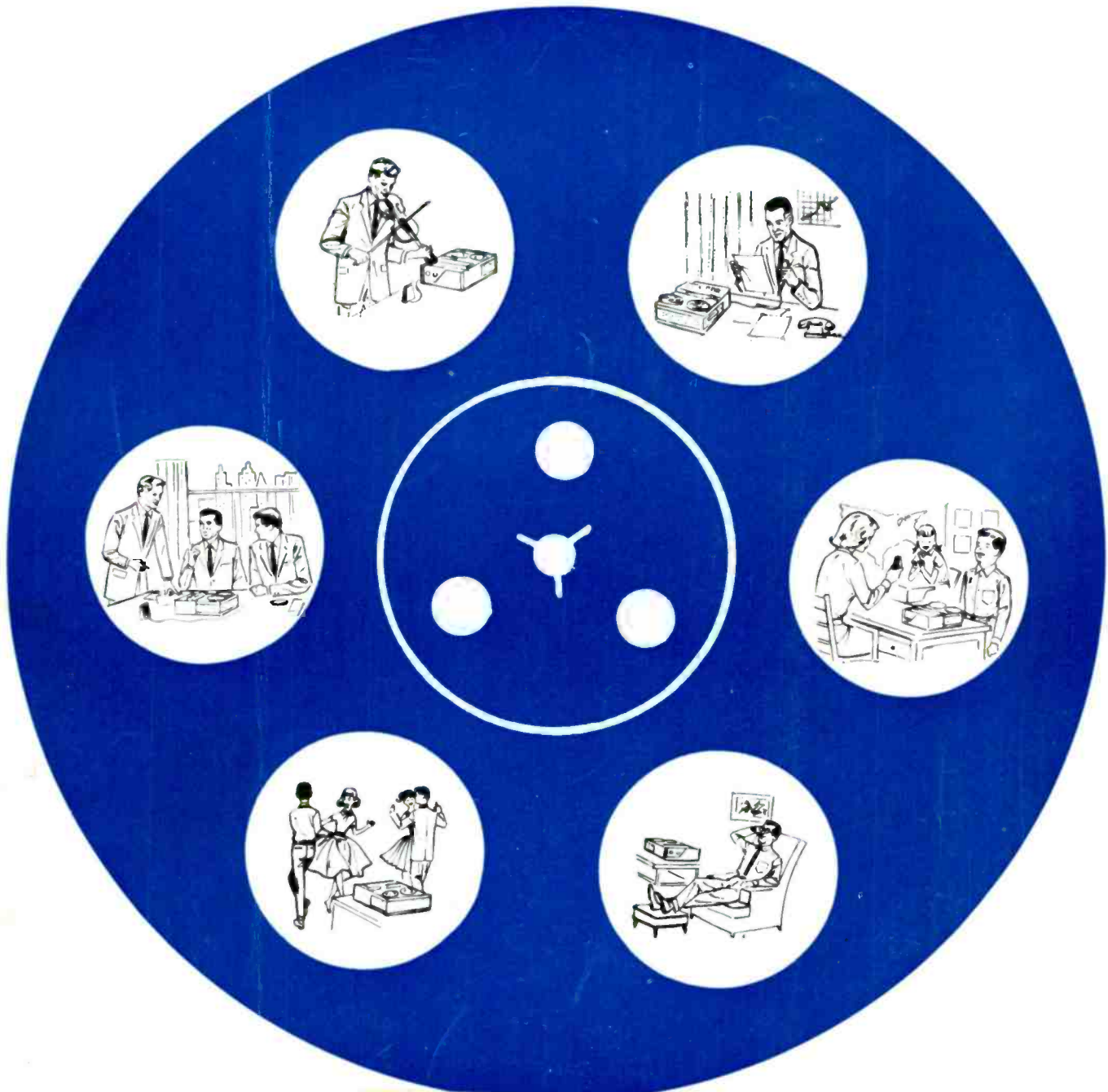


TAPE RECORDING



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HI-FI

GUARANTEED SPECIFICATIONS—Playing time up to 4 hours, using LP tape 3 3/4 ips, 7" reel. Frequency Response —Upper Channel: 40-15,000 cps. ± 3db. at 7 1/2 ips.; 40-8,000 cps. ± 3db. at 3 3/4 ips.; Lower Channel: 40-15,000 cps. ± 3db. at 7 1/2 ips. (NARTB Standard Equalization). Wow and flutter less than 0.3%; Signal to noise ratio greater than 50 db.; Signal from lower channel pre-amp output 0.5—1.5 volts; Crosstalk—50 db.



RI

960
AMPEX
STEREOPHONIC RECORDER REPRODUCER

CROSTALK

from the Editors

WE GET SICK and tired of hearing of the "difficulties" of threading a tape recorder. This statement has appeared time and again in many places, so often that some people actually believe it.

* * * * *

ANYONE WHO doesn't have more than one thumb on each hand can load a recorder and thread the tape mighty fast. And, so far as the woman's angle is concerned, any gal who can thread a sewing machine will have no trouble with a tape recorder.

* * * * *

NO ONE MENTIONS the difficulties with record players, of threading record holes on bent shafts, of trying to locate the first groove on the record when you've misplaced your bifocals, of keeping the needle free of grit that grinds away the grooves, of the care necessary to keep a record in top condition, of the wiping cloths, of anti-static brushes, of record sprays in pressurized cans, of tiny scales to measure the stylus pressure. of turntable rumble, strobe speed checks and the like. This is all taken for granted. But to place a piece of plastic ribbon in a groove and attach it to a reel hub. Brother that's a job . . . so they say.

* * * * *

SORRY KIDS but we won't buy that loose talk. Tape is not hard to thread and it never has been. Its care is simple and convenient. And, to top it all off—it sounds better . . . and you can record on it, too.

* * * * *

WE GET A KICK out of some of the ads for hi-fi equipment. Most of them are in an atmosphere of pleasant living where there are no chairs, everyone sits on the floor. Guess where the records are shown. Lying about on the rugs. At least you could do this with tape without harm. Maybe the ad men should switch to tape.

* * * * *

WHY DO THEY put handles on tape recorders? The obvious answer is to make them portable. Anything with a handle on it is portable, even though, with some models, when you pick them up your feet sink in the pavement up to the ankles. But weight aside, where are the models for the living room?

* * * * *

WE NOTICED THIS at the music show in New York. Manufacturers of phonos wrapped beautiful cabinets around their machinery, cabinets that were works of art, fine woods, wonderful finishes. Some of the complete music systems jobs did include a tape recorder along with an AM-FM tuner, and record player. With one sole exception we failed to note a single recorder in a fine cabinet comparable to the disc units.

* * * * *

LET US NOT kid ourselves. The little woman has a lot to say about what is bought for the home, and especially what is put in the living room. Something that has eye appeal is already half sold so far as she is concerned. The auto makers found this out the hard way. While papa looked under the hood and discussed tires and mileage, mama glimpsed the upholstery, considered the effect of the paint job on the neighbors, etc.

* * * * *

NOW THAT recorded tape is about to take its rightful place as the medium for music in the home, this industry had better start to provide living room recorders to play it on.

TAPE IS VERSATILE. This is the theme of the Magnetic Recording Industry and also of our cover for this month. While most of the noise is made about playing music, or recording it, there are still a vast number of uses for a recorder. That's the beautiful part of it—not only does it play music better but it can do other jobs as well.

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HI-FI

TAPE RECORDING

VOL. 6 NO. 10

SEPTEMBER 1959

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New Stereo Tape Recorder

Cybernetically engineered for intuitive operation

Fluid smooth, whisper quiet...with feather-light touch you control tape movement with the central joystick of your Newcomb SM-310. This exciting new stereophonic record-playback tape machine has been cybernetically engineered to fit you. Intuitively, you sense how to operate this handsome instrument. The natural movement, you find, is the correct movement. Loading is utterly simple. It is almost impossible to make a mistake. The transport handles tape with remarkable gentleness, avoids stretch and spilling.

The Newcomb SM-310 records stereophonically live from microphones or from broadcast or recorded material. There are

mixing controls on both channels for combining "mike" and "line." The SM-310 records and plays back half-track monaural also. So versatile is the machine that you may record and playback on either or both channels in the same direction.

The SM-310 is a truly portable unit which combines the features required by the professional and desired by the amateur for on-location making of master stereo tapes. For example, the SM-310 takes reels up to 10½", has two lighted recording level meters arranged pointer-to-pointer for ready comparison, has a 4 digit counter to pinpoint position without repeating on any size reel. For playback there are a "balance" control and a

ganged volume control. Head cover removes, giving direct access to tape for easy editing.

The Newcomb SM-310 is a sleek, rugged, compact machine, discreetly styled by an eminent industrial designer in easy-to-live-with shades of warm gray and satin aluminum...a gratifying, precision instrument for the creative individual who is deep in the art of tape recording. Eight, tightly-spaced pages are required in a new brochure to describe the SM-310 in detail; send for your free copy.

Advance showings in New York and Los Angeles proves an unprecedented demand for this instrument. We urge those who desire early delivery to place their orders now.



NEWCOMB AUDIO PRODUCTS CO., DEPT. B-9, 6824 LEXINGTON AVENUE, HOLLYWOOD 38, CALIFORNIA

NEW TAPES

CLASSICAL BALLETS

COPLAND'S BILLY THE KID AND RODEO
Morton Gould and His Orchestra
RCA KSC-6000
4-track stereo, 3¾ ips, cartridge
\$9.95 . . . 44 mins.

We appreciate fully the masterful musical expressions Copland wrings forth from these two Western-type ballets. This composer must have deep-rooted feelings, plus the ability to skillfully give them to others through music. He is immensely creative.

Perhaps the Beatniks aren't so "way out" after all when they claim they "feel" music. Anyone can let musical melodies, harmonies, rhythm, arrangements go into one ear and pass unnoticed out the other, but they lose so much in the transition. This they do not realize. Only those who linger on the thoughts provoked by the music, whether they be the same as the composers or not, thoroughly enjoy what the carefully placed notes on a musical bar express.

With these ballets, however, we are told what the composer is conveying, and following the story through the music is sheer delight. We would suggest you read the accompanying sheet before playing the tape.

Billy The Kid has an excitement-packed Western plot with a sad ending, and with the pioneer spirit of the frontier prominently displayed.

Rodeo, on the other hand, has a lighter plot in which Cowgirl wins Cowboy and also has a livelier score. We liked the honky-tonk piano in the Honky Tonk Interlude.

We find the fidelity on this cartridge tape to be more in line with the excellence of RCA's recording engineering skill and thoroughly enjoyed it.

SYMPHONIES MENDELSSOHN'S ITALIAN AND REFORMATION SYMPHONIES

Sequence A: Symphony No. 5 in D Minor,
Op. 107 ("Reformation")
Sequence B: Symphony No. 4 in A,
Op. 90 ("Italian")

Charles Munch conducting Boston Symphony
Orchestra
RCA KCS-6006
4-track stereo, 3¾ ips, cartridge
\$9.95 . . . 55 mins.

Shortly after Mendelssohn's twentieth birthday he toured Europe. Between pleasures during his travels he composed three symphonies, two of which we hear on this release.

"Reformation" was composed while Mendelssohn was in North Wales in September 1829. The author had in mind

the celebration planned the following year of the Tercentenary of the Augsburg Confession, the drawing up of the constitution of the Protestant faith. As it turned out, the anniversary celebration was not held and the Symphony was introduced as a concert piece two years later.

The sunshine of Naples put Mendelssohn in the mood for the "Italian" Symphony. The finale of this symphony is a de-latinized saltarello (Italian dance).

These compositions are powerful works, dynamically interpreted by the Boston Symphony Orchestra. You think of this orchestra as one, rather than a group—there is such a placid smoothness when they play.

The pickup from all sections is expertly controlled and there is an overall orchestral tone which is neither too strong nor too weak, but quite firm.

Any symphony must be listened to in an undisturbed atmosphere through which the music can filter unhindered to really be appreciated. We found this tape to be a well-balanced, well-recorded release which should be pleasing to collectors of classics.

WALTZES VIENNA

Sequence A: Weber: Invitation to the
Dance; Johann Strauss, Jr.: Morning
Papers

Sequence B: Johann Strauss, Jr.: On the
Beautiful Blue Danube; Richard Strauss,
Waltzes from "Der Rosenkavalier"

Chicago Symphony Orchestra, Fritz Reiner,
conductor
RCA KCS-4006
4-track stereo, 3¾ ips, cartridge
\$8.95 . . . 38 mins.

Vienna is a city of music and its name is synonymous with the waltz. The waltz was at first nixed by society, but it was just too good to be ignored. Its popularity grew rapidly and soon people all over Vienna were dancing, whistling, humming, singing the ¾ time compositions.

Fritz Reiner conducts with a magnetism which draws from the musicians the depth, orchestral tone, the force, the melodic blandness and overall harmonious sweep that makes for a fine musical production of these beautiful waltzes. The strings, percussion, horns, even the crystal clear ring of the triangle are artfully blended into a musical extravaganza.

We were especially noting the Waltzes "Der Rosenkavalier" and believe the best descriptive adjective we could find would be "powerful." The stirring impact the tape concludes with leaves the music still ringing in your ears.

To borrow from Mr. Winchell, orchids to you Mr. Reiner, Chicago Symphony, and RCA for this simply delicious, rich musical reproduction.

OPERAS MEMORIES OF POPULAR OPERAS

Un bel di (Madama Butterfly), Waltz from "Faust", My Heart at Thy Sweet Voice (Samson and Delilah), Barcarolle (The Tales of Hoffman), Che gelida manina (La Boheme), Musetta's Waltz (La Boheme)

George Feyer, piano
RCA BPS-201
2-track stereo, 7½ ips, reel-to-reel

INDUSTRIAL

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& A

V

AUDIO-
VISUAL

EXHIBITION

The 3rd Annual

Presented by
INDUSTRIAL EXHIBITIONS, Inc. 17 East 45th St., New York City

\$6.95 18 mins.

Our first impression here is that the performer, George Feyer, is truly an artist who immensely enjoys his hours spent at the piano. You have a rather cozy responsiveness as if you were comfortably seated in a warm living room listening to Mr. Feyer leisurely playing close by.

So often, when reviewing tapes, we have mentioned that too much of a good thing eventually lessens one's interest in it and such seems to be the case here. After a bit you begin to wish you could hear a violin or some other instrument join in.

We feel also that the arias and pieces played here can never really be done justice unless played by a full orchestra.

We believe the notion that the sound from a piano is difficult to record is gradually diminishing what with the expert facilities and equipment now available. In any event, the fidelity and clearness reproduced here is rated tops.

SHOWS

PORGY AND BESS

Overture, Summertime, A Woman Is a Sometime Thing, The Wake: Gone, Gone, Gone; Porgy's Prayer, My Man's Gone Now, I Got Plenty o' Nothin', Bess, You Is My Woman Now, Morning; Catfish Row, I Can't Sit Down, It Ain't Necessarily So, I Ain't Got No Shame, What You Want with Bess?, Street Cries; Strawberry Woman; Crab Man, I Loves You, Porgy, A Red Headed Woman, Clara, Clara, There's a Boat That's Leavin' Soon for New York, Oh, Where's My Bess?, I'm on My Way

Original Sound Track recording from the motion picture

COLUMBIA TOB 51 (double reel)
2-track stereo, 7½ ips, reel-to-reel
\$18.95... 55 mins.

Porgy and Bess has been with us since its introduction in 1935 and now it has finally reached the motion picture screen with a brilliant cast and magnificent music giving it impact. This great folk opera story is adapted from DuBose Heyward's novel and DuBose and Dorothy Heyward's play. In the movie Porgy is portrayed by Sidney Poitier and Bess by Dorothy Dandridge, with Pearl Bailey as Maria and Sammy Davis, Jr. as Sportin' Life.

The human emotions in the struggle for happiness by a crippled beggar and a "wicked, loose-living" woman are expressed in the superb music. Many of the songs are most familiar, such as Summertime, I Got Plenty o' Nothin', and It Ain't Necessarily So.

The intensity and power George Gershwin gave to the music, coupled with the deep feeling with which it is sung on this recording are a desirable combination indeed.

So many musical shows are filled with catchy, bright music which is entirely likable, but lacks feeling. Not so with Porgy and Bess.

Columbia's engineers have added their competent dexterity to the excellent recording equipment and superior reproduction of tape to come up with a real gem. JAMAICA

Sequence A: Introduction, Savannah, Savannah's Wedding, Pretty to Walk

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With, Push the Button, Incompatibility, Little Biscuit, Cocomat Sweet
Sequence B: Take It Slow, Joe, Yankee Dollar, Monkey in the Mango Tree, Ain't It the Truth, Leave the Atom Alone
Napoleon, I Don't Think I'll End It All Today

An original cast recording featuring Lena Horne and Ricardo Montalban
RCA KPS-4002
4-track stereo, 3¾ ips cartridge
\$8.95... 44 mins.

