm loads, the overwhelming majority of them can't meet stringent test requirements into 4-ohm loads.

Try and test the typical receiver with a 4-ohm load and it will go into thermal overload or premature distortion. It can't meet the test simply because it doesn't have the means. It doesn't have oversized power transformers. Big power supply filter capacitors. Massive heat sinks. And powerful, discrete output transistors. Fortunately, Sony ES receivers are endowed with all of these advantages. So we can proudly rate our receivers for stable, reliable operation into 4-ohm loads. The benefit for purchasers of 4-ohm loudspeakers is obvious. But as we will demonstrate, even the owners of 8-ohm speakers will reap sonic rewards.

The STR-GX90ES defies the conventional wisdom of receiver design. After all, the typical receiver would never be built with the exacting standards of Sony G-Chassis™ construction. It would never have such prodigious power. And it would never achieve the impeccable sound quality of this formidable ES component.

- FTC 4-ohm rated at 120 watts per channel, 20–20,000 Hz, 0.015% THD
- FTC 8-ohm rated at 120 watts per channel, 20–20,000 Hz, 0.006% THD
- Opto Legato Linear A
- Spontaneous Twin Drive
- Sony G-Chassis™ construction
- Two power transformers
- Discrete output transistors
- 59-key programmable A/V UniCommander® remote
- Audio/video/S-Video switching
- REC OUT select
- Source Direct switch
- MC phono input
- Preamp output/main amp input
- Adaptor input/output loop
- Simulated wood side panels

STR-GX80ES AM/FM RECEIVER

Sony's new STR-GX80ES is designed to take its place as the centerpiece of top audio/video systems. You'll take command of extensive switching for audio, video and S-Video signals. And you'll wield a powerful programmable audio/video remote control. All this in a receiver that exemplifies the ES standard for sound quality.

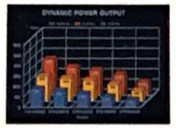
- FTC 4-ohm rated at 110 watts per channel, 20–20,000 Hz, 0.015% THD
- FTC 8-ohm rated at 110 watts per channel, 20–20,000 Hz, 0.006% THD
- Opto Legato Linear A
- Spontaneous Twin Drive
- Sony G-Chassis™ construction
- Separate power transformers for audio and control
- Discrete output transistors
- 59-key programmable A/V UniCommander® remote
- Audio/video/S-Video switching
- REC OUT select
- Source Direct switch
- Preamp output/main amp input
- Adaptor input/output loop

On the back panel, you'll find tangible proof of Sony's ability to deliver power into 4-ohm speakers.

Real power for real loudspeakers.

In order to get repeatable, reliable specifications, receivers are usually tested when hooked up to laboratory resistors. Unfortunately, these laboratory resistors don't behave at all like speakers. While resistors present an impedance that's constant at all audio frequencies, speakers present an impedance that varies dramatically. In fact, the typical "8-ohm" loudspeaker can have peaks higher than 30 ohms and dips lower than 3 ohms!

Here's the problem: as impedance drops, more and more current is demanded from the receiver. Many receivers can't cope. But Sony ES receivers are FTC-rated into 4 ohms. Which means ES receivers produce current in casual disregard of loads that would cause the typical receiver distress. Sony ES receivers handle the toughest low-impedance and complex-impedance speakers with reassuring stability and effortless ease.



High 4-ohm dynamic power ratings demonstrate these receivers' ability to deliver full, undistorted power, regardless of speaker load.

A better class of Class A.

For decades, high fidelity amplifiers have been divided into two general classes. Class A amplifiers, cherished for their inherently low distortion, leave the positive and negative transistors on for the full duration of the audio waveform. Unfortunately, their tremendously high bias makes these amps inefficient, bulky and astronomically expensive.

Class B amplifiers are far more efficient, because they're constantly switching between the positive transistors and negative transistors for each half of the audio wave. Unfortunately, their very low bias permits audible, staccato-like crossover distortion at each switching point.

Sony resolves this long-standing tradeoff with a new circuit called "Opto Legato Linear™ A." (In music, "legato" is the opposite of "staccato.") This circuit varies the output transistor bias according to the signal level. When the music is soft, bias is low and the amplifier operates in Class A. As the music gets louder, the circuit steps up through four levels of bias, applying only as much as needed to stay in Class A. When the music reaches dynamic peaks, the amplifier reverts to a modified form of Class B. In Sony's design, both transistors are left on all the time for zero switching distortion.

STR-GX60ES AM/FM RECEIVER

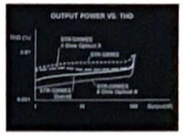
In dramatic contrast to the murky thinking behind most receivers, the STR-GX60ES has one clear priority. To provide excellent sound, into real-life speakers, for years to come. It's a priority backed by full FTC 4-ohm power ratings and a three-year parts and labor limited warranty, about which your dealer has full details.

- FTC 4-ohm rated at 100 watts per channel, 20–20,000 Hz, 0.015% THD
- FTC 8-ohm rated at 100 watts per channel, 20–20,000 Hz, 0.006% THD
- Opto Legato Linear A
- Spontaneous Twin Drive (STD) power supplies
- Separate power transformers for audio and control
- Discrete output transistors
- 59-key programmable A/V UniCommander™ remote
- Audio/video switching
- REC OUT select
- Source Direct switch
- Adaptor input/output loop
- Audio muting
- Aluminum front panel

STR-GX50ES AM/FM RECEIVER

Most receivers lack heat sinks, power supply and power transistors robust enough to be FTC-rated into 4-ohm loads. Fortunately, Sony's remarkable STR-GX50ES is not like most receivers. Rather, like all ES receivers, the GX50ES is fully FTC rated into 4-ohm loads. And it handles the real world's low-impedance speakers with ease.

- FTC 4-ohm and 8-ohm rated at 80 watts per channel, 20–20,000 Hz, 0.08% THD
- Parallel speaker outputs
- Opto Legato Linear A minimizes amplifier distortion
- Spontaneous Twin Drive (STD) power supplies
- Separate power transformers for audio and control
- Discrete output transistors
- 56-key A/V UniCommander™ remote
- Motorized volume control
- Audio/video switching
- Source Direct switch
- Audio muting
- Tape monitor
- 30 AM/FM station presets
- Aluminum front panel



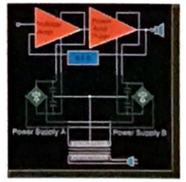
The benefit of Opto Legato Linear™ A technology is noticeably reduced distortion for smoother, warmer sound.

