

hk725

harman/kardon
high technology
separates



Ultrawideband response and TIM.

As mentioned before, our ultrawideband design provides frequency response from .1 to 160,000 Hz compared with conventional narrowband design which typically provides response from 20 to 20,000 Hz.

This ultrawideband design delivers audible benefits, including incredibly fast transient response. Fast transient response is important because it means that the vast complexity of fundamental tones and harmonics reaches the listener in exactly the same time relationship as on the recording.

Conventional narrowband equipment cannot reproduce fast transients accurately, causing TIM. The music sounds harsh and metallic. And the spatial relationship of the various instruments becomes unclear and vague, which degrades stereo imaging.

Discrete components vs. integrated circuits.

Conventional equipment also contains components that affect the sound quality. Integrated circuits, or ICs.

They're used to save space and money—a single, inexpensive IC contains hundreds of circuits on a chip just 1/4" square.

Unfortunately, ICs present compromises.

First, they're not made to the same high standards as the discrete components we use.

And the circuit density creates a problem, too. With so many circuits in such a small area, each one is affected by its neighbors as the IC heats up. The result is Thermal Distortion, another recent discovery.

Rather than compromise the sound of Harman Kardon equipment, we design our audio circuitry with discrete components rather than ICs. They cost more. But sound noticeably better.

DC coupling. One more way we avoid distortion.

The hk725 is also DC coupled. Basically, DC coupling eliminates coupling capacitors in the signal path.

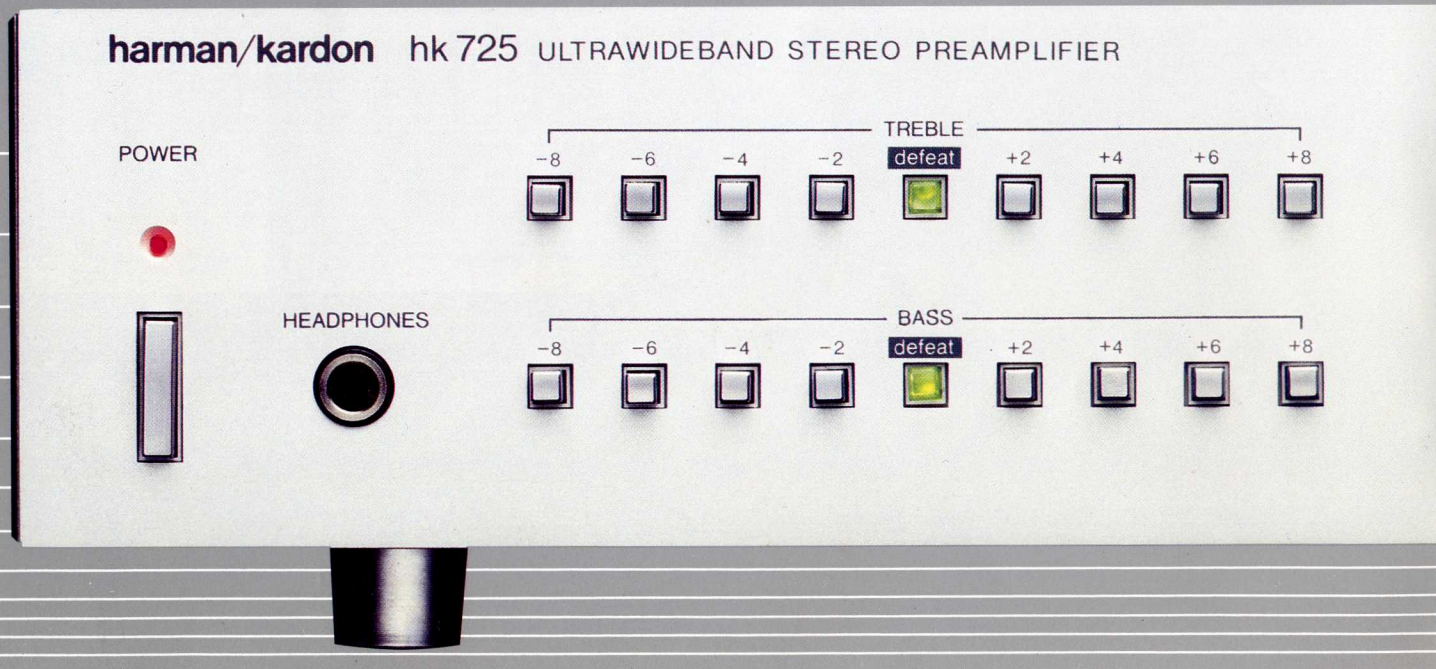
This eliminates phasing problems which mask low frequencies. So low frequency response is tighter, more articulate.