We have often wondered why some Broadway show music is recorded at all. While the show itself, with the glittering stage sets, costumes, performers, and appropriate music may be a wondrous spectacle, to those who have not had the opportunity to attend the real thing, just hearing the music does not stir too much enthusiasm. Such is our feeling about most of the music from Jamaica.

The music could hardly touch that from "South Pacific," "Gigi," "My Fair Lady," or "Oklahoma" to mention a few. We have no doubt about the attraction and pull Jamaica has to the public as a stage musical, but as simply music in itself Jamaica is not nearly as popular.

We concur with most all reviews of this production, however, in that Lena Horne sings her share of the Harold Arlen score like she had felt it before it was written. She is a superb entertainer whom we believe possesses the quality associated with Judy Garland. The inner expressions pour forth and are heard in the lyrics she alternately purrs, or dynamically belts out.

RCA has recorded this with a skillful clarity of detail—very clean and clear.

POPULAR
LENA HORNE AT THE WALDORF-ASTORIA

Sequence A: Today I Love Everybody.

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Let Me Love You, Come Runnin', Mood Indigo, I'm Beginning to See the Light, Honeysuckle Rose
Sequence B: How You Say It, Day In-Day Out, New-Fangled Tango, I Love to Love, From This Moment On

With Nat Brandwynne's Orchestra, conducted by Lennie Hayton
RCA KPS-3005

4-track stereo, 3 $\frac{3}{4}$ ips, cartridge
\$6.95... 32 mins.

Lena Horne opened at the Empire Room of the Waldorf-Astoria on December 31, 1956 and proceeded to break attendance records for the next eight weeks. One evening RCA Victor sent its engineers down to catch her act and as a result were able to capture her electric presentation and the customer-audience's enthusiastic reception and appreciation.

Miss Horne has a most versatile voice with a wide range, and a style no-one could replace. Her pronunciation is most distinct and she can sing in an extremely fast tempo without losing any words or melody. At times she sizzles, and we mean sizzles.

Some of the selections Lena renders on this tape are slated more for adult listening.

RCA's engineers may have been outside the home studio, but this nevertheless did not lessen the recording perfection they usually achieve.

SATURDAY NIGHT WITH MR. C

Sequence A: Theme (Dream Along With Me); Accentuate the Positive; Letters (Medley: Almost Like Being in Love, Little Man, You've Had a Busy Day, Gypsy in My Soul, and Whiffenpoof Song); Red Sails in the Sunset

Sequence B: Birth of the Blues; When I Fall in Love; Come Rain or Come Shine; It Had To Be You; Twilight on the Trail
Perry Como with Mitchell Ayres Orchestra and The Ray Charles Singers

RCA KPS-3015

4-track stereo, 3 $\frac{3}{4}$ ips, cartridge
\$6.95... 30 mins.

Perry—we love you. Mr. Como's popularity with folks of all ages and likes cannot be denied. The naturalness and easy-swinging smoothness this performer maintains makes for pleasant listening any time.

Congratulations RCA for releasing some of the better-known, and liked, stars on tape. We'd like to see and hear more.

We like the variety of this tape's selections as well as Mitchell Ayres' orchestra and the Ray Charles Singers backing.

Combines top talent, appropriate music, excellent recording, perfect reproduction fidelity—what more could you ask for.

THE NEW GLENN MILLER ORCHESTRA IN HI FI

Sequence A: Don't Be That Way, I'm Thrilled, Whistle Stop, Mine and Anything Goes

Sequence B: I Almost Lost My Mind, Accentuate the Positive, On the Street Where You Live, Lullaby of Birdland

Directed by Ray McKinley

RCA KPS-3007

4-track stereo, 3 $\frac{3}{4}$ ips, cartridge
\$6.95... 31 mins.

Glenn Miller was without a doubt one of the greatest dance band leaders of his

time, certainly he was one of the most popular. After his fateful and sudden disappearance in a plane which faded into nonexistence during the Second World War, his friend, Ray McKinley, proceeded to carry on his music.

While the Miller touch is not evident, much of the Miller style has remained. Mr. McKinley has added his own touch, which is only natural. He is due credit for his keeping much of the band together and for his unending enthusiasm for good showmanship.

This tape is grand for dancing. We note, however, that at times you are enjoyably listening to a rather soft passage and quite suddenly are rocked from a blaring trumpet or raucous boom from the drums.

We felt that we should keep our hand on the volume control and alternately increase or decrease the sound according to the prominent instruments. Our recollections of the old Miller group include a delightful air of smoothness, even with the brass lending its touches when needed.

Mr. McKinley's vocal talents leave much to be desired.

We feel the clear, precise fidelity heretofore found on a great percentage of RCA's tapes is somewhat lacking on this cartridge. That extra precision of RCA's previous tapes is just not there.

ESQUIVEL EXPLORING NEW SOUNDS IN STEREO

My Blue Heaven, Bella Mora, Boulevard of Broken Dreams, Lazy Bones, Spellbound Esquivel and His Orchestra
RCA APS-226

2-track stereo, 7 $\frac{1}{2}$ ips, reel-to-reel
\$4.95... 15 mins.

For those tape collectors who like the unusual, here we have another addition. The popular Esquivel has combined his performing talent with his arranging skills and come up with a tape of five selections which are played like we've never heard before. Some of the effects are eerie and weird. Some are most appealing, others just don't seem to belong at all.

Now while all this new fal-de-ral may be okay to a certain extent, we believe if we listened to too much of this sort of thing, we'd soon be resting upon a head-shrinker's couch. Reminds one of the feeling you get looking at a "modernistic" painting. You know—scrambled eggs with coloring.

Nevertheless, there is that inner motivation which prods you forward, perhaps because you have become fascinated by what you are hearing.

Of the selections here we actually were captivated with the imaginative instrumentation used in Lazy Bones. However, Bella Mora tempted us to push fast-forward and move on to pleasanter listening.

The assortment of instruments (and we use the word questioningly) is most odd.

We do not question, however, the reproduction capabilities of RCA's engineers—fidelity is great. Whether you decide to get this one or not is strictly up to you—we're still trying to make up our minds about it.

JAZZ

BETWEEN 18th and 19th ON ANY STREET

Sequence A: Struttin' with Some Barbe-

cue; Medley: West End Blues, Muggles, Save It, Pretty Mama; Bob's Blues; Between 18th and 19th on Chestnut Street Sequence B: The Five Piece Band; Cake Walking Babies from Home; Medley: A Sunday Kind of Love, Black and Blue, I'm Not Rough; Woodchopper's Ball

Bob Scobey's Frisco Jazz Band with Clancy Hayes

RCA KPS-3012

4-track stereo, 3 $\frac{3}{4}$ ips, cartridge
\$6.95 30 mins.

Teamwork—that's what this band has, or maybe a more modern word would be togetherness. However you call it, they play as a group, not as individualists.

This tape is pure Dixieland jazz, some fast—some slow, and if you are not an advocate of same, you probably won't want this one.

But for those of you who do go for jazz, this RCA release is a natural.

The beat is definitely there and you get the feeling that the musicians were in another world as they play.

We cannot locate any flaws in the fidelity.

NOVELTY

BOB AND RAY THROW A STEREO SPECTACULAR

Sequence A: Bob and Ray Visit Dr. Ahkbar at the Castle; Riders in the Sky, George Melachrino conducts his orchestra; Minuet on the Rocks, Skitch Henderson and his orchestra; Bob and Ray in the Round Room; Buck Dance, Dick Schory's New Percussion Ensemble; New-Fangled Tango, Lena Horne; Bob and Ray: The Thing; Second Hungarian Rhapsody, The Guckenheimer Sour Kraut Band.

Sequence B: The First Noel, Radio City Music Hall Organ; We'll Gather Lilacs in the Spring, Julie Andrews; Song of the Volga Boatman, The Sauter-Finegan Orchestra; Bob and Ray in the Laboratory; Whatever Lola Wants, Abbe Lane; The Ox Drivers, The Belafonte Singers; Bob and Ray: The End

RCA KPS-3024

4-track stereo, 3 $\frac{3}{4}$ ips, cartridge
\$6.95 40 mins.

Crazy, but wonderful. You've got to hear it to understand and if we tried to describe some of the shenanigans Bob and Ray have whipped up on this tape—you wouldn't believe it. We're speaking of Bob Bollard, who produced the tape and Ray Hall, engineer.

The gist of the thing is that Bob and Ray pay a visit to Dr. Ahkbar, their crazed research scientist, at his castle. What they run into at the mysterious castle shouldn't happen to a tsetse fly.

These fellows have incorporated sound effects, into a wild figment of somebody's imagination. For those of you familiar with Mad magazine, listening to this tape is like glancing through its pages.

The boys have also included throughout the tape, however, some jaunty—some lovely—some nutty selections by top RCA performers such as Julie Andrews, Skitch Henderson and his orchestra, Lena Horne, the Sauter-Finegan Orchestra, the Guckenheimer Sour Kraut Band, etc.

All of this is woven together in a well-knit pattern.

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Just one small point here, in some spots during the script reading, the sound level dropped so low we could hardly distinguish what the fellows were saying and we found it difficult to establish a good balance for listening.

Other than this the tape was quite good and we most heartedly enjoyed it.

SOUND IN THE ROUND

Side 1: Ping-Pong Game, Steam Train, Electric Train, Birds, Air Hammer, Fireworks, Parade, DC-7, Jet Plane, Roller-Coaster, Subway, Thunder And Rainstorm, Laura

Side 2: Foghorn, Rain, Boat Whistles, Horse And Cart, Nickelodeon, Football Game, Sirens, Roller-Skating Rink, War-Airplanes, Ack-Ack, Carrillon, Bagpipers

Produced and recorded by James C. Cunningham and Robert Oakes Jordan
Narrated by Tom Mercein

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4-track stereo, 7 $\frac{1}{2}$ ips, reel-to-reel
\$6.95 30 mins.

Concertapes has combined its two Sound in the Round tapes on this one 4-track release, and a most impressive array of sounds it is.

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BOOK DEPT.
Tape Recording Magazine
Severna Park, Md.

QUESTIONS AND 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.

Reels Warp

Q—In using my recorder I often have trouble with the reels warping and not letting out, or taking up the tape properly. This also causes the reels to sit unevenly on the turntables and as they revolve they rub on the recorder deck. I have tried several different brands and sizes of reels but have the same problem with every reel. Is there some way in which this warping can be prevented or is there a type of reel that will not warp. The reels are used and stored only under normal conditions and have not been exposed to excessive heat.—W. A. R., Mechanicsburg, Pa.

A—Since all of the reels seem to cause trouble we would suggest that you check the recorder. It is possible that the tape guide may be out of line thus causing the tape itself to ride high or low as it is pulled off the reel. Another possibility is that the shafts on which the reels rest are not true and are causing the reels to rub the deck. Since the reels have not been exposed to excessive heat, which is the primary cause of warping, this possibility has been ruled out. In storing them, we would suggest that they be kept on edge in their boxes.

Speed Trouble

Q—Recently I purchased a portable recorder that runs slow when set at the 3¾ ips speed for tapesponding. Of course it doesn't matter when I play my own tapes on my own machine but when I send tapes to others they complain that they all sound fast and I have noticed that tapes sent to me all sound slow.

I am getting nowhere in my "fight" with the store that sold me the tape recorder. They insist that the machine plays at the correct speed and will do nothing more about it. However, there is no doubt that the machine actually runs slow. I cut a tape 675 inches long which should go through the machine in 3 minutes but it takes 3 minutes and 21 seconds. So my machine runs 7 seconds late per minute.

What company makes a stroboscope which is used to show if a machine runs fast or slow? I understand there is such a tape made but I have written to several tape companies and none of them has ever heard of it. Secondly, can you tell me how to prove my machine runs slow? How do most repair shops test for speed?—C. P. Jr., Peekskill, N. Y.

A—The best test to show the speed of the machine is the one you already made—that of actually running a measured tape through it. This gives you the actual time that it is out. A stroboscope will show whether a machine is running fast or slow

and such a device can be obtained from ORR Industries, Opelika, Alabama or through any dealer in Irish tape. It is useful to keep on hand as a check. If you are interested in winning your fight with the dealer we would suggest you take the machine to his shop and run the tape through it in his presence... but maybe it isn't worth the trouble.

You do not mention if the 7½ ips speed is also slow. If such were the case, then the motor speed could be too low, or there may be too much drag on the tape as it comes from the reel, either from too tight pressure pads or from the slipping clutch being too tight. It might pay to check these points anyhow.

If the 7½ ips speed is right and only the 3¾ ips speed is off, you may have a worn drive roller which has changed size, or something has either worn or was originally the wrong size on the recorder. We would suggest checking the entire drive mechanism.

Increasing the size of the capstan by slipping a sleeve over it will cure the trouble but it will make the other speed too fast if it is now correct.

In checking speeds, repair shops will either use a strobe device or a measured tape.

Livingston Audio Products, Box 202, Caldwell, N. J. has an excellent test tape with strobe markings on it. You might write to them concerning price and availability.

Head Demagnetization

Q—Is it necessary to demagnetize the head of my Revere T-1100 tape recorder after a certain number of hours use? In other words, would failure to demagnetize the head impair either the quality of the recording or the playback?

Which is the best medium to use to remove the accumulated oxide which I find becoming very hard? Can hardened felt pressure pads cause a squeal to appear on the recording tape? Is there any way to soften them or must they be replaced?—T. H. P., M.D., Bay Head, N. J.

A—Ordinarily tape recorder heads should be demagnetized after every 10 to 15 hours of use. If the head becomes magnetized it will have a tendency to add hiss to the tape and also to wipe off the high frequencies. The effect is generally a very sly one and is not noticed. The Revere T-1100 has automatic head demagnetization built-in and the machine will take care of itself in that respect.

Regarding the pressure pads, hardened ones will cause the squeal you mention. If they are very far gone, they should be replaced. If you wish to try cleaning them, use carbon tetrachloride or a commercially available cleaner and a nail file to restore the nap.

FEEDBACK

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

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

Study Tapes

To the Editor:

Your magazine is always welcome. I thoroughly enjoy reading through it immediately upon its receipt. I want to submit some information to you that you might find worthy of listing in your "Feedback" column.

In addition to serving as President of Mid-American Life Insurance Company, I have the privilege of serving as Secretary of the Christian Anti-Communism Crusade. We currently have between 250-300 hours of tape recordings available for study purposes, on the subject of Communism and what we as Americans must do if we are to survive. I am enclosing a manual on "How to Establish A Local Study Group" which lists a number of the tapes available. You will note that these speakers are some of the top men in this country on this subject. The majority of the tapes are recorded on 1800' tapes, with a message on each side of the tape.

These tape recordings are in use now in public schools and churches throughout the country, as well as civic clubs helping to educate the people on a grass roots level, which is the first step in effective counter-action. Action without knowledge breeds confusion and chaos. Our legislative process is dependent upon political expediency, which must be created from the grass roots.

I would be happy to see to it that any of your subscribers that desired it, received a copy of the manual on "How to Establish A Local Study Group." Request for same can be sent to me in care of The Christian Anti-Communism Crusade, P. O. Box 6422, Houston 6, Texas.—*W. P. Strube, Jr., Houston, Texas.*

Tape Fan

To the Editor:

Referring to July '59 issue of Tape Recording, I wish to give Frank Zeman, Cincinnati, Ohio a good pat on the back for his answer to Mr. Curtis D. Janke who has such a warped opinion of tape, which was published in May '59 issue of Tape Recording.

I have been a tape recording fan for many years. Having some four hundred thousand feet of recorded tape, I'll match my tapes with the best professionally recorded tapes you can buy.

When I purchase or am given a new disc, first thing I do is put it on tape. Tape is far superior to discs and my vote goes to tape and tape recording.

Have been a subscriber to Hi-Fi Tape Recording Magazine for many years. Its a fine, interesting magazine, and sure fills the bill for the person interested in tape and tape recording. I look forward to its monthly arrival.—*A. A. Yundt, Chicago, Ill.*

Customer Courtesy

To the Editor:

In the July issue I noticed a letter in the "Feedback" from Mr. Peter F. Gilles of Cleveland, Ohio, complaining about companies not sending information upon request. This may be true in some cases but I can give an example of just the opposite.

I recently purchased an Ampex 960 and had minor difficulties with it. I wrote Ampex Audio, Inc. and asked for some information. Not only did I receive a very prompt courteous reply with complete answers to my questions but they enclosed a group of technical books free of charge.

