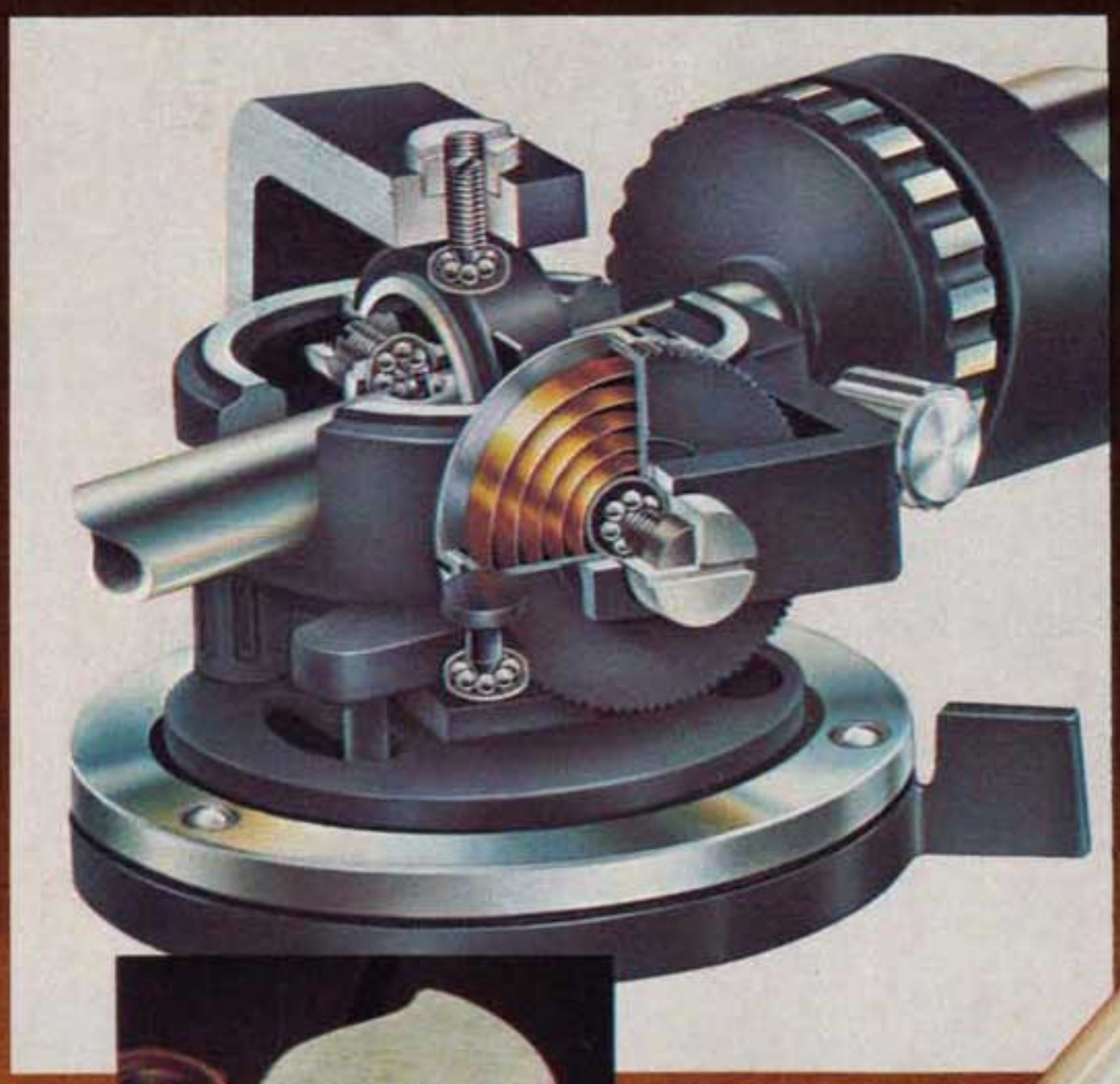
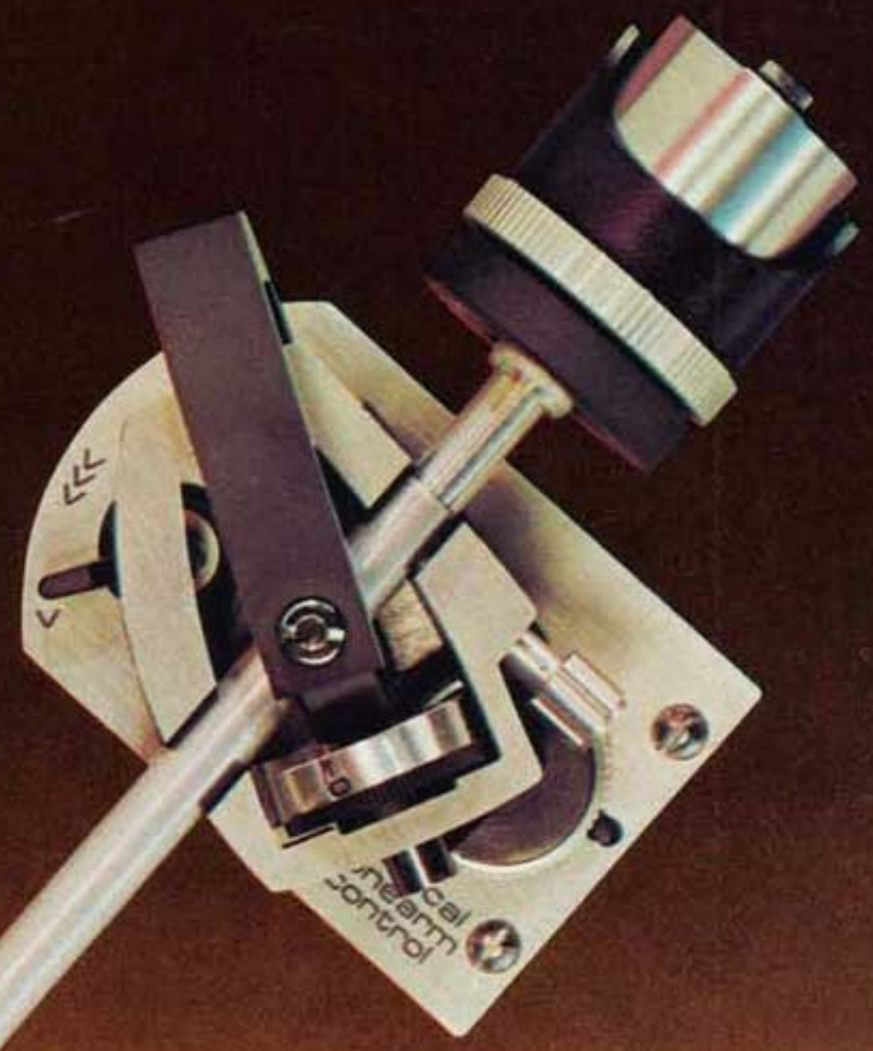
