

tape recording

THE ROCK REVOLUTION

T210 R-871
MR ROY PERRIN
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RUTHERFORD N J 07070



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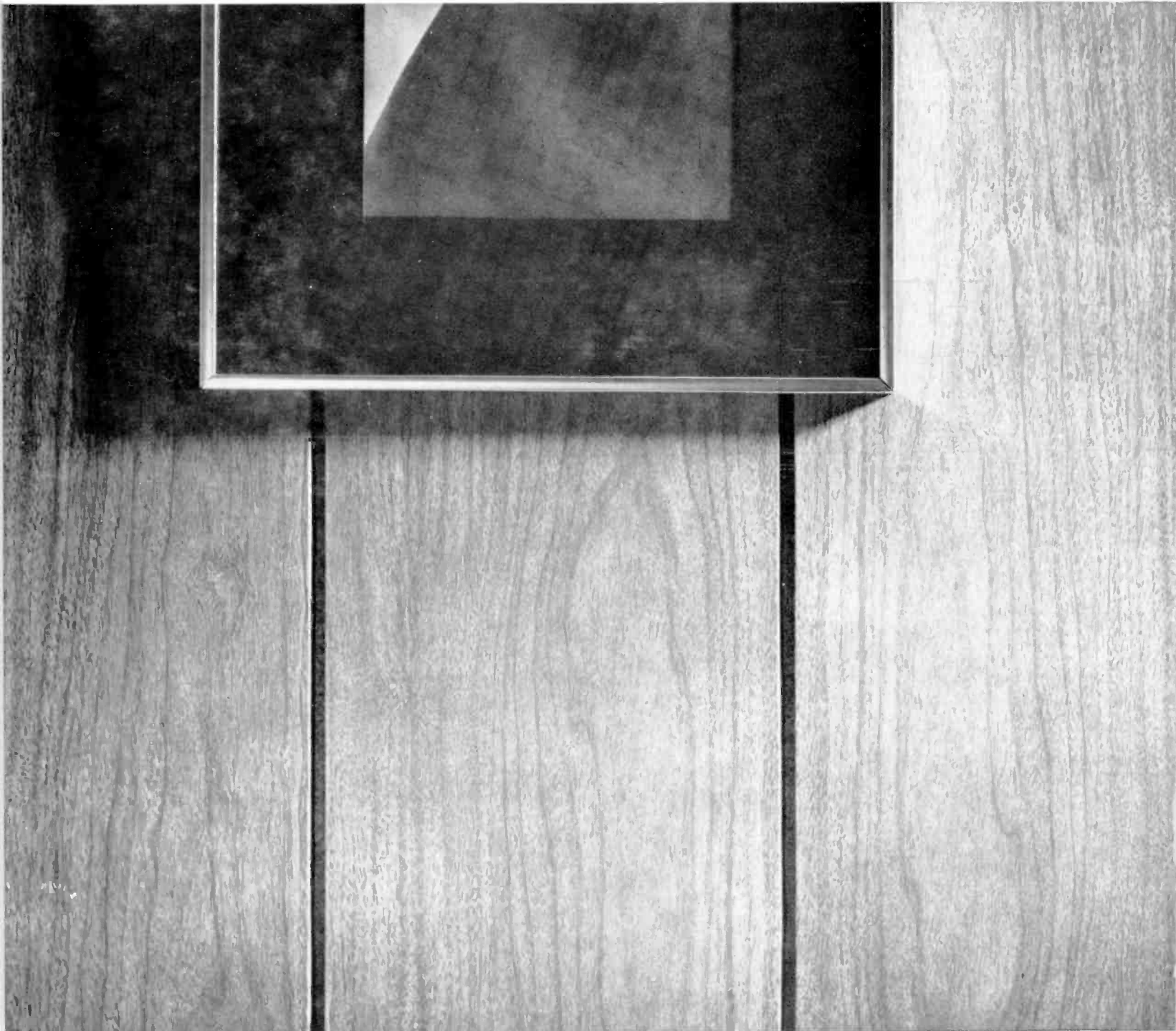
Voltage supply in your city can vary as much as 10%. And even a 2% variation causes a significant tape speed change in tape decks with induction motors and a difference in reproduced sound that is intolerable.

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cover permits you to see the head gap position markings for professional editing; 3 speeds; automatic sound-on-sound with adjustable level controls; variable echo control for reverb recording; calibrated VU meters with individual record indicator lights; stereo headphone jack; electronically controlled dynamic muting for automatic suppression of tape hiss without affecting high frequency response. All this, for under \$230.

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RCA

tape

NOTES

Foiled Again

Metal foil sensing tape—the stuff you stick on at the end of a reel to trigger the reversing mechanism on the majority of reversing recorders—can be a royal pain in the backside. The only form it comes in is a continuous strip on a roll with a gummed back and a peelable backing paper. That backing paper doesn't always come off readily, and when it does, the foil develops a mind of its own before you can snip it off with the scissors.

Then comes the problem of transporting this 1/2-inch hunk of contrary stuff to the recording tape and sticking it down. A pair of tweezers liberated from milady's boudoir is a help. A bit more of a help is the dispenser pack that 3M uses for its metal foil tape—at least the backing peels off easily with this arrangement, and you *could* use the plastic "tape guide" on the package to hold down the stuff you're working on.

What we'd like to see is an individual, precut and pretrimmed foil strip—something like the precut tape and movie film splices that sell at a premium price. We're not so keen on the individual tape splices packaged this way, but a prepackaged individual metal foil strip would be a big help and time saver—especially for the all-thumbs set. Guess it'll just be a matter of time.

Continued on page 34

tape

recording

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VOLUME 16, NO. 6

ARTICLES

- Revvng Up The Rock Revolution
by Christopher Porterfield 6
- Capturing The Melodies of Birds
by Donald J. Borrer 14
- How They Make 8-Track Cartridges 18
- Build Your Own De-gausser
by John W. Berridge 22
- A Tape Recorder For The Senior Citizen
by Jean R. Lange 30

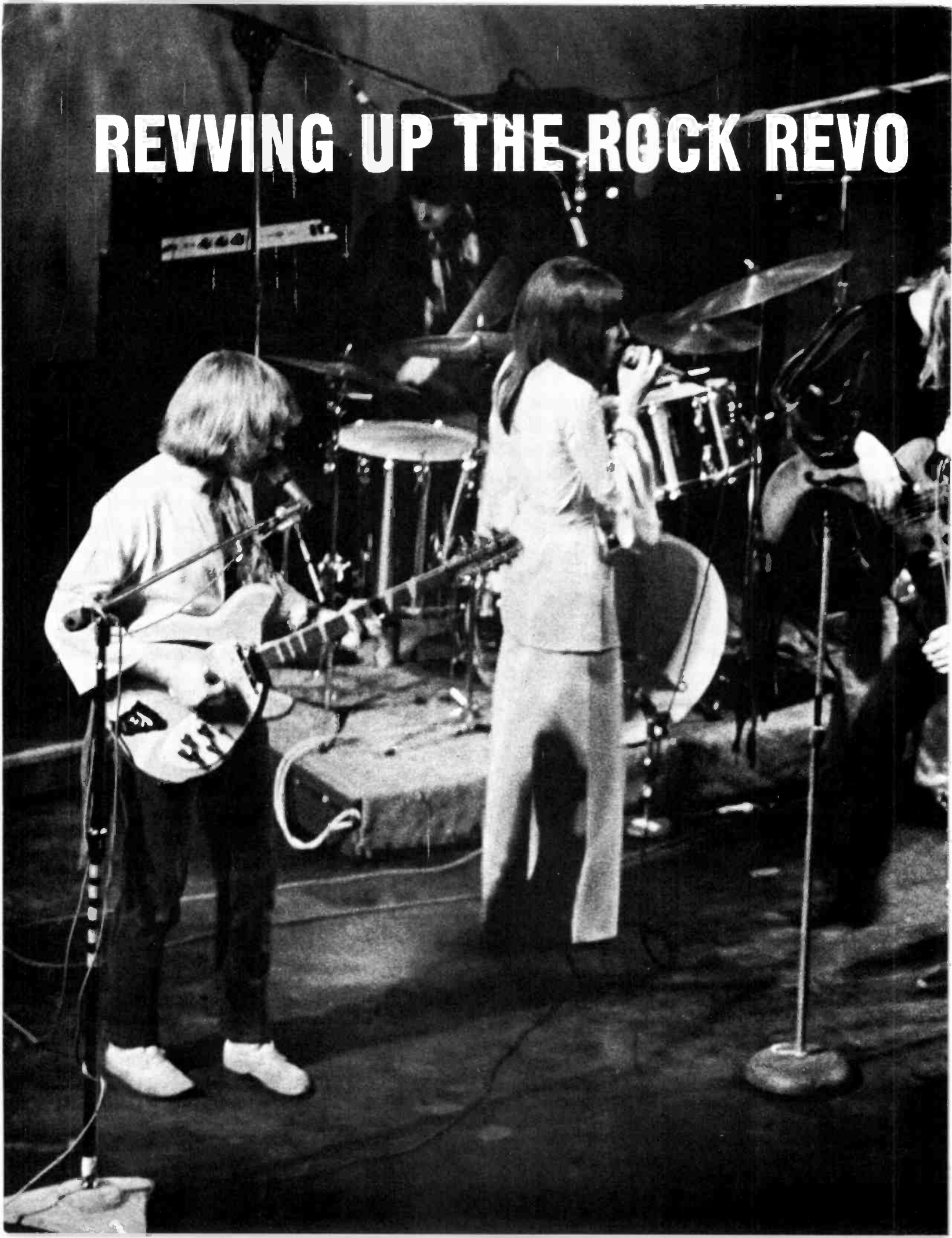
FEATURES

- Tape Notes 4
- Tape Reviews 32
-

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REVVING UP THE ROCK REVO



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Back in the days when they called it rock 'n' roll, the musicians would come into a recording studio, set up their gear, and twang their way through an arrangement that they might already have played dozens of times in live performances. The studio, with its microphones and tapes, was largely a passive agency. Its product was a record in the most literal sense of the word: a document, something that registered that preserved an objective event. That, as the pop music world measures time, was deep in the past—say, three or four years ago.

Since then, rock 'n' roll has developed into the expressive, flexible, and marvelously mongrelized genre called rock. The recording studio, steadily sprouting new electronic gadgets, has become a challenging frontier for adventurous-minded rock musicians. Today, the record does not merely document a rock performance, it shapes and transforms it as well. In a McLuhanesque metamorphosis, what was merely the medium has become the message, or at least a good part of it. "Records are no longer simply a showcase for performers," says Bob Cullen, a New York-based Artists and Repertory man who produces pop records for RCA. "Records are now a separate form in themselves."

As such, records have created new molds for rock music while shattering some old ones. The very nature of long-playing records, for example, has encouraged musicians to break away from the two-to-three-minute time limit enforced by 45-rpm singles and attempt longer, more ambitious compositions: This is actually more dramatic than it sounds: record sales used to depend almost entirely on how often a particular release was played on the radio, and few disc jockeys would allow more than a three-minute musical interlude between commercials. Recently, recordings lasting up to a quarter of an hour by such groups as The Jefferson Airplane, The Cream, and The Doors have reached a wide audience without much air play. Their success, in turn, has spurred a scattering of radio stations—mostly FM outlets on the East and West coasts—to open up their programming to the new, longer pieces.



Even when a rock LP consists of shorter pieces, the increasingly sophisticated listeners who make up its market want it to adhere to the total-album concept. "An album used to be the group's latest singles plus whatever you had in the can," says Cullen. Now, it is expected to bring together individual songs that are "comfortable" with each other, and preferably that illustrate some over-all unity. John Sebastian, a member of The Lovin' Spoonful, says that an album like the Beatles' "Sgt. Pepper's Lonely Hearts Club Band" or the Mothers of Invention's "Absolutely Free" "has little shiny spaces there for bands, but those songs are movements to me. It is all one work." Rick Jarrard, an RCA Artists and Repertory man who produces pop records on the West Coast, has just finished working with a group called The Family Tree on an album in which every song tells a different part of the same story—the life of a spinster schoolteacher.