Just recently I received orders from Japan where 50 cycle current is used. Again I sent a letter to Ampex requesting information on how to convert my tape recorder to 50 cycle current. I immediately received the information requested plus the necessary conversion parts, again free of charge.

In the last few years I've sent many letters to different companies producing all types of Hi-Fi components and I've never had such fast and courteous service

as I received from the Ampex Corporation.

I hope you publish this letter to show that some tape companies are very interested in their customers—*John J. Clancy, NAAS, Kingsville, Texas.*

Reader Helps Reader

To the Editor:

Recently while cleaning and oiling my Crestwood Model 304, I made note of the motor number for your reader who was unable to find the proper replacement for his. The motor was made by The General Industries Co., Elyria, Ohio, Mod. D-10, Part No. 20340. I hope this is of help to Mr. Szanyos. *George Stallings, Seaford, N. Y.*

Longer Play Tapes

To the Editor:

I believe there would be a demand for tapes that play longer rather than trying to compete price-wise with records. I think there would be a market for tapes on double-play tape, 4-track, 7½ inch, giving two hours of music on one tape even though the tape might sell for \$18.95.—*David Beatty, Kansas City, Mo.*

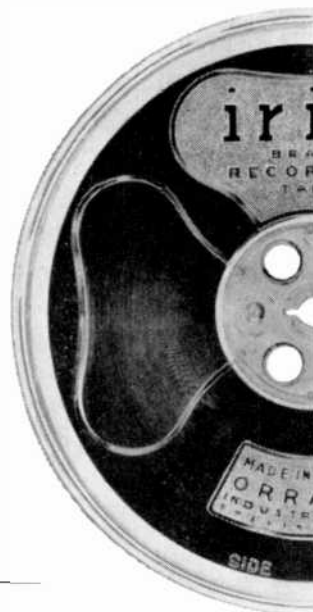
Bernstein TV Shows

To the Editor:

I would like to know if any of your readers have a good tape of any or all of the Leonard Bernstein television shows from the 1958-1959 season. If I could borrow such tapes, I have access to Ampex equipment with which to make my own copies.—*E. B. Asplundh, 501 York Road, Jenkintown, Pa.*

(Continued on page 31)

WHERE
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A FINE
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irish
ferro-sheen tape

note to
PENTRON owners

To insure optimum recording quality with your machine, the recommended tape is **irish Long Play #602**. Send for technical bulletin.

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TAPE CLUB NEWS

Congratulations



Kenneth deCourcy Low of Warwick, Australia, and his bride, the former Miss Evelyne Pierce of Long Island, New York, are shown leaving the church after their wedding. Miss Pierce and Mr. Low met through membership in World Tape Pals.

When Kenneth deCourcy Low, director of youth activities at Radio Station 4WK, Warwick, Australia, and Miss Evelyne Pierce, musician-artist-teacher in Long Island, New York, arranged for tape exchanges between their students through the World Tapes for Education Program of WTP, they did not suspect that these common interests would lead to romance.

From strictly educational tape exchanges, the couple progressed to personal tape exchanges. They were amazed at the similarity of their ideas and ideals. The tape exchange was continued after Evelyne accepted a position as teacher at the American Family School in Landstuhl, Germany. In May, after many thousands of taped ideas had been exchanged, she flew from Germany to Australia to meet her fiance in person for the first time and to complete wedding plans first made on tape.

The wedding took place June 1 at the Central Methodist Church in Warwick. Evelyne wore an emerald green velvet streetlength frock purchased in London and a green feathered headdress. Their attendants were Mr. and Mrs. A. Billington, parents of WTP Miss Margaret Billington. Margaret will be remembered by WTP members as one of the student team which won an international debate between the Warwick International Club and the Choate School, Wallingford, Conn., which was set up through WTE.

Besides his work at Radio Station 4WK, Ken is also art and theater critic for the Warwick Daily News, where his columns appear under the pseudonym "Apollo." The Australian press gave the wedding unusual publicity because of the aspects of courtship by tape recording.

Although World Tape Pals does not

guarantee the outcome of romances begun on tape, the wedding of Evelyne and Ken adds to evidence already accumulated by WTP's first couple, Alan and Daphne Wilson, now of Colombo, Ceylon, to the ability of tape exchange to promote friendship and understanding.

Special Edition

The British Tape Recording Society announces the publication of a special edition combining "The Recordist" (club house journal) and "Call Book Supplement" listing all new members of the Society. Members in the U. S. and Canada will receive copies shortly.

Club Expansion

Due to the untiring efforts of Ted Yates, founder and executive secretary of the British Tape Recording Society, assisted by overseas representatives, the club now spans the world as Britain's first and foremost international English speaking tape recording organization.

Formal links and affiliations have now been established with well-known clubs in Canada, South Africa, New Zealand and the A.T.R.A. of Australia.

Membership increased by over 50 new members from the U. S. A. during the first part of this year and continues to increase due to the efforts of B.T.R.S. representative for the U. S. A. and Canada, Mr. Peter M. Bardach of New York.

New Headquarters

The British Tape Recording Society reports the opening of a new headquarters at 52a, 64 Hough Green, Chester, Cheshire. From these headquarters the new club tape magazine "T.C.N." (tape club news) will soon be issued. Among other features, the first issue will contain a 15 minute interview with Tony Schwartz, leading American documentary recordist.

Sounds of Britain #1

British Tape Recording Society members on this side of the Atlantic are offered free copies of a new one hour documentary program from the Society tape library. Called "Sounds of Britain #1," the tape features two half hour programs . . . one a sound picture of Edinburgh, the other an actuality recording made in London's famed Petticoat Lane market. U. S. and Canadian members should send a five inch reel of tape (enclosing 25 cents for return postage) to the U. S. representative (see address in box). Dubbing time will be 2-3 weeks.

New A.T.E. Appointments

Charles Riecke III has been appointed to form and head the new American Tape Exchange Tape Library. Lee Holm will head the revised Tape Network. Carl Wilcocks has been appointed as the Club's South African representative and Dale Louis is looking into the cost and details of printed mailing labels for the use of members for sending tapes through the mail.

Service Committee

The Service Committee of The Voice-spondence Club, composed of volunteer

members who genuinely want to serve their fellows, offers its help to any Club member, but particularly to those with physical handicaps. The largest group of handicapped members are the sightless, who compose about 15 to 20% of the Club's world-wide membership. Each sightless member receives as a gift a 5-inch tape on which is listed all the special services available through the Club, the names and listings of many of the blind members, a listing of the tapes available in the Club's Tape Library, and other important information. The tape, as well as some of the recorded issues of the Club's magazine, "The Voice-spondent," are distributed in cooperation with Ways and Means for the Blind, Inc.

JOIN A CLUB

AMERICAN TAPE EXCHANGE

Stuart Crouner, Secretary
181 E. Main St.
Gouverneur, N. Y.

AURORA SCIENCE TAPE SOCIETY

Walt Richard Sheasby, Jr.
215 North Baldwin Ave.
Sierra Madre, Calif.

BILINGUAL RECORDING CLUB OF CANADA

J. P. Paquette, Recruiter
1993 Morgan Boulevard
Montreal, Quebec, Canada

CATHOLIC TAPE RECORDERS OF AMERICA, INTERNATIONAL

Jerome W. Ciarrocchi, Secretary
26 South Mount Vernon Avenue
Uniontown, Pennsylvania

CLUB DU RUBAN SONORE

J. A. Freddy Masson, Secretary
Grosse Ile, Cte, Montmagny,
P. Que., Canada

ORGAN MUSIC ENTHUSIASTS

Carl Williams, Secretary
19 Van Derveer St.
Amsterdam, New York

TAPE RESPONDENTS INTERNATIONAL

Jim Greene, Secretary
P. O. Box 416, Dept. T, St. Louis 66, Mo.

THE VOICESPONDENCE CLUB

Charles Owen, Secretary
Noel, Virginia

UNITED RECORDING CLUB

Richard L. Marshall, President
2516 S. Austin Boulevard
Chicago 50, Ill.

WORLD TAPE PALS, Inc.

Marjorie Matthews, Secretary
P. O. Box 9211, Dallas 15, Texas

FOREIGN

AUSTRALIAN TAPE RECORDISTS ASSOC.

John F. Wallen, Hon. Secretary
Box 970H, 6, P.O. Adelaide, South Australia

BRITISH TAPE RECORDING SOCIETY

Peter M. Bardach, U. S. Representative
210-16 Grand Central Parkway
Queens Village 27, N. Y.

TAPE RECORDER CLUB

A. Alexander, Secretary
123 Sutton Common Rd.
Sutton, Surrey, England

Please enclose self addressed, stamped envelope when writing to the clubs.

TAPE IN EDUCATION

BY MAJOR JOSEPH J. KRAMP, USAF, RET.

THE Armed services have long been faced with the problem of rapid training of men for the complicated jobs of operating and maintaining modern electronic military equipment. Many advanced techniques have been tried by the Armed services to improve the quality of instruction and to reduce the training period. The latest experimental technique to come to our attention is the one being used presently by the U. S. Army at the Ordnance Guided Missile School, Redstone Arsenal, Huntsville, Alabama.

Results of a new audio-visual approach to guided missile instruction have been reported by the Army via a study by Dr. C. D. Leatherman, senior educational advisor to the OGMS, and its success has justified the faith placed in the program by top Army officers.

Initially set up by the Army because it realized a cut-down in training time was a "must," the program has been termed an unqualified success by Army officials. In the past the OGMS spent as much as 14 months in training men for skilled jobs, only to see them leave the service at the expiration of their 2 year enlistments. And some quarters estimated the annual cost of training skilled replacements for the entire U. S. Army to be in excess of 2 billion dollars. To assist in initiating and streamlining a skilled replacement training program, the Army called in TelePrompTer Corporation, planned group communications specialists.

The study by Dr. Leatherman revealed that experimental groups, enjoying a unique variety of TelePrompTer Corporation audio and visual techniques, effected a time savings of 27% and at the same time achieved 5% better grades and retained 7% more knowledge than the control groups.

The results were gleaned from technical instruction given during the Nike-Hercules Acquisition and Computer Course at the OGMS. Total hours for the course amounted to 1,096. Each experimental period consisted of a total of 102 hours, including 9 hours for examinations. The evaluation study was repeated three times with only minor modifications for improvements in techniques or procedures.

The basic course contained three blocks of instruction which were generally considered to be the most difficult of the 12 blocks of instruction taught in the course. The three blocks of instruction chosen for the evaluation studies included Fundamentals of Electronics (37 hours); Plan Position Indicator for Radars (21 hours); and Steering for the Internal Guidance portion of the missiles (35 hours). The hours of instruction in the three evaluation studies represented about 10% of the total hours of instruction in the course.

TelePrompTer techniques include the Multi-Matic screen, whereby the component parts of a missile can be projected simultaneously on several smaller screens surrounding a large central screen. Another effective piece of TelePrompTer Corporation equipment is a device called "TeleMation," which automatically synchronizes up to 12 separate or simultaneous staging effects with a speaker's voice.

Imagine, for example, an instructor giving a lecture on the Nike guided missile. He could be talking about the missile and then point out any specific detail like the instrumentation in the nose cone by referring to one of the smaller screens on which a picture of the instrumentation could be flashed.

A fourth study is currently under way to determine whether the time savings are due to the group communications equipment itself or to the subtle, disciplined teaching techniques (including script writing), or to a combination of both.

The experimental group is using TelePrompTer Group Communications equipment as before. The control group, with identical equipment, excludes the use of a prepared script and the TeleMation device (slides for this group are being operated by hand).

In each instance, however, the student was to get the impression that no changes had been made, that the instructor continued to use a prepared script and not his own lesson plan and that he was using group communications equipment.

The results, thus far, from the Evaluation Study #4 are as follows:

	Experi- mental Group	Control Group	Dif- fer- ence
Fundamentals of Electronics* (exam scores)	77.1	81.2	4.1
AGCT	128.7	131.9	3.2
Electronic Inventory Test	61.1	64.4	3.3
* 33% time savings			

The important thing to note from this study is that on general basic mental ability (AGCT) the experimental group was at a slight disadvantage since they were 3.2 points lower than the control group. Similarly, in the Electronic Inventory, the experimental group was 3.3 points below the control group.

Results of the first examination (Fundamentals of Electronics) indicate that the experimental group remained slightly lower than the control group (4.1) which was according to predictions. The instruction, however, was accomplished with a 33% time savings with no statistically reliable difference in mean scores for Fundamentals of Electronics.

COMPARE these performance specifications

- Sensitivity -57 db
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COMPARE the price \$57⁰⁰

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Prove it yourself. Try it in your studio subject to your own work conditions, your own recorder, your own performance standards. You'll see why no other lavalier microphone can match it.

Model 58 wired for selection of high or low impedance; Model 58A wired for selection of 50 or 200 ohms impedance.

Weight—3 1/2 oz. (less cable)
Cable—25 ft. attached
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G-4 Stand \$5.75

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Professional Transistorized
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Check These Unusual Features:

- ✓ Weight: 8 lbs.; Size: 5½ x 9 x 12 inches.
- ✓ Exceeds NARTB Broadcast Standards.
- ✓ Newest Noise-Free Motor; No Microphonics.
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- ✓ Dry Rechargeable or Replaceable Batteries.
- ✓ 10 Selected Transistors Used.
- ✓ Meter for VU, Amplifier and Motor Batteries.
- ✓ Battery Life: Amplifier 125 hrs., Motor 40 hrs.
- ✓ Modular plug-in construction.
- ✓ High Speed Rewind (3 minutes).
- ✓ Choice of 5 Single-Speed Models.
- ✓ Full unconditional Two Year Guarantee.
- ✓ Prices from \$386. to \$446.

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RCA Sound Tape is famous for incomparable high-fidelity reproduction. Available in the popular and economical 5" and 7" reel sizes, on splice-free Mylar* and acetate bases. Ask for RCA Sound Tape wherever superior quality magnetic recording products are sold!

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Electron Tube Division

**RADIO CORPORATION
OF AMERICA**

Harrison, N. J.

NEW PRODUCTS

BELL STEREO•PAK



Bell Sound Division, Thompson Ramo Wooldridge Inc., 555 Marion Road, Columbus 7, Ohio, has introduced the Bell Stereo•Pak cartridge players and recorders, designed to accommodate the RCA-type stereo tape cartridge. The Bell Stereo•Pak mechanical design is simple, with a minimum of moving parts. Two controls perform all operating functions. Wow and flutter has been maintained at a low level of 0.25% RMS. Other features include a precision snap-action shutoff switch, frequency response from below 50 cps to 15,000 cps. All models of the Bell Stereo•Pak incorporate a completely transistorized stereo record-playback preamplifier with extremely low hum and noise. Three models include a built-in component type 14-watt stereo power amplifier. Bass and treble controls, separate channel volume controls and an input selector switch provide complete flexibility of operation. A matching pair of speakers is all that is required for a complete integrated stereo music system. For complete details and prices, write to the manufacturer above.

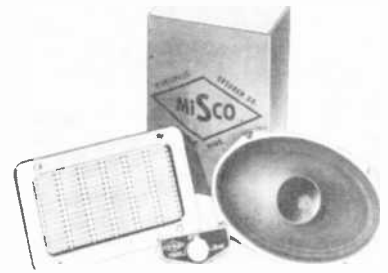
TAPE KARE KIT



In order to help maintain tape, Robins Industries Corp., Flushing 54, N. Y., has announced the Gibson Girl Tape Kare Kit (TK-4H). The kit contains a Hebblyist

H-4 splicer, a JCT-2 Jockey Cloth for cleaning tape, a roll of ST-500 splicing tape, a box of ST-500 tape clips, and TE-24, a tape editing book. This kit is priced at \$3.50. For additional information, contact Robins Industries.

AUTO SPEAKER KIT



The Minneapolis Speaker Company, 3806 Grand Avenue South, Minneapolis 9, Minn. has unveiled a new line of rear seat auto speaker kits. These speakers feature an attractive, pliable cone, distinctively red in color. The "Red Line" speaker kits are available in either 5 x 7 or 6 x 9 size, with either a dual or single cone, and with either 1.47 or 3.16 magnets. There is also a choice of 3-position switch or fader control, and either a chrome or gray grille. These kits are sold through electronic distributors throughout the country. Further information and literature is available from the above manufacturer.