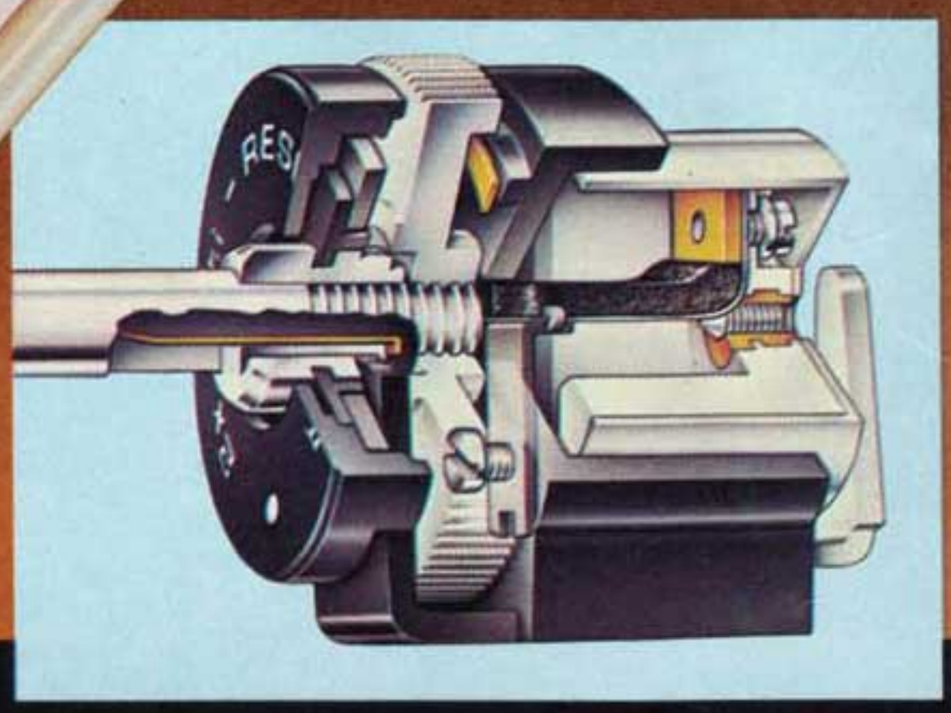
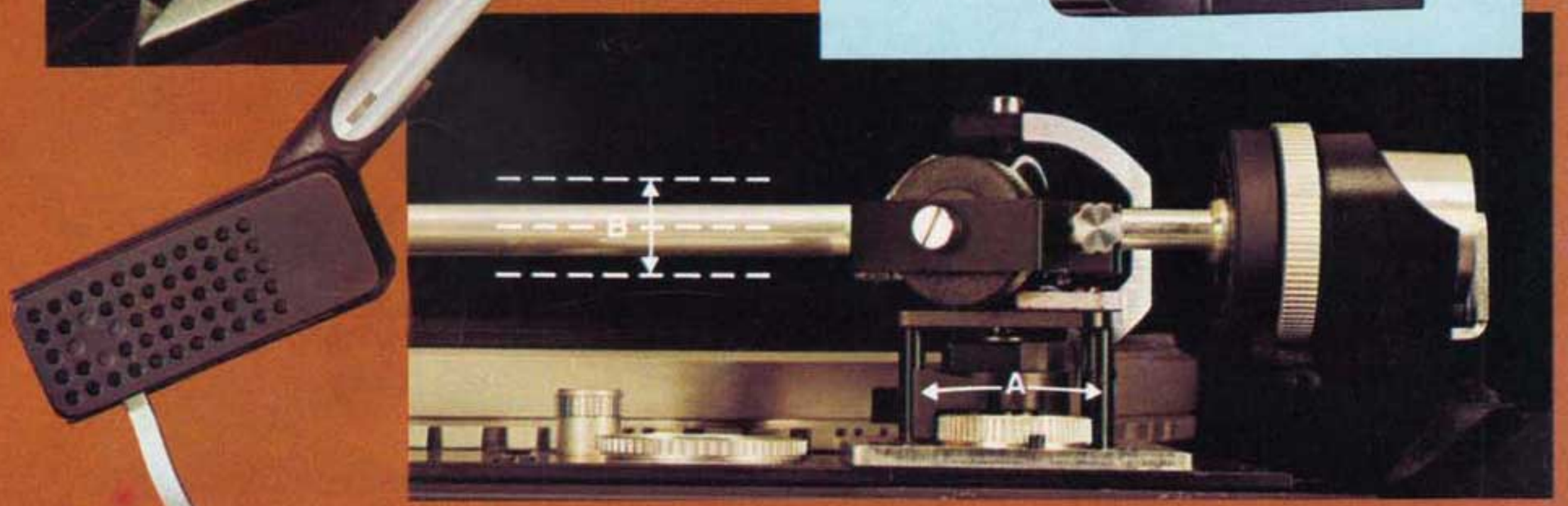
There have never been so many ways to enjoy Dual precision.

