WHYS & HOWS OF EQUALIZATION

INCLUDES COMPLETE SPECIFICATIONS ON ALL MODELS



Soundcraftsmen

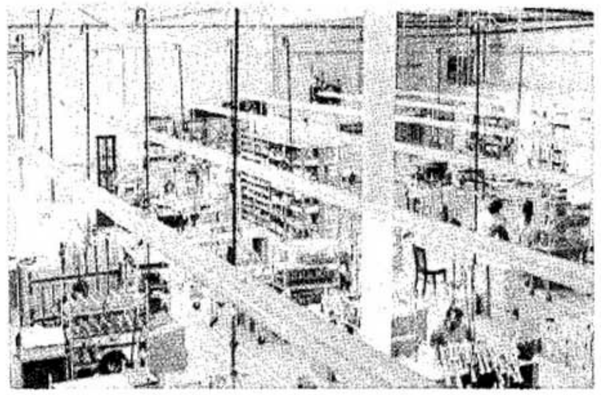
...EQUALIZERS, PRE-AMPLIFIERS, AMPLIFIERS

and the new **'SCAN-ALYZER'**

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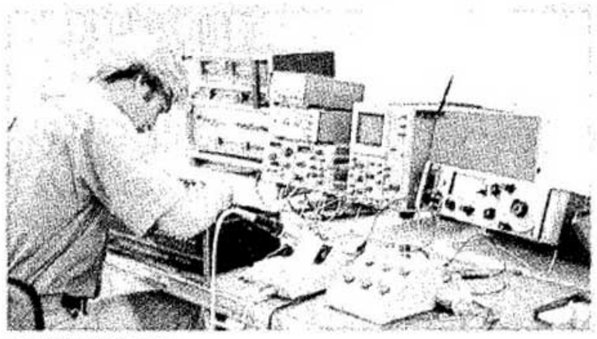
the *Soundcraftsmen* STORY

Soundcraftsmen celebrates its eighth year of manufacturing audio components for the discriminating audiophile. From the introduction of our first equalizer in 1970 through today, our goal has been to design and manufacture very affordable "separates" with the unique and necessary features that audio buffs demand.



PRODUCTION AREA

Soundcraftsmen engineers are highly respected in audio design circles as being very forward thinking, yet practical, when engineering new products. By using proven design principles from the past with tomorrow's technology, we have brought the finest in equalization, preamplification and amplification products to you. The audiophile is a rare breed!



ENGINEERING

While price is important, performance and, most of all, sound quality are the determining purchase criteria — this is our criteria for design and manufacturing. We will continue to offer *value,* which can be significantly different from price!



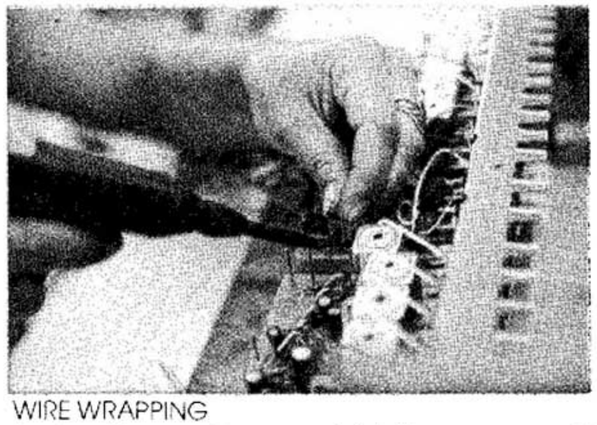
COIL CIRCUITS

In our more expensive equalizers and preamplifiers we use uncompromising L/C coil circuitry. Through these expensive coil circuits, we are able to obtain greater than ± 15dB boost or cut levels on our "eq" circuits. By winding our own coils, we maintain exacting center frequency tolerances and have the ability to wind each coil to the specified octave center.



It has been well established that coils offer significant advantages over I.C.'s in equalizer circuitry but, as with everything we purchase, the best is not cheaper. In our moderately priced equalizers we have refined op-amp synthesized inductor design to allow a true ± 12dB boost or cut and, through our critical level balancing zero-gain circuit, have eliminated the "electronic sound" found in other I.C. operated equalizers. The signal-to-noise and distortion specifications are unmatched in these units' price ranges.

Soundcraftsmen pioneered the use of solderless "wire wrap" construction, eliminating the possibility of cold solder joints. Our ferrous chassis, coupled with



WIRE WRAPPING

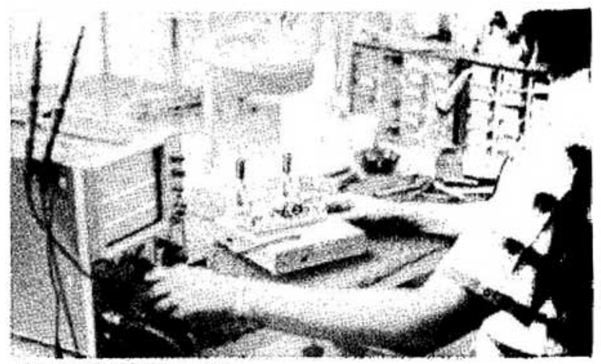
isolated transformer shielding, stops all magnetic radiation and gives extraordinary 105/114dB equalizer signal-to-noise ratios and 84/90/97dB preamp signal-to-noise ratios.

All transistors are of special low noise type and resistors are high grade carbon film. Circuit boards are glass epoxy or



equivalent. The highest quality switches and other components are used to achieve maximum specifications and long trouble-free service.

Thirty-five percent of Soundcraftsmen's production staff is involved in quality control procedures. One hundred percent quality control is seen on EVERY unit manufactured. EVERY transistor



QUALITY CONTROL

and circuit board is put through an individual test. EVERY completed unit is electronically tested for specification accuracy and then EVERY unit is connected to a high fidelity system and listened to — just like you would at home. If your unit meets or exceeds the critical standards set forth on these tests, it is then packaged for shipment.



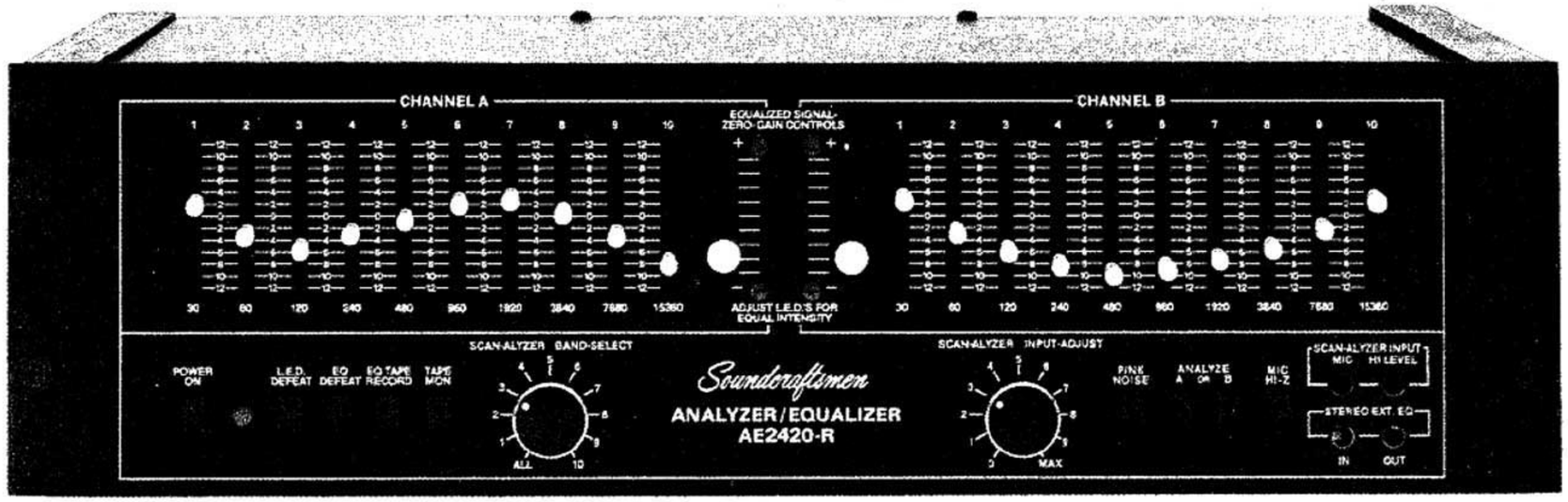
From the highest quality equalizers, to unique preamplifiers, to the revolutionary Class H amplifier, you cannot purchase finer components to create your music system.

The next few pages will answer many of your questions. If you have more, our customer service department will be pleased to assist you by telephone or letter. We invite your questions and appreciate your interest.

One last but *very important* item - In this day of "overseas manufacturing," we are still pleased to say Soundcraftsmen is *all* United States manufactured in Santa Ana, California, U.S.A.

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'SCAN-ALYZER'™



SIMPLIFIED OPERATING INSTRUCTIONS

1. HOOK-UP: Connections to system are the same as for an equalizer, either in the tape monitor loop, or external processing loop of preamp or receiver.

2. INITIAL SETTINGS: All pushbuttons to "out" position. **"SCAN-ALYZER BAND SELECT"** control to **"ALL"** position (fully counter-clockwise). Individual octave controls and **EQUALIZED SIGNAL** controls to "flat" (center detent) position.

3. TO ANALYZE CHANNEL A: Insert input phone plug into appropriate jack. (Push in **"MIC HI-Z"** if high impedance mic is used). Push in buttons labeled **"PINK NOISE"** and **ANALYZE A.**" Turn down sound equipment and listen for any background noises such as air conditioners, motors, fluorescent lights, etc. which could be picked up by the microphone and cause errors in room analysis. These should be turned off during room analysis.

4. Turn up the volume control on preamp, or receiver, until the pink noise coming from speaker **"A"** (left side) is at a normal listening level or higher to mask any further background noise. Increase **"SCAN-ALYZER INPUT-ADJUST"** control until Ch. A Equalized Signal L.E.D.s are at equal intensities.

5. Use one hand to advance **"SCAN-ALYZER BAND-SELECT"** control to position "1." Use other hand to adjust L.E.D.s for equal intensity with Ch. A octave control number "1." Continue through positions "2,3,4,5,6, 7,8,9,10" rapidly in sequence. Each scan-setting requires only one or two seconds. Repeat this sequence in reverse, going from 10 to 1, then 1 to 10 and 10 to 1. Rotate **"SCAN-ALYZER BAND-SELECT"** control knob rapidly from 1 to 10 and return, to verify all octaves are equally balanced, by observing both L.E.D.s as you scan.

6. TO ANALYZE CHANNEL B: Push in button labeled **"ANALYZE B."** Return **"ANALYZE A"** button to the "out" position. Adjust **"SCAN-ALYZER INPUT-ADJUST"** control until Ch. B Equalized Signal L.E.D.s are at equal intensities. Follow same instructions as for Ch. A, paragraph 5.

7. Return **"ANALYZE B"** and **"PINK NOISE"** buttons to the "out" position.

8. Re-adjust Octave Controls to compensate for your Mic by moving Octave Controls plus or minus exactly as shown, and **in the same direction** as shown, on your Mic Calibration Chart. Although any Mic having a Calibration Chart may be used, even those supplied with low-cost cassette recorders, greatest accuracy will be achieved by using a Mic of good quality.

The Patent-Pending DIFFERENTIAL COMPARATOR circuitry of the "SCAN-ALYZER"/EQUALIZER IS THE KEY TO HIGH PRECISION ACCURATE EQ analysis, The basic simplicity of the DIFFERENTIAL COMPARATOR circuitry makes it possible for even a novice to accurately EQ his room and his system, yet that same circuitry is so highly accurate it can actually be used for 0.1 dB laboratory measurements in EQ analysis. This combination of equalizer and analyzer creates a functional component that should be an integral part of every high quality home stereo system. The "SCAN-ALYZER"/EQUALIZER with its accompanying COMPU-TONE CHARTS, can be used in a home stereo system for many important functions—for example...

