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24
Radio-TV

WHITE'S RADIO LOG
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EXPERIMENTER

DECEMBER-JANUARY 75c

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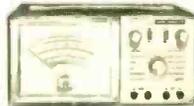
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Automotive

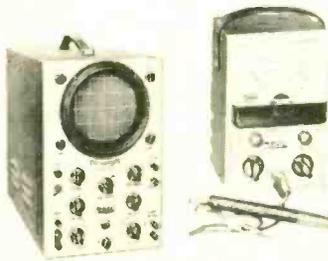
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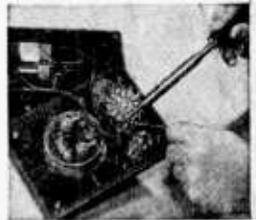
Transistor experiments on programmed breadboard — using oscilloscope.



Construction of Oscilloscope.



Construction of Multimeter.





Radio-TV EXPERIMENTER

December 1968/January 1969

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Cover photo by Leonard Heicklen



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1

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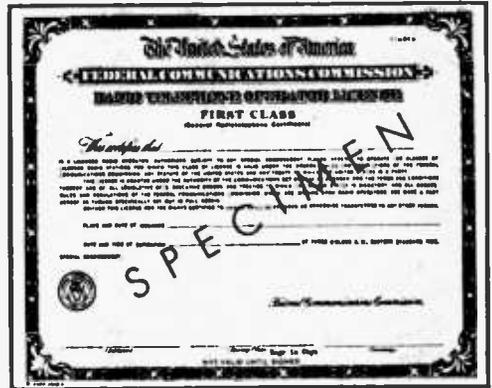
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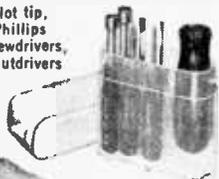
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Radio-TV EXPERIMENTER

Dec. '68/Jan. '69

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Dedicated to America's Electronics Hobbyists

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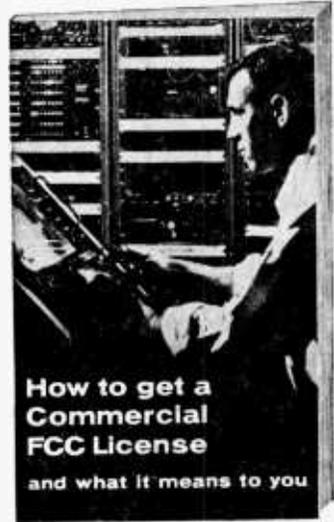
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It tells how to go about getting the key to job success in the growing electronics boom—a Government FCC License



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JULIAN M. SIENKIEWICZ, EDITOR

Moustache Wax, Anyone? I know it will happen! Someone will write the Editor, asking whether or not the moustache worn by Gene Cashman on our cover this issue is for real. In the interests of honest reporting I must state the moustache is *not* real. However, Gene was sporting the bristly ends of a rudimental mous-



Ramuk of Rabat is no other than Gene Cashman, a professional actor and model. Gene had a lot of fun posing for this cover until his moustache dropped.

tache indicating he lost the original about election time. I tried to pry the truth from him as to why the upper lip was shorn clean, but Gene refused to reply with fingers pressed to our Fickle Finger Finder. To understand why Gene feared the Fickle Finger Finder you only have to put one together. Complete plans are given in this issue, starting on page 39. You'll find the Fickle Finger Finder fantastic for fun or fame!

It's The Greatest! Leafing through page after

page of the latest HI-FI BUYERS' GUIDE here in Big City Editor's office, my hurdle is how to convince my readers that this book is every bit as great as I think it is. I'll begin by saying that this is a magazine with a difference, designed to help you, the buyer, pick the hi-fi components that are right for you. It's packed with test re-



A really good buy—Hi-Fi Buyers' Guide

ports on stereo equipment of all kinds, reports that tell you exactly how each and every piece of equipment chalked up when put through its paces in our lab. To round off fully 35 pages of test reports, this issue offers some first-rate features that are bound to be of interest to everyone who wants their true hi-fi dollar's worth.

You'll find the Fall/Winter 1968 Hi-Fi BUYERS' GUIDE on your newsstand now. Price is \$1.25, but don't look on the outlay as money spent. How come? Simple! The purchase price is peanuts compared to what you can save by using and applying the wealth of information it contains. But that's only my opinion—get a copy of Hi-Fi BUYERS' GUIDE and agree with me!

Hey, Mr. Postman. This is not a letter column, but my regular readers know that I publish letters from time to time for various reasons. Here is a letter on a plea for information.

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I'm a high school student in the senior year and now in the process of building an *automatic picture taking reception station* for the current Nimbus and ESSA series weather satellites. I should be operational this coming fall. This station is not of the commercial variety, but of the type now being built for amateur use; preferably the one designed by K2RNF in 1965. This is the one that can be built for less than \$250.00 as opposed to the commercial type running in the \$35,000 range.

I would like to get in contact with other amateurs
(Continued on page 10)

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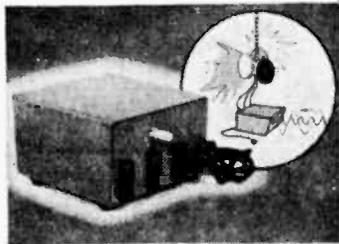
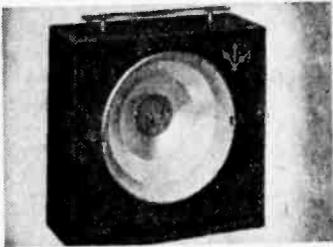
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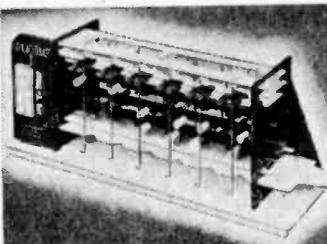
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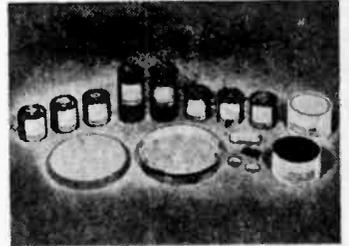
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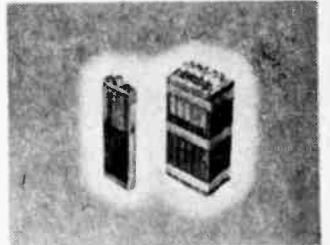
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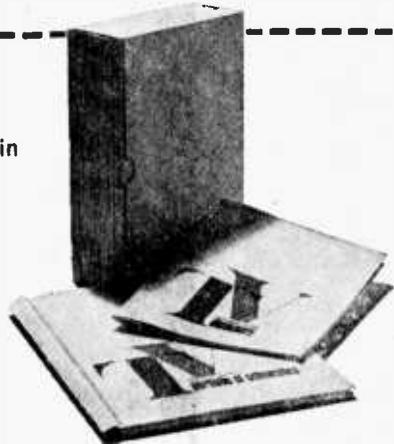
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POSITIVE FEEDBACK★★

This possibility has come to light as a result of new radar measurements of the planet made from earth, combined with analysis of the trajectory of the U.S. Mariner 5 spacecraft as it curved around behind Venus two days after the Russian probe's arrival.

The analysis of Mariner's path, affected by Venus' gravitational attraction, revealed the distance to the planet's center of mass, and the last data from the Russian probe, fitted onto the imaginary line between the mass center and Mariner, presumably indicated the surface of the planet. Judging by the distance from the last Russian data to the mass center, the radius of Venus seemed to be 3780 miles: less than half of earth's.

But previous studies, by both U.S. and Soviet researchers, had indicated that the planet's radius was only 3766 miles—somebody was wrong.

Now it seems to have been closed, for the time, in favor of the old.

While Mariner 5 was in the vicinity of Venus, Dr. Von R. Eshleman of Stanford University in Palo Alto, Calif., together with colleagues from Stanford, the University of California's Jet Propulsion Laboratory and the 1000-foot radio telescope at Arecibo, Puerto Rico, used

the giant telescope to bounce radar waves from the surface of Venus. By comparing Arecibo's distance with Mariner's distance from the planet's center of mass, the scientists were able to confirm precisely (and confidently), the earlier, smaller radar estimates of Venus' radius.

According to that calculation, the pressure and temperature data from both spacecraft were wrong, since the figures were assumed to be for altitudes some 14 miles higher than now appears to be the case.

The "new Venus," therefore, has an estimated surface temperature of 800 degrees F. and an atmospheric pressure 100 times greater than that of earth. The original Russian spacecraft data indicated a cooler, but still uncomfortable, 536 degrees, and a somewhat less crushing 22 atmospheres of pressure.

But why the error?

When the instrument package was released, its altimeter indicated that it was about 14 miles above the surface. However, says Dr. Eshleman, some kinds of altimeters give the same signal at multiples of a given height. If the spacecraft was really 28 miles up when it dropped its instrument package, the mystery is solved. All the data fit consistently together if that one, simple correction is made. ■

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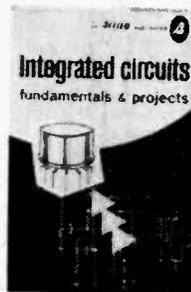
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More on ICs. With all the amazing developments in electronics, few rival the introduction of the *integrated circuit* (IC) which may have the greatest influence on the design and application of electronics products and systems. *Integrated Circuits—Fundamentals and Projects* by Rufus P. Turner, Ph.D., of California State College at Los Angeles, covers in non-technical language the historic-technical development of the IC, its general features, types and applications.

The reader will learn how this device made of semiconductor material can contain, in an area as small as 1/20 of a square inch, a complete electronics circuit consisting of scores of transistors, diodes, capacitors and transistors,



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permanently connected and virtually indestructible.

Experimenters will be guided in the use of the device in inexpensive building projects. The book provides details on assembling a simple audio preamplifier, high gain preamplifier, quarter-watt audio amplifier, crystal oscillator/frequency standard, AF/RF signal tracer and DC Voltmeter. Published and sold by Allied Radio Corporation, 100 N. Western Ave., Chicago, Ill. 60680.

Got a Sick Peacock? Here's looking at *Practical Color TV Servicing* by Robert L. Goodman—a brand-new book designed to provide readers with the benefit of an expert troubleshooter's many years of practical experience, this comprehensive guide includes several dozen case-history analyses of color TV problems. In detailing ways to track down virtually any problem, the author discusses circuits for a

variety of makes and models, including new portables and solid state receivers only recently introduced! The book details new and helpful techniques for using everyday test instruments



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to greater advantage, in addition to many simplified methods of applying advanced troubleshooting procedures with more sophisticated instruments.

A special color photo section is included—with dozens of full-color illustrations—to show clearly what the author is talking about in his discussions on troubleshooting, alignment, convergence adjustments, etc. Each chapter is profusely illustrated (over 230 in all) to further explain the troubleshooting techniques involved. Get your copy direct from Tab Books, Blue Ridge Summit, Pa. 17214 today!

School Days! International Correspondence Schools has developed the first, low-priced, accelerated program of independent study to teach all practical aspects of color and black-and-white TV repair. Called *TV Servicing/Repair*, the course differs from other standard ICS courses in this field by dispensing with electronic theory not necessary for a comprehensive repair knowledge.

TV Servicing/Repair consists of six hard-cover volumes (936 pages) written by electronics consultant Forest H. Belt, and takes a reader from tube-changing to bench servicing of virtually all TV set disorders—portable and console, tube and transistor, black-and-white and color. Each volume is indexed and profusely illustrated with line drawings, schematics and close-up photographs—many in full color. Each chapter concludes with a *Check Your Learning* section with answers included, by which a reader can test his grasp of subject matter just presented. At the end of the course is a comprehensive examination, which is mailed to ICS for correction. A diploma is awarded for successful completion. The course is priced at \$99.

A specially prepared dictionary of TV terms and supplementary theoretical information, carefully keyed to text material, is included

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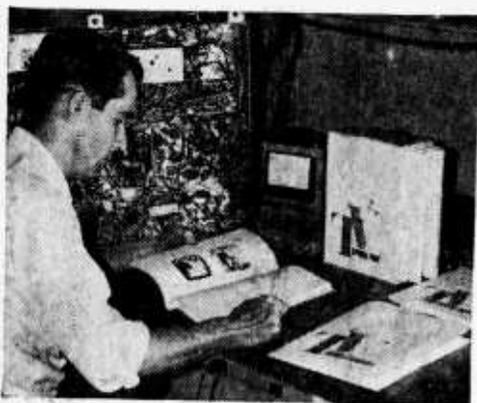
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with the course. A portfolio of schematics of major manufacturer's most popular TV models also is made available.



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Another feature of *TV Servicing/Repair* is that enrollees automatically become members of the ICS TV Servicing/Repair Association. This entitles them to purchase TV components at trade rates from many supply houses. Association members also receive a periodic newsletter on subjects of interest to the servicing trade. And annually, ICS will offer schematics on new TV models at special member rates.

ICS regards the program as broad enough to profit the fix-it-yourselfer, interested only in chopping his own set's servicing expenses. At the same time, it is deep enough to give a solid background and practical A-to-Z "how to" for the man interested in a career in TV servicing and repair.

 **R/C Is Still Here.** You can now get the second edition of *Radio-Control Manual—Systems, Circuits, Construction* by Edward L. Safford, Jr. It's completely updated and revised, with 70% new material. This long-time favorite contains something of value for everyone with an interest in radio-control systems. While basically oriented for radio-controlled model hobbyists, much of the information and many of the cir-



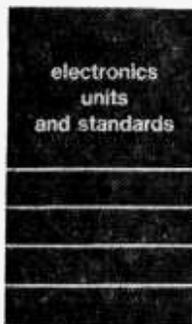
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cuits can be applied to practical applications such as garage-door openers, low-power communications devices (such as Citizens Band radio), amateur radio uses, or to any type of radio-control operation. Complete data is supplied on transmitters and receivers, encoder and decoder circuits, servomotors, etc. For the model builder, complete plans are included for constructing from super-simple to super-sophisticated radio-control systems—from scratch or from readily-available kits. One system is even designed to control a model airplane indoors! Contains complete information on circuits you can build, and assemblies you can buy, including sources.

The book explains all currently-used radio-control systems, including the digital type so popular among multichannel fans. Also included is a complete set of plans for the *Digi-mite* system. The book can and has served as a text for courses in radio control, and contains construction ideas that make fine laboratory-learning experiments.

You can get your copy of this valuable R/C text direct from the publisher—Tab Books, Blue Ridge Summit, Pa. 17214.

 **First Comes the Ground Floor.** Before anyone can really understand electronics, he must understand the terms *volt, ohm, ampere*, etc.; the standards used to establish them; and how they are derived from the standards. *Understanding Electronics Units and Standards*, by Earl J. Waters, provides a basic, simple discussion of these units and their standards.



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To provide a sound basis upon which to develop the primary standard of measurement, the book also gives the reader the fundamentals of atomic structure, electrostatic charge of the electron, and electron movement about the atom. Questions at the end of each chapter reinforce the reader's understanding of this basic subject.

Copies are available from electronics parts distributors and bookstores throughout the coun-

try, or from the publisher, Howard W. Sams & Co., Inc., 4300 W. 62nd St., Indianapolis, Ind. 46268. ■

Throw 'em a Curve. Formerly engineers and technicians had to search through any number of sources to find needed facts on waveform measurements. This widely scattered information is now gathered together and organized in Rufus P. Turner's *Waveform Measurements*.



Soft cover
86 pages
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This book is the first single source to provide complete instructions for measuring the common waveforms. From troubleshooting to signal synthesis, its how-to approach will prove invaluable to electronics personnel who must have practical data on hand in their day-to-day operations. Equal attention is given to the instrument measurement of frequency components which determine the particular shape of a wave as well as those which influence circuit behavior. Step-by-step "cookbook" procedures show proper use of various instruments, including the oscilloscope, wave analyzer, distortion meter, and recorder.

Free of superfluous theory, fully illustrated, the book offers enough background for a working knowledge of electrical waves and harmonics. A special section shows how to check total distortion in modulated and unmodulated waves. In addition, practical methods of measuring modulated waves are set forth.

Rufus P. Turner is currently on the faculty of California State College at Los Angeles. For your copy visit your local bookshop, electronics parts dealer or contact the publisher directly—Hayden Book Co., 116 W. 14th St., New York, N.Y. 10011. Tell 'em the 'ol Bookworm sent you. ■

● *Ultra High Frequency Propagation*, by Henry R. Reed & Carl M. Russell. Chapman & Hall Ltd. Distributed by Barnes & Noble, 105 5th Ave., New York, N.Y. 10003. Paper, \$5.00. 562 pp., 2nd edition.

Presents current information on UHF radio wave propagation, and includes a review of all other related system parameters. ■

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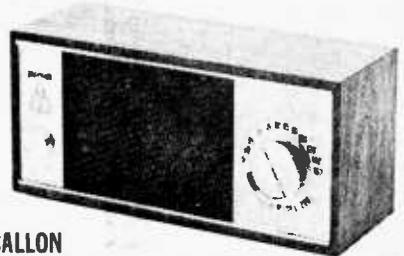
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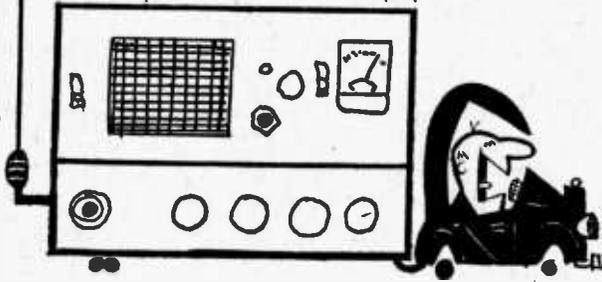
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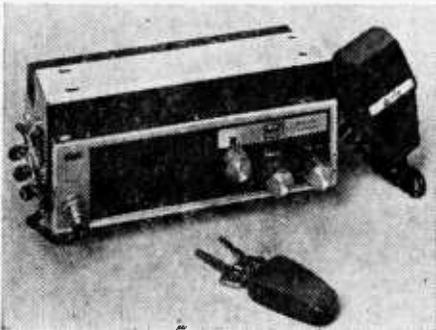
■ **Arvin a Good Time.** Those of you out there in CB-land who are ancient enough to remember Blue Baron (no Fred, he wasn't a German Flying ace) will be familiar with the name *Arvin*. There wasn't a kitchen in this nation which didn't have a little radio bearing this trade name. In fact, *Arvin* broadcast radios have been familiar sights (and sounds) right through the years. Now *Arvin's* name should be a popular one with the CB crowd.

Arvin—you guessed, didn't you—just announced a new CB rig; in fact; three of 'em! For starters they have the Model 20Y55-19. Despite the rather un-exotic name for the set, it's got more goodies than Carter has liver pills



Arvin Model 20Y33-19 Mobile Transceiver

brother, the 20Y19—the 1955Y—the Y55-20—(oh, forget it!)—the set also permits 9 channel operation. Main difference is the size, and the



Arvin Model 20Y55-19 Base or Mobile Transceiver

(oops, there we go showing our age again!). The base/mobile rig can operate on any 9 CB channels via its 21-transistor circuitry and it offers really slick-as-a-slippery-sardine styling. It's a teeny-weeny thing which measures about 9 in. across, 3 in. high, and 6 in. deep; very unobtrusive. The 20Y55-19 (they really must do something about that name) sells for \$114.95.

In an even tinier package, *Arvin* presents its 20Y33-19, which is only 6 in. wide, 2 1/4 in. high, and less than 7 in. deep. Like its larger



Arvin Model 10Y33-19 Portable Transceiver

fact that the smaller set operates only from a 12-volt power source. It's a low \$89.95.

For portable use, Arvin sends along their 10Y33-19 (you know, these are the only sets you've got to order with an area code) hand held unit. It's an 11-transistor rig which runs 100 milliwatts for license-free Part 15 operation. The unit is \$29Y-95 (now they've even got me doing it).

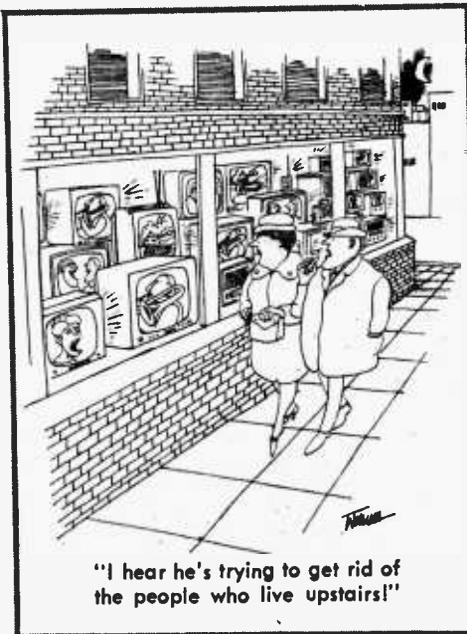
More details on these neat lookers can be obtained by contacting Arvin Industries, Inc., 1531 13th St., Columbus, Indiana 47201.

High Camp Antenna. Getting ready for that trip you didn't get around to taking last summer? Well this coming summer you've got to plan on it definitely because you have no excuses about not having CB in your pick-up truck camper. Yup, Antenna Specialists says that their new M-189 camper antenna is based upon their now-famous "Maggie Mobile" concept which is so widely used by police mobile units.

The antenna has a precision wound loading coil at the base which will give an excellent match to any rig, and it's got a hard-as-nails ruggedized mounting bracket which won't have a nervous breakdown when you smash your camper's roof into a low hanging branch. The whole she-bang mounts exter-



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Now all Dremel Moto-Tools belt out twice the torque of previous models! They're virtually stall-proof, even when you're really bearing down. Compact — lightweight — and now super-powered for grinding, drilling, polishing, carving, deburring, and sanding. Shock-proof Lexan housing. See your dealer for a demonstration.

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CB RIGS & RIGMAROLE

nally on the camper so you won't have to mess up the decor inside.

You can get additional information from *Antenna Specialists*, 12435 Euclid Ave., Cleveland, Ohio 44106.

Testy CB Rig? An extended range antenna noise bridge is now ready, willing, and able to aid you in checking-out an antenna installation.



Omega-T Systems Extended Range Antenna Noise Bridge

Made by *Omega-T Systems*, the Model TE7-02 is useful over a broad range of frequencies in measuring the resonant frequency of an antenna, measuring the input impedance of RF amplifiers and other networks.

If you're a-mind to perking up a pooped-out CB installation you'll find many uses for this thing. It comes with detailed instructions.

Price is \$34.95 (a small price to pay for the salvation of a CB station) from *Omega-T Systems*, 516 West Belt Line Rd., Richardson, Tex. 75080. ■

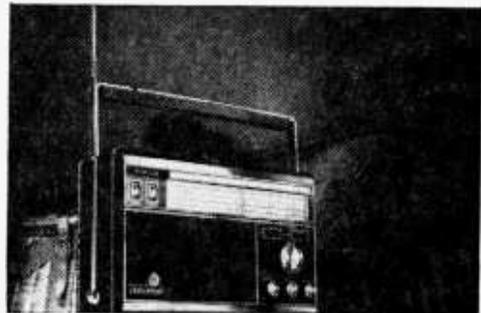


NEW PRODUCTS

HIGH-FIDELITY AMATEUR RADIO SHORT WAVE RECORDERS GIMMICKS GADGETS TOOLS ETC.

5 Bands for You Sporting Types

Here are two new portable radios designed specially for boat owners, hunters, pilots, fishermen, or any other kind of shortwave enthusiast, from The Hallicrafters Company. The CR-44 Ranger covers 30 bands and provides AM reception of standard broadcast stations on 540-1600 kHz; full fidelity FM in the 88-108 MHz band; and sensitive reception of F.A.A. and Canadian weather-navigation stations, marine/aviation radio beacons on the 185-400 kHz long wave range; marine weather station, amateurs and other services in the 2.0-5.2 MHz range, and police, fire, civil defense, U.S. Weather Bureau, and the like in the 152-174 MHz range. The CR-50 Sea-Air, on the other hand, covers 38 bands. With the Sea-Air, the Ranger's FM-entertainment and 152-174 MHz VHF ranges are replaced with an extended shortwave range from 5.2-15.5 MHz and the 108-135 MHz VHF aircraft range, where planes in flight, control



Hallicrafters CR-50 Sea-Air Portable Radio

towers, radar approaches, navigational beacons and all other VHF aircraft services can be heard. Either portable can be used as a primary navigational aid on small boats; their direction finders can tune sharp "nulls" of known stations, permitting cross bearings for position FIX or homing direction. The Ranger sells for \$119.95; the Sea-Air for \$99.95. For more info write to The Hallicrafters Co., 600 Hicks Rd., Rolling Meadows, Ill. 60008.

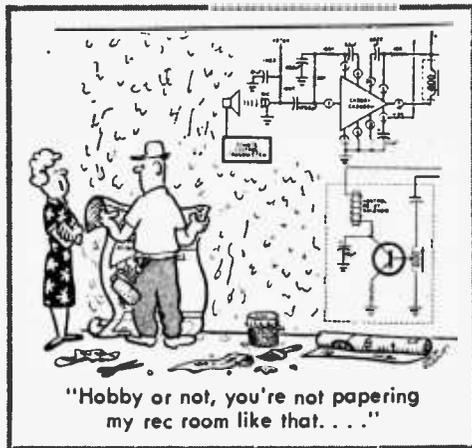
8-Track Cartridge Recorder

Kinematic' new model 1000 has several features not previously available in an 8-track record/playback machine. Viz: the new Nor-tronics head which records and plays back utiliz-



Kinematic Model 1000 Cartridge Recorder

ing a single Z-axis head. With this head the audio and bias signals are automatically combined. The 1000 will play and record both stereo and mono automatically. The unit shuts itself off after the fourth stereo channel or eighth monaural channel. On monaural you can put almost 200 minutes of program material on a standard 90-minute 8-track cartridge. This is the equivalent of 100 sides at 45 rpm. It's ideal for logging radio stations, keeping track of telephone conversations, or what have you. The 1000 has separate VU meters for playback as well as separate inputs for tuners, magnetic



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- 3 2N3563 TRANSISTORS, npn, 600mc, 100hfe, epoxy \$1
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- 65 HALF WATTERS, to 1 meg, 5% popular values too \$1
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- 40 "MICRO" CONDENSERS, for transistor circuitry \$1
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NEW PRODUCTS

phono cartridges, and microphones. The deck is designed to play through any home entertainment system which has audio input channels. It measures $12 \times 4\frac{1}{2} \times 9\frac{1}{4}$ -in. and the list price is \$299.95. For more dope write to Kinematix, Inc., 2040 Washington Blvd., Chicago, Ill. 60612.

Checkin' Out Those Transistors

Now here we have an in-circuit transistor checker kit for only \$24.95. This new Heathkit instrument, the IT-18, measures DC Beta in or out of circuit in two ranges from 2 to 1000. It

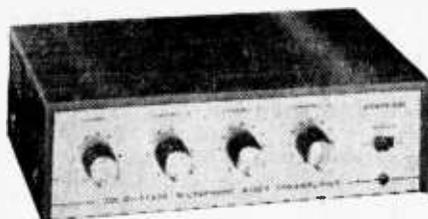


Heathkit IT-18 In-Circuit Transistor Checker Kit

also tests diodes in or out of circuit for forward and reverse current to indicate opens or shorts. It provides positive identification of *pnp* or *npn* devices and anode or cathode of unmarked diodes, and matches transistors of same or opposite type. It cannot damage either circuit of device even if connected improperly. The IT-18 has a big $4\frac{1}{2}$ -in. 200 μ A meter; 10-turn calibrate control and complete portability (power supplied by a single "D" cell). There's a front panel socket for lower powered devices, and it's supplied with 3-ft. test leads and a rugged polypropylene case. For more info write the Heath Co., Benton Harbor, Mich. 49022.

For the Hard Rock Aficionado

This low-silhouette unit, the 44-485, is a solid-state microphone mixer/preamplifier, designed to amplify guitars and other electronic instruments (souped-up sitar?). It's also useful, of course, for stereo tape recording, and up to three units may be paralleled to provide a total of 12 inputs, each with its own volume control. The 44-485 operates from a 117-V, 50-60Hz AC power source with a power drain of 1.2 watts. The output is 6 volts rms at 2% distortion; out-

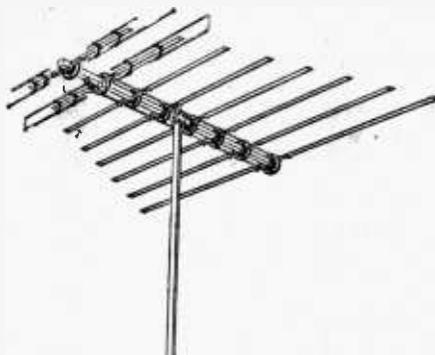


AMD Electronics Model 44-485 Mixer

put impedance 2200 ohms. Frequency response is 50 to 20,000 Hz \pm 2 dB, and the size is $5 \times 2\frac{1}{2} \times 9$ in. The price of the unit is \$29.95 and if you want to know more about it, write Claricon Products, AMD Electronics, 663 Dowd Ave., Elizabeth, N. J. 07201.

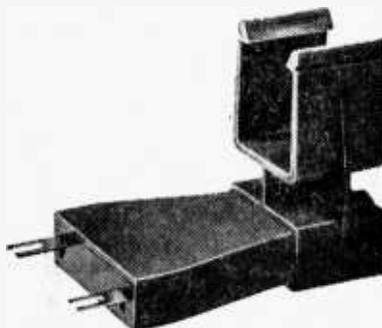
Convertible TV Antenna

A series of new 300-ohm rooftop television antennas that can be readily converted for use with 75-ohm Coloraxial downleads for superior



Jerrold Paralog 300 Plus Antenna

color reception has been brought out by Jerrold. The new VIP series can be converted by means of a new snap-on transformer (Model STO-83), available separately. The VHF-FM antennas have a flat response of \pm 1 dB per channel, a twist-resistant square boom, high-strength Cyclo-lac insulators, vibration-proof point-contact ele-



Jerrold STO-83 Snap-On Transformer

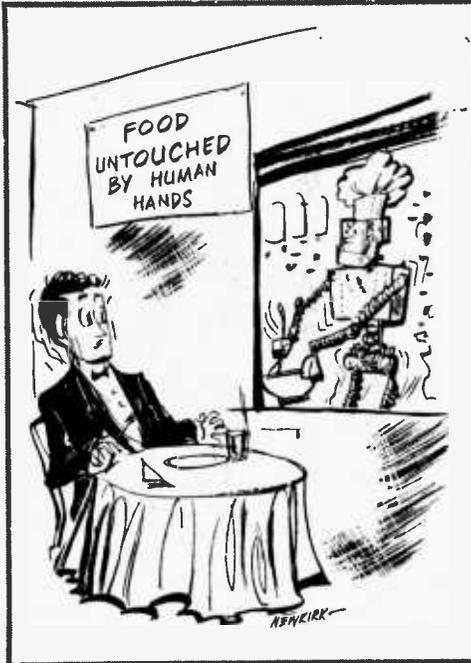
ment locks, and Golden Armor coating. The impedance-matching transformer can be snapped over the boom of the antenna where it can be pushed into contact with two 300-ohm terminals. No special connector is needed for coaxial cable. The STO-83 transformer sells for \$2.39. The VIP series 301 through 307, for metropolitan to deep fringe areas, have list prices ranging from \$16.95 to \$79.95. More information can be had from Distributor Sales Div., Jerrold Electronics Corp., Box A, Philadelphia, Pa. 19105.

Kits for Kids

A new line of educational radio kits designed to be built by individuals ages 12 and older has recently been introduced by Graymark Enterprises. There are two kits: model 2001 Comanche Transistor Radio retails for \$19.95; model 202 Scallon Table Radio sells for \$21.95. Each kit is complete in every detail, all necessary parts and fittings included, no extras to purchase. With the



Graymark Enterprises Model 2002 Radio Kit



RADIATION DETECTOR

AN/PDR-27 RADIAC SET



A portable, water-tight, battery operated radiation detector and indicator. It is capable of detecting and measuring Beta and Gamma radiations together—or Gamma radiation alone. The test unit can be carried by hand or by the shoulder strap. The Probe is attached to the main unit by a coiled cord. Visual indication is provided by the radiac meter, aural indication is provided by the headphones. Battery voltage required: 1.35 VDC & 1.5 VDC. Also 22.5 —DCV. With Tubes: 3/502AX, 1/3V4, 2 GM tubes BS-1 & 2. Headset and Manual contained in metal carrying case: 9 1/2 x 15 x 10 1/2". Wt.: 28 lbs. Prices: Used—Not Checked \$19.95

Used—Checked \$29.95

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COMING IN NOVEMBER

If you enjoy making furniture you'll find a special treat waiting for you at most of the newsstands on Nov. 7. That's the day **WOOD PROJECTS 1969** edition goes on sale.

WOOD PROJECTS 1969 will cost only 75¢ at newsstands or \$1 per copy, postpaid, from Science & Mechanics Publishing Co., 229 Park Avenue South, New York, N. Y. 10003. Better reserve **YOUR** copy **NOW**.

NEW PRODUCTS

kit comes a step-by-step instructional manual, with convenient testing procedures at various stages. For further details, write for an illustrated brochure to Grayback Enterprises, Inc., Box 54343, Terminal Annex, Los Angeles, Calif. 90054.

Here We Go 'Round the TV-FM

Cornell-Dubilier announces somethin' new in TV/FM antenna rotor design. The AR33 Autorotor has fully automatic pushbutton control, with $\pm 1^\circ$ position accuracy. It uses the heavy-

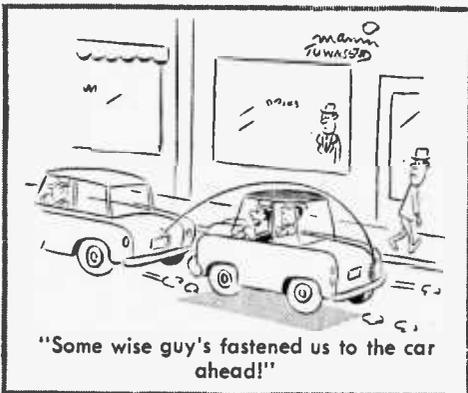


Cornell-Dubilier AR33 Autorotor Antenna Rotor

duty Bell rotor, with design origin stemming from the famous HAM-M amateur rotor. The Autorotor has completely silent operation, solid state circuitry, 360° compass dial operation, and contemporary styling by Raymond Loewy. Price is \$79.95, and descriptive literature is free on request from Cornell-Dubilier Electronics, 50 Paris St., Newark, N. J. 07101.

Electronic Sky Watch

A new outdoor lantern conversion kit, designed primarily for post lanterns and incorporating a photocell switch that controls the lantern automatically, has been introduced by General Electric's Large Lamp Department. Named "Skywatch," the conversion kit combines the photocell adapter with a new distinctively



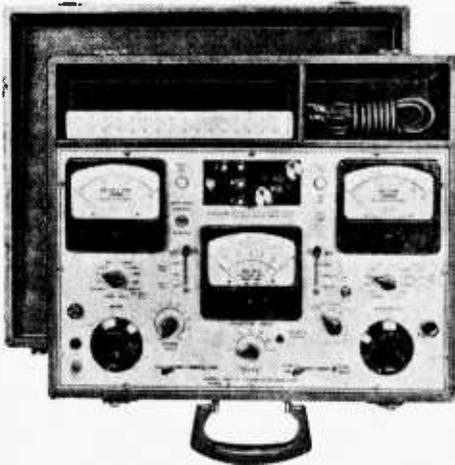
General Electric Skywatch Outdoor Lighting Unit

shaped Tuff-Skin coated Flair Postlight bulb, allowing homeowners to turn the postlight on once and forget it. The bulb is inserted into the Skywatch adapter, and then the entire unit is installed into any standard socket used in post lanterns or other outdoor fixtures. After insertion of the Skywatch unit, the photocell control automatically turns the postlamp or other outdoor fixture on at dusk and off at daybreak by reacting to light and darkness rather than the time of day. The Skywatch unit is completely weather-proof and is designed to fit all standard sockets. No additional wiring is needed for the spring-loaded center contact device, and the light sensitive photocell eye can be positioned in any desired direction. Equipped with a time delay, the unit is unaffected by extraneous light sources such as automobile headlights, lightning etc. A specially designed telescopic tube adjusts to fit flush against the inside of the post lantern glass to guard against intermittent operation due to reflection. The unit exceeds Underwriter's Laboratory standards for up to 150-watts in enclosed fixtures, and is guaranteed for 3 years from date of purchase with full replacement of defective units when returned to the supplier. Currently available in all general merchandise stores, The General Electric Skywatch Flair Postlight outdoor lighting unit is offered only as a complete kit with a suggested retail price of \$10.98.

Looking Inside Solid State

A new and improved all-solid-state transistor analyzer that is described as the ultimate in semiconductor analysis, provides a true small-signal AC Beta test, continuous instrument

monitoring, sets up easily and quickly, has three independent power supplies and large 4½" meters, makes H parameter, high current, high voltage, AC and DC Beta measurements, reads leakage current in the nanoampere region, tests



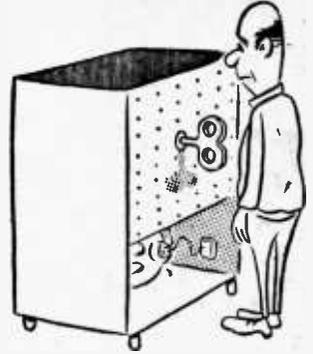
Triplett Model 3490-A Transistor Analyzer

both small-signal and power transistors, diodes, rectifiers, zener diodes, SCR's and the latest FET's in the collector current range of 100µa to 30 amperes, has been introduced by The Triplett Electrical Instrument Company, Bluffton, Ohio. The portable Model 3490-A, Type 2 provides the operator with maximum capability and flexibility for plotting complete transistor characteristic curves, taking single readings plus setting up any type of transistor test. It is ideally designed for use in electronic laboratories, re-



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NEW PRODUCTS

search and development departments, quality control sampling, evaluation engineering and technical training schools. A new 30-page instruction manual enclosed with the unit also lets the operator set up his test easily and quickly, step-by-step. User net price is \$441. It would be impossible to talk about all the specifications for this unit without using up the space allotted for this column. So get all the facts by writing direct to The Triplett Electrical Instrument Co., Bluffton, Ohio 45817.

Machine and Mikes

Recognizing the need for modern, high quality tape recorders to be used with microphones of matching performance levels, Telex's Viking Tape Recorder Division, Minneapolis, and Electro-Voice, Inc. Buchanan, Michigan, are working together in a unique type of marketing program. Each purchaser of a new Viking 433W stereo tape recorder at \$389.95, manufacturer's suggested list, will receive free of extra charge a pair of Electro-Voice 631 dynamic omnidirectional microphones. The microphones, packed in an attractive and convenient carrying case, have phone plug connectors on the cables for immediate connection to the recorder. List price value of the microphones is \$126.00. The



*Viking Model 433 Tape Recorder
with Electro-Voice Microphones*

fine performance available from today's superb tape machines is severely limited, practically speaking, unless the user has quality microphones to record with. Inexpensive microphones usually furnished with recorders simply will not take advantage of the quality inherently built into a well designed tape machine. This promotion should not only have immediate effects on sales by creating attention, but in the long run increase the overall market for tape products by simplifying the user's purchase and allowing him to make substantially better quality recordings at a reduced overall price.

The Viking 433W is a 4-track stereo machine with three motors, three heads, three speeds, and monitor controls. It may be used for sound on

sound and echo. E-V Model 631 microphones are rugged and reliable dynamic models for hand-held or stand use. A four-stage internal blast filter allows use close-up with no pops or distortion. The units have a unique silent magnetic on/off switch with a snap-off actuator which when removed leaves the mike in fail-safe "on" with no openings or gaps to degrade response. Want more info? Then write to Electro-Voice/Viking, Buchanan, Mich. 49107 for all the facts.

Packed Full of Components

Here's a brand new kit, an all solid-state FM stereo compact, called the "Component Compact." Designed to give "big system" sound in the small space of a stereo compact the Heathkit AD-27 Component Compact uses proven stereo components. The receiver is the highly praised Heathkit AR-14, modified only mechanically to fit the cabinet. And the automatic 4-speed turntable is the precision-crafted British BSR McDonald 500, with a Shure diamond stylus cartridge. The amplifier portion features 15 watts per channel music power output, all



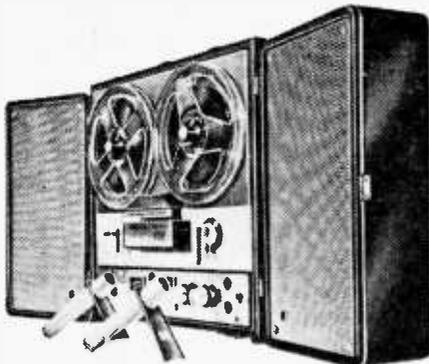
Heathkit Model AD-27 Stereo Compact



solid-state circuitry, frequency response of ± 1 dB, 12-60,000 Hz, 45 dB channel separation, harmonic & IM distortion of less than 1%, 4 to 16 ohm output impedance, tape output, and a front panel headphone jack with a speaker defeat switch for private listening. The FM stereo portion has 4 IF stages, 5 μ V sensitivity, -45 dB hum and noise, less than 1% distortion, smooth inertia flywheel tuning, adjustable phase control for optimum channel separation, stereo indicator light, 20 dB channel separation and filtered outputs. The AD-27 is sold without speakers to allow the complete versatility necessary for outstanding performance in any situation (Heath recommends their AS-10, AS-16 and AS-37 speaker systems). The Heathkit AD-27 Component Compact sells for \$169.95 mail order. For complete ordering information and specifications write to Heath Company, Benton Harbor, Michigan, 49022.

Always Make Them Better

Take your best solid state tape recorder, improve it with the latest OTL (output-transformer-less) circuitry, without boosting the price, and you have a potential winner . . . so hopes Radio Shack, Boston-based nationwide hi-fi/electronics retail chain. Radio Shack has just introduced their re-designed Realistic-909 portable recorder; it plays and records 4-track stereo



Radio Shack Model 909 Tape Recorder

and monaural tapes, makes "sound-with-sound" recordings, and tapes FM-multiplex stereocasts, all with improved sound and longer life thanks to new-for-'69 OTL circuitry. Still priced like its predecessor at \$159.95, the new model 909 offers many of the conveniences and operating features of costlier tape recorders: a die-cast mode selector, digital tape counter, three speeds without capstan change, two VU meters, an up-front stereo headphone jack and illuminated record pushbuttons. Its two wing speakers separate for optimum stereophonic effect. The new recorder is being offered under the company's proprietary Realistic brand in all 300 Radio Shack stores. It comes complete with two dy-



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NEW PRODUCTS

dynamic microphones, mike stands, two patch cords and a seven-inch take-up reel. Want more facts? Then write to Radio Shack, 730 Commonwealth Ave., Boston, Mass. 02215.

How to Drown out the Instruments

For all you vocalists who're tired of having your sonic time beaten by amplified guitars, drums, organs, sitars, and all like that, Atlas Sound has produced the Banshee. It's a cobra-

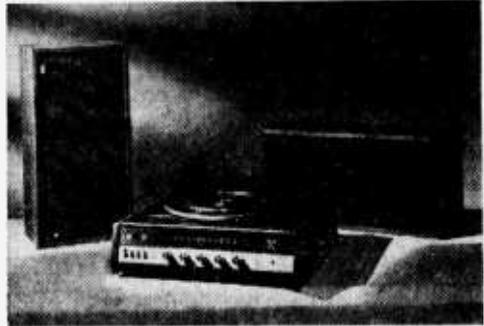


Atlas Sound Banshee Horn

flare horn, and it will spray out the vocals with 125 watts of peak power. Frequency response of the Banshee is 100 to 12,000 Hz, and the sound intensity is claimed to be 131 dB! Man, that should drive your ear drums to the center of your head. Impedance is 16 ohms. Banshee has a built-in pre-wired phone jack; you just insert a speaker cable with a two-conductor phone plug and everybody can really dig those crazy lyrics. Atlas recommends a speaker stand to elevate the sound above the crowd. It's best to keep the audience below the sonic boom. Atlas has two models, the SS-4 for \$25, the SS-2 for \$48. The Banshee is \$121.00, and for more poop, write Atlas Sound, Parsippany, N. J. 07054.

For the Two-Music-Center Family

Fisher has come out with a moderate-priced pair of compact home music systems; the Fisher 120, an FM-stereo phono system that sells for \$299.95, and the Fisher 125, a complementary system that includes an AM tuner section as well as FM-stereo, which sells for \$329.95. Their newly-designed FM front ends and IF amplifier sections incorporate FETs (field effect transistors) and ICs (integrated circuits). Baxandall feedback circuits are used in the bass and treble controls. A main/remote speaker switch, loudness contour and full tape and phono facilities are also included. Atop the receiver is a 4-speed automatic turntable with cue control, anti-skating, balanced tone arm and magnetic car-

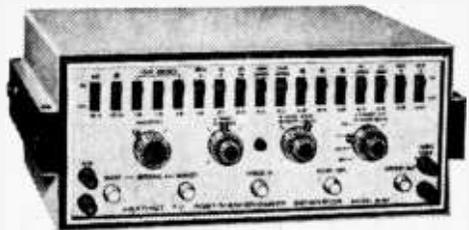


Fisher 120 FM-Stereo Phonograph Music Center

tridge, and automatic shut-off. A pair of Fisher XP-55B speaker systems, which retail separately for \$49.95 each, are included with each 120 and 125 package. The speaker systems feature an 8-in. free-piston bass speaker with heavy magnet structure and a 3-in. wide-range treble speaker. Anything else you'd like to know? Write Fisher Radio Corp., 11-40 45th Rd., Long Island City, N. Y. 11101.

Cover Six Bases at a Glance

The Heath Co. has put on the market the Heathkit IG-57 post marker/generator at \$135.00. The IG-57 will display as many as six markers at a time, obsoleting the old time-consuming variable marker system. Markers are provided for color bandpass alignment; picture and sound carrier frequencies for channels 4 and 10; FM tuner, FM IF and discriminator alignment; and TV sound IF adjustments. 400 Hz modulation is built in for trap adjustment and



Heathkit Model IG-57 TV Post Marker/Generator

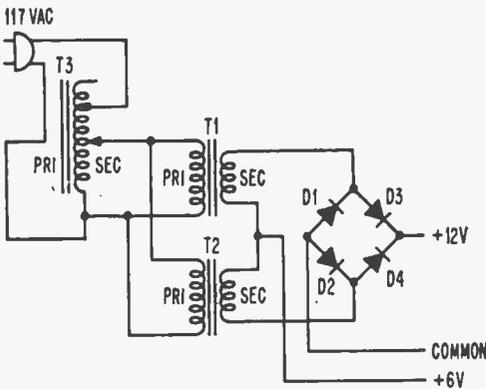
checking and adjusting FM tuners. A variable voltage supply is provided for use as a source of positive or negative bias. The sweep generator portion has 5 linear sweep ranges, covering the sweep necessary for TV tuned circuits in sound IF, color bandpass, video IF circuits and for proper overall RF/IF response. The IG-57 also has a trace reversing switch, a blanking switch and a phase control so the markers will appear as in the set manufacturer's alignment instructions, regardless of the scope used. For literature on the IG-57, write to the Heath Co., Benton Harbor, Mich. 49022. ■



Hot Line!

Could you give me a diagram for a combination 6- and 12-volt, 12-amp battery charger to work off a 117 VAC line?

—A. K., Calumet, Mich.



Try this circuit. Transformers T1 and T2 are 20-A, 6.3-volt filament transformers and T3 is a variable autotransformer such as a Variac, Ohmite, or one sold by Allied Radio under its own brand name. Make sure the diodes are hefty enough to handle the current. The charging rate is controlled with T3. Additional filtering can be added if you ever decide to use this baby as a power supply.

Shrinking Power

When are integrated circuits for audio power amplifiers going to be available at low cost?

—R. F. P., Norwalk, Conn.

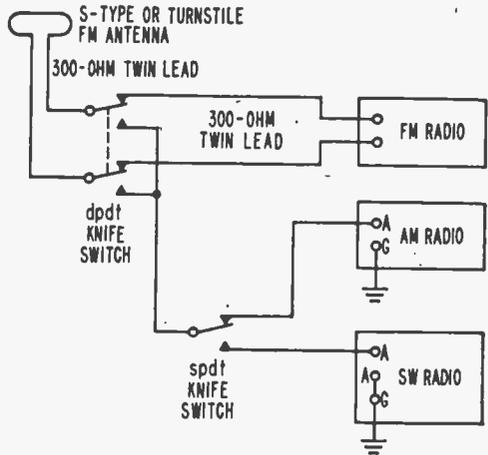
They're available now. The GE PA234 puts out 1 watt with a 600-millivolt input and its frequency response covers a range of 30 Hz to 100 kHz! The input voltage can be anywhere

between 9 and 25 volts, and the device is a fraction of the size of a speaker. Price in large quantities is less than a buck; more at a parts store if you're buying only one. The whole amplifier costs less than a tube used in the output stage of a conventional amplifier. What more do you want?

Long Wires

How high and long should an AM radio antenna be constructed? I have an old radio set and can get a large pole for the body, but how high should it be? Also, how high and long should a shortwave antenna be? Can an FM antenna be used for either shortwave or AM reception?

—R. K., Nanaimo, B.C.



Your antenna should be as high as possible and about 100 ft long for AM if there are no stations nearby. You can use the same antenna for shortwave, but don't try an FM antenna. However, you can use an FM antenna for FM, AM, and SW if it's wired as shown. When using the antenna system for AM or SW, the transmission line (twin lead) functions as a vertical antenna.

Buzz Bomb

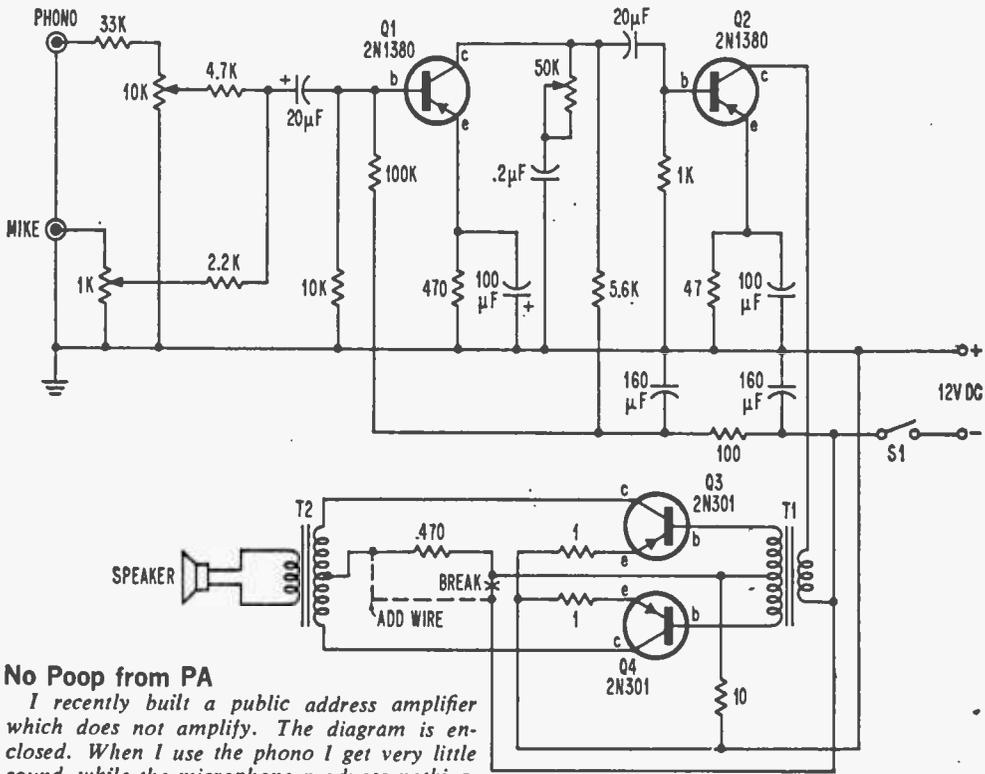
When I turn the volume all the way down on my Panasonic radio hum can be heard. What is the matter and how can it be fixed?

—J. S., N.Y., N.Y.

Offhand it sounds like a defective volume control. But, without knowing the model number, we can only guess. Why don't you try the Panasonic Service Center in New York City?

The longer the Wave . . .

I have a Grundig 500 transistor portable radio. How can I connect an outside antenna to the radio to receive long-wave transmissions? The range of the long-wave band is 150-260 kHz. What kind of antenna can I use? My



No Poop from PA

I recently built a public address amplifier which does not amplify. The diagram is enclosed. When I use the phono I get very little sound, while the microphone produces nothing. What's wrong?

—R. H., Snyderstown, Pa.

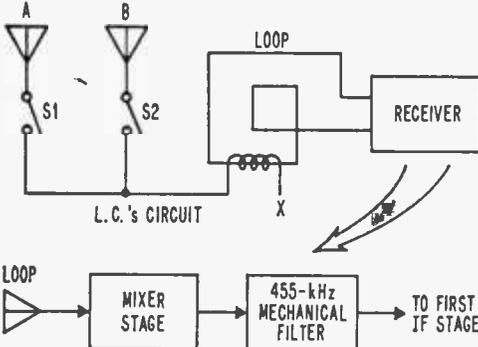
The 470-ohm resistor connected to the center tap of the primary of the output transformer is incorrectly wired. Rewire the circuit as per the dotted line and you're in business.

Whip and Peak

I have an antenna hook-up for BCB DX as shown. Antenna A is a whip; antenna B is homebrew. Whenever I connect these antennas, selectivity is decreased, but volume is increased. How can I improve selectivity without using a bandspread in the receiver?

—L. C., Auburndale, Mass.

Connect point X to ground. Add a 455-kHz



mechanical filter ahead of the IF stage as shown in the block diagram. Wiring instructions should come with the filter. You can probably get one from Lafayette Radio, 111 Jericho Tpke., Syosset, N.Y. 11791. But don't expect too much from such a patchwork setup.

Down the Slopes

I would like to know if it's possible to convert a communications receiver from AM to AM and FM?

—J. M., Taunton, Mass.

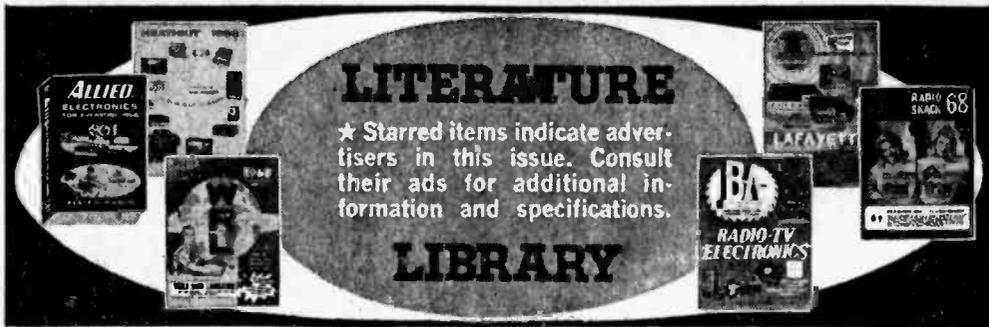
It isn't necessary to convert the receiver to hear ham and land-mobile FM stations. Tune them in carefully, just off carrier. Your AM detector will demodulate the FM through slope detection. How about that!

How Big the Beat?

Can you furnish me with a circuit for a 250-300 watt transistor amplifier for an electric guitar. All I need is the driver and output stages, as I have a preamp circuit designed already. I have looked around at various places but have had no luck.

—M. C., Ames, Iowa

What do you want with 250 watts? Radio City Music Hall uses only 85 watts to fill a space equivalent to 1800 living rooms. Just get
(Continued on page 34)



LITERATURE

★ Starred items indicate advertisers in this issue. Consult their ads for additional information and specifications.

LIBRARY

CB—AMATEUR RADIO—SHORTWAVE RADIO

141. Newly-designed CB antenna catalog by *Antenna Specialists* has been sectionalized to facilitate the picking of an antenna or accessory from a handy index system. Man, *Antenna Specialists* makes the pickin' easy.

102. No never mind what brand your CB set is, *Sentry* has the crystal you need. Same goes for ham rigs. Seeing is believing, so get *Sentry's* catalog today. Circle 102.

★130. Bone up on the CB with the latest *Sams* books. Titles range from "ABC's of CB Radio" to "99 Ways to Improve your CB Radio." So Circle 130 and get the facts from *Sams*.

107. Want a deluxe CB base station? Then get the specs on *Tram's* all new Titan II—it's the SSB/AM rig you've been waiting for!

101. If it's a CB product, chances are *International Crystal* has it listed in their colorful catalog. Whether kit or wired, accessory or test gear, this CB-oriented company can be relied on to fill the bill.

96. Get your copy of *E. F. Johnson's* new booklet, "Can *Johnson 2-Way Radio Help Me?*" Aimed for business use, the booklet is useful to everyone.

★129. Boy, oh boy—if you want to read about a flock of CB winners, get your hands on *Lafayette's* new 1969 catalog. *Lafayette* has CB sets for all pocketbooks.

103. *Squires-Sanders* would like you to know about their CB transceivers, the "23'er" and the new "SS." Also, CB accessories that add versatility to their 5-watters.

46. Pick up *Hallcrafters'* new four-page illustrated brochure describing *Hallcrafters'* line of monitor receivers—police, fire, ambulance, emergency, weather, business radio, all yours at the flip of a dial.

★2. Now, get the all-new 512-page, fully illustrated *Lafayette Radio 1969* catalog. Discover the latest in CB gear, test equipment, ham gear, tools, books, hi-fi components and gifts. Do it now!

116. Pep-up your CB rig's performance with *Turner's* M+2 mobile microphone. Get complete spec sheets and data on other *Turner* mikes.

48. *Hy-Gain's* new CB antenna catalog is packed full of useful information and product data that every CBER should know. Get a copy.

111. Get the scoop on *Versa-Tronics'* Versa-Tenna with instant magnetic mounting. Antenna models available for CBERs, hams and mobile units from 27 MHz to 1000 MHz.

45. CBERs—get your copy of *World Radio Labs 1969 CB Catalog* No. 2. You've got to see to believe *WLR's* special CB bonus offers. This is the catalog for big CB buyers.

50. Get your copy of *Amphenol's* "User's Guide to CB Radio"—18 pages packed with CB know-how and chit-chat. Also, *Amphenol* will let you know what's new on their product line.

115. Get the full story on *Polytronics Laboratories'* latest CB entry *Poly-Pup*. Full 5-watts, great for mobile, base or portable use. Works on 12 VDC or 117 VAC.

100. You can get increased CB range and clarity using the "Cobra-23" transceiver with speech compressor—receiver sensitivity is excellent. Catalog sheet will be mailed by *B&K Division of Dynascan Corporation*.

54. A catalog for CBERs, hams and experimenters, with outstanding values. Terrific buys on *Grove Electronics'* antennas, mikes and accessories.

ELECTRONIC PRODUCTS

★42. Here's colorful 108-page catalog containing a wide assortment of electronic kits. You'll find something for any interest, any budget. And *Heath Co.* will happily send you a copy.

★44. Kit builder? Like wired products? *EICO's* 1969 catalog takes care of both breeds of buyers. 32 pages full of hi-fi, test, CB, ham, SWL, automotive and hobby kits and products—do you have a copy?

128. If you can hammer a nail and miss your thumb, you can assemble a *Schober* organ. To prove the point, *Schober* will send you their catalog and a 7-in. disc recording.

126. *Delta Products* new capacitive discharge ignition system in kit form will pep up your car. Designed to cut gas costs and reduce point and plug wear. Get *Delta's* details in full-color literature.

66. Try instant lettering to mark control panels and component parts. *Datak's* booklets and sample show this easy dry transfer method.

109. *Seco* offers a line of specialized and standard test equipment that's ideal for the home experimenter and pro. Get specs and prices today.

ELECTRONIC PARTS

★135. Get with ICs! *RCA's* new integrated Circuit Experimenter's Kit KD2112 is the first of its kind and should be a part of your next project. Get all the facts direct from *RCA*. Circle 135.

140. How cheap is cheap? Well, take a gander at *Cornell Electronics'* latest catalog. It's packed with bargains like 6W4, 12AX7, 5U4, etc., tubes for only 33¢. You've got to see this one to believe it!

132. Discover 18 new and different professional-quality amplifiers, tuners, and preamps completely assembled on PC-boards now offered by *Amper-ex*. Prices will amaze you!

★1. *Allied's* catalog is so widely used as a reference book, that it's regarded as a standard by people in the electronics industry. Don't you have the 1969 *Allied Radio* catalog? The surprising thing is that it's free!

8. Get it now! *John Meshna, Jr.'s* new 46-page catalog is jam packed with surplus buys—surplus radios, new parts, computer parts, etc.

23. No electronics bargain hunter should be caught without the 1969 copy of *Radio Shack's* catalog. Some equipment and kit offers are so low, they look like misprints. Buying is believing.

★5. *Edmund Scientific's* new catalog contains over 4000 products that embrace many interests and fields. It's a 148-page buyers' guide for Science Fair fans.

★106. With 70 million TV and 240 million radios somebody somewhere will need a vacuum tube replacement at the rate of one a second! Get *Universal Tube Co.'s* Troubleshooting Chart and facts on their \$1 flat rate per tube.

★4. *Olson's* catalog is a multi-colored newspaper that's packed with more bargains than a phone book has names. Don't believe us? Get a copy.

★7. Before you build from scratch check the *Fair Radio Sales* latest catalog for electronic gear that can be modified to your needs. *Fair* way to save cash.

★6. Bargains galore, that's what's in store! *Poly-Paks Co.* will send you their latest eight-page flyer listing the latest in available merchandise, including a giant \$1 special sale.

10. *Burstein-Applebee* offers a new giant catalog containing 100s of big pages crammed with savings including hundreds of bargains on hi-fi kits, power tools, tubes, and parts.

