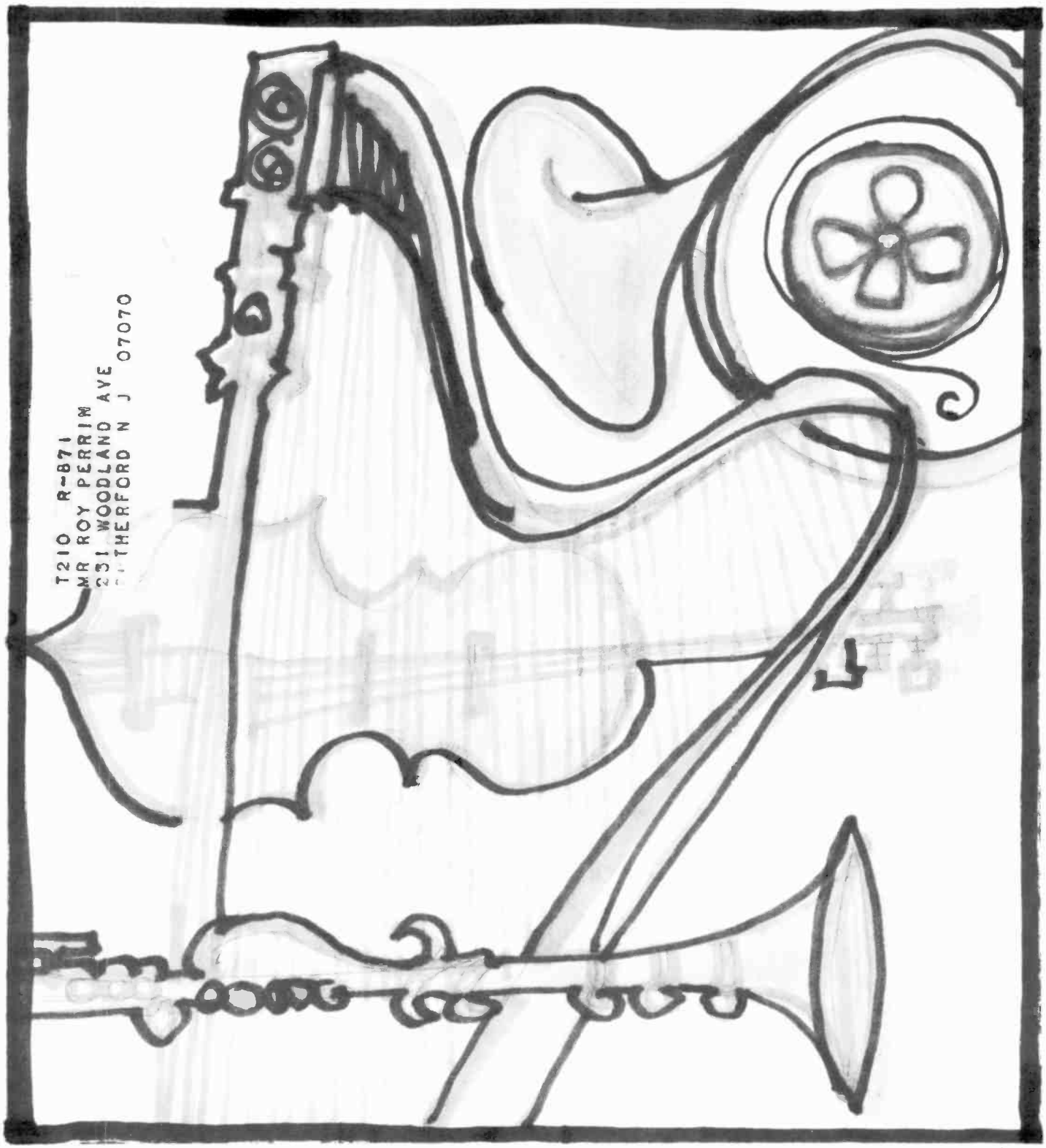
tape recording

VOLUME 16, NO. 7

60¢



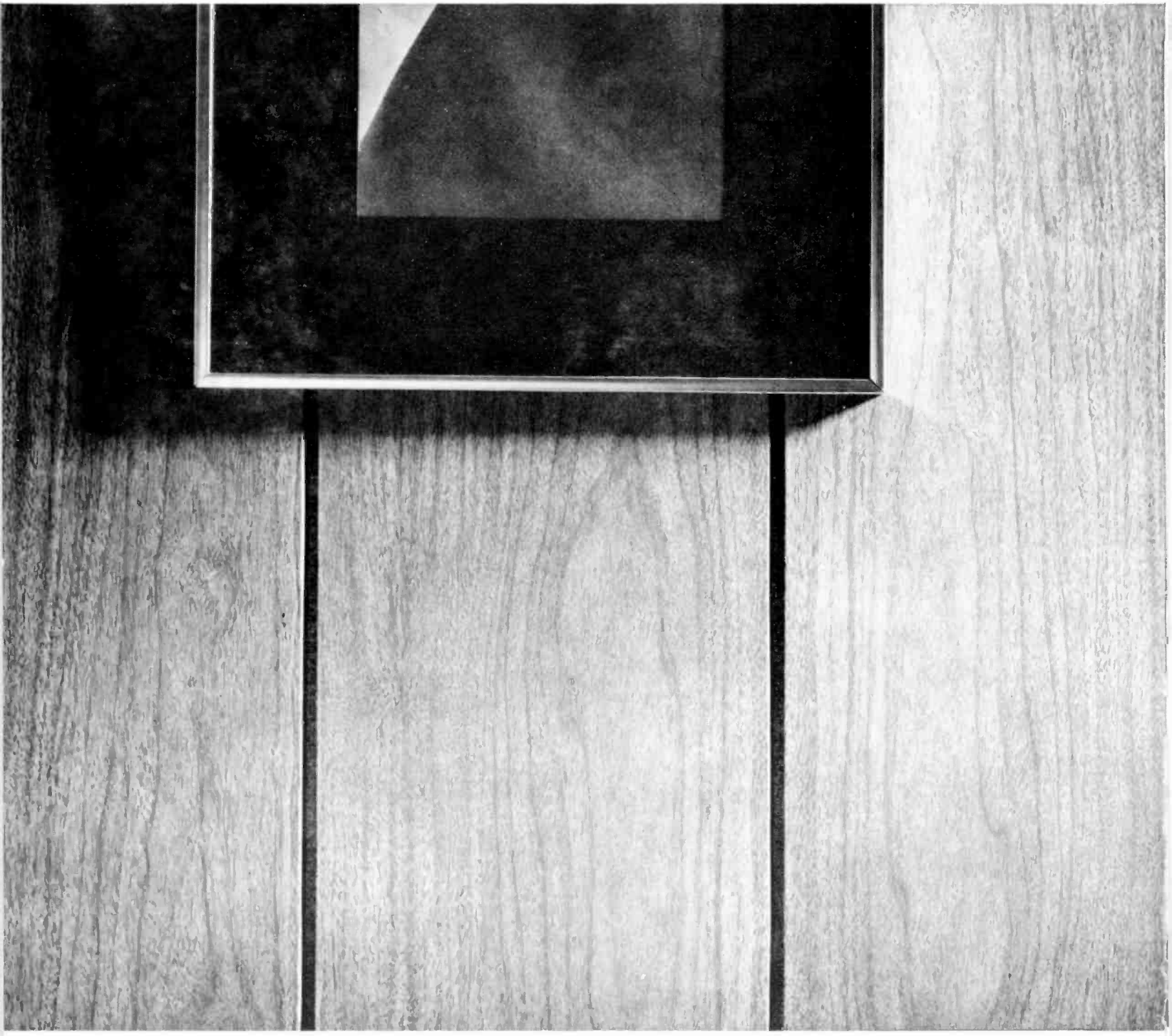
2/20/70

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.

The Concord Mark II stereo tape deck completely ignores fluctuations in line voltage. It is driven by a hysteresis synchronous motor which locks onto the 60 cycle power line frequency and maintains constant speed (within 0.5%) regardless of voltage variation from 75 to 130 volts. So if you're about to buy a tape deck that doesn't have a hysteresis synchronous drive motor you're liable to negate any other fine feature it might have.

Don't get the idea the hysteresis motor is all the Concord Mark II has to offer. It also has just about every other professional feature. Three high-quality heads: ferrite erase head; wide gap Hi-Mu laminated recording head for optimum recorded signal and signal-to-noise ratio, narrow gap Hi-Mu laminated playback head for optimum reproduced frequency response. No compromise combination heads. The three heads and four preamplifiers also make possible tape source monitoring while recording.

The tape transport mechanism assures a fast startup—you don't miss a note. Supply and takeup tape tension arms eliminate startup burble. A special flutter filter eliminates flutter due to tape scrape or cogging action. A cue control provides instantaneous stop and start operation. Other important conveniences: the flip-up head



NEITHER AIR CONDITIONERS, TV SETS, WASHERS, NOR HYSTERESIS-DRIVE CONCORD MARK II

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.

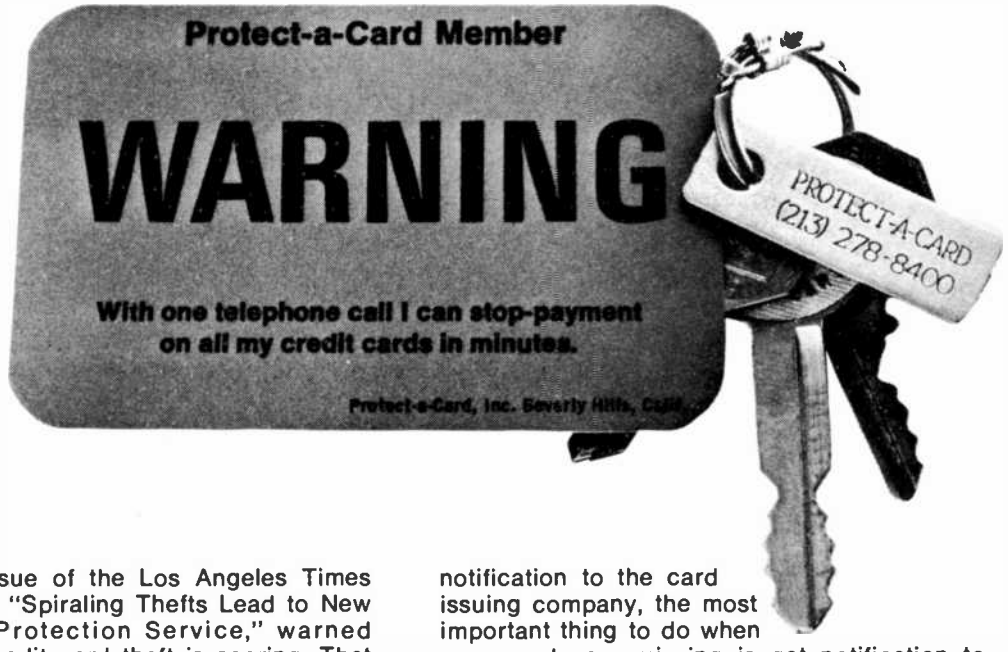
The hysteresis drive Concord Mark III has all of the features of the Mark II plus pressure-sintered ferrite heads for extended frequency response and virtually no head wear. It sells for under $260.

The hysteresis drive Mark IV, the top-of-the-line Concord deck, offers all of the performance and conveniences of the Mark II and III including wide gap record, narrow gap playback heads, tape source monitoring, sound-on-sound, echo recording. Plus, a dual capstan tape transport mechanism with electronic automatic reverse, no metal or foil or signal required on the tape. Superior recording performance plus the convenience of automatic reverse and continuous play. A superb instrument offering the finest performance money can buy, and it's under $330. Audition the new Concord Mark series, the tape decks with the hysteresis synchronous drive motor at your high fidelity dealer today. For "all the facts" brochure, write: Concord Electronics Corp., 1935 Armacost Avenue, Los Angeles, California 90025. (Subsidiary of Ehrenreich Photo-Optical Industries, Inc.)

For copy of Concord Mark III Instruction book, mail 25¢ in coin

ANY OTHER ELECTRICAL APPLIANCE CAN KEEP THE FROM ITS PRECISELY APPOINTED SPEED.

A Warning for people who carry credit cards.



In a recent issue of the Los Angeles Times the lead story, "Spiraling Thefts Lead to New Credit Card Protection Service," warned readers that credit card theft is soaring. That thousands of Americans who never thought it could happen to them will lose a whopping $50 million this year. And that it can happen to *you*.

Fact is you can lose a credit card by carelessness or theft and find yourself with bills for *thousands* of dollars in a matter of days! (One of our members called in last week when his cards were stolen from his glove compartment. A lady whose purse was taken from the locked trunk of her car while she was golfing. And a businessman who lost his cards while vacationing in Hawaii. Etc.)

That's why we started Protect-a-Card. The Credit Card Protection Service that sends stop-payment notice to all your credit cards in minutes.

For only $5 we record your cards and account numbers at our Data Center. Then if they're lost or stolen you just call us *collect*. 24 hours a day. From anywhere in the continental U.S. (From overseas you simply cable.)

We'll immediately wire stop-payment notice to all your card companies. At no charge to you. Then we'll send you copies of those wires. So you have time-dated *proof* of the notification that ends your liability.

Since you are liable for all charges made with your cards until you give proper (written) notification to the card issuing company, the most important thing to do when your cards are missing is get notification to each card issuer *fast*. Protect-a-Card does this for you electronically. Infinitely faster than you could do it yourself. And with none of the worries and headaches.

End credit card worries today. Mail the coupon with a $5 check (protects your cards for a full year) and a list of your credit cards and account numbers. We'll rush you a thief-warning membership card and a key-ring tag inscribed with our 24-hour emergency telephone number. (Like those in the picture.)

Then you can really enjoy your credit cards. And let the thieves do the worrying for a change.

Protect-a-Card, Inc.
Data Processing Center
P.O. Box 2970, Clinton, Iowa 52732

☐ I am enclosing a $5 check and a list of my credit cards and account numbers. Rush me my membership. (Your cancelled check is your receipt.)

Name_____
Address_____
City_____ State_____ Zip_____
For telephone identification:
Soc. Sec. No._____ Age_____
Occupation_____
Signature_____

1-018-9- 12062

tape recording

SEPTEMBER–OCTOBER, 1969 VOLUME 16, NO. 7

ARTICLES

FEATURES

Tape Recording: Publisher: Richard Ekstract; Editor: Robert Angus; Circulation Mgr.: Anne Rossi; Music Editor: Erwin Bagley; Technical Editor: Walter Salm; Tape Club News Editor: Marcia Rube; Art Director: Everette Short.

Tape Recording (title registered U.S. Pat. Off.) is published seven times a year (bi-monthly except March-April when monthly) by A-TR Publications, Inc., Richard E. Ekstract, President; Robert N. Angus, Secretary; executive and editorial offices, 145 East 52nd St., New York, N.Y. 10022. Subscription rates: U.S. and Canada $3.00 for one year, $5.00 for two years, all other countries $4.50 per year. Second class postage paid at New York, N.Y. and at additional mailing office. Single copies 60 cents.

A private car instead of a bus; friends instead of strangers. Isn't this the way you want to travel?

Horizons for Professional People was founded by a professor to give educated Americans a chance to travel in dignified, sensible and economical fashion. Instead of spending 17 days in a crowded bus, you can have 21 days on your own in a chauffeured car *and still save.* To learn more about this bold new concept in travel, please read on.

Several years ago in Cambridge, Mass., a world-renowned professor made a vow. He had just returned from a trip to Europe. It had been a disaster. A nightmare. Speeding in a hot, crowded bus–while a bored tour director droned on. Sleazy accommodations; second rate food and drink. Worst of all was enduring the contempt of Europeans. The professor resolved that it would never happen to him again.

