TRUTH IN LISTENING

WHAT IS TRUTH?

A pair of speakers may be the most difficult choice one has to make in selecting audio components.

Price is certainly one of the factors that must guide a buyer. But outside of price and particular points of styling which distinguish one make from another, all speakers look pretty much the same.

To make matters more confusing, the differences in design, engineering, and quality control among speakers, even though they can be significant, are either difficult to see or buried inside an enclosure, out of sight.

It's not surprising, then, that speakers have become the component most shrouded in mystery and invested with magical powers. It's also not surprising that subjective judgment has become more important in choosing speakers than in other components.

The logic goes something like this.

"Your ears differ from other people's ears and so does your listening room. So you, and only you, can choose which speakers are right for your system."

While this sounds reasonable, it isn't much help to the person faced with a difficult decision.

Also, it's not true. Because there is an objective standard by which speakers can be judged and that is how accurately they reproduce the information they receive from the amplifier.

Call it fidelity or call it accuracy.

At AR we simply call it truth.

It's something that can be measured and controlled. It's a function of design, care in manufacture, cost, and uniform quality control. And it's something a listener learns to value as he or she lives with a pair of speakers.

Some speakers fall short of ideal accuracy simply because they are designed to sell for a low price. Others are designed purposely to colour sound.

Certain enclosures, for example, are designed purposely to accentuate bass. Their "boominess" tends at first to hide any fuzziness present. Beyond the fact that they colour the sound, many people find that continued listening to speakers of this type produces an uncomfortable sensation that, for lack of better name, we'll call listening fatigue. For many people speakers like this just don't wear well. These are the kinds of speakers which are so often termed "rock" speakers, because of the "boomy" sound they produce.

At AR we have always believed that if a rock group wants to accentuate the bass end of the spectrum they'll do it in the studio and in mixing. The job of our speakers is not to distort the sound which has been so carefully crafted on a record or tape. Rather, it is to reproduce it exactly.

The old battle of the rock vs. the classical speaker doesn't make much sense to us, and we think that the makers of other quality speakers would probably agree.

To us, the question which a buyer must answer is whether or not he or she wants truthful reproduction.

AR

PRACTICAL CONSIDERATIONS

A little basic information about speakers, how they perform, and about some characteristics of sound waves can help you make a more informed judgment when you pick a pair of speakers.

Later in this booklet we will describe some of the differences between listening in a high-fidelity shop and listening at home. For now, it's enough to say that the two experiences can be quite different.

As for speakers, you should remember that nearly any pair will sound good in a confined space or a tiny room.

As for sound waves themselves, remember that different frequencies act differently. The low frequencies tend to surround the speaker with a sphere of sound. They are, in other words, non-directional and are thus influenced by the speakers position in relationship to the walls of the listening room. High frequencies, on the other hand, tend to be directional something like the beam of a flashlight.

AR has made significant contributions to the propagation of both low and high frequency sound waves, but for the moment we will concentrate on advances in bass reproduction.

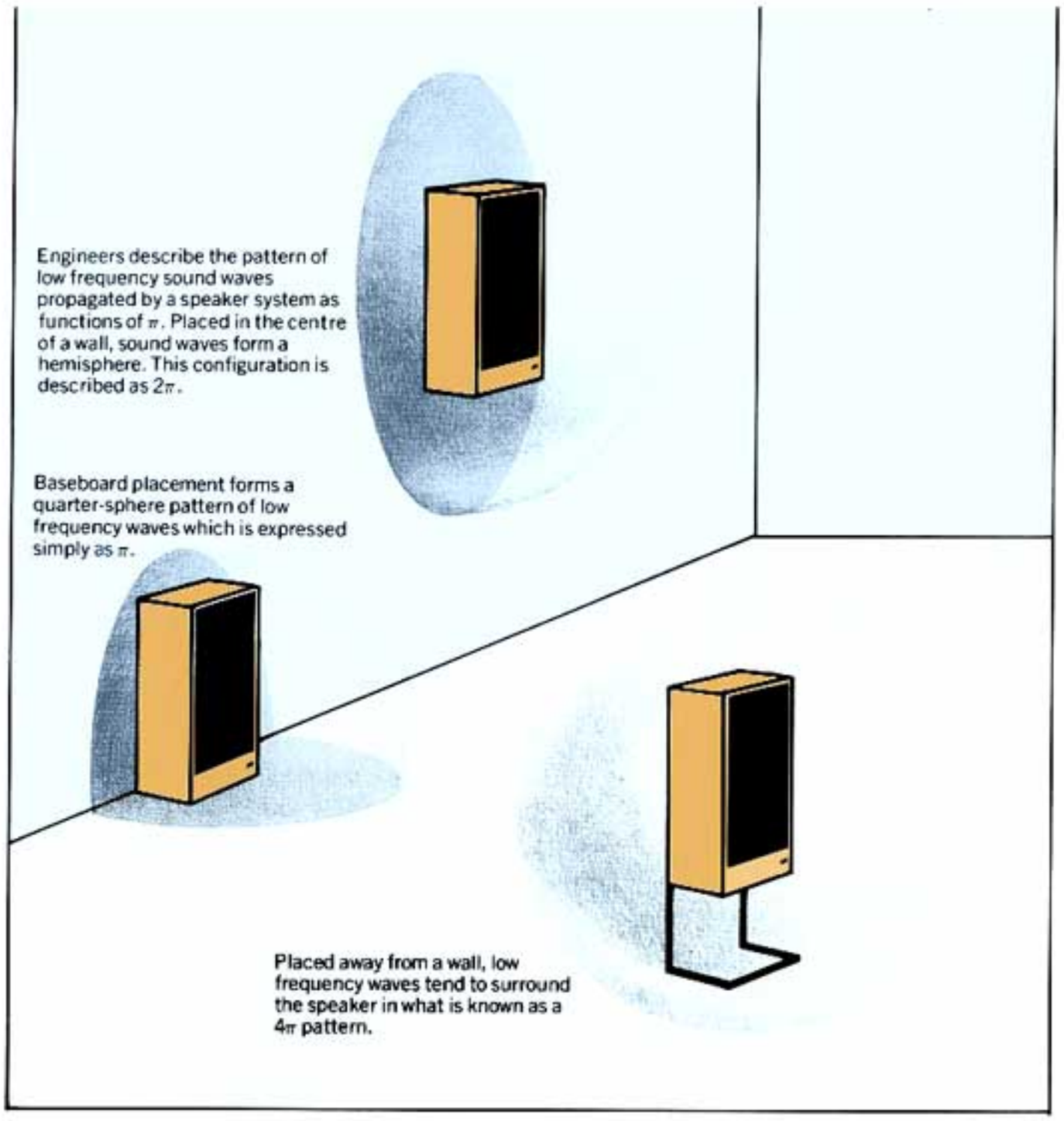
Directionality of the low end is influenced largely by speaker placement. Because low frequencies want to surround the speaker with an imaginary sphere, it's easy to picture what happens when you place one in a corner. Only a quarter sphere of sound is possible and the walls act like the walls of a megaphone. Corner placement therefore "directs" low frequency sound waves into the room and seems to reinforce bass.