To establish a room EQ curve using its own EQ or external EQ.

To establish a curve for 3-head taping so that each tape recording is precompensated for any variance in the recording tape's, or in the tape recorder's frequency response characteristic.

To establish a curve for given sets of room conditions, i.e.; a crowded room, a room with drapes closed and doors closed, an empty room, a room with drapes open and doors open, furniture changes, etc.

To establish the performance characteristics of a new component to be added to the system.

To verify the continued accuracy of performance of the entire system or of individual components in the system. such as a 3-head tape deck, amplifier, preamplifier, speakers, etc., and many more applications too numerous to list!

EQUALIZER SECTION

HARMONIC DISTORTION: Less than .01% at 2V

IM DISTORTION: Less than .01% at 2V

SIGNAL-TO-NOISE: 105dB at 10V output, 100dB at 2V output

OCTAVE CONTROLS: ±16dB boost or cut-each octave (all other octaves set at max), ±12dB boost or cut-each octave (all other octaves set at zero)

GAIN CUT CAPABILITY: +22dB/−28dB–all controls at maximum

ZERO GAIN CONTROLS: 18db range

FILTER TYPE: Op-Amp synthesized inductors

DIMENSIONS: 5¼" x 19" x 11¼" **WEIGHT:** 20 lbs.

ANALYZER SECTION

DIFFERENTIAL COMPARATOR: Minimum input: 75 millivolts. Differential measurement accuracy: ±0.1dB

HI LEVEL INPUT: Input impedance: 47K ohms, Gain: adjustable; 30dB max. Freq. Response: ±0.1dB 20Hz to 20KHz

MIC PREAMP: Input impedance: 200 ohms or 20K ohms (Switchable Lo or Hi Z), Gain: 80dB max. Freq. Response: ±0.1dB 20Hz to 20KHz

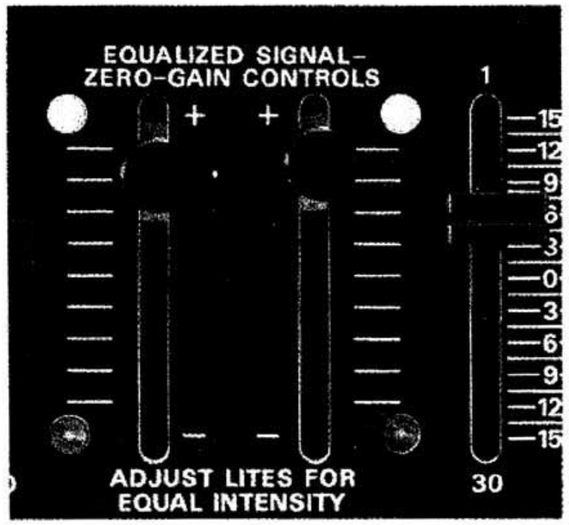
PINK NOISE SOURCE: Internal generator, plus test record.

BAND-PASS FILTER: Center Frequencies: 30,60,120,240, 480, 960Hz, 1.92, 3.84, 7.68, 15.36KHz

SELECTABILITY: 11-position switch for selecting each of the 10 individual Band-Pass Filters, or all ten.

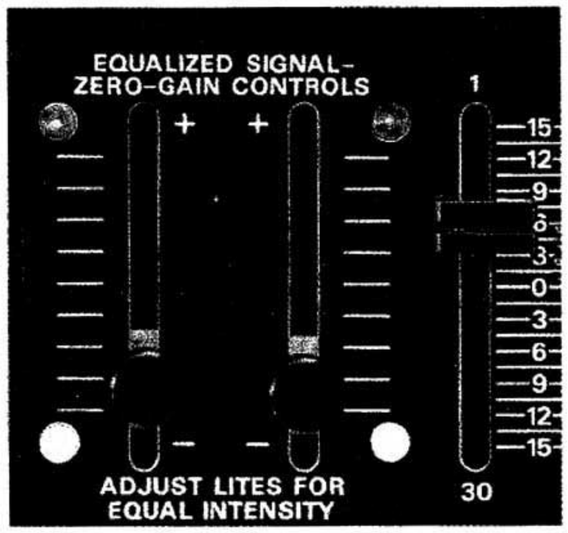
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IN-OUT MONITORING: L.E.D Voltage Comparison Circuit
HARMONIC DISTORTION: Less than .01% at 2 V.
IM DISTORTION: Less than .01% at 2 V.
SIGNAL-TO-NOISE: 114 dB at 10 V output
100 dB at 2 V output
OCTAVE CONTROLS: ±22 dB boost or cut–each octave (all other octaves set at maximum)
±15 dB boost or cut–each octave (all other octaves set at zero)
GAIN CUT CAPABILITY: +32 dB/–38 dB–all controls maximum
ZERO GAIN CONTROLS: +6 dB/–12 dB range
FILTER TYPE: Precision tuned passive wire-wound coil inductors
DIMENSIONS: 5¼" x 19" x 11¼"
WEIGHT: 21 LBS.



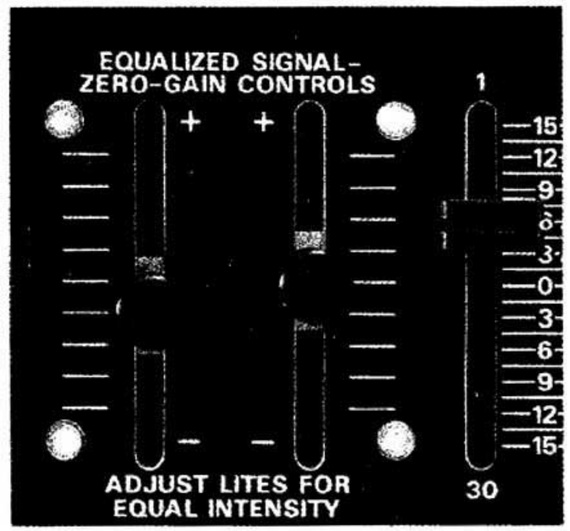
The zero-gain balancing L.E.D.'s visually illustrate gain differential through the equalizer (input vs. output) by comparing the input voltage to the output voltage of the equalizer. A glowing top L.E.D. indicates a higher output voltage from the equalizer than its input voltage. (EXAMPLE: 1 volt input; 2 volts output.) Equalizers without this control feature can cause overloading and distortion in the Amplifier and Speaker system due to excessive gain.

HARMONIC DISTORTION: Less than .01% at 2 V
IM DISTORTION: Less than .01% at 2 V
SIGNAL-TO-NOISE: 105 dB at 10 V output
OCTAVE CONTROLS: ±16 dB boost or cut–each octave (all other octaves set at maximum)
±12 dB boost or cut–each octave (all other octaves set at zero)
GAIN CUT CAPABILITY: +22 dB/–28 dB–all controls at maximum
ZERO GAIN CONTROLS: +6 dB/–12 dB range
FILTER TYPE: Op-Amp synthesized inductors
DIMENSIONS: 5¼" x 19" x 11¼"
WEIGHT: 21 LBS.



Just as excessive gain is undesirable, insufficient gain can create a poor signal-to-noise ratio and cause related components to operate at *less than their capabilities*. A bottom L.E.D. glowing indicates an output voltage of less than the equalizer's input voltage. (EXAMPLE: 1 volt input; ½ volt output.)

HARMONIC DISTORTION: Less than .01% at 2 V
IM DISTORTION: Less than .01% at 2 V
SIGNAL-TO-NOISE: 105 dB at 10 V output
OCTAVE CONTROLS: ±16 dB boost or cut–each octave (all other octaves set at maximum)
±12 dB boost or cut–each octave (all other octaves set at zero)
GAIN CUT CAPABILITY: +22 dB/–28 dB–all controls at maximum
ZERO GAIN CONTROLS: +6 dB/–12 dB range
FILTER TYPE: Op-Amp synthesized inductors
DIMENSIONS: 4½" x 17⅞" x 9½"
WEIGHT: 14 LBS.



When both top and bottom L.E.D.s have been balanced for equal intensity there is "zero-gain" through the equalizer. Unity-gain has now been established thus creating a clean *equalized* signal for compatible feeding to the next component in the stereo system chain.

NOTE: *All S/C Eq products incorporate zero-gain control circuits. Models with LED circuits also have visual indication of unity or zero gain.*

How your surroundings affect the sounds you hear.

Long before man understood the principles of acoustics (the science of sound), he was able to exploit natural phenomena to achieve *equalization of sound*. Archeologists have found indications, within a great dome-shaped cavern, that it was once inhabited by a pre-historic commune, whose leader occupied a position at the narrow end. From this vantage point, his voice projected, with nearly *equal intensity*, into all areas of that natural sound chamber.

Man's attempts to build sound chambers, in the forms of great theatres and concert halls, that would provide sound of *equalized intensity and fidelity* to all members of the audience, have produced a variety of successes laced with failure.

Who has not heard of the famous halls that could boast that each member of the audience, in a hushed silence, could hear the sound of a pin dropped on the center of the stage! But, in each of these halls, there existed a less heralded condition, usually known only to the management and veteran patrons of its performances. Various, specific areas of seating had a character all their own, that ranged from annoyingly loud to acoustically "dead"!

It is only with the recent developments in audio frequency analysis, that we have come to fully realize how such adverse conditions may exist within the same hall (or, for that matter, within a comparatively small room).

The noise of the pin, dropped on the stage, consisted of a very narrow band of sound frequencies. The acoustical characteristics of the hall not only favor the projection of these particular frequencies, indeed, they serve to actually intensify them!

But, the normal human ear responds to over 20,000 frequencies of sound! Ranging from around 20 to 20,000 Hertz (frequency cycles) and covering nearly 10 octaves. Which means, in the case of the acoustically "dead" areas of the hall, that only a minority of the audible frequencies, including those created with the pin, may be clearly heard. In still other areas of the hall, these same frequencies may be so harshly intensified as to create a measure of physical discomfort!

What contributes to such acoustical phenomena? Many of the same things that are present, on a much smaller scale, within your own listening room. The various properties of all elements of the room either absorb, reflect, or intensify sound waves. The character and finish of walls, ceilings, floors, carpeting, drapes and furniture, open or closed doors and windows, even the numbers and dress of the audience! And, contributing further to the complexity of variables, are the differing responses to these elements, by the individual frequencies and sets of frequencies, across the entire range of human hearing!

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...OWS OF EQUALIZATION

How sound frequencies react to your acoustical environment.

Let us, for example, examine these differences in terms of octaves (band of frequencies), since octaves are the form in which frequencies are most readily perceived by the average human ear.

The first octave band is made up of 20 to 40 Hertz, the lowest frequencies perceptible to the human ear. In contrast, the 10th octave band's frequencies range from 10,240 to 20,480 Hertz, so high that many of these frequencies are not perceptible to persons with less than excellent hearing. The differences between these octaves are like night and day! In fact, descriptive audio terminology employs the term "bright" to signify sound of accentuated high frequencies. Frequencies within the upper octaves travel like a bright beam of sunlight, in a straight line, reflected by any hard surface, and persisting in bouncing from surface to surface. On the other hand, frequencies of the lower octave bands tend to radiate in all directions and are easily absorbed into any soft surface. As an extreme example, let's say we have two speakers, identically matched. We place the left speaker in an open, heavily carpeted area, where it projects into a sofa backed by a cork wall. The right speaker we place on a polished floor projecting into a wall of windows. We have now given the speakers something more in common... Problems. As we stand in the middle of the room, it is gradually apparent that we have just succeeded in unmatching our "matched" speakers! The left speaker produces music that sounds "thin," deficient in bass notes (absorbed by the soft surfaces) and weak in high frequencies (which die an early death among the non-reflective surfaces). The right speaker, on the other hand, seems capable of producing only high frequencies (as they bombard us from the many hard surfaces surrounding the speaker, we can hear little else).