What is more, he vowed to do something about the lack of opportunity for educated Americans with an interest in "in-depth" travel. And that was the beginning of Horizons for Professional People. An idea in travel whose time is *now.*

Basically it is a group of educated individuals banded together as a kind of clan in order to secure intelligent, in-depth travel. It is not a cut-rate tour. It is designed to help the traveler meet Europeans, rather than Americans. And it is based on the principle, "Before the journey–find the friend!"

You see, in H.P.P. you will always travel with others like yourself; no more than six of you and an especially selected H.P.P. Friend. A national of the country you visit, he is always an extraordinarily knowledgeable and affable person. And he is always paid at least 50% more than ordinary guides.

Here is what traveling as a member of H.P.P. can mean to you:

It means journeying in your own private, chauffeured car. It means setting your own pace and not vacationing to a time clock. It means being charged the French price for French goods instead of the American price. It means getting a good table and service at a great restaurant (your friend knows the owner.) On another note, it means being advised not to play at a certain table in one of London's most famous gambling clubs. Or it means dining in Rome on pasta and Orvieto and singing along with table companions who starred in the Opera a few hours ago. And because you have a friend, you will find it easy to make other friends. Today, you may have but a handful of acquaintances abroad. But traveling this way, you will meet many new friends in many countries–doctors and jockeys; housewives and doctors; executives and laborers. Imagine claiming to know a country without really knowing the people in it!

It has taken months of search to find the extraordinary men qualified as Friends for H.P.P. Here is what a typical Friend is like:

Claude G.–France. Born in Paris. Father an art restorer; mother from the Basque country. Active in Resistance, thereafter assisted in recovery of lost, strayed or stolen art. Lecturer on art history; published two books, one a novel which enjoyed critical but not financial success. Lives with wife, two children, hard by the University. Knows provinces well–after art his passion is fishing. Possesses a "relaxed" clarinet, often sits in at places like La Contre Scarpe.

With friends like this showing you their countries, you can see why members of H.P.P. enjoy such fantastic trips. And, amazingly, the trips are not at all expensive. They range from just $595 to $1200, complete. It really doesn't have to cost more to travel like a human being instead of part of the herd! And in H.P.P., wherever you go–you always travel first class. You eat and drink the best. You tour as a sensitive and civilized human being.

Right now, there is probably a trip being offered which you would enjoy. But to qualify, you must first become a member of H.P.P. There is a one-time membership fee of $10.00 that makes you eligible for *all* trips. With membership you receive trip listings. You will also receive free travel bulletins, a digest of member's experiences and a biography of each Friend.

But a word of caution: By its very nature, Horizons for Professional People cannot serve great numbers of people. Though all cultivated individuals who seek in-depth travel are eligible, we must reserve the right to process membership applications *in the order received.* It would be wise for you to mail the membership application along with your check for dues, *right away,* if you do have any interest in taking a trip in the future. And please remember, membership gives you the privilege, *but never the obligation* to take an H.P.P. trip.

Horizons for Professional People,
P.O. Box 2980, Clinton, Iowa 52732

Please accept my application for active membership in Horizons for Professional People. I understand that the $10.00 fee, which I enclose, is a one-time charge entitling me to all privileges of membership for as long as I choose to remain a member. Because enrollment is limited, all applications will be processed and acted upon in the order received.

NAME _____
(please print)

ADDRESS _____

CITY _____ STATE _____ ZIP _____

1–166–9– 1 2 0 6 2

THE 8-TRACK STEREO TAPE CARTRIDGE PLAYER OF YOUR CHOICE

FREE*

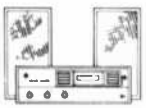
YOURS AS A GIFT JUST FOR JOINING NOW

Stereo Tape Club of America

*with one year membership and minimum tape purchase, six now and one a month for a year; speakers extra.

PICK ONE FREE

NEWEST FINEST SOLID STATE AUTOMATIC 8-TRACK STEREO TAPE CARTRIDGE PLAYERS



$114.95 reg. price

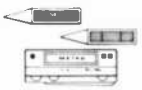
COMPLETE HOME SYSTEM

With built-in amplifier and 2 deluxe stereo speaker units in handsome walnut cabinets. THE PLAYER IS FREE. We will bill you only special member's price of $24.95 for speakers. ☐ check HOME SYSTEM in coupon.

$79.95 reg. price

HOME PLUG-IN SYSTEM

Pre-amplified model. Plugs into your present stereo record system. Beautiful walnut grain finish. THE PLAYER IS FREE. No speakers needed, plays through your own stereo system. ☐ check HOME PLUG-IN in coupon.



$89.95 reg. price

DELUXE AUTO SYSTEM

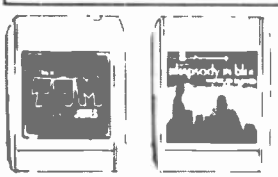
Complete with easy installation kit and 2 deluxe flush mount speakers (no drilling holes). THE PLAYER IS FREE. We will bill you only special member's price of $5.98 for speakers. ☐ check AUTO SYSTEM in coupon.

WHY WE GIVE YOU THE FINEST 8-TRACK STEREO PLAYER FREE

We are America's largest all-label, all-artist stereo tape cartridge club. We hope to win you over to the newest, most advanced, most convenient way to enjoy music in your home, car and office—with trouble-free, compact stereo tape cartridges that play continuously, switch tracks automatically, and last practically forever. They never scratch, warp or wear out. They never tangle or break.

If you like the system, you'll buy your stereo tape cartridges from us. You never pay more than regular price. You can pick free bonus tapes immediately, without waiting. You enjoy up to 50% savings on special offers.

To guarantee your continuing interest, the equipment must be fine enough to give brilliant high fidelity performance over many years of trouble-free service. That's why we give you our STEREOMATIC unit FREE. It's the best premium equipment. That's why we are willing to send it to you at no risk or obligation on your part. If you like it, KEEP IT. It's yours FREE just for buying stereo tape cartridges you would want to own anyway. If not, return it and your membership is cancelled. You pay nothing and owe nothing. To take advantage of this fabulous new membership offer—complete coupon and mail now.



SELECT ANY 6 TO START MEMBERSHIP

Only Stereo Tape Club gives you full selection; all labels, all artists, all new releases.

POPULAR

- ☐ 1321—FRANK SINATRA'S GREATEST HITS (Reprise) 6.98
- ☐ 1330—A MAN ALONE, Frank Sinatra (Reprise) ... 6.98
- ☐ 1331—I TAKE A LOT OF PRIDE, Dean Martin (Reprise) ... 6.98
- ☐ 1308—THE BEST OF EDDY ARNOLD, Eddy Arnold (RCA) 6.98
- ☐ 1309—LOOK AROUND, Sergio Mendes & Brasi 66 (A&M) 6.98
- ☐ 1333—CRYSTAL ILLUSIONS, S. Mendes & Brasil 66 (A&M). 6.98
- ☐ 1311—THE BEST OF NANCY WILSON (Capitol) ... 6.98
- ☐ 1314—JOHNNY'S GREATEST HITS, Johnny Mathis (Columbia) ..7.98
- ☐ 1318—ELVIS' GOLD RECORDS, Elvis Presley (RCA) ... 6.98
- ☐ 1319—WHEN YOU'RE SMILING, Nat King Cole (Pickwick). 5.98
- ☐ 1337—SOULFUL, Dionne Warwick (Scepter) . 6.98
- ☐ 1324—PROMISES, PROMISES, Dionne Warwick (Scepter) ..$6.98
- ☐ 1325—HELP YOURSELF, Tom Jones (Parrott) ... 6.98
- ☐ 1328—THIS IS TOM JONES, Tom Jones (Parrott)... 6.98
- ☐ 1326—AGE OF AQUARIUS, 5th Dimension (Liberty). ..6.98
- ☐ 1332—FOR ONCE IN MY LIFE, Vikki Carr (Liberty)... 6.98
- ☐ 1316—HONEY, Bobby Goldsboro (United Artists .. 6.98
- ☐ 1334—TODAY, Bobby Goldsboro (United Artists ... 6.98
- ☐ 1335—I'M ALL YOURS, BABY, Ray Charles (ABC)... 6.98
- ☐ 2301—THE BEAT OF THE BRASS, Herb Alpert & T.B. (A&M) ..6.98
- ☐ 2314—WARM, Herb Alpert & The Tijuana Brass (A&M) ... 6.98
- ☐ 2306—FERRANTE & TEICHER, THE EXCITEMENT OF, (Pickwick) ..5.98
- ☐ 2307—ROGER WILLIAMS GREATEST HITS, (Kapp)... 6.98
- ☐ 2302—A FISTFUL OF DOLLARS, Hugo Montenegro (RCA)... 6.98
- ☐ 2315—A WARM SHADE OF IVY, Henry Mancini & Orch. (RCA) 6.98
- ☐ 8304—TO RUSSELL MY BROTHER, Bill Cosby (Warner Bros)... 6.98

ROCK AND FOLK

- ☐ 3301—LADY SOUL, Aretha Franklin (Atlantic)... 6.98
- ☐ 3335—ARETHA'S GOLD, Aretha Franklin (Atlantic)... 6.98
- ☐ 3307—DOORS, The Doors (Elektra) ... 6.98
- ☐ 3337—THE SOFT PARADE, The Doors (Elektra)... 6.98
- ☐ 3326—FOR ONCE IN MY LIFE, O. C. Smith (Columbia)... 6.98
- ☐ 3327—BLOOD, SWEAT AND TEARS, (Columbia) ... 6.98
- ☐ 3328—LOVE CHILD, Diana Ross and the Supremes (Motown) 6.98
- ☐ 3330—THE BEATLES 1 & 2, (Apple) ... 13.98
- ☐ 3331—BAYOU COUNTRY, Creedence Clearwater Revival (Fantasy) 6.98
- ☐ 3336—SMASH HITS, The Jimi Hendrix Experience (Reprise) 6.98
- ☐ 3338—CROSBY/STILLS/NASH, (Atlantic) ... 6.98
- ☐ 3339—HALLELUJA, Canned Heat (Liberty)... 6.98
- ☐ 3340—IN-A-GADDA-DA-VIDA, Iron Butterfly (Atco)... 6.98
- ☐ 3341—SHOW, Temptations (Gordy) ... 6.98
- ☐ 3342—THE BEST OF CREAM, The Cream (Atco)... 6.98
- ☐ 3343—SUITABLE FOR FRAMING, Three Dog Night (Dunhill)... 6.98
- ☐ 3344—BECK-OLA, Jeff Beck (Epic)... 6.98
- ☐ 3345—FELICIANO/10-23, Jose Feliciano (RCA)... 6.98
- ☐ 3346—2525 (EXORDIUM & TERMINUS), Zager & Evans (RCA) 6.98
- ☐ 8302—BOOKENDS, Simon & Garfunkel (Columbia) ... 7.98
- ☐ 8314—PETER, PAUL & MOMMY, Peter, Paul & Mary (W.Bros) 6.98
- ☐ 8315—OARABAJAGAL, Donovan (Epic)... 6.98

COUNTRY AND WESTERN

- ☐ 4301—TIME I GET TO PHOENIX, Glen Campbell (Capitol)... 6.98
- ☐ 4303—HANK WILLIAMS GREATEST HITS, (MGM)... 6.98
- ☐ 4309—JOHNNY CASH AT FOLSOM PRISON, (Columbia) ... 6.98
- ☐ 4313—JOHNNY CASH AT SAN QUENTIN, (Columbia)... 6.98
- ☐ 4312—THE SENSATIONAL CHARLIE PRIDE (RCA)... 6.98
- ☐ 4314—FROM ELVIS IN MEMPHIS, Elvis Presley (RCA)... 6.98
- ☐ 4315—SAME TRAIN, DIF. TIME Merle Haggard (Capitol)... E.98
- ☐ 4316—STATUE OF A FOOL, Jack Greene (Decca) ... 6.98
- ☐ 8312—NASHVILLE SKYLINE, Bob Dylan (Columbia)... 6.98

JAZZ

- ☐ 5301—DOWN HERE ON GROUND, Wes Montgomery (A&M)... 6.98
- ☐ 5307—THE BEST OF WES MONTGOMERY, (Verve)... 6.98
- ☐ 5316—A DAY IN THE LIFE, Wes Montgomery (A&M)... 6.98
- ☐ 5302—THE ELECTRIFYING EDDIE HARRIS, (Atlantic) ... 6.98
- ☐ 5305—UP POPS RAMSEY LEWIS, (Cadet) ... 6.98
- ☐ 5306—GROOVIN' WITH THE SOULFUL STRINGS, (Cadet)... 6.98
- ☐ 5311—FOOL ON THE HILL, Sergio Mendes & Brasil 66 (A&M)... 6.98
- ☐ 5312—MEMPHIS UNDERGROUND, Herbie Mann (A&M)... 6.98
- ☐ 5313—SOULFUL STRUT, Young-Holt Unlimited (Brunswick)... 6.98
- ☐ 5314—AQUARIUS, Charlie Byrd (Columbia)... 6.98
- ☐ 5315—MILES DAVIS' GREATEST HITS, (Columbia)... 6.98

SHOW AND CLASSICAL

- ☐ 6301—DR. ZHIVAGO, Original Sound Track (MGM)... 7.98
- ☐ 6306—CAMELOT, Original Sound Track (Warner Bros)... 6.98
- ☐ 6310—HAIR, Original Broadway Cast (RCA)... 7.98
- ☐ 6312—ROMEO & JULIETTE, Orig. Sound Track (Capitol)... 6.98
- ☐ 6313—MIDNIGHT COWBOY, Orig. Sound Track (United Artists) .6.98
- ☐ 7301—MY FAVORITE CHOPIN, Van Cliburn (RCA). ... 6.98
- ☐ 7303—GERSHWIN RHAPSODY IN BLUE, Lon. Fest. Orch. (Lon.) 6.98
- ☐ 7306—TCHAIKOVSKY: SWAN LAKE Fiedler & Boston Pops (RCA)..6.98
- ☐ 7311—SWITCHED ON BACH, (Columbia) ... 7.98
- ☐ 7313—2001: A SPACE ODYSSEY, Orig. Sound Track (MGM)... 6.98
- ☐ 7314—BERNSTEIN'S GREATEST HITS, Bernstein-N.Y. Phil. (Col.) 7.98

SEND NO MONEY • JUST MAIL

Stereo Tape Club of America
P.O. Box 2986 Clinton, Iowa 52732

Please enroll me as a member and send the FREE Stereomatic 8-track tape cartridge player checked below.

- ☐ **HOME SYSTEM** (speakers $24.95)
- ☐ **HOME PLUG-IN** (no speakers)
- ☐ **AUTO SYSTEM** (speakers $5.98)

Also send the 6 stereo tape cartridge albums I am buying now to start membership. (Select 6 from list, print numbers below.)

Bill me for these. I may pay in 3 monthly installments if I wish, including mailing and handling. If I am not 100% delighted, I may return player and cartridges in 10 days and my membership will be cancelled. I owe nothing.

Name_____ Age_____

Address_____

City_____ State_____ Zip_____

Auto make & year_____

Phone_____ Spouse Name_____

Bank_____ Branch_____

Credit Ref _____ Loc._____

Credit Ref._____ Loc._____

Charge albums above to my credit card.