Placed on the floor in the centre of a wall, the same quarter sphere sound pattern emerges except that the walls of the imaginary megaphone will be the side wall and the floor.

In the centre of that same flat wall the sound pattern will be an imaginary half sphere. With no "megaphone walls" bass reproduction will seem to be somewhat diminished.

And, placing these same speakers away from the wall of a room will appear to further diffuse bass by allowing it to surround the speaker and be dissipated in all directions.

These various placements which provide a quarter sphere, a half sphere or full sphere of sound are described by engineers as functions of π(Pi.) Hence the designation 10π for the AR speaker which has specifically been designed with a *woofer environ-*



mental control that compensates for the three placement alternatives we have described.

All AR speakers have been designed to be placed in the centre of a wall. In addition all AR speakers have a switch which allows the owner to adjust mid- and high-ranges and tailor overall response to the acoustics of the room.

The AR10π offers additional flexibility through its *woofer environmental control* switch, which gives the owner the option of matching bass response (thus "tuning" the speaker) to its placement in the room.

In the simplest terms this means that should AR10π speakers be located away from a wall, even in the centre of a room, the original sound which the speaker was designed to produce can be preserved.

The AR10π – a no-compromise 3-way (woofer, mid-range, tweeter) speaker system with excellent dispersion and even energy output all across the audible spectrum. A pair of 3-position switches allows the owner to adjust the mid- and high-range drivers to the "liveliness" of the room. A 3-position *woofer environmental control* allows the owner to adjust low-end response to speaker placement as explained above. Floor stands are available as an option at extra cost.

AR10π

AR INNOVATION

The term "high-fidelity" has come to stand for a multi-million dollar industry and its products.

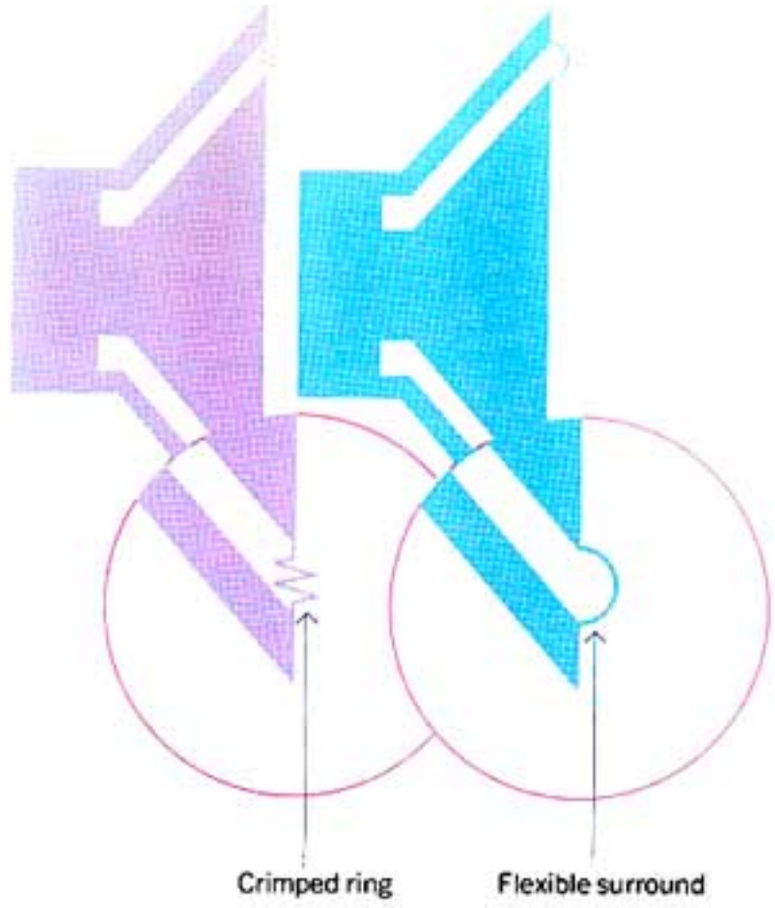
But not so long ago it simply stood for an engineering ideal: accuracy of reproduction, or as we have termed it at AR, "truth in listening."

As far as speakers are concerned, a large enclosure, precisely designed and placed, was the formula for accurate reproduction in the early days. Even now this same approach is appropriate in certain circumstances.

But giant cabinets present obvious disadvantages for the majority of listeners. And if AR has made a significant contribution to the art and science of building speakers it has been to develop ways to dramatically improve accuracy in speakers of a size that most of us can live with.

The AR invention which has proved most significant is the acoustic suspension concept.

This development which was first introduced barely 25 years ago



dramatically improved the bass response which could be generated from a moderate size enclosure.

