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New Model 779 Sentinel 23 CB Transceiver. 23-channel frequency synthesizer provides crystal-controlled transmit and receive on all 23 channels. No additional crystals to buy ever! Features include dual conversion, illuminated S RF meter, adjustable squelch and noise limiter, TVI filter, 117VAC and 12VDC transistorized dual power supply. Also serves as 3.5 watt P.A. system. **$169.95 wired.**

New Model 712 Sentinel 12 Dual Conversion 5-watt CB Transceiver. Permits 12-channel crystal-controlled transmit and receive, plus 23-channel tunable receive. Incorporates adjustable squelch & noise limiter, & switches for 3.5 watt P.A. use, spotting, & Part 15 operation. Transistorized 12VDC & 117VAC dual power supply. $99.95 **wired only.**

New Model 753 The one and only SSB AM CW Tri-Band Transceiver Kit. "The best ham transceiver buy for 1966"—Radio TV Experimenter Magazine. 200 watts PEP on 80, 40 and 20 meters. Receiver offset tuning, built-in VOX, high level dynamic ALC. Unequaled performance, features and appearance. Sensationally priced at **$179.95 kit, $299.95 wired.**

STEREO/HI-FI

New Model 3566 All Solid-State Automatic FM MPX Stereo Tuner/Amplifier. "Very satisfactory product, very attractive price"—Audio Magazine. No tubes, not even nuvistors. Delivers 112 watts IHF total to 4 ohms, 75 watts to 8 ohms. Completely pre-wired and pre-aligned RF, IF and MPX circuitry, plus plug-in transistor sockets. **$219.95 kit (optional walnut cabinet $14.95), $325.00 wired including walnut cabinet.** UL approved.

Model ST70 70-Watt Integrated Stereo Amplifier. Best buy of highest ranked stereo amplifiers according to independent testing. $99.95 kit, $149.95 wired. ST40 40-Watt Integrated Stereo Amplifier. $79.95 kit, $129.95 wired. ST97 Matching FM MPX Stereo Tuner, $89.95 kit; $139.95 wired.

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RADIO-TV EXPERIMENTER

Cover Photo
by Don Lothrop

February-March 1966
CONTENTS/INDEX

☆Cover Highlights

50 EASY TO BUILD
PROJECTS

FEBRUARY-MARCH 1966

RADIO-TV EXPERIMENTER

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RADIO-TV EXPERIMENTER, Vol. 20, No. 1 (#772), is published bi-monthly by SCIENCE & MECHANICS PUBLISHING CO., a subsidiary of Davis Publications, Inc. Editorial, business and subscription offices: 505 Park Ave., New York, N. Y. 10022. One-year subscription (six issues)—$4.00; two-year subscription (12 issues)—$7.00; and three-year subscription (18 issues)—$10.00. Add $1.00 per year for postage outside the U.S.A. and Canada. Advertising offices: New York, 505 Park Ave., PL-2-6200; Chicago: 520 N. Michigan Ave., 527-0330; Los Angeles: 6253 Hollywood Blvd., 213-463-5143; Atlanta: Pirnie & Brown, 3108 Piedmont Rd., N.E., 404-233-6729; Long Island: Len Osten, 9 Garden Street, Great Neck, N.Y., 516-487-3305; Southwestern advertising representative: Jim Wright, 4 N. Eight St., St. Louis, CH 1-1965.

EDITORIAL CONTRIBUTIONS must be accompanied by return postage and will be handled with reasonable care; however, publisher assumes no responsibility for return or safety of manuscripts, art work, or photographs. All contributions should be addressed to the Editor, Radio-TV Experimenter, 505 Park Avenue, New York, New York 10022.

Second class postage paid at New York, New York and at additional mailing office.

POSITIVE FEEDBACK

Julian M. Sienkiewicz, Editor
WA2CQL/KMD4313

■ A computer recited part of Hamlet's soliloquy before an august gathering of scientists, and earned their applause by singing in tune, if with a somewhat mechanical voice, a chorus of "Daisy." The significance of this performance by a computer was that it *synthesized speech*. It actually spoke and sang. It did not merely repeat or play back as the tape recorders do.

Dr. Peter B. Denes of the Bell Telephone Laboratories used a tape recording of his computer's voice to dramatize to an International Business Machines Corporation scientific symposium here how computers have become *one of the most important tools in speech research.*

With computers, Dr. Denes said, "we have been able to generate artificial speech from its basic building blocks, called phonemes, which are somewhat like letters are to written language. What makes speech infinitely more difficult to analyze, however, is that the phonemes change when put in different contexts."

Dr. Denes told the 150 scientists attending the computer seminar at the Thomas J. Watson Laboratories that because "we all produce and perceive speech with so little effort, we instinctively feel that it must be an unusually simple process. On close examination it defies explanation and seems almost miraculous."

I hate to quibble with the good doctor, but I am sure that the readers of RADIO-TV EXPERIMENTER will agree with their Editor that synthesized speech is only the beginning. We now have computers that can "think," and if man can continue to improve computers, the machines will be able to think well enough to learn how to talk. It may be difficult to imagine a machine issuing forth baby talk and then maturing to an eloquent Winston Churchill or humorous Jacky Gleason, but it is in the cards. It may take a score of years, but don't be surprised if man compresses the clock into a decade.

Happy Birthday. It isn't very often the Editor takes time out to congratulate a business on its twentieth birthday, but he would like to make an exception for EICO Electronic Instrument Company. Most of us look at companies as

(Continued on page 12)

(Continued from page 10)

impersonal organizations that somehow produce the products we want and cash the checks we send them. This EICO does, but they go beyond the scope of ordinary business. Many years ago before I entered the editorial field I was like many of my readers today—a kit builder. I had the first high-fidelity set in the neighborhood made from EICO kits long before my next door neighbor knew what hi-fi was. And like some kit builders, I goofed in the construction. What to do? I sat down and wrote a letter to EICO telling them of my troubles. Back came a letter listing all the faults that could cause the trouble symptoms my setup had. Sure enough, a cold solder joint in the feedback circuit was the villain. This one letter typed by a technician (not a form letter) made me realize that there were humans behind those letterheads. And with this kind of company attitude toward its customers, no wonder EICO is enjoying its twentieth birthday.

So, happy birthday, EICO, and let me add my special good wishes to Harry R. Ashley, EICO's president, and Philip A. Portnoy, Executive Vice President—the pair that sired countless kits.

Wet-Cell Mouth. Our overseas cousins reported in the British Medical Journal that weak electrical currents in the mouth play an important part in corroding metallic fillings. When dissimilar metals, such as gold or amalgam, come into contact within the mouth, electrical currents are developed. If these fillings are in opposing teeth, a short-circuit that may cause a sharp pain develops when the mouth is closed. (That makes the jaw an s.p.s.t. switch.) When the tongue touches fillings made of dissimilar metals, the current passing through may cause a burning sensation. This may be one of the possible causes of *leucoplakia*, a thickening and overgowth of mucous membranes that sometimes leads to cancer. If proven true, dentists may switch over to ceramic or plastic filling with gold caps becoming a thing of the *dark ages*.

"Stereo transistors!
What will he think of next?"

Class C CB News. Unhappy marriages we've heard of, but the marriage of Class C (radio control) CB'ers and Class D (voice communications) operators on one band has proven to be one of the most unhappy domestic relationships since the Hatfields and the McCoys.

The Class D operators have long complained about the "boop boop" radio control signals which were taking up five channels worth of much needed communications space.

Class C operators, on the other hand, said that the talkative Class D operators were generating so much interference in their model ship and aircraft receivers that many were lost as a result.

It now appears that something may be done to alleviate the heated tempers on both sides of the fence. It seems that the Academy of Model Aeronautics has requested that the FCC establish five additional channels for radio control of model aircraft, these channels to be located on 72 mc.

This would mean an extension of the Class C operating privileges, as the FCC has been asked to let the existing 27 mc. R/C channels remain for the model users, should they still find the need for them.

These five new 72 mc. channels would create what amounts to a "private" band for the model aircraft fanciers—far away from the Class D ack-ack guns which (they claimed) were costing them many of their finest flying machines. Indeed, we know of one Class D CB'er who boasts that he "shot down" seven model aircraft during one single skip contact—for this feat he received the coveted Iron Ground Plane medal, Second Class.

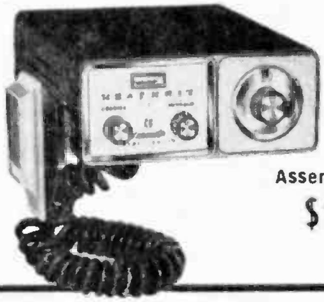
Meanwhile, back at the FCC, at least one major manufacturer of commercial two-way radio equipment ran for the aspirin bottle at the prospect of model aircraft being given frequencies in the 72 mc. band. It seems that with a severe shortage of frequencies for commercial VHF communications, the 72 mc. channels are a coveted prize—perhaps too highly desired by industry to be "given away" for model aircraft hobby use.

Yet another cry of woe has come from those hobbyists who sail radio controlled model ships, and the users of 27 mc. automatic garage door opening devices. They are crying "foul" and "sell out" because they don't seem to be part of this master plan to give the aircraft hobbyists their own exclusive channels.

While creation of these five new 72 mc. radio control channels will not remove the R/C from the 27 mc. Class D band, we hope that the new channels will attract so many model aircraft users that the FCC will see its way to shifting all radio control operations to the new band, thereby creating five channels which might then be given over to Class D stations. Perhaps one of these channels could be assigned to low power (Part 15) CB hobby use, which would include the use of CW (code). ■

How To Have Fun While

New 23-Channel 5-Watt All-Transistor CB Transceiver

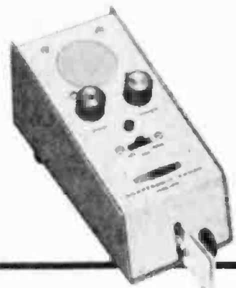


Kit GW-14
$89.95

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 $2\frac{7}{8}$" H x 7" W x $10\frac{1}{2}$" 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.

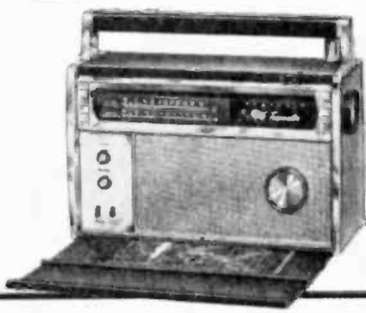
New Fully Automatic Electronic CW Keyer



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 All-Transistor, 10-Band SWL Portable



Kit GR-43
$159.95

10 bands tune longwave, broadcast, FM and 2-22.5 mc shortwave. 16 transistors, 6 diodes, 44 factory-built & aligned tuned circuits. Two separate AM & 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.

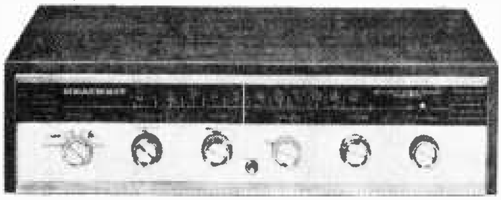
New Deluxe 5-Band SSB Ham Transceiver

Kit SB-100
$360.00

Full SSB-CW transceive operation on 80-10 meters. 180 watts PEP SSB—170 watts CW. Switch select for USB/LSB/CW operation. Operates PTT and VOX; VOX operated CW with built-in sidetone. Heath SB series Linear Master Oscillator (LMO) for true linear tuning. Mobile or fixed operation with appropriate power supply. 23 lbs. . . Accessory mobile mount, SBA-100-1 . . . $14.95.

You Save...Build A Heathkit®!

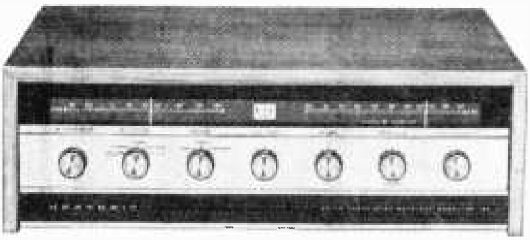
New 30-Watt Transistor FM Stereo Receiver



Kit AR-14 $99.95 (less cabinet)

31 transistors, 11 diodes for transparent transistor sound; 20 watts RMS, 30 watts IHF music power @ ±1 db, 15-60,000 cps; wideband FM/FM stereo tuner, two pre-amplifiers, & two power amplifiers; compact 3⅞" H x 15¼" W x 12" D size. Assemble in around 20 hours. Mounts in a wall, or optional Heath cabinets (walnut $9.95, beige metal $3.95). 16 lbs.

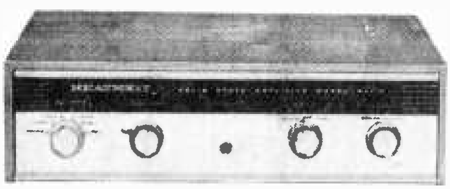
66-Watt Transistor AM/FM Stereo Receiver



Kit AR-13A Now Only $184.00

Just add 2 speakers for a complete stereo system. Boasts AM/FM/FM stereo tuning; 46-transistor, 17-diode circuit for natural transistor sound; 66 watts IHF music power (40 watts RMS) at ±1 db from 15-30,000 cps; automatic switching to stereo; preassembled & aligned "front-end" & AM-FM IF strip; walnut cab. 35 lbs.

New 30-Watt Transistor Stereo Amplifier



Kit AA-14 $59.95 (less cabinet)

17 transistors, 6 diodes; 20 watts RMS, 30 watts IHF music power @ ±1 db 15-60,00 cps. Accommodates phono, tuner, auxiliary . . . 4, 8, 16 ohm speakers. Bookshelf size: 10¼" D x 3" H x 12" W. Install in a wall, or Heath cabinet (walnut $7.95, beige metal $3.50). 10 lbs. . . . Matching FM/FM stereo tuner available @ $49.95.

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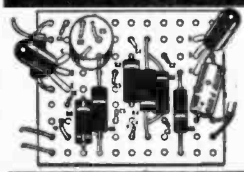
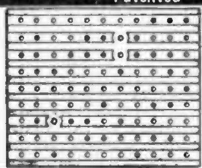




PITCHING PUTTER

■ New mechanical practice putting green, called *Roputt,* can be adjusted to an infinite number of tilt and slope angles. The grass-like top of the 9 by 4-foot green, endorsed by Arnold Palmer, simulates the feel and speed of creeping bent.

For more information on *Roputt,* which operates on 115 volts, lists under $350, and weighs about 175 lbs, write Wichman Industries, 7110 South France Ave., Minneapolis, Minn., 55410. ■

Microswitch pushbuttons control motor-driven jacks to adjust tilt and slope of green.

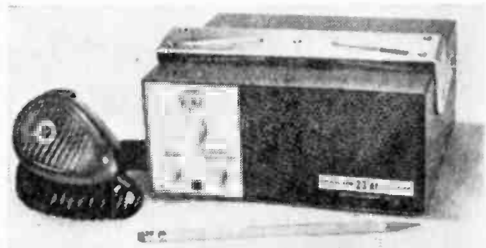
cb RIGS AND RIGMAROLE

■ This go-round we have a new solid-state transceiver, the most *gung-ho* antenna ever to be seen zipping down the highway, and a little gadget that promises to make your mobile unit sound like a base station. Interested? Well, let's go!

Full 23. Our transceiver is from an outfit with the handle of Squires-Sanders, this is the company which manufactures Clegg equipment for the Ham bands—and any VHF Ham operator can attest to the superior quality of every piece of gear which emerges from Clegg's production line. Anyway, as their world premier in the CB field, Squires-Sanders offers a rig called the "23'er," which has (you guessed it), 23 channels and is designed for mobile and base station CB'ing.

Pumping out a full five watts, the 23'er comes factory equipped with crystals for all channels (what, no crystal synthesizer?) plus the following other features: 23 silicon transistors, 6 diodes, 1 Zener diode, supersensitive receiver, 4 watts of receiver audio, Squires-Sanders special speech booster in the modulator, transmit light, and a provision for instant conversion to PA service—but there's more!

This rig has one of those "noise silencer circuits" which everybody is talking about these days. The circuit really goes to town



Squires-Sanders, Inc. Model 23'er 23-Channel Citizens Band Transceiver

on ignition noise and completely eliminates it—not just gives it a once over lightly with a slight clip as in many of the standard noise limiters. The manufacturer says that in spots where a weak CB signal cannot be read, the 23'er can still hear 'em—and well too!

Besides the fact that this circuit gives you a sharper CB rig than normal, it probably saves you a good $30 for having your car's ignition system *de-noised,* which won't be necessary with the 23'er.

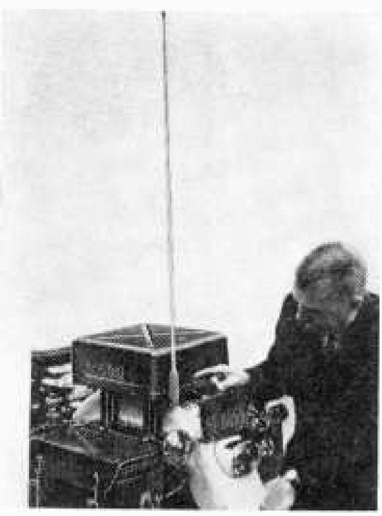
The rig operates from any vehicle with a 12 volt negative ground electrical system (that's just about every American car today) or from 115 volts AC when used in conjunction with an optional AC power supply.

Weight is a scant 4 pounds, and the compact unit measures 8″ by 3½″ by 7″.

In the price department, the 22'er goes for $235, including ceramic mike, mobile mounting bracket, and all crystals. The AC power supply is $24.50.

For further details, drop a line to Squires-Sanders, Inc., Martinsville Rd., Millington, N. J. 07946.

Adds Color to CB. Our wild, wild, antenna comes from The Antenna Specialists Company, 12435 Euclid Avenue, Cleveland, Ohio 44106.



Antenna Specialists Co. "Colorguard" Fluorescent Orange CB Antenna

This antenna is the Colorguard, and is actually a whole series of antennas, rather than just one single sky hook. These antennas are produced in a brilliant fluorescent "International Emergency Orange" material—some in fiberglass, others in steel which is encased in plastic orange jackets.

Originally conceived for police work on radio equipped motorcycles, the idea met with such outstanding official reception in the experimental stages that it was quickly worked up for other frequencies. The CB versions have already created quite a bit of happy talk among CB clubs and REACT teams.

At a recent "sneak preview" of the CB version in Fairfax, Va., six mobile units were equipped with Colorguard antennas and tested under a variety of traffic conditions. Public safety officials expressed considerable interest in the antennas.

Your editor has seen these antennas and must admit that he hasn't ever seen anything quite like them before. The color is a dazzling orange which can be seen at great distances. It immediately identifies any mobile unit as being one equipped for emergency radio communications. Although Antenna Specialists make no claims for the other benefits of their Colorguard antennas, your editor found that they make an eyecatching addition to your car when trying to seek it out in a crowded parking lot.