Understanding the many factors that are present, it is no longer difficult to realize why the many subtleties of music, created by a symphony orchestra or a lone guitar, may be either drowned out by intensified frequencies, or lost, absorbed, before they reach our ears. All the originality of the composition, brilliance of the orchestration, and inspiration of the rendition, can emanate with great fidelity from your music system, but arrive at your ears Frankensteined by your listening environment!

So, let's see what equalization can do to: (1) change the effects your listening environment has on your music, (2) considerably enlarge the capabilities of your music system, and (3) allow you to tailor your music to the sounds most pleasing to your individual ear!

How equalization enhances your music system and your hearing ability.

One of the things you will have automatically corrected, in establishing your "Master Equalization Curve," is a portion of any hearing deficiency you may have in the way of loss of extreme low or high notes, etc. Since you will be equalizing to your own ear (the ultimate critic) you will tend to offset a portion of these losses. Just as you will also tend to offset a portion of the losses created by your music system. Most of us are blessed with hearing that is not perfect (and, as we grow older, we become more blessed), but we seldom put a label on that condition until it becomes a real problem. Manufacturers, on the other hand, label the imperfections of their equipment with "tolerences," or the maximums of deviations from a perfect performance. In the very finest professional equipment, for instance, each component has a definite tolerance (20 to 20,000 Hz, ±.2 dB for a microphone, 50 to 15,000 Hz, ± 1.5 dB for a tape recorder head, and so on for each component link in the system). Adding up the tolerances for all components in a professional recording system can produce answers that total from 4 to 9 decibels of possible variation at any given frequency! Since most of us have no need for this extremely expensive professional degree of perfection, we rightly assume that even good music systems must have even greater potential variations. It is this variation, in your system, that you and your Soundcraftsmen Audio Frequency Equalizer will automatically nullify to provide you with one more benefit in the process of equalization!

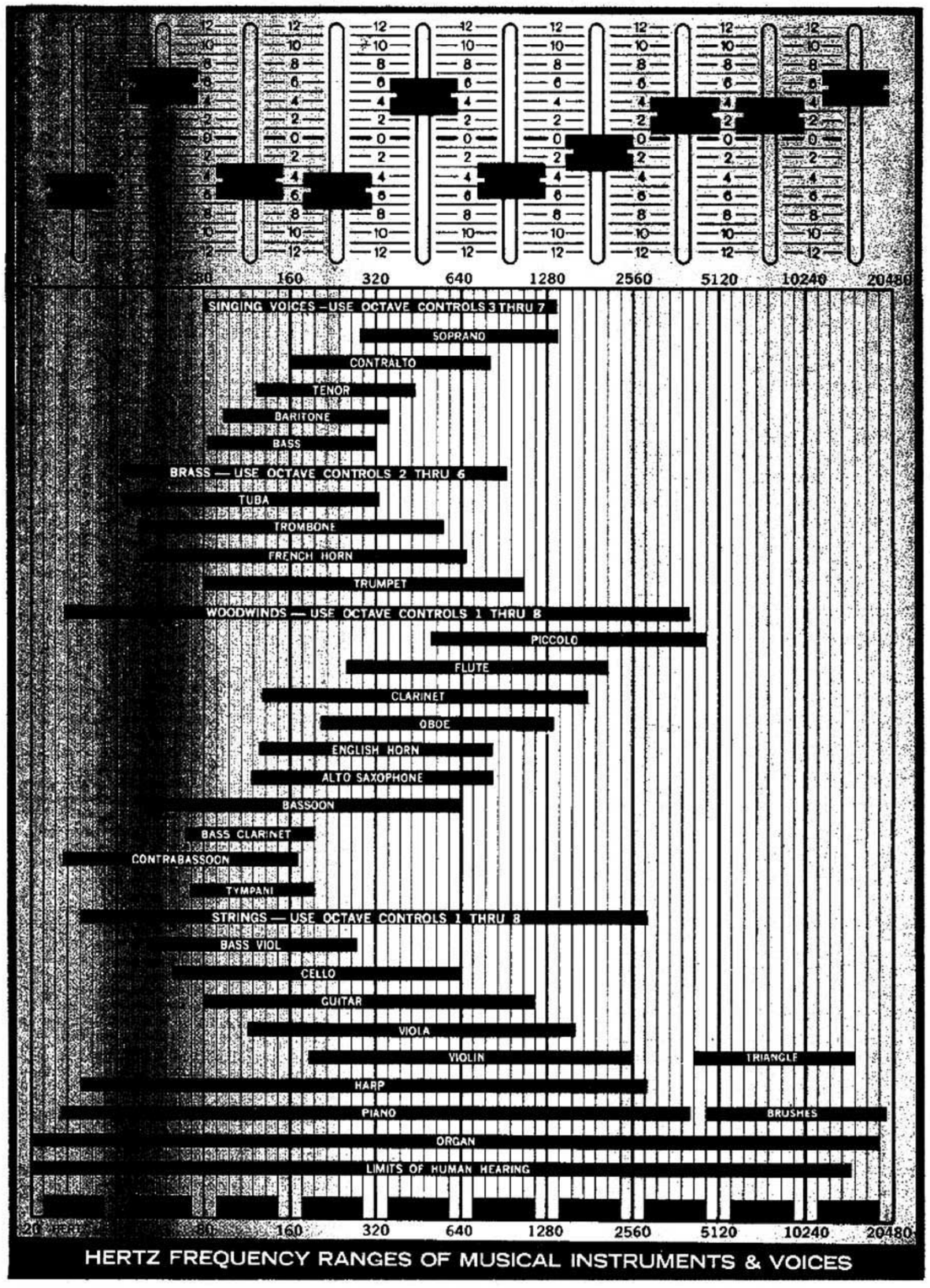
Many more equalizer capabilities

Additional Computone Charts are supplied to give you a means of recording the settings for controls as you experiment further with the variety of capabilities inherent in the Equalizer.

For example, here are some typical environment factors that might drastically change the initial settings of your Master Equalization Curve. (1) Draperies open or closed. (2) Sliding glass door open or closed. (3) Empty room versus the room full of people. (4) Seating arrangement in the room. (5) Changes in position of the furniture in the room. (6) Listening to remote speakers.

10-POINT CHECKLIST FOR YOUR EQUALIZATION-EVALUATION

- ☐ EQUALIZING FOR ROOM CHANGE
- ☐ EQUALIZATION OF RECORDS
- ☐ COMPENSATING FOR RADIO STATIONS
- ☐ EQUALIZING TAPES
- ☐ CHANGING OVERALL BALANCE
- ☐ HEARING DEFICIENCIES
- ☐ SOUND REINFORCEMENT
- ☐ CHANGING THE "COLOR" OF YOUR SPEAKER SYSTEMS
- ☐ SPECIAL EFFECTS
- ☐ P.A. SYSTEMS-"FEEDBACK"



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WHY'S AND HOW'S (Continued)

As you become familiar with the Equalizer's capabilities, you will, undoubtedly, find more instances for which you will want to readjust the equalizer. Here are a few more examples of how your Equalizer can greatly enhance your enjoyment of your stereo system. (1) Compensating for deficiencies in old 78 records, or favorite recordings that have either become worn or that have never sounded quite the way you felt they should. (2) Compensating for radio station characteristics. Some stations are noted for over modulating either low or high frequencies, and you can adjust for each particular station to provide the correct musical response, as you like to hear it. You may wish to make a Computone Card record for each of your favorite stations. (3) Adjusting for pre-recorded or home recorded tapes that seem to be deficient in certain frequency areas. You can boost or cut to provide exact reproduction in final playback. (4) Changing the overall balance of the music you are listening to, to produce the exact sound that is most pleasing to your ear, regardless of the normal equalization process. (5) Providing special effects through the boosting or cutting of the loudness of specific instruments on a musical reproduction. (6) Using the equalizer for tape dubbing to create a near perfect tape out of one that may have serious deficiencies. The Soundcraftsmen equalizer instruction manual explains how you can make your own corrected tape recordings of records, radio broadcasts, or tapes. Once the corrective taping has been done, no further adjustment of the equalizer is needed during playback.

You will find, because of the complete flexibility of control provided by your Soundcraftsmen Equalizer, there are seemingly infinite numbers of occasions and uses for enhancing your listening enjoyment.

How the equalizer overcomes listening environment distortions.

Since each of the octave bands demonstrate highly individual characteristics in their ability to be absorbed or reflected, it is clear that we need individual controls for each octave to deal with the entire audio spectrum effectively. Certainly, the standard amplifier bass and treble tone controls, or the more flexible 4, 5, or even 6 different segment tone controls, cannot provide adequate means of controlling the many potential audio deficiences throughout the entire spectrum that we must utilize for true fidelity of reproduction.

In large halls and auditoriums, where the startling extremes in peaks and valleys of frequency response levels are often encountered, and where acoustic feedback and "ringing" can occur, it is desirable to utilize ⅓ octave controls that provide a very selective and sharp cut or boost of narrow frequency bands to tame these highly exaggerated responses. In the more amenable home listening environment, octave by octave control represents a more practical criteria, better suited to those surroundings and our accustomed identification with octaves of music, rather than narrow bands of frequencies.

How equalization is accomplished with the Soundcraftsmen Equalizer.

The ten controls on the left and the ten controls on the right of the Soundcraftsmen Audio Frequency Equalizer give you individual control of the left and right channels of your music system. With these, you are able to control, individually, each of the ten octaves covering the full range of each channel (20 to 20,480 Hz).

By raising the octave-band control above the center zero (0) mark, you are able to boost the intensity of that octave. By lowering the same octave-band control, you are able to lower the intensity of sound of that particular octave (nearly to the point of silencing it, if you wish). With these 20 controls, ten octave-bands for each channel of your system, you have much the same control of your music as the engineer in the sound studio from which it emanates or was recorded!

Indeed, many of the problems overcome by audio engineers within the recording studio, parallel those you will find within your own "sound reproduction studio," your home listening area. Just as the audio engineer has the equipment necessary to overcome the sound studio's acoustic and equipment problems to produce a recording of the finest fidelity, you now have the means of overcoming the equipment and acoustical problems within your reproduction studio, to recapture all the fidelity of the finest recordings.

You now have the ability to correct the situation when an octave barely struggles through to your ear, either weakened by your system, or dissipated by your acoustical environment. You simply raise that octave's control to intensify it, and equalize its intensity with that of the other octaves. Conversely, octaves overly intensified by your system or environment may be reduced to match the intensity of the other octaves.

To allow you to accomplish the initial equalization of your music system and acoustical environment, Soundcraftsmen has created an Instructional Test Record to be used in conjunction with your Soundcraftsmen Equalizer. You will find the step by step instructions are easily followed, and the process of equalization unusually fascinating, as you hear for the first time an octave by octave accounting of what your system and listening environment have been doing to your music!

Utilizing the test tones for each octave, the recording enables you to arrive at the proper setting, of each individual octave-band control, that provides a complete equalization of all octaves. These individual control positions should be recorded for future reference. The Soundcraftsmen Compu-tone Charts, supplied with your Equalizer, provide a diagram of the settings calibrated on the front panel of the instrument. After you have marked the positions of the control knobs on the chart, label the chart as the "Master Equalization Curve." Now, you have a means of quickly reduplicating these settings after further experimentation with your Equalizer's capabilities.

EQUALIZER REVIEWS

the stereophile

"... considerably more flexible than anything they are likely to be using now, and has much lower distortion than most professional active equalizers ... its circuits are so quiet that you can actually insert it between a high-impedance microphone and the mike preamp without introducing undue noise ... in other words, it is the most nearly perfect audio device we have ever tested ... We are confident that you'll never regret spending the money for it. And we have never before said that of any product."

