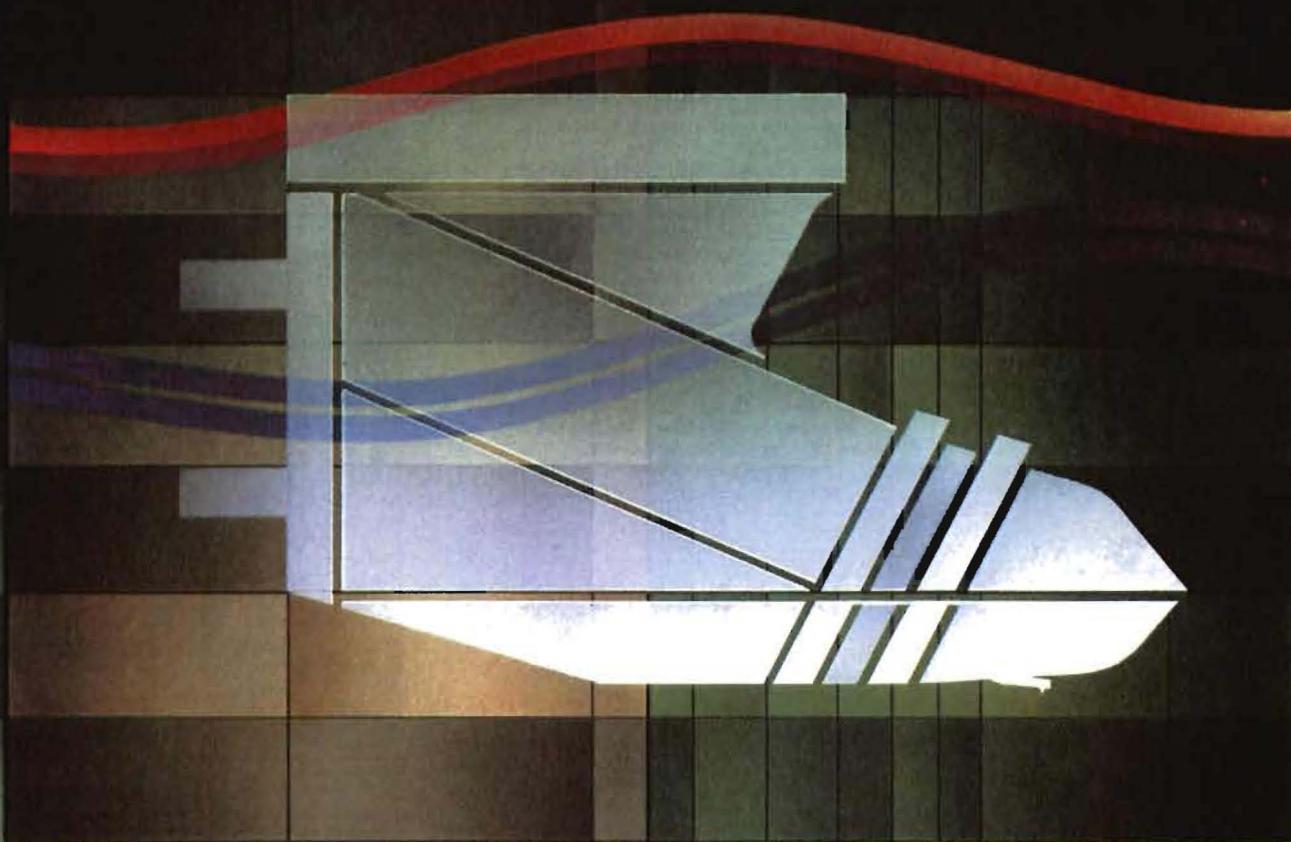


AKG
ACOUSTICS



Enhance Your HiFi System
with AKG Phonocartridges

MICRO MASS TECHNOLOGY
integrating the approved *TS* SYSTEM

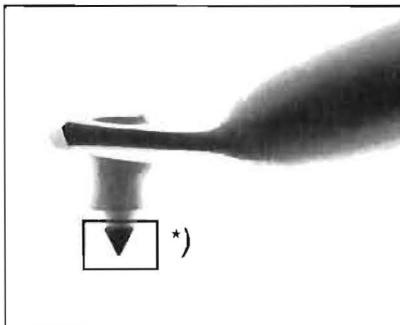
12

The better your phono-cartridge, the better the performance of your hifi system.

