

SONY[®] STEREO POWER AMPLIFIER TA-3120
ALL SILICON TRANSISTOR

SONY

**STEREO AMPLIFIER
3120**

SOLID STATE / 21 TRANSISTOR



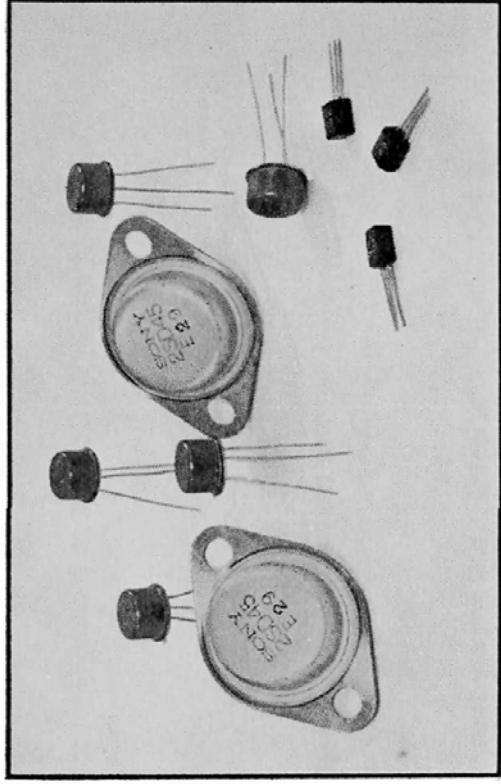
POWER



ON

OFF

OWNER'S INSTRUCTION MANUAL



You are now the proud owner of the SONY TA-3120, Stereo Power Amplifier.

SONY has been a leader in the field of transistorization of radios, television receivers and tape recorders long before our entry into the high fidelity market. We have been endeavoring for many years to develop a high-quality solid-state amplifier system, superior from every standpoint to amplifiers with vacuum-tube circuitry. The Stereo power amplifier Model TA-3120 is the successful fruit of this labor. The amplifier's outstanding features are due to the silicon transistors which provide continuous power output of over 50 watts at high frequencies (100 kHz). SONY has also developed the medium power NPN silicon transistor and a PNP silicon transistor with the same parameters. This pair of transistors drives the final power stage in a quasi-complementary symmetry circuit. Only the highest quality transistors developed by SONY are used in the TA-3120.

Before operating the TA-3120, read this manual completely. Keep this manual handy for future reference.

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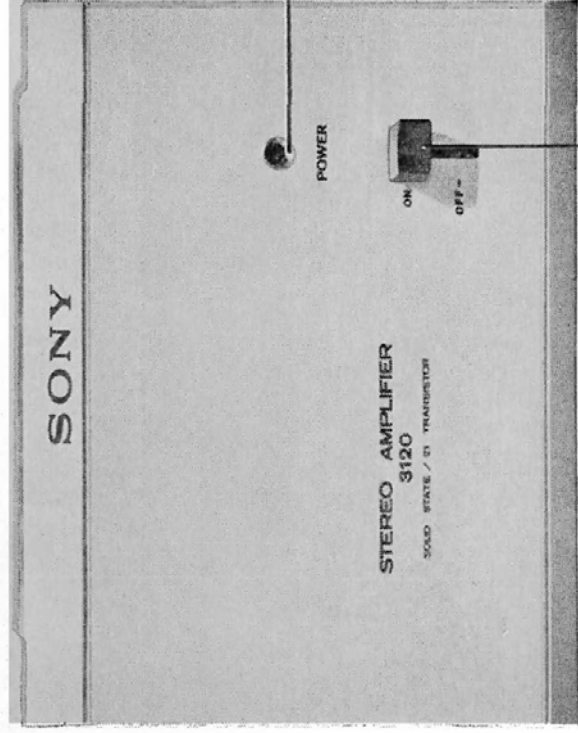
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Precautions

1. Do not attempt to open the chassis cover of the amplifier.
2. Do not operate the TA-3120 where the ac voltage is 10% higher than the rated value.
3. Do not operate the TA-3120 where the room temperature is over 110°F, and never block the ventilation grille.

An application for free 3-year factory service warranty is included with this TA-3120. Fill the Application Form and send it within 10 days after the date of purchase.

