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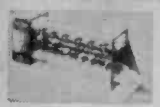

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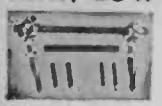

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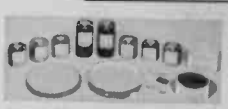

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April-May 1966 CONTENTS/INDEX

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RADIO-TV EXPERIMENTER

Dedicated to America's Electronics Experimenters

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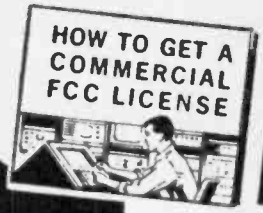

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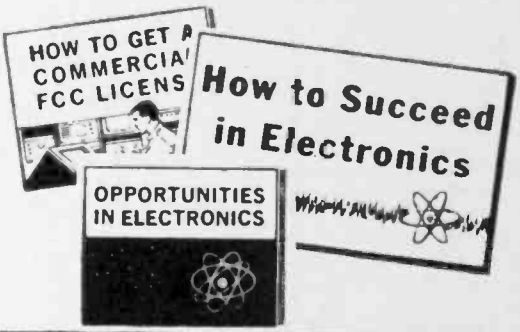

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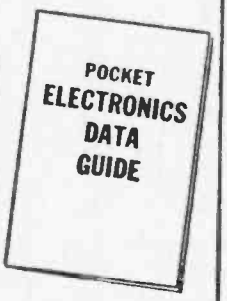

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POSITIVE FEEDBACK

Julian M. Sienkiewicz, Editor
WA2CQL/KMD4313

It seems to me that operating a nuclear reactor is safer than driving a car, taking a railroad trip, swimming in the ocean or a lake, or working in a factory. In the 22 years since atomic power was first harnessed, only six men have died from nuclear radiation in the United States. That averages out to less than one-third person per year, compared to an annual fatality rate of 40,000 for motor vehicles, 1,000 for railroads, 18,000 for falls and 5,200 for drownings.

Basically, an atomic reactor works like any old-fashioned power plant that burns fuel to heat water. The water makes steam, and the steam turns a turbine generator to produce electricity. There is one difference, instead of oil, gas or coal, uranium is used as fuel, making the boiler safer, cheaper, cleaner, smaller and quieter than any other power plant.

Because nuclear energy first burst upon the public mind in the form of terrifying bombs, any number of myths have developed over the years. Nuclear plants cannot explode even if all external controls fail. Over the years, the Atomic Energy Commission has conducted tests on experimental reactors in remote places to check what happens when reactors are pushed beyond all safety limits. Even then the reactor did not blow up like a bomb but produced a low-level steam explosion, with almost all the radiation contained inside the reactor building.

So it behooves us to think *atomic* when power plants are proposed for new sites or as replacements. One of the benefits we will reap will be the elimination of soot and foul gasses now belched into the air by present day coal-burning electric power plants.

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The Progressive Radio "Edu-Kit" is the foremost educational radio kit in the world, and is universally accepted as the standard in the field of electronics training. The "Edu-Kit" uses the modern educational principle of "Learn by Doing." Therefore you construct, learn schematics, study theory, practice trouble shooting—all in a closely integrated program designed to provide an easily-learned, thorough and interesting background in radio.

You begin by examining the various radio parts of the "Edu-Kit." You then learn the function, theory and wiring of these parts. Then you build a simple radio. With this first set you will enjoy listening to regular broadcast stations, learn theory, practice testing and trouble-shooting. Then you build a more advanced radio, learn more advanced theory and techniques. Gradually, in a progressive manner, and at your own rate, you will find yourself constructing more advanced multi-tube radio circuits, and doing work like a professional Radio Technician.

Included in the "Edu-Kit" course are Receiver, Transmitter, Code Oscillator, Signal Tracer, Square Wave Generator and Signal Injector Circuits. These are not unprofessional "breadboard" experiments, but genuine radio circuits, constructed by means of professional wiring and soldering on metal chassis, plus the new method of radio construction known as "Printed Circuitry." These circuits operate on your regular AC or DC house current.

THE "EDU-KIT" IS COMPLETE

You will receive all parts and instructions necessary to build twenty different radio and electronics circuits, each guaranteed to operate. Our Kits contain tubes, tube sockets, variable, electrolytic, mica, ceramic and paper dielectric condensers, resistors, tie strips, hardware, tubing, punched metal chassis, Instruction Manuals, hook-up wire, solder, selenium rectifiers, coils, volume controls and switches, etc.

In addition, you receive Printed Circuit materials, including Printed Circuit chassis, special tube sockets, hardware and instructions. You also receive a useful set of tools, a professional electric soldering iron, and a self-powered Dynamic Radio and Electronics Tester. The "Edu-Kit" also includes Code Instructions and the Progressive Code Oscillator, in addition to F.C.C. Radio Amateur License training. You will also receive lessons for servicing with the Progressive Signal Tracer and the Progressive Signal Injector, a High Fidelity Guide and a Quiz Book. You receive Membership in Radio-TV Club, Free Consultation Service, Certificate of Merit and Discount Privileges. You receive all parts, tools, instructions, etc. Everything is yours to keep.

PRINTED CIRCUITRY

At no increase in price, the "Edu-Kit" now includes Printed Circuitry. You build a Printed Circuit Signal Injector, a unique servicing instrument that can detect many Radio and TV troubles. This revolutionary new technique of radio construction is now becoming popular in commercial radio and TV sets.

A Printed Circuit is a special insulated chassis on which has been deposited a conducting material which takes the place of wiring. The various parts are merely plugged in and soldered to terminals.

Printed Circuitry is the basis of modern Automation Electronics. A knowledge of this subject is a necessity today for anyone interested in Electronics.

FREE EXTRAS

• SET OF TOOLS

- SOLDERING IRON
- ELECTRONICS TESTER
- PLIERS-CUTTERS
- VALUABLE DISCOUNT CARD
- CERTIFICATE OF MERIT
- TESTER INSTRUCTION MANUAL
- HIGH FIDELITY GUIDE • QUIZZES
- TELEVISION BOOK • RADIO TROUBLE-SHOOTING BOOK
- MEMBERSHIP IN RADIO-TV CLUB! CONSULTATION SERVICE • FCC AMATEUR LICENSE TRAINING
- PRINTED CIRCUITRY

SERVICING LESSONS

You will learn trouble-shooting and servicing in a progressive manner. You will practice repairs on the sets that you construct. You will learn symptoms and causes of trouble in home, portable and car radios. You will learn how to use the professional Signal Tracer, the unique Signal Injector and the dynamic Radio & Electronics Tester. While you are learning in this practical way, you will be able to do many a repair job for your friends and neighbors, and charge fees which will far exceed the price of the "Edu-Kit." Our Consultation Service will help you with any technical problems you may have.

FROM OUR MAIL BAG

J. Stataitis, of 25 Poplar Pl., Waterbury, Conn., writes: "I have repaired several sets for my friends, and made money. The "Edu-Kit" paid for itself. I was ready to spend $240 for a Course, but I found your ad and sent for your Kit."

Ben Valerio, P. O. Box 21, Magna, Utah: "The Edu-Kits are wonderful. Here I am sending you the Questions and also the answers for them. I have been in Radio for the last seven years, but like to work with Radio Kits, and like to build Radio Testing Equipment. I enjoyed every minute I worked with the different kits; the Signal Tracer works fine. Also like to let you know that I feel proud of becoming a member of your Radio-TV Club."

Robert L. Shuff, 1534 Monroe Ave., Huntington, W. Va.: "Thought I would drop you a few lines to say that I received my Edu-Kit, and was really amazed that such a bargain can be had at such a low price. I have already started repairing radios and phonographs. My friends were really surprised to see me get into the swing of it so quickly. The Trouble-shooting Tester that comes with the Kit is really swell, and finds the trouble, if there is any to be found."

UNCONDITIONAL MONEY-BACK GUARANTEE

ORDER FROM AD—RECEIVE FREE BONUS RADIO & TV PARTS JACKPOT WORTH $15

☐ Send "Edu-Kit" postpaid. I enclose full payment of $26.95.
☐ Send "Edu-Kit" C.O.D. I will pay $26.95 plus postage.
☐ Rush me FREE descriptive literature concerning "Edu-Kit."

Name .....

Address .....

.....

PROGRESSIVE "EDU-KITS" INC.

1186 Broadway, Dept. 535NN, Hewlett, N. Y. 11557

POSITIVE FEEDBACK

articles and items which he would like his readers to see and read. One such item was a very clever cartoon that you may have spotted on page 12 of our January, 1966 issue. This cartoon first appeared in a company newspaper, *Pulse*, published by Collins Radio Company. Well, as you can guess, your editor forgot to give credit to *Pulse* and to the Collins company. So let me say, "thank you," and I promise never to do it again.

Gotta Match, Buddy. A flame can be used as an amplifier to produce intense sound. Scientists at Stanford Research Institute here have used such a *pyroacoustic* loudspeaker to amplify a human voice to a loudness many times over what is possible with electrodynamic loudspeakers of the same power. Loud sound generators are needed, for instance, to test equipment exposed to jet engine noise. An extremely loud speaker also could be useful in disaster situations.

According to theory, a flame should be able to increase sonic energy from 10 to 100 times. To verify the theory, a small prototype pyroacoustic loudspeaker was built. A stream of combustible gas is modulated as it passes through an opening formed by a metal block and the diaphragm of a conventional electromagnetic loudspeaker. The modulated gas stream expands through a throat and passes through a wire mesh flame holder.

The variation of the flame caused by the variations in gas flow gives differing mechanical energy to the gas molecules of the combustion products. Since large changes in molecular motion follow those of the loudspeaker, sound is amplified many times. The gas can be any burnable mixture of hydrocarbons and air. If this operation ever worked its way into the hi-fi industry, music lovers may end up using seltzer bottles as volume controls.

Operator, Please. With smog filling the air, industrial wastes polluting the streams, and junkyards and billboards cluttering the highways, trash is now littering up outer space at a fast clip. Just call *Dial-A-Satellite*.

Operated by the Smithsonian Astrophysical Observatory near Boston, *Dial-A-Satellite* consists of two automatic phone-answering machines, one in Boston and one in Wash-

ington, D.C., which offer a recorded satellite count to anyone who calls.

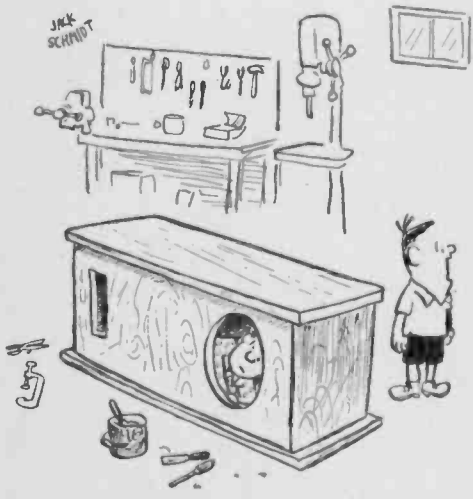
In Boston, the number is 617-491-1497, and in Washington it is 202-737-8855.

The Dial-A-Satellite script writer is James Cornell of the Observatory staff. Every morning he produces a new message, which is then taped for the Boston number, and sent by teletype to Washington where it is recorded for use in the Nation's Capital. The new recording appears in Boston at about 9:30 a.m. and in Washington at midday.

Of course the close to one thousand objects (895 as we go to press) now in the sky are not all operating satellites. A large portion of them are simply space rubbish, such as burned-out rocket stages that have broken up in space. For example, 206 of the objects are bits and pieces of the Transit 4A and Injun-SR-3 satellites launched in 1961. Another 122 are the remains of three Russian satellites launched last March 15.

Besides producing the Boston and Washington reports, Mr. Cornell provides weekly information to the Hayden Planetarium in New York City, which then creates its own message. That number is 212-873-0404.

Dial-A-Satellite was started on March 18, 1964, when there were only 431 man-made objects cluttering up the spaceways. On Dec. 11 of that year, the total passed 500. The number of people calling has also grown considerably. Though *Dial-A-Satellite* was a success even in its early days, with 50 or 60 calls a day, the number is now



"You better hurry, Mom! Dad glued himself in the hi-fi cabinet."

POSITIVE FEEDBACK

about twice that amount. When the comet Ikeya-Seki was visible in the sky, calls skyrocketed to 700 a day in Boston and almost 2,000 a day in Washington.

Dial-A-Satellite gets its information from the Observatory's own around-the-world tracking network, which consists of 12 huge Baker-Nunn trackers, specially designed for this job. The Smithsonian is not the only group keeping records of objects in the sky, however. The National Aeronautics and Space Administration does its own counting at Goddard Space Flight Center in Greenbelt, Md., and the U.S. Air Force's NORAD (North American Air Defense Command) has a system called Spacetrack to keep it informed.

Despite the electronic miracles of the Space Age, *Dial-A-Satellite* does have its ups and downs. One tender incident centers around a Cambridge, Mass., woman whose telephone number is only slightly different than that of the tape recorded message. Mr. Cornell was one day calling *Dial-A-Satellite* from his home to check on the condition of the tape (since there is no alarm system to warn of malfunctions), when he made the mistake that many others had apparently made, and called the Cambridge number instead.

"If I ever get my hands on the man responsible for *Dial-A-Satellite*," said the woman through clenched teeth after Mr. Cornell explained his error (but had not identified himself), "I'll kill him!"

Another victim of misdialed numbers reacted differently. Every morning, she telephones *Dial-A-Satellite*, writes down the day's report, and provides the information to anyone who seeks it. "So someone won't have wasted his dime," she said. I wonder whether the telephone company would care to comment on space-age wrong numbers.

Electronic Voice. For those unable to speak, an artificial voice offers for the first time something resembling human tones. The new device, about the size of an oblong electric shaver, is held against the throat. As the speaker mimes his words, vibrations are picked up by the instrument and converted into words. Faraday Electronic Instruments Ltd., manufacturer of the artificial voice, claims this is the first device to provide human pitch and tone. Others have produced a monotone or a metallic sound.

(Continued on page 116)

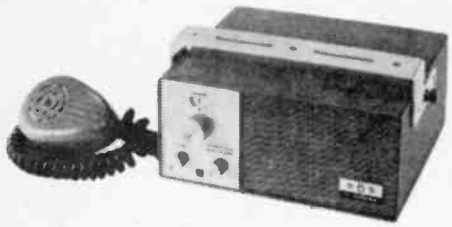
cb RIGS AND RIGMAROLE

■ Hi gang, the warm weather CB season is just about upon us and you'll be cleaning the antenna and tuning up the rig. The manufacturers of CB gear are hoping that you'll find that, with a new season beginning, you'll be looking to start off anew with a modern design piece of CB gear.

Squires Sanders Strikes Again. Not content with resting on their laurels, having created a mild sensation with their "23'er" CB rig, Squires Sanders has worked up an entirely new entry called the *S5S*.

The *S5S* is a unit with five crystal controlled channels which features the unique "Noise Silencer" circuit.

The "Noise Silencer" circuit defeats noise caused by auto ignition, power lines, and fluorescent lights without loss of signal level, without introduction of audio distortion. It



Squire Sanders S5S CB Transceiver

incorporates a pre-IF silencer that sniffs out noise before the IF circuit innocently amplifies it. By detecting the noise pulse before the IF selectivity, the noise silencing pulse is as short as possible so that only the tiniest slice of signal is dented in the process. In addition to the "Noise Silencer" circuit, which specializes in wrestling with pulse-type noises, the *S5S* also employs a standard diode noise limiter to squash broadband noise.

Featuring an ultra-sensitive receiver, the *S5S* drags in signals having a strength of half a microvolt. Sharp 8 kc. selectivity is accomplished by means of a 4 crystal lattice filter. Adjacent channel selectivity is better than 50 db.

The megacycle maker section runs a full,

CB Rigs & Rigmarole

healthy, 5 watts input with a built-in speech booster to clip the modulation for maximum talk power.

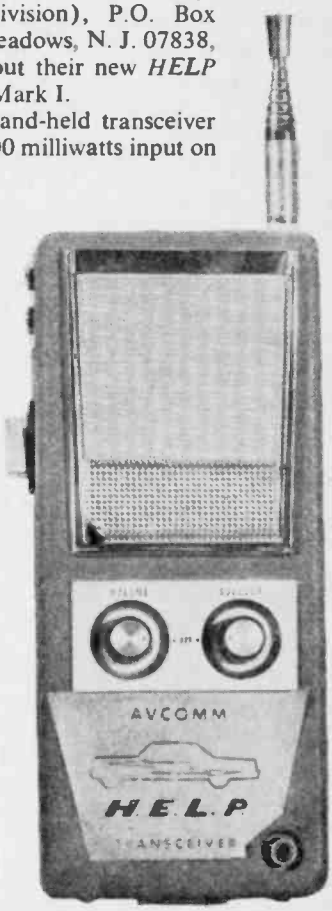
Solid state circuitry (25 transistors, 5 diodes, 1 zener diode) was used throughout to permit low battery drain. The unit is designed to operate from 12 volt DC systems (negative ground), although a 110 volt power supply is also available as an option.

Crystals for Channel 9 are provided, and the manufacturer reminds CB'ers that the unit will function nicely on the CAP 26.62 mc. channel.

Further details on the $185 unit may be obtained by writing to the manufacturer, Squire-Sanders, whose address is Millington, N. J. Just mention RADIO-TV EXPERIMENTER.

Help On Wheels. As a further boost to the Highway Emergency Locating Plan (HELP), a company with the unlikely name of Ajax Floor Products Corp. (Avcomm Division), P.O. Box 161, Great Meadows, N. J. 07838, has brought out their new *HELP* Transceiver, Mark I.

This is a hand-held transceiver which runs 200 milliwatts input on



Avcomm 200-milliwatt HELP Transceiver

any frequency between 25 and 50 mc. This power permits coverage up to a mile in tall building or heavy traffic areas, up to 5 miles line of sight, up to 7 miles in open country or over water. A telescoping whip is provided, however the rig can be used with an external antenna. An earphone or external microphone may also be plugged in, although the set already has a built-in speaker/microphone. A squelch is thrown in for good measure, as is a superhet receiver circuit with a noise limiter, 455 kc. IF, and push-to-talk.

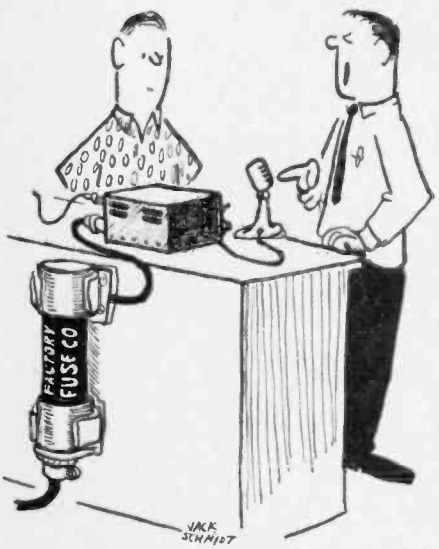
This looks like a good bet to toss in the glove compartment of your car if you want the reassurance of having a rig along with you on a trip without having to make a permanent installation.

If you want to use this as a base station, you can run it from an external power supply.

Strictly Picturesque. Just about taking the CB world by storm is the latest method of 1—talking police out of giving tickets (in some instances, anyway), 2—keeping busy-

U.S. GOVERNMENT OFFICIALLY LICENSED RADIO COMMUNICATIONS UNIT

Only as official as the ink used to print it, the scare sticker, above, keeps CB rigs untouched.



"It pulls a lot more power than I expected . . ."

CB Rigs & Rigmarole

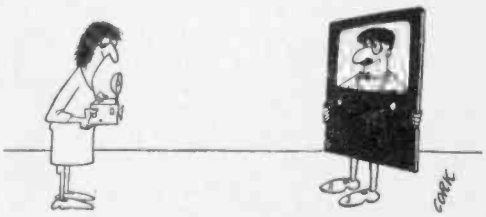
bodies away from your CB gear, and 3—impressing all of your friends. The storm-maker is a sign, printed on heavy card stock. It announces "U. S. GOVERNMENT OFFICIALLY LICENSED RADIO COMMUNICATIONS UNIT," in white stencil lettering on a black background. Cut to fit on a car's sun visor, it also can be placed in the window of your base station.

The signs are being offered by Haral Associates, 1133 Broadway, New York, N. Y. 10010, and some free gifts are thrown in with each order—for instance, a 2-color, realistic looking "UNCLE" ID card, and a surprise zany "nut" sticker for your front door. Price for the whole smear is 50¢ or you can get 3 sets for a buck.

Another interesting CB item is actually four separate items—wild CB operator awards, to be exact. One award proclaims "Radio's Biggest Egotist," then there's "World's Biggest Lid," and what about the "Worked All TV Sets" award? There's one other one, but you'll have to see it for yourself.

"Radio's Biggest Egotists" Award is multi-colored.

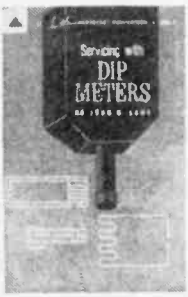
These awards are printed with four colors, on standard engraved border forms—look real nice. You get all four awards, plus four envelopes for mailing the awards for $2. Order them from: Van, 348D Essex, Stirling, N. J. 07980. ■



BOOKMARK
by Bookworm

■ "When you pick 'em, pick the best." Your ol' Bookworm is in some trouble this issue of Radio-TV Experimenter because he followed his own good advice. This column offers three excellent books, but how to tie it into a neat package poses a problem that's difficult to solve. So here they are, no particular order, no particular reason other than they're worthwhile owning.

RF Alert! A dip meter is one of the most useful pieces of test equipment available today—it is far more useful than most technicians and experimenters realize. Its basic design purpose is to measure the resonant frequency of an LC circuit, and, unlike any other instrument, it performs this function without direct connection to the circuit under test and without power applied to the resonant tank circuit. Thus by using a dip meter, all transmitter circuits can be pre-tuned while the gear is "off the air." *Servicing With Dip Meters* by *John D. Lenk* is a book written to move the dip meter from the side shelf to the workbench work area. Experimenters and hams have found the dip meter indispensable in checking the tuning of resonant circuits—traps, tanks, transmission lines and antennas. This text tells (and shows with detailed illustrations) how the dip meter can be used to determine capacitance and inductance; align tuned circuits in radios, TV's and transmitters; check oscillator crystals; determine the Q of circuits; etc. To explain these operations, John Lenk—a seasoned writer known to the ol' Bookworm and Editor—offers valuable suggestions as well as detailed procedures.



Soft cover
128 pages
65 illus.
$2.95

Those who already own a dip meter will find in *Servicing With Dip Meters* many new ways of getting their money's worth out of their gear. To get your copy drop in and see your local electronic parts dealer or write to the publisher, Howard W. Sams & Co., Inc., 4300 West 62nd Street, Indianapolis 6, Indiana.

More on SCR's. This first edition of the *RCA*

Bookmark

Silicon Controlled Rectifier Experimenter's Manual, KM-70, presents a large number of practical and interesting control circuits which experimenters, who may not be too familiar with solid-state circuits and components, can build. Each circuit has been designed to use a common complement of active semiconductor components which are available in RCA's Experimenter's Kits KD2105, KD2106, and KD2110. Most of the circuits can be built on the same basic chassis. These components have been selected to provide the user with flexibility in the variety and number of circuits which he can build at a minimum cost.

Soft cover
80 pages
66 illus.
95¢

This manual is profusely illustrated with circuit schematic drawings, detailed chassis layouts, and photos of wired chassis and active circuit elements (Kit components). It contains easy-to-read sections on:

- Semiconductor theory from the basic p-n junction to the silicon controlled rectifier.
- General construction details including soldering, assembly techniques, trouble-shooting, reference data, safety precautions, etc.
- Descriptions and operation details for 14 control circuits including universal motor and model-railroad speed controls, timer circuits, battery chargers, light-operated switches, heat control circuits, a lamp dimmer, and overload and synchronous switches. Also, to aid in the experimenter's understanding of the basic important concepts covered in the manual, a list of 20 review questions has been included.

Most electronic parts dealers carry RCA manuals. but, if you cannot pick up your copy off your dealer's counter, write to RCA, Electronic Components and Devices, Dept. KGB, Harrison, New Jersey.

Edmund's At It Again. One of the world's great bargain centers for products in the hobby, science, math, optics, education, and do-it-yourself fields is the Edmund Scientific Co., Barrington, New Jersey. There are, in fact, few items in these areas that Edmund does not carry. And now, newly available and being offered free and postpaid, is the latest edition of the fascinating

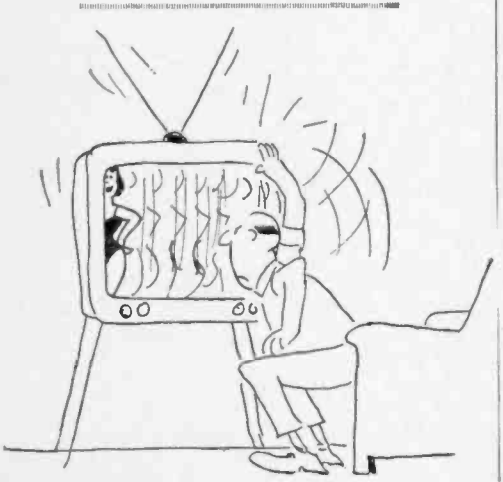
Edmund Catalog, Issue No. 661. All you have to do is write and ask for a copy.

Soft cover
148 pages
Many illus.
Free

As always, brand new specials head the Edmund product list. These include: a magnet variety kit, for experimental, study, or home hobby use, featuring 23 separate magnets in 11 different types and shapes; a small, highly useful 6-volt nickel-cadmium battery, composed of five 1.2-volt cells, which recharge in one hour (a charger kit is offered separately); a popular, new Science Fun Chest, containing a variety of devices and materials, all exemplifying different scientific principles; and special kits of new Moire patterns, now also available in color, in large sizes, and as photo negatives.

Unusual educational items that are non-electronic, available nowhere else, is the regular Edmund line of telescopes, binoculars, microscopes, spotting scopes, prisms, mirrors, tools, miniature lathes, war surplus materials, unusual new Mylar reflective sheeting for striking photographic work, or just plain sun bathing; high-intensity lamps, crystal growing kits, a wide range of Science Fair materials; camera accessories; disposable mixing-measuring cups, gloves and razorblade knives; magnifiers, stethoscopes, solar cells, even a complete solar house model.

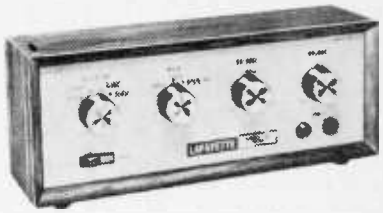
To get your free, postpaid copy of Catalogue No. 661, clip this item and mail direct to Edmund Scientific Co., Dept. JCS, 107 E. Gloucester Pike, Barrington, New Jersey 08007. ■



NEW products

Remote Stereo Headphone Control Unit

Lafayette Radio has come up with a remote stereo headphone control unit, the "Stereo-Trol." This unit enables audiophiles to accurately control the amount of channel separation to make headphone listening as enjoyable as large speaker reproduction. Sound from both channels reaches each ear. Fingertip operation controls volume, balance,



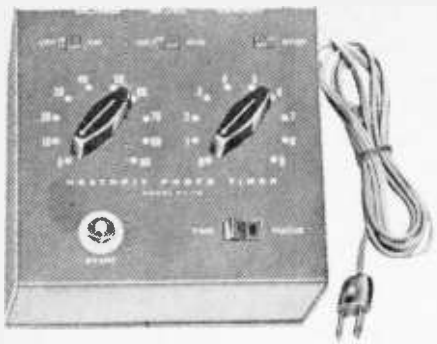
Lafayette "Stereo-Trol" Headset Amplifier

and "dimensional stereo" mixing of each channel, regular total channel separation, and speaker on-off. Unit connects directly to amplifier and speakers then connect to "Stereo-Trol." An important feature of the "Stereo-Trol" is its portability. It may be used to remotely control headphones from anywhere in the room, even mounted on the wall. Controls: Speaker/Phones switch; Selector, left or right channel only, or stereo with choice of left-right reversal; Mode—mono or stereo with or without "dimensional stereo" operation; Left-Right Balance; and Volume. Comes in oiled walnut finished cabinet-dimensions are 4½ H x 11 W x 3¼" D. "Stereo-Trol" sells for $24.95 and is available from Lafayette Radio, Dept. KCP, 111 Jericho Turnpike, Syosset, L. I., N. Y. 11791.

Photo Timer Kit

A new kit for the darkroom dweller the Heathkit Photo Timer, model PT-15, allows the user to accurately control exposure times of both contact and enlarging operations in tenths of a second up to 9.9 seconds, and in full seconds up to 99 seconds. To accomplish this, the new timer employs two switch-selected ranges which also allow accurate resetting of any interval any time. Additional features include AC outlets for the enlarger

and safelight; all solid-state electronic circuitry—no gear drive mechanisms to wear out, nor light leaks; a Time-Focus switch to permit turning off the enlarger manually; and a "stop" switch to halt the exposure process if you decide the time interval is incorrect.



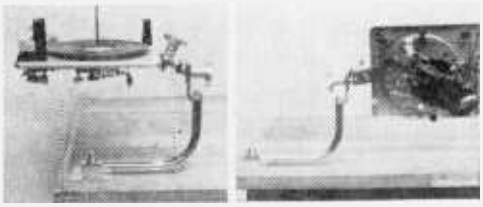
Heathkit Photo Timer, Model PT-15

Here's how the Photo Timer works—set the desired exposure time, and push the "start" button. The photo-timer turns on the enlarger and extinguishes the safelight. At the end of the pre-selected interval, it automatically turns the enlarger off and the safelight on. To quickly expose more than one print, just tap the "start" button to repeat the cycle. Every exposure will be accurate to within 2 percent of the first interval. For full information on the PT-15 simply drop a note or postal card to the Heath Company, Dept. EB, Benton Harbor, Michigan 49023.

Third Hand for Workbench

Uni-Swiv is a new work holder that secures parts and products in any desired position during repair, production and home workbench jobs. Originally designed for better handling of record changers during repairs, it also serves as a third hand to hold a variety of other items. In many applications, it eliminates the need for a vice.

Uni-Swiv mounts to the workbench tabletop. To conserve space, it may be bolted to the front corner so work can be swung out over the front or side. The unit may be moved easily from one position to another. It



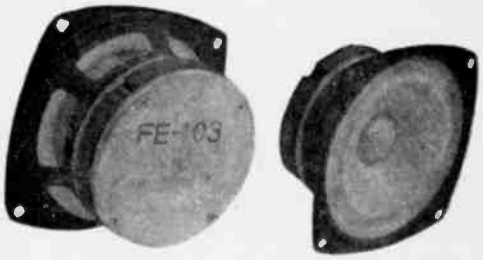
Uni-Swiv Work Holder

NEW products

consists of a 1-inch diameter nickel-plated "L" shaped bar and tube that swivels in a 22-inch horizontal arc around the base. The bar curves upward 7¼" to a clamp-holder and clamp containing Neoprene pads which permit rotation of the work 360 degrees in both horizontal and vertical planes. Both the clamp-holder and clamp have hand-locking knobs for fast easy adjustments and for clamping the work. Swivel tension is designed to provide smooth action without the need of adjustment. Priced at $24.95 list, Uni-Swiv is manufactured and distributed by E. Konigslow Stamping & Tool Co., Dept. AFZ, 450 N. Ninth St., Elwood, Ind. 46036.

4-Inch Speaker for Miniature Systems

Olson Electronics is now offering their new 4-inch high-compliance speaker, Model S-732. Speaker cone is suspended from the metal frame by a soft, flexible cloth ring. Powerful ceramic magnet develops over 10,000 gauss. Olson claims excellent performance is obtained in an enclosure only 280 cubic inches in volume. Recommended cabinet size is only 8¾" x 8" x 6⅛". Response: 35 to 16,000 cps. Impedance: 8 ohms. Power capacity 15 watt IHF. Available from Olson at $8.98 each. For more information write to Olson Electronics, Inc., Dept. WW, 260 So. Forge Street, Akron, Ohio 44308.



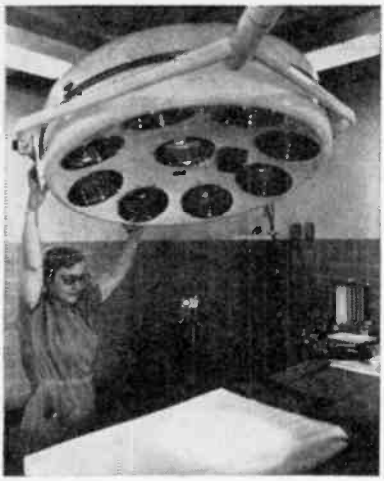
Olson 4-inch High-Compliance Speaker

Get That Catalog. This column can only hope to cover selected new products. Many others, some of which may be of greater interest to you than our selections, are eventually listed in mail order catalogs of major (and *minor*) radio and electronic part supply houses. Write today for their catalogs and keep informed.

(More NEW PRODUCTS *on page 92)*

WORLD OF NEWS

A TV Eye for Ben Casey



A closed circuit television camera, recessed in a surgical light at Hollywood, Calif. Hospital, allows the medical staff, nurses and internes to follow surgery at a remote location. The 800 line, high resolution camera transmits a signal to monitors some distance from the operating room and allows a close-up view of the operation in greater detail than would be possible in a surgical amphitheatre. The system, believed to be the first installed in a surgical light, is designed so the surgeon and observers may converse over a communications system. If the surgeon moves the light, camera settings may be changed by an operator at a remote location.

X-Rayed to the Top

X-ray technicians working hundreds of feet above the ground radiographed every welded joint in the gleaming stainless steel Gateway Arch that now dominates the St. Louis skyline. And they used atomic energy to do it. Each Saturday morning when the construction site was cleared of construction personnel, two "human fly" radiographers made their way to the top with a Picker-Tech/Ops Iridium-192 "gamma ray projector." This is a device that sends gamma radiation—very similar in wave length and penetrating power to conventional x-rays—through solid substances and projects a radiographic image of the solid's interior on x-ray film. The equipment was developed by Technical Operations Inc. for Picker X-Ray Corporation.

The progress of the two radiologists matched that of the structure itself. At the start, they radiographed freshly welded seams atop each of

(Continued on page 87)

Literature Library

Numbers in heavy type indicate advertisers in this issue. Consult their ads for additional information.

ELECTRONIC PARTS

1. This 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 latest *Allied Radio* catalog? The surprising thing is that it's free!

2. The new 510-page 1966 edition of *Lafayette Radio's* multi-colored catalog is a perfect buyer's guide for hi-fi'ers, experimenters, kit builders, CB'ers and hams. Get your free copy, today!

3. *Progressive "Edu-Kits" Inc.* now has available their new 1966 catalog featuring hi-fi, CB, Amateur, test equipment in kit and wired form. Also lists books, parts, tools, etc.

4. We'll exert our influence to get you on the *Olson* mailing list. This catalog comes out regularly with lots of new and surplus items. If you find your name hidden in the pages, you win $5 in free merchandise!

5. Unusual scientific, optical and mathematical values. That's what *Edmund Scientific* has. War surplus equipment as well as many other hard-to-get items are included in this new 148-page catalog.

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

7. Whether you buy surplus or new, you will be interested in *Fair Radio Sales Co.'s* latest catalog—chuck full of buys for every experimenter.

8. Want a colorful catalog of goodies? *John Meshna, Jr.* has one that covers everything from assemblies to zener diodes. Listed are government surplus radio, radar, parts, etc. All at unbelievable prices.

10. *Burstein-Applebee* offers a new giant catalog containing 100's 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.

12. VHF listeners will want the latest catalog from *Kuhn Electronics.* All types and forms of complete receivers and converters.

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

25. Unusual surplus and new equipment/parts are priced "way down" in a 32-page flyer from *Edlie Electronics.* Get one.

75. *Transistors Unlimited* has a brand new catalog listing hundreds of parts at exceptionally low prices. Don't miss these bargains!

HI-FI/AUDIO

13. Here's a beautifully presented brochure from *Altec Lansing Corp.* Studio-type mikes, two-way speaker components and other hi-fi products.

15. A name well-known in audio circles is *Acoustic Research.* Here's its booklet on the famous AR speakers and the new AR turntable.

16. *Garrard* has prepared a 32-page booklet on its full line of automatic turntables including the Lab 80, the first automatic transcription turntable. Accessories are detailed too.

17. Two brand new full-color booklets are being offered by *Electro-Voice, Inc.* that every audiophile should read. They are: "Guide to Outdoor High Fidelity" and "Guide to Compact Loudspeaker Systems."

19. *Empire Scientific's* new 8-page, full color catalog is now available to our readers. Don't miss the sparkling decorating-with-sound ideas. Just circle #19.

22. A wide variety of loudspeakers and enclosures from *Utah Electronics* lists sizes shapes and prices. All types are covered in this heavily illustrated brochure.

24. Here's a complete catalog of high-styled speaker enclosures and loudspeaker components. *University* is one of the pioneers in the field that keeps things up to date.

26. Always a leader, *H. H. Scott* introduces a new concept in stereo console catalogs. "At Home With Stereo" the 1966 guide, offers decorating ideas, a complete explanation of the more technical aspects of stereo consoles, and, of course, the complete new line of *Scott* consoles.

27. An assortment of high fidelity components and cabinets are described in the *Sherwood* brochure. The cabinets can almost be designed to your requirements, as they use modules.

30. Tone-arms, cartridges, hi-fi, and stereo preamps and replacement tape heads and conversions are listed in a complete *Shure Bros.* catalog.

95. Confused about stereo? Want to beat the high cost of hi-fi without compromising on the results? Then you need the new 24-page catalog by *Jensen Manufacturing.*

TAPE RECORDERS AND TAPE

31. "All the Facts" about *Concord Electronics Corporation* 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-Tarzian* 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.

33. Become the first to learn about *Norelco's* complete Carry-Corder 150 portable tape recorder outfit. Four-color booklet describes this new cartridge-tape unit.

34. The 1966 line of *Sony* tape recorders, microphones and accessories is illustrated in a new 16-page full color booklet just released by *Superscope, Inc.*, exclusive U.S. distributor.

35. If you are a serious tape audiophile, you will be interested in the new *Viking of Minneapolis* line—they carry both reel and cartridge recorders you should know about.

91. Sound begins and ends with a *Uher* tape recorder. Write for this new 20 page catalog showing the entire line of *Uher* recorders and accessories. How to synchronize your slide projector, execute sound on sound, and many other exclusive features.

HI-FI ACCESSORIES

76. A new voice-activated tape recorder switch is now available from *Kinematix.* Send for information on this and other exciting products.

39. A 12-page catalog describing the audio accessories that make hi-fi living a bit easier is yours from *Switchcraft, Inc.* The cables, mike mixers, and junctions are essentials!

KITS

41. Here's a firm that makes everything from TV kits to a complete line of test equipment. *Conar* would like to send you their latest catalog—just ask for it.

42. Here's a 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. A new short-form catalog (pocket size) is yours for the asking from *EICO.* Includes hi-fi, test gear, CB rigs and amateur equipment—many kits are solid-state projects.

AMATEUR RADIO

46. A long-time builder of ham equipment, *Hallicrafters* will send you lots of info on the ham, CB and commercial radio-equipment.

CB—BUSINESS RADIO SHORT-WAVE RADIO

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

49. Want to see the latest in communication receivers? *National Radio Co.* puts out a line of mighty fine ones and their catalog will tell you all about them.

50. Are you getting all you can from your Citizens Band radio equipment? *Amphenol Cadre Industries* has a booklet that answers lots of the questions you may have.

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

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

55. Interested in CB or business-band radio? Then you will be interested in the catalogs and literature *Mosley Electronics* has to offer.

90. If two-way radio is your meat, send for *Pearce-Simpson's* new booklet! Its 18 pages cover equipment selection, license application, principles of two-way communications, reception, and installation.

93. *Heath Co.* has a new 23-channel all-transistor 5-watt CB rig at the lowest cost on the market, plus a full line of CB gear. See their new 10-band AM/FM/Shortwave portable and line of shortwave radios. #93 on the coupon.

96. If a rugged low-cost business/industrial two-way radio is what you've been looking for. Be sure to send for the brochure on *E. F. Johnson Co.'s* brand new Messenger "202."

SCHOOLS AND EDUCATIONAL

56. *Bailey Institute of Technology* offers courses in electronics, basic electricity and drafting as well as refrigeration. More information in their informative pamphlet.

57. *National Radio Institute*, a pioneer in home-study technical training, has a new book describing your opportunities in all branches of electronics. Unique training methods make learning as close to being fun as any school can make it.

36. *Coyne Electronics Institute* offers home/resident training in electricity, radio-TV, electronics, refrigeration and air conditioning.

59. 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.*

60. Facts on accredited curriculum in E. E. Technology is available from *Central Technical Institute* plus a 64-page catalog on modern practical electronics.

61. *ICS (International Correspondence Schools)* offers 236 courses including many in the fields of radio, TV, and electronics. Send for free booklet "It's Your Future."

74. How to get an F.C.C. license, plus a description of the complete electronic courses offered by *Cleveland Institute of Electronics* are in their free catalog. Circle #74.

94. *Intercontinental Electronics School* offers three great courses: stereo radio & electronics; basic electricity; transistor. They are all described in *Inesco's* 1966, 16-page booklet.

ELECTRONIC PRODUCTS

62. Information on a new lab transistor kit is yours for the asking from *Arkay International.* Educational kit makes 20 projects.

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

64. If you can use 117-volts, 60-cycle power where no power is available, the *Terado Corp.* Trav-Electric 50-160 is for you. Specifications are for the asking.

67. "Get the most measurement value per dollar," says *Electronics Measurements Corp.* Send for their catalog and find out how!

92. How about installing a transistorized electronic ignition system in your current car? *AEC Laboratories* will mail their brochure giving you specifications, schematics.

TELEVISION

70. *Heath Co.* now has a 25" rectangular-tube color TV kit in addition to their highly successful 21" model. Both sets can be installed in a wall or cabinet: both are money-saving musts!

73. Attention, TV servicemen! *Barry Electronics* "Green Sheet" lists many TV tube, parts, and equipment buys worth while examining. Good values, sensible prices.

72. Get your 1966 catalog of *Cisin's* TV, radio, and hi-fi service books. Bonus—TV tube substitution guide and trouble-chaser chart is yours for the asking.

29. Install your own TV or FM antenna! *Jefferson-King's* exclusive free booklet reveals secrets of installation, orientation; how to get TV-FM transmission data.

97. Interesting, helpful brochures describing the TV antenna discovery of the decade—the log periodic antenna for UHF and UHF-TV, and FM stereo. From *JFD Electronics Corporation.*

TOOLS

78. You can easily select the right tool for easy, speedy driving of Bristol Multiple Spline and Allen Hex socket screws from *Xcelite's* compact, interchangeable blade sets. Send for Bulletin N365 for details.

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BEGINNERS All Wave Radio Kit, tube and transistor included $3.00. Ekeradio, Box 131, Temple City, Calif.

IT'S Supercalifragilisticexpialidocious! Free information about Kit-of-the-Month Club and new catalog: Etched Circuit Boards, Radio Books. Exclusive items. Leader Enterprises, Box 44718KS, Los Angeles, 90044.

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Won't you please help us?

We'd like to learn a little more about the readers of RADIO-TV EXPERIMENTER. Nothing personal of course, just some general information which will assist us in the planning of a better magazine for you.

When you've completed the questionnaire, just put it into an envelope and mail it back to us. If you wish, you needn't even tell us your name. Thanks for your help.

—Julian M. Sienkiewicz, Editor

1 — First, please indicate your age group.
- ☐ under 18
- ☐ 18 to 24
- ☐ 25 to 34
- ☐ 35 to 44
- ☐ 45 to 54
- ☐ over 55

1a — ☐ Male ☐ Married ☐ Female ☐ Single
No. of Children ☐ one ☐ two ☐ three ☐ more

2 — What is your present occupation? (if you go to school part time and work part time, please indicate both)
- ☐ armed forces
- ☐ business owner
- ☐ clerical
- ☐ craftsman
- ☐ official (gov't)
- ☐ professional
- ☐ student
- ☐ technical
- ☐ sales
- ☐ other_____ (SPECIFY)

3 — What was the last school you attended?
- ☐ grade school
- ☐ high school
- ☐ college
- ☐ graduate school

3a — Did you graduate? ☐ yes ☐ no

4 — Have you ever taken a correspondence course?
☐ yes ☐ no

4a — Do you intend to take a correspondence course?
☐ yes ☐ no
if yes, what type of course?
- ☐ electronic technician
- ☐ electronic computers
- ☐ basic electricity
- ☐ TV & radio servicing
- ☐ general theory
- ☐ communications
- ☐ other_____ (SPECIFY)

5 — Would you indicate the approximate total annual family income?
- ☐ under $3000
- ☐ $3000 to $4999
- ☐ $5000 to $6999
- ☐ $7000 to $9999
- ☐ $10,000 to $14,999
- ☐ $15,000 and over

6 — How often do you buy RADIO-TV EXPERIMENTER?
- ☐ this is my first issue
- ☐ whenever I see it
- ☐ regularly
- ☐ I subscribe

6a — How long do you keep your copy of RADIO-TV EXPERIMENTER?
- ☐ about 1 month
- ☐ more than 1 month
- ☐ more than 3 months
- ☐ as permanent library reference

6b — How many people, other than you, will read this copy of RADIO-TV EXPERIMENTER?
_____ (NO. OF PEOPLE)

7 — What other electronic magazines do you read?

	regularly	once in a while
Electronics Illustrated	☐	☐
Electronics World	☐	☐
Elementary Electronics	☐	☐
Popular Electronics	☐	☐
Radio Electronics	☐	☐

8 — What is there about electronics that interests you the most?
- ☐ HI-FI
- ☐ CB
- ☐ SWL
- ☐ ham radio
- ☐ construction
- ☐ experimentation
- ☐ servicing
- ☐ other_____ (SPECIFY)

9 — Do you own any equipment of your own, such as,
- ☐ oscilloscope
- ☐ V.O.M.
- ☐ V.T.V.M.
- ☐ signal generator
- ☐ CB transceiver
- ☐ ham transmitter
- ☐ communications receiver
- ☐ other_____ (SPECIFY)

10 — How much money have you spent on equipment in the past year?
$_____on test equipment
$_____on Hi-Fi equipment
$_____ham equipment
$_____on CB equipment
$_____on SWL equipment
$_____other_____ (SPECIFY)

11 — What type of equipment do you expect to purchase this year?
- ☐ test equipment
- ☐ Hi-Fi equipment
- ☐ communication equipment (ham, CB, SWL)
- ☐ other _____ (SPECIFY)

11a — How much do you expect to spend on your new equipment purchases?
- ☐ under $50
- ☐ $50 to $99
- ☐ $100 to $199
- ☐ $200 to $299
- ☐ $300 to $399
- ☐ over $400

12 — Do you find White's Radio Log useful?
☐ Yes ☐ No comment_____

Please mail to: JULIAN M. SIENKIEWICZ, Editor, Radio-TV Experimenter, 505 Park Avenue, New York, New York 10022

Thanks again.

If you wish, you needn't give us your name and address.

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Build a 6 meter Solid-State Transmitter

by Edward A. Morris
W12VLU

A simple circuit—Easy to build and to operate as a portable, mobile or emergency Ham station. Ideal as a first station or as an extra rig for any Ham.

HERE is one QRP* 6-meter transmitter that does not *sound* QRP! This potent handful uses a total of 7 semiconductors—5 transistors and one diode, to generate one of the cleanest signals you will hear on 6-meters. The RF section operates at a DC power input level of 250 milliwatts. Clean, crisp, 100% modulation is the result of high level collector modulation. The modulator itself uses two transistors to drive the class B push-pull modulating stage. A push-to-talk ceramic microphone and internal relay switching add to the convenience and operating utility of this little rig. The transmitters output network will provide a good match for antennas whose impedance is 30 to 75 ohms.

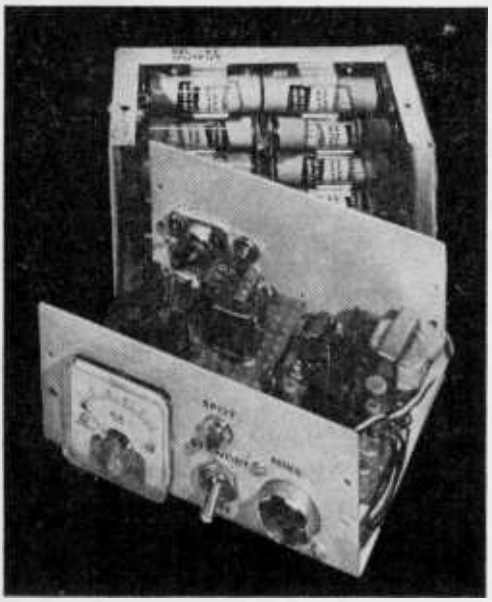
There's More. Other features include a spot switch, internal antenna transfer and receiver mute terminals operated by the push-to-talk relay. A built in relative RF output meter makes tune up a snap, and also provides an indication of

Continued Overleaf

*QRP: Decrease power; followed by question mark (QRP?), must I decrease power? As used in text above, "Reduced power" 6-meter transmitter.

battery strength. Operating power is derived from ten inexpensive AA-size penlight cells.

Modular type construction allows even a beginner to tackle this rig with confidence. Low in cost, it will fit a beginners modest budget. Total cost is under $35.00—and that's using all new, quality components throughout. Later on we'll tell you how to reduce this cost almost in half with just a few modifications. More about that later.



Completed unit shows compactness that is possible by using modular construction.

Go Walkie-Talkie. The transmitter described here was built as part of an all solid state 6-meter amateur station. The companion receiver was physically designed to match the transmitter. The receiver, built in the same size case, can be bolted to the right side of the transmitter to form a complete 6-meter station.

The receiver was described in the March/April, 1966 issue of ELEMENTARY ELECTRONICS which may have been on the newsstand when you purchased this issue of RADIO-TV EXPERIMENTER. If you missed this copy of ELEMENTARY ELECTRONICS, you can obtain one by ordering it direct from the publisher of this magazine, DAVIS PUBLICATIONS, INC. for $1.00 postpaid.

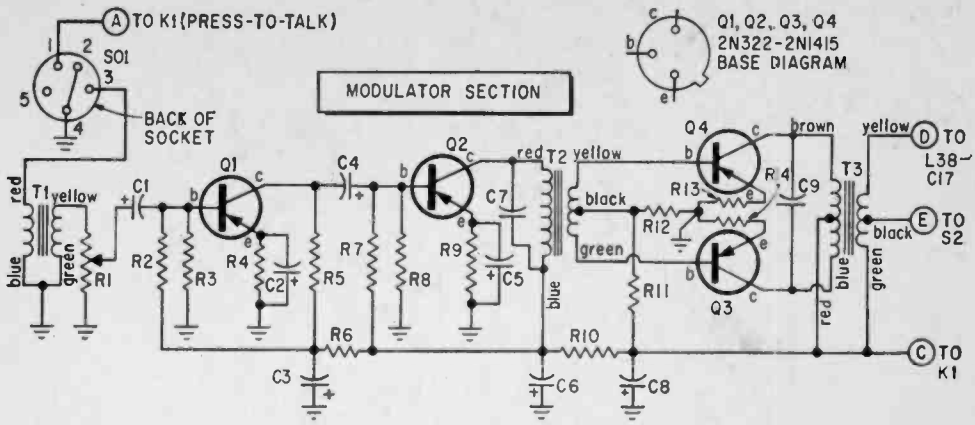
How it works. Let's first describe the action of the audio modulator, and then the RF section. Later on, how they work together.

Audio signals generated by the ceramic microphone are coupled into the primary of transformer T1, which matches the high microphone impedance to the low input impedance of transistor Q1. Variable resistor R1 serves as the modulation control. Audio from the secondary of T1, is coupled into the base of Q1 by capacitor C1. The bias on Q1 is preset by resistors R2 and R3. This stage is stabilized by resistor R4, which is by-passed by capacitor C2. Resistor R5 is the collector load for transistor Q1.

The audio voltage developed across R5 is coupled into the base of transistor Q2. The operation of this stage is identical to the first with the exception that a transformer, T2,

Parts List for 6-meter Solid-state Transmitter

B1-B10—1.5 volt AA cells (See text)
C1, C4—10-mf., 12-WVDC miniature electrolytic capacitor, (Lafayette 99R6082 or equiv.)
C2, C3, C5—50-mf., 12-WVDC miniature electrolytic capacitor (Lafayette 99R6085 or equiv.)
C6, C8—10-mf., 15-WVDC miniature electrolytic capacitor (Lafayette 99R6049 or equiv.)
C7—.005-mf., 75-WVDC miniature ceramic capacitor (Lafayette 99R6062 or equiv.)
C9—.05-mf., 75-WVDC miniature ceramic capacitor (Lafayette 99R6068 or equiv.)
C10—100-mmf., 500-WVDC ceramic capacitor
C11, C14—.01-mf., 75 WVDC miniature ceramic
C15, C19—capacitor (Lafayette 99R6063 or equiv.)
C12—20-mmf., 500-WVDC ceramic capacitor
C13, C17—68-mmf., 500-WVDC ceramic capacitor
C16—15-mmf., 500-WVDC ceramic capacitor
C18—10-mmf., 500-WVDC ceramic capacitor
D1—1N64 crystal diode
J1, J3, J4—phono jack, single hole mounting
J2—RF Connector, type SO-239
K1—3 p.d.t. miniature relay (Potter and Brumfield KM14D, 12-VDC coil. See text)
L1—4 ¾ turns No. 26 wire close wound on ⅜ o.d. ferrite tuned coil form
L2—1 ¼ turns No. 26 wire, wound around top of L1
L3—5 ¾ turns No. 26 wire close wound on ⅜ o.d. ferrite tuned coil form
M1—0-1 ma. miniature meter (Lafayette 99R5052)
Q1, Q2—2N322 transistor (Motorola)
Q3, Q4—2N1415 transistor (GE)
Q5, Q6—2N2512 transistor (Amperex) (order from Newark Electronics Corp., 223 West Madison St., Chicago, Ill. 60606. Part No. 22F2634 @ $1.60 each)
R1—5,000-ohm miniature potentiometer (Lafayette 99R6143)
R2—100,000-ohms
R3—15,000-ohms
R4—1,200-ohms



Modulator is only an audio amplifier. The main difference is in T3 secondary winding.

and not a resistor, is the collector load.

The output of transformer T2 drives the output stage, which is operated class B push-pull. The secondary of T2 is center tapped. As one transistor amplifies one half of the input signal, while the second transistor amplifies the other half.

Resistors R11 and R12 form a voltage divider which places a slight forward bias on transistors Q3 and Q4 to reduce cross-over distortion. Stabilization of transistors Q3 and Q4 is accomplished by resistors R13 and R14 which are in series with the emitter leads. The amplified output appears in the secondary of transformer T3.

Now that we have discussed the operation of the modulator, let's turn to the RF section.

The RF carrier is generated by transistor Q5, which operates as a crystal controlled overtone oscillator. The bias on Q5 is set by resistors R15 and R16. Capacitor C10 bypasses resistor R15. The resonant circuit formed by capacitors C12, C13 and coil L1 is resonant at the crystal frequency. Capacitors C12 and C13 also form a voltage divider —the crystal (XTAL) being placed in the feedback path which starts and sustains oscillation.

Transistor Q6, which is the final amplifier, operates class B. Radio frequency energy at the crystal frequency is coupled into the base of Q6 by the secondary of coil L1, that is coil L2. The turns ratio of L1/L2 is arranged to match the low input impedance of Q6.

A small amount of bias is placed on Q6

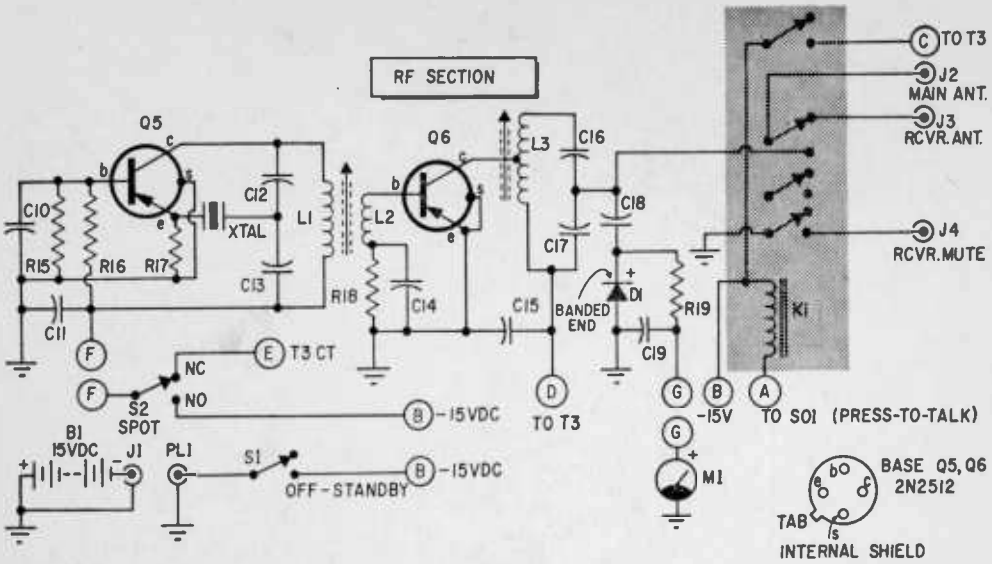
R5, 15—4,700-ohms
R6, 9—470-ohms
R7—220,000-ohms
R8—10,000-ohms
R10—220-ohms
R11—2,700-ohms
R12—47-ohms
R13, 15—10-ohms
R16—27,000-ohms
R17—100-ohms
R18—68-ohms
R19—330-ohms

Note: all fixed value resistors are ½-watt, ±10%

PL1—Phono jack, RCA type
SO1—5-pin chassis connector (Amphenol PCG-5)
S1—S.p.s.t. toggle switch
S2—S.p.d.t. push-button switch
T1—Miniature audio transformer; 100,000-ohm primary, 2,000-ohm secondary (Lafayette 99R6125)
T2—Miniature audio transformer; 10,000-ohm primary, 2,000-ohm C.T. secondary (Lafayette 99R6126)
T3—Miniature audio transformer; 500-ohm C.T. primary, 500-ohm C.T. secondary (Lafayette 33R8553)
XTAL—6-meter (50.1 to 54 mc.) 5th. overtone crystal
1—Push-to-talk microphone (Lafayette 44R0116)
1—Heat sink for Q6 (Thermalloy type 2211B)
1—Minibox, 5x4x3 inch (See text)
2—⅜ inch o.d. ferrite tuned coil form (Lafayette 99R6000 or 6001 or 6002)
Misc.—Nuts, bolts, solder, hook-up wire, ¼ o.d.-⅛ inch id plastic tube, perforated board, flea clips, eyelets, rubber feet, battery holders, etc.

Parts List—Bracket Handle

2—3 x ¾ x ⅛ inch aluminum
1—10 ⅜ x ¾ x ⅛ inch aluminum
2—¾ x? inch length of aluminum 90° angle stock
Misc.—Nuts, bolts, epoxy, microphone hang-up bracket, (supplied with microphone)



The usual high-frequency wiring techniques must be used when wiring this section of unit.

by resistor R18 and capacitor C14, which generate signal developed bias. The collector of Q6 is tapped down on L3 to obtain a better impedance match and maximum power output. Capacitors C16 and C17 form a capacitive voltage divider which matches the resonant-frequency impedance of the tank circuit to that of the antenna. A small portion of the output energy is sampled via capacitor C18. This energy is rectified by diode D1. This DC voltage is applied to the meter to provide a visual indication of RF power output.

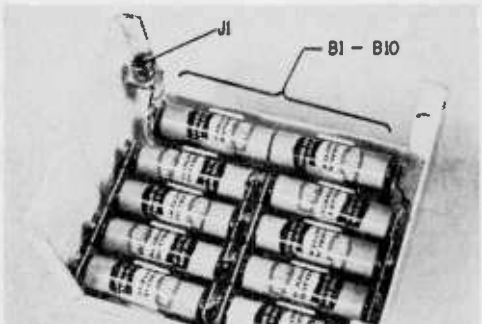
Team Work. Now that we have explained the operation of the modulator and RF sections separately, we'll show how they work together.

When the push-to-talk switch on the microphone is depressed, relay K1 is energized. A pair of contacts on the relay are closed and power is applied to the transmitter at point C. Notice that current flowing to the RF section must first pass through the secondary of the modulation transformer, T3. When you speak into the microphone, the audio modulation voltage appears in series with the DC voltage. This audio modulation voltage adds and subtracts from the DC voltage according to the input signal. Thus the current to the RF section is modulated by the input audio signal, and the carrier is modulated.

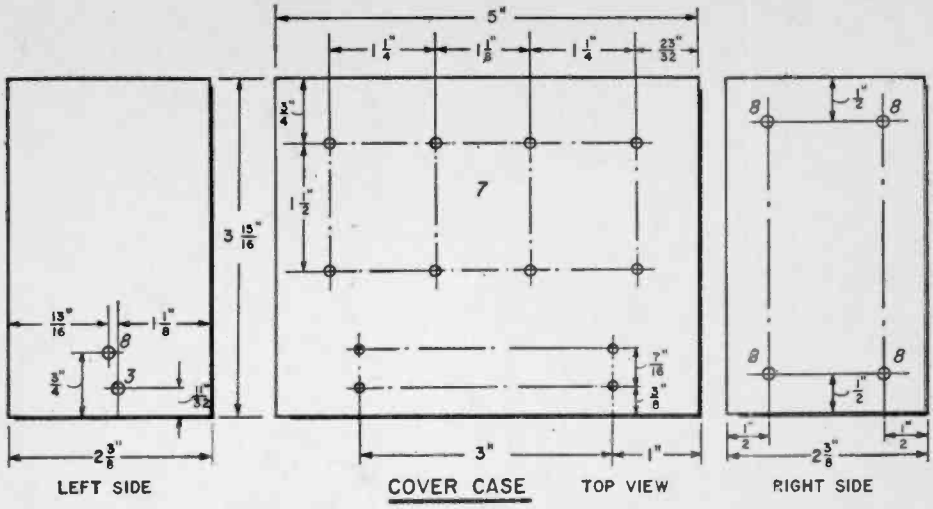
Mechanical Construction. The transmitter is built into a standard 5x4x3 inch aluminum chassis cut down to 5x4x2⅜ inches. To modify the case, the bottom ⅝ inch from each half of the box is cut off. It's a simple job with a hacksaw or a hand nibbler. Dress any rough edges with a file.

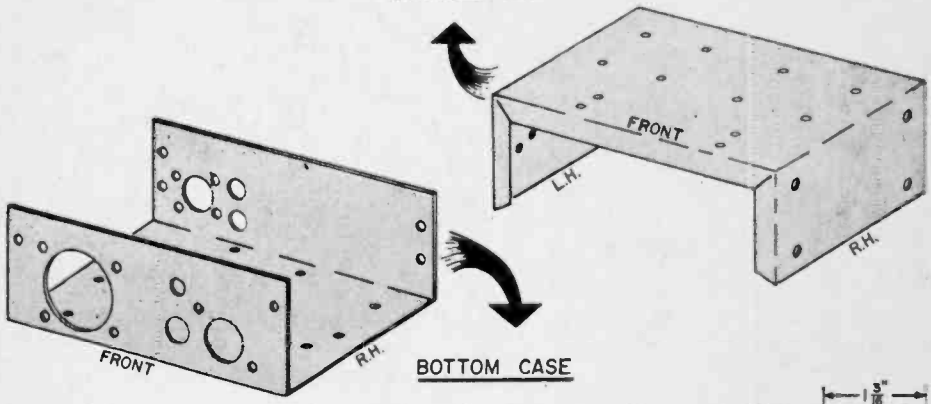
Lay out the spots to be drilled in the case with a square. Center punch each spot to be drilled before drilling. The larger holes can be formed by first drilling a small hole and using a reamer to enlarge it to the proper size. The holes for meter M1 and socket SO1 are most easily made with a Greenlee chassis or knock-out punch.

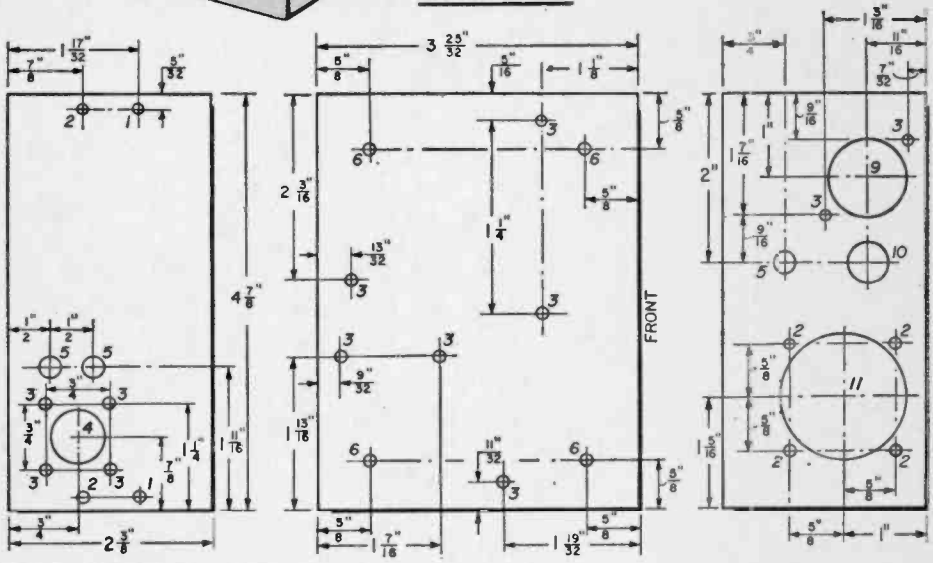
After all the mechanical work on the case has been completed, the case is prepared for painting. Wash the case to remove any dirt or grease which might prevent the paint from adhering to the case properly. The case can



Batteries mounted in cover provide the 15-volts DC. Keep contacts clean and secure.







Notes on Chassis Box Preparation

1. Original hole in case.
2. 3/32" diameter hole.
3. Hole for #4 screw.
4. 5/8" diameter hole.
5. 1/4" diameter hole.
6. Hole for #6 screw.
7. All holes in case cover top are for #4 screws.
8. Holes for #8 screws.
9. 7/8" diameter hole.
10. 1/2" diameter hole.
11. 1 1/2" diameter hole.

then be painted using a good quality spray paint following the paint manufacturer's directions.

Suitable decals may then be applied to give the transmitter a professional, finished appearance. Apply several light coats of a clear spray paint to protect both the paint job and the decals.