Even the highest quality turntables, amplifiers and loudspeakers are incapable of making up for losses and errors that occur during playback of a record. Therefore, the phono cartridge is, in a way, the most important element of your hifi system. This is what you should remember when buying a hifi system or improving your existing hifi system. A high quality phono-cartridge is one of the most rewarding purchases – and not nearly the most expensive. The following five criteria must be considered in designing the optimum phonocartidge.

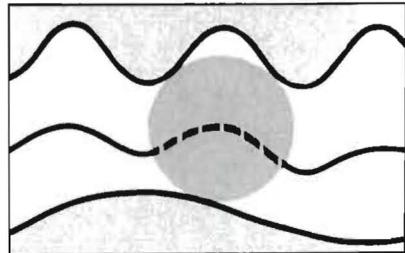
The Mass of the Diamond

The requirement of optimum reproduction and minimum wear of the record can only be met by means of low effective mass, i. e. the mass that is actually moved by the groove. It is mainly defined by the type and construction of the transducer system, by the material and dimension of the cantilever and by the size of the stylus. Modern technology and production processes have made it feasible to reduce the mass of the cantilever and transducer systems considerably. Up to now, the most difficult problem was how to reduce the mass of the diamond. However, the limitations imposed by production technology are severe and conventionally constructed styli are much bigger and thus heavier than would be necessary for tracking. *)



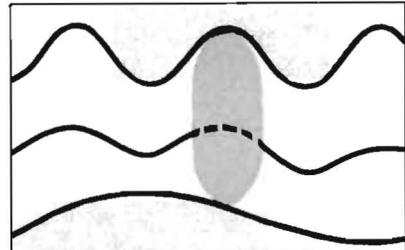
Conventional stylus technology

The Stylus Cut



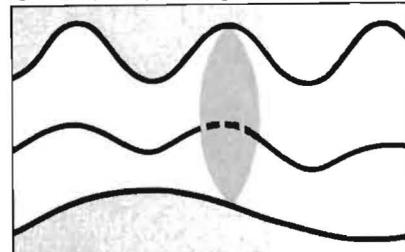
Radial (Spherical) Cut

The diamond tip has the shape of a cone with a rounded tip. Its cross section is circular. Unable to track higher frequencies.



Biradial Cut

Starting from a radial cut, two additional surfaces are cut out. At inner grooves, the higher frequency tracking suffers.



Elliptical Cut

This is similar to the biradial cut, except that the radii of the contact surfaces are smaller. The stylus will track the inner wall of the groove very well, even at the highest frequencies. Better than the biradial cut, it still does not duplicate the ideal shape of original record – cutting stylus.

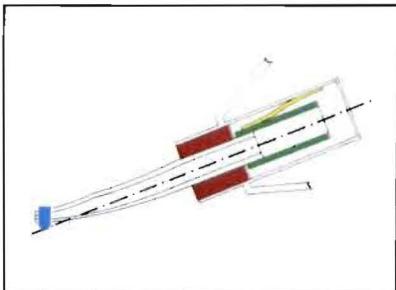
3 4 5

The Suspension

The moving part of the cartridge – the stylus plus cantilever and transducer element – must be held in the cartridge housing and stylus assembly in such a manner that the stylus may follow exactly the modulation of the record groove.

The flexibility and friction components of the elastic suspension element must be carefully balanced in order to attain optimum tracking ability. Furthermore, it is most important that the pivot point of the stylus cantilever-transducer assembly remains at precisely the same place even at the highest frequencies. The quality of the suspension defines to a great extent the frequency response, and the crosstalk rejection value.

For correct stereo separation any left/right signal combination must have identical phase and frequency response. A good suspension system must be absolutely impervious to aging in order to guarantee the quality of the cartridge over a long period of time. As the suspension usually is an integral part of the stylus assembly, it should also be extremely small to fulfill the requirement of low stylus assembly mass.