It Makes Your Antenna 10-Feet Tall. The Dyna-Power, a solid state antenna booster, is a multi-purpose device which sounds like the answer to a CB'er's prayer. Tied up in a little package, smaller than

Dyna-Comm Products "Dyna-Power" Solid-State Standing-Wave Reducer

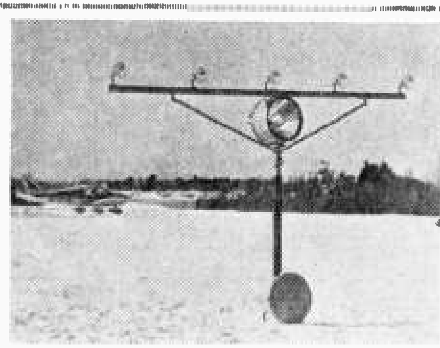
a frozen juice can, we have something which offers the following features: increases power by reducing SWR, gives you more range, decreases noise and static, has a built-in RF and modulation indicator, and a lightning arrestor.

The unit requires no external power and installs by simply inserting it in your mobile antenna lead. It's water tight and ruggedized.

Price is $9.95 from Dyna-Comm Products, 4860 N.W. 2nd Avenue, Miami, Fla. 33127. If you write to them, they'll send you some data on the Dyna-Power and also data on one of their other products called the Dyna-Filter which eliminates noise from your car's generator brushes or voltage regulator.

Dyna-Comm Products "Dyna-Filter" Car Generator Noise Suppressor

We'll be back next issue with late news on some of the highlights appearing on the CB scene. Until then, we'll be CB'ing you! ■



Lighting System For Small Airports

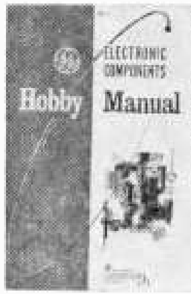
The aviation lighting unit shown above is part of a low-cost electronic flash and approach lighting system for small airports made by Sylvania Electric Products Inc. The system consists of a series of the units, ranging from 10 to 28, spaced 100 feet apart down the centerline approach path to the runway. Each unit is equipped with a five lamp incandescent light bar and a powerful condenser discharge light. By means of a master timer, the condenser discharge lights flash in sequence from the outer light bar towards the runway threshold, providing the pilot with long-range centerline line-up even under low visibility conditions.

BOOKMARK

by Bookworm

■ There was a time when important electronic book titles never reached the book stores because authors did not have the information on hand. More so, the task of writing these titles usually was greater than the efforts one man could muster. So, electronic companies have become book publishers and with their resources they have grouped the efforts of many professions to produce a title ,that normally would take several years in the making. Three such companies are Motorola, General Electric and Allied Radio. Considering the effort put into the texts reviewed in this issue of RADIO-TV EXPERIMENTER as well as the quality of the end results, the prices asked for these texts are very low. To prove a point here are reviews on three titles everyone should have on their bookshelves. You would have to go far and wide to equal them with a library of several volumes—if they could be had.

Hobby Manual. Want a light that dims gradually at a pre-determined time—just right for the bachelor's den or the children's bedroom? Or an electronic organ the size of a typewriter that gives off melodious tones when plugged into your hi-fi? Or an airport receiver that lets you eavesdrop on conversations between pilot and control tower? Or a second ignition system to improve gas mileage and assure quick winter starts?



200 pages
Soft cover
167 illus.
$1.50

The General Electric Electronic Components Division's Hobby Manual, believed to be the most comprehensive hobby manual ever produced by a major electronic components manufacturer, tells you how to make them. Expanded in size and scope from last year's 50-page G. E. Silicon Controlled Rectifier Hobby Manual which concentrated on simple circuitry using silicon controlled rectifiers, the new manual utilizes a wide range of components: transistors, vacuum tubes, reed switches, thyrectors, thermistors, capacitors and photo-conductors, as well as silicon controlled rectifiers. It also has 45 pages explaining in layman's language the fundamental operation of these components.

There's a step-by-step explanation for making the automatic lamp dimmer utilizing a triac, three transistors and several diodes. It will amaze the girl friend when it's time for romance or help the youngsters fall asleep in a gradually darkening room.

The eight-key organ employs a simple circuit with a unijunction transistor which permits manual raising or lowering of the octaves. The airport receiver uses two transistors, two penlight cells, some wires and a plastic box. And the electronic ignition system, as an alternative to the normal system, works off the existing coil and breaker points thanks to a silicon controlled rectifier.

There are 35 projects in all ranging from the gimmickry of a magic lamp that turns on and off with a magnetic wand to such handy items as a one-compactron, all-band short wave receiver; a thermistor thermometer with remote control and alarm, and a battery saver employing one resistor and one silicon controlled rectifier.

The manual may be obtained from authorized distributors for General Electric electronic components or from the G-E Warehouse, Dept. RPG, 3800 North Milwaukee Ave., Chicago.

Your First Measurements. The VOM (volt-ohmmeter) and the VTVM (vacuum-tube-voltmeter) are probably the most useful and most commonly used instruments for electronic/electrical measurements. Now Allied Radio has published a compact, clearly written, well-illustrated booklet, "Best Ways to Use Your VOM and VTVM".

The information supplied will enable anyone, even a beginner, to locate most of the common troubles in electronics and electrical equipment. The text, assuming little knowledge on the part of the reader, tells exactly how to connect VOM's and VTVM's for measurement of voltage, resistance, current.

Bookmark

With a brief coverage of basic principles, emphasis is on the important features of the instruments, how they work and how they are used. Photos and drawings show connections for various measurements, how to set switches and controls, and what scales to use. Applications discussed cover measurements that can be made around the home on television and radio sets, and hi-fi, Citizens Band and Amateur Radio equipment.

Tests and measurements are explained for resistors, capacitors, coils, diodes, transistors, fuses, motors, lamps, batteries and switches. Miscellaneous applications cover use of a VOM and VTVM as a tachometer, temperature indicator, salinity tester, soil tester, relay tester, and for tape recorder bias measurement. A chapter on care, repair, adjustment and calibration of these two instruments is also included. Available for fifty cents, postpaid in the U.S.A., from Allied Radio Corp., 100 N. Western, Chicago, Ill., 60680.

96 pages
Soft cover
75 illus.
50¢

Largest Of Its Kind. A new 908-page bound volume Semiconductor Data Manual has been published by Motorola Semiconductor Products Inc. Technical data and specification for more than 2600 semiconductor products, application selector guides and general semiconductor information combine to make the Semiconductor Data Manual the most complete semiconductor reference available. No mere listing of type numbers, the Semiconductor Data Manual provides complete electrical and thermal characteristics for each device type. In addition, many design and parameter curves are given.

To simplify application problems, many selector charts indicate recommended device types for specific electrical conditions and circuit requirements. For example, the high-frequency transistor section alone contains five separate selectors: silicon high-speed switching, germanium high-speed switching, silicon medium-speed switching and general purpose amplifier, RF, and small-signal amplifier and switching transistors.

898 pages
Soft cover
$3.50

As an aid to the user, the Semiconductor Data Manual is arranged in device-application sections such as high-frequency transistors, power transistors, silicon controlled rectifiers and gate controlled switches, zener and reference diodes, and integrated circuits. Altogether, there are ten device sections. For those occasions when it is necessary to locate a device by type number alone, there is a comprehensive alpha-numeric index.

As an aid in applying semiconductors, an additional section of the Semiconductor Data Manual is given over to applications data and technical information such as: How to Get More Value Out of a Transistor Data Sheet, Understanding Transistor Response Paraments and High-Power Varactor Diodes —Theory and Application.

The true scope of the Semiconductor Data Manual is partially indicated by considering the coverage of just a few of the device sections. For example, the zener and reference diode section provides complete specifications on some 911 basic zener diode types, 162 temperature compensated reference diodes and 48 reference amplifiers. Among the nearly 650 transistors listed in several sections are 262 high-frequency types, 159 power transistors and 84 low-power, low-frequency (milliwatt) transistors, plus field effect transistors and multiple transistors.

The silicon rectifier section describes some 181 devices with current ratings to 1000 Amperes. The rectifier assembly section includes more than 400 types. The silicon controlled rectifier section covers 192 scr's plus gate controlled switches.

The Semiconductor Data Manual is available at $3.50 per copy from the Technical Information Center, Motorola Semiconductor Products, Inc., Box 955, Phoenix, Arizona 85001. ■

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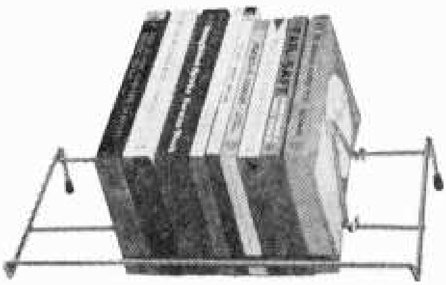
Paperback Bookrack

Here is the handiest, most versatile bookrack ever designed for your desk-top electronic paperback books and magazines. Holds one or as many as thirty paperbacks. This sturdy paperback rack becomes full sized bookrack simply by turning around, can also be used for displaying '45 records or tapes. Has these "more for the money features": adjustable—self locking bookends fold flat when not in use—angled to secure and make viewing easy. Ideal place for often read books. Handsome brass plated finish with non-marring legs—compact sturdy construction. Excellent for paperbacks; copies of RADIO-TV EXPERIMENTER, ELEMENTARY ELECTRONICS, RADIO-TV REPAIRS; or electronic reference texts you would like to keep on your desk top. Price: \$1.49 postpaid. For more information or to place orders write to CEL Products, Dept. EGD, 865 N. Sangamon, Chicago, Ill. 60622.



CEL Products Paperback Bookrack

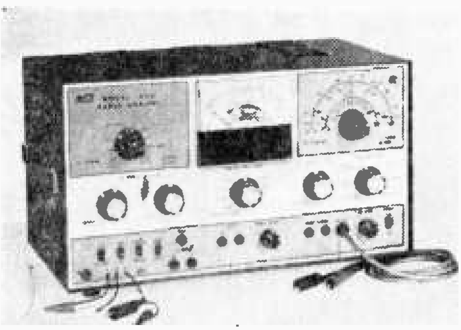
Transistor Radio Servicing Made Easy

AM and FM auto and transistor radios can now be serviced with higher profit with the Dynascan B&K Model 970 Radio Analyst. The new all solid-state instrument increases repair profit potential through combining all the necessary functions needed to repair these radios into one time saving unit. It is complete with power supply, in-circuit and out-of-circuit transistor tester, RF and audio signal generators, and a rugged volt-ohm-milliammeter.

The Model 970 Analyst employs an in-circuit signal injection procedure that functions on either power or signal type transistors through introducing a dc test signal into the transistor stage and reads good/bad

NEW products

directly on the built-in meter. No circuit alterations or removal of transistors is necessary for this test. This is the first instrument to have the capability of checking power transistors in this manner. Transistor Beta and Leakage may be read directly on the meter scales if the transistor is tested out-of-circuit. The built-in power supply provides 1½ to 12 volts for battery substitution and a separately variable 1½ to 12 volts for bias. For additional information see your *B&K distributor or write to B&K Manufacturing Company, Dept. MCA, 1801 West Belle Plaine Avenue, Chicago, Illinois 60613.*



Dynascan B&K Model 970 Radio Analyst

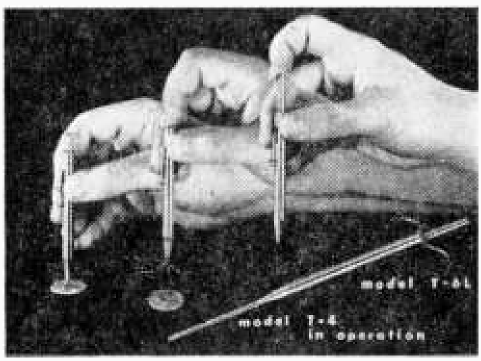
Triceps—A Universal Hand Tool

This remarkable, all stainless steel instrument eliminates many of the problems encountered by those who work with very small, delicate, oddly shaped, or otherwise difficult to handle objects.

Depressing the Triceps plunger causes three resilient, hooked fingers to flare out from the tip. By properly positioning the extended fingers and releasing the plunger, the fingers retract and an object is firmly but gently grasped. It is then a simple matter to position, adjust, retrieve or just hold an object for as long as necessary without maintaining any finger pressure on the plunger. To release, just depress the plunger momentarily.

The Triceps is a vital tool for servicemen, technicians, assemblers, model makers, engineers, inspectors or anyone who is hampered by the limitations of screwdrivers, tweezers, pliers, forceps, small clamps and other conventional tools. This instrument has innumerable uses in clean rooms and in the field of miniaturization. In electronic and precision mechanical work, the positioning and holding of fine wires and most components during soldering and assembly, is made easier and less fatiguing. Many operations in the fabrication of semiconductors, miniature components and modules, are made simpler and safer by minimal contact between tool and part. The Triceps is extremely versatile in positioning, adjusting, and assembling small or irregularly shaped parts and is the ideal means of retrieving objects dropped into a chassis or mechanical assembly.

Six models are available, ranging in length from 4½ to 18 inches. The T6L and the T8L terminate in a 2″ long needle-nosed segment. This makes it possible to reach into cramped locations that are inaccessible to most other tools. All models are provided with a finger grip, except for the T4 which has a convenient pocket clip. Priced from $2.85 to $5.20. For more information write to *Universal Technical Products Co., P.O. Box 257, Dept. 72-21, Forest Hills, N. Y. 11357.*



Universal Tech. Products Triceps

Shortwave Receiver

Lafayette Radio Electronics Corporation has released a new shortwave communications receiver, the HA-226 which is ideal for the shortwave listener, novice ham, or hobbyist, the HA-226 is a sensitive superheterodyne shortwave receiver with a built-in power supply and a 4″ speaker covering 550 KC through 30 MC in four bands. Features On/Off Volume Control, Band Selector, Main Tuning and CW Phone switch. Illuminated S-meter shows signal strength and correct tuning for best reception. Large slide rule dial with red pointer and 0-100 logging scale facilitate tuning. AVC reduces fading and blasting on distant stations. The unit has front panel headphone jack for private listening, 3 tubes and 2 diodes. Size: 10⅟₁₆ W x 6 H x 8″D. For 110-120 volts, 50/60 cycles AC. The imported receiver is $49.95 from *Lafayette, 111 Jericho Turnpike, Syosset, L. I., N. Y. 11791; the stock No. is 99-2520WX.*

Lafayette Model HA-226 SW Receiver

Free Tape Rack!

The Magnetic Tape Division of Sarkes Tarzian Inc. has announced an unusual offer to introduce tape recorder owners to the fine quality and performance of Tarzian Tape. For a limited time only. Tarzian will give away a good-looking, convenient tape storage rack, absolutely free with the purchase of three reels of Tarzian Tape. This special tape-and-rack package is now available from Tarzian Tape dealers throughout the country. It applies only to Tarzian's standard-play acetate tape, in the 1200 foot (7″) reel, the most popular size and type.

Sarkes Tarzian Tape Storage Rack

The tape rack, especially designed by Sarkes Tarzian Inc., will hold twelve boxed reels of tape, in either 5″ or 7″ size. Although

NEW products

these racks are not for sale separately anywhere, they are equivalent to book and record racks which sell in the $2.00 price category. Although this special offer applies only to standard play acetate tape, Tarzian manufactures a full line of magnetic recording tapes. Included in the Tarzian line are standard and long play acetate tapes, plus long play and extra long play polyester tapes, in all standard reel sizes.

This special premium offer will continue only as long as the current supply of tape racks lasts. So take advantage of this introductory offer immediately. For the name of the nearest Tarzian Tape Dealer, write to *Sarkes Tarzian Inc., Magnetic Tape Division, Dept. DV, East Hillside Drive, Bloomington, Indiana.*

Packed Solid Solid-State PA

Both the size and weight minimum requirements of amplifiers for PA systems have been drastically reduced by the introduction of the new Geloso transistorized amplifiers. These units

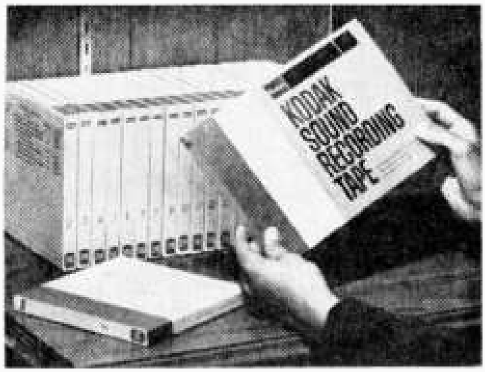
Geloso Transistorized PA Unit

are available in models with outputs of 16 watt, 34 watt or 50 watt, and may be operated from 6- or 12-volt DC batteries or 110-volt AC outlet using a Geloso adapter. Power consumption is low. Separate volume controls are provided for microphone, phono or tape. Dual microphone inputs. Prices for the Geloso amplifiers start at $66.70, professional net. Details and descriptive literature are available from American Geloso Electronics, Inc., Dept. 64, 251 Park Ave. South, New York, N. Y. 10010.

Decor Tape Boxes

Kodak Sound Recording Tape is now available in library box packaging to make the music lover's tape library shelf as attractive in styling as his living room equipment. Designed to harmonize with any decor, the beige-colored boxes have dark brown "bindings" and are protected before purchase by a removable yellow sleeve.

Effective immediately, all five and seven-inch reels of Kodak Sound Recording Tape will be packaged at no extra cost in the new boxes. The tape is available in lengths ranging from 625′ on a Durol base to 3600′ of long-play tape on a polyester base. Smaller reels for portable recorder use will still be available in mailer cartons without a library box design.



Kodak Hi-Fi Tape with Decor Boxes

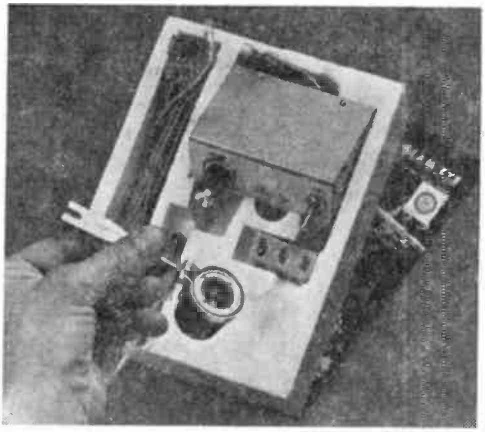
In actual use, the sleeve is removed after choosing a tape for a specific use. When the user is recording, he identifies his recorded selections by using the lines provided on the back of the box. Library-boxed Kodak Sound Recording Tape is available through Kodak photographic dealers, electronic supply houses and department stores.

High & Low It With Transistors

The "Bullitt Beam Eye" is a new automotive headlight dimmer with advanced performance features and lower price than others previously available in the United States. Design provides adjustable control to select the sensitivity desired; automatic dimming for both oncoming headlights and when overtaking red tail-lights; switch for manual operation, and constant override by the regular dimmer switch control.

The electric eye unit of the Bullitt device is a compact photoconductive cell, only 1¼″ in depth, with chromed, swivel bracket for mounting in the windshield area. The control unit is solid-state for trouble-free operation and long life, measuring 1-¾″ x 3″ x 4-⅛″. Brackets, nuts and screws for mounting under the dashboard are provided, together with color coded wires, plug connectors and simple instruction manual giving full installation information. Required installation time is approximately one hour. List price is $32.50. The transistorized "Bullitt Beam

Eye" is distributed through automotive and electronic trade channels handled by Bullitt Northwest, Dept. 74E. 557 Roy Street, Seattle, Wash. 98109.