11. Now available from *EDI (Electronic Distributors, Inc.)*; a catalog containing hundreds of electronic items. *EDI* will be happy to place you on their mailing list.

120. *Tab's* new electronics parts catalog is now off the press and you're welcome to have a copy. Some of *Tab's* bargains and odd-ball items are unbelievable offers.

TOOLS

★78. Do more jobs with fewer tools. Double duty sets contain midget nut and screwdrivers plus special piggy-back handle that gives midgets the power and reach of standard drivers. *Xcelite's* the name—get their catalog 166.

118. Secure coax cables, speaker wires, phone wires, etc., with Arrow staple gun tackers. 3 models for wires and cables from 3/16" to 1/2" dia. Get fact-full Arrow literature.

TELEVISION

★70. Need a new TV set? Then assemble a Heath TV kit. Heath has all sizes. B&W and color, portable and fixed. Why not build the next TV you watch?

127. National Schools will help you learn all about color TV as you assemble their 25-in. color TV kit. Just one of National's many exciting and rewarding courses.

91. Interesting, helpful brochures describing the TV antenna discovery of the decade—the log periodic antenna for VHF and UHF-TV, and FM-stereo. Get it from JFD Electronics Corporation.

SCHOOLS AND EDUCATIONAL

142. Radio-Television Training of America prepares you for a career—not a job. 16 big kits help you learn as you build. 120 lessons. Get all the facts today!

★74. Get two free books—"How to Get a Commercial FCC License" and "How to Succeed in Electronics"—from Cleveland Institute of Electronics. Begin your future today!

★136. "Power Engineering," a new 32-page, illustrated brochure by ICS (International Correspondence Schools) describes seven ICS Power Engineering courses that may open a new career for you. Get a copy today!

114. Prepare for tomorrow by studying at home with Technical Training International. Get the facts today on how you can step up in your present job.

★137. For success in communications, broadcasting and electronics get your First Class FCC license and Grantham School of Electronics will show you how. Interesting booklets are yours for the asking.

138. For a complete rundown on curriculum, lesson outlines, and full details from a leading electronic school, ask for this brochure from the Indiana Home Study Institute.

105. Get the low-down on the latest in educational electronic kits from Trans-Tek. Build light dimmers, amplifiers, metronomes, and many more. Trans-Tek helps you to learn while building.

3. Get all the facts on Progressive Edu-Kits Home Radio Course. Build 20 radios and electronic circuits; parts, tools and instructions come with course.

HI-FI/AUDIO

134. Discover PlayTape—America's newest tape cartridge and tape players. Units priced at under \$17 with cartridges at 45-disc prices. PlayTape has one of America's largest recorded libraries.

139. Altec Lansing covers both ends of the audio market—microphones and loudspeaker systems. Altec supplies the facts—you do the asking. Circle 139 now!

19. Empire's new 16-page, full-color catalog features speaker systems in odd shapes for beautiful room decor. Also, rediscover Empire's quality turntable line and cartridges.

26. Always a leader, H. H. Scott introduces a new concept in stereo console catalogs. The information-packed 1969 Stereo Guide and catalog are required reading for audio fans.

85. Write the specs for an ideal preamp and amp, and you've spelled out Dynaco's stereo 120 amp and PAS-3X preamp. So why not get all the facts from Dynaco!

119. Kenwood puts it right on the line. The all-new Kenwood stereo-FM receivers are described in a colorful 16-page booklet complete with easy-to-read-and-compare spec data. Get your copy today!

131. Let Elpa send you "The Record Omnibook." It's a great buy and Elpa wants you to have it free. Your records will thank you when the mailman delivers it.

17. Mikes, speakers, amps, receivers—you name it, Electro-Voice makes it and makes it good. Get the straight poop from E-V today.

27. 12 pages of Sherwood receivers, tuners, amplifiers, speaker systems, and cabinetry make up a colorful booklet every hi-fi bug should see.

99. Get the inside info on why Telex/Acoustech's solid-state amplifiers are the rage of the experts. Colorful brochure answers all your questions.

TAPE RECORDERS AND TAPES

123. Yours for the asking—Elpa's new "The Tape Recording Omnibook." 16 jam-packed pages on facts and tips you should know about before you buy a tape recorder.

31. All the facts about Concord Electronics Corp. tape recorders are yours for the asking in a free booklet. Portable, battery operated to four-track, fully transistorized stereos cover every recording need.

32. "Everybody's Tape Recording Handbook" is the title of a booklet that Sarkes-Tarjian will send you. It's 24-pages jam-packed with info for the home recording enthusiast. Includes a valuable table of recording times for various tapes.

34. "All the Best from Sony" is an 8-page booklet describing Sony-Super-scope products—tape recorders, microphones, tape and accessories. Get a copy before you buy!

35. If you are a serious tape audiophile, you will be interested in the all new Vikings/Telex line of quality tape recorders.

HI-FI ACCESSORIES

112. Telex would like you to know about their improved Serenata Headset—and their entire line of quality stereo headsets.

104. You can't hear FM stereo unless your FM antenna can pull 'em in. Learn more and discover what's available from Finco's 6-pages "Third Dimensional Sound."

RADIO-TV EXPERIMENTER

Dept. 169
229 Park Avenue South
New York, N.Y. 10003

Please arrange to have the literature whose numbers I have circled sent to me as soon as possible. I am enclosing 25¢ for 1 to 10 items; 50¢ for 11 to 20 items to cover handling. (No stamps, please.)

Indicate total number of booklets requested

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44	45	46	48	50	54	66	70	74	78
85	91	96	99	100	101	102	103	104	105
106	107	109	111	112	114	115	116	118	119
120	123	126	127	128	129	130	131	132	134
135	136	137	138	139	140	141	142		

NAME _____

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CITY _____

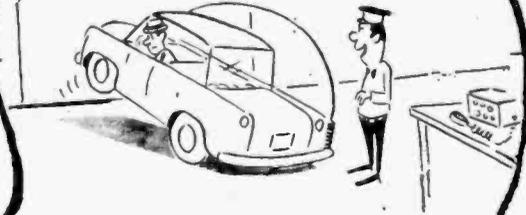
STATE _____ ZIP _____



maximum number of items=20



"And that, dear, is my QTC D signal—third call to dinner."



"I told you that was a powerful antenna."

the strange world of ham

By Marvin Townsend



"I didn't know you'd gone mobile, Joe. What'd you do with the baby?"



"We've had complaints your signals are interfering with the normal flow of traffic along this street, miss."



"Whaddaya know! A ham radio retriever!"



Fickle Finger Finder

See through lies and have fun with a lie detector that tells you no tales

By Ron Michaels

Do you have a credibility gap in your home? Are you getting wrong answers to what you think are the right questions? Would you like your next party to be the blowout you've always hoped for?

Well, whether it's used for super-sleuthing, electronic instruction, or just plain ol' fun, our Triple F (Fickle Finger Finder) *(Continued overleaf)*

Fickle Finger Finder

Finder) lie detector should turn out to be that *one* electronic construction project you've long been waiting for. No matter what the application, this pint-sized polygraph provides reasonable accuracy and excellent sensitivity so that you can put the finger on any or all who are willing to be examined.

Pro and Con. Although the Triple F lie detector is far simpler than a professional model—the kind used by law enforcement agencies—it works on much the same principle. It measures the subject's skin resistance before, during, and after he gives an answer to your question. When a series of questions are administered to him, changes in his skin resistance should reflect a change in his emotional state or psychological attitude.

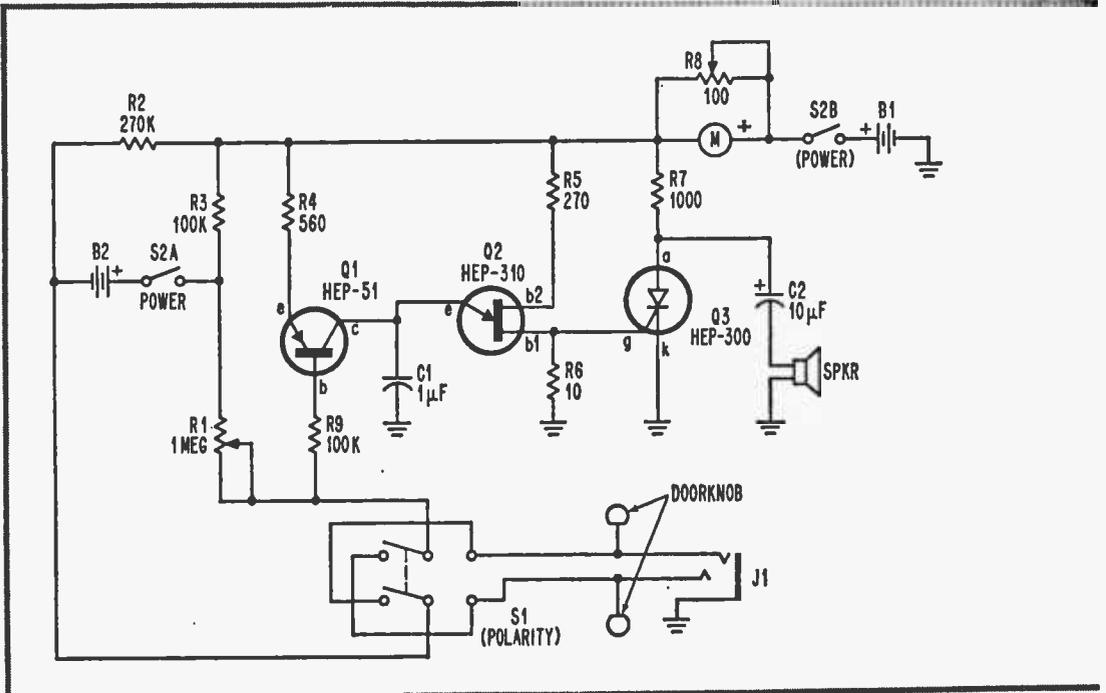
Of course, professional devices sample several other physiological variables as well. Measurements of heart rate, breathing rate, and blood pressure are all necessary to obtain an indication of the subject's general condition under questioning. The polygraph is obviously so named because many graphs must be recorded at the same time.

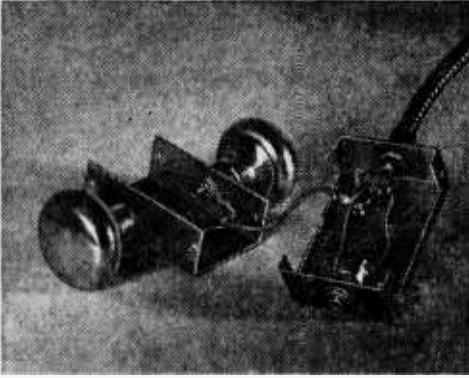


While meter face was changed on cover photo, everything else is the same. Small chassis mounts on meter case via gooseneck stand.

Chances are, you've observed from the photos that our Triple F lie detector is like no other you've ever seen. This is because ordinary brass doorknobs have been used to connect the subject to the monitor. More conventional electrodes (explained later on) can be used, but the doorknob electrodes are easier to apply and are somewhat less frightening.

Now, while you may not be called upon to give family or friends the third degree, a gadget like the Triple F detector can turn a dull party into a real blast. That's why





Brass doorknobs plug into banana jacks; plug assembly is then fixed in knob by tightening screw. Jacks must be insulated.

the doorknobs serve as electrodes. Have your subject place a finger on each knob and you're in business!

Not only is his skin resistance a factor in the meter reading, but the pressure of his fingers against the knobs introduces another variable. People can take turns lickety-split and there is no problem of changing leads or transducers. For more serious work, however, attaching electrodes are probably best.

Another feature is the built-in speaker. This will click—like a Geiger counter—at a rate which increases as the meter reading

increases. Thus, an entire room full of people can monitor the goings-on and chime in on the verdict.

Circuit Operation. The device is built around a unijunction transistor (Q2) which is part of a variable-frequency pulse generator. The generator's output is a chain of pulses whose frequency depends on the total resistance in Q2's emitter circuit. This resistance is controlled by transistor Q1's resistance, which in turn depends on the amount of current flowing into Q1's base.

When your subject touches both doorknobs simultaneously, his body completes a Wheatstone bridge connected to Q1's base circuit and a tiny current (a few μA) flows through him into the transistor. The level of current flowing through him and into Q1 depends on his skin resistance.

Accordingly, the greater the current flowing into Q1, the lower its resistance becomes, and the pulse rate of the unijunction transistor generator increases. This causes more current to flow so that the reading on the meter increases.

The pulse output from Q2 and the meter reading are inversely proportional to your subject's skin resistance—the lower his skin resistance, the greater the current flowing in the lie detector's circuit. More important, small changes in skin resistance cause small changes in pulse rate. It's your job to detect these changes by monitoring either the meter, the speaker, or both.

The output pulses are fed to a discharge capacitor associated with a silicon-controlled rectifier (Q3). Each pulse causes the SCR to conduct momentarily. This discharges the electrical energy stored in capacitor C2 through the voice coil of the speaker, thereby producing a *click*. In between pulses, C2 recharges slowly in anticipation of the next pulse. Like the meter reading, the number of clicks depends on the pulse rate from Q2.

Polarity switch S1 reverses the direction of current flow through the subject. This counteracts the effects of electrolysis on the surface of his skin. Electrolysis can throw the reading off and negate your test. During a test, flip the switch back and forth every few minutes.

Potentiometer R1 (the rate control) is used to adjust the meter reading and click rate to a convenient level for monitoring. (About 4 on the meter scale is right; but note that the meter face was altered on cover photo.) This should be done at the start of a test; it will compensate for varying skin

PARTS LIST FOR FICKLE FINGER FINDER

B1—9-V transistor battery (2N6, 246 or equiv.)

B2—4.5-V mercury bias battery

C1—1- μF , 200-V paper capacitor

C2—10- μF , 10-V electrolytic capacitor

J1—3-conductor phone jack (Switchcraft 12B, Allied 47B4969 or equiv.)

Q1—Pnp transistor (Motorola HEP-51)

Q2—Unijunction transistor (Motorola HEP-310)

Q3—Silicon-controlled rectifier (Motorola HEP-300)

R1—1,000,000-ohm, $\frac{1}{2}$ -watt resistor

R2—270,000-ohm, $\frac{1}{2}$ -watt resistor

R3, R9—100,000-ohm, $\frac{1}{2}$ -watt resistor

R4—560-ohm, $\frac{1}{2}$ -watt resistor

R5—270-ohm, $\frac{1}{2}$ -watt resistor

R6—10-ohm, $\frac{1}{2}$ -watt resistor

R7—1000-ohm, $\frac{1}{2}$ -watt resistor

R8—100-ohm, hum-adjust, wirewound potentiometer

S1—Dpdt toggle switch

S2—Dpst toggle switch

Misc.—6 x 4 x 4 $\frac{1}{4}$ -in. aluminum meter case, 3 $\frac{1}{4}$ x 1 $\frac{1}{8}$ x 2-in. aluminum chassis box, 0-1 mA DC panel meter (Simpson 1212, Allied 52E8532 or equiv.), 8-ohm miniature speaker, brass doorknobs, banana plugs and jacks, phone plug, test leads, gooseneck mike stand, perf board, push-in terminals, spacers, rubber feet, decals, wire, solder, hardware, etc.

Fickle Finger Finder

resistances of different subjects under test.

Small Package. The circuitry is housed in a 6x4¼x4-in. aluminum meter case that has a sloping front panel. The doorknob/electrode assembly is built into a 3¼x1½x2-in. aluminum chassis box. The small box connects to the main cabinet via a flexible microphone stand called a *gooseneck*. A heavy weight of some kind in the main cabinet should prevent the unit from tipping over if you desire greater stability.

Start out by mounting S1, S2, R1, the meter, and the gooseneck on the cabinet. Mount the speaker against one side and drill a few holes in front to serve as a grille. Potentiometer R8 (meter range adjust) mounts in the floor of the cabinet so that it is accessible from the underside. This will be used after the cabinet is closed.

The bulk of the circuitry goes on a piece of perf board. This should be mounted on the back of the case. Push-in terminals can be used as soldering points. Parts layout isn't critical but check on the polarity of semiconductor leads and electrolytic capacitor C2 when you wire them in place.

Power is supplied by a large 9-volt tran-

sistor radio battery (B1). Since current drain is relatively low, you can dispense with a battery holder if you wish. Just cement the battery in place with a few drops of contact adhesive—it's easy to break the bead loose during replacement. Also mount the 4.5-volt mercury *bias* battery (B2) in the same way. The batteries can also be secured with a piece of tape.

The doorknobs are connected to the circuit via insulated banana jacks mounted on the small chassis box. Discard the plastic sleeve from the corresponding banana plug and place the metal plug assembly inside each doorknob. Then tighten the knob's setscrew to get a good electrical and mechanical connection. It's important that neither of the jacks touches ground! (Since most brass doorknobs are supplied with a protective lacquer coating that acts as an insulator, this must be removed before mounting. Acetone or nail polish remover will do the job.)

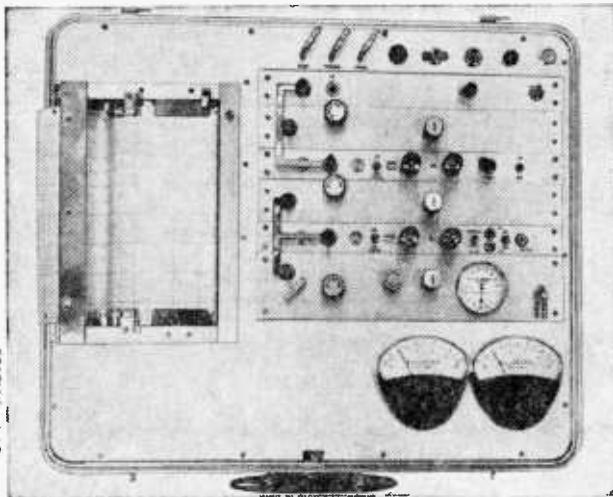
Finally, phone jack J1 should be mounted in the small chassis (as shown), or in the meter case. This jack enables you to connect other types of electrodes to the circuit.

Electrodes. Various electrodes can be made from metallic transducers that make contact with your subject's skin. The designs possible are limited only by your imagination. An inexpensive solution can

What's in a word? Lie detectors give the bad guys a hard time!



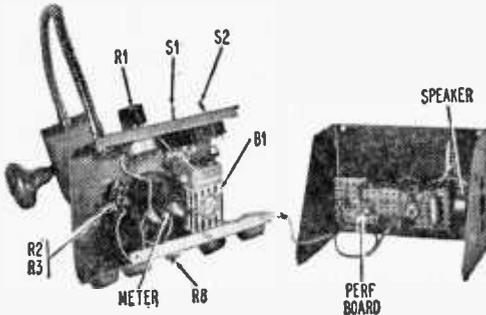
Police examine suspect right on the spot. Man taking lie detector test is being held for murder. Portable polygraph measures skin resistance, breathing, and pulse rate.



Truth Verifier polygraph manufactured by C.H. Stoelting Co., of Chicago has 6 recording channels for various physiological measurements. Note use of meters and graph.

be had by using so-called adjustable rings sold in five-and-dime stores. Solder test leads to two rings and connect the free ends to a phone plug for J1.

When you make a test, adjust each ring's



Parts layout of lie detector isn't critical. Meter will be most expensive item, but since readings are relative anyway, cheaper model can be used without affecting tests results.

diameter to fit your subject's fingers and place them on *adjacent* fingers of the same hand. The advantage of the ring electrodes is that contact pressure between electrode and skin surface is more or less constant. The varying pressure will change the reading just like a change in skin resistance.

Regardless of what type of electrode you use, it is important that your subject doesn't touch the metal cabinet or any ground point

during a test. This will short out the base circuit of Q1 and produce an artificial (and meaningless) high pulse rate.

Adjustment. The meter range adjust control (R8) must be set before you operate the instrument. Start by setting R1 (rate control) for *minimum* resistance. Next, moisten the thumb and forefinger of one hand (this insures minimal skin resistance) and place them simultaneously across both doorknobs. Now adjust R8 for just under full-scale deflection (approximately 9.5).

The most sensible approach is to adjust R1 at the start of each test so that the meter will read some standard value (4 is about right). At this setting the clicks from the speaker will be slow enough so that slight changes in pulse rate can be heard.

Stimulus-Response. It takes a good deal of skill to administer a lie detector test and then interpret the results. Even so simple a polygraph as your Triple F detector will be difficult to monitor in the beginning. However, the basic idea is simple. When a person knows that he is lying, his heart may beat a bit faster, he may breathe a bit deeper, and he may perspire more, thereby lowering his skin resistance.

The *may* is important. Many liars don't react much, especially when they are used to lying. An honest person may react simply because the machine and the circumstances



This lady from Ontario seems composed as she faces lie detector. Curves in background is graph of her test.



Above, ex-convict and mental patient is interrogated about bombing of school. Test was held inconclusive.



At left, Stoelting's Deceptograph is a typical polygraph used by professionals.

Fickle Finger Finder

make him nervous. All these variables make it clear why a lie detector test can't be used as evidence in a courtroom.

One oft-used technique is to ask the subject a long series of questions that can all be answered with a simple *yes* or *no* response. This helps put the subject at ease and establishes a reference before more strategic questioning. These first questions should be non-controversial and should cover general topics: "Are you a male?" "Have you ever been to Boston?", etc.

Keep track of the subject's reactions while these questions are being asked and try to determine what you think is a *standard* response. Then suddenly slip in a loaded question at some strategic point. Study the response carefully. Did the meter reading (or click rate) change in some way? Did it take longer to steady itself? Was there much movement?

Now you have an established questioning procedure. Continue to ask a series of neutral questions and then slip in one that is strategic. If you notice a markedly different response to the important question, you're in the money. There is a definite *possibility* that your subject is lying as he answers, or that he is at least disturbed by the question. Once you have this kind of indication, you can determine a more direct line of questioning to get the goods on him.

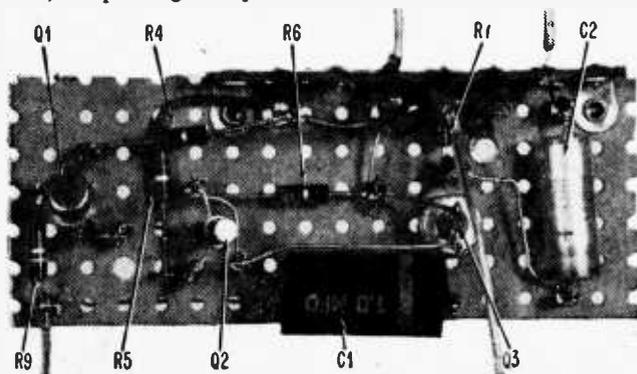
Remember to flip the polarity switch during the test, and if you use contact electrodes, make sure they don't come loose. Naturally, the meter must face *away* from the subject. A cutout switch for the speaker can also be added to prevent any leakage of information during more serious work. For parties, however, keep things simple.



Here's a girl who's telling the truth! Mrs. Michaels seems to be an old hand at beating her husband's line of inquiry. She demonstrates correct position for your subject.

For more information on the capabilities of your Triple F detector, take a look at any textbook on experimental psychology. In the chapter on *galvanic skin response* you'll find lots of info on possible ways to use your equipment.

As we've said, it takes time to get squared away with testing procedures and develop some skill at interrogation. But you should do all right; all it takes is accurate monitoring and a willing subject. ■



Circuit board layout follows schematic closely. Leads are not critical, but don't get sloppy about wiring. Use some kind of heat sink when you solder semiconductor leads.

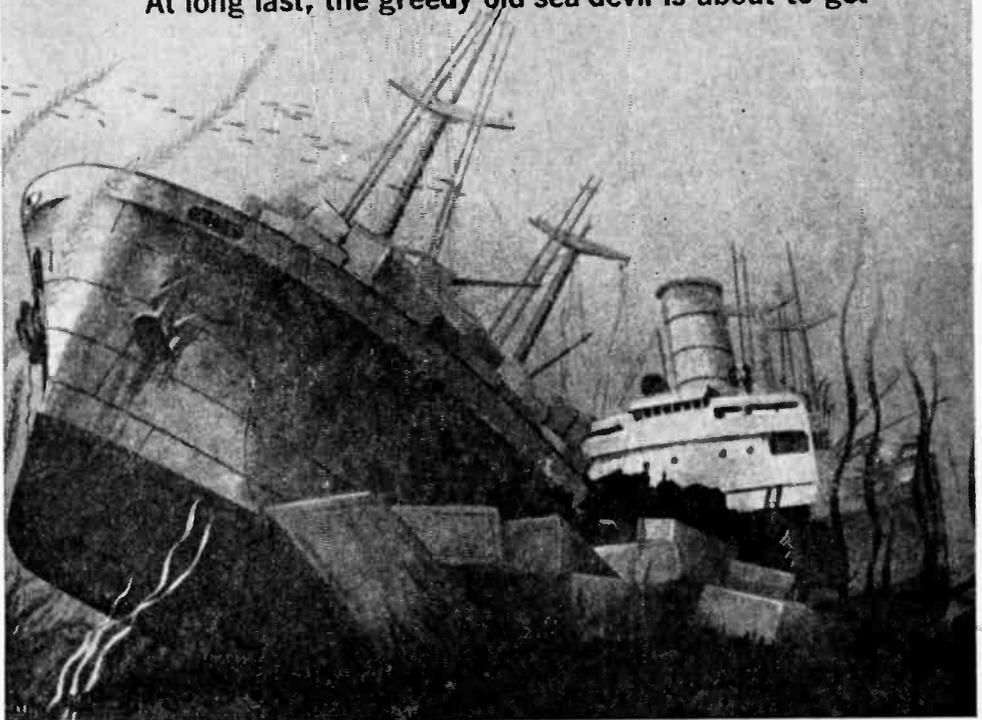
Tapping the Treasures of the Last Continent

Electronics helps turn the key to open Davy Jones' Locker

By Jorma Hyypia

■ The biggest treasure chest in the world has a volume exceeding 3.5 billion cubic miles. Crammed into it are treasures of infinite variety and mind-staggering value. The jealous custodian of this fabulous hoard: Davy Jones.

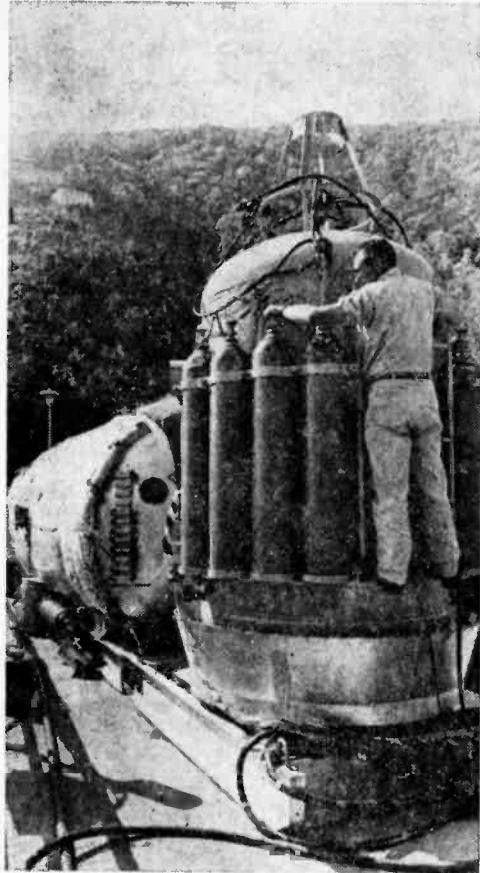
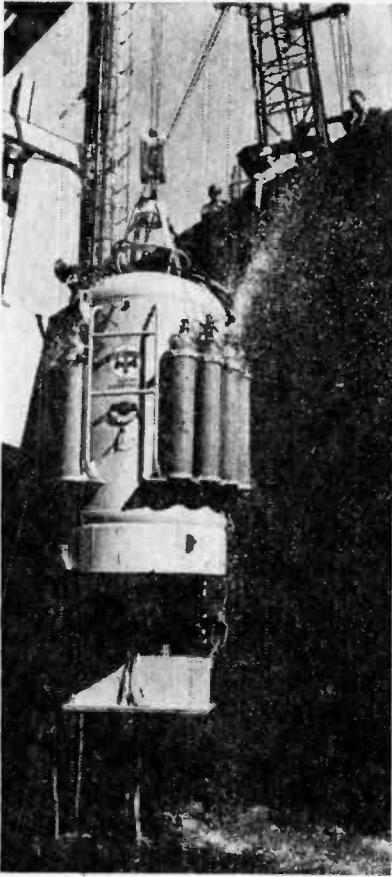
At long last, the greedy old sea devil is about to get



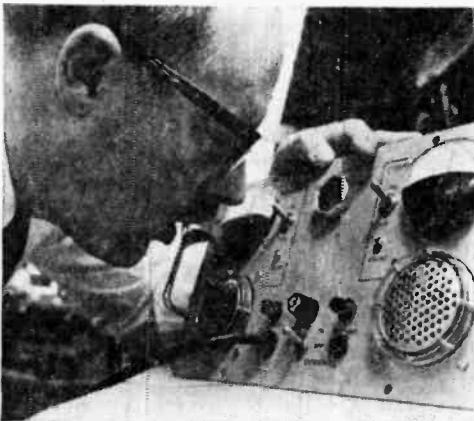
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Left, cachalot diving chamber (Westinghouse stole name from deep-diving sperm whale) returns to mother ship. Note life-support oxygen and helium tanks strapped to side of chamber. Right, cachalot system utilizes two chambers—one for diving, another (at rear) for on-deck decompression. Men pass from one chamber to other through pressure locks.

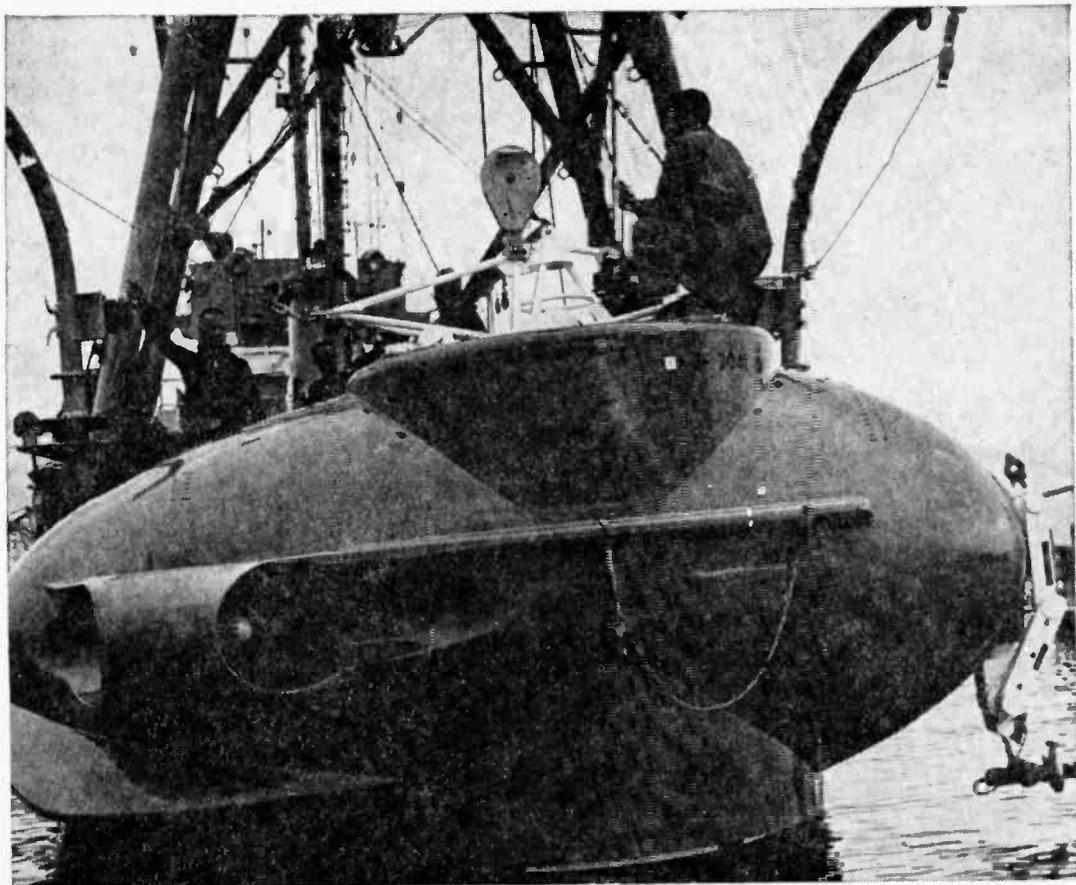


Oxygen sensing and controlling device by Westinghouse is used in cachalot system. It makes automatic adjustments if gas mixture in deck chamber changes and signals crew should the diver's apparatus malfunction.

his come-uppance. Reason is the biggest safe-cracking job in history is in the making. The necessary tools, weapons, life-support systems and get-away vehicles are ready. Tactical plans for Operation Treasure Chest are being drawn up. All that remains is to pick just the right team for the job.

Master mind of the operation is the U.S. federal government. The Soviet Union may become a co-partner, or at least first lieutenant. To qualify as a leader, each of these nations must contribute from \$3- to \$5-billion for operational expenses. The rest of the team—consisting of volunteers from 45 other qualifying nations—would contribute an aggregate of several billions more.

The time table calls for a ten-year assault on Davy Jones' locker, beginning in 1970 or soon thereafter. The expected loot: scientific information, minerals, oil, natural gas, fish and other food materials.



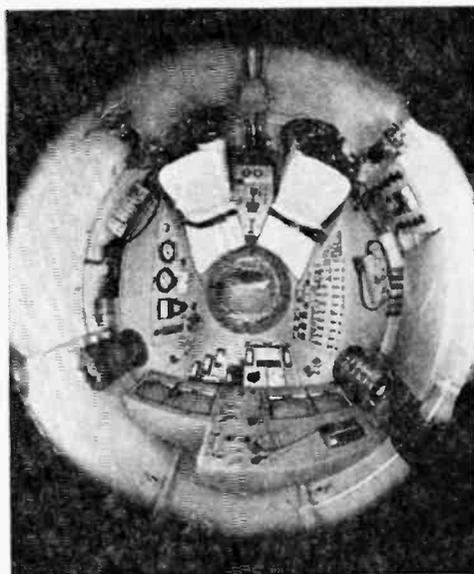
Above, deep ocean work boat by AC Electronics is self-propelled, two-man sub designed for undersea research, placement and recovery operations, and general surveillance work. TV camera and direct optical systems provide 360-deg visibility. Below, interior of boat as pictured by fish-eye lens. Sub can carry payload (men and instruments) of 1021 pounds.

Electronics Role. Man has been dunking under ocean waters in all sorts of contraptions for hundreds of years, but the big plunge into oceanographic research has come only within the past few decades. In a relatively short time, oceanographic techniques have been developed to such degree that a major international decade of ocean exploration is now feasible.

Electronics plays a vital role in virtually every aspect of ocean exploration—from the simplest telephone communications between divers and surface support crews, to complex computerized data processing of scientific observations.

The accompanying illustrations provide the briefest sampling of the ways in which electronics is used in marine science.

Hazardous Work. Deep sea exploration is one of the most hazardous of man's occupations. The fact that remarkably few men



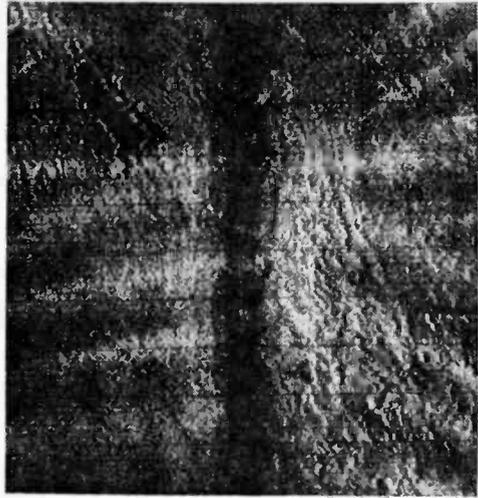
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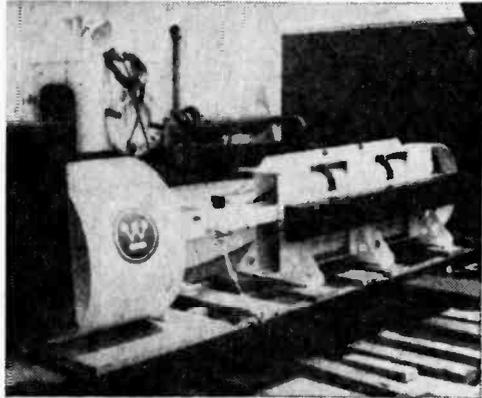
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Used for seismic measurements, digital-air gun by Texas Instruments (above) is electro-mechanical device that forces air bubbles of predetermined sizes under water. Below, ship-board oceanographic system, also developed by Texas Instruments, digitizes, corrects, linearizes, arranges, and plots variety of data.



Bottom-scanning sonar by Westinghouse used ultrasonic sound to make picture of Atlantic bottom (above) at depth of 8000 ft. Device (below) operates at depths up to 20,000 ft.



lose their lives in this work is a testimonial to the ingenuity of scientists and engineers who place safety before daring.

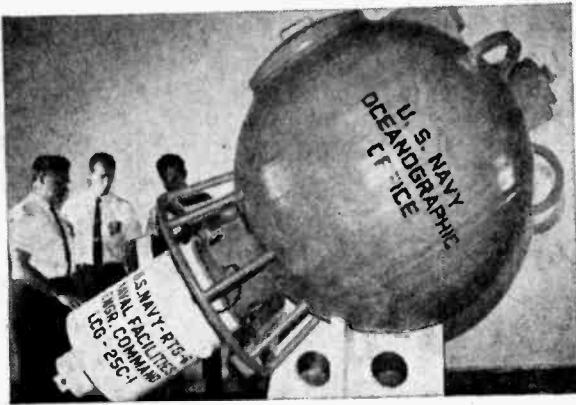
As man goes ever deeper into this hostile environment, his problems of survival are compounded. Undoubtedly, a diver's two greatest worries concern breathing and coming back alive and well.

Martini Law. If ordinary air were to be used in dives deeper than 150 feet, the nitrogen in the air would produce a narcotic effect on the diver called "rapture of the deep." Divers describe the effects of nitrogen narcosis by stating "Martini's Law": every additional 50 feet of diving depth produces the same effect as one more martini.

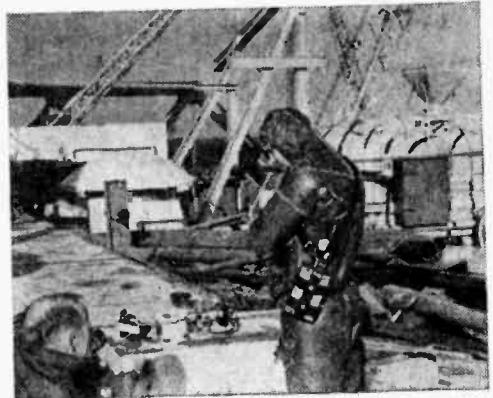
Oxygen also becomes toxic at depths greater than 300 feet because the great pressure forces excessive amounts of the life-sustaining gas into the bloodstream. To com-



Sparkarray transducer by EG&G Inc. produces sound pulses for seismic profiling of ocean bottom. Signals from sparkarray can penetrate bedrock effectively at depths up to 7000 ft.



Undersea radioisotope generator by Martin Marietta will power oceanographic buoy for beaming data to ships and planes.



Brain- and heart-wave recordings are made by solid-state package worn by divers on job. The manufacturer: Ocean System, Inc.

compensate for these two effects, helium is substituted for nitrogen (it does not dissolve as easily in the bloodstream), and the proportion of oxygen to inert gas is progressively reduced with increasing depth. The helium produces one curious effect: it makes the voices of divers sound like Donald Duck over communications systems.

How does electronics enter into these problems? Automatic sensor systems now monitor divers' oxygen supplies and warn of malfunctions in the supply equipment even before the divers themselves feel adverse effects. And the quack is being taken out of the garbled Donald Duck speech by electronic de-scrumbling.

Prolonged Submergence System. In the past, divers consumed more time going down and coming up than they spent on the bottom doing work. Now the men can be hauled up as fast as the winches can turn, without the slightest danger of the dreaded "bends."

A number of oceanographic research organizations are independently developing prolonged submergence systems in which the diving chambers remain pressurized after being surfaced. From these diving chambers the men pass into other on-deck chambers having equal pressures; here they can either be decompressed gradually, or they can remain fully pressurized until the next trip into the deep. In fact, divers can now live for weeks in a "deep sea" environment, right on the deck of the mother ship. Thus, in the course of a prolonged exploration project requiring many dives, they need to be decompressed only once—when the job is done.

The electronic devices associated with life-support systems are relatively simple, albeit of vital importance. The truly sophisticated and ingenious applications of electronics are in the area of instrumental data gathering.

Pingers, boomers, sparkarrays, digital-air
(Continued on page 120)

Absentee Sit-In

Mohammed can't go
to the mountain?
Then send mountain
to Mohammed
—and pronto!

■ High-school students in the Greater New York area are now offered a helping hand found in few other places in the world. The hand, in this case, takes the form of a special FM radio station. Its purpose: to enable physically handicapped students to continue their education even though they can't go to school. What's more, there's even a special telephone system that lets students and instructors communicate with each other al-



Homebound student calls in question to his instructor over special telephone system.

Instructor receives question from student at left, then files it with other queries.



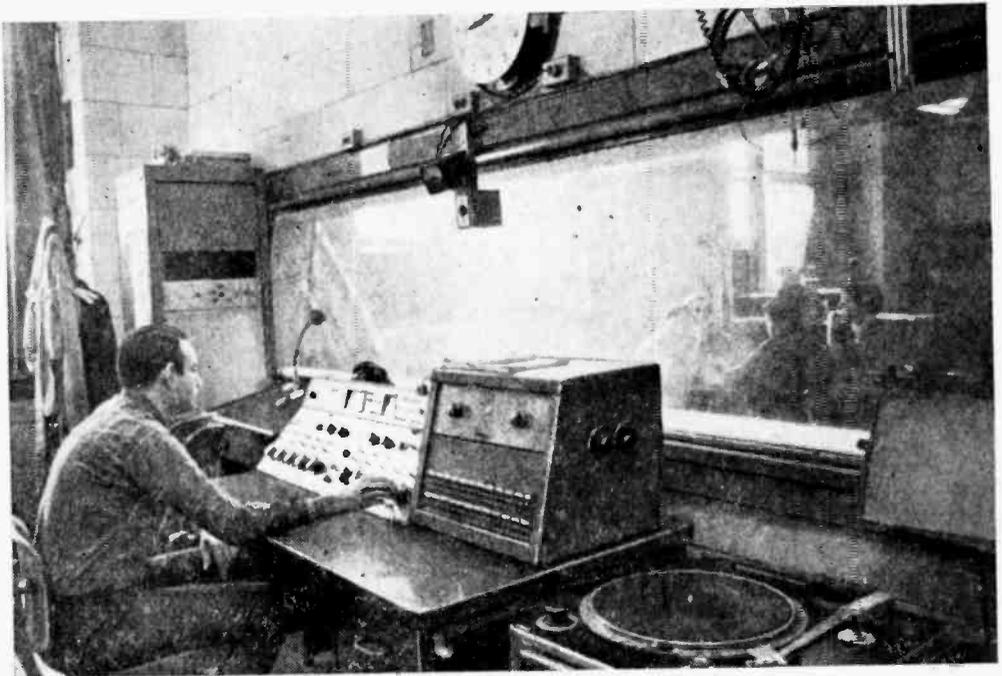
In studio, students and instructor participate in High School of the Air round-table discussion, which is broadcast to homebound students who are physically unable to attend classes.

most as though they were in the same room.

Students who are participants in Homebound Instruction, a program for students who are unable to attend school because of permanent or temporary physical handicaps, are supplementing their education by means of High School of the Air. This special FM radio station, which has been set up to broadcast educational programs for the homebound student, helps him keep pace with his

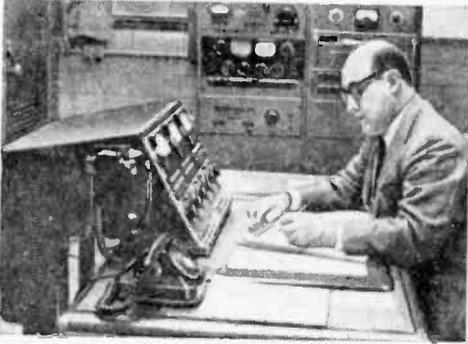
schoolmates and prepares him for his Regents and College Board Examinations.

As part of Homebound Instruction, a program which brings teachers to the students' homes for regular two-hour sessions, High School of the Air is a combination radio station and school. While students at the station participate in regular classes, Homebound students listen to the classes and communicate with their instructors via a



In control room, technician keeps eye on discussion group and hand on gain control as broadcast goes out over airwaves. Some class sessions are taped for later broadcast.

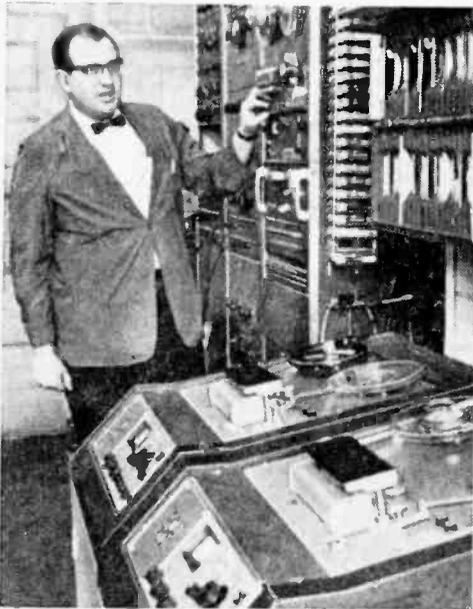
Absentee Sit-In



Technician supervises equipment which broadcasts High School of the Air programs.

telephone broadcasting system. This free-flowing dialogue between instructor and Homebound students enables their teachers to answer questions as well as quiz their absentee students.

Safeguarding the handicapped student from an irretrievable academic set-back, High School of the Air ensures that the high-schooler will receive a well-rounded, college preparatory education despite his accident or illness. —Robert Levine ■

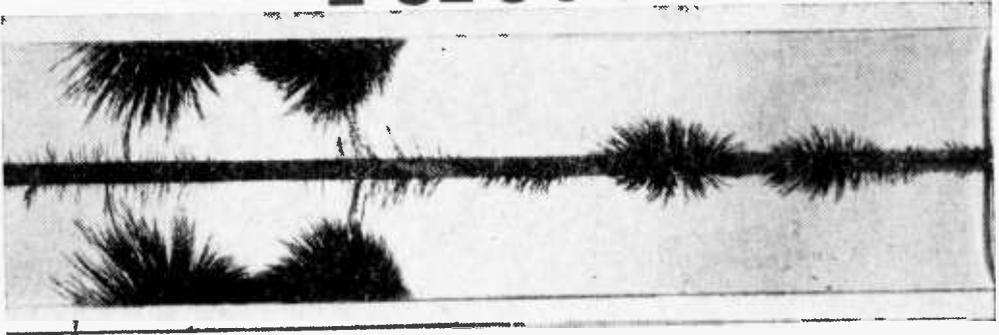


Tapes and tape recorders play important role in station's programming. Machines in foreground are professional RCA units.



Getting ready to record High School of the Air program, station technician loads tape on recorder mounted in large rack panel.

Frozen Magnetic Forces



See what magnetism can really do,
then freeze it for your friends!

By Erik Horneman

Fascinating as they are, two-dimensional magnetic field patterns (made by sprinkling iron powder, on cardboard or glass placed over magnets) provide only a limited representation of what are actually three-dimensional phenomena. Force field patterns become doubly interesting and revealing when the missing third dimension is added.

Unfortunately, it's not possible to convey the unique characteristics of 3-D magnetic patterns in two-dimensional photographs. You'll have to use your imagination to visualize what the equipment described in this article will give you.

You can start experimenting using nothing more elaborate than a test tube, a couple of small magnets, a bit of iron powder, and some mineral or cooking oil. But your experiments will have more zip if you go to a little more trouble and set up the experiment properly.

Plastic Cell. The 3-D force fields are not easy to observe in a test tube because the curved glass distorts the image. A wide-mouth medicine bottle with flat sides is preferable to a test tube. However, a relatively tall plastic cell made from sheet plastic is best of all.

Make the cell from $\frac{1}{8}$ -in. thick acrylic plastic sheet (Lucite or Plexiglas) that can be obtained from plastic suppliers, or from craft or hobby stores. Cut four $1\frac{1}{8} \times 5\frac{1}{2}$ -in. pieces for the walls, and a $1\frac{1}{2} \times 1\frac{3}{4}$ -in. piece for the bottom.

The plastic can be cut with a fine-toothed hand saw, or preferably, with a bench power saw fitted with a special abrasive cutting wheel designed for plastics and similar materials. In any case, all edges must be made perfectly square and smooth to get leak-proof joints. If the plastic is purchased from

Magnetic Forces

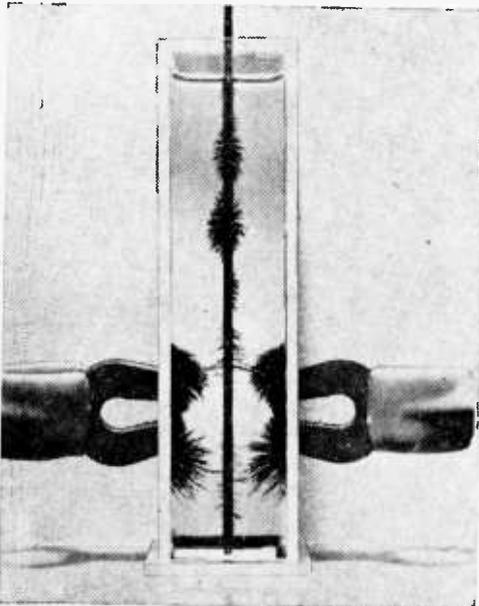
a supply house or a small plastics fabricator, you may be able to obtain the plastic pre-cut to the required sizes.

Clamp the four walls together firmly to form a rectangle. Using a small artists' paint brush dampened with adhesive solvent, feed a little of the solvent along the joints. Too much solvent, however, will spread out and spoil the cell walls by etching the plastic. Use just enough to wet the joints so that the ground glass look of the edges disappears. The solvent will run into the joint interfaces by capillary action.

The best solvent to use is ethylene dichloride. This can be obtained from chemical supply houses, or possibly from the dealer supplying the sheet plastic. Glacial acetic acid also works well though it takes a bit longer to set. Be sure the acetic acid is 100% pure. You can obtain it from a drug store or photosupply store.

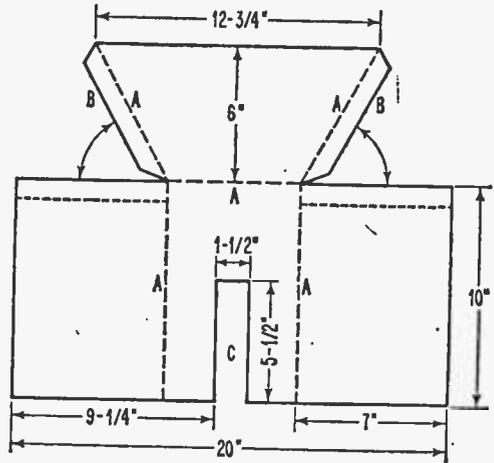
Now set the cemented rectangle aside, still clamped, for an hour or two. The hardening time can be determined by cementing some plastic scrap together at the same time.

When this is done, check one end to see that the walls match perfectly. If they don't,



Magnetic bridge is only one example of striking, three-dimensional patterns obtainable once filings are suspended in oil. Array collapses moment magnets are removed.

Cardboard baffle is important accessory for proper illumination of field patterns. Baffle above is made of photographic mounting board and is used with 150-watt bulb.

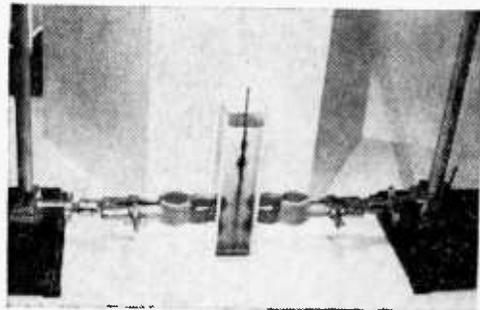


- SCORE AND BEND BACK ALONG LINES A
- GLUE TABS B TO SIDE PANELS
- COVER WINDOW C WITH GROUND GLASS OR TRANSLUCENT PLASTIC SHEET

use a sanding wheel to flatten and smooth the bottom edges, or rub them against sandpaper if a sanding wheel isn't available. Now clamp the bottom piece in position and cement it in place.

When the cell is finished, fill it with water and check for leaks. If a leak is discovered, dry the cell, re-clamp, and add more adhesive to the leaky spot.

Light Baffle. The field patterns are more visible if the cell is illuminated from the rear with a 150-watt bulb. To eliminate glare, make the simple cardboard baffle shown in the drawing. Any stiff cardboard will do. Better yet, try using photographic mounting board. It's easy to cut and shape and makes



Laboratory hardware comes in handy for holding magnets against plastic cell. Object in background is cardboard light baffle (see above) with window to illuminate filings.

an attractive baffle for display purposes.

Use the dimensions shown if you made the cell as specified. Cut only about a *third* of the way through the indicated lines (using a sharp knife or razor blade) and bend the board back to form two angled sides and a top. The window should be covered with a piece of ground glass, translucent artists' acetate, or even translucent paper—anything that will diffuse the light passing through the window.

The cell was designed for use with relatively small magnets such as cupboard door catches or small alnico horseshoe magnets sold by hardware stores. The magnets shown are about 1-in. long. Naturally, you can make larger cells for more dramatic displays if you have bigger and stronger magnets.

Make your own iron powder by filing or grinding ordinary nails. Iron powder can also be purchased from science supply houses. (Edmund Scientific Co., Barrington, N.J. 08007, sells a pound of powdered cast iron—catalog # 60,176—for only 75¢ postpaid.)

A small amount of iron powder (start with about $\frac{1}{4}$ teaspoon) is suspended in enough oil to almost fill the cell. Water will not do because the powder settles too rapidly. Almost any viscous material will do. Extra heavy mineral oil (Nujol) sold at drug stores is cheap and very good because it is thick and clear. Glycerine and thin cooking oils can be used as long as they do not have much color.

Magnetic Bridge. For your first experiment, try making a magnetic bridge. Position the small magnets on opposite sides of the cell, about a third of the way up from the

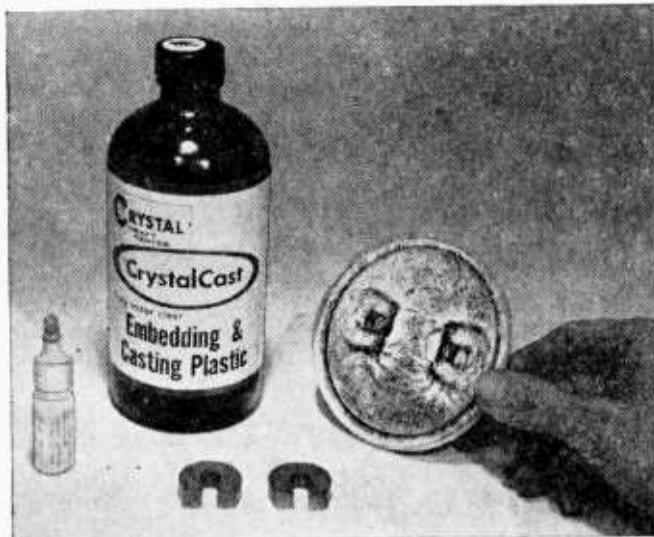
bottom. Orient the magnets so that their opposite poles are facing and they will attract rather than repel one another.

Shake the iron/oil mixture vigorously to produce a uniform suspension and pour it quickly into the cell. As the iron powder begins to settle, the particles will be trapped by the magnetic field. Most of the particles should accumulate near the poles of the magnets in the form of radiating, fibrous rosettes. If enough powder is present, whole bridges will form across the cell along the dominant lines of force. The bridge will remain intact so long as the magnets are left in place, but it will collapse the moment the magnets are removed.

The cell must be tall so that there is a reservoir of suspended powder that can gradually precipitate into the magnetic field. If there isn't enough powder present to form a complete bridge, add more powder by sprinkling a little at a time on top of the oil. Try to avoid forming lumps.

Watch the settling process with the aid of a magnifying glass. The particles first form stringlike clusters while still distant from the magnet poles. These strings slowly become oriented into curved patterns that reveal the outlying, weaker regions of the magnetic field. Eventually, the more remote patterns disappear as the powder accumulates near the center of the field.

Magnetic Tree. Many different experiments can be performed with the equipment. Try using magnets of different sizes and shapes, or introduce iron objects into the cell where they can become magnetized by induction. *(Continued on page 118)*



Frozen magnetic fields are created when patterns are imbedded in plastic, as described in text. A little imagination is all it takes to turn larger plastic configurations into interesting conversation pieces; smaller, 2 x 2-in. mountings used as slides make it possible to project frozen force fields on a screen.



Super Speakers

Psychological warfare takes a new tack with airborne systems that

■ The voices of diplomats engaged in Vietnam peace talks in Paris rarely carry beyond the heavy doors of the conference rooms. But over the battlegrounds of Vietnam the voice of Uncle Sam is so loud and clear it can penetrate enemy bunkers from flying podiums a mile or more in the sky.

It's all part of psychological warfare made possible by modern audio electronics. Helicopters and other aircraft now flying over enemy territory carry high-power speaker systems capable of beaming anywhere from 250 to more than 2000 watts of solid audio at ground targets.

In wars past, about the only electronic way to alert enemy troops to your side of the story was by means of normal radio broadcasts, which might be picked up by a few bootleg receivers in the enemy ranks. Such broadcasts could be easily jammed to make them virtually ineffective. Not so with the big voice in the sky. Every human being within range can't help but hear clearly. And about the only way enemy forces can hope to short-circuit this type of broadcast is with anti-aircraft fire.

The Peace Front. Psychological warfare is only one of many possible uses for these super speakers. They should be very effective in the control of civil disturbances, for

example, and rescue teams searching for trapped mountain climbers or for victims of air disasters can be given helpful information. Similarly, civilians trapped in flood or other disaster areas can be given vital survival instructions.

The audio system can of course be used in ground-based installations as well as in aircraft. Since no single system could possibly meet all operational needs, one company—Applied Electro Mechanics, Inc. of Alexandria, Va.—has made provision for ganging several basic systems when broadcast conditions call for extremely high audio outputs.

Choose Your Power. A glance at the specs for the AEM high-powered voice amplifier reveals that it is completely transistorized and capable of operating in a temperature range extending from -30 to $+130^{\circ}\text{F}$, in relative humidity up to 97 percent, and at altitudes up to 12,000 ft above mean sea level. The maximum usable range is more than one mile under favorable conditions.

Maximum rated audio output is 250 watts, but this can be increased to 350 watts under special conditions. Considerably more radiated power can be obtained by operating amplifiers in multiple combinations of two, four, or more. The amplifier is normally

Helicopter at left sports four-unit super-speaker array on its left landing gear; 1400-watt system at right is slung from wing of piston plane. Aim in both cases is identical: to blast enemy forces with behests, not bombs.



Go to War

blast out with 2000 watts of solid audio,

/ By Carlos Gunzmann

powered by a lead-acid or nickel-cadmium 24- to 28-V storage battery. Lower voltage supplies can be used, but at a sacrifice of audio power.

Frequency response of the amplifier is flat within 3 dB over the 500 to 5000 Hz range—more than adequate for good voice intelligibility. Because the amplifier operates in a saturated state, its voltage waveform at full power approaches a square wave. Operating at 0.4 rated power, its amplitude distortion is 12 percent or less, measured at a frequency of 1000 Hz with sine-wave output.

Preamp, Driver, Output. Signal amplification is achieved with a two-stage preamplifier module consisting of a single-transistor linear amplifier feeding a two-transistor push-pull stage. The output from the preamplifier module is fed to a push-pull class-B driver stage, which drives a bridge-type power amplifier output stage. The output stage is directly coupled to speakers, connected so as to give a nominal 2-ohm impedance to the AC current flow.

The usual load is furnished by two 4-ohm speakers connected in parallel. However, higher directivity can be gained by paralleling four 8-ohm speakers to load one amplifier.

Because the transistorized system could

easily be damaged by misuse, a protective circuit utilizing electronic switching has been added. It operates within microseconds to protect semiconductor components from such adverse conditions as reverse polarity or excessive current. When the trouble is cleared, or if it is only transitory, the protective circuit resets by simple operation of the power switch.

A noise-cancelling dynamic microphone having an output impedance of 50 ohms is normally used. This standard mike can be replaced with a newer type having 20-dB improvement in anti-feedback characteristics. It makes possible microphone operation in the immediate vicinity of high-powered speakers working under full gain. There is also improvement in the rejection of background noises.

As you might expect, the system isn't limited to live voice programming. Specially designed tape players can provide repeat transmissions of messages lasting as long as 25 minutes.

Airborne Systems. The projection of sound from fixed wing or helicopter aircraft is feasible up to two miles slant range with a one- or two-amplifier system. The way speakers are mounted on the aircraft depends on the type of flight pattern that's

Super Speakers

planned. If a target circling course is to be used, the horns are pointed horizontally abeam of the aircraft frame so that the bank of the aircraft or the downward thrust of rotor blades will direct the sound beam at the ground target.

Sometimes the speakers are mounted in an open doorway or are fitted into a streamlined pod attached to a wing armament rack to reduce air resistance.

Ground Installations. Super speakers operated from ground-based installations can project sound over great distances if conditions are favorable. Since sound waves are strongly affected by wind, weather, time of day, and intervening objects, the operators of these outdoor sound systems must contend with unusual problems that the average hi-fi hobbyist never has to think about.

