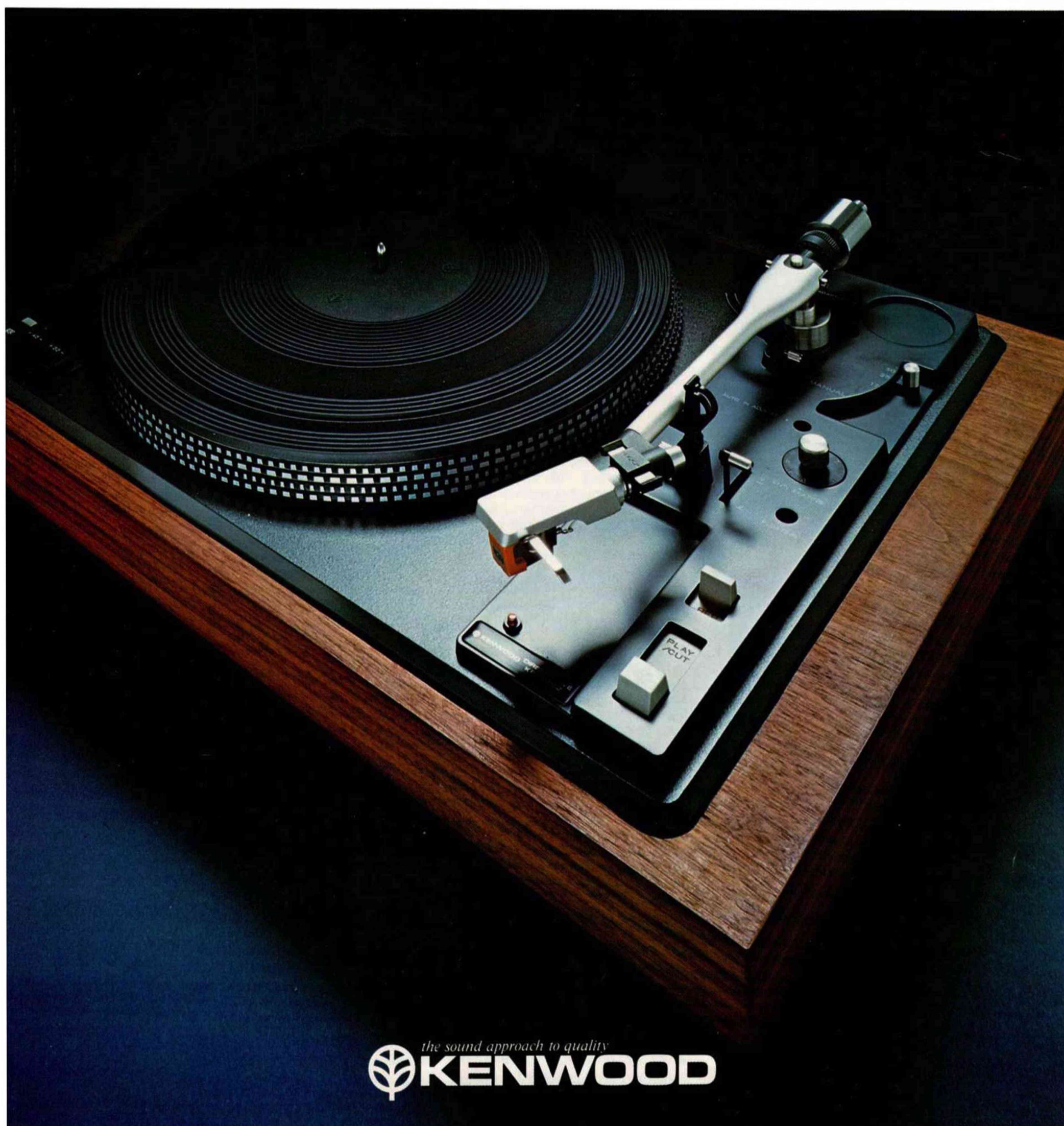


KENWOOD DIRECT DRIVE FULL-AUTO PLAYER

# KP-5022



*the sound approach to quality*  
**KENWOOD**



# The Direct-Drive turntable for perfectionist

## Direct Drive Full-Automatic Stereo Turntable

This turntable features such operations as Auto-lead in, Auto-cut, Auto-return and Auto-repeat—all by effortless “one-touch” control. In addition, the turntable is turned directly by a ultra-low speed DC servo motor. A highly sensitive oval tapered pipe arm, together with a highly effective VM-type cartridge, add further merits to this compact, thin player which incorporates the top-notch technology available in players today.

### Direct Drive Mechanism

Almost all turntables now available use a high-speed motor with a belt drive or idler to reduce the speed to 33-1/3 or 45 rpm. Such mechanisms have merit in that vibration from the motor is absorbed by the belt or idler. On the other hand, in such mechanisms, the quality of the belt or idler is often inferior because quality of raw materials is not uniform and manufacture calls for precision that is not always available.

Another drawback of this type of mechanism is that high-speed motors generate vibration. To eliminate this problem, some quality players have adopted a motor which turns at a reduced speed, which eventually assures a constant speed. This system is called Direct Drive. However, it is expensive because it has to employ a servo mechanism which is expensive. Consequently, the use of this mechanism has been limited to expensive models without arm or cartridge, designed exclusively for the use of dedicated audiophiles.

KP-5022, however, is effectively designed to reduce the cost to the level of models using a synchronous motor, making it possible to use this mechanism in an automatic player. A 8 -pole brushless DC servo motor is controlled by a voltage servo amplifier to maintain a constant speed of 33-1/3 or 45 rpm. This has made it possible to keep wow and flutter less than 0.05% (RMS). The S/N ratio is more than 58 dB.

### 1 Oval Tapered Pipe Arm

The slim, tapered arm, with its oval cross section, is not only beautiful to look at but its performance has been greatly improved, too. Resonance in arms, even below the audible range (most arms have a resonance point around 10 Hz), causes inter modulation distortion, resulting in acoustic deterioration. To prevent this, many countermeasures have been taken in the KP-5022. The specially designed arm, with its oval cross section and slim tip, the shell, and other parts help eliminate resonance. The pivot part of the arm uses a special rubber damper and moulded material has been used for the head connector. The straight arm is laterally balanced in a way to avoid the occurrence of resonance. The interior shield wire has the low capacity of 32.5 pF/m which, together with the high sensitivity arm, is perfect for CD-4.

### 2 Direct Reading Tracking Force

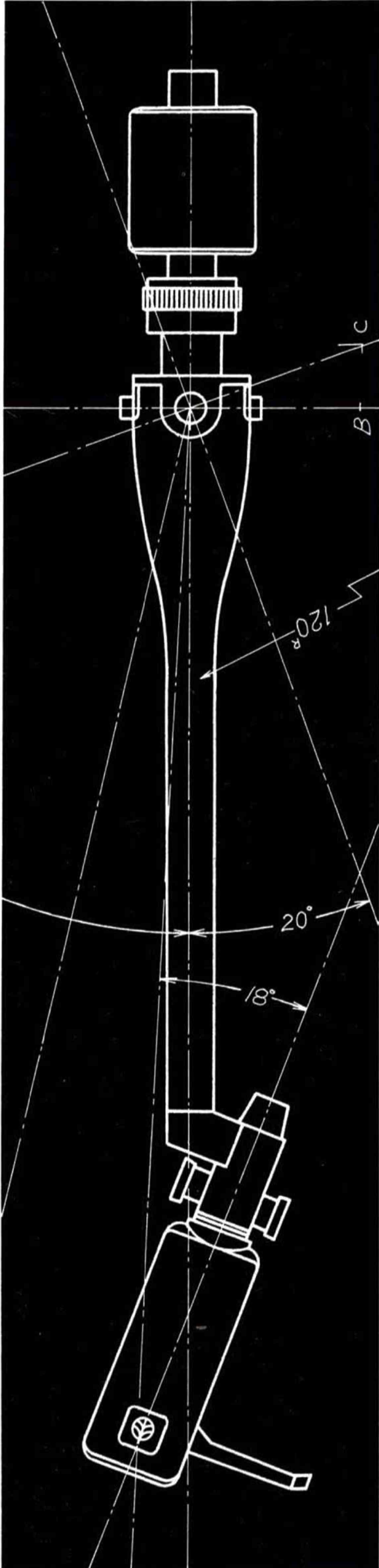
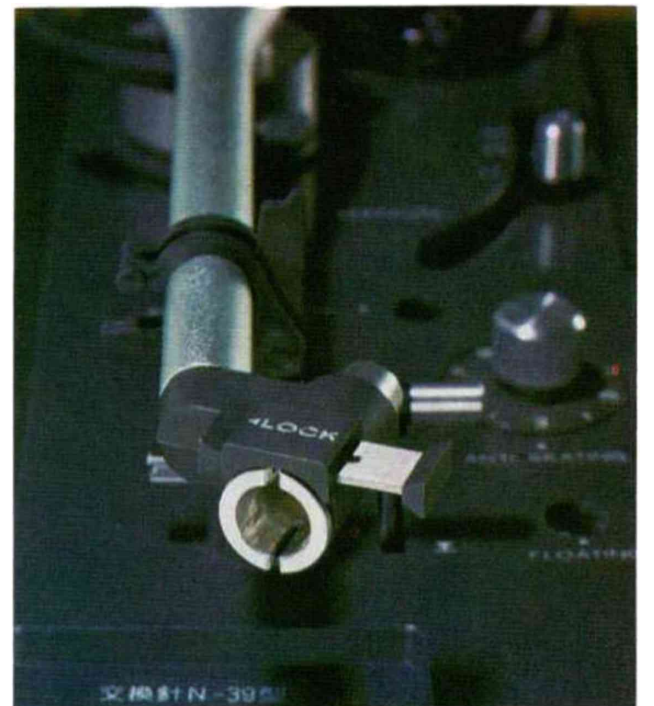
The tracking force can be read directly. This system allows adjustment every 0.25g, with a click stop every 0.5g, ensuring proper tracking force and bypassing all the complications involved in conventional models.

The proper tracking force for the attached cartridge is 2g ( $\pm 0.25g$ ).

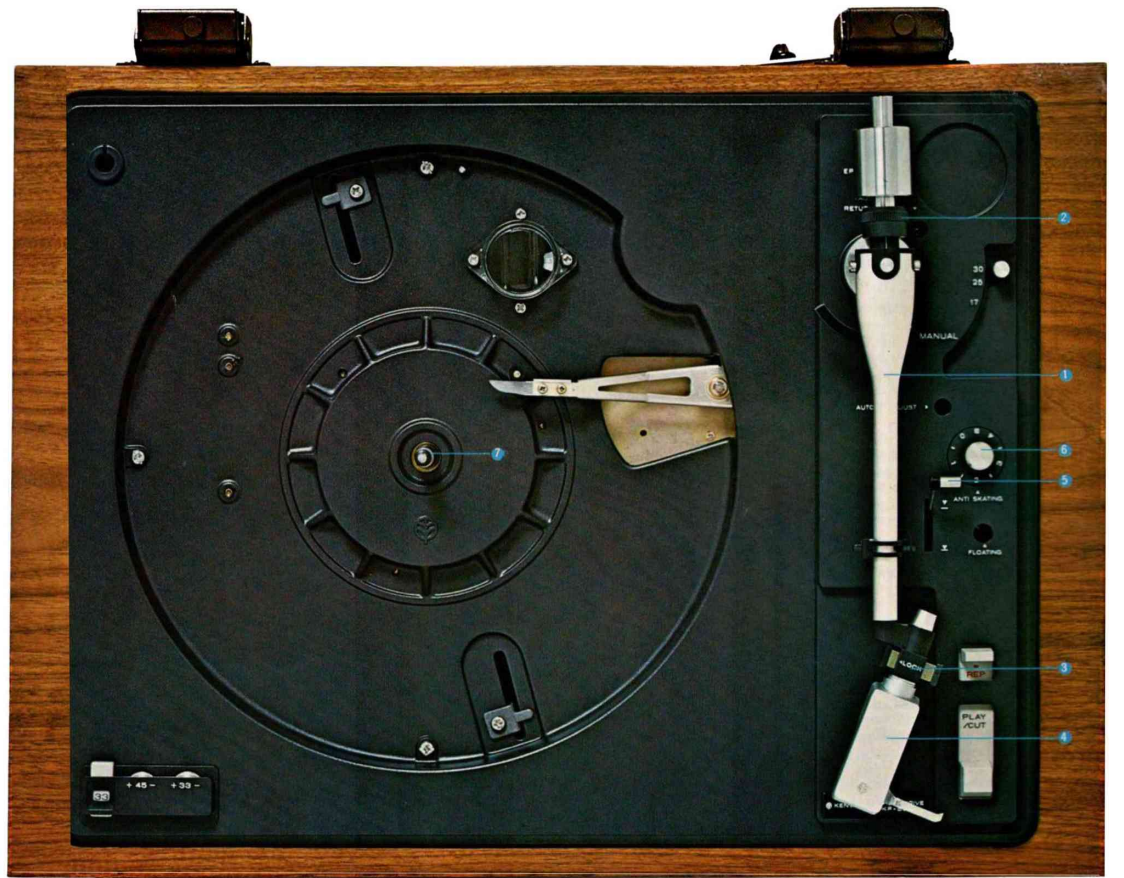
### 3 Slide Type Connector

The head shell connector uses a new slide type in lieu of the conventional screw type. The screw type has a shortcoming in that the arm pivot is often twisted in removing the head, resulting in reduction of sensitivity and mechanical movement. The slide type eliminates this defect and excludes the possibility of impaired performance of the pivot part. The die-cast aluminum shell, compared to the ordinary pressed shell, is more resistant to deformation and is less susceptible to resonance.

The screw at the root of the shell can be adjusted to bring the stylus into contact with the surface of the record at precisely the right angle. Contact of the stylus to the record at a diagonal causes excessive cross-talk between the left and right channels of a stereo record or poor separation between the front and rear channels of a 4-channel record of the CD-4 type.

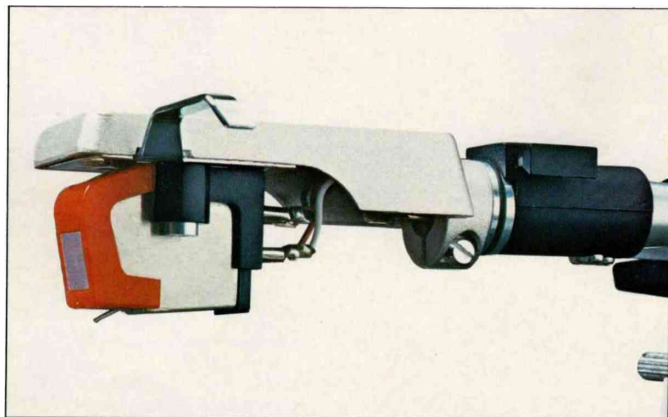
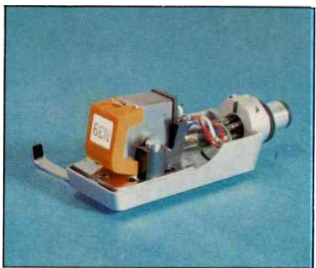






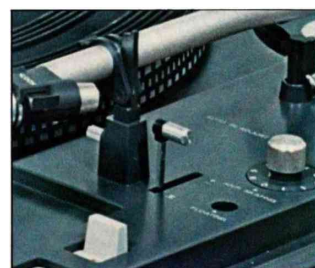
**4 Cartridge**

The cartridge is of the highly efficient moving magnet type, incorporating a tapered cantilever. By tapering the cantilever, which suspends the stylus, moving mass has in effect been reduced, thereby obtaining clear sound in the high range.



**5 Pause Mechanism**

It is sometimes desired to temporarily suspend playing. Operating this lever suspends the arm exactly in position while the motor and automatic mechanisms continue operating. When the lever is returned to its original position, the arm continues playing where it left off.



**6 Anti-Skating Device**

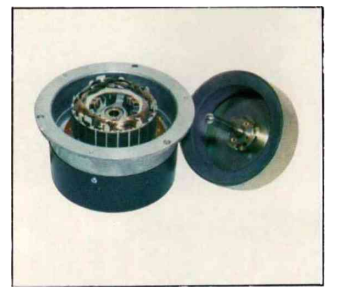
Most arms now available use "overhang" and "offset angle" to reduce tracking error and, for this reason, the stylus tip tends to give way to centripetal force with subsequent skidding. This force measures only about 1/10 of the tracking force, but it is the cause of unsteady tracking, especially when the tracking force is low. The anti-skating mechanism of the KP-5022 eliminates this skating force, without giving extra load to the arm, thus preventing reduction of sensitivity. Set the scale at the figure which corresponds to the tracking force—that is all that is required. This can be done even while a record is playing.

**7 Center Spindle**

The spindle has been given a mirror finish with the roll-vanishing process. The super-hard steel ball bearings are given the roll-vanishing process to assure quiet rotation.

**Direct-Drive Motor**

This 24-slot D. C. motor is controlled by electrical servo-amp, and direct coupled the turntable. The motor rotates accurately 33 1/3, 45 r.p.m., so that signal-to-noise ratio and wow + flutter are surprisingly improved.





### 8 Full-Auto Mechanism

The full-auto mechanisms that received acclaim in the KP-3021 have been further improved in the KP-5022. Auto-lead in and auto-cut operate with just a touch of a finger. A record can be repeated as often as desired merely by setting the repeat switch. And, the arm returns to its rest and the power is cut when play is finished. Manual operation is also possible.

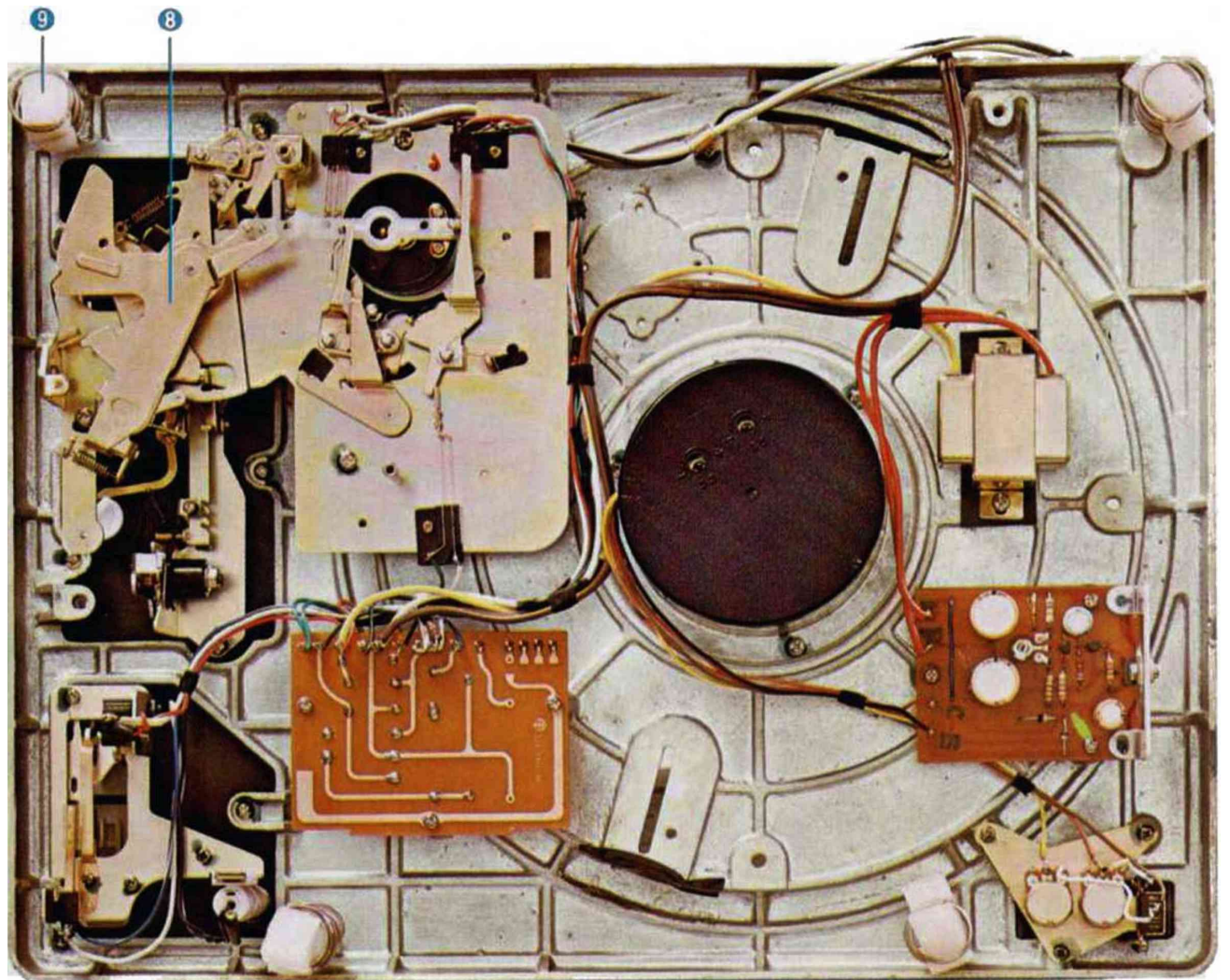
A new delay circuit eliminates the noise normally heard when the stylus contacts the record surface.

### 9 Panel Floating Mechanism

Howling is a phenomenon which occurs when the sound coming out of a speaker feeds back through the player. This is related to the location in the room of the player as well as the acoustic characteristics of the room. Howling prevents the user from increasing the volume and the quality of the sound cannot be improved even by lowering the volume below the setting where the howling occurs.

To prevent howling, KP-5022 is designed with the player board separated from where it is connected to the cabinet by eliminating the screws that tie the player board and the cabinet together.

It is, nevertheless, recommended that the player be installed where howling tends to be less.



### Stylus Gauge Lamp

The position of the stylus tip is related to overhang, so it is necessary for the stylus to be properly positioned. KP-5022 has a pilot lamp to make this adjustment simple while the arm is resting on the rest.

This adjustment is necessary whenever the cartridge is replaced.

### Strobo Scope

The Strobo Scope marks for 33-1/3 and 45 rpm (50/60 Hz) are engraved around the circumference of the turntable. The marks will appear to be not moving when the light from

a lamp is applied and the speed is adjusted correctly. This permits adjusting for perfect pitch. Separate controls are provided for 33-1/3 and 45 rpm.

### Cabinet

The cabinet, made of non-resonant, low expansion ABS resin, is an integral unit with many outstanding improvements.

Resonance of a player cabinet takes place, in most cases, when the power frequency is 50/60 Hz, or multiples thereof. The KP-5022 cabinet, therefore, has been constructed at the reduced resonance level of 6 dB (the ratio

obtained by Trio), assuming the resonance point at 110 Hz.

The possibility of improper contact or disconnection of the pin cord while the player is in operation is eliminated by a jack (on the back of the cabinet) disconnecting the interior wiring from the cabinet. The un-needed part of the AC cord is wound on a bobbin, keeping the entire layout neatly arranged.

### Dust Cover

The acrylic dust cover uses free-stop type hinges and can be easily removed when not needed.





## SPECIFICATIONS

Drive.....	.. Direct Center-drive
Motor .....	.. D C Servo Motor (8 pole 24 slot)
Turntable.....	..12 inch (30 cm) Solid die-cast aluminum alloy type
Speed .....	.. Two speeds. $33 \frac{1}{3}$ and 45 rpm
Wow-Flutter .....	..Less than 0.05 % (WRMS)
Signal to Noise Ratio ..	.. More than 58 dB
Speed Control Range ..	..Within $\pm 3\%$ (Individual control for $33 \frac{1}{3}$ and 45 rpm)
Tonearm .....	.. Static Balance Type. Tapered pipe arm Slide-locked EIA plug-in connector Direct-reading stylus pressure
Tracking Error.....	.. $\pm 1.5$ degree
Stylus Pressure Variable Range.....	.. 0 to 4 grams
<b>CARTRIDGE</b>	
Type .....	.. Moving magnet type
Freq. Response .....	.. 20 Hz - 20,000 Hz
Channel Separation _____	.. More than 25 dB (1,000 Hz)
Output .....	.. 5 mV (1,000 Hz. 50 mm/sec)
Output Balance .....	.. Less than 2.5 dB (1,000 Hz. 50 mm/sec)
Load Impedance .....	.. 50 k ohms
Stylus Pressure .....	.. $2 \pm 0.25$ grams
Stylus.....	.. 0.6 mil Diamond
Compliance .....	.. $7 \times 10^6$ cm/dyne
Replacement Stylus _____	.. Type N-39
Special Mechanism.....	.. Auto-in Auto-cut Auto-repeat Auto-return Manual-in Disc size selector Pause elevation Anti-skating control Head shell stand Height and flexibility-adjustable large insulator Pilotlamp for stylus adjust 24 pole synchronous gear motor for arm drive
Supplied Accessories ..	.. EP Adaptor Low capacity audio cord with Pin plug
Power Requirement _____	.. AC 110 - 120V/220 - 240V. 50/60 Hz
Power Consumption _____	.. 5 watts
Dimensions.....	.. W $18 \frac{31}{32}$ " (482 mm). H $6 \frac{1}{8}$ " (170 mm). D $13 \frac{1}{2}$ " (347 mm)
Weight .....	.. 19.8 lbs (9 kg)



# Kenwood KD-5066



## Description

The direct drive system in the Kenwood KD-5066 has a 20 pole, 30 slot DC servo motor which has excellent wow characteristics, providing great reliability and leading to longer life of the turntable.