"Bullitt Beam Eye" Headlight Dimmer

Guitar Amplifier Line

Rheem Califone, a division of Rheem Manufacturing Company, one of the world's largest corporations has entered the guitar amplifier field. All of the new Rheem models feature solid state transistorized circuitry. An engineer for Rheem Califone explained that guitar amplifiers are mobile, and conventional tube-types have difficulty in withstanding the tortures of travel. The aerospace industry has proven beyond a doubt that transistors deliver better sound, with less distortion, and perform with excellence under the most difficult circumstances.

Rheem Califone Model 1910 Guitar Amplifier

True-tone tremolo, a Rheem Califone feature, permits the musician to obtain special sound effects. Extra large speakers, foot controls, a large number of microphone and instrument plug-in outlets, and specialized controls are some of the features to be found on the models. Prices of the

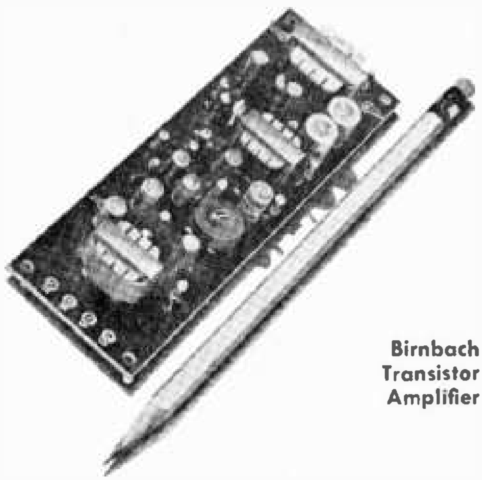
NEW products

four entirely new models range from $85.95 to the highest priced model in the line at $159.95. For more information write to Rheem Califone, Div. of Rheem Mfg. Co., Dept. R63, 5922 Bowcroft Street, Los Angeles, Calif. 90016.

Compact Transistor Audio Amplifier

Now you can build your own stereo, or intercom system, or home alarm with Birnbach's new compact transistor amplifier. It may also be used for a public address amplifier, electronic stethoscope, utility amplifiers, science projects, modulation for transmitters.

Featuring a low distortion of 400 milliwatt push-pull output and an extremely high gain of 800 db, it is built to handle low level mikes, phono pickups, telephone pickups, etc. The printed circuit amplifier consists of:



Birnbach Transistor Amplifier

a volume control; 5 transistors, 1 thermistor; a shielded input transformer with two primary windings, one for 50 ohms and one for high impedance; and an output transformer with two secondary windings, 8 ohms (for speakers), 500 ohms (for modulation and high impedance loads).

(Continued on page 93)

ASK ME another ?

By Leo G. Sands

RADIO-TV EXPERIMENTER *brings the know-how of electronics experts to its readers. If you have any questions to ask of this reader-service column, just type it on the back of a 4¢ postal card and send it to "Ask Me Another,"* RADIO-TV EXPERIMENTER, *505 Park Avenue, New York, New York 10022. The experts will try to answer your questions in the available space in upcoming issues. Sorry, the experts will be unable to answer your questions by mail.*

TD-FM Radio Is No Help

How can I modify the TD-FM radio (June-July 1964 issue) for the 150-274 mc range?

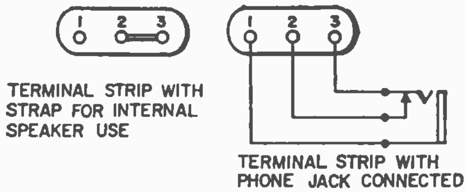
—G. C. M., Jacksonville, Fla. & F. S., Wallington, N. J.

While it is possible to change the coils to alter the frequency range, you probably would not be pleased with the results. The 150-174 mc mobile radio band channels are spaced only 30 kc apart and the FM signals deviate only ±5 kc. In the FM broadcast band, the channels are 200 kc apart and the signals deviate ±75 kc. Even in the 2-meter amateur band (144-148 mc) the signals usually deviate ±15 kc. Extremely good selectivity is required to separate the signals in the 150-174 mc. band and an FM discriminator is required which will provide adequate audio recovery. Only a multi-stage superheterodyne receiver with a very sharp selectivity will provide satisfaction.

Add a Phone Jack

On the back of my receiver there are three screw terminals for speaker connections. They enable me to disable the internal speaker and use an external speaker, or use both speakers. How can I install a headphone jack so the internal speaker will be disabled when I plug in the phones? The set is designed for use with a 3.2-ohm speaker.

—J. M., Newark, N. J.

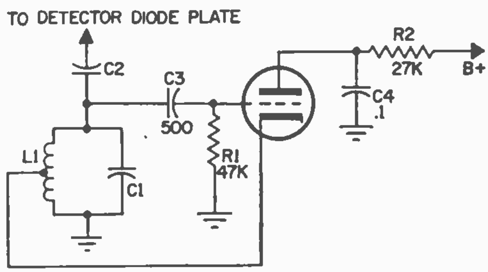


When the internal speaker is to be used by itself, terminals 2 and 3 are strapped together. To use an external speaker, the strap is removed and the external speaker is connected to terminals 1 and 2. Right so far? Remove the strap from terminals 2 and 3. Get a three terminal phone jack and connect it as shown in the diagram. When you plug in the phone jack, the short across terminals 2 and 3 is removed and the phones are connected across 1 and 2. It doesn't make much difference if the phones are 8-ohms. But, if you want to, connect a 5-ohm, 2-watt resistor across 1 and 2.

BFO

I have an old Philco radio which has short-wave bands. Can I use it as a novice amateur receiver if I add a BFO? If so, can you give me a circuit for a BFO?

—G. L., Philadelphia, Pa.



You certainly can add a BFO to your set to make it possible to receive CW (code) and SSB (single sideband phone) signals. Meissner and others make BFO Coils that can be used in an oscillator circuit like the one shown in the diagram. L1-C1 should tune to the receiver IF at about the mid-position of C1. The values of R1, R2, C3 and C4 are approximate and vary with the type of tube used. C2 should have a low value (10-50 mmf) and it may be necessary to retrim the receiver IF transformers after the connection is made.

Surplus Savings

In a recent issue, you mentioned the book "Surplus Conversion Handbook" by Tom Kneitel which describes ways of converting equipment from military to civilian use. Can you tell me where I can purchase military surplus equipment?

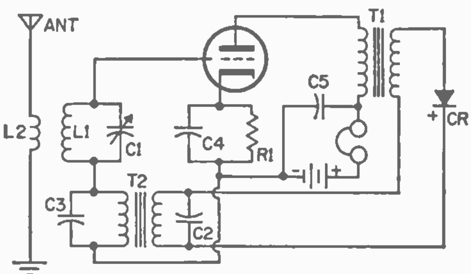
—M. M., St. Cloud, Minn.

There are probably several military surplus dealers in Minneapolis and St. Paul. You might write to Space Electronics, 4178 Park Avenue, Bronx, N. Y., Fair Radio Sales, Box 1105, Lima, Ohio, G&G Radio Supply Co., 77 Leonard St., New York, N. Y. 10013, and R. F. Goodheart Co., Inc, Box 1220, Beverly Hills, Calif. 90213, and ask them to send you their surplus equipment price lists.

Build a Reflex

What is a reflex receiver and how can I build one?

—E. L. M., Sudbury, Mass.



In a reflex receiver a tube or transistor performs more than one function. For example, in the diagram a single triode tube functions as both an RF amplifier and an AF amplifier. The incoming radio signal is fed from L2 to L1 which is tuned to the frequency of the station with C1. The RF signal is amplified by the tube and is coupled to the detector through T1, an untuned RF transformer. The diode detector output is fed to the primary of interstage audio transformer T2. Capacitor C2 across this winding is an RF filter. The audio signal at the secondary of T2 is fed to the grid of the tube through L1 which has negligible impedance at audio frequencies. Hence, the tube now also acts as an AF amplifier and the audio output signal is fed to the headphones.

Capacitor C3 across the audio transformer secondary provides an RF path to ground for the tuned circuit. Capacitor C4 across the cathode bias resistor increases the gain by reducing degeneration. Capacitor C5 provides an RF path to ground for the primary of the RF transformer.

L1-L2 may be a standard antenna coil

ASK ME another

(transformer). You will have to experiment with T1 to get maximum RF gain in the band in which you operate the receiver. Try an interstage RF coil (transformer). It could be tuned to increase the gain and selectivity, but the circuit might oscillate since the tube is a triode. Instead of headphones, you could use another interstage audio transformer in the plate circuit and feed its output to an audio power amplifier for loudspeaker operation.

Here's One

I live in an apartment and have 148-174 mc receiver which calls for a ground plane aerial. Since I cannot put an aerial on the roof, can I set the ground plane on the window?

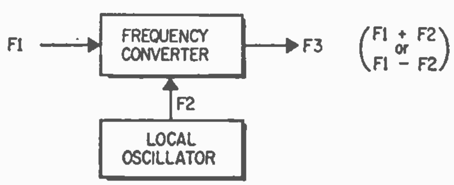
You can use a ground plane, coaxial or any of several other types of antennas designed for use in this band. Since a ground plane antenna has horizontal or drooping radials, it may be too bulky to set on the window sill. One that might work out well is a half-wave type, made by Mark Mobile, 5439 West Fargo, Skokie, Illinois, which does not require a ground plane.

Kicking Mc's About

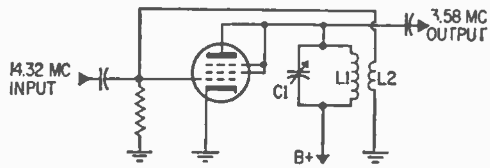
How can I convert a 40-meter band signal into a 20-meter band signal in a transmitter? And, how can I convert a 20-meter band signal into an 80-meter band signal?

—*J. N. L., New York, N. Y.*

The most straight forward way to convert almost any frequency to almost any other frequency is to use what is known as a frequency converter as shown in the Diagram A. Signal F1 from the transmitter oscillator or a multiplier stage is mixed with signal F2 from a so-called local oscillator in the frequency converter stage to produce a third frequency F3, as in the mixer of a superheterodyne receiver. The new frequency may be equal to the sum or difference of F1 and F2. For example, if F1 is 7.18 mc and F2 is 7.00 mc, F3 could be 14.18 mc (sum) or 180 kc (difference). The desired beat signal is selected by tuning the output of the mixer to that frequency.



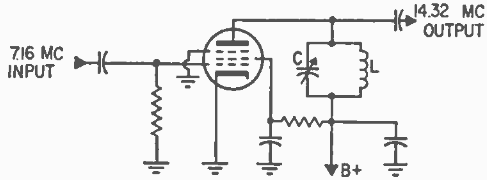
A Frequency converter Block diagram.



B Frequency multiplier basic schematic.

Another way to increase a frequency is to use a frequency multiplier, as shown in the Diagram B. For example, if a 7.16 mc signal is fed into the control grid of the sharp cut-off pentode tube and its tank circuit (L-C) is tuned to two times 7.16 mc or 14.32 mc, the output signal will be the second harmonic of the input signal.

The frequency of a signal may be lowered with a frequency converter or with a frequency divider as shown in the Diagram C. Here a signal at 14.32 mc is fed to the control grid of a triode-connected, sharp cut-off pentode (screen and suppressor grids tied to the plate). The plate tank circuit (L1-C1) is tuned to 3.58 mc, one-fourth in the input frequency. The control grid is connected to L2, a tickler coil which makes an oscillator out of the circuit. The oscillator operates at 3.58 mc and its third harmonic, 10.74 mc, or its fifth harmonic, 17.90 mc, mixes with the 14.32 mc input signal to produce a beat signal at 3.58 mc. (10.74 mc subtracted from 14.32 mc is equal to 3.58 mc, or 14.32 mc subtracted from 17.90 mc is equal to 3.58 mc).



C Frequency divider basic schematic.

What Q Like?

I read with interest the article about mechanical filters. But, a Q-multiplier costs about the same, can be installed as easily, and has variable selectivity. What are the relative merits of a crystal filter which is cheaper yet?

—*J. T. H., Pittsburgh, Pa.*

A mechanical filter or a crystal lattice filter is used in commercial communications equipment. Both are excellent, require no adjustment and are stable. A Q-multiplier, on the other hand, may not be as stable, but costs less. For variable selectivity, the old-fashioned, adjustable single-crystal filter is recommended, But, for voice communications reception, the crystal lattice or mechanical filter is recommended. If you're a short-wave listener, you may want both. A modified receiver that can switch in a Q-miltiplier or mechanical filter, or both (?), is worth while having.

Facts on Part 15

Can I use Coil-Tenna loaded car radio aerial for a small broadcaster?

—D. S., Virden, Ill.

If the antenna you refer to is for use in the 27-mc citizens band, its use with an unlicensed low power broadcaster, operating in that band, is unlawful. Part 15, FCC Rules and Regulations stipulates that the antenna must be a "single" element not more then five feet in length. The loading coil and coaxial cable are also elements. In the AM broadcast band, however, you can use an antenna up to 10 feet long, including its lead-in. The rules say nothing about loading coils for the broadcast band.

&?)*!* Noise

I have noise problems with my CB set. It has a generator or distributor noise I can't eliminate. I have installed wheel noise suppressors, a 0.5 mfd capacitor on the generator, voltage regulator and coil. I am using resistor spark plugs. What else can I do?

—C. L. J., Joanna, S. C.

Try a generator noise filter which is a tunable trap. Several are on the market including Lafayette 99G6018 ($2.49).

Kick in Some db's

The transmitter of a local FM station is so close that its signal completely overloads my tuner. How can I attenuate this station on 100.5 mc so I can receive a good music station on 99.9 mc?

—L. J., Huntington, W. Va.

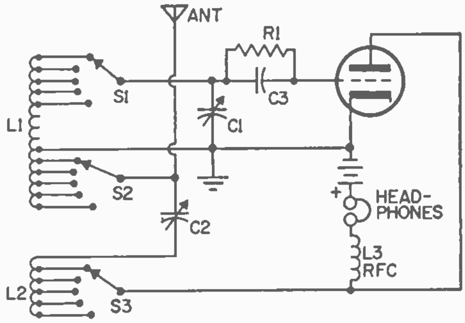
Try an attenuator at the antenna terminals, such as JFD's three-step attenuator, which will reduce the strength of the interfering signal. Or, if the stations are in different directions, use a high-gain antenna, with a high front-to-back ratio, aimed at the wanted station.

ASK ME another ?

The Reinartz Circuit

Having read recently about the passing of John L. Reinartz and his great contributions to radio, I am curious about the Reinartz circuit. Can you publish a schematic of this circuit?

—*A. T., Marysville, Wash.*



The two coil windings, L1 and L2, shown in the diagram were wound on what is known as a "spiderweb" form, a circular piece of fiber or other insulating material with radial slots. The coils were woven in and out of the slots. Tap switches were used to select the amount of inductance in the circuit. S1 selected the number of turns in use in the grid circuit, which in combination with tuning capacitor C1 determined the receiving frequency. S2 selected the antenna to grid coil-turns ratio. S3 selected the number of turns in the tickler circuit and, therefore, gave the user wide latitude in selection of regeneration (positive feedback) at various frequencies. Capacitor C2 was the actual regeneration control. RF choke L3 isolated the tickler coil (for RF) from the headphones.

By means of the three tap switches, it was possible to select frequency bands and optimize the relationship of the antenna circuit, tuning circuit and regeneration circuit. If you attempt to build a receiver using the Reinartz circuit, put an RF stage ahead of it since it is capable of radiating an interfering signal when regeneration controls are set so that the detector is oscillating. The RF stage can be fed into the circuit by disconnecting the antenna and feeding the output of the RF stage through a small capacitor to the junction of the arm of S2 and the stator plates of C2. ■

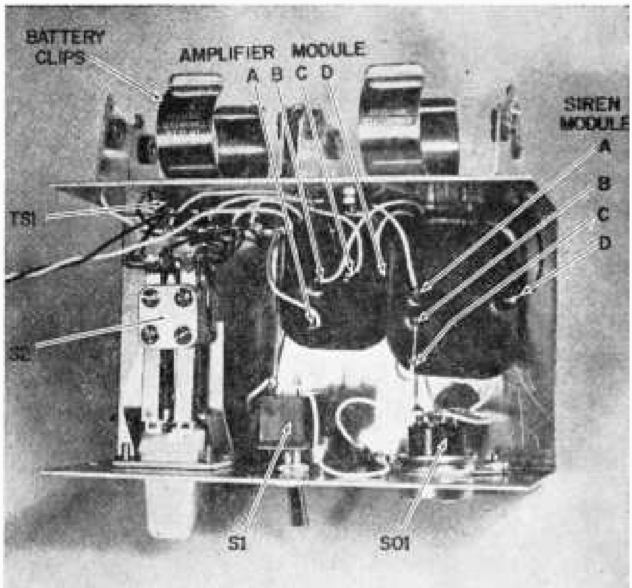
Boatman's Electronic Loudhailer

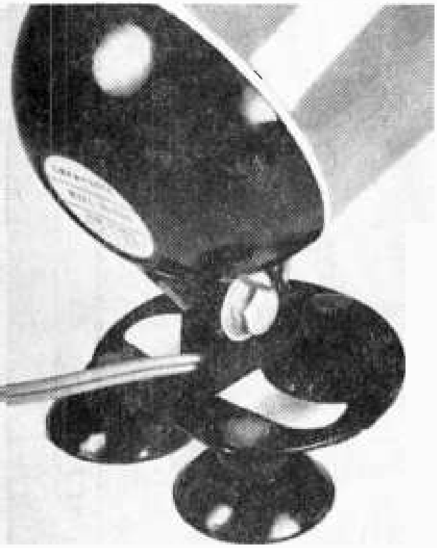
by Edward A. Morris

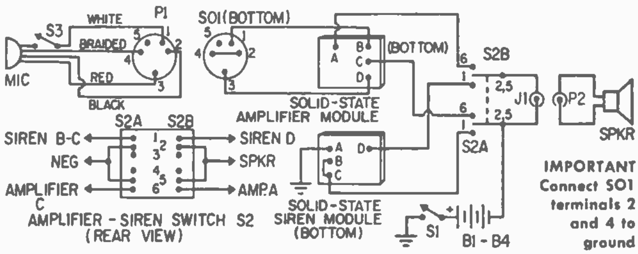
☐ Electronic loudhailers and bull horns have always ranked as one of the most useful accessories for a boat owner. DX'ing a shouting fellow-mate from across the channel is nigh impossible, especially in the wind and spray, and quite wearing on the voice box to boot. Of course, on one of the nights when the bay is *like a mirror,* it's another story: all of us have lain awake in our bunks at least once listening to the *slap, slap, slap* of the waves on a lapstraked boat hull off on *(Continued Overleaf)*

Don't limit the Loudhailer's voice to just the sea or lake fronts—its mity-mite voice can also serve the outdoorsman on camping and fishing trips—other applications include indoor functions such as basketball games, conventions, school assemblies and many others!

Cover-off view of the chassis box shows encapsulated solid-state modules with their protruding connectors called out. Base of horn speaker, below, shows suction cup placement for mounting. The schematic diagram details microphone, speaker, module and switching connections for siren-loudhailer.