A line-of-sight beaming toward the target area is ideal, especially if the sound can be made to pass over rivers or lakes. Hillside locations can be excellent for sending messages into valley areas.

Echoes can both help and hinder message transmission. Ordinarily, echoes result in wasted power; hence the sound beam should be aimed so as to clear intervening masses such as hills or buildings. However, echoes can at times be used to advantage to reach

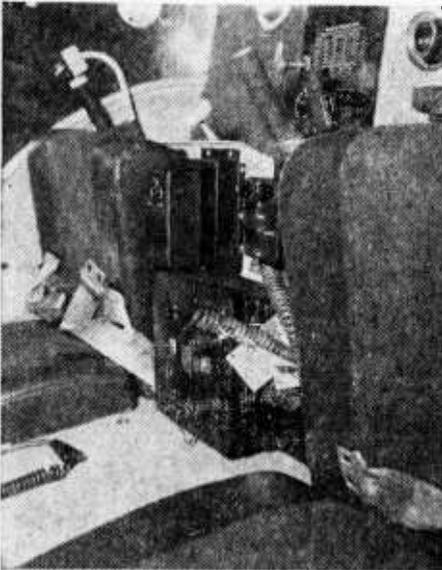
targets which sound cannot be beamed to directly.

Sound projection is easy if the speakers can be located upwind of the target area so that the wind can help to carry the sound in the desired direction. If the sound must be beamed cross wind, the horns must be directed slightly upwind of the target. Though the degree of correction depends on the projection distance and the wind velocity, the average correction works out to about one degree for each 10 mph of cross wind.

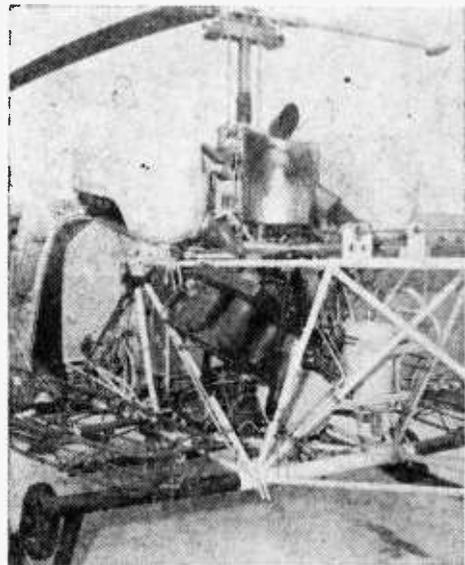
Better Than Bombs? While the cross-currents of public opinion concerning the morality and military wisdom of bombing North Vietnam blow ever hotter, there can be little opposition to bombarding the enemy with words. Given a choice, even the enemy would surely prefer saturation with 2000 watts of audio power than with 2000 pounds of bombs!

But in war you do not ask what pleases the enemy. You ask what offensive and defensive tactics are effective. Is this type of psychological warfare worth the trouble? Does it really lower enemy resistance in any measurable degree? Even on this opinions will differ. But it's still worth a try.

In any case, the U.S. cannot be accused of waging only a shooting war. It's also waging a shouting war—on the battlefield as well as in the conference room. ■

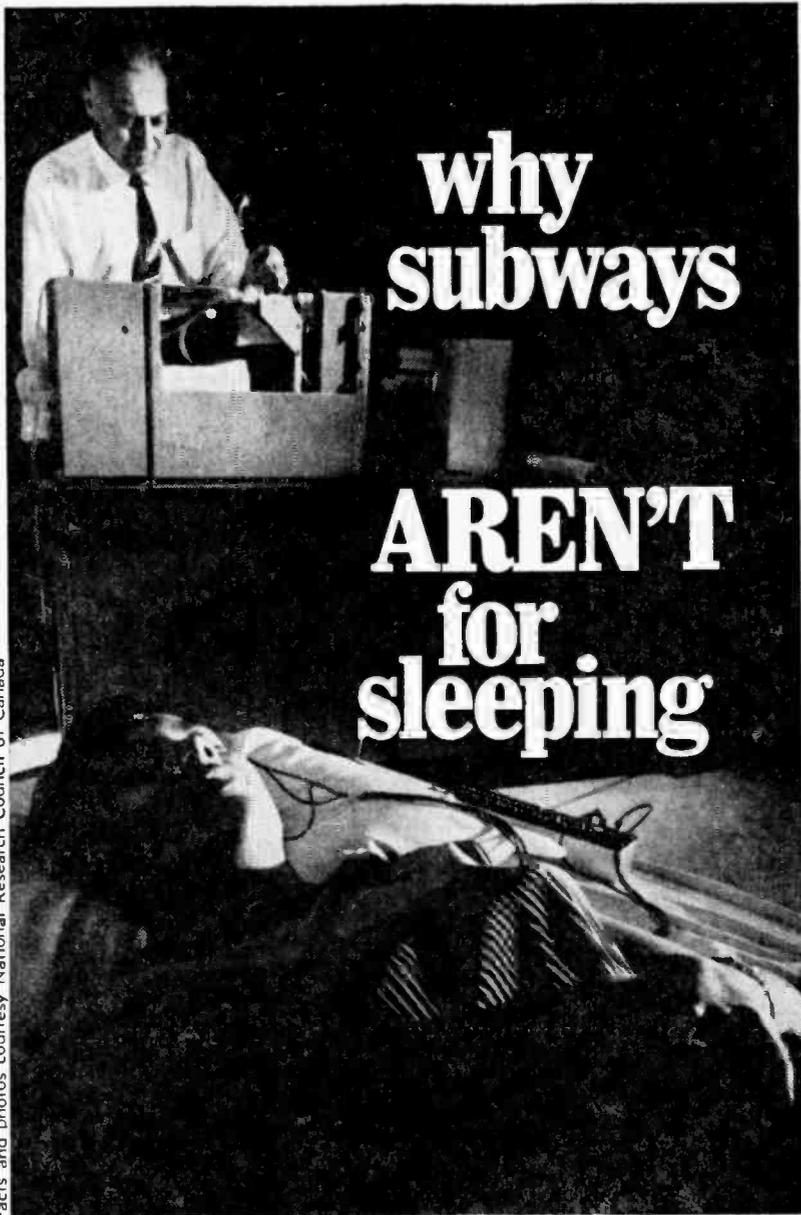


Super-speaker powerhouse (in dead center) is small enough to be tucked away inside Bell whirlybird. Unit operates off 28 VDC.



Power-packing 4-speaker array mounted on helicopter stands ready to belt out decibels to entire enemy audience within earshot.

Facts and photos courtesy National Research Council of Canada



why
subways

AREN'T
for
sleeping

■ A person who allows himself to be lulled to sleep by a quietly-playing radio may be harming himself without knowing it.

This is a preliminary finding of National Research Council of Canada scientists using a new high-speed method of analyzing the effects of noise, such as from traffic, on sleeping subjects. The NRC method permits eight hours of recorded brain wave patterns to be scanned in five minutes and is expected to eventually gain wide acceptance in other areas of sleep research.

While the number of subjects studied is still small, it is clear that levels of noise as low as 50 dB (the rating of a quiet radio) can disturb a sleeper without actually awakening him. The nature of the disturbance involves a change from a deep to a shallower sleep and this is known to be deleterious to a person's well-being.

(Continued on page 113)

Look What's New In Your



NEW kit MI-18-1

\$29⁹⁵

NEW kit MI-18-2

\$32⁹⁵

Heathkit Solid-State Tachometer

The Professional Tach. That's the new Heathkit MI-18. In Design: breaker point, "tach" lead or unique inductive pickup connection; use it with any spark-type engine and any ignition system, 2 cycle 1-6 cyl. engines or 4 cycle, 2-8 cyl. engines . . . all electronics are in the tach itself. In Performance: 0-6000 & 0-9000 RPM ranges . . . 250° edge-lighted dial . . . temperature-compensated, $\pm 4\%$ accuracy from 0° —120° . . . adjustable red line pointer . . . 10.5 to 17.5 VDC operation. In Styling: stainless steel hardware, splash-proof black & chrome case and scratch-proof glass face for use in rugged conditions. The MI-18-1 mounts in your dash — requires only a 3/4" hole & 2 1/4" depth. The MI-18-2 comes with mounting case & hardware. Put a Professional Tach in your car, boat, dune-buggy, or bike now — the Heathkit MI-18! Shpg. wt. 3 lbs.



NEW kit GR-17

\$43⁹⁵

Heathkit AM-FM Portable Radio

Here's performance others can't match. The new Heathkit GR-17 portable has 12 transistor, 7 diode circuit with the same front end as Heathkit hi-fi tuners; 3-stage IF; big 4" x 6" speaker; tone control; AFC on FM and amplified AGC on AM; built-in AM rod antenna plus telescoping 34" FM antenna; 350 milliwatt output; and 200-300 hour battery life. Shpg. wt. 5 lbs.



NEW kit AD-27

\$169⁹⁵

Heathkit FM Stereo COMPONENT-COMPACT

This new Heathkit AD-27 stereo compact has features not found in other units costing twice as much for one very simple reason. It wasn't engineered to meet the usual level of compact performance. Instead, Heath took one of its standard stereo/hi-fi receivers, the AR-14, and re-arranged it physically to fit a compact configuration. The result is performance that is truly high fidelity without compromise. It features 31 transistor, 10 diode circuitry with 15 watts per channel dynamic music power (enough to let you choose most any speaker systems you prefer), full-range tone controls, less than 1% distortion, and 12 to 60,000 Hz response. The pre-assembled FM stereo tuner section with 4-stage IF offers 5 μ V sensitivity, excellent selectivity, AFC, and the smoothest inertia tuning. The BSR McDonald "500" turntable offers features usually found only in more expensive units . . . like low mass tubular aluminum tone arm, anti-skate control, cueing and pause control, plus a Shure magnetic cartridge with diamond stylus. It's all housed in a smart oiled walnut cabinet with sliding tambour door that disappears inside the cabinet. For value and performance choose the AD-27, the new leader in stereo compacts. Shpg. wt. 41 lbs.

NOW, THE TUNER AND AMPLIFIER OF THE FAMOUS HEATH AR-15 RECEIVER ARE AVAILABLE AS SEPARATE COMPONENTS



NEW kit AJ-15

\$189⁹⁵*

HEATHKIT AJ-15 Deluxe Stereo Tuner

For the man who already owns a fine stereo amplifier, and in response to many requests, Heath now offers the superb FM stereo tuner section of the renowned AR-15 receiver as a separate unit. The new AJ-15 FM Stereo Tuner has the exclusive design FET FM tuner for remarkable sensitivity, the exclusive Crystal Filters in the IF strip for perfect response curve and no alignment; Integrated Circuits in the IF for high gain, best limiting; elaborate Noise-Operated Squelch; Stereo-Threshold Switch; Stereo-Only Switch; Adjustable Multiplex Phase, two Tuning Meters; two variable output Stereo Phone jacks; one pair variable outputs plus two fixed outputs for amps., recorders, etc.; front panel mounted controls; "Black Magic" panel lighting; 120/240 VAC operation. 18 lbs. *Walnut cabinet AE-18, \$19.95.



NEW kit AA-15

\$169⁹⁵*

HEATHKIT AA-15 Deluxe Stereo Amplifier

For the man who already owns a fine stereo tuner, Heath now offers the famous amplifier section of the AR-15 receiver as a separate unit. The new AA-15 Stereo Amplifier has the same superb features: 150 watts Music Power; Ultra-Low Harmonic & IM Distortion (less than 0.5% at full output); Ultra-Wide Frequency Response (± 1 dB, 8 to 40,000 Hz at 1 watt); Ultra-Wide Dynamic Range Preamp (98 dB); Tone-Flat Switch; Front Panel Input Level Controls; Transformerless Amplifier; Capacitor Coupled Outputs; Massive Power Supply; All-Silicon Transistor Circuit; Positive Circuit Protection; "Black Magic" Panel Lighting; new second system Remote Speaker Switch; 120/240 VAC. 26 lbs. *Walnut cabinet AE-18, \$19.95.

Free 1969 Heathkit® Catalog

**New Lower Prices On Heathkit Color TV
Make Them A Better Buy Than Ever!**

Deluxe "295" Color TV...Model GR-295 ^{now only} **\$449⁹⁵**
(less cabinet)

New improved phosphors and low voltage supply with boosted B+ for maximum color fidelity and operation • automatic degaussing • exclusive Heath Magna-Shield • ACC and AGC assures color purity, flutter-free pictures under all conditions • preassembled IF with 3 stages instead of the usual 2 • deluxe VHF turret tuner with "memory" fine tuning • choice of installation—wall, custom or optional Heath factory assembled cabinets • Easy to assemble.

Big, Bold, Beautiful... With Advanced Features and Exclusive Heathkit Self-Servicing. Top quality, American brand color tube... 295 sq. inch viewing area. The built-in dot generator and full color photos and simple instructions let you set-up, converge and maintain the best color pictures at all times. Add to this the detailed trouble-shooting chart in the manual and you put an end to costly TV service calls for periodic picture convergence and minor repairs.

GRA-295-4, Mediterranean cabinet shown..... \$119.50
Other cabinets from \$62.95

Deluxe "227" Color TV...Model GR-227 ^{now only} **\$399⁹⁵**
(less cabinet)

Has same high performance features and built-in servicing facilities as the GR-295, except for 227 sq. inch viewing area. The vertical swing-out chassis makes for fast, easy servicing and installation. The dynamic convergence control board can be placed so that it is easily accessible anytime you wish to "touch-up" the picture.

GRA-227-1, Walnut cabinet shown..... \$59.95
Mediterranean style also available at \$99.50

Deluxe "180" Color TV...Model GR-180 ^{now only} **\$349⁹⁵**
(less cabinet)

Same high performance features and exclusive self-servicing facilities as the GR-295 except for 180 sq. inch viewing area. Feature for feature the Heathkit "180" is your best buy in deluxe color TV viewing... tubes alone list for over \$245. For extra savings, extra beauty and convenience, add the table model cabinet and mobile cart.

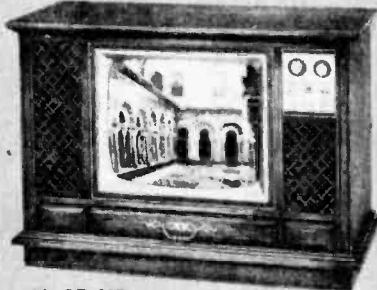
GRA-180-5, table model cabinet and cart..... \$39.95
Other cabinets from \$24.95

Now, Wireless Remote Control For Heathkit Color TV's

Control your Heathkit Color TV from your easy chair, turn it on and off, change VHF channels, volume, color and tint, all by sonic remote control. No cables cluttering the room... the handheld transmitter is all electronic, powered by a small 9 v. battery, housed in a small, smartly styled beige plastic case... feather-light and contoured to fit comfortably in your hand for easy pushbutton operation. The receiver contains an integrated circuit (15 resistors, 10 transistors, 1 diode) and a meter for adjustment ease. Circuit board construction and plug-in wire harness make installation of receiver and control motors easy. For greater TV enjoyment, order yours now.

kit GRA-295-6, 9 lbs., for Heathkit GR-295 and GR-25 Color TV's..... \$69.95
kit GRA-227-6, 9 lbs., for Heathkit GR-227 and GR-180 Color TV's..... \$69.95

**3 HEATHKIT® COLOR TV'S
NOW! ALL WITH 2-YEAR
WARRANTY ON PICTURE TUBE**



kit GR-295



kit GR-227



kit GR-180



**NEW Wireless
TV Remote Control**

\$69⁹⁵

FREE 1969 Heathkit Catalog

Shows these and over 300 other easy-to-build kits that save up to 50%... Electronic Organs, Stereo, Marine, CB, Ham Radio, Test, Photography, Educational for home & hobby. No skills or experience needed. Send for your free copy today. Mail coupon or write Heath Co., Benton Harbor, Michigan 49022.

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CL-343

Forecast

Propagation Forecast

By C. M. Stanbury II

December 1968/January 1969

□ Probably the biggest surprise of this current sunspot cycle, and we have now just about reached its peak, is the continued abundance of DX on lower shortwave frequencies. This past summer, when reception below 6 MHz should have been at its worst, the DX continued to roll in, especially on 60 meters.

With the static level now reaching its annual low, 60-meter reception will be even better from Central Africa (see Forecast table), while 90 meters should also be watched closely for unusual Central African DX. And although South Pacific reception will have been reduced to a trickle (it is midsummer down there) both 60- and 90-

PEAK LISTENING PERIODS		
Area	EST	PST
ASIA (except Near East)	0300-0900	2100-0900
EUROPE, NEAR EAST, & AFRICA (N. of Sahara)	1500-2400	0300-0600 1200-2100
AFRICA (S. of Sahara)	1500-1800 2100-0200	1800-2300
SOUTH PACIFIC	0300-0900	0000-0900
LATIN AMERICA	1800-0800	1300-0500

meter bands will provide SWLs with some excellent Latin American loggings north of the Tropic of Capricorn. When to listen? Why, check our Peak Listening Periods table and good DX to you! ■

RADIO-TV EXPERIMENTER PROPAGATION FORECAST					
Dec. 1968/ Jan. 1969 LISTENER'S STANDARD TIME	ASIA (except Near East)	EUROPE, NEAR EAST & AFRICA (N. of the Sahara)	AFRICA (S. of the Sahara)	SOUTH PACIFIC	LATIN AMERICA
0000-0300	19, 25	41, 49	49, 60e, (90e)	25	49, 60
0300-0600	(25, 31), 41, 49	31	(31-poor)	25, 31, (41w)	49, 60
0600-0900	(25, 31), 41, 49	16, 19	19	25, 31	49, (60)
0900-1200	19, 25	13, 16, 19	19, 25	19	31
1200-1500	16, 19	13, 16, 19	(19), 25	(25-poor)	19
1500-1800	16, 19	(19), 25, 31, (49)	31, 60e	(19-poor)	31
1800-2100	16, 19	25, 31	31, 60w, (90w)	16, 19	49, 60, 90
2100-2400	16, 19	25, 31	60, (90)	16, 19	49, 60, 90

To use the table put your finger on the region you want to hear and log, move your finger down until it is alongside the local standard time at which you will be listening and lift your finger. Underneath your pointing digit will be the shortwave band or bands that will give the best DX results. The time in the above propagation table is given in *standard time* at the listener's location, which effectively compensates for differences in propagation characteristics between the East and West Coasts of North America. Abbreviations: w—Western North America and e—Eastern North America. When w or e follow a band listing, it means the band is only good for that part of the continent. The shortwave bands in brackets are suggested as possible second choices. Refer to White's Radio Log for our world-wide Shortwave list.

eavesdropping on the spies



You make like The Man From UNCLE for the SW thrill of a lifetime!

By Don Jensen

■ Early on a Thursday morning in 1957, a 22-year-old airman sat alone in the living room of his house trailer near Malmstrom Air Force Base, Montana. He tuned his Hallicrafters shortwave receiver to the proper frequency and waited. At exactly 7:05 a.m., the set's speaker came to life. Quickly, the young man picked up a pencil and began jotting down the details of the transmission.

But Airman Second Class Robert Glenn Thompson was no ordinary shortwave listener. He was a Russian spy and the message he copied so carefully was a secret coded instruction from Moscow.

Was Thompson the only American to hear the transmission that Thursday? Perhaps, but conceivably the message, like dozens of similar ones aired every day, could have been picked up by any shortwave listener.

Done with Digits. Because these secret instructions are usually sent in a series of four- or five-digit code groupings, DX devotees of the game of "spy on the spies" have dubbed them the "numbers stations." While

the "numbers" game, in its present form, is largely a Cold War phenomenon, spy stations have a long, though inglorious, past. They can be traced back as far as 1915, when the Imperial German government sent Morse signals by spark-gap transmitter to its agents in North Africa, instructing them to cause trouble among the Berber tribes.

Easily heard by the average SWL, today's espionage broadcasts, beamed in various languages from transmitters on both sides of the Iron Curtain, provide a tantalizing glimpse into the shadowy world of the cloak and dagger.

In Steps Big Red. Thompson's role as a spy began in 1956, when the young intelligence clerk at Berlin's Tempelhof airport, fed up with his commander's petty complaints, attempted to defect to the Communists. At first he was rejected by Russian intelligence officers, but later, threatened with exposure of his offer to defect, Thompson was recruited as an espionage agent. During a five-day furlough from his military

eavesdropping

duties, the airman slipped behind the Iron Curtain to attend a spy school on the Black Sea. There he learned a smattering of Russian, elementary cryptology and the operation of certain radio equipment.

When he was reassigned by the Air Force to the Montana Strategic Air Command base, his Russian masters were delighted. They gave him \$1,000 and told him to buy a short-wave radio and a camera.

Thompson was given a code book and

Meanwhile, shortwave listeners built up their own unofficial file of data on the "numbers stations." This research showed that a large group of them operate between about 3 and 8 MHz. Some of these transmitters show up on approximately the same frequency, night after night. Other pop up unexpectedly on off-beat channels. One study of about 100 transmissions indicated the best time to tune for these signals may be between 2300 and 0500 GMT.

DXers report hearing spy transmissions in Russian, Czech, Polish, German, Spanish, Chinese, English, and occasionally in a gib-



Russian spy Colonel Rudolf Ivanovich Abel (left) is shown at time of his arrival in New York for arraignment by Federal Grand Jury; Russian Lt. Col. Reino Hayhanen (right) testified at trial.

was told when and where to tune for his radio instructions. He was to listen for his special call sign, the names of two Russian rivers, "Amur ja Lena," (not the more exotic, but erroneous, "Amour Lenin" call reported later by the press). The novice spy was taught to use his code book to decipher the "numbers" messages. But Thompson developed cold feet once back in the States and apparently never furnished his mentors with any more information.

In 1964, the FBI closed in and arrested Thompson, then a fuel oil distributor on Long Island. The following spring he was tried in Brooklyn federal court and was sentenced to 30 years imprisonment for "13 overt acts of espionage" while serving in Germany.

Tune 'em In. From Thompson and Soviet defectors like Reino Hayhanen, U.S. counter-intelligence specialists learned details of the "numbers" broadcasts. Further data came from government radio monitors.

berish that has been described as an artificial language. One listener, fluent in East European languages, heard a woman, speaking in Czech, add a final "greetings to our friends in the CIA." This barbed comment apparently was to let Western monitors know that those in charge of the transmission were aware of the eavesdropping.

American shortwave listeners have shown great interest in Spanish language "numbers stations," widely heard on many frequencies since the early 1960s.

TIME magazine once noted some of these Spanish "numbers" transmissions "probably originate no farther south than 'Little Havana,' in southwestern Miami." They have been attributed to anti-Castro exile organizations signaling sabotage teams within Cuba.

Others have theorized that at least some of these transmitters are operated secretly by the Central Intelligence Agency, possibly from locations near the nation's capital and

Typescript copy, originally appearing in the book entitled *The Code Breakers*, closely resembles original of one-time or "gamma" pad found on Communist spies captured in Japan in 1961. In use, one side is employed for enciphering (coding), the other for deciphering (decoding).

39892	09897	07361	35736	38309	69801	56628	37254	61467	52308
33571	01448	63458	24848	30238	08098	14542	31851	07595	77970
27135	40220	47079	71707	80533	01536	97896	88209	71480	42063
49941	56035	48846	15111	59324	57188	83556	96509	08657	46861
10051	21816	62553	86240	99495	75643	56639	05326	97662	54705
40048	55040	17710	60896	94366	58493	69423	44744	07023	50651
11512	18996	91403	40539	50135	43896	70213	66610	65808	03001
74168	69956	53870	02897	18192	06724	13542	87558	11061	71468
20349	15133	12850	56853	47799	16904	59633	10280	50670	51183
20883	94649	78587	63065	94545	92600	10425	35051	98370	35554
51802	14552	07608	38392	22224	99718	57838	08540	62986	40799
20348	29842	76282	49048	51771	95196	30638	03983	76992	72652
98905	46438	78295	72769	07178	77170	45854	58100	40649	42651
53669	33304	18152	17691	54117	35868	60370	62207	91750	93298
08658	97627	93221	37250	66427	66368	08297	37727	99832	89892
52053	66220	87679	61332	81960	83742	23755	03930	41515	10297
54208	37131	32366	77519	57374	95762	25255	38703	20509	40545
06587	04827	18084	80286	29274	23049	07180	95128	34875	81629
54419	64469	20538	15087	89185	72724	98390	98735	09156	04417
52776	73748	01537	27259	51549	23888	63783	92325	29209	10390



American spy Robert Glenn Thompson (center) is flanked by two FBI agents as he is led from FBI headquarters in New York for arraignment in Federal court for supplying data to U.S.S.R.

in Florida. Certainly some of these Spanish spy broadcasts are directed to clandestine agents inside Cuba and must originate, with the tacit approval of the government, from U.S. territory.

Still other Spanish "numbers" outlets are probably the work of the Castro regime, beaming instructions to insurgency teams throughout Latin America.

Ain't Crackable! DXers, inspired by Edgar Allan Poe's "The Gold Bug," a novel popularizing cryptography, tried their hand at deciphering the signals by studying the most frequently appearing digits. In English, for example, "e" is the most common letter, followed by "t," "r," "i," "n," "o" and "a." The most frequently used letter in Russian is "b." But they were on the wrong track. Today's espionage makes use of much more sophisticated enciphering techniques.

A favorite method of the Russian spy agency, KGB, makes use of the "gamma," or one-time code pads, together with special

key phrases known only to the individual spy and his masters.

Thompson was required to memorize the phrase, "*Die Buchhandlungen Wirtschaft*," which translates to "the bookstores management," in German. Hayhanen's key included the Russian word for snowfall, "*snegopa*," and the first 20 letters of a folk song.

The heart of these cipher systems is the "gamma" code pad. Ranging from cigarette pack to postage stamp size, these tiny booklets contain as many as 250 pages of highly inflammable celluloid material, which can be destroyed quickly.

On each page there are scores of five-digit figures. Pages to be used for deciphering the "numbers" messages are printed in red. Others, printed in black, are used for enciphering outgoing messages. The spy's own reports, incidentally, are rarely sent by radio, due to the ease with which authorities are able to pinpoint (Continued on page 117)



Control box in hand, Saul readily convinces robot to demonstrate its spectacular feats. Robot can open its mouth, blink its eyes, walk, turn, wave its arms.



MAD



FACTS AND PHOTOS BY THREE LIONS

Above, Saul and his brother Lenny search through junkbox for parts for robot.



During initial test run, robot opened and closed its mouth at first command of its master. Right, monster shies from lighted match in manner of Smokey The Bear.

ABOUT MONSTERS

Not one, but two robots now lay in the creative wake of an ingenious Brooklyn boy, who may outdo Frankenstein himself with Monster No. 3!

■ When can a man be called mad about monsters? Why, when he's built not one, but two, and both with his own brain- and brawn-power!

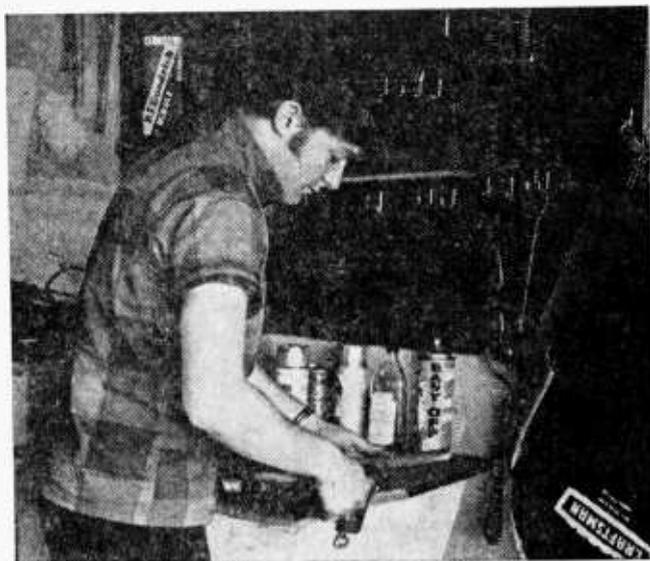
The man in this instance is actually still a teen-ager, Saul Gottlieb of Brooklyn, N.Y. First monster born of Saul's penchant for robots saw the light of day while Saul was still in the ninth grade (it won its master second place in a city-wide competition). Not entirely satisfied with his earlier effort, Saul recently went one better to create the monster pictured here.

Constructed during his lunch hours, Saul's latest robot is a silverish-colored plywood conglomeration of materials found in local junkyards and in the Gottlieb home. Bat-

Second success story for 19-year-old Saul Gottlieb of Brooklyn, N.Y., second robot was constructed of silver-painted plywood and junkbox parts. Working chiefly during his lunch hours,

Saul put robot together in his school's wood and metal shops over a three-month period.

Completed monster was exhibited at American Institute's Thirtieth School Science Fair.



MAD ABOUT MONSTERS



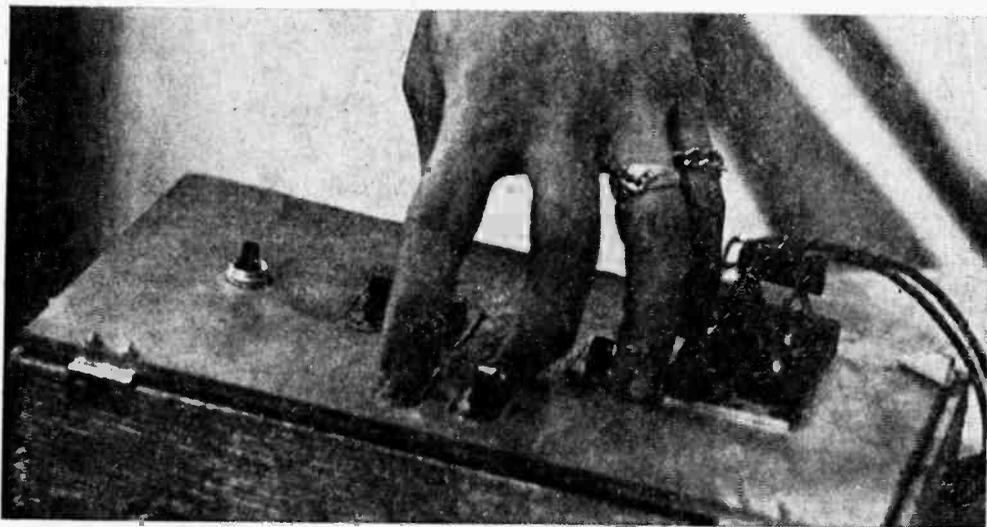
tery- and AC-operated, it includes relay switches concocted from coils of an Army telephone and a transformer lifted from an old road-racing set.

In addition to performing a variety of arm, leg, eye, and mouth movements, the completed monster also turns away from fire and follows an aluminum-foil track with the help of photoelectric eyes in the form of two cadmium cells. Could an even more sophisticated robot emerge from Saul's drawing board? "Sure will," proclaims Saul, who's quick to admit he goes for monsters *rrrrrrmmmf!* —C. Hansen

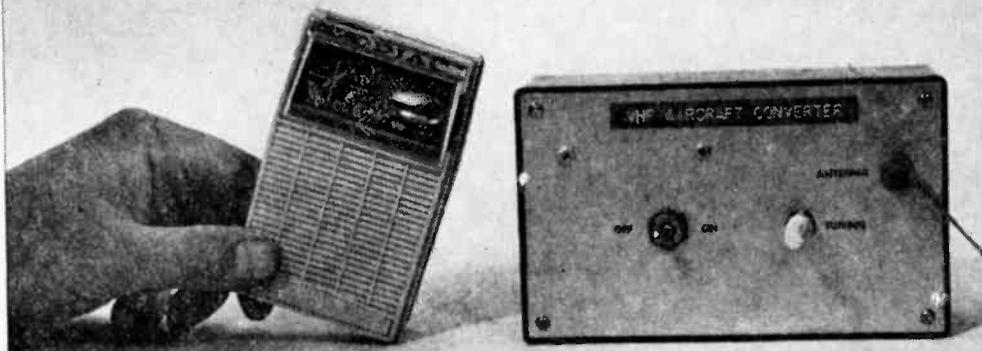


Saul culled from many a source book before finalizing plans for his second robot.

Guts of monster (above) include parts of his mother's rotisserie and toy submarine; details of control panel are shown below.



Want some instant VHF? Here's a 7-buck aircraft convertor that gets you airborne fast!



SONIC BOOMER

Herb Friedman, W2ZLF/KBI 9457

■ If you're tired of the same old shortwave fare, why not join the airlift to the frequencies from 118 to 128 MHz? Assuming you live close to an airport (and who doesn't?), you can ride along in the cockpit while the pilot chats with the control tower.

All it takes for instant vhf is a handy little device that converts vhf aircraft frequencies to around 1600 kHz on the broadcast band. Just set up your Sonic Boomer near a BC radio and you can tune in the planes and tower as easily as a local rock station.

Mighty Midget. The convertor shown in our photos costs under \$7.00, or about \$6.00 if you already have a toggle switch and battery in your junk box. Heart of the Sonic Boomer is a solid-state module which is supplied ready-to-go for only \$5.00. All you add is the battery, power switch, and cabinet.

The Cordover module (see Parts List) works on the *radiation principle*. There is no need for a direct connection between the convertor and radio. You simply place an ordinary transistor radio next to the Sonic Boomer and vhf radio signals will be received at approximately 1600 kHz.

The module is amazing but no great mystery. Inside is a local oscillator that hetero-

dynes the received vhf signal. A *beat* frequency results, and this is radiated as an RF carrier into your radio.

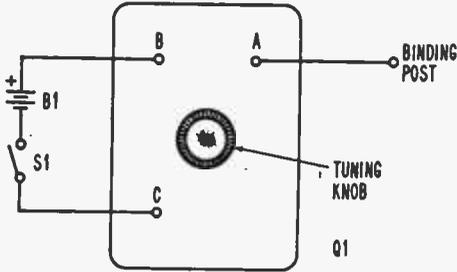
For a practical example, assume the desired aircraft signal is at 120 MHz. When you adjust the built-in coil slug, the convertor's oscillator tunes to 119 MHz, the 120-MHz signal is heterodyned by the local oscillator, and the module's output now contains both the sum and difference frequencies of 120 and 119 MHz. These are, respectively, 239 MHz and 1 MHz. Note that it is the *difference* signal which falls in the broadcast band, so if we tune our radio to 1000 kHz (1 MHz) we will receive the original aircraft signal.

Of course, there may be a radio station broadcasting at 1000 kHz, so you might get nothing but interference. In practice, the module's oscillator frequency is adjusted so that the difference frequency is approximately 1.6 MHz (1600 kHz), which is a more quiet spot on the dial. When your BC radio is placed near your convertor it picks up the original modulation at this much lower frequency.

Construction. What there is, is very little indeed. The Sonic Boomer is mounted on the aluminum front panel of a Bakelite util-

SONIC BOOMER

CM-A MODULE (BOTTOM VIEW)



Entire vhf converter consists of only three parts: Cordover CM-A module, 9-V battery, and spst toggle switch. That's all that's to it!

ity case. The locking flange of the tuning coil holds the module in place. Proper size hole for the coil is 27/64 in.

Besides the module, you need mount only an insulated binding post, an spst toggle switch, and a battery holder. The battery holder is of the *polarized* variety and has a red plastic ring around the positive terminal. This ensures that the battery will not be installed incorrectly. While not absolutely necessary, the holder is a good idea if you want to avoid damaging the module.

No connection is made to the front panel. The negative lead from the battery goes to terminal C of the module. The positive connection is made at terminal B, while an insulated binding post is connected to terminal A. And that's it—just three components and three connections.

Tuning Tips. Your radio should be tuned to an unused frequency near 1600 kHz. Connect a 2-ft wire (nothing longer) to the binding post and turn power switch S1 *on*. Move the radio around the convertor until you hear maximum noise from the speaker. Then back the tuning slug all the way out and turn it in very slowly until you hear a signal.

You can *trim* the tuned signal for better reception by slightly turning the radio's dial. If you have an RF signal generator, set the generator to local aircraft frequencies and adjust the convertor until you pick up the generator's modulated output. Turn off the generator and then zero in on the desired station.

Keep in mind that aircraft transmissions are brief. Therefore, tune across the band very *slowly* when searching for a station

PARTS LIST FOR SONIC BOOMER

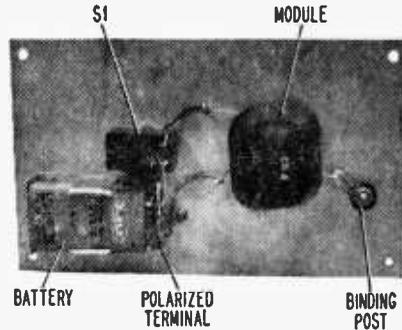
B1—9-V transistor battery (Burgess 2U6 or equiv.)

Q1—Converter module (Cordover CM-A)

S1—Spst toggle switch (Lafayette 99H6150 or equiv.)

Misc.—Utility case (Lafayette 99H6272 or equiv.), insulated binding post, polarized battery holder (Keystone 203P or equiv.), antenna wire, decals, solder, wire, hardware, etc.

Note—the aircraft convertor module is available from Carl Cordover & Co., 104 Liberty Ave., Mineola, N.Y. 11501 for \$5.50, including postage and handling. The module is also available at most Lafayette Radio Associate Stores for \$5.00.



Note that connections to module are soldered directly to the leads coming from its funny-looking case. No connections are made to the panel; be sure binding post is insulated.

(you may miss something if you're not careful). When you have the tuning set, you can mark the tuning knob and count the number of turns to your target.

So much for instant vhf! Now how about a cup of instant coffee to go with it? ■



To receive aircraft signals, simply place your BC radio near convertor and move it about slowly until the radio peaks at its maximum volume. Tuning it will be a slow process.

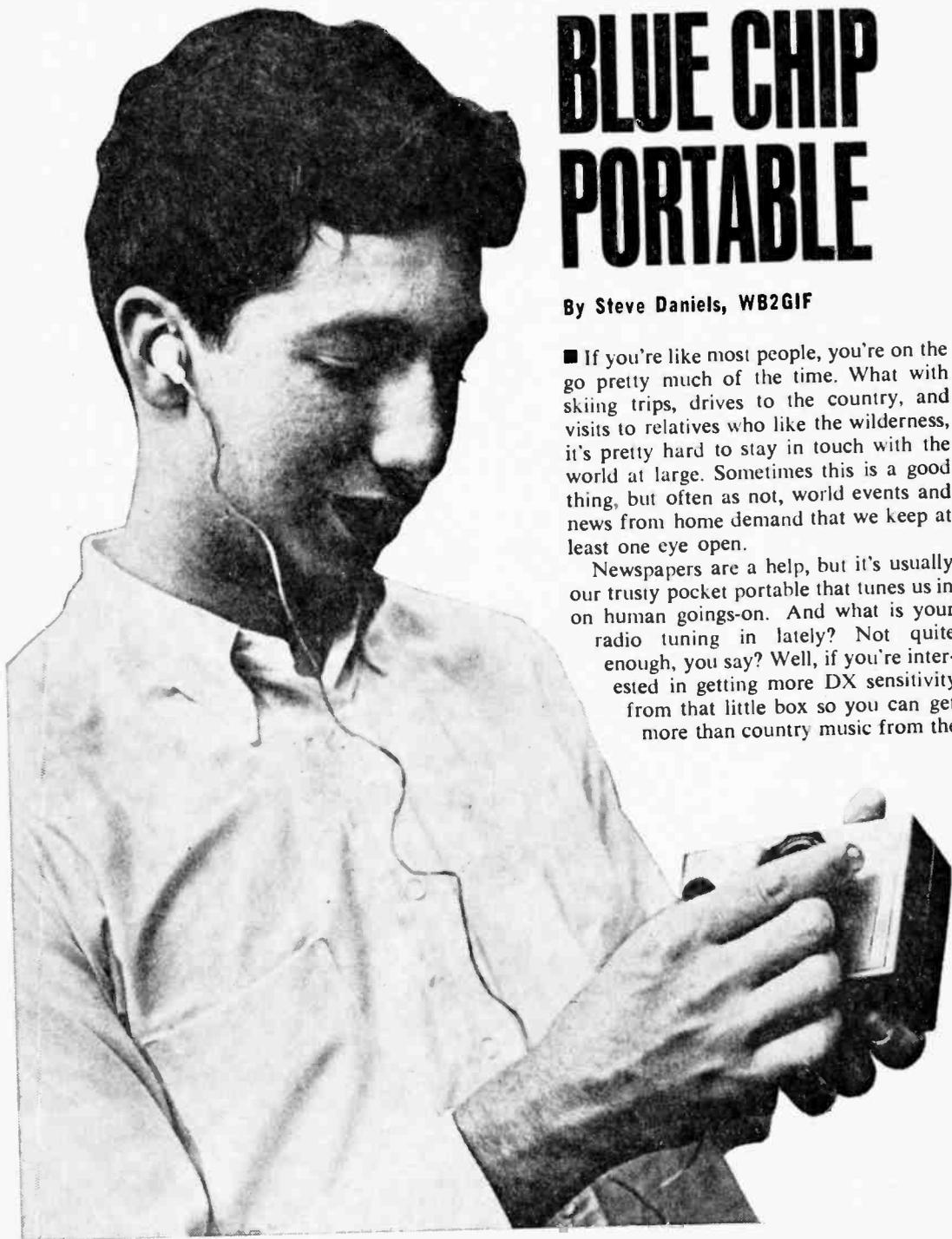
BCB MEANS BC BLASTER WHEN THE CHIPS START TO FALL!

BLUE CHIP PORTABLE

By Steve Daniels, WB2GIF

■ If you're like most people, you're on the go pretty much of the time. What with skiing trips, drives to the country, and visits to relatives who like the wilderness, it's pretty hard to stay in touch with the world at large. Sometimes this is a good thing, but often as not, world events and news from home demand that we keep at least one eye open.

Newspapers are a help, but it's usually our trusty pocket portable that tunes us in on human goings-on. And what is your radio tuning in lately? Not quite enough, you say? Well, if you're interested in getting more DX sensitivity from that little box so you can get more than country music from the



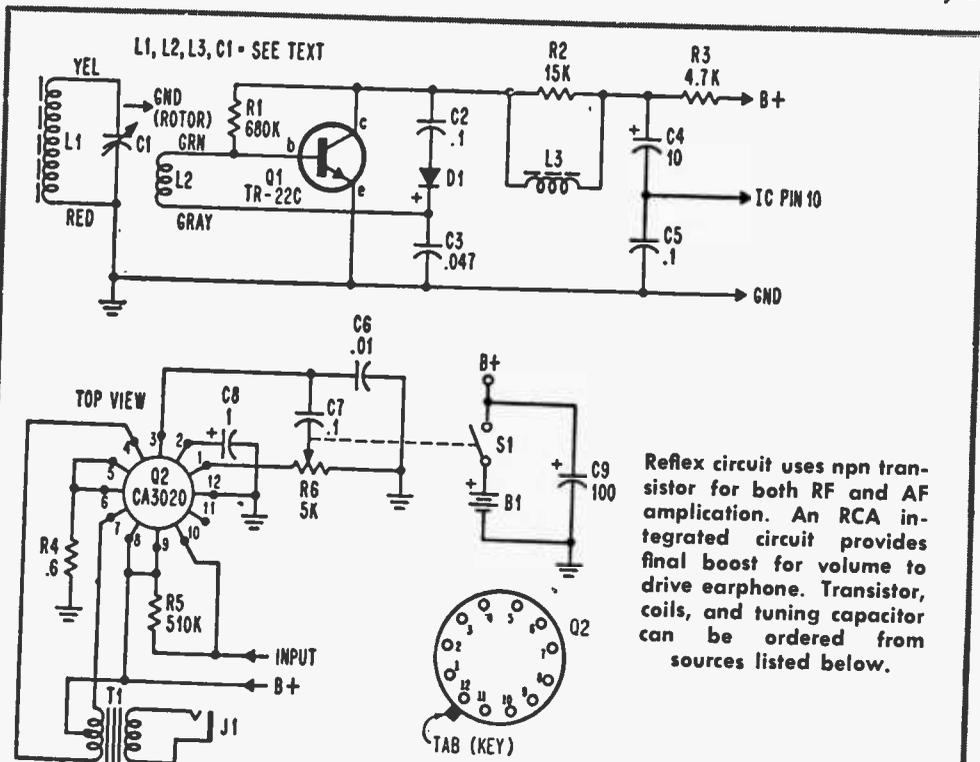
BLUE CHIP PORTABLE

next county, turn on our Blue Chip Portable and listen in big.

Chips Galore! This portable has a hy-

brid circuit that makes solid-state listening quicker than liquor for a real groovy time—and that isn't an olive in there, son! An npn transistor and integrated circuit (IC) are placed back to back for a truly unique package.

The unusual sensitivity and selectivity of



Reflex circuit uses npn transistor for both RF and AF amplification. An RCA integrated circuit provides final boost for volume to drive earphone. Transistor, coils, and tuning capacitor can be ordered from sources listed below.

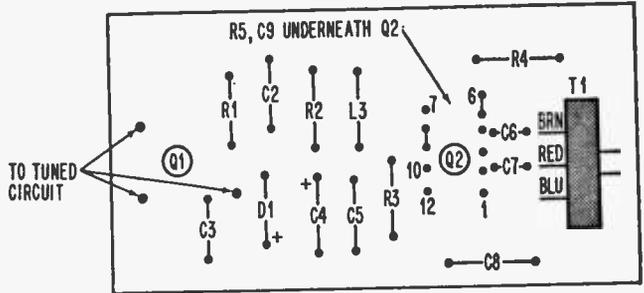
PARTS LIST FOR BLUE CHIP PORTABLE

- B1—9-V transistor battery (Burgess 2U6 or equiv.)
 - C1—H.M. Smith 2418-6 variable capacitor (see text)
 - C2, C5, C7—.1- μ F, 10-VDC disc capacitor
 - C3—.047 μ F, 10-VDC disc capacitor
 - C4—10- μ F, 10-VDC miniature electrolytic capacitor
 - C6—.01- μ F, 10-VDC disc capacitor
 - C8—1- μ F, 15-VDC miniature electrolytic capacitor
 - C9—100- μ F, 15-VDC miniature electrolytic capacitor
 - D1—1N64 germanium point-contact diode (Sylvania)
 - J1—Miniature phone jack (see below)
 - L1, L2—H.M. Smith 2418-8 loopstick (see text)
 - L3—H.M. Smith 2418-7 choke (see text)
 - Q1—Npn transistor (International Rectifier TR-22C)
 - Q2—Integrated circuit (RCA CA3020)
 - R1—680,000-ohm, $\frac{1}{2}$ -watt resistor
 - R2—15,000-ohm, $\frac{1}{2}$ -watt resistor
 - R3—4700-ohm, $\frac{1}{2}$ -watt resistor
 - R4—0.6-ohm, $\frac{1}{2}$ -watt resistor (9 in. of Belden #8817 litz wire wound over and soldered to any value over 1000 ohms)
 - R5—510,000-ohm, $\frac{1}{2}$ -watt resistor
 - R6—5000-ohm miniature potentiometer with spst switch
 - S1—Part of R6
 - T1—125-ohm (CT) pri., 8-ohm sec., output transformer (Argonne AR-176, Lafayette 33H8571 or equiv.)
- Misc.—4 $\frac{1}{2}$ x 3 $\frac{1}{2}$ x 2-in. utility box, perf board, flea clips, earphone with miniature phone plug and matching jack (Lafayette 99H2541 or equiv.), battery clip (Lafayette 99H6287 or equiv.), knobs, $\frac{1}{4}$ -in. spacers, wire, solder, hardware, etc.
- Note—L1/L2, L3 and C1 are available from H.M. Smith, Inc., 812 Snediker Ave., Brooklyn, N.Y. 11207. Prices are \$1.50, 35¢, and 90¢, respectively, not including postage and handling. The International Rectifier TR-22C transistor can be ordered from Arrow Electronics Inc., 900 Broad Hollow Rd., Rte. 110, Farmingdale, N.Y. 11735. Price is 90¢, not including postage and handling.

the front end is made possible by a high-Q tuned circuit and a reflex RF stage. Signals picked up by the special loopstick are inductively coupled to the base of Q1 where they are amplified. However, the combined RF and audio signals can't get past the reactance presented by R2 and L3, so they are shunted through C2 to D1 which detects the signal.

The RF carrier is bypassed to ground through C3 (due to its low high-frequency reactance) and the audio is fed back to the base of the transistor for reamplification. Audio appearing at the collector can now get past the R2/L3 combination since this combo presents much less reactance to low frequencies. C4 couples the signal to the audio stage, and C5 bypasses any remaining RF to ground.

The original circuit was developed by Philips-Norelco, and is the one used in the Norelco Electronic Educational kits. Use of the loopstick, variable capacitor, choke, and transistor listed (see Parts List) is recommended because the circuit is sensitive with regard to transistor gain and the Q of



other parts (all are Norelco components).

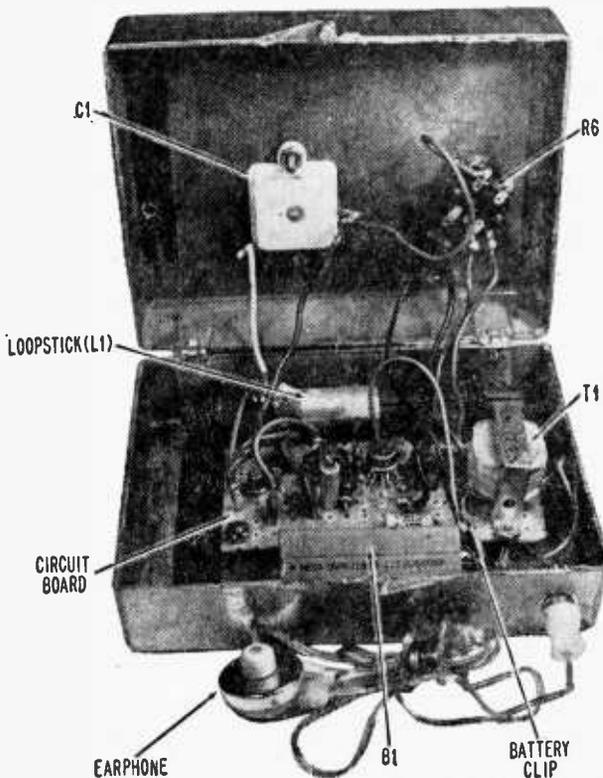
The audio circuitry is in an RCA CA3020 IC. It consists of a class A preamplifier with a quasi-complementary emitter-follower output. It can deliver ½ watt at 3% distortion using a 9-volt source.

Building It. In order to prevent the high gain of this circuit from throwing the front end into oscillation, a tight wiring job in the RF stage is a necessity; and it's almost as critical in the audio, IC stage. Mount the pot, variable capacitor, loopstick, and phone jack in the case. The author used a 4½ x 3½ x 2-in. plastic box, but you can use whatever is best for your needs.

Connect the red lead from the loopstick, one terminal each from the switch and pot, and a 6-in. length of wire to the *rotor* of the variable capacitor. This goes to ground. The loopstick is best secured with a bit of epoxy cement. Wire the balance of the circuit on a piece of 2 x 4-in. perf board. The RF stage is straightforward, so just follow the photo and diagrams.

When you get to the audio stage, place 5 flea clips immediately after the B+ resistor R3 (see circuit layout). Put another (6 clips in a second row facing T1). Clip off lead 11 from the IC (see schematic).

Bend leads 7 through 12 for the IC toward the row closer to the RF stage, and bend the remaining 6 leads toward the second row. Clip, bend, and position the leads as required to mount the IC as shown in the photo. (Continued on page 112)

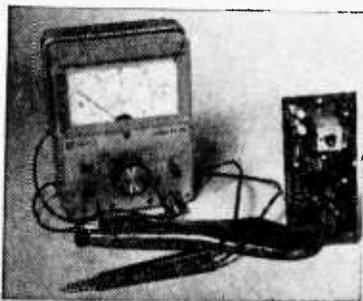


Components fit into plastic box with ease. Use spacers to mount perf board in bottom half of box, leaving space for earphone at left. Layout for perf board can be seen in drawing at top of page.

IMAGINEERING DESIGN TIPS



Photos by Moto



BETTER LUCK WITH LOCK

● Printed circuit boards are troublesome when it comes to checking component values with an ohmmeter, disconnecting and installing new parts, or just visually inspecting them. Next time you want to hold a board in place and leave both hands free, use the locking pliers-wrench. Use just enough pressure to grip the board so it will stand up and stay put.

—Joe Gronk



CHART THE FUTURE IN PLASTIC

● That portable radio or hi-fi set may be new today, but a few years from now Father Time will see to it that parts replacement are needed. Unfortunately, the transistor or tube location chart or battery chart would have long since peeled away into brown dust. Laminate charts in plastic as you would important ID cards. Epoxy plastic inside unit.

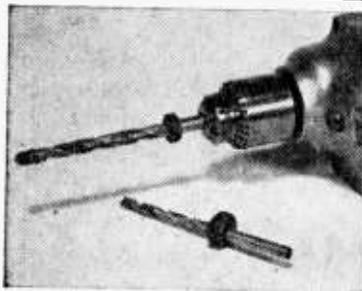
—M. Stubblefield



TIPS ON CLEANING TIPS

● The soldering iron tip is the champion crud collector in your workshop. Just plug it in and watch the tip go to work. Even the plated types collect this crusty crud. Removing the crud is easy. Just wipe the tip lightly across the wet sponge surface of a finger moistener used in banks to count money. Stubborn scales can be removed with an ink eraser.

—Al Wise



RUBBER BUMPER IS BETTER

● Next time you're drilling a hole in a pre-painted aluminum chassis or on a finished surface, don't worry about the chuck scarring the metal as the bit drills through. Just slip a rubber grommet on the bit and push it up near the chuck. Now, as the chuck drops to the surface of the drilled material, the grommet will take the punishment.

—Harry Gray

● Send your Imagineering Design Tips with full details and a photo or drawing to Radio-TV Experimenter, 229 Park Ave. South, New York, N.Y. 10003. The top ideas selected by the editors will win \$10.00. Entries become the property of Radio-TV Experimenter and can't be returned.



H.H. SCOTT MODEL LT-112B
Broadcast-Monitor
FM-Stereo Tuner

■ Though billed as a kit, the Scott LT-112B is more properly described as a semi-kit, intended to give a novice at construction the opportunity of obtaining a stereo tuner of broadcast-monitor quality at an extremely reasonable price. Featuring FM-only reception, the LT-112B offers several features not normally found on consumer-type FM tuners.

Three controls determine the mode of operation. The function switch selects either normal operation, a sub-channel filter to reduce noise which might appear on the stereo sub-channel, or a noise filter which reduces noise on both mono and stereo signals (such as might be required for fringe-area reception). The noise filter works by slightly reducing the high-frequency response.

A selector switch selects either the mono or stereo modes and also controls operation of the interstation muting circuits, which mute the receiver between stations to avoid sharp noise bursts. When the selector switch is set to mono-muting *off* or mono-muting *on*, both stereo and mono broadcasts are received mono. When the selector switch is set to the auto-stereo position, the tuner automatically switches to the stereo mode for stereo broadcasts. Again, this feature is available with muting *on* or *off*. A front-panel stereo indicator lamp shows when a station is transmitting a stereo program.

The third switch determines the function of the built-in meter, which can indicate signal strength, multipath, center tuning, or align (the align position being used only when the kit is initially adjusted by the builder).

The multipath meter is somewhat unusual and requires an explanation. Normally, when set to the multipath position, the meter will indicate the same as when set to the signal-strength position. If the signal is free from multipath reflections the meter will show no change in level. But should there be multipath interference the meter will kick downward, following the modulation. The greater the multipath interference the greater the downward deflection of the meter's pointer. Therefore, to orient an antenna for minimum multipath sensitivity, it's only necessary to position the antenna for minimum deflection of the meter pointer.

In and Out. Three antenna terminals allow connection of an external or internal antenna. The external antenna terminals are unbalanced to ground and match 300 ohms. A jumper bar can be used to connect the internal antenna—which is a capacitor to the AC line cord—to the “high” antenna terminal. Naturally, while the built-in line antenna might give adequate performance in an area of private homes, you can expect severe multipath if you rely on it for reception in an apartment house.

There is a total of four output connections for each channel. The direct AF output, which is fully adjustable from *off* to maximum output through internal controls accessible through the cover, has two jacks per channel. One is for driving an amplifier, the other for a tape recorder or second amplifier drive.

A third output is a panel-mounted headset (stereo) jack, intended for medium-impedance headphones. (Inserting a headset does not disable the amplifier outputs.) The fourth channel output is for an oscilloscope and is intended for observation of multipath interference (professional use).

In addition to the panel-selected noise filters, the LT-112B incorporates a special anti-noise circuit that switches the receiver to mono should the noise level be too high for good stereo reception. Essentially, the anti-noise circuit ensures that the unit is switched to stereo only when there is sufficient pilot signal level to ensure proper synchronization of the 38-kHz oscillator.

Performance. The LT-112B proved very sensitive, measuring 2.1 μV (IHF) for 30

LAB CHECK

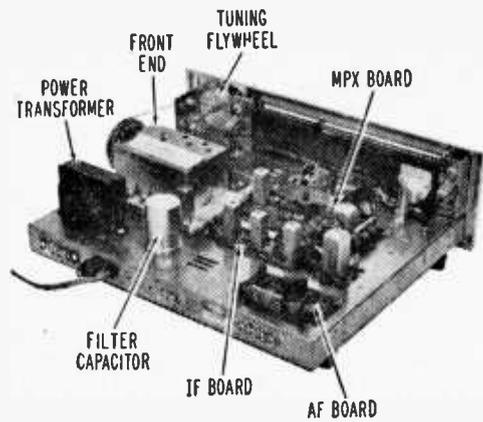
dB attenuation of noise and distortion. Full limiting of 50-dB noise reduction required only 14 μ V. The mono THD (total harmonic distortion) with a test signal of 1000 μ V measured a low 0.54% mono and 1.1% stereo. The maximum AF output level measured slightly more than 1 V.

Both the stereo and mono signal-to-noise ratios measured slightly better than -60 dB. Stereo separation at 1 kHz was 26 dB and 15 dB at 15 kHz.

Assembling the Kit. If done with reasonable care, even a novice should have no difficulty with assembly. Most of the work consists of mounting the pre-wired solid-state assemblies and installing the interconnecting wires. To reduce the possibility of a wiring error to absolute minimum, the LT-112B's assembly manual section shows the wiring in the exact colors that appear in the unit itself; i.e., a red wire is shown in the pictorial as red.

Most of the circuitry is supplied factory-wired on printed circuit (PC) assemblies. The user installs the power-supply components, the interconnecting leads, and the switching facilities. The front end, which uses field effect transistors (FETs) for overload immunity, is supplied pre-wired and aligned. Only the IF amplifier, which is factory aligned, need be touched up, and no instruments are needed for so-called alignment.

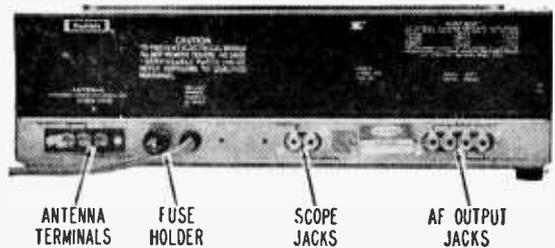
The LT-112B, priced at \$199.95 (kit), is supplied with a metal cover and an oversize



All printed-circuit assemblies for the LT-112B are supplied pre-wired and aligned, but builder must touch up IF after assembly.

front panel, which allows the tuner to be neatly installed in a panel cutout. An optional wood cabinet is available.

For additional information, on the LT-112B, write H. H. Scott, Inc., Dept. WG, 111 Powder Mill Rd., Maynard, Mass. 01754. ■



Rear view of completed LT-112B. Unit offers choice of internal or external antennas, also has scope jacks for checking multipath.

NEW HOPE FOR THE BLIND Radio Waves Replace Light

□ Steps toward electrical brain stimulation that could permit the blind to read are reported by two University of Cambridge scientists.

A number of electronic experiments in the U.S. and other parts of the world have given hope to the blind by showing that the visual cortex does not wholly lose its functional capacity even after years without visual input. The latest report, by British doctors G. S. Brindley and W. S. Lewin, describes how the idea was first tried on the motor cortex of 14 baboons. Achieving some success, the team then attached an array of electrodes connected to radio receivers in the

right hemisphere of the brain of a 52-year-old blind woman. She was stimulated to experience sensations of light in the left half of the visual field.

Safety of the implant was demonstrated with the baboons, in which a fibrous membrane grew to separate it from the brain and its covering.

The model contains 80 receivers, but the researchers expect to increase the number of electrodes to at least 200 per hemisphere. Hopefully, this would permit a blind person to see printed letters. The present model permits sensations of a very small spot of white light, which the patient describes as like a star in the sky or a grain of rice at arm's length. ■



Street Corner Santa Claus

It was many years ago that we took that walk, my father and I. We were living on Winnemac Avenue in Chicago at the time. I was just a freckle-faced kid, home from boarding school for Christmas.

I didn't know my father very well. There was more than years between us. He was riding the wave in vaudeville, a headliner on the Shubert circuit, a celebrity whose routing from city to city, and theater to theater, kept him away from home about ten months of every year.

Home was a ground floor apartment where mother lived with my younger sister and brother, and into which she had gathered all the Christmas spirit her meager income allowed. Father had arrived on the train from Minneapolis that afternoon, which was darkening into my first Christmas Eve with all our family in several years.

After dinner, while mother was still busy in the kitchen, and my sister and brother were clearing the table, father patted me on the head and asked me if I would like to take a walk. Somewhat in awe of that comparative stranger, that famous man who belonged to the theatrical world, I nodded enthusiastically, and scampered to the bedroom for my blue coat with brass buttons and stocking cap that shielded my ears from the biting cold.

While I was fastening my overshoes, I watched father put on the handsome great coat with brown fur collar, and the grey felt hat with snap brim that he wore with such jaunty grace. He seemed to me the very personification (Continued on page 114)



Ultra-exact people measure those old standbys—the volt, ohm, and ampere—again and again, but $I = E/R$ still holds, fellows!