Dual









For sheer quality performance and reliability, any Dual will do. The basic tonearm design and the major tonearm settings—balance, stylus pressure, anti-skating—are identical on all models. Thus, if basic excellence in record playback is all you require, we would suggest our lowest priced model, the 1225.

At the other extreme, the CS 721 raises the art of record reproduction to its highest level. Its tonearm provides more tracking performance refinements than any other tonearm ever made. And its electronically-regulated, direct-drive system is the quietest of any turntable ever made.

You should also consider the question of convenience. If you prefer handling the tonearm, there are three semi-automatic Duals to choose from, each providing safety features that raise them above the simple manual class. The other five Duals offer fully automatic start and stop—four of them, the additional option of multiple play.

As for drive systems, we fully agree with Julian Hirsch, who said: "It would make little difference if the platter were powered by well-disciplined hamsters on a treadmill. It is the end result that counts."

Thus, while Dual makes all three types of drive systems—belt, rim and direct—all with inaudible rumble, wow and flutter—Dual makes only one type of tonearm—straight-line, tubular. With tonearms, that is the best way to achieve extreme rigidity and lowest effective mass.

What follows is a description of the differences among all Dual turntables.

Which Dual for you?

The CS 721...fully automatic, single play, direct drive... successor to the quietest turntable ever made.

Independent test reports on the electronic direct-drive Dual CS 701 were extraordinary. Their results are still pertinent since the CS 721 has the same drive system. Hirsch-Houck Labs found the wow level "essentially at the residual level of our test record." And the Feldman Lab Report in FM Guide was able to detect "no flutter whatsoever."

It takes very advanced engineering to achieve this level of performance. The electronic, DC, brushless motor has Hall-effect speed control. The motor's unique overlapping-field coil design produces a perfectly consistent rotating field with no magnetic flux irregularities. Another example: two specially tuned mechanical anti-resonance filters located within the tonearm counter-balance absorb resonant energy resulting from record warp and from the normal tonearm/cartridge resonance. The result: better tracking and cleaner, smoother frequency response.

The CS 721 tonearm has a number of new developments that contribute significantly to fine-tracking performance. Most notable of these: the tonearm base has a vernier height adjustment for setting the tonearm parallel to the record, with any size cartridge. This eliminates the added mass of cartridge spacers otherwise needed to achieve precise vertical tracking angle. It also makes cartridge mounting and interchange more convenient.

Other settings and adjustments of the CS 721 tonearm provide for adjustable cueing height and descent speed, as well as stylus overhang. In all, there are seven adjustments that enable the user to optimize the operation and performance of the CS 721 tonearm with any cartridge. And in addition, there are fully automatic start and stop plus continuous repeat. Other features: illuminated strobe, 10% pitch control and dynamically-balanced cast platter.

The CS 704...semi-automatic with electronic direct drive.

The CS 704 heads a group of semi-automatic models that meets the needs of those who prefer to handle the tonearm at the beginning and end of the record.

However, the CS 704 tonearm provides important automatic features that we believe even the most sure-handed music lover will appreciate.

When the tonearm is raised from its resting post and moved toward the record, there's no need to guess when it is precisely over the 12" or 7" lead-in groove; a mechanical sensor lets you know.

The tonearm then will not descend until the cue-control lever is actuated. You don't even have to remember to set the cue-control in its up position. It automatically resets at the end of play.

All this is achieved by the CS 704's unique indexing indicator which is interlocked with the cue-control. However, if you don't want this help, you can simply switch this system off.

There are two other touches of automation. Moving the tonearm toward the record turns on the drive system. At the end of play, the tonearm lifts and the motor shuts off.