☐ BankAmericard ☐ Master Charge ☐ Interbank

Acct. #_____ ☐ Diners Club

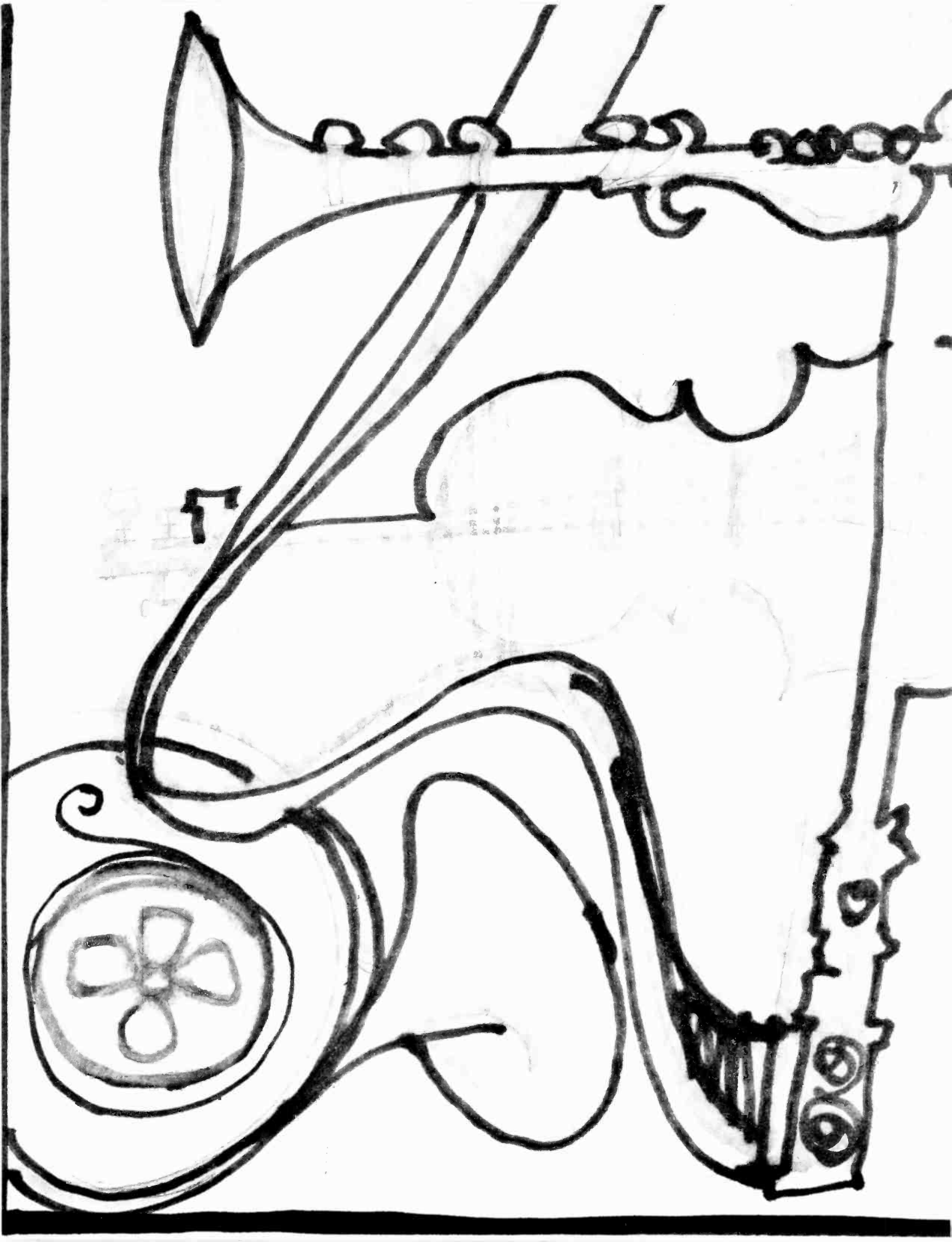
MY MAIN MUSICAL INTEREST IS (check one)

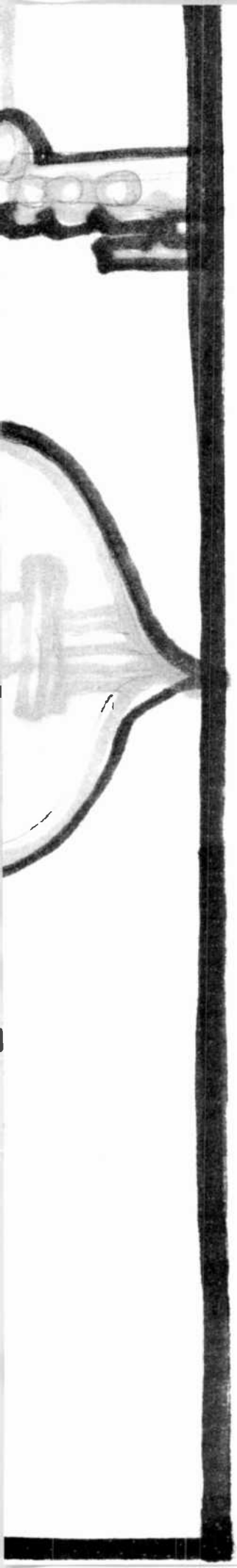
☐ Popular ☐ Rock & Folk ☐ Show & Classical

In addition to the 6 cartridges I am buying now to start my membership, I agree to purchase a cartridge a month during the coming year. (Albums you'll want to buy anyway; thousands to choose from.)

SIGNATURE (REQUIRED)

1—232—12— 12062





THE INSTRUMENTS OF THE ORCHESTRA

One of life's great pleasures is to relax in a comfortable chair to listen to a fine recording of a favorite piece of music played on a quality high fidelity system. The recording is so natural and lifelike, you can pick out the violins as they enter; admire the breathless, silvery quality of the flute; identify the plaintive call of the oboe; or follow the bass line of the melody as the double bass and contrabassoon pick it out.

Have you ever wondered, as you sat there, why some instruments sound different from others, even though they may be playing the same notes? Why it is that the symphony orchestra sounds sometimes like a single great instrument, at others like lovers flirting; and at still others like rush hour on the freeway? And above all, why 20th century musicians persist in playing music on instruments developed 200 years and more ago?

The urge to make music is strong in all of us; historians can't agree on whether the first intelligible grunts uttered by primitive man were words or an attempt at song. In any event, our prehistoric ancestors discovered that a tune could make you feel better when you had the blues; could scare the daylights out of an enemy if you shrieked it at him when he least expected it; could bridge the gap between himself and his gods; and, if tender enough, could put the baby to sleep.

Just how and when the first instruments came into being is lost in the dawn of pre-history. But musicians point out that man discovered that he could extend his arm by using a club; so he could extend his voice by using a plucked string to accompany it. By the time of the Greeks, man had found that if you stretched the skin of an animal tight across a frame and beat it, you got a pleasing sound. Or you could cut holes in a reed or cut reeds to different lengths and blow on them to produce a series of notes. You could stretch animal thongs or gut tightly, pluck it and produce a musical tone. Or, if you wanted to summon the troops to arms or the faithful to worship, you could sound a musical note on the hollowed-out horn of an animal.

These primitive instruments originated with nature and probably were discovered by accident; it took thousands of years for that plucked string to become the Grecian shepherd's lute, and nearly 2000 more to become the modern harp. If primitive man did all the work, it took the Greeks to create some order in music, and to lay the groundwork for the modern symphony orchestra. As recently as 500 B.C., most musicians played by themselves, rather than in groups. The reason was that while Orestes might be able to produce a very acceptable tune on his reed pipe, Agrippa, who played the lute, couldn't play along with him. The two instruments were out of tune with one another; frequently they couldn't even produce the same notes.

The man who decided to do something about it was Pythagoras, a Greek mathematician. Musicians had already discovered that if you brought all the instrumentalists together—men rattling jawbones, lutenists, whistles made with blades of grass, and so on—and had each play the notes of which he was capable, then tried to arrange them all in some kind of order, you wound up with an incredible range of tones, all slightly different. At this point, Pythagoras made an interesting discovery. He stretched a string tightly across two supports and plucked it. It produced a tone. Next, he cut the string exactly in half and plucked that. This time, the note sounded exactly the same as the first, only higher. By vibrating two-thirds of the original length, he got a rather pleasing chord. And, he discovered, by continuing this mathematical process, he could come up with seven more or less equal steps between any given note and the next highest note that sounded like it.

Pythagoras' followers labelled his discovery the octave (the basic note, six intermediate steps, and repetition of the basic note at the next higher level). The next step was to discard many of the arbitrary tones produced by the myriad of instruments then in use and introduce a series of half-steps which would permit the creation of music on a systematic basis.

For the first time, it was possible to measure the string in advance before tying it onto the lute frame to be sure that it would have the proper pitch. By organizing the musical scale, the Pythagoreans made it possible for musicians to play together.

But there's more to music than just notes. You don't have to be a professional musician to know that a high A played on the violin doesn't sound exactly like High A sounded on a trumpet. The harpsichord, bassoon, and electric guitar each have their own distinctive sound (or timbre, as the experts refer to it). The tonal color of an instrument results not only from the frequency at which it resonates when blown or plucked, but from the harmonics it sets up—frequencies two, three or ten times that of the original note. Because these harmonics interact differently with different instruments, the tones you can't hear as well as those you can help you to distinguish one instrument from another. An A with a frequency of 440 cycles, when played on a violin, may have a first harmonic at 880 cycles, a second at 1760, a third at 3520 and so on beyond the range of hearing. But the violin string resonates in sections as well as a whole. Intermediate harmonics of a fifth, a fourth, and so on also are created, each doubling to beyond the range of hearing. It's this combination of resonances that makes a violin sound like a violin.

When Pythagoras assembled all the instruments of his day to organize the scale, he discovered that if you sorted them all out on the basis of the way they produce sound, you can group virtually all the instruments under one of four headings. Some instruments create music when their strings vibrate. The strings, in turn, can be vibrated by plucking or stroking with a bow, and this group includes violins, the harp, the viola and others. There are the instruments which produce music when you bang them, such as the drum, the triangle or chimes, the xylophone and others. Or there are those metal instruments like the trumpet and tuba which produce sound when you blow into them. Finally, there are the descendants of the shepherd's pipes, instruments like the clarinet, oboe and bassoon, which contain a reed which vibrates to produce sound. Each of these groups, or families, contains members whose musical "voices" correspond to the human voice—high-pitched, moderately high, moderately low or deep bass.

THE STRINGS

The largest family in the symphony orchestra—in terms of sheer numbers—are the strings. In an average

orchestra today of 96 players, some 65, or about two-thirds, play stringed instruments. In the 30-man orchestras that Mozart conducted, the percentage of string players was even higher. In a typical orchestra, there are some 18 first violinists, 16 second violins, 12 violas, 10 violin-cellos, 10 double basses and one harp. The actual number varies from orchestra to orchestra, depending on the preferences of the conductor and the actual music being played. These might be referred to as the coloratura sopranos, mezzo-sopranos, contraltos, tenors, and basses respectively of the string family.

Why are there 34 violinists when there are only three trumpeters? The fact is that the strings produce a very small tone in comparison to the brass or percussion. In order to achieve the same level of sound, it's necessary to use large numbers of them playing together—and to put them prominently in front of the louder instruments.

The first and second violin sections usually sit to the left of the conductor. Although their instruments are identical, the second violins usually play one-third lower than first violinists. The player closest to the conductor (the violinist seated at the right end of the front row) is the leader; other string players take their cues from him regarding movement of the bow and other points of playing.

Four of the five members of the string family look very much alike and produce sound in exactly the same way. These consist of four strings, which produce the initial vibration; and oddly-shaped wooden box or belly, which resonates and amplifies it; a neck with pegs in it to loosen or tighten the strings; a bridge to hold them taut; and a tailpiece to which they're anchored firmly. The belly contains two f holes or scrolls from which the sound emerges.

As we've indicated, the strings can trace their ancestry back through the chest of viols, a collection of different-sized stringed instruments played with a bow which became common in the 1500s; through the lute of the Middle Ages and the Greeks to the primitive hunter who discovered that when he twanged the string on his hunting bow, it produced a pleasing sound. Actually, the violin, cello, viola and bass as we know them today are a relatively recent development.

Music in the early 1600s was changing from the somewhat plain melody of the Renaissance to the embroidered beauty of the baroque. Nowhere was this change in taste more evident than in England, where composers like Purcell, Dowland and Locke were producing music which made severe technical demands on the somewhat limited viols.

Italy, however, was equal to the demand. In the city of Cremona, such craftsmen as Antonio Stradivari and the Amati and Guarneri families began turning out violins, violas, cellos and basses in instruments which produced not only a wider range, but more delicate sounds than the viol. As the composers of the day discovered what could be done with these new instruments, the older viols, which ranged in size from something like the string bass down to a mini-violin, gradually disappeared.

The remarkable thing about the instruments made in Cremona is that while they've been imitated by violin-makers for the past 200 years, their superb sound has never been equalled. Accordingly, leading soloists and violinists in major symphony orchestras today play and prize an Amati, or a Stradivarius.

A string player can produce four notes simply by plucking the strings on his instrument (an effect called *pizzicato*) or by drawing a bow or horsehair across them. To play a scale or melody, he creates additional notes by pressing the strings down against the wooden neck with his fingers so that only a portion of the entire string vibrates. By varying the length of the vibrating portion, he can produce any note of the scale.

A skillful violinist can shade tones from soft to loud, from the schmaltz of a gypsy violin to the brittle harshness of a Stravinsky or Weill violin passage. More common is the lyrical, singing quality of a Schubert string quartet or a violin concerto by Brahms. The range of the violin is broad, roughly 3½ octaves, starting with the G below Middle C or 196.2 to 2354.4 cycles per second.

The viola, some three inches larger than the violin, has longer strings which in turn means lower tones. Because the viola is closer than any of the other stringed instruments to the original viols, it is considered the oldest member of the family. Tuned one-fifth lower than the violin, it produces a muffled, melancholy sound, much richer on its lower strings and often rather pinched and nasal on the higher notes. A full symphony orchestra uses about 12 violas.

There are even fewer violincellos (usually about ten). The cello differs from its higher-pitched relatives in that, because it's bigger, it rests on the floor while it's played, rather than tucked under the chin. Its tonal and dynamic range are the greatest in the string family (four octaves centered on middle C, or 65.4 to 1046.4 cycles). Its greater size and the length of its strings give the cello a lovely full-blooded tone throughout its range. The bottom strings are rich and fruity, while on its A string the instrument has a glorious singing quality which is unique in the orchestra.

Then there's the six-foot-high double bass, also known as contrabass or bass viol. Because of its height, players have to stand up to play it, or sit on a stool. Like the viola, it has changed little from the viols of the Renaissance. Until very recently, composers assigned the bass viol the task of playing the cello melody an octave lower. The result is a tone of great carrying power which furnishes support for the entire orchestra. It has been used for comic effects (in Saint Saens' *Carnival of the Animals*, for example) and as a percussion instrument, something like the kettle drum. There may be as many as ten in a full symphony orchestra, producing a tone which generally is gruff and thick.

The harp is famed not only for the beauty of its tone, but for its appeal to the eye as well. As we've noted, it is a direct descendant of the lute and can trace its ancestry back to Egyptian instruments of the 13th century B.C. The model familiar to today's

concertgoers, with its curved neck forming the top of a triangle, and soundboard next to the player, is largely the work of Sebastian Erard, an 18th century French instrument-maker. The Erard harp, complete with foot pedals, was introduced in 1810, and offers a range of 6½ octaves, from the G flat three octaves below Middle C. The harp usually plays the notes of a chord spread out; but isolated notes on the instrument can be equally effective. A thrilling effect occurs when the harpist runs her fingers (harpists frequently are women) across all the strings, to form a certain chord or scale, as Rimsky-Korsakov calls for in his *Capriccio Espagnol*.

THE WOODWINDS

Tucked into the symphony orchestra behind the strings are the woodwinds. In an average symphony orchestra, there are about 15 players—three each of flutes, oboes, clarinets and bassoons, and perhaps one each of piccolo, English horn, bass clarinet and double bassoon. As their numbers indicate, these instruments produce a somewhat louder sound than do the solo strings; and some composers tend to treat them more as soloists than as parts of a blended whole.

