Accuphase

P-300II STEREO POWER AMPLIFIER

C-200II STEREO CONTROL CENTER

T-100 AM/FM STEREO TUNER

Accuphase P-300II

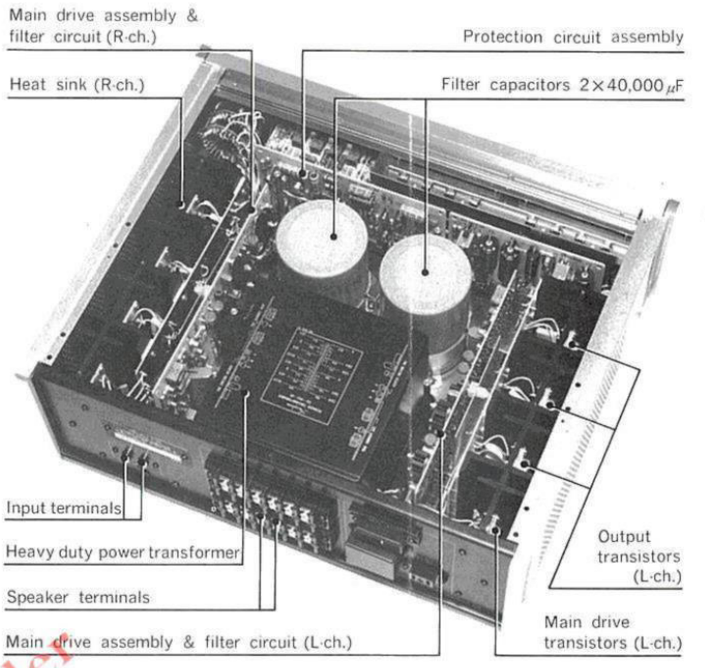
DUAL CHANNEL POWER AMPLIFIER

It is a mistake to calculate the value of a power amplifier solely in terms of cost per power. Other more important factors should also be considered to assess its overall value such as those power qualities like low distortion, well-regulated power supply and power bandwidth, as well as versatile functions and appearance values.

A power amplifier must have the high quality and range capability to deliver precise reproduction of the softest to the loudest passages of source signals. The powerful P-300II which can deliver 150 watts per channel (8 ohms load, 20 to 20,000 Hz with less than 0.03% distortion) without strain has been perfected to ensure performance to the very limits of technical measurability with complementary-symmetry push-pull amplifier circuits in every stage, minimum distortion advatages of DC amplifier design, and carefully selected devices with ample safety factor that are used in high stability circuitry.

While good measurements alone do not necessarily mean good sound in all amplifiers, this truth does not apply to the P-300II which has both superior sound, and specifications. This sound has been developed and perfected by the most careful listening tests which have been conducted continuously by our sound engineers at Kensonic Laboratory for many years.

The P-300II opens a new vista in sound reproduction perfection by delivering a sound that is free from any coloration and that reveals the depth of the inner world of music.



MINIMUM NEGATIVE FEEDBACK REDUCES TIM.

There is a subtle difference in the SOUND of different amplifiers, even among those amplifiers which have been engineered to technical measurability limits. Good measurements are no guarantee of good SOUND, and some top specification amps are likely to sound inferior to others.

One of the main causes for this difference is Transient Intermodulation Distortion (TIM), a recent focus of design attention. This distortion cannot be measured by ordinary static tests. It occurs when a dynamic signal, like music which contains sharp, abrupt pulses, is amplified. It is caused mainly when the abruptness of the signal exceeds the response time of the NFB (Negative Feedback) loop circuit to cause clipping. It may also arise from non-linearity characteristics of circuit rise time. This distortion is likely to occur in direct ratio to the amount of NFB required. Therefore the basic circuit design, before NFB, must be improved so that only a minimum of NFB will be needed.

The Accupahse P-300II employs active elements with superior high frequency characteristics as the basic approach for its complementary-symmetry push-pull lineup from input to output. This extravagant design permits minimum NFB application which has resulted in superb rise time, linearity and stability characteristics and prevented TIM distortion.

The P-300II therefore boasts an audible difference in high quality sound. It also has outstanding measurable qualifications.

DC AMPLIFIER DESIGN MINIMIZES SOUND COLORATION

The capacitors used in amplifiers play an important factor in determining their sound. Although nearly ideal low capacity capacitors such as those for interstage coupling functions are now available, good quality capacitors for NFB loop use are difficult to obtain because of their high capacitance. In order to ensure a minimum of sound coloration, the P-300II employs a DC unit amplifier design which has eliminated the need for capacitors in NFB loop.

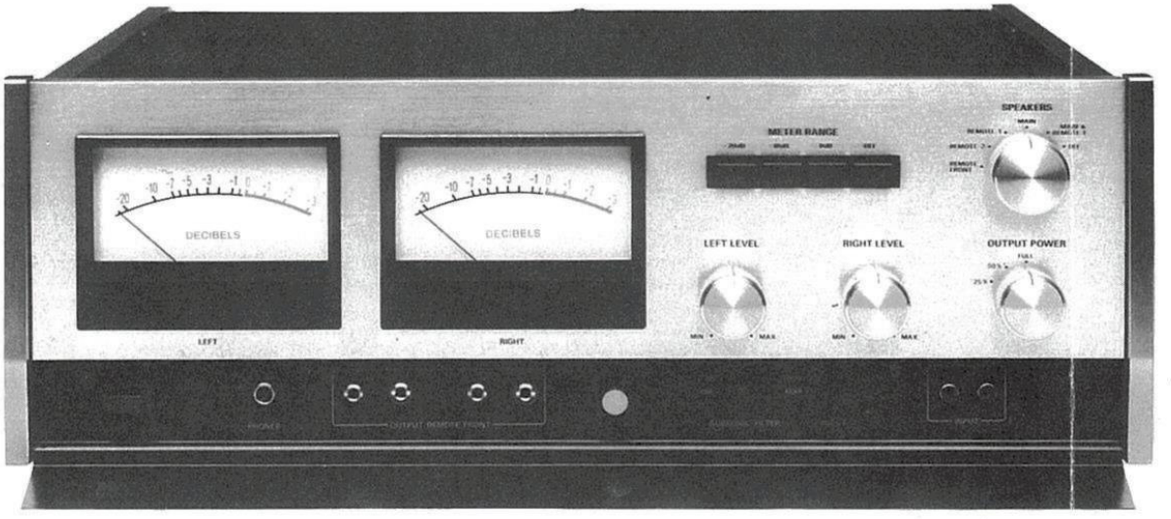
A DC amplifier design requires the highest stability circuitry to prevent any appearance of DC current at the output which may cause speaker damage. Therefore the power supply of the P-300II has been further stabilized to prevent any possibility of DC drift. Dual transistors have been employed at the input stage for stabilized center voltage, and all active elements have been carefully selected for uniformity against temperature changes. These precautions have given to the P-300II even higher stability which guarantees continuously dependable, highest quality performance at all times.