## Specifications

Drive system:..... direct drive

Motor:..... 20 pole, 30 slot DC servo motor (for turntable), 24 pole synchronous gear motor

Platter:..... 30.5cm aluminium alloy diecast

Speeds:..... 33 and 45rpm

Wow and flutter:..... less than 0.03% WRMS

Rumble:..... -70dB

Tonearm:..... static balance type, s-shaped tonearm

Effective length:..... 215mm

Overhang:..... 9.5mm

Tracking force range:..... 0 to 3g

Cartridge weight range:..... 4 to 12g

Cartridge:..... V-41A (v shaped dual magnet type)

Stylus:..... N-41

Frequency response:..... 20 to 20,000Hz

Output:..... 2.0mV

Tracking force:..... 1.5 to 2.5g

Dimensions:..... 480 x 167 x 379mm

Weight:..... 10.5kg



# Vier Kenwood-Neuentwicklungen für anspruchsvolle Schallplattenliebhaber



KD-5033



KD-3033



KD-2033



KD-1022

**Höchste Leistungsklasse in jeder Preisklasse**  
Vom kleinsten bis zum größten Modell bietet Ihnen jeder der vier neuen Plattenspieler von Kenwood in seiner Preisklasse höchste Leistungsklasse. Alle Feinheiten und Strukturen eines Klangbildes, die verschlüsselt in den Rillen Ihrer Schallplatten ruhen, werden von diesen Plattenspielern ertastet und in höchster Wiedergabequalität gebracht. Modernste Kenwood-Technik, die sanft und zuverlässig mit Ihren Schallplatten umgeht, schenkt Ihnen unverfälschte unverzerrte Musikerlebnisse im klaren Reich der High Fidelity.

**Weltpitzenklasse der High Fidelity, der KD-5033.**  
**ein Plattenspieler für höchste Ansprüche**

**Direktantrieb** des Plattentellers durch einen 3poligen kollektorlosen Gleichstrom-Spaltpolmotor mit Servosteuerung. Ein Laufwerk mit extrem hoher Gleichlaufkonstanz. (Die Präzisions-Motorlager sind dauergeschmiert für 20000 Betriebsstunden.)

**Drehzahlfeineinstellung** bis auf 0,05 % genau durch eingebautes Stroboskop mit Glühlampe und Drehzahl-Feinregler.

**Vollautomatik**, abschaltbar, ein 24poliger separater Synchronmotor steuert den Tonarm.

**Tonarm**, S-förmig, resonanzfrei, kugelgelagert, statisch und lateral ausgewuchtet.

**Abtastsystem**, elektromagnetisch, höchste Klangqualität, Frequenzgang 10 bis 25 000 Hz  
**Viele Besonderheiten:** Wiederholerschaltung, Pausenschaltung, während des Abspielens einstellbare Anti-Skating-Einrichtung, verstellbare Auflagekraft, vibrationsfreie Aufhängung, neue platzsparende Abdeckhaube u. v. a.

**Die anderen neuen Modelle von Kenwood**  
**KD-3033**  
Betriebsarten: vollautomatisch und manuell  
**KD-2033**  
Betriebsarten: halbautomatisch und manuell  
**KP-1022**  
Betriebsart: manuell

Modell	KD-5033	KD-3033	KD-2033	KP-1022
Motor	Servogesteuerter Gleichstrommotor	Synchronmotor	Synchronmotor	Synchronmotor
Antrieb	direkt	Riemenantrieb	Riemenantrieb	Riemenantrieb
Drehzahl	33,33 und 45 U/Min	33,33 und 45 U/Min	33,33 und 45 U/Min.	33,33 und 45 U/Min
Stör/Nutzsignalabstand	> 58 dB	> 49 dB	> 49 dB	> 47 dB
Gleichlaufschwankungen	< 0,05%	< 0,06 %	< 0,06 %	< 0,07 %
Frequenzgang	10 Hz - 25 kHz	20 Hz - 20 kHz	20 Hz - 20 kHz	20 Hz - 20 kHz
Tonabnehmersystem	magn V-46	magn V-39 MK-II	magn. V-39 MK-II	magn V-39 MK-II
Abmessungen				
Breite	480 mm	480 mm	480 mm	446 mm
Höhe	168 mm	168 mm	168 mm	175 mm
Tiefe	350 mm	350 mm	350 mm	354 mm
Gewicht	10 kg	7 kg	6 kg	6 kg



# Kenwood KD-500



## SPECIFICATIONS

### MOTOR and TURNTABLE

<b>Drive System</b>	Direct drive system
<b>Motor</b>	8 pole 24 slot brushless DC servo motor
<b>Turntable Platter</b>	30 cm (12") diameter 1.5 kg (3.3 lbs.) weight Aluminum alloy die-cast
<b>Speeds</b>	2 speeds, 33-1/3 and 45 rpm
<b>Speed Control Range</b>	Within $\pm 8\%$ (Individual control for 33-1/3 and 45 rpm)
<b>Wow and Flutter</b>	Less than 0.03% (WRMS) DIN $\pm 0.05\%$
<b>Signal to Noise Ratio (Rumble)</b>	JIS Better than 60 dB DIN unweighted Better than -50 dB DIN weighted Better than -70 dB

### TONEARM

<b>Type</b>	Static-balance type, S-shaped pipe arm, EIA plug-in connector
<b>Effective Arm Length</b>	237 mm (9-5/16")
<b>Over-Hang</b>	15 mm (9/16")
<b>Tracking Error</b>	$\pm 1.5$ degree
<b>Stylus Pressure Variable Range</b>	0 to 4 grams
<b>Usable Cartridge Weight</b>	5 to 12 grams (Supplied head shell..... 11 grams)

### CARTRIDGE

<b>Type</b>	Moving magnet type (V-46)
<b>Frequency Response</b>	10 ~ 25,000 Hz
<b>Channel Separation</b>	Better than 25 dB (1,000 Hz)
<b>Output Voltage</b>	3 mV ( 1,000 Hz, 5 cm/sec. )
<b>Output Balance</b>	1.5 dB ( 1,000 Hz, 5 cm/sec.)
<b>Load Impedance</b>	50 k ohms
<b>Stylus</b>	0.5 mil diamond
<b>Stylus Pressure</b>	1.5 $\pm 0.5$ grams
<b>Compliance</b>	10 x 10 <sup>-6</sup> cm/dyne
<b>Replacement Stylus</b>	N-46

### MISCELLANEOUS

<b>Power Consumption</b>	9 watts
<b>Dimensions</b>	W 502 mm (19-3/4") D 382 mm (15") H 162 mm (6-3/8")
<b>Weight</b>	15.5 kg (34.2 lbs) KD-550 14.9 kg (32.8 lbs.) KD-500
<b>Special Features</b>	Stroboscope with lamp Fine speed adjusting control Anti-skating device (KD-550) Oil damped arm elevation (KD-550) Stylus pressure direct-readout counter (KD-550) Height adjusting insulation Free stop action dust cover Low capacity audio cord (KD-550) Head shell stand
<b>Supplied Accessories</b>	EP adaptor (with over-hang checker), Head shell Ground wire Hexagonal wrench Arm base (KD-500)



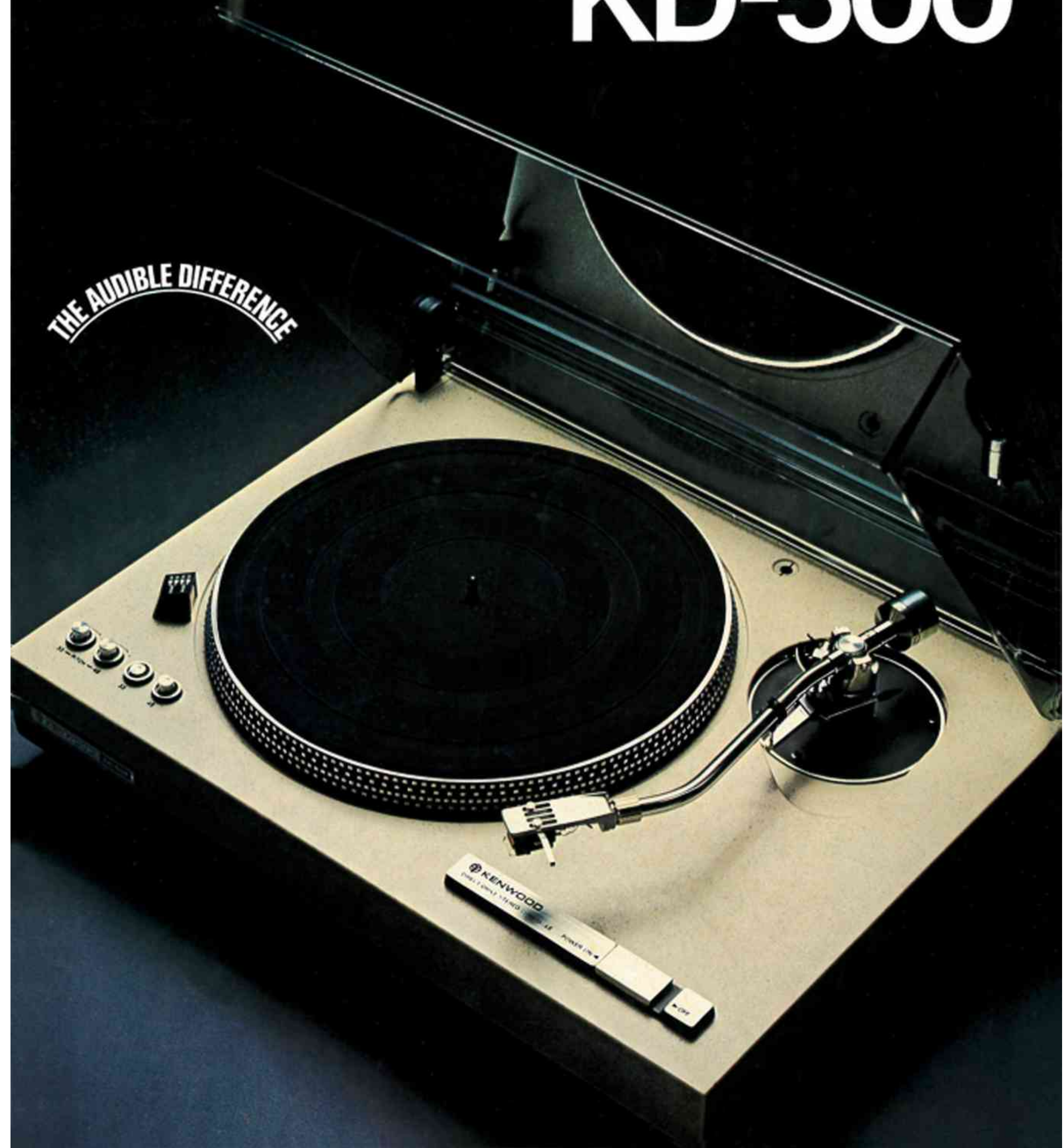
 **KENWOOD**

DIRECT DRIVE HIGH FIDELITY TURNTABLES

# KD-550

# KD-500

THE AUDIBLE DIFFERENCE





# Kenwood KD-500/550

## Direct-Drive Turntables That Re-define The State of The Art

Representing the most advanced state of the art of turntable design, the Kenwood KD-500 and KD-550 are, simply, two of the finest turntables presently available from any source. What this means to the purchaser is audio performance in which the various degrees of error—acoustic feedback, speed fluctuation, wow & flutter, etc.—are held within values too minute to be perceptible to even the most acute sense of hearing.

Kenwood has achieved this remarkable performance through the use of bold, innovative technology which does not hesitate to cast aside conventional methods when progress demands. A case in point is the cabinet, probably the first unusual feature you will notice about the KD-500/550, because of its marble-like appearance. While this cabinet is one of the most attractive we have ever designed, appearance was not the primary concern in its selection. The compression molded resin concrete of which it is made happens to provide the most effective damping of acoustic feedback of any material currently available.

Likewise, in designing the direct drive motor system, we were not content to use one of the speed control systems based on conventional principles, but developed a vastly improved solution in the form of a frequency generator which provides speed stability unaffected by changes in external load, temperature or other outside factors.

The same design philosophy continues in the tonearm of Model KD-550. To prevent mechanical resonances, vibrations and unwanted “play,” a radically new type of pivot has been developed that imparts maximum stability. Moreover, the arm is mounted on a lauan plywood base board specially selected for its resonance damping qualities. (Model KD-500 is identical in its cabinet and drive system, but is supplied without tonearm. Two tonearm base boards are, however, supplied. One of these is prepared for mounting of the SME -3009 laboratory reference arm.)

We think you will find the facts about the Kenwood top-of-the-line turntables rewarding reading. Kenwood dealers look forward to an opportunity to demonstrate first-hand what Kenwood turntables mean in terms of listening enjoyment.

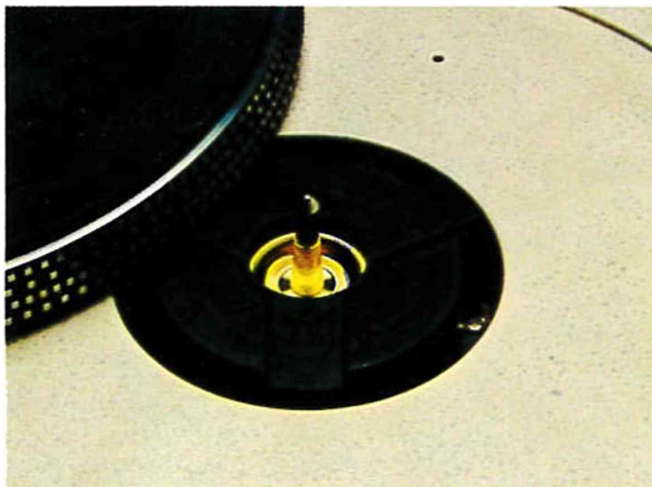


Direct-Drive DC Motor with Frequency Generator Servo-Control Concept is Reality with New Kenwood Design.

The direct-drive, DC servo motor of the KD-500/550 represents the finest in turntable drive systems. The rotational speed of the platter is controlled not by the frequency or voltage of the AC current, but by a frequency generator — speed transducing system. The frequency generator emits a signal of constant frequency, and platter speed is compared with this by means of a light-emitting diode transducing system. If there is the slightest fluctuation between the reference frequency and the frequency resulting from platter rotation, a corrective current precisely proportionate to the fluctuation is supplied to the motor. The result is near perfect speed stability, regardless of AC frequency or voltage, or of ambient conditions such as room temperature.

When you consider the changing load conditions imposed on the motor as a result of different tracking force settings,

the addition of record cleaning arms, and the variations in stylus drag which occur constantly as the stylus tracks alternately in empty grooves, and grooves into which lands and valleys have been inscribed to create the audio signal, the value of the 800 g-cm corrective torque of the KD-500/550 can easily be appreciated. What will also impress you about this powerful drive motor is its very short build-up time. The accelerative force of the motor is sufficient to bring the very heavy platter from a standstill to a full rated 33-1/3 rpm in 1.65 seconds.



Wow & Flutter Undiscernible to the Ear

The frequency generator servo control in use with the DC direct drive motor provides a wow & flutter rating that is below the limits of perception of the human ear. The 0.03% WRMS rating of the KD-500/550 is half that obtained with conventional voltage-derived servo systems, and a small fraction of the 0.2% WRMS shown on the best of idler drive turntables. Where audio enjoyment is concerned, this imperceptible wow and flutter rating means that there is no apparent low frequency pitch variation or high frequency tone irregularity.

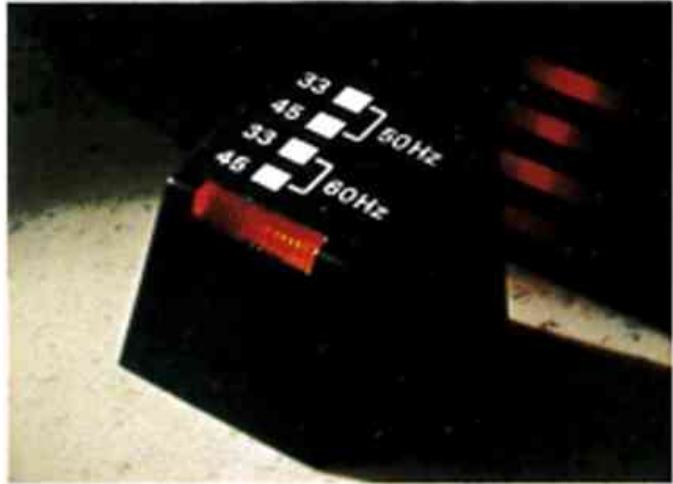
Wide-Angle Stroboscope for Viewing Convenience

The outer edge of the turntable platter is provided with four rows of strobe light markings by means of which platter rotation speed is monitored and adjusted. The four rows of markings permit check-



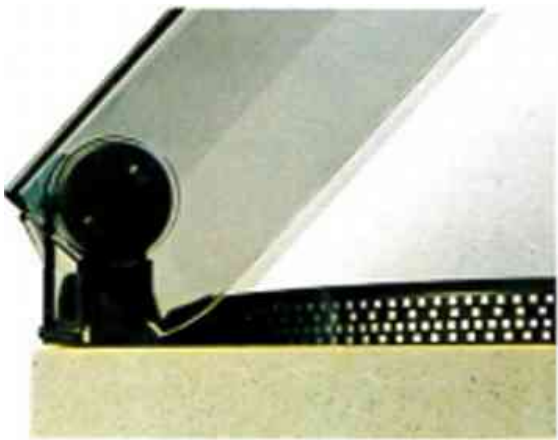


ing of 33-1/3 and 45 rpm speeds at either 50 or 60 Hz. For instant verification of platter speed at convenient distances from the turntable, the stroboscope has been designed to give bright, wide-angle illumination. Independent fine speed controls are provided for 33-1/3 and 45 rpm speeds. This feature allows precise adjustment of one speed without upsetting the adjustment of the other.



#### Space Saving Hinge

The cover hinge is of flush-back construction, which means that the rear of the cover will not project beyond the turntable cabinet when the cover is opened. The advantage of this feature to the user is that the turntable may now be placed flush against a wall, without annoying interference when the cover is raised.



#### Solid Acrylic Dust Cover Provides Additional Isolation From Acoustic Feedback

The extra-heavy dust cover of die-cast

acrylic plastic is a full 3.5 mm thick to dampen feedback resonance transmitted through the air before it is picked up by the record and tonearm/cartridge. The cover is as attractive as it is functional, and forms an integral part of the KD-500/550 turntable.

## KD-550 With Kenwood Precision Ibnearm

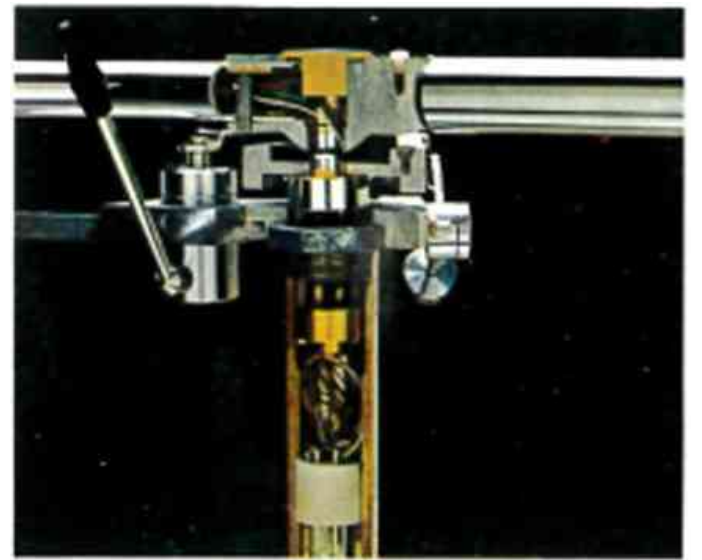
Radically New Tonearm  
Construction Prevents Vibrations

Whereas high quality tonearms of the past have achieved a remarkable degree of refinement in their tracing ability and geometrical accuracy, one problem area remained to be solved: how to combine high vertical and lateral sensitivity with stable pivot construction free from play and mechanical looseness. Kenwood engineers found a solution in the form of a radically new pivot construction (see cut-sample photograph).

This one-point pivot, although resembling a gimbal suspension in its appearance, possesses a higher center of gravity for improved tracing behavior. A special "play adjust" screw permits optimum tightening of pivot firmness after the arm has been mounted, preventing play and looseness from interfering with arm performance even after extended periods of use.

#### Ultra High Sensitivity — Arm Responds to Force of 10 Milligrams

Arm sensitivity is a good indicator of its ability to trace the most violent groove undulations at the lightest tracking forces that the cartridge will permit. In the KD-550's tonearm, this sensitivity is so high that the arm will respond to a force as minute as 10 milligrams, in horizontal or vertical direction. This figure amply corroborates Kenwood's claim to leadership in ultra precision engineering.



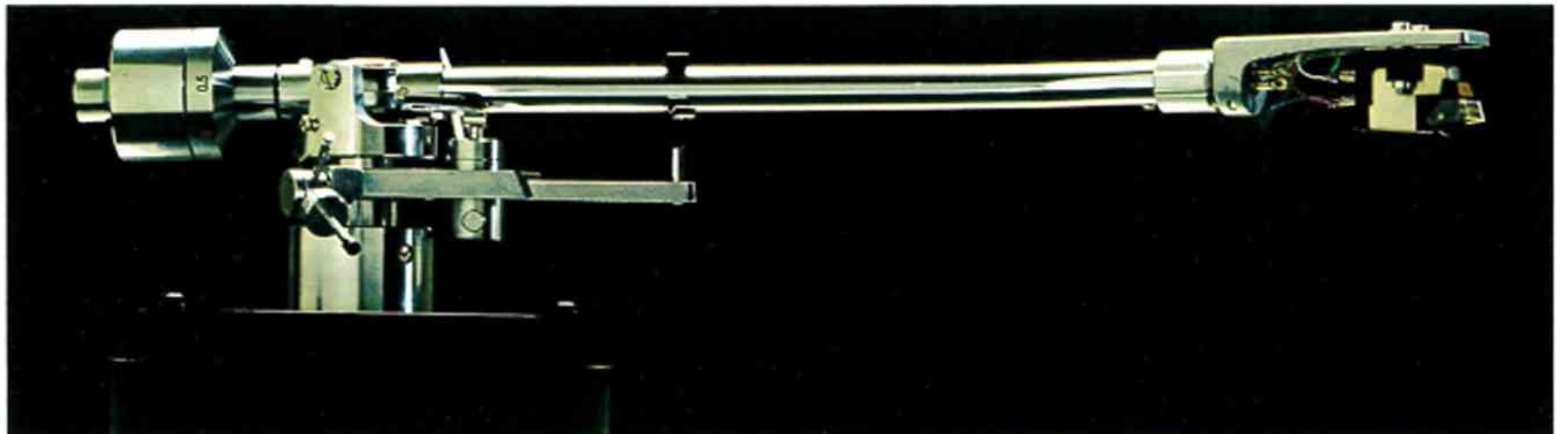
#### Low Capacitance Phono Cables for Optimum CD-4 Reproduction

Conventional phono cables (the cords that connect the turntable to the amplifier) suffer from a phenomenon called "stray capacitance," and this can seriously limit the transfer of the supersonic frequencies needed for effective playing of CD-4 ("Quadradisc") records. Kenwood equips the KD-550 with specially designed cables that cause no appreciable high frequency losses, for optimum playing of CD-4 discs.

## KD-500 Without tonearm

Supplied without Tonearm to Enable You to Fit the Model of Your Choice

Two lauan plywood damped tonearm bases are provided with the KD-500 model to accommodate most high quality accessory tonearms. The owner of this turntable will, of course, want to select the best of tonearms, as only these will display to full advantage the outstanding qualities of this, the finest turntable in the Kenwood line. The second tonearm base supplied with the KD-500 has a mounting hole drilled for attaching an SME Model 3009 laboratory reference tonearm, for the ultimate in audio pickup systems.