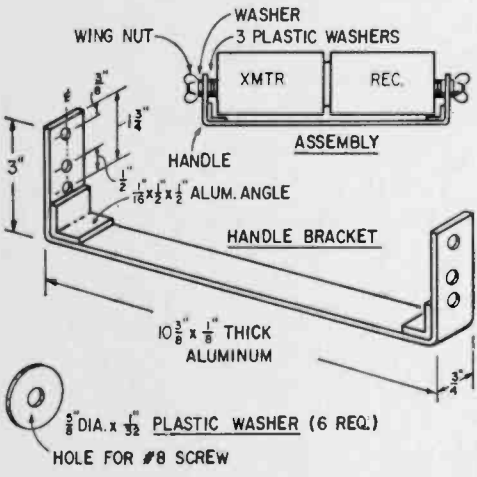
The mounting bracket (see drawings) is assembled using ¾ x ⅛ inch aluminum stock cut to the dimensions given. The corner brackets, made from aluminum angle stock, were *epoxied* to the side pieces. The reader may prefer to use conventional hardware. The microphone bracket, which comes with the microphone, is mounted using 6-32 hardware.

Electrical Construction — Modulator. The modulator is built on a 1 15/16 x 2 13/16 inch piece of perforated board. The general parts layout can be seen in the photographs. Most of the components are mounted upright in order to conserve space. Although the layout is not critical, due to the compact construction of the modulator, the reader would do well to follow the layout presented. Modulator Location Table gives the exact location of all capacitors and resistors on the perforated board. The placement of transistors Q1 through Q4 and transformers can be determined from the photographs.

After the modulator is wired, recheck it for possible errors. After you've assured yourself that the wiring is correct, proceed to test the modulator.

Testing Modulator Section. Insert the transistors. Temporarily connect a 470-ohm, ½-watt resistor from point C to D. Connect a VOM set to read AC volts across the 470-ohm resistor. Connect a microphone to the input. Apply negative (−) 15 volts to point C, and positive (+) 15 volts to a ground point. Set the modulation control R1 so that the meter reads 7 to 7.5 volts rms when speaking into the microphone in a slightly louder than normal voice. The modulator is now set to modulate the transmitter 80 to 100%.

If a VOM is not available, a medium impedance (500 to 2,000 ohms) headset can be used to check that the modulator is operating.



Handle is used as bracket to mount rig under dashboard or for tabletop tilting.

Electrical Construction—RF Section. The RF transmitter section is built on a piece of copper clad perforated board to simplify construction. Areas of the copper are stripped from the board to provide insulated areas for flea clips, coils, etc. Remember that at VHF frequencies, all leads should be as short as possible to ensure proper operation.

Coils L1, L2, and L3 are wound on miniature ⅜-inch o.d. coil forms. The coil forms specified are replacement parts for popular CB walkie talkies, and are easy to obtain. Strip off the original winding and rewind the coils as given in the Parts List. A drop of wax or Duco cement will keep the turns from coming loose. Be sure that the tap on coil L3 does not short to an adjacent turn.

Complete the wiring as shown in the schematic diagram. Recheck your work for possible errors.

Testing RF Section. After the RF board has been checked over, test it as follows.

Plug in transistors Q5 and Q6. As transistor Q6 is operated close to its maximum power rating, be sure to use the heat sink specified in the parts list. Plug a 6-meter (50.1 to 54 mc.) 5th overtone crystal into the crystal socket. Using jumper leads, connect terminals F, D, and C together. Connect the positive terminal of meter M1 to terminal G, and the negative terminal to ground. Temporarily solder a 47-ohm, ½-watt resistor from the junction of capacitors C16 and C17 to ground. Use short leads. Connect negative (−) 15 volts to terminal B, and positive (+) 15 volts to ground. When terminal A is momentarily contacted to ground, relay R1 should pull in and meter M1 should deflect up scale. Tune coils L1 and L3 for maximum on meter M1. A meter indication of 0.6 to 0.9 will indicate that the RF section is operating correctly.

Final Testing and Alignment. Assuming no wiring errors have been made during the final assembly, the transmitter should require only minor adjustments to tune it up for peak output and 100% modulation.

Connect a 50-ohm dummy load to J2. If you don't already have one, you can make one up quite easily. Insert a 50-ohm (47-ohms will also do), ½-watt resistor into a PL-259 connector, pass one lead through the center conductor and solder. The remaining lead is soldered to the shell of the connector.

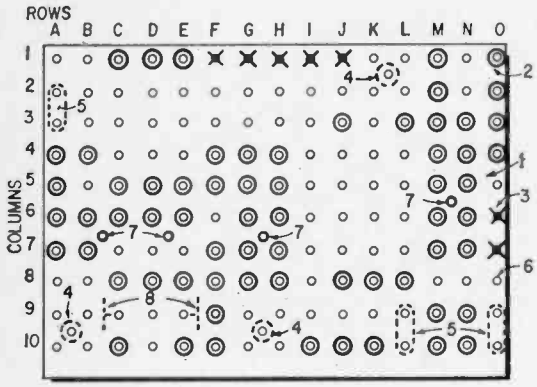
Plug in the battery pack, and the microphone to the unit. Switch S1 to the stand-by position. When you depress the push-to-talk button, on the microphone, meter M1 should deflect up scale, indicating that there is output. If it does not, recheck the wiring.

Key the push-to-talk switch, and without speaking into the microphone, peak coils L1 and L3 for maximum reading on meter M1. A reading of 0.6 to 0.9 is about right. With the dummy load still connected, listen to the transmitter with a receiver tuned to the transmitter's frequency. Adjust the modulation control, variable resistor R1, for best modulation when speaking in a slightly louder than normal voice. The modulation control should not be advanced *too high*, however, or the transmitter may overmodulate on peaks.

On the Air. Operating this rig is a breeze. Once the necessary tune-up adjustments have been made, you can forget them. This is one rig you don't have to shout into to be heard —the modulator has plenty of reserve power.

Batteries are replaced when the indicated

Modulator section contains the greater number of electronic components. Table at right indicates resistor and capacitor positions on perforated board below. The completed modulator is at bottom right.



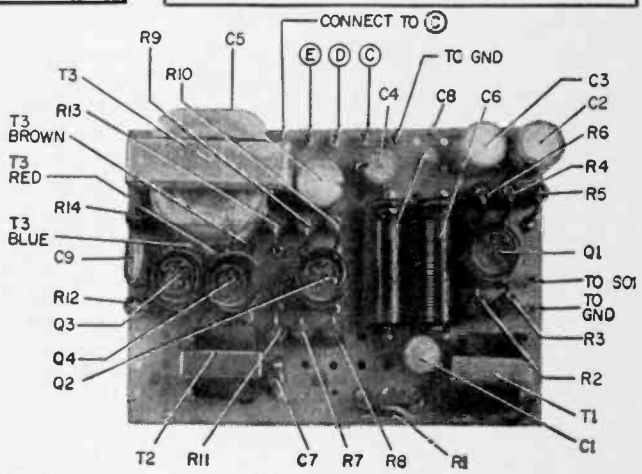
Modulator Location Table

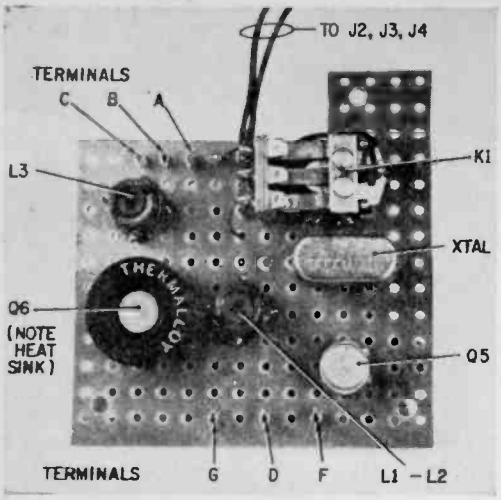
Resistor	Location	
R1	I 10, J10, K10	
R2	M6, M7*	
R3	N6, N7*	
R4	N3*, N4	
R5	O3*, O4	
R6	M3*, M4	*indicates which hole the upright resistor rests on.
R7	G7, G8*	
R8	H7, H8*	
R9	G4*, G5	
R10	H4*, H5	
R11	F7, F8*	
R12	A7*, B7	
R13	F4*, F5	
R14	A4*, B4	

Capacitor	Location	
C1	K8, K9*	
C2	O1*, O2	
C3	M1*, M2	
C4	I1*, J2	*indicates position of positive (+) terminal, if polarized.
C5	G3, H3*	
C6	L3*, L8	
C7	F9, F10	
C8	J3*, J8	
C9	A5, A6	

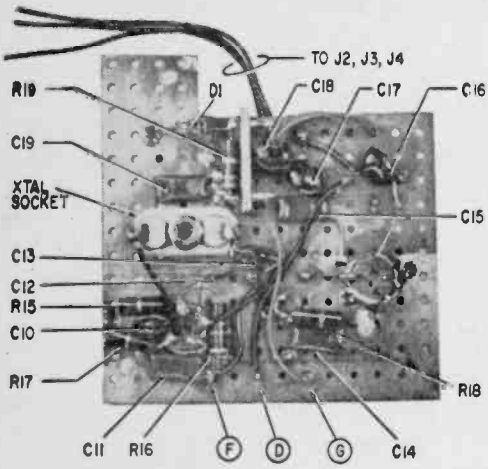
Notes on Modulator Perf-Board

1. Component side of board is shown. All interconnections are on other side.
2. Eyelet in hole is indicated with heavy circle.
3. Flea clip locations are (X).
4. Dotted circle indicates a hole drilled for #4 screw.
5. Dotted circular loop around two holes indicates cutout for transformer mounting.
6. Unmarked holes not used.
7. Small dark circles not in line with perf-board holes are drilled 1/16" diameter.
8. Slots cut for T2 mounting.





Top view of RF section (above) and the bottom view (below) have fewer components to squeeze into available space. Point-to-point wiring is used in RF stage to keep all lead lengths as short as possible thus keeping all stray capacitances lower.

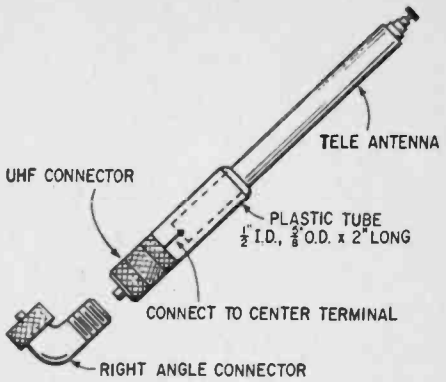


RF power output on meter M1 drops. You'll get more for your money if you use the premium alkaline cells. These cells do cost more initially, but will last far longer than ordinary cells, and actually reduce the operating cost-per-hour.

With a low power rig such as this, a good antenna is a must. A simple whip antenna suitable for portable operation can be assembled using a replacement type telescoping antenna joined to a PL-259 connector.

For best results when used as part of a fixed station, a better antenna should be used. A properly cut half wave dipole will give good results if it's mounted high and is in a good location. A beam type antenna would be your best bet.

Ranges of 30 to 50 miles are typical, and can be expected when the rig is used with a beam type antenna. A lot depends on the height and location of the antenna. Naturally, if you live on top of a 1500-foot hill, your



Adjust telescoping antenna around basic 54-inch length for maximum signal radiation. Don't remove antenna with power on.

results are likely to be a lot better than the fellow who lives *between* two 1500-foot hills! Skip contacts 600 to 1500 miles distant are possible during the summer months. For additional antenna information, the reader is referred to The Radio Amateur's Handbook published by the ARRL.

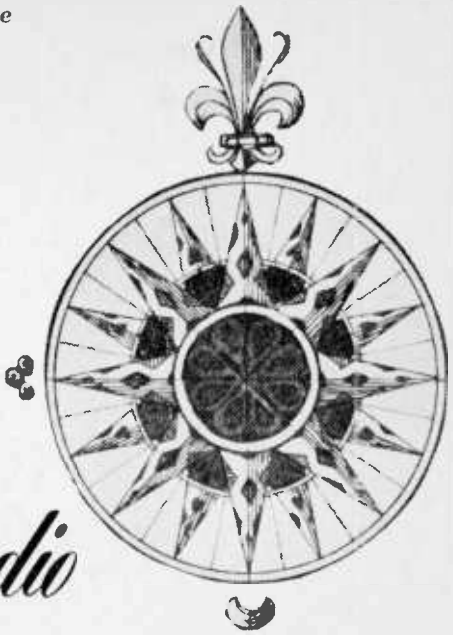
Warning. When operating this or any other transistorized transmitter, *NEVER key the transmitter without a suitable load being attached to the output!* To do so will most likely cause instantaneous damage to the RF output transistor. You have been warned.

Some Modifications. Earlier we mentioned that the cost of building this transmitter could be cut substantially by making a few modifications. If the reader is willing to forego the operating convenience of push-to-talk capability, Relay K1 can be replaced with an ordinary 3-position, double-throw slide switch. A standard microphone can be used in place of the push-to-talk microphone specified in the parts list. If you feel that you can do without the relative power output meter, and use a field strength meter to tune the rig up with, meter M1 and its associated components (C18, C19, D1, R19) may be dispensed with. Several dollars can be saved by shopping for the 6-meter crystal on the surplus market. A basic version of this transmitter can be built, using all *new* parts, for

(Continued on page 117)

You too can be a DX hound! All you need is patience and some late-night listening time.

14 Countries on your Table Radio



by Tom Kneitel
KBG4303

■ Think that *real* DX is something available to operators having sophisticated communications receivers? It isn't! With no more than a regular table radio (with the possible exception of those dreadful little 5-tube—and sometimes 4-tube—AC-DC sets) you can have a crack at aeronautical radiobeacons in 14 countries. True, the communications receivers will pull 'em in *better*—and *more often*—but your set will snag a good percentage of them.

These radiobeacon stations transmit their identification call over and over, very slowly in Morse code. The use of code is where you get your break, because the modulated dots and dashes are much easier for a receiver to monitor than are regular voice and music transmissions from broadcast stations. And don't let the fact that you might not be able to copy CW (continuous wave) code stop you from listening to these stations because they send so slowly that you can copy down the dots and dashes on a piece of paper and then decipher them. Since the letters are repeated over and over, there are plenty of chances for you to try again if you missed a letter.

Try Our List. While there have been spotty, very incomplete, listings of these radiobeacons published previously, the one presented here is (while still not complete) the most comprehensive one ever compiled.

The stations on the list should start showing up on your receiver around sunset and continue through the night. Most of them operate irregularly and it could be possible to hear as many as two or three on the same frequency during different periods on the same day!

If possible, you should use a long wire antenna when trying to receive these stations. If your set has a ferrite loopstick antenna, just string up 100 feet of wire outside your window and wrap three or four turns of it around the loopstick. If the set has two screw-terminals marked "A" and "G," attach the antenna to the "A" post. If possible, run the antenna from east to west, since most of the stations will be south of you and the long wire will receive best from a broadside direction.

Use the Mail. It's possible to get QSL's from these stations, and many listeners boast rather sizeable collections of wallpaper from aeronautical radiobeacon stations. When sending your report to the latin American beacons, address it in Spanish. A typical example would be: Estacion Radiofaro "CTG," Aerovias Nacionales de Colombia, Cartagena, Colombia. Enclose a prepared

Communications-type receiver (above) tunes to 1750 kc easily. It may be necessary to realign some table radios, unlike that at right, which do not tune to stations above 1600 kc calibration.

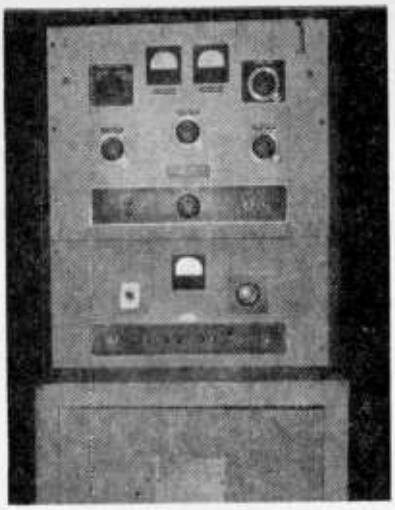
A small tropical town such as this is often the site of the beacon station. Unlike broadcast stations there is no staff to handle mail and no budget to cover cost of mailing a reply. Postage, for confirmation of your reception report, may be paid for by an employee. To insure a prompt reply include two International Reply Coupons in letter with self-addressed envelope —best way to make sure reply is addressed right.

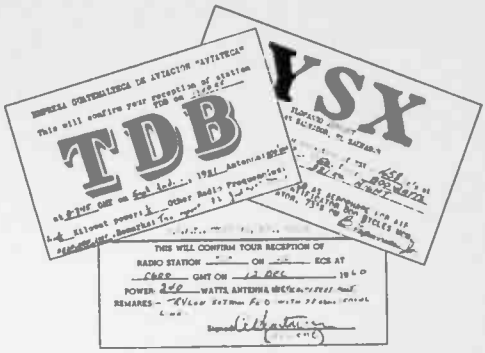
Medium-Wave Beacon Stations

Kc.	Ident. Call	Location	EST	Owner
1400	MS/ETC6	Massawa, Ethiopia	irreg.	
1500	JM/ETD9	Gimma, Ethiopia	irreg.	
	HQB/HQB	San Pedro Sula, Hond.	Irreg.	SAHSA
	JUI	Jashjurl, Peru		
1510	HQR/HQR	Ocotepeque, Hond.	Irreg.	SAHSA
1530	HQF/HQF	Puerto Cortes, Hond.	Irreg.	SAHSA
1540	HQK/HQK	Juticalpa, Hond.	Irreg.	SAHSA
1550	HQN/HQN	La Esperanza, Hond.	Irreg.	SAHSA
1560	HQG/HQG	Tela, Hond.	Irreg.	SAHSA
1570	HQS/HQS	S. Barbara, Hond.	Irreg.	SAHSA
1580	HQI/HQI	Yoro, Hond.	Irreg.	SAHSA
1590	HQP/HQP	S. Rosa de Copan, Hond.	Irreg.	SAHSA
1600	HQC/HQC	La Ceiba, Hond.	Irreg.	SAHSA
	LA	La Plma, Hond.	Irreg.	SAHSA
	MAL/OAR3	Puerto Maldonado, Peru	Irreg.	CAF
1602	LGM	Leguizamo, Colombia	Irreg.	FAC
1608		El Paso, Colombia	0500-1800	ANC
	PRN/PRN	Tupurquara, Brazil	Irreg.	
	PUD/PUD	Eirunepe, Brazil	Irreg.	
	PVB/PVB	Salvador, Brazil	Irreg.	
	VSA	Villahermosa, Mex.	Irreg.	
	YNP/YNP	Managua, Nicaragua	days	PAA
1609	BT	Vasskaren, Sweden	Irreg.	
1610	CTG	Cartagena, Colombia	0430-2400	ANC
1611.5	CHA	Charana, Bolivia	days	PANAGRA
1613	RAB	Rabinal, Guatemala		
1615	BOB	Bobures, Venez.		
	MIL	Quincemil, Peru		
	PSO	Pasto, Colombia	0800-1500	ANC
1617	KH	Karlshamn, Sweden	Irreg.	
1618	PVT/PVT	Santarem, Brazil	Irreg.	
	TUL/XACV	Tulancingo, Mex.	cont.	
1620	CEP	Concepcion, Bolivia	cont.	PANAGRA
	EBG	El Bagre, Colombia	0800-1500	ANC
	IZT	Ixtepec, Mexico		
	LAV	Tumeremo, Venez.		
	NLD	Nuevo Laredo, Mex.		
	URM	Urlman, Venez.		
1625	CDT	CondotoConbolo Cmla,	Irreg.	AN
	CZM/XACQ	Cozumel, Mex.		
	MZT	Mazatlan, Mex.		
	TGE/TGE	Guatemala City, Guat.	0600-1800	PAA
	TIKS/TIKS	San Jose, Costa Rica	cont.	PAA
	TIKX/TIKX	El Coro, Costa Rica		
	TQN	Tres Esquinas, Colombia	Irreg.	FAC
1628-(1698)	UXT/XACU	Tuxtla Gutierrez, Mex.	0500-1800	
1630	APB	Apolo, Bolivia		LAB
	MTR	Monteria, Colombia	0500-1800	ANC
	TJA	Tarija, Bolivia	cont.	LAB
1635	PPN	Popayan, Colombia	0800-1500	ANC
1638	CME	Carmen, Mex.		
	IAC	La Quiaca, Argentina	cont.	
	MTT/XACJ	Minatitlan, Mex.		
	PRN/PRN	Tapurucuara, Brazil		

Station Owners

AG	Pan American Grace Airways
ANC	Aerovias Nacionales de Colombia
ARM	Aeronautical Radio de Mexico
CAF	Compania de Avacion Faucet, S.A.
CORPAC	Corp. Peruana de Aeropuertos y Avlacon Comerical
CRAL	Costa Rican Air Lines
FAC	Fuerza Aerea Colombiana
GS	Golpet Sagoc.
LAB	Lloyd Aereo Boliviano
PAA	Pan American Airways, Inc.
PANAGRA	Pan American Grace Airways
SAHSA	Servicio Aereo de Honduras
SM	Sociedad Aeronautica de Medellin





Few beacon stations have printed QSL cards —you may get yours on a letterhead if you are lucky. Those above were handmade by author and sent along with the report. The blanks were filled in by operator of station. Typical transmitter is at left.

card for the station fill in and return to you. Enclose International Reply Coupon, too.

Since our list of radiobeacons was compiled piece meal from different sources, including monitoring reports sent to RADIO-TV EXPERIMENTER's DX central, we have come up against some conflicting data on the same stations. Whenever possible we have tried to reconcile these differences, but some stations seem to have been reported on more than one frequency. The additional frequency is given in parentheses in the table.

Most stations transmit only their identification letters, which, in some cases, happens to coincide with their callsign. Some radiobeacons are not assigned a regular callsign, just the identifying letters. Where both the callsign and identifying letters are known, these have been indicated on the list.

All you need now is a table radio and a little patience. Oh, you fellows with the communication jobs can join in the fun too—after all you discovered these stations in the first place! Happy DX'ing! ■

Kc.	Ident. Call	Location	EST	Owne
(1600)	SRE	Sucre, Bolivia	cont.	LAB
1638	THY/OAG3	Chachapoyas, Peru	irreg.	CORPAC
	ZCO/ZCO	Cuzco, Peru	days	CORPAC
	ZQC/ZQC	Piarco, Trinidad	irreg.	PAA
	ZYN/ZYN	Labrea, Brazil		
1640	JSE	San Jose, Bolivia	cont.	PANAGRA
	SOG	Sogamoso, Colombia	irreg.	ANC
1648	OAX/XACS	Oaxaca, Mex.	2330-1200	
	PRE/PRE	Aracaju, Brazil	irreg.	
	PRF/PRF	Bauru, Brazil	irreg.	
	PRU/PRU	Cuiaba, Brazil	irreg.	
(1688)	PUI/PUI	Tefe, Brazil	irreg.	
1648	PVC/PVC	Fortaleza, Brazil	irreg.	
(1708)	PVK/PVK	Altamira, Brazil	irreg.	
	TIJ	Tijuana, Mex.		
1648,5-(1600)	ASC	Ascension, Bolivia	irreg.	LAB
1650	MOY/OAP3	Moyobamba, Peru	irreg.	CAF
	UIB	Quibdo, Colombia	0600-1800	ANC
1655-(1660)	CUC	Cucuta, Colombia	0500-1800	ANC
1658	CPE	Campeche, Mexico		
	PRH/PRH	Maceio, Brazil	cont.	
(1688)	PRJ/PRJ	Benjamin Constant, Braz.	irreg.	
1658	PVM/PVM	Manaus, Brazil	irreg.	
1660	CLO	Cali, Colombia	0500-1800	ANC
1662	PZA	Puerto Cabezas, Nicar.		
1665	ZZD4/ZZD4	Jatai, Brazil	irreg.	
	ZZG2/ZZG2	Pedra Azul, Brazil	irreg.	
	ZZG6/ZZG6	Rio Verce, Brazil	irreg.	
	ZZG7-ZZG7	Vitoria ca Conquista, Braz.	irreg.	
	ZZG8/ZZG8	Guiratinga, Brazil	irreg.	
	ZZH3/ZZH3	Governador Valadarez, Brazil	irreg.	
	ZZZ9/ZZZ9	Altenas, Brazil	irreg.	
1668	GDL	Guadalajara, Mex.		
	HMO	Hermosillo, Mex.		
	MID	Merida, Mex.		
1670	AUR	Guatemala City, Guat.		
	CZU	Corozal, Colombia	0600-1800	ANC
	TIKY/TIKY	Puerto Limon, Costa Rica	cont.	PAA
	TIPM/TIPM	Palmar, Costa Rica		CRAL
1675	TOR	Tournavista, Peru		
	ULQ	Tulua, Colombia		
1678	PRI/PRI	Campo Grande, Brazil	irreg.	
	PRS/PRS	Mossoro, Brazil	irreg.	

Kc.	Ident. Call	Location	EST	Owner
	PVV/PVV	Vitoria, Brazil	irreg.	
	TIX/XADG	Tixtla, Mex.	0800-2300	ARM
1680	EJA	Barramcebermija, Col.	0500-2400	ANC
	TDT6/TDT6	Puerto Barrios, Guat.	0600-1900	AG
1685	DRC	Dos Rios, Colombia	0500-1800	ANC
1688	PPE	Punta Penasco, Mex.		
	PRG/PRG	Tres Lagoas, Brazil	irreg.	
	PUD/PUD	Tirunepe, Brazil	irreg.	
	PUI/PUI	ele, Brazil	irreg.	
	PVR	Puerto Vallarta, Mex.		
	PVU/PVU	Parnaiba, Brazil	irreg.	
1690	MDE	Medellin, Col.	0500-1900	ANC
	TDT7/TDT7	Carmelita, Guat.	0600-1900	AG
1695	TBU	Tibu, Colombia	irreg.	GS
1698	ACA/XADH	Pie de la Cuesta, Mex.	0800-2300	ARM
(1688)	PVG/PVG	Cucui, Brazil	irreg.	
1698	REX	Reynosa, Mex.		
	SDM	Santo Domingo, Mex.		
(1628)	TGZ	Tuxtla Gutierrez, Mex.	0500-1900	
1698	ZQC2/ZQC2	Galeota Pt., Trinidad	irreg.	PAA
1700	GU/ETC2	Gore, Ethiopia	irreg.	
	IBR/OAK3	Iberia, Peru	irreg.	CAF
	QIN/OAT3	Quince Mil, Peru	irreg.	CAF
	TDT5/TDT5	Flores, Guat.	0600-1900	AG
	URC	Urcos, Peru	irreg.	CAF
1704	HRD/HRD	Toncontin, Hond.	irreg.	PAA
	TGU	Tegucigalpa, Hond.		PAA
1705	AFI	Amalfi, Colombia	0800-1900	ANC
1708	MXL/XACI	Mexicali, Mex.	0700-1800	
	PRT/PRT	Canavierias, Brazil	irreg.	
	PUB/PUB	Caruaru, Brazil	irreg.	
	PUK/PUK	Corumba, Brazil	irreg.	
	PVR/PVR	Recife, Brazil	irreg.	
	TAM/XACA	Tampico, Mex.	0615-1745	
	TAP/XACX	Tapachula, Mex.	0800-1900	
1710	BUN	Buenaventura, Col.		
	IQQ/CBY	Iquique, Chile	irreg.	
	SNG	San Ignacio, Bolivia		
1715	TIKP/TIKP	Puntarenas, Costa Rica	cont.	PAA
1718.5	MZL	Manzanillo, Mex.		ARM
1730	GRN	Gravo Norte, Col.	irreg.	SM
1740	PO	Popton, Guat.		
1745	CGW	Cartago Valle, Colombia	0600-1800	ANC
1750	DD/ETC5	Dembidollo, Ethiopia	irreg.	
	PLT	Plato, Colombia		

Electronic Forerunner of our Underseas Future

By K. C. KIRKBRIDE

You are not in the swim if you think these predictions are all wet!

■ You have probably already been told that if you expect to stay in the swim at all you will soon be expected to own your own underwater home, complete with submarine in your underseas garage, and if you can't afford to buy a sub, you can rent one for a measley $100.00 a day.

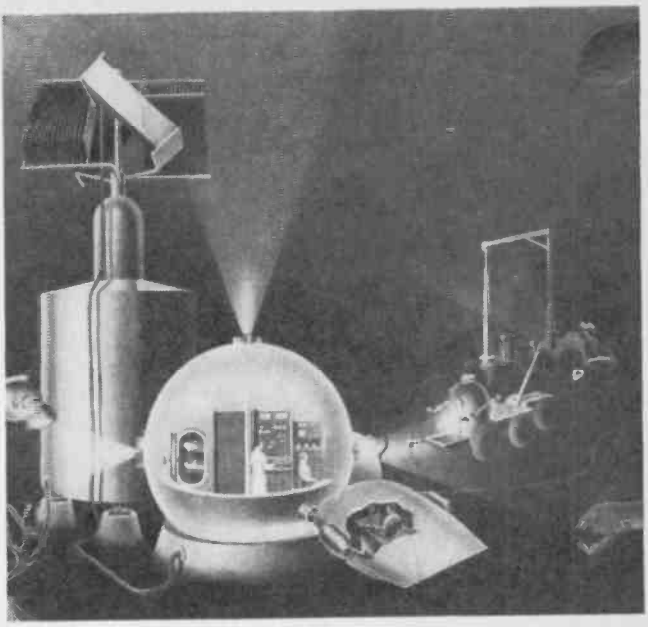
Other imaginative spokesmen have pictured fabulous future underwater cities looking much like great plastic clam shells, linked by transparent underwater pavilions, and ringed by factories and fisheries.

Even such a recognized authority as Dr. Athelstan Spilhaus, Dean of the Institute of Technology of the University of Minnesota, predicts we will one day see "floating factories and dwellings, all the components of future ocean cities." While other serious forecasters warn we will have to take to the seas for at present we double our production of people every thirty-seven years, risking future famine of both food and land.

But while future predictions and prospects sound sometimes frightening, awesome and sometimes adventurous, the thought occurs that our imaginative spokesmen have said little about how we will anchor or power such floating factories or fisheries, or cities or homes in the turbulent whimsical ocean waters.

A Grip on Bottom. Now Woods Hole engineers, for the first time, have built a sound structure that can stay put against pressures and currents of the seas. Looking much like a king-size Daddy Long Legs, it

This artist's sketch shows how man could explore "inner space" and tap the vast natural resources beneath the ocean floor through the use of an advanced system of power generation. Heart of the system is a Westinghouse undersea nuclear reactor (left) capable of producing 3,000 kilowatts of electricity for life support and operational activities in a two-mile deep undersea community. Sphere would house the crew and serve as the control center for undersea vehicles used in gathering samples, drilling, mining or exploring. An undersea research vehicle, called "Deepstar," will be similar to the one in the lower center of this scene. Deepstar will cruise the ocean at depths of 12,000 feet.



At 110 foot level, diver Ed Davies inspects cables connecting Sea Spider's underwater sphere to telemetering buoy at surface. The many inquisitive fish bring other, unwelcome visitors, dangerous sharks and toothy barracuda, to the experimental "inner space" anchorage.

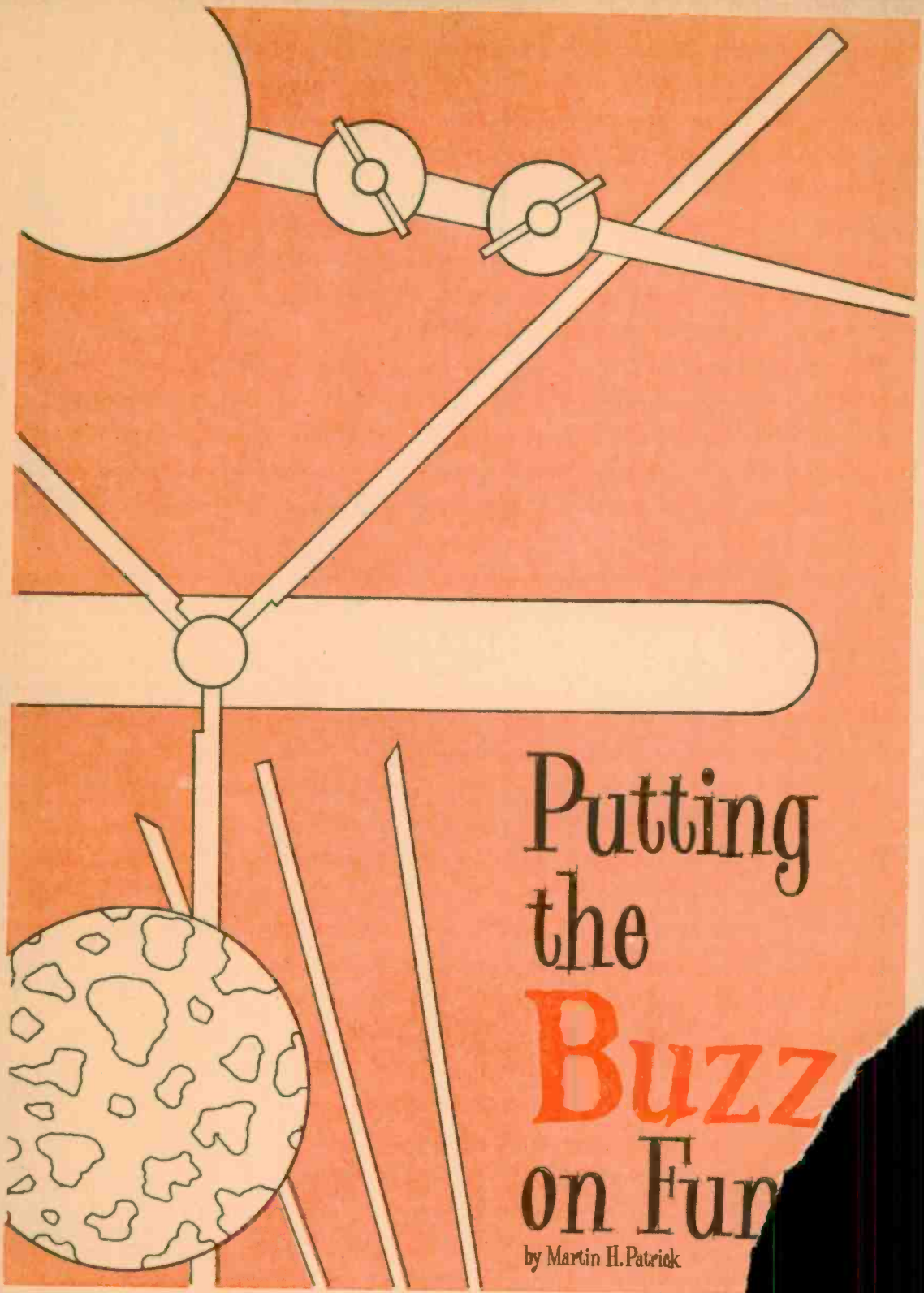
reaches 2600 feet down to the ocean's floor. The ingenious structure now at Blake Plateau, off the stormy shores of South Carolina, is an electronic reporting station, collecting news of tides and currents off the Continental Shelf.

Its four spidery cabled legs (three looking much like a tripod, the fourth running straight down to the ocean floor) are weighted to the bottom of the sea with 1500 pound anchors. To keep these long steel cables in straight lines, round hollow glass spheres—known to withstand severe ocean pressures—are spotted along the cables. Hydrophones attached to the steel legs spot ocean news, transmit it through electrical conductors in the cables up through the ocean waters to a saucer-shaped structure 110 feet below the surface of the sea.

Here a dramatic-looking saucer, packed with electronic equipment, picks up the ocean's news from its four cable legs, relays it up through cables to a ten-foot buoy atop the sea. The buoy, in turn, radios its message to a nearby ship.

Woods Hole spokesmen feel pretty proud of their underwater saucer for while this one is only four feet high, and seven feet in diameter, it is the first structure known to stay fixed and stable, withstanding the pressures of the ocean. And it can well be the first-generation forerunner of the floating factories and cities forecast. Next generation, Woods Hole men say, will probably be to replace present electronic gear in the saucer to make room for men who can station inside and spot supplies of fish.

(Continued on page 96)



Putting the Buzz on Fun

by Martin H. Patrick

Don't try to explain how it works. Just sit back and enjoy it!

THIS VIBRATOR, with a few add-on toys, will provide endless hours of fascinating fun, and often sheer bewilderment, for everyone.

The construction is quite simple and the finished project will justify any effort to share in the educational fun of spinning color wheels, airplane propellers, plastic globes or a merry-go-'round; simulate a snake crawling up a pole or make a barber pole rotate as well as many other displays.

Changing the reciprocal (back-and-forth) motion of the vibrator into rotary (circular motion is the educational part of this project). The change of motion takes place at the tip of the soft-iron stem (Fig. 1) which has an off-center point. The tip, cut at the proper angle, causes an object balanced on it to rotate when the stem is vibrated. The point of the tip must be at an angle (about 45-degrees) to the direction of the back-and-forth motion (Fig. 2). The direction of rotation of the object balanced on the tip can be changed by turning the angle of the point of the tip 90 degrees in relation to the direction of the back-and-forth motion. (For experimental purposes an adapter can be fitted to the stem to make it easy to change the

kn
are
attaction of rotation — just twist the adapter
transd instead of replacing the stem with an-
side th ith a point at a new angle.)
to the speed of rotation and the mass
the sur

(weight) that can be rotated are determined by several factors. The most important are the natural resonance of the stem (the normal frequency at which it will vibrate because of length and diameter of the stem) and the frequency of the reciprocal motion applied to the stem. Then there is the shape of the tip of the stem and the angle of the tip in relation to the direction of the reciprocal motion as well as the weight and balance of the object to be rotated as well as the friction at the pivot.

BUILDING A VIBRATOR. Take an 8½-inch length of soft-iron wire (#12 ASWG — American Steel Wire Gauge) and bend it into an "L" with the bottom part about 3-inches long — allow an extra half inch for the loop to attach the stem to the base. *Be sure to use soft-iron wire.* Steel wire can become permanently magnetized and upset the smooth vibration of the stem. Copper wire will not vibrate at all since copper is not attracted by magnetism.

File the tip of the stem to a 45-degree flat surface as shown in Fig. 2. This cut must also be 45 degrees to the plane of the bottom 3-inch length of soft-iron wire that is to be attached to the wooden base.

THE ELECTROMAGNET. The power to drive the stem can come from almost any source that will produce a vibration that can be used as the reciprocal motion. An electromagnet can be energized with 60-cycle cur-

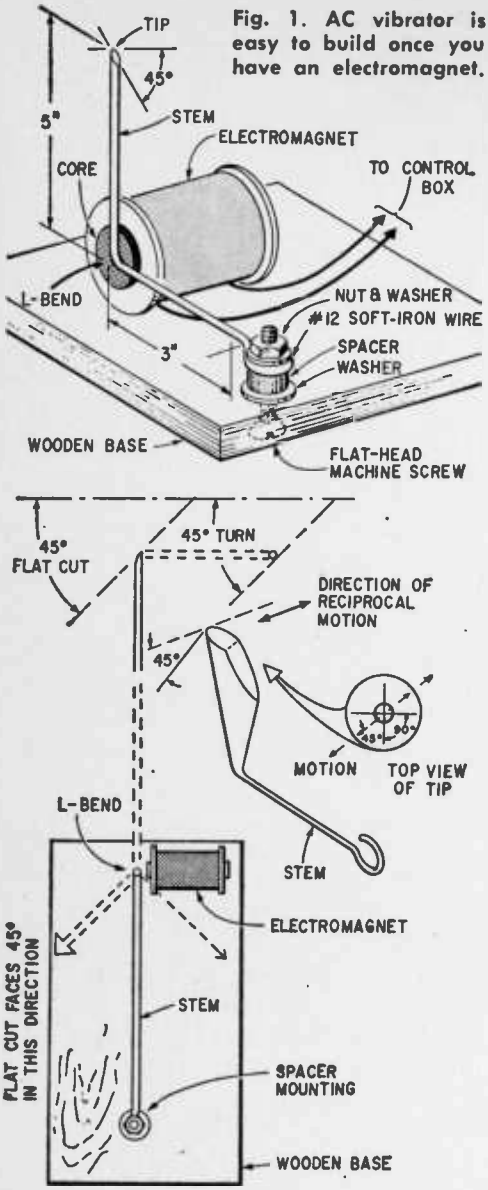


Fig. 1. AC vibrator is easy to build once you have an electromagnet.

Fig. 2. Shape and position of stem point is the most important part of construction.

rent from the AC-power line to give 7200 back-and-forth motions each minute. A DC-powered buzzer or bell can also be used—adjusting the contact gap will change the frequency of the reciprocal motion but this is just one more factor that must be taken into account when adjusting the vibrator for maximum output. The bell has a distinct advantage—it's already assembled. Just remove the bell, cut off the clapper and bend the stem up at a right angle to the soft-iron armature.

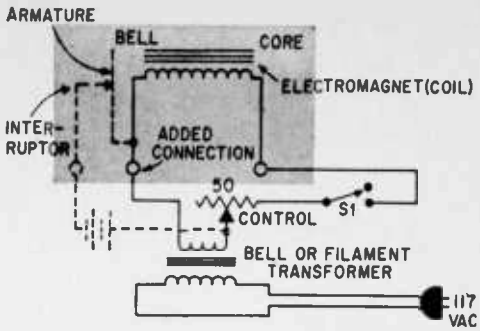
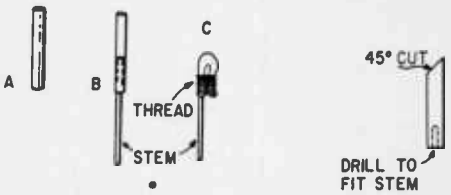
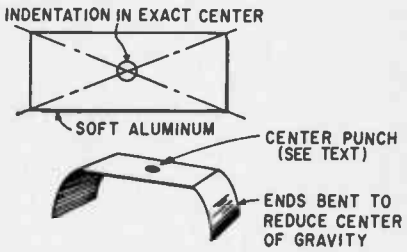


Fig. 3. Circuit diagram is simple. Dotted lines indicate wiring used for battery power.



Figs. 4 and 5. Two simple stem adapters.

Fig. 6. (Below) the simplest rotor made.



Vibrator Power. Batteries can be used to power the vibrator when small fry are using it without supervision or if you must use the vibrator away from AC-power sources. A simple change in the internal connections of the bell will let you use either the AC power line or the DC battery (Fig. 3).

Using the bell on DC will reduce the range of the control since a certain minimum power must be applied to the bell's electromagnet to pull the armature in to open the interrupter contacts. You'll have to experiment with the contact spacing to get proper reciprocal action.

It is important to know the electrical characteristics of the electromagnet that is used to vibrate the stem. You can get electromagnets from any number of sources and as long as you use the proper voltage and can supply enough current the vibrator will work properly and will last for a long, long time. If the electromagnet overheats you may be applying too much voltage, the electromagnet requires too much current or it is not

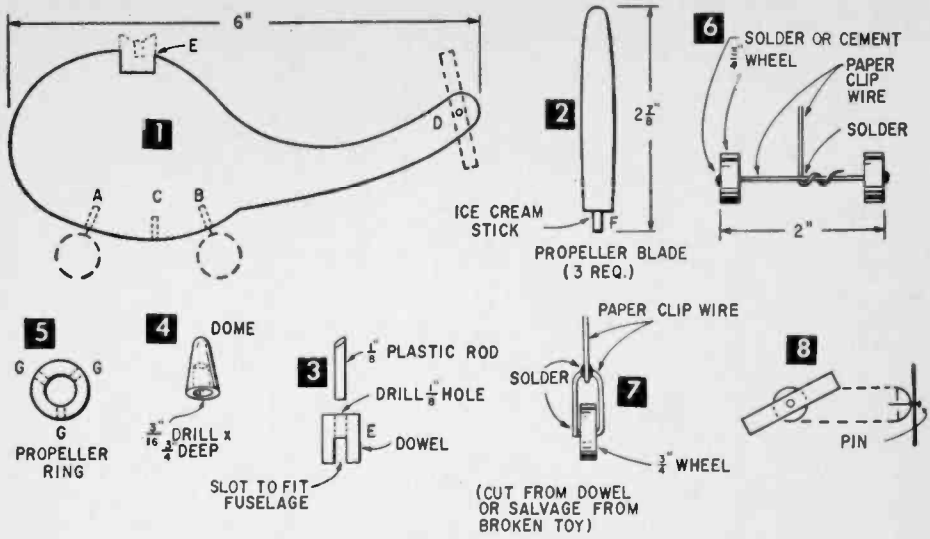


Fig. 7. Whirly-Bird construction details above and finished unit at right. Both top and rear rotors spin rapidly when the 'Bird is positioned correctly on the stem.

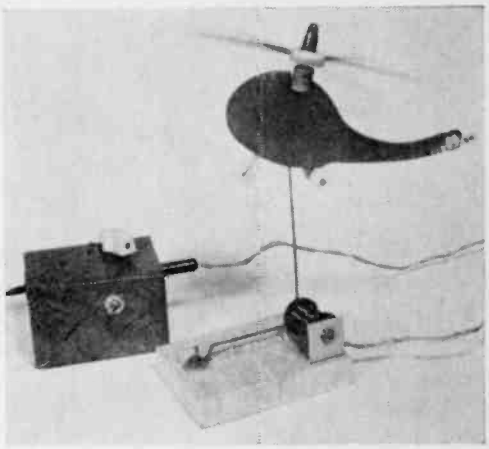
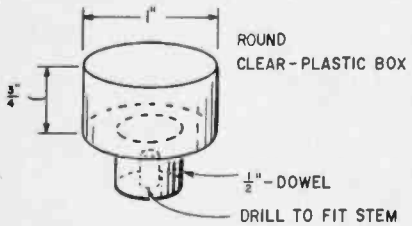


Fig. 8. Glitter Swirl (below) sets tiny store-bought square spangles into motion inside transparent box. Fill box about 1/3 full and cement top to prevent spills.



designed for continuous operation. (Use coils that are wound with fine wire as these require less current.) If you have to buy a bell also *buy the transformer that was designed to operate that bell* at the same time —you'll save yourself a lot of headaches later on.

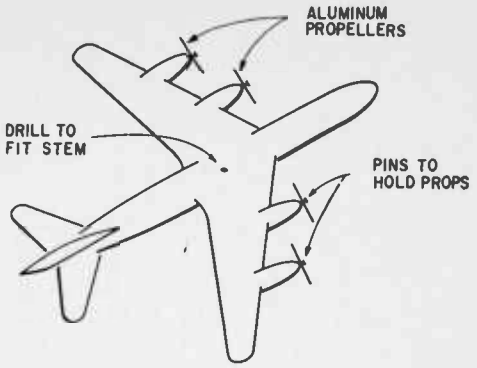
Relay coils may be used for the vibrator electromagnet. Remember though, relay coils, just like bells, are designed to operate at one of a number of maximum voltages between 6 and 120 volts—AC and DC. Only use the DC-type coil—it has a plain rod core. The AC-type coils are often made from laminations or have split cores with a shorting loop around one half. AC-type coils are designed to reduce the vibrations of the armature—we want maximum armature or stem vibration. The lower voltage coils are best to use—they are safer to handle and easier to control. (You might try the higher-voltage units for extra power—when trying to rotate larger and heavier objects.)

Around We Go. Before attempting to operate the vibrator adjust the soft-iron stem so that there is about 1/16-inch of space between the stem and the core of the electromagnet. With this spacing the stem should vibrate vigorously when the control is set to apply maximum power to the electromagnet. The spacing will vary—it depends on the strength of the magnet, the material of the core and stem as well as the flexibility of the stem.

Once you have the electromagnet positioned so it can vibrate the stem you're set to make things go 'round. The object must be well balanced and have a low center of gravity. Objects such as chemistry test tubes (or aluminum or glass tubes used to protect the more expensive cigars) or glass percolator tops are suitable. Since they are

without a sharply defined pivot point (indentation), and are very smooth inside, an adapter will have to be made. Take a 1-inch length of spaghetti (the insulating tubing that is slipped over bare wire) and insert the tip of the stem about halfway inside (Fig. 4). Fold the other half over and tie it firmly to the half around the stem with sewing thread. This adapter should make the test tube or percolator top spin rapidly. For slower rotation, make an adapter from a harder material such as plastic. Cut and file the tip to a 45-degree angle as shown in Fig. 5. The hole in the adapter should be made with a twist drill slightly smaller than the diameter of the tip of the stem. This makes a snug fit that will not slip off easily.

Fig. 9. Fan-Jet is made from a plastic-toy jet airliner with a 4-inch wingspread.



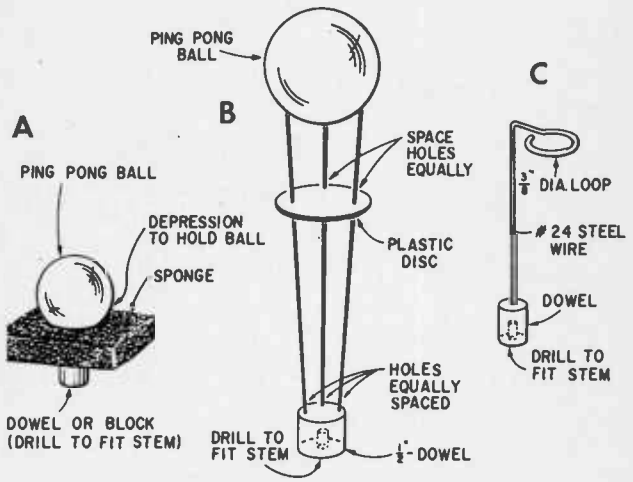


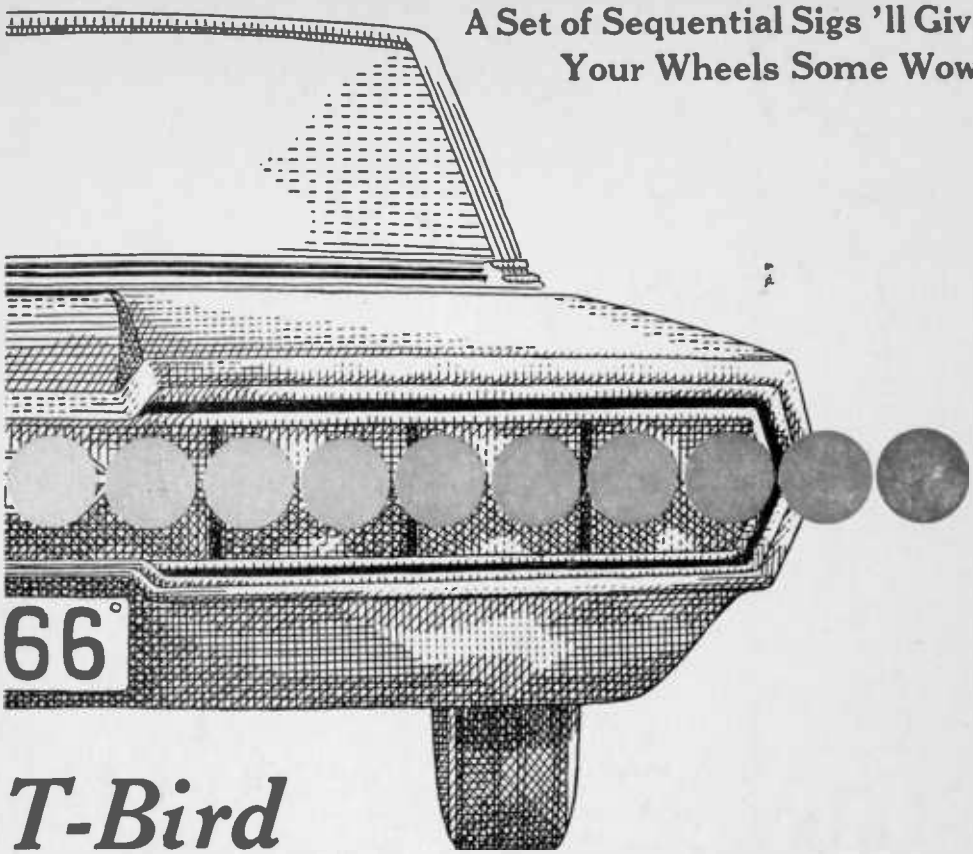
Fig. 10. Three Spin-A-Sphere adapters are different ways of doing the same thing. Any light-weight ball may be used although ping-pong ball is the easiest to find in stores.

Make a Rotor. The simplest rotor is one made from a strip of soft aluminum about ½-inch wide and some 2 inches long. The dimensions (Fig. 6) are not critical. Just as long as you locate the center exactly—draw a couple of lines diagonally across the strip from corner-to-corner. Make an indentation where the lines cross—use a center punch with the strip of aluminum set on the end grain of a scrap of 2-by-4. The punch does not have to be sharp—you just want a depression that will keep the strip from slipping off the point of the stem; not a hole.

Once you bend the ends of the strip down, to lower the center of gravity, you're ready to turn on the power and let it spin. Make sure that you have almost perfect balance. (You can suspend little plastic toys from this rotor—just drill a small hole in each end of the rotor and hook the toys on with thread or thin wire. Use two identical toys—it's easier to keep rotor balanced.)

Now turn up the control and the rotor should start to turn slowly. The setting of the control knob should change the speed of rotation—too much vibration may cause the smaller objects to fall off the stem. With proper adjustment you can get the various rotors to spin silently—the stem does not have to vibrate hard enough to clatter against the core of the electromagnet. But the clatter will not ruin anything but your peace and quiet. Since each rotor or adapter has a different size and weight the stem will clatter when some are on the stem and not when others are on the stem without changing the position of the stem or the control-knob setting. The clatter makes the Fan-Jet and Whirly-Bird appear more realistic. The Spin-A-Sphere adapter will clatter the easiest while the Glitter Swirl is the least likely to clatter. For details on constructing these fascinating little adapters see Figs. 7, 8, 9 and 10 near the end of this article. ■

A Set of Sequential Sigs 'll Give Your Wheels Some Wow!



T-Bird Turn Indicator

By Roy Nelson

■ Many travelers on today's highways have seen the turn signals on a 1966 Thunderbird. There is no question in their mind as to what the driver of this car has in his mind when it comes to changing courses on the well traveled streets of Megopolis as it exists today. The changing lights, which move in the direction of the turn, are a clear indication of what the driver has in mind. These animated lights can be installed on your car, with the same effect—and with parts that can be purchased from electronic parts distributors and the neighborhood hardware store.

If you are the owner of an automobile that has a twelve-volt battery as its primary source of electrical power, this is a nice weekend project and the cost will be about half the $50.00 bill the system costs when purchased from a Ford parts depot.

Mechanical Construction Details. Much consideration must be given to the environment in which this device must function. It is exposed to wind, rain, snow and heat and cold. If you can't find a practical way to customize this animated direction signal into the rear contour of the car—or you want to road test the operation *before* you install the unit permanently you can make an external indicator unit. Pay a visit to your local automotive-supply dealer and look over his stock (or catalogs) of accessory lights that are used for customizing and for trucks. Five of these, flush mounted on each side in the rear, make an easy, professional-looking installation.

The external indicator unit consists of a metallic housing that can be made from a number of different forms which are available in a number of markets. In every case an arbitrary length of four feet has been selected to cover the majority of cars. If you live in a major city it is suggested you contact a supplier of fluorescent light fixtures and acquire the basic 40-watt lamp-strip

cover which is shaped like a square letter "U." This strip cover is approximately 2½ inches wide by 2 inches deep (the upright portions of the U shape). At each end of the strip will be the openings for the lamp sockets which are of no use to you. Cut the ends from this cover to eliminate the socket openings which will leave you the U-section devoid of openings.

At the same time you purchase the cover section, buy the end pieces if the price is right. The total cost should be about $1.00 to $1.50 depending where you get them.

Another source of this basic metal box is a piece of aluminum square downspout—used for rain protection on homes. The square downspout can be easily cut into the basic U-shape required for the indicator unit.

Fig. 1 illustrates what must be done to each of the boxes to adapt them to this project. One other thing—you could be lucky and have an uncle who owns a sheet metal shop. He might make the box for you.

The metal indicator box can be used on the outside of the car or inside the car on the rear window ledge. If you decide to use the indicator on the inside of the car, the box can be made from ¼-inch plywood generally following the dimensions given in Fig. 1 or you can tailor it to fit your own

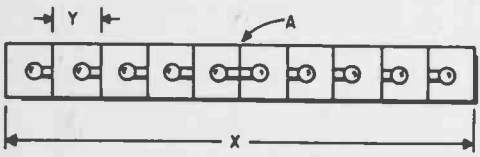


Fig. 1. Drawing shows division of indicator box; table gives proportionate dimensions.

Length X (in.)	Length Y (in.)
48	4¾
46	4⅝
44	4⅝
42	4¼
40	4
38	3¾
36	3⅝
34	3⅜
32	3¼
30	3

vehicle. If you construct the box from plywood or metal other than aluminum, paint the interior with a glossy white enamel or aluminum paint to create a reflecting surface. The exterior can be painted to match your car. You need not paint the interior of an aluminum box but the exterior of the aluminum box should be painted to prevent corrosion, particularly in the northern climates of the U. S. where salt is used on the streets in the winter.

The next step in the construction of the indicator is to compartmentize interior. The table will assist you in dividing the box into the proper portions. The table covers box lengths from 30 to 48 inches in 2-inch increments. If your indicator is some other length, divide this dimension by ten to arrive at the compartment lengths.

Ten Little Boxes. Locate the center point of the box, indicated as A, and measure the compartment lengths towards each end—beginning at "A." Dimensions shown in the table are not an exact division of the box but they make construction easier. Any difference, over or under, in compartment length winds up in the end compartment, where it is least noticed.

The individual compartment dividers are constructed of ⅛-inch pressed hardboard. The dimensions in Fig. 2 are approximate since they must be tailored to fit the inside of your indicator box. Hardboard was selected because it is easy to cut and file. Nine dividers are needed—all are the same size. Two lamp sockets are mounted on the center divider. Each of the remaining eight dividers must have a 5/16-inch hole drilled through

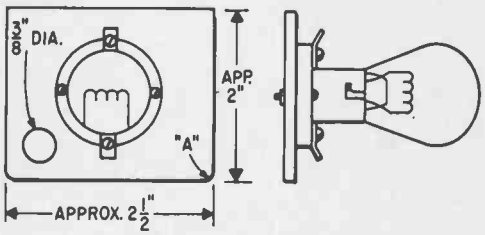


Fig. 2. Compartment dividers are constructed as shown; round corners "A" to fit box.

it to accommodate the wiring cable. When assembling the dividers to the box, place the cable holes on the dividers at the bottom of the indicator box to prevent the cable from showing through the cover of the indicator window.

After you have mounted the lamp sockets on the dividers, insert the individual dividers in the indicator box at the previously determined points by using silicone rubber (such as Dow Corning RTV-732) as a cement. The interior surface must be clean—free of dust, soap or grease—to allow proper adhesion. Place a thin layer of the rubber on the proper three edges of the divider and slide each into place in its marked position in the box. The rubber cures to a sticky consist-

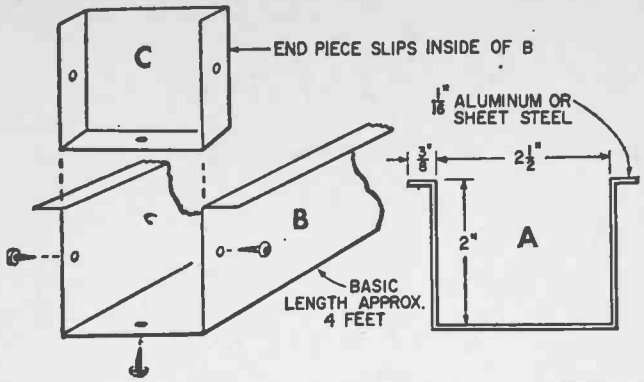
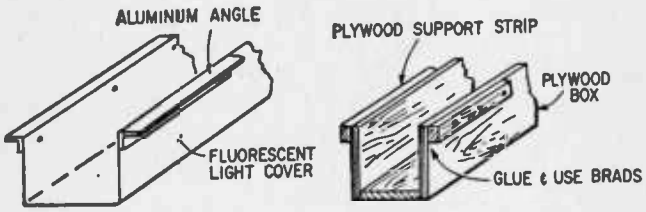
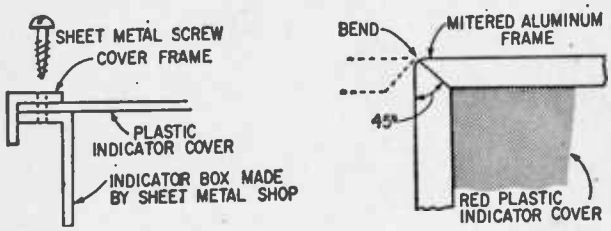


Fig. 3. A length of aluminum channel at the left makes the best indicator box. End pieces are secured with sheet metal screws. Alternate approaches are shown lower left. You can use a fluorescent light cover or even



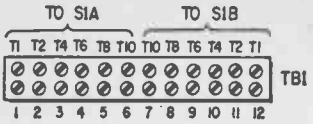
construct the box of plywood. The details of construction for the alternate approaches are quite simple and only involve the fashioning of a support lip, angle strip or a mitered bend. The photographs show completed sub-assemblies for the indicator.

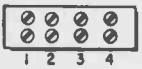


ency in an hour and completely in 24 hours. (The prime reason for using silicone rubber is to preclude vibration in the box—to destroy its resonance capability.) Be sure that each divider is flush with the top edge of the box. If the dividers have been cut and fitted properly the friction between the box and the dividers will hold each in place until the silicone rubber cures. If the dividers are too loose, use a piece of masking tape or adhesive cellophane tape across the width of the box to catch the top edge of the divider and the sides of the box for the 24-hour curing period.

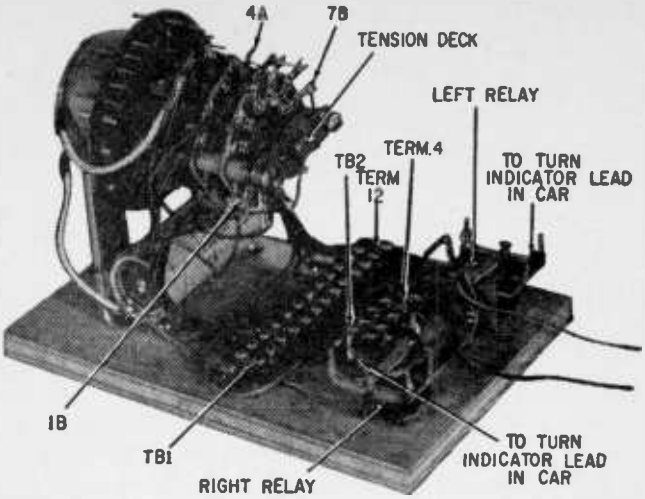
At this point, set the box aside for 24 hours.

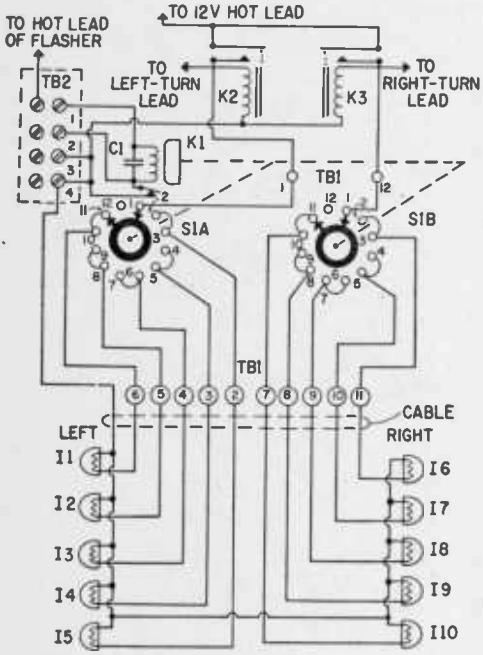
Closing It In. The indicator cover plate is a single piece of ruby-red transparent or frosted plastic. The length and width are determined by the size of your indicator box. If your indicator box was made from a fluorescent fixture cover or a length of downspout, a cover-plate mounting strip will be required. Many hardware stores have a do-it-yourself aluminum section. Purchase enough ⅜ inch aluminum angle to extend the full length of your box on each side and across each end. At the same time purchase a dozen ⅜-inch number-6 sheet-metal screws to fasten the angle to the side of the box as shown in Fig. 3. You will also need the same amount of ⅜-inch angle, plus 3 inches, to make the indicator cover frame. If your box was custom made in a sheet metal shop, the mounting lip is a part of the box and you need only the cover frame. Purchase a dozen ¾-inch, number 6 sheet-metal screws to mount the frame and plastic cover to the box as shown in Fig. 3 If the indicator is to be used on the outside of the car, be





Terminal boards TB1 and TB2 are labeled above as a quick guide for making connections. Switching unit, at the right, is covered and mounted in the most convenient location in your car. Schematic diagram, below, shows connections made from unit to car.





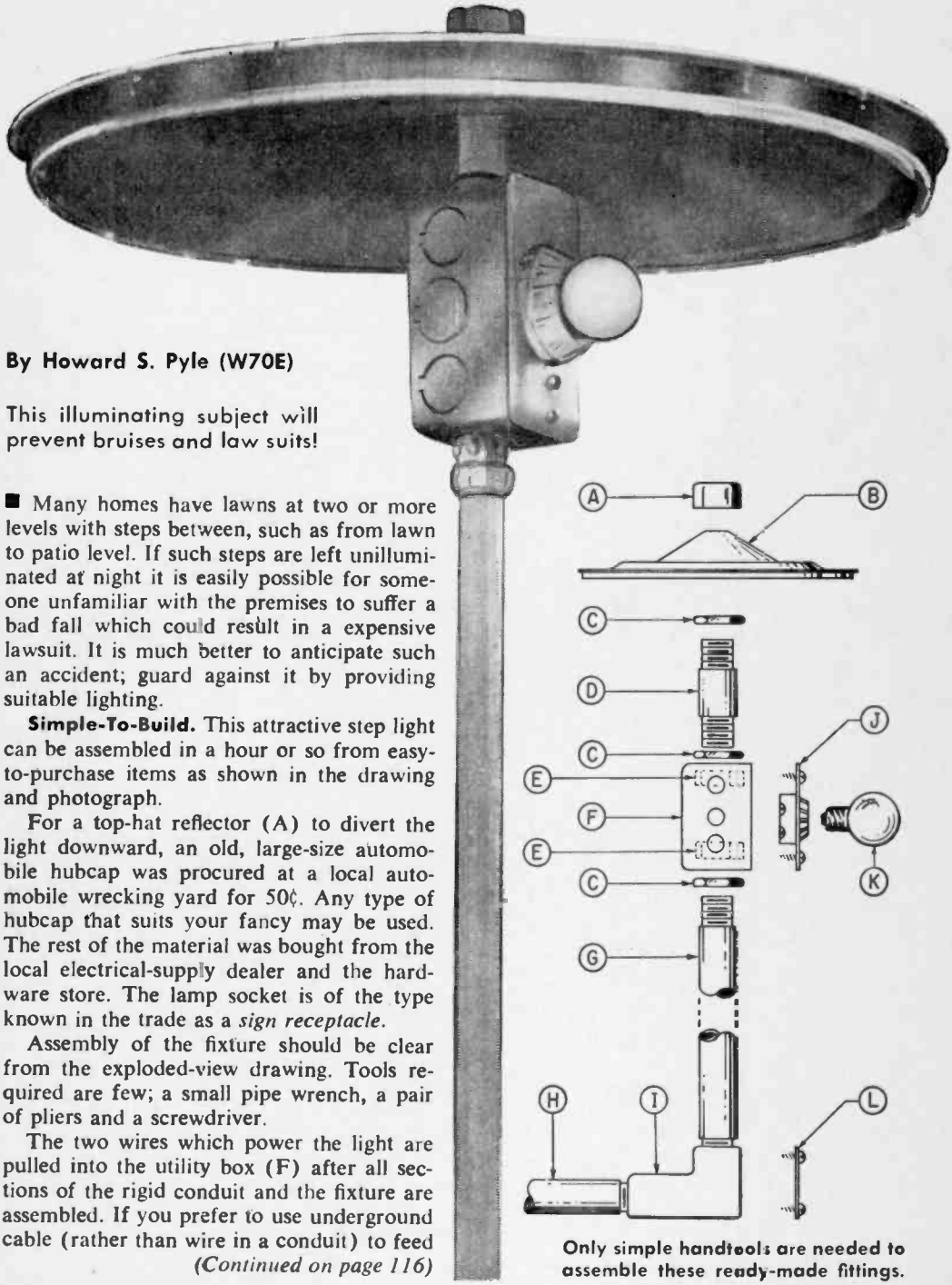
sure to purchase chrome or nickel-plated screws to prevent rusting. If your box is plywood, glue a strip of ¼-inch plywood to the top edge of your box and across the ends as shown. The cover frame for both wooden and metal boxes is made of aluminum angle.

