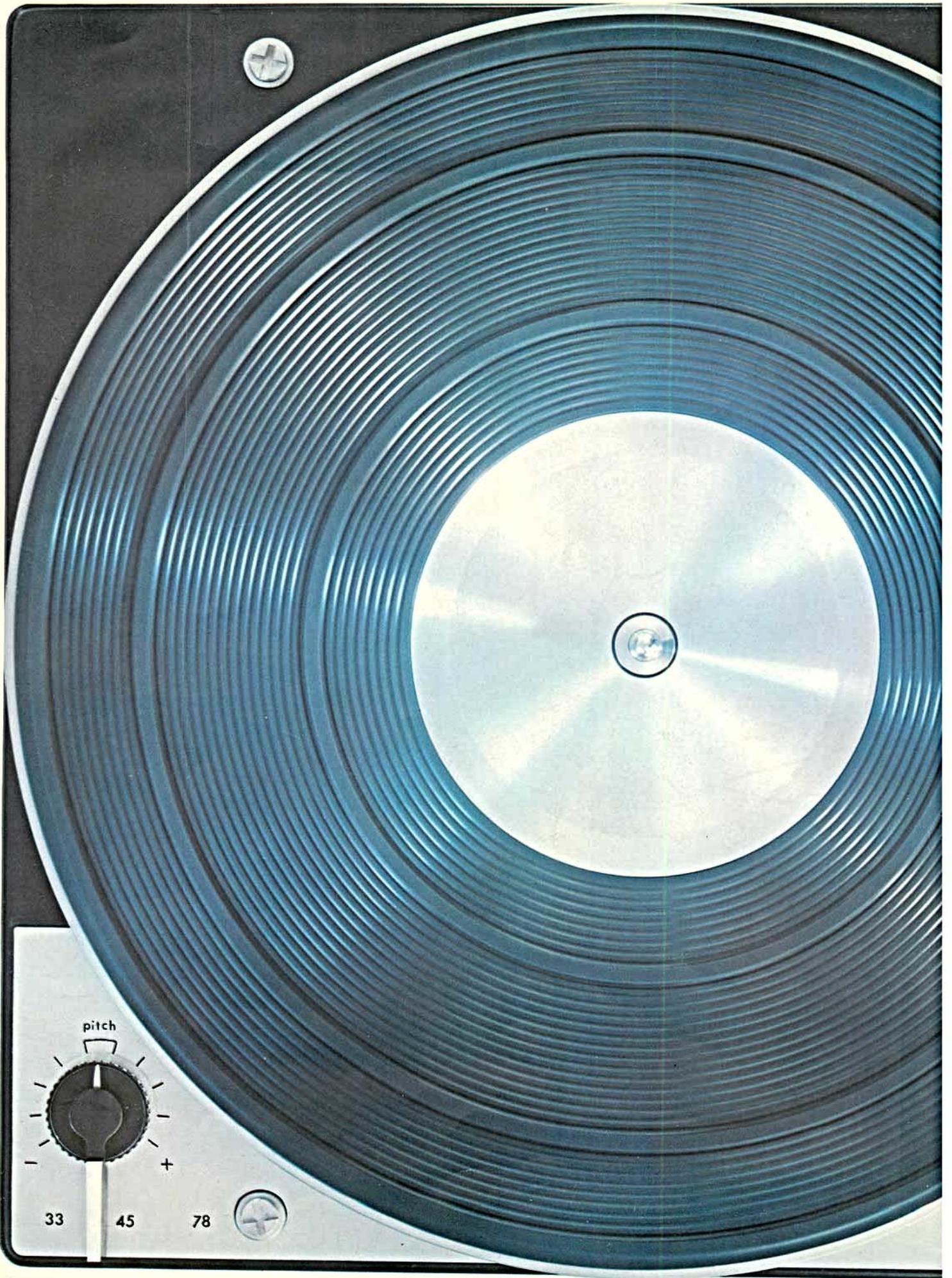


Dual 1229
Professional Automatic
HiFi Turntable

Dual







Contents

Dual 1229

	page
Tonearm Suspension	5
Cue Control	
Tonearm Tracking Error	
Tonearm Counterweight with Shock Absorber	6
Mode Selector for Perfect Correction of Vertical Tracking Error	
Skeleton-Type Tonearm Head	7
Tonearm Resonance	
Continuously Selectable Stylus Force	8
Built-in, Illuminated Strobe	
Anti-skating Precision	9
Pitch Control	10
Handling the Dual 1229	
Rotating Single-Play Spindle	11
Dynamically Balanced, Heavy Platter	
Precision Design	12
Dual "Synchronous Continuous-Pole" Motor	
Bases and Dust Covers	13
Technical Features	14
Available Versions	

Dual 1229 — the basic component for High-grade HiFi Stereo Systems

Dual 1229 — the HiFi automatic record player with exclusive features. For music lovers who appreciate precision and ease of handling and who want to enjoy faithful reproduction, the Dual 1229 provides outstanding handling

ease. But the most important principle for Dual is the uncompromising engineering which results in completely undistorted and acoustically perfect reproduction. The Dual 1229 will handle your valuable records

so gently and carefully, that they will sound as beautiful years from now as they do now. The tonearm of the Dual 1229 has unexcelled pick-up characteristics. Precision calibration permits accurate adjustment of stylus force to 1/10 p. The extremely accurate anti-skating controls are provided with a synchronous scale division for just that purpose. The Dual "synchronous continuous-pole" motor and a 6.8 lbs. non-magnetic platter guarantee constant platter speeds and accurate synchronization. A variable pitch-knob controls platter speed as read on a built-in, illuminated strobe. All these features and a multitude of outstanding technical details make the Dual 1229 the outstanding basic component for high-grade HiFi stereo systems.



Dual HiFi system with Dual 1229
with base CK 20
and cover CH 20,
HiFi amplifier CV 120,
HiFi tuner CT 17,
HiFi tape deck CTG 29
with cover CH 20,
HiFi speakers CL 190,
phonotable PT 3
and discoboxes DB 30-4.