In order for the system to follow the nearly-instantaneous changes in musical dynamics, Sony uses an optical link from the bias control section to the output stage. This ensures precise, fast-acting operation while preventing unwanted interference.

The benefits of Opto Legato Linear A are impressive. You get the tremendous efficiency of a Class B amplifier, combined with the glorious sound of Class A. In fact, through most of the music's dynamic range, you get the blissfully low distortion of pure Class A operation – ideal for hour upon hour of musical enjoyment.

Spontaneous Twin Drive: Satisfying your hunger for power.

In conventional receivers, the demands of the power-hungry output stage can interfere with the supply of voltage to the sensitive input stage. Sony eliminates this interference by giving the input and output stages separate power supplies. Each is independently rectified and filtered with large capacitors. This solution, called Spontaneous Twin Drive, eliminates power starvation at the early voltage amp stages – even when the power output stage is drawing heavy current.



Spontaneous Twin Drive design assures a stable supply of voltage A even while the speakers draw heavy current.

Spontaneous Twin Drive results in consistent receiver performance from the softest musical passages to the loudest. The sound is clear and non-fatiguing with vivid reproduction of musical dynamics.

Discrete output transistors: individual and incomparable.

In preference to inexpensive integrated circuit "power packs," Sony ES insists on individual (discrete) output transistors. Sony's carefully-selected discrete transistors cost more. But their enhanced cooling, proven reliability and superior frequency response make them more than worth the cost.

ES transformers declare independence.

Compared to separate components, a traditional weakness of receiver design has been the increased opportunity for circuit-to-circuit interference. Sony has attacked this problem head-on. To eliminate the possibility of interference through the power supply, every ES receiver employs two independent power transformers–one for audio, the other for control. Sony also uses heat sinks to form an internal magnetic shield down the center of our receivers. Our top models let you shut down the front panel fluorescent display, eliminating even this slight potential contribution to noise. As a result, ES receivers reproduce music against a seamless, noise-free background. You hear only the music, not one thing more.

To minimize internal interference, Sony receivers have one transformer for the audio, and another for system control.

STR-GX40ES AM/FM RECEIVER

The STR-GX40ES is an outstanding example of how Sony ES maintains high standards across the board. With the power and refinement of such technologies as Spontaneous Twin Drive power supplies and discrete transistor output stage, this receiver is fully qualified to deliver audiophile-grade sound for years to come.

- FTC 4-ohm and 8-ohm rated at 50 watts per channel, 20–20,000 Hz, 0.08% THD
- Parallel speaker outputs
- Spontaneous Twin Drive (STD) power supplies
- Separate power transformers for audio and control
- Discrete output transistors in full complementary circuit
- 29-key Audio remote
- Motorized volume control
- Electronic switching
- Source Direct switch
- Audio muting
- Tape monitor
- 30 AM/FM station presets
- Aluminum front panel

RM-S103/U203/P303 REMOTE CONTROLS

Every ES Receiver is supplied with a Sony Remote Commander® unit. Even the most affordable will control not only the receiver it came with, but also nearly all Sony infrared remote high fidelity components. The other ES remotes add integrated audio/video remote operation and the ultimate luxury—programmability.

For the STR-GX40ES.

Simply because this is Sony's most affordable ES Receiver, there's no reason to expect anything less than luxury. This receiver comes supplied with Sony's slim-line RM-S103 Remote Commander® unit. The RM-S103 can operate an entire Sony audio system, including two tape decks, and a compact disc player.

For the STR-GX50ES.

The RM-U203 UniCommander® unit that accompanies Sony's STR-GX50ES has the remarkable advantage of integrated audio/video remote control. This hand-held unit selects and controls Sony wireless remote television sets, Sony VCRs (VHS, 8mm or Beta), and Sony video disc players, in addition to full-system control for audio components.

For the STR-GX60ES, GX80ES and GX90ES.

Imagine being able to master virtually any mix of infrared-operated audio and video components–from a single hand-held remote! That's a key operating feature of Sony's top three ES Receivers. Their RM-P303 UniCommander® remote has a special LEARN mode that enables it to take the place of your VCR remote and your TV remote–no matter what brand they may be.

THREE TYPES OF DECKS. ONE STANDARD OF QUALITY.

As the digital age progresses, something strange is happening to analog cassette decks. Today's decks seem to be built only for convenience. Auto reverse and dual "dubbing" decks have proliferated while concern for sound quality appears to have fallen by the wayside.

At Sony, we refuse to yield to the popular notion that analog recording means second-rate performance. We can't ignore 40 years of Sony experience in making analog decks sound better. We've mastered every aspect of the tape recording process—from microphones and mixing consoles to blank tape, recording heads, transport mechanisms and playback electronics. So while we're as eager as anyone to make cassette decks easier and more enjoyable, we simply refuse to sacrifice sound quality in the process.

That's why every ES Cassette Deck—whether single-direction, auto reverse or dual—uses a newly-developed Sony mechanism for an audible reduction in distracting wow & flutter. That's why every ES deck features Dolby* B and C noise reduction, as well as Dolby HX Pro™ headroom extension. And every ES deck satisfies the one technical requirement that continues to elude so many others: full frequency response.

Every ES deck achieves frequency response across the entire audible spectrum, from 20 Hz at low frequencies to 20,000 Hz at the top, within a range of ±3 dB. Thanks to this consistent, exalted standard of performance, you'll hear the same extraordinary clarity of sound no matter which Sony ES deck you buy.

So if anyone doubts that auto-reverse and dual decks can be virtually as good as single-direction decks, let them experience Sony ES. Where all types of decks display one type of performance. And if anyone supposes that the era of high fidelity analog cassette recording is at end, let them discover the musical truth—at a Sony ES dealer.

