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Turn Talk Into Dollars
Sound Gift Idea Guide

tape

50c DECEMBER 1965 recording

MR. ROY PERLIN
231 WOODLAND AVE
RUTHERFORD N.J.



Al Hirt Tapes Christmas

12/21/65



We just developed a sound tape so sensitive that you can now cut recording speed by half, yet retain full fidelity. You can actually record twice the music per foot. Your budget will applaud.

Start savings with this new box. 

SCOTCH® Brand "Dynarange" Series Recording Tape is the name. And this one makes all music come clearer, particularly in the critical soprano range. Reason: This tape cuts background tape noise in half. With this result: You can now record at 3½ ips all the finest fidelity that before now your tape recorder could only capture at 7½.

Your dealer has a demonstration tape that lets you hear the excellence of this new tape at slow speed. Costs a little more. But you need buy only half as much—and can save 25% or more in tape costs. Or, if you use this new tape at fast speed, you'll discover fidelity you didn't know your recorder had.

Other benefits of new "Dynarange" Tape: Exceedingly low rub-off keeps recorders clean. The "Superlife" coating extends wear-life 15 times over ordinary tapes. Lifetime Silicone lubrication assures smooth tape travel, protects against recording head wear and extends tape life. Comes in new sealed pack, so tape is untouched from factory to you. Reasons aplenty to see your dealer soon, hear a demonstration. And try a roll!

"SCOTCH" AND THE PLAID DESIGN ARE REG. TMS OF 3M CO., ST. PAUL, MINN. 55119 ©1965, 3M CO.



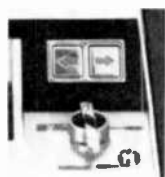
Magnetic Products Division 

SOMEDAY, THERE MAY BE OTHER FULLY AUTOMATIC TAPE RECORDERS LIKE THE NEW CONCORD 994



The 994 gives you automatic reversing ☐ Plays or records automatically three different ways ☐ Stops by itself where you want it to ☐ Threads itself automatically ☐ And, the 994 is available now!

With the transistorized 994, Concord introduces a new dimension to tape recording. Some might call it modernization, some might call it automation. We think of it as *convenience*—in playing, in recording, in starting and stopping, in threading, in hours of uninterrupted listening. You can't compare it to anything because the 994 is as different from the conventional stereo recorder as the old crank-type Gramophone is from the modern record changer.



AUTOMATIC PROGRAMMING. You can program the 994 to play or record one side of a tape from beginning to end and stop automatically. Or, to play/record first one side of the tape, reverse, play the other side, then stop automatically. Or, to play/record forward and back, forward and

back, continuously, as long as you like—an hour, six hours, or all day. You may change direction of tape any time you like by merely pressing the direction change buttons. These same lighted buttons automatically show you direction of tape travel.

PUSH-BUTTON KEYBOARD. The operating controls are literally at your fingertips. This is the one recorder you can operate without arm waving, and with one hand! As far as threading, that's even simpler—the 994 threads itself automatically.



After all this, we didn't just stop in designing the 994. We kept going. As a result, the 994 offers superb performance and every conceivable feature required for your listening and recording pleasure. Here's a brief sample: three speeds with automatic equalization, four professional heads, two VU meters, digital tape counter, cue control, sound-on-sound, exclusive Concord Trans-A-Track recording, 15-watt stereo amplifier, professional record/monitoring system. The 994 may also be used as a portable PA system, with or without simultaneous taping.



TWO-WAY STEREO SPEAKERS. The split lid of the 994 houses a pair of true two-way speaker systems, each containing a tweeter, woofer, and crossover network. A pair of highly sensitive dynamic microphones is included.



The 994 is priced under \$450.* An identical recorder, Model 990 comes without speakers or microphones and is priced under \$400.* Both are at your dealer's now. So why wait? Drop in for a demonstration and find out for yourself what *fully automatic tape recording by Concord* is all about! Or, for complete information, write Dept. TR12

For Connoisseurs of Sound

Other Concord models from \$50 to \$800.

CONCORD 994

CONCORD ELECTRONICS CORPORATION, 1935 Armacost Avenue, Los Angeles, California 90025

IN CANADA: Magnasonic Industries, Ltd., Toronto/Montreal

*Prices slightly higher in Canada.

THE SIGNATURE OF QUALITY ■ Tape Recorders/Industrial Sound Equipment/Dictation Systems/Communications Devices/Closed Circuit Television

Circle 44 on Reader's Service Card

November-December 1965

Condescend to observe honorable tape recorder.

Is unnecessary to give what our honored American friends call "snow job" in pointing out superiority of new Cipher 98 four-track stereo recorder. Specifications are own best advertisement. Honorable audiophiles will recognize Cipher 98 as number one sun of world's fastest-rising tape recorder industry. New solid-state Cipher 98 incorporates nearly every feature of very expensive professional machine, at price significantly lower than comparable recorders made across Pacific or in Europe. Observe: 3 heads (erase, record, playback); no pressure pads; tape speeds $7\frac{1}{2}$

and $3\frac{3}{4}$ ips with knob change, $1\frac{7}{8}$ ips with capstan sleeve change; wow and flutter less than 0.2%; signal-to-noise ratio better than 52 db; two VU-type panel meters; automatic shutoff; digital tape index; pause control; plays horizontally or vertically; comes with own detachable stereo speakers and two dynamic microphones. Honorable dealer most happy to demonstrate; list price mere \$350.00. (Ah so! Our honored American friends wonder where we learned to speak well English. We studied electronic engineering at University of California!) **CIPHER 98 \$350.00**



WITH HANDSOME CARRYING CASE AND WALNUT COLOR CONTROL PANEL.
FOR MORE INFORMATION, WRITE TO INTER-MARK CORPORATION,
29 WEST 36TH STREET, NEW YORK, N. Y. 10018.
IN CANADA: INTER-MARK ELECTRONICS LTD., 298 BRIDGELAND AVE., TORONTO 19, ONT.

Circle 43 on Reader's Service Card

tape

recording

NOVEMBER-DECEMBER 1965

VOLUME 13 No. 1

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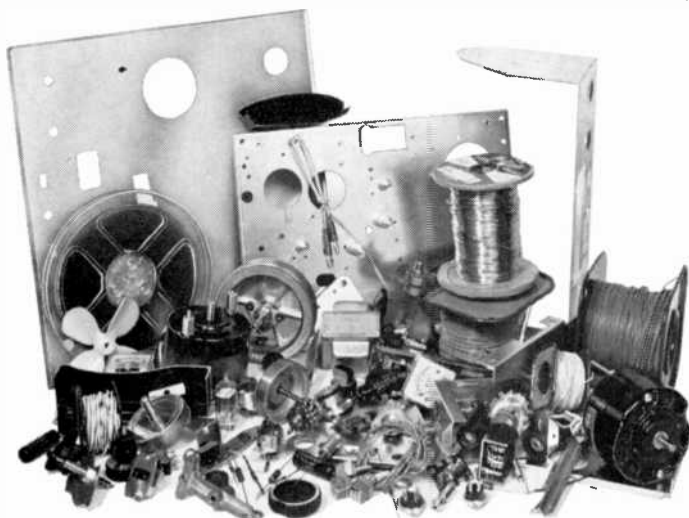
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HOW TO BUILD YOUR OWN STEREO TAPE RECORDER...



Start out by engineering a mechanical transport to move tape from one reel to another, tracking accurately within 1/5000 inch over three hyperbolic heads at 3-3/4 and 7-1/2 ips. Tape must run very smooth to hold flutter and wow below 0.2%. Provide high speed-take-up and rewind with a dependable brake system to stop the tape instantly without snapping or stretching. Add tape lifters, counter, automatic stop, pause control, cueing. Connect a fool-proof record interlock to the amplifier section. Design separate amplifiers for recording and playback with a 30-18,000 cps frequency range and facilities to monitor the tape while recording. Provide a bias/erase frequency of 95KC, signal-to-noise ratio of 55DB with total harmonic distortion not to exceed 1%. Include calibrated VU meters, stereo-mono switch, AB monitor switch, high level inputs, mike inputs, amp outputs, monitor outputs and independent record/playback controls for each channel. Package the entire assembly into a compact enclosure no larger than 13 x 13 x 7", provide forced air cooling and cover with a decorator styled stainless steel panel.

IF YOU DON'T FEEL QUITE UP TO MAKING YOUR OWN
TAPE RECORDER, ASK YOUR NEAREST VIKING DEALER
ABOUT THE...

88 STEREO COMPACT



Hear the magnificent sound,
see the smooth action, all
set and ready to take home
for less than \$340.00.
Walnut base \$29.95 extra.



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tape

LETTERS TO THE EDITOR

Sarasota, Fla.

I have been a subscriber to the **TAPE RECORDING** magazine for 5 years now, but the Sept.-Oct. issue has reached a new low in the opinion of my family and myself.

In this day of low-morality and all the other things that are undesirable, to have you publish an article like Andy Warhol's on page 15-19 where you seemingly condone his comments at the bottom of page 19, is the last straw.

I wouldn't want children picking up your mag—and reading about pornography and spying on people—that's not done in decent society.

This will serve notice that I will not renew my subscription nor recommend your magazine any more to my friends.

R. T. Lapham

Chicago, Illinois

On page 62 October issue **TR** Mag Arthur Miles of San Diego, Calif. requests "All about Tape on Tape" by Jack Bayha, narr by Ed Condit & published by your predecessor prior to 1959.

I'd be pleased to dub this for him upon the receipt of a 7" reel of tape and his *complete* address.

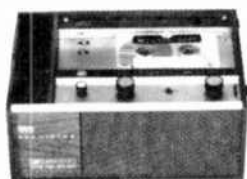
Thank you for entering my request in your current issue under "Tapespondents Wanted" column. The response has been excellent, even before receiving my copy. So far only letters averaging one daily, no tapes. For your information... from past experience this will taper off to an occasional letter or card perhaps a tape and will for a year or more prompt a request now and then.

(Continued on page 10)

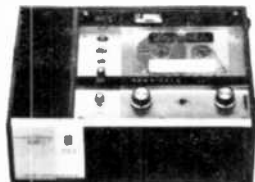
Tape Recording

Now RCA, the company that makes tape recorders for Gemini, offers 9 tape recorders you can buy.

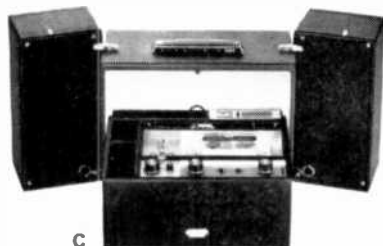
They're from RCA VICTOR. They start at \$49.95*



A



B



C

4 Solid State snap-in cartridge models

A Snap in a tape cartridge and you're all ready to record or play—no reels to thread. The *Relay I* 4 track, 2-speed recorder has VU meter recording level indicator, fast forward. **B** The *Relay II* snap-in cartridge recorder has big 6" oval speaker, VU meter, and controls for volume, record, rewind/off/play, tone, fast forward, speed and track selectors, public address and earphone switches. **C** Stereo tape recorder, the *Relay III*, is RCA Victor's finest tape cartridge recorder. Two 9" oval speakers, two 3½" tweeters in swing-out, detachable enclosures. Four-track recording at 3¾ or 1½ ips. Sound-plus-Sound permits addition of new sound to a previously recorded tape. Also available as a modular unit to play through your own stereo system. See the *Module Mark I*.

*Optional with dealer



RCA Solid Copper Circuits are the circuits of the Space Age . . . they replace old-fashioned hand-writing for better performance, greater dependability, fewer service headaches.



Circle 66 on Reader's Service Card

National Aeronautics and Space Administration



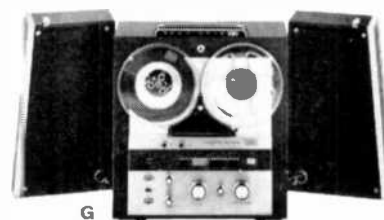
D



E



F



G

5 Solid State reel-to-reel models

D The *Tiros I* is battery operated—records wherever you go. All Solid State (no tubes to burn out); has VU meter recording level monitor and battery level indicator. Includes mike, batteries, earphone, tape and reels. **E** Reel-to-reel recorder, completely Solid State, battery-operated—but plays on house current, too, with optional AC adapter. 4" oval speaker, earphone jack, tone control, VU meter, fast forward. See the *Tiros II*. **F** Deluxe monaural 4-track reel-to-reel recorder, the *Score I* comes complete with microphone, 7" reel of tape, reel and auxiliary cable. **G** Stereo reel-to-reel model, the *Score II*, has two 9" oval speakers, two 3½" tweeters in swing-out, detachable enclosures. Sound-plus-Sound feature lets you add sound to previously recorded tape. Or see the *Module Mark II* reel-to-reel tape deck—plays through your present amplifier-speaker system.



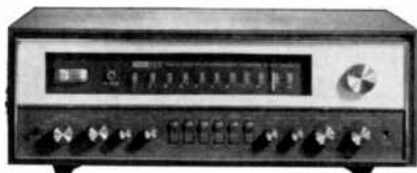
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Now—choose the
finest in transistor
components or
complete system

harman kardon

STRATOPHONIC



Model SR900—FM—75 watts

This incredibly pure, spacious sound has captivated discerning ears throughout the nation. And only Harman-Kardon offers you such a wide choice of all-transistor components: FM or AM/FM stereo receivers in IHF output powers from 36 watts to 75 watts; an all-transistor 36-watt integrated stereo amplifier; and an all-transistor AM/FM stereo tuner—all with the performance that has created a new era in sound ...literally *sound unbound*. And now comes the latest addition to the Stratophonic Series...

NEW!

Harman-Kardon Stratophonic
COMPACT MUSIC SYSTEM
complete with speakers



Model SC440 complete AM/FM system

Here for the first time is a complete full-component music system—36-watt all-transistor AM/FM stereo receiver with built-in Garrard AT-60 automatic turntable, plus a pair of radically new Harman-Kardon speakers designed especially for this remarkable system ... speakers which disperse the sound to produce the full stereo effect even in a small room. Hear Stratophonic Sound at your Harman-Kardon dealer's.

harman kardon

A subsidiary of The Jerrold Corporation
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Also available in Canada

LEADER IN SOLID-STATE-STEREO COMPONENTS

Circle 47 on Reader's Service Card

tape

TAPING FROM FM STEREO

By George Robertson

Tape fans of the Philadelphia Orchestra are in for a disappointment this year. The Orchestra's concerts, which have been taped in stereo by radio station WFLN in Philadelphia and supplied to good music stations across the country, will not be recorded this year. The players, who have jurisdiction over taping, have voted against it. The orchestra's concert tapes have been sold in the past to some 22 FM stations, including WQXR in New York, WFMT in Chicago, WGMS in Washington, D.C. and WDEA in Ellsworth, Me. Proceeds from the sale of the tapes go entirely to the pension fund for the musicians. Last year, more than \$24,000 was realized from this source.

Each year the musicians may vote for or against continuing the transcriptions. During the average season, some 39 concerts are taped, including student, childrens and pension fund concerts. The Boston Symphony and New York Philharmonic have similar systems. Although the musicians gave no reason for their vote, an orchestra member who declined to be identified said the general feeling among the men was that the transcription service was not offering enough money to the pension fund. He said that the men of the New York Philharmonic were receiving far more money for broadcast services than is the case in Philadelphia. Since the decision not to tape was for the 1965-66 season only, it's quite possible the Orchestra may resume taping next season.

During December and January, the Metropolitan Opera will broadcast nine complete operas on Saturday afternoons. Here are the approximate timings for each act, as presented by the Metropolitan. If you're planning to tape any or all of these performances, it's a good idea to allow several minutes' leeway on the longer acts, just in case:

December 4: Verdi—II Trovatore

Act I	Scene 1	11 min.
	Scene 2	16 min.
Act II	Scene 1	22 min.
(Act II)	Scene 2	15 min.
Act III	Scene 1	12 min.
	Scene 2	9 min.
Act IV	Scene 1	19 min.
	Scene 2	15 min.

December 11: Verdi—Don Carlo

Act I	57 min.
Act II	35 min.
Act III	77 min.

December 18: Strauss—Arabella
Times not available at press time.

December 25: Offenbach—La Perichole

Act I	49 min.
Act II	41 min.
Act III	43 min.

January 1: Saint-Saens—Samson et Delilah

Act I	46 min.
Act II	40 min.
Act III	28 min.

January 8: Puccini—La Fanciulla del West

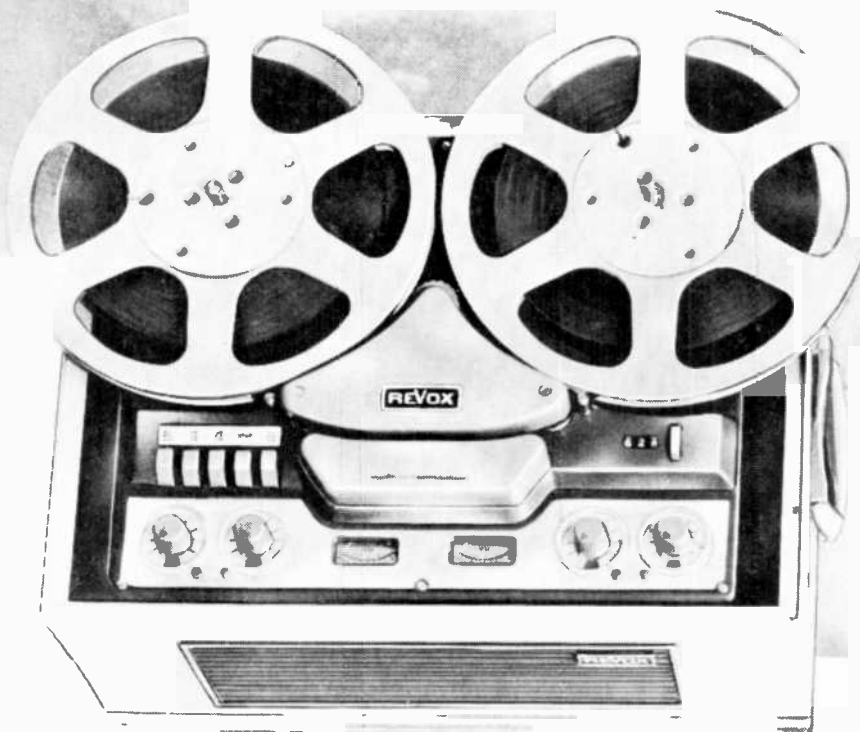
Act I	53 min.
Act II	45 min.
Act III	25 min.

January 15: Tchaikovsky—Pique Dame

(Continued on page 10)

Tape Recording

The Remarkable REVOX



has finally arrived in the U.S.

You've heard of the remarkable REVOX, of course. You've heard them rave about this recorder in London. Paris. Rome. Johannesburg. Everywhere. But you couldn't buy it in the U. S. until now. Now, finally, REVOX is ready for its American and Canadian debut. Is there another tape recorder anywhere that matches it, feature for feature? Decide for yourself:

Is the REVOX different? Consider these features, found only in the most expensive, professional tape recorders. Each of the two reels has its own Pabst motor. There is also a separate, heavy duty Pabst 6/12 pole hysteresis synchronous capstan motor that electrically changes the number of poles for the speeds. This is a direct drive unit assuring linear tape speed, whether at 3¾ ips or 7½ ips. Direct coupling eliminates wow and flutter; no belts to break or slip. Tension adjustment contrast assures use of any reel up to 10½ inches with assurance that tape will not snap or break. There are three ring-core heads, specially designed and manufactured by REVOX . . . each head performing its own function of record, playback and erase. Other features? All operating modes are switched electrically by push-buttons; you can use remote control on the REVOX; also a highly accurate tape counter; no pressure pads (for long head life); no need for hum-bucking gimmicks. Vertical or Horizontal Mounting.

EXCLUSIVE BENEFITS

The REVOX is the only recorder in its price category that takes a 10½-inch reel. You

can record up to 4,800 feet of LP tape with unsurpassed sound quality. It's a complete 4-track stereo recorder. Exceptionally fast rewind. Oversized, solenoid-operated brakes assure quick and positive braking, even with extremely fast winding speeds. A microswitch senses the end of the tape and automatically stops the motor after a reel has been rewound or where a splice has opened. Tape breakage and tape spill are virtually impossible.

CREATING SPECIAL EFFECTS

With the built in mixing facilities of the REVOX, you can mix and record any two signals. You can also set one channel for playback, while the other is recording, and thus achieve all kinds of multiplay and duoplay effects — sound with sound — even sound on sound with echo.

PROFESSIONAL QUALITY FEATURES

The REVOX G-36 includes two VU meters, one for each channel, for accurate control of recording levels. All operating controls are electrically operated by pushbuttons. There are no gears, belts, levers or friction drives. In its smart gray, portable carrying

case, with pockets for reels (reels not included), the REVOX is built for a lifetime of proud performance. Only \$500.

AN EXPERT'S VIEW

Recently, British critic Geoffrey Horn wrote this about the REVOX: "One can record a piano at 3¾ ips, and if on listening critically to a held chord one detects the slightest waver, then it is likely to be the piano tuner you should send for, not the tape mechanic. This is a superlative machine, quite the best domestic tape recorder I have experienced, and so well worth saving and waiting for."

The REVOX is available only through carefully selected Franchised Dealers. Complete literature and Dealer listings are available upon request. Write Dept. TR-10.

ELPA MARKETING INDUSTRIES, Inc.,
NEW HYDE PARK, N. Y.



REVOX — another Elpa quality product distributed in the U. S., Canada and Puerto Rico.

Circle 60 on Reader's Service Card

**Your tape head
is wearing
every time you
use your
recorder!**



***The question is—
how much is it worn?***

You can check for head wear by looking for these obvious defects:

1. Grooves — worn into the head by the tape. Easily recognized by lightly running your finger across the face of the head.
2. Pitting or Open Gap—which can be seen. If pitting is noticeable or if you see a vertical line dividing pole pieces, intimate contact has already been lost and the head must be replaced!

Protect your large investment in tape and equipment by replacing worn heads with full fidelity Nortronics precision quality replacement heads — Remember the tape head is the heart of your recorder!



Restore the brilliant realism of tape that you have gradually lost... see your local Nortronics dealer for factory recommended replacement heads!