Panel Facilities



POWER pilot light

POWER

STEREO AMPLIFIER
3120

SOLID STATE / 61 TRANSISTOR

ON

OFF

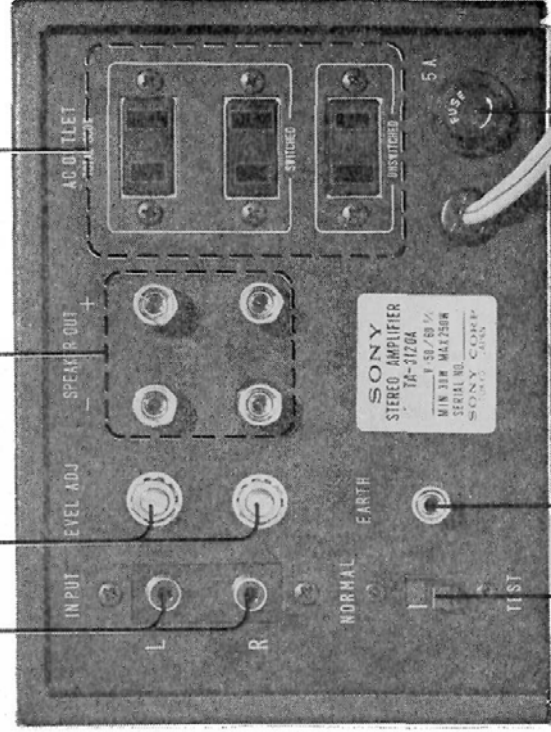
POWER ON/OFF switch

LEVEL ADJUST

SPEAKER OUT

INPUT jacks

AC OUTLET



TEST/NORMAL switch

AC power cord

EARTH terminal

FUSE holder

POWER ON/OFF switch

Turns the TA-3120 ON or OFF. When the amplifier is turned on, the red pilot lamp lights.

POWER pilot light

Lights while the amplifier is ON.

AC power cord

Connect to a convenient wall outlet.

AC OUTLET (SWITCHED, UNSWITCHED)

The two upper outlets are controlled by the front POWER ON/OFF switch. The bottom outlet, marked UNSWITCHED, remains live. Therefore, the component connected to this outlet should be turned ON or OFF by its own power switch.

The maximum rating of these outlets is 300 watts total.

FUSE holder

Contains a 5-ampere fuse.

INPUT jacks

Phono-type input jacks accept the outputs from your preamplifier or the outputs from an electronic crossover network (SONY 3-Channel Dividing Stereo Preamplifier TA-4300 is available separately) used with multi-channel amplification systems.

LEVEL ADJUST

These adjustments are semi-fixed. They set volume levels of the left and right channels, and/or each amplifier in parallel use.

These screws are turned fully clockwise at the factory. Counterclockwise rotation decreases the volume level.

SPEAKER OUT

These outputs connect to any 4~16 ohm speakers.

Connect (+) and (-) terminals with the respective connections on the speakers. Connect left speaker to LEFT terminals and right speaker to RIGHT terminals. Use connecting cord with a large diameter (zip cord, etc.). The TA-3120 provides frequency response of 5 Hz to 200 kHz and has 60-watt music power output per channel. Therefore, the use of speakers having high power-handling capability is recommended. If speakers of lower power handling capability are used, be sure to reduce the speaker volume when removing a phonograph pickup stylus from a record or when detuning a tuner, so as not to damage the speakers.

TEST/NORMAL switch

There are two positions: TEST and NORMAL.

Use the TEST position only when testing the amplifier (when making frequency-response checks at low frequencies, down to 5 Hz). In regular operation, set this switch to the NORMAL position. In the NORMAL position low frequencies below 15 Hz are cut at approximately 6 dB/octave. This prevents possible damage to speakers by high power output at very low frequencies.

EARTH (ground) terminal

Connect at ground wire from a preamplifier or other component to this terminal (or connect this terminal directly to a good ground).

Notes on Operation

The TA-3120 has superior low-frequency characteristics and delivers a saturated output power of up to 100 watts, even at 5 Hz. This saturated power may cause serious damage to speakers. In order to avoid damage, lower the sound volume of your preamplifier when detuning an FM tuner or removing a phonograph pickup stylus from a record.

