

ROLLING STONE[®]

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AUDIO SUPPLEMENT

EARS ONLY

Audio Supplement on
The Sound Machines of 1975: How to
buy them, use them, tune them, stroke them and
otherwise, make the most of them.

Now, from JBL, something you've probably never heard before: the other half of the music.

(JBL has perfected an entirely new sound system. The most astonishing part is a new high frequency transducer that can fill a room with the high half of sound. It works – well, it works like a nozzle.)

We're going to talk about acoustics and harmonics and all sorts of heavy stuff for the next minute or two. We'll try to do it with merciful brevity. But at the end we're going to unveil a new \$396 loudspeaker called Jubal.



For that kind of money, you're entitled to know what you're getting into.

First, music.

Half the music you hear is in the low and midrange of sound. "Fundamental tones," they're called: the human voice, a piano, a guitar, a violin, a trumpet, whatever. That's where you hear the basic shape and form of sound.

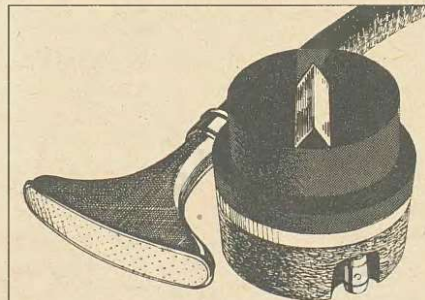
But the character of music, the music of music – overtones, onset tones, all the harmonic shading

and texture and subtlety are hidden in the highs. (Without them you couldn't tell a flute from a trumpet from a piano.)

Next, the hard stuff.

Any good sound system is designed to disperse sound throughout the room. What you hear and feel is direct and reflected sound. Together they create ambient sound, the sense of being in the middle of something.

Now, as long as the music is in the low and midrange, the



The Nozzle.™

It's formal name is the JBL 077 Ultra High Frequency Transducer.

It was developed because the world of recording and listening is still very square. Sound studios, auditoriums and living rooms are box-like.

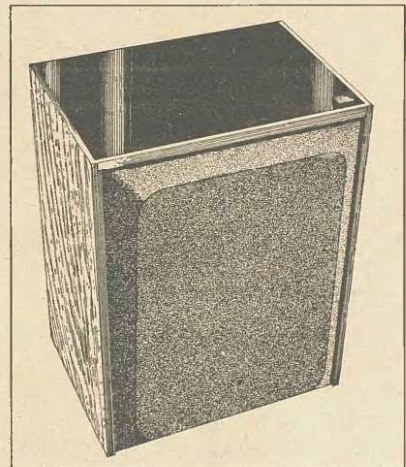
But sound is conical, circular, radial—the pebble in the pond.

The Nozzle™ accepts enormous amounts of high frequency power and disperses it into a near-perfect horizontal pattern.

The result? Pure, bright, transparent, distortion-free high frequency tones throughout the room.

Nice.

The Jubal is the smallest floor system we make. 24" x 18" x 13". It has a handsome smoked glass top and a unique three-dimensional grille in Midnight Blue, Rust Red, or Earth Brown.



traditional tweeter will spread it around. But as the tones go higher, the tweeter narrows its range. There's a pea-shooter effect. You have to stand directly in front of the speaker to hear the high highs. They never get to the rest of the room.

Enough words. Go hear the music. Take a favorite tape or record – something you know by heart – and ask your JBL dealer to hook it up to Jubal.

If you think Jubal sounds like something special, friend, you don't know the half of it.



I Have Been to the City of Hope and My Ears Are Open Wide

By Tim Cahill

42

Paul Klipsch walked into church one fine day and saw a good seat in a pew down front. Right in the middle, too—a perfect place to hear from, in case the preacher started lapsing into unsound theology. So he stepped right over the back of the pew, directly into the seat.

Why didn't he make his way down the pew, excusing himself to the parishioners as he passed? Like anybody else?

"It looked more efficient that way," said Colonel Klipsch.

The Colonel is an audio inventor, credited with what may be the world's most efficient folded-horn speaker, and his attitude might be extreme but it's something he shares with hi-fi nuts the world over. Efficiency. Clarity. Get that sound.

It's because of such people that we have hi fi today. We owe them a lot, and this special supplement to ROLLING STONE is about their endeavors in one way or another. About Colonel Paul Klipsch, for instance, and his 40-year diary of track laps, craps and scores.

Turn Up the Volume, My Foot's Asleep

By Charles Perry

36

A younger audio inventor, one working in a newer and touchier zone, is How Wachspress. He's devised his own way of transmitting sound, but unlike the Colonel he doesn't aim to fill a room. He wants to send sound directly to your skin. Is this hi fi for the deaf? Sonic sex for the man in the moon? The first stage in justifying How's slogan, "Reality Is Obsolete"?

Baffles, Condensers, Equalizers and Limiters: This Is a Recording

By Bob Palmer

56

Rock & roll has made the most exacting use of hi-fi techniques in the recording studio, as anybody who listens to rock knows. It's a mysterious world, full of talk about hot mikes and fat drums, not to mention the guitar as gunslinger.

Bob Palmer is in a position to know about the studio scene, because he was a Memphis studio reed man from '64 to '66. A graduate of the defunct group of rockjazzers known as the Insect Trust, he's made a legendary (because unreleased) album with saxophonist Ornette Coleman. This spring he'll be a visiting professor of music at Bowdoin College.

His most enlightening experience while writing the studio story came when he spent a day with Rodney Mills in his Atlanta studio. "Not so much

that I saw anything new," he says, "but I finally understood things I'd taken on faith."

A Magnificent Seven: The Professional Set

By David Hamilton

52

Just for completeness, what do those console-wise record producers and engineers keep in their own homes for when they want to listen to music? You want it, you got it.

TV Sound: Please Stand By

By Ben Fong-Torres

49

Now that television has finally begun to admit serious rock & roll exists, it's become obvious that TV's been getting away all these years with terribly low fidelity sound. TV is mostly talk, and the quality of sound doesn't make it impossible to make out the words. But a dime-store record player gets better fidelity. The scandal of the age (but there's hope).

You Better Shop Around

By Len Feldman

74

ROLLING STONE'S Acoustics columnist contributes an eye-opening tour of some New York hi-fi spots, which shows that you can't always get what you need—namely advice—from a salesman. You'd better read up a little about hi fi.

Take This . . . And This . . . And This . . .

By Len Feldman

77

And here's something to read—a survey of the basic and not-so-basic accessories you

can adorn your hi-fi system with, courtesy of Mr. Acoustics.

All Power to the Four-Ears

By Len Feldman

70

Len is a professional hi-fi reviewer with \$30,000 worth of testing equipment in his home. He's written six books on audio, including *The Rolling Stone Guide to High-Fidelity Sound*, and often speaks at hi-fi exhibitions: You can hear him at the New York Hi-Fi Show the first week in October. He was involved in the development of one of the early quadraphonic systems, the Electro Voice system, and has kept careful track of the quad story since. Here's what's been happening.

The Best System: Mix and Match

60

For the prospective purchaser, here's a list of ten hi-fi systems in ten different price ranges (\$450 to \$9000) which is also an instructive essay in how to construct a system and how to upgrade one you already have.

EARS ONLY

TURN UP THE VOLUME MY FOOT'S ASLEEP

BY CHARLES PERRY

It sits there like an old Hoover vacuum cleaner. Only it doesn't inhale dust, it exhales vibrations. And the hose isn't coming out of a squat globe, but out of the top of a cube about 14 inches on a side, painted fire-engine red. How Wachspress talks about it as if it were a monolith from 2001.

How—that's his whole first name—has luxuriant black hair, immense muttonchop sideburns and a gentle, inward expression as if he's keeping quiet about a surprise party. His monolith is the "Auditac Sonic Stimulator": It's a sort of limited-access loudspeaker for every part of the body *except* the ears. "The Beatles on your back. Bartok on your belly," croons an Auditac leaflet; "Beethoven between your legs." It's the first in a series of "tactile communication devices" How thinks are going to revolutionize our society as much as television has.

At the moment the papa of the revolutionary device is sitting tight. Not one Sonic Stimulator has been sold, for fear of interference on his patent applications. But on the morning after Richard Nixon's resignation, he kindly consented to give ROLLING STONE's unbiased test panel a demonstration of the device, plus unlimited glasses of apple juice.

The Sonic Stimulator idea is simple. The ear is a specialized organ for transmitting sound signals to the brain, but since sound is merely physical vibration, any pressure-sensitive organ can "hear." The palm of the hand, for instance (very good, says How; good hi-fi reception because of its abundance of nerve endings). Or the groin (also good for the same reason and because of the various internal organs nearby, each with its own complement of sensors). The elbows and knees are good listeners too, because they readily transfer sound vibrations to the skeleton, thus sending messages from all over the body.

The experience is a little like being at a live concert on about 12 square inches of your body. The music is faintly audible to the ears, but the air in the probe is pummeling your flesh like a concert hall speaker. How can envision a setup that would cover the entire body with sound vibrations, but would make so little audible noise that the landlady would never know the Fillmore was going on upstairs.

And a better system would involve having the hose filled with liquid instead of air. "Oh yeah," says How. "I've played with it in the bathtub."

It's a long and winding road that has led this 29-year-old from being an aeronautics major at Brooklyn Tech to an audio inventor in a tiny and incredibly compact San Francisco apartment stuffed with electronics paraphernalia—even in the kitchen. Fortunately, How Wachspress is equipped to understand it; he's into Alan Watts, dynamical analogies, basic psycho-physical processes, the concept of unity—understanding things on the level where the essential difference disappears be-



See the tattoo? Right below that is Sonic Stimulator, son of Tuning Fork.

tween, say, sound and electricity. As he recounts his life story, he regularly pauses to sum it up in terms of larger processes. Such as, "So my interest in audio went through these stages: reproduction, recording, synthesis, multimedia."

While explaining things, he doodles arrows on a notepad. "I am a person," he says, "who has survived all sorts of disasters and setbacks because I've known what I wanted to do."

One of his early setbacks was dropping out of Cooper Union at the age of 19. He went to work at a plastics factory, which gave him an idea of what was involved in manufacturing. As a consequence, he says, he has a horror of becoming a manufacturer. When it comes time to manufacture the Sonic Stimulator he envisions non-exclusive licensing of everybody who wants to manufacture it, rather than setting up his own factory. (How promises this soon. The crucial claims of his Teletac patent application have been allowed—and he expects to set up some sort of public showcase within a year.)

During a trip to London in 1966 he

was inspired to revive his childhood dream of being an inventor when he saw a museum exhibit of the prototypes of famous inventions. Back in New York, he scuffled around in audio technology, something he'd returned to after Cooper Union; as a child he had messed around with early model tape-recorders and the like, because his father was an audio engineer. How worked as a news recorder for WBAI-FM in New York and did odd jobs around recording studios, not counting a little research and development for a business machine company.

Then he fell into a situation that changed his life. It was 1969 on the Lower East Side and, as he says, "Hair was in the streets, not on the stage." One of the unique institutions cast up by the wild ferment of those days was a sort of psychedelic playground called Cerebrum. Fifty-six customers at a time would spend a couple of hours wearing translucent white robes, being fed strawberries soaked in wine and playing with touchy-feely toys like giant balloons, lying under collapsed tents of parachute material and stroking each

other with hand lotion. The addition of a low-keyed lightshow and music made it what it was dubbed, a sensorium. How was brought in to fix the sound system; he was also a Cerebrum "guide."

Cerebrum eventually folded, a victim of cashflow problems and, in How's opinion, an inability to interest customers in returning. "Somebody called those the Go-Go Years," he recalls. "It was a wild time, people were trying anything. I got into all the senses. I was inventing atomizers—I still have a scent library. And it was at that time that I got the original acid flash of multimedia. The idea of two-way tactile communication over a distance. Carrying it to its most outrageous extension, a fuck-by-phone machine."

It was just a flash at the time, though. He started experimenting and realized the essential problem was not how to send messages over a wire—Alexander Graham Bell had settled that—but how to transfer tactile sensations into electronic messages. He went around touching people with tuning forks, blowing into tubes touching their skin, groping for a key. Eventually this was to lead to the fire-engine-red vacuum cleaner on the floor of a San Francisco apartment.

But not right away. How got a job as sound man and truck driver for a rock band, and got canned in Fort Worth ("once the sound system was working right"). Flat broke and halfway between New York and the West Coast, he elected to go west.

In Los Angeles, he now sheepishly admits, he went to real estate school to organize himself a source of income. In February 1970 he moved to San Francisco and worked in real estate. By this time he'd decided he needed more audio engineering background. He got a first-class radio license and later went back to school for another year.

At school he used the lab to make his first Auditac prototypes in 1971, and by January 1972 one of the prototypes satisfied him. In July he became chief engineer at KSAN, the underground FM station. The next month he gave a public demonstration of Auditac at a seminar of a group called Sexual Attitude Restructuring, held in the basement of San Francisco's avant-gardist Glide Memorial Church. The orgasmic response of some of the participants led to an article in London's *Evening Standard* by Richard Neville, late of *Oz* magazine, and eventually an article stressing the sexual possibilities of How's inventions in *Oui*.

"I'd rather not emphasize the sexual aspect as much as the *Oui* story did," says How. "They just concentrated on one aspect. There are so many possibilities." Not that he's above making invidious comparison between his baby and a conventional vibrator, the kind advertised "for relieving tension." "This is the competition," he says condescendingly. "Only one note. And a distorted note. This is not hi-fi: By comparison with the Auditac it's the Stone Age."

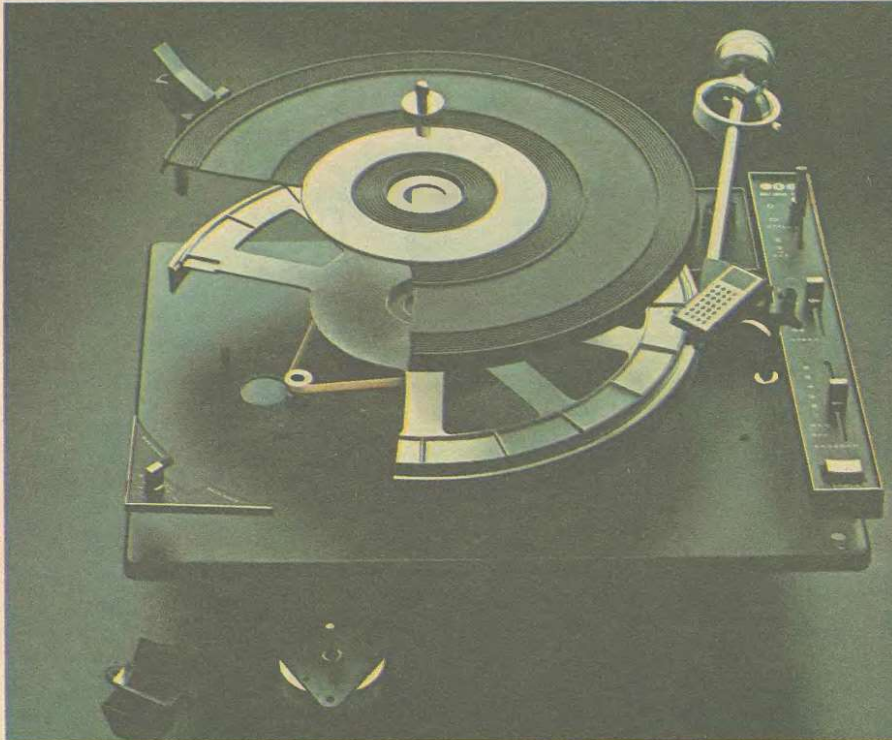
But there are the other possibilities. Such as shaking hands with the folks back home [Continued on Page 38]

WE HAVE CHOSEN THIS RATHER UNORTHODOX WAY TO PRESENT THE NEW B·I·C™ TURNTABLES—BECAUSE THE NEW B·I·C TURNTABLES ARE RATHER UNORTHODOX.

Traditionally, new audio equipment (new anything for that matter) is introduced with orthodox "product shots".

In the case of the B·I·C 980 and 960 we're breaking that mold. We're taking you inside and underneath—because much of the real beauty of these instruments lies in the innovation and engineering that's there.

In the exploded view you see a combination of things not found in any other turntable—a belt drive system and a record support post. Never before has there been a belt drive turntable



with automatic multiple play capabilities. Only B·I·C has this combination.

At right you see the B·I·C program panel. With it you can operate these turntables manually. Or you can elect to play a single disc automatically. Or you can repeat a single disc as many as 6 times. Or you can play from 2 to 6 discs in series.

For the first time one turntable combines the advantages of a manual unit with the convenience of perfect automatic record handling—without sacrificing playback performance.

The Worm's Eye View

The underside of the turntable is revealing.

Compare it with the underside of any unit you choose and you'll be struck by the simple, clean appearance of the B·I·C.

Many moving parts found in turntables with automatic features have been eliminated. (We've sold and serviced millions of automatic record players over the past 37 years and one thing we've learned is that simpler is better and less is more.)

The motor is a 24-pole, 300 RPM unit. It has the torque to move the platter to playing speed in $\frac{1}{8}$ a revolution. The 1800 RPM units used in automatic turntables are simply no match for its smoothness, silence, and durability.

Only B·I·C has a 300 RPM 24-pole motor.

The 4 shock mounts at the edge of the unit plate form an acoustically damped interface between the unit plate and base. These hollow rubber, spherical cushions were designed specifically for B·I·C Programmed Turntables.

Conventional units use metal springs.

Other Intriguing Features

The B·I·C tone arm includes features you won't find on any other arm at any price.

The cartridge shell can be adjusted so that optimum 15° tracking can be achieved no matter how deep or shallow your cartridge body is.

Cueing time can be adjusted for from 1 to 3 seconds via a knob on top of the unit.

Seven other adjustments can be made from the top of the instrument which permit easy fine-tuning of the tone arm system, to a greater degree than has ever been possible before. The control tabs and linear scale for anti-skate and tracking force adjustment are unique. The cycle button which controls play is unique. Etc. Etc.

Dependability

B·I·C Programmed Turntables are made in the United States, in our own factories. We mention this because quality control is probably *the* most important factor in building this kind of equipment. The fact that the specifications for these turntables have been created and quality controlled by B·I·C is more important than you think.

Performance

We barely have space here to hint at the things you should know about these turntables and their performance.

Your audio dealer has a comprehensive 26-page booklet about them which includes performance figures, dimensions and details about the B·I·C 2-year warranty.

Get this booklet, or write for more information to Andrew Stephens, Dept. 9M, British Industries Co., Westbury, N.Y. 11590. We think you ought to compare turntable features before you buy. If you compare ours with any and all others you're considering (price no object) we'll be happy. We think you will be too.



The 980 and 960 are identical except for the 980's electronic speed and pitch control circuitry and its lighted strobe. Accessories available include solid oiled-walnut wood base—matte black molded base—and hinged dust cover. The 980 will sell for approximately \$200. The 960 for about \$150.

TURN UP THE VOLUME MY FOOT'S ASLEEP



"We're still in the mono stage. We'll probably develop multitrack systems, one guy playing for the elbow, one for the crotch, one for the face. . . ."

R. Footbath

[Continued] when you've just landed on the moon. Such as translating visual information into sound, watching a TV program with your hand. Such as Hyper-reality, an abandonment of what How calls man's "historical preoccupation with the need to maintain constant images of the physical world . . . a product of his extreme orientation toward physical survival in a hostile environment." In other words, treating the sensory apparatus as a jungle gym, something to play with. How has described it as "like making adjustments on a television set, except you are what's plugged in." But outside of the slogan "Reality Is Obsolete," much of this is hush-hush stuff. How smiles enigmatically and promises big surprises.

"I've been getting into experiencing sound as a constantly evolving multi-dimensional experience. Part is ear-based, the rest is the evolving body-based experience, part of it connected to the ears." One of How's favorite images is the shark: Certain sharks, he says, have tubes running the length of their bodies that relay sound information to the ears.

But How is less interested in ear-based hearing than in sensing sound through pressure sensors in the body: in the skin, the joints and the internal organs. He claims to have become so sensitized to sound that he can't bear to listen to Santana with the Sonic Stimulator at full volume. "Some people have repressed touch awareness," he says. "They ask why this machine doesn't flash them out as much as they expect. But I had two women down here from The Bodycentre to try it, and they asked me to turn the volume down, it was too intense for them."

Music isn't all you can listen to with your skin, of course. "I could play you some sound effects," says How. "I could set up one of these sensory probes to give the feeling of the ocean, all the sensations of the ocean—you'd feel water churning." In fact, most music contains a lot of wasted effort from

the touch audience's point of view, because the range of the skin's sensitivity is confined to lower frequencies than the ear's. The range of hearing of the ear is from 20 cycles per second up to 15-20,000. The body can sense up to 10,000 cycles, though How admits it's hard to distinguish one note from another above 1000, and of course the power of a wave is dependent on its length. The higher the note, the more difficult it is to transmit.

How recognizes the problem. "You've got to realize," he says surprisingly, "that the skin wasn't meant for hearing." Surprisingly, that is, if you think the senses should necessarily be used the way they were meant to be. Hyper-reality is a whole new game.

But while the skin has less sensitivity in the upper registers, it has vastly more in the lower. The ear doesn't register below 20 cycles, but of course the skin can register *no* cycles—constant pressure. "The ears are more sensitive in a specialized way," says How, "but the body is a broader-band receiver. The ears can't detect seven cycles per second, but of course the chest cavity can—that's the resonant frequency of the chest. Enough power at that frequency would make you explode."

How puts the equivalent ratio between high and low notes between ear-based and body-based hearing at roughly ten to one. "If you had a mythological electronic device that could take all the information out of the hearing range and restore it in the body range by dividing by ten, you'd have it made. There are all sorts of frequency dividers but they won't divide all the frequencies in a band, linearly. I'm working on a device that would transfer it, an auditory-audiotactile converter. You could take it on the street and convert any sounds into tactile information.

"We're still at the monophonic stage of audiotactile experience. Once this thing is going, lots of new instruments will come out. New schools of music, new styles of composition will be devel-

oped. New scales, not based on the octave.

"We haven't yet explored the possibilities of compositions specifically designed for sexual excitement. So it's all brand new. We'll probably develop multitrack systems — one guy playing for the elbow, one for the crotch, one for the face. And there won't be any rules, because nobody will be in a position to say, 'That's wrong, because we're in the Neoclassical Period of the Elbow.'"