Nortronics®

8183H 10th Ave. No. • Minneapolis, Minn. 55427

Circle 57 on Reader's Service Card

tape

NOTES

The report we prepared on new tapes for slow-speed recording (April issue) seems to have interested a substantial number of readers. Few, perhaps, were as interested as Mr. Ed Welker, who promptly contacted us. Part of the reason for Mr. Welker's interest may be put down to the fact that he's in charge of marketing for RCA's Red Seal Recording Tape. Would we, he wanted to know, be interested in subjecting RCA's new low noise tape to the same type of tests we had run on Minnesota Mining's Dynarange, Audio Devices' and Kodak's high output tapes, Sony's PR-150 and Ampex' slow-speed tape? We would. We did. And here are the results.

RCA's low noise tape, identified by the code number 15ALN, exhibits many of the same characteristics as Scotch's 201—which we found to be a pretty good tape. 15ALN proves to be capable of unusually wide-range recording with negligible tape hiss. As we did in April, we checked 15ALN for background noise by splicing it into a sample tape with Scotch 201. We found that both exhibited extremely low noise. On a Roberts and Norelco, Dynarange exhibited a slight edge. When we used the same tape on two recorders with slightly different bias adjustments, a Wollensak and a Uher, we achieved slightly less noise with RCA.

We found, when we recorded at $3\frac{3}{4}$ ips, that both tapes exhibited extremely wide range characteristics, capturing highs and lows

which ordinary tapes tend to muffle at slower speeds. Absence of tape hiss, we found, added to our enjoyment of the Berlioz "Requiem," which we dubbed from RCA Victor's recording as a test. The same material, recorded at $1\frac{7}{8}$ ips, proved less interesting both on Dynarange and 15ALN.

We came to the conclusion that you can get appreciably better results with either tape than with the conventional formulations from the same manufacturers. Which one will perform best on your recorder may be a matter of experimentation.

Letters...

(Continued from page 6)

For some time now I have been searching for an "Audio Baton" discontinued by Blonder-Tongue and sold by Radio Shack. No luck thus far. But I believe somehow that TR can pull an answer.

Lou Berger

Taping FM Stereo...

(Continued from page 8)

Times not available at press time.
January 22: Beethoven—Fidelio
Overture (Leonore No. 3) 12 min.

Act I	Scene 1	31 min.
(Act I)	Scene 2	36 min.
Act II	Scene 1	32 min.
	Scene 2	13 min.

January 29: Mozart—Don Giovanni

Act I	88 min.
Act II	82 min.

Kodak
TRADEMARK

Some plain talk from Kodak about tape:

The meat of the matter... and some boxing news

Undistorted output from a tape—as from any other link in the chain of audio components—is at the very heart of high fidelity enjoyment. Distortion (or the lack of it) is in theory simple enough to evaluate. You start out with something measurable, or worth listening to, and you reproduce it. Everything added, subtracted or modified by the reproduction, that can be measured or heard, is distortion. Since most kinds of distortion increase as you push any component of your system closer to its maximum power capability, you have to label your distortion value to tell whether you did this while coasting or at a hard pant.

Cry “uncle”

To make the distortions contributed by the tape itself big enough to measure and control, we simply drive the tape until it hollers “uncle” and use that power reference as our benchmark. Here’s the procedure. Record a 400-cycle signal (37.5-mil wavelength at 15 ips) and increase its level until in a playback, which is itself pristine, you can measure enough 1200-cycle signal (third harmonic) to represent 2% of

the 400-cycle signal level. This spells “uncle!” We use 400 cycles for convenience, but insist upon a reasonably long wavelength because we want to affect the entire oxide depth.

The more output level we can get (holding the reproduce gain constant, of course) before reaching “uncle,” the higher the undistorted output potential of the tape.

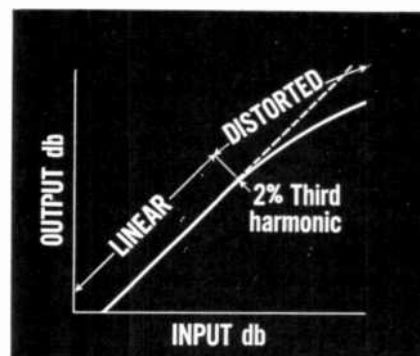
Simple, what?

“Wadayamean — undistorted output at two percent?”

That’s what makes a Miss America Contest. Two percent third harmonic is a reference point that we like to contemplate for a picture of oxide performance. Since distortion changes the original sound, it becomes a matter of acumen and definition how little a change is recognizable. If you’re listening, two percent is a compromise between a trained and an untrained ear. If you’re measuring, it comes at a convenient point on the meter. It’s like a manufacturer testing all sports cars at 150 mph, even though some cars are driven by connoisseurs and some by cowboys. Same goes for tape. Two per-

cent tells us a lot about a tape even if, on the average, you never exceed the 0.5% level.

Because undistorted output helps to define the upper limit of the dynamic range, it has a further effect on the realism of the recording. The higher the undistorted output, the easier it is to reproduce the massed timpani and the solo triangle each at its own concert hall level. And this is just another area where Kodak tapes excel... our general-purpose/low-price tape (Type 31A) gives you up to 3 decibels more crisp, clean output range than conventional tapes.



2% third harmonic distortion represents the practical limit to linear recording.

Kodak tapes—in the five- and seven-inch sizes—now *look* as good as they sound. We’ve put package identification on a removable sleeve and designed a tape library box with a smart new look. This box features durable one-piece construction, full index space, plus detailed tape use instructions on the inside. Kodak Sound Recording Tapes are available at most electronic, camera, and department stores.

New 24-page, comprehensive “Plain Talk” booklet covers all the important aspects of tape performance, and is free on request. Write: Department 8, Eastman Kodak Company, Rochester, N. Y. 14650.

The great unveiling — Kodak’s new library box with removable sleeve!



EASTMAN KODAK COMPANY, Rochester, N. Y.

November-December 1965

Circle 45 on Reader's Service Card

Tape Makes Our Christmas

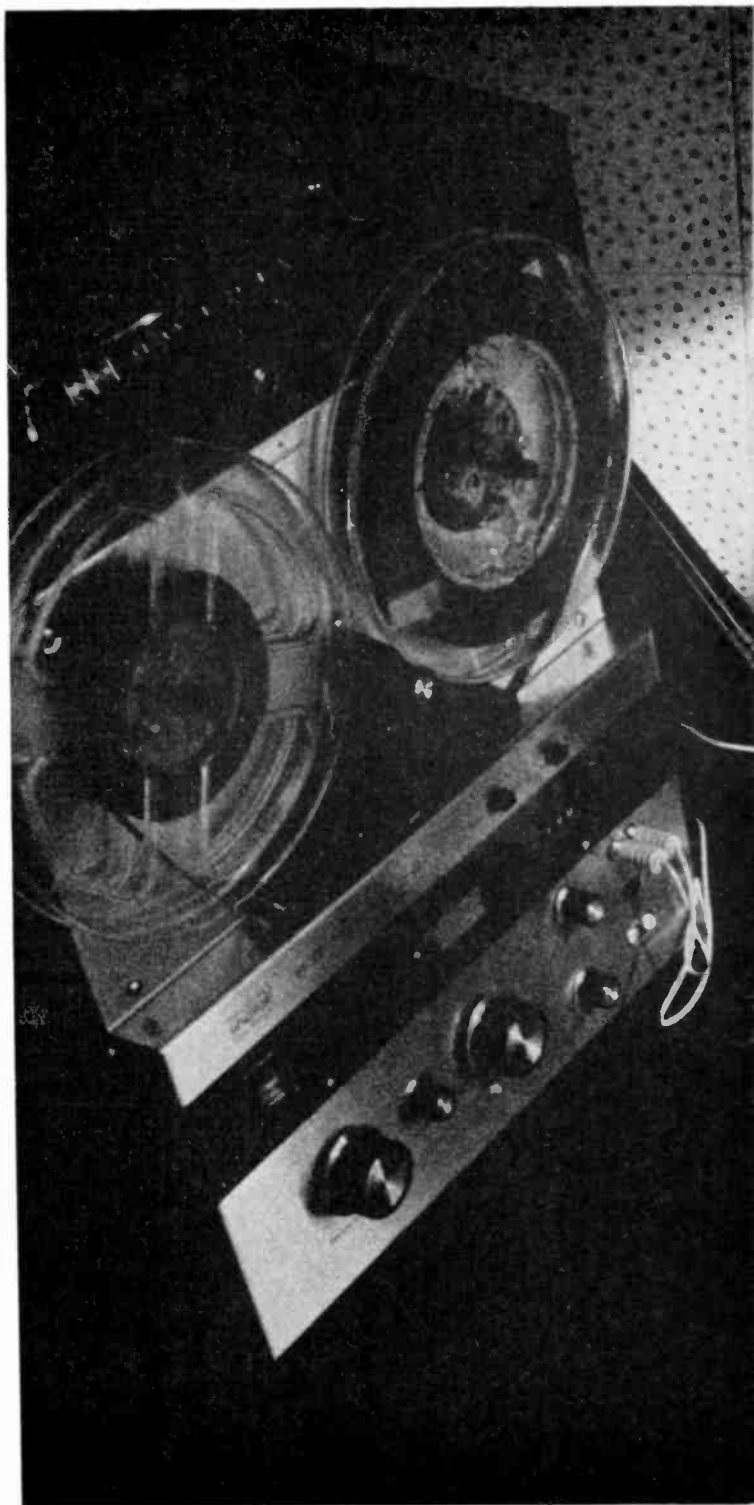
by Al Hirt

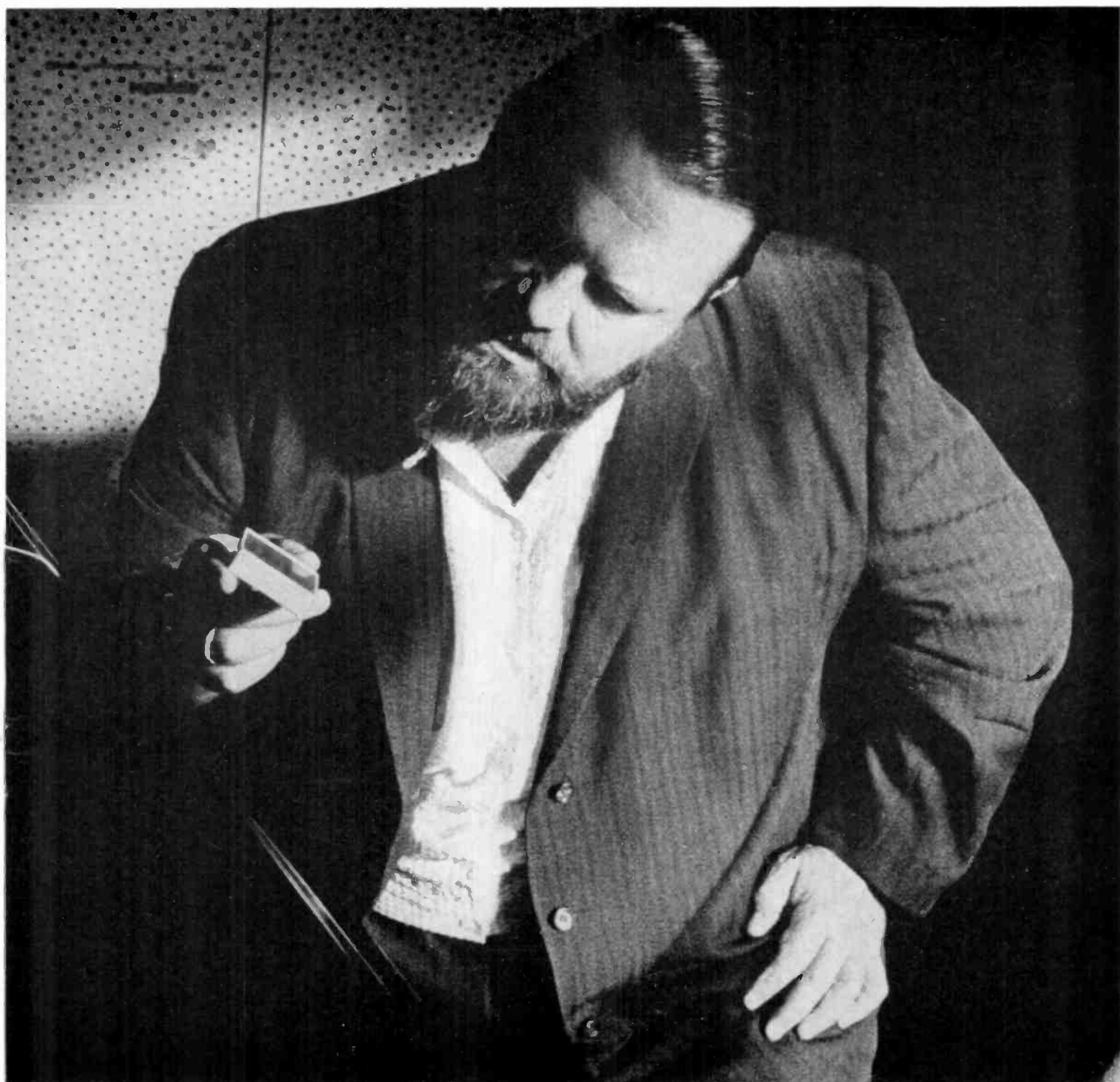
Not so many years ago, anyone outside his native New Orleans who had heard the name Al Hirt thought of a good jazz trumpeter. But that was before Al's RCA Victor records and tapes brought him to the attention of the nation as an outstanding musician and to the attention of executives of the Columbia Broadcasting System as a possible television personality. Al's CBS television series made him a full-fledged personality, along with such other show biz greats as Danny Kaye, Judy Garland and Maria Callas. Back in New Orleans, however, Al Hirt is known best as a family man. When Christmas-time comes 'round, wherever he's travelling, Hirt heads for home and his family to spend the holidays.

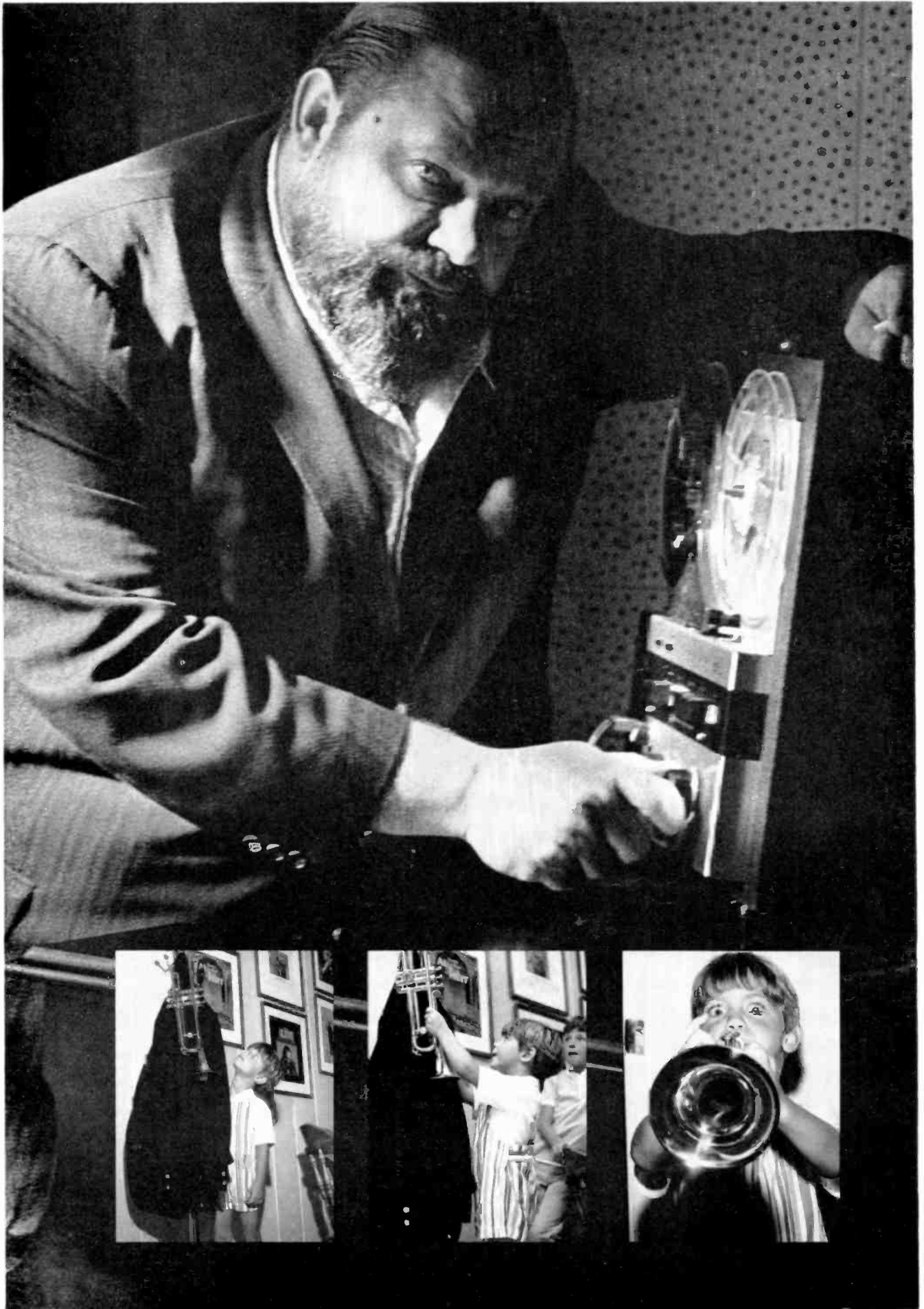
Being on the road for so many years, I really appreciate spending most of my year in New Orleans with my family. I like nothing better than to relax and listen to music when I'm home. Not so much my own. Mostly other artists I admire—and there are plenty of those. There's been a tape recorder in our family for years. It's one of the most versatile instruments we own. In fact, it's the only musical instrument in our home that everyone in the family can play. We use the tape recorder so much that we take its presence for granted. However, it always seems that just about Christmas time everyone really starts taping.

We have a large family with eight children. Mary Lee, our oldest, is married now and a mother. When she visits with the baby, out comes the tape recorder. Gretchen, who is 19, is away at the Pasadena Playhouse studying to be an actress under the tutelage of Agnes Moorehead. Needless to say, when she's home at Christmas, the tape recorder gets a good workout. The other six always seem to want to use the recorder mostly when somebody else is using it. Suddenly it becomes indispensable for memorizing a speech or a line in a play. I must admit, though, that on rainy days our tape recorder has often helped keep several of the kids out of mischief for hours on end—and it's been a blessing to my sanity.

Recently a friend suggested that we get the family together and tape some Christmas carols for our friends. I think this is a great idea for almost any large family—especially for those with relatives that live far away. In our case, I'm forced to reveal that, with the possible exception of our 10 year old son Stephen (who claims to want to be a trumpet player but doesn't practice), we have one of the most non-musical families you're likely to meet. In fact, the kids like to tell the story of how Mary (my wife) used to sing lullabies to them until they were old enough to say, "Ma, we love you, but please don't sing to







us any more." Some of our neighbors tape Christmas carols and play them through outdoor speakers during the holidays. It adds a nice personal touch to Christmas. We tape the carolers who come to serenade us at Christmas and they sound much better than we ever could.

I guess it's because we have so much family visiting during the holiday season that we end up recording what amounts to a family sound album every year. Each Christmas we try to tape as many of our friends and relatives as we can and each successive year we play back the tapes and bring back many fond memories. It's amazing how many amusing and interesting things you can manage to capture on tape. I mean everything from jokes to "inside" family gags or just plain conversation. Some things that seemed hilarious at the time can be a bit puzzling a year or two later and that's part of the fun, too.

My mom and dad live in New Orleans and they get a kick out of listening to some of the taped interviews I do on various radio shows while I'm on tour. You know, when I stop to think about it, I wonder what we did before we ever got our first recorder. Now that I'm a grandparent, I've even taped our little grandson's cries. We're eagerly awaiting his first words.

At Christmas time—and at other times of the year—I get little packages from RCA Victor which seem like presents. These are prerecorded tapes by the company's other artists. One of the privileges of working for a company like RCA is that you can ask them to send you all the new releases as they are issued. I look forward to getting those little cardboard cartons that appear in the mail, and to hearing what some of my friends in the business are up to. I guess that's one reason for the immense popularity of record and tape clubs.

Many people ask me if I work out new arrangements or musical ideas by taping them at home, but I must confess I don't. I tape enough recording sessions each year to keep from wanting to tape my work at home. What is great, though, is listening to tapes of our recording sessions of material that hasn't been released. Some of it consists of flubs. Some is material that just didn't seem to fit at the time, and some may be items we decided to hold and release later. These are the tapes I've done that I find most interesting—and the family enjoys listening to them, too.

Recording off the air is another favorite in our house and right about here I'd like to offer a tip to parents with a tape recorder and growing children. *Keep plenty of blank tape on hand.* Can you imagine digging out a vintage tape from your collection that you haven't heard in years only to find it's been replaced by a recent record-

ing of the Beatles? It's happened more than once to me.

I mentioned that I don't record myself at home because I do so much taping all year round. However, I recommend that any youngster learning a musical instrument tape himself regularly. It's the perfect way to keep tabs on progress and to learn how to overcome flaws. Anyone who is serious about music study will benefit from taping himself.

If you have an idea by now that we find a tape recorder indispensable in our house, you've gotten to know a little about the Hirts. Before you write and ask me what tape recorders I own, I'll tell you. My first recorder was a VM. Next, RCA was good enough to send us a cartridge unit year before last and this year we got an RCA YG 445 reel-to-reel unit. I also have an Ampex 4400 which I bought a little over a year ago. We've never done anything special with any of these recorders. We just enjoy them. Even our youngest, Jeff, who's only five has figured out how to thread a recorder. I can't think of anything that has given all of us as much pleasure in so many different ways as the tape recorder. If you give yours a good workout this Christmas—you'll be giving yourself one of the nicest presents you'll get next year.