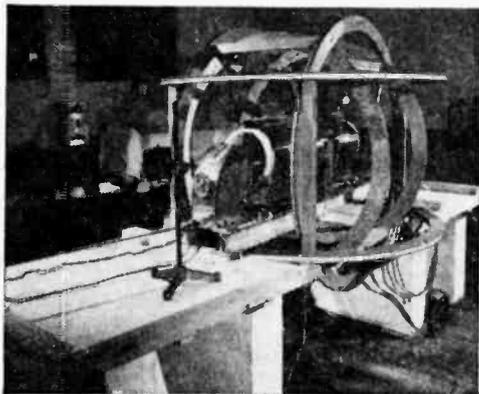
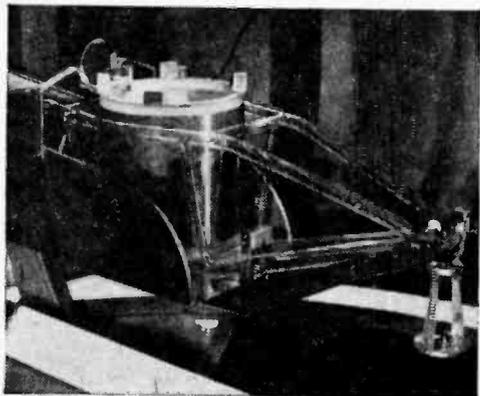
U.S. Moves to Stop Volt Drain

■ The increasing importance of precision measurements has made it evident—especially to the National Bureau of Standards (NBS) in Washington—that a more accurate definition of the volt is needed. New measurements of both the ampere and ohm in terms of basic units such as length, mass, and time have been made in laboratories throughout the world, and the U.S. has been found wanting.

While the U.S. ohm is accurate to better than 1 part per million (ppm), the ampere is smaller by 11 ppm than the ampere de-

finied by equipment maintained at the Bureau International des Poids et Mesures at Sèvres, France (BIPM). The U.S. is one of ten countries participating in international comparisons of standards for electrical units. Naturally, each country wants the value of its volt to agree with the BIPM value.

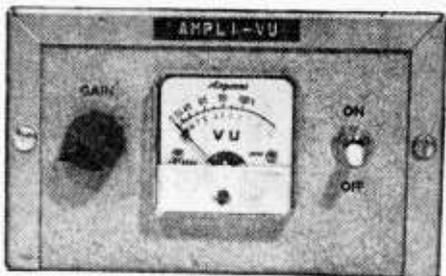
Since no adjustment in the value of the ohm is called for, blame must be placed on the volt for the low value of the ampere measurement ($I = E/R$, remember?). According to the NBS, as of January 1, 1969, the U. S. standard (*Continued on page 116*)



HI-FI

SUPERMETER

By Bill Britton



**This high-gain monitor
takes over where your AC
VTVM leaves off!**

■ These days people are getting more and more particular about sound quality in general and hi-fi systems in particular. A basic tactic in this campaign is to go after the components of a system and check them out against required performance characteristics. This can be done either before or after you purchase a piece of equipment. Usually, however, it's a matter of seeing that what you've already got is really on the audio beam.

The best magnetic cartridges, dynamic mikes, and tape heads usually have extremely low outputs—way down in millivoltland. It's the job of the preamplifier and power amplifier to boost these miniscule signals up to the level where your neighbors start complaining.

So far so good. But these low outputs can be a real problem when it comes time to measure the exact audio levels coming into your system. Your AC VTVM (if you have one) may not be able to give an accurate reading so far down the decibel scale. Most likely, it simply isn't sensitive

enough to gather in all those little millivolts.

Meter Power. What to do? Our Hi-Fi Supermeter can make a low-level audio frequency-response check, test a microphone, or check out a magnetic phono pickup. Full-scale frequency response measurements are possible down to -70 dB; you'll even be able to measure the output of 1-mV cartridges or mikes with a full-scale reading. Impedance is no problem 'cause the Supermeter has a 2-megohm input impedance, high enough to prevent loading the most sensitive circuit.

The Supermeter is nothing more than a linear amplifier specifically designed to drive a low-cost vu meter. While the average, imported vu meter is notoriously non-linear (even \$500 recorders using these meters give unreliable readings), the Supermeter's readings are within the accuracy of a professional unit.

For example, if the Supermeter's gain is adjusted so that the vu meter indicates zero for an input signal, a 3-dB reduction in the signal will drop the meter reading exactly

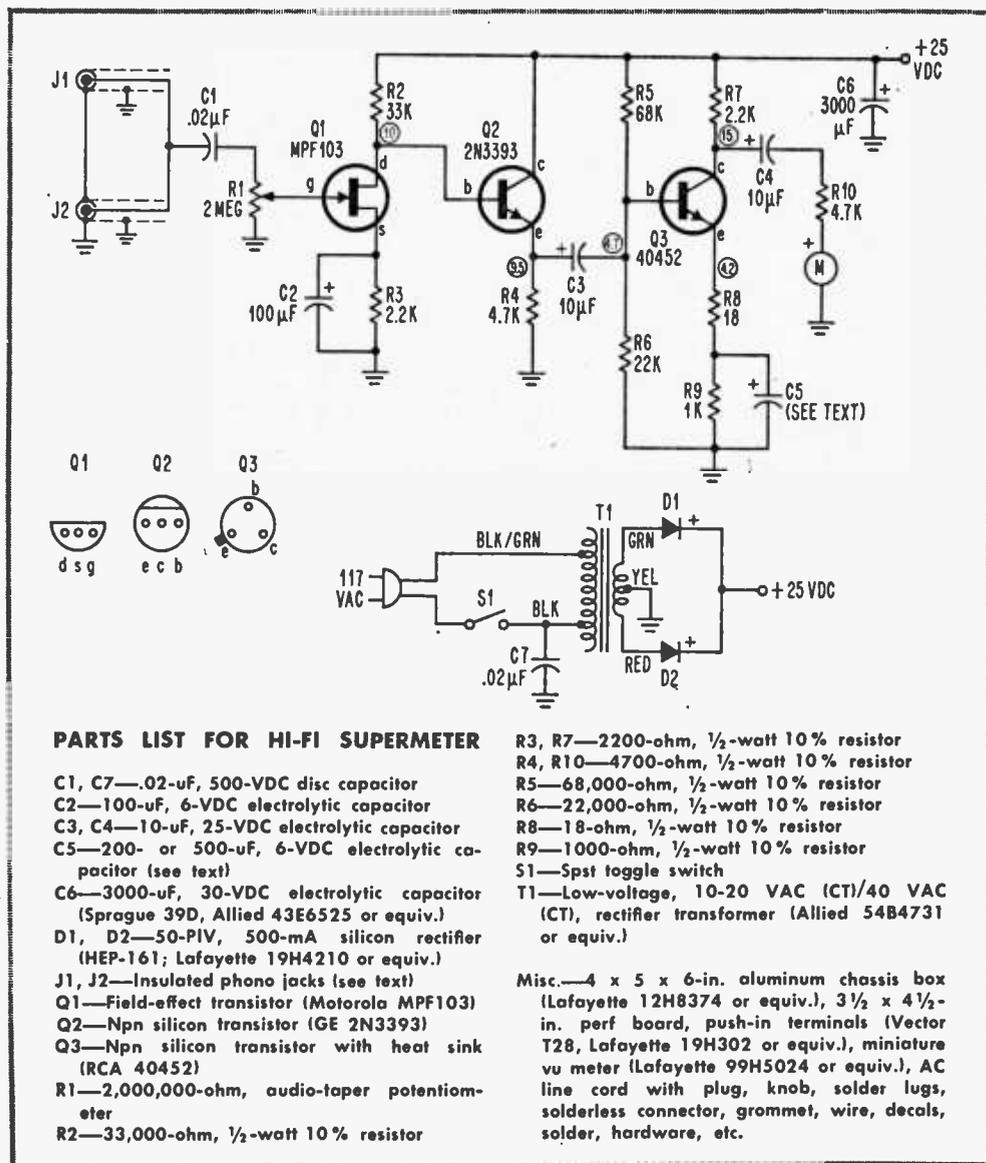
SUPERMETER

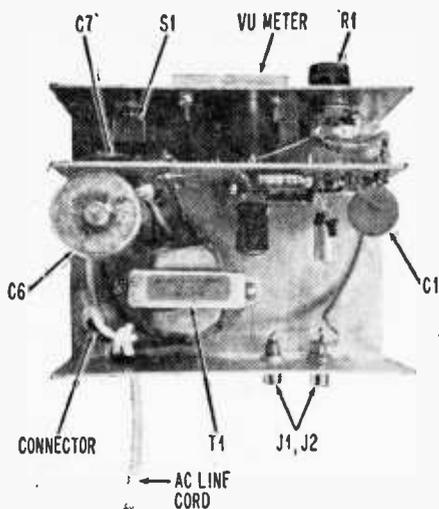
3 dB. The same accuracy applies from full scale of +3 dB down to the bottom level of -20 dB.

Frequency response, however, depends to some degree on the value of C2. If C2 is 200 μ F, the meter readings will be down -4 dB at 50 Hz and then ruler flat to 15 kHz. If C2 is 500 μ F, the readings are ruler flat from 20 Hz to 15 kHz. The upper frequency limit will be determined by the quality of meter you buy.

To keep costs at a minimum, the Supermeter isn't calibrated in terms of voltage—it's only designed to make accurate frequency measurements at very low signal levels and to be used as a relative level indicator.

The meter has a three-stage linear amplifier. Q1 is an FET (field-effect transistor) whose input impedance is in the tens of megohms. Therefore, the Supermeter's input impedance is determined by gain control R1, which has a value of 2 megohms. Q2 serves as an emitter follower and provides a high-impedance termination for Q1's moderately high output impedance. It also functions as a low-impedance driver for Q3,



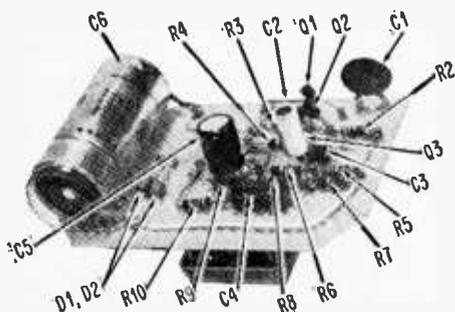


To avoid hum pickup from transformer, amplifier is assembled on right side of perf board. Meter screws hold it in place.

which serves as a medium-impedance amplifier for the vu meter.

Construction. The device is built into a 4 x 5 x 6-in. cabinet. All circuitry goes on a perf-board assembly that mounts directly on the back of the meter. The board is secured by the meter's terminals. If you use a larger size meter than the one specified (see Parts List) you may need a larger cabinet.

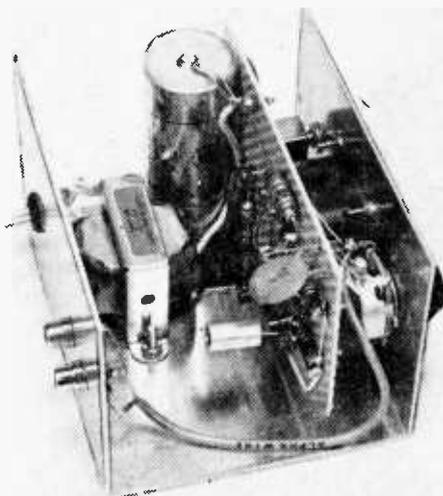
First step is to drill holes for the meter, R1, S1, J1, J2, and the line-cord grommet. Temporarily mount the meter on the panel and cut a section of perf board to approximately the size of the front panel (about 3½ x 4½ in.). Position the board against the meter's terminals, then mark and drill two holes in the board for the meter termi-



Layout of board attached to back of vu meter. Squared wiring is used to minimize hum. Ground bus takes place of chassis.

nal screws. Take the meter off the case and then secure the board to the meter, placing the solder lugs supplied with the meter under the screws on the wiring side of the perf board.

Use push-in terminals as tie points and wire the amplifier on the right side of the perf board (see photo), away from power transformer T1. To avoid instability don't use multiple ground connections. All ground leads should be tied together in a line and finally connected to the grounded meter terminal. T1's center-tap (yellow lead) goes



Power transformer is positioned close to C6. Shielded input and AC cord go to front.

directly to the ground bus, not the cabinet. The shielded input provides the ground connection to the cabinet.

Transistor Q3 is somewhat unusual in that it is supplied with a heat sink. While an equivalent transistor is available without a heat sink, don't try to substitute it. Though it operates within the required ratings in your Supermeter, this version tends to run hot, so better stability is obtained with the specified model.

Capacitor C6 provides sufficient filtering for the Supermeter, but not enough for its use as a sound amplifier. Accordingly, don't attempt to use the circuit as an amplifier unless you add an additional RC filter. And make certain the 3000- μ F electrolytic capacitor you obtain will fit in the cabinet.

(Continued on page 116)



DUAL MODEL 1019
Calibrated Anti-Skate
Auto/Professional Turntable

■ We first discovered the Dual 1019 at a hi-fi show where, between souped-up highs and lows emanating from assorted booths, we heard some truly great sound. Further investigation disclosed the fine sound was coming from some rather ordinary high-quality amplifier-and-speaker equipment . . . and a record changer! That's right, a *record changer*—the one item which, according to thousands of hi-fi pundits, is supposed to preclude really good sound quality.

But there it was, really fine sound quality from a changer.

The difference, of course, is that the Dual 1019 isn't really a record changer in the old sense of the term. As we see it, the 1019 is basically a quality turntable employing calibrated anti-skate and which can be used, if desired, to change records. And the 1019 even gets around the old changer problems of sliding record against record, or enlarging spindle holes, by employing a somewhat unique elevator mechanism which lifts the standby records completely clear of the one to be dropped.

As shown in our photos, the 1019 closely resembles a typical quality turntable. There is a speed control which selects either 16, 33 $\frac{1}{3}$, or 78 rpm; a pitch control which varies the selected speed over approximately a 6% range; a cueing control which gently

lowers or raises the tonearm; and a calibrated stylus (tracking) force adjustment.

Closer inspection reveals a 7-, 10-, and 12-in. record indexer (common to record changers) and a manual/start switch (which implies record changer). However, the spindle is a standard, player-only type. Where is the changer mechanism and what is the horizontal dial that appears to be a second stylus pressure adjustment?

The Dual 1019 is converted to a changer by simply pulling out the standard spindle and inserting a longer, "elevator" spindle. The horizontal dial is not for stylus pressure but for anti-skate, which is matched to the stylus pressure.

Better Stereo. In the simple type of tonearm pivoting, the force exerted by the spinning record (in combination with the offset angle of the tonearm head) drives the tonearm toward the center of the record, forcing the stylus against the inner groove wall. While normally unnoticed with older, less compliant pickups, the sound quality and balance are somewhat degraded when using modern pickups, which exert very low stylus pressure.

To avoid the effects of this inward motion—called *skating*, the 1019 employs a calibrated horizontal spring that applies a reverse force to the tonearm (towards the outside wall). Because the anti-skate force is dependent on the stylus pressure, the 1019 has a calibrated anti-skate force control which is matched, by using a supplied chart, to the stylus pressure.

The practical effect is immediately apparent. If, when using high-compliance pickups, you have noted that the stylus is pushed toward the inside of the record (force against inner groove wall), you'll find it stays dead center on the 1019. The improvement in sound quality—when using a modern, high-compliance pickup—is readily apparent.

Features & Features. Built like a fine watch, the 1019 has just about every convenience imaginable, whether in the auto (manual) or changer mode. The player can be used in any of three ways: 1) by simply placing the arm on the record, 2) by positioning it over the selected cut and then gently lowering the arm with the cueing control lever, or 3) by pressing the lever which

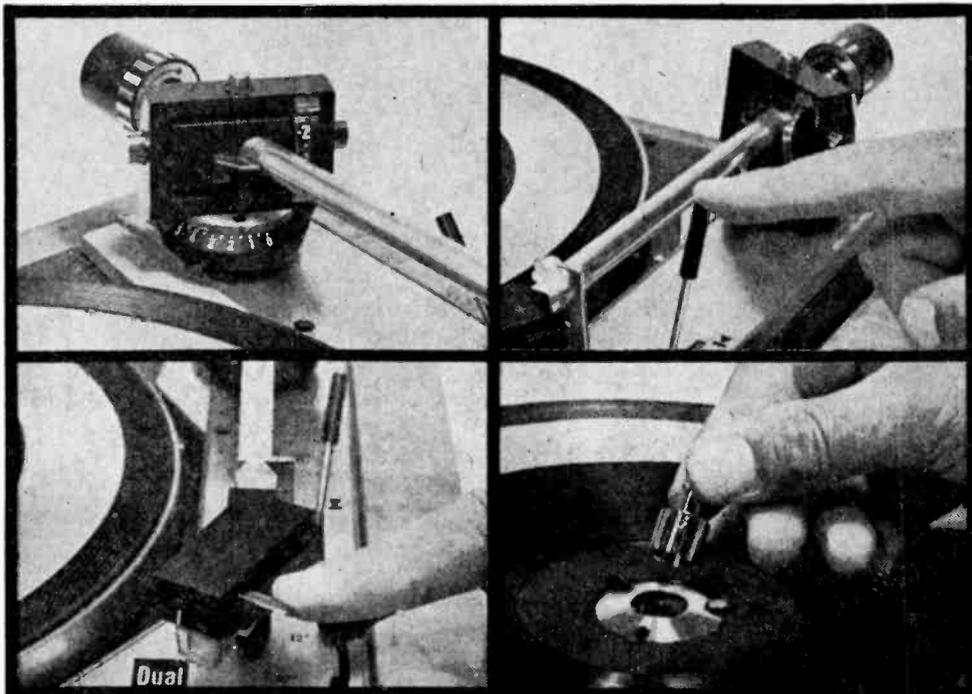
starts the motor and swings the arm into the selected 7-, 10-, or 12-in. record indexing.

With the single-play spindle in position, the arm lifts up at the end of the record, returns to the rest, and the motor shuts off—regardless of how the player is started. During manual operation, if the arm is lifted and placed at the edge of the arm rest, the motor stays on. If the arm is placed directly on the rest, the motor shuts off.

For changer operation, you simply pull out the short spindle and insert the changer

User Adjustments. The mechanism is completely jamproof; no matter how you try to jam the tonearm the mechanism will reset to either the rest or play positions. Should the lead-in groove indexing get out of adjustment or the arm fail to clear the top record of a changer stack, the user can easily make the correction via separate adjusting screws accessible through the top of the deck (a service technician won't be needed).

To set stylus pressure, the user first balances the pickup (the two-way adjustable



Photos show four outstanding features which help make Dual 1019 truly exceptional in both design and performance. At top left, tracking-force and anti-skate adjustments; top right, cueing lever allows arm to be lowered or raised in both manual and automatic modes; bottom left, tonearm lift doubles as pickup lock; bottom right, changing spindles converts from automatic to manual modes.

spindle, which works with an elevator action. With the records on the changer spindle, pressing the start level causes the motor to start and a set of spindle fingers to push up the record stack. Then a pressure finger grabs the second record in the stack, thereby retaining all the records except the bottom one. The fingers then retract, allowing the bottom record to fall to the platter. At no time do the records in the stack slide together, nor are they pushed out from under the stack's pressure by a cam in the spindle hole.

counterweight balanced all the standard pickups we tried). Then, the user simply sets the stylus-pressure wheel to the desired pressure. A test between $\frac{1}{2}$ and 3 grams indicated the 1019's pressure gauge to be phenomenally accurate; for example, when set to $1\frac{1}{2}$ grams the stylus pressure checked out within $\frac{1}{16}$ gram. Finally, the anti-skate force is set according to a chart supplied with the 1019, since the anti-skate force depends on the tracking force and the stylus radius.

One of the problems with any turntable
(Continued on page 120)

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HAM TRAFFIC DE W7DQS

The Beauty Of Being Breathless

■ Tune across the ham fone bands that most of us are familiar with, and you find quite a mass (or mess) of long-winded characters. All give with yak, yak, and more yak before they finally take a breath and flip off the rig to give the other guy a chance to talk. Ninety-nine times out of a hundred, though, the guy who makes the next transmission turns out to be just as gabby.

Gets pretty tiresome, doesn't it? Wouldn't it be nice if there were some other type of hamming without the nuisance of these wind jammers? Believe it or not, there is!

It's known as FM (for frequency modulation, naturally), and it's become very popular on 6 and 2 Meters and is gaining followers on the 420-MHz band. Except for amateur TV or satellite communications or moon-bounce experiments, it's probably the most modern form of hamming. A lot of ops accustomed to more conventional forms of ham radio haven't caught up with FM yet, but it's definitely worth investigating.

Among other advantages you will find is the fact that most of the hams on FM have voluntarily adopted a short, snappy way of operating that's a pleasant change from the gabby style so common on the HF bands. Most ham FMers keep each transmission short. Information and comments are exchanged in a fresh, breezy style that is sometimes called "dispatch operating." It's not quite as clipped as the rapid chatter of a taxi cab dispatcher, but it leans in that direction.

It's not really unfriendly, either. It's just that the type of person who likes FM operating also seems to be one who takes pity on the ears of his fellow operators. He has his say, quick and simple, then gets off the air and gives the next man a chance. As for the few exceptions to this state of affairs,

may their final plates turn cherry red and their antennas fall down on their empty heads!

Commercial Surplus. Virtually all the FM gear used by hams is commercial gear they've picked up second hand. This is the same stuff as used by the cops, cab drivers, and utility trucks, to mention only a few, for their two-way mobile communications.

Most of these outfits install new equipment every few years, so the old stuff can be picked up by hams who are sharp at bargain hunting. What's more, the frequencies this kind of gear is used on commercially are close to the VHF ham bands, so it's not difficult to convert this stuff to ham use.

A strong advantage to this equipment is the fact that each receiver is completely quiet when there's no input signal. This means you can put a rig in your car or your living room, and it won't bother anyone with continual hissing, scratching, and popping as do the receivers most of us are accustomed to.

Another strong plus for FM is the fact that certain standard frequencies are used all across the nation, and all equipment is crystal-controlled. As a result, there're no tuning knobs to twiddle for best reception, and you can drive anywhere and instantly find someone to talk to. Then, too, there are no squeals and howls caused by two or more stations beating together—on FM, you hear only the strongest signal; all others are wiped out.

Since VHF is ordinarily limited to so-called line-of-sight transmission distances, you'll find most of the activity in the large cities. Even so, there are stations out in the boondocks, as many a city ham has discovered as he drove along on vacation. Since an FM receiver is completely quiet unless there's someone talking on the frequency, a

lot of hams leave their rigs turned on all the time so they'll hear anyone who pops up.

Bigger And Better. Sounds like a dream, but hams have actually been granted some new operating frequencies and permitted higher-power operation than before. And don't groan when I tell you all this has happened in the 160-Meter band—those frequencies can be more useful than you think.

It's also a cheery feeling to realize that hams still have some friends among officialdom in our government. In this case, the U.S. Coast Guard gave us a helping hand by approving additional ham operating privileges in the 160-Meter band. The Coast Guard operates the LORAN (*LOng RANGE Navigation*) stations along our coasts used by ships and ocean-hopping aircraft. Since these stations operate on 160 Meters, hams have been restricted to use of certain frequencies in the band. Simultaneously, they've also been required to use rather low power levels, both to prevent interference with the LORAN stations.

Because of installation of some new LORAN stations, plus a new engineering study of the whole LORAN setup, we hams now are permitted use of some frequencies in the band that formerly were denied us. Further, on most frequencies, we're allowed to use increased power levels, in some cases up to a full kilowatt. Each state is treated individually in the rules, which fill a full-page table in the FCC rule book. States near the coasts are restricted more than those some distance inland, as a general rule.

Right now, with sunspots at a relatively high level, 160 isn't much to work. But a few years from now, when a drop in sunspot numbers mean 10, 15, and sometimes 20 Meters will be much less useful, you can have a real ball on 160.

The rule change should also shake loose some new gear from the commercial manufacturers. Most store-bought rigs and re-

ceivers now available don't even include the 160-Meter band. But with the increased activity and power levels now permissible, equipment makers will likely produce some that does. Older gear, which conservative types have hung on to, does cover 160 and will doubtless take on additional value because of this band.

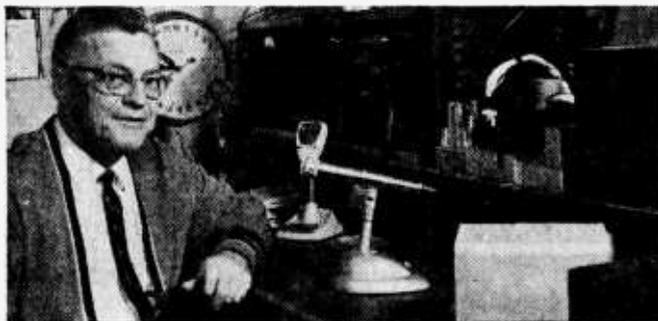
Hot News For Hams. "We interrupt this broadcast to bring you a bulletin from our newsroom." Long the standard opening for a hot flash aired by a radio or TV station, the phrase is also applicable to ham radio's own broadcast news service. You can make use of it every day to get the latest scoop you may not learn of elsewhere for several days or weeks.

How? Just tune in one of the many bulletin broadcasts from W1AW, the high-powered amateur radio station in Newington, Conn. operated by the American Radio Relay League. Brief, up-to-the-minute news items of interest to hams all over the world are transmitted nightly on all ham bands from 160 through 2 Meters. The transmissions are made simultaneously with a 1000-watt rig on each band.

Transmissions are made at different times during the evening on CW, fone, and teletype. The CW is sent at 18 wpm, which makes it excellent practice material if you're getting ready to take the General Class exam. If you can copy W1AW, you'll have no trouble at all passing the 13-wpm test in front of a strict examiner.

If this speed is still too fast for you, don't despair—there's an easy way to beat the game. Just use a two-speed tape recorder. Record the W1AW transmission on the high speed, then play it back at the low speed! Tricky, eh?

Big Brother Again. Through the convenience offered by modern technology, another nail has been driven in the coffin of
(Continued on page 120)



Laudable example of an avid FM operator is Walt Smith, WA9BHV, of Indianapolis, Ind. In addition to a goodly mixture of commercial and home-brew equipment, Walt's shack also sports an impressive array of mikes. Who would guess that Mike was once a railroad telegrapher?

WHITE'S RADIO LOG

An up-to-date Broadcasting Directory of North American AM, FM and TV Stations. Including a Special Section on World-Wide Shortwave Stations

This is the third and last part of *White's Radio Log*, which until now has been published in three parts twice each year. In this issue of *White's Radio Log*, we have included the following listings: U.S. AM Stations by Call Letters, U.S. FM Stations by Call Letters, Canadian AM Stations by Call Letters, Canadian FM Stations by Call Letters, Major Broadcast Stations in Mexico and the Caribbean, and the World-Wide Shortwave Stations section.

Beginning with the next issue of RADIO-TV EXPERIMENTER, *White's Radio Log* will feature an entirely new format in order to enable the Editors to offer readers one of the most complete *Logs* ever. Here's what's in store.

First off, there will be increased coverage of World-Wide Shortwave Stations *plus* an all-new section on emergency broadcast

services—police, fire, etc.—for major metropolitan areas throughout the U.S. Secondly, this expanded format will mean that a specific section of the *Log* will now appear in consecutive issues of RADIO-TV EXPERIMENTER throughout the year. Therefore, readers will want to save an entire year's issues of RADIO-TV EXPERIMENTER in order to have a complete volume of *White's Radio Log*. An updated, completely revised version of the first listing will appear in the first issue of the new year.

When collected, the entire volume of *White's Radio Log* will give you complete listings with up-to-the-minute station-change data not offered by any other magazine or book. And regardless of your listening interests—SW, BCB, FM, TV, or DX—you'll find the new, expanded *White's* an unbeatable reference.

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U. S. AM Stations by Call Letters

Call	Location	kHz	Call	Location	kHz	Call	Location	kHz	Call	Location	kHz
KAAA	Kingman, Ariz.	1230	KATY	San Luis Obispo, Cal.	1340	KBPS	Portland, Oreg.	1450	KCOH	Houston, Tex.	1430
KAAY	Little Rock, Ark.	1090	KATZ	St. Louis, Mo.	1600	KBRC	Ainsworth, Neb.	1400	KCOK	Tulare, Calif.	1270
KABC	Los Angeles, Calif.	790	KAUS	Austin, Minn.	1480	KBRB	Mt. Vernon, Wash.	1430	KCOL	Ft. Collins, Colo.	1410
KABH	Midland, Tex.	1510	KAVA	Burney, Cal.	1450	KBRF	Fergus Falls, Minn.	1250	KCOM	Comanche, Tex.	1590
KABI	Abilene, Kans.	1500	KAVE	Carlsbad, N. Mex.	1240	KBRI	Brinkley, Ark.	1570	KCON	Conway, Ark.	1230
KABL	Oakland, Calif.	960	KAVI	Rosky Ford, Colo.	1320	KBRK	Brookings, S. Dak.	1430	KCOR	San Antonio, Tex.	1350
KABQ	Albuquerque, N. M.	1350	KAVL	Lancaster, Calif.	610	KBRL	McCook, Nebr.	1300	KCOY	Alliance, Nebr.	1400
KABR	Aberdeen, S. Dak.	1420	KAVR	Apple Valley, Calif.	960	KBRN	Brighton, Colo.	800	KCOW	Santa Maria, Calif.	1400
KACE	Riverside, Calif.	1570	KAWA	Waco-Marlin, Tex.	1010	KBRO	Bremerton, Wash.	1490	KCPX	Salt Lake City, Utah	1320
KACI	The Dalles, Oreg.	1300	KAWL	York, Neb.	1370	KBRR	Ladwell, Colo.	1230	KCRA	Sacramento, Calif.	1350
KACT	Santa Barbara, Cal.	1290	KAWT	Douglas, Ariz.	1450	KBRB	Springdale, Ark.	1470	KCRB	Chanute, Kans.	1460
KACL	Andrews, Tex.	1350	KAWV	Hober Springs, Ark.	1370	KBRV	Soda Springs, Ida.	790	KCRG	Enid, Okla.	1390
KACY	Port Huemeb, Calif.	1520	KAYC	Beaumont, Tex.	1450	KBRX	O'Neill, Nebr.	1350	KCRH	Cedar Rapids, Iowa	1600
KADA	Ada, Okla.	1230	KAYE	Puyallup, Wash.	1450	KBRZ	Frederic, Texas	1460	KCRM	Crane, Tex.	1380
KADL	Pine Bluff, Ark.	1270	KAYG	Lakewood, Wash.	1480	KBSF	Springhill, La.	1460	KCRS	Midland, Tex.	550
KADO	Marshall, Tex.	1410	KAYL	Storm Lake, Iowa	990	KBSN	Crane, Tex.	970	KCRT	Trinidad, Colo.	1240
KAFE	Sante Fe, N. M.	810	KAYO	Seattle, Wash.	1150	KBST	Big Spring, Tex.	1490	KCRV	Charthursville, Mo.	1870
KAFF	Flagstaff, Ariz.	930	KAYS	Hays, Kans.	1400	KBTA	Batesville, Ark.	1340	KCSJ	Pueblo, Colo.	590
KAFY	Bakersfield, Calif.	550	KAYT	Rupert, Idaho	970	KBTC	Houston, Mo.	1250	KCSR	Chadron, Nebr.	610
KAGE	Winona, Minn.	1380	KAZA	Gilroy, Cal.	1200	KBTM	Jonesboro, Ark.	1210	KCTA	Corpus Christi, Tex.	1030
KAGI	Crossett, Ark.	800	KZAB	Indianola, Iowa	1490	KBTN	Neesho, Mo.	1420	KCTI	Gonzales, Tex.	1450
KAGP	Grants Pass, Oreg.	930	KZAL	San Saba, Tex.	1410	KBTO	El Dorado, Kans.	1360	KCTO	Columbia, La.	1540
KAGO	Klamath Falls, Oreg.	1150	KZAM	Longview, Wash.	1270	KBTR	Denver, Colo.	710	KCTY	Salinas, Calif.	980
KAGT	Anacortes, Wash.	1340	KZAN	Bowie, Tex.	1410	KBUC	San Antonio, Tex.	1310	KCTX	Childress, Tex.	1510
KAHI	Auburn, Calif.	950	KZAR	Burley, Idaho	1280	KBUD	Athens, Tex.	1410	KCUB	Tucson, Ariz.	1290
KAHR	Redding, Calif.	1330	KZAT	San Antonio, Tex.	680	KBUI	Briham City, Utah	800	KCVB	Red Wing, Minn.	1230
KAHU	Waipahu, Hawaii	940	KZBA	Benton, Ark.	690	KBUN	Bemidji, Minn.	1490	KCVL	Colville, Wash.	1270
KAIM	Honolulu, Hawaii	870	KZBB	Borger, Tex.	1200	KBUR	Burlington, Iowa	1490	KCVR	Los Angeles, Calif.	1570
KAIN	Nampa, Id.	1340	KZBC	Centerville, Utah	1600	KBUS	Mexia, Tex.	1590	KCYL	Lamasas, Tex.	1450
KAIR	Guson, Ariz.	1490	KZBD	Yakima, Wash.	1390	KBUY	Ft. Worth, Tex.	1540	KCYN	Williams, Ariz.	1240
KAIJ	Grants Pass, Oreg.	1270	KZBQ	Burbank, Cal.	500	KBUZ	Mesa, Ariz.	1310	KDAA	Ft. Bragg, Calif.	1230
KAKC	Tulsa, Okla.	970	KZBR	North Bend, Oreg.	1340	KBVM	Lancaster, Calif.	1380	KDAA	Carrington, N. D.	800
KAKE	Wichita, Kan.	1240	KZBS	Buffalo, Wyo.	1450	KBVV	Bellevue, Wash.	1540	KDAL	Duluth, Minn.	610
KALB	Alexandria, La.	580	KZCH	Oceanlake, Oreg.	1390	KBWD	Brownwood, Tex.	1380	KDAY	Lubbock, Tex.	580
KALE	Richland, Wash.	960	KZCH	Shreveport, La.	1220	KBXM	Kennett, Mo.	1540	KDAY	Santa Monica, Calif.	1580
KALF	Mesa, Ariz.	1500	KZCA	McKeesport, Kans.	1390	KBYC	Carlsbad, Okla.	1490	KDBA	Santa Barbara, Calif.	1490
KALG	Alamogordo, N. Mex.	1330	KZCB	Waxahatchie, Tex.	1590	KBYG	Big Spring, Tex.	1400	KDBM	Dillon, Mont.	800
KALI	San Gabriel, Cal.	1430	KZCE	Modesto, Calif.	970	KBYM	Shampock, Tex.	1580	KDBS	Alexandria, La.	1410
KALL	Salt Lake City, Utah	910	KZCK	Elk City, Okla.	1240	KBYR	Anchorage, Alaska	1270	KDCE	Espanola, N. M.	970
KALM	Thayer, Mo.	1290	KZCL	Idabel, Okla.	1240	KBZY	Salem, Oreg.	1490	KDDA	Dumas, Ark.	1560
KALN	Iola, Kan.	1370	KZCN	Carrizo Sprngs., Tex.	1450	KBZZ	Lajunta, Colo.	1400	KDDD	Dumas, Tex.	800
KALO	Little Rock, Ark.	1230	KZCR	San Antonio, Tex.	1150	KZCB	Dardanelle, Ark.	980	KDEF	Decorah, Iowa	1240
KALT	Atlanta, Tex.	900	KZCS	Portland, Oreg.	1010	KZCA	Phoenix, Ariz.	1560	KDEF	Albuquerque, N. Mex.	1540
KALV	Alva, Okla.	1440	KZCT	Marshall, Minn.	1560	KZCD	Alton, Ill.	1490	KDEJ	El Cajon, Calif.	910
KAMD	Caden, Ark.	910	KZCF	Belle Fourche, S. Dak.	1450	KZCE	Redlands, Calif.	1410	KDEO	El Cajon, Calif.	910
KAMI	Cozad, Neb.	1580	KZCG	Caldwell, Idaho	910	KZCF	Glennallen, Alaska	790	KDES	Palm Sprngs., Calif.	920
KAML	Kenedy-Karnes City, Tex.	990	KZCH	Waco, Tex.	1580	KZCN	Canyon, Tex.	1550	KDET	Center, Tex.	930
KAMO	Rogers, Ark.	1390	KZCI	Sturgis, S. D.	810	KZCO	Helena, Mont.	1540	KDEW	DeWitt, Ark.	1470
KAMP	El Centro, Calif.	1430	KZCJ	Nashville, Ark.	1260	KZCP	Clarksville, Tex.	1350	KDEX	Dexter, Mo.	1590
KAMY	McComey, Tex.	1450	KZCK	Branson, Mo.	1220	KZCS	Slaton, Tex.	1050	KDFL	Summer, Wash.	1560
KANA	Anasconda, Mont.	1340	KZCL	BHS Tort Springs, Ark.	1350	KZCT	Pine Bluff, Ark.	1390	KDFN	Deniaphan, Mo.	1540
KAND	Corleane, Tex.	1340	KZCM	Burlington, Ia.	1150	KZCB	De Moines, Iowa	1590	KDFO	Durango, Colo.	1200
KANE	New Iberia, La.	1240	KZCN	Monette, Ark.	1580	KZCD	Lubbock, Tex.	1590	KDHI	Twenty-nine Palms, Calif.	1250
KANI	Wharton, Tex.	1500	KZCO	Fresno, Calif.	900	KZCE	Reno, Nev.	1230	KDHL	Faribault, Minn.	920
KANN	Oden, Utah	1090	KZCP	Avallon, Cal.	740	KZCF	San Diego, Calif.	1170	KDHN	Dimmitt, Tex.	1470
KANO	Anoka, Minn.	1470	KZCQ	Liberty, Mo.	1140	KZCG	San Fran., Calif.	740	KDIA	Oakland, Calif.	1310
KANS	Larned, Kan.	1470	KZCR	BM Roswell, N. Mex.	910	KZCH	Cornings, Ark.	1260	KDID	Ortonville, Minn.	1550
KAOB	Dulane, Minn.	1390	KZCS	BIS Muskogee, Okla.	870	KZCI	Oneida, N. M.	930	KDIN	Sioux Falls, S. Dak.	1240
KAOK	Lake Charles, La.	1400	KZCT	Waxahatchie, Tex.	1590	KZCJ	Paris, Ark.	1460	KDJJ	Holbrook, Ariz.	1270
KAOL	Carrollton, Mo.	1430	KZCU	LeMmon, S. D.	1400	KZCK	Honolulu, Hawaii	1420	KDJW	Amarillo, Tex.	1010
KAOR	Oroville, Calif.	1340	KZCV	OTtowa, Iowa	1400	KZCL	Lawton, Okla.	1050	KDKA	Pittsburgh, Pa.	1020
KAPR	Raymond, Wash.	1340	KZCW	KBJT Fordyce, Ark.	1570	KZCM	Sierre, S. D.	1240	KDKC	Clinton, Mo.	1280
KAPB	Marksville, La.	1370	KZCX	KBKR Baker, Oreg.	1490	KZCN	Corpus Christi, Tex.	1150	KDKD	Littleton, Colo.	1510
KAPE	San Antonio, Tex.	1370	KZCY	KBKW Aberdeen, Wash.	1450	KZCO	Independence, Mo.	1510	KDKL	DeRidder, La.	1010
KAPG	Pueblo, Colo.	690	KZCZ	KBLC Akeport, Cal.	1270	KZCP	Tucson, Ariz.	1390	KDKM	El Dorado, Ark.	1290
KAPR	Douglas, Ariz.	930	KZCA	KBLE Big Lake, Wash.	1050	KZCQ	Yuma, Calif.	1280	KDKN	Spokane, Wash.	1440
KAPS	Mt. Vernon, Wash.	1470	KZCB	KBLF Red Bluff, Calif.	1490	KZCR	Spokane, Wash.	1330	KDNT	Denton, Tex.	1440
KAPT	Salem, Ore.	1220	KZCC	KBLI Blackfoot, Idaho	690	KZCS	Cuero, Tex.	1600	KDOK	Tyler, Tex.	1490
KAPY	Port Angeles, Wash.	1290	KZCD	KBLH Helena, Mont.	1240	KZCT	Cedar Falls, Iowa	1250	KDOL	MoJave, Calif.	1340
KARA	Albuquerque, N. M.	1310	KZCE	KBLR Bolivar, Mo.	1130	KZCV	Charles City, Iowa	1580	KDOM	Window, Minn.	1580
KARE	Atehsion, Kan.	1470	KZCF	KBLT Big Lake, Tex.	1290	KZCW	Cherokee, Iowa	1440	KDON	Salinas, Calif.	1460
KARI	Baino, Wash.	1580	KZCG	KBLU Yuma, Ariz.	1320	KZCX	Chicoke, Mo.	1010	KDPA	Scottsdale, Ariz.	1440
KARK	Little Rock, Ark.	920	KZCH	KBLV Logan, Utah	1390	KZCY	Chickasha, Okla.	1490	KDQD	Medford, Oreg.	1300
KARM	Fresno, Calif.	1430	KZCI	KBLW Gold Beach, Oreg.	1220	KZCZ	Tucson, Ariz.	1390	KDQV	DeQueen, Ark.	1390
KARR	Great Falls, Mont.	1400	KZCJ	KBM1 Henderson, Nev.	1400	KZCA	Spokane, Wash.	1330	KDRG	Deer Lodge, Mont.	1440
KARS	Belen, N. M.	860	KZCK	KBMN Bozeman, Mont.	1230	KZCB	Del Rio, Tex.	910	KDRS	Sedalia, Mo.	1340
KART	Jerome, Idaho	1400	KZCL	KBMO Benson, Minn.	1290	KZCC	Paraquid, Ark.	1490	KDRY	Alamo Hts., Tex.	1110
KARY	Prosser, Wash.	1310	KZCM	KBMR Bismarck, N. D.	1350	KZCD	Alamo Hts., Tex.	1110	KDSJ	Deadwood, S. Dak.	980
KASA	Phoenix, Ariz.	1340	KZCN	KBMW Wahneton, N. D.	1450	KZCE	Deadwood, S. Dak.	980	KDST	Denison-Sherman, Tex.	1530
KASB	Eugene, Ore.	1590	KZCO	Breckenridge, Minn.	1450	KZCF	Delano, Calif.	1480	KDTE	Delta, Tex.	950
KASI	Ames, Iowa	1430	KZCP	KBNB Billings, Mont.	1240	KZCG	Chico, Calif.	1400	KDTA	Delta, Colo.	1400
KASL	Newcastle, Wyo.	1240	KZCQ	KBND Bend, Oreg.	1110	KZCH	Pine Bluff, Ark.	1400	KDTH	Dubiquo, Iowa	1370
KASM	Albany, Minn.	1150	KZCR	KBOA Kennett, Mo.	830	KZCI	Clubeurne, Tex.	1120	KDTH	Hutchinson, Minn.	1260
KASO	Minden, La.	1240	KZCS	KBOE Oskaloosa, Iowa	740	KZCJ	Clinton, Iowa	1390	KDWA	Hastings, Minn.	1460
KAST	Astoria, Ore.	1370	KZCT	KBOI Boise, Ida.	670	KZCK	Leavenworth, Kans.	1410	KDWB	St. Paul, Minn.	1340
KATY	Auburn, Wash.	1220	KZCV	KBOK Malvern, Ark.	1310	KZCL	Rails, Tex.	1530	KDWT	Stanford, Tex.	1400
KATA	Astoria, Ore.	1500	KZCW	KBOL Boulton, Colo.	1490	KZCM	Paris, Ariz.	1590	KDXE	N. Little Rock, Ark.	1380
KATE	Albert Lea, Minn.	1450	KZCX	KBLW Logan, Utah	1390	KZCN	Rofta, Mo.	1590	KDXL	Mansfield, La.	1360
KATI	Casper, Wyo.	1400	KZCY	KBNB Omaha, Nebr.	1490	KZCO	Coffield, Ark.	1150	KDXU	St. George, Utah	1450
KATL	Miles City, Mont.	1340	KZCZ	KBOP Pleasanton, Tex.	1380	KZCP	Clifton, Ark.	1400	KDYL	Tooele, Utah	990
KATN	Boise, Ida.	950	KZCA	KBOR Brownsville, Tex.	1600	KZCQ	Independence, Mo.	1510	KDZA	Pueblo, Colo.	1230
KATO	Safford, Ariz.	1230	KZCB	KBOW Butte, Mont.	350	KZCR	Kansas City, Kans.	1340	KDZB	Brownwood, Tex.	1500
KATR	Texarkana, Tex.	840	KZCC	KBOX Dallas, Tex.	1480	KZCS	Wichita, Kan.	1490	KDZC	St. Paul, Minn.	980
KATQ	Eugene, Ore.	1320	KZCD	KBOY Medford, Oreg.	730	KZCT	Broken Bow, Nebr.	1280	KDZD	Ketchikan, Alaska	620
						KZCV	Alturas, Calif.	570	KEDA	San Antonio, Tex.	1540
						KZCW	San Marcos, Tex.	1470	KEDD	Dodge City, Kans.	1550
						KZCX	Newton, Iowa	1280	KEDO	Longview, Wash.	1400
						KZCY	Centerville, Iowa	1400			

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WHITE'S RADIO LOG

Call	Location	kHz	Call	Location	kHz	Call	Location	kHz
KEED	Eugene, Ore.	1450	KGMV	Missoula, Mont.	1450	KILO	Grand Forks, S. Dak.	1440
KEEE	Nacogdoches, Tex.	1230	KGNB	New Braunfels, Tex.	1420	KILR	Estherville, Ia.	1070
KEEL	Shreveport, La.	710	KGNC	Amarillo, Tex.	710	KILT	Houston, Tex.	510
KEEN	San Jose, Calif.	1370	KGND	Dodge City, Kans.	1570	KIND	Yakima, Wash.	1480
KEEP	Twin Falls, Idaho	1450	KGNU	Santa Clara, Cal.	1430	KIMB	Kimball, Nebr.	1260
KEES	Gladewater, Tex.	1460	KGNS	Laredo, Tex.	1390	KIML	Gillette, Wyo.	1280
KEGG	Daingerfield, Tex.	1560	KGO	San Francisco, Calif.	810	KIMM	Rapid City, S. D.	1150
KEG	Hosung, Minn.	1480	KGOL	Palm Desert, Cal.	1270	KIMN	Denver, Colo.	950
KELA	Centralia-Chekalls, Wash.	1470	KGOS	Torrington, Wyo.	1490	KIMO	Hilo, Hawaii	850
KELD	El Dorado, Ark.	1400	KGRF	Grafton, N. Dak.	1340	KIMP	Mt. Pleasant, Tex.	960
KELL	Tulsa, Okla.	1430	KGRB	West Loma, Cal.	1000	KIN	Independence, Kans.	1330
KELK	Elko, Nev.	1240	KGRH	Henderson, Tex.	1000	KING	Seattle, Wash.	1090
KELD	St. Charles, Mo.	1460	KGRJ	Bend, Ore.	940	KINL	Gillette, Wyo.	1270
KELP	El Paso, Tex.	920	KGRN	Grinnell, Iowa	1410	KINM	Alamagordo, N. M.	1270
KELR	El Reno, Okla.	1460	KGRS	Pasco, Wash.	1340	KINO	Winslow, Ariz.	1230
KELY	Ely, Nev.	1230	KGRT	Las Cruces, N. Mex.	570	KINS	Eureka, Calif.	980
KENA	Mena, Ark.	1450	KGRR	Fresno, Calif.	1600	KINT	El Paso, Tex.	1590
KENE	Toppenish, Wash.	1490	KGTN	Fresno, Calif.	1530	KINY	Juneau, Alaska	800
KENI	Anchorage, Alaska	1350	KGU	Honolulu, Hawaii	750	KIOD	Des Moines, Iowa	940
KENN	Portales, N. Mex.	1430	KGUC	Gunnison, Colo.	1490	KIOT	Barstow, Calif.	1310
KENM	Farmington, N. M.	1390	KGUD	Santa Barbara, Calif.	990	KIOW	Bay City, Tex.	1270
KENO	Las Vegas, Nev.	1460	KGUL	Port Lavaca, Tex.	1560	KIPA	Hilo, Hawaii	1130
KENR	Houston, Tex.	1070	KGVJ	Greenville, Tex.	1400	KIPS	Willows, Calif.	1560
KENT	Prescott, Ariz.	1340	KGVO	Missoula, Mont.	1290	KIRL	St. Charles, Mo.	1460
KENY	Bellingham-Ferndale, Wash.	930	KGWR	Wetmore, Mont.	630	KIRP	Seattle, Wash.	710
KEOR	Atoka, Okla.	1110	KGWA	Enid, Okla.	960	KIRT	Missouri, Tex.	1580
KEOS	Flagstaff, Ariz.	690	KGY	Olympia, Wash.	1240	KIRV	Fresno, Cal.	1540
KEPR	Kennebec-Richland-Pasco, Wash.	610	KGYN	Guymon, Okla.	1210	KIRX	Kirkville, Mo.	1450
KEPS	Eagle Pass, Tex.	1270	KHAC	Window Rock, Ariz.	1300	KISD	St. Louis, S. Dak.	1230
KERB	Kermitt, Tex.	600	KHAD	DeSoto, Mo.	1190	KISL	Salina, Kan.	910
KERD	Eastland, Tex.	590	KHAI	Honolulu, Hawaii	1090	KISN	Vancouver, Wash.	930
KERG	Eugene, Ore.	1280	KHAK	Cedar Rapids, Iowa	1220	KIT	Santa Barbara, Calif.	1340
KERN	Bakersfield, Calif.	1410	KHAL	Homer, La.	1320	KITK	Yakima, Wash.	1280
KERV	Kerrville, Tex.	1230	KHAP	Aztec, N. M.	1340	KITI	Chahalis-Centralia, Wash.	920
KESM	Eldorado Springs, Mo.	1580	KHAR	Anchorage, Alaska	590	KITN	Olympia, Wash.	1420
KEST	Boise, Idaho	790	KHAS	Hastings, Nebr.	1230	KIUL	Garden City, Kans.	1200
KETA	Livingston, Tex.	1440	KHAT	Phoenix, Ariz.	1480	KIUN	Pecos, Tex.	1400
KEUN	Union, La.	1490	KHBM	Monticello, Ark.	1430	KIUP	Durango, Colo.	930
KEVA	Evart, Wyo.	1590	KHBR	Hibbs, Tex.	1560	KIUY	Crockett, Tex.	1290
KEVL	White Castle, La.	1590	KHBN	Hibbs, Tex.	1560	KIWA	Sheldahl, Iowa	1550
KEVT	Tucson, Ariz.	690	KHBD	Hardin, Mont.	1270	KIXF	Fortuna, Cal.	1280
KEWI	Topeka, Kans.	1440	KHEM	Big Springs, Tex.	1230	KIXJ	Seattle, Wash.	910
KEWQ	Paradise, Cal.	930	KHEY	El Paso, Tex.	690	KIXL	Dallas, Tex.	1040
KEX	Portland, Ore.	1190	KHFH	Sierra Vista, Ariz.	1420	KIXX	Provo, Utah	1400
KEXO	Grand Junction, Colo.	1290	KHFX	Austin, Tex.	970	KIZZ	Amarillo, Tex.	1140
KEXS	Excelsior Springs, Mo.	1030	KHHH	Pampa, Tex.	1230	KJZZ	El Paso, Tex.	950
KEYE	Oakes, N. Dak.	1220	KHIL	Wilcox, Ariz.	1250	KJAM	Jackson, Okla.	1390
KEYE	Perryton, Tex.	1400	KHIT	Walla Walla, Wash.	1320	KJAN	Atlantic, Iowa	1220
KEYJ	Jamestown, N. Dak.	1400	KHJ	Los Angeles, Calif.	1330	KJAX	Santa Rosa, Calif.	1150
KEYL	Long Prairie, Minn.	1400	KHMO	Hannibal, Mo.	1070	KJBY	Sacramento, Calif.	1420
KEYL	Wichita, Kan.	900	KHOB	Hobbs, N. Mex.	1390	KJCB	Midland, Tex.	1150
KEYR	Terrytown, Nebr.	690	KHOD	Truckee, Calif.	1400	KJCF	Festus, Mo.	1400
KEYS	Corpus Christi, Tex.	1450	KHOS	Tucson, Ariz.	940	KJCK	Junction City, Kans.	1420
KEYV	Prosser, Ia.	1450	KHOT	Madera, Calif.	1250	KJJD	John Day, Ore.	1400
KEYZ	Williston, N. Dak.	1360	KHOW	Denver, Colo.	1020	KJEF	Estes Park, Colo.	1470
KEZU	Rapid City, S. Dak.	920	KHOZ	Harrison, Ariz.	900	KJEM	Oklahoma City, Okla.	800
KEZY	Anaheim, Calif.	1190	KHQ	Spokane, Wash.	590	KJFT	Beaumont, Tex.	1380
KFAB	Omaha, Nebr.	1110	KHRB	Lockhart, Mo.	1060	KJFJ	Webster City, Iowa	1570
KFAC	Los Angeles, Calif.	1330	KHRT	Minot, N. D.	1320	KJFM	Ft. Worth, Tex.	870
KFAH	Lakewood Center, Wash.	1480	KHSA	Hemet, Cal.	1290	KJHN	Houma, La.	1490
KFAM	Fulton, Mo.	900	KHSH	Hemet, Cal.	1290	KJLN	North Platte, Nebr.	970
KFAM	St. Cloud, Minn.	1450	KHSL	Chico, Calif.	1290	KJNO	Juneau, Alaska	630
KFAR	Fairbanks, Alaska	660	KHUB	Fremont, Nebr.	1230	KJNP	North Pole, Alaska	1170
KFAX	San Francisco, Calif.	1100	KHUM	Santa Rosa, Calif.	1580	KJOE	Shreveport, La.	1480
KFAY	Fayetteville, Ark.	1250	KHUZ	Borger, Tex.	1490	KJQV	Stockton, Calif.	1280
KFBB	Great Falls, Mont.	1310	KHVV	Honolulu, Hawaii	1040	KJPW	Waynesville, Mo.	1390
KFBC	Cheyenne, Wyo.	1240	KHYT	Tucson, Ariz.	1330	KJR	Seattle, Wash.	950
KFBD	Waynesville, Mo.	1270	KIB	Pal Alto, Calif.	1220	KJRB	Spokane, Wash.	790
KFBK	Sacramento, Calif.	1530	KIBH	Seward, Alaska	950	KJRK	Yakima, Wash.	950
KFBR	Noales, Ariz.	1340	KIBL	Beaville, Tex.	1490	KJK	Columbia, Mo.	900
KFCB	Redfield, S. Dak.	1380	KIBS	Bishop, Calif.	1230	KJSH	Joshua Tree, Cal.	1420
KFDI	Van Buren, Ark.	1580	KICA	Clovis, N. M.	980	KJST	Wichita, Kan.	1450
KFDI	Wichita, Kansas	1070	KICK	Spencer, Iowa	1240	KKAL	Denver City, Tex.	1580
KFDR	Grand Coulee, Wash.	1360	KICK	Springfield, Mo.	1350	KKAM	Pueblo, Colo.	1350
KFEL	Pueblo, Colo.	970	KICN	Golden, Colo.	1250	KKAN	Phillipsburg, Kans.	1490
KFES	St. Joseph, Mo.	680	KICD	Calexico, Calif.	1490	KKAR	Armons, Calif.	1220
KFFA	Helena, Ark.	1360	KICG	Hastings, Neb.	1300	KKAS	Siltburg, Neb.	1300
KFGO	Fargo, N. D.	790	KICK	McCook, Neb.	1360	KKEP	Estes Park, Colo.	1470
KFGQ	Boone, Iowa	1260	KICY	Nome, Alaska	850	KKEY	Vancouver, Wash.	1150
KFH	Wichita, Kans.	1330	KIDD	Idaho Falls, Idaho	590	KKHI	San Francisco, Calif.	1550
KFI	Los Angeles, Calif.	640	KIDD	Monterey, Calif.	630	KKIN	Aitkin, Minn.	930
KFIL	Preston, Minn.	1060	KIDD	Boise, Idaho	870	KKIT	Pittsburg, Calif.	990
KFIR	Sweet Home, Ore.	1370	KIG	Glendale, Calif.	1510	KKIS	Taos, N. Mex.	1840
KFIV	Medoto, Calif.	1360	KIFG	Iowa Falls, Ia.	860	KKJ	St. Joseph, Mo.	1410
			KIFW	Phoenix, Ariz.	910	KKK	Oklahoma City, Okla.	1550
			KIGS	Siitka, Alaska	1230	KKL	Honolulu, Hawaii	690
			KIGO	St. Anthony, Ida.	1400	KKLB	Brownfield, Tex.	1300
			KIHN	Hugo, Okla.	1340	KKLC	Los Angeles, Calif.	570
			KIHR	Hood River, Ore.	1340	KKLD	Klamath Falls, Ore.	960
			KIJV	Huron, S. Dak.	1340	KKLX	Lakewood, Colo.	1600
			KIK	Honolulu, Hawaii	830	KKAM	Cordova, Alaska	1450
			KIKK	Pasadena, Tex.	1530	KKAN	Lemoore, Calif.	1820
			KIKO	Miami, Ariz.	1340	KKAV	Las Vegas, Nev.	1230
			KIKS	Sulphur, La.	1310	KKBK	Libbuck, Tex.	1340
			KIKX	Tucson, Ariz.	580	KKBL	La Grande, Ore.	1450
			KIKZ	Seminole, Tex.	1250	KKBS	Los Banos, Calif.	1390
			KILE	Galveston, Tex.	1400	KKCB	Libby, Mont.	1280

Are your home-town AM stations listed correctly in *White's Radio Log*? If you believe there is a correction called for in *White's* listings, please check first with your local station. For each call sign obtain the correct city location, frequency, and power. (Remember, even though your local paper may list a station as a "home-town" station, it may be officially licensed by the FCC for operation in the next city.) Get all the facts on a piece of paper (be very brief), include your name and address, and mail to *White's Radio Log*, RADIO-TV EXPERIMENTER, 229 Park Avenue South, New York, N. Y. 10003. Your help in contributing to the accuracy and completeness of *White's Radio Log* will be sincerely appreciated.