Tonearm in four-point gimbal suspension

5

Tonearm

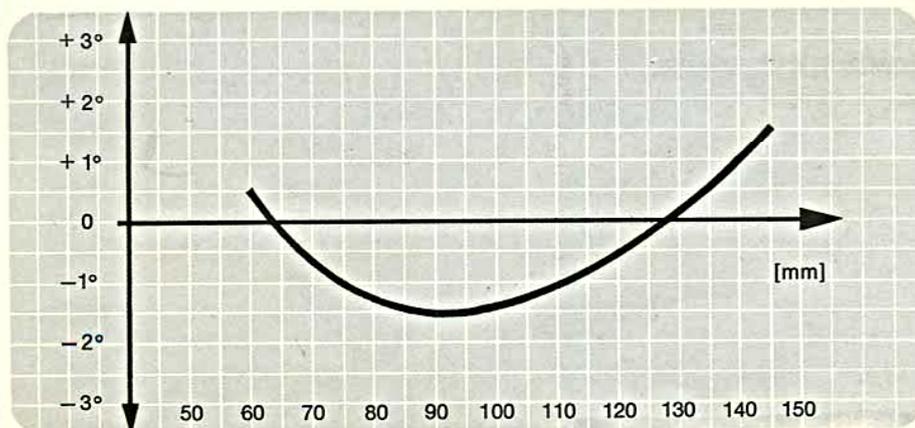
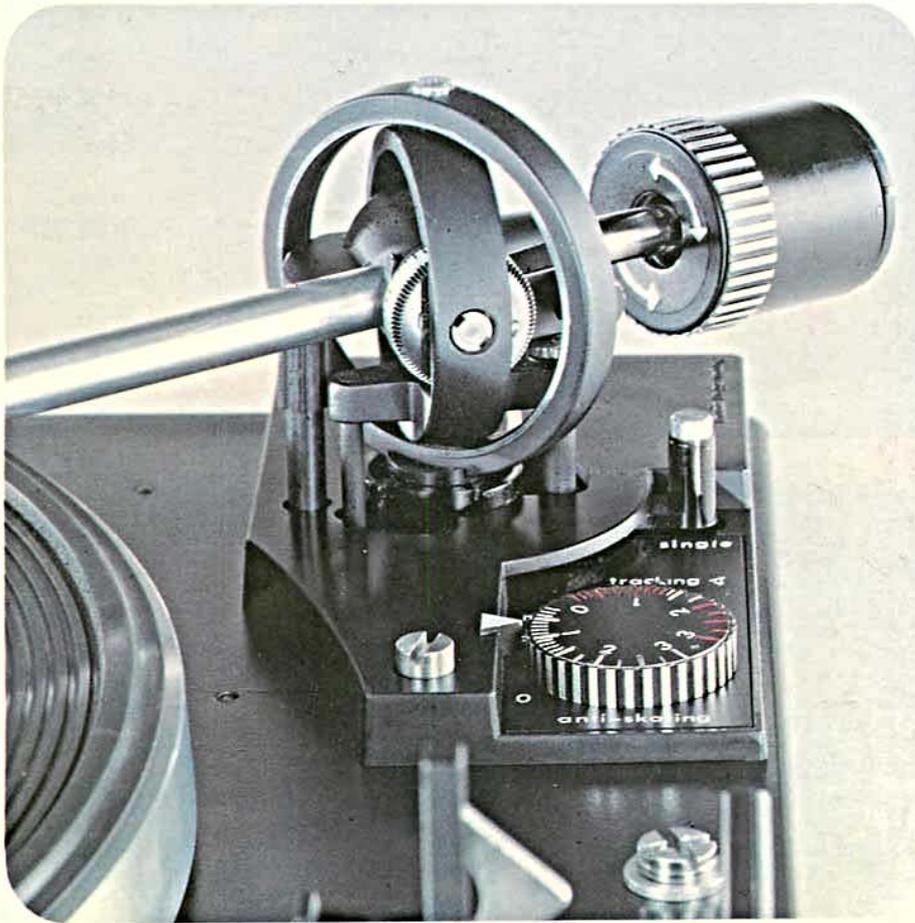
Characteristics and precision of the tonearm determines the quality of a HiFi record player. The tonearm of the Dual 1229 is a distortion-free, all-metal arm with an extremely low dynamic mass, balanced in both planes of motion. Stylus force is controlled by a coiled spring around the horizontal shaft. This keeps the tonearm balanced during play and it will track perfectly and is insensitive to vibration. The effective length of the Dual 1229 tonearm from the center of rotation to the stylus tip is $8\frac{3}{4}$ inch, which makes this arm the longest automatic tonearm in use. The tangential tracking error is only 0.4° /inch max.

Tonearm Suspension

The tonearm of the Dual 1229 automatic record player is suspended in both directions in hardened and finely polished centers in a four-point gimbal system. In this ring-in-ring arrangement the tonearm rotates vertically in the inner ring around the horizontal axis. The tonearm and the inner ring together rotate horizontally in the outer ring around the vertical axis. This precision suspension is practically without friction and provides optimal pick-up conditions for the cartridge.

Cue Control

The Dual 1229 is provided with an extremely precise cue control which can be operated absolutely free of vibration. The tonearm will set down gently at any desired point of the record. During automatic starting the cue control will raise and lower the tonearm with extreme care. For manual operation, a slight touch on the sensitive control lever will initiate lowering the arm. Lowering and raising, e. g. for temporarily interrupting playback, are silicon-damped. The lowering speed is insensitive against temperature changes and amounts to approx. $\frac{1}{5}$ inch/sec.



Tonearm Tracking Error

Zero horizontal tracking error is theoretically possible only with a tonearm of infinite length. On the Dual 1229 this ideal conception is attained by the use of an extra long tonearm and optimal design. The tangential tracking error does not exceed $1^\circ 30'$ in any tonearm position. This corresponds to $0.16^\circ/\text{cm}$ or $0.4^\circ/\text{inch}$, respectively. Any remaining theoretical distortion will be far below the threshold of audibility.

Weight-balanced tonearm Perfect correction of vertical tracking error

6



Tonearm Counterweight with Shock Absorber

One of the most important characteristics of a HiFi record player is the weight-balanced tonearm. By shifting and turning the balance weight, the tonearm can be balanced for both planes of motion in a particularly simplified and accurate manner. The counterweight is elastically connected and therefore makes the tonearm thoroughly insensitive to vibration.

