

SONY

Turntables



Sony achievements in every aspect of audio and video reproduction are legendary. The company's success in these fields is no accident, nor is it recent. It arises from three sources. First, the vast Sony research and engineering facilities, among the most sophisticated in the world. Second, the application of 'total-system technology' in the design of every product. And third, a commitment to translating this approach into advanced instruments for the home—at a cost within the reach of the user. Sony's six new direct-drive turntables are outstanding expressions of Sony leadership.

Even the least expensive models, the semi-automatic PS-T22 and the fully-automatic PS-T33, boast the direct-drive system. At their heart is Sony's remarkable brushless-slotless (BSL) motor. The BSL design eliminates the motor cogging inherent in most direct-drive systems. The result is smooth, even rotation. This rotation is monitored with exquisite precision by Magnedisc servo control. Magnedisc senses the slightest variations in turntable speed—and corrects these variations before they can affect the sound.

Sony's more expensive models take this system one step further. They compare the Magnedisc readings with a stable reference frequency, generated by a quartz crystal. These are Sony's quartz X-tal Lock turntables: the fully-automatic PS-X45, X55, X65, and X75.

These Sony models incorporate outstanding drive systems—with wow and flutter below an amazing 0.025% on even the modestly-priced PS-T22. But total-system technology demands that the entire record-playing system be designed to the same standards as the drive system. Sony's comprehensive research has uncovered new ways to improve sound quality, cartridge compatibility, and operating convenience. These studies have led to the development of new, low-mass tonearms; smooth, silent tonearm automation; and special, non-resonant cabinets.

Each of these Sony turntables boasts a cabinet made of Sony Bulk Molding Compound (SBMC). This specially-developed, non-resonant material absorbs the air-borne low-frequency sounds that can often generate acoustic feedback and 'howling'.

Sony's new tonearms accept the widest range of cartridges, including the very latest, high-compliance types. Sony's straight tonearms—incorporated on the PS-T22, T33, X45, and X55—feature smooth bearings and exceptionally low mass. With these Sony turntables, you can take full advantage of modern, light-tracking cartridges.

The PS-X65 and X75 offer a major Sony innovation: Velocity Feedback, a microprocessor-controlled tonearm guidance system. In the X65, Velocity Feedback controls all horizontal motion of the tonearm: not only indexing and automatic cycling, but also anti-skating force and tracking itself. The X75 uses Velocity Feedback for vertical as well as horizontal motion. Not only can these tonearms be safely matched to almost any cartridge, but they also provide superior stereo separation, reduced resonance, less record and stylus wear, lower background noise, and reduced intermodulation distortion.

Sony's attention to detail extends to convenience of operation. Controls are conveniently placed at the front. They are accessible even with the dust cover closed. There are feather-touch function switches, integrated-circuit-logic function sequencing, automatic record size sensing, and more.

For all their sophistication, these turntables are quite easy to use and surprisingly affordable. Sony, with its vast and sophisticated design and manufacturing facilities, is committed to providing outstanding performance at modest cost.

The following pages provide an in-depth look at how these turntables perform, and how they satisfy the needs of music lovers the world over.



# Sony PS-T22 and PS-T33



## Direct-Drive Turntables with Low-Mass Tonearms

The semi-automatic PS-T22 and fully-automatic PS-T33 offer the superb performance of Sony direct drive, together with low-mass tonearms, and non-resonant bases. With specifications close to Sony's best turntables, the T22 and T33 must be considered extraordinary values.

### Straight Tonearm

The tonearm of the PS-T22 and T33 is designed along the shortest path between two points—a straight line—for minimum mass.

The arm is composed of Duralumin alloy for high rigidity. This permits an unusually slender tonearm shaft, for minimum mass. Low mass permits the use of the widest variety of cartridges, including modern, high-compliance models.

At the back of the arm, Sony's Long-Span Pivot reduces side-play and bearing friction. Unlike conventional arms, the shaft is supported at two points, in front of and behind the pivot, for reduced tonearm resonance. The Sony tonearm's exceptional combination of low mass, low bearing friction, and low resonance enables the T22 and T33 to follow the undulations of recorded music with the utmost clarity.

The tonearm is completed by a light-weight, die-cast aluminum headshell with low-mass connector. The headshell can be removed from the arm by means of a special locking collar, making cartridge installation quick and easy.

### Operating Convenience

The semi-automatic PS-T22 returns the tonearm to its rest and switches the motor off at the end of play. The tonearm also returns when you press the Reject control. The Reject, Speed and Variable Pitch controls are all accessible, even with the dust cover closed.

The fully-automatic PS-T33 features automatic start and repeat, as well as automatic reject and shut-off.

On either turntable, if the arm is interrupted during its automatic cycle, a safety-clutch system returns the mechanism to neutral—eliminating a common source of accidental damage to the stylus, the tonearm and the cycling mechanism.

### The Sony BSL Motor

The PS-T22 and T33 are direct-drive turntables. Thus, idler wheels and drive belts, which can introduce irregular motion or vibration have been eliminated. But a direct-drive turntable must do more. It must have a motor that rotates without fluctuation. The T22 and T33 incorporate Sony's BSL motor to deliver the full performance of direct drive.

As a typical direct-drive motor turns, the torque increases and decreases as a result of slots between the electromagnets. This wavering of force is called 'cogging'. Sony has eliminated cogging with the remarkable brushless-slotless (BSL) motor. There are no slots, so the torque delivered to the platter is uniform and smooth.

