

# YAMAHA PF-1000/PF-800

*Natural Sound Belt Drive Turntables*

*Double Float Suspension System*

*Dynamic Balance Twin-Pipe Tonearm*

*Two-Piece Platter*

*Automatic Arm Lifter*

*Disc Clamper with Strobe Disc*

*±6% Pitch Control*

*Oil-Damped Cueing Mechanism*



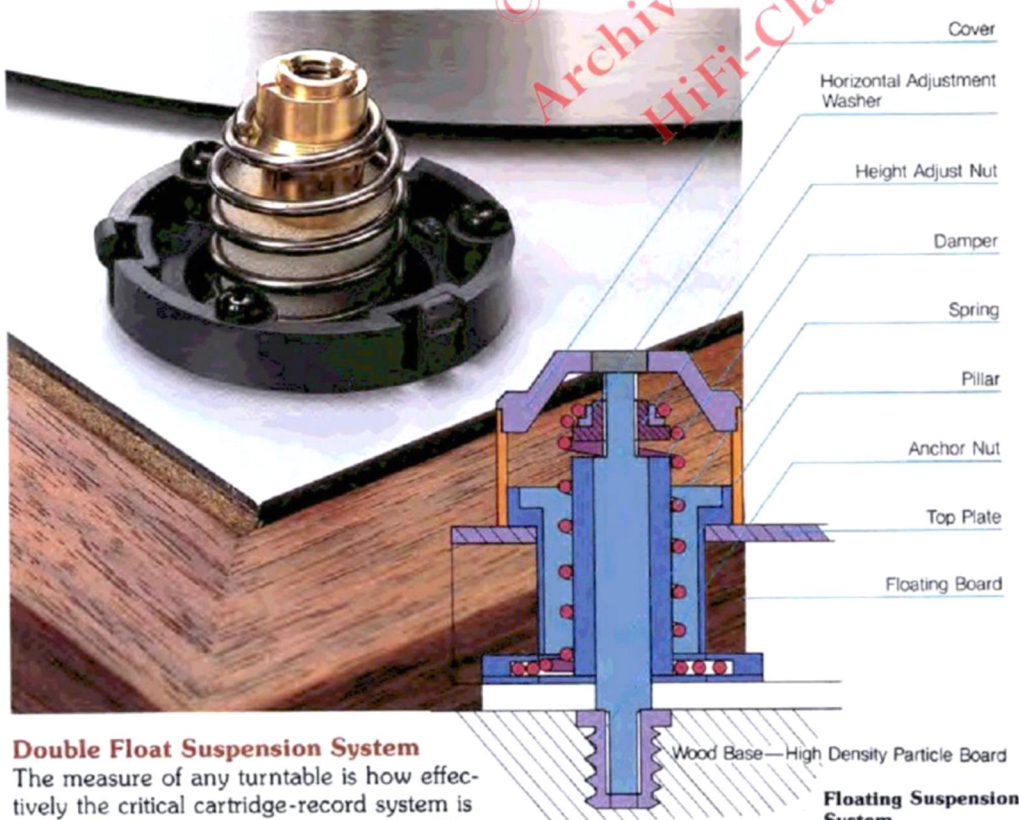
# Behind the Superior Yamaha Sound

Yamaha's foundation as a manufacturer spans more than a hundred years in a number of specialized fields. Since the company began as a producer of reed organs, it has expanded steadily until today, Yamaha music instruments, sound reinforcement gear, music education and popularization programs, motor products, sports equipment, and of course, audio products, are renowned worldwide for their highly refined performance. Naturally, the many years spent in intensive research and

## ENGINEERING OUT VIBRATION FOR PURE, NATURAL SOUND

The only good vibrations in a turntable system are the ones that come from the music itself. All other vibrations, whether occurring externally or within the turntable itself, serve only to degrade sound quality, either by increasing wow and flutter or by modulating the music signal. To the average ear, the slight deterioration in sound quality inherent in conventional turntables may scarcely be noticeable, and therefore acceptable. But to the demanding audiophile, even the slightest amount of sound coloration caused by vibration is unacceptable. And if you're one of these demanding individuals, you'll be pleased to know you have some astute company: the audio engineers at Yamaha. The results of their labor of love — eliminating spurious vibrations to let the pure music shine through — are now available for your listening enjoyment. The PF-1000 and PF-800 Natural Sound Belt Drive Turntables.