TC-K950ES CASSETTE DECK

Here's a deck that emphatically disproves the notion that analog recording is immune to substantial improvement. Sony innovations in the mechanics of tape transport, bias circuitry, head design and anti-resonance have produced a deck that establishes a new benchmark in analog fidelity.

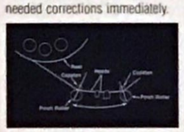
- Response 15 Hz–22 kHz ±3 dB
- Three heads
- Three motors
- Closed-loop dual-capstan tape drive
- Quartz-locked direct-drive capstan motor
- Wow & flutter 0.022% (WRMS)
- 210 kHz Super Bias™ circuitry
- Dolby® B and C noise reduction
- Switchable Dolby HX Pro headroom extension
- Sony LaserAmorphous heads
- Midship dual chassis construction
- Sorbothane cassette stabilizer
- Bias and Rec calibration
- CD direct mode
- Switchable MPX filter
- Linear Counter
- Remote capability
- Simulated wood side panels

Three heads are better than two.

A two-head cassette deck uses a single head, with a single head gap, for both recording and playback. For optimum recording, the head gap should be wide. Yet for optimum playback, the gap should be narrow. Any combined record/play head must compromise these two goals.

With three separate heads, the Sony TC-K950ES, K850ES and K650ES refuse to sacrifice anything. Each head–erase, record and play–is optimized for its particular function. The playback head has a narrow gap for response beyond 21,000 Hz (±3 dB), while the record head has a wide gap for superb dynamic range. You get the music's full depth and breadth–for sound quality without compromise.

The three-head format also permits you to monitor the tape while it is being recorded. In this way, you can compare the quality of the recorded music with the original source, and make any needed corrections immediately.



By isolating the area of tape-to-head contact, Sony's closed-loop dual capstan system reduces modulation noise.

Closing the loop on modulation noise: closed-loop dual-capstan drive.

Most cassette decks use a single capstan, engaging a single pinch roller, to drive the tape. Unfortunately, this design permits slight variations in supply reel back-tension to make the tape vibrate along its length. The result is modulation noise, which smears musical tones across the frequency spectrum, muddying the sound.

The closed-loop dual capstan drive of the TC-K950ES and K850ES cuts modulation noise off at the source. Sony locates one capstan and pinch roller on either side of the head assembly. This isolates the tape as it comes into contact with the heads, separating it from noise-inducing friction.

Sony's configuration positions a direct-drive motor right on the axis of one capstan. Quartz accuracy assures precise tape speed day-in, day-out. And the system uses Sony's famous brushless, slotless "BSL" motor. It eliminates cogging–variation in torque that is symptomatic of conventional, slotted motors.

The second capstan is driven by a belt–the "closed loop" that gives the system its name. It applies exactly the right amount of tape tension. Tape-to-head contact is optimized, for music that is clear and distinct in pitch, from the lowest musical frequencies to the highest.

The three-motor transport from Sony, the transport authority.

Because tape speed irregularities can be heard as the wavering sound called "wow & flutter," Sony created a new, ultra-precise three-motor mechanism. In Sony's new design, one high-torque motor drives the reel hubs and accomplishes fast-forward and rewind. The second motor drives only the capstans, and is responsible for accurate tape speed. The third, "assist" motor governs power loading of the cassette door and insertion of the heads into the cassette. It's a division of labor that offers three compelling advantages.

With three motors in place of the usual two, Sony's new tape drive offers reduced wow & flutter, plus unsurpassed refinement.

First and most important, the system helps eliminate tape speed irregularities. So the veil of wow & flutter is measurably and

TC-K850ES CASSETTE DECK

Incorporating nearly all the technical sophistication of the TC-K950ES, the Sony TC-K850ES is an outstanding value. Quartz direct-drive precision, three-head performance and closed-loop dual-capstan accuracy are the highlights for which breathtaking dynamic range and broad frequency response are the clear results.

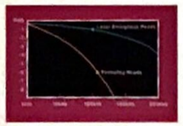
- Response 15 Hz–21 kHz ±3 dB
- Three heads
- Three motors
- Closed-loop dual-capstan tape drive
- Quartz-locked direct-drive capstan motor
- Wow & flutter 0.024% (WRMS)
- 160 kHz Super Bias™ circuitry
- Dolby® B and C noise reduction
- Switchable Dolby HX Pro headroom extension
- Sony LaserAmorphous heads
- Sorbothane cassette stabilizer
- Bias and Rec calibration
- CD direct mode
- Switchable MPX filter
- Linear Counter
- Power loading system
- Full logic transport
- Remote capability

audibly lifted. You hear music played back with a clarity that rivals the source.

Second, the three-motor design dramatically reduces the mechanical linkages needed to transfer force from a single motor. Fewer pulleys, gears, cams and levers means you get a significantly more reliable system. Finally, the third motor replaces the crude solenoid of earlier designs. So operational clunks and jolts are replaced by graceful whirrs. Mode changes are faster. And tape handling is reassuringly smooth and silent.

In addition, Sony's rigid, die-cast monocoque motor base and a visco-elastic Sorbothane cassette stabilizer prevent air-borne and mechanical vibrations from disturbing the sound.

The definite advantages of amorphous heads.



Sony's Laser Amorphous Head delivers far superior linearity, lower noise, and extended frequency response when compared to conventional tape heads.

It's axiomatic that a cassette deck's sound can be no better than the elements that record and play back music from the tape: the heads. Common to all ES Series decks, Sony's LaserAmorphous heads combine two important innovations for better sound. First, an amorphous (non-crystalline) magnetic material eliminates the noise that occurs when the crystals in conventional heads switch polarity. Second, a special laser welding process is used to affix the amorphous laminations. Together, these features enable Sony's LaserAmorphous heads to operate at higher energy levels and higher frequencies than conventional head designs. This translates into extended dynamic range, flat response, and the ability to handle the extremely high frequencies of Sony's Super Bias circuitry.

TC-K650ES CASSETTE DECK

For the cassette enthusiast who wants to step up to the performance benefits of three separate heads, the Sony TC-K650ES is an outstanding choice. You'll experience full-bodied dynamic range, effortless bass response, and clearly-etched treble—everything you'd expect from a three-head machine in Sony's ES Series.