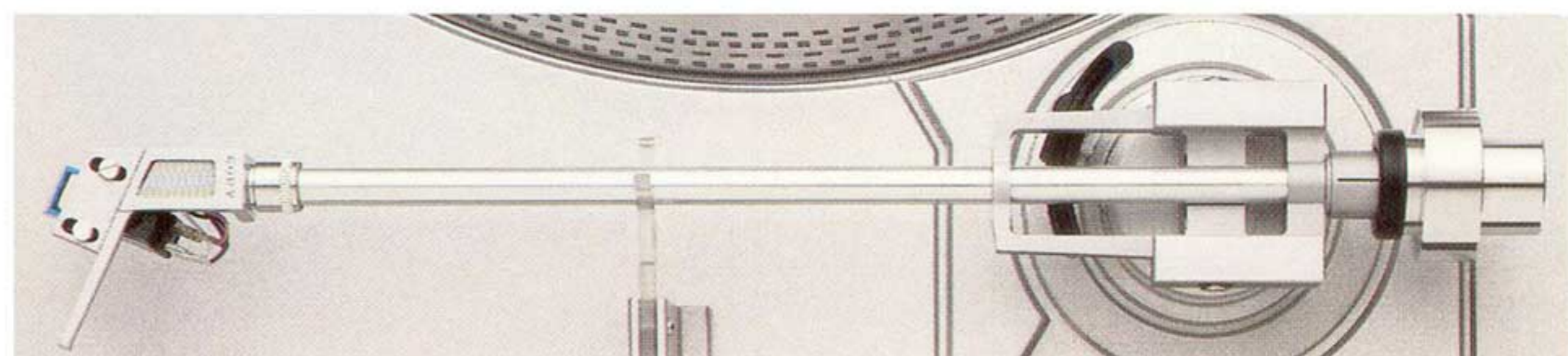
### Magnedisc Servo Control

Most good turntables incorporate servo systems, which monitor the motor speed and adjust the voltage to correct for deviations. Most servo systems use a frequency generator, mounted within the motor, to monitor speed. Sony has increased the accuracy of measurement with its Magnedisc system, which monitors speed not at the motor, but at the outer rim of the platter.

Based on technology for computer-controlled machinery, this system reads magnetic signals on the platter with a multi-gap pickup head. The signals are relayed to the servo electronics, which corrects the motor drive voltage. This prevents even minute speed variations. The result is evident in the performance figures: wow and flutter below 0.025% (WRMS), rumble at -75dB (DIN B).

### SBMC Cabinet

Acoustic feedback is the distressing 'howling' caused when the turntable itself vibrates in response to loud sounds. These turntables sharply reduce feedback with a cabinet formed of Sony Bulk Molding Compound (SBMC). Made of calcium carbonate, fiberglass, and a polyester binder, SBMC is rigid and acoustically inert to absorb sound. Thus, the PS-T22 and PS-T33 provide impeccably precise, quiet, distortion-free performance even when the reproduced music becomes loud.



# Sony PS-X45

## The Unsurpassed Accuracy of Quartz-Locked Direct Drive

The fully-automatic PS-X45 incorporates the outstanding features of the PS-T33, including Sony's straight tonearm, BSL motor, Magnedisc servo control, and SBMC cabinet. To these, the X45 adds quartz X-tal Lock, for the ultimate in direct-drive precision. The result is uncompromising reproduction of musical sound at an affordable price.

### Straight Tonearm

The PS-X45 incorporates the same ultra-low-mass straight tonearm as used in the PS-T33. This tonearm's low mass, low bearing friction, and low resonance enable the X45 to reproduce music with exceptional freedom from distortion.

The tonearm system includes a low-mass headshell, direct-read anti-skating control, and a direct-read counterbalance for quick, precise cartridge set-up. An overhang adjustment gauge, on the underside of the platter mat, facilitates dead-accurate cartridge alignment for the lowest possible tracking error.

### Operating Convenience

The PS-X45 is fully automatic. At the touch of a button, the tonearm starts play. The arm returns at the end of play, and when you press the Reject control. The X45 also features automatic repeat. The Start/Stop, Speed, Repeat, and Power controls are all accessible, even with the dust cover closed. The Speed and Repeat controls respond to the lightest touch, without jarring the tonearm when a record is playing. LEDs indicate which control is in operation.

And a tonearm safety-clutch returns the cycling mechanism to neutral, should the arm be interrupted during its automatic cycle.

### BSL Motor

As you would expect, the X45 uses Sony's BSL Motor, which elimi-



nates the cogging of conventional motors. The torque delivered to the platter is uniform and smooth.

The BSL motor's high torque is evident: the platter is brought to full speed within  $\frac{1}{2}$  revolution at  $33\frac{1}{3}$  rpm—response matched only by professional equipment. And electromagnetic braking, using the reverse torque of the BSL motor, stops the platter quickly.

As with the T33, Sony's Magnedisc system monitors the speed of the X45 at the platter's outer rim. Magnedisc reads magnetic signals with a multi-gap pickup head. The readings are relayed to the servo electronics so rapidly and precisely that any speed variation is corrected before it can affect the musical signal.

### Quartz X-tal Lock

To further ensure accurate speed, the Sony PS-X45 compares the Mag-

nedisc readings with a totally stable reference: a quartz crystal oscillating at a precise frequency. Quartz X-tal Lock prevents even minute speed variations caused by changes in temperature, voltage fluctuations, or even the load placed on the platter by the stylus, or a record-cleaning device.

