

TAPE RECORDING

Mr. Roy Perrin
231 Willard Ave.
Rutherford, N.J.

Pat Suzuki,
star of Flower
Drum Song, now
recorded on
tape

Just A Minute--

Use this minute to take stock of yourself. After all, who in this wide world knows you as well as you do? Ask yourself these questions and let your conscience give straightforward answers:

1. Am I successful in my chosen profession?
2. Is my position secure?
3. Have I advanced or been content to lag?
4. Has my earning capacity reached a maximum?
5. Where am I heading?
6. Do I "belong," or am I an outsider—professionally and socially?
7. Do opportunities slip by me ungrasped?
8. What can I do to improve?

We can't answer the first seven for you—only you can. But we can point out the basic trouble if you gave yourself a majority of negative answers—you probably cannot speak well. Admit it, isn't this the biggest and perhaps the only factor holding you back?

You remember, don't you. You remember how your insides tighten and your voice quivers whenever the V.I.P.'s talk to you; or how embarrassed you were at the business convention when your mouth felt dry and zippered. Sure, you remember how later you thought of what you could have said—but didn't.

There are other considerations too which you sometimes find yourself dwelling upon. The successful lawyer who lives nearby and drives a swanky blue Cadillac; the used-to-be neighbors who built their dream house and moved recently (he was an engineer wasn't he); and it wasn't long ago you read about that old school chum who has become a prominent manufacturer in the toy industry. Why aren't you capable of having what they have?

WE'VE GOT THE ANSWER

Chances are you are just as capable, which brings up back to the eighth question—the one to which we have the answer. Those people, just like all successful people, speak well. They speak dynamically, positively—they know what they want to say and how to say it. YOU CAN TOO!

The Institute of Human Communication will help you along the road to success. You want success—the Institute wants to help you succeed. Therefore, a speech course with all lessons on tape has been developed by people with years of experience in teaching public speaking and voice, and experience in radio, TV and on the platform. You can learn at home, in your spare time, how to speak effectively. You learn to speak by speaking, you learn by hearing actual speakers and our instructors coach you to achieve the results you want.

INSTRUCTION ON TAPE

Tape is the ideal medium with which to acquire better speaking habits. Every student is given individualized, private instruction. Assignments are tailored to fit your needs and interests, to help you develop your abilities to the fullest. You will suffer no embarrassment such as you might in a group class. Our instructors work with you and guide your progress. They are interested in you and what they can do to help you accomplish what you want to do.

Never underestimate your own ability to speak well. Thousands of successful speakers were

at one time reticent and awkward in their vocal communication. All you need is to understand where your deficiencies lie and to correct them. Our instructors will help you do this. They will bring out your hidden speaking talents.

HERE IS WHAT YOU'LL LEARN

The Art of Communication, How to Develop Your Hi-Fi Voice, How to Organize Material, Effective Communication, How to Prove What You Say, How to Dramatize Ideas, How to Sell Your Ideas, How to Make a Speech of Introduction, Making a Speech to Inform, How to Hold an Audience in the Palm of Your Hand, How to Handle a Controversial Subject, How to Read a Radio Script, How to Stir Your Audience, etc.

FREE SPEECH TEST

Opportunity does not pick and choose its recipients. Get set to answer its knock. Use the coupon below to get our free speech test. We will give you an honest appraisal without obligation and tell you frankly where you need help. We will explain fully how our course can help you. Do it today—tomorrow just pushes your big chance a little further away.

TIME'S UP

Your minute, or two, or three, has slipped by and we are sure you will agree the time spent in reading this has not been wasted. Why not take just a few more minutes to fill in the coupon. At the close of the course, should you elect to try it, your answers to the questions above can look something like this:

1. I like my work and my family has a higher standard of living than ever before.
2. I've been with the firm ten years and expect to be there until retirement.
3. My name's up for another promotion next month.
4. Each promotion means a raise.
5. I'm heading toward a fuller, more stable, life.
6. I have more invitations to business and social functions than I can handle.
7. Opportunity is always welcome at my door.
8. CONTACT THE INSTITUTE OF HUMAN COMMUNICATION

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Communication
Baltimore, Md.

Approved by the Maryland State
Department of Education

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Institute of Human Communication
Associated Teaching Center
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TAPE RECORDING

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 WRITE 1030 KIFER ROAD, SUNNYVALE, CALIFORNIA • UNITED STEREO TAPE 

NEW TAPES

★—Fair ★★—Good ★★★—Very Good ★★★★—Excellent

We are happy to report that among the many new tapes being released, both in cartridge form and reel-to-reel, an increasing number of popular, well known, names are now appearing, names that heretofore were seen only on discs.

With tapes offering better quality at prices comparable to or, in some cases, less than, discs, it was inevitable that top recording execs would get around to scheduling tape releases featuring big name artists.

Among the newest releases we find such names as Pat Boone, Lawrence Welk, Billy Vaughn, Ella Fitzgerald, Lena Horne, Harry Belafonte, Perry Como, Louis Armstrong, Pat Suzuki, David Rose, Roger Williams, Johnny Puleo, Perez Prado, Lionel Hampton, Maurice Chevalier, and many, many more, with still others to follow.

Also, in the ranks of the newest releases, there are a number of original sound tracks from movies, Broadway shows, and television series.

Keep 'em coming fellas, we're with you.

CLASSICAL



Music ★★★★★
 Artists ★★★★★
 Performance ★★★★★
 Fidelity ★★★★★

PETER AND THE WOLF

Prokofieff's Peter and the Wolf and Lieutenant Kije Symphonic Suite.

Boris Karloff, narrator.

Mario Rossi conducting the Vienna State Opera Orchestra.

VANGUARD VTC 1601

4-track, 7½ ips, reel-to-reel.
 \$7.95 . . . 45 mins.

Prokofieff had a warm feeling for children, a whimsical humor and, it seems to us, a pretty strong imagination, all of which are evident in these two compositions.

Peter and the Wolf is a bewitching symphonic setting of a fairy tale. Prokofieff also wrote the story. What a perfect tape to introduce your child to classical music.

Boris Karloff was an excellent choice for narrator. He does so quite well. In fact, we would like to hear more from this gentleman on tape.

Lieutenant Kije was first composed as a movie score. It was a light satire about an imaginary being who came into existence when a mad Russian Tsar magnified a blot on a piece of paper into the fancied name of Lieutenant Kije. Not wishing to doubt their Tsar, his courtiers invented mythical exploits for the Lieutenant. This is all musically told.

A most interesting tape, well done in all respects, with immaculate fidelity.



Music ★★★★★
 Artists ★★★★★
 Performance ★★★★★
 Fidelity ★★★★★

BEETHOVEN "EMPEROR" CONCERTO

Concerto No. 5, in E-Flat, Op. 73
 Arthur Rubinstein, pianist
 Symphony of the Air; Josef Krips, conductor
 RCA KCS-4009
 4 track, 3¾ ips, cartridge
 \$6.95 . . . 38 mins.

The name "Emperor" is most fitting for this moving composition. Piano, orchestra, and the music itself are majestic.

Beethoven achieved a great deal of contrast on this fifth concerto, just as in his fourth, by using the "enharmonic" change. That is, as well as using a tone common to two seemingly unrelated keys, Beethoven arrives at B major from E-flat by treating E-flat as its "enharmonic" equivalent, D-sharp.

Recording is superb, especially considering that the piano and orchestra are both being recorded simultaneously. All sound is evenly balanced and well reproduced.

POPULAR



Music ★★
 Artists ★★★★★
 Performance ★★★★★
 Fidelity ★★★★★

THE GEORGE WRIGHT SOUND

Side 1: Chloe, Mood Indigo, Beyond The Sea, Honky Tonk Train.
 Side 2: I Love Paris, Baubles, Bangles and Beads, The Whistler and His Dog, When You Wish Upon a Star, Dizzy Fingers.

George Wright.
 HIFITAPE R-710
 4-track, 7½ ips, reel-to-reel.
 \$7.95 . . . 32 mins.

My, oh my, the glorious wonder of a mighty Wurlitzer pipe organ. It would take entirely too much space to mention the tremendous array of instrument pipes, the special effects, the varied sound this king of musical devices can produce.

It is a whole orchestra in one package, and it needs a practiced master to play it properly. George Wright is just that.

We wonder sometimes what our ancestors would think if they could hear the almost unbelievable sound reproduction we are able to get today with tape and good equipment.

Here is a powerful organ, expertly recorded, with all its sound brilliance showering around you.

Fidelity, well your ears can't even hear all the fidelity this tape offers.



Music ★★
 Artists ★★★★★
 Performance ★★
 Fidelity ★★★★★

THE GREATEST

Side 1: Thou Swell, There Will Never Be Another You, Love Is Here To Stay, 'S Wonderful, My Baby Just Cares For Me, Nevertheless.

Side 2: Singin' In The Rain, I'm Beginning To See The Light, A Fine Romance, Come Rain or Come Shine, I Can't Believe That You're in Love With Me, This Can't Be Love.

Count Basie Plays . . . Joe Williams Sings.

VERVE VST 4-204

4-track, 7½ ips, reel-to-reel.
 \$7.95 . . . 35 mins.

The Basie organization is a team, with the coach at the piano keys calling signals. They play together, and while Joe Williams' voice is not by any means exceptional, it most adequately fits in with the Basie backing.

This backing, plus the singing, plus Mr. Basie's subtle piano tinkling, are all amply well placed in the recording. It would seem to us that mike placement for this recording was well thought out. Can't help but compare the combination to the baking of a cake. All ingredients are there, all are well mixed.

Cheers for the rich fidelity and stereo.



Music ★★★★★
 Artists ★★★★★
 Performance ★★★★★
 Fidelity ★★★★★

LEROY ANDERSON PRESENTS

Belle of the Ball, Fiddle-Fiddle, Sandpaper Ballet, Sarabande, The Penny-Whistle Song, Syncopated Clock, The First Day of Spring, Forgotten Dreams, Blue Tango, Sleigh Ride, Serenata, Song of the Bells.

Leroy Anderson and His Orchestra.

STEREOPHONIC MUSIC SOCIETY S15

4-track, 7½ ips, reel-to-reel.
 \$7.95 . . . 41 mins.

Light symphonic music elegantly performed. Gilt-edged arranging and conducting.

Added effects such as that of sandpaper in the Sandpaper Ballet, the alarm in Syncopated Clock, and the horse whinny in Sleigh Ride enhance the whole release.

The selections on this tape are varied and well chosen—each has an appeal all its own. Mr. Anderson wields a talented baton and you know every musician is giving his best.

Dazzling stereo, praiseworthy fidelity.



Music ★★
 Artists ★★★★★
 Performance ★★★★★
 Fidelity ★★★★★

LET'S DANCE

Side A: My Sin, Dancing Tambourine, Euphrates, The Puerto Rican Peddlar, Armen's Theme, Dixie Dawn Patrol.

Side B: Let's Dance, Cuddle Up A Little Closer, Yearning, A Gliss To Remember, The Glow-Worm, The Trouble With Harry.

David Carroll and His Orchestra.

MERCURY STA 60001

4-track, 7½ ips, reel-to-reel.

\$6.95 ... 28 mins.

We have found in the course of listening to tapes that you can start one spinning and tell after the first few bars of music whether you will like it or not. In most cases you know if you will tire of it, because it has a monotonous sound even with the melodies different; or if you will want to play it many times, because what you are hearing are original, imaginative arrangements.

David Carroll here uses an instrumental stratagem that definitely puts this tape in the last mentioned category. An engrossing, perfectly delightful treat for the ears, danceable too.

Superb fidelity, as most sound on tape is.



Music ★★★★★
 Artists ★★★★★
 Performance ★★★★★
 Fidelity ★★★★★

THE GLENN MILLER SOUND IN STEREO

Side 1: St. Louis Blues, At Last, Sleepy Town Train, Yesterday's Gardenias, In the Mood, American Patrol, I Know Why, Tuxedo Junction, Rhapsody in Blue.

Side 2: Serenade in Blue, Song of the Volga Boatmen, Moonlight Cocktail, Anvil Chorus, Kalamazoo, Sunrise Serenade, Under the Double Eagle, Danny Boy, Chattanooga Choo Choo, Adios.

Played by members of the Glenn Miller Orchestra and The Bay Big Band.

OMEGATAPE ST 4001

4-track, 7½ ips, reel-to-reel.

\$9.95 ... 60 mins.

Ahhh, that unforgettable Miller swinging style. The arranging mastery of this irreplaceable band leader cannot be duplicated.

Those making up this group who were originally with Glenn, must certainly take great pride in once again playing some of his most popular hit selections. We know the thousands of Miller fans will want this captivating release. It is just chock full of Miller highlights.

Great dance tape, scrumptious background music for a party, pure listening pleasure. We think you'll like it.

Don't know why, but the fidelity and precise stereo engineering on this 4-track is considerably better than on the 2-track versions we had of the same programs.

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 tribute to **CHARLIE BARNET**
 tribute to **WOODY HERMAN**
SHEP FIELDS and his Rippling Rhythm
GLENN MILLER SOUND | **TOAST to the DORSEYS**
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 HOLLYWOOD

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Music ★★★★★
 Artists ★★★★★
 Performance ★★★★★
 Fidelity ★★★★★

JOHNNY PULEO AND HIS HARMONICA GANG

Sheik of Araby, It Had To Be You, Peg O' My Heart, Twelfth Street Rag, Cuddle Up A Little Closer, St. Louis Blues Boogie, Italian Medley, Miente Me, You Are Always in My Heart, Peanut Vendor, Southland Tribute, Roses of Picardy, Orpheus.

AUDIO FIDELITY AFST 1830
 4-track, 7 1/2 ips, reel-to-reel.
 \$8.95... 26 mins.

We find words hardly adequate to describe the perfection of this tape, both performance-wise and fidelity-wise. Talk about live sound—you feel like these fellows are standing about 3 feet in front of you.

The harmonica tonal variations and harmony are simply glorious. We prefer listening to Johnny Puleo and His Gang to some of the full orchestras we have yawned through.

Audio Fidelity's engineers and recording equipment do a superb job. Sharp, uncluttered fidelity, stereo at its best.

We can't leave here without a mention about the beautiful, easily handled packaging of Audio Fidelity's tapes.



Music ★★★
 Artists ★★
 Performance ★★
 Fidelity ★★★★★

NEW SOUNDS AT THE ROOSEVELT

Let My People Swing, Yearning, You Should Have Told Me, I Cried for You, Honey-suckle Rose, If Love Is Good to Me, Mountain Greenery, Cool-Aid, Sleepy Time Gal, Lagonda, April, Wabash Blues, Blue Thursday, Walkin'.

Larry Elgart and His Orchestra.
 RCA EPS-244
 2-track, 7 1/2 ips, reel-to-reel.
 37 mins.

For those unfamiliar with it, the Roosevelt is a prominent hotel in New York, where Mr. Elgart and His Orchestra appear.

Unfortunately, it seems that the difference in orchestra styling is fading. There are so many "just bands", good bands, but not bands of distinction with a quality all their own. It is in this latter classification that we must list the Elgart band. You can dance to it all night, but just listening causes a monotony you soon tire of.

As usual, RCA's engineering and reproduction are above reproach and the resultant fidelity is of the highest order.

MISCELLANEOUS

ALMA MATER

Side 1: Whiffen Poof Song, Cayuga's Waters, Stein Song, Army Blue, Eyes of Texas, Fair Harvard.

Side 2: Sweetheart of Sigma Chi, Tell Me Why, Oklahoma Hail, The Palisades, Maryland My Maryland, Navy Blue & Gold. The Johnny Mann Singers.

LIBERTY 7134
 4-track, 7 1/2 ips, reel-to-reel.
 \$7.95... 30 mins.



Music ★★★★★
 Artists ★★★★★
 Performance ★★★★★
 Fidelity ★★★★★

Stirring college songs, sung by 25 male voices—The Johnny Mann Singers. Sung with all the gentleness, all the inspiration, all the exhilarating strength the songs were meant to convey.

These masculine voices, so well blended, so harmonious, give a noble performance indeed. You sort of feel sentimental even though you may never have attended any of the schools the songs represent. No musical background, just pure, melodious singing.

Great release—high, high fidelity.



Music ★★★
 Artists ★★★★★
 Performance ★★★★★
 Fidelity ★★★

FURY OF THE MATADOR

Side 1: Espana Cani, Opera Flamenco, Vito, En Er Mundo, Gitanillo.