—Editor

Call	Location	kHz	Call	Location	kHz	Call	Location	kHz
KLCN	Blytheville, Ark.	910	KMPG	Hollister, Cal.	1520	KONA	Kealahouka, Hawaii	790
KLCO	Poteau, Okla.	1280	KMPL	Sikeston, Mo.	1520	KONE	Reno, Nev.	1450
KLEA	Lexington, N. Mex.	630	KMRC	Morgan City, La.	1430	KONG	Visalia, Calif.	1400
KLEE	Golden Meadow, La.	1600	KMRE	Anderson, Cal.	1580	KONI	Spanish Fork, Utah	1480
KLEB	Ottumwa, Iowa	1480	KMRS	Morris, Minn.	1230	KONO	San Antonio, Tex.	860
KLEI	Kailua, Hawaii	1130	KMUL	Muleshoe, Tex.	1380	KONP	Port Angeles, Wash.	1450
KLEM	LeMars, Iowa	1410	KMUS	Muskogee, Okla.	1380	KOPD	Lakewood Center, Wash.	1480
KLEN	Kilgus, Tex.	1480	KMVI	Waikuku, Hawaii	680	KOPK	Billings, Mont.	970
KLER	Wichita, Kans.	1480	KMYC	Marysville, Calif.	1410	KOPM	Phoenix, Ariz.	960
KLES	Orofino, Idaho	950	KNAB	Burlington, Colo.	1140	KOOD	Omaha, Nebr.	1420
KLEX	Lexington, Mo.	1570	KNAF	Fredericksburg, Tex.	910	KOOS	Coos Bay, Oreg.	1280
KLEY	Wellington, Kan.	1130	KNAK	Salt Lake City, Utah	1280	KOPR	Butte, Mont.	1410
KLFB	Lubbock, Tex.	1420	KNAL	Victoria, La.	1410	KOPY	Alice, Tex.	1070
KLFD	Litchfield, Minn.	1410	KNBA	Vallejo, Calif.	1190	KOQT	Bellingham, Wash.	1530
KLGA	Algona, Iowa	1600	KNBY	Norton, Kan.	1530	KORC	Bryan, Tex.	1240
KLGR	Rodwad Falls, Minn.	1490	KNBR	San Francisco, Cal.	1280	KORO	Pasco, Wash.	1600
KLIB	Liberal, Kans.	1470	KNBY	Newport, Ark.	1280	KORS	Springfield-Eugene, Ore.	1530
KLIC	Monroe, La.	1230	KNCB	Vivian, La.	1600	KORK	Las Vegas, Nev.	1450
KLID	Poplar Bluff, Mo.	1340	KNCC	Concordia, Kans.	1390	KORL	Honolulu, Hawaii	650
KLIF	Dallas, Tex.	1190	KNCD	Nebraska City, Nebr.	1600	KORN	Mitchell, S. Dak.	1490
KLIK	Jefferson City, Mo.	950	KNCO	Hettinger, N. Dak.	1490	KORT	Trangeville, Idaho	1570
KLIN	Lincoln, Nebr.	1400	KNCK	Honolulu, Hawaii	1270	KOSD	Odessa, Tex.	860
KLIP	Fowler, Calif.	1220	KNCK	Langdon, N. D.	1080	KOSG	Panshuka, Okla.	1500
KLIP	Portland, Oreg.	1200	KNDY	Marysville, Kans.	1570	KOSI	Aurora, Colo.	1430
KLIR	Denver, Colo.	990	KNEA	Jeansboro, Ark.	970	KOSY	Texarkana, Ark.	790
KLIV	San Jose, Cal.	1590	KNEB	Scottsbluff, Nebr.	960	KOTA	Rapid City, S. Dak.	1380
KLIX	Twin Falls, Idaho	1310	KNEC	McAlester, Okla.	1150	KOTN	Pine Bluff, Ark.	1490
KLIZ	Brainerd, Minn.	1380	KNEI	Waukon, Ia.	1140	KOTS	Oeming, N. M.	1230
KLKC	Parsons, Kans.	1540	KNEL	Brady, Tex.	1420	KOUR	Independence, Iowa	910
KLKA	Leesville, La.	1570	KNEV	Nevada, Mo.	1490	KOVE	Lander, Wyo.	1330
KLLL	Lubbock, Tex.	1460	KNET	Palestine, Tex.	1450	KOVD	Provo, Utah	960
KLME	Laramie, Wyo.	1480	KNEY	Marionville, Mo.	1540	KOWB	Laramie, Wyo.	1290
KLMO	Longmont, Colo.	1060	KNEP	McPherson, Kans.	1540	KOWL	South Lake Tahoe, Cal.	1490
KLMR	Lamar, Colo.	920	KNEZ	Lompoc, Calif.	960	KOWN	Escondido, Calif.	1450
KLMS	Lincoln, Nebr.	1480	KNFT	Bayard, N. M.	950	KOYN	Oxnard, Calif.	1490
KLMX	Clayton, N. Mex.	1450	KNGS	Manford, Calif.	620	KOYD	Phoenix, Ariz.	550
KLOD	Ogden, Utah	1430	KNIA	Knoxville, Iowa	1320	KOYL	Odessa, Tex.	1310
KLOA	Ridgecrest, Calif.	1240	KNIC	Winfield, Kan.	1550	KOYN	Billings, Mont.	910
KLOC	Ceres, Calif.	920	KNIN	Maryville, Mo.	1580	KOZA	Odessa, Tex.	1230
KLOE	Goodland, Kans.	1200	KNIN	Wichita, Kan.	990	KOZE	Lewiston, Idaho	1300
KLOG	Ketchikan, Alaska	1490	KNIR	New Iberia, La.	1360	KOZI	Cheban, Wash.	1220
KLOH	Pipestone, Minn.	1050	KNIR	Abilene, Tex.	1280	KOZN	Omaha, Nebr.	1200
KLOK	San Jose, Calif.	1170	KNLV	Ord, Neb.	1060	KOZP	Grand Rapids, Minn.	1250
KLOD	Lincoln, Neb.	1530	KNNO	Cottage Grove, Oreg.	1400	KPAL	Palm Springs, Calif.	1450
KLOM	Lompoc, Calif.	1330	KNNN	Friona, Tex.	1070	KPAM	Portland, Oreg.	1400
KLOO	Corvallis, Ore.	1340	KNOC	Natchitoches, La.	1450	KPAN	Hereford, Tex.	860
KLOU	Lake Charles, La.	1580	KNOC	Monroe, La.	540	KPAR	Albuquerque, N. M.	1190
KLOW	Loveland, Colo.	1570	KNOW	Ft. Worth, Tex.	970	KPAS	Banning, Calif.	1400
KLZL	Lake Park, N. Mex.	1050	KNOP	N. Platte, Nebr.	1410	KPAT	Berkeley, Calif.	1490
KLPM	Minot, N. Dak.	1390	KNOR	Norman, Okla.	1400	KPAY	Chico, Calif.	1060
KLPR	Okla. City, Okla.	1140	KNDT	Prescott, Ariz.	1450	KPBK	Pine Bluff, Ark.	1510
KLRA	Little Rock, Ark.	1010	KNOW	Austin, Tex.	1490	KPBC	Port Sulphur, La.	1050
KLRS	Mountain Grove, Mo.	1360	KNOX	Grand Forks, N. Dak.	1310	KPBM	Carlsbad, N. Mex.	740
KLTF	Little Falls, Minn.	860	KNPT	Newport, Ore.	1310	KPCA	Marked Tree, Ark.	1580
KLTI	Macon, Mo.	1580	KNPU	Wakarusa, Hawaii	860	KPCN	Grand Prairie, Tex.	730
KLTR	Blackwell, Okla.	1580	KNUI	Ujima, Minn.	1230	KPCD	Quincy, Cal.	1370
KLTZ	Glass, Mont.	1240	KNUZ	Houston, Tex.	1230	KPCR	Bowling Green, Mo.	1580
KLUB	Salt Lake City, Utah	570	KNWC	Sioux Falls, S. O.	1270	KPCB	Portland, Oreg.	800
KLUC	Las Vegas, Nev.	1140	KNWS	Waterloo, Iowa	1090	KPEB	Spokane, Wash.	1380
KLUE	Longview, Tex.	1280	KNX	Los Angeles, Calif.	1070	KPEF	Lafayette, La.	1420
KLUV	Haynesville, La.	1580	KOAC	Denver, Colo.	850	KPEP	San Angelo, Tex.	1420
KLVI	Beaumont, Tex.	560	KOAC	Corvallis, Ore.	530	KPET	Lamesa, Tex.	690
KLVJ	Paducah, Tex.	1480	KOAG	Arroyo Grande, Cal.	1280	KPGE	Page, Ariz.	1340
KLVY	Clarksville, Ark.	1360	KOAK	Red Oak, Ia.	1080	KPHO	Phoenix, Ariz.	1580
KLWJ	Lawrence, Kans.	1320	KOAL	Price, Utah	1230	KPHD	Colorado Springs, Colo.	1070
KLWT	Lebanon, Mo.	1230	KOAL	Pittsburg, Kans.	860	KPIN	Case Grande, Ariz.	1260
KLWV	Cedar Rapids, Iowa	1450	KOAM	Pittsburg, Kans.	770	KPLC	Lake Charles, La.	1400
KLYD	Bakersfield, Calif.	1350	KOAB	Albuquerque, N. Mex.	770	KPLT	Paris, Tex.	1490
KLYQ	Hamilton, Mont.	980	KOBE	Las Cruces, N. Mex.	1430	KPLY	Crecent City, Calif.	1240
KLYR	Clarksville, Ark.	1360	KOBI	Hot Springs, S. Dak.	1240	KPMC	Bakersfield, Calif.	1150
KLZ	Denver, Colo.	1050	KOCC	Kilgore, Tex.	1240	KPNG	Port Neches, Tex.	1560
KMA	Shenandoah, Iowa	960	KOCC	Oklahoma City, Okla.	1340	KPNW	Eugene, Ore.	1120
KMAC	San Antonio, Tex.	630	KODA	Houston, Tex.	1010	KPOC	Crescent City, Ark.	1420
KMAA	Madill, Okla.	1550	KODE	Joplin, Mo.	1230	KPOF	Denver, Colo.	910
KMAK	Fresno, Calif.	1340	KODI	Cody, Wyo.	1400	KPOI	Honolulu, Hawaii	1380
KMAA	Butler, Mo.	1530	KODL	The Dalles, Oreg.	1440	KPOJ	Portland, Oreg.	1330
KMAN	Manhattan, Kans.	1350	KODY	Fort Platte, Nebr.	1240	KPOL	Los Angeles, Calif.	1540
KMAQ	Maquoketa, Iowa	1320	KODW	Delwin, Iowa	950	KPOR	Roseville, Cal.	1110
KMAR	Windsor, Mo.	1570	KOFI	Kalispell, Mont.	1180	KPOP	Quincy, Wash.	1370
KMAS	Shelton, Wash.	1280	KOFY	Ottawa, Kans.	1220	KPOS	Post, Wyo.	1370
KMAV	Mayville, N. D.	1520	KOFO	San Mateo, Calif.	1050	KPOW	Powell, Wyo.	1260
KMBL	Junction, Tex.	1450	KOGA	Ogallala, Nebr.	930	KPPC	Padadena, Calif.	1240
KMBY	Monterey, Calif.	1240	KOGO	San Diego, Calif.	600	KPRW	Wenatchee, Wash.	560
KMBZ	Kansas City, Mo.	980	KOGT	Orange, Tex.	1600	KPRB	Redmond, Oreg.	1240
KMCB	Fairfield, Iowa	1570	KOHN	Reno, Nev.	630	KPRC	Houston, Tex.	950
KMCL	McCall, N. D.	1240	KOHL	Helena, Ore.	1600	KPRK	Livingston, Mont.	1340
KMCM	McMinnville, Oreg.	1260	KOHD	Honolulu, Hawaii	1170	KPRL	Paso Robles, Calif.	1240
KMCO	Conroe, Tex.	900	KOHU	Hermiston, Oreg.	1570	KPRM	Paris, Minn.	1240
KMCW	Augusta, Ark.	1190	KOIL	Omaha, Nebr.	920	KPRO	Riverside, Calif.	1440
KMOO	Ft. Scott, Kans.	1600	KOIN	Portland, Oreg.	1290	KPRS	Kansas City, Mo.	1590
KMED	Medford, Oreg.	1440	KOJN	Havre, Mont.	910	KPSO	Fallurrias, Tex.	1260
KMEL	Wenatchee, Wash.	1340	KOKA	Port Arthur, Tex.	1340	KPST	Preston, Idaho	1340
KMFN	San Bernardino, Cal.	1290	KOKB	Austin, Tex.	1370	KPTL	Carson City, Nev.	1300
KMED	Phoenix, Ariz.	740	KOKL	Oklmulgee, Okla.	1240	KPTN	Central Point, Ore.	1480
KMER	Kemmerer, Wyo.	950	KOKM	Warrensburg, Mo.	1450	KPUA	Hilo, Hawaii	1400
KMFB	Mendocino, Cal.	1300	KOKX	Keokuk, Iowa	1310	KPUB	Paoli, Colo.	970
KMHL	Marshall, Minn.	1400	KOKY	Key Lake, Ark.	1440	KPUG	Bellingham, Wash.	1170
KMHT	Marshall, Tex.	1450	KOLA	Seattle, Wash.	1300	KPUL	Pullman, Wash.	1150
KMFL	Cameron, Tex.	1330	KOLT	Tucson, Ariz.	1450	KPUR	Amarillo, Tex.	1440
KMFL	Grant, N. D.	980	KOLP	Port Arthur, Tex.	1340	KPVD	Piedmont, Mo.	1140
KMIS	Portageville, Mo.	1050	KOLJ	Coalinga, Cal.	1050	KPXE	Liberty, Tex.	1050
KMJ	Fresno, Calif.	580	KOLM	Rocheater, Minn.	1520	KQAQ	Austin, Minn.	970
KMLB	Monroe, La.	1440	KOLN	Reno, Nev.	920	KQEN	Rebours, Ore.	1240
KMLD	Vista, Cal.	1000	KOLR	Stirling, Colo.	1490	KQEO	Albuquerque, N. Mex.	920
KMJI	Grand Island, Nebr.	750	KOLS	Pryor, Okla.	1570			
KMIO	Marshall, Mo.	1300	KOLT	Scottsbluff, Nebr.	1300			
KMIL	Sioux Falls, Iowa	620	KOLW	Port Arthur, Tex.	1340			
KMO	Tacoma, Wash.	1360	KOMA	Okla. City, Okla.	1520			
KMON	Great Falls, Mont.	560	KOME	Tulsa, Okla.	1300			
KMOR	Murray, Utah	1230	KOMO	Seattle, Wash.	1000			
KMOX	St. Louis, Mo.	1120	KOMW	Okm, Wash.	680			
KMPC	Los Angeles, Calif.	710	KOMY	Watsonville, Calif.	1340			

WHITE'S RADIO LOG

Call	Location	kHz	Call	Location	kHz	Call	Location	kHz
KTBC	Austin, Tex.	590	KURV	Edinburg, Tex.	710	KWIK	Pocatello, Idaho	1240
KTCC	Malden, Mo.	1470	KURY	Brookings, Oreg.	910	KWIL	Albany, Oreg.	790
KTCH	Wayne, Neb.	1590	KUSD	Vermillion, S. Dak.	690	KWIM	Ashland, Oreg.	580
KTCS	Minneapolis, Minn.	690	KUSH	Cushing, Okla.	1600	KWIP	Merced, Calif.	1580
KTDL	Fort Smith, Ark.	1410	KUSN	St. Joseph, Mo.	1270	KWIQ	Moses Lake, Wash.	1260
KTDL	Laurens, La.	1470	KUTL	Utah	790	KWJQ	Des Moines, Wyo.	1050
KTDO	Toledo, Oreg.	1230	KUTI	Yakima, Wash.	980	KWIT	Moberly, Mo.	1230
KTEE	Idaho Falls, Idaho	1260	KUTY	Palmdale, Calif.	1470	KWIZ	Santa Ana, Calif.	1480
KTEL	Walla Walla, Wash.	1490	KUVR	Holdrege, Neb.	1380	KWJJ	Portland, Oreg.	1060
KTEM	Tempe, Tex.	1400	KUXL	Golden Valley, Minn.	1570	KWK	St. Louis, Mo.	1380
KTEO	San Angelo, Tex.	1340	KUZN	W. Monroe, La.	1310	KWKX	Abilene, Tex.	1340
KTER	Ferrell, Tex.	1570	KUZZ	Bakersfield, Calif.	800	KWKH	Shreveport, La.	1580
KTHH	Houston, Tex.	720	KVAC	Forks, Wash.	1490	KWKW	Pasadena, Calif.	1300
KTFS	Texarkana, Tex.	1400	KVLA	Sauk Rapids, Minn.	1480	KWVY	Des Moines, Iowa	1530
KTGA	Tlona, N. D.	1090	KVAN	Vancouver, Wash.	1480	KWLA	Many, La.	1530
KTGR	Columbia, Mo.	1580	KVAS	Astoria, Ore.	1230	KWLG	Decorah, Iowa	1240
KTHE	Thermopolis, Wyo.	1240	KVBR	Brainerd, Minn.	1340	KWLC	Wagoner, Okla.	1530
KTHO	South Lake Tahoe, Cal.	990	KVCK	Wolf Point, Neb.	1450	KWLM	Willmar, Minn.	1340
KTHS	Berryville, Ark.	1480	KVCL	Winnfield, La.	1270	KWMC	Del Rio, Tex.	1490
KTHW	Houston, Tex.	1270	KVCV	Redding, Calif.	600	KWMT	FT. Dodge, Iowa	1540
KTIB	Thibodaux, La.	1480	KVCS	San Luis Obispo, Calif.	920	KWNA	Winnemucca, Nev.	1400
KTIL	Tillamook, Oreg.	1590	KVCE	Conway, Ark.	1350	KWNC	Winn, Minn.	1400
KTIM	San Rafael, Calif.	1510	KVEG	Las Vegas, Nev.	970	KWNS	Pratt, Kans.	1290
KTIP	Porterville, Calif.	1450	KVEL	Vernal, Utah	1250	KWNT	Davenport, Iowa	1580
KTIS	Minneapolis, Minn.	900	KVEN	Ventura, Calif.	1450	KWOD	Worthington, Minn.	730
KTIX	Pendleton, Ore.	1240	KVEV	Austin, Tex.	1500	KWOP	Poplar Bluff, Mo.	930
KTKA	Ketchikan, Alaska	980	KVFC	Cortez, Colo.	740	KWON	Clinton, Okla.	1320
KTKB	Fort, Calif.	1310	KVFD	FT. Dodge, Iowa	1400	KWOO	Barleesville, Okla.	1400
KTKT	Turkey, La.	900	KVFE	Great Bend, Kans.	1580	KWOW	Worland, Wyo.	1340
KTKL	Tullulah, La.	1360	KVFI	Seattle, Wash.	570	KWOS	Waco, Okla. Mo.	1240
KTLN	Denver, Colo.	1280	KVIC	Victoria, Tex.	1340	KWOS	Pomona, Calif.	1600
KTLO	Mountain Home, Ark.	1240	KVIL	Highland Park, Tex.	1150	KWPC	Muscateen, Iowa	860
KTLL	Tahlequah, Okla.	1350	KVIN	Vinita, Okla.	1470	KWPM	West Plains, Mo.	1450
KTLU	Rusk, Tex.	1580	KVIO	Cottonwood, Ariz.	1600	KWPR	Claremore, Okla.	1270
KTUX	Tex. City, Tex.	1320	KVIP	Redding, Calif.	540	KWRP	Woodburn, Ore.	940
KTMK	Alabaster, Okla.	1520	KVKM	Wichmans, Tex.	1410	KWRD	Henderson, Tex.	1470
KTMN	Trumann, Ark.	1530	KVLB	Cleveland, Mo.	730	KWRE	Wetmore, Okla.	1410
KTMS	Santa Barbara, Calif.	1250	KVLC	Little Rock, Ark.	1050	KWRF	Warran, Ark.	360
KTNC	Falls City, Neb.	1230	KVLF	Alpine, Tex.	1240	KWRG	New Roads, La.	1500
KTNN	Tucumcari, N. Mex.	1400	KVLG	LaGrange, Tex.	1570	KWRO	Croquille, Oreg.	630
KTNT	Tacoma, Wash.	1400	KVLH	Pauls Valley, Okla.	1470	KWRV	Boonville, Mo.	1370
KTOB	Petaluma, Cal.	1490	KVLL	Woodville, Tex.	1220	KWRW	Guthrie, Okla.	1490
KTOD	Jenabon, Okla.	920	KVLM	Fallton, Nev.	980	KWSC	Pullman, Wash.	1250
KTOD	Sinton, Tex.	1590	KVMA	Marshall, Ark.	680	KWST <td>Waco, Calif.</td> <td>620</td>	Waco, Calif.	620
KTOE	Mankato, Minn.	1420	KVMC	Colorado City, Tex.	1320	KWSH	Wakona-Seminole, Okla.	1260
KTOH	Lihue, Hawaii	1350	KVNL	Sonora, Calif.	1450	KWSL	Kand Junction, Colo.	1340
KTOK	Oklahoma City, Okla.	1000	KVNS	Winslow, Ariz.	1010	KWSO	Wasco, Calif.	1010
KTON	Belton, Tex.	940	KVNI	Coeur d'Alene, Idaho	1240	KWSR	Rifle, Colo.	810
KTOO	Henderson, Nev.	1280	KVNU	Logan, Utah	810	KWST	Barstow, Calif.	1230
KTOP	Tonopah, Nev.	1490	KVNV	Basstrop, La.	1340	KWTC	Springfield, Mo.	1560
KTOT	Big Bear Lake, Cal.	1050	KVNY	Waco, Wyo.	1230	KWTT	Springfield, Mo.	1560
KTOW	San Springs, Okla.	1340	KVOA	Albuquerque, N. Mex.	730	KWUN	Concord, Cal.	1480
KTPA	Prescott, Ark.	1370	KVOE	Emporia, Kans.	1400	KWUP	Enterprise, Oreg.	1340
KTRB	Modesto, Calif.	860	KVOG	Ogden, Utah	1490	KWVY	Waverly, Iowa	1470
KTRC	Santa Fe, N. Mex.	1400	KVOM	Lafayette, La.	1330	KWWL	Waterloo, Iowa	1330
KTRF	Lufkin, Tex.	1420	KVON	Morrilton, Ark.	800	KWXY	Cathedral City, Cal.	1340
KTRF	Thief River Falls, Minn.	1230	KVON	Napa, Calif.	1440	KWYX	Farrington, N. Mex.	960
KTRG	Honolulu, Hawaii	990	KVOD	Tulsa, Okla.	1170	KWYN	Wynne, Ark.	1400
KTRH	Houston, Tex.	740	KVOR	Co. Springs, Colo.	1300	KWYO	Sheridan, Wyo.	1410
KTRI	St. Louis City, Iowa	1470	KVOU	Uvalde, Tex.	1400	KWYR	Winnier, S. Dak.	1260
KTRM	Beaumont, Tex.	990	KVOW	Riverton, Wyo.	1450	KWYS	W. Yellowstone, Mont.	920
KTRN	Wichita Falls, Tex.	1290	KVOX	Moorhead, Minn.	1280	KWYV	Everett, Wash.	1280
KTRY	Basstrop, La.	730	KVOY	Yuma, Ariz.	1490	KXA	Seattle, Wash.	770
KTSB	San Antonio, Tex.	1310	KVOZ	Laredo, Tex.	1490	KXAR	Hope, Ark.	1490
KTSM	El Paso, Tex.	1380	KVPA	Ville Platte, La.	1050	KXEL	Waterloo, Iowa	1540
KTST	Trenton, Mo.	1600	KVRA	Vermillion, S. D.	1490	KXFL	Prescott, La.	1480
KTTR	Rolla, Mo.	1490	KVRC	Arkadelphia, Ark.	1240	KXGX	Mexico, Mo.	1540
KTRS	Springfield, Mo.	1400	KVRD	Cottonwood, Ariz.	1240	KXEW	Tucson, Ariz.	1600
KTTT	Columbus, Neb.	1510	KVRE	Santa Rosa, Calif.	1460	KXFS	Pexco, Calif.	1550
KTUC	Tucson, Ariz.	1260	KVRS	Salida, Colo.	1340	KXGI	FT. Madison, Iowa	1360
KTUF	Tempe, Ariz.	1580	KVRS	Rock Springs, Wyo.	1360	KXGN	Glendive, Mont.	1400
KTUL	Sullivan, Mo.	950	KVSA	McGehee, Ark.	1220	KXIC	Iowa City, Iowa	800
KTW	Seattle, Wash.	4230	KVSA	Santa Fe, N. Mex.	1260	KXLD	Lawrence, Kan.	1410
KTW	Casper, Wyo.	1030	KVSH	Valentine, Neb.	940	KXLP	Phoenix, Ariz.	1400
KTXJ	Jasper, Tex.	1500	KVSI	Montpelier, Ida.	1450	KXJF	Forrest City, Ark.	950
KTXS	Sherman, Tex.	1350	KVSL	Show Low, Ariz.	1450	KXKW	Lafayette, La.	1520
KTYM	Inglewood, Calif.	1460	KVSO	Ardmore, Okla.	1240	KXLL	Portland, Oreg.	750
KUAM	Agana, Guam	610	KVWC	Vernon, Tex.	1490	KXLE	Elliensburg, Wash.	1240
KUAT	Tucson, Ariz.	1550	KVWG	Pearsall, Tex.	1280	KXLF	Butte, Mont.	1370
KUBA	Yuba City, Calif.	1600	KVWM	Show Low, Ariz.	370	KXLI	Helena, Mont.	1240
KUCB	Montrose, Colo.	1520	KVWO	Cheyenne, Wyo.	1370	KXL	Leiston, Mont.	1230
KUDE	Oceanside, Calif.	1380	KVWL	Holdenville, Okla.	1370	KXLR	Little Rock, Ark.	1150
KUDI	Great Falls, Mont.	1450	KWAC	Bakersfield, Calif.	1490	KXLY	Clayton, Mo.	1320
KUFA	Fairmont, Minn.	1370	KWAD	Wadena, Minn.	920	KXLY	Spokane, Wash.	920
KUGA	Honolulu, Hawaii	1500	KWAK	Stuttgart, Ark.	1240	KXO	El Centro, Calif.	1230
KUKI	Ukiah, Calif.	1490	KWAL	Wallace, Idaho	620	KXOA	Sacramento, Calif.	1470
KUKU	Willow Springs, Mo.	690	KWAM	Memphis, Tenn.	990	KXOB	St. Louis, Mo.	1480
KULU	Honolulu, Hawaii	1380	KWAT	Waxahatchie, N. C.	1480	KXOL	Fort Worth, Tex.	1380
KULE	Ephrata, Wash.	730	KWBA	Baytown, Tex.	1360	KXOW	Hot Springs, Ark.	1420
KULP	El Campo, Tex.	1390	KWBB	Wichita, Kans.	1410	KXOX	Sweetwater, Tex.	1240
KULY	Ulysses, Kan.	1420	KWBC	Navasota, Tex.	1350	KXRA	Alexandria, Minn.	1490
KUWA	Pendleton, Oreg.	1290	KWBE	Beatrice, Neb.	1450	KXRI	Russellville, Ark.	1490
KUWB	Honolulu, Hawaii	1420	KWBG	Boone, Iowa	1590	KXRD	Aborden, Wash.	1320
KUWA	Honolulu, Hawaii	1420	KWBH	Hutchinson, Kans.	1450	KXRE	San Jose, Calif.	1500
KUWA	Honolulu, Hawaii	1420	KWBI	Beaumont, Tex.	1480	KXRF	St. Louis, Mo.	1480
KUWA	Honolulu, Hawaii	1420	KWBL	Beaumont, Tex.	1480	KXSL	St. Louis, Mo.	1480
KUWA	Honolulu, Hawaii	1420	KWCL	Oak Grove, La.	1280	KXXX	Colby, Kans.	790
KUWA	Honolulu, Hawaii	1420	KWCO	Chickasha, Okla.	1580	KXYZ	Houston, Tex.	1320
KUWA	Honolulu, Hawaii	1420	KWDR	Del Rio, Tex.	810	KYA	San Francisco, Calif.	1260
KUWA	Honolulu, Hawaii	1420	KWDS	Recheater, Minn.	1270	KYAC	Kirkland, Wash.	1460
KUWA	Honolulu, Hawaii	1420	KWED	Seguin, Tex.	1580	KYAK	Anerorage, Alaska	630
KUWA	Honolulu, Hawaii	1420	KWEI	Weiser, Idaho	1260	KYAL	McKinney, Tex.	1600
KUWA	Honolulu, Hawaii	1420	KWEL	Midland, Tex.	1020	KYAN	Burton, La.	1150
KUWA	Honolulu, Hawaii	1420	KWEM	Hubb, N. Mex.	1480	KYNG	Fort Worth, Oreg.	1420
KUWA	Honolulu, Hawaii	1420	KWFA	Merkle, Tex.	1500	KYCN	Wheatland, Wyo.	1340
KUWA	Honolulu, Hawaii	1420	KWFB	San Angelo, Tex.	1260	KYCS	Roseburg, Oreg.	950
KUWA	Honolulu, Hawaii	1420	KWFT	San Angelo, Tex.	1260	KYCT	Payette, Idaho	1430
KUWA	Honolulu, Hawaii	1420	KWFT	Wichita Falls, Tex.	620	KYD	Medford, Oreg.	1250
KUWA	Honolulu, Hawaii	1420	KWGT	Stockton, Calif.	1280	KYLT	Missoula, Mont.	1340
KUWA	Honolulu, Hawaii	1420	KWHI	Brenham, Tex.	1280	KYME	Boise, Idaho	740
KUWA	Honolulu, Hawaii	1420	KWHK	Hutchinson, Kans.	1260	KYND	Burton, La.	1150
KUWA	Honolulu, Hawaii	1420	KWHN	Fort Smith, Ark.	820	KYNG	Fort Worth, Oreg.	1420
KUWA	Honolulu, Hawaii	1420	KWHN	Salt Lake City, Utah	860	KYNT	Fresno, Calif.	1300
KUWA	Honolulu, Hawaii	1420	KWHW	Altus, Okla.	1450			

Call	Location	kHz	Call	Location	kHz	Call	Location	kHz	Call	Location	kHz
KYOK	Houston, Tex.	1590	WALK	Patchogue, N.Y.	1370	WBAC	Cleveland, Tenn.	1340	WBOY	Clarksburg, W.Va.	1400
KYOR	Blythe, Calif.	1450	WALD	Midweston, N.Y.	1420	WBAD	College Park, Ga.	1570	WBPZ	Lock Haven, Pa.	1270
KYOS	Mendocino, Calif.	1400	WALH	Albion, Mich.	1260	WBAN	Barnesville, Ga.	1090	WBRB	Mt. Clemens, Mich.	1430
KYOU	Gresley, Colo.	1450	WALO	Humasas, P.R.	1240	WBAG	Burlington, N.C.	1150	WBRG	Birmingham, Ala.	1960
KYRO	Potosi, Mo.	1280	WALT	Tampa, Fla.	1110	WBAL	Baltimore, Md.	1090	WBRE	Bradenton, Fla.	1420
KYSM	Mankato, Minn.	1230	WALY	Herkimer, N.Y.	1420	WBAM	Montgomery, Ala.	740	WBRR	Wilkes-Barre, Pa.	1340
KYSN	Colorado Sprngs., Colo.	1460	WAMA	Selma, Ala.	1340	WBAP	Fort Worth, Tex.	820	WBRG	Lynchburg, Va.	1050
KYSS	Missoula, Mont.	930	WAMD	Aberdeen, Md.	970				WBRJ	Indianapolis, Ind.	1500
KYUM	Yuma, Ariz.	560	WAME	Miami, Fla.	1260	WBAR	Bartow, Fla.	1460	WBRJ	Marletta, O.	910
KYVA	Gallup, N.Mex.	1230	WAMG	Gallatin, Tenn.	1130	WBAT	Wagon, Ind.	1490	WBRK	Pittsfield, Mass.	1590
KYW	Philadelpa, Pa.	1080	WANA	Anniston, Ala.	980	WBAY	Barnett, S.C.	740	WBRC	Berlin, N.H.	1580
KYX	Oregon City, Ore.	1520	WAML	Laurel, Miss.	1340	WBAX	Wilkes-Barre, Pa.	1240	WBRM	Marion, N.C.	1250
KZAK	Tyler, Tex.	1330	WAMM	Flint, Mich.	1420	WBAY	Green Bay, Wis.	1360	WBRN	Big Rapids, Mich.	1460
KZEE	Weatherford, Tex.	1220	WAMO	Homestead, Pa.	86C	WBZA	Pittsfield, N.Y.	1550	WBRT	Barstow, Ky.	1320
KZEL	Eugene, Ore.	1540	WAMR	Venice, Fla.	1320	WBBA	Kingsfield, Ill.	1580	WBRO	Waynesboro, Ga.	1310
KZEY	Tyler, Tex.	690	WAMS	Wilmington, Del.	1380	WBBC	Burlington, N.C.	920	WBRV	Boonville, N.Y.	900
KZIA	Albuquerque, N.M.	1580	WAMW	Washington, Ind.	1580	WBBD	Rochester, N.Y.	950	WBRX	Berwick, Pa.	1280
KZIN	Yuba City, Cal.	1450	WAMY	Amory, Miss.	1580	WBBI	Abingdon, Va.	1230	WBRX	Waterbury, Conn.	1590
KZIP	Amarillo, Tex.	1310	WAN	Anniston, Ala.	1480	WBBK	Blakely, Ga.	1260	WBSA	Boz, Ala.	1580
KZIX	Fort Collins, Colo.	600	WANB	Waynesboro, Pa.	1580	WBBL	Richmond, Va.	1480	WBSC	Bennettsville, S.C.	1550
KZNG	Hot Springs, Ark.	1340	WANL	Lincolville, Ala.	1540	WBBM	Chicago, Ill.	780	WBSG	Blackshear, Ga.	1350
KZOE	Princeton, Ill.	1490	WANP	Annapolis, Md.	1190	WBBO	Forest City, N.C.	780	WBSP	New Bedford, Mass.	1420
KZOL	Farwell, Tex.	1570	WANQ	Pineville, Ky.	1230	WBBO	Augusta, Ga.	1340	WBSP	Pensacola, Fla.	1540
KZON	Santa Maria, Cal.	1600	WAND	Anderson, S.C.	1280	WBBR	Travelers Rest, S.C.	1580	WBT	Charlotte, N.C.	1110
KZOO	Honolulu, Hawaii	1210	WANR	Richmond, Va.	990	WBBS	Lyons, Ga.	970	WBT	Batavia, N.Y.	1490
KZOT	Marionna, Ark.	1240	WANW	Waynesboro, Va.	970	WBCT	Youngstown, Ohio	1240	WBTA	Watkins, N.H.	1480
KZOW	Globe, Ariz.	1240	WANX	Waynesboro, Va.	1390	WBDB	Plymouth, N.H.	1380	WBTH	Williamson, W.Va.	1400
KZUN	Opportunity, Wash.	630	WAOA	Opekila, Ala.	1520	WBDB	Ponca City, Okla.	1230	WBTM	Onancock, Va.	1330
KZYM	Cape Girardeau, Mo.	1220	WADK	Atlanta, Ga.	1380	WBDA	Bay Minette, Ala.	1150	WBTN	Bennington, Vt.	1370
KZZN	Littlefield, Tex.	1490	WADP	Ostego, Mich.	980	WBDB	Levittown, Pa.	1490	WBTD	Linton, Ind.	1600
VOUS	Argentina, Nfld.	1480	WADV	Vincennes, Ind.	1450	WBCH	Hastings, Mich.	1220	WBTS	Bridgeport, Ala.	1480
WAAA	Winston-Salem, N.C.	980	WAPA	San Juan, P.R.	880	WBCK	Williamsburg, Va.	740	WBUC	Buckhannon, W.Va.	1460
WAAA	Worcester, Mass.	1440	WAPC	Riverhead, N.Y.	1570	WBCK	Battle Creek, Mich.	930	WBUD	Greentown, N.J.	1260
WAAA	Terre Haute, Ind.	1300	WAPD	Jacksonville, Fla.	970	WBCK	Youngstown, Ohio	1240	WBUD	Ridgeland, S.C.	1480
WAAF	Chicago, Ill.	950	WAPF	Waynesboro, Va.	980	WBCK	Burys City, Mich.	1540	WBUD	Butler, Pa.	1050
WAG	Adel, Ga.	1470	WAPG	Arcadia, Fla.	1480	WBCK	Union, S.C.	1500	WBUX	Doylesville, Pa.	1570
WAAK	Dallas, N.C.	960	WAPI	Birmingham, Ala.	1070	WBCE	Pittsfield, Mass.	1420	WBUX	Lexington, N.C.	1440
WAAW	Ann Arbor, Mich.	1600	WAPL	Appleton, Wis.	1570	WBEE	Harvey, Ill.	1570	WBUX	Fredonia, N.Y.	1570
WAAA	Andalusia, Ala.	1530	WAPD	Chatanooga, Tenn.	1150	WBEE	Elizabethton, Tenn.	1240	WBVM	Utica, N.Y.	1550
WAAW	Trenton, N.J.	1300	WAPX	Montgomery, Ala.	1600	WBEL	Beloit, Wis.	1380	WBVP	Beaver Falls, Pa.	1230
WAAW	Gadsden, Ala.	570	WAQE	Towson, Md.	1580	WBEN	Buffalo, N.Y.	930	WRB	St. Pauls, N.C.	1050
WAAW	Huntsville, Ala.	1570	WAQI	Wapakoneta, Ohio	1220	WBEN	Wheaton, S.C.	970	WRB	St. Pauls, N.C.	1050
WABA	Aguadilla, P.Rico	850	WAQJ	Birmingham, Ala.	1220	WBET	Brockton, Mass.	1480	WRB	St. Pauls, N.C.	1050
WABB	Mobile, Ala.	1490	WARA	Attleboro, Mass.	1320	WBEB	Beaufort, S.C.	960	WRB	Savannah, Ga.	1450
WABC	New York, N.Y.	770	WARB	Covington, La.	730	WBEB	Beaver Dam, Wis.	1430	WRB	Canton, Ill.	1560
WABC	Ft. Campbell, Ky.	1370	WARD	Johnstown, Pa.	1490	WBEX	Chillicothe, Ohio	1490	WRB	Boston, Mass.	1030
WABC	Fairhope, Ala.	1220	WARE	Ware, Mass.	1250	WBFB	Bedford, Pa.	1310	WRB	Glens Falls, N.Y.	1410
WABC	Greenwood, Miss.	960	WARF	Jasper, Ala.	1240	WBFB	Quincy, Tenn.	1500	WRB	Odesa, Tex.	920
WABH	Urbaird, Va.	1150	WARJ	Abbeville, Ala.	1480	WBFB	Woolburry, Tenn.	1540	WRB	Wheeling, W. Va.	1470
WABI	Bangor, Me.	910	WARK	Wardensburg, Md.	1490	WBFB	Woolburry, Tenn.	1540	WRB	St. Pauls, N.C.	1050
WABI	Adrian, Mich.	1490	WARM	Scranton, Pa.	590	WBGN	Bowling Green, Ky.	1340	WRB	St. Pauls, N.C.	1050
WABK	Gardiner, Me.	1280	WARN	Ft. Pierce, Fla.	1330	WBGS	Slidell, La.	1560	WRB	St. Pauls, N.C.	1050
WABL	Amite, La.	1570	WARD	Canonsburg, Pa.	540	WBHB	Fitzgerald, Ga.	1240	WRB	St. Pauls, N.C.	1050
WABO	Waynesboro, Miss.	990	WART	Moulton, Ala.	1530	WBHC	Hampton, S.C.	1270	WRB	St. Pauls, N.C.	1050
WABO	Cleveland, Ohio	1540	WARU	Peru, Ind.	1600	WBHF	Cartersville, Ga.	1450	WRB	St. Pauls, N.C.	1050
WABR	Winter Park, Fla.	1440	WARV	Warwick, Greenwih, R.I.	1590	WBHM	Birmingham, Ala.	1550	WRB	St. Pauls, N.C.	1050
WABT	Tunkasee, Ala.	1600	WAS	Hardegrave, Md.	1330	WBHM	Birmingham, Ala.	1550	WRB	St. Pauls, N.C.	1050
WABT	Abbeville, S.C.	1590	WASA	Sparksburg, S.C.	1530	WBHP	Huntsville, Ala.	1230	WRB	St. Pauls, N.C.	1050
WABY	Albany, N.Y.	1400	WASK	Lafayette, Ind.	1450	WBHT	Brownsville, Tenn.	1520	WRB	St. Pauls, N.C.	1050
WABZ	Albemarle, N.C.	1010	WASK	Lafayette, Ind.	1450	WBIA	Augusta, Ga.	1230	WRB	St. Pauls, N.C.	1050
WACA	Camden, S.C.	1590	WASP	Brownsville, Pa.	1130	WBIB	Centerville, Ala.	1110	WRB	St. Pauls, N.C.	1050
WACC	Kittanning, Pa.	1380	WATA	Boone, N.C.	1450	WBIE	Marletta, Ga.	1070	WRB	St. Pauls, N.C.	1050
WACE	Chickadee, Mass.	730	WATC	Gaylord, Mich.	900	WBIG	Greensboro, N.C.	1480	WRB	St. Pauls, N.C.	1050
WACI	The Dalles, Ore.	1480	WATE	Knoxville, Tenn.	1480	WBIP	Wilmington, N.C.	1480	WRB	St. Pauls, N.C.	1050
WACK	Newark, N.Y.	1420	WATI	Indianapolis, Ind.	810	WBIR	Knoxville, Tenn.	1240	WRB	St. Pauls, N.C.	1050
WACL	Waycross, Ga.	570	WATJ	Indianapolis, Ind.	810	WBIS	Bristol, Conn.	1440	WRB	St. Pauls, N.C.	1050
WACO	Waco, Tex.	1460	WATK	Antigo, Wis.	900	WBIV	Bedford, Ind.	1340	WRB	St. Pauls, N.C.	1050
WACR	Columbus, Miss.	1050	WATM	Attmore, Ala.	1590	WBIX	Jacksonville Beach, Fla.	1010	WRB	St. Pauls, N.C.	1050
WACT	Tuscaloosa, Ala.	1420	WATN	Watertown, N.Y.	1240	WBIZ	Emu Claire, Wis.	1400	WRB	St. Pauls, N.C.	1050
WACX	Austell, Ga.	1600	WATO	Oak Ridge, Tenn.	1290	WBIZ	Emu Claire, Wis.	1400	WRB	St. Pauls, N.C.	1050
WACX	Shelby, N.C.	1600	WATP	Marion, S.C.	1320	WBK	Chardon, O.	1560	WRB	St. Pauls, N.C.	1050
WAD	Wadsworth, N.C.	1210	WATQ	Watersbury, Conn.	960	WBKH	Hattiesburg, Miss.	950	WRB	St. Pauls, N.C.	1050
WADK	Newport, R.I.	1540	WATS	Sayre, Pa.	1240	WBKN	Newton, Miss.	1410	WRB	St. Pauls, N.C.	1050
WADM	Decatur, Ind.	1540	WATT	Cadillac, Mich.	900	WBKV	West Bend, Wis.	1470	WRB	St. Pauls, N.C.	1050
WADO	New York, N.Y.	1280	WATW	Birmingham, Ala.	1400	WBLC	Lenoir City, Tenn.	1360	WRB	St. Pauls, N.C.	1050
WADR	Remsen, N.Y.	1480	WATX	Alpena, Mich.	1450	WBLC	Lenoir City, Tenn.	1360	WRB	St. Pauls, N.C.	1050
WADS	Ansonia, Conn.	890	WAUB	Auburn, N.Y.	1310	WBLC	Lenoir City, Tenn.	1360	WRB	St. Pauls, N.C.	1050
WABE	Altenont, Tenn.	790	WAUC	Waukegan, Ill.	1310	WBLC	Lenoir City, Tenn.	1360	WRB	St. Pauls, N.C.	1050
WABL	Waycross, P.Rico	800	WAUD	Auburn, Ala.	1230	WBLC	Lenoir City, Tenn.	1360	WRB	St. Pauls, N.C.	1050
WAEW	Crossville, Tenn.	1330	WAUG	Augusta, Ga.	1050	WBLC	Lenoir City, Tenn.	1360	WRB	St. Pauls, N.C.	1050
WAF	Staunton, Va.	900	WAUK	Waukesha, Wis.	1510	WBLC	Lenoir City, Tenn.	1360	WRB	St. Pauls, N.C.	1050
WAF	Grand Rapids, Mich.	1480	WAV	Arlington, Va.	780	WBLC	Lenoir City, Tenn.	1360	WRB	St. Pauls, N.C.	1050
WAGC	Centrs, Ala.	1550	WAVC	Warner Robins, Ga.	1350	WBLC	Lenoir City, Tenn.	1360	WRB	St. Pauls, N.C.	1050
WAGC	Leesburg, Va.	1290	WAVE	Louisville, Ky.	970	WBLC	Lenoir City, Tenn.	1360	WRB	St. Pauls, N.C.	1050
WAGF	Dothan, Ala.	1320	WAW	Dayton, Ohio	1210	WBLC	Lenoir City, Tenn.	1360	WRB	St. Pauls, N.C.	1050
WAGF	Franklin, Tenn.	950	WAVL	Apollo, Pa.	910	WBLC	Lenoir City, Tenn.	1360	WRB	St. Pauls, N.C.	1050
WAGL	Lancaster, S.C.	1560	WAVN	Stillwater, Minn.	1220	WBLC	Lenoir City, Tenn.	1360	WRB	St. Pauls, N.C.	1050
WAGM	Presque Isle, Maine	950	WAVO	Avondale Estates, Ga.	1420	WBLC	Lenoir City, Tenn.	1360	WRB	St. Pauls, N.C.	1050
WAGN	Memominee, Mich.	1340	WAVU	Albertville, Ala.	630	WBLC	Lenoir City, Tenn.	1360	WRB	St. Pauls, N.C.	1050
WAGO	Oshkosh, Wis.	690	WAVZ	New Haven, Conn.	1300	WBLC	Lenoir City, Tenn.	1360	WRB	St. Pauls, N.C.	1050
WAGR	Lumberton, N.C.	580	WAWA	West Allis, Wis.	1590	WBLC	Lenoir City, Tenn.	1360	WRB	St. Pauls, N.C.	1050
WAGS	Elizhoptville, S.C.	1380	WAWK	Waukegan, Ill.	1310	WBLC	Lenoir City, Tenn.	1360	WRB	St. Pauls, N.C.	1050
WAGY	Forest City, N.C.	1480	WAWZ	Zarephath, N.J.	1380	WBLC	Lenoir City, Tenn.	1360	WRB	St. Pauls, N.C.	1050
WAMT	Alhambra-Cleona, Pa.	1510	WAX	Yerkes Beach, Fla.	1370	WBLC	Lenoir City, Tenn.	1360	WRB	St. Pauls, N.C.	1050
WAIK	Galesburg, Ill.	1590	WAXK	Superior, Wis.	1320	WBLC	Lenoir City, Tenn.	1360	WRB	St. Pauls, N.C.	1050
WAIL	Baton Rouge, La.	1260	WAXX	Georgetown, Ky.	1580	WBLC	Lenoir City, Tenn.	1360	WRB	St. Pauls, N.C.	1050
WAIM	Anderson, S.C.	1230	WAXY	Chippewa Falls, Wis.	1150	WBLC	Lenoir City, Tenn.	1360	WRB	St. Pauls, N.C.	1050
WAIN	Columbia, Ky.	1270	WAYB	Waynesboro, Va.	1490	WBLC	Lenoir City, Tenn.	1360	WRB	St. Pauls, N.C.	1050
WAIR	Winston-Salem, N.C.	1340	WAYC	Dayton, Md.	900	WBLC	Lenoir City, Tenn.	1360	WRB	St. Pauls, N.C.	1050
WAIT	Chicago, Ill.	1490	WAYD	Rockingham, N.C.	900	WBLC	Lenoir City, Tenn.	1360	WRB	St. Pauls, N.C.	1050
WAJ	Decatur, Ill.	1490	WAYR	Orange Park, Fla.	550	WBLC	Lenoir City, Tenn.	1360	WRB	St. Pauls, N.C.	1050
WAJR	Morgantown, W.Va.	1440	WAYS	Charlotte, N.C.	610	WBLC	Lenoir City, Tenn.	1360	WRB	St. Pauls, N.C.	1050
WAKE	Walparaiso, Ind.	1500	WAYT	Waynesboro, Pa.	1230	WBLC	Lenoir City, Tenn.	1360	WRB	St. Pauls, N.C.	1050
WAKI	McMinnville, Tenn.	990	WAYZ	Waynesboro, Pa.	1230	WBLC	Lenoir City, Tenn.	1360	WRB	St. Pauls, N.C.	1050
WAKN	Aiken, S.C.	990	WAZA	Bainbridge, Ga.	1380	WBLC	Lenoir City, Tenn.	1360	WRB	St. Pauls, N.C.	1050
WAKO	Lakewood, Ill.	910	WAZB	Clearwater, Fla.	1230	WBLC	Lenoir City, Tenn.	1360	WRB	St. Pauls, N.C.	1050
WAKR	Akron, Ohio	1480	WAZC	Hazleton, Pa.	1490	WBLC	Lenoir City, Tenn.	1360	WRB	St. Pauls, N.C.	1050
WAKS	Fuquay Springs, N.C.	1480	WAZS	Summerville, S.C.	990	WBLC	Lenoir City, Tenn.	1360	WRB	St. Pauls, N.C.	1050
WAKX	Superior, Wis.	1320	WAZL	Hazleton, Pa.	1490	WBLC	Lenoir City, Tenn.	1360	WRB	St. Pauls, N.C.	1050
WAKY	Louisville, Ky.	790	WAZM	Lafayette, Ind.	1410	WBLC	Lenoir City, Tenn.	1360	WRB	St. Pauls, N.C.	1050
WALD	Waterboro, S.C.	1060	WAZN	Waynesboro, Va.	1490	WBLC	Lenoir City, Tenn.	1360	WRB	St. Pauls, N.C.	1050
WALE	Fall River, Mass.	1400	WBA	West Lafayette, Ind.	920	WBLC	Lenoir City, Tenn.	1360	WRB	St. Pauls, N.C.	1050
WALG	Albany, Ga.	1590	WBAB	Babylon, N							

WHITE'S RADIO LOG

Call	Location	kHz	Call	Location	kHz	Call	Location	kHz
WCVL	Crawfordsville, Ind.	1500	WEAG	Alcoa, Tenn.	1470	WEUP	Huntsville, Ala.	1600
WCVP	Murphy, N.C.	650	WEAL	Greensboro, N. C.	1510	WEVA	Emporia, Va.	860
WCVR	Randolph, Vt.	1230	WEAM	Arlington, Va.	1390	WEVD	New York, N.Y.	1330
WCVS	Springfield, Ill.	1430	WEAN	Providence, R.I.	790	WEVE	Eveleth, Minn.	1340
WCVT	Portsmouth, Va.	1350	WEAO	Eau Claire, Wis.	790	WEVW	St. Louis, Mo.	1770
WCWA	Toledo, O.	1230	WEAS	Savannah, Ga.	900	WEWJ	Laurinburg, N.C.	1080
WCWC	Ripon, Wis.	1600	WEAT	W. Palm Beach, Fla.	850	WEWZ	Royal Oak, Mich.	1340
WCWR	Tarpon Springs, Fla.	1420	WEAV	Plattsburg, N.Y.	960	WEXT	W. Hartford, Conn.	1550
WCYB	Bristol, Va.	690	WEAW	Evanston, Ill.	1330	WEYE	Sanford, N.C.	1290
WCYN	Cynthiana, Ky.	1400	WEBB	Baltimore, Md.	1360	WEYZ	Talladega, Ala.	1580
WDAD	Indiana, Pa.	1450	WEBC	Duluth, Minn.	560	WEZE	Boston, Mass.	1260
WDAE	Tampa, Fla.	1250	WEBJ	Brewton, Ala.	1240	WEZZ	Williamsburg, Ky.	1440
WDAF	Kansas City, Mo.	610	WEBO	Owego, N.Y.	1330	WEZQ	Winfield, Ala.	1300
WDAK	Columbus, Ga.	540	WEBO	Harrisburg, Ill.	1240	WEZV	Cocoa, Fla.	1350
WDAL	Meridian, Miss.	1390	WEBR	Buffalo, N.Y.	1110	WFAA	Dallas, Tex.	870
WDAN	Danville, Ill.	1450	WEBS	Calhoun, Ga.	1110			820
WDAR	Darlington, S.C.	1350	WEBY	Milton, Fla.	1330	WFAB	Miami, Fla.	990
WDAS	Philadelphia, Pa.	1480	WECL	Eau Claire, Wis.	1050	WFAD	Midlebury, Vt.	1490
WDAX	McRae, Ga.	1410	WECP	Carthage, Miss.	1480	WFAG	Farmville, N.C.	1250
WDAY	Fargo, N. Dak.	970	WEDC	Chicago, Ill.	1240	WFAL	Alliance, Ohio	1310
WDBF	Estanaba, Mich.	680	WEDD	McKeesport, Pa.	810	WFAP	Fayetteville, N.C.	1230
WDBF	Delray Beach, Fla.	1420	WEDD	South Plains, N.C.	990	WFAR	Farristown, Pa.	1470
WDBJ	Roanoke, Va.	960	WEED	Rocky Mount, N.C.	1390	WFAS	Plainfield, N.Y.	1230
WDBL	Springfield, Tenn.	1590	WEEE	Rensselaer, N.Y.	1300	WFAU	Augusta, Me.	1540
WDBM	Statesville, N.C.	550	WEFF	Highland Park, Ill.	1430	WFAV	Ft. Atkinson, Wis.	940
WDBO	Orlando, Fla.	580	WEEL	Boston, Mass.	590	WFAZ	Falls Church, Va.	1220
WDBQ	Dubuque, Iowa	1490	WEEL	Fairfax, Va.	1310	WFBA	San Sebastian, P.R.	1460
WDCF	Dodge City, Fla.	1350	WEEN	Lafayette, Tenn.	1460	WFBF	Greenville, S.C.	1330
WDFC	Clinton, N.Y.	1370	WEER	Pittsburgh, Pa.	1080	WFBF	Fernandino Beach, Fla.	1570
WDFR	Hanover, N.H.	1340	WEER	Warrenton, Va.	1250			
WDDT	Greenville, Miss.	900	WEET	Richmond, Va.	1320	WFBG	Attoona, Pa.	1290
WDDY	Gloucester, Va.	1420	WEUU	Reading, Pa.	1450	WFBG	Syracuse, N.Y.	1390
WDEA	Ellsworth, Me.	1370	WEWV	Washington, N.C.	1320	WFBM	Indianapolis, Ind.	1260
WDEB	Jamesstown, Tenn.	1500	WEEX	Easton, Pa.	1250	WFBP	Baltimore, Md.	1300
WDEC	Americus, Ga.	1290	WEEX	Chester, Pa.	1590	WFBP	Spring Lake, N. C.	1450
WDEB	Chattanooga, Tenn.	1370	WEEX	Concord, N.C.	1410	WFCG	Franklin, La.	1110
WDEH	Stewart, Tenn.	800	WEGP	Worcester, Maine	1390	WFCM	Winston-Salem, N. C.	1550
WDEL	Wilmington, Del.	1150	WEHH	Elmira Heights, Horseheads, N.Y.	1590	WFDK	Fitchburg, Mass.	910
WDEM	Macon, Ga.	1500	WEHV	Windsor, Conn.	1480	WFDK	Manchester, Ga.	1370
WDEV	Waterbury, Vt.	550	WEIC	Charleston, Ill.	1270	WFEE	Manchester, N.H.	1370
WDEW	Westfield, Mass.	1570	WEIF	Moundsville, W. Va.	1370	WFEE	Sylacauga, Ala.	1340
WDGL	Douglasville, Ga.	1520	WEIM	Fitchburg, Mass.	1280	WFEE	Harrisburg, Pa.	1400
WDGN	Minneapolis, Minn.	1130	WEIM	Clinton, W. Va.	1430	WFFC	Columbia, Miss.	1360
WDHA	Dayton, Tenn.	1070	WEIS	Centerville, Ala.	940	WFG	Marathon, Fla.	1300
WDIC	Clinchco, Va.	1430	WEJL	Seranton, Pa.	630	WFG	Franklin, Mass.	960
WDIG	Dothan, Ala.	1450	WEKG	Jackson, Ky.	810	WFGW	Gaffney, S.C.	1570
WDIX	Orangeburg, S.C.	1150	WEKB	Shelby Fayetteville, Tenn.	1240	WFGW	Black Mountains, N.C.	1010
WDJS	Mt. Olive, N.C.	1430	WEKY	Richmond, Ky.	1260	WFHK	Bristol, Va.	980
WDKZ	Bridgeport, Conn.	1530	WEKZ	Monroe, Wis.	1340	WFHR	Wis. Rapids, Wis.	1320
WDKD	Kingstree, S. C.	1260	WELB	Ellettsville, Va.	1490	WFIL	Fulton, Ky.	900
WDLA	Walton, N.Y.	1270	WELC	Fisher, W. Va.	690	WFIL	Midford, Conn.	1500
WDLB	Marshfield, Wis.	1450	WELS	S. Daytona, Fla.	1590	WFLG	Sumter, S.C.	1290
WDLR	Delaware, Ohio	1550	WELI	New Haven, Conn.	960	WFLM	Philadelphia, Pa.	560
WDLM	E. Moline, Ill.	960	WELK	Charlottesville, Va.	1070	WFIN	Findlay, Ohio	1330
WDLN	Panama City, Fla.	950	WELL	Freeport, Ill.	1510	WFIS	Fountain Inn, S.C.	1600
WDLT	Indianola, Miss.	1370	WELM	Elmira, N.Y.	1410	WFIV	Kissimmee, Fla.	1080
WDLV	Donalsonville, La.	1090	WELP	Easley, S.C.	1360	WFIV	Fairfield, Ill.	1390
WDMG	Dover-Foxcroft, Me.	1340	WELR	Roanoke, Ala.	1360	WFJ	Montgomery, Ala.	1500
WDMJ	Oaquette, Mich.	860	WELS	Kinston, N.C.	1010	WFKN	Franklin, Ky.	1220
WDMP	Dodgeville, Wis.	810	WELV	Ellenville, N. Y.	1370	WFKY	Frankfort, Ky.	1490
WDMS	Lynchburg, Va.	1320	WELW	Willoughby, O.	1330	WFLA	Tampa, Fla.	970
WDNY	Dorocoke City, Md.	540	WELX	Xenia, O.	1110	WFLB	Fayetteville, N. C.	1490
WDON	Durham, N.C.	920	WELZ	Ely, Minn.	1450	WFLI	Lookout Mtn., Tenn.	1070
WDON	Wilkes, W. Va.	1240	WELZ	Plainfield, N.J.	1890	WFLN	Philadelphia, Pa.	900
WDNG	Anniston, Ala.	1450	WELZ	Albany, Miss.	1680	WFLP	Florida, Va.	870
WDNT	Dayton, Tenn.	1280	WEMB	Erwin, Tenn.	1420	WFLR	Dundee, N. C.	1570
WDDB	Canton, Miss.	1370	WEMD	Easton, Md.	1460	WFLR	Fredericksburg, Va.	1350
WDDE	Presburg, Ky.	1310	WEMJ	Laconia, N.H.	1490	WFLW	Monticello, Ky.	1360
WDDC	Chattanooga, Tenn.	1310	WEMP	Milwaukee, Wis.	1250	WFM	Goldboro, N.C.	730
WDDG	Dunkirk, N.Y.	1410	WENC	Whiteville, N.C.	1220	WFM	Frederick, Md.	930
WDDH	Waco, Tex.	1400	WEND	Ebensburg, Pa.	1580	WFMH	Cullman, Ala.	1460
WDDI	Albion, S. C.	1470	WENY	Elmira, N.Y.	1330	WFMI	Montgomery, Ala.	1510
WDDJ	Athens, Ga.	1470	WENG	Englewood, Fla.	1530	WFNJ	Youngstown, Ohio	1390
WDDN	Wheaton, Md.	1540	WENK	Union City, Tenn.	1240	WFNY	Fairmont, N.C.	860
WDDR	Sturgeon Bay, Wis.	910	WENN	Birmingham, Ala.	1320	WFNV	Madisonville, Ky.	730
WDDO	Oneonta, N.Y.	730	WENO	Madison, Tenn.	1430	WFNC	Fayetteville, N.C.	940
WDDT	Burlington, Va.	1400	WENR	Englewood, Tenn.	1040	WFNL	No. Augusta, S.C.	1600
WDDV	Dover, Del.	1410	WENT	Gilovesville, N.Y.	1390	WFOB	Fostoria, Ohio	1430
WDDW	Dodgeville, Mich.	1440	WENZ	Highland Springs, Va.	1450	WFOA	Marletta, Ga.	1230
WDDQ	DuQuoin, Ill.	1580	WEOK	Poughkeepsie, N.Y.	930	WFOY	Franklin, N.H.	1400
WDRD	Hartford, Conn.	1360	WEOL	Elyria, Ohio	1390	WFOY	St. Augustine, Fla.	1240
WDSK	Dillon, S.C.	800	WEPG	S. Pittsburgh, Tenn.	1100	WFP	Ft. Payne, Ala.	1450
WDSG	Dyersburg, Tenn.	1450	WEPG	S. Pittsburgh, Tenn.	1100	WFP	Atlantic City, N.J.	1400
WDSL	Cleveland, Miss.	1410	WEPM	Martinsburg, W. Va.	1340	WFP	Ft. Valley, Ga.	1150
WDSK	Mocksville, N. C.	1520	WERN	Plainfield, N.J.	1890	WFR	Hammond, La.	1400
WDSM	Superior, Wis.	710	WERD	Atlanta, Miss.	1680	WFR	Franklin, Pa.	1450
WDSN	DeFuniak Springs, Fla.	1280	WERE	Cleveland, Ohio	1900	WFR	Franklin, N.H.	1400
WDSR	Lake City, Fla.	1340	WERH	Hamilton, Ala.	970	WFR	Reidsville, N.C.	1600
WDSU	New Orleans, La.	1280	WERI	Westerly, R.I.	1260	WFR	Coudersport, Pa.	600
WDTM	Solmer, Tenn.	1130	WERK	Muncie, Ind.	990	WFR	Fremont, Ohio	900
WDTW	Gainesville, Ga.	1240	WERL	Eagle River, Wis.	950	WFR	West Frankfort, Ill.	1300
WDUX	Waupaca, Wis.	800	WERT	Van Wert, Ohio	1220	WFS	Franklin, N.C.	1050
WDVA	Jackson, Tenn.	1810	WESL	Lebanon, Mo.	1580	WFSG	Boca Raton, Fla.	740
WDVA	Davilla, Va.	1250	WESA	Charler, Pa.	940	WFSG	Alparaso, Fla.	1340
WDVH	Gainesville, Fla.	980	WESB	Bradford, Pa.	1490	WFSF	Franklin, N.H.	1400
WDVL	Vineland, N.J.	1270	WESC	Greenville, S.C.	660	WFSR	Kingwood, W. Va.	1580
WDWD	Dawson, Ga.	990	WESD	Southbridge, Mass.	970	WFSR	Bath, N.Y.	1360
WDWS	Champaign, Ill.	1400	WESR	Tasley, Va.	1390	WFST	Caribou, Maine	660
WDXB	Chattanooga, Tenn.	1490	WEST	Easton, Pa.	1400	WFST	Kinston, N.C.	900
WDXE	Lawrenceburg, Tenn.	1370	WEST	Salem, Mass.	1230	WFTG	London, Ky.	1400
WDXL	Lawrenceburg, Tenn.	1370	WEST	Salem, Mass.	1230	WFTL	Ft. Lauderdale, Fla.	1400
WDXL	Lexington, Tenn.	1490	WETA	Wilmington, N.C.	750	WFTM	Marysville, Ky.	1270
WDXR	Clarksville, Tenn.	540	WETB	Johnson City, Tenn.	790	WFTN	Franklin, N.H.	1340
WDXR	Paducah, Ky.	1560	WETC	Wendell-Zebulon, N.C.	540	WFTO	Fulton, Miss.	1230
WDXR	Sumter, S.C.	1240	WETH	St. Augustine, Fla.	1420	WFTO	Front Royal, Va.	1450
WDYZ	Buford, Ga.	1460	WETO	Gadsden, Ala.	930	WFTO	Ft. Walton Beach, Fla.	1260
WDZD	Decatur, Ill.	1050	WETT	Ocean City, Md.	1500	WFUL	Fulton, Ky.	1270
WDFR	Franklin, S.C.	800	WETT	Westumpka, Ala.	1250	WFUN	Miami, Fla.	760
WEAC	Gaffney, S. C.	1500	WETZ	West Martinsville, West Virginia	1330	WFUN	Greensboro, N.C.	1570
WEAD	College Park, Ga.	1570	WEUC	Ponce, P.R.	1420	WFVA	Fredericksburg, Va.	1290

