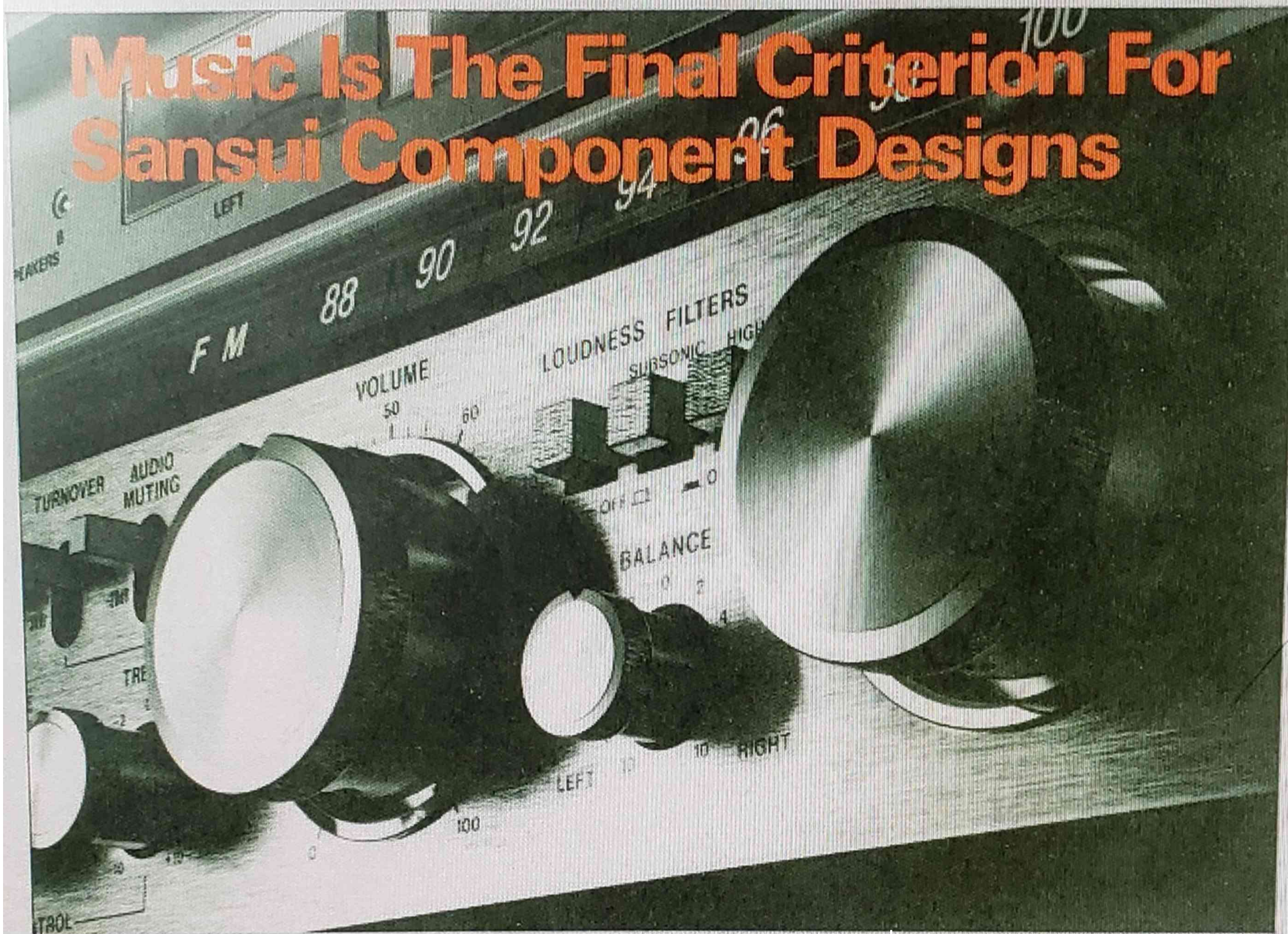


Only hi-fi, everything hi-fi.