Tonearm refinements shared with the CS 721 include the newly-designed gimbal, adjustable height and the anti-resonance filters.

The 1249...our top fully automatic, single-play/multi-play model.

The 1249 holds a unique position in the Dual family. It is our only full-size, fully automatic model that offers both single-play and multi-play.

Tracking is flawless at pressures as low as a quarter of a gram. In single-play, the tonearm parallels the record to provide perfect vertical tracking. In multi-play, the Mode Selector lifts the entire tonearm to parallel the center of the stack.

The dynamically-balanced cast platter and flywheel are driven by an 8-pole synchronous motor via a precision-ground belt. Pitch is variable over a 6% range and can be set to exact speed by means of an illuminated strobe, read directly from the rim of the platter.

All operations are completely flexible and convenient—and foolproof. The tonearm can be lowered to the record manually or via the viscous-damped cue-control or by simply pressing the automatic switch. You also have the options of single play, continuous repeat, or multiple play.

The 510...semi-automatic with Vario-pulley belt drive.

Semi-automatic version of the 1249. Tonearm operation is identical to the CS704 as described above. The precision-machined platter is linked to an 8-pole synchronous motor via a precision-ground belt.

Pitch control is achieved via the unique Vario-pulley which expands and contracts to vary platter speed rather than stretch or distort the belt. Exact speed can be read from the built-in illuminated strobe on the rim of the platter.

The 502.

Semi-automatic operation and Vario-pulley belt-drive system. Similar to 510 except does not have mechanical sensor pitch control, or illuminated strobe.

The 1228—top model in our compact series of single-play/multi-play models.

The 1228 shares nearly every feature to be found on all other Duals. Its tonearm is mounted in a four-point gimbal suspension and can track flawlessly at as low as a half gram. Adjustable stylus angle provides perfect vertical tracking in both single and multi-play. The combination induction/synchronous motor drives a hefty 3¾ pound platter that provides effective flywheel action to minimize any possible speed variation.

Other features include: pitch control with illuminated strobe, cue-control viscous damped in both directions to prevent bounce, single-play spindle that rotates with the platter.

The 1226.

Similar to 1228, except tonearm not gimbal-mounted; ball-bearing race in horizontal pivot. Motor is induction and tracking angle is fixed.

The 1225.

Similar to 1226, except for laminated platter and non-rotating single-play spindle.

A word about prices: Dual prices are competitive to units of comparable quality. Actual selling prices are set by individual dealers.

The Dual 510.

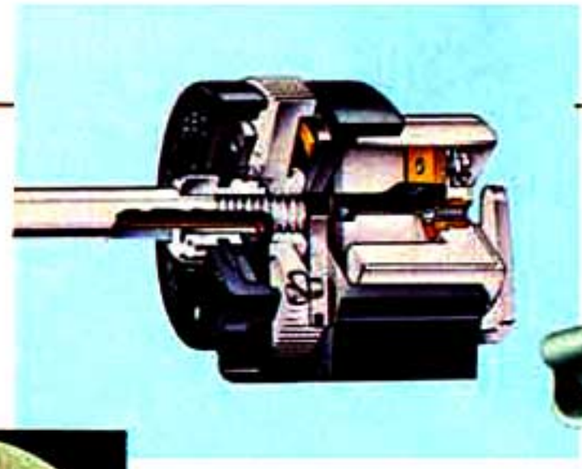
The Dual CS 704.

The Dual CS 721.