REPORT OF THE UNBIASED TESTING PANEL

Our researcher, Dr. Feltbetter, experimented with the Auditac probe in four postures: standing, sitting, crouching and lying. Areas stimulated included the hand, belly, calf, elbow, knee, back and face, both with and without earphones to make the sounds more audible to the ears. How suggested, and Dr. Feltbetter agreed, that hearing the sound clearly while sensing it makes for a more satisfying experience.

General conclusions:

1. Low notes are far more successful than high notes.
2. Strongly marked rhythms come across best.
3. Variation in tone and rhythm adds considerably to the interest.

If these sound like the criteria of a good rock & roll instrumental, it's not accidental. "Yes, it's true," says How. "Pop musicians are already in tune with the idea of playing with their equipment, they already understand body music and are into some degree of man-machine interface. I remember in the olden days lots of groupies used to snuggle up to the speakers at concerts."

Dr. Feltbetter evidently found the experiment absorbing, especially when he had the earphones on while applying the Sonic Stimulator probe. How declared at one juncture, "He's not paying any attention to us, he's completely inside his body now." At several points, the Doctor asked for "more volume."

The opening drum line of Santana's "Hope You're Feeling Better" elicited a sharp, high-pitched giggle.

In conclusion, the Doctor declared the effect of the Auditac "entertaining and relaxing. I look forward to the day of the sonic massage." He also expects use of the principle for Feelzak in supermarkets and possibly in advanced weapons design.

"But there may be limits to our appreciation of hi-fi feels," says Dr. Feltbetter. "Not every cycle's gonna get you off."

YOUR STROKE PARADE

Dr. Feltbetter's Top Ten:

1. "Superstition," Stevie Wonder
2. "Sugar Magnolia," the Grateful Dead
3. "California Man," the Move
4. "That's the Way God Planned It," Billy Preston
5. "Keep On Growing," Derek and the Dominoes
6. "Layla," Derek and the Dominoes
7. "Se A Cabo," Santana ("or any other cut from *Abraxas*")
8. "Dark Side of the Moon," Pink Floyd ("or any other cut from the album")
9. "Let Me Sing Your Blues Away," the Grateful Dead
10. "Johnny B. Goode," Chuck Berry

Supplemental Listing of Folk and Classical Hits:

1. "U Kurshevo Ogin Gori," unnamed village orchestra, *Macedonian Folk Dances Vol. 1*, Folkraft 24
2. "Rukina (Seven Drums of the Mwami)," *Music from Rwanda*, Barenreiter BM 30 L2302
3. "Tampai Gyentsen (The Banner of the Faith)," *Tibet 1*, Barenreiter BM 30 L2009
4. "Dueling Tubas," Martin Mull
5. "Toccata and Fugue in D Minor," J.S. Bach (or any other Bach organ music)



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A Klipsch LA SCALA® theater speaker does more for your sound system than a bank of conventional loudspeakers. And with far less distortion. Feed it rafter-splitting rock or a gentle ballad. The three balanced horns give it right back the way you put it in.

LA SCALA can fill any big auditorium as it does Radio City Music Hall. Or you can tame it for your home. Being 160 times more efficient than a typical "Acoustic Suspension" loudspeaker, it will perform as loud with a good one watt amplifier as an "Acoustic Suspension" speaker with a 160 watt monster. And a whole lot cleaner. You can have it in birch plywood, raw or black. \$525.

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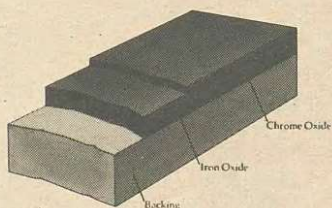
Introducing the Classic Cassette with ferri-chrome.



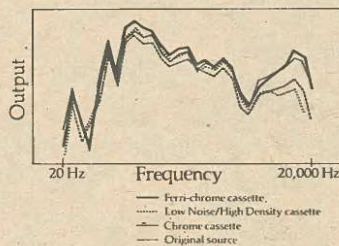
Truer than chrome. Truer than iron oxide. Compatible with all cassette recorders.

Its secret is a tape double-layered with oxide. Through advanced 3M technology, ferri-chrome literally combines the best characteristics of two coating formulations into one. Its chromium dioxide coating delivers high output and brilliant high frequencies; its gamma ferric iron oxide provides superb mid-range and rich low frequencies and low noise levels. Together they give you full-range performance you've never heard before in any cassette.

This ferri-chrome combination gives "Scotch" brand Classic cassettes



fidelity that often deceives the sharpest ear. Included in a variety of test procedures was the use of a Brüel and Kjaer Model 3347 spectrum analyzer. We began with the original play (record) of a broad-spectrum piece of music, first measuring output levels versus frequency from the record, then the Classic cassette recording of the record, and finally, the record recorded on our low noise/high density cassette and on our chrome cassette. Our graph shows the results:



Compatibility is another ferri-chrome bonus. It means Classic cassettes will deliver optimum performance on any quality machine. (On machines with a chrome switch position use the HIGH or NORMAL switch position.)

Along with Classic cassettes, we've also developed an outstanding Classic 8-Track cartridge and Classic open-reel tape. Both with their own special oxide formulation which offers sound brilliance beyond previously unsurpassed "Scotch" brand standards. Super quiet. Utterly responsive.

The Classics — cassette, cartridge, and open-reel tape — are quite simply and clearly the best we've ever made.



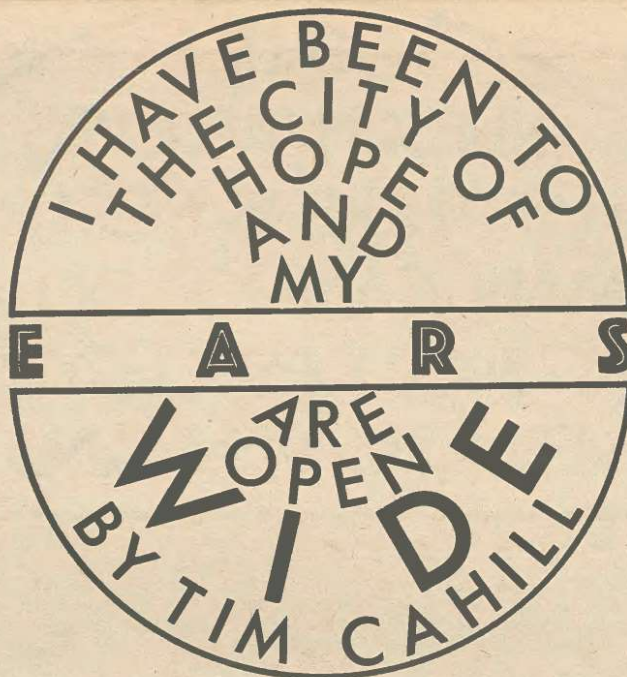
3M
COMPANY

SCOTCH IS A REGISTERED TRADEMARK OF 3M CO.

Scotch brand. The Master Tape.



Paul Lipsch is the only man I know who has to tell you how a clock works before he can tell you what time it is.



How I came into possession of the two great beasts is an overlong and convoluted tale. Suffice it to say, they take up about a cubic yard apiece of my living space and are remarked upon with some apprehension by guests. One is obliged, in the confines of my flat, to sit no more than a few yards from these monsters, staring directly into the bore, as it were.

More than anything else, I suppose, it is the gaping flat black maws which give the impression that, in irresponsible hands, these Klipsch La Scala speakers are capable of shattering aural cavities and leaving one dazed, unconscious and bleeding from the brain. Not entirely so, of course. More than once in the last few years — for explicable reasons associated with indulgence—I have cranked the La Scalias up past the threshold of pain. And yet . . . I live. I hear.

Other smaller speakers, given the proper amp, are capable of pounding out more noise. But these Klipsches, how to describe them? Surgically precise: That gives the impression of cleanness, but it also suggests they may be a bit sharp or shrill at high frequencies, and that is not true. At the bottom end, one has no difficulty distinguishing between a closely spaced bass drum-beat and a Fender bass note. There is none of that "guttury" sounding extra bass some manufacturers build into the speakers they build for the rock market.

A quick aside: It was the summer of 1956 when I bought my first phonograph, a pathetic portable with a built-in speaker. The saleswoman, I'm sure, marked me for a pimply rube. She put a 45-RPM copy of "Don't Be Cruel" on the turntable and cranked the bass over to full. Elvis had never, but never, sounded that way on the radio. Some several weeks after I got the phonograph home, it slowly began to dawn on me that I had somehow been taken.

Such was my seminal audio experience, and this coupled with a truly monumental ignorance of acoustics and physics has made me the aural counterpart of the clod who says, "I don't know anything about painting, but I know what I like." As a technical incompetent, I am forced to rely on the time-honored earbone method of speaker evaluation. Cymbals better sound like cymbals and not like someone *shhsh*-ing into a microphone. There should be no muddiness in the vocals on a well-produced record, and unless the bassist is using a fuzztone, there should be no audible bass distortion.

My two La Scalias meet these tests admirably at both low and high vol-

ume. I used to think it had something to do with their size, that in smaller speakers the sound gets all strangled up for lack of room and comes out sounding choked. Nonsense, professional recording folk have told me. They've taken pains to explain about horn loading and intermodulation distortion and 32-foot bass waves and every other goddamn thing—all in this sad, condescending tone—until I got the distinct impression that, in their opinion, I had hooked up my amp to a pair of Rembrandts when the best I deserved was Keanes.

But the professionals had other more interesting stories to tell. The speakers were made, not on the East or West Coast, but in Hope, Arkansas, a tank town of the first water. They were invented by a fanatic scientist and audio legend in his own right, Colonel Paul Klipsch. The Colonel, it was said, was irascible and took God's own sweet time making his speakers. He was supposed to be a pilot, a marksman, a millionaire and a mad genius. Estimates of his age ran anywhere from 70 to 105 years.

After years of collecting Klipsch stories, I finally managed to meet the Colonel. I have been to the City of Hope and my ears are open wide.

Hope, Arkansas, is located smack in the flat fertile groin of the Red River Valley, near the borders of Louisiana, Texas and Oklahoma. It is 20 miles from nowhere, 30 miles from Texarkana and 90 miles from Shreveport. Truck drivers stop in Hope only long enough to see if there are any West Coast "turnarounds" to be had. (These are big black pellets of speed powerful enough, so they say, for a man to highball on out to the West Coast, turn around and start back in one sitting.) A nonfatal traffic accident is front-page news here and the miniature golf course is thriving.

Hope, named for the daughter of the man who laid out the town in 1873, has its own small measure of fame. Jim Bowie had a blacksmith hammer out the first Bowie knife in nearby Washington, and Hope itself, the chamber of commerce claims, is the home of the world's largest watermelons. In 1935 Mr. Oscar D. Middle-

brooks crossed him a big round watermelon with a big long watermelon to get a big round long watermelon that weighed 195 pounds. It was the largest watermelon ever grown on the face of the earth. Middlebrooks called it the Hope Triumph.

Lumbering, agriculture, poultry and light industry are big in Hope. Most of the townsfolk don't really know what all goes on at Klipsch and Associates, out there a couple miles down the road in the tiny rural town of Oak Haven. "Them hairy sons of bitches make radios, huh," is a typical reply. Other people, only slightly more knowledgeable, mention the mad, wild lifestyle of the people at K&A. Some of the employees — executives, mind you — have been known to drink as many as two or three beers at raucous parties that last sometimes until midnight.

The 40-odd employees at K&A can well afford to snub their noses at conventions here in Hope. The average income for an individual wage earner in the county is \$4200. The lowest paid man at K&A brings in \$6200. Within three years, the same man will be pulling in \$10,000. Job security is good. The Colonel's first employee, Lloyd McClellan, hired in 1948, is still on the job. Almost no Klipsch speakers — ranging in price from the \$250 Heresy to the top-of-the-line \$1300 Klipschorn — are sold in Hope. K&A executives have no business contacts in Hope. There is no need to attend the right church, join the proper clubs or even behave in an identifiably sane manner.

The local Hope movers and shakers — the bankers, local merchants and big landowners — speak of the Klipsch folks as if they were some sort of strange and amusing sect with puzzling traditions. The most visible member — the living symbol of the sect — is Colonel Paul Klipsch himself. Stories about him in Hope-town are legion.

"You know, he must be 70 years old and he runs by my house every day. Wears walking shorts. That man has muscles in his legs."

"I saw him walking down the street one day and he was lifting his legs up over the parking meters, one after the other. Well, one of those meters was a little higher than the others and he cracked the inside of his ankle against

the top. I heard words you wouldn't hear in a Tijuana whorehouse."

"I was on nursing duty when he was sick at the hospital not long ago and I remember I went into his room and he was up out of bed, running in place. He told me he had it all figured out, how many steps made a mile."

"He's the only man I know who has to tell you how a clock works before he can tell you what time it is."

"Paul's owned an airplane for about 20 years now, I guess, and this must have been right around the time he got the first one, because he was still experimenting with it. I was at the airport and I looked up and I saw a plane in a position *no* aircraft should be in. When he came in I asked him what the hell he was doing up there. He said that he asked a lot of people what would happen if he put the plane in stall position with the engine on and no one could tell him. He had spent the whole afternoon finding out for himself. He had a couple of sheets of paper all filled up with graphs about it."

"He's a pretty eccentric one all right and we like to laugh about him, but I'll tell you one thing: I don't believe there is a thing in the world Paul Klipsch couldn't do if he put his mind to it."

Bob Moers is president of K&A (Klipsch is chairman of the board). In his 13 years in Hope, Moers has had occasion to collect some of the best inside Klipsch anecdotes. His favorite is the time the Colonel bought himself one of those pocket calculators. Seemed that the instructions warned that a certain element failed in extremely warm weather. "I came out to the office after lunch and it was a sweltering day," Moers remembers. "Paul was in his lab and he had the air conditioner off. It was probably around 100 degrees and he was standing there, sweating, in his underwear, with the calculator in parts all around him. By the end of the day he had figured out why the part failed and sent the company a letter about it."

Moers showed me around the small, L-shaped factory. They were making La Scalias and Klipschorns that day. A K-horn will weigh 225 pounds and stand over four feet high. They are all hand assembled, and some 59 boards go into the bottom alone, along with three-quarters of a pound of glue and two gross of screws. There are only four people in the world who can construct a K-horn bottom. If you want a Klipschorn direct from K&A, the current wait is 12 weeks. This fall they are

PAUL KLIPSCH BELIEVES THAT THERE IS NOTHING A MAN CANNOT DO AND THAT INCLUDES CHOOSING BETWEEN HEAVEN AND HELL.

moving to a new half-acre facility that should quadruple production.

We moved to the far end of the factory where a wide shipping door opened out onto the rolling green fields. In the distance one could see an older car, a 1956 Ford station wagon, coming down the highway, kicking up dust.

"That's Paul," Moers said.

"In a '56 Ford?"

"Well, Paul has made his million, but he's almost pretentious in his unpretentiousness."

The car rattled to a brisk stop in the lot and Paul Klipsch unfolded out of the driver's side. He was straight and flat bellied, six foot three and 170 pounds. Someone in Hope had told me that he looked like "a typical Yankee."

"How's that," I had asked.

"You know, like those Uncle Sam-wants-you posters." Sure enough, Klipsch did have much of that same stern facial angularity. He wore a long goatee and his silver hair was combed straight back from the forehead. He was an imposing-looking man.

"How old is he?" I asked Moers.

"He just turned 70." Klipsch looked a good decade younger. He wore a short-sleeved shirt, a creased Silver Bell western hat and odd-looking faded brown slacks. Moers whispered, "Paul buys his pants with a 34" waist, then has them taken in two inches, but only at the waist. That way he has room in his pockets for all the crap he carries around."

"Like what?"

"He has a journal that he has kept since he was at Stanford. Part of it is graphs for things he can't carry in his head. He calls those graphs 'dirty pictures.' The rest is comments on experi-

ments and some of the rest is coded personal material. I think I'm the only person who can read the code, and I think Paul is probably the only man in the world who can tell you whether he was constipated or whether he scored on any given day 40 years ago."

Moers and I had wandered back into the main section of the factory where we almost collided with the Colonel as he burst through a side door. Moers explained that I was a reporter here to do a story on Paul Klipsch. Paul Klipsch nodded absently and asked if I wanted a plane ride down to the airport in Shreveport. I explained that I would be staying for a day or so and hoped that we'd have a chance to sit and talk. Without so much as a nod, the Colonel turned, strode back toward his car.

"I hope you're not insulted," Moers said.

"No, not really. He seemed to have something on his mind."

"I should warn you about something," Moers said. "Paul runs several miles a day, you know. His doctor just cut him down from five to three miles a day and he was pretty mad about it. Anyway, he can't stand people who aren't in shape. We were walking down the street one day and there was a 250-pound woman in front of us and Paul muttered something about that 'amorphous bag of suet.' What I'm trying to say is that he tends to say exactly what he thinks. He'll probably comment on your . . . corpulence."

Corpulence? There was a moment of silence. Corpulence? I'm a little over six feet tall and weigh in at 200 pounds even. There may be ten or 15 pounds I could drop, but . . . corpulence?

Moers changed the subject. Did I know that there were only 2000 La Scalas manufactured to date. The La Scala, along with the K-horn, the Cornwall, the Belle Klipsch (a furniture-type La Scala) and the Heresy were the only speakers K&A made. Did I know that the La Scala was designed in 1964 specifically for Winthrop Rockefeller's portable public address system in his gubernatorial race against Orville Faubus?

No, I said, I didn't know those things. My pants felt a little tight.

We retired to the president's office, a handsome wood-paneled affair, where Moers explained that the K&A motto was the word "Bullshit." The Colonel usually has a pocket full of little yellow buttons that feature the motto in Old English script. Klipsch first settled on the company motto when he read an ad for a new loudspeaker. According to Moers, the ad made incredibly exag-

gerated claims about the speaker. Klipsch read the ad over several times, looked up and said, "Bullshit."

Moers himself, it turned out, was a fairly cosmopolitan Yankee who had come to Hope in 1961. He had graduated from the University of Illinois with a degree in marketing, had worked for Procter & Gamble and the McCulloch Corporation and was the Boston-based New England district manager for Sunbeam when he started hearing about Paul Klipsch. "I was a hi-fi enthusiast and I had bought a pair of Klipschorns from Bill Bell, who was the top Klipsch dealer in the country. We got to be friends and one day I said, 'Bill, you and this guy Klipsch must be making a ton of money.' Well, Bill told me it wasn't that way. They needed sales help, Bell said, and he went on to sell me on the idea of at least visiting Hope.

"I was raised in Chicago and Boston and the idea of moving to Hope was repulsive. Of course I had never seen the place, but it was just after the '58 school integration battles in Little Rock. I thought, My God, I'm going to the land of segregation and Sow Belly. I'll be bored and hot. I'll have no social intercourse or intercourse of any description since my wife threatened to leave me if I moved to Hope. I did convince her to come down with me and I convinced Paul that if I didn't boost sales to a certain amount within a certain amount of time, I'd tip my hat and be on my way. I've been here 13 years."

Moers and Klipsch are a good example of the time-honored symbiotic relationship of the businessman and the engineer. Klipsch himself often says, "My company went broke; Bob Moers's company made money." In 1960, the year before Moers came to Hope, K&A did \$57,000 in gross sales. In 1973, the figure was \$1.6 million, and projected sales for '74 top the \$2-million mark.

Paul Klipsch, as I was to discover, has a habit of drifting off into eye-glazing technical tangents. He never seems to notice that he has lost his listener, five or ten minutes before, on the brisk definition of frequency distortion. It is Moers's job to make the Colonel's work accessible to the majority of us who are technical cretins.

As Bob Moers describes it, then: The Gospel according to St. Paul.

In the beginning was the word. As spoken, it was difficult to hear over a couple of hundred yards. Then there was radio, and the vacuum-tube amplifier. Hard on their heels came Paul Klipsch. A teenaged Klipsch built his first radio the year before the first pub-

lic broadcast, and in 1919 he made his first loudspeaker with a mailing tube and a pair of earphones. Klipsch says those first speakers "sounded like hell."

He attended "Cow Collich" (as he insists on naming and spelling New Mexico A&M, now known as New Mexico State University), then got a job with GE at their test engineering plant in Erie, Pennsylvania, where he fell in love with some locomotives bound for Chile. Klipsch wrote the Chilean company and got a job maintaining those locomotives for four years. While in Chile he sent for his wife-to-be, Belle. He met her ship at a north Chile port and the two were married at sea.

Klipsch returned to America at the depth of the Depression and did graduate work in electrical engineering at Stanford. Later he was a geophysicist in Houston. "It's interesting to note," says Moers, "that Paul holds more patents in geophysics than he does in audio." In 1938, as part of a long-standing hobby, Paul built his first Klipschorn — which he described as "sounding like hell." He worked on the unique design, publishing a paper in the *Journal of the Acoustical Society of America* in 1941, and was granted a patent on the speaker the same year.

The war interrupted Klipsch's work on his speaker. He joined the service and became second in command at the Army Munitions Proving Grounds (since closed down) in Hope. A long-time marksman, Klipsch invented and patented two accuracy devices for small-bore weapons. After the war Klipsch remained in the reserves at Hope where he rose to the rank of lieutenant colonel.

Between 1945 and 1948, Klipsch worked in a ten-dollar-a-month shed, improving his basic design and writing more technical papers about his experiments. At the time he had one other employee and was building speakers for other scientists and wealthy audiophiles. Belle Klipsch worked as a schoolteacher in order to keep food on the table.

By 1950 Klipsch had a few representatives in hi-fi stores around the country. By 1960 Klipsch had sold about 1200 of his Klipschorn speakers. With Moers's help, Klipsch has now sold some 6000 Klipschorns.

Sometime late in the afternoon the Colonel arrived back from Shreveport. He hustled through Moers's office into his own. There was the sound of some rustling, then he was back with a strange gadget which he handed to me. It was a standard hacksaw frame, but

Rosewood speaker



IN 1919 HE MADE HIS FIRST LOUD-
SPEAKER WITH A MAILING TUBE
& A PAIR OF EARPHONES.
KLIPSCH SAYS THAT
THOSE FIRST SPEAKERS
"SOUNDED LIKE
HELL."

where the blade would be, there was a chain. A totally useless tool.