HEAVY DUTY STABLE POWER SUPPLY

The stable power supply of the P-300II which can meet the heavy requirements of 400 watts of power into 4 ohms without strain, also can maintain, with ease, well-regulated supply voltages against varying load conditions created by rapidly changing input signals. Even for fff, each music part is separated smoothly, and there is no awareness of muddiness.

CLOSELY SELECTED PARTS

It is a well known fact that different parts can be responsible for differences in sound quality, even from exactly the same amplifier circuit. This is due to the fact that the parts themselves often possess



certain electrical characteristics which have no relation to their designated function.
All parts, therefore, are selected carefully with "Performance First" in mind, and they are subjected to severe durability and other tests to determine how their characteristics might affect sound quality.

DEPENDABLE SPEAKER PROTECTION CIRCUIT
Mistakes in speaker connections that cause short circuited outputs or similar troubles will disconnect the speakers automatically by relay action from this amplifier to protect expensive speakers from damage. In such cases, the power meter lamp will flash on and off successively as a warning signal. As soon as the trouble is corrected, the lamp will again glow steadily, and normal operation will resume automatically.

SUBSONIC FILTER
Undesirable turntable rumble and subsonic tone arm resonance vibrations that enter the input may appear as intermodulation distortion in the mid and high frequency ranges. Subsonic filter, with a sharp cutoff characteristic of 18 dB/oct is provided to eliminate these undesirable signals below 17 Hz. This filter can be switched ON or OFF with a control available on the front sub-panel.

LARGE SIZE POWER METERS
Large size power meters indicate power output in dB. Switch selection of three ranges, 0 dB, −10 dB and −20 dB, permit both low and high power measurements. A 0 dB reading indicates power output of 150 watts into 8 ohms when the meter range switch is set to 0 dB.

PLENTY OF INPUT/OUTPUT TERMINALS
Plenty of outputs are available to which four pairs of stereo speakers can be connected, and switch selected. Accommodations for two pairs of input systems are also provided, and they too can be switch selected. Jacks are avaialble on the front sub-panel for one pair each of these inputs and outputs, respectively.

POWER LIMITER
A power limiter switch is provided on the front panel so that power output can be limited to protect high efficiency speakers when they are used. This switch permits choice of 25%, 50% and full power operation.

GUARANTY SPECIFICATIONS

PERFORMANCE GUARANTY:
All Accuphase product specifications are guaranteed as stated.

POWER OUTPUT: (both channels driven from 20Hz to 20,000Hz with no more than 0.03% total harmonic distortion)
200 watts per channel, min. RMS, at 4 ohms
150 watts per channel, min. RMS, at 8 ohms
75 watts per channel, min. RMS, at 16 ohms

TOTAL HARMONIC DISTORTION:
(from 20Hz to 20,000Hz at any power output from 1/4 watt to rated power)
4 ohms; 0.03% max.
8 ohms; 0.03% max.
16 ohms; 0.03% max.

INTERMODULATION DISTORTION:
will not exceed 0.01% at rated output for any combination of frequencies between 20 Hz and 20,000 Hz at 8 ohms

FREQUENCY RESPONSE:
1 Hz to 250,000 Hz; +0, −3 dB at 1 watt power output
20 Hz to 20,000 Hz; +0, −0.2 dB at rated power output

SLEWING RATE: more than 25V/μS

DAMPING FACTOR: 60, 8 ohms load at 40 Hz

INPUT SENSITIVITY AND IMPEDANCE:
1.4 Volt, 100k ohms, for rated output at the maximum level control

HUM AND NOISE:
115 dB below rated output, IHF-A weighted

POWER LEVEL METER:
Meter is calibrated to read 0 dB when amplifier produces 150 watts into 8 ohms load.
METER RANGE switch is provided to increase meter sensitivity by 10 dB or 20 dB

OUTPUT LOAD IMPEDANCE: 4, 8 and 16 ohms

SUBSONIC FILTER: cutoff frequency: 17 Hz 18 dB/oct

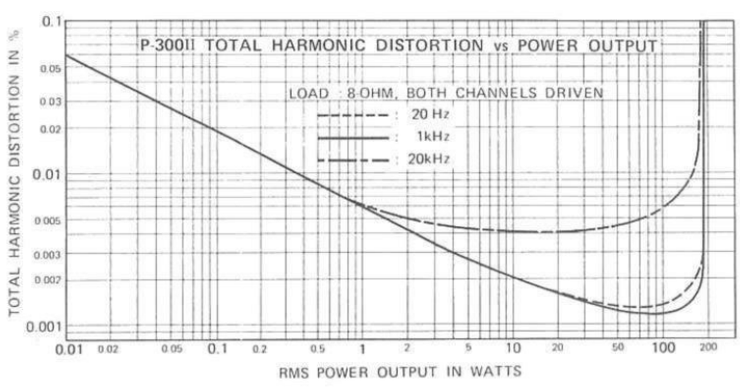
POWER LIMITER:
Full power output, 50% output, and 25% output with front panel switching.