# Anti-Resonance Compression Base

## Acoustic Feedback Damping Begins with ARCB Cabinet

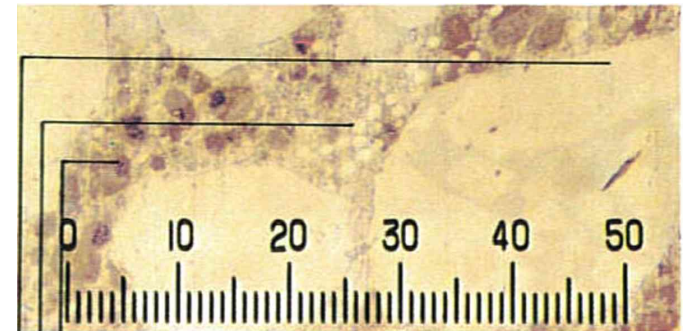
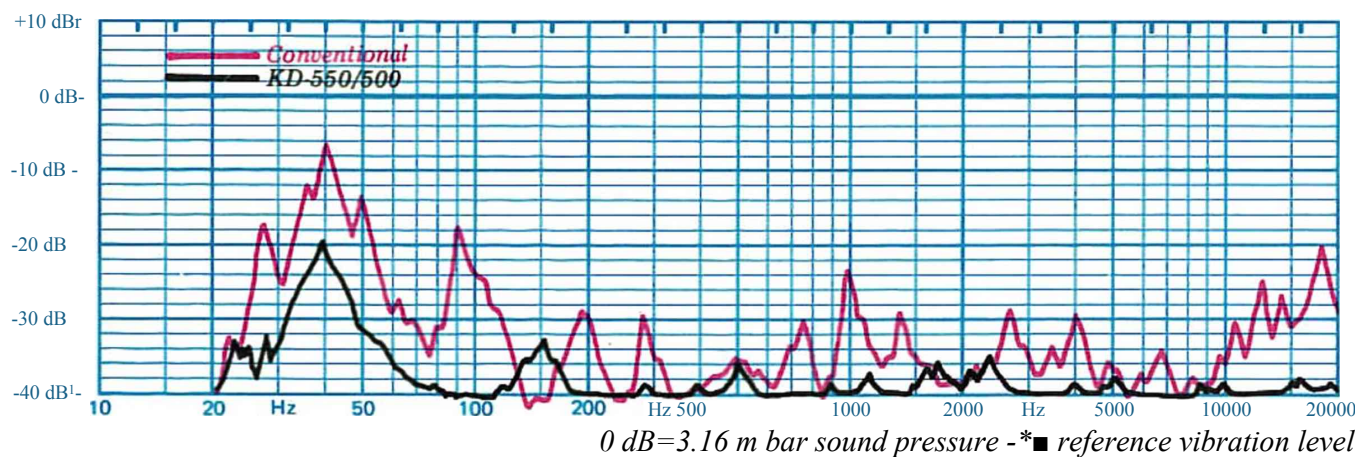
We took particular care in designing the KD-500 and KD-550 turntables to prevent floor — as well as acoustic feedback from reaching the record or tonearm. For cabinet material, the KD-500 and KD-550 use a special compression-molded resin concrete called ARCB. This massive ARCB is compression molded from limestone particles, unsaturated polyester

resin, limestone and glass powders. The base is not only structurally rigid but provides damping characteristics below approx. 1 kHz frequency far superior to other materials in use.

To complement the remarkable damping qualities of this revolutionary base material, Kenwood further isolated the turntable platter from feedback with a sub-base of 18 mm thick lauan plywood which has excellent damping properties at high frequencies. The tonearm base is

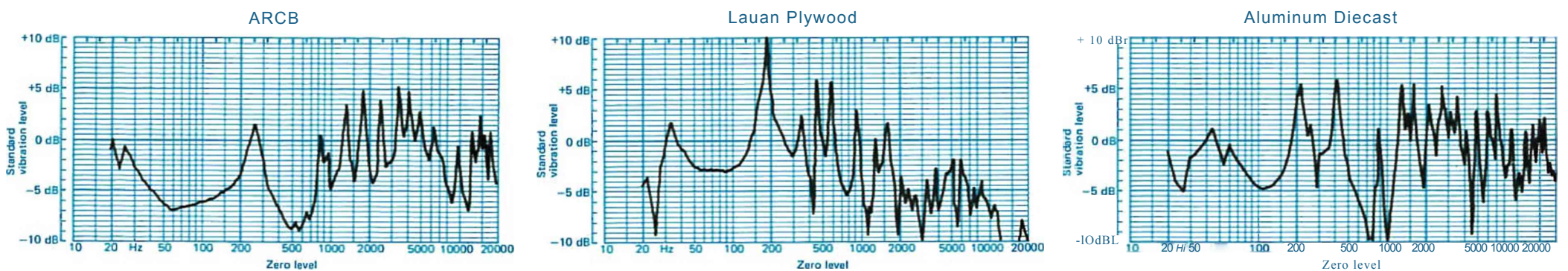
mounted on a block of lauan plywood 21 mm thick and 108 mm across. A rubber sheet provided on the turntable platter isolates the record from high frequency vibration, and the base itself is mounted on rubber dampened insulators. The outstanding and complementary characteristics of resin concrete, lauan plywood, and rubber have been combined to create a turntable with remarkably low sensitivity to resonance feedback frequencies across the entire audio spectrum.

## Excitability of KD-550 Turntable Base vs. Conventional Turntable Base at Various Frequencies



- ^Black particles: glass powder, particle size 10—100 microns
- White particles: polyester resin, spherical, particle size less than 10 microns
- Limestone: Particle size up to 5 mm.

## Resonance of Different Base Materials at Various Frequencies



## Vibration Attenuation of Different Base Materials at 250 Hz

ARCB Attenuation coefficient delta = 0.28

Luan Plywood delta = 0.067

Aluminum Diecast delta = 0.024



# Kenwood KD-500/550

## SPECIFICATIONS

**Model: KD-550**

### MOTOR & TURNTABLE

Drive System.....	Direct-Drive System
Motor.....	Brushless DC Motor with Frequency Generator Servo-Control
Turntable Platter.....	30 cm (12 inch) Diameter, Aluminum Alloy Die-Cast, Weight 1.5 kg (3.3 lbs)
Speeds.....	2 speeds, 33-1/3 and 45 rpm
Speed Control Range.....	Within ±8% (Individual Control for 33-1/3 & 45 rpm)
Wow & Flutter.....	Less than 0.03% (WRMS)
Rumble.....	DIN Weighted Better than—70 dB DI N Unweighted Better than —50 dB

### TO NEARM

Type.....	Static-Balance Type, S-Shaped Pipe Arm Universal 4-PIN Connector
Effective Arm Length . . . .	237 mm (9-5/16 inch)
Overhang.....	15 mm (9/16 inch)
Tracking Error.....	±1.5 Degree
Stylus Pressure Variable Range.....	0 to 4 grams
Usable Cartridge weight . . .	5.0 to 12.0 grams (Furnished Head shell weight 11.0 grams)

### CARTRIDGE

(U.S.A., Canada, England & South Africa Model are not equipped with the V-46 cartridge)

Furnished Cartridge.....	V-46
Stylus.....	N-46 with 0.5 mil Solid Diamond Stylus Tip
Frequency Response.....	10 to 25,000 Hz
Output Voltage.....	3 mV (1,000 Hz, 5 cm/sec.)
Optimum Tracking Force . . .	1.5 ± 0.5 grams
Load Impedance.....	50 k ohms
Replacement Stylus.....	N-46

### MISCELLANEOUS

Power Requirements.....	60 Hz 120V (U.S.A. & Canada model) or 50/60 Hz 110-120/220-240V switchable
-------------------------	--

Power Consumption.....	9 Watts
Dimensions.....	W 502 mm x H 162 mm x D 382 mm W 19-3/4" x H 6-3/8" x D 15"

Weight.....	15.5 kg (34.2 lbs)
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<b>Additional Features.....</b>	Anti-Skating Device Oil-Damped Cueing Device Stylus Pressure Direct-Readout Counter Stroboscope with Lamp Adjustable Fine Speed Controls Adjustable Height Insulator Free Stop Action Dust Cover Low Capacitance Audio Cables Head Shell Stand EP Adaptor with Overhang Gauge Head Shell, Grand Wire Hexagonal Wrench
---------------------------------	--

### Supplied Accessories



**KD-500**  
without Tonearm

**Model: KD-500**

### MOTOR & TURNTABLE

Drive System.....	Direct-Drive System
Motor.....	Brushless DC Motor with Frequency Generator Servo-Control
Turntable Platter.....	30 cm (12 inch) Diameter, Aluminum Alloy Die-Cast. Weight 1.5 kg (3.3 lbs)
Speeds.....	2 speeds, 33-1/3 and 45 rpm
Speed Control Range.....	Within ±8% (Individual Control for 33-1/3 & 45 rpm)
Wow & Flutter.....	Less than 0.03% (WRMS)
Rumble.....	DIN Weighted Better than —70 dB DI N Unweighted Better than —50 dB

### MISCELLANEOUS

Power Requirements.....	60 Hz 120V (U.S.A. & Canada model) or 50/60 Hz 110-120/220-240V switchable
-------------------------	--

Power Consumption.....	9 Watts
Dimensions.....	W 502 mm x H 162 mm x D 382 mm W 19-3/4" x H 6-3/8" x D 15"

Weight.....	14.9 kg (32.8 lbs)
-------------	--------------------

<b>Additional Features.....</b>	Stroboscope with Lamp Adjustable Fine Speed Controls Adjustable Height Insulator Free Stop Action Dust Cover Head Shell Stand
<b>Supplied Accessories.....</b>	EP Adaptor with Overhang Gauge Grand Wire Additional Arm Base for SME Tonearm Hexagonal Wrench

### CABINET MATERIALS . . . Construction of Cabinet is

	Anti-Resonance Compression Base (ARCB) with Luan Plywood Board.
	This Massive ARCB is Compression Molded from Limestone Particles, Unsaturated Polyester Resin, Limestone & Glass Powders.
Cabinet Weight.....	9.3 kg (20.5 lbs)
ARCB weight.....	7.9 kg (17.4 lbs)

### RELATIVE PROPORTIONS OF THE MAIN COMPONENTS OF ARCB

Limestone . . . . .	particle diam 3—5 mm	
	10—200 μ	60% w/w
	< 10/1	
Polyester resin.....	25% w/w	
Polyvinyl chloride powder . . .	Particle diam 10—30 μ	5% w/w
Glass powder.....	Several percent	
Ainc stearate (releasing agent)		

The above specifications may be changed or modified without notice.

A product of  
**TRIO-KENWOOD CORPORATION**

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 **KENWOOD**

**KD-650**  
**KD-600**

QUARTZ PLL DIRECT DRIVE TURNTABLES





# Quartz phase-locked speed control combined with a high-inertia platter produces outstandingly authentic music reproduction from records.

- \* High-inertia platter: 550kg-cm<sup>2</sup>
- \* Quartz PLL servo speed control
- \* ARCB limestone-resin-concrete base

Complex signal-imprinting processes that provide records with wider dynamic range, combined with more subtle reproduction from technology based upon transient load theory and a new generation of cartridges, are allowing its strong emphasis on resonance suppression, today's record fan to be more critical of reproduced sound quality than ever before. Setting the pace for the serious audiophile is the new Kenwood KD-650/600, a turntable capable of reproduction.

reproducing the most complex musical passages with accuracy and authenticity. With its new the KD-650/600 turntable demonstrates once again Kenwood engineers' deep commitment to the improvement of quality in sound



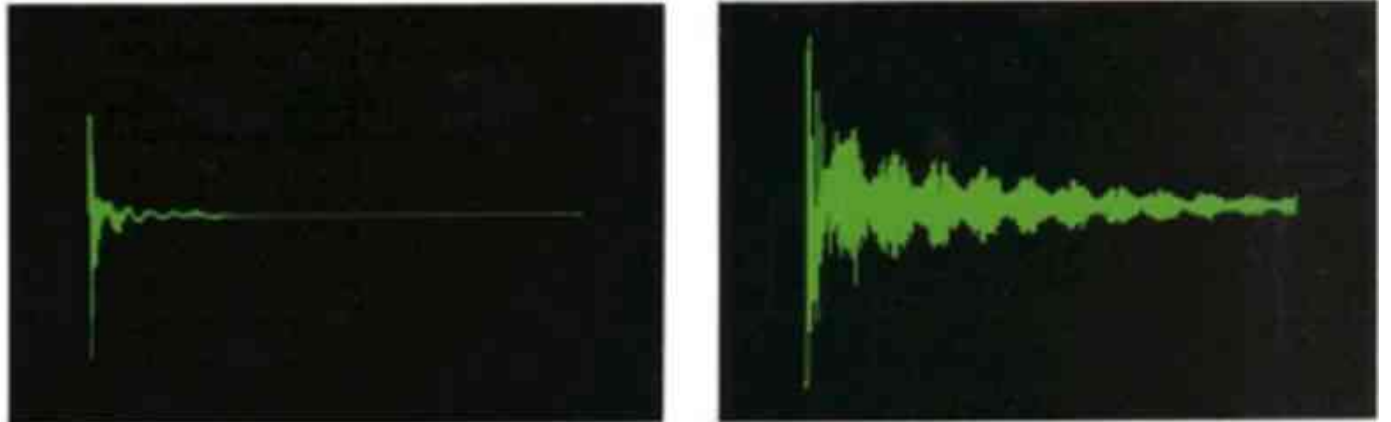
## A High-Inertia Platter

The greater a platter's moment of inertia, the better it will resist all external disturbances, which include fluctuations in transient load dictated by the actual signal, stylus-drag load, pivot bearing friction, as well as all vibrations from the motor, transformer, floor, or sound pressure waves generated from the speakers. With its heavy weight of 2.6 kg (5.7 lbs) and extremely high moment of inertia of 550 kg-cm<sup>2</sup>, the platter of the KD-650/600 is fully capable of resisting or absorbing any external influence, and thus minimizes the margin of error over which the quartz servo speed control system has to operate. As a result, the high-inertia Kenwood platter is the over-riding factor in \*

KD-650/600 loaded with a 550kg-cm<sup>2</sup> With conventional 200kg-cm<sup>2</sup> platter  
platter

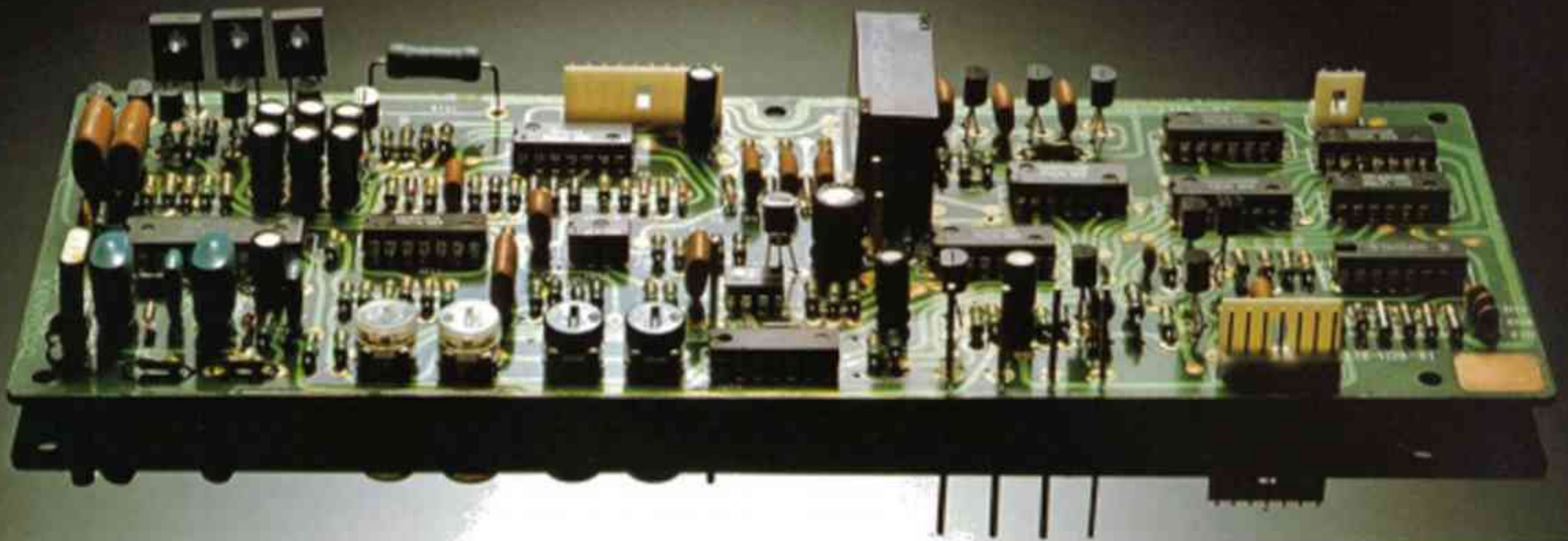
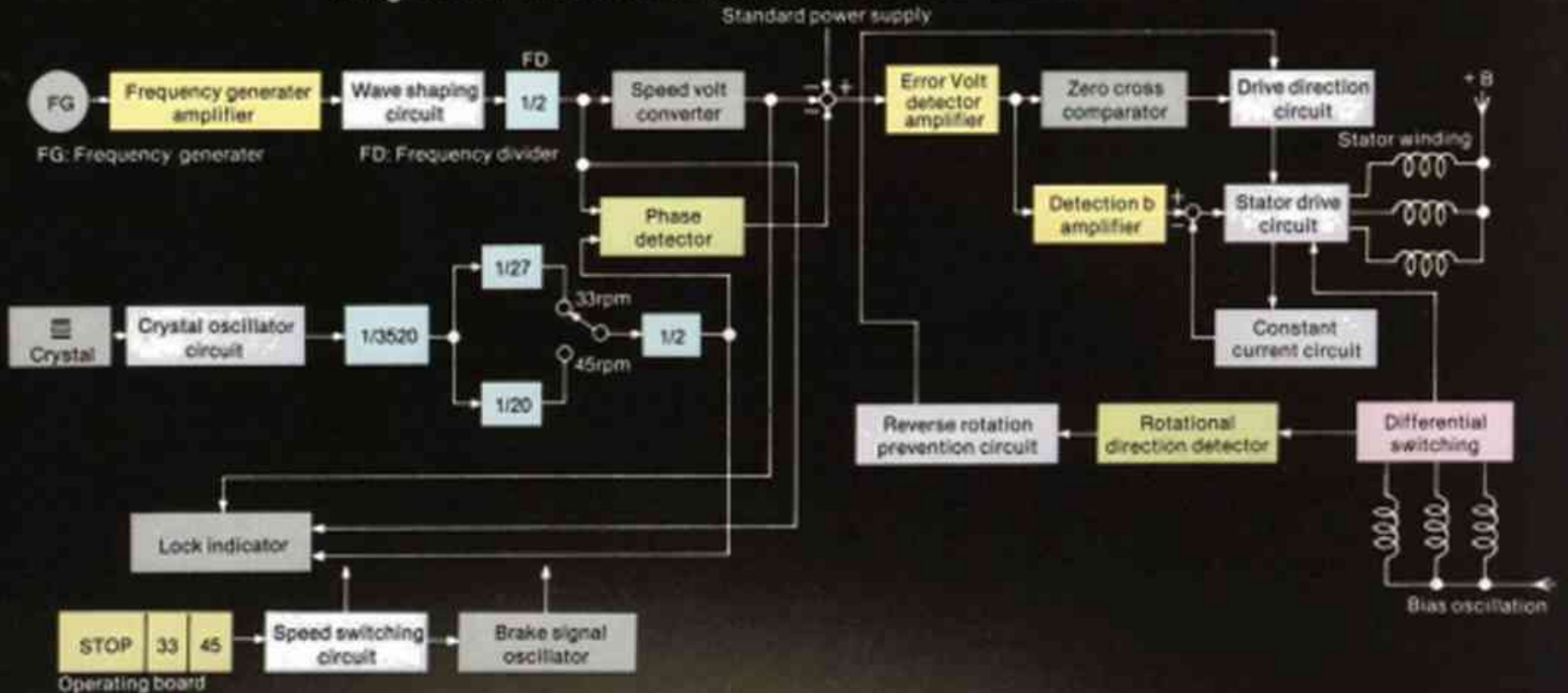


The KD650/600's extra-heavy platter provides a high 550 kg-cm<sup>2</sup> moment of inertia capable of absorbing all external influences, complemented by quartz phase-locked speed control accuracy.



Scope traces show how Kenwood's heavier 550kg-cm<sup>2</sup> inertia platter quickly stabilizes after shock is given- to center shaft.

## Diagram of PLL control circuit in the KD-650 /KD-600



A mechanical 180-tooth speed detector and a linear speed control signal provided by the Kenwood Speed-Volt servo motor ensure that the quartz PLL circuit maintains maximum platter rotation accuracy



obtaining the KD-650/600's remarkable transient accuracy. This can be seen in the performance data: 0.00015% transient load fluctuation at mid-frequency, with a typical 20 g-cm stylus load at 33-1/3 rpm.

### How the Quartz PLLIC Controls Motor Speed, Platter Rotation

Although quartz crystal oscillation used as a standard reference signal is an extremely accurate way of measurement, other factors can diminish this accuracy. For example, ordinary quartz systems using printed magnetic coating or machine-pressed slit-disk systems as the speed detector are inherently inefficient, and their accuracy can also deteriorate with time. The Kenwood system is a purely mechanical integration-type detection system linked with a new Speed-Volt motor. Unlike conventional signal-pulse detection



methods, servo feedback is provided by a 180-tooth precision-cut wheel. These teeth generate pulses whose frequency varies linearly with rotational speed. Moreover, the reversible Speed-Volt servo motor directly converts the fluctuations of platter speed into a linear control signal (ordinary FG servo systems cannot produce a linear signal). Because it is linear, the quartz oscillator is able to operate more efficiently in a true negative feedback system. A large-scale IC, which includes highly stable MOS FETs provides a circuit entirely unaffected by temperature or moisture. An advantage of the linear speed con-

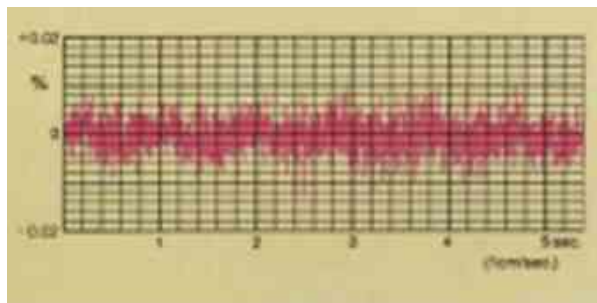
trol factor is that it eliminates the low-pass filter usually used to block unwanted oscillation that occurs at the resonant frequency ( $f_0$ ) of the turntable system. In this way, every element designed into the KD 650/600 contributes to extreme stability and accuracy, creating ideal conditions for playback of records.



*Quartz lock indicator lights up when PLL circuit is locked and turntable is operating at correct speed*

### 0.025% (WRMS) Wow-And Flutter

In a turntable, various elements can produce wow-and-flutter, a combination of slow and fast variations in pitch which can be highly audible if uncorrected. Wow-and-flutter in the KD-650/600 has been reduced to 0.025% (WRMS). This has been achieved by the incorporation of the high-inertia platter and the quartz phase-locked servo circuit, and by the development of a new 20-pole 30-slot brushless DC motor. Designed with extremely high torque to drive the extra-heavy platter, this new motor offers an important advantage over other motors. Its 30-slot design eliminates the common fault of erratic delivery of energy during the motor's current-switching process, a phenomenon known as "cogging".



*Kenwood's 20-pole 30-slot brushless DC servo motor combines with the high-inertia platter and quartz PLL circuit to produce extremely low wow-and-flutter.*

### Smooth Operation

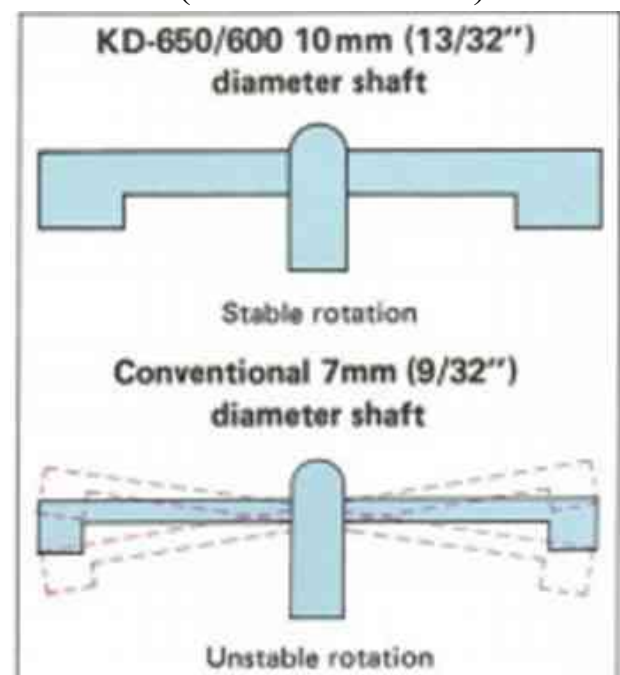
In addition to the high starting torque (1.5 kg-cm) motor, the PLL reversible servo circuit maintains accurate platter speed deviation control in both directions, which results in exceptionally smooth start-up and stop, as well



as smooth direct changes between speeds. A digital touch-sensing start/stop switch eliminates potentially harmful vibration. The braking system is all-electronic: it utilizes the polarity of a motor coil to slow down the platter smoothly without placing any load on the servo motor.