Conventional Suspension

When uniformly excited in different directions by the groove, the stylus will not follow these movements precisely.

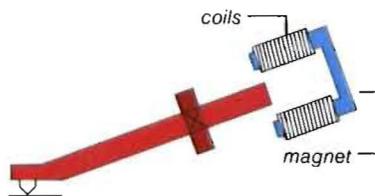
Two major problems are the non symmetrical suspension materials causing high inter-modulation distortion, and the inclusion of the conventional tie-wire. By being too stiff at high frequencies and less stiff at low frequencies, the tie-wire will cause a wandering pivot point which will result in audibly blurred imaging.

The Transducer

It converts the mechanical movements of the stylus into electrical signals and consists of a static part and a moving part driven by the stylus.

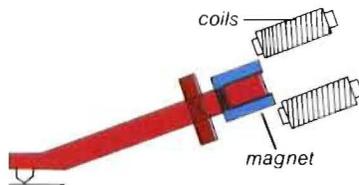
With moving magnet cartridges – and much more so with moving coil cartridges – it is very difficult to reduce dynamic mass. But after all, it is low dynamic mass that ensures a transparent sound image, low distortion, and minimum record wear.

Essentially, three systems are used:



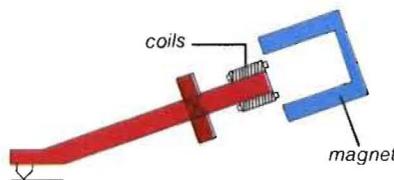
Induced Magnet System

– The induced magnet principle – occurs when stylus moves an extremely light, thin-walled iron tube. This modulates the magnetic flux in a static magnetic system in step with the stylus movement, so voltage is induced in the induction coils of the static system.



Moving Magnet System

– The moving-magnet principle, where the magnet itself is moved by the stylus. This means additional dynamic mass.



Moving Coil System

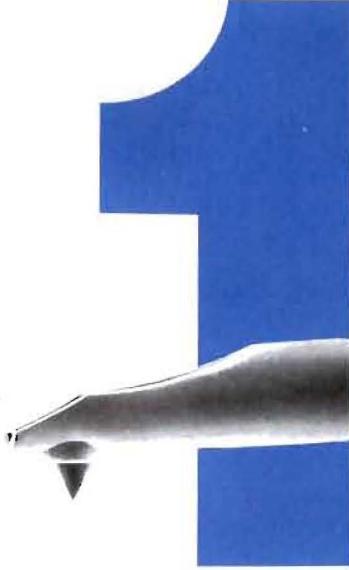
– The electro-dynamic or moving-coil principle. Here, the magnet is static, whereas the coils are attached to the moving cantilever. The moving coil system requires heavier tracking forces and usually will require factory replacement of stylus. Frequently, it also requires a costly step-up transformer, another potential source of distortion.

The Housing

Static charges may build up on a plastic cartridge housing due to its interaction with the record. Unless this electric charge is neutralized, it may produce repulsion between the cartridge and the record.

This, in turn, may reduce the actual tracking force by as much as 50%. The system no longer works under optimum conditions, distortion figures rise.

In addition, the tracking force will vary considerably according to variations in the electric charge on the rotating disc surface. Some phonocartidges utilize an anti-static brush which may affect tracking, anti-skating and add additional mass.



The AKG Approach

The Ultimate Pick-up System

Using the latest technologies AKG has created – by intensive research and development – a new cartridge generation which offers a perfect solution to all problems originating from the record tracking process. Each individual part of the cartridge was consistently developed with perfection in mind. Even the traditionally successful induced magnet transducer principle used in AKG cartridges for years, was improved decisively.

The only exception is the TS-System stylus suspension. That AKG invention, already used in the first AKG cartridge, has so far not been surpassed. Therefore, the TS-System was taken over to form part of the new AKG cartridge generation.

The AKG Micro Diamond Technology

The AKG team was the first to succeed in reducing the diamond stylus mass to the stylus tip necessary for tracking. Any ballast such as long diamond rods or holders for bonded styli is a thing of the past.