Buy it, you'll like it!

MODERN RECORDING

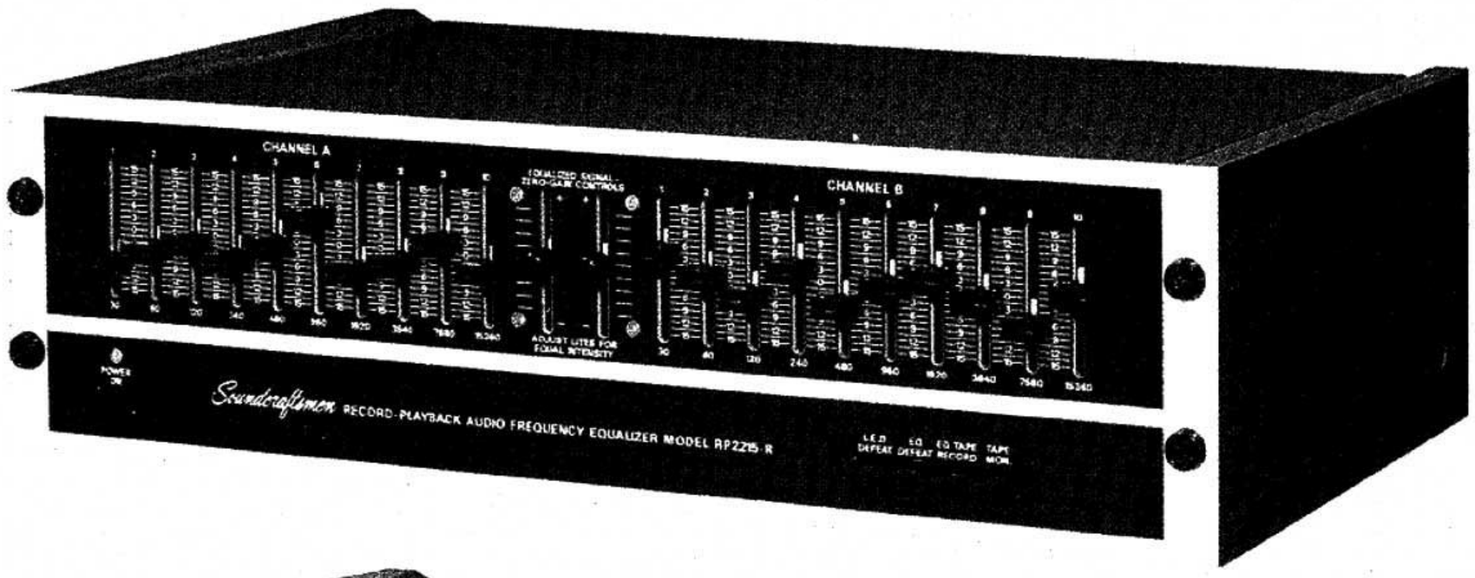
"...On all counts, the Soundcraftsmen impressed MR as being a carefully thought-out and well-engineered product that not only does what it claims, but does so without demanding too much on the part of the user—including the non-technical owner... Internal construction, components layout, and wiring are all first-rate. The power supply for the device is located at a generous distance from the signal circuit boards and is very well shielded, which accounts for the excellent S/N measured... We were pleased to note that the controls of one channel are totally separate physically from those of the other, in recognition of the fact that often the two stereo channels require different equalization."

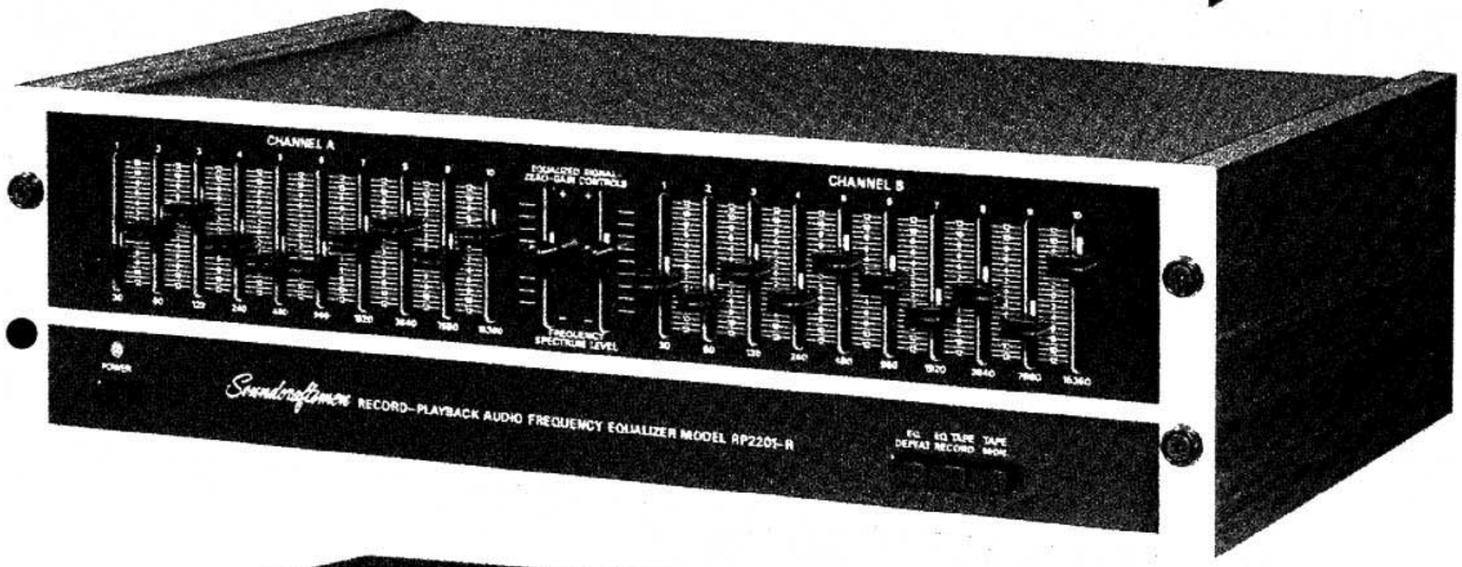
hi-fi stereo BUYERS GUIDE

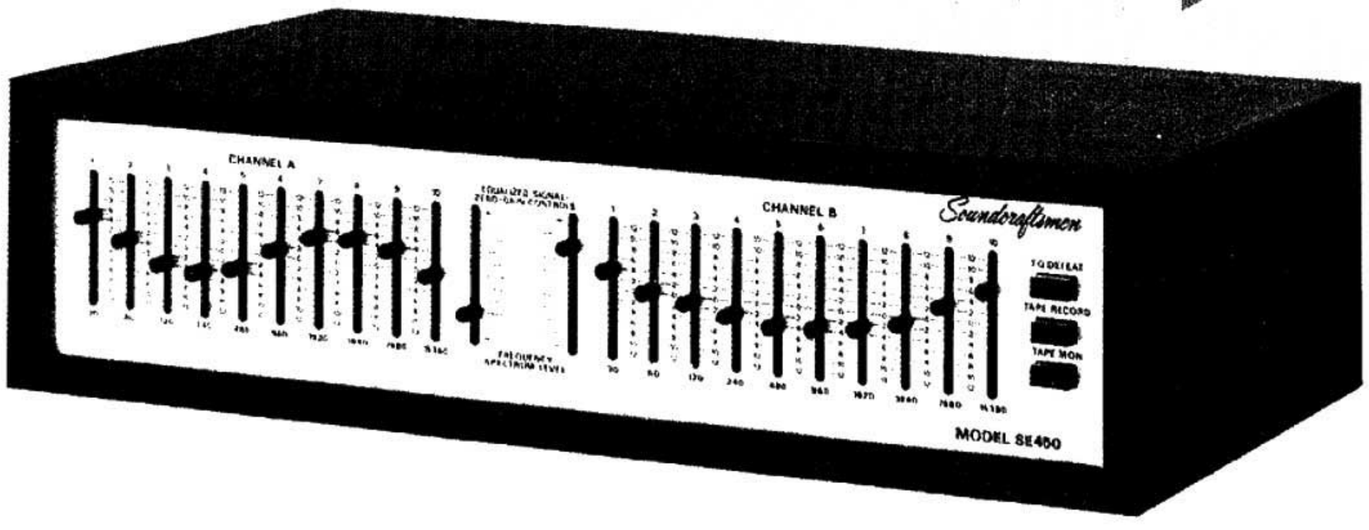
"...In user tests the equalizer could be set to obtain what is best described as 'spectacular bass effect' from smaller, bookshelf-type speaker systems... In all the trials it was the unanimous opinion of the panel that the equalizer always improved the overall sound, and the panel was universally impressed with the equalizer's ability to 'modernize' older recordings... We tried the Soundcraftsmen equalizer in several locations with several speaker systems, always using the same signal input and amplifying equipment. In all instances the listening panel was impressed with the equalizer's ability to restore 'lost' deep bass to all speakers in all locations. The fact is, we heard some notes we never heard before."

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by Soundcraftsmen







The Soundcraftsmen RP2215-R is the finest octave-wide graphic stereo equalizer available today. Our eight-year journey into equalizer technology has given us specs like 114dB signal-to-noise and distortion of 0.01%. The wire-wound coil circuitry allows a ±15dB boost or cut with uncolored natural sound.

Because an equalizer should not be used as an amplifier, our exclusive LED/zero-gain balancing circuit can be used to visually and audibly achieve "zero-gain" after equalization. Equalization during tape recording is essential and the RP2215-R allows this through a front panel button. You can also monitor the tape recorded signal with the provided "tape monitor" button.

The RP2201-R created new design standards for I.C. equalizer technology. Only through our op-amp synthesized inductor circuit can a true ±12dB boost or cut be obtainable with an incredible 105dB signal-to-noise ratio. While this model does not incorporate the L.E.D. circuit as described in the above model, it does have the zero-gain controls and, very important—front panel tape equalization. A truly affordable equalizer at a cost-conscious price.

The SE450 is Soundcraftsmen's latest equalizer entry. The electronic quality of the R02201-R with construction changes allowing remarkable value. Still—all the necessary features like front panel tape equalization, zero-gain and tape monitor and an attractive case as well. Soundcraftsmen equalization is now within the reach of everyone—from the modest system owner to the true audiophile.

