

# AUDIONICS



There are basically two types of quadraphonic reproduction systems -- DISCRETE and MATRIX. Discrete systems utilize four distinct channels and offer separation comparable with present twochannel stereo. Discrete systems are, however, characterized by their high cost and relatively minimal amounts of high quality program material available commercially. In addition, discrete systems have not been approved by the Federal Communications Commission for use by FM stereo broadcasters. The future of the discrete system remains doubtful from a practical commercial standpoint.

The second method is the MATRIX system. There are three better known systems: The ELECTRO-VOICE STEREO 4\* System, the SANSUI QS\*\* System and the CBS SQ system \*\*\*. There is little program material for the first two systems, with only a handful of record companies of consequence producing encoded discs. Presently, however, COLUMBIA RECORDS, EMI, CAPITOL, EPIC and VANGUARD are releasing discs encoded by the CBS SQ process. The available material processed in SQ encompasses the full spectrum from country to classics with new releases monthly.

The music listener interested in quadraphonic sound has one logical choice after balancing cost vs program material . . . the CBS SQ system. Until the present time, there have been two types of SQ decoders. The most popular have used a Motorola or E-V integrated circuit as the heart of the unit. These simple matrix decoders sell for \$60 to \$100 and offer credible performance

along with several rather serious shortcomings from the high fidelity standpoint, including increased distortion, and narrow phase difference bandwidth. These decoders also lack the capability to be updated to logic performance.

The second type of SQ decoder is the FULL LOGIC unit. Using some electronic "trickery" and taking advantage of a phenomena known as psycho-acoustics, the logic decoder will provide remarkable results, nearly achieving the performance of discrete system from the listening standpoint. The obvious disadvantage of the logic decoder is its cost . . . present logic decoders retail for nearly \$300.00. **DO NOT CONFUSE SO-CALLED SEMI-LOGIC DECODERS** now available for under \$100 with actual logic types. Most of these semi-logic type units produce undesirable aural side effects and are not as effective as some of the straight-forward decoders using an integrated circuit.

As an alternative to the preceding types, Audionics, Inc. announces an SQ decoder which produces outstanding acoustic results but avoids the expense presently connected with the logic decoder. The Audionics SQ decoders (known as the 106 series) will easily outperform any current decoder available at up to \$200.00 in cost, yet is priced at \$100.00 (or less depending upon the version you choose). The Audionics 106 series achieve performance very nearly that of logic decoders because of the following innovation

A new 6-Pole phase shift network which produces a Phase Difference Bandwidth from 20HZ to 18kHz  $\pm$

\* TM, Electro-Voice Corp.  
\*\* TM, Sansui Electronics Corp.  
\*\*\* TM, CBS, Inc.



**PRICES:** 106A Module version \$39.95 post paid. requires 20-26 vdc at 10 mA

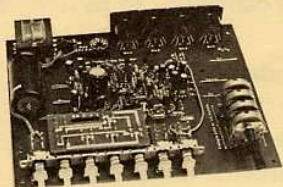
106B Module version with all hardware less case and trim \$74.95 postpaid

106C Complete component version with case and trim panel. \$99.95 postpaid

**ACCESSORIES:** Trim panel less case for use with "B" version. Includes pushbutton trim and knob. \$9.95 postpaid

**WARRANTY:** One year including parts and labor. Unit must be returned to Audionics, Inc., or authorized repair station. 106 A and B versions subject to inspection prior to any warranty service. Units having failed due to incorrect electrical or mechanical installation will be repaired or replaced (our option) for a fixed fee. All units fully tested before shipment and guaranteed to meet published specifications. Prices may be slightly higher at stocking dealers.

106 A



106 B

10° ( $\pm 3^\circ$  at spot frequencies). All SQ discs are encoded with an accuracy from 20HZ to 20kHz  $\pm 1^\circ$ , as specified by CBS Laboratories. Conventional matrix decoders have an accuracy usually of  $\pm 10^\circ$  from 100 HZ to 10 kHz.