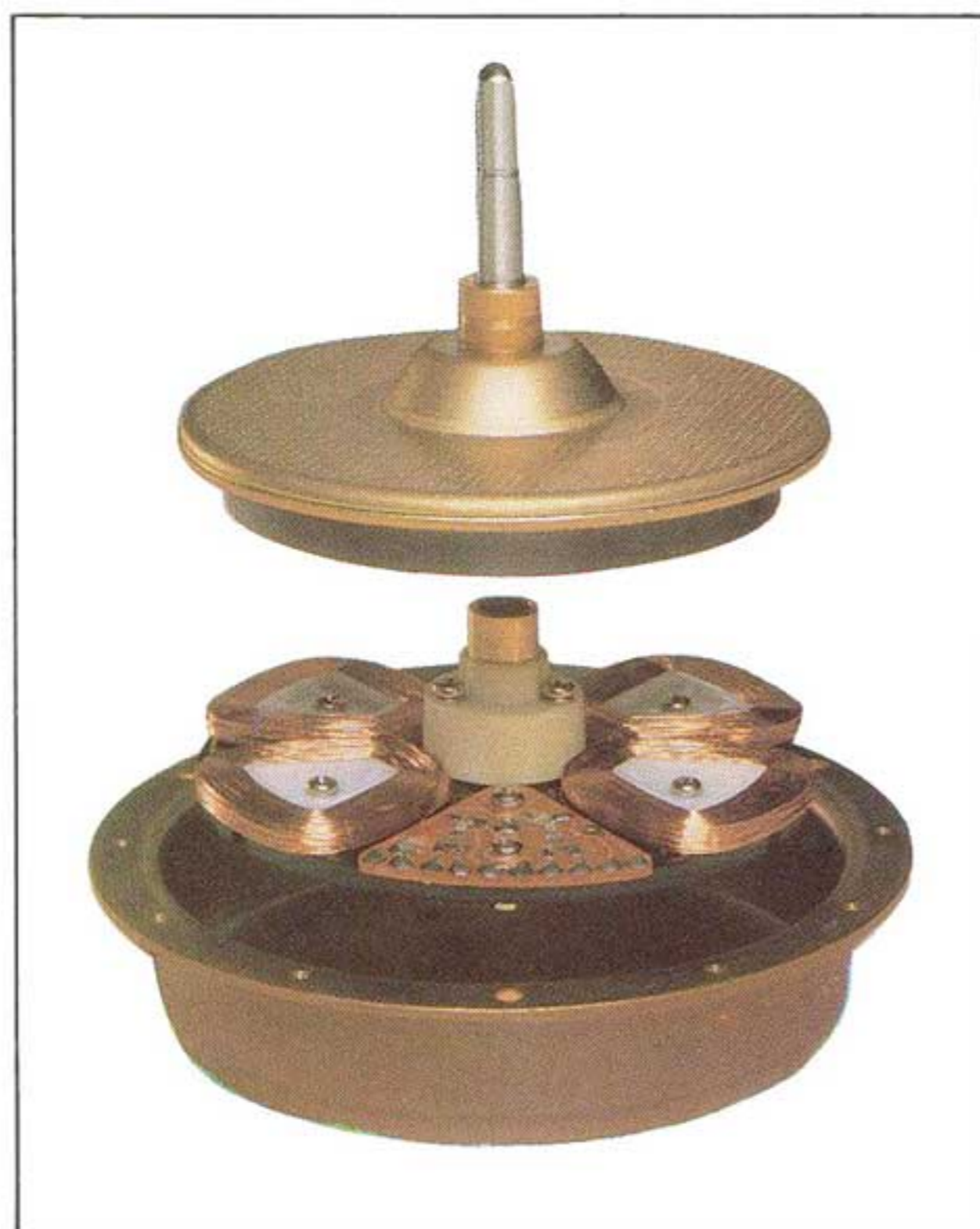
As final assurance of smooth and steady rotation, the platter of the PS-X45 is made from a single die-casting of heavy, extra-thick aluminum, a full 310mm (12 $\frac{1}{4}$ " in diameter. Platter and mat together add up to a combined weight of 1.5kg (3 lb. 5 oz), contributing significantly to rotational stability.

The combination of BSL motor, Magnedisc servo control reading at the platter's outer rim, and quartz reference in a locked-loop circuit achieves superb performance: wow and flutter below 0.025% (WRMS), rumble at  $-78$ dB (DIN B).

### Fluid-Filled Insulators

The X45 sharply reduces feedback with its Sony Bulk Molding Compound (SBMC) cabinet. SBMC is acoustically inert, to absorb the high-level, low-frequency sounds that normally generate acoustic feedback.

Because loudspeakers produce mechanical vibrations which can be transmitted to the turntable through its feet, the PS-X45 is mounted on specially-designed, fluid-filled feet. These insulators absorb acoustic energy so effectively that the PS-X45 continues to perform superbly, even when the reproduced music is played at the loudest levels.



# Sony PS-X65

## Superior Performance with the Tonearm Horizontal Guidance System

The PS-X65 is a convincing demonstration of Sony's unique capabilities in audio component design. This fully-automatic, direct-drive turntable has all of the responsiveness of the PS-X55, and all of the high-performance features: Sony's famous BSL motor, quartz X-tal Lock with Magnedisc servo control, SBMC cabinet, and fluid-filled feet. What is distinctive about this turntable is its tonearm. Through microprocessor control, the tonearm of the X65 offers greater operating versatility, compatibility with a wider range of cartridges, and higher performance than conventional arms. With this remarkable tonearm, the Sony PS-X65 qualifies as a component for the discriminating music lover.

### Microprocessor-Controlled Tonearm

All lateral motion of the X65 tonearm—including indexing, automatic cycling, tracking, and anti-skating force—is generated by a linear motor. This motor operates without physical contact, for precise, vibration-free performance. Lateral tonearm motion is detected by a velocity sensor, which reports to a microprocessor. In turn, the microprocessor sends instructions back to the linear motor. And a second linear motor governs tonearm cueing.