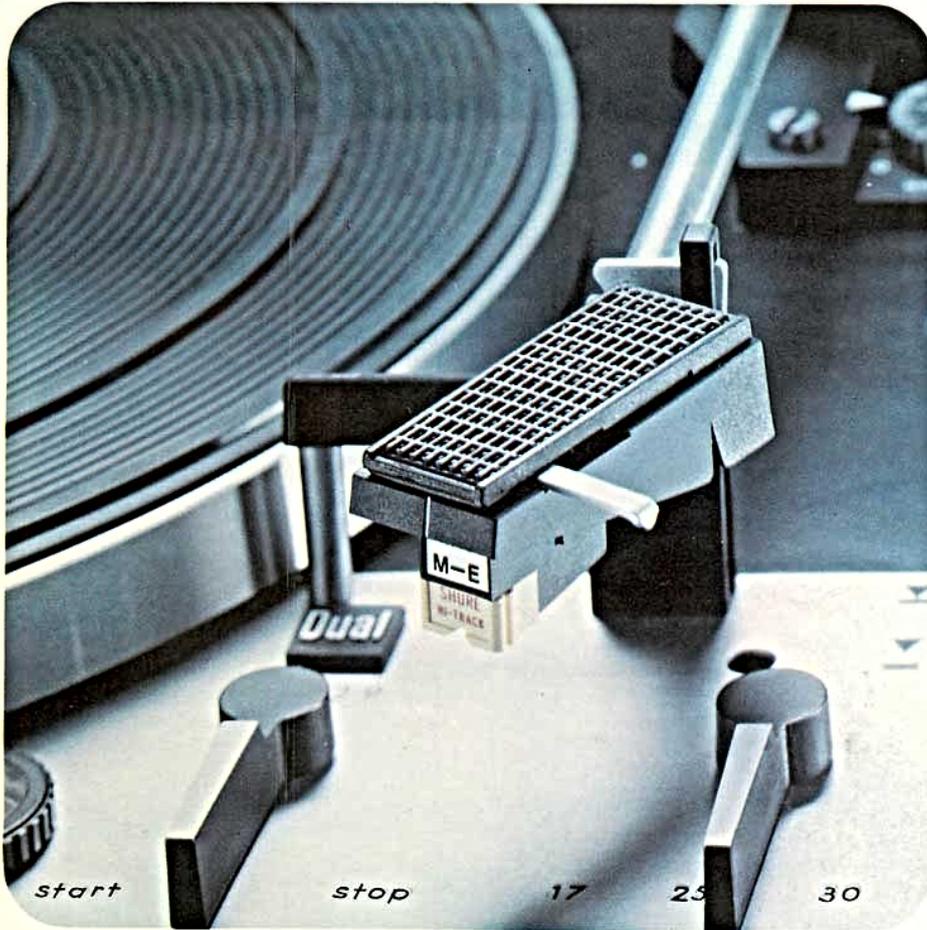


Mode Selector for Perfect Correction of Vertical Tracking Error

In accordance with an international agreement, records are cut to a standardized cutting stylus angle. The Dual 1229 is provided with an adjusting device to maintain this angle during single play and changer mode. This Mode Selector raises the tonearm base during the changer mode in such a manner that the tonearm is in parallel with the center of the stack of 6 records. During single-play the mode selector lowers the base until the tonearm is in parallel with the record. The stylus contacts the sound groove at the angle at which it was cut. This prevents otherwise unavoidable pickup distortion.

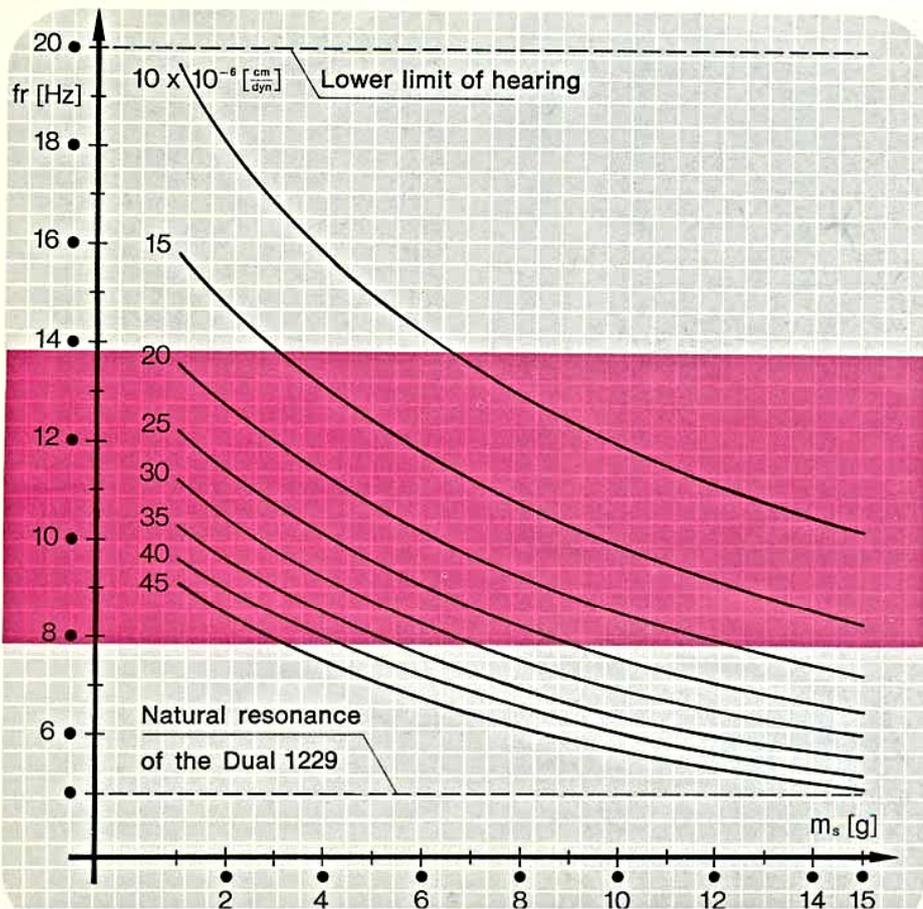
Extremely lightweight tonearm head

Tonearm and plate resonance



Skeleton-Type Tonearm Head

The tonearm head is made of a light-metal alloy. Skeleton design makes this head extremely light and torsionally rigid. The cartridge holder is also a special Dual development and provides additional savings in weight in excess of 2 grams. The tonearm head has a cartridge carrier which is interlocked with the handle and permits mounting all cartridges with standard 1/2 inch attachment. The cartridge carrier is additionally provided with recesses for using the various cartridges offered by Dual. This type of engagement eliminates the otherwise required screws, nuts and spacers. The stylus tip is always certain to be automatically located at the geometrically accurate location.