Al Hirt on Tape

- | | |
|--|---|
| FTP 1082 | Al Hirt—The Greatest Horn in the world |
| FTP 1109 | Horn A-Plenty |
| FTP 1123 | Al Hirt at Mardi Gras |
| FTP 1156 | Trumpet & Strings |
| FTP 1166 | Our Man in New Orleans |
| FTP 1214 | Three Great Bands — Mancini-Hirt-Prado |
| FTP 1219 | Honey in the Horn |
| FTP 1278 | Cotton Candy |
| FTP 1289 | Sugar Lips |
| FTP 1296 | That Honey Horn Sound |
| FTP 1293 | Best of Al Hirt |
| <i>4-track stereo cartridges</i> | |
| KPS 4043 | Trumpet & Strings |
| KPS 4063 | Honey in the Horn |
| <i>Red Seal 4-track stereo tapes</i> | |
| 'Pops' Goes the Trumpet—with Arthur Fiedler and the Boston Pops Orchestra (FTC 2171) | |
| <i>RCA Stereo 8 Cartridges</i> | |
| P8S 1011 | The Best of Al Hirt |
| P8S 1032 | That Honey Horn Sound |
| P8S 1050 | Trumpet and Strings |
| <i>RCA Stereo Cartridge TwinPaks</i> | |
| P8S 5005 | Cotton Candy & Sugar Lips |
| P8S 5021 | Honey in the Horn & That Honey Horn Sound |

Christmas Music On Tape

by Ron Sommers

Once upon a time, Christmas music meant a round of familiar carols—*Hark, the Herald Angels Sing*, *Deck the Halls with Boughs of Holly* and *We Three Kings*. But times have changed. In recent years, American composers have created several holiday classics which already have taken their place with these—*White Christmas*, *Rudolph the Red-Nosed Reindeer* and *The Drummer Boy*, to name just a few.

For the serious music listener, Christmas meant Handel's monumental *The Messiah* and perhaps Bach's *Christmas Oratorio*. But that was before the wholesale expansion of prerecorded tape catalogues which has taken place in recent years. Today there's Christmas music for every conceivable taste on tape—and enough of it so that no listener could possibly become bored by the time the holiday is ended.

Which is fortunate. In the late 1940s, it was customary to many communities across the country for local merchants to rig up public address systems and play carols along the main street. The number of carols then on record numbered not more than two dozen, and by the time the holiday had come and gone, most shoppers were so sick of *Adeste Fideles* they were quite prepared to wait until next year to hear it again. Accordingly in the early 1950s, some communities passed local ordinances banning the playing of Christmas carols on the streets.

Then the record companies began experimenting—first with early (and unfamiliar) English carols, then with folk music dealing with the holiday from Germany, Austria, France, Italy, even countries as remote as Peru and New Zealand. Companies specializing in classical music came up with sparkling recordings of Corelli's Christmas Concerto and Leopold Mozart's *Musical Sleigh Ride*. Christmas music was recorded by music boxes and carillons, by opera stars and folk singers, by massed choirs and simple trios. The pity was that virtually all of the really interesting recordings remained on disc only. The market for tapes of these was considered "too limited" by the experts. So hundreds of tape recorder owners bought the records, transferred them to long-play tapes and used them to provide a charming atmosphere throughout the holidays—particularly during gift-giving and Christmas dinner.

Recently, however, the companies which produce prerecorded tapes have discovered the error of their ways. The problem for the tape buyer

today is not to discover something new, different and exciting in Christmas music, but to choose from among the dozens of fine tapes available. We present herewith a rundown of some of our favorites from the new titles available this year, as well as those from previous years which continue to give us pleasure.

THE OLD FAVORITES

If you're just beginning your collection of Christmas music on tape, you'll want to examine the collections of familiar carols first. Although the actual selection of carols varies from tape to tape, these usually include such favorites as *Joy to the World*, *Away in a Manger*, *Silent Night*, *O Holy Night*, and others. Your choice probably will be dictated as much by the artist who records them as by the actual selection. Among our favorites are Perry Como's *Season's Greetings* (RCA Victor FTP 1030), Mantovani (London LPM 70036) and Melachrino Strings (RCA Victor FTP 1032), the Mormon Tabernacle Choir (Columbia MQ 758), Andre Kostelanetz (Columbia MQ 762), Roger Williams (Kapp KCL 41019), the Ray Conniff Singers (Columbia CQ 768), and Johnny Mathis (Mercury 60837).

Classical artists have recorded these favorites, too—among them Joan Sutherland (London LOL 90107), Marian Anderson (RCA Victor FTC 2118), the Berlin Handel Choir (Deutsche Gramophon DGC 6366), and the Robert Shaw Chorale, whose collection of Carols and Chorales (FTC 2026) has become an all-time tape best seller.

FOR CHILDREN

So far, children haven't fared too well in tape releases. But Christmas is a holiday particularly for children, and there are two excellent tapes to help them enjoy it. Pickwick's *Christmas is for the Family* with Dennis Day (P4T-X1) is a treat for anyone—but kids in particular will enjoy it. Specifically for children is MGM's *'Twas the Night before Christmas* (5002E), an excellent collection of stories for and about the holiday.

NEW MUSIC

Can Tin Pan Alley create music which can be compared to the great carols? A few purists may not think so, but a large number of listeners—not only in the United States, but all over the world—have accepted at least three as modern classics. They are *White Christmas*, whose best interpreter, for our money, still is Bing Crosby (Warner Brothers WSTC 1484); *the Drummer Boy*, which



Dozens of Fine Tapes Are Available

receives fine recordings from the Harry Simeone Chorale on Kapp KTX 41104 and on Pickwick PTT-X2; and *Rudolph the Red-Nosed Reindeer*, which appears on a number of collections.

THE CLASSICS

Certainly the most familiar piece of serious Christmas music—and probably the piece of classical music which more Americans have heard live than any other—is Handel's *Messiah*. The tape enthusiast has at least four excellent choices available to him—Sir Adrian Boult's recording for London (LOR 80077) with Joan Sutherland; Elisabeth Schwarzkopf and Otto Klemperer on Angel (SCL-3657); Eugene Ormandy with Eileen Farrell on Columbia (M2Q 510) or Hermann Scherchen's "authentic" recording with the Vienna State Opera Orchestra and choir (Westminster WTZ 134). Your choice among the first three is likely to be dictated by soloists and conductor; all use essentially the same score. Scherchen has gone back to the score of the original performance in Dublin in 1744 and has scaled down the size of his orchestra and chorus. The recording, as a result, is less spectacular than some of its competitors—but it has remained a consistent seller since its first appearance on tape in 1960.

Last year, London added Berlioz' hauntingly beautiful *L'Enfance du Christ* to its catalogue. The recording (LOH 96003) features tenor Peter Pears with the St. Anthony Singers and the Goldsbrough Orchestra conducted by Colin Davis. We could still use tapes of Bach's *Christmas Oratorio* and some of the Christmas cantatas, but things

are improving. The Corelli *Christmas Concerto* is the first of a number of baroque masterpieces associated with the holidays to appear on tape—and there are two excellent versions from which to choose. The Solisti di Zagreb have recorded it (together with Haydn's diverting *Toy Symphony*) for Vanguard (VTA 1802), while London's version is by Karl Munchinger and the Stuttgart Chamber Orchestra (LCL 80110).

OFF THE BEATEN TRACK

Christmas at King's College Chapel, Cambridge England, is an occasion for some beautiful and unusual music-making. London (LOL 90071) has recorded a number of early English and Latin carols in unusual settings during a regular Anglican church service. The chapel contributes its own unique acoustics to the music, which is sometimes familiar, sometimes new, but always interesting.

CAROLS WITHOUT WORDS

In recent years, there has been an increasing demand for recordings of more or less familiar Christmas music without words. The most common of these have been organ recordings—used by some homeowners to provide outdoor sound to accompany lawn decorations and lighted outdoor trees, by others to provide accompaniment for a holiday sing-along. Two of the best are John Klein's *Christmas Sound Spectacular* (RCA Victor FTP 1029) and John Gart's new Kapp album (KTL 41103). London also has an organ album—complete with chimes—by Charles Smart and James Blades (LPM 70037) which may be of interest.

The Most Popular Christmas Carol

The winter of 1818 was a snowy one in the Austrian Alps, and in the small town of Oberndorf, dampness from the constant snowfall had played hob with the organ in the church of St. Nicholas. A scant two weeks before the Christmas festival, the organ broke down entirely. Worse, the snowfall was so heavy that the man who repaired organs throughout the Tyrol was unable to come to have a look at it.

Oberndorf was a community which loved its

music. The idea that the church choir would be unable to show its versatility was a disturbing one. So the assistant pastor, Father Joseph Mohr, a man of 26, asked the acting church organist, 31-year-old Franz Gruber, if he could come up with music for the service which could be sung without accompaniment. Came the midnight service, and Mohr and Gruber—with the accompaniment of a guitar and a small choir—sang their new song.

The song might never have travelled beyond Oberndorf if Gruber and Mohr hadn't sung their carol for the organ repairman when he arrived weeks later. He was so much impressed with it that he carried it with him wherever he went.

By the time the phonograph came into existence nearly a hundred years later, the song had become a firm fixture of the Christmas holidays in America as well as in Europe. It wasn't surprising, then, to find recordings by such early phonograph artists as Frank C. Stanley and Henry Burr in the catalogues of 1899.

Perhaps the best-known of all the recordings of the song was the one cut in Camden, New Jersey on September 29, 1908. The artist was Madame Ernestine Schumann-Heink, then at the height of her career with the Metropolitan Opera in New York. Interestingly enough, the weather in Camden that day was a far cry from the snow and cold of Gruber's native Alps. It was, according to old-timers, a hot, sticky day. A present-day employee of the Victor Company, which made the original recording, and whose father worked on the recording session tells this story of how things went: "Not only was the weather uncomfortable, but the musicians had put in a long day in a cramped studio. Everybody was a bit on edge, and Schumann-Heink was late. Finally, she arrived amid much fanfare. She was a big, hefty woman, and she had some trouble working her way through the orchestra to the recording horn. As she edged through musicians and instruments, a violinist leaned over to her and whispered, 'Psst, Mme. Schumann-Heink—sideways!' 'Sideways?' she demanded at the top of her voice, 'I got no sideways!' From that moment on, the recording session went smoothly."

In any case, the record went on sale in time for the 1908 Christmas season. It remained a staple of the Victor catalogues for well over 30 years. Victor, which is reluctant to discuss sales figures, says that sales were "brisk" up to the withdrawal of the record during the change from 78 rpm to LP. Non-gramophone owners were treated to Schumann-Heink's sparkling performance for years on the Columbia Broadcasting System's Christmas broadcasts by the New York Philharmonic. In recent years intermission commentator James Fasset has revived the custom of playing the record during the broadcast.

Nowadays, tape users can choose from among a wide number of recordings of the song. It's been taped for Columbia by the Mormon Tabernacle Choir, for London by Mantovani and Joan Sutherland, for Victor by Leontyne Price and Perry Como, to name only a few of the better-known ones.



Although Victor has remade most of its original acoustic recordings, the company never remade the 1908 Schumann-Heink version. Despite occasional competition from other artists (Paul Robeson's version of the song, for example, enjoyed a lively sale for several years during the 1930s), the Schumann-Heink version continued to hold its own. Then in the early 1940s, a radio organist named Ken Griffin included the song in a recording of some of the standard Christmas repertoire that he made for one of the minor record labels. The company has long since gone out of business and been resurrected again, and Griffin, best known at the time as an organist for day-time radio soap operas, has died. But the records continued to sell, year after year, on a succession of labels.

Recording companies today carry out many of the lessons learned with the Schumann-Heink and Griffin recordings. Nowadays, in order to make sure that records are in the stores in time for Christmas buying, they must be cut in mid-July. Thus, most of them tend to be made on hot, uncomfortable days. It's not uncommon for a visitor to New York, walking up Broadway in the heat of summer, to see clusters of bearded, bereted musicians getting in a few licks of this famous song on the sidewalk during a break in a recording session.

It's a far cry from the parish of St. Nicholas nestled in the Austrian Alps to the steaming canyons of Tin Pan Alley in July, but this most durable of carols has made the trip—picking up admirers all along the way, from the travelling organ repairman throughout most of Western Europe to the New World.

The song? You've heard of it, of course. It's *Silent Night*.

Putting Shortwave broadcasts on tape enables you to build a sound library which can entertain—perhaps even amaze—your friends, or provide you with educational materials you'd have a hard time getting otherwise.

Have you ever had a hankering to tune in and tape Radio Moscow? Learn Swedish? catch the English equivalent of Bob Hope or maybe even tape the cries of Australian wild-life? With a short wave receiver, your tape recorder and a little luck, you can do all this and much more virtually any day in the week. For short wave makes it possible to tune in to just about any corner of the globe (and a few spots not on it), to learn a language, enjoy a symphony concert, learn about cultures and habits abroad, or be treated to a stiff dose of propaganda. Putting these items on tape enables you to build a sound library which can entertain—perhaps even amaze—your friends, or provide you with educational materials you'd have a hard time getting otherwise.

The short wave band runs from approximately six mc. to 17.90 mc., a point somewhere above the standard broadcast band, but well below domestic television and FM signals. Short wave programming can be picked up on standard table or transistor portable radios equipped to receive it, or on special short wave receivers built by such manufacturers as National, Hallicrafters, Hammarlund, Lafayette Radio and Heath Co. You can improve your reception by adding an antenna—the better the antenna, the more reliable will be your results. A simple AM antenna or length of zip cord attached to the receiver will produce some improvement, while a \$150 installation can produce superb results.

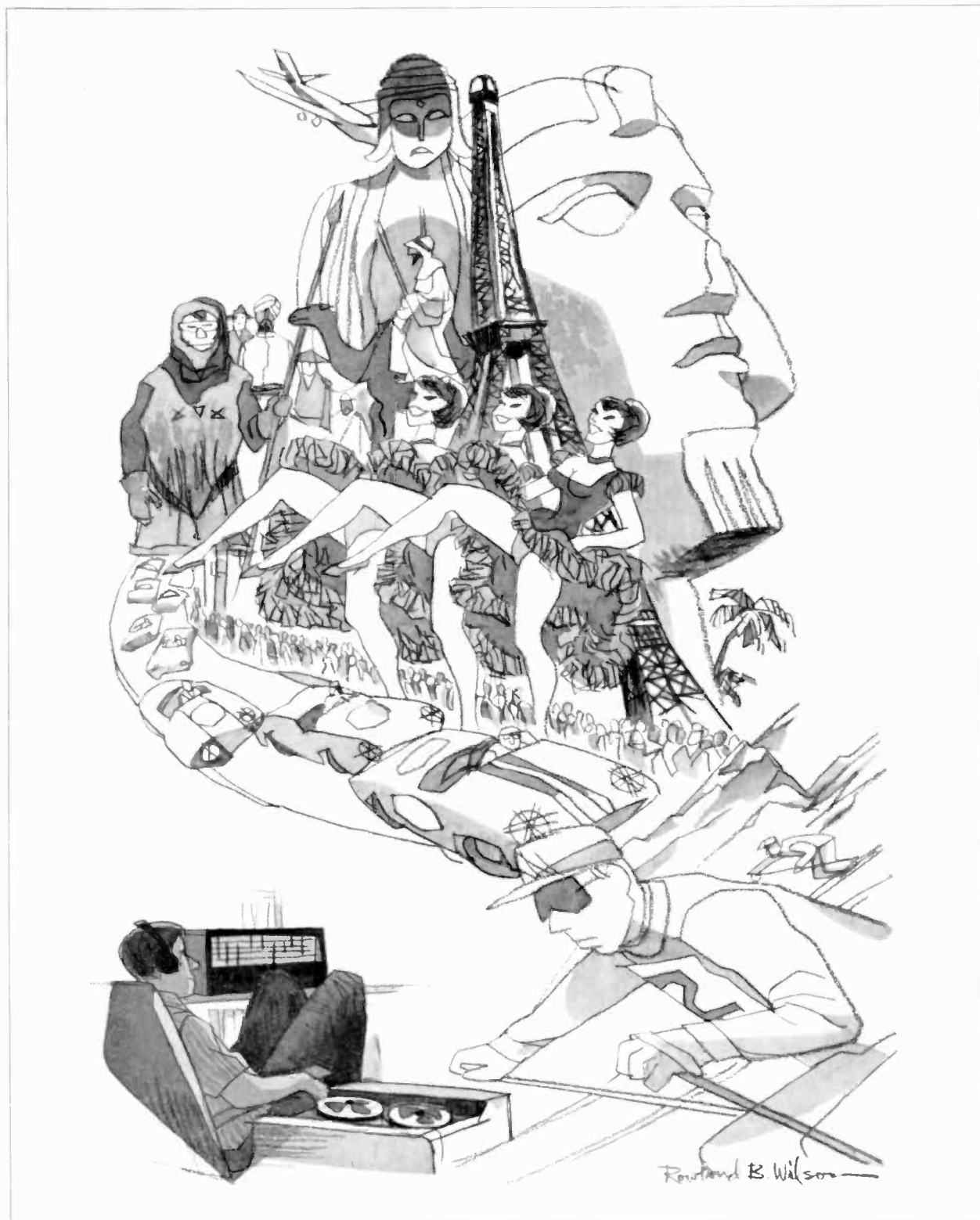
The interesting thing about short wave, though, is that even with the most rudimentary equipment, virtually anywhere in the United States you can be reasonably sure of pulling in most, if not all, of the major short wave broadcasters—the U.S.S.R., Radio Australia, the BBC, Red China, Czechoslovakia, the Voice of America and the Canadian Broadcasting Corporation. In addition, there are literally dozens of smaller voices worth tuning in which you may be able to pick up on good evenings in your neighborhood.

If you've never listened to short wave, there are some things you should know about it before you try taping. In the first place, it's exasperatingly unreliable. Scheduled programs don't appear. A station you tune in at 9 PM has disappeared by 10. A program you want particularly to tape fades in and out. And so on. Part of the reason for all this is that short waves bounce off the ionosphere, an outer layer of the earth's atmosphere. This bouncing enables a station in virtually any part of the world to reach a listener in virtually any other part. But the ionosphere is affected by a variety of conditions which cause it to reflect some signals better than others.

To play it safe, all of the major short wave broadcasters use a variety of stations to transmit a single program. Radio Moscow, for example, may offer the same propaganda simultaneously at a dozen or more spots on the dial. If one fades, it's

Andorra to Zanzibar Tape 'Em At Home

by Robert Angus



hoped that you'll tune to another to continue the broadcast. Most short wave broadcasters hop merrily about the dial, using a given frequency for only an hour or two at a time. In fact, it's theoretically possible to tune to one spot on the dial, leave your set on, and hear from four or five different countries during the course of the day.

Second, most—but by no means all—of the voices you'll hear on short wave are the voices of governments. Among the exceptions most frequently heard in the United States are WRUL, a private enterprise international service largely in English beamed from New York featuring news, church services and stock market reports as well as American-style deejays; CHNX and CFRX from Sydney, N.S. and Toronto, Onta. in Canada, both relaying the programs of commercial AM stations to listeners in the far North; and HCJB, an evangelical religious station in Quito, Ecuador.

Most foreign governments (and many of the private stations) broadcast at least a part of their schedule in English. This ranges from Norway's quarter-hour a week to the BBC's 24-hour-a-day programming. Listeners in America frequently are able to pick up programs intended for Africa, Australia or other distant points as well as those beamed specifically to North America. Many of the broadcasters offer printed schedules, to help you determine in advance which programs you may want to tape, and where you'll find them on the dial. In virtually all cases, these programs are free. But we've found them notoriously unreliable, serving at best only as a tentative guide.

What's involved in taping? First, we'd suggest using low noise tape for any SW off-the-air recordings. There's plenty of hiss coming over the air without adding any unnecessary background noise from the tape. Because short wave broadcasts are essentially low fidelity, it's not necessary to tape at speeds greater than $3\frac{3}{4}$ ips. If you want to save your tapes for some reason, you may want to edit out some of the squawks, interference from other stations and so on. So it might be a good idea to record only one track on the tape.

A major difference between short wave and any other kind of radio reception lies in tuning in the station of your choice. The short wave band includes literally hundreds of stations (they're covered in detail in such magazines as *Electronics Illustrated* and *Popular Electronics*, and listed in the *World Radio & Television Handbook*), some right on top of each other. Each station has an extremely narrow sliver of the dial, so tuning must be slow and accurate. Fast tuning across the band may indicate no sound at all. Slightly slower tuning may indicate blips of sound. Each blip is a station, and it frequently takes a steady hand to tune into it accurately. This is particularly a problem with transistor radios, which have the ability to pick up the stations, but are difficult to tune because of their small dials.

Larger receivers designed especially for SW reception, such as Lafayette Radio's HA-63 receiver, break the band transistor radios try to cover in one into two separate parts. In addition, there are features such as bandspread which simplifies the tuning problem plus a tuning meter. The HA-63 and other such units are the SW equivalents of your FM receiver. Many are equipped for earphone listening as well as use with high efficiency high fidelity loudspeakers. Receivers of this type sell for \$50 to \$75.

Next, you'll have to set up your equipment. If you're using a transistor radio which doesn't have a tape output, simply plug the recorder into the earphone output. On some radios, this short-circuits the speakers, making it necessary for you to monitor the broadcasts as it goes into your recorder. On others the speaker will continue to operate. Monitoring is more necessary than when taping from AM or FM because interference may increase without warning on your frequency, making it advisable to tune to another one. The same technique may be used with SW receivers, most of which come equipped with earphone outputs. If you're using a table or console radio which has a short wave band, you can use a cable with alligator clips, connecting one clip to each lead to the radio's loudspeaker.

We've mentioned antennas before. A good antenna is especially designed for SW reception and is sold by radio supply houses for anywhere from \$15 to \$150. If you don't plan on becoming a serious listener, you can rig up a simple antenna with a strip of lamp cord and an ordinary window screen. Attach one frayed end of the lamp cord to the screen (preferably mounted in a window) and the other to the antenna terminals or antenna of your radio. It isn't great, but it works.

Another thing a short wave radio does for you is to allow you to record the satellites. A number of the Russian satellites, for example, can be heard on the upper end of your short wave receiver, and it's expected that some American voices may join them in the near future. For the scientifically-minded, there are the standard frequency and time signal stations, operated by the National Bureau of Standards, the Royal Greenwich Observatory, and others. Programs of these stations don't make for very interesting listening (they include beep tones indicating the time, test frequencies and occasional other scientific data), but they do save a telephone call if you want to set your watch. Finally, many foreign stations identify themselves by snatches of music ranging from Mozart's "The Magic Flute" (Austria) to native folk music (Nigeria). Most of these selections are only a few bars long, and are repeated over and over. Some hobbyists like to collect them, splicing them together with the proper station identifications and placing them end to end as a means of indicating how many stations they've pulled in.

Stations Most Frequently Heard in the U.S.