Side 2: El Gato Montes, Rafaeo Llorente, Manolette, La Entrada, Gallito. Don Miguel Valencia conducting La Fiesta de Toros.

TELECTROSONIC TT-407
 \$4.98... 28 mins.

Ole! This tape weaves a lively pattern of the bullring, which clearly sets forth all the pomp, bravery, and untouchable pride of the matador, all the explosive, menacing anger of the bull, and the contest between the two for survival.

It's all there in the music—fiery, searing music, recorded in Madrid. A tape mostly for listening pleasure.

NOW BUY TAPE!



BROADWAY SHOWS with words and music in **STEREO**
 available 2 track or 4 track

FLOWER DRUM SONG - THE MUSIC MAN
MY FAIR LADY **OKLAHOMA** **SOUTH PACIFIC**
 from your tape dealer or from

Omegatape
 HOLLYWOOD

La Fiesta de Toros orchestra magnificently presents all the thrills and excitement the compositions are written to convey.

Good stereo effect, no complaints on fidelity.



Music ★★★
 Artists ★★★★★
 Performance ★★★★★
 Fidelity ★★★★★

HOLLYWOOD THEMES IN STEREO

Side 1: Terry's Theme, A Very Precious Love, Tara's Theme, Ruby, Wild Is The Wind, Variations on Colonel Bogey.

Side 2: Gigi, Love Theme From La Strada, Spellbound, The Long Hot Summer, The Old Man and the Sea, Katsumi Love Theme.

Frank Hunter and His Orchestra.

KAPP KT 41006

4-track, 7½ ips, reel-to-reel.

\$7.95... 34 mins.

Just as TV, the films have been given much added impetus thanks to theme, or, more appropriately, mood music. For that is just what it is. It is designed to complement the drama being enacted, to help create the mood portrayed.

Many of the movie theme music selections become popular such as Very Precious Love, Gigi, and the Colonel Bogey March on this tape.

Frank Hunter and his orchestra give this music all the lush richness and tonal coloring it calls for. He has gathered an impressive array of strings and woodwinds together and come up with some fruitful scores which are pleasant to listen to.

Smoothly balanced stereo, faultless fidelity.



Music ★★★
 Artists ★★★
 Performance ★★★
 Fidelity ★★★★★

PARIS IN STEREO

Side 1: Valentine, The Song From Moulin Rouge, La Gaiete Parisienne, Mon Homme, A Paris.

Side 2: La Belle Helene, La Ronde De L'Amour, La Vie Parisienne, Apache Dance, Sous Les Toits De Paris, Paris Canaille.

Raymond Lefevre and His Grande Orchestra.

KAPP KT 41009

4-track, 7½ ips, reel-to-reel.

\$7.95... 30 mins.

A musical portrait of Paris is a most adequate description of this tape. Whatever Paris may mean to you, this music will stir memories. If it means nothing in particular, perhaps this tape will stir new thoughts.

In any event, the lilting music is lovely and picturesque.

Raymond Lefevre and His Grande Orchestra render pleasing performances. The overall orchestra tonal structure is well blended.

Stereophonically speaking, this tape is right on the button, and fidelity-wise we classify it A-1.



The Early Middle Ages
 History Series, Campus Library, Campus World, Inc.

By Dr. Donald E. Queller, Assistant Professor of History and General Studies at the University of Southern California. 2 hours, 3¾ ips. \$11.95

With satellites whirling overhead and the stockpiling of hydrogen bombs going on apace, it is almost comforting to listen to this tape and realize that the people of this day and age were not alone in having problems of some magnitude.

The tape covers: The Late Roman Empire, The Early Christian Church, The Barbarian Invasions, The Transmission of the Classical Heritage, The Carolingian Empire, The Invasions of the Moslems, Maygars and Norsemen, Feudalism, Manoralism, The Feudal Monarchies, The Church in the Feudal Age, Literature and Learning in the Feudal Age, The Byzantine Civilization and Islam and Arabic Culture.

Professor Queller has done a remarkable job in organizing his material so that it is well presented in the period of time dictated by the length of the tape. He draws the basic outlines of each period and shows how it evolved into the next. Thus in the space of some 120 minutes you get a clear but broad picture of the systems under which our ancestors lived. Such things as a gigantic bureaucracy, heavy taxation, and inflation are not new.

Dr. Queller does an excellent job of voicing and the tape is very interesting.

NEW TAPES RECEIVED

REEL-TO-REEL

Audio Fidelity, Dukes of Dixieland, 4-track, 7½ ips, AFST 1851

Audio Fidelity, Mallet Magic, Harry Breuer and His Quintet, 4-track, 7½ ips, AFST 1825

Campus World, Inc.—The Campus Library, Political Science Series, California Government, dual track, 3¾ ips, PS-2

Campus World, Inc.—The Campus Library, Religion Series, God: Basic Conceptions, dual track, 3¾ ips, R-3

Campus World, Inc.—The Campus Library, English Series, The Epic: Its History and Development, dual track, 3¾ ips, EH-2
 Hifitape, Tahiti, The Surfers, 4-track, 7½ ips, R 417

MGM, David Rose Plays Music From Gigi, 4-track, 7½ ips, ST 3592-3640

Omegatape, Flamenco, Laurindo Almeida, 4-track, 7½ ips, SST 807

Omegatape, The Hi-Lo's in Stereo, with Frank Comstock's Orchestra, 4-track, 7½ ips, SST 800

Roulette, Try A Little Tenderness, Tyree Glenn With Strings, 4-track, 7½ ips, RTC-504

Stereophonic Music Society, The Cadet Glee Club, West Point Sings Army Blue, 4-track, 7½ ips, S19

Warner Bros., Gone With the Wind, Muir Mathieson conducting the Sinfonia of London, 4-track, 7½ ips, WST 1322

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STEREO

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- Built-in 3 speaker performance.
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- Two speeds . . . 7½ and 3¾ ips.
- -52 db signal to noise ratio

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CROSSTALK

from the Editors

NEW PRODUCTS are the lifeblood of any industry. Every firm which expects to stay in business must constantly have on the drawing boards and in its development labs, new and experimental ways of improving its products. This is the only way it can keep ahead of its competitors. Should research and development stop then the industry is dead or dying.

* * * * *

THE TAPE RECORDING industry is no exception and, we are happy to say, it is very lively in the matter of new, better and cheaper products.

* * * * *

WORD OF THESE new developments sooner or later leaks out in reports couched in guarded phrases "it was learned that . . .", "a source said," etc. It also seems that everything that is going to be brought out is scheduled to "fight" something else or cause "confusion." Next year is supposed to see the "battle of the cartridges." This year it was the "battle of the cartridge vs. reel-to-reel" and the "battle of the speeds."

* * * * *

WE HOPE we can get ring side seats at the battle of the cartridges because all the other battles fizzled out.

* * * * *

THE LATTER BATTLE is supposed to take place because Minnesota Mining, CBS labs and a couple of other fellows are working on a new type of cartridge that uses 1/8 inch tape running at 1-7/8 ips speed. This can be stacked and a number can be made to play in sequence, like a stack of phono records on a record changer.

* * * * *

WE HAVE NOT seen this cartridge. It is still in the lab and any firm that shows its hand in this industrial poker game before that hand is ready to be shown is just courting disaster. We don't expect to see it until it is ready for market, then we shall probably be deluged with cartridges and machines so we can do a story on it for our readers. It sounds like a good idea but as far as we are concerned, it is just a gleam in its inventor's eye. We've seen too many gleams go out when the realities of production were faced. So don't look for any article on it for a year or maybe two.

* * * * *

THIS CARTRIDGE IS supposed to "fight" the RCA cartridge, which was supposed to "battle" reel-to-reel which was supposed to add to the "confusion" of four track vs two track and so on ad infinitum. But let's look at the record.

* * * * *

IS THE 1-7/8 ips speed new? Not by a jugfull. It has been on some recorders for years and has been added to others as models were changed. Is 1/8" tape new? No. We reported on that back in 1955. It was supposed to permit owners of dual track machines to edit their tapes. It went over like a lead balloon.

* * * * *

THEN CAME THE RCA cartridge. This was going to turn the tape world topsy-turvy. It was to be the end of reel-to-reel recorders. It was announced two years ago and is still not here in quantity. It is a good logical development but, looking at the record, we find the sale of reel-to-reel recorders has never been better and the output of reel type music on tape has hit an all time high.

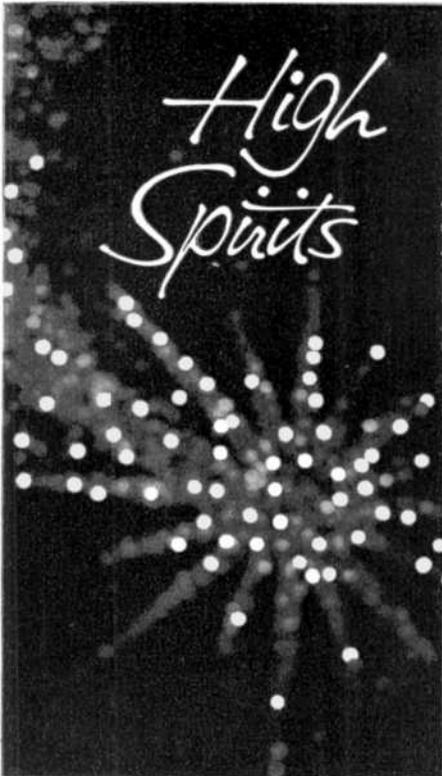
* * * * *

THE BATTLE OF the speeds was a bust because almost every recorder has both speeds on it. The cartridge battle was a dud because all you have to do to play it on the other machine is to take the tape from the cartridge and play it. And doubtless, when 1/8 inch tapes makes its bow someone will come up with an adapter so you can play it on your recorder.

* * * * *

SO WHY GET IN a tizzy every time something new breaks in tape. Applaud the company for having the guts to make something better or cheaper. If you like it buy it, if you don't, don't buy it and it will disappear. The time to get scared is when an industry stops developing new ways to do things. For instance, where does the phono industry go after the present stereo binge?

* * * * *



*A reel of
spirited classics...
professionally recorded
on Audiotape*

Put yourself in *high spirits!* This reel of bright and melodic classics will make a fine addition to your tape library. And, it's available on a bargain basis.

The makers of Audiotape have not gone into the music business. They are simply using this reel to demonstrate how life-like music can sound when it's recorded on Audiotape. The result is a delightful listening experience for you. "High Spirits"—at Audiotape dealers everywhere.

THE PROGRAM

"High Spirits" includes these bright selections, professionally recorded on Audiotape:

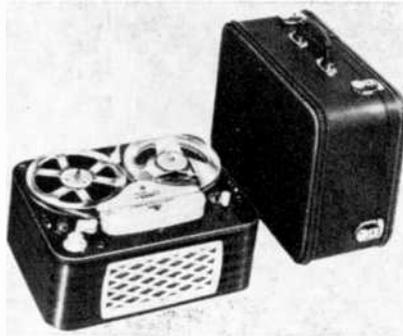
- StraussFrisch ins Feld
- Straussfrom Fledermaus Waltz
- Beethoven ...from Symphony No. 1 in C
- Tchaikovsky...from Capriccio Italian
- Bizetfrom Carmen Suite
- BerliozRakoczy March

audiotape

Manufactured by AUDIO DEVICES, INC.
444 Madison Ave., New York 22, New York
Offices in Hollywood & Chicago

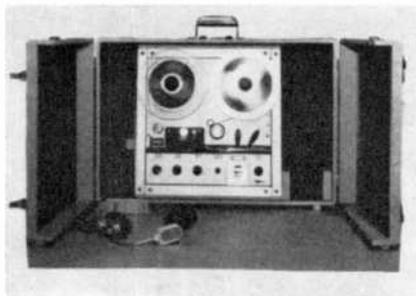
NEW PRODUCTS

TANDBERG MODEL 4

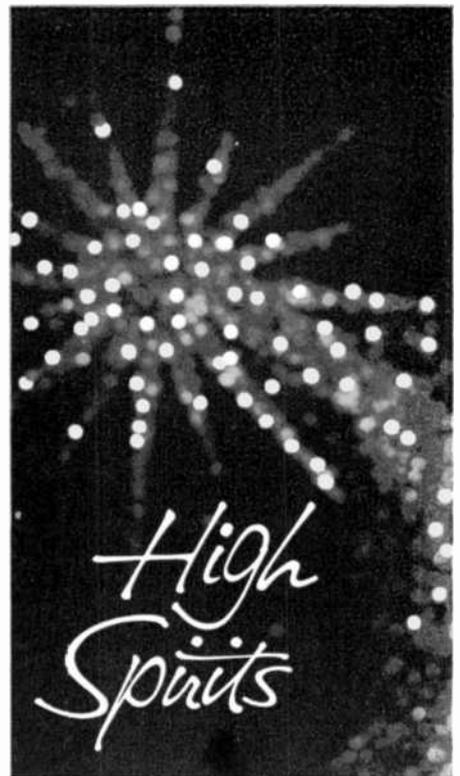


Tandberg of America, Inc., 10 East 52nd St., New York 22, N.Y. has introduced a four-track monaural tape recorder, developed for maximum recording and playing time on 1/4" tape. The Model 4 (manually operated) and the Model 4F (remote control operated) will record, play or erase four separate tracks on 1/4" tape. It has three speeds, 1 7/8, 3 3/4 and 7 1/2 ips with a frequency response at the highest speed of 30 to 16,000 cycles. The unit also features a selective four-track erase switch, which permits erase of any track without affecting the other three tracks. The price of Model 4 is \$349.50 complete with luggage case and microphone. The remote control Model 4F includes foot pedal, luggage case, and microphone and is priced at \$399.50. Write manufacturer for complete details.

SCHOOL RECORDER



Califone Corp., 1020 North La Brea Ave., Hollywood 38, Calif. has introduced the Solitaire school tape recorder, Model 72-T. It is housed in a carrying case with front doors which open out to provide side panels of a booth. These panels are covered with durable polyurethane foam for deadening sound. The Solitaire is equipped with a continuous duty synchronous motor, an easily operated precision tape deck with a two channel amplifier, resettable digital indicator, single control for record/play/stop functions, rewind and fast-forward control interlocked with function control to prevent tape spillage or breakage, simplified VU meter, and convenient line cord compartment. It will play up to 7" reels at 3 3/4 or 7 1/2 ips. Wow and flutter are under .25% rms. Price is \$349.50. Additional information is available from the manufacturer.



*A special
bonus package
... from the makers
of Audiotape*

Here's a great opportunity for tape fans. "High Spirits," a sparkling program of toe-tapping classics, is now available from Audiotape dealers in a money-saving bonus package.

No matter what type of tape equipment you have, you can enjoy this exhilarating program, for it's available in two-track stereo, four-track stereo and dual-track monaural sound (all at 7 1/2 ips on 1200 ft. of Audiotape)

THE OFFER

You get the "High Spirits" recording and a 7" reel of Audiotape (on 1 1/2-mil acetate base) for the price of two 7" reels of tape plus \$1.00. And since you're getting two 1200-ft. reels of professional-quality Audiotape—with "High Spirits" recorded on one of them—you're actually paying only a dollar for this fine program of lively classics. Don't wait. See your Audiotape dealer now.

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Record Anything, Anywhere with "The Magnemite"



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Tapebook #2

HOW'S YOUR HEARING?

by James M. Laing, M. Ed.

Are You Getting The Most Out of
Your HI-FI or Stereo?

Can You Understand Speakers?
Hear Lyrics Plainly?

Protected hearing is the key to your listening enjoyment.

Hearing is one of your most precious human possessions. It, however, like every other precious possession, requires protective care. Without proper protection your hearing can leave you completely, and without warning.

To properly protect your hearing there are two things you must do: (1.) test your hearing periodically, and (2.) seek early medical guidance as soon as a hearing test indicates a possible hearing loss.

Periodical hearing tests are important because, unlike most other ailments, a hearing loss gives you little positive warning. A hearing loss can creep into your life so gradually that you can be completely unaware of its presence.

Test your hearing . . . and be sure!

To help you check your hearing periodically is the purpose of this "hearing check recording."

TAPE CONTAINS

30 minutes of music by the famous Lenny Herman Orchestra—good for listening or dancing as well as screen testing of hearing. Specially monitored.