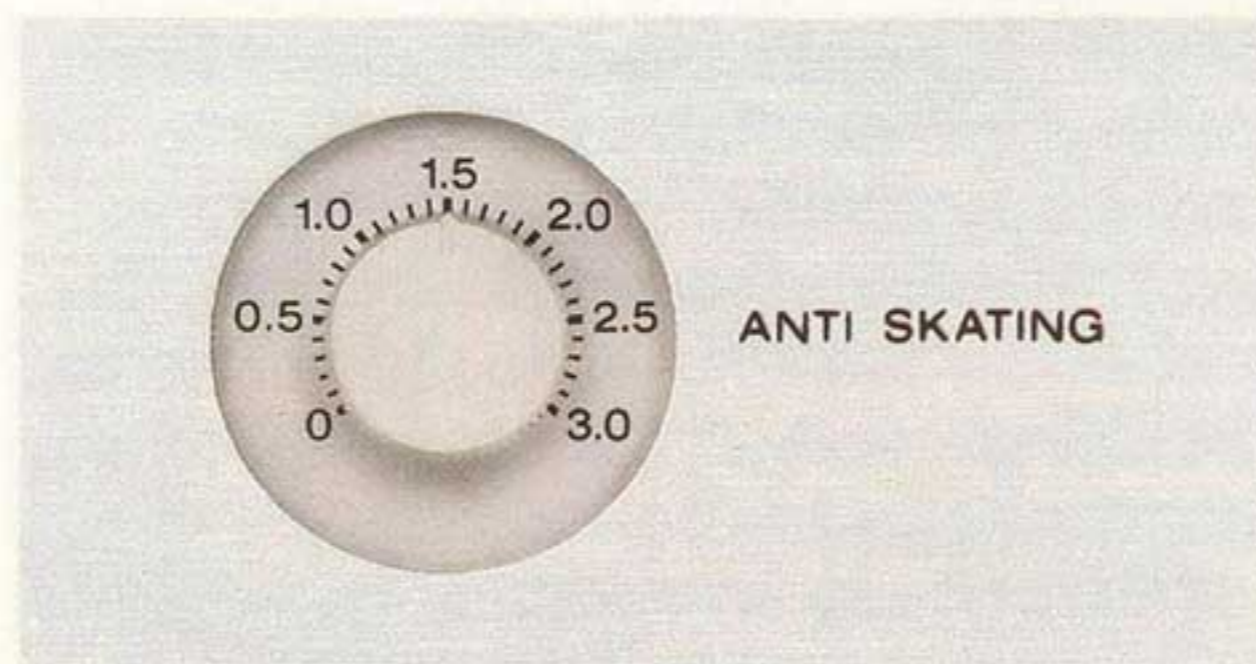
This microprocessor tonearm guidance system provides three benefits. First, it helps damp tonearm vibrations and low-frequency resonances, allowing the tonearm to be used with an unprecedented variety of phono cartridges. Second, the microprocessor allows for extraordinary operating flexibility and convenience. And third, the microprocessor provides the most accurate anti-skating compensation available, for a more precise stereo image.

### Electronic Anti-Skating Compensation

Skating force (the pivoted tonearm's tendency to be pulled toward the center of a rotating record) can disturb the



stereo image, distort the music, and increase record and stylus wear. This force can vary due to tracking pressure, the position of the tonearm on the record, the stylus type, and the record material itself. Even when mechanical anti-skating devices take some of these variables into account, enough imprecision remains for critical audiophiles to cross-check the settings with test records. On the PS-X65, anti-skating force is selected via a front-panel control. Because the velocity sensor detects skating force directly, the microprocessor maintains perfect anti-skating compensation. As a result, stereo imaging on the PS-X65 is a more precise replica of the original recording.

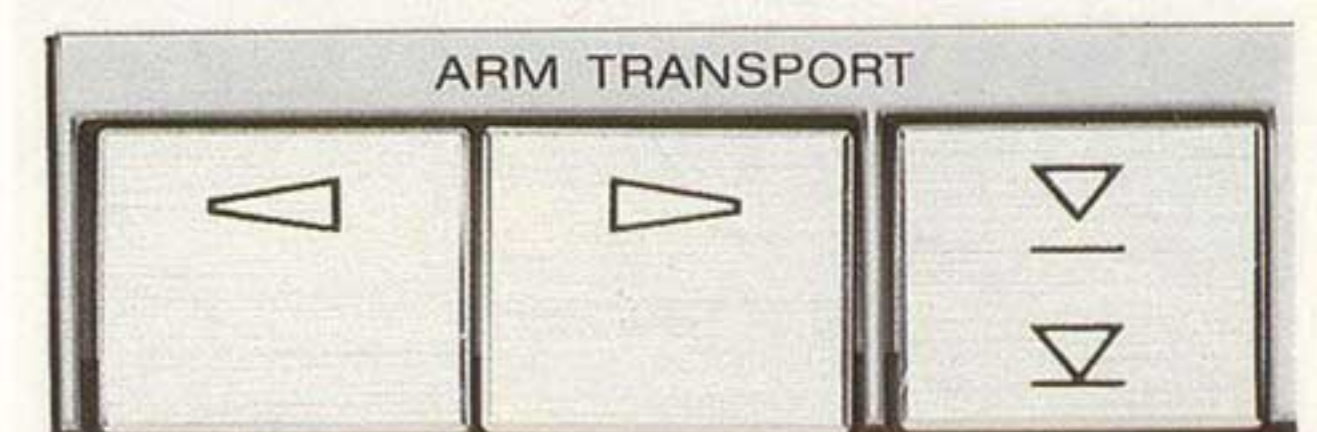


### Operating Convenience

The PS-X65 offers all of the conveniences of the X55, including the stylus muting circuit, Luminous Sensor, automatic record-size selection, and logic function sequencing with the ability to change commands in mid-cycle. But the X65 offers yet another refinement. Microprocessor control allows you to index the tonearm to the left or right, without lifting the dust cover.

Two buttons, marked with a left-pointing arrow and a right-pointing arrow, are positioned at the front of the turntable.

They operate at two speeds. When you first touch the left or right button, the



arm moves slowly. If you leave your finger on the button, the arm will move quickly. Thus, by holding the button down, you can move quickly to the desired musical selection. And, by touching the button repeatedly, you can move the tonearm slowly to the precise beginning of that selection.