IMPORTANT Connect SO1 terminals 2 and 4 to ground

the horizon. But when the wind blows up and the boat ahead starts dragging anchor and you've got to alert him and communicate fast, then your voice needs an assist. And this loudhailer is just the ticket.

High Value, Low Cost. The price of commercially available loudhailers is prohibitive to most boat owners and they forego an accessory that proves indispensable once you have one. But, with this project, you can build your own for less than $25, and an excellent one at that. The unit includes a miniature horn speaker, a ceramic microphone, and an electric siren. The siren circuit drives the speaker well enough to be heard over 200 yards; and the voice amplifier drives it to carry in excess of 150 yards!

Thanks to the use of two pre-packaged, solid-state, electronic circuits—an audio amplifier and siren circuit—this loudhailer-siren is both easy and fun to build. A novice can build it in less than 3 hours! Because the circuits are cast in moisture and shock proof epoxy resin, very little maintenance should ever be required, other than the usual replacement of weak batteries.

Both the horn-speaker and the electronic chassis are equipped with 3-point suction cup mount's, which facilitate placement in almost any location and provides for stowing the units rigidly, preventing damage in rough weather.

How It Works. The loudhailer contains two separate pre-packaged electronic modules, one each for the loudhailer and the electronic siren. Each module is a complete working electronic circuit containing all the necessary components to do the job.

Switching the speaker and power between the two modules is accomplished by switch S2 as shown in the schematic diagram. When switch S2 is in the up or AMPLIFIER position, the speaker is connected to the amplifier module, and power is connected to it.

When switch S2 is in the down or SIREN position, both the speaker and power are connected to the electronic siren module. With switch S2 in the center position, both modules are disconnected from the speaker and power. The switch has a spring return to off from the SIREN position.

Operating power is supplied by batteries

PARTS LIST

B1, B2, B3, B4—Size C batteries (Eveready No. E-93 or equiv.)
J1—Phono jack
P1—Amphenol 91-MPM5L plug (included in purchase of microphone listed below)
P2—Phono plug
S1—S.p.s.t. toggle switch
S2—Four-pole, double-throw lever switch, 3 position: on, off, momentary on (Lafayette Radio 99R6158 or equiv.)
S3—Push-to-talk switch (part of microphone listed below)
SO1—Amphenol connector No. PCG-6 (Lafayette 32R1962 or equiv.)
TS1—6-connector terminal strip
1—Push-to-talk ceramic microphone for relay switching (Lafayette 42R0115 — includes coiled cord, plug, and hang-up bracket — or equiv.)
1—Miniature horn speaker (Lafayette 99R4508 — 8-ohm, 8 watts max. includes mounting bracket and 2-conductor cable — or equiv.)
2—Solid-state modules, phonograph amplifier and electronic siren, respectively (Cardover PH-7 and SM-1, or Lafayette 19R0111 and 19R0105 or equiv.)

ALTERNATE WIRING

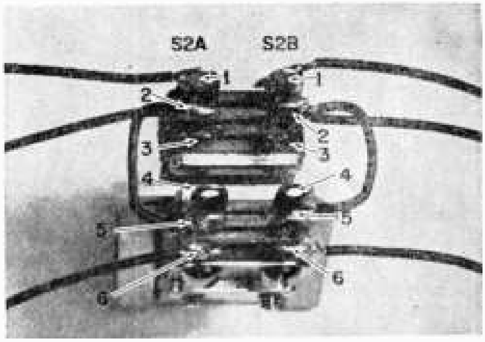
The modules used in this unit are the Cardover models listed above, and shown in the schematic diagram. If the Lafayette modules are used, wire them into the Loudhailer by making the following modifications.

LAFAYETTE AMPLIFIER MODULE 19R0111: With an ohmmeter, determine which of the two green leads on the Lafayette module is connected to the black lead within the module. This green lead corresponds to that from terminal C as shown on the schematic. Clip off the black lead. The remaining green lead corresponds to that from terminal A. The yellow lead on the Lafayette module corresponds to that from terminal D. Clip off the brown lead. The red lead corresponds to that from terminal B on the schematic.

LAFAYETTE SIREN MODULE 19R0105: Determine which green lead connects to the black lead. This green lead corresponds to that from terminal C. The other green lead corresponds to that from terminal D on the schematic. Determine which yellow lead is connected to the red lead. The red lead is from terminal A. Clip off the yellow lead that connects to the red. The remaining yellow lead corresponds to that from terminal B. Do not connect it to terminal C, however; connect it to terminal A.

1—5¼" x 3" x 2½" aluminum chassis box (Lafayette 12R8373 or equiv.)
2—Battery clips for 2 size C cells
Misc.—6 1⅜-inch diameter suction cups, 1" x ⅞" piece of bakelite, epoxy cement, hardware, hookup wire, spray paint, solder, etc.

Estimated cost: $25.00
Estimated construction time: 3 hours



Wire lever switch S2 before mounting on chassis; connections are called out here.

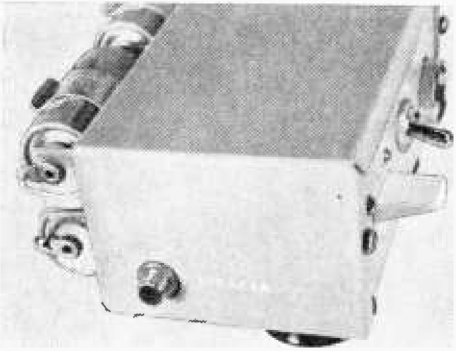
B1 through B4 which are connected in series to obtain 6 volts to power the modules.

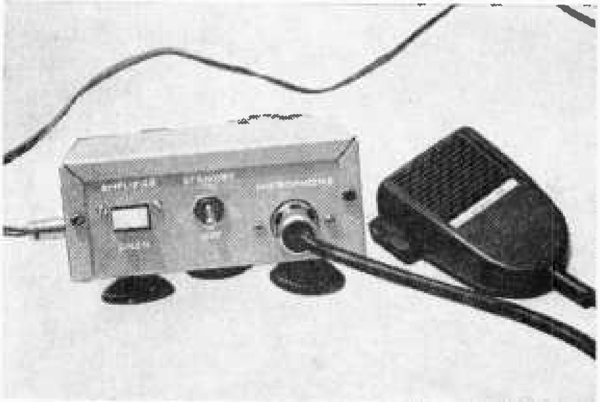
Mechanical Construction. Start construction by laying out centers for all the holes to be drilled in the small chassis box. Refer to the detail drawings and photographs. The larger holes can be made by first drilling a smaller hole, and enlarging it with a reamer. The slot shaped hole for switch S2 can be formed by scribing the outline on the case with the help of a T-square. Then drill several smaller holes within the outline, and enlarge and shape them into the required rectangle with the help of a file. The cutout for SO1 is made in a similar fashion.

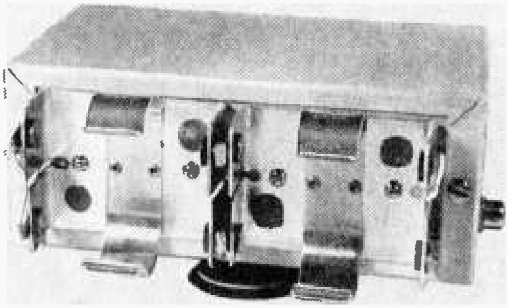
After all the mechanical work has been completed on the case, it's prepared for painting by scrubbing it down with a scouring pad or a household cleaner to remove any grease or oil on the case. Several light coats of spray paint can then be applied to the case.

Depending on the type of suction cups you get, you will either have glue, or screw them onto the chassis bottom. The author obtained the suction cups used on his unit from a suction cup type paper clip, bought in a local stationery store. Some of these clips are provided with screw mounts, in which case simply use the appropriate hardware to mount them. Others, however, are attached with rivets, as were the authors. In which case first remove the rivet and clean the back with alcohol to remove any traces of grease. The suction cups are then mounted using epoxy cement. Make sure to first remove any paint from the bonding surface.

Jack J1 for the external speaker is mounted on a ⅞-inch by 1-inch piece of bakelite so as to insulate it from the metal case and ground. The jack itself is mounted in a hole drilled in the center of the strip. The jack and strip are then mounted in the hole pro-







Side view of chassis shows speaker jack, J1, which is insulated from the chassis using a small square of bakelite. Rear view of the chassis, left, gives details of mounting the battery clips. Clean front panel of easy-to-operate unit is shown in shot above.

vided for it in the side of the case using epoxy or some other suitable cement. Again, take care that the jack is centered in the hole in the case, and that it does not touch the sides of the hole at any point. Now mount the two battery clips using 4-40 hardware. STANDBY-OFF switch S1 is mounted in its proper position on the front panel.

Locate and fix the Amplifier and Siren modules in position using epoxy cement. The proper position for the modules can be seen from the photos.

Electrical Construction. While the epoxy mounting the circuit modules is curing, attach leads to the terminal of AMPLIFIER-SIREN switch S2, following the inset drawing with the schematic. Attempting to wire the switch once its been mounted can be a difficult job, so attach and solder the leads first. Just leave the leads long enough to make connections to the terminal strip.

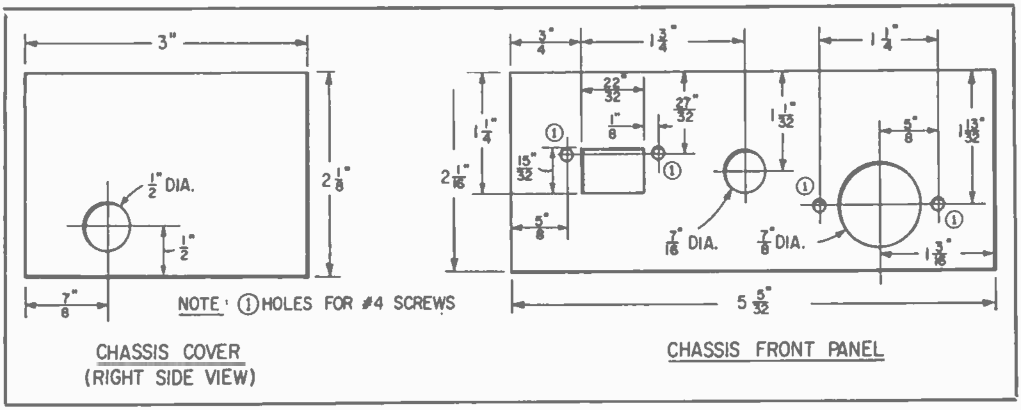
To make certain the switch is wired correctly, hold the switch so that the terminals face you. The mounting holes should be on top. Switch section A will then be on your left, section B on your right. Terminals 1-6 are numbered consecutively from top of each section downward.

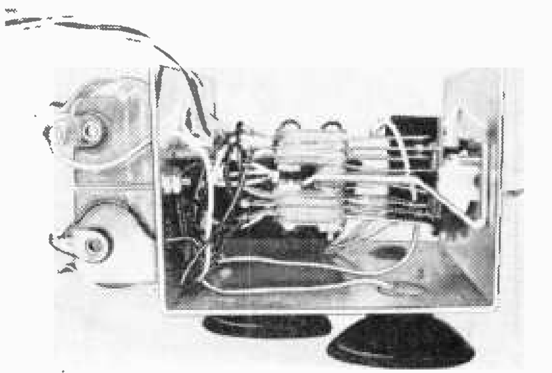
Mount and wire microphone socket SO1. Continue to wire the remainder of the unit according to the schematic diagram. Terminate the end of the speaker lead in an RCA plug and recheck the wiring when you're finished to detect any possible errors.

If you plan on using a microphone other than the one specified in the parts list, you may have to rewire or change microphone socket SO1. If the microphone you plan on using does not have a push-to-operate feature, ground terminal B on the amplifier module. Connect terminal D to the hot lead from the microphone. The shield lead on the microphone connects to ground.

Testing the Unit. After you've assured yourself that the unit is wired correctly, install the four C cells in the battery holders. A spot of paint can be used to denote the positive terminal in each section of the battery clip, and prevent possible damage to the modules due to an incorrect battery polarity installation.

Plug the speaker plug, P1, into J1, and the microphone into SO1. Set switch S1 to the STANDBY position. Flip switch S2 into the up position—the loudhailer AMPLIFIER position. Depress the push-to-operate switch





The drawings above provide exact locations for cutting the chassis to receive J1, S2, S1, and SO1. Side view of the chassis, at the right, shows contact strips of the lever switch. The wires going out of the picture connect to jack J1 mounted on chassis cover.

S3 in the handset and give the 'ol *Testing . . . 1, 2, 3 . . .*; you should come through loud and clear.

Next press switch S2 downward to the SIREN position and hold it there. After about two seconds, the siren will start to wail upward in pitch and the neighbors will know you've successfully completed your loudhailer.

If the unit does not perform properly, turn the unit off and recheck your wiring against the schematic.

Installation and Operation. The unit can be mounted where it will be most convenient for you skippers to use. You can keep it in the cockpit or—if you're one of the big fellows—haul it topside to the flying bridge to have it right at hand.

Before mounting, coat the suction cups with silicon grease or petroleum jelly. This serves a dual function: first, it protects the rubber from attack by salt water spray, and second, it improves the rigidity of the mount to the deck.

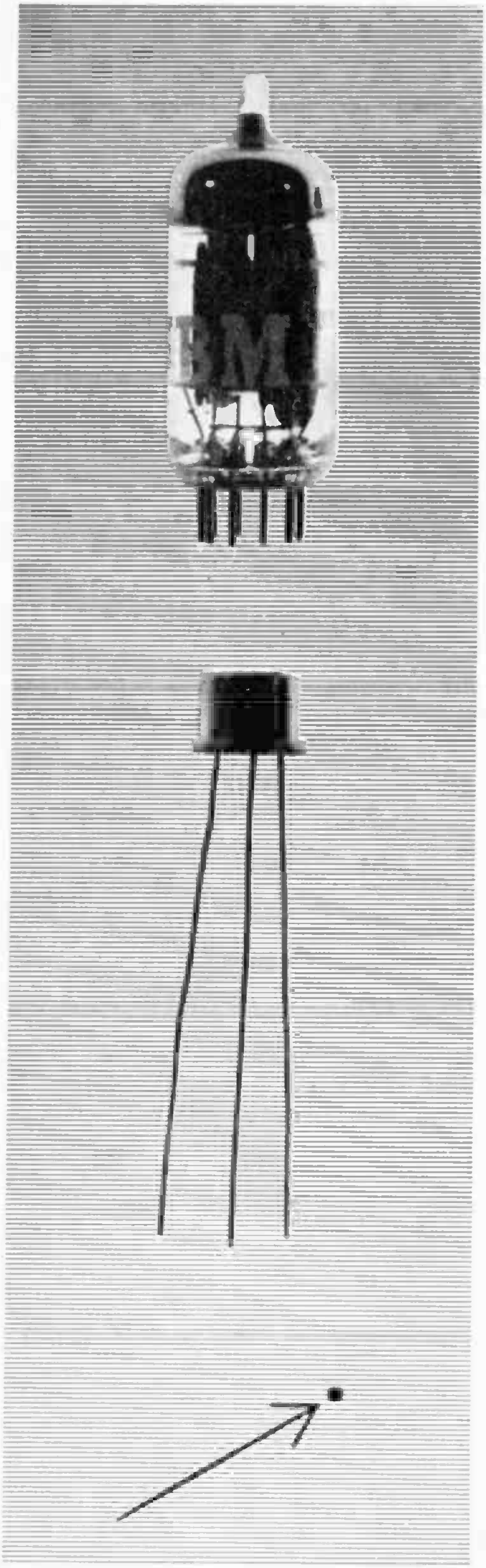
The microphone hang-up bracket can either be mounted with brass wood screws, or brass machine screws and nuts, according to your needs.

In normal use, set switch S-1 to STANDBY, and forget it. It's meant to prevent accidental operation while the units being transported. No current drain on the batteries is possible with it in the STANDBY position as long as switch S2 remains in the center off position.

For use as a loudhailer, set switch S2 to the AMPLIFIER position—the switch will lock in this position. Depressing the push to talk switch, S3, in the handset, applies power to the amplifier module. Speak directly into the microphone in a slow distinct, slightly louder than normal voice for the most effective results.

To use the siren, press switch S2 down, and hold it there as long as you want the siren to sound. The switch is under spring tension to return to the center off position. By keeping the siren in short bursts, you'll get a sound not unlike that used by emergency vehicles.

Now, you're ready to leave the dock or mooring with a little added convenience and safety on board. Next time you're out water skiing, fishing, or just lazily cruisin' around, you'll be able to get across a routine or *Mayday* message loud and clear. ■



the Case of the Shrinking

"It is unworthy of excellent men to lose hours like slaves in the labor of calculation."

Thus wrote Baron Gottfried von Leibniz, a seventeenth-century philosopher and mathematician, and so irritated was he with the drudgery of computation he set out to invent a machine that would do the job for him. Although von Leibniz failed, the effort symbolizes the persistent dream of a mechanical servant, obedient and infallible, to handle the menial tasks usurping time man could otherwise devote to creativity.

It's taken the science of electronics—the branch of physics that deals with the emission, behavior and effects of electrons—to bring the dream its closest to fulfillment. By harnessing the electron, science has vaulted the gap between the mere mechanical counter (examples: the abacus, the adding machine) and the true computer which can perform in seconds calculations that could take platoons of mathematicians months or years to complete.

An Extinct Monster. Twenty years ago there was only one electronic computer in existence—a 30-ton laboratory curiosity that occupied 1,550 square feet of floor space at the University of Pennsylvania and used 18,000 vacuum tubes as circuits and switches. Today, there are nearly 23,000 computers at work in the U.S. in the background of virtually every area of human activity, from

You are the key witness in this case; the "culprits" are the scientists and engineers who "did away with" tubes and transistors with their new weapon—microelectronics

Computer

By *Du Pont Magazine* Editorial Staff

bookkeeping to interplanetary exploration. Specialists are directing computers to do such jobs as deciphering the Dead Sea Scrolls, landing jet aircraft without human help, and "talking" on the New York Stock Exchange; in performance, some operate at speeds measured in billionths of a second and add, say, two five-digit numbers 2½ million times in a second.

What made the difference? How could the once-massive electronic computer be brought to the practical dimensions required if it was to assume an unprecedented role in everyday business, industry and science?

Answer: miniaturization of electronic circuitry, in which the newest development is a technology called microelectronics. Although the techniques vary, one such method utilizes the ancient art of screen printing to produce circuit patterns with precious metal "ink" compositions developed by Du Pont and to which are attached tiny transistors and diodes no larger than the period at the end of this sentence.

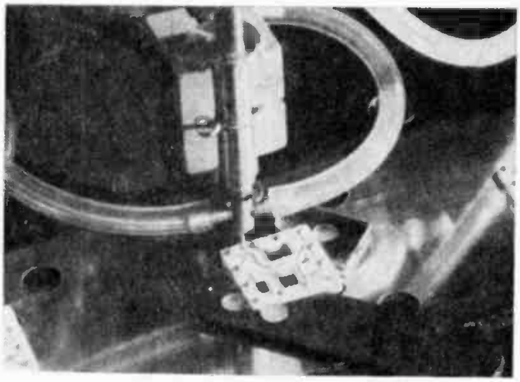
As a result, microelectronics is literally shrinking the computer's components and is setting a course that should see the electronics industry's dollar volume topping $20 billion by 1970.