33 ton pairs to test musical discrimination

75 word pairs to test speech discrimination

Full 7" 7½ IPS
dual track reel
full direction booklet
Only \$9.95

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ASK YOUR DEALER OR ORDER FROM
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Mooney-Rowan Publications
Severna Park, Md.

COUSINO MAG-MATIC



The Cousino Electronics Corporation, 2107 Ashland Avenue, Toledo 2, Ohio, has just introduced the Mag-Matic Educator Dual Channel tape recorder with the Voice-Flector and automatic loading Echo-Matic endless loop magnetic tape cartridge. The Mag-Matic recorder is the basic unit used in the Cousino Electronic Language Laboratory and is designed to provide industrial users with a method of training executives and employees in foreign and domestic speech training programs, plus many other oral practice requirements. The Voice-Flector is a convenient, portable isolation booth, acoustically designed for direct, non-electronic self analysis of auditory response. Both the recorder and Voice-Flector are designed to be used independently with other type equipment. For more information and prices, contact Cousino.

AMERICAN MIGHTY MIDGE



American Microphone is marketing a new omni-directional lavalier microphone called the "Mighty Midge," or Model D-12. Its naturalness of pick-up eases balancing problems, and a rugged dynamic element protects the unit against all normal hazards. A plastic alloy diaphragm affords maximum protection against wind blast, temperature and pressure extremes and corrosive agents. A necktie clip and lavalier cord are standard equipment. Frequency response is 70

to 12,000 cps, and its impedance is 50 ohms. It is priced at \$59.50. For further information and literature, write American Microphone Mfg. Co., 412 South Wyman Street, Rockford, Illinois.

PHONO-TRIX



A streamlined, completely self-contained recorder, precision-made in West Germany, is being distributed in this country by Matthew Stuart & Company, Inc., 353 West 54th St., New York City. It is called the Phono-Trix and it measures 9" x 5" x 4½" and weighs only 5 pounds. It operates on four standard flashlight batteries, providing 40 hours of recording time at a cost of 80 cents. It is available in speeds of either 1⅞ or 3¾ ips, and uses a standard 3-inch reel of tape on a dual track system. Tapes are interchangeable with other machines. It can also be used as an amplifier, with its 20-foot microphone cable making it ideal for meetings and other gatherings. A full line of Phono-Trix accessories is also now available. Phono-Trix is priced from \$69.95 to \$149.95, depending on the model. Write Matthew Stuart for details.

FAIRCHILD AMP



Fairchild Recording Equipment Co., Long Island City, New York, has announced that its 25-watt amplifier, Model 255, now incorporates a number of engineering changes and is rated at 30 watts output. This has been accomplished through circuit revisions and by the use of EL34 output tubes and a GZ34 rectifier. Average production units measure less than 0.1% intermodulation distortion at full output. For price and further information, write to the factory.

TAPE IN EDUCATION

Robert C. Snyder

THIS is the first of what we hope will be a series of columns on the philosophy and use of the tape recorder as an educational device.

We believe firmly that the development of the tape recorder constitutes an opportunity to create entirely new methods of education, that the recorder will lead to a new philosophy of learning in languages and similar fields, and that specialized types of recorders—which we will describe for you in future columns—will make possible new techniques in fields such as musical instrument and voice training.

We would like to hear from you about unusual techniques that you are using or know about. Tell us, if you like, about new techniques which you believe could be developed and about new types of machines which you believe would be necessary to carry out such techniques. We will print interesting letters and give you details of new ideas as they are developed.

The educational use of tape recorders can be divided into at least a half a dozen different areas. Furthermore, the recorder can be used either as a teaching aid by the teacher or as a self-learning device by the student.

We have at hand letters from Mr. Darrell Page of Washington, D. C. and Mrs. Nancy B. Lane of Wellesley, Mass.

Mr. Darrell inquires about a self-learning aspect of recorder use. In an article entitled "Magnetic Tape: The Mind's New Tool" in the October, 1959 issue of Reader's Digest, reference is made to the techniques of speech time-compression and expansion as a method of conveying spoken information at an accelerated rate.

Mr. Darrell wants to know more about how this is done and also whether he can have his own tapes containing law subjects "compressed" and so "speeded up" to enable him to review more material in his preparation for the bar exams.

Mr. Darrell's question leads us into a most interesting area of educational use of recorders. That is the area of the relative effectiveness of conveying information by the spoken word as against the written word.

A fast reader may read accurately at the rate of over 500 words per minute. Normal speech is around 100 words per minute and even the most rapid speakers can rarely speak distinctly at much over 200 words per minute. Few listeners would enjoy listening to speech at the higher speed for long.

To overcome this difficulty and "time-compress" or condense speech in order to permit the spoken transmission of more information in a given amount of time, Fairbanks, Everitt, and Jaeger at the University of Illinois developed a machine several years ago which, in effect, clips out very small segments of the sound track at repeated short intervals.

Imagine taking a standard tape recorded at $7\frac{1}{2}$ inches per second. Every quarter of an inch along the tape cut out and throw away a one-sixteenth inch segment. Splice

the remaining pieces back together and you will have a tape which is now one-fifth shorter than the original and will take one-fifth less time to run through the playback, *but the pitch of the recorded material will not have been raised at all.* If you doubt this, try it for yourself.

The Fairbanks machine, of course, does this electromechanically rather than by cutting and editing the tape.

By reversing the operation of the machine it is possible to "expand" or lengthen the speech, again without changing the pitch of the sound. This expanded speech is most useful in analyzing speech patterns in the study of foreign languages, speech defects, difficult musical passages, etc.

The degree of compression or expansion can be varied and the final length of a speech, spoken instruction, etc., can, within reason, be made to fit a particular time requirement.

Readers who are interested in details of this process are referred to page 261 of "Elements of Magnetic Tape Recording" by N. M. Haynes. Details of the machine itself can be found, we are informed, on page 7 of the *I.R.E. Transactions-Audio* for January-February, 1954 in an article entitled "A Device for Time Expansion Used in Sound Recording," by G. Fairbanks, W. L. Everitt, and R. P. Jaeger.

Consider also the possibility of compression

of classroom lectures in subjects such as history, geography, law, etc., in which there is often a high ratio of modifying words to essential idea words. Such applications might result in savings of up to one-half of the time necessary to convey a given amount of information.

Consider, if you will, *the* further possibilities of speech time-compression if all articles, prepositions, verbs, etc., which *are* not essential to *the* sentence *were* deleted before *the* material *was* voiced and *then* *the* spoken material *was* further condensed by *the* Fairbanks technique.

In the preceding paragraph the italicized words could be omitted with no real loss of meaning. The flow of speech is not as euphonious, but it is intelligible none the less and a time saving of 10%-20% results.

We would like to hear from any readers who have utilized the Fairbanks or other time-compression technique with details of the application and an evaluation of the effectiveness of the results.

Mr. Darrell asked us whether he could have his own tapes compressed. We presume this might be relatively expensive because it involves at least two separate re-recordings of the material, but we have written for the information and will let you know what we learn.

Mrs. Lane, in her letter, asks us for details of concrete and if possible "tried" uses of the tape recorder in the elementary school classroom. We plan this to be the subject of our column either next month or the month after. Have you any suggestions for her?



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Recording professionals who know that a microphone can make or break a recording session have made the Shure UNIDYNE the most widely used, most-requested microphone in the world. Where sound reproduction is most critical, this extraordinary ultra-cardioid uni-directional microphone picks up every subtle shading of sound . . . without distortion . . . and with superb suppression of random background noise. Frequency response, 50 to 15,000 cps—and now 41% higher in output level. (Matched Unidynes are available for Stereo recording.)

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FEEDBACK

Excerpts from readers' letters will be used in this column.

Address all correspondence to: The Editor, Hi-Fi TAPE RECORDING, Severna Park, Maryland.

Natural Death for Phonos

To the Editor:

I have been a subscriber to *Tape Recording* for the last three years, or more, and while most of the time while reading "Feedback" I am content to let letters I do not agree with go by without comment, I feel I must take strong exception to one in the issue of November, 59.

I too favor the tape recorder over the phonograph and while I have two tape recorders I feel I cannot go along with such advertising as "Help Stamp Out Phonographs" and "Why Gamble with Records"—this is too much like shooting your old dog or horse because you have acquired a better one.

I am almost 60 years old now but I never will forget the many, many hours of listening pleasure I have had from phonographs up to the time I bought my first tape recorder and I always had a phonograph—ever since I was 18 years old.

I am in favor of the advancement of anything that is for a good purpose but not at the cost of destroying the things I once had. I would not destroy the harp-

sichord because I may now have a piano, nor any type of musical instrument that is not generally used any more; these things have died a natural death in most cases and God bless them for what they once meant to many people who never knew the phonograph, let alone a tape recorder.

Most of my tape library consists of copies of old phonograph records which I have been able to obtain at little cost—records of mostly gone and forgotten and sometimes unknown singers, orchestras and bands.

How will those born and raised in the tape recorder era look upon such advertisements as "Junk the Tape Recorder" and "Why Gamble with Reels" when another instrument appears to supersede the tape recorder . . . and can anyone deny the possibility of this?

The phonograph has lived a long and useful life through its various developments so why not let it die a natural death when its time really comes—as all of us human beings would wish when their time comes.—*Peter F. Gilles, Cleveland, Ohio.*

Taped Messages

To the Editor:

The following from the Sunday, October 1 edition of the *Japan Times* might be of interest to you.

"Employees of an Osaka electric company are greeted by their president every morning when they report to punch the time clock. The gimmick is that a tape recorder is connected with the time recorder so that a push of the button automatically reproduces the president's mildest voice saying 'Top of the morning to you!'

"This greeting is given to those who punch the clock before 8:30 A.M., the regular starting time for the company. Those who arrive a moment after 8.30 A.M. hear a louder and rather unpleasant voice say, 'You're late!'

"For those who arrive before 8:00 A.M. the president's voice melodiously says, 'I'll never forget your diligence.'

"The number of late comers is said to have been considerably reduced."—*David T. Thomson, Director, English Academy, Kyoto, Japan.*

We are indebted to Director Thomson for that choice bit. We also noted in a press dispatch that the city of Osaka keeps its pedestrians under control by playing tape recorded music while they wait for the red light to change before crossing the intersection. Sounds like Osaka is a real tape recorder town.

No More Whistle

To the Editor:

I recently ran into a condition which

I'd like to pass along—perhaps it will help others who are tape fans.

I have thousands of feet of recorded tape and out of a clear sky all my tape had a whistle when played. The whistle was not in the music but was coming from the recorder.

I put on new pads but still the whistle was present. Now here's the catch. I ran out of the regular recorder pads so for some time was making pads from an old felt hat. The last pads were cut from a different hat, which contained slightly thicker felt. This slight additional thickness was causing the tape to whistle.

Found this out by easing the pad pressure arm with a probe while the recorder was in operation. Secured and installed regulation pads from the company who made the recorder—whistle is no more.—*A. A. Yundt, Chicago 14, Ill.*

Our thanks to reader Yundt for his thoughtfulness in passing along the valuable tip.

Stereo Binge—Fooley

To the Editor:

There is reason enough lying about on the shelves of dealers who stock pre-recorded tape, to substantiate the reasoning of Curtis D. Janke of Sheboygan (May/59-page 13).

However, Mr. Janke first must realize that the discs he cherishes above tape, were themselves born from a master tape at 15-inch speed, the latter being a far cry from the mass-produced tapes Mr. Janke rightly compares unfavorably with disc playback.

It does not take a highly trained ear to detect that SOMETHING definitely happens to program material when it is zipped off at 60-inch speed for mass sales. Of this there is no question. I speak now of monaural dubbing. Stereo has the quality of masking the situation. Mr. Janke has evidently discovered something is wrong and perhaps more time will pass before a larger percentage of Audio Fans are made aware of it.

Every time I purchase pre-recorded tape, I regret it. Oh, there are exceptions, but they are rare. Too often I have returned the tape for refund or credit. I can snap on my AM-FM tuners and tape-record music aired from a studio-clean disc which appears to have more liveness and fidelity than some mass-produced tape.

I would prefer a real crisp disc even tho there may be a suspicion of needle travel, rather than tape which sounds as if the mike had been wrapped in burlap! It is entirely likely that a contributing factor behind stereo's push today is that it creates a liveness in tape which was lacking monaurally due to hasty dubbing techniques and poor miking.

Speaking of stereo: one of our hi-fi salons is frantically pushing a free stereo-tape (via radio advertising) with each stereo machine, "prices slashed—bargains everywhere." A trip to the store reveals no elbowing crowds. It is possible that the Stereo Boom has already reached its peak.

I can look at the stereo situation with suitable perspective, as it was 1951/52 that

ALLIED has the BEST BUY IN THIS QUALITY TAPE RECORDER



ONLY \$99.95 \$5 down

KNIGHT® KN-4050 DUAL TRACK RECORDER

Features push-button automatic control for instant selection of Record, Play, Rewind, Forward and Stop at either 7½ or 3¼ speeds. Includes digital index counter; safety interlock to prevent accidental erasure; separate tone and volume controls; recording level indicator. Records from mike, radio, TV or phono. Built-in 5-watt amplifier and 4 x 6" speaker for remarkably faithful quality. Easy to operate. Compact—only 30 lbs. Complete with microphone, 5" reel of tape and 7" take-up reel. An exclusive Allied product—unbeatable for value.

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FREE 1960 ALLIED CATALOG

Your buying guide to everything in recording, hi-fi and electronics. World's largest selection of recorders, tape decks, amplifiers, mixers, tape and accessories. Write for your Free copy.



ALLIED RADIO

100 N. Western Ave., Dept. 83-A, Chi. 80, Ill.

I broke the sound-barrier with one of the first stagger-head Magnecords, which we used at 15-inch speed with two condenser mikes. It was an expensive outfit and we had good results.

Might I add for today's stereo fans: they will soon lose taste for stereo-speaker playback once they've clamped to their heads a pair of stereo-phones. The result is musical ecstasy—real crazy, man, real crazy! Today, I scarcely turn my head when I hear a stereo demonstration. I sold the outfit 4-years ago. Today I have a full track Magnecord M-90 with access to another machine. When dubs are made from these two (at 7½ inch speed) the dubs are identical. Dubs at 15-inches are of course superb.

I think the stress towards tape economy by splitting tracks and lowering tape speed will eventually work against tape equipment sales. Friends who drop in and hear my playback of masters or dubs at 15-inches, are completely fascinated by the clear realism. The "high" end of course is right there, but what separates the men from the boys is the superbly clean and utterly natural bass reproduction at 15 inches, impossible to display at 7½ inches. I have some dubs from masters purchased of George Wright on the massive theatre Wurlitzer. These organ notes are terrific on the system. A pair of properly phased Lansing C-34 folded corner horn speakers six-feet apart creates a "fill" of sound not too removed from stereo as heard today. When Audio friends hear this combination they wonder: "Why all this fuss over stereo, requiring special recorders, special tapes, extra amplifiers? I don't get it!" Neither do I.

Improper miking technique may have indirectly contributed to stereo supplanting monaural tape. It has been hard to weed out the really significant tapes—I speak only of instrumentals now. So many studios resort to several mikes and this creates a muddy effect. As witness to this, I have beside me a 15-inch dub of a popular orchestra, purchased as a monaural copy. Its lack of brilliance and clarity is due to blending of two stereo tracks.

Metro Goldwyn Mayer sound studios whose technicians got me on to the right track, mike-wise, developed the "single-mike" technique to a high level. Properly placed, one mike can handle an entire orchestra, even vocals, without cancellation and odd effects resulting from more than one mike. M-G-M skill was behind development of the mike now called the Stephens C-1 system. When I use this instrument on orchestras, or choral groups, the results far surpass any other pickup. One of the severest tests of any mike is the pickup of the complex waveforms from a large choral group. When I use the C-1 system the results are limited only by the skill of the singers.

The stereo-binge can go no higher today than enjoyed by the few who may listen via stereo phones, which is real living! Me? I'm sticking to full track monaural, as it's going to be around a LONG time. I agree with Mr. Janke in his appreciation of the disc as engineered today. There is much in favor of his line of reasoning.—
F. W. Anderson, Seattle, Wash.