BUTOBA MT4



The Turning Corporation of America, 60 East 42nd St., New York 17, N. Y. (sole U. S. distributor of the Butoba range of self-powered tape recorders) has announced the introduction of the new Butoba MT4 which may either be operated on eight ordinary flashlight batteries or on electrical current. It is both small and light enough to be carried and used everywhere with ease. The recorder has speeds of 1½ and 3¾ ips, with a playing time of up to two hours on each track. Frequency response is 50-13,000 cps at the faster speed. Other features include seven transistors, push-button operation, fast rewind and fast forward, tone and volume controls and volume indicator. For price and additional details, contact the Turning Corporation of America.

BOOK REVIEWS

The Audio Cyclopedia by Howard M. Tremaine. 1269 pages. 6" x 9 1/4". cloth bound, illustrated, \$19.95. Howard W. Sams & Co., Inc., 2201 East 46th Street, Indianapolis 6, Indiana.

On the front jacket of this book appears the line "7 years in preparation"—and we can well believe it. It would take seven years to cover the more than 3400 audio topics which the book includes and to amass the more than 1600 illustrations.

The book is a practical engineering guide for the person who has some understanding of electronics and wishes to apply that knowledge to the recording and reproduction of sound. Even though it may take some knowledge of electronics to get top value from all the information, the serious tape recordist or audiophile will find the work a valuable addition to his library.

The entire book is in question and answer form. For convenience, it is divided into twenty-six sections and has a complete index.

The sections include: Basic Principles of Sound, Acoustics and Studio Techniques, Constant Speed Devices, Motors and Generators, Microphones, Attenuators, Equalizers, Wave Filters, Transformers and Coils, Sound Mixers, VU and Volume Indicator Meters, Vacuum Tubes, Transistors and Diodes, Audio Amplifiers, Disc Recording, Cutting Heads, Recording and Reproducing Styli, Pickups, Magnetic Recording, Optical Film Recording, Motion Picture Projection Equipment, Loudspeakers, Enclosures and Headphones, Power Supplies, Test Equipment, Audio-Frequency Measurements, Installation Techniques, General Information, Charts and Tables, Stereophonic Recording and Reproduction of Disc Records and the Index.

The author is to be congratulated on two counts. First, because of its completeness and second because of his courage in attempting it. Mr. Tremaine has been in audio work since before World War I, including service with the early Victor Talking Machine Co.

At first glance, the price of this book may seem high but considering the amount of information it contains it is practically five or six ordinary books in one.

Stereo. . . How It Works by Herman Burstein. 224 pages. 5 1/2" x 8 1/2". paper bound, illustrated, \$2.90. Gernsback Library, Inc., 154 West 14th Street, New York 11, N. Y.

It is assumed that those reading this book will have at least a rudimentary acquaintance with high fidelity and the terms associated with same. It is written as much for the nontechnical fan as for those familiar with electronics.

With the strides toward perfect sound reproduction steadily increasing since the introduction of stereo, the audiophile's collection of equipment is also steadily expanding and his need to understand stereo has thusly been upped.

This book is designed to enlighten such understanding. It is concerned not only with the playback aspect of stereo, but with tech-

niques of microphoning it over the air as well. Tracing stereo from its beginning, Mr. Burstein explains just what it is.

Chapters include: Forms of Audio Reproduction, The Stereo Effect, Stereo on the Air, Stereo on Discs—Other Systems, Stereo on Tape, Stereo Microphone Techniques, Amplifiers for Stereo, Speakers for Stereo, and Installing a Stereo System.

This book handles the stereophonic phase of sound reproduction quite well and we recommend it for those keeping up with developments in this field.

From Microphone to Ear, second revised and enlarged edition, by G. Slot, 258 pages, 6" x 8 1/4", cloth bound, illustrated, \$4.50. The Macmillan Company, 60 Fifth Avenue, New York 11, N. Y.

Keeping up with the rapidity of new developments in sound reproduction today is an enormous task indeed. Mr. Slot has revised this edition to include the latest information, especially on stereophonic reproduction.

Among the chapters are: From Tinfoil to Stereophony, From Sound to Record, Amplifiers, Loudspeakers: Operation and Characteristics, Stereophony, High-Fidelity—Evaluation and Testing, Magnetic Tape Recordings, etc.

In the text, the author gives descriptions of sound-recording and sound-reproducing techniques in a manner so as to be understood by readers without technical training as well as those with. The book is intended to answer questions posed by gramophone and tape recorder owners, and to explain the relation to one another of the most important technical problems. There are numerous instructive diagrams throughout.

Mr. Slot has made every effort to describe what happens to sound between the microphone and the ear, in this up to date volume.

Practical Electronics by Robert Hertzberg. 136 pages. 6 3/4" x 9 3/4", cloth bound, illustrated, \$2.50. Arco Publishing Company, 480 Lexington Avenue, New York 17, N. Y.

In this book we have another addition for the do-it-yourself hobbyist's shelf. The amateur radio operators and audiophiles will want this one.

Mr. Hertzberg, in simple, clear text, describes electronic components and their functions, he analyzes test equipment, and he has assembled and reports on construction kit projects. In addition to this, the volume also contains feature articles on microwave and the latest experimental devices.

There are hundreds of photographs and drawings in this handy guide.

Included in the articles are: Complex Ham Receiver Simplified, All-Band Transistor Radio, Hi-Fi Where You Want It, Radio's Newest Workhorse—Microwave, Introduction to Troubleshooting, Know Your Components, Transistor Care and Testing, Novice Ham Station, The Cathode-Ray Oscilloscope, An ABC of the FCC, etc.

Very good for all dabblers in electronics.



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LECTURE SOUND FACILITIES

by Joel Ehrlich



. . . new method of tape recording lectures solves transcription problem.

The lecture hall during the Audio Engineering Society's 1958 convention. In order to facilitate tape recording these lectures for later transcription and use in the Society's Journal, it was proposed that the recording setup be incorporated with the P.A. system—have all mikes fed to one mixer.

A GREAT number of important technical papers are presented each year to the members of the Audio Engineering Society, the largest American society dedicated wholly to Audio Engineering. The organization is a national one, and the papers presented in New York, are of equal interest in California. For some time now, the question of how to get these lectures to the other side of the nation, has been a major one.

The A.E.S. has a journal all its own—a medium ideally suited to the propagation of this information. Since all members receive the Journal, and since the content of the Journal is strictly limited to these technical papers, some method of

transcribing the technical papers had to be found. Tape recording was the obvious answer, but even this had its limitations.

How, for instance, to get the questions asked of the lecturer from the floor as well as the lecturer's answer? What if there were many people in the audience—how to get their reactions? How to ensure that *all* questions asked from the floor were recorded.

A novel approach was dreamed up by George Cohen, Facilities Chairman of the Society—incorporate the recording set-up with the P. A. system, and make the audience and lecturer dependent upon the P. A. system. In short, the mikes

all fed one mixer. The lecturer gets his own mike, and several mikes are scattered about the audience in the hands of assistants who carry the mikes to the questioners. The mixer feeds only the tape recorder. The input monitor of the tape recorder feeds the P. A. system. The level of the P. A. system is so adjusted, that unless the mike is getting enough signal, or—to rephrase it—unless there is enough signal getting on to the tape, there is no appreciable output from the P. A. speakers. This keeps the lecturer on his toes, he can hear when his voice level is fluctuating, and forces the questioner to wait for a microphone in order to be heard. To further ensure the recording of every word, a loud buzzer was built into the input of the P. A. amplifier, on the off chance that someone might shout to make himself heard without a mike. A button was pushed, and a mildly loud buzz filled the hall.

After adopting this basic system, halls had to be found which would suit its use. Time was limited as a sure-fire system had to be adopted in time for the annual New York Convention and Technical Session.

Fortunately, a long series of technical sessions was scheduled during which the system could be tested and, if need be, modified. Beginning with the technical papers presented at the 1957 A.E.S. convention in New York, when the basic system described above was developed and tested, the components were varied and many. By the time the 1958 convention dawned, the system was perfected.

At the 1957 convention, an assortment of dynamic, velocity and capacitor mikes (Electro-Voice dynamic, Fen-Tone velocity and Altec capacitor mikes) fed a Bogen P. A. mixer. This, in turn, fed the Bogen P. A. amplifier. From the high impedance output of the amplifier, a tap was run to a Ferrograph tape recorder. Connected to the monitor output of this Ferrograph was an extension to the input of a second Ferrograph. A single speaker was connected to the low impedance output of the P. A. amplifier.

The main difficulty of this system was the fact that, if the

level of the floor mike(s) was turned up, there was severe feed-back caused by the high level of the single speaker. In addition, the system did not have sufficient flexibility to permit the use of the large number of mikes required for the recording of a symposium. However, it did perform the main function of having one agency controlling the overall sound level. This meant that the level of the P. A. amplifier could be adjusted so that the level of the mixer "pots" had to be high enough, when there was adequate P. A. level, that there was a good level to the tape recorder.

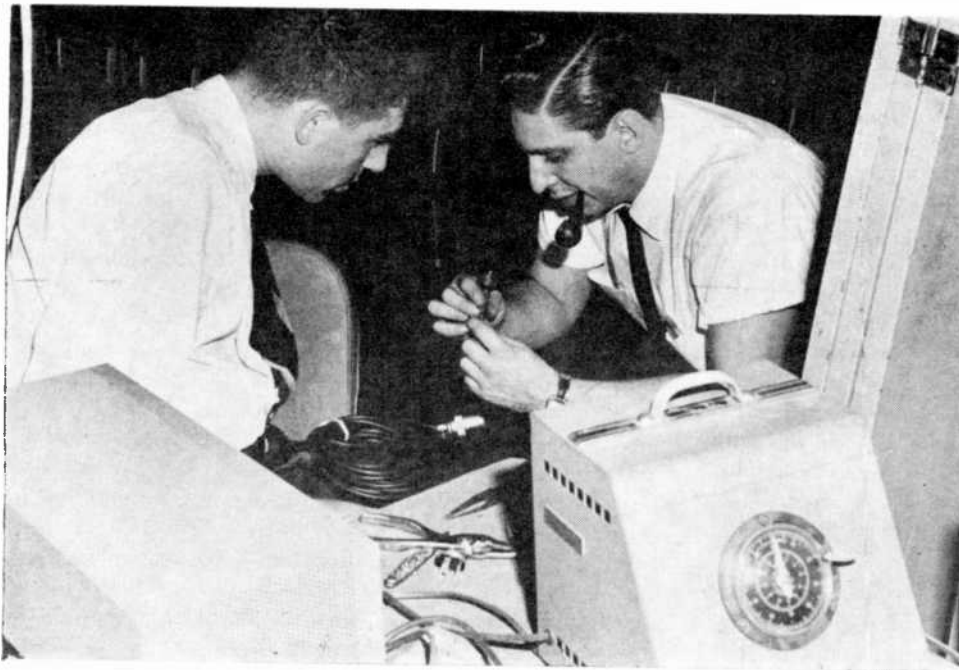
Following the convention, the 4th lecture series got under way. This series of lectures was subscribed to fairly well, and was held in a fair sized room in New York's R.C.A. Institute. A new system was adopted for this set-up.

At first, we tried to work without a P. A. system, this proved to be impossible, due to our selection of a room that would fit the initial requirement—that for a room which would depend upon the P. A. system. The system then adopted consisted of several Electro-Voice dynamic mikes for the floor (one #655-C probe type dynamic and one #654 based probe type dynamic), one high sensitivity, directional dynamic for overall pick-up (Electro-Voice #655 cardioid dynamic) and two velocity mikes on neck stands for the lecturers (Fen-Tone Reslo RBM ribbon/velocity mikes, on Atlas "Necky" chest stands) all feeding the five input mike mixer. The output of this mixer was connected to a transistorized preamplifier. This was provided to guarantee sufficient signal, no matter how little appeared at the output of the mixer.

The output of the preamp (a Fisher TR-1) was connected to a specially designed tape recorder (not designed for this function, but rather designed for extreme serviceability and exceptional ruggedness as well as the ability to record up to 2½ hours at a time, without reel change). The recorder was comparable to any conventional recorder as far as electronics and functions were concerned. The reason for its use was,



An assistant holds a mike for the lecturer during a section meeting after the convention. A smaller recording system is required for these meetings and this system has been adopted as standard by the New York section of the A.E.S.



Preparing Cannon connectors for the extensions while getting equipment organized for recording lecture. The technique used for recording the A.E.S. lectures has also been used with success by individuals for the recording of neighborhood plays, concerts, and the like.

the entire system had to be "torn down" at the end of each lecture and carried off. The following week, it had to be set up no more than a half hour before the lecture. It had to be a very sturdy recorder in order to take this sort of carrying about. In point of fact, it made 48-35 mile trips in the trunk of an auto, over not too good roads, and never required any service of any kind—this, after three years of flying about the country for similar types of recording sessions!

The output, (monitor) of this recorder was fed to a Fairchild 25 watt amplifier which, in turn, fed a Goodman 8" speaker in a small baffle. This system had the advantage of permitting the level control of the tape recorder to control the P. A. level. In setting up the system, an assistant whispered into the lowest sensitivity mike and the levels of the recording system adjusted. Only *after* this was done, was the P. A. system adjusted. This ensured that the level of the P. A. system, while adequate, was a function of the level into the recorder, and thus, the level getting onto the tape.

Later on, during the lecture series, we tried feeding the P. A. amplifier through a split-feed from the preamp. We found this to be a practical method of feeding the P. A. system, even though it meant operating the P. A. amplifier a bit differently. Since we had no control over the P. A. system from the recorder, but only through the mixer, we had to modify our set-up. We first adjusted the tape recorder levels so that we got good level onto the tape with the mixer controls set at 50% rotation from a person speaking in a normal voice three feet from the mike. We then set the P. A. system level so that it would not cause feedback with the mixer pots set at 100% rotation with the same input to the mike. Thus, no matter what we had to do at the mixer in order to get a signal onto the tape, the level never went high enough to cause feedback in the P. A. system. However, there was always adequate level at the P. A. speaker.

After the lecture series ended, we adopted a similar technique for all regular section meetings. In some instances, we experimented further. One session saw us use a Ferrograph with two mikes and a small mixer, with the tape recorder picking up from the output of the P. A. system. This was not too successful as the prime ingredient, the control of the entire system by the tape recorder was lacking. In later ses-

sions, we were always careful to leave the overall control of level at the tape recorder. Even in the case of a split-feed from the mixer, P. A. level was set only on the basis of adequate (plus a safety factor) recording level.

As the New York convention for 1958 drew to a close, we began assembling the many components that would be required. We decided upon the use of Presto R-800 professional tape recorders (the same as those used for the Fred Waring recording described in the article "Pros Record Amateurs" in the August '58 issue of *Hi-Fi Tape Recording*). These were to be run at 7½ ips speed using 10½" reels of 1 mil Audiotape. The mikes were all supplied by Electro-Voice and consisted of six #666 cardioid dynamic mikes (for use on the floor for questions) and two #649 lavalier mikes for use on the lecturers. These mikes were connected to two Bogen P. A. mixers, one of which fed into the other. This gave us a total of eight inputs—the most we would require at any time. We used a split-feed from the second mixer, one output (600 ohm balanced) to the tape recorders and the other (high impedance unbalanced) to the P. A. amplifier (70 volt output of 50 watts). We split the feed to the tape recorders also, and fed each directly from the mixer.

For loudspeakers, we turned to University loudspeakers for several of their small P. A. speakers. These were fed from the 70 volt line output of the Bogen amplifier. Levels were adjusted so that the speakers further from the front of the auditorium operated at a higher level than those close to the front of the auditorium. In addition, another speaker was set up at the recording position for monitoring. In addition to this, earphones were connected to each recorder for monitoring off the tape. Further, two University S-11 high quality speaker systems were set up on the front of the stage for demonstrations. When not being used for this purpose, they were connected into the P. A. line and run at low level. Another pair of Bogen P. A. amplifiers were used to drive these two speakers. They had their own level controls.

Both mixers had their own level meters (V. U. type), so we covered the meter on the mixer which had its output connected to the other mixer. The meters on the recorders were adjusted to match the level indications on the mixer

meters. This ensured that the operator only had to read the mixer meters.

The playback level of both recorders was adjusted to exactly match the input level. This permitted the operator to read the level actually on the tape by meter and to compare it with the level being fed to the tape in order to ensure adequate recording level at all times. After this was done, the level of the P. A. amplifier was adjusted to give adequate level all over the hall. The individual speaker levels were set by actually having someone in the auditorium advising us of level while we adjusted the taps on the transformers which were mounted upon the speakers.

All mikes were run through extensions. These extensions were concealed as well as possible and were, in all cases, covered so that a careless person would not trip over them. This not only protected the audience, it made sure we would not have our recording interrupted.