"That's an Aggie chain saw," the Colonel explained. He went back into his office. Thirty seconds later he was back to tell a joke. It was about this Aggie (defined as any agriculture-and-mechanical-school graduate, such as Paul Klipsch) who wanted to be a lumberjack. The foreman of the lumber crew told the Aggie he could have a job if he could cut a certain amount of trees with a power saw. At the end of the day, the exhausted Aggie was back. He had managed to meet his quota. "Let me show you something," the foreman said. He pulled the cord and the power saw roared into life. The startled Aggie jumped back in terror. "What's that noise!" he screamed.

So much for the jokes. The Colonel scooped up the prototype Aggie chain saw and disappeared into his office. Momentarily he was back again, this time with a faded yellow cardboard prototype of a Klipschorn speaker. It was dated 1940 and there was a patent number on it. The Colonel went back into his own office. The small cardboard box had one clear side through which one could see the way the 59 bottom boards fit together.

As I understand the problem and Klipsch's solution:

The horn is the most efficient and effective system for reproducing sound. The problem is that in order to produce the full range of bass sounds, the horn itself must be the size of a small room. Klipsch developed a method of folding a horn in a trihedral corner in such a way that the boards inside the box acted as an exponential horn, along with walls of the room. For this reason a Klipschorn must be placed in the corners of the room. The walls are extensions of the exponential horn. The K-horn is still a mammoth speaker, but it manages to produce (on a single watt of power if one likes, the beasts are so efficient) the lowest bass note the ear can hear.

During the next few days, I had the opportunity to talk to the Colonel at some length, for all the good it did me. The conversations teetered on the brink of total noncommunication.

"Did you get interested in loudspeakers because you loved music or because you loved acoustics?" I asked.

The answer started well within my range of competence, then rolled on out into my personal twilight zone. "A little of both," he said. "I shouldn't ever call myself a musician but I did play cornet in the Cow Collich band. Anyway, it was 1933 when one of my col-

leagues at Stanford invited me to his house. He asked me if I wanted to listen to the radio and I said, 'Oh, heck no.'

"Well, he turned it on anyway. Jim Sharp had built a loudspeaker using a Jensen auditorium speaker and he had put a baffle on it. Well, baffles weren't very well known then but they should have been, because in 1877 Lord Rayleigh described mathematically the function of a piston vibrating in a hole in an infinite wall. He didn't call it a loudspeaker, of course. Making that thing speak and spout music wasn't possible until we got ahold of something like a vacuum-tube amplifier, but the principle is the same as a paper-cone loudspeaker vibrating in a hole in an infinite baffle. By the way, an infinite baffle would be a wall of very large extent and not a finite box. Referring to a box as an infinite baffle is an oxymoron at best."

* Infinite baffle, indeed.

If there is a key to the Colonel's character, I couldn't sort it out of some 100 pages of tape-recorded transcripts of his own words. He tended to be guarded about his personal life, and unremittently scientific. His story is best told in a few anecdotes.

For instance: Paul Klipsch is a devout Christian who sometimes takes notes during a minister's sermon, the better to remember the Holy Word or, more often, to confront the preacher on his interpretation of Christ's teachings. It is said that some ministers get exceedingly nervous when Paul Klipsch takes out his notebook during services.

A few years ago, the Colonel was chosen as a deacon at the First Presbyterian Church in Hope. To become a Presbyterian deacon, one must make a lengthy confession of faith but Klipsch balked on the third chapter, the one about how certain people are God's elect and destined for heaven, while others are willy-nilly doomed to hell. The Colonel not only refused his deaconship but joined another church. It seems that Paul Klipsch believes that there is *nothing* a man cannot do, and that includes choosing heaven or hell.

Another story illustrating the same point: In the summer of 1969, at the age of 65, Paul Klipsch fell sick. For three months he battled a severe fever and the ailment was diagnosed as severe bilateral emphysema. Forty percent of his lungs was destroyed. Many men that age with a disease that serious might have resigned themselves to a few more sedentary years. Not Paul Klipsch. As soon as he could walk, he tried to run. At first he could jog ten

seconds—total—at a clip. Within a year he had run his first complete mile.

Klipsch took up aerobics, a system developed by Dallas physician Kenneth Cooper, specifically designed for strengthening the heart and building up the volume of air the lungs are able to handle. Cooper recommends that a young man in good shape should exercise enough to earn 30 aerobic points a week. Klipsch usually earns 80. Dr. Cooper tested the Colonel recently and discovered that his vital capacity is now 110% of that of other men his size and weight.

During my visit to Hope, I happened to catch a glimpse at Klipsch's notes for one day. Most of it was graphs and technical data, but it began like this:

R. 1.8

S

R. 1.8

Which, I'm told, means that Klipsch ran 1.8 miles, stopped in his house for a bowel movement, then ran another 1.8 miles. The total running time for 3.6 miles was 34.30 minutes—a distance and time that would challenge the average 30-year-old.

My favorite Paul Klipsch story happened almost two decades ago, in 1956 to be exact. The Colonel was sitting in a Philadelphia bar drawing dirty pictures. With him was the local distributor, a man who made part of his living explaining the corner speaker and the exponential horn to awed and wealthy customers.

"What's that you're doing?" the man asked.

Klipsch explained that he was designing a small speaker that could be used between two Klipschorns in a three-speaker array.

"But Paul," the distributor argued, "that isn't a corner speaker. You can't do that. It would be heresy."

"The hell I can't," Klipsch said, "and that's what I'm going to call it."

The next year K&A began marketing the Heresy speaker. It sells well to smaller churches in need of quality sound reproduction.

On my last day in Hope, I talked to the Colonel at some length and it went somewhat better.

"What induced you to puddle around with radio?" I asked.

"Well," he said, "can you imagine a kid of seven or eight being impressed by something real noisy? That was what got me interested in locomotives and airplanes. My father took me to visit the local radio station at Purdue where they had a transmitter of the type known as the rock crusher. A rotary

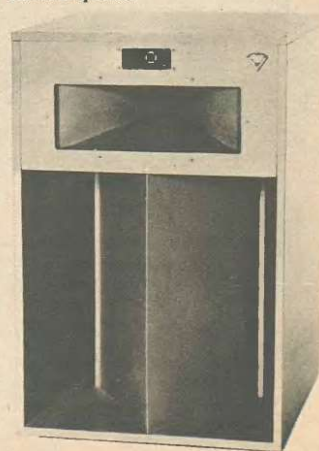
spark gap. When they put the key down, why all hell broke loose around the electrodes of this rotating wheel and it was noisy. Well, that was my first impression of a radio and I thought, 'I'd like to have something that would make a noise like that.' Hell, you could hear it probably about as far as you could hear it."

"Paul," I said, "Bob Moers once told me that you didn't have any interest in the space program and he found that strange since you have a plane and are a scientist and have an interest in the military. He thought it was perhaps because you have contributed to everything you've been in—geophysics, ballistics, audio—and that it was impossible for you to contribute in the same way to the space program. But you know, I'm thinking that everything you've done has had to do with noise, and space has to do with infinite silence."

"You might have a point there," the Colonel allowed. His mind seemed to be somewhere else and when I told him I'd be leaving the next morning, he wordlessly handed me a half-dozen bullshit buttons and an aerobics book. The last I interpreted as an unspoken comment on my corpulence.

In the week that followed I listened to my La Scala and thought a bit about the man who sells Heresy to churches. The buttons said "Bullshit." The book, in its way, said, "The hell I can't." There is, I suppose, some kind of inspirational message there. For what it's worth I've been playing a lot of handball lately and the last time I weighed myself, I had lost five pounds.

LaScala speaker



Quadraphonic: It isn't the future of listening.

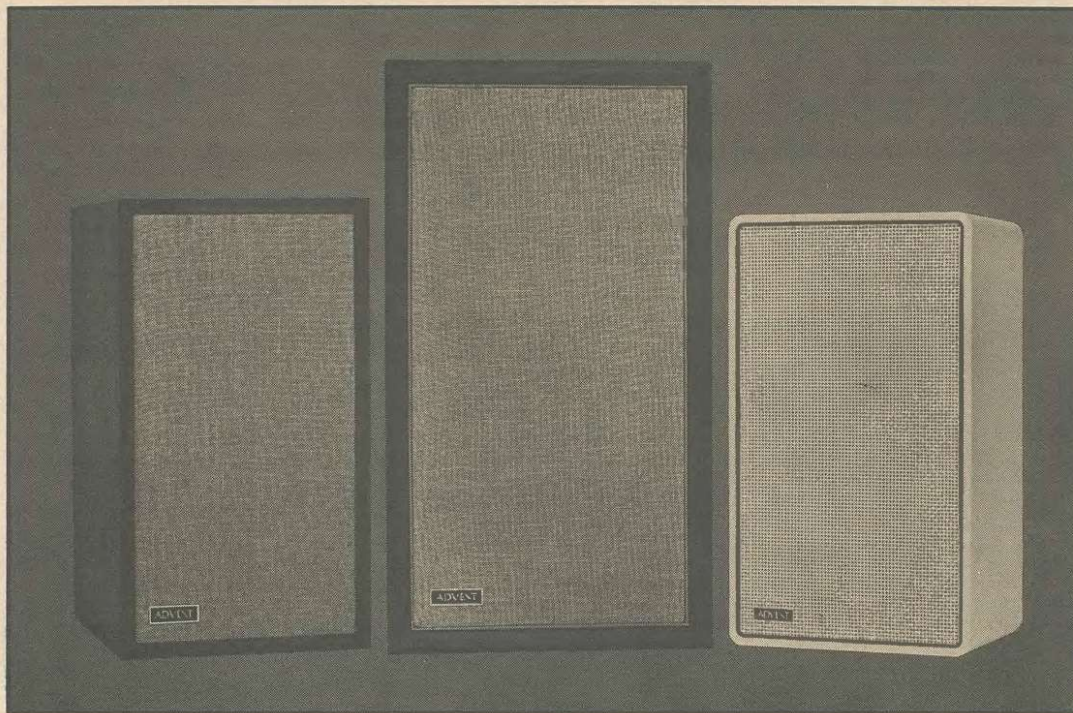


It's the here and now. The equipment is in the stores. So are the records and tapes. And if you're not listening in Quad, you're missing at least half the excitement of music.

Recording artists whose work is available in Quad include:
Aretha Franklin • Alice Cooper • Herbie Mann • Judy Collins
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CD-4 compatible discrete Quadradisc recordings. The wave of the present on Warner Bros., Reprise, Atlantic, Electra, Asylum, and Nonesuch records and tapes.

The Three Advent Speakers



When products become best-sellers largely on the strength of word-of-mouth advertising, and when people consistently go out of their way to write the company and say thanks for making them, you have reason to believe that something special is going on.

The something special is this:

The three speakers described below do exactly what they are represented to do.

The Advent Loudspeaker

The original Advent was designed to compete in every audible respect with the most expensive speakers available, at a fraction — often a very small fraction — of their cost. Its useful frequency range is as wide as any speaker's, and its sound is clean, clear, and beautifully defined, with a musical balance that is satisfying not just with the best recordings or one kind of musical material, but with the whole range of music and the various ways of recording it. Its bass response is approached by only a handful of speakers at any price, and surpassed by none.

It costs \$107 to \$130, depending on cabinet finish and what part of the country it's shipped to.

The Smaller Advent Loudspeaker

The Smaller Advent was designed to do exactly what the original Advent does, at half the size and two-thirds the cost, except that it will not play quite as loud. Its range and overall sound

are the same as the original (not close, but the same), and for anything short of roof-raising volume levels in really big rooms, you would be very hard-pressed to hear any difference between original and Smaller.

The Smaller Advent costs \$74 to \$79.

The Advent/2

This is the newest Advent and it sounds just like the other two except that it doesn't have the final half-octave of bass response that they do. It's designed to get the absolute maximum of useful performance at lowest cost, and its own low price is made lower still by the fact that it works superbly with low-cost, low-power amplifiers and receivers. It comes in a beautiful, warm-white molded cabinet instead of the usual low-cost imitation wood finish, and since the enclosure does what a wood one does at far lower weight, it's much easier to mount on a wall or shelf.

The Advent/2 hasn't had as much time as the other Advents to get word-of-mouth going. But it will. What it does is enable people to put together a stereo system for \$350 or less that isn't a "starter" or a compromise for a tight budget, but a joy to live with ever after.

The Advent/2 costs \$58 to \$59.50.

To check the accuracy of the above statements, just bring along your eyes and ears and (whatever shape it's in these days) your common sense to the nearest Advent dealer. We will be happy to send you his name, and literature on our speakers, if you will write us.

Thank you.

Advent Corporation, 195 Albany Street, Cambridge, Massachusetts 02139

Why nearly every record player is like a car that doesn't steer straight.



If you've ever driven a car with badly aligned front wheels or a defective steering mechanism, you know what we're talking about.

It's a queasy feeling when you can't make the car point in the same direction as the road is pointing.

There happens to be a distinctly comparable problem with record players, except that it's a nearly universal deficiency, not just a malfunction.

Of course, in this case there's no human life at stake, only the fidelity of the reproduced sound. And sometimes the life of the record.

Like a car, the phono cartridge (or pickup head) should point where it's going. Right down the middle of the groove. Not at an angle to it.

A more scientific way of saying the same thing is that the head should remain perpendicular to the line drawn through the stylus tip and the turntable spindle.

Any deviation from this ideal is known as tracking error. It's measured in degrees and it causes distortion.

Inevitably,

The trouble is that there's no way to avoid tracking error and the resulting distortion with any conventional pivoted tonearm. Why? Because the head swings in an arc and is therefore at a continuously changing angle to the groove as it travels across the record.

The problem has remained fundamentally the same since the Emile Berliner gramophone of 1887. It has been minimized, thanks to improvements in tonearm geometry, but it hasn't been eliminated.

With one important exception.

In the current line of Garrard automatic turntables, the top models are equipped with Garrard's unique Zero Tracking Error Tonearm.

This remarkable invention ends tracking error once and for all. The head is always properly lined up with the groove because it's hinged instead of fixed and keeps adjusting its angle during play. A simple idea, yes, but the engineering details took the world's leading manufacturer of turntables seven years to perfect.

The Zero Tracking Error Tonearm is a major technological coup, not just a glamour feature. You can hear the difference.

The "Acoustics" column of *Rolling Stone* magazine, for example, reported that the original Garrard turntable equipped with the new arm "sounded markedly 'crisper' than other turntables" under otherwise identical test conditions.

It's true. Just like a car that doesn't steer straight, tracking error can make a nasty sound.

"It probably is the best arm yet offered as an integral part of an automatic player."

—High Fidelity Magazine

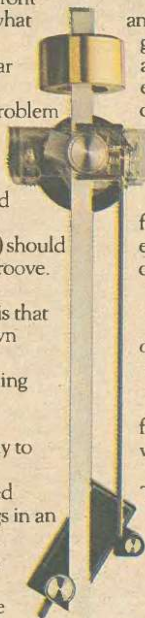
It can even cause unnecessary record wear. The information engraved in the grooves of the new CD-4 discrete

four-channel records is so finely detailed that it can be partially wiped out by a stylus that doesn't sit absolutely square and true.

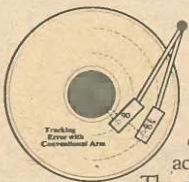
Ask your nearest Garrard dealer about the Zero Tracking Error Tonearm.

It's absurd to tolerate a problem that somebody has already solved.

Top of the line: Garrard Zero 100c, \$209.95. Other Garrard automatic turntables from \$49.95 up. To get your free copy of the new 16-page full-color Garrard Guide, write Garrard, Dept. RS-9, 100 Commercial Street, Plainview, N.Y. 11803.



Garrard
Division of Plessey Consumer Products



TV, SOUND: PLEASE STAND BY

By Ben Fong-Torres

There's audio trouble in the vast wasteland. It's nothing you haven't heard about or heard for yourselves. It's just that today, with hi fi's growth into quad and beyond, with the establishment of 32- and 64-track foundations for pop recordings, with the advancement/onslaught of rock sound systems, and with rock & roll's domination of TV's late night weekends, the mediocre sound on television is more agonizing than ever.

"It has been the greatest complaint of TV engineers," says Bob Huestis, production engineer at KQED, San Francisco.

There is some hope in the technological future, and there are ways of breaking into your set yourself (preferably with help from engineer-friends, hired TV technicians or accessories) to improve the sound. But here in 1974, sound quality on television is definitely more a case of sound than of quality.

Who's to blame and what's to be done depend on who you ask. Engineer Carroll Adams, a member of the Society of Motion Picture and Television Engineers (membership: 8000), is SMPTE's representative to the Ad Hoc Committee for the Study of Television Sound, only a year-and-a-half old. Other members are from the National Association of Broadcasters, the Audio Engineering Society and the Network Transmission Committee. Also invited to meetings are TV set manufacturers—"but they rarely show up," says Adams. "They claim there's no point in talking because the problem is a lousy signal. The engineers say the sets are rotten. And the stations—everybody, actually—blames the phone company for lousy signals."

"And," Adams adds, "there's a lack of interest in doing anything for the new sounds."

"It's an interesting contradiction," says Doug Leighton, a freelance TV audio engineer in Los Angeles. "On *In Concert* or *Rock Concert*, the groups bring out the big remote trucks and go to all the trouble and money. But the TV manufacturers and producers—lots of times they don't care about the audio. The attention goes to the visual image. Cheap and dirty, that's the word."

Cheap means a small, radio-logical speaker, average three inches in diameter (or a 3" x 5" oval) on the average portable. The speakers are placed into

cabinets wherever they fit. Proper enclosures for speakers, then, are rarely found. Cheap also applies to the amplifiers that receive and boost sound that is transmitted in near hi fi. on the FM band.

Dirty is meant by Leighton to describe the resulting sound. "TV signals," he says, "are FM. The band width is there for a high-quality signal," give or take a normal hum, known as intercarrier buzz, from the amp.

"The quality of the sound could be FM," says Huestis. "There's nothing to reduce it, except one thing: FM works on a 75 kHz (cycles per second) depth-swing. On TV, it's a 25 kHz deviation. This affects the signal-to-noise ratio, and it's a minor effect." More important, he says, is "the long lines audio loss—the phone lines are so bad." Leighton explains: "The TV FM signal is capable of a 15 kHz frequency response (FM radio has the same capability)—if you have a line direct from the studio to the transmitter." Phone lines for TV transmission, according to an engineer at Pacific Telephone, have a 5 kHz limit. "So," says Leighton, "the signal is reduced in terms of frequency response." All this, of course, before the signal reaches the waiting, tiny soundtrap called the TV speaker.

Satellites would help, but the phone company says that they don't yet carry audio signals, and more than limited use is far off. AT&T is said to be working on improving its phone lines. Expansion of the TV band width, says one TV technician, would mean "modifying every TV transmitter and all audio circuits. It'd affect every manufacturer and station owner." The implication was clear: too drastic, too expensive. Or, as Carroll Adams at the Ad Hoc Committee puts it: "Each of us knows what has to happen to improve TV sound. The problem is: Who's going to pay for it?"

Adams has a dream: "It's gonna take the phone company faithfully reproducing what they get and the TV manufacturers exercising quality control. And we, the engineers, have to send the cleanest signal we can." Does he think it'll happen?

"I periodically wax more or less optimistic. I don't think the consumers will permit sound to get worse. I don't think they'll voluntarily do anything, certainly not spend the kind of bread it takes, until consumers and advertisers raise a hue and cry."

But some of us can't wait. Or, as

Carroll Adams observes: "Some fanatics have carefully hand built receivers just for the sound from TV." These are connected to stereo systems and operate independently of the TV set. Such tuners, in fact, are on the market. One firm now preparing what it calls a "UHF-VHF Hi-Fidelity Tuner" is Rhoades National Corporation, operating out of Hendersonville, Tennessee. Formed just two years ago by 25-year-old David Rhoades, the company's main product is the "Teledapter," which, according to mail-order ads in the backs of stereo magazines, allows you to "listen to TV through your stereo," "just takes minutes to plug it in" and results in "fantastic high-fidelity sound."

The Teledapter—or, as Rhoades himself puts it, with a twang, "our \$16.95 retail item"—has sold nearly 3000 units since its introduction. Rhoades hastened to modify the ad claims. "Your quality is naturally limited," he said. "We don't pretend it's as good as FM. It depends on the quality of the TV." Humm . . . "But you do get more presence and depth." What the Teledapter does, said Rhoades, is "it takes the low impedance output from your TV, and it has a matrix circuit that simulates stereo and plugs into any audio input on your amplifier."

We didn't give Rhoades enough time to ship out a Teledapter for testing, but several technicians, hearing the president's description of his product, agreed on its basic principle. Leighton said the "UHF-VHF Hi-Fidelity Tuner," which allows bypassing of the TV set's circuitry, sounded "firmer"; he has heard of such tuners on sale for under \$100. Rhoades's model is expected to retail at \$199.

Or, if you're knowledgeable around a TV set, you can do it yourself. An employee at the Radio Shack, the electronics store, makes it sound easy: "It's very simple," he said, "you take off the speaker and cut into the wires." Luther Green, owner of Street Studios in San Francisco, is more cautious: "If you take the back off a TV set, there are many places that will send you backward at a very high velocity. Just touch a capacitor—which can store electricity for 20 years—and it can short out your nervous system."

Green also believes it best to intercept the TV set at the volume control, before sound reaches the amp stage. Leighton agrees, and offers some specifics: "You go a stage before the amp,

pull that signal out and match it electronically to the hi-fi amp. It will sound surprisingly good." Adds Bob Huestis: "You start to hear audio you've never heard before, like camera cables dragging across the studio floors." Matching the low output of the TV amp to the average eight or 16 ohm stereo speaker is no problem, says Leighton, but he also warns of dangers. "If the TV amp shorts, it could put DC volts on the output, which would then directly couple to the input of the hi-fi amp. And if there's no blocking capacitor on the input, the hi-fi amp could be damaged." And there's the matter of the ultor anode located behind the TV tube. "Its tremendous high voltage," says Leighton, "can take a while to discharge."