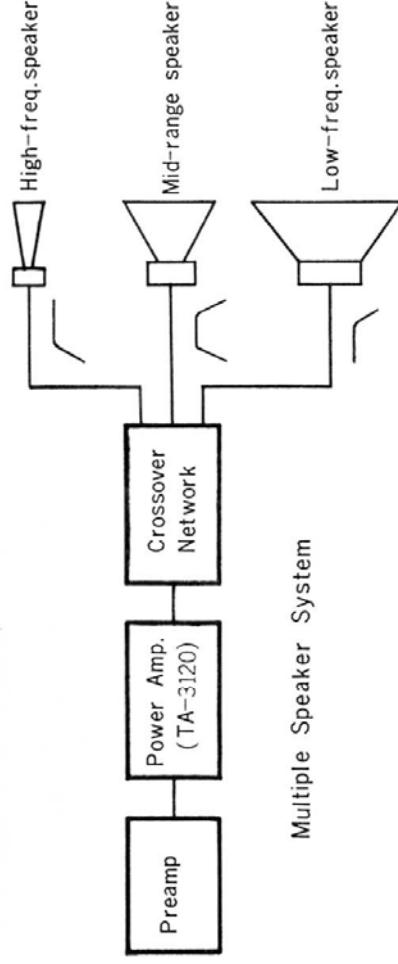
Except when testing the amplifier or reproducing very low frequencies in flat response, always set the TEST/NORMAL switch to the NORMAL position.

When testing the TA-3120, continuous operation using sine-wave signals for one hour or more should be made at an output power of less than 20 watts. If an accidental short circuit of the speaker terminals occurs, or if speakers having very low impedance (2-3 ohms) are used and are overloaded by high-level output, the protection circuit will be activated. This causes the TA-3120 to be muted for 2-3 seconds while the automatic protection circuit resets itself. *If this happens, turn the POWER ON/OFF switch OFF and eliminate the cause of failure.* Then turn ON the amplifier again. The TA-3120 will automatically resume after 2-3 seconds of silence even if the power has not been turned off. However, if the cause has not yet been eliminated, the TA-3120 will again turn off automatically. Continued on-and-off action tells you that a short exists in the speaker circuit. Turn off the unit and check all speaker connections.

How to combine the TA-3120 in your stereo system

Multiple (2-way or 3-way) Speaker System

In this system, the crossover network is placed between the power amplifier and the speaker system. The network divides frequencies into 2 or 3 bands for reproduction through the most suitable speakers.



High-quality multiple speaker systems now on the market are precisely designed by the manufacturers and usually have a smooth over-all response. However, this multiple speaker system may not give full satisfaction to the perfectionist because of the following:

1. Inferior transient characteristics caused by the inductors and capacitors of the crossover network.
2. The crossover frequency cannot be changed easily.
3. Speaker efficiencies may differ. In many cases the efficiency of the mid-range and high-range speakers is inferior to the low-range speaker. An attenuator is then used with the low-range speaker and the damping factor deteriorates.
4. If the impedance of the cone type speaker changes with the frequency, the crossover network may not work as designed and may cause dips and peaks in the frequency response.

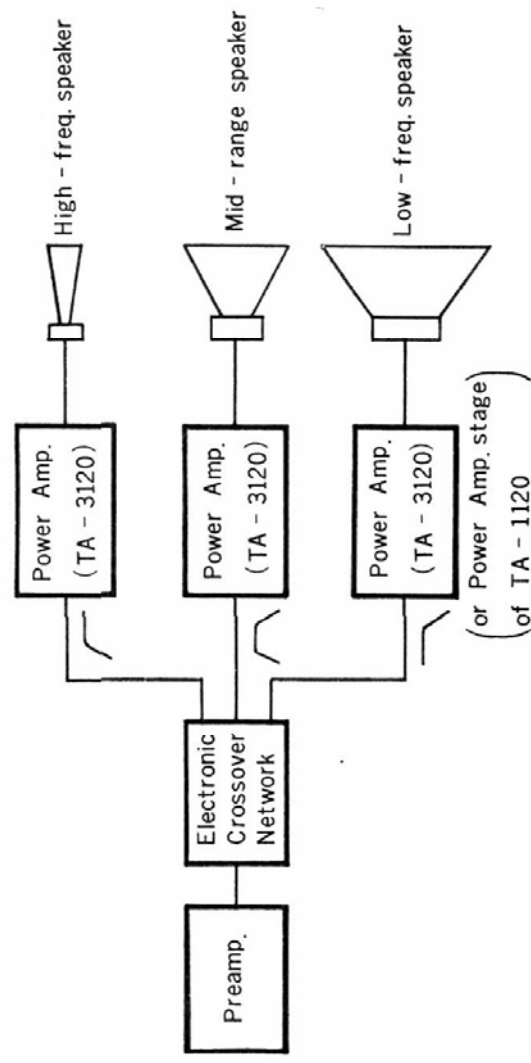
For those who require a more critical sound reproduction system, or wish to combine speakers to suit personal taste, the Multi-channel amplification system is recommended.