Nation & Station	Frequencies mc.	Time EST	Remarks
Australia	17.84, 15.22	8-10:45 AM	News, nature talks, Australian music
Canada	15.32, 5.97, 17.82 15.32, 11.72, 9.63 11.76, 9.62, 15.19	7:15-8:15 AM 4:15-4:50 PM 6-6:30 PM	News, commentary News, commentary News, commentary
China (Rep. of)	6.09, 11.72, 11.82, 15.34, 17.09	9:50-10:50 PM	News, commentary, music
Czechoslovakia	9.75, 11.99	8-9 PM	News, music commentary
Germany	9.75, 11.99	10:30-11:30 PM	News, music commentary
Great Britain	6.16, 9.64 easily found at virtually any hour of day or night	8:35-9:15 PM	News, commentary, culture
Netherlands	9.59, 11.73	4-4:50 PM	News, cooking, commentary, classical music, light music, comedy, talks, etc.
Switzerland	9.59	8:30-9:20 PM	News, learn dutch, folk music, travel, history, classical music
Soviet Union	6.12, 9.53, 9.665 wide range of frequencies	8:15-9:45 PM 5-5:30 PM 6-6:30 PM 7-7:30 PM 8-8:30 PM 9-10:30 PM 11-11:30 PM 12-1 AM	News, folk music, talks News, folk music, commentary talks, learn Russian, etc.
United States WRUI.	15.44, 15.31, 17.88, etc.	7 AM-Midnight	ABC radio news, church services, hit parade, stock market reports, interviews, time, test tones
WWV	10.0, 15.0 and others	24 hours	

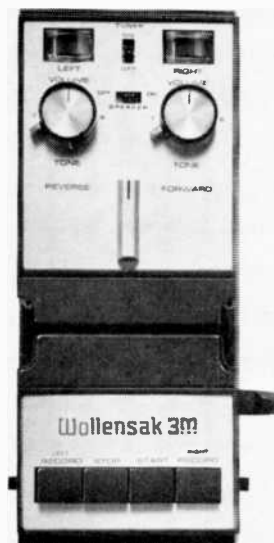
Other Stations You May Be Able to Hear

Albania	7.09, 9.39	3-3:30 PM	News
Austria	7.09	4:30-5 PM	News & commentary
Bulgaria	6.155	6-11:30 PM	News, music, culture, etc.
Canada CFRX	6.07	7-8 PM	News & commentary
CHNX	6.07	11-11:30 PM	News & commentary
CJCX	6.07	24 hours	News, music
France	6.13	24 hours	News, music, drama
East Germany	6.01		News, music
Ecuador HCJB	6.175	3-3:15 PM	Learn French
	5.97, 9.56	8, 9:30 PM	News
	15.115	3:30-5:30 PM	Religious programming
	15.115, 17.89	6:30-7 PM	Religious programming
	15.115, 17.89	9-11:30 AM	Religious programming
Hungary	9.833, 9.54, 7.30, 6.23	7:30-8 PM	News commentary, talks, music
	9.83, 7.30, 6.23	8:30-9:30 PM	News commentary, talks, music
	9.83, 9.54, 7.30, 6.23	10-11 PM	News commentary, talks, music
	9.83, 7.30, 6.23, 7.21	11:30-12 PM	News commentary, talks, music
Indonesia	9.585, 11.715	9:30-10:30 AM	News, commentary
Israel	9.009, 9.715	3:45-4:15 PM	News, folk music, culture
Italy	5.96, 9.575	7:30-7:50 PM	News, commentary
	5.96, 9.575	10:05-10:25 PM	News, commentary
Japan	11.78, 15.135	7-8 PM	News, talks
Norway	17.825, 15.175, 11.85, 6.13	7, 11 PM	News
Nigeria	11.9	Sundays	
	11.9, 15.255	10-11 AM	News, features
	11.9, 15.255	Noon-2 PM	News, features
	9.74, 6.185, 6.025	4-5 PM	News, features
Portugal	6.19, 9.59, 9.51, 7.22, 6.15, 5.99	10:45-11:30 PM	News, features
Romania	9.57, 6.19, 9.59, 9.51, 7.22, 6.15, 5.99	8:30-9:30 PM	News, commentary
	9.57, 6.19, 9.59, 9.51, 7.22, 6.15, 5.99	10-10:30 PM	News, commentary
	6.13, 9.615	11:30-Midn't	News, commentary
Spain	15.195	8-8:45 PM	News, features
Sweden	15.195	9-9:30 AM	News, learn Swedish
	11.805	2-2:30 PM	News, features
Vatican City	5.98, 7.25, 9.645	8:45-9:15 PM	News, learn Swedish
		7:50-8:10 PM	News, religious features

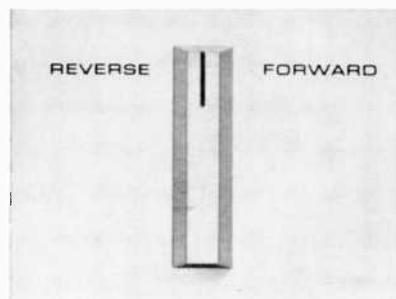
NOTE: These were the times of transmission at the time this feature was prepared. Schedules and frequencies vary, and may be different for your part of the country or at some future time. This information is intended only to provide you with a rough idea of what sort of information is on when. Further details can be had from the short wave services of individual countries, or by tuning in regularly to the station of your choice.

Wollensak for '66 new beauty with a soul of stereo

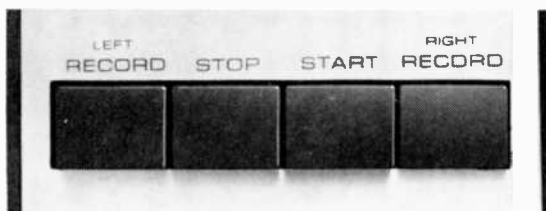
You're looking at over six feet of slim-lined beauty. Seductively clothed in walnut wraps. But underneath lies a soul of powerful stereo sound. A magnificent piece of modern design combined with the traditional excellence of Wollensak . . . this is the beginning of a new era in tape recorders, a new idea in fine sound systems. So let your wife call it beautiful furniture. You call it beautiful sound. And here are some of the reasons why!



WOLLENSAK CONTROL CENTRAL An exclusive new concept in tape recorder control . . . a complete Sound Studio in a hand-span! All controls are centrally grouped for maximum simplicity, more compact construction, more satisfying sound-on-tape performance.



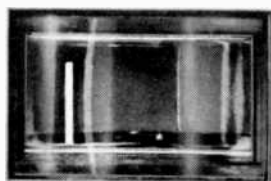
HIGH SPEED SEARCH CONTROL This new tape handling mechanism provides positive control in fast forward or fast rewind operation for extremely accurate program location. Simplifies both program editing and playing.



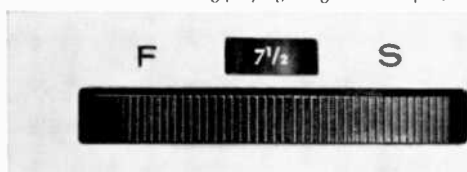
POWER ACTIVATED PUSH BUTTONS For each playing and recording operation, power activated push buttons provide fingertip touch control of tape. Positive locking control mechanism prevents the accidental erasure of tape recordings.



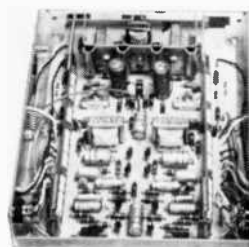
FOUR-DIGIT COUNTER New, push-to-reset four digit tape counter accurately indicates program location on tapes. Essential for recording/playing long uninterrupted material.



PRECISION VU METERS Even the most critical recording gain control settings are made precise through these easy-to-read Wollensak VU meters. All Wollensak stereo models feature individual left and right channel meters.



4-SPEED OPERATION 7 1/2 - 3 3/4 - 1 7/8 - 15/16 ips. A tape speed for every application and need. From long-play voice at an economical 15/16 ips to highest fidelity at 7 1/2 ips. Allows for the utmost in tape recording and playing versatility; with more musical satisfaction than you've ever had.



SOLID-STATE CIRCUITRY Space age transistors allow replacement of vacuum tubes, reduce heat, provide for compact design and more rugged reliability for trouble-free operation. They also assure instant warm-up.



EXTRA LARGE BALANCED FLY-WHEEL Provides positive, constant speed. Minimizes wow and flutter which provides most exact sound reproduction in both record and playback. An assurance of finest true hi-fidelity.

THE SLEEK LOOK IN SUPERB SOUND—WHAT YOU WANT IS A WOLLENSAK!

3M
COMPANY

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Photo by Toto

STOCKING STUFFERS: On a \$10 budget, you can choose from among (moving clockwise) a variety of prerecorded tapes that list for \$7.95, small reels of tape for correspondence with mailers (46¢ to \$1.93 each), patch cords and cable (59¢ up), the Electro-Voice 715 Century ceramic microphone (under \$10), microphone cable (3-5¢ per foot), 3¼ inch reels of recording tape (\$2 up), a Robins De Luxe Stereo 4 tape splicer (\$7.95), a blank Norelco cartridge for the Carry-Corder (under \$4), RCA Victor cartridges for the Ford Stereomatic car player (\$8.95), a Robins deluxe head demagnetizer (\$6), and blank recording tape from American, Kodak or Irish (\$2 to \$6.50 per reel). In the center there's an attractive desk microphone stand by Atlas at \$2.50. In the foreground is a tieclip microphone for secret recordings which may be purchased for as little as \$3.



Photo by Toto

\$25 or less buys some interesting and novel gifts for the tape buff, including on the top row this Electro-Voice model 641 dynamic microphone, a pair of Koss SP-3X stereo headphones, a weatherproof Electro-Voice Sonocaster loudspeaker. On the bottom row are an assortment of prerecorded tapes (you can combine two or three \$7.95 tapes or two \$11.95 twinpacks), a Rotron Whisper fan (about \$15) to cool the hottest recorder or audio system, an American dynamic microphone (under \$15) and a Magneraser bulk tape eraser (under \$15). The American Tape Kit generally sells for under \$15, too.



Photo by Toto

For a budget of up to \$50 (listing clockwise) an extension speaker to give added stereo spread (\$30 to \$50); Telex Stereo Headphones with separate tone controls (under \$30); General Electric M1080 transistor portable tape recorder (under \$40); a selection of Scotch low-noise recording tape (\$7.50 list per reel); Pickering V-15 AME-1 stereo cartridge (under \$30); a University 8000 Dynamic Microphone (under \$50); Kodak Carousel Sound Synchronizer (under \$30); an assortment of pre-recorded tape or a pair of Koss PRO-4 Stereo Earphones (\$45). In the center: Concord's F-85 Sound Camera (under \$40).



Instant Privacy

Headphones Make It Happen

by Hans Fantel

When you've got a date with Maria Callas, you don't want anyone butting in. Least of all your wife. Or the kids.

But where can you sneak off to be alone with Maria? Time was when well-appointed homes sported a separate music room so a man could take a sabbatical from his family behind sturdy oak doors. But in this split-level age of cardboard walls and doorless togetherness, it's getting harder all the time to find that island of quiet necessary for the full enjoyment of music.

A growing number of hi-fiers rely on earphones to remove themselves from the scene—psychologically at least. Slip them on, and suddenly you're whisked away from all petty distractions to your rendezvous with Maria. Besides, with earphones—or headsets, as they are now often called—you can stretch out your date far into the night. You can still listen at full volume after everyone, including the neighbors, have gone to bed.

Privacy, of course, works both ways. While Callas thrills you with high Cs, your wife may be trying to entertain a thought or two of her own. So she, too, appreciates it if you keep Maria to yourself.

For tape fans, earphones are the logical way to monitor recordings. Listening while you record lets you make the necessary adjustments in mike placement or recording level that result in a perfect "take." They also blot out annoying extraneous noise.

Later, when you edit your tapes, the noises you hear as you back up the reels to that critical cue are sweetened for you by the anticipation of the final result. But to the rest of your family, those grunts and growls sound like amplified indigestion. Again, earphones are the answer.

Aside from being instruments of domestic peace, headsets have yet another advantage. Because the sound goes directly to your ears, it skips all the acoustic quirks of your living room. Problems like speaker placement and stereo listening location are bypassed automatically. The acoustic image of the place where the original recording was made reaches you without being altered by your own home acoustics. With prerecorded tapes, the net effect is an uncanny illusion: the very space of the concert hall or recording studio seems infused via the stereo earphones right into your head.

There are, as any serious recordist knows, times when it's as important to shut sound out as it is to keep it in. When you're editing or cueing a tape, you can work more efficiently if you don't hear the kids playing cowboys & indians in the background or extraneous noises from the street. By the same token, when you're recording live, it's



important to know that the sounds you hear actually are going onto your tape. Earphones shut out the sounds reverberating in your recording studio (whether it be a professional one, your living room or the street) and lock in those sounds actually going into your recorder.

Donning stereo earphones for the first time nearly always causes a reaction of total amazement. You can feel the whole concert stage—maybe some 60 feet wide—spreading out in whatever space there happens to be between your two ears! With the whole orchestra inside your cranium, you'll find it hard to believe that your hat size stayed the same.

How does this happen? Nobody knows for sure. The basic process of sensory perception is still not understood completely. Psychologists, physicists, and philosophers have yet to discover the exact relation between reality and our senses. Of course, it may be argued that all space perception—visual or acoustic—ultimately lies within our heads. The sensation of hearing stereo "space" via earphones is surely an astounding demonstration of this.

Getting back to the more tangible subject of hardware, the recent comeback of headsets was first greeted with loud snorts: "Earphones? I thought they went out with catwhisker radios!"

Today's stereo headsets are a wholly different breed. While their early ancestors were nothing but primitive telephone receivers with a metal diaphragm stretched across a signal-activated magnet, modern earphones—quite aside from being two-channel stereo devices—are crafted with the same precision that marks today's audio components. Structurally they resemble full-sized speakers, consisting essentially of a permanent magnet, a voice coil, and a carefully designed and suitably suspended cone. By way of analogy, one might say that today's stereo hi-fi headsets compare to ordinary radio earphones as a racing yacht compares to a tree-trunk canoe. Mainly the difference lies in calculated refinement.

Cone and magnet structures of the new headsets are designed for extended frequency response at low distortion. The new Koss Model PRO-4, for example, represents professional quality design, covering the range of 30 to 20,000 cps with less than one percent distortion at maximum output—specifications that few loudspeakers can match or even approach. One manufacturer, Superex, even designs headsets with a complete coaxial system—separate woofer and tweeter—in each earpiece. And the Telex "Serenata" Model offers such refinements as an electronic tone control, similar to the high-frequency level controls found on many loudspeakers.

If you've had no prior experience with modern

headsets, you'll be amazed at the full bass obtained from such small sound generators. How can low frequencies be reproduced so effectively by diaphragms measuring only about two inches in diameter? Ordinary loudspeakers must be relatively large for adequate bass response because they must push plenty of air to project bass energy into a room-size listening space. But the "listening space" to be filled by earphones is only the tiny air volume between the earphones and your eardrums. Moreover, with the headsets fitted tightly against your ears by means of soft padding, this small air space is sealed off and represents what the engineers call a "closed system." This provides practically loss-free transfer of low-frequency energy. Under such conditions even a small generator suffices to create ample bass.

Like loudspeakers, stereo headsets tend to have their own individual sound coloration. In selecting a model for your own use, compare different designs just as if you were buying a pair of speak-



ers. Clarity is the most important criterion. Make sure the sound doesn't blur even at full volume. Try to pick out the individual instruments in the orchestra. Watch for the presence of bass even in soft passages, note if the sound of the lower strings has its proper solidity. Check the transient response by listening critically to the crispness of sound in such instruments as harpsichord, guitar, and various kinds of percussion. And watch for that common drawback of inferior designs—high-frequency distortion. Violins, for example, should sound silky and smooth, without stridency.

Aside from sound, fit is the main factor in picking your earphones. You should be able to wear your headset all evening without any discomfort. Fit around the head is rarely a problem because most headbands are either flexible or otherwise adjustable. The earpieces, however, have fixed dimensions. So make sure they don't pinch or squeeze your ears. They should fit *around* the ears rather than *over* the ears. They should also provide a good air seal; otherwise you lose bass

The present popularity of headphones is hardly surprising when one considers their distinct benefits.



response. Some ear cushions are liquid-filled so that they mold themselves to the contours of your head. Others rely on foam materials to form an efficient sound seal. On some models, ear cushions are washable, a decided advantage in case they become grimy or saturated with skin oils.

The lighter the headset, the longer you can wear it without fatigue. For this reason, virtually all recent models are made of lightweight materials. Norelco's Model K-50, for example, weighs merely 9½ ounces. You are hardly conscious of wearing this set.

Hooking up the earphones presents no difficulties with modern equipment. Nearly all tape recorders and up-to-date amplifiers have special earphone jacks. In some cases, loudspeakers are silenced automatically whenever the earphone plug is inserted in this jack, and a single three-pole jack generally is used to connect both stereo channels simultaneously and in phase, thus eliminating all possibility of error.

However, if your stereo amplifier has no provisions for headphones, they can be connected to the loudspeaker terminals. Most modern headsets operate in the same impedance range (four to 16 ohms) as most loudspeakers, so they are naturally matched to the amplifier's output terminals. However, the power developed at these terminals is far too great for earphones, and a resistor must be interposed to guard against damage to the earphones through overloads. Most headset manufacturers offer various kinds of auxiliary hardware at nominal price to permit connecting their headsets to various types of amplifier outputs. These, however, will be needed only in exceptional cases. In most situations, hooking up the earphones is simply a matter of plugging them in.

There may be occasions when you want to convert your stereo earphones to mono operation. Instead of letting each earpiece reproduce a separate sound channel, you may want to pipe the identical signal to both ears. At home with your

stereo equipment, you would use your earphones in stereo. But suppose you're taking a portable mono tape recorder out in the field and want to monitor on location. In that case, you would need a mono headset. Or suppose you want to use your earphones for private listening to the audio portion of a TV broadcast. Again you need mono earphones to bring the same signal to both ears.

Fortunately, most models provide for alternative use in either mono or stereo so that the same pair of earphones serves both functions. Koss, for example, offers several models equipped with a mono/stereo switch, and in other designs conversion from stereo to mono (or vice versa) can be accomplished with a simple wiring adjustment.

While nobody expects earphones to supplant loudspeakers for general listening, the rising interest in private listening has caused several companies to design special amplifiers to be used with headsets only. Shure, for instance, has just introduced the Solo-Phone (\$45), a fully transistorized amplifier for earphones which accommodates inputs for tape, magnetic phono cartridge, or stereo tuner. Koss offers a similar amplifier for \$29.95, minus the magnetic phono input. A stereo earphone amplifier with elaborate controls is Jen-



sen's CC-1 (\$52), which permits the listener to adjust the degree of stereo separation and also incorporates a channel-reverse and mono/stereo switch. Similar facilities are offered by Lafayette's Stereo-trol, which sells for \$24.95. These amplifiers may form the basis of a bedside stereo system or serve in similar situations calling for acoustic isolation.

The present popularity of earphones is hardly surprising when one considers their distinct benefits: to the tape fan they offer the most effective way of monitoring during a recording and thus for obtaining maximum quality tapes from his sessions. And for the general listener, earphones are the magic road to instant privacy.

Universal Headphone Adapter

Anyone Can Make

by Walter Salm

Stereo headphones can be a real pleasure, provided you're properly equipped to use them. A large number of stereo tape recorders in use today don't however, have the provision for plugging in these phones; the same is true for some stereo amplifiers.

Some amplifiers have a single three-conductor headphone jack on the front panel and a speaker shutoff switch. This doesn't afford much flexibility, and there's always the chance of damaging the output transformers if this switch should be flipped when no headphones are plugged in to provide a load.

Most tape recorders have individual phone jacks for extension loudspeakers. These jacks are of the closed-circuit type, which shut off the tape recorder's own speakers when the plugs are inserted. This is fine for earphone listening, but most stereo headsets come equipped with a single three-conductor plug rather than two 2-conductor jobs. We haven't seen any commercial "Wye" connectors for a quick conversion job, but it's relatively easy to put one together. Four parts are needed—two standard two-conductor phone plugs (Lafayette no. 99 R 6221—25 cents each) one Switchcraft jack type 830 (Allied no. 42 U 971—93 cents) and a short length of two-conductor wire. Shielded phono or microphone cable will work nicely. Cut the wire into two pieces, each about seven or eight inches long. This is assuming the jacks are close to each other. If they are widely separated make the cables longer accordingly. Strip off $\frac{3}{4}$ inch of outer insulation from each end, unbraid and twist the shield, and strip the center conductor about $\frac{1}{4}$ inch. Solder these cables to the two phone plugs—one plug on each cable. Solder the braided shield to the case of the plug, and crimp the cable clamp over the wire for mechanical strength. Solder the center conductor to the other terminal in the plug.

Connect the other ends of both cables to the single three-conductor line jack. Solder both

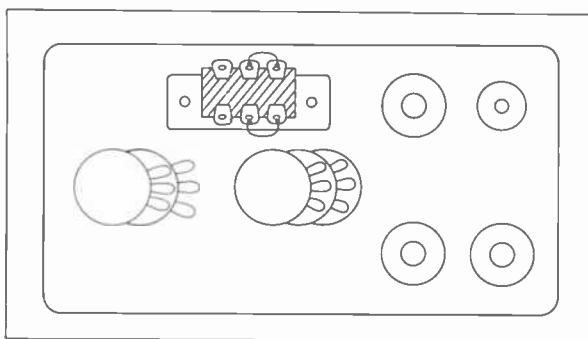
braided shields to the common terminal and solder the other wires as shown. The jack has screw terminals which should be removed. Solder the wires into the screw holes. You may want to color-code the two plugs by putting some red Mystik tape on the right-channel plug. In stereo, red usually signifies the right channel, black or green the left, and white is common or ground.

If your tape recorder is hooked up to a stereo amplifier and component speaker system, a junction control box is the answer to headphone listening problems. Probably the best-designed do-it-yourself unit of this kind on the market is the Heathkit AC-13, which sells for \$9.95. Assembly time is about 90 minutes (or less), and it's really simple to put together. The box provides jacks for stereo headphones with two sets of volume/balance controls, so two people can listen at different levels and balance settings.