- **Response 20 Hz–20 kHz ±3 dB**
- **Three heads**
- **Three motor transport**
- **Wow & flutter 0.05% (WRMS)**
- **160 kHz Super Bias™ circuitry**
- **Dolby® B and C noise reduction**
- **Dolby HX Pro headroom extension**
- **Sony LaserAmorphous heads**
- **Bias fine adjustment**
- **CD direct mode**
- **Switchable MPX filter**
- **Linear Counter**
- **Switchable fluorescent display**
- **Power loading system**
- **Full logic transport**
- **Aluminum front panel**
- **Remote capability**

TC-RX70ES AUTO REVERSE CASSETTE DECK

The TC-RX70ES is the auto-reverse deck that fully adheres to ES standards of performance. That alone will be enough to motivate many smart music lovers to own this machine. Other factors will be its three-motor drive system, Super Bias™ circuitry, LaserAmorphous head, Dolby® HX Pro headroom extension and remote capability.

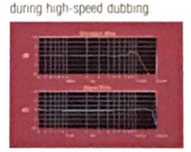
- **Response 20 Hz–20 kHz ±3 dB**
- **Auto reverse with quick reverse**
- **Three motor transport**
- **Wow & flutter 0.06% (WRMS)**
- **160 kHz Super Bias™ circuitry**
- **Dolby B and C noise reduction**
- **Dolby HX Pro headroom extension**
- **Sony LaserAmorphous head**
- **Switchable MPX filter**
- **Linear Counter**
- **Cue & Review**
- **Stereo mic inputs**
- **Fluorescent display**
- **Power loading system**
- **Full logic transport**
- **Auto focus recording**
- **Aluminum front panel**
- **Remote capability**

Not all bias is created equal: Super Bias™ circuitry.

All cassette decks use recording bias, a constant high-frequency signal that's critical for keeping distortion low. Most good decks use a bias frequency of 80 or 105 kHz. But even a signal this high above 20 kHz still creates audible "beat" frequencies. In contrast, Sony's Super Bias™ circuitry operates at 160 kHz for a significant reduction in beat-frequency noise. Recordings sound cleaner and less distorted.

Sony Super Bias™ circuitry achieves a measurable reduction in beat-frequency noise.

Super Bias circuitry has an added advantage in high-speed dubbing. When tape speed is doubled, so are the audio frequencies. To avoid beat frequency problems, most high-speed dubbing decks cut off the highest audio frequencies, resulting in audible loss. Thanks to Super Bias circuitry, Sony ES Series dual decks can deliver vastly superior performance during high-speed dubbing.



Super Bias™ offers truly extended frequency response (bottom), to make high-fidelity dubbing a reality.

Dolby® B and C noise reduction.

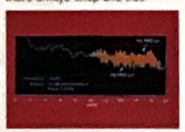
To reduce the noise and "hiss" inherent in the cassette recording process, every ES deck features Dolby B and C noise reduction. The newer Dolby C system effectively doubles the noise reduction of Dolby B. Your enjoyment of music is not obscured by tape hiss because Dolby C reveals music against a background of silence. Every Sony ES deck also includes a switchable "MPX" filter, to assure

proper Dolby* operation when you record FM multiplex stereo broadcasts.

Maximum headroom with Dolby HX Pro™ circuitry.

In tape recording, the ability to capture high-level, high-frequency music is called headroom. It's an ability hindered by the self-biasing that occurs when high-frequency musical signals begin to act like additional recording bias. This effect dulls the response, taking the zing out of high-frequency instruments such as cymbals and harpsichords.

Dolby HX Pro headroom extension counteracts the self-bias effect by reducing the bias level whenever high-level high-frequency music is present. You get high-frequency response that's always crisp and true.



Dolby HX Pro varies the recording bias to yield a substantial increase in high-frequency recording headroom.

The fine points of fine bias adjustment.

Slight variations, even within a single batch of tape, can demand slight adjustments in recording bias. For this reason, Sony offers fine bias adjustment. The TC-K850ES and K950ES have the additional precision of bias and record calibration. Either way, you get the right amount of recording bias for every tape you use.

Reading the minutes.

Instead of arbitrary counter numbers, the Linear Counter used in every Sony ES deck shows you elapsed tape time in minutes and seconds. With Sony's Linear Counter, there's no need to guess how much recording time is left on the tape. You always know whether or not a selection you want to record will fit.

TC-WR90ES DUAL CASSETTE DECK

Sony's top dual cassette deck was designed for people who had never considered dual cassette decks. Its exceptional frequency response and dynamic range give music a satisfying depth and breadth. Think of the second mechanism as a thoughtful convenience built into a high-performance single deck.

- Response 20 Hz–20 kHz ±3 dB
- Dual deck with high-speed dubbing
- Quick auto reverse
- Deck A and B Relay Play
- Deck A and B twin/sequential recording
- Dual three-motor transport
- 160 kHz Super Bias™ circuitry
- Dolby B and C noise reduction
- Dolby HX Pro headroom extension
- Sony LaserAmorphous heads
- Sorbothane cassette stabilizer
- Bias fine adjustment
- Linear Counter
- Full logic transport
- Auto focus recording
- Remote capability
- Simulated wood side panels

TC-WR80ES DUAL CASSETTE DECK

Imagine two cassette decks with frequency response from 20 Hz to 20 kHz. Suppose they both contained sophisticated technology such as Super Bias circuitry and LaserAmorphous heads. Now imagine they enjoyed full logic operation compatible with Sony ES receiver remote controls. You've just imagined the TC-WR80ES.

- Response 20 Hz–20 kHz ±3 dB
- Dual deck with high-speed dubbing
- Dual auto reverse
- Deck A and B Relay Play
- Dual two-motor transport for smooth tape handling
- 160 kHz Super Bias™ circuitry
- Dolby B and C noise reduction
- Dolby HX Pro headroom extension
- Sony LaserAmorphous heads
- Bias fine adjustment
- Linear Counter
- Fluorescent display
- Full logic transport
- Automatic Music Sensor™
- Power Loading system
- Aluminum front panel
- Remote capability

With Sony, dubbing is fast . . .