Multi-Channel Amplification System

A separate power amplifier is required to drive each speaker. The electronic crossover network is placed between the preamplifier stage and each power amplifier stage. The network divides the entire frequencies into 2 or 3 frequency ranges.

This system provides the following advantages:

1. Accurate crossover frequencies. The cut-off characteristics can be determined regardless of the impedance characteristics of the speakers.
2. Only resistors and capacitors are used to make the crossover network, thus an easy change in crossover frequency can be effected.
3. Level control can be done independently in each frequency range.
4. Damping factor is not affected.

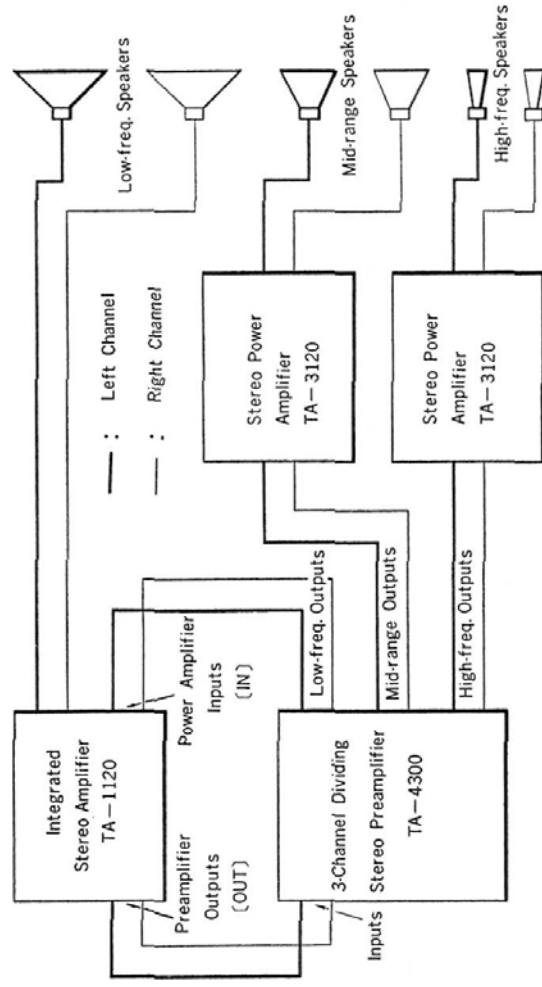


The TA-3120 is ideal for Multi-channel systems and will provide the highest performance when it is combined with the SONY Integrated Stereo Amplifier TA-1120 and the SONY 3-Channel Dividing Stereo Pre-amplifier TA-4300.

A typical 3-Channel amplification system is as follows:

Integrated Stereo Amplifier TA-1120 + a 3-Channel Dividing Stereo Pre-amplifier TA-4300 + two Stereo Power Amplifiers, TA-3120.

The Integrated Stereo Amplifier TA-1120 has preamplifier output terminals and power-amplifier input terminals which permit the power-amplifier stage of the TA-1120 to be used as one of the three power amplifiers of the system. The 3-Channel Dividing Stereo Pre-amplifier TA-4300 is provided with a crossover frequency selector for selecting the most suitable crossover frequencies for your speaker systems. The crossover frequency selector can select 150, 250, 400 or 600 Hz (18 dB/octave) between low and mid-range, and 3, 4, 5 or 6.5 kHz (12 dB/octave) between mid and high-ranges.



The TA-4300 Circuit Diagram is provided on page 15.

Technical Descriptions

Lowest possible distortion

The TA-3120 is designed so that it has the lowest possible IM distortion*1. Generally the amount of Harmonic Distortion*2 is used for judging the quality of amplifiers, but the factor that gives greater annoyance to listeners is the IM (Intermodulation) distortion.

The SONY TA-3120 has the least amount of IM distortion, not only at high-power output but also at low-power output in the full frequency range. Our circuit design was made so that IM distortion decreases at low-power outputs. The power amplifier employs selected pairs of SONY silicon transistors. These transistors amplify signals beyond 200MHz and have very uniform gain (hFE) characteristics throughout their operating ranges. Direct coupling is used; there are no transformers to introduce phase shift or distortion. As a result, IM distortion has reached an unprecedented low. It is less than 0.15% at 50 watts output, and less than 0.02% at 20 watts or less. IM measurements are made with any frequency combinations between 40 to 300Hz and 3kHz to 200kHz. In addition, a newly-designed power transformer gives the TA-3120 excellent power regulation.