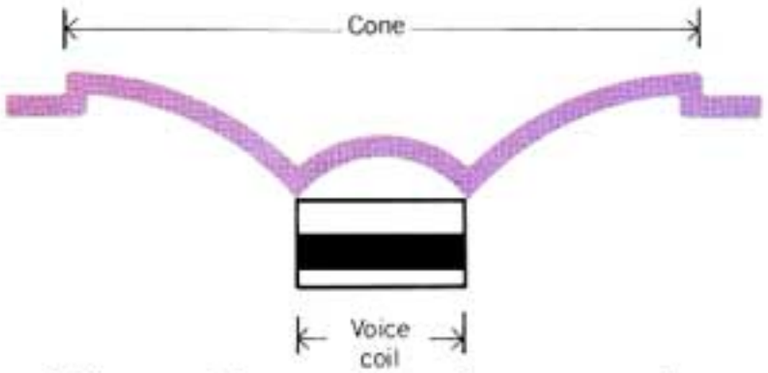
In order to move air a speaker cone is moved electro-magnetically and must return to its starting point in order to move again.

The method of return prior to the development of acoustic suspension was to crimp the cone material at its perimeter where it was mounted. This crimping acted as a spring which returned the speaker cone to rest position.

A spring of this kind offers only a limited amount of cone movement before distortion sets in. To reproduce deep bass frequencies the speaker cone must be able to move relatively large distances.

AR's acoustic suspension uses a sealed enclosure with the air inside the enclosure serving as the spring.

When the speaker cone is moved electro-magnetically the air in the enclosure is compressed and expanded. Air pressure thus helps return the cone to its original position. Obviously an air spring of this kind is not subject to the same limited travel as a mechanical spring.



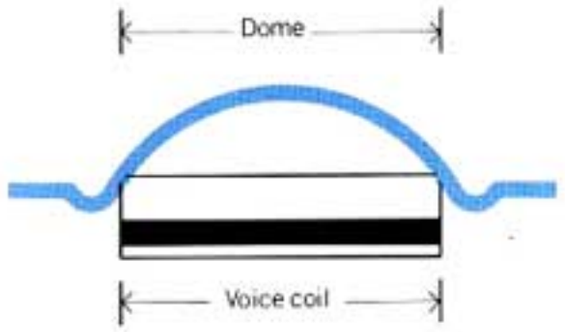
The speaker cone can be mounted loosely and is therefore extremely responsive. Bass harmonic distortion is greatly reduced. Low frequency response is uniform and extended. Far better bass response can be extracted from a small enclosure and thus the entire speaker system gives extremely truthful reproduction.

The measure of this invention is that today the majority of speaker systems use acoustic suspension woofers.

A second important original AR development is the dome high-range speaker.

The design problem which previously had to be solved in a high-range speaker centres around cone weight and dispersion.

The speaker must be light in order to reproduce high frequencies



and must disperse these high frequency-sound waves which, because they are very short and thus "directional" by nature, resist dispersion.

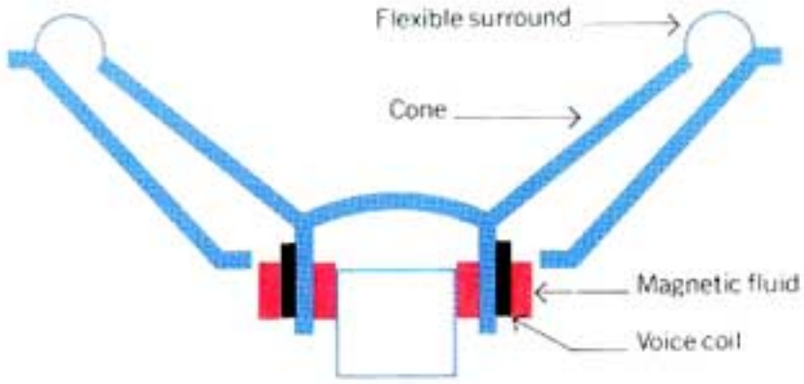
AR's solution was the development of the "dome radiator" which is both light and small, for excellent accuracy and dispersion. In addition, the dome configuration provides room for a much larger voice coil than a cone speaker of similar size, and enables the speaker to handle much more power.

With the high listening levels many listeners use today, the matter of power handling capability has become increasingly important, and has led AR to another important design development.

A speaker designed to reproduce mid-range and high frequencies is relatively small. Tolerances are very fine and fitting the various components into the available space presents difficult problems, not the least of which is cooling the voice coil.

The AR solution in its new mid- and high-range drivers has been to float the voice coil in a newly developed, magnetic fluid. The solution is an expensive one. But the result is a precisely mounted voice coil with better power handling capacity than the old design because of the excellent heat transfer characteristics of the fluid.

This is, in effect, the first liquid-cooled driver.



The AR11 – identical in performance and specifications to the AR10π except that it does not offer the *woofer environmental control*. The AR11 is certainly the most accurate speaker we have ever built which means that it is probably the most accurate speaker of its size ever made. Each of its three drivers represents significant advancement in performance capabilities over original AR speakers. If you want to know what "truth in listening" means, listen to the AR11.

AR11

AR DRIVERS

High fidelity engineers have come to use the term driver (because it drives air) to describe what the rest of us call a single speaker.

A combination of drivers, a crossover network and the properly engineered enclosure is then described as a speaker system.

We at AR have always tried to balance our enthusiasm for the aesthetics of sound reproduction with the aesthetics of the enclosure itself. Yet we have always made the major investment in what you hear rather than what you see.

It saddens us to see drivers of questionable quality embellished with heavy brushed aluminum castings and sold on their looks rather than their performance.

It is one of those marketing compromises we are unwilling to make.

At AR we manufacture our own drivers rather than buy them from outside suppliers.

Each of the drivers we make is tested individually in an anechoic chamber.