Because the process of dubbing tapes can be tedious, Sony's dual-well decks offer the option of high-speed dubbing. Which means you can dub a 90-minute tape in about 45 minutes and expect results almost as good as a real-time copy. For circumstances where sound quality is paramount, real-time dubbing is always there when you need it.

Sony has also enhanced the convenience of the dual well design by combining it with auto reverse and Relay Play. You get continuous playback of up to four cassette sides—automatically. The twin/sequential recording on the TC-WR90ES also lets you make two identical cassettes (twin) or automatically record on Deck B as soon as Deck A has finished (sequential).

. . . and so is auto reverse.

The typical auto reverse system must run to the very start of the leader tape before engaging reverse play. The wait without music can seem like an eternity. That's why the TC-RX70ES and WR90ES offer Sony's Quick Reverse. This system immediately reverses tape direction as soon as the head reaches the leader tape. So a C-90 sounds like one continuous tape—not two.

COMPACT DISC PLAYERS	SINGLE DISC				MULTI DISC		
	CDP-X77ES	CDP-X55ES	CDP-X33ES	CDP-209ES	CDP-C85ES	CDP-C75ES	CDP-C9ES
TECHNOLOGY							
Digital Filter	8 fs/45 bit	8 fs/45 bit	8 fs/18 bit	8 fs/18 bit	8 fs/18 bit	8 fs/18 bit	8 fs/18 bit
Noise Shaping	Yes	Yes	Yes	Yes	Yes	Yes	Yes
D/A Conversion	50 m Pulse/s	50 m Pulse/s	50 m Pulse/s	50 m Pulse/s	50 m Pulse/s	50 m Pulse/s	2/18 bit
Digital Sync	Yes	Yes	Yes	Yes	Yes	Yes	—
Servo Stabilizer	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Linear Drive	Yes	Yes	Yes	—	—	—	—
Chassis	FB Chassis	FB Chassis	FB Chassis	Monocoque	Monocoque	Monocoque	Monocoque
Digital Output	Coax/Optical XLR	Optical	Optical	Optical	Optical	Optical	Optical
Transformers	2	2	1	1	1	1	1
Power Supply	Multi Regulated	Multi Regulated	Multi Regulated	Multi Regulated	Multi Regulated	Mutli Regulated	Multi Regulated
Line Output	Variable/Balance	Variable	Variable	Variable	Variable	Variable	Fixed
FEATURES							
Custom File	Yes (w/o Memo)	Yes (185 Disc)	Yes (185 Disc)	—	Yes (184 Disc)	Yes (184 Disc)	—
Programming	20	24	24	24	32	32	32
Repeat Play	6 (A-B, Remote)	7 (A-B, Remote)	7 (A-B, Remote)	6 (A-B, remote)	6	6	6
Shuffle Play	Yes (Remote Only)	Yes (Delete)	Yes (Delete)	Yes (Delete)	Yes (Select)	Yes (Select)	Yes
Direct Access	Yes (20, RM)	Yes (20)	Yes (20)	Yes (20)	Yes (5+ 20 RM)	Yes (5+ 20 RM)	Yes (10+ 20 RM)
Index Search	Yes (Remote Only)	Yes (Remote Only)	Yes (Remote Only)	Yes (Remote Only)	—	—	—
Peak Level Search	—	Yes	Yes	Yes	Yes	Yes	—
Auto Space	—	Yes (Remote Only)	Yes (Remote Only)	Yes (Remote Only)	—	—	—
Fader	Yes (Remote)	Yes	Yes	Yes	Yes	Yes	Yes
Remote	RM-D770	RM-D590	RM-D590	RM-D490	RM-D706	RM-D706	RM-D905
Music Calendar	—	Yes (20)	Yes (20)	Yes (20)	Yes (20)	Yes (20)	Yes (20)
Display On/Off	Yes, 2 Way	Yes, 3 Way	Yes, 3 Way	—	—	—	—
Time/Prgm Edit	—	Yes	Yes	Yes	Prgm Edit Only	Prgm Edit Only	—
Gold Plated I/O	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Side Wood	Yes	Yes	—	—	Yes	—	—
SPECIFICATIONS							
Freq Response	2Hz ~20kHz ±0.3dB	2Hz ~20kHz ±0.3dB	2Hz ~20kHz ±0.3dB	2Hz ~20kHz ±0.3dB	2Hz ~20kHz ±0.3dB	2Hz ~20kHz ±0.3dB	2Hz ~20kHz ±0.3dB
S/N Ratio	117dB	115dB	113dB	110dB	110dB	110dB	105dB
Dynamic Range	100dB	100dB	100dB	97dB	98dB	98dB	95dB
Distortion	0.0015%	0.0018%	0.002%	0.003%	0.0025%	0.003%	0.003%
Separation (1kHz)	110dB	110dB	110dB	100dB	105dB	105dB	98dB
W/F	Below Measurable Limits						
Line Out (Fixed) (Variable)	2 v/50 k ohms 2 v/50 k ohms	2 v/50 k ohms 2 v/50 k ohms	2 v/50 k ohms 2 v/50 k ohms	2 v/50 k ohms 2 v/50 k ohms	2 v/50 k ohms 2 v/50 k ohms	2 v/50 k ohms 2 v/50 k ohms	2uv/10 k ohms 2uv/50 k ohms
Headphone	40mW/32 ohms	28mW/32 ohms	28mW/32 ohms	15mW/32 ohms	15mW/32 ohms	15mW/32 ohms	15mW/32 ohms
Remote Commander	RM-D770	RM-D590	RM-D590	RM-D490	RM-D706	RM-D706	RM-D905
Weight	37 lbs. 6 oz.	27 lbs. 7 oz.	24 lbs. 3 oz.	10 lbs.	18 lbs.	15 lbs. 6 oz.	14 lbs. 2 oz.
Dimension WHD	18⅝" x 5" x 14⅞"	18⅝" x 5" x 14⅞"	17" x 5" x 14⅞"	17" x 4⅜" x 11⅛"	18⅝" x 5" x 15¼"	17" x 5" x 15¼"	17" x 4⅜" x 14⅜"