But more important than the artistic framework that recording provides for rock musicians is the fresh, fertile, musical vocabulary it gives them. The recording studio's burgeoning arsenal of electronic devices vastly expands the range of notes and noises open to today's experimental groups. More and more, rock records are projecting not only the sound of music but also the music of sound—nearly any sound.

Tape alone offers a whole spectrum of possibilities. It can be speeded up, slowed down, run backwards, dubbed, or manipulated to achieve a variety of reverberations and repeater effects. And now that RCA and several major recording firms are using eight-track tape in their studios, their records can be pieced together by a highly adaptable "layer-cake" method: each musical element recorded on a separate track, then combined, mixed, and equalized as the producer sees fit. Filters can be used to blank out certain portions of a sound, the Leslie speaker can be plugged in to lend its peculiar, quavery vibrato, and there is even a device called a "fuzz," which distorts tones into the kind of buzz that a bad phonograph needle produces.

"While we're in the studio with tapes and things," says the Beatles' Paul McCartney, "why ignore them?"

You can make them a part of it. They're the instruments now." Adds Mick Jagger, lead singer for the Rolling Stones, "We're playing with sound, and we're all still learning. The recording studio, with all the things it has in it, is another form of art, of music."

Playing with sound, using electronic equipment as instruments, the rock groups have replaced, or at least supplemented, the old, thumping guitars-drums-bass formula with what pop critic Richard Goldstein calls "collages of sound images." In so doing, they have left behind the debate about whether recorded sound sometimes misrepresents performances by enhancing and boosting them. Recordings of electronic rock no longer purport to represent live performances. They are no longer reproductions but productions—studio events, self-contained and self-referring. As Paul McCartney puts it, "To do these things a few years ago was a bit immoral. But electronics are no longer immoral."

The change in recording approaches and attitudes is summed up by George Martin, who acts as record producer, arranger, instrumentalist, and electronic midwife for the Beatles' recording sessions. "Making records," says Martin, "has been until recently rather like painting from the beginning of the Greeks to the Dutch school. The main aim was to be as lifelike as possible. But now in painting we have impressionism, cubism, all sorts of abstractionism. And just now in records we have reached the stage where we are working with pure sound. We are building sound pictures.

As in some abstract painting, electronic rock has occasionally been so taken up with the technique of its new idiom that it has failed to communicate. But the best groups, points out RCA's John Pfeiffer, an executive producer of Red Seal (classical) Artists and Repertory, "use whatever sound material is available not as an end in itself but as a means of projecting their oral urgency." In short, some of the sound pictures being built in recording studios are richly expressive, and can be deeply stirring.

The best examples of this, as of so many other things in rock, are the Beatles. Their "Sgt. Pepper" album, released last summer, heralded the electronic



era in rock. On track after track, special effects reinforce superior lyrics and melodies in a way that gives most listeners psychic shivers. The county fairground noises in the title song, the fantastic echoes and distortions in the psychedelically inspired "Lucy in the Sky with Diamonds," the mystical melange of fluid, swooping sounds in the Indian-flavored "Within You, Without You"—all impressively document Martin's assertion that the Beatles "place far greater demands on the studio than any other group."

When the results sound like "Sgt. Pepper," the demands seem worth while. That album's "A Day in the Life" is perhaps the finest song yet produced in the rock form, and it would have been possible only in a recording studio. Its electronic dimension not only supports the music but actually seems to distill the essence of the song's imagery and emotion: at the end, the refrain, "I'd love to turn you on," leads to a hair-raising crescendo of orchestral cacophony, followed by a 40-second electronic hybrid of a chord that suggests a trance of escape, or perhaps resignation.

Dominant as they are, the Beatles are far from the only group to tune in successfully on electronic rock. The latest album by the Rolling Stones, "Their Satanic Majesties Request," comprises the Stones' distinctive charting of the same galaxy of sounds opened up by "Sgt. Pepper." The Jefferson Airplane's newest release, "After Bathing at Baxter's," uses none of the "imported" sounds so common in the Beatles' work, but it does put the Airplane's own voices and instruments through an elaborate set of electronic permutations; woven into the opening segment called "Streetmasse," for example, is a kaleidoscope of feedback from amplifiers, spoken words, and instrumental sounds (including some by the Gary Burton quartet, a jazz group that visited the studio while the recording was being made).

Besides such direct products of electronic recording techniques, there are a number of general by-products. For one thing, rock albums have become much more time-consuming and expensive to produce

than they were a few years ago. "Sgt. Pepper" cost three months of work and \$56,000, five times as much as an ordinary classical album costs in England. Bob Cullen says that where an album used to be tossed off in four days, he now counts on a siege of six weeks or two months in the studio whenever he embarks on a new recording. And Rick Jaffard points out that the conscientious producer spends nearly as much time on an album outside of the studio as inside, mostly on preparation.

Inevitably, the growing length and complexity of recording sessions increase the importance of the producer. Working with a group in a studio day after day from 10:00 A.M. to 10:00 P.M., he must be, as Cullen puts it, "in complete 'sync' with the group"—a combination of catalyst, cheerleader, and confessor. This is why so many of the rock producers turn out to be young men themselves, intuitively keyed into the life and times—and music—of the rock musicians they work with. Jarrard, for example, is 27 and a former rock 'n' roll singer; Cullen is 28 and a former drummer as well as a singer. "In the studio," Cullen says, "you're the fifth member of the group—even the leader."

On the other hand, the producer must be able to separate himself enough from the group to distinguish between the good and bad in their ideas and performances. He must also know enough about the new electronic techniques to be able to bring the group's sometimes fuzzy initial concepts to life. Watching a producer in action in a control booth—directing the musicians, molding the arrangement and sound effects, conferring with his engineer in an arcane vocabulary of phrases like "ping-ponging" and "punching in"—there can be no doubt that he is a creator in his own right.

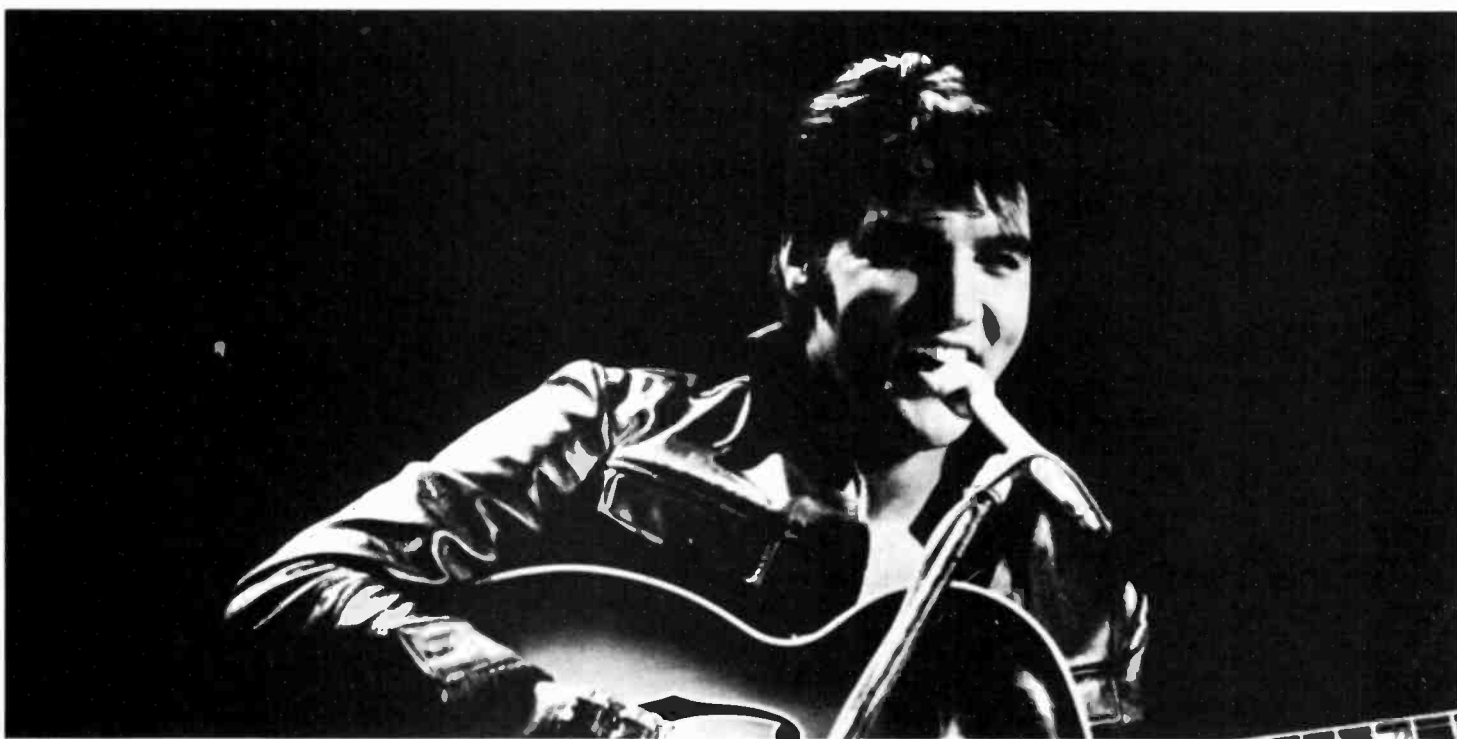
Another by-product of the electronics explosion is a new attitude among rock musicians toward recording, which many of them used to regard as a cold, commercial necessity. The Mamas and the Papas have gone so far as to build their own recording studio, and Mama Michelle now speaks of recording as "one of the greatest parts of the business."

Guitarist Mike Bloomfield, leader of the Electric Flag-American Music Band, is fascinated by the potential in the studio for "creating new sounds by turning the knobs certain ways." He views the studio as the setting where he can most fully develop himself and his group: "I've got a million ideas, and I want to see how many colors I can get out of this band."

For a while, it even appeared that rock groups might have to choose between the beckoning studios and their accustomed round of in-person appearances.

A year ago the Beatles gave up touring in order to concentrate on recording and other ventures, and thereafter it became fashionable to categorize groups as either live bands or recording bands. Since it was impossible to do in person what could be done in the studios, the argument went, groups would simply have to decide which kind of music they wanted to make.

But the split never really developed, partly because most groups were stimulated by the cross-fertilization





between the two activities. Now, in fact, some of the newer, more electronically oriented groups are taking what has been learned in the studio and putting it to work on the stage and in the night club. The live performances of an English group called The Pink Floyd incorporate elements of *musique concrete* and avant-garde electronics. A far-out, new Los Angeles group called The United States of America carries an imposing array of electronic equipment—much of it specially designed for the group—which enables it to

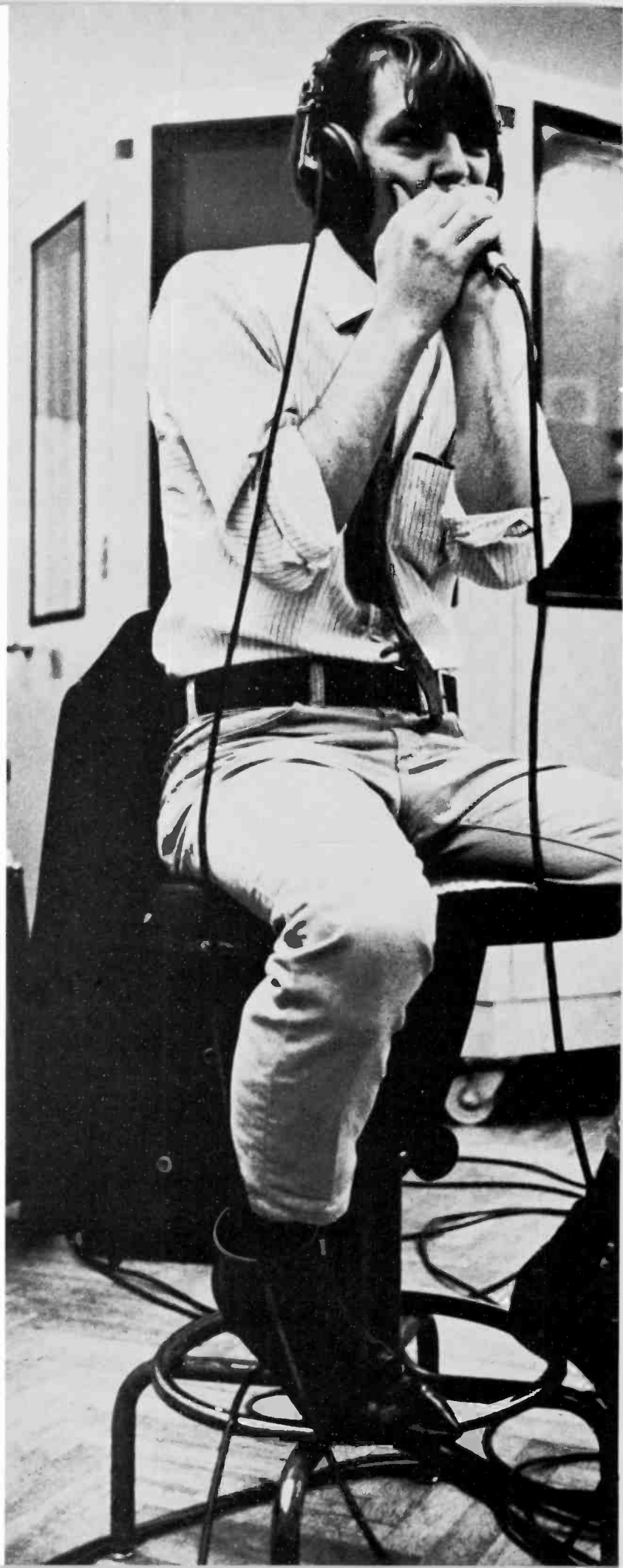
do almost anything in person that it could do in a recording studio.