*Sansui*

## Music Is The Final Criterion For Sansui Component Designs



Sansui is hi-fi, all hi-fi, and that means music.

The final test of every Sansui component is not some complicated meter reading. It is the sound perceived by the human ear.

This subjective view of what constitutes real hi-fi quality guides Sansui researchers and engineers every step of the way to their ultimate goal of superlative audio equipment. Although music is an unpredictable test instrument, it is, after all, what hi-fi is all about.

Every decision about design and construction is made at Sansui on the basis of just how it will affect musical and tonal quality. This has led Sansui to transcend conventional frequency res-

ponse limits, lift signal-to-noise ratios to unusual heights and to lower distortion well below the level audible to the human ear. To meet the demands of a test by music, Sansui has come up with distinctive and original designs for all of its components that provide the very best. An example is the Sansui DC amplifier - a whole new concept of precisely-controlled power that reproduces distinct sound images of shimmering clarity and resounding dynamic response.

Each major Sansui component — the goals sought in its design and construction, the special development problems and their solutions, and the attributes of the final product — are discussed in this special issue devoted to Sansui's full line

of completely hi-fi audio equipment.

Sansui's hi-fi equipment is the key to the best in music because Sansui design and development decisions are based on real music heard by real people.

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# Futurist Design Concept Distinguishes Receivers



The structure of the world's economy is changing and changing with it is the world audio market.

Today's low growth economy, punctuated by occasional depressions in some developed countries, has fostered a cautious attitude on the part of audio equipment enthusiasts. Gone are the days of thoughtless, conspicuous consumption. The audio buyer of today is attracted only by products of proven high quality — even if the price is high. Users are very careful to select only products that meet their own special requirements. What this means to the manufacturer is that unless a product can project its own sound image convincingly and persuasively, no amount of assurance of high quality and improved specifications can do the job. Sansui firmly believes that each product must be its own best representative in the marketplace.

## Receiver Market Worsening

Regrettably much receiver competition nowadays is based on the problem of output power relative to cost - and many products are of inferior quality. Discount selling has driven not only dealers, but also some manufacturers to

accept small profits on their receivers. And there is a growing tendency among some to push sales of integrated amplifiers and tuners, with a stable profit margin, rather than receivers. This tendency became dominant recently in the United States and has since spread worldwide,

As manufacturers of receivers, this mushrooming tendency has prompted us to examine our situation very closely. By nature, the receiver market overlaps the amplifier/tuner market to a great extent. The market will fail to grow, if, despite its lower price, the receiver is capable only of inferior sound quality. Purchasers of receivers should be distinguished from amplifier/tuner purchasers only by individual taste, rationale or life style. Distinction based on sound quality and price should be obsolete.

## Concept of Receivers' Future

Sansui is convinced that the only products that can survive in the future receiver market are those that meet these two criteria - sophisticated circuitry for maximum sound quality and original design incorporating the most advanced technology.

Sansui's recently-developed Pure Power Stereo Receiver Series is based on these important precepts. The first is built on Sansui's outstanding qualifications as a specialized audio manufacturer, dedicated to the ceaseless search for the ultimate in sound quality, and the second on Sansui's specific receiver expertise which inevitably leads to the finest in receiver quality and operational facility.

## Sansui Designs Trendsetters

Before embarking upon the now design program, Sansui established a number of goals to be achieved. It was decided that the design should project a powerful feeling of strength and intrinsic integrity. It should make actual operation easy and should appeal to audio consumers.

Using these goals as a basis, a design contest was held and hundreds of drawings carefully evaluated. Three-dimensional models were constructed before a final decision was reached.

## Design Development

A fundamental design concept unites the complete series — a symmetry that provides enduring enjoyment for the user. The unusual symmetry is achieved by placing the twin jumbo knobs for tuning and volume control in the center of the front panel. This also makes operating unusually easy and convenient. The new models generally group the function sector on the right of the front panel and the control sector on the left, adding to the feeling of balance.