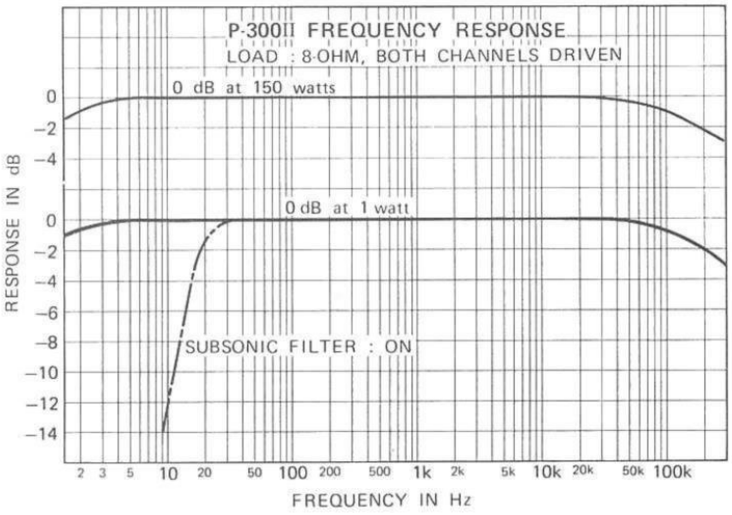
POWER REQUIREMENT:
Voltage selector for 100V, 117V, 220V, 240V 50/60 Hz operation
Consumption: 100 Watts at zero signal output
510 Watts at rated power output into 8 ohms load

SEMICONDUCTOR COMPLEMENT:
92 Transistors, 1 IC, 2 FET's, 91 Diodes, 2 Thermistors

DIMENSIONS:
445mm (17 1/2 inches) wide, 152mm (6 inches) high,
355mm (14 inches) deep

WEIGHT:
25 kgs. (55 lbs.) net, 29.3 kgs. (64.5 lbs.) in shipping carton



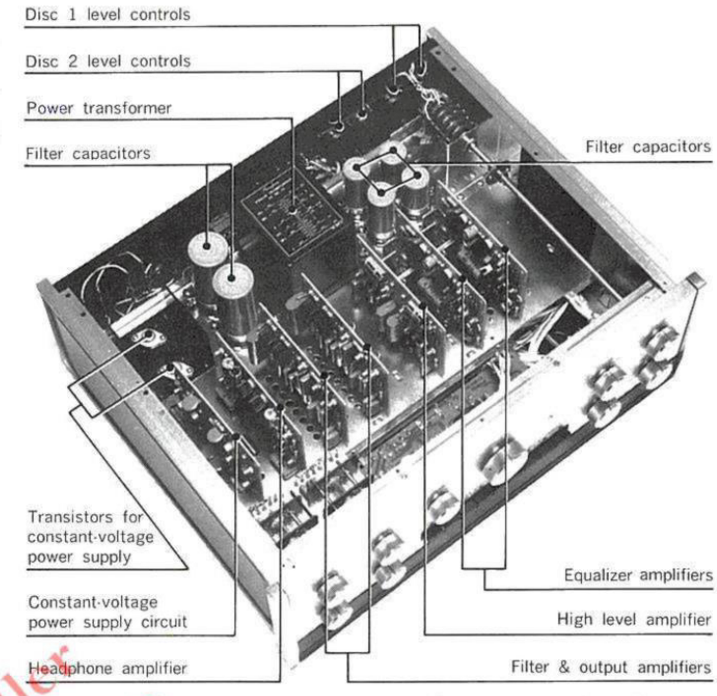


Accuphase C-200II

STEREO CONTROL CENTER

A good control center must be able to preamplify program source signals faithfully without changing their characteristics. It must also be able to provide compensation, when required, for room acoustics or deficiencies in program source signals. To satisfy the first requirement of fidelity, a good control center must have excellent characteristics such as wide dynamic range, flat frequency response, low noise and low distortion, as well as the ability to amplify and deliver a true replica of the input pulse signal. As for its second function of supplying compensation, it must have excellent equalization and other circuitry that can be finely adjusted, as well as efficient filters to cut off noise. Moreover, a good control center must have plenty of input connectors, and its controls should be well laid out to avoid complexity.

The Accuphase C-200II, which was designed to serve as a top class control center, easily meets all these requirements, and more. Every stage is push-pull driven and powered by dual power supplies. Input voltages up to 400 mVrms can be handled, a maximum for equalizer amplifiers. Its 10 inputs and 7 outputs, and a total of 28 controls attest to its functional diversity. Yet it is simple to operate. Excellent design and full utilization of its front and front-sub panels have made this possible.



EVERY STAGE IS CLASS-A PUSH-PULL DRIVEN WITH ICL EQUALIZER INPUT DESIGN

The C-200II employs extravagant complementary-symmetry class-A push-pull driven amplifier circuits all the way from the equalizer input to the final output, including both the filter and headphone amplifiers. In addition, the equalizer input employs ICL (Input Capacitor-Less) design. The outstanding superiority of this basic circuitry permits the advantage of minimum negative feedback and consequently superior characteristics.

Recent hi-fi design attention is being focused on Transient Intermodulation Distortion (TIM) which is seen as a big factor in determining amplifier quality differences. It cannot be traced with ordinary static tests. It occurs when a dynamic signal, like music which contains sharp, abrupt pulses, is amplified, and the signal abruptness exceeds the response time of the NFB (Negative Feedback) loop circuit and causes clipping.

It may also arise from non-linearity of rise time characteristics. This distortion is more likely to occur in direct ratio to the amount of NFB used. The complementary-symmetry class-A push-pull Accuphase circuitry which requires minimum NFB is ideal to prevent TIM distortion. Moreover, another big advantage is its outstanding stability against power line fluctuations, as well as continuous operation over long periods.

As a result, the distortion ratio of both the equalizer and high level amplifier sections has been minimized to the limits of technical measurability.

ACCUPHASE ORIGINALITY MARKS EQUALIZER DESIGN

(a) New Ring Emitter Transistors (RET) specially developed for high frequency amplification are now used at the equalizer output in a push-pull class-A amplifier. This new RET consists of 100 low input signal transistors working in parallel with the ballast resistors at the emitters constructed by its diffused layer. It thus retains the superior high frequency characteristics of low amplification factor transistors, and also permits high power amplification.

In addition to these advantages, larger electric currents fed to the RET's significantly lower the output impedance. This engineering approach has made it possible to decrease the impedance of the NFB loop and greatly improve S/N characteristics.

(b) Easily handles dynamic range inputs.

Employment of complementary-symmetry class-A driven amplifier in the final stage and use of plus, minus dual power supplies enable the C-200II to handle wide dynamic range inputs as large as 400 mVrms at 1 kHz with distortion ratio less than 0.01%. This rating applies with the equalizer amplifier gain set at 40 dB. If it is set to 30 dB, input voltage up to 1.2 Vrms can be handled.

(c) Low enhancement circuit has fine adjustment of "Presence".