Once all this was done, the operator only had to watch his mixer meter and adjust his mixer pots to obtain correct recording level. P. A. level was automatically correct if the recording level was properly set. The only other thing the operator had to do was change reels on the tape recorders. He started one recorder just before the first ran out. After the first did run out, he took the reel off and marked it. He returned it to the box and then put another reel on the recorder. He then checked the level on the tape by means of the earphones and the playback level against the input level. Then all he had to do was watch his meter and levels. He also timed each talk, and kept this record on the back of the tape reel box. He had two assistants on the floor with probe mikes for questions from the floor.

This system worked without trouble during the entire convention. In addition, during the annual banquet, a similar system was used to record the speeches of the guest speakers and to provide public address for the dining hall.

Following the convention, a smaller system was seen as being required for sectional meetings. An Ampex #601 recorder was used, along with two Electro-Voice mikes; one #666 and one #655-C. The #666 was either hand held (by an assistant) or floor stand mounted, for the speaker. The #655-C was hand held (by an assistant) for questions from the floor. Where required, the P. A. system was split-fed from the mixer. The system used for the P. A. system was the Ampex amplifier/speaker system complimenting the #601.

The accompanying photos show the equipment used at the convention as well as a section meeting after the end of the convention. In all cases the systems adopted worked without any trouble at all. The small system has been adopted as the standard system by the New York section of the A.E.S. for the recording of all lectures. The larger system has been adopted as the standard for all convention and large scale lectures.

After recording, the tapes are turned over to a stenographic service where a speed typist transcribes the tape with three copies. These are then returned to the Society. One copy is sent to the lecturer. He corrects the text and returns it to the Society. This is then turned over to the editor of the Journal, and the lecture later appears in printed form in the Journal for the benefit of the entire Society. In addition, important papers are printed for the industry as a whole. The 4th lecture series was also printed in book form for any interested parties. This is all a result of the efficient recording of the lecture, questions and answers.

This technique has also been used with success by the individual parties concerned, for the recording of neighborhood plays, concerts, lectures and the like. It has been used in schools and parks. In short, wherever P. A. and recording is required, the technique used, is more than adequate. Of the many ideas proposed for the recording and amplifying of this type of material, this technique has been the most successful. The split-feed to the recorder from the mixer has been found to be superior to the feeding of the P. A. amplifier from the recorder due to its greater flexibility. The adjustment of levels in such a manner as to ensure adequate recorder level, no matter how high the level has to be adjusted, without causing feed-back in the P. A. system has its obvious advantages. With this system, any mikes may be used without danger of feedback. It is important to *first* adjust recorder level for good signal (plus a small safety factor) with the mixer pots set to no more than 50% rotation with an average source level. It is also important to adjust the P. A. amplifier level to adequate with the mixer pots at 50% rotation and yet low enough so that there is no feedback with the mixer pots at 100% rotation.

Provided this is done, there is no danger of feedback, no matter how difficult the recording conditions may be. In addition, adequate level for recording is always found. Professional equipment need not be used, as is proven by the fact that a Bell recorder was used for a similar session with a Bell 20 watt amplifier and a small speaker system. Crystal mikes were used as sound sources and a Pentron mixer for mike mixing.

The split feed is accomplished through the use of a patch cord having a splice in it. Thus, it is a cable having one input and two outputs. This is a split feed. It is important to remember *never* to change the input level on either unit once the split-feed is working. Changing one may affect the other. Always adjust one, then the other. Then recheck the first and adjust if needed. Then recheck the second and adjust if need be, and so on. Once both are properly set, *all* level control must be at the mixer or other device from which the split-feed is taken.

This system is further proof of the versatility of the tape recorder and should prove of usefulness to all people who ever have the need to record something and also provide P. A. sound.



Getting set up for the 1958 convention. The mixers are in the foreground and two Presto recorders are on the table in the rear.



The illustration shows a setup for handling either hi-fi, lo-fi or stereo. The base is an old Wilcox-Gay unit with a Livingston tone arm added containing a stereo cartridge. For lo-fi copying, the small arm is used with a steel needle, for hi-fi, the large arm is employed and the output taken from the right hand jack which connects both channels together. For stereo, separate cords are run to right and left jacks.

Dubbing Stereo Records

BACK in the "good old days" BS (Before Stereo) it was widely advocated among tape fans that a new record be copied on tape as soon as it was purchased and that thereafter the music be played from the tape. This preserved the disc in prime condition and formed a reserve unit in case anything happened to the tape.

Since the advent of the stereo disc, this old method has become even more important for stereo discs do not seem to wear as well as monaural and are more expensive. Hence putting them on tape is a good investment.

Copying a monaural record was easy. The current from the cartridge was simply fed into the microphone jack, if a magnetic cartridge was used, or run through the phono amplifier and into the radio phono input on the recorder for other types of cartridges. Other than setting the recording level, little more had to be done.

Copying a stereo disc, however presents more problems. For one thing, the signal has been split into two channels. Each channel is engraved on one side of the groove of the record.

Thus, if a monaural copy of a stereo disc is desired, you will not get it by simply using one of the pairs of leads from the cartridge. This will result in an unbalanced

recording.

To copy a stereo disc monaurally, you must connect the two outputs together to get a full signal. Then the recording will sound normal and you will get, in monaural, the full range of the sounds.

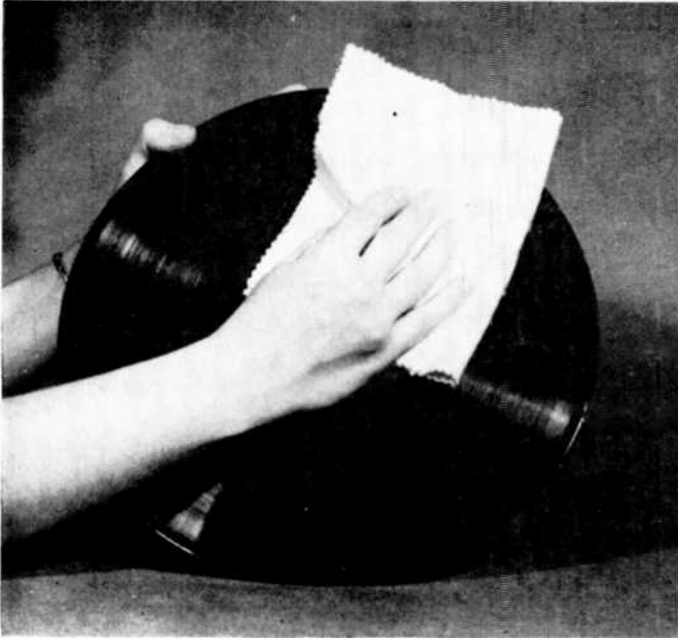
Now that stereo recorders have come on the market, and more will be along, it is possible to copy stereo records in stereo.

The first thing to check is the cleanliness of the record and it is recommended that it be wiped off with one of the anti-static cloths. The newer the record the better the final result will be and if you can copy it on the first play you will be better off.

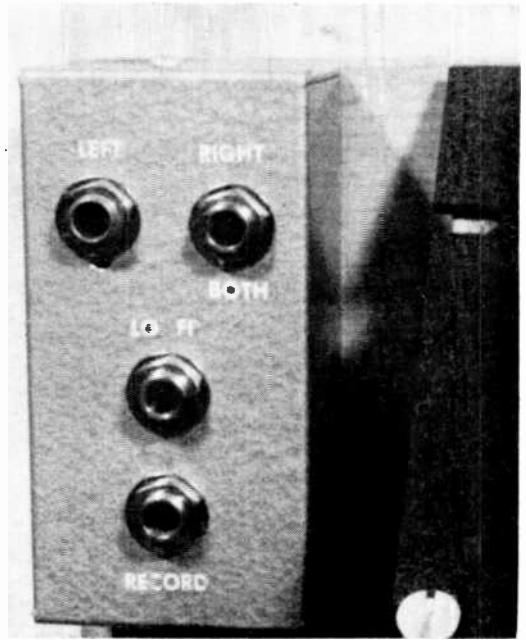
One of the audio test records, such as that put out by Walsco Electronics, Rockford, Ill., will be found helpful in balancing the two channels to make sure they are equal before the recording is made.

After checking this point, the record should be played to see that the recording level is adequate. Any changes in the recording level should be made exactly the same for both channels otherwise an imbalance will be recorded on the tape.

Of course this could be taken care of in playback by



Left: cleanliness is next to Godliness in making copies of records for each tick and pop will be faithfully reproduced on your tape along with the music. An anti-static cloth does a good job of removing dust. Be sure to use a stereo cartridge and needle on stereo records—the use of a monaural needle will ruin them. Right: the jack box which is connected to the arms. By plugging into the tight channel, both outputs are mixed for monaural recording from a stereo cartridge. The lo-fi output connects to the 78 RPM arm and the other jack to the disc recorder. Use shielded cables on all leads to the arms.



an adjustment of the volume controls but it is best to get it on the tape the first time.

Once the recording has been started, let the volume controls alone. Any adjustments during recording will cause a shift in the sound perspective, just as though one of the mikes had been moved during the original recording.

The point of sound pickup for your recorder will depend upon the equipment you have. Actually it is just a duplication of a monaural pickup on each channel. If you have a "package" stereo phono you can tap off the volume control or at the speaker terminals.

If you are blessed with a stereo amplifier you can feed from that into the phono input of the recorder or, lacking an amplifier, you can feed into the mike jack for

cartridges with a weak output, such as a magnetic cartridge. Crystal cartridges, with their greater output may cause distortion of the sound if fed directly to the microphone input of your recorder.

To make stereo recordings you must have a stereo recorder. This would seem obvious but, because of a lack of a better term, some recorders are called stereo recorders when actually they will only play back stereo and their recording is restricted to monaural. A stereo recorder will have two inputs, one for each channel.

If you live in an area where there are stereo broadcasts you can let the station play the records and hook your stereo recorder to an AM-FM combination, a stereo tuner or an FM multiplex unit.



Cuing a record. The needle is placed in the groove and the record run until the first note starts. The finger is then placed on the record and the disc backed off a half turn. If the turntable motor is strong enough it will spin the turntable while the record is held still with the finger. On cue, lift the finger and the record will play.



Reverend Alfred R. Desautels, S. J., Chairman of the Holy Cross College modern languages department, shown monitoring a master tape during a lab exercise. Rev. Desautels has done considerable research in the use of magnetic tape in teaching languages.

Tape Language Laboratory

by Hiland Holt

***. . . . language instruction on tape proves superiority
over old teaching methods.***

ONE of the major contributions that magnetic tape is making in the teaching of languages is its amazingly successful applications and achievements in language laboratories, used in conjunction with language courses. Those progressive schools which have been pioneering in the potentials magnetic tape offers to language instructors who believe that good instruction is 90% research effort to improve language quality level, and 10% instruction, are discovering that the magnetic tape language laboratory is no

longer an experiment, but rather a definitely-needed and effective working tool which provides vast improvements in pronunciation, oral comprehension, and diction.

Probably the most advanced and latest type language laboratory in New England, and possibly in the United States, is the Modern Languages Laboratory at the College of The Holy Cross, Worcester, Massachusetts. Established in September, 1957, or on the 114th birthday of the college, it is now far from its experimental stage and is in its third

successful year. It is attracting an increasing number of educators, who, after a most impressionable and interesting visit at the "lab," are convinced that a language laboratory should be standard procedure and an integral part of language courses, no matter what level or grade the language is taught.

The lion's share of the success in the language laboratory at Holy Cross belongs to a quiet, modest, and most personable top-flight educator, Reverend Alfred R. Desautels, S.J., Chairman of the Modern Language Department. One of the most brilliant students to earn a PH.D. in French literature, at the University of Paris, Reverend Desautels had done considerable research and experimentation in the use of magnetic tape as an aid in the teaching of language. Having discovered the effectiveness of magnetic tape for language laboratories, he was selected by the College of the Holy Cross to set up a Modern Language Laboratory which would be ready for the September 1957 classes. Under his skillful leadership, this language laboratory became a success shortly after its inception, because it offers unusual versatility and recording facilities for the language professors who make the master tapes, and for the entire student body of 700 young men, all of whom study languages, and spend one hour a week at the language laboratory.

The laboratory is about 30 feet wide, and 40 feet long. At one end is the master console with five Webcor Royals which are operated by Mrs. Gertrude LeBlanc, Laboratory Technician, and which can handle five different languages simultaneously. There are forty individual soundproofed booths for the students, each booth equipped with a Webcor Royal, a goose-neck Electro-Voice microphone (915 Crystal), a channel and volume selector, and inputs for the student's earphones, and the monitor's, whenever desired. The walls of the booths are made of Masonite which is perforated. Two pieces of this material were used to form a partition of about two inches thick, and then filled with Fibreglass to form an almost soundproof type of wall structure. The ceiling is acoustically tiled. There is a desk for the



The master console at the Language Laboratory has five Webcor Royals which can handle five different languages simultaneously. Laboratory technician, Mrs. Gertrude LeBlanc, is shown in background.

Laboratory Technician located at one end of the master console, where the mimeographed lessons are handled, and another desk, near the entrance, where Mrs. LeBlanc performs secretarial duties.

The system, which was developed by Reverend Desautels, comprises the following steps and procedures:

(1) Every Friday, each student is given a sheet of paper, listing approximately 60 sentences in English. The student is required to spend one hour at the laboratory the following week, and is expected to be prepared to express these sentences correctly in the language which he is studying. A master tape of this material is also made by the professor of each language studied.

(2) Master tapes are placed on the master console re-



General wide-angle view of Language Laboratory at Holy Cross College, Worcester, Mass.



Top: Students holding sheets listing approximately 60 sentences in English, listen to master tape and hear each sentence spoken by the professor. There is a pause after each sentence, and the student repeats this sentence into the mike and onto his own tape. Middle: During the second twenty-minute period, students listen to the playback which has both the professor's and the student's recordings. Students study original list while listening. Bottom: For the last twenty minutes, the student is handed a small slip of paper listing approximately 10 sentences selected from the original list. He is allowed 8 to 10 minutes to say these sentences, in the language he is studying, into the mike, and onto the tape, which is picked up by the laboratory technician, and which will be reviewed and graded by the professor.

orders by the Laboratory Technician, who might also give further instructions to the students through a mike and loudspeaker.

(3) Putting on his earphones, the student turns on his own recorder, and selects the channel for his particular lesson. For the first twenty minutes, he hears the sentences spoken on the master tape, and repeats the lesson onto his own tape. There is a pause after each sentence on the master tape so that the student has time to repeat this sentence on his own tape, via the microphone.

(4) For the next twenty minutes, the student listens to the playback, while studying the original list of sentences in English. Sometimes the professor can plug in his own earphones on the side of the booth for criticism.

(5) For the last twenty minutes, the student is handed a slip of paper listing approximately 10 sentences selected from the original list. He is allowed 8 to 10 minutes to say these sentences, in the language he is studying, into the mike, and onto his own "test tape," which is picked up by the Laboratory Technician, and which will be reviewed and graded by the professor.

Although not all language laboratories use the same approach and techniques which are used at Holy Cross, Reverend Desautels feels that the three breakdowns of twenty minutes each provide the climate for developing maximum student capacities and abilities within the shortest period of time. Being a very serious and devoted researcher, always seeking an improvement in his own system, he stated that educational experiments with magnetic tape haven't "even scratched the surface" yet, and that magnetic tape and electronics will offer even richer rewards in the educational field for those who persevere in research, in addition to instructing and teaching.

Certainly the latest technique of using language laboratories, in conjunction with language learning, is not confined to the college level of instruction. Reverend Desautels' system can be used effectively at any level of instruction. Holy Cross College happens to be one of the best and strongest language schools in the country. And with the entire student body of 700 students required to take languages, it is not surprising to learn that this top-flight college hand-picked a master craftsman in Reverend Desautels to set up this language laboratory.

Reverend Desautels' system of the breaking down of the one-hour lab time into twenty-minute periods, and the various exercises performed by the student during each period, is the "secret formula" to a successful language laboratory. This is the working tool which enriches the quality level in pronunciation, oral comprehension, and diction. While the terrific workload at Holy Cross requires a sizeable investment in equipment, any elementary, junior high, or senior high school, can adopt Reverend Desautels' system with only two or three magnetic tape recorders, and achieve the same quality level that Holy Cross does.

It is the fondest hope of this writer that the day is not far off when all public and private schools will include the establishment of language laboratories, as an integral part of language learning, in the current re-evaluations now in process throughout American school systems. As one visitor at the Holy Cross Laboratory commented: "I have just realized that we have several magnetic tape recorders at our school which aren't being used very much, and haven't been given much attention by the language department, but believe me, when I get back, I'll know just what to do!"

Quiz on New Four-Track

. . . . test your knowledge—see if you can answer before reading our answer.

Q—What are 4-track stereo tapes? How do they differ from other tapes?