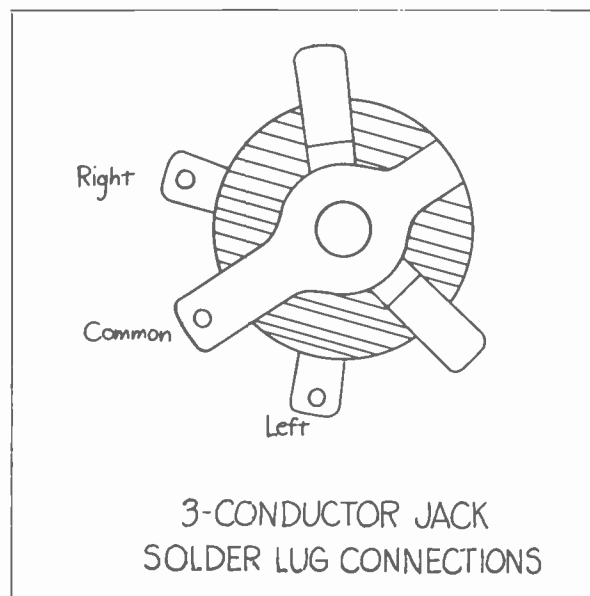
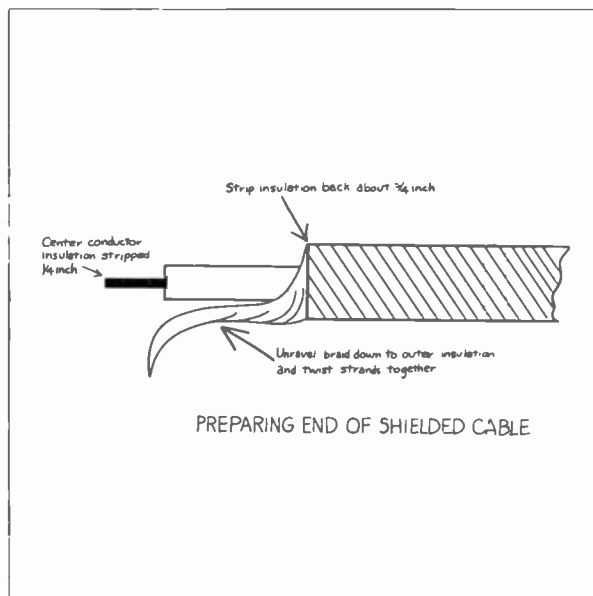
The box also contains beefy ceramic 16-ohm resistors rated at 24 Watts to provide adequate loading for the amplifier's output transformers. These resistors not only protect the transformers, they also protect the headphones from overloading, since they can be wrecked quite easily by cranking up the amplifier's volume control.

One feature that seems strange at first glance, is the doubling of wires in the cable that terminate at the same point. Closer examination shows that these double-up wires apparently reduce possible hum pickup—a definite advantage.

The one disadvantage of the Heathkit is the fact that it was apparently designed before the three-conductor headphone plug became popular. Instead of accommodating a plug of this type, it provides jacks for two standard two-conductor plugs—resulting in the same problem that we had with the tape recorder. There are two possible solutions. One is to use the homemade Wye connector described previously. The other and



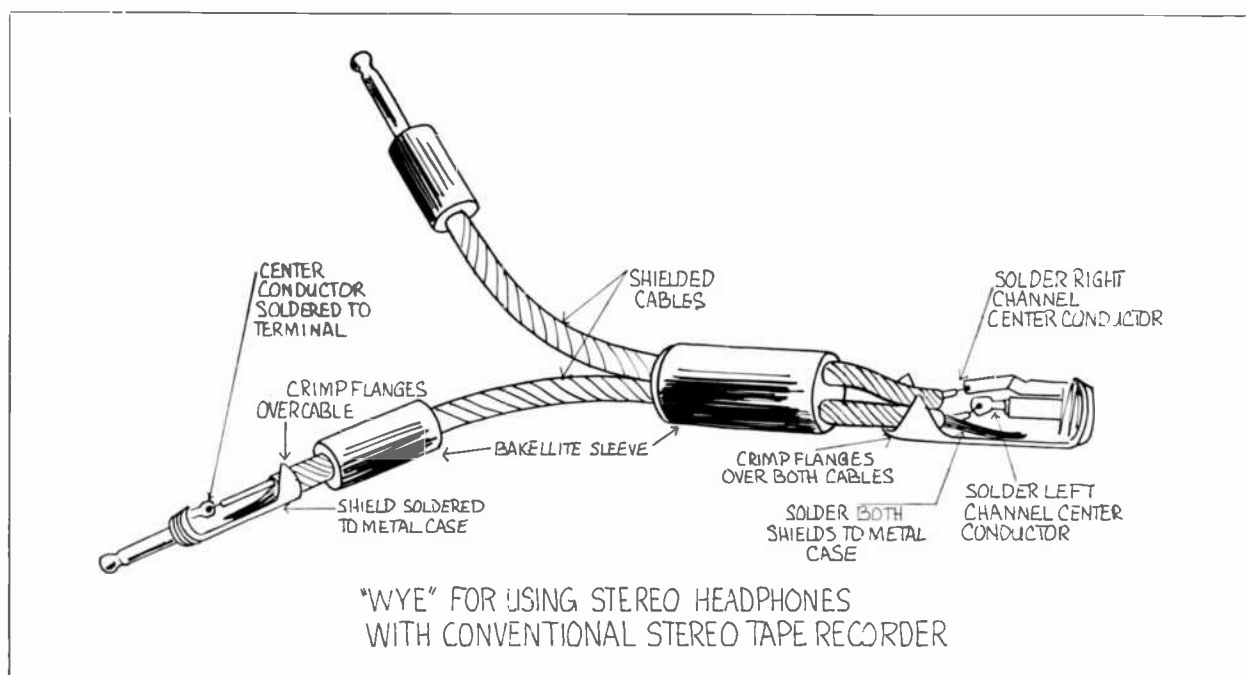
Additional wiring for slide switch to provide loudspeaker and headphone listening simultaneously. This modification is optional.



we think more acceptable one is to invest a dollar bill in four three-conductor phone jacks (Lafayette no. 99 R 6118—25 cents each) and substitute these for the jacks that are supplied in the kit. This will provide listening for four sets of headphones, a nice little bonus feature. If you don't feel that you need more than two jacks, just use two and plug the other two holes on the panel with $\frac{1}{2}$ -inch plugs (Lafayette no. 13 R 7291—36 cents per package of six). Wire the jacks as shown in the diagram, and be sure to use Heath's insu-

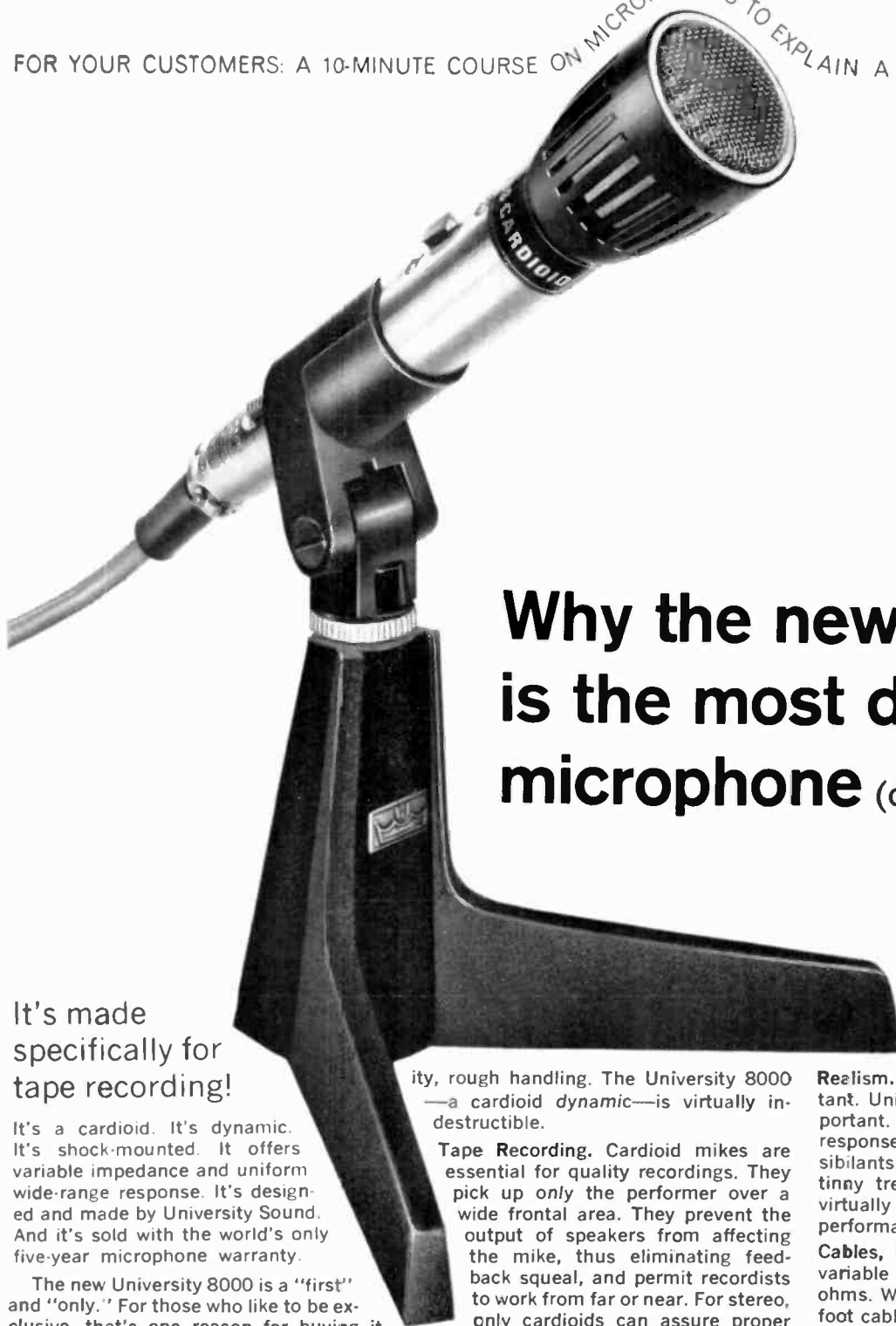
lating fiber washers as described in their construction manual.

The kit comes equipped with a 15-foot cable which you can roll up and hide behind your equipment cabinet when the headphones aren't in use. This long cable permits use of the control box in the normal listening area with controls at your fingertips. The box also has a switch for remotely shutting the speakers on and off. A very worthwhile project for the stereo headphone enthusiast.



Impedance: 4-16 ohms Plug: Single Stereo	Impedance: 4-16 ohms Plug: 2 Mono
970 1270 4470 860 865 890 1160 1165 2070 2075 2080	Ampex
510 801	Concertone
R-1100	884 994 Concord
	1020 Magnecord
400 401	Norelco
555 333 300 888	Oki
G-36	Revox
440 990 1040	330 770 997 Roberts
200 600 777	CS300 500 500A Sony
74B	Tandberg
	8000 Uher
	220 Viking
1580 T1980 1288	5280 5300 Wollensak

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Why the new 8000 is the most demanded microphone (of its kind!)

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tape recording!

It's a cardioid. It's dynamic. It's shock-mounted. It offers variable impedance and uniform wide-range response. It's designed and made by University Sound. And it's sold with the world's only five-year microphone warranty.

The new University 8000 is a "first" and "only." For those who like to be exclusive, that's one reason for buying it. The *important* reasons may be found in the following microphone buyers' guide!

There Are Cardioids...and Cardioids. All cardioids are essentially "deaf" to sounds originating from the rear. They're invaluable for eliminating background sounds, for use in noisy and reverberant areas, for reducing feedback and for permitting a higher level of sound reinforcement before feedback would normally occur. **BUT**—not every cardioid uses rugged dynamic generating elements. There are crystal cardioids which offer high sensitivity and output. But their response is limited; deterioration is rapid due to heat, humid-

ity, rough handling. The University 8000—a cardioid *dynamic*—is virtually indestructible.

Tape Recording. Cardioid mikes are essential for quality recordings. They pick up *only* the performer over a wide frontal area. They prevent the output of speakers from affecting the mike, thus eliminating feedback squeal, and permit recordists to work from far or near. For stereo, only cardioids can assure proper balance, if both are matched. *University quality control makes any two 8000's absolutely identical "twins" to assure full stereo effect.*

Placement and Portability. Cardioids make microphone placement far less critical; allow a greater latitude—without feedback—than is possible with omnidirectional types. You are assured of superior performance in any way you use the 8000—for recording, indoors or out. Extremely rugged, the 8000 can be used *without-care*, in all portable applications. Corrosion-proof, it is impervious to heat and humidity.

Realism. Wide-range response is important. Uniform response is even more important. The new 8000 offers wide-band response, extremely uniform to eliminate sibilants (hissing S's), bass boom and tinny treble. Its reproduction quality is virtually indistinguishable from the live performance.

Cables, Long and Short. The 8000 has variable impedance—250 to 20,000 ohms. With high impedance mikes, a 10-foot cable is maximum to avoid response loss and hum pickup. The 8000, sold with a 15-foot cable, can also be used with longer cables to record without recorder noise, and make recordings with recorder out of sight.

For complete specifications on the fabulous 8000 series, write Desk M519

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Microphones—How They Work

by Walter Salin



If you're a recorder owner who does a good deal of live recording with your unit—taping live music at home, or trying to practice a speech while the kids are watching television—you may have considered adding a microphone to the one the manufacturer supplied with your recorder. After all, the recorder with the microphone supplied by its manufacturer is very much like a new camera. You can get a great deal more out of the recorder by adding microphones just as the camera buff gets better pictures by adding filters and lenses.

Before you rush out to your friendly neighborhood audio dealer to invest in a new microphone, however, there are several things you should consider. All microphones, like all lenses, are not alike. Some are designed specifically for interviewing. Some are designed to highlight a soloist singing with an ensemble. Some are designed to get all the sound—indiscriminately—on the tape. Like the camera buff, you can spend \$4.95 for your sound lens—or \$150 or more.

The microphone's job in life is to accept sound waves and convert them into a varying electrical current that represents these sound waves. This signal voltage usually is fed into such devices as amplifiers, tape recorders and preamplifiers where it is amplified to a useable level. In the tape recorder, it usually goes through at least one stage of amplification before the signal finally is dubbed onto tape.

There are five basic categories of microphones, if you classify by the way in which they convert sound to electricity. The oldest, invented by Alexander Graham Bell and still used in today's telephones, is the carbon microphone. In it sound waves strike a sensitive diaphragm which vibrates. The diaphragm is linked mechanically to a package of carbon granules which, when they're pressed, create resistances to a flow of electricity. The carbon mike offers severely limited frequency response and a steady hissing noise which makes it impractical for most tape recording.

A popular low-cost unit is a piezoelectric microphone, better known as a crystal or ceramic mike. Crystal mikes use a thin slice of rochelle salt crystal to generate electricity. The crystal can be bent, twisted or vibrated in accordance with sound waves. The same element is used in phonograph pickups and some high fidelity loudspeakers to create sound waves from electricity. In the crystal mike, the crystal is connected mechanically to a vibrating diaphragm. As the crystal vibrates, it generates a varying electrical current, representing the sound waves. Crystal mikes are both cheap and sensitive. They have a very high signal voltage output, but are susceptible to moisture

This is the first in a series of articles that may help to make you a microphone expert

and humidity. Any excess water vapor tends to react chemically with the rochelle salt element, destroying the microphone. This precludes use of the crystal mike in tropical climates and in automobiles where the mike may be locked up in a hot, humid container for hours at a time. Crystal mikes frequently are those supplied with low-cost and medium-priced tape recorders.

The crystal mike user can have his cake and eat it too by using the ceramic microphone. Instead of rochelle salt, this mike uses a slab of barium titanate—a ceramic material that has essentially the same basic piezo properties as the crystal. Barium titanate is insensitive to humidity and has a generally better frequency response than crystal. The output signal voltage is slightly lower than for the crystal mike.

Once upon a time, dynamic mikes were to be found exclusively in broadcasting studios and recording studios. The cost of manufacture made them prohibitive for anybody who wasn't a millionaire. But in recent years, manufacturers have found a number of short cuts which make it possible for anybody to own a dynamic microphone—at prices starting below \$10. Dynamic mikes are among the most widely used today. In this type, the diaphragm moves a coil of wire through the field of a permanent magnet, generating an electric current in the coil. The dynamic has been improved greatly and refined since its introduction in the late 1930s. Virtually all of today's better dynamics (including the \$12.95 models) exceed in fidelity, reliability and performance the \$500 models RCA introduced during radio's golden days.

The dynamic mike seems to have everything. Its fidelity is remarkable. Some models have directional properties which make it possible to screen out unwanted background noise. Most are rugged almost to the point of being indestructible. Many have the frequency and dynamic response which makes it well-nigh impossible to tell the recorded sound from the original. Manufacturers claim that the dynamic mike can be used as a hammer to drive nails (although we don't recommend it), doused in a bucket of water, and still perform perfectly. Dynamics come in a wide variety of shapes, sizes, pickup patterns, impedances and prices, all important factors to be considered before making your purchase.

One of the first true high fidelity microphones to be invented was the ribbon or velocity mike. At the time of its inception in the mid 1930s, the velocity was virtually the only mike that offered clean frequency response through the entire audible spectrum. It rapidly became the standard of the broadcasting industry to such an extent that



Microphones -- How They Work



even today, tradition-molded broadcasters are reluctant to change over to more modern, rugged and versatile units.

To be sure, the velocity microphone is a star performer. It has no diaphragm as such—just a very slender and fragile corrugated aluminum ribbon running from the top to the bottom of the mike. The ribbon is suspended between the poles of a large horseshoe magnet. Sound waves striking the ribbon cause it to vibrate and its motion through the magnet's field generates a feeble electric current through the aluminum. Because this current is so weak, the velocity microphone usually requires some preamplification before the signal is fed into the tape recorder.

The velocity mike is extremely fragile and is therefore limited in its applications. In the studio or concert hall, it provides cheap, brilliant frequency response with lifelike clarity. Drop it just once or take it outdoors where the wind can get at the delicate ribbon, and it is gone forever. Streamlined modern versions of the velocity microphone are being manufactured now, and at least one manufacturer is producing a low-price (\$50) model aimed at the home tape recorder market.

The fifth kind of mike is the time-honored condenser type. The diaphragm of this mike is a flexible aluminum plate that is actually one of the plates of a condenser that is wired into the circuit of a sensitive preamplifier. As the diaphragm vibrates, its distance from the opposing plate increases and decreases, changing the circuit's capacitance. This in turn causes a shift in the preamplifier's resonant frequency, and it produces a usable signal voltage at the preamp's output. The condenser microphone traces its

history back even farther than the velocity type. It was in use at broadcast stations in the early 1930s. A specification sheet dated 1932 claims a response of 30 to 10,000 cycles for a typical studio model.

In another era—the 1950s—the condenser mike, slimmed down to more reasonable proportions, was belting out the finest high fidelity sound then possible. It was responsible for the much talked-about single microphone technique, where a single Neumann/Telefunken mike hung high above the head of the conductor standing on the concert hall stage. The best of today's concert-hall stereo recording techniques simply use two of these mikes.

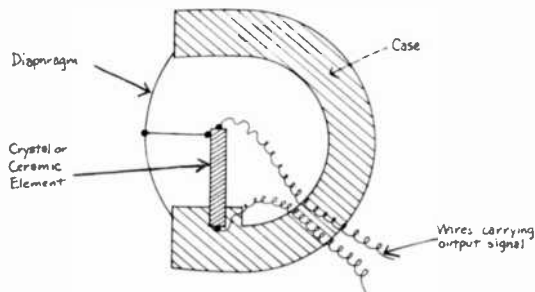
But the condenser mike has been further improved and streamlined. The mike of the 1950s had a miniature (for that era) single vacuum tube amplifier built into the case. Today's even slimmer models boast transistor preamplifiers with built-in battery powered supplies, and the prices are lower, too.

Choice of the microphone, naturally depends on its intended use, budget considerations, and required portability. There are many microphone characteristics that must be considered, including impedance, length of cable needed, pickup pattern, sensitivity, preamplifiers, number of mikes needed, stands, booms and accessories.

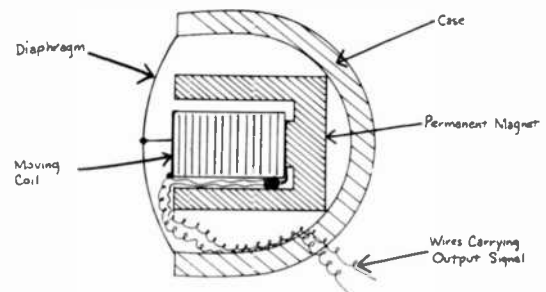
IN THE NEXT ISSUE . . .

Important microphone characteristics—how to interpret a mike specification sheet—how to pick the mike best suited to your needs. Some typical units will be discussed and evaluated. If you do any live recording at home, this next issue is a must!

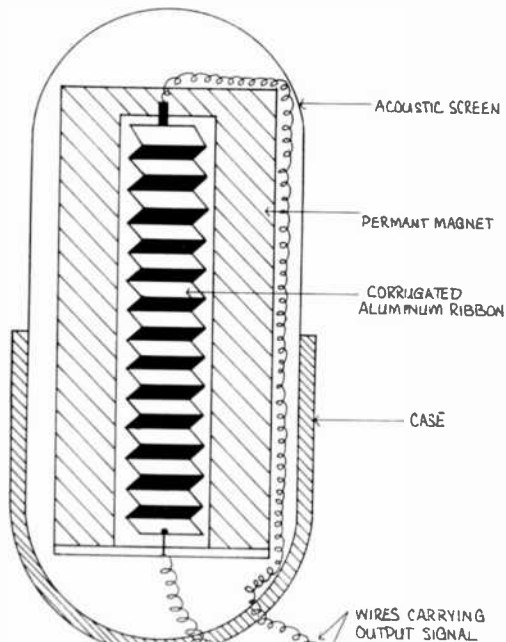
A specification sheet dated 1932 claims a response of 30 to 10,000 cycles for a condenser microphone



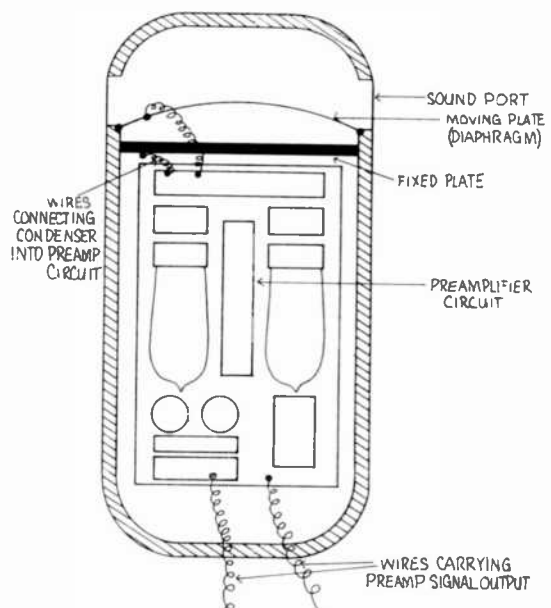
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ment of playback head. (f) 4 track stereo—4 track mono recording and playback with built-in mixer control for both channels. (g) Sound on sound switch. (h) Detachable plexiglass cover.