The 106 series achieves such high performance with a special 17 transistor circuit (patent pending) which provides for higher overload capability, wider PHASE DIFFERENCE BANDWIDTH and far lower harmonic distortion. The 106 series may be used with the finest audio systems without degradation of fidelity. Besides offering superior electronic performance, the 106 series may be updated to FULL LOGIC performance. Provisions have been made to incorporate logic circuitry at such time that the cost is reduced to appeal to a wide listening audience. To our knowledge, none of the other decoders presently available, including one popular "universal model" offer this provision. **THE 106 SERIES CANNOT BECOME OBSOLETE.**

The Audionics SQ decoder is available in three versions to meet specific requirements of various listeners. The first version is designated the 106A. The "A" version consists of the 106 circuitry on a small circuit board without power supply, switching facilities, or any hardware. The "A" version is furnished with instructions for installation and operation. The module is wired, tested and shipped postpaid for \$39.95. The "A" version is designed for the experienced hobbyist and electronics constructor.

The second version is the 106B. The "B" version incorporates the same circuitry of the "A" version, but the circuit board is enlarged to approximately 5½" x 6½" and includes switching, input/output jacks and all cables, master volume control and power supply. The "B" version is supplied less cabinet or trimplate, buttons and knob.

The third version is the 106C. The "C" version is complete -- plug it in and you're ready to go (assuming you have a pair of rear channel speakers and an extra amplifier).

Whichever version you choose, the high performance remains the same:

Wider phase Difference Bandwidth 20HZ to 18kHz  $\pm 10^\circ$  ( $\pm 3^\circ$  spot frequency)

Flat frequency response  $\pm 1$ dB 5HZ - 100kHz

Lower Total Harmonic Distortion - nominally 0.025%

Superior signal-to-noise ratio -80 dB with only 250 mV rms signal input

Higher overload characteristics before Distortion -- up to 2.5 volts.

Switchable 'Blend' networks which permit you to add-on full logic circuitry now being developed for availability in the near future.

Low impedance outputs for use up to 100' from amplifiers.

#### THE FOLLOWING IS AN EXPLANATION OF SWITCHING FUNCTIONS ON THE 106 B AND C VERSIONS:

Switch One -- power on and off

Switch Two -- 4-Channel Discrete Tape.

Allows reproduction of pre-recorded Discrete Quadraphonic tape. Several reel-to-reel and cartridge play-back systems are available. The 106 decoder's master gain control will regulate the volume on all four speakers but the signal will not pass through the SQ Matrix circuit.

Switch Three -- 2-Channel stereo. Passes normal stereo signals to the front amplifier and mutes the signal to the rear amplifier.

Switch Four -- SQ Decode. Activates the SQ decoder on all SQ, EV and QS encoded material, and gives true quad-

raphonic reproduction. Like the ambience switch, it also gives extraordinary results on 2-Channel stereo sources. Depending upon the integrity of the recording and the mix-down, the effect may be quite different from the 'Ambience' position.

Switch Five -- Ambience. Adds ambience or 'Hall Effect' to most ordinary 2-Channel stereo sources. The effect is a remarkable enhancement of conventional two-channel program material. Sound will come from all four speakers.

Switch Six -- Tape Monitor. Replaces the tape monitor on the Front amplifier which must be left in the tape position to accommodate the 106 decoder. With the decoder switch in the "Source" position, amplifiers connected to the decoder will reproduce whatever signal

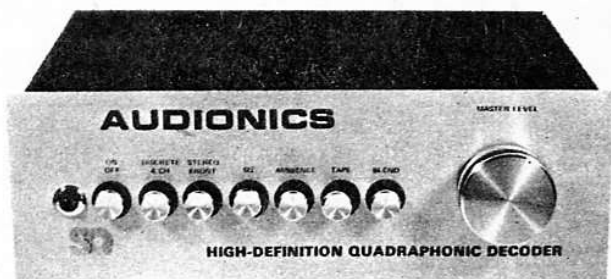
is selected at the front amplifier's control panel. This signal will automatically be made available to the recorder for taping, if required. SQ encoded material from Discs or FM stereo can be taped and replayed through the decoder for full SQ quadraphonic reproduction. When the decoder's switch is in the "Tape" position, and the tape recorder is in the Playback Mode, any source selected at the front amplifier is over-ridden, and only material from the tape recorder will be heard.

Switch Seven -- Blend. Adds a predetermined amount of 'Blend' to the rear channels. Its use is purely subjective. Further spaciousness and greater frontal definition can be achieved by pushing the switch in. In these cases, front-center soloists will be better defined.