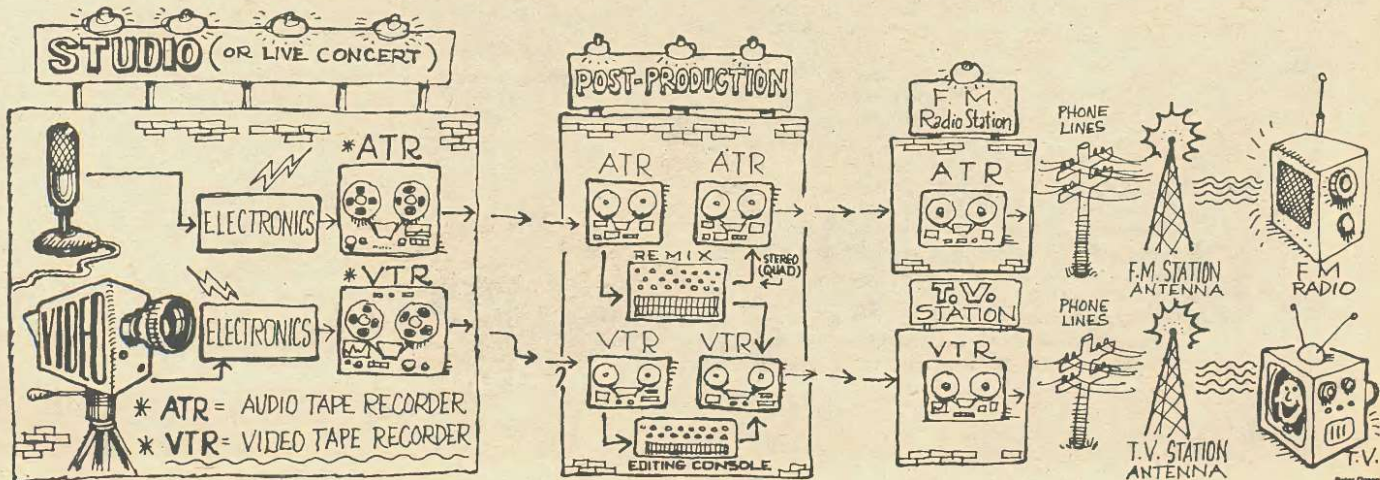
In short, it's best to have an expert do the work, or get a separate tuner or similar device, or check out the two manufacturers who provide audio output jacks on their sets: Heathkit, which also features a large 6" x 9" speaker, and Quasar.

The Quasar includes two jacks on all console models, one for hookup to a hi-fi amp, the other for an extension speaker without use of an outside amp. All portable Quasars feature an extension speaker jack. Frank Gayes, engineer at the company's Color TV Product Planning division, says the audio jack takes the sound out "at the top of the volume control, at the audio detector stage."

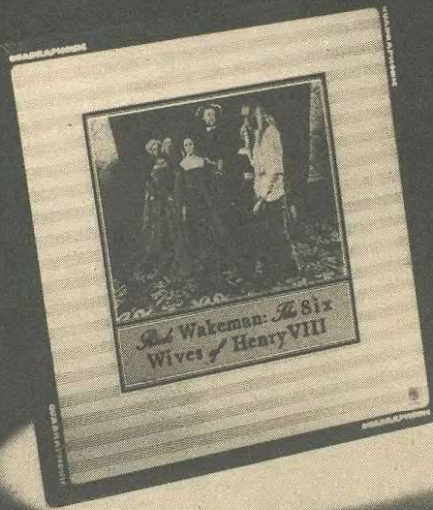
But Gayes seemed itching to talk, if secretly, about something else. "I'll word it truthfully and hedge a little. We have under development a dramatic improvement in sound that will come out in the very near future. We are adding circuitry to improve the sound. It will be part of our TV sets, not an optional accessory." Also, speakers will be separately contained.

So at least one or two manufacturers are growing ears. Next could be improved phone lines, or the adoption of satellite communications. Or stereo TV (in Japan, television signals have three-channel capacity, allowing for stereo transmission plus an additional line, for, say, a second language). A pay TV system in New Jersey plans use of multiple channels and regular stereo simulcasts, not unlike the ventures into stereo simulcasts (stereo radio, regular TV) initiated by the ABC-TV network's *In Concert*.

But now we're talking about money. Stay tuned. We may be right back.



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Independent producer

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6. Angle an under-dash stereo upwards as much as possible. This makes it easier to read the FM dial, locate controls, and feed tapes.
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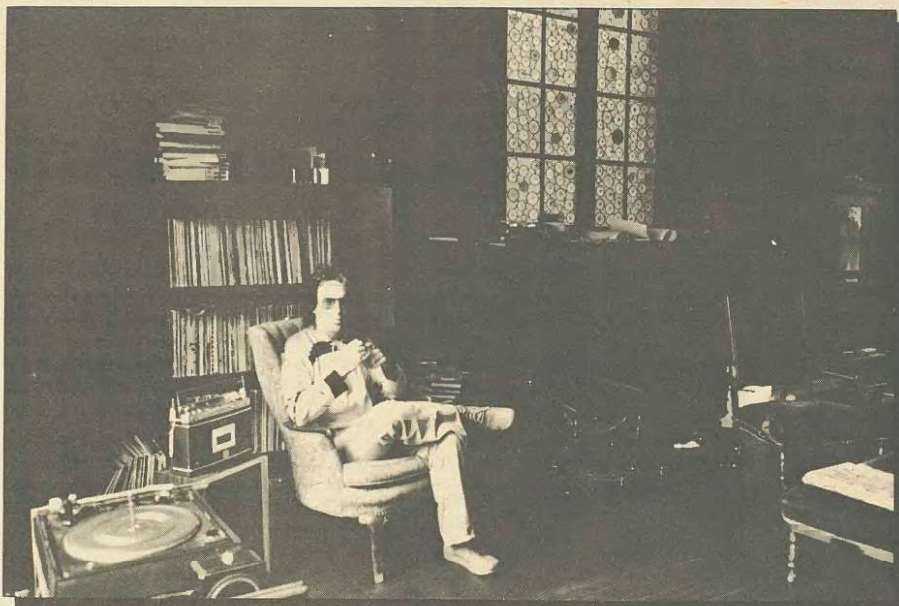
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THE PROFESSIONAL SET: A MAGNIFICENT SEVEN

We went to the professionals, record producers and executives, to get their taste in home sound furnishings. They range from Richard Perry, who stays right on top of the state of the art, down to Elliot Mazer, who purposely bought the set that most everyone gets. And when it comes to knowing exactly what hardware they've got in the listening room, they're not really so magnificent. They're just folks.



Nick Simpson

Elliot Mazer, independent producer (Janis Joplin, Neil Young):

"I used to have a really big system but I decided I'd prefer something more reasonable, average, so I just walked into Pacific Stereo and asked for their best-selling system. The speakers were awful, so I had to get something else. The ones I have are the best sounding in mid-range I've ever heard . . . an incredible top-range, really clean. They've got a new crossover thing which makes it . . . just really good.

"I've got it in a room with 12-foot arched ceilings, a lot of stone and wood, a really live room. I tried to get as far away from a cube room as possible — cubes just bounce the bass everywhere . . . lousy. I've also got a 1961 Wurlitzer juke box, complete with ceramic cartridge."

Garrard turntable ("the cheapest") with cartridge
Garrard had pre-installed • Sherwood S7100A
receiver • Ed Long speakers ("made in
Oakland") • Sony CS-5500 cassette tape deck



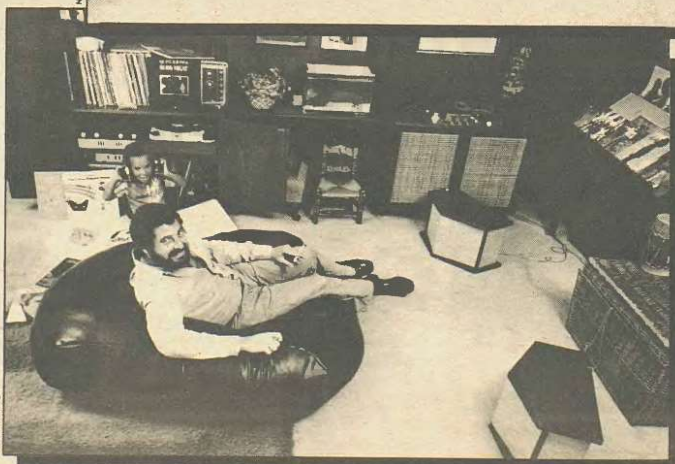
Nick Simpson

Roy Halee, engineer/producer for CBS Records, San Francisco (Simon & Garfunkel together and separately, Laura Nyro):

"The system is in my living room. I really love the speakers. I can listen to them for six hours because they don't scream at you. On the other hand, they aren't the greatest rock & roll speakers. The sound gets a little mushy. But they push a lot of air at very low volume, which makes them nice for classical.

"I really don't care much either way about the rest of the system. I have a very average system, also — basically a Pioneer setup with Tanor speakers — to see what the pressings will sound like to the average guy. Anything would sound good on the Bozaks."

Thorens TD125 turntable with Ortofon
cartridge • Crown DC300 amp • Marantz
pre-amp • Bozak Concert Grand II speakers • Teac
tape deck ("a little two-tracker")



© Neal Nordlinger

Phil Ramone, independent producer (Paul McCartney, Paul Simon, Bob Dylan):

"The room is the most important thing. I believe in getting a good, flat room and then working from there. I used to have JBL speakers here at the house and Bose in the office, but the Bose sounded lousy in the office. I brought them out to the house, where they sound great, and put the JBLs in the office.

"But what's really important is how the record sounds on average speakers. I keep an average system (Sony HP 149A) around to listen to work. I mean, if I'm always working on the best stuff around, it's easy to make it sound good."

Thorens turntable with Stanton cartridge • McIntosh
amp/pre-amp • Sose 901 speakers • Ampex two-track
tape deck with Dolby



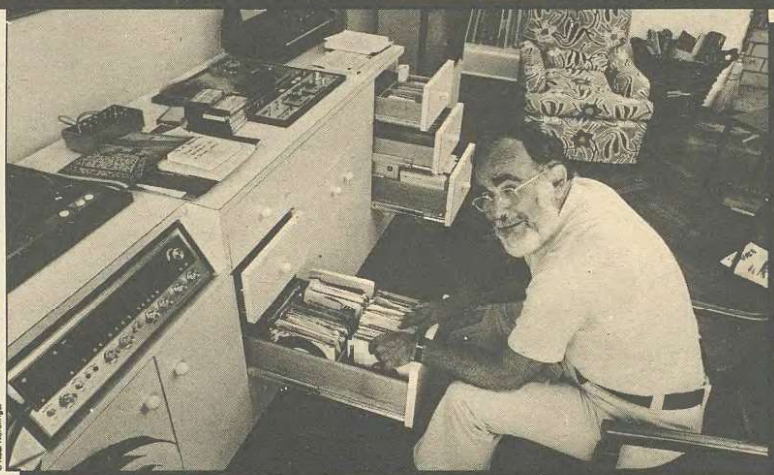
Anthony Frindlin

Richard Perry, independent producer (Carly Simon, Ringo, Harry Nilsson, Martha Reeves, Fats Domino, Barbra Streisand, Tiny Tim):

"I have regular Altec studio monitors in the house, but if it wasn't for the Mastering Lab crossovers, I wouldn't use them. In its natural state, it's my least favorite speaker. I don't want to hear back the hype on either end. I want the truest sound available. As a cross-reference, I also have two Braun speakers because I particularly like the top end. I also have speakers outside.

"I have a McIntosh amp, because it's the only one that could possibly drive all my speakers. I've recently gotten into putting on two or three albums at a time what with speakers all over the house, so the Dual is the best that can go either manual or automatic. I'm temporarily using a Kenwood combination amp, pre-amp and tuner, until I can get the new Marantz pre-amps that aren't available until autumn."

Dual 1019 turntable with Stanton cartridge • McIntosh 2100 power amp • JVC UT-900 digital tuner • Kenwood KR 7070 receiver • Altec 604E speakers with Mastering Lab crossovers • Teac 7030 tape deck • Advent cassette tape deck



O'Hair Neffinger

Jerry Wexler, Atlantic Records vice president (produced Aretha Franklin):

"I never was a hi-fi freak and I don't like spaceship equipment. It's incumbent on me to have a truth machine; I want to hear the truth, so I use the same system for everything." The system is tied around three tape decks, allowing cassette-to-reel recording and track separation. He singled out his speakers for their "fuller bass response." Quad? "I've got too much to do without fucking around with a wrinkle. I mean, that's what it is now, a wrinkle."

Pioneer PL61 turntable • Pioneer OX949 receiver • JBL 100 speakers • Sony 850 tape deck and SB300 switch • Wollensak 4760 cassette tape deck, with Dolby



Neil Klobas

Phil Walden, Capricorn Records president (Allman Brothers manager, former manager of Otis Redding):

"The system was picked out for me by my engineers; I really don't know that much about it. I get studio quality from it. The kids have a KLH compact, but I let 'em use the big one if they want. We're a progressive family."

One feature of the system is an equalizer. "I never fully understood it, but everybody told me I should have it." What exactly is it for? "Conspicuous consumption for rock & roll executives. Only \$600."

Dual 1229 turntable • Crown D155 amp • McIntosh C28 pre-amp • Altec Acousto-Voice Equalizer • JBL 4320 speakers • Sony TC-850 tape deck



O'Hair Neffinger

Joel Dorn, independent producer (Roberta Flack, Bette Midler, Don McLean):

"The key to the system is the speakers. They are absolutely the flattest I've ever heard — no phony highs or lows. You know, I can only hear in one ear. I can't really hear spatial relationships; so the flatness of the sound is very important.

"In any case, the most important thing is the combination of all the elements. The whole thing together is what sounds good. I have three copies of this system: two at work, one at home.

Dual 1219 turntable with Stanton cartridge • Marantz 18 receiver • Electro-Voice Sentry II speakers • Sony tape deck — "the biggest made"

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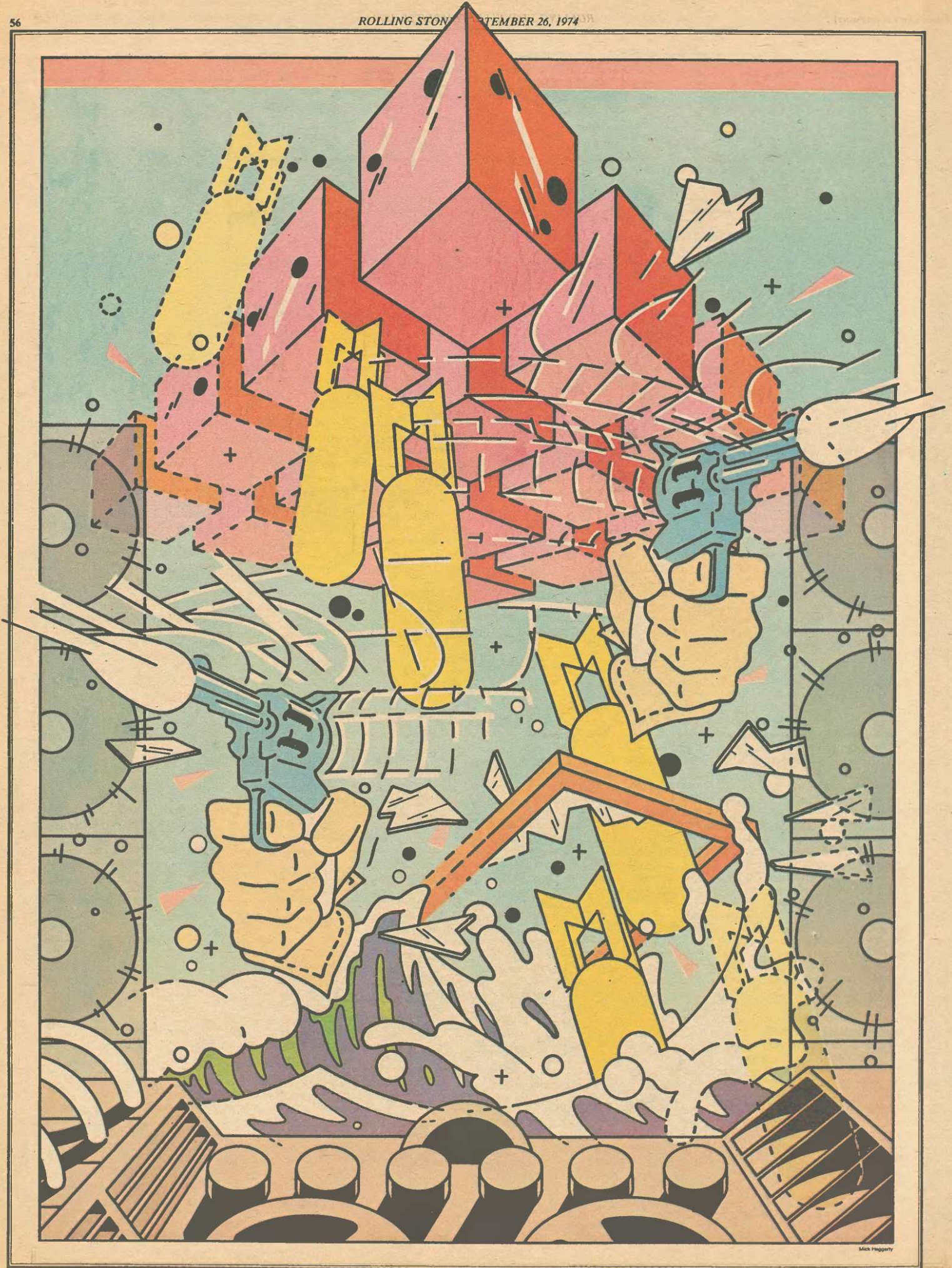
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BY BOB PALMER

Picture yourself in the middle of a three-dimensional movie. The characters moving in and out of the frame around you are musical instruments, the scenes are songs. . . . No, wait. Picture that electric guitar, pumping away from the right speaker, as a gunslinger at high noon and its echo, bleeding back from the left speaker, as the gunslinger's shadow. . . . Try again. Picture yourself in a boat on a river. . .

These admittedly imperfect analogies are the sort of thing recording engineers and producers fall back on when asked to describe the experience of making and listening to stereo records. "Everything for me is a picture," says Phil Ramone of A&R Studios, New York, who has engineered live albums by Paul Simon, Bob Dylan and the Band. "I picture people standing there or instruments being up, down, sideways, down the hall. But if the camera work is so tricky you can't enjoy the movie, something's wrong. The instruments have to be placed and the blend has to be achieved according to the music."

Bill Schnee, who works as an engineer principally with producer Richard Perry (Ringo Starr, Carly Simon, Martha Reeves), speaks of a "total picture. As to how you create that picture, well, there's more than one way to skin a cat. Say you have a guitar on the left and a guitar on the right, a piano mid-left and some kind of percussion instrument mid-right. You can reverse the picture, like walking through the speakers and turning around, and still get the same kind of perspective. In other words, the way a stereo record sounds has more to do with balance and frequency split than with how the elements come at you."

The illusion of space, depth and movement is perhaps stereo's *raison d'être* from a listener's point of view. Instruments and voices can function as distinct elements and as parts of a whole. Most record buyers take this kind of clarity for granted, but artists, producers, and engineers must recreate it for each song and each album. Since most stereo records begin as a collection of isolated tracks, recorded piecemeal, the people responsible for making them must create a picture of what the music might have sounded like had it been played all at once. The "basic track," often simply bass, drums and rhythm guitar, must be combined with lead instruments, strings, horns and

vocals, all recorded separately, and the result must sound "natural."

Paradoxically, the naturalness of the final product often depends on how unnatural or isolated the components are. Recording a drummer in the middle of a studio may result in a muddy or noisy sound; placing the drummer in an enclosure, preferably a sound-proofed booth, will result in a cleaner, fuller, more natural sound, provided the proper microphones are used. This "pure" drum sound, when blended with other instruments, will drive the record with more force and resonate more familiarly in the ear than if it had been recorded in a room with other instruments. When a "live" studio recording is musically desirable most engineers will still attempt to isolate the drums as much as possible, perhaps with baffles around the set.

Producers, engineers and recording artists all agree on the importance of drums, even on records which are understated rhythmically. Most recording sessions begin with careful placement of the drums. The next step is the choice of microphones. At its simplest the choice is between condenser and dynamic mikes.

"Every microphone has a different sound," says engineer Rodney Mills of Atlanta's Studio One, "and you use it for the sound it's got. But in the layman's terms, a condenser mike will transmit exactly what's being played out there. Like when a drummer hits a cymbal there's a real fast attack, a first little ping that you get, and a condenser will transmit it just that way, or even sound a little brighter sometimes. The level on condensers is usually real high, and they often tend to pick up a lot of things you don't want to pick up. Also, they will break up and distort on you if you use them on something that's very loud and percussive, like a snare drum. But I always use condensers when I'm after a real crisp, bright sound."

"Now a dynamic mike isn't self-powered, and on something with a percussive, sharp attack there will be a split-second, almost infinitesimal delay before that first attack gets through. So dynamic mikes might sound a little dull on cymbals, hi-hat or tambourine. But if you put a dynamic mike on toms, the closer you move the mike the more low end you'll get. The closer you sing into it, the more presence you'll have; the low end will start building up. Usually the directional pattern

on a dynamic mike is cardioid or heart-shaped; you can switch the patterns on most condenser mikes from cardioid to omnidirectional to figure-eight."

Mills believes that the latest, most expensive microphone models are not always the best. Bill Schnee has "taken a personal liking to some of the older microphones with tubes, the predecessors to the current state-of-the-art models. The old-timers will say that tube microphones have a warmer sound, and to a certain extent that's true. A lot of people will claim that the frequency response is extended on solid-state models, but in many cases it isn't extended as smoothly; the tube models will have a "truer" sound."

Some old-timers have a preference for tubes which extends to recording consoles, equalizers and limiters. Willie Mitchell records Al Green and other Hi artists on an archaic eight-track console which uses tubes. The Mastering Lab in Los Angeles has a custom-designed tube amplifier for cutting stereo masters. "A lot of guitarists are using old tube amplifiers in the studio," notes Phil Ramone. "You can get certain kinds of distortion with them you just can't get with transistors." In some cases tube equipment will provide warmer, more musical playback at home. "But you have to use solid-state circuitry for the kind of recording being done today," Schnee maintains, "because it would take a walk-in closet to house the tubes for a 16-track board, and about five tons of air conditioning to keep that tube room cool."

Where microphones are placed in relation to sound sources and how many are used are choices as personal as those of make and model. Willie Mitchell never uses more than two microphones on a set of drums and where he puts them is a well-kept secret. Thom Bell, who produces groups like the Spinners and the Stylistics, uses as many as 16, miking virtually every piece of the drum kit. Rodney Mills uses four to nine microphones on a drum set and records it on four of his 16 tracks. "Four is not a lot of tracks for drums anymore," says Ramone. Bill Schnee usually uses three tracks, "split up in a variety of ways. Sometimes the bass drum is on a track by itself and the rest of the kit is in a kind of stereo perspective. Sometimes the bass drum and toms are on one track and the snare is on a second track. It depends on the sound you're looking for."