The music of a group like The United States of America also illustrates another important point. Until now, most of the electronic sounds in rock have been actual musical sounds—a guitar, a voice—processed and altered by electronic equipment. Today, more and more of the original sounds are coming from the electronic equipment itself: oscillators, synthesizers, and the like.

Last year, The Byrds recorded a piece titled "CTA-102" (the name of an asteroid) in which they evoked a space journey with an assortment of weird electronic sound-makers, among them an oscillator and a Theramin, which nonmembers of the rock generation may recall from the soundtrack of the 1940s Hitchcock movie *Spellbound*. The Youngbloods, in a recent recording session at RCA under Cullen's supervision, expanded their instrumentation to include a Moog synthesizer, a sort of electronic keyboard instrument that ripples out tones of the blip-bleep variety.

In other words, experimental rock musicians are rapidly appropriating the methods of avant-garde composers who deal in electronic music, and in this way are bidding, consciously or not, to close the gap between "serious" and popular music. Paul McCartney spends hours studying the records of Cologne-based electronic composer Karlheinz Stockhausen. Mike Bloomfield's dictum, "Music is sound and sound is music," shows a complete—if unwitting—rapport with the thought of that elder statesman of the far out, John Cage. Thousands of young listeners who disdain "longhair" music unknowingly welcome its devices—when smuggled into rock recordings—with open ears and minds.

Professor Robert Tusler of the Music Department, the University of California at Los Angeles, an admirer of The Jefferson Airplane, the Beatles, and The Byrds, thinks the Beatles, especially, "have taken over many of the electronic concepts of serious composers like those of the Cologne group or of the Italian Guigini Nono. They've made an enormous contribution to electronic music."





The influence flows the other way too. Younger electronic composers especially, are finding rock a vitalizing current to stir into their "serious" mixes. RCA's John Pfeiffer, himself an electronic composer, has already obtained "weird and interesting results" by adding electronic effects to a rock song in one of his pieces, and he plans to keep probing the possible combinations of the two forms.

If there should ever be a marriage between classical and pop electronic music, the ceremony would unquestionably be held in the recording studio. Cullen, noting the trend toward larger groups and more elaborate arrangements, predicts that rock may "take on a classical robe" within the next five years through the evolution of big bands in the studios. Not big bands like Glenn Miller's, or even Stan Kenton's, but big rock bands bristling with electronic equipment and literally humming with a powerful potpourri of noises, distortions, tape tricks, and so on.

Even if the wedding never comes off, the romance is bound to produce daringly new and unusual explorations that should be, in every sense, electrifying. "The approach of these forms to each other," says Pfeiffer, "will provide the rock groups with a means of growth and establishing their identity. Beyond that, it will push the recording studios to make more things available to the groups, and it will put more of the burden of popularity on the studios. All in all, it means an exciting, stimulating time for the groups, A and R men, engineers—and the recording companies."



CAPTURING THE MELODIES OF

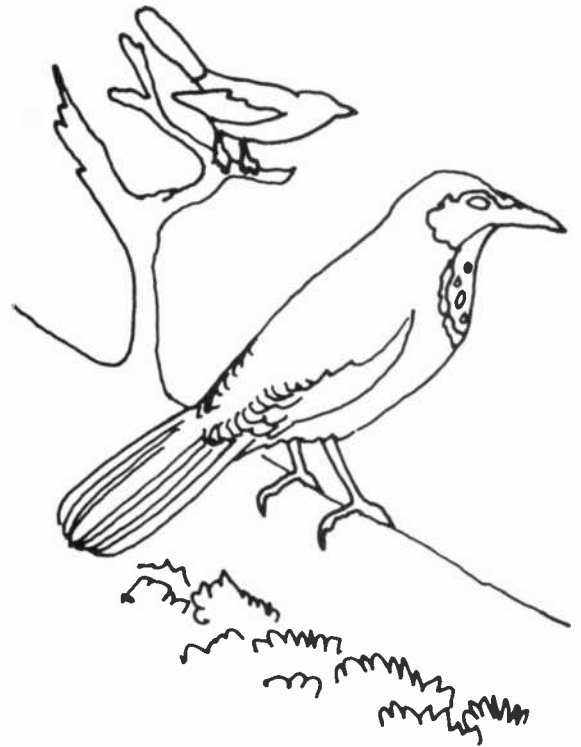
Birds are without doubt the world's most versatile singers, and if you are interested in unusual melodies you should try recording bird songs. You can record many birds right at home, either from a window of your house or in your yard, particularly if your yard contains a few trees and shrubbery. You'll find recording bird songs a fascinating hobby.

Recording bird songs is a wonderful way to get acquainted with both the birds and their songs, and you'll find that birds have interesting singing habits. Listening to song recordings is an easy way to learn bird songs, and although you can buy phonograph records of the songs of many birds it's a lot more fun to make your own tapes.

Most bird songs can be recorded satisfactorily with the average home recorder. The frequencies generally lie between about 1,000 and 8,000 cycles per second, with relatively few over 8,000. You can get good recordings of most songs with a tape speed of 7½ inches per second; with the higher-pitched songs a tape speed of 15 inches per second will give you a better recording. I use the faster tape speed because it gives greater fidelity with the higher frequencies, and it enables me to play the songs back at a reduced tape speed when I want to study the details of a song.

The biggest problem in recording bird songs is to get the microphone within range of the bird. If the bird is singing in your yard, you may be able to get a good recording merely by setting the microphone on the window sill. You'll do better if the pick-up can be limited to the direction of the bird, and still better if you use a parabolic reflector to increase the strength of the sound at the microphone. If your recorder operates only on AC current, a long power cable, or a low impedance microphone on a long cable, will enable you to get the microphone closer to the bird.

One reason for some sort of directional pick-up is the problem of extraneous noise. If you've never done any out-door recording you may be surprised at the amount of noise you sometimes encounter. The sounds of traffic, airplanes, and trains, even though they may seem to be a long distance away, will often spoil a recording. If you want to record just one bird, you may have trouble with other birds singing nearby. Man-made noises sometimes make it impossible to get good recordings no matter how directional your pick-up is, and the only thing you can do is wait until the noises have stopped or moved out of range, or do your recording somewhere else. The singing of other birds is usually not so bad, as they can furnish a natural background for the singer you're recording.



A simple way to screen out some of the extraneous noise is to use a cone or cylinder of cardboard around the microphone. A better way, which not only provides directionality but adds to your pick-up, is to use a parabolic reflector.

I have made many good recordings in my yard—or in other people's yards—using a recorder powered by AC current; I usually use a long power cable to get the microphone closer to the bird. However, I've

BIRDS

by Donald J. Borror



made better recordings, and of more kinds of birds, using a battery-powered portable recorder. I now use a Magnemite Portable Model with a microphone mounted in a parabolic reflector. If I'm recording under conditions where it is desirable to be able to move about easily and quickly, or if I'm working alone, I use a 24-inch reflector (see facing page); one person can easily carry all this equipment. If mobility is not so important, that is, if the bird I want to

record is apt to remain in one place for a while—and I have some assistance in carrying the equipment—I use a 40-inch reflector mounted on a tripod (see photo, p.31); this has more than twice the pick-up of the smaller reflector.

Most recording of bird songs must be done in the spring and early summer, during the bird's mating and nesting seasons. In the northern part of the country the first singing starts about the middle or latter part

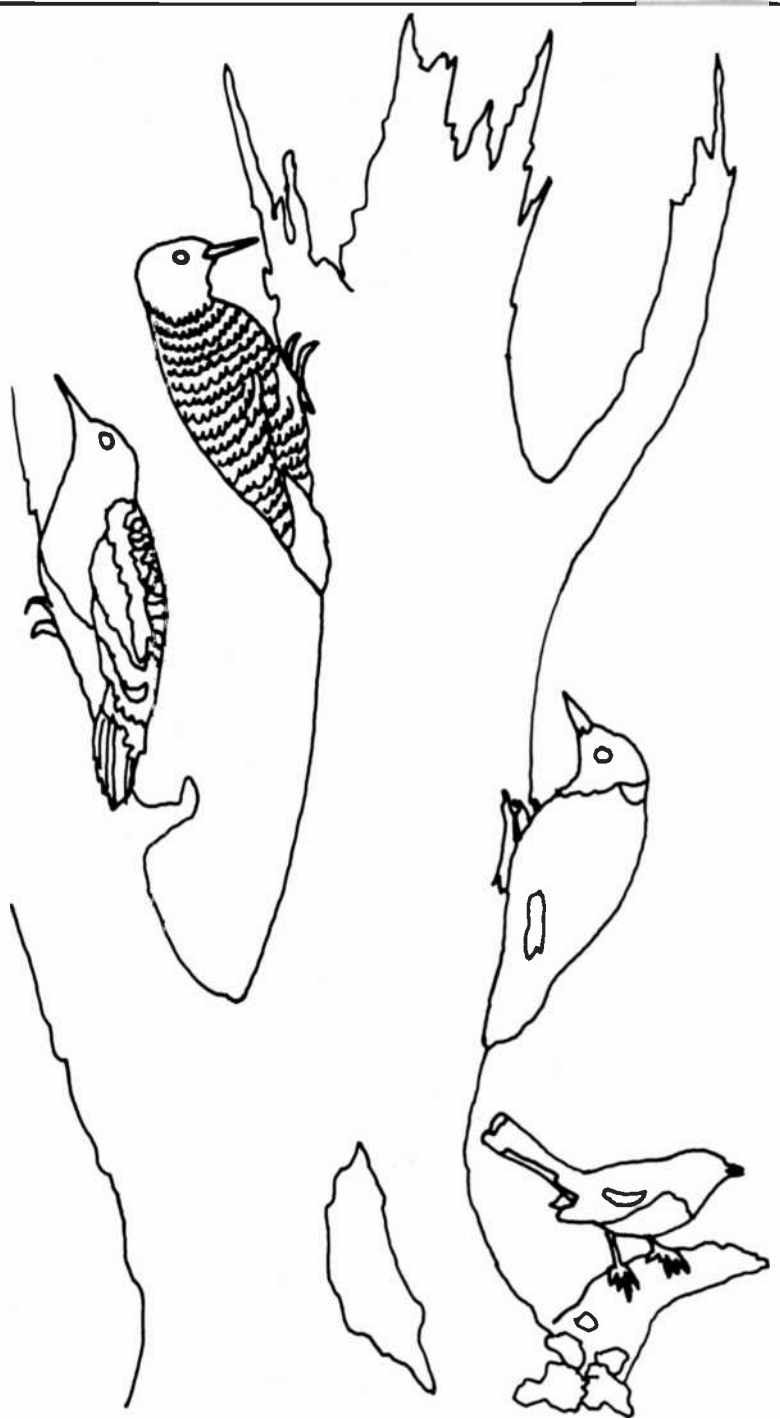
of February, and continues until about mid-summer. Call notes can be recorded almost any time of the year. During the heat of the summer most birds are quiet and sing little.