To mount the frame and cover-support angle on the box, align the angle and box as shown in Fig. 3 and clamp the angle to the box with a small C-clamp at each end. Mark off the length into six equal parts and drill five holes (using a #35 or 7/64-inch drill) at these marks through the angle and the box. Repeat the operation on the opposite side of the box. Drill one hole through the end angle and end pieces. Remove the angles and enlarge the holes *in the angles only* using a #24 or 5/32-inch drill. Now assemble the angles to the box using the #6-3/8-inch sheet-metal screws to do the fastening. Once the proper size of the plastic cover plate has been determined, lay the frame angles on top of the plastic cover plate and cut the two end and side pieces to make a mitered frame. (Do not remove the protective paper from the plastic sheet while you are performing these operations.) Clamp the frame angles, plastic cover and box together at the ends. Be sure the pieces are properly aligned. Mark off the frame angle into six equal parts and drill five holes through the frame angle, plastic cover and box (or box angle) with a #35 or 7/64-inch drill. Drill the opposite combination on the other side the same way and use one screw hole for the end pieces. Enlarge the holes in the frame angles and the plastic with a #24 or 5/32-inch drill but do not enlarge the holes on the box angle.

Electrical Construction. The heart of the animated turn indicator is a *rotary solenoid*. A number of companies manufacture this gadget. This particular unit was purchased from Universal Relay Corporation at 42 White Street in New York City. Their model number is R-1228 and is delivered, postpaid, to your house anywhere in the U. S. for $7.00. When your solenoid is delivered it will have three switch decks (sections)—of which two are no use to you. Disassemble the switch portion carefully retaining the 6 spacers, the two assembly screws, the spring-

(Continued on page 88)

A LIGHT FOR SAFETY



By Howard S. Pyle (W70E)

This illuminating subject will prevent bruises and law suits!

■ Many homes have lawns at two or more levels with steps between, such as from lawn to patio level. If such steps are left unilluminated at night it is easily possible for someone unfamiliar with the premises to suffer a bad fall which could result in a expensive lawsuit. It is much better to anticipate such an accident; guard against it by providing suitable lighting.

Simple-To-Build. This attractive step light can be assembled in a hour or so from easy-to-purchase items as shown in the drawing and photograph.

For a top-hat reflector (A) to divert the light downward, an old, large-size automobile hubcap was procured at a local automobile wrecking yard for 50¢. Any type of hubcap that suits your fancy may be used. The rest of the material was bought from the local electrical-supply dealer and the hardware store. The lamp socket is of the type known in the trade as a *sign receptacle*.

Assembly of the fixture should be clear from the exploded-view drawing. Tools required are few; a small pipe wrench, a pair of pliers and a screwdriver.

The two wires which power the light are pulled into the utility box (F) after all sections of the rigid conduit and the fixture are assembled. If you prefer to use underground cable (rather than wire in a conduit) to feed

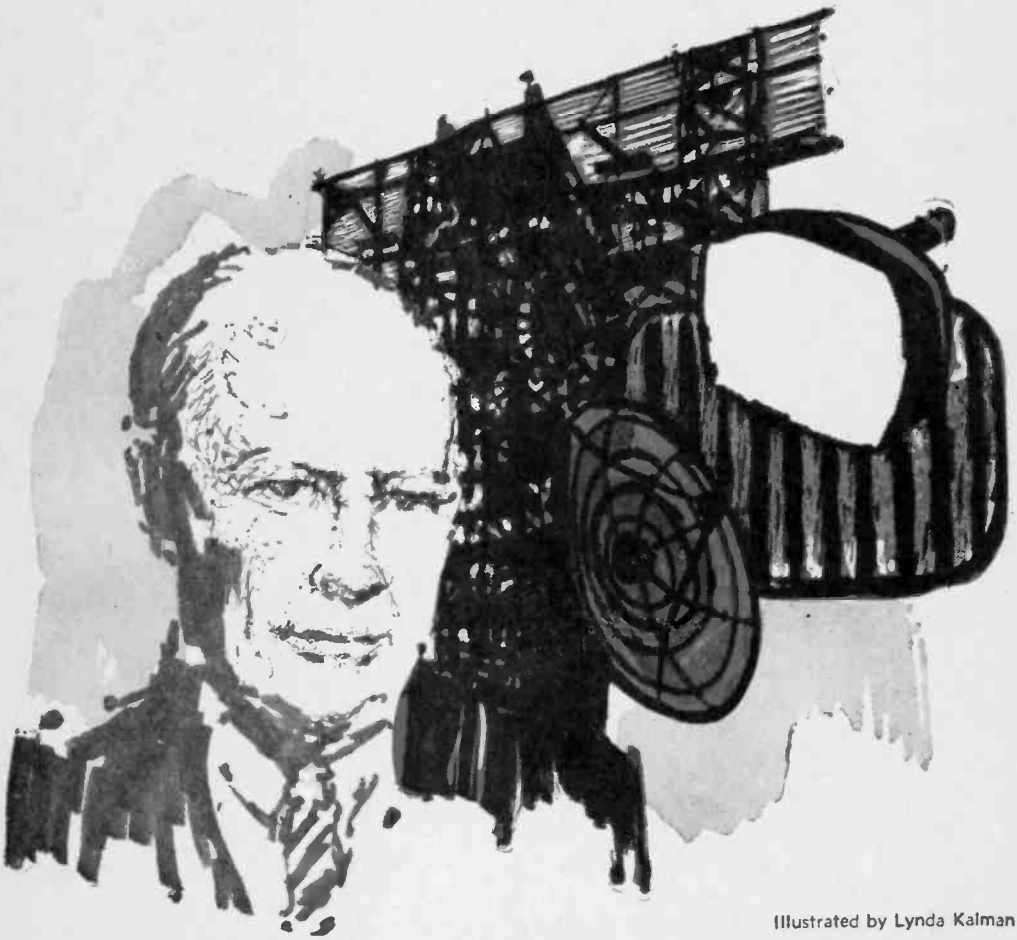
(Continued on page 116)

Only simple handtools are needed to assemble these ready-made fittings.

BUT IT CAN BE DONE!

By K. C. Kirkbride

Advances in electronics technology have always depended on men like Allen B. DuMont



Illustrated by Lynda Kalman

■ There wasn't a time-clock in the place. For the big, ruddy, square-jawed, mentally-tireless man who ran the growing, sprawling factory refused to waste time worrying about the occasional worker who would chisel on company time.

He was far more concerned about a more dangerous fellow. The fellow he feared—to the point of obsession—was the one who would say *it cannot be done.*

It was in the mid forties. The transistor wasn't even a gleam in Bell Laboratories' eyes. And a television set was a bulky monster that could crowd you right out of your own living room, its unwieldy size necessitated by a thirty-inch long glass tube inside that weighed in at forty-four pounds. And nobody dreamed it would ever slim down.

Except Allen Bascom DuMont.

New Tube. Now, peering down at a new light-weight, metal and glass 19-inch long job that had just come off his production line, the "Father of Television" mused:

"Funny people, engineers, always tell you it can't be done. They told me this idea wouldn't work, said the tube was too short to get a sharp image. Finally had to order 'em to go ahead and make it. Turns out it gives the sharpest image ever."

But the shorter, lighter tube that was to be the first to slim both size and price of television sets was just one of the can-be-done wins in Allen DuMont's sixty-four productive years. Often called "Mr. Television," and known as the "Armstrong" of the television industry, he developed the fragile cathode-ray tube into a practical, workable instrument that foundation'd an industry.

He designed a radar system in the thirties, tinkered with a color television tube thirty years before color came of age, built one of the first mechanical television transmitters, the first electronic transmitter, organized one of the first television commercial networks. And after years of struggle and financial failure, spiralled to almost overnight wealth to become television's first millionaire.

But the strong-jawed stubborn convictions that spurred Allen DuMont to fortune rose out of a childhood as rugged as his later personality.

No Games. Born in Brooklyn, New York, on January 29, 1901, he fell victim to a polio epidemic when he was eleven years old. An active, energetic, sports-loving boy, he was suddenly forced to spend one year in bed and confine his young energies to games he could play sitting down.

Radio became his game. He pored over books on telegraphy, played with microphones and crystals, and when the year was up and he could go back to school, he had built his first wireless receiver and transmitter. Four years later, in the Summer of 1916, when he was fifteen, he earned his license as a ship's wireless operator, took vacation jobs on merchant ships.

At Sea. One day at sea he was poring over a book published by Rensselaer Polytechnic Institute in Troy, New York. In the book was a picture of a boyhood memory, the Brooklyn Bridge. When DuMont reached shore, he went to Rensselaer and registered for classes.

It was at the Institute he dreamed his first dreams of a perfected cathode ray and oscillograph. He would ponder the then-crude instruments in the school's laboratories and vow one day to perfect them.

But when he graduated in 1924 with a degree in electrical engineering, his first job was to find a job. Radio was young. About the best you could say for it was it had been invented. Sometimes *that* seemed doubtful. Whether it would ever be much more than a hobbyist's toy was anybody's guess. For it was handicapped by a serious bottleneck, vacuum tube production.

First Job. In his first job at Westinghouse Lamp Company, in Bloomfield, New Jersey, young DuMont confronted this problem, found his new employer could turn out but 500 tubes in a day. That just wasn't enough.

As he used to tell it, "They got so tired of hearing me criticize their tube production set-up that one day they told me to go ahead and see what I could do." In other words, put up or shut up. DuMont put up. Within three years, he filed ten patents speeding and improving tube production so that Westinghouse was soon producing 50,000 tubes a day in place of the original meager 500. One DuMont gadget looked much like a Ferris Wheel and would season and test tubes at

The television industry has come a long way since the first all-electronic TV receiver was introduced in the United States in 1938. Shown at the right, the set, the Type 180, made in the DuMont Laboratories, had 14-inch picture. The imagination and determination of Dr. Allen B. DuMont, left, made it the forerunner of the wide variety of receivers that are available today.

The DuMont technician at the right fashions a glass tube casing. The glass is heated as it spins on a lathe-type machine and shaped using the heated wedge tips.

the then-fantastic speed of 5,000 an hour. The bottleneck was broken. Radio was on its way.

And Allen DuMont at twenty-eight years of age had won the Westinghouse prize for most valuable contribution to the company two years in a row—two definite wins for his *can-do* philosophy.

Change. In 1928, DeForest Radio Company, in Passaic, New Jersey, was reorganizing, needed a new chief engineer, hired DuMont from Westinghouse. Much of DeForest's old machinery had to be discarded and the Company needed the young miracle man to supervise design of a new line of tubes. Under DuMont direction, new equipment was assembled and patented and within one year, the DeForest Company was turning out 30,000 tubes every day.

That problem solved, the mentally-restless DuMont looked around him. DeForest had just bought a company owned by Charles F. Jenkins, who was already transmitting a crude black and white image he optimistically called television. In 1930, the DeForest experimental transmitter W2XCD in Passaic, New Jersey, was already broadcasting pictures, the first in the United States.

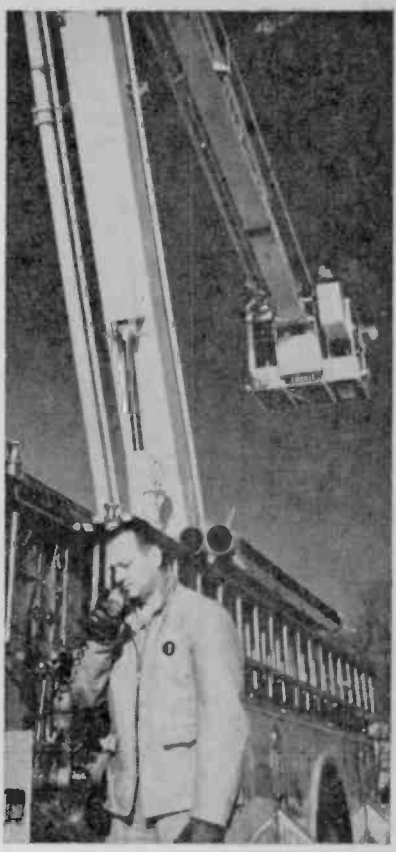
Marconi. Ever since Marconi had first suggested in 1896 that it might become possible, engineers had dreamed pictures might one day travel through air. But how to break them down and reassemble at the other end was a problem.

The Jenkins method of scanning called for a Nipkow metal disc—a spiral with sixty holes, placed at both transmitting and receiving ends. Images were transmitted by breaking the picture into 3600 bits. The holes of the disc would revolve over a scene so fast —twenty to thirty times per second—the eye saw the picture as a whole. At the other end, these bits were woven together again. But the two—transmitting and receiving stations —had to be perfectly synchronized or there was distortion, or worse, no picture at all.

To the DeForest engineers, this crude, bulky contraption broadcasting a hazy, fuzzy sixty-line picture was *it!* Television was a reality. DuMont wasn't convinced.

Go Electronic. "The way to develop television," he argued, "is to perfect the cathode

Two-way radios used by this modern fire department bear the name that has become a legend—DuMont. Dr. Allen B. DuMont is shown below with one of the original 3-gun shadow mask type television tubes produced by the DuMont Laboratories in 1956, prior to the interest and popularity of color TV today. The color tubes were produced by Electron Tube Division, now a part of Fairchild Camera and Instrument Corp.



ray tube." Television must go electronic, he insisted, or die in its spinning stage.

At the time the cathode-ray was a delicate, fragile affair. Developed in 1887 by Braun in Germany to study alternating currents, it was imported into this country as much as a curiosity as a tube, at the costly price of $900 apiece. And the tube at best lived thirty hours.

DuMont argued that this fragile prima donna could be fashioned into a sturdy, long-life tube. But the arguments and attitudes that had won DuMont a boost at Westinghouse brought a blue slip at DeForest and in the depths of depression, the year, 1931, he lost his job.

At the time people were security conscious. And the young miracle-man tube expert could easily have found another job, even in 1931. But running for cover wasn't for Allen DuMont. He squared his shoulders, jutted his square jaw, said, "I've had enough working for other people."

With that, he went home, parked his car in the driveway and set up business in his garage. Then began a long struggle against almost unconquerable odds. A DeForest employee-friend invested $500 in the new "business." DuMont added another $500. The $1,000 was spent in a few days. The friend pulled out. DuMont was alone. He offered his part time services to others as a consultant. He cashed in insurance policies, borrowed from his wife's relatives: hired an apprentice machinist for $10.00 a week, a spare-time glass blower and a spare-time chemist, each at one dollar an hour, and went into action.

Obstacles. Raw materials needed to make the tube weren't even in production. Later companies like Corning were to invest millions to produce glass blanks but then, the tubes had to be blown by hand.

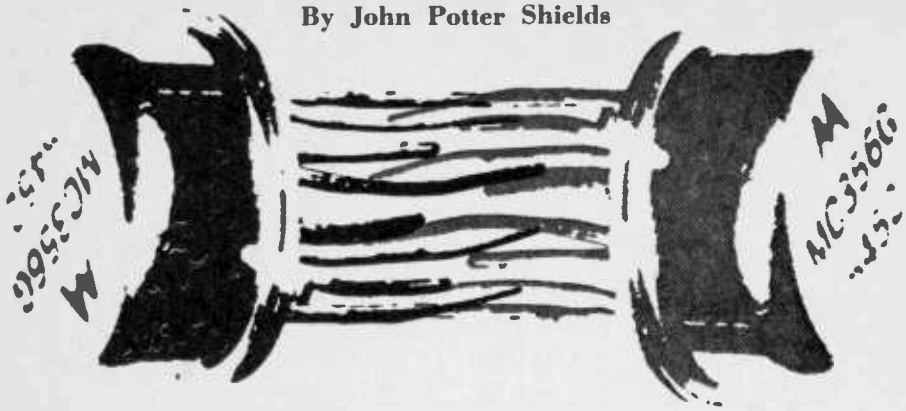
The young blond giant glass-blower DuMont had hired for a dollar an hour, Stanley Koch, later said, "Everything had to be done the hard way. We had to make the blanks by hand, and we had to find the right metal for the filaments, and lenses, by experiment.

"The problem of getting ingredients for the fluorescent screen is an example. The

(Continued on page 118)

Build an Integrated-Circuit Preamp

By John Potter Shields

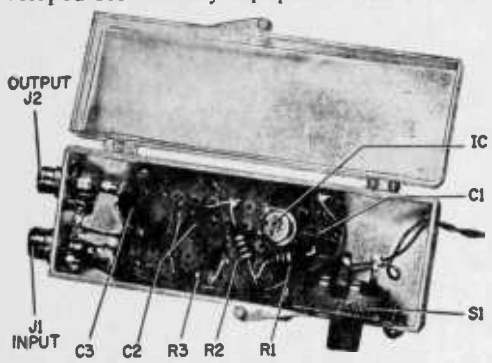


Kick the transistor habit! Swing to integrated circuits.

■ One of the most intriguing semiconductor developments in the last few years has been the integrated circuit. A typical integrated circuit (which is as small as some end-of-the pencil erasers) will contain several transistors, diodes and associated resistors and capacitors which together form a complete electronic circuit.

An integrated circuit (I.C.) is a semiconductor wafer which has the *p-n* junctions formed directly on its surface. The proper interconnecting resistance and capacitance values as well as interconnecting leads are formed by depositing oxide films or reverse-biased *p-n* junctions on the wafer. The I.C. wafer is mounted either in a flat encapsulated package or in a standard transistor case with connecting leads brought out from appropriate points in the circuitry.

Integrated circuits were originally developed for military equipment and for use in computers where it is important to reduce the physical size of the units as much as possible. Integrated circuits also have greater reliability than a similar circuit made with individual (discrete) components.



Wired out flat on a perf-board, the IC preamp fits into a plastic case. Unit is complete except for battery which is externally connected.

Until recently the prices of integrated circuits placed them well out of reach of the average electronics experimenter. Now, due to volume production, several types of I.C.'s are available at fairly reasonable prices.

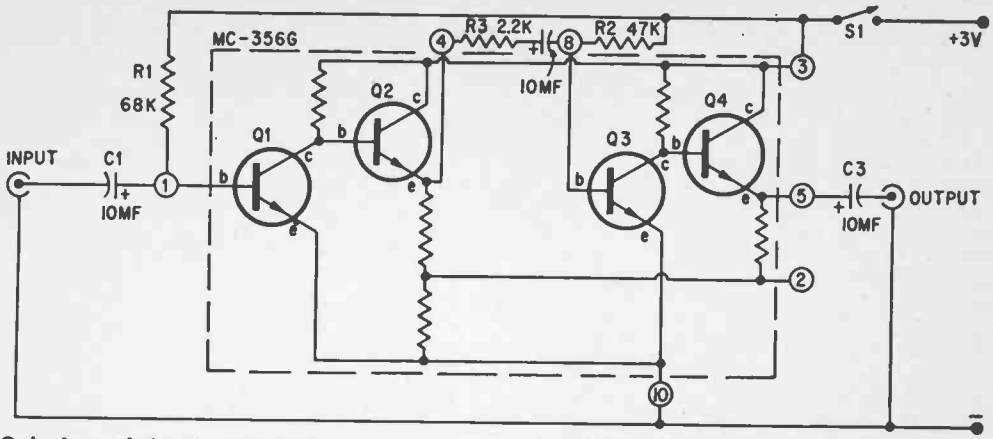
This two-stage, resistance-coupled I.C. preamplifier was designed to see just what could be done with these inexpensive units. The finished preamp is packaged in a small plastic box. It has a voltage gain of over 80 across a low-impedance output.

Some possible applications include use as a microphone preamp (to boost the output of a crystal or dynamic mike), telephone pickup-coil amplifier (its output can be fed directly to a pair of low-impedance headphones), scope preamplifier (for audio frequencies) and many more.

Because of the preamp's low-impedance output relatively long leads can be run from the I.C. amplifier output with little loss of the higher frequencies.

The Circuit. Refer to the complete schematic diagram of the Motorola MC356G integrated circuit which is used in the assembly of this integrated-circuit preamplifier. This I.C. contains six transistors and five resistors. Only four of the transistors are used in the I.C. preamp circuit, as shown in the preamp's schematic diagram.

The signal is fed to the base of Q1 (pin 1 of the MC356G) through the DC-block-



Only four of the six transistor elements in Motorola's MC356G are used in preamp's circuit.

PARTS LIST

C1, C2, C3—10-mf, 10-volt miniature electrolytic capacitor
IC—Integrated circuit (Motorola MC356G)
J1, J2—Phono jack (single-hole mount)
R1—68,000-ohm, ½-watt resistor
R2—47,000-ohm, ½-watt resistor
R3—2200-ohm, ½-watt resistor
S1—S.p.s.t. slide switch
1—10-contact socket for IC (Allied Radio 40-H-195)
Misc.—wire, solder, eyelets, perforated phenolic board, dry cells and plastic box.

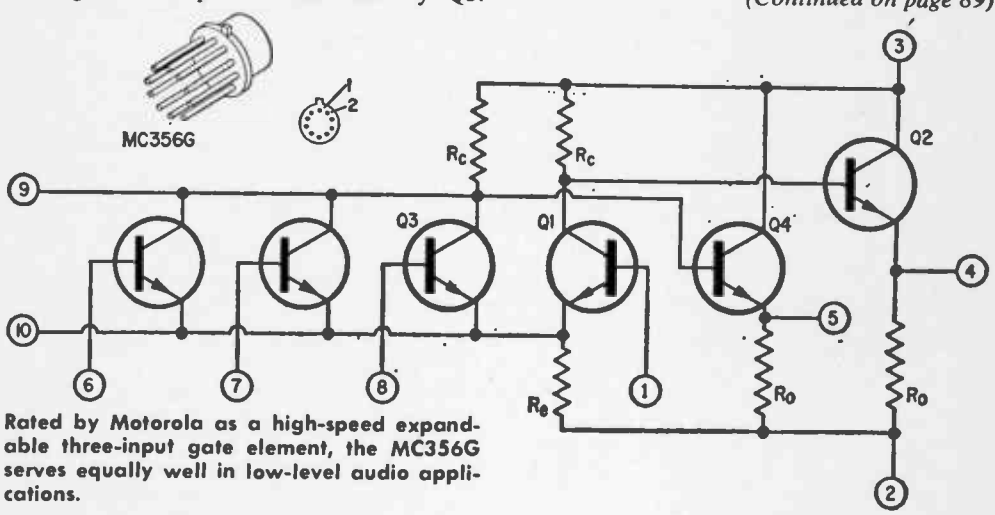
Estimated construction cost: $8.00
Estimated construction time: 2 hours

ing capacitor (C1). Amplified signals at the collector of Q1 are direct coupled to the base of Q2 (an emitter-follower stage). The output signal at the emitter of Q2 is picked off pin 4 of the MC356G. This signal is then fed to the base of Q3 through C2 (connected between pins 4 and 8 of the MC356G. Again the signal is amplified—this time by Q3. Signals at the collector of Q3 are direct coupled to the base of another emitter-follower stage (Q4). The output signal at the emitter of Q4 appears at pin 5 of the MC356G and is connected to the preamp's output jack by DC-coupling capacitor C3. Proper base-bias voltages for Q1 and Q3 are supplied by R1 and R2 respectively. Operating voltage (3 volts) is applied to pins 3 and 10.

Let's Build It. Construction of the I.C. preamp is a snap. The original unit was assembled on a piece of perforated phenolic board. See photo. Small brass eyelets were used as tie points for the various component leads.

The MC356G plugs into a special 10-contact socket which is easily mounted in a hole drilled through the phenolic board. Input and output connectors of the I.C. preamp are RCA-type phono jacks.

(Continued on page 89)



Rated by Motorola as a high-speed expandable three-input gate element, the MC356G serves equally well in low-level audio applications.

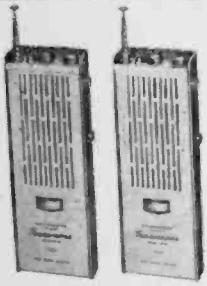
How To Have Fun While You

23-Channel 5-Watt All-Transistor CB Transceiver

Kit GW-14
$89.95

Assembled GWW-14
$124.95

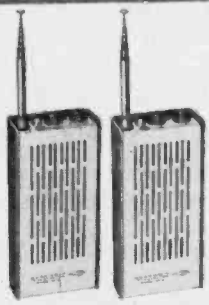
23 crystal-controlled transmit & receive channels for the utmost reliability. Low battery drain . . . only .75 A transmit, .12 A receive. Only 2⅞" H x 7" W x 10½" D . . . ideal for car, boat, any 12 v. neg. gnd. use. "S" meter, adjustable squelch, ANL, built-in speaker, PTT mike, aluminum cabinet. 8 lbs. Optional AC power supply, Kit GWA-14-1, 5 lbs. $14.95. Special 23-Channel Crystal Pack (46 crystals), GWA-14-2 . . . reg. $137.70 . . . only $79.95. CB crystals only $1.99 each with *any* Heathkit CB transceiver order!



Powerful 1-Watt Walkie-Talkie!

Kit GW-52A
$69.95
(pair $129.95)

Up to 3 mile inter-unit communications. 10-transistor, 2-diode circuit. Crystal-controlled transmit & receive. Includes $20 rechargeable battery & built-in 117 v. AC battery charger. Adjustable squelch, automatic noise limiter, rustproof metal case, earphone, strap, and crystals (specify channel). 4 lbs.



Deluxe 9-Transistor Walkie-Talkie

Kit GW-21A
$39.95
(pair $74.95)

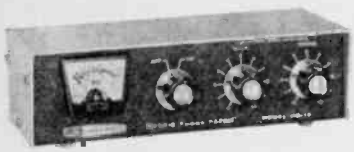
1 mile range between units. 100 milliwatt input power crystal-controlled transmitter, superhet receiver. Built-in squelch & automatic noise limiter. Includes sturdy aluminum case, earphone, strap, crystals (specify channel). Fast, simple circuit board assembly. 3 lbs. GWA-30 Battery Set (2) $2.95

Fully Automatic Electronic CW Keyer

Kit HD-10
$39.95

All-transistor circuitry. 15-60 words per minute. Solid-state switching—no relays to stick or clatter. Convertible to semi-automatic operation. Built-in paddle. Self-completing dashes. Variable dot-space ratio. Built-in sidetone. Keys neg. voltages only, such as grid-block keying. Transformer-operated power supply. Fused. 6 lbs.

New Amateur Radio Hybrid Phone Patch!



Kit HD-15
$24.95

Features individual gain controls for receiver-to-line & line-to-transmitter audio level; VU meter; 1-switch operation. Minimum of 30 db isolation between transmitter and receiver circuits permit VOX & PTT operation. 4 lbs.

New Relative Power Meter

Kit HM-15
$14.95

Indicates forward or reflected power and SWR. Band coverage 160 through 6 meters. Handles peak power of well over 1 kilowatt. Matches 50 or 75 ohm lines. Essential for tuning and monitoring transmitter/antenna systems. 3 lbs.

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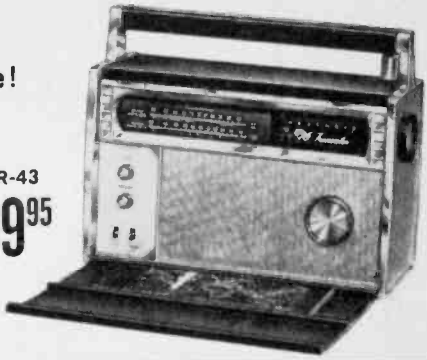
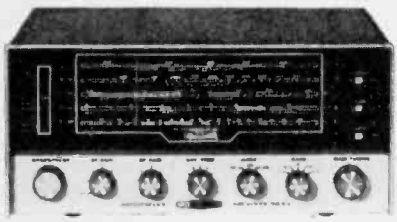
Deluxe All-Transistor, 10-Band Shortwave Portable!

10 bands tune longwave, standard AM, FM and 2-22.5 mc shortwave. 16 transistors, 6 diodes, and 44 factory-built & aligned RF circuits. Separate FM tuner & IF strip same as used in deluxe Heathkit FM tuners. Two built-in antennas, 4" x 6" speaker, battery-saver switch. Operates anywhere on 7 flashlight batteries, or on 117 v. AC with optional charger/converter GRA-43-1 @ $6.95. Assembles in 10 hours. 17 lbs.

Kit GR-43
$159.95



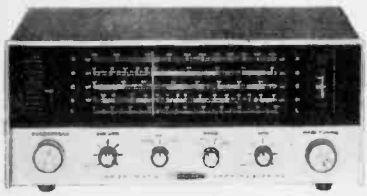


Kit GR-54
$84.95

New Deluxe Shortwave Radio!

Compare it to sets costing $150 and more! 5 bands cover 200-400 kc, AM, and 2-30 mc. Tuned RF stage, crystal filter for greater selectivity, 2 detectors for AM and SSB, tuning meter, bandspread tuning, code practice monitor, automatic noise limiter, automatic volume control, antenna trimmer, built-in 4" x 6" speaker, headphone jack, gray metal cab., free SWL antenna. 25 lbs.

Low Cost Shortwave Radio!



Kit GR-64
$37.50

Covers 550 kc to 30 mc—includes AM plus 3 shortwave bands. 5" speaker; bandspread tuning; signal strength indicator; 7" slide-rule dial; BFO; 4-tube circuit plus 2 rectifiers; noise limiter; external antenna connectors; Q-multiplier input; gray aluminum cabinet; AM antenna. 15 lbs.

New "Q" Multiplier!

Kit GD-125
$14.95

Use with matching GR-64 (opposite) or similar SWL receivers with IF circuits from 450-460 kc. Creates extra-sharp selectivity through an efficient "Q" of 4000 and provides a notch for adjacent signal attenuation. Includes built-in power supply. Charcoal cabinet gray, front panel. 3 lbs.

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Propagation Forecast

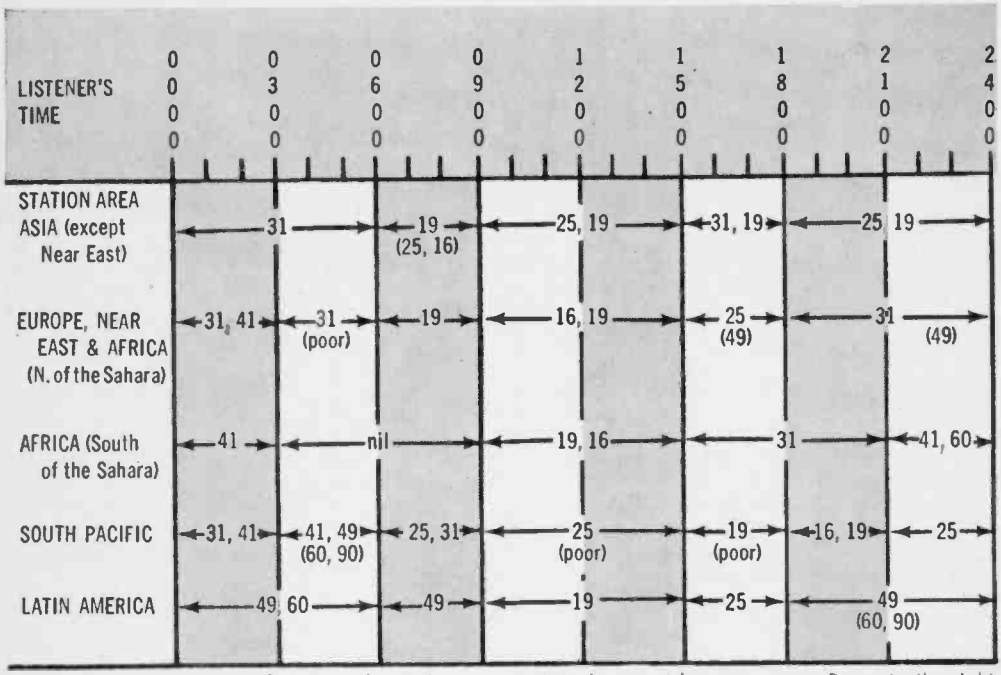
By C. M. Stanbury II

April/May 1966

■ As noted several times before, these predictions apply primarily to short-wave *broadcast* reception rather than general reception, utility, amateur, etc. They are also based on the concept of *best DX available* rather than simply the strongest signal. For example, at 0000-0300 listener's time East of the Mississippi, Africa will usually be loudest on 31 meters but more interesting African catches will be available on 41 meters (despite ham QRM) and therefore we have listed 41 meters, rather than 31 on the chart.

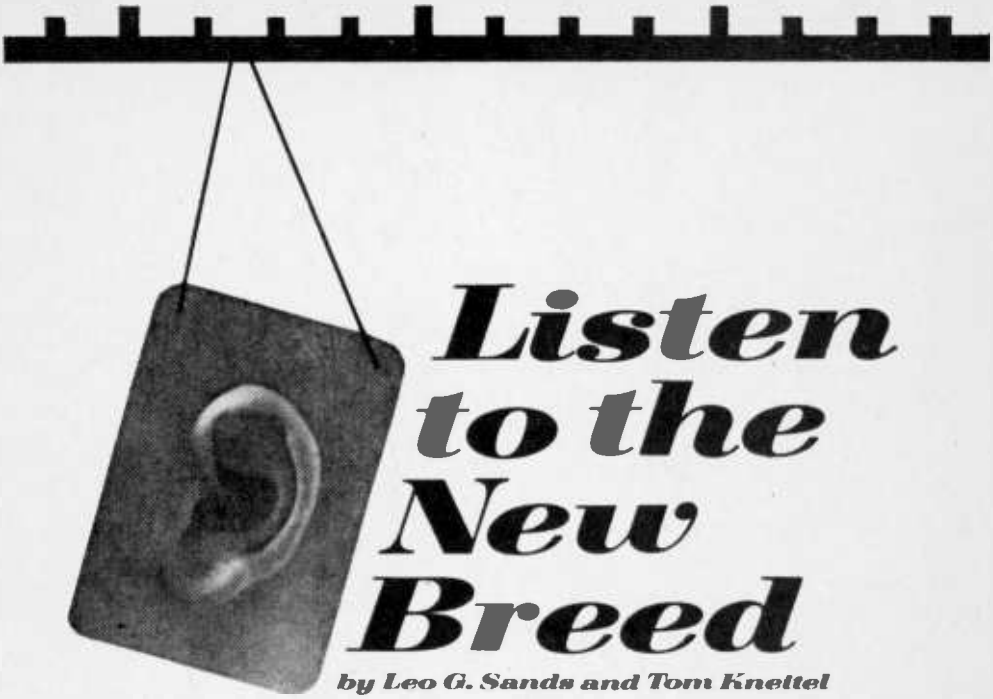
By available we mean an *average* SWL can hear it with a *little* effort. Okay, what's *average* and what's a *little* effort? We consider the average SWL to have two years experience and a short-wave oriented (not amateur or surplus) receiver costing approximately $100. If you have less experience or a less expensive receiver (or one which was not primarily intended for SW use), you'll just have to work a little harder. By a little effort, we mean reception that requires some concentration and maybe several different tries on consecutive dates.

Of course extra effort always pays off in DXing, especially on the *lower frequencies*. Radio South Africa on 2376-evenings EST is a tough one that will come in this spring. ■



To use the table put your finger on the region you want to hear and log, move your finger to the right until it is under the local standard time you will be listening and lift your finger. Underneath your pointing digit will be the short-wave band or bands that will give the best DX results. The time in the above propagation prediction 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. However, Asia and the South Pacific stations will generally be received stronger in the West while Europe and Africa will be easy to tune on the east coast. The short-wave bands in brackets are given as poor second choices. Refer to White's Radio Log for World-Wide Short-Wave Broadcast Stations list.

Tune in on drama in everyday life—fights, fire, finance—listen as it happens!



Listen to the New Breed

by Leo G. Sands and Tom Knettel

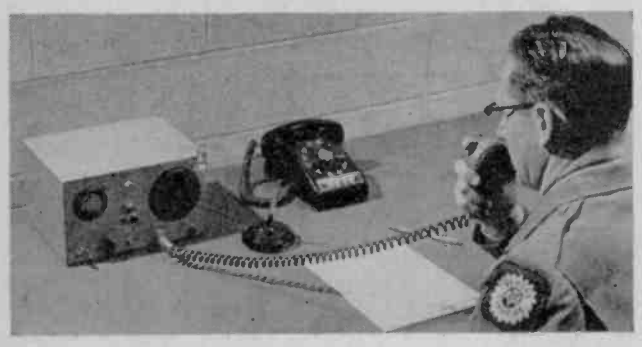
Remember the "New Breed?" It was a TV show about a modern police department. More fact than fiction, the program was quick to point out the need for a flexible and "instant" method of radio communications. Several years ago, police departments realized that their cumbersome low-frequency (2 mc.) radio equipment was costing them communications efficiency. After considerable experimentation, the police departments (with the exception of a few diehard low-frequency enthusiasts) moved en masse to frequencies above 30 mc. The idea proved so successful that most of the other two-way communications users were quick to abandon the low frequency bands and seek their luck on the VHF frontiers.

Result? The VHF communications bands now abound with police, fire, radiotelephone, railroad, press, taxi, industrial, and countless other types of communications systems. In some areas there are so many stations jammed onto a frequency that the users are rattling the FCC's front doors to demand additional channels. Indeed, in New York City, where the police department already uses a dozen or so frequencies, the need for additional VHF channels is so acute that the Department has asked the FCC for no less than 10 new channels!

Contrary to popular belief, it isn't against the law for you to listen to police radio stations, as a matter of fact, doing just this has created an entirely new hobby; that of monitoring the VHF bands to sit-in on the exciting worlds of police, fire, and other emergency communications. Within the past year, a number of manufacturers have devised excellent receiving equipment which is intended to cater to this rapidly growing new market —the gear is low-cost, well-made, and just sitting there waiting for you to plug it in and ride along with a squad car, hitch on to a speeding hook and ladder, rattle along in a picturesque red caboose, or eavesdrop on a news reporter excitedly describing tomorrow's headlines to his editor.

If you like, you can even obtain QSL cards from many of these stations; returns are amazingly good, and if you specialize in reporting to only certain specific groups of stations you can build yourself a really unique collection. The possibilities of collecting QSL cards from these thousands of stations are

Whistles, bells, lantern signals and top-of-the-voice yelling is passe. Just pick up a telephone handset and talk to just about anyone, anywhere, any time—without troublesome wires.



Railroad engineer (top, left), construction-site winchman (top, right), turnpike-police dispatcher and patrolman all maintain contact by radiotelephone for better teamwork.

Get More Information About VHF/FM Monitor Receivers From—

Aerotron
Aeronautical Electronics, Inc.
U. S. Route 1
Raleigh, N.C.

Allied Radio Corp.
100 N. Western Ave.
Chicago, Ill. 60680

Avcomm Division
Ajax Floor Products Corp.
Great Meadows, N.J. 07838

Communications Company, Inc.
300 Greco Avenue
Coral Gables, Fla. 33134

Fairchild-DuMont
725 Bloomfield Ave.
Clifton, N.J.

General Electric Co.
Communications Equipment
Lynchburg, Va.

General Radiotelephone Co.
3501 W. Burbank Blvd.
Burbank, Calif.

Gregory Electronics, Inc.
Route 46
Saddle Brook, N.J.

The Hallicrafters Company
5th and Kostner
Chicago, Ill. 60624

Hammarlund Manufacturing Co.
73-88 Hammarlund Blvd.
Mars Hill, N.C.

Hartman Marine Electronics
30-30 Northern Blvd.
Long Island City, N.Y.

Kaar Electronics Corp.
2520 Charleston Ave.
Mountain View, Calif.

Kuhn Electronics Inc.
20 Glenwood
Cincinnati, 17, Ohio

Lafayette Radio Electronics Corp.
111 Jericho Turnpike
Syosett, L.I., N.Y. 11791

Motorola, Inc.
Communications Division
Chicago, Ill. 60651

Outercom Electronics Corp.
725 Providence Road
Charlotte, N.C.

Radio Corporation of America
Mobile Radio Dept.
Camden 2, N.J.

Radio Shack Corp.
730 Commonwealth Ave.
Boston 17, Mass.

Regency Electronics, Inc.
7900 Pendleton Ave.
Indianapolis, Ind. 46226

Squires-Sanders, Inc.
Millington, N.J. 07946

Warehouse lift trucks dispatched in TV manufacturing plant (above) with same ease tugboat and crew are directed to job (below).

almost endless and we will go into some of the actual details of tracking down and sending reports to these stations a little later.

The Two Bands. Basically, the emergency stations have settled within two separate bands, 30 to 50 mc (known as "low band") and 150 to 174 mc (we bet you guessed that this one is called "high band"). You'll also want to include aircraft stations under the heading "emergency communications," and they operate within the band of 108 to 136 mc. Just about all of the high and low band stations utilize a type of emission known as "narrow band FM," while the aircraft stations use plain, old-fashioned AM.

Specific frequency assignments within the high and low bands are shown in the accompanying Table 1. Tables 2 and 3 are for marine and telephone frequencies. Utilizing a suitably tuned and matched antenna, you can expect to hear stations within a 50 mile radius on the low band. On the high band, your reception will be affected by the height of your antenna more so than on the low band, but you should be able to hear just about everything within 30 to 40 miles. "Skip" propagation conditions will frequently bring in low band stations across the continent, especially during the summer months when "skip" is a common occurrence. High band stations, as a rule, aren't affected by "skip," but sometimes an autumn temperature inversion will suddenly cause a station several hundred miles distant to appear with almost local strength.

Table 1. VHF Low and High Band Channel Allocations

Low Band (Mc.)		High Band (Mc.)	
30.58-30.62	Industrial	150.80-150.98	Land Transportation
30.66-30.82	Industrial/Land Transportation	150.98-151.49	Public Safety
30.86-31.14	Public Safety/Land Transportation	151.49-152.00	Industrial
31.18-31.98	Public Safety	152.00-152.24	Common Carrier (base)
33.02-33.10	Public Safety	152.24-152.48	Land Transportation
33.14-33.38	Industrial	152.48-152.84	Common Carrier (base)
33.42-33.98	Public Safety	152.84-153.73	Industrial
35.02-35.18	Industrial	153.74-154.46	Public Safety
35.22-35.66	Common Carrier (base)	154.46-154.63	Industrial
35.70-35.98	Industrial	154.63-156.25	Public Safety
37.02-37.42	Public Safety	156.25-157.45	Marine
37.46-37.86	Industrial	157.45-157.74	Land Transportation
37.90-37.98	Public Safety	157.74-158.10	Common Carrier (mobile)
39.02-39.98	Public Safety	158.10-158.46	Industrial
42.00-42.95	Public Safety	158.45-158.70	Common Carrier (mobile)
42.95-43.20	Industrial	158.70-159.48	Public Safety
43.20-43.66	Common Carrier (mobile)	159.48-161.57	Land Transportation
43.68-44.61	Land Transportation	161.57-161.63	Marine
44.61-46.66	Public Safety	161.62-161.78	Remote Broadcast
47.00-47.43	Public Safety	161.78-162.00	Marine Telephone
47.43-47.69	Public Safety/Industrial	162.25-170.15	Public Safety/Remote Broadcast
47.69-49.60	Industrial	170.43-172.38	Public Safety

Table 2. VHF Marine Channels

Channel Designator	Frequency (Mc.)		Points of Communication	Authorized Communications
	Ship	Coast		
6.....	156.3	.....	Intership only	Safety.
7A.....	156.35	156.35	Intership and Ship to Coast.	Business and Operational.
8.....	156.4	.....	Intership only	Do.
9.....	156.45	156.45	Intership and Ship. to Coast.	Do.
10.....	156.5	156.5	.....do.....	Do.
11.....	156.55	156.55	.....do.....	Do.
12.....	156.6	156.6	.....do.....	Port Operations.
13.....	156.65	156.65	.....do.....	(1).
14.....	156.7	156.7	.....do.....	Port Operations
16.....	156.8	156.8	.....do.....	Safety and Calling. [2]
18A.....	156.9	156.9	.....do.....	Business and Operational.
19A.....	156.95	156.95	.....do.....	Do.
20.....	157.0	161.60	Ship to Coast	Port Operations.
24.....	157.2[3]	161.8[3]	Ship to Public Coast	Public Correspondence.
25.....	157.25[3]	161.85[3]	.....do.....	Do.
26.....	157.3	161.9	.....do.....	Do.
27.....	157.35	161.95	.....do.....	Do.
28.....	157.4	162.0	.....do.....	Do.

[1] Business and Operational in the Great Lakes area only. In other areas, communication is authorized primarily with other ship stations for the exchange of navigational information (including radar information) concerning the passage of ships, or as an at-the scene aid in any maritime emergency; secondarily with land stations used in connection with the passage of ships through locks, bridge areas, and government controlled waterways and with land stations as necessary to exchange marine navigational information with shore radar stations.
[2] This frequency is authorized for call, reply, and safety purposes. It may also be used for messages preceded by the urgency and safety signals and, if necessary, for distress messages.
[3] These frequencies are not available in Puerto Rico or the Virgin Islands.

Receivers. There are basically two types of receivers available for VHF monitoring, the fixed frequency type and the tunable type. Fixed frequency sets, as their name implies, are designed for receiving from one to six previously decided upon frequencies within either the high band or the low band. Crystals must be ordered for each of these frequencies and a crystal selector switch on the front panel of the receiver enables you to rapidly switch from one channel to another without having to search around for the frequency you want.

Fixed frequency sets are usually not the best to use for general "eavesdropping" work because of the limited coverage which they offer. For getting the "whole picture" of what's going on, the most practical set is one which is continuously tunable over the entire band, with a knob and indicated on a dial, just like a regular broadcast receiver.

Table 3. VHF Mobile Telephone Channels
(base station frequencies, mc.)

Low Band		High Band		
35.26	35.42	152.51	152.63	152.75
35.30	35.46	152.54	152.66	152.78
35.34	35.50	152.57	152.69	152.81
35.38	35.54	152.60	152.72	

While some receivers are constructed to cover both the high and low bands, in most instances you will have to either make a choice as to which of the two bands you want to hear, or buy two separate receivers, one for high band and the other for low band. In many areas you will find that the majority of desired stations are all on the same band —as a broad generality, rural users seem to prefer low band while big city users tend to congregate on high band.

Operation of a VHF monitor receiver is far less complicated than a regular communications receiver, such as is used for listening to Ham, marine and shortwave broadcasts; in fact, they are actually easier to use than a TV set. The standard set has three controls, volume (for louder and softer), the tuning control (to change frequency), and a squelch (to enable you to silence random background noise when the monitored channel is not in use).

Power requirements are nothing more complicated than plugging the set into a wall outlet. Some sets are specially designed for mobile operation and will function on 12 volts DC. In some cities and towns, local laws prohibit the use of *mobile* receivers which are capable of monitoring police frequencies—check this out with your local

police authorities before you install a set in your car.

Just for the record, while an FM broadcast receiver may seem like a handy set to convert to VHF monitoring use, it's a very hairy job and isn't worth the effort. While FM is used for all bands involved, the broadcast receiver was intended for so-called "wide band FM," a far cry from the type of FM used by communications stations.

Converters. An inexpensive way to try your hand at listening on the VHF frequencies is by means of a converter. The converter is a gadget about the size of a pack of smokes; it is intended to be used in conjunction with a standard broadcast band receiver, either in a car or with a home set. A converter simply does what its name implies, it receives the VHF signal, *converts* it to another frequency, and then rebroadcasts it on the new frequency. The new frequency is within the range of the standard broadcast receiver and you then hear the UHF signal just as if it were being transmitted on the broadcast band.

Converters usually are transistorized and will operate from a 9-volt battery or from the battery in your car. A switch on the converter enables you to use the broadcast receiver for either VHF monitoring or for the purposes for which it was originally intended —no loss of broadcast quality should be

Popular VHF/FM Monitor Receivers

Make	Model	Freq. range (Mc)	Tunable	Fixed-tuned Channels	Price	Power Requirement
Aerotron	6NR	148-174	no	one (6 optional)	$199.50	AC
Aerotron	7NR	25-54	no	one (6 optional)	$199.50	AC
Avcomm	M1-A	30-50	yes	none	$ 49.95	AC
Avcomm	M-1B	151-174	yes	none	$ 49.95	AC
Avcomm	M-2A	30-50	yes	none	$ 49.95	AC
Avcomm	M-2B	151-174	yes	none	$ 49.95	AC
Hallicrafters	CRX-4	30-50	yes	none	$ 79.95	AC
Hallicrafters	CRX-5	151-174	yes	none	$ 79.95	AC
Knight (Kit)	KG-220	30-50	yes	none	$ 39.95	AC
Knight (Kit)	KG-221	152-174	yes	none	$ 39.95	AC
Knight	KN-2558	30-50	yes	none	$ 59.95	AC
Knight	KN-2557	152-174	yes	none	$ 59.95	AC
Lafayette	HA-50	30-50	yes	none	$ 59.95	AC
Lafayette	HA-52	152-174	yes	none	$ 59.95	AC
Lafayette	HA-520	30-50 152-174	yes	none	$ 89.95	AC
Outercom	MR-50X	144-174	no	1-6	$149.95 up	AC
Outercom	MR-60X	144-174	no	1-6	$149.95 up	AC
Realistic	RP-30/50 AM-FM	30-50	yes	one	$ 54.95	AC
Realistic	RP-148/175 AM-FM	148-175	yes	none	$ 54.95	AC
Realistic	Dual Band	30-50 148-175	yes	one (low band)	$119.50	AC
Regency	AR-132(AM)	108-132	yes	none	$ 59.95	AC
Regency	AR-136(AM)	108-136	yes	none	$ 79.95	AC
Regency	DR-200	30-50 152-174	yes yes	one one	$169.50	AC
Regency	MR-10B	152-174	yes	none	$ 79.95	AC
Regency	MRC-10B	152-174	no	one	$ 79.95	AC
Regency	MR-33B	30-50	yes	none	$ 79.95	AC
Regency	MRC-33B	30-50	no	one	$ 79.95	AC
Regency	PR-35BR	30-50	yes	none	$ 59.95	AC
Regency	PR-155BR	152-174	yes	none	$ 59.95	AC
Regency	M-40	30-50	yes	none	$114.95	12VDC
Regency	M-160	152-174	yes	none	$114.95	12BDC
Regency	TML-1	30-50	no	one	$ 99.95	AC/12VDC
Regency	TML-2	30-50	no	six	$119.95	AC/12VDC
Regency	TMH-1	150-175	no	one	$ 99.95	AC/12VDC
Regency	TMH-2	150-175	no	six	$119.95	AC/12VDC
Sonar	FR-101	30-50	yes	two	$ 79.95	AC
Sonar	FR-102	152-174	yes	two	$ 79.95	AC
Squires-Sanders	FM-Alert	30-50	yes	two	$ 79.95	AC
Squires-Sanders	FM-Alert	152-174	yes	two	$ 79.95	AC

space ratio if desired. The dot-space and speed controls are ganged so the ratio remains constant over the speed range. All characters are self completing, that is, if the paddle is just touched to the dash contact the full dash is generated regardless how short a time the paddle is held against the contact and the operator cannot send a false or second dash until the first one is completed. The dots are similarly self completing.

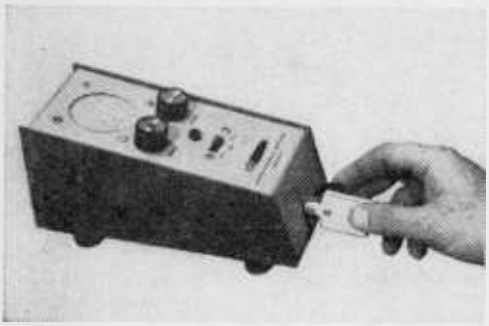
The monitor tone is that of a multivibrator —not as raucous as a neon relaxation oscillator but not as clean as a receiver's BFO. A normal-thru phone jack disables the speaker when headphones are plugged in.

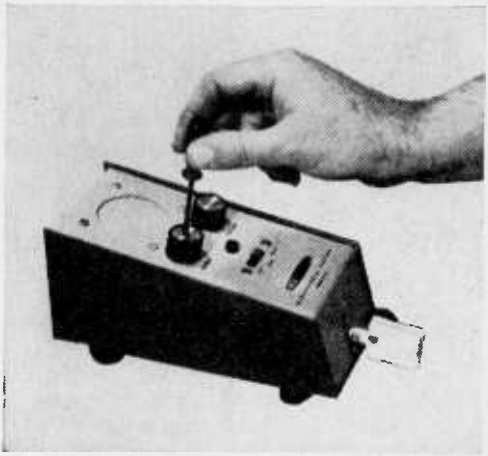
Keying of the transmitter is accomplished by the use of a transistor switch rather than a relay. The collector and emitter of the transistor switch are connected between the transmitter's keying line and ground. With no base signal applied the transistor appears as a high impedance between the keying line and ground so the transmitter is muted. When the keyer is operated the switch's base is driven negative—causing it to conduct—and the transmitter is keyed. The transistor switch is a *pnp* type so it must be connected to a transmitter whose keying line is *negative* to ground. With a transmitter using grid block keying this is not a problem as the grid-block voltage is negative. But a "Novice type" transmitter, where the keying is done directly in the oscillator or amplifier, has a positive voltage (with respect to ground) across the key terminals and the HD-10 cannot be used unless an intermediate keying relay is connected between the keyer and the transmitter.

Our Comments. While in terms of character generation and monitoring the HD-10 keyer is superb the paddle leaves something to be desired if you are accustomed to a standard bug. The paddle is made of phenolic board strip and so has a slight *give*. When it is pushed to the dash or dot side there is a little extra motion after the paddle activates the keyer—it is a "soft" feel which takes a bit of getting used to when one has used a standard paddle in which metal strikes metal with no give. As far as stability goes the keyer is *excellent;* it is very heavy with oversize rubber feet and even the hardest slamming of the paddle will not cause the keyer to slide around the table.

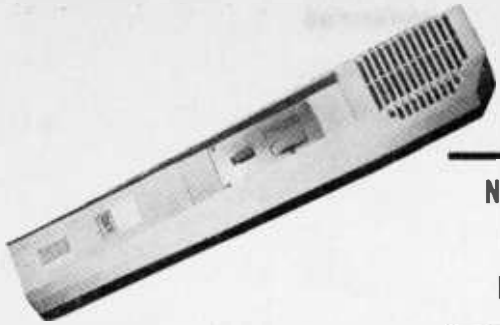
A word must be said for the kit designers at Heath. A ten-transistor kit with mechanical features could be a major project, even for the old pro. Not so with the HD-10—it's truly a novice kit, a first kit!

At $39.95 the Heathkit HD-10 Electronic Keyer is an excellent buy for any CW operator as it's the *easiest* and *cheapest* way to get a 100% readable "machine quality" fist. ■





Ratio and speed controls are concentric, thereby insuring proper and consistent dot-space ratio at all keying speeds. Space length is adjustable from outside the cabinet via a screw in the center of the speed control. For dots, the paddle is moved right; for dashes, slap it left. Southpaws can reverse this sequence by simply reversing the connections to the snap-action switches.



NORELCO Model DX-11 Reverberation Dynamic Microphone

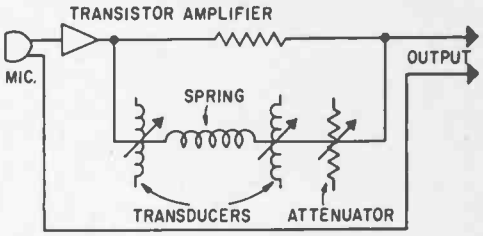
■ How would you like to have an echo chamber to jazz up your recordings? Get the full-bodied sound of rock-and-roll; make your *O Solo Mio's* sound as if they were coming from the great stage of the opera house; give your living room recordings of the local Clambake Five the *big* sound of the Tijuana Brass. Too expensive, you say; an echo chamber would cost a few thousand. Not so! All it takes is $99.00 for Norelco's DX-11 Reverberation Microphone.

The DX-11 is a completely self contained reverberation device (an electronic echo chamber). A housing about twice the size of the average dynamic mike contains a dynamic mike element, a transistorized amplifier, and a large spring with its associated transducers (the reverberation mechanism). The power supply is a self contained, standard, transistor radio 9-volt battery. A neat carrying case is included in the purchase price that'll serve the "tote-along" crowd as well as for storage when not in use.

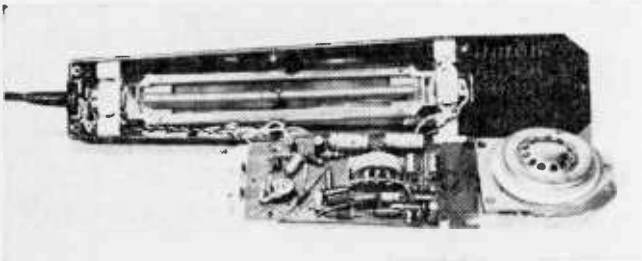
Here's how it works. The signal from the microphone element is split; part of it is amplified and fed to a transducer which in turn drives a spring. The spring vibrates in step with the audio signal (the same as in a hi-fi reverberation device); another transducer attached to the other end of the spring converts the mechanical spring motion back to electrical energy. The standing waves on the spring as audio is applied produces an "echo" electrical equivalent in the spring's output transducer. The output transducer's electrical signal is then recombined with the mike signal, producing the so-called "echo effect." A volume control is provided which varies the reverberation from full-off to full-on.

The frequency range is 50-15,000 cps. The pickup pattern is cardioid, that is: sensitivity to the sides and front with sharply reduced sensitivity to sounds arriving into the back. Both a low (150 ohm) and a high impedance output (50,000 ohms) are provided. Impedance selection is determined by which of the three color coded output leads are connected to the plug. Output level is −50 db for the low impedance and −36 db for the high impedance. The relatively high output level of the DX-11 is a result of the microphone element's signal being amplified in the transistor amplifier before it is split to the "echo channel."

(Continued Overleaf)



Functional schematic diagram (see above) shows microphone input fed to an amplifier (triangle) whose split output goes to an attenuator (resistor symbol) and transducer. The transducer causes the sound energy to vibrate the spring and then be picked up by a second transducer. This "echo" signal is then mixed with voice signal.



Inside view of the DX-11 reveals printed circuit construction—long rod-like object running the length of the plastic case is reverb spring.

Using the Norelco DX-11 is a lot simpler than trying to get echo from a tape recorder. With the echo control *off* only the normal mike output is passed along to the output plug. As the control is advanced the output from the reverberation amplifier is added to the normal mike output. Since the echo control is built into the mike the performer has easy control over the amount of reverberation.

Our comments. While the DX-11 *does* produce a decided echo effect most of the reverberation appeared to us to be in the midrange, with reduced effect on the very low and high frequencies. Entertainers will enjoy this feature because the echo effect is greatest on the human voice. Also, the effect had a slight *metallic ring*. However, in the nature of special effects the DX-11's performance was close to that of a commercial reverb device which sells for more than $1000, and the DX-11 performed well at simulating caves, dungeons, large rooms, giants and monsters, and just plain adding liveness to "dead" acoustics. When it comes to adding reverb to your tape recorded musical works you'd better try it before you buy, for some of you will like the effect while others won't. We must admit that a talented user of the DX-11 will come up with unusual arrangements that listeners will enjoy.

For additional information write to Norelco Audio Products, North American Philips Co., Inc., 100 E. 42nd St., New York, N.Y. 10017. ■

SQUINT TINT HINT

Green Indians on purple horses,
Chase cowboys of royal blue;
They have lilac hands and sea green teeth,
And heads of an azure goo.

Through a mountain pass of bright red grass,
Where would you expect to see?
On Saturn? Neptune? Venus or Mars?
No, here on our color TV.

Our black and white set, could never get,
Such vivid exciting scenes;
Beautiful green girls, with dark blue curls,
And noses like pinto beans.

A plaid man chats with pink polecats,
Believe me, it's quite a treat;
The station break must make stomachs ache,
From the things they show to eat!

Sickly green steaks, and olive corn flakes,
Stew that's a purple mottle;
Then, with good cheer, someone pours beer,
That's scarlet in the bottle.

We sit and stare as we see the fare,
We can't imagine its taste;
The show then skids, to the dental kids,
Brushing with a dark brown paste.

Next, some joker shows wash that's ocher,
And claims that it's white and clean;
A woman praises, as she raises,
Blue-green white shirts to be seen.

We don't mind, a TV of this kind,
Should we get service and pay?
You gambling men better guess again,
Because we like it this way.

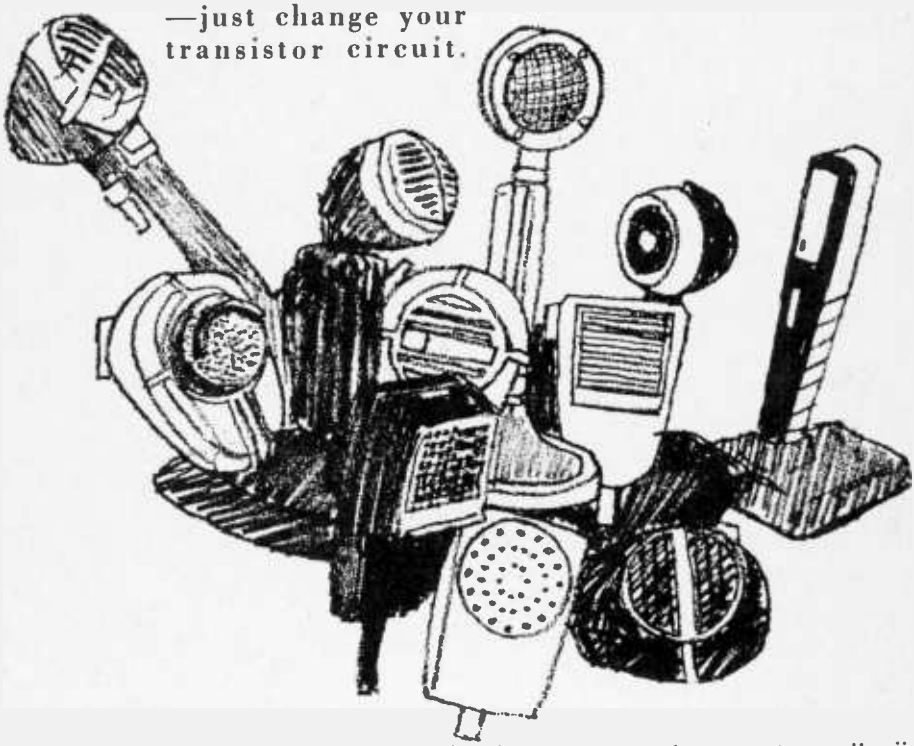
Although not right, the colors are bright,
Pleasing the kids and my wife;
We'll not change it nor rearrange it,
No sireee, not on your life!

BY EDMUND A. BRAUN

Transi-Match

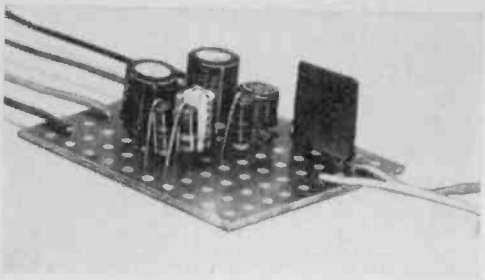
By Herb Friedman,
W2ZLF/KB19457

You don't need large audio transformers —just change your transistor circuit.

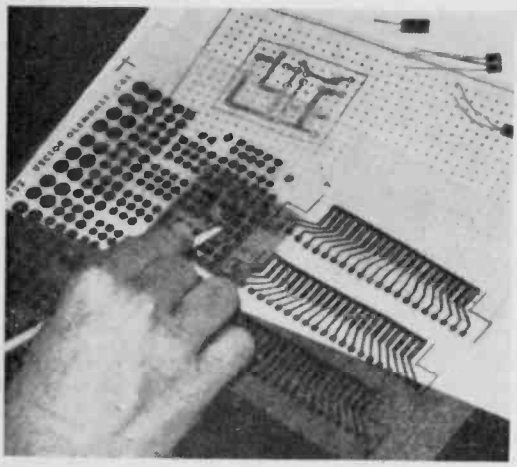


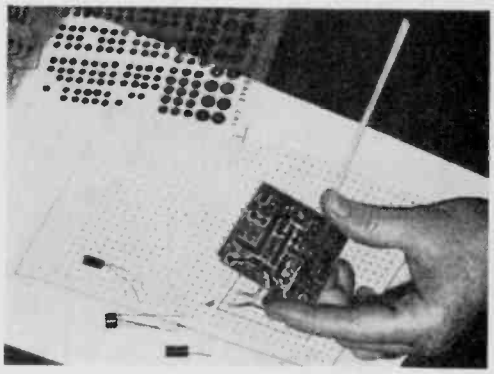
■ Until all electronic gear is fully transistorized—or to use the newer term, all soiid-state —the average experimenter and hobbyist will have his hands full trying to utilize *tube* components with transistor equipment. A good case in point is the ordinaiy microphone. Many hobbyists, be they audiophiles, CB'ers or hams, have a collection of microphones which are all but useless with transistor circuits. In the case of crystal and ceramic mikes, which are designed to work into high-impedance loads (of 1 megohm or more), the low input impedance of typical transistor amplifiers loads down the mike, resulting in almost no low-frequency response and sharply-reduced output voltage. Even the high-quality, high-impedance dynamic mikes used by audiophiles and tape recordists suffer from low-impedance loading.