In the beginning, the woodwinds were all made of wood, or at least of reeds cut to a particular length. The earliest woodwinds are the shepherd's pipe, a single reed with holes cut along its length; and the pipes of Pan, a series of pipes of different lengths tied together. Instead of producing sound by vibrating a string, the player blew into the end of the pipe to set up a vibrating column of air (something like blowing across the top of a bottle to produce a musical note). The player could play the notes of a melody by varying the length of the vibrating column—either by blowing on pipes of different lengths, or by using his fingers to cover the holes cut in the single reed.

Later, instrument makers discovered that they could increase the volume of sound by adding a bell-shaped end to the pipe to act something like a megaphone. And some discovered that you could produce a more flexible instrument with greater subtleties of tone by inserting one or two reeds into the mouthpiece and letting *them* vibrate. One of the earliest of these was the bagpipe which appeared first not in Scotland nor in Ireland, but in Central Europe from a very early period. By the time of the Middle Ages, there were several instruments—among them the shawm and bombard—which used two reeds vibrating in a single mouthpiece, much as the oboe and English horn do today.

If you look closely at the woodwinds in a modern symphony orchestra, you'll see that not all of the instruments are made of wood. In fact, the piccolo and flute, the two which bear the closest resemblance to the shepherd's pipe, are made of an alloy of silver. The two-foot-long flute has a three-octave range, starting with Middle C (or 261.6 to 1046.4 cycles); while the piccolo, about half its size, plays one octave

higher. Both offer a real challenge to your high fidelity music system. Can it reproduce their high, pure white (or neutral sounding) tones naturally, from the breathy bottom through their silvery midrange, to the shrill, piercing top notes?

The flute and piccolo don't use vibrating reeds. Instead of blowing into the end, as the shepherd did and as players of other woodwind instruments do, the flute and piccolo players blow across a mouthpiece on the side of the tube, near one end. They hold their instruments to the right as they play, instead of straight in front of them. Probably nobody did more to popularize the flute than King Frederick the Great of Prussia. Not only was the king a lover of music who commissioned works for the flute by such composers as Bach and Quantz; but he was a composer and performer as well, spending hours playing duets and chamber works on the flute.

As if to make up for the absence of reeds in the piccolo and flute, there are two each in the oboe, English horn and bassoon. As we've seen, these double-reed instruments evolved from the shawms and bombards, which in turn probably came to Western Europe with the Crusaders when they returned from the Near East. Their tone wasn't particularly pleasant, so they were relegated to military bands. Toward the end of the 17th century, these large, harsh-sounding instruments gave way to the more pleasing double-reed instruments we know today.

The soprano voice of the family is the oboe, sometimes referred to jokingly by musicians as "the ill wind that nobody blows good." Double-reed instruments in general, and oboes in particular, are considered difficult instruments to play. Unlike all other brass and wind instrument players, the double-reed player has to force his breath through a narrow opening between the reeds—with the result that he usually has breath left over at the end of a composition. The oboe usually is the first instrument you hear at a concert, because the A which the first oboeist plays before a concert begins is used by the other musicians to tune their instruments. Its mournful, almost mystical cry betrays its Eastern origins; composers often use it for pastoral or eerie effects.

Playing roughly five notes below the oboe is the English horn which, technically, is neither a horn nor English. Like the oboe, it evolved from the older double-reed instruments, and benefited from improvements in keys and fingering by the German flutist Theobald Boehm in the 19th century. The tube of the English horn is wider and longer than the oboe, and ends in a pear-shaped bell. Its penetrating tone is akin to the oboe's, but is richer and deeper and more sombre. The Romantic composers—Brahms, Tchaikovsky, Richard Strauss—loved to use it for mournful passages. Perhaps the best example is the slow movement of Cesar Franck's *Symphony in d.*

The baritones and basses of the woodwind family are the bassoon and contrabassoon, which produce thick, weighty bass tones and complaining, reedy ones in the upper registers. The contrabassoon is capable of some of the lowest tones in the orchestra—down to 30 cycles and with a range up to about F above Middle C (about 700 cycles). The parent instrument plays an octave higher. Both bassoons, like giant snakes, are bent double, towering over the heads of the players. The larger model, in fact, if straightened out, would measure 16 feet in length. The tone is inclined to be thin and querulous, a quality which has led some composers to use them for humorous effect.

Finally, there are two single-reed members of the woodwind family—the clarinet, and its big brother, the bass clarinet. Actually, an orchestral clarinet player may bring two instruments to a concert with him. One is pitched in A, the other in B flat. The clarinetist may switch from one to the other depending on the key of the work (or musical passage) he's playing. Although either instrument is capable of playing any melody, it's easier to finger certain scales on one than on the other. The clarinet's first champion was the Czech composer Johann Stamitz, who, during the 1760s, began composing and conducting works for three and sometimes four clarinets, in the orchestra he conducted at Mannheim. Mozart heard the Mannheim orchestra twice—in 1763 and later in 1777—and the unusual tonal combinations Stamitz had created with clarinets and the other woodwinds deeply impressed him. Not only did Mozart begin writing orchestral parts for the clarinet, he wrote some of the first concertos featuring the clarinet as a solo instrument.

It has a range of three octaves, starting one octave below Middle C, with the bass clarinet sounding one octave below it. The instrument possesses a beautiful liquid tone, clear and powerful in the high register, relaxed in the middle, cool and almost spectral in its lower reaches. It has a remarkably wide range from low to high, and from soft to loud.

Continued next month

If you were born after 1947,

you're in luck.

If you're under 22, you can join the TWA 50/50 Club.

Which means that every time you fly with us in the U.S.A., you get 50% off.

If we don't fly where you want to go (and we fly to 39 cities around the country), just take another airline. You can still use our 50/50 Club Card.

You can also use it for hotel and ski discounts, and for details on those discounts, you get our Semi-Annual Newsletter.

All of which means our 50/50 Club Card can save you loads of money. Which isn't bad for a $3.00 card.

Just mail in your application with all the correct information, and don't worry about it.

Your application won't be rejected.

TWA

Our people make you happy.
We make them happy.

TWA 50/50 CLUB

IDENTIFICATION CARD APPLICATION

FOR AGES 12 thru 21

Please Print

1. Name _____

2. Address _____

City _____ State _____ Zip Code _____

3. Male ☐ Female ☐ 4. Hair Color _____ 5. Eye Color _____

6. Date of Birth _____
Month Day Year

7. Fee enclosed: $3.00 Check ☐ $3.00 Money Order ☐

Make checks payable to: TWA
(Not refundable — DO NOT MAIL CASH)

8. Signature _____

Mail to: Trans World Airlines
P.O. Box 2952
Clinton, Iowa 52732

1-067-9- 12062

TRAVEL RESTRICTED ON CERTAIN HOLIDAY PERIODS

SO YOU WANT TO BE A WRITER

by Jane Gordon

Anyone who finds it hard to write a simple letter is invariably awed by the person who, at the drop of a well-sharpened pencil, can dash off several thousand words a day every day of the year. Two of the people who do, and make a good living at it, are the writing team of Elsie Lee and Michael Sheridan. Rain or shine, in fitness or fatigue, they turn out close to a million words a year—and more than half the work is done with a tape recorder!

In one year alone, this happy and prolific couple sold 76 articles, 5 short stories, one 4-part serial and innumerable foreign reprints . . . and three-quarters of the articles were based on recorded interviews with celebrities or experts in various fields!

How do they do it? When I called on Lee and Sheridan in their charming Hollywood apartment, I found out: four typewriters, three tape recorders, a reference library of 500 books and 14 file drawers add up to "organization."

Of all the 14 file drawers, however, the most used are two which contain a verbatim transcript of every tape recorded interview Lee and Sheridan have ever made. They frankly admit that some of this material has been sold and sold, over and over again.

"For instance, take our file on Art Linkletter. We've sold some 39 articles under his by-line in the past six years," says Michael Sheridan, "but all it has come from only five taped interviews! Of course, Art is among the exceptionally articulate people. One interview with him gives a writer all the material for the assignment in hand, plus enough for two or three others complete, as well as the springboard for one or two future articles! Thus, if the writer is efficient, he can double his income by combining and recombining to sell both in America and in foreign countries . . . *but* he must get every word, and the only way to do this is with a tape recorder."

"Although Elsie Lee takes shorthand and I could concentrate on the questions while she made notes, we never got the sort of interview material to satisfy a top editor," Michael Sheridan explains.

"Then we bought our first tape recorder—we had to borrow the money, but the very first article we got from that recorder paid for the machine," he adds. "Furthermore, when editors heard we used a tape recorder for interviews, we immediately began to

move into the top-paying markets!"

A smart leather attache case stands ready-packed and set to go, contains: 2 cleared long-play tape reels, an empty take-up reel, heavy duty extension cord, recorder cables, mending tape and a press book of representative major published articles (to impress diffident personalities). At a moment's notice, either partner can add the interview questionnaire and depart in a hurry to catch a personality like Jerry Wald, producer of "Peyton Place," who suddenly finds he can fit an interview into his busy schedule.

What's the technique of using a tape recorder for writing? Lee and Sheridan agree that it changes the entire course of your work! "We used to do pieces like '200 Ways to Use Wax in Your Home' and 'Snails Make *Lovely* Pets'," Elsie Lee remakrs with a wicked grin, "and in a way, we still do—because if you're a writer, you're always getting ideas and the only way to get rid of them is to write them out of your system. But with a recorder, you do them differently, and often they turn into a major piece that pays you a major price.

"For instance: I have to balance the check book . . . because I once worked at Price, Waterhouse. The fact that I was a librarian and not an accountant makes no difference," she explains sadly. "Michael can talk faster than I can, and I'm stuck with the finances . . . Of course, you've realized I'm also Mrs. Sheridan? And I get all the chores of any other wife!

"Every time I balance our books, I think 'There must be an easier way to do this!' I could write an article on my experience and perhaps sell it as a filler for $75—but now, we'll take our tape recorder, talk to a bank manager (the one who has to struggle with me when I can't find that dime he says I've spent) and turn it into a major piece that will bring us $500."

Aside from turning minor ideas into major pieces, the biggest advantage of a recorder lies in *accuracy*. "It's not merely that you get every single word. You also get the tone of voice, which may easily tell you that a 'no' really means a 'yes.' You get the individual speech pattern of the personality, which makes the final article sound as though they wrote it. Most of all," the writers agree, "you get *twice as much* from the interview!"

Use of a recorder may frighten a personality at first, but with a little sales talk, always ends by producing a completely natural (often much more off-the-record) interview. "We tell the person that no one will hear the tape because Elsie Lee does all transcription personally. At any moment, we'll turn off the recorder to go back and erase a sentence they've reconsidered. And of course, all by-line articles *must* be approved before being sent to the editors, which means the 'author' can put a red line through any word, sentence, or paragraph he wants to change."

Best of all, a tape recorder gets everything in half the time—a major asset which opens doors to even the busiest and most important personalities.

I asked Michael Sheridan, "Which personality has impressed you most out of the hundreds you've interviewed?"

"Eleanor Roosevelt!" he said without hesitation. "Never mind politics—they can't change the fact that she's a very great *lady*, with all that the word implies . . . and I wish we met more of them! She has the most charm of any woman we've ever interviewed—the greatest combination of every inner and outer quality you could imagine! Her voice is a joy to listen to, record and preserve. Usually we wipe off immediately after transcription, but we kept that reel for almost a year—for the sheer pleasure of her voice."

Lee/Sheridan use their recorder for casual duty, take it along as a matter of course to all the previews, cocktail parties and show business shindigs to which they're asked as members of the press. For "symposium' work they find it invaluable.

At this point, I felt very impressed. Obviously a tape recorder . . . or perhaps a whole battery of tape recorders . . . made the life of a writer one long sweet song. Elsie Lee and Michael Sheridan looked at each other covertly and grinned.

"Things do go wrong," they admitted. Once after a two-hour interview with Joan Caulfield for an assignment article, Michael ran into an old friend as he was leaving the hotel. Knowing he had an unused reel in the machine, he seized the opportunity for an interview with Jack Entratter, operator of the Sands

Hotel in Las Vegas. Over six cups of coffee in Entratter's suite, Michael recorded a full reel of anecdotes and data, on the change he could sell it to one of the men's magazines—but you've guessed it! When Elsie started to transcribe, she had a reel of Jack Entratter, and an empty reel.

In his pleasurable excitement at catching a friend, Michael had recorded Entratter on the Caulfield reel—wiping off the assigned material with a speculative piece which, to this day, Lee/Sheridan has never sold anywhere!

Machines also go sour mechanically and when least expected. Today, the writers check their machine by a test recording before *every* interview . . . because once their machine failed to record an entire afternoon with Imogene Coca.

Most amusing incident, however, resulted from the original small-reel unit. "We spent about 4 hours recording Tallulah Bankhead, who was a very old friend of Michael's," says Elsie Lee. "Needless to say, it was the most off-the-record interview we've ever had with anyone. We ended with six 5-inch reels completely full of Tallulah for an assigned article on her friend Bea Lillie, but also containing comments and divagations in Tallulah's unforgetable deep voice—and since she was talking to Michael, they were, if possible, even more frank comments than usual!

"We'd assured her the reels would be erased after transcription, so she could say *anything* and only I would hear it. And she certainly said *everything!* It took me a full day to transcribe," says Elsie Lee, "after which I erased the reels and put them away. Unfortunately the machine was in need of an overhaul.

"We got Tallulah onto the reels, but damned if we could get her off! At first, we told each other accusingly 'You didn't set the record button'—and we ran all the reels through again, but although diminished, she was still with us. Then we took the machine to the repair shop. When it came back, we ran the reels through again. At least," says Michael Sheridan, "we thought we did . . . but for the rest of that winter, every time we'd check a few feet of tape during an interview with someone else, we were likely to get a throaty 'DAHLINGS!' from Tallulah when least expected!"

A tape recorder, both writers agree, leads to innumerable charming adventures. One was a fast limosine trip from Hampshire House to LaGuardia Airport with Bob Hope. With 28 minutes to make his plane, Lee/Sheridan had about 25 minutes to record him for a major piece.

"That was four years ago, and we hadn't a battery recorder," they recall, "so we rented one from a New York dealer. We showed up at Hampshire House with heads erect and tails over the dashboard, ready to go—and go we certainly did! Michael asked the questions while Elsie recharged the machine as unobtrusively as possible. There was only one interruption . . . when the limousine stopped in traffic and Bob spotted Victor Borge coming out of a newsstand.

"Hope leaned forward to hail Borge, but the limousine moved on and he settled back with his famous pixy grin. "Well, at least, *now* I know where he buys those foul cigars!' he remarked, and went on with the interview."

"My Friend Bing" later appeared in *Family Circle*, sold to editors in England, Australie, South Africa and Scandinavia. Out of 25 minutes, Lee and Sheridan reaped nearly $2000.

What's the difference between "a by-line article," and plain garden-variety ghost-writing? "A great deal," says Michael Sheridan.

The ghost-writer simply writes a piece—any subject, length or writing style. Then he gets someone avid enough for publicity to put his name to it. The result doesn't necessarily represent the personality's views, style of thought or speech, nor any field on which he's qualified to talk for publication.

The by-line article, however, represents all these things, and a tape recorder is very nearly essential. "Take the articles we've done with Andre Kostelanetz," they say. "Obviously, he can talk about music, but music has many phases. With a recorder, we've taped him on getting your child to practice, therapeutic uses of music, incidents in his round-the-world recording trip. From the transcripts, we've sold Andre Kostelanetz to four major magagines . . . in his own words, and on subjects he's qualified to discuss . . . including a short by-product piece on travel tips for the layman!"

Many of the personalities these writers interview are highly literate people who could write their own articles. Why do they use Lee and Sheridan? "Because they're too busy to sit at a desk and put down their thoughts . . . because they don't know which magazine will be interest in what subject . . . because they haven't technical knowhow to organize a manuscript, and because," Michael Sheridan explains, "you'd be surprised how often they don't know they have anything worthwhile to say!"