A—Ordinary stereo tapes have two tracks, one for each channel. The new 4-track tapes have two pairs of tracks, one pair in each direction, so that no rewinding is necessary. The use of 4 tracks on the tapes has meant that double the amount of music can be put on the same amount of tape.

Q—Has the use of four tracks degraded the quality we have come to expect from tape?

A—No. Improved heads and duplicating methods have, if anything, increased the quality of the new tapes so that they are superior to the old.

Q—What is the estimated number of four-track machines?

A—750,000 four-track recorders will have been produced this year and last. Add to that more than a half-million machines in the country that can be easily converted and you have a large audience that will make new tape production worthwhile from the commercial standpoint.

Q—Are these tapes on reels? At what speed do they run?

A—Yes, the tapes are on standard reels and play at the 7½-inch per second speed. This speed gives quality superior to any other means of playing stereo.

Q—Will well known artists and numbers be available?

A—Yes. The present tapes now available include ten which are in the top 30 on the charts. Included are such items as: the MGM original cast recording of *GiGi*, Billy Vaughn in *Blue Hawaii*, Lawrence Welk in *Mr. Music Maker*, Ella Fitzgerald and Louis Armstrong in *Porgy and Bess*, Roger Williams, David Carroll, the *1812 Overture* by Tchaikovsky. Both pops and classical are well represented.

Q—Will the tapes be expensive?

A—No. On the average the single album tapes will be only \$1 or \$2 more than the discs. Double albums will be the same price or less than the stereo discs. In some cases the savings are dramatic, in one instance there is a saving of \$5.00 over disc costs on a double album.

Q—Will four track machines obsolete present tape libraries?

A—No. Four track machines will play *any* tapes now on the market, including those made on two track machines.

Q—Will there be an adequate library of music of all kinds so that a person will feel the purchase of a tape machine is worthwhile?

A—Yes. 170 tapes are now available. By fall there will be a total of 500 and the supply will continue to increase.

Q—Will I have difficulty securing these tapes? Will dealers be able to get them?

A—No. The tape producers have established a gigantic one-stop operation in addition to their regular distribution to assure every dealer he will obtain the tapes he needs quickly and easily.

Q—Why should dealers stock and sell these tapes when there are already stereo disc records on the market?

A—Reel-to-reel stereo tapes at the 7½-inch speed are the ultimate in sound reproduction. In addition, tape has no problem of wear, as do the discs, the equivalent of two records can be put on one tape. There is no danger of channel shifting with tape, nor can dust or scratches affect the music on the tape.

The dealer who wishes to sell his customers the best will have to sell them tape.

In four-track 7½ speed tape offers

- 1—a superior product at a competitive or lower price.
- 2—greater customer satisfaction.
- 3—the highest fidelity commercially obtainable today.
- 4—a product proven by 10 years of field use. Reel-to-reel recorders at 7½ speed have proved their reliability.

Q—Since the number of tracks has been increased won't this increase the problem of channel separation and crosstalk.

A—No. The separation between any pair of tracks is actually greater than in two track. On the machines which we have heard, there has been no noticeable crosstalk.

Q—How, with thinner tracks can the claim of higher fidelity be justified?

A—New duplicating techniques using half-inch master tapes plus better heads on both duplicators and home machines have made the big difference. More about this will appear in later issues.

Q—Will I be able to record four track stereo?

A—On some machines yes, on others you will have means of playing stereo tapes but the recordings will be monaural, using a pair of tracks for a single recording.

National Tape Repository Operation

by Frank Hall

. . . . a wealth of educational material is housed here for use by schools and organizations.

"SERVICE to the nation" is the motto established at Kent State (Ohio) University, the home of the National Tape Repository. It was established by a joint committee of the Association for Education by Radio and Television and the Division of Audio Visual Instruction, N.E.A., in December, 1954. Since that time more than five thousand programs have been sent to schools and organizations throughout the world.

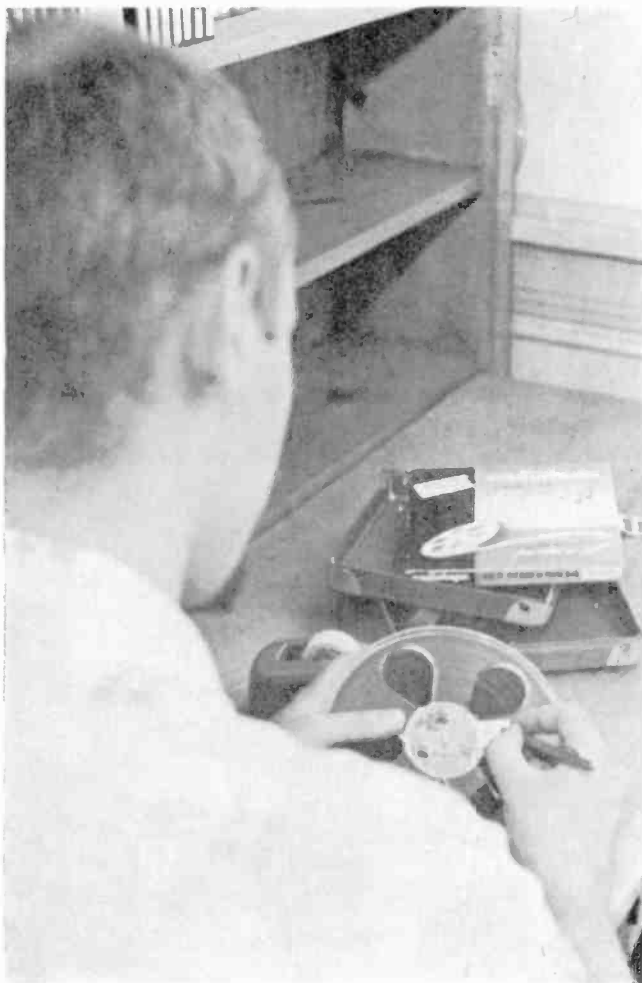
To handle this segment of the entire Audio-Visual Program at Kent State University a business type organization

has been developed. Dr. Anna Hyer, DAVI, develops the catalog and secures the new masters to be placed in the expanding collection. Evaluation centers composed of Universities and public school systems throughout the United States determine if the material has top educational value.

To help school systems with their in-service education programs K.S.U. has developed a filmstrip with sound on tape entitled "Tips On Tape." In a fifteen minute period it can help teachers see the value of tape and tape recorders in the classroom.



Top, left: Over sixty pieces of correspondence per month are handled in coordinating the evaluation service centers for educational material alone. Top, right: Tapes and orders are received by the secretary, who, in turn, sends them to the Tape Repository. Bottom, left: Masters are removed from the racks according to the orders. Bottom, right: The masters and blank tape are placed on the duplicator. Duplication is done single track $3\frac{3}{4}$ or $7\frac{1}{2}$ ips as desired. Two programs can be duplicated simultaneously on the Magnecord single copy equipment.



Above: Each taped copy is labeled for the user. Below: Invoices are prepared. The charge is nominal, fifty cents per fifteen minutes of program plus postage. The center supplies tape when requested.



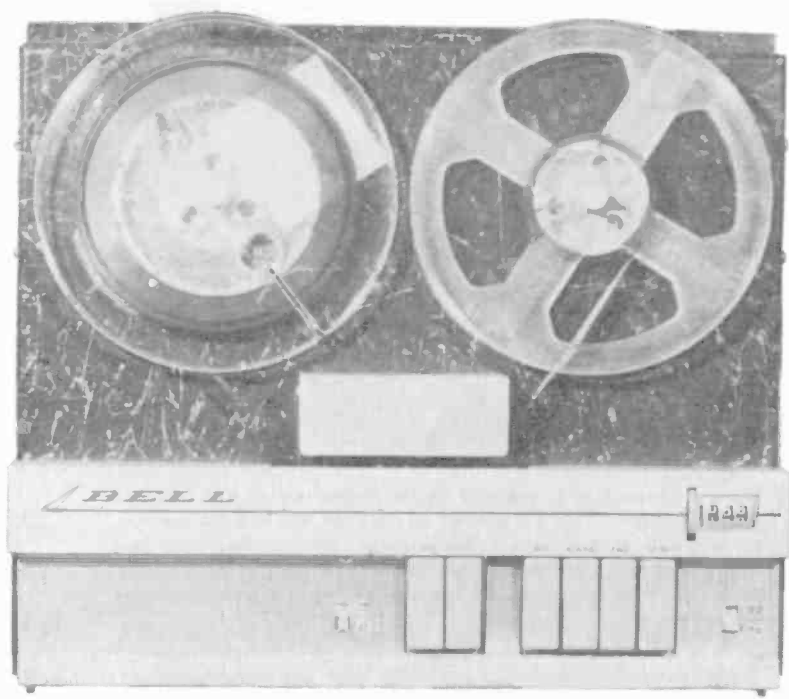
The completed tape is replaced in the mailing carton and labeled. Like any product of a mechanical or electrical machine there sometimes results a bad product. The average, however, has been less than one program per year of center operation (eight years—seven programs), and the center will replace any program reported faulty without charge.



Since mailing costs differ according to zone, the material is weighed and stamped.



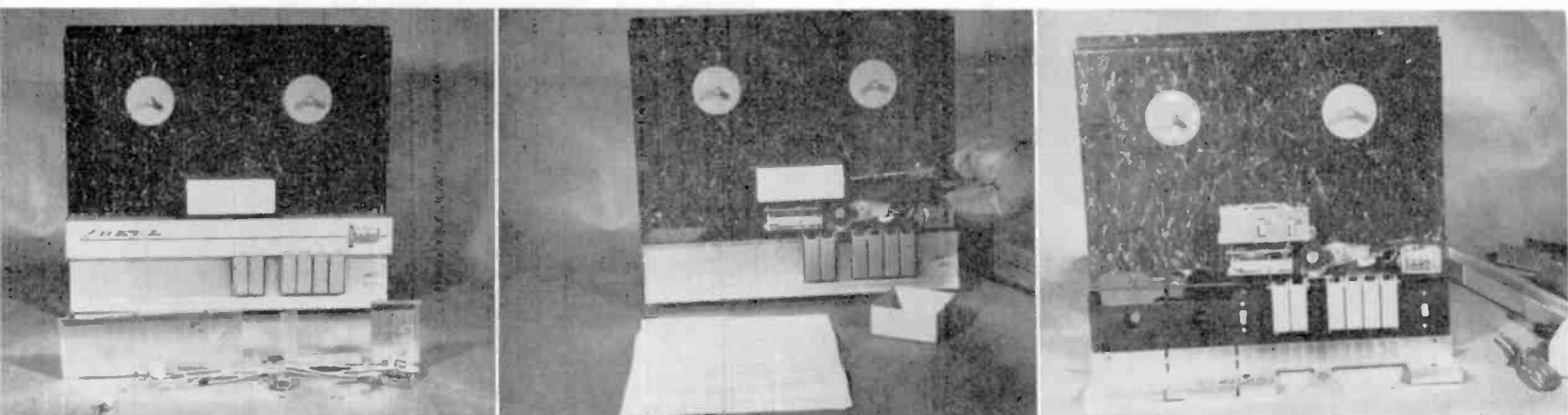
Each order is kept in a ledger. Once a school or organization starts ordering, they will usually send repeat orders. Checks are sent with orders, monthly, quarterly or yearly as arranged.



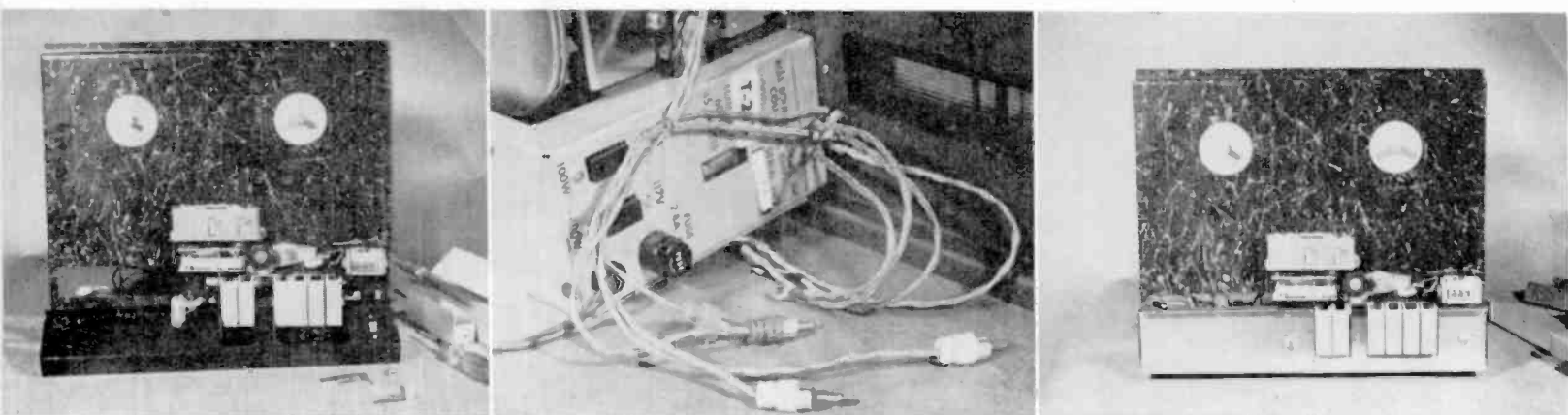
Bell Four-Track Conversion

USUALLY when we tackle a conversion job or kit for test purposes we pick out someone in the "kitchen mechanic" class to see if the job can be done satisfactorily by a person with little or no knowledge and only the instructions furnished by the manufacturer to guide them.

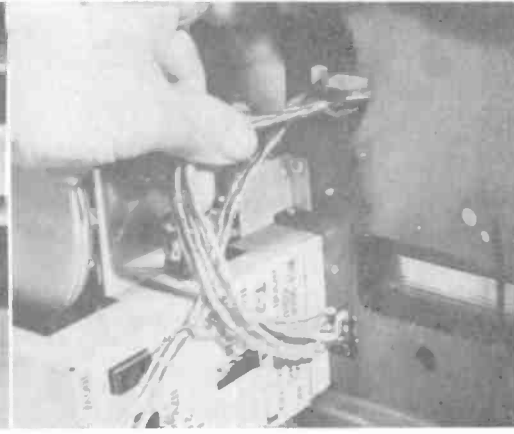
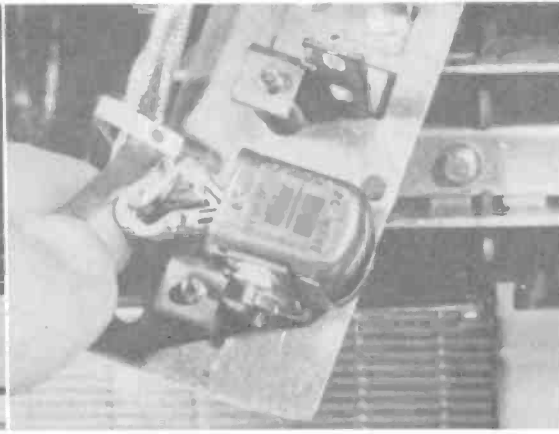
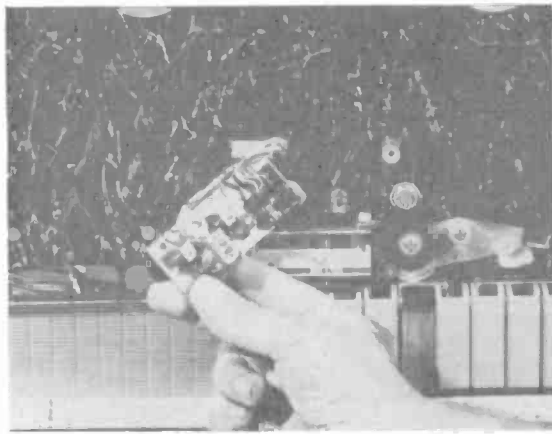
This we did in converting the Bell tape transport to four track operation. The person had never attempted a conversion job before—and he got no help. In fact, we



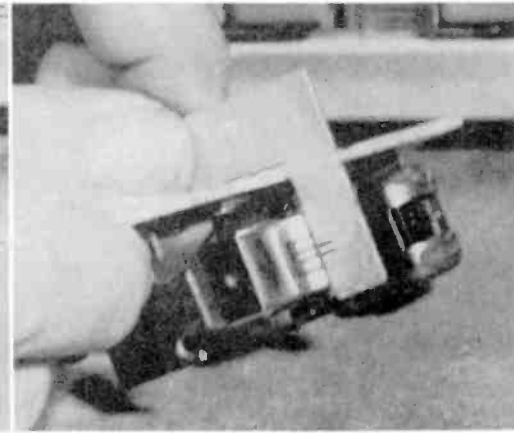
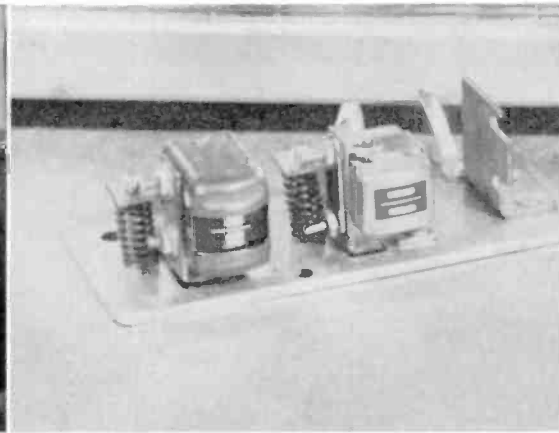
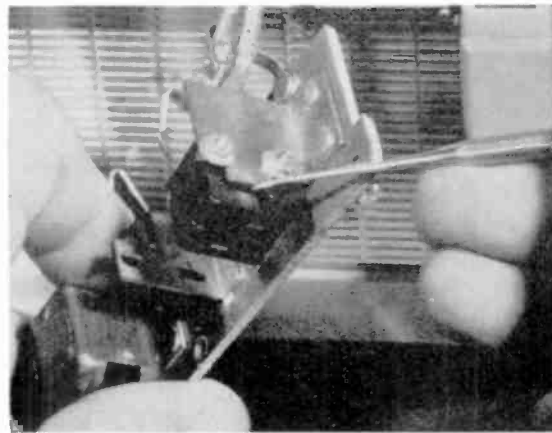
Left: the Bell deck with the conversion kit in the foreground. The kit consists of a new front piece, a switch and new cables, 4 track head and pressure pad. A gauge is also provided for head alignment. Center: the head cover is removed as a first step. Put the directions in front of you and have a small box handy to keep the screws in as you remove them from the deck. Right: the deck with the aluminum cover, head cover plate and gold trim plate removed.