Want a specific instance of the problem? Then take those inexpensive four-channel mike mixers generally used by tape fans to mix two or more mikes into a home recorder with only one mike input. While there's no difficulty in feeding the low-impedance mixer output into the high-impedance mike input on the recorder, the relatively low input impedance of the mixer (usually between 100K to 500K) will drop the "fi" right out of any mike designed for a high-impedance load.



It's hard to believe that the neat little Transi-Match (above) grew from a handful of papers and a piece of perforated phenolic board (top, right) contained in a kit for making experimental printed-circuit-boards. Circuit is first transferred to polka dotted layout sheet then resist is applied to board and unwanted copper etched away.

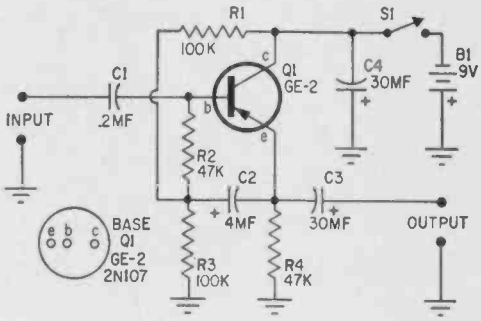




Following layout sheet, resist pattern is applied to perforated phenolic board that has been precut to size indicated on layout sheet (left). Circuit is now doublechecked. An error can still be changed. Even components should be inserted or positioned to see if they can fit the allotted space on circuit board.

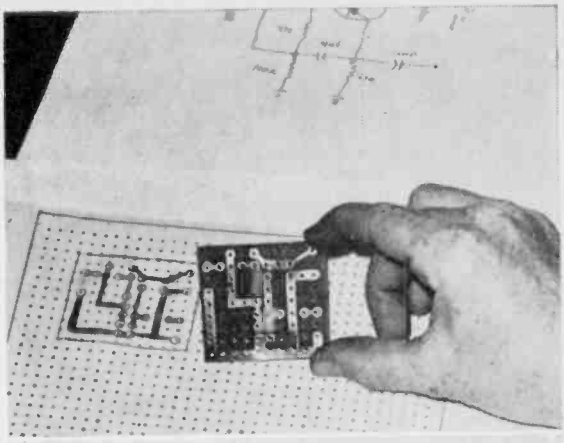
Again, the same problem occurs when one tries to replace the mike supplied with an inexpensive solid-state tape recorder with a good-quality/high-output ceramic mike; again, the low-impedance loading destroys the mike's frequency response.

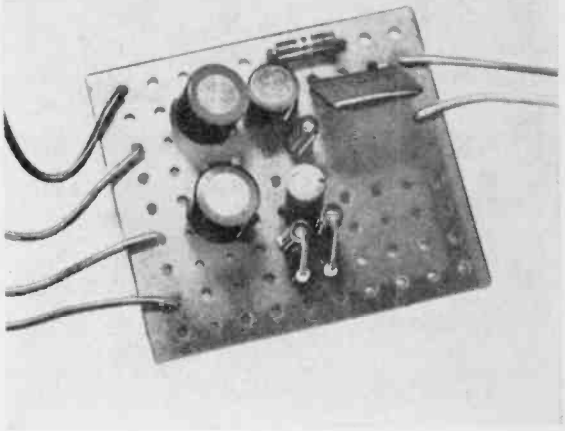
Or maybe you don't have an impedance matching problem *yet*. Perhaps you've got a good case of hum on a long mike line; a quick conversion from high to low impedance is all that's needed to restore a good signal-to-noise ratio. High-impedance microphone lines are notoriously sensitive to hum pickup. Further, the longer the line the greater the high-frequency losses due to the center-to-outer-conductor capacitance of the shielded mike cable. But, if the mike's high impedance is transformed to a low impedance *at the microphone*, the line's hum sensitivity falls to almost nothing, as do the high frequency capacitance losses. Transform the impedance of even a crystal mike to 50 or 150 ohms and you can run a couple of hundred feet of line with virtually no hum or frequency loss problems.



The output of the one-transistor circuit can be connected to input of an amplifier.

Impedance Matching. The solution to the high-low problem is the Transi-match





Only after the resist pattern has been doublechecked and you are certain everything is completely correct is it safe to slip the copper-clad board into the small plastic bag containing the etching chemicals (above). After a few minutes the copper, unprotected by the press-on resist, will start to disappear. When all of the unwanted copper is gone, the etched board must be taken from the chemicals and washed and rinsed carefully—the resist is scrubbed from the remaining copper with steel wool (top, right) and the components are mounted (right).

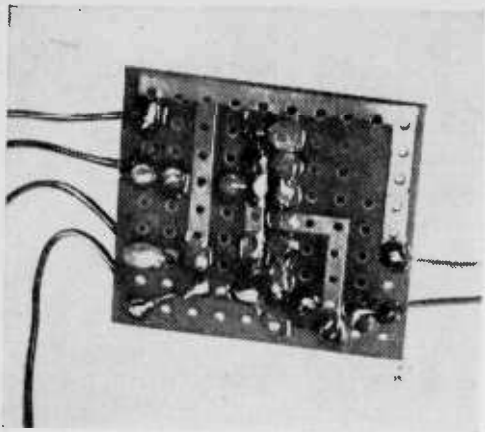
PARTS LIST

R1, R3—100,000 ohms, ½ watt, 10%
R2, R4—47,000 ohms, ½ watt, 10%
C1—.2 mf, 75 WVDC
C2—4 mf, 15 WVDC
C3, C4—30 mf, 15 WVDC
Q1—Transistor, GE-2 (General Elec.), SK-3010 (RCA see text), 2N107, 2N404, 2N508, 2N1191, etc.
B1—9 volts (Burgess 2U6 or equiv.)
S1—SPST
Misc.—Vector Printed Circuit Kit #27X-A for printed circuit version.
Estimated cost: $4.00
Estimated construction time: 1 hour (does not include printed circuit version)

shown in the schematic diagram, a one-transistor circuit whose sole function is to match a very high impedance to a very low impedance. In terms of amplification—there is none. There is actually a loss of 2 db or so since this is an emitter-follower type circuit. Actually, the Transi-match is an old friend—the *bootstrapped* amplifier, which simulates (to the source) a high-impedance load by using positive feedback. A portion of emitter (output) signal is returned to the base via C2.

The Transi-match is ideally suited to the hobbyists as it's input impedance is nominally 1.5 megohms. With loads ranging from 50 ohms up it is flat (within ±1 db) from 20 cycles to over 50 kc. While some capacitor values are considerably larger than those usually used in a circuit of this type, the specified values have been chosen to make the Transi-match universal—the frequency response being virtually independent of load.

Typical of any high-impedance amplifier, care must be taken to avoid "hum" pickup in the input circuit. While the usual low input impedance of transistor amplifiers allows the use of ordinary hook-up wire,



Underside of board shows solder connections between components and copper foil.

unshielded Transi-match input leads will result in severe hum; use normal shielding techniques—just as you would for a tube-type amplifier.

The Power Supply. While a 9-volt battery is shown the Transi-match can be used with any 6- to 12-volt DC supply. Since the current drain is quite low, about 100 microamperes, it does not place a strain on any battery-pack supply and can be added to most amplifiers.

The schematic shown uses a negative power supply with the positive battery terminal grounded. A positive supply with a negative ground can be used if Q1 is replaced with an NPN transistor like the RCA SK-3010, a general replacement type. Also, make certain you reverse the polarity of all capacitors.

Since the Transi-match involves only a handful of components it can be easily assembled on a small printed-circuit board (PC board) which can then be built into a solid-state amplifier. A typical PC version is shown in the photographs.

A Printed Circuit. Making your own PC board(s) is not difficult, even for the beginner, and with a modern PC design kit such as the Vector 27X-A you can learn the tricks of miniaturization which may be used for many projects.

The Vector kit is especially designed for quick-and-dirty one-shot boards; it is very useful to the hobbyist because the boards are made without special resist inks or photographic processing. The heart of the Vector process is a transfer resist similar to the rub-off characters supplied in children's toys. You know the type, the child cuts out a picture of Dick Tracy, turns it over, rubs the back of the transfer with a stick and Dick Tracy is transferred to another surface. The Vector resist works the same way; you turn over a sheet containing resist circles, lines curves and swirls, rub the paper with a stick and the resist is transferred *neatly* to the copper foil.

Several pieces of copper clad board are supplied, with one being more or less designed for the rank beginner at PC boards; this board is pre-drilled with component lead holes arranged in a grid. This arrangement eliminates the need to drill component holes.

A PC Transi-match. Copy the schematic —and make it BIG. Note that if you lay the actual components over the schematic they actually fall into place as they would be arranged in a printed circuit version. Use the Vector layout sheet. It has a grid of dots corresponding to the holes in the pre-drilled copper-clad board. Layout the PC wiring so it conforms exactly to the schematic. Position the components on the grid so their leads fit through the holes. Draw a circle around each dot where a component will pass through the board to the copper foil. Use a separate dot for each lead. Don't try to jam two or three leads through the same hole. Be sure to make the common (ground) lead extra heavy (wide) and run it along one or two edges so the mounting screws will ground the Transi-match to the associated equipment.

When your sketch is finished draw the boundary line and cut a section of perforated board to the exact finished dimensions. Transfer the drawing to the copper foil with carbon paper or just match the resist designs to the drawing and apply the resist directly to the copper foil. Just as with the drawing, transfer the resist circles which are the terminal points and then connect them together with resist lines. A hint—chemicals last longer with least etching.

The chemicals supplied with the kit etch away the undesired copper—the copper that has not been protected by the resist. After being immersed, for a few minutes in the chemical solution, the undesired copper will disappear. Remove the PC board, strip off the resist—follow the manufacturers instructions exactly. Then push the components through the proper holes, solder, and the PC Transi-match is completed.

If you need several Transi-match units it is best to prepare all the PC boards with resist and then etch them all at once. ■

HARMAN-KARDON Model SC-440
AM/FM Stereo/Phono
Compact Music System

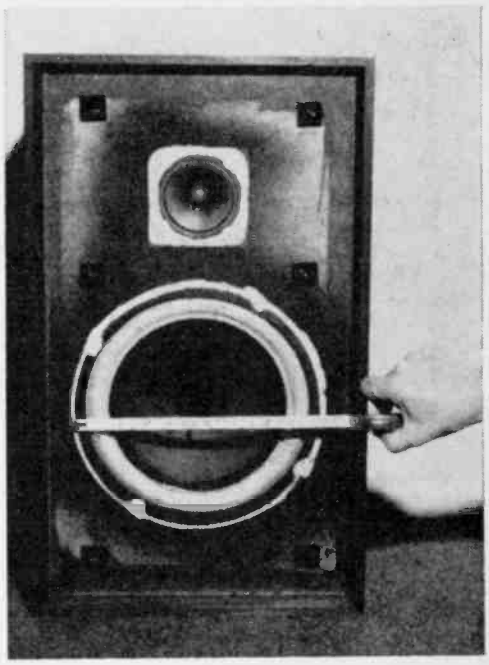
■ As it's presently used the description "Stereo Compact" has come to mean an amplifier or receiver complete with *small speakers,* and unfortunately, advertising copy notwithstanding, small speakers mean a small (poor) low frequency response. A stereo compact is therefore a compromise between low frequency response and the convenience of portability and/or small physical size; and of course, one cannot complain when they know in advance they must compromise. It is therefore unfortunate that Harman-Kardon's SC-440 Stratophonic Compact Music System must suffer with the adjective *compact,* as by contemporary standards its speakers are not compact in size or weight, nor are they compact in terms of low frequency response. The SC-440 delivers the full bodied sound associated with a *component* system which is what the SC-440 really is.

The only thing compact about the SC-440 is the "control center" which consists of a stereo receiver, Garrard AT-60 changer and an ADC-R-770 pickup, all contained in an open cabinet that looks like and is not much larger than a record changer base.

Features. The stereo receiver tunes AM and stereo or mono FM. The FM-stereo function is the "automatic" type which switches to mono or stereo as determined by the transmitted signal. When set to the stereo mode a *stereo indicator light* indicates when a stereo signal is being received. If a stereo signal is so weak as to be subject to severe noise interference the receiver can be switched to the mono mode for better noise reduction. The FM receiver's performance is just about what you'd expect from quality gear: A sensitivity of under 3 microvolts, reasonably good selectivity and good separation. The AM reception is AM, not good, not bad—but that is the fault of AM and not the SC-440.

A single "peak for best reception" type tuning meter is used for both AM and FM.

The amplifier's switching for AM, FM and turntable is built-in, the only input jacks are the *auxiliary,* used for a tape recorder or similar high-level device. Tandem (one knob) controls are provided for volume, balance and tone; a switch handles the *con-*



SC-440's woofer measures a full 12 inches with tweeter measuring in at 3¼ inches. Sizes indicate that this is not a "vest pocket" loudspeaker system—enclosure is actually larger than some so-called *bookshelf* speaker units.

tour equalization—low frequency boost at low volume levels. A panel mounted stereo phone jack is provided as well as a speaker on-off switch which disconnects the speakers and terminates the amplifiers when listening with headphones. A tape output and a switched AC receptacle are provided on the rear apron.

Our Tests. The amplifier response is very wide; with the tone controls set to the center position the response is almost ruler flat from 20 cps to 50 kc. When the two channels are adjusted to equal output with the balance control the variation in frequency response between the two channels is less than ¼ db. Similarly balanced between channels, the power output is 11 watts at less than 1% *THD* (total harmonic distortion). While the treble control has a wide variation of 7 db cut to 17 db boost at 20 kc., the bass control provides only 5 db and 6.5 db boost at 20 cps. While some older records might require more than 6 db boost, it is adequate for most modern recordings as the associated speakers aren't shy on low frequency response. If additional bass boost is needed it can be supplied by the contour control.

The contour control provides 11 db boost at 20 cps when the volume control is ¼ open. Normally, the ¼ open position provides a very high volume level from records and the tuner, so the contour can be used to provide additional bass boost. At normal listening levels the bass boost when added to the contour boost provides a total of 17 db bass boost at 20 cps. Frankly, anyone who needs 17 db of bass boost (or even as low as 10 db) does not need a hi-fi system because the music they will be listening to will be distorted to the sounds of the thirty's.

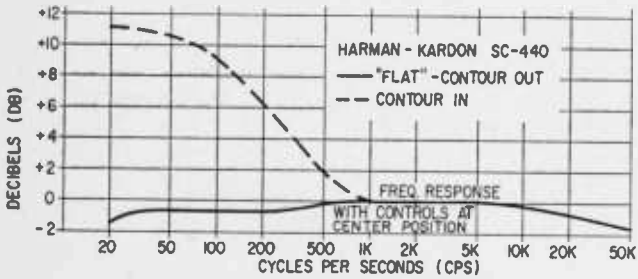
Overall sound quality from AM (for what it is), FM and disc is very good.

The Sound Comes Out. The heart of the SC-440 system are the speakers—as usual, the acoustic suspension type (the latest speaker fad). Each enclosure is 13¾ x 10½ x 22⅞ inches; certainly large by *compact* standards, large even by the "bookshelf

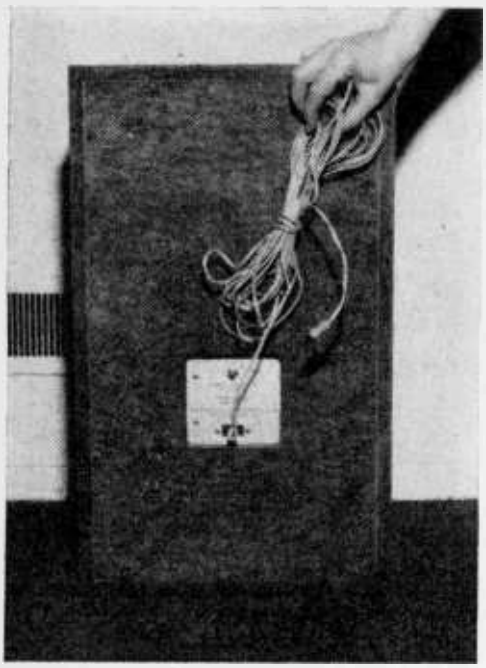
(Continued on page 96)

Harman-Kardon SC-440 Specifications

Frequency response, 20 cps to 50 kc.	
Power output for less than 1% THD,	11 watts per channel
Speaker impedance, 8 ohms	
Auxiliary input sensitivity, 280 mv. (.28v.) rms.	
Tone control:	
	20 cps / 20 kc.
Cut	5 db / 7 db
Boost	6.5 db / 17 db



The SC-440 frequency response tested better than manufacturer's claims indicating maker's specs are true and not "dreamed up" to sell sets. With contour added over 11 db of bass boost is added to audio.



To insure that the audiophile doesn't snafu the speaker phasing both the amplifier outputs and speaker inputs are phono jacks. Twenty-five-foot lengths of speaker leads with matching plugs are provided. Knob at top of speaker jack-plate is the tweeter output level control.

The Mighty Stereo Midgets

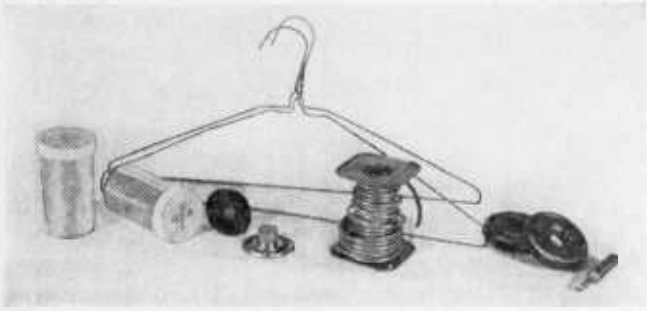
By Roy E. Nelson

**Listen undisturbed and in quiet!
No more distracting noise!
Neighbors can't complain about
window-rattling crescendos!
You won't upset your budget!**

■ Realism in the field of stereo listening has created the advent and subsequent sale of the stereo headset with some relief to the family if you like Mozart at 2:00 A.M. These gadgets vary in price from $15.00 to $50.00 a pair and venture to guarantee your very presence in the concert hall.

Uniquely enough all the parts to build an excellent pair of these "realistic" listeners are right in the nearest neighborhood electronic parts house and at a bargain price. A pair of coat hangers, like your wife gets for free, and a quick visit to your neighborhood drug store will complete the parts list.

Mechanical Construction. The heart of this stereo headset is a pair of 2-inch speakers that are used for replacement in the small transistor radio sets. (My particular pair come from Electronic Distributors of Chicago at 99¢ each.) The impedance of these speakers varies from 8 to 30 ohms but most are the 8- or 10-ohm variety. The container and sound chamber for each ear is made from a plastic container primarily used by pharmaceutical houses for various and sundry drugs. (See photo.) The pair I utilized were 2 inches in diameter and 3¼ inches long. Ideally the size would be



From this collection of odds and ends you can build a good looking pair of inexpensive stereo headphones that should give many hours of pleasure.

PARTS LIST

2—2-inch, 8-ohm speakers.
1—3-circuit phone plug
10-feet—3-wire cable, (Belden type 8443) (see text)
2—plastic containers, 2 inches in diameter, 1-inch (or greater) in height
Misc.—pair of earphone cushions, coat hangers, electrical tape, epoxy cement and Silastic or Dow-Corning RTV 732.
(Speakers, cable, phone plug and cushions available from Electronic Distributors Inc., 4900 Elston Ave., Chicago, Ill.

Estimated cost: $4
Construction time: 3 hours

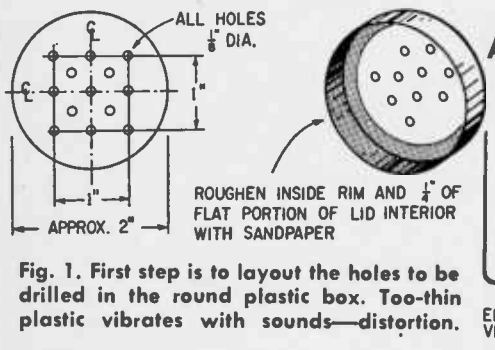


Fig. 1. First step is to layout the holes to be drilled in the round plastic box. Too-thin plastic vibrates with sounds—distortion.

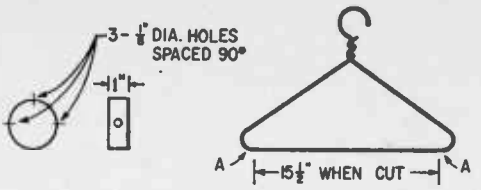
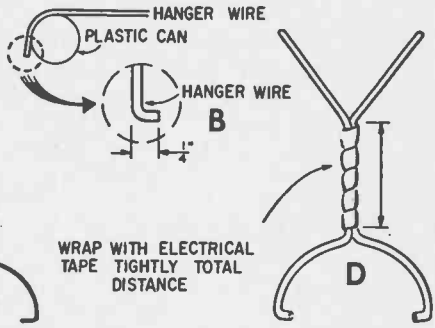


Fig. 2. (above left) Drill-hole spacing is indicated for plastic container rim.

Fig. 3. (above right) Straight portion of wire coathanger is used for headband.

Fig. 4. (below) Two pieces of coathanger wire are bent to form phones' headband.



2 inches in diameter by 1 inch in height. Unfortunately beggars (and authors) can't be choosers and since Harold, my druggist, handed me these two plastic cans as a gesture of good will, I will describe what has to be done to a 3¼ inch plastic can to make a 1 inch headphone container. It's very simple, cut 2¼ inches off the top leaving a 1 inch can with a solid bottom and a plastic lid.

Mark a 1 inch square on each lid as shown in Fig. 1 and drill 13 holes with a ⅛ inch drill. Drill these holes carefully and without too much pressure on your drill as the plastic has a tendency to flow from the heat generated by drilling too fast. After drilling the holes remove any small bits of plastic that might adhere to the edges of these holes to prevent their touching the speaker diaphragm. With a piece of fine sandpaper roughen the surface of the inside edge of the plastic lid and a distance of about ¼ inch at the inside rim of this lid as shown in Fig. 1. This will create a bonding surface for the epoxy cement used to assemble the headset.

Prepare the epoxy cement by mixing the resin and hardener as instructed on the container. With a tooth-pick or some small stick, spread a thin layer of cement on the edge of the little speaker gasket. Be sure that no cement spills onto the diaphragm. If you have any excess remove it with your applicator and then carefully press the speaker into the plastic lid that has been prepared with holes and roughened edges. Repeat the above described operation with the other lid and speaker and set the assembly aside to dry overnight.

In each 1-inch plastic can, drill three holes in the sides as shown on Fig. 2 with an ⅛-inch drill. One of the holes will carry the leads from the speaker and the other two will carry the coat-hanger head band. Set these aside for later assembly.

Hang It. Many of today's modern coat hangers, as delivered by your neighborhood cleaner, come with a plastic-foam cover as a protection for your clothes. If you are lucky enough to find some in your closet, scrounge two of them and let your wife scream. (The next load from the cleaner will have new ones and she will be pacified.) Remove the foam rubber covers and set them aside to be used later. Cut the hangers

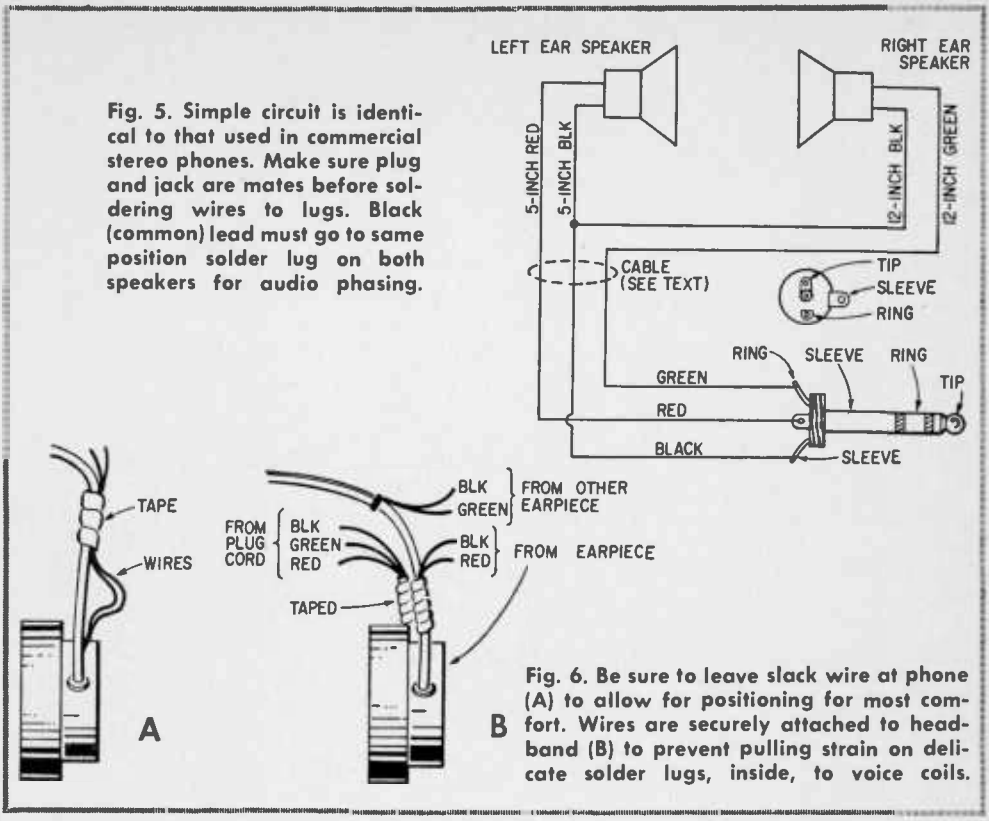


Fig. 5. Simple circuit is identical to that used in commercial stereo phones. Make sure plug and jack are mates before soldering wires to lugs. Black (common) lead must go to same position solder lug on both speakers for audio phasing.

Fig. 6. Be sure to leave slack wire at phone (A) to allow for positioning for most comfort. Wires are securely attached to headband (B) to prevent pulling strain on delicate solder lugs, inside, to voice coils.

at the points designated as "A" on Fig. 3. Both of the pieces you make from these hangers should be identical so complete the operation I am about to describe on each hanger. Using the top part of the plastic can as a form, create a quarter turn around the form (Fig. 4A) at each end of the hanger. With a pair of long nose pliers, make a ¼-inch hook at each end of your turns like Fig. 4B. The next step requires using your head. With the quarter turns pointing forward and held in your hands, place the hanger over your head and center it. Now pull your hands down to your ears and form the hanger to fit your head. It will tend to spring away from the contour of your head but a little squeezing will fix this in a jiffy. (If your head is tender, try a towel over it when you make the second hanger.) When you get through, you should have two pieces of coat hanger that look like the two views in Fig. 4C— after you put the last bend in the hanger right where the curve and the straight portion meet. Each end of each piece should be the same.

Place the two pieces of coat hanger side by side, so the ends look like Fig. 4D, and wrap some plastic electrical tape around the two pieces for about 1½ inches above what is now a half turn with two inward-pointing hooks. Wrap the tape tightly and repeat the operation on the other end. Spread the two parallel hanger wires to distance of 2 inches at the center portion of your just manufactured headband. Now go to bed. The transducers (speakers to you) have only been drying for half an hour.

Electrical Connections and Final Assembly. The schematic is shown in Fig. 5. The ideal wire to use for the hookup of these midgets is a piece of Belden cable #8443. This cable has 3 22-gauge stranded conductors and is fairly flexible. Determine the length of headset cable you need and buy two feet more for the interconnections between the speakers. (I used 10 feet—a convenient length.) Cut about 17 inches from your piece of cable and remove the outer vinyl covering from this piece. The three wires are red, green and black. If the cement holding the speakers in place in the lids has hardened, cut the black wire in two pieces 12 and 5 inches. Cut the green wire to 12 inches in length and solder the 12-

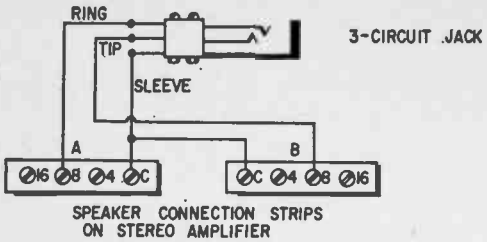


Fig. 7. Too much power from speaker output can quickly ruin these stereo headphones.

inch green and the 12-inch black wires to one of the speakers. Solder the 5-inch black wire to the other speaker and cut a 5-inch piece of red wire to match and solder it to the remaining terminal on the second speaker.

We are now ready to assemble the plastic cover caps to the speakers. Pass the red and black wire on one speaker through the middle hole in the cap—leaving the opposed holes to accept the headband. Repeat this process with the green and the black wire on the other speaker and cap. Seat the plastic cover in the plastic lid and place a small weight on the plastic cover with the lid down. Run a small bead of Dow-Corning RTV 732 Silicone Rubber around the plastic lid to create the bond and seal for the cover and lid. Repeat the operation on the other earpiece and set them aside to dry. The rubber takes about 24 hours to completely cure.

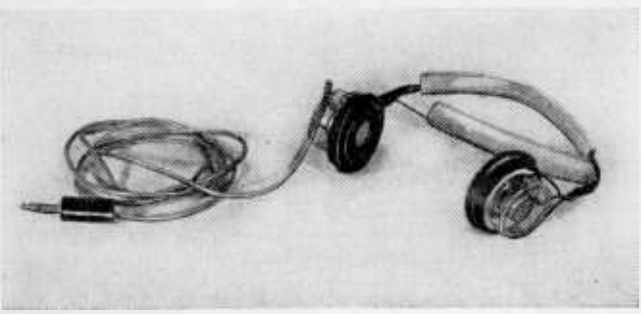
After the silicone rubber has cured, hook the headband into the earpiece with the green and black wire. Make a small loop in the two wires to allow for ear adjustment as shown in Fig. 6 and wrap a small piece of plastic tape over the previously taped portion of the headband to hold these wires in place. Now tape the two wires in three or four places to one of the two wires forming the headband and lead these wires over to the taped portion on the other end of the headband. Hook the other ear piece to the headband and leave a small loop in the red and black wire for adjustment and tape these two wires to the previously taped portion of the headband at this end.

Now prepare the remainder of your three wire cable by removing 1 inch of the outer insulation leaving the three insulated wires exposed. Tape this wire to the taped portion of the headband at the end where the red and black wire earpiece is attached. Follow the method shown in Fig. 6B. Splice the three black wires together, the two red and the two green. Solder the connections and tape each separately and then the entire assembly to the headband.

Prepare the other end of your three wire cable by removing 1 inch of the outer insulation. Disassemble the plug and slip the cover over the cable. Now solder the black wire to the sleeve, the red wire to the ring, and the green wire to the tip as shown in Fig. 5. Replace the cover on the plug and head for the stereo outfit in the living room. If it has a stereo headset jack plug your headset in and start out at low volume. The headset will stand about .2 watts of power and 200 milliwatts (.2 watts) at your ears will sound like you are at the conductor's podium in Hollywood Bowl.

If your stereo system does not have stereo headset connections you can wire in a jack as shown in Fig. 7. Use the 8-ohm connections for these phones.

Remember the plastic-foam we set aside when we dismantled the coat hangers—well take the two pieces and cover the "over the head" portion of the head band with this foam and hold in place with a little epoxy, RTV-732 or rubber cement. Oh yes . . . I bought a pair of earphone cushions for my ears as I use these earphones for hours and the plastic gets a little hard. They slip right over the plastic lids and friction holds them in place. Now pardon me while I make a Martini and have a date with Jane Morgan—stereo style. ■



Completed phones are neat and convenient although not as "pretty" as commercial units costing five times as much.

BINARY-SWITCHING CAPACITANCE DECADE

By Jack Brayton

A thousand capacitance values at your finger tips—from one compact unit that occupies less bench space than a VTVM

■ Have you ever needed an unknown value of capacitance and would have given anything, except the high price, for a capacitance decade box? If you're like most of us experimenters you have; but you need not ever again.

Technically, decade isn't the right word to use since it denotes a system based on tens instead of twos. However, the word describes an instrument that performs the same job as a decade although using a different system.

This is a unique capacitance substitution box which can be built for pennies. Its range starts at 100 mmf and extends to over .1 mf! And, more important, this is covered in .0001 mf (100 mmf) steps! In short—more than 1000 distinct values are available!

If you've glanced at the schematic (Fig. 1) you've seen that the circuit consists of 10 capacitance values and 10 s.p.s.t. switches. It seems unbelievable that such a simple circuit could provide even a hundred different values let alone a thousand. But we assure you it can.

The Secret. Most of us have heard the joke about the "foolish" man who offered to work for a penny a day, doubled every day, for thirty days. In spite of how little this might sound—the fact is—that even as early as the 21st day the man would be making $10,485.76 a day! And, up to that point, he would've earned a total of nearly $21,000. This doubling principle (powers-of-two) is used with the binary number system—a system used in computers because it saves parts. Our capacitance box operates on a similar system and illustrates the part savings.

Two main differences exist between the decimal (the conventional number system) and the binary system. First, instead of using ones, tens, hundreds, thousands, etc. the binary system uses powers-of-two (ones, twos, fours, eights, etc.) as column values. Next, the numbers 0 through 9 aren't used under these values as in the decimal system. In the binary system only *ones* and *zeros* are used. A *one* indicates that the column value is present and, of course, a *zero* indicates that the column value isn't present. Any number can be made up in this manner.

Again, looking at Fig. 1, we can see that the values of C1, C2 and C3 are 100 mmf, 200 mmf, and 400 mmf respectively;

Table Of Capacitors

Capacitor Number	Micro-farads	Standard Values Used			
		First	Second	Third	Fourth
C1	.0001	100 Mmf			
C2	.0002	200 Mmf			
C3	.0004	400 Mmf			
C4	.0008	750 Mmf	50 Mmf		
C5	.0016	1500 Mmf	100 Mmf		
C6	.0032	.003 Mf	200 Mmf		
C7	.0064	.005 Mf	1300 Mmf	100 Mmf	
C8	.0128	.01 Mf	2200 Mmf	500 Mmf	100 Mmf
C9	.0256	.02 Mf	.005 Mf	500 Mmf	100 Mmf
C10	.0512	.047 Mf	.004 Mf	200 Mmf	

Table at right lists the values of capacitance that must be connected in parallel to obtain the correct total capacitance for accurate results from binary–powers-of-two decade box.

every capacitor is *double* the value of the preceding capacitor. These, of course, correspond to the 1, 2 and 4 values of the binary column headings.

Each switch in the circuit represents either a *one* or *zero* under its heading. Whether a *one* or *zero* is represented depends on the position of the switch contacts—closed they're *one*—open they're *zero*. Of course, the values of the capacitors with closed switches add since they're in parallel. As a result, the value of the capacitance across the output is *the sum of the capacitors with closed switches;* or the column headings with a one underneath.

How To Set and Use The Switches. At first it might appear that our substitution box is difficult to set but nothing could be further from the truth.

The eighteen most often used values are listed with their respective ones and zeros in Fig. 2. Notice that each value has two rows of binary numbers; the top row represents the 5 top switches on the panel while the bottom row represents the 5 bottom switches. Of course, a *one* means the switch goes up (on) while a *zero* indicates that it goes down or off.

Other Values. Any value, within range, can be easily set *by subtracting the largest column heading which can be subtracted from the desired value and putting this column's switch in the up or on position.* In the case of a remainder you do the same with it until there's nothing left.

To illustrate, let's suppose we wanted a 700 mmf capacitance. Looking at the panel we see that the largest column heading which will subtract from 700 mmf is 400 mmf so we put the 400 mmf switch up or on. We have a 300 mmf remainder. The largest column heading which will subtract from this is 200 mmf so we put its switch in the up position. This, of course, leaves a 100 mmf

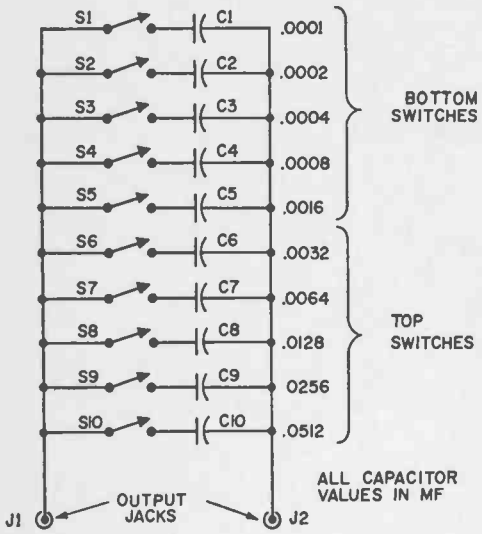


Fig. 1. Simple schematic diagram shows circuit of s.p.s.t. switches and capacitors.

.0001	00000 00001	**.0047**	00001 01111
.0002	00000 00010	**.0068**	00010 00100
.0003	00000 00011	**.01**	00011 00100
.0004	00000 00100	**.015**	00100 10110
.0005	00000 00101	**.022**	00110 11100
.001	00000 01010	**.033**	01010 01010
.0015	00000 01111	**.047**	01110 10110
.0022	00000 10110	**.068**	10101 01000
.0033	00001 00001	**.1**	11111 01000

Fig. 2. Some capacitance values are given with off (0) and on (1) switch positions.

remainder which we subtract from the 100 mmf heading (also putting its switch up) which leaves no remainder. Thus, the 100, 200 and 400 mmf switches are closed and these add to give us the desired value of 700 mmf.

The only point which should be remembered is whenever you're subtracting be certain that both numbers are in the same units. (Don't accidentally use a .001 for a .0001 value.) Of course, to change an mmf value to its mf equivalent the decimal point is moved 6 places to the *left*. It's moved to the *right* 6 places when converting from mf to mmf.

Getting Started. The first step toward building a project is always obtaining the necessary parts. This, of course, is simple enough. However, because we've used quite a few capacitors, much time can be saved if we steer you to their source. Other types of capacitors may, of course, be substituted but those listed are both low in cost and come in the values best suited to the project.

All of the capacitors used, in the original model, except the .047 mf, are Sprague, temperature-stable, 10%, 1000 volt ceramics and are available from Allied Radio. The .047 mf is a 1000 volt paper tubular.

As for the switches—almost any slide or toggle s.p.s.t. switch will work except those designed for low voltage applications.

Construction. Fig. 3 shows the locations of the panel-hole centers. To prevent marring the cabinet, the centers should be first marked on a sheet of graph paper (4 by 7 inches). This can then be taped (or rubber cemented) to the front panel and the hole centers punched. Since a sloping-face chassis is used, the hole centers should be *deeply* punched and the drill bits sharp to prevent the drill from "walking" across the panel—use a small-size drill first, then a larger one.

The size of the switch holes depends, of course, on the switches selected. Those specified mount in 15/32-inch holes. If another type is substituted check their size before drilling.

If decals or wax transfers are to be used as panel markings they should be applied *before* the components are installed in the cabinet. It's hard to align them otherwise. The switch markings are ½" above the hole *centers* and adhesive cellulose tape, of this width, applied to the panel serve as guide lines.

Capacitor Sub-Assembly. All of the capacitors are mounted on a piece of perforated, unclad phenolic as shown in Fig. 4. The board size (2 7/16 x 3 3/8 inches) is a stock size and no cutting is necessary. Both the perforated board and the flea clips (2 packages required) are available from Lafayette Radio or other electronics parts suppliers.

The first step in building the sub-assembly is enlarging the four corner holes using a 9/64-inch bit. These holes match those on the panel. The four stand-offs can be of any length from ½ to ¾ inch and they're fastened to

PARTS LIST

C1-C9—make from one or more of the following 1000-volt ceramic-disc capacitors: 1—50 mmf; 5—100 mmf; 3—200 mmf; 1—400 mmf; 2—500 mmf; 1—750 mmf; 1—1300 mmf; 1—1500 mmf; 1—2200 mmf; 1—.003 mf; 1—.004 mf; 2—.005 mf; 1—.01 mf; 1—.02 mf; 1—.047 mf.
J1, J2—Tip jacks or banana jacks.
S1-S10—S.p.s.t. Toggle switch (Allied Radio 34 U 527) or slide switch (Allied Radio 35 U 023) or equivalent.
1—Bud 1609 Chassis or equivalent.
Misc.—2 pkgs. Flea Clips; 1—perforated, unclad phenolic board (2 7/16 by 3 3/8-inches); 22 awg Bus wire, 4—standoffs (see text) tapped for 6-32; 8—¼-inch, 6-32 machine screws.
Estimated cost: $10.00—$3 less when slide switches are used.
Estimated construction time: 4 hours.

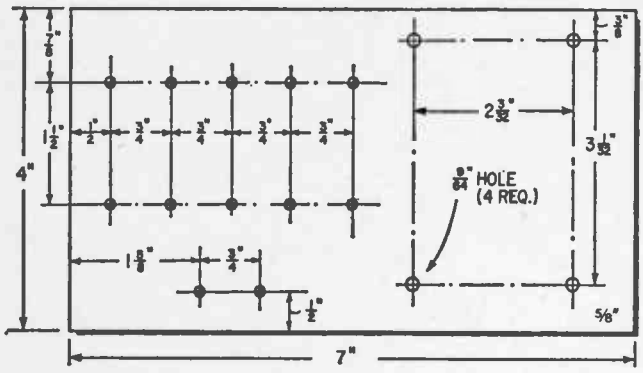


Fig. 3. Front-panel layout is for a 4- by 7-inch sloping-front cabinet. The four 9/64-inch holes on the right must be marked and drilled accurately to mate with tapped spacers. Tubular-type spacers allow more sideplay but assembly becomes a bit more difficult.

the perf-board with 6-32 machine screws.

The flea clips (2 lines of 10 each) are inserted in the *second row of holes from the edge of the board.* The first five clips in each row are *spaced 1 hole apart* while the following five are put in *every other hole.*

Ten basic capacitors are used in the project. However, because these capacitors are not standard values they have to be made up from several standard values in parallel. Table 1 lists the values used for each capacitor.

Space on the board is limited. Therefore, the larger ceramics have to be staggered—one toward one side and one toward the other. Care should be taken to insure that the leads of one group do not touch those of the next. And, as a general rule, the largest capacitor, in each group, should have the smaller capacitors soldered across them. Attach the leads close to the larger capacitor's body. The leads of the largest capacitor can then be used to mount the entire group. However, the ceramics across the .047 mf tubular *are not* fastened to the .047's leads—instead they go directly to the flea clips. Also the leads on the .047 must be bent so the body of the capacitor is over the edge of the board slightly and *its other edge doesn't extend past the flea clips.* Its leads can then be shoved down the center of the clips and cut-off on the bottom. A short length of bus-wire (22 awg) is run down one side of the board (shown in Fig. 4) and soldered to *each* terminal in the row. Before the board is mounted on the panel a wire must be soldered to each of the ten remaining terminals—to the bottom of the clips on the underside of the perforated

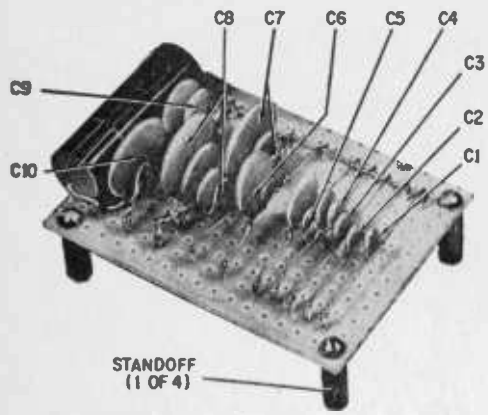


Fig. 4. Capacitors C1, C2 and C3 on board are not paralleled values—all others are.

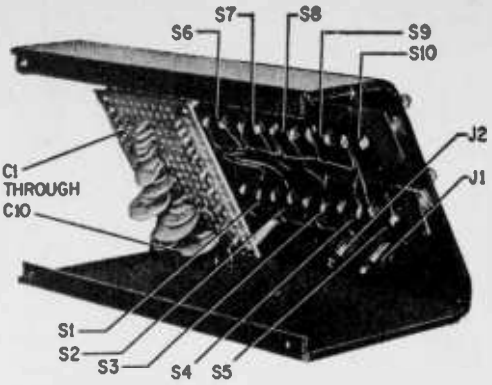


Fig. 5. Unit can be half as wide if capacitor board is mounted to cover the switches.

phenolic board.

The final wiring is done according to the schematic shown in Fig. 1 and consists of merely connecting the wires to one terminal of their respective switches. The other terminal, of each of the switches, connected to a common bus-wire as shown in Fig. 5. One output jack is then connected to the bus-wire on the switches and the other to the bus-wire on the capacitors.

Checking The Unit. After construction is complete the unit should be checked visually for shorts, poor solder connections and, if possible, continuity checks should be made in the following order.

1. Check for continuity from the bus-wire on the capacitor board to J2.

2. Put all the switches in the *down* position and check for continuity from *each* of the 10 capacitor terminals to J1. (Continuity *should not* exist.)

3. Check for continuity from the terminal of C1 (side opposite the bus-wire) to J1. Turn S1 *on* and *off.* (Continuity *should* be present with the switch *up* and *should not* be present with the switch *down.*)

4. Repeat the above step for each of the other switches making sure only one switch is *on* at a time.

5. Make a final check of the capacitors, be sure each group contains the right values.

The above checks assure you the unit is wired correctly and the proper capacitors are connected to the right switches.

The last step is attaching the chart shown in Fig. 2 to the front panel. ■

World of News

Continued from page 21

the two unfinished legs; at the end they had advanced to the 630-feet-high central span. Each leg was erected "piece by piece." Each section of steel plate, cross-braced for rigidity, was hoisted to the top with a creeper crane, dropped in place and welded to the structure immediately below.

One man would go "over the top" of the newly welded segment, climb down inside the hollow structure and tape industrial x-ray film to the inside of the welded joint. His companion, working from a wooden platform on the outside of the leg, was responsible for aiming the gamma camera. The two men communicated with each other by rapping out Morse code signals. Two-way radios could not be used.

Highest U. S. monument, the 630-feet, $30-million Gateway Arch rises majestically above St. Louis skyline, its welded joints 100 per cent inspected with the aid of nuclear energy emitted by a radioactive isotope. Its welded panels are designed to withstand winds of more than 150 miles an hour.

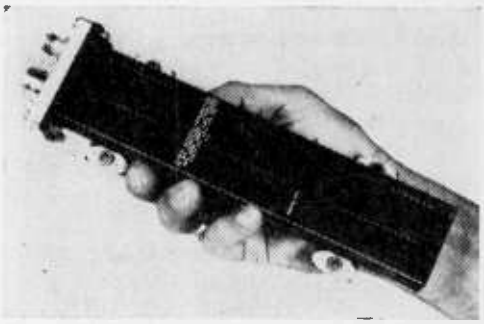
Each had to get out of the radiation field before the gamma projector was turned on. To make the exposure, the "photographer" would use a crank-and-cable remote control system to move the radioactive iridium pill out of its shielded storage container and into "on" position.

A Yelp from Space

An unsung hero of the space age—a device called a traveling wave tube, or TWT—has racked up nearly 30,000 operational hours in outer space aboard four successful spacecraft and, as a result, is scheduled for launch on at least eight future space shots, including the Apollo man-on-the-moon vehicle. The device is basically an amplifier that takes in signals at a low power level and sends them out at a higher level. Thus the TWT does more than twitter; it "yells."

The unique metal-and-ceramic TWT designed and built by Hughes Aircraft Company's microwave tube division has been described as the "critical component" in the transmitter of the Mariner 4 spacecraft that recently sent back to earth millions of signals that were "translated" into photographs of Mars—a space "first." This tube has operated more than 6,000 hours.

The tube, or different versions of it, will be sent up on the forthcoming Surveyor soft-landing moon vehicle to determine moon conditions for a safer man landing; the Pioneer sun probe; the Lunar Orbiter to decide where Apollo will land on the moon; Apollo itself, carrying the first U.S. astronauts to the moon; the Applications Technology Satellite; future Pegasus meteorite-detecting satellites; Saturn telemetry shots; and future Early Bird-type high-altitude synchronous communications satellites to link worldwide communications.



Space Megaphone—A comparatively unkown space-age device, the traveling wave tube, or TWT, shown in a man's hand. Hughes Aircraft Company, Los Angeles, reports that TWTs built by it have logged nearly 30,000 operational hours aboard Syncoms, Early Bird and Mariner 4 spacecraft and are scheduled for launch on at least eight future space shots, including the Apollo man-on-the-moon vehicle. About the size of a slide rule case the 8-inch-long 13-ounce TWT can boost a space signal from a twitter to a yell.

The traveling wave tube is aptly named because it has traveled more than Gordon Cooper and Marco Polo combined (though "traveling" refers to the energy wave inside the tube rather than the entire tube's space meanderings). On Mariner 4, the TWT made a journey of 325,000,000 miles to keep a rendezvous with Mars, and then sent signals 134,000,000 miles back to earth by a transmitter with power weaker than that used for the smallest conventional flashlight bulb. ■

Turn Indicator

Continued from page 50

tension deck and the switch deck nearest the solenoid for reassembly later. The tension deck has five pieces, spring, two steel balls, a ratchet detent and the support frame. It must be reassembled and used or the switch will operate erratically. Retain only the phenolic deck that mounts the two self-pulsing contacts—discard the others.

Acquire a Centralab 1413 switch or two type JD (1 pole, 11 position) switch sections or equivalent. Remove the two decks from the switch (if you had to buy a switch) and reassemble the rotary-solenoid switch assembly as it was originally only using the two new switch sections. In any event your rotary solenoid, when reassembled, must have a self-pulsing deck, two single-pole, eleven-position decks and the tension deck on the end. Be sure that the common terminals on each switch section (the new ones) are in the same position or the rest of these instructions will be useless.

Mount the solenoid with the switch decks on a piece of ½-inch board 4 by 6 inches with two 2-inch corner brackets as shown in the photographs of the switch unit. Use the two holes in the solenoid plate to fasten the whole assembly to the corner brackets. Then mount the twelve-terminal (TB1) and four-terminal (TB2) barrier strips. Mount the 1000 mf. capacitor and the two twelve-volt relays as shown. The polarity of this capacitor is important. One end of it is connected to the solenoid and to the automobile-chassis ground. Determine the polarity of the battery system in your car, positive or negative ground, and connect this capacitor properly—negative to negative, positive to positive.

Wiring the Switch. Viewing the switch decks from the rear, terminal 1 is the common terminal on each deck. Connect together terminals 2 and 3, 4 and 5, 6 and 7, 8 and 9, 10 and 11. Do this on both decks but do not solder at this time. Connect individual insulated leads, approximately 6 inches long, to terminals 1, 2, 4, 6, 8, and 10 on each deck and solder all terminals on both switch decks. Terminal 12 is not used on either deck. Connect the leads from each deck to the twelve-terminal barrier strip beginning with terminal 1 of deck "A" at one end and terminal 1 of deck "B" at the

PARTS LIST

C1—1000 mf, 15-volt electrolytic capacitor
I1 to I10—Indicator lamps (G.E. type 1003)
K1—Rotary Solenoid (Universal Relay type R-1228)
K2, K3—12-volt relay (Phillips Advance 15-12-1C—Newark 60F1748)
S1A, S1B—1-pole, 11-position wafers (Centralab 1413 switch or JD sections)
Sockets—S.C. Bayonet (Newark 25F306)
TB1—12-terminal barrier strip (Cinch Jones type 12-172)
TB2—4-terminal barrier strip (Cinch Jones type 4-172)
Cover—Red plastic, ⅛-inch, size as needed
Cable—12-conductor stranded (Belden 8743) length as needed
Misc.—Sheet-metal screws, silicone rubber, hookup wire, hardboard, lugs, plywood, wood screws, glue, do-it-yourself aluminum angle, solder, etc.

Estimated construction cost: $25
Estimated construction time: 8 hrs—exclusive of mounting in car and customized (built-in) installations.

Indicator light strip can be positioned in any of several locations. Remember, the number of lights used can be varied if you wish to utilize the multiple stock taillights existing on some cars.

other end (see schematic). Connect the leads from each deck in sequence. Work toward the center of this barrier strip until all leads on the two switch decks are connected as indicated in the schematic. Next connect the solenoid coil, capacitor and pulsing contacts to the four-terminal barrier strip (TB2) as shown in the schematic. Connect a lead from terminal 1 on the long strip (TB1) to the normally-open contact on one of the twelve-volt relays and connect a lead from terminal 12 to the normally open contact on the other twelve-volt relay.

The indicator unit will require eleven conductors between it and the switch unit. To simplify this connection, a piece of 12-conductor cable (Belden 8743) is used. The colored conductors are paired with a black lead in each case. The length of this cable is determined by where you locate the indicator and switching units in your car. The switching unit is best placed in one corner of the trunk. One side of all the lamp sockets is connected to a common lead. The opposite side of each lamp socket has an individual lead connected from the lamp to the large barrier strip in the switching unit. The detail drawing in the schematic lists the barrier strip terminals that the individual lamps are connected to through the cable. The common lamp lead connects to #4 on the small barrier strip (TB2). Connect #3 and #4, on TB2, together, and when you mount the switch unit connect a #18-awg (or larger diameter) wire from terminal 4 on the barrier strip TB2 to ground on the car. Use some convenient nut or bolt for this connection. The wire must make a good electrical connection to the metallic frame or the body of the car.

The schematic shows the 12-volt relays have a common coil connection to ground on the small terminal strip (TB2). The other coil connection on each relay will go to the hot lead on each of the right and left turn-indicator leads at the tail lights. Relays are used to prevent overloading the flasher unit and to return the system to its original state with a minimum of effort when you trade the car. The armature lead of the relays can be connected together and in turn to some constant source of 12 volts in the vehicle. (Ignition switch or hot side of brake-light switch.) A lead must be connected from terminal 1 on the four-terminal strip (TB2) to the "X" or 12-volt driven contact on the flasher unit under the dashboard. This lead comes from the control switch on the steering column and you must connect to this lead between the steering-column switch and the flasher and *not after the flasher* or the system will not work. If this contact is not marked in your car, use an ohmmeter to determine which contact it is. Whenever the control switch is activated on the control or steering column, this lead will have a constant 12 volts. It will not be intermittent with the action of the flasher. With the plastic cover plate removed, place the lamps in the sockets and connect the indicator unit to the switching unit as shown in the schematic. Check the operation of the indicator. It should sequence the five lights during each action of the flasher unit and should be relatively in synch with the operation of the normal turn indicators. Flasher units vary from car to car but the action will be there.

The last step is to make a plywood cover for the switching unit. This cover should fit over the plywood base on which the switching unit is mounted. Construct the cover from ¼-inch plywood. The outside dimensions should be 4½-inches wide by 6½-inches long by 5½-inches high with openings cut for the indicator cable, control wires and ground.

Have a ball, and don't get crossed up in your wiring. ■

I.C. Preamp

Continued from page 57

Three volts for the I.C. preamp is easily supplied by penlight (AA or AAA) cells wired in series. The current drawn by the I.C. preamp is slight and even the lowest ampere-hour cells will last a considerable length of time. If a somewhat larger plastic box is used as a case the cells can be mounted with the preamp perforated-phenolic chassis.

Let's Test It. After completing the few simple connections carefully check the unit for wiring errors. Be sure to remove any stray bits of wire or drops of solder because they can cause short circuits. When you are satisfied that all is in order, connect the output of the preamp to either a pair of headphones or a scope and then apply operating power. Touching the *hot* input lead of the preamp with a finger should produce a hum in the phones or a trace on the scope. Now connect up the microphone or telephone pickup coil and hear what's going on. ■

New Breed Listening

Continued from page 68

TV twin-lead to the monitor. The baluns come ready made and sell for a dollar or so —most TV stores carry them for the convenience of customers using coaxial cable leadins from a TV antenna to the TV receiver.

For reception of local high and low band stations, a random length of wire seems to work well—and a pair of TV "rabbit ears" has even been pressed into service with acceptable results.

Going a few steps further towards a "real" antenna, you might try using an inexpensive Citizens Band ground plane antenna for receiving on either band. At least the antenna is vertically polarized, which is an improvement over the TV antenna, since most of the signals you will hear are polarized in a vertical plane. If you don't intend using the CB ground plane for 11 meters any longer, you can chop the elements to really achieve excellent results. For instance, for low band operation, trim the whip of the ground plane to 72 inches and each of the three or four radials to 84½ inches. For high band, cut the whip to 18 inches and the radials to 17 inches each.

Actually, for you purists out there, and for those of you who don't want to give the ol' CB GP a haircut, you can buy a number of commercially made high and low band antennas for relatively small outlays of cash.

Be sure to use good quality 50 ohm coaxial cable between the VHF monitor receiver and the antenna—the wrong lead line, or a poor quality version of the right one, can smother most of the signal by the time it reaches your set. For a run of 50 feet, or less, use type RG-58A/U cable. For longer hauls, you'll get better results with heavy stuff like RG-8U cable.

On either band, you'll find that the higher your antenna is mounted, the longer receiving range you will obtain.

Listening. Since these aren't regular broadcasting stations, you can't expect them to be on the air with a continuous transmission. As a matter of fact, even the busiest station may have an actual on-the-air time of only 20 or 30 minutes per hour. More often than not, the stations come on with short transmissions and then listen for their mobile unit (which is sometimes on another frequency than the base station). Each station has a callsign, but many announce it only one or twice an hour.

To find out the frequency of your local police, fire, etc. services, you can ask at a local two-way radio service shop. You can always, as a rather direct approach, call or drop by the police department or fire house and ask them for their frequency. Try to seek out the officer in charge of communications, because while these frequency assignments aren't "secret" (they are a matter of public record), sometimes they are difficult to pry from a suspicious police or fire officer. This also holds true for stations in any of the other services operating on these bands.

Lists of radio stations operating in most services on these bands are published by *Radio Publications*, Box 629, Mineola, N. Y. Several lists are issued in the form of rather large directories; check with the publisher to see the status of the lists and the prices.

Get More Information About UHF Converters From—

Aquaspace Development, Inc.
Box 586
Canoga Park, Calif.

Crescent Electronics
Route 4, Box 192
Rolla, Mo. 65401

Hartman Marine Electronics
30-30 Northern Boulevard
Long Island City, N.Y.

Herbert Salch & Co.
Woodsboro, Texas

Instrument Devices Corp.
P. O. Box 284
Huntington, N.Y. 11744

International Crystal Mfg.
18 North Lee
Oklahoma City, Okla.

JM Industries
P. O. Box 2
West End, N.J.

Kuhn Electronics, Inc.
20 Glenwood
Cincinnati 17, Ohio

Scientific Associates Corp.
Box 1027
Manchester, Conn.

Sentry Mfg. Co.
P. O. Box 12322
Oklahoma City, Okla. 73112

Vanguard Labs
190-48 99th Avenue
Hollis, N.Y. 11423

Webber Labs
40 East Morris Street
Lynn, Mass.

Reporting. When you hear a station, and have established its operating company or agency, you can then send off a reception report to the station and hope to get a "QSL," or verification of reception.

These stations are all covered by a so-called "secrecy of communication" law which forbids your divulging the contents of messages transmitted by these stations. As a rule, the law (while it does apply) is never wielded against a shortwave listening hobbyist seeking a QSL as the reward for a reception report. The law is called "Section 605 of the Communications Act, as amended."

When sending a reception report, include the time and date of the transmission which you heard. You might give a brief two or three word general summation of the transmission which you heard. An example would be: "stolen car" or "2 alarm fire" or "baggage car switch." Include a few words on the quality and strength of their signals, and a listing of your receiver and antenna.

If you want a QSL, enclose a prepared card with your report. This should have the entire verification message written out, with blank spaces left for the operator to write in data on this transmitter power, antenna type, etc. Also leave a place for his signature. Be sure to stamp the card and self-address it.

Address your reception report to the chief operator or dispatcher at the station which you heard.

Stations To Be Heard. Other than the more common variety police, fire, taxi, etc. stations to be heard, you will probably come upon some other lesser known services.

For instance, the "Common Carrier" service; these are the many "mobile radiotelephone" stations which put telephone calls through from cars to home and office telephones. Marine telephone stations do the same, but from yachts, coastal tankers, tugboats and the like.

Relay-broadcast stations are used by local radio broadcasting stations to relay on-the-spot pickups to the main studio—this might be a sporting event, a local emergency, etc.

You'll hear power companies, bus lines, forestry stations, oil drilling rigs in the Gulf of Mexico, highway trucks—even motion picture companies "on location."

If there's a communications need, you could possibly hear it in operation on the high and low bands—and on a table model receiver which will cost you only a few dollars.

SM Industries

Single-channel, fixed-frequency converter has one control—the on-off switch.

Scientific Assoc. Corp.

Multi-channel, fixed-frequency converter has channel-selector switch for tuning.

Herbert Salch & Co.

Continuous-tuning converter has to be preset for best reception and range.

We have compiled a directory of the vital statistics of the most popular of the current crop of VHF monitor receivers. These sets are available through most of the larger mail order electronics supply houses, or from many local communications equipment dealers (your neighborhood CB shop probably has them or can order one).

In the time it took you to read this special RADIO-TV EXPERIMENTER report there were undoubtedly several things happening on VHF within earshot of your location—all of which you would have found fascinating. What are you doing to see that you have a box-seat on tomorrow's news? What will be on the air while you read another article? ■

New Products

Continued from page 20

Marine and Aircraft Portable Radio

An unusual new 4-band 12-transistor portable radio has been introduced by Nova-Tech, Inc. The new set, called Pilot II, picks up planes in flight, airport control towers, police calls, standard broadcasts, shortwave and the entire marine band. A unique 4-way power supply provides operation from internal batteries, an external dry cell, regular house current, or an optional solar cell bank for sun power. Pilot II has a rotating antenna and null meter that combine to make the set an accurate radio direction finder. When you

Nova-Tech Pilot II Communications Receiver

rotate the antenna, the incoming signal strength changes and the null meter indicates when the antenna points to the transmitting station. The angle of rotation shows on the bearing scale and you can then plot your course.

As a communications receiver, the Pilot II picks up jet airliners, business and private planes, airport towers and aviation emergencies. The shortwave band tunes police calls, ship-to-ship and ship-to-shore communications, Coast Guard and MAY DAY calls. The third band monitors continuous weather broadcasts and forecasts, and receives aviation and marine navigation beacons. A must for the weekend small boatsman.

Other features include squelch control to eliminate static and hash on the aircraft band, Morse code plate to identify beacon signals, calibrated optical sights for taking visual bearings, removable and adjustable mounting bracket, two external headphone jacks, push button dial light, and 3 extendable whip antennas. The set weighs 2 lbs. and measures 8" x 5" x 2", smaller than ordinary cigar box. It is priced at $129.95 and is available by mail direct from the manufacturer, Nova-Tech, Inc., 1721 Sepulveda Blvd., Manhattan Beach, California.

SSB on 6-Meters

The new Heathkit SB-110 brings Heath SB-Series standards for performance to six-meters fixed-or-mobile! This 180-watt PEP SSB transceiver features the same Heath LMO (Linear Master Oscillator) engineered to control the tuning, stability, and linearity of the SB-300 and SB-400. Tuning is linear to the degree of less than 400 cycles deviation between 100 kc. calibration points, and frequency stability is less than 100 cps drift per hour after 20 minutes warmup.

The SB-110 features upper and lower sideband and CW modes of operation with PTT, VOX, and VOX operated CW. The 150-

Heathkit SB-110 6-meter Transceiver

watt CW signal originates from a separate carrier crystal offset for an 800 cps. continuous-wave note.

The SB-110 shows excellent keying characteristics and is capable of cross-mode operation-hot for DX contests! And for that contest, MARS, or NET operator, the SB-110 can be operated either VFO transceive; crystal-control transmit, VFO receive; or crystal-control transceive.

The SB-110 is styled in the SB-Series motif and earns admiration either on desk-top or under the dashboard of a car. A new design mobile mounting bracket permits rapid plug-in mobile installation. Fixed and mobile power supplies are remote and become part of the permanent installations, while the SB-110 itself can be transferred quickly from desk-top to car. The kit sells for $320. Complete specifications and details may be obtained by writing to Heath Company, Dept. EB, Benton Harbor, Michigan 49023. ■

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Underseas Future

Continued from page 41

Fish Snoopers. They will probably use Sonar to track large hauls when the day comes we must farm the seas to feed a starving land-world, just as Bendix men now count salmon in Alaska. Sonar, the Bendix men find, can target the air bladder of the salmon.

Their system consists of a transducer placed in water at a 12-degree angle from a line perpendicular to the flow of the salmon. A high-frequency crystal-controlled signal is transmitted through the water downward at an 18-degree angle from the water's surface, limiting range of the beam to approximately 25 feet from the transducer. The limited range assures accuracy, as there can be no false counts caused by wind ripples or passing boats and the slight angle of transmission prevents false counts caused by air bubbles, debris or rocks.

Eliminating the Line Cord. With electronic large-scale fishing, and a future underseas structure as platform, we may well feed the hungry nations of the world. But to power a "floating factory" underseas calls for the reactor Westinghouse engineers have designed. They've designed a nuclear model to operate without man's assistance for as long as 18 months, adding another six months at reduced power levels, if need be. Its designers believe this reactor may well supply power needs for a future underseas city of 6,000 people.

It will have no movable parts, produce 3,000 kilowatts of electricity, use thermoelectric currents to convert heat of fission to electricity, and be built to withstand pressures two miles under the sea.

Forty-six feet high, twenty feet in diameter, it will have no pumps to circulate water for cooling purposes. The water will boil in the reactor's core, circulate by thermal convection to thermoelectric elements near the reactor's top, the heat exchanger reaching out from the reactor, looking much like solar cell "paddles" on a space satellite.

Such a fabulous reactor, designed to one day power "floating factories" or cities under the sea may sound as visionary to some, as the forecasts, but not when we consider another prediction.

United Nations sources warn us that they expect 6,000,000,000 people on this planet by year 2,000 A. D. This, within only thirty-five years. And it is this writer's prediction that when we are forced to contend with that many of our fellow men, we may be very glad to follow the advice of our imaginative forecasters and go down and live in the sea. ■

Harman-Kardon SC-440

Continued from page 78

speaker" standards of a few years back. Ten-inch woofers are used with 3¼ inch cone type wide dispersion tweeters. A tweeter level control is provided. As you would expect from a big cabinet with a big woofer, the bass is *big*. It's not the *apparent* or *synthetic* bass that can be squeezed out of small speakers, rather it's closer to the *feeling* of bass one gets from 15-inch speakers. The tweeters, however, are another story—they're excessively "hot". While we realize that *super-efficient-tweeters* are the latest rage with the speaker manufacturers, they do result in excessively bright, or even overbright, sound. If you like your music bright, or if you're going to sit well off the speaker axis, you'll not be disappointed. But if you like your music mellow it's going to take some juggling of both the tweeter level and treble controls. The controls are there and they have the range to contour the highs to the brightness you prefer.

Adding up the SC-440. Here's what we get! A very compact control center not much larger than just a base mounted record changer that can be placed almost anywhere in the room. Two "bookshelf"—not compact—speakers which deliver the sound quality associated with "component" systems. Essentially, the SC-440 *is* a component system with transistors providing miniaturization of the control center.