The standards used in testing AR drivers are the same as those used in manufacturing professional microphones. That is, each driver must perform to within ±1 dB of design specifications. Any driver which fails the test is rejected.

Each and every speaker is tested for frequency response, power response, distortion, resonance, impedance, polarity and other performance parameters. As far as we know AR is the only major speaker manufacturer that subjects each speaker that goes into its systems to such complete testing.

Then, when the speakers are assembled into a complete system, the entire system is subjected to a total of 27 different performance tests.

This exhaustive test programme is one reason that AR can offer a speaker performance warranty that is unparalleled.

As for the construction of AR drivers, a few points are worth noting.

AR uses a 12-pound magnet structure in its 12" woofer. The magnet structures in other AR drivers are proportionately as heavy. To our knowledge AR uses the heaviest magnet structures for speakers of their size and type.

It is important to distinguish between the weight of the magnet structure and the weight of the speaker, for it's possible to build an impressively heavy speaker by adding weight to the front frame or to decorative metalwork.

The weight of the magnet structure is the only important factor and the laws of physics demand that the weight for each driver be precisely determined. The weight of the structure determines the magnetic energy which ultimately controls the motion of the cone precisely and ensures minimal distortion.

The AR12—offers 3-position adjustment of mid- and high-range speakers and a somewhat smaller woofer, in an enclosure of the same size as the AR11. The primary difference between the two is that the bass response of the AR11 extends slightly lower and its mid-range dispersion characteristics are slightly better. The performance standard for all AR speakers is, however, the same so that the AR12 offers the same high degree of musical accuracy as the AR11, and other AR speakers.

Another blow struck for "truth in listening" can be found in AR's newly designed dome tweeters.

The dome itself is made of impregnated, feather-light fabric. Thus it combines light weight for accuracy while producing more sound.

This new technology, coupled with the advantages of liquid cooling which have been mentioned, produces speakers with greater power-handling capability than any speakers we have every built. And true to the AR tradition they are capable of handling more power (thus producing higher sound levels) while maintaining the spectacular accuracy for which AR has become famous.

AR12

SELECTING SPEAKERS

The choice of a pair of speakers is an aesthetic decision and thus a very personal choice.

After all the facts have been weighed, you'll be buying what you hear and what you like.

But certain facts must be considered.

First, remember that what you hear in the listening room of a high fidelity shop is not necessarily what you'll hear at home.

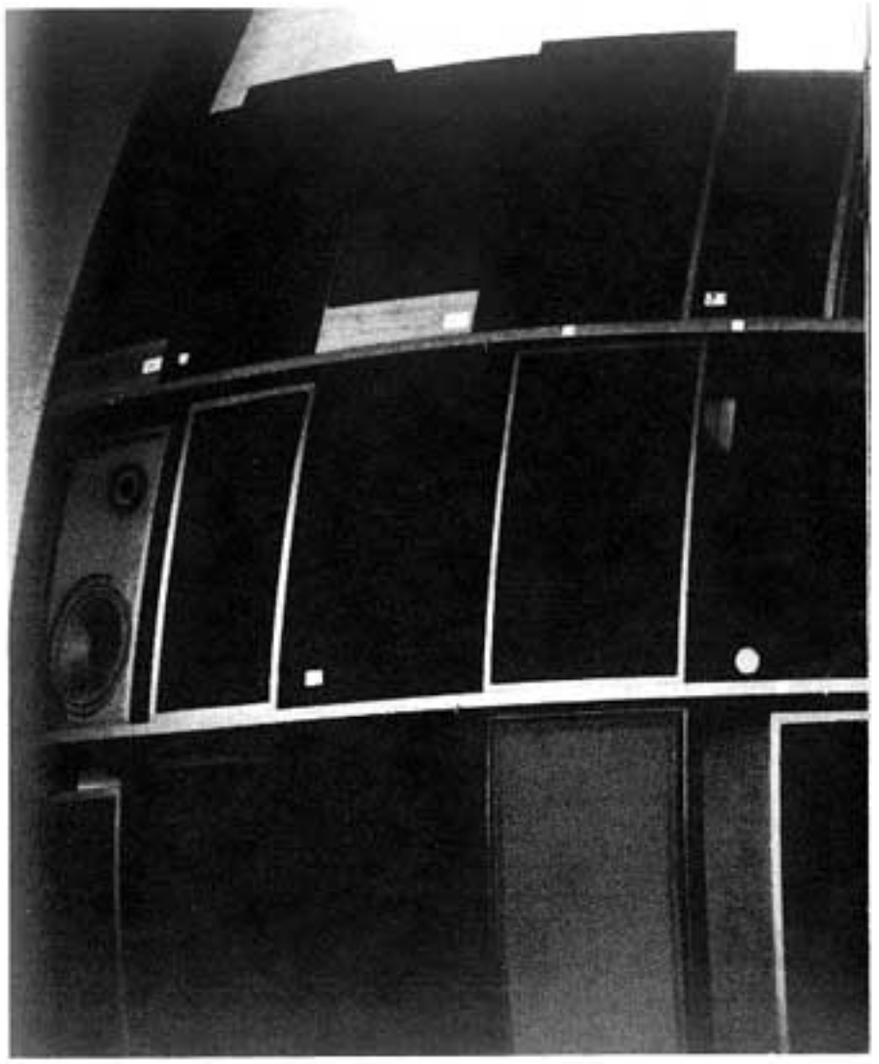
The listening rooms in many hi-fi shops tend to be small and small rooms tend to make any speaker sound good. You can demonstrate this for yourself by taking your portable radio into a phone box if you have one handy and closing the door. Suddenly the wispy sound of its tiny speaker will be much improved.

Remember that speaker placement is a critical factor in what the speakers you buy will sound like. So, when you're comparing two speakers in the shop you'll get a better idea of their relative merits if they're comparably placed in the testing room. If one is sitting high on a shelf in the corner and another is in the centre of the wall on the floor you won't get a true comparison.