In creating these remarkable turntables, Yamaha engineers identified every source of vibration that affects turntables, then went about finding ways to isolate them, cancel them, eliminate them. This led to the incorporation of some advanced concepts in turntable design. Things like the Double Float Suspension System. Vibration-absorbing motor casing. Two-piece platter. Dynamic balance twin-pipe tonearm with damped counterweight attachment. Disc clamper with strobe disc. In short, the most extensive collection of sophisticated components and concepts to be found on any turntables available today. For the critical listener, this means new levels of sound reproduction purity, especially with audiophile class records. When bad vibrations are eliminated, music is nothing but good vibrations.



### Double Float Suspension System

The measure of any turntable is how effectively the critical cartridge-record system is isolated from vibration and resonance. The more effective the isolation, the better the sound. Period. So even if you use only the finest, most sensitive cartridges, and keep your records in immaculate condition, you

won't be able to enjoy their full clarity and dynamic range if vibration and resonance creep in to modulate the music signal. The PF-1000 and PF-800 go right to the base

of the problem — with an advanced new Double Float Suspension System that eliminates spurious vibrations before they can destroy your listening pleasure. The first part of this system is special insulator feet employing a combined spring/rubber damping system with an extra-broad absorption spectrum. This advanced design prevents practically all external vibrations from reaching the turntable chassis. But it's just the start. Because the sub-chassis incorporating the platter and tonearm assembly are mounted on the chassis by a three-point spring suspension system. So any vibration in the chassis is absorbed before it can reach the platter itself. But there's more to the Yamaha system. Instead of floating on top of the springs, the sub-chassis is actually suspended from the springs, thus making the center of gravity as low as possible. This eliminates the tendency for the sub-chassis to sway, which can introduce wow and flutter. What's more, the resonance frequency of the suspension system is just a few Hertz — well below the lowest music frequencies — which further prevents any possibility of chassis resonance affecting the music signal.

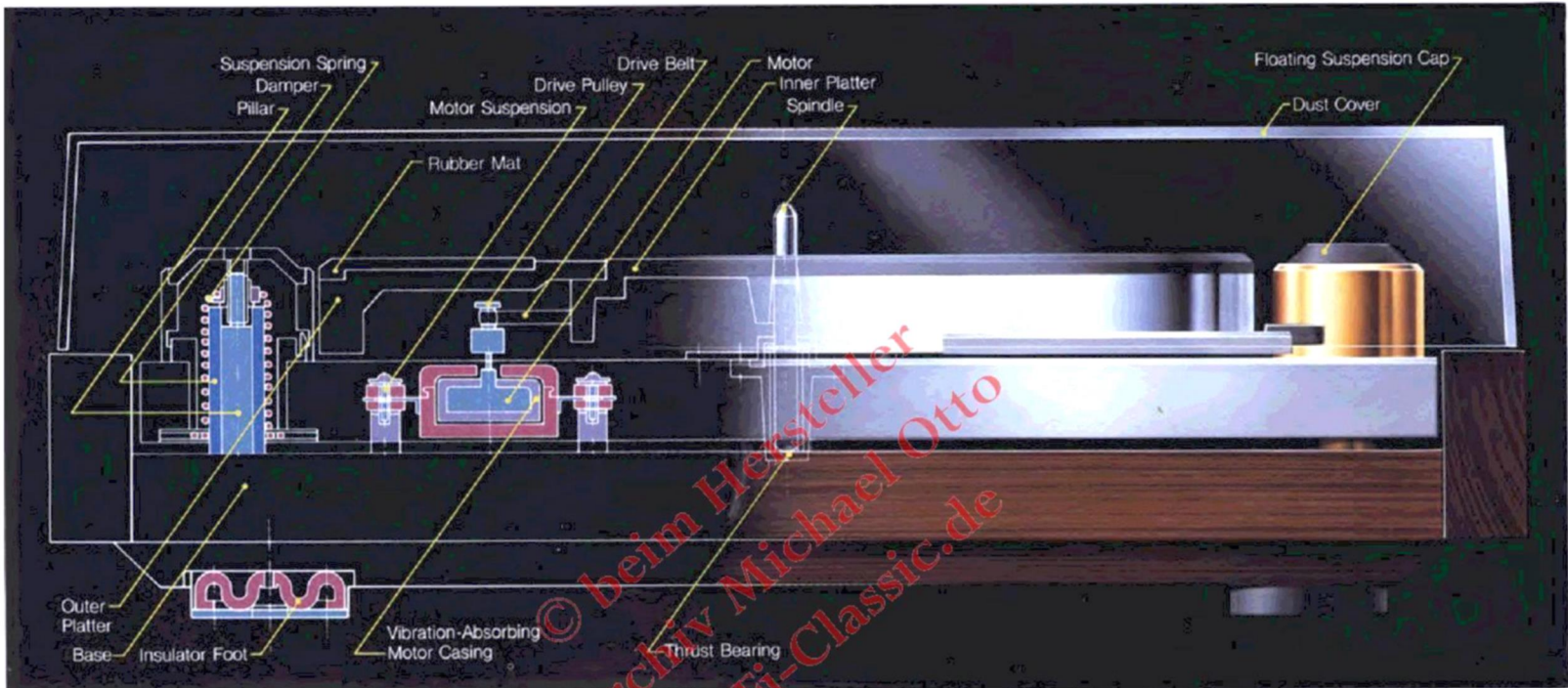
### Putting the Motor in Solitary Confinement