Call	Location	kHz	Call	Location	kHz	Call	Location	kHz	Call	Location	kHz
WFWL	Camden, Tenn.	1220	WGWR	Asheboro, N.C.	1260	WHRY	Ann Arbor, Mich.	1600	WIRC	Hickory, N.C.	630
WFWY	Ft. Wayne, Ind.	1090	WGY	Schenectady, N.Y.	810	WHRY	Elizabethown, Pa.	1600	WIRD	Lake Placid, N.Y.	920
WFCY	Alma, Mich.	1340	WGYV	Greenville, Ala.	1300	WHSC	Hartsville, S.C.	1450	WIRE	Indianapolis, Ind.	1430
WGAA	Odartown, Ga.	580	WHA	Madison, Wis.	970	WHSL	Wilmington, N.C.	1490	WIRJ	Humboldt, Tenn.	740
WGAC	Augusta, Ga.	580	WHAB	Baxley, Ga.	1260	WHSM	Hayward, Wis.	910	WIRK	W. Palm Beach, Fla.	1290
WGAD	Gadsden, Ala.	1350	WHAG	Halfway, Md.	1410	WHST	Hattiesburg, Miss.	1230	WIRL	Peoria, Ill.	1290
WGAF	Valdosta, Ga.	910	WHAI	Greenfield, Mass.	1240	WHTC	Holland, Mich.	1450	WIRD	Ironton, Ohio	1230
WGAI	Elizabeth City, N.C.	560	WHAK	Rogers City, Mich.	960	WHUB	Asbury Park, N.J.	1410	WIRY	Irwin, Ky.	1840
WGAL	Lancaster, Pa.	1490	WHAL	Shelbyville, Tenn.	1400	WHUC	Easton, N.J.	1400	WIRY	Plattsburgh, N.Y.	1340
WGAN	Portland, Maine	560	WHAM	Rochester, N.Y.	1400	WHUS	Hyde Park, N.Y.	950	WISC	Columbia, S.C.	560
WGAP	Maryville, Tenn.	1400	WHAN	Hamlet, N.Y.	980	WHUD	Hudson, N.Y.	1200	WISA	Isabella, P.R.	1390
WGAR	Cleveland, Ohio	720	WHAP	Hopewell, Va.	1340	WHUM	Reading, Pa.	1240	WISE	Asheville, N.C.	1310
WGAS	S. Gastonia, N.C.	1420	WHAR	Clarksburg, W.Va.	1340	WHUN	Huntington, Pa.	1150	WISK	Americus, Ga.	1390
WGAT	Gate City, Va.	1050	WHAS	Louisville, Ky.	840	WHUT	Anderson, Ind.	1470	WISL	Shamokin, Pa.	1480
WGAU	Athens, Ga.	1340	WHAT	Philadelphia, Pa.	1340	WHVL	Hendersonville, N.C.	1600	WISM	Madison, Wis.	1480
WGAW	Gardner, Mass.	1340	WHAW	Haverhill, Mass.	1490	WHVR	Hanover, Pa.	1280	WISN	Milwaukee, Wis.	1260
WGBB	Freeport, N.Y.	1240	WHAW	Weston, W.Va.	980	WHWB	Rutland, Vt.	1000	WISP	Ponce, P.R.	1260
WGBE	Chipsley, Fla.	1240	WHAZ	Troy, N.Y.	1330	WHWB	Princeton, N.J.	1350	WISR	Butler, Pa.	680
WGBF	Evansville, Ind.	1280	WHBB	Kansas City, Mo.	710	WHWC	Columbus, Ga.	1270	WISS	Berlin, Wis.	1090
WGBS	Greensboro, N.C.	1280	WHBB	Salma, Ala.	1490	WHYL	Carlisle, Pa.	960	WIST	Charlotte, N.C.	1240
WGBT	Seranton, Pa.	910	WHBC	Canton, Ohio	1480	WHYN	Springfield, Mass.	560	WISV	Virouage, Wis.	1360
WGBR	Goldsboro, N.C.	1150	WHBF	Rock Island, Ill.	1270	WHYP	North East, Pa.	1530	WISZ	Gene Burnie, Md.	1440
WGBS	Miami, Fla.	710	WHBG	Harrisonburg, Va.	1360	WHYZ	Greenville, S.C.	1070	WITB	San Juan, P.R.	1140
WGBD	Red Lion, Pa.	1440	WHBH	Shelbytown, Wis.	1330	WHZZ	Greenville, S.C.	1070	WITD	Baltimore, Md.	1230
WGCD	Chester, S.C.	1490	WHBN	Harrodsburg, Ky.	1420	WIAC	Sarasota, P.R.	1020	WITL	Lansing, Mich.	1010
WGCH	Greenwich, Conn.	1490	WHBO	Madison, Tenn.	1050	WIAM	Williamson, N.C.	900	WITN	Washington, N.C.	910
WGCM	Gulfport, Miss.	1360	WHBP	Memphis, Tenn.	560	WIBA	Madison, Wis.	1280	WITY	Danville, Ill.	980
WGCV	Geneva, Va.	1150	WHBT	Harriman, Tenn.	1600	WIBC	Macon, Ga.	1280	WITZ	Jasper, Ind.	990
WCEE	Indianapolis, Ind.	1590	WHBU	Anderson, Ind.	1240	WIBD	Indianapolis, Ind.	1070	WIVE	Ashtand, Va.	1480
WGEN	Geneseo, Ill.	1500	WHBY	Appleton, Wis.	1230	WIBG	Philadelphia, Pa.	990	WIVK	Knoxville, Vt.	870
WGEN	Quincy, Ill.	1440	WHCC	Waynesville, N.C.	1400	WIBM	Jackson, Mich.	1450	WIVK	Knoxville, Tenn.	950
WGEN	Geneseo, Ill.	1500	WHCD	Sparta, Ill.	1230	WIBR	Baton Rouge, La.	1240	WIVY	Vieques, P.R.	1370
WGET	Gettysburg, Pa.	1320	WHCO	Spartanburg, S.C.	1400	WIBV	Belleville, Ill.	1260	WIVY	Jacksonville, Fla.	1050
WGEZ	Beloit, Wis.	1360	WHCU	Union, N.Y.	870	WIBW	Topeka, Kans.	950	WIXE	Monroe, N.C.	1190
WGFA	Watkins, Pa.	1360	WHDD	Houghton, Mich.	1400	WIBX	Utica, N.Y.	850	WIXL	Lancaster, Ky.	1280
WGFS	Covington, Ga.	1430	WHDD	Boston, Mass.	850	WICC	Bridgeport, Conn.	600	WIXN	New Richmond, Wis.	1590
WGGA	Gainesville, Ga.	550	WHDM	Olean, N.Y.	1450	WICE	Providence, R.I.	1290	WIXN	Dixon, Ill.	1460
WGGG	Gainesville, Fla.	1230	WHDM	McKenzie, Tenn.	1440	WICK	Norwich, Conn.	1310	WIXO	Oakton Park, Fla.	1520
WGGH	Marion, Ill.	1150	WHDS	Portsmouth, N.H.	750	WICL	Salisbury, Md.	1320	WIXY	Cleveland, O.	1260
WGGI	Salamanca, N.Y.	1590	WHDS	Rockester, N.Y.	1480	WICE	Malone, N.Y.	1490	WYIN	Rome, Ga.	1360
WGH	Newport News, Va.	1310	WHDS	Martinsville, Va.	1370	WIDD	Biddeford, Maine	1400	WIZE	Springfield, Ohio	1340
WGH	Clayton, N.C.	1570	WHDS	Wilmington, N.C.	1570	WIDD	Elizabethtown, Tenn.	1520	WIZR	Johnstown, N.Y.	930
WGHM	Skowegan, Maine	1150	WHDS	Syracuse, N.Y.	1270	WIDG	St. Ignace, Mich.	940	WIZS	Henderson, N.C.	1450
WGHN	Grd. Haven, Mich.	1370	WHDS	Stuart, Va.	1310	WIDG	St. Ignace, Mich.	940	WIZZ	Streator, Ill.	1250
WGHQ	Kingston, N.Y.	920	WHDS	Fort, Ala.	1430	WIDJ	Elizabethtown, N.C.	1600	WIAB	Waukegan, Ill.	1440
WGIC	Xenia, O.	1500	WHDS	Memphis, Tenn.	1430	WIFE	Indianapolis, Ind.	1310	WIAG	Norfolk, Nebr.	890
WGIG	Brunswick, Ga.	1440	WHDS	Riveria Beach, Fla.	1600	WIFB	Albany, Ind.	1570	WIAM	Jackson, Tenn.	1460
WGIL	Galesburg, Ill.	1400	WHFB	Benton Harbor, S.C.	1060	WIFM	Elkin, N.C.	1540	WIAR	Marion, Ala.	1310
WGIR	Manchester, N.H.	1600	WHFG	Houghton L., Mich.	1290	WIFG	Wiggins, Miss.	1420	WIAS	Providence, R.I.	920
WGIC	Charlotte, N.C.	1600	WHHH	Warren, Ohio	1440	WIFM	Medford, Wis.	1490	WIAT	Pittsburgh, Pa.	1320
WGKA	Atlanta, Ga.	1190	WHHM	Henderson, Tenn.	1580	WIFG	Atlanta, Ga.	1230	WIAT	Swainsboro, Ga.	800
WGKR	Perry, Fla.	1310	WHHT	Lucedale, Miss.	1440	WIFG	Gouverneur, N.Y.	1440	WIAX	Jacksonville, Fla.	930
WGKV	Charleston, W. Va.	1490	WHHV	Hillsville, Va.	1400	WIFI	Homedale, Fla.	1430	WIAX	Mullins, S.C.	1280
WGL	Fort Wayne, Ind.	1250	WHHY	Montgomery, Ala.	1440	WIFR	Iron River, Mich.	970	WIAB	Albany, Ga.	1260
WGLB	Port Wash., Wis.	1560	WHIC	Hazardsburg, Ky.	1320	WIKB	Bogalusa, La.	1490	WIBB	Haleyville, Ala.	1390
WGLC	Mendota, Ill.	1290	WHIE	Riffin, Ga.	1320	WIKC	Newport, Vt.	1480	WIBC	Bloomington, Ill.	1230
WGLD	Babyton, Va.	1290	WHIP	Portsmouth, Va.	1400	WIKD	Chester, Va.	1400	WIBD	Salem, Ill.	1350
WGLM	Hollywood, Fla.	1320	WHIP	Medford, Mass.	1430	WIKD	Evansville, Ind.	820	WIBE	Knoxville, Tenn.	1430
WGMF	Watkins Glen, N.Y.	1500	WHIM	Providence, R.I.	1110	WIKD	Indianapolis, Ind.	1430	WIBL	Holland, Mich.	1260
WGLM	Hinesville, Ga.	890	WHIN	Gallatin, Tenn.	1010	WIKD	Cambridge, Ohio	1270	WIBM	Jerseyville, Ill.	1480
WGMN	Millington, Tenn.	1380	WHIO	Dayton, Ohio	1290	WIKD	Willmantic, Conn.	1400	WIBN	Baton Rouge, La.	1150
WGMN	Bethesda, Md.	570	WHIR	Hazardsburg, N.C.	1230	WIKD	Willmantic, Conn.	1400	WIBS	DeLand, Fla.	1490
WGN	Chicago, Ill.	720	WHIS	Blufffield, W.Va.	1440	WIKD	Urban, Ill.	980	WICD	Seymour, Ind.	1390
WGN	Gastonia, N.C.	1450	WHIS	West Bern, N.C.	1450	WIKD	Urban, Ill.	980	WICM	Sebring, Fla.	960
WGN	Panama City Beach, Fla.	1480	WHIZ	Orlando, Fla.	1270	WIKD	Franklin, Pa.	1450	WICD	Jackson, Mich.	1480
WGN	Indian Rocks Beach, Fla.	1520	WHIZ	Zanesville, Ohio	1240	WIKD	Lansing, Mich.	1320	WICJ	Johnson City, Tenn.	910
WGN	Murfreesboro, Tenn.	1450	WHJB	Greensburg, Pa.	620	WIKD	Lansing, Mich.	1320	WIOA	Quincy, Mass.	1300
WGN	Grand City, Ill.	920	WHJC	Watauga, W.Va.	1360	WIKD	Tampa, Fla.	1010	WIDJ	Thomasville, Ala.	630
WGN	Newburgh, N.Y.	1220	WHJC	Cleaveland, W.Va.	1420	WIKD	Tampa, Fla.	1010	WIDJ	Jackson, Miss.	620
WGN	Kingsport, Tenn.	1090	WHKE	Hickory, N.C.	1290	WIKD	St. Petersburg Beach, Fla.	1590	WIDJ	Salisbury, Md.	1470
WGN	Richmond, Va.	1590	WHKB	Virginia, Minn.	1400	WIKD	Lima, Ohio	1100	WIEF	Grand Rapids, Mich.	1230
WGN	Wahalla, S. C.	1000	WHLD	Niagara Falls, N.Y.	1270	WIKD	Michigan City, Ind.	1420	WIEH	Gallipolis, Ohio	1150
WGN	Grayson, Ky.	1370	WHLF	South Boston, Va.	1400	WIKD	Franklin, Pa.	1450	WIEH	Waukegan, Ill.	1440
WGN	Mobile, Ala.	900	WHLL	Hempstead, N.Y.	1600	WIKD	Lansing, Mich.	1320	WIEJ	Valdosta, Ga.	1150
WGN	Coltsboro, N.C.	1300	WHLM	Wheeling, W.Va.	1500	WIKD	Lansing, Mich.	1320	WIEK	Dover, Ohio	1450
WGN	Munising, Mich.	1400	WHLN	Bloomburg, Pa.	550	WIKD	Lansing, Mich.	1320	WIEJ	Johnston, S.C.	1570
WGN	Valdosta, Ga.	950	WHLN	Liamon, Ky.	1410	WIKD	Lansing, Mich.	1320	WIEJ	Erie, Pa.	1400
WGN	Bethlehem, Pa.	1100	WHLO	Akron, Ohio	640	WIKD	Lansing, Mich.	1320	WIEJ	Jefferson City, Tenn.	1480
WGN	Albany, Ga.	1450	WHLP	Centerville, Tenn.	1450	WIKD	Lansing, Mich.	1320	WIGA	Jackson, Ga.	1400
WGN	Buffalo, N.Y.	550	WHLS	Port Huron, Mich.	1450	WIKD	Lansing, Mich.	1320	WIGL	Salem, N.J.	1510
WGN	Cairo, Ga.	790	WHLT	Huntington, Ind.	1300	WIKD	Lansing, Mich.	1320	WIGL	Tullahoma, Tenn.	740
WGN	Grand Rapids, Mich.	1410	WHMA	Anniston, Ala.	1390	WIKD	Lansing, Mich.	1320	WIJL	Jacksonville, Ill.	1550
WGN	Greenwood, Miss.	1240	WHNC	Gaithersburg, Md.	1150	WIKD	Lansing, Mich.	1320	WIJM	Lansing, Mich.	1240
WGN	Lake City, Fla.	980	WHAI	Howell, Mich.	1350	WIKD	Lansing, Mich.	1320	WIJC	Commerce, Ga.	1270
WGN	Greenville, Pa.	940	WHAP	Northampton, Mass.	1400	WIKD	Lansing, Mich.	1320	WIJD	Chicago, Ill.	1180
WGN	Chicago, Ill.	950	WHN	New York, N.Y.	1050	WIKD	Lansing, Mich.	1320	WIJJ	Christiansburg, Va.	1250
WGN	Greenville, Tenn.	950	WHNC	Henderson, N.C.	890	WIKD	Lansing, Mich.	1320	WIJK	Niagara Falls, N.Y.	1410
WGN	Ephrata, Pa.	1310	WHNY	McComb, Miss.	1250	WIKD	Lansing, Mich.	1320	WIJM	Lewisburg, Tenn.	1490
WGN	Geneva, N.C.	1480	WHOC	Des Moines, Iowa	1360	WIKD	Lansing, Mich.	1320	WIJM	Mt. Holly, N.J.	1460
WGN	Huntington, N.Y.	740	WHOD	Decatur, Ala.	1490	WIKD	Lansing, Mich.	1320	WIKM	Harrisville, Tenn.	1090
WGN	Millen, Ga.	1570	WHOD	Jackson, Ala.	1290	WIKD	Lansing, Mich.	1320	WIKM	Jamestown, Ky.	1060
WGN	Atlanta, Ga.	920	WHOK	Lancaster, Ohio	1320	WIKD	Lansing, Mich.	1320	WIKM	Waynesville, N.C.	1400
WGN	Greensville, Ala.	1270	WHOL	Allentown, Pa.	1600	WIKD	Lansing, Mich.	1320	WIKM	Waynesville, N.C.	1400
WGN	Wentworth, S.C.	1350	WHOM	New York, N.Y.	1480	WIKD	Lansing, Mich.	1320	WIKM	Waynesville, N.C.	1400
WGN	Summerville, Ga.	1350	WHON	Centerville, Ind.	950	WIKD	Lansing, Mich.	1320	WIKM	Waynesville, N.C.	1400
WGN	Greenville, N.C.	1590	WHOP	Hopkinsville, Ky.	1230	WIKD	Lansing, Mich.	1320	WIKM	Waynesville, N.C.	1400
WGN	Kannapolis, N.C.	870	WHOS	Decatur, Ala.	800	WIKD	Lansing, Mich.	1320	WIKM	Waynesville, N.C.	1400
WGN	Wilson, N.C.	590	WHOT	Campbell, Ohio	1330	WIKD	Lansing, Mich.	1320	WIKM	Waynesville, N.C.	1400
WGN	Gettysburg, S.C.	1400	WHOU	Houlton, Maine	1340	WIKD	Lansing, Mich.	1320	WIKM	Waynesville, N.C.	1400
WGN	Cypress Gardens, Fla.	540	WHOW	Clinton, Ill.	1520	WIKD	Lansing, Mich.	1320	WIKM	Waynesville, N.C.	1400
WGN	Natick, Mass.	1060	WHOD	Salinas, P. R.	1210	WIKD	Lansing, Mich.	1320	WIKM	Waynesville, N.C.	1400
WGN	New Port Richey, Fla.	1500	WHOS	Harrisburg, Pa.	1390	WIKD	Lansing, Mich.	1320	WIKM	Waynesville, N.C.	1400
WGN	Atlanta-Declar, Ga.	1010	WHOS	High Point, N.C.	1070	WIKD	Lansing, Mich.	1320	WIKM	Waynesville, N.C.	1400
WGN	North Augusta, S.C.	1380	WHOS	High Point, N.C.	1070	WIKD	Lansing, Mich.	1320	WIKM	Waynesville, N.C.	1400
WGN	Bangor, Maine	1250	WHOS	High Point, N.C.	1070	WIKD	Lansing, Mich.	1320	WIKM	Waynesville, N.C.	1400
WGN	Geneva, N.Y.	1240	WHOS	High Point, N.C.	1070	WIKD	Lansing, Mich.	1320	WIKM	Waynesville, N.C.	1400
WGN	Greenville, Miss.	1260	WHOS	High Point, N.C.	1070	WIKD	Lansing, Mich.	1320	WIKM	Waynesville, N.C.	1400
WGN	Selma, Ala.	1340	WHOS	High Point, N.C.	1070	WIKD	Lansing, Mich.	1320	WIKM	Waynesville, N.C.	1400

Call	Location	kHz	Call	Location	kHz	Call	Location	kHz	Call	Location	kHz
WMSG	Oakland, Md.	1050	WNXT	Portsmouth, Ohio	1260	WPFB	Middletown, Ohio	910	WRDS	S. Charleston, W. Va.	1410
WMSJ	Sylva, N.C.	1480	WNYC	New York, N.Y.	830	WPFA	Perry, Ga.	980	RDW	Augusta, Ga.	1480
WMSK	Morganfield, Ky.	1500	WNYN	Canton, O.	900	WPFC	Prager Hgts., Md.	1580	WREB	Holyoke, Mass.	930
WNSL	Decatur, Ala.	1450	WNYR	Rochester, N.Y.	860	WPFD	Burgaw, N. C.	1470	WREC	Memphis, Tenn.	600
WNMR	Manchester, Tenn.	1320	WOAH	Miami, Fla.	1220	WPFG	Danville, Pa.	1570	WREL	Lexington, Va.	1450
WMST	Mt. Sterling, Ky.	1150	WOAI	San Antonio, Tex.	1200	WPGW	Portland, Ind.	1440	WREN	Topeka, Kans.	1250
WMT	Cedar Rapids, Iowa	600	WOAP	Owosso, Mich.	1080	WPBH	Phillipsburg, Pa.	1260	WRED	Ashtabula, Ohio	970
WMTA	Central City, Ky.	1380	WOAY	Oak Hill, W. Va.	860	WPBK	Waverly, Tenn.	1060	WREJ	Reidsville, N. C.	1220
WMTG	Vanleue, Ky.	730	WOBS	Jacksonville, Fla.	1360	WPBN	Port Huron, Mich.	1380	WREY	New Albany, Ind.	1290
WMTD	Hinton, W. Va.	1380	WOBT	Rhineland, Wis.	1240	WPBQ	Sharon, Pa.	790	WRFC	Athens, Ga.	960
WMTF	Manistee, Mich.	1340	WOCA	Davenport, Iowa	1240	WPBK	Alexandria, Va.	730	WRFD	Worthington, Ohio	880
WNTL	Litchfield, Ky.	1580	WOGB	North Yarmouth, Mass.	1240	WPIN	St. Petersburg, Fla.	680	WRFS	Alexander City, Ala.	1050
WNTM	Moulton, Ga.	1300	WOCH	North Vernon, Ind.	1460	WPIT	Collierville, Tenn.	1590	WRGA	Rome, Ga.	1540
WNTN	Morrisston, Tenn.	1300	WOCC	Miami, Fla.	1450	WPIT	Pittsburgh, Pa.	730	WRGM	Richmond, Va.	1470
WNTR	Morristown, N.J.	1250	WOCN	Oconto, Wis.	1260	WPKE	Pikeville, Ohio	1240	WRGS	Wagoner, Tenn.	1370
WNTS	Murfreesboro, Tenn.	810	WODI	Brookneal, Va.	1230	WPKO	Waverly, Ohio	1380	WRHI	Rock Hill, S.C.	1340
WNUS	Muskegon, Mich.	1090	WODY	Bassett, Va.	900	WPKY	Princeton, Ky.	1580	WRHL	Rochelle, Ill.	1060
WNVA	Greenville, S.C.	1260	WOGA	Sylvestor, Ga.	1540	WPLA	Plant City, Fla.	910	WRIB	Providence, R.I.	1220
WNVB	Martinsville, Va.	1440	WOGO	New Smyrna Beach, Fla.	1430	WPLB	Greenville, Mich.	1380	WRIC	Richlands, Va.	540
WNVC	Millville, N.J.	1450	WOHI	E. Liverpool, Ohio	1490	WPLM	Plymouth, Mass.	1390	WRIG	Wausau, Wis.	1330
WNVD	Millersville, Ga.	1450	WOHO	Toledo, Ohio	1470	WPLP	Portsmouth, Va.	590	WRIN	Rensselaer, Ind.	1560
WNVO	Mt. Vernon, Ohio	1300	WOHP	Bellefontaine, Ohio	1390	WPLY	Plymouth, Wis.	1420	WRIP	Rossville, Ga.	1190
WNVR	Sidney, Ohio	1080	WOHS	Sheboy, N.C.	730	WPMB	Pandalia, Ill.	1500	WRIS	Roanoke, Va.	1410
WNWV	Wilmington, O.	1090	WOIB	Ashe, Iowa	640	WPM	Parkersburg, Pa.	1010	WRIT	Milwaukee, Wis.	1340
WNWY	Myrtle Beach, S.C.	1450	WOIB	Saline, Mich.	1420	WPM	Portsmouth, Va.	1010	WRIV	Riverhead, N.Y.	1390
WNYN	Mayodan, N.C.	1420	WOIC	Camden, S.C.	1320	WPMP	Pascagoula, Miss.	1580	WRIZ	Coral Gables, Fla.	1340
WNZR	Ft. Myers, Fla.	1410	WOIC	Canter, O.	1060	WPNC	Plymouth, N.C.	1470	WRJC	Ruston, Wis.	1270
WNAB	Bridgeton, Conn.	1450	WOIA	Canter, O.	1060	WPNE	Brevard, N.C.	1240	WRK	Racine, Wis.	1400
WNAD	Norman, Okla.	640	WOIA	Douglas, Ga.	1310	WPNN	Plymouth, N. H.	1300	WRKS	San German, P. R.	1060
WNAE	Warren, Pa.	1310	WOIB	Winter Garden, Fla.	1600	WPNO	Auburn, Me.	1530	WRJW	Pleasure, Miss.	1320
WNAE	Grenada, Miss.	1400	WOIC	Okeechobee, Fla.	1570	WPON	Phoenix City, Ala.	1460	WRKB	Kannapolis, N.C.	1460
WNAH	Nashville, Tenn.	1360	WOIC	Charleston, S.C.	1340	WPOP	Hartford, Conn.	1410	WRKD	Rockland, Maine	1450
WNAK	Nanticoke, Pa.	730	WOJK	Jackson, Miss.	1550	WPR	Portland, Maine	1490	WRKE	Rockwood, Tenn.	580
WNAK	Nelsonville, O.	940	WOJK	Meridian, Miss.	1450	WPQW	New York, N.Y.	1330	WRKL	New City, N.Y.	1350
WNAK	Nearby, Wis.	1280	WOKE	Columbus, Ga.	1340	WPPA	Pottsville, Pa.	1360	WRKM	Rocky Hill, Tenn.	1350
WNAK	Norfolk, Pa.	1140	WOKE	Meridian, Miss.	1450	WPPA	Pottsville, Pa.	1360	WRKN	Brandon, Miss.	970
WNAK	Natchez, Miss.	1240	WOKE	Brookton, Mass.	1410	WPPA	Pottsville, Pa.	1360	WRKO	Boston, Mass.	680
WNAU	New Albany, Miss.	1470	WOKE	Milwaukee, Wis.	920	WPPA	Pottsville, Pa.	1360	WRKT	Cocoa Beach, Fla.	1300
WNAV	Annapolis, Md.	1430	WOKE	Alton, Ill.	1570	WPPA	Pottsville, Pa.	1360	WRKV	Rockville, Conn.	800
WNAX	Yankton, S. Dak.	570	WOL	Washington, D.C.	1450	WPPA	Pottsville, Pa.	1360	WRLO	Lanett, Ala.	1490
WNBC	New York, N.Y.	660	WOLD	Marion, Va.	1330	WPPA	Pottsville, Pa.	1360	WRMA	Montgomery, Ala.	950
WNBF	Binghamton, N.Y.	1290	WOLF	Flournoy, N.Y.	1340	WPPA	Pottsville, Pa.	1360	WRMG	Red Bay, Ala.	1430
WNBH	New Bedford, Mass.	1340	WOLF	Flournoy, N.Y.	1340	WPPA	Pottsville, Pa.	1360	WRMN	Elgin, Ill.	1410
WNBP	Newburyport, Mass.	1470	WOMI	Owensboro, Ky.	1490	WPPA	Pottsville, Pa.	1360	WRMS	Beardstown, Ill.	790
WNBS	Murray, Ky.	1340	WOMI	Decatur, Ga.	1310	WPPA	Pottsville, Pa.	1360	WRMT	Rocky Mount, N.C.	1490
WNBT	Wellsboro, Pa.	1490	WOMP	Bellaire, Ohio	1290	WPPA	Pottsville, Pa.	1360	WRNB	New Bern, N.C.	1490
WNBY	Newberry, Mich.	1450	WONA	Winona, Miss.	1570	WPPA	Pottsville, Pa.	1360	WRNC	Raleigh, N.C.	1240
WNBZ	Saranac Lake, N.Y.	1240	WOND	Pleasantville, N.J.	1410	WPPA	Pottsville, Pa.	1360	WRNG	N. Atlanta, Ga.	680
WNCA	Siler City, N.C.	1570	WONF	Flournoy, N.Y.	1340	WPPA	Pottsville, Pa.	1360	WRNL	Richmond, Va.	910
WNCC	Barnesboro, Wis.	950	WONN	Lakeland, Fla.	1230	WPPA	Pottsville, Pa.	1360	WROA	Gulfport, Miss.	1390
WNCB	N. Charleston, S.C.	910	WONN	Tallahassee, Fla.	1410	WPPA	Pottsville, Pa.	1360	WROB	West Point, Miss.	1420
WNCB	Ashtabula, Ohio	1340	WONN	Defiance, Ohio	1280	WPPA	Pottsville, Pa.	1360	WROC	Rochester, N.Y.	1250
WNCB	Greenville, N.C.	1070	WOND	Grand Rapids, Mich.	1300	WPPA	Pottsville, Pa.	1360	WROD	Daytona Beach, Fla.	1340
WNCB	Daytona Beach, Fla.	1150	WODF	Dothan, Ala.	560	WPPA	Pottsville, Pa.	1360	WROK	Rockford, Ill.	1440
WNCB	Syracuse, N.Y.	1260	WODF	Washington, D.C.	1340	WPPA	Pottsville, Pa.	1360	WROL	Burlington City, Tenn.	1140
WNCB	South Bend, Ind.	1490	WODF	Dothan, Ala.	560	WPPA	Pottsville, Pa.	1360	WROM	Rumford, Maine	950
WNEB	Worcester, Mass.	1320	WODF	Greenville, N.C.	1340	WPPA	Pottsville, Pa.	1360	WRON	Ronover, W. Va.	710
WNEB	Tacoma, Wa.	630	WOPA	Oak Park, Ill.	1490	WPPA	Pottsville, Pa.	1360	WRSS	Seatoboro, Ala.	1330
WNEL	Caugas, P. R.	1430	WOPB	Bristol, Tenn.	1490	WPPA	Pottsville, Pa.	1360	WROV	Roanoke, Va.	1240
WNER	Live Oak, Fla.	1250	WORA	New York, N.Y.	710	WPPA	Pottsville, Pa.	1360	WROW	Albany, N.Y.	590
WNES	Central City, Ky.	1050	WORA	Mayaguez, P.R.	760	WPPA	Pottsville, Pa.	1360	WROX	Clarksville, Miss.	1450
WNEW	New York, N.Y.	1130	WORC	Worcester, Mass.	1310	WPPA	Pottsville, Pa.	1360	WRP	Cambridge, N.Y.	1280
WNEW	Macon, Ga.	1400	WORC	Orangeburg, S.C.	1580	WPPA	Pottsville, Pa.	1360	WRPL	Charlotte, N.C.	1400
WNEX	Green Bay, Wis.	1440	WORC	Orangeburg, S.C.	1580	WPPA	Pottsville, Pa.	1360	WRPM	Polarville, Miss.	1530
WNFA	Nashville, Va.	1600	WORR	York, Pa.	1350	WPPA	Pottsville, Pa.	1360	WRR	Dallas, Tex.	1310
WNGO	Mayfield, Ky.	1320	WORR	Savannah, Tenn.	1010	WPPA	Pottsville, Pa.	1360	WRRR	Rockford, Ill.	1330
WNHC	New Haven, Conn.	1340	WORM	Madison, Ind.	1270	WPPA	Pottsville, Pa.	1360	WRRS	Clinton, N.C.	890
WNHV	White River Jct., N.Y.	910	WOSH	Fulton, N.Y.	1300	WPPA	Pottsville, Pa.	1360	WRSA	Saratoga Springs, N.Y.	1280
WNIA	Cheektowaga, Vt.	1230	WOSH	Oskosh, Wis.	1490	WPPA	Pottsville, Pa.	1360	WRSG	St. George, N.Y.	1390
WNIK	Aricibo, P.R.	1230	WOSL	Louisville, N.Y.	820	WPPA	Pottsville, Pa.	1360	WRSL	Stanford, Ky.	1520
WNIL	Niles, Mich.	1290	WOTR	Corry, Pa.	1370	WPPA	Pottsville, Pa.	1360	WRSW	Warsaw, Ind.	1480
WNIS	Niles, Mich.	1540	WOTT	Watertown, N.Y.	1410	WPPA	Pottsville, Pa.	1360	WRTA	Altoona, Pa.	1240
WNJH	Hammondtown, N.J.	1580	WOTW	Nashua, N.H.	900	WPPA	Pottsville, Pa.	1360	WRTH	Wood River, Ill.	590
WNJR	Newark, N.J.	1430	WOVB	Athens, Ohio	1340	WPPA	Pottsville, Pa.	1360	WRTL	Rantoul, Ill.	2500
WNKY	Neon, Ky.	1480	WOVE	Welch, W. Va.	1340	WPPA	Pottsville, Pa.	1360	WRUF	Gainesville, Fla.	950
WNLC	New London, Conn.	1510	WOW	Omaha, Neb.	590	WPPA	Pottsville, Pa.	1360	WRUM	Rumford, Maine	790
WNLK	Norwalk, Conn.	1350	WOWF	Flournoy, N.Y.	1240	WPPA	Pottsville, Pa.	1360	WRUN	Utica, N.Y.	1150
WNMP	Evansville, Ill.	1590	WOWW	Ft. Wayne, Ind.	1190	WPPA	Pottsville, Pa.	1360	WRUS	Russellville, Ky.	610
WNMT	Garrettsville, O.	1520	WOX	Oxford, N.C.	1340	WPPA	Pottsville, Pa.	1360	WRVA	Richmond, Va.	1140
WNMC	Newton, N.C.	1230	WOX	Oxford, N.C.	1340	WPPA	Pottsville, Pa.	1360	WRVK	Mt. Vernon, Ky.	1460
WNNJ	Newton, N.J.	1360	WOXZ	Ozark, Ala.	900	WPPA	Pottsville, Pa.	1360	WRWD	Augusta, Ga.	1480
WNOR	New Orleans, La.	990	WPAB	Ponce, P.R.	550	WPPA	Pottsville, Pa.	1360	WRWH	Cleveland, Ga.	1380
WNNT	Warsaw, Va.	690	WPAC	Patchogue, N.Y.	1580	WPPA	Pottsville, Pa.	1360	WRWY	Waynesboro, Va.	1430
WNOD	New Orleans, La.	1060	WPAD	Faducak, Ky.	1450	WPPA	Pottsville, Pa.	1360	WRYP	Yonkers, N.Y.	940
WNDE	Naples, Fla.	1270	WPAL	Charleston, Mich.	1050	WPPA	Pottsville, Pa.	1360	WSAC	Fort Knox, Ky.	1470
WNDF	Coltsville, N.C.	1230	WPAL	Charleston, S.C.	730	WPPA	Pottsville, Pa.	1360	WSAF	Sarasota, Fla.	1220
WNDO	Chattanooga, Tenn.	1260	WPAM	Pottsville, Pa.	1450	WPPA	Pottsville, Pa.	1360	WSAI	Cincinnati, Ohio	1360
WNOP	Newport, Ky.	740	WPAM	Mount Airy, N.C.	740	WPPA	Pottsville, Pa.	1360	WSAJ	Grove City, Pa.	1340
WNOR	Norfolk, Va.	1230	WPAP	Parkersburg, W. Va.	1450	WPPA	Pottsville, Pa.	1360	WSAL	Laguardia, Ind.	1230
WNOS	High Point, N.C.	1590	WPAP	Zephyrhills, Fla.	1400	WPPA	Pottsville, Pa.	1360	WSAM	Saginaw, Mich.	1400
WNOD	Milwaukee, Wis.	860	WPAT	Paterson, N.J.	930	WPPA	Pottsville, Pa.	1360	WSAN	Allentown, Pa.	1470
WNOW	York, Pa.	1250	WPAX	Thomsville, Ga.	1240	WPPA	Pottsville, Pa.	1360	WSAO	Senatobia, Miss.	1550
WNX	Knoxville, Tenn.	980	WPAY	Portsmouth, Ohio	1400	WPPA	Pottsville, Pa.	1360	WSAR	Fall River, Mass.	1480
WNPS	New Orleans, La.	1450	WPAY	Pottstown, Pa.	1370	WPPA	Pottsville, Pa.	1360	WSAT	N. Saisbury, N.C.	1280
WNPT	Tuscaloosa, Ala.	1280	WPBC	Richfield, Minn.	980	WPPA	Pottsville, Pa.	1360	WSAU	Wausau, Wis.	550
WNPV	Lansdale, Pa.	1440	WPCC	Clinton, S.C.	1400	WPPA	Pottsville, Pa.	1360	WSAV	Savannah, Ga.	930
WNRG	Grundy, Va.	940	WPCC	Clinton, S.C.	1400	WPPA	Pottsville, Pa.	1360	WSAZ	Huntington, W. Va.	1370
WNRI	Woonsocket, R.I.	1380	WPCC	Clinton, S.C.	1400	WPPA	Pottsville, Pa.	1360	WSB	Atlanta, Ga.	750
WNRJ	Gainsville, Va.	1580	WPCC	Clinton, S.C.	1400	WPPA	Pottsville, Pa.	1360	WSBA	Savannah, Ga.	1400
WNRK	Newark, Del.	1260	WPCC	Clinton, S.C.	1400	WPPA	Pottsville, Pa.	1360	WSBB	New Smyrna Beach, Fla.	1230
WNRY	Narrows-Pearlburg, Va.	990	WPCC	Clinton, S.C.	1400	WPPA	Pottsville, Pa.	1360	WSBC	Chicago, Ill.	1240
WNRL	Laurel, Miss.	1260	WPCC	Clinton, S.C.	1400	WPPA	Pottsville, Pa.	1360			
WNRN	Newton, Mass.	1550	WPCC	Clinton, S.C.	1400	WPPA	Pottsville, Pa.	1360			
WNRT	Tazewell, Tenn.	1250	WPCC	Clinton, S.C.	1400	WPPA	Pottsville, Pa.	1360			
WNUE	Ft. Walton Beach, Fla.	1400	WPCC	Clinton, S.C.	1400	WPPA	Pottsville, Pa.	1360			
WNUG	Chickasaw, Miss.	1390	WPCC	Clinton, S.C.	1400	WPPA	Pottsville, Pa.	1360			
WNUI	Talladega, Ala.	1230	WPCC	Clinton, S.C.	1400	WPPA	Pottsville, Pa.	1360			
WNVA	Norton, Va.	1350	WPCC	Clinton, S.C.	1400	WPPA	Pottsville, Pa.	1360			
WNVL	Nicholasville, Ky.	1250	WPCC	Clinton, S.C.	1400	WPPA	Pottsville, Pa.	1360			
WNVY	Pensacola, Fla.	1230	WPCC	Clinton, S.C.	1400	WPPA	Pottsville, Pa.	1360			
WNWI	Valparaiso, Ind.	1080	WPCC	Clinton, S.C.	1400	WPPA	Pottsville, Pa.	1360			

U. S. FM Stations by Call Letters

Call	Location	Call	Location	Call	Location	Call	Location
KAAY-FM Little Rock, Ark.		KCDR-FM Cedar City, Utah		KEWI-FM Topeka, Kan.		KIHI Tulsa, Okla.	
KABC-FM Los Angeles, Calif.		KCEE-FM Tucson, Ariz.		KEYC-FM Menasha, Minn.		KIKK-FM Houston, Tex.	
KABL-FM San Francisco, Cal.		KCEB-FM Eau Claire, Wis.		KFAM-FM Wichita, Kan.		KIKS-FM Lake Charles, La.	
KACA-Prosser, Wash.		KCFM-FM Saris, Mo.		KEZE-Anaheim, Calif.		KILT-FM Houston, Tex.	
KACE-FM Riverside, Calif.		KCFM-FM St. Louis, Mo.		KFAB-FM Omaha, Neb.		KIMP-FM Mt. Pleasant, Tex.	
KACD-FM St. Louis, Mo.		KCHV-FM Conchella, Cal.		KFAC-FM Los Angeles, Calif.		KIND-FM Independence, Kan.	
KADI-FM St. Louis, Mo.		KCIL Houma, La.		KFAM-FM St. Cloud, Minn.		KING-FM Seattle, Wash.	
KADO-Texasarks, Ark.		KCIM-FM Carroll, Ia.		KFAV-Fayetteville, Ark.		KINI-Indio, Cal.	
KADX-Denver, Colo.		KCIB-FM Minnet, N. D.		KFCB-FM Cheyenne, Wyo.		KIIO-Oklaaha, Okla.	
KAFE-FM Santa Fe, N. M.		KCIC-Kansas City, Kan.		KFBD-FM Waynesville, Mo.		KIOW-Corpus Christi, Tex.	
KAFF-FM Flagstaff, Ariz.		KCKN-FM Kansas City, Kan.		KFB-FM Omaha, Neb.		KIRO-FM Seattle, Wash.	
KAFI-Auburn, Calif.		KCLC-FM St. Charles, Mo.		KFKB-FM Sacramento, Calif.		KISA-Kansas City, Mo.	
KAFM-Salina, Kans.		KCLE-FM Chebure, Tex.		KFCM-Phoenix, Ariz.		KISS-San Antonio, Tex.	
KAGH-FM Crossett, Ark.		KCLO-FM Leavenworth, Kans.		KFGQ-FM Boone, Iowa		KISW-Seattle, Wash.	
KAIM-FM Honolulu, Hawaii		KCLU-FM Rolla, Mo.		KFH-FM Wichita, Kans.		KIT-FM Yakima, Wash.	
KAIS-Newport Beach, Calif.		KCMA-San Francisco, Cal.		KFIG-Fresno, Cal.		KITE-FM San Antonio, Tex.	
KAKC-Tulsa, Okla.		KCMI-Los Angeles, Calif.		KFIB-FM Marshalltown, Ia.		KITH-Phoenix, Ariz.	
KAKI-San Antonio, Tex.		KCMS-FM Manitou Springs, Colo.		KFJC-FM Altoona, Pa.		KITT-San Diego, Calif.	
KALA-Davenport, Ia.		KCNM-Carlsbad, N. M.		KFKF-FM Bellevue, Wash.		KITY-San Antonio, Tex.	
KALB-FM Alexandria, La.		KCNM-Omaha, Neb.		KFLA-FM Scott City, Kan.		KIXI-FM Seattle, Wash.	
KALH-Denver, Colo.		KCOB-FM San Antonio, Tex.		KFLY-FM Corvallis, Ore.		KIXL-FM Dallas, Tex.(s)	
KALL-FM Salt Lake City, Utah		KCPB-Tacoma, Wash.		KFMB-FM San Diego, Calif.		KIAM-FM Madison, S.D.	
KALW-San Francisco, Calif.		KCPX-FM Salt Lake City, Utah		KFMC-Provo, Utah		KJAN-FM Atlantic, Ia.	
KALX-Berkeley, Cal.		KCRA-FM Sacramento, Calif.		KFMD-Dubuque, Ia.		KJAX-Stockton, Cal.	
KAMB-Merced, Cal.		KCRC-FM Enid, Okla.		KFMF-Ft. Collins, Colo.		KJAZ-Alameda, Cal.	
KAMS-Mammoth Spring, Ark.		KCRW-Santa Monica, Calif.		KFMG-Des Moines, Ia.		KJCK-FM Junction City, Kan.	
KAMU-Anchorage, Alaska		KCSB-FM Santa Barbara, Cal.		KFMK-Houston, Tex.(s)		KJEF-FM Jennings, La.	
KANG-Angwin, Cal.		KCSM-San Mateo, Calif.		KFML-FM Denver, Colo.		KJEM-FM Okia, Okla.	
KANS-FM Larned, Kan.		KCSU-FM Ft. Collins, Colo.		KFMM-Tucson, Ariz.		KJET-FM Beaumont, Tex.	
KANT-FM Lancaster, Calif.		KCTA-FM Sinten, Tex.		KFNN-Abilene, Tex.		KJLH-Long Beach, Cal.	
KANU-Lawrence, Kans.		KCTE-FM Minneapolis, Minn.		KFMP-Port Arthur, Tex.		KJLM-San Diego, Calif.	
KANW-Albuquerque, N. Mex.		KCUE-FM Red Wing, Minn.		KFMQ-Lincoln, Neb.		KJML-Sacramento, Cal.	
KADL-FM Carrollton, Mo.		KCUU-Pella, Ia.		KFMR-Fremont, Cal.		KKND-Jamestown, N.D.	
KARD-Wichita, Kan.		KCUR-FM Kansas City, Mo.		KFMS-Kansas City, Mo.		KKIP-Fresno, Cal.	
KARK-Little Rock, Ark.		KCVS-FM Salt Lake City, Utah		KFMW-Magnolia, Ark.		KKRF-FM Waynesville, Mo.	
KARL-FM Carlsbad, Cal.		KCWS-FM Ellensburg, Wash.		KFMW-San Bernardino, Calif.		KJRG-FM Newton, Kans.	
KARM-FM Fresno, Calif.		KCYB-Richland, Wash.		KFMX-San Diego, Calif.		KJRL-Houston, Tex.	
KASC-Conway, Ark.		WDAF-FM Kansas, Mo.		KFMY-Eugene, Ore.		KJSB-Liberal, Tex.	
KASI-FM Ames, Iowa		KDBS-FM Santa Barbara, Calif.		KFNB-Oklahoma City, Okla.		KJ8K-FM Columbus, Neb.	
KASU-Jonesboro, Ark.		KDBS-FM Alexandria, La.		KFNE-Big Springs, Tex.		KKFM-Colorado Springs, Colo.	
KATN-FM Boise, Ida.		KDCR-Sloux Centre, Ia.		KFNW-FM Galveston, Tex.		KKHI-FM San Francisco, Cal.	
KATT-Woodland, Calif.		KDEB-FM Dallas, Tex.		KFDA-Honolulu, Hawaii		KKIT-FM Los Angeles, Cal.	
KATY-FM San Luis Obispo, Calif.		KDEF-FM Albuquerque, N. Mex.		KFOG-San Francisco, Calif.		KKLP-Pipestone, Minn.	
KAUS-FM Austin, Minn.		KDEN-FM Denver, Colo.		KFOX-FM Los Angeles, Cal.		KKPD-Rodondo Beach, Cal.	
KAVI-FM Rocky Ford, Colo.		KDES-FM Palm Spgs., Calif.		KFRC-FM San Francisco, Calif.		KKWS-Wadena, Minn.	
KAVR-FM Apple Valley, Cal.		KDFC-San Francisco, Calif.		KFRE-FM Fresno, Calif.		KLAK-FM Lakewood, Colo.	
KAWB-McKinney, Tex.		KDEF-FM Albuquerque, N. M.		KFRN-FM Brownwood, Tex.		KLAW-Lawton, Okla.	
KAWL-FM York, Neb.		KDFR-Tulare, Cal.		KFRW-Quincy, Cal.		KLAY-FM Tacoma, Wash.	
KAWY-Casper, Wyo.		KDHI-FM Twenty-Nine Palms, Cal.		KFTW-FM Ft. Morgan, Colo.		KLBK-FM Lubbock, Tex.	
KAYD-Beaumont, Tex.		KDHL-FM Faribault, Minn.		KFUO-FM Clayton, Mo.		KLBK-FM Lubbock, Tex.	
KBAY-San Jose, Cal.		KDIC-Grinnell, Iowa		KFWT-FM Ft. Worth, Tex.		KLCB-FM Lubbock, Tex.	
KBBB-FM Borger, Tex.		KDIG-San Diego, Cal.		KFXM-Jackson, Miss.		KLCC-Eugene, Ore.	
KBBI-Los Angeles, Calif.		KDJV-FM Amarillo, Tex.		KFYR-FM Bismark, N.D.		KLCN-FM Blytheville, Ark.	
KBBK-FM Boise, Ida.		KDKA-FM Pittsburgh, Pa.		KGAF-FM Gainesville, Tex.		KLCO-FM Poteau, Okla.	
KBBL-Riverside, Cal.		KDLA-FM De Ridder, La.		KGB-FM San Diego, Calif.		KLEA-FM Livingston, N. M.	
KBBW-San Diego, Cal.		KDLK-FM Del Rio, Tex.		KGBC-FM Galveston, Tex.		KLEB-FM Golden Meadow, La.	
KBBX-Seattle, Wash.		KDLF-FM Waterbury, S.D.		KGCB-FM Omaha, Neb.		KLEF-Houston, Tex.	
KBCA-Los Angeles, Calif.		KDLR-FM Devils Lake, N. D.		KGBN-FM Caldwell, Idaho		KLEF-FM Los Angeles, Cal.	
KBCL-FM Shreveport, La.		KDMC-Corpus Christi, Tex.		KGCS-FM Los Angeles, Cal.		KLEF-FM Los Angeles, Cal.	
KBEE-FM Modesto, Calif.		KDMI-Des Moines, Iowa		KGEC-Palm Springs, Cal.		KLEF-FM Los Angeles, Cal.	
KBEB-FM San Antonio, Tex.		KDNC-FM Spokane, Wash.		KGFM-Parkersfield, Cal.		KLEF-FM Los Angeles, Cal.	
KBEW-FM Blue Earth, Minn.		KDNT-FM Natchez, Miss.		KGHO-FM Houma, Wash.		KLEF-FM Los Angeles, Cal.	
KBEY-Kansas City, Mo.		KDOL-FM Tyler, Tex.		KGLA-Los Angeles, Calif.		KLEF-FM Los Angeles, Cal.	
KBFL-Buffalo, Mo.		KDOT-FM Scottsdale, Ariz.		KGLT-Bozeman, Mont.		KLEF-FM Los Angeles, Cal.	
KBFM-Lubbock, Tex.		KDPS-Des Moines, Iowa		KGMB-FM Honolulu, Hawaii		KLEF-FM Los Angeles, Cal.	
KBGH-FM Memphis, Tex.		KDSM-FM Denison, Ia.		KGMI-FM Bellingham, Wash.		KLEF-FM Los Angeles, Cal.	
KBGL-Pocatello, Ida.		KDSU-Fargo, N.D.		KGMR-FM Jacksonville, Fla.		KLEF-FM Los Angeles, Cal.	
KBHF-Bozeman, Mont.		KDSX-FM Denison-Sherman, Tex.		KGNC-FM Amarillo, Tex.		KLEF-FM Los Angeles, Cal.	
KBHS-FM Hot Springs, Ark.				KGNO-FM Dodge City, Kan.		KLEF-FM Los Angeles, Cal.	
KBIA-FM Columbia, Mo.				KGPD-San Francisco, Calif.		KLEF-FM Los Angeles, Cal.	
*KBIG-FM Los Angeles-Avalon, Cal.				KGRD-FM Las Cruces, N.M.		KLEF-FM Los Angeles, Cal.	
KBIM-FM Roswell, N. Mex.				KGRE-Greeley, Colo.		KLEF-FM Los Angeles, Cal.	
KBIG-Edmonds, Wash.				KGRI-FM Henderson, Tex.		KLEF-FM Los Angeles, Cal.	
KBLE-FM Seattle, Wash.				KGUD-FM Santa Barbara, Calif.		KLEF-FM Los Angeles, Cal.	
KBMC-Eugene, Ore.				KGUS-Hot Springs, Ark.		KLEF-FM Los Angeles, Cal.	
KBMF-FM Spearman, Tex.				KGVM-FM Idaho Falls, Ida.		KLEF-FM Los Angeles, Cal.	
KBMS-Los Angeles, Calif.				KGWV-FM Great Falls, Mont.		KLEF-FM Los Angeles, Cal.	
KBMW-FM Breckenridge, Minn.				KHAK-FM Cedar Rapids, Iowa		KLEF-FM Los Angeles, Cal.	
KBNN-Albuquerque, N. M.				KHAR-FM Anchorage, Alaska		KLEF-FM Los Angeles, Cal.	
KBND-Houston, Tex.				KHBL-Plainville, Tex.		KLEF-FM Los Angeles, Cal.	
KBDA-FM Keanett, Mo.				KHBM-FM Monticello, Ark.		KLEF-FM Los Angeles, Cal.	
KBDB-FM Covina, Cal.				KHBR-FM Hillsboro, Tex.		KLEF-FM Los Angeles, Cal.	
KBDC-Ogden, Utah				KHCB-FM Houston, Tex.		KLEF-FM Los Angeles, Cal.	
KBDE-FM Okaloosa, Iowa				KHEN-FM Haneyetta, Okla.		KLEF-FM Los Angeles, Cal.	
KBDF-FM Boise, Ida.				KHER-FM Phoenix, Ariz.		KLEF-FM Los Angeles, Cal.	
KBDO-Portland, Ore.				KHFI-FM Austin, Tex.		KLEF-FM Los Angeles, Cal.	
KBDS-Tulsa, Cal.				KHFM-Albuquerque, N. Mex.		KLEF-FM Los Angeles, Cal.	
KBDF-FM Dallas, Tex.				KHJ-FM Sacramento, Calif.		KLEF-FM Los Angeles, Cal.	
KBDF-FM Medford, Dreg.				KHJ-FM Los Angeles, Calif.		KLEF-FM Los Angeles, Cal.	
KBPI-Denver, Colo.				KHOB-FM Hobbs, N. M.		KLEF-FM Los Angeles, Cal.	
KBPO-Beaumont, Tex.				KHDF-Los Angeles, Calif.		KLEF-FM Los Angeles, Cal.	
KBRC-San Francisco, Cal.				KHOM-Houma, La.		KLEF-FM Los Angeles, Cal.	
KBRR-FM Brookings, S. D.				KHOZ-FM Phoenix, Ariz.		KLEF-FM Los Angeles, Cal.	
KBRD-FM Bremerton, Wash.				KHPC-Brownwood, Tex.		KLEF-FM Los Angeles, Cal.	
KBTC-FM Houston, Mo.				KHQ-FM Spokane, Wash.		KLEF-FM Los Angeles, Cal.	
KBTR-FM Jonesboro, Ark.				KHRU-Clayton, Mo.		KLEF-FM Los Angeles, Cal.	
KBUC-FM Terrill Hills, Tex.				KHSC-Arcata, Calif.		KLEF-FM Los Angeles, Cal.	
KBUS-FM Terrill Hills, Tex.				KHSI-FM Hemet, Cal.		KLEF-FM Los Angeles, Cal.	
KBUR-FM Burlington, Ia.				KHVF-FM Honolulu, Hawaii		KLEF-FM Los Angeles, Cal.	
KBUY-FM Ft. Worth, Tex.				KHYI-Fromont, Calif.		KLEF-FM Los Angeles, Cal.	
KBUZ-FM Mesa, Ariz.				KIBS-FM Bishop, Cal.		KLEF-FM Los Angeles, Cal.	
KBVR-Corvallis, Ore.				KICD-FM Spencer, Ia.		KLEF-FM Los Angeles, Cal.	
KBVU-FM Provo, Utah				KICS-FM Hastings, Neb.		KLEF-FM Los Angeles, Cal.	
KCB-FM Dardanelle, Ark.				KID-FM Idaho Falls, Ida.		KLEF-FM Los Angeles, Cal.	
KCAL-FM Redlands, Calif.				KIEM-Eureka, Calif.		KLEF-FM Los Angeles, Cal.	
KCBH-Beverly Hills, Calif.				KIFG-FM Iowa Falls, Ia.		KLEF-FM Los Angeles, Cal.	
KCBL-FM Greeley, Colo.				KIFM-Bakersfield, Cal.		KLEF-FM Los Angeles, Cal.	
KCBS-FM San Francisco, Calif.						KLEF-FM Los Angeles, Cal.	
KCCCE-Weatherford, Okla.						KLEF-FM Los Angeles, Cal.	

WHITE'S RADIO LOG

Call Location

KMOX-FM St. Louis, Mo.
KMPX San Francisco, Calif.
KMRC-FM Morgan City, La.
KMSC Clear Lake City, Tex.
KMSM Rolla, Mo.
KMSU Mankato, Minn.
KMUL-FM Muleshoe, Tex.
KMUW Wichita, Kans.
KMYC-FM Marysville, Calif.
KMYO-FM Little Rock, Ark.
KMVR Denver, Colo.
KMUZ Santa Barbara, Calif.
KNBQ Bethany, Okla.
KNBR-FM San Francisco, Calif.
KNBU Baldwin, Kan.
KNBY-FM Newport, Ark.
KNDA St. Louis, Mo.
KNDR Chickasha, Okla.
KNDX Yukima, Wash.
KNEB-FM Scottsbluff, Nebr.
KNED-FM McAlester, Okla.
KNEI-FM Waukon, Iowa
KNER Dallas, Tex.
KNEV Reno, Nev.
KNWF-FM Scottsbluff, Nebr.
KNFB Nowata, Okla.
KNFM Midland, Tex.
KNHS Torrance, Cal.
KNIK-FM Anchorage, Alaska
KNIR-FM New Iberia, La.
KNIX-FM Phoenix, Ariz.
KNO Thousand Oaks, Calif.
KNOB Long Beach, Calif.
KNDC-FM Natchitoches, La.
KNOE-FM Monroe, La.
KNOF St. Paul, Minn.
KNOK-FM Ft. Worth, Tex.
KNRO-FM Conroe, Tex.
KNTO Wichita Falls, Tex.
KNUP-FM New Utm, Minn.
KNUS Dallas, Tex.
KNWA Fayetteville, Ark.
KNWC-FM Sioux Falls, S.D.
KNWS-FM Waterloo, Iowa
KNX-FM Los Angeles, Calif.
KNXR Rochester, Minn.
KOA-FM Denver, Colo.
KOAT-FM Albuquerque, N.M.
KOB-FM Albuquerque, N.M.
KOBG Joplin, Mo.
KOBH-FM Hot Springs, S.O.
KOCM Newport Beach, Cal.
KOCV Odesa, Tex.
KOCY-FM Oklahoma City, Okla.
KOD-FM Houston, Tex.
KOFM Oklahoma City, Okla.
KOFD-FM Ottawa, Kan.
KOGM-FM Tulsa, Okla.
KOGO San Diego, Calif.
KOL-FM Omaha, Neb.
KOLN-FM Portland, Oreg.
KOLP San Francisco, Cal.
KOK-FM Austin, Tex.
KOKH Oklahoma City, Okla.
KOL-FM Seattle, Wash.
KOLM-FM Rochester, Minn.
KONG-FM Visalia, Calif.
KONI-FM Spanish Fork, Utah
KODL-FM Phoenix, Ariz.
KOPR-FM Great Falls, Mont.
KORA-FM Bryan, Tex.
KORE-FM Springfield-Eugene, Oreg.
KORK-FM Las Vegas, Nev.
KORU Tulsa, Okla.
KOSE-FM Osceola, Ark.
KOSI-FM Denver, Colo.
KOSD Turlock, Cal.
KOST Los Angeles, Cal.
KOSU-FM Stillwater, Okla.
KOSY-FM Texarkana, Tex.
KOTN-FM Pine Bluff, Ark.
KUTO Alamogordo, N. M.
KOV-FM Kearney, Neb.
KOWH-FM Omaha, Neb.
KOWN-FM Escondido, Cal.
KOF-FM Odesa, Tex.
KOZE-FM Lewiston, Idaho

Call Location

KPAC-FM Port Arthur, Tex.
KPAK El Paso, Tex.
KPAF-FM Hereford, Tex.
KPAN-FM Berkeley, Calif.
KPCS Pasadena, Calif.
KPDQ-FM Portland, Oreg.
KPEL-FM Lafayette, La.
KPEN San Francisco, Calif.
KPER-FM Gilroy, Cal.
KPET-FM Lamesa, Tex.
KPPA Berkeley, Calif.
KPPB Berkeley, Calif.
KPPK Los Angeles, Calif.
KPKI-FM Portland, Oreg.
KPLC-FM Lake Charles, La.
KPLT-FM Paris, Tex.
KPLU Tacoma, Wash.
KPLX San Jose, Cal.
KPFM Portland, Oreg.
KPGM Los Altos, Calif.
KPLR-FM St. Louis, Mo.
KPM Onard, Cal.
KPNW-FM Eugene, Oreg.
KPOI-FM Honolulu, Hawaii
KPOJ-FM Portland, Oreg.
KPOL-FM Los Angeles, Calif.
KPPC-FM Pasadena, Calif.
KPPS-FM Parsons, Kans.
KQF-FM Wenatchee, Wash.
KQRI San Diego, Calif.
KPRM-FM Park Rapids, Minn.
KPRN Seattle, Wash.
KPRS-FM Kansas City, Mo.
KPSD Dallas, Tex.
KPSR Los Altos, Cal.
KQUL-FM Pullman, Wash.
KQWJ Plentywood, Mont.
KQFM Portland, Oreg.
KQID Odesa, Tex.
KQRS-FM Golden Valley, Minn.
KQTY Wichita, Kan.
KQUE Houston, Tex.
KQV-FM Pittsburgh, Pa.
KQWB-FM Moorhead, Minn.
KQZC McAllen, Tex.
KRAB Seattle, Wash.
KRAK-FM Stockton, Calif.
KRAM-FM Las Vegas, Nev.
KRAV Tulsa, Okla.
KRBE Houston, Tex.
KRBI-FM St. Peter, Minn.
KRBE-FM Colorado Springs, Ia.
KRCC Colorado Springs, Colo.
KRCH St. Louis, Mo.
KRCS San Bernardino, Cal.
KRCW Santa Barbara, Calif.
KROD-FM Colorado Springs, Colo.
KREB Monroe, La.
KREM-FM Spokane, Wash.
KREB Santa Ana, Calif.
KRES Moberly, Mo.
KREX-FM Grand Junction, Colo.
KRFM Phoenix, Ariz.
KRFO-FM Owatonna, Minn.
KRHM Los Angeles, Calif.
KRIL El Dorado, Ark.
KRIT Clarion, Iowa
KRNF-FM Los Angeles, Calif.
KRKH-FM Lubbock, Tex.
KRKY Denver, Colo.
KRLD-FM Dallas, Tex.
KRMD-FM Shreveport, La.
KRMG-FM Tulsa, Okla.
KRMS-FM Orange Beach, Mo.
KRNI-FM St. Louis, Mo.
KRNT-FM Des Moines, Ia.
KRNV Boulder, Colo.
KRNY-FM Kearney-Holdrege, Nebraska
KROA Aurora, Neb.
KROB-FM Robstown, Tex.
KROC-FM Rochester, Minn.
KROW-FM San Francisco, Calif.
KROS-FM Clinton, Iowa
KROW Santa Barbara, Calif.
KROY-FM Sacramento, Calif.
KRPM San Jose, Calif.
KRRC San Jose, Calif.
KRSA-FM Salinas, Cal.
KRST Minneapolis, Minn.
KRST-FM St. Louis Park, Minn.
KRSL-FM Russell, Kan.
KRSN-FM Los Alamitos, N. Mex.
KRSP-FM Salt Lake City, Utah
KRST Albuquerque, N. M.
KRUS-FM Ruston, La.
KRVM Eugene, Oreg.
KRVN-FM Lexington, Nebr.
KRWG University Park, N. M.
KRWL Carson City, Nev.