Be sure that both systems are being driven by the same amplifier during the comparison, too, since the amplifier can obviously affect a speaker's performance.

Remember that the speakers you're comparing should be played back at the same sound level for a valid comparison. Some will play back at different sound levels than others, by design. As a general rule you can expect those speakers which play back louder than others to have proportionately less extended bass response.

Ultimately, the volume level produced is not a measure of the accuracy of a speaker. The volume level produced must be considered in



AR14—our largest 2-way speaker system (woofer, mid/high-range) in an enclosure of the same size as the most expensive AR speakers. A rear-mounted switch allows adjustment of treble energy to room acoustics. The AR14, with only two drivers, is a way of buying AR accuracy for considerably less than in our larger models. A comparison with competitive speakers in its price range will give you some idea of the exceptional value the AR14 represents.

Selecting speakers can be a confusing business. The dealer who sells AR speakers is a high-fidelity pro and can be relied on to give you good advice.

light of the quality of reproduction-even response from low bass through mid-range to treble. Ideally a speaker should not give undue emphasis to the bass end, shrillness in the mid-range, or tinniness in the treble. We advise buyers to listen for tightness in the low frequencies, crispness in the high end, and even reproduction all across the sound spectrum.

At AR we make no pretence about being objective. We are convinced that for the size of its enclosure and the price you pay, the AR speaker is better value than any other speaker you can buy. By better value we simply mean that it will give you better sound reproduction, that it is better built, and that it will therefore sound better longer.

We believe, also, that the AR sound is easier to listen to and live with. And that is a factor which is difficult to judge at the moment you're comparing speakers.

It's easy enough to be tempted by the description "rock speaker" which is often used in connection with the gigantic, expensive units designed specifically for outdoor use or concerts in large auditoriums. But the fact is, efficiency doesn't count for much if the speakers don't perform truly. And the "rock" vs. "classical" speaker argument doesn't make much sense either, because a pair of AR speakers, can reproduce rock or classical music with such fidelity that in countless test demonstrations playing all types of music the great majority of listeners can't tell the difference between the live and the recorded performance.

AR15—a new addition to the AR range, which is smaller and lighter-weight than the AR14 and thus an ideal speaker for smaller shelves. It offers a 3-position switch so that the high-end contour can be adjusted to the "liveliness" of your listening room. The liquid-cooled high-range driver gives it and our other small speakers greater power-handling capacity than in earlier small AR models.

AR14

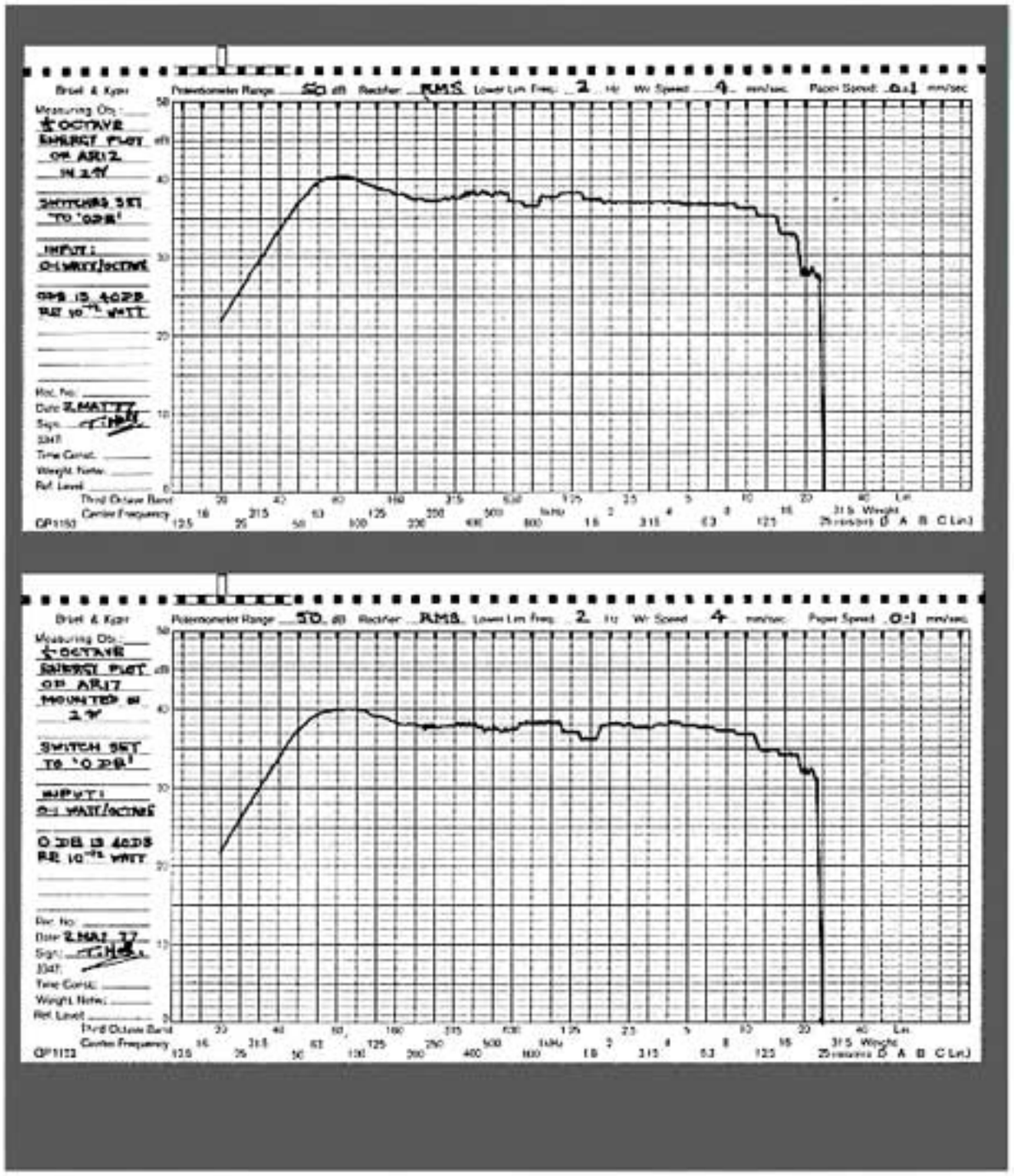
AR15

their power-handling capacity and extended bass response, both of which are a function of size not quality.