After perfecting the suspension system to absorb external vibrations, Yamaha engineers turned their attention to remedying the

development in all these fields has resulted in a vast and varied store of technology. Moreover, the finely balanced interrelationship between the many Yamaha in-house technologies, production facilities and product groups creates a highly efficient network that makes it possible to achieve optimum quality and performance in every product.

Yamaha audio know-how, however, does not stop at technology. Each and every new audio product must

face the most demanding challenge imaginable: the critical ears of Yamaha music instrument designers. Unless the reproduced sound is exactly like the real thing, the product is not considered finished. Yamaha gives you vast technology tamed by musical sensitivity—a claim no other audio manufacturer can honestly make.



other half of the problem—eliminating internally-induced vibrations originating from the motor. They solved this problem in several ways. First, they selected a superbly stable and vibration-free FG servo motor for platter drive, then encased it in vibration-absorbing rubber, and attached it to the main chassis by a damped mounting system to further ensure that no vibrations reach the platter assembly. For the drive belt, they chose a vibration-absorbing resilient rubber material that soaks up any irregularities emanating from the drive pulley. The result of this careful attention to detail is virtual elimination of internally-induced vibration—and the sound deterioration that it creates.

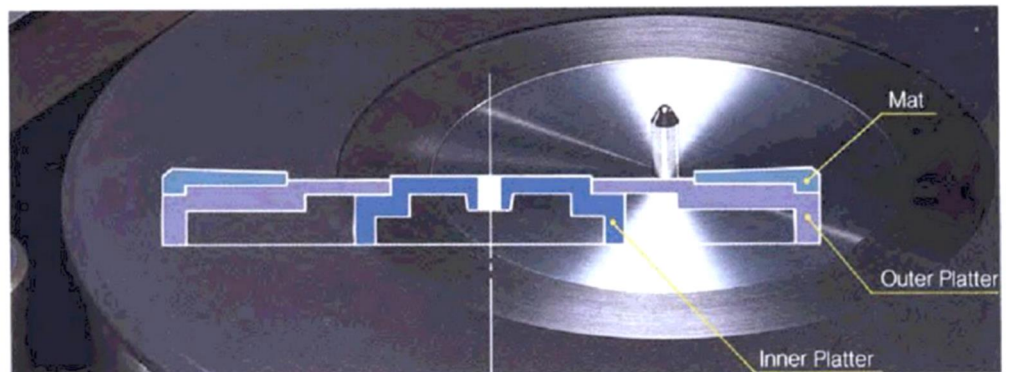
#### Doubling Platter Vibration Absorption

The platter does more in a Yamaha PF-Series turntable than properly support the record. It, too, plays a positive role in suppressing the transmission of spurious vibration and resonance to create cleaner, purer sound. The most noticeable difference between PF-Series turntable platters and conventional units is their two-piece design, with inner and outer platters formed of different materials. The first benefit of this system is that the resonance frequencies of the two materials are different (zinc and

aluminum in the PF-800, gun metal and aluminum in the PF-1000) effectively damping platter vibration. Also, any external vibration induced into the platter will be effectively stopped at the point where the two platter sections meet. The result of this design is that vibration and resonance within the platter itself, or from external sources, is effectively cancelled. Further, the drive belt is coupled to the perimeter of the inner platter rather than the outer platter perimeter, which increases the effective inertia of the platter for enhanced suppression of flutter. With this superior two-piece platter system, every record gets off to a good start!