FEATURES

RP2201-R & RP2215-R

- 19" black & silver front panel
- Environmental Test Record included
- Computone Charts included
- Tape & Line equalization

SE450

- Brushed aluminum silver front panel
- Handsome black vinyl cabinet
- **ALSO AVAILABLE WITH ALL-BLACK FRONT PANEL, WHITE KNOBS AND LETTERING—(SE450 ONLY)**

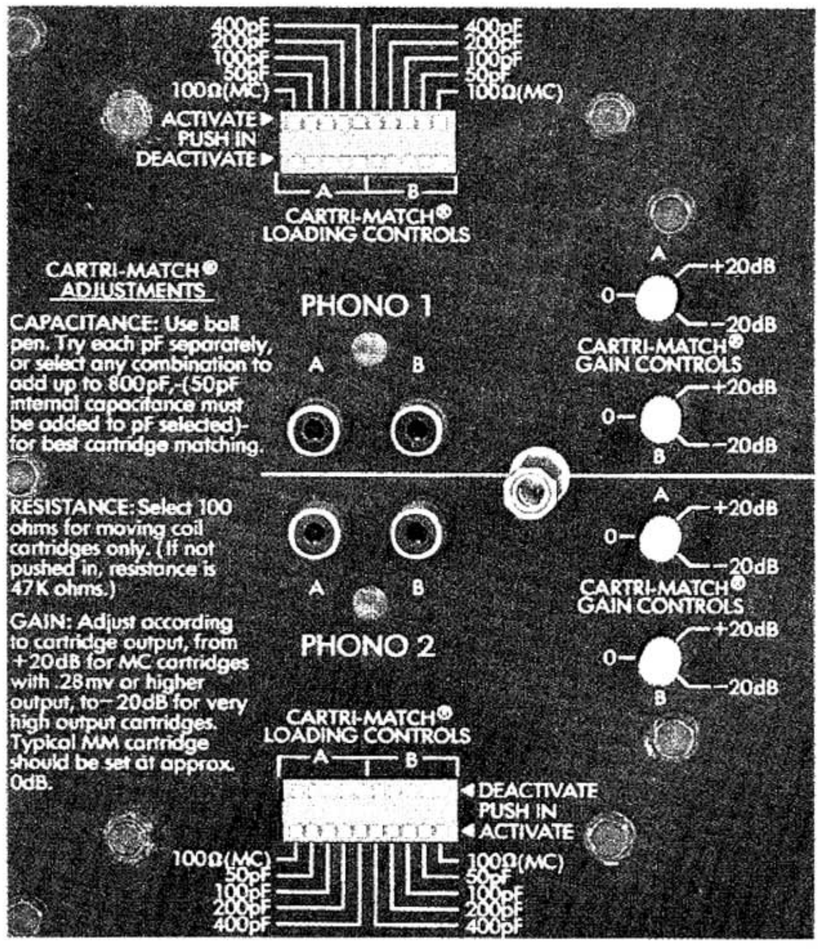
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SIGNAL PROCESSING



With today's myriad of add on accessories, it has become a nightmare to connect noise reduction units, expanders, etc., etc., to preamplifiers and then be able to send *all* or *some* of these signals to the tape recorder and/or the amp and speakers. Through the SP4002's signal processing, it is possible by front panel switching, to Dolby,* DBX,* Equalize and Filter a tape recording, a tape dub or your amp/speaker system without changing any cables. All add-on accessories can be connected to the signal processor section of the SP4002 permanently. To the tape recordist and accessory owner, this one feature can stop the hours of frustration associated with the interconnecting of additional specialty components.

*Trademarks Dolby Labs & DBX Inc.



Audiophiles, engineers and the audio press are increasingly aware that the "load" conditions into which a phono cartridge operates have a serious effect on the smoothness of system response. Cartridges are designed to operate into a certain load in the preamp stage; this load is usually specified by cartridge manufacturers in their literature and varies from cartridge to cartridge. The loading effects of various preamp stages and turntables also vary from type to type (most Shure cartridges, for instance, need 450 picofarads of capacitance to yield flat response, while Pickering cartridges require 280 picofarads).

To date, no practical method of matching these varying characteristics has existed and, consequently, the vast majority of systems, even those with state-of-the-art components, have exhibited serious response defects in the mid and upper treble, simply because the cartridges involved have not been operating under the load conditions specified by their manufacturers. This problem has most commonly had the effect of adding a harsh, metallic quality to most recordings, as well as accentuating both master tape hiss and record noise.

The SP4002 Cartri-Match® controls allow cartridge loading on both phono 1 and phono 2 from 50 to 800 picofarads in 50 picofarad increments. The computer style "dip switches" can be easily adjusted to allow a perfect match between your cartridge and the four separate SP4002 phono preamplifiers.

For moving coil cartridges, it is possible to use virtually all of them *without* the need of a head amplifier. Due to a truly unique phono input stage, we have reduced the needed input levels to .28 millivolts and then added a ±20dB phono gain stage to increase the phono level after preamplification. The result is a flexible phono section with moving magnet *and* moving coil cartridge capacity with a signal-to-noise ratio of 97dB. Individual phono gain adjustments are used for each of the four phono preamps.

FREQUENCY RESPONSE: Hi-level ±¼ dB, 5 Hz to 100 kHz Phono ±½ dB, 20 Hz to 20 kHz
TOTAL HARMONIC DISTORTION: .01% at 1 Volt
IM DISTORTION: Less than .01% at 1 Volt
PHONO IMPEDANCE: 47K or 100 Ohms
PHONO SIGNAL-TO-NOISE: 97 dB
PHONO CARTRIDGE SENSITIVITY: Any High Fidelity cartridge 0.28 millivolts or greater output
PHONO PREAMP DESIGN: Four separate mono preamp circuits
PHONO LEVEL ADJUSTMENT: Individual ±20 dB gain controls on all four phono preamps
PHONO CARTRIDGE COMPATIBILITY: Moving coil, variable reluctance or moving magnet (no head-amp required if over 0.28 MV output)
HEADPHONE LEVEL: Capable of driving 8 Ohms to 2000 Ohms

IN-OUT MONITORING: L.E.D. Voltage Comparison Circuit
HARMONIC DISTORTION: Less than .01% at 2 V
IM DISTORTION: Less than .01% at 2 V
SIGNAL-TO-NOISE: 114 dB at 10 V output
100 dB at 2 V output
OCTAVE CONTROLS: ±22 dB boost or cut–each octave (all other octaves set at maximum) ±15 dB boost or cut–each octave (all other octaves set at zero)
GAIN CUT CAPABILITY: +32 dB/−38 dB–all controls maximum
ZERO GAIN CONTROLS: +6 dB/−12 dB range
FILTER TYPE: Precision tuned passive wire-wound coil inductors
DIMENSIONS: 7" x 19" x 11"
WEIGHT: 28 LBS.

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by Soundcraftsmen

SP4002





SP4002 DESCRIPTION

The new SP4002 Signal Processing Preamplifier is the most flexible preamplifier available. Its push-button patching capabilities are endless. The SP4002 was designed for those audiophiles who take a "hands on" approach to their equipment. For tonal flexibility, we have included two ten octave graphic equalizers. For the tape enthusiast, the SP4002 is capable of handling up to three tape recorders with three way dubbing control. Along with this are two signal processing loops for added accessories, a sub-sonic filter and stereo/mono mode switching. Our unique Cartri-Match® phono preamplifier design allows the use of two moving coil cartridges *without* head amplifiers and adjustable cartridge loading on phono 1 and phono 2 from 50 to 800 picofarads. Again the Soundcraftsmen tradition of "affordable separates" is continued.

SP4000	SP4001	SP4002	FEATURES:
		☐	Dual 10-band ±15 dB Equalization
	☐		Dual 10-band ±12dB Equalization
	☐	☐	Zero-Gain/LED Level Balancing
☐	☐	☐	Sub-Sonic Filtering –3 dB @ 15 Kz, 12 dB p/o rolloff.
		☐	Variable Cartridge Loading
		☐	Variable 47K/100 Ohm Phono Impedance
		☐	±20 dB Phono Level Adjustment
		☐	Moving Coil Cartridge Inputs
☐	☐	☐	Four Mono Phono Preamplifiers
		☐	Three-way Tape Dubbing
☐	☐		Two Way Tape Dubbing
☐		☐	Two Amplified Headphone Outputs (8Ω–2000Ω)
☐			Three External Processing Loops
	☐	☐	Two External Processing Loops
☐	☐	☐	Stepped Level Control
	☐	☐	Zero-Detent Slide Potentiometers (EQ Section)
		☐	Brushed Aluminum Handles
		☐	19" Rack Mount Brushed Aluminum, 3/16" Panel
☐	☐		19" Rack Mount Brushed Aluminum 1/8" Panel
		☐	Front Panel Tape Inputs & Outputs
	☐	☐	Includes "Frequency Spectrum Analyzer" Test Record
		☐	Includes Computone Charts
☐	☐	☐	Walnut Wood Veneered Side Panels

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SP4001/SP4000 SPECIFICATIONS

FREQUENCY RESPONSE: Hi-level ± ¼ dB, 5Hz to 100 KHz
Phono ± ½ dB, 20Hz to 20 KHz

TOTAL HARMONIC DISTORTION: Less than .01% at 1 Volt.

IM DISTORTION: Less than .01% at 1 Volt.

PHONO IMPEDANCE: 47K Ohms.

PHONO SIGNAL-TO-NOISE: 97 dB.

PHONO PREAMP DESIGN: Four separate mono preamp circuits.

HEADPHONE LEVEL: Capable of driving 8 ohms to 2000 ohms.

OUTPUT: Low impedance–will drive any amp or headphones.

IN-OUT MONITORING: L.E.D. Voltage Comparison Circuit

HARMONIC DISTORTION: Less than .01% at 2V

IM DISTORTION: Less than .01% at 2V

SIGNAL-TO-NOISE: 105 dB below 5V output, 95 dB below 2V output.

OCTAVE CONTROLS: ±16 dB boost or cut–each octave (all other controls set at maximum)
±12 dB boost or cut–each octave (all other controls set at zero)

GAIN CUT CAPABILITY: +22 dB/−28 dB, all controls at maximum

ZERO GAIN CONTROLS: +6 dB/−12 dB, total 18 dB range

FILTER TYPE: Op-Amp synthesized inductors

DIMENSIONS: 5¼" x 19" x 11¼"

WEIGHT: 20 LBS.

". . . The major difference between the AE2420-R and other equalizers from Soundcraftsmen is the added analyzer that is built into the device. Inputs are provided for both microphone (such as would be used in room analysis), and for line sources (useful for analyzing tape deck and recording tape response, or amplifier response, etc.) . . ."

"Signals fed into the analyzer are compared by a differential comparator circuit against the pink-noise signals produced by the Scan-alyzer itself. Overall unity gain is adjusted, and then the operator introduces the octave filters one at a time while adjusting each slider for unity gain in each frequency band, using the LEDs as guides. When the octave-by-octave analysis is completed, the positions of the sliders may be marked on a "Computone" chart (several are supplied with the unit) for a record of the response characteristic produced by the analyzer . . ."

". . . The Soundcraftsmen SP4002 is obviously a highly versatile control center whose performance and sound quality should satisfy the most critical listener. We obtained fine results using several different phono cartridges—including a high-output moving-coil unit. It should be noted that Soundcraftsmen recommends the SP4002 only for use with moving-coil cartridges that deliver at least 0.28-mV output . . ."

". . . Using the pink-noise analyzer feature of the AE2420-R I found that the whole job of setting up the controls for flat system response took no more than a minute (a couple of seconds for each octave), including the second and third-time fine tuning which often is necessary because of slight interaction between adjacent octave controls.

The AE2420-R is cleverly conceived to do a form of real-time analysis that I found to be more accurate than that obtainable with some of the LED-type analyzers that have recently appeared. The differential comparator circuit is extremely sensitive, and it responds to differences well below 1.0 dB. So, at just under $500 the buyer of this unit gets an effective two-channel graphic equalizer plus a built-in means of verifying its settings and of measuring system and room response quickly and accurately. All told, a nice idea, and well executed by one of the first companies to deal seriously with graphic equalization . . ." ". . . In lab tests and actual use the Soundcraftsmen AE2420-R proved its mettle as both analyzer and equalizer. As a cleverly designed and effectively worked-out product it leaves little to be criticized . . ."

"The greatest appeal of the Soundcraftsmen SP4002 will probably be to people who have definite ideas about the octave-to-octave balance they want to hear from their music systems . . . a high-quality, very flexible control preamplifier with above-average tape-recording facilities make a fine combination, and the Soundcraftsmen SP4002 is the proof."