TA-E1000ESD	
CONVERTER SECTION	
A/D Converter Sampling Freq:	48 kHz
A/D Conversion:	High Density Linear Converter System
D/A Converter Sampling Freq:	32 kHz, 44.1 kHz, 48 kHz
D/A Conversion: (Front Channel): (Rear Channel):	18 Bit Linear, 8fs x 2 16 Bit Linear, 4fs x 1 (Dual)
AUDIO	
Frequency Response (Parametric EQ, Dynamics, Surround all OFF): Other than Phono In (Front 1-2, Rear Center at Wide): (Subwoofer): Phono In (Video 1-3 Audio Out, Tape 1-2 Rec Out)	 10 Hz-20 kHz ±0.1 dB Cutoff 80 Hz-18 dB/Oct 20 Hz-20 kHz ±0.2dB
Input Sensitivity and Input Impedance: Phono: Tuner, CD, Tape 1-2, Video 1-5, VDP, TV Coaxial: S/N (network): Phono: Tuner, CD, Tape 1-2, Video 1-5, VDP, TV Optical 1-2, Coaxial:	 2 mV, 50 k ohms 150 mV, 50 k ohms 0.5 V p-p ±20% 75 ohms Front/rear both 84 dB (A) Front/rear both 91 dB (A) Front 110 dB (A) Rear 95 dB (A)
Residual Noise:	Below 10 uV (A)
Output Voltage and Output Impedance: Front 1-2: Video 1-3 Audio Out, Tape 1-2 Rec Out: Headphones:	 1.5 V 150 mV 1 k ohms 15 mW (at 8 ohms) Accepts low and high impedance headphones
Total Harmonic Distortion: Analog Input: Digital Input:	 Front 1 kHz Below 0.004% Front 1 kHz Below 0.003%
VIDEO	
Input Sensitivity & Impedance (Video 1-5, VDP, TV)	1V p-p 75 ohms
Output Voltage & Impedance (Video 1-3, Monitor 1-2):	1V p-p 75 ohms
S-Video Input Sensitivity & Impedance (Video 1, 2, 5):	Luminance: 1V p-p 75 ohms Chrome: 0.286V p-p 75 ohms
S-Video Output Voltage & Impedance (Video 1, 2, Monitor):	Luminance: 1V p-p 75 ohms Chrome: 0.286V p-p 75 ohms
DSP	
EQ Frequency Range:	3 Band, 18 Hz-20 kHz (91 positions)
Gain ±	Per each Band ± 12 dB, 0.1 dB step
Slope:	4 slope-step variable
Sound Field (Main Parameter): Room Size & Wall: Seat Position (Rear-Front): (Left-Right): Center Level & Rear Level: Sound Field (Sub Parameter): Effect Level:	 0.5-2.0 (0.1 Step) 101-step variable 101-step variable 0 dB ~60 dB ~ ∞ dB (1 dB Step) 0% ~ 100% (1% Step)
Early Reflection Time:	1 mS~ 255 mS (1mS Step)
Early Reflection Level:	0% ~ 100% (1% Step)
Reverb Time:	0.3 Sec ~ 5.0 Sec (0.1S Step)
Spread:	0.5 ~ 2.0 (0.1 Step)
Reverb Density:	Low ~ Mid ~ High
Dynamics:	CMP9 ~ Linear ~ EXP9
Both Dolby Delay & Each Dolby Delay:	15.0 mS ~ 30.0 mS (0.1 ms Step)
Each Rear Level:	0 dB ~ 60 dB ~ ∞ dB (1 dB Step)
GENERAL	
Power Requirements:	AC 120V, 60Hz (USA, CND)
Power Consumption:	35 watts
AC Outlets (USA, CND):	Switched x 3, (total 700 watts). Unswitched x 1 (300 watts)
Weight:	17 lbs. 11 oz.
Dimensions (w/side wood panels) WHD:	18½" x 6" x 14¼"

TA-N77ES	
Continuous RMS Power:	207W + 270W 4 ohms 20Hz-20kHz, THD 0.006% 200W + 200W 8 ohms 20Hz-20kHz THD 0.004%
Output Both Channels Driven:	
Mono Operation:	580W 8 ohms 20Hz-20kHz THD 0.007%
Dynamic Power:	800W 2 ohms 520W 4 ohms 300W 8 ohms
Power Bandwidth:	10HZ-100kHz 4 ohms 0.02% 10HZ-100kHz 8 ohms 0.02%
THD:	0.004% 4 ohms at 10W 0.0018% 8 ohms at 10W
Dynamic Headroom (IHF):	2.8dB 4 ohms 1.8dB 8 ohms
IM Distortion:	0.006% 4 ohms at rated output 0.004% 8 ohms at rated output
Damping Factor:	100 8 ohms 1kHz
Slew Rate: Residual Noise:	150V/micro sec. 300V/micro sec. (inside) less then 35 micro V network A
Power Consumption:	330W-USA
Weight:	54 lbs. 11 oz.
Dimensions (WHD):	18½" x 7⅜" x 14½"

TA-N55ES	
Continuous RMS Power:	110 watts + 110 watts, 8 ohms
(Both Channels Driven 20-20,000 Hz 0.004% THD)	135 watts + 135 watts, 6 ohms 150 watts + 150 watts, 4 ohms
Output both channels driven:	150 watts + 150 watts, 4 ohms
Mono Operation:	300 watts, 8 ohms
Dynamic Power:	*Stereo* *Mono* 150 watts 500 watts 8 ohms 290 watts 680 watts 4 ohms 400 watts 750 watts 2 ohms 450 watts 2 ohms
Power Bandwidth:	5-50 kHZ
THD:	0.004% 8 ohms at 10 watts 1.8 dB 8 ohms
Dynamic Headroom (IHF):	2.8 dB 4 ohms
IM Distortion:	0.004%
Damping Factor:	100 8 ohms
Slew Rate:	120 V/micro sec. 250 V/micro sec. (inside)
Residual Noise:	90 mV
Power Consumption:	280 watts
Weight:	26 lbs. 14 oz.
Dimensions (WHD):	18¾" x 6" x 14½"