Priced at $449.00 the speakers and control center are finished in oiled walnut. If you wish, you can pick up a bronze-tinted Plexiglas dust cover for $19.95. For additional information write to Harman-Kardon, Ames Court, Plainview, L.I., N.Y. ■

You Tell Us! It's nice to know that you, our readers, read equipment Lab-Checks to the very end. But what we would like to know is—what equipment you want us to test next. Write to the Editor with your recommendations. ■

Volume 45, Part 2

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 Short-Wave Stations

This is the second part of *White's Radio Log*, now published in three parts twice each year. This format permits the Editors of RADIO-TV EXPERIMENTER to offer to its readers two complete volumes of *White's Radio Log* each year, while increasing the scope of the *Log* and inserting station changes as they occur.

In this issue of *White's Radio Log* we have included the following listings: U. S. AM Stations by Location, U. S. FM Stations by States, Canadian AM Stations by Location, Canadian FM Stations by Location, and the expanded, up-to-date World-Wide Short-Wave Section.

In the June/July issue of RADIO-TV EXPERIMENTER, the *Log* will contain 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, and the expanded World-Wide Short-Wave Section.

In the event you missed any part of the *Log* published earlier this year, you will have a complete copy of *White's Radio Log* by collecting any three consecutive issues of RADIO-TV EXPERIMENTER during 1966. The three consecutive issues comprise a complete volume of *White's Radio Log* that offers complete listings with last minute station change data that can not be offered in any other magazine or book. If you are a broadcast band DX'er, FM station logger, like to photograph distant TV test patterns, or tune the short-wave bands, you will find *White's Radio Log* an unbeatable reference.

QUICK REFERENCE INDEX

WHITE'S

RADIO LOG

U. S. AM Stations by Location

Location	C.L.	Kc.
Abbeville, Ala.	WARI	1480
Abbeville, La.	KROF	960
Abbeville, S.C.	WABV	1590
Aberdeen, Md.	WAMD	970
Aberdeen, Miss.	WMPA	1240
Aberdeen, S.Dak.	KSDN	930
	KXRO	1320
Aberdeen, Wash.	KBKW	1450
Abilene, Tex.	KRBC	1470
	KCAD	1580
	KNIT	1280
	KWKC	1340
Abilene, Kansas	KABI	250
Abingdon, Va.	WBBI	1230
Ada, Okla.	KADA	1230
Adel, Ga.	WAAG	1470
Adrian, Mich.	WABJ	1490
Agana, Guam	KUAM	610
Aguadilla, P.R.	WABA	850
	WGRF	1840
Ahoskie, N.C.	WRCS	970
Aiken, S.C.	WAKN	990
	WLOW	1300
Aitkin, Minn.	KKIN	1000
Akron, Ohio	WAKR	1590
	WSLR	1350
	WCUE	1150
	WHLO	640
Alamogordo, N.M.	KALG	1230
	KRAC	1270
Alamo Heights, Tex.	KDRY	1110
Alamosa, Colo.	KGIW	1450
Albany, Ga.	WALG	1590
	WFAZ	960
	WLYB	1250
	WGPC	1450
	WJAZ	960
Albany, Ky.	WANY	1390
Albany, Minn.	KASM	1150
Albany, N.Y.	WABY	1400
	WOKO	1460
	WPTR	1540
	WROW	590
Albany, Oreg.	KWIL	790
	KRKT	990
Albemarle, N.C.	WABZ	1010
	WZKY	1580
Albert Lea, Minn.	KATE	1450
Albertville, Ala.	WAVU	630
Albion, Mich.	WALM	1260
Albuquerque, N.M.	KABQ	1350
	KDEF	1150
	KGGM	610
	KHIP	1520
	KOB	770
	KQEO	920
	KARA	1310
	KVOD	730
	KLOS	1580
	KRZY	1450
Alcoa, Tenn.	WEAG	1470
Alexander City, Ala.	WRFS	1050
Alexandria, La.	KALB	580
	KDBS	1410
	KSYL	970
Alexandria, Minn.	KXRA	1490
Alexandria, Va.	WPIK	780
Algona, Iowa	KLGA	1600
Alice, Tex.	KOPY	1070
Alisal, Cal	KRSA	1570
Allentown, Pa.	WHDL	1600
	WAEB	790
	WKAP	1320
	WSAN	1470
Alliance, Nebr.	KCOW	1400
Alliance, Ohio	WFAH	1310
Alisal, Calif.	KRSA	1570
Alma, Ga.	WCQS	1400
Alma, Mich.	WFYC	1280
Alpena Township, Mich.	WATZ	1450
Alpine, Tex.	KVLF	1240
Altavista, Va.	WKDE	1280
Alton, Ill.	WOKZ	1570
Altona, Man.	CFAM	1290
Altoona, Pa.	WFBG	1290
	WRTA	1240
	WVAM	1430
Alturas, Calif.	KCND	570
Altus, Okla.	KWHW	1450
Alva, Okla.	KALV	1430
Amarillo, Tex.	KBUY	1010
	KFDA	1440
	KGNC	710
	KIXZ	940
	KRAY	1360
	KZIP	1310
Ambridge, Pa.	WMBA	1460
Americus, Ga.	WDEC	1290
	WISK	1390
Ames, Iowa	KASI	1430
	WOI	640
Amherst, Mass.	WTTT	1430
Amherst, N.S.	CKDH	1400
Amherst, N.Y.	WUFO	1080
Amite, La.	WABL	1570
Amory, Miss.	WAMY	1580
Amsterdam, N.Y.	WAFS	1570
	WCSS	1490
Anaconda, Mont.	KANA	580
Anacortes, Wash.	KAGT	1340
Anaheim, Calif.	KEZY	1190
Anchorage, Alaska	KBYR	1270
	KFQD	750
	KENI	550
Andalusia, Ala.	WCTA	920
Anderson, Cal.	KMRE	1580
Anderson, Ind.	WHUT	1470
	WHBU	1240
Anderson, S.C.	WAIM	1230
	WANS	1280
Andrews, Tex.	KACT	1360
Annapolis, Md.	WANN	1190
	WYRE	810
	WNAV	1430
Ann Arbor, Mich.	WAAM	1600
	WPAG	1050
Anna, Ill.	WRAJ	1440
Anniston, Ala.	WANA	1490
	WDNG	1450
	WHMA	1390
Anoka, Minn.	KANO	1470
Ansonia, Conn.	WADS	680
Antigo, Wis.	WATK	900
Apollo, Pa.	WAVL	910
Apopka, Fla.	WTLN	1520
Apple Valley, Cal.	KAVR	980
Appleton, Wis.	WAPL	1570
	WHBY	1250
Aquadilla, P. R.	WUNA	1340
Arab, Ala.	WRAB	1380
Arcadia, Fla.	WAPG	1480
Arcata, Calif.	KENL	1340
	KATA	1340
Ardmore, Okla.	KVSO	1240
Arecibo, P.R.	WCMN	1280
	WMIA	1070
	WNIK	1230
Argentia, Nfld.	VOUS	1480
Arkadelphia, Ark.	KVRC	1240
Arkan. City, Kans.	KSOK	1280
Arlington, Fla.	WDCJ	1220
Arlington, Va.	WAVA	780
	WEAM	1390
Arroyo Grande, Calif.	KOAG	1280
Artesia, N.M.	KSVP	990
Arvada, Colo.	KQXI	1550
Ashburn, Ga.	WMES	1570
Asbury Park, N.J.	WJLK	1440
Asbury Park-Eatontown, N. J.	WHTG	1410
Asheboro, N.C.	WGWR	1260
Asheville, N.C.	WISE	1310
	WLOS	1380
	WSKY	1230
	WWNC	570
Ashland, Ky.	WCMI	1340
	WTCR	1420
Ashland, Ohio	WNCO	1340
Ashland, Oreg.	KWIN	1400
	KRVC	1350
Ashland, Va.	WIVE	1480
Ashland, Wis.	WATW	1400
Ashtabula, Ohio	WAQI	1600
	WREO	970
Aspen, Colo.	KSNO	1280
Astoria, Oreg.	KAST	1370
	KVAS	1230
Atchison, Kans.	KARE	1470
Athens, Ga.	WGAU	1340
	WDOL	1470
	WKAC	1080
	WRFC	960
	KQXI	790
Athens, Ohio	WATH	970
	WOUB	1340
Athens, Tenn.	WLAR	1450
Athens, Tex.	KBUD	1410
Atlanta, Ga.	WPLO	590
	WIGO	1340
	WAOK	1380
	WERD	860
	WGKA	1600
	WGST	920
	WIIN	970
	WQXI	790
	WSB	750
	WYZE	1480
Atlanta-Decatur, Ga.	WGUN	1010
Atlanta, Tex.	KALT	900
Atlantic, Iowa	KJAN	1220
Atlantic Beach, Fla.	WKTX	1600
Atlantic City, N.J.	WFPG	1450
	WLDB	1490
	WMID	1340
Atmore, Ala.	WATM	1590
Attleboro, Mass.	WARA	1320
Auburn, Ala.	WAUD	1230
Auburn, Calif.	KAHI	950
Auburn, N.Y.	WMBO	1340
	WAUB	1590
Auburn, Wash.	KASY	1220
Auburndale, Fla.	WTWB	1570
Auburndale, Wis.	WLBL	930
Augusta, Ga.	WAUG	1050
	WBBQ	1340
	WBIA	1230
	WGAC	580
	WRDW	1480
Augusta, Maine	WRDO	1400
	WFAU	1340
Aurora, Colo.	KOSI	1430
Aurora, Ill.	WMRO	1280
	WKKD	1580
Aurora, Mo.	KSWM	940
Austin, Minn.	KAUS	1480
	KQAQ	970
Austin, Tex.	KNOW	1490
	KHFI	970
	KTBC	590
	KOKE	1870
	KVET	1300
Avalon, Cal.	KBIG	740
Avon Park, Fla.	WAVP	1390
Avondale Estates, Ga.	WAVO	1420
Aztec, N. Mex.	KHAP	1340
Babylon, N.Y.	WBAB	1440
	WGLI	1290
Bad Axe, Mich.	WLEW	1340
Bainbridge, Ga.	WMGR	980
	WAZA	1360
Baker, Mont.	KFLN	960
Baker, Oreg.	KBKR	1490
Bakersfield, Calif.	KAFY	550
	KBIS	970
	KERN	1410
	KGEE	1230
	KUZZ	800
	KLYD	1350
	KWAC	1490
	KPMC	1560
Bellingham, Wash.	KPUG	1170
Baldwinsville, N.Y.	WSEN	1050
Ballinger, Tex.	KRUN	1400
Baltimore, Md.	WBAL	1090
	WAYE	860
	WBMD	750
	WCAO	600
	WCBM	680
	WEBB	1360
	WFBR	1300
	WITH	1230
	WSID	1010
	WWIN	1400
Bamberg-Denmark, S.C.	WWBD	790
Bangor, Maine	WABI	910
	WGUY	1250
	WLBZ	620
Banning, Calif.	KPAS	1490
Barboursville, Ky.	WBVL	950
Bardstown, Ky.	WBRT	1320
Barnesboro, Pa.	WNCC	950
Barnwell, S.C.	WBAW	740
Barre, Vt.	WSNO	1450
Barstow, Calif.	KWTC	1230
	KIOT	1310
Bartlesville, Okla.	KWON	1400
Bartaw, Fla.	WBAR	1460
Bassett, Va.	WODY	900
Bastrop, La.	KTRY	730
	KVOB	1340
Batavia, N.Y.	WBTA	1490
Batesburg, S.C.	WBLR	1430
Batesville, Ark.	KBTA	1340
Batesville, Miss.	WBLE	1290
Bath, Maine	WJTO	730
Bath, N.Y.	WFSR	1580
Baton Rouge, La.	WAIL	1460
	WLUX	1550
	WYNK	1380
	WIBR	1300
	WJBO	1150
	WLCS	910
	WXOK	1260
Battle Creek, Mich.	WBCK	930
	WKFR	1400
	WVOC	1500
Baxley, Ga.	WHAB	1260
Bay City, Mich.	WBCM	1440
	WXOX	1250
Bay City, Tex.	KIOX	1270
Bay Minette, Ala.	WBCA	1150
Bayamon, P.R.	WBPR	1600
Bayamon, P.R.	WRSJ	1560
Baytown, Tex.	KWBA	1380
Beacon, N.Y.	WBNR	1260
Beardstown, Ill.	WRMS	790
Beatrice, Nebr.	KWBE	1450
Beaufort, N.C.	WBMA	1400
Beaufort, S.C.	WBEU	960
	WSIB	1490
Beaumont, Tex.	KLVI	560
	KPYC	1450
	KTRM	990
Beaver Dam, Wis.	WBEV	1430
Beaver Falls, Pa.	WBVP	1230
Beckley, W. Va.	WJLS	560
	WWNR	920
Bedford, Ind.	WBIW	1340
Bedford, Pa.	WBFD	1310
Bedford, Va.	WBLT	1350
Beeville, Tex.	KIBL	1490
Bel Air, Md.	WVOB	1520
Belen, N.Mex.	KARS	860
Belfast, Me.	WBME	1230
Belgrade, Mont.	KGVW	630
Bellaire, Ohio	WOMP	1290
Bellefontaine, Ohio	WOHP	1390
Bellefonte, Pa.	WBLF	1380
Bell Fourche, S.Dak.	KBFS	1450
Belle Glade, Fla.	WSWN	900
Belleville, Ont.	CJBQ	800
Belleville, Ill.	WIBV	1260
Bellevue, Wash.	KFKF	1330
	KBVU	1540
Bellingham, Wash.	KPUG	1170
	KGMI	790
	KOQT	1550
Bellingham-Ferndale, Wash.	KENY	930
Belmont, N.C.	WCGC	1270
Beloit, Wis.	WGEZ	1490
	WBEL	1380
Belton, S.C.	WHPB	1390
Belton, Tex.	KTON	940
Belzoni, Miss.	WELZ	1460
Bemidji, Minn.	KBUN	1450
Bend, Oreg.	KBND	1110
	KGRL	940
Bennetsville, S.C.	WBSC	1550
Bennington, Vt.	WBTN	1370
Benson, Minn.	KBMO	1290
Benson, N.C.	WPYB	1580
Benton, Ark.	KBBA	890
	KGKO	1600
Benton, Ky.	WCBL	1290
Benton Harbor-St. Joseph, Mich.	WHFB	1060
Berkeley, Calif.	KPAT	1400
Berkeley Springs, W.Va.	WCST	1010
Berlin, N.H.	WMOU	1230
	WBRL	1400
Berry Hill, Tenn.	WVOL	1470
Berryville, Ark.	KTHS	1480
Berwick, Pa.	WBRX	1280
Bessemer, Ala.	WYAM	1450
Bethesda, Md.	WUST	1120
Bethlehem, Pa.	WGPA	1100
Beverly, Mass.	WMLO	1570
Biddeford, Maine	WIDE	1400
Big Bear Lake, Cal.	KTOT	1050
Big Delta, Alaska	WXLL	980
Big Lake, Tex.	KBLT	1290
Big Rapids, Mich.	WBRN	1460
Big Spra., Tex.	KBST	1490
	KHEM	1270
	KBYG	1400
Big Stone Gap, Va.	WLSD	1220
Bijou, Cal.	KOWL	1490
Biloxi, Miss.	WLOX	1490
	WVMI	570
Billings, Mont.	KBMY	1240
	KGHL	790
	KOOK	970
	KOYN	910
	KURL	730
Binghamton, N.Y.	WINR	680
	WKOP	1360
	WNBF	1290
Birmingham, Ala.	WAPI	1070

Location	C.L.	Kc.
	WBRC	960
	WCRT	1260
	WAQY	1220
	WENN	1320
	WATV	900
	WSGN	610
	WYDE	850
	WVOK	690
Bisbee, Ariz.	KSUN	1230
Bishop, Calif.	KIBS	1230
Bishopville, S.C.	WAGS	1380
Bismarck, N.Dak.	KFYR	550
	KBMR	1350
Bismarck-Mandan, N.Dak.	KBOM	1270
Black Mountain, N.C.	WBMT	1350
	WFGW	1010
Black River Falls, Wis.	WWIS	1260
Blackfoot, Idaho	KBLI	590
Blackshear, Ga.	WBSG	1550
Blackstone, Va.	WKLV	1440
Blackwell, Okla.	KLTR	1580
Blaine, Wash.	KARI	550
Blakely, Ga.	WBBK	1260
Blanding, Utah	KUTA	790
Bloomington, Ill.	WJBC	1280
Bloomington, Ind.	WTTS	1370
Bloomsburg, Pa.	WCNR	930
	WHLM	550
Blountstown, Fla.	WKMK	1370
Blue Earth, Minn.	KBEW	1560
Bluefield, W.Va.	WHIS	1440
	WKOY	1240
Blythe, Calif.	KYOR	1450
Blytheville, Ark.	KLCN	910
Boaz, Ala.	WBSA	1300
Boca Raton, Fla.	WSBR	740
Bogalusa, La.	WIKC	1490
	WBOX	920
Boise, Idaho	KATN	1010
	KBOI	670
	KEST	790
	KGEM	1140
	KIDO	630
	KYME	740
Bolivar, Mo.	KBLR	1550
Bolivar, Tenn.	WBOL	1560
Bonham, Tex.	KFYN	1420
Boone, Iowa	KFGQ	1260
	KWBG	1590
Boone, N.C.	WATA	1450
Boonville, Ind.	WBNL	1540
Boonville, Mo.	KWRT	1370
Booneville, Miss.	WBIP	1400
Boonville, N.Y.	WBRV	900
Borger, Tex.	KHUZ	1490
	KBBB	1600
Boston, Mass.	WBZ	1030
	WCOP	1150
	WILD	1090
	WNAC	680
	WEZE	1260
	WEEI	590
	WHDH	850
	WMEX	1510
	WORL	950
Boulder, Colo.	KBOL	1490
	KDEY	1360
Bowie, Tex.	KBAN	1410
Bowling Green, Ky.	WKCT	930
	WBGN	1340
	WLBJ	1410
Bowl. Green, Ohio	WMGS	730
Boynton Beach, Fla.	WZZZ	1510
Bozeman, Mont.	KXXL	1450
	KBMN	1230
Bradbury Hgts., Md.	WPGC	1580
Braddock, Pa.	WLOA	1550
Braddocks Heights, Md.	WMHI	1370
Bradenton, Fla.	WTRL	1490
	WBRD	1420
Bradford, Pa.	WESB	1490
Brady, Tex.	KNEL	1490
Brainerd, Minn.	KLIZ	1380
	KVBR	1340
Branson, Mo.	KBHM	1220
Brantford, Ont.	CKPC	1380
Brattleboro, Vt.	WTSA	1450
	WKVT	1490
Brawley, Calif.	KRDP	1300
Brazil, Ind.	WWCM	1380
Breckenridge, Minn.	KBMW	1450
Breckenridge, Tex.	KSTB	1430
Bremen, Ga.	WWCC	1440
Bremerton, Wash.	KBRO	1490
Brenham, Tex.	KWHI	1280
Brevard, N.C.	WPNF	1240
Brewster, N.Y.	WBRW	1510
Brewton, Ala.	WEBJ	1240
Bridgeport, Ala.	WBTS	1480
Bridgeport, Conn.	WICC	600
	WNAB	1450
Bridgeton, N.J.	WSNJ	1240
Brigham City, Utah	KBUH	800
Brighton, Colo.	KBRN	800
Brinkley, Ark.	KBRI	1570
Bristol, Conn.	WBIS	1440
Bristol, Tenn.	WDPI	1490
	WKYE	1550
Bristol, Va.	WCYB	690
	WFHG	980
Brockton, Mass.	WBET	1460
	WOKW	1410
Brockville, Ont.	CFJR	1450
Broken Bow, Nebr.	KCNI	1280
Bronson, Me.	KBHM	1220
Brookfield, Conn.	WINE	940
Brookfield, Mo.	KGHM	1470
Brookhaven, Miss.	WCHJ	1470
	WJMB	1340
Brookings, Oreg.	KURY	910
Brookings, S.Dak.	KBRK	1430
Brookline, Mass.	WBOS	1600
Brookneal, Va.	WODI	1230
Brooksville, Fla.	WWJB	1450
Brownfield, Tex.	KKUB	1300
Brownsville, Tenn.	WBHT	1520
Brownsville, Tex.	KBOR	1600
Brownwood, Tex.	KBWD	1380
	KEAN	1240
Brunswick, Ga.	WGIG	1440
	WMOG	1490
	WYNR	790
Brunswick, Maine	WCME	900
Bryan, Ohio	WBNO	1520
Bryan, Tex.	KORA	1240
	WTAW	1150
Buckhannon, W.Va.	WBUC	1460
Bucyrus, Ohio	WBCO	1540
Buffalo, N.Y.	WBEN	930
	WYSL	1400
	WEBR	970
	WGR	550
	WKBW	1520
	WWOL	1120
Buffalo, Wyo.	KBBS	1450
Buford, Ga.	WDYX	1460
Burbank, Calif.	KBLA	1500
Burley, Idaho	KBAR	1230
Burlington, Iowa	KBUR	1490
	KYED	1150
Burlington, N.C.	WBBB	920
	WBAG	1150
Burlington, Vt.	WDOT	1400
	WJOY	1230
	WVMT	620
Burnett, Tex.	KTSL	1340
Burns, Oreg.	KRNS	1290
Butler, Ala.	WPRN	1220
Butler, Me.	KMAM	1580
Butler, Pa.	WBUT	1050
	WISR	680
Butte, Mont.	KBOW	550
	KXLF	1370
Cabin, John, Potomac, Md.	WXLN	950
Cadillac, Mich.	WATT	1240
Caguas, P.R.	WNEL	1430
	WVJP	1110
Cairo, Ga.	WGRA	790
Cairo, Ill.	WKRO	1490
Calais, Maine	WQDY	1230
Caldwell, Idaho	KCID	1490
	KBGN	910
Calera, Ala.	WBYE	1370
Calexico, Calif.	KICD	1490
Calhoun, Ga.	WCGA	900
Camas, Wash.	KVAN	1480
Cambridge, Md.	WCEM	1240
Cambridge, Mass.	WYHR	740
Cambridge, Ohio	WILE	1270
Camden, Ark.	KAMD	910
	KJWH	1450
Camden, N.J.	WCAM	1310
	WKDN	800
Camden, S.C.	WACA	1590
Camden, Tenn.	WFWL	1220
Cameron, Tex.	KMIL	1330
Camilla, Ga.	WCLB	1220
Campbell, Ohio	WHOT	1330
Campbellsville, Ky.	WTCO	1450
Canandaigua, N.Y.	WCGR	1550
Cannon City, Colo.	KRLN	1400
Canonsburg, Pa.	WARO	540
Canton, Ga.	WCHK	1290
Canton, Ill.	WBYS	1560
Canton, Miss.	WMGO	1370
Canton, N.C.	WWIT	970
Canton, Ohio	WCNS	900
	WHOF	1060
	WHBC	1480
	WINW	1520
Canyon, Tex.	KCAN	1550
Cape Girardeau, Mo.	KFVS	960
	KZYM	1220
	KGMO	1550
Carbondale, Ill.	WCIL	1020
Carbondale, Pa.	WCDL	1440
Caribou, Maine	WFST	600
Carlisle, Pa.	WHYL	960
	WIOO	1000
Carlsbad, N.Mex.	KAVE	1240
	KPBM	740
Carmel, Calif.	KRML	1410
Carmi, Ill.	WROY	1460
Carnegie, Pa.	WZUM	1590
Caro, Mich.	WKYD	1360
Carolina, P. R.	WVOZ	1400
Carrington, N.Dak.	KDAK	1600
Carrizo Springs, Tex.	KBEN	1450
Carroll, Iowa	KCIM	1380
Carrollton, Ala.	WRAG	590
Carrollton, Ga.	WLBB	1100
Carrollton, Mo.	KAOL	1430
Carson City, Nev.	KPTL	1300
Cartersville, Ga.	WBHF	1450
	WKRW	1270
Carthage, Ill.	WCAZ	990
Carthage, Mo.	KDMO	1490
Carthage, Miss.	WECP	1480
Carthage, Tenn.	WRKM	1350
Carthage, Tex.	KGAS	1590
Caruthersville, Mo.	KCRV	1570
Casa Grande, Ariz.	KPIN	1260
Casey, Ill.	WKZI	800
Casper, Wyo.	KTWO	1470
	KATI	1400
Cathedral City, Calif.	KVOC	1230
	KWXY	1340
Cayce, S.C.	WCAY	620
Cayey, P.R.	WLEY	1080
Cedar City, Utah	KSUB	590
Cedar Falls, Iowa	KCFI	1250
Cedar Rapids, Iowa	KCRG	1600
	KLWW	1450
	WMT	600
	KHAK	1360
Cedartown, Ga.	WGAA	1340
Celina, Ohio	WCSM	1350
Center, Ala.	WEIS	990
	WAGC	1550
Center, Tex.	KDET	930
Centerville, Ala.	WBIB	1590
Centerville, Iowa	KCOG	1400
Centerville, Ind.	WHON	930
Centreville, Miss.	WLBS	1580
Centerville, Tenn.	WHLP	1570
Centerville, Utah	KBBC	1600
Central City, Ky.	WNES	1050
	WMTA	1380
Centralia, Ill.	WCNT	1210
Centralia & Chehalis, Wash.	KELA	1470
Centerville, Ala.	WBIB	1590
Ceres, Calif.	KLOC	920
Chadburn, N.C.	WVOE	1590
Chadron, Nebr.	KCSR	610
Chambersburg, Pa.	WCHA	600
	WCBG	1590
Champaign, Ill.	WDWS	1400
Chanute, Kans.	KCRB	1460
Chapel Hill, N.C.	WCHL	1360
Charleroi, Pa.	WESA	940
Charles City, Iowa	KCHA	1580
Charleston, Ill.	WEIC	1270
Charleston, Mo.	KCHR	1350
Charleston, S.C.	WCSC	1390
	WOKE	1340
	WPAL	730
	WQSN	1450
	WTMA	1250
Charleston, W.Va.	WCAW	680
	WCHS	580
	WGKV	1490
	WKAZ	950
	WTIP	1240
	WXVA	1550
Charlotte, Mich.	WCER	1390
Charlotte, N.C.	WBT	1100
	WAYS	610
	WGIV	1600
	WKTC	1310
	WSOC	930
	WIST	1240
	WWOK	1480
	WRPL	1540
Charlotte Amalie, V.I.	WBNB	1000
	WSTA	1340
	WBNB	1000
Charlottesville, Va.	WCHV	1260
	WELK	1010
	WINA	1400
Chase City, Va.	WMEK	980
Chattahoochee, Fla.	WSBP	1580
Chattanooga, Tenn.	WMDC	1450
	WAPO	1150
	WDEF	1370
	WDOD	1310
	WDXB	1490
	WNOO	1260
Cheboygan, Mich.	WCBY	1240
Cheektowaga, N.Y.	WNIA	1230
Chehalis-Centralia, Wash.	KITI	1420
Chelan, Wash.	KOZI	1220
Cheraw, S.C.	WCRE	1420
Cherryville, N. C.	WCSL	1590
Cherokee, Iowa	KCHE	1440
Chester, Ill.	KSGM	980
Chester, Pa.	WEEZ	1590
	WVCH	740
Chester, S.C.	WGCD	1490
Chester, Va.	WIKI	1410
Chestertown, Md.	WCTR	1530
Cheyenne, Wyo.	KFBC	1240
	KCHY	1530
	KRAE	1480
	KVWO	1370
	KEND	980
Chicago, Ill.	WAAF	950
	WAIT	820
	WBBM	780
	WCFL	1000
	WCRW	1240
	WEDC	1240
	WGN	720
	WIND	560
	WJJD	1160
	WLS	890
	WMAQ	670
	WMBI	1110
	WNUS	1390
	WSBC	1240
Chicago Hgts., Ill.	WMPP	1470
	WCGO	1600
Chickasha, Okla.	KWCO	1560
Chico, Calif.	KHSL	1290
	KPAY	1060
Chicopee, Mass.	WACE	730
Childress, Tex.	KCTX	1610
Chillicothe, Mo.	KCHI	1010
Chillicothe, Ohio	WBEX	1490
	WCHI	1350
Chipley, Fla.	WBGC	1240
Chippewa Falls, Wis.	WAXX	1150
Christiansburg, Va.	WJJJ	1260
Christiansted, V.I.	WIVI	970
Church Hill, Tenn.	WMCH	1260
Cicero, Ill.	WVON	1450
Cincinnati, Ohio	WCKY	1530
	WCIN	1480
	WCPO	1230
	WKRC	550
	WLW	700
	WSAI	1360
	WZIP	1050
Clanton, Ala.	WKLF	980
Clare, Mich.	WCRM	980
Claremont, N.H.	WTSV	1230
Claremore, Okla.	KWPR	1270
Clarion, Pa.	WWCH	1300
Clarksburg, W.Va.	WBOY	1400
	WHAR	1340
	WPDX	750
Clarksdale, Miss.	WROX	1450
	WKDL	1600
Clarksville, Ark.	KLYR	1360
Clarksville, Tenn.	WJZM	1400
	WDXN	540
Clarksville, Tex.	KCAR	1350
Claxton, Ga.	WCLA	1470
Clayton, Ga.	WGHC	1570
Clayton, Mo.	KXLW	1320
	KFUO	850
Clayton, N.Mex.	KLMX	1450
Clearfield, Pa.	WCPA	900
Clearwater, Fla.	WTAN	1340
	WAZE	860
Cleburne, Tex.	KCLE	1120
Clermont, Fla.	WSLC	1340
Cleveland, Ga.	WRWH	1350
Cleveland, Miss.	WCLD	1490
	WDSK	1410
Cleveland, Ohio	WKYC	1100
	WDOK	1260
	WERE	1300
	WGAR	1220
	WHK	1420
	WABQ	1540
	WJW	850
Cleveland, Tenn.	WBAC	1340
	WCLE	1570
Cleveland, Tex.	KVLB	1410
Cleve. Hgts., Ohio	WJMO	1490
Clewiston, Fla.	WOWY	1590
Clifton, Ariz.	KCLF	1400
Clifton Forge, Va.	WCFV	1290
Clinchco, Va.	WDIC	1430
Clinton, Ill.	WHOW	1520
Clinton, Iowa	KCLN	1390
	KRDS	1340
Clinton, Mo.	KDKD	1260
Clinton, N.C.	WRRZ	880
Clinton, Okla.	KWOE	1320
Clinton, S.C.	WPCC	1410
Clinton, Tenn.	WYSH	1380
Cloquet, Minn.	WKLK	1230
Clovis, N.Mex.	KCLV	1240
	KICA	980
Coachella, Calif.	KCHV	970
Coalinga, Calif.	KBMX	1470
Coatesville, Pa.	WCOJ	1420
Cocoa, Fla.	WKKO	860
	WEZY	1350
	WWBC	1510
Cocoa Beach, Fla.	WRKT	1300
Cody, Wyo.	KODI	1400
Coeur d'Alene, Ida.	KVNI	1240
Coffeyville, Kans.	KGGF	690
Colby, Kans.	KXXX	790
Coldwater, Mich.	WTVB	1590
Coleman, Tex.	KSTA	1000
Colfax, Wash.	KCLX	1450
College Park, Ga.	WAIA	1570
Collierville, Tenn.	WSHC	1590
Colonial Heights, Va.	WPVA	1290
Colorado City, Tex.	KVMC	1320
Colo. Sprgs., Colo.	KRDO	1240
	KPIK	1580
	KVOR	1300
	KSSS	740
	KYSN	1460
	KRYT	1530

WHITE'S RADIO LOG

Location	C.L.	Kc.
Columbia, Ky.	WAIN	1270
Columbia, Miss.	WCJU	1450
Columbia, Mo.	KFRU	1400
	KCGM	1580
Columbia, Pa.	WCDY	1580
Columbia, S.C.	WCDS	1400
	WIS	560
	WOIC	1320
	WNDK	1230
	WQXL	1470
Columbia, Tenn.	WMCP	1280
	WKRM	1340
Columbus, Ga.	WDAK	540
	WRBL	1420
	WHYD	1270
	WCLS	1580
	WOKS	1340
Columbus, Ind.	WCSI	1010
Columbus, Miss.	WACR	1050
	WCBI	550
Columbus, Nebr.	KJSK	900
	KTTT	1510
Columbus, Ohio	WBNS	1460
	WCDL	1230
	WMNI	920
	WOSU	820
	WTVN	610
	WVKO	1580
Colville, Wash.	KCVL	1270
Comanche, Tex.	KCOM	1550
Commerce, Ga.	WJJC	1270
Concord, Calif.	KWUN	1480
Concord, N.H.	WKXL	1450
Concord, N.C.	WEGO	1410
Concordia, Kans.	KNCK	1390
Conneaut, Ohio	WWOW	1360
Connellsville, Pa.	WCVI	1340
Connersville, Ind.	WCNB	1580
Conroe, Tex.	KMCO	900
Conway, Ark.	KCON	1230
	KVEE	1330
Conway, N.H.	WBNC	1050
Conway, S.C.	WLAT	1330
Cookeville, Tenn.	WHUB	1400
	WPTN	1550
Coolidge, Ariz.	KCKY	1150
Coos Bay, Oreg.	KOOS	1280
	KYNG	1420
Copper Hill, Tenn.	WLSB	1400
Coquille, Ores.	KWRD	630
Coral Gables, Fla.	WRIZ	1550
	WVCG	1080
Corbin, Ky.	WCTT	680
	WYGO	1330
Cordele, Ga.	WMIM	1490
Cordova, Alaska	KLAM	1450
Corinth, Miss.	WCMA	1280
	WKCU	1350
Cornelia, Ga.	WCON	1450
Corning, Ark.	KCCB	1260
Corning, N.Y.	WCBA	1350
	WCLI	1450
Corona, Cal.	KREL	1370
Corpus Christi, Tex.		
	KCTA	1030
	KCCT	1150
	KEYS	1440
	KRYS	1360
	KSIX	1230
	KUNO	1400
Corry, Pa.	WOTR	1370
Corsicana, Tex.	KAND	1340
Cortez, Colo.	KVFC	740
Cortland, N.Y.	WKRT	920
	KFLY	1240
	KLOO	1350
Corvallis, Ore.	KLOO	1340
Coryden, Ind.	WPDF	1550
Coshocton, Ohio	WTNS	1560
Cottage Grove, Ore.	KNND	1400
Cottonwood, Ariz.	KVRD	1240
	KVID	1600
Coudersport, Pa.	WFRM	600
Council Bluffs, Iowa		
	KFNF	920
	KRCB	1360
Courtenay, B.C.	CFCP	1440
Covington, Ga.	WGFS	1430
Covington, Ky.	WCLU	1320
Covington, La.	WARB	730
Covington, Tenn.	WKBL	1250
Covington, Va.	WKEY	1340
Cowan, Tenn.	WZYX	1440
Craig, Colo.	KRAI	550
Crane, Tex.	KCRR	1380
	KBSN	970
Crawfordsville, Ind.		
	WCVL	1550
Crescent City, Calif.	KPLY	1240
Creston, Iowa	KPDD	1310
	KSIB	1520
Crestview, Fla.	WCNU	1010
	WJSB	1050
Crewe, Va.	WSVS	800
Crockett, Tex.	KIVY	1290
Crookston, Minn.	KROX	1260
Crossett, Ark.	KAGH	800
Crossville, Tenn.	WAEW	1330
Crowley, La.	KSIG	1450
Crystal Lake, Ill.	WCLR	850
Cuero, Tex.	KCFH	1600
Cullman, Ala.	WFMH	1460
	WKUL	1340
Culpeper, Va.	WCVA	1490
Cumberland, Ky.	WCPM	1260
Cumberland, Md.	WCUM	1230
	WTBO	1450
Cummings, Ga.	WSNE	1410
Cushing, Okla.	KUSH	1600
Cuyahoga Falls, Ohio		
	WCUE	1150
Cypress Gardens, Fla.		
	WGTO	540
Cynthiana, Ky.	WCYN	1400
Dade City, Fla.	WDCF	1350
Dadeville, Ala.	WDVC	910
Dalhart, Tex.	KXIT	1410
Dallas, N.C.	WAAK	960
Dallas, Oreg.	KROW	1460
Dallas, Tex.	KRLD	1080
	KIXL	1040
	KSKY	660
	KLIF	1190
	WFAA	570
	WFAA	820
	KBDX	1480
	WRR	1310
Dalton, Ga.	WBLJ	1230
	WRCD	1430
	WTTI	1530
Danbury, Conn.	WLAD	800
Danville, Ill.	WDAN	1490
	WITY	980
Danville, Ky.	WHIR	1230
Danville, Pa.	WPGM	1570
Danville, Va.	WBTM	1330
	WYPR	970
	WDVA	1250
	WILA	1580
Dardanelle, Ark.	KCAB	980
Darlington, S.C.	WDAR	1350
Davenport, Iowa	WOC	1420
	KWNT	1580
	KSTT	1170
Dawson, Ga.	WDWD	990
Dayton, Ohio	WHIO	1290
	WING	1410
	WONE	980
	WAVI	1210
Dayton, Tenn.	WDNT	1280
Daytona Beach, Fla.		
	WNDB	1150
	WMFJ	1450
	WROD	1340
Deadwood, S.Dak.	KDSJ	980
Dearborn, Mich	WKNR	1310
Decatur, Ala.	WHOS	800
	WAJF	1490
	WMSL	1400
Decatur-Atlanta, Ga.		
	KGUN	1010
	WOMN	1310
Decatur, Ill.	WDZ	1050
	WSOY	1340
Decatur, Ind.	WADM	1540
Decorah, Iowa	KDEC	1240
	KWLC	1240
Deer Lodge, Mont.	KDRG	1400
Deerfield, Va.	WABH	1150
Defiance, Ohio	WDNW	1280
De Funiak Springs, Fla.		
	WDSP	1280
	WZEP	1460
De Kalb, Ill.	WLBK	1360
De Land, Fla.	WJBS	1490
	WOOO	1310
Delano, Calif.	KCHJ	1010
Delaware, Ohio	WDLE	1550
Delray, Bch., Fla.	WDBF	1420
Del Rio, Tex.	KDLK	1230
Delta, Colo.	KDTA	1400
Deming, N.Mex.	KOTS	1230
Demopolis, Ala.	WXAL	1400
	WJWT	1350
Denham Sprgs., La.	WLBI	1220
Denison, Iowa	KDSN	1580
Denison-Sherman, Tex.		
	KDSX	950
Denmark-Bamberg, S.C.		
	WWBD	790
Denton, Tex.	KDNT	1440
Denver, Colo.	KDEN	1340
	KFML	1390
	KHOW	630
	KIMN	950
	KLIR	990
	KLZ	560
	KBTR	710
	KDA	850
	KPOF	910
	KFSC	1220
	KTLN	1280
Denver City, Tex.	KKAL	1580
De Queen, Ark.	KDQN	1390
DeRidder, La.	KDLA	1010
Des Moines, Iowa	KCBC	1390
	KIDA	940
	KRNT	1350
	KSO	1480
	KWKY	1150
	WHO	1040
Detroit, Mich.	WCAR	1130
	WJBK	1500
	WJLB	1400
	WJR	760
	WWJ	950
	WXYZ	1270
Detroit Lakes, Minn.		
	KDLM	1340
Devils Lake, N.Dak.		
	KDLR	1240
Dexter, Mo.	KDEX	1590
Diboll, Tex.	KSPL	1260
Dickinson, N.Dak.	KDIX	1230
Dickson, Tenn.	WDKN	1260
Dillon, Mont.	KDBM	1490
Dillon, S.C.	WDSC	800
Dimmitt, Tex.	KDHN	1470
Dinuba, Calif.	KRDU	1130
Dixon, Ill.	WIXN	1460
Dodge City, Kans.	KGND	1370
	KEDD	1550
Donaldsonville, Ga.	WSEM	1500
Doniphan, Mo.	KDFN	1500
Dothan, Ala.	WAGF	1320
	WDIG	1450
	WODF	560
Douglas, Ariz.	KAWT	1450
	KAPR	930
Douglas, Ga.	WDMG	860
	WOKA	1310
Douglas, Wyo.	KWIV	1050
Douglasville, Ga.	WDGL	1520
Dover, Del.	WDOV	1410
	WKEN	1600
Dover, N.J.	WRAN	1510
Dover, N.H.	WTSN	1270
Dover, Ohio	WJER	1450
Dowagiac, Mich.	WDOW	1440
Doylestown, Pa.	WBUX	1570
Dublin, Ga.	WMLT	1330
	WXLI	1230
Du Bois, Pa.	WCED	1420
Dubuque, Iowa	KDTH	1370
	WDBQ	1490
Duluth, Minn.	KDAL	610
	WEBC	560
	KAOH	1390
Dumas, Tex.	KDDD	800
Duncan, Okla.	KRHD	1350
Dundee, N.Y.	WFLR	1570
Dunkirk, N.Y.	WDOE	1410
Dunn, N.C.	WCKB	780
Du Quoin, Ill.	WDQN	1580
Durango, Colo.	KIUP	930
	KDGO	1240
Durant, Okla.	KSFO	750
Durham, N.C.	WDNC	620
	WSRC	1410
	WSSB	1490
	WTIK	1310
Dyersburg, Tenn.	WDSG	1450
	WTRO	1330
Eagle Pass, Tex.	KEPS	1270
Eagle River, Wis.	WERL	950
Easley, S.C.	WELP	1360
E. Grand Forks, Minn.		
	KRAD	1590
Eastland, Tex.	KERC	1590
E. Lansing, Mich.	WKAR	870
	WVIC	730
E. Liverpool, Ohio	WDHI	1490
East Longmeadow, Mass.		
	WTYM	1600
Eastman, Ga.	WUFF	710
E. Moline, Ill.	WDLM	960
E. Point, Ga.	WTJH	1260
E. Prairie, Mo.	KGGL	1080
E. Syracuse, N.Y.	WPAW	1540
Easton, Md.	WEMD	1460
Easton, Pa.	WEEX	1230
	WEST	1400
Eatontown, N.J.	WHTG	1410
Eau Claire, Wis.	WEAQ	790
	WBIZ	1400
	WECL	1050
Eau Gallie, Fla.	WMEG	920
Ebensburg, Pa.	WEND	1580
Edenton, N.C.	WCDJ	1260
Edinburg, Tex.	KURV	710
Edmonds, Wash.	KGDN	630
Effingham, Ill.	WCRA	1090
Elba, Ala.	WELB	1350
Elberton, Ga.	WSGC	1400
El Cajon, Calif.	KDEO	910
El Campo, Tex.	KULP	1390
El Centro, Calif.	KXO	1230
	KAMP	1430
El Dorado, Ark.	KDMS	1290
	KELD	1400
Eldorado, Kans.	KBTO	1360
Eldorado Springs, Mo.		
	KESM	1580
Eleele, Kanai, Hawaii		
	KUAI	720
Elgin, Ill.	WRMN	1410
Elizabeth City, N. C.		
	WCNC	1240
	WGAI	560
Elizabethton, Tenn.	WBEJ	1240
	WIDD	1520
Elizabethtown, Ky.	WIEL	1400
Elizabethtown, N.C.		
	WBLA	1440
Elizabethtown, Pa.	WHRY	1600
Elk City, Okla.	KBEK	1240
Elkhart, Ind.	WTRC	1340
	WCMR	1270
Elkins, N.C.	WIFM	1540
Elkins, W.Va.	WDNE	1240
Elko, Nev.	KELK	1240
Elkton, Md.	WSER	1550
Ellensburg, Wash.	KXLE	1240
Ellenville, N.Y.	WELV	1370
Ellsworth, Me.	WDEA	1370
Elmira, N.Y.	WELM	1410
	WENY	1230
Elmira Heights-Horseheads, N.Y.		
	WEHH	1590
El Paso, Tex.	KRDD	600
	KELP	920
	KHEY	690
	KINT	1590
	KIZZ	1150
	KSET	1340
	KTSM	1380
El Reno, Okla.	KELR	1460
Ely, Minn.	WELY	1450
Ely, Nev.	KELY	1280
Elyria, Ohio	WEOL	930
Eminence, Ky.	WSTL	1600
Emporia, Kans.	KVDE	1400
Emporia, Va.	WEVA	860
Emporium, Pa.	WLEM	1250
Endicott, N.Y.	WENE	1430
Englewood, Colo.	KGMC	1150
Englewood, Fla.	WENG	1530
Enid, Okla.	KCRC	1390
	KGWA	980
Enterprise, Ala.	WIRB	600
Enterprise, Oreg.	KWVR	1340
Ephrata, Pa.	WGSA	1310
Ephrata, Wash.	KULF	730
Erie, Pa.	WWYN	1260
	WICU	1330
	WJET	1400
	WWGO	1450
Erwin, Tenn.	WEMB	1420
Escanaba, Mich.	WDBC	680
	WLST	600
Escondido, Calif.	KDWN	1450
Espanola, N. M.	KDCE	970
Etowah, Tenn.	WCPH	1220
Eufaula, Ala.	WULA	1240
Eugene, Oreg.	KORE	1450
	KPIR	1500
	KASH	1600
	KATR	1320
	KERG	1280
	KUGN	590
	KWFS	1540
Eunice, La.	KEUN	1490
Eureka, Calif.	KINS	980
	KDAN	790
Eustis, Fla.	WLCO	1240
Evanston, Ill.	WEAW	1330
	WNMP	1590
Evanston, Wyo.	KEVA	1240
Evansville, Ind.	WROZ	1400
	WGBF	1280
	WIKY	820
	WJPS	1330
Eveleth, Minn.	WEVE	1340
Everett, Pa.	WWDS	1110
Everett, Wash.	KRKO	1380
	KWYZ	1230
Evergreen, Ala.	WBLD	1470
Fairbanks, Alaska	KFAR	610
	KFRB	900
Fairbury, Nebr.	KGMT	1310
Fairfax, Va.	WEEL	1310
Fairfield, Ill.	WFIW	1390
Fairfield, Iowa	KMCD	1570
Fairhope, Ala.	WABF	1220
Fairmont, Minn.	KSUM	1370
Fairmont, N.C.	WFMD	860
Fairmont, W.Va.	WMMN	920
	WTCS	1490
Fairway, Kan.	KUDL	1380
Fajardo, P.R.	WMDD	1480
Falfurrias, Tex.	KPBO	1260
Fall River, Mass.	WALE	1400
	WSAR	1480
	KVLV	980
Falls Church, Va.	WFAX	1220
Falls City, Nebr.	KTNC	1230
Fargo, N.Dak.	WDAY	970
	KFNW	900
	KQWB	1550
	KXGO	790
Faribault, Minn.	KDHL	920
Farmersville, La.	KTDL	1470
Farmington, Me.	WKTJ	1380
Farmington, Mo.	KREI	800
Farmington, N.M.	KENN	1390
	KWYK	960
	KRZE	1280

Location	C.L.	Kc.
Farmville, N.C.	WFAG	1250
Farmville, Va.	WFLO	870
Farrell, Pa.	WFAR	1470
Farwell, Tex.	KZOL	1570
Fayette, Ala.	WWWF	990
Fayetteville, Ark.	KHOG	1440
	KFAY	1250
Fayetteville, N.C.	WFAI	1230
	WFNC	940
	WFLB	1490
	WIDU	1600
Fayetteville, Tenn.	WEKR	1240
Fergus Falls, Minn.	KOTE	1250
Fernandino Beach, Fla.	WFBF	1570
Ferriday, La.	KFNV	1600
Festus, Mo.	KJCF	1400
Festus, St. Louis, Mo.	KXEN	1010
Findlay, Ohio	WFIN	1330
Fisher, W.Va.	WELD	690
Fitchburg, Mass.	WEIM	1280
	WFGM	960
Fitzgerald, Ga.	WBHB	1240
Flagstaff, Ariz.	KCLS	600
	KJKJ	1400
	KEOS	690
	KEOS	1290
Flat River, Mo.	KFMO	1240
Flint, Mich.	WFDF	910
	WTRX	1330
	WAMM	1420
	WMRP	1570
	WKMF	1470
	WTAC	600
Flomaton, Ala.	WTCB	990
Florence, Ala.	WJOI	1340
	WOWL	1240
Florence, S.C.	WJMX	970
	WOLS	1230
	WYNN	540
Floydada, Tex.	KFLD	900
Foley, Ala.	WHEP	1310
Fond du Lac, Wis.	KFIZ	1450
Fordyce, Ark.	KBJT	1570
Forest, Miss.	WMAG	860
Forest City, N.C.	WBBO	780
	WAGY	1320
Forest Grove, Ore.	KWAY	1570
Forrest City, Ark.	KXJK	950
Ft. Atkinson, Wis.	WFAW	940
Ft. Bragg, Calif.	KDAC	1280
Ft. Campbell, Ky.	WABO	1370
Ft. Collins, Colo.	KCOL	1410
	KZIX	600
Ft. Dodge, Iowa	KVFD	1400
	KWMT	540
Ft. Knox, Ky.	WSAC	1470
Ft. Lauderdale, Fla.	WFTL	1400
	WWIL	1580
Ft. Madison, Iowa	KXGI	1360
Ft. Morgan, Colo.	KFTM	1400
Ft. Myers, Fla.	WINK	1240
	WMYR	1410
	WCAI	1350
Ft. Payne, Ala.	WFPA	1400
	WZOB	1250
Ft. Pierce, Fla.	WARN	1330
	WIRA	1400
Ft. Scott, Kans.	KMDO	1600
Ft. Smith, Ark.	KFPW	1230
	KFSA	950
	KTCS	1410
	KWHN	1320
Ft. Stockton, Tex.	KFST	860
Ft. Valley, Ga.	WFPM	1150
Ft. Walton Beach, Fla.	WNUE	1400
	WFTW	1260
Ft. Wayne, Ind.	WGL	1250
	WOWO	1190
	WANE	1450
	WKJG	1380
Ft. Worth, Tex.	KJIM	670
	KCUL	1540
	KFJZ	1270
	KNOK	970
	WBAP	570
	WBAP	820
	KXOL	1360
Fostoria, Ohio	WFOB	1430
Fountain City, Tenn.	WGYW	1430
	WROL	1490
Fountain Inn, S.C.	WFIS	1600
Fowler, Calif.	KLIP	1220
Framingham, Mass.	WKOX	1190
Frankfort, Ind.	WILO	1570
Frankfort, Ky.	WFKY	1490
Franklin, Ky.	WFKN	1220
Franklin, La.	KFRA	1390
Franklin, N.C.	WFSC	1050
Franklin, N.H.	WFTN	1240
Franklin, Pa.	WFRA	1450
Franklin, Tenn.	WAGG	950
Franklin, Va.	WYSR	1250
Frederick, Md.	WFMD	930
Frederick, Okla.	KTAT	1570
Fredericksburg, Tex.	KNAF	910
Fredericksburg, Va.	WFVA	1230
	WFLS	1350
Fredericktown, Mo.	KFTW	1450
Fredonia, N.Y.	WBUZ	1570
Freeport, Ill.	WFRL	1570
Freeport, N.Y.	WGBB	1240
Freeport, Tex.	KBRZ	1460
Fremont, Mich.	WBFC	1490
	WSHN	1550
Fremont, Nebr.	KHUB	1340
Fremont, Ohio	WFRO	900
Fresno, Calif.	KARM	1430
	KBIF	900
	KIRV	1510
	KEAP	980
	KXEX	1550
	KFRE	940
	KGST	1600
	KMAK	1340
	KMJ	580
	KYNO	1300
Front Royal, Va.	WFTR	1450
Frostburg, Md.	WFRB	560
Fulton, Ky.	WFUL	1270
Fulton, Mo.	KFAL	900
Fulton, N.Y.	WOSC	1300
Fuquay Sprgs., N.C.	WFVG	1460
Gadsden, Ala.	WGAD	1350
	WETO	930
	WAAX	570
	WEAC	1500
Gaffney, S.C.	WFGN	1570
Gainesville, Fla.	WDVH	980
	WGGG	1230
	WRUF	850
	WUWU	1390
Gainesville, Ga.	WGGA	550
	WDUN	1240
	WLBA	1580
Gainesville, Tex.	KGAF	1580
Gaithersburg, Md.	WHMC	1150
Galax, Va.	WBOB	1360
Galesburg, Ill.	WGIL	1400
	WAIK	1590
Gallatin, Tenn.	WHIN	1010
Gallipolis, Ohio	WJEH	990
Gallup, N. Mex.	KGAK	1330
	KYVA	1230
Galveston, Tex.	KILE	1400
	KGBC	1540
Gander, Nfld.	CBG	1450
Garden City, Kan.	KUIL	1240
	KUPK	1050
Garden City, Mich.	WERB	1090
Gardner, Mass.	WGAW	1340
Gary, Ind.	WWCA	1270
	WLTH	1370
Gastonia, N.C.	WGNC	1450
	WLTC	1370
Gate City, Va.	WGAT	1050
Gaylord, Mich.	WATC	900
Geneseo, Ill.	WGEN	1500
Geneva, Ala.	WGEA	1150
Geneva, Ill.	WGSB	1480
Geneva, N.Y.	WGVA	1240
Georgetown, Del.	WJWL	900
Georgetown, Ky.	WAXU	1580
Georgetown, S.C.	WGTN	1400
	WGOO	1470
Georgetown, Tex.	KGTN	1530
Gettysburg, Pa.	WGET	1320
Gillette, Wyo.	KMRL	1490
Gilroy, Calif.	KPER	1290
Gladewater, Tex.	KEEB	1430
Glasgow, Ky.	WKAY	1490
	WCDS	1440
Glasgow, Mont.	KLTZ	1240
Glen Burnie, Md.	WISZ	1590
Glendale, Ariz.	KRUX	1360
Glendale, Calif.	KIEV	870
Glendive, Mont.	KXGN	1400
	KGLE	590
Glennallen, Alaska	KCAM	790
Glens Falls, N.Y.	WBZA	1410
	WWSC	1450
Glenville, Ga.	WKIG	1580
Glenwood Sprgs., Colo.	KGLN	980
Globe, Ariz.	KZOW	1240
Gloucester, Va.	WDDY	1420
Gloversville-Johnston, N.Y.	WENT	1340
Gold Beach, Oreg.	KBLY	1220
Golden, Colo.	KICM	1250
Golden Meadow, La.	KLEB	1600
Golden Valley, Minn.	KQRS	1440
	KUXL	1570
Goldsboro, N.C.	WFMC	730
	WGBR	1150
	WGOL	1300
Gonzales, Tex.	KCTI	1450
Goodland, Kans.	KLDE	730
Goshen, Ind.	WKAM	1460
Gouverneur, N.Y.	WIGS	1230
Grafton, N.D.	KGPC	1340
Grafton, W.Va.	WVVW	1260
Graham, Tex.	KSWA	1330
Grand Coulee, Wash.	KFDR	1360
Grand Forks, N.D.	KFJM	1370
	KILO	1440
	KNOX	1310
Grand Haven, Mich.	WGHN	1370
Grand Island, Nebr.	KMMJ	750
	KRGI	1430
Grand Junction, Colo.	KREX	920
	KEXO	1230
	KSTR	620
	KWSL	1340
Grand Prairie, Tex.	KPCW	730
Grand Rapids, Mich.	WJEF	1230
	WFUR	1570
	WGRD	1410
	WLAV	1340
	WMAX	1480
	WOOD	1300
Grand Rapids, Minn.	KOZY	1490
Grangeville, Idaho	KORT	1230
Granite City, Ill.	WGNU	920
Granite Falls, N. C.	WKJK	1580
Grants, N.Mex.	KMIN	980
Grants Pass, Oreg.	KAGI	950
	KAJO	1270
Grayson, Ky.	WGOH	1370
Gt. Barrington, Mass.	WSBS	860
Gt. Bend, Kans.	KVGB	1590
Gt. Falls, Mont.	KFBB	1310
	KUDI	1450
	KMON	580
	KARR	1400
Greeley, Colo.	KFKA	1310
	KYOU	1450
Green Bay, Wis.	WBAY	1360
	WJPG	1440
	WDUZ	1400
Greeneville, Tenn.	WGRV	1340
	WSMG	1450
Greenfield, Mass.	WHAI	1240
Greensboro, N.C.	WBIG	1470
	WCOG	1320
	WEAL	1510
	WKTB	1550
	WGBG	1400
	WPET	950
Greensburg, Pa.	WHJB	620
Greenville, Ala.	WGYV	1380
Greenville, Ky.	WKYF	1600
Greenville, Mich.	WPLB	1380
Greenville, Miss.	WJPR	1330
	WDDT	900
	WGVM	1260
Greenville, Pa.	WGRP	940
Greenville, N. C.	WNCT	1590
	WOOW	1340
	WPXY	1550
Greenville, S.C.	WESC	660
	WFBC	1330
	WMRB	1490
	WMUU	1260
	WQOK	1440
Greenville, Tex.	KGVL	1400
Greenwich, Conn.	WGCH	1490
Greenwood, Miss.	WABG	980
	WGRM	1240
	WLEF	1540
Greenwood, S.C.	WCRS	1450
	WGSW	1350
Greer, S.C.	WEAB	800
	WCKI	1300
Grenada, Miss.	WNAG	1400
Gresham, Oreg.	KRDR	1230
Gretna, Va.	WMNA	730
Griffin, Ga.	WKEU	1450
	WHIE	1320
	WGRI	1410
Grinnell, Iowa	KGRN	1410
Groton, Conn.	WSUB	980
Grove City, Pa.	WSAJ	1340
Grundy, Va.	WNRG	940
Guayama, P.R.	WXRF	1590
Gulfport, Miss.	WROA	1390
	WGCM	1240
Gunnison, Colo.	KGUC	1490
Guntersville, Ala.	WGSV	1270
Guthrie, Okla.	KWRW	1490
Guymon, Okla.	KGYN	1220
Hagerstown, Md.	WARK	1490
	WJEJ	1240
Haines City, Fla.	WHAN	930
Haleyville, Ala.	WJBB	1230
Halfway, Md.	WHAG	1410
Hamden, Conn.	WDEE	1220
Hamilton, Ala.	WERH	970
Hamilton, Mont.	KYLQ	960
Hamilton, Ohio	WMOH	1450
	WCNW	1560
Hamilton, Tex.	KCLW	900
Hamlet, N. C.	WKDX	1250
Hammond, Ind.	WJOB	1230
Hammond, La.	WFPR	1400
Hammonton, N.J.	WNJH	1580
Hampton, S.C.	WBHC	1270
Hampton, Va.	WVEC	1490
Hancock, Mich.	WMPL	920
Hanford, Calif.	KNGS	620
Hannibal, Mo.	KHMO	1070
Hanover, N.H.	WTSL	1400
	WDCR	1340
Hanover, Pa.	WHVR	1280
Hardin, Mont.	KHDN	1230
Harlan, Ky.	WHLN	1410
Harlingen, Tex.	KGBT	1530
Harriman, Tenn.	WHBT	1600
Harrisburg, Ill.	WEBQ	1240
Harrisburg, Pa.	WFEC	1400
	WCMB	1460
	WHP	580
	WKBO	1230
Harrison, Ark.	KHOZ	900
Harrisonburg, Va.	WHBG	1360
	WSVA	550
Harrodsburg, Ky.	WHBN	1420
Hartford, Conn.	WDRC	1360
	WCCC	1290
	WPOP	1410
	WTIC	1080
Hartford, Wis.	WTKM	1340
Hartselle, Ala.	WHRT	860
Hartsville, S.C.	WHSC	1450
Hartwell, Ga.	WKLY	980
Harvard, Ill.	WMCW	1600
Harvey, Ill.	WBEE	1570
Hastings, Mich.	WBCH	1220
Hastings, Minn.	KDWA	1460
Hastings, Nebr.	KHAS	1230
	KICS	1550
Hattiesburg, Miss.	WBKH	950
	WFOR	1400
	WHSY	1230
	WXXX	1310
Havelock, N.C.	WUSM	1330
Haverhill, Mass.	WHAV	1490
Havre, Mont.	KOJM	610
Havre de Grace, Md.	WASA	1330
Hawkinsville, Ga.	WCEH	610
Haynesville, La.	KLUV	1580
Hays, Kans.	KAYS	1400
Hayward, Wis.	WHSM	910
Hazard, Ky.	WKIC	1390
Hazelhurst, Ga.	WVOH	920
Hazlehurst, Miss.	WMDC	1220
Hazleton, Pa.	WAZL	1490
Helena, Ark.	KFFA	1360
Helena, Mont.	KCAP	1340
	KBLL	1240
Hemet, Calif.	KHSJ	1320
Hempstead, N.Y.	WHLI	1100
Henderson, Ky.	WSON	860
Henderson, Nev.	KBMI	1400
	KTOO	1280
Henderson, N.C.	WHNC	890
	WIZS	1450
Henderson, Tex.	KGRI	1000
	KWRD	1470
Hendersonville, N.C.	WHKP	1450
	WHVL	1600
Henryetta, Okla.	KHEN	1590
Hereford, Tex.	KPAN	860
Herkimer, N.Y.	WALY	1420
Hermiston, Oreg.	KOHU	1570
Herndon, Va.	WHRN	1440
Herrin, Ill.	WJPF	1340
Hettinger, N.Dak.	KNDC	1490
Hibbing, Minn.	WMFG	1240
Hickory, N.C.	WHKY	1290
	WIRC	680
	WSPF	1000
Highland, Ill.	WINU	1510
Highland Park, Ill.	WEEF	1430
Highland Park, Tex.	KVIL	1150
Highland Springs, Va.	WENZ	1450
High Point, N.C.	WMFR	1230
	WNOS	1590
	WHPE	1070
Hillsboro, Ohio	WSRW	1590
Hillsboro, Oreg.	KUIK	1360
Hillsboro, Tex.	KHBR	1560
Hillsdale, Mich.	WCSR	1340
Hillsville, Va.	WHHV	1400
Hilo, Hawaii	KPUA	970
	KIPA	1110
	KIMO	850
Hinesville, Ga.	KGML	990
Hinton, W. Va.	WMTD	1380
Hobbs, N.Mex.	KWEW	1480
	KHOB	1390
Holbrook, Ariz.	KDJI	1270
Holdenville, Okla.	KVYL	1370
Holdredge, Nebr.	KUVR	1380
Holland, Mich.	WHTC	1450
	WJBL	1260
Hollister, Calif.	KGHT	1520
Hollywood, Fla.	WGMA	1320
Holly Hill, S.C.	WHHL	1440
Holyoke, Mass.	WREB	930
Homer, La.	KHAL	1320
Homestead, Fla.	WIII	1430
Homewood, Ala.	WJLD	1400
Honolulu, Hawaii	KAIM	870
Honolulu, Hawaii	KCCN	1420
	KGMB	590
	KZOO	1210
	KHAI	1090
	KPOI	1380