The best place to record bird songs is on the nesting grounds, where the birds do most of their singing. If there are birds nesting in your yard, you can record them right there. Nearly all the singing is done by the males. Song seems to be the male's means of advertising itself, proclaiming its nesting territory, and attracting a mate. Once the territory has been selected, the male sings from a few selected perches in its territory. A little observation will soon reveal the location of these singing perches, and knowing where a bird is apt to sing is a big help in getting a recording. The best time to record birds is early in the day; this is the time when there is the most bird song, and the least extraneous noise.

During March, April, and May many birds are migrating north, and pass through your area on their way to their nesting grounds farther north. Many of them sing during migration, and recording their songs is usually a matter of being ready for them when they pass through. Some will go through your yard; others are more apt to be found in woodlands, parks, thickets, and swamps—places providing different habitat conditions from those in your yard.

If you hear a bird song you don't recognize, my advice is to record it first and look it up afterward. If you fail to find or identify the bird, at least you have the recording; you may later learn what the bird is, or you may find someone who can identify the recording. A pair of binoculars is very helpful in identifying birds, and if you're interested in a good bird guide, Roger Tory Peterson's "Field Guide to the Birds" (Houghton Mifflin Co., \$3.75) is one of the best. "A Guide to Bird Songs," by Aretas A. Saunders (Doubleday and Co., \$3.00) is the best guide to bird songs.

When I make a recording in the field I use the microphone to put my field notes on the tape. Later the recording is edited, that is, the parts I want to keep are cut out, assembled, and labeled. A recording is labeled (on the leader tape) with the name of the bird, the date, and a serial number, and additional



data on the recording are put into written field notes under this serial number. The tapes are filed by species; I use 3-inch, 5-inch, and 7-inch reels, depending on how much tape I have on any particular species. This editing, incidentally, is often quite a job, and may take longer than it took to get the recording in the first place. I think I have done well if I have a minute of edited tape for every hour I have spent getting it.

My associates and I have been recording bird songs for several years, and now have recordings of 196 species—plus recordings of a good many other animals. Our tapes fill a couple of fair-sized book cases

in the Department of Zoology and Entomology at Ohio State University. In the process of making these recordings, and in studying the recordings themselves, we have learned some interesting things about bird songs, and we have been surprised at the vocalizing some birds can do.

There is a great deal of variation in the songs of different birds—in their length, the frequency with which they are sung, and in their complexity. Some songs are quite short, only a second or two in length, while others are long-continued and of an indefinite length. Most of our common birds sing at fairly regular intervals, the interval varying from about five to thirty seconds in different species. Once this interval is determined, you can often predict within a second or two when the next song will be sung. For example, wood thrush songs are usually four or five seconds apart, Carolina wren songs about six seconds apart, cardinal songs nine or ten seconds apart, song sparrow songs ten or twelve seconds apart, field sparrow songs about fifteen seconds apart, and ovenbird and yellowthroat songs about twenty seconds apart.

Some amazing complexities can be found in bird songs. Many birds are capable of some rather remarkable vocal gymnastics, and their songs are not as simple as the bird books lead us to believe.

Bird notes are often not pure musical tones, but contain many frequencies, and their pitch is difficult or impossible to determine accurately by ear. Many songs contain more notes than the ear detects; some birds can utter a hundred or more distinct notes a second. What sounds to the ear like a buzzy note is actually either a very rapid series of short notes, from forty or fifty to a hundred or more a second, or it is a note that fluctuates up and down in pitch equally rapidly. There are notes in some wood thrush songs that fluctuate in pitch two hundred times a second, and some of the buzzes of this bird consist of notes uttered at the rate of a hundred and twenty a second. What sounds like a trill in a bird song is usually a rapid series of notes or phrases, up to forty or fifty a second (if uttered more rapidly they would sound like a buzz); notes fluctuating in pitch from ten to forty or fifty times a second also sound like a trill.

Many birds can utter more than one note at a time. In one song sparrow song I recorded in Maine there is a moment when eight notes are uttered simultaneously. In some wood thrush and blue jay songs there are moments when four notes, pitched like the notes of a major chord, are uttered simultaneously. Some wood thrush songs contain a series of relatively steady notes, and at the same time a rapid series of lower-pitched, abruptly down-slurred notes. Some bird notes may be slurred over an octave or more in less than a hundredth of a second.

These features of bird songs, as well as many others, have been determined by means of electronic sound-analyzing equipment, but many of these things can be detected simply by playing the recording at a reduced speed (one-half to one-eighth normal speed). Playing bird songs at a reduced tape speed often produces more very unusual effects.

Once you begin recording bird songs you'll soon find that they show a lot of variation; the same bird may sing different songs, or the songs of different individuals of the same species may be different. If you can make a number of recordings of a single individual, for example, a bird nesting in your yard, you'll be able to determine just how many different songs it sings. The cardinal, a bird that commonly nests around houses, has a fair-sized repertoire; I have recorded as many as four different songs from the same individual, but I suspect it sings more than that. I have recorded 13 different songs from a single song sparrow, a bird that often nests in yards containing shrubbery. I have recorded 18 different songs from a single wood thrush and 22 from a single Carolina wren—birds you may have in your yard if there is a woods or ravine nearby. Once you learn the songs of some of these birds, at least the song sparrow, Carolina wren, and wood thrush, you can recognize individual birds, and you can tell if the bird in your yard one season is the same bird that was there the season before.

After you get a collection of bird song recordings, you'll have a lot of fun listening to them, and you'll soon learn to recognize the different species. And you'll find that all the bird students in your vicinity will be interested in listening to your recordings.



*Quality
Control
Worker*

In a recent issue, we visited Deutsche Grammophon's cassette duplication facilities in Hanover, Germany, said to be the world's most modern. This month we take a look at what RCA Victor claims to be the largest and most up-to-date eight-track cartridge plant in the world at Indianapolis. A unique feature of the RCA plant is the duplication tree, a rack which holds the master tape as it passes the playback head. Each tape tree can be attached to from 10 to 40 duplicating units simultaneously. As the tapes are duplicated on rows of slaves, a quality control worker monitors the input. Each slave duplicates a pancake, or 10½" reel, of tape, which is cut into individual cartridge-length tapes automatically. Splicing the ends of a cartridge tape still remains a critical hand operation, even in this automated plant. Spliced tapes loaded in their plastic shell go through a final quality check before being packed in cartons and shipped to your local tape dealer.

HOW THEY MAKE 8-TRACK CARTRIDGES

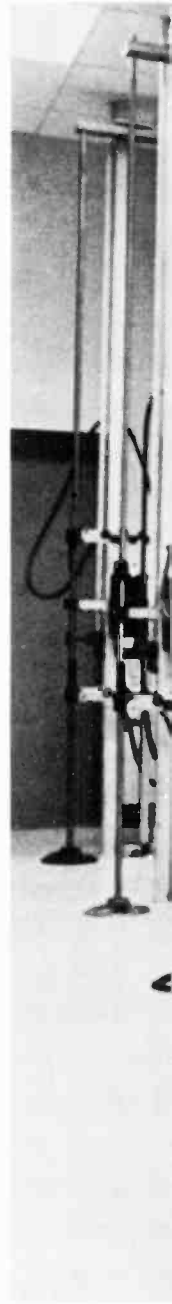
Packaging Department

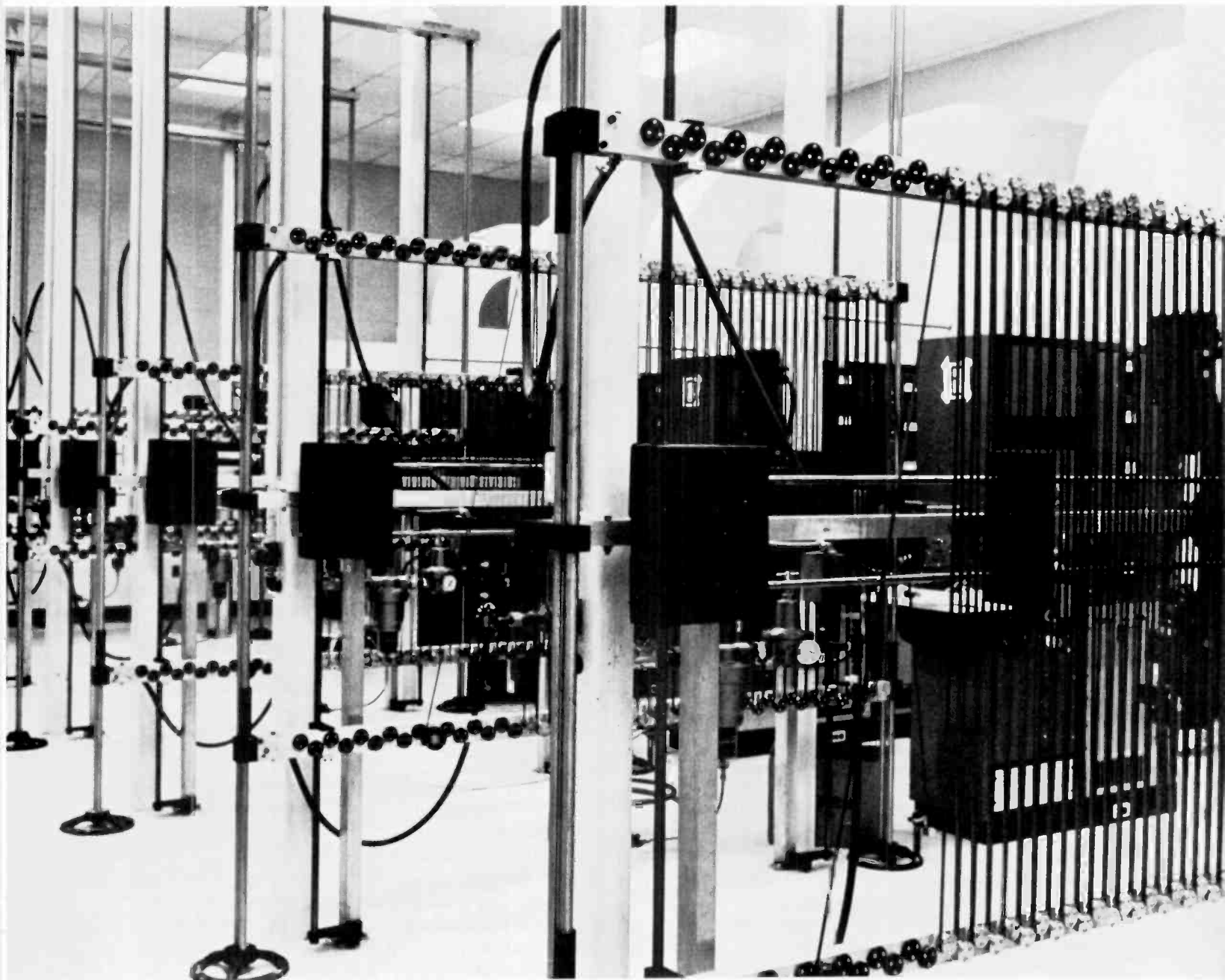




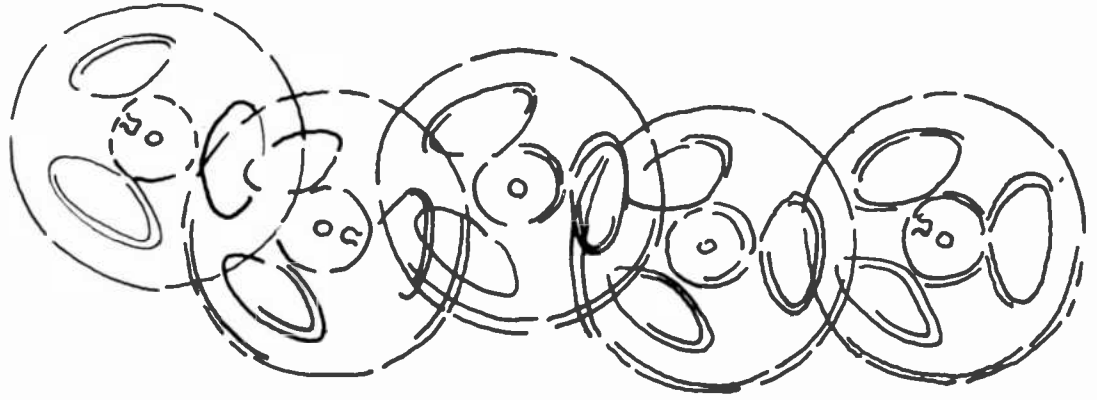
Audio Check Quality Control

Splicing A Stereo 8 Tape





"Tape Trees"—The Master Units For Tape Reproduction



BUILD YOUR OWN

DE-GAUSSER? Just a fancy name for the good old-fashioned bulk eraser, and there are some pretty fancy bulk erasers in use these days. It's the fastest, most trouble-free and efficient method of erasing tape. In fact, bulk erasing a brand new tape can actually reduce its inherent noise level to a new low. How does this happen?