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AMPLIFIERS by Soundcraftsmen



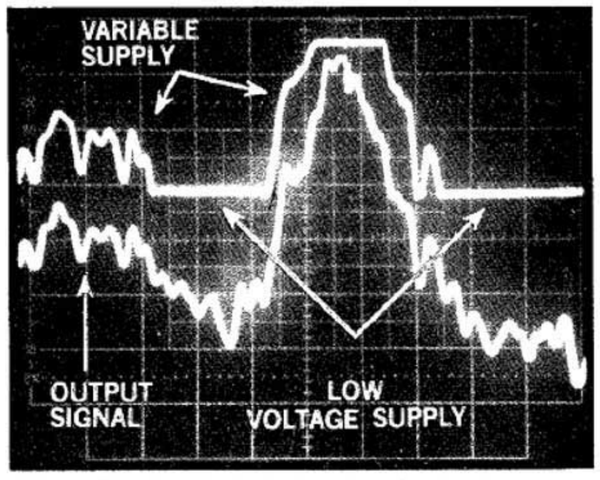
MA5002





VARI-PORTIONAL SYSTEM® –

TECHNICAL DESCRIPTION: A brief explanation of the VARI-PORTIONAL® SYSTEM is that its computer-like ANALOG LOGIC CIRCUITRY senses and calculates the amount of voltage required in accordance with the amplifier's rising or falling output power level, and it then directs the power supply to make available precisely the amount of voltage required, with no wasted energy. The scope photo illustrates this Patent Pending system by showing a loud rock music signal penetrating the upper voltage supply, and also showing the supply VARIABLY increasing AHEAD of the signal. Because all electronics related to the energy saving/new class circuitry are out of the amplifier's feed-back loop, no change in sound can ever be detected. The second supply will only operate when it is necessary, but you will only know when you see the VARI-PORTIONAL® green L.E.D.'s turn on—your ears won't tell you.



CLASS "H" – VARI-PORTIONAL®

Soundcraftsmen's revolutionary new Patent Pending VARI-PORTIONAL® system uses Analog Logic Circuitry to anticipate power demands, then supplies only a proportional amount of power, as required by varying input signal voltages.

The advantages of the VARI-PORTIONAL® system are obtained through its continuous monitoring of output power requirements for optimum efficiency. This results in direct and measurable energy savings by reducing the amount of energy dissipated as heat loss, yet with controlled full power always available, standing by, and supplied as needed. This higher powered amp can be sold at a price even lower than ordinery Class AB amplifiers through cost savings made possible by the Patent Pending VARI-PORTIONAL® circuitry. For example, no fan is needed even under most severe operating conditions.

An added advantage is a substantial savings in power consumption. Class AB amplifiers of the same power rating, operating at ⅓ power in accordance with FTC test requirements, will consume over 40% more energy than the Soundcraftsmen CLASS H amplifier. Thus, the CLASS H amp provides savings in heat dissipation of approximately 200 watts. Progressively greater percentages of savings may be obtained at lower power levels.

AUTO-CROWBAR® PROTECTION

This AUTO-CROWBAR® protection circuitry is unique among amplifiers. It uses no relays, no circuit breakers. It is all-solid-state, and is instantaneous-acting in triggering an SCR (silicon controlled rectifier), which discharges the amplifier's DC power supply in a few micro-seconds; simultaneously the AC power is de-coupled by a TRIAC, leaving the amp with no power applied. (An auxiliary low voltage (12VDC) power supply, used for meter lights and L.E.D.'s, remains activated. This supply turns on the overload L.E.D. and also resets the full AUTO-CROWBAR® circuit after approximately 2 or 3 seconds delay) when the overload is minor, such as over-driving or shorted speaker wiring. The AUTO-CROWBAR® circuit will automatically and continuously attempt to reset itself every second or two, until the overloaded condition is removed....This same AUTO-CROWBAR® protection circuit will also cut off the amplifier's output when an overheating condition exists. (This is extremely unlikely, because the VARI-PORTIONAL® SYSTEM enables the Soundcraftsmen amp to operate so efficiently that it is barely warm to the touch, even when operating at very loud music levels.)

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AMPLIFIER FEATURES AND SPECIFICATIONS

FEATURES

MA5002
- % of Output Meters
- Input Level Controls
- Speaker Switching–Two Pair
- Clipping Indicators
- Vari-Portional® LED's
- Overload Indication
- Rack Handles
- 19" Front Panel

EA5003
- Dual 10-Band Graphic Equalizer, plus EQ ¼" Output Jacks
- Input Level Controls
- Speaker Switching
- Clipping Indicators
- Vari-Portional® LED's
- Overload Indication
- Rack Handles
- 19" Front Panel

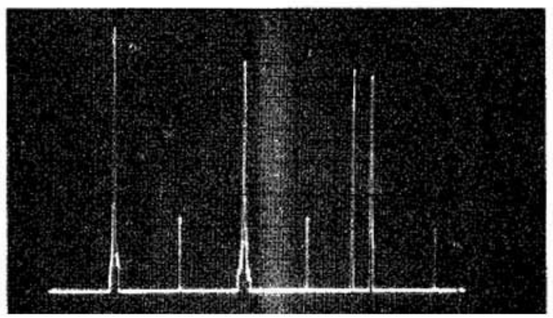
PA5001
- Overload Indication
- Rack Handles
- 19" Front Panel

SPECIFICATIONS

Power Output–250 watts RMS-8 ohms/360 watts 4 ohms (per channel)
I.M. Distortion–Less than 0.05%
T.H.D. Distortion–Less than 0.1%
T.I.M. Distortion–Less than 0.02%
Signal-To-Noise–Greater than 105dB down
Frequency Response–±¼dB, 20Hz to 20KHz
Slew Rate–Greater than 90v per micro-second (supply)
Slew Rate–Greater than 50v per micro-second (amplifier)
Damping Factor–Greater than 150 @ 50 Hz
Stability–Any load 2 ohms to 32 ohms
Input Sensitivity–1.28 RMS for rated output
Input Impedance–Can be driven from any source 4 ohms to 50 K ohms
Overload Protection–AC–Instant disconnect through Auto-Crowbar® triac
Speaker Protection–No current limiting, instant turn off
Level Controls–Control level from 0 to full volume
Power Turn-on–Surge-delay remote turn on through triac operated circuitry
Input Jacks–¼" Phone Jacks
Speaker Outputs–Standard banana plugs
Line Cord–Heavy duty 3-wire grounded plug
Dimensions–19" x 7" x 15"

T.I.M. Transient Intermodulation Distortion

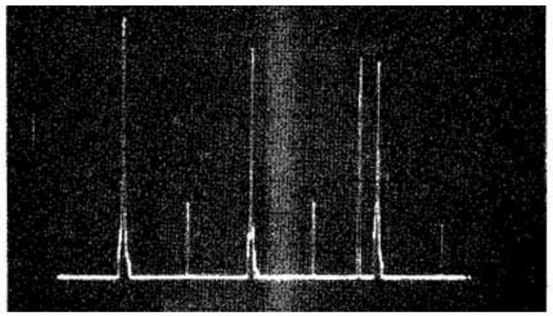
The recent emphasis of sonic quality of amplifiers has placed significant attention upon a newly discovered form of amplifier distortion: Transient intermodulation Distortion. Modern amplifiers which measure well with steady state IM or THD methods may actually sound unacceptable. Until recently there has been a lack of agreement among both designers and manufacturers as to how to measure the relatively new transient distortion products. What is generally agreed upon however, is that low T.I.M. figures are associated with discernible and quite audible differences of how good an amplifier sounds: warm, open, clear vs. cold, constrained and muddy. Amplifiers measuring low in T.I.M. products have been noted to have the former positive and acceptable charactistics. To measure an amplifier's specific T.I.M. characteristics a testing method has been proposed and published by the Audio Engineering Society* This method uses a 3.18 KHz square wave and 15.00 KHz sinewave filtered by a 30 KHz low pass filter as the input signal. A very sharp wave analyzer is then used to measure the ouput spectrum of the amplifier.

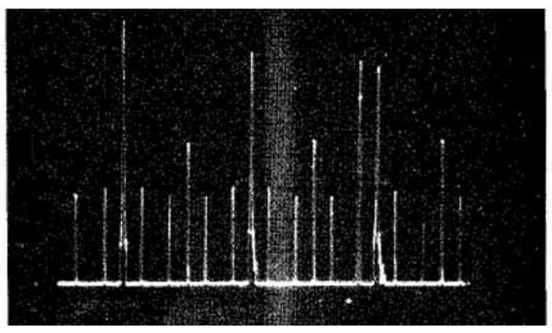


T.I.M. or Transient Intermodulation Distortion is measured by feeding a composite sine wave and square wave signal to the amp under test and comparing the input to the output.

test equipment
HP 3580A Spectrum Analyzer
HP 8165A Programmable Signal Source
Tektronix SG 502 Sine Wave Oscillator
Tektronix 7633 Oscilloscope

testing criteria
250 Watts Output
8 Ohm Load
Input: 3.18KHz square wave 15KHz sine wave (12dB below square wave)
Spectrum Analyzer Settings:
Resolution Bandwidth=10Hz
Frequency Span/Div.=2KHz
Sweep Time/Div.=50 Sec.





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ENGINEERING REPORT

Theory and Operation – Class H Amplifier by Paul Rolfes – Chief Engineer, Soundcraftsmen

The class H amplifier is a new class of audio amplifier which is suitable for, and specifically designed for, the reproduction of hi fidelity sound. The major advantage in using the class H design over other methods for reducing dissipation on output transistors is that there is no switching or changing of signal paths within the basic amplifier itself. All the controls for increased power requirements act only within the power supply and therefore are

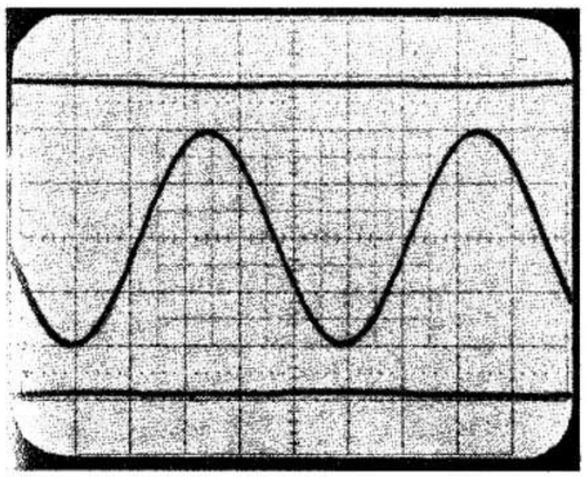


FIG. 1

outside of the feedback loop and have no effect on the distortion, stability or slew rate of the basic amplifier.

The first thing one would notice when looking at the differences in the class H amplifier is the fact that it has two positive and two negative power supplies. The ratio of the voltages in these power supplies is arranged such that the low voltage supply is two thirds of the high voltage supply. In operation the amplifier appears to work exactly like a conventional class AB amplifier at low volume output; however, as the signal level approaches the limit of the low voltage supplies a difference begins to become obvious.

Referring to FIG. 1, the oscilloscope picture shows two horizontal lines which are the B+ and B– supplies to the output stages, and a 1 KHz sine wave operating within the limits of these supplies. As the output signal increases, one would expect that clipping would occur when the output level reaches the supply voltage level. However, as seen in FIG. 2, the VARI-PORTIONAL® circuit anticipates the sine wave's approach to the supply level and begins to increase the B+ to allow for additional head room. This process continues as required, until the VARI-

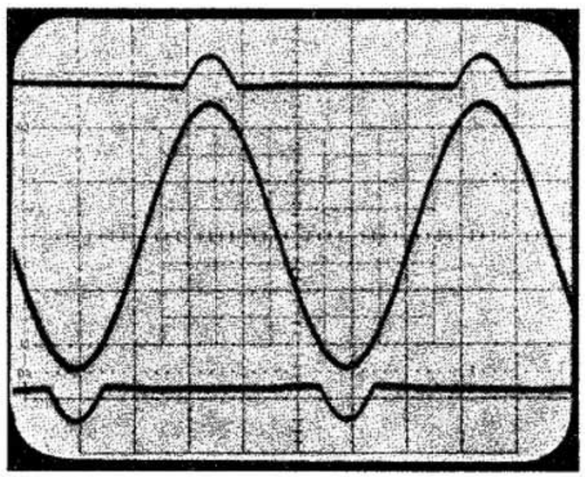


FIG. 2

PORTIONAL® system reaches its maximum, which is the limit of the high voltage supply. As seen in FIG. 3 the VARI-PORTIONAL® system has reached its limit and the sine wave has entered the opening made when the VARI-PORTIONAL® system increases the B+ supply to provide more head room to the amplifier. If the output level continues to increase, clipping finally will occur against the high voltage supply, as seen in FIG 4.