#### Sleek Low-Profile Cabinet

Conventional turntables normally use some type of insulator feet to absorb structure-borne vibration, while very little is done to absorb airborne vibration. Yamaha PF-Series turntables absorb vibration by using a combination of mass, the double float suspension system and—specifically for the reduction of airborne vibration—a low-profile cabinet design. This slimmed-down cabinet design presents the smallest possible area to airborne vibrations. The reduced air resistance, plus the mass and suspension of the turntable system, effectively minimizes the possibility of the music signal being modulated by airborne vibrations.



# A NEW LOOK IN TONEARM PERFORMANCE

The Yamaha dynamic balance twin-pipe straight tonearm is the culmination of years of research and experimentation in every aspect of tonearm design. Incorporating the technological superiority of Yamaha's exclusive optimum-mass, minimum resonance straight tonearm design, it features such additional advanced concepts as twin-pipe construction and dynamic balancing for even greater response and performance. So it not only looks unique, but provides unique accuracy in music reproduction as well. What's more, this precision-engineered tonearm provides the same superior performance with an even broader range of cartridges, so you get pure, natural sound reproduction with virtually any cartridge you choose.

## Mass and Tonearm Design

Mass is recognized as an important factor in determining a tonearm's performance. What is mass? Simply stated, it's an object's "resistance to acceleration." Since a tonearm is constantly subjected to various acceleration forces caused by irregularities of the record's surface, such as warpage, mass is indeed a critical factor in determining its performance. In the case of a tonearm, however, mass is not the only determining factor—the compliance (cantilever "stiffness") of the cartridge used combines with the tonearm/cartridge mass to determine final overall performance. For this reason, some tonearms may offer optimum performance with only certain types of cartridges—an unacceptable limitation for most audiophiles. The Yamaha optimum mass,

minimum resonance tonearm obviates this limitation by providing optimum performance with the broadest range of cartridges possible. How? Read on.

## Mass and Tracking

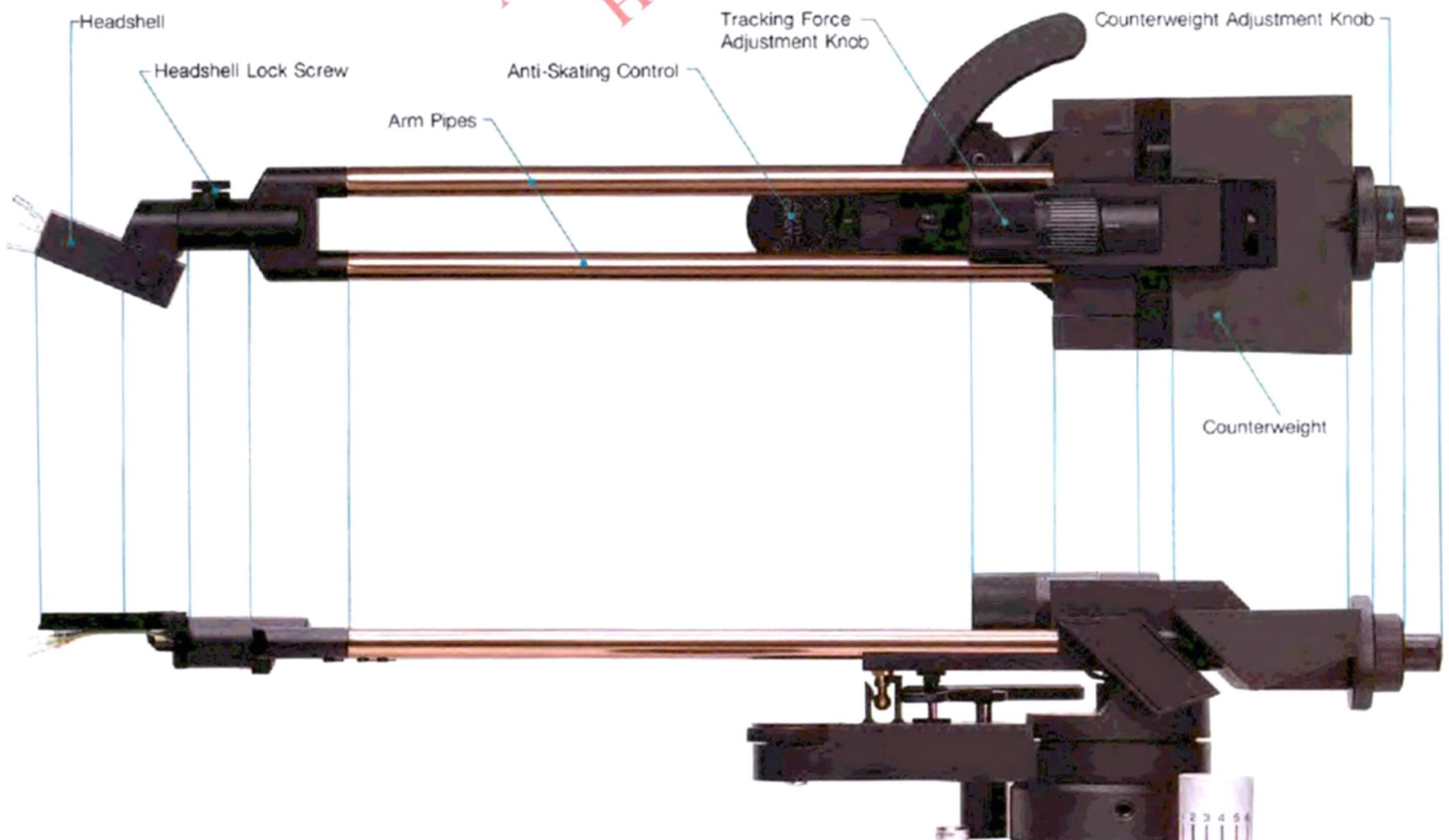
Mass is a critical factor in tonearm performance. A tonearm that possesses either too great or too low a mass can have quite disastrous results on vertical tracking performance. Referring to Figure A, we can see that if a warped record is played with an excessively massive tonearm (all records have some degree of warpage), the sudden vertical acceleration that occurs when the warp reaches the stylus causes the stylus and cantilever to be "mashed" up into the cartridge housing, and then nearly left hanging from the cartridge on the down side of the warp. Because the tonearm's high mass makes it resistant to acceleration, it tends to stay in the same place in spite of variations in the record's surface. Naturally, this extreme cartridge excursion causes distortion. We can also see here how cartridge compliance plays an important role. A stiffer cantilever would apply greater force to the cartridge and tonearm, reducing the problem in this illustration somewhat, but new problems would be created in other areas, such as reduced transient response and efficiency. Figure B illustrates how the optimum mass of the Yamaha tonearm provides optimum tracking performance—and with virtually any cartridge you use.