### Other Tonearm Features

The precision, accuracy, and sonic integrity of the X65 tonearm are enhanced by three additional features. First, the base of the tonearm is made of a rigid cast zinc alloy, to minimize unwanted vibrations that could otherwise be transmitted to the tonearm and stylus.

Second, the height of the arm is adjustable for precise tracking of the record grooves. The height can be altered over a range of 6mm using a precisely calibrated ring with its own locking lever.

Finally, to ensure faithful transmission of the entire audio frequency range, and to maintain clear conduction, with no possibility of corrosion, the electrical contacts between the headshell and the tonearm, as well as the output connectors leading to the amplifier, are plated with gold.

# PS-X75



## A New Standard of Turntable Performance

The Sony PS-X75 represents Sony design and engineering at its finest. As you would expect, the X75 incorporates those features which are the hallmarks of Sony's PS-X series: BSL motor, Magnedisc servo control, quartz X-tal Lock, and SBMC cabinet. Most important, Sony has taken the tonearm guidance system of the X65 to its logical conclusion: vertical as well as horizontal control. The result is the superlative performance of the Biotracer tonearm. With the incorporation of the Biotracer, the X75's precision, response to command, and unadulterated reproduction of musical sound surpass the performance of most professional transcription turntables.

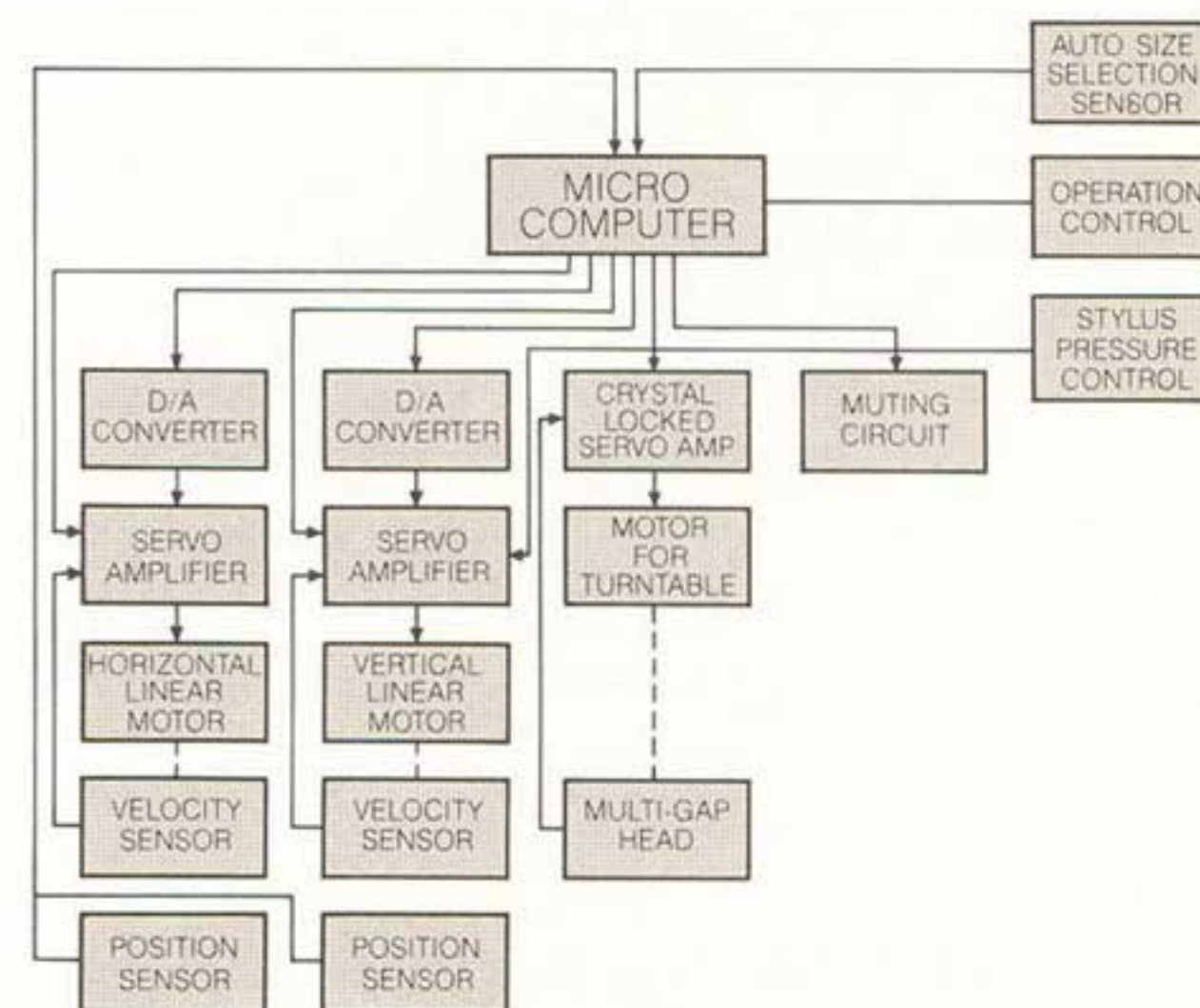
### The Biotracer Tonearm

The tonearm of the PS-X75 is a prime example of Sony total-system technology. It is called the Biotracer because it is almost lifelike (bio) in its control over the way the stylus traces the record groove. The active tracking of the Biotracer Tonearm stands in contrast to the passive systems of conventional tonearms. The Biotracer represents an integrated, unified solution to the problems of skating force, stylus force, and tonearm/cartridge resonance.

The Biotracer tonearm has no lateral balance and no anti-skating control. Under the motor board, there are no linkages for automatic set-down, and automatic shut-off. Instead, all of these functions are undertaken by three linear motors. There is one motor for vertical and one motor for horizontal tracking control. The third motor, for cueing, is completely disengaged during play. All three motors operate without physical contact, so tonearm operation is utterly smooth and silent.