TA-N110

Continuous RMS Power:	8 ohm: 45 + 45 watts 0.08%
(FTC):	6 ohm: 50 + 50 watts 0.08%
(Mono):	8 ohm: 100 watts 0.08%
Dynamic Power:	8 ohm: 124 watts 6 ohm: 150 watts 4 ohm: 168 watts
Power Bandwidth:	8 ohm: 10Hz-40kHz 0.12% 8 ohm: 12Hz-40kHz 0.12%
Dynamic Headroom:	8/6 ohm: 1.3dB
IM Distortion:	0.08%
Residual Noise:	Less than 50uV (A-Network)
Frequency Response:	5Hz-200kHz ± 0.3dB
Input Sensitivity:	180mV 50k ohm
S/N Ratio:	105dB (A-Network)
Weight:	11 lbs. 11 oz.
Dimensions (WHD):	17" x 4¾" x 10½"

ST-S730ES

S/N Ratio (Stereo/Mono):	92dB/100dB
THD (Stereo/Mono):	0.0075%/0.004%
Sensitivity (Mono):	10.3dBf/0.9uV
50 db Quieting (Mono):	16.8dBf/1.8uV
(Stereo):	37.9dBf/22.5uV
Selectivity (400kHz Wide):	70dB
(300kHz Narrow):	65dB
Separation (1kHz Wide):	70dB
Frequency Response:	15Hz-15kHz ± 0.2dB
Capture Ratio (Wide):	1.0dB
IF Rejection:	120dB
Spurious Rejection:	120dB
Power Consumption:	17 watts
Weight:	14 lbs.
Dimension (WHD):	18½" x 3⅜" x 14¾"

RECEIVERS	STR-GX90ES	STR-GX80ES	STR-GX60ES	STR-GX50ES	STR-GX40ES
AMPLIFIER					
Power (8 ohms, 20-20kHz):	120 watts	110 watts	100 watts	80 watts	50 watts
Spontaneous Twin Drive:	Yes	Yes	Yes	Yes	Yes
Amplifier Design:	Pure Complimentary	Pure Complimentary	Pure Complimetary	Pure Complimentary	Pure Complimentary
Discrete Outputs:	Yes	Yes	Yes	Yes	Yes
Optical Legato Linear A:	Yes	Yes	Yes	Yes	Yes
Power Transformer:	Dual (Audio, Control)	Dual (Audio, Control)	Dual (Audio, Control)	Dual (Audio, Control)	Dual (Audio, Control)
Pre Amp Design:	Low Distortion	Low Distortion	Low Distortion	Low Distortion	Low Distortion
G Chassis:	Yes	Yes	—	—	—
Input Function:	8	8	7	7	5
Speaker Outputs:	A + B (para)	A + B (para)	A + B (para)	A + B (para)	A + B (para)
Low Impedance Capable:	Yes, 2 ohms	Yes, 2 ohms	Yes, 2 ohms	Yes, 2 ohms	Yes, 2 ohms
Source Direct Switch:	Yes	Yes	Yes	Yes	Yes
Adaptor In/Out:	Yes	Yes	Yes	—	—
Tape Monitor:	—	—	—	Yes	Yes
Audio Muting:	Yes	Yes	Yes	Yes	Yes
Subsonic Filter:	Yes	Yes	—	—	—
Record Out Selector:	Yes	Yes	Yes	—	—
TUNER					
Presets:	30	30	30	30	30
Auto Tuning:	Yes	Yes	Yes	Yes	Yes
GENERAL					
Remote Control:	A/V, RM-P303	A/V, RM-P303	A/V, RM-P303	A/V, RM-U203	A/V, RM-S103
S Video Capable:	Yes, 3	Yes, 2	—	—	—
Pre Amp Out:	Yes	Yes	—	—	—
Motorized Volume:	Yes	Yes	Yes	Yes	Yes
Video Inputs:	2	2	2	2	—
Aluminum Face Plate:	Yes	Yes	Yes	Yes	Yes
Copper Plated Chassis:	Yes	—	—	—	—
Wood Side Panels	Yes	—	—	—	—
SPECIFICATIONS AMPLIFIER					
Power (8 ohms, 20-20kHz):	120 watts 0.006%	110 watts 0.006%	100 watts 0.08%	80 watts 0.08%	50 watts 0.08%
(4 ohms, 20-20kHz):	120 watts 0.015%	110 watts 0.015%	100 watts 0.08%	80 watts 0.08%	80 watts 0.08%
THD:	0.008%	0.008%	0.08%	0.08%	0.08%
Dynamic Power (2/4/8 ohm):	350/220/160	310/200/145	240/200/130	185/160/105	105/100/75
Video Output Rec Out:	150mV/50k ohm	150mV/50k ohm	150mV/10k ohm	150mV/10k ohm	
Input Sens/Imp Phono:	2.5mV/50k ohm	2.5mV/50k ohm	2.5mV/50k ohm	2.5mV/50k ohm	2.5mV/50k ohm
CD/DAT/Tape/Video:	150mV/50k ohm	150mV/50k ohm	150mV/50k ohm	150mV/50k ohm	150mV/50k ohm
Head Room:	1.25dB	1.25dB	1.0dB	1.0dB	1.0dB
Damping:	60	60	60	60	60
Power Bandwidth:	5Hz-60kHz	5Hz-60kHz	5Hz-60kHz	10Hz-30kHz	10Hz-30kHz
Frequency Response CD:	2Hz-20kHz ($^{+0}_{-0.3}$)	2Hz-20kHz ($^{+0}_{-0.3}$)	5 Hz-50kHz ($^{+0}_{-1dB}$)	5Hz-50kHz ($^{+0}_{-1dB}$)	5Hz-50kHz ($^{+0}_{-1dB}$)
Phono (RIAA):	±0.3dB	±0.3dB	±0.5dB	±0.5dB	±0.5dB
S/N Ratio CD:	98dB	98dB	86dB	86dB	86dB
Phono:	90dB	90dB	85dB	85dB	85dB
TUNER					
FM Tuning Range:	87.5-108.0	87.5-108.0	87.5-108.0	87.5-108.0	87.5-108.0
FM Sensitivity (IHF):	11.2dBf	11.2dBf	11.2dBf	11.2dBf	11.2dBf
50dB Quieting (Mono):	16.8dBf	16.8dBf	18.3dBf	18.3dBf	18.3dBf
(Stereo):	37.9dBf	37.9dBf	38.3dBf	38.3dBf	38.3dBf
Selectivity (400kHz):	85dB	85dB	65dB	60dB	60dB
Separation (1kHz):	55dB	55dB	50dB	45dB	45dB
Frequency Response:	15Hz-15kHz (±0.5dB)	15Hz-15kHz (±0.5dB)	30Hz-15kHz (±1.5dB)	30Hz-15kHz (±1.5dB)	30Hz-15kHz (±1.5dB)
THD (Mono/Stereo):	0.05/0.07%	0.05/0.07%	0.1/0.2%	0.1/0.2%	0.1/0.2%
S/N Ratio (Mono/Stereo):	83/78dB	83/78dB	82/76dB	82/76dB	82/76dB
Capture Ratio:	1.2dB	1.2dB	1.2dB	1.2dB	1.2dB
IF Rejection:	120dB	120dB	90dB	90dB	90dB
Spurious Rejection:	100dB	100dB	100dB	100dB	100dB
Image Rejection:	80dB	80dB	80dB	80dB	80dB
AM Tuning Range:	570-1760	570-1760	570-1760	570-1760	570-1760
AM Sensitivity (1kHz):	50dB	50dB	50dB	50dB	50dB
S/N (1kHz):	54dB	54dB	54dB	54dB	54dB
THD (1kHz):	0.3%	0.3%	0.3%	0.5%	0.5%
Selectivity (10kHz):	30dB	30dB	30dB	30dB	30dB
MISCELLANEOUS					
Power Consumption:	295 watts	275 watts	210 watts	170 watts	140 watts
Weight:	32 lbs. 2 oz.	30 lbs.	22 lbs. 3 oz.	19 lbs. 7 oz.	18 lbs. 7 oz.
Dimension (WHD):	18⅝" x 6⅜" x 17¼"	17" x 6⅜" x 17¼"	17" x 5⅜" x 14¾"	17" x 5⅜" x 14¾"	17" x 5⅜" x 14¾"