Lee/Sheridan think they are really middle-editors . . . that is, they find the outlet for the article, ask questions that will produce the pertinent information, and shape the article to please the magazines

who will buy. For this, they get the money paid by the magazine. The personality gets the credit for a good article, but deserves it because it really represents his thoughts and information.

For the neophyte, here are some tips from expers Lee/Sheridan:

1. Don't make the personality conscious of the recorder. Set it up beforehand, if possible. Keep the machine out of sight—on the floor at the edge of couch or office desk, with only the microphone in view.

2. If you must set up in the presence of the personality, do not allow yourself to be nervous! Elsie Lee usually sets up, while Michael Sheridan engages the personality in soothing conversation. She also tries unobtrusively to record a few senstences and check them back with her earphone to get the proper volume level.

3. Use a set-microphone, on table or floor-stand. If you're tying up the personality's mind, don't tie up his hands . . . and don't think the wand-mike used on TV shows is romantic! *Your* hands should be free, also—to create a sense of leisure and intimacy by lying quiet in your lap, lighting a cigarette or sipping the cup of coffee. If your hands are free, the interviewee will quickly forget the machine completely.

4. Always prepare a complete questionnaire beforehand—for three reasons:

(a) your preparation for the interview shows the personality the session was important enough for you to spend time on it. He gains confidence in your, feels his time will not be wasted, puts him on his toes mentally to provide top-notch answers rather than a few words off the top of his head.

(b) For your sake, the prepared questionnaire prevents your forgetting to ask a vital question. It also allows you to ask other questions that will provide contributions to symposiums (if you do this sort of work) or anecdotes which may be expanded and sold as shorties. The answers to extraneous questions may give you good leads for other subjects on which the personality can talk authoritatively in future articles. Most of all, you can get answers to "tough" questions essential to the article in hand.

For example, Lee/Sheridan use basic questions for every interview, no matter what the subject: "Your most amusing experience . . . your most embarassing experience . . . the Christmas you remember best . . . did you enjoy going to school, and what was your best subject?" and *then*: "Just why did your wife leave you?" Nine times out of ten, they get the simple correct answer.

(c) For many articles, the carefully designed questionnaire will write the finished piece! Take the time to make your questions provide the opening, the middle and the sock-ending. This takes knowledge of article writing, and fails if the personality is tongue-tied with nervousness—but it's worth trying for every interview. *When* it works, you'll literally make $1000 for about 8 hours of work.

More than anything else, a tape recorder will teach you to be a good interviewer, says Elsie Lee. You'll learn to *shut up!*

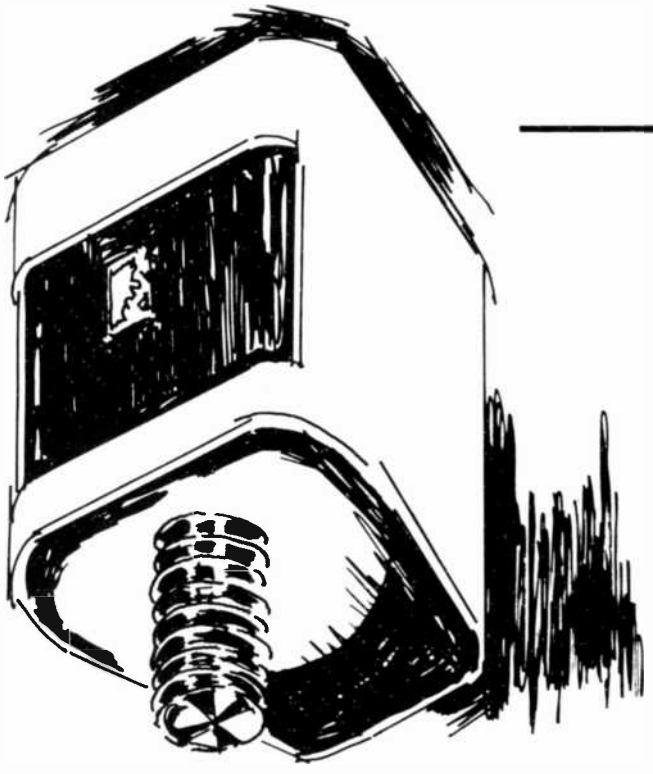
"Our success (if you can call it that) is due half to the tape recorder and half to planned diversification," says Elsie Lee seriously. "We save time with a recorder, but we've deliberately never allowed ourselves to be typed." Elsie Lee is basically a fiction writer whose short stories have appeared in *Ladies' Home Journal, Today's Woman, Woman's Home Companion* and innumerable magazines here and in Canada and abroad. Michael Sheridan has written books and plays, directed and produced motion pictures and BBC programs in England. Elsie Lee has written TV stories and both have done paperback books.

In the months of August-September 1958, Lee/Sheridan were on the stands in 8 magazines, ranging from one of Gourmet's rare short stories to a highly technical article on astrophotography. Simultaneously, I discovered, they were responsible for *Why People Are Funny* by Art Linkletter, and *Astronomy for Everybody*, both issued by Trend Books and both done completely with tape recorder! Already delivered for October publication is "How To Polish Rocks and Gems" by Michael Sheridan, much of which was taped at the Mineral Show in San Bernardino.

"The book we most enjoyed doing," says Michael Sheridan, "was Robins' 'More Fun With Your Tape Recorder.' If you want the truth: Elsie didn't know anything about astronomy and I didn't know anything about rocks, and these books were only possible by tape recording information from experts . . . but the book on tape recorders is something we know, understand and would die without. We're hoping millions of people will find it helpful, so we can add to our equipment."

"*More* equipment?" I asked blankly, and I must have looked very startled because they both laughed.

"Yes," said Michael Sheridan. "Elsie's waiting for that new IBM machine where you'll just put your tape in a slot and the typewriter will transcribe for you. She thinks that may give us time enough for a trip around the world . . . without a tape recorder!"



by Charles G. Westcott

WHAT YOU CAN DO ABOUT MAGNETIC HEAD WEAR

The magnetic recording head of your tape machine is built to an almost fantastic tolerance. The utmost in skill and precision has gone into its construction. Today's magnetic recording head is built to a tolerance as close as ten-thousands of an inch. The magnetic head is, in fact, the most critical and precision device in the tape recorder.

Magnetic heads not only determine the frequency response, both low and high, but also help establish signal-to-noise ratio. In magnetic head construction the pole pieces must be long enough to reproduce low frequencies and the gap sufficiently short to reproduce high frequencies.

In playback, the high frequencies on the tape are generally limited in reproduction by the length of the gap. As the recorded wave lengths on the tape approach the physical size of the head gap, the signal becomes greatly attenuated. Therefore, to properly reproduce a signal of 7,500 cps at 7½ ips, the recording gap must not be any larger than 5 ten-thousands of an inch or the signal will be greatly reduced.

It is not uncommon for home-type recorders, as well as professional units, to go up to 15,000 cycles at 7½ ips. This means that the gap length must not be longer than 2.5 ten-thousandths of an inch long.

Yet, paradoxically, despite the marvel of precision engineering that the magnetic head is, little or not attention is paid to it by most recorder owners. Month after month recordings of the highest quality are obtained without the slightest regard being given to head maintenance. Of all the systems of recording and reproducing sound now in use, magnetic tape is unquestionably the least difficult to maintain.

Amazingly, this is a real disadvantage. Owners of home tape recorders and technicians in professional studios alike tend to become careless in head maintenance. All too often, not the slightest thought is given to proper head care. Yet, when trouble starts, it is generally too late. The damage is irreparable and the worn head must be replaced.

Many misconceptions surround the problem of head wear. It is generally felt that head wear is due to the fact that the iron oxide particles coated on the tape backing are extremely hard and mu-metal, of which recorder heads are constructed, is, by contrast, relatively soft. The slipping friction of the tape coating against the soft mu-metal head may, at first glance, appear to be abrasive. The iron oxide coating of the tape is, in fact, more than two times as hard as mu-metal. However, the contact of the hard tape against the soft head is analogous to the action of a bearing.

In bearing construction, the shaft is hard and the bearing material itself is soft. The shaft rotating within the bearing runs smooth and free. It is the dirt that works into the bearing that causes wear, necessitating replacement. A fundamental law of physics, this is just as true for recorder head wear. It is the dirt that collects on the tape which scours and abrades the head, not the iron oxide tape coating.

To prevent head wear, guides, capstans, pressure rollers and, of course, the heads of the recorder must be kept clean and free from contamination. As tape passes through the machine, minute quantities of dirt, grease, dust, as well as magnetic oxide and binder, are rubbed off the tape and deposited on the heads and guides of the recorder.

These extraneous deposits have immediate adverse effects, although the magnitude of the effect may not become large enough to be serious for some time. Although gradual, there is an inevitable loss whenever a recording is made or reproduced.

The accumulation of fine dust and binding materials gradually causes losses in high frequency response due to poor tape and head conformity. Intimate head contact is essential in attaining high frequency response. The thinnest deposit is sufficient to cause a measurable high frequency loss. Long-time accumulation of contaminating matter on the head can ultimately result in complete loss of high frequency signal. Changes in level independent of frequency can also occur when severe buildups have been allowed to accumulate.

All magnetic tapes transfer small amounts of coating and backing dust to the machine. Most of this accumulation comes from the slit edge of the tape and has a definite resinous nature. This gives the "dust" a tacky nature, assuring its adhesion to the exposed parts of the recorder. Moreover, the dust, like a fine rouge abrasive, gradually wears away the laminated metal of the head.

Carbon tetrachloride has been commonly used as a solvent in the past to remove these accumulations. While carbon tetrachloride is satisfactory in removing

grease and oil deposited on the capstan and pressure roller (which introduce wow and flutter into the recording system) it is dangerous to use this fluid as a cleaning solvent on head assemblies.

In the construction of most magnetic heads, thin laminations are stamped to give the desired gap profile and core structure. The laminations are then stacked and cemented together to form a magnetic head. In other constructions, a single lamination is butted and cemented against the end of another lamination to form a gap. The resin used to cement these laminations and encapsulate many head assemblies is dissolved by carbon tetrachloride. Carbon tetrachloride also corrodes the mu-metal head surface.

The common alcohols (wood, isopropyl, etc.) are completely useless. They are poor solvents, having no action at all on any binder or resinous component that might be present.

Long recognizing this problem, recorder manufacturers in maintenance guides have warned against the excessive use of carbon tetrachloride: "use sparingly when cleaning heads, slightly moistening only a pipe cleaner or the tip of a soft cloth."

Until recent months there has been no alternative other than to expose precision heads to the hazards of using carbon tetrachloride. The problem of safely keeping heads and guides clean has been solved by a special solvent combination, recently marketed, ideally suited for this purpose. Called "Long Life Cleaner," this product is a blend of several solvents, each chosen for its specific action on one or another of the contaminants commonly deposited on tape machines.

This cleaner can be used with no fear of damage to any recording head now on the market, and is absolutely harmless to machine parts. Continued use, once or twice a week, will prevent harmful, long-term accumulations.

As we have seen in the case of a shaft and bearing, abrasive wear is caused primarily by dirt and grime. However, in any bearing, to prevent wear, a lubricant must also be present. With the introduction of lubricated magnetic tape, head wear has been definitely reduced.

In the construction of magnetic tape, a silicone lubricant is actually impregnated throughout the tape. Lying in the spaces between the oxide particles and the resin, the silicone continually re-lubricates the tape surface. The lubricant will generally last the life of the tape.

However, head wear is most effectively reduced if the head itself is also protected by a lubricant. Known as a synergistic action, a silicone lubricant coated on the head "works together" with the silicone lubricant in the tape to produce the lowest possible friction. This means that the combination of silicone in both places is more effective as a lubricant than would be expected from the action of the silicone on either head or tape alone.

Now, also available to the recordist is "Long Life Lubricant." When this lubricant is applied to the guides and heads of the machine, the solvent flashes off. Left behind is a deposit of an extremely thin layer of silicone, having no effect on the frequency response. The layer is so thin that its presence is virtually unmeasurable.

However, the elimination of excessive friction has other positive advantages to the recorder owner besides reduced head wear. The silicone lubricant, in addition, eliminates squeal caused by the intermittent sticking and seizing of magnetic tape to the head, a feature vitally important in high temperature and humidities. Even though the tape does not squeal audibly, tape modulation often indroduces distortion products into the recording, particularly in the middle and higher frequencies.

Here is still another preventive maintenance tip: Never use any type of transparent cellophane tape for splicing magnetic tape. All major magnetic tape manufacturers offer specially designed splicing tapes containing thermosetting adhesive. This type adhesive resists oozing and will not gum up the recording head and tape guides.

However, splices made with even the best splicing tape in time becomes sticky, and small particles of the adhesive spread from the splice to the surrounding layers of tape. This causes unevenness during recording and dropouts in the sound at the point of contamination. Here again, a silicone lubricant can be used to clean away the sticky area and return the tape to its original condition. The silicone lubricant completely neutralizes any adhesive not removed by the solvent, remaining on the tape as a safeguard against tackiness.

As we have already seen, intimate head contact with magnetic tape is essential in attaining high frequency response. Professional recorders use a high

tape back tension that figuratively stretches the tape across the head, holding it constant by tension.

In most home machines very little, if any, back tension is applied. Pressure pads are used to hold the tape against the head. The pressure pad is generally a good device to assure intimate tape contact with the head. However, incorrect and unevenly distributed pressure against the pads tends to wear the head somewhat unevenly, developing pits and craters. This will eventually lead to poor tape conformity to the head and loss of high frequencies. Pitting is caused primarily by worn pressure pads. It is important to check pressure pads at frequent intervals for wearing or unevenness. Keep extra pressure pads on hand for occasional replacement.

When the heads are once worn, the frequency of any recorder will suffer drastically. There is no alternative but to replace the head. Generally, this necessitates the replacement of the entire head and coil assembly. (In a butted lamination head, however, the worn pole pieces can be removed and a new gap inserted without the purchase of an entire new head. This is, however, generally a factory replacement job.)

There is not a sound enthusiast that breathes who is not eager to "soup" up the performance of his recorder. "Why not," he might reason, "increase the frequency response of my recorder by a new and better head? After all, a new head represents a fairly modest investment. Didn't you say earlier that it was the head that helped establish frequency response and the signal-to-noise ratio?"

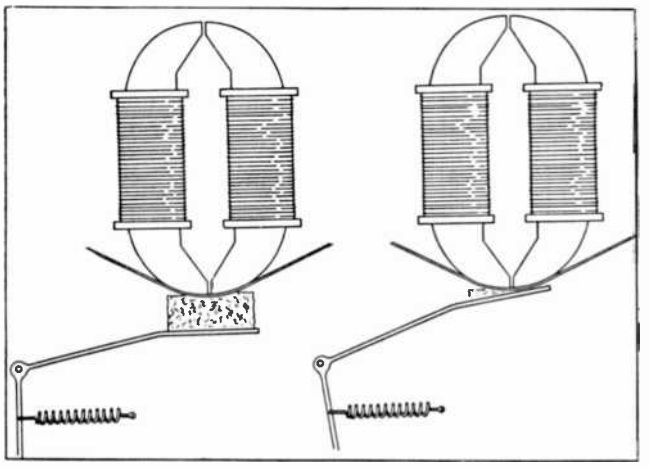
Regretably, however, there is no simple and easy answer. Whether or not a worn head can be replaced by an improved and more expensive head produced by another manufacturer or a different type of head produced by the same manufacturer depends in large measure upon the recorder itself.

Each type of recorder head demands a different amount of bias for maximum performance. In the recorder factory, during manufacture, the bias is either adjusted or permanently set to fall within a region of proper operation when used with a certain type of head.

If a recorder has an adjustable bias, when replacing a head, the bias should be always readjusted to give optimum performance. It is vital that the necessary time be taken to be sure the bias be properly adjusted. If the bias is too low, serious distortion will result. If it is too high, the high frequencies will be lost.