The almost compulsive attention to drums in today's recording studios may in part be a reaction to the sort of thin, tinny drum sound heard on most pop recordings as late as 1960. "That's a typical growth thing," Phil Ramone points out. "When a new invention or technique comes along people go to extremes until they find a happy medium that's comfortable for them." Many of the pioneers of the fatter, deeper, more dominant drum sound were Southern producers who owned their own studios — or rented at a fraction of New York/Los Angeles rates — and were free to experiment. Chips Monan (American Studios, originally in Memphis), Rick Hall (Fame in Muscle Shoals, Alabama) and Tom Dowd (who recorded Aretha Franklin in Muscle Shoals using local personnel) were among the innovators.

"They discovered that a good drum sound is primarily concerned with knowing how to tune a set of drums for studio use," says Atlanta producer Buddy Buie. "And the recording situation was informal enough for the drummers to learn how they sounded in the control booth, how the engineer was going to equalize the drums later and so on. They might experiment with putting a towel in the bass drum or a shirt inside the snare or moving the mike away from the bass drum pedal to avoid picking up the air from it. To most Southern producers, a nice wide sound on the base drum and snare is drums; the rest is just coloring. And I think the whole industry has learned from that. I hear it, for example, in the sound producer Gus Dudgeon gets on Elton John's records."

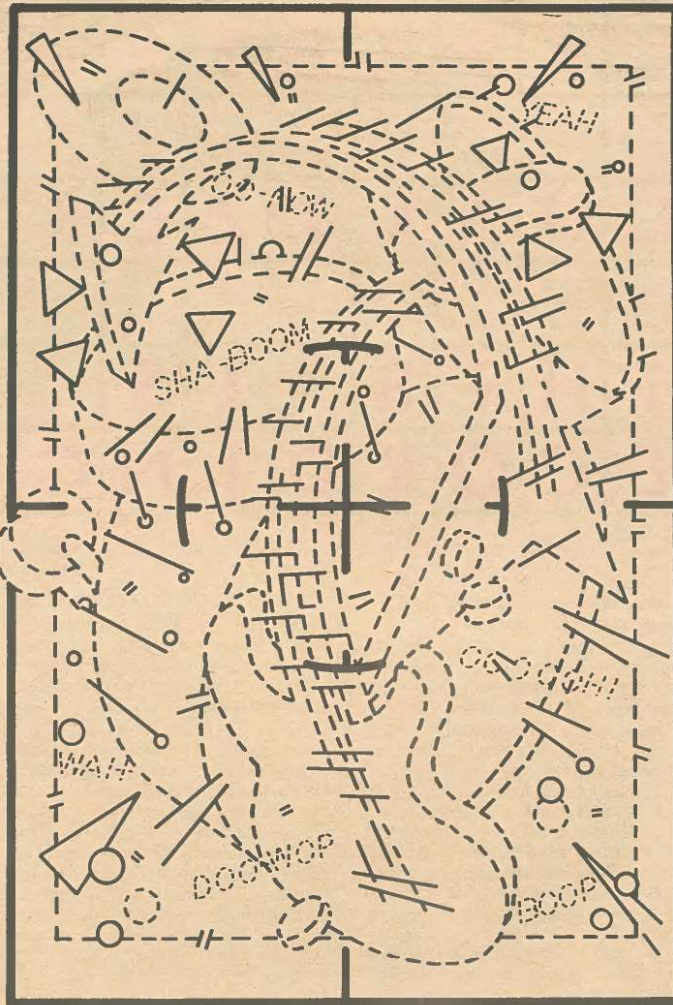
Once a satisfactory drum sound has been obtained, most engineers and producers will move on to the bass and then to the other instruments. How many instruments will play on the basic track will usually be a joint decision based on the relative studio experience of the musicians, how much stereo separation is felt to be absolutely necessary and how much control the engineer will be able to exercise over the elements later in the mix-down. At Studio One in Atlanta the drummer will play in a "booth" which is in fact a completely enclosed room within the studio. The guitarist and bassist will often sit in the control booth while they play, with their amplifiers outside in the studio. "If a musician is a pro," says Rodney Mills, "he doesn't have to have everybody in there getting him off to play."

Phil Ramone disagrees. "Ideally," he says, "every engineer would like to have each musician in a separate room so that all the equalization and echo and phasing and other tricks we use after the fact will be under our control. That should be the better sound but then you have to discuss the chemistry of the people involved. A lot of groups now are starting to feel that they play better together and are asking us to record them 'live' in the studio. And certainly with the equipment we have now we're capable of fixing most errors that happen, of using baffling and whatnot to maintain enough separation so that something that doesn't work can be replaced. There's nothing better than a situation where the players are playing off each other and a peak of excitement has been reached, and that kind of situation is also a challenge for the engineer; keeps him on his toes."

Once all the parts are on tape and assembled, the engineer and producer go to work on the sounds. This is one of the most crucial and least understood phases of the recording process and most artists have learned to ignore it at their peril. "The first time I recorded," a rock guitarist and bandleader recalls, "I got burned in the mix. So I started going to mixing sessions and then I got burned in the mastering. Now I follow a record all the way through, almost to the pressing plant, to make sure the sound I heard doesn't get lost somewhere between the studio and the consumer."

Equalizers and limiters are primary tools for shaping individual sounds and the relationship of one sound to another. "An equalizer," Bill Schnee explains, "is a kind of sophisticated tone control such as you would find on a stereo amplifier. It changes the shape of the sound. With an equalizer you can add a certain spectrum of highs or lows, take away lows and midrange—whatever you want to do. A limiter is basically a level control device. When limiters were first introduced they were intended to control volume and apparent volume." The need for limiting is apparent once you consider the sound at a concert, where a guitarist turning the volume up for an effect or a horn suddenly squealing into the high register can distract, cause imbalance in the overall blend or trigger distortion. "Limiters do restrict an instrument's dynamic range," Schnee adds, "and they make a characteristic sound in doing it. Now they're used for the sound they bring to an instrument, for a certain musical quality, as much as they're used to control levels."

The judicious use of echo chambers is another available control device. "If you use, say, three individual echo chambers for left, center and right," says Ramone, "you can blend or not blend according to the requirements of the music. If you have two guitars hard left and hard right and the artist wants some musical feeling between the two, you can blend their echoes and still have your separation, your clarity. Or if you have a string section and a horn section recorded in two different studios, you can blend their echoes. If you keep them entirely separated, you may not have a band sound." A producer like Brad Shapiro (Wilson Pickett, Joe Simon, Willie Jackson) may record rhythm tracks in Muscle Shoals, horns and backing vocals in Memphis, strings in Miami and lead vocals in New York, and then blend echoes and ambience from the various studios in order to create the illusion that a single orchestra is playing.



The placing of instruments in the stereo arc then becomes a matter of proportion and individual taste. Bass and drums will be in the center on virtually any recording of pop and rock, though as Rodney Mills points out, "the lower a sound goes, the less directional it is, so you can put a bass slightly off-center in the arc and it will still sound like it's coming from the middle." Lead instruments—guitar, keyboard or horn solos—are usually close to the center, as are lead vocals. There are many exceptions, however. Paul McCartney sometimes double-tracks his voice and spreads it out at extreme left and extreme right. Often guitar solos or their echoes are panned from speaker to speaker for effect.

"People will swear a guitar has to be on the left," Schnee says, "but it's obviously psychological. Another person will think it has to be on the right." Phil Ramone bases his mixing decision on "making the thing cohesive between the two tracks. Usually two acoustic guitars split extreme left and right and bass and drums split left and right of center is a nice sound. But if the two guitars had a tremendous kick between each other when you recorded them, it might be better to put them left and right of center and spread the drums a little more or use your keyboards and percussion to create a stereo effect. Blend is the name of the game anyway; people don't always sit in the same place when they put on a record. If I'm at a party and a record is on I want to keep hearing a good mix as I walk around the room."

Most producers, engineers and re-

cording artists agree that an understanding of the recording process is a more valuable listening aid than any instructions on how to listen, but there are certain basics. "You might as well use earphones," Ramone says, "if you're going to play records too loud or place your speakers too far apart. In both cases the separation can be too extreme. The ear will start to pick up things it shouldn't hear—edits and little bits of distortion. A lot of acceptable distortions are very good musically, but they blend and make sense only when you hear them as a unit."

Playing records at low volume will often muddle the separation and certain subtleties of instrumental and vocal phrasing may disappear entirely. The drum sounds so many engineers work so hard to obtain will sound dull or muted, the bass will recede into the background. How soft is too soft? How far apart is too far apart? The answer depends on your equipment and the acoustic qualities of your listening room, and most record makers invite you to experiment and use your ears. Once the equipment settings sound right, the speakers are properly placed in the room and the volume level has been adjusted, the trick is to get comfortable and concentrate on the music.

If you want to listen for sound, you can learn a great deal from the credits on the album jacket. Was it recorded in one studio or several? Did one engineer follow the album all the way through or are several listed? When personnel are listed track by track, did one musician play several instruments, employing overdubs? When different artists and

producers use the same studio, how much does the sound differ? Is there a point on your volume control at which sounds separate dramatically? These questions, which crop up frequently in discussions of the state of contemporary recording arts, can be applied to the following albums.

• *Caribou* (Elton John; Gus Dudgeon, producer; engineered by Dave Hentschal and the staff of London's Trident Studios) and John's previous albums have been widely imitated in terms of sound. "It's a synthetic kind of sound," Bill Schnee says, "going for a piano sound rather than capturing a piano. But it's very impressive."

• *Rock Of Ages* (the Band) and *Live Rhymin'* (Paul Simon), both engineered and mixed by Phil Ramone, are exceptionally recorded live albums. Both use material from one or two performances and most cuts are uncorrected and unedited. Some "live" albums are partially re-recorded in a studio.

• *Call Me and Livin' For You* (Al Green; produced and engineered by Willie Mitchell) and *Third Annual Pipe Dream* (Atlanta Rhythm Section; produced by Buddy Buie; engineered by Rodney Mills) exemplify the quixotic search for the perfect drum sound. If you listen on good equipment you can almost gauge the weight of the drummers' sticks and sense the welter of almost subliminal tones that comprise the snare drum's harmonics.

• *Mighty Love* (the Spinners; produced by Thom Bell; engineered by Joe Tarsia) and *Ship Ahoy* (the O'Jays; produced by Kenny Gamble and Leon Huff; engineered by Tarsia) are producers' records. Bell, Gamble and Huff write the songs, hire the arrangers and supervise every step of the recording process. They employ large orchestral forces—massed strings, brass choirs, multiple keyboards, guitars and percussion instruments—with telling effect, mixing them into miraculously organic-sounding composites.

• *Let It Bleed* (the Rolling Stones; produced by Jimmy Miller; engineered by Glyn Johns) is still a classic and from a sound standpoint the Stones and Johns haven't surpassed it. The opening seconds of "Gimme Shelter," with two guitars working hard left and right, comprise the most frequently imitated album intro of all time.

• *Fulfillingness' First Finale* (Stevie Wonder; produced and engineered by Wonder, Robert Margoulef and Malcolm Cecil) is instructive for its blend of electronic and acoustic instruments. The mixes aren't always the best in the world—backing vocals are almost lost here and there, for example—but nobody else has managed to put a synthesizer and a dry acoustic piano together and make them sound this good.

• *Martha Reeves* (produced by Richard Perry; engineered by Bill Schnee) was largely recorded with tube microphones and mastered with a tube amplifier. Is it really warmer, friendlier?

• Deutsche Grammophon and KCM, both German labels distributed in the U.S. by Polydor, maintain well-deserved reputations for the best recording quality in classical music and jazz respectively. Charles Ives's *Three Places in New England* (Boston Symphony Orchestra; Michael Tilson Thomas, conductor) and *Solo Improvisations Volume One* (Chick Corea) are indications of how luminous and enveloping acoustic instruments can sound on record.



*i had a three-bered thought
 the first thought rose above
 the rest
 and curled into a perfect
 cylinder
 the second
 was white and white
 and bubbled into itself
 with a crashing voice
 but the third receded
 and softly carried
 the others back
 into the grey-green mist
 and it was music all the time*

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THE BEST SYSTEM:

Mix & MATCH

THE PICK OF THE STEREO SYSTEMS

SYS-TEM	CARTRIDGE	(A)=Auto, (B)=Manual RECORD PLAYER	RECEIVER or TUNER and AMPLIFIER	SPEAKER SYSTEMS (Price per pair)	BASIC SYSTEM PRICE	CASSETTE DECK OPTION	OPEN REEL DECK OPTION	SYSTEM PRICE W/ OPTIONS
1	Pickering V-15/IV AC \$25	Dual 1216 (A) \$155 AR-XB (M) \$125	Pioneer Sound Project "300" \$190	Advent/2 \$120	\$460-\$490	TEAC 160 \$260	Sony TC353D \$320	\$1040-\$1070
2	Shure M-91ED \$55	Pioneer PL-12D (M) \$120 BSR 520AX (A) \$115	Sansui 350A \$220	B. I. C. Formula 2 \$225	\$615-\$620	Kenwood KX710 \$250	Akai 4400D \$370	\$1235-\$1240
3	Audiotechnica AT-12E \$55	Phillips GA212 (M) \$200 B. I. C. 960 (A) \$150	Marantz 2240 \$500 Pioneer SX838 \$500	Advent (Standard) \$260	\$965-\$1015	Advent 201 \$300	Dokorder 7100 \$400	\$1665-\$1715
4	Empire 2000E III \$70	Dual 1229 \$260 (A) or Dual 1299Q \$260 B. I. C. 980 \$200 (A) B&O 3000 \$265 (M)	Sony STR-7065 \$550 Marantz 2275 \$650	ADC 450A \$300	\$1120-\$1285	Pioneer CT-5151 \$270	TEAC 2300S \$500	\$1890-\$2055
5	Shure V15-III \$78	Thorens TD-125AB w/ arm (M) \$410	Pioneer SX-1010 \$700	JBL-100 \$600 B. I. C. Formula 6 \$550	\$1738-\$1788	TEAC 360S \$380	Pioneer RT-1020H \$650	\$2768-\$2818
6	Empire 1000ZE/X \$100	Technics SL-1300 \$400	Marantz 1200B Amplifier PLUS Marantz 120B Tuner \$700 + \$550	Dahlquist DQ-10 \$700	\$2450	Pioneer CT-F7171 \$370 Tandberg TCD310 \$500	Dokorder 9200 \$900	\$3720-\$3850
7	Ortofon SL-15E plus STM-72 Transformer \$100 + \$35	Pioneer PL-71 \$300	Bose 1801 Amplifier \$800. 1801-LED w/display \$990. PLUS SAE Mk. IX Preamp. \$350 PLUS Kenwood 700T Tuner \$700 Crown DC300A Amplifier \$730 PLUS Harmon-Kardon Citation 11 Preamp. \$350 PLUS Sequerra I Tuner \$2500	Bose 901 \$565 Ohm Model F \$800 AR-LST \$1200	\$2850-\$5215	Nakamichi 700 \$700 Nakamichi 1000 \$1100	Crown CX-822 \$2000	\$3550-\$8315

THE PICK OF THE 4-CHANNEL SYSTEMS

	CARTRIDGE	RECORD PLAYER	RECEIVER	SPEAKER SYSTEMS (Price for four)	BASIC SYSTEM PRICE	OPEN REEL DECK OPTION	CD-4 OR SQ LOGIC OPTION (if not built-in)	SYSTEM PRICE W/ OPTIONS
1Q	Audiotechnica AT-14S \$75	See Stereo System #2 \$115-\$120	Sylvania RQ3748 \$600	See Stereo System #3 \$520	\$1246-\$1259	Technics RS 740US \$500	Lafayette SQ-W \$110 Lafayette CD-4 decoder \$100	\$1336-\$1949
2Q	Audiotechnica AT-15S \$100	See Stereo System #4 \$200-\$265	Fisher 514 \$750 Pioneer QX-949 \$750	See Stereo System #4 \$600	\$1675-\$1715	Akai GX-280DSS \$800	Lafayette SQ-W	\$1775-\$2575
3Q	Stanton 780/4DQ \$125	See Stereo System #6 \$400	Kenwood KR-9940 \$975	AR-3A \$1200 AR-LST \$2400	\$2700-\$3900	TEAC 3340S \$1150		\$3850-\$5050

Trying to pick the ten top hi-fi systems from the hundreds of components available is no easy task — especially when you ask the advice of dedicated audiophiles, who are a fairly opinionated group. Still, pick them we did, and with hardly any disclaimers at all, we present them in ascending order of cost: seven great stereo rigs and three quadraphonic systems.

First some general facts. If you want FM radio plus a good phono system, forget about the \$300 starting point referred to in past system listings. Even a modest receiver feeding a pair of small speakers and fed by a decent quality manual record player or automatic turntable and cartridge costs more than \$400 today.

Consequently schlock compact systems are selling better than ever. Three and four piece compact systems are available at department stores for as little as \$100 and for as much as the least expensive of the systems listed here. You connect open-backed plastic

speakers to a plastic-encased "electronic music center," with its low-fi eight-track player slot in the front and a ceramic or crystal cartridge-equipped lightweight record-scratcher perched on top and presto—"stereo."

If, on the other hand, you want honest sound and are ready to part with anywhere from \$400 to \$8000, consider our winning ten.

BEATING THE PRICES

There are two things you can do if you're not ready to spend the amounts shown. First, remember we're showing list prices. In many cases, a hi-fi dealer will be willing to make a package deal if he thinks you're going to buy the whole set from him.

Second, you need not start out with a complete receiver in any of the systems listed. In fact, the top two stereo systems use separate amplifiers and tuners. In any system, tuner purchase can be put off to a later date so that you

can enjoy better record reproduction at the outset, either for the same total price or for a considerable saving.

For example, in system #1, instead of going for the Pioneer Project 300 receiver, you could select a Kenwood KR-4004 integrated amplifier for about the same money and get 18 watts of continuous power per channel—about double the power output of the Pioneer all-in-one. Or, you could select a Marantz Model 1030 at a savings of about \$20. Of course, when you do elect to buy a tuner later, you'll end up spending more for the total system than if you had bought a receiver, but you've spread your investment over a longer period.

On the negative side, we hasten to tell you that our systems do not include such accessories as record changer bases, dust covers and the like. These extras are fairly inexpensive and should be more than offset by the discounts you're likely to pick up on total system purchases.

MIXING AND MATCHING

In general, we've tried to apportion the dollars spent for each system in a way that will not result in a weak link. There's nothing to prevent you from jumping one, or at most two steps up and down from one system component to one listed in another system. Don't go beyond that, though, or you're liable to end up with a component that's too good—or too poor—for the rest of the system. Most audio nuts consider tape an extra to a basic system, despite the fact that tape recording is becoming more and more a factor in home hi-fi. Tape decks, whether cassette or open-reel, are not needed to get started and have been separated from the pricing of the basic systems.

SYSTEM 1: \$460-\$1070 RANGE

This modest powered "starter set" is nice for small dormitory rooms but won't blast [Continued on Page 62]



Fifth row center

Morgan—a dummy recording head in the best seat at the Boston Symphony's Tanglewood Music Festival—gave Bose a key answer acoustical engineers had sought for ten years. The shrill and harsh sounds characteristic of even the finest of conventional home music loudspeakers were apparently caused by beaming sound waves directly at a listener.

In a live performance, sound waves from musical instruments reflect from all surfaces of the hall and arrive at a listener's ears from all directions.

The same sound comes to each separate ear milliseconds apart. Our mind pulls it together. Like a willow swept by rain, we are bathed in sound, and just as our two eyes unify an image, so do our ears cooperate.

As simple as this seems, Bose engineers spent years at exacting experimentation to discover that more precise electronics wouldn't close the gap between the experience of concert music and conventional hi-fi. The answer lay in how music travels to our ears.

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New B.I.C 980 Automates Brillo Bob

A bunch of us from Warehouse Sound Co. were doing the national electronics show, and it'd been a long day. We'd started from San Luis Obispo and traveled nine hours by ox cart, plane, and bus, and then walked miles in that overgrown exhibit hall. Now we're looking for a cab, all of us beat and wishing we were anywhere but in Chicago.

All except Brillo Bob, who's our permanently wired audio freak; he's bubbling about some new B.I.C. turntable he's just seen and using words like "revolutionary" and "incredible." But nobody's listening — our ears have long since shifted out of gear from too many over-hyped salesmen.

We flag a cab and pile in. Bob gets the front seat, but promptly turns around. "I wish you guys would listen to me. . ."

Weary silence.

"You've got to see this thing, the B.I.C. 980 . . . they're using a twenty-four-pole, servo-controlled 300 RPM motor. It's programmable . . . and it's

the first belt-driven automatic



changer! Cripes — you ought to see the way it handles records . . ."

Mike tells Bob to get back in his cage. Bob just grins. "Okay, but I'm telling you it's a ball-buster. Just wait and see."

We reach the hotel and guess who I get for a roommate.

Next morning I awake to find Bob has fled after using my toothbrush, comb, and all the towels. There's a note on the mirror: "Do something about your midrange-snoring, you distort. See you at B.I.C."

When the rest of us finally get back for the show's second day, we head for the B.I.C. display to see what the hell Bob is so excited about. And there he is, surrounded by B.I.C.'s vice-president, Frank Hoffman, and half their sales staff. And Bob's telling them about their own 960 and 980. Mr. Hoffman tells me that they'll let Warehouse Sound Co. have the first shipment of new turntables, if only Bob would put their demonstrator back together . . .

Now, several months later, we've had time to check out the new B.I.C. turntables. Bob jilted his manual and lives with a new 980. The rest of us think the B.I.C.'s are so fine that we've even featured them in our new catalog. Write or call, and we'll zip you B.I.C. literature, fast and free. Add \$1 for postage, and we'll also send our 64-page discount catalog of music systems and components, plus your choice of the 1975 edition of the Music Machine Almanac, a 185-page full-color guide of today's stereo and quad components, complete with photos, specs, and prices, (normally \$1.95), or our own 64-page Professional Products catalog for musicians. Better yet, send \$2 and get it all. Either way, we mail first class, the day we get your coupon . . .