The acoustic suspension principle which uses the air inside the sealed enclosure as part of the restoring force, gives these smaller ARs exceptional bass reproduction for speakers of their size.

Even at low listening levels you will find them honest and transparent with even, truthful response all across the sound spectrum. Thus they give you the option of buying just as much speaker as you need for a particular room or situation without any need to compromise in the quality of reproduction you get.

The chart on these pages is a very rough guide to give you some idea of which AR speakers you should consider for the particular room you have in mind.



1/3 octave energy plots for the AR 12 (above) and the AR 17 (below) illustrate the AR design philosophy. While the AR 12 is capable of handling more power, note that the energy response for both speakers is virtually the same from 20Hz to over 20kHz. The "flat" curve indicates a high degree of accuracy, or "truth in listening."

AR18—a new AR speaker system. This is a bookshelf system, with liquid-cooled high-range driver which can be used with amplifiers capable of delivering 100 watts continuous power per channel (being driven to clipping 10 percent of the time) on normal music source material. It features a two-position switch for high-frequency level control. The AR18 makes "truth in listening" available to virtually all high-fidelity enthusiasts, even those with restricted space or tight budgets.

AR17

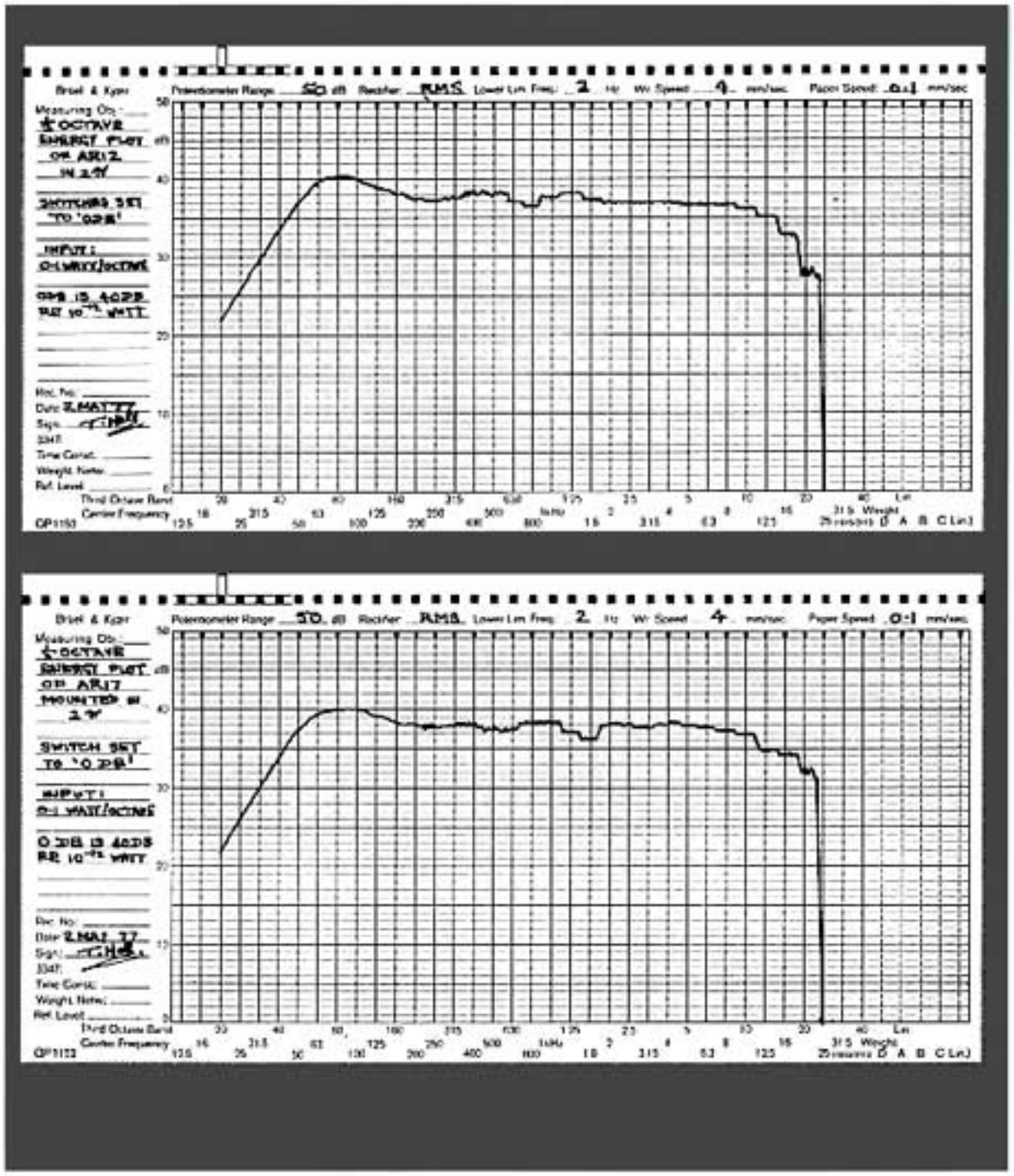
AR18

their power-handling capacity and extended bass response, both of which are a function of size not quality.

The acoustic suspension principle which uses the air inside the sealed enclosure as part of the restoring force, gives these smaller ARs exceptional bass reproduction for speakers of their size.

Even at low listening levels you will find them honest and transparent with even, truthful response all across the sound spectrum. Thus they give you the option of buying just as much speaker as you need for a particular room or situation without any need to compromise in the quality of reproduction you get.