### Direct-Drive System Uses 1.1-inch Diameter Center Shaft

With many inferior direct drive designs a weak point lies in the use of an inadequate center shaft which in fact is the focal point for long-term drive stability. The KD-650/600 uses an unusually large diameter (10 mm or 13/32") shaft



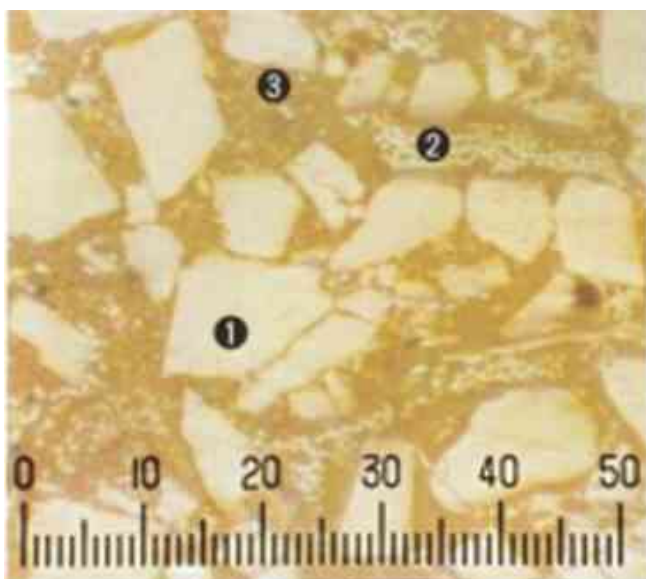
*A precision finished high quality stainless steel core rotates totally enclosed in a brass friction-free sleeve for rock steady vibrationless rotation.*



as an integral part of the direct drive system, ensuring maximum mechanical impedance, or firmness, between the turntable and the cabinet. A very low rumble figure of better than  $-75$  dB (DIN wtd) is one result.

### An Anti-Resonance Turntable Base

“Howling”, or acoustic feedback, is often caused in a turntable which uses inferior materials in its construction. It is created when vibrations from the floor or other structures, or when sound pressure waves generated by the speakers and reflecting off room surfaces, reach the cartridge. Acoustic feedback within the system itself can also be a problem. Because resonances can occur at any frequency with various materials, a quality turntable must use only the best cabinet materials which will damp and absorb resonance over the whole frequency range. Thus the KD-650/600 uses a double construction which bonds the main top layer of ARCB resin-concrete with a bottom layer of hard homogenized compression board. Together, they form a compact, rigid structure capable of damping resonances to a high degree over the whole frequency range.



- Limestone particles
- Glass powder
- Polyester resin and limestone powder

*Compression molded using natural limestone particles. Kenwood-developed A RCB is one of the most effective materials for damping low frequency resonance. A bottom layer of hard homogenized compression board effectively damps high range resonance.*

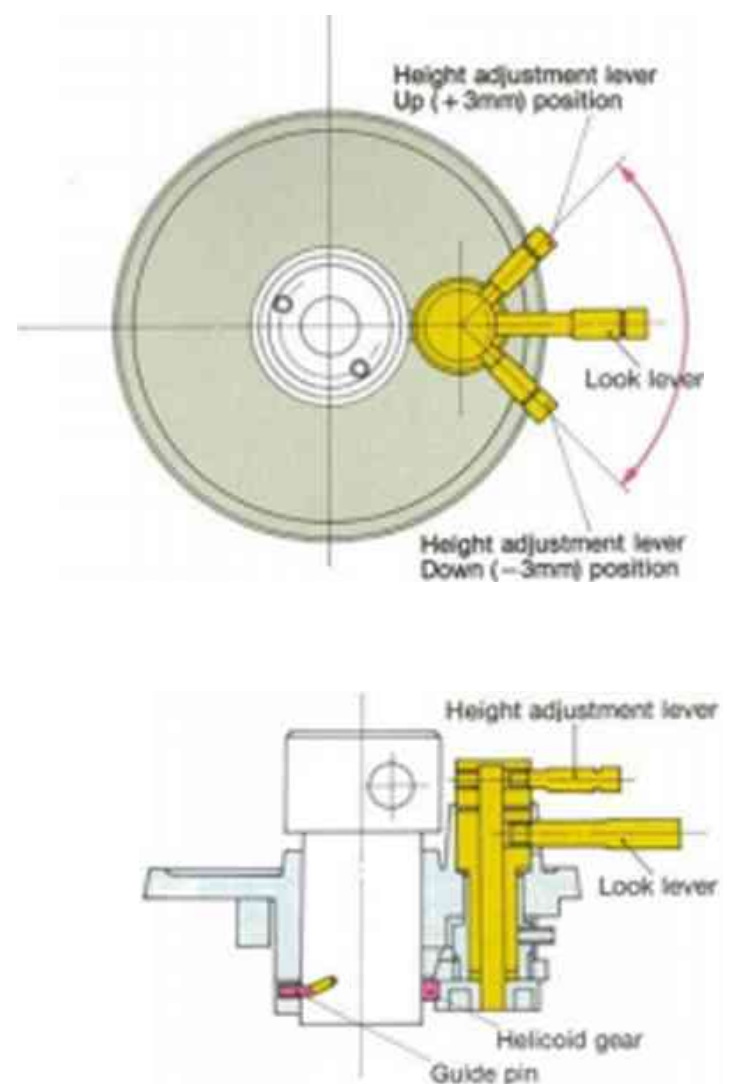


*The KD-650 non-résonnant tonearm assembly is a remarkable achievement in tonearm design, providing precision in every detail and performance that matches the high level of the turntable assembly. It is, in fact, an integral part of the KD-650 system.*

### Kenwood's Integrated High Performance Tonearm For The K1V650

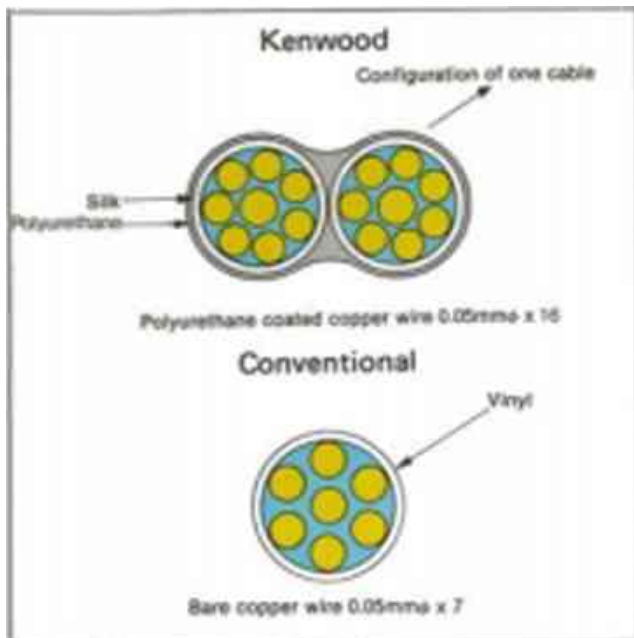
This is a carefully designed tonearm that fully matches the high level of performance obtained with the turntable assembly. Its proven S-shaped static balanced design with a hand-made brass pivot bracket provides low tracking error to reduce harmonic distortion, and resonance suppression adequate for most cartridges. It is light and flexible, but possesses sufficient strength and mass to prevent mistracking or “shimmy”, at the same time being highly responsive to groove modulations. But this is more than just an efficient tonearm, for it is designed as a totally integrated part of the KD-650 system. Every detail of its performance has been taken into account. For example, its wide-diameter thick diecast aluminum base is attached directly to the ARCB cabinet base using machine screws to obtain a very high mechanical impedance. A layer of anti-resonant hard rubber is sandwiched in between. A new wedge-shaped chuck system is used to attach the tonearm firmly to the base. This is both highly rigid and easy to operate, and results in a contact rigidity some 45 times greater than that obtain-

ed with ordinary screws. Since many users of this high quality turntable will undoubtedly wish to select their own cartridges, tonearm height is adjustable by a smooth operating helicoid mechanism (like that used for cameras) to  $\pm 3$  mm ( $\pm 1/8$ "). In addition,



*High-precision helicoid arm adjustment permits use of different types of cartridge.*





*Silk-wound parallel Penta-Litz wire offers the advantage of low resistance to maintain tonal Quality.*

a common resonance problem caused by the resonant frequency ( $f_0$ ) of the counterweight is solved by an elastic decoupling method. Arm elevation is by a non-reaction oil-damped sealed cueing device designed to prevent "bounce". Static type anti-skating control is also provided. Inside the tonearm, new silk-wound low resistance parallel Penta-Litz wire (patent pending) reduces signal loss, crosstalk and capacitance. All contact points are gold-plated. The bracket which supports the pivot is made of brass and uses no parallel faces, thereby preventing resonance. Finally, the headshell of lightweight diecast aluminum uses a unitized construction and industrially-derived Collet chuck system to increase its rigidity and lower its resonance into the "safe" range.

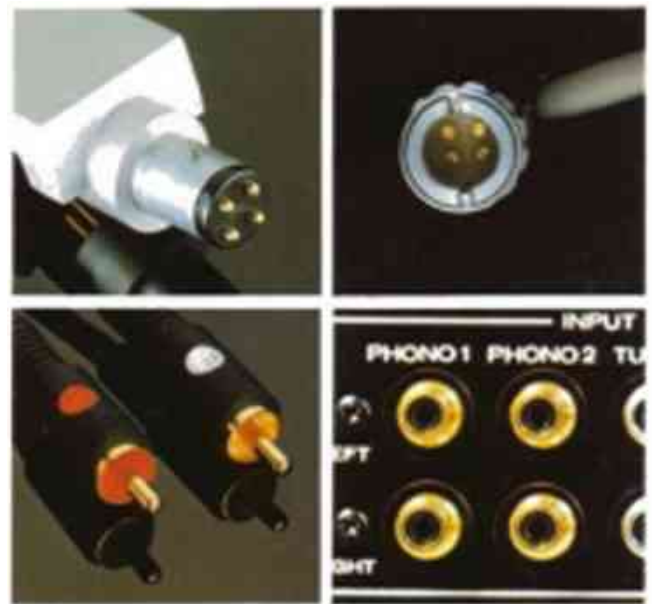
### The K1XMM Used With Top-Quality Tonearms

With a quality turntable capable of such performance as the KD-600, many audio enthusiasts will wish to choose a particular tonearm in order to create a sound system suited to individual preference. The KD-600 is therefore supplied with two different tonearm bases. One is designed to mount the Ortofon AS-212MKII tonearm; the other to mount either the Infinity Black Widow or SMB-30091, 3009II, 3009III series laboratory reference tonearms. With this additional flexibility, the KD-600 easily takes its place in

the best of today's high fidelity systems.

### Other Quality Features

- LED Indicators Embedded In Touch-Sensing Switches
- Electronic-Controlled Braking System
- Special Anti-Vibration Rubber Platter Sheet  
Helmholtz-principle air cavities inside the sheet absorb resonances created at the record/rubber sheet interface.
- Illuminated Quartz-Lock Indicator  
Large and positioned for easy visibility.
- Illuminated Power Indicator
- Audio Insulators  
Designed for both vertical and horizontal vibration absorption.
- Heavy Duty Ribbed Non-Resonating Acrylic Dust Cover
- Low-Capacitance Phono Cables Ready For CD-4 discs.

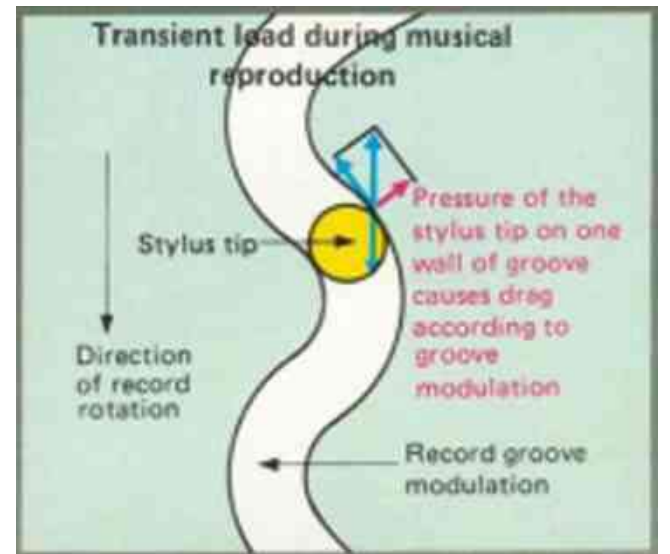


*All contact points are gold-plated for minimum contact loss.*



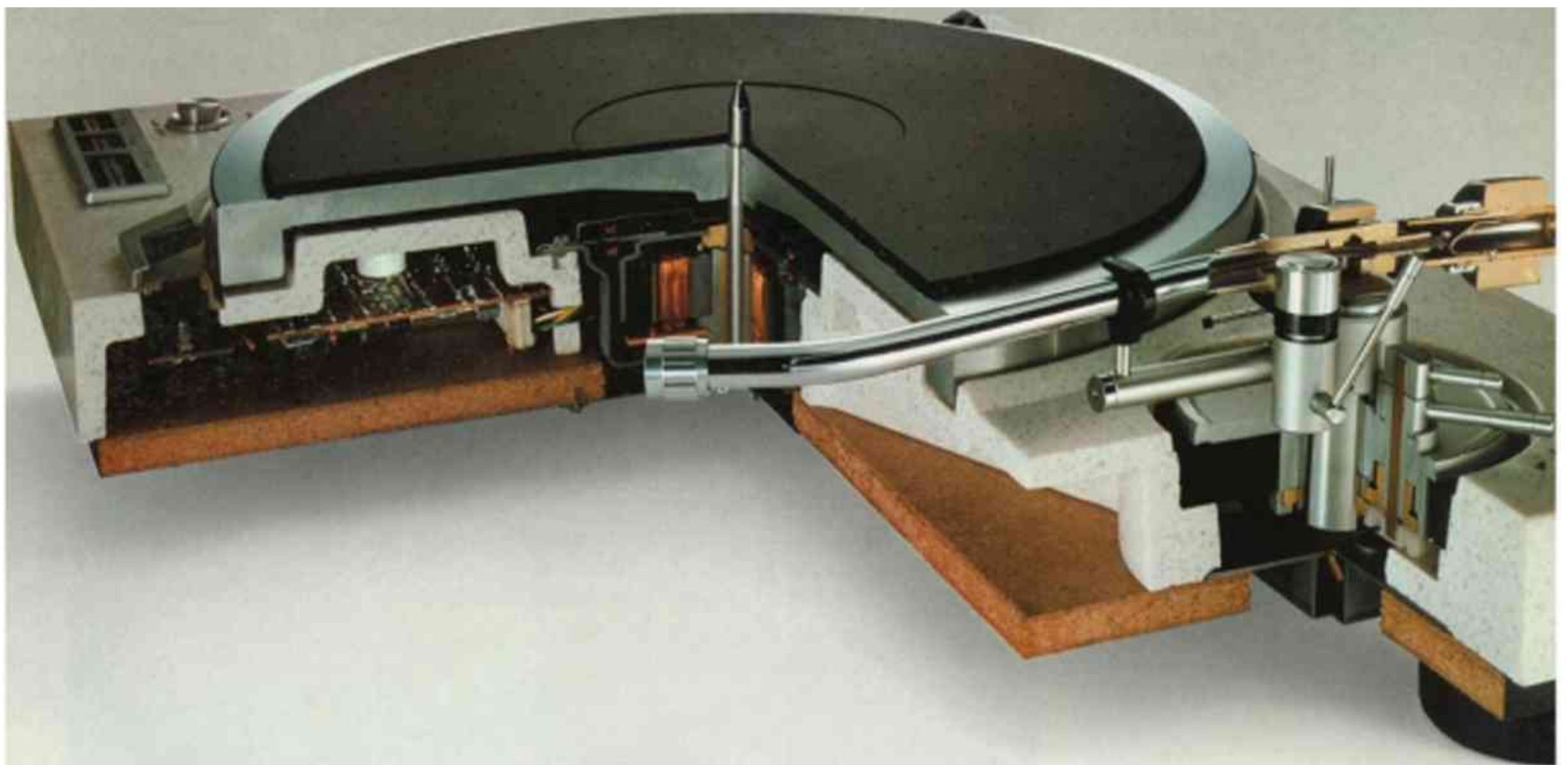
## A Turntable's Dynamic Performance Is Affected By Instantaneous Load Fluctuations

It may be surprising that Kenwood stresses the importance of a high-inertia platter over quartz-lock speed control, especially when most manufacturers feature quartz speed control prominently in their brochures. But the fact is, quartz speed control cannot cover up basic deficiencies in transient performance, when the stylus is actually tracking the grooves. Quartz oscillation uses its stable signal as a reference to compare the platter's rotation speed, correcting its phase fluctuations as appropriate through a servo circuit. Its effectiveness depends to a great extent on how speed is detected, and on how stable the whole system is. More importantly however, quartz servo control merely controls motor speed; it cannot by itself correct transient load fluctuations. These minute fluctuations occur when a heavily modulated groove (for example a heavy transient signal in the range of 100 Hz to 1 kHz) causes a kind



*Under dynamic conditions, serious degradation of sound quality can result from transient load fluctuations created when the stylus tracks an inscribed signal with very wide dynamic range.*

of “braking” effect which varies in effect according to the amplitude of the signal and its duration. Tests at Kenwood have shown beyond doubt that transient load fluctuations form a major barrier to authentic music reproduction. The solution to this problem was to incorporate a heavy platter that embodies very high inertia. This primary source of transient rotational stability is therefore fully complemented by the greater speed control accuracy afforded by the quartz phase-lock servo system.





# KD-650/KD-600

## SPECIFICATIONS

### KD-650

#### MOTOR & TURNTABLE

Driva System.....	Quartz PLL direct drive system
Motor.....	20 Pole. 30 Slot brushless DC servo motor (Starting torque 1.4 kg cm)
Turntabla Plattar.....	33 cm (13 inch) diameter, aluminum alloy die cast Weight - 2.6 kg (5.7 lbs) Moment of inertia - 560 kg cm*
Spaad.....	2 Speeds. 33 1/3 and 45 rpm.
Wow & F lutter.....	Less than 0.025% (WRMS)
Rumbla.....	DIN weighted better than -75 dB DIN unweighted better than -55 dB
Load Fluctuation.....	0% (within 120 g of tracking force)
Trantiant Load Fluctuation.....	Less than 0.0003% (at 33 1/3 rpm.. 400 Hi, to 20 g em load) Less than 0.00016% (at 33 1/3 rpm.. 1.000 Hz. 20 g em load)
Starting Tima.....	Within 1.8 sec.
Plattar Spaad Daviation.....	Less than 0.002%
Tima Orift.....	Less than 0.0002%/h
Tamparatura Orift.....	Less than 0.00002%/c

#### TO NEARM

Typa.....	Static balanced type. S shaped pipe arm. EI A plug-in connector.
Effectiva Tonaarm Length.....	245 mm (9 5/8 inch)
Ovarhang.....	15 mm (9/16 inch)
Tracking Error.....	♦ 1.8 to —1.0 degree
Stylus Pratsura	
Variabla Ranga.....	0 to 3 grams (0.1 g steps)
U sabla Cartndga Waight.....	2.0 to 12.0 grams
Adjustabla Haight Ranga.....	Within 13 mm (11/8 inch)
Arm Bata.....	Wedge shaped chuck type

#### ADDITIONAL FEATURES.....

Illuminated quartz lock and power indicator.  
Electroniccontrolled brake, digital sensor start and stop switches.  
helicoid type arm-height adjuster.  
wedge shaped chuck type arm base.  
static type anti skating device,  
oil damped cueing device.  
LED speed indicators.  
Adjustable height insulators,  
acrylic dust cover (weight 1.2 kg),  
stylus pressure direct readout counter,  
headshell stand.

#### MISCELLANEOUS

Powar Raquiramant.....	AC 120V, 60 Hz
Powar Consumption.....	35.0 watts
Dlmanions.....	W 490 mm (19 5/16") H 165 mm (6 1/2") D 460 mm (18 1/8")
Waight.....	16.0 kg <35.2 lbs)

#### SUPPLIED ACCESSORIES.....

Low resistance phono cables with gold plated terminals. EP adaptor with overhang gauge. Screwdriver, silicon cloth. Ground wire.

### KD-600

#### MOTOR & TURNTABLE

Driva System.....	Quartz PLL direct drive system
Motor.....	20 Pole. 30 Slot brushless DC servo motor (starting torque 1.5 kg cm)
Turntabla Plattar.....	33 cm (13 inch) Diameter, Aluminum alloy die cast Weight — 2.6 kg (5.7 lbs) Moment of inertia - 550 kg-cm <sup>3</sup>
Spaad.....	2 Speeds. 33 1/3 and 45 rpm.
Wow & F luftar.....	Less than 0.025% (WRMS)
Rumbla.....	DIN weighted better than -75 dB DIN unweighted better than —55 dB
Load Fluctuation .....	0% (within 120 g of tracking force)
Trantiant Load Fluctuation .....	Less than 0.0003% (at 33 1/3 rpm.. 400 Hz. to 20 9-cm load) Less than 0.00015% (at 33*1/3 rpm., 1.000 Hz. 20 g em load)
Starting Tima.....	Within 1.8 sec.
Plattar Spaad Daviation.....	Less than 0.002%
Tima Drift.....	Less than 0.0002%/h
Tamparatura Drift.....	Less than 0.00002%/c

#### ADDITIONAL FEATURES.....

Illuminated quartz lock and power indicator, electronic-controlled brake, digital sensor start and stop switches.  
LED speed indicators,  
adjustable height insulators,  
acrylic dust cover (weight 1.2 kg),  
headshell stand.

#### MISCELLANEOUS

Powar Raquiramant.....	AC 120V.60Hz
Powar Consumption.....	35.0 watts
Dimansions.....	W 490 mm (19 5/16") H 165 mm (6 1/2") D460 mm (18 1/8")
Waight.....	15.4 kg (33.9 lbs)

#### SUPPLIED ACCESSORIES.....

Low resistance phono cables with gold plated terminals. EP adaptor with overhang gauge. Screwdriver, silicon cloth. Ground wire. Hexagonal wrench. Two tonearm bases for SME 30091/300911/3009111 and Infinity Black Widow or Ortofon AS 212MKII.

### KD-650/600

#### CABINET

Material.....	Construction of cabinet is Anti-Resonance Compression Base (ARCB) with hard homogenized board. This massive ARCB is compression molded from lime stone particles, glass powders and lime stone bonded unsaturated polyester resin.
Cabinet Assembly Weight.....	7,9 kg (17.4 lbs)
ARCB Weight.....	6,5 kg (14.3 lbs)

# Kenwood KD-2055



## SPECIFICATIONS

### MOTOR and TURNTABLE

Drive System	Belt drive system
Motor:	4 pole synchronous motor
Turntable Platter:	30 cm <math>\phi</math> diameter Aluminum alloy die-cast
Speeds	2 speeds. 33-1/3 and 45 rpm
Wow and Flutter:	Less than 0.06% (WRMS) DIN $\pm$ 0.08%
Signal to Noise Ratio (Rumble):	JIS Better than 50 dB DIN unweighted Better than 44 dB DIN weighted Better than 65 dB

### TO NEARM

Type	Static-balance type. S-shaped pipe arm. EIA pAig-m connector
Effective Arm Length:	215mm 18-7/16-1
Over-Hang;	9.5 mm 13/8")
Tracking Error:	$\pm$ 1.5 degree
Stylus Pressure Variable Range	0 to 3 grams
Usable Cartridge Weight:	4 to 13 grams (Supplied head snell 7 grams balance weight 4 grams!)

### CARTRIDGE

Type:	Moving magnet type (V-39 MK II)
Frequency Response	20 - 20,000 Hz
Channel Separation:	Better than 25 dB (1,000 Hz)
Output Voltage:	3mV(1,000Hz.5cm/s«c)
Output Balance	1.5dB(1,000Hz. 5cm/see)
Load Impedance:	50k ohms
Stylus	0.5 mil diamond
Stylus Pressure:	2.10 25 grams
Compliance	7 x 10 <sup>-6</sup> cm/dyne
Replacement Stylus	N 39MKII

### MISCELLANEOUS

Power Requirements:	AC 120V. 60 Hz -KP AC 220V. 50 Hz — L AC 220 - 240V. 50 Hz - T X S AC 110-120/220-240V 50/60 Hz - M U W
Power Consumption:	9.5W (U \$ A and Canada) 14W (Other Nations)
Dimensions	W 480 mm 118 7/8") D 363 mm 114-5/16") H 146 mm 15-3/4")
Weight:	11.7 kg (25.8 lbs)
Special Features	Auto In Mechanism. Auto-Cut Mechanism. Auto Return Mechanism. Auto-Repeat Mechanism. Manual Operating Mechanism. Disc Size Selector. Pause Elevation. Anti-Skating Insulator. Head She* Stand. Pilot Lamp. Free-Stop Action Dust Cover. Low Capacity Audio Cord with PIN Plug
Supplied Accessories	EP adaptor. Motor lubricating oil. Over hang gauge Motor puMey and screw driver — MU W



# Kenwood KD-5070



## Description

The 20-pole, 30 slot brushless DC motor turns at precise servo-controlled speeds for outstanding performance in terms of wow and flutter.