*1 Intermodulation Distortion

If a pure 60 Hz sine wave and a pure 7,000 Hz sine wave are fed into an amplifier, pure 60 and 7,000 Hz signals plus small amount of harmonic distortion are expected to come out. Along with these, however, some small amount of 7,060 Hz and 6,940 Hz signals are found. This presence of sum and difference tones is called IM (intermodulation) distortion and is expressed as a percentage of the total output power. IM distortion is not part of a normal overtone (harmonic) and produces greater annoyance to the human ear than harmonic distortion. Typical high-quality amplifiers have 1% to 5% IM distortion.

*2 Harmonic Distortion

If a pure 100 Hz sine wave is fed into an amplifier, a pure 100 Hz signal is expected at the output. However, along with the 100 Hz wave, small amounts of 200, 300, 400, 500, etc. Hz waves are found at the output terminals of the amplifier. Their presence is related to harmonic distortion. Harmonic distortion is expressed as the percentage of total output energy that appears at frequencies that are multiples of the pure input tone.

Typical high-quality amplifiers have less than 1.0% total harmonic distortion in the range of 30-15 kHz.

Amplifiers that have low percentages of IM distortion automatically have low measured values of harmonic distortion. Less than 0.1% is measured at 50 watts output using signals in the 25 Hz to 15 kHz range. Harmonic distortion is so low at 10 watts output that it has been found to correspond to the residual distortion of the measuring equipment.

Extended Frequency Range

To amplify the audible range of frequencies with the lowest possible distortion, a great amount of negative feedback should be applied. Further, a very flat frequency response is required over a frequency range which is several times wider than the audible range.

The TA-3120 uses silicon transistors having high cut-off frequencies (ft) to obtain extremely flat frequency response up to 30kHz without the help of negative feedback. Then, 40dB of negative feedback is applied to each circuit to establish a very flat frequency response in the range of 5Hz to 100kHz. In the power amplifier stage of the TA-3120, response remains within +0dB, -2dB between 5Hz and 200kHz, at 50 watts.

In the preamplifier stage, 3-directly coupled amplifier circuits are used for obtaining a very flat frequency response over the extended range of frequency.

Damping Factor

Damping is one of the essential factors in determining the quality of the sound reproduced.

High damping factors assure accurate speaker movement in response to output signals. Speaker travel that results from mechanical inertia is suppressed. The output circuits of the TA-3120 are designed to give high damping factors. Using the IHF standards of measurement and an 8-ohm load, damping factors are approximately:

200 between 100Hz and 200kHz.

140 at 50Hz,

100 at 30Hz and 60kHz.

These values, coupled with the very low distortion, yield truly phenomenal sound over the entire audible range.

Complete Protection of Transistors

The TA-3120 incorporates an instantaneous protection of circuit that protects power transistors from accidental short circuits at the output terminals. This protection circuit permits automatic resumption of operation within 2-3 seconds.

Technical Specifications

Circuit system:

All silicon transistor stereo power amplifier
Quasi-complementary symmetry circuit
19 transistors, 22 diodes

Power output:

Music power (IHF)

120 watts with both channels (8 ohms)

Rated output (RMS)

50 watts per channel (8 ohms)

Harmonic distortion:

At 1 kHz

Less than 0.1% at rated output

Less than 0.01% at 10 watt output

20-15 kHz

Less than 0.1% at rated output

Less than 0.06% at 25 watt output

Less than 0.03% at 0.5 watt output

Intermodulation:

Less than 0.2% at rated output

Less than 0.05% at 25 watt output

Less than 0.02% at 10 watt output

60 Hz: 7 kHz=4:1
(SMPTE)

Frequency response:

5 Hz-200kHz $+0$ -2 db at rated output (TEST/NORMAL switch is placed in TEST position)

NORMAL position setting cuts low frequencies below 15 Hz at 6 dB/octave

Input impedance:

Higher than 100 K ohms

Damping factor:

At 1 kHz

Better than 180 (8 ohms)

Better than 360 (16 ohms)

Sensitivity:

1 volt at 50 watt output

Signal to noise ratio:

110 dB (IHF, closed circuit)

Residual noise:

Loss than 0.1 μ watt (8 ohms)

Inputs:

LEFT and RIGHT (adjustable by semi-fixed LEVEL ADJUST)

Output:

SPEAKER OUT (LEFT and RIGHT) suitable for 4-16ohm speakers

AC outlets:

Switched.....2

Unswitched1

Maximum 300 watts total

Power requirement:

AC117 volts \pm 10%, 60 Hz

Power consumption:

Approx. 30 watts (45 VA) (at zero signal)

Approx. 250 watts (320 VA) (maximum)

Dimensions:

7 $\frac{1}{2}$ (W) \times 5 $\frac{3}{4}$ (H) \times 17 $\frac{1}{2}$ (D)"

Weight:

Approx. 17 lb 10 oz

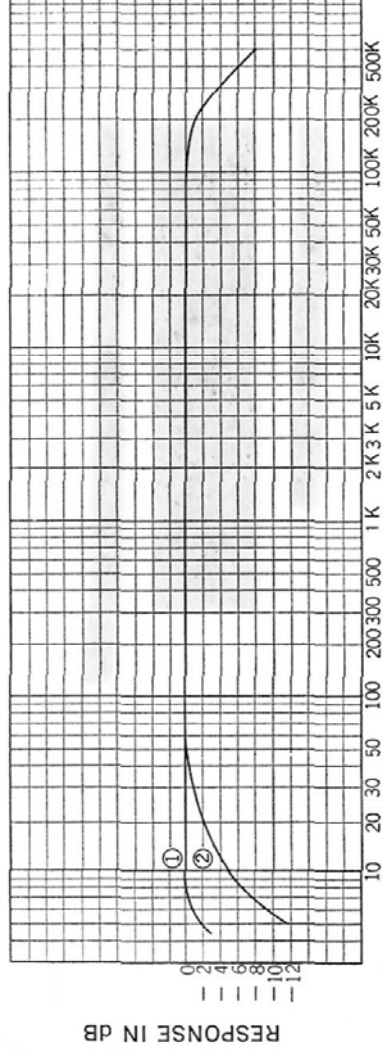
Supplied accessories:

Phono plug (\times 2), Polishing cloth

Design and Specifications subject to change without notice

Operating Curves

Frequency Response Curves

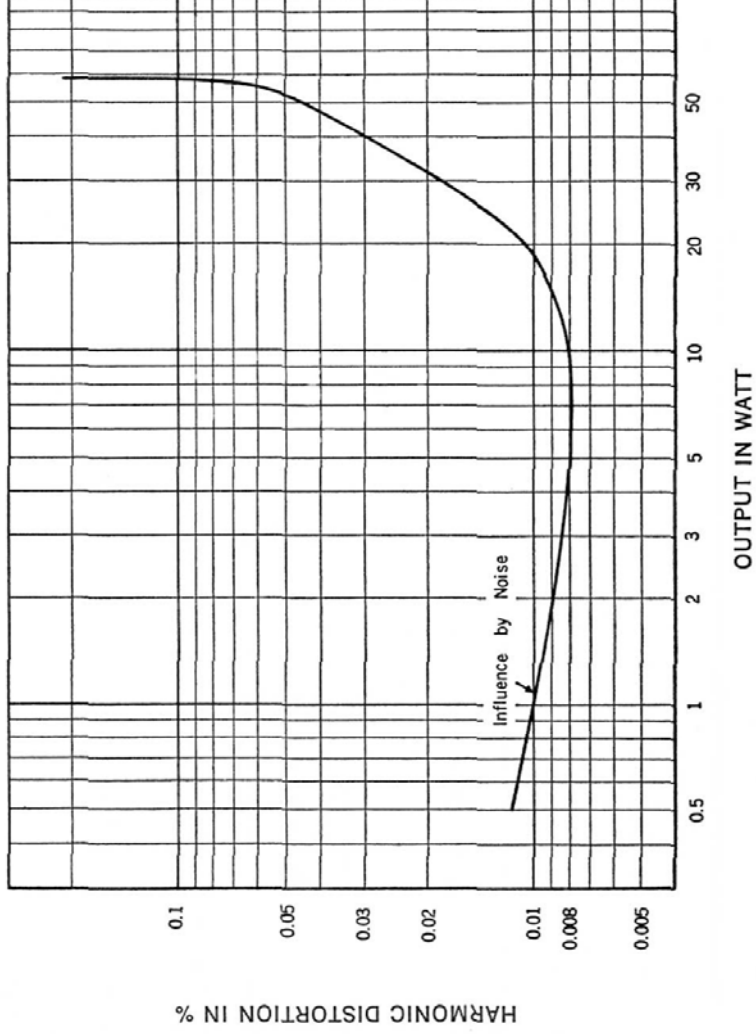


output 50w=0 dB
at 8Ω resistor

- ① TEST/NORMAL switch is set in [TEST] position
- ② TEST/NORMAL switch is set in [NORMAL] position