WHITE'S RADIO LOG

Location	C.L.	Kc.
	KIKI	830
	KGU	760
	KHVH	1040
	KNDI	1270
	KOHO	1170
	KORL	650
	KTRG	990
	KULA	690
Hood River, Oreg.	KIHR	1340
Hope, Ark.	KXAR	1490
Hopewell, Va.	WHAP	1340
Hopkinsville, Ky.	WHOP	1230
	WKOA	1480
Hoquiam, Wash.	KGHO	1560
Hornell, N.Y.	WWHG	1320
	WLEA	1480
Hot Springs, Ark.	KAAB	1340
	KBHS	590
	KZNG	1470
Hot Springs, S.Oak.	KOBH	580
Houghton, Mich.	WHDF	1400
Houghton Lake, Mich.	WHGR	1290
Houlton, Maine	WHOU	1340
Houma, La.	KCIL	1490
Houston, Miss.	WCPC	940
Houston, Mo.	KTBC	1250
Houston, Tex.	KCOH	1430
	KENR	1070
	KILT	610
	KNUZ	1230
	KODA	1010
	KPRC	950
	KTHT	790
	KTRH	740
	KXYZ	1320
	KYOK	1590
Howell, Mich.	WHMI	1350
Hudson, N.Y.	WHUC	1230
Hugo, Okla.	KIHN	1340
Humacao, P.R.	WALO	1240
Humboldt, Tenn.	WIRJ	740
Huntingdon, Pa.	WHUN	1150
Huntington, Ind.	WHLT	1300
Huntington, N.Y.	WGSM	740
Huntington, W.Va.	WKEE	800
	WSAZ	930
	WWHY	1470
Huntsville, Ala.	WBHP	1230
	WEUP	1600
	WFIX	1450
	WAAY	1550
Huntsville, Tex.	KSAM	1490
Huron, S.Dak.	KIJV	1340
Hutchinson, Kans.	KWBW	1450
	KWHK	1260
Hutchinson, Minn.	KDUZ	1260
Hyde Park, N.Y.	WHVW	950
Idabel, Okla.	KBEL	1240
Idaho Falls, Idaho	KID	590
	KTEE	1260
Immokalee, Fla.	WCOF	1490
Independence, Ia.	KUPI	980
	KOUR	1220
Independence, Kans.	KIND	1010
Independence, Mo.	KCCX	1510
Indiana, Pa.	WDAD	1450
Indianapolis, Ind.	WATI	810
	WBRI	1500
	WFBM	1260
	WGEE	1590
	WIBC	1070
	WIFE	1310
	WIRE	1430
	WXLW	950
Indianola, Iowa	KBAB	1490
Indianola, La.	KBAB	1490
Indianola, Miss.	WNLA	1380
Indian Rocks Beach, Fla.	WGNP	1520
Indio, Calif.	KREO	1400
Inglewood, Calif.	KTYM	1480
Inkster, Mich.	WCHB	1440
International Falls, Minn.	KGHS	1230
Iola, Kansas	KALN	1370
Ionia, Mich.	WION	1430
Iowa City, Iowa	KXIC	800
	WSUI	910
Iowa Falls, Iowa	KFIG	1510
Iron Mtn., Mich.	WMIQ	1450
Irondale, Ala.	WIXI	1480
Ironton, Ohio	WIRO	1230
Ironwood, Mich.	WJMS	630
Irvine, Ky.	WIRV	1550
Isabella, P.R.	WISA	1390
Ishpeming, Mich.	WJPD	1240
	WCKD	970
Islip, N.Y.	WBIC	540
Ithaca, N.Y.	WHCU	870
	WTKD	1470
Iuka, Miss.	WVOM	1270
Jackson, Ala.	WHOD	1290
Jackson, Mich.	WIBM	1450
	WKHM	970
	WJCO	1510
Jackson, Miss.	WJDX	620
	WJQS	1400
	WJXN	1450
	WOKJ	1550
	WWUN	1590
	WRBC	1300
	WSLI	980
Jackson, Ohio	WLMJ	1280
Jackson, Tenn.	WDXI	1310
	WJAK	1460
	WTJS	1390
Jackson, Wis.	WYLO	540
Jackson, Wyo.	KSGT	1340
Jacksonville, Ark.	KGMR	1500
Jacksonville, Fla.	WJAX	930
	WAPE	690
	WZOK	1320
	WIVY	1050
	WMBR	1460
	WOBS	1360
	WPDQ	900
	WQIK	1280
	WRHC	1400
Jacksonville, Ill.	WJIL	1550
	WLDS	1180
Jacksonville, Miss.	WJQS	1400
Jacksonville, N.C.	WJNC	1240
	WLAS	910
Jacksonville, Tex.	KEBE	1400
Jacksonville Beh., Fla.	WBIX	1010
Jamestown, N.Oak.	KEYJ	1400
	KSJB	600
Jamestown, N.Y.	WJTN	1240
	WKSN	1340
Jamestown, Tenn.	WCLC	1280
Janesville, Wis.	WCLO	1230
Jasper, Ala.	WWWB	1360
	WARF	1240
Jasper, Ind.	WITZ	990
Jasper, Tex.	KTXJ	1350
Jefferson City, Mo.	KLIK	950
	KWOS	1240
Jefferson City, Tenn.	WJFC	1480
Jeffersonville, Ind.	WXVW	1450
Jena, La.	KCKW	1480
Jennings, La.	KJEF	1290
Jerome, Idaho	KART	1400
Jerseyville, Ill.	WJBM	1480
Jesup, Ga.	WLOP	1370
John Day, Ore.	KJOY	1400
Johnson City, Tenn.	WJCW	910
	WETB	790
Johnston, S.C.	WJES	250
Johnstown, N.Y.	WIZR	930
Johnstown, Pa.	WJAC	850
	WARD	1490
	WCRO	1230
Joliet, Ill.	WJOL	1340
	WJRC	1510
Joliette, Que.	CJLM	1350
Jonesboro, Ark.	KBTM	1230
	KNEA	970
Jonesboro, La.	KTOC	920
Jonesboro, Tenn.	WJSO	1590
Jonesville, La.	KANV	1480
Joplin, Mo.	WMBH	1450
	KQYX	1580
	KFSB	1310
	KODE	1230
Junction, Tex.	KMBL	1450
June. City, Kans.	KJCK	1420
Juneau, Alaska	KINY	800
	KJNO	630
Kailua, Hawaii	KLEI	1180
Kalamazoo, Mich.	WKPR	1420
	WKZO	590
	WKLZ	1470
	WKMI	1360
Kalispell, Mont.	KGEZ	600
	KOFI	930
Kane, Pa.	WKZA	960
Kankakee, Ill.	WKAN	1320
Kannapolis, N.C.	WGTL	870
	WRKB	1460
Kans. City, Kans.	KCKN	1340
Kansas City, Mo.	KCMO	810
	KMBC	980
	KPRS	1590
	WDAF	610
	WHB	710
Kaukauna, Wis.	WKAU	1050
Kenedy-Karnes City, Texas	KAML	990
Kealakekua, Hawaii	KEKO	790
Kearney, Nebr.	KGFW	1340
	KRNY	1460
Keene, N.H.	WKNE	1290
	WKBK	1220
Kelso, Wash.	KLOG	1490
Kemmerer, Wyo.	KMER	950
Kendallville, Ind.	WAWK	1570
Kenedy, Tex.	KAML	990
Kennett, Mo.	KBOA	930
	KBXN	1540
Kennewick-Paseo-Richland, Wash.	KEPR	810
Kenosha, Wis.	WLIP	1050
Kent, O.	WKNT	1520
Keokuk, Iowa	KOKX	1310
Kermit, Tex.	KERB	600
Kerrville, Tex.	KERV	1230
Kershaw, S.C.	WKSC	1300
Ketchikan, Alaska	KTKN	930
Kewanee, Ill.	WKEI	1450
Keyser, W.Va.	WKYR	1270
	WKLP	1390
Key West, Fla.	WKWF	1600
	WKIZ	1500
Kilgore, Tex.	KOCA	1240
Killeen, Tex.	KLEN	1050
Kimball, Nebr.	KIMB	1260
King, N. C.	WKTE	1090
King City, Calif.	KRKC	1490
Kingman, Ariz.	KAAA	1290
Kings Mountain, N.C.	WKMT	1220
Kingsport, Tenn.	WKIN	1320
	WKPT	1550
Kingston, N.Y.	WBAZ	1550
	WGHQ	920
	WKNY	1490
Kingstree, S.C.	WDKD	1310
Kingsville, Tex.	KINE	1330
Kinston, N.C.	WELS	1010
	WFTC	960
	WISP	1230
Kirkland, Wash.	KYAC	1460
	KBLE	1050
Kirksville, Mo.	KIRX	1450
Kissimmee, Fla.	WFIV	1080
Kittanning, Pa.	WACB	1380
Klamath Falls, Oreg.	KAGO	1150
	KFLW	1450
	KLAD	960
Knoxville, Iowa	KNIA	1320
Knoxville, Tenn.	WBIR	1240
	WIVK	850
	WATE	620
	WKXV	900
	WNOX	990
	WROL	1490
Kokomo, Ind.	WIOU	1350
Koseiusko, Miss.	WKOZ	1350
Laconia, N.H.	WLNH	1350
	WEMJ	1490
LaCrosse, Wis.	WKBH	1410
	WLCX	1490
	WKTY	580
Ladysmith, Wis.	WLDY	1340
Lafayette, Ga.	WLFA	1590
Lafayette, Ind.	WASK	1450
	WAZY	1410
	WBAA	920
Lafayette, La.	KPEL	1420
	KVOL	1330
	KXKW	1520
Lafayette, Tenn.	WEEN	1460
LaFollette, Tenn.	WLAF	1450
LaGrande, Oreg.	KLBM	1450
LaGrange, Ga.	WLAG	1240
	WTRP	620
LaGrange, Ill.	WTAQ	1300
LaGrange, Tex.	KVLG	1570
LaJunta, Colo.	KBZZ	1400
Lake Charles, La.	KLOU	1580
	KPLC	1470
	KAOK	1400
Lake City, Fla.	WDSR	1340
	WGRO	960
Lake City, S.C.	WJOT	1260
Lake Geneva, Wis.	WMIR	1550
Lakeland, Fla.	WLAK	1430
	WONN	1230
	WWAB	1330
Lake Placid, N.Y.	WIRD	920
Lake Providence, La.	KLPL	1050
Lake Tahoe, Calif.	KOWL	1490
Lakeview, Oreg.	KQIK	1230
Lake Wales, Fla.	WIPC	1280
Lakewood, Colo.	KLAK	1600
Lakewood Center, Wash.	KFHA	1480
Lake Worth, Fla.	WLIZ	1380
Lamar, Colo.	KLMR	920
Lamesa, Tex.	KPET	690
Lampasas, Tex.	KCYL	1450
Lancaster, Calif.	KAVL	610
	KBVM	1380
Lancaster, N.Y.	WMMJ	1300
Lancaster, Ohio	WHOK	1320
Lancaster, Pa.	WGAL	1490
	WLAN	1390
Lancaster, S.C.	WLCM	1360
	WAGL	1560
Lander, Wyo.	KOVE	1330
Lanett, Ala.-W. Point, Ga.	WRLD	1490
Lansdale, Pa.	WNPV	1440
Lansford, Pa.	WLSH	1410
Lansing, Mich.	WILS	1320
	WJIM	1240
	WITL	1010
Lapeer, Mich.	WMPC	1280
	WTHM	1530
LaPlata, Md.	WSMD	1560
LaPorte, Ind.	WLOI	1540
Laramie, Wyo.	KLME	1490
	KOWB	1290
Laredo, Tex.	KGNS	1300
	KVOZ	1490
Larned, Kans.	KANS	1510
LaSalle, Ill.	WLPO	1220
LasCruces, N.Mex.	KOBE	1450
	KGRT	570
Las Vegas, Nev.	KENO	1400
	KLAV	1230
	KORK	1340
	KRAM	920
	KLUC	1050
	KVEG	970
Las Vegas, N.Mex.	KFUN	1290
Latrobe, Pa.	WPKV	1570
	WQTW	1570
	WTRA	1480
Laurel, Md.	WLMD	900
Laurel, Miss.	WAML	1340
	WLAU	1600
	WNSL	1260
Laurens, S.C.	WLBG	860
Laurinburg, N.C.	WEWO	1080
	WLNC	1300
Lawrence, Kans.	KFKU	1250
	KLWN	1320
Lawrence, Mass.	WCCM	800
Lawrenceburg, Tenn.	WOXE	1370
Lawrenceville, Ga.	WLAW	1360
Lawrenceville, Ill.	WAKD	910
Lawrenceville, Va.	WLES	580
Lawton, Okla.	KSWO	1380
	KCCO	1050
Leadville, Colo.	KBRR	1290
Leaksville, N.C.	WLOE	1490
Leavenworth, Kans.	KCLO	1410
Lebanon, Ky.	WLBN	1590
Lebanon, Mo.	KLWT	1290
Lebanon, Oreg.	KGAL	920
Lebanon, Pa.	WLBR	1270
Lebanon, Tenn.	WCOR	900
Leesburg, Fla.	WLBE	790
	WBIL	1410
Leesburg, Va.	WAGE	1290
Leesville, La.	KLLA	1570
Lehighton, Pa.	WYNS	1150
Leitchfield, Ky.	WMTL	1580
Leland, Miss.	WESY	1580
LeMars, Iowa	KLEM	1410
Lemoore, Calif.	KLAN	1320
	KOAD	1240
Lenoir, N.C.	WJRI	1340
Lenoir, Tenn.	WLIL	730
Lenoir City, Tenn.	WBLC	1360
Leonardtown, Md.	WKIK	1370
Levelland, Tex.	KLVT	1230
Levittown, Pa.	WBCB	1490
Lewisburg, Pa.	WUNS	1010
Lewisburg, Tenn.	WJJM	1490
Lewiston, Idaho	KRLC	1350
	KOZE	1300
Lewiston, Maine	WCOU	1240
	WLAM	1470
Lewistown, Mont.	KXLO	1230
Lewistown, Pa.	WKVA	920
	WMRF	1490
Lexington, Ky.	WLAP	630
	WBLG	1300
	WVLK	590
Lexington, Miss.	WXTN	1150
Lexington, Mo.	KLEX	1570
Lexington, Nebr.	KRVN	1010
Lexington, N.C.	WBUY	1440
Lexington, Tenn.	WDXL	1490
Lexington, Va.	WREL	1450
Lexington Pk., Md.	WPTX	920
Libby, Mont.	KLCB	1230
	KLIB	1470
Liberal, Kans.	KSCB	1270
Liberty, Ky.	WPHN	1560
Liberty, N.Y.	WVOS	1240
Liberty, Tex.	KFAZ	1050
Lihue, Hawaii	KTOH	1490
Lima, Ohio	WIMA	1150
	WCIT	940
	WPRC	1370
Lincoln, Ill.	WLKN	1450
Lincoln, Me.	KFOR	1240
Lincoln, Nebr.	KLIN	1400
	KLMS	1480
	KLOL	1530
Lincolnton, N.C.	WLON	1050
Linton, Ind.	WBTO	1600
Litchfield, Ill.	WSMI	1540
Litchfield, Minn.	KLFD	1410
Little Falls, Minn.	KLTF	960
Little Falls, N.Y.	WLFH	1280
Littlefield, Tex.	KZZN	1490
Little Rock, Ark.	KARK	920
	KALO	1250
	KLRA	1010
	KOKY	1440
	KAAY	1090
	KVLC	1050
Littleton, Colo.	KOKO	1510
Littleton, N. H.	WLTN	1400

Location	C.L.	Kc.
Live Oak, Fla.	WNER	1250
Livingston, Mont.	KPRK	1340
Livingston, Tenn.	WLIV	920
Livingston, Tex.	KETX	1440
	KVLL	1220
Lock Haven, Pa.	WBPZ	1280
Lockport, N.Y.	WUSJ	1340
Lodi, Calif.	KCVR	1570
Logan, Utah	KVNU	810
	KSTU	1300
	KLGN	1390
Logan, W.Va.	WLOG	1230
	WVOW	1290
Logansport, Ind.	WSAL	1280
Lompoc, Calif.	KKOK	1410
	KLOM	1330
	KNEZ	960
London, Ky.	WFTG	1400
Long Beach, Calif.	KFOX	1280
	KGER	1390
Longmont, Colo.	KLMO	1060
Long Prairie, Minn.	KEYL	1400
Longview, Tex.	KFRO	1370
	KLUE	1280
Longview, Wash.	KEDO	1400
	KBAM	1270
Lookout Mtn., Tenn.	WFLI	1070
Lorain, Ohio	WWIZ	1380
Loretto, Pa.	WWSF	1400
Loris, S.C.	WLSC	1570
Los Alamos, N.Mex.	KRSN	1490
Los Angeles, Calif.	KABC	790
	KFI	640
	KHJ	930
	KFWB	980
	KGFJ	1230
	KFAC	1330
	KLAC	570
	KMPC	710
	KNX	1070
	KPOL	1540
	KGBS	1020
	KRKO	1150
Los Banos, Calif.	KLBS	1330
Louisburg, N.C.	WYRN	1480
Louisville, Ga.	WPEH	1420
Louisville, Ky.	WAVE	970
	WAKY	790
	WHAS	840
	WKLO	1080
	WINN	1240
	WFIA	900
	WLOU	1350
	WTMT	620
Louisville, Miss.	WLSM	1270
Loveland, Colo.	KLOV	1570
Loves Park, Ill.	WLUV	1520
Lovington, N.Mex.	KLEA	830
Lowell, Mass.	WCAP	980
	WLLH	1400
Lubbock, Tex.	KCBD	1590
	KDAV	580
	KLBK	1340
	KFYO	790
	KLLL	1460
	KSEL	950
Lucedale, Miss.	WHHT	1440
Ludington, Mich.	WKLA	1450
Lufkin, Tex.	KRBA	1340
	KTRE	1420
Lumberton, N.C.	WAGR	580
	WTSB	1340
Luray, Va.	WRAA	1330
Lynchburg, Va.	WLVA	590
	WLLL	930
	WOMS	1320
	WWOD	1390
	WBRG	1050
Lynn, Mass.	WLYN	1360
Lyons, Ga.	WBBT	1340
Macomb, Ill.	WKAI	1510
Macon, Ga.	WBML	1240
	WCRY	900
	WIBB	1280
	WMAZ	940
	WNEX	1400
Macon, Miss.	WMBC	1400
Macon, Mo.	KLTI	1560
Madawaska, Me.	WSJR	1230
Madera, Calif.	KHOT	1250
Madill, Okla.	KMAD	1550
Madison, Fla.	WMAF	1280
Madison, Ga.	WYTH	1250
Madison, Ind.	WORX	1270
Madison, S.D.	KJAM	1390
Madison, Tenn.	WENO	1430
Madison, Wis.	WHA	750
	WIBA	1310
	WISM	1480
	WKOW	1070
	WMAD	1550
Madisonville, Ky.	WFMW	730
	WTTL	1310
Magee, Miss.	WSJC	810
Magnolia, Ark.	KVMA	630
Makawao, Hawaii	KNUI	1310
Malden, Mo.	KTCB	1470
Malone, N.Y.	WICY	1490
Malvern, Ark.	KBOK	1310
Manassas, Va.	WPRW	1460
Manati, P.R.	WMNT	1500
Manchester, Conn.	WINF	1280
Manchester, Ga.	WFDR	1370
Manchester, Ky.	WWXL	1450
Manchester, N.H.	WFEA	1370
	WGIR	610
	WKBR	1250
Manchester, Tenn.	WMSR	1320
Manhattan, Kans.	KSAC	580
	KMAN	1350
Manistee, Mich.	WMTE	1340
Manistique, Mich.	WTIQ	1490
Manitou Springs, Colo.	KCMS	1490
Manitowoc, Wis.	WCUB	980
	WOMT	1240
Mankato, Minn.	KYSM	1230
	KTOE	1420
Manning, S.C.	WYMB	1410
Mansfield, La.	KOXI	1360
Mansfield, Ohio	WMAN	1400
	WCLW	1570
Maplewood, Minn.	WRCR	1010
Maquoketa, Iowa	KMAQ	1320
Marathon, Fla.	WFFG	1300
Marianna, Ark.	KZDT	1460
Marianna, Fla.	WTYS	1340
	WTOT	980
Marietta, Ga.	WFOM	1230
	WBIE	1080
Marietta, Ohio	WMOA	1490
	WBRJ	910
Marine City Mich.	WDOG	1590
Marinette, Wis.	WMAN	570
Marion, Ala.	WJAM	1310
Marion, Ill.	WGGH	1150
Marion, Ind.	WBAT	1400
	WMRI	860
Marion, N.C.	WBRM	1250
Marion, Ohio	WMRN	1490
Marion, S.C.	WATP	1480
Marion, Va.	WMEV	1010
	WOLD	133
Marked Tree, Ark.	KPCA	1580
Marksville, La.	KAPB	1370
Marlborough, Mass.	WSRO	1470
Marquette, Mich.	WDMJ	1320
Marshall, Mich.	WMRR	1540
Marshall, Minn.	KMHL	1400
Marshall, Mo.	KMMO	1300
Marshall, N.C.	WMMH	1460
Marshall, Tex.	KMHT	1450
	KDOX	1410
Marshalltown, Iowa	KFJB	1230
Marshfield, Wis.	WOLB	1450
Martin, Tenn.	WCMT	1410
Martinsburg, W.Va.	WEPM	1340
Martinsville, Va	WHEE	1370
	WMVA	1450
Maryville, Mo.	KNIM	1580
Marysville, Calif	KMYC	1410
Marysville, Kans	KNDY	1570
Maryville, Tenn.	WGAP	1400
Mason City, Iowa	KGLO	1300
	KRIB	1490
	KSMN	1010
Massena, N.Y.	WMSA	1340
	WYBG	1050
Massillon, Ohio	WTIG	990
Matewan, W.Va.	WHJC	1380
Mattoon, Ill.	WLBH	1170
Mauston, Wis.	WRJC	1270
Mayaguez, P.R.	WAEL	600
	WKJB	710
	WORA	760
	WPRA	990
	WTIL	1300
Mayfield, Ky.	WNGO	1320
Mayodan, N.C.	WMYN	1420
Maysville, Ky.	WFTM	1240
McAlester, Okla.	KTMC	1400
	KNED	1150
McAllen, Tex.	KRID	910
McCall, Ida.	KMCL	1240
McCamey, Tex.	KAMY	1450
McComb, Miss.	WHNY	1250
	WAPF	980
McCook, Nebr.	KBRL	1300
	KWRV	1360
McGehee, Ark.	KVSA	1220
McKeesport, Pa.	WEDO	810
	WMCK	1360
McKenzie, Tenn.	WHDM	1440
McKinney, Tex.	KMAE	1600
McMinnville, Oreg.	KMCM	1280
McMinnville, Tenn.	WBMC	980
	WAKI	1230
McPherson, Kans.	KNEX	1540
McRae, Ga.	WDAX	1410
Mead, Wash.	KLFF	1590
Meadville, Pa.	WMGW	1490
Medford, Mass.	WHIL	1430
Medford, Oreg.	KMED	1440
	KSHA	860
	KOOV	1300
	KBDY	730
	KYJC	1230
Medford, Wis.	WIGM	1490
Media, Pa.	WXUR	690
Melbourne, Fla.	WMMB	1240
Memphis, Tenn.	WHBQ	560
	WHER	1430
	WMC	790
	WDIA	1070
	WMPS	680
	WLOK	1340
	WMQM	1480
	WREC	600
	KWAM	990
Mena, Ark.	KENA	1450
Mendota, Ill.	WGLC	1090
Menominee, Mich.	WAGN	1340
Menomonie, Wis.	WMNE	1360
Merced, Calif.	KYOS	1480
	KWIP	1580
Meriden, Conn.	WMMW	1470
Meridian, Miss.	WCOC	910
	WOAL	1350
	WMOX	1010
	WOKK	1450
	WQIC	1390
Merkle, Tex.	KWFA	1500
Merrill, Wis.	WXMT	730
Mesa, Ariz.	KBUZ	1310
	KALF	1510
Metropolis, Ill.	WMOK	920
Metter, Ga.	WMAC	1360
Mexia, Tex.	KBUS	1590
Mexico, Mo.	KXEO	1340
Mexico, Pa.	WJUN	1220
Miami, Ariz.	KIKO	1340
Miami, Fla.	WGBS	710
	WIOD	610
	WFAB	990
	WAME	1260
	WMIE	140
	WQAM	1220
	WQAM	560
	WSKP	1450
	WINZ	940
Miami, Okla.	KGLC	910
Miami Beach, Fla.	WMBM	1490
	WKAT	1360
	WFUN	790
Michigan City, Ind.	WIMS	1420
Middleport-Pomeroy, Ohio	WMPO	1390
Middlesboro, Ky.	WMIK	560
Middletown, Conn.	WCNX	1150
Middletown, N.Y.	WALL	1340
Middletown, Ohio	WPFB	910
Midland, Mich.	WMON	1490
Midland, Tex.	KCRS	550
	KJBC	1150
	KWEL	1440
	KABH	1510
Milan, Tenn.	WKBJ	1600
Miles City, Mont.	KATL	1340
Milford, Conn.	WFIF	1500
Milford, Del.	WKSB	930
Milford, Mass.	WMRC	1490
Milledgeville, Ga.	WMVG	1450
Millen, Ga.	WGSR	1570
Millington, Tenn.	WGMM	1380
Millinocket, Me.	WMKR	1240
Millville, N.J.	WMVB	1440
Milton, Fla.	WEBY	1330
	WSRA	1490
Milton, Pa.	WMLP	1380
	WARC	1380
Milwaukee, Wis.	WEMP	1250
	WFOX	860
	WRIT	1340
	WISN	1130
	WMIL	1290
	WOKY	920
	WTMJ	620
Minden, La.	KASO	1240
Mineola, N.Y.	WFYI	1520
Mineola, Tex.	KMOO	1510
Mineral Wells, Tex.	KORC	1140
Minneapolis, Minn.	WCCO	830
	WLOL	1330
	WMIN	1400
	WDGY	1130
	WWTC	1280
	KTCR	690
	KTIS	900
	KUOM	770
	KSTP	1500
Minot, N. Dak.	KLPM	1390
	KHRT	1320
	KCJB	910
Mission, Kans.	KBEA	1480
Mission, Tex.	KIRT	1580
Missoula, Mont.	KGVO	1290
	KXLL	1450
	KQTE	1340
	KYSS	910
Mitchell, S.Dak.	KORN	1490
Moab, Utah	KURA	1450
Moberly, Mo.	KNCM	1230
Mobile, Ala.	WUNI	1410
	WABB	1480
	WGOK	900
	WMOO	1550
	WTUF	840
	WKRG	710
	WLIQ	1360
	WMOZ	960
Mobridge, S.Dak.	KOLY	1300
Mocksville, N.C.	WDSL	1520
Modesto, Calif.	KTRB	860
	KBEE	970
	KFIV	1360
Mojave, Calif.	KOOL	1340
Moline, Ill.	WQUA	1230
Monahans, Tex.	KVKM	1330
Moncks Corner, S. C.	WBER	950
Monett, Mo.	KRMO	990
Monette, Ark.	KBIB	1560
Monmouth, Ill.	WRAM	1330
Monroe, Ga.	WMRE	1490
Monroe, La.	KMLB	1440
	KLIC	1230
	KNOE	540
Monroe, Mich.	WQTE	560
Monroe, N.C.	WMAP	1060
Monroe, Wis.	WEKZ	1260
Monroeville, Ala.	WMFC	1360
Monterey, Calif.	KIDO	630
	KMBY	1240
Montevideo, Minn.	KOMA	1460
Monte Vista, Colo.	KSLV	1240
Montezuma, Ga.	WMNZ	1050
Montgomery, Ala.	WBAM	740
	WAPX	1600
	WCOV	1170
	WFMI	1500
	WHHY	1440
	WMGY	800
	WRMA	950
Montgomery, W.Va.	WMON	1340
Monticello, Ark.	KHBM	1430
Monticello, Fla.	WWSO	1090
Monticello, Ky.	WFLW	1360
Montpelier, Ida.	KVSI	1450
Montpelier-Barre, Vt.	WSKI	1240
Montrose, Colo.	KUBC	580
Montrose, Pa.	WPEL	1250
Mooresville, N.C.	WHIP	1350
Moorhead, Minn.	KVOX	1280
Morehead, Ky.	WMDR	1330
Morehead City, N.C.	WMBL	740
Morgan City, La.	KMRC	1430
Morganfield, Ky.	WMSK	1550
Morgantown, N.C.	WMNC	1430
Morgantown, W.Va.	WAJR	1440
	WCLG	1300
Morrilton, Ark.	KVOM	800
Morris, Ill.	WCSJ	1550
Morris, Minn.	KMRS	1280
Morristown, N.J.	WMTR	1250
Morristown, Tenn.	WCRK	1150
	WMTN	1300
Morton, Tex.	KRAN	1280
Moscow, Idaho	KRPL	1400
Moses Lake, Wash.	KSEM	1470
	KWIQ	1260
Moss Point, Miss.	WACY	1460
Moulton, Ala.	WLCB	1530
Moultrie, Ga.	WMGA	1400
	WMTM	1300
Moundsville, W.Va.	WEIF	1370
Mountain Grove, Mo.	KLRS	1380
Mountain Home, Ark.	KTLO	1490
Mountain Home, Ida.	KFLI	1240
Mt. Airy, N.C.	WPAQ	740
	WSYD	1300
Mt. Carmel, Ill.	WVMC	1380
Mt. Clemens, Mich.	WBRB	1430
Mt. Dora, Fla.	WVGT	1580
Mt. Holly, N.J.	WJJZ	1460
Mt. Jackson, Va.	WSIG	790
Mt. Kisco, N.Y.	WVIP	1310
Mt. Olive, N.C.	WDJS	1430
Mt. Pleasant, Mich.	WCEN	1150
Mt. Pleasant, Tex.	KIMP	960
Mt. Shasta, Calif.	KWSO	620
Mt. Sterling, Ky.	WMST	1150
Mt. Vernon, Ill.	WMIX	940
Mt. Vernon, Ind.	WPCO	1590
Mt. Vernon, Ky.	WRVK	1460
Mt. Vernon, Ohio	WMVO	1300
Mt. Vernon, Wash.	KAPS	1470
	KBRC	1430
Muleshoe, Tex.	KMUL	1380
Mullins, S.C.	WJAY	1280
Muncie, Ind.	WLBC	1340
	WERK	990
Munfordville, Ky.	WLOC	1150
Munising, Mich.	WGDN	1400
Murfreesboro, N. C.	WWDR	1080
Murfreesboro, Tenn.	WGNS	1450
	WMTS	810
Murphy, N.C.	WCVP	800
	WKRK	1320
Murphysboro, Ill.	WINI	1420
Murray, Ky.	WNBS	1340
Murray, Utah	KMOR	1230
Muscatine, Iowa	KWPC	860
Muscle Shoals City, Ala.	WLAY	1450
Muskegon, Mich.	WKBZ	850
	WKJR	1520
	WTRU	1600
	WMUS	1090
Muskogee, Okla.	KBIX	1490
	KMUS	1380
Myrtle Beach, S.C.	WMYB	1450
	WTGR	1520
Nacogdoches, Tex.	KEEE	1230
	KSFA	860

WHITE'S RADIO LOG

Location	C.L.	Kc.
Nampa, Idaho	KFXD	580
	KAIN	1340
Nanticoke, Pa.	WNAK	730
Napa, Calif.	KVON	1440
Naples, Fla.	WNOG	1270
Narrows, Va.	WNRV	990
Nashua, N.H.	WOTW	900
	WSMN	1590
Nashville, Ark.	KBHC	1260
Nashville, Ga.	WNGA	1600
Nashville, Tenn.	WKDA	1240
	WLAC	1510
	WMAK	1300
	WNAH	1360
	WSIX	980
	WSM	650
	WWGM	1560
Nassau, Bahamas	ZNS-2	1240
Natchez, Miss.	WMIS	1240
	WNAT	1450
Natchitoches, La.	KNOC	1450
Naugatuck, Conn.	WOWW	860
Navasota, Tex.	KWBC	1550
Nebraska City, Nebr.		
	KNCY	1600
Needles, Calif.	KSFE	1340
Neenah, Wis.	WNAM	1280
Neillsville, Wis.	WCCN	1370
Neon, Ky.	WNKY	1480
Neosho, Mo.	KBTN	1420
Nevada, Mo.	KNEM	1240
New Albany, Ind.	WNUW	1570
	WNIR	1290
New Albany, Miss.	WNAU	1470
Newark, Del.	WNRK	1260
Newark, N.J.	WJRZ	970
	WNJR	1430
	WVNJ	620
Newark, N.Y.	WACK	1420
Newark, Ohio	WCLT	1430
New Bedford, Mass.	WBSM	1420
	WNBH	1340
New Bern, N.C.	WHIT	1450
	WRNB	1490
Newberry, S.C.	WKDK	1240
New Boston, Ohio	WIOI	1010
New Braunfels, Tex.	KGNB	1420
New Britain, Conn.		
	WRCH	910
	WRYM	840
New Brunswick, N.J.		
	WCTC	1450
Newburgh, N.Y.	WGNY	1220
Newburyport, Mass.	WNBP	1470
New Castle, Ind.	WCTW	1550
New Castle, Pa.	WKST	1280
Newcastle, Wyo.	KASL	1240
New City, N. Y.	WRKL	910
New Haven, Conn.	WAVZ	1300
	WELI	960
	WNHC	1340
New Iberia, La.	KANE	1240
	KVIM	1360
New Kensington, Pa.		
	WKPA	1150
New London, Conn.	WNLC	1510
New Martinsville, W.Va.		
	WETZ	1330
Newnan, Ga.	WCOH	1400
	WNEA	1300
New Orleans, La.	WDSU	1280
	WNNR	990
	WBOK	800
	WNOE	1060
	WSMB	1350
	WNPS	1450
	WSHO	1230
	WTIX	690
	WWL	870
	WWOM	600
	WYLD	940
Newport, Ark.	KNBY	1280
Newport, N.H.	WCNL	1010
Newport, Oreg.	KNPT	1310
Newport, R.I.	WADK	1540
Newport, Tenn.	WLIK	1270
Newport, Vt.	WIKE	1490
Newport News, Va.	WGH	1310
	WTID	1270
Newport Richey, Fla.		
	WGUL	1500
New Richmond, Wis.		
	WIXK	1590
New Roads, La.	KWRG	1500
New Rochelle, N.Y.	WVOX	1460
New Smyrna Beach, Fla.		
	WSBB	1230
	WORT	1550
Newton, Iowa	KCOB	1280
Newton, Kans.	KJRG	950
Newton, Miss.	WBKN	1410
Newton, N.J.	WNNJ	1360
Newton, N.C.	WNNC	1230
New Ulm, Minn.	KNUJ	860
New York, N.Y.	WABC	770
	WADO	1280
	WBNX	1380
	WCBS	880
	WEVD	1330
	WHN	1050
	WHOM	1480
	WINS	1010
	WLIB	1190
	WMCA	570
	WNBC	660
	WNEW	1130
	WNYC	830
	WOR	710
	WPOW	1330
	WWRL	1600
Niagara Falls, N.Y.	WHLD	1270
	WJJL	1440
Niceville-Valparaiso, Fla.		
	WNSM	1340
Nicholasville, Ky.	WNVL	1250
Niles, Mich.	WNIL	1290
Niles, Ohio	WNIO	1540
Nogales, Ariz.	KNOG	1340
Nome, Alaska	KICY	850
Norfolk, Nebr.	WJAG	780
Norfolk, Va.	WTAR	790
	WCMS	1050
	WNOR	1230
	WRAP	850
Normal, Ill.	WIOK	1440
Norman, Okla.	WNAD	640
	KNOR	1400
Norristown, Pa.	WNAR	1110
N. Adams, Mass.	WMNB	1230
N. Atlanta, Ga.	WATY	680
N. Augusta, S.C.	WGUS	1380
	WFNL	1600
	WTHB	1550
North Bend, Oreg.	KFIR	1340
North Charleston, S.C.		
	WNCG	910
Northampton, Mass.		
	WHMP	1400
Northfield, Minn.	WCAL	770
N. Little Rock, Ark.	KOXE	1380
	KXLR	1150
North Platte, Nebr.	KJLT	970
	KNOP	1410
	KODY	1240
No. Syracuse, N.Y.	WSOQ	1220
N. Vernon, Ind.	WOCH	1460
Northwestern, Ind.	WNWI	1080
No. Wilkesboro, N.C.		
	WKBC	810
Norton, Kans.	KNBI	1530
Norton, Va.	WNVA	1350
Norwalk, Conn.	WNLK	1350
Norwich, Conn.	WICH	1310
Norwich, N.Y.	WCHN	970
Oakdale, La.	KREH	900
Oakes, N.Dak.	KEYD	1220
Oak Grove, La.	KWCL	1280
Oak Hill, W.Va.	WOAY	860
Oakland, Calif.	KEWB	910
	KABL	960
	KOIA	1310
Oakland, Md.	WMSG	1050
Oakland Park, Fla.	WIXX	1520
Oak Park, Ill.	WOPA	1490
Oak Ridge, Tenn.	WATO	1290
Ocala, Fla.	WMOP	900
	WTMC	1290
	WWKE	1370
Ocean City, Md.	WETT	1590
Ocean City, Somers Pt., N.J.		
	WSLT	1520
Oceanlake, Oreg.	KBCH	1380
Oceanside, Calif.	KUDE	1320
Ocilla, Ga.	WSIZ	1380
Odessa, Tex.	KECK	920
	KOSA	1230
	KOYL	1310
	KRIG	1410
Oelwein, Iowa	KOEL	950
Ogallala, Nebr.	KOGA	930
Ogden, Utah	KLO	1430
	KANN	1250
	KSVN	730
	KVOG	1490
Ogdensburg, N.Y.	WSLB	1400
Oil City, Pa.	WKRZ	1340
Okeechobee, Fla.	WOKC	1570
Okla. City, Okla.	KBYE	890
	KLPR	1140
	KOCY	1340
	KOMA	1520
	KTOK	1000
	KJEM	800
	WKY	930
Okmulgee, Okla.	KOKL	1240
Old Saybrook, Conn.	WLIS	1420
Olean, N.Y.	WMNS	1360
	WHDL	1450
Olney, Ill.	WVLN	740
Olympia, Wash.	KGY	1240
Omaha, Nebr.	KITN	920
	KBON	1490
	KFAB	1110
	KOIL	1290
	KOOO	1420
	KOWH	660
	WOW	590
Omak, Wash.	KOMW	680
Oneida, N.Y.	WMCR	1600
Oneida, Tenn.	WBNT	1310
O'Neill, Nebr.	KBRX	1350
Oneonta, Ala.	WCRL	1570
Onsonta, N.Y.	WDOS	730
Ontario, Calif.	KASK	1510
Ontario, Oreg.	KSRV	1380
Opelika, Ala.	WPHO	1400
Opelousas, La.	KSLO	1230
Opp, Ala.	WAMI	860
Opportunity, Wash.	KZUN	630
Orange, Mass.	WCAT	1390
Orange, Tex.	KOGT	1600
Orange, Va.	WJMA	1340
Orangeburg, S.C.	WDIX	1150
	WORG	1580
	WTND	920
Orange Park, Fla.	WAYR	550
Ord, Neb.	KNLV	1060
Oregon City, Ore.	KYMN	1520
Orlando, Fla.	WDBO	580
	WHOO	990
	WHIY	1270
	WLOF	950
	WKIS	740
Ormond Bch., Fla.	WQXQ	1380
Orofino, Idaho	KLER	950
Oroville, Calif.	KAOR	1340
Ortonville, Minn.	KDIO	1350
Osage Bch., Mo.	KRMS	1150
Osceola, Ark.	KOSE	860
Oshkosh, Wis.	WOSH	1490
Oskaloosa, Iowa	KBOE	740
Oswego, N.Y.	WSGO	1440
Othello, Wash.	KRSC	1400
Ostego, Mich.	WAOP	980
Ottawa, Ill.	WCMY	1430
Ottawa, Kans.	KOFO	1220
Ottumwa, Iowa	KBIZ	1240
	KLEE	1480
Owatonna, Minn.	KRFO	1390
Owego, N.Y.	WEBO	1330
Owensboro, Ky.	WOMI	1490
	WVJS	1420
Owosso, Mich.	WOAP	1080
Oxford, Miss.	WSUH	1420
Oxford, N.C.	WOXF	1340
Oxnard, Calif.	KOXR	910
Ozark, Ala.	WOZK	900
Paducah, Ky.	WDXR	1560
	WKYX	570
	WPAD	1450
Page, Ariz.	KPGE	1340
Painesville, Ohio	WPVL	1460
Paintsville, Ky.	WSIP	1490
Palatka, Fla.	WWPF	1280
	WSUZ	800
Palestine, Tex.	KNET	1450
Palm Bch., Fla.	WQXT	1340
Palm Sprgs., Calif.	KCMJ	1010
	KOES	920
	KPAL	1450
Palmdale, Calif.	KUTY	1470
Palo Alto, Calif.	KIBE	1220
Pampa, Tex.	KPDN	1340
	KHHH	1230
Panama Beach, Fla.		
	WGNE	1480
	WSCM	1290
Panama City, Fla.	WDLP	590
	WPCF	1430
Paoli, Ind.	WVAK	1560
Paradise, Calif.	KNGL	930
Paragould, Ark.	KDRS	1490
Paris, Ark.	KCCL	1460
Paris, Ill.	WPRS	1440
Paris, Ky.	WPDE	1440
Paris, Tenn.	WTPR	710
Paris, Tex.	KPLT	1490
	KFTV	1250
Parkersburg, W.Va.	WCEF	1050
	WPAR	1450
	WTAP	1230
Park Falls, Wis.	WPFP	1450
Park Rapids, Minn.		
	KPRM	1240
Parsons, Kans.	KLKC	1540
Pasadena, Cal.	KPPC	1240
	KRLA	1110
	KWKW	1300
Pasadena, Tex.	KLVL	1420
	KIKK	650
Pascagoula-Moss Point, Miss.		
	WPMP	1580
Pasco, Wash.	KORD	910
	KGRS	1340
Paso Robles, Calif.	KPRL	1230
Patchogue, L.I., N.Y.		
	WALK	1370
	WPAC	1580
Paterson, N.J.	WPAT	930
Pauls Valley, Okla.	KVLH	1470
Pawhuska, Okla.	KOSG	1500
Pawtucket, R.I.	WXTR	550
Payette, Ida.	KYET	1450
Pearsall, Tex.	KVWG	1280
Pecos, Tex.	KIUN	1400
Peekskill, N.Y.	WLNA	1420
Pekin, Ill.	WSIV	1140
Pell City, Ala.	WFHK	1430
Pendleton, Oreg.	KTIX	1240
	KUMA	1290
Pennington Gap, Va.		
	WSWV	1570
Pensacola, Fla.	WBOP	980
	WBSR	1540
	WMEL	610
	WNVY	1230
	WCOA	1370
Peoria, Ill.	WAAP	1350
	WMBD	1470
	WIRL	1290
	WPEO	1020
Perry, Fla.	WPRY	1400
	WGKR	1310
Perry, Ga.	WPGA	980
Perry, Iowa	KDLS	1310
Perryton, Tex.	KEYE	1400
Peru, Ind.	WARU	1600
Petaluma, Calif.	KTOB	1490
Petersburg, Va.	WSSV	1240
Petoskey, Mich.	WMBN	1340
Phenix City, Ala.	WPNX	1460
Philadelphia, Miss.	WHOC	1490
Philadelphia, Pa.	KYW	1060
	WCAU	1210
	WDAS	1480
	WFIL	560
	WFLN	900
	WHAT	1340
	WHOC	1490
	WIBG	990
	WIP	610
	WPEN	950
	WRCP	1540
	WTEL	860
Philipsburg, Pa.	WPHB	1260
Phillipsburg, Kans.	KKAN	1490
Phoenix, Ariz.	KIFN	860
	KXIV	1400
	KHAT	1480
	KHEP	1280
	KCAC	1010
	KOY	550
	KOOL	960
	KPHO	910
	KUEQ	740
	KRIZ	1230
	KTAR	620
Phoenix City, Ala.		
	WPNX	1460
Piedmont, Ala.	WPID	1280
Pierre, S.Dak.	KGFX	690
	KCCR	1240
Pikeville, Ky.	WLSI	900
	WPKE	1240
Pine Bluff, Ark.	KCLA	1400
	KADL	1270
	KOTN	1490
	KCAT	1530
	KPBA	1590
Pine City, Minn.	WCMP	1350
Pinellas Park, Fla.	WFSO	570
Pineville, Ky.	WMLF	1230
Pineville, W.Va.	WWYO	970
Pipestone, Minn.	KLOH	1050
Piqua, Ohio	WPTW	1570
Pittsburg, Calif.	KKIS	990
Pittsburg, Kans.	KOAM	860
	KSEK	1340
Pittsburgh, Pa.	KDKA	1020
	KQV	1410
	WAMO	860
	WJAS	1320
	WPIT	730
	WRYT	1250
	WEEP	1080
	WWSW	970
Pittsfield, Ill.	WBBA	1580
Pittsfield, Mass.	WBEC	1420
	WBRK	1340
Pittston, Pa.	WPTS	1540
Plainfield, N.J.	WERA	1590
Plainview, Tex.	KVOP	1400
Plant City, Fla.	WPLA	910
Platteville, Wis.	WSWW	1590
Plattsburg, N.Y.	WEAV	860
	WIRY	1340
Pleasanton, Tex.	KBOP	1380
Pleasantville, N.J.	WOND	1400
Plymouth, Ind.	WTCA	1050
Plymouth, Mass.	WPLM	1390
Plymouth, N.C.	WPNC	1470
Plymouth, N.H.	WPNH	1300
Plymouth, Wis.	WPLY	1420
Pocahontas, Ark.	KPOC	1420
Pocatello, Idaho	KSEI	930
	KWIK	1240
	KSNN	1290
Pocomoke City, Md.	WOMV	540
Pomona, Calif.	KWOW	1600
	KKAR	1220
Pompton Lakes, N.J.		
	WKER	1500
Pompano Beach, Fla.		
	WLOO	980
	WRBD	1470

Location	C.L.	Kc.
Ponca City, Okla.	WBBZ	1230
Ponce, P.R.	WPRP	910
	WEUC	1420
	WPAB	550
	WLEO	1170
	WISO	1260
Pontiac, Ill.	WJBG	1060
Pontiac, Mich.	WPON	1460
Pontotoc, Miss.	WSEL	1440
Pooli, Ind.	WVAK	1560
Poplar Bluff, Mo.	KWOC	930
	KLIO	1340
Poplarville, Miss.	WRPM	1530
Portage, Mich.	WTPS	1580
Portage, Pa.	WWML	1470
Portage, Wis.	WPDR	1350
Portageville, Mo.	KMIS	1050
Portales, N.Mex.	KENM	1450
Port Angeles, Wash.	KAPY	1000
	KONP	1450
Port Arthur, Tex.	KOLE	1340
	KPAC	1250
Porterville, Calif.	KTIP	1450
Port Hueneme, Calif.	KACY	1520
Port Huron, Mich.	WHLS	1450
	WTTH	1380
Port Jervis, N.Y.	WOLC	1490
Port Lavaca, Tex.	KGUL	1560
Portland, Ind.	WPGW	1440
Portland, Maine	WCSH	970
	WGAN	560
	WLOB	1310
	WPOR	1490
Portland, Oreg.	KBPS	1450
	KBEV	1010
	KLIQ	1290
	KEX	1190
	KGW	620
	KOIN	970
	KPAM	1410
	KPOQ	800
	KPOJ	1330
	KWJJ	1080
	KXL	750
Port Neches, Tex.	KPNG	1150
Portsmouth, N.H.	WBBX	1380
	WHEB	750
Portsmouth, Ohio	WPAY	1400
	WNXT	1260
Portsmouth, Va.	WHIH	1400
	WPMH	1010
	WAVY	1350
Port Washington, Wis.	WGLB	1560
Post, Tex.	KPOS	1370
Poteau, Okla.	KLCO	1280
Potomac-Cabin John, Md.	WXLN	950
Potosi, Mo.	KYRO	1280
Potsdam, N.Y.	WPOM	1470
Pottstown, Pa.	WPAZ	1370
Pottsville, Pa.	WPAM	1450
	WPPA	1360
Poughkeepsie, N.Y.	WEOK	1390
	WKIP	1450
Powell, Wyo.	KPOW	1280
Poynette, Wis.	WIBU	1240
Prairie du Chien, Wis.	WPRE	980
Pratt, Kan.	KWNS	1290
Prentiss, Miss.	WKPO	1510
Prescott, Ariz.	KYCA	1490
	KENT	1340
	KNOT	1450
Prescott, Ark.	KTPA	1370
Presque Isle, Me.	WAGM	950
	WEGP	1390
Preston, Idaho	KPST	1340
Prestonsburg, Ky.	WPRT	980
	WOOC	1310
Price, Utah	KOAL	1230
Prichard, Ala.	WSIM	1270
Prince Albert, Sask.	CKBI	900
Princeton, Ill.	WZOE	1490
Princeton, Ind.	WRAY	1250
Princeton, Ky.	WPKY	1580
Princeton, N.J.	WHWH	1350
Princeton, W.Va.	WLOH	1490
Prineville, Oreg.	KRCO	690
Prosser, Wash.	KARY	1310
Providence, R.I.	WEAN	790
	WHIM	1110
	WICE	1290
	WJAR	920
	WLKW	990
	WPRO	630
	WRIB	1220
Provo, Utah	KIXX	1400
	KEYY	1450
	KOVO	960
Pryor, Okla.	KOLS	1570
Pueblo, Colo.	KOZA	1230
	KAPI	690
	KCSJ	590
	KFEL	970
Pueblo, Colo.	KKAM	1350
	KPUB	1480
Pulaski, Tenn.	WKSR	1420
Pulaski, Va.	WPUV	1580
Pullman, Wash.	KWSC	1250
	KOFE	1150
Punta Gorda, Fla.	WCCF	1580
Punxsutawney, Pa.	WPME	1540

Location	C.L.	Kc.
Putnam, Conn.	WINY	1350
Puyallup, Wash.	KPUY	1450
Quanah, Tex.	KOLJ	1150
Quantico, Va.	WQVA	1580
Quincy, Calif.	KQCY	500
Quincy, Fla.	WCNH	1230
Quincy, Ill.	WGEM	1440
	WTAD	930
Quincy, Mass.	WJOA	1300
Quincy, Wash.	KPOR	1370
Quitman, Ga.	WSFB	1490
Racine, Wis.	WRAC	1460
	WRJN	1400
Radford, Va.	WRAD	1460
Raeford, N.C.	WSHB	1400
Raleigh, N.C.	WKIX	850
	WNOH	1550
	WPTF	680
	WLLE	570
	WRNC	1240
Rails, Tex.	KCLR	1580
Rantoul, Ill.	WRTL	1480
Rapid City, S.Dak.	KOTA	1380
	KIMM	1150
	KRSD	1340
	KEZU	920
Raton, N.Mex.	KRTN	1490
Ravenswood, W.Va.	WMOV	1380
Rawlins, Wyo.	KRAL	1240
Raymond, Wash.	KAPA	1340
Raymondville, Tex.	KSOX	1240
Rayville, La.	KRIH	990
Reading, Pa.	WEEU	850
	WHUM	1240
	WRAW	1340
Redding, Calif.	KROG	1230
	KAHR	1330
	KQMS	1400
	KVCV	600
	KVIP	540
Red Bluff, Calif.	KBLF	1490
Redfield, S.Dak.	KFCB	1380
Redlands, Calif.	KCAL	1410
Red Lion, Pa.	WGCB	1440
Red Lodge, Mont.	KRBN	1450
Redmond, Oreg.	KPRB	1240
Red Wing, Minn.	KCUE	1250
Redwood Falls, Minn.	KLGR	1490
Reedsburg, Wis.	WROB	1400
Reedsport, Oreg.	KRAF	1470
Reidsville, N.C.	WFRC	1600
	WREV	1220
Remsen, N.Y.	WREM	1480
Reno, Nev.	KOH	630
	KBET	1340
	KOLO	920
	KONE	1450
	KCBN	1280
Rensselaer, Ind.	WRIN	1560
Rensselaer, N.Y.	WEEE	1300
Renton, Wash.	KREN	1420
Rexburg, Idaho	KRXK	1230
Rhinelander, Wis.	WOBT	1240
Rice Lake, Wis.	WJMC	1240
Richfield, Minn.	WPBC	980
Richfield, Utah	KSVC	980
Richland, Wash.	KALE	960
Richland, Wis.	WRCO	1450
Richlands, Va.	WRIC	540
Richmond, Ind.	WKBV	1490
Richmond, Ky.	WEKY	1340
Richmond, Va.	WANT	990
	WBBL	1480
	WRGM	1540
	WLEE	1480
	WEET	1320
	WGOE	1590
	WMBG	1380
	WRNL	910
	WRVA	1140
	WXGI	950
	WRGM	1540
Richwood, W.Va.	WVAR	1280
Ridgecrest, Calif.	KRCK	1360
	KLOA	1240
Ridgeland, S.C.	WBUG	1430
Rio Piedras, P.R.	WUNO	1320
	WRAI	1190
Ripley, Miss.	WSCA	1260
Ripley, Tenn.	WTRB	1570
Ripon, Wis.	WCWC	1600
Riverhead, N.Y.	WRIV	1390
	WAPC	1570
Riverside, Calif.	KPRO	1440
	KACE	1570
Riverton, Wyo.	KVOW	1450
Riviera Beach, Fla.	WHEW	1600
Roanoke, Ala.	WELR	1360
Roanoke, Va.	WDBJ	960
	WRIS	1410
	WHYE	910
	WROV	1240
	WSLS	610
Roanoke Rapids, N.C.	WCBT	1230
Roaring Sprgs., Pa.	WKMC	1370
Roberval, Que.	CHRL	910
Robinson, Ill.	WTAY	1570
Robstown, Tex.	KROB	500
Rochester, Minn.	KROC	1340
	KFAV	1520

Location	C.L.	Kc.
	KWEB	1270
Rochester, Minn.	KOLM	1520
	KWEB	1270
Rochester, N.H.	WWNH	930
Rochester, N.Y.	WBBF	950
	WHAM	1180
	WHEC	1460
	WNYR	680
	WSAY	1370
	WROC	1280
Rockford, Ill.	WROK	1440
	WJRL	1150
	WRRR	1330
Rockford, Mich.	WJPW	810
Rock Hill, S.C.	WRHI	1340
	WTYC	1150
Rockingham, N.C.	WAYN	900
Rock Island, Ill.	WHBF	1270
Rockland, Maine	WRKO	1450
Rockmart, Ga.	WPLK	1220
Rock Springs, Wyo.	KVRS	1360
Rockville, Md.	WINX	1600
Rockwood, Tenn.	WRKH	580
Rocky Ford, Colo.	KAVI	1320
Rocky Mount, N.C.	WCEC	810
	WEED	1390
	WRMT	1490
	WKWS	1290
Rocky Mount, Va.	WYTI	1570
Rogers, Ark.	KAMO	1390
Rogers City, Mich.	WHAK	960
Rogersville, Tenn.	WRGS	1370
Rolla, Mo.	KCLU	1590
	KTTR	1490
Rome, Ga.	WLAQ	1410
	WIYN	1360
	WRGA	1470
	WROM	710
Rome, N.Y.	WKAL	1450
	WRNY	1350
Ronceverte, W.Va.	WRON	1400
Roseau, Minn.	KRWB	1410
Roseburg, Oreg.	KRNR	1490
	KQEN	1240
	KRXL	1250
	KYES	950
Rosenberg, Tex.	KFRO	980
Roswell, N.Mex.	KROO	1320
	WRIP	980
	KRSY	1250
	KGFL	1430
	KBIM	910
	KROO	1320
	KRIK	960
Roxboro, N.C.	WRXO	1430
Royal Oak, Mich.	WEXL	1340
Rugby, N. Dak.	KGCA	1450
Ruidoso, N.Mex.	KRRR	1340
Rumford, Me.	WRUM	790
Rupert, Idaho	KAYT	970
Rushton, La.	KRUS	1490
Rusk, Texas	KTLU	1580
Russell, Kans.	KRSL	990
Russellville, Ala.	WWWR	920
Russellville, Ark.	KXRJ	1490
Russellville, Ky.	WRUS	810
Rutland, Vt.	WHWB	1000
	WSYB	1380
Sacramento, Calif.	KCRA	1320
	KFBK	1530
	KGMS	1380
	KJAY	1430
	KRAK	1140
	KROY	1240
	KXOA	1470
Safford, Ariz.	KGLU	1480
	KATO	1230
Sag Harbor, N.Y.	WLNG	1600
Saginaw, Mich.	WKNX	1210
	WSAM	1400
	WSGW	790
St. Albans, Vt.	WWSR	1420
St. Albans, W.Va.	WKLC	1300
St. Augustine, Fla.	WFOY	1240
	WETH	1420
St. Charles, Mo.	KAOY	1460
St. Cloud, Minn.	KFAM	1450
	WJON	1240
Ste. Genevieve, Mo.	KSGM	1340
St. George, S.C.	WQIZ	1300
St. George, Utah	KOXU	1450
St. Helen, Mich.	WMIC	1590
St. Helens, Oreg.	KOHI	1600
St. Ignace, Mich.	WSTI	940
St. Johns, Mich.	WJUD	1580
St. Johnsbury, Vt.	WTWN	1340
St. Joseph, Mich.	WSJM	1400
St. Joseph-Benton Harbor, Mich.	WHFB	1060
St. Joseph, Mo.	KFEQ	680
	KKJO	1550
	KUSN	1270
St. Louis, Mo.	KATZ	1600
	KMOX	1120
	KSO	550
	KSTL	690
	KWK	1380
	KXOK	630
	WEW	770
	WIL	1430
	KXEN	1010
St. Louis Park, Minn.	KRSI	950

Location	C.L.	Kc.
St. Mary's, Pa.	WKBI	1400
St. Paul, Minn.	KSTP	1500
	KOWB	630
	WMIN	1400
	WMKT	1370
	WCCO	830
St. Peter, Minn.	KRBI	1310
St. Petersburg, Fla.	WPIN	680
	WSUN	620
	WLCY	1380
St. Petersburg Beach, Fla.	WILZ	1590
Salamanca, N.Y.	WGGO	1590
Salem, Ill.	WJBD	1350
Salem, Ind.	WSLM	1220
Salem, Mass.	WESX	1230
Salem, Mo.	KSMO	1340
Salem, N. J.	WJIC	1510
Salem, O.	WSOM	600
Salem, Oreg.	KSLM	1390
	KAPT	1220
	KBZY	1490
	KGAY	1430
Salem, Va.	WBLU	1480
Salida, Colo.	KVRH	1340
Salina, Kans.	KSAL	1150
	KFRM	550
	KISI	910
Salinas, Calif.	KOON	1460
	KSBW	1380
Salinas, Calif.	KCTY	980-1000
Saline, Mich.	WOIB	1290
Salisbury, Md.	WBOC	960
	WICO	1320
	WJOY	1470
Salisbury, N.C.	WSTP	1490
	WSAT	1280
Salmon, Idaho	KSRA	960
Salt Lake City, Utah	KALL	910
	KCPX	1320
	KLUB	570
	KNAK	1280
	KSL	1160
	KSOP	1370
	KSXX	630
	KWHO	860
	KWIC	1550
San Angelo, Tex.	KTEO	1340
	KGKL	960
	KPEP	1420
	KWFR	1260
San Antonio, Tex.	KAPE	1480
	KBAT	880
	KBER	1150
	KCOR	1350
	KITE	930
	KUKA	1250
	KUBO	1310
	KMAC	630
	KONO	860
	KTSA	550
	WOAI	1200
San Bernardino, Calif.	KCKC	1350
	KFXM	590
	KRNO	1240
	KMEN	1290
Sandersville, Ga.	WSNT	1490
San Diego, Calif.	KCBQ	1170
	KFMB	760
	KOGO	600
	KGB	1360
	KSON	1240
	KSDO	1130
Sandpoint, Idaho	KSPT	1400
Sand Spring, Okla.	KTOW	1340
Sandusky, Ohio	WLEC	1450
San Fernando, Calif.	KGIL	1260
Sanford, Fla.	WTRR	1400
Sanford, Me.	WSME	1220
Sanford, N.C.	WEYE	1290
	WWGP	1050
San Francisco, Calif.	KFRC	610
	KCBS	740
	KFAX	1100
	KGO	810
	KNBR	680
	KKHI	1550
	KSAY	1010
	KSFO	560
	KSOL	1450
	KYA	1260
San Gabriel, Cal.	KAIL	1430
San German, P. R.	WRJS	1060
Sanitobia, Miss.	WSAD	1550
San Jose, Calif.	KLOK	1170
	KLIV	1590
	KEEN	1370
	KXRX	1500
San Juan, P.R.	WAPA	680
	WHOA	870
	WIAC	740
	WIPR	940
	WKAQ	580
	WKVM	810
	WKYN	630
	WITA	1140
San Luis Obispo, Calif.	KATY	1340
	KSLY	1400
	KVEC	920

WHITE'S RADIO LOG

Location	C.L.	Kc.
San Marcos, Tex.	KCNY	1470
San Mateo, Calif.	KOFY	1050
San Rafael, Calif.	KTIM	1510
San Saba, Tex.	KBAL	1410
San Sebastion, P.R.	WFBA	1460
Santa Ana, Calif.	KWIZ	1480
Santa Barbara, Cal.	KDB	1490
	KGUD	990
	KIST	1340
	KTMS	1250
	KACL	1290
Santa Clara, Calif.	KGNU	1430
Santa Cruz, Calif.	KSCO	1080
Santa Fe, N.Mex.	KTRC	1400
	KVSF	1260
Santa Maria, Cal.	KCOY	1400
	KHER	1600
	KSMA	1240
	KSEE	1480
Santa Monica, Cal.	KDAY	1580
Santa Paula, Calif.	KSPA	1400
Santa Rosa, Calif.	KSRO	1350
	KHUM	1580
	KVRE	1460
	KJAX	1150
Santa Rosa, N.Mex.	KSYX	1420
Sapulpa, Okla.	KREK	1550
Saranac Lake, N.Y.	WNBZ	1240
Sarasota, Fla.	WKXY	930
	WSAF	1220
	WSPB	1450
	WYND	1280
Saratoga, N.Y.	WSPN	900
Saratoga Springs, N.Y.	WKAJ	900
Sauk Rapids, Minn.	WVAL	800
Sault Ste. Marie, Mich.	WSOO	1230
Savannah, Ga.	WBYG	1450
	WEAS	900
	WSAV	630
	WSGA	1400
	WTOC	1290
	WSOK	1230
Savannah, Tenn.	WORM	1010
Sayre, Pa.	WATS	960
Scheffield, Ala.	WSHF	1290
Schenectady, N.Y.	WGY	810
	WSNY	1240
Scotland Neck, N.C.	WYAL	1280
Scott City, Kans.	KFLA	1310
Scottsbluff, Nebr.	KNEB	960
	KOLT	1320
Scottsboro, Ala.	WCRI	1050
	WROS	1330
Scottsdale, Ariz.	KDOT	1440
Scottsville, Ky.	WLCK	1250
Scranton, Pa.	WARM	590
	WEJL	630
	WGBI	910
	WICK	1400
	WSCR	1320
Seaford, Del.	WSUX	1280
Searcy, Ark.	KWCB	1300
Seaside, Oreg.	KSRG	730
Seattle, Wash.	KAYO	1150
	KIXI	910
	KING	1090
	KiRO	710
	KJR	950
	KOL	1300
	KOMO	1000
	KETO	1590
	KTW	1250
	KVI	570
	KXA	770
	KBLE	1050
Sebring, Fla.	WJCM	960
	WSEB	1340
Sedalia, Mo.	KDRO	1340
	KSIS	1050
Seguin, Tex.	KWED	1580
Selma, Ala.	WGWC	1340
	WHBB	1490
Selma, N. C.	WBZB	1510
Seminole, Tex.	KTFO	1250
Senatobia, Miss.	WSAO	1550
Seneca Township, S.C.	WSNW	1150
Sevierville, Tenn.	WSEV	930
Seward, Alaska	KIBH	950
Seymour, Ind.	WJCD	1390
Seymour, Tex.	KSEY	1230
Shakopee, Minn.	KSMM	1530
Shallotte, N.C.	WVCB	1410
Shamokin, Pa.	WISL	1480
Shamrock, Tex.	KBYP	1580
Sharon, Pa.	WPIC	790
Shawano, Wis.	WTCH	960
Shawnee, Okla.	KGFF	1450
Sheboygan, Wis.	WHBL	1330
	WKTS	950
Sheffield, Ala.	WSHF	1290
Shelby, Mont.	KSEN	1150
Shelby, N.C.	WOHS	730
	WADA	1390
Shelbyville, Ind.	WSVL	1520
Shelbyville, Ky.	WCND	940
Shelbyville, Tenn.	WHAL	1400
	WLIJ	1580
Sheldon, Iowa	KIWA	1550
Shelton, Wash.	KMAS	1280
Shenandoah, Iowa	KMA	960
	KFNF	920
Shenandoah, Pa.	WMBT	1530
Sheridan, Wyo.	KWYO	1410
	KROE	930
Sherman, Tex.	KRRV	910
	KTXO	1500
Shippensburg, Pa.	WSHP	1480
Show Low, Ariz.	KVWM	970
Shreveport, La.	KANB	1300
	KBCL	1220
	KEEL	710
	KOKA	1550
	KJOE	1480
	KCIJ	980
	KRMD	1340
	KWKH	1130
Sidney, Mont.	KGCX	1480
Sidney, Nebr.	KSID	1340
Sidney, O.	WMVR	1080
Sierra Vista, Ariz.	KHFH	1420
Sikeston, Mo.	KSIM	1400
	KMPL	1520
Siler City, N.C.	WNCA	1570
Silcam Sprgs., Ark.	KUOA	1290
Silsbee, Tex.	KKAS	1300
Silver City, N.Mex.	KSIL	1340
Silver Sprgs., Md.	WQMR	1050
Simcoe, Ont.	CFRS	1560
Sinton, Tex.	KTOD	1590
Sioux City, Iowa	KSCJ	1360
	KMNS	620
	KTRI	1470
Sioux Falls, S.Dak.	KISD	1230
	KELO	1320
	KNWC	1270
	KSOO	1140
Sitka, Alaska	KIFW	1230
	KSEW	1400
Skowhegan, Maine	WGHM	1150
Slaton, Tex.	KCAS	1050
Slidell, La.	WBGS	1560
Smithfield, N.C.	WMPM	1270
Smithville, Tenn.	WJLE	1480
Smyrna, Ga.	WYNX	1550
Snyder, Tex.	KSNY	1450
Socorro, N.Mex.	KSRC	1290
Soda Sprgs., Idaho	KBRV	540
Solvay, N.Y.	WQSR	1320
Somerset, Ky.	WSFC	1240
	WTLO	1480
Somerset, Pa.	WVSC	990
Sonora, Calif.	KVML	1450
Sonora, Tex.	KCKG	1240
So. Bend, Ind.	WNDU	1490
	WJVA	1580
	WSBT	960
Southbridge, Mass.	WESO	970
So. Boston, Va.	WHLF	1400
Southern Pines, N.C.	WEEB	990
South Charleston, W. Va.	WRDS	1410
South Daytona Beach, Fla.	WELE	1590
So. Gastonia, N.C.	WGAS	1420
So. Haven, Mich.	WJOR	940
So. Knoxville, Tenn.	WSKT	1580
So. Paris, Me.	WKTQ	1450
So. Pittsburg, Tenn.	WEPG	910
So. St. Paul, Minn.	KDWB	630
	WMKT	1370
So. Williamsport, Pa.	WMPT	1450
Spanish Fork, Utah	KONI	1490
Sparks, Nev.	KBUB	1270
Sparta, Ill.	WHCO	1230
Sparta, Tenn.	WSMT	1050
Sparta, Wis.	WKLJ	990
	WCOW	1290
Spartanburg, S.C.	WHCQ	1400
	WORD	910
	WSPA	950
Spencer, Iowa	KICD	1240
Spencer, W.Va.	WSPZ	1400
Spokane, Wash.	KGA	1510
	KDNC	1440
	KSPO	1230
	KPEG	1380
	KHQ	590
	KNEW	790
	KREM	970
	KXLY	920
	KCFA	1350
	KUDY	1280
Springdale, Ark.	KBRS	1340
Springfield, Ill.	WCVS	1450
	WMAY	970
	WTAX	1240
Springfield, Mass.	WHYN	560
	WMAS	1450
	WSPR	1270
Springfield, Mo.	KGBX	1260
	KICK	1340
	KTTS	1400
	KWTO	560
Springfield, Ohio	WIZE	1340
	WBLY	1600
Springfield-Eugene, Ore.	KEED	1120
Springfield, Tenn.	WDBL	1590
Springfield, Vt.	WCFR	1480
Springhill, La.	KBSF	1460
Spring Lake, N. C.	WFBS	1450
Spring Valley, N.Y.	WRRC	1300
Spruce Pine, N.C.	WTOE	1470
Stamford, Conn.	WSTC	1400
Stamford, Tex.	KDWT	1400
Stanford, Ky.	WRSL	1520
Starke, Fla.	WPXE	1490
Starkville, Miss.	WSSO	1230
State College, Pa.	WMAJ	1450
	WRSC	1390
Statesboro, Ga.	WWNS	1240
Statesville, N.C.	WSIC	1400
	WDBM	550
Staunton, Va.	WTON	1240
	WAFC	900
Stephenville, Tex.	KSTV	1510
Sterling, Colo.	KGEK	1230
	KOLR	1490
Sterling, Ill.	WSDR	1240
Steubenville, Ohio	WSTV	1340
Stevens Point, Wis.	WSPT	1010
Stillwater, Minn.	WAVN	1220
Stillwater, Okla.	KSPJ	780
Stockton, Calif.	KJOY	1280
	KSTN	1420
	KWG	1230
Storm Lake, Iowa	KAYL	990
Streator, Ill.	WIZZ	1250
Stroudsburg, Pa.	WVPO	840
Stuart, Fla.	WSTU	1450
Stuart, Va.	WHEO	1270
Sturgeon Bay, Wis.	WDOR	910
Sturgis, Mich.	WSTR	1230
Sturgis, S. D.	KBNB	1280
Stuttgart, Ark.	KWAK	1240
Suffolk, Va.	WLPM	1460
Sullivan, Ind.	WKQV	1550
Sulphur, La.	KIKS	1310
Sulphur Sprgs., Tex.	KSST	1230
Summerville, Ga.	WGTA	950
Summerville, S.C.	WALS	980
Sumner, Wash.	KDFL	1560
Sumter, S.C.	WFIG	1290
	WDXY	1240
	WSSC	1340
Sunbury, Pa.	WKOK	1070
Sunnyside, Wash.	KREW	1230
Sun Valley, Ida.	KSKI	1340
Superior, Nebr.	KRFS	1600
Superior, Wis.	WDSM	710
	WIGL	970
	WWJC	1270
	WAXK	1320
Susanville, Calif.	KSUE	1240
Sutton, W. Va.	WSGB	1490
Swainsboro, Ga.	WJAT	800
Sweetwater, Tenn.	WDEH	800
Sweetwater, Tex.	KXOX	1240
Sylacauga, Ala.	WFEB	1340
	WMLS	1290
Sylva, N.C.	WMSJ	1480
Sylvania, Ga.	WSYL	1490
Sylvester, Ga.	WOGA	1540
Syracuse, N.Y.	WHEN	620
	WFBL	1390
	WNDR	1260
	WOLF	1490
	WSYR	570
Tabor City, N.C.	WTAB	1370
Tacoma, Wash.	KMO	1360
	KTAC	850
	KTNT	1400
	KVI	570
Taft, Calif.	KTKR	1310
Tahlequah, Okla.	KTLQ	1350
Tahoe Valley, Calif.	KTHO	590
Talladega, Ala.	WEYY	1580
	WNUZ	1230
Tallahassee, Fla.	WMEN	1330
	WONS	1410
	WTAL	1450
	WTNT	1270
Tallassee, Ala.	WTLS	1300
Tallulah, La.	KTLD	1360
Tampa, Fla.	WALT	1110
	WDAE	1250
	WYOU	1550
	WFLA	970
	WHBO	1050
	WINQ	1010
	WTMP	1150
	WSOL	1300
Taos, N. Mex.	KKIT	1340
Tarboro, N.C.	WCPS	760
Tarpon Springs, Fla.	WCWR	1470
Tasley, Va.	WESR	1330
Taunton, Mass.	WPEP	1570
Tawas City, Mich.	WIOS	1480
Taylor, Tex.	KTAE	1260
Taylorsville, N. C.	WSTH	860
	WTLK	1570
Taylorville, Ill.	WTIM	1410
Tazewell, Tenn.	WNTT	1250
Tell City, Ind.	WTCJ	1280
Tempe, Ariz.	KUPD	1060
	KYND	1580
Temple, Tex.	KTEM	1400
Terre Haute, Ind.	WBOW	1290
	WAAC	1800
	WTHI	1480
Terrell, Tex.	KTER	1570
Terrytown, Nebr.	KEYR	690
Texarkana, Ark.	KOSY	790
Texarkana, Tex.	KCMC	740
	KATQ	940
	KTFS	1400
Texas City, Tex.	KTLW	920
Thayer, Mo.	KALM	1290
The Dalles, Oreg.	KODL	1440
	KACI	1300
Thermopolis, Wyo.	KRTR	1490
	KTHE	1240
Thief River Falls, Minn.	KTRF	1230
Thibodaux, La.	KTIB	680
Thomaston, Ga.	WSFT	1220
	WTGA	1590
	WTHN	1500
Thomasville, Ala.	WJDB	630
Thomasville, Ga.	WPAX	1240
	WLDR	730
Thomasville, N.C.	WTNC	790
Thomson, Ga.	WTWA	1240
Three Rivers, Mich.	WLKM	1510
Ticonderoga, N.Y.	WIPS	1250
Tiffin, Ohio	WTTF	1600
Tifton, Ga.	WTIF	1340
	WWGS	1430
Tillamook, Oreg.	KTIL	1580
Titusville, Fla.	WRMF	1050
Titusville, Pa.	WTIV	1230
Toccoa, Ga.	WLET	1420
	WNES	630
Toledo, Ohio	WOHO	1470
	WSPD	1370
	WTOD	1580
	WCWA	1230
	WTTO	1520
Toledo, Oreg.	KTDO	1230
Tolleson, Ariz.	KRDS	1190
Tomah, Wis.	WTMB	1460
Tompkinsville, Ky.	WTKY	1370
Tooele, Utah	KDYL	990
Topeka, Kans.	WIBW	580
	KEWI	1440
	WREN	1250
	KTOP	1490
Toppenish, Wash.	KENE	1490
Torrington, Conn.	WTOR	610
Torrington, Wyo.	KGOS	1490
Towanda, Pa.	WTTC	1550
Towson, Md.	WAQE	1570
Trail, B.C.	CJAT	610
Travelers Rest, S.C.	WBBR	1580
Traverse City, Mich.	WTCM	1400
	WCCW	1310
Trenton, Mo.	KTTN	1600
Trenton, N.J.	WAAT	1300
	WBUD	1260
	WTTM	920
Trinidad, Colo.	KCRT	1240
Troy, Ala.	WTBF	970
Troy, N.Y.	WHAZ	1330
	WTRY	980
	WXKW	1600
Troy, N. C.	WJRM	1390
Truckee, Calif.	KHOE	1400
Trumann, Ark.	KTMN	1530
Truth or Consequences, New Mexico	KCHS	1400
Tryon, N.C.	WTYN	1550
Tucson, Ariz.	KTUC	1400
	KXEW	1600
	KAIR	1490
	KCEE	790
	KTAN	580
	KCUB	1290
	KEVT	690
	KHOS	940
	KMOP	1330
	KFIF	1550
	KTKT	990
	KOLD	1450
Tucumcari, N.Mex.	KTNM	1400
Tulare, Calif.	KCOK	1270
	KGEN	1370
Tulia, Tex.	KTUE	1260
Tullahoma, Tenn.	WJIG	740
Tulsa, Okla.	KAKC	970
	KOME	1300
	KRMG	740
	KELI	1430
	KVOO	1170
	KFMJ	1050
Tupelo, Miss.	WELO	580
	WTUP	1490