Heads also vary as to the amount of equalization necessary, especially at high frequencies. Consequently, not only the bias but also the equalization will need readjustment if changing heads to another manufacturer. Sometimes an adjustment or compensation in the circuitry is also necessary.

In general, here is a fairly simple rule to follow



Above is typical record head. Note narrow gap. At right is same head when badly worn. Note that constant wear and abrasion has worn away the narrow gap, destroying high frequency response and increasing signal-to-noise ratio.

when considering switching to a different type of head: Do not change heads to another manufacturer or change to a different type of head produced by the same manufacturer unless you are prepared to adjust both the bias and the equalization of your recorder. On most home-type recorders, the head can be replaced with the head of the same manufacturer without difficulty.

Caution should be exercised by the uninitiated before attempting to adjust bias and equalization or alter the circuitry of the recorder. If a service repair shop is used, convince yourself the technician in charge is thoroughly acquainted with the operation of your recorder.

Dynamu Magnatronics Corporation, a division of the Maico Company, furnishes a complete head-replacement kit for most makes and types of recorders containing complete instructions for adjusting the bias. The instructions are clear and simple and, if followed, no difficulty should be encountered in making a bias change.

Most present day recorders are excellent mechanisms. It is possible that the results you seek can be achieved by an external speaker system or even a more expensive, professional-type machine as opposed to switching to a different type head.

One additional precaution must also be observed in changing heads: Be certain that the head is properly aligned in respect to azimuth. If the head is in correct azimuth alignment, the gap in the head is exactly perpendicular to the tape. This means that tapes recorded on one machine will reproduce properly when played on another.

Of course, when the same head is used for both record and playback, the azimuth can be out of perpendicular alignment and the tape can still be reproduced satisfactorily since both heads will have the same angle. However, few recordists would be content only to play back on their machines tapes they recorded themselves. This is, in effect, closing the door to the increasing number of exciting recorded tapes now commercially available. For interchangeability of tapes, the azimuth must be correctly set.

Azimuth alignment tapes can be obtained from the L.S. Toogood Company, Audio Devices, the Dubbings Company and others. These tapes have a high frequency signal at a short wave length recorded on the tape at a very precise 90-degree angle from the edge.

When adjusting an alignment tape on a machine, the normal procedure is to play the tape, then to adjust the reproduce head for maximum output. Care should be taken to reach the point of maximum output, since a lesser peak will occur on each side of the maximum output position. Simply connect an A-C voltmeter or volume indicator meter to the output or approximate by ear.

If a separate record head is used, it can be adjusted by recording a high frequency tone of approximately 3/4 mil wave length. At 3 3/4 ips, 5 kc is required and at 7 1/2 ips, 10 kc will produce a 3/4 mil wave length. A sine-wave oscillator should be used.

Since the playback head has been set to an accurate azimuth, the tape should be played back while recording, adjusting the record head until maximum output has been obtained.

A simpler method—effective, although less accurate—is to record music with as many highs as possible. Feed the recorded tape, playing from one machine into the phonoplug, recording and playing back the music simultaneously. Both machines must, of course, be run at the same speed. By adjusting the record head, it is possible to set it at a fairly accurate azimuth by the judgment of one's ear.

It is also important that the erase head be in correct alignment. Many cases of alleged "print through" or signal transfer have, in reality, been traced to an erase head which was improperly aligned. The adjustment of the erase head is not critical. Simply be certain by visual inspection and testing that the erase head is in the right track position.

When adjusting the head alignment, also check the tape guides. The tape must be guided across the head in a perfectly straight manner. Close tolerances must be maintained so the tape will follow the same path on each playback. Poorly guided tapes tend to weave back and forth across the head. The head is likely to be thrown out of alignment, reducing high frequencies or causing severe amplitude variation.

If proper maintenance is followed, most heads will assure thousands of hours of trouble-free performance.

(Ed. note: The head cleaner and lubricant mentioned can be obtained from recorder dealers or from EMC Recordings Co., 806 E. 7th Street, St. Paul 6, Minn.)

WHAT'S A DB?

In order to be able to measure something, you must have something to measure it with. Some of the standards of measurement in use today have had fantastic beginnings. For instance, our familiar foot was based on the length of the average human foot in the dim and distant past and, in various countries where it was in use. it varied between 11 and 14 inches.

The pound suffered similarly. Some "pounds" weighed as much as three times other "pounds" so that no one knew just what he was ordering or getting. Even today we have two different kinds of gallons on this continent. The United States uses one, and Canada the other, the Canadian being the larger of the two.

Whereas a foot is used to measure length and a pound is used to measure weight, the "db" is used as a universal unit to measure a number of electronic things.

You will find such terms as *dbv*, and *dba*. Most of the confusion we can get rid of by sticking to the *dbm* of the sound engineer which is known most commonly as the plain db of the tape recorder and microphone specs. We will restrict its application to audio and while our definitions will not be 100% correct they will prove understandable and workable in more than 90% of the cases.

The db is an abbreviation of the word "decibel" and its history is just as odd as the foot or pound. Like Topsy—it just grew.

Back in the early days of telephony and early radio transmission of programs over telephone lines, the engineers had a unit which they called "miles of loss" which was based on the transmission loss of a signal which traveled over two miles (one going and one returning) of No. 19 wire. Later a logarithmic term called the "Transmission Unit" was used. Still later this became the "bel" in honor of the inventor of the telephone but it proved too large a unit for ordinary measurements so it was changed to the "decibel" or 1/10 of a bel.

What we will use here is the dbm which is the power ratio based on one milliwatt (the *m* in the dbm) of power which represents zero decibels when it originates and terminates in a 600 ohm load. This is the usual audio impedance found in recorders, transmission lines, etc. The word impedance is just a word that is used instead of resistance because you are dealing with alternating currents.

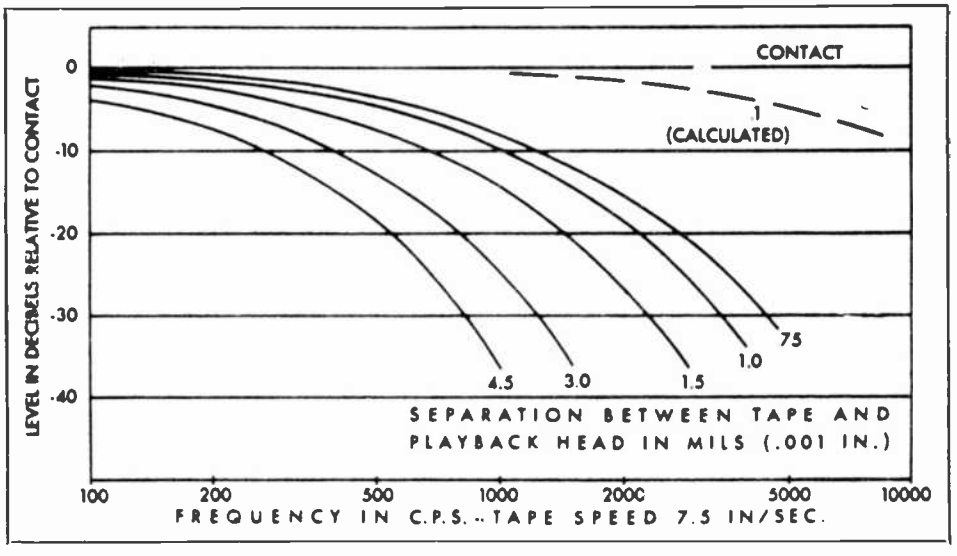
This still sounds like a really complicated and unusable term for anyone but an audio engineer—it really isn't though.

Let's leave the db for a moment and turn our attention to the thermometer—a measure of heat or its absence. There are two scales in common use, the Centigrade and the Fahrenheit. In the United States the latter is used for most common purposes, such as knowing when to put on your winter woolies. The Centigrade scale is widely used in scientific work and is international in scope.

Of the two, the Centigrade is the only one that is based on anything definite. As you will recall from your high school days, water freezes at 0 degrees C. and boils at 100 degrees C. with the fluid at a stipulated atmospheric pressure. The space in between has been whacked into 100 units.

But 0 degrees on the Fahrenheit scale isn't anything specific—nothing happens. Fahrenheit just picked a workable zero point for his scale and on from there. Water freezes at 32 degrees and boils at 212 degrees on his scale. Zero degrees F. is neither the absence of heat, which has been placed at ninus 460 degrees nor the greatest heat, which reaches millions of degrees in the sun and stars. We doubt that any of us have ever thought the Fahrenheit scale complicated.

Radio and transmission engineers were faced with the same problem when it came to constructing an



Above is a chart showing how the db "thermometer" is useful. The chart shows the value of keeping your head clean. The O line indicates the output is flat with the tape in perfect contact out to 10,000 cycles. If the tape is held away from the head by one-tenthousandth of an inch the output will gradually drop off (dash line) from slightly above 1000 cycles until at 10,000 cycles it is 10 db "down." Let us now refer to the worst condition shown on the chart, the lower solid line which shows what happens when the tape is held 4.5 mils away from the head. The output at 100 cycles is down about 3 db and from there the curve plummets until at 1000 cycles it is 40 db below zero . . . or from the table, the putput is 10,000 times less. Beyond this point there is no response for the higher notes simply do not reproduce at all. Chart courtesy of Minnesota Mining and Mfg. Co.

db's	*ratio*	*db's*	*ratio*
1	1	20	100
2	1.7	30	1,000
3	2	40	10,000
4	2.75	50	100,000
5	3.25	60	1,000,000
6	4	70	10,000,000
7	5	80	100,000,000
8	6.5	90	1,000,000,000
9	8		
10	10		

Table above shows how db scale, which is logarithmic, compares to the arithmetical scale. A 20 db increase in loudness will actually make the sound 100 times as loud. Our ears follow the db scale of values.

audio yardstick. They finally settled on a workable unit of tone, 1000 cycles per second, at a current of 1.29 milliamperes and .744 volts. This they called a milliwatt or zero db.

So O db is not a loud sound, nor a weak one just as 0 degrees F. is neither very cold or very hot. The threshold of sound, the absence of all noise is 90 db below zero. When you think of it that way, much of the mystery of the db scale disappears and it becomes as easy to understand as the thermometer.

There is only one fly in the ointment, however, and that is the way our ears behave. If someone places in our hands a one pound weight and then substitutes a two pound weight we feel that it is twice as heavy, or, if we have a one foot piece of wood and secure one two feet in length, it is obvious that the second is twice as long as the first.

In attempting to devise a hearing aid for the deaf, Dr. Bell invented the telephone. His early research had an effect on the way the db is calculated for he

discovered that our ears do not respond to sound in an arithmetical linear fashion, as do our eyes or muscles.

Our eyes perceive that something two feet long is twice as long as something one foot in length. Our muscles sense that a two pound weight is twice as heavy as a one pound weight but our ears respond in logarithmic fashion.

If sound is doubled, the human ear will barely notice the increase and, if it is cut in half, the ear will barely be able to detect that the sound is lower. Because of this insensitivity to changes in sound level the broader logarithmic scale was chosen with the unit of measurement the db.

Let's start at zero db. This represents one milliwatt of sound of a pleasing tone, 1000 cycles per second, which can be easily heard in a headphone.

If we double the power, producing two milliwatts of sound only a barely perceptible change in loudness will be noted. But by referring to the table, we can see we have increased the sound plus 3 db.

If the power is again doubled to four milliwatts, the sound will again slightly increase in loudness but we will find we have now increased it to 6 db from the first level. At eight milliwatts we are at plus 9 db and a 16 times increase in power takes us to 12 db and so on.

The reverse is also true. Starting at 0 db and cutting the sound power in half, we will notice a very minor change in the headphone but the sound will have dropped to minus 3 db on our "sound thermometer." If we halve it again, getting one-fourth the power, we will again notice a slight change and we will be "down" or minus 6 db.

You can quickly see that the use of the logarithmic scale is necessary when you consider the fact that whereas 10 db is 10 times the power, 20 db is 100 times, 30 db 1000 times, 40 db 10,000 times, 50 db is 100,000 and 60 db 1,000,000 times.

It is interesting to note the various loudnesses in dbs of some common sounds. These measurements are with reference to the threshold of human hearing.

The rustle of leaves will run 20 db and an average conversation 60 db or, referring to the tables, the yak-yak is 10,000 times as loud as the rustle of leaves. The average factory runs 75 db, an auto horn 120 db, a 75 piece orchestra 140 db and a turbojet engine 175 db.

So what does all this mean when you go to buy a tape recorder or other piece of gear?

Suppose the specifications read "50 to 10,000 cps plus or minus 3 db." Is this good or bad?

We'll take up the matter of cps in another article in this series. Right now just consider it as tones on a piano. The lowest G note vibrates the air at a rate of 48.99 times a second. The highest note on the piano, the little tinking C way at the other end of the keyboard vibrates the air 4186 times a second (cycles a second). Of course, there are overtone notes that go beyond this. According to some authorities a piano may be recorded realistically if the recording medium will go out to 8000 cps.

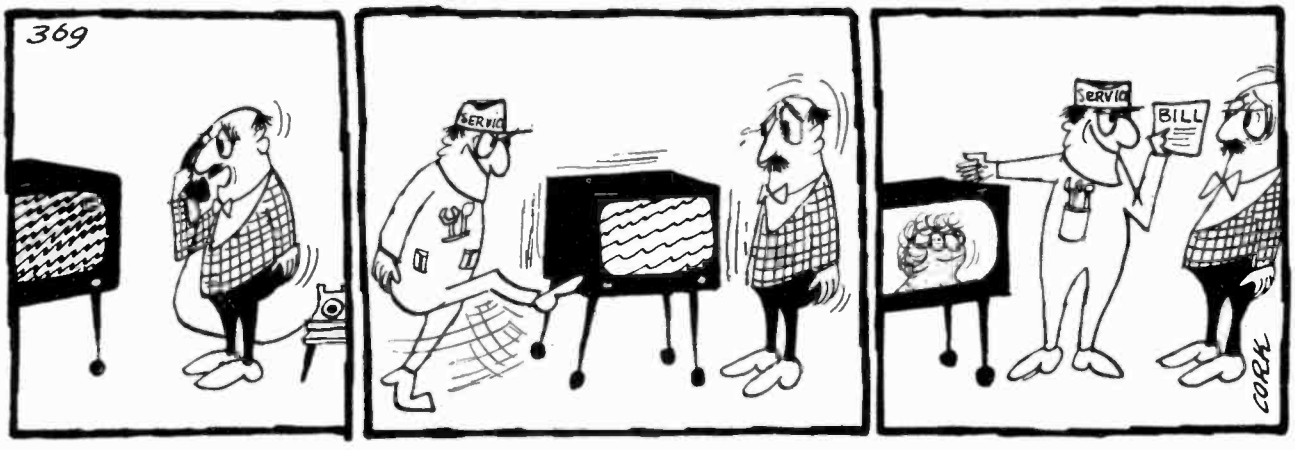
Let us compare the piano notes with the specifications given, 50 to 10,000 cycles per second, plus or minus 3 db. As we have learned, it takes an increase or decrease of at least 3 db for the human ear to tell that the loudness of the sound has been changed. Thus, the specs tell us that any note or sound which falls within the range of from 50 cycles per second to 10,000 cycles per second will be reproduced either exactly as recorded or at no greater change than is barely perceptible to the human ear. The plus or minue 3 db forms a sort of fence on either side of the flat position where every sound would be reproduced exactly as it was recorded with no variation whatever. So both the low G and the high, high C will be reproduced within 3 db of each other.

Some of the finer instruments hold the specifications to within two dbs which is not discernible to the ear at all. Only a sensitive meter will show it.

Some of the commercial equipment used in the voice range of frequencies (300 to 2500 cps) varies as much as plus or minus 10 db yet is perfectly acceptable for speech and the deviations would not even be noticed by an untrained ear.

Any chart which shows, or any description that makes the statement that the equipment is "flat" from here to there means that there is no deviation at all.