Each of the linear motors is complemented by a velocity sensor. The ver-

tical and lateral velocity sensors monitor the movement of the tonearm, and feed this information back to a microprocessor, which controls the motors. This system is called Velocity Feedback (VFB). VFB accounts for the unprecedented sensitivity of the Biotracer Tonearm. And VFB enables the PS-X75 to suppress unwanted tonearm resonances.



This block diagram shows the many functions of the microprocessor—the heart of the PS-X75.

### Electronic Stylus Force

Variations in stylus force can result in mistracking distortion, constriction of

frequency response, and premature record wear. Even when a tonearm's tracking force vernier is accurate, the dynamics of actual use will alter the effective force. Warped records, or even static build-up on the turntable dust cover, can induce mis-tracking. The PS-X75's vertical VFB system senses and immediately corrects for these external influences on stylus force. You select force electronically, by means of a single knob on the front panel. Once the proper stylus force has been set, the X75 maintains perfect tracking—and low distortion—in actual use.

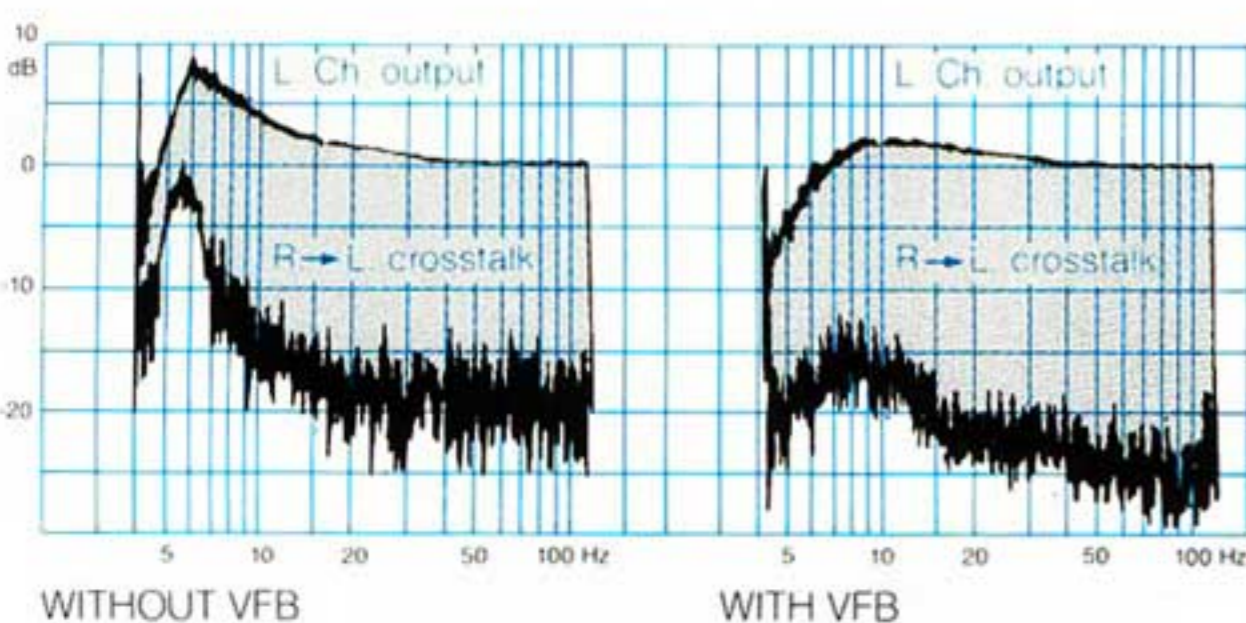
### Electronic Anti-Skating Compensation

As with the PS-X65, anti-skating compensation is controlled by the microprocessor. Because the VFB system senses skating force directly, the X75 applies just the right amount of anti-skating force regardless of tracking pressure, stylus type, or any of the other factors that influence skating force. The audible result is better stereo balance, and better stereo imaging.