Call Location

KRVS-FM Lafayette, La.
KRXL Kirksville, Mo.
KRYS-FM Colorado Springs, Colo.
KSAM-FM Huntsville, Tex.
KSAN-FM San Francisco, Cal.
KSEB-FM San Luis Obispo, Cal.
KSCO Santa Cruz, Calif.
KSBW-FM Salinas, Calif.
KSOA La Sierra, Calif.
KSDB-FM Manhattan, Kans.
KSDO-FM San Diego, Cal.
KSDS San Diego, Calif.
KSEA San Diego, Calif.
KSEB-FM Lubbock, Tex.
KSEF-FM Durant, Okla.
KSFA-FM Nacogdoches, Tex.
KSFM Dallas, Tex.
KSFY San Francisco, Calif.
KSGM-FM Ste. Genevieve, Mo.
KSHE Sherwood, Mo.
KSN Crisman, Tex.
KSIB-FM Oreston, Ia.
KSIS-FM Sedalia, Mo.
KSIX-FM Corpus Christi, Tex.
KSJM Jamestown, N.D.
KSJN-FM New Brighton, Minn.
KSJO-FM San Jose, Calif.
KSJR-FM Collegeville, Minn.
KSJS San Jose, Calif.
KSIT San Angelo, Tex.
KSIT-FM Salt Lake City, Utah
KSLA Seattle, Wash.(s)
KSLH St. Louis, Mo.
KSLO-FM Opelousas, La.
KSMA-FM Santa Maria, Calif.
KSMB Lafayette, La.
KSNM Santa Fe, N. M.
KSNF San Angelo, Cal.
KSOO-FM Sioux Falls, S.D.
KSOP-FM Salt Lake City, Utah
KSOZ Point Lookout, Mo.
KSPC Claremont, Calif.
KSPI-FM Stillwater, Okla.
KSPJ-FM Ocala, Fla.
KSRF Santa Monica, Calif.
KSRN Reno, Nev.
KSRT Tracy, Cal.
KSTE Emporia, Kans.
KSTN-FM Stockton, Calif.
KSTP-FM St. Paul, Minn.
KTSUI Iowa City, Iowa
KSUN-FM Bisbee, Ariz.
KSPV-FM Artesia, N. M.
KSWC Winfield, Kan.
KSWM-FM Aurora, Mo.
KSYN Joplin, Mo.
KTAC-FM Tacoma, Wash.
KTAL Texarkana, Tex.
KTAP Tucson, Ariz.
KTAR-FM Phoenix, Ariz.
KTBC-FM Austin, Tex.
KTBT Garden Grove, Cal.
KTFC Cedar Falls, Iowa
KTGR-FM Minneapolis, Minn.
KTGS-FM Ft. Smith, Ark.
KTGK-FM Texarkana, Tex.
KTEA-FM Midwest City, Okla.
KTEC Dretsch, Oreg.
KTEP El Paso, Tex.
KTGR-FM Columbia, Mo.
KTFC Sioux City, Ia.
KTGR-FM Columbia, Mo.
KTGL-FM St. Louis, Mo.
KTIB-FM Thibodaux, La.
KTIM San Rafael, Calif.
KTIS-FM Minneapolis, Minn.
KTJD-FM Ottawa, Kans.
KTLM-FM Tahlequah, Okla.
KTMS-FM Santa Barbara, Cal.
KTNM-FM Tucuman, N. M.
KTNT-FM Tacoma, Wash.
KTOC-FM Jonesboro, La.
KTOD-FM Sinton, Tex.
KTOP Topeka, Kan.
KTOY Tacoma, Wash.
KTQM-FM Clovis, N. M.
KTRE-FM Modesto, Calif.
KTRH-FM Houston, Tex.
KTRM-FM Beaumont, Tex.
KTSM-FM El Paso, Tex.
KTSR Kansas City, Mo.
KTTT-FM Springfield, Mo.
KTUX Hayward, Cal.
KTW-FM Seattle, Wash.
KTWD Spokane, Wash.
KTWN-FM Anoka, Minn.
KTJ-FM Jasper, Tex.
KTXN-FM Victoria, Tex.

Call Location

KTWR Tacoma, Wash.
KTXR-FM Springfield, Mo.
KTXT-FM Lubbock, Tex.
KTYM-FM Inglewood, Calif.
KUAC College, Alaska
KUANA-FM Agana, Guam
KUCR Riverside, Cal.
KUFM Lincoln, Neb.
KUER Salt Lake City, Utah
KUID Moscow, Ida.
KUIDE-FM Deane, Idaho
KUDU-FM Ventura-Oxnard, Calif.
KUDY-FM Spokane, Wash.
KUER Salt Lake City, Utah
KUMM-FM Lincoln, Neb.
KUGN-FM Eugene, Oreg.
KUHJ Houston, Tex.
KUKI-FM Ukiah, Cal.
KULA Las Vegas, Nev.
KULP-FM El Campo, Tex.
KUMD-FM Duluth, Minn.
KUMH Albuquerque, N. M.
KUNF La Grange, Mo.
KUOA-FM Silham Springs, Ark.
KUOH Honolulu, Hawaii
KUOI-FM Moscow, Ida.
KUOP Stockton, Calif.
KUOR-FM Redlands, Cal.
KUOW Seattle, Wash.
KUOF-FM Tempe, Ariz.
KUPH-FM Garden City, Kan.
KURL-FM Billings, Mont.
KUSC Los Angeles, Calif.
KUSO-FM Vermillion, S. Dak.
KUSN-FM St. Joseph, Mo.
KUSU-FM Logan, Utah
KUT-FM Austin, Tex.
KUTE Glendale, Cal.
KUWR Laramie, Wyo.
KUWS-FM Newton, Ia.
KUZN-FM W. Monroe, La.
KUZZ-FM Bakersfield, Cal.
KVBC Grand Forks, N. D.
KVCL-FM Winnfield, La.
KVCR-FM Bernardino, Calif.
KVFE-FM Colorado Springs, Colo.
KVEN-FM Ventura, Calif.
KVET-FM Austin, Tex.
KVEZ San Mateo, Cal.
KVF San Fernando, Calif.
KVLV-FM Highland Park-Dallas, Tex.
KVLV-FM Fallon, Nev.
KVMG-FM Cochran, Ga.
KVMN Pueblo, Colo.
KVQA-FM Tucson, Ariz.
KVQE-FM Emporia, Kan.
KVOK Honolulu, Hawaii
KVOP-FM Plainville, Tex.
KVOR-FM Colorado Springs, Colo.
KVQX-FM Moorhead, Minn.
KVPI-FM Villa Platte, La.
KVRF Vermillion, S.O.
KVRO Stillwater, Okla.
KRVL St. Cloud, Minn.
KRVL Dallas, Tex.
KRVF-FM Austin, Tex.
KWAB Waverly, Iowa
KWAT-FM Watertown, S.D.
KWAV Monterey, Cal.
KWBE Eugene, Oreg.
KWBE-FM Beatrice, Neb.
KWBU Waco, Tex.
KWGR-FM Ogden, Utah
KWDM Des Moines, Ia. (s)
KWEB-FM Rochester, Minn.
KWEH Camden, Ark.
KWFC Springfield, Mo.
KWRP-FM San Angelo, Tex.
KWG-FM Stockton, Calif.
KWGN-FM Abernathy, Tex.
KWGO-FM Abernathy, Tex.
KWGS Tulsa, Okla.
KWHG Lincoln, Neb.
KWHI-FM Brenham, Tex.
KWHO-FM Salt Lake City, Utah
KWHF Edmond, Okla.
KWIC Salt Lake City, Utah
KWIF-FM Moses Lake, Wash.
KWIX St. Louis, Mo.
KWIZ-FM Santa Ana, Calif.
KWJB-FM Globe, Ariz.
KWKC-FM Abilene, Tex.
KWKH-FM Shreveport, La.
KWKI Kansas City, Mo.
KWLW-FM Willmar, Minn.
KWLW San Angelo, Tex.
KWMF-FM Walnut Creek, Cal.

Are your home-town FM stations listed correctly in *White's Radio Log*? If you believe there is a correction called for in *White's* listings, please check first with your local station. For each callsign obtain the correct city location and frequency. (Remember, even though your local paper may list a station as a "home-town" station, it may be officially licensed by the FCC for operation in the next city). Get all the facts on a piece of paper (be very brief), include your name and address, and mail to *White's Radio Log*, RADIO-TV EXPERIMENTER, 229 Park Avenue South, New York, N. Y. 10003. Your help in contributing to the accuracy and completeness of *White's Radio Log* will be sincerely appreciated. See page 110.

—Editor

Call	Location	Call	Location	Call	Location	Call	Location
KWMT-FM	Flt. Dodge, Ia.	WAUG-FM	Augusta, Ga.	WBVO	Boyetown, Pa.	WDAR-FM	Darlington, S.C.
KWNS-FM	Pratt, Kan.	WAUK-FM	Waukesha, Wis.	WBYS-FM	Canton, Ill.	WDAS-FM	Philadelphia, Pa.
KWNT-FM	Davenport, Ia.	WAUP-FM	Akron, Ohio	WBZ-FM	Boston, Mass.	WDAY-FM	Fargo, N. D.
KWDA-FM	Worthington, Minn.	WAVA-FM	Arlington, Va.	WBZI	Xenia, O.	WDBJ-FM	Reno, N. V.
KWDC-FM	Porter, Bluff, Mo.	WAVO-FM	Decatur, Ga.	WCAC	Anderson, S.C.	WDBL-FM	Springfield, Tenn.
KWPC-FM	Muscataine, Iowa	WAVY-FM	Portsmouth, Va.	WCAL-FM	Northfield, Minn.	WDBM	Medina, O.
KWPM-FM	West Plains, Mo.	WAWA-FM	Milwaukee, Wis.	WCAO-FM	Baltimore, Md.	WDBO-FM	Orlando, Fla.
KWSB-FM	Gunnison, Colo.	WAWK-FM	Kendallville, Ind.	WCAR-FM	Detroit, Mich.	WDBQ-FM	Charlottesville, Va.
KWTO-FM	Springfield, Mo.	WAWR-FM	Boone Green, O.	WCAS	Knoxville, Tenn.	WDCB-FM	Buffalo, N. Y.
KWVC-FM	Columbia, Mo.	WAWM-FM	Murray, Ky.	WCBS	Memphis, Tenn.	WDCD-FM	Hamden, Conn.
KWVV-FM	Stephenville, Tex.	WAWZ-FM	Zarephath, N.J.	WCBE	Columbus, Ohio	WDDS-FM	Syracuse, N.Y.
KWVR-FM	Mexico, Mo.	WAXO	Kenosha, Wis.	WCBL	Ft. Benton, Ky.	WDEA-FM	Ellsworth, Me.
KXEL-FM	Cathedral City, Cal.	WAYL	Minneapolis-St. Paul, Minn.	WCBM-FM	Baltimore, Md.	WDEB-FM	Jamestown, Tenn.
KXFM	Santa Maria, Cal.	WAYZ-FM	Waynesboro, Pa.	WCBN-FM	New York, N.Y.	WDEC-FM	Americus, Ga.
KXIC-FM	Iowa City, Ia.	WAZL-FM	Hazleton, Pa.	WCBP	Columbia, Ill.	WDEE	Hamden, Conn.
KXIT-FM	Dalhath, Tex.	WAZW-FM	Lafayette, Ind.	WCBY-FM	Chobogyan, Mich.	WDEF-FM	Sweetwater, Tenn.
KXJK-FM	Forrest City, Ark.	WBAA-FM	W. Lafayette, Ind.	WCCB	McComb, Miss.	WDEL-FM	Wilmington, Del.
KXKL	San Francisco, Calif.	WBAB-FM	Babylon, N.Y.	WCCF-FM	Hartford, Conn.	WDEN-FM	Macon, Ga.
KXLL	Los Angeles, Calif.	WBAL-FM	Baltimore, Md.	WCCM-FM	Hampton, Va.	WDEG-FM	Draft, O.
KXLY-FM	Spokane, Wash.	WBAP-FM	Ft. Worth, Tex.	WCCN-FM	Nellisville, Wis.	WDET-FM	Detroit, Mich.
KXOA	Sacramento, Calif.	WBAT-FM	Barab, Wis.	WCCV-FM	Charlottesville, Va.	WDFM	State College, Pa.
KXQR	Fresno, Calif.	WBAY-FM	Green Bay, Wis.	WCCW-FM	Traverse City, Mich.	WDHA-FM	Dover, N.J.
KXRA-FM	Alexandria, Minn.	WBBA-FM	Pittsfield, Ill.	WCDF-FM	Cedarville, O.	WDHI-FM	Duluth, Minn.
KXRR	Sacramento, Calif.	WBBC-FM	Burlington, N. C.	WCED-FM	Dubois, Pa.	WDIX-FM	Orangeburg, S. C.
KXTR	Kansas City, Mo.	WBBC-FM	Jackson, Mich.	WCEF-FM	Parkersburg, W. Va.	WDJK	Atlanta, Ga.
KXXI	Alamogordo, N. M.	WBBC-FM	Rochester, N.Y.	WCFM-FM	Cambridge, Md.	WDJR	Oil City, Pa.
KXXK	Dallas, Texas	WBBI-FM	Abingdon, N.Y.	WCFM-FM	Charlottesville, Mich.	WDKC	Albany, N.Y.
KXXZ-FM	Houston, Tex.	WBBI-FM	Chicago, Ill.	WCFM-FM	Williamstown, Mass.	WDKO-FM	Kingstree, S.C.
KYEW	Phoenix, Ariz.	WBBO-FM	Chicago, N.C.	WCFM-FM	Chippewa Falls, Wis.	WDKN-FM	Dayton, Ohio
KYLE-FM	Tempe, Ariz.	WBBO-FM	Augusta, Ga.	WCHA-FM	Chambersburg, Pa.	WDLF-FM	Marshfield, Wis.
KYMS	Santa Ana, Cal.	WBBS-FM	E. St. Louis, Ill.	WCHD	Detroit, Mich.	WDLP-FM	Panama City, Fla.
KYSM-FM	Mankato, Minn.	WBBS-FM	Youngstown, Ohio	WCHK-FM	Canton, Ga.	WDMB-FM	Statesville, N.C.
KZAK-FM	Tyler, Tex.	WBBC-FM	Levittown-Fairless Hills, Pa.	WCHN-FM	Clinton, N.Y.	WDMJ-FM	Marquette, Mich.
KZAM	Seattle, Wash.	WBCH-FM	Hastings, Mich.	WCHS-FM	Charlestown, W. Va.	WDMV-FM	Dodgeville, Wis.
KZEL-FM	Eugene, Ore.	WBCL-FM	Williamsburg, Va.	WCHO-FM	Washington Court House, O.	WDMS-FM	Lynchburg, Va.
KZEM	Corpus Christi, Tex.	WBCL-FM	South Beloit, Ill.	WCHQ	Camuy, P.R.	WDMW	Manomonia, Pa.
KZOM	Oklahoma City, Okla.	WBCL-FM	Bay City, Mich.	WCIS-FM	Moss Point, Miss.	WDNC-FM	Durham, N.C.
KZSU	Stanford, Cal.	WBCL-FM	Boston, Mass.	WCJM	W. Point, Ga.	WDOR-FM	Orlando, Fla.
KZUN-FM	Opportunity, Wash.	WBCL-FM	Bucyrus, O.	WCJW	Cleveland, O.	WDOO-FM	Providence, R.I.
KZYM-FM	Cape Girardeau, Mo.	WBCL-FM	Beloit, Wis.	WCJW	Cocoa, Fla.	WDOO-FM	Providence, R.I.
WAAA-FM	Winston-Salem, N.C.	WBCL-FM	Indianapolis, Ind.	WCJW	W. Point, Ga.	WDOO-FM	Providence, R.I.
WAAF	Worcester, Mass.	WBCL-FM	Elyria, O.	WCJW	Cleveland, O.	WDOO-FM	Providence, R.I.
WAAZ-FM	Parkersburg, W. Va.	WBCL-FM	Buffalo, N.Y.	WCJW	Cleveland, Tenn.	WDOO-FM	Providence, R.I.
WAAZ-FM	Crestview, Fla.	WBCL-FM	Brookton, Mass.	WCJW	Corning, N.Y.	WDOO-FM	Providence, R.I.
WABA-FM	Agua Dulce, P.R.	WBCL-FM	Beaufort, S. C.	WCJW	Chicago, Ill.	WDOO-FM	Providence, R.I.
WABC-FM	New York, N.Y.	WBCL-FM	Chillicothe, Ohio	WCJW	Chicago, Ill.	WDOO-FM	Providence, R.I.
WABD-FM	St. Campbell, Ky.	WBCL-FM	Chicago, Ill.	WCJW	Chicago, Ill.	WDOO-FM	Providence, R.I.
WABE	Atlanta, Ga.	WBCL-FM	Detroit, Mich.	WCJW	Chicago, Ill.	WDOO-FM	Providence, R.I.
WABF-FM	Fairhope, Ala.	WBCL-FM	Seneca, S. C.	WCJW	Chicago, Ill.	WDOO-FM	Providence, R.I.
WABG-FM	Bangor, Maine	WBCL-FM	Buffalo, N.Y.	WCJW	Chicago, Ill.	WDOO-FM	Providence, R.I.
WABX-FM	Detroit, Mich.	WBCL-FM	Tallahassee, Fla.	WCJW	Chicago, Ill.	WDOO-FM	Providence, R.I.
WABZ-FM	Albemarle, N.C.	WBCL-FM	Newark, N. J.	WCJW	Chicago, Ill.	WDOO-FM	Providence, R.I.
WACO	Waco, Tex.	WBCL-FM	Bowling Green, Ohio	WCJW	Chicago, Ill.	WDOO-FM	Providence, R.I.
WACT-FM	Tuscaloosa, Ala.	WBCL-FM	Warwick, R.I.	WCJW	Chicago, Ill.	WDOO-FM	Providence, R.I.
WADB	Point Pleasant, N.J.	WBCL-FM	Brownsville, Tenn.	WCJW	Chicago, Ill.	WDOO-FM	Providence, R.I.
WADM-FM	Decatur, N.Y.	WBCL-FM	Marionetta, Ga.	WCJW	Chicago, Ill.	WDOO-FM	Providence, R.I.
WAEB-FM	Cincinnati, Ohio	WBCL-FM	Biloxi, Miss.	WCJW	Chicago, Ill.	WDOO-FM	Providence, R.I.
WAEF	Cincinnati, O.	WBCL-FM	Knoxville, Tenn.	WCJW	Chicago, Ill.	WDOO-FM	Providence, R.I.
WAEK	Syracuse, N.Y.	WBCL-FM	Wethers, N. Y.	WCJW	Chicago, Ill.	WDOO-FM	Providence, R.I.
WAEW-FM	Crossville, Tenn.	WBCL-FM	Eau Claire, Wis.	WCJW	Chicago, Ill.	WDOO-FM	Providence, R.I.
WAEZ	Miami Beach, Fla.	WBCL-FM	Baltimore, Md.	WCJW	Chicago, Ill.	WDOO-FM	Providence, R.I.
WAFB-FM	Baton Rouge, La.	WBCL-FM	Trenton, N. J.	WCJW	Chicago, Ill.	WDOO-FM	Providence, R.I.
WAGR-FM	Lumberton, N.C.	WBCL-FM	Manchester, Ind.	WCJW	Chicago, Ill.	WDOO-FM	Providence, R.I.
WAGY-FM	Fort Smith, N. C.	WBCL-FM	West Bend, Wis.	WCJW	Chicago, Ill.	WDOO-FM	Providence, R.I.
WAHR	Huntsville, Ala.	WBCL-FM	Beckley, W. Va.	WCJW	Chicago, Ill.	WDOO-FM	Providence, R.I.
WAIC	Springfield, Mass.	WBCL-FM	Lexington, Ky.	WCJW	Chicago, Ill.	WDOO-FM	Providence, R.I.
WAIN-FM	Columbia, Ky.	WBCL-FM	Buffalo, N.Y.	WCJW	Chicago, Ill.	WDOO-FM	Providence, R.I.
WAIV	Indianapolis, Ind.	WBCL-FM	Batesburg, S.C.	WCJW	Chicago, Ill.	WDOO-FM	Providence, R.I.
WAJC	Indianapolis, Ind.	WBCL-FM	Springfield, Ohio	WCJW	Chicago, Ill.	WDOO-FM	Providence, R.I.
WAJM	Montgomery, Ala.	WBCL-FM	Meriden, Conn.	WCJW	Chicago, Ill.	WDOO-FM	Providence, R.I.
WAJP	Joliet, Ill.	WBCL-FM	Oneida, Tenn.	WCJW	Chicago, Ill.	WDOO-FM	Providence, R.I.
WAJR-FM	Clinton, W. Va.	WBCL-FM	Catonsville, Md.	WCJW	Chicago, Ill.	WDOO-FM	Providence, R.I.
WAKE-FM	Valparaiso, Ind.	WBCL-FM	Elwood, Ind.	WCJW	Chicago, Ill.	WDOO-FM	Providence, R.I.
WAKM	Bedford, Pa.	WBCL-FM	Tomball, Tex.	WCJW	Chicago, Ill.	WDOO-FM	Providence, R.I.
WAKN-FM	Alken, S.C.	WBCL-FM	Charlotte Amalie, V.I.	WCJW	Chicago, Ill.	WDOO-FM	Providence, R.I.
WAKO-FM	Lawrenceville, Ill.	WBCL-FM	Conway, N. H.	WCJW	Chicago, Ill.	WDOO-FM	Providence, R.I.
WAKR-FM	Akron, Ohio	WBCL-FM	Fitchburg, Mass.	WCJW	Chicago, Ill.	WDOO-FM	Providence, R.I.
WAKW	Cincinnati, O.	WBCL-FM	Boonville, Ind.	WCJW	Chicago, Ill.	WDOO-FM	Providence, R.I.
WALK-FM	Patchoupa, N.Y.	WBCL-FM	Bloomington, Ill.	WCJW	Chicago, Ill.	WDOO-FM	Providence, R.I.
WALL-FM	Midletown, N. Y.	WBCL-FM	Columbus, Ohio	WCJW	Chicago, Ill.	WDOO-FM	Providence, R.I.
WALM-FM	Marshall, Mich.	WBCL-FM	Buffalo, N.Y.	WCJW	Chicago, Ill.	WDOO-FM	Providence, R.I.
WAMC	Albany, N.Y.	WBCL-FM	Salisbury, Md.	WCJW	Chicago, Ill.	WDOO-FM	Providence, R.I.
WAMF	Amherst, Mass.	WBCL-FM	Cleveland, Ohio	WCJW	Chicago, Ill.	WDOO-FM	Providence, R.I.
WAMO-FM	Pittsburgh, Pa.	WBCL-FM	Milwaukee, Wis.	WCJW	Chicago, Ill.	WDOO-FM	Providence, R.I.
WAMU-FM	Washington, D.C.	WBCL-FM	Brookline, Mass.	WCJW	Chicago, Ill.	WDOO-FM	Providence, R.I.
WANG-FM	Grand Rapids, Mich.	WBCL-FM	Terre Haute, Ind.	WCJW	Chicago, Ill.	WDOO-FM	Providence, R.I.
WANS-FM	Anderson, S. C.	WBCL-FM	Lock Haven, Pa.	WCJW	Chicago, Ill.	WDOO-FM	Providence, R.I.
WANF	Albany, Ky.	WBCL-FM	Clarks Summit, Pa.	WCJW	Chicago, Ill.	WDOO-FM	Providence, R.I.
WANM	Tallahassee, Fla.	WBCL-FM	Birmingham, Ala.	WCJW	Chicago, Ill.	WDOO-FM	Providence, R.I.
WANZ	Sebring, Fla.	WBCL-FM	Bradenton, Fla.	WCJW	Chicago, Ill.	WDOO-FM	Providence, R.I.
WAOV-FM	Vincennes, Ind.	WBCL-FM	Wilkes-Barre, Pa.	WCJW	Chicago, Ill.	WDOO-FM	Providence, R.I.
WAPC-FM	Riverhead, N. Y.	WBCL-FM	Pittsfield, Mass.	WCJW	Chicago, Ill.	WDOO-FM	Providence, R.I.
WAPI-FM	Birmingham, Ala.	WBCL-FM	Big Rapids, Mich.	WCJW	Chicago, Ill.	WDOO-FM	Providence, R.I.
WAPL-FM	Appleton, Wis.	WBCL-FM	Waltham, Mass.	WCJW	Chicago, Ill.	WDOO-FM	Providence, R.I.
WAPS	Akron, Ohio	WBCL-FM	Carrington, Ga.	WCJW	Chicago, Ill.	WDOO-FM	Providence, R.I.
WAQB-FM	Atlantic Beach, Fla.	WBCL-FM	Providence, R.I.	WCJW	Chicago, Ill.	WDOO-FM	Providence, R.I.
WARD-FM	Meadville, Pa.	WBCL-FM	New Bedford, Mass.	WCJW	Chicago, Ill.	WDOO-FM	Providence, R.I.
WARI-FM	Johnstown, Pa.	WBCL-FM	Muncie, Ind.	WCJW	Chicago, Ill.	WDOO-FM	Providence, R.I.
WARK	Little Rock, Ark.	WBCL-FM	Charlotte, N. C.	WCJW	Chicago, Ill.	WDOO-FM	Providence, R.I.
WARR-FM	Rockledge, Fla.	WBCL-FM	Houston, Mo.	WCJW	Chicago, Ill.	WDOO-FM	Providence, R.I.
WARS-FM	Peru, Ind.	WBCL-FM	Buffalo, N.Y.	WCJW	Chicago, Ill.	WDOO-FM	Providence, R.I.
WASA-FM	Haure De Grace, Md.	WBCL-FM	Boston, Mass.	WCJW	Chicago, Ill.	WDOO-FM	Providence, R.I.
WASH	Washington, D. C.	WBCL-FM	Lexington, N.C.	WCJW	Chicago, Ill.	WDOO-FM	Providence, R.I.
WASK-FM	Lafayette, Ind.	WBCL-FM	Woodbridge, Va.	WCJW	Chicago, Ill.	WDOO-FM	Providence, R.I.
WATH-FM	Athens, O.	WBCL-FM	Union City, Pa.	WCJW	Chicago, Ill.	WDOO-FM	Providence, R.I.
WATL-FM	Tampa, Fla.	WBCL-FM	Beaver Falls, Pa.	WCJW	Chicago, Ill.	WDOO-FM	Providence, R.I.
WATM-FM	Altmore, Ala.	WBCL-FM	Berea, Ohio	WCJW	Chicago, Ill.	WDOO-FM	Providence, R.I.
WATO-FM	Oak Ridge, Tenn.	WBCL-FM	Bayamon, P.R.	WCJW	Chicago, Ill.	WDOO-FM	Providence, R.I.
WATR-FM	Waterbury, Conn.	WBCL-FM		WCJW	Chicago, Ill.	WDOO-FM	Providence, R.I.
WATZ-FM	Alpena, Mich.	WBCL-FM		WCJW	Chicago, Ill.	WDOO-FM	Providence, R.I.

WHITE'S RADIO LOG

Call	Location	Call	Location	Call	Location
WERM	Wapakoneta, Ohio	WHLN	Port Huron, Mich.	WJBR	Wilmington, Del.
WERS	Boston, Mass.	WHLT	FM Huntington, Ind.	WJCD	FM Seymour, Ind.
WERT	FM Van Wert, Ohio	WHAA	FM Anniston, Ala.	WJCV	FM Johnson City, Tenn.
WESA	FM Charleroi, Pa.	WHMD	Marineville, Wis.	WJDX	FM Jackson, Miss.
WESC	FM Greenville, S.C.	WHME	South Bend, Ind.	WJEN	FM Gallipolis, Ohio
WESP	Charlotte Amalie, V.I.	WHMP	FM Northampton, Mass.	WJEF	FM Hagerstown, Md.
WEST	FM Easton, Pa.	WHMS	Hialeah, Fla.	WJER	FM Dover, D.
WETA	FM Washington, D.C.	WHNC	FM Henderson, N.C.	WJFM	FM Grand Rapids, Mich.
WETL	South Bend, Ind.	WHNR	McMinnville, Tenn.	WJGA	FM Jackson, Miss.
WETN	Wheaton, Ill.	WHOD	FM Des Moines, Iowa	WJGS	Houghton, Mich.
WEV	Evansville, Ind.	WHOH	Hamilton, Ohio	WJHL	FM Johnson City, Tenn.
WEVD	FM New York, N.Y.	WHOK	FM Lancaster, Ohio	WJIB	Boston, Mass.
WEWO	FM Laurinburg, N.C.	WHOM	FM New York, N.Y.	WJIG	FM Tullahoma, Tenn.
WEXI	Arlington Heights, Ill.	WHODD	FM Orlando, Fla.	WJIN	FM Lansing, Mich.
WEZK	Knoxville, Tenn.	WHOP	FM Hopkinsville, Ky.	WJIV	Cherry Valley, N.Y.
WEZR	Manassas, Va.	WHOV	Hampton, Va.	WJLD	FM Chicago, Ill.
WEZY	FM Cocoa, Fla.	WHRF	FM Harrisburg, Pa.	WJLM	FM Lewisburg, Tenn.
WFAN	FM Dallas, Tex.	WHRH	FM High Point, N.C.	WJLK	FM Asbury Park, N.J.
WFAN	FM Alliance, Ohio	WHRK	FM Chicago, Ill.	WJLN	Birmingham, Ala.
WFAS	FM White Plains, N.Y.	WHRR	FM Riverhead, N.Y.	WJMC	FM Rice Lake, Wis.
WFAU	FM Augusta, Maine	WHRM	FM Bausau, Wis.	WJMD	Bethesda, Md.
WFAW	Fort Atkinson, Wis.	WHRS	FM Binghamton, N.Y.	WJMI	Jackson, Miss.
WFCB	FM Greenville, S.C.	WHSA	Highland Twp., Wis.	WJML	Potosky, Mich.
WFCB	Flint, Mich.	WHSB	Alpena, Mich.	WJMS	FM Florence, S.C.
WFCB	FM Toledo, Pa.	WHSL	FM Wilmington, N.C.	WJNX	FM Yazoo City, Miss.
WFBM	FM Indianapolis, Ind.	WHSR	FM Winchester, Mass.	WJOF	Athens, Ala.
WFBM	FM Winston-Salem, N.C.	WHSY	FM Hattiesburg, Miss.	WJOL	FM Florence, Ala.
WFCI	Franklin, Ind.	WHTE	FM Holland, Mich.	WJOL	FM Joliet, Ill.
WFCJ	Miamisburg, Ohio	WHUG	FM Easton, N.J.	WJON	FM St. Cloud, Minn.
WFCR	Amherst, Mass.	WHUN	FM Hudson, N.Y.	WJOY	FM Burlington, Vt.
WFOR	FM Winston-Salem, N.C.	WHUS	Storrs, Conn.	WJPA	FM Washington, Pa.
WFOS	FM Manchester, Ga.	WHWC	Colfax, Wis.	WJRF	FM Detroit, Mich.
WFOT	Columbia City, Ind.	WHYL	FM Carlisle, Pa.	WJRH	Easton, Pa.
WFEM	Elwood City, Pa.	WHYN	FM Springfield, Mass.	WJRS	FM Jamestown, Ky.
WFFF	FM Columbia, Miss.	WIA	Interlochen, Mich.	WJSM	FM Martinsburg, W.Va.
WFFM	Muskegon, Mich.	WIAE	FM Santa Juan, P. R.	WJST	FM Martinsburg, N.Y.
WFHA	FM Red Bank, N.J.	WIAM	FM Williamston, N.C.	WJVM	Sturgis, S.D.
WFHD	FM Henderson, Tenn.	WIAM	Indianapolis, Ind.	WJWL	FM Ridgetown, Del.
WFIO	Rio Piedras, P. R.	WIAB	FM Madison, Wis.	WJWS	FM Ridgeway, Pa.
WFIG	Sumter, S. C.	WIBC	FM Indianapolis, Ind.	WJZZ	Bridgeport, Conn.
WFIL	FM Philadelphia, Pa.	WIBJ	FM Jenkintown, Pa.	WKAI	FM MaComb, Ill.
WFIN	FM Findlay, Ohio	WIBG	FM Philadelphia, Pa.	WKAJ	FM Saratoga Springs, N.Y.
WFIU	Bloomington, Ind.	WIBM	FM Jacksonville, Mich.	WKAK	Kankakee, Ill.
WFIV	FM Fairfield, Ill.	WIBQ	FM Utica, N.Y.	WKAQ	FM San Juan, P.R.
WFIZ	Conneaut, Ind.	WIBW	FM Topeka, Kan.	WKB	FM Windsor, Mich.
WFKO	Kokomo, Ind.	WICB	Ithaca, N.Y.	WKAT	Miami, Fla.
WFLA	FM Tampa, Fla.	WICH	FM Norwich, Conn.	WKAY	FM Glasgow, Ky.
WFLN	FM Philadelphia, Pa.	WICD	FM Salisbury, Md.	WKAZ	FM Charleston, W.Va.
WFLD	Farmville, Va.	WIFE	FM Indianapolis, Ind.	WKBC	FM N. Wilkesboro, N.C.
WFLR	FM Dundee, N.Y.	WIFF	FM Auburn, Ind.	WKBJ	FM Ridgeway, Pa.
WFLT	FM Franklin, Tenn.	WIFI	Philadelphia, Pa.	WKBJ	FM Milan, Tenn.
WFLW	FM Monticello, Ky.	WIFN	Franklin, Ind.	WKCV	FM Covington, Tenn.
WFLY	Troy, N.Y.	WIGS	FM Gouverneur, N.Y.	WKCF	FM Youngstown, Ohio
WFMB	Springfield, Ill.	WIHS	Middletown, Conn.	WKCR	FM New York, N.Y.
WFMD	FM Frederick, Md.	WIKI	FM Chester, Va.	WKCS	Knoxville, Tenn.
WFME	Newark, N.J.	WIKL	FM Evansville, Ind.	WKCU	FM Corinth, Miss.
WFMF	Chicago, Ill.	WIL	FM St. Louis, Mo.	WKDA	FM Nashville, Tenn.
WFMG	Gallatin, Tenn.	WILE	FM Cambridge, Ind.	WKDN	FM Camden, N.J.
WFMH	FM Cullman, Ala.	WILL	FM Urbana, Ill.	WKEE	FM Huntington, W.Va.
WFML	Montgomery, Ala.	WILD	FM Frankfurt, Ind.	WKEL	FM Keaweenaw, Ill.
WFMM	FM Baltimore, Md.	WILS	FM Lansing, Mich.	WKET	FM Ketterling, Ohio
WFMN	Newburgh, N.Y.	WILX	FM Johnstown, Pa.	WKEU	FM Griffin, Ga.
WFMQ	Lebanon, Tenn.	WINE	FM Kenner, La.	WKEX	FM Covington, Va.
WFMS	Indianapolis, Ind.	WINK	FM Ft. Myers, Fla.	WKFM	Chicago, Ill.
WFMT	Chicago, Ill.	WIOD	FM Miami, Fla.	WKFR	FM Battle Creek, Mich.
WFMT	East Orange, N.J.	WIPR	FM San Juan, P.R.	WKHM	FM Jackson, Mich.
WFMW	FM Madisonville, Ky.	WIRB	FM Enterprise, Ala.	WKIC	FM Hazard, Ky.
WFMX	Staatsville, N.C.	WISA	FM Humboldt, Tenn.	WKIS	FM Orlando, Fla.
WFNY	Racine, Wis.	WIRP	FM Rochester, N.Y.	WKIT	Wilmington, N.C.
WFNZ	Allentown, Pa.	WIS	FM Madison, Wis.	WKIX	FM Raleigh, N.C.
WFNC	FM Fayetteville, N.C.	WISN	FM Milwaukee, Wis.	WKJB	FM Mayaguez, P. R.
WFNS	FM Burlington, N.C.	WISU	Terre Haute, Ind.	WKJF	Pittsburgh, Pa.
WFNY	Racine, Wis.	WISZ	FM Glen Burnie, Md.	WKJG	FM Ft. Wayne, Ind.
WFDB	FM Fostoria, Ohio	WITA	FM San Juan, P.R.	WKKD	FM Erie, Pa.
WFDL	Hamilton, Ohio(s)	WIT	FM Baltimore, Md.	WKKY	FM Erlanger, Ky.
WFON	Fond du Lac, Wis.	WITL	FM Lansing, Mich.	WKLC	FM St. Albans, W.Va.
WFOR	FM Hattiesburg, Miss.	WITN	FM Washington, N.C.	WKLD	Oenonta, Ala.
WFOS	Chesapeake, Va.	WITZ	FM Jasper, Ind.	WKLF	FM Clanton, Ala.
WFDY	FM St. Augustine, Fla.	WIUC	Winchester, Ind.	WKLN	Cullman, Ala.
WFPG	Atlantic City, N.J.	WIVC	Peoria, Ill.	WKLK	Atlanta, Ga.
WFPK	Louisville, Ky.	WIVE	FM Ashland, Va.	WKLQ	FM Dearborn, Mich.
WFQL	San Juan, P.R.	WIVL	FM Christiansted, St. Croix, V.I.	WKLW	FM Jackson, Ky.
WFRB	FM Frostburg, Md.	WIVK	FM Knoxville, Tenn.	WKOC	FM Sunbury, Pa.
WFRE	FM Fresno, Cal.	WIVY	FM Jacksonville, Fla.	WKOP	FM Binghamton, N.Y.
WFRJ	Auburn, Ga.	WIXK	FM New Richmond, Wis.	WKOX	FM Framingham, Mass.
WFRM	FM Freeport, Ill.	WIXL	FM Newton, N. J.	WKDZ	FM Kosciusko, Miss.
WFRD	FM Fremont, Ohio	WIXN	FM Dixon, Ill.	WKPS	New Wilmington, Pa.
WFRS	FM Franklin, N. C.	WIXX	FM Ft. Lauderdale, Fla.	WKPT	FM Kingsport, Tenn.
WFSA	FM Tallahassee, Fla.	WIZR	FM Johnston, N.Y.	WKRC	FM Cincinnati, Ohio
WFTL	FM Ft. Lauderdale, Fla.	WIZZ	FM Streator, Ill.	WKRG	FM Cincinnati, Ohio
WFTM	FM Maysville, Ky.	WIAC	FM Johnstown, Pa.	WKRT	FM Cortland, N.Y.
WFTW	FM Ft. Walton Beach, Fla.	WIAS	FM Pittsburgh, Pa.	WKRR	Louisville, Ky.
WFUL	FM Fulton, Ky.	WIAT	FM Swainsboro, Ga.	WKSL	Greencastle, Pa.
WFUR	FM Grand Rapids, Mich.	WIAX	FM Jacksonville, Fla.	WKSN	FM Jamestown, N.Y.
		WIAZ	Albany, Ga.	WKSU	FM Kent, Ohio
		WIBK	FM Detroit, Mich.	WKTA	McKenzie, Tenn.
		WJBL	FM Holland, Mich.	WKTG	Struthers, O.
		WJBM	FM Jerseyville, Ill.	WKTM	N. Charleston, S.C.
		WJBO	FM Baton Rouge, La.	WKTN	FM Mayfield, Ky.
				WKTN	FM Kenton, O.

Call	Location	Call	Location	Call	Location	Call	Location
WKTB-FM Jacksonville, Fla.		WMGW-FM Meadville, Pa.		WNTH Winnetka, Ill.		WPPA-FM Pottsville, Pa.	
WKUB Manitowoc, Wis.		WMHC South Hadley, Mass.		WNTH Hackettstown, N.J.		WPRB Princeton, N.J.	
WKUC Wabash, Ind.		WMHE Toledo, Ohio		WNUB-FM Northfield, Vt.		WPRK Winter Park, Fla.	
WKVM-FM San Juan, P.R.		WMIS Morrison, Ill.		WNUR Evanston, Ill.		WPRM-FM Park Rapids, Minn.	
WKWK-FM Wheeling, W.Va.		WMIC-FM Sandusky, Mich.		WNUS-FM Chicago, Ill.		WPRO-FM Providence, R.I.	
WKYC-FM Cleveland, O.		WMIL-FM Milwaukee, Wis.		WNXT-FM Portsmouth, N.H.		WPRS-FM Philadelphia, Pa.	
WKYF-FM Greenville, Ky.		WMIN-FM St. Paul, Minn.		WNYC-FM New York, N.Y.		WPRT-FM Prestonburg, Ky.	
WKYV Frankfort, Ky.		WMIT Black Mountain, N.C.		WNYE New York, N.Y.		WPSR Evansville, Ind.	
WKYX-FM Paducah, Ky.		WMIV S. Bristol, N.Y.		WNYF New York, N.Y.		WPTP-FM Raleigh, N.C.	
WLAC-FM Nashville, Tenn.		WMIX-FM Mt. Vernon, Ill.		WNYM-FM Canton, O.		WPTH Fort Wayne, Ind.	
WLAD-FM Danbury, Conn.		WMJR Ft. Lauderdale, Fla.		WNYR-FM Rochester, N.Y.		WPTN-FM Cookeville, Tenn.	
WLAE Hartford, Conn.		WMKC Oshkosh, Wis.		WOAB Ozark, Ala.		WPTW-FM Piqua, Ohio	
WLAG-FM LaGrange, Ga.		WMKY-FM Morehead, Ky.		WOAP-FM Owosso, Mich.		WPUV-FM Pulaski, Va.	
WLAN-FM Lancaster, Pa.		WMLP-FM Milton, Pa.		WOAY-FM Oak Hill, W.Va.		WPUT Philadelphia, Pa.	
WLAF-FM Lexington, Ky.		WMLS-FM Sycauga, Ala.		WOBC Oberlin, O.		WQCL Philadelphia, Pa.	
WLAT-FM Conway, S.C.		WMLW Milwaukee, Wis.		WOBM Toms River, N. J.		WQOC-FM Midland, Mich.	
WLAV-FM Grand Rapids, Mich.		WMMM Westport, Conn.		WOBN Westerville, Ohio		WQFM Milwaukee, Wis.	
WLAY-FM Muscle Shoals, Ala.		WMMR Philadelphia, Pa.		WOBT-FM Rhinelander, Wis.		WQIK-FM Jacksonville, Fla.	
WLBG-FM Laurens-Clinton, S.C.		WMNA-FM Gretna, Va.		WOC-FM Davenport, Iowa		WQLT Florence, Ala.	
WLBI-FM Mattoon, Ill.		WMNB-FM North Adams, Mass.		WOCB-FM W. Yarmouth, Mass.		WQMF Babylon, N. Y.	
WLBJ-FM Bowling Green, Ky.		WMNI-FM Columbus, Ohio		WOCH-FM North Vernon, Ind.		WQMG Greensboro, N.C.	
WLBK-FM Okla. Ill.		WMOA-FM Marietta, O.		WOCO-FM Decoto, Wis.		WQMS Hamilton, Ohio	
WLBK-FM Lebanon, Pa.		WMOP-FM Decala, Fla.		WOOL-FM Carbondale, Pa.		WQMU Indiana, Pa.	
WLCK-FM Scottsville, Ky.		WMOR-FM Morehead, Ky.		WOPM Greenville, Tenn.		WQMV Vicksburg, Miss.	
WLDM-FM Lancaster, S.C.		WMOU-FM Berlin, N.H.		WOPN-FM Shelby, N.C.		WQPS Pittsfield, Mass.	
WLDM Oak Park, Mich.		WMPI-FM Scottsburg, Ind.		WOLF-FM Ames, Iowa		WQRS-FM Detroit, Mich.	
WLOR-FM Traverse City, Mich.		WMPL-FM Hancock, Mich.		WOLV-FM De Ruyter, N.Y.		WQSB Albertville, Ala.	
WLDS-FM Jacksonville, Ill.		WMPS-FM Memphis, Tenn.		WOKK-FM Meridian, Miss.		WQST Forest, Miss.	
WLEC-FM Sandusky, Ohio		WMRF-FM Lewistown, Pa.		WOKU-FM Greensburg, Pa.		WQTC-FM Selma, Ala.	
WLEN Adrian, Mich.		WMRI-FM Marion, Ind.		WOKZ-FM Alton, Ill.		WQTX-FM Two Rivers, Wis.	
WLEO-FM Ponce, P. R.		WMRN-FM Marion, Ohio		WOLA San Juan, P.R.		WQXI-FM Smyrna, Ga.	
WLET-FM Teococ, Ga.		WMRO-FM Aurora, Ill.		WOLF-FM Marion, Va.		WQXM Clearwater, Fla.	
WLEW-FM Bad Axe, Mich.		WMRY E. St. Louis, Ill.		WOLI Ottawa, Ill.		WQXY-FM Baton Rouge, La.	
WLEX-FM Lexington, Ky.		WMRP-FM Flint, Mich.		WOLA Tallahassee, Fla.		WRAD-FM Radford, Va.	
WLFM Appleton, Wis.		WMRY E. St. Louis, Ill.		WOMC Royal Park, Mich.		WRAG-FM Carrollton, Ala.	
WLGN-FM Logan, O.		WMSE-FM Oakland, Md.		WOMI-FM Owensboro, Ky.		WRAJ-FM Anna, Ill.	
WLHB-FM New York, N.Y.		WSH-FM Elizabethtown, Pa.		WOMP-FM Bellaire, Ohio		WRAM-FM Williamsport, Pa.	
WLH-FM New London, Wis.		WSK-FM Morganfield, Ky.		WONC Naperville, Ill.		WRAL-FM Raleigh, N.C.	
WLIL-FM Lenoir City, Tenn.		WSP Harrisburg, Pa.		WONE-FM Dayton, O.		WRAR-FM Tanabshnock, Va.	
WLIN Detroit, Mich.		WMSR-FM Manchester, Tenn.		WONF Pensacola, Fla.		WRBS-FM Princeton, Ind.	
WLIP-FM Kenosha, Wis.		WMST-FM Mt. Sterling, Ky.		WONO-FM Syracuse, N. Y.		WRBJ-FM St. Johns, Mich.	
WLIR Hicksville, N. Y.		WMT-FM Cedar Rapids, Iowa		WOOD-FM		WRBL-FM Columbus, Ga.	
WLIV-FM Livingston, Tenn.		WMTL-FM Park Ridge, Ill.		Grand Rapids, Mich.		WRBR South Bend, Ind.	
WLJC Beattyville, Ky.		WMTL-FM Leitchfield, Ky.		WOOF-FM Othman, Ala.		WRBS Baltimore, Md.	
WLJM Gadsden, Ala.		WMTM-FM Moultrie, Ga.		WOOO-FM Oelander, Fla.		WRCC-FM Washington, D.C.	
WLKR-FM Norwalk, Ohio		WMTN-FM Morrilton, Tex.		WOOR Oxford, Miss.		WRCM Jacksonville, Fla.	
WLKW-FM Providence, R.I.		WMTS-FM Murfreesboro, Tenn.		WOPA-FM Oak Park, Ill.		WRCP-FM Knapshank Center, Wis.	
WLLH-FM Lowell, Mass.		WMTW-FM		WOPF-FM Bristol, Tenn.		WRCP-FM Philadelphia, Pa.	
WLMC Okeechobee, Fla.		Mt. Washington, N.H.		WOR-FM New York, N.Y.		WRDB-FM Rudersburg, Wis.	
WLNA-FM Peekskill, N.Y.		AM. Amherst, Mass.		WORA-FM Mayaguez, P.R.		WRDL Ashland, O.	
WLNG-FM Sag Harbor, N.Y.		WBLU Oxford, Ohio		WORM-FM Savannah, Tenn.		WRFC-FM Memphis, Tenn.	
WLNH-FM Laconia, N.H.		WBUH Allentown, Pa.		WORR Corazal, P.R.		WRED Youngstown, Ohio	
WLND London, Ohio		WBUK Huntington, Mich.		WORX-FM Madison, Ind.		WREK Atlanta, Ga.	
WLNR-FM Lansing, Ill.		WMUL Kalamazoo, Mich.		WOSC-FM Fulton, N.Y.		WREK-FM Ashabata, Ohio	
WLDA-FM Braddock, Pa.(s)		WMUN Muncie, Ind.		WOSE Oswego, N.Y.		WRFB-FM Richmond, Va.	
WLDB-FM Portland, Maine		WMUU-FM Greenville, S. C.		WOSH-FM Oshkosh, Wis.		WRFL Winchester, Va.	
WLDC-FM Munfordville, Ky.		WMUZ Detroit, Mich.		WOSU-FM Columbus, Ohio		WRFM New York, N.Y.	
WLDE-FM Leaksville, N.C.		WMV-FM Millville, N.J.		WOTW-FM Nashua, N.H.		WRFS-FM Alexander City, Ala.	
WLDF-FM La Porte, Ind.		WMVQ-FM Millville, N.J.		WOUB-FM Athens, Ohio		WRFY-FM Reading, Pa.	
WLDF-FM La Porte, Ind.		WMVW-FM Milledgeville, Ga.		WOUR Utica, N. Y.		WRGA-FM Rome, Ga.	
WLDF-FM La Porte, Ind.		WMVO-FM Mount Vernon, Ohio		WOVE Welch, W. Va.		WRHS Park Forest, Ill.	
WLDF-FM La Porte, Ind.		WMVR-FM Sidney, Ohio		WOV Ft. Pierce, Fla.		WRIG-FM Nashville, Tenn.	
WLDF-FM La Porte, Ind.		WMVB-FM Myrtle Beach, Fla.		WOXR Oxford, Ohio		WRIP-FM Cape May, N. J.	
WLDF-FM La Porte, Ind.		WMYR-FM Ft. Myers, Fla.		WOYE-FM Mayaguez, P. R.		WRIT-FM Milwaukee, Wis.	
WLDF-FM La Porte, Ind.		WNAM-FM Neenah-Menasha, Wis.		WPAA Andover, Mass.		WRIU Kingston, R. I.	
WLDF-FM La Porte, Ind.		WNAS New Albany, Ind.		WPAB-FM Ponce, P. R.		WRIW Mackinac City, Mich.	
WLDF-FM La Porte, Ind.		WNAT-FM Natchez, Miss.		WPAC-FM Pateogue, N. Y.		WRJN-FM Racine, Wis.	
WLDF-FM La Porte, Ind.		WNAU-FM New Albany, Miss.		WPAD-FM Paducah, Ky.		WRJL Newark, Miss.	
WLDF-FM La Porte, Ind.		WNAV-FM Annapolis, Md		WPAG-FM Paterson, N. J.		WRKF-FM Kansas City, Mo.	
WLDF-FM La Porte, Ind.		WNAZ-FM Nashville, Tenn.		WPAT-FM Paterson, N. J.		WRKC Wilkes-Barre, Pa.	
WLDF-FM La Porte, Ind.		WNBC-FM New York, N.Y.		WPAY-FM Portsmouth, Ohio		WRKO-FM Rockland, Me.	
WLDF-FM La Porte, Ind.		WNBD-FM Daytona Beach, Fla.		WPBA-FM Palm Beach, Fla.		WRKO-FM Boston, Mass.	
WLDF-FM La Porte, Ind.		WNBF-FM Binghamton, N.Y.		WPBC-FM Richfield, Minn.		WRKT-FM Cocoa Beach, Fla.	
WLDF-FM La Porte, Ind.		WNBH-FM New Bedford, Mass.		WPBF W. Palm Beach, Fla.		WRLB Long Branch, N. J.	
WLDF-FM La Porte, Ind.		WNRI-FM Park Falls, Wis.		WPBS Philadelphia, Pa.		WRLC Palmyre, Pa.	
WLDF-FM La Porte, Ind.		WNBX Andalusia, Ala.		WPBS Philadelphia, Pa.		WRLO-FM Lanett, Ala.	
WLDF-FM La Porte, Ind.		WNCL Columbus, O.		WPDE-FM Paris, Ky.		WRLJ Jacksonville, Fla.	
WLDF-FM La Porte, Ind.		WNCN New York, N.Y.		WPDM-FM Potsdam, N.Y.		WRLM Tounton, Mass.	
WLDF-FM La Porte, Ind.		WNCO-FM Ashland, Ohio		WPDR-FM Portage, Wis.		WRLS-FM Hayward, Wis.	
WLDF-FM La Porte, Ind.		WNCY-FM Greenville, N.C.		WPEA Exeter, N. H.		WRMC-FM Middlebury, Vt.	
WLDF-FM La Porte, Ind.		WNDA Huntsville, Ala.		WPEL-FM Montrose, Pa.		WRMF-FM Titusville, Fla.	
WLDF-FM La Porte, Ind.		WNDR Kingston, N. Y.		WPEN-FM Philadelphia, Pa.		WRMI-FM Morris, Ill.	
WLDF-FM La Porte, Ind.		WNDU-FM South Bend, Ind.		WPFX-FM Pensacola, Fla.		WRMN-FM Elgin, Ill.	
WLDF-FM La Porte, Ind.		WNDR Kingston, N. Y.		WPFB-FM Middletown, Ohio		WRNA Charlotte, N.C.	
WLDF-FM La Porte, Ind.		WNDR Kingston, N. Y.		WPFC-FM Los Angeles, Calif.		WRNJ Atlantic City, N.J.	
WLDF-FM La Porte, Ind.		WNDR Kingston, N. Y.		WPFD-FM Portsmouth, N. H.		WRNL-FM Richmond, Va.	
WLDF-FM La Porte, Ind.		WNDR Kingston, N. Y.		WPER-FM Terre Haute, Ind.		WRNO New Orleans, La.	
WLDF-FM La Porte, Ind.		WNDR Kingston, N. Y.		WPFA-FM Perry, Ga.		WRNS Kinston, N.C.	
WLDF-FM La Porte, Ind.		WNDR Kingston, N. Y.		WPGB Bradbury Hts., Md.		WRNW Mount Kisco, N.Y.	
WLDF-FM La Porte, Ind.		WNDR Kingston, N. Y.		WPGR-FM Buraw, N.C.		WRQA-FM Guilford, Miss.	
WLDF-FM La Porte, Ind.		WNDR Kingston, N. Y.		WPIC-FM Pittsburgh, Pa.		WRQB-FM Rochester, N.Y.	
WLDF-FM La Porte, Ind.		WNDR Kingston, N. Y.		WPID-FM Philadelphia, Pa.		WROR-FM Rochester, Ind.	
WLDF-FM La Porte, Ind.		WNDR Kingston, N. Y.		WPIN-FM Philadelphia, Pa.		WRDK-FM Rockford, Ill.	
WLDF-FM La Porte, Ind.		WNDR Kingston, N. Y.		WPIS-FM Philadelphia, Pa.		WRDM-FM Rome, Ga.	
WLDF-FM La Porte, Ind.		WNDR Kingston, N. Y.		WPIT-FM Pittsburgh, Pa.		WRDW-FM Albany, N.Y.	
WLDF-FM La Porte, Ind.		WNDR Kingston, N. Y.		WPJX-FM New York, N. Y.		WROY-FM Carmi, Ill.	
WLDF-FM La Porte, Ind.		WNDR Kingston, N. Y.		WPJB-FM Jacksonville, R.I.		WRPC San German, P.R.	
WLDF-FM La Porte, Ind.		WNDR Kingston, N. Y.		WPKE-FM Pikeville, Ky.		WRP-FM Fox River, Ill.	
WLDF-FM La Porte, Ind.		WNDR Kingston, N. Y.		WPKM Tampa, Fla.		WRPQ-FM Poplarville, Miss.	
WLDF-FM La Porte, Ind.		WNDR Kingston, N. Y.		WPKN Bridgeport, Conn.		WRPN-FM Ripon, Wis.	
WLDF-FM La Porte, Ind.		WNDR Kingston, N. Y.		WPLB Greenville, Mich.		WRR-FM Dallas, Tex.	
WLDF-FM La Porte, Ind.		WNDR Kingston, N. Y.		WPLC Plantation Key, Fla.		WRRN Franklin Lakes, N.J.	
WLDF-FM La Porte, Ind.		WNDR Kingston, N. Y.		WPLM-FM Plymouth, Mass.		WRRR Warren, Pa.	
WLDF-FM La Porte, Ind.		WNDR Kingston, N. Y.		WPLN Nashville, Tenn.		WRRZ-FM Clinton, N.C.	
WLDF-FM La Porte, Ind.		WNDR Kingston, N. Y.		WPLP-FM Atlanta, Ga.		WRSA Decatur, Ala.	
WLDF-FM La Porte, Ind.		WNDR Kingston, N. Y.		WPMF-FM Pascaoula, Miss.		WRSC-FM State College, Pa.	
WLDF-FM La Porte, Ind.		WNDR Kingston, N. Y.		WPOR-FM Portland, Me.		WRSI-FM Bayamon, P.R.	
WLDF-FM La Porte, Ind.		WNDR Kingston, N. Y.		WPOS-FM Holland, O.		WRST-FM Stanford, Ky.	
WLDF-FM La Porte, Ind.		WNDR Kingston, N. Y.				WRV Skokie, Ill.	
WLDF-FM La Porte, Ind.		WNDR Kingston, N. Y.				WRSE-FM Elmhurst, Ill.	

WHITE'S RADIO LOG

Call	Location
WSOM-FM	Salem, Ohio
WSOU-FM	Henderson, Ky.
WSOY-FM	Spang, N.J.
WSPA-FM	Decatur, Ill.
WSPA-FM	Spartanburg, S. C.
WSPB-FM	Sarasota, Fla.
WSPD-FM	Toledo, Ohio
WSPE	Springville, N.Y.
WSPK	Poughkeepsie, N.Y.
WSPT	Columbus, O.
WSRC-FM	Stevens Point, Wis.
WSRF-FM	Tf. Lauderdale, Fla.
WSRW	Worcester, Mass.
WSRV	Syracuse, N. Y.
WSRW-FM	Hillsboro, Ohio
WSSU	Superior, Wis.
WSSV-FM	Petersburg, Va.
WSTC-FM	Port Clinton, Conn.
WSTK	Woodstock, Ill.
WSTM	St. Matthews, Ky.
WSTO	Owensboro, Ky.
WSTP-FM	Salisbury, N.C.
WSTR-FM	Sturgis, Mich.
WSTU-FM	Stuart, Fla.
WSTV-FM	St. Stevens, Ohio
WSPJ	Platteville, Wis.
WSUS	Stevens Point, Wis.
WSUW	Whitewater, Wis.
WSVA-FM	Harrisburg, Va.
WSVB	Tamaqua, Pa.
WSVL-FM	Shelbyville, Ind.
WSVS-FM	Grewe, Va.
WSWG	East Lansing, Mich.
WSWM	Greenland, N.C.
WSWN-FM	Belle Glade, Fla.
WSWV-FM	Platteville, Wis.
WSYR-FM	Syracuse, N. Y.
WTAB-FM	Tabor City, N. C.
WTAC-FM	Plymouth, Ind.
WTAD-FM	Quincy, Ill.
WTAE-FM	Pittsburgh, Pa.
WTAN-FM	Clearwater, Fla.
WTAP-FM	Parkersburg, W. Va.
WTAR	Norfolk, Va.
WTAS	Crete, Ill.
WTAW-FM	College Station, Tex.
WTAX-FM	Springfield, Ill.
WTAY-FM	Wabash, Ind.
WTBC-FM	Tuscaloosa, Ala.
WTBO-FM	Cumberland, Md.
WTBS	Cambridge, Mass.
WTCA-FM	Plymouth, Ind.
WTCH-FM	Shawano, Wis.
WTCD-FM	Traverse City, Mich.
WTCE-FM	Campecheville, Ky.
WTCV	Memphis, Tenn.
WTCW-FM	Whitesboro, Ky.
WTDX	Petersburg, Fla.
WTDS	Toledo, Ohio
WTDF	Lake Success, N. Y.
WTDL	Hammond, La.
WTG	Lima, O.
WTHI-FM	Terre Haute, Ind.
WTHM-FM	Lapeer, Mich.
WTHS	Miami, Fla.
WTIC-FM	Hartford, Conn.
WTID-FM	Norfolk, Va.
WTIO	Charleston, W. Va.
WTIS-FM	Jackson, Tenn.
WTIU	Charlottesville, Va.
WTLC	Indianapolis, Ind.
WTLN-FM	Maitland, Fla.
WTMA-FM	Charleston, S.C.
WTMB-FM	Tomah, Wis.
WTMJ-FM	Milwaukee, Wis.
WTNC-FM	Thomasville, N.C.
WTNS-FM	Cochoncton, O.
WTNT-FM	Tallahassee, Fla.
WTOA	Trenton, N.J.
WTOC-FM	Savannah, Ga.
WTOD-FM	Toledo, Ohio
WTOF	Canton, Ohio
WTOP-FM	Washington, D.C.
WTOS	Wauwatosa, Wis.
WTOT-FM	Marina, Fla.
WTOW-FM	Baltimore, Md.
WTPA-FM	Harrisburg, Pa.
WTPR-FM	Paris, Tenn.
WTQX-FM	Selma, Ala.
WTRC-FM	Elkhart, Ind.