So the db turns out to be simply a measurement of sound power that is akin to the degrees on a thermometer and, like a thermometer, has a reference point of zero. Minus or "down" dbs indicate how much below the reference point the sound lies and plus dbs how much above. The spread between the minus and plus ratings given in the specifications tells you how far from the flat, or absolutely true reproduction, the particular piece of gear is allowed to wander. Since the ear cannot detect a difference of less than 3 db, anything below this point will be physically undetectable by a human.


369
SERVIC
SERVIC
BILL
CORK


TAPE RECORDER
CORK
AB-93

by John L. Russell, Jr.

SERVICING THE BATTERY-OPERATED TRANSISTOR TAPE-RECORDER

The market is flooded with those small economic portable battery operated transistor tape recorders, and the buying public has responded favorably to their appeal. Ranging in price from a twenty dollar bill upwards to fifty dollars or more, they are a fine example of what can be done with miniaturization and transistors.

However, many of these units are becoming inoperative and are showing up in increasing numbers at repair shops. Electronic enthusiasts who have been fixing their own radios, hi fi's, and TV's are fascinated to dip into the back of the new tape recorders. In doing so they are often quite surprised to learn that in some ways the tiny units are the same as the conventional tape recorders, but in other ways they are quite unique and different.

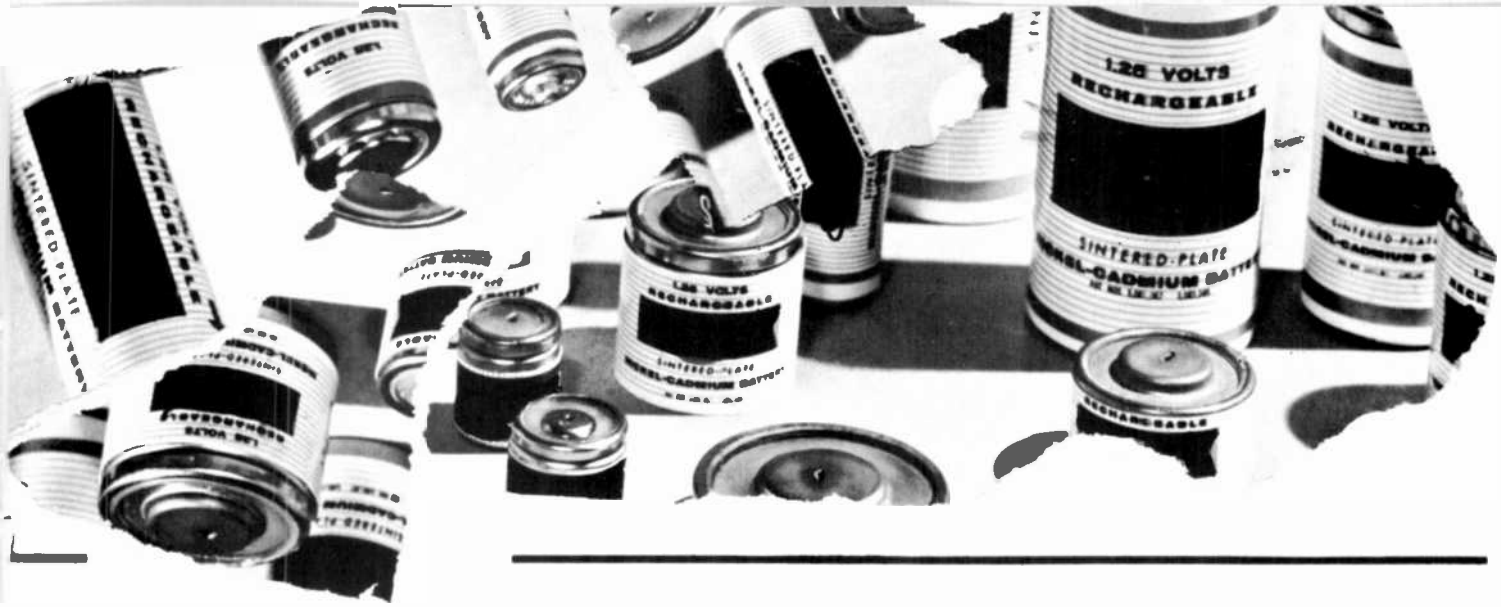
The most important drive mechanism in the conventional tape recorder, for example, is the capstan which moves the tape at the desired speed. On rewind, the capstan is disengaged. The economy transistor tape recorder has no capstan at all. Reel-to-reel drive is used. A motor shaft drives the rubber rim of a turntable on which the 3-inch tape reels are placed.

When the tape is moving forward, the motor shaft presses on the rim of the takeup turntable and rotates it. The takeup reel pulls the tape off the supply reel and across the heads. The supply turntable spins freely. The diameter of the tape on the reel increases gradually. Because the take-up reel is rotating at a constant number of revolutions per minute, tape speed across the head increases as the tape is played. Consequently the tape speed on a typical machine may run from three and one quarter ips at the start of the tape to six and one half ips at the end.

In the conventional system the tape speed is controlled by the capstan assembly so the drive to the takeup turntable only winds the tape on the takeup reel. So while the basic system is similar, the same thing occurring in both, the capstan is missing. The story is related about the technician who impatiently examined a portable transistor tape recorder and not knowing a thing about them only wished to get rid of the customer. He took a quick look into the set and exclaimed: "No wonder it won't work—there's no capstan!" He sent the customer, a pretty young girl out to get a new capstan. By the time she had made the rounds of electronic supply houses she wearily attempted to return her "defective" tape recorder to the place where she purchased it. After leaving with her new tape recorder the salesman, scratching his head commented to the manager: "Imagine—her tape recorder didn't have a capstan—damn imports!"

Another very unique feature of the small battery operated transistor tape recorders is the rocking assembly for the motor. The motor is mounted on a bracket supported at each end, so it can rock from side to side like a cradle. There are two shafts on the motor, one at each end. So by simply lifting up one side of the cradle, one shaft of the motor presses against the rubber rim of its associated turntable. This lifting is done by the motor switch, which moves against one of the control tabs. At the same time, the switch closes, starting the motor. Now the same switch controls the head pad as well. The pad is pulled off the head surface in the rewind and stop positions. Of course, the motor's rewind shaft has to be larger in diameter than the forward shaft so rewind is faster than forward. And there is no fast forward as there is on the conventional unit.

The amplifier is conventional, albeit small, and the record-play switching merely turns the amplifier end for end so that it amplifies the head output in play, and the mile output in record. In recording, the speaker is disconnected so an earphone is used to monitor recording.



There is no bias oscillator—erasing is done by a permanent magnet on which the tape runs when recording. The erase magnet covers the top half of the tape, because the head is, in fact, half-track.

Now as in conventional recorders there are three types of troubles: mechanical, audio, and operational, but before even considering these difficulties the batteries must be checked to make sure they are installed properly, the tape may be on the wrong side of the tape head, or it may be twisted or misthreaded. Make sure the head is clean.

If the trouble is mechanical or associated with an inoperative motor the cure is effected by simply applying pressure with the fingers to alleviate pressure or to increase pressure. The tab which holds the fixed end of the motor cradle spring can be bent away from the cradle for more pressure or toward it for less pressure.

The dc resistance of the motor should run around 5 to 10 ohms and this is easily checked.

Now if the motor is running all right, but the machine simply won't record or play, apply an audio signal across the head terminals and turn the switches to play. If signal is heard from the speaker, disconnnect the head and read its dc resistance. Testing the dc resistance of magnetic heads is not common practice in conventional recorders, but needs to be done in this case. Ohmmeter testing actually magnetizes the head, and increases the noise level of the tape machine. The noise level in these machines is high to begin with and no increase in noise is noticed after dc testing. The dc resistance of the head should normally run somewhere between 100 and 1,000 ohms.

If the amplifier is suspect inject an audio signal at the base of each transistor to isolate the bad stage. A signal generator is fine, but you don't even need it. Touch one finger to a collector of the output stage and another finger to each base, starting with the first transistor. Your body forms a feedback loop causing the amplifier to oscillate around the good stages.

It is a good idea to check all the transistor leads to make sure they are not contacting each other. The ends of resistor bodies may short to the nearest object, so it is wise to check to see that each component is isolated properly.

If anything through the amplifier works properly, check the speaker line. Sometimes the contacts on the earphone jack open so they can be rebent very simply.

If the machine plays but will not record, better check the mike. Apply an audio signal to it and listen for talkback. Crystal mikes are used for these recorders because they are cheapest.

If trouble persists in spite of the fact that the mike checks out, then test the recording system by injecting an audio signal across the head, with the machine in record position, of course. If this can be heard on playback, inject a signal at the collector of the output stage and the base of each stage, working towards the first transistor. Listen to the playback after each test. This is a bit time consuming and requires a bit of patience, but it is a good method.

If, after all this, you still can't get the darned thing to work and you are sure you have checked all the elementary possibilities, like making sure you turn the set on, making sure you are not using a blank tape, or making some idiotic mistake or oversight, it might be well to get another one to replace the defective one. Sometimes if a tape recorder is left in intense heat, in spite of the fact that most of them have a heat sink inside, it can be destroyed hopelessly. In spite of its claim to ruggedness, dropping one doesn't help matters either. Beaause these units are so light, compact, and easy to move around, they are often subjected to the most extreme abuses just in normal portable use.

tape

REVIEWS

Eddy Arnold

The Warmth Of Eddy. *Including: I Started A Joke, You Don't Need Me Anymore, My Way, San Francisco Is A Lonely Town, Yesterday, When I Was Young, You Fool, Cycles, Band Of Gold, What Have I Done For Her Lately? To Sleep With You, Then I'll Be Home. RCA.*

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

The warmth of Eddy isn't just a title but the meaning of the man himself and this warmth spills over into eleven current country favorites. Talented, award winner Chet Atkins produced this package and Cam Mullins conducted the orchestra. Both men are veterans of Eddy sessions. If Arnold is to have another million seller distilled from this package, I recommend San Francisco Is A Lonely Town or What Have I Done For Her Lately? Another superlative package to have and keep. There are few singers around today with Arnold's convictions. –F.R.

Collection

Stage and Screen Spectacular–All-time Favorites/Hits of the 60's. *Ronnie Aldrich, Stanley Black, Frank Chacksfield and their Orchestras, playing Around the World, My Favorite Things, Exodus, Slaughter On Tenth Avenue, Born Free, Warsaw Concerto, Hello Dolly, Impossible Dream and 12 others. Phase 4–London/Ampex J 74128. 7½ ips. $9.95.*

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

Ampex must love its customers to release a collection like this at such a bargain price. It's a double-length tape, and might almost be called a Phase 4 Show Music Sampler, except that it's limited to three orchestral groups. There's something for everyone in this tape–everything from Stanley Black's spine-tingling arrangements of Slaughter on Tenth Avenue to his boisterous Hello Dolly. Chacksfield's Warsaw Concerto rekindles memories of lusty bachelorhood, while Aldrich's piano is always pleasant.

Aldrich's presence in this collection is perhaps a mistake in programming; his style just doesn't fit in too well with Black and Chacksfield. Aldrich is a little too bland and homogenized, but as such is a pleasant interlude or foil for the other two orchestras. Standout cut is Black's Slaughter on Tenth Avenue–positively the best arrangement and performance we've ever heard. Some of the other cuts we've heard in other Phase 4 collections. Thus the serious tape collector is being sandbagged with duplicate performances.

Otherwise, this is a dandy tape, both for listening and as a stereo showpiece.

–W.G.S.

Paul Mauriat

Mauriat Magic. *Paul Mauriat and his Orchestra playing Love in Every Room, San Francisco, Angelica, Merci Cherie, Live for Life, Michelle, A Banda, the Last Waltz and others. Philips/Ampex PTC 6270. 7½ ips. $7.95.*

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

The "Mauriat Magic" title is about as descriptive as any review could be. This is the new big band sound with lots of extras thrown in. This isn't for the under-30 set, but any of us "old-timers" who relish good popular music for its own sake and maybe for a little dancing, dig the Mauriat sound and interpretation. He's good, and it's small wonder that his singles are setting sales records. This album is a cross section of some of his best-known performances and is a worthwhile addition to any collection. Recorded sound is excellent–an all-around good job. –W.G.S.

Rod McKuen

Rod McKuen At Carnegie Hall. Including: *Overture Medley, So Long, Stay Well, The Importance Of The Rose, I've Been To Town, Everybody's Rich But Us, A Cat Named Sloopy, Bend Down And Touch Me, Joanna, The Things Men Do, Gee, It's Nice To Be Alone, Trashy, Stanyan Street, If You Go Away, Seasons In The Sun, Overture Medley (2), Kaleidoscope, Ally, Ally, Oxen Free, I'll Cathch The Sun, Do It Yourself Protest Songs–Don't Ban The Bomb, We, The Ivy That Clings To The Wall, People On Their Birthdays, Champion Charlie Brown, Love's Been Good To Me, The Art Of Catching Trains, To Watch The Trains, Amsterdam, The World I Used To Know, Happy Birthday, Merci Beaucoup, Jean, Closing Remarks. Warner 7 Arts.*

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

There are no adjectives left to be written about this young poet, composer, singer, etc., etc., etc. A totally honest guy, he approaches his bottomless songbag with truth and love. Represented among the forty-four tunes are such hits as Jean (from the film The Prime of Miss Jean Brodie), Love's Been Good To Me (the current Sinatra chart-buster) and We (from McKuen's film score Me, Natalie).

A couple of fluffs on the part of the composer are left in to show the sincerity of the overall concert. This is perfect basic McKuen and should be in every library.

Werner Muller

Vienna. *Werner Muller and his Orchestra*

playing Die Schlittschuhlaufer, Radetsky March, Third Man Theme, On The Beautiful Blue Danube, Fledermaus Overture, Shon Rosmarin and others. London/Ampex LPL 74118. 7½ ips. $7.95.

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

What, not another schmaltzy Viennese waltz collection? That's the first reaction, before playing this tape. Put it on the machine, and get a delightful surprise—it's *not* another schmaltzy Viennese recording. It's something special—a collection of some Vienna-inspired selections and some that seem rather strange for this kind of collection, until you hear them. Johann Strauss Senior's Radetsky March for one; who ever plays the Radetsky March in a popular album? And the Third Man Theme? But somehow, with Werner Muller's special touch, it all comes out right, and for the sentimentalists who want at least one Strauss waltz, there's just that—one Strauss waltz. Add to this London's Phase 4 technique, plus Dolby masters, and you have a masterful recording achievement. All right, maybe it *is* just a *little* schmaltzy in places, but it's never sickeningly sweet.

—W.G.S.

101 Strings

Million Seller Hits—Vol. 1. *101 Strings plays Come Fly With Me, That Old Black Magic, Strangers in the Night, Somethin' Stupid and six other popular Sinatra melodies. Audio Spectrum/Ampex ASE 5087. 3¾ ips. $4.95.*

Music	***
Performance	**
Recording	***

Take a bunch of pleasant, but otherwise unnoteworthy songs, give them to Sinatra, and you've got a smash hit album. Give the same tunes to a bunch of competent German musicians called 101 Strings, and you've got pleasant, low-key syrup that's good for absolutely nothing except some low-level background music. This doesn't even qualify as the Montovani, Black or Chacksfield syrup. Their's is good syrup; this is just gooey. It's okay if you don't want listening-type background, and there are many times that this may be just the case.

—W.G.S.

Original Drifting Cowboys

We Remember Hank Williams/The Original Drifting Cowboys. *Included are: Cold, Cold Heart, Honky Tonkin', On The Banks of The Old Pontchartrain, I Just Don't Like This Kind of Livin', A Mansion On The Hill, Window Shopping, Pan American, Wedding Bells, There'll Be No Teardrops Tonight, May You Never Be Alone, Take These Chains From My Heart. MGM.*

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

MGM's all-time money maker on the country scene, Hank Williams, is remembered in song by the Original Drifting Cowboys. Well recognizable as the late star's backing group on those early 1949 cuttings. The Cowboys recreate those famous sounds with the aid of some aidded studio musicians. This is the Williams sound as it would be heard today. All selections are approached with the greatest affection for the late wrangler.