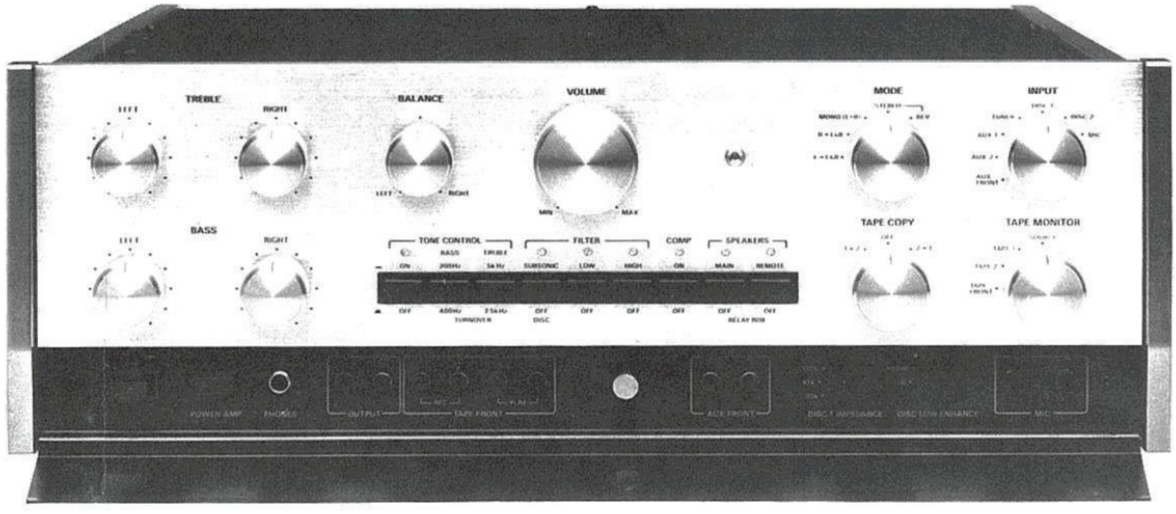
The C-200II is equipped with a LOW ENHANCE switch which accentuates rich bass tones that add to music enjoyment. This switch offers selection of 0, +0.5 and +1 dB change against the RIAA characteristic curve at 100 Hz.

(d) Disc input level control has 10 dB variation.

A 10 dB continuously variable attenuator is available to attenuate cartridge output, when excessive, to a suitable level. It also permits comparison of cartridges connected to DISC 1 and DISC 2, and equalization of their levels.

(e) Disc input has impedance matching switch.

The C-200II is equipped with an impedance matching switch which provides selection of 30k, 47k and 100 k ohms input impedances at DISC 1. This makes impedance matching easy, especially to moving coil cartridges connected through step-up coupling transformers that require different optimum impedances depending on the make. It eliminates



mismatching impedances at disc input connections which deteriorate sound quality.

WIDE CHOICE OF TONE VARIATION

(a) 10-step bass control, plus two turnover frequencies.
Every shade of bass tone variation is at your fingertips with the C-2001I which offers 10-step rotary switch control for each channel, plus a choice of 200 Hz or 400 Hz turnover frequencies. These turnover frequencies provide a variation range of ±10 dB (at 100 Hz for 400 Hz turnover, at 50 Hz for 200 Hz turnover).
(b) 10-step treble control, plus two turnover frequencies.
Likewise every shade of treble control is also available through 10-step selection for each channel, plus choice of 2.5 kHz and 5 kHz turnover frequencies that provide a variation range of ±10 dB (at 10 kHz for 2.5 kHz turnover, 20 kHz for 5 kHz turnover).
An independent switch is provided to turn the tone control circuit ON or OFF.

LOW, HIGH FILTERS

(a) Low filter with 18 dB/oct cutoff at 30 Hz.
The C-2001I has a built-in low filter which can cut off at 18 dB/oct, all subsonic vibrations below 30 Hz which are likely to cause inter-modulation distortion.
(b) High filter with 12 dB/oct cutoff at 5 kHz.
It also has a 12 dB/oct cutoff High filter for 5 kHz which very effectively cuts high frequency noise without essentially affecting music quality.

PLENTY OF INPUT/OUTPUT CONNECTORS

A total of 10 inputs and 7 outputs are available, which should meet the needs of any assortment of program sources or sound equipment test connections. Of these, 3 inputs MIC, AUX and TAPE PLAY, and three outputs, TAPE REC, MAIN OUTPUT, and HEADPHONE are conveniently available on the front sub-panel.

THREE TAPE RECORDERS CAN BE CONNECTED

Inputs and outputs for connecting three tape recorders are available, of which two can be used for tape copying from one tape deck to the other. This function can be carried on while simultaneously listening to a different program source, since an independent tape copy switch is provided.

COMPLEMENTARY-SYMMETRY CIRCUIT HEADPHONE AMP.

A direct-coupled, complementary-symmetry circuit amplifier, made available exclusively for headphone use, upgrades the quality of headphone reproduction that is available through the C-2001I.

SPEAKER SWITCHING THROUGH OPTIONAL RELAY BOX

In installations where the power amplifier may not be close at hand, speaker selection is possible through the C-2001I's front panel Speaker Selector switches when a Relay Box (optional equip.) is connected.

GUARANTY SPECIFICATIONS

PERFORMANCE GUARANTY:
All Accuphase product specifications are guaranteed as stated.

FREQUENCY RESPONSE: High level input: +0, −0.2 dB 20 Hz to 20,000 Hz
Low level input: +0.2, −0.2 dB 20 Hz to 20,000 Hz

DISTORTION: Lower than 0.01% at rated output level, 20 Hz to 20,000 Hz

INPUT SENSITIVITY AND IMPEDANCE:

Disc 1:	2–6mV*; 30k ohms, 47k ohms, 100k ohms
Disc 2:	2–6mV*; 47k ohms
Mic:	2mV; 47k ohms
Tuner:	200mV; 130k ohms
Aux 1, 2, FRONT:	200mV; 130k ohms
Tape Play 1, 2, FRONT:	200mV; 130k ohms

(*2–6mV Variable)

MAXIMUM INPUT FOR DISC INPUT:
400mV RMS at disc level control maximum for 1kHz
1.2V RMS at disc level control minimum for 1kHz
400mV – 1.2Vrms at 0.01% distortion, 1kHz

OUTPUT LEVEL AND IMPEDANCE:

Main Output:	2.0V*; 200 ohms
Headphones:	0.4V*; 0.3 ohms
Tape Rec. 1, 2, FRONT:	200mV; 200 ohms

(* at rated input, volume control maximum)

MAXIMUM OUTPUT LEVEL: 10 Volts at 0.01% distortion

VOLTAGE AMPLIFICATION IN DECIBELS:
Tuner, Aux, Tape Play input: to Main Output; 20 dB
to Tape Rec.; 0 dB
to Headphones; 6 dB
Disc 1, Disc 2 and Mic input (at 1kHz):
to Main Output; 60 dB
to Tape Rec.; 40 dB
to Headphones; 46 dB

HUM AND NOISE:
Tuner, Aux, Tape Play: 105 dB below rated output, IHF-A weighted
Disc, Mic: 94 dB below 10mV input, IHF-A weighted

TONE CONTROLS:
10-step Rotary Switch for each channel with turnover frequency Switches.