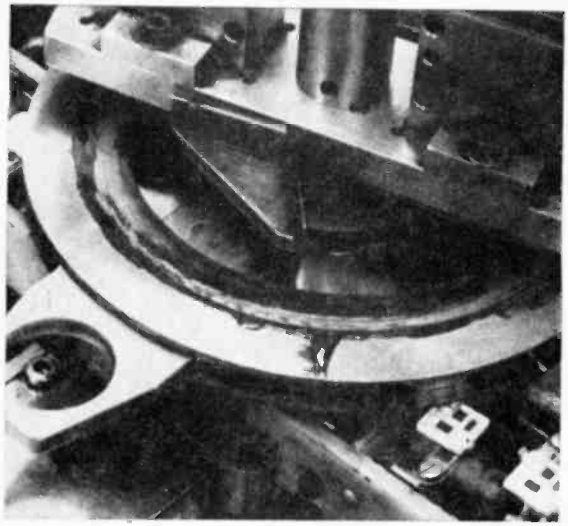
As might be expected, microelectronics has given birth to a "new generation" of computers (the first generation was powered by vacuum tubes; the second by transistors which allow electric impulses to travel through solid material instead of a vacuum) introduced last year by International Business Machines Corporation. Called System/360, these new computers are made in a small-to-large range of sizes (the processing power of the largest is 50 times greater than that of the smallest), can store billions of bits of information, and provide a "whole new family of computers that may ultimately replace all of IBM's present lines."

New Family of Computers. Says one industry observer: "It's as if someone were to present the transportation industry with a motor that costs a tenth as much, runs 10 times as long between overhauls with one-tenth the fuel consumption, weighs 5 pounds instead of 500 pounds, requires little labor to produce, and still develops 300 horsepower."

How does System/360 differ from its predecessors? Explains an IBM representative: "All told, System/360, in single system, spans the performance range of virtually all current IBM computers and has a capacity more than twice that of our most powerful earlier models. It achieves extremely high speeds largely because its microminiature circuits permit electric impulses to travel shorter distances; thus, the system's machine cycle time—the basic pulsebeat of a computer—ranges from one millionth to 200 billionths of a second."

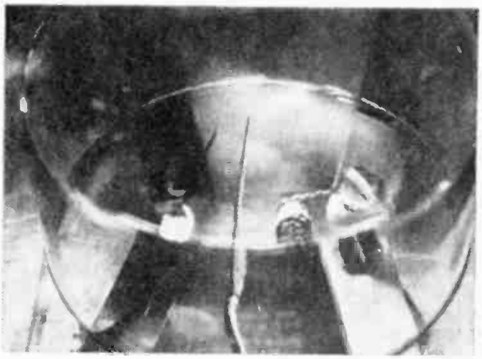
Shrinking Computer





The components are positioned on the substrate, above, to form a complete microcircuit for the Solid Logic Technology module.

Above right, the circuit patterns for IBM's half-inch-square ceramic substrates are automatically printed using DuPont's precious metal Resistor and Conductor Compositions.



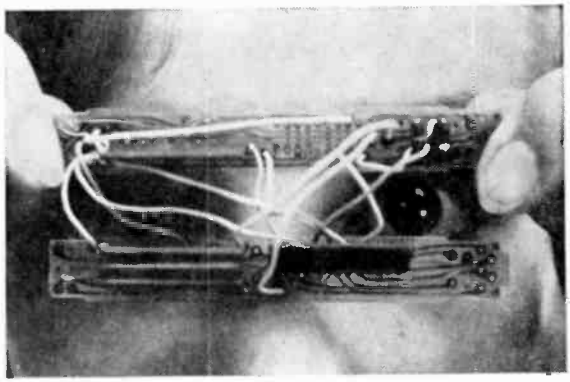
At the right, the metal evaporates inside Burrough's vacuum chamber and a thin coat of metal is thus deposited on the wafer's surface.

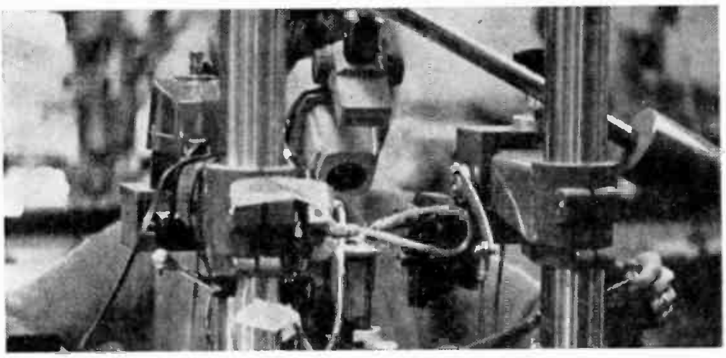
How does the system work? "Solid Logic Technology," says Yvan Cormier, manager of substrate screening at IBM's East Fishkill, N.Y., manufacturing facility. SLT is IBM's descriptive phrase for the half-inch-square ceramic modules (called "logic circuits") which contain screen-printed circuit paths that direct electric impulses much as a pipe organ produces music by directing air to various pipes. Mounted on the ceramic squares (substrates) are the period-size transistors and diodes ("solid" semiconductor devices) that perform such functions as the switching and amplifying necessary if logic algebra is to be worked electronically.

A Technological Crop. Making the miniature SLT transistors and diodes is a meticulous process that begins with the "growing" of silicon crystals, i.e., lowering a seed crystal into molten silicon, then slowly pulling it out to form a 1¼-inch-wide, 12-inch-long crystal. The crystals, when fully "grown," are then sliced into half-dollar-size wafers about twice the thickness of a human hair. Photographic and etching techniques are used to form 1,100 transistors or diodes on a single wafer. Each wafer is given a protective, 60-millionths-of-an-inch-thick film of glass, then is diced with a precision cutting tool into the individual completed device.

The finished transistors and diodes are then mounted on the ceramic substrates. Feeding each such device the amount of signal and power it requires for its job is a network of conductors and resistors (passive devices) which has been imprinted on the substrate. "As their names imply, conductors simply carry the current while resistors set the current level," says Cormier. "So by carefully selecting and screening conductor and resistor materials, we can reliably build the required logic circuits."

Circuit Printing Presses. Unlike earlier computer circuits, whose general image was one of myriad wires, IBM's logic circuits are relative marvels of simplicity. Reason: "Wires" (conductors) and resistors are now screen printed on the ceramic substrate. The printing process is performed in IBM's fully mechanized production line via screen-print-





A Burrough's printing machine operator, top left, dries strips of conductor patterns that were printed on stainless steel screen.

An assembly technician, above, holds two circuit boards with Burrough's miniature components encased in the flat shells.

A Burrough's technician, left, tests the quality of completed circuits with the microscope.

ing machines in a matter of seconds.

The "ink" IBM uses for its conductor circuits is Du Pont's Conductor Composition, a dispersion of precious metals and glass in an organic material. For its resistors, the firm uses Du Pont's Resistor Composition, a specially treated mixture of noble metal powders and glass which has been dispersed in an organic solution.

But screen-printed circuits aren't new to electronics. Explains Wayne Pearson, manager of ceramic products for Du Pont's Electrochemicals Dept.: "For more than 25 years, Du Pont has taken an active part in developing and improving Conductor Compositions for a wide variety of applications in the electronic components industry, and in 1960 introduced a series of Resistor Compositions for application by the screen-printing process—a relatively simple process.

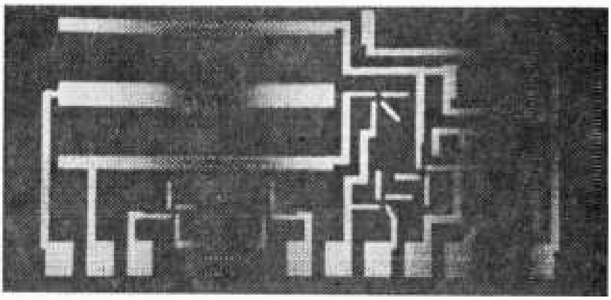
"For example, some other methods for making microminiature circuits, such as silicon monolithic or vapor-deposited thin film techniques, provide reliable circuits but require elaborate, complicated equipment such as photo-etching devices or sputtering and evaporating machines that operate in a high vacuum. The cost of such machinery itself is high; furthermore, it's expensive to operate, for the procedure is a slow and meticulous one. Screen printing, on the other hand, calls for relatively elementary equipment, the most elaborate of which is a continuous belt furnace that fires the composition onto the substrate."

Short or Long Runs. Another advantage is that circuit designs can easily be changed by merely changing the screen on the printing machines. "There's virtually no limit to the configurations that can be printed on a circuit module," says Pearson. "And, because the screens are easily changed, the method is economical for either short or long production runs."

The result: rugged, reliable and high-quality printed circuits that have high power stability and are relatively insensitive to moisture and abrasion.

Other computer manufacturers also screen print microelectronic circuits for their new

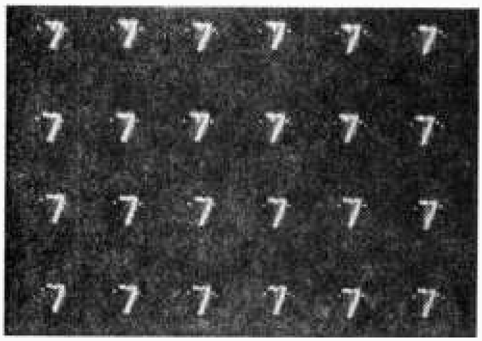
Shrinking Computer

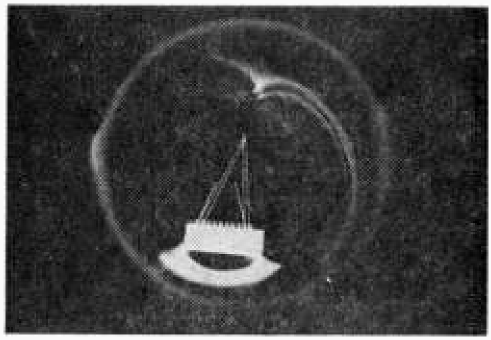


At the right is the fine stainless steel screen which is used to print the conductor patterns.

The "Nixie" tubes, shown below, test performance of the circuits when they are completed.

Pile of silicon wafers glow in Burrough's furnace, bottom right, during diffusion process.





high-speed machines. But the technique is not limited to computer applications; such components are finding wide use today in all forms of electronics equipment.

Burroughs Corporation, for instance, uses the screen-printing technique at its Electronics Components Division, Plainfield, N.J., to make an inexpensive line of microcircuit products which it sells to electronics systems manufacturers.

Screen printing at Burroughs is a two-step process similar to applying colored bands on a dinner plate. First, Du Pont's Conductor Composition is squeezed through a 200-mesh stainless steel screen onto a ceramic substrate; the module is then fired in a continuous belt furnace at temperatures as high as 1900°F. The procedure is repeated for printing the resistors, which are fired at about 1400°F.

After firing, the module is dipped in a solder bath so as to provide leads and pads for attaching transistors and diodes. Last, the circuit is given an organic coating and baked to form a hard protective shell over the circuit.

Microelectronics at Work. Burrough's postage-stamp-size components are used in industry in a multitude of electronic applications, including counting, decoding and latching devices. One principal user is Burroughs' own "Nixie" tube, a display device used for such things as numerical readout in digital instrumentation and the displaying of stock quotations in a broker's office.

"In another application, we make screen-printed circuits for miniature binary decoders with memories used with 'Nixie' tubes," says Ivar Larsson, Burroughs' manager of microcircuit development department. "The module is one of the smallest electronic display devices with a memory in existence and is designed for aerospace applications where space is at a premium.

Burroughs, like other firms in the components manufacturing field, has found that microelectronics creates some rather startling changes in the industry. Explains Larsson: "Circuit designers were once limited by the integrated circuit manufacturer's capabilities; thus, electronic firms had to design their circuits around the devices that were available. Today, however, thanks to screen printing and other techniques, such limitations are reduced and designers can retain the freedom they enjoyed with discrete components. That, in effect, is the reason for the popularity of hybrid circuits.

"Microelectronics is said to be today's most expanding technology," Larsson adds with a grin. "But, in the process, it's shrinking the size of everything it encompasses." ■

A GO-GO STEREO COMPACT

BY HOMER L. DAVIDSON

Set your brain a' bubbling with a little in-crowd ingenuity and you'll transform that toy phonograph that was once used for Mother Goose's recorded rhymes into a music maker for the jerking generation!

■ How about digging up that discarded children's phonograph and setting it spinning again? But do more than just getting it to crank over: convert it to a stereophonic phonograph or—as it's more popularly known—a stereo compact!

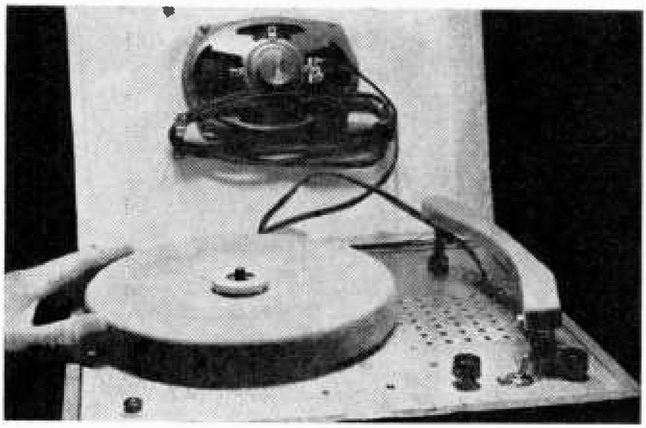
All it takes is two transistor amplifier circuit boards, a stereo cartridge, an inexpensive power supply, and a second speaker. Just put 'em all together.

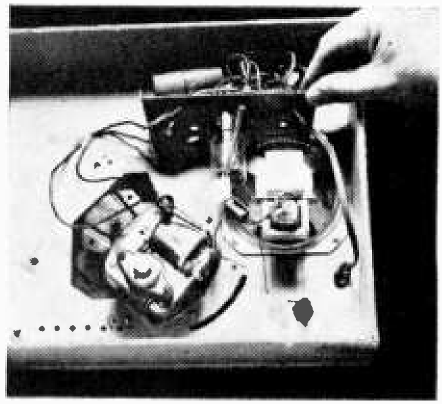
A New Twist. It makes no difference that the original one-tube amplifier in the old phono is on the *bum*, because you'll be replacing it with two circuit boards. Each amplifier circuit board uses 4 transistors and delivers a push-pull output of 1 watt. The complete board is readily available (see parts list) and need only be mounted and wired into the phonograph.

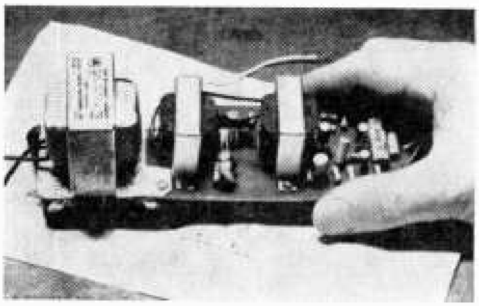
The amplifiers are designed to work into 8-ohm speakers, but they'll push the 3.2-ohm speakers usually found in the small phono with practically no noticeable difference. The speaker cone on the unit shown here was damaged so two new 4 x 6-inch oval 8-ohm speakers were used.

In and Out. A glance at the schematic diagram shows the stereo cartridge pickup which passes the signal to the left and right channel balance controls through a scratch filter. Switch S1 switches the scratch network in and out. Controls R2 and R4 are 25,000-ohm balance adjustments for the right and left channels, respectively.

The 12-volt power supply is transformer operated and uses a filament step-down transformer, T1. The 6.3 vac output of the transformer is boosted in a unique voltage doubler circuit. (Refer to the schematic diagram.) Voltage doubler capacitor C3 and CR1 and CR2 form a voltage doubling network. Actually, the output voltage from the positive side of CR1 is 14 volts DC. A filtering network of R6, C4 and C5 takes out the AC ripple from the power supply. You will note that resistor R6 is a very low value.







As shown, above left, the original phono speaker is mounted in the enclosure (note perforations). The second speaker is mounted in the cover of the phonograph. In selecting the speaker, make sure it clears turntable and arm when the cover is closed. The speaker lead is run out of the turntable board at the rear and is coiled around the fabricated brackets. The original tube amplifier, above, is removed from phono and replaced with amp board, left.

Also, capacitors C4 and C5 are very high in capacity. With the two transistor amplifiers pulling 8 milliamperes of current, R6 can only drop the output voltage 2 volts. No 60-cycle hum is heard with a high capacity filter network. A 2200-ohm resistor, R7, is a stabilizing resistor and helps lower the B+ voltage to 12 volts.

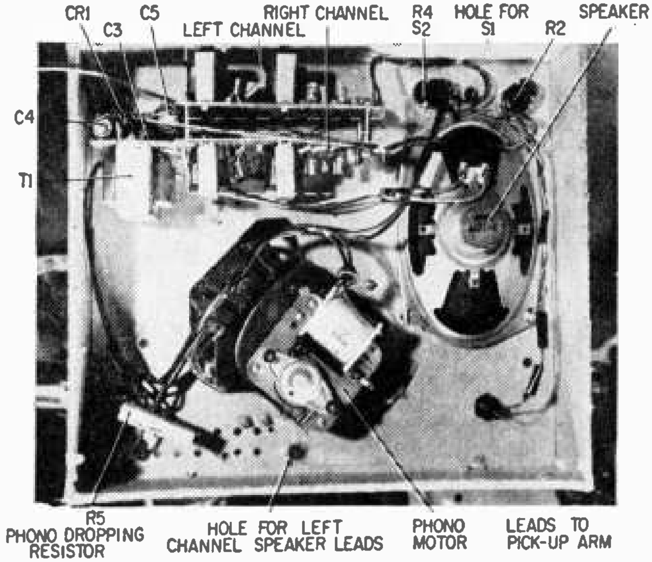
Mono to Stereo. Start by removing the old one-tube amplifier from the turntable mounting board. Take off the amplifier and volume control. Remove the old crystal cartridge from the pickup arm. Cut the AC phono-motor wires going to the small amplifier. If this phono motor operates directly from the AC line. without being in series with the amplifier tube, the additional voltage dropping resistor, R5. shown in our schematic will not be needed. (See the drawing of the phono motor hookup.) Most phono motors that are in series with the filament of the amplifier tube are 85 or 90-volt AC motors. Simply use a 100-ohm 50-watt resistor in series with the motor if this happens to be your case.