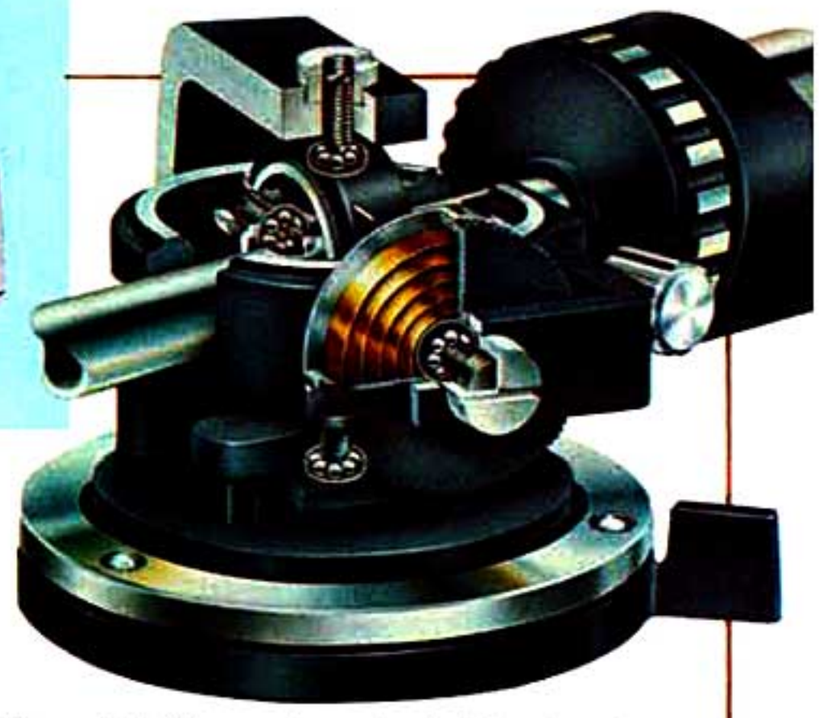
The Dual 1249.

The Dual 1228.

The Dual 1225.

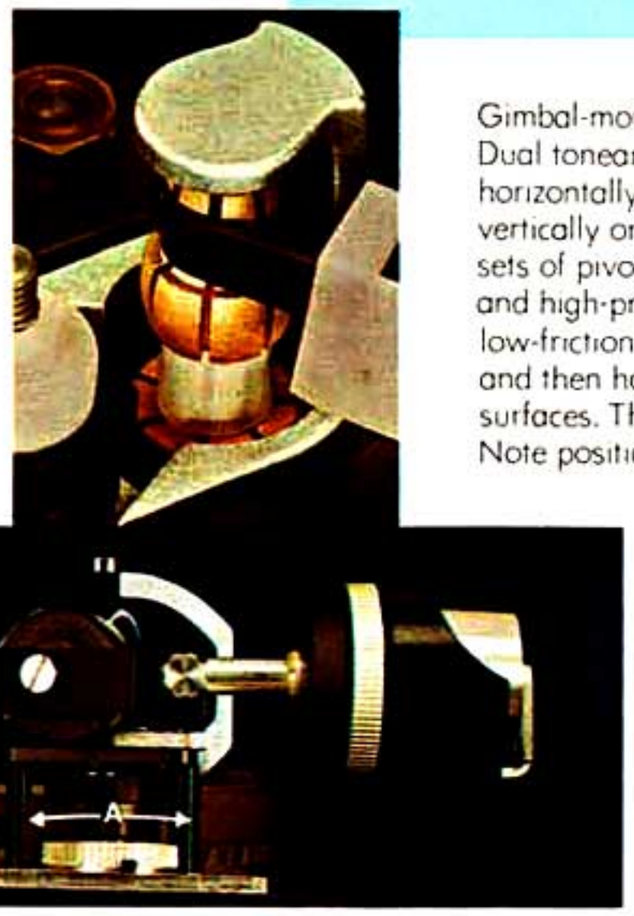


Unique counterbalances of Dual CS721 and CS704 house two separately tuned anti-resonance filters. These absorb energy in the resonance-frequency ranges of the tonearm/cartridge system and the chassis to minimize acoustical feedback.