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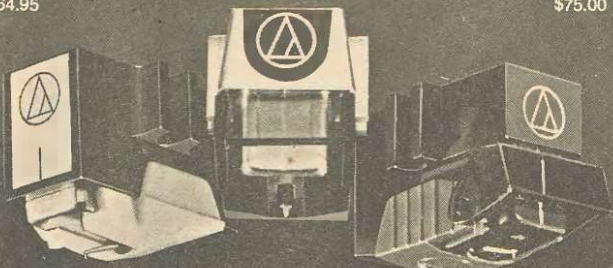
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*U.S. Pat. Nos. 3,720,796; 3,761,647
†Shibata stylus Pat. No. 3,774,918



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[Continued] you with its attainable sound levels. The little Advent speakers are not the most efficient, but they are smooth and clean-sounding and small enough for placement just about anywhere without having to move any fur-



niture around. The turntable choice (manual or automatic) is up to you, and if it appears that we've gone overboard in price here it's because we feel you'll want to hang on to these important components even if you upgrade the rest of the system later.

SYSTEM 2: \$615-\$1240 RANGE

This system has been chosen to give fairly loud sound power. The little Sansui receiver (not shown) is good for about 20 honest watts per channel, but it will sound like a lot more because of the B.I.C. Venturi speakers, which are



very efficient for their size, which is still quite small. The Shure M-91ED is a favorite workhorse of a cartridge that isn't going to be knocked out of commission the first time you accidentally drop the tone arm on a record.

SYSTEM 3: \$965-\$1715 RANGE

With this system, we're getting into the feature-laden systems people dream about. Both receivers can deliver nearly 50 watts per channel (the Pioneer beats the Marantz by a slim five watts), which the regular sized Advents handle beautifully and with enough sound output to please all but the most demanding power nuts. The Audiotechnica AT-12E is one of the lowest priced CD-4 cartridges that also does a fine job with stereo, useful as a stepping stone to quad. If you definitely plan not to switch to quad someday, there is the

Shure choice in system #2. The B.I.C. 960, though an automatic, is so close in



design and performance to a good manual that you might want to choose it if you ever plan to stack more than one record and want the convenience of multiple record playing and the precision of a manual.

SYSTEM 4: \$1120-\$2055 RANGE

Moving up just a bit in power output (60 watts per channel for the Sony, 70 for the Marantz, both at very low-rated distortion), this system also offers a choice of two excellent automatics or an excellent manual turntable made in Europe. Bang and Olufsen (not shown) is the full name of the maker. The medium-efficiency ADC speaker with this system has a big enough enclosure (25" x 14" x 12½") to be floor-standing and provide good bass, even though it's still a sealed enclosure design and ought to be less efficient than it actually proves to be. You may prefer to pick

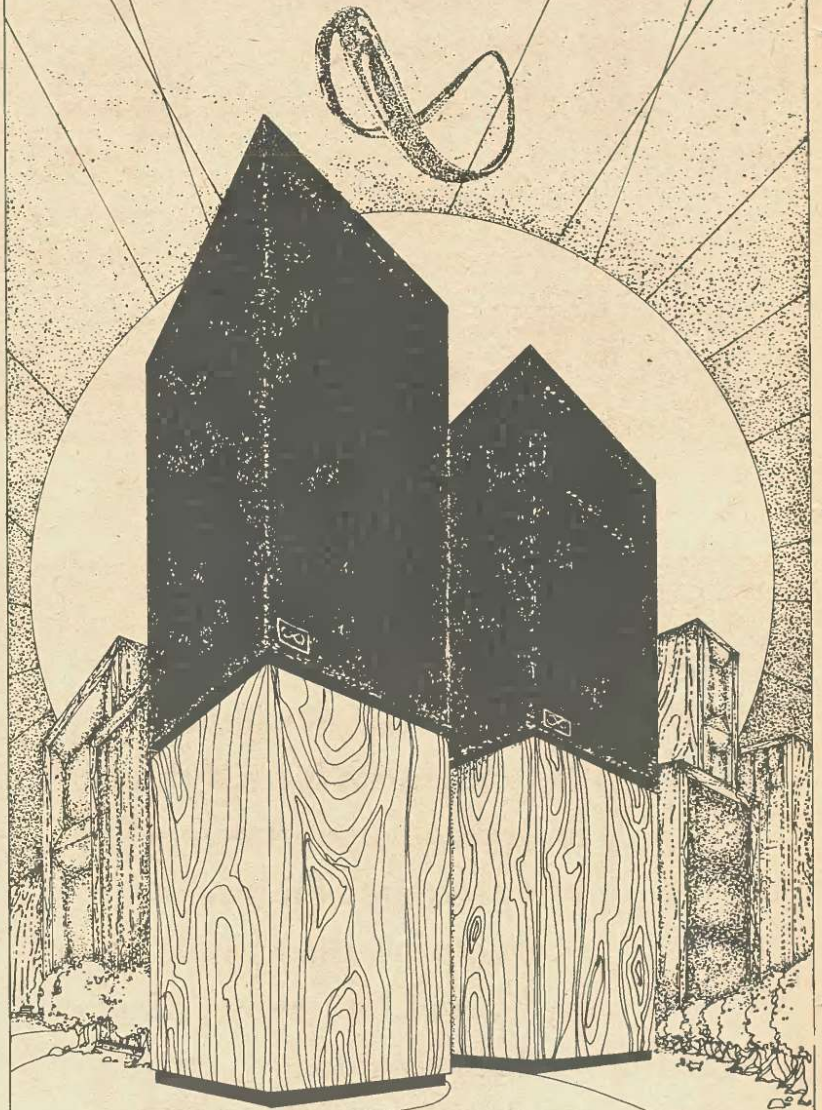


speakers from system #5 or system #3 or even a few we haven't listed, as long as they can handle the power output of the receivers safely. When you're in this bracket, no one has the right to push you into a choice of speakers. All we're doing here is giving you a reference point from which you can be your own judge.

SYSTEM 5: \$1738-\$2818 RANGE

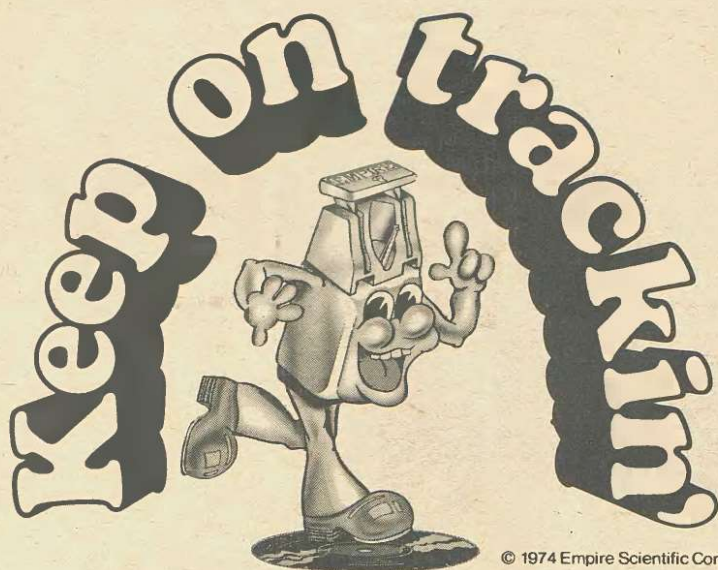
The best way to get 100 watts of audio power per channel without going into separate [Continued on Page 64]

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[Continued] power amps is with the new Pioneer SX-1010. Its tuner section is state-of-the-art and as sensitive as any we know. Both the JBL-100 and the fairly new B.I.C. Venturi Formula Six



are very efficient (the B.I.C. has a slight edge in this department), and either choice coupled to the SX-1010 will just about move your walls if you crank up the volume control. If you do decide to buy some other speaker systems, make certain they can handle the full 100 watts plus that the Pioneer receiver puts out: Not every speaker can. We offer no multiple choice in this system when it comes to cartridge and turntable. The Swiss-made TD-125AB is the most recent—and best—in a long line of precision turntables made by that firm since long before the return to manual players. Similarly, the Shure V15-III is the most recent of a line of super flat response, high-tracking cartridges which have been around for a good many years. That goes for the Empire pickup shown in system #6 below, and either one will work just fine in either systems #5 or #6.

SYSTEM 6: \$2450-\$3850 RANGE

This is the first system in which we split the electronics into a separate amplifier and tuner. We've chosen Marantz units for both, because they play well to-



gether and look like they belong to each other, but just about any tuner in this quality bracket will work fine with the chosen amp and vice versa. Since the integrated amplifier we've chosen has the same 100 watt-per-channel capability as the Pioneer from system #5, you'd go this route only if you have a good reason for wanting separates. Good reasons include spacing out your purchases [Continued on Page 66]

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If you can't get into spending heavy bucks on speakers, get into the invisible sound of ADS and BRAUN. Invisible sound is—if you'll excuse the expression—out of sight. But our prices aren't. For less than \$100 you can have an ADS speaker that shares a lot of good stuff with our \$800 model. And in-between there are four other fine models to match your pocketbook.

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Here's what marvels Franz hath wrought. A 1" dome tweeter so light it acts like it has no mass at all. A 2" midrange dome with such wide dispersion that it radiates nine times as much power as conventional cone drivers. A revolutionary new sealing fluid that damps our dome drivers for amplifier-like, ultra-low distortion. And an exclusive woofer cone compound that's rigid at low frequencies, self-damping at high ones.

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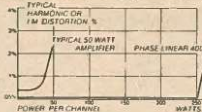
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Maybe. If you don't mind settling for something less than clear, crisp highs and firm, solid lows for audiences of 1 to 10,000. But if you want distortion-free high output amplification, if you want something compact, reliable, versatile enough to handle quality stereo speaker systems, guitars, organs, PA systems—you need at least 400 watts. At \$499, why live with anything less than a Phase Linear 400? See your dealer.

SPECIFICATIONS:

Power—Greater than 200 watts/channel R.M.S., both channels driven into eight ohms, 5 to 20 kHz. **Distortion**—Less than .25%; typically less than .05%. **Hum/Noise**—Better than 100 dB below 200 watts. **Weight**—35 lbs. **Dimensions**—10" wide, 7" high, 10" deep.



Phase
Linear
400

THE POWERFUL DIFFERENCE

PHASE LINEAR CORPORATION
P.O. Box 1335
Lynnwood, Washington 98036

[Continued] (starting with just the amp) and liking the somewhat greater flexibility of separates. You'd better have lots of room if you go along with us on the Dahlquist DQ-10 speakers. They look like full range electrostatics, but they're not. They measure about 31" x 31" but are only 9" deep. They sound great and, incidentally, Saul Marrantz (who is no longer part of the company he started years ago) is involved in their design and manufacture.

SYSTEM 7: \$2850-\$8315 RANGE

Since this is the highest priced system of our seven stereo arrays, we just couldn't limit the electronics to a single group. There seems to be more good stuff around at the high end than ever before and we've chosen two sets of separates that offer very high power to drive the relatively low-efficiency but high-quality speaker systems. The turn-

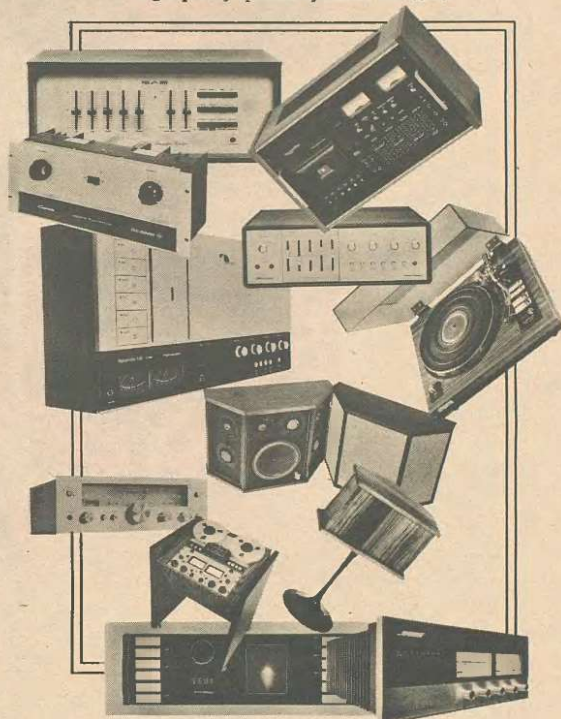
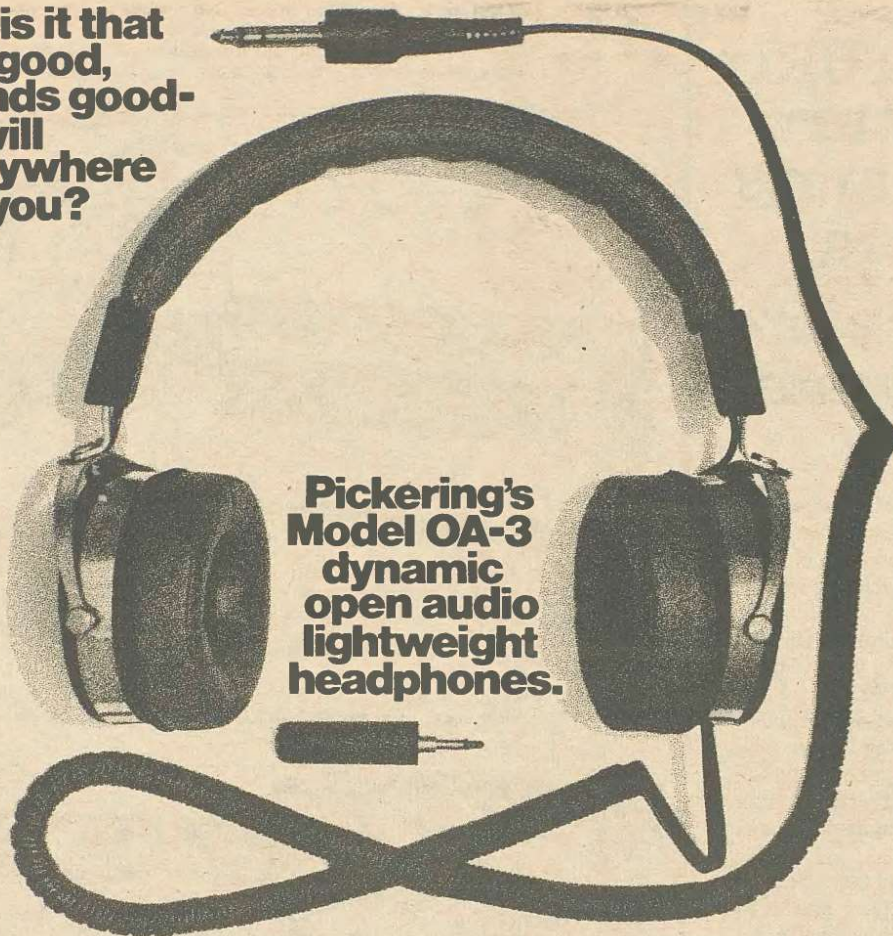


table is Pioneer's newest and best direct-drive servo-controlled model. The three different speaker selections represent three different design philosophies (and, therefore, three different kinds of sound, among which you'll have to judge for yourselves). Bose 901s are omnidirectional, as are the Ohm Model F floor-standing units (not shown). The Acoustic Research LSTs also feature extremely wide dispersion and utilize a multitude of direct radiating and angled tweeters and super-tweeters. Kenwood's new 700-T tuner uses totally accurate frequency-synthesizing circuits which tune to desired frequency electronically. The price for the Sequerra tuner includes a panoramic analyzer which tells you all kinds of things on a scope display tube, such as what stations are to either side of the one you're tuned to, how strong the signals are and much more. About \$500 can be lopped off the price of this one by omitting this feature.

SYSTEM 1Q: \$1246-\$1949 RANGE

The choice of this GTE Sylvania four-channel receiver may come as a surprise but the product is good and offers very high power in a reasonably priced quad receiver. [Continued on Page 68]

What is it that
feels good,
sounds good-
and will
go anywhere
with you?



Pickering's
Model OA-3
dynamic
open audio
lightweight
headphones.

Expanded Listening Enjoyment. Just plug the special adapter into the ear-phone jack of any Mono Cassette Recorder, Portable Radio or TV Set and plug the OA-3 into the special adapter and enjoy total sound reproduction everywhere you go.

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KR-7400 AM/FM Stereo Receiver

**the longer you look the better you'll like
KENWOOD KR-7400**

When you're about to spend money on a really good hi fi system, you can't be too careful about the receiver you choose. That's the reason KENWOOD invites you to look closely at the KR-7400. Check the specs. You'll see that KENWOOD gives power ratings in the most stringent manner possible: 63 RMS watts per channel (x2) into 8 ohms at all frequencies from 20-20k Hz. Check the features. You'll find unexpected extras like Triple Tone Controls and a unique Tape-Through circuit that lets you dub for hours while you go right on listening to any other program source. But most important, check the performance. Music sounds better because the KR-7400 is engineered better: direct coupling, low-noise preamp, MOS-FET front end, and a new Phase-Lock-Loop MPX circuit that extends stereo separation throughout the audio range. It all adds up to top performance.

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Looking for speakers that can reproduce music's full dynamic range so you can hear the loudest louds and softest softs?

B·I·C VENTURI does it all without sacrificing frequency range, accuracy, size or price.

B·I·C VENTURI offers four ways to turn low-power amplifiers into tigers and high-power amps into pussycats: The Formula 2, fills the average room with clean, high level sound from even modestly powered, inexpensive amplifiers. The Formula 4, enhances the performance of low-power amplifiers. It also handles high-power amplifiers effortlessly and flawlessly. The Formula 6 handles up to 125 watts per channel and achieves a quality of sound unrealized from super-power amplifiers. And the newest B·I·C VENTURI, the Formula 1, sounds better than all other speakers of its size and in its under-\$75 price class.

Visit your B·I·C VENTURI dealer... and purr. For descriptive brochure write: British Industries Co., Div. of Avnet, Inc. Westbury, N.Y. 11590.
Canada: C.W. Pointon, Ont. RS-9

B·I·C VENTURI



[Continued] Our gripe with most four-channel all-in-ones, however laden with decoders and demodulators they may be, is their low power output. Sylvania has managed to get better than 50 watts per channel into each of its four amp sections and even



though it lacks latest matrix logic circuitry and lacks CD-4 demodulating circuits altogether, these are easily added outboard, as shown in the option columns for this system.

SYSTEM 2Q: \$1675-\$2575 RANGE

If you can afford the added cost, the receivers of this system offer more control features, built-in CD-4 circuitry and, in the case of



the Fisher, full logic SQ decoding. Both provide enough power for the speaker systems chosen and are ready to accept adaptors if discrete four-channel FM comes into the picture.

SYSTEM 3Q: \$2700-\$5050 RANGE

Double logic SQ decoding, plus every other kind of matrix choice, built-in CD-4 and a good receiver (even considered from a two-



channel vantage point), are featured on Kenwood's new KR-9340. If you're at this level, the rest of the system should be familiar to you.

There you have it: Our ten best systems for stereo or quad. Before you take pen in hand to offer counter suggestions, remember—maybe your ears don't work like ours. One thing's for sure: Even our first system will sound a lot better than any of the one-piece mahogany monstrosities too many people still listen to.

... on the test bench and in the living room its behavior refines and surpasses that of the Type II Improved without changing the V-15's basic identity — which has, from the beginning, been very attractive and..."

...ration is the best the lab has measured so far..."

... must be reckoned as one of the very best cartridges on the market."

High Fidelity, July, 1973 (U.S.A.)

"Shure Bros., in introducing the Type III, has created a new standard for other cartridges to shoot at."

"... an amazing curve for an IM and Shure guarantees that it will perform this way."

"... we were unable to find a cartridge that could not track a groove. This cartridge could not track a groove. This cartridge could not track a groove."

"... our subjective IM distortion showed a significant improvement over last year's best cartridges."

"... a clinically clean performance that will be hard to improve upon."

Electron, July, 1973 (Canada)

"I cannot think in terms of 'presence' to describe this cartridge so much as its 'absence'. The sound is completely neutral and the quiet background is a tribute to its smooth response and high resonance. I found no trouble from hum and no special cables or connecting techniques were needed to maintain the response. Needless to say, it tracked the groove of records with scores of..."

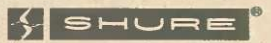
... we firm certain passat V-15 Ty, yet, coml and electr.

Aw shucks, folks...

The Shure V-15 Type III Cartridge is a product of which we are supremely proud, one that took seven years of grueling laboratory work to take shape. And, although we expected an enthusiastic reaction, the response we're getting is, frankly, a bit overwhelming to us. Hi-fi authorities and critics from all over the world have written — each in his own way — that the V-15 Type III sets a performance standard beyond any other cartridge available today. They use words we wouldn't dare use ourselves — like "the standard for years to come," "perfect," "ultimate," etc., etc., etc. Please write for the highlights of published reports we've assembled (ask for AL482) — and read and judge for yourself. (We feel about it the way a proud papa feels about his newborn's photograph.)



Shure Brothers Inc.
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Evanston, Ill. 60204
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Available as a 4-track or 2-track stereo tape deck, the **DOKORDER 1120** has all the professional features you could ever want!

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The Sound of Koss Stereophones has always made music lovers go ape. So, for a limited time, we're offering a free "Go Ape Shirt" with the purchase of any Koss Stereophone. And for those who think it's possible to go ape without a Koss Stereophone, our "Go Ape Shirts" are available for only \$2.25 plus 25¢ handling. At that price, they may not blow your mind like a Koss Stereophone would, but they won't blow your budget either.



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Please send me my "Go Ape Shirt" (s) in the following size (s).

Size:	Small 34-36	Medium 38-40	Large 42-44	Ex. Large 46
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I get my shirt free and have enclosed my new Koss Stereophone Warranty Card as proof of purchase.

I have enclosed check or money order (payable to Koss Offer) to buy _____ shirts at \$2.25 each plus 25¢ each for handling. Total enclosed \$_____.