To overcome the problems of tonearm mass, some manufacturers have come out with a "low mass" tonearm design.

However, excessively low mass creates tracking problems on a smaller physical scale, but with equally disastrous results on reproduction quality. As Figure C shows, if the tonearm/cartridge mass is too low, even the minute modulations of the record groove are enough to set the tonearm in motion, making accurate reproduction impossible. Again, the optimum mass of the Yamaha tonearm keeps cartridge stationary in relation to the stylus/cantilever for precise mechanical-to-electrical transduction of the music embossed in the record's groove—Figure D.

## Mass and Resonance

Mass and resonance are closely related in a tonearm. Resonance is the natural frequency of an object—that is, the frequency at which it freely oscillates with the greatest amplitude. What makes this a problem is that all objects resonate. And the tie-in with mass is that an object's resonant frequency is basically determined by its mass. Although the Yamaha straight tonearm is critically designed to damp out all spurious resonance and to minimize its fundamental resonance as much as possible, a small amount of resonance must remain. The remarkable feature of the Yamaha tonearm is that its remaining resonance has been "designed" to have virtually no effect on music reproduction. Through extensive research and experimentation, Yamaha engineers determined that the frequency corresponding to the least music and warp activity is 12 Hz (Figure E). Then they designed the Yamaha tonearm so that



its resonance — a value that takes tonearm/cartridge mass and cartridge compliance into account — would be in extremely close tolerance of 12 Hz, thereby minimizing the effects of tonearm resonance on the music signal. What's more, they designed the straight tonearm so that these values would be nearly identical regardless of the type of cartridge used. The result of all this precision engineering is audibly superior reproduction of every disc, with every cartridge — the combination the audiophile has been waiting for.

### Unique Twin-Pipe Design for Unique Operation

When you combine the Yamaha optimum mass, minimum resonance straight tonearm design with the twin-pipe system, you enter an entirely new realm of tonearm performance — and appearance. First, the twin-pipe system offers excellent resistance to flexing, which improves horizontal tracking to minimize distortion. Then there's the advantage of having the left and right signal leads being carried through separate pipes, thereby eliminating the possibility of capacitive coupling to ensure maximum signal separation. Further, the resonance point of the tonearm is designed to lie between the record warp frequencies and the music signal, so it cannot effect music reproduction quality. And finally, this configuration results in an effective mass that is optimally matched with the widest range of available cartridges. But there's another bonus — this unique tonearm looks every bit as sophisticated as it operates. It's state-of-the-art. And looks it.