—F.R.

Prokofieff

Symphony No. 5 in B flat major, opus 100. *Berlin Philharmonic Orchestra, Herbert von Karajan conductor. Deutsche Grammophon/Ampex DCG 9040. 7½ ips. $7.95.*

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

Good Prokofieff combined with good performance equals good listening. The Fifth Symphony, the first Prokofieff Symphony composed after a 14-year lapse, combines the best of his old and newer techniques. It's brash, brassy, melodious, playful and thoroughly delightful. Von Karajan's performance adds the immediacy of excellent control and boisterous enthusiasm. Everything seems just right, and the conductor has managed to bring out some subtle neuances we haven't heard before. Blame part of this on the recording—a Dolbyized spine-tingler that's crystal-clear every note of the way. This is not a quiet, sit-and-listen-and-meditate recording. You get involved in spite of yourself, alternately beating time with your foot and jumping up and down with enthusiasm—that is, if you're a Prokofieff lover. If you are, this new reading of the Fifth is a must.

—W.G.S.

Too busy to keep up with your reading?

Here's the breakthrough you've been waiting for—recorded books you can listen to anywhere, anytime. Start your library now while this low-cost, money-back introductory offer is in effect!

NASH VOICEBOOKS T.M.

...the books you listen to!

CONVENIENT LONG-PLAYING CASSETTES bring you 90-minute condensed narrations of books like these. "Read" for pleasure, for self-improvement, for greater business success

HOW OFTEN have you said to yourself, "I know I should read more ... but who has the time?" If an active life keeps you from doing all the reading you want to do—and should do—you'll welcome Voicebooks, the books you listen to. This revolutionary thought-communication development makes it possible for you to "read" several books a week *by using spare time that might otherwise be wasted.*

Put Your Spare Time to Profitable Use

Each Voicebook is a standard tape cassette about the size of a deck of playing cards. You can play Voicebooks on any lightweight, inexpensive, battery-operated cassette player anywhere you go, as often as you want—in your car while traveling or commuting, in the kitchen or workshop, even (with ear-plug) on the plane, bus, train or subway.


"Read" While You Drive!

Within each pocket-sized Voicebook is 90 minutes of pure gold: information you can use to develop and expand your abilities and awareness ... to sharpen your business skills... to alert yourself to money-making opportunities... to increase your knowledge and appreciation of music, literature, philosophy... or simply to bring you intellectual stimulation and pleasure.

Edited for Easier Understanding

Voicebooks' experienced editors preserve the meaning and essence of each book while judiciously trimming off the superfluous. The result is 90 minutes of solid, useful information skillfully narrated by professionals—masters of the art of dramatizing important passages and key phrases to heighten emphasis and clarity.

Choose from Many Important Books

Someday all books may be available in the Voicebooks format. Every day more and more authors and publishers are licensing their books for recording. Those listed here, already available, are from some of America's most respected publishers – including Simon and Schuster, Hawthorne, Prentice-Hall.


"Read" While You Work!

Happily, they include many of the most helpful and popular books of our time—books such as Success Through a Positive Mental Attitude, Sam Snead on Golf, Helping Yourself with Self-Hypnosis and Bishop Sheen's Guide to Contentment. In the months to come Voicebooks will add dozens of new titles.

Start Your Voicebooks Library Today with this Money-Back Introductory Offer! Save by Ordering Now!

BUY ANY TWO VOICEBOOKS ... GET A THIRD ONE FREE! Just check the three titles you want on the certificate at the right. Send payment for only two—at $9.95 each. We pay postage and handling on prepaid orders. Try out your Voicebooks for two weeks. If you're not completely satisfied, return them and we'll send you a full refund.

Voicebooks is not a club. There are no dues, no fees, no extra charges of any sort, never any minimum purchases. You pay for the Voicebooks you buy—and you may buy as many or as few as you want, when you want them.

IF YOU DON'T OWN A CASSETTE PLAYER ...

... order the compact, versatile Voicebooks player for only $29.95—with batteries, microphone, ear plug, blank cassette. You can either *play* or *record* with this lightweight, convenient, battery-operated player. Includes volume control, record and playback switch, fast forward and reverse. Play any cassette—long play or regular. An extraordinary value!

VALUABLE INTRODUCTORY OFFER CERTIFICATE

☐ 301 ☐ 201 ☐ 303

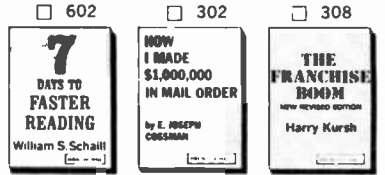
☐ 311 ☐ 305 ☐ 603

☐ 306 ☐ 601 ☐ 307

BUY ANY TWO VOICEBOOKS —GET A THIRD ONE FREE!

Check the three titles you want; pay for only two. Mail this certificate today.

☐ 602 ☐ 302 ☐ 308



☐ 102 ☐ 309 ☐ 310

☐ 304 ☐ 101 ☐ 203

Nash VOICEBOOKS,
P.O. Box 2988 Clinton, Iowa 52732

Please send the items indicated below for two weeks free trial. If not delighted, I will return them within two weeks for refund.

#	#	#	#
#	#	#	#

☐ **ONE VOICEBOOK.** $9.95
☐ **THREE VOICEBOOKS.** $19.90 for two; one is free.
☐ **SIX VOICEBOOKS.** $39.80 for four; two are free.
☐ **ALSO SEND CASSETTE PLAYER.** $29.95 including batteries, microphone, ear plug, free blank cassette.
☐ Payment enclosed; we pay all shipping charges.
☐ DINERS CLUB #_____
☐ AMERICAN EXPRESS #_____
☐ MASTERCHARGE #_____ Issuing bank_____
☐ BANKAMERICARD #_____

Name _____

Address _____

City _____ State _____ Zip _____

In California only add 5% sales tax. In Canada add 8% foreign exchange.

1—365—12— 1 2 0 6 2

Some people say Ampex stereo recorders are expensive.

They're right.

We put more into them. So you get more out of them. More sound, because our recorders actually produce their stated specifications. And every Ampex keeps giving you the stated spec performance over a much longer period of time.* Here are the facts.

Every Ampex recorder frame is die-cast. We don't cut it out of sheet metal. Connection points on it are milled, not stamped, for greater accuracy. Then we die-cast and mill a special block that connects with the frame and holds the tape heads absolutely rigid. This total die-cast framework costs more, but heads mounted on a less rigid framework can move. And if they move, even a fraction, maximum frequency response is gone.

Every Ampex uses famous deep-gap heads. These heads cost us a lot more to make, but they deliver far better sound far longer than any others in the industry.** We install them more precisely. And on bi-directional units we make sure the heads are equally sensitive. So both directions sound identical.

Every Ampex tape drive system is powered by a special, heavy-duty hysteresis synchronous motor. A motor we make even better with a die-cast flywheel/fan for consistently cooler, smoother operation. And we use an exclusive Ampex-designed drive belt with built-in damping factor to further reduce flutter.

The Ampex reel drive and brake system costs more to build. But it makes tape breaking, tearing or stretching almost impossible no matter how fast you change direction. Our dual capstan drive is expensive but insures less wow, flutter and less wear on tapes. Our stainless steel tape guides are ground more accurately and set more precisely into each unit. This insures that tape crosses the heads at an optimum frequency response angle even after years of use.

Finally, every Ampex uses higher grade electrical components. Our transistors, resistors, capacitors and semi-conductors surpass engineering specifications. And we don't push them to their limits. Even our transformers are larger, with more laminations and copper, so they don't have to hum to handle the electrical load, magnetize the heads less, run cooler and have a much longer life span.

The result? Every Ampex tape recorder lives up to its high performance specifications. And keeps living up to those specifications for years longer. You pay a little more for an Ampex but *in the long run* it's a bargain.

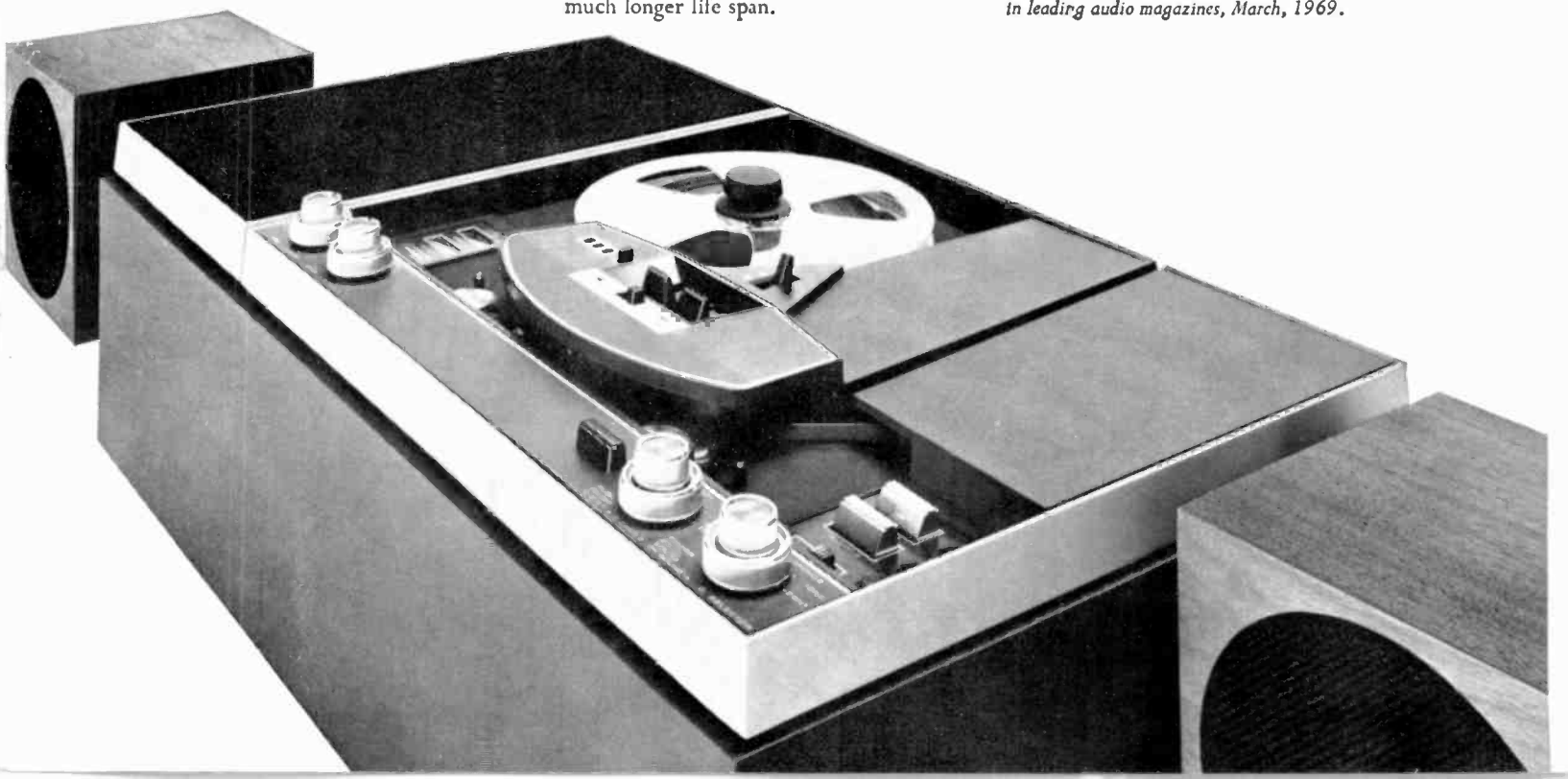
A case in point: the new Ampex 1467 system. You get Sound-on-Sound, Sound-with-Sound, Echo Effect, "Silent Signal" Automatic Reverse, Automatic Repeat, Monitor, Pause Control, 4 Deep Gap Heads, Two Walnut Acoustic Suspension Speakers, Two Dynamic Mikes and performance specs only matched by another Ampex. (Especially after you use it a year or so.) Suggested retail price: $449.95.

Write Ampex Corporation, Consumer Equipment Division, Dept. TR9, 2201 Lunt Ave., Elk Grove Village, Ill. 60007 for a full color spec sheet on the 1467 and a brochure on the entire Ampex line.

AMPEX

* *See "Will your tape recorder sound as good in December as it did in May." in leading audio magazines, April, 1969.*

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



"Scotch" Brand Cassettes prevent tape hangups

Here's the inside story.

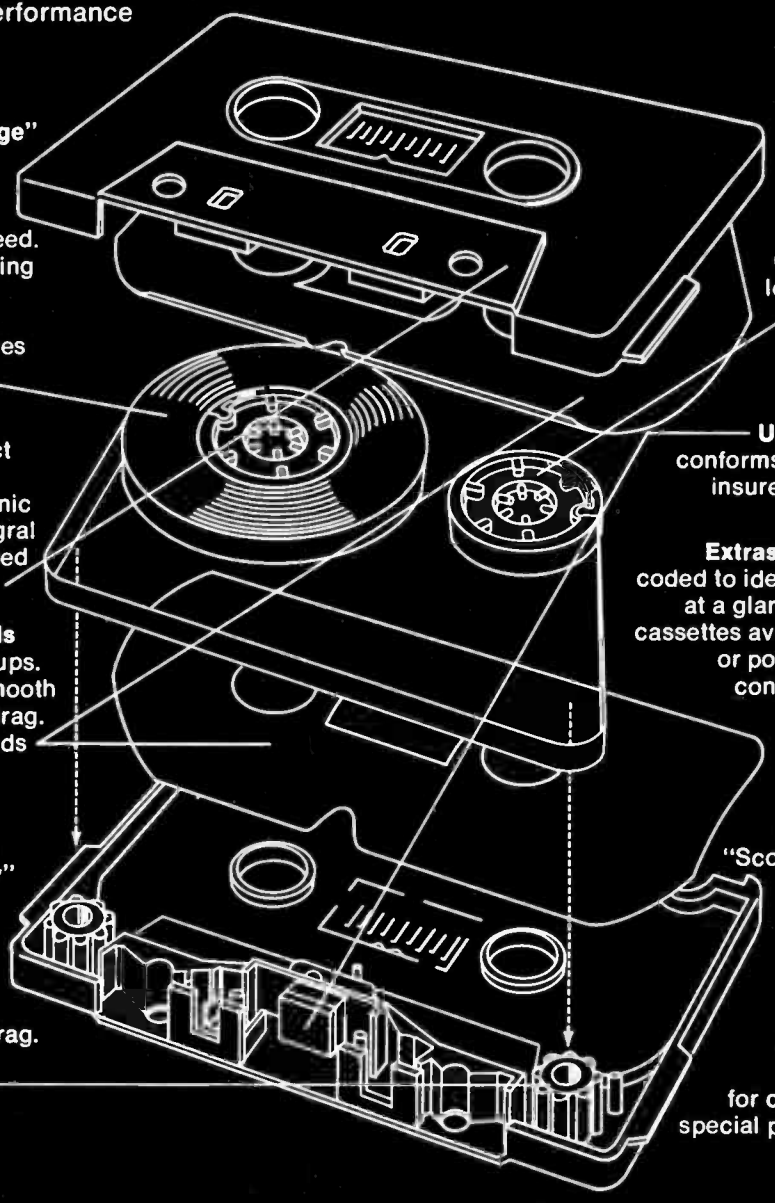
"Scotch" Brand builds in trouble-free performance with exclusive features:

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: 3M Company, P.O. Box 3146 St. Paul, Minn. 55101. Also ask your dealer for catalog of special premiums.

3M COMPANY