HOW



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TAPE CLUB NEWS

Demonstrator Tape

The Bilingual Recording Club of Canada advises that a demonstrator tape is now available to those who want to get information about the club. This tape has been prepared carefully, and all necessary information is on it. It tells all about BRC: Membership fees, activities, demonstration of tape correspondence and interviews. It is available in French or English, just by sending a 3" reel of blank tape to the librarian:—E. A. Rawlings, 5411 Bocage Street, Cartierville, P.Q., Canada. The master tape will be dubbed on the 3" reels which will be returned promptly. The recording is made on professional equipment. The French recording is narrated by Maurice Roussel and the English one by Ernie Rawlings. Anybody interested in getting information regarding BRC, has just to mail a 3" reel of blank tape.

Traveling Voicospontent

VS-er Terence Hill, one-time Canadian resident and now of Southern Rhodesia, says that he originally started out to work his way around the world and only recently was able to put the brakes on after moving nearly 100,000 miles through some 26 different countries—voicospontent most of the time. He feels he has at last taken a permanent job in Southern Rhodesia and can settle down to regular taping after setting something of a record for telling about The Voicospontent Club to his friends all over the world.

Taping Central

American Tape Exchange headquarters has been getting inquiries as to what Taping Central means. Secretary Stuart Crowner clears this up for us. Taping Central refers to A.T.E. Headquarters International. It is a place where all news is received, where all activities are initiated, where the Newsletter is written, it is a complaint center where you may let off steam, it is where you may turn if you have problems of a taping nature, and it is a friend. I think this clarifies the matter quite well.

Illustrated Mailing List

The Australian Tape Recordists Association is planning to produce an illustrated 1960/61 mailing list, and all members are requested to send a photograph of themselves to the club secretary to facilitate this.

In addition, designs for a representative and distinctive Association Lapel Badge have been requested, with the view to producing these shortly.

Also, several manufacturers have offered samples of their latest and best tape to the club, and as a feature of membership benefit, reels are being circulated "round-robin" fashion to those wishing to try out new tapes on the understanding that they are prepared to write in immediately, their comments (good or otherwise) to give the manufacturers their unsolicited opinions of the products. American manufacturers are being invited to participate in this idea.

This club is constantly growing—membership has doubled in the last eight months—and we wish them continued success.

Circular Issued In Two Languages

The Club du Ruban Sonore, although greatly composed of French-speaking tapists, nevertheless does not neglect its English-speaking members. Its most recent circular was issued in both languages. Because of cost of printing though, its bulletins are issued in French for the time being. However, thanks to Edgar R. Violette of 110 Oakland Terrace, Hartford 12, Conn., U.S.A., an English translation of the bulletin is read and recorded on magnetic tape and loaned on a round-robin basis to interested listeners. Blind members of the club can also hear a French reading of the bulletin, thanks to Freddy Masson of Grosse Ile, Montmagny Cty, Quebec, Can.

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QUESTIONS & ANSWERS

Questions for this department may be sent by means of a postcard or letter. Please address your queries to "Questions and Answers," HI-FI TAPE RECORDING, Severna Park, Maryland. The most interesting and widely applicable questions will be used in this department.

Got New Webcor

Q—After reading your November issue I went out and bought a Webcor Regent Coronet. Now I would like to know:

- 1-Are my heads self-demagnetizing?
- 2-Have you ever heard of using Doe Skin for pressure pads?
- 3-To use external speakers with my Webcor is there anything I should know to get a good match, such as impedance, etc.—
J. D., Alloway, N. J.

A—So far as we know the Revere is the only recorder which has this feature and probably, it is a patented one. We would suggest you get a head demagnetizer and use it after about every ten hours or so of playing time. We haven't tried Doe Skin but we have used Dr. Scholl's Kiro Felt which is made to ease pressure spots on the feet. It has an adhesive backing already applied and seems to adhere well to the pressure pad arm. We imagine Doe Skin is similar and should work as well. As to external speaker, Webcor makes a matching speaker for the unit or you can use any good speaker that has the same impedance as the output. As we recall, this was 8 ohms, which is more or less standard for speaker outputs.

Squeal Trouble

Q—In the summer I noticed a squeal on most of my brand name extra-play tapes. The noise becomes unbearable after a few minutes and does not seem to be mechanical but also affects the audio and is detectable on a few tapes I copied on another machine.

I started cleaning the heads with a commercial head cleaner and although this improved the treble in the tone, the squeal remained. Someone told me it was the head pads. I cleaned these with a brush and although it did stop the noise when some tapes were run, most extra play tapes still produced the squeal. I oiled the machine but to no avail so it is definitely narrowed down to the tape either coming off the reel before contacting the heads, or from the heads or pads.

This may help you in diagnosing the squeal trouble. The condition does not exist on standard tapes, only on the extended play tapes. Unfortunately, of some 75 tapes I have, 68 are of the extended play type.—
H. G. H., Palmyra, N. J.

A—We believe that your difficulty still lies in the pressure pads on your recorder and we would suggest that you replace them with new ones. Simply brushing them will not remove the accumulated wax and dirt which is imparting a very high frequency jerky motion to your tape and causing it to squeal by alternately seizing it and letting it go again.

Although it should not happen, there is some possibility that the lubrication built into the tapes when they are made has dried

out. To remedy this we would suggest that you treat the tapes with one of the silicone replacement fluids such as Long Life Tape Conditioner, the Filmagic applicator or the Robins Tape Cleaning Cloth. One or all of these should be available at a dealers.

Follow the directions for whichever of the products you choose to buy as it is possible to over-lubricate the tape with silicones which will make the capstan and roller slip. A very little goes a long, long way.

Steel Tape Reels

Q—I would like to know in your December issue why or why not it is impossible to buy steel reels for tapes. I would think since the plastic reel is liable to sag and warp in the summer months, the steel reel would overcome all these points. I purchased an 8MM movie reel and tried it out. It worked fine but I thought I had better get first-hand information on this. I hope you can answer this for me as no one in our community can help.—A. F. Falls River, Mass.

A—The only metal reel to come to our attention to hold regular 1/4 inch tape was one supplied with a Ferrograph recorder and

is made in England. We would suggest that you contact the Ercona Corp. 16 W. 46th Street, New York 36 about the availability of these reels in the United States. Other than this, the 8MM movie reel is about the only reel of metal widely available.

Metallized Tape

Q—I have been unable to obtain any information re metallized tape which is used in conjunction with the electro-magnetic automatic stops on tape recorders.

Could you please give me some information as to where I may obtain such tape. Your cooperation will be greatly appreciated.—R. A. W., Pittsburgh, Pa.

A—Minnesota Mining and Mfg. Co., Saint Paul 6, Minn. puts out such a tape. It is Scotch Tape #425. It is thin aluminum with an adhesive backing ready to apply to the magnetic tape.

Recorded Tape Source

Q—I am writing to inquire about where I could go about getting some tape already recorded with the latest hit tunes or Rhythm and Blues.—W. H. G., APO, New York

A—We suggest you write to United Stereo Tapes, 1020 Kifer Road, Sunnyvale, Cal., to Bel Canto, 2919 La Cienega Blvd., Culver City, Cal., and to Livingston Audio Products, 147 Roseland Ave., Caldwell, N. J. They will provide you with catalog material and tell you how to get the tapes you need.

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Pioneers in Creative Tape

by Stark Auringer

. . . . Dr. Vladimir A. Ussachevsky of Columbia University has contributed much to composition of music directly on tape.

COMPOSERS are seldom ivory-tower people. They are very quickly aware of developments which will aid them in their search for qualities of sound which they can use. The science of tape recording was not yet out of its infancy when several schools of composers—in France, in Germany, in Holland and Japan, and in the United States—became alerted to the possibility of composing directly on tape, using at first conventional musical instru-



Dr. Ussachevsky experimenting with piano sounds in 1954. An early composition completed directly on tape was *Sonic Contours*, which was based entirely on transformed piano sounds.

ments and soon the sound-generating devices of the laboratory. The American composer Henry Cowell, himself a daring innovator in the pre-tape era, has pointed out the historic significance of the use of this technique in the ranks of his craft: "For the first time it is possible for composers to bypass performers."

Mr. Cowell has also paid tribute to Vladimir A. Ussachevsky, of the music faculty of Columbia University, as a man who "more than anybody else in this country has devoted himself to music for tape recorders."

Taking my own portable recorder along into an environment in which it must have felt painfully outclassed, I went to interview Dr. Ussachevsky in the basement experimental studio at the university. It is a perpetually cool location, a delightful escape from New York's July heat. As one enters the door, an emphatically worded sign warns that the air conditioner must never be turned off:

protection for the library of tapes, with a welcome bonus in comfort for those who work here. The moderate-sized room is crowded. The bookcases lining the walls contain hundreds of neatly boxed tapes of all sizes. At the far end stands the equipment used in modifying sound; band-pass filter, mixer, equalizer, speed-control devices. In front of this formidable battery runs a long table holding a couple of tape recorders out of the four or five used in

blending the tapes—full-sized professional machines. Ready at hand are such smaller necessities as a stopwatch, and rolls of colored splicing tape to help in locating materials. Here Dr. Ussachevsky and his colleague, Prof. Otto Luening, also of the music department and a composer, produce the tapes which increasingly are making their way in the concert hall, in the theater, on the ballet stage, and in recorded music.

Dr. Ussachevsky, tall and black-haired with heavy-rimmed glasses, sat across the mike from me and gave me something of the history of composing on tape, something of his own efforts in the field, and the present status of the project at Columbia. He spoke slowly, choosing the correct word in the way of a man of scientific mind. Which is what he is. The approach and attitudes of the scientist engineer combine well with the professional training as composer to equip him for the role he has cut out for himself.

Altho the son of Russian parents, he was born in China and spent the first seventeen years of his life there. (He still likes to take his meals in Chinese restaurants, where he calls for the chopsticks.) His was a cultured family, and he studied piano, but because of the remoteness from Western concert halls, never heard Tschaikowsky until the age of eighteen. It was at about that time that he came to this country to study electrical engineering at Cal Tech. A depression was under way and it was changing many career plans. "All the engineers told me that if I had any manifest talent in a line other than engineering I should pursue it." With music such a close second, the change in plans was in his case a painless one, and he attended Pasadena Junior College, and Pomona College where he took his B.A. with a major in music. For his graduate work he came east to the University of

Rochester, taking his M.A. and Ph.D. at its Eastman School of Music. He later went back to California and Claremont College for a teacher's certificate. During the war, Dr. Ussachevsky's knowledge of China was useful to the armed forces. Since 1947 he has been at Columbia, where his present title is associate professor of music.

It was at his suggestion that Columbia bought its first tape recorder, but at that time it was his plan to use it simply for the recording of regular music performances. When in 1951 he first began to experiment with composing directly on tape, he was unaware of the work which had been done in Europe. But contacts were soon made. In 1953 he attended the first Congress of Experimental Music, held at the Musique Concrète Studio of Radiodiffusion Française in Paris. In 1955 he and Prof. Luening, with whom he had been working from the early stages, traveled on a Rockefeller Foundation grant, studying the techniques in use in Europe's experimental music studios.

Dr. Ussachevsky points out that the first French experiments, to which the name Musique Concrète was given, date back to 1946-1947, and that discs were first used, altho they switched to tape as soon as it became available. This French school used sound sources of nonelectronic origin, including musical instruments. But soon a German school, choosing the title Electronic Music, began using electronic instruments exclusively for generating the original sound. The work at Columbia has not been confined to either of these approaches, but has freely made use of various sound sources—piano, flute, gongs and other instruments, the human voice, and to an increasing degree, electronic devices.

The team of Ussachevsky and Luening began putting their own first sounds on tape with piano and flute, and were attracted by the possibilities of changing pitch through the use of the simple 2-to-1 speed ratio. "I began to experiment with simple speed change," recalls Dr. Ussachevsky, "and Mr. Mauzey, an electrical engineer here at Columbia, began to give me some ideas on reverberation and helped me with mixing. He helped me with recording sounds, and he built some of the first simple devices for mixing and reverberation which I still have as a matter of historical interest. But I had to learn the techniques of tape manipulation pretty much by myself because there was nobody to show me." An early work was *Sonic Contours*, which is an entire composition based on transformed piano sounds. In this, reliance was placed on "some filtering, a great deal of transposition, and a great deal of reverberation. And I added a few voices for a special effect."

At an early stage in his efforts, long before electronic equipment for generating the sound had been tried, Dr. Ussachevsky learned that tape offered the composer "almost too many opportunities." A tone of any pitch, produced by any musical instrument, can be extended throughout the audible range thru manipulations with speed.

The attack, or initial tone (such as the actual stroke of the hammer on the strings in the case of the piano) can be cut away, leaving only the continuing tone. The sound originally recorded can be played backwards, so that the attack comes at the end. Or a narrow-band filter can be used to suppress or minimize certain of the overtones and produce a different timbre. A fascinating example of distortion can be achieved with feedback. It's hard to describe, but the effect in one of Dr. Ussachevsky's compositions reminded me of the laughter of ghostly voices—the reincarnation of what had once been a simple piano tone. With all these resources, in endless combination, to play around with, the possibilities are limited only by time and the creative imagination.

And also, Dr. Ussachevsky would add, by money for equipment. The several tape recorders required to play the individual tracks are only the beginning. Add mixers and filters and one soon finds, in the words of our informant, that "\$4000 is very limiting." In the matter of filters alone, he has written in a technical article, "there is no end to the number of filters composers of experimental music would like to have." Then there's the question



Together with Peter Mauzey, engineer, Dr. Ussachevsky checks over some newly acquired equipment at Columbia. The university is still assembling electronic devices for this work.

of pitch regulation thru speed, which has long since escaped the limitation of the 2-to-1 ratio. "Even to change the speed on one of our machines takes us roughly \$350 to \$400 worth of gear." And one can go into the higher echelons of finance with the addition of a range of electronic devices for the production of the sound itself—warble-tone generators, audio oscillators, sawtooth generators, square-wave generators, white-noise generators. The laboratory at Columbia is still completing its assemblage of these electronic allies.

With these facilities at one's command, how does one go about the actual composing? One factor at least hasn't changed since the days of Bach. There must be in a man's mind the preconception of a unified and coherent statement, in terms of sound, which has its qualities of balance and dramatic contrast. Both Dr. Ussachevsky and Prof. Luening were established composers before tape came



Columbia University Experimental Studio in 1956. Tape materials are in temporary boxes. At this time the equipment and space Dr. Ussachevsky had to work with was limited, but the possibilities for composing directly on tape were endless.

along, each with a number of opuses in conventional forms to his credit. But here, instead of selecting combinations of orchestral instruments, they put the imagination to work to utilize those materials which can be recorded on tape. The first step, then: the recording of a sound which experience suggests can be put thru certain mutations to achieve a desired result. It may be a single note or chord on the piano, a continuous roll on the gong, or the wind-and-rushing-water effect of the white-noise generator. When the sound is taped, every attempt is made to achieve minimum distortion and the most favorable signal-to-noise ratio. A somewhat higher-than-normal recording volume may be used to offset any losses occurring in the subsequent steps. A microphone is generally required only at this first step, and sometimes its placement in relation to the sound source is used to achieve special effects.

At the second step, we subject the original sound to one or more of the manipulations already described—the alterations in pitch, the filtering, the feedback effect, the cutting away of the attack. While the transcribing process is going on, a filter can be used; or the composer can be controlling his effect thru regulating the volume or speed-change dials. The number of sound-mutation procedures is planned so as to have a minimum of re-recording, which would result in the undesirable loss of the more perishable upper frequencies.

The third step is the mixing of several tapes to produce the final product. This might be compared, in conventional terms, to running together the treble, bass, and intermediate lines in a choral or orchestral work. "It is only here," wrote Dr. Ussachevsky in his own article, "that the composer can verify whether his planning has been accurate all along." All the sound mutations have by now been completed, but two ticklish problems remain to be solved in this final step. Each separate tape (and there may be three, four or five of them) must contribute its line of sound at the proper volume relative to the others.

And then there's synchronization, which, the composer points out, "can be a major headache if one strives for extreme precision." It is necessary to use synchronous motors; and the several single-track machines must start simultaneously, each at a precise point on its respective tape. Otherwise the entire sequence from that point on will be thrown off. A number of attempts may be necessary before achieving the desired effect.