BASS: Turnover frequency 400 Hz: ±10 dB (2 dB step) at 100 Hz
Turnover frequency 200 Hz: ±10 dB (2 dB step) at 50 Hz

TREBLE: Turnover frequency 2,500 Hz: ±10 dB (2 dB step) at 10,000 Hz
Turnover frequency 5,000 Hz: ±10 dB (2 dB step) at 20,000 Hz

DISC LOW ENHANCEMENT (for Disc input):
0 dB, +0.5 dB, +1 dB at 100 Hz to RIAA standard characteristics
Bass tone becomes richer when switched to +0.5 dB or 1 dB.

COMPENSATOR: ON position boosts low frequencies for low level listening.
+9 dB at 50 Hz (at volume control – 30 dB)

FILTER: Subsonic Filter: 17 Hz cutoff 6 dB/oct
Low Filter: 30 Hz cutoff 18 dB/oct
High Filter: 5,000 Hz cutoff 12 dB/oct

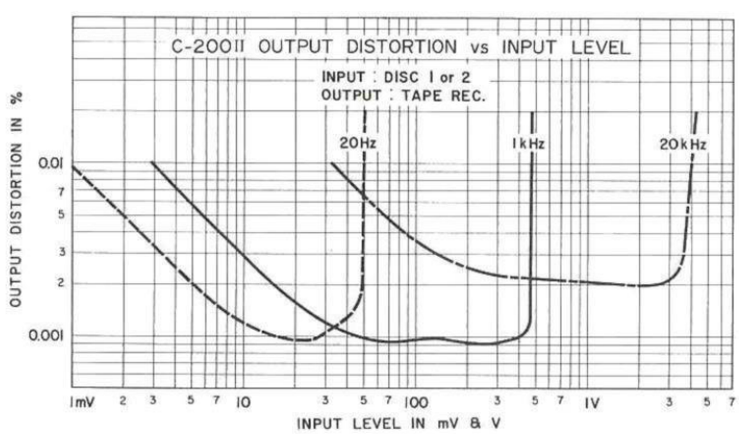
VOLUME CONTROL: Less than 1 dB tracking error control down to −80 dB

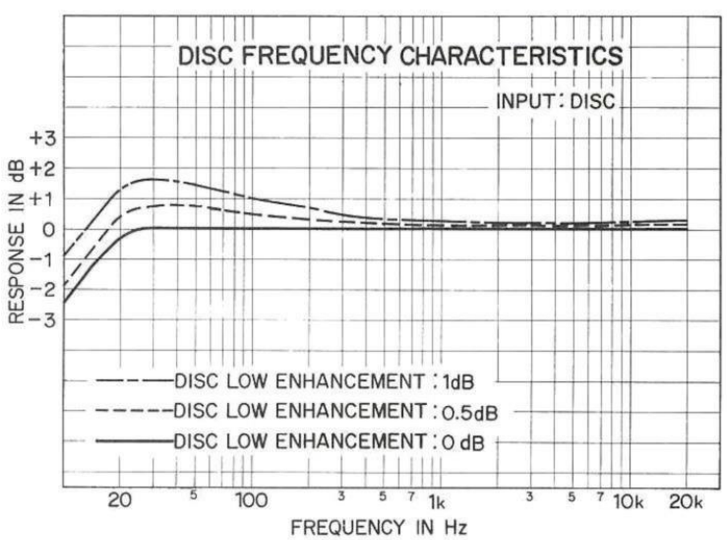
POWER REQUIREMENT: Voltage selector for 100V, 117V, 220V, 240V 50/60 Hz
Consumption: 36 watts

SEMICONDUCTOR COMPLEMENT: 80 Transistors, 2 FET's, 33 Diodes

DIMENSIONS: 445mm (17 1/2 inches) wide, 152mm (6 inches) high, 355mm (14 inches) deep

WEIGHT: 14 kgs. (30.8 lbs.) net, 18.3 kgs. (40.6 lbs.) in shipping carton





Accuphase T-100

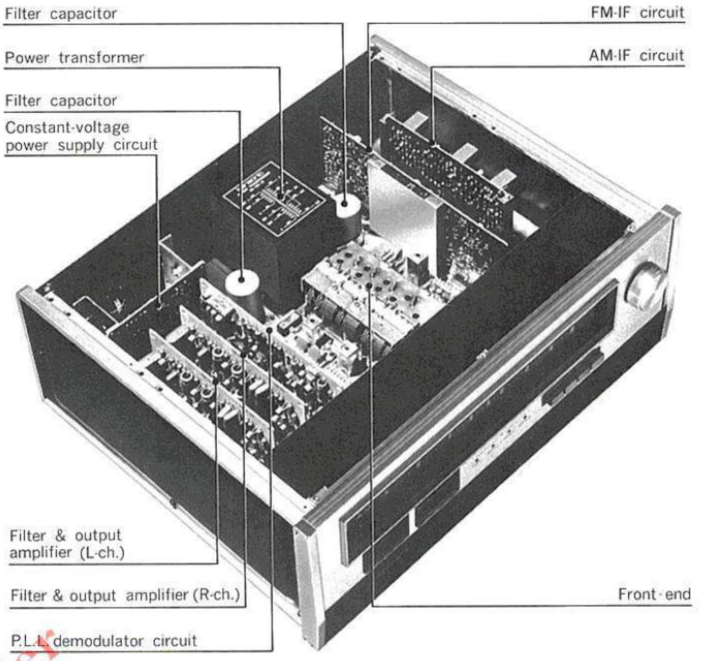
LOW DISTORTION AM-FM STEREO TUNER

A superior tuner can significantly enrich audio life today for there is an abundance of broadcast reproduction matter which provides great opportunities to expand one's tape library through careful air checking. The ideal tuner should come close to connecting the broadcast studio to the amplifier, and eliminate the medium of radio waves. Thus, it should be able to cut the noise, interference and distortion that is picked up with the radio waves during its transmission, to a level which cannot be detected by the ear.