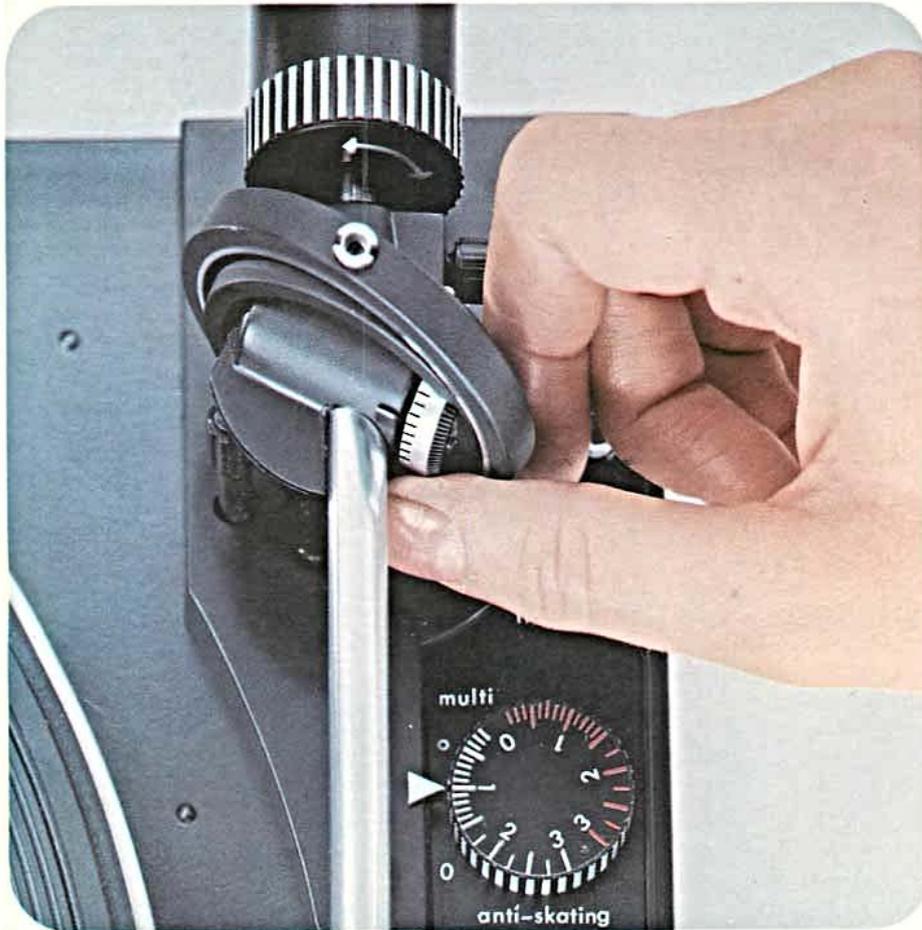


Tonearm Resonance

Tonearm resonance depends on the compliance C and the mass (dead weight) m_s of the cartridge. The tonearm of the Dual 1229 is torsionally rigid and designed in such a manner that its resonance in combination with any modern cartridge system is below the audible range and above the resonance of the plate suspension. Distortion of the sound pattern is prevented. The most favorable frequency range is between 8 and 14 Hertz. A cartridge having a weight of approx. 5.5 g and a compliance of 25×10^{-6} cm/dyn will, for example, provide a tonearm resonance of 9.5 Hertz.

Accurate adjustment of stylus force Illuminated strobe with adjustable viewing angle

8



Continuously Selectable Stylus Force

The stylus force can be continuously varied from 0 to 3 p for direct reading. In the particularly interesting range of 0–1.5 p the scale has an $\frac{1}{10}$ p graduation for accurate adjustment. Accurate adjustment of the stylus force is especially important for cartridge systems with high stylus compliance and the pertinently required lower stylus force. The Dual 1229 is already operationally safe from 0.25 p. The stylus force is set in accordance with the technical data of the cartridge system.

Stylus forces above 3 p can be adjusted by means of the tonearm counterweight. A full rotation of the counterweight will change the stylus force by $\frac{1}{2}$ p. For accurate adjustments, the counterweight is provided with a rotatably mounted disc with appropriate calibrations (refer to illustrations on page 6).

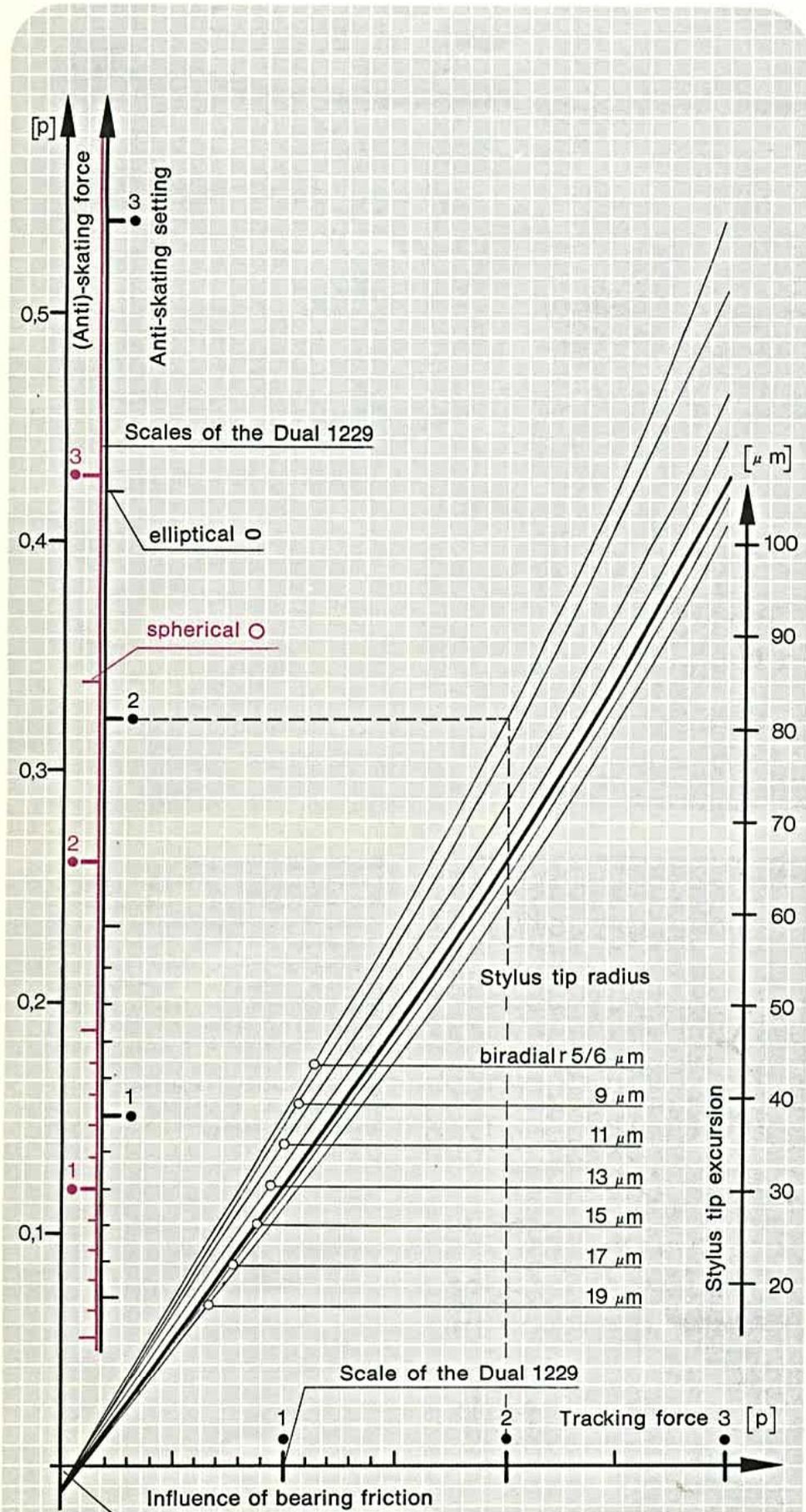


Built-in, Illuminated Strobe

The stroboscope serves to check the platter speed. At accurately adjusted standard speeds ($33\frac{1}{3}$ or 45/rpm.) the lines of the stroboscope seem to be standing still. If the marks rotate in the direction of the platter rotation, the platter speed is too high. If the mark rotates in reverse, the speed is too low. The built-in strobe has a light tunnel with a variable angle and a light source of its own (glow bulb). The platter speeds of the Dual 1229 can be accurately adjusted and varied by $\pm 3\%$, to obtain special effects if desired.