Thus composing on tape is a challenging job, and sometimes a wearysome one, always demanding the utmost in coordination and the skillful handling of equipment, as well as a composer's vision of a satisfying final product. As I inadequately describe the process here, it may sound very much like an experimentalist's wonderland, far removed from any entertainment value. But for a technique which has been in existence for less than a decade (in this country) the practical results have been quite impressive. As early as 1953, the Louisville Philharmonic, which has a unique reputation for encouraging American composers, commissioned Dr. Ussachevsky and Prof. Luening to compose a work for tape recorder and orchestra. They completed their scoring by the end of that year, and *Rhapsodic Variations for Tape Recorder and Orchestra* was performed on March 20, 1954. This is a date for music historians to remember, for it was the first composition which used the tape recorder as a solo instrument with orchestra. It has been performed a number of times since, by symphonic aggregates in San Francisco and Kansas City, at Columbia, at Jordan Conservatory in Indianapolis, and in Belgium.

In 1954, conductor Alfred Wallenstein commissioned another work for tape recorder and orchestra. He suggested that Prof. Luening's *Fantasy in Space* and the Ussachevsky *Sonic Contours* could be welded into a single unified work. The result was *A Poem in Cycles and Bells*, which has been recorded by the Royal Danish Radio Orchestra.

In 1955, Orson Welles commissioned the same two-man team to compose some tape music for his production of

King Lear at the City Center in New York. Welles, says Dr. Ussachevsky, was "very good in knowing exactly what he wanted." From specimen tapes given him by the composers, he envisioned the most appropriate effects, and from that point on the composers were given a free hand in producing the music to meet his needs. *King Lear* went on the stage at New York's City Center Theater early the following year.

A fourth major Ussachevsky-Luening effort was music for *Back to Methuselah*, produced in 1958 and starring Faye Emerson and Tyrone Power in a New York stage play. Tape music was especially appropriate here, for the action of Shaw's play carries the audience into the distant future, and effects were desired which would sound "not only modern but different—something for which the listener would be totally unprepared."

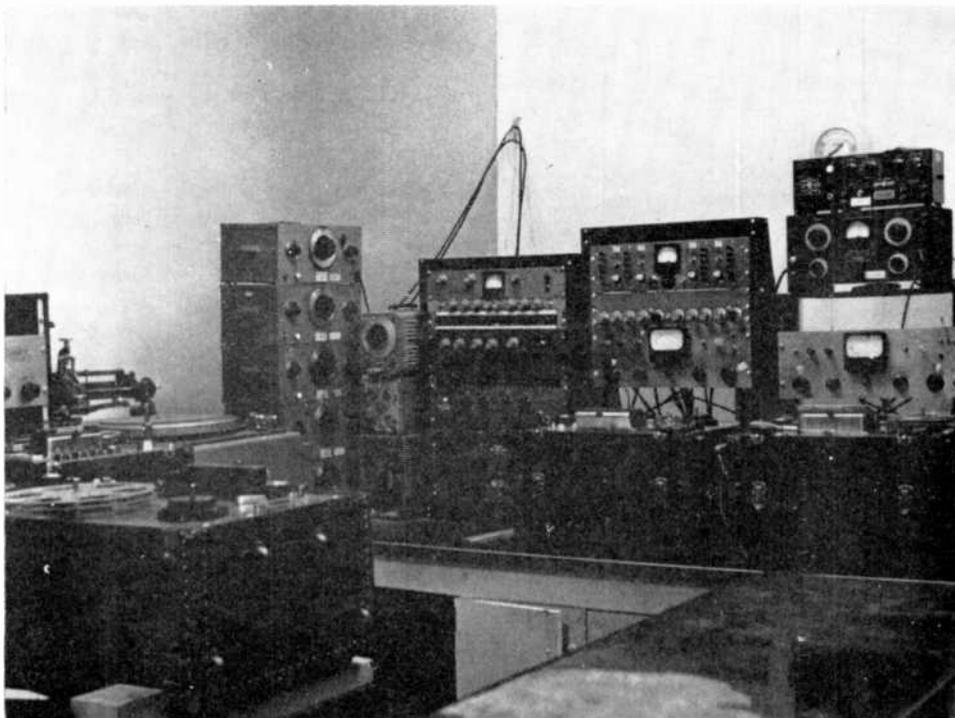
From the Columbia studio have also come tapes for background music for television shows. Recently Dr. Ussachevsky worked independently on the score of a motion picture, *The Boy Who Saw Thru*, which has both conventional and tape music on its sound track.

I asked Dr. Ussachevsky whether any of the tapes produced at the studio were available commercially. The answer: "There was an outfit called Phonotapes which originally put out some of our compositions: *Sonic Contours*, *Fantasy in Space*, *Incantation*, *Slow Speed*, and *Invention on a Twelve-Tone Theme*. That was all done on records and tape. It was called *Tape Recorder Music*. But this outfit no longer exists. One or two of mine are available through Ethnic Folkways, on tape as well as records." To date, the best available collection of the Ussachevsky-Luening compositions (if you all-out tape converts don't mind buying a record) is a long-play release put out by Composers Recordings, Inc., 2121 Broadway, New York.

Their release numbered CRI-112 contains *A Poem in Cycles and Bells*, *Suite from King Lear*, and an opus by Dr. Ussachevsky alone, *A Piece for Tape Recorder*, as well as a nontape composition by another contemporary American composer.

In January, 1959, Princeton University joined Columbia in a five-year project devoted to electronic music. This project, made possible by a grant from the Rockefeller Foundation, has as its aim establishing the Columbia-Princeton Electronic Music Center, located at Columbia University. The Center will house standard and specialized electronic equipment designed to meet the needs of production of electronic music. Princeton composers Roger Sessions and Milton Babbitt are now participating in the work, and in planning the facilities with the two Columbia composers.

What is the future of electronic music and of composing on tape? The writer has no credentials as a prophet. But the record of rapid progress is there for anyone to see, and one can draw the projection lines for himself. For the conservative, we may expect that this type of music, except when used for brief "special effects," may remain for some time outside the pale. That's nothing new: so did Wagner, and so to many Stravinsky does still. But those with a tolerant ear and/or an understanding of musical history have high hopes for the future of the newborn babe. Referring to electronic music in his essay *The Pleasures of Music*, appearing in *The Saturday Evening Post*, a leading American composer, Aaron Copland, wrote: "We will have to take into account areas of sound hitherto excluded from the musical scheme of things. And why not? With so many other of man's assumptions subject to review, how could one expect music to remain the same?"

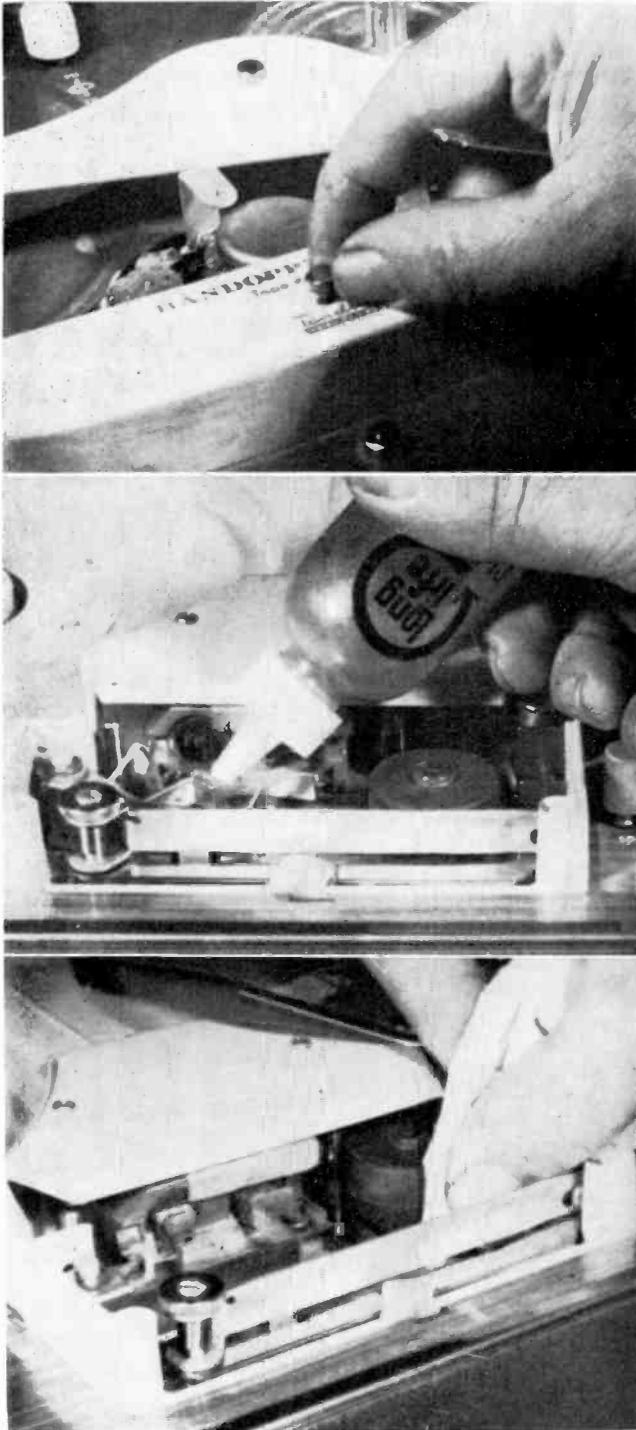


Columbia University Experimental Studio at McMillin Theatre, 1958-1959. The university is still assembling equipment. Thousands of dollars have already been expended for equipping this studio, but the devices needed are numerous indeed.

Golden Rules of Recorder Care

By Jean Cover

. . . . for top performance your machine needs careful attention.



Top: Removing the cover over the transport area of most recorders is simply a matter of loosening a few screws. Be sure, however, to not misplace the screws. Middle: Applying Long Life cleaner in recorder tape transport area. Use something on the order of a Q-tip or pipe cleaner for removing dirt. Bottom: Be sure to include the pressure roller when cleaning. Dirt or oil on this can cause the tape to jerk or slip. Right: After cleaning, rough up the pressure pads with a nail file or other scratchy agent.

DO you want your tape recorder to last? Silly question, isn't it? Silly because the answer is so obvious. Everyone wants to preserve any worthwhile investment he makes.

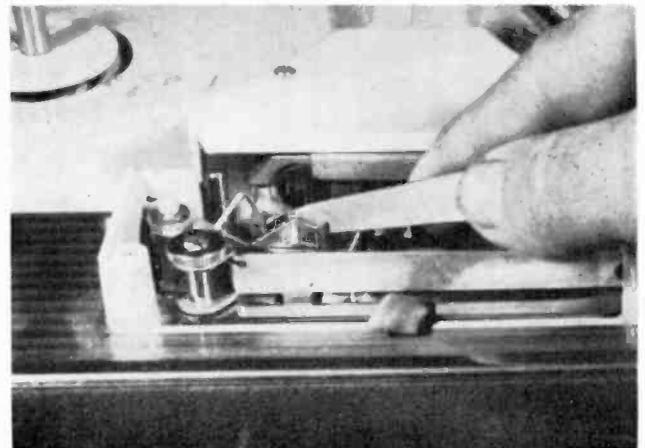
Your recorder, just like your automobile, and home appliances needs care and there are a few simple practices which can be followed to see that it receives that care.

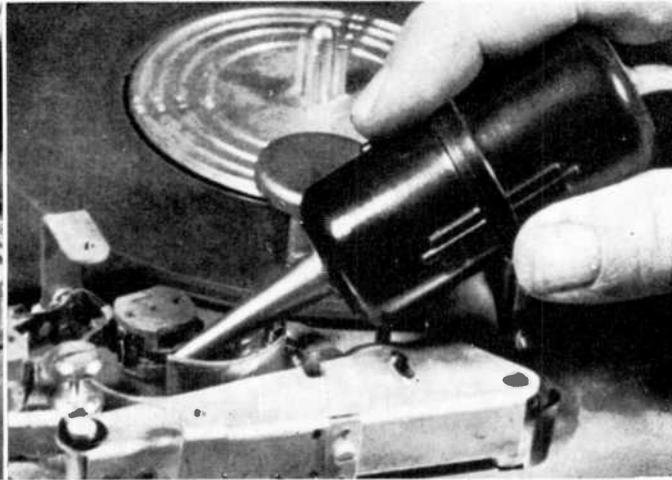
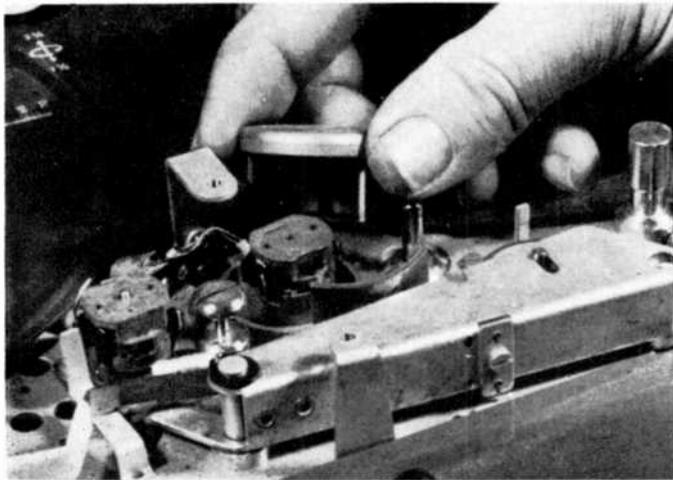
Know your machine manufacturer's name and address should you have to contact them. Most of the major manufacturers will either include with your recorder, or furnish upon request, a list of "Authorized Service Stations" throughout the country for repairs to their products. It is well to get this list and check it for your local station representative. Since a recorder is different from, and contains so many more components than a radio, it is evident that most radio shops will not be able to handle such repairs adequately. Having your machine serviced periodically is a good practice and will assure its longer life.

On the day of your recorder's arrival we suggest that, as you unpack the machine you carefully inspect it for any damage which may have occurred in shipping. Along the same lines, it is well to check to be sure all accessories supposed to be included are there.

Have your recorder's nesting place picked out. Of course if the machine is an addition to an already existing hi-fi setup, you probably have the location all picked. For those of you who intend doing a goodly amount of recording from the radio or phonograph, the most logical spot will be near these; perhaps pop is going to use it most of the time for business and wants it in his den; or maybe the club basement used by everyone is best. Ultimately, it may be the woman of the house, who always has a wary eye open for a proper decorating scheme, who makes the decision.

Most recorders seldom remain stationary in a home where they are in constant use. It is well to remember, however, that a recorder should not be placed on a cushion, bed, or similar yielding surface which will plug ventilation holes and cause the machine to overheat.





Left: For cleaning and demagnetizing the heads, remove anything which might block your reaching them properly, such as the protective head shield being taken off this recorder. Right: Demagnetizing heads regularly is a recommended practice. Residual magnetism left in these heads can cause distortion. Head demagnetizers such as the one here are available commercially. Shown is the Robins Industries unit.

You will be anxious to try the machine to ascertain that it functions properly, but do not be overly enthusiastic. Take your time.

Read all instructions carefully. To many of us, instructions are bothersome, but you must remember they are there to serve you. They are for your convenience and are not to be overlooked. All too often a tinkerer begins pushing buttons, pulling levers, and whatnot, only to end up breaking something before the machine has even warmed up.

Dust and dirt are enemies to your recorder. Even though brand new, dust your machine before using and frequently thereafter. Use lintless cloths which will not leave remnants in the machine. Remember to always close the lid when the machine is not in use.

Tape must have proper contact with the machine's heads to operate satisfactorily. Dust, dirt, or an accumulation of magnetic oxide particles from the tape on these heads may cause squeal, distortions, loss of fidelity and volume, and other irregularities in recording or reproduction.

Tape spliced improperly (using sticky adhesive, rather than hard adhesive splicing tape) may even deposit a residue of adhesive goo on head surfaces.

Pressure pads which push the tape against the heads also become glazed and can manufacture the same type problems. Heads and pressure pads should be cleaned after about every 100 hours use, as well as tape guides and capstan rollers in the transport area. Tape guides are the metal arms which guide the tape through its threading process, and the capstan is the metal shaft against which a pressure roller tightly presses the tape and pulls it through. Should these surfaces not be kept clean, the tape will begin slipping or jerking. Pressure pads should be roughened up with some scratchy agent such as a nail file after cleaning.

One of the manufactured cleaners is recommended for this cleaning, although isopropyl alcohol may be used. Such tape cleaners are available from: Electrical & Chemical Specialty Company, Robins Industries Corp., and The Distributor's Group, Inc.

Do not use carbon tetrachloride or any liquid which tends to soften rubber surfaces or head plastics. Carbon tetrachloride can be used, however, for cleaning tube prongs, rotating switches, brake bands, and other metal parts.