## AUDIOFILE® mini-review:

# AUDIONICS decoder



Most of our readers have heard quadraphonic sound and are convinced of its value in adding an extra touch of realism.

These are early days and it is difficult to justify replacing excellent equipment just because it does not have the 4-channel facility. Fortunately, in most cases it is unnecessary to make complicated modifications to up-date the sound. All that is needed is a suitable decoder, some cables and an extra pair of power amplifiers.

The Audionics decoder is a small, (8" wide x 2-1/2" high x 6" deep) self powered unit, designed primarily for decoding the Columbia SQ records. The row of buttons on the front panel provide switching between 4-channel discrete sources such as tape and previously decoded JVC discs, normal 2-channel stereo and the SQ system. The decoder will also extract the out-of-phase information from ordinary stereo records and pass it to the rear channels to create an ambience effect. A master gain control is located on the right hand side of the panel.

The Audionics decoder can be spliced into the Hi-fi system in a few minutes using the four DIN sockets on the rear panel and internationally standardised DIN cables. One socket connects the decoder to the front amplifier tape monitor socket and carries the complete signal from the amplifier to the decoder and returns the front part of the signal. The rear information is passed to a second stereo amplifier by a three way DIN cable terminated at the other end by two RCA phono plugs. A third socket as a tape monitor and enables the tape recorder to be plugged back into the system, allowing coded sources to be taped and replayed through the decoder. The fourth socket carries signals from a 4-channel source, by-passing the decoder circuits, to the appropriate amplifiers.

A well written set of instructions, running to fifteen pages covers every aspect of installation and permutation of equipment from recommended amplifier switch settings to the detailed pin connections at the rear of the decoder. No circuit diagram is given.

### Tests

All the tests were to be purely subjective, since I have no CQ test record with which to calibrate the system, so armed with a handful of SQ and E-V encoded discs I examined the instruction manual and started to up-date the Hi-fi installation.

The first hurdle was at the parts counter of the local electronics store where I was unable to buy all the cables. Instead of using a DIN cable with two RCA plugs, I ended up with one having four. Fortunately, there are no connections at the decoder corresponding to the unwanted plugs and a quick check with the meter showed that I should use the

yellow plug for the right rear and the black plug for the left rear channel.

The power requirements for a rear channel are very much less than the front so I pressed an elderly receiver into service for the experiment, having ten watts per channel, at reasonably low distortion.

The first step in the setting up procedure is to make sure that all the speakers are in phase. This is more than making certain that the color code is observed in the wiring so that positive goes to positive. With two amplifiers, one would conceivably have an extra stage of amplification and there could be a phase inversion at the output of one amplifier. On the Audionics decoder there is a "Blend" button, not mentioned in the text, which I took to provide identical outputs to all amplifier.

### Easy to phase speakers

Using this mode and a bass heavy musical passage it was a simple matter to phase the speakers and adjust the level controls on the amplifiers so that the gain in each was similar.

The instruction manual is quite vague on the subject of how to obtain the optimum gain settings on the amplifiers. Unless the recording is made at the centre of a musical group, with the sound coming equally from all directions, the absolute accuracy of the system does not seem to be too important. I found that the stereo atmosphere was enhanced over a wide range of settings.

CQ records were reproduced magnificently, with a good directional effect from and between all the speakers. E-V encoded discs were reproduced satisfactorily. The jet aircraft obligingly took off from the right directions and the motor cyclist scattered pools of oil around the perimeter of the living room carpet as prescribed in Ovation record OD-1.

Enoch Light's Brigade attacked us from all the corners of the room and from this I conclude that the decoder is suitable for use with all matrix encoded records.

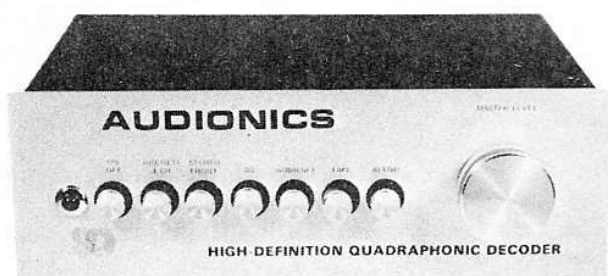
The Audionics Decoder appears to perform its function very well. It acts as a convenient switching centre for all four channel and 2-channel modes of operation and provides a master gain control for the overall system, once the correct volume settings have been determined.