HOW IT WORKS

Tape can only be magnetized to a certain level, known as the saturation point, and normal recording magnetizes a tape to various levels some way below this point. Now these magnetizations are fairly permanent and to remove them you must first saturate all the tape completely. All the tape is thus at the same magnetic level and produces . . . no, not NO signal, but a steady signal of no specific frequency, better known as random noise. This is why tape erased by a permanent magnet or a D.C. erase head has a very high noise level.

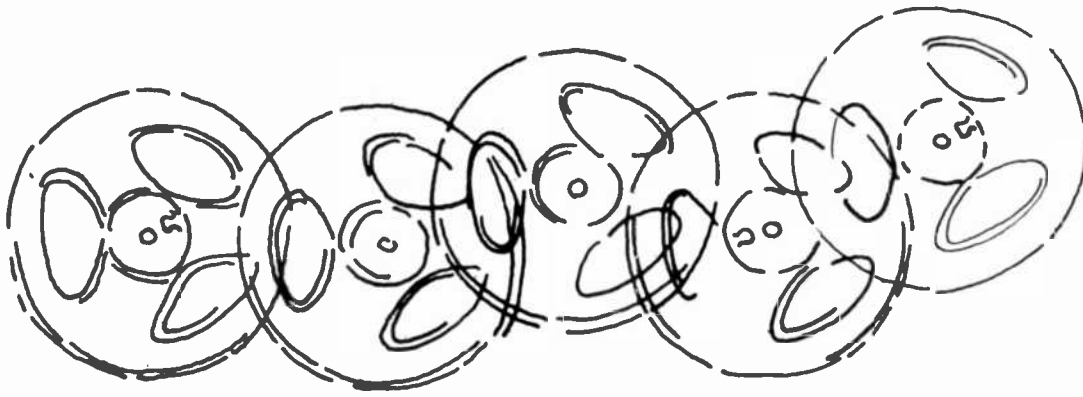
The next step is to remove this magnetization. It can be done by reversing the magnetizing field until the existing magnetization has been cancelled and then switching the field off before it starts to magnetize in the opposite direction. Perfectly possi-

ble in theory, but since the whole operation takes place in a matter of microseconds, a little impractical. However, let's carry the idea a little farther.

If an alternating field is applied, strong enough to saturate the tape, all the signal will be wiped from it because at the peak of each half-cycle of field, the tape is magnetized to saturation. Halfway between this half-cycle peak and the next though, the field and the magnetization are both zero which is what's wanted. In other words, the magnetization is alternating between saturation in one polarity and saturation in the other about the zero point. The sum total of magnetization over one full cycle is zero.

However, the chances of switching off the field at the exact moment that it is actually zero are practically nil, particularly since the easiest alternating field to produce is a 60-cycle one. If the field is merely switched off there's a very good chance that some residual magnetism will remain and this reproduces as very heavy noise on subsequent recordings. Another approach is called for.

Since the field alternates about the zero point, its strength can be decreased and the resultant will still be zero. Thus, if the field starts at the saturation level and gradually decreases to zero, the end result will be a cancellation of all magnetism on the tape. Gradually



DE-GAUSSER

by John W. Berridge

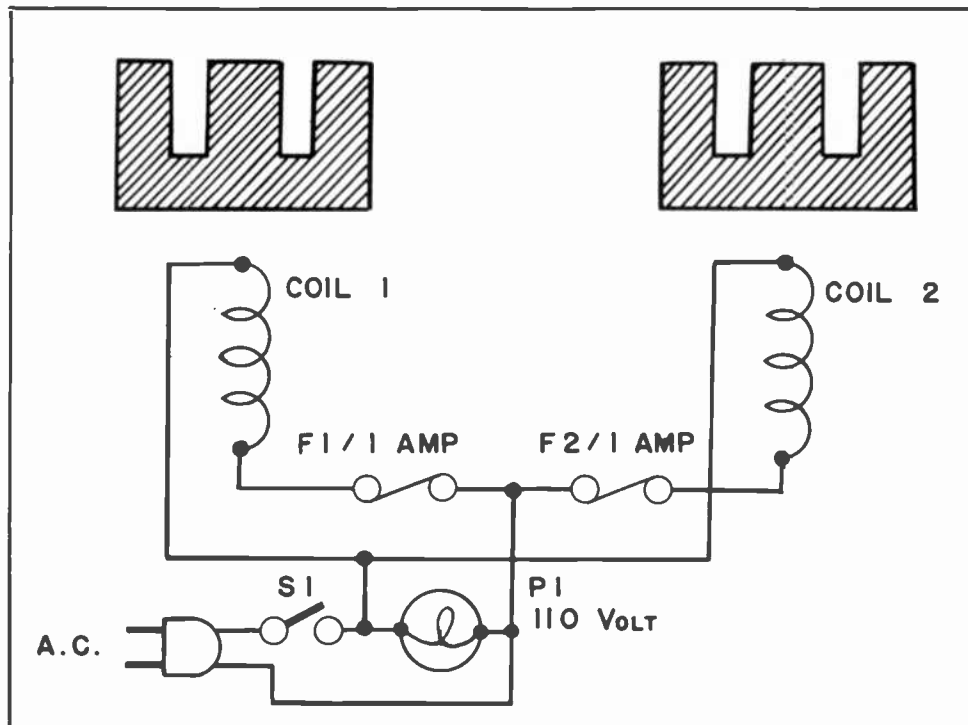


Fig. 1. Schematic of the completed bulk eraser. Wiring layout is not critical just as long as no A.C. appears on any external metal parts. Use a terminal block for the connections and soldering will be unnecessary.

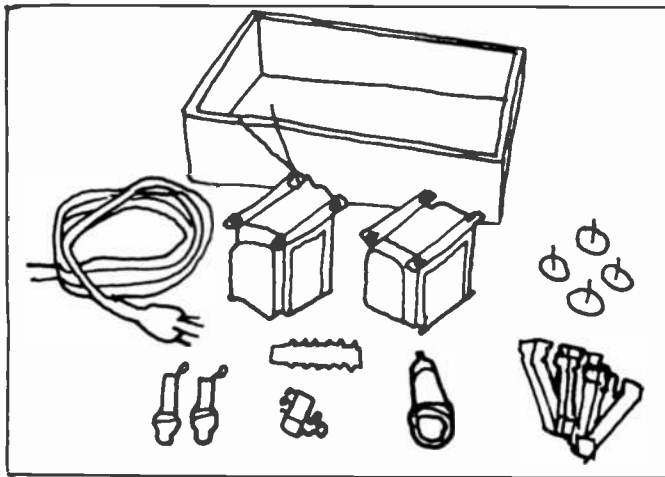


Fig. 2. The only new part in this collection is the chassis which was purchased with a bright finish for appearance. The brackets happened to be handy but can easily be made up from scrap aluminum.

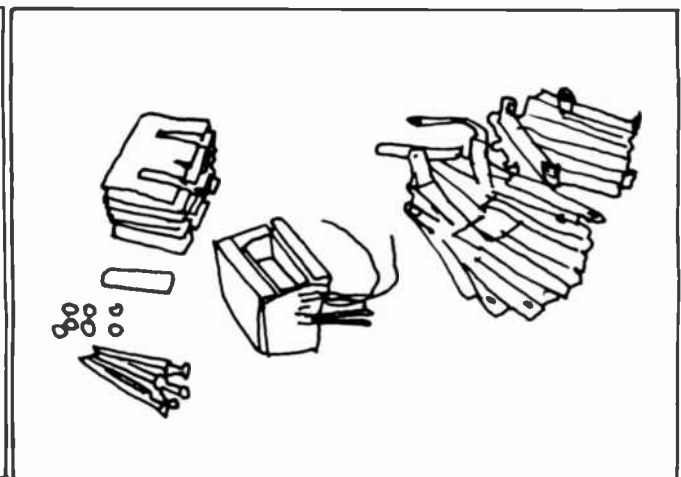


Fig. 3. Break each of the transformers down into its various parts. The coil in the center, the E laminations and securing screws on the left will all be used, the I laminations and covers can be thrown away. Check the coil to be sure that the windings or insulation haven't been cut thru anywhere.

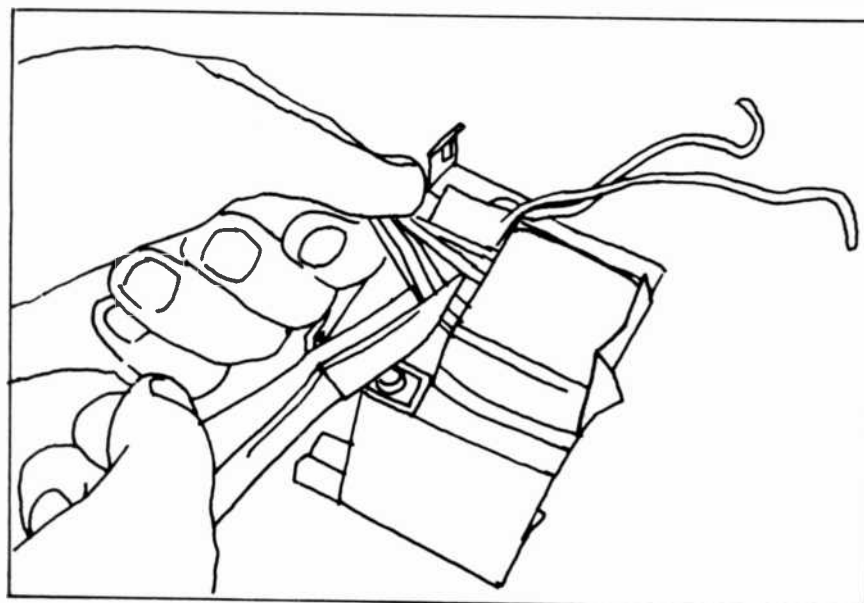


Fig. 4. Replace all the E laminations facing the same way and bolt on the brackets. The holes in these brackets are so drilled that the face of the laminations will be flush with the top of the chassis when they are bolted down. Complete the work on the coils by cutting off all the old secondary leads (making sure they ARE the secondary).

means over the period of at least a half-dozen cycles. Remember this for the moment because it affects the method of operation of a bulk eraser.

How to decrease the field slowly? Well, there's always the possibility of "fading down" the voltage on the electromagnet generating the field, but there's an easier and cheaper way of doing it than this. Since the actual strength of the field is inversely proportional to the square of the distance from its source, then separating the electromagnet (eraser) and the tape will achieve the same purpose . . . at less expense. Again, I'll deal with this in a moment.

Now that the operation of a bulk eraser is known, it isn't too hard to construct one. All we need, basically, is a 115-volt, 60-cycle electromagnet and a switch. Such an electromagnet is usually an expensive item, will anything else do? Well, all an electromagnet is is a coil wound around an open core, usually laminated. Now a choke is a coil wound around a closed core and a transformer is a choke with secondary windings added. Forget the extra windings and find a way to open up the core, and a power transformer will do the job nicely. It's just a question of picking one that can be broken down.