This is where the main emphasis was placed in designing the Accuphase T-100 Tuner. In addition, special attention was paid to performance stability against external variables such as incoming signal levels, changes of temperature, humidity and time, as well as on smooth-working tuning and switching mechanisms. In short, the most advanced electronic and mechanical techniques were called upon to develop this outstanding tuner.

Two basic functions are required of tuners: the ability to catch and select radio waves as in the case of a receiver's front-end, and to amplify and demodulate them, without causing distortion as is so important in audio equipment. The difficulty is that the characteristics of the two requirements are so mutually opposed, that often one tends to suffer when the other is improved. It is a fact that to solve this problem requires the highest technology and considerable expense.

In developing the Accuphase T-100 tuner, we have met this challenge by developing latest radio frequency techniques and by adding required new circuitry unsparingly. The result is something we are proud of introducing, and we are sure that you will come to have a special attachment for this tuner too!



ADVANCED DESIGN FM FRONT-END

FM signals picked up by the antenna are tuned and amplified by the RF amplifier, then mixed with the local oscillator signal in the converter circuit to form a 10.7 MHz intermediate frequency (IF) signal. This circuitry constitutes what is known as the front-end, which plays a vital role in determining a tuner's value. This section must be able to amplify weak signals well, handle strong signals without distorting, and have the capability to remove completely all radio frequency noise and interference.

The T-100 meets these requirements well by utilizing a linear frequency, 5-gang tuning capacitor, double tuned RF amplifier stages, complete intercircuit shielding, local oscillator buffer circuit, and dual gate FET's in all RF and converter circuits, etc. This is attested by performance ratings for spurious signal rejection of better than 100 dB. Image rejection is also better than 90 dB. The T-100 also has a 245 mm (9-1/2") wide, slide-rule type dial which has linear frequency indications at 250 kHz intervals that is combined with precision tuning mechanism to ensure smooth, accurate tuning.

15-STAGE LINEAR PHASE FILTER IN FM IF CIRCUIT

The 10.7 MHz IF signal from the front-end enters the IF amplifier circuit where it is amplified and fed to the detector while adjacent frequency signals are rejected. This rejection (IF selectivity) is normally the function of transformers or mechanical filters in conventional tuners. The T-100, however, employs a newly developed 15-stage Linear Phase Filter combined with an integrated circuit to obtain better rejection and, at the same time, less distortion. Thus, selectivity was made compatible with sound quality, as attested to by the performance ratings for distortion of less than 0.04% and effective selectivity of more than 70 dB, which significantly surpass the limitations of past tuners.

WIDEBAND FM DETECTOR

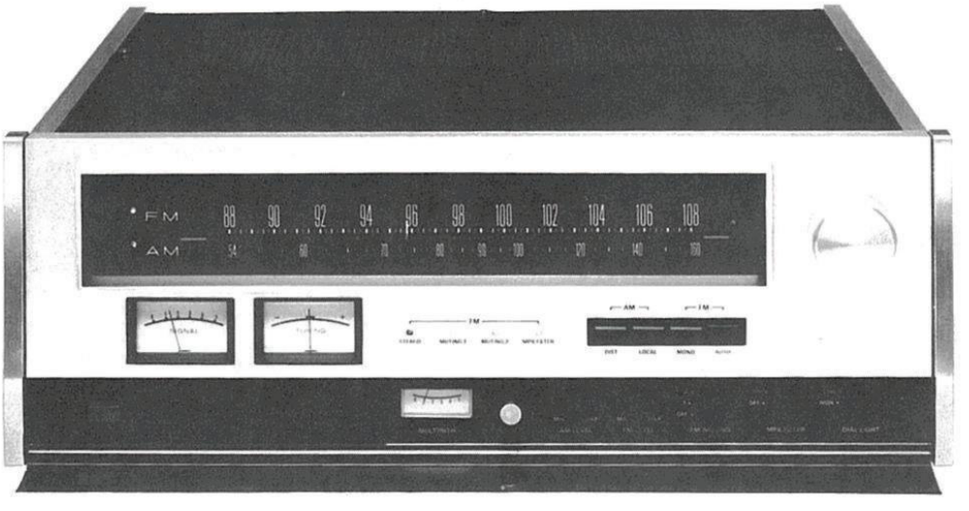
In order to demodulate the linear phase amplified IF signal without distortion into an audio signal, the former is fed to a special detector circuit which employs a 1,200 kHz wide discriminator which has three times the width of those normally used. This has contributed to significant improvement in stereo characteristics.

PHASE-LOCKED LOOP STEREO DEMODULATOR

We have avoided all use of coil and capacitor tuned circuits in the stereo demodulator which separates the audio signal into left and right channel stereo signals. Instead we have used the most advanced Phase-Locked Loop Stereo Demodulator which automatically locks the phase of the subcarrier generator with that of the incoming pilot signal. This accounts for the excellent ratings for stereo separation of better than 50 dB (1 kHz), and distortion of less than 0.08% on stereo. It also ensures long life and dependable performance.

INDEPENDENT MULTIPATH METER

In addition to the Signal and Tuning meters, an independent Multipath meter is provided inside the front sub-panel. Multipath signals, like TV



ghost signals, cause distortion which harm FM stereo sound quality. To avoid them, the FM antenna should be oriented for minimum deflection of the Multipath meter.

LOW DISTORTION AM TUNER

Good quality broadcasts are also available on AM, although frequency response is narrower. AM has usually been treated as an accessory by most high fidelity manufacturers, and has received very little new design considerations. However, as a result of a new type detector circuit, optimum bandwidth research and use of expensive MOS and J type FET in the front-end and IF stages, we can offer low distortion, noise-free AM music performance with the T-100.

OTHER FEATURES

The front sub-panel contains a 2-step muting switch, a stereo noise filter control, independent AM and FM level controls, and dial light control. The Multipath meter lamp lights automatically when the sub-panel cover is opened.

GUARANTY SPECIFICATIONS

PERFORMANCE GUARANTY:

All Accuphase product specifications are guaranteed as stated. All specifications are measured in accordance with the new IHF measurement method.