Call	Location
WTRE-FM	Greensburg, Ind.
WTRF-FM	Wheeling, W. Va.
WTRQ-FM	Dyersburg, Tenn.
WTSB-FM	Lumberton, N.C.
WTSF-FM	Buffalo, N.Y.
WTSR	Trenton, N.J.
WTSV-FM	Claremont, N.H.
WTTT-FM	Towanda, Pa.
WTTF-FM	Tiffin, Ohio
WTTM-FM	Trenton, N.J.
WTTN-FM	Watertown, Wis.
WTTV-FM	Westminster, Md.
WTVL-FM	Bloomington, Ind.
WTVN-FM	Warville, Me.
WTVR-FM	Columbus, Ohio
WTVY-FM	Richmond, Va.
WTWC	Dothan, Ala.
WTWC	Urbana, Ill.
WTYD	New London, Conn.
WTZE-FM	Tazewell, Va.
WTZG	Greensboro, N. C.
WUCB-FM	Chicaca, Ill.
WUFG	Utica, N. Y.
WUHY-FM	Philadelphia, Pa.
WULX-FM	Richmond, Ind.
WUNC	Chapel Hill, N.C.
WUNH	Durham, N.H.
WUOM	Ann Arbor, Mich.
WUT	Knoxville, Tenn.
WUPY	Lynn, Mass.
WUSF-FM	Columbia, S.C.
WUSF	Tampa, Fla.
WUSO	Springfield, O.
WUST-FM	Bethesda, Md.
WUSV	Scranton, Pa.
WUWM	Milwaukee, Wis.
WYAC	Adrian, Mich.
WYAF-FM	Charleston, W. Va.
WYAM-FM	Altoona, Pa.
WYBC	Bethany, W. Va.
WYBR-FM	Ithaca, N.Y.
WYBZ-FM	Lewisburg, Pa.
WYCA-FM	York, Pa.
WYCL-FM	Winfield, La.
WYCM	Carrollton, Ky.
WYCR	Loudenville, N.Y.
WYEC-FM	Hampton, Va.
WYEM	Springfield, Ill.
WYFM	Lakeland, Fla.
WYFV	Dundee, Ill.
WYGH-FM	Grand Rapids, Mich.
WYHC	Hempstead, N.Y.
WYHI	Evansville, Ind.
WYIC-FM	E. Lansing, Mich.
WYIP-FM	Mount Kisco, N.Y.
WYIS	Terre Haute, Ind.
WYJP-FM	Cape Girardeau, Mo.
WYJS-FM	Owensboro, Ky.
WYKC-FM	Galesburg, Ill.
WYKL-FM	Lexington, Ky.
WYLR	Sauk City, Wis.
WYMC-FM	Mt. Carmel, Ill.
WYMD	Monroe, Mich.
WYNE-FM	Columbia, Ala.
WYNJ-FM	Newark, N.J.
WYNO-FM	Mansfield, Ohio
WYOR	Rochester, N.Y.
WYOS-FM	Liberty, N.Y.
WYOT-FM	Wilson, N.C.
WYQX-FM	New Rochella, N.Y.
WYR-FM	Carolina, P. R.
WYPC-FM	Monroeville, Ill.
WYPD-FM	Stroudsburg, Pa.
WYQM	Huntington, W. Va.
WYSC-FM	Somerset, Pa.
WYSH	Huntington, Ind.
WYSR	Rapid City, S.D.
WYST	Menomonee, Wis.
WYST	St. Petersburg, Fla.
WYSU-FM	Birmingham, Ala.
WYTL	Monticello, Ind.
WYTS	Terre Haute, Ind.
WYUD-FM	Kettering, Ohio
WYUM	Coral Gables, Fla.
WYV	Valparaiso, Ind.
WYVY	Bakersfield, Calif.
WYWB-FM	Bridgeton, N.C.
WYWC	Buckhannon, W. Va.
WYWO-FM	Cheyenne, Wyo.

Call	Location
WWBD-FM	Bamberg, S.C.
WWCF	Greenfield, Wis.
WWCO-FM	Waterbury, Conn.
WWDC-FM	Washington, D.C.
WWDL-FM	Scranton, Pa.
WWDL	Scranton, Pa.
WWGQ-FM	Erie, Pa.
WWGP-FM	Sanford, N.C.
WWHC	Hartford City, Ind.
WWHG-FM	Hornell, N.Y.
WWHI	Munell, N.Y.
WWHO	Jackson, Miss.
WWJ-FM	Detroit, Mich.
WWJC-FM	Superior, Wis.
WWKS	Macomb, Ill.
WWLA	La Crosse, Wis.
WWMO	Reidsville, N.C.
WWMS-FM	Bryan, O.
WWMT	New Orleans, La.
WWQD-FM	Lynchburg, Va.
WWQG	Boca Raton, Fla.
WWOL-FM	Buffalo, N.Y.
WWOM-FM	New Orleans, La.
WWON-FM	Woonsocket, R.I.
WWPB	Falm Beach, Fla.
WWQS	Orlando, Fla.
WWQT	Gainsville, Ga.
WWRH	Columbus, Ga.
WWRW	Wisconsin Rapids, Wis.
WWSC-FM	Glens Falls, N. Y.
WWSM	Bay Minette, Ala.
WWST-FM	Woooster, Ohio
WWSW-FM	Wilmington, Pa.
WWTV-FM	Cadillac, Mich.
WWTY	Corinth, Miss.
WWUW	W. Hartford, Conn.
WWVA-FM	Wheeling, W. Va.
WWVR	Terre Haute, Ind.
WWWF	Detroit, Mich.
WWXL-FM	Manchester, Ky.
WWYN-FM	Erie, Pa.
WXAC	Reading, Pa.
WXAX	Elkhart, Ind.
WXB-FM	Milton, Ind.
WXEN-FM	Cleveland, Ohio
WXFL-FM	Climwood Park, Ill.
WXGL	Wilm. Haven, Fla.
WXLI-FM	Dubuque, Ia.
WXPN	Philadelphia, Pa.
WXQL	Glens Falls, N. Y.
WXQR-FM	Jacksonville, N. C.
WXRA	Woodbridge, Va.
WXRC	Hickory, N. C.
WXRF	Mayaguez, P. R.
WXRI	Norfolk, Va.
WXTA	Greencastle, Ind.
WXTC	Annapolis, Md.
WXTO-FM	Grand Rapids, Mich.
WXUR-FM	Media, Pa.
WXYW	Suffolk, Va.
WXYZ-FM	Detroit, Mich.
WYCB	New Haven, Conn.
WYCR	York Haven, Pa.
WYCS	Yorktown, Va.
WYDD	Pittsburgh, Pa.
WYCA	Hammond, Ind.
WYCE	Warwick, R.I.
WYCS	Yorktown, Va.
WYFI	Norfolk, Va.
WYFM	Charlotte, N.C.
WYFY-FM	Columbia, Tenn.
WYGO-FM	Corbin, Ky.
WYNK-FM	Baton Rouge, La.
WYNR-FM	Brunswick, Ga.
WYON	Grand Rapids, Mich.
WYOR	Coral Gables, Fla.
WYRL	Melbourne, Fla.
WYSH-FM	Clinton, Tenn.
WYSL-FM	Buffalo, N.Y.
WYSD	Willow Springs, Ohio
WYZZ	Yikes-Barre, Pa.
WZAK	Cleveland, O.
WZEP-FM	Defunak, Springs, Fla.
WZFM	Charlestown, W. Va.
WZIF-FM	Cincinnati, Ohio
WZMF	Menomonee Falls, Wis.
WZWM-FM	Grand Rapids, Mich.
WZZW	Augusta, Ga.

Canadian AM Stations By Call Letters

Call	Location	kHz	Call	Location	kHz	Call	Location	kHz	Call	Location	kHz
CBA	Sackville, N.B.	1070	CBD	Ottawa, Ont.	910	CFAX	Victoria, B.C.	1070	CFW	Camrose, Alta.	790
CBAF	Moncton, N.B.	1300	CBOF	Ottawa, Ont.	1250	CFBC	Saint John, N.B.	930	CFY	Charlottetown, P.E.I.	630
CBD	Saint John, N.B.	1110	CBR	Calgary, Alta.	1010	CFBR	Sudbury, Ont.	550	CFDA	Victoriaville, Que.	1380
CBDR	Schefferville, P.Q.	1230	CBT	Grand Falls, Nfld.	540	CFBV	Smithers, B.C.	1230	CFDR	Dartmouth, N.S.	790
CBE	Windsor, Ont.	1550	CBU	Vancouver, B.C.	980	CFCB	Corner Brook, Nfld.	570	CFG	Goose Bay, Nfld.	1340
CBF	Montreal, Que.	690	CBV	Quebec, Que.	980	CFCC	Montreal 15, Que.	600	CFGB	Richmond Hill, Ont.	1310
CBG	Gander, Nfld.	1450	CBW	Winnipeg, Man.	740	CFCH	Callander, Ont.	600	CFGD	Grand Prairie, Alta.	1050
CBH	Halifax, N.S.	860	CBX	Edmonton, Alta.	740	CFCL	Timmins, Ont.	620	CFGR	Gravelbourg, Sask.	1230
CBJ	Sydney, N.S.	1140	CBZ	Coroner Brook, Nfld.	990	CFCN	Calgary, Alta.	1060	CFGT	Alma, Que.	1270
CBK	Chicoutimi, Que.	1580	CBZ	Fredericton, N.B.	1450	CFCH	Chatham, Ont. with another studio at Wallaceburg, Ont.	630	CFK	Kamloops, B.C.	910
CBK	Regina, Sask.	540	CFAB	Windsor, N.S.	960	CFCK	Chatham, Ont. with another studio at Wallaceburg, Ont.	630	CFJR	Brockville, Ont.	1450
CBL	Toronto, Ont.	740	CFAC	Calgary, Alta.	1290	CFCL	Smithers, B.C.	1440	CFLD	Smithers, B.C.	1400
CBM	Montreal, Que.	940	CFAM	Altona, Man.	960						
CBN	St. John's, Nfld.	640	CFAR	Flin Flin, Man.	590	CFCP	Courtenay, B.C.	1440		Studio at Station CFBV	

Call	Location	kHz	Call	Location	kHz	Call	Location	kHz	Call	Location	kHz
CFHM	Hearst, Ont. Studio at Station CFCL, Timmons, Ont.	1340	CHML	Hamilton, Ont.	900	CJOB	Winnipeg, Man.	680	CKKC	Nelson, B.C.	1890
CFHK	Kapuskasing, Ont. Studio at Station CFCL, Timmons, Ont.	1230	CHNC	New Carlisle, Que.	610	CJOC	Lethbridge, Alta.	1220	CKKR	Regina, Sask.	1350
CFHM	La Tuque, Que.	1240	CHND	Sudbury, Ont.	900	CJOE	London, Ont.	1290	CKLB	Oshawa, Ont.	1350
CFHS	Levis, P.Q.	1240	CHNS	Halifax, N.S.	960	CJON	St. John's, Nfld.	620	CKLC	Kingston, Ont.	1380
CFHV	Yailleyfield, Que.	1240	CHOK	Sarnia, Ont.	1070	CJOR	Vancouver, B.C.	710	CKLD	Theftford Mines, Que.	1230
CFHB	Montreal, Que.	1240	CHOM	Pembroke, Ont.	1350	CJOY	Grand Bank, Nfld.	930	CKLG	Vancouver, B.C.	730
CFHL	Corwall, Ont.	1410	CHOW	Welland, Ont.	1470	CJRL	Kenora, Ont.	1220	CKLM	Montreal, Que.	1370
CFMR	Fort Simpson, N.W.T.	1490	CHQB	Powell River, B.C.	1260	CJRN	Niagara Falls, Ont.	1600	CKLN	Nelson, B.C.	1240
CFNB	Fredericton, N.B.	550	CHQR	Calgary, Alta.	1470	CJRS	Sherbrooke, P.Q.	1510	CKLW	Windsor, Ont.	1390
CFNL	Ft. Nelson, B.C. Studios at Station CFNL, Fort St. John, B.C.	590	CHQT	Edmonton, Alta.	1110	CJRW	Summerside, P.E.I.	1240	CKLY	Lindsay, Ont.	910
CFNS	Saskatoon, Sask.	1170	CHRC	Québec, Que.	800	CJSA	Sts. Agathe des Monts, P.Q.	1280	CKML	Mont Laurier, Que.	610
CFDB	Fort Frances, Ont.	900	CHRD	Drummondville, Que.	1480	CJSL	Estevan, Sask.	1280	CKMP	Midland, Ontario	1230
CFDB	Ville Vanier, Que.	1340	CHRL	Roberval, Que.	910	CJSM	Shunavon, Sask.	1490	CKMR	Newcastle, N.B.	790
CFOS	Owen Sound, Ont.	560	CHRS	Jacques-Cartier, Que.	1090	CJSB	Sorel, Que.	1320	CKNB	Campbellton, N.B.	950
CFDX	Pointe Claire, Que.	1470	CHRT	Riviere du Loup, P.Q.	1450	CJSB	Corwall, Ont.	1220	CKNL	Fort St. John, B.C.	550
CFPA	Port Arthur, Ont.	1230	CHSC	St. Catharines, Ont.	1150	CJTT	Kirkland Lake, Ont.	1280	CKNR	Elliott Lake, Ont.	1340
CFPL	London, Ont.	980	CHSJ	Saint John, N.B. at Station CFAM, Altona, Man.	1220	CJVI	Victoria, B.C.	900	CKNW	New Westminster, B.C.	980
CFPR	Prince Rupert, B.C.	860	CHTK	Prince Rupert, B.C.	1250	CJVR	Melfort, Sask.	1420	CKNX	Wingham, Ont.	920
CFSC	Saskatoon, Sask.	900	CHTM	Thompson, Man.	1570	CJWA	Sault Ste. Marie, Ont.	1240	CKOC	Hamilton, Ont.	1150
CFRA	Ottawa, Ont.	980	CHUB	Nanaimo, B.C.	610	CKAC	Montreal, Que.	730	CKOK	Pentilton, B.C.	800
CFRB	Toronto, Ont.	580	CHUC	Cobourg, Ont.	800	CKAD	Midleton, N.S.	1490	CKOM	Saskatoon, Sask.	1250
CFRC	Kingston, Ont.	1010	CHUM	Toronto, Ont.	1050	CKAP	Kapuskasing, Ont.	580	CKOD	Osoyoos, B.C.	1240
CFRG	Gravelbourg, Sask.	710	CHVO	Orillia, Ont.	1450	CKAR	Waukegan, Ont.	630	CKOT	Tillsonburg, Ont.	1310
CFRM	Edmonton, Alta.	1260	CHWO	Dakville, B.C.	1270	CKAR-1	Parry Sound, Ontario, Studio at Station CKAR, Huntsville, Ontario	1340	CKOV	Kelowna, B.C.	630
CFRW	Simoes, Ont.	1560	CHWX	Willowdale, Ont.	1270	CKAY	Duncan, B.C.	1500	CKOX	Woodstock, Ont.	1350
CFRW	Winnipeg, Man.	1470	CHYM	Kitcheener, Ont.	1490	CKBB	Barrie, Ont.	1360	CKOY	Ottawa, Ont.	1310
CFRY	Portage la Prairie, Man.	920	CHYR	Leamington, Ont.	710	CKBC	Bathurst, N.B.	900	CKPC	Prince George, B.C.	550
CFSL	Weyburn, Sask.	810	CJAD	Montreal, Que.	800	CKBI	Matana, Que.	1250	CKPR	Port Arthur, Ont.	580
CFSS	Stephenville, Nfld.	1340	CJAF	Cabano, Que.	1240	CKBM	Montmagny, Que.	1490	CKPT	Peterborough, Ont.	1420
CFTK	Galt, Ont.	1110	CJAT	Trail, B.C.	810	CKBS	St. Hyacinthe, Que.	1240	CKRB	Cité de Beauce, Que.	1480
CFTR	Terrace, B.C.	590	CJAV	Port Alberni, B.C.	880	CKBW	Bridgewater, N.S.	1000	CKRC	Winnipeg, Man.	690
CFUN	Vancouver, B.C.	1410	CJBC	Toronto, Ont.	900	CKCB	Collingwood, Ont. with another Studio at Barrie, Ont.	1400	CKRD	Red Deer, Alta.	980
CFVR	Abbotsford, B.C.	1240	CJBM	Causapescal, Que., with Studio at Rimouski, Que.	1450	CKCH	Hull, Que.	970	CKRE	Regina, Sask.	1400
CFWB	Campbell River, B.C.	1490	CJBQ	Bellefleur, Ont.	800	CKCK	JBina, Sask.	620	CKRJ	Korriquire, Que.	590
CFWH	Whitehorse, Y.T.	570	CJBR	Rimouski, Que.	820	CKCL	Truro, N.S.	600	CKSA	Lloydminster, Alta.	1080
CFYK	Yellowknife, N.W.T.	1340	CJCA	Edmonton, Alta.	920	CKCM	Grand Falls, Nfld. with another studio at St. John's, Nfld.	620	CKSB	Saint-Boniface, Man.	1050
CHAB	Meese Jaw, Sask.	1340	CJCB	Sydney, N.S.	920	CKCN	Sept-Îles, Que.	560	CKSL	London, Ont.	1410
CHAD	Amos, Que.	1340	CJCH	Halifax, N.S.	920	CKCQ	Quebec, B.C. Studio	570	CKSM	Shawinigan, Que.	1220
CHAM	Hamilton, Ont.	1280	CJCI	Woodstock, N.B.	680	CKCR	Revelstoke, B.C. Studio at Station CKXR, Salmon Arm, B.C.	1340	CKSU	Sudbury, Ont.	1400
CHAT	Medicine Hat, Alta.	1270	CJCK	Stratford, Ont.	1240	CKCV	Québec, Que.	1280	CKSW	Swift Current, Sask.	610
CHCM	Marysville, Nfld. with another studio at St. John's, Nfld.	580	CJDC	Orundahler, Alta.	910	CKCW	Moncton, N.B.	1220	CKTB	St. Catharines, Ont.	610
CHCC	Lethbridge, Alta.	1090	CJDM	Edmundston, N.B.	630	CKCY	Sault Ste. Marie, Ont.	920	CKTR	Trois-Rivières, Que.	1150
CHCD	Edmonton, Alta.	630	CJEM	Drummondton, N.B.	1400	CKDA	Victoria, B.C.	1220	CKTS	Sherbrooke, Que.	900
CHCF	Granby, Que.	1450	CJET	Smiths Falls, Ont.	630	CKDB	Amherst, N.S.	900	CKUA	Edmonton, Alta.	580
CHCG	Sydney, N.S.	900	CJFP	Rivière-du-Loup, Que.	1400	CKDC	Dauphin, Man.	730	CKVD	Val-d'Or, P.Q.	950
CHCH	Peterborough, Ont.	980	CJFX	Antigonish, N.S.	940	CKDE	Dryden, Ont. Studio at Station CJRL, Kenora, Ont.	900	CKVM	Villie-Marie, Que.	1240
CHFA	Edmonton, Alta.	680	CJGN	Windsor, Sask.	940	CKDF	New Glasgow, N.S.	1320	CKWL	Williams Lake, B.C.	960
CHFG	Churchill, Man.	1230	CJIB	Vernon, B.C.	940	CKEG	Cranbrook, B.C.	570	CKWS	Kingston, Ont.	580
CHFI	Toronto, Ont.	680	CJJC	Sault Ste. Marie, Ont.	1050	CKEK	Kenville, N.S.	1350	CKWX	Vancouver, B.C.	1130
CHGB	La Pocatière, Que.	1310	CJJD	Langley, B.C.	850	CKEL	Cranbrook, B.C.	570	CKXZ	Brandon, Man.	1150
CHIC	Brampton, Ont.	790	CJKE	Kirkland Lake, Ont.	1350	CKEM	North Bay, Ont.	100.9	CKXL	Calgary, Alta.	1140
CHIN	Toronto, Ont.	1340	CJLJ	Jilliat, Que.	1060	CKEN	Windsor, Ont.	980	CKYM	Pease River, Alta.	810
CHIR	Leamington, Ont.	730	CJLW	Yarmouth, N.S.	1340	CKEP	Timmins, Ont.	680	VOAR	St. John's, Nfld.	1230
CHLC	Saguenay Co., Que.	580	CJLS	Fort William, Ont.	900	CKEY	Toronto, Ont.	980	VOCM	St. John's, Nfld.	590
CHLN	Trois-Rivières, Que.	550	CJME	Regina, Sask.	1300	CKFH	Toronto, Ont.	980	VOVR	St. John's, Nfld.	900
CHLO	St. Thomas, Ont.	680	CJMS	Montreal, Que.	1280	CKGB	Timmins, Ont.	980			
CHLT	Sherbrooke, Que.	630	CJMT	Chicoutimi, Que.	1420	CKGM	Montreal, Que.	900			
			CJNB	North Battleford, Sask.	1050	CKJL	Saint-Jérôme, Que.				
			CJNR	Blind River, Ont.	730						

Canadian FM Stations by Call Letters

Call	Location	MHz	Call	Location	MHz	Call	Location	MHz	Call	Location	MHz
CBC-FM	Toronto, Ont.	94.1	CFMC-FM	Saskatoon, Sask.	103.9	CHUM-FM	Toronto, Ont.	104.5	CKGB-FM	Timmins, Ont.	94.5
CBF-FM	Montreal, Que.	95.1	CFMO-FM	Ottawa, Ont.	95.9	CHY-FM	Kitcheener, Ont.	97.7	CKGM-FM	Montreal, Que.	97.7
CBFL-FM	Maniwaki, Que.	98.9	CFMQ-FM	Regina, Sask.	92.1	CJBO-FM	Bellefleur, Ont.	101.1	CKLC-FM	Kingston, Ont.	98.3
CBM-FM	Montreal, Que.	100.7	CFMS-FM	Victoria, B.C.	98.5	CJBR-FM	Rimouski, Que.	97.5	CKLG-FM	Vancouver, B.C.	99.3
CBO-FM	Ottawa, Ont.	105.7	CFPL-FM	London, Ont.	95.9	CJCA-FM	Edmonton, Alta.	99.5	CKLW-FM	Windsor, Ont.	93.9
CBU-FM	Vancouver, B.C.	97.7	CFQR-FM	Montreal, Que.	92.5	CJCB-FM	Sydney, N.S.	94.9	CKOT-FM	Pentilton, B.C.	97.1
CBUF-FM	Vancouver, B.C.	97.7	CFRG-FM	Kingston, Ont.	91.9	CJCF-FM	Montreal, Que.	95.9	CKOT-FM	Tillsonburg, Ont.	100.5
CBWF-FM	Winnipeg, Man.	98.3	CFRN-FM	Edmonton, Alta.	100.3	CJCM-FM	Sault Ste. Marie, Ont.	100.5	CKPC-FM	Brantford, Ont.	92.1
CFBC-FM	Saint John, N.B.	98.9	CFRW-FM	Winnipeg, Man.	94.3	CJMS-FM	Montreal, Que.	94.3	CKPR-FM	Port Arthur, Ont.	94.3
CFCA-FM	Kitcheener, Ont.	105.3	CHCC-FM	Lethbridge, Alta.	100.9	CJOB-FM	Winnipeg, Man.	97.5	CKQS-FM	Oshawa, Ont.	94.9
CFFM-FM	Kamloops, B.C.	98.3	CHFI-FM	Toronto, Ont.	98.1	CJOV-FM	Kelowna, B.C.	104.7	CKRO-FM	Red Deer, Alta.	98.9
CFFM-FM-1	Savona, B.C.—Re-broadcasting of CFM-FM	101.9	CHFM-FM	Calgary, Alta.	95.9	CJRM-FM	Montreal, Que.	93.5	CKSD-FM	Sudbury, Ont.	92.7
CFFM-FM-2	Clearwater, B.C.—Re-broadcasting of CFM-FM	92.7	CHGB-FM	La Pocatière, Que.	102.9	CJRT-FM	Toronto, Ont.	91.1	CKTB-FM	St. Catharines, Ont.	97.7
CFFM-FM-3	Merritt, B.C.—Re-broadcasting of CFM-FM	103.9	CHIC-FM	Brampton, Ont.	102.1	CJSS-FM	Corwall, Ont.	104.5	CKUA-FM	Edmonton, Alta.	98.1
CFFM-FM-4	Clinton, B.C.—Re-broadcasting of CFM-FM	106.5	CHIN-FM	Toronto, Ont.	100.7	CJSB-FM	Saskatoon, Sask.	99.7	CKVL-FM	Verdun, Que.	96.9
			CHLT-FM	Sherbrooke, Que.	102.7	CKAT-FM	North Bay, Ont.	100.9	CKWM-FM	Kenville, N.S.	97.7
			CHNS-FM	Halifax, N.S.	96.1	CKCL-FM	Truro, N.S.	100.9	CKWS-FM	Kingston, Ont.	96.3
			CHQM-FM	Vancouver, B.C.	103.5	CKCY-FM	Sault Ste. Marie, Ont.	104.3	CKWW-FM	Windsor, Ont.	88.7
			CHRC-FM	Québec, Que.	98.1	CKFS-FM	Hamilton, Ont.	95.3	CKX-FM	Brandon, Man.	98.1
			CHSC-FM	St. Catharines, Ont.	105.7	CKFM-FM	Toronto, Ont.	98.9	CKY-FM	Winnipeg, Man.	92.1

WHITE'S RADIO LOG

Major Broadcast Stations in Mexico and the Caribbean

kHz Call Location

BAHAMAS

1540 ZNSI Nassau

CUBA

570 CMHI Santa Clara
590 CMW Havana
630 CMHQ Santa Clara
640 CMQ Havana
690 CMBC Havana
720 — Colon
760 CMCD Havana
790 CMCH Havana
880 CMCA Havana
860 CMBL Havana
870 CMDN Guantanamo
910 CMGX Mantanzas
930 CMBF Isle de Pinos

kHz Call Location

CURACAO

(Netherlands, W. I.)

855 PJC2 Willemstad (Curacao)

DOMINICAN REPUBLIC

820 H1SD Santo Domingo
690 H1AW Santo Domingo
790 H1L Santo Domingo
958 H1F Puerto Plata
1020 H1JP Santo Domingo
1330 H1DB Santiago de los
Caballeros
1460 H1AN Hato Mayor del Rey

HAITI

1035 4VEC Cap Hatien

JAMAICA

550 — Montego Bay

kHz Call Location

560 — Kingston
580 — Port Maria
620 — Mandeville
700 — Montego Bay
720 — Kingston
750 — Port Maria
770 — Mandeville

MEXICO

620 XENK Mexico City
630 XEFB Monterrey
660 XEPM Mexico City
680 XELG Leon
690 XEN Mexico City
690 XETRA Tijuana
730 XEX Mexico City
730 XEX Leon (relay)
800 XELO Ciudad Juarez
850 XETQ Orizaba
900 XEW Mexico City
940 XEQ Mexico City
970 XEJ Ciudad Juarez

kHz Call Location

970 XEDF Mexico City
980 XETU Tampico
980 XETG Tuxtla Gutierrez
1010 XEHL Guadalajara
1030 XEQR Mexico City
1060 XEPD Mexico City
1110 XERCN Mexico City
1260 XEL Mexico City
1290 XEDA Mexico City
1310 XEBP Terson
1320 XEAL Mexico City
1460 HELX Zitacuara
1500 XERH Mexico City
1570 XERF Ciudad Acuna
1580 XEDM Hermosillo
1590 XEVOZ Mexico City

A THANK YOU NOTE FROM THE EDITORS

Thank you! The Editors of RADIO-TV EXPERIMENTER would like to thank all readers who offered information on station changes, additions and deletions during the past few months. Though many of the letters overlapped, each aided us considerably in making the task of keeping White's Radio Log as current as possible at press time. If we left your name out, please forgive us!

Lewis Abrams,
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tion WAVA, Arlington, Va.
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Donald Bohn,
Cass Lake, Minn.
Dave Bright, Muscatine, Iowa

David A. Bull,
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John Coker, Peoria, Ill.
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Hammond, Ind.
Terry Cook, Missoula, Mont.
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Bill Frahm, Boise, Idaho
W. R. Garrett, Augusta, Ga.
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Howard Gayle,
Jacksonville, Fla.
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Council Bluffs, Iowa
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Mountain Home AFB, Idaho
Ron Harris, Flint, Mich.
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Dave Mobley, Toledo, Ohio
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Red Bank, N.J.

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Winchester, Va.
Max Zweig, Atlanta, Ga.
C. H. Zwierzyna, Chicago, Ill.

World-Wide Shortwave Stations

On your mark, get your set, and go get 'em in our really big contest! This month's prize is—are you ready?—absolutely nothing! How 'bout that, gang—a contest with no prizes, only the satisfaction you'll get in seeing how good you and your short-wave gear are functioning as a team. We'll give you the scoring scoop in a minute, but

now for the big quizzers; take it way Pert Barks:

1. We hope you heard the *Voice of Hope*, it's a broadcaster in South Korea. The station has been reported on 6170 kHz at about 0815 GMT with tests. You can get a QSL from: ROK Army Broadcasting Station, Voice of Hope, Seoul, Korea.

2. You thought it was expensive to go to Europe, didn't you? Well somebody set up a bootleg broadcasting station which proves how inexpensive the place is, the station even calls itself *The Voice of Free*

France? Free—that's even better than inexpensive! Station has been heard at irregular times on 13700, 27000, and 27560 kHz.

3. Here's one you'll have to put some hours into, but it's worth it. The station is VLV at Mawson Base in Antarctica and we'll bet you a penny that you haven't logged that rare place yet! The station has been heard at varying times around 0100 GMT on 12255 kHz trying to contact other stations with messages. The signal is for the Byrds (sorry about that).

4. Another place you've never heard is a minute speck of island which some folks call Tristan da Cunha. Guess what, they're now broadcasting on 3290 kHz with an antenna smashing 40 watts. Transmissions are in English on Wednesdays, Fridays, and Sundays at 1900 to 2200 GMT. They want reception reports.

5. Hey, we haven't done the 2182 kHz bit in a while; it's about that time again! The frequency is the calling and emergency channel for boats and it teems with stations every night. How many can you log in 15 minutes?

6. Lithuania is a tiny nation which was rescued from the Nazis by the USSR, except the Red fuzz remained on to "protect" them against any other possible invasions from Germany, Saturn, Andora, Czechoslovakia and other hostile armies. This has been going on for about 25 years now and, as a result, the country has almost vanished as a separate identity on the radio bands. You can now try for Radio Vilnius on 17740 kHz at 2245 GMT.

7. Spy, anyone? It's one of those mysterious "numbers" stations which are believed to be transmitting coded messages to

This Issue's Shortwave Contributors

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spies. This one's been reported on 5755 kHz about 0220 GMT with numbers in Spanish.

8. Good news for those of you who drool with envy whenever someone else logs the tiny kingdom of Nepal. They've put some new and very powerful transmitters on the air and the country is now being reported by a number of listeners. Look for them on 9590 kHz at 0630 and 1530 GMT.

Scoring: You get 10 points each for 1, 2, 3, 6, 7, and 8. Number 4 earns you a gigantic 20 points and number 5 gets you 1 point per station. Did you rack up 20 points? If you did, you didn't try very hard. Did you get 50 points? You tried hard, keep it up. Did you get 70 points? Nice going, old chap! You got *more* than 70 points? Impossible! We didn't even do that good—and we cheated a little. ■

kHz	Call	Identification	Location	GMT
90-Meter Band—3200-3400 kHz				
3230		Fiji Is. BC	Suva, Fiji Is.	1000
3333	VL9CD	Austral. BC	Wewak, New Guinea	1015
3385	VL9BR	Austral. BC	Rabaul, N. Borneo	1030
3995	VQO	Solomon Is. BC	Honiara, Solomon Is.	1105
	HJCA5	R. Tarpi	Cuena, Ecuador	0650
4830		Ondas del Angel	Quito, Ecuador	0415
4900	YVNK	R. Juvenetad	Barquisimeto, Venez.	0230
4923		R. Quito	Quito, Ecuador	0400
4930		R. Mil	Santo Domingo, Dom. Rep.	0410
4965		R. Santa Fe	Boqota, Colombia	0345
4985	CP75		La Paz, Bolivia	0230
4990		R. Nigeria	Nigeria	2200
5022	HJFW	T. Caldas	Manizales, Colombia	0400
5045	CP38	R. Altiplano	La Paz, Bolivia	0310
60-Meter Band—5950-6200 kHz				

kHz	Call	Identification	Location	GMT
5055	—	R. Cultura	Guiaba, Brazil	0100
5955	ZYR226	—	Sao Paulo, Brazil	0900
5970	—	R. Horizonte	Boqota, Colombia	0230
	OBX4O	R. El Sol	Lima, Peru	0200
5980	OBX4M	R. Panamericana	Lima, Peru	0330
6010	YSS	R. Nacional	San Salvador, El Salvador	0455
6015	—	R. Abidjan	Abidjan, Ivory Coast	0700
6025	—	R. Portugal	Lisbon, Portugal	0400
6065	PRL8	—	Brasilia, Brazil	0945
6080	OAX4Z	R. Nacional	Lima, Peru	0210
6090	—	R. Luxembourg	Vaduz, Luxembourg	0530
	HISD	—	Santo Domingo, Dom. Rep.	2300
6115	HRXW	R. Comayaguella	Tequiguilpa, Honduras	0400
6130	—	R. Nacional	Madrid, Spain	0015
6135	PRC21	—	Porto Alegre, Brazil	2335
6145	—	Biafra Calling	Enugu, Biafra	0530
6155	—	R. Austria	Vienna, Austria	0545
	—	Far East Net	Tokyo, Japan	0220

(Continued on next page)

kHz Call	Identification	Location	GMT
41-Meter Band—7100-7300 kHz			
7200 —	V. America	London, England	1345
7260 —	Trans World R.	Monte Carlo, Monaco	0700
7270 —	R. RSA	Johannesburg, S. Afr.	0430
7580 —	V. Korea	Pyongyang, N. Korea	1415
31-Meter Band—9500-9775 kHz			
9505 HISD	R-TV Santo Domingo	Santo Domingo, Dom. Rep.	0110
9510 ZAA	R. Tirana	Tirana, Albania	0140
9525 —	R. Habana	Havana, Cuba	0423
9540 ZL2	R. New Zealand	Wellington, N.Z.	0810
—	R. Prague	Prague, Czech.	0110
9562 OAX4R	R. Nacional	Lima, Peru	2400
9595 PCJ	R. Nederland	Hilversum, Neth.	0145
9615 —	V. del Victor	San Jose, C.R.	0140
9655 OAX9G	—	Chachapoyas, Peru	0415
9685 —	R. Gazeta	Sao Paulo, Brazil	2250
9690 HVJ	Vatican R.	Vatican City	0055
—	RAE	Buenos Aires, Arg.	0630
9695 VUD	All India R.	Delhi, India	1345
9705 —	R. RSA	Johannesburg, S. Afr.	0145
9730 —	R. Berlin Int'l.	Berlin, E. Germ.	0100
9780 —	R. Peking	Peking, China	0140
9825 —	BBC	London, England	0320
9833 —	R. Budapest	Budapest, Hungary	0110
10530 —	R. Alma Ata	Alma Ata, USSR	2400
11100 —	R. Peking	Peking, China	1215
11340 —	BBC	London, England	0530
11600 —	R. Peking	Peking, China	1230
11720 —	R. Canada	Montreal, P.Q.	0130
—	R. Nacional Brasilia	Brasilia, Brazil	2400
11730 PCJ	R. Nederland	Hilversum, Neth.	2045

25-Meter Band—11750-11975 kHz			
11795 DMQ11	Deutsche Welle	Cologne, W. Germany	0100
—	PRL9	R. Nacional	Brazil
11800 —	R. Nacional	Madrid, Spain	2310
11805 ZYZ36	R. Globo	Rio de Janeiro, Brazil	2345
11810 RAI	RAI	Rome, Italy	2200
11820 —	TWR	Bonaire, Neth. Antilles	2230
11825 —	R-TV Francaise	Papeete, Tahiti	0700
11840 —	V. West	Lisbon, Portugal	2235
11860 BED45	V. Free China	Taipei, Formosa	0955
11885 —	R. Bucharest	Bucharest, Rumania	0150
11910 —	R. Budapest	Budapest, Hungary	0045
11920 —	Far East BC	Manila, Phil.	1700
11925 DMQ11	Deutsche Welle	Cologne, W. Germ	2245
—	R. Tashkent	Tashkent, USSR	1215
11935 —	V. West	Lisbon, Portugal	0230
11950 ZPA5	R. Encarnacion	Montevideo, Uruguay	0010
11990 —	R. Prague	Prague, Czech.	2245
12000 —	Gorovit Kiev	Kiev, USSR	2245
12040 —	BBC	London, England	0500
15016 —	R. Hanoi	Hanoi, N. Vietnam	1800

kHz Call	Identification	Location	GMT
15050 —	R. Euzkadi	(clandestine)	2045
15060 —	R. Peking	Peking, China	0245
15080 VUD	All India R.	Delhi, India	1840
19-Meter Band—15100-15450 kHz			
15100 —	R. Moscow	Moscow, USSR	0310
15125 ZYN32	R. Soc. de Bahia	Salvador, Brazil	1930
15155 —	R. Habana	Havana, Cuba	1445
15160 —	R. Budapest	Budapest, Hungary	2300
15165 VUD	All India R.	Delhi, India	2145
15185 —	R. Helsinki	Helsinki, Finland	1800
15220 —	R. RSA	Johannesburg, S. Africa	1220
15230 —	R. Ceylon	Colombo, Ceylon	0125
15250 —	R. Bucharest	Bucharest, Rumania	1945
15255 —	V. Nigeria	Lagos, Nigeria	0600
15260 —	AFRTS	Tokyo, Japan	1720
15305 —	Swiss BC	Berne, Switz.	0200
15320 —	R. Australia	Melbourne, Australia	0200
15335 —	V. Friendship	Brussels, Belg.	2110
15365 —	R. Nacional	Tenerife, Canary Is.	0410
15375 —	BBC	London, England	0010
15400 —	Austrian R.	Vienna, Austria	1230
15410 RAI	Rome AI	Rome, Italy	2350
15420 —	BBC	Cyprus	1930
15430 —	Austrian R.	Vienna, Austria	0010
15445 ZYN32	—	Brasilia, Brazil	0050
15450 —	R. Berlin Int'l.	Berlin, E. Germ.	0045
17700 —	R. Berlin Int'l.	Berlin, E. Germ.	1945
17705 VUD	All India R.	Delhi, India	1100
17710 —	R. Habana	Havana, Cuba	2055
17725 —	R. Japan	Tokyo, Japan	0130
17730 —	Ici Paris	Paris, France	0035
17740 HVJ	R. Vatican	Vatican City	0030
17745 —	R. Moscow	Moscow, USSR	1950
17745 —	R. Peking	Peking, China	2300
17770 ZL5	R. New Zealand	Wellington, N.Z.	0300
—	RAI	Rome, Italy	0215
17785 —	R. Japan	Tokyo, Japan	0215
17790 —	BBC	London, England	2200
17795 —	R. Peking	Peking, China	0100
17800 —	R. Warsaw	Warsaw, Poland	2230
17810 PCJ	R. Nederland	Hilversum, Neth.	0110
—	AFRTS	Los Angeles, Calif.	0230
17830 —	Swiss BC	Berne, Switz.	0000
17840 —	R. Prague	Prague, Czech.	2345
—	R. Australia	Melbourne, Australia	2330
17845 —	Swiss BC	Berne, Switz.	1720
—	DMQ17	Deutsche Welle	Cologne, W. Germany
17880 —	R. Moscow	Moscow, USSR	0110
17895 —	R. Kiev	Kiev, USSR	0050
17910 —	R. Ghana	Accra, Ghana	1510
18650 —	R. Moscow	Moscow, USSR	0440
19725 —	R. Moscow	Moscow, USSR	0430

13-Meter Band—21450-21750 kHz			
21495 —	R. Portugal	Lisbon, Port.	1800
21550 —	BBC	London, England	1800
21620 —	R-TV Francaise	Paris, France	1810
21640 —	R. Moscow	Baku, USSR	0325
21740 —	R. Australia	Melbourne, Australia	0300
26040 —	V. America	Greenville, N.C.	1900

Blue Chip Portable

Continued from page 75

Secure its leads by soldering each joint with a small, hot, and clean iron. An alligator clip makes a good heat sink.

Mount R5 between pins 8 and 10 on the underside of the board and then wire in the other components of the stage. Connect

the 100- μ F capacitor C9 from pin 8 or pin 9 to ground and be sure to observe polarity.

The space available on the board should suffice if you are careful and use the recommended parts. Bring fleas out as tie points for all mounted parts and connect them to the perf board. Connect a battery and turn the unit on. If you have trouble with feedback, check your layout and wiring.

Total cost is about \$15. This is a BC blaster you don't dare be without. ■

Subways And Sleeping

Continued from page 59

In the NRC's studies, sleeping subjects are exposed to prerecorded sounds in the "nuisance" noise region below the 85-dB level—the point above which hearing loss can be sustained and measured. An electroencephalograph is used to record the sleeping subject's brain waves, since this instrument is an excellent indicator of a subject's depth of sleep and hence of the degree to which noise can disturb this condition.

The EEG signals are recorded on magnetic tape rather than on the standard electroencephalograph chart. The tape is slowed down during the recording period. During the playback, the tape is run through at 50 to 100 times the recording speed and the EEG signals can be analyzed and recorded by a sound level recorder which retains the gross features indicating the depth of sleep. This procedure permits an investigator to take an 8-hour EEG recording and scan it

for meaningful data in less than 10 minutes.

Because of the great contraction of time; not all the information on the original recording is retained. However, the continuity in time is retained and this provides a good picture of the progression of a person's sleep.

In scanning the tape recording, the investigator tries to determine when EEG signals change in ways that are characteristic of alterations in the sleep pattern. When the signals are fed to a speaker, changes in sleeping conditions are readily audible.

By studying the extent to which these rhythms can be interrupted by different types and intensities of sound, researchers hope to find new clues concerning the effect of noise on sleepers—effects which the subject is probably not aware of.

One such effect is expected to show up as psychological damage caused by noise disrupting dreaming. Dreaming takes up about one-third of everyone's normal sleep time and is deemed essential to mental health. People deprived of dreams become nervous and irritable and within 10 days their personalities begin to change. ■



Canada's Dr. G.J. Thiessen, Head of Acoustics Section at NRC's Division of Applied Physics, examines brain pattern charts. Studies established need for sleeping in peace and quiet.

Street Corner Santa

Continued from page 79

of debonair sophistication, a leading man in his world and mine.

As I tucked my hand into his, and he opened the door, his mellow voice called to mother, "I'm taking our little boy for a walk, my dear . . . We'll be back shortly."

Winnemac Avenue in those days was lined on both sides with apartment houses, as I suppose it is now, and the architecture of them all was pretty much the same—red brick fronts, white stone steps, square living room windows, and sun porches paneled with glass storm windows. In just about every one of those glassed-in porches sparkled a lighted Christmas tree, glittering with ornaments, festooned with strings of popcorn, cranberries, gleaming metal floss.

As I trudged along at my father's side, his rubbers and my overshoes squeaking on the crusted snow, my eyes feasted on that procession of pretty trees, and at the gaily-wrapped packages around the bases of some of them—presents that would bring joy to the children and grownups who lived in those apartments.

I didn't mind the cold, even though it must have been close to zero. The air was so crisp and clear, and the stars gleamed like little Christmas tree lights all across the heavens. It was the most precious night of all the year, and I was home, far from the impersonal atmosphere and strict discipline of the school, and I was walking with the man who seemed to me the greatest in all the world—my father.

We came to the windy corner at Argyle Avenue and Sheridan Road. Father hadn't spoken much, perhaps because his pint-size boy seemed as strange to him as he did to me. Once or twice he asked if I was warm, and I nodded my head. Sometimes he pointed with gloved hand to a particularly beautiful Christmas tree.

There was a brightly-lighted candy store on that corner, and across the way rows of lights in a tall building were spangled against the deep blue sky. There, by the lamp post, standing by a metal tripod which held a kettle for donations from passersby, was a rather forlorn-looking Santa Claus. He wasn't plump and ruddy cheeked, as the pictures always show, but appeared gaunt and thin. His red suit with white trimmings hung from

bony shoulders and seemed scant protection from the penetrating cold. But he kept bravely ringing the little brass bell and looking hopefully at people who were hurrying by.

Father paused and dropped some coins into the kettle. I still remember the clinking sound and the pride I felt at his generous gesture. He had a way of doing things with what theatrical people call *flair*.

I heard the muffled voice of the Santa Claus say, "Merry Christmas, and may God be with you."

After hesitating for a moment, father reached for my mittened hand and we started north on Sheridan Road, my short legs pumping along to keep up with his longer strides. About the middle of the block, he stopped and looked back.

"What is it, papa?" I asked.

"That voice," I heard him mutter. He went on as if talking to himself. "No, it can't be him . . . Floyd Sampson is dead . . . At least, that's what I heard."

"Who is Floyd Sampson?"

He looked down at me with an indulgent smile. "Who is Floyd Sampson? You never heard of him, my boy? Why, Floyd was just about the most popular jazz pianist who ever wowed an audience. Started doing a single in vaudeville, then plush night clubs, and wound up on radio. Top billing! Big spender! Too soft-hearted for his own good. Why, Floyd was up in lights when I was scratching for walk-on parts."

"Was he a friend of yours, papa?"

I felt his hand pat my head, as he turned and led me slowly back down the street. "A friend? I guess you could say he proved himself that. There was the time up in North Dakota—Bismarck, I think it was—when the Orpheum closed, and the management couldn't pay us off. It was just about the Christmas season, cold as it is tonight. I was hungry and stone broke. Sampson was on his way up then, headliner on our bill. I didn't know him very well, but I looked up to him like a tin god."

"You said he was on the radio."

"That came later, sonny boy. Radio was just beginning to put vaudeville out of business, and Floyd didn't begin broadcasting till later. Well, to go on with my story, that warm-hearted big shot saw I was up against it, and got me a room at his hotel—best place in town—and the next morning he staked me to money for meals and a ticket back to Chicago, where I had friends and

connections. I have never forgotten that.”

We were nearly at the corner. “How do you know it’s him, papa?”

“I don’t. But I never forget a voice, especially a cultivated voice like his. And there’s something about him—his eyes. I’ve got a hunch, and I’m going to play it.”

I tugged at his sleeve. “If he was so popular on radio, why would he be working as a street corner Santa Claus now?”

He looked thoughtful, as he said, “That’s a good question. I’m not sure of the facts, but there was talk about Sampson getting arthritis in his hands. Fingers got crippled up and he couldn’t play anymore. And somebody told me he lost his wife and began drinking too much. Either way, or both, he didn’t hold his own in the big time. Show business moves fast, and fame is fickle, my boy.”

Father walked up to the bell-ringing Santa Claus, looked long and hard at him, then pushed back the stocking cap and pulled down his false beard a little.

“Why, Floyd Sampson, it’s you! Do you remember me from vaudeville days—George Beane? We once played the Shubert circuit on the same bill.”

The older man pushed my father’s hand away, and rearranged his cap and beard, then said in husky tones, “Who’d you say I was? Never heard of Floyd Sampson. Now let me get on with my work here.”

Father laughed shortly. “Oh, you’re Sampson all right. Think I could forget the greatest jazz pianist of them all—and the man who gave me shelter, and food, and railroad fare back to Chicago, that time up in North Dakota when I was stranded?”

There was no answer. The Santa Claus shook his head and turned away.

For a few moments the two men just stood there, saying nothing and doing nothing. Then father spoke up again. “Well, whoever you say you are, I think you *used to be* Floyd Sampson, and I’m backing my hunch.” He reached for his billfold, and took out all the money he had, folded it into a tight roll, and pressed it into the other man’s hand. “Just repaying a loan, long overdue,” he said, and led me away. “Merry Christmas, and good luck, Floyd.”

I heard the brass bell begin tinkling again as we turned the corner.

As we walked up Winnemac Avenue, father began talking again. “You know, son, people sometimes say actors have a lot of ham in them, even when they’re old and

can’t get bookings anymore. They say applause is like dope, and once you’ve heard it you never stop craving for it. Well, that isn’t exactly the way it is. The really talented performers, like Floyd back there, have pride—you saw that in him—and they have hope. Pride for what they were, and hope for another chance to show what they can do. What else have they got to live for?”

I wasn’t very old, and didn’t know very much, so I didn’t know how to answer him. So I just nodded my head, and pressed his hand, and kept trying to keep up with his long legs. But I remembered what he said, even to this day.

And I shall never forget the soft, white blankets of snow that made the world look new that night, and the bite of the cold, and the warm security of my father’s hand.

I had always looked up to my dad, but that night I began to understand him. He may not always have been right, but the way he said things made them seem so. For instance, the next morning when we opened our Christmas presents, we found that mother had stretched her budget by investing in a superheterodyne radio in a mahogany cabinet with one of those cone-type speakers. The new radio was playing softly when father made his entrance in a red silk robe.

He looked, listened, and said to mother—“Mabs, my dear,” (her name was Mable, but he always called her Mabs, except when they were arguing about something) “where’d that come from?”

“I bought it, George, as a present for the whole family.”

He frowned. “Don’t you know those infernal noise boxes are closing theaters and putting performers out of work?”

Mother didn’t answer—just stood there with folded arms, looking uncertainly from the radio to her declaiming husband. “Besides,” he said with a wave of his arm, “radio is just a fad. It will never take the place of real, live entertainment.”

As I said, father wasn’t always right. Radio is still with us, and he is now a memory. But, right or wrong, he was always lovable—he was lovable because he gave generously of himself and what he had.

And during the passing years I think I have never seen lovelier Christmas trees than in those glassed-in porches along our street, and I never see one of those street-corner Santas without thinking of Floyd Sampson. ■

Hi-Fi Supermeter

Continued from page 83

Power transformer T1 is a multi-voltage type (see Parts List). Use only the color-coded leads shown in the schematic. Cut short all unused wires. Also, make certain all components are mounted securely on the board, including silicon rectifiers D1 and D2, and input capacitor C1. While C1 connects to the input jack and R1, its mounting terminals provide convenient tie points.

The input lead and AC line cord from the rear apron are routed to the front panel underneath notches at each lower corner of the perf board. The input lead must be shielded cable, with the shield connected to the chassis at J1 and to R2's ground lug. This lug is also connected to the perf-board ground bus.

Final Steps. After the board wiring is complete, remove the vu meter and install it on the front panel along with R1 and S1. Then mount the board assembly onto the meter's terminals. Make the board connections to S1 and R1 and then mount T1, J1, J2, and the line cord. J1 and J2 can be any model jack which matches your existing equipment connectors. Finally, hook up the line cord and the jack connections.

Note that R1 should always be turned off, full counterclockwise, before S1 is turned on or when connecting or removing plugs! When you apply power, place your finger on J1 or J2's hot terminal and advance R1. The meter should indicate the

hum induced by your finger.

Individual transistor characteristics can prevent proper operation. The normal circuit voltages measured with a VTVM are shown in ovals on the schematic. The most probable trouble spot will be the drain electrode of Q1 (FET). If the voltage is appreciably lower than 10 V, disconnect Q2's base from Q1's drain and decrease R2's value in small increments (about 20%) until 10.5 V is measured at the drain electrode. Then reconnect Q2's base.

The parallel input jacks, J1 and J2, allow your Supermeter to be used with 4-channel microphone mixers. Simply connect the mixer's output to J1 and the recorder input to J2. Adjust the recorder's gain control for normal recording level and then advance R1 until the meter indicates zero on program peaks. From now on, channel mixing can be referred to the meter reading, thereby ensuring proper recording levels from all mixer inputs.

Last but not least, the Supermeter helps to signal-trace low-level transistor amplifiers whose signal voltages are often so small that they are unmeasurable on ordinary meters, either VOMs or VTVMs. If desired, a pair of high-impedance (crystal) phones can be connected across the meter terminals for monitoring. Be sure not to use low-impedance phones (5000 ohms or less).

There is virtually no commonly used audio level that won't produce a 100% meter reading. Just make certain all input leads are shielded to avoid having the signal reading masked by hum. Then you'll know just how hi the fi really is! ■

Stopping Volt Drain

Continued from page 80

volt will differ by about 10 ppm from its previous value. This should help to bring everything in line with the BIPM ampere.

The top photo on our lead page shows a capacitance standard used in the recent determination of the NBS ohm. The capacitive reactance of the capacitor at a known frequency is balanced against the resistance to be determined.

The photos at the bottom of the page show a complex electrodynamicometer (an instrument for measuring mechanical force) which was used to determine the NBS am-

pere. When direction of current in the large coils is reversed, torque is induced into a small rotating coil so that it pulls against a balance arm and upsets the equilibrium of the equipment. Balance is restored by adding weights to the balance arm by means of a rod and pulley arrangement at the outer end of the housing; this factor, along with others, leads to a new calculation for the ampere.

Talk about wheels within wheels! The outer framework of coils compensates for the earth's magnetic field—so putting the ampere back on its feet is obviously one heck of a business. All of this equipment is so ultra precise that even adding weights to the balance arm is a major design problem. Oh well, all in day's work. —Hans Richter

Eavesdropping On Spies

Continued from page 67

an illegal station operating within the U.S.

There are only two copies of each "gamma" pad—one kept by the agent, the other by his superiors. Each page is used once, then destroyed. At the start of each broadcast, a special indicator, often a three or five-digit number, tells the spy which page in his "gamma" booklet to use.

How It's Done. Thompson revealed how he deciphered his instructions from Moscow: If, for example, the seventh group in the message was 27406 and the seventh group on the proper page of his "gamma" pad was 27410, he would subtract the digits and obtain the answer, "4." The same method would be used with all the number groups received.

Other techniques, instead of subtraction, call for modular addition, in which the sums exceeding 9 are not "carried over" into the next column.

Thompson arranged his key phrase in the shape of a "T" and numbered the letters starting at the bottom of the shaft, then across from left to right.

11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
D	I	E	B	U	C	H	A	N	D	L	U	N	G	E	N
							W	10							
							I	9							
							R	8							
							T	7							
							S	6							
							C	5							
							H	4							
							A	3							
							F	2							
							T	1							

In this case, "4" would stand for "H." If the number had been "14," it would mean "B." Each set of five numerals would give a single letter of the message. This system required that Moscow's instructions be carefully phrased, since Thompson's key words contained only 16 different letters.

Even Spies Have Class. Actual use of the cipher pads and key phrases apparently varies a great deal depending on the status of the secret agent and the degree of security required.

Lesser agents like Thompson used relatively uncomplicated systems. Hayhanen and KGB master spy, Rudolf Abel, who was nabbed by the FBI in 1957, but later

Language	Frequencies	Remarks
English	3205, 5510	Possible U.S. origin
Spanish	3200, 3380 5785, 5950, 6650, 7335, 7650, 9800	Suspected CIA stations Frequencies vary greatly
German	5015, 11290, 17655, 17685	Some may originate from near Madgeburg, East Germany
Czech	7400, 9975	Possible East German location
Chinese	4235	Seldom reported
Russian	5510	Rarely heard
Unknown	3824, 4883, 4980	May be artificial language—East German location suggested

Note: Frequencies, especially those of Spanish speaking stations, may vary as much as 50 kHz or more. Many additional frequencies have been observed with "numbers" broadcasts. It has been postulated that four-digit groupings may be of American origin.

"swapped" for U-2 pilot, Francis Gary Powers, used more complex techniques. These involved the "gammas" and a complicated matrix of numbers and letters.

If you're still thinking about cracking the "numbers" game, forget it! Since each cipher is used only once, then destroyed, these messages are "fracture-proof." One team of expert government analysts tried for four years without success to unscramble a page of 207 five-digit numbers.

The "numbers stations" have even stymied the multi-million dollar "electronic brain" computers at the Ft. Meade, Md., home of the National Security Agency, our official espionage eavesdroppers. So, if the big boys can't crack the nut, why try? Just keep logging these spy broadcasts and someday, when we get one of our boys inside the Russian KGB, you may be eligible for some crazy verifications.



"It's what they call total involvement."

Frozen Magnetic Forces

Continued from page 55

For example, the magnetic tree shown in the illustrations was made by placing a thin iron rod at the center of the cell. To support the rod, thrust it into a hole drilled in a piece of plastic sheet which is a little smaller than the bottom area of the cell.

Incidentally, the rod plus plastic base makes a handy agitator for dispersing the iron powder throughout the oil after experiments. Simply move it up and down like a plunger to mix the powder and oil.

How are the two *palm tree* growths on the upper part of the rod to be explained? These are obviously regions having concentrated fields. They were created accidentally when the rod was tested with a horseshoe magnet.

The momentary contact with the testing magnet was enough to magnetize the rod at these points. This fortunate accident served to underscore the fact that bar and cylinder magnets need not be limited to a north and south pole at the magnet's opposite ends. You can see that it is possible to have more than one pair of poles on the same bar magnet. If the rod had been touched in *two* places with the horseshoe magnet, two more intermediate poles would have been formed and the magnetic tree would have been even more elaborate.

Other effects can be achieved by suspending smaller iron bars either between the outside magnets or elsewhere in the cell. The 3-D patterns produced by the powder will reveal the induced magnetism in these iron pieces and will show how magnetic fields can be distorted by metallic objects.

This oil system might also be used to demonstrate 3-D field patterns produced by electric currents. The coils could be immersed either in the oil or wrapped around the outside of the cell.

Frozen Fields. These 3-D patterns as well as two-dimensional ones can be preserved permanently by locking them in slabs or blocks of plastic. First try making a permanent mold of a simple two-dimensional pattern.

Obtain a bottle of embedding and casting plastic sold by craft and hobby shops. You have to add a few drops of a catalyst solution to the clear liquid just before it is used.

Mix some of the catalyst with enough plastic liquid to fill a polyethylene lid swiped off

a coffee can. Stir in enough iron powder to obtain a uniform suspension. To determine the correct amount, make preliminary tests using mineral oil instead of the plastic liquid.

When you're ready, pour the suspension into the plastic lid and place it over one or two small magnets. The usual patterns should develop immediately. When the pattern looks right (before too much powder has been drawn to the poles), remove the lid and set it aside to harden.

When the plastic is thoroughly hardened, just pop it out of the lid. You now have the force field permanently frozen inside the molded plastic disc.

Having gone this far, you will surely be tempted to mold some 3-D patterns of your own. Don't use your plastic cell for this purpose because it would be impossible to remove the molded plastic without destroying the cell!

Instead, make a *take-apart* cell from sheet glass and fasten the walls and bottom together with adhesive tape.

The liquid plastic has about the same viscosity as mineral oil, so the iron powder will behave just as it did in the oil. When the 3-D pattern has formed in the liquid plastic, let the cell and magnets stand *undisturbed* at least overnight to ensure hardening. Then remove the glass walls, trim off any excess plastic, and polish if necessary.

If you don't pour too much catalyst into the liquid plastic there will be plenty of time to get the desired pattern—even if the powder must be dispersed for a second try.

Besides all the heavyweight, scientific applications, these frozen fields (as discs or blocks) would make novel paperweights to give to your friends as Christmas gifts. Could there be any better way to convince them that you do, indeed, have a magnetic personality? ■



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Ham Traffic

Continued from page 91

personal freedom by the computer builders. Over in the Netherlands, residents must buy a license to operate a TV or radio receiver. Just to make sure this is done, the good folks at the Netherlands' equivalent of our FCC have bought a computer to keep track of the names and addresses of everyone who has paid his fee for having a receiver.

According to the manufacturer, the computer will replace bulky card files and make it easier for authorities to investigate homes where no radio or TV sets are registered. The computer people seem proud of their achievement, which, they say, could see use in several European countries which charge fees of set owners to pay for the government broadcasting networks. What they fail to explain is why folks who don't have receivers should be investigated by the authorities.

Coming, perhaps, is the time when a knock on the door in the middle of the night will be the Feds checking to see if you have

a license for your electric wrist watch. Progress, it's wonderful.

Our Shrinking World? We all know that most of our ham bands are crowded, and it's no surprise that commercial bands are jammed, too. Thing is, the big Decision Makers who cluck their tongues over such matters thought they had a pretty good way to wipe out some of this congestion. Synchronous satellites were to be the answer and some have already been used to a limited degree. (In all justice, it should be noted that hams were among the pioneers in using satellites for long-range relay of VHF.)

One proposed commercial project was use of synchronous satellites to relay VHF transmissions from aircraft on transoceanic flights. However, the future of this project is somewhat uncertain. It's possible technically and has, in fact, already been effected by some airlines. Catch is that there are already so many satellites in orbit (or about to be launched) that choice locations will soon be overcrowded or unobtainable.

Think of it: the Space Age is only a little over 10 years old, and already there's a traffic jam up there! ■

Tapping The Treasures

Continued from page 49

guns, ultrasonic generators and like systems are used to create electrical explosions or to otherwise send probing signals deep into the ocean; the returning signals take pictures of the ocean bed and probe rock structures thousands of feet below the ocean floor.

In remote areas of the world, fully automatic instruments floating on platforms measure environmental factors and relay the data to satellites passing hundreds of miles overhead; the satellites in turn relay the information to ground stations thousands of miles distant. Deep in the ocean, below the instrument platforms are atomic power plants to produce electricity to run the data gathering and telemetry-radio systems.

We have the Key. Poor old Davy Jones hasn't a chance against such technologic onslaughts. His bountiful locker is cracking, and before long it will burst wide open.

But for man, the technologic challenge will only be beginning. He will know what is in the ocean. The next job will be to find ways to get it out. We will tell you all about that—maybe twenty years from now. ■

Dual 1019 Lab Check

Continued from page 85

arm is getting the correct stylus overhang and correct cartridge height. The 1019 eliminates the guesswork with an unusually large selection of mounting hardware and a special gauge that clamps to the pickup shell. With the gauge in position, the user simply selects the hardware which places the pickup stylus dead center in the gauge; no measurements or guesswork are needed.

Overall Observations. As you've probably already surmised, we were highly impressed with the Dual 1019: it performed flawlessly both as an automatic turntable and as a changer. Even with the platter loaded with ten 12-in. records, the Dual 1019 exhibited no evidence of noticeable wow or speed change.

Supplied complete with manual and changer spindle, pickup shell, pickup gauge, and strobe disc, the Dual 1019 lists for \$129.50. A base and dust cover are available as optional accessories.

For additional information, write United Audio Products, Dept. D, 535 Madison Ave., New York, N.Y. 10022. ■

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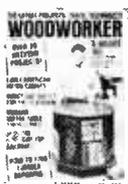
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