

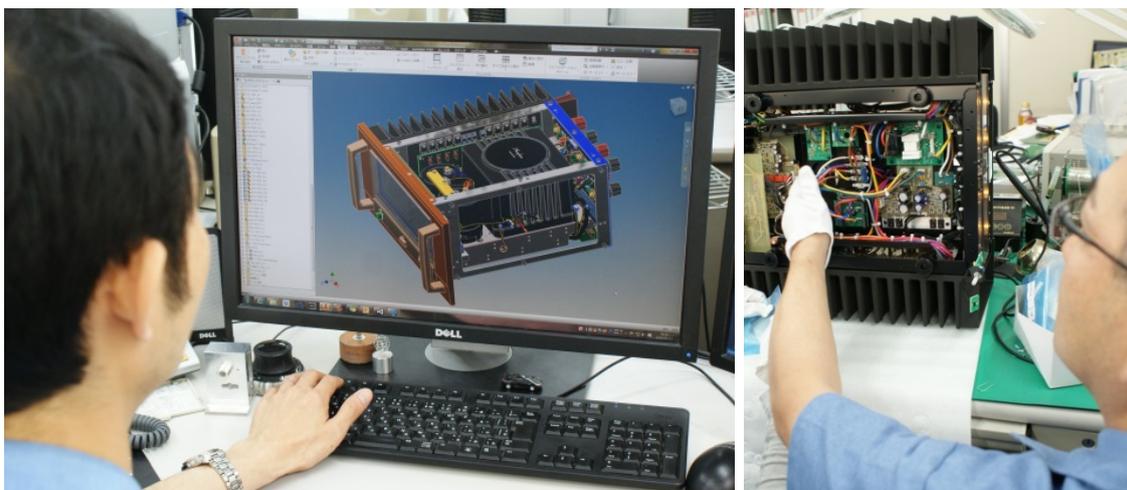
Development and Technology Department

For dedicated audiophiles, high-end audio products are the tools that enable the reproduction of music just as they envision it in their hearts, somewhat akin to what the musical instrument is to a musician. This means that sound quality is of course the most important aspect, but product design and operation feeling also play an important role. While meeting such perceptual demands, every high-end audio product is also a piece of electrical equipment for use in the home, and as such has to meet strict requirements with regard to safety, reliability, and long-term stability.

■ Design with full regard to safety

The safety of a product is the most important item to be considered at the design stage. Ever since introducing its first products in 1973, Accuphase has always given careful thought to ensuring complete safety.

Based on international safety standards, we have developed our own design rules. Accuphase products are sold in more than 60 countries around the globe, but rather than adjusting our products by destination, we apply only a single stringent in-house standard that fulfills all international safety provisions. This means that the most severe values for each safety item such as voltage resistance rating and maximum current are fully met by all of our products, thereby creating an ample safety margin.



■ Developing superior circuits for electrical performance as well as sound quality

The electrical characteristics of audio equipment these days are approaching the very limits of measuring equipment. Some audio manufacturers therefore hold the opinion that once a certain level is met, electrical performance no longer has a bearing on sound quality.

Accuphase on the other hand believes that electrical performance and sound quality are intricately related. In our view, high-end audio equipment must excel in both aspects, combining outstanding performance with impeccable sound.

Accuphase publishes the actual measurement data for its audio products, such as distortion, noise and linearity, in catalogs and other reference materials. Our specifications are not best-case, hard to reproduce numbers calculated under special conditions in the laboratory. Rather, we give guaranteed figures with plenty of margin that can be verified through measurement at any time. We can do this because we have full confidence in the performance of our products.

Based on this approach, we have developed many innovative circuits that push electrical performance and sound quality to new heights, including the ultra low noise volume control system [AAVA \(Accuphase Analog Vari-gain Amplifier\)](#), a current feedback amplification principle that ensures rock stable operation up to the high frequency range, fully balanced instrumental amplifier topology, and the [MDSD D/A converter](#) for accurate reproduction of Super Audio CDs.