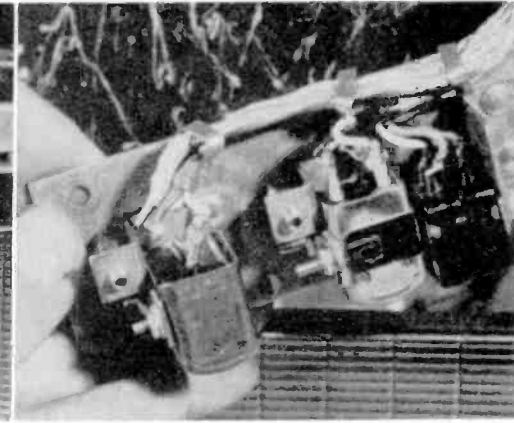
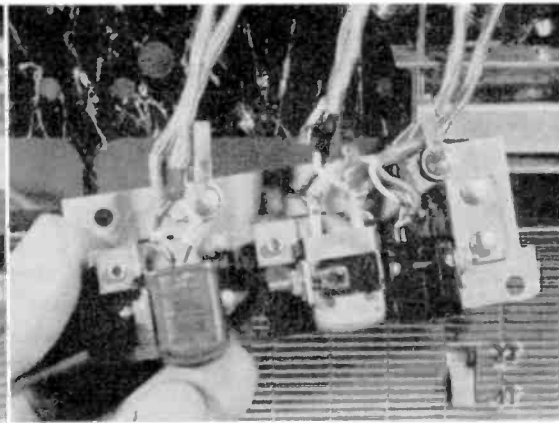
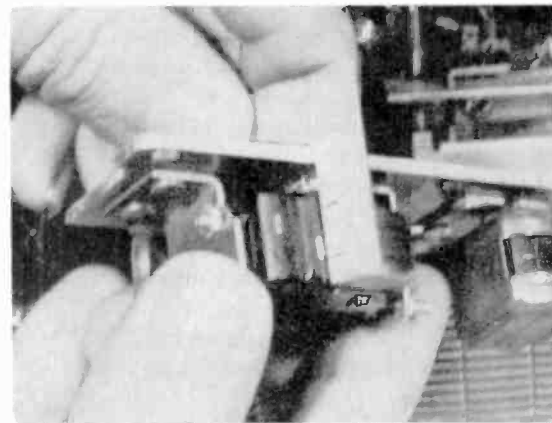
Left: after removing the screws at each end of the upper deck plate, the plate is rotated until the underside faces toward you. Center: the wires from the new switch are fed through the hole in the chassis and the switch installed with the two small bolts provided. Check to see that the contacts are clear of the plate then replace the deck plate, putting back the two screws. Right: the next step completed, which is to replace the gold front cover. Be sure the spacer is in place under the brass screw which holds the cover on.



Left: the main head bracket is removed by removing the three Phillips-head screws that hold it to the deck plate. Do not unscrew the two screws in the center of the bracket as these are head alignment adjusting screws. Center: with a small screwdriver, pry apart the cable clamps on the head assembly and detach the leads to the in-line head. The yellow and white coded head leads are removed from the chassis. Right: feed the leads from the newly installed switch through the hole at the head position.



Left: if the transport incorporates a dual channel erase head, it must be removed to make room for the 1/4 track head to be installed. Marks should be scribed on the side of the erase head with a sharp instrument to allow the head to be correctly reinstalled and aligned. Loosen the nuts and remove the erase head after the lines are scribed. Center: the new head mounted in place on the center bracket. It is held in place by two small nuts. These should be tightened enough to hold the head but still permit adjustment of the head on the bracket. Right: using the gauge provided in the kit, the new head is aligned with the two center lines scribed on the gauge. Align this very carefully and be careful not to scratch the surface of the head with the gauge.



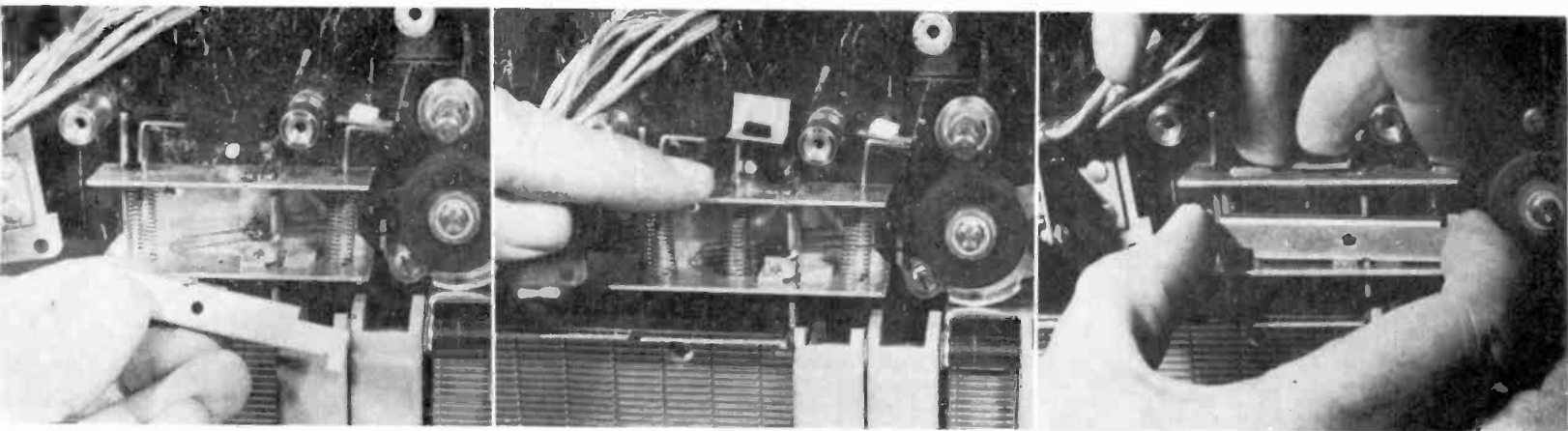
Left: after replacing the erase head it is checked with the same gauge using the outside scribed lines. In addition, the lines you scribed on the side of the erase head should be lined up with the bracket. Tighten the nuts. Center: the head leads are connected according to the directions. Since all wires are color coded, this is easy. Hold the heads in the same position as shown in the drawings in the instruction sheet and you will have no trouble deciphering the proper connections. Right: carefully tuck the cables under the cable clamps and press them down in place again as they were at first.

stopped him from time to time to make pictures of the progress.

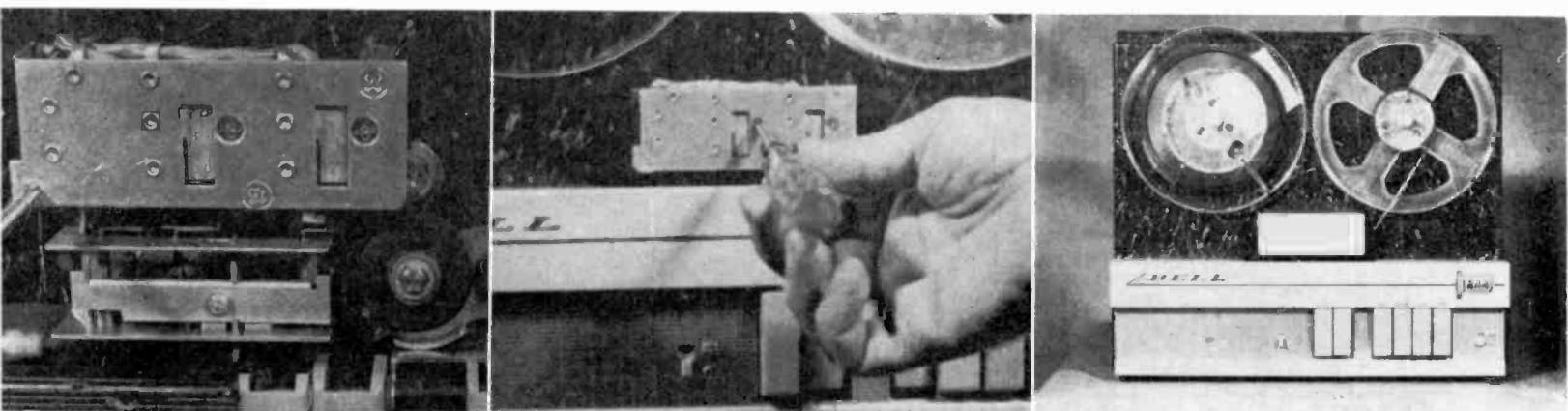
Even so, he polished the job off in about two-and-a-half

hours, including the stops for pictures.

If you have a Bell deck and wish to make the conversion our advice is to go ahead and do it. You will not have



Left: next step is to put in the new pressure pad. First remove the small screw in the head pressure pad retainer and lift it off slowly so the pressure pad arms will not pop out of place. Center: insert the new pressure pad and spring furnished in the kit. This goes in the center position and the wide part of the shield should be next to the deck plate. Right: hold all pressure pads down using three fingers of one hand and replace the pressure pad retaining plate with the other. Insert the screw and tighten it.



Left: replace the head bracket and tighten the screws to hold it in place. Center: after replacing the decorative plate with the Bell name on it connect the deck to AC power and hook it into the stereo system so that a tape may be played. Put a 4 track 7½ ips tape on the machine and while playing it, adjust the center head alignment screw for maximum high frequency brilliance (maximum high frequency output). If available, the best check is made with a test tape and a vacuum tube voltmeter. The head should be aligned for maximum output at 7500 cycles per second or above. Be sure the switch position is in the 4 track spot. Right: the completed job ready to handle either 2 or 4 track tapes.

any regrets for your machine will then be able to play not only the old two track tapes but the new four track tapes as well.

The cost of the conversion kit will be quickly repaid in savings on stereo tapes for the new tapes cost about half as much as the old.

Before starting we would advise that you read the directions carefully—more than once. Locate those parts which can be seen without dismantling the machine and figure what is going to happen when the screwdriver is finally applied.

When ready to begin, get yourself a clear area on which to work. It should be large enough to enable you to lay the parts out and to have a place for the parts you remove from the machine as you progress.

The directions should be in front of you at all times and if you follow them step by step you will have no trouble at all. A small cardboard box to put the screws in as you take them out of the machine will help and prevent any from becoming lost.

As the job progressed the only trouble encountered was from big fingers in two places. One was the installation of the new head which means handling two small nuts and

getting them started on the head studs. The nut at the top is out in the open and is easy. The one at the bottom was too much for our candidate and he wound up holding it in a pair of small pliers—which he probably should have done in the first place.

The only other spot, and you are warned about it in the directions, is keeping a spacer between the upper deck and the lower deck in place as you put the screw through it that holds on the gold front plate. This turned out to be easy also.

To do the job you will need a Phillips-head screwdriver, a regular screwdriver and a pair of pliers . . . all readily available around the average house.

The Bell directions are clear and concise and listed step by step. By reading each step carefully and looking before you leap you should make the transformation in a few pleasant hours of work.

There is nothing to fear, even if you have not seen the innards of a tape recorder before. There is no wire stripping or soldering and every part fits.

By making the conversion you will increase the value of the machine and be able to play any tape at the flick of a switch—we recommend that you do it.

FEEDBACK

(Continued from page 11)

Non-Promotion of Tape

To the Editor:

This is to inform you of a condition now existing in the tape business which is detrimental to the promotion of tape playing. I am sure you are not aware that you are aiding the continuation of this condition.

There are certain companies who seem to be actively engaged in bringing an end to the playing of tape recordings. These companies furnish you with information regarding releases on tape. When orders are forwarded to these companies by distributors or dealers, they are informed to the effect that the company does not believe in the further manufacture of tape recordings and that such releases of theirs are not available. For as long as a year this has been happening. As far as we can tell, they have not produced these tapes, but continue to furnish you with reviews purely as a means of getting their negative selling propaganda to the public.

We have on hand over a hundred notices to the effect mentioned above.

It is our suggestion that you discontinue the practice of running reviews of tapes from those companies who do not produce and ship. We believe they are using your magazine to secure free advertising which will become a channel for breeding public opinion that will have a negative effect on the desirability of tape recordings over records. We would appreciate your comments.—Robert S. Bryant, Lubbock Radio, Lubbock, Texas.

The situation which Mr. Bryant mentions became obvious with the introduction of the stereo disc. Many dealers and some record companies mistakenly figured that since stereo was available on records there no longer was a need for tape and it could take a back seat. As orders declined, distributors and others whose income depends on moving masses of goods, dropped the stereo tape lines because they did not show sufficient volume. This, in turn, backed up to the manufacturing level. Some tape companies had a drop in business as much as 80 to 90%.

While wide-awake dealers, such as Mr. Bryant's firm, continued to do a good business in tapes, they found it increasingly difficult to get the tapes for sale because of the conditions listed above. The situation was brought about by panic-button pushers in the industry.

We do not believe that the companies sought to get free advertising. Because of the outpouring of tapes prior to the stereo disc, our reviews were always a month or so behind, as is normal with any publication, and these reviews coasted past the point where distributors were lowering the boom on tape.

To get around this difficulty in respect to the new 4 track 7½ ips tapes, there has been set up a large "One-Stop" firm which will handle the output of all companies, thus assuring the dealers that they will be able to get tapes for sale. The firm is United Stereo Tapes, 1020 Kifer Road, Sunnyvale, Cal.

We believe that some dealers and con-

sumers have become disenchanted with the stereo disc because of its shortcomings. These people will be switching to tape and, since the new tapes are competitive in price to the stereo discs, they will be able to get better quality for the same money. If the old American adage of building a better mousetrap holds true then tape is due for a boom the like of which has not been seen before.

Cat's Meow?

To the Editor:

I have recently returned from a tour of duty in South America and find that tape recording has taken many steps forward of which I am not aware.

As a subscriber to your publication I have come to rely upon you for the most up to the minute info available and would appreciate any light you can shed on the following questions.

I have been offered an RCA cartridge stereo machine that seems to be "The cat's meow" in up to the minute features. If you have had the opportunity to inspect this machine, I would like your opinion of this product.

I have also been told that Minnesota Mining and RCA have been jointly developing this particular machine and cartridge and that there is supposed to be quite a large selection of titles available. Does this stack up with the info you have on the subject?

Finally, has the tape industry decided to do some standardization with its products or are they going to continue to "sluff off" until they create a Frankenstein monster that will pry on the consumer until he hollers, "That's all buddy, I want out?"

I have been fighting this battle of the Stereo Tape for over three years and am thoroughly convinced that it is about time for the powers that be to think of the poor consumer. It is very discouraging to have someone say that the sound is great, but where do you get the tapes?—Lt. Edgar G. Levine, Turner AFB, Ga.