Variable speed control permits precision speed settings using power-line frequency as the reference, but can be overridden for pitch-matching.

The stroboscope indicates precise speed setting.

Manual or fully automatic action of the tonearm allows positioning and lifting automatically at the start and end of a track.

There is automatic shut-off at end of play and manual override.

The precision tone arm is of the static balance type with anti-skate correction and a plug-in EIA headshell.

The cueing lever is viscous damped and raises and lowers the arm for gentle pause operations.

A massive ARCB (anti resonance compression base) is used to house the motor unit.

This is moulded from limestone particles, glass powders and unsaturated resin to provide the ideal base structure for stability and resonance control.

## Specifications

Drive system:..... direct drive

Motor:.....20-pole, 30-slot brushless DC servo motor

Platter:..... 1.50kg, 316mm, aluminium alloy

Speeds:..... 33 and 45rpm

Pitch control:..... +-3%

Wow and flutter:..... less than 0.025% WRMS

Rumble:.....-73dB weighted

Tonearm:..... static balance type

Effective length:..... 225mm

Overhang:..... 15mm

Stylus pressure:..... 0 to 3g

Usable cartridge weight:.. 3 to 10g

Dimensions:..... 480 x 156 x 367mm

Weight:..... 11.15kg



## KD-850

### FULL AUTOMATIC QUARTZ PLL DIRECT DRIVE TURNTABLE

Motor.....	20pole, 30slot Brushless DC servo Motor (for Platter Drive) 2 pole, 3 slot DC Micro Motor (for Automatic Function)
Wow & Flutter.....	0.022% (WRMS)
Rumble.....	-83dB (DIN B)
Tonearm.....	Static-Balanced Type, S-Shaped Pipe Arm
Cartridge .....	Model DM11



## KD-750

### QUARTZ PLL DIRECT DRIVE TURNTABLE

Motor.....	20 pole. 30 slot Brushless DC Servo Motor
Wow & Flutter.....	0.022% (WRMS)
Rumble.....	-74dB (DIN B)
Tonearm.....	Static-Balanced Type, S-shaped Pipe Arm
Cartridge .....	Model DM-II
Dimensions (W x H x D) . . .	19 5/16" (490mm) x 6-1/2" (165mm) x 16-5/8" (423mm)
Weight.....	38.6 lbs (17,5 kg)



## KD-650

### QUARTZ PLL DIRECT DRIVE TURNTABLE

Motor.....	20 pole, 30 slot Brushless DC servo Motor
Wow & Flutter.....	0.025%(WRMS)
Rumble.....	75dB (DIN B)
Tonearm.....	Static-Balanced type, S-shaped pipeArm
Cartridge .....	Model DM-II
Dimensions (W x H x D)	19-5/16" (490mm) x 6-1/2" (165mm) x 18-1/8" (460)
Weight.....	35.2 lbs (16,0 kg)



 **KENWOOD**

DIRECT-DRIVE TURNTABLE

**KD-2070**



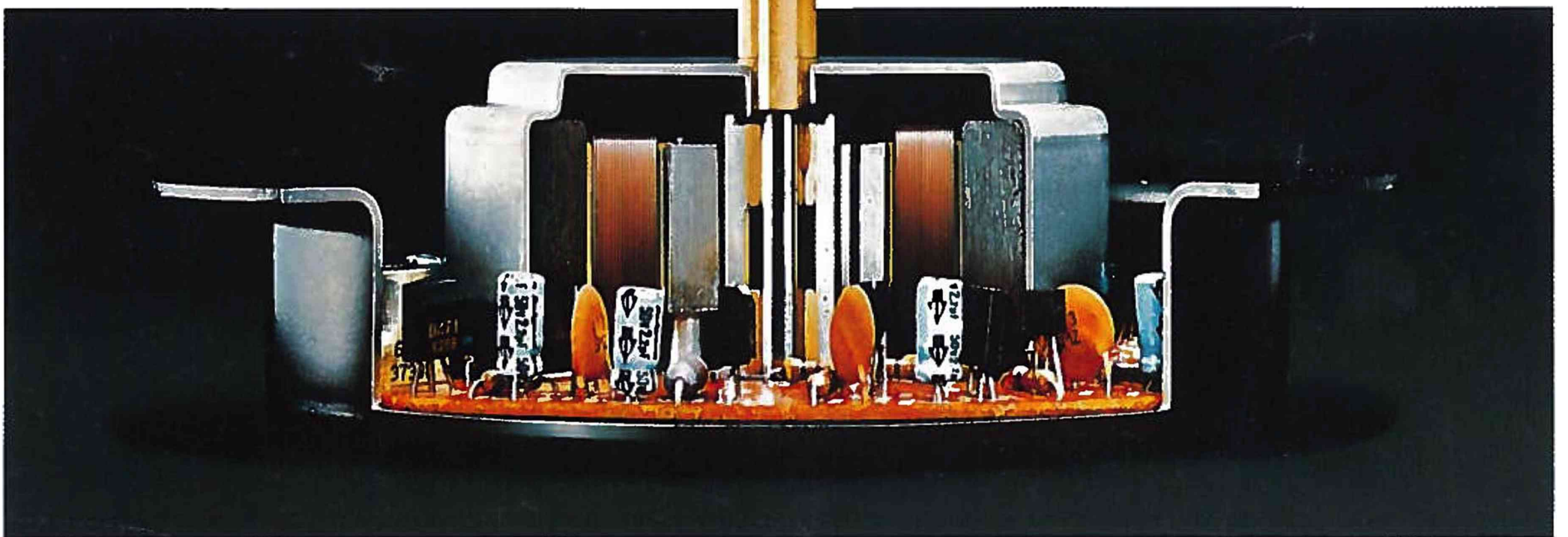
# Kenwood's new KD-2070—outstanding value in a direct-drive turntable system

Audio enthusiasts throughout the world have been quick to recognize the direct-drive turntable system as a quieter and more reliable method of reproducing the music contained in phonograph records. In a direct drive turntable system, there are no belts or idler wheels. In fact, no speed-reducing "step-down" mechanisms of any kind are used, since the motor rotates at exactly the required slow speed of or 45rpm. Kenwood's KD-2070 direct drive turntable system incorporates a new, 20-pole brushless DC motor which is coupled directly to a heavier turntable platter. This combination results in a high moment of inertia and provides smoother, quieter rotational speed—a primary requirement for the reproduction of high quality sound from records. The music you recover from records is as good as that produced during the original recording session, with no extraneous noise added. Now, Kenwood's engineers have created a direct drive system, with its recognized advantages, in a moderately

priced complete turntable system.

Consider the low rumble specification of the KD-2070. This specification provides a direct indication of the effects of vibration associated with the turntable's drive motor and, in the case of the KD-2070, it is a low — 65dB (using the DIN "B" measurement method). That means that any residual low-pitched background noise which might be heard during the playing of soft musical passages and which might "muddy" reproduced sound has been reduced to such a degree that music reproduced using the KD-2070 is heard distinctly and with complete clarity.

In the design of the KD-2070, Kenwood engineers have succeeded in reducing two common forms of rotation irregularity known as wow and flutter. They have incorporated a motor with a greater number of poles and have coupled it to a heavier turntable platter. The new motor's 20-pole design increases accuracy of rotation, while the heavier aluminum die-cast platter provides a higher inertia. In this\*





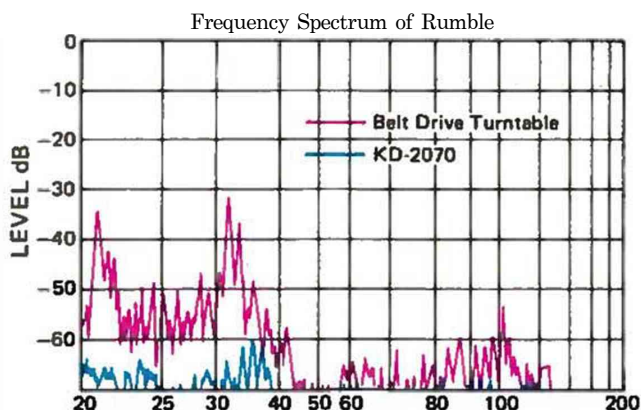
way, the uneven torque created by electronic switching (an inherent feature of all direct drive systems) is absorbed by a higher moment of inertia. It is this 20-pole motor design and the higher moment of inertia provided by the properly matched turntable platter that combines to deliver a new standard in “wow and flutter” specifications—a mere 0.04% (WRMS).

The tonearm design used in the KD-2070 is fully as impressive as the turntable and drive system. The high precision statically balanced tonearm used in the KD-2070 is so perfectly balanced that it sets a new high in tonearm

performance. Undesirable “shimmy” and torsional types of resonance can deteriorate reproduced sound quality during record reproduction. These problems, inherent even in some of the best designed tonearms, have been eliminated in the KD-2070 tonearm. Basic design improvements such as a totally die-cast arm support and proper geometric layout which lowers tracking error and establishes the center of gravity of the arm so that it is closer to the rotational axis have been incorporated. The results: lower distortion and lower crosstalk between stereo channels.

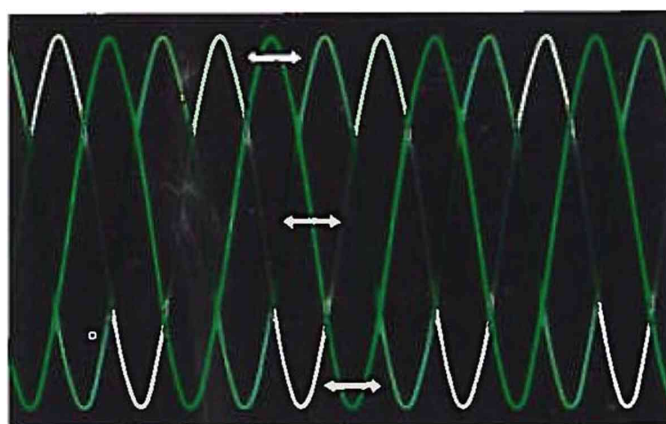
### The Direct Drive System

One of the most significant features of a direct drive turntable system is that its direct-drive motor rotates at the slower speeds of 33-1/3 or 45 revolutions per minute (rpm), compared with the 1800 rpm of conventional turntable motors. A significant advantage of the slower rotating motor is that rumble components are reduced to below audibility and rumble frequency, normally in the audible range (at about 30 Hz and multiples of that frequency) is reduced to below the limits of human hearing. So, rumble, that low pitched background noise which ordinarily deteriorates reproduced sound, becomes insignificant in direct-drive designs. The Kenwood KD-2070, with its rumble specification of -65 dB (using the DIN B measurement standards) reflects this important design advantage of direct drive systems.

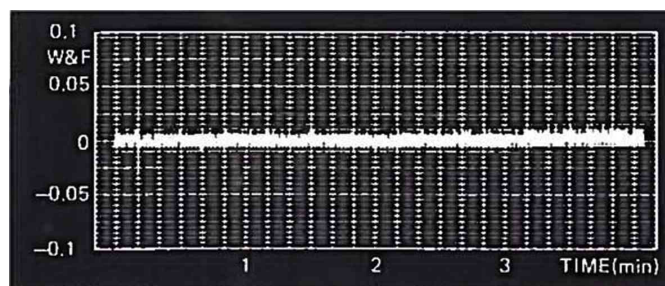


Another important consideration in turntable performance is the extent to which a turntable can provide smooth

and accurate rotation so that all sounds are reproduced at correct, unwavering pitch. In order to reduce any subtle rotational irregularity, Kenwood engineers designed the KD-2070 turntable system using a DC motor with a large number of poles and an extra heavy platter to increase rotational moment of inertia and, thereby, the smoothness of turntable rotation.



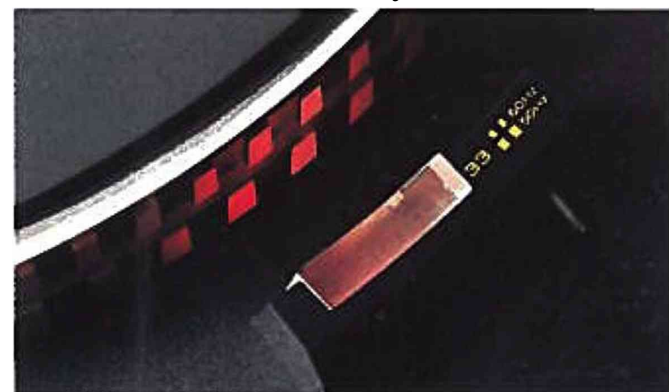
Scope Trace of Variation caused by Flutter



Wow & Flutter Characteristics

Although the actual speed of the direct drive motor is regulated by an electronic speed control system called a servo-circuit, the switching of current required to drive this type of motor creates uneven torque known as the “cogging phenomenon.” Kenwood engineers realized that effective reduc-

tion of the “cogging phenomenon” could be accomplished by increasing the cogging frequency. By incorporating a 20-pole, 30-slot motor, the cogging frequency was effectively raised to 16.7 Hz. This higher cogging frequency, combined with an extra heavy platter with an inertia of 220 kilograms cm<sup>2</sup> results in a direct drive turntable system that is as free of the “cogging phenomenon” as any turntable available today. In terms of performance specifications, the low wow and flutter figure of 0.04% (WRMS) attests to the extent to which rotation irregularity has been reduced in the KD-2070 direct drive system. Long term reliability is another benefit derived from direct-drive turntable designs. Since the turntable platter is driven directly by the motor in such systems. All speed reducing elements such as belts or idler pulleys and wheels, which are made of rubber and may deteriorate with age, are completely eliminated. The original excellent performance levels of the turntable can be maintained throughout the life of a direct drive turntable system.



### High Torque Brushless DC Motor

The newly designed DC motor incorporated in the KD-2070, in addition to providing for direct-drive rotation of the platter, is designed with a high torque characteristic and governed by a superior electronic regulating circuit, making this turntable one of the best available in its price range. As we have noted, the heavier turntable platter, with its high inertia of  $220 \text{ kg}\cdot\text{cm}^2$ , is ideal in providing smooth rotation without irregularities. To drive such a heavier turntable platter requires high torque, and for this reason the torque of the motor used in the KD-2070 is as high as  $600 \text{ gm}\cdot\text{cm}^2$ . This high torque level is more than sufficient to drive the heavy platter and provides an additional user benefit. The KD-2070 is able to attain its rated speed of  $33\frac{1}{3} \text{ rpm}$  in a mere 2.5 seconds.

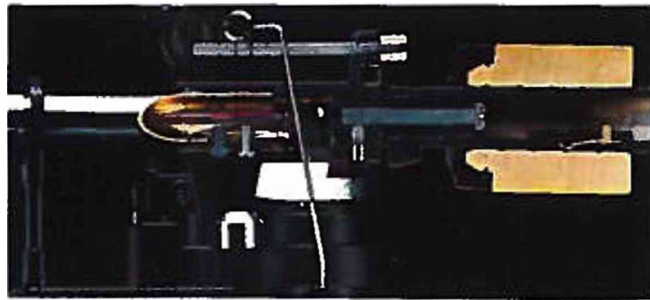
Another design feature associated with the DC motor is its servo control circuit — a system used to regulate speed and detect even the most minimal speed fluctuations.

Speed fluctuations caused by friction between the record groove and the stylus, or sudden loads imposed by heavy signal modulations inscribed in the record groove, if not properly compensated for, can have a detrimental effect on sound reproduction. Kenwood engineers, realizing this problem, developed a superior servo-circuit by increasing the dynamic range of the servo speed control circuit. As a result of this new design, the KD-2070 boasts a speed error of less than 0.2%, compared to a typical 0.4% speed fluctuation of even more expensive models.

Although DC motors generally offer many design advantages, in many DC motor designs brushes are employed to switch electrical currents. These brushes can generate noise which, in turn, can degrade reproduced musical sounds. The DC motor incorporated in the design of the KD-2070 uses no brushes and, for this reason, hum and noise inherent in older DC motor designs is completely gone. As a result, signal-to-noise ratio is improved and power consumption is reduced.

### The Tonearm

The precision tonearm incorporated in the KD-2070 is one of the very best available today. Kenwood engineers demonstrated their experience and concern for sound quality, incorporated engineering features in this tonearm that relate directly to the quality of sound reproduced from records. Performance criteria such as reduction of mass, minimization of tangential tracking error, reduced bearing friction, location of the center of gravity close to the actual axis of rotation and reduction of the effects caused by resonances of the tonearm are just a few of the exemplary features of the KD-2070 tonearm design.



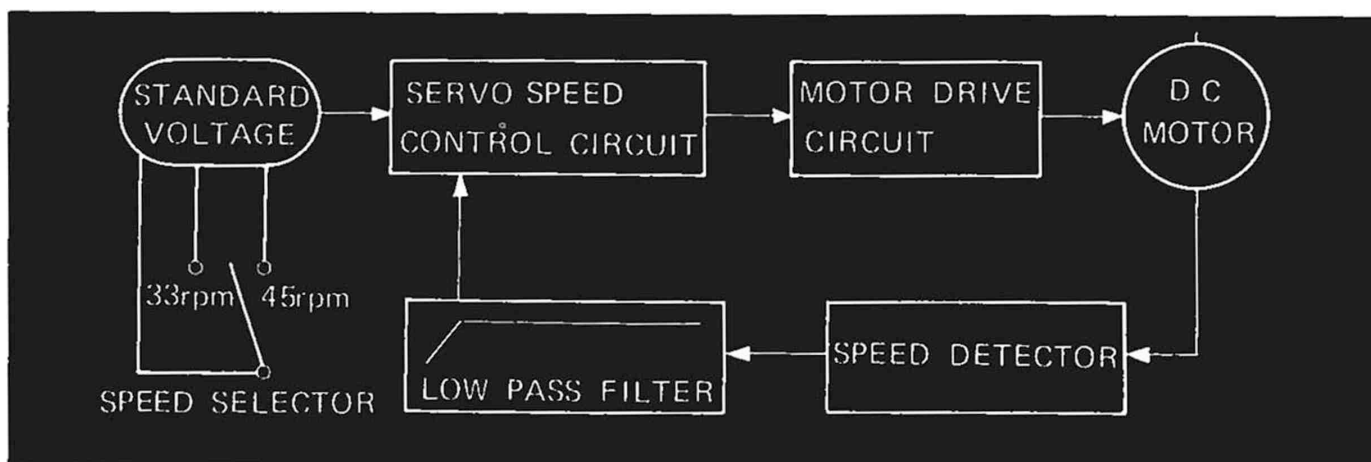
In order to reproduce sound with the least amount of distortion and with a minimum amount of vibration, the

tonearm which supports the cartridge must be light in weight, structurally rigid and non-resonant. A tonearm is subject to resonance because of its own weight, material and construction. Increasing the weight of the arm will increase its rigidity but may also cause the arm to lag behind the wide movements of the cartridge stylus. It may be unable to respond to sudden movements or changes imposed by record groove modulation. As a result, distortion may be added and the arm may be unable to track high frequency signals inscribed in the record groove.

Decreasing the mass of the tonearm will enable the tonearm to be more responsive to sudden changes in groove modulation but a less rigid arm may cause it to flex. The combination of resonances and flexure of the arm, influenced by recorded signals or external vibrations, can create peaks and dips in the response of the reproduced sound which are highly undesirable in a high quality music reproducing system. In constructing the new tonearm for the KD-2070, Kenwood engineers employed a lightweight but rigid tubular arm and a cartridge shell made of die-cast metal alloy. Thanks to the light and rigid material used, the arm is much more responsive to sudden changes in groove modulation. At the same time, physical ruggedness of the tonearm prevents flexing and thereby reduces unwanted peaks and dips in overall response. To eliminate the "shimmy" often caused by recorded signals as well as by external vibration, Kenwood engineers devised a die-cast pivot for the new arm. This new design provides stability of operation and eliminates any "shimmy" which might cause the stylus to momentarily lose contact with the record groove.

### "S"-Shaped Tonearm Minimizes Tracking Error

Ideally, a cartridge and tonearm should track a record groove with precise tangency from outer to inner grooves. If tangency is different from that employed in cutting the master disc, from which all discs are "pressed", a slight



BLOCK DIAGRAM (THE FEEDBACK LOOP IN KD-2070 SPEED CONTROL SYSTEM)



distortion of reproduced music results, consisting primarily of second order harmonics. Though not as objectionable as third-order and higher harmonic distortion, Kenwood engineers turned their attention to solving this problem, as well. One solution to the problem of designing a tonearm with the least tracking error that also has low mass and low friction is to make the arm longer and incorporate an S-shaped design. This design, successfully incorporated in the KD-2070 tonearm, significantly reduces tracking error without sacrificing other performance features such as low mass and reduced friction.

#### Reduced Friction Through Increased Micro Ball Bearings

An important consideration in the design of any tonearm is minimization of pivot friction, which permits the stylus to maintain intimate groove contact with the least amount of downward tracking force. Kenwood engineers solved the problem of tonearm pivot friction by using a smaller diameter pivot bearing and a greater number of ball bearings in the pivot, thereby increasing the spread or distribution of contact. This design not only decreases stylus drag but virtually eliminates vertical backlash as well. You can easily feel the smoothness of motion of the KD-2070 tonearm by setting the counterweight for "zero balance" and moving the arm gently in a circular motion.

#### Anti-Skating Adjustment

Tonearms employing a pivot point and an offset angle tend to move towards the center of the turntable during record play, because of unbalanced forces resulting directly from tonearm geometry. These forces, if not counteracted, cause uneven wear of record groove walls and can even result in unbalanced and distorted output from one of the two stereo reproducing channels. The KD-2070 tonearm incorporates an anti-skating adjustment to completely neutralize this undesired side-thrust. The anti-skate device is adjusted to correspond with downward

tracking force, effectively counteracting the inward side thrust caused by tonearm geometry.

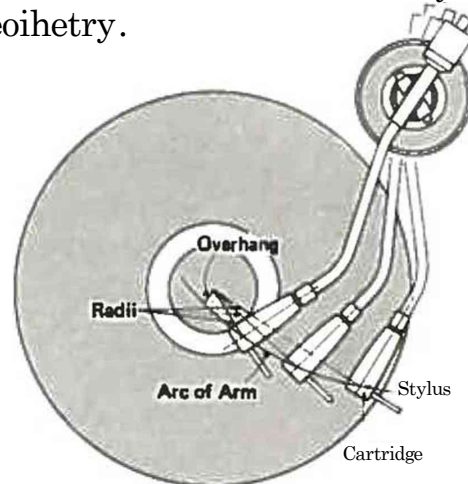
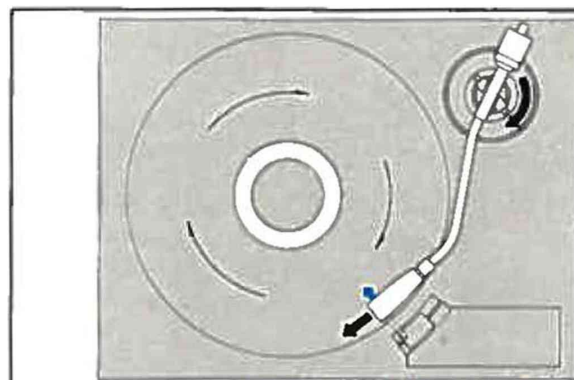


Diagram of S-Shaped Arm at Different Positions on Platter



Small arrow indicates skating forces.

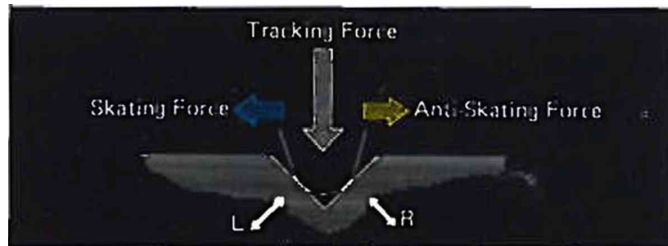
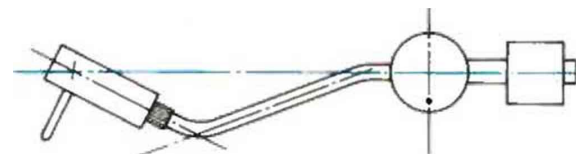


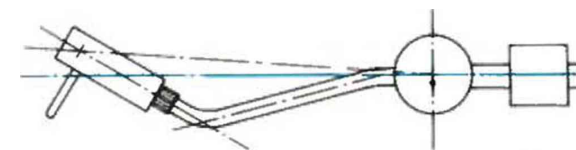
Diagram of Anti skating Effect and KENWOOD Anti-skate Adjustment

#### Tonearm Center of Gravity

In most S-shaped tonearm designs, the stylus is designed to be on axis with respect to the weight-axis center of the entire tonearm. This normally causes the center of gravity to shift towards the direction in which the tonearm tube is bent and, if the turntable system is not perfectly horizontally level, the arm tends to rotate and create unbalanced forces in the record groove. Kenwood engineers devised a precision shape to the KD-2070 tonearm which results in the center of gravity remaining as close as possible to the center of rotation axis. In this design, even if the turntable system is not perfectly level, rotational forces on the tonearm are suppressed, thereby improving crosstalk and lowering distortion which might otherwise occur.