FM MONOPHONIC Performance:

SENSITIVITY: Usable Sensitivity: 10.3dBf (1.8μV*)
50dB Quieting Sensitivity: 17.3dBf (4.0μV*)

VOLTAGE STANDING WAVE RATIO: 1.5

SIGNAL TO NOISE RATIO AT 65dBf (1mV*): 80dB

DISTORTION:

	100Hz	1,000Hz	10,000Hz
65dBf (1mV*) Input:	0.04%	0.04%	0.08%

INTERMODULATION DISTORTION: will not exceed 0.05%
(Antenna input 65dBf (1mV*), 100% mod., 14kHz and 15kHz=1:1)

FREQUENCY RESPONSE: +0, −1dB 20Hz to 15,000Hz

SELECTIVITY: Alternate Channel: 70dB
Adjacent Channel: 12dB

CAPTURE RATIO: 1.5dB

RF INTERMODULATION: 70dB

SPURIOUS RESPONSE RATIO: 100dB

IMAGE RESPONSE RATIO: 90dB

IF RESPONSE RATIO: 100dB

AM SUPPRESSION RATIO: 75dB

SUBCARRIER PRODUCT RATIO: 70dB

SCA REJECTION RATIO: 60dB

OUTPUT: 2.0 Volts

FM STEREO Performance:

SENSITIVITY: Usable Sensitivity: 19.2dBf (5.0μV*)
50dB Quieting Sensitivity: 34.8dBf (30μV*)

SIGNAL TO NOISE RATIO AT 65dBf (1mV*): 75dB

DISTORTION:

	100Hz	1,000Hz	10,000Hz
65dBf (1mV*) Input:	0.08%	0.08%	0.3%

INTERMODULATION DISTORTION: will not exceed 0.08%
(Antenna input 65dBf (1mV*), Standard Stereo mod., 9kHz and 10kHz = 1 : 1)

FREQUENCY RESPONSE: +0, −1dB 20Hz to 15,000Hz

STEREO SEPARATION:

100Hz	1,000Hz	10,000Hz
45dB	50dB	45dB

STEREO AND MUTING THRESHOLD:
2-step Switching at 19.2dBf (5μV*) and 31dBf (20μV*)
(*old IHF methods at 300ohms)

AM Performance:

SENSITIVITY: 15μV DISTANCE
150μV LOCAL

SIGNAL TO NOISE RATIO: 50dB
(Antenna input level 1mV, 30% Mod. at 1kHz)

THD: will not exceed 0.5% (Antenna input level 1mV, 30% Mod. at 1kHz)

SELECTIVITY: 30dB

IMAGE REJECTION: 70dB

IF REJECTION: 60dB

WHISTLE FILTER: −30dB at 10kHz

OUTPUT: 0.6 Volts (30% Mod.)

GENERAL:

TUNING CAPACITOR: FM: Frequency Linear 5-gang
AM: 3-gang

OUTPUT IMPEDANCE: Audio Output FIXED: 200ohms
Audio Output CONTROLLED: 2.5kohms

FM ANTENNA INPUTS: 300-ohm balanced; 75-ohm unbalanced

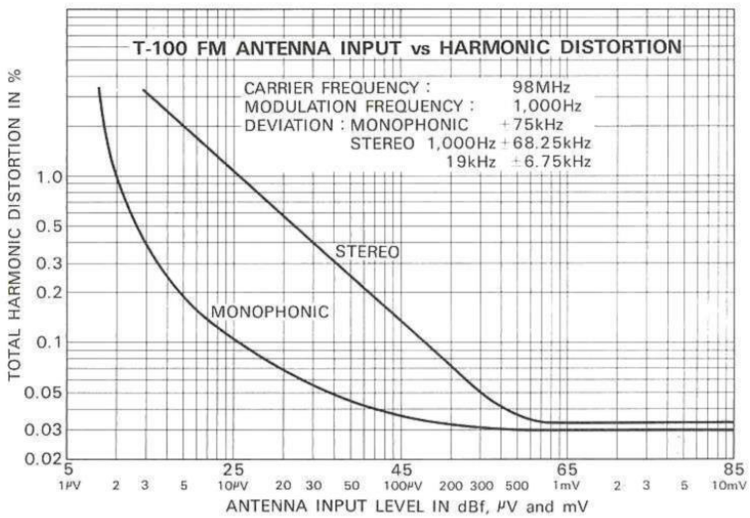
METERS: Signal strength Meter, Center Tuning Meter, Multipath Meter

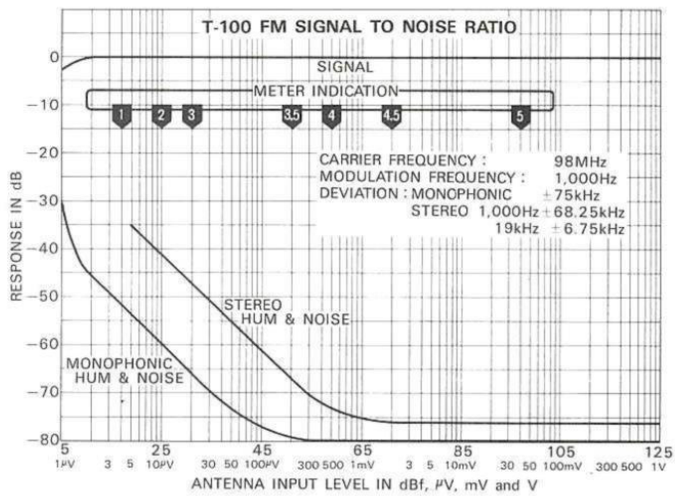
POWER REQUIREMENT:
Voltage selector for 100V, 117V, 220V, 240V 50/60Hz operation
Consumption: 26 Watts

SEMICONDUCTOR COMPLEMENT:
7 FET's, 45 Transistors, 9 IC's, 43 Diodes

DIMENSIONS:
445mm (17 1/2 inches) wide, 152mm (6 inches) high,
355mm (14 inches) deep

WEIGHT:
14kgs. (30.8 lbs.) net, 18.3kgs. (40.6 lbs.) in shipping carton





BASIC ENGINEERING POLICY

We seek, through audio technology, music that's exciting and inspiring, that moves our hearts and enriches our lives. This is the idea behind our slogan, "Enrich Life through Technology." It is the basic guiding principle behind all Accuphase audio components whose high grade can even be considered to be extravagant. We intend, however, to avoid non-audible frills, and concentrate our engineering on how best to reproduce the musical contents of program sources. If "Accuphase tone," as such, should come to be accepted, it would be a manifestation of our interpretation of sound as it should be, and its hallmark would be its very special degree of transparency and clarity. To this end, we are re-educating our engineers in music, to increase further their knowledge and appreciation of this art which we are dedicated to re-creating.