Gimbal-mounted Dual tonearms pivot horizontally and vertically on identical sets of pivot points and high-precision low-friction bearings. The metal of the pivot point is first hardened and then honed, a process which produces microscopically smooth surfaces. The ball-bearing races are only 0.157 inch in diameter. Note position of stylus-pressure spring around vertical pivot.

Slotted Vario-pulley used in Dual's three belt-driven models is individually machined for perfect concentricity and balance. Speeds are adjusted by expansion and contraction of pulley. Speed changes can be made while platter is rotating, belt is never twisted or distorted. The drive belt is precision-ground to close tolerance, to maintain speed constancy and to eliminate weak spots that shorten belt life.



(A) Vertical Tonearm Control used in Dual's two direct-drive models sets and locks tonearm height at any point over an 8mm range (B). Tonearm thus exactly parallels the record with any size cartridge. Result: accurate vertical tracking without the added mass of cartridge spacers.

Some of the ways that "Precision makes the difference."

Every Dual turntable, from the 1225 to the new CS 721, is designed with one concept: to provide more precision than you are ever likely to need. As applied to the tonearm, this concept has been fulfilled with particular thoroughness. The conversion of groove modulations into music—as well as the life of one's records—is significantly influenced by every aspect of tonearm design: geometry, balance, mass, resonance, bearing friction and the application of stylus pressure and anti-skating.

Serious music lovers, whose investment in records typically exceeds their investment in equipment, know this. And some who are now Dual owners tell us they wish they had understood more about tonearms hundreds of dollars in ruined records earlier. If you are uncertain about the quality of your present tonearm, here are the design principles that allow every Dual tonearm to produce optimum performance from today's finest cartridges and maximum longevity from all records.

The effective length of any tonearm is the distance between the pivot and the stylus tip. A straight line—the shortest distance between these two points—achieves maximum rigidity and lowest mass. Both highly desirable characteristics. Both present in every Dual tonearm.

Stylus pressure is applied through a long coiled spring centered around the vertical pivot, and its accuracy is maintained independently of record warp or turntable level. So is the dynamic balance of the tonearm. The anti-skating system is separately calibrated for conical, elliptical and CD-4 "long-contact" styli. Anti-skating force automatically varies during play to compensate for the inherent change in skating force that occurs as the stylus moves across the record.

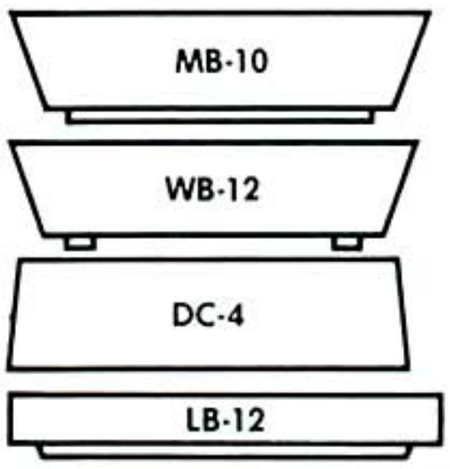
The tonearms of the six top Dual models pivot in a true four-point gyroscopic gimbal suspended within a rigid frame. Every gimbal is hand-assembled, and special test gauges are used during manufacturing and assembly to ensure that lateral and vertical friction will conform to Dual's stringent specifications. (For example, less than 0.007 gram in the vertical axis.) Only by such rigid quality control can tonearm calibration be set and maintained with the accuracy required by today's finest cartridges.

All component parts in Dual turntables are built with similar care and precision. For example, the rotor of every motor is dynamically balanced in all planes of motion. And the motor pulleys that drive the belts or idler wheels are individually machined and examined with precision instruments to ensure perfect balance and concentricity. Thus, the virtual absence of drive-system vibration, the primary source of rumble.

Despite all this precision and refinement, Dual turntables are rugged in design. They need not be babied, by you or anyone else in your family. Chances are your Dual—any Dual—will outlast all your other components, so you should carefully consider which type of Dual you want, as described on the following pages.