The chart on these pages is a very rough guide to give you some idea of which AR speakers you should consider for the particular room you have in mind.



1/3 octave energy plots for the AR 12 (above) and the AR 17 (below) illustrate the AR design philosophy. While the AR 12 is capable of handling more power, note that the energy response for both speakers is virtually the same from 20Hz to over 20kHz. The "flat" curve indicates a high degree of accuracy, or "truth in listening."

AR18—a new AR speaker system. This is a bookshelf system, with liquid-cooled high-range driver which can be used with amplifiers capable of delivering 100 watts continuous power per channel (being driven to clipping 10 percent of the time) on normal music source material. It features a two-position switch for high-frequency level control. The AR18 makes "truth in listening" available to virtually all high-fidelity enthusiasts, even those with restricted space or tight budgets.

AR17

AR18

SPECIFICATIONS

Specifications are subject to change without notice

Drive units: AR10π
300 mm acoustic suspension woofer, 38 mm hemispherical dome midrange, 19 mm hemispherical dome highrange
Crossover frequencies:
525 Hz, 5000 Hz
Impedance:
4 to 8 ohms nominal, depending on switch positions; highest impedance in π and −6 dB switch positions, lowest in 4π and 0 dB positions
Controls:
Three 3-position switches for woofer environmental control and for midrange and highrange level control
Efficiency:
1 watt will produce 86 dB SPL on axis at 1 metre
Power-handling ability:
May be used with amplifiers capable of delivering up to 150 watts continuous power per channel being driven to clipping 10 per cent of the time, on normal music source material
Crossover network:
Half-section LC network on each driver using air-core chokes and computer grade bi-polar electrolytic capacitors; acoustic output of midrange and highrange drivers as well as the normalising of woofer output for the three basic environments is accomplished via an autotransformer and individual switching networks
Driver resonance frequencies:
Woofer 18 Hz (free air), midrange 400 Hz, highrange 2000 Hz
System low-frequency response:
−3 dB at 35 Hz
Effective system Q:
0.75
Flux density:
Woofer 9,800 gauss, midrange 13,000 gauss, highrange 14,000 gauss
Volume of enclosure:
41.9 litres
Cabinet dimensions
354 x 635 x 273 mm deep
Weight:
Packed in carton 27.1 kg
unpacked 24.9 kg

Drive units: AR11
300 mm acoustic suspension woofer, 38 mm hemispherical dome midrange, 19 mm hemispherical dome highrange
Crossover frequencies:
525 Hz, 5000 Hz
Impedance:
4 ohms nominal
Controls:
Two 3-position switches for midrange and highrange level control
Efficiency:
1 watt will produce 86 dB SPL on axis at 1 metre
Power-handling ability:
May be used with amplifiers capable of delivering up to 150 watts continuous power per channel being driven to clipping 10 per cent of the time, on normal music source material
Crossover network:
Half-section LC network on each driver using air-core chokes and computer grade bi-polar electrolytic capacitors: acoustic output of midrange and highrange drivers is controlled by switchable resistive networks
Driver resonance frequencies:
Woofer 18 Hz (free air), midrange 400 Hz, highrange 2000 Hz
System low-frequency response
−3 dB at 35 Hz
Effective system Q:
0.75
Flux density:
Woofer 9,800 gauss, midrange 13,000 gauss, highrange 14,000 gauss
Volume of enclosure:
41.9 litres
Cabinet dimensions:
354 x 635 x 273 mm deep
Weight:
Packed in carton 24.9 kg
unpacked 22.6 kg

Drive units: AR12
250 mm acoustic suspension woofer, 56 mm cone midrange with integral rear loading cavity and magnetic fluid suspension of drive system, 19 mm hemispherical dome highrange
Crossover frequencies:
700 Hz, 4000 Hz
Impedance:
8 ohms nominal
Controls:
Two 3-position switches for midrange and highrange level control
Efficiency:
1 watt will produce 86 dB SPL on axis 1 metre
Power-handling ability:
May be used with amplifiers capable of delivering up to 150 watts continuous power per channel being driven to clipping 10 per cent of the time, on normal music source material
Crossover network:
Half-section LC network on each driver using air-core chokes and computer grade bi-polar electrolytic capacitors: acoustic output of midrange and highrange drivers is contolled by switchable resistive networks
Driver resonance frequencies:
Woofer 26 Hz (free air), midrange 500 Hz, highrange 2000 Hz
System low-frequency response:
−3 dB at 44 Hz
Effective system Q:
1.15
Flux density:
Woofer 7,800 gauss, midrange 8,000 gauss, highrange 14,000 gauss
Volume of enclosure:
41.9 litres
Cabinet dimensions:
354 x 635 x 273 mm deep
Weight:
Packed in carton 19 kg
unpacked 17 kg

Drive units: AR14
250 mm acoustic suspension woofer, 25 mm dome highrange
Crossover frequency:
1300 Hz
Impedance:
8 ohms nominal
Control:
3-position switch for highrange contour control
Efficiency:
1 watt will produce 86 dB SPL on axis at 1 metre
Power-handling ability:
May be used with amplifiers capable of delivering up to 100 watts continuous power per channel being driven to clipping 10 per cent of the time, on normal music source material
Crossover network:
Half-section LCR network on each driver using air-core chokes, bi-polar electrolytic capacitors and highpower noninductive resistors: acoustic output of highrange driver is controlled by switchable contouring network
Driver resonance frequencies:
Woofer 26 Hz (free air), highrange 1000 Hz
System low-frequency response:
−3 dB at 44 Hz
Effective system Q:
1.15
Flux density:
Woofer 7,800 gauss, highrange 15,000 gauss
Volume of enclosure:
41.9 litres
Cabinet dimensions:
354 x 635 x 273 mm deep
Weight:
Packed in carton 18.1 kg
unpacked 15.9 kg