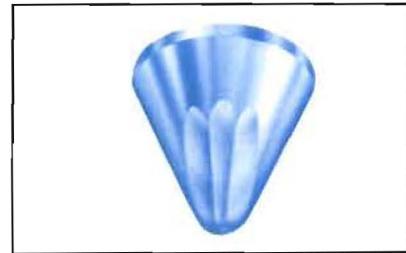
The AKG MD cartridge features the absolutely lightest weight stylus – a precisely cut stylus, laser beam aligned and directly mounted on the low mass, low resonant Al-Mg-Si*) cantilever. This ensures maximum record life, and the reproduction quality is audibly better than that of conventional styli.

principle	diamond	mg	%
micro diamond		0,015	5,4
nude		0,08	28,5
bonded		0,28	100

The Analog-6 Stylus Cut

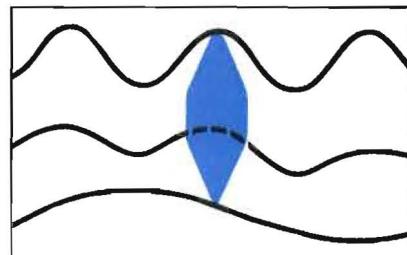
The AKG team has developed a unique stylus cut, the „analog 6“. Six cut surfaces, the relative positions of which are controlled with utmost precision, guarantee optimum tracking characteristics and maximum adaptation to the groove geometry of the record.

Conventionally cut styli tend to periodically lose contact with the record groove at certain deflections. As a result, tracking errors will deteriorate the signal to noise ratio and this may damage the groove.



Analog-6 Stylus Cut

The „analog 6“ cut guarantees precise groove guiding characteristics and avoids all problems mentioned before. The high quality of modern records will remain intact even if they are played very frequently.



The „analog 6“ cut most closely duplicates the shape of the original record-cutting stylus. In this way, ultimate tracking is assured at the difficult inner grooves thus maintaining the lowest tracing distortion possible.



*) Al – Aluminium
Mg – Magnesium
Si – Silicon



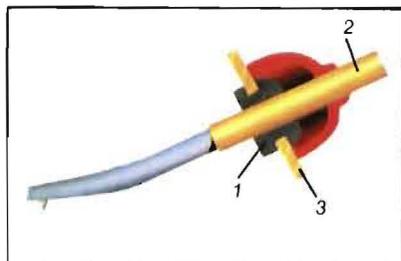
The AKG TS-System

Conventional suspension systems usually consist of a relatively large flexible element that holds the cantilever or the transducer element affixed to it. An additional part, usually a tension wire, is needed to produce the necessary resetting force.

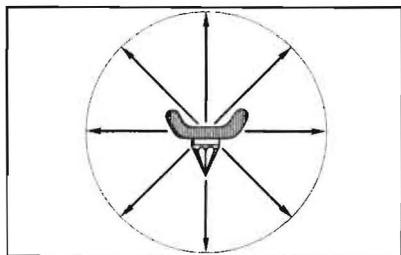
It is a clear disadvantage of these suspension systems that the pivot point around which the bar moves is not definitely fixed dynamically but shifts along the cantilever axis in accordance with the frequency resulting in frequency depending crosstalk and therefore bad stereo imaging.

Also, the very soft materials normally used, cannot rule out axial or torsional cantilever movements.

The TS-System is based on the principle of the single pivot point, knife-edge type suspension.



AKG TS-System Suspension



The stylus faithfully follows every excursion, in every direction.

The armature (2) affixed to the low mass Al.-Mg.-Si. cantilever is held in place by a flexible disc (1) which is banded to a thin metal plate (3). The hole contained in the plate is only marginally larger than the diameter of the armature (2). This prevents torsional and axial shifting when following the stylus movement, with the hole rim functioning as a knife edge. In this way the AKG TS-System guarantees absolute pivot point stability.



The Transducer

Previous AKG cartridges made use of the well tested induced magnet principle. Its electrical and mechanical values are the best ever to be obtained. However, further decisive improvements were accomplished by fundamentally redesigning the transducer system. Among other factors, the construction of the magnet system was optimized resulting in excellent linearity.

This was achieved by means of a rare earth samarium cobalt cylinder magnet. This also resulted in a dramatic reduction of inductivity and mass.