Location	C.L.	Kc.
Turlock, Calif.	KCEY	1390
Tuscaloosa, Ala.	WJRD	1150
	WACT	1420
	WNPT	1280
	WTUG	790
	WTBC	1230
Tuscumbia, Ala.	WVNA	1590
	WRCK	1410
Tuskegee, Ala.	WABT	580
Twenty-Nine Palms, Calif.	KDHI	1250
Twin Falls, Idaho	KTFI	1270
	KLIX	1310
	KEEP	1450
Two Rivers, Wis.	WTRW	1590
Tyler, Tex.	KDOK	1330
	KGJB	1490
	KTBB	600
	KZEY	690
Tyrone, Pa.	WTRN	1340
Uhrichsville, Ohio	WUND	1540
	WBTC	1540
Ukiah, Calif.	KUKI	1400
	KMSL	1250
Ulysses, Kan.	KULY	1420
Union, S.C.	WBCU	1460
Union City, Tenn.	WENK	1240
Uniontown, Pa.	WMBS	590
Urbana, Ill.	WILL	580
	WKID	1580
Utica, N.Y.	WIBX	950
	WBVM	1550
	WRUN	1150
	WTLB	1310
Utuado, P.R.	WUPR	1530
Uvalde, Tex.	KVOU	1400
Valdese, N.C.	WSVM	1490
Valdosta, Ga.	WGOV	950
	WGAF	910
	WJEM	1150
	WVLD	1450
Valentine, Nebr.	KVSH	940
Vallejo, Calif.	KNBA	1190
Valley City, N.Dak.	KOVC	1490
Valparaiso-Niceville, Fla.	WNSM	1340
Valparaiso, Ind.	WAYK	1500
Van Buren, Ark.	KFDF	1580
Van Cleve, Ky.	WMTC	730
Vanceburg, Ky.	WKKS	1570
Vancouver, Wash.	KISN	910
	KKEY	1150
	KGAR	1550
Vandalia, Ill.	WPMB	1560
Van Wert, Ohio	WERT	1220
Venice, Fla.	WAMR	1320
Ventura, Calif.	KVEN	1450
	KUDU	1590
Vermillion, S.Dak.	KUSD	690
Vernal, Utah	KVEL	1250
Vernon, Tex.	KVWC	1490
Vero Beach, Fla.	WAXE	1370
	WTTB	1490
Vicksburg, Miss.	WQBC	1420
	WVIM	1490
Victoria, Tex.	KNAL	1410
	KVIC	1340
Victorville, Calif.	KCIN	1590
Vidalia, Ga.	WVOP	970
Vieques, P.R.	WIVV	1370
Ville Platte, La.	KVPI	1050
Vincennes, Ind.	WAOV	1450
Vineland, N.J.	WWBZ	1360
	WDVL	1270
Vinita, Okla.	KVIN	1470
Vinton, Va.	WKBA	1550
Virginia, Minn.	WHLB	1400
Virginia Beach, Va.	WKVK	1550
Viroqua, Wis.	WISV	1360
Visalia, Calif.	KONG	1400
Vivian, La.	KLVI	1600
Waco, Tex.	WACO	1580
	KAWA	1010
	KBGO	1580
	KWTX	1230
Wadena, Minn.	KWAD	920
Wadesboro, N.C.	WADE	1210
Wahpeton, N.D.-Breckenridge, Minn.	KBMW	1450
Wailuku, Hawaii	KMVI	550
Waipahu, Hawaii	KAHU	940
Walhalla, S.C.	WGOG	1000
Wallace, Idaho	KWAL	620
Wallace, N.C.	WLSE	1400
Walla Walla, Wash.	KHIT	1320
	KUJ	1420
	KTEL	1490
Walnut Ridge, Ark.	KRLW	1320
Walsenburg, Colo.	KFLJ	1380
Walterboro, S.C.	WALD	1220
Waltham, Mass.	WCRB	1330
Walton, N.Y.	WDLA	1270
Ward Ridge, Fla.	WJOE	1570
Ware, Mass.	WARE	1250
Warner Robbins, Ga.	WRBN	1600
	WRPB	1350
Warren, Ark.	KWRF	860
Warren, Ohio	WHHH	1440
Warren, Pa.	WNAE	1310
Warrensburg, Mo.	KOKO	1450
Warrenton, Mo.	KWRE	730
Warrenton, Va.	WEER	1570
	WKCW	1420
Warsaw, Ind.	WRSW	1480
Warsaw, Va.	WNNT	690
Warwick-E.Greenwich, R.I.	WYNG	1590
Wasco, Calif.	KWSO	1050
Washington, D.C.	WGMS	570
	WMAL	630
	WOL	1450
	WOOK	1340
	WWDC	1260
	WRC	980
	WTOP	1500
Washington, Ga.	WLOV	1370
Washington, Ind.	WAMW	1580
Washington, Iowa	KCII	1380
Washington, N.J.	WCRV	1580
Washington, N.C.	WEEW	1320
	WITN	930
Washington, Pa.	WJPA	1450
Washington Court House, Ohio	WCHO	1250
Waterbury, Conn.	WATR	1320
	WBRY	1590
	WWCO	1240
Waterbury, Vt.	WDEV	550
Waterloo, Iowa	KXEL	1540
	KNWS	1090
	KWWL	1330
Watertown, N.Y.	WATN	1240
	WOTT	1410
	WWNY	790
Watertown, S.Dak.	KSDR	1480
	KWAT	950
Watertown, Wis.	WTTN	1580
Waterville, Me.	WTVL	1490
Watseka, Ill.	WGFA	1360
Watsonville, Calif.	KOMY	1340
Wauchula, Fla.	WAUC	1310
	WPRV	1600
Waukegan, Ill.	WKRS	1220
Waukesha, Wis.	WAUK	1510
Waupaca, Wis.	WDUX	800
Wausau, Wis.	WRIG	1400
	WSAU	550
	WXCO	1230
Waverly, Iowa	KWVY	1470
Waverly, Ohio	WPKO	1360
Waverly, Tenn.	WPHC	1060
Waxahachie, Tex.	KBEC	1390
Wayeross, Ga.	WACL	570
	WAYX	1230
Waynesboro, Ga.	WBRO	1310
Waynesboro, Miss.	WABO	990
Waynesboro, Pa.	WAYZ	1380
Waynesboro, Va.	WAYB	1490
	WANV	970
Waynesburg, Pa.	WANB	1580
Waynesville, Mo.	KJPW	1390
Waynesville, N.C.	WHCC	1400
Weatherford, Tex.	KZEE	1220
Webster City, Iowa	KJFJ	1570
Weed, Calif.	KDAD	800
Weirton, W.Va.	WEIR	1430
Weiser, Idaho	KWEI	1260
Welch, W.Va.	WELC	1150
	WOVE	1340
Weldon, N.C.	WCNF	1400
Wellsboro, Pa.	WNBT	1490
Wellston, Ohio	WKOV	1330
Wellsville, N.Y.	WLSV	790
Wenatchee, Wash.	KPQ	560
	KUEN	900
	KMEL	1340
Wendell-Zebulon, N.C.	WETC	540
Weslaco, Tex.	KRGV	1290
West Allis, Wis.	WAWA	1590
W. Bend, Wis.	WBKV	1470
Westbrook, Me.	WJAB	1440
West Chester, Pa.	WCHE	1520
West Covina, Cal.	KGRB	900
W. Frankfort, Ill.	WFRX	1300
W. Hartford, Conn.	WEXT	1550
West Jefferson, N.C.	WKSK	1600
W. Liberty, Ky.	WLKS	1450
West Looma, Cal.	KGRB	900
W. Memphis, Ark.	KSUD	730
W. Monroe, La.	KUZN	1310
W. Palm Beach, Fla.	WEAT	850
	WJND	1230
	WIRK	1290
West Plains, Mo.	KWPM	1450
West Point, Ga.	WBMK	1310
W. Point, Ga.-Lanett, Ala.	WRLD	1490
West Point, Miss.	WROB	1450
Westport, Conn.	WMMM	1260
W. Springfield, Mass.	WTXL	1490
W. Yarmouth, Mass.	WOCB	1240
Westerly, R.I.	WERI	1230
Westfield, Mass.	WDEW	1570
Westminster, Md.	WTTR	1470
Weston, W.Va.	WHAW	980
W. Warwick, R.I.	WWRI	1450
Westwego, La.	KABE	1540
Wetumpka, Ala.	WETU	1250
Wewoka-Seminole, Okla.	KWSH	1260
Wharton, Tex.	KANI	1500
Wheatland, Wyo.	KYCN	1340
Wheaton, Md.	WDON	1540
Wheeling, W.Va.	WHLL	1600
	WBZE	1470
	WKWK	1400
	WWVA	1170
White Castle, La.	KEVL	1590
Whitehall, Mich.	WLRC	1490
White Plains, N.Y.	WFAS	1230
White River Junc., Vt.	WVTR	910
Whitesburg, Ky.	WTCW	920
Whiteville, N.C.	WENC	1220
Wichita, Kans.	KAKE	1240
	KLEO	1480
	KFDI	1070
	KFH	1330
	KSIR	900
	KWBB	1410
Wichita Falls, Tex.	KNIN	990
	KTRN	1290
	KWFT	620
Wickenburg, Ariz.	KAKA	1250
Wickford, R.I.	WKFD	1370
Wildwood, N.J.	WCMC	1230
Wilkes-Barre, Pa.	WBAX	1240
	WBRE	1340
	WILK	980
Williamsburg, Ky.	WEZJ	1440
Williamsburg, Va.	WBCI	740
Williamson, W.Va.	WBTH	1400
Williamsport, Pa.	WLYC	1050
	WRAK	1400
	WWPA	1340
Williamston, N.C.	WIAM	900
Willimantic, Conn.	WILI	1400
Williston, N.D.	KEYZ	1360
Willmar, Minn.	KWLM	1340
Willoughby, Ohio	WELW	1330
Willow Springs, Mo.	KUKU	1330
Willows, Calif.	KIQS	1560
Wilmington, Del.	WAMS	1380
	WDEL	1150
	WILM	1450
	WTUX	1290
Wilmington, N.C.	WMFD	630
	WHSL	1490
	WKLM	980
	WGNI	1240
Wilmington, O.	WMWM	1090
Wilson, N.C.	WGTM	590
	WLLY	1350
	WVOT	1420
Winchester, Ky.	WWKY	1380
Winchester, Tenn.	WCDT	1340
Winchester, Va.	WINC	1400
	WHPL	610
Windber, Pa.	WWBR	1350
Windemere, Fla.	WXIV	1480
Winder, Ga.	WIMO	1300
Windom, Minn.	KDOM	1580
Windsor, Conn.	WSOR	1480
Winfield, Ala.	WEZQ	1300
Winfield, Kan.	KNIC	1550
Winnemucca, Nev.	KWNA	1400
Winnfield, La.	KVCL	1270
Winner, S.Dak.	KWYR	1260
Winnsboro, La.	KMAR	1570
Winnsboro, S.C.	WCKM	1250
Winona, Minn.	KWNO	1230
	KAGE	1380
Winona, Miss.	WONA	1570
Winslow, Ariz.	KVNC	1010
	KINO	1230
Winston-Salem, N.C.	WAAA	980
	WAIR	1340
	WPEQ	1550
	WSJS	600
	WTOB	1380
	WKBX	1500
Winter Garden, Fla.	WOKB	1600
Winter Haven, Fla.	WSIR	1490
	WINT	1360
Winter Park, Fla.	WABR	1440
Wisconsin Rapids, Wis.	WFHR	1320
	WRNE	1220
Wolf Pt., Mont.	KVCK	1450
Woodburn, Ore.	KWRC	940
Woodbury, Tenn.	WBFJ	1540
Wood River, Ill.	WRTH	590
Woodside, N.Y.	WWRL	1600
Woodward, Okla.	KSIW	1450
Woonsocket, R.I.	WNRI	1380
	WWON	1240
Wooster, Ohio	WWST	980
Worcester, Mass.	WAAB	1440
	WNEB	1230
	WORC	1310
	WTAG	580
Worland, Wyo.	KWOR	1340
Worthington, Minn.	KWOA	730
Worthington, Ohio	WRFD	880
Wynne, Ark.	KWYN	1400
Wyoming, Mich.	WERX	1530
Wytheville, Va.	WYVE	1280
Yakima, Wash.	KIT	1280
	KIMA	1460
	KBBO	1390
	KQOT	930
	KUTI	980
	KYAK	1390
Yankton, S.D.	KYNT	1450
	WNAX	570
Yauco, P.R.	WKFE	1550
Yazoo City, Miss.	WAZF	1230
York, Nebr.	KAWL	1370
York, Pa.	WNOW	1250
	WORK	1350
	WSBA	910
York, S.C.	WYCL	1580
Youngstown, Ohio.	WBBW	1240
	WFMJ	1390
	WKBN	570
Ypsilanti, Mich.	WYSI	1480
	WYNZ	1520
Yreka, Calif.	KSYC	1490
Yuba City, Calif.	KUBA	1600
	KAGR	1450
Yuma, Ariz.	KBLU	1320
	KVOY	1400
	KYUM	560
Zanesville, Ohio	WHIZ	1240
Zarephath, N.J.	WAWZ	1380
Zebulon-Wendell, N.C.	WETC	540
Zephyr Hills, Fla.	WZRH	1400
Zion, Ill.	WZBN	1500

U. S. FM Stations by States

Location	C.L.	Mc.
ALABAMA		
Albertville	WAVU-FM	105.1
Alexander City	WRFS-FM	106.1
Andalusia	WNBX	98.1
Anniston	WHMA-FM	100.5
Athens	WJOF	104.3
Bay Minette	WBCA-FM	105.5
Birmingham	WAPI-FM	98.5
	WBRC-FM	106.9
	WCRT	96.5
	WSFM	93.7
Clanton	WKLF-FM	97.7
Cullman	WFMH-FM	101.1
Decatur	WHOS-FM	102.1
	WRSA	96.9
Dothan	WOOF-FM	99.7
Fairhope	WABF-FM	92.1
Homewood	WJLN	104.7
Huntsville	WAHR	99.1
	WNDA	92.9
Jackson	WHOD-FM	104.9
Mobile	WKRG-FM	99.9
Monroeville	WMFC-FM	99.3
	WLPR	96.1
Montgomery	WFMI	98.9
	WAJM	103.3
	WHHY-FM	101.9
Muscle Shoals	WLAY-FM	105.5
Selma	WHBB-FM	100.1
	WHPD	100.1
Sylacauga	WMLS-FM	98.3
Tuscumbia	WVNA	100.3
Tuscaloosa	WTBO-FM	95.7
	WUOA	*91.7
ALASKA		
Anchorage	KNIK	105.5
	KBYR-FM	102.1
College	KUAC	104.9
ARIZONA		
Globe	KWJB-FM	100.3
Mesa	KBUZ-FM	104.7
Phoenix	KRFM	95.5
	KFCA	*88.5
	KITH	101.3
	KOOL-FM	94.5
	KNIX-FM	102.5
	KOY-FM	92.5
	KMEO	96.9
	KTAR-FM	98.7
	KYEW	93.3

WHITE'S RADIO LOG

Location	C.L.	Mc.
	KHEP-FM	101.5
Show Low	KVWM	93.5
Tempe	KUPD-FM	97.9
Tucson	KFMM	99.5
	KCEE-FM	96.1
	KSOM	92.9
	KVOA-FM	93.7

ARKANSAS

Blytheville	KLCN-FM	96.1
Dardanelle	KCAB-FM	102.5
El Dorado	KRIL	99.5
	KELD-FM	103.1
Fayetteville	KFAY-FM	92.1
Ft. Smith	KFPW-FM	94.9
	KMAG	99.1
	KTCS-FM	99.9
Harrison	KHOZ-FM	102.9
Hot Springs	KBHS-FM	96.7
Jonesboro	KBTM-FM	101.9
	KASU	91.9
Little Rock	KARK	103.7
Mammoth Springs	KAMS	103.9
Osceola	KOSE-FM	98.1
Pine Bluff	KOTN-FM	92.3
Siloam Springs	KUOA-FM	105.7

CALIFORNIA

Alameda	KJAZ	92.7
Anaheim	KEZR-FM	95.9
Angwin	KANG	88.1
Apple Valley	KAVR-FM	102.5
Arcata	KTOO	*90.5
Atherton	KPEN	101.3
Auburn	KAFI	101.1
Avalon	KBIG	104.3
Bakersfield	KERN-FM	94.1
	KGEE-FM	97.5
	KIFM	98.5
Berkeley	KPFA	94.1
	KPFB	*89.3
	KPAT-FM	102.9
Bijou	KHUR	99.9
Carlsbad	KARL-FM	95.9
Carmel	KRML-FM	101.7
Claremont	KSPC	*88.7
Coachella	KCHQ-FM	93.7
El Cajon	KECR	93.3
Escondido	KOWN-FM	92.1
Fremont	KFMR	104.9
Fresno	KARM-FM	101.9
	KCIB-FM	94.5
	KFRE-FM	93.7
	KMJ-FM	97.9
	KXQR	102.7
Garden Grove	KGGK	94.3
Glendale	KFMU	97.1
	KUTE	101.9
Hayward	KTUX	101.7
Hemet	KHSJ-FM	105.5
Inglewood	KTYM-FM	103.9
La Canada	KUNF	*88.9
LaSierra	KSDA	*89.7
Lodi	KCVR-FM	97.7
Lompoc	KLOM-FM	92.7
Long Beach	KJLH	102.3
	KLON	*88.1
	KNOB	97.9
Los Altos	KPGM	97.7
	KFJC	88.7
Los Angeles	KABC-FM	95.5
	KBBI	107.5
	KBCA	105.1
	KBMS	105.9
	KCBH	98.7
	KFAC-FM	92.3
	KFOX-FM	100.3
	KGLA	*103.5
	KHJ	101.1
	KMLA	100.3
	KNX-FM	93.1
	KPFK	*90.7
	KPOL-FM	93.9
	KRHM	94.7
	KRKD-FM	96.3
	KLAC-FM	102.7
	KUSC	*91.5
	KXLU	*89.1
	KHOF	99.5
Los Angeles-Avalon		
	KBIG-FM	104.3
Los Banos	KLBS-FM	95.9
Los Gatos	KLGS	95.3
Marysville	KRFD	99.9
Merced	KWIP-FM	101.5
Modesto	KBEE-FM	103.3
	KTRB-FM	104.1
Monterey	KHFR	96.9
Newport Beach	KOCM	103.1
Northridge	KEDC-FM	88.5
Oakland	KAFE	98.1
Oceanside	KUDE	102.1
Ontario	KOYA	93.5
Oxnard	KPMJ	104.7
Pasadena	KPCS	89.3
	KPPC-FM	106.7
Palm Springs	KDES-FM	104.7
Redding	KCER	92.9
Redondo Beach	KKOP	93.5
Redlands	KCAL-FM	96.7
Ridgecrest	KLOA-FM	105.5
Riverside	KBBL	99.1
	KACE-FM	92.7
	KDUO	97.5
Sacramento	KCRA-FM	96.1
	KERS	*88.9
	KFBK-FM	96.9
	KJML	106.5
	KEBR	100.5
	KHIQ	105.1
	KJML	95.3
	KRAK-FM	92.9
	KSFM	96.9
	KXRQ	98.5
	KXOA-FM	107.9
Salinas	KSBW-FM	102.5
	KRSA-FM	100.7
	KERR	103.9
San Bernardine	KVCR	*91.9
	KFMW	99.9
	KEBS	*89.5
San Diego	KOGO-FM	94.1
	KFMB-FM	100.7
	KFMX	96.5
	KGB-FM	101.5
	KITT	105.3
	KJLM	98.1
	KLRO	94.9
	KPRI	106.5
	KSDS	*88.3
	KBBW	102.9
	KSDO-FM	103.7
	KSEA	97.3
San Fernando	KVFM	94.3
San Francisco	KALW	*91.7
	KBRG	105.3
	KCBS-FM	98.9
	KOFC	102.1
	KEAR	97.3
	KFOG	104.5
	KFRC-FM	108.1
	KGO-FM	103.7
	KNBR-FM	99.7
	KMPX	106.9
	KOIT	93.3
	KPEN	101.3
	KRON-FM	96.5
	KSFR	94.9
	KXKX	88.5
	KCMA	*90.3
	KBRG	105.3
	KABL-FM	98.1
	KKHI-FM	95.7
San Jose	KSJO-FM	92.3
	KRPM	98.5
	KSJS	90.7
	KPLX	106.5
	KEEN-FM	100.3
San Luis Obispo	KATY-FM	96.1
	KVEC-FM	93.3
San Mateo	KCSM	*90.9
	KUFY	107.7
San Rafael	KTIM	100.9
Santa Ana	KWIZ-FM	96.7
	KYMS	106.3
Santa Barbara	KCSB-FM	91.1
	KDB-FM	93.7
	KMUZ	103.3
	KTMS	97.5
Santa Clara	KSCU	*90.1
	KREP	105.7
Santa Cruz	KSCO-FM	99.1
Santa Maria	KXFM	99.1
	KSMA-FM	102.5
Santa Monica	KCRW	*89.9
	KSRF	103.1
Santa Rosa	KEFM	100.1
Sierra Madre	KMAX	107.1
Stanford	KZSU	*90.1
Stockton	KUOP	*91.3
	KSTN-FM	107.3
	KWG-FM	105.7
Thousand Oaks	KNJO	92.7
Tulare	KDFR	106.7
	KGEN-FM	94.9
Turlock	KHOM	92.9
Twenty-Nine Palms		
	KDHI-FM	95.7
Ukiah	KUKI-FM	93.5
Ventura-Oxnard	KVEN-FM	100.7
Visalia	KONG-FM	92.9
Walnut Creek	KDFM	92.1
West Covina	KSGV	98.3
Woodland	KATT	95.3

COLORADO

Boulder	KRNW	97.3
Colorado Springs	KRCC	*91.3
	KKFM	96.5
	KSHS	*90.5
	KVOR-FM	92.9
	KLST	94.3
	KRYT-FM	101.9
Cortez	KZFM	94.1
Denver	KFML-FM	98.5
	KLIR-FM	100.3
	KLZ-FM	106.7
	KMET	99.5
	KOA-FM	103.5
	KOCI-FM	101.1
	KTGM	105.1
	KIMN-FM	95.5
	KBPI	105.9
Ft. Collins	KCSU-FM	*90.9
	KFMF	98.9
Grand Junction	KREX-FM	92.3
Lakewood	KLAK-FM	107.7
Longmount	KLMO-FM	104.3
Manitou Springs	KCMS-FM	102.7

CONNECTICUT

Bridgeport	WJZZ	99.9
	WPKN	88.1
Brookfield	WGHF	95.1
Danbury	WLAD-FM	98.3
Darien	WDRM	95.9
Farifield	WSHU	*91.1
Hamden	WDEE	101.3
Hartford	WHCN	105.9
	WDRC-FM	102.9
	WCCC-FM	104.9
	WLAE	93.7
	WRTC-FM	*89.3
	WTIC-FM	96.5
Meriden	WBMI	95.7
Middletown	WESU	88.1
New Haven	WNHC-FM	99.1
	WYBG-FM	94.3
Norwalk	WDRN	95.9
Stamford	WSTC-FM	96.7
Storrs	WHUS	*90.5
Waterbury	WATR-FM	92.5
	WWCO-FM	104.1
Westport	WMMM	107.9

DELAWARE

Dover	WDOV-FM	94.7
Wilmington	WDEL-FM	93.7
	WJBR	99.5

D. C.

Washington	WASH	97.1
	WAMU-FM	*88.5
	WFAN	100.3
	WGAY	99.5
	WGMS-FM	103.5
	WGTB	*90.1
	WMAL-FM	107.3
	WOL-FM	98.7
	WRC-FM	93.9
	WTOP-FM	96.3
	WWDC-FM	101.1

FLORIDA

Atlantic Beach	WKTZ-FM	96.1
Belle Glade	WSWN-FM	93.5
Boca Raton	WWOG	103.3
Bradenton	WBRO-FM	103.3
Clear Water	WTAN-FM	95.7
Cocoa	WEZY-FM	99.3
Cocoa Beach	WXBR	101.1
	WRKT-FM	104.3
Coral Gables	WVCG-FM	105.1
Crestview	WAAZ-FM	104.9
Daytona Beach	WNDB-FM	94.5
	WMFJ-FM	101.9
De Funiak Springs		
	WZEP-FM	103.1
Fort Lauderdale	WWIL-FM	103.5
	WFLM	105.9
	WFTL-FM	106.7
	WMJR	100.7
Ft. Meyers	WINK-FM	96.9
	WMYR-FM	101.9
Ft. Pierce	WARN-FM	98.7
Ft. Walton Beach		
	WFTW-FM	99.3
Gainesville	WRUF-FM	*104.1
Jacksonville	WJAX-FM	95.1
	WQIK-FM	99.1
	WEBL	92.5
	WKTZ-FM	96.1
Key West	WKIZ-FM	92.5
Lakeland	WVFM	94.1
Maitland	WTLN-FM	95.3
Marianna	WTOT-FM	100.9
Melbourne	WMMB-FM	102.3
Miami	WKAT-FM	93.3
	WGBS	96.3
	WIOD-FM	97.3
	WTHS	*91.7
	WEDR	99.1
	WWPB	101.5
Miami Beach	WKAT-FM	93.1
	WAEZ-FM	94.9
	WMBM-FM	93.9
Milton	WXBM-FM	102.3
Mount Dora	WFAC	107.7
Naples	WNFM	94.5
Ocala	WMOP-FM	93.7
Okeechobee	WLMC	103.1
Orlando	WDBO-FM	92.3
	WHOO-FM	96.5
	WKIS-FM	100.3
Palm Beach	WWOS-FM	97.9
Panama City	WMAI-FM	107.9
	WDLP-FM	92.5
Pensacola	WPEX-FM	94.1
	WCOA-FM	100.7
St. Augustine	WFOY-FM	97.7
St. Petersburg	WGNB	101.5
	WTCX	99.5
	WPIN-FN	107.3
Sarasota	WYAK	102.5
	WSPB-FM	106.3
Sebring	WSEB	105.5
Stuart	WMGF	92.7
Tallahassee	WFSU-FM	*91.5
	WBGM	98.9
Tampa	WDAE-FM	100.7
	WEMI	94.9
	WFLA-FM	93.3
	WPKM	104.7
	WUSF	*89.7
West Palm Beach	WPBF	107.9
Winter Haven	WINT-FM	97.5
Winter Park	WPRK	*91.5
	WLOQ	103.1

GEORGIA

Albany	WGPC-FM	104.5
	WJIZ	96.3
Americus	WDEC-FM	94.3
Athens	WGAU-FM	102.5
	WDOL-FM	104.7
Atlanta	WABE	*90.1
	WAVO-FM	94.9
	WPLO-FM	103.3
	WGKA-FM	92.9
	WSB-FM	98.5
	WLTA-FM	99.7
Augusta	WAUG-FM	105.7
	WBBQ-FM	104.3
Brunswick	WGIG-FM	100.7
Canton	WCHK-FM	105.5
Carrollton	WLBB-FM	102.3
Columbus	WRBL-FM	102.9
	WGBA-FM	107.3
Cornelia	WCON-FM	99.3
Dublin	WXLI-FM	92.7
Gainesville	WDUN-FM	103.9
	WLBA-FM	97.1
Griffin	WKEU-FM	99.9
Lagrange	WLAG-FM	104.1
Macon	WMAZ-FM	99.1
Manchester	WFDR-FM	99.3
Marietta	WBIE-FM	101.5
	WKLS	96.1
Moultrie	WMTM-FM	93.9
Newnan	WCOH-FM	96.7
Rome	WRGA-FM	102.3
	WROM-FM	97.7
Rossville	WRIP-FM	105.5
Savannah	WTOC-FM	94.1
	WEAS-FM	93.1
Smyrna	WKXI	94.1
Swainsboro	WJAT-FM	101.7
Toccoa	WLET-FM	106.1
Valdosta	WGOV-FM	92.9
West Point	WBMK-FM	100.9

HAWAII

Honolulu	KAIM-FM	95.5
	KHVH-FM	93.9
	KPOI-FM	97.5
	KVOK	*88.1
	KUOH	*90.5

IDAHO

Boise	KBOI-FM	97.9
Idaho Falls	KID-FM	96.1
Lewiston	KOZE-FM	96.7
Moscow	KUIO	*91.7
Pocatello	KBGL	*88.7

ILLINOIS

Alton	WOKZ-FM	100.3
Anna	WRAJ-FM	92.7
Arlington Heights	WNWC	92.7
Aurora	WKKD-FM	93.9
	WMRO-FM	107.9
Bloomington	WJBC-FM	101.9
Carbondale	WSIU	*91.9
Carmi	WROY-FM	97.3
Centralia	WCNT-FM	93.3
Champaign	WDWS-FM	97.5
	WLRW-FM	94.5
Charleston	WEIC-FM	92.1
Chicago	WBBM-FM	96.3
	WBEZ	*91.5
	WCLM	101.9
	WLS-FM	94.7
	WDHF	95.5
	WEBH	93.9
	WEFM	99.5
	WSDM	97.9
	WFMF	100.3
	WNUS-FM	107.5
	WFMT	98.7
	WKFM	103.5

Location	C.L.	Mc.
	WMAQ-FM	101.1
	WMBI-FM	90.1
	WNIB	97.1
	WXRT	93.1
	WJJD-FM	104.3
Columbia	WCBW	104.9
Crete	WTAS	102.3
Decatur	WSOY-FM	102.9
DeKalb	WNIC	*89.7
	WLBK-FM	92.5
Dixon	WIXN-FM	101.7
E. St. Louis	WBBR	101.1
Effingham	WCRA-FM	95.7
	WELG	103.9
	WRMN-FM	94.3
Elgin	WEPS	*88.1
	WELG	103.9
	WRMN-FM	94.3
Elmhurst	WRSE-FM	*88.7
Elmwood Park	WXFM	105.9
Evanston	WEAW	105.1
	WNUR	*88.7
Fairfield	WFIW-FM	104.9
Flossmoor	WHFH	*88.5
Freeport	WELL-FM	98.5
Galesburg	WYKC-FM	*88.1
Glen Ellyn	WELF	107.1
Greenville	WGRN	*89.3
Harrisburg	WEBQ-FM	99.9
Highland Park	WEEF-FM	103.1
Jacksonville	WLDS-FM	100.5
	WAJP	93.5
Joliet	WJOL-FM	96.7
Kankakee	WKAK-FM	99.9
Lansing	WLNR-FM	106.3
LaSalle	WLPO-FM	99.3
Lawrenceville	WAKO-FM	103.1
Litchfield	WSMI-FM	106.1
Loves Park	WLUV-FM	96.7
Macomb	WWKS	*91.3
Madison	WGNO	106.5
Mattoon	WLBH-FM	96.9
Mendota	WGLC-FM	100.9
Morris	WRMI-FM	104.7
Mt. Carmel	WSAB	94.9
	WVMC-FM	101.1
Mt. Vernon	WMIX-FM	94.1
Oak Park	WOPA-FM	102.7
Olney	WSEI-FM	92.9
Ottawa	WOLI	98.3
Paris	WPRS-FM	98.3
Park Forest	WRHS	*88.1
Park Ridge	WMTH	*88.5
Pekin	WSIV-FM	95.3
Peoria	WMBD-FM	93.3
Quincy	WGEM-FM	105.1
	WTAD-FM	99.5
Robinson	WTAY-FM	100.7
Rockford	WROK-FM	97.5
Rock Island	WHBF-FM	98.9
	WVIK	90.9
Skokie	WRSV	98.3
South Beloit	WBEL-FM	103.1
Springfield	WTAX-FM	103.7
	WFMB	104.5
	WVEM	101.9
Streator	WIZZ-FM	97.7
Taylorville	WGGM	95.0
Urbana	WILL-FM	*90.9
Waukegan	WEFA	102.3
Wheaton	WETN-FM	*88.1
Winnetka	WNTH	*88.1
Woodstock	WREK	105.5

INDIANA

Anderson	WAFM	97.9
Bloomington	WFIU	*103.7
	WTTV-FM	92.3
Bluffton	WCRD	100.1
Columbus	WCSI-FM	98.3
Connersville	WCNB-FM	100.3
Crawfordsville	WNDY	106.3
Elkhart	WCMR-FM	104.7
	WTRC-FM	100.7
	WXAX	104.7
Elwood	WBMP	101.7
Evansville	WIKY-FM	104.1
	WEVC	*91.5
	WPSR	90.7
	WVHI	105.3
Fort Wayne	WPTH	95.1
	WKJG-FM	97.3
Franklin	WFCI	*89.3
	WIFN	95.9
Frankfort	WILD-FM	99.7
Gary	WGVE	*88.1
Goshen	WGCS	91.1
Greencastle	WGRE	*91.7
Greenfield	WSMJ	99.5
Greensburg	WTRE	107.3
Hammond	WYCA	92.3
Hartford City	WHCI	*91.9
	WWHC	104.9
Huntington	WVSH	*91.9
	WHLT-FM	103.1
Indianapolis	WAJC	*104.5
	WBDG	90.9
	WICR	*88.7
	WISH-FM	107.9
	WAIV	105.7
	WFBM-FM	94.7
	WFMS	95.5
	WGEE-FM	103.3
	WIAN	*90.1
	WIBC-FM	93.1
Jasper	WITZ-FM	104.7
Kendallville, Ind.		
	WAWK-FM	93.3
Kokomo	WFKO	100.5
	WKMO	93.5
Lafayette	WASK-FM	105.3
	WAZY-FM	96.7
La Porte	WLOI-FM	96.7
Logansport	WSAL-FM	102.3
Madison	WORX-FM	96.7
Marion	WMRI-FM	106.9
	WBST	*90.7
Muncie	WMUN	104.1
	WWHI	*91.5
New Albany	WNAS	*88.1
New Castle	WCTW-FM	102.5
	WYSN	*91.1
North Vernon	WOCH-FM	106.1
Peru	WARU-FM	98.3
Plainfield	WJMK	98.3
Princeton	WRAY-FM	98.1
Richmond	WGLM	96.1
	WECI	*91.5
	WKBV-FM	101.3
Seymour	WJOD	93.7
Shelbyville	WSVL-FM	97.1
South Bend	WETL	*91.9
	WHME	103.1
	WNDU-FM	92.9
	WPFR	102.7
	WJVA-FM	103.9
Terre Haute	WTHI-FM	99.9
	WBOW-FM	107.5
	WPFR	102.7
	WVTS	100.7
	WISU	*89.7
Wabash	WSKS	*91.3
	WKUZ	95.9
Warsaw	WRSW-FM	107.3
Washington	WFML	106.5
West Lafayette	WBAA-FM	99.1
Vincennes	WAOV-FM	96.7

IOWA

Ames	WOI-FM	*90.1
Boone	KFGQ	*99.3
Cedar Falls	KTCF	*88.1
Cedar Rapids	KHAK-FM	98.1
	WMT-FM	104.5
Clarion	KRIT	96.9
Clinton	KROS-FM	96.1
Davenport	WOC-FM	103.7
Des Moines	KDPS	*88.1
	KDMI-FM	97.3
	KSD	98.5
	WHO-FM	100.3
	KFMG	94.9
	KWDM	93.3
Dubuque	WDBQ-FM	105.3
	KDTH-FM	92.9
Ft. Dodge	KWMT-FM	94.5
Iowa City	WMT-FM	*91.7
	KXIC-FM	100.9
Iowa Falls	KIFG-FM	95.3
Mt. Vernon	KRNL-FM	*89.7
Muscatine	KWPC-FM	99.7
Newton	KUWS-FM	95.9
Oskaloosa	KBOE-FM	106.3
Sioux City	KDVR	97.9
	KTFC	103.3
Spencer	KICD-FM	107.7
Storm Lake	KAYL-FM	101.5
Waterloo	KNWS-FM	101.9
Waverly	KWAR	89.1

KANSAS

Baldwin	KNBU	*88.9
Emporia	KSTE	*88.7
Garden City	KNCO-FM	97.3
Junction City	KJCK-FM	94.5
Kansas City	KCFC	98.1
	KCKN-FM	94.1
Larned	KANS-FM	96.7
Lawrence	KANU	*91.5
	KLWN-FM	105.9
Leavenworth	KCLO-FM	98.9
Manhattan	KSDB-FM	*88.1
Newton	KJRG-FM	92.3
Ottawa	KTJO-FM	*88.1
	KOFO-FM	95.7
Parsons	KPPS-FM	*91.1
Pratt	KWNS-FM	93.1
Russell	KRSL-FM	95.9
Salina	KAFM	99.9
Scott City	KFLA-FM	94.3
Topeka	KTOP	100.3
	WIBW-FM	97.3
Wichita	KFH-FM	100.3
	KQTY	101.3
	KMUW	*89.1
	KCBM-FM	107.3

KENTUCKY

Albany	WANY-FM	106.3
Ashland	WCMI-FM	93.7
Beattyville	WLJC	102.3
Benton	WCBL-FM	102.3
Bowling Green	WLBJ-FM	96.7
Campbellsville	WTCO-FM	103.9
Central City	WNES-FM	101.9
Erlanger	WKKY-FM	100.9
Ft. Knox	WSAC-FM	105.5
Fulton	WFUL-FM	104.9
Georgetown	WRVG	*90.1
Glasgow	WGGC	95.1
Greenville	WKYF-FM	101.1
Hazard	WKIC-FM	101.1
Henderson	WSON-FM	99.5
Hopkinsville	WHOP-FM	98.7
	WKOF	100.3
Lexington	WBKY	*91.3
	WLAP-FM	94.5
Louisville	WFPK	*91.9
	WFPL	*89.3
	WKLO-FM	99.7
	WLRS	102.3
	WXEL	103.9
Madisonville	WFMW-FM	93.9
	WNGO-FM	94.7
Manfordville	WLOC-FM	102.3
Maysville	WFTM-FM	95.9
Monticello	WFLW-FM	101.7
Morehead	WMOR-FM	92.1
	WMKY-FM	91.1
Owensboro	WOMI-FM	92.5
	WVJS-FM	96.1
Paducah	WPAD-FM	96.9
	WKYX-FM	93.3
Paintsville	WSIP-FM	100.1
Pikeville	WPKE-FM	92.1
Prestonburg	WDOC-FM	95.5
Russellville	WRUS-FM	92.1
St. Mathews	WSTM	103.1
Somerset	WSFC-FM	96.7
Whitesburg	WTCW-FM	104.9

LOUISIANA

Alexandria	KALB-FM	96.9
Baton Rouge	WJBO-FM	102.5
DeRidder	KDLA-FM	101.7
Hammond	WTGI	107.1
Houma	KCIL-FM	107.1
Jennings	KJEF-FM	92.7
Lafayette	KRVS-FM	*88.3
	KPEL-FM	99.9
	KSMB	94.5
Lake Charles	KPLC-FM	99.5
La Place	WCKW	92.3
Monroe	KMLB-FM	104.1
	KNOE-FM	101.9
	KREB	106.1
Mt. Vernon	KRNL-FM	105.3
Natchitoches	KNOC-FM	97.7
New Orleans	WBEH	89.3
	WDSU-FM	105.3
	WNNR-FM	97.1
	WWOM-FM	98.5
	WMMT	95.7
Opelousas	KSLO-FM	107.1
Shreveport	KRMD-FM	101.1
	KBCL-FM	96.5
	KWKH-FM	94.5
Thibodaux	KTIB-FM	106.3

MAINE

Augusta	WFAU-FM	101.3
Bangor	WABI-FM	97.1
Brunswick	WBOR	*91.1
	WCME-FM	98.9
Caribou	WFST-FM	97.7
Ellsworth	WDEA-FM	95.7
Lewiston	WCOU-FM	93.9
	WLAM-FM	107.5
	WRJR	91.5
Orono	WMEB-FM	91.9
Poland Springs	WMTW-FM	94.9
Portland	WLOB-FM	97.9

MARYLAND

Annapolis	WNAV-FM	99.1
	WANN-FM	107.9
	WXTC	107.9
	WAQE-FM	101.9
Baltimore	WBJC	91.5
	WCAO-FM	102.7
	WCBM-FM	106.5
	WFMM-FM	93.1
	WRBS	95.1
	WSID	92.3
	WBAL-FM	97.9
	WITH-FM	104.3
	WSID-FM	92.3
Bethesda	WJMD	94.7
	WHFS	102.3
Bradbury Heights	WPGC	95.5
Catonsville, Md.	WCBC	105.7
Cumberland	WCUM-FM	102.9
Frederick	WFMD-FM	99.9
Frostburg	WFRB-FM	105.3
Glen Burnie	WISZ-FM	95.9
Hagerstown	WJEJ-FM	104.7
	WARK-FM	106.9
Halfway	WHAG-FM	96.7
Havre de Grace	WASA-FM	103.7
Oakland	WBUZ	95.5
Salisbury	WBOC-FM	94.3
Tacoma Park	WGTS-FM	*91.9
Waldorf	WSMD-FM	104.1
Westminster	WTTR-FM	100.7

MASSACHUSETTS

Amherst	WAMF	*88.1
	WFCR	*88.5
	WMUA	*91.1
Andover	WPAA	91.7
Boston	WBUR	*90.9
	WBCN	104.1
	WBZ-FM	106.7
	WCOP-FM	100.7
	WEEI-FM	103.3
	WERS	*88.9
	WHDH-FM	94.5
	WRKO-FM	98.5
	WXHR-FM	96.9
Brockton	WBET-FM	97.7
Brookline	WBOS-FM	92.9
Cambridge	WGBH-FM	*89.7
	WHRB-FM	95.3
	WTBS	88.1
Fitchburg	WBNE-FM	104.5
Framingham	WKOX-FM	105.7
Gloucester	WVCA-FM	104.9
Greenfield	WHAI-FM	98.3
Haverhill	WHAV-FM	92.5
Lawrence	WCCM-FM	93.7
Lowell	WLLH-FM	99.5
Lynn	WLYM-FM	101.7
Medford	WHIL-FM	107.9
New Bedford	WBSM-FM	97.3
	WNBH-FM	98.1
N. Adams	WMNB-FM	100.1
N. Attleboro	WRLM	93.3
Northampton	WHMP-FM	99.3
Pittsfield	WQRB-FM	105.5
Plymouth	WPLM-FM	99.1
S. Hadley	WMHC	*88.5
Springfield	WHYN-FM	93.1
	WSCB	*88.9
	WMAS-FM	94.7
Waltham	WCRB-FM	102.5
W. Yarmouth	WOCB-FM	94.9
Williamstown	WCFM	*91.3
Winchester	WHSR-FM	*91.9
Worcester	WAAB	107.3
	WSRS	96.1

MICHIGAN

Adrian	WLEN	103.9
Alma	WFYC-FM	104.9
Alpena	WHSB	107.7
Battle Creek	WKFR-FM	103.3
Big Rapids	WBRN-FM	100.9
Ann Arbor	WUDM	*91.7
Bay City	WBCM-FM	96.1
	WNEM-FM	102.5
Benton Hrbr.	WHFB-FM	99.9
Birmingham	WHFI	94.7
Charlotte	WCER-FM	92.7
Coldwater	WTVB-FM	98.3
Dearborn	WKNR-FM	100.3
Detroit	WDET-FM	*101.9
	WBFG	98.7
	WCHD	105.9
	WDTM	106.7
	WABX	99.5
	WDTR	*90.9
	WGPM	107.5
	WJBK-FM	93.1
	WMUZ	103.5
	WGPR	97.9
	WJR-FM	96.3
	WOMC-FM	104.3
	WQRS-FM	105.1
	WRMK-FM	98.7
	WWJ-FM	97.1
	WXYZ-FM	101.1
	WCAR-FM	92.3
E. Lansing	WKAR-FM	*90.5
	WSWM	99.1
	WVIC-FM	95.7
Flint	WFBE	*95.1
	WGMZ-FM	107.9
	WMRP-FM	105.5
Grand Rapids	WFUR-FM	102.9
	WJEF-FM	93.7
	WLAV-FM	96.9
	WYON	101.3
	WODD-FM	105.7 (s)
	WVGA-FM	104.1
	WXTD-FM	97.9
	WKLW-FM	95.7
Greenville, Mich.		
	WPLB-FM	107.3
Highland Pk.	WHPR	*88.1
Holland	WJBL-FM	94.5
	WHTC-FM	96.1
Houghton Lake	WJGS	98.5
Interlochen	WGYA	*105.1
	WIAA	89.7
Jackson	WIBM-FM	94.1
	WKHM-FM	106.1
Kalamazoo	WMUK	102.1
	WKMI-FM	106.5
Lansing	WJIM-FM	97.5
	WILS-FM	*89.7
	WYFE	100.7
Marquette	WNMR	90.1
	WDMJ-FM	95.7
Midland	WQDC-FM	99.7
Mount Clemens	WBRB-FM	102.7
Mount Pleasant	WCMU	*90.1

WHITE'S RADIO LOG

Location	C.L.	Mc.
Muskegon	WFFM	106.9
Oak Park	WLDM	95.5
Owasso	WOAP-FM	103.9
Petoskey	WJML	98.9
	WMBN-FM	96.7
Port Huron	WHLS-FM	107.1
Royal Oak	WOAK	*89.3
	WOMC	104.3
Saginaw	WSAM-FM	98.1
Spring Arbor	WSAE	*89.3
Sturgis	WSTR-FM	108.1
Traverse City	WLOR-FM	101.9
	WTCM-FM	103.7
Warren	WPHS	91.5
Ypsilanti	WEMU	*88.1

MINNESOTA

Brainerd	KLIZ-FM	95.9
Golden Valley	KQRS-FM	92.5
Mankato	KMSO	*90.5
	KYSM-FM	103.5
Minneapolis	KTIS-FM	*88.5
	KWFM	97.1
	WLOL-FM	99.5
	WPBC-FM	101.3
	WAYL	93.7
	WCTS-FM	100.3
Red Wing	KCUE-FM	105.5
Richfield	WPBC-FM	101.3
Rochester	KROC-FM	106.9
	KNXR	97.5
St. Cloud	KFAM-FM	104.7
St. Louis Park	KRSI-FM	104.1
St. Paul	KNOF	95.3
	KSTP-FM	94.5
Willmar	KWLM-FM	105.5
Worthington	KWOA-FM	94.9

MISSISSIPPI

Forest	WQST	92.5
Greenwood	WSWG	99.1
Gulfport	WROA-FM	107.1
Hattiesburg	WHSY-FM	104.5
Jackson	WJDX-FM	102.9
	WSLI-FM	96.3
	WWHO	94.7
Kosciusko	WKOZ-FM	105.1
Laurel	WNSL-FM	100.3
Meridian	WMMI	*88.1
Moss Point	WACY-FM	104.9
Pascagoula	WPMP-FM	99.1
Poplarville	WRPM-FM	107.9
Pontotoc	WSEL-FM	96.7

MISSOURI

Buffalo	KBFL	91.3
Carrollton	KAOL-FM	101.1
Clayton	KFUO-FM	99.1
Columbia	KWWC-FM	90.5
Crestwood	KSHE	94.7
El Dorado Springs		
	KESM-FM	101.7
Houston	WBTC-FM	99.3
Joplin	WMBH-FM	96.1
	KSYN	92.5
Kansas City	KCMO-FM	94.9
	KBEY	104.8
	KTSR	*90.1
	WOAF-FM	102.1
	KCMK	93.3
	KCUR-FM	*89.3
	KMBC-FM	99.7
	KPRS-FM	103.3
	KXTR	96.5
Kennett	KBOA-FM	98.9
Osage Beach	KRMS-FM	93.5
Poplar Bluff	KWOC-FM	94.5
Rolla	KCLU-FM	94.3
	KMSM	*88.5
St. Joseph	KUSN-FM	105.1
St. Louis	KCFM	98.7
	KADI	96.5
	WAMV-FM	101.1
	WIL-FM	92.3
	KSLH	*91.5
	KSTL-FM	98.1
	KRFD	106.9
Sedalia	KSIS-FM	92.1
Springfield	KTTS-FM	94.7
	KTXR	101.5
Waynesville	KFBD	97.7
West Plains	KWPM-FM	93.9

MONTANA

Belgrade	KGVW-FM	96.7
Billings	KURL-FM	97.1
Bozeman	KBHF	93.7
Great Falls	KOPR-FM	106.3
Missoula	KUFM	*88.1

NEBRASKA

Beatrice	KWBE-FM	92.9
Columbus	KJSK-FM	101.1
Hastings	KICS-FM	93.5
Kearney-Holdrege		
	KHOL-FM	98.9
Lexington	KRUN-FM	93.1
Lincoln	KFMQ	95.3
	KWHG	102.7
Omaha	KQAL-FM	94.3
	KFAB-FM	99.9
	KGBI-FM	100.7
	KOWH-FM	94.1
	WOW-FM	92.3
	KICN	96.1
Scottsbluff	KNEW-FM	94.1

NEVADA

Las Vegas	KORK-FM	97.1
	KRGN	101.9
	KLUC-FM	98.5
	KVEG-FM	92.3
Reno	KNEV	95.5
	KUNR	88.1

NEW HAMPSHIRE

Berlin	WMOU-FM	103.7
Claremont	WTSV-FM	106.1
Durham	WUNH	*90.3
Exeter	WPEA	*88.1
Laconia	WLNH-FM	98.3
Keene	WKNE-FM	103.7
Manchester	WKBR-FM	95.7
	WGIR-FM	101.1
Mt. Washington	WMTW-FM	94.9
Nashua	WOTW-FM	106.3
Portsmouth	WHEB-FM	100.3

NEW JERSEY

Asbury Park	WJLK-FM	94.3
	WHTG-FM	105.5
Atlantic City	WFPG-FM	96.9
	WMGM	103.7
	WRNJ	95.1
Bridgeton	WSNJ-FM	107.7
Camden	WKON-FM	106.9
Dover	WDHA-FM	105.5
E. Orange	WFMU	*91.1
Eatontown	WHTG-FM	106.3
Franklin	WLVP	102.3
Franklin Lakes	WRRH	88.7
Glassboro	WGLS-FM	*89.7
Hackettstown	WNTI	*91.9
Long Branch	WRLB	107.1
Millville	WMVB-FM	97.3
Newark	WHBI	105.9
	WFME	94.7
	WVNJ-FM	100.3
	WBGO	*88.3
New Brunswk.	WCTC-FM	98.3
Paterson	WPAT-FM	93.1
Princeton	WPRB	103.3
Red Bank	WFHA-FM	106.3
South Orange	WSOU	*89.5
Trenton	WBUD-FM	101.5
	WTOA	97.5
	WTTM-FM	94.5
Wildwood	WCMC-FM	100.7
Zarephath	WAWZ-FM	99.1

NEW MEXICO

Alamogordo	KXXI	94.3
Albuquerque	KANW	*89.1
	KARA-FM	99.5
	KDEF-FM	94.1
	KRST	92.3
	KHFM	96.3
	KOAT-FM	100.3
	KOB-FM	93.3
Clovis	KTQM-FM	99.9
Hobbs	KHOB-FM	95.7
Los Alamos	KRSN-FM	98.5
Lovington	KLEA-FM	101.7
Mountain Park	KMFM	97.9
Roswell	KBIM-FM	94.9
Santa Fe	KSNM	95.5
Taos	KKIT-FM	99.3
University Park	KRWG	*91.7

NEW YORK

Albany	WAMC	*90.3
Auburn	WMBO-FM	106.9
Babylon	WTFM	103.5
	WGSM-FM	94.3
	WGU-FM	102.3
Binghamton	WNBF-FM	98.1
	WKOP-FM	99.1
Brooklyn	WNYE	*91.5
Brookville	WCWP	*88.1
Buffalo	WBEN-FM	102.5
	WDCX	99.5
	WBFO	*88.7
	WBUF	93.3
	WEBR	94.5
	WGR-FM	96.9
	WTSL-FM	103.3
	WWOL-FM	104.1
	WYSL-FM	103.3
	WOIF	96.1
Canton	WSLU	*89.7
Central Square	WCSQ	*89.3
Cherry Valley	WJIV	101.9
Clinton	WHCL-FM	88.7
Corning	WCLI-FM	106.1
Cortland	WKRT-FM	99.9
Depew	WBLK-FM	93.7
DeRuyter	WOIV	105.1
Elmira	WECW	*88.1
	WEHH-FM	94.3
	WENY-FM	92.7
Floral Park	WSHS	*90.3
Garden City	WLIR	92.7
Genese	WGSU	88.3
Hempstead	WHLI-FM	98.3
	WVHC	*88.7
Hornell	WWHG-FM	105.3
Ithaca	WHCU-FM	97.3
	WICB	*91.7
	WEIV	103.7
	WVBR-FM	93.5
Jamestown	WJTN-FM	93.3
	WKSN-FM	101.7
Kenmore	WYSL-FM	103.3
Lake Success	WTFM	103.5
Liberty	WVOS-FM	95.9
Loudonville	WVCR-FM	89.1
Middletown	WALL-FM	92.7
Mt. Kisco	WRNW	107.1
	WVIP-FM	106.3
New Rochelle	WVOX-FM	93.5
New York	WABC-FM	95.5
	WBAI	99.5
	WCBS-FM	101.1
	WEVD-FM	97.9
	WFUV	*90.7
	WHOM-FM	92.3
	WKCR-FM	*89.9
	WLIB-FM	107.5
	WNCN	104.3
	WNEW-FM	102.7
	WNBC-FM	97.1
	WNYC-FM	93.9
	WNYE	91.5
	WOR-FM	98.7
	WPIX-FM	101.9
	WQXR-FM	96.3
	WRFM	105.1
	WRVR	106.7
Niagara Falls	WHLD-FM	98.5
Norwich	WCHN-FM	93.9
Olean	WHOL-FM	95.7
Oswego	WOSE	104.9
Plattsburg	WEAV-FM	99.9
Patchogue	WALK-FM	97.5(s)
	WPAC-FM	106.1
Peekskill	WLNA-FM	100.7
Potsdam	WTSC-FM	91.1
Poughkeepsie	WKIP-FM	104.7
	WEOK-FM	101.5
Riverhead	WAPC-FM	103.9(s)
Rochester	WHFM	98.9
	WBBF-FM	92.5
	WCMF	96.5
	WIRQ	*90.9
	WROC-FM	97.9
	WVOR	100.5
Schenectady	WGFM	99.5
South Bristol	WMIV	95.1
Springville	WSPE	*88.1
Syracuse	WAER	*88.1
	WODS-FM	93.1
	WONO	107.9
	WSYR-FM	94.5
Troy	WFLY	92.3
	WRPI	*91.5
Utica	WRUN-FM	105.7
Wethersfield	WBIV	105.7
White Plains	WFAS-FM	103.9

NORTH CAROLINA

Albemarle	WABZ-FM	100.9
Asheboro	WGWR-FM	92.3
Asheville	WLOS-FM	104.3
Burlington	WBBB-FM	101.1
	WFNS-FM	93.9
Black Mountain	WMIT	106.9
Burgaw	WPGF-FM	99.9
Burlington-Graham		
	WBAG-FM	92.9
Chapel Hill	WUNC	*91.5
Charlotte	WBT-FM	107.9
	WIST-FM	95.1
	WSOC-FM	103.7
	WYFM	104.7
Clingman's Pk.	WMIT	106.9
Concord	WEGO-FM	97.9
Durham	WONC-FM	105.1
	WSRC-FM	107.1
Elkin	WIFM-FM	100.9
Fayetteville	WFNC-FM	98.1
Forest City	WBBO-FM	93.3
	WAQY-FM	105.3
Franklin	WFSC-FM	96.7
Gastonia	WGNC-FM	101.9
Goldsboro	WEQR	96.9
Greensboro	WMDE	98.7
	WQMG-FM	97.1
	WUAG	*89.9
Greenville	WWWS	*91.3
	WNCT-FM	107.7
Grifton	WITN-FM	93.3
Henderson	WHNC-FM	92.5
	WHKP-FM	102.5
Hendersonville	WHKP-FM	102.5
Hickory	WHKY-FM	102.9
	WIRC-FM	95.7
High Point	WHPE-FM	95.5
	WHPS	*89.3
	WMFR-FM	99.5
	WNOS-FM	100.3
Jacksonville	WJNC-FM	92.1
	WXQR-FM	105.5
Kannapolis	WRKB-FM	99.7
Laurinburg	WEWO-FM	96.5
Leaksville	WLOE-FM	94.5
Lexington	WBUY-FM	94.3
Lumberton	WTSB-FM	95.7
	WAGR-FM	102.3
North Wilkesboro		
	WKBC-FM	97.3
Raleigh	WKIX-FM	96.1
	WPTF-FM	94.7
	WRAL-FM	101.5
Reidsville	WWMO-FM	102.1
Rocky Mount	WEED-FM	92.1
	WFMA	100.7
Rochester	WVOR	92.5
Roxboro	WRXO-FM	96.7
Salisbury	WSTP-FM	106.5
Sanford	WWGP-FM	105.5
Shelby	WOHS-FM	96.1
Statesville	WFMX	105.7
Tabor City	WTAB-FM	104.9
Tarboro	WCPS-FM	104.3
Thomasville	WTNC-FM	98.3
Washington	WITN-FM	93.3
Williamston	WIAM	103.7
Wilmington	WPRV	98.9
Wilson	WVOT-FM	106.1
Winston-Salem	WAIR-FM	93.1
	WYFS	107.5
	WFDO-FM	*88.1
	WSJS-FM	104.1

NORTH DAKOTA

Fargo	KFNW-FM	97.9
	WOAY-FM	93.7
	KOSU	91.9

OHIO

Akron	WAKR-FM	97.5
	WAPS	*89.1
	WCUE-FM	96.5
Alliance	WFAH-FM	101.7
Ashland	WNCO-FM	101.3
Ashtabula	WREO-FM	97.1
Athens	WOUB-FM	*91.5
	WATH-FM	105.5
Barberton	WOBN	94.9
Bellaire	WOMP-FM	100.5
Berea	WBWC	*88.3
Bowling Green	WAWR-FM	93.5
	WBGU	*88.1
Bryan	WBNO-FM	100.9
Bucyrus	WBCO-FM	92.7
Cambridge	WILE-FM	96.7
Canton	WHBC-FM	94.1
	WCNO	106.9
	WTOF	98.1
Celina	WMER-FM	94.3
	WCSM-FM	96.7
Chillicothe	WBEX-FM	98.3
Cincinnati	WAEF-FM	98.5
	WCPO-FM	105.1
	WAKW-FM	98.3
	WGUC	*90.9
	WKRC-FM	101.9
	WJBI	102.7
	WZIP-FM	92.5
Circleville	WNRE	104.9
Cleveland	KYW-FM	105.7
	WBOE	*90.3
	WCRF-FM	103.3
	WCLV	95.5
	WDOK-FM	102.1
	WERE-FM	98.5
	WGAR-FM	99.5
	WHK-FM	100.7
	WJW-FM	104.1
	WNOB	107.9
	WXEN	106.5
	WZAK	93.1
Cleveland Hts.	WCUY-FM	92.3
Columbus	WCBE	*90.5
	WBNS-FM	97.1
	WCOL-FM	92.3
	WMNI-FM	99.7
	WOSU-FM	*89.7
	WTVN-FM	96.3
	WVKO	94.7
Conneault	WFIZ	104.9
Dayton	WHIO-FM	99.1
	WONE-FM	104.7
	WDAO	107.7
Delaware	WSLN	*91.1
East Liverpool	WOHI-FM	104.3
Eaton	WCTM	92.9
Elyria	WEOL-FM	107.3
Findlay	WFIN-FM	100.5

Location	C.L.	Mc.
Fostoria	WFOB	96.7
Fremont	WFRO-FM	99.3
Gallipolis	WJEH-FM	101.5
Granville	WDUB-FM	91.3
Greenville	WDRK-FM	106.5
Hamilton	WQMS	96.7
	WHOH	103.5
	WCNW-FM	94.9
Hillsboro	WSRW-FM	106.7
Kent	WKSU-FM	*88.1
	WKNT-FM	100.1
Kenton	WKTN-FM	98.3
Kettering	WVUD-FM	99.9
Lancaster	WHOK-FM	95.5
Lima	WIMA-FM	102.1
Logan	WLGN-FM	98.3
London	WLNO	106.3
Mansfield	WVNO	106.1
Marietta	WCMD	*89.3
	WMOA-FM	94.3
Marion	WMRN-FM	106.9
Miamisburg	WFCJ	98.9
Middletown	WPFB-FM	105.9
Mt. Vernon	WMVO-FM	93.7
New Concord	WMCO-FM	*91.9
Newark	WCLT-FM	100.3
Norwalk	WLKR-FM	95.3
Oxford	WMUB	*88.5
	WOXR	97.7
Piqua	WPTW-FM	95.7
Port Clinton	WRWR-FM	94.5
Portsmouth	WPAY-FM	104.1
	WNXT-FM	99.3
Salem	WSOM-FM	105.1
Sandusky	WLEC-FM	102.7
Sidney	WMVR-FM	105.5
Springfield	WBLY-FM	103.9
	WEEC-FM	100.7
Steubenville	WSTV-FM	103.5
Struthers	WKTL	90.7
Tiffin	WTTF-FM	103.7
Toledo	WSPD-FM	101.5
	WMHE	92.5
	WTDS	*91.3
	WTOL-FM	104.7
	WTRT	99.9
Urbana	WCOM-FM	101.7
Van Wert	WERT-FM	98.9
Wapakoneta	WERM	92.1
Washington Court House		
	WCHO-FM	105.5
Westerville	WOBN	*91.5
Wilberforce	WJSC-FM	*88.9
Wooster	WWST-FM	104.5
Worthington-Columbus		
	WRFD-FM	97.9
Xenia	WHBM-FM	103.9
Yellow Springs	WYSD	*91.5
Youngstown	WKBN-FM	98.9
	WBBW-FM	99.3
	WRED	101.1
Zanesville	WHIZ-FM	102.5

OKLAHOMA

Bethany	KNBQ	104.9
Durant	KSED-FM	107.3
Edmond	KWHB	97.7
Lawton	KLAW	101.5
McAlester	KNED-FM	101.3
Midwest City	KTEA-FM	92.5
Norman	WNAD-FM	*90.9
Nowata	KNFB	94.3
Oklahoma City	KOKH	*88.9
	KEFM	94.7
	KIOD	100.5
	KJEM-FM	102.7
	KOCY-FM	96.1
	KOFM	104.1
	KYFM	98.9
	KFNB	101.9
Shawnee	KBGC	*89.9
Stillwater	KOSU-FM	*91.7
	KSPI-FM	93.9
Tulsa	KWGS	*90.5
	KRMG-FM	95.5
	KOCW	97.5
	KOGM-FM	92.9
	KRAV	96.5

OREGON

Corvallis	KFLY-FM	101.5
	KBVR	*90.1
Eugene	KRVM	*91.9
	KEED-FM	93.1
	KFMY	97.9
	KUGN-FM	99.1
	KWAX	*91.1
	KBMC	94.5
Grants Pass	KGPO	96.9
Medford	KBOY-FM	95.3
Oretech	KTEC	*88.3
Portland	KDAP-FM	92.3
	KGMG	95.5
	KOIN-FM	101.1
	KPDQ-FM	105.3
	KPFM	97.1
	KPOJ-FM	98.5
	KQFM	100.3
	KRRC	*89.3

Location	C.L.	Mc.