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REVIEWS

Palestrina

Missa Papae Marcelli and Eight Motets. Regensburg Cathedral Choir cond. Schrems. Archive Production, ARC 3182,

Music Performance Recording

Here's a recording that's admirable in every way, the engineers having achieved despite the resonance of the cathedral acoustics, quite remarkable clarity together with a splendid sense of depth and perspective. The Marcellus Mass appears to have been composed early in 1565 (it was first performed at the Sistine Chapel in April of that year), some ten years after the death of Pope Marcellus II. Marcellus actually reigned only 22 days, but during his reign he exhibited great interest in the layman from the city of Palestrina who served as his choirmaster. It's likely that the composer-choirmaster created this masterpiece as a memorial to his mentor. The eight motets are nearly as remarkable. The Regensburg choir has a singularly clean chording and attack, and it's possible to catch each Latin word of the text. Among the offertories, note particularly Ascendit Deus. —R.A.

Boyce

Eight Symphonies. I Solisti di Zagreb cond. Janigro. Vanguard VTC 1074, \$7.95.

Music Performance Recording

Here's one of those really charming tapes which comes along altogether too infrequently. Dr. William Boyce's eight symphonies (more in the nature of dance suites than symphonies as we know them today) were first published in 1760, and were in fact dance interludes from his

stage works. Unlike Henry Purcell, Boyce went relatively unheard in concert halls from his own time until 1928, when the late Constant Lambert revived and edited the eight symphonies recorded here. The symphonies' recording career has been almost as checkered—with a recording dating back to 78 rpm days by the Zimmler Sinfonietta and a set now more than ten years old by the London Baroque Ensemble. Now comes the third complete set, recorded in delicious stereo by an ensemble which has a way with the Baroque. One might have hankered for a stereo recording by the LBE, but we're unlikely to get it—and this tape admirably fills the gap in the interim. —R.A.

Leontyne Price

Arias from Aida, Il Trovatore, Madama Butterfly, La Rondine, Tosca, Turandot with the Rome House Orch. cond. Basile and De Fabritiis. RCA Victor FTC 2205, \$7.95.



Music Performance Recording

"Leontyne Price," the writer of the liner notes for this tape modestly pro-

claims, "stands at the pinnacle of the music world and is universally regarded as one of the greatest artists of our time." Anyone who has seen her portrayals of the jealous singer Floria Tosca, the captive princess Aida or the slave girl Liu (in Puccini's Turandot) will be quick to agree. Leontyne Price is indeed a fine singer actress—free of the mannerisms which have marred many of Maria Callas' stereo recordings, without the rich opulence of Renata Tebaldi brought to these same roles a decade ago, but with a quiet dignity of her own and a deep understanding of the characters she portrays.

These qualities come across magnificently in this recording. Her emotions range from the passionate love song of Trovatore's Leonora (*Tacea la notte*) through the conflicting emotions of love and national pride in *Ritorna vincitor* to her plea to Prince Calaf not to attempt Princess Turandot's deadly riddles. Thrown in for good measure is the melodic and rarely performed, aria *Chi il bel sogno di Doretta* from Puccini's *La Rondine*. —R.A.

Bach

Harpichord Concertos Nos. 1 in d; 5 in f; 7 in g, Sylvia Marlowe, harpichord. Baroque Chamber Orch. cond. Marlowe. Decca ST74-10104, \$7.95

Music Performance Recording

Here's one of those delightful packages every reviewer hopes he'll happen across in his monthly allotment. The first concerto has appeared on tape before (in a London recording by George Malcolm), but this is the first time on tape for nos. 5 and 7. One hopes that ere long, Decca, which has recorded all seven concerti plus the concerti for two, three

and four harpsichords with Mme. Marlowe, will issue the complete set. The performances here are stylish, particularly by the soloist. Mr. Malcolm's orchestral support seems somewhat more substantial and a bit better directed than Decca's pickup group, but the Decca ensemble provides a perfectly adequate background for some delicate, sensitive harpsichord playing.

The music may well be more familiar than the titles indicate. All seven of the harpsichord concertos are transcriptions by Bach, either of his own works or of the works of other baroque masters such as Vivaldi. The first is generally thought to be based on an early work for violin, the manuscript of which has since been lost. Number five is a reworking of a Vivaldi violin concerto; and the seventh is a transcription for harpsichord of the famous violin concerto in a.

—R.A.

Beethoven

Piano Sonatas Nos. 8 in c, "Pathétique;" 14 in c Sharp, "Moonlight;" 23 in f, "Appassionata;" and 26 in E Flat, "Les Adieux." Arthur Rubenstein. RCA Victor FTC 2206, \$7.95.

Music Performance Recording



This tape consists of Beethoven's three best-known works for solo piano with a fourth, "Les Adieux," thrown in for good measure. The three best-sellers are available on a Columbia tape with Rudolf Serkin, and two of them are coupled on a London twin-pack with the fifth concerto played by Wilhelm Backhaus. Which pianist you prefer may well be a matter of taste. Suffice it to say that Rubenstein has lost none of his fire and dynamism; that this recording crackles with excitement, then relapses into introspection during the "Moonlight Sonata." It is well played and, for our money, the best-recorded of the three tapes. Speaking of money, this tape represents a 25 per cent bonus over Columbia's with the addition of the Sonata 28—yet another reason for buying it.

—R.A.

Bach

Organ Preludes and fugues in E Flat, BWV 552 and a, BWV 543; Pastorale in F, BWV 590; Toccata in F, BWV 540; Corale Prelude: Schmucke Dich, BWV 654. E Power Biggs, organ. Columbia MQ 740, \$7.95.

Music Performance Recording



Here's a tape that really has it made, both artistically and commercially. It brings to tape for the first time several keyboard favorites by J. S. Bach (although others have appeared on Westminster, RCA Victor and London in the past). For the organ student, there's Mr. Biggs' impeccable technique at the keyboard of the Glentrop Organ in the Busch-Reisinger Museum at Harvard University which isn't one of the biggest-sounding organs on tape, but to this reviewer is one of the most satisfying. For the audiophile, this recording offers him an opportunity to show off his equipment. The Glentrop organ clearly doesn't have the dynamic range of some of today's large organs, such as Atlantic City's Convention Hall, Salt Lake City's Mormon Tabernacle, Philadelphia's John Wanamaker or New York's Riverside Church organs, but it does provide a wider dynamic range than the disc version of this recording is able to encompass—note particularly the Prelude and Fugue in A which begins the second track, and the Toccata in F, which ends it. Here, to these ears, is an excellent demonstration of the superiority of tape over disc.

—R.A.

Vivaldi

Concerti Grossi, Op. 8 Nos. 1-4, "The Four Seasons." John Corigliano, violin, New York Philharmonic cond. Bernstein. Columbia MQ 736, \$7.95.

Music Performance Recording



The tape enthusiast is fortunate to have four strikingly good recordings of this work from which to choose. The others include the Virtuosi di Roma on Angel, I Solisti di Zagreb on Vanguard and Victor's recording by the Societa Corelli. The recording you choose will depend in large part on your son's and musical preferences. Leonard Bernstein's recording is the most recent, and offers the best sound—noticably better than Vanguard's, which goes back seven or eight years; more striking than Victor's or Angel's.

His interpretation of the music is more striking, too. It's free from some of the annoying Bernsteinisms one occasionally finds in recordings of baroque music by the New York Philharmonic, but one is constantly aware of the artistry of violinist John Corigliano and the human

dynamo on the podium. For our money, Victor and Angel offer a quieter, more subtle (and more traditional) approach to the music. Since both of these tapes are adequately recorded, either would be our choice for repeated listening. But there are many virtues in the Bernstein recording.

—R.A.

Tchaikovsky

Concerto in D Major for Violin and Orchestra, Opus 35, Mendelssohn; Concerto in E Minor for Violin and Orchestra, Opus 64, Zino Francescatti, Violin, New York Philharmonic, Thomas Schippers, conductor and Members of the Cleveland Orchestra, George Szell, conductor. Columbia MQ 742, \$7.95.

Music Performance Recording



Standard repertoire items such as these concertos have already had so many playings and versions released that it is hard to get ecstatic over new releases. The pairing, however, is especially fortunate for beginning tape library builders. Francescatti is always the fine craftsman and his violin glitters well but unspectacularly in both these concerti. There is an occasional bit of spontaneity—the bow scrape or double-bowing that is off by the merest fraction of a note—that bring this tape closer to the live concert hall than many others we have heard. Too many recordings reek of recording studio ultra-perfectionism, but this one just avoids it. The Schippers accompaniment of the Tchaikovsky is a little too perfect and somewhat lacking in enthusiasm.

The Szell performance of the Mendelssohn, on the other hand, has a Beethovenian power wherever possible—a feat that Szell pulls off very well. The tape on the whole is excellent, and an apt selection for the basic library.

—W.G.S.

Background Music

Easy Listening, Vol. 1 60 Popular Favorites recorded by Dick Hayman, Michael Legrand, Hugo Winterhalter, Jose Melis, Cyril Ornadel, David Rose and others. Ampex AST-182, \$23.95 (17½ ips).

Music Performance Recording



180 minutes of easy listening, proclaims the title of this king-size tape package. Actually, the total playing time is only 177 minutes and 50 seconds—but who's going to quibble about two minutes and ten seconds with a package like this? The recording makes no pretense of being high fidelity—in fact Ampex makes clear that it's intended for background music use. As such, the recording is adequate for extended listening, and the program has been selected carefully to be unobtrusive. Sound quality on a Roberts 770

is comparable to that from a good FM table radio, which is about all one could reasonably ask from a 1 7/8 ips tape.

The music includes such favorites as Stardust, Tonight, So in Love, Rhapsody in Blue, Manhattan, Moonlight Serenade, September Song and Greensleeves. Whoever selected the order of the songs and the artists to play them for Ampex deserves congratulations for producing a program which maintains interest by varying tempos, instrumental groups and moods. This isn't the most interesting 177 minutes on tape, but it's lively and pleasant—and for the price, what more can you ask? —R.S.

Shirley Bassey

The Spectacular Shirley Bassey, includes *As I Love You, You, You Romeo, My Funny Valentine, How About You, From This Moment On, Wayward Wind, etc.* Philips PTC 600168, \$7.95.

Music
Performance
Recording



Shirley is a diamond—but with a few rough facets. She has a fine voice, a lot of technique, the basics of a distinctive style—and is obviously intent on pleasing her listeners. But she misses—by trying too hard. In striving for tasteless, spectacular effects she exceeds her vocal capacity, generating an atmosphere of strain which grates in the ears. It would be nice if she could relax, forget about what other song belters are doing and develop her own unique talents within a comfortable, natural framework that brings out the best in her voice.

It's a shame Philips declined to indicate who did the excellent orchestrations in this set of topnotch songs.

The reprocessed monophonic sound is good, but it wanders occasionally, and seems to favor one channel. —F.P.

Jerry Vale

There Goes My Heart, includes There Goes My Heart, Just One More Chance, There Must Be a Way, I Understand,

November-December 1965

Somebody Else is Taking My Place One More Blessing (Chi Sei Tu), I Can't Help It and others. Columbia CQ 755, \$7.95.

Music
Performance
Recording



This tape should be welcomed by Jerry Vale fans. It contains an even dozen sad ballads well suited to Vale's big voice. The pacing is good, the selections are sure to appeal to romantics and the measured and comfortable accompaniment is in the same vein.

If romance is your cup of tea, you will hear it in Vale's voice, the depth of his involvement with the songs he sings and overall the mood of this tape. —R.E.

Astrovision #9

Three hours of popular music by a variety of artists, Smash—\$23.95.

Music
Performance
Recording



This tape was created for American Airlines jet passengers who want to loll away the hours during long flights. Passengers have a choice of light classical selections on one channel, popular music such as this on another or a televised movie. Someone got the bright idea to sell the musical packages on 3 3/4 ips tapes for \$23.95 each.

This one is a mixed bag from Phillips, Mercury and Smash featuring such artists as Johnny Mathis, Sarah Vaughn, Roger Miller, the Smothers Brothers, Woody Herman, Shirley Bassey, Robert Farnon, Clark Terry and many, many others.

Considering the problems facing the programmers, they are not to be faulted. It is doubtful, however, that everyone could enjoy equally all the 65 songs by 21 artists from 21 different albums. I, for one, am no aficionado of the Smothers Brothers who appear three times. I could have done without the original cast of "I Had a Ball," too. Score all those concerned with an "AA" for effort. Somewhere on this tape there will be something for everyone—but is that worth \$23.95? —R.E.

Horst Jankowski

The Genius of Jankowski, Horst Jankowski, orchestra and chorus, includes *My Yiddishe Momme, Donkey Serenade, Simpel Gimpel, Walk in the Black Forest, Nola, Clair de Lune, etc.* Mercury STC 60993, \$7.95.

Music
Performance
Recording



For those who like combinations of piano, strings and voices, this album should certainly fill the bill. For those seeking sophisticated, intriguing arrangements of material usually played in a straightforward manner, this set should

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also please highly.

The genius of composer-pianist-arranger-choral director and orchestra leader Horst Jankowski is evident throughout this sparkling collection of standard and not-so-standard selections. His genius also apparently brought out the genius of the recording engineers who inscribed this tape.

Listen especially for (1) the compelling rhythms in the ordinarily-goofy Toselli Serenade; (2) the juxtaposition of piano and chorus in Simpel-Gimpel; (3) the pianists in Parlez Moi D'Amour and Nola; (4) the curious syncopation of Clair de Lune; and (5) the tricky vocalizing in When The Girls Go Marching In. —F.P.

Phil Bodner

Living Jazz: "Dear Heart" and other favorites, Phil Bodner and orchestra, includes Red Roses for a Blue Lady, St. Thomas, Up A Lazy River, Never On Sunday, etc., RCA Camden CTR 878, \$4.95.

Music Performance Recording

"Here's some jazz that's both commercial and good... played by a group of New York's top studio musicians who make themselves some very healthy livings." So advises the cover blurb—and it is to the point. There is something for most collectors of the current music scene in this package: Bossa Nova, Mainstream, and some elements of Rock and Roll, with Bossa Nova predominant. The selections are pretty much OK.

Excellent solos and well-thought-out voicing of the instruments, plus lots of "presence" in the recording, all add up to put this set quite high on the desirable list. And the price is right. —F.P.

Robert Shaw Chorale

On Broadway. Songs from Hello, Dolly!; Fiddler on the Roof; The Most Happy Fella; Lost in the Stars; South Pacific; On the Town; My Fair Lady; Carousel; Paint Your Wagon; The Music Man; The Sound of Music. Chorale and Orch. cond. Robert Shaw. RCA Victor FTC 2202. \$7.95.

Music Performance Recording

It has been said that the great days of the American musical theatre are over. This tape, containing songs from two current, one recent and eight older Broadway shows, would tend to support that view. For the three comparatively new items are among the weakest on this tape—and you have to sit through two of them before the tape really gets down to business. Nevertheless, even these have been treated to new arrangements by Robert Russell Bennett, which may help

you forget just how pedestrian a score "The Sound of Music" really was.

The Shaw Chorale has included hits, like "76 Trombones" and "They Call the Wind Maria" from "Paint Your Wagon." They've gone off the beaten track, too, for some unfamiliar songs from scores which didn't make it big—the title song from Kurt Weill's "Lost in the Stars" and "Standing on the Corner" from Frank Loesser's "Most Happy Fella" are two examples which make today's musicals look pale by comparison.

There's some fine choral singing on this tape, punctuated by the occasional baritone solo. RCA has given the group a wide stereo spread and provided recording which enables you to hear all the words, if you so desire. —R.A.

Tijuana Brass

Whipped Cream and Other Delights, Herb Alpert's Tijuana Brass, includes A Taste of Honey, Tangerine, Lemon Tree, Whipped Cream, Love Potion No. 9, El Garbanzo, Butterball, Peanuts, Lollipops and Roses and others. A & M, AMB 110 \$7.95.

Music Performance Recording

Go to any hi fi show these days and you're almost certain to hear this tape grinding away in more than one display room. It provides a wonderful showcase for any good music system.

Herb Alpert and his Tijuana Brass have soared to the top of the charts with a "sound" that seems to appeal to almost everyone. They demonstrate that sound beautifully on this tape although not all of the selections are of uniformly high order. The recording is top-notch and the sound is excellent. —R.E.

Mel Torme

That's All, Mel Torme, includes The Nearness of You, My Romance, I've Got You Under My Skin, That's All, What Is There to Say, The Folks That Live on the Hill, PS. I Love You, The Second Time Around and others. Columbia CQ728 \$7.95.

Music Performance Recording

Here is exquisite Torme: hushed, lush and velvety. This album, marking Torme's debut on Columbia, is an assemblage of quiet love songs performed in the best of taste. Torme's musicianship is superb. His feeling for the ballads shines through every number. The background, conducted and arranged by Bob Mersey, never intrudes; it adds just the right touch of romance. Warning to unabashed sentimentalists: this tape will get to you. Truly, this is music for lovers only. A recommended buy. —R.E.

Tessie O'Shea

Cheers, includes *I've Got a Lovely Bunch of Cocoanuts*, *It all Belongs to Me*, *Lily of Laguna*, *It's Men Like You*, *I've Got Sixpence*, *Two Ton Tessie* and several others. Command C872 \$7.95.

Music
Performance
Recording



When a great entertainer steps on a stage the audience gets an immediate feeling of communication. This doesn't always hold true for recordings. We are pleased to report that Tessie O'Shea sparkles and bubbles as much on this tape as she does in person—and that's plenty!

Call it cornball, call it unabashed sentimentality, call it anything you like but be prepared to be utterly charmed by the fabulous "Two-Ton" Tessie who will bring the fun and joy of an English music hall right into your livingroom. The material is perfect for Miss O'Shea's talent. The recording is excellent and the overall performance is superb. Enjoy it. —R.E.

Ethel Smith

Ethel Smith Sings Sweetly, includes *Tenderly*, *String of Pearls*, *Misty*, *Sophisticated Lady*, *Stompin' At The Savoy*, etc., Decca ST74-4095, \$7.95.

Music
Performance
Recording



Caution: turn down the bass control before playing this one. The Queen of the Hammond digs those low notes, and the Decca engineers apparently do so, too. Set the bass control at "flat"—otherwise the pictures might vibrate right off your walls.

Miss Smith does right by her material (she is co-composer of two of the items) and the arrangements are far from dull. However, after a half hour of listening one comes away feeling a bit cloyed. It could very well be the nature of the featured instrument. —F.P.

November-December 1965

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Ship of Fools

Ship of Fools, Boston Pops Orchestra, conducted by Arthur Fiedler, music arranged by composer Ernest Gold. RCA Victor FTC 2203, \$8.95.

Music
Performance
Recording



A rousing, cheerful and exceptionally tuneful score played in the traditional Pops style with lots of verve and sparkle. Even the first listening has one whistling catches of the easily-remembered music which nostalgically revives the sounds of the '30's, including the operettas of Lehar and Kalman.

The album begins with the Latin-flavored Goodbye to Vera Cruz, then moves into the Straussian-flavored Candlelight and Silver with its sweeping lilt that pulls at the listener to get up and do a few turns. Ric Rac, an elegant polka, is followed by Flirtation, a piquant melody that contrasts sharply with the short, brash, bouncy and noisy Charleston for An Old Fool. Next comes poignant, dreamy melody Irgendwie, Irgendwo, Irgendwann, with Heute Abend, etc., a brisk concert-type fox trot, finishing the side.

On side two, the somewhat melancholy love theme, Ship of Fools, is hauntingly projected by the string section. Kudos to all who participated in this fine recording effort. —F.P.

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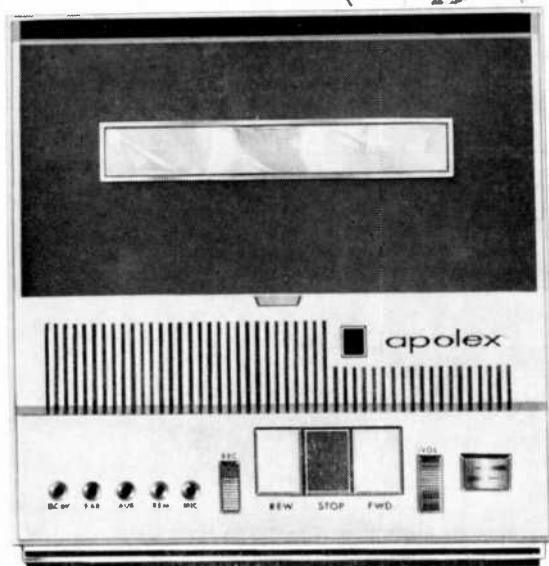
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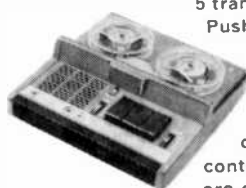
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Nat King Cole

Dear Lonely Hearts*, and Those Lazy-Hazy-Crazy Days of Summer**, Nat King Cole, with orchestra and chorus conducted by Belford Hendricks*, and music conducted by Ralph Carmichael**, includes Miss You, Near You, Yearning, Tavern in the Town, After the Ball, You Tell Me Your Dream, etc. Capitol Y2T 2360, double play, 3¾ i.p.s. Biasonic, \$11.95.