Cut a piece of aluminum to use as a chassis for the transformer. Drill and prepare the power supply chassis to mount on one end of the transistor amplifier. Mount the chassis on the end where the speaker

PARTS LIST

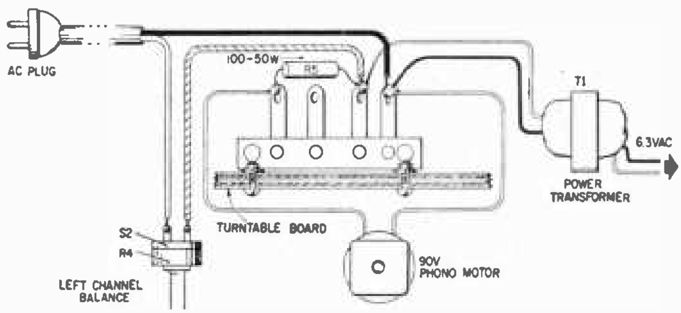
C1, C2—150-mmf fixed capacitors
C3—100-mfd, 15 WVDC electrolytic capacitor
C4, C5—1000-mfd, 15 WVDC electrolytic capacitors
CR1, CR2—Silicon diode rectifiers, 750 mil 400 PIV (Lafayette Radio 19R5002 or equiv.)
I1—Neon indicator lamp assembly (Leecraft "Snaplite" or equiv.)
R1, R3—10,000-ohm, ½-watt fixed resistors
R2, R4—25,000-ohm volume controls (with s.p.s.t. switch S2 on R4)
R5—100-ohm, 50-watt fixed power resistor
R6—47-ohm, ½-watt fixed resistor
R7—2200-ohm, ½-watt fixed resistor
S1—D.p.s.t. toggle switch
S2—S.p.s.t. switch (on R4)
T1—Filament transformer (Stancor P4134 or equiv.)
2—1-watt, solid-state, push-pull, transistor audio amplifier circuit boards (Lafayette 99R9038)
1—Stereo/monaural crystal cartridge (Sonotone 12-TH-RS77 or equiv.)
1—4-inch PM speaker (or size to match present speaker)
Misc.—Aluminum mounting angles, terminal strips, hardware, hookup wire, panel marking, speaker grille, solder, etc.

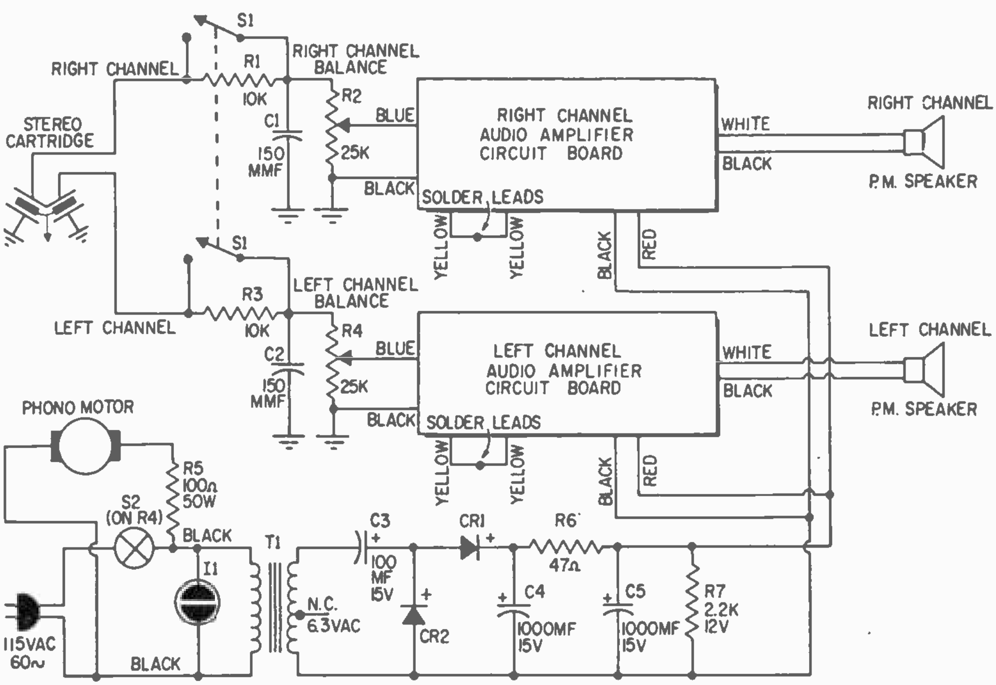
Estimated cost: $22.00
Estimated construction time: 4 hours



Nearly completed conversion of the phonograph is shown from the underside. Amplifier circuit boards are piggy-backed and the power supply components are attached to one of the boards on their own subchassis. There is generally more than enough room under the average phonograph to easily mount all the components. Note the placement of R5 and the perforations in the turntable board. The resistor becomes quite hot so be sure to position it away from wiring and components and provide vent holes above it.

Detail drawing, right, indicates how phonograph is converted to supply 12 volts DC to the amplifier circuit boards and the AC voltage to the phono motor. Schematic diagram, below, shows connections from transformer to rectifier and filter network. Leads from the boards are color coded.





transformer is located. You will then keep all AC components away from the crystal input, eliminating possible hum pickup.

A ⅜-inch hole is drilled near the power transformer mounting for a rubber grommet. The 6.3 VAC leads go through this opening. The power transformer is a Stancor R6134, although any 6.3 VAC filament transformer will do. After the power transformer is mounted, wire the other smaller components into place as the soldering process goes on. Keep the small components as close together as possible. Use a 4-lug soldering terminal strip to hold these small parts in place. Tape up the yellow center-tapped unused voltage lead.

After the power supply wiring is completed check the output voltage. You will note that when there is no load on the power supply, the DC voltage is quite high. Now bolt the power supply chassis to the perforated transistor amplifier board. Use short bolts to hold the unit, as they will be pulled out later for long spacer bolts.

Now cut four plastic or metal spacers ¾-inch in length. Small copper tubing or small aluminum TV antenna bars will make good solid spacers. Cut and bend two small L-brackets to secure the amplifier boards to the turntable board.

Wiring the Amplifiers. Bolt the two transistor amplifiers together with spacers between. Use long bolts and cut off any protruding ends. Attach the small L-brackets to the amplifier boards.

Run the red leads from each amplifier to the B+ connection of the power supply. Solder the black leads to the negative terminal. Cut off the yellow leads and solder them together. These two yellow leads were the wire terminals for an on-off switch. We are switching the unit on and off at the primary of the power transformer.

Plug the AC transformer leads into the AC outlet and check the voltage on the power supply. This voltage should be close to 12 volts. You will notice a hum when the blue leads are touched on the amplifier. Be careful when working around the transistor boards that no parts are disturbed and shorted.

Bolt the amplifier units to the turntable board. This amplifier section should be no bigger than the old one-tube job. If the compartment under the turntable is too small, the transistor amplifiers can be mounted flat against the sides. If the small PM speaker is going to be replaced for a larger one, drill out and pull off before the amplifiers are mounted.

Run another flexible phono wire up through the arm to the stereo cartridge. Mount the small turnover cartridge in place of the old one. If there happen to be lead weights glued on the plastic arm, remove them. Solder the small cartridge connectors to each wire. Cut a flexible piece of wire one inch long and solder the small tip on one end and the other end to the black or ground lead. Slip the four tips over the small cartridge male prongs. A key to left, right and ground connections will be given with the cartridge you purchase.

Bring the cartridge leads down through the arm to the scratch-filter switch S1. Wire up each balance control.

Left Channel Speaker. Cut off 8 feet of regular flat rubber AC cord and solder to the left channel amplifier speaker leads.

Prepare your stereo compact for a left channel speaker by removing the hinge pins from the phonograph cover. Cut off one half of the hinge and solder the pin to the top end. Now the top lid will slip right into the stationary hinge on the bottom unit. Take a circle cutter and cut two holes for the speaker opening. Drill the four speaker holes and four holes for a metal or plastic grille.

Solder the two wires to the speaker and bolt into place. Use a plastic strip to secure the cord to the cover and keep it from pulling out of the speaker terminals. Fasten the grille in place and on the back side, at the bottom, mount two cord brackets. The speaker cord can be wrapped around them before closing the top lid.

Final Assembly. Hookup the phono motor as shown in the photograph. This motor happens to be a 90-volt unit and a 50-watt resistor is wired in series. Position the resistor so its heat is dissipated through the perforations in the turntable board. Tie a knot in the AC power cord so it cannot be pulled out and solder the leads to the terminal tie point.

Drill a hole for the neon indicator, I1, in the front of the turntable board, so it can be seen. The hole should be snug to keep the unit in place. Solder the leads of I1 to the primary of the power transformer. Mount the balance controls on the turntable board and complete wiring.

Check Out. Turning on the left channel volume control. Rub your finger lightly over the crystal cartridge. Now turn the left chan-

(Continued on page 92)

IN cold weather, an automobile is more difficult to start. This harder starting is caused by a combination of two conditions: the amp-hour capacity of the battery is a function of the temperature (the lower the temperature the lower the amp-hour capacity), and the thickened crankcase oil and grease put a heavy load on the starter. This causes a heavy current drain from the car battery. Since the initial current drain is about 500-amps for a 6-volt system and 300-amps for a 12-volt system, the battery voltage is greatly reduced in cold weather. This reduced voltage often supplies insufficient spark to the ignition system.

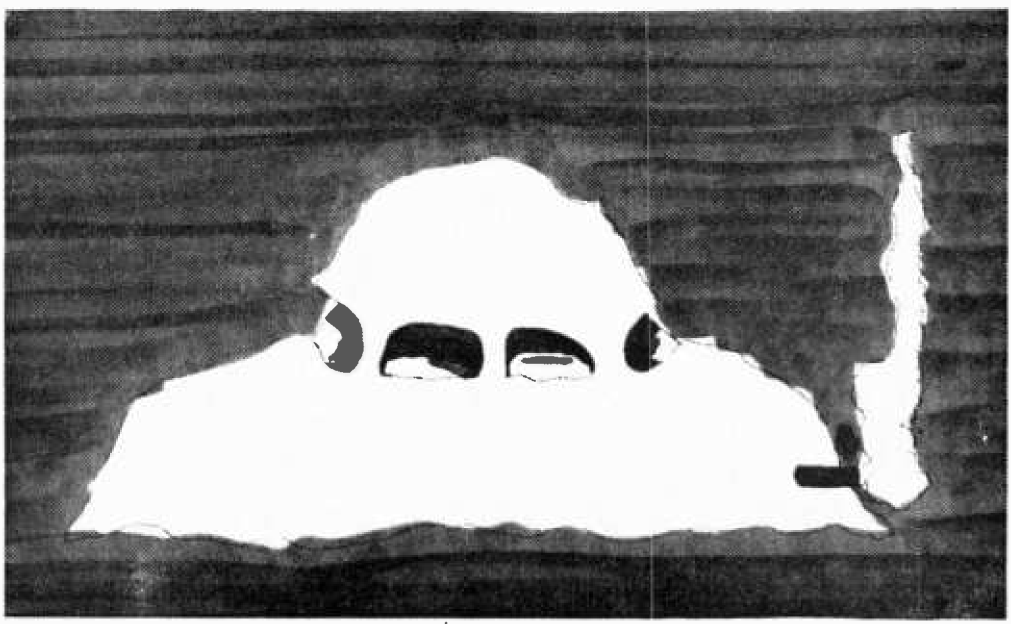
Separate Ignition Supply. The simple yet effective circuit described here automatically connects a separate battery to the ignition system when the car is started. Your auto battery turns the starter and the auxiliary battery supplies the ignition spark. As soon as the motor is running, the circuit automatically disconnects the auxiliary ignition battery and reconnects the car battery. Circuits to do this have been described before. Most of them have four shortcomings: high cost, complexity, manual on-off switch, and adaptability only to certain polarity and/or voltage systems. This circuit is adaptable to either grounded-positive or grounded-negative, 6-volt or 12-volt systems. It can be constructed, exclusive of the auxiliary battery, for under $10.00. Often the parts can be salvaged from the junk box. No switch is required and only two components are used.

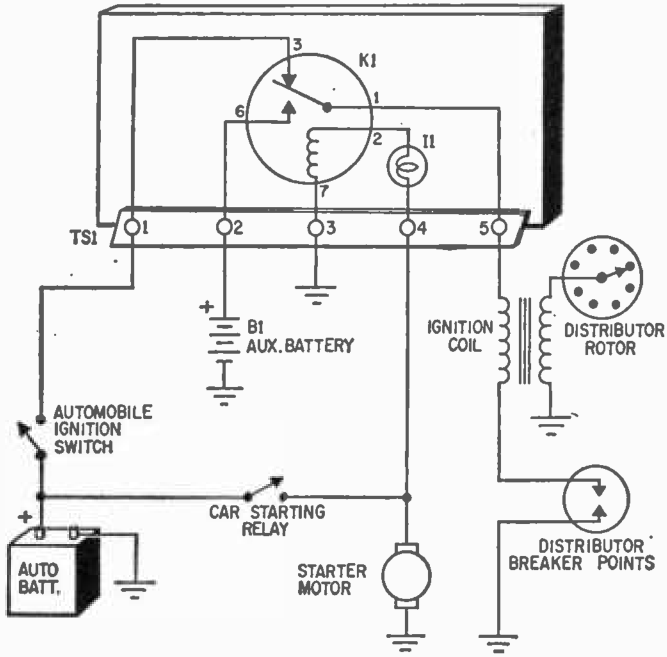
Operation. The schematic diagram shows the circuit and the connections for installation in a car. As the starter-motor is actuated by the car starting relay a voltage appears at the starter-motor terminal. This voltage, applied to bulb I1 and relay coil, which are connected in series, energizes relay K1. The car battery is then disconnected from, and the auxiliary battery B1 is connected to, the ignition system. The starter-motor is, of course, disengaged once the engine starts. The voltage is removed from the starter-motor terminal and relay K1 reverts to its normally de-energized position, thus disconnecting the auxiliary battery and reconnecting the car battery.

An AC relay is used for K1. It is necessary to have a relay which will operate at reduced car battery voltage. A sensitive low-voltage DC relay would be delicate, costly, and unreliable due to car vibration. An AC relay

COLD WEATHER CAR STARTER

By Richard C. Peterson



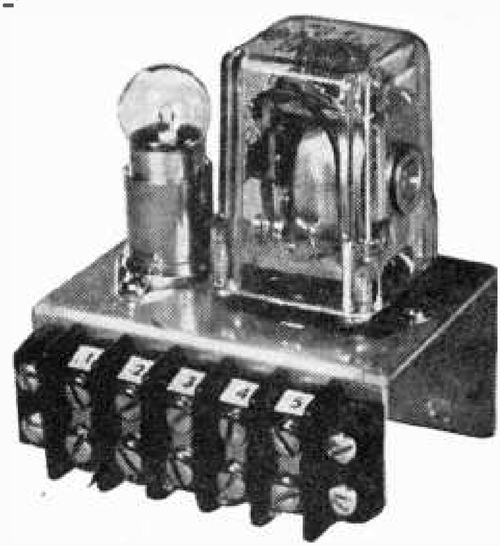


Combination schematic diagram and pictorial shows the car starting aid and its connections to your automobile starting and ignition systems. Current through the starter motor connects the auxiliary battery to the ignition coil through relay K1.

PARTS LIST

B1—Auxiliary battery: 6- or 12-volt lead storage, or 6- or 12-volt industrial dry cell(s) (Eveready 706 or equiv.)
I1—Incandescent current limiter (No. 63 or 64 bulb for 6 volts; No. 89 or 90 for 12-volt use)
K1—General purpose relay (Potter and Brumfield KRP-11A, specify 6 or 12 volts)
TS1—5-screw barrier terminal strip
1—8-pin octal socket
Misc.—Scrap aluminum, hookup wire, installation wire (see text), hardware, solder, etc.

Estimated cost: $9.00
Estimated construction time: 1 hour plus installation



The cold weather car starter can be easily mounted in your engine compartment in the most convenient location. Then just make the five connections to terminal strip TS1.

will operate satisfactorily at much lower DC voltage. Although the indicated relay was used in the original circuit, any relay with approximately the same characteristics may be used. The particular relay used had a 5-ohm, 6.3-volts AC, .3 ampere coil. It had DC pull-in characteristics of 1.5-volts and ¼-amp.

A bulb, I1, is used for current limiting, rather than a resistor, in order to utilize two unique characteristics of incandescent bulbs: non-linear resistance and constant-current control. At low car battery voltage, the cold bulb has low resistance and allows the relay to operate. At high car battery voltages, the resistance of the hot bulb is several times higher and is used to limit the relay coil current to a safe value. When used with the indicated bulbs the circuit has pull-in characteristics of 2-volts on a 6-volt system, and 4-volts on a 12-volt system. The relay coil's AWG 28 wire is adequate for the maximum bulb current of .6 amperes.

Simple Construction. The small size and simplicity of the starting aid unit did not warrant the use of a commercial chassis. A chassis was fabricated from scrap aluminum

(Continued on page 85)

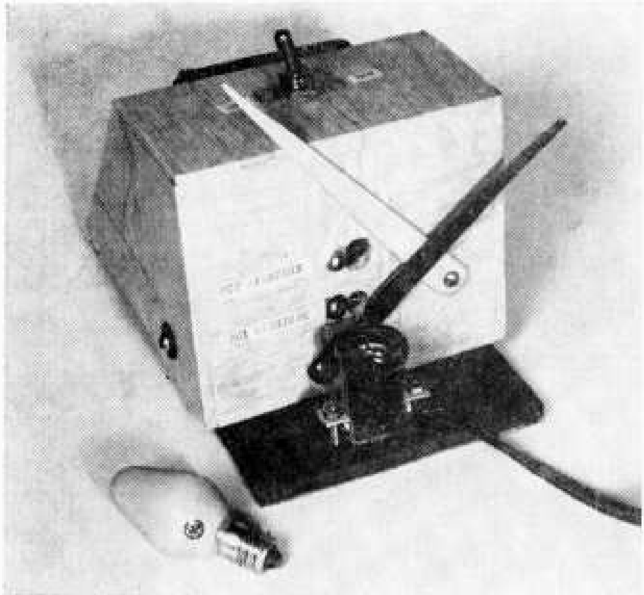
PHOTOELECTRIC TRANSISTOR CHECKER

Martin H. Patrick

Light-powered this unique transistor-tester is completely isolated from the power line —never needs batteries and eliminates expensive power-supply components.

If you've always wanted a transistor checker that's free from all the disadvantages of the conventional types, this photoelectric model is for you. There is no problem of periodic battery replenishing and constant resetting of the meter as cell power runs down, as was a battery operated transistor checker; there is no need for an expensive separate power supply as with power-line type transistor checkers; there is only the need for two inexpensive little photocells.

The Circuit. The checker circuit consists simply of two small photoelectric cells, PC1 and PC2, connected to a d.p.d.t. toggle switch, S1, to provide base power and collector power to either a pnp or npn transistor under test. A 0-1ma milliammeter, M1, in the collector circuit, indicates transistor condition.