Tonearm of Competitive Model with Center of Gravity Away from Rotation Axis



KENWOOD Tonearm with Center of Gravity Close to Rotation Axis

#### Large Diameter Tonearm Base

The KD-2070 employs a large, 92 mm diameter tonearm base which is firmly fixed to the system's cabinet. As a result, any resonance in the arm itself is suppressed, improving overall sound reproduction quality and preventing any dips or peaks in overall frequency response. \* (see graph on back page.)

#### Additional Features

A new, easy-to-read stroboscope pattern for 33-1/3 rpm speeds (at either 50 or 60 Hz) has been inscribed on the outer rim of the turntable platter in the KD-2070, and is well illuminated by the built-in strobe light, while 45 RPM markings have been separately placed atop the surface of the platter, making both speed settings easier to see and adjust, using a single pitch control knob which correctly sets both speeds at the same time.

Viscous damped cueing control has been incorporated in a single three-position control which turns the unit on and off, lifts the arm and, in the play position, gently lowers it for effortless cueing at the start of record play or at any point during playing.

The attractively finished turntable base included with the KD-2070 turntable system is not just a "cosmetic extra". It, too, has been designed to prevent resonance and acoustic feedback problems by using two layers of thick high-density particle board and ABS copolymer resin. In short, the Kenwood KD-2070 turntable system is a total design — and one which offers the best record playing performance available in its price range — the avowed goal of all Kenwood high fidelity component products.

# KD-2070

## SPECIFICATIONS

### MOTOR & TURNTABLE

Drive System.....	Direct-Drive System
Motor.....	20-Pole 30-Slot DC Servo Motor
Turntable Platter.....	31cm (12-3/16") Diameter Aluminum Alloy Die-Cast Weight 1.1 kg (2.4 lbs)
Speeds .....	2 Speeds, 33-1/3 and 45 rpm
Speeds Control Range.....	Within $\pm 3\%$
Wow & Flutter.....	Less than 0.04% (WRMS)
Rumble.....	DIN Weighted better than $-65$ dB DIN Unweighted better than $-45$ dB

### TO NEARM

Type.....	Static-Balance Type, S-Shaped Pipe Arm, EIA Plug in Connector
Effective Tonearm Length. . . .	225mm (8-7/8" )
Overhang.....	15mm { 9/16" }
Tracking Error.....	$\pm 1.5$ degree
Stylus Pressure Variable Range .	0 to 3 grams
Usable Cartridge Weight.....	4 to 10 grams

### CARTRIDGE

(U.S.A. model is not equipped with the V-48 Cartridge)

Furnished Cartridge.....	V-48
Stylus.....	N-48 with 0.5 Mil Diamond
Frequency Response.....	20 Hz to 20,000Hz
Output Voltage.....	2.3 mV(1,000 Hz, 5 cm/sec.)
Optimum Tracking Force . . . .	$2.0 \pm 0.5$ grams
Replacement Stylus.....	N-48

ADDITIONAL FEATURES. . . Speed Adjustment Pitch Control  
Illuminated Stroboscope.  
Viscous-Damped Cueing Device,  
Anti-Skating Device,  
Headshell Stand,  
Free Stop Action Dust Cover,  
Stylus Pressure Direct-Readout  
Counter

### MISCELLANEOUS

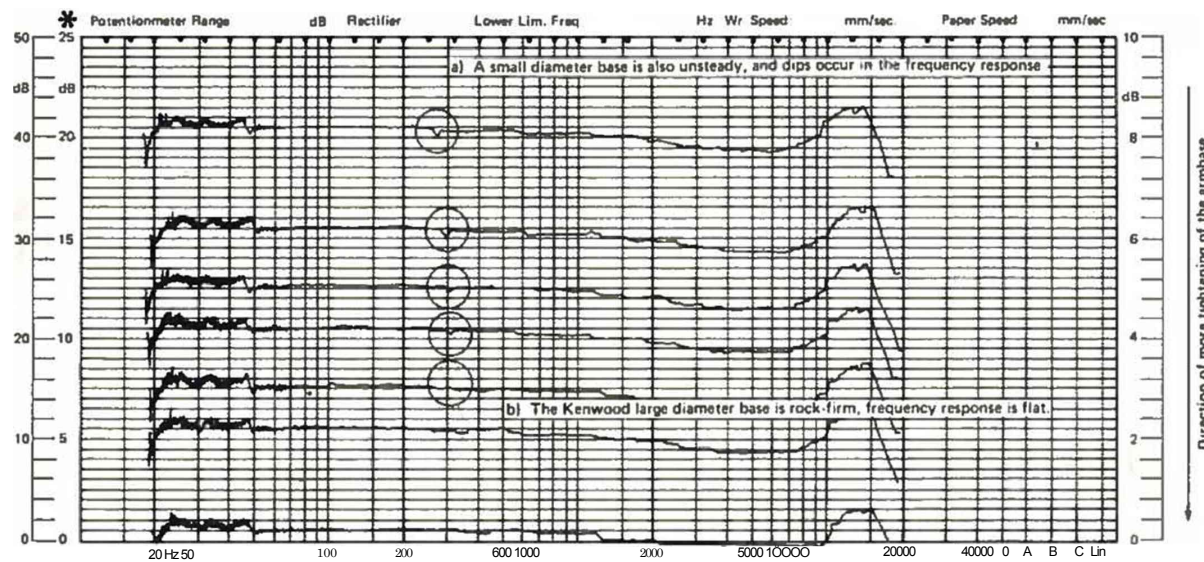
Power Requirement.....	AC 120V, 60 Hz
Power Consumption.....	7.0 watts
Dimensions.....	W 468mm (18-7/16") H 147mm (5-3/4") D 365mm (14-3/8" )
Weight.....	7.0 kg (15.4 lbs)

SUPPLIED ACCESSORIES . . . EP Adaptor  
Overhang Gauge

### CABINET

Material..... Particle board laminated with metallic  
mat black finish is used in the  
construction of cabinet.  
Bottom cover is injection molded  
from ABS copolymer resin.

Kenwood follows a policy of continuous advancements in development.  
For this reason specifications may be changed without notice.





## Kenwood KD-700



### Specifications

Drive:.....direct-drive system

Motor:.....quartz PLL coreless and slotless DC servo motor

Platter:.....33cm aluminium alloy die-cast

Speeds:.....33.33 and 45rpm

Wow and flutter:.....less than 0.02% WRMS

Signal to noise ratio:....., more than -80dB

Tonearm:.....static-balance type, straight tubular arm, eia plug-in connector

Effective length:.....245mm

Overhang:.....15mm

Stylus pressure range: ... 0 to 3g

Usable cartridge range:. 4.5 to 12g

Dimensions:.....490 x 162 x 410mm

Weight:.....12.0kg

# KD-770D

## QUARTZ PLL DIRECT DRIVE AUTO-LIFT-UP HS TURNTABLE

The precision-engineered KD-770D features the Kenwood ultra-rigid DL motor and high-stability HS tonearm for outstanding music reproduction accuracy.

### Dynamic center-lock direct drive motor

This improvement in the direct drive system produces outstanding accuracy in shaft rotation, which is virtually free of instability. It is the source of the KD-770D's wow-and-flutter rating of 0.008% (Readout Direct) — an accuracy found in few other turntables.

### Integrated uniblock structure with ARCB reduces vibrational energy-loss

Many turntables cause a loss in musical energy during reproduction through insufficient structural rigidity. With the Kenwood DL system, it has been possible to integrate the motor into a solid block of ARCB anti-resonant resin-concrete. This in turn is mechanically linked with the tonearm assembly, so that the entire unit forms one rigid integrated whole. This has important results in terms of locational accuracy, improved tonearm tracking and better sound quality.

### High-stability HS tonearm for super-accurate signal pickup

The tonearm assembly of the

KD-770D is superbly engineered to perform its task of tracking record grooves while preventing partial vibrations from affecting the stylus pickup and thus degrading the signal. The pivot bracket is a large-size diecast span of trapezoidal form with thick walls, designed to resist all vibrational and torsional movement. It is coupled to the shaft by a knife-edge base. Both shaft and bracket in this high-stability design have natural resonant frequencies that are computer-calculated to suppress the generation of spurious partial vibrations.

### High-inertia platter with inertia-lock

One of the ways the KD-770D heightens its music reproduction quality is with its heavy platter that develops a moment of inertia value of 450 kg-cm<sup>2</sup>. This is more than enough to block subtle variations in platter rotation accuracy which are caused, not by external vibration but by resonance from dynamic music signals.

The benefits of this are more evident with digital-source records that have wide dynamic range. Once the heavy platter has reached precise rotation

speed, a special electronic inertia-lock is activated.

### High-efficiency DC motor with quartz PLL control

The platter is driven by a high-efficiency, high-torque, slotless and coreless DC motor of 3-phase switching plane type. This is controlled by a quartz-referenced phase-locked loop circuit. In order to provide the same sort of efficiency and accuracy in bringing the platter to a stop, an electronic reverse-torque braking system is employed. All motor/platter movement comes under the command control of a high-integration bipolar circuit for greater reliability.

### Electronic operation and non-contact auto-lift-up function

As a precision instrument, the KD-770D is designed primarily for the manual operation often preferred by purists. However, electronic aids to operation are also provided, including tonearm lift-up. At the end of the record, lift-up is performed in total silence by a non-contact photo-sensor mechanism.

### Attractive black mirror-lacquer piano finish

More than a functional turntable, the KD-770D is also a remarkably handsome piece of furniture, finished with a fine piano-like surface of dark, almost black, simulated walnut grain veneer.





# KD-770D

## MOTOR & TURNTABLE

Drive System.....	Direct Drive
Motor.....	Quartz PLL Coreless & Slotless DC Servo Motor
Turntable Platter.....	13" (33cm) Diameter, Aluminum Alloy Die-Cast Weight — 4.2lbs (1.9kg) Starting Torque — 1.2 kg.cm
Speeds .....	2 Speeds, 33-1/3 and 45 rpm.
Wow & Flutter.....	Less than 0.02% (WRMS) Less than 0.008% (Readout Direct)
Rumble.....	DIN weighted better than -80dB DIN unweighted better than -55dB

## TO NEARM

~Vps .....	Static-Balanced Type, Straight Pipe Arm, EIA Plug-in Connector
Effective Tonearm Length .....	9-5/8" (245mm)
Overhang.....	9-16" (15mm)
Tracking Error .....	+1.8 to —1.0 degree
STYLUS Pressure Variable Range.....	0 to 3 grams (0.1g Step)
Adjustable Cartridge Weight .....	2.0 to 12 grams with Supplied Headshell
Adjustable Height Range.....	Within 9/32" (7mm)

## KD-770D

**BUILT-IN FEATURES**..... Illuminated Quartz-Lock Indicator, Electronic-Controlled Brake, Arm-Height Adjuster, Anti-Skating Device, Electronically Controlled Auto-Lift Up Mechanism, LED Speed Indicator, Free-Stop Action Acrylic Dust Cover, Stylus Pressure Direct Readout Counter.

### GENERAL

Power Requirement ..... 120V, 60Hz

Power Consumption..... 22 watts

Dimensions (WxHxD)..... 19-5/16" X 6-3/8" X16-1/8"  
(490 x162 x410mm)

Weight (Net) ..... 25.7lbs (11.7kg)

**SUPPLIED ACCESSORIES** ..... Low Capacitance Phono Cables with Gold-Plated Terminals, EP Adaptor, Hexagonal Wrench, Aluminum Alloy Die-Cast Headshell

**CABINET MATERIAL** ..... Particle board laminated with piano-polished simulated walnut grain finish



# Kenwood L-07D

## TURNTABLE

### Precision record player for distortion-free scanning

The analog record player will remain the main source of the hi-fi enthusiast's program for many years to come - and high precision is a crucial factor in achieving distortion-free record scanning.

Chronic turntable problems such as The susceptibility to even minimal impact sound and distortion of sound due to the component's own vibrations were resolutely tackled and largely eliminated at Kenwood - for us almost a chapter in the past.

Of course, ease of use is also of great importance for everyday operation. Many of our record player models have therefore been equipped with comprehensive microprocessor control.



L-07D turntable with quartz-stabilized PLL-controlled direct drive  
• Speed control with phase-locked quartz servo control loop »tonearm mechanism with opto-digital sensor «Heavy platter with high mass moment of inertia • Low-resonance tonearm» Vibration-damping. in laminar construction

wise constructed frame made of ARCB synthetic resin special material »synchronism fluctuations: less than 0.02% (effective, rated) »Rumble to noise ratio: better than -94dB (DIN-rated) »Load-dependent speed swan kungen: under 0.00008% (33lh RPM.1kHz, 20g \* cm load)



**KD-5100** Fully automatic turntable with quartz-controlled direct drive  
• Microprocessor tonearm control »Warp resistant tonearm with low mass  
• Electronic touch buttons and connection option for infrared remote control  
• Fault-free automatic operation «quartz speed / phase control» synchronous fluctuations: less than 0.03% (effective, rated) «Rumble to noise ratio: better than -75dB (DIN-rated)



**KD-50F** Fully automatic turntable with quartz-PLL controlled direct drive  
• Speed control via quartz-stable, phase-locked control loop »Torsionally rigid, straight tonearm of low mass» Separate tonearm motor; DC motor with high torque for turntable drive  
• Smooth-running tap keys «Synchronous fluctuations: less than 0.025% (effective, rated)» Rumpel-noise ratio: better than -75dB (DIN-rated)



**KD-40R** turntable with direct drive and automatic tonearm return  
• High level of operating convenience thanks to front-side touch buttons  
• LED displays »New, vibration-damping frame  
• Warp resistant tonearm with low mass  
• Synchronization fluctuations below 0.03% (effective, rated) »Rumble-noise ratio: better than -75dB (DIN-rated)



**KD-1600 MKII** turntable with automatic tonearm insertion and return  
• Automatic tonearm return and turn-off of the turntable motor »Tonearm attachment by pressing a button» Separate tonearm motor • Low-mass, straight tonearm of high strength »Synchronization fluctuations below 0.05% (effective, rated)» Rumble noise-voltage distance: better than -65dB (DIN-rated)

PLATTENSPIELER	*L-07D	KD-5100	KD-1600MKII	KD-50F	KD-40R
Antriebsart	Plattenspieler mit quarz-geregeltem Direktantrieb	Plattenspieler mit quarz-geregeltem Direktantrieb	Riemenantrieb	Plattenspieler mit quarz-geregeltem Direktantrieb	Riemenantrieb
Motor	Kern- und nutenloser Servo-Gleichstrommotor, Hochlaufmoment 2,5kgcm	Kern- und nutenloser Servo-Gleichstrommotor für Plattentellerantrieb; 2-poliger, 3-kerbiger Gleichstrommotor für automatische Funktionen	Vierpol-Synchronmotor	Kernloser Motor mit Quarz-PLL-Regelung für Plattenlaufwerk; 12-Pol-Wechselstrommotor für Tonarm-Automatik	Servo-Gleichstrommotor
Plattenteller	33cm Durchmesser, Aluminium-Druckguß-legierung lamelliert mit Dural, Gewicht 5,5kg einschließlich antimagnetischer Edelstahl-Plattentellerauflage, Massenträgheitsmoment 1,025kgcm <sup>2</sup>	31,6cm Durchmesser, Aluminium-Druckguß-legierung, Gewicht 1,5kg, Massenträgheitsmoment 330kgcm <sup>2</sup>	30cm Durchmesser, Aluminium-Spritzguß-legierung	31cm Durchmesser, Aluminium-Druckguß-legierung	31cm Durchmesser, Aluminium-Druckguß-legierung
Drehzahlen	2 Drehzahlen, 33-1/3 und 45UpM	2 Drehzahlen, 33-1/3 und 45UpM	2 Drehzahlen, 33-1/3 und 45UpM	2 Drehzahlen, 33-1/3 und 45(JpM	2 Drehzahlen, 33-1/3 und 45UpM
Gleichlaufschwankungen	Weniger als 0,02% (WRMS) Weniger als *0,032% (DIN)	Weniger als 0,03% (WRMS) Weniger als ±0,055% (DIN)	Weniger als 0,05% (WRMS) Weniger als ±0,07% (DIN)	Weniger als 0,025% (WRMS) Weniger als ± 0,05% (DIN)	Weniger als 0,03% (WRMS) Weniger als ±0,055% (DIN)
Rumpeln	Besser als -94dB (DIN, bewertet) Besser als - 55dB (DIN, nicht bewertet)	Besser als -75dB (DIN, bewertet) Besser als - 53dB (DIN, nicht bewertet)	Besser als -65dB (DIN, bewertet) (DIN, nicht bewertet)	Besser als -75dB (DIN, bewertet) Besser als — 55dB (DIN, nicht bewertet)	Besser als - 73dB (DIN, bewertet) Besser als -55dB (DIN, nicht bewertet)
<b>TONARM</b>					
Bauart	J-förmiger Rohrtonarm mit Gegengewicht und EIA-Anschluß	Gerader Tonarm mit Gegengewicht	Gerader Rohrtonarm mit Gegengewicht	Gerader Rohrtonarm mit Gegengewicht	Gerader Tonarm mit Gegengewicht
Effektive Tonarmlänge	245mm	225mm	225mm	225mm	225mm
Überhang	15mm	15mm	15mm	15mm	15mm
Einstellbereich der Auflagekraft	0 bis 2g (50-mg-Schritte)	0 bis 3g	0 bis 3g	0 bis 3g	0 bis 3g
Zul. Tonabnehmergewicht (einschl. beiliegendem Systemträger)	1 bis 9g (9 bis 22g mit mitgeliefertem Zusatzgewicht)	4 bis 9g	4 bis 12g	4 bis 10g	4 bis 10g
Leistungsaufnahme	45W	19W	12W	10W	8W
Abmessungen B x H x T	555 x 160 x 470mm	470 x142 x 407mm	440x130 x 372	440x130 x 373	440x130 x 373
Gewicht	31.0kg	9.0kg	5,2kg	4,8kg	4,6kg
Spurfehlerwinkel	+ 2°26' - -1°ir - +1°48	+ 3°24' - -1°	+ 3°24' - -1°	±1,5°	±1,5°

"Separate Steuereinheit: Abmessungen 130 (B) x 110 (H)x356(T) mm; Gewicht 4,3kg



 **KENWOOD**®

**L-07D**

DIRECT-DRIVE TURNTABLE



 **High Rigidity**



**Kenwood's new turntable design aims at nothing less than 100 percent conversion of recorded to reproduced music signals.**



 **High Rigidity**



In searching for ideal reproduction of music from records. Kenwood's team of engineers have stripped away the "mental blocks" of conventional analog turntable design, to reach the sources of reproduction problems. As the result, they have achieved what many in the audio industry have thought impossible: a near 100% ratio of conversion of recorded to reproduced music signals. In fact, they have literally redesigned the turntable.

The analog type turntable has been with us for nearly a hundred years,

but never before has its design been taken so close to its practical limits. In hi-fi design—as in so many fields—accepted conventions can cloud the designer's vision, while "improvements"—even electronic ones—are often no more than stop gap measures deriving from an original misconception. Against this backdrop, Kenwood engineers set themselves the task of reexamining basic turntable problems.

First among these problems is the fact of energy loss caused by undesirable vibrational movement affecting the point of contact between the cantilevered stylus and the record groove. The audible effects of turntable and tonearm resonance had to be worked into a comprehensive theory before applying the solutions—among them, laminating different materials to mutually cancel out inherent resonant frequencies, and designing the entire signal conversion system into an ultra-rigid closed loop.

Moreover, since it is dynamic performance which dictates the quality of the music that is actually heard, Kenwood engineers have designed a totally new type of heavy, vibration-proof platter that achieves an extremely high moment of inertia to provide excellent transient load characteristic.

A further feature indicating out of the ordinary sound reproduction is the external Dynamic Phase Compensator, a logic control that precisely compensates for ambient variations in motor speed.

With such methodology, Kenwood engineers offer you the rich, dynamic musical lode that lies buried under existing sound conversion systems, and which even the digital PCM methods of the foreseeable future, with their standardized and finite limitations, will not be able to achieve.

Such claims may sound exaggerated in an audio world accustomed to frequent "breakthroughs". But any serious music lover who has perhaps accepted the inevitability of less-than-satisfactory record reproduction should not miss the first opportunity to hear a favorite recorded work played via the incomparable L-07D.





# Kenwood's unique "back to the basics" design creates a highly rigid closed pickup loop.

- High-Rigidity Triple Layer Base «Aluminum-Carbon-Boron Laminated Tonearm
- Low Resonance Triple Layer Platter »Carbon-Boron Headshell
- Dynamic Phase Compensator »Low Gravity Integrated Design

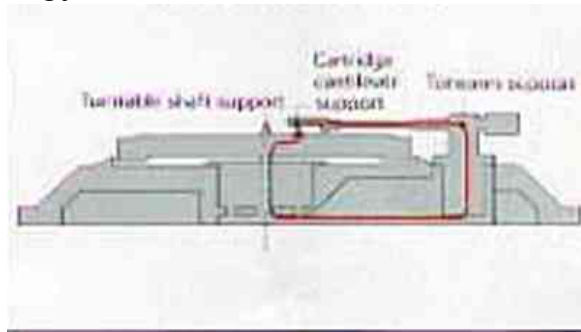
## Why electronics do not solve all turntable problems

It seems incredible that the turntable of today actually differs very little from its original concept of a hundred years ago. In going back to examine those original concepts, it became clear to the Kenwood design team that the application of electronic solutions to solve basically mechanical problems is not always effective. And today's turntable problems are primarily mechanical. They stem from the unavoidsable fact that the pivoted tonearm tracks a rotating record. Apart from increasing motor speed accuracy, the promise held out by electronics has not been fulfilled. Moreover, the digital PCM technique, in order to become widely available, will have to be standardized, rather like FM broadcasting it will certainly aim at perfection, but only within finite limitations such as in frequency and dynamic range. By way of contrast, analog disc-cutting techniques can already record signals above 20kHz and wider dynamic range is also available. Thus, the owner of the L-07D, which is designed to reduce vibrational distortion to zero, can at this very moment hear all of the exhilarating musical content inscribed in the best analog records available today.

## Kenwood's "closed-loop" sound conversion theory

In the process of converting the recorded signal into one that can be heard, the mechanical aspect naturally plays a predominant role. And the very fact that both the record and the tonearm physically move is always a source of potential energy loss. Actually, when the stylus is tracing the inscribed record groove, any movement other than that strictly necessary for the tracing process results in mistracking or output distortion.

In a turntable, unwanted vibrational movement is likely to come from the three main pivotal points that make up the turntable system. The first of these is the turntable, or more specifically, the motor shaft around which the platter revolves. The second is the tonearm pivot which is often incorrectly considered by designers as independent of the rest of the turntable. The third is the cartridge cantilever. The basic design of the L-07D rests on the knowledge, borne out by exhaustive laboratory tests, that only a precisely localized relationship between these three critical pivots can prevent loss of energy, **CLOSED PICKUP LOOP**



Thus, the L-07D system represents a closed-loop constructed as rigidly as the materials allow. In this uncompromising manner, Kenwood engineers have designed a turntable that can become the reference source for all analog record reproduction.

## How Kenwood engineers designed the L-07D to absorb vibration over the entire audible frequency range

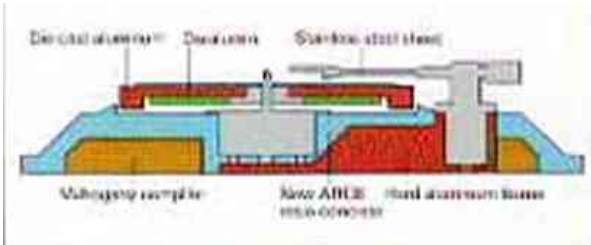
Kenwood engineers realized that only a highly rigid construction could prevent signal loss through undesirable vibrational movement. They therefore ruled out the use of conventional elastic vibration-damping materials such as rubber or metal springs, which merely damp vibrations through internal loss. More importantly, such common materials can create partial vibrations of several orders that may cause even worse resonances than

those intended for suppression. On the other hand since highly rigid materials have fairly precise resonant frequencies, bonding different materials together restricts resonant frequencies over a wide frequency range. This is the function of the massive 33kg (72.6lb) triple layer base. It uses a new ARCB (Kenwood Anti-Resonance Compression Base) material (about 10kg/22 lbs) made of a special resin-concrete which is bonded to a layer of mahogany composite (about 7kg/15.4 lbs). This forms the entire cabinet. But embedded in this highly rigid composite base is a third element: a hard aluminum frame (about 2kg/4.4 lbs) that provides the ultimate accurate localization of the motor and tonearm. This is one essential link in the continuous loop comprising stylus, arm, base, motor, platter and record. The result of this design is a freedom from resonance across the entire audible frequency range, and near perfect conversion of recorded to reproduced signal - a unique achievement in the history of turntable design.