Precise anti-skating control

Anti-skating diagram



Anti-skating Precision

What is skating? It is the tendency of the tonearm to move toward the center of the platter while the record is played. This tendency is a particular disadvantage when playing stereo records, since the relative pressure of the stylus against the lefthand (inner) walls of the record is greater than against the righthand (outer) walls. This difference in stylus force will cause distortion in the righthand channel and the inner wall of the record will also be more subject to wear. The stylus will also wear unevenly. To compensate for this skating force, the tonearm must be provided with a counterforce accurately defined both in size and direction. The anti-skating control of the Dual 1229 meets this requisite. The counterforce is applied practically free of any friction and can be continuously adjusted in such a manner, that the skating force is exactly compensated. Anti-skating can also be operated during play and has separate scales for spherical and elliptical (biradial) styli.

Adjacent diagram:

Skating force and stylus excursion as a function of stylus force and tip radius, as applied to the tonearm of the Dual 1229. The colors correspond to the colors on the anti-skating dial scale — namely red for spherical (conical) styli and black for elliptical styli. The stylus excursion refers to a compliance of 25×10^{-6} cm/dyn.

Pitch control

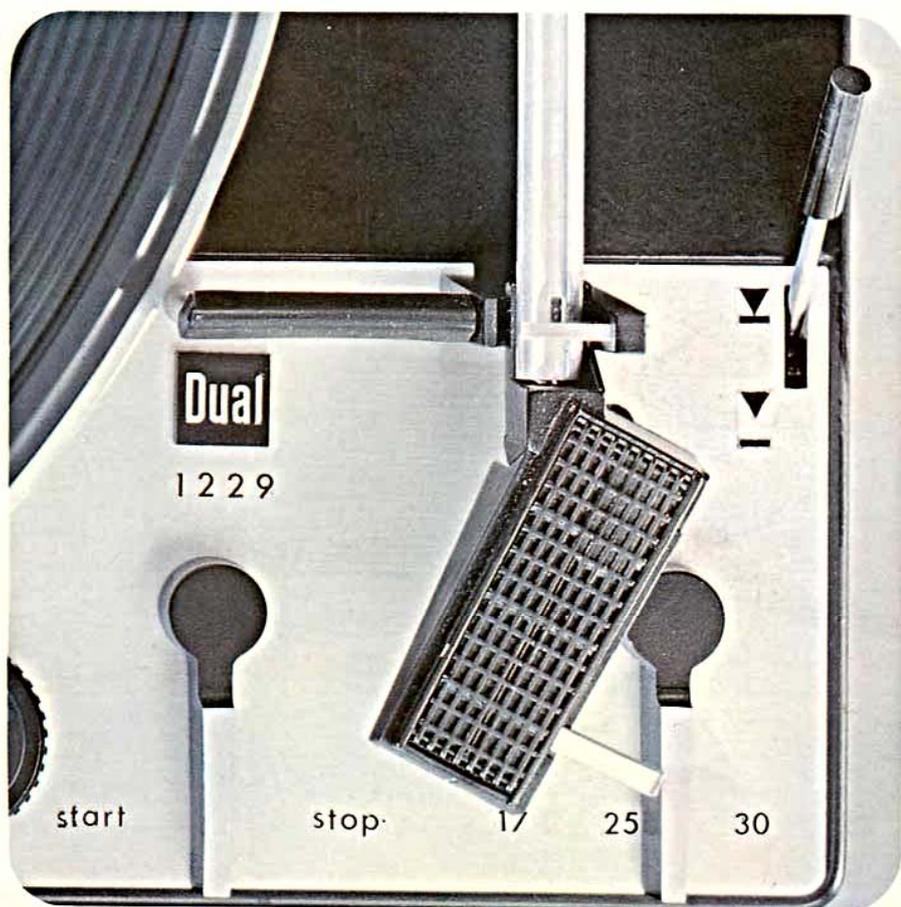
Vibration-free operation with rotary levers

10



Pitch Control for "Tuning" Records

Accurate platter speeds are assured by the Dual "synchronous continuous-pole" motor in combination with the 6.8 lbs platter. The nominal speeds can also be individually changed, e. g. when playing an instrument along with a record where the pitch of the record must be adjusted accordingly. Or for adjusting a few bars of the music accurately to match the length of a film scene. In each case, the pitch control of the Dual 1229 permits such adjustments. Pitch and speed can be changed by approx. $\frac{1}{2}$ tone or approx. 6 %.



Handling the Dual 1229

The Dual 1229 has rotary levers for "Start", "Stop" and record diameter. The rotary levers are both stylish and handy. Rotary motion in combination with lever effect makes handling easy and free of shock or vibration. Simply turn rotary lever to "Start". The tonearm of the Dual 1229 raises or lowers gently, automatically and with great precision. Raising and returning the tonearm at the end of the playback and switching-off is also automatic. Independent of whether the tonearm has been moved into playback position with the automatic starter, the cue control or manually. The "Stop" lever serves to stop playback at any time. If you want to jump a few bars or listen to a given spot on the record, simply use the cue control, which will hold the tonearm above the record in non-playing position until it is lowered again by simply touching the cue-control. For a quick record change place tonearm on stand-by near tonearm support.