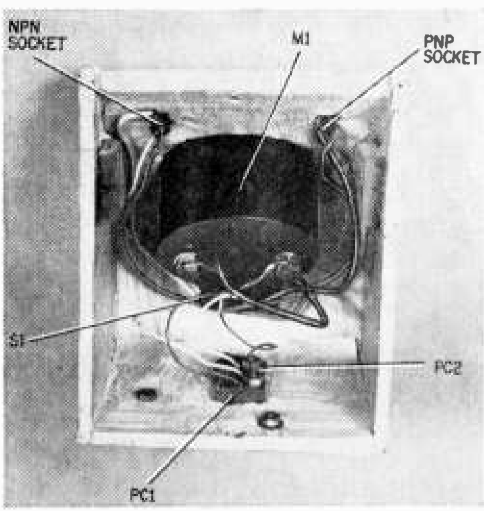


Rear view of the completed unit shows location of 7½-watt nite-light lamp used to illuminate a pair of photovoltaic cells that provide the base and emitter-collector voltages. The long, tapered strips are the shutters that control the quantity of light that reaches PC1, PC2. Switch on top changes the wired connections between PC1 and the base connections on the transistor sockets for proper voltage porarity. Light-adjusting shutters must be repositioned when different lamps are used. Calibration and recalibration are a necessary evil for any electrical or electronic test instrument that is to be relied upon for accuracy.

Light shining through chassis apertures from an outside light source energizes the photocells sufficiently to provide enough energy to give transistors a quick check. The only circuit component that might fail is the light bulb which is replaced easily enough. Otherwise, once the tester is set there should be no need for further adjustment.

Catching the Light. Since the number of parts is few, they can be packaged in a comparatively small chassis box. The box shown was fabricated with wood scrap, but a commercial enclosure can be used (See Parts List). The transistor sockets should be easily accessible and a slanted front is desirable for ease in reading meter M1. Perhaps the only critical part of construction will be the location of the photocells. They should be placed so they receive the light directly from the light source through the chassis apertures. The amount of light falling on the faces of the photocells can be controlled by any type of home-brew shutter. Shown here are two strips of aluminum attached to the chassis by their one end so they can be moved to open or close the apertures completely. Photocell PC1 needs very little light to generate the required current; therefore its aperture can be made comparatively smaller than that for PC2 which must deliver slightly more than one milliampere.

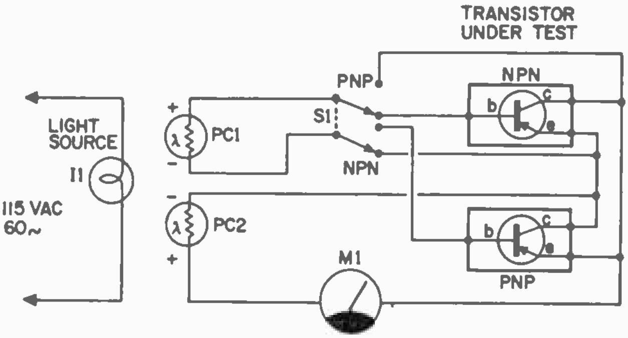
Bottom view of transistor tester with bottom cover removed. Callouts refer to schematic.



As far as the selection of photocells is concerned, you can use any type on hand, or you can order two from any of the electronic mail-order houses. The two used in the unit shown here were salvaged from a broken silicon cell by carefully soldering the leads to the top and bottom of each, being careful not to short the edges.

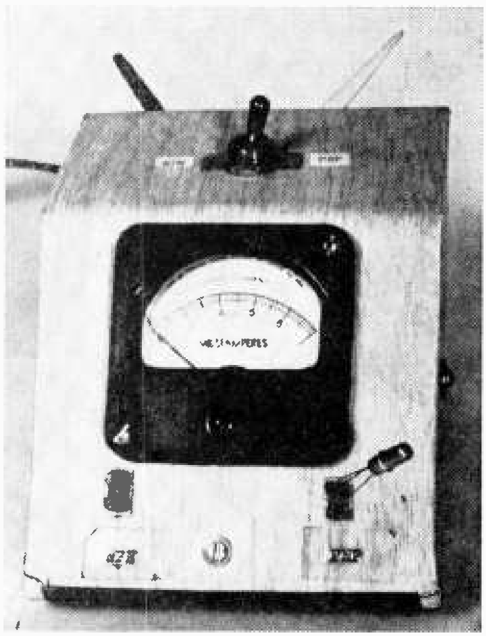
The outside light source may be any type light bulb that produces a response of at least 1 milliampere of current in the photocell. The bulb can be energized directly from the power line as in the schematic diagram (using a GE 7½-watt bulb, for example). Or, it can be operated from a filament transformer. Almost any output transformer with a sufficiently high primary resistance connected to a 115-volt AC line will deliver

A good desk lamp can be a replacement for I1. It may be necessary to recalibrate the tester everytime it is set up since the distance from the lamp to PC1 and PC2 will not be exactly the same each time. Variations in line voltage will also change the light output and the voltage output from PC1 and PC 2 will be different.



Parts List

I1—Light source for PC1, PC2 (115vac, 7½-watt incandescent lamp or equiv.) (See text.)
M1—0-1 DC milliammeter (Lafayette Radio 99G5052)
PC1, PC2—Cadmium photocells (Lafayette 99G6315) (See text)
S1—D.p.d.t. toggle switch
1—4¼" x 4" x 4" aluminum universal meter case (Bud CMA1936 or equiv.)
Misc.—Transistor sockets, light source socket, line cord, hardware, wire, scrap aluminum, solder, etc.
Estimated cost: $7.00
Estimated construction time: 3 hours



Short-lead transistors with triangular basing may not fit into inline transistor sockets.

enough power to light a conventional pilot light. Check the output voltage and use a bulb with the closest voltage rating. Note that the bulb can be operated at a reduced voltage.

Calibration. To adjust the transistor checker, first light the bulb you've selected as an outside light source. Short the emitter to the collector with a wire fine enough to fit into either socket, and make sure that both light apertures are closed. Then slowly move your shutter, opening aperture PC2. The milliammeter should move. Open the aperture until M1 reads full scale. If you can't get a full scale reading, move the light source closer to the aperture. Remove the shorting wire from the transistor socket.

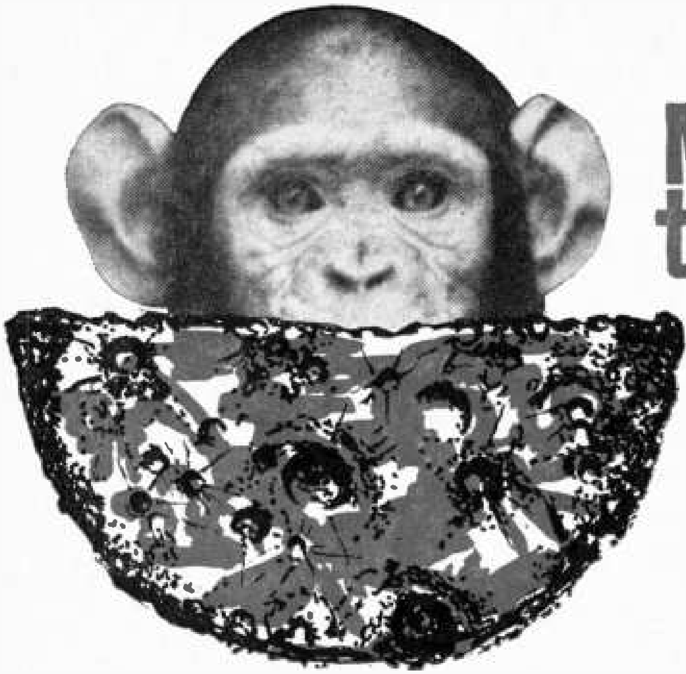
Select a transistor that you know is good—one with a high *beta*—and insert it into the proper socket. Slowly open the shutter covering the aperture of PC1 until you get a reading somewhere in the middle of the milliammeter scale—about .5 to .6 ma. If the transistor you're using is known to be good, this setting will suffice for general testing; but if you have a transistor with a known *beta*, you can make a more accurate setting by adjusting the aperture of PC1 until you read the proper *beta* value on the scale.

Once the checker is set, it should require only very little attention thereafter.

Eliminating Variables. One observation you should make is the nature of the ambient lighting where you use the checker. If variations in its level will upset the balance of your initial calibration, you might enclose the outside light source, I1, and the apertures completely, leaving only a means of actuating the shutters.

With the checker complete, you only need some questionable transistors. Insert them in the proper socket and note the first reading which is the leakage. Now flick switch S1 and meter M1 will indicate the condition of the transistor.

The circuit shown here does not include a switch for the outside light source, I1, since, for occasional use, it is easy enough to just plug the line cord into the nearest socket. ■



Monkeys to the moon

Chimps with a college education will take much of the risk out of man's first voyage to the lunar surface.

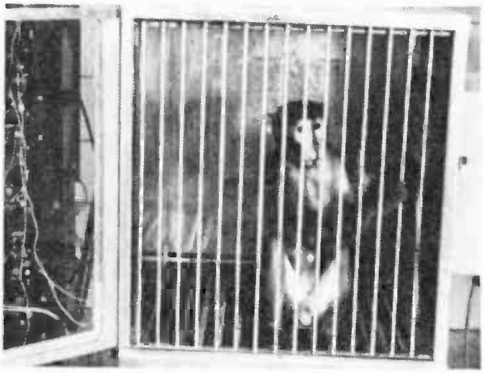
■ Billions of dollars are tagged for putting a man on the moon but the first intelligent creature to reach our lunar satellite may well be a chimpanzee. Just as a chimp named Ham preceded Alan Shepard's space ride back in 1961, so will one or more astromonks blaze the way for man's exploration of the moon.

Some 83 chimps are now being trained for the job at Holloman Air Force Base in New Mexico. Researchers at the base's Bioastronautics Research Laboratory expect to obtain clues to human reactions during extended space flights. Some chimps will ride orbital rockets, others will journey aboard a space platform to be established as a way-station between earth and moon. A few should get to circle the moon itself.

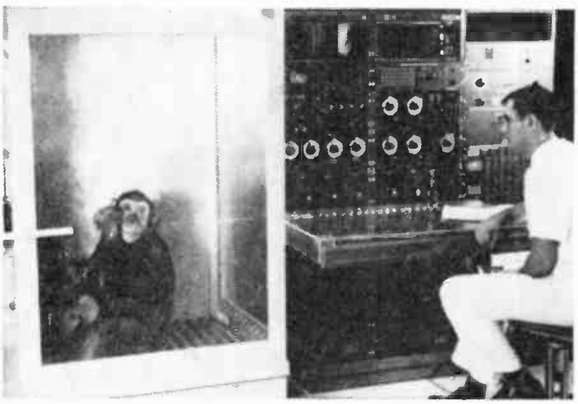
In space the monkeys will perform the same tasks they're learning here on earth. Information telemetered back to earth will provide scientists with data on their reactions during flight. George Meeter, a program director at Holloman, says that four or five chimps now at the center will probably go into orbit during the lunar exploration program. "They may be sent out alone, or even teamed up with an astronaut," Meeter said. "And sometime in the next decade, one or more of them may land on the moon—providing that there's a way to get them back. We aren't in favor of tossing intelligent animals into space and leaving them there," Meeter added. "If a method is found to put a rocket on the moon and retrieve it automatically, the passenger will probably be a Holloman chimp. For initial flights, such as the space platform and automatic circuits around the moon, our chimps will almost certainly be the first passengers."

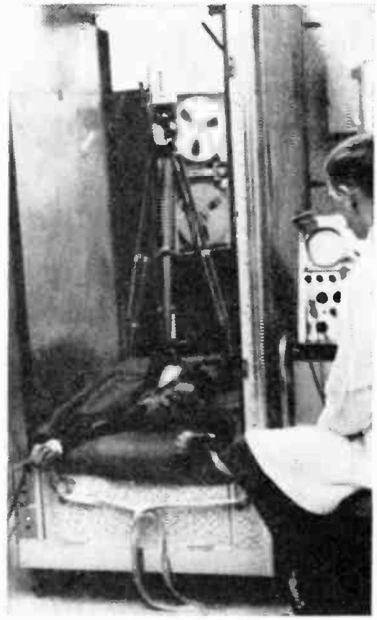
Meanwhile, back at the lab the chimps are pampered in keeping with their status and purchase price. Cost has recently skyrocketed to $1,000 each since surgeons also use them in some kinds of transplant operations. These chimps, too, are better-educated than their earlier mates in the space program. They can operate more complicated devices and are trained to count up to eight, as against Ham's three.

Only young chimps between the ages of four and five will see outer space. The older ones will be retired to an earth-bound existence in zoos around the country. So the next time you visit the monkey house, don't do a double-take if you see some ape running through a countdown. He's just reminiscing. ■



Caged monk waits turn in million-dollar test lab at Holloman while comrade in photo below him sits out high-altitude chamber. This simulates thin air of upper atmosphere. Below, closed-circuit TV camera keep watch on chimp. Wires on body pick up pulse, pressure, etc.





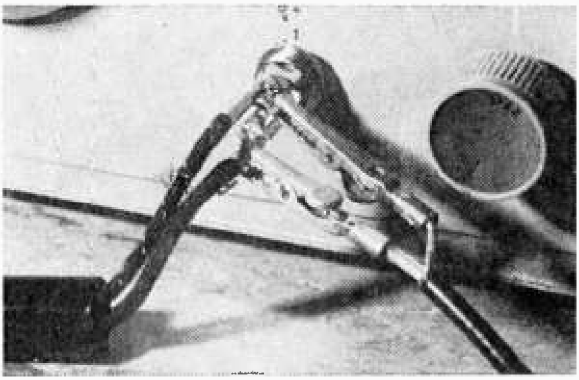
Photos courtesy Three Lions

Masked monk at left wears oxygen gear to check out rigors of space flight. Above, chimp is ready for long trip from Holloman to Cape Kennedy—not through space, but in secure steel crate.

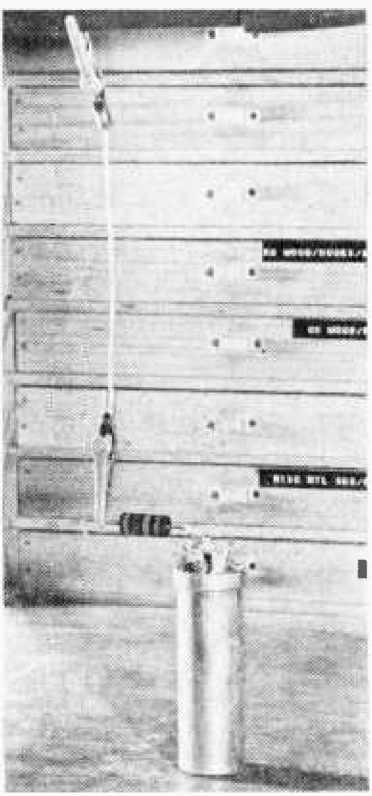
Clip Tips

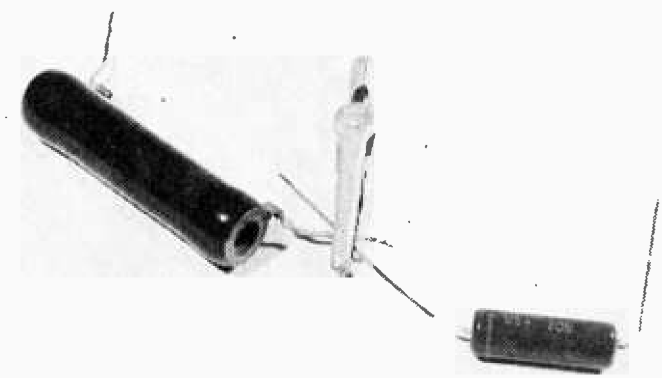
by Marshal Lincoln

Alligator clips are the handiest items on the electronic hobbyist's work bench. Though mostly for making temporary electrical connections, these versatile little clips are also fine for just about every third-hand job; from holding open a magazine at a selected page, to serving as a heat sink while soldering delicate diodes and transistors. The accompanying photos illustrate several ways—some old, some new—that clips can make tinkering easier.



Hooking up that extra pair of headphones for a visitor to the radio shack is done quickly this way. Unscrew the insulating cap from the regular phone plug and add the second pair of phones in parallel using a pair of clips. It's handy for an amateur field day or other contest when an assistant monitors to hear information for the log book. This method may also be used for quickly connecting your receiver to a tape recorder when you want to make an off-the air recording.

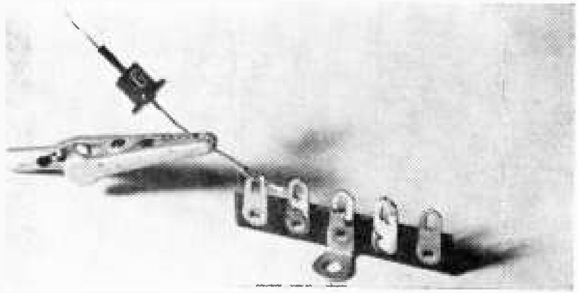


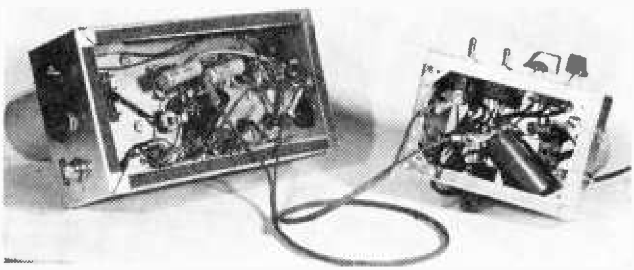


Above; temporary connections of trial components when, say, trying various values of resistors in an experimental circuit, can be quickly made with alligator clips. Once the right component for the job is selected, it's soldered in permanently. Remove circuit power while using clips.

Another way to hold a component in place while soldering is to attach it to an alligator clip which, in turn, is suspended from the bench lamp by another clip and piece of wire. The suspending wire can be maneuvered around to hold the component at various points on the work bench surface.

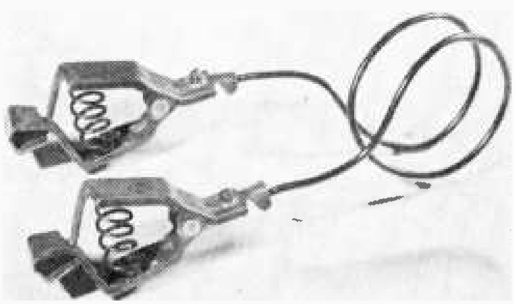
An alligator clip by itself makes a handy heat sink for use when soldering delicate diodes and transistors which are easily damaged by too much heat. Hook the clip to the lead between the diode body and the connection to be soldered, as shown. After soldering the connection, leave clip in place until the joint cools.





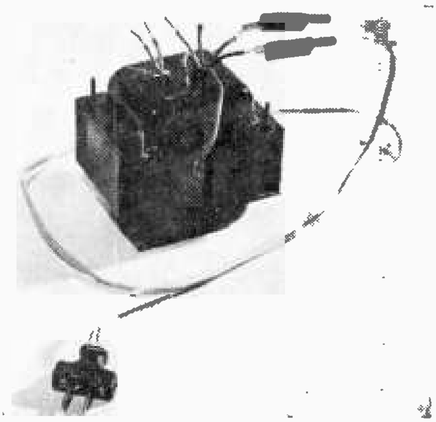
Several sets of patch cords like these are good for making temporary connections while checking newly constructed or modified equipment. A few feet of lamp cord, with an alligator clip soldered to each end of each wire is all that's necessary. A spot of paint can be added for color-coding so you can match up the correct clips at either end.

At right; special clips seen at bottom of photo have sockets that can be plugged on to standard test probes, pin or banana plugs. They can save much time by making a temporary, but solid connection with a test lead in a way that doesn't require holding by hand.