Specially designed phono stage.

One purpose of a preamplifier is to present signals of uniform strength to the power amplifier.

Since turntables provide much weaker signals than tuners, tape decks and other program sources, preamplifiers consist of two separate amplifier stages. The phono stage, which boosts turntable signals to the same level as the other sources. And the high-level stage, which then boosts all signals to a level acceptable to the power amplifier.

Additionally, the phono stage performs another function. It equalizes the phono signal to match the RIAA curve used in the record making process.



While other manufacturers roll this curve off below 20 Hz and above 20,000 Hz, we follow the RIAA curve faithfully even beyond the audible frequency range. By equalizing in this way, the hk725 produces cleaner, drier, tighter bass. And more transparent highs.

Both our 8-stage phono stage and our high-level stage incorporate one other design feature. FET front ends. These provide higher overload capacity, lower distortion, and higher signal-to-noise ratio than conventional designs.

Fixed resistor tone controls.

The hk725 employs unique fixed resistor pushbutton tone controls rather than the conventional variable potentiometer rotary controls.

This design feature provides several benefits.

First, and most important, fixed resistors provide less distortion.

Second, fixed resistor controls provide defeat positions. This allows the signal to bypass the circuitry altogether for a less processed, less distorted sound. Most tone controls even when turned to their neutral position force the signal to pass through the circuitry, causing distorted sound. Of course if you find it necessary to tailor treble and bass to your listening room, the twin defeats allow you to alter one frequency range without affecting the other.

And finally, pushbutton tone controls allow you to duplicate any setting precisely and easily.

Tape copy and monitor controls.

Not only does the hk725 preamplifier allow you to copy from one tape deck to another, it allows you to monitor either one. Or if you prefer, you may even listen to the tuner, turntable or other program source while copying.

Subsonic filter.

A subsonic filter has been incorporated into the hk725 to remove turntable rumble and the effect of record warp.

Twelve wiper volume control.

Conventional volume controls employ rotary controls with 4 wipers. The hk725 volume control has 12. This extra bit of engineering not only provides a smoother acting, longer lasting control, but helps lower distortion as well.

Other hk700 series components.

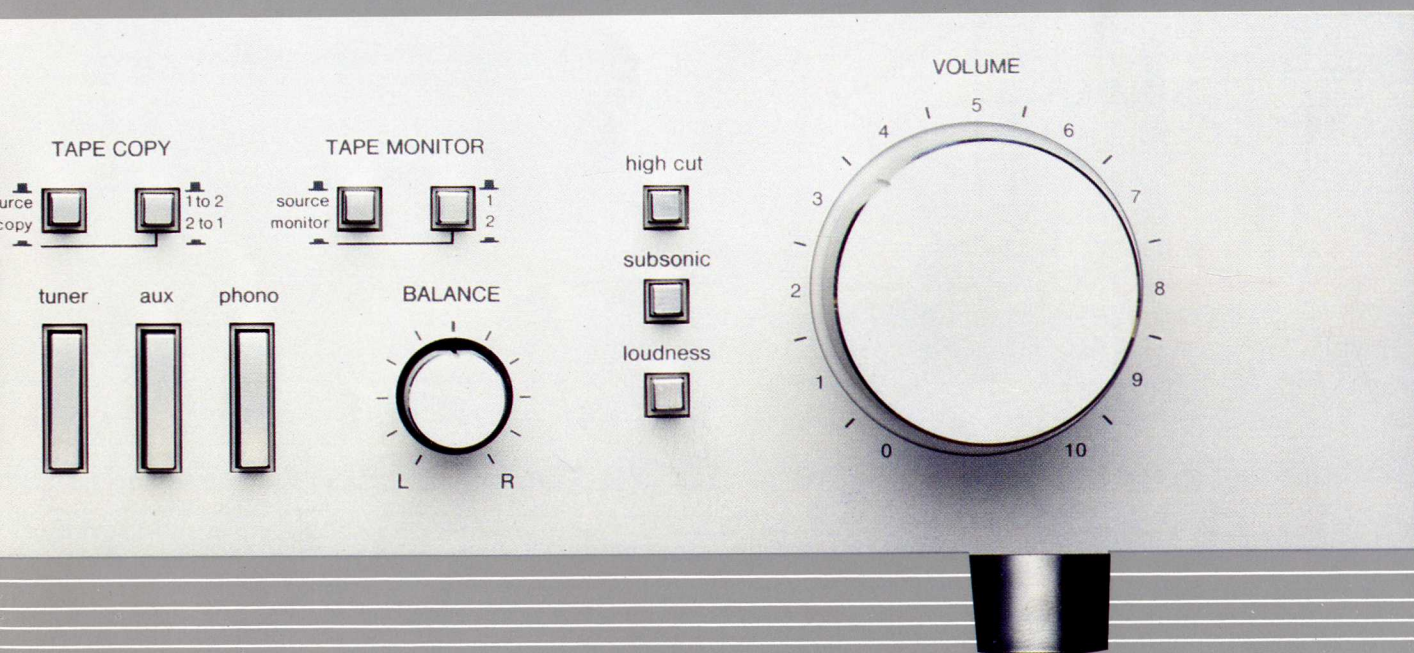
The hk725 is just one component in Harman Kardon's new 700 series of high technology separates. You can also add an amplifier, tuner and cassette deck from our line.