Bases and dust covers.

...for Dual 1225, 1226, 1228.



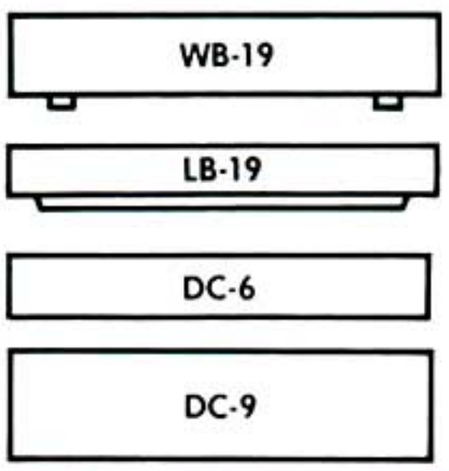
MB-10, molded simulated walnut-grain base, 15⅞ x 13¾ x 3½"

WB-12, walnut veneer base, 15⅝ x 13⅝ x 3⅛"

DC-4, hi-profile cover for either MB-10 or WB-12, total height including base, 7¾"

LB-12, simulated walnut-grain base, 16½ x 14¼ x 3⅛", with spring-loaded hinge for dust cover.

...for Dual 502, 510, 1249.



WB-19, walnut veneer base, 17 x 14¼ x 3⅛"

LB-19, simulated walnut-grain base, 16½ x 14¼ x 3⅛" with spring-loaded hinge for dust cover. **LB-19A**, simulated brushed aluminum base. Otherwise, same as LB-19.

Note: Spring-loaded hinges on LB-12 and LB-19 bases allow cover to remain open to any degree.

Dust covers for LB-12, WB-19 and LB-19 bases.

DC-6, low profile cover, total height including base, 5⅛".
DC-9, hi-profile cover, total height, including base, 7¾".

DC-9X, dust cover for WB-19. Similar to DC-9, except hinged front section folds up and back for access to controls.

Note: CS721 and CS704 are supplied mounted on base and with dust cover included.

Quick comparison of Dual features.

OPERATING FEATURES	SINGLE-PLAY/MULTI-PLAY MODELS				SINGLE-PLAY MODELS			
	DUAL 1225	DUAL 1226	DUAL 1228	DUAL 1249	DUAL 502	DUAL 510	DUAL CS704	DUAL CS721
Manual start & stop	yes							
Automatic start & stop	yes				no			yes
Rotating single-play spindle	no	yes			not applicable			
Cue-control	yes (damped in both directions)							
Pitch-control	6% range						10% range	
Built-in strobe	no		yes		no	yes		
TONEARM DESIGN AND FEATURES								
Balance method	vernier-adjust counterbalance*							
Bearing suspension type	needle-point		four-point gyroscopic gimbal					
Effective length	8¼"				8¾"			
Horiz. friction, grams	0.025	0.02	0.015					
Vert. friction, grams	0.009	0.008	0.007					
Cartridge wt. range, grams	1-8				1-12			
Min. tracking pressure, grams	1.0	0.75	0.25					
Low-cap. tonearm leads	yes (CD-4 ready)							
Anti-skating system	calibrated scales for conical, elliptical, CD-4 styli							
Adjustable vert. tracking	no		two-position		not required		8mm vernier height range	
MOTOR AND DRIVE SYSTEM								
Motor type	hi-torque		hi-torque/ synchs	8-pole synchronous			electronic, DC, brushless	
Drive system	rim			belt			direct	
Platter type	laminated	cast		cast*	cast	cast*		
Rumble, wtd. DIN 45 500	>59dB	>60dB	>62dB	>66dB			>70dB	>72dB
Wow/flutter, DIN 45 507	<±0.08%	<±0.075%	<±0.07%	<±0.05%			<±0.03%	

*CS704 and CS721 counterbalances contain two anti-resonance filters to minimize feedback.

*Dynamically balanced

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