HOW TO MAKE IT

A cheap power transformer will actually be better for this job than one of the more expensive ones. Good transformers use potting techniques which protect the thing but make it hard to get apart, and shielding to keep the field within the core (which is the LAST thing wanted here!). If it has a burnt-out secondary winding, so much the better, since it can be resurrected from the scrap-heap for next to nothing. The eraser detailed here is similar to the big commercial variety and will erase reels all the way from the little 3" type up to the big 10½" NAB variety. For this it needs two coils and two similar transformers were used. They were donated by a friend since they had very poor regulation and were hardly capable of handling any current whatever. One of the two had a secondary lead adrift anyway.

First step is to break down the transformer into its various parts, coils, laminations, covers and securing screws. The covers are thrown out since they would bridge the open ends of the cores and act as a

magnetic short-circuit. First the coils. Snip off all the secondary leads as short as possible (they aren't wanted) but make darned sure they ARE the secondaries first. Now turn to the laminations. These take two forms, short straight ones called I's and others shaped like large-sized E's. There may also be a couple of E's with longer legs than the remainder which were on the outside ends of the stack. Throw these out with the I's, they aren't needed anymore either. Originally the E's were interleaved, half in one way, half in the other, with an I across the tips of each E to form a closed loop. Now replace all the E's facing the same way around. They should be a nice tight fit so use a small hammer to tap them evenly into place, and be careful not to hammer them in at an angle or they'll cut through the insulation and short out the coils. Do the same with the second transformer.

Next, the mounting of what are now large electromagnets. Originally, four securing screws held the transformers together but the E laminations have only two holes drilled in them (the I's had the other two) so use two of the securing screws to attach four right-angle brackets to the base of each electromagnet. Since the field is radiated off the open end of the laminations, the magnets should be mounted with the open ends upwards out of whatever box you choose to mount them in.

My own choice was a new 8" x 12" x 3" steel chassis, cadmium plated and purchased without the steel baseplate. The bright finish makes a better looking job. All the necessary holes were cut in it for other hardware such as switch, pilot light (115-volt variety), terminal block, two fuse-holders (panel mounting) and a made-up A.C. cord with protective rubber lead-through. Spacing of the mounting holes for the magnets is important. The strongest field will be developed between the limbs of the laminations on each magnet, and the two should be mounted in such a way that either one or both covers the whole thickness of tape as wound on any reel from 3" to 10½". The best spacing will probably be on the center line of the chassis with one magnet almost at one end and the other separated from it by about 4". An 8" x 12" top cover plate (the chassis is used upside down) of some insulating material such as hardboard or phenolic is made up. A metal plate will NOT do as it would shield the magnetic field.

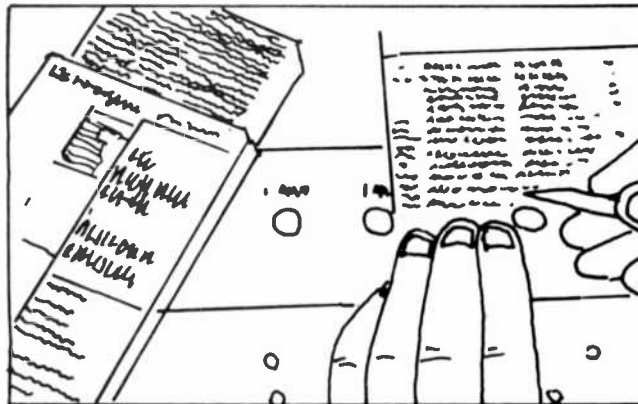


Fig. 5. Letter the chassis before mounting any of the front panel parts. The INSTANT LETTERING system shown goes on with a quick rub of a pencil and mistakes can be easily removed, yet the lettering is permanent. A complete set of 24 sheets costs \$4.95 from Datak Corp., Guttenberg, New Jersey.

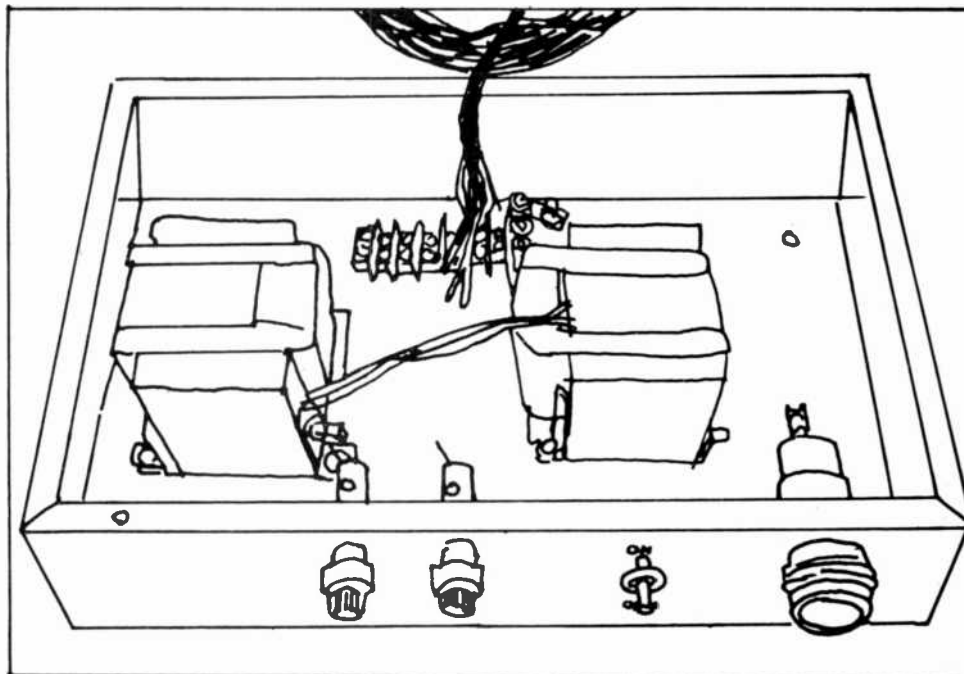


Fig. 6. Here is how the parts are laid out in the chassis. Placement of the coils is important as shown in Fig. 7, but there is plenty of room to spare. The holes around the outside lip of the chassis are drilled to take sheet metal screws, since the chassis will be a closed box when the cover is put on.

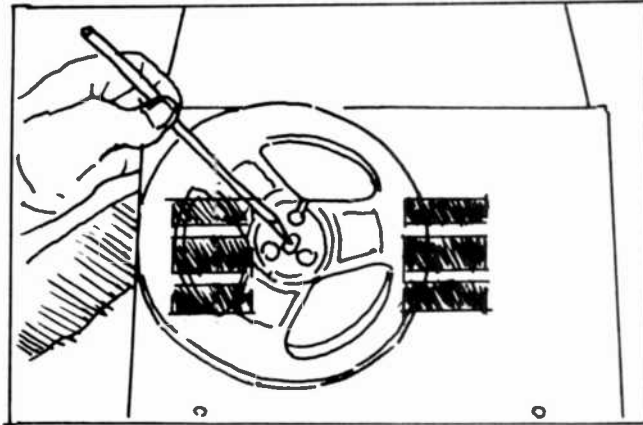


Fig. 7. Black tape in the same relative position as the pole pieces of the coils show the importance of coil location and also help position the spindle on which the reels will be placed. From this it can be seen that the left-hand coil will cover the smaller reels and the inner half of bigger reels while the right-hand coil covers the outside half of bigger reels.

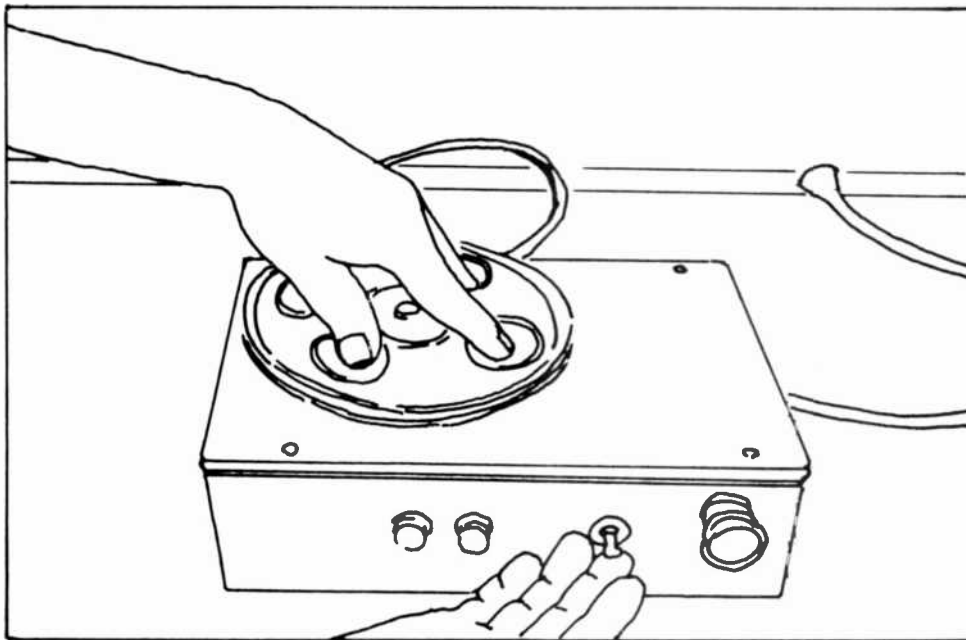


Fig. 8. Finally in operation and working perfectly. One evening's work produces a piece of equipment which looks as good as commercial gear, works equally as well and costs a fraction of the price.

On this top cover is mounted a spindle for the reels, consisting of a large washer to space the reels slightly away from the cover so that they're free to turn, and a 5/16" diameter spacer about 3/4" long, all held together with a long mounting bolt. The head of the bolt shouldn't be more than 5/16" diameter or the reels won't pass over it. When reels up to 7" are sat on this spindle they can be rotated by hand through the field and then removed and pulled away. For 10 1/2" reels with an NAB hub, the easiest way to make a spindle for them is to get hold of an old box in which these reels are sold. There's a stamped-out metal boss in them to hold the reel in place in the box. Cut out this boss, drill a 5/16" hole in the center of it and lay it over the spindle fixed to the cover. It may buzz when the field is turned on but it's only needed if you do intend to use those bigger reels.

The interior work can be completed by connecting up the magnets with the fuses, switch and pilot light as shown in the diagram, then screwing on the top cover. Since the whole lot will be a closed box when the cover is in place, it's necessary to use sheet-metal screws (or wood screws if you've used a wooden case) to secure it. The holes in the cover will be clearance holes for the screws but in the box will need to be smaller tapping holes so that the screws can cut their own thread.

Finishing touches? Paint the top cover if you think it needs it. Add four rubber feet to the underside to prevent scratching the furniture. Finally, letter the fuseholders with their rating, the switch with its "on" and "off" positions and the top or front with the legend "CAUTION! DO NOT EXCEED TEN MINUTES CONTINUOUS OPERATION." This I'll explain also in a moment. For the lettering itself, the simplest and best way is by means of a product just on the market called "Instant Lettering." This is a dry transfer process in which the letter or word is transferred direct from a plastic carrying sheet to almost any smooth surface with a quick rub of a pencil or ball point pen. Mistakes can be lifted off with the sticky side of a piece of adhesive tape, but when the lettering is rubbed over with a piece of the waxed paper that protects it in its package, it becomes quite permanent. A package of 24 assorted electronic phrases, alphabets and numbers is available for \$4.95 from The Datak Corporation, 63 71st

Street, Guttenberg, N. J., or from the mail-order houses like Lafayette and so on. One big advantage with it is that if you run out of a particular word, you can make it up with one or more letters culled from less used words, a "borrowing" technique that isn't possible with other methods.

HOW TO USE IT

The need to decrease the field slowly dictates how a bulk eraser should be used. Obviously, if the tape is plunked down, the eraser switched on and then off again, you'll leave a dose of residual magnetism on the tape and also, because the magnets are arranged on a radius from the center of the reel, any tape at right-angles to this radius will hardly be touched at all. So, place the reel on the spindle, switch the eraser on, rotate the reel slowly by hand a couple of times, then withdraw it from the spindle slowly for two or three feet before switching off the eraser. Continue rotating it as it's being withdrawn from the spindle if possible.