Each conforms to the same design philosophy and rigorous standards as the hk725.

Each provides the ultimate in clean, accurate performance.

If you're building a complete component system that includes hk725, you'll want to consider the rest of the 700 series.

They were made for each other.



Actual Size

An introduction to negative feedback.

Over the past few years, audio manufacturers have been using Total Harmonic Distortion (THD) figures as a measure of accuracy for their equipment. Their theory is simple. The lower the THD figures, the less distorted the reproduction. In the vast majority of equipment, these low THD figures are not accomplished by careful attention to circuit design. Rather, they're accomplished by a heavy application of negative feedback, a universally used form of electronic compensation.

In addition to improving THD figures, negative feedback also allows the design engineer to compensate for design deficiencies in other areas.

It has the effect of increasing the frequency response of equipment with conventional narrowband circuit design. Using negative feedback, a designer can "artificially" improve the inherent frequency response of the amplifier from the typical narrowband 20-20,000 Hz range to a new range

as broad as 1 Hz to 150,000 Hz.

For these reasons, most manufacturers have come to regard negative feedback as a design panacea. It's simple to improve THD and frequency response by adding more negative feedback. It's much more difficult to improve the basic circuit design.

The price you pay for negative feedback.

In 1973, Dr. Matti Ojala, an internationally recognized authority in the audio field (now a Harman Kardon engineering consultant), discovered and isolated a new form of dynamic distortion. Transient Intermodulation Distortion, or TIM.

Dr. Ojala also traced the source of TIM. It is chiefly caused by the overuse of negative feedback. As excess negative feedback is applied, the amplifier input stage becomes saturat-

ed, TIM increases, and music becomes grating, unclear, and smeared.

It was also discovered that TIM is much more audible than THD. While most people cannot detect THD at levels below .3%, they can readily detect TIM at levels of just .03% in music.

As you can see, the heavy application of negative feedback to reduce THD figures and compensate for other design deficiencies has its price—TIM. Which does far more to degrade the purity of music than THD. And that's a very high price indeed.

The Harman Kardon Philosophy: The less a signal is processed, the purer the sound.

At Harman Kardon, we believe that the less a signal is processed,

the more faithful it will be to the original source. In essence, the more straightforward the circuit design, the better.

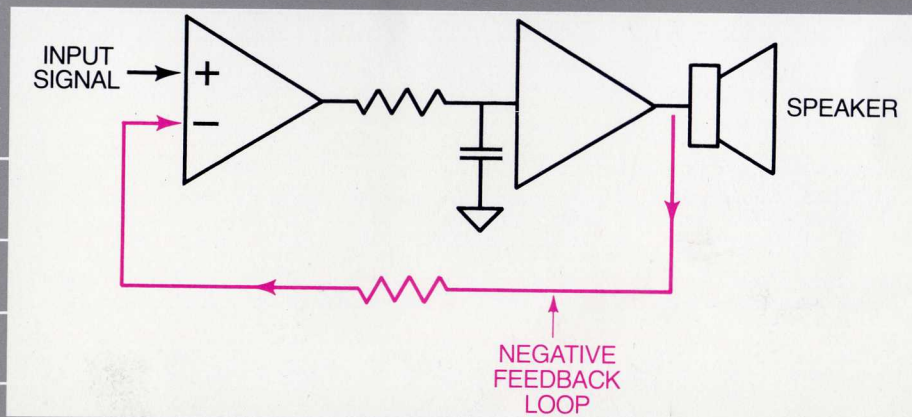
This philosophy is most readily seen in our approach to negative feedback.