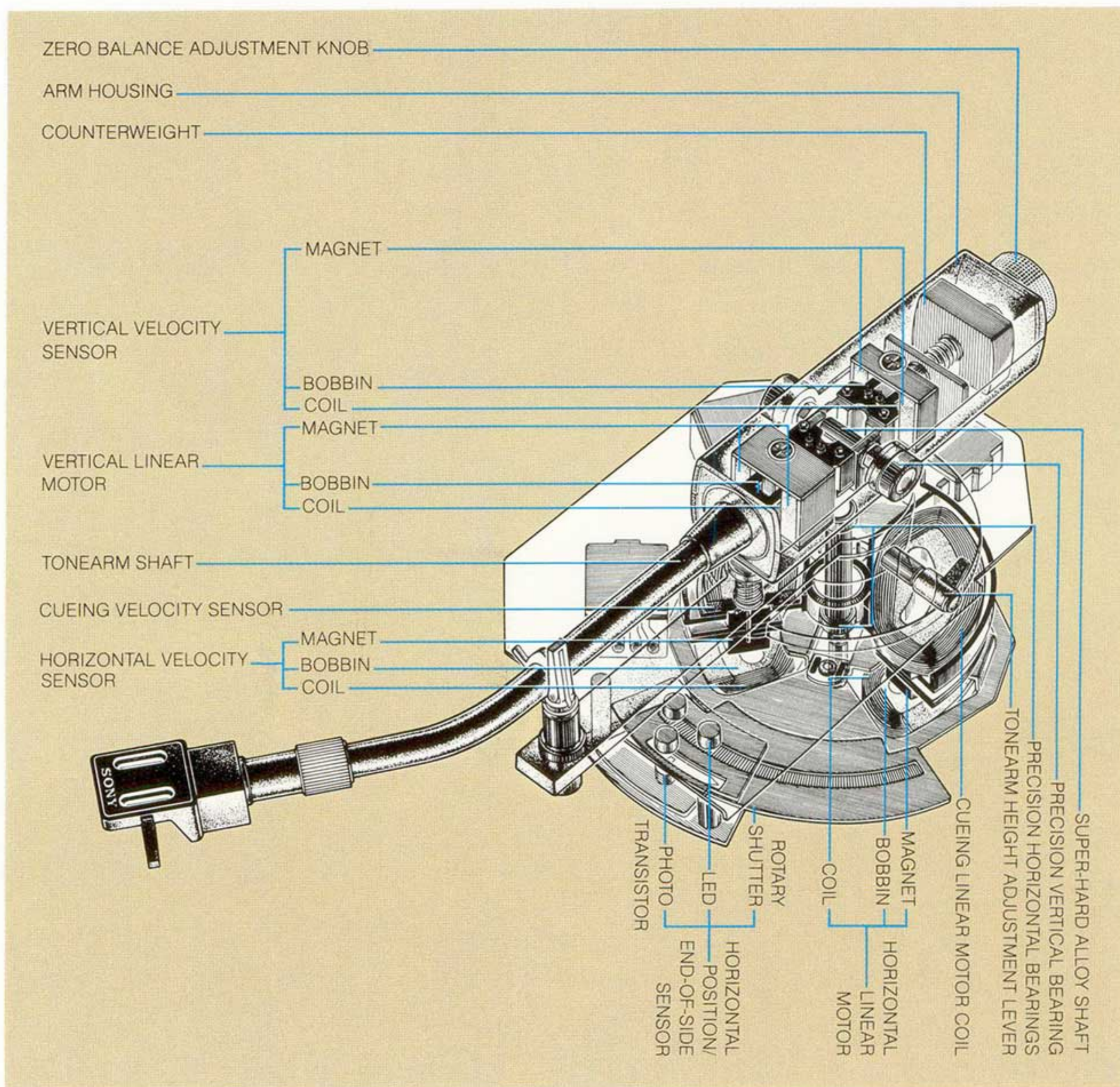
### Electronic Tonearm Damping

Until now, even the finest tonearms have had some limitation in the variety of cartridges with which they were compatible. This limitation arises from the problem of low-frequency resonance. Resonance dictates the range of cartridges a specific tonearm can successfully use. Severe resonance at the wrong frequencies can introduce added record and stylus wear, along with audible distortion. Sony's Biotracer tonearm helps to dampen the unwanted vibrations of tonearm resonance.

In a typical case, with a high-compliance moving-coil cartridge, VFB reduces the resonant peak from 10dB to



Low-frequency resonance and crosstalk characteristics, with and without Velocity Feedback.

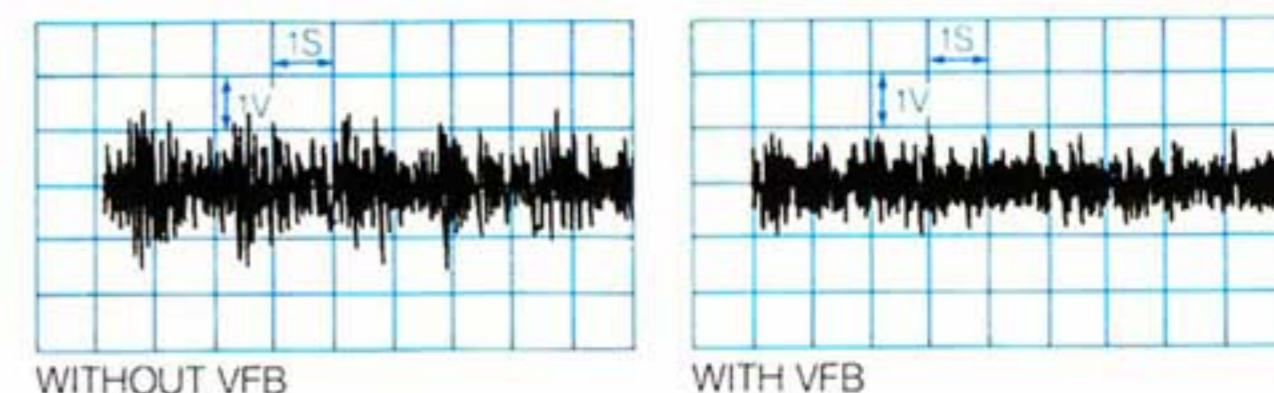


only 3dB. At the same time, VFB increases low-frequency stereo separation dramatically, with improvements that can be charted up to 100Hz. In consequence, your sound system is spared the ill-effects of low-frequency resonance. And bass reproduction in conjunction with the X75's drive and chassis system is remarkably tight and well-defined.

Another result of VFB's superior anti-resonance capabilities is freedom. Because low-frequency resonance no longer poses a problem, you are free to select from among the widest variety of cartridges: from moving-magnet and moving-iron types to high-compliance moving-coil models.

In addition, the VFB system actually reduces low-frequency background noise. Tests on a 'quiet' unmodulated groove demonstrate that VFB damps

the effects of even slight record warp and eccentricity, resulting in improved signal-to-noise ratio.



'Quiet-groove' playback characteristics, with and without Velocity Feedback.

### Operating Convenience

With the PS-X75, the microprocessor-controlled tonearm offers superb convenience. You can index the tonearm to the left or right, without lifting the dust cover or touching the arm itself. And the index feature has both high and low speeds for rapid, exact positioning of the tonearm.