The significant increase in the size of the tuning and volume control knobs recognizes their constant use. The new size expresses innate power and precision while providing the utmost operating facility.

Basic design goals were met in the Pure Power Stereo Receiver Series. It reproduces stately and sonorous sound powerfully. Precision controls make them easy to operate and the overall design has unusual visual appeal.

### Knobs

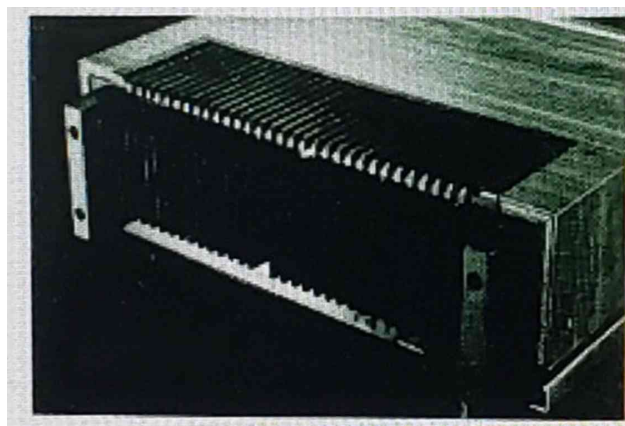
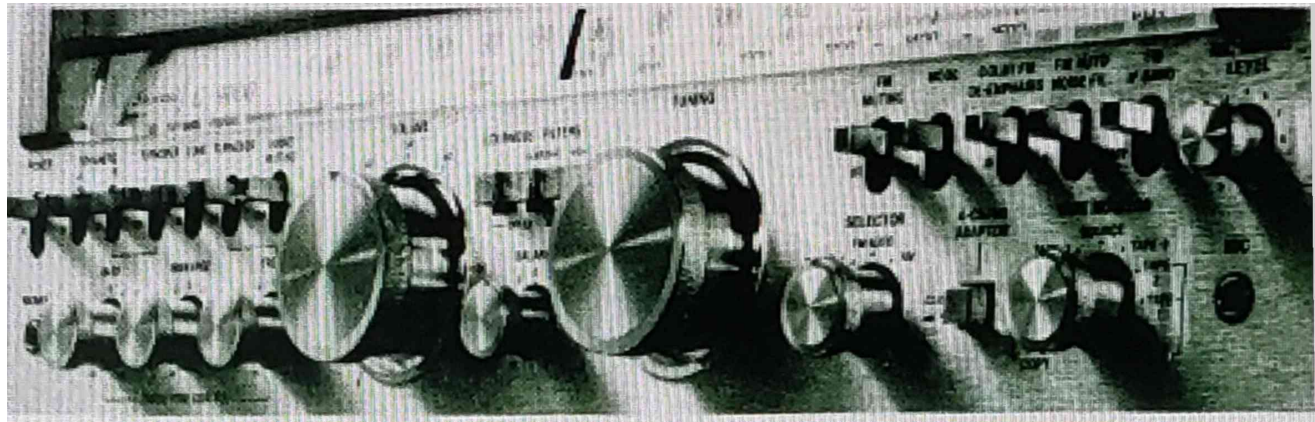
The handsome knobs thrust forward from within the receiver. A silken smooth diamond-polished surface gives them an air of technical precision. The turning surface of each knob is engraved with finely-grooved striations combining efficiency with beauty. The original design was carved by hand on the master model. More than five different artistic patterns were executed before the elusive feeling of "the right touch" was attained.

### Panel

The entire front panel is of thick, striated metal that emphasizes the sense of strength conveyed by the whole unit. The striations contrast strikingly with the shining smooth surface of the knobs, the dial borders and the panel edges. An entirely new typeface was designed for panel lettering to guarantee instant legibility.