If you can accept a slightly more complicated set-up and the book-shelves can accommodate two more pieces of equipment with some extra cables snaking around, you will find that the Audionics Decoder offers an inexpensive means to sample the delights of four channel stereo. ♦

# QUADRANSWERS

by

ANDREW MARSHALL



## IN SEARCH OF THE PERFECT MATRIX DECODER THE AUDIOPHICS 106C (Audiex Ltd. \$124.95)

As I said last month, I've been a bit unhappy about the available matrix decoders I've heard before. I've been wanting to replace my Sony, which has "front-back logic" (which means special circuits boost signals going to the rear speakers to increase separation from front to back). My experience with "partial logic circuits" (as they are commonly called) is that separation is increased, but in the process the quadraphonic image shifts perceptibly — an instrument can literally move along the wall of the room following another which has just begun to play in a rear speaker. Thus I came to the conclusion that logic circuits were not the answer to improved separation with matrix decoders. (This may not be entirely true — I'm told full logic is much better; but *that's* a story for a later column!) All decoders that I had heard without logic were not much better than Dynaquad (or other ambient recovery systems) for separation. What was needed, I reasoned, was a decoder with a high level of phase resolution, that is, one that could more accurately duplicate the phase-shifting encoding characteristics of the SQ system. Columbia claims encoding phase integrity of 1 degree; therefore all SQ records should be able to be decoded for excellent separation and spatial placement if a *decoder* can be designed to be anywhere near as accurate in its action as the *encoder*.

So I was delighted when Howard Gladstone of Gladstone Electronics offered me a chance to check out the new AUDIOPHICS 106C High Definition SQ Decoder, which claims phase integrity within 3 degrees of original encoding parameters at critical frequencies.

The AUDIOPHICS has a simple (and attractive) brushed aluminum front panel with seven buttons and a large rotary knob. It is quite small, measuring 8 by 3 by 6 inches deep. The knob is a master level control and the buttons are (left to right) On-Off, 4 Channel Tape, Stereo Front only, SQ, Ambient, Tape Monitor, and Blend. I found the SQ and Ambient buttons provide quite different decoding action, the latter being for use with stereo discs, and perhaps for other matrix systems such as Sansui QS (EV-4 is now fully compatible with SQ). The Blend button provides a little less rear separation in order to more firmly place soloists at center front. It is quite useful in getting rid of that disconcerting center-of-the-room feeling with soloists, especially in rock recordings.

But I haven't really told you whether or not it really is a "High Definition" decoder yet. Well I can happily report that it does a very effective job, much better than anything I have heretofore heard. SQ records come out with much better separation than before with *no* shifting of instruments (no logic circuits!) and clean, balanced sound from all four speakers. Now I'm waiting for the chance to compare it with a full-logic decoder, of the sort made by Sony (their SQD 2000 sells for \$400.00 in Canada — a horrendous price).

In terms of technical checks, frequency response is flat through all four outputs, and hum and noise are well below audibility, except for a slightly higher hiss level in the rear channels in the SQ mode only (However it *is* below the noise levels of any SQ records I have). The construction quality is good, although I recommend (as with any piece of equipment one buys) that the unit be heard in the store before it is taken home and plugged in. That way unnecessary trips back and forth can be avoided. I checked out personally three different units and came up with a faulty switch on one; but it was easy to fix, and Audiex were glad to do so. I would recommend that they follow the lead of other manufacturers and include connecting cables in the purchase price, especially when considering that the 106C has only DIN connectors at the rear panel.

In summary I can quite confidently recommend the AUDIOPHICS High Definition Decoder (which is also available in semi-kit form) as an excellent way to get the best out of matrix quadraphonic records, and as well notably enhance the sound of stereo discs. Audiex (a division of Gladstone Electronics) has a mailing address of P.O. Box 156, Station "S", Toronto 20. The main Gladstone store is at 1736 Avenue Road (just above Lawrence) where they have a system set up to demonstrate the decoder.

Next month I'll review several recent SQ quadraphonics releases from the Columbia and Vanguard catalogues, and answer any questions you may have.