Music
Performance
Recording



The talent of the late King Cole is very obvious here, lifting what is essentially a one-hour sing-along off the low musical plateau where such efforts are usually anchored. The chorus is top notch—but is repressed to sing-along limits. My First and Only Lover and Who's Next In Line? are rock-and-roll flavored; the rest of the songs on Side One are in relaxed tempos.

Side Two (Lazy, etc.) starts off at a somewhat faster pace, begins to bounce with Tavern, and continues largely at an up-tempo pace. Most of the arrangements on this side have a rickey-tickey feeling—nice conveying the olde-tyme flavor of the olde-tyme songs. Six of the Side Two songs were adapted by King Cole—to their advantage.

The sound is quite good.

—F.P.

King Family

The King Family Show! Includes, Pass Me By, Amen, I Used To Love You, Always, Remember etc. Warner Brothers WSTC 1601, \$7.95.

Music
Performance
Recording



For those who were in their 'teens or twenties back in the early forties, this album will certainly evoke strong memories of that period when Alvino Rey and The King Sisters were consistent hit makers. Here they are again, somewhat older, multiplied, and oozing a strong feeling of "family."

Old-timers will find vast differences—yet some similarities—between the King family of today and the Rey-King combine of yesteryear.

A feeling of "Rah! Rah!" and "Look, Ma, We're Singing!" is evident throughout this set, which contains some nice moments where the material is presented in straight fashion, as in "My Favorite Things," and the Berlin medley. But there are quite a few rough moments—for example, the exaggerated "Climb Every Mountain," the slap-dash "When Are You Going To Learn," and the maudlin "The Square."

Tape Recording

tape

TAPESPENDENTS WANTED

PAUL T. FERRARO, 84-09 Talbot St., Kew Gardens, N.Y. 11415, Owns Concord four-track mono $3\frac{3}{4}$, $7\frac{1}{2}$ ips. Interested in Italian opera only. Will trade, buy or sell. Send listings, he will do same.

ROBERT L. CARROLL, P.O. Box 88382, Indianapolis, Indiana 46208. Owns a VM 730 $3\frac{3}{4}$, $7\frac{1}{2}$ ips mono.

HELEN COMMODORE, 2930 West 5th St., Brooklyn, N.Y. 11224, Owns an Ampex 1080, mono or stereo $3\frac{3}{4}$ & $7\frac{1}{2}$ ips.

JOHN FREDERICK INMAN, 602 Gallatin St., N.W., Washington, D.C. 20011. Owns a Concord 994, stereo, $1\frac{7}{8}$, $3\frac{3}{4}$, $7\frac{1}{2}$ ips. Interested in world wide tapespondents, exchanging ideas, music tapes, etc. English only, likes Wurlitzer organ, also band, organ & instrumental groups, also hi-school & all marching bands; no vocals or rock & roll; adult. (Both Sexes)

ALEC TAYLOR, 6455 Westmoor Road, Birmingham, Mich. 48010 Uher $1\frac{7}{8}$ to $7\frac{1}{2}$ ips dual track, Ampex $3\frac{3}{4}$ & $7\frac{1}{2}$ ips four track stereo, Concertone $7\frac{1}{2}$ & 15 ips dual track. Interested in collectors' items: voices-famous and infamous, 16mm Cinematography, will answer all tapes.

EARL WHITE, 2020 Holly St., Harrisburg, Pa. 17104. Owns Roberts 1055, 4 track stereo, $3\frac{3}{4}$ & $7\frac{1}{2}$ ips. Wants to trade jazz tapes and information on foreign jazz connections. Will answer all correspondence.

MRS. H. W. BARTLETT, 1005 S. Elm Street (Apt. 1), Spokane, Wash. 99204. Owns Aiwa, mono, $1\frac{7}{8}$ & $3\frac{3}{4}$ ips. Interested in taking color slides as well as black and white, would like a tape pal in a foreign-English speaking country. English only.

MICHAEL WARNER, 105 East 192 St., Bronx, N.Y. 10468. Owns a four track Vernon, Roberts 2 track stereo & Concord 330 transistor, $1\frac{7}{8}$, $3\frac{3}{4}$, $7\frac{1}{2}$ ips. Interested in foreign correspondence.

ROBERT STARRETT, 5225 Lexington Avenue, Hollywood, Calif. 90029. Owns Tandberg 6, Grundig TK8 (any speed) $\frac{1}{4}$ or $\frac{1}{2}$ track. Interested in Al Jolson—Judy Garland radio recordings, will trade these and other from 1930's and 1940's, particularly musical and comedy programs. Adult.

TERRY PHILLIPS, 710 Broadway, Pistakee Highlands, McHenry, Ill. 60050, Owns Ampex four-track mono & stereo (all

speeds) #1050. Interested in music, art, poetry, high fidelity, science fiction. Age: 22.

ARILD HOITIL, Varonn Vn.8, Oslo 6, Norway. Owns Tandberg 64, four track, 3 speeds, stereo. Interested in tapesponding in Hawaii—especially—also elsewhere in the world (21 years).

GEORGE BERGSTROM, 1725 Ashland Ave., Santa Monica, Calif. 90405, Owns Wollensak T1600, mono, $3\frac{3}{4}$ ips. Interested in old records, Indian lore, legends, science. South American travels, Incas, Mayas. Adult.

MRS. G. E. MCKEE, Rte. 2, Kettle Falls, Wash. 99141, Owns Sony $3\frac{3}{4}$ & $7\frac{1}{2}$ ips., mono or stereo, Aiwa $1\frac{7}{8}$ & $3\frac{3}{4}$ ips (mono). Interested in gardening, animals, outdoor sports. Would like tapespondents from Latin America especially, speaks limited Spanish—also other countries.

GEORGE LIPPMAN, 618 E. 80th St., Brooklyn 36, N.Y., Owns Wollensak 1280 $3\frac{3}{4}$ ips, mono, also $7\frac{1}{2}$ ips stereo. Interested in slot racing, rock and roll music. All tapes answered. Age: 17.

FRANK HORAK, 1555 W. 87 St., Los Angeles, Calif. 90047, Owns Ampex F-44 four track, mono or stereo $3\frac{3}{4}$ & $7\frac{1}{2}$ ips. Interested in hi-fi music and photography, welcomes tapesponding in German or English.

EARL and HELEN LINDER, P.O. Box 52-353, Miami, Fla., have all professional tape recorders, all speeds, mono & stereo. Interested in trading tapes on Christian worship, bible, history, science, metaphysics, prophecy, astronomy, pyramid study integration and segregation.

KEN WEDDLE, 10103 Dartmouth Ave., Tampa, Florida 33612. Can handle any tape. Sports writer and photographer cover major southern auto-speedboat and outdoor racing events. Interested in foreign tapes, will exchange sports, etc. All tapes answered.

FRANK BALK, 113 West 18th, Carroll, Iowa 51401. Owns Cipher 1 & VII, mono & stereo $1\frac{7}{8}$, $3\frac{3}{4}$ & $7\frac{1}{2}$ ips. Interested in music, photography, languages, travel. English or German.

DON JARES, 3203 Maple Ave., Brookfield, Ill. 60513. Owns Ampex F-4470 four-track stereo & mono (prefer stereo) $7\frac{1}{2}$ &

$3\frac{3}{4}$ ips. Speak some Spanish. Interested in good stereo music, teen-ager, will answer all tapes (both sexes).

WERNER S. TRAPP, 3165 Keats St., Fremont, Calif. 94536, Owns Sabafon T1 220-four track, 2 speed stereo & mono. Interested in color photography, popular, musical comedy, dance, sports, comedy, prefer female tapespondents.

BRUCE SHERMAN, 13346 Sherwood, Huntington Woods, Mich. 48070. Owns Concord 220, mono, $3\frac{3}{4}$ ips. Interested in UFO's, sleep-learning, tape recording, photography, teenager-answer all tapes.

ALVIN M. HARRISON, 1612 So. Broad St., Phila., Pa. 19145. Owns Tandberg 74 & 64, stereo, $3\frac{3}{4}$ ips (3 or 5 in. reel).

BILL SILVERMAN, 550 Warner Ave., Los Angeles, Calif. 90024 Owns Sony 250-A & Ampex 2080. Interested in Wagner, Beethoven, etc. ($3\frac{3}{4}$ & $7\frac{1}{2}$ ips) 10 yrs. old. WILLIAM WEICHI, 31 Chase St., Lowell, Mass. 01850. Owns Panasonic RQ102S, mono, $1\frac{7}{8}$ & $3\frac{3}{4}$ ips, two-track. Interested in old radio mystery drama, documentaries, vaudeville, music '30s & '40s, humor, celebrities, will answer all tapes. Adult.

LINCOLN CANTWELL, 518 Quincy St. East, San Antonio, Texas. Owns Cipher VII, mono, $3\frac{3}{4}$ ips. Interested in hearing from Australians but will answer all tapes. Enjoys travel, played football, sports, golf, records, books. Prefer candid conversation. (college student)

Would you like to be included in next issue's listing of tapespondents? To be sure you are, just fill out the coupon—the more complete the information you give, the better—and mail to TAPESPENDENTS Editor, TAPE RECORDING, 156 East 52nd Street, New York 22, N.Y.

Name _____
Address _____
City _____
State _____ Zip Code _____
Recorder(s) _____
Prefer tapes: (please check) ☐ mono ☐ stereo
 ☒ $1\frac{7}{8}$ ☐ $3\frac{3}{4}$ ☐ $7\frac{1}{2}$ ☐ other

An interview with the oldest man in town might be of particular interest to many of the folks who live in your area-especially newcomers



Turn Talk Into Dollars

by Pierce Alan Coryell

If you want an expensive, portable, battery-operated tape recorder and don't have the money, go bravely to the nearest local radio station and say, "How would you like to buy me an expensive, portable, battery-operated tape recorder?" Don't wait for an answer but immediately promise in return to do a series of half hour, ad lib discussion programs on tape on location with local topics, people, and places.

If the program director says "Yes," you have gained two objectives: (1) the recorder, and (2) the pleasure of turning talk into dollars.

It is easier than you think. Topics for local stations are those that network radio cannot handle—the national or international topic from the local angle ("A Central Pennsylvania View of Unifying the Armed Forces") or an exclusively local topic ("Why Fort Augusta at the juncture of the Susquehanna River branches discouraged the French and so we speak English"). Furthermore, you have plenty of well-informed people right in your area. People who live and breathe a subject and can speak extemporaneously and well. Put two fire chiefs in a firehouse with you, add coffee and a recorder—and you'll have an easy half hour on the problems of fighting fires.

Making money with your tape recorder by doing interviews requires certain ingredients. A must is a local radio station interested in reflecting the lives and problems and special knowledge of people who affect the local community. Second, you need a good machine. I used a Trans-Flyweight by Amplifier Corporation of America with an Electro-Voice microphone at 7½ ips capturing 10,000 cycles—because we were on FM as well as AM. With the increase in the number of FM stations and new requirements of separate programming of AM-FM transmitters, it doesn't hurt to have a recorder that meets NAB standards. Also, a good machine eliminates the technician. There's just you, the recorder, a cup of coffee apiece and guests. No extra hands present to invite self-consciousness. Also, because you will be recording in various locations with differing acoustics, you need all the help a good machine can give. And battery-operation is desirable. How many electric plugs are there outdoors in state parks? Third, you must have informed local people. They are all around, if you look: lawyers, psychiatrists, ministers, doctors, teachers, college faculty, state policemen, postmasters, probation

officers, prison inmates—the list is as long as the telephone book. Fourth, you as moderator must be interested—not necessarily informed. In this condition, once you have agreed with your guests on areas to be covered in the particular discussion, you find their answers feed the next questions, and you never quite cover the topic. The first time the Chairman of the State Board of Parole and two assistants talked with me in a private dining room (the hotel was glad for the mention) about Prisoners and Parole, after we turned off the recorder someone said, "Why, we never even got to sex criminals and parole." Two months later we did. Fifth, choose a place to record that's logically connected with the topic and nearby so the listeners can identify. When we spoke with civil defense directors on survival after a blast we did it from the office of the director for most of central Pennsylvania. Three postmasters drank my coffee in the basement of the Sunbury post office while we discussed the postal system. (Did you know pony express riders had to be thin, wiry orphans in their late teens?) From a police office in Northumberland the chief and a teacher of driver's education talked about drag strips, how old a boy should be to drive, and what makes a good driver.

With these five ingredients, you've got it—adult education that is entertaining. Now, entertainment, in part, means making a subject interesting to the listener. You must pick men and women who know their topic. When John Glenn went round and round the world, the heads of the Departments of Science, Sociology, and Religion at Bucknell University discussed the effect on our region. Religion would need to replace world terms with those more universal and galactic. Our green enclave between Pittsburgh and Philadelphia will be swallowed up. Pennsylvania Dutch farmers in the future will have to switch to hydroponics. And, oh yes, you also learn it is a mistake to record in a narrow, glassed-in lounge. It was a great discussion but, acoustically, we were at the bottom of a well.

Any topic can be made interesting if seasoned with a little relevant emotion. From the Federal Penitentiary at Lewisburg we recorded a civilian teacher of a class in Personality Adjustment talking to three inmates about adjustment to life outside after a stay inside as well as about some

Turn Talk Into Dollars

problems of adjustment inside. The class listened intently, and so did a lot of Sunday School classes when the tape was played over the air.

From a recording standpoint I made perhaps my best program in a large living room seated on a psychiatrist's couch talking to our host, and to a psychologist and minister about marriage counselling. Wall to wall carpeting, over-stuffed furniture, and sharp minds helped.

We have recorded from court rooms with district attorneys, from a state police barracks bedroom with policemen, from the living room of the President of Suquehanna University with the President of Bucknell as his guest (they told me their universities were an asset to our region—and in such beautiful English), from a local library (when I asked the two librarians with whom they'd seek shelter on a stormy night) a borrower who read "Forever Amber" or one who read books on astronomy, (they giggled at 7½ ips), from a bank boardroom, from a schoolroom, from deep in a store window (Buying on Time), even from the radio station (The Role of Radio in the Life of Our Region) and once, and once only, from a state park on a bluff 200 feet above US Route 15. We picked up traffic going from Florida to Canada, a diesel locomotive in the distance, birds in the trees, insects in the grass, wind past the microphone on our picnic table and a discussion with three historians on pioneers to our river valley.

In addition to the great outdoors there are certain other hazards. In urban areas there are programs, usually on FM, where an enormously gifted announcer sits down with one man for an hour or more conversation on an esoteric subject. There are programs on AM stations where a topic is chosen and listeners telephone in their opinions. I believe the former programs, however interesting in other respects, tend to a certain monotony—only two voices too long. I think the latter programs encourage a certain exhibitionism in uninformed minds. Remember, the goal is not just education but entertaining education; and for that I think half an hour is enough of the listener's attention to demand. Further, if you are seriously trying to provide education, then your guests should be people who can illuminate the subject, not merely give an opinion about it.

When I proposed my taped program to our local station, I suggested the tapes be played on

FM after the 11 P.M. news on the theory that only those on the particular tape and their relatives would listen. "No," said the manager, "We'll put it on in good radio time, 11:30 Saturday mornings, both transmitters." I thought he was making a mistake, but when we went off the air people called the station, stopped me in the street—and even wrote letters. I was told that we had broadened horizons and stretched minds, that we had promoted understanding within the whole community directly and peripherally through the simple sharing of ideas. I know one of the chief values of our program was in digging up the local wealth or specialized knowledge and in letting the community take pride that the experts were their friends, their neighbors and themselves.

All it took—all it takes—were and are a willing station, a good battery tape recorder, coffee for everyone, and a moderator interested in licensed nosiness. When having teenage guests, this prescription may be varied with soft drinks. The basic problem is not in finding the people to participate. People who are informed are willing to share. (The psychiatrist said he was tired of doing marriage counseling when it was too late—perhaps our program might help him reach people sooner.) The basic, practical problem is simply one of coordination, of finding a time and place that you and your guests can meet without interfering with their or your professional and business lives. You can record at mutually convenient times and places varying from week to week and play back at a regular spot in the station schedule.

I did this series a couple of years ago, but the bug of adult education without tears keeps on biting. Also, with the passage of time I have acquired a Uher 4000, which may fairly be described as an expensive, portable, battery operated tape recorder. In my first series we never did get to float down the Susquehanna River in a rowboat discussing the problems of the largest river basin east of the Mississippi and south of the St. Lawrence. We never really got our teeth in to the Role of Poetry in Modern Civilization, or Can a White Collar Worker Find Happiness on a Pennsylvania Farm?, or Is the Convalescent Home a Cultural Windfall or Deadfall, or . . . there are so many topics and places and people we haven't yet touched on. What are you waiting for?

tape

EQUIPMENT REVIEWS

We believe that there are four major categories of recorders on the market today, each requiring a different type of testing to produce the maximum amount of information for a prospective purchaser or user. There are the economy models, primarily designed for tape beginners on a budget; moderately priced machines for general home use; component-quality recorders and decks; and battery-operated portables. The first group, which generally includes those machines priced under \$200, are judged on the basis of value for money, ease of operation, features and durability of construction. Those in the middle price range (from \$200 to about \$350) are judged on these bases plus their high fidelity characteristics. Since some purchasers will be interested in sound fidelity, we publish those test results which best indicate the capabilities of the unit to the user. For component-quality recorders and decks (those priced above \$350), we include full test results and discussion of construction as well as data on features, ease of operation, etc. Since most battery-operated portables are admittedly of limited fidelity, our reports concentrate on reliability, quality of construction, ease of operation, portability and other factors more likely to be of interest to the portable user. Those few battery-operated portables which do claim to be component-quality units will be reported on with full technical details.

We have adopted this procedure of testing and reporting because we believe it can best help readers to find the right machine for their particular needs and because it seems to us patently unfair to compare the technical capabilities of a \$149 recorder with one designed to sell for twice or three times as much.

Concord F-85



For a pint-size machine at a pint-size price, the Sound Camera may not have everything, but it does produce a decent recording at a constant tape speed. Fidelity is not a feature expected of battery portables in this price range, but if the recording level is watched carefully, the F-85 can at least approximate reasonably good reproduction.

The pushbutton controls are easily accessible from the top of the recorder, making candid recordings easier. The user can operate all the controls visually while the machine is hanging from the strap. A remote-control switch on the micropophone—a must for battery portables—adds to the operating convenience.

Setting the proper recording level can be a problem. The neon indicator flashes only on overloads, making it difficult to gauge properly.

The unit takes four size "C" batteries, and the neon level indicator doubles as a battery-condition checker, as it does on most such machines. An optional AC adapter for indoor use saves the batteries for portable situations. The tape moves at a standard 1 7/8 ips speed, making it possible to splice tapes onto a long reel for playback on large-size AC-only ma-

chines.

Fast rewind time is relatively slow if you're accustomed to operating larger and more expensive machines, but is about average for this type of recorder. The machine records 1/2 track, giving about 10 minutes time on each half of a 100-foot reel. Reel size is 2 1/2 inches, and will hold up to 300 feet of triple-play tape. The take-up reel is visible through a plexi-glas window in the cover.

One annoying operational characteristic is the way the tape bounces against the playback head during rewind. This causes a "barking" or undulating sound from the speaker, and nervous users will find themselves turning the volume control down during rewind. But this is a minor inconvenience.

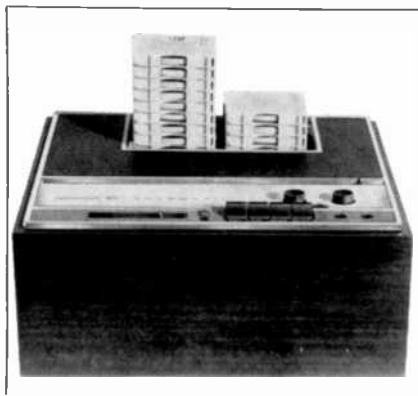
The machine weighs in at 2 3/4 pounds with batteries, and it measures five inches wide x 2 3/4 inches thick and 7 3/4 inches high when standing on end. It's by far the most convenient and most portable of all the machines tested this month.

The neon indicator light may cause some grumbling since the microphone is relatively insensitive and you can't always be sure the volume control is turned up high enough when recording. A VU meter would have eliminated this difficulty. An extra stage of microphone preamplification would have helped out a lot too, but this seems to be a common failing of even the most expensive transistor portables. And, at this price, how much can we expect?

If you've checked into some other low-and medium-priced machines, you'll find that the erase "head" consists of a crude bar magnet that's pressed against the tape being erased. The F-85 sports a sure-nuff erase head complete with associated circuitry. It does the job quite well. And, by the

way, the capstan drive really does its job, too. All in all the F-85 is a fine value at a cost of less than \$40.

Wollensak 7000



The Wollensak 7000 is one of a series of machines that are, basically, tape changers. The 7000 is a deck only, the 7100 contains power amplifiers and built-in speakers and the 7200 contains power amplifiers but has bookshelf speakers furnished with it.

There are features in the Wollensak 7000 that distinguish it from the more common tape machines. It uses a unique tape cartridge and a special tape with a narrow width. The machine is automatic in that it will thread itself, rewind and change cartridges. These represent solutions to problems heretofore encountered.

When loaded with a sufficient number of cartridges the tape can play for as long as 15 hours without interruption except for the short times required for rewinding the cartridges. The tape is a special low-noise high resolution type developed by 3M for use with this player. It is 146 thousandths of an inch wide, approximately 450 feet are wound in each cartridge and the operating speed is $1\frac{7}{8}$ inches per second. The plastic housing of the cartridge is about

$3\frac{3}{4}$ inches square and about one half inch thick and is sealed against entrance of foreign material. The cartridges are keyed to fit and lock against each other and as many as 20 can be loaded onto the machine at one time.

Press the "ON" button, then the play button, the machine starts, threads itself, plays for 45 minutes and then automatically rewinds. The played cartridge is ejected and another falls into playing position. When the second cartridge drops into place the cycle begins again and continues until all cartridges have been played. If desired a cartridge may be rejected at any time. And, because the machine is equipped with a counter that has a high degree of accuracy, it is possible to locate the desired portion of a numbered tape at any time, since this machine has the unusual feature (for a cartridge machine) of being able to wind in both the fast forward and rewind modes. When playing of a cartridge is complete, mechanical fingers support the stacks of cartridges (unplayed on the left, played on the right) while the platform tilts downward to the right to allow the played cartridge to slide to the right (and bottom) into the played stack. When the platform returns to the level position the next cartridge drops into place to be played. Once a cartridge is in position to be played the payout-rewind idler engages the rim of the cartridge reel and rolls out the stiff leader tape. The leader follows guides between the pressure roller and capstan onto the takeup reel (which is a permanent part of the mechanism). Spring loaded flanges grip the leader and winding starts. A tape sensing pin located between the erase and record-playback head senses the presence of the tape and signals for the start of playback. At the end of the reel the same sensing pin signals for rewind and the tape is rewound back into the cartridge.