Drive units: AR15
200 mm acoustic suspension woofer, 25 mm dome highrange
Crossover frequency:
1700 Hz
Impedance:
8 ohms nominal
Control:
3-position switch for highrange contour control
Efficiency:
1 watt will produce 85 dB SPL on axis at 1 metre
Power-handling ability:
May be used with amplifiers capable of delivering up to 100 watts continuous power per channel being driven to clipping 10 per cent of the time, on normal music source material
Crossover network:
Half-section LCR network on each driver using air-core chokes, bi-polar electrolytic capacitors and highpower noninductive resistors: acoustic output of highrange drivers is controlled by switchable contouring network
Driver resonance frequencies:
Woofer 25 Hz (free air), highrange 1050 Hz
System low-frequency response:
−3 dB at 48 Hz
Effective system Q:
1.15
Flux density:
Woofer 7,800 gauss, highrange 16,000 gauss
Volume of enclosure:
18 litres
Cabinet dimensions:
298 x 544 x 197 mm deep
Weight:
Packed in carton 12.2 kg
unpacked 11 kg

Cabinet finish: All enclosures have real walnut veneer finish, except the AR18 which has walnut-grain vinyl veneer finish.

DIN SPECIFICATIONS

The German DIN standards are generally accepted in Europe as a means of comparing high fidelity equipment and are presented here for that reason. More complete specifications for AR speakers are given above.

Frequency range: The limits of frequency range are those frequencies at which reponse is 8 dB lower than the average level, this average level being taken over range 100 Hz to 4000 Hz.

Impedance: The nominal impedance of the system.

Sensitivity: The number of watts necessary to produce a sound pressure level of 96 dB at the measuring microphone, the watts being calculated from Watts $= V^2/R$, where V is applied voltage and R is numerically equal to the stated impedance.

Nominal power handling: The number of watts of a specially tailored noise spectrum that the system can withstand for one minute in every three over a total time of 300 hours, the power being based on the nominal impedance.

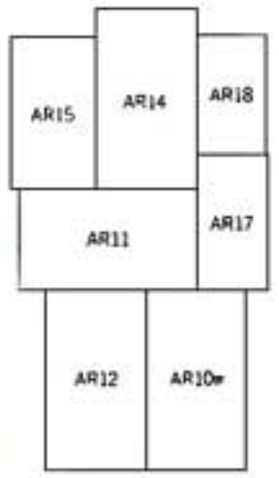
Maximum power handling: The maximum burst of power of no more than 2 seconds duration that the system can withstand at frequencies between 250 Hz and its low frequency limit without audible distortion caused by such factors as limitations of coil or cone movement.

All frequency range, and sensitivity measurements were made in a hemispherical anechoic environment at a distance of one metre on the axis of the loudspeaker.

The impedance of the AR-10π depends on the setting of the Woofer Environmental Control and the midrange and highrange driver level controls.

Drive units: AR17
200 mm acoustic suspension woofer, 32 mm pressure unit
Crossover frequency:
2000 Hz
Impedance:
8 ohms nominal
Control:
2-position switch for highrange level control
Efficiency:
1 watt will produce 86 dB SPL on axis at 1 metre
Power handling ability:
May be used with amplifiers capable of delivering up to 100 watts continuous power per channel being driven to clipping 10 per cent of the time, on normal music source material
Crossover network:
Network using computer grade electrolytic capacitor: acoustic output of highrange driver is controlled by a switchable resistive network
Driver resonance frequencies:
Woofer 25 Hz (free air), highrange 1500 Hz
System low-frequency response:
–3 dB at 50 Hz
Effective system Q:
1
Flux density:
Woofer 7,800 gauss, highrange 14,000 gauss
Volume of enclosure:
18 litres
Cabinet dimensions:
254 x 473 x 222 mm deep
Weight:
Packed in carton (two speakers) 17.5 kg, unpacked (each speaker) 7.7 kg

Drive units: AR18
200 mm acoustic suspension woofer, 32 mm pressure unit
Crossover frequency:
2000 Hz
Impedance:
8 ohms nominal
Control:
2-position switch for highrange level control
Efficiency:
1 watt will produce 86 dB SPL on axis at 1 metre
Power handling ability:
May be used with amplifiers capable of delivering up to 100 watts continuous power per channel being driven to clipping 10 per cent of the time, on normal music source material
Crossover network:
Network using computer grade electrolytic capacitor: acoustic output of highrange driver is controlled by a switchable resistive network
Driver resonance frequencies:
Woofer 25 Hz (free air), highrange 1500 Hz
System low-frequency response:
–3 dB at 62 Hz
Effective system Q:
1
Flux density:
Woofer 7,800 gauss highrange 14,000 gauss
Volume of enclosure:
9.77 litres
Cabinet dimensions:
244 x 419 x 159 mm deep
Weight:
Packed in carton (two speakers) 13.8 kg, unpacked (each speaker) 6.1 kg



THE AR FULL FIVE YEAR WARRANTY

These strict controls on quality and consistency make it possible for AR to offer a five-year full warranty on each speaker system.
The workmanship and performance in normal use of AR speakers are warranted for five years from the date of purchase. This warranty covers parts, repair labour, and freight costs to and from the factory or nearest authorized service station. New packaging if needed is also free.

	AR10π	AR11	AR12	AR14	AR15	AR17	AR18
Frequency range	27 Hz-30 kHz	27 Hz-30 kHz	36 Hz-30 kHz	36 Hz-25 kHz	40 Hz-25 kHz	43 Hz-25 kHz	48 Hz-25 kHz
Impedance	4-8	4	8	8	8	8	8
Sensitivity	9 watts	9 watts	9 watts	9 watts	9 watts	9 watts	9 watts
Nominal power handling	100 watts	100 watts	100 watts	50 watts	50 watts	50 watts	50 watts
Maximum power handling	225 watts	225 watts	100 watts	100 watts	60 watts	60 watts	60 watts