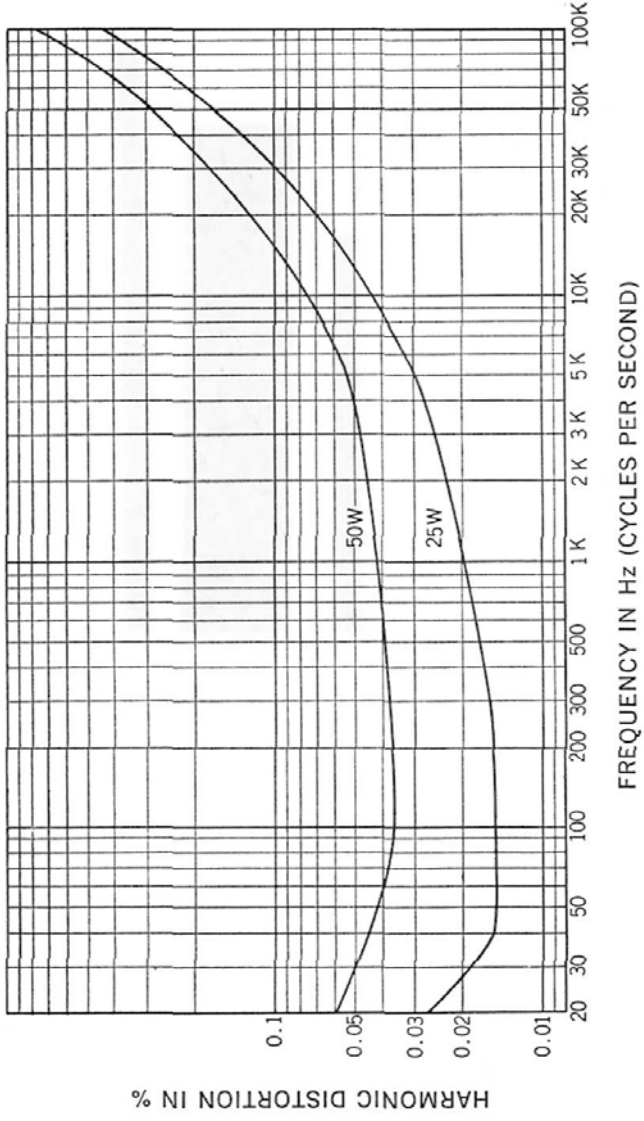
FREQUENCY IN Hz (CYCLES PER SECOND)