PENNSYLVANIA

Allentown	WFMZ	100.7
	WAEB-FM	104.1
Altoona	WVAM-FM	100.1
	WFBG-FM	98.1
Beaver Falls	WBVP-FM	106.7
	WGEV	*88.3
Bethlehem	WGPA-FM	95.1
Bloomsburg	WHLM-FM	104.5
Boyertown	WBYC-FM	107.5
Braddock	WLOA-FM	96.9
Butler	WBUT-FM	97.7
Carbondale	WODL-FM	94.3
Carlisle	WHYL-FM	102.3
Chambersburg	WCHA-FM	95.1(s)
DuBois	WCED-FM	102.1
Easton	WEST-FM	107.9
	WJRH	*90.5
	WEEX-FM	99.9
Ebensburg	WEND-FM	99.1
Elizabethtown	WMSH-FM	106.7
Erie	WJET-FM	103.7
	WWYN-FM	99.9
Gettysburg	WGET-FM	107.7
Greensburg	WHJB-FM	107.1
Greenville	WGRP-FM	107.1
Grove City	WEDA-FM	
Harrisburg	WHP-FM	97.3
	WMSP	94.9
	WTPA-FM	104.1
	WCMB-FM	99.3
Havertown	WHHS	*89.3
Hazleton	WAZL-FM	97.9
Jenkintown	WIBF-FM	103.9
Johnstown	WARD-FM	92.1
	WJAC-FM	95.5
Lancaster	WGAL-FM	101.3
	WDAC	94.5
	WLAN-FM	96.9
Lebanon	WLBR-FM	100.1
Lewisburg	WVBU-FM	90.5
Lewiston	WMRF-FM	95.9
Lock Haven	WBPZ-FM	92.1
Martinsburg	WJSM	92.7
Meadville	WARC	*90.3
	WMGW-FM	100.3
Media	WXUR-FM	100.3
Montrose	WPEL-FM	96.5
New Kensington-Tarentum	WYDD	100.7
Oil City	WDJR	98.5
Palmyra	WRLC	92.1
Philadelphia	WCAU-FM	98.1
	WPBS-FM	105.3
	WDAS-FM	105.3
	WEAF-FM	104.5
	WFIL-FM	102.1
	WDVR	101.1
	WFLN	95.7
	WHAT-FM	96.5
	WUHY-FM	*90.9
	WIFI	92.5
	WIBG-FM	94.1
	WIP-FM	93.3
	WPEN-FM	102.9
	WPWT	*91.7
	WQAL	106.1
	WRTI-FM	*90.1
	WXPN	*88.9
Pittsburgh	KDKA-FM	92.9
	WAMO	105.5
	WEEP-FM	107.9
	WRYT-FM	106.1
	KQV-FM	102.5
	WDUQ	*91.5
	WJAS-FM	99.7
	WKJF	93.7
	WPIT-FM	101.5
	WWSW-FM	94.5
Pottsville	WPPA-FM	101.9
Reading	WRFY-FM	102.5
Red Lion	WGCB-FM	96.1
Scranton	WGBI-FM	101.3
	WUSV	*88.9
	WWDL-FM	104.9
Sharon	WPIC-FM	102.9
Somerset	WVSC-FM	97.7
State College	WMAJ-FM	103.1
	WDFM	*91.1
	WRSC-FM	96.7
Stroudsburg	WVPO-FM	93.5
Sunbury	WKOK-FM	94.1
Tamaqua	WSVB	105.5
Towanda	WTTC-FM	95.3
Tyrone	WGMR-FM	102.3
University Park	WDFM	*91.1
Warren	WRRN	92.3
Washington	WJPA-FM	95.3
Waynesboro	WAYZ-FM	101.5
Wilkes-Barre	WBRE-FM	98.5
	WYZZ	92.9
Williamsport	WLYC-FM	105.1
	WRAK-FM	100.3
York	WNDW-FM	105.7
	WSBA-FM	103.3

RHODE ISLAND

Cranston	WLDV	99.9
Kingston	WRIU	*91.1
Providence	WPJB-FM	105.1
	WBRU	95.5
	WICE-FM	107.7
	WPFM	94.1
	WPRO-FM	92.3
	WCRQ	101.5
Woonsocket	WWON-FM	106.3

SOUTH CAROLINA

Anderson	WCAC	101.1
Batesburg	WBLR-FM	92.1
Beaufort	WBEU-FM	98.7
Charleston	WCSC-FM	96.9
	WTMA-FM	95.1
Clemson	WSBF-FM	*88.1
Columbia	WCOS-FM	97.9
	WNOK-FM	104.7
	WUSC-FM	*89.9
Conway	WLAT-FM	104.1
Dillon	WDSC-FM	92.9
Easley	WELP-FM	103.9
Florence	WJMX-FM	103.1
Greenville	WESC-FM	92.5
	WFBC-FM	93.7
	WMUU-FM	94.5
Greenwood	WCRS-FM	96.7
Lancaster	WLCM-FM	107.1
Laurens-Clinton	WLBG-FM	100.5
Myrtle Beach	WMYB-FM	92.1
N. Charleston	WKTM	102.5
Rock Hill	WRHI-FM	98.3
Seneca	WBFM	98.1
Spartanburg	WSPA-FM	98.9
Sumter	WFIG-FM	101.3

SOUTH DAKOTA

Hot Springs	KOBH-FM	96.7
Sioux Falls	KELO-FM	92.5

TENNESSEE

Bristol	WOPI-FM	96.9
Brownsville	WBHT-FM	95.3
Chattanooga	WDOD-FM	96.5
	WLON	106.5
	WDEF-FM	92.3
Cleveland	WCLE-FM	100.7
Collegedale	WSMC-FM	*88.1
Cookeville	WHUB-FM	98.3
	WPTN-FM	94.3
Covington	WKBL-FM	93.5
Dickson	WDKN-FM	102.3
Franklin	WFLT-FM	100.1
Gallatin	WFMG	104.5
Greeneville	WGRV-FM	94.9
Humboldt	WIRJ-FM	102.3
Jackson	WTJS-FM	104.1
Jamestown	WDEB	100.1
Johnson City	WJCW-FM	101.5
Kingsport	WKPT-FM	98.5
Knoxville	WBIR-FM	93.5
	WIVK-FM	107.7
	WKCS	*91.1
	WUOT	*91.9
	WCAS	97.5
Lawrenceburg	WDXE-FM	95.9
Lexington	WDXL-FM	99.3
Livingston	WLIV-FM	95.9
Manchester	WMSR-FM	99.7
McKenzie	WKTA	106.9
McMinnville	WHNR	101.7
Memphis	WMC-FM	99.7
	KLYX	101.1
	WMPS-FM	97.1
	WNTL	102.7
	WREC-FM	104.5
Milan	WKBJ-FM	92.3
Morristown	WMTN-FM	95.9
Nashville	WLAC-FM	105.9
	WPLN	90.3
	WSIX-FM	97.9
Oneida	WBNT-FM	105.5
Savannah	WORM-FM	97.7
Sevierville	WSEV-FM	102.1
Sparta	WSMT-FM	105.5
Springfield	WDBL-FM	94.3
Tullahoma	WJIG-FM	93.3

TEXAS

Abernathy	KWGN-FM	99.5
Abilene	KACC-FM	*91.1
	KFMN	99.3
	KWKC-FM	105.1
Amarillo	KGNC-FM	93.1
	KVII-FM	94.1
Austin	KHFI-FM	98.3
	KAZZ	95.5
	KTBC-FM	93.7
	KUT-FM	*90.7
Beaumont	KHCB-FM	105.7
	KAYD-FM	97.5
	KLVI-FM	94.1
Big Spring	KFNE	95.3
Brenham	KWHI-FM	106.3
Brownwood	KHPC	88.1
	KFRN-FM	99.3
Bryan	KORA-FM	98.3
Clear Lake City	KMSC	102.1
Cleburne	KCLE-FM	94.9
College Station	WTAW-FM	92.1
Conroe	KNRO	106 9
	KNRO-FM	106.5
Corpus Christi	KZFM	95.5
Dallas	KIXL-FM	104.5
	KEIR	102.9
	KMAP	105.3
	KNER	*88.1
	KNUS	98.7
	KRLD-FM	92.5
	WFAA-FM	97.9
	WRR-FM	101.1
	KVTT	*91.7
	KBOX-FM	100.3
Denton	KDNT-FM	106.1
DiBoll	KSPL-FM	95.5
Dumas	KDDD-FM	95.3
El Paso	KVOF-FM	*88.5
	KTSM-FM	99.9
	KHMS	94.7
Ft. Worth	WBAP-FM	96.3
	KFJZ-FM	97.1
	KJIM-FM	102.1
	KCUL-FM	93.9
	KNOK-FM	107.5
	KTCU-FM	*89.1
Gainesville	KGAF-FM	94.5
Galveston	KGBC-FM	106.5
Harlingen	KELT	94.5
Henderson	KGRI-FM	100.1
Hereford	KPAN-FM	106.3
Highland Park-Dallas		
	KVIL-FM	103.7
Hillsboro	KHBR-FM	102.3
Houston	KHGM	102.9
	KHCB-FM	105.7
	KHUL	95.7
	KFMK	97.9
	KODA-FM	99.1
	KLEF	94.5
	KOST	100.3
	KQUE	102.9
	KRBE	104.1
	KXYZ-FM	96.5
	KTRH-FM	101.1
	KUHF	*91.3
	KBNO	93.7
Hilleen	KLEN-FM	93.3
Humboldt	WIRJ-FM	102.3
Huntsville	KSAM-FM	101.7
Jasper	KTXJ-FM	102.3
Lake Jackson	KLJT	107.3
Lamesa	KPET-FM	100.3
Longview	KLUE-FM	105.7
Lubbock	KSEL-FM	99.7
	KBFM	96.3
	KTXT-FM	*91.9
Marshall	KMHT-FM	97.3
Midland	KNFM	92.3
	KMDD-FM	93.3
Mt. Pleasant	KIMP-FM	100.7
Muleshoe	KMUL-FM	103.1
Odessa	KQIP	96.7
	KWMD	99.1
	KOCV	91.3
	KOYL-FM	97.9
Paris	KPLT-FM	99.3
Pasadena	KLVL-FM	92.5
Plainview	KHBL	*88.1
Port Arthur	KFMP	93.3
	KPAC-FM	96.5
San Angelo	KWLW	99.9
	KSJT	97.5
San Antonio	KISS	99.5
	KEEZ	97.3
	KAKI-FM	98.1
	KITY	92.9
	KMFM	96.1
Sinton	KTOD-FM	101.3
Spearman	KBMF-FM	98.3
Temple	KYLE-FM	104.9
Texarkana	KTAL-FM	98.1
	KOSY-FM	102.5
Tyler	KZAK	93.1
	KDOK-FM	101.5
Victoria	KTXN-FM	92.1
Waco	KEFC	97.5
Wichita Falls	KLUR	99.9
	KNTO	95.1

UTAH

Ephraim	KEPH	*88.9
Logan	KUSU-FM	*91.5
Ogden	KBOC	101.9
Provo	KBYU-FM	*88.9
Salt Lake City	KCPX-FM	98.7
	KLUB-FM	97.1
	KSL-FM	100.3
	KSOP-FM	104.3
	KWHO-FM	93.3

VERMONT

Burlington	WJOY-FM	98.5
	WRUV	*90.1

VIRGINIA

Arlington	WAVA-FM	105.1
	WCCV-FM	97.5
Blacksburg	WVVV	104.9
Charlottesville	WINA-FM	95.3
	WTJU	91.3
Covington	WKEY-FM	100.9
Crewe	WSVS-FM	104.7
Farmville	WFLO-FM	95.7

WHITE'S

RADIO LOG

Location	C.L.	Mc.
Fredericksburg	WFVA-FM	101.5
Gretna	WMNA-FM	103.3
Grundy	WNRG-FM	97.7
Hampton	WVEC-FM	101.3
	WHOV	*88.3
Harrisonburg	WEMC	*91.7
	WSVA-FM	100.7
Lynchburg	WWOD-FM	100.1
	WDMS-FM	101.7
Manassas	WPRW-FM	106.7
Marion	WMEV-FM	93.9
Martinsville	WMVA-FM	96.3
Newport News	WGH-FM	97.3
Norfolk	WMTI	*91.5
	WCMS-FM	100.5
	WNOR-FM	98.7
	WPHD	104.5
	WRVC	102.5
	WTAR-FM	95.7
	WXRI	105.3
	WYFI-FM	99.7
Portsmouth	WAVY-FM	96.9
Radford	WRAD-FM	101.7
Richmond	WCOD	98.1
	WRFK	91.1
	WRVA-FM	94.5
	WRNL-FM	102.1
Roanoke	WDBJ-FM	94.9
	WLRJ	92.3
	WROV-FM	103.7
	WSLS-FM	99.1
South Boston	WHLF-FM	97.5
South Norfolk	WFOS	*90.5
Staunton	WSGM-FM	93.5
Suffolk	WXYW	92.9
Williamsburg	WCWM	89.1
	WRCI	96.5
Winchester	WRFL	92.5
Woodbridge	WXRA	105.9

Location	C.L.	Mc.
WASHINGTON		
Aberdeen	WDUX-FM	104.7
Bellingham	KGMI-FM	92.9
	KERI	104.3
Bremerton	KBRO-FM	106.9
Centralia	KGME-FM	102.9
Cheney	KEWC-FM	*89.1
College Place	KGTS	91.3
Edmunds	KGFM	105.3
Ellensburg	KCWS-FM	*91.5
Eugene	KBMC	104.5
Hoquiam	KGHO-FM	103.9
Lynden	KLYN-FM	106.5
Opportunity	KZUN-FM	96.1
Prosser	KACA	102.3
Richland	KCYS	95.1
Seattle	KING-FM	98.1
	KBBX	98.9
	KBLE-FM	93.3
	KETO-FM	101.5
	KGMJ	95.7
	KIRO-FM	100.7
	KISW	99.9
	KLXN	96.5
	KDL-FM	94.1
	KRAB	107.7
	KTW-FM	102.5
	KUOW	94.9
	KIXI-FM	95.7
	KZAM	92.5
Spokane	KREM-FM	92.9
	KDNC-FM	93.7
	KTWD	105.7
	KXLY-FM	99.9
	KHQ-FM	98.1
Tacoma	KCPS	90.9
	KLAY-FM	106.1
	KTNT-FM	97.3
	KTOY	*91.7
	KTAC-FM	103.9
Yakima	KNDX-FM	106.3
WEST VIRGINIA		
Beckley	WBKW	99.5
Berkeley Springs	WSCF-FM	93.5
Bluefield	WHIS-FM	104.5
Charleston	WKAZ-FM	97.5
	WCHS-FM	96.1
	WKNA	98.5
	WTIO	105.9
	WVAF	99.9

Location	C.L.	Mc.
Huntington	WKEE-FM	100.5
	WMUL	*88.1
	WVQM	103.3
Martinsburg	WEPM-FM	97.5
Morgantown	WAJR-FM	101.9
Norfolk	WCMS-FM	100.5
Oak Hill	WOAY-FM	94.1
Parkersburg	WTAP-FM	103.1
	WCEF-FM	99.3
St. Albans	WKLC-FM	105.1
Wheeling	WKWK-FM	97.3
	WWVA-FM	98.7
	WTRF-FM	107.5
WISCONSIN		
Appleton	WLFM	*91.1
	WAPL-FM	105.7
Chilton	WHKW	*89.3
Colfax	WHWC	*88.3
Delafield	WHAD	*90.7
Eau Claire	WIAL	94.1
	WEAU-FM	100.7
Fort Atkinson	WFAW	107.3
Green Bay	WBAY-FM	101.1
Greenfield Twp.	WWCF	94.9
Highland	WHHI	91.3
Highland Twp.	WHSA	*89.9
Janesville	WCLO-FM	99.9
Kenosha	WLIP	95.1
La Crosse	WHLA	*90.3
	WWLA	93.3
Madison	WHA-FM	*88.7
	WIBA-FM	101.5
	WISM-FM	98.1
	WMFM	104.1(s)
	WRVB-FM	102.5
Marinette	WHMD	*91.5
Marshfield	WDLB-FM	106.5
Menomonee	WZMF	98.3
Merrill	WLIN	100.7
Milwaukee	WFMR	96.5
	WMIL-FM	95.7
	WISN-FM	97.3
	WRIT-FM	102.9
	WMKE	102.1
	WQFM	93.3
	WTMJ	94.5
	WBON	107.7
	WEMP-FM	99.1
	WUWM	*89.7
Monroe	WEKZ-FM	93.7
Mt. Horeb	WFMK	92.3
Neenah-Menasha		
	WNAM-FM	99.3

Location	C.L.	Mc.
Neillsville	WCCN-FM	107.5
Oshkosh	WMKC	96.7
Platteville	WSUP	*90.5
Racine	WRJN-FM	100.7
	WFNY	92.1
Rhinelander	WOBT-FM	107.9
Rice Lake	WJMC-FM	96.3
Richland Center	WRCO-FM	100.9
Ripon	WCWC-FM	95.9
Sauk City	WVLR	96.7
Sparta	WCOW-FM	97.1
Stevens Point	WSPT-FM	97.9
Superior	WWJC-FM	105.1
Tomah	WTMB-FM	98.9
Two Rivers	WTRW-FM	102.3
Watertown	WTTN-FM	104.7
Waukesha	WAUK-FM	106.1
Wausau	WHRM	*91.9
	WRIG-FM	101.9
Wauwatosa	WTOS	103.7
West Bend	WBKV-FM	92.5
Whitewater	WSUW	91.7
Wisc. Rapids	WFHR-FM	103.3
WYOMING		
Cheyenne	KVWO-FM	106.3
PUERTO RICO		
Arecibo	WCMN-FM	104.3
	WNIK-FM	107.3
Aguadilla	WABA-FM	100.3
Bayamon	WRSJ-FM	100.7
Carolina	WVOZ-FM	107.7
Fajardo	WMDD-FM	96.5
Guayama	WXRF-FM	106.9
Mayaguez	WKJB-FM	99.1
	WORA-FM	97.5
	WOYE-FM	94.1
Ponce	WLEO-FM	101.9
	WPAB-FM	93.3
San Juan	WIPR-FM	*91.3
	WIAC-FM	102.3
	WITA-FM	107.7
	WOLA	105.7
VIRGIN ISLANDS		
St. Croix, Christiansted	WIVI-FM	99.5
Christiansted, St. Croix	WIVI-FM	99.5

Canadian AM Stations by Location

Location	C.L.	Kc.
Abbotsford, B.C.	CFVR	1240
Altona, Man.	CFAM	1290
Amherst, N.S.	CKDH	900
Amos, Que.	CHAD	1340
Antigonish, N.S.	CJFX	580
Barrie, Ont.	CKBB	950
Bathurst, N.B.	CKBC	1360
Belleville, Ont.	CJBQ	800
Blind River, Ont.	CJNR	730
Brampton, Ont.	CHIC	790
Brandon, Man.	CKX	1150
Brantford, Ont.	CKPC	1380
Bridgewater, N.S.	CKBW	1000
Brockville, Ont.	CFJR	1450
Cabano, Que.	CJAF	1240
Calgary, Alta.	CBR	1010
	CFAC	960
	CFCN	1060
	CFVP	6030
	CHQR	810
	CKXL	1140
Callander, Ont.	CFCH	600
Cambell River, B.C.	CFWB	1490
Campbellton, N.B.	CKNB	950
Camrose, Alta.	CFCW	790
Causapscal, Que.	CJBM	1450
Charlottetown, P.E.I.	CFCY	630
Chatham, Ont.	CFCO	630
Chicoutimi, Que.	CBJ	1580
	CJMT	1420
Chilliwack, B.C.	CHWK	1270
Churchill, Man.	CHFC	1230
Cobourg, Ont.	CHUC	1450
Collingwood, Ont.	CKCB	1400
Corner Brook, Nfld.	CBY	990
	CFCB	570
Cornwall, Ont.	CFML	1110
	CJSS	1220
Courtenay, B.C.	CFCP	1440
Cranbrook, B.C.	CKEK	570
Dartmouth, N.S.	CFDR	790
Dauphin, Man.	CKDM	730
Dawson Creek, B.C.	CJDC	1350
Drumheller, Alta.	CJDV	910
Drummondville, Que.	CHRD	1340
Dryden, Ont.	CKDR	900
Duncan, B.C.	CKAY	1500

Location	C.L.	Kc.
Edmonton, Alta.	CBX	740
	CFRN	1260
	CHED	630
	CHFA	680
	CHQT	1110
	CJCA	930
	CKUA	580
Edmundston, N.B.	CJEM	570
Estevan, Sask.	CJSL	1280
Flin Flon, Man.	CFAR	590
Fort Frances, Ont.	CFOB	800
Fort Simpson, N.W.T.	CFMR	1490
Fort St. John, B.C.	CKNL	560
Fort William, Ont.	CJLX	800
Fredericton, N.B.	CBZ	970
	CFNB	550
Galt, Ont.	CFTJ	1110
Gander, Nfld.	CBG	1450
Goose Bay, Nfld.	CFGB	1340
Granby, Que.	CHEF	1450
Grande Prairie, Alta.	CFGP	1050
Grand Bank, Nfld.	CJOX	710
Grand Falls, Nfld.	CBT	540
	CKCM	620
	CJCN	680
Gravelbourg, Sask.	CFRG	710
	CFGR	1230
Guelph, Ont.	CJOY	1460
Halifax, N.S.	CBH	860
	CHNS	960
	CJCH	920
Hamilton, Ont.	CHML	900
	CKOC	1150
	CHIQ	1280
Hauterive, Que.	CHLC	580
Huntsville, Ont.	CKAR	630
Hull, Que.	CKCH	970
Inuvik, N.W.T.	CHAK	860
Joliette, Que.	CJLM	1350
Jonquiere, Que.	CKRS	590
Kamloops, B.C.	CFJC	910
Kapuskasing, Ont.	CKAP	580
Kelowna, B.C.	CKOV	630
Kenora, Ont	CJRL	1220
Kentville, N.S.	CKEN	1350
Kingston, Ont.	CFRC	1490

Location	C.L.	Kc.
	CKLC	1380
	CKWS	960
Kirkland Lake, Ont.	CJKL	560
Kitchener, Ont.	CHYM	1490
	CKKW	1320
Kitimat, B.C.	CKTK	1230
Langley, B.C.	CJIC	850
La Sarre, Que.	CKLS	1240
La Tuque, Que.	CFLM	1240
Leamington, Ont.	CJSP	710
Lethbridge, Alta.	CHEC	1090
	CJOC	1220
Lindsay, Ont.	CKLY	910
Lloydminster, Alta.	CKSA	1080
London, Ont.	CFPL	980
	CKSL	1410
Marystown, Nfld.	CHCM	560
Matane, Que.	CKBL	1250
Medicine Hat, Alta.	CHAT	1270
Middleton, N.S.	CKAO	1490
Midland, Ont.	CKMP	1230
Moncton, N.B.	CBAF	1300
	CKCW	1220
Mont Laurier, Que.	CKML	610
Montmagny, Que.	CKBM	1490
Montreal, Que.	CBF	690
	CBM	940
	CFCF	600
	CFMB	1410
	CJAD	800
	CJMS	1280
	CKAC	730
	CKLM	1570
	CKGM	980
Moose Jaw, Sask.	CHAB	800
Nanaimo, B.C.	CHUB	1570
Nelson, B.C.	CKLN	1390
New Carlisle, Que.	CHNC	610
Newcastle, N.B.	CKMR	790
New Glasgow, N.S.	CKEC	1320
New Westminster, B.C.	CKNW	980
Niagara Falls, Ont.	CJRN	1600
North Battleford, Sask.	CJNB	1050
North Vancouver, B.C.	CKLG	730

Location	C.L.	Kc.
Oakville, Ont.	CHWO	1250
Orillia, Ont.	CFOR	1570
Oshawa, Ont.	CKLB	1350
Ottawa, Ont.	CBO	910
	CBOF	1250
	CFRA	580
	CKOY	1310
	CKPM	1440
Owen Sound, Ont.	CFOS	580
Parry Sound, Ont.	CKAR-1	1340
Peace River, Alta.	CKYL	610
Pembroke, Ont.	CHOV	1350
Penticton, B.C.	CKOK	800
Peterborough, Ont.	CHEX	980
	CKPT	1420
Pointe Claire, Que.	CFOX	1470
Portage La Prairie, Man.	CFRY	920
Port Alberni, B.C.	CJAV	1240
Port Arthur, Ont.	CFPA	1230
	CKPR	580
Prince Albert, Sask.	CKBI	900
Prince George, B.C.	CKPG	550
Prince Rupert, B.C.	CFPR	860
	CHTK	560
Quebec, Que.	CBV	980
	CFOM	1340
	CHRC	800
	CJLR	1060
	CKCV	1280
Quesnel, B.C.	CKCQ	570
Red Deer, Alta.	CKRD	850
Regina, Sask.	CBK	540
	CJME	1300
	CKCK	620
	CKRM	980
Richmond Hill, Ont.	CFGM	1310
Rimouski, Que.	CJBR	900
Rivière du Loup, Que.	CJFP	1400
Roberval, Que.	CHRL	910
Rouyn, Que.	CKRN	1400
Ste. Anne de la Pocatiere, Que.	CHGB	1310
St. Boniface, Man.	CKSB	1050
St. Catharines, Ont.	CKTB	610
St. Hyacinthe, Que.	CKBS	1240
St. Jean, Que.	CHRS	1090

Location	C.L.	Kc.	Location	C.L.	Kc.	Location	C.L.	Kc.	Location	C.L.	Kc.
St. Jérome, Que.	CKPL	900		CKTS	900	Toronto, Ont.	CBL	740	Ville St. Georges, Que.		
Saint John, N.B.	CBO	1110	Simcoe, Ont.	CFRS	1560		CFRB	1010		CKRB	1460
St. John's Nfld.	CBN	640	Smiths Falls, Ont.	CJET	630		CHFI	1540	Wawa, Ont.	CJWA	1240
	CJON	930	Smithers, B.C.	CFBV	1230		CHUM	1050	Welland, Ont.	CHOW	1470
	CKZN	6180	Sorel, Que.	CJSO	1320		CJBC	860	Weyburn, Sask.	CFSL	1340
	VOAR	1230	Stratford, Ont.	CJCS	1240		CKEY	590	Whitehorse, Y.T.	CFWH	570
	VOCM	590	Steinbach, Man.	CHSM	1250		CKFH	1430	Williams Lake, B.C.	CKWL	1240
	VOWR	800	Stephenville, Nfld.	CFSX	910	Trail, B.C.	CJAT	610	Windsor, N.S.	CFAB	1450
St. Joseph d'Alma, Que.			Sudbury, Ont.	CFBR	550	Truro, N.S.	CKCL	600	Windsor, Ont.	CBE	1550
	CFGT	1270		CHNO	900	Val d'Or, Que.	CKVO	1230		CKLW	800
St. Thomas, Ont.	CHLO	680		CKSO	790	Valleyfield, Que.	CFLV	1370		CKWW	580
Sackville, N.B.	CBA	1070	Summerside, P.E.I.	CJRW	1240	Vancouver, B.C.	CBU	690	Wingham, Ont.	CKNX	920
Saint John, N.B.	CFBC	930	Swift Current, Sask.	CKSW	1400		CFUN	1410	Winnipeg, Man.	CBW	990
	CHSJ	1150	Sydney, N.S.	CBI	1140		CHQM	1320		CJOB	680
Sarnia, Ont.	CHOK	1070		CJCB	1270		CJOR	600		CJQM	1470
Saskatoon, Sask.	CFNS	1170		CJCX	6010		CKLG	730		CKRC	630
	CFQC	600	Terrace, B.C.	CFTK	590		CKWX	1130		CJQM	1470
Sault Ste. Marie, Ont.	CJIC	1050	Thetford Mines, Que.	CKLO	1230	Verdun, Que.	CKVL	850		CKY	580
	CKCY	920	Thompson, Man.	CHTM	610	Vernon, B.C.	CJIB	940	Woodstock, N.B.	CJCJ	920
Sept-Iles, Que.	CKCN	560	Trois-Rivières, Que.	CHLN	550	Victoria, B.C.	CFAX	1070	Woodstock, Ont.	CKOX	1340
Shawinigan, Que.	CKSM	1220		CKTR	1150		CJVI	900	Yarmouth, N.S.	CJLS	1340
Shefferville, Que.	CFKL	1230	Tillsonburg, Ont.	CKOT	1510		CKOA	1220	Yellowknife, N.W.T.	CFYK	1340
Sherbrooke, Que.	CHLT	630	Timmins, Ont.	CFCL	620	Victoriaville, Que.	CFOA	1380	Yorkton, Sask.	CJGX	940
				CKGB	680	Ville Marie, Que.	CKVM	710			

Canadian FM Stations by Location

Location	C.L.	Mc.	Location	C.L.	Mc.	Location	C.L.	Mc.	Location	C.L.	Mc.
Belleville, Ont.	CJBQ-FM	97.1	Kitchener, Ont.	CHYM-FM	96.7	Quebec, Que.	CHRC-FM	98.1		CHFI-FM	98.1
Brampton, Ont.	CHIC-FM	102.1	Lethbridge, Alta.			Red Deer, Alta.	CKRO-FM	98.9		CHUM-FM	104.5
Brandon, Man.	CKX-FM	96.1		CHEC-FM	100.9	Rimouski, Que.	CJBR-FM	101.5		CJRT-FM	91.1
Calgary, Alta.	CHFM-FM	95.9	London, Ont.	CFPL-FM	95.9	Saint John, N.B.	CFBC-FM	98.9		CKFM-FM	99.9
Cornwall, Ont.	CJSS-FM	104.5	Montreal, Que.	CBF-FM	95.1	Saskatoon, Sask.	CFMC-FM	103.9	Truro, N.S.	CKCL-FM	100.9
Edmonton, Alta.	CFRN-FM	100.3		CBM-FM	100.7	Sault Ste. Marie, Ont.			Vancouver, B.C.	CBU-FM	105.7
	CJCA-FM	99.5		CFCF-FM	92.5		CJIC-FM	100.5		CHQM-FM	103.5
	CKUA-FM	98.1		CJFM-FM	95.9		CKCY-FM	104.3		CKGL-FM	99.3
Halifax, N.S.	CHNS-FM	96.1		CJMS-FM	94.3	Sherbrooke, Que.	CHLT-FM	102.7	Verdun, Que.	CKVL-FM	96.9
Hamilton, Ont.	CHML-FM	95.3		CKGM-FM	97.7	St. Catharines, Ont.			Victoria, B.C.	CFMS-FM	98.5
Kamloops, B.C.	CFFM-FM	98.3	Oshawa, Ont.	CKLB-FM	93.5		CKTB-FM	97.7	Windsor, Ont.	CKLW-FM	93.9
Kelowna, B.C.	CJOV-FM	104.7	Ottawa, Ont.	CBO-FM	103.3	Sudbury, Ont.	CKSO-FM	92.7	Winnipeg, Man.	CJOB-FM	97.5
Kentville, N.S.	CKWM-FM	97.7		CFMO-FM	93.9	Sydney, N.S.	CJCB-FM	94.9		CBW-FM	98.3
Kingston, Ont.	CFRC-FM	91.9	Penticton, B.C.	CKOK-FM	97.1	Timmins, Ont.	CKGB-FM	94.5		CKQM-FM	94.3
	CKLC-FM	99.5	Port Arthur, Ont.			Toronto, Ont.	CBC-FM	99.1		CKY-FM	92.1
	CKWS-FM	96.3		CKPR-FM	94.3						

World-Wide Short-Wave Stations

■ The shortwave section of *White's Radio Log* is an exclusive feature of RADIO-TV EXPERIMENTER magazine. This is a listing of the most active and most often reported stations, as compiled from reader reports sent in to us, from published schedules of the stations listed, and from actual monitoring at the official RADIO-TV EXPERIMENTER monitoring station, DX Central.

We invite our readers to send in their loggings for inclusion in these listings. Be sure to include the following information for each station reported: approximate frequency, callsign and/or station name, and time monitored in Eastern Standard Time (24 hour clock). Address your reports to: DX Central, White's Radio Log, RADIO-TV EXPERIMENTER, 505 Park Avenue, New York, N.Y. 10022, U.S.A.

All times shown in these listings are Eastern Standard Time, 24 hour clock. For example, our listing of 0800 would mean 8:00 AM EST, and our listing of 1608 would be 4:08 PM EST. For conversion to other time zones, subtract 1 hour for CST, 2 hours for MST, 3 hours for PST (0900 PST is 1200 EST).

The following abbreviations are used: BC-Broadcasting Company, Corporation or System; E- Emissora; R- Radio; V- Voice or Voz.

We are indebted to the following DX reporters for making this listing possible.

Edward J. Huttie, Wescoesville, Pa.
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Verle E. Miller, Nebraska City, Nebr.
Tom Sangston, Tacoma, Wash.
David Knowlton, Spokane, Wash.
Anne Raby, Picton, Ont.
Marc DeLorenzo, Hyannis, Mass.
Harry Davis, Cliffside Park, N. J.
Louis Walker, Winter Park, Fla.
Kerry Matthews, Miami Beach, Fla.
Andre Fredette, Berthierville, Que.
Thomas E. Nichols, Guam
Bruce Gray, Greenville, N. C.
Dan Gaylord, Longview, Wash.
Robert Wilk, Kansas City, Mo.

kc/s	Call	Name	Location	EST
2425	—	Rhodesian BC	Gwelo, Rhodesia	2255
3205	VQO3	Solomon Is. BC	Honiara, Solomon Is.	0315
3215	—	Azad Kashmir R.	(clandestine)	1200
	—	R. Club Mozamb.	Lourenco Marques, Mozamb.	1530
3220	VTW3	R. Tarawa	Betio, Tarawa, Gilb. Is.	0500
3222	—	R. Mauretania	Nouakchott, Mauret.	1730
3260	—	R. Club Mozamb.	Lourenco Marques, Mozamb.	1600
3265	HIRM	R. Sol	Higuey, Sto. Domingo	1800
3277	—	R. Kashmir	Srinigan, Kashmir	1045
3280	—	R. Maldive Is.	Male, Maldive Is.	0700
3295	—	All India R.	Jullundur, India	0900
3300	—	R. Club Mozamb.	Lourenco Marques, Mozamb.	1500
3304	VL8BD	R. Daru	Daru, Papua	0200
3306	—	Rhodesian BC	Gwelo, Rhodesia	2230
3315	—	R-TV Francaise	Ft. de France, Martinique	2035
3316	—	Sierra Leone BC	Freetown, Sierra Leone	0100
3350	—	Ghana BC	Accra, Ghana	0030
3356	—	Bechuanaland BC	Gaberones, Bechuanaland	1130
3366	—	Ghana BC	Accra, Ghana	0030
3376	HIAD	R. San Juan	San Juan, Sto. Domingo	2300
	—	E. Oficial	Luanda, Angola	1530
3385	HIDA	R. Hit Musical	Santiago, Sto. Domingo	1830
3390	—	V. del Rio Tarqui	Cuenca, Ecu.	2230
3396	—	Rhodesian BC	Gwelo, Rhodesia	2255
3420	—	Ghana BC	Accra, Ghana	0050
3835	HCWN1	V. del Triunfo	Quito, Ecuador	2340
3883	—	R. Club Cabo Verde	Cape Verde Is.	1600
3930	CR4AC	R. Barlavento	Sao Vincente, Cape Verde Is.	1700
3935	VRH12	Fiji BC	Suva, Fiji Is.	1300
3947	HCDY4	R. Iris	Esmereldas, Ecu.	1937
3953	MCM	BBC	London, England	1900
3980	VRH13	Fiji BC	Suva, Fiji Is.	1300
3985	—	Escuelas R.	Riobamba, Ecuador	0530
3995	VQO3	Solomon Is. BC	Honiara, Sol. Is.	0315
4684	—	V. of Vietnam	Hanoi, N. Vietnam	1715
4750	ZYF23	R. Maranhao	San Luis, Brazil	2200
4770	HCMX4	R. Cenit	Portoviejo, Ecuador	0600
4785	—	R. Bamako	Bamako, Mali	0200
4795	XZK2	Burma BC	Rangoon, Burma	0855
4828	—	Rhodesian BC	Gwelo, Rhodesia	0115
4835	—	R. Bamako	Bamako, Mali	0200
4865	—	R. Brunei	Brunei	0900
4870	YVKP	R. Tropical	Caracas, Venez.	1800
4877	—	VTVN	Saigon, S. Vietnam	0330
4890	—	ABC	Port Moresby, Papua	1500
	YVKB	R. Venezuela	Caracas, Venez.	2130
4900	YVNK	R. Juventud	Barquisimeteo, Venez.	2230
4910	—	V. Revolucion	Conakry, Guinea Rep.	0430
	HCMJ1	E. Gran Colombia	Quito, Ecuador	0015
4915	HCLR5	R. Trebol	Alausi, Ecuador	2300
	—	Ghana BC	Accra, Ghana	0030
4920	—	Cambodian BC	Phnom Penh, Cambodia	2047
4945	—	Springbok R.	Paradys, S. Africa	1200
4965	—	R. Santa Fe	Bogota, Colombia	2030
4967	CR6RE	R. Club Malanje	Malanje, Angola	1615
	—	R. Kuwait	Kuwait	2130
4970	YVLK	R. Rumbos	Caracas, Venez.	2130
4975	—	S. African BC	Paradys, S. Africa	1100
4984	—	Ghana BC	Accra, Ghana	0030
4995	HRQW	R. Juventud	Tela, Honduras	2100
5010	YVRW	R. Bocono	Bocono, Venez.	1900
5020	HJFW	Transm. Caldas	Manizales, Col.	1100
5021	CR6RH	R. Club da Huila	Sa da Banderia, Angola	1730
5030	YVKM	R. Continente	Caracas, Venez.	1945
5040	YVMA	R. Maturin	Maracaibo, Venez.	2000
5045	CP38	R. Antiplano	La Paz, Bolivia	0030
5055	—	R. Singapore	Singapore	1130
5188	OAX8F	R. Atlantida	Iquitos, Peru	2135
5805	—	R. Sanaa	Sanaa, Yemen	1530
5874	HRNL	V. de Honduras	Tegucigalpa, Honduras	1945
5950	—	R. Warsaw	Warsaw, Poland	1830
	—	R. Peking	Peking, China	1500
5955	CKCX	R. Canada	Montreal, Que.	0055
	TGNA	R. Cultural	Guatemala City, Guat.	2200
5960	XEUMT	R. Universidad	Sisoguichi, Chih., Mex.	1800
5970	—	R. Canada	Montreal, Que.	2000
5980	PCJ	R. Nederland	Hilversum, Netherlands	0530
	ZFY	R. Demerara	Georgetown, Br. Guiana	0440
	VRH6	Fiji BC	Suva, Fiji Is.	2330
5983	4VB	V. de la Revolucion	Port au Prince, Haiti	2230
5990	—	R. Habana	Havana, Cuba	2200
	—	R. Sweden	Stockholm, Sweden	2000
5995	—	R. Warsaw	Warsaw, Poland	1400
6000	—	R. Americas	Swan Island	1930
	TGTA	R. Sonora	Guatemala City, Guat.	2330
6005	CFCX	CFCX	Montreal, Que.	0615
	VRH7	Fiji BC	Suva, Fiji Is.	1700
6010	ETLF	R. V. Gospel	Addis Ababa, Ethiopia	1045
6015	—	R. Habana	Havana, Cuba	0230
6025	—	R. Portugal	Lisbon, Portugal	1645
	PCJ	R. Nederlands	Hilversum, Netherlands	0530
6030	DZH6	Far East BC	Manila, Philippines	0445
6037	TIFC	Faro del Caribe	San Jose, C.R.	2200
6045	—	Deutsche Welle	Rwanda	0015
6055	—	R. Prague	Prague, Czech.	1000
6060	—	R. Habana	Havana, Cuba	2200
6070	CFRX	CFRX	Toronto, Ont.	1055
6075	HRMH5	V. del Junco	Sta. Barbara, Honduras	0745
	DMQ6	Deutsche Welle	Cologne, W. Germany	2130
	—	R. Ceylon	Colombo, Ceylon	0945
6085	PCJ	R. Nederlands	Hilversum, Netherlands	1400
6090	HI3U	R. Sr. Domingo TV	Santo Domingo, Sto. Domingo	2000
	—	VTVN	Dalat, S. Vietnam	2240
6110	GSL	BBC	London, England	1900
6125	ORU	Brussels Calling	Brussels, Belgium	1900
6130	CHNX	CHNX	Halifax, N.S.	1130
6140	—	R. Nac. Espana	Madrid, Spain	0400
6150	—	R. S. Africa	Paradys, S. Africa	2200
6155	—	R. Baghdad	Baghdad, Iraq	2130
	OEI2I	Oesterr. R.	Vienna, Austria	1800
	—	V. de Revol.	Conakry, Guinea, Rep.	0100
6160	HSK4	R. Thailand	Pangkok, Thailand	2315
6175	—	R. Algiers	Algiers, Algeria	0130
6185	HCJB	V. of the Andes	Quito, Ecuador	0100
6190	TGFP	R. Nac.Tikal	Flores Peten, Guat.	2015
	—	R. Budapest	Budapest, Hungary	1700
6195	GRN	BBC	London, England	1745
	—	R.TV Marocaine	Rabat, Morocco	2330
6210	TIGPH3	R. Monumental	San Jose, C.R.	1900
6223	—	R. Tabriz	Tabriz, Iran	1300
6270	—	R. Peking	Peking, China	1630
6300	—	R. Peking	Peking, China	1300
6345	—	R. Peking	Peking, China	1635
6540	—	R. Pyongyang	Pyong, N. Korea	1400
6850	—	Rozglosnia Marcerska	Warsaw, Poland	0700
7100	—	R. Pakistan	Karachi, Pakistan	1445
7105	—	R. Nac. Espana	Madrid, Spain	0400
7113	—	R. Vilnus	Vilnus, Lith. SSR	1730
7120	XZK4	Burma BC	Rangoon, Burma	0200
7125	—	R. Warsaw	Warsaw, Poland	0700
	VUD	All India R.	Delhi, India	1445
7130	BED7	V. Free China	Taipei, Formosa	2150
	—	BBC	London, England	1745
7135	—	Lisbon Calling	Lisbon, Portugal	0300
7145	—	R. Warsaw	Warsaw, Poland	1700
7155	—	V. of America	Okinawa, Ryukyu Is.	0715
7175	—	Rhodesian BC	Gwelo, Rhodesia	0500
7180	—	R. Baghdad	Baghdad, Iraq	2130
7185	HSK7	R. Thailand	Bangkok, Thailand	2315
7195	—	R. Budapest	Budapest, Hungary	1700
7200	—	V. Free Pakistan	(clandestine)	0900
7225	—	Lisbon Calling	Lisbon, Portugal	1645
7235	VUD	All India R.	Delhi, India	1445
7265	—	R. Tirana	Tirana, Albania	1900
7270	—	R. S. Africa	Paradys, S. Africa	2200
7290	DMQ7	Deutsche Welle	Cologne, W. Germany	1130
7302	—	R. Liberdad	(clandestine)	2345
7306	—	Rozglosnia Marcerska	Warsaw, Poland	0500
7320	—	R. Moscow	Moscow, USSR	2200
7330	—	R. Kiev	Kiev, USSR	1930
7345	—	R. Prague	Prague, Czech.	1000

kc/s	Call	Name	Location	EST
7450	—	R. Maldive Is.	Male, Maldive Is.	0430
7520	—	Vatican R.	Vatican City	1950
7580	—	R. Pyongyang	Pyongyang, N. Korea	1400
9009	4XB31	Kol Yisrael	Jerusalem, Israel	1540
9390	—	R. Tirana	Tirana, Albania	1900
9420	—	U.N. Radio	Seoul, Korea	0245
9480	—	R. Peking	Peking, China	0620
9500	—	R. Peking	Peking, China	0600
9505	—	R. Japan	Tokyo, Japan	1200
9510	GS8	BBC	London, England	1745
9515	ETLF	R. V. of Gospel	Addis Ababa, Ethiopia	2015
9520	OZF5	V. of Denmark	Copenhagen, Denmark	0400
9525	—	R. S. Africa	Paradys, S. Africa	1345
	PCJ	R. Nederlands	Hilversum, Netherlands	0230
	—	R. Habana	Havana, Cuba	1200
9550	—	R. Habana	Havana, Cuba	2200
	—	R. Prague	Prague, Czech.	1000
9580	GSC	BBC	London, England	1700
9593	—	Hellenic Nat'l BC	Athens, Greece	1000
9540	ZL2	R. New Zealand	Wellington, N.Z.	0515
9560	—	R. Japan	Tokyo, Japan	1200
	—	R. Berlin Int'l.	Berlin, E. Germany	2000
9565	ETLF	R. V. of Gospel	Addis Ababa, Ethiopia	1130
9570	—	RAI	Rome, Italy	1615
9590	PCJ	R. Nederlands	Hilversum, Netherlands	1400
9610	LLG	R. Norway	Oslo, Norway	2200
9615	—	R. Peking	Peking, China	0615
	—	R. Nac. Espana	Madrid, Spain	1100
9625	—	Kol Yisrael	Jerusalem, Israel	1540
	—	R. Canada	Montreal, Que.	1800
9630	—	R. Canada	Montreal, Que.	1615
9640	DMQ9	Deutsche Welle	Cologne, W. Germany	2130
9645	—	Lisbon Calling	Lisbon, Portugal	0300
	TIFC	Faro del Caribe	San Jose, C.R.	2200
	—	Vatican Radio	Vatican City	1930
	—	R. Maldive Is.	Male, Maldive Is.	0245
	HCJB	V. of the Andes	Quito, Ecuador	0100
9650	—	V. Revolucion	Conakry, Guinea Rep.	1100
9655	—	V. Free China	Taipei, Formosa	0500
9660	—	R. Nac. Espana	Tenerife, Canary Isl.	0900
9680	—	R. Habana	Havana, Cuba	0500
	—	R. Moscow	Moscow, USSR	1800
9685	—	R. Algiers	Algiers, Algeria	0130
	BED73	V. of Free China	Taipei, Formosa	0500
	ZYR227	R. Gazeta	Sao Paulo, Brazil	2115
9690	VUD	All India R.	Delhi, India	1445
9695	—	R. Nac. Espana	Madrid, Spain	0400
	DMQ9	Deutsche Welle	Rwanda	1015
9700	—	R. Sofia	Sofia, Bulgaria	1900
9705	ETLF	R. V. of Gospel	Addis Ababa, Ethiopia	0930
	—	R. Sweden	Stockholm, Sweden	2000
9715	PCJ	R. Nederlands	Hilversum, Netherlands	0530
9720	—	V. of Free China	Taipei, Formosa	1030
9725	4X8SI	Kol Yisrael	Jerusalem, Israel	1540
9740	WRUL	R. N.Y. Worldwide	New York, N.Y.	1600
9745	HCJB	V. of Andes	Quito, Ecuador	0100
	—	R. Bamako	Bamako, Mali	0200
9750	—	Springbok R.	Paradys, S. Africa	0000
9755	—	R-TV Francais	Paris, France	1915
9760	—	V. of Vietnam	Hanoi, N. Vietnam	0000
9765	ETLF	R. V. of Gospel	Addis Ababa, Ethiopia	1000
9860	—	R. Peking	Peking, China	1430
9865	YDF8	V. of Indonesia	Djakarta, Indonesia	1200
9916	VUD	All India R.	Delphi, India	1445
9920	—	Hellenic Nat'l BC	Athens, Greece	0015
11640	VUD	All India R.	Delhi, India	1445
	—	V. of Vietnam	Hanoi, N. Vietnam	0000
11705	—	R. Tirana	Tirana, Albania	1700
11710	LRA35	R. Nacional	Buenos Aires, Argentina	1500
11720	—	R. Nacional	Brasilia, Brazil	1730
	—	R. Canada	Montreal, Que.	2000
11725	—	R. Canada	Montreal, Que.	1800
	BED75	V. of Free China	Taipei, Formosa	1030
11730	PCJ	R. Nederlands	Hilversum, Netherlands	1100
11735	CXA7	R. Oriental	Montevideo, Uruguay	1800
11740	VUD	All India R.	Delhi, India	1445
	CE1174	R. Nuevo Mundo	Santiago, Chile	2130
11750	—	Far East Network	Tokyo, Japan	2100
11755	ETLF	R. V. of Gospel	Addis Ababa, Ethiopia	1200
	HCJB	V. of the Andes	Quito, Ecuador	0100
11770	—	Deutsche Welle	Rwanda	1510
11775	ZYZ28	R. Mayrink Veiga	Rio de Janeiro, Brazil	2000
11780	—	BBC	London, England	1615
11795	—	R. Central do Brazil	Rio de Janeiro, Brazil	1455
11800	—	R. Nac. de Espana	Tenerife, Canary Is.	1900
	—	R. Japan	Tokyo, Japan	1200
11820	—	Trans World R.	Bonaire, Neth. W.I.	1600
11825	8ED69	V. of Free China	Taipei, Formosa	2150
11835	CXA9	E. El Espectador	Montevideo, Uruguay	1900
	—	R. Algiers	Algiers, Algeria	0400
11840	—	V. of Vietnam	Hanoi, N. Vietnam	0000
	—	U.N. Radio	Monrovia, Liberia	0200
11855	—	Deutsche Welle	Rwanda	0930
11860	8ED45	V. of Free China	Taipei, Formosa	2150
11866	—	V. of Afr. Fraternity	Elisabethv., Katanga	1000
11875	ETLF	R. V. of Gospel	Addis Ababa, Ethiopia	1330
11880	WRUL	R. N.Y. Worldwide	New York, N.Y.	1500
11885	CXA68	R. Sarandi	Montevideo, Uruguay	1800
11895	—	Windward I. BC	St. Georges, Grenada	1700
11900	—	R. S. Africa	Paradys, S. Africa	1345
11905	—	Deutsche Welle	Rwanda	0130
	WRUL	R. N.Y. Worldwide	New York, N.Y.	1645
	—	RAI	Rome, Italy	1615
11910	HCJB	V. of the Andes	Quito, Ecuador	0100
	HSK9	R. Thailand	Bangkok, Thailand	2315
	—	Kol Yisrael	Jerusalem, Israel	0400
11920	ETLF	R. V. of Gospel	Addis Ababa, Ethiopia	2015
11925	—	Deutsche Welle	Cologne, W. Germany	1815
11930	—	R. Habana	Havana, Cuba	2200
11970	—	R. Singapore	Singapore	1130
	PCJ	R. Nederlands	Hilversum, Netherlands	0230
11990	—	R. Prague	Prague, Czech.	1000
12010	—	R. Peking	Peking, China	2110
12095	GRF	BBC	London, England	1615
15070	GWC	BBC	London, England	1500
15085	—	R. Peking	Peking, China	2130
15095	—	R. Peking	Peking, China	2130
15110	HCJ8	V. of the Andes	Quito, Ecuador	1800
15120	—	R. Warsaw	Warsaw, Poland	0700
15125	—	V. of Free China	Taipei, Formosa	1030
	HLK41	V. of Free Korea	Seoul, Korea	0200
15140	GSF	BBC	London, England	1615
15155	WRUL	R. N.Y. Worldwide	New York, N.Y.	0700
15165	—	Idhaat al Jumhuriyah	Damascus, Syria	1100
15190	—	R. Canada	Montreal, Que.	1800
15220	—	R. Pyongyang	Pyongyang, N. Korea	2300
15258	—	R. Tananarive	Tananarive, Malagsay Rep.	1100
15260	GSI	BBC	London, England	1500
15315	—	U.N. Radio	Monrovia, Liberia	0200
15320	—	R. Canada	Montreal, Que.	1615
15345	BED49	V. of Free China	Taipei, Formosa	2150
15370	ZYC9	R. Tupi	Rio de Janeiro, Brazil	1500
15375	—	R-TV Marocaine	Rabat, Morocco	0900
15383	CXA60	R. Sarandi	Montevideo, Uruguay	1530
15385	WRUL	R. N.Y. Worldwide	New York, N.Y.	0700
15410	—	BBC	London, England	0600
	ETLF	R. V. of Gospel	Addis Ababa, Ethiopia	0830
15425	PCJ	R. Nederlands	Hilversum, Netherlands	0930
15440	WRUL	R. N.Y. Worldwide	New York N.Y.	0900
17720	—	R. Liberty	Taipei, Formosa	1730
17730	WRUL	R. N.Y. Worldwide	New York, N.Y.	1000
17740	GRQ	BBC	London, England	1500
17745	—	R. Peking	Peking, China	0120
17780	—	R. Liberty	Taipei, Formosa	1730
17810	PCJ	R. Nederlands	Hilversum, Netherlands	0930
17835	KA2XFW	(radar signal)	Pullman, Wash.	1407
17839	—	V. of Islam	Jeddah, Saudi Arabia	0940
17845	WRUL	R. N.Y. Worldwide	New York, N.Y.	0700
17870	GRP	BBC	London, England	1500
21540	—	R. Prague	Prague, Czech.	0300

A Light for Safety

Continued from page 46

the lamp, you can eliminate items H, I, and L in the materials list and place a ½-inch conduit bushing (same as the one shown (E) in the drawing) over the lower end of the three-foot length of rigid conduit (G) which supports the lamp fixture. Lead-covered underground cable is quicker and easier to install —where your electrical code allows you to use it—and more economical since it costs slightly less per foot than the conduit alone (without wire).

Painting. When completed, the entire above-ground portion of the installation (including the hubcap) must be painted. All metal parts should receive two coats of aluminum paint or a good grade of outside, oil-base paint of green to match the shrubbery or a color to match the house or the patio furniture. Remember to paint the inside of the hubcap white or aluminum for more reflected light.

Not only does this little fixture fulfill its purpose perfectly but it is most economical to operate. Even burning throughout each night the power consumption of a 10-watt bulb figures out to about 10¢ a month! Higher-wattage lamps would add a few more pennies each month.

This fixture has proven so attractive, both day and night, that several more hubcaps were procured and made into additional fixtures to illuminate several garden areas. Many guests and other visitors have made admiring comments about the fixtures.

A Bonus. In addition to serving as a step and garden light, during the Christmas-holiday season the normal lamp bulbs are replaced with red and green bulbs for a festive effect.

The sturdy hubcaps can be replaced with any one of a large number of plastic items—such as inverted translucent waste baskets, bowls, serving trays—that never need painting. To keep from attracting many flying insects, at night, use yellow lamps and translucent plastics. Use different length pipe nipples (D) to adjust height of reflector above lamp. Aluminum foil can be used to line inside of reflector—keep it smooth for concentrated light and wrinkle it for diffused light. ■

PARTS LIST

A—½-inch galvanized pipe cap (Hdw)
B—Automobile hubcap (or whatever pleases your fancy)
C—½-inch rigid conduit locknut (galvanized) (Elect)
D—2 by ½-inch galvanized-iron pipe nipple (Hdw)
E—½-inch rigid conduit bushing (galvanized) (Elect)
F—Utility outlet box, surface mount (galvanized) (Elect)
G—½-inch galvanized-iron rigid conduit (3-feet or length to suit installation) (Elect)
H—½-inch galvanized-iron rigid conduit (length to reach power source—see text) (Elect)
I—½-inch condulet (type LB) (Elect)
J—Cover plate for single utility box (with single lamp socket) (Elect)
K—10-watt (or larger) light bulb
L—Blank cover with gasket (for condulet I)

Estimated cost: $4.00
Estimated construction time: 1 hour

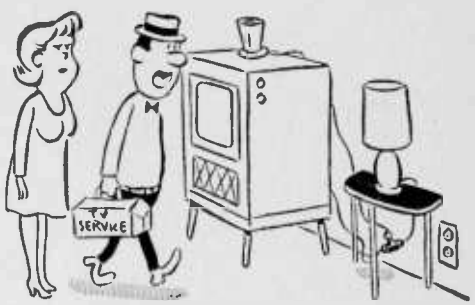
Estimated cost does not include additional conduit, wire or underground cable required to reach power junction box. Elect—means that item is an electrical supply; Hdw—is hardware or plumbing supply item.

Positive Feedback

Continued from page 10

It is even possible to reproduce the speaker's original accent though only as a loud husky whisper. Only one or two hours practice are required for perfect operation.

The Faraday Artificial Voice consists of a noise generator and a transducer powered by a rechargeable battery. The transducer picks up vibrations from the throat and sends them to the generator, which is carried in a shoulder holster. ■



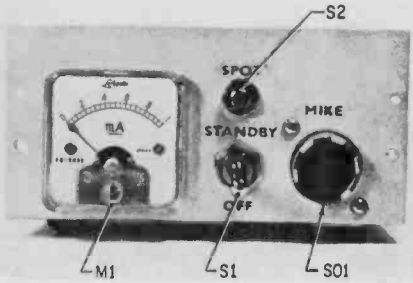
"Lady, I think I see your trouble already!"

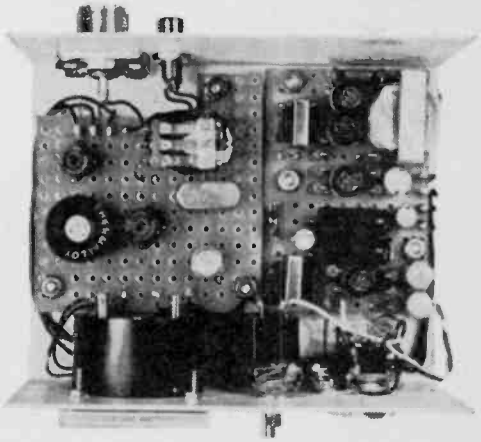
6-Meter Transmitter

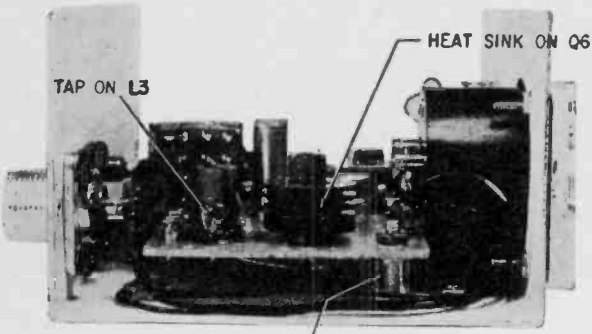
Continued from page 36

as little as $18.00—quite easy on the wallet.

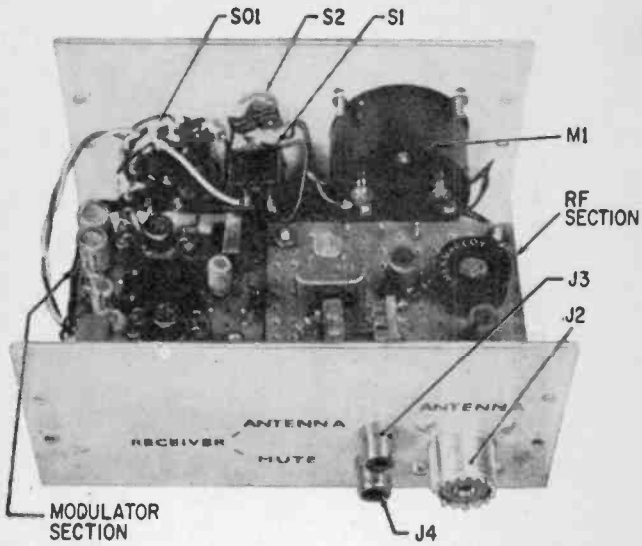
Special mention must be made of the fact that the transmitter described in this article may be legally operated by those persons holding a valid Technician, or higher class, amateur license. ■







Top view of completed 6-meter transmitter is shown above and the front panel view is at its left. Beware of using miniature microphone jacks—they are delicate and can be difficult to replace in an emergency. Be sure to place heat sink on Q6 before applying power to unit.



Rear-panel view and a partial view of the innards (right) shows back-of-front-panel wiring. Antenna jack J3 is for interconnecting the whip antenna (in J2) to matching 6-meter receiver (see text). When testing transmitter a dummy load or antenna must be connected to J2 or transistor Q6 will be damaged. Q6 will also be damaged if the heat sink is not in place to absorb heat generated in semiconductor-wafer junction.

It Can Be Done!

continued from page 55

basic material is zinc orthosilicate. Nowadays it is made synthetically and this is a sizable industry. But then nobody was making it and the stuff just couldn't be bought. In the evenings and on weekends DuMont and his chemist brother-in-law would take gunny sacks up to the old zinc mine not far from the factory, to buy chunks of *willemite* to grind and sift out what they needed."

Faith and Work. Reminiscing, Koch said, "What I remember most was the man's drive. No matter how hard you worked, he worked harder.

And in spite of the odds, it wasn't long before the hard work and faith started to pay off. With dogged persistence, DuMont improved the cathode ray tube until it would operate 1,000 hours, and could be produced at a fraction of its original cost. He even dabbled with adding color, placing colored phosphor dots on its faceplate.

But in the year 1932 there just wasn't any market for the tube, no matter how hardy. DuMont realized he would have to create a market, offered it to schools and universities thinking if young men going out into industry knew the tube they would spread its reputation. By the end of his second year (first year netted two sales of $35.00 each) —he had piled up sales of $1920.00, with only a $25,000 overhead.

Can Be Done. But he had proved the cathode ray was a practical, working tube and it could be sold!

As sales increased, so did his expenses. More money was needed and again DuMont found a solution. He invented a small electronic gadget he dubbed a "magic eye," an indicator that could gauge if a radio was tuned properly. This he sold to RCA for $20,000.00 and with this windfall, bought an old rat-infested pickle factory, and increased his payroll to 42 people.

With the dollars left he went to Europe to see what English, French and German engineers were doing about television. This trip convinced him television had a commercial future, and when he came back, he started manufacturing sets. This was in 1937. In 1938, he sold the first all-electronic television receivers ever marketed in America. At the same time, he built an experimental transmitter in his Passaic plant, started regular TV programming for the home viewers.

Stock Sale. To answer his financial and expansion problems, he sold 56,000 shares of his stock to Paramount Pictures for $56,000 (stock that was worth 135 times that amount within ten years) and built Station WABD. But in spite of deals and borrowing and expansions, DuMont's money troubles lasted until war started.

Radar. True, he had fashioned a radar system based on his cathode ray tube but the Signal Corps asked him not to patent it for "security reasons" and when he finally did try, found someone had beat him to that patent punch. But World War II brought explosively expanding markets for DuMont's inventions. Suddenly the cathode ray tube was in frantic demand. The United States Government paid him $750,000 to teach other companies how to produce the tube, then took back all except 5% in taxes, left him with a raft of competitors.

But nothing daunted DuMont. His persistent can-win determination multiplied when war ended, and he poured his tremendous energies into transmitter, tube and television receiver production, organized a television network between New York, Washington, and Pittsburgh.

Success. In the first peacetime year, 1946, DuMont factories produced and sold $2,290,000 worth of television products. The following year, $11,000,000. In 1948, he more than doubled to $26,000,000 and by 1949 reached $1,000,000 a week, a total of $55,000,000 for the year. Earnings soon reached $75,000,000 a year!

American Television Society cited him. Television Broadcasters Association followed. He won the Marconi Memorial Medal of Achievement, the Gold Medal of the American Association for the Advancement of Science, was chosen by a Forbes Magazine poll as one of the twelve foremost business leaders of America.

And probably most poignant of all: American Schools and Colleges Association tended their Horatio Alger Award.

Merge. In July of 1960, DuMont merged his Allen B. DuMont Laboratories with Fairchild Camera and Instrument Company in Clifton, New Jersey, sold his television broadcasting properties to Metro-Media.

And his last days were spent as Senior Consultant to Fairchild, until on November 15, 1965, after a short illness, he died in New York, his life an inspiration to the person who says, *it can be done!* ■

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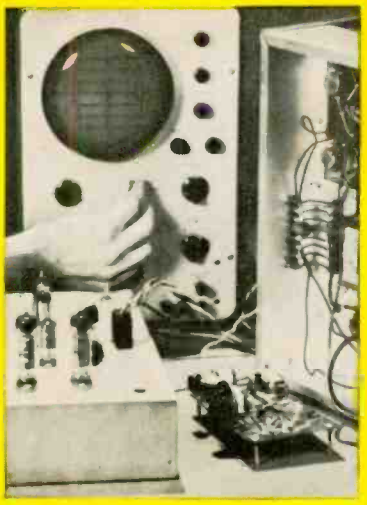

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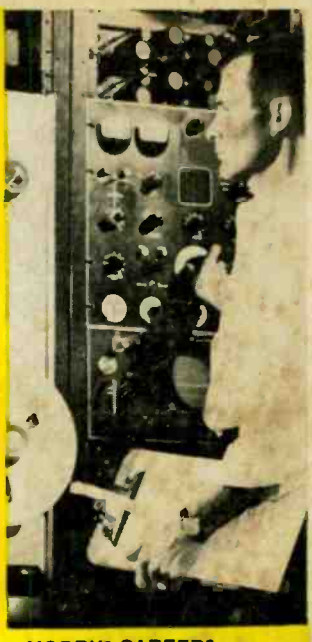

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