While most manufacturers process the signal with 60 to 80 dB of negative feedback, we use less than 30 dB. We can minimize negative feedback for one simple reason. We've optimized our designs in the original amplification circuitry.

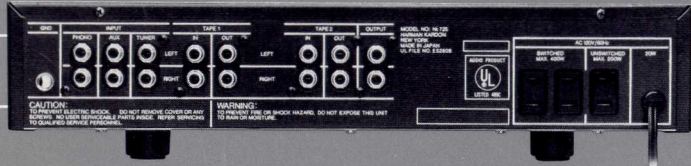
For instance, the hk725 provides a frequency response of .1 to 130,000 Hz without the help of negative feedback. The minimal amount we use improves this range nominally.

We've also achieved low THD levels in the original amplifying circuitry. Again, the negative feedback we use improves that figure, but not substantially.

So, by doing our homework in the original design, we can minimize the use of negative feedback, reducing TIM to undetectable levels.



specifications: hk725 preamplifier



Input Sensitivity: Phono: 2.3 mV/47 k ohms
High Level: 145 mV/23 k ohms

Frequency Response: Less than 1 Hz to beyond 150 kHz
+0, -1 dB

RIAA Equalization: ± 2 dB (20-20 kHz)

Signal-to-Noise Ratio: Phono: 90 dB (IHF-A)
High Level: 106 dB (IHF-A)

Phono Overload: 250 mV at 1 kHz

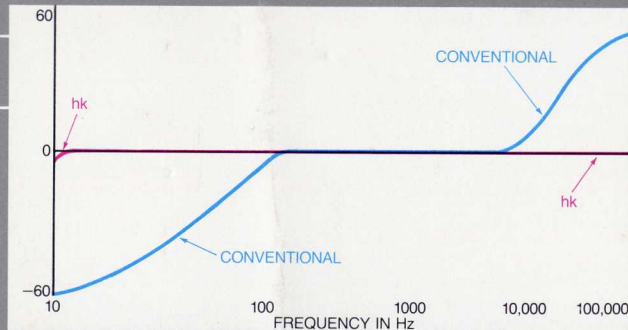
Total Harmonic Distortion: Phono: 0.009%
High Level: .005%

Intermodulation Distortion: 0.009% at 2 volts output

Slew Rate: Greater than 200 volts/
microsecond to output with IHF
standard load.

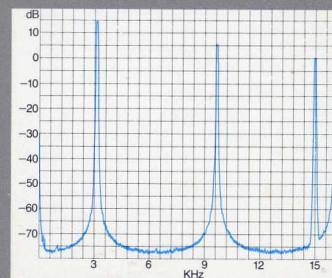
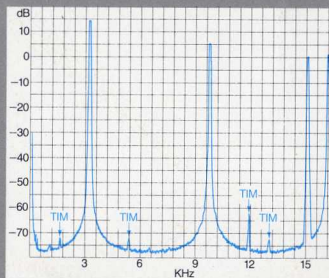
Dimensions: 385 mm/15.2" Wide
72.5 mm/2.9" High
320 mm/12.6" Deep

Weight: 4.2 kg 9.25 lbs.



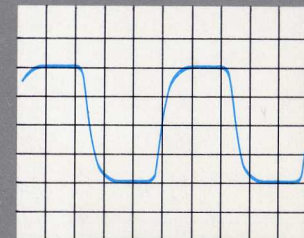
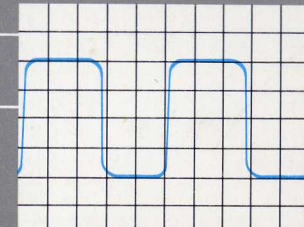
RIAA equalization.

Conventional equalization to the RIAA curve causes phase errors below 200 Hz and above 10,000 Hz. The equalization circuitry in the hk725 equalizes faithfully, causing no phase error between 20 and 200,000 Hz. The result is cleaner, tighter bass, more transparent highs.



Transient Intermodulation Distortion (TIM).

When too much negative feedback is used, as in the conventional preamplifier in the left graph, TIM is highly audible. By reducing negative feedback in the Harman/Kardon preamplifier on the right, TIM is reduced to an inaudible level.



Square wave response.

Accurate reproduction of a square wave, a result of ultrawide-band design, is critical to maintain phase linearity. The hk725 on the top reproduces a square wave more accurately than conventional designs, producing a clearer, cleaner stereo image.

harman/kardon

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All specifications and features subject to change without notice.

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