(Andrew Marshall is a long-time audiophile and a music commentator for radio stations CJRT-FM, Toronto and CKWS-FM, Kingston. His *World of Music* is heard on CJRT-FM Sunday at 5 p.m. and features frequent quadraphonic programs.)

The preceding review reprinted by permission from *The FM Guide*, June 1973, Toronto, Ontario, Canada

**MANUFACTURERS COMMENT:** Units produced for the United States have both DIN and RCA connections on the rear panel.

The 106C sells for \$99.95 including shipping with a one year warranty for both parts and labor.

The 106C may be ordered directly from AUDIOPHICS, INC., in areas where there are no dealers; slightly higher at stocking dealers.

This letter is our personal invitation to you and other members of your staff to attend an informal and private press showing of our new quadriphonic decoding system. Our Shadow Vector (TM) Quadriphonic System is designed primarily to decode the SQ (TM-CBS) record system as well as other matrix forms.

The Shadow Vector system performs the SQ decoding function with some notable improvements. Specifically, there is NO suppression of ambience nor is there any additional enhancement. Ambience retrieval from SQ discs is as originally mastered. In addition to full ambience recovery, separation is maintained to beyond 30dB with no conventional "logic" sounds --thus there are none of the detrimental effects to the reproduction sometimes associated with logic decode circuitry. A wide variety of U. S. and the latest European pressings will be demonstrated and you are invited to bring any particular discs that are of personal interest.

The demonstration will be held at the home of our Northern New Jersey retail dealer, Mr. Roger Isele, 180 Wearimus Road, HoHoKus, New Jersey. If you desire, we can provide personal transportation from Manhattan or the Newark Air Terminal. The dates are May 29 and 30, 1975. Please arrange to let Audionics, Inc., or Mr. Isele know of your intentions regarding attendance. We have scheduled this press showing before CES due to the hectic nature of CES and because many audio journalists do not attend CES. Light refreshments will be served and you are invited to stay as long as you like to listen and evaluate the system under excellent listening conditions. Associated playback equipment of a very high standard will be utilized.

Please contact Mr. Isele at 201-444-0570 or Charles Wood at Audionics, Inc., Portland, Oregon. We look forward to demonstrating our system to you on May 29 or 30. Thank You.

Sincerely yours,  
Charles Wood

**AUDIONICS, INC. — AUDIONICS INTERNATIONAL, INC.**

High definition SQ products, stereophonic amplifiers, and loudspeakers  
U.S. distribution and sales agency for Radford Electronics, Ltd. and Radford Laboratory Instruments, Ltd.



# News

QUADRIPHONIC NEWSLETTER Nov-Dec 1976

## AUDIONICS

Suite 160  
10950 SW 5th  
Beaverton, Oregon 97005  
(503) 641-5225

Interest in both the TATE System and Audionics Shadow Vector Decoder continues with inquiries arriving at the rate of several dozen per week.

Delays at National Semiconductor have backed up our production timetable for a general consumer version decoder by Audionics utilizing the TATE integrated circuits to decode SQ\*. Packaging and styling of our consumer decoder has been finalized. The Audionics/Tate SQ decoder will be housed in a 3 1/2" rack mount to match Audionics new BT-2 high performance preamplifier and power amplifier. A four-channel power amplifier is slated for release in late 1977.

The projected consumer price for the Audionics/Tate SQ\* decoder is under \$200.00. The TATE integrated circuits will be available to other licensed SQ manufacturers. Due to variations in integrated circuit production it is expected that several groups of TATE integrated circuits will be available offering various degrees of performance. Audionics will utilize TATE integrated circuits yielding the highest degree of performance with respect to separation, signal to noise ratio, and lowest distortion. It is expected that even the lowest performance TATE ICs (which will be probably be favored by manufacturers of low to medium cost receivers) will provide a level of performance far in advance of current consumer matrix decoders and surpassing the most current carrier system type demodulators in separation, distortion and decoding bandwidth.

The SHADOW VECTOR SYSTEM, a professional decoder for broadcast, studio, and advanced audiophile applications, has been under development by Audionics for several years. The Shadow Vector SQ Decoder is scheduled for release following our introduction of the Audionics/Tate SQ decoder for consumer use.