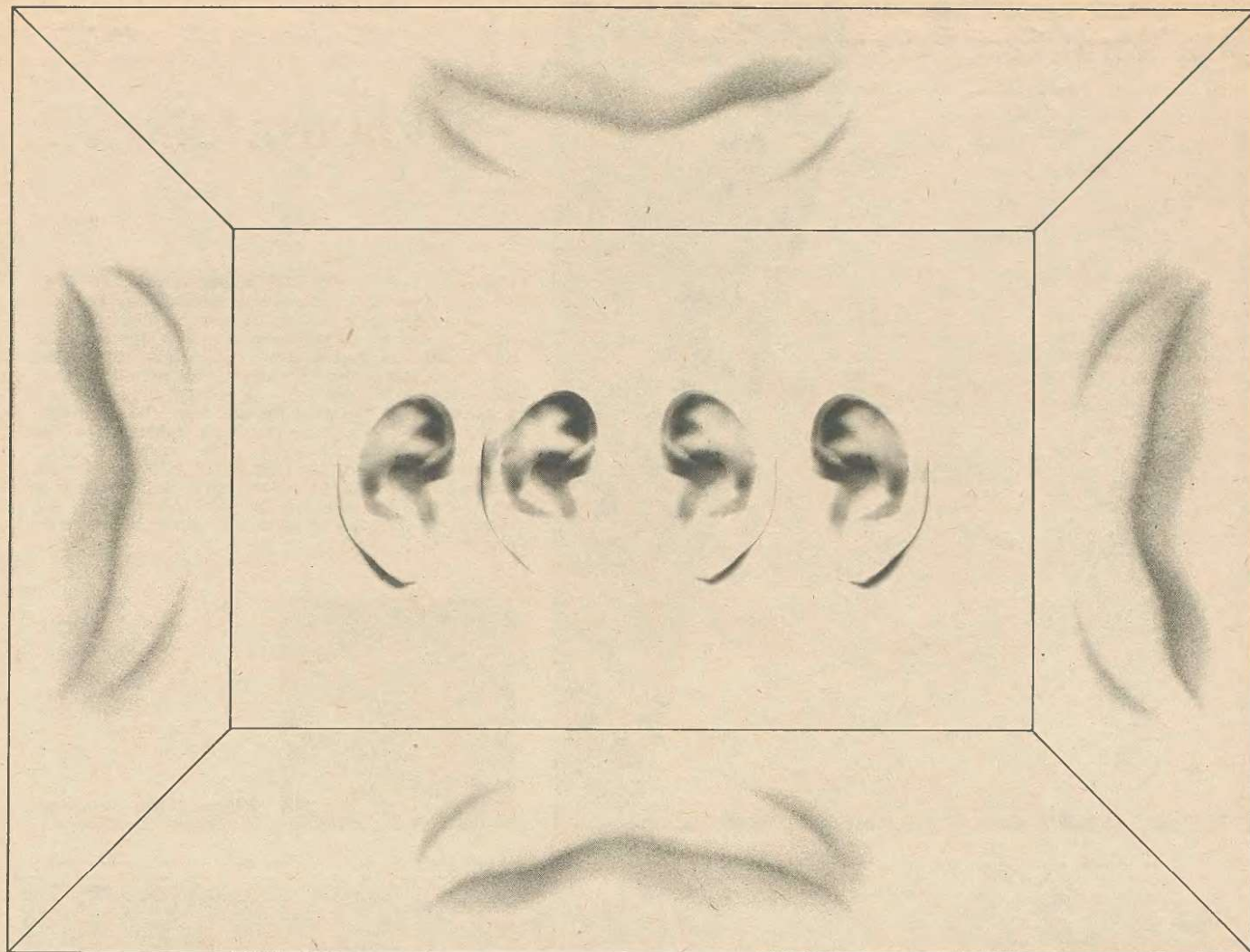
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Offer good in U.S. only, except where prohibited. Allow 5 to 6 weeks for delivery. Offer expires December 31, 1974.





Tony Lane

ALL POWER TO THE FOUR-EARED PEOPLE!

BY LEN FELDMAN

When Vanguard Records released their first open-reel four-channel tapes back in 1969, optimists in the hi-fi business enthusiastically predicted every system of hi-fi components would be quadraphonic inside of five years. A year later we were introduced to matrix four-channel discs: first one kind, then another, then a third kind and more, until it looked as though you'd need a room full of "black box" decoders if you wanted to play every kind of quad disc that was popping up.

About the time the dust settled and listeners began to discover that most quad records (and even a great many stereo records) sound great when played through just about any kind of decoder, along came RCA with a "discrete" four-channel record that needed a new kind of phono pickup plus a special gadget called a demodulator and everyone panicked again. RCA called the new system Quadradisc (though JVC, the Japanese company that invented this trickier kind of record, had

named it CD-4 a couple of years before) and began to issue Quadradisc records in an attempt to catch up with CBS's more established SQ records and Sansui's QS records (not to mention imported records using the RM system, which stands for "Regular Matrix" and is somewhat like Sansui's QS).

Soon some FM stations were playing matrix discs like SQ and QS and telling everyone that they were "broadcasting in four-channel sound." They weren't, unless you had an appropriate decoder at home that could unscramble the two encoded channels back out to four. Meanwhile, the industry set about developing four-channel broadcast systems that could really transmit four separate channels all at once. So, in effect, we have four-channel broadcasts now, but we're also waiting for the FCC to give us new rules whereby we could have *real* four-channel broadcasts, so that discrete program sources such as RCA's discs (and even those '69 tapes from Vanguard or anyone else) could be played over FM.

Why is everyone from manufacturer to dealer to thoroughly confused con-

sumer complaining that they don't understand what's holding up four-channel sound? How come we're living at the end of 1974 and quadraphonics hasn't swept the country? After all, it took no longer for stereo records to catch on, after their introduction in the late Fifties. So what if the industry immediately standardized on one kind of stereo recording system, and so what if the FCC authorized a stereo FM broadcast system less than three years after the first stereo disc was commercially available?

So, when the brave hearts, the daredevils of the audio fraternity, rushed right out and bought those first SQ or QS or RM matrix records and the gear needed to play them, what happened next? All the companies who swore up and down that the little bit of channel separation afforded by these "mix and unmix" systems was all you really needed to enjoy good quad sound did a quick reverse. All of a sudden we started hearing about "logic circuits" that could increase the channel separation so that we could hear military bands marching around the room, from

speaker to speaker, merry-go-rounds spinning dizzily around us, and even jet planes streaking across the room from right-front to left-rear—and then again from left-front to right-rear.

And we didn't get just *one* kind of logic circuit. From the good folks at CBS we got "10-40 Blend," then "Front-Back Logic," then "Wave-Matching Logic" and, more recently, "Variable-Blend Logic." Sansui proudly came up with "Variomatrix," which was really designed for their QS system, but with a slight change of switch positions works fine for SQ too—except that they don't say so, because pride, I guess, prevents them from taking a license with CBS who are, after all, promoting a competing matrix system. Now JVC (the champions of the CD-4 system) and Technics by Panasonic have equipment that grudgingly decodes matrix discs too, but they don't label their switch positions QS or SQ, preferring to call them by such terms as "Matrix 1" and "Matrix 2."

There are now lots of quad records available, hundreds in fact. But when you go to [Continued on Page 72]

The Non-Giant Economy Size.

Unlike so many of our giant competition, Sherwood doesn't make a full line of audio equipment. No radios. No tape decks. No headphones. No turntables. Versatility may never be our claim to fame.

But the limited scope of our output does have benefits. We can concentrate on refining each of our products, engineering them for maximum performance.

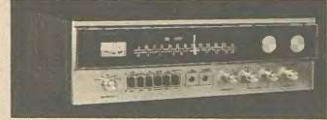
A case in point is the S7310. With a minimum RMS output of 38 watts per channel (20-20,000 Hz at less than .5% distortion), this receiver outpowers all other units in its price range. With exceptional selectivity and sensitivity ratings.

We also utilize only the finest and most advanced of proved componentry: Dual gate MOS FET's and phase lock loop circuitry, the latest integrated circuitry and Solid-State

FM IF Ceramic Filtering devices. Equally important, we've eliminated the gimmickry and gadgets that add nothing to the equipment except a potential for malfunction.

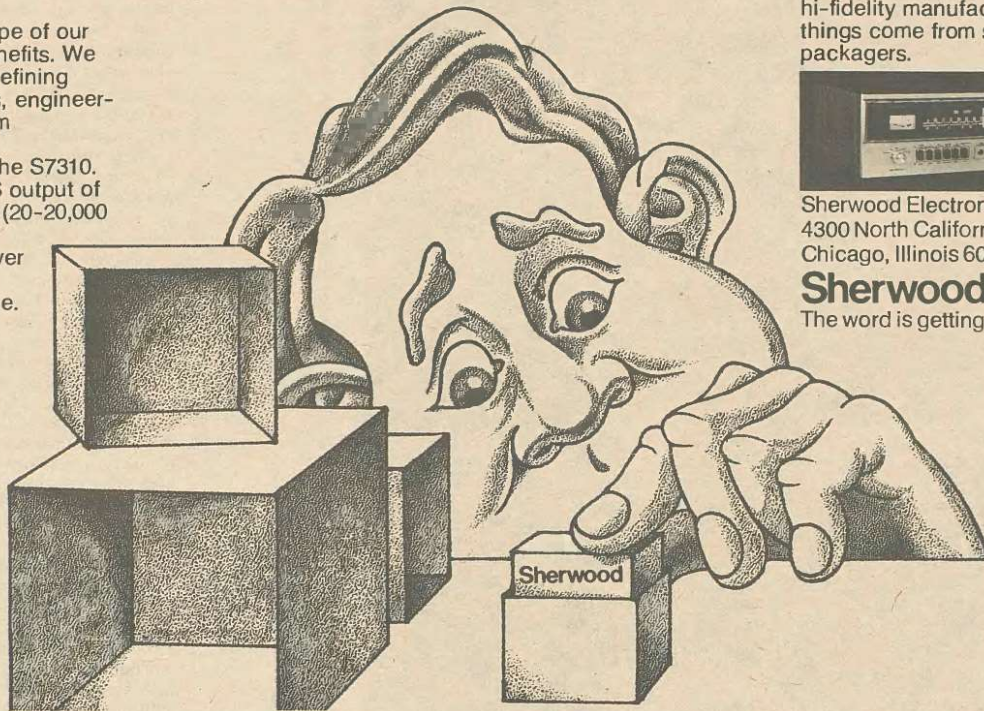
In short, if you look at receivers that do as much as Sherwood's S7310, they probably cost more than \$369.95. Or, if they cost the same, do less.

Which only proves that, in hi-fidelity manufacturing, good things come from small packagers.



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4300 North California
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The word is getting around.



HOW TO UPGRADE YOUR SPEAKERS FOR AN EXTRA BUCK.



The sound that comes out of those beauties is the sound that's on the cassette. No better, no worse. And if you're using discount cassettes, chances are you're hearing discount sound, delivered with breathtaking clarity.

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Drop a TDK ED cassette in there next time and hear the difference. An absolutely stunning difference. Vibrant sound, rich in color and detail, with the depth and harmonics that were there when the music happened.

One TDK ED cassette. One time. One listen. That may be the *first* time you'll *really* hear your speakers. And all for as little as an extra buck. An extra buck more than the cassette you're probably using now.

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sound as clear as light

The ESS Heil air-motion transformer is the loudspeaker of the future with an *entirely new principle* of sound propagation. With *five times* the clarity and delineation of an electrostatic. With distortion as *low* as that found in *modern electronics*. With a moving system so *weightless* it accelerates instantly to recreate the first critical milliseconds of a sound. With no "cone", no "voice coil", no "forward backward" motion, and so simple and perfected in its design that it can carry a lifetime warranty.

The acclaimed performance of the ESS Heil air-motion transformer is available in a wide range of superbly engineered ESS amt speaker systems from the compact, convenient amt 5 reference bookshelf through the incomparable floor-standing amt 3 rock monitor. A full-color brochure describing in simple language the completely unique operation of the ESS Heil air-motion transformer, with full specifications for all ESS amt speaker systems is available, free, at your authorized ESS dealer. Call this toll free number for your nearest ESS dealer location.

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(In Illinois call 800-332-4400)



Heil air-motion transformer loudspeaker systems.

ESS, inc. 9613 oates drive • sacramento, california 95827

[Continued from Page 70] a record shop and thumb through the racks, you're not likely to find them stacked in alphabetical order or by type of music or by group or artist's names. Quarantined in a separate rack somewhere, you'll find them all under the general heading of "Four-Channel Records"—and more than likely the dealer will look at you kind of funny if you spend much time looking through those isolated racks. Good going, record dealers of America.

And as for the knowing dealers who sell hi-fi components, with but a few exceptions they're down-playing quadraphonic sound as though it were a step backward instead of another step toward sonic realism in a home music system. Walk into the typical audio shop and tell someone you're interested in quad but that you own a good stereo system already and don't want to discard it, and you're more than likely to be confronted by blank stares. All dealers are carrying a couple of new, expensive, all-in-one receivers that offer every kind of quad option known (including logic matrix decoding, CD-4 decoding, and even a jack on the back of the set for the four-channel broadcast system of the future). But what equipment is available if you want to ease into four-channel sound slowly?

ADVICE FOR THE PERPLEXED— PART ONE

If you just want to get an inkling of what four-channel sound is all about—a feel of surround sound, you can do it without buying any fancy decoders or new amplifiers or throwing out your entire hi-fi rig.

Pick up a third speaker system somewhere—borrow one if you have to. Hook up one of its terminals to the "hot" output terminal on the left channel output of your present amp or receiver and the other speaker terminal to the "hot" speaker output of your right channel amplifier. Position the speaker somewhere behind you (it isn't that critical) and play a few of your favorite records.

All of a sudden you're hearing sounds coming from behind you—sounds that are actually different from the sounds coming from the two front speakers—and you're not even playing a quad record! I guarantee you that you'll want to replay every one of your records this way—just to see what surprises are stored in those two-channel grooves. It's a great way to find out if you are "ready for four-channel sound." If you feel it all adds something to the music, go on to step two.

POOR MAN'S FOUR-CHANNEL SOUND

You can still buy any number of passive add-on boxes, such as the ones first proposed and sold by Dynaco (which they called Dynaquad). They let you add two more speakers without having to buy a second amplifier for those two back channels. With such a device (you can buy one for as little as \$29.95), you can start playing matrix-encoded records as well as stereo discs you presently own.

You won't get exactly the spatial orientation for the four channels that the record maker had in mind, but you will get a four-channel effect that's worth hearing. The only thing you won't have much control over is the ideal listening position in the room, since you won't have individual control over the rear channels and will have to take it pretty much as it comes. Separation

tion won't be terrific either, but then you may not feel it's necessary when you listen to music. Try it and see.

READY TO SPEND A LITTLE MORE?—
PART THREE

Anything beyond what we've just talked about will require a pair of extra amplifier channels, and that means a second stereo amp. You may find some amps combined with decoders, so that only one new piece of equipment is required, which will be fully compatible with the stereo amp or receiver you already own. If you prefer more components, splitting the extras into a new separate stereo amp and a decoder of your choice lets you match the new amp power to that of the old and also lets you choose the level of matrix decoding perfection that you really feel you want.

If simple matrix decoding is enough—settle for it. If you crave that extra separation from matrix-encoded records, you can get it by purchasing decoders for about \$100. As for playing CD-4 (discrete records), that will require two more items: a new phono pickup (maybe you were ready for one anyway—what with your ground-down over-used diamond stylus ready for replacement), and a separate CD-4 demodulator, also available around the \$100 level.

The advantage here is that even if you decide later on you want a more sophisticated or a better decoder, you don't have to throw out the whole system. The speakers are still fine, and the four channels of amplification (your original stereo set plus the extra amp) can be made to work with whatever decoder they're likely to invent in the future.

READY TO GO ALL THE WAY?—
PART FOUR

If you're just now considering hi-fi components for the first time and the idea of a good quad system appeals to you, don't let the prospect of surround-sound blind you to your needs for good, low-distortion sound delivered by an adequately powered amplifier or receiver. If the money you have to spend adds up to either a good stereo system that fits your requirements or a less-than-adequate four-channel system—stick with the stereo system for now. Take one step backward into Part Four later.

If you've got enough cash for a good quad receiver (and everything else that goes with it) that doesn't have every kind of sophisticated decoding and demodulating facility you might need someday but does have the input control features and power you require, choose it instead of a lesser receiver that has all the quad frills. Remember, even the all-in-one quad receiver can have outboard adaptors added to it later if that's what you want to do.

Perhaps the audio industry has gone off a little half-cocked in its enthusiasm for four-channel sound. Perhaps it's even been guilty of not being able to get its many systems together before offering them to the listening public. But that's really no reason to deprive yourself of what can be better, more lifelike sound reproduction in your listening room. In the end, it's you who will decide whether we're going to live with only SQ, or only QS, or only CD-4 or all three—or more. But the decision or decisions can't be made until you listen—and judge for yourself.

Sound so clear you can hear a pin drop, or a piccolo player catch his breath.

Listening to the Pep 79E is like being suspended from the concert hall ceiling with the microphones. Nothing comes between you and the music. Because we built a perfect membrane driver, and an electrostatic element that produces the most transparent, distortion-free sound you've ever heard. And now electrostatic stereophones aren't bulky or isolating. The Pep 79E weighs a mere 8 1/2 ounces, and our trans-air concept blends outside sounds with inside sounds without sacrificing performance. Frequency response: 10 Hz to 22,000 Hz. It's black, with Chroma trim, has comfortable ear cushions, a fully adjustable headband, and 15 foot coil cord. Comes with a trouble-free, self-energized console. The system is guaranteed for 1 year. The only alternative is huge, costly speakers that will wake up your neighbors.



Pep 79E Electrostatic System -
Sugg. Retail Price \$90.00



Superex Stereophones. Feel what you hear.

For free literature write: Superex Electronics Corp., Dept. 12, 151 Ludlow Street, Yonkers, N.Y. 10705.
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	*As and when available from our dealers.

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Address _____

Buying hi-fi components in New York City can be tricky. The uninformed consumer is apt to leave a hi-fi store with equipment which costs 50% more than he wanted to spend and which won't perform nearly as well as it did in the shop's listening room.

We decided to visit five shops along 45th Street in Manhattan (a street with numerous large and small hi-fi salons, many of which were displaced from the downtown Cortlandt Street area



when the new World Trade Center buildings went up a few years ago).

Our first store was a long-established one (Harvey Radio East) which has a reputation for having knowledgeable floor salespeople. Our approach to the first salesperson who greeted us was that of know-nothings with not much money to spend. The first question we were asked was how much money did we have—a valid question in view of the vast array of equipment on display in all price categories. There was no inquiry as to how big our listening room was, how loud we liked our music or how far we were from the center city (in terms of our FM reception needs).

After we were pegged as \$350-\$500 purchasers, the salesman led us to a system standing in the main sales area (not in the enclosed listening rooms, which contained only the higher-priced stuff). This system, like many others in this section of the store, was preselected by the store's management and had a combined price-tag which was about 10%-20% less than the total list prices for the individual components. For \$350, he offered a low-powered receiver (Kenwood 2400), a well-known record changer (BSR), two popular, small low-cost speakers (Advent 2) and a low-priced magnetic phono cartridge (ADC).

When we asked to listen to some-



thing a little better, he skipped over his next prepackaged system and turned on a \$539 deal consisting of a somewhat higher powered receiver (Sansui), a well known record changer from Britain (Garrard) which we think contained a popular American-made medium-priced phono cartridge (Shure M-93E) and a pair of slightly larger speakers made by his favorite hi-fi personality. This time, the conversation centered around the reliability and quality of the receiver. After establishing that we had heard of McIntosh products (which are in a different league both in price and quality) he assured us that in Japan, the maker of the receiver we were auditioning was considered "The McIntosh of Japan."

We thought it best not to tell him that five or six other hi-fi companies in the Orient claim the same distinction.

Hi-Fi Specialist

Down the block we found a store which sells only component hi-fi (Tech Hi Fi). We were first presented with a well-written, 45-page booklet published by this company, which now has some 40 locations in New England, the Mid-Atlantic States and the Midwest. Interspersed between nearly a dozen selected systems (all at discounts ranging from 15%-30%) and individual catalog listings of more than 30 individual manufacturers' products is much useful information about how to choose a good hi-fi component system. Aside from a confusing (and erroneous) diagram, which is supposed

to aid in matching amplifier power to room size, listening preferences and speaker efficiency, the information contained in the giveaway booklet is solid, truthful and very informative.

The salesperson in the branch we visited was almost too relaxed. He hardly seemed eager to sell us anything, despite the fact that this time we assumed the role of experienced stereo equipment owners who merely wanted to do some upgrading. When we told him about our present equipment, he recommended that we keep our present amplifier and perhaps just listen to a variety of better speakers he had on display. He handed us a remote control cable which enabled us to switch speakers, in pairs, from our listening position. A great gadget it was, too, although no attempt was made to compensate for level differences between speakers as we switched.

The most interesting part of the visit involved another customer who had bought a fairly expensive pair of very low-efficiency speaker systems and had returned to complain that they didn't sound as good as they had in the showroom. Evidently, he had also been sold an overly powerful amplifier. Our salesperson listened to his problem and decided that, if anything, the man should have chosen an even more powerful amplifier.

He proceeded to hook up the type of speakers the man had bought to a 350-watt amplifier and started to increase the volume until the man would be pleased with what he heard. Suddenly, the highs dropped out and it was

clear to us (if not to the salesperson and customer) that the tweeters had blown out. Much to our amusement, the customer's eyes lit up and he proclaimed, "Now they sound exactly like mine at home!" Without batting an eye, the salesperson knowingly concluded that, "the trouble was just with a crossover capacitor," which would, of course, be replaced in accordance with the terms of the warranty. We concluded from this visit that:

1. It was a well-equipped store with



plenty from which to choose.

2. You'd better know what you're looking for before you shop in this kind of place.

3. They give out great primers on hi-fi, which more of their own local salespeople should read.

National Chain Store

Not very far down the street is a branch store of one of the largest chains of electronics outlets in the country. This giant retail operation (Lafayette Radio) publishes an annual mail-order catalog as well as a few catalog supplements each year. Since the outfit features its own receivers, amplifiers, even speakers, our objective here was to see just how hard the salesperson would try to push us away from standard brands and into the house-label equipment.

He did push, but not nearly as hard as we had expected. His pitch was twofold. He had a complete line of his "own" receivers on a shelf just below a corresponding line of one of the most popular receiver brands around (Pioneer). His point was that while his house-brand receivers did not go up as high in price as the well-known brand, those models which he did have compared favorably with the brand-name models [Continued on Page 77]



Two for the road.