The obvious advantage of such a system is that the amplifier is operating at a lower voltage most of the time. This lower voltage operation saves energy because it substantially reduces the dissipation of the amplifier, since the dissipation of the power output stage is directly proportional to the voltage applied across the output transistors. It should be noted, however, that there is an energy saving at all times even under high power sine wave conditions. Referring to FIG. 3 and 4 it can be seen that although the high voltage supply is being turned on to its maximum, it is only on during that period of time when it is required. It is still off for a substantial portion of the sine wave; consequently the amplifier is operating on

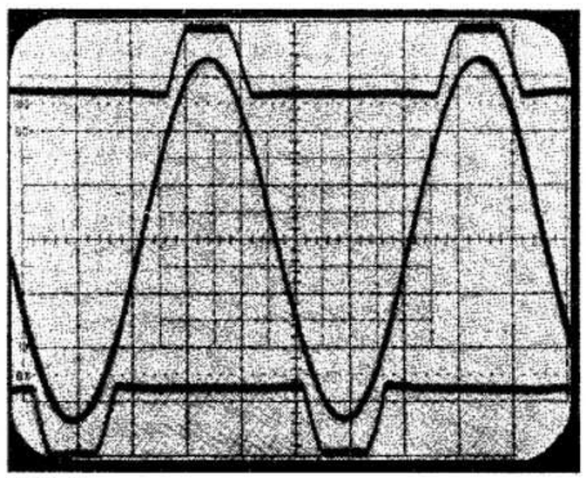


FIG. 3

the low voltage—(the more efficient supply)—during this period of time.

Going back and reviewing the sequence of these pictures again, it can be noted in FIG. 1 that the hi voltage supply is not required and therefore not used. In FIG. 2, the hi voltage supply is actually not yet required because of the selection of the output voltage; however the VARI-PORTIONAL® logic circuitry has detected a rising wave shape, is anticipating the fact that the supply may become required, and therefore is beginning to turn the supply on in advance of the sine wave actually reaching the supply level. In FIG. 3 it can be noted that the slope or rate of rise of the upper wave shape (which shows the positive supply turning on) is greater than the slope of the sine wave that is entering into the upper supply. Because of this fact, the sine wave can never "catch up" with the upper supply since the "turn on" gain of the upper supply is greater than the gain of the amplifier. It should also be noted that the inherent slew rate of the upper supply is greater than the slew rate of the amplifier, which is approximately 50 volts per micro-second. Therefore, regardless of wave shape (even a hi frequency square

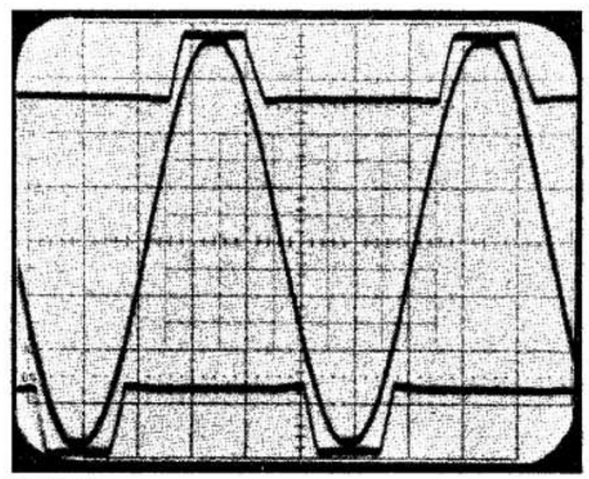


FIG. 4

wave) the VARI-PORTIONAL® supply logic is fast enough to anticipate the rising wave shape and turn the supply on with a gain and slew rate that are higher than the amplifier and therefore move out of the way of the oncoming output signal.

From the above description of the operation it can readily be seen that the amplifier using the VARI-PORTIONAL® control system, or class H, achieves a substantial savings in dissipation or heat loss on the output transistors.

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THE proliferation of new power-amplifier "classes" continues unabated, with the Soundcraftsmen MA5002 (tentatively labeled "Class H") power amplifier being the latest variant to reach the consumer market. The class of an amplifier circuit usually refers to its internal operating conditions, such as the quiescent (no-signal) current drawn by its tubes or transistors and the fraction of the signal cycle during which each part of the amplifier is active. Recent developments have extended this usage somewhat to include any means by which an amplifier is induced to deliver more power, or to deliver it more efficiently, than conventional design allows.

In the case of the MA5002, the amplifier circuits (except possibly the protective circuits) are conventional and operate in class AB at all times. The difference lies in the use of a power supply whose voltage increases with the signal level, thus giving the amplifier more "headroom" as needed to accommodate high signal amplitudes. Given low- or no-signal conditions, the output transistors operate with a reasonably low voltage and correspondingly low power dissipation. The result is a very powerful amplifier (rated to deliver 250 watts per channel to 8-ohm loads from 20 to 20,000 Hz with less than 0.1 per cent total harmonic distortion) that is claimed to draw appreciably less power from the 120-volt a.c. power line when idling or delivering normal listening levels than other amplifiers of comparable ratings. At full power output, however, the MA5002 draws an impressive 1,000 watts from the power line.

The Soundcraftsmen amplifier has two power supplies (actually, each is a dual positive/negative voltage supply), with one delivering up to 50 per cent more voltage than the other. At power outputs up to 50 per cent of the rating (125 watts), only the lower-voltage power supply is connected to the output stages and the unit operates like a very conservatively rated 125-watt amplifier. When the instantaneous signal amplitude is sufficient to drive the amplifier beyond 125 watts, a "Vari-Portional" circuit goes into action and begins to turn on the high-voltage supply, which takes over smoothly from the lower-voltage one. It follows the signal waveform so rapidly that the effective operating voltage on the output transistors increases *faster* than is required to handle the increased signal level. As the manufacturer points out, the high-voltage power supply is in effect a powerful, wide-band audio amplifier whose slew rate is greater than that of the audio amplifier proper (which is itself rated at a very high 50 volts per microsecond).

No current limiting is used to protect the output transistors. Instead, the MA5002 has an "electronic crowbar" that shuts down the amplifier totally in the event of an output short circuit or excessive load current. After about 2 seconds, the unit turns on again automatically (if the fault remains, it will not come on fully and will emit a click every 2 seconds).

The front panel of the MA5002 has two large meters calibrated from −20 dB to +3 dB; their 0-dB points are supposed to correspond to the rated output of 250 watts into 8 ohms. Between the meters are pushbutton switches that increase their sensitivity by factors of ten or one hundred so that they can indicate output levels of a fraction of a watt. Each channel has a front-panel LEVEL control plus a green VARI-PORTIONAL light and a red CLIPPING light. The green light begins to glow when the higher-voltage power supply goes into action, and the red light is a fast-responding indicator of output clipping. An OVERLOAD light comes on when the electronic crowbar has been tripped, and there is a red POWER pilot light. Two SPEAKERS switches and a POWER switch complete the controls.

Most of the rear apron of the MA5002 is devoted to two large heat sinks; between them are two pairs of speaker-output binding-post terminals and the two input phono jacks. There is a power-line fuse and a heavy-duty line cord with a three-prong grounding plug.

The Soundcraftsmen MA5002 is furnished with finished-walnut side plates, removable for rack mounting, and sturdy black handles on the front panel. The amplifier is 19 inches wide, 15 inches deep, and 7 inches wide; it weighs 55 pounds.

● ***Laboratory Measurements.*** The one-hour pre-conditioning at one-third rated power made the amplifier's heat sinks too hot to touch for more than a couple of seconds. However, throughout the rigorous testing that followed there was no sign of excessive temperature on any other external surface of the amplifier.

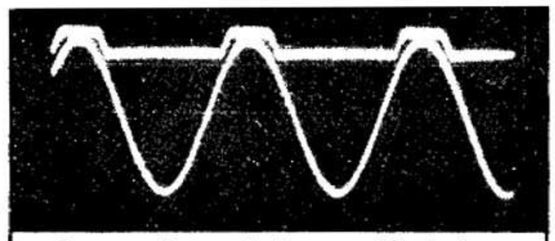
With a 1,000-Hz test signal, both channels driving 8-ohm loads, clipping occurred at 312.5 watts per channel. The 4-ohm output before clipping was a very impressive 458 watts, and the 16-ohm clipping level was 207 watts. At the rated 250 watts output, the harmonic distortion was well under the 0.1 per cent rating, measuring about 0.03 per cent at 20 Hz, 0.005 per cent at 100 Hz, and increasing smoothly to 0.07 per cent at 20,000 Hz. At half and one-tenth power the characteristic was similar, with lower readings.

At 1,000 Hz, the harmonic distortion was between 0.007 and 0.025 per cent from 0.1 watt to 310 watts output. The intermodulation (IM) distortion was nearly constant at around 0.05 per cent (it ranged from 0.034 to 0.065 per cent) over the full power range from less than 10 milliwatts to 310 watts.

The amplifier required an input signal of 0.25 volt for a reference 10-watt output, and the unweighted noise level was 85.4 dB below 10 watts (or 113 dB below rated power). The rise time of the output waveform was 3 microseconds, and the slew rate was 48 volts per microsecond on one channel and 40 volts per microsecond on the other. The frequency response was down 0.2 dB at 5 and 25,000 Hz, and down to −3 dB at 100,000 Hz. We also made a difference-tone distortion measurement using equal-amplitude signals at 18 and 19 kHz and driving the amplifier to a level only 0.2 dB below the clipping point. The 1,000-Hz difference-frequency IM product was 79 dB below either input tone (85 dB below peak-envelope power), and third-order distortion products at 17 and 20 kHz were at −62 dB.

The VARI-PORTIONAL lights began to glow at 125 watts, and the CLIPPING light flashed at 331 watts. The literature on the MA5002 includes scope photos illustrating the response of the Vari-Portional circuit to high signal levels. We repeated this test for ourselves, and the resulting scope photos show clearly how the power-supply voltage (upper line) begins to increase as the peak of the signal waveform reaches 125 watts, finally increasing enough to accommodate some 380 watts output at the clipping point. (This reading is higher than our original clipping measurement because we drove only one channel and allowed the line voltage to rise to 125 volts instead of the standard 120 volts.) The accompanying photo shows only the positive power supply, but an identical effect takes place with the negative supply voltage.

We short-circuited the amplifier outputs repeatedly, at various power levels, and the crowbar circuit worked perfectly every time to prevent any damage to the amplifier. The output-meter calibration was such that in its low-sensitivity range 0 dB corresponded to about 50 watts on a steady sine-wave signal, or about 250 watts on brief musical peaks, into 8 ohms. The relative accuracy of the meter readings and range switches was good, and the least-visible meter deflection was at about 0.1 watt (sine wave).



Scope photo of the amplified sine wave at the MA5002's output and the power-supply voltage (upper trace), which increases to match the signal.

● ***Comment.*** On the basis of its actual performance, the Soundcraftsmen MA5002 is a very powerful, clean amplifier capable of delivering considerably more power than many other comparable- or higher-price units. Not many $700 power amplifiers can deliver close to 1,000 clean watts to a pair of 4-ohm speakers (and not too many 4-ohm speakers can absorb 500 watts safely, so caution is advisable!). We found the protective system of the MA5002 to be excellent in respect to problems of shorted outputs or too many pairs of speakers connected in parallel.