Both units perform SQ decoding functions at a level of performance here-to-fore unavailable to the general consumer and professional user. It should be pointed out that while producers of records using other quadriphonic systems have released very few discs the past few months, Columbia Records (CBS) and other SQ record producers have increased their catalogues at a very steady rate. At the same time development of advanced decoding systems for SQ has continued by Audionics, CBS, TATE, and others.

It is the opinion of Audionics, Inc., that within the 1977 calendar year SQ will be accepted as the World Standard for quadriphonic reproduction.

\* SQ is a trademark of CBS, Inc.

Shadow Vector System is a trademark identification of Audionics, Inc.

TATE SYSTEM is a trademark identification of TATE Audio, Ltd.

This newsletter is provided as a service of Audionics, Inc. to individuals and firms upon request and may not be reprinted for public distribution without permission of Audionics, Inc.

## Shadow Vector Quadraphonic System<sup>TM</sup>

The Shadow Vector System is intended for professional review of quadraphonic sources. It permits accurate appraisal of encoder integrity by direct viewing of oscilloscope outputs or listening through high definition monitor loudspeakers. The audiophile or professional can be assured that the superb quality of the SQ\* mix is being heard with complete accuracy and original perspective.

Specifically, the Shadow Vector System offers the following advantages over conventional SQ decoders:

Full separation for direct sounds—in excess of 30dB. Resolution of complete SQ code: The four corners, and any position intermediate between any corner, including diagonal splits, yielding full performance in any position used by the code. (1)

No distortion of sound field—reverberation present in original mix is present at original level at all times and is smoothly distributed over a wide arc, eliminating any sensation of shifting perspective or unnatural spatial environments. (2)

Distortion is substantially lower than encoder.

Subjectively, the Shadow Vector System offers the following advantages over conventional SQ decoders:

The sensing circuit is sufficiently rapid to be effectively “quicker than the ear for localization purposes. No other commercially available decoder can claim this.

The reverberant field of the Shadow Vector System is evenly spherical at all times with

smooth phase shifts between speakers localizing reverberation beyond confines of the listening room. “Full logic” decoders reproduce a reverberant field that is totally suppressed except for momentary “holes.” This is why many discs are recorded in surround sound—to permit a glimpse of the rear reverb by placing direct sources in the rear, which unclamps the rear channels only as long as a direct source is present in that direction. Full Logic and variblend reverberant field is triangular in shape. Listen to a center front located soloist with such a system and you will hear reverb from a triangulated area defined by left front, right front, and a sharp point between the rear speakers.

In summation, the Shadow Vector System will decode SQ discs without loss of ambience due to “logic” effects, with low distortion, and without loss of definition. The system offers “discrete” type performance without the liabilities of restricted program sources or the sonic limitations of carrier type disc systems. The Shadow Vector System will of course provide excellent results with other matrix systems as well as conventional stereo discs. Currently the European and American SQ catalogues are expanding at a rapid rate thus insuring a continued growth of program material.

The Shadow Vector System is expensive to be sure and will remain so. For most listeners conventional SQ circuitry will more than suffice. For the advanced audiophile who is reluctant to give up the performance inherent in state-of-the-art stereo equipment, there probably is no other alternative.

### Specifications:

**Controls:** Power switch, left front, right front, left back, right back channel gains. Input gains for left and right channels and left and right crosstalk adjust. Adjustments provided for decoder separation, decoder master gain. Additional controls for meter select, stereo tape monitor, quadraphonic tape monitor, stereo, EV (Stereo-4), SQ standard, SQ-in phase, SQ exterior.

**Features:** Variable separation, dynamically accurate VU meters, oscilloscope output jacks. Selectable program phasing for evaluation of different aspects of SQ program mix.

**Frequency Response:** 20Hz to 20kHz  $\pm$  1dB

**Phase Accuracy over decode bandwidth:** One degree or better

**THD and IM Distortion:** Less than 0.05% at 2.5 volts output; typically less than 0.025%.

**Construction:** Military grade, thru-hole plated G-10 fire retardant circuit boards. Components to computer/military grade throughout. Resistors typically 0.25% to 1% tolerance, tantalum capacitors, optional rack mount for professional applications. Provisions made for electrical interface with studio and professional use.

**Dimensions:** 19" wide x 5¼" high x 11" deep.

**Price:** \$1,250.00.