### Dial

A solid piece of glass protects the dials and an array of meters, echoing the luminosity of the knob surfaces. The horizontal dial panel stretching the length of the receiver perfectly balances the lower portion of the receiver face. The four meters across the top of the dial panel, on the G-6000 and up, are clearly visible at a glance. Sansui developed its own meter design to make it possible to locate the meters within the dial panel. Previously available meters required more space below the meter



face or had to be placed more deeply within the panel plane.

The dial indicator is a golden color providing a rich contrast to the surrounding silver of the front panel.

### Side and Rear

The G-5000 and up are characterized by a die-cast aluminum heat sink exposed at the rear which plays a significant role in producing a powerful sound. On the G 8000 and up, input and output terminals are on the right and left sides of the receiver contributing to easy handling.

### The Complete Receiver

Completion of the intricate processes of design led to the construction of a final model with substantially the same attributes as the Pure Power Stereo Receiver Series on the market today. During the design process, Sansui's

designers attended many hi-fi shows throughout the world to determine the latest trends in receiver design. The final model was shown to Sansui's overseas sales representatives and audio users in order to ascertain their reaction to Sansui's completely original design approach. The unanimously positive response convinced Sansui of the soundness of the new design.

### Sales Strategy

Sansui's policy of the best/*n* sound quality is epitomized by the new stereo receivers, a series that offers a large number of models covering a wide price range. In the series, there is a model to appeal to each of your prospective receiver customers.

The originality of the design should be accented in the showroom by lighting arrangements similar to those used by potential customers in their own living rooms. Turn on the power switch and let your lighting bring out the full beauty and precision of the delicate combination of smooth and striated surfaces.

Above all, let the customer listen to the powerful sound quality of all the series receivers. The specifications are, of course, superior to those of competing models by other manufacturers, but the final judge, as always, is the customer's own hearing test. Emphasize that this is the first time in the world that a receiver is equipped with the DC amplifiers found in the G-5000 and up.

Beauty, efficiency and superb sound quality combine to make the series an outstanding sales winner.

# What Is A "DC" Amplifier and What's Good About It?



now on sale, frequency response is flat within the audible range, although phase response is disturbed from a frequency about ten times higher than the low range cut-off frequency, in amplifiers such as these, having a curved phase response in the low range when pulsative signals, such as music, are supplied, the waveform is distorted by phase rotation in the low range which adversely affects the reproduced sound.

## TIM Distortion

Transient intermodulation (TIM) distortion is the dynamic distortion generated transiently by a pulsative signal, this distortion is caused mainly by a capacitor in the NF loop. Briefly, in the case of a sine wave input, as shown in Fig. A-1, if a negative feedback signal superimposed on the input has the reverse phase and a half amplitude, theoretically, waves are simply added at the summing point, the point at which the input signal is combined with the feedback signal, so that only amplitude is halved in the combined signal, Practically, however, the NFB signal has a time delay due to the capacitor in the negative feedback loop. Provided the NFB signal be delayed by 45°, as shown in Fig. A-2, a wave which is more than the half in amplitude and has a correct sine waveform, appears at the summing point as shown in Fig. A-3. Although this combined waveform. Fig. A 3, has a time delay relative to the input wave-

An increasing number of amplifiers exported from Japan now bear the letters "DC".

These DC amplifiers dominate the Japanese market, but abroad there is continuing confusion about just what DC means.

This will attempt to explain the initials and make some useful sales suggestions.

First, what is a DC amplifier?

Too often, the initials are taken to mean "direct current", which, of course, they do in electrical parlance, but not in the audio world. Using this definition, a DC amplifier would be one that could reproduce very low range sound from direct current (zero Hz) which would be nonsensical because music convertible into direct current does not exist.

Direct current amplifiers have, in fact, been used for many years, but in medical appliances and in measuring instruments. Such amplification in the musical field would probably lead to damaged speakers.

In audio language, DC simply means "direct coupled" and the purpose of a DC amplifier is, in summary, to improve transmission characteristics markedly by removing coupling capacitors from the signal path, including the negative feedback loop.