Mismatching by amplifiers or cable capacities is much less critical than with conventional cartridges with comparable sensitivity. A new light, thin-walled soft-iron armature (2) is affixed to the cantilever (1). The soft-iron armature moves between the four PERMENORM (nickel-iron-alloy) pole pieces (4) fitted with induction coils (3).

The pole pieces (4) are surrounded by the AKG cylindrical magnet (5) with radial magnetization. No further flux-conducting iron parts are necessary. The induction of the magnet can be used in full for signal transduction, as there is no magnetic loss to other metal parts of the cartridge. Saturation however, is necessary for a linear transducer to suppress distortion as far as possible. Ruling out all magnetic losses, the new AKG radial field magnetic system allows for thorough magnetization of the soft-iron armature.

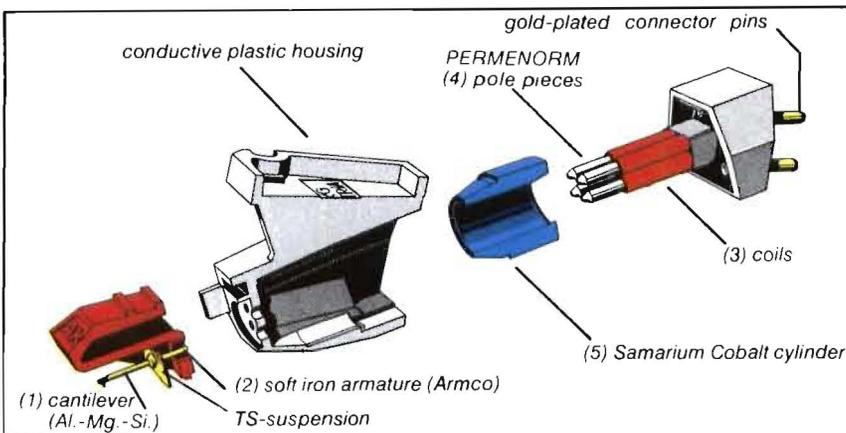


The Housing

By virtue of its sophisticated design the AKG light-weight plastic housing is free from resonances which would impair the sound. The housing material itself is also new.

The use of an electrically conductive plastic material prevents electrostatic charging to charge transfer from the record surface as is common with insulated housings. This, in turn, prevents the formation of static that may counteract and reduce the tracking force by up to 50%.

Given the low tracking forces common today, a tracking force reduction from 0.75 grams to less than 0.4 grams means that the stylus may be lifted out of the groove, particularly when the record is not perfectly flat. This could cause severe record damage by chipping the groove wall. The unique AKG conductive plastic body insures the elimination of static charge effects.



The New AKG Phonocartridge Range

Optimum sound can be obtained from a cartridge only if it is compatible with the tone arm in every respect. Not every tone arm is suited for every cartridge. Therefore, the AKG phonocartridge line comprises a number of different models so as to offer a satisfactory solution for every application and tone arm design.



Technical Data	Unit	P 25 MD
Frequency range	Hz	10 ... 28,000
Sensitivity	mV	0.75
Channel separation	1 kHz 10 kHz	30 25
Channel balance (over the entire frequency range)	dB	1
Frequency intermodulation distortion	%	0.3
Impedance/ Inductance	Ω /mH	900/170
Recommended load Impedance/ Capacitance	k Ω /pF	47/470
Tracking force range	mN	10 ... 15
Optimum tracking force	mN	12.5
Compliance (static)	mm/N	24
Tracking ability at 300 Hz 10.8 kHz	μ m %	80 0.6
Effective mass	mg	<0.4
Diamond mass	mg	0.015
Tip radii	μ m	5 x 18 „Analog 6“
Weight	g	3.5
Accessories		1, 2, 4, 5, 6

The top of the live micro mass cartridge. The P 25 MD is suited for installation in any high quality tone arm with minimum bearing friction. The „analog-6“ cut of the MD Micro Diamond stylus was developed especially for this system and guarantees constant contact with the groove, even over the most critical signal modulations. Each stylus is measured with ultimate precision using special laser optics and adjusted by hand. Conductive housing of stylus assembly prevents noise caused by statically charged records. The lowest dynamic mass and the best transducing characteristics result from: The AKG Micro Diamond technology, the „analog-6“ stylus cut, the samarium cobalt ring magnet-transducer, the approved AKG TS-System suspension and the ultra lightweight conductive plastic housing. A great number of accessories are supplied with the P 25 MD, as well as the original frequency response graph with cross talk figures.