When cleaning, avoid using harsh materials which can scratch surfaces. Here again, caution must be exercised before deciding to go inside a machine to reach and clean certain areas. If you do not have the slightest notion of what you are doing, this is best left to a qualified repairman.

A simple method sometimes used for cleaning the transport area is to dip a shoestring in the cleaning fluid and thread the machine with it just as you would a tape. Then pull it backward and forward a few times, thereby wiping off the tape guides, heads, pressure pads, capstan and pressure roller all in one easy application.

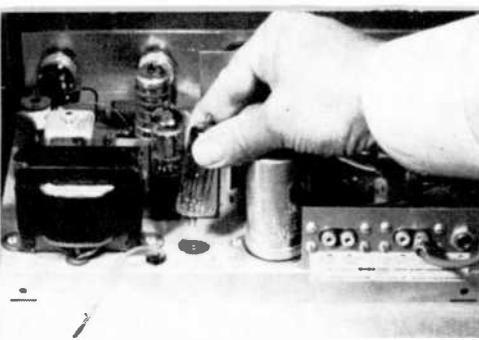
A record head that becomes magnetized or holds residual magnetism will make noisy, distorted recordings. Heads may become magnetized by surges of current during motor switching, a lightning discharge, proximity to a magnet, removing tubes when the machine is in the record position, disconnecting the head in the record position and if operated too quickly after throwing to record from playback.

Therefore, demagnetization of heads is recommended as a regular practice. A head demagnetizer can be purchased, or can be made, if you are of the do-it-yourself clan. Any degausser must be energized before passing it over the part to be demagnetized and must not be shut off until removed several inches away from the newly demagnetized part. Otherwise, it may magnetize rather than demagnetize. Also, the amplifier system should be off while this process is taking place to prevent a signal from being applied to the amplifier. Follow manufacturer's directions when using a demagnetizer.

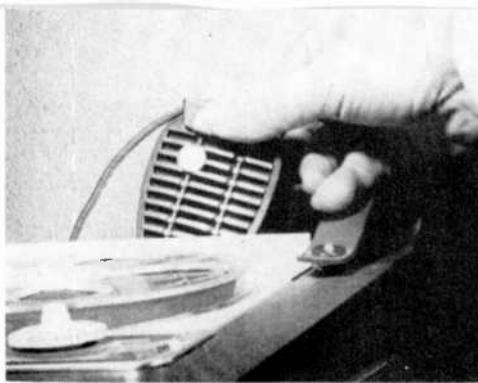
Do not go over your machine with an oil can lubricating every joint and moving part. Too much oil tends to cause more trouble than it can do good. Limited, proper lubrication with a lubricant is fine, but even this should be done only if specified in the manufacturer's instructions.

Never substitute another grade of oil for that specified by the manufacturer. Do not drip it anywhere but where it belongs. It should never be allowed to get on frictional surfaces, contact surfaces, or in a coil winding.

Before you try your machine for the first time, be sure that the machine and any necessary components are turned on, that operating instructions are followed, and that all connections are made properly.



DO replace worn tubes.



DO protect microphones.



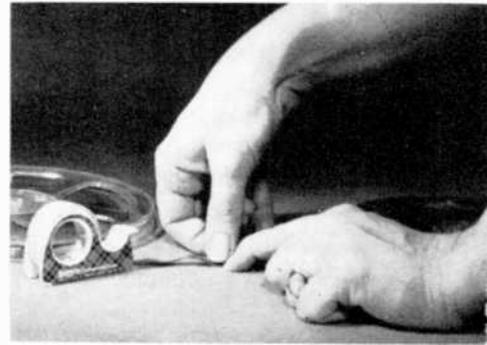
DO make proper connections.



DON'T rest recorder on pliable surfaces.



DON'T put tape and reels on radiator.



DON'T use soft adhesives for splicing.

When preparing your machine for recording, it is essential to insert the plug of a microphone into its appropriate input jack. While this may sound like a simple rule to follow, it is surprising how many folks do not heed it and end up wondering why they are not getting a recording.

The input marked Radio or Radio-Phono is for recording from these to your recorder. For this you would need a patch cord which simply has a plug on one end (this goes into your Radio-Phono input) and alligator clips on the other end which are to be attached to the two metal lugs on the back of the radio or phonograph speaker.

Any recorder takes about 10-20 seconds for its tubes to warm up. For maximum performance professionals will wait about 5 minutes for all bearings to be at their best operating temperature. This is not necessary, however, for general home recording.

Some tape manufacturers suggest that a new reel of tape, or one that has been stored for some time, be run off to the takeup reel and rewind before using. This is to alleviate sticking and vibration or jerking due to tape too tightly or too loosely wound.

Just as your recorder must be cared for, so too accessories such as mikes, patch cords, plugs, microphone extension cables, earphones, mixers, leader tape and extra reels of tape should be properly looked after.

Never leave a mike out in the open where it can collect dust, be overheated, or be knocked about. It is very sensitive and easily damaged. Store it in the recorder or put a covering over it.

Never put tape reels on a radiator, in direct summer sunlight streaming through a window, or any place where high temperatures can reach them. The heat will cause warping and a wobbly reel of tape is worse than no tape at all. Bent or cracked reels should be discarded. They can cause periodic wows (changes in pitch), or binding

which puts undue tension on the tape.

Keep tape stored in a dry location with not too extreme humidity or temperature changes. Although Mylar tape resists heat and humidity, even this should be properly stored.

Another item you might wish to have on hand is a recorded test tape. These tapes test the recorder for such elements as wow and flutter, head alignment, frequency response, etc. Playing such tapes on your machine will warn you of any symptoms of decrease in performance standards and be a signal to have your machine looked at by an authorized technician.

Although good quality machines are made for lengthy trouble-free operation, parts eventually wear and must be replaced. To help it last a bit longer, always turn the machine off when not in use.

You will find it desirable to plan your own tape filing or cataloging system as your recording collection grows. All tapes should be labeled.

Unless you have some electronic or circuitry training, do not attempt to fumble about under the cover of your machine, other than to clean, replace a tube or make some simple adjustment. Leave such repairs to those familiar with them.

If you wish to understand the basic fundamentals of tape recording, you can obtain a book on the subject and do a bit of studying.

Among the better reference books available are: *Tape Recorders—How They Work*, by Charles G. Westcott; *Tape Recorders and Tape Recording*, by Harold D. Weiler; *How to Make Good Tape Recordings*, by C. J. Le Bel; *Magnetic Recording*, by S. J. Begun; *How To Use A Tape Recorder* by Dick Hodgson and H. Jay Bullen; and *Magnetic Tape Recording*, by H. G. M. Spratt.

The old adage "Care Saves Wear" was never more applicable than when applied to a tape recorder.

MR. MUSIC MAKER LAWRENCE WELK

THE GLOBE OF LOVE
SIDE BY SIDE
SOMEBODY ELSE IS TAKING MY PLACE
THE FOG OF THE LOOSEBROOK FIVE
DANCE WITH A WALTZ
WHY WON'T YOU BE MY GIRL
HEAVENS
ALL ALONE
THE GOOD IS GOOD
LA BELLE
SILVER POLDI
JULIE FELD
A LITTLE BIT OF HAPPINESS
I'LL NEVER SAY "I'VE BEEN" AGAIN
YOU'RE DANCING ON CLOUDS
WHEN YOU'RE DANCING
SCATTERBRAIN
BLUE DENIM
MOTHER'S BIRTH
REMEMBER
I CAN'T GIVE YOU NOTHING BUT LOVE
MOM'S BIRTH DAY
THE GLOBE OF LOVE
WHEN YOU'RE DANCING



4 track tapes make bow

1959 ROUNDUP

... a year marked by dramatic developments in the tape world.

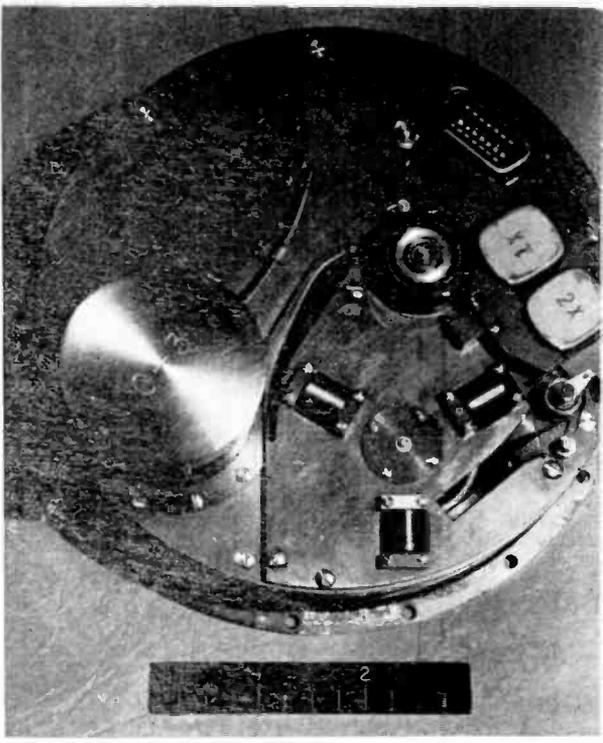
THE first part of the year 1959 was marked by the same sort of inactivity and "business as usual" that occupied the latter half of 1958. Three things were responsible for the general lassitude and these were the impact of the stereo disc, the recession and the stalling of the RCA cartridge.

Dealers were afraid of being caught with obsolete merchandise on their shelves, not knowing what direction the industry would take. They also felt that the appearance of the stereo disc had doomed tape to oblivion, not realizing that those who wanted the best would stick to tape in spite of the appearance of the disc. The recession, of course, hit all lines of business.

Traditionally, the "Parts Show" which is held in Chicago in May of each year and the Association of Music Merchants show, held in July are the breaking places for the showing of new equipment to the dealers.

It was at the Parts Show that the revolution in tape got its start. A number of manufacturers showed 4 track stereo models and at the music show in July, there were even more.

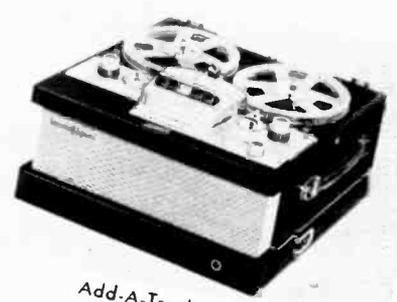
To keep pace with the numbers of recorders coming out in 4-track form the United Stereo Tapes distributing company was set up. This firm undertook to serve as a one-source supply for all tapes so that dealers once again could order tapes and be sure of get-



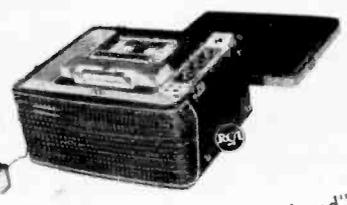
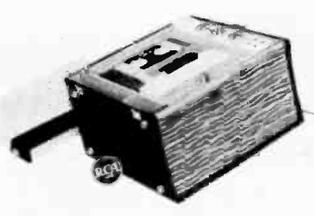
Tape in space



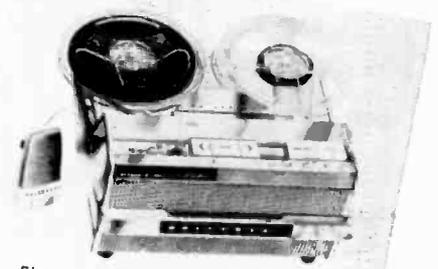
New lightweight Webcor



Add-A-Track by V-M



Cartridge player "re-introduced"



Electronic control by Wollensak



Self-contained stereo Pentron



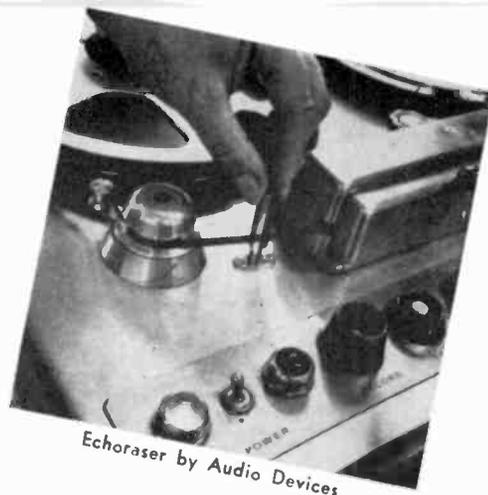
Transistorized portable by Ercona Corp.



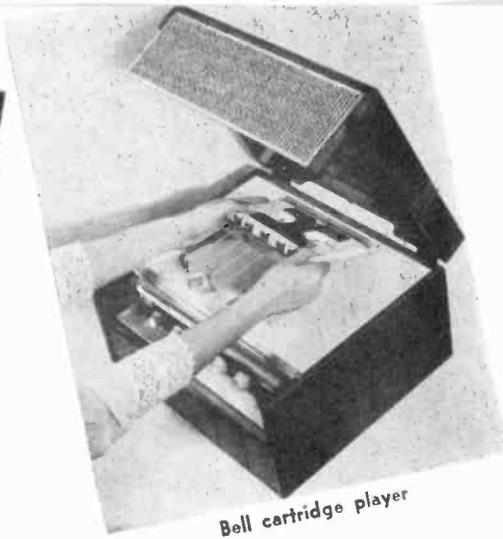
Cartridge adapter by Roberts



Telectro 4 track



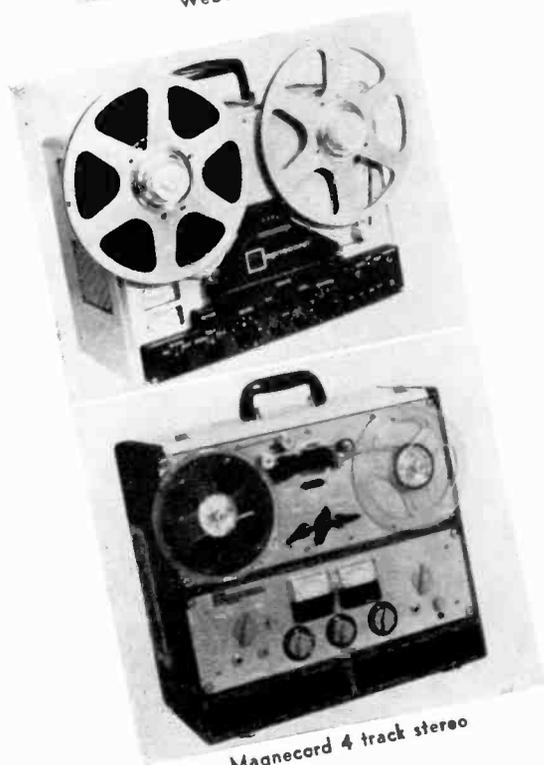
Echoraser by Audio Devices



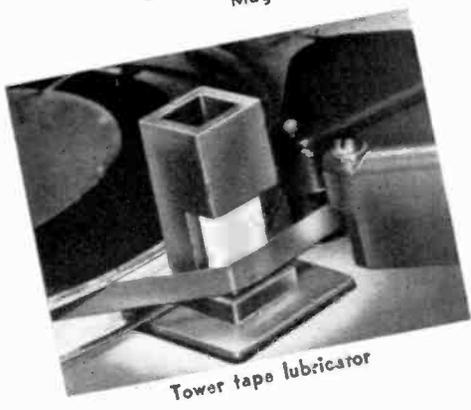
Bell cartridge player



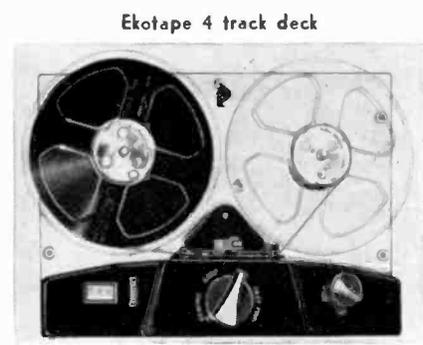
Webcor 4 track stereo



Magnecord 4 track stereo



Tower tape lubricator



Ekotape 4 track deck



Ampex 4 track stereo

ting them promptly. Later in the year SMS also announced that it too would be able to supply 4-track tapes to dealers. Both firms offered the tapes of all companies and during the latter part of the year such big names as London Records and Decca were added to those already putting out 4-track stereo tapes. This included 22 other firms and the catalog of four track tapes numbered over 400. All this happened in a few short months and augered well for 1960.