The mechanism is intricate because of the multiplicity of levers, cams and springs required to do all of the functions. The problem of jamming was anticipated by the designers, however, and it is only necessary, if one should encounter a problem, to lift the lid of the mechanism, rotate the sequence wheel to the load position and allow the machine to return itself to normal operation. For the mechanically inclined the mechanism is absolutely fascinating to watch operate. Our unit had a small window in the cover in which appeared the name of the functions as they took place in sequence. This information is printed on the sequence wheel, which is accessible by lifting the top cover and which affords a full view of the mechanism.

We connected the recorder to our system in order to make comparative performance checks. Recordings made and played on the Wollensak were indistinguishable from the source material, which speaks well for the performance of the instrument. There is no way that one could edit tape in what would be considered a normal manner, but if one wished to, it is possible to edit electronically. There are a couple of nice extra features on this instrument, too. The tone controls, though continuous, have four settings: treble, hi-fi, bass and balanced tone. Balanced tone appears to be something that approximates a loudness curve and would be very desirable when using just extension speakers. Another feature we like is the complete shut-off of the recorder when the last cartridge is played, just the thing for the absent minded professor types.

Measurement of flutter showed it to be a bit on the high side as would be expected, but not high enough to be audible on a piano recording. Distortion was undetectable in listening tests, which are what really count. Signal to noise

ratio was good for a move type recorder and the output from the pre-amplifier was high enough to drive a power amplifier directly. Fast forward time for a full cartridge was 55 seconds and rewind time was 35 seconds. The radio/phono input sensitivity was 46 Mv. on each channel, quite high and more than adequate. The microphone sensitivity was also quite high and more than adequate. Microphones are supplied with the instrument, as are patch cords and a spare cartridge.

All in all the Wollensak 7000 series constitute a nice marriage of the advantages of tape with the convenience of the record changer, the end result being top performance and top convenience. Both reel to reel tape machines and record changers had better look to their laurels.

Panasonic RQ101S



To outward appearances, this machine is very ordinary; it looks more or less like most Japanese transistor recorders. But the similarity ends there. This compact two-hands full has a positive capstan drive and two speeds— $3\frac{3}{4}$ and $1\frac{7}{8}$ ips. The capstan is covered by a removable drum whose larger diameter provides the faster speed. Changing speeds is relatively easy,

and a center post is provided for storing the removable capstan cylinder.

Fidelity for voice at $3\frac{3}{4}$ ips is especially good. Patched-in music programs reproduce so-so, but decidedly good for a machine of this type. Slow-speed recording provides less voice fidelity, as could be expected, but still maximum intelligibility. This is certainly a highly satisfactory recorder from the standpoint of playback quality.

On the minus side, the unit lacks a remote-control provision and of course, there's no switch on the microphone for this purpose. Much cheaper recorders have this feature—why not this one? Another drawback is the rotary knob function/operate control. Its awkward to use, even on a table top. In portable hand-carried applications, this awkward control knob plus the lack of a remote control switch can really create all-thumbs situations.

The machine is reasonably light—a trifle over four pounds with its six size "D" batteries and dynamic micropophone. It measures $7\frac{3}{4}$ inches wide, three inches thick, and stands eight inches high in carrying position.

Recording level and battery conditions are indicated by a single neon lamp. The rewind, incidentally, is one of the fastest we've seen in reel-to-reel battery machines. Reel diameter is three inches and the unit has the usual accessory jacks. A separate record lock button prevents accidental erasure, and the machine boasts a standard erase head, no permanent magnets here.

An instruction manual hardly seems necessary, the Panasonic is so easy for the tape buff to understand. The only item that might cause a problem is the removable capstan cover (for the $3\frac{3}{4}$ ips speed), but this isn't the first machine to use such a feature.

The recorder produces a fairly high level of drive motor noise, when playing or recording, but the

plastic cover that goes over the reels, heads and capstan manages to muffle this noise to some extent. The cover has a king size picture window for watching the amount of tape on the reels.

Even so, this high operating mechanical noise would preclude the use of this machine for any sophisticated eavesdropping or hidden machine applications.

General Electric M8010



There's an old adage that says, "If you can't beat 'em, join 'em." This may be what General Electric had in mind with this machine, but they had a very curious way of approaching the problem.

First, the M8010 is a battery powered transistor portable with a fairly low price tag. It's made in the USA, but it contains some components conspicuously labeled "Japan," so the unit isn't all-American no matter how you slice it.

If size means quality, then this recorder walks away with the prize. It measures a hefty $11\frac{1}{4}$ inches wide, $3\frac{1}{4}$ inches deep, and $8\frac{1}{4}$ inches high—not really that big, but you'll never get it into your overcoat pocket. Its six pounds will however, tuck neatly into an attache case and still leave a good deal of room.

Norelco Continental Tape Recorders

Norelco Continental '401'

The recording studio in a suitcase

Fully self contained 4 track stereo record/playback. 4 speeds, $7\frac{1}{2}$, $3\frac{3}{4}$, $1\frac{1}{2}$, $\frac{1}{4}$ ips — up to 32 hours on a 7 inch reel. Has dual preamps, power amplifiers, stereo matched speakers. (2nd speaker in lid). Ganged stereo controls eliminate need for dual knobs and microphones. Special facilities include monitoring, mixing, sound on sound, portable P.A. Frequency response 50 to 18,000 cps; wow and flutter less than 0.14% at $7\frac{1}{2}$ ips. Signal to noise ratio better than -48 db.

Weights 39 lbs. $18\frac{1}{4}$ " x 15 " x 10 ".
CIRCLE 53 ON READER-SERVICE CARD



Norelco Continental '201'

New marvel of tape recording versatility

Multi-purpose 4 track tape recorder has every built-in feature for quality recording and playback; 2 speeds, $7\frac{1}{2}$ or $3\frac{3}{4}$ ips provide up to 8 hours playing time on a single 7 inch reel. Fully self contained. Has dual preamps for stereo playback with external hi-fi system. Special facilities include parallel operation, mixing, pause control, tone control, portable P.A. Frequency response 60 to 16,000 cps.

Weights 18 lbs. $15\frac{3}{4}$ " x $13\frac{3}{4}$ " x $6\frac{3}{4}$ ".
CIRCLE 54 ON READER-SERVICE CARD



Norelco Continental '95'

Quality engineered, budget priced tape recorder

Compact $3\frac{3}{4}$ ips speed machine provides up to 3 hours playing time. New automatic record control *electronically* sets correct recording volume. Make a perfect tape everytime. Has simple pushbuttons to record, playback, wind, rewind, tape pause and stop; adjustable controls for on/off, volume and tone. Frequency response 80 to 12,000 cps.

Weights 12 lbs. $14\frac{1}{4}$ " x 10 " x 5 ".
CIRCLE 55 ON READER-SERVICE CARD



All specifications subject to change without notification.

Norelco Tape Recorder Accessories

FOR MODEL	DESCRIPTION	FOR MODEL	DESCRIPTION
'101'	DL 86 Leather Carrying Case	'95', '101', '150'	TP 86 Telephone Pickup Coil
'101'	CC 86 Texon Carrying Case	'150'	TC 2 x 30 Tape Cartridge
'101'	BE 86 AC Adapter	'201'	EL 3775/21 Monitoring Headset
'101'	RS 86 Remote Mike Switch	'201', '401'	EL 3984/15 Foot Control
'150'	BE 50 AC Adapter	'201', '401'	TP 34/49 Telephone Pickup Coil
'101', '150'	FP 86 Foot Pedal	'401'	EL 3775/37 Stereo Headset
'101', '150'	HP 86 EL 3775/85 Listening Headset	'401'	2A1048 Mike Adapter
'101', '150'	CTM 86 Close Talking Mike		

CIRCLE 56 ON READER-SERVICE CARD

NORTH AMERICAN PHILIPS COMPANY, INC.

High Fidelity Products Department
100 East 42nd Street, New York, N. Y. 10017

Build This \$50 Gift For Under \$20

by Peter Suthern

With headphones on, the man at the mixer cocks his ear intently. The string bass dominates the right channel too much; he reaches out and turns a knob slightly counterclockwise. A moment later, watching a cue sheet, he takes hold of a knob labeled "music" and turns it slowly down to just above the zero mark. With his other hand, he turns up a control labeled "announcer". A man at a microphone begins to read. The mixer listens critically to the voice, making sure it can be understood above the music.

A glimpse into the life of a recording engineer? Might be. But it could also be *you!* Here is a stereo mixer *you* can build for between \$15 and \$20—less if you have access to used parts or "bargain" stores. It will do all the things a professional console will—but on a smaller scale. *Even if you've never built any electronics from scratch before, you should have no trouble with this.*

Specifications? Flat within 1.5 db from 10 to 30,000 cycles; 0.25% or less harmonic distortion at any frequency between 30 and 15,000 cycles with 1 volt input. Noise is 68 db below 1 volt output. Overall gain from any one input to the corresponding output in the STEREO position is about 1.5.

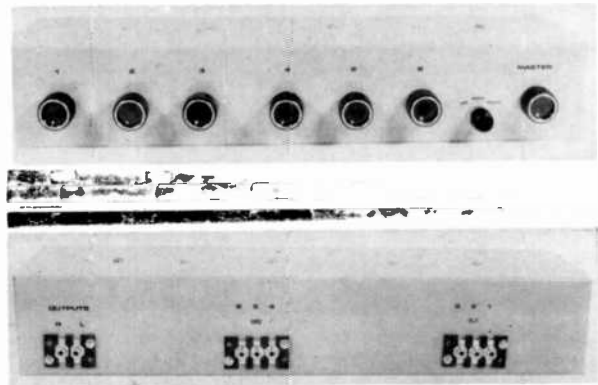
This mixer can be used for high-level sources (tuner output, preamplified mike or phono), low-level sources (unpreamplified mike or phono) or even for both at the same time (more about that later). You can use three separate stereo sources, or six separate monaural sources, depending on how you flip the OFF-MONO-STEREO switch. The master gain pot controls both channels (or both groups of three mono sources) simultaneously. (For monaural operation only, you may want to replace the ganged master pot with two separate units, or with a so-called "dual concentric" control, which permits separate adjustment. You would then have two "sub-master" controls, in professional parlance).

To build the mixer, buy exactly the parts called for. Substitutions are OK *if* you know what you're doing. If you feel you can spend a little more on the project, get low-noise deposited-carbon or metal-film resistors, and use Ohmite AB controls instead of the ones specified. This will reduce the noise of the mixer and *keep* it noise free longer, too.*

The photos and drawings on these pages show you exactly what to do. Try to wire the little amplifier modules exactly as shown, to avoid mistakes or unforeseen "bugs".

Using the mixer

To hook the mixer to your recorder or amplifier, use shielded audio cable just as you do for hi-fi system interconnections. You can plug in



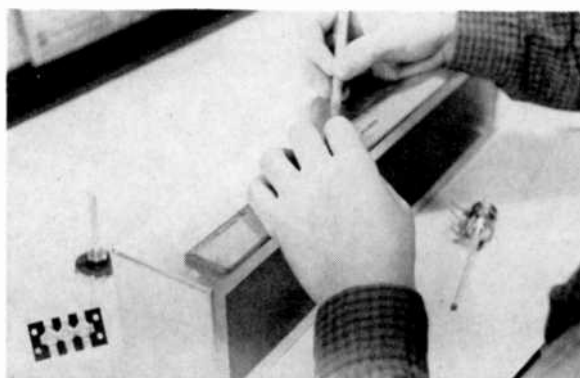
If you want to paint chassis, do it after drilling. A coat of zinc chromate primer (such as Krylon No. 1319) followed by the spray-can enamel of your choice, makes a professional job. The lettering was done with Letraset Instant Lettering—a dry-transfer method that is more elegant than inking or decals. Instant Lettering or Prestype, a similar product, is available from most art and drafting supply stores.

the "line" output of a tape recorder, for instance (great for copying or dubbing), or the output of a tuner or a phono preamp, or all of them. These are all examples of *high-level* sources (around 1 volt of signal). The mixer is then working as a high-level mixer and its output must go to the high-level ("radio" or "line") input of your recorder or amplifier.

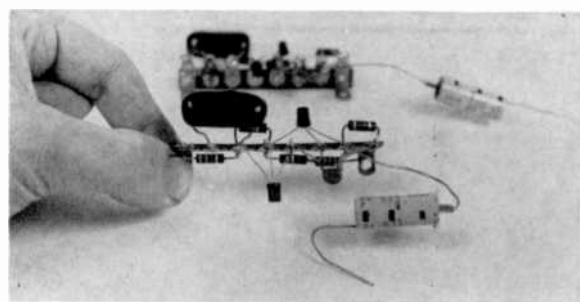
You can also plug in microphones (crystal, ceramic or high-impedance dynamic). In that case, the mixer works as a low-level mixer and the output should go to the microphone input of your recorder or amplifier. The hiss generated by the resistors will be considerably more obvious this way, and low-noise resistors will be worth while.

You can use both high- and low-level sources at the same time, but, unless you insert "pads", you will have to work the microphone controls wide open, and the tape or tuner or other high-level controls barely cracked. To avoid that, put a resistor of 2 to 3 megohms in series with each high-level input. That cuts the high signals down to the size of the low. The mixer output should go to the mike input of the recorder in this case.

*One of the wisest moves you can make, especially if you plan to build other electronic equipment, is to send for the catalogs of the major electronic supply houses, like Allied Radio Corp., Lafayette Radio Electronics Corp., Burstein-Applebee, etc.



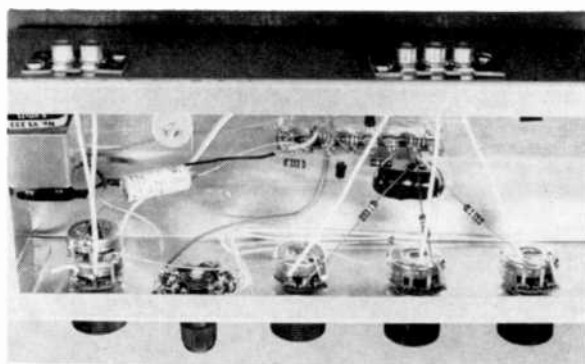
Begin by making the chassis as shown in the drawings and photos. Arrangements of parts isn't critical, but the layout used here is convenient and logical. The only holes you have to worry about lining up are the ones for the 8-lug terminal strips and for the input and output jacks in back.



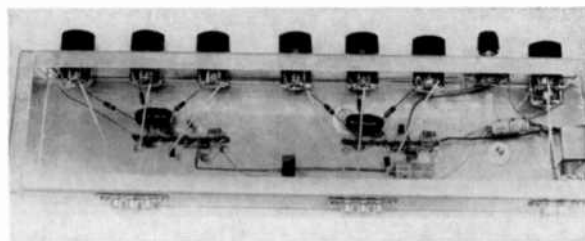
Wire the 8-lug strips exactly as shown here and in the drawing. Be sure your soldering iron (a small "pencil" type is best) is clean and hot, and remember to heat the joint, then touch the solder to the hot joint. Don't drip the solder on like glue. Solder the transistors in last, and be sure their flat sides are positioned as shown. The way to prevent damaging them by overheating is to tin the ends of the leads first, by touching them with the hot solder-coated iron tip, then quickly "tack" each lead in place on the terminal strip. No need to twist or wrap any wires—regardless of what kit manuals may have told you.

Use of low-impedance mikes with this mixer is not recommended, because of noise. You can use them if you have to, but only with a mike-to-grid matching transformer between the microphone and the input of the mixer.

One big advantage of this type of mixer, with transistor amplifiers built right in, is that you



Views of the finished mixer.



can run practically any length of cable to the recorder—50 feet, 100 feet—without any loss of high frequencies. You will sometimes be stuck in an awkward location, and you will be happy to move the recorder itself out of the way, after setting levels and starting it, and have only the mixer to keep you company at your vantage point.

Finally, if you're feeling experimental, there's no reason you can't use more or fewer inputs on each channel. To add inputs, just hang them on in the same way the three existing ones are set up, with a pot and a 220,000-ohm isolating resistor for each.

WHAT YOU'LL NEED

Resistors (number in parentheses is the quantity)

4,700 ohms (2)

33,000 ohms (2)

120,000 ohms (2)

3.3 megohms (2)

10 megohms (2)

(All these can be 1/2 watt, 10% carbon resistors.

For lower hiss level, use high-quality 1/2-watt deposited-carbon or metal-film resistors.)

220,000 ohms (6)

Capacitors

180 pf ceramic (2)

.05 μ f paper or ceramic, 100 volts or higher (2)

10 μ f electrolytic, 15 volts or higher (2)

50 μ f electrolytic, 25 volts or higher (1)

Controls

250,000 ohms, audio taper (6) (IRC Q13-130 or equivalent)

Ganged 5,000-ohm controls on common shaft, audio taper, (IRC Q13-114 plus similar add-on rear section, or equivalent)

2-pole, 3-position shorting type rotary switch (Centralab 1473, Mallory 3123J, or equivalent)

Transistors

General Electric 2N2925 (4)

Miscellaneous

Chassis—aluminum, 3" x 4" x 17" (Bud AC-432 or equivalent)

8-lug solder-terminal strips (2) (H. H. Smith 900 or equivalent)

Double phono-jack (1); triple phono jack (2)

Batteries—9-volt flat type (2) (RCA VS323, Burgess 2U6; or use 8.4-volt mercury type for longer life, such as Mallory TR146X)

6—32 x 1/4-inch machine screws, lockwashers and nuts (11 of each)

Hookup wire

Snap-on connectors for batteries (2)

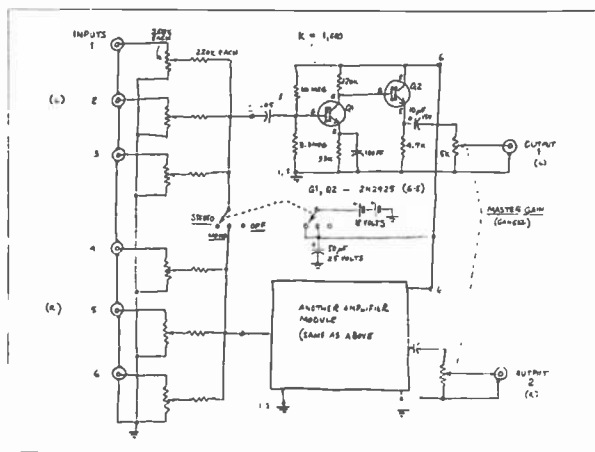


Fig. 1—Schematic of the mixer. Don't worry—everything can be wired from the pictorials and photos alone!

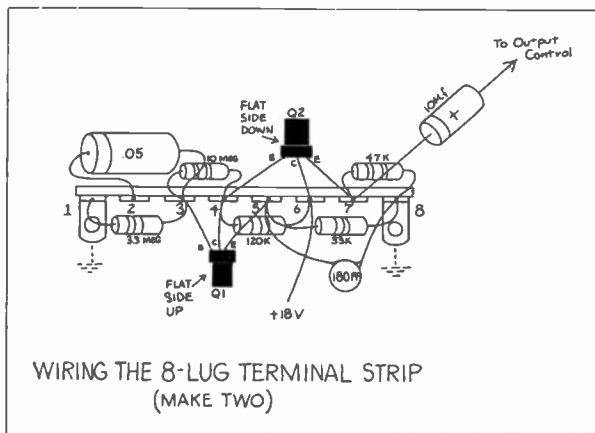


Fig. 2—How to wire the 8-lug terminal strips that support the amplifier modules. Be sure the plus sign on the 10-μF capacitor is toward the strip, not toward the output control.

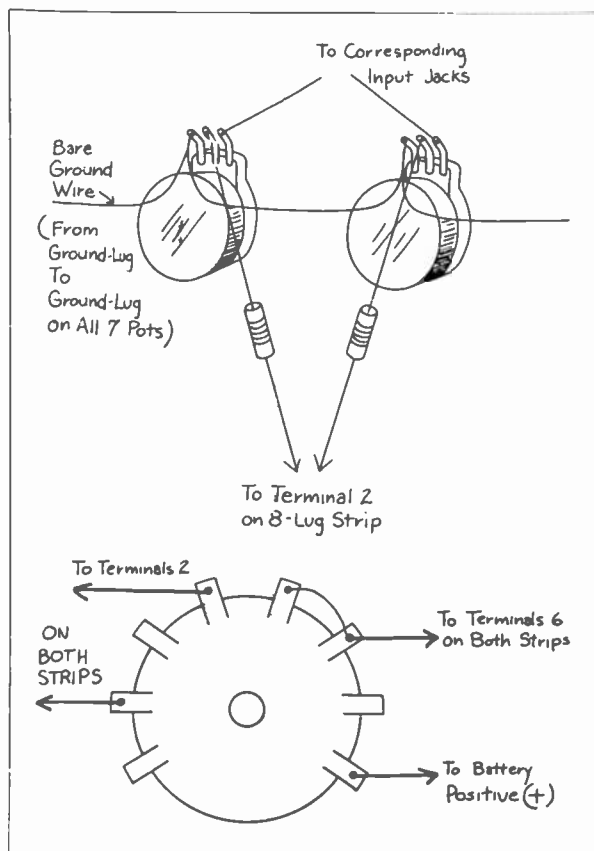


Fig. 3—Wiring the mixer pots and switch. Details of the can be wired from the pictorials and photos alone! should apply in any case.

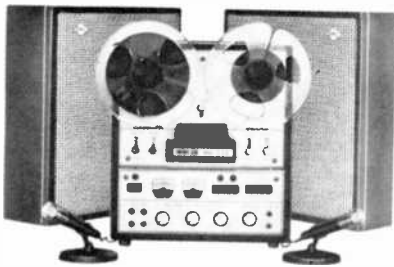
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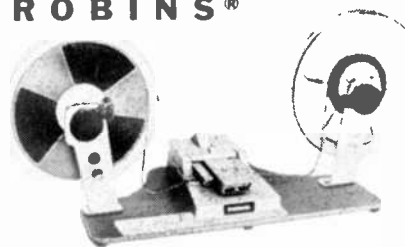
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