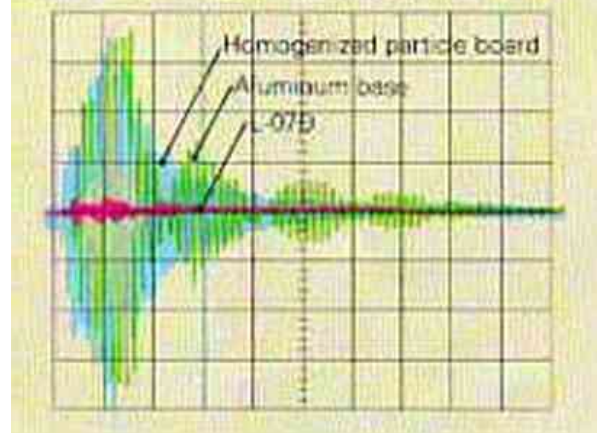




**TRIPLE LAYER BASE & PLATTER**



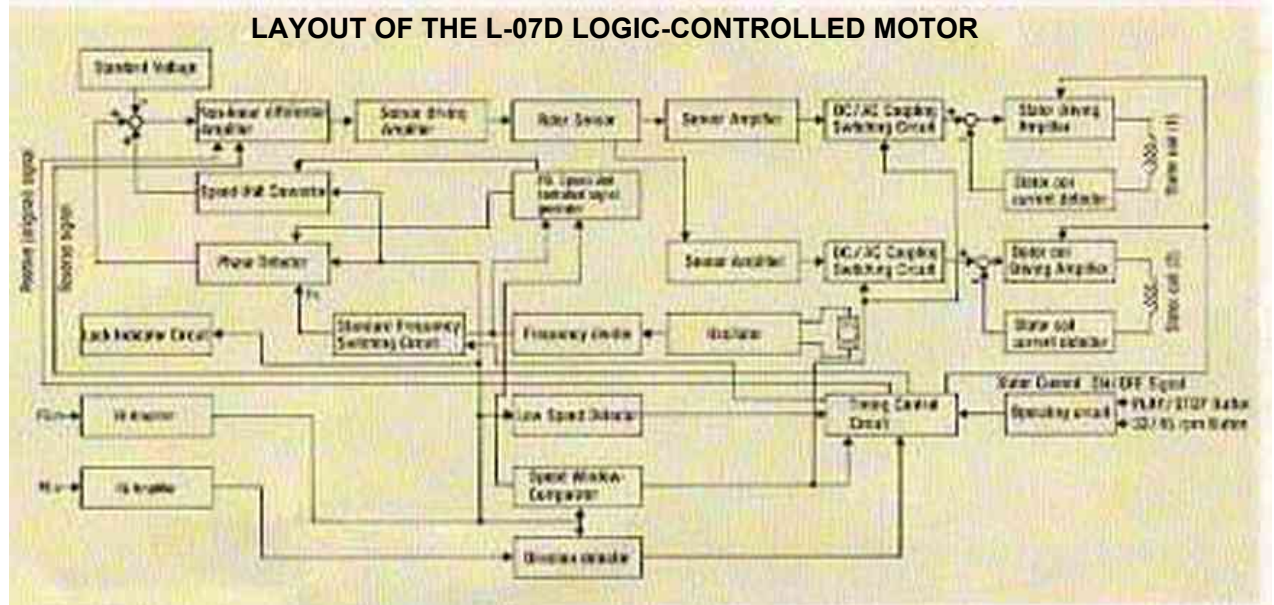
**RESONANCE DAMPING CHARACTERISTICS**



**External Dynamic Phase Compensator controls ambient changes**

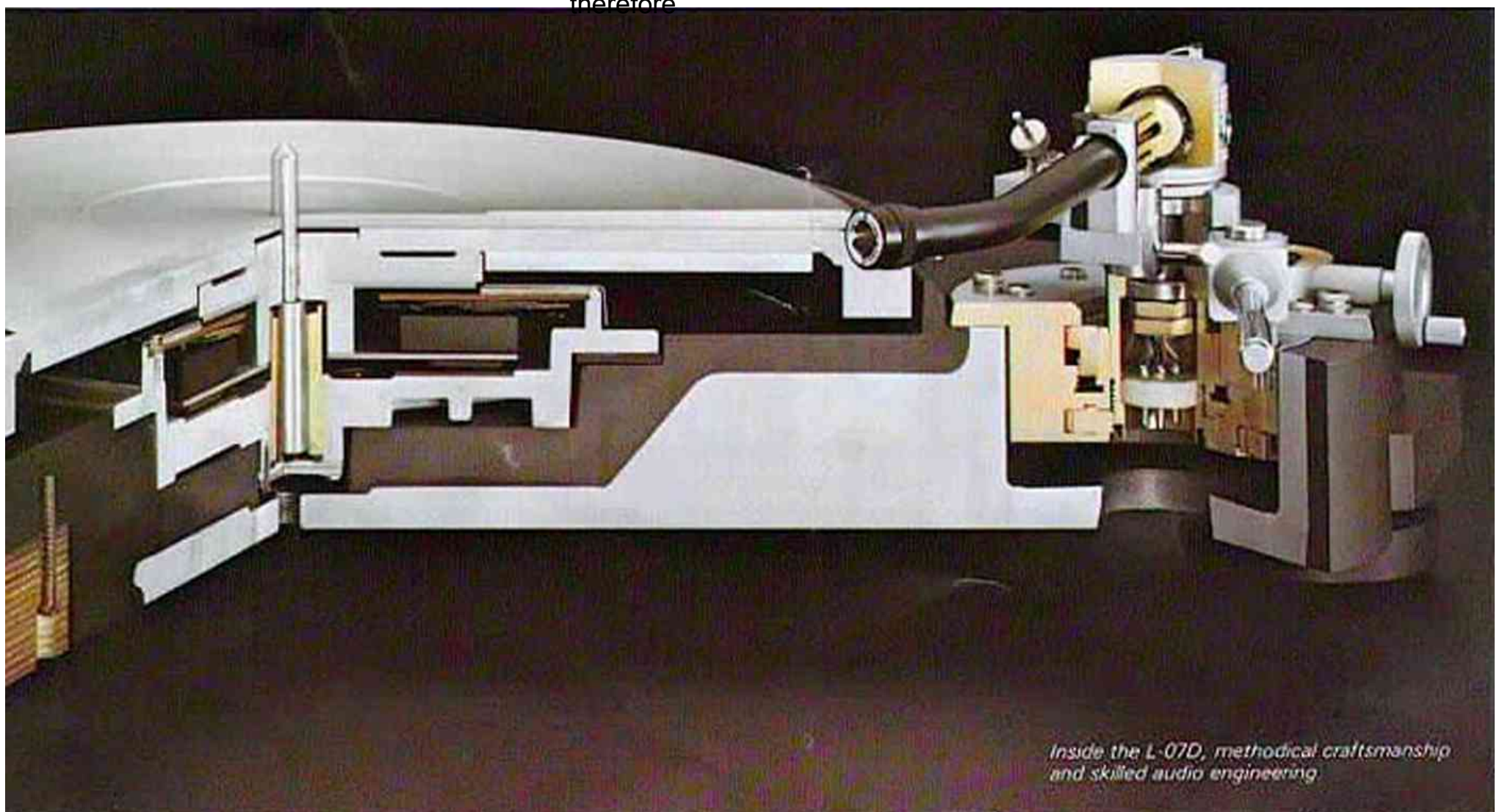
The direct-drive system of the L-07D incorporates a highly sophisticated

**LAYOUT OF THE L-07D LOGIC-CONTROLLED MOTOR**



quartz-lock, speed-phase double servo control and constant-current type motor to maintain high accuracy in motor speed. But even with the best of servo-systems, various ambient conditions during turntable operation can produce speed fluctuations that can ultimately affect perceived sound quality. Such factors include temperature and humidity, and changes in viscosity resistance due to heat generated by the oil in the bearing system. Kenwood engineers have therefore

incorporated an external logic control circuit that automatically compensates for ambient changes to within  $\pm 3\%$  of rated speed. When a record stabilizer is used, changing the parameters, the phase compensator can be switched to a different value. The motor itself is an improved design, using a new hard aluminum die-cast casing and an exceptionally stable rigid, 12mm diameter stainless steel center shaft around which the entire direct-drive system revolves. In this







way. the motor has a fixed thrust to ensure high mechanical impedance under all dynamic conditions.

**A high moment-of-inertia provides excellent transient load characteristic**

Even the music signal itself can significantly affect reproduction at the stylus/record groove point of contact. A signal with a wide dynamic range, for example, can easily result in a momentary braking effect in platter rotation. For this reason, the L-07D incorporates a massive platter that produces a high moment -of-inertia of 1025kg-cm\*. This is able to absorb all such random effects of transient music signals

**A vibration-proof triple layer platter with non magnetic stainless steel platter sheet**

Another unique feature incorporated in the L-07D design is the structured platter The massive die-cast aluminum platter is reinforced beneath by a 4mm thick, duralumin layer. But on top of the platter is a second layer of 5 mm thick, vibration-proof stainless steel. The two surfaces are interfaced by precision machining to prevent ringing, while the non magnetic nature of the steel sheet serves as a barrier to magnetism generated by a moving-coil type cartridge.

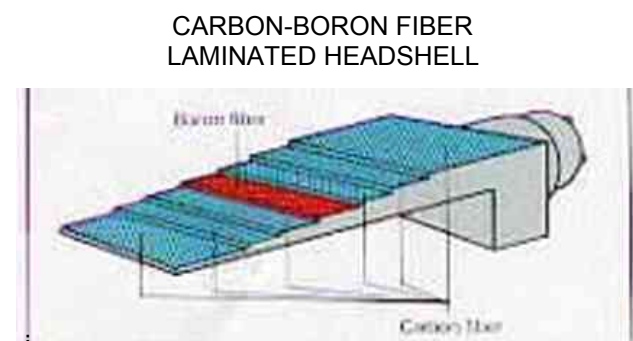
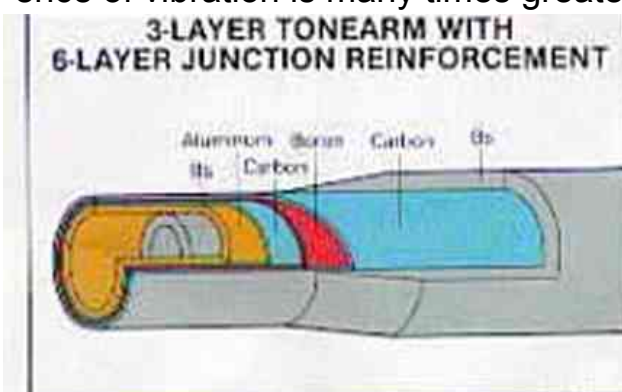
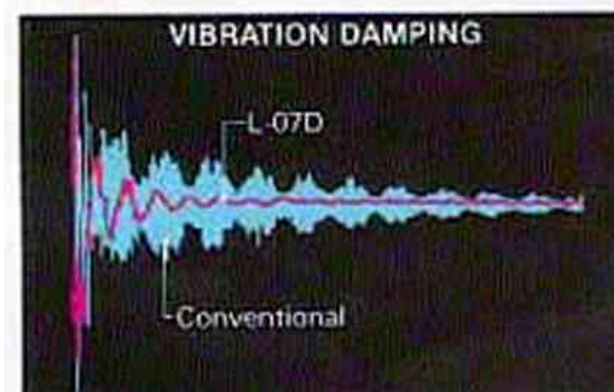
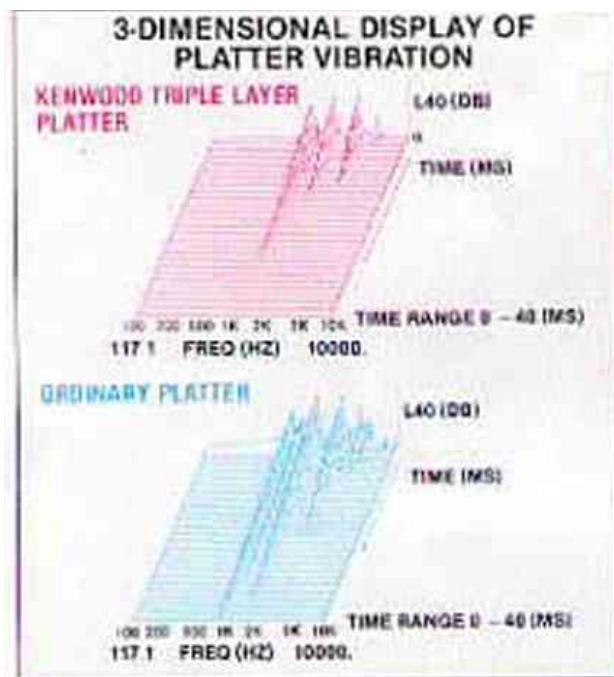
**Highly rigid, tapered tonearm with 3\*layer laminated construction in low-resonance design**

When normal variations in recorded signal level are in the order of only a few microns, even the slightest instability in the tonearm can result in distortion. Actually, in conventional tonearm design, large amplitudes at resonant frequencies can result not only in horizontal and vertical movement, but even in twisting and "rattling" of the pivot. The Kenwood tonearm designed as a highly rigid link in the L-07D system, achieves a remarkable freedom from such resonance problems. One feature is its pipe, a unique three-layer laminated structure using highly rigid materials hard aluminum, boron fiber and carbon fiber. Each material is selected for its ability to restrict resonance amplitudes. as well as for its low mass and relatively large elastic modulus. At the pipe/holder junction, where the Influence of vibration is many times greater.

a tapered Six-layer structure is used This careful design is largely responsible for the accuracy and clarity of reproduction across the audible range particularly at low-level low frequencies that are most difficult to reproduce authentically.

**The carbon-boron headshell**

Headshell resonance usually occurs at frequencies at which the ear is most sensitive—between 1 kHz and 5kHz—and is the reason that headshells often have a distinct tonal quality. To avoid this problem for the L-07D system. Kenwood engineers designed a headshell that raises resonance out of the critical audible range, while fulfilling basic requirement such as rigidity and low mass. The new design uses carbon and boron fibers laminated in opposed fiber directions to increase torsional strength.



**Tonearm base with precision Collet chuck provides extreme rigidity and stability**

Too many tonearms are treated as add-on features without regard to the probable effects of vibration caused by imperfect fixture to the base. Kenwood engineers take a different view. This is why you will find an extra-wide diameter, stainless steel tonearm shaft, and a massive base clamped directly to the metal frame that links tonearm to motor. To achieve maximum rigidity in this fixture, a genuine Collet chuck is used—the same type employed for precision machinery—which reaches a pressure force of



# L-07D

## SPECIFICATIONS

### MOTOR & TURNTABLE

Drive System.	Quartz PLL Direct Drive
Motor.....	Coreless & Slotless DC
	Servo Motor (Starting Torque 2,5kg-cm)
Turntable Platter	33cm (13") Diameter, Aluminum Alloy
	Die-Cast laminated with Duralumin
	Weight - 5,5kg (12.1 lbs) Including Non-
	Magnetized Stainless Turntable Sheet.
	Moment of Inertia 1025kg • cm <sup>2</sup>
Speeds	2 Speeds. 33-1/3 and 45rpm
Wow & Flutter	Less than 0.02% (WRMSI)
Rumble ...	DIN Weighted Better than 94db
Loud Fluctuation	0% (within 120g of tracking force)
Transient Load Fluctuation	Less than 0.00015% (at 33 1/3rpm.
Ructuoiioo	400Hz. 20g-cm load)
	Less than 0.00008% (at 33-1/3rpm.
	1,000Hz, 20g-cm load)
Time & temperature Drift	Limitation of Measurement

### TONARM

Type	Static Bulmicnd Type
	J-Shaped Pipe Ami.
	EI A Plug in Connector.
Effective Toiicar in Length	245mm (9-5/8 )
Overhang .	15mm (9/16')
Trucking Error	+2°26' - 1°11' - -1°48*
	i(150mm) (85mm) (150mm)
Stylus Pressure Variable Range	0 to 2 grams (50mg steps)
Usable Cartridge Weight ...	1 to 9 grams
(with Supplied Headshoii)	9 to 22 grams (with addition of inc'-
	uded weight)
Adjustable Height Range	Within 7 mm (1/4)
	By Helicoid Fixture (0.1mm steps)
Arm Base	Cuttut Chuck Type, Weight 1,5kg
	(3,3 lbs)
Headshell .....	Comjpression-Molded Carban
	and Boron Fibers.
	Weight - 12g

### ADDITIONAL FEATURES

Illumirinted Quartz-lock and Power	Indicator,
	Electronic and Mechanically
	Controlled Brake,
	Arm-Height Adjuster.
	Anti Skating Device.
	Oil Damped Cueing Control.
	LED Speed Indicators,
	Adjustable Height Insulator
	(12mm or 1/2") with Level
	indicator Stylus Pressure Direct
	Readout counter
	Sub-Tonarm Space for 14 inch
	Tonarm

### MISCELLANEOUS

Power Requirement .	AC 120V. 60Hz
Powur Consumption	11.0 watts
Dimensions	
Turntable and Motoi .....	W 565mm (21-7/8)
	H 160 mm (6-5/16*)
	D 470 mm (18- 1/2')
Control Unit	W 130mm (5-1/8")
	H 110 mm (4 -11/32" )
	D 356mm (14*)
Weights	
Turntable ana Motor	31.0kg (68.2 lbs)
Control Unit .....	4 , 3 k g
	(9.5lbs)

### SUPPLIED ACCESSORIES ..

Low resistace & low capacitance	phono cables with gold plated terminals.
	45rpm adaptor with overhang gauge. •
	Turntable platter cover,
	Oust cover cloth. Screwdriver.
	Silicon cloth, Ground wire.

### CABINET

Material	The cabinet is constructed of
	an Anti-Resonaoe Compression Base
	(ARCB) with die-cast aluminum frame
	and mahogany complite
	material.

# Kenwood KD-2100



## Specifications

Type:..... fully automatic record player

Drive method:..... belt drive

Motor:..... FG servo DC

Platter:..... 310mm, 0.7kg aluminium alloy die cast

Speeds:..... 33 and 45rpm

Rumble:.....67dB

Tonearm:..... S-shaped, static balance type

Effective length:..... 213mm

Overhang:..... 14mm

Stylus pressure range:..... 0 to 3g

Cartridge weight range:..... 5 to 10g (with supplied headshell)

Dimensions:..... 440 x 135 x 360mm

Weight:..... 5.5kg



## TURNTABLE

Although the new digital program sources are in the spotlight today, there is no danger that the tried and tested record player could be forgotten. After all, only he is able to give new life to precious analog recordings, the majority of which will never be available in digital form. Few devices do this as impressively as the Kenwood KD-990.

# Kenwood KD-990





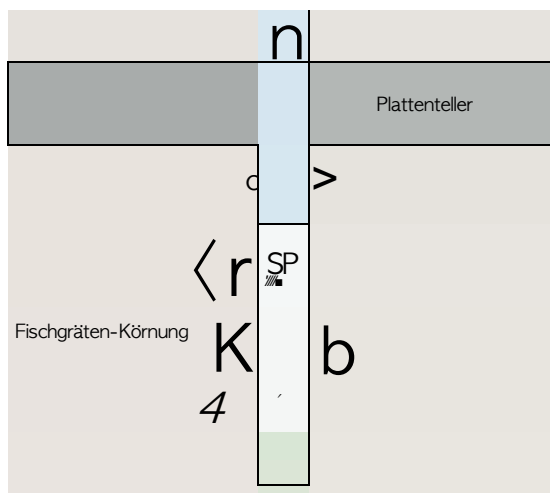
# Designed for authentic reproduction at the highest level

## Direct drive with dynamic oil pressure stabilization

Direct drive turntables rightly enjoy the reputation of excellent synchronism. The high-quality new records, however, revealed that they also still have a weak point: due to the play in the bearing sleeve, elastic bending occurs on the motor shaft (= plate axis). These are transferred to the platter as a slight dangling movement, which results in a corresponding deflection of the scanning needle.

The Kenwood engineers solved the problem with dynamic oil pressure stabilization. The motor shaft itself is provided with a herringbone grain, which is a special oil in the bearing sleeve against the wall presses. The resulting hydraulic pressure turns the shaft sideways steamed. For better stabilization, the bearing surface of the shaft in the bearing was also widened.

The dynamic oil pressure stabilization improves the smoothness of the turntable, which means that the stylus is able to feel the sound groove unhindered. This is particularly noticeable for the particularly quiet passages that the KD-990 can reproduce in an unusually clear and nuanced manner.



**Wellenrotation**  
Lauf bei Öldruckstabilisierung

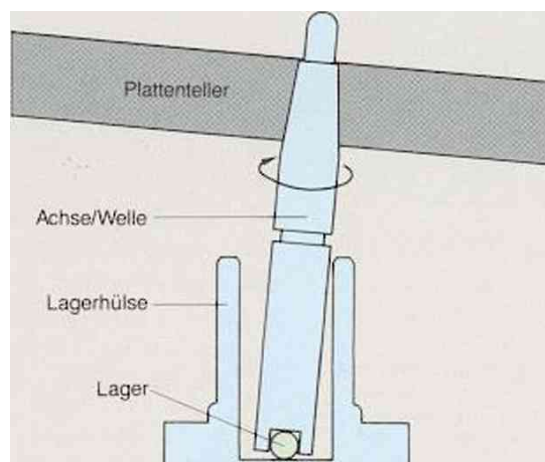


## Clean vibration damping through integrated inner frame

The integrated design of the KD-990 isolates the components involved in the scanning from impact sound and the housing vibrations. When mounting the drive and the tonearm base in a conventional turntable frame, such vibrations and resonances often cause energy losses, which reduce the scanning precision and make the sound appear vague or obscured.

Kenwood integrated the motor and the tonearm base in a solid die-cast frame into a solid, vibration-insensitive block and stored it on large dampers

feet. A sophisticated .. floating "suspension decouples the inner frame from the housing with the high-vibration components (eg transformer). This construction ensures high impact sound resistance and reduces the energy losses touching the music signal to practically zero.



Wellenspiel bei: konventioneller Lagerung

## Solid turntable with quartz PLL controlled speed

A quartz-phase-locked control loop ensures precise compliance with the nominal speed. However, the transient fluctuations also play a role in ensuring that the turntable runs perfectly. Role, e.g. can occur if the needle is highly modulated when scanning. Sound groove sections briefly exerts an increased braking torque on the turntable. Because of their short duration and unpredictable amplitude, such are short-term Brake torque peaks, which can audibly affect the height reproduction, are not sufficient via the electronic control comprehensible. Kenwood therefore equipped the KD-990 with a heavy weight platter, which has such a high moment of inertia (450kg.cm<sup>2</sup>) developed transient braking torques remain without influence. The high run-up torque (1.5kg.cm) of the direct drive brings the plate to nominal speed immediately.

## Resonance-proof precision tonearm

To the high stability of the drive and To be able to fully exploit the excellent impact sound absorption of the construction, the KD-990 received a J-shaped one. resonance-proof tonearm with impressive scanning power. It is mounted in a low-friction but structurally very firm suspension on a solid, reinforced base. The practical one Universal system carrier enables the cartridge to be changed quickly.

## Deluxe Paint

The elegant mirror lacquer housing mix on a dark, wood-grained background underlines the classic claim of the KD-990. Due to the relatively slim and compact design, the device blends in harmoniously with its surroundings.