Advance
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	P 15 MD	P 10 ED	Comment
	10 ... 23,000	20 ... 20,000	
	0.95	1.65	at 1 cm/sec
	30 20	25 15	
	2	2	
	0.4	0.5	(at -6 dB level acc to DIN 45554 2)
	1000/200	1000/200	
	47/470	47/470	
	10 ... 15	12.5 ... 20	10 mN ~ 1 p
	12.5	15	10 mN ~ 1 p
	27	20	vertical
	80 0.95	80 1.7	Distortion at 30 cm/s
	<0.5	<0.9	
	0.015	0.28	
	8 x 18 elliptic	8 x 18 elliptic	
	3.5	3.5	5.6 g with additional weight
	2, 3, 4, 5, 6	6, 2, 4	

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Advanced quality cartridge. Elliptically cut Micro Diamond, adjusted with laser-controlled precision, the Al-Mg-Si stylus bar, and TS single pivot point knife-edge suspension guarantee optimum sound quality owing to low mass and excellent localization. Recommended tracking force and compliance are adapted to each other in such a way that the P 15 MD system can virtually be used with every high quality turntable without causing any problems. Gentle tracking by MD technology and only 1.25 g recommended tracking force is a matter of course with the P 15 MD, as is its high resistance against humidity and unfavorable climate. The conductive housing eliminates static charges and thus changing tracking forces. Proof of the high quality of the P 15 MD is given by the original measurement graph. The P 15 MD + headshell is a premounted version of the P 15 MD. A low mass, low resonance Aluminium, Magnesium headshell is used and is suitable for most S and J tone arms.

A robust, high output cartridge system with excellent sound characteristics. It is suitable for most tone arms and is also recommended for situations in which back cueing is a necessity. The P 10 ED uses an elliptically cut diamond and incorporates many features of the top model P 25 MD, such as the TS single pivot point, knife-edge suspension, light-weight Al.-Mg.-Si. stylus bar, laser adjusted diamond conductive housing and high reliability even under unfavorable climatic conditions and humidity.

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Accessories:

An unusual number of accessories are available for optimum installation and care of the new AKG Micro Mass cartridges. See table for accessories supplied with the individual cartridge.

1. Universal adjustment gauge

permits and simplifies the following procedures:



- adjustment of overhang
- vertical alignment of stylus axis
- horizontal alignment of the tone arm (with adjustable tone arm systems)
- checking vertical tracking angle
- inspecting the stylus for dirt
- secures mounting bolts and holds cartridge in place when fitting the contact sleeves
- measuring tracking force
- cleaning the stylus

Patents:

TS-suspension

A 341.798
 AUS 502.885
 B 830.444
 GB 1.448.053
 I 1.039.088
 CDN 1.069.057
 USA 4.054.758

2. Cleaning brush

Special design with carbon fibers for thorough yet gentle cleaning of the stylus.



3. Adjustment mirror

For simplified checking whether stylus axis is vertical to record plane.



4. Flexible plastic compound

For easy, resonance free cartridge installation.

Patents pending:

TS-suspension:

D OS 2526903
 J OS 54-20101
 DK AS 123.500

Adjustment gauge:

A 4118/80

5. Screwdriver

For firm yet careful tightening of screws



6. Elegant black plastic box

It is designed to hold and protect cartridge and accessories. After removing the foam lining, use it to keep your replacement cartridge or the accessories and the maintenance material. Of course, every AKG cartridge comes complete with an installation kit - screws, nuts, washers, balance weight.



MD-Micro diamond:

DK 198184/79.4630
 J 146105/79
 CH 9938/79-7
 USA 06/103.493
 A A 6663/79

Transducer system:

A 3541/79
 A A 968/80



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