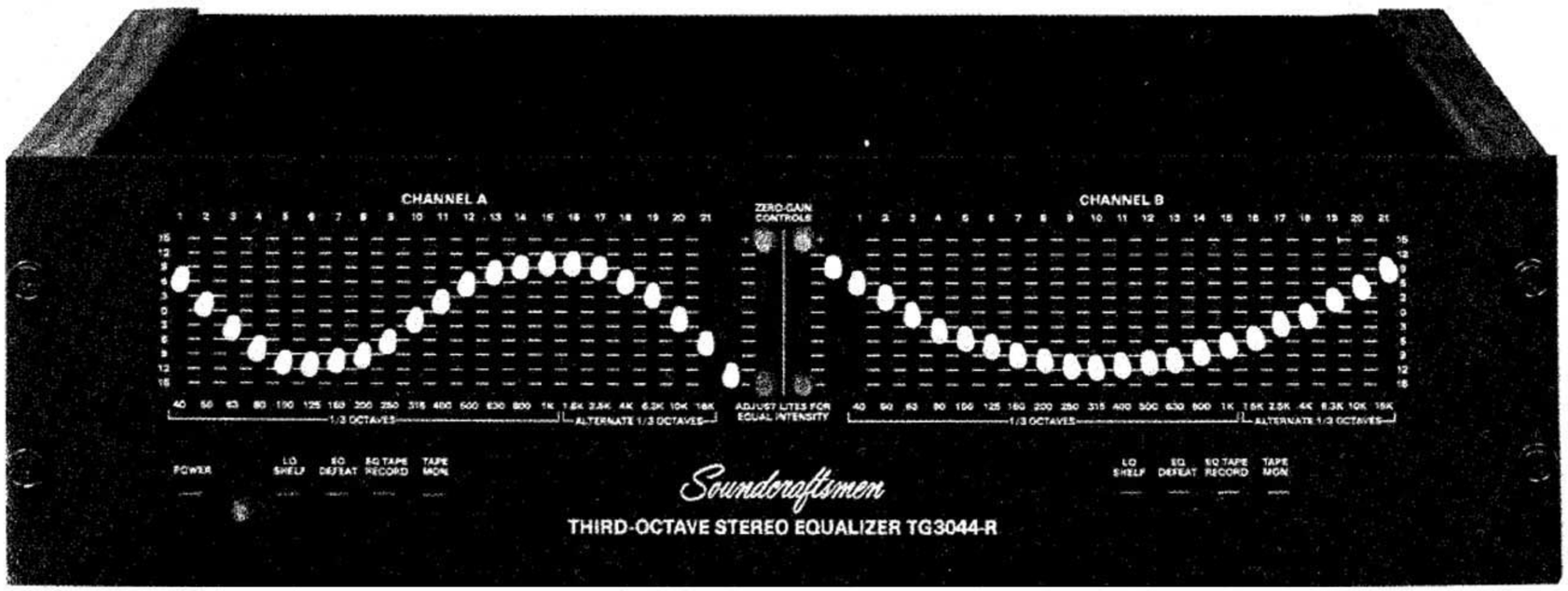
In normal use, the MA5002 power amplifier indeed runs very cool, as one would expect from a "125-watt" amplifier whose output semiconductors (eight per channel) and power supply are designed for two to three times that power. If it is "pushed" it gets hot, of course, but we cannot imagine ever needing a fan or other external cooling means.

We listened to the amplifier at length, often driving it until all its signal lights except OVERLOAD were activated. At no time was there any audible evidence of anything out of the ordinary; the MA5002 behaved and sounded just like the very rugged and clean high-power amplifier that it is.

It is worth mentioning that, unlike some other techniques for increasing the *short-term* power-output capability of an amplifier, the Soundcraftsmen "Class H" system is capable of full-time operation. In other words, the extra power is available not only for a fraction of a second during a musical peak, but for as long as may be required by the musical program material, without any damage to the amplifier or change in its operating characteristics. One may argue whether the Soundcraftsmen design truly represents a new class of amplifier operation, but it is certainly a very effective means of economically providing large amounts of clean audio power when it is needed.

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by Soundcraftsmen



- ☐ 15-band ⅓ octave equalizer–two channels
- ☐ 6-band alternate ⅓ octave equalizer–two channels
- ☐ Zero-gain level controls
- ☐ L.E.D. indication of unity-gain in/out level balancing
- ☐ System 1/line equalization–either channel
- ☐ System 2/tape equalization–either channel
- ☐ Low shelving–3dB @ 15 Hz, 12dB per octave roll off
- ☐ Eq defeat–separate (each channel)
- ☐ 600 ohm balanced or unbalanced operation
- ☐ Zero insertion loss
- ☐ Stereo operation
- ☐ Mono operation–each channel separately
- ☐ Tape monitor circuit

One-third octave equalization has always been acclaimed by professional sound engineers as being the absolute method of achieving balanced frequency conditions in problem listening areas. Up until now, the one-third octave units available were either too expensive and/or overly complicated for home equalization and semi-pro use. The new Soundcraftsmen TG3044-R one-third and alternate-one-third octave-wide equalizer now meets the needs of the demanding audiophile, performer and studio engineer.

A consensus of expert consulting opinions has agreed that virtually all environmental acoustic aberrations are found in the 40 Hz to 1 KHz frequency areas. The listening room layout and sound system design will collide more often and in narrower frequency increments in these low frequency ranges. After 1 KHz, room problems have a tendency to be of a broader nature, lending to correction through two-thirds or octave-wide balancing.

The TG3044-R equalizer is divided into one-third and alternate-one-third segments. Each independent mono channel has 15 controls in one-third octaves and six controls in alternate-one-third octaves.

The advantage of this frequency division design is two-fold. First, by eliminating the less often used controls in the high end, we have created a less complicated unit for precise yet simplistic and quick system set-up. Second, and most important, we have been able to build a reliable, high quality equalizer with features and specs not available from other manufacturers at any price.

EXCERPTS FROM MAGAZINE TEST REPORT:

"Providing one-third octaves up to the 1-KHz area is designed to correct for acoustical problems that require relatively narrow frequency segments for correction. Room problems above 1 KHz are said to be a broader nature and lend themselves to correction via relatively wider frequency segments."

"Gives the demanding Audiophile and the Semi-Pro user as much EQ facility as possible for the price."

"All published spec's were met or bettered. Especially notable was the device's extremely low distortion."

TOTAL HARMONIC DISTORTION .01% @ 2V RMS
IM DISTORTION .01% @ 2V RMS
SIGNAL-TO-NOISE 114dB-10V RMS output–100dB-2V RMS output
INPUT CAPABILITY Maximum 10V RMS-22dBM
OUTPUT CAPABILITY 10V-22dBM
INPUT IMPEDANCE 47K ohms
OUTPUT IMPEDANCE 600 ohms-balanced–300 ohms-unbalanced
ISO CENTER FREQUENCIES (Hz) (⅓ Octaves) 40, 50, 63, 80, 100, 125, 160, 200, 250, 315, 400, 500, 630, 800, 1K; (Alternate ⅓ Octaves) 1.6K, 2.5K, 4K, 6.3K, 10K, 16K
BOOST/CUT INDIVIDUAL CONTROLS ±22dB (all other controls at max); ±15dB (all other controls at zero)
FILTER TYPE Precision-tuned passive, wire-wound inductors and op-amp synthesized inductors

EQUALIZATION 42 vertical slide potentiometers, -0- center detent
ZERO-GAIN 2 vertical slide potentiometers
EQ IN/OUT 2 front panel pushbuttons
EQ TAPE RECORD 2 front panel pushbuttons
TAPE MONITOR 2 front panel pushbuttons
POWER 1 front panel pushbutton

DIMENSIONS 5¼" x 19" rack panel x 11" deep
WEIGHT 23 Pounds
FINISH Front panel–black anodized aluminum. Textured black chassis

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Soundcraftsmen includes the tools that make equalization accurate and enjoyable



(12" LP RECORD
FOR 10-MINUTE
ROOM EQUALIZATION)

How Typical Room Problems are Eliminated By Equalization

Your stereo system is capable of even better sound... if your room can be made to let it alone!

A "typical room," selected from several case studies, provided the measurements for recording and plotting these "before" and "after" equalization graphs.

BEFORE: Typical room response curve recorded before the equalization of the music system sound source. ("0" represents the desirable flat response level of 75db S.P.L.)

AFTER: Response curve recorded after equalization of the sound source by means of the Soundcraftsmen Equalizer and Instructional Test Record.

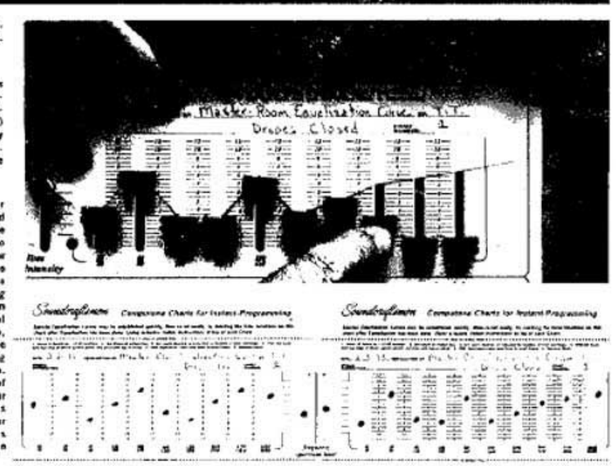
OCTAVE CONTROL SETTINGS: Illustrated, positions of octave/frequency controls which achieved equalization corrections well within the maximum ± 2db tolerance specified for flat response capabilities of the Soundcraftsmen Equalizer.

COMPUTONE CHARTS FOR INSTANT-MEMORY PROGRAMMING

SOUNDCRAFTSMEN COMPUTONE CHARTS are included with each unit to provide an easy-to-use guide for accurate resetting of equalizer controls in repetitive situations, such as "Master Room Equalization" settings.

COMPUTONE CHARTS also provide a means of easily setting the controls as your experiment further with the variety of capabilities inherent in the Equalizer. For example, here are some typical environment factors that might drastically change the initial settings of your Master Equalization Curve. (1) Draperies open or closed. (2) Sliding glass door open or closed. (3) Empty room verses the room full of people. (4) Seating arrangement in the room. (5) Changes in position of the furniture in the room. (6) Listening to remote speakers.

A FEW MORE EXAMPLES of how your Equalizer can be reset to enhance your enjoyment of your stereo system are (1) Compensating for deficiencies in old 78 records, or favorite recordings that have either become worn or that have never sounded quite the way you felt they should. (2) Compensating for radio station characteristics. Some stations are noted for over modulating either low or high frequencies, and you can adjust for each particular station to provide the correct musical response, as you like to hear it. You may wish to make a **COMPUTONE CHART** record for each of your favorite stations. (3) Adjusting for prerecorded or home recorded tapes that seem to be deficient in certain frequency areas. You can boost or cut to provide exact reproduction in final playback. (4) Changing the overall balance of the music you are listening to, to produce the exact sound that is most pleasing to your ear, regardless of the normal equalization process. (5) Providing special effects through the boosting or cutting of the loudness of specific instruments on a musical reproduction. (6) Using the equalizer for tape dubbing to create a near perfect tape out of one that may have serious deficiencies. (7) Changing the "color" of your speaker systems. All speakers have their own characteristics or "color." This means that certain segments of the audio spectrum are reproduced at higher or lower levels than the balance of the audio spectrum. With Soundcraftsmen's octave-wide equalization, you can adjust the levels of certain segments in the audio spectrum to suit your own listening preferences.



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