Harmonic Distortion Curve

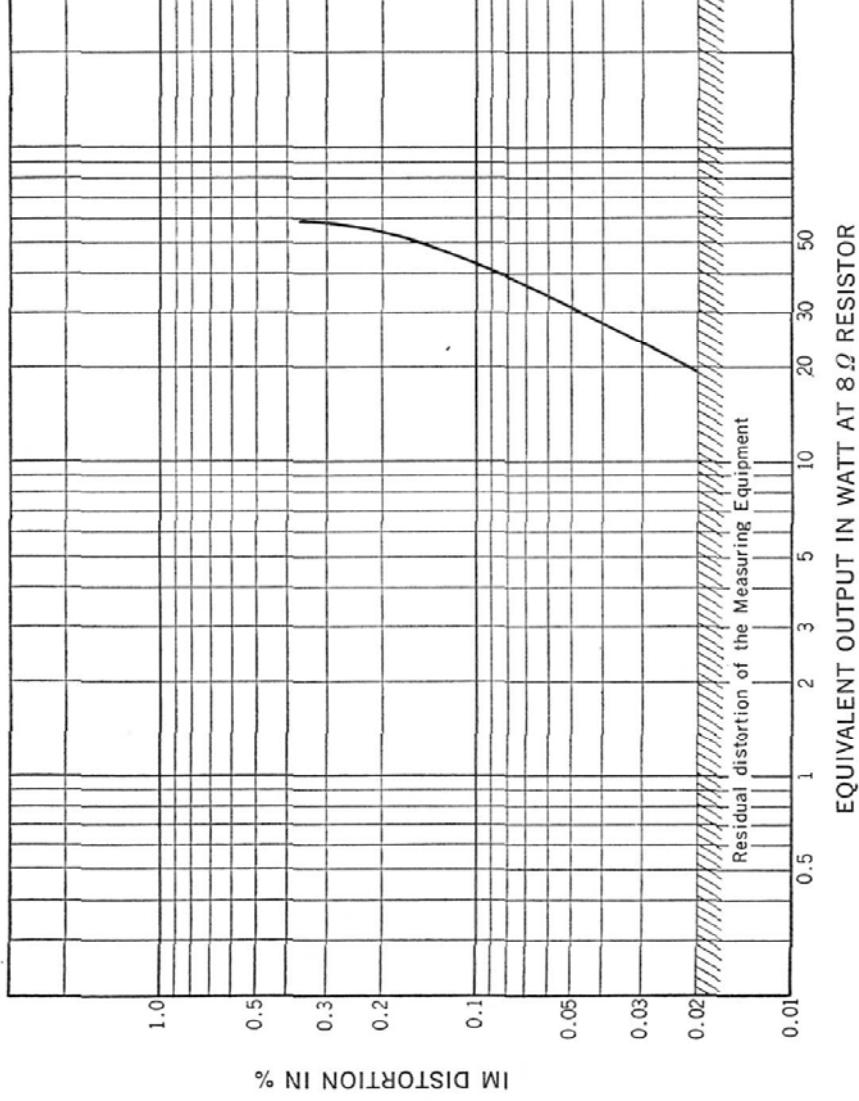


1 kHz
at 8Ω resistor
Residual distortion of
the Measuring Equipment
:0.008%

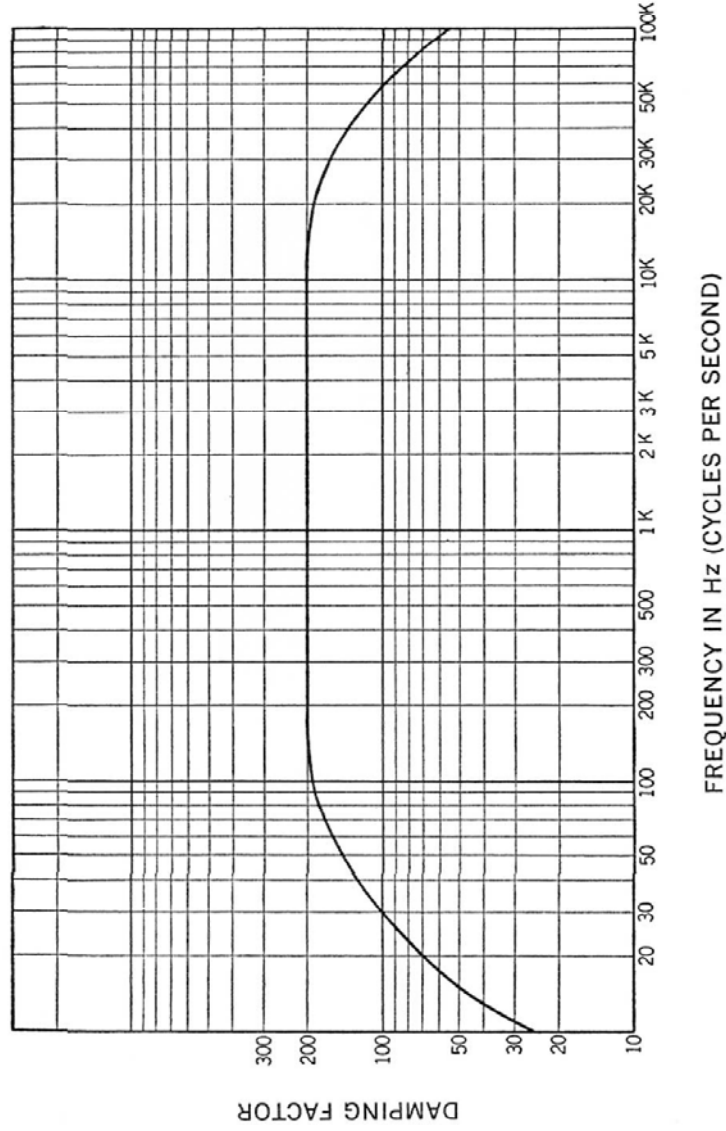
Harmonic Distortion Curves



IM Distortion Curve 60 Hz : 7 kHz = 4 : 1



Damping Factor Curve



FREQUENCY IN Hz (CYCLES PER SECOND)

Hz (Hertz): cycles per second

New international standard for the unit of the frequency established by IEEE.