### Dynamic Balance, Dynamic Performance

Conventional counterweight "static" balancing systems work well for most applications. But when Yamaha engineers designed the new twin-pipe tonearm system, they wanted to go all the way to provide simply unparalleled performance. So they settled

on a more dynamic system — dynamic balance. "Dynamic balance" means that the tonearm tracking force is provided by a directly-coupled dynamic tension system that is little affected by sudden acceleration. While a static balance tonearm will act like a "seesaw" when subjected to vertical acceleration, tending to continue on its upward swing, the dynamic balance system maintains constant tracking pressure at all times. The result is virtually perfect vertical tracking for minimum distortion and reduced wear on records and cartridges — the dynamics of greater listening enjoyment.

### Tonearm Damping is Equally Dynamic

The wide, heavy, uniquely shaped counterweight used for the twin-pipe tonearm, located at the back of the extra-wide pivot for added stability, provides unsurpassed tonearm oscillation-prevention

characteristics. But the beauty of this system is more than skin deep. Inside, specially designed dampers are utilized at critical connection surfaces to form a dynamic damping system that effectively isolates the cartridge from vibration transmitted via the tonearm. This extra effort to stop vibration is worth it — as you'll discover in the pure, natural sound you hear in every record you play.

### Even the Headshell is Superior

Each of the PF-Series turntables is supplied with two exceptionally lightweight, precision-formed headshells. You can mount a different cartridge in each and change over from one to the other quickly and easily. The headshell itself also offers exceptional hum rejection since it is formed of a conductive carbon-fiber resin, to ensure maximum signal pickup purity.

Fig. A: High-Mass Tonearm

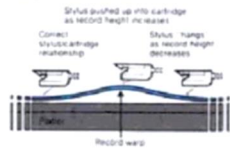


Fig. B: Yamaha Optimum Mass Tonearm

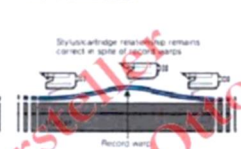


Fig. C: Low-Mass Tonearm

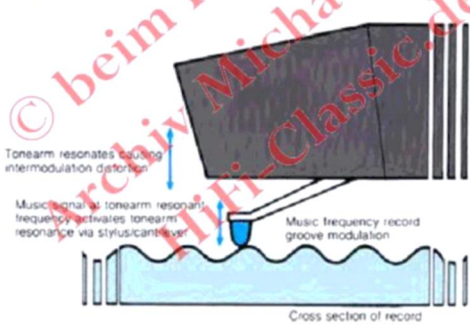


Fig. D: Yamaha Optimum Mass Tonearm

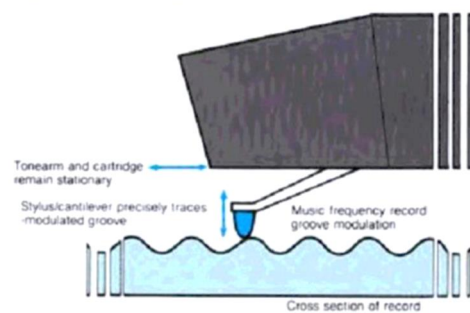


Fig. E: Spectral analysis graph of a typical direct-cut disc

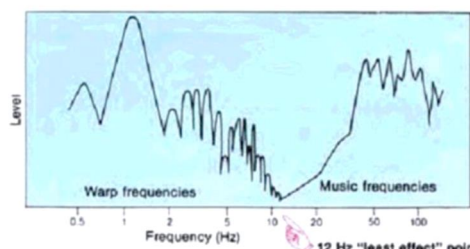
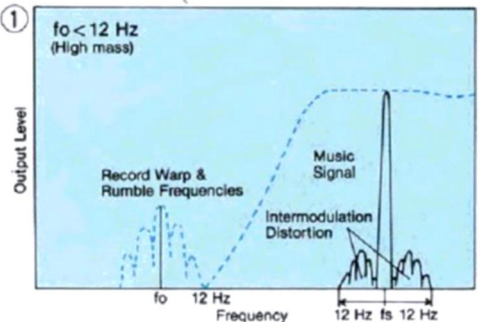
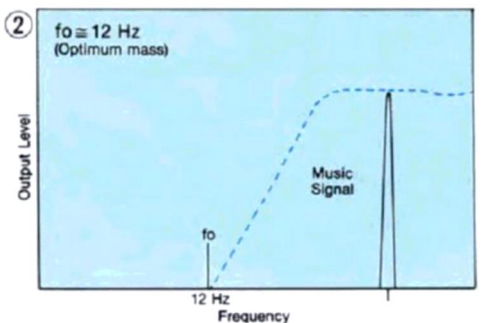