Why the caution about continuous operation? A transformer is designed to be operated with a closed core and a loaded secondary. If the core is not a closed loop and no load exists on the secondary windings (which have been cut short remember), all the energy which would otherwise go into the load placed on that secondary is now dispersed in the form of a strong radiated field, which we do want, and very heavy heat losses, which we certainly don't. If these magnets are left on for too long they burn up. It's a good practice to turn the eraser off after each tape, regardless of whether you have others to do or not.

Two final comments. Don't stack valuable recordings on or near the eraser. Switch it on, even by accident, and there goes your recordings. An eraser like this will put out a field strong enough to wipe a tape, if only partially, at 18" or more.

If this unit is too bulky for you or you aren't ever likely to use bigger reels, then you can use one transformer and make it up into a little hand-held unit which you can pass over the reel. It can be just as effective on 7" or smaller reels, but it will be a heavy thing to hold if you have more than one tape to erase at a time.

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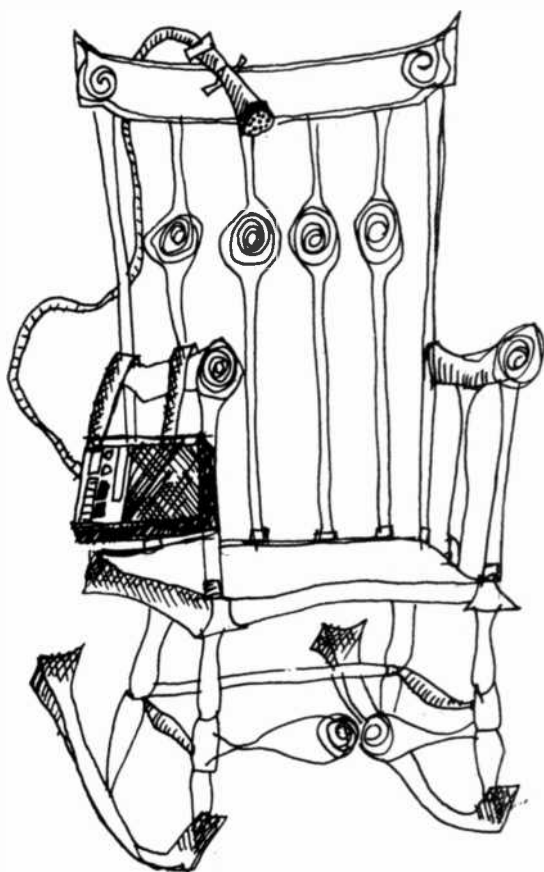
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by Jean R. Lange

A TAPE RECORDER FOR THE SENIOR CITIZEN



If you are a senior citizen, and there are more than 20 million in this country, the purchase of a tape recorder could turn out to be one of the most useful investments you ever made.

If you have imagination you will find innumerable uses for it. In many ways it can compensate for the handicaps that come with advancing years. It can help you keep up your correspondence; earn spare cash for you; record your autobiography for your family or posterity; speed the dull hours of sickness; record spur-of-the-moment thoughts you might otherwise forget, and, with the aid of a friend, bring the outside world into your room if you are unable to leave it.

Many people have already discovered the tape recorder as a medium for keeping up correspondence, especially in these days when so many of us have relatives serving overseas. A taped message conveys a sense of intimacy that the written word does not have. Moreover, for stiff and aging fingers that have difficulty holding a pen, a tape recorder can be an inestimable boon.

However, a word of warning to those who send taped messages to other countries. Many foreign tape recorders operate on a different speed from those made here. The recipient may not be able to play back your message on his own machine. He may have to take it to a store that carries a large selection of tape recorders and suffer the embarrassment of hearing a private message played back within public hearing. So check before you mail.

A tape recorder at the chair or bedside of a shut-in can relieve the lonely hours in many ways. It will record a shopping list for your daily helper record a message you want to give to your next visitor; capture the music on your radio. And if nothing more, you can talk into the microphone and hear yourself talk back. An experience that can sometimes be illuminating.

When it comes to using a tape recorder to earn extra money, exercise your imagination. Perhaps one of the most ingenious ideas, developed by a friend of mine, was to take his small tape recorder to funerals and record the eulogy delivered for the deceased. He found a ready market for copies of the tape among the relatives and friends. Later, he extended the idea to weddings where guests recorded their good wishes for the bridal pair.

As a senior citizen who is a free-lance writer I find my tape recorder invaluable because my hearing is not what it used to be. This fact was brought home to me when I interviewed the clerical promoter of a local centennial celebration. He said, I thought, "I have a choir."

The blank stare and following roar of laughter when I asked about his choir plunged me into confusion. "I don't have a choir," my interviewee said. "I am a Franciscan friar."

After that I went straight out and bought a tape recorder. Although not all interviewees like to be confronted with a microphone, few will refuse to cooperate if you tell them frankly why you are using it, and your desire to report what they say correctly.

Frequently one may wish to take notes when reading at a library. Writing is slow and tiresome, and Xeroxing is expensive. Most libraries will have a corner where a tape recorder can be used to dictate notes without disturbing other readers.

There are occasions, too, when it is important for you to understand every detail of a legal, or important personal discussion. The use of a tape recorder will ensure that you have not misheard what was being said. For the hard-of-hearing an ear plug will make understanding the playback much easier, even for those who normally wear hearing aids. The transference of sound directly into the ear when using an ear plug minimizes the distortion of words.

As to failing eyesight—that is another angle. Writing is tiring when your eyes are no longer the best in the world. Reading can be an excessive strain. If you like to write a lot you can cut down on eye strain by taping your letter or script before you write it down on paper. You can edit the tape with the aid of the rewind and forward stops on your tape recorder. If you love to read but cannot do so for long, a member of your family or a friend may be cajoled into putting a chapter of your favorite book on tape.

For the person who can no longer get around in the world, a tape recorder can bring the world to him—with the aid of a friend.

For example, suppose there is a lecture you want to hear, but you are flat on your back and tied to bed. If a friend will take your tape recorder to the lecture and record it for you, you can listen to it at home at your leisure, if not in complete comfort.

In my experience, a word to the person in charge of a lecture will obtain permission to place the microphone and tape recorder near to the speaker. A small, portable, battery operated tape recorder has the advantage of being unobtrusive and practically noiseless in operation. It would be an inconsiderate lecturer indeed who would refuse your request if the circumstances are explained to him.

Some senior citizens may think that the price of a tape recorder is beyond their slender resources. This is not so, providing the choice is made with care. There are many small machines on the market, little bigger than a camera, which cost less than \$50 and can be bought for small monthly payments.

In my opinion, the tape recorder for a senior citizen should be of the type which uses cassettes instead of tapes on reels. For stiff fingers, threading a tape can be a patience-consuming experience. Cassettes are easily inserted in the machine, even if you cannot see at all.

A battery operated machine is preferable to one that has to be plugged in to the main current. It is not always easy for an elderly person to reach down to where electrical outlets are usually placed. Batteries, carefully used, will give many hours of operation. If you do want to run the tape recorder on main current, a transformer can be purchased for about \$5.00, and many recorders operate on both batteries and current.

A tape recorder with piano-type keys is easiest to operate. It can be especially helpful for the blind since the keys are easy to locate by touch.

The newest tape recorders weigh only a couple of pounds, and are therefore no strain on bad backs. The microphone is remarkably sensitive, considering its size. I have used one at a meeting to record the voices of people sitting more than 20 feet away from me, and the recording was quite understandable.

Tapes, whether cassettes or reel type, can be used many times over if you do not wish to keep the recording. The small cassette type plays for a full hour—half an hour on each side. It is easily flipped over when one side is used up. Though the purchase of many tapes can be expensive, they have a long life. And think how easy it will make gift giving for relatives and friends: just add to Grandad's collection of tapes for Christmas.

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REVIEWS

Henry Mancini

Encore! Henry Mancini and his orchestra playing: More; Sanba de Orfeu; Theme from "Zorba the Greek"; I Will Wait for You; Days of Wine and Roses; Charade; Moon River; A Hard Day's Night; And I Love Her; Somewhere, My Love and others. 8-track stereo cartridge. RCA P8S 1276.

Music	***
Performance	***
Recording	***

The big Mancini sound on cartridge tape is as big and expansive and has that distinctive thump-thump beat that makes almost any melody thoroughly danceable. So what's a dance-type rendering doing in a format designed for highway listening? It's a break—and a welcome one—from humdrum, hypnosis-inducing pavement with broken white lines to watch unendingly. And the Mancini mystique is woven through a variety of moods that change from one selection to another, relieving the possibility of driving boredom. Stereo separation is quite good, as is the recorded sound, but like so many cartridge tapes, there's some distracting wow in spots. —W.G.S.

Peter Nero

Hits From Hair To Hollywood. Selections are: Midnight Cowboy, Everybody's Talkin', Love Theme From Romeo And Juliet, The Windmills Of Your Mind, The April Fools, Theme From Picasso Summer, Aquarius. Let The Sun Shine In, Be-In, Where Do I go?, Hair, Good Morning Starshine. Columbia.

Music	***
Performance	***
Recording	***

Nero's second set of recordings for Columbia could not be a finer selection of

current contemporary Broadway Show and Hollywood Film compositions. Each and every one destined to become classics. Peter ventures into the current fad, the Moog synthesizer, with fantastic success. Best tracks are: The Windmills Of Your Mind, Aquarius, and Let The Sunshine In. With Nero's classical touch each new set of charts seem to surpass the previous. —F.R.

Leonard Nimoy

The New World Of Leonard Nimoy. Included are: Time To Get It Together, Ruby, Don't Take Your Love To Town, The Mayor Of Ma's Cafe, I Walk The Line, I Finally Saw The Two Of You Today, Mary's Near, Abraham, Martin And John, Proud Mary, Let It Be Me, Everybody's Talkin', The Sun Will Rise, Put A Little Love In Your Heart. Dot.

Music	***
Performance	***
Recording	***

Nimoy finds chanting no Impossible Mission. Here Mr. Spock goes slightly soul-country with some contemporary classics as Rubby, Don't Take Your Love To Town and Johnny Cash's I Walk The Line. A good showing is made on most all selections. There's a large following of this gentle actor and they won't be disappointed in this set of charts. —F.R.

David Rose

Little Drummer Boy, David Rose and His Orchestra. Included: Carol Of The Bells, Little Drummer Boy, The Christmas Waltz, The Christmas Tree, The Christmas Song, I Saw Three Ships, Deck The Hall, The First Noel, Joy To The World, Silent Night. O Come All Ye Faithful, The Twelve Days Of

Christmas, Toyland, Christmas Is Coming, Angels We Have Heard On High. Capitol.

Music ***
 Performance ***
 Recording ***

The magical David Rose touch has been frosted and tinselled and pine boughed for the Yule season. A beautiful collection of popular as well as traditional Christmas goodies. There are light hearted elves dancing around the huge family tree with holly in their hair and there are deep thought-provoking moments of a distant star in a cold winter's sky. A star which has shown for over nineteen hundred years. A lovely holiday package and a perfect gift for all families, and musical tastes. —F.R.

Stiletto

Stiletto (Original Motion Picture Soundtrack), with music composed and conducted by Sid Ramin. Included are: Knife Fight On The Hill, Main Title, Ileana's Theme, Goat Island, Confrontation, Stiletto, Sugar In The Rain, Follow That Man, Northwest Cornet Facing East, Rram. Columbia.

Music ***
 Performance ***
 Recording ***

Adapted from a Harold Robbins' novel, Sid Ramin has captured the feeling intended by the producers. His secret trumpet runs and high register figures have won him an Oscar in the past and this reviewer can see why not another for this creatively original scoring. The main title should even make the singles charts. —F.R.

The Frank Sinatra Family

The Sinatra Family Wish You A Merry

Christmas. Selections are: I Wouldn't Trade Christmas, It's Such A Lovely Time of Year, Some Children See Him, O Bambino, The Bells Of Christmas, Whatever Happened To Christmas?, Santa Claus Is Coming To Town, Kids, The Christmas Waltz, The Twelve Days Of Christmas. Reprise.