Regarding the RCA cartridge machine we have not tested it but plan to in the near future and do a consumer's report on it. We have one of the machines on hand and it sounds well. At the moment there are 16 cartridges on the market with more to come. Bel Canto and Mercury will also have cartridges.

The tape industry has standardized, after a rather long hiatus, on four track tape. This will be available in two forms, 7½ ips reel type and 3¾ ips cartridge. The tape may be removed from the cartridge and played on a reel type machine. At this writing about 150 4 track reel-to-reel tapes are available (see catalog published in our last issue).

We do not foresee any changes in the immediate future which would obsolete present equipment of either type. Four track has come to stay and this is the most practical form for commercial duplication. Since it competes price-wise with the stereo disc and has better qualities, we feel it will ultimately be the home music medium.

We also feel that owners of present stereo machines will do well to convert them to four track operation.

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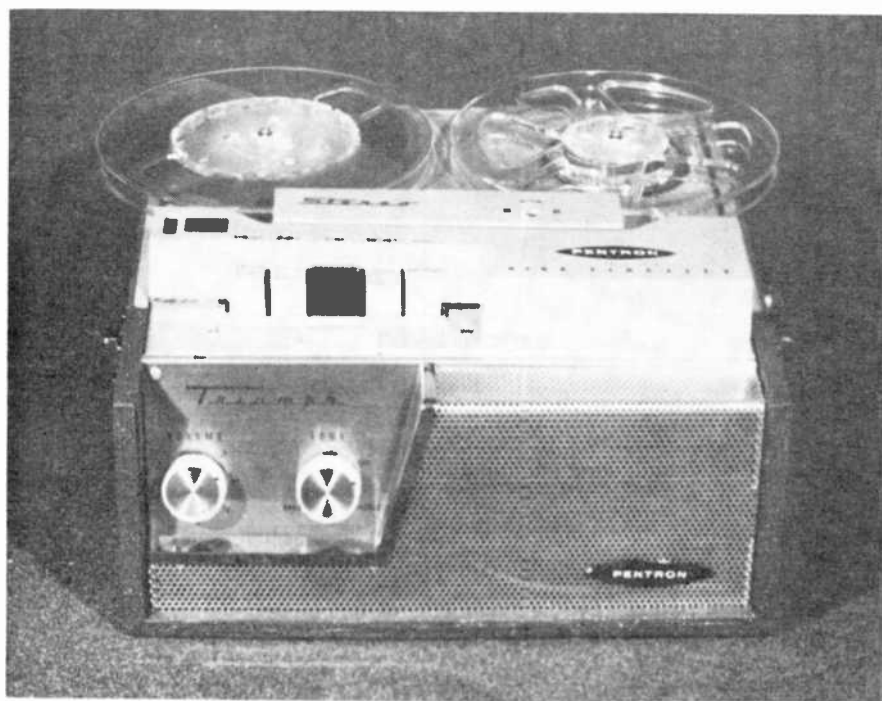
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NEW PRODUCT REPORT



PENTRON TRIUMPH RECORDER

. . . lightweight, easily accessible heads, monitor switch are among features.

THE Pentron Triumph tips the scales at only 19 pounds and measures only 12½" x 12½" x 7". This is both a sensible size and a sensible weight for a recorder that is portable.

Despite its small size, it performed well under test. The controls are conveniently located and work easily, the machine has a monitor switch so that incoming program material may be monitored with headphones or the set speaker, and it plays both two track and four track tapes.

The two track-four track adjustment is a screw which is turned with a small screwdriver through a hole in the head cover. It can only be adjusted in the play position when the screw is directly under the hole.

One feature we liked on this machine was the fact that the whole head cover is easily removable. Made of plastic, it can be sprung out of position by pressing with the thumbs against the front, then lifted up.

Since heads should be cleaned about every 15 hours of use for maximum

results and be demagnetized occasionally, it is nice to be able to do it so easily. Removal of the head cover also allows access to the head for close editing.

While it has nothing to do with the recorder itself, we were intrigued by the box in which it comes. In reality it is two boxes, the outside one taking the beating in shipping and the inside one, with carrying handles, is used to take it home from the dealer's shop. We think dealers will welcome this feature.

Tape threading is straight-line and the machine has two speeds, 3¾ ips and 7½ ips. A switch on the deck plate between the two reels makes the change and this should be operated while the machine is running. Be sure the switch clicks into place when the speed is changed.

The microphone and cords are held in the lid of the recorder. The line cord is not attached to the machine, being plugged into a receptacle on the back when ready for use. This

STAFKSTED

*Product: Pentron Triumph
XP60 S*

*Distributor: Pentron Corp., 777
S. Tripp Ave., Chicago 24, Ill.*

*Price: Recorder \$249.95. Match-
ing Amplifier Speaker \$59.50.*

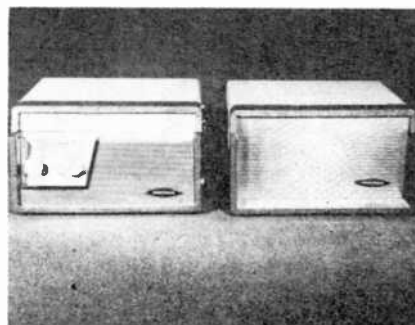
arrangement makes for a neater appearance of the case.

Also on the back is the output panel containing an output jack for connection, through the output cord, to the stereo amplifier to get the second stereo channel. Another jack takes the feed from the pre-amplifier in the unit and is used to feed an external amplifier if desired. The third jack is an external speaker jack which mutes the speakers in the set. Also on the same panel is the monitor switch.

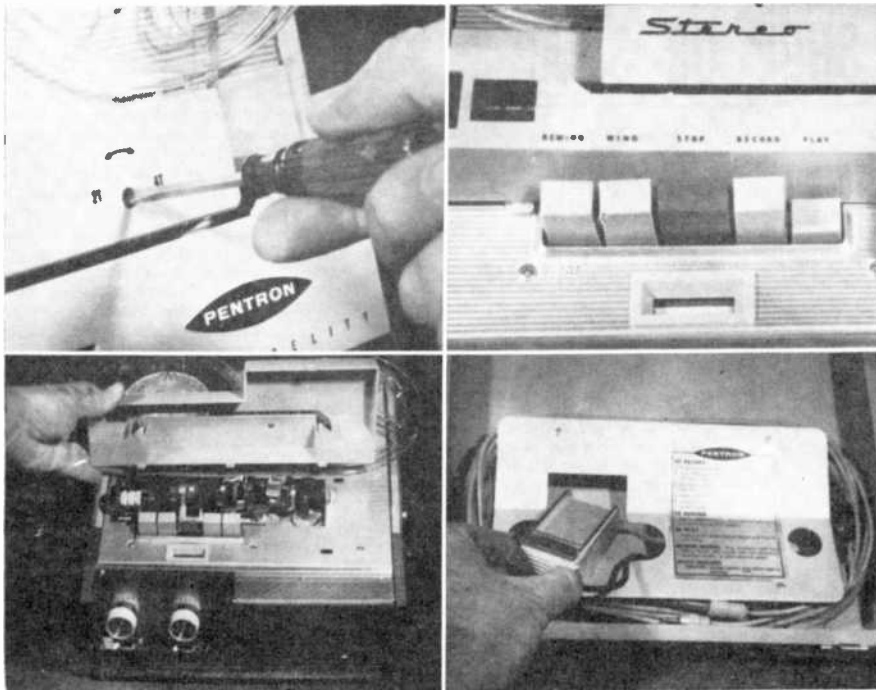
This switch permits programs to be heard through the recorder speaker while the recording is being made. Especially useful when the unit is connected to a tuner, it is also handy to monitor recordings made with the microphone. Headphones are advised for this to prevent feedback but if the mike is some distance from the recorder, the speaker may be used at low volume.

Volume control in recording is by means of an electron beam tube where the light advances from the sides toward the center as the volume is increased.

Another good feature of the recorder is the shut-off switch which cuts the motor current should the tape break or the end of the tape pass the head. This works in all operating positions.



The Triumph recorder with its matching amplifier-speaker. Both units are finished in tones of gray.



Upper left: the change from two track to four track operation is accomplished by inserting a small screwdriver through the hole in the head cover. Upper right: controls of the recorder are grouped conveniently. Lower left: the entire head cover lifts off easily to permit access to the heads for cleaning. Lower right: the microphone snaps in a bracket in the lid which also holds the power and output cords.

The Triumph is equipped with a half-track double-gap erase head and a four track head. This permits recording in regular dual track fashion by shifting the head to the two track position by means of the screw or the playback of either two track in-line or four track stereo tapes.

All controls are push-button operated and should be pressed positively when operating them. Wind and rewind are of good speed and it is not necessary to go through the stop position when switching from one to the other.

The record button can only be depressed when the machine is in stop position and, as a safety device, the tape will not travel if this button

alone is pressed. It is necessary to press both the record and play buttons together in order to record. For play, only the play button need be depressed.

We made rapid switches from wind to rewind and from play to both but there was no inclination for the tape to spill from the reel nor was there any undue strain imposed on it.

The microphone and radio input jacks are on the side of the cabinet.

To use the unit as a PA system the mike is plugged into the radio input jack, the tape is left off the machine and the play button depressed.

Should some clown depress all the buttons at once they may be released by depressing them simultaneously and releasing them sharply.

Output from the recorder is given at 8 watts. The power consumption at full load is only 80 watts which makes this a good machine to use with an inverter in car, boat or plane.

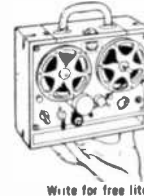
The matching companion amplifier-speaker unit does a good job using an ECL 82, one of the newest tubes. Two speakers are incorporated and the output is more than sufficient for home use.

All in all this is an attractive and compact machine and worth your consideration. We found nothing wrong with it.



The output panel on the back has jacks for amplifier connection, external speaker and stereo amplifier. The switch permits monitoring while recording.

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Remittances in full should accompany copy. Ads will be inserted in next available issue. Please print or type your copy to avoid error. Address ad to: Shop or Swap, Hi-Fi Tape Recording Magazine, Severna Park, Md.

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STEREOPHONIC

RECORDER/REPRODUCER



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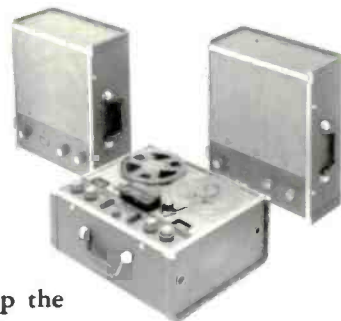
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Guiding the Ampex engineers who created the 960 was a dual objective—that of building a machine which was not only a superb example of engineering skill, but one which would also offer its user a range of capabilities far exceeding that of any other recorder made today. The result was not merely an improved stereo recorder, but *an entirely new concept* in home entertainment.

The STEREO 960 fits into family life in literally dozens of ways, contributing many tangible benefits in musical, educational and recreational fun. You'll use it to keep up the family correspondence by sending "letters in sound", to tape stereo programs off the air, to preserve your best monaural and stereo discs on tape, and to acquire new musical and language skills. You'll have endless fun exploring the 960's many fascinating recording capabilities, including sound-on-sound, echo chamber effects, and other advanced techniques.

ABOVE--960 PORTABLE STEREO
RECORDER/REPRODUCER

BELOW--MODE L 2560 PORTABLE
STEREO SYSTEM CONSISTING OF
960 AND PAIR OF 2010
AMPLIFIER-SPEAKERS



AMPEX STEREO

SIGNATURE OF PERFECTION IN SOUND

RECORDER/REPRODUCER SPECIFICATIONS

The true values of a recorder are best assessed through careful evaluation of its performance specifications and operating features. It is worthwhile noting here that these specifications are based not on theoretical design parameters but on actual performance tests. They are specifications which the recorder not only meets or exceeds today, but which years from now will still hold true. The Ampex Model 960 Stereophonic Recorder/Reproducer is capable of essentially distortionless frequency response from 30 to 20,000 cycles per second at the operating speed of 7 1/2 inches per second, and from 30 to 15,000 cycles per second at 3 3/4 inches per second. Its precision-engineered timing accuracy is such that it offers perfection of pitch held to tolerances of less than one-third of a half-tone. Playing times, using standard (.002"), long play (.0015"), and extra-long play (.001") tapes are as follows:

	(a) 4-Track Stereo Tapes	(b) 2-Track Stereo Tapes	(c) Monaural Tapes, half-track
1200 foot reel	3 3/4 ips - 2 hrs. 8 min. 7 1/2 ips - 1 hr. 4 min.	3 3/4 ips - 1 hr. 4 min. 7 1/2 ips - 32 minutes	3 3/4 ips - 2 hrs. 8 min. 7 1/2 ips - 1 hr. 4 min.
1800 foot reel	3 3/4 ips - 3 hrs. 12 min. 7 1/2 ips - 1 hr. 36 min.	3 3/4 ips - 1 hr. 36 min. 7 1/2 ips - 48 minutes	3 3/4 ips - 3 hrs. 12 min. 7 1/2 ips - 1 hr. 36 min.
2400 foot reel	3 3/4 ips - 4 hrs. 16 min. 7 1/2 ips - 2 hrs. 8 min.	3 3/4 ips - 2 hrs. 8 min. 7 1/2 ips - 1 hr. 4 min.	3 3/4 ips - 4 hrs. 16 min. 7 1/2 ips - 2 hrs. 8 min.

RECORD INPUTS: High impedance line inputs (radio/TV/phono/auxiliary) 0.3V rms for program level; high impedance microphone inputs

PLAYBACK OUTPUTS: Approximately 0.5V rms from cathode follower when playing program level tapes

PLAYBACK FREQUENCY RESPONSE: 30-20,000 cps at 7 1/2 ips; 30-15,000 cps at 3 3/4 ips
Within ±2 db 50-15,000 cps at 7 1/2 ips, 55 db dynamic range
Within ±2 db 50-10,000 cps at 3 3/4 ips, 50 db dynamic range

FLUTTER AND WOW: Under 0.2% rms at 7 1/2 ips; under 0.25% rms at 3 3/4 ips

HEADS: Manufactured to the same standards of precision that exist in Ampex broadcast and recording studio equipment. Surfaces are lapped to an optical flatness so precise that they reflect specified wavelengths of light, resulting in uniform performance characteristics and greatly minimizing the effects of head wear. Azimuth alignment of stereo head gaps in the same stack is held within 20 seconds of arc, equivalent to less than 10 millionths of an inch — a degree of precision achieved through use of a unique process involving micro-accurate optical measurements within a controlled environment. Head gap width is 90 millionths of an inch ±5 millionths of an inch.

KEY TO THE EXCITING FUN FEATURES OF THE 960 --

THE AMPEX STEREO-GRAPH

Here's the simplest, quickest answer to almost every question about how to perform the operations illustrated at right and numerous other recording functions. The Ampex Stereo-Graph shows you, quickly and clearly, the proper dial settings to make for more than a dozen of the most popular uses for the 960 . . . including sound-on-sound, language and music instruction,



and other special effects. A convenient tape footage/playing time indicator is included on the reverse side.

MODEL 2010 MATCHING AMPLIFIER-SPEAKER

The Ampex Model 2010's ten-watt (20 watts peak) amplifier section provides operating characteristics (unequalized) flat within ±0.1 db, with total harmonic distortion less than 0.5 of 1%, throughout the maximum range of human hearing ability, at rated output. Noise and hum are 80 db below rated output, and input sensitivity is 0.18V to develop rated power.

The specially designed 8" speaker provides smooth, peak-free response throughout a remarkably wide audio range. Such superior design features as its massive die-cast frame and edgewise-wound ribbon coil contribute effectively to higher levels of performance than ever before achieved with a speaker this size.



MODEL 960 DIMENSIONS: Portable cases 9" x 15" x 17 1/2". Unmounted recorder 13" x 15" x 6 1/2" depth below top plate, 1 3/8" above. Recorder weight 36 lbs., speaker amplifier 31 lbs.

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The Ampex, in private rehearsal, can be a wonderful confidence-builder for people who normally develop rubber knees when faced with the prospect of speaking before a group.

Learning to speak a new language is made immeasurably easier on the Ampex; you can record your own phrases side-by-side with those of the instructor, and play them back for comparison at any time.



When you strike up the band in stereo, you don't need professional musicians to make a professional recording. Advanced techniques are amazingly easy on the Ampex.

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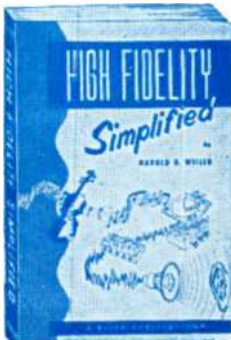
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