	SINGLE DECK				DUAL DECK	
CASSETTE DECKS	TC-K950ES	TC-K850ES	TC-K650ES	TC-RX70ES	TC-WR90ES	TC-WR80ES
TECHNOLOGY						
Playback Response:	15-22 kHz	15-21 kHz	20-21 kHz	20-20 kHz	20-20 kHz	20-20 kHz
Type:	3 Head	3 Head	3 Head	Quick Reverse	Dual, A/R	Dual, A/R
Super Bias:	210 kHz	160 kHz	160 kHz	160 kHz	160 kHz	160 kHz
Noise Reduction:	B. C	B. C	B. C	B. C	B. C	B. C
Dolby HX Pro:	Yes (on/off)	Yes (on/off)	Yes	Yes	Yes	Yes
Laser Amorphous Heads:	Yes	Yes	Yes	Yes	Yes	Yes
Motors:	3	3	3	3	3 + 3	2 + 2
Drive Capstans:	Dual, Direct Drive	Dual, Direct Drive	Single	Single	Single	Single
FEATURES						
High Speed Dubbing:	—	—	—	—	Yes	Yes
Auto Reverse:	—	—	—	Yes (quick)	Yes (quick), Dual	Yes, Dual
Relay Play:	—	—	—	—	Yes	Yes
Dual Record:	—	—	—	—	Yes	—
Bias Adjustment:	Calibration	Calibration	Fine	—	Fine	Fine
Full Logic Controls:	Yes	Yes	Yes	Yes	Yes	Yes
Multiplex Filter:	Switched	Switched	Switched	Switched	Automatic	Automatic
Tape Counter:	Linear	Linear	Linear	Linear	Linear	Linear
Fluorescent Display:	Yes	Yes	Yes	Yes	Yes	Yes
AMS:	Yes	Yes	Yes	Yes	Yes	Yes
Rec Level Calibration:	Yes	Yes	—	—	—	—
Cassette Stabilizer:	Yes	Yes	Yes	Yes	Yes	—
Power Loading:	Yes	Yes	Yes	Yes	Yes	No
Display Mode Switch:	Yes	Yes	Yes	Yes	—	—
Side Wood:	Yes	—	—	—	Yes	—
Auto Focus Recording:	—	—	—	Yes	Yes	—
Aluminum Panel:	Yes	Yes	Yes	Yes	Yes	Yes
Remote Capable:	Yes	Yes	Yes	Yes	Yes	Yes
SPECIFICATIONS						
Freq. Res. (−20dB ± 3dB Typ 4):	15Hz-22kHz	15Hz-21kHz	20Hz-21kHz	20Hz-20kHz	20Hz-20kHz	20Hz-20kHz
W & F (WRMS) %:	0.024%	0.024%	0.05%	0.06%	0.06%	0.07%
S/N Dolby Off Type 4:	61	61	60	59	59	59
Dolby C On Type 4:	76	76	75	74	74	74
Input Sensitivity dB/mV:	−20dB/77.5mV	−20dB/77.5mV	−20dB/77.5mV	−20dB/77.5mV	−20dB/77.5mV	−20dB/77.5mV
Output Level dB/mV:	−5dB/435mV	−5dB/435mV	−5dB/435mV	−5dB/435mV	−5dB/435mV	−5dB/435mV
Headphone Level (8 ohms) db:	−20/w vol	−20/w vol	−20/w vol	−28	−20/w vol	−28
Weight:	25 lbs. 13 oz.	15 lbs. 4 oz.	10 lbs. 3 oz	10 lbs. 3 oz	15 lbs. 14 oz	10 lbs. 13 oz.
Dimensions (WHD):	18⅝" x 5⅞" x 15"	17" x 5⅜" x 13⅞"	17" x 4⅞" x 11¼"	17" x 5" x 11¼"	18⅝" x 5⅞" x 13⅜"	17" x 5⅜" x 11¼"

Features and specification subject to change without notice. Non-metric weights and measures approximate.

Sony Corporation developed the pulse D/A converter and designed the LSI circuitry with the cooperation of NTT (Nippon Telegraph and Telephone Corporation). Multi-stage noise shaping, with a 2-stage 3rd order noise shaper and EFB pass techniques was originated by NTT.

SONY

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