Fig. F: Tonearm Resonance & Intermodulation Distortion

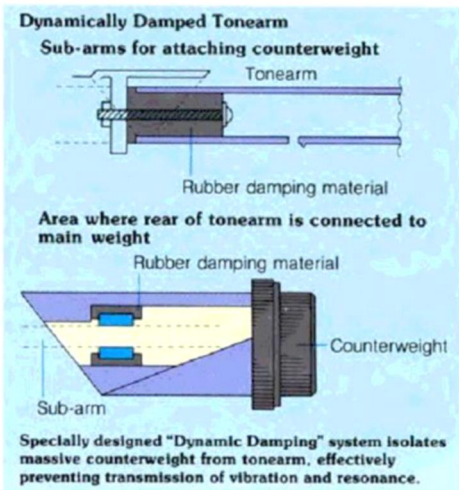
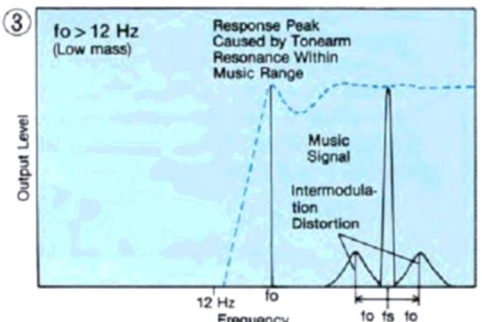
(Dotted line = overall response. Solid line = single frequency response.  $f_0$  = tonearm resonant frequency.  $f_s$  = single frequency.)



Tonearm resonance in record warp & rumble range causes intermodulation distortion.



Optimum mass tonearm causes no intermodulation distortion





## A NEW CONCEPT IN AUDIOPHILE PERFORMANCE

### PF-1000

If your preference in audio componentry runs to the slightly esoteric, where every part of every piece of equipment is thoroughly designed using the most sophisticated technology for superb performance, Yamaha has created the PF-1000 for you. No fancy convenience features to play with here. The emphasis is on uncompromising audio reproduction performance. You notice it first with the unique twin-pipe tonearm. But there's much, much more. And now it's time for a closer look at this superb turntable—the further attention to detail that puts the PF-1000 in a class by itself in audiophile turntables. We've explained the advantages of the two-piece platter. How it reduces turntable platter resonance and vibration as no other design can. But it's not only how you design a turntable that counts, but the types of materials you use as well. That's where the PF-1000 truly stands out. The inner platter, which interfaces with the drive belt, is made of high-density gun metal for unsurpassed vibration suppression and rota-

tional stability. Then there's the material used in the cabinet—the best. Pure American walnut with a specially blended composite wood core. So the PF-1000 not only looks like the high-quality component that it is, but actually benefits from the superior acoustic qualities of cabinet materials. Then there's the sophisticated brushed aluminum top panel which not only looks great, but adds mass and therefore absorbs vibration more effectively. Class. But that's what the PF-1000 is all about. And it's the extra touch that the PF-1000 can lend to your audio system. No matter how classy it already is.





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## PERFORMANCE – YAMAHA PF-SERIES TURNTABLES

### PF-800

The PF-800 is so close in performance to the PF-1000 that it may be the only turntable in this class that can rival it. There's the same emphasis on performance over gadgetry, although like the PF-1000 it does incorporate an automatic arm lifter mechanism that goes to the trouble of lifting the arm at the end of the record and shutting off the motor for you. And it also shares such advanced features as the dynamic balance twin-pipe straight tonearm, Double Float Suspension System, two-piece platter, and everything else that matters. There's also the same attention to style and detail that separates this remarkable turntable from the ordinary. Indeed, to make the PF-800 an attractive alternative to the PF-1000, we substituted zinc for gun metal as the material for the inner platter, which allowed us to retain the same outstanding vibration-damping characteristics. And instead of real American walnut, we finished the cabinet in striking black, which elegantly complements the popular black-finish component systems

preferred by many audiophiles. That's it. So the choice is yours. We couldn't make it, so we made the PF-800 in the PF-1000's tradition of uncompromising audio performance.