OUR VIEWS CONCERNING SPECIFICATIONS

It is our policy concerning specifications to avoid listing meaningless figures. Rather we stress the characteristics most important to best music reproduction, and consider each figure very carefully as to what it means in terms of good music. Our specification figures are then rated very conservatively, and represent what we can guarantee the user for continuous, long-life performance. We acknowledge that specifications are an important factor in determining the quality of audio components, but believe that what lies behind the figures is even more important.

FREQUENCY RESPONSE

Some ultra wideband proponents maintain that frequency response from DC to 200 kHz is necessary from the standpoint of transient response. However, the truth is that no program source goes beyond 20 kHz. Moreover, if a square wave (a sine wave with countless harmonics) is recorded on a highest quality 15-inch tape recorder, only the fundamental sine wave can be recorded beyond 7 kHz. Even at 7 kHz, the fundamental wave plus the 3rd harmonic (21 kHz) forming a composite wave with a single dip at the crest is all that can be recorded. The range for speakers is about the same. While the upper range of human hearing is 20 kHz, most people cannot distinguish the higher harmonics beyond 7 kHz. To them a 10 kHz square waveform on an oscilloscope would be meaningless from a hearing standpoint. We believe therefore, that a frequency response range from 20 Hz to 20 kHz is sufficient. What is more important as far as characteristics in frequencies beyond human hearing are concerned is phase characteristic to prevent overshoot distortion and vibration with input pulses within the audible range. This problem extends up to several hundred kHzs, so we cannot be content with a flat frequency response characteristic that is only wide.

NOISE LEVEL

The ratio between signal and noise levels is referred to as S/N ratio or S/N. We regard at least a 50 dB rating as a necessary minimum, more than 60 dB for good quality and over 70 dB for high quality audio equipment. Moreover, 10 dB should be subtracted from S/N ratio ratings for FM tuners since they are normally measured at 100% modulation while the average broadcast signal level is about 10 dB less.

In the case of power amplifiers, there should be absolutely no residual noise under "no signal" conditions. This level is then measured against the output to determine its S/N ratio, so this ratio will vary at different powers. Minimum S/N requirements for output powers should be 10 W: 79 dB, 20 W: 86 dB, 100 W: 89 dB and 150 W: 90.8 dB. Noise can be expected with anything less than these ratings.

DISTORTION

Different checking standards for total harmonic distortion (THD) in relation to loudness, frequency, etc. have resulted in different ratings which were often meaningless from a comparison standpoint in the past. However, re-examination of methods is being regarded as necessary by top experts today, with its improved equipment and more discriminating listeners. Since we regard S/N 50 dB as the bare minimum requirement against noise, we believe that −50 dB (about 0.2%) should be considered the maximum standard for THD. When two signals enter an amplifier with THD distortion, intermodulation distortion (IMD) results and sound becomes muddy. Both THD and IMD are caused by nonlinear amplifiers, and have a mutual relationship, IMD occurring at within 1 to 6 cycles of THD, and increasing sharply past the clipping level. The tolerance level of intermodulation distortion has been regarded as 2 to 5% for years, but our tests show that it should be held down to less than 0.5% in high quality amplifiers.

DAMPING FACTOR

$$DF = \frac{\text{Speaker impedance}}{\text{Amplifier output impedance}}$$

During the radio tube era we enjoyed experimenting with various amplifier-speaker combinations since speaker response characteristics, near its resonance point, differed so considerably with the amplifier used due to the latter's high output impedance. With the advent of solid state amplifiers and their low output impedances, damping factor jumped past 20 to several hundred, and at one time there was a "DF" race among audio manufacturers.

While it is true that an increase in DF results in an improvement in the Q factor of speakers, this is so only up to a damping factor of 10. Increases beyond this point, no matter how large, bring only negligible returns and they do not contribute to any improvement in sound quality.

Another important factor is that the DF frequency characteristic of amplifiers should be flat from 20 to 20,000 Hz. Otherwise, speaker impedance will cause a change in the driver voltage at certain frequencies. This means that amplifiers with uneven DF frequency characteristics and/or those with high output impedances cannot be expected to get the maximum performance from a speaker. A good amplifier should be capable of getting the best performance out of not only all types of input components, but also from any and all speakers that are used with it. In this sense, it should have a damping factor of more than 10. To control DF may be considered as one of the measures to create tones with various speaker systems.

THAT WHICH CANNOT BE MEASURED

We have, in the above, pointed out some important audio equipment characteristics, and our opinions regarding them, but we recognize that there are certain things that cannot be measured accurately such as dynamic characteristics. For example, certain parts in a circuitry, while having the same rating, may affect sound differently. For this reason, it must be added that an audio component after its completion should be thoroughly tested for performance, as we make sure of doing at Accuphase.

IMPORTANT FACTORS CONCERNING A PRODUCT

It cannot be said that an audio product is good just because it sounds good. We list the following eight points which form the fundamental designing and engineering policy regarding our products: originality, guaranteed performance specifications, mechanism, design, long life dependability, safety, service and complete user satisfaction. We believe that this last point, "complete user satisfaction" is the most important since it represents the total sum value of a product.

REGARDING 4-CHANNEL

An American audio publication once stated that true quadraphonic sound should add new dimensions, not direction, to conventional stereophonic sound. In other words, rather than surround the listener with music, it should attempt to come closer to real concert hall quality sound which everyone can agree is an improvement over two channel reproduction. This is the way we also feel about 4-channel reproduction. Several years have passed since the advent of 4-channel sound, but it has yet to be universally accepted. It is being tried by interested people to some extent in the United States, but its acceptance in Europe is still practically zero. Although high fidelity single unit audio equipment made for the general public in Japan have almost all been switched to 4-channels, the more discriminating component market is taking a "wait and see" attitude. Although 4-channel recording has been standardized into three methods, RM, SQ and CD-4, what is more important is that a number of questions remain to be settled before the popularization and acceptance of 4-channel sound, such as the kind of sound to be reproduced from the rear speakers, the kinds of speakers to use and their positions, recording method standardization to eliminate rear balance adjustments every time a reproduction is played, etc. There are also problems regarding 4-channel methods that still remain to be solved such as compatibility, durability, costs, broadcasting possibilities, availability of good records, etc. Although the users will eventually determine which method is best for them after considering all such aspects, the many questions that still remain defy a quick decision.

We intend to continue to upgrade stereophonic sound quality while watching how the fundamental problems facing 4-channel sound will eventually be settled.

Accuphase

KENSONIC LABORATORY INC.