Along with this increased activity in 4-track was a resurgence of the market for regular 2-track stereo tapes. The start was slow but gradually gathered speed.

It was finally realized by all concerned that the cartridge concept would not mean the end of reel-to-reel recorders and when this fact sunk in, reel-to-reel recorders once again took off in sales that promised to equal or better the average 20% gain per year of the past five years.

During the year a number of exciting developments took place in recorders. First was the appearance on the market of lightweight machines in standard makes. This was in response to the demand for more portability by those who had to carry a machine from place to place.

Another innovation was the appearance of the Add-A-Track feature on the new V-M 720. The possibilities of this are far reaching and not limited to home use for the ability to play one

track while recording on another is very useful in educational uses of the recorder.

Likewise, the growing demand for truly portable self-contained units finally brought fruit with the introduction of the Steelman, of U. S. manufacturer, and the importation of such machines as the Sruzzi.

Electronic control, including rewind and back-up was brought out in the Wollensak 1600 series of recorders. This further extended the usefulness of the tape recorder in specialized applications as well as in regular home-type use.

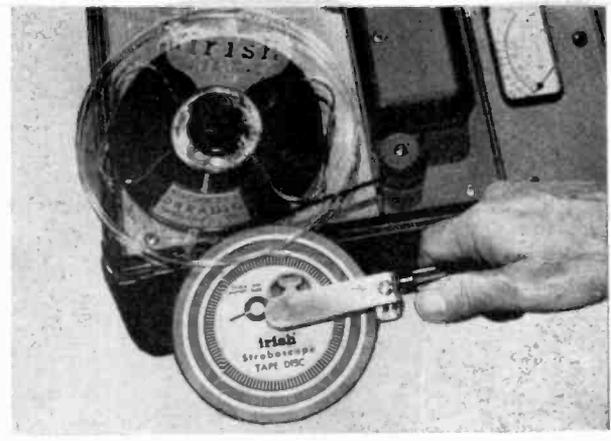
The RCA cartridge machine was "re-introduced" and immediately thereafter Bell Sound came out with six different models embodying the cartridge principal. The now-you-see-it, now-you-don't introduction of the cartridge machine, which was probably occasioned by production bottlenecks slowed its acceptance.

In addition to RCA, a number of firms made music available in cartridge form and Roberts Electronics brought out a cartridge adapter which rested on top of the recorder and used the recorder drive and electronics.

Tape took off into space in many forms perhaps the most dramatic of which was the broadcasting of the president's message from a whirling



Tandberg 4 track recorder



Irish tape timer



Norelco 4 track recorder

satellite in space. Tape also made possible the relaying of messages from one point on the earth to another using a tiny tape recorder in the satellite.

The appearance of stereo recorders in the popular price ranges by Pen-tron, Telectro, Ampex, Webcor, Nor-elco, Magnecord and others will enable home recordists to make stereo recordings of their own from discs, radio stereo broadcasts or regular home recordings.

Thus the hobby of tape recording has been broadened by this latest development and, with the lower price of stereo tapes, the ownership of a tape recorder becomes even more worthwhile.

Seldom heard about but heard all over was the amount of background music that was being played by tape machines. This segment of the industry used cartridge machines, such as the Waters-Conley unit, or machines such as the Crown Crownomatic that would play for 16 hours without repeating.

Newcomb brought cybernetics to the tape industry by fitting the design of their machine to the human functions instead of the more usual other way around.

An increasing number of recorders came out with transistorized electronics, decreasing the weight. This was mostly apparent in the self-contained portable machines although the influ-

ence of transistors was also beginning to be felt in other units.

For a regular home unit, transistors do not have enough advantages to outweigh their higher cost at the present time but for lightweight units, they are a must.

A number of devices such as Robins tape care kits, Irish's speed checker, Electro-Chemical's lubricant applicator and Audio Device's echo eraser made their appearance and made the tape recordist's life a bit easier.

Kits for conversion to 4 track were made available by most manufacturers.

1959 also saw tape beginning to take its rightful place in the field of education. Many schools installed language laboratories which used tape equipment as the base and new methods of teaching via tape were coming under close scrutiny from all angles.

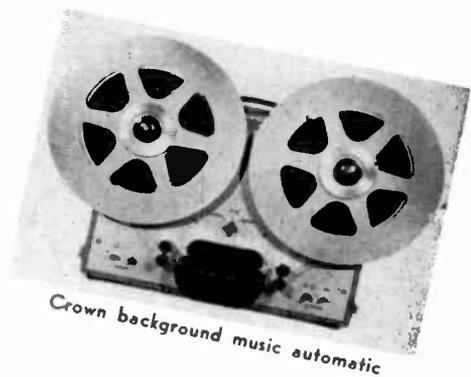
Two schools offered correspondence courses on tape, the Midwestern Broadcasting school in radio announcing and the Institute of Human Communication in public speaking. These institutions used taped lessons and the student's responses were likewise on tape. This, we are sure, is a development which will grow.

The activity of the last half of 1959 more than made up for the hangover from 1958 in the early months of the year.

Now that the field has settled on 4-track things will hum in 1960.



Steelman portable

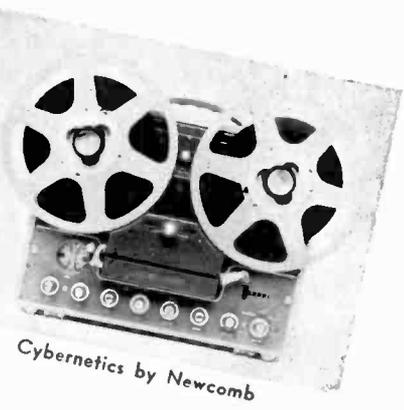


Crown background music automatic

Tape in schools



Transistorized Magnemite



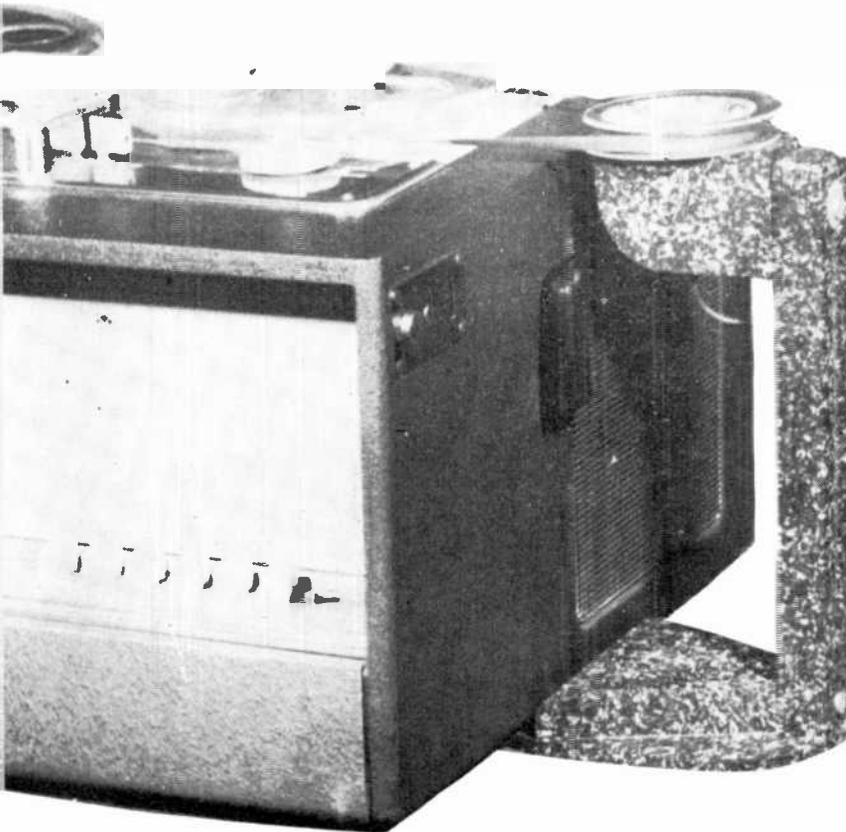
Cybernetics by Newcomb

New Slide Synchronizer Fits Any Recorder

... used in conjunction with any electrically operated slide projector it will enable slide shows to be presented automatically.

by

Jerry Brock



THE synchronization of color slides and taped narration is gaining in importance with each passing day.

Not only does it offer a cheap and effective means of conveying sight and sound, in contrast to the expensive color movies with sound, but it is something which anyone can do with a minimum of equipment.

It is valuable in the fields of education for lesson material may be prepared in this form by any teacher and

rerun as necessary without additional work on the teacher's part. It is likewise valuable for sales training or the presentation of new products to interested groups.

For home use, it offers a way to show your slides with music background, or voiced narration in a professional manner that is sure to entertain your audience.

Just recently a very simple synchronizer came on the market made by the Meston Company which will fit any tape recorder. It comes knocked-down and can be assembled in five minutes, or less with only a screwdriver.

As the pictures show, it is basically a stand, the base of which slips under the recorder to hold it steady. The contact head height is adjustable to suit the individual recorder.

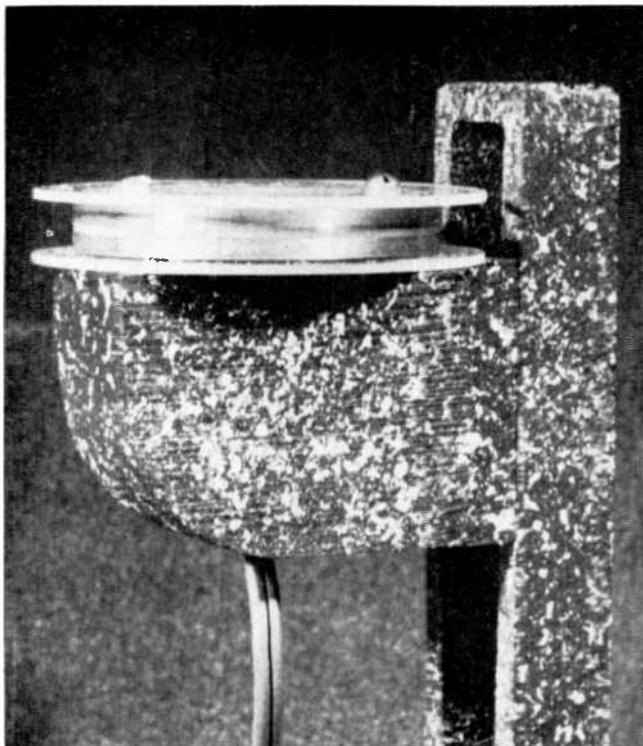
Metallic tabs are placed on the shiny side of the tape at each point in the narration where a slide change is desired. Contact is made between the two brass contact plates on the synchronizer head by these tabs and the resultant closing of the circuit is conveyed to an automatic slide projector by means of the connecting cord.

Since the metallic tabs are applied to the back, or shiny side of the tape, the tape must be given a twist as it leaves the reel or the head slot (depending upon which side of the recorder you have placed the synchronizer) so that side rubs against the contacts.

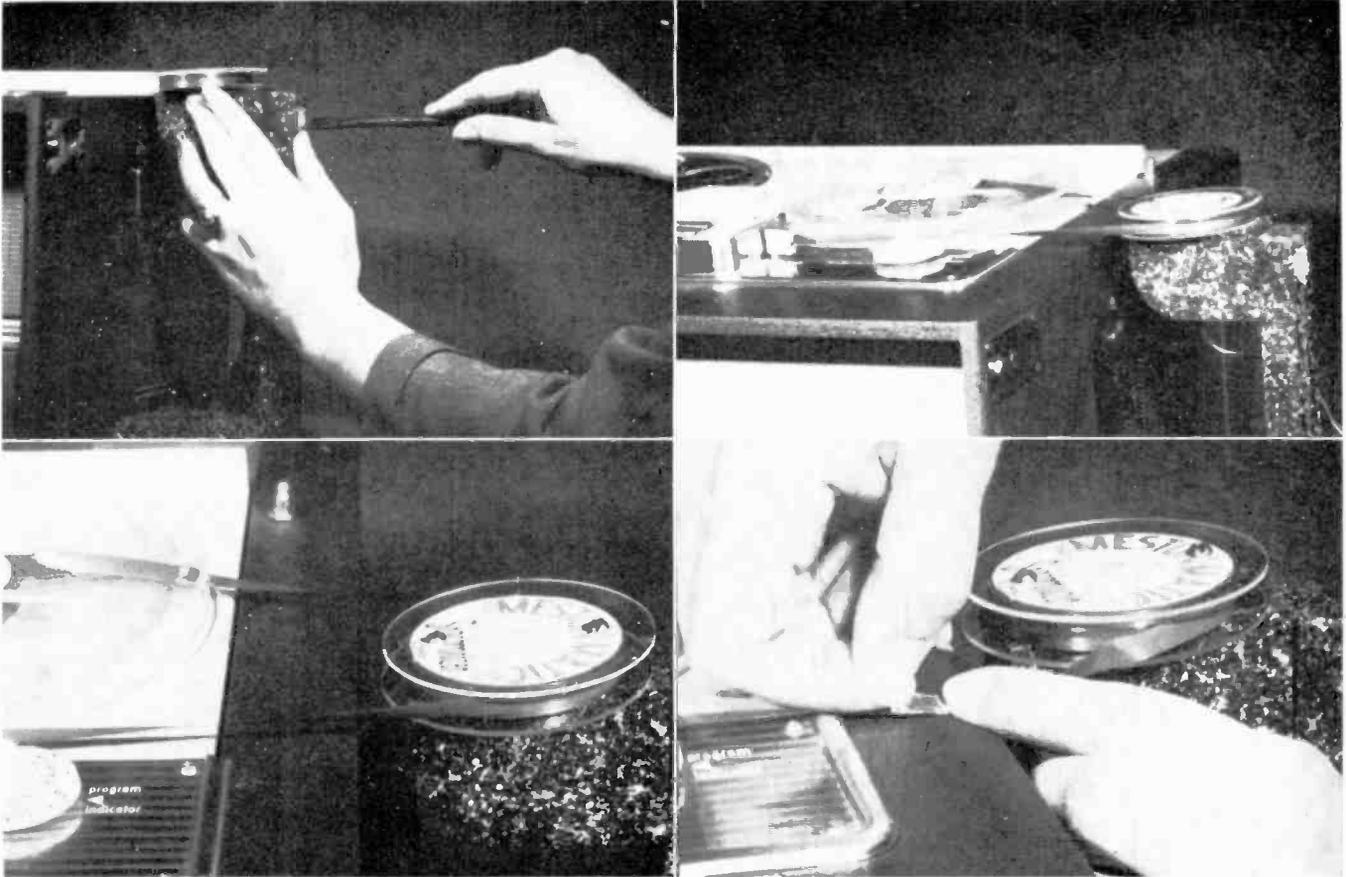
Another reverse twist as it leaves the synchronizer head will bring it right again on the reel.

The tabs should be about a half inch in length but may be shorter or longer, depending upon the amount of contact time necessary to operate the projector.

The metallic tape has an adhesive backing and it may



Close-up of the Meston Synchronomatic head showing the two brass contact strips which, when brought into contact with the metallic tab on the tape, operate the slide projector.



Upper left: after the unit is assembled, the synchronizer head is brought up to the level of the tape reel. The screw is then tightened to hold this position. Upper right: The tape runs from the head slot around the synchronizer head and back to the take-up reel. The synchronizer may also be placed so the tape is contacted before the head is reached. Lower left: showing how the tape is twisted as it leaves the head and again after leaving the synchronizer head. Lower right: applying the metallic tape tab.

be peeled off if the tape is used for another recording.

The best way to make up such a program is to first select and arrange the slides in the order in which you want them to be shown. Once this is done, the script should be written out to cover each slide in the sequence.