# KD-990

## Quartz-controlled semi-automatic turntable

- Quartz-PLL-controlled direct drive
- Dynamic oil pressure-stabilized motor shaft
- H-core and slotless servo rotor with double phase correction
- Structurally integrated construction with solid, decoupled frame
- Motor frame and tonearm base
- High torque torque, 1,5kg.cm
- Heavy turntable with 450kg.cm<sup>2</sup> moment of inertia
- High sensitivity to dynamic braking torques
- Low resonance
- J-shaped tonearm
- Effortless replacement of the system carrier / pickup combination
- Automatic lifting of the tonearm in the outlet groove
- Adjustable tonearm height
- Antiskate device
- Two speeds
- Large damper loops
- Wood-grained housing with mirror lacquer finish
- Synchronization fluctuations 0.02% (effective, rated '■ rumble noise ■ voltage distance over 80dB (DIN-rated)



# Turntable

# KD-990

Type of drive	Quartz PLL direct drive
Motor	Core and slotless direct current •
Platter	Aluminium- Die cast alloy Diameter 33cm Weight 1.9kg
Speeds	33-1/3.45 UpM
Flutter	Under 0,03% (DIN) Under 0,02% (WRMS)
Rumble S / N ratio	Over 80db (DIN , weighted) Over 55dB (DIN, unweighted)
Tonarm	
Design type	J shaped tubular tonearm with counterweight and EIA-plug connection
Effective Tonarmlength	245mm
Overhang	15mm
Setting range of the Tracking force	0 to 3g
Cartridge weight (including enclosed System carrier) General	2 to 12g
Power consumption	22 Watt
Dimensions ( B X H X D, m m )	490x182x410
Weght	11.7kg



## Kenwood KD-7010

### Specifications

Drive system: direct drive

Motor: quartz PLL coreless and slotless DC servo motor

Platter: 330mm aluminium alloy diecast

Speeds: 33 and 45rpm

Wow and flutter: 0.02% wrms

Rumble: 80dB

Tonearm: static balance type, J-shape tonearm

Effective length: 245mm

Overhang: 15mm

Dimensions: 490 x 182 x 410mm

Weight: 13.7kg





## Kenwood KD-8030

### Specifications

Type: auto lift-up record player

Drive method: direct drive

Motor: Quartz PLL DC servo

Platter: 330mm aluminium alloy diecast

Speeds: 33 and 45rpm

Wow and flutter: 0.02% wrms

Rumble: 80dB

Tonearm: static balance, J-shaped pipe arm

Effective length: 245mm

Overhang: 15mm

Cartridge weight range: 2 to 12g (with supplied headshell)

Dimensions: 490 x 182 x 410mm

Weight: 13.7kg



**KENWOOD®**

**KD-5100**

QUARTZ DIRECT DRIVE  
FULL-AUTOMATIC TURNTABLE





# The KD-5100: computer-guided operation and highly accurate music reproduction.

- Microprocessor tonearm "brain"
- Rigid low-mass straight tonearm
- Fail-safe automatic operation «Electronic touch-keys
- Quartz PLL, sample-and-hold motor speed control
- Anti-resonance base \*Wow-and-flutter less than 0.03% (WRMS)
- Rumble better than -75dB (DIN wtd)

As soon as you see and operate the KD-5100, you will instantly recognize it as a minor masterpiece in turntable design.

It takes only the lightest finger pressure on a touch-key to cue the tonearm into its smooth, firm glide in the direction commanded. In fact, Kenwood's microprocessor electronic "brain" and digital-optical sensor system are responsible for every precision movement the slender, straight tonearm makes.

But computer-guided control is by no means the only merit of the KD-5100. There's the newly designed, low-mass tonearm with its carbon-fiber headshell: one of the most successful of its kind in terms of freedom from resonance problems and superb tracking ability.

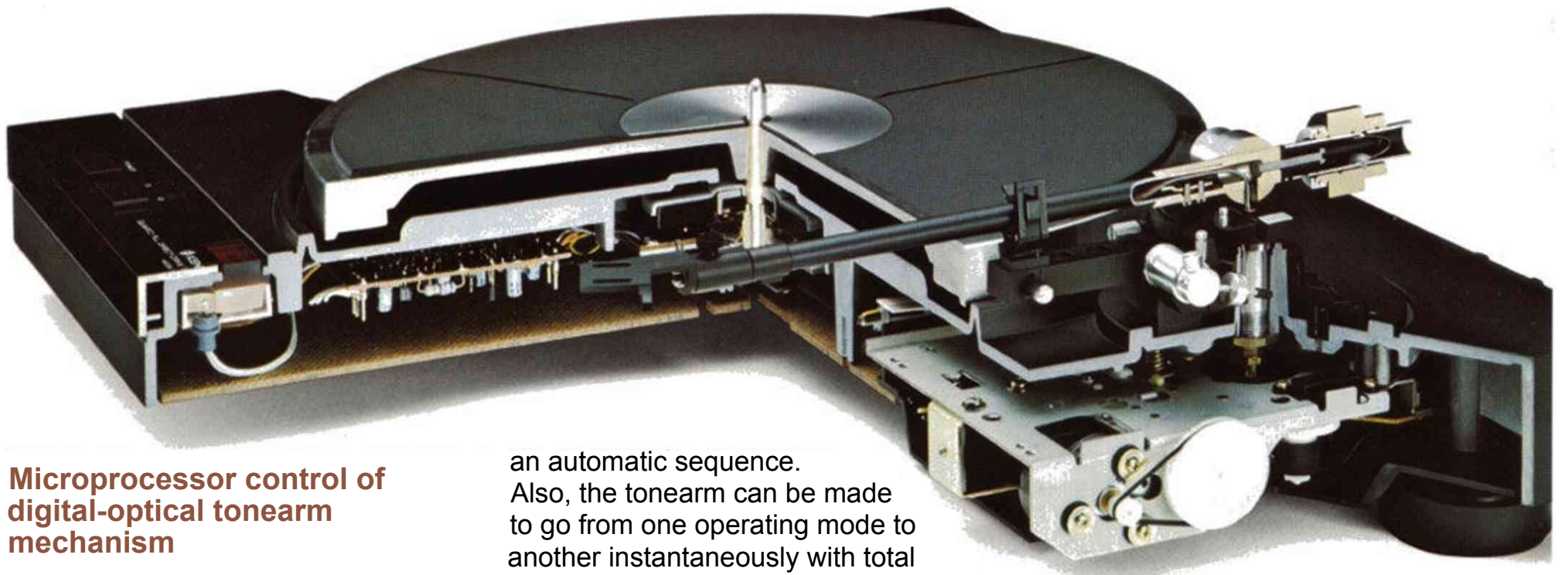
In its direct-drive system too, the KD-5100 excels. Its quartz-referenced phase-locked loop servo feedback system, advanced sample-and-hold phase detector and heavy, high-inertia platter provide both accuracy and stability, even in the face of transient load fluctuations.

Moreover, its new ARB base is specially designed for anti-resonance, a vital consideration for any turntable.

With its controls arranged for easy accessibility along the front control strip and its handsome wide-and-low styling, the KD-5100 is destined to take pride of place in any hi-fi system.







### Microprocessor control of digital-optical tonearm mechanism

The KD-5100 has the ultimate in automatic-tonearm control systems. First, it incorporates a Kenwood microprocessor that governs all of the actions and movements of the fully automatic tonearm. This is also what gives the controls the superb feel of a precision instrument. Second, the tonearm mechanism is not a "mechanism" at all in the usual sense. In fact, it is an optical sensor system that uses LED's and photo-transistors to effect changes in arm movement. Since there are no mechanical linkages to break down or wear, the system is utterly reliable, flexible and error-proof. For example, the tonearm can be operated by hand even during

an automatic sequence. Also, the tonearm can be made to go from one operating mode to another instantaneously with total safety.



The "brain" that controls tonearm action.

will not lower itself even if automatic operation is started. Such comprehensive error-prevention methods give you the total security you need to protect valuable records and stylus.

### Full-auto or auto-return operation

Naturally, fully automatic operation is given priority. But for those who prefer manual loading, the KD-5100 offers the convenience of auto-return. In fact, the KD-5100 can change from full-automatic to manual operation or back at any time.

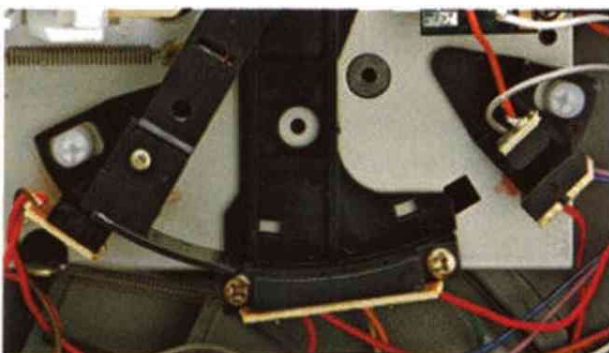
### Transient accuracy with high-inertia platter

Kenwood engineers were among the first to fully understand the effects of transient load fluctuations on the accuracy of reproduced music signals. Such fluctuations have little to do with conventional wow-and-flutter measurements and motor-speed accuracy. Rather, they are created dynamically. For example, when the stylus is tracing a record groove, a heavily modulated signal can cause a momentary braking

### Easy, error-proof operation

Only the lightest finger-touch is needed on the PLAY/CUT key to activate the tonearm into a smooth, firm glide to the record's edge. Similarly, a second light pressure will instantly raise the tonearm and send it back to rest. But there's more to electronic control than this. For example, unless the record-size selector is indicated, if the PLAY / CUT touch-key is pressed accidentally with no record on the platter, the tonearm simply returns to rest without lowering. In the same way, the electronic cueing control is designed to interrupt automatic operation at any position, without causing the tonearm to return. In addition, unless the record-size selector is pressed, the tonearm

Digital-Optical Sensor



This is the KD-5100's non-mechanical arm activator. It has the great merits of being utterly smooth and totally error-proof.

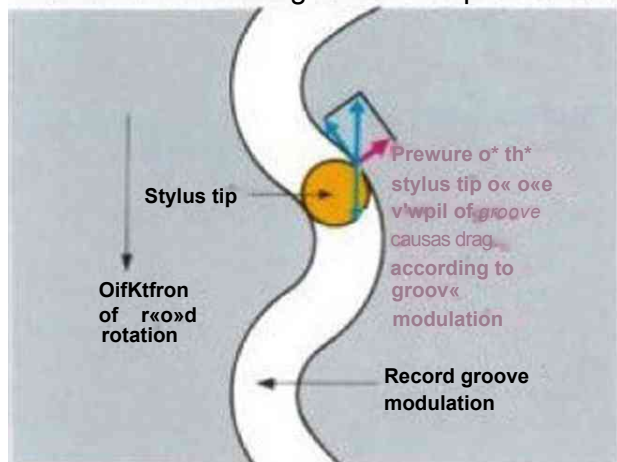


Touch-key electronic controls make the KD-5100 easy to operate. Controls include Power "on" and speed select; repeat play, cueing, disc-size select and play/cut. Quartz-lock indicator is at center.



effect on platter rotation. The fact that these fluctuations occur at random, according to both amplitude and duration of the signal, means that they are difficult to control. Moreover, other externally created disruptions in platter rotation can also degrade the signal. Combined vibrations from within the system are an example. Kenwood's solution to this often-ignored problem is the heavy, high-inertia platter. Designed to produce a moment-of-inertia of 330kg crrr' the KD-5100 platter can absorb the minutest fluctuations to maintain constant platter rotation speed.

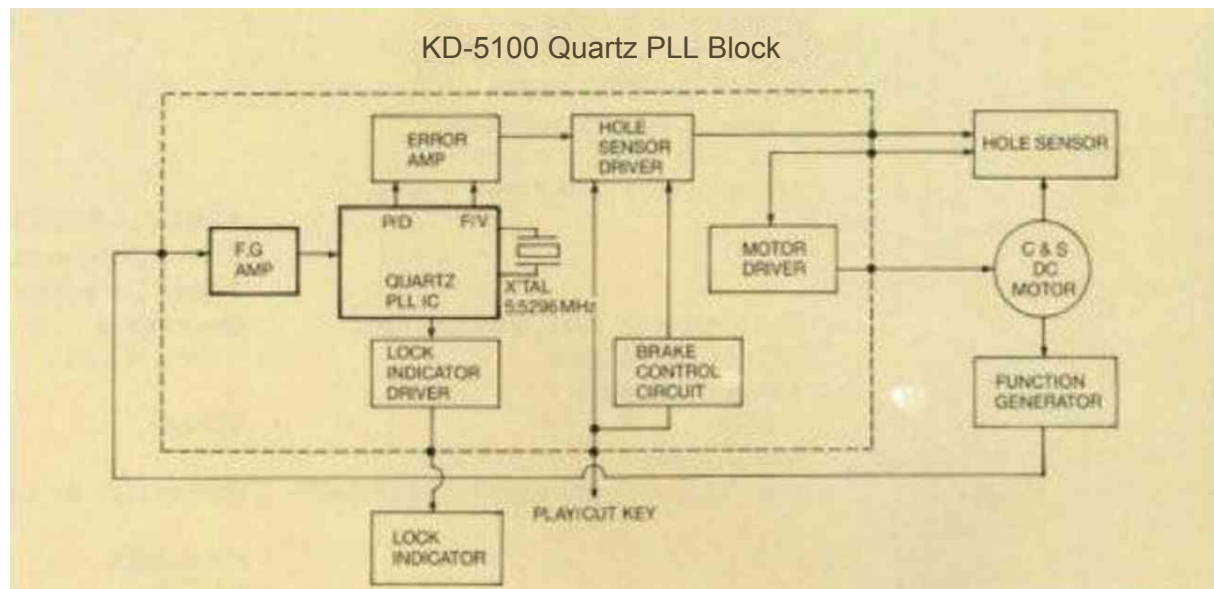
#### Transient Load During Musical Reproduction



A heavily modulated signal can cause a momentary braking effect on platter rotation. The high inertia platter resists such fluctuations.

#### Quartz PLL motor-speed control with sample-and-hold phase detector circuit

Strict control of motor speed is another vital aspect to achieving accuracy in record reproduction. Any motor is subject to changes in speed caused by ambient factors such as temperature and relative humidity, or changes in viscosity resistance of the oil in the bearing system, caused by heat. Also, changes in phase can occur, since line voltage is often unstable. All of these factors can add up to audible degradation of sound quality. To avoid this, Kenwood engineers have incorporated one of the most effective speed control systems available today. It includes

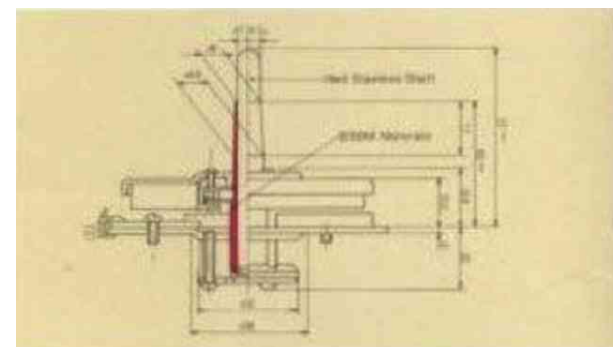


The KD 5100 employs one of the most advanced speed/phase control systems of any turntable.

a quartz-referenced phase-locked loop circuit that governs a DC direct-drive servo-motor whose slotless and coreless design significantly contributes to the low wow-and-flutter spec, of 0.03% WRMS. "Cogging"—or uneven energy delivery of conventional motors—is practically absent. The rotation speed detector providing servo-feedback is also highly advanced. Its all-integrated circuit using a special, 90-slot, high-precision cut gear produces a speed control signal that is far more linear than ordinary detector systems using machine-stamped slits or magnetic coating. Last, but certainly not least, Kenwood engineers have incorporated an advanced sample-and-hold phase detection circuit that efficiently solves the problem of phase changes that many listeners can easily perceive.

#### Extra stability from rugged shaft design

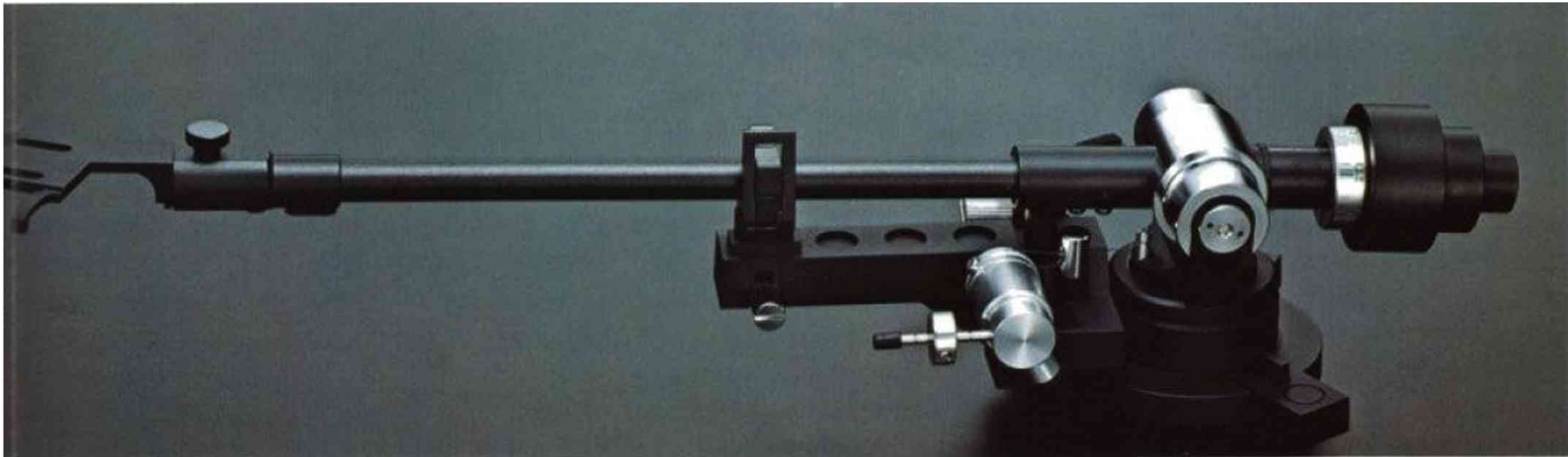
As the pivot on which the entire direct-drive system relies, the center shaft also has a key role in the creation of accurate music reproduction. This is why Kenwood engineers have designed a wider diameter center shaft with extra impedance, made of high quality, hard stainless steel, rotating in a brass shaft.



This is the kind of engineering quality that really pays dividends in terms of accurate music reproduction.

#### New, straight tonearm designed with low mass for excellent tracking ability

In the chain of command that sends the music signal from the cartridge pickup to the amplifier, the tonearm assembly is clearly a potential weak link. In fact, conventional lightweight tonearm design can even contribute to resonance due to torsional flexing or "shimmy" of the arm. For example, even a relatively mild warp in a record can cause mistracking and generate audible distortion. In order to improve tonearm tracking ability, Kenwood engineers have designed a new slender, straight tonearm that has significantly lower effective moving mass, yet which retains the rigidity to resist the effect of partial vibrations. The result of this design is exceptionally smooth tracking of the grooves. The tonearm, in a sense, can "ride out" the warps and reso-



*Anti resonance design provides the new straight arm tonearm with its accurate, smooth tracking ability.*

nances and reproduce music signals with great accuracy. The secret of its success lies in two common problem areas, outlined next.

### **Stable, anti-resonance pivot**

The three vital parts of the pivot assembly are the pipe holder, pivot ring and bracket. These are made of rigid brass material and die-cast zinc (bracket). For increased strength, the holder is pressure-fitted to the pivot ring. This structure has sufficient static mass to resist partial vibrations.

### **Headshell and its holder incorporate carbon-fiber**

Carbon-fiber is an expensive material. But the Kenwood design team be-

came convinced that only this kind of material could provide the KD-5100 tonearm with sufficient rigidity to avoid partial vibrations, while at the same time lowering effective mass.

### **Anti-resonance cabinet**

The turntable cabinet is also a frequent source of vibration problems. To avoid these, the KD-5100 has a base compounded of several materials including calcium carbonate and glass fiber in a synthetic stone structure. This provides both rigidity and a resonance frequency that is below the audible range.

### **Extra-rigidity with tonearm/turntable connection**

In tests made at Kenwood research laboratories, it became clear that precise and rigid positioning of the

two critical pivot points (tonearm and motor shaft) leads to improved reproduction. This is why these two pivots are connected by a short metal rib, so that the entire structure represents a solid, united front against vibration.

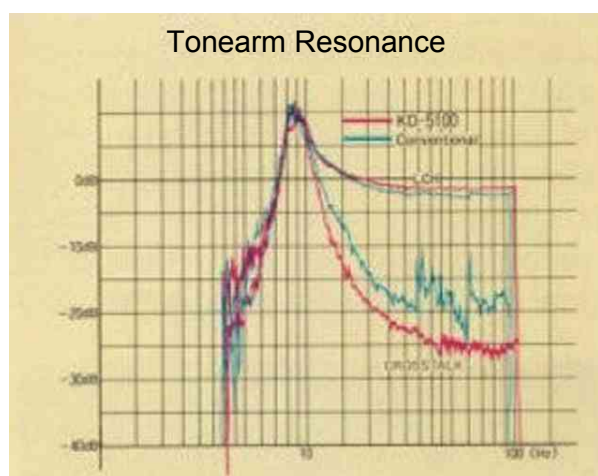
### **More highlights of the KD-5100**

#### **Anti-skating control**

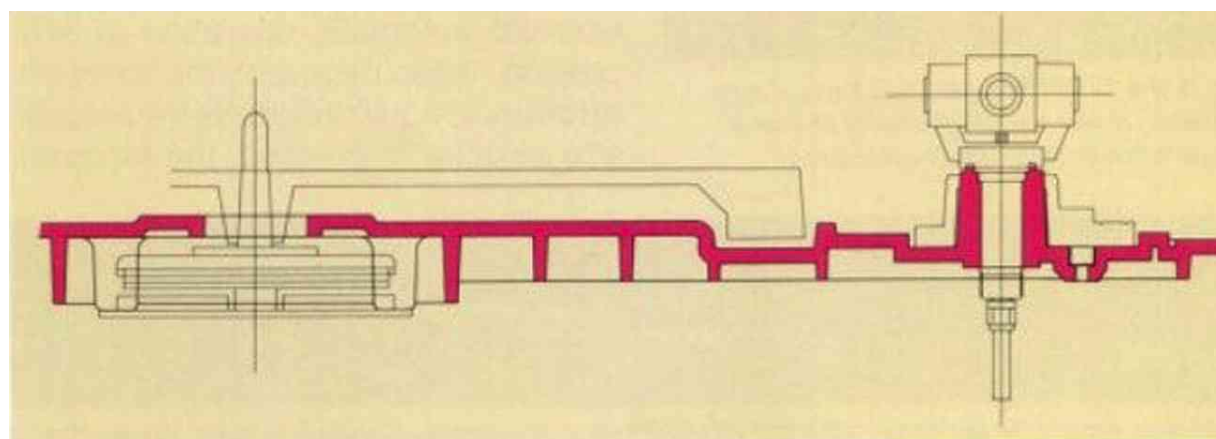
Low-resonance anti-skating control uses nylon thread to block possible transmission of vibrations to the tonearm.

#### **Remote control facility**

The KD-5100 is designed to accommodate the optional RC-500 remote control system. This can effect automatic operational modes by the handheld controller. Another advantage the entire stereo system can be pre-programmed to shut off after the tonearm has returned to rest.



*Graph shows resonance reduction of the KD-5100 tonearm with its carbon-fiber headshell. Its tracking ability compares favorably with a leading low mass tonearm.*



*Extra-rigidity comes from connection of tonearm assembly with motor shaft.*



# KD-5100

## SPECIFICATIONS

### MOTOR & TURNTABLE

Drive System.....	Quartz PLL Direct-Drive
Motors.....	Coreless <i>E<sub>t</sub></i> Slotless DC Servomotor (For platter drive), 2-Pole, 3-Slot DC Motor (For automatic functions)
Turntable Platter.....	31.6cm (12-7/16 inch) Diameter Aluminum Alloy Die-Cast Weight: 1.5kg (3.3lbs) Moment of Inertia: 330kgcm <sup>2</sup> (Including rubber sheet)
Speeds.....	2 Speeds, 33-1/3 and 45rpm
Wow & Flutter.....	Less than 0.03% (WRMS)
Rumble.....	DIN weighted better than -75dB

### TO NEARM

Type.....	Static-Balance Type, Straight Arm
Effective Tonearm Length.....	225mm (8-7/8 inch)
Overhang.....	15mm (9/16 inch)
Tracking Error.....	+ 3°24'----- 1°
Stylus Pressure Variable Range ...	0 to 3 grams
Usable Cartridge Weight.....	4 to 9 grams (with supplied headshell)

ADDITIONAL FEATURES.....	Fully Automatic Tonearm System by Microprocessor (Automatic Lead-In/ Return/Cut/Repeat), Illuminated Quartz-Lock Indicator, Anti-Skating Device, Oil-Damped Cueing Device with LED Indicator, Disc-size Selector with LED Indicators, Speed Selector Switch with LED Indicators, Headshell and 45 rpm Adaptor Stand, Stylus Pressure Direct Readout Counter
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### MISCELLANEOUS

Power Requirement.....	AC 120V, 60Hz
Power Consumption.....	19 watts
Dimensions.....	W 470mm (18-1/2") (W x H x D) H 142mm (5-9/16") D 407mm (16")
Weight.....	9.0kg (19.8lbs)

SUPPLIED ACCESSORY.....	45rpm Adaptor
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### CABINET

Material.....	Construction of cabinet is of Anti-Resonance Base (ARB). This massive ARB is injection molded from polyester resin, glass and calcium carbonate fibers, etc.
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