Music ***
 Performance ***
 Recording ***

The Chairman Of The Board has gathered his brood around the family tree for a few Yule offerings. The best voice around is still Papa Frank of course and although his gang (Frank Jr., Tina, Nancy Jr.) hold their own, his two solo tracks stand out clearly the very finest. There should be plenty of singles action for Whatever Happened To Christmas? and The Christmas Waltz. Certainly the package holds a reverent meaning of Christmas, yet there is a mound of fun to be had in constant listening. This one should hit the chart tops for a few Christmas seasons to come. —F.R.

Those Wonderful Thirties The Stars of Hollywood's Golden Era

Including: Tip-Toe Through The Tulips (Nick Lucas), Looking At You (Jolson), Falling In Love Again (Dietrich), A Guy What Takes His Time (Mae West), Inka Dinka Doo (Durante), September In The Rain (James Melton), Jeepers Creepers (Armstrong), Love Walked In (Kenny Baker), Thanks For the Memory (Bob Hope and Shirley Ross), Over The Rainbow (Garland), Lullaby Of Broadway (Wini Shaw), The Object Of My Affection (Pinky Tomlinson), Love Me Forever (Grace Moore), When Did You Leave Heaven (Tony Martin), I'm In The Mood For Love (Frances Langford), Rainbow On The River (Bobby Breen), Pennies From Heaven (Bing Crosby), The Moon Of Manakoora (Dorothy

Lamour), With Plenty of Money And You (Dick Powell), It's Raining Sunbeams (Deanna Durbin). Decca.

Those Wonderful Thirties The Stars of Broadway, Night Clubs, And Vaudeville

Including: Minnie The Moocher (Cab Calloway), Just A Crazy Song (Bojangles Robinson), Wear A Hat With A Silver Lining (Ted Lewis), You're The Top (Merman), Lost In A Fog (Jane Froman), Dinah (Ethel Waters), Chinatown, My Chinatown (Borrah Minevitch), These Foolish Things (Benny Fields), No Regrets (Frances Faye), Darling, Je Vous Aime Beaucoup (Hildegard), Moanin' Low (Libby Holman), Bidin' My Time (The Foursome), My Blue Heaven (Gene Austin), Club Durante Melody (Durante, Clayton, and Jackson), On The Sunny Side Of The Street (Harry Richman), The Lady Is A Tramp (Sophie Tucker), Hello Momma (George Jessel), My Heart Belongs To Daddy (Mary Martin), September Song (Walter Huston), The Gin Rummy Song (Joe E. Lewis). Decca

Music ***
 Performance ***
 Recording **

Here in these three double packages we have about the finest collection of '30s memorabilia ever assembled. Not just watered down wax of the period but carefully selected, and for the most part, not available outside of the original 78 versions, musical milestones. Theatre, silver screen, radio and recording personalities are aglow once again. And they all have defied the show business world to outdo them, for over three decades now. Really, today, where can you go to hear the likes of Jolson, Tucker, Huston, Garland, Powell, and scores of others. This was and is the heart of the show world. These are the three definite sets to have in your library. And

they are marvelous sound wise considering the age of recording. A true labor of love by the Decca people. —F.R.

Roger Williams

Autumn Leaves-1965. Selections include: Summer Wind, Red Roses For a Blue Lady, Three O'Clock in the Morning, A Walk in the Black Forest, Cumana, The Sweetheart Tree, Forget Domani, Cara Mia, Crying in the Chapel, You'll Never Walk Alone, Chim Chim Cher-ee, The Whiffenpoor Song, Yellow Bird, Theme from "Exodus," Autumn Leaves-1965, Mona Lisa, Cherry Pink And Apple Blossom White, Memories Are Made of This, Our Love, Lollipops and Roses, Tico-Tico, Oh What It Seemed To Be, Someone To Watch Over Me, Papa, Won't You Dance With Me? Kapp KTJ 83452, 8-track cartridge

Music ***
Performance ***
Recording ***

Roger Williams' second cartridge this month is his now famous 10th anniversary program. Best-selling as an album, this tape should find itself in every basic library. However good this tape is, I find fault in his revising the sound of Autumn Leaves. It's similar to Dick Tracy having his nose straightened. Never-the-less a fine package with Summer Wind, The Sweetheart Tree, Someone To Watch Over Me, acting as standouts. —F.R.

Miscellaneous Popular

Sky-Bound Stereo—Popular Style. Some 63 popular selections featuring Jerry Butler, Clebanoff Strings, Ray Davies Orchestra, Derek & Ray, Horst Jankowski, Lennon Sisters, Gloria Lynn, Paul Mauriat Orchestra, Roger Miller, Regis Philbin, Smothers Brothers, Spanky & Our Gang, Frankie Valli. Ampex/Mercury, Philips, Fontana, Smash (American Airlines); W-46. 3-3/4 ips.

Music ***
Performance ***
Recording ***

We sometimes wonder just how the Ampex programmers manage to put together these marathon tapes with so much timely and well planned music. Such is certainly the case here, with all the latest favorites of Roger Miller, Paul Mauriat, and even the Smothers Brothers (grown up of late). The major part of the material is happily selected; some of it not so—therefore, the three-star rating for music. But this tape has so much plain old-fashioned good listening that it'd be hard to find much fault with it. Sure, there's a little too much weight on the syrup stuff and too little on the "think" music. There's also precious little of the original recording artists—much of the music is watered-down copy stuff that's dubiously called "chicken rock" today. But these renditions do have their place in the scheme of things, and this tape is the place for a great many of them. It even has some old-time long standby favorites to add a little extra zest. An excellent job.

—W.G.S.



"Sure it costs more, it has a cartridge tape recorder!"

TAPE NOTES, Continued from page 4

While we're on the subject of metal foil sensing, we were delighted to note that one prominent tape manufacturer we know of is incorporating a metal foil length at each end of the company's blank tapes. Fine idea. Trouble is the foil's on the wrong side of the tape and won't work with most of today's metal-foil-sensing reversing recorders. Did somebody goof, or wasn't the metal strip meant for anything other than decoration?

And when oh when are tape manufacturers going to start putting metal foil strips on prerecorded tapes? Not to mention the need for sequence B to start at the same spot where sequence A ends. Are you listening out there?

—W.G.S.

Some people say Ampex recorders look too simple.

They're right.

We make stereo tape recorders that look and operate as simply as possible. By eliminating unnecessary buttons, levers and toggle switches. And we do this without eliminating features.

Ampex multi-function controls replace the usual array of single function switches and still offer all the features. Like sound-on-sound, sound-with-sound, echo, mode selectors, etc. All with a lot less confusion.

Ampex eliminates more switches by building automatic controls inside their units.

Ampex patented dual capstan drive eliminates the need for a tape tension control. The Ampex two-step interlocking system automatically reduces head magnetization during recording. Another button you don't have to push.

You're not paying for unnecessary buttons and bother when you get an

Ampex. You're paying for solid sound construction. For deep-gap heads that deliver more constant, true sound when they're new, and keep delivering sound like new for years longer.* For solid construction, like a die-cast (rot sheet metal) frame and head bridge so everything mounted in Ampex units stays absolutely rigid. For higher grade electrical components. And a heavy-duty hysteresis synchronous motor. Honest sound specifications. So you get a tape recorder that will last years longer.**

The more we put on the inside, the less you see on the outside. It's that simple.

Here's real proof: The Ampex 1455A stereo tape deck. With a new Pause Control, Sound-on-Sound, Sound-with-Sound, Variable Echo Effect, Direct Tape Monitor, "Silent Signal" Automatic Reverse, Automatic Threading, . . .

. . . Automatic Equalization, 4-Deep-Gap Heads and performance specs only matched by another Ampex recorder (especially after you use it a year or so). Walnut grained base included. Suggested retail price: \$349.95

AMPEX

Write Ampex Corporation, Consumer Equipment Division, Dept. HF-10, 2201 Lunt Ave., Elk Grove Village, Ill. 60007 for a full color brochure on the entire Ampex line.

*See "A message from the heads of Ampex. Listen." in leading audio magazines, March, 1969.

**See "Some people say Ampex stereo recorders are expensive. They're right." in leading audio magazines, September, 1969.

"Scotch" Brand Cassettes prevent tape hangups

Here's the inside story.

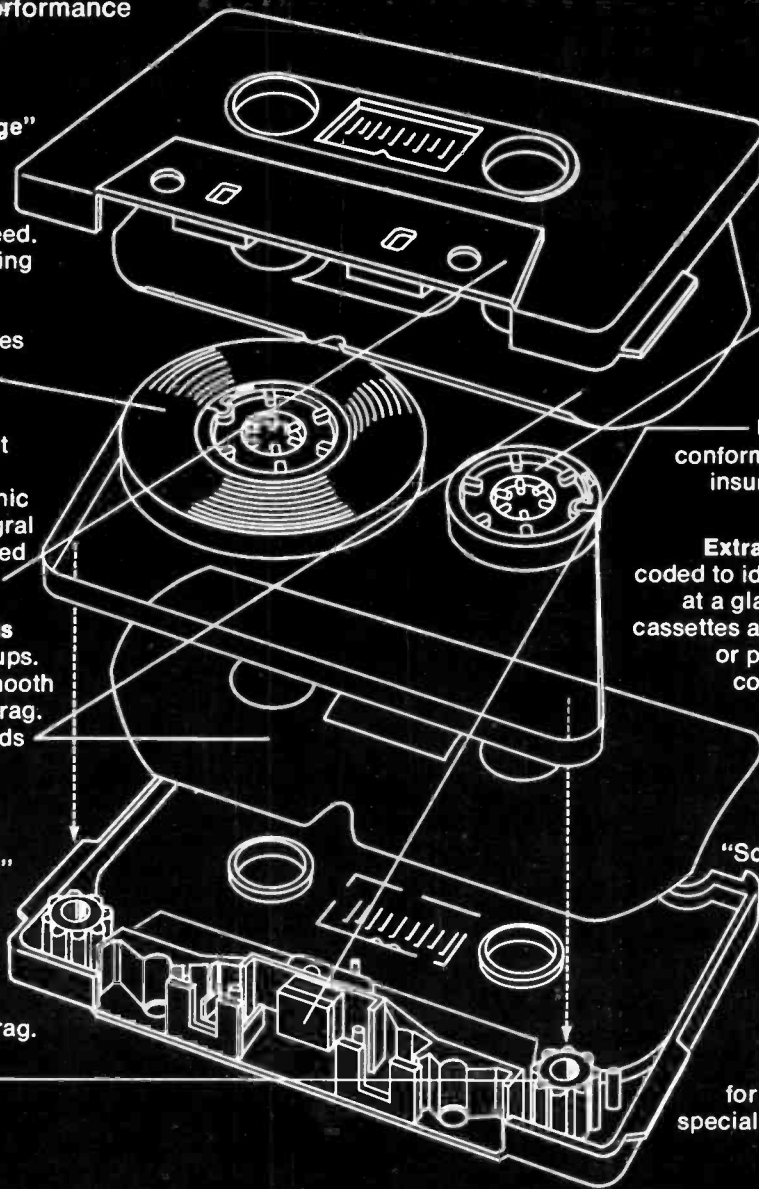
"Scotch" Brand builds
in trouble-free performance
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Famous "Dynarange" Magnetic Tape provides highest possible fidelity at slow recording speed. A slick, tough coating affords smooth tape travel, resists oxide ruboff, assures long tape life.

Precision-molded case is high-impact plastic, features permanent ultrasonic sealing, large integral window. Color coded for recording time.

Anti-friction shields combat tape hangups. Exclusive, ultra-smooth material reduces drag. Bowed shape guards against uneven tape wind.

Fixed tape guides help prevent "wow" and "flutter" often caused by imperfect roller guides. Splined design cuts friction and drag.



One-piece hub locks leader tape securely, eliminates "bump" that can distort tape in winding.

Unitized pressure pad conforms to recorder head to insure better tape contact.

Extras: Cassettes are color coded to identify recording times at a glance. 30, 60, 90-minute cassettes available in album-style or postal-approved plastic containers. Plus C-120 in album only.

Helpful booklet, "Recording Basics" is yours free with any "Scotch" Brand purchase from your nearest participating dealer. Or send 25¢ coin to cover handling to:
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