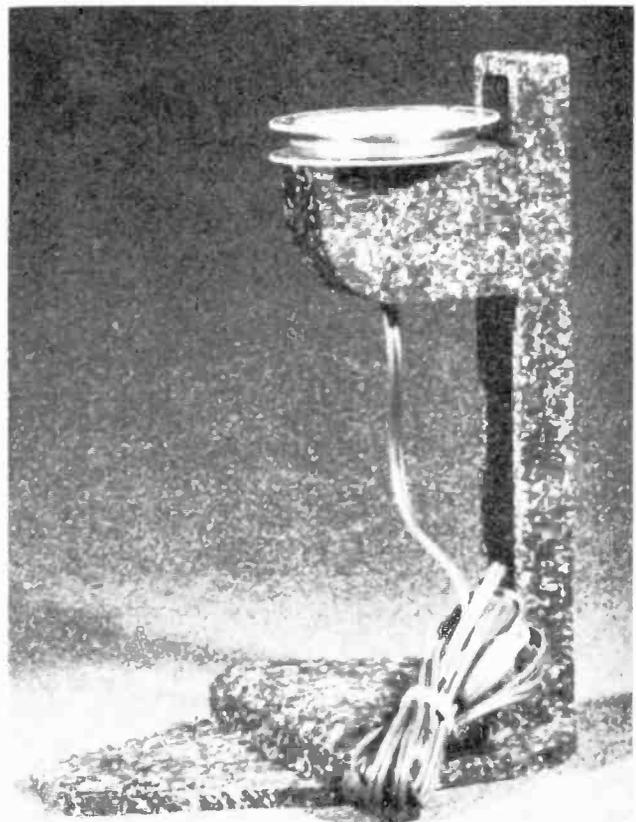
The script should then be recorded using your recorder. Enough time should be allowed between each section for the operation of the projector. If the script is read too rapidly you may find the projector lagging a bit in getting each slide on the screen.

Background music carried behind the voice and rising in volume when there is no talking makes a presentation more attractive. This may be added using a turntable and a mixer, or lacking a mixer, you may play music in the room as the voice is being recorded.

Once the narration and/or background music has been recorded, the tape is rewound and run through in play. Check the narration carefully for any flubs and make any necessary corrections.

When the narration is satisfactory, run it through the recorder with the synchronizer hooked up and the slides in the projector. At each point where a slide is to be changed, put a tab on the tape. After the tab is placed, let it run over the synchronizer head and accuate the projector. This will serve as a double check on both the position of the tab and seeing that the tab is of the proper length to make the projector work every time.

This completes the job and from now on every showing will be perfectly narrated, perfectly timed and no more work for you.



The Meston Synchronomatic after assembly. Only two screws hold the pieces together and it can be assembled in less than five minutes. Base slides under recorder to hold it in place.

**Beginning a new series of articles
on tape recorder specifications:**

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 food 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° C. and boils at 100° C. with the fluid at a stipulated atmospheric pressure. The space in between has been whacked into 100 units.

But 0° on the Fahrenheit scale isn't anything specific—nothing happens. Fahrenheit just picked a workable zero point for his scale and went on from there. Water freezes at 32° and boils at 212° on his scale. Zero degrees F. is neither the absence of heat, which has been placed at minus 460° 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 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 0 db is not a loud sound, nor a weak one just as 0° 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 times and 60 db 1,000,000 times.

It is interesting to note the various loudnesses in db's 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 tinkling 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

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.

reproduced either exactly as recorded or at no greater change than is barely perceptible to the human ear. The plus or minus 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 wherever. So both the low G and the high, high C will be reproduced within 3 db of each other.

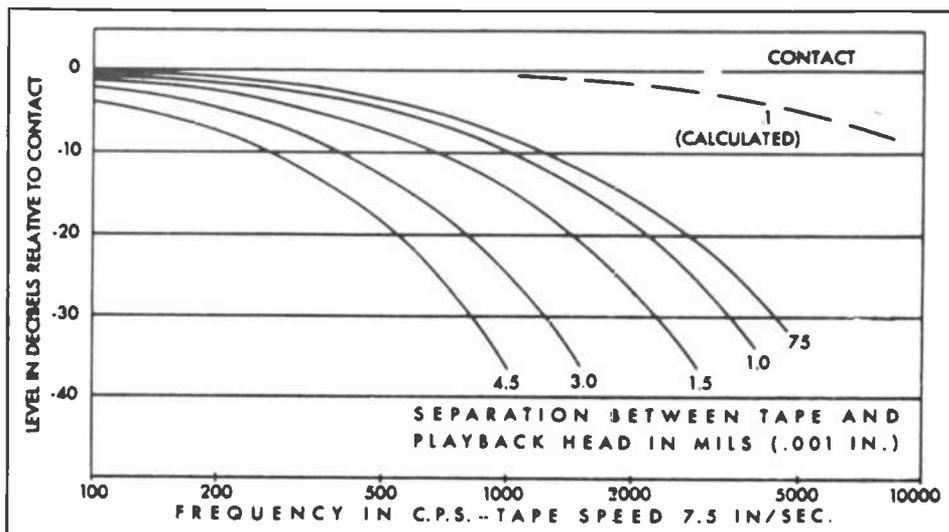
Some of the finer instruments hold the specifications to within two db's which is not discernible to the ear at all. Only a sensitive meter will show it.

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" db's indicate how much below the reference point the sound lies and plus db's 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.

At right is a chart showing how the db "thermometer" is useful. The chart shows the value of keeping your head clean. The 0 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 output 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.



NEW PRODUCT REPORT

STA **F** OK STED



NORELCO STEREO CONTINENTAL

... features 4-track record and playback, monitoring jack, and mixing. Has three speeds, stereo mike.

THE Norelco Stereo Continental 400 is a completely self-contained unit with both stereo record and playback. It has dual preamplifiers and amplifiers for playback and dual recording amplifiers for record.

It incorporates the latest in 4 track heads and will either record monaurally one track at a time or stereo in both directions.

It is a three-speed machine having $1\frac{7}{8}$, $3\frac{3}{4}$ and $7\frac{1}{2}$ ips speeds with a frequency response of 50 to 7000 at the lowest speed, 50 to 14000 at $3\frac{3}{4}$ and 50 to 18000 at $7\frac{1}{2}$.

All stereo recorders will of necessity have more controls and appear to the average person as being more complicated and perhaps beyond their comprehension.

This machine has a complete set of controls but it is one of the simplest machines to operate.

For playback, you need only push the key for the appropriate speed, push the play key and adjust the volume to suit your taste—that is no more than on the simplest of recorders. The only other thing which must be done is to put the selector switch to the appropriate position—either monaural or stereo.

The principal controls are found in the push keys shown in the photo on the facing page. The record control has an interlock to prevent accidental erasure. Next to it is the pause key with its release, a small button above it. This we found to be a very handy gadget indeed.

For one thing, it enables you to plug in the microphone and adjust the recording volume before you move the tape. It also enables you to start and stop the tape at any point while keeping the recorder in readiness to resume either playing or recording. This is very handy for the elimination of commercials when recording off the air.

The recording volume indicator is of the bar of light type. In this unit there is a central red line which the light approaches from either end. Proper recording level is attained when the light just touches the bar on peaks. A magnifying lens over the indicator makes it very easy to see and it may be clearly seen in a brightly lighted room with no difficulty.

The program index counter located at the top of the machine is a four digit unit which can be reset.

There are separate volume controls for microphone and radio/phono in

Product: Norelco Stereo Continental 400

Distributor: North American Philips, Inc., 230 Duffy Ave., Hicksville, L. I., N. Y.

Price: \$399.50

recording and thus it is possible to mix two sources of sound and record them on the tape.

The selector switch enables the user to put the machine in either monaural record and playback or stereo record and playback.

For monophonic record, the monaural switch is placed in the R + L position and the selector switch set to the desired track.

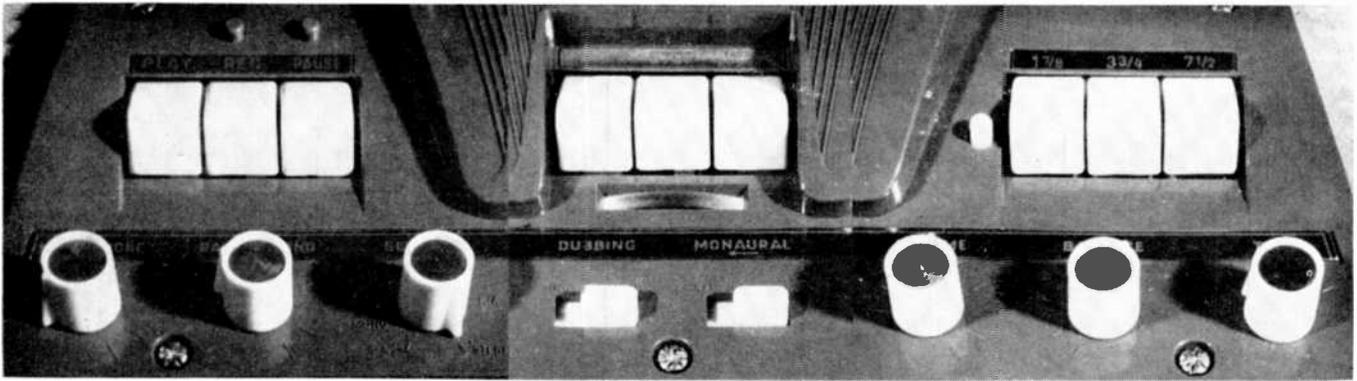
The microphone is plugged in and the left side of it used. If recording from a radio or phonograph, the accessory cord should be plugged into the left input channel.

For stereo recording, the selector switch is set to stereo and the mike plugged in. If a recording is made from radio or records, then each lead is plugged into its appropriate jack on the input panel.

The microphone furnished with this unit is most unusual. It consists of a single unit which contains two pickup cartridges. These are shielded from each other within the case.



The Continental 400 with the case closed. Recorder is finished in green and gold with white control knobs. Speaker for second stereo channel is contained in lid. Unit is complete.



The controls. Upper push keys, first group at left, play, record and interlock, pause and release. Middle group, fast rewind, stop and fast forward. Right, small button is shut-off, keys are speed control for 1 7/8 ips., 3 3/4 and 7 1/2. Knobs from left to right are: microphone volume control, radio/phono volume control, selector. Bars are dubbing control and selector for monaural operation. At right are playback volume control, balance control and ganged tone control. Below middle group of keys can be seen the record volume indicator.

Using this mike you can't make a bad stereo recording, you will get stereo on your first try. As your skill as a recordist increases, you might want to get into the use of two mikes and this you can do by means of an accessory junction box and mikes.

There is an arrow on the top of the mike and this should be pointed toward the center of the sound source.

Of course, it is possible to get a wider spread pickup with two mikes but it is just as likely, without sufficient knowledge, to so place the mikes that you get a poor stereo recording. This mike was designed for average use.

The balance control is centered with normal balance and should be turned toward the weaker channel to raise its

volume if necessary. Thus the sound level may be set by the regular volume control and then the balance between the two speakers established without disturbing it.

The tone control is ganged with the upper part of the knob controlling the right channel and the lower part the left. At midway, the response is flat. Toward the left it boosts the bass and to the right it boosts the treble.

There is no "on-off" switch on this machine. To prepare it for recording or playing back you merely depress the proper speed key and this turns on the recorder. To turn it off, you depress the small button to the left of the speed key group of controls.

By using a pair of 1000 ohm stereo headphones plugged into the monitoring jack it is possible to hear what is being put on the tape as it is recorded. This is a very worthwhile feature, especially if two separate mikes are used for stereo recording. You can also hear the sound if recording is done monaurally.

There is a dubbing switch on the unit which permits recording one

sound over the other but since there is no way of hearing the first sound while recording the second it is not of much use. This is the one thing for which we did not care on the machine

An automatic tape stop is incorporated and to actuate it a 6" length of aluminum foil is attached to the tape about three feet from the end.

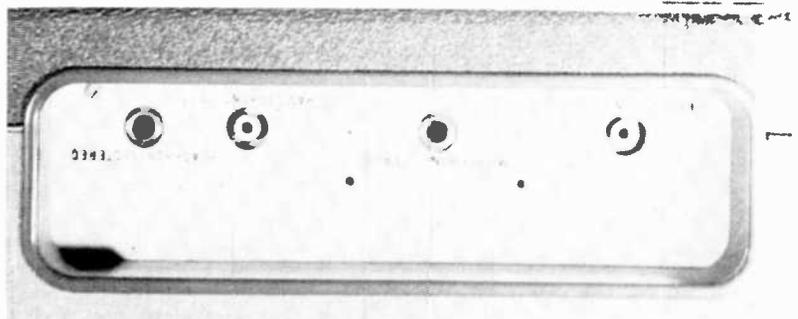
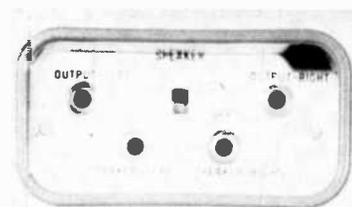
In testing this machine we found it to be of fine workmanship throughout. It is quiet in operation and simple to use, despite the apparent number of controls.

Its output volume is adequate and the sound is excellent. We also liked the fact that it is a complete unit with no other amplifiers or speakers needed.

If you are planning the purchase of a stereo recorder we believe it would be wise for you to consider this unit.

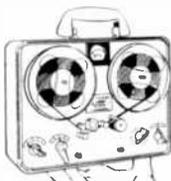


A stereo mike containing two separate mike cartridges is furnished with the unit. Arrow on top should be pointed toward middle of sound when a recording is made.



Upper: output panel on side of recorder: Upper jacks are for right and left feed to external amplifier. Center switch cuts speaker in unit when desired. Lower jacks are speaker outputs for left and right. External speaker provided with machine is plugged into right channel. These jacks are feeds from the machine's amplifiers. Lower: input panel on recorder. Has radio/phono left and right, jack for monitoring with stereo headphones and jack to take stereo mike plug.

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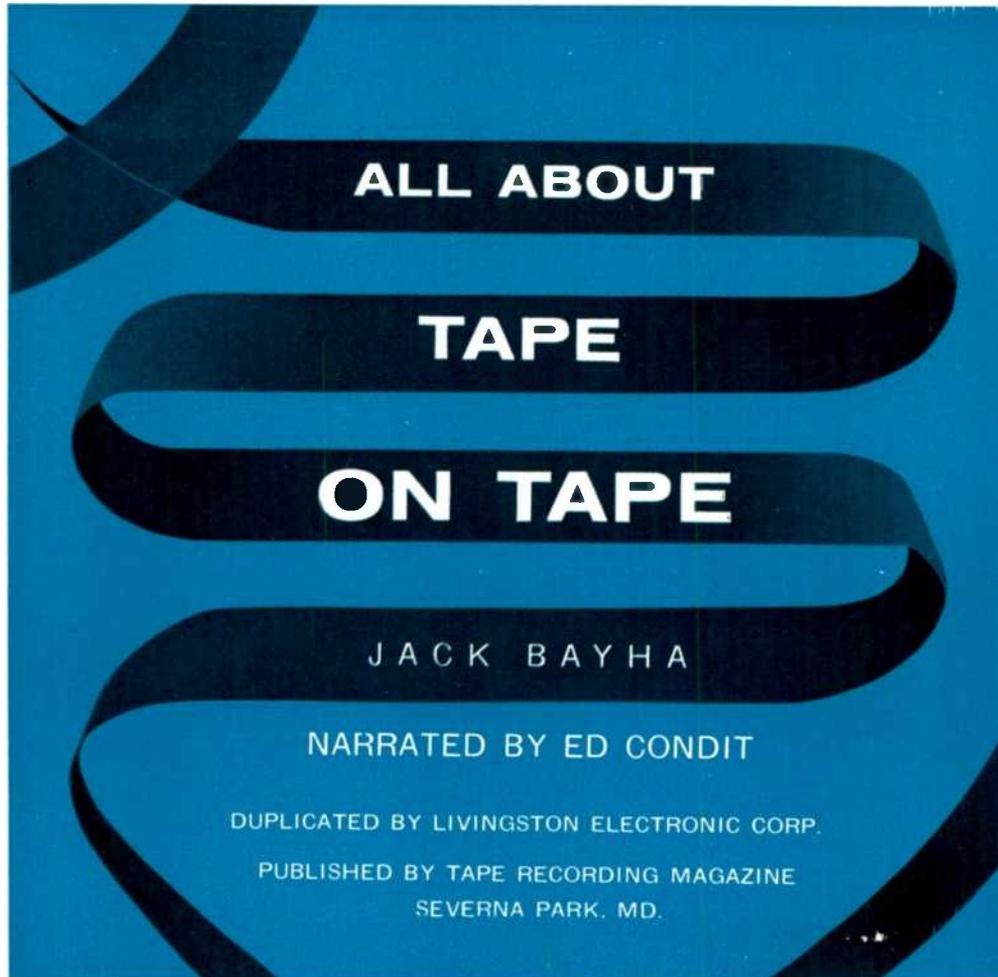
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