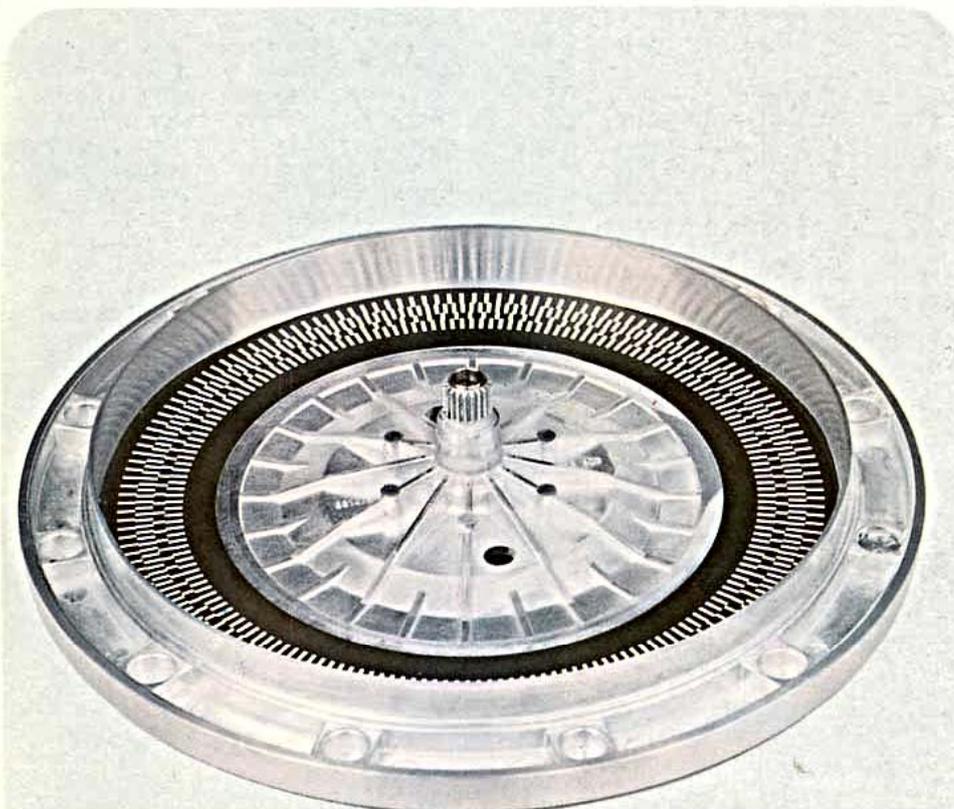
Rotating single-play spindle Optimal platter

11



Rotating Single-Play Spindle

A record rotating around a stationary spindle generates friction. Friction reduces the quality of the reproduction. The Dual 1229 solves this problem in a most simplified manner: The replaceable rotating single-play spindle is mounted in the platter in such a manner that it will rotate with the record. No friction will result and record center holes will not be worn to an eccentric shape which would cause wow.



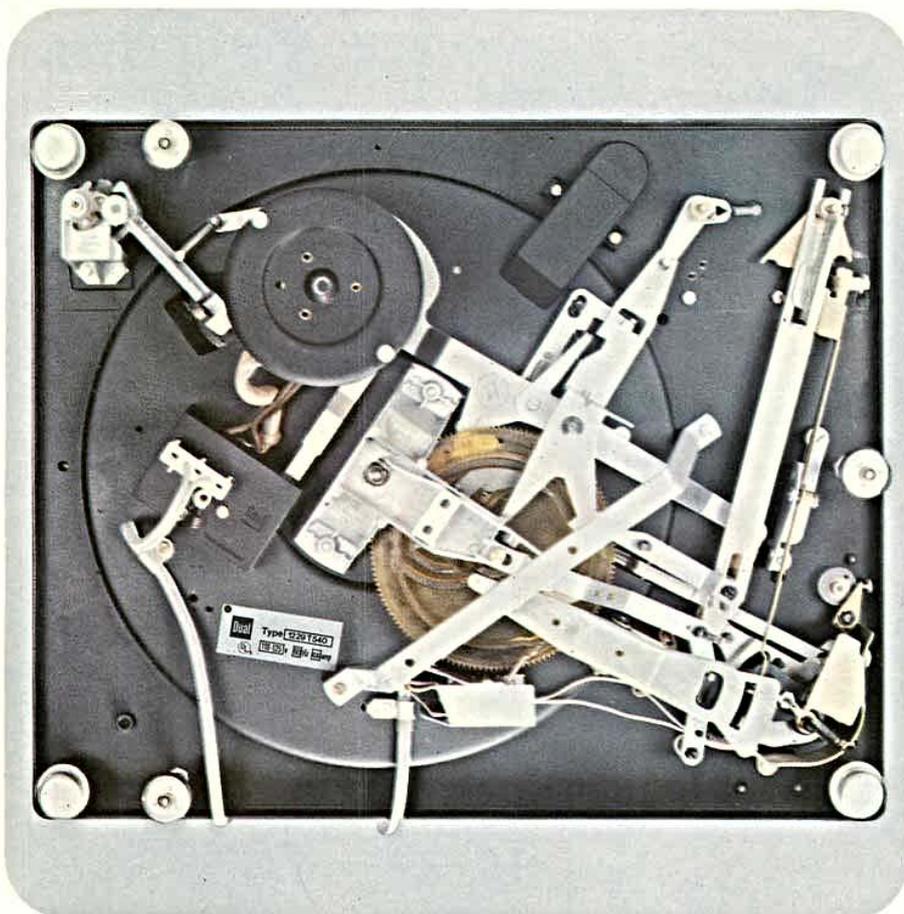
Dynamically Balanced, Heavy Platter, 12 Inch Dia.

The Dual 1229 has a die-cast platter made of nonmagnetic metal with a rubber mat. It is dynamically balanced, weighs 6.8 lbs. and has an extraordinarily large flywheel mass for optimum constant speed. Measurable wow and flutter are far below the threshold of audibility. Records should be supported exceedingly well and the platter of the Dual 1229 is of such a large size for just that reason: 12 inch dia. slightly deepened toward the center (concave).