# PF-1000/PF-800

Natural Sound Belt Drive Turntables

## MORE FEATURES FOR GREATER PERFORMANCE

### Convenient Automatic Arm Lifter

Both the PF-1000 and PF-800 emphasize performance over gadgetry. But there's one area where a little automation can actually help protect your investment in cartridges and the turntable itself—an automatic record-end arm lifter. This system raises the tonearm when the record is finished, then shuts off the turntable motor. That's all. But it prevents the stylus from running endlessly in the record's leadout groove, which can prematurely wear out the stylus, or even damage it. It also reduces motor wear due to unnecessary, extended operation. You just might also appreciate not having to run over to the turntable every time a record is finished. But we'll leave the importance of that feature up to you.

### Disc Clamper with Strobe Disc

Here's an ingenious device that, although simple in appearance, actually performs an important sound-enhancing function. The disc clamper clamps onto the turntable spindle over the record, holding the record in firm contact with the record mat thereby eliminating air spaces that can contribute to resonance of the record itself. The disc clamper also features a strobe disc: during operation, you can check for spot-on rota-

tion speed merely by illuminating the strobe disc with a standard fluorescent lamp. The result—the highest possible reproduction quality.



### Oil-Damped Manual Cueing

This smooth-acting oil damped mechanism slowly and carefully raises and lowers the tonearm to prevent damage to records and the stylus due to accidental manual mishandling. During cueing, it also aids accurate placement of the stylus at any point on the record.

### ± 6% Pitch Control

This pitch control system works accurately at both platter speeds—33-1/3 and 45 rpm. So you can not only precision-tune

platter rotation for accurate reproduction, but you can also easily adjust rotation speed to compensate for high or low line voltages. Or say you want to "play along"—the pitch control allows you bring records "into tune" with any instrument.

### High-Density Acryl Dust Cover

The PF turntable dust cover maintains the uncompromised quality of the rest of the design. It is made of thick, high-density acryl which further contributes to the vibration and resonance absorption properties of the entire turntable system.

### Top Quality Cable with Gold-Plated Connectors

Even PF turntable connector cables are special. They are high quality, low impedance types that ensure maximum signal transmission efficiency and accuracy.



PF-1000 phono connectors are plated with gold so they cannot corrode and cause increased contact resistance.

## PF-1000/PF-800 SPECIFICATIONS

	PF-1000	PF-800		PF-1000	PF-800
<b>TURNTABLE</b>			Pick-Up Cable	(Cable only) 110 pF	
Drive System	Belt Drive	←	Capacitance	(With Tonearm) 130 pF	
Motor	FG Servo	←	<b>CONTROL FUNCTIONS</b>		
Platter (Inner)	Gun Metal	Zinc	Auto Lift up/Auto Stop	←	
(Outer)	Aluminum	Aluminum	<b>CABINET</b>		
Speed	33-1/3, 45 rpm ± 6%	←	Base	Real Wood Finish	Vinyl Finish
<b>TONEARM</b>			Dust Cover	Acrylic	←
Type	Dynamic Balance Twin-pipe	Straight	Hinge	Removable	←
Effective Length	222 mm (8-3/4")	←	Panel Suspension		
Offset Angle	23°	←	System	3-Point Spring Suspension	
Overhang	16 mm (5/8")	←	Unit Insulator	Rubber	←
Tangential Tracking			<b>PERFORMANCE</b>		
Error	- 1° to 3°	←	Signal-to-Noise		
Suitable Cartridge			Ratio (DIN-B)	80 dB	←
Weight	2 to 11 g	←	Wow and Flutter	0.023%	0.028%
Sensitivity (Vertical)	10 mg	←	<b>GENERAL</b>		
(Horizontal)	10 mg	←	Power Supply	Matched to supply voltage and frequency of each area	
Anti-Skate	Dynamic (Spring)	←	Power		
Arm Lifter			Consumption	7 W	←
(Manual Cueing)	Oil Damped	←	Dimensions	473 x 154 x 376 mm	←
Arm Height Adj.	8 mm	←	(W x H x D)	(18-5/8" x 6-1/8" x 14-3/4")	
Headshell	Conductive Resin	←	Weight	13.7 kg	13 kg
Pick-Up Cable	(Cable only) 950 m-ohms			(30 lbs. 3 oz.)	(28 lbs. 10 oz.)
Resistance	(With Tonearm) 170 m-ohms				

Specifications subject to change without notice.

For details please contact:

SINCE 1887



**YAMAHA**

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