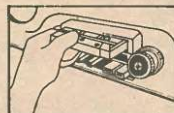
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It's Quad. And It's under \$100.

Yes, under \$100, yet the Glenburn 2155A/QUAD comes with the Audio-Technica AT12S wide response quadrasonic cartridge. It's the only automatic turntable in its price range capable of effective performance in the CD-4 mode, when used with other high performance CD-4 equipment. Yet, it is totally compatible with all conventional stereo systems.

The exclusive Glenburn Uni-Planar mechanism, with all moving parts in a single plane, makes this the smoothest and quietest automatic turntable of any even near it in price. And it establishes new lows in its class for tracking and tripping forces.

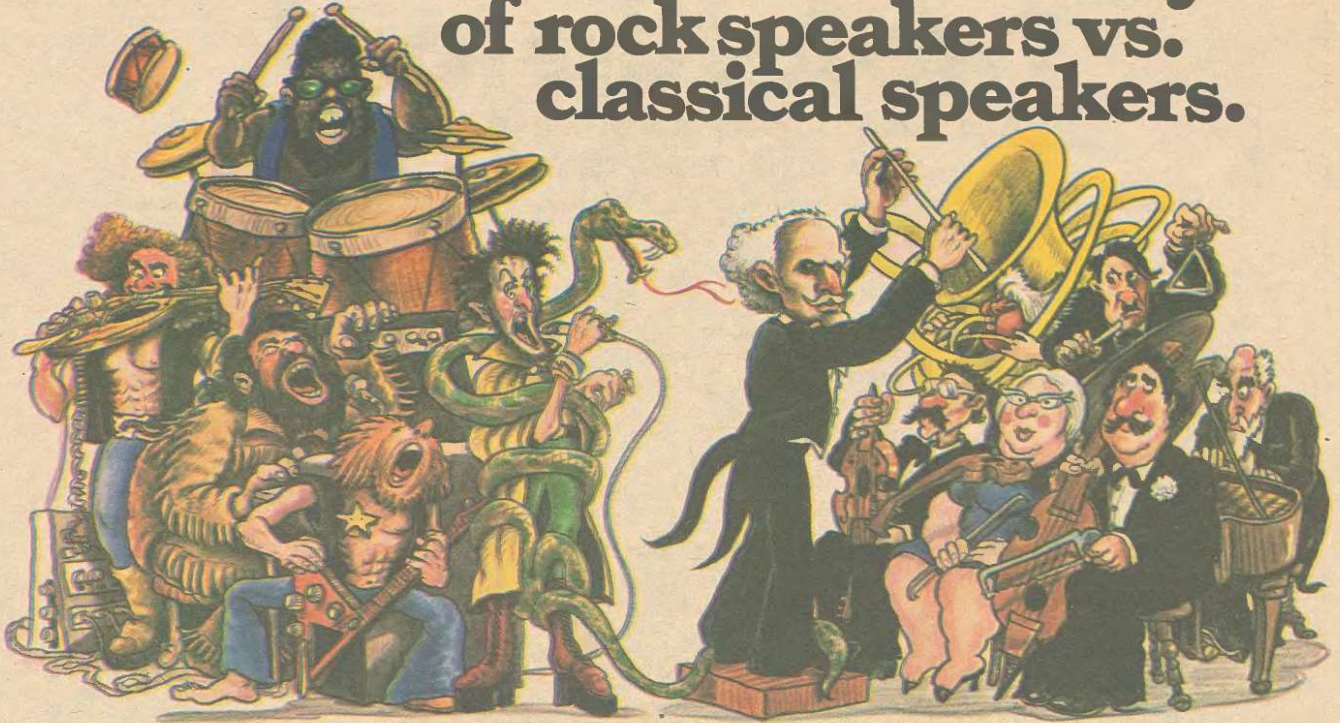
The Glenburn 2155A/QUAD is just one of five all-new automatic turntables by Glenburn...the first new design concept to come along in years. Welcome to a new beginning in sound by Glenburn.

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GLENBURN CORPORATION,
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The Rectilinear 5: end of the myth of rock speakers vs. classical speakers.



The new Rectilinear 5 is capable of playing very, very loud. Rock-festival loud. Even with a medium-powered amplifier.

At the same time, it's uncannily accurate. It sounds sweet, unstrained and just plain lifelike at all volume levels.

The temptation is great, therefore, to one-up that prestigious manufacturer who some time ago announced "The first accurate speaker for rock music."

But we refuse to perpetuate that mythology. It's perfectly obvious that the Rectilinear 5 reproduces classical music just as accurately as rock. We could never see how a voice coil or a magnet would know the difference between Jimi Hendrix and Gustav Mahler.

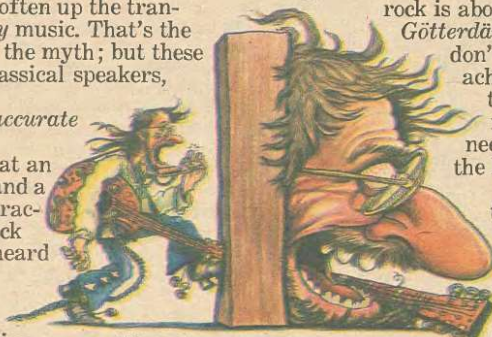
So we'd rather use this opportunity to set things straight once and for all. Thus:

There's no such thing as a rock speaker or a classical speaker. Any more than there's a late-show TV set or a football-game TV set.

There are, however, speakers that impose a hard, sizzling treble and a huge bass on *any* music. And others that round off the edges and soften up the transient details of *any* music. That's the probable origin of the myth; but these aren't rock and classical speakers, respectively.

They're *inaccurate* speakers.

It's true that an aggressive treble and a heavy bass are characteristic of most rock music, even when heard live. It's also true that some record producers exaggerate these qualities, sometimes to a freakish degree, in their final mix of the recorded sound.



Wrong: Freaky sound made even freakier by the speaker.

But that doesn't mean the speaker can be allowed to add its own exaggerations on top of the others.

A loudspeaker is a conduit. Its job is to convey musical or other audio information unaltered. If the producer wants to monkey around with the natural sound that originally entered the microphones, that's his creative privilege.

He'll be judged by the musical end results. But if the speaker becomes creative, that's bad design. (The listener who can't resist the creative urge can always use his tone controls.)

By the same token, if some classical record producers prefer a warm, pillowy, edgeless string sound, that doesn't mean your speakers should impart those same qualities to cymbals, triangles or high trumpets. (Stravinsky's transients can be as hard as rock.)

And if you like to listen at very high volume levels (after all, that's what rock is about—but so is *Die Götterdämmerung*), you still don't need a speaker that achieves high efficiency through spurious resonances. What you need is something like the Rectilinear 5.

Everything in this remarkably original design was conceived to end the trade-off between efficiency and accuracy. The four drivers are made to an entirely new set of specifications. The filter network that feeds the

drivers is totally unlike the traditional crossover network. Even the cabinet material is new and different.

Of course, those who feel threatened by all this fuss about accuracy and naturalness will point out that the monitor speakers preferred by engineers and producers in recording studios are usually of the zippy, super-aggressive variety.

That's perfectly true, but the reason happens to be strictly nonmusical.

"I use the XYZ speaker only as a tool," a top producer explained to us. "I wouldn't have it in my house. It really blasts at you when you crank up the volume, so that any little glitch on the tape hits you over the head. After eight hours in the studio, that's what it takes to get your attention. I know how to deal with those unpleasant highs; they're in the speaker, not on my tape."

It's easy enough to find out for yourself. Any reputable dealer will let you hear the Rectilinear 5 side by side with a "rock" or "monitor-type" speaker. Adjust each speaker by ear to the same high volume level, making sure the amplifiers are of good quality. Then listen. To rock or classical.

Then and there, the myth will crumble.

RECTILINEAR®

Rectilinear Research Corp.
107 Bruckner Blvd., Bronx, N.Y. 10454
Canada: H. Roy Gray Limited, Ontario



Rectilinear 5 Contemporary Laboratory Series bookshelf/floor speaker system, \$299.00. Delta Dispersion Base (patent pending) optional.

[Continued from Page 74] costing about \$50 more.

Surprisingly, when it came to speaker selection, he seemed to favor the more popular brand-name models. The house-brand speaker designs were in a corner, less prominently displayed. We never did get to the speaker auditioning session, because he wandered off to another customer who seemed more anxious to buy. We promised to come back another time.

Before leaving, he made his other big point. His store was now offering an unconditional 30-day money-back guarantee and, therefore, was not about to recommend equipment that we were likely to be dissatisfied with, since, as he put it, "The boss doesn't get too happy when people come back for their money." Actually, this made sense and probably does keep the salespeople pretty honest and straight—since their commissions are at stake when a system is returned. The few things we learned from visiting this chain store were:

1. They are doing enough business to avoid pushing their own brand unduly. The store was more crowded than the others we had visited.

2. Listening rooms were well-equipped with an ample choice of speakers but limited numbers of electronic component lines—dominated by their own brand components.

A Pair of Discounters

There isn't a hi-fi shop in New York City that can't be persuaded to give some discount, especially if you're buying an entire system from scratch. If one component is price fixed, they'll extend greater discounts on the rest of the system. Still, certain shops are more noted for their heavy discounts than others, and our last two shopping trips involved such stores.

The first place, Sound and Sight Audio, had a minimum amount of equipment set up for actual listening, but the salesperson assured us that if we knew what we wanted he could get it for us. After demonstrating a couple of fine receivers (Pioneer and Kenwood) he quickly moved over to another fine unit (Tandberg), which he proceeded to tout as being better constructed, pos-



"If you look closely, you can see the men playing."

essed of more features and a more reliable performer. In the course of further conversation he proudly announced that he was the only franchised dealer for this receiver in the immediate area—and it didn't take us long to figure out why he was therefore pushing this model.

We listened to some speakers (only a few brands were on display) and, before we could comment, he had a system all worked out for us at "around \$1000." Our target, as told to him at the outset, had been \$800. When it was obvious to him that we weren't digging for our checkbooks, he quickly suggested that we "shop around in other stores—decide what you like and come back to us for the lowest prices." In other words, let someone else do the selling, but let him make the sale. The whole visit lasted less than 15 minutes. Again, our conclusions:

1. The hi-fi buff who really knows what he wants can do well shopping in this kind of store.

2. Soft sell (aside from the push to the "exclusively franchised" product line) is the rule here, rather than the exception.

3. Any attempt at serious auditioning is futile, because of inadequate listening rooms and an inadequate selection

of merchandise to be compared. The salesperson was probably right in sending us elsewhere to do our listening. Whether we would come back to him for the actual purchase depends on how important store warranties are to us. At this place, you'd better bank on the manufacturer's warranty, which may involve extra time and trouble if something does go wrong, but is perfectly safe and almost always honored.

Finally, we visited another discounter, Grand Central Radio, which had a much greater assortment of merchandise. Although our previous visits to this shop resulted in encounters with rather brusque and inattentive salespeople, this time we were luckier (or management has weeded out the impatient salespeople they had used years ago). We listened to a variety of receivers and speakers and there was no attempt to rush us toward a sale. Somehow, we ended up listening to the same "exclusively distributed" set favored by the previous smaller shop. We surmised that the exclusivity must extend, at most, for a couple of square blocks.

Again, speaker-system switching involved no attempt to equalize levels from more efficient and less efficient speakers. When we asked to listen to a couple of giant speaker systems which

were in a corner, we were told that "no one uses big speakers anymore."

Random Shopping Conclusions

Footwear and laden with literature, we retreated to sort things out. A few additional reactions set in as we started to report our experiences.

It's true that we always indicated that we were interested in a stereo system, but we were still surprised to find that not a single salesperson tried to push us into four-channel systems. The chain store, which has made a point of pushing quad in its stores, was happily demonstrating it to another customer, but made no effort to introduce us to the four-channel possibility.

With the exception of the first store we visited, every salesperson used FM radio as a program source—tuning into whatever happened to be on, regardless of quality. In a sense, we were listening to the cartridge and turntable that the DJ at the station was using. Worse, all of these midtown stores had lousy FM reception—even on the best sets—probably because they didn't bother to put up decent antennas.

None of the salespeople asked us anything about our room size, where we lived or how loud we liked our music. Some did ask what kind of music we like—so that they'd be able to find that kind of material as they tuned across the FM dial. One salesperson (at the first discount store) did suggest that after we'd shopped the other stores, if we wanted to bring in a favorite record he'd play it for us.

No one tried to pull any fast or underhanded deals—local reputation notwithstanding. If consumers in New York City still need a lot of pre-education about hi-fi before they face the trauma of shopping for a system (and I think that's true in New York and every other place I've visited), it's not so much because salespeople are going to try to rip them off, but because the number of components on the market is so great that it's impossible and unfair to expect to walk into your first hi-fi shop as an audio neophyte and walk out as a complete know-it-all.

Take This...

Once you've purchased the basic components of your hi-fi system you can enjoy the good sounds of your growing record or tape collection. Or you can surround your system with a variety of accessories that will further improve it and keep your components and program source material in top shape.

Audio accessories range from \$1.65 (package of 18 handy cardboard mailers in which you can safely mail your favorite cassette recordings—Robbins Industries Corp. Cat. # TCB-18)—to \$2610 (a complete "Mini-Studio"—including a professional half-track Revox tape recorder, a mixer, an assortment of microphones, mike stands, booms, clamps and cables and a monitoring headset—from Lamb Laboratories). Between those extremes are a host of products some of which are electronic, some of which are chemical and some of which are mechanical.

RECORD CARE PRODUCTS

If you expect to be able to play your records continuously without having them wear out, you ought to own and use some form of record cleaning sys-

And This...

tem. For as little as \$8 you can buy the popular Watts Dust Bug record brush that mounts to your turntable by means of a plastic arm and removes dust as each record is played. Or, you can buy record cleaning kits from the same firm, consisting of manually held soft brushes and anti-static cleaning fluids.

Discwasher, a relative newcomer in the record care product business, offers a specially designed brush and a newly developed fluid that removes dust, fingerprint oil, even destructive biological growth from record grooves. It works well and it costs \$12.95.

Pickering sells a stylus timer (PST-1) for \$13.95 that actually measures stylus wear time in increments of 100 hours up to 1000 hours. It mounts on the turntable under the tone arm and pays for itself if it prevents gouging of even as few as three of your records by warning you that it's time for a new stylus.

TAPE CARE PRODUCTS

No matter how good your tape deck, its heads will quickly pick up deposits of oxide and other contaminants from

the tapes you record and play. Liquid cleaners for removing these particles from tape heads, capstans and pressure rollers are available from Chemtronics and Nortronics with prices ranging from \$1.55-\$3.75 for a giant size spray can.

The same companies make special cassettes or cartridges equipped with impregnated fabric belts (instead of tape) which also clean heads and other tape path surfaces. Robbins Industries also features these types of cassette or cartridge cleaners too, at prices ranging from \$2.50-\$5.55.

While record care consists primarily of keeping records and stylus clean, there are other useful tape accessories you'll want to consider as you get more involved in tape recording. After long use, tape heads become permanently magnetized and, in that condition, tend to add noise and degrade frequency response. Tape head demagnetizers (which work off regular house current) are available from Lafayette Electronics, Nortronics, Robbins Industries and Sony/Superscope. Prices range from \$3.35-\$13.95.

Trying to splice torn tapes can be a

And This...

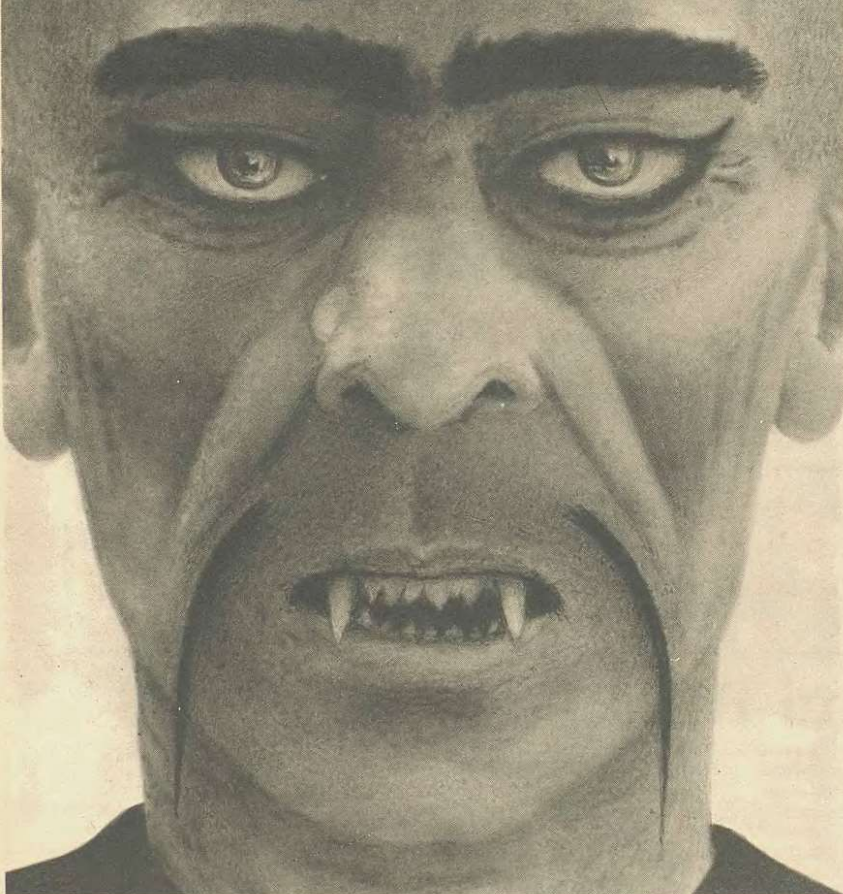
frustrating experience unless you own a simple-to-use splicing or editing kit. Such kits are available for open reel tape splicing and editing, eight-track cartridge splicing and cassette tape repair and, depending upon their sophistication, range in price from \$4-\$12 from Editall, Nortronics and Robbins.

Finally, to erase tapes that seem unerasable (because of over-recorded levels or repeated use) you may want to consider a bulk tape eraser. A few slow passes over a reel, cartridge or cassette of recorded tape with these A C or battery-operated bulk erasers and your old tapes will be cleaned of any residual program or noise magnetization. Bulk erasers are available from about \$15 to heavy duty models for about \$40. If you own one of these, never turn it on near a recorded tape you don't want erased.

ELECTRONIC ACCESSORIES

If you want to expand your taping operations, there are multi-channel signal mixers available from Shure Bros. (M-68 at \$93.60, M-67 at \$181.20 or the M-688 Stereo Microphone Mixer

Malcolm Scholl, Audioanalyst, As Seen Through The Eyes Of His A-200X Speaker



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audioanalyst

P.O. Box 262, Brookfield, Conn. 06804
Monstrous About Perfection

at \$127.80), Pioneer (their six-channel mixer MA-62 at \$250) or the battery-operated MX-14 from Sony at \$229.95.

The tape monitor jacks on an amplifier or receiver serve as an invitation to a host of other electronic devices which can be inserted into a hi-fi chain at this convenient break in the circuit. If you own a cassette recorder without built-in Dolby noise reduction circuitry, outboard Dolby boxes from TEAC and others can improve the signal-to-noise ratio for tape by as much as 10 dB. Their model AN-180 at \$329.50 lets you record and play back using the Dolby system. Since most FM tuners and receivers are not equipped for new, low noise FM Dolby broadcasts, such Dolby outboard devices enable you to listen to these broadcasts as they were meant to be heard.

More precise control of frequency response than is provided by the basic treble and bass tone controls may be attained by a more sophisticated tonal equalizer. Soundcraftsmen make two stereo models, the 20-12 at \$300 or the PRP-18, a combination preamplifier/equalizer at \$500. Both enable you to tailor frequency response of each of the ten octaves involved in audio.

If not quite that much control is needed, the BSR-Metrotec's FEW-2 frequency equalizer is available for \$100. It divides the audio spectrum into five parts for each channel. At the other extreme, there's the Altec 729A Acousta-Voicette unit for \$875. With it, the audio spectrum of each stereo channel can be divided into 24 parts. Altec will send a technician to adjust all the slide controls to take care of room acoustics or other hi-fi component deviations from flat response.

If you feel that your records or program sources lack the dynamic range of a live concert (the soft sounds are too loud and the loud sounds are too soft) there are some new dynamic range expanders which will be helpful. The dBX Model 117 Dynamic range enhancer (\$160) can restore up to 20 dB of dynamic range that may have been "compressed" in records, tapes and even FM broadcasts. This area of improvement in home music reproduction is also being seriously investigated by other manufacturers.

VISUAL DISPLAY PRODUCTS

Connecting an oscilloscope to your hi-fi system so that you can observe (and correct) the effects of FM multipath distortion, or watch channel separation, may not seem vital to most sound buffs but evidently there are enough serious audiophiles who want this capability. Some have their own built-in test signals and display complex musical waveforms as they're playing, and can also be connected to the multipath output jacks on a tuner or receiver.

A MOST "BASIC" ACCESSORY

In order to get the best performance from an FM tuner or receiver, a proper outdoor FM antenna should be attached. Most of the well-known makers of TV antennas also have models designed specifically for FM reception, including Channel Master, Blonder-Tongue, Finco, JFD and Winegard. Finco, for example, makes a low-cost model (FM-3 at \$15.70) that does nicely in stronger signal areas, a medium-priced model (FM-4G at \$28.60) for suburban locations and a super-sensitive highly directional model (FMSL-12 at \$57.90) for "fringe" locations.

THE NO-JIVE NO-STATIC SUPER 'FI GUIDE



At last, there's a book that will tell you everything you want to know about hi-fi and how to assemble the sound system you want. *The Rolling Stone Guide to High Fidelity Sound* will help you figure out what you're looking for, how to get the best deal for your money, and more:

- How much audio power do you really need?
- Which component should you choose first?

- What about room acoustics?
- Should you buy a record changer or a straight turntable?
- Where should you put the speakers?
- What about four-channel sound?

Len Feldman, Rolling Stone's Acoustics Columnist, gives straight answers to these and hundreds of other questions about hi-fi equipment. If complicated spec sheets—and high-pressure salesmen—have turned you off, get the *Rolling Stone Guide to High Fidelity Sound* and start building your dream system, whether it's radio, records or tapes you're interested in. This is not a product guide. It is a guide to choosing better products for the best sound you can achieve with today's hi-fi component equipment.

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 A rather theatrical red light
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