Precision makes the difference in performance

Synchronous motor with absolutely constant speed

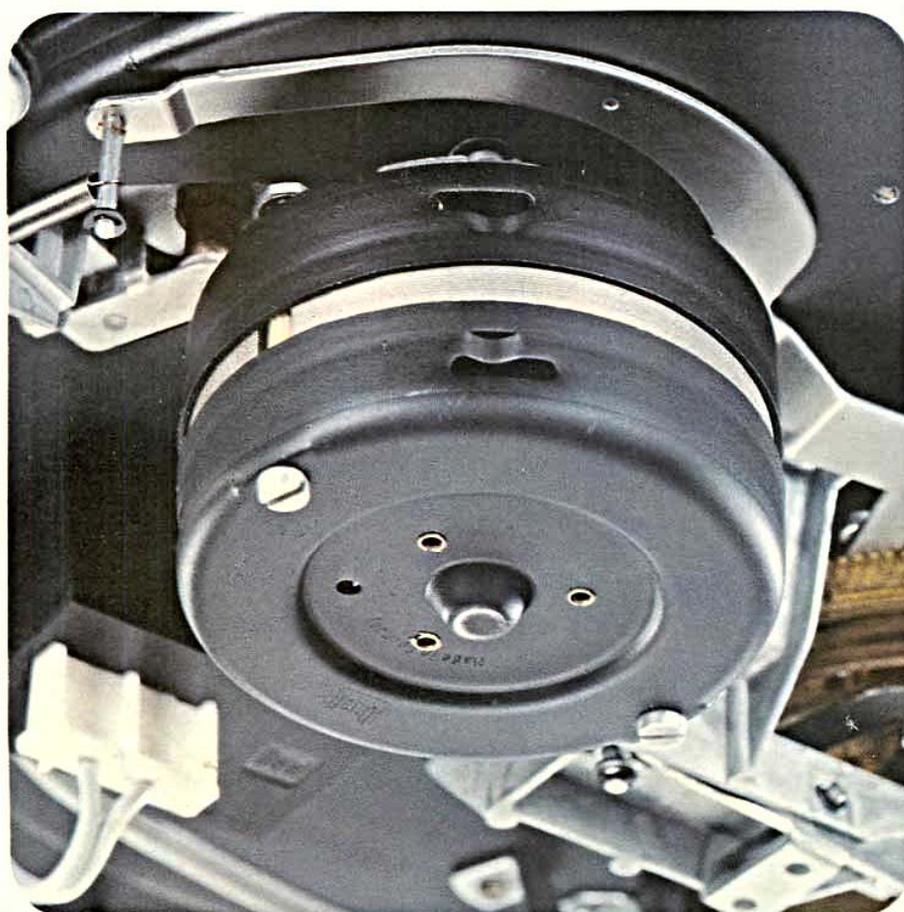
12



Precision Design of Dual 1229

It is quite interesting to study the mechanical design of the Dual 1229 in detail. Even a technically inexperienced reader will appreciate the clean and simple design. Every detail of the total design is compatible with all other elements. Technologically optimum — mechanically simple. This makes the Dual 1229 easy to service. The sound pickup cable with a 5-pole standard plug according to DIN standard 41524 or with RCA plugs is also provided with plugs at unit end. The same applies to the supply cable and its 5-pole unit plug. This plug is prepared for the connection of initial stage and power amplifiers up to 400 VA, which are then switched on and off together with the Dual 1229. Both stereo channels are short-circuited while the changing mechanism is in operation. The short circuit contacts are open during record play.

The Dual 1229 corresponds to the international safety regulations according to IEC Publication 65 and has been approved by the respective national safety authorities (VDE, SEV, SEMKO, CSA, UL etc.).



Dual "Synchronous Continuous-Pole" Motor

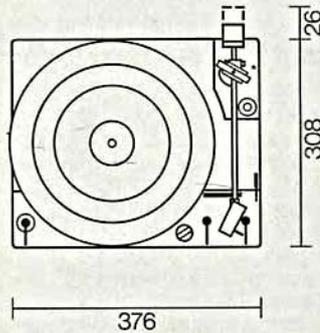
Incorrect platter speeds will vary the pitch (tempo) of the music. The "synchronous continuous-pole" motor has been developed by Dual to quickly accelerate the heavy platter to the specified speed and maintain that speed. The "synchronous continuous-pole" motor requires less than $\frac{1}{2}$ platter rotation to attain its nominal speed of 1,500/rpm at 50 Hz or 1,800/rpm at 60 Hz. The motor speed is unaffected by variations in voltage, temperature and load fluctuations.

Bases with special characteristics

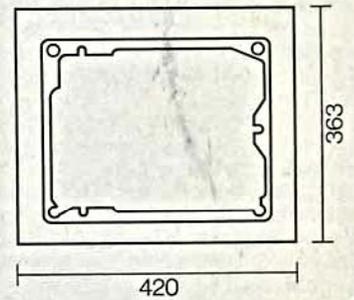
New covers for comfortable handling



Chassis Dual 1229 from above



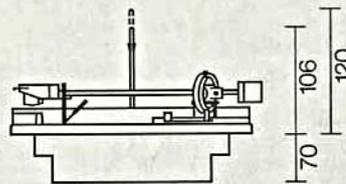
Base CK 20 from above



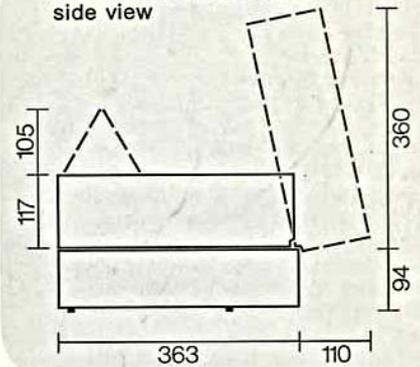
Base CK 20 walnut finish
Base CK 20 W white enamel
 Room for accessories behind the front lid.
 Dimensions: $16\frac{1}{2} \times 3\frac{3}{4} \times 14\frac{1}{4}$ in.
 (W x H x D)
 Weight: 3.5 lbs.

Cover CH 20
 The front of the CH 20 cover can be tipped up together with a portion of the surface for handling unit. This is a particular advantage on shelves or hard-to-reach locations. The slightly tinted cover can also be tilted open or removed completely. Matching bases CK 20 and CK 21. Dimensions: $16\frac{1}{2} \times 4\frac{5}{8} \times 14$ in.
 (W x H x D)
 Weight: 3.3 lbs.

Chassis Dual 1229 side view



Cover CH 20 Base CK 20 side view



Base CK 21 walnut finish
Base CK 21 W white enamel
 Base CK 21 can be lifted with cover CH 21 in place to permit automatic record changing with the cover closed. Dimensions in position for single play: $16\frac{1}{2} \times 3\frac{5}{8} \times 14\frac{1}{4}$ in. (W x H x D), with CH 21 mounted: $7\frac{2}{3}$ in. high. Dimensions in position for changing records: $16\frac{1}{2} \times 4\frac{3}{4} \times 14\frac{1}{4}$ in. (W x H x D), with CH 21 mounted: $8\frac{3}{4}$ in. high.
 Weight: approx. 4.4 lbs.

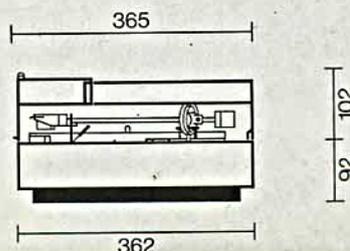
Cover CH 21
 The slightly tinted cover protects equipment against dust. For operating the installed equipment the cover of the CH 21 can be pushed back in such a manner that no additional height is required. The CH 21 can also be completely opened and removed. Matching bases CK 21 and CK 20. Dimensions: $16\frac{3}{8} \times 4 \times 14\frac{3}{8}$ in.
 (W x H x D)
 Weight: approx. 2.9 lbs.