■ Strict selection of parts and ample design margins

When building quality audio equipment, the selection of the right parts plays a crucial role. The failure rate of individual parts will determine the overall reliability and long-term stability of the end product. We also attach special importance to the "made in Japan" classification, having decided to use only parts that



come from a supplier with a manufacturing base in Japan or from an authorized distributor in Japan who guarantees the quality of the product. Wherever possible, we make direct visits to the respective company or plant where the parts are made, in order to verify their quality assurance framework first hand.

In using these parts, we design their operating conditions with ample performance leeway, so that they can develop their optimum performance and reliability potential. For electronic components, plenty of margin is allowed in aspects such as withstand voltage, rated current, and temperature rise, while for mechanical components the margin applies to aspects such as mechanical strength and durability. The same principle applies to external design parts, where beauty of the finish and the capability to withstand a variety of environmental conditions is realized through many layers of plating, painting, and other surface treatment processes.

When quality parts are used with ample leeway, the structure of the unit itself naturally becomes sturdy and massive. This is especially true with regard to the drive mechanism of a CD player, where the transmission of internal vibrations to the outside is prevented by suitable damping and the transmission of external vibrations to the inside by vibration-proof construction.



CD player vibration test

We even adhere to this concept when it comes to the box and packing material for the product. Repeated drop tests under extremely severe conditions were conducted to determine optimum materials and box construction. As a result, the best quality cardboard available in Japan was selected for the double wall exterior carton.



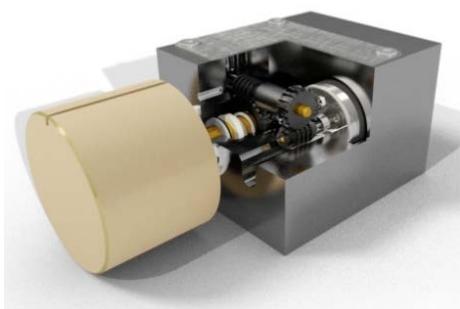
Temperature and humidity testing in an environmental Chamber



Product drop test

■ Exquisite operation feel

In a high-end audio product, the operational feel of the controls is an important consideration as well. When designing the volume knob and various switches, we devote careful attention to the touch transmitted to the fingertips at the time of operation, and even to the operation sound. Some of our products are equipped with custom-made rotary switches combining excellent operation feel with high reliability, and with a special volume control mechanism made in-house.



Accuphase also fabricates proprietary SA-CD/CD and CD drive mechanisms in-house to micrometer level precision (one thousandth of a millimeter), to achieve ultra smooth movement of the disc tray and quiet operation.



■ Designed for impeccable sound

Electronic parts and mechanical components as well as circuit topology and mechanical structure, all of these elements that constitute a piece of audio equipment have their own sonic characteristics. This is the reason why audio equipment from various manufacturers can differ considerably in how the finer details and nuances of the music are reproduced. It is this type of sonic character that ultimately determines the value of the product. But even with the latest measurement technology, it is very difficult to pinpoint or analyze sound quality differences. The ultimate measuring tools are still the human ears.

When embarking on the design of a product, we have a certain concept of the sound that we want to achieve, and this guides us in deciding on circuit topology, parts selection, and physical construction. But in many cases, it will not be possible to realize the original sonic concept right away.

By changing the combination of parts, their physical layout, and various other factors, we adjust the sound and work towards bringing it closer to our goal. This important process of sonic tuning is unique to quality audio equipment, it is usually not part of the development process for other electric products used in the home. At Accuphase, about as much time is devoted to repeated listening tests of our products as to technical development.

With automobiles and many home appliances, parts will often be swapped or changes made to construction in the middle of a production run, with the aim of reducing costs or improving performance. This practice is known as running change. Accuphase by contrast never does this, because a running change would inevitably change the sound quality. We carefully preserve the single prototype that was decisive in determining the sound quality of a given model during development, and every subsequent product is checked against this reference, from very first that leaves our premises to the end of the production run, thereby ensuring that sound quality remains absolutely consistent.