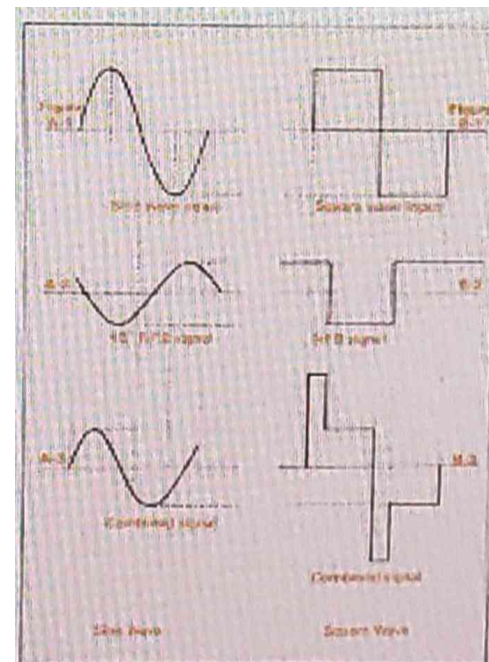
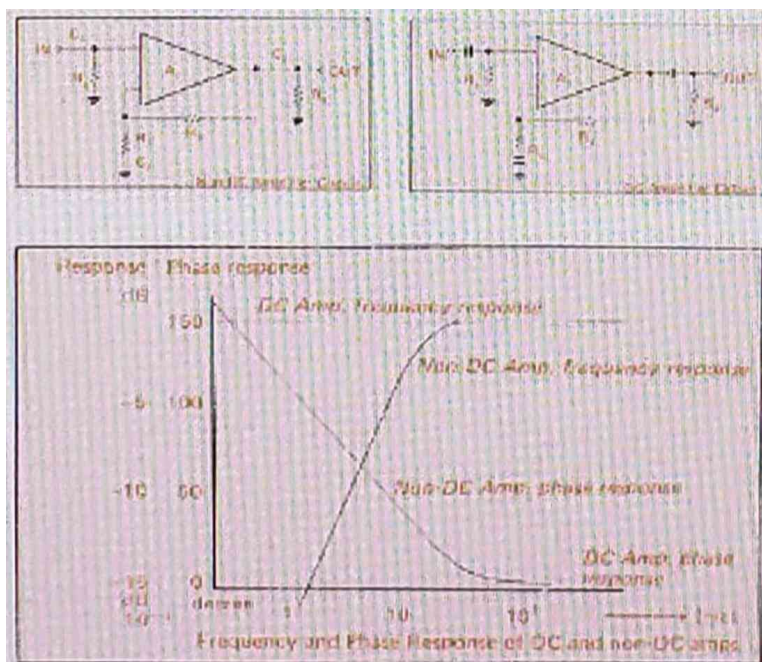
## Capacitor Coloration

Every capacitor has its own inherent

sound determinant whether used for input-output coupling or in the NTG loop of non DC amplifiers. In some cases, too, sound quality is deflected in a particular way, that is to say, colored, after the signals have left the capacitor. Sometimes, this coloring is used deliberately to create a particular sound pattern. It is, of course, needless to say that basically an amplifier should not color sound at all. It should reproduce an output signal completely faithful to the original input signal. It should only amplify energy.

## Deterioration of Phase Response

Capacitors in the signal path of non-DC amplifiers deteriorate phase response to a large extent. In non-DC amplifiers



form, Fig. A-1, no distortion is generated so that no particular problem is posed by sine input.

Now, let us consider the square wave input shown in Fig. B. Provided other conditions are the same as in Fig. A, the combined signal appearing at the summing point shows acute peaks at the rise and fall as shown in Fig. B-3. This is TIM distortion which is always generated by pulsative musical signals.

### Sansui's DC Amplifier

The new DC design effectively solves some of the problems of the non-DC amplifier, but the DC design alone is not enough to improve sound quality. In general, the DC amplifier is more highly

susceptible to drift than is the non-DC amplifier. Therefore, the inherent merits of the DC amplifier will not result in sound quality improvement unless sufficient countermeasures are taken. For example, use of an FET, a field effect transistor, in the initial stage and of a power supply of low impedance over a wide range.