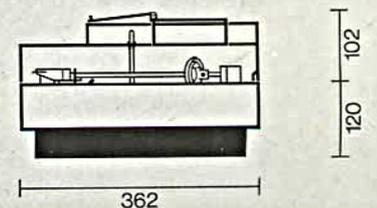
Installation
 The Dual 1229 is installed from above as shown on the adjacent drawings. The drawings also show the accurate dimensions. Included with each unit are the Operating Instructions and a Dimensional Installation Drawing.

Bases CK 20 and CK 21 are prepared for installing the HiFi equalizer-preamplifier Dual TVV 46.

Cover CH 21 (closed)
 Base CK 21
 in position for single play



Cover CH 21 (open)
 Base CK 21
 in position for automatic record changing



Dual 1229

Technical features / Available versions

Operating Modes

Manual record player, automatic record player, automatic record changer (up to 6 records).

Drive

Four-pole, magnetically shielded Dual "synchronous continuous-pole" motor.

Line Voltage

110–130, 220–240 Volts AC, switchable.

Line Frequency

50 or 60 Hz, matching to other mains frequencies by changing motor drive pulley.

Connection to Power Line

With cable via 4-contact AMP 10k connector, or 5-contact Dual connector. The power switch of the Dual 1229 includes contacts for switching power to an amplifier or preamp on and off with the changer. Maximum switch load, 400 VA.

Power Consumption

approx. 10 Watts

Current Consumption

approx. 62 mA at 220 V 50 Hz

approx. 115 mA at 117 V 60 Hz

Turntable Speeds

33 $\frac{1}{3}$, 45, 78 rpm

Illuminated Strobe

for 33 $\frac{1}{3}$ and 45 rpm, adjustable for 50 or 60 Hz. Light tunnel on platter with variable viewing angle.

Pitch Control

Independent of load, control range $\frac{1}{2}$ tone (6%) on all three speeds.

Turntable Platter

Non-magnetic 6.8 lbs. die-cast platter, 12 in. dia., dynamically balanced, mass inertia: 4×10^5 g cm².

Wow and Flutter

$\leq \pm 0.06\%$, measured acc. to DIN standard 45 507

Rumble-to-Noise-Ratio

Rumble unweighted > 42 dB

acc. to DIN 45 500

Rumble weighted > 63 dB

acc. to DIN 45 500

Tonearm

Torsionally rigid, extra-long all-metal tonearm with four-point gimbal suspension. Skeleton-type tonearm head and

removable cartridge carrier.

Tonearm Geometry

Distance from tonearm pivot to turntable shaft: 203.1 mm (8.1")

Distance from tonearm pivot to stylus tip (effective tonearm length): 222.0 mm (8.75")

Overhang: 18.9 mm (.745")

Offset angle: 25° 20'

Maximum horizontal tracking error (in record radius range from 55 mm to 146 mm [2.16" to 5.75"]): 1° 30'

Tonearm Bearing Friction

with reference to stylus tip:

vertical < 0.007 grams

horizontal < 0.015 grams

Tonearm Resonance

The tonearm resonance – dependent on cartridge characteristics – and the effective dynamic mass for horizontal movement of tonearm are shown in the diagram on page 7.

Tonearm Balance

The tonearm can be balanced by sliding and turning the counterweight. The counterweight is elastically mounted on a threaded shaft and braked to prevent accidental turning. A click-stop indicates each hundredth gram adjustment.

Tonearm Head

Removable, suitable for receiving all cartridge systems with $\frac{1}{2}$ " fastening standard and a dead weight of 1 to 12 g. Adjustable overhang $\frac{3}{8}$ ".

Stylus Force

0 to 3 p continuously adjustable. Adjusting accuracy from 0–1.5 p = $\frac{1}{10}$ p, from 1.5–3 p = $\frac{1}{4}$ p. Stylus forces from 3–5 p by rotating weight. Operationable from 0.25 p.

Anti-skating Adjustment

Continuously adjustable, separate scales for elliptical and spherical styli according to DIN 45 500 (scale division similar to adjustment of stylus force). For differing stylus types adjustments are made according to table in Operating Instructions of the unit.

Audio Connecting Cable

The unit is normally fitted with a 2-channel audio cable having a DIN 41 524 standard connector or RCA phono plugs. The audio line is a 4-conductor cable fitted at the record-changer end with AMP flat-prong or RCA plug.

Muting Circuit

Both channels are muted during start, stop and change cycling. When the tonearm is on its rest, the short-circuiting is opened.

Weight

Complete chassis 7,2 kg (16 lbs); complete unit packed for shipping, 8,4 kg (18 $\frac{1}{2}$ lbs)

Installation

The Dual 1229 is mounted entirely from above the mounting board with three special captive screws. Packed with each unit is a full-scale template for making any necessary mountingboard cut-outs, with all dimensions.

The complete record player module includes the Dual CK 20, CK 20 W, CK 21 or CK 21 W base and one of the Dual CH 20, CH 21 or CH 5 dust covers.

Spring Suspension

The chassis is resiliently suspended over the mounting board by four coil springs which are friction-damped and isolated from vibrations or jarring of the mounting board. The natural resonant frequency of the suspension, both vertically and horizontally, is approximately 4.8 Hz.

Electrical Safety

The Dual 1229 meets all requirements of international safety standards IEC 65 and is approved by safety agencies (VDE, SEV, SEMKO, CSA, UL, etc.).

Standard accessories

Single-play rotating center spindle, selfstabilizing changer spindle AW 3 for 1–6 records. Centering disc for 7 in. records.

Optional accessories

Changer spindle AS 12 for 7 in. records. Equalizer-preamplifier TVV 46.

Available Versions

The Dual 1229 is available as a chassis only.

For a complete record player module bases and covers must be additionally ordered (refer to page 13).

HiFi Automatic Record Player Chassis

Dual 1229 with Shure DM 101 M-G

Magnetic Cartridge

Recommended stylus force: 0.75 ($\frac{3}{4}$) p

Frequency response: 20–20,000 Hz

Crosstalk attenuation: > 25 dB at 1 kHz

Compliance:

40×10^{-6} cm/dyn horizontal

30×10^{-6} cm/dyn vertical

Stylus: diamond, 15 μ m, spherical

HiFi Automatic Record Player Chassis

Dual 1229 with Shure DM 103 M-E

Magnetic Cartridge

Recommended stylus force: 0.75 ($\frac{3}{4}$) p

Frequency response: 20–20,000 Hz

Crosstalk attenuation: > 25 dB at 1 kHz

Compliance:

40×10^{-6} cm/dyn horizontal

30×10^{-6} cm/dyn vertical

Stylus: diamond, 5 x 18 μ m, elliptical (biradial)

Demonstration and sales:

For the
finest
in sound:
Dual