# Features and Specifications

Features	PS-T22	PS-T33	PS-X45	PS-X55	PS-X65	PS-X75
Direct-Drive System	Yes	Yes	Yes	Yes	Yes	Yes
Linear BSL Motor	Yes	Yes	Yes	Yes	Yes	Yes
Magnedisc Servo Control	Yes	Yes	Yes	Yes	Yes	Yes
Quartz X-tal Lock, with Indicator	—	—	Yes	Yes	Yes	Yes
Variable Pitch Control with Strobe	Yes	Yes	—	—	—	—
Electromagnetic Braking	—	—	Yes	Yes	Yes	Yes
Die-Cast Aluminum Platter	Yes	Yes	Yes	Yes	Yes	Yes
Sony Bulk Molding Compound Cabinet	Yes	Yes	Yes	Yes	Yes	Yes
Height-Adjustable Fluid-Filled Feet	—	—	Yes	Yes	Yes	Yes
Electronic Tonearm Velocity Feedback	—	—	—	—	Horizontal	Vertical and Horizontal
Stylus Force Adjustment Type	Direct Read	Direct Read	Direct Read	Direct Read	Direct Read	Velocity Feedback
Anti-Skating Force Adjustment Type	Direct Read	Direct Read	Direct Read	Direct Read	Velocity Feedback	Velocity Feedback
Tonearm Shape	Straight	Straight	Straight	Straight	J-Shaped	J-Shaped
Duralumin Tonearm Shaft	Yes	Yes	Yes	Yes	Yes	Yes
Die-Cast Aluminum Headshell	Yes	Yes	Yes	Yes	Yes	Yes
Long-Span Tonearm Pivot	Yes	Yes	Yes	Yes	Yes	Yes
Cast Zinc Alloy Tonearm Base	—	—	—	—	Yes	Yes
Overhang Gauge on Platter Mat	—	—	Yes	Yes	Yes	Yes
Tonearm Height Adjustment	—	—	—	—	Yes	Yes
Tonearm Lead-In Groove Adjustment	—	Yes	Yes	Yes	Yes	Yes
Auto Shut-Off	Yes	Yes	Yes	Yes	Yes	Yes
Reject Control	Yes	Yes	Yes	Yes	Yes	Yes
Fully Automatic Operation	—	Yes	Yes	Yes	Yes	Yes
Tonearm Safety Clutch	Yes	Yes	Yes	Yes	Yes	Yes
Logic IC Function Sequencing	—	—	—	Yes	Yes	Yes
Discrete Tonearm Servo-Motor	—	—	—	Yes	Velocity Feedback	Velocity Feedback
Luminous Sensor	—	—	—	Yes	Yes	Yes
Audio Muting Circuit with Relay	—	—	—	Yes	Yes	Yes
Record Size Selector	—	Manual	Manual	Automatic with Stylus Protection	Automatic with Stylus Protection	Automatic with Stylus Protection
Gold-Plated Headshell Contacts	Yes	Yes	Yes	Yes	Yes	Yes
Tonearm Litz Wire	—	—	—	—	—	Yes
Removable, Spring-Loaded Dust Cover	Yes	Yes	Yes	Yes	Yes	Yes
<b>Specifications</b>						
Speed Accuracy, Fixed	—	—	± 0.003%	± 0.003%	± 0.003%	± 0.003%
Variable	± 4%	± 4%	—	—	—	—
Wow & Flutter, WRMS	0.025%	0.025%	0.025%	0.025%	0.025%	0.025%
Rumble, DIN B	- 75dB	- 75dB	- 78dB	- 78dB	- 78dB	- 78dB
Platter Diameter	12¼"	12¼"	12¼"	12¼"	12½"	12½"
	310mm	310mm	310mm	310mm	320mm	320mm
Platter Weight, with Mat	2 lbs 0.9kg	2 lbs, 7 oz 1.1kg	3 lbs, 5 oz 1.5kg	3 lbs, 5 oz 1.5kg	4 lbs, 7 oz 2.0kg	4 lbs, 10 oz 2.1kg
Speeds	33⅓, 45 rpm	33⅓, 45 rpm	33⅓, 45 rpm	33⅓, 45 rpm	33⅓, 45 rpm	33⅓, 45 rpm
Start-Up Time, at 33⅓ rpm	½ rot.	½ rot.	½ rot.	½ rot.	½ rot.	½ rot.
Tonearm Balance Type	Static	Static	Static	Static	Static	Static
Pivot-to-Stylus Length	8½"	8½"	8½"	8½"	9¼"	9¼"
	216.5mm	216.5mm	216.5mm	216.5mm	235mm	235mm
Overhang	⅝"	⅝"	⅝"	⅝"	½"	½"
	16.5mm	16.5mm	16.5mm	16.5mm	13mm	13mm
Stylus Force Range	0-3g	0-3g	0-3g	0-3g	0-3g	0-3g
Anti-Skating Compensation Range	0-3g	0-3g	0-3g	0-3g	0-3g	0-3g
Output Cable Capacitance	108pF	108pF	70pF	60pF	70pF	67pF
Power Requirements (UL)	AC-120V 60Hz 6W max.	AC-120V 60Hz 6W max.	AC-120V 60Hz 12W max.	AC-120V 60Hz 12W max.	AC-120V 60Hz 18W max.	AC-120V 60Hz 18W max.
Dimensions (H x W x D)	5⅞x17x14⅜"	5⅞x17x14⅜"	5⅞x17x14⅜"	5⅞x17x14⅜"	6½x18⅞x16½"	6½x18⅞x16½"
	130x430x362mm	140x430x362mm	130x430x362mm	130x430x362mm	165x480x420mm	165x480x420mm
Weight	13 lbs, 7 oz 6.1kg	14 lbs, 5 oz 6.5kg	15 lbs, 7 oz 7.0kg	17 lbs, 10 oz 8.0kg	28 lbs, 10 oz 13kg	28 lbs, 10 oz 13kg

Features and specifications subject to change without notice.  
Cartridges not included.

**SONY**  
High Fidelity Components

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