Sansui regards the DC design as but one technique for improving sound quality. For instance, the DC design does not contribute directly to improved sound, but it does improve phase response. However, it should be noted that this improvement is obtained only in the low range. Phase shift occurs in the high range even in DC amplifiers. To

avoid this, Sansui has devised a method for expelling the range where phase shift occurs to a very high range, far above the upper audible limit, to prevent its influencing the audible range. This is one reason why the AU-717/517 has a flat frequency response from zero Hz {DC} to 200kHz.

Concurrently, Sansui has improved slew rate and rise time considerably to obtain rapid response capable of meeting the quick rises and falls of today's music. The resulting amplifiers can produce high power with minimum distortion at a very high range so that percussive sound may be realistically reproduced.

## Cost Quality Ratio Important but Sansui Puts Sound First

A suitable relationship between sound quality and cost is a primary factor when developing a new audio product.

Cost must be considered fully in planning, for if it is not, the resulting new product may not appeal to consumers. However, Sansui feels that cost considerations must not at any time lead to less than optimum sound quality.

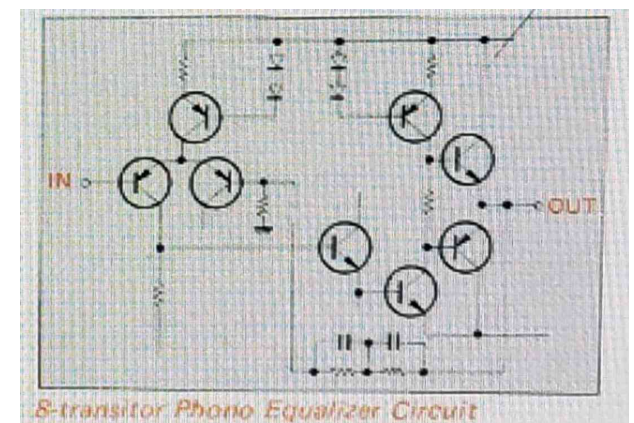
The first step in development of a new product is the setting of specifications surpassing those of existing products in the same price category. At Sansui, these often are so strict as to seem difficult to attain. Acting on the premise that even such rigid specifications can be achieved, Sansui proceeds to work toward the maximum possible sound quality.

For example, let's examine the development of the phono equalizer incorporated in Sansui's AU-717/517 amplifier. Today there are eight low-noise transistors in each channel of the equalizer, but at the outset there were only four — and therein lies the story.

Thinking, at first, that four transistors would be adequate, Sansui de-

signed, built and tasted a trial circuit with four transistors. A number of tests showed that such an arrangement was not satisfactory and in no way commensurate with the greatly-improved performance of the DC power amp section being developed. So, the number of transistors was increased from four to five and then to six. The six-transistor circuit satisfied the physical characteristics required. An apparently successful solution.

But, the phono equalizer in the AU-717/517 has eight transistors in each channel. Why? Because additional testing of the six-transistor model eventually revealed the fact that the sound did not emerge in a strong, forceful manner even though the power supply was reinforced and satisfactory specifications achieved. Sansui sound experts were dissatisfied with the sound quality after repeated tests. So the phono equalizer was redesigned once again. Constant current power supply was put into both the first stage differential input circuit and the third Class A amplification stage to facilitate output drive. In other words, two more transistors were added



bringing the total to eight.

But, why not eight from the start? Because more transistors do not always result in better sound. Additional ones do not necessarily improve sound quality beyond a certain level — and result in lowered cost performance. The eight transistors in Sansui's AU-717/517 amplifier are the result of extensive sound quality research which determined that eight was the exact number required for the best quality sound.

It is this accumulation of experience gained from constant such trial and-error processes that forms the firm foundation underlying all Sansui's high fidelity products.

# Loud and Proud

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