The "coil" shown above is a useful accessory for the ham or CB mobile operator. It forms a coupling link between a grid-dip meter and the whip antenna. To use it, disconnect the coax feed line from the base of the mobile antenna and attach this gadget. One clip goes to the base of the antenna and the other to a good ground on the car body. Move the grid-dip meter near this coil and operate the meter to find the antenna's resonant frequency.

A pair of alligator clips attached to a lamp cord with a wall plug at the other end provides a temporary hookup to house current for a component under test. (Shown here is a surplus transformer.) Be sure to put insulating sleeves over the clips to prevent short circuits.



CQ WITH ANTIQUITY

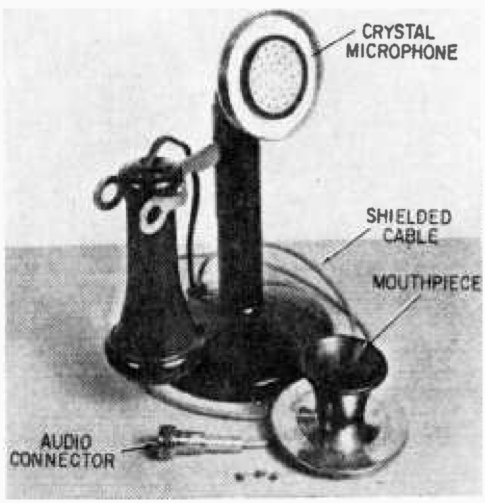
by Art Trauffer

Add a bit of Americana to your next amateur contact with a "candlestick" phone

■ The new has been added to the old in this novel desk stand mike for the ham shack or tape recordist. As shown in the photo, a desk stand telephone of yesteryear has had its old carbon transmitter replaced with a brand new crystal mike cartridge. If you don't have one of these old telephones around, they are still available at some second hand stores, antique dealers, auctions, or from the firms listed in the footnote below.

The face-plate and mouthpiece are removed from the transmitter housing by removing four small screws. Disconnect the two wire leads which go to the carbon element, and then remove the carbon element from the back of the face-plate. The old wire leads can either be clipped off or pulled down into the phone stand. The new crystal mike cartridge is mounted in a sponge rubber ring, as shown, but first connect a mike cable to the microphone cartridge and pass the cable down through the stand. Use rubber cement or Goodyear Pliobond to hold the microphone cartridge in the sponge rubber ring and the ring in the transmitter housing.

If desired, you can wire the receiver hook switch so that the mike is switched on when the receiver is lifted off the hook. You can even use the receiver as a low-impedance earphone for radio use. ■



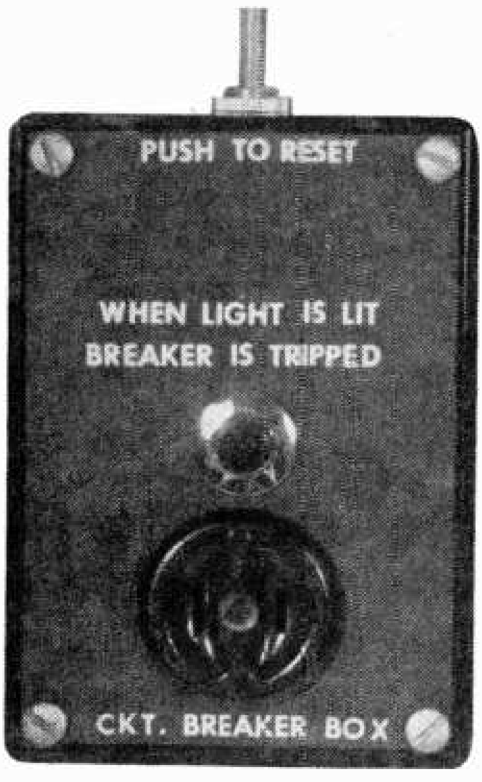
Write to the following companies to obtain literature on what's available and prices: Lewins Antique Telephones, 5215 W. 77th Terr., Prairie Village, Kansas 66208. Telephone Company, Turtle Lake, Wisconsin; Continental Telephone Supply Co., 49 W. 46th St., New York 36, N. Y.; Telephone Engineering Co., Lincoln Bldg., Simpson, Pennsylvania; Telephone Repair & Supply Co., 1760 Lunt Ave., Rogers Park Station, Chicago 26, Ill.; Delta Electronics, Box 2262, Dallas 21, Texas.

A plug-in black box can save fuses and the steps wasted in replacing them

GO BETWEEN CIRCUIT BREAKER

By James A. Fred

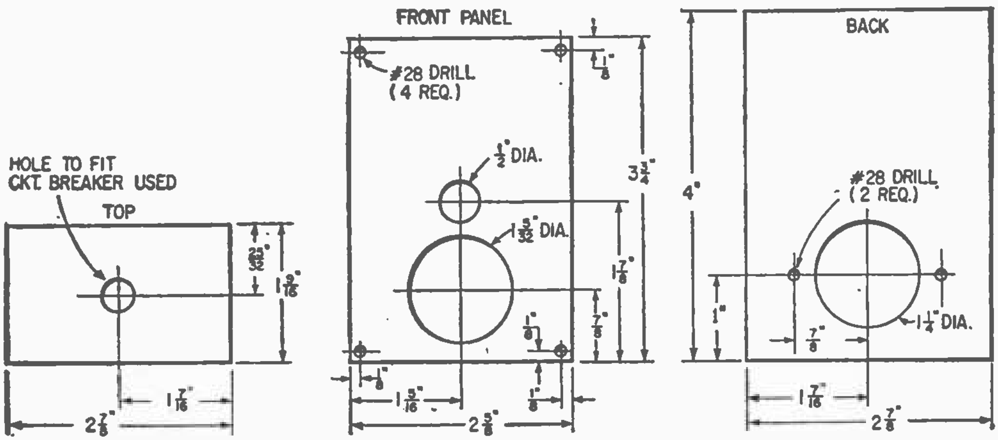
■ How many times have you been embarrassed by a fuse blowing out and plunging your house into darkness when you plugged a newly repaired electrical applicance into a wall outlet? Or perhaps you were showing your latest electronic creation to your wife and the wires crossed and blew a fuse. This has happened to me and I know that it has happened to most of you experimenters. I have often thought of making some kind of a circuit breaker box to use between the suspected appliance or circuit and the wall outlet. The availability of circuit breakers in low current ratings for TV sets brought the project to completion.



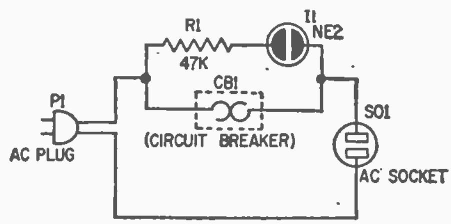
Current Rating. The most widely used circuit breaker in TV sets have been the Mel-Rain type manufactured in Puerto Rico. This circuit breaker is now availible from Mallory in nineteen different current carrying ratings. The highest rating is 4.14 amperes. To go above this value, you can use Wood Electric Corp. Circuit breakers which have ratings from 5 to 20 amperes. The Allied Radio Corp. also stocks the Wood circuit breakers. Both types are quite reasonable in price and give complete protection from short circuits within their current ratings.

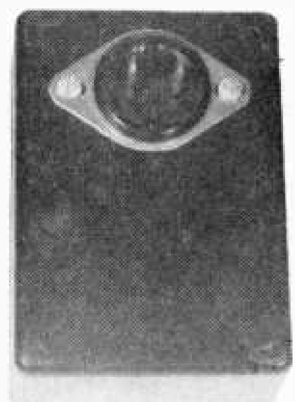
After much thought I decided to house all the necessary parts for the circuit breaker in a plastic box with a phenolic cover. This makes a completely insulated unit with no chance for shock. Follow the layout drawings in preparing the box to mount components.

All the needed parts are listed for either the Mallory-Mel-Rain circuit breaker for currents under five amperes or for the Wood circuit breaker for currents from five to twenty amperes. You may build either or both as I did to meet your needs. If you desire you may use the grounded type AC socket and plug. The pilot light I1 is for convenience only and lights up when circuit breaker CB1 trips or opens up. This will be a useful indication if you aren't nearby when the breaker trips. Be sure and use a wire that will carry the breaker overload current when



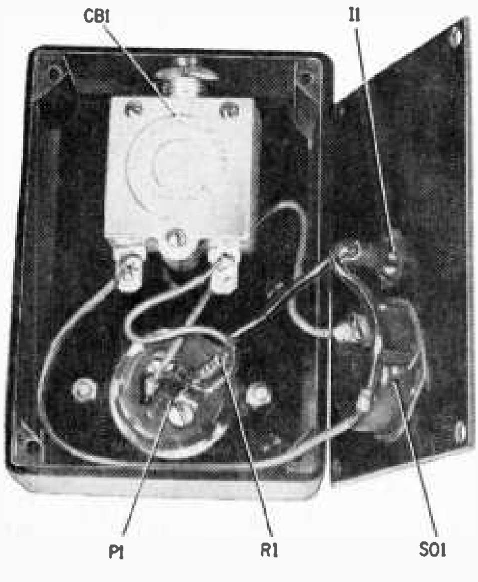
PARTS LIST
CB1—Circuit breaker of required current carrying capacity: Mallory CBB series up to 4 amperes; Wood Electric Co. Model 375 from 5 to 20 amps (Order Model 375 from Allied Radio; Cat. No. 33Z438C; specify 5, 7, 10, 15 or 20 amperes.)
I1—Indicator lamp ("Econoglow" type 116, Allied Radio No. 7EE906 or equiv.)
P1—AC plug (Amphenol 61-M1 or equiv.)
R1—47,000-ohm, 1/2-watt resistor
SO1—AC socket (Amphenol 61-F or equiv.)
1—2 7/8"x4"x1 9/16" plastic case (Allied Radio 87U895 or equiv.)
Misc.—Plastic cover for case (cut to size from 6"x3 1/2" cover, Allied 87U887), ring nut and nickel plated washer (Mallory 233 and 225, respectively), hardware, decals, hookup wire, solder, etc.)
Estimated cost: $4.00
Estimated construction time: 1 hour





Detail drawing, top, pinpoints location of holes for mounting components. The schematic diagram, above, shows how I1 is paralleled with the circuit breaker to light when CB1 opens. At the right is the back of the plastic case showing the AC plug, P1.

Inside view of the plastic case and back of cover reveals installation of components.



wiring up the box. The decals add a professional touch to the appearance of the unit.

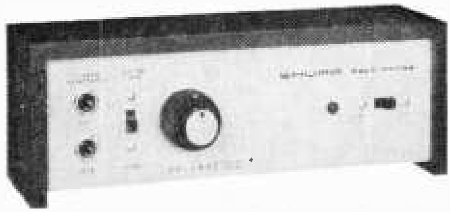
As you can see from the photograph, the P1 plugs directly into a wall outlet. The device under test is then plugged into breaker box socket SO1. When a short circuit occurs in the Mallory type breaker the circuit opens and the red button pops up. From a distance it would be hard to tell whether or not the red button is out farther than it was. With the red light however there is no doubt when the circuit breaker is open. When the Wood circuit breaker trips, the button pops up and shows white and red making it easier to tell when it is open.

Check It Out. When you have finished the assembly and wiring, test the circuit in the

(Continued on page 120)

RADIO-TV EXPERIMENTER LAB CHECK

SHURE SA-1 SOLO-PHONE
Hi-Fi Stereo
Headphone Amplifier

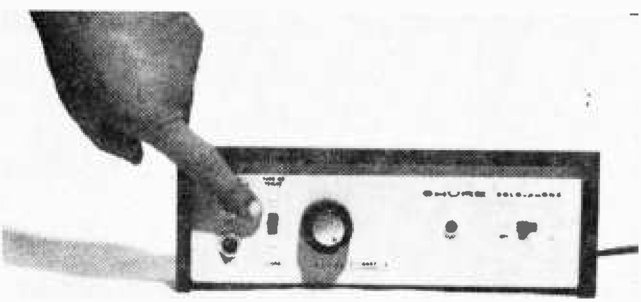


■ It's often amazing how we overlook simple solutions; take for example hi-fi listening with headphones. Here is an ever-expanding market, more headphones are being sold than at any other time—even more than forty years ago when all listening was done with phones; yet we use a $200 powerhouse with a 35 to 100 watt rating to drive headphones which can rattle the eardrum with only one milliwatt of power. And as a reward for not thinking we must worry about fusing the headphones, attenuating the drive level, and how to get around the inevitable hum when using a headset with a high power amplifier. How much simpler, and certainly cheaper, to use a very low power amplifier specifically designed for headphone listening —something like Shure's Model SA-1 *Solo-Phone*.

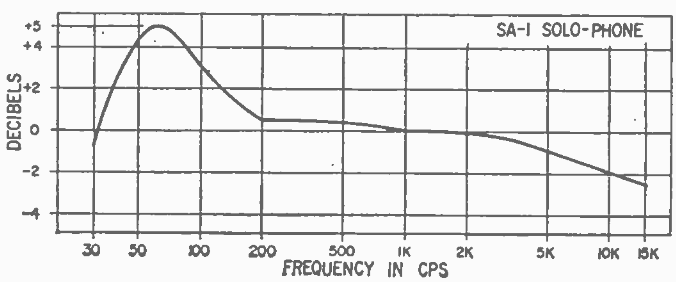
What Is It. The *Solo-Phone* is a miniature AC powered solid-state (all transistor) amplifier specifically designed for high-fidelity listening with headphones. Two stereo inputs are provided: an equalized magnetic phono and a high level input for a tuner or tape recorder. Either input source is selected by a switch on the front panel. Two output jacks are provided so that two separate stereo headsets can be plugged in at the same time. The volume level of both channels is adjusted by a dual-concentric control with a friction lock. Once each channel is adjusted for optimum balance rotating either control adjusts the output levels for both channels simultaneously.

A switched AC receptacle is provided on the rear apron for simultaneous power control of the input equipment; tuner, record player or tape machine.

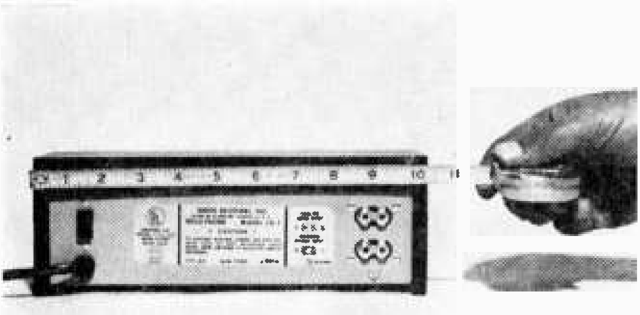
Keep in mind that the *Solo-Phone* is strictly a headphone amplifier, it is not something which can double at several jobs; it cannot drive a speaker, that is, not for most practical purposes. You will get very



Switch on SA-1 front panel is used to select phono or high-level inputs such as tuner or tape. Knob to right is dual-type control for stereo balance and volume. Although fully transistorized, the SA-1 has self-contained power supply for operating from 117 VAC. Audio output power is 20 milliwatts; more than ample for listening on headphones.



Frequency-response curve for SA-1 reveals boost in bass response around 100 cps to improve performance on headphones. At the high, or treble, end, drop-off in response is negligible to the upper limits of human hearing.



Width of amplifier is 10¼". At left are seen AC cord, and switched AC receptacle. At right are input sockets. Input impedance for phono is 47,000 ohms; for tuner or tape it is 250,000 ohms. AC power drain is 5 watts.

low volume from a small, high-efficiency speaker, however. Since Shure claims that the Solo-phone can be used with headset impedance from 4 ohms up, that's the way it was checked, with phones of various impedances. True to the claim, the *Solo-phone* performed well with low or high impedance (crystal) phones. An interesting effect was obtained with budget headphones of the two dollar variety. While we aren't certain why we got the effect we did, inexpensive phones sounded quite good, so much so that when listening to a communications receiver we preferred driving the phones through the SA-1 rather than through the receiver's headset jack. Perhaps it was due to the low frequency boost below 100 cps.

Lab Checking. As shown in the graph, the SA-1's frequency response into an 8-ohm load, there is a slight bass boost or "compensation." We found the compensation a decided asset as it gave a little more "body" to headset sound—which is generally needed. Contrary to popular opinion, headsets may be flat on the low end when checked with instruments but not necessarily so when checked with your ears.

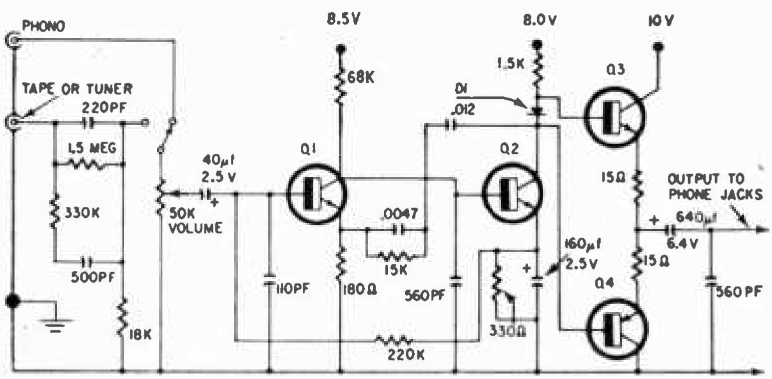
Distortionwise, the *Solo-Phone* exceeded Shure's specs, being .6% THD (total harmonic distortion) at the rated output of 100 mv., rather than the specified "less than 1%" (which implies .99%).

Sensitivity for rated output is 6 mv. for the phono input and 140 mv. for the high level phono input.

Our Views. Though the *Solo-Phone* is intended for high-fidelity headphone listening some other uses come to mind. It makes an excellent isolation amplifier for monitoring while tape recording; and it is particularly attractive as a headphone amplifier for the hard of hearing (such as when connected to the TV receiver) since when one must use a headset for several hours low distortion, balanced sound is an absolute necessity to avoid ear fatigue.

Another use came to light when the maintenance chief of a local FM station borrowed the test model for a tryout. Now we can't get it back: he claims, "it's the best turntable cueing amplifier he's run across in years."

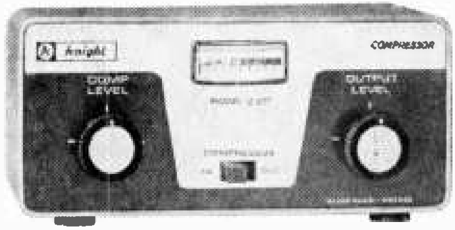
We're similarly impressed; for $45, including the walnut case, the Solo-Phone is about the least expensive way to get true high-fidelity headphone listening. For more information and complete specifications write to Shure Brothers, Inc., Dept. HH, 222 Hartrey Ave., Evanston, Illinois. ■



Schematic of SA-1 showing one of two identical stereo channels. Circuit is equalized for RIAA playback; output of unit is push-pull.

RADIO-TV EXPERIMENTER LAB CHECK

KNIGHT-KIT C-577 Ham/CB Audio Compressor/Preamp Kit



■ By now there isn't a Ham or CB'er who isn't an expert on *talk power,* and that includes *you.* You know that maximum range is achieved when the transmitter is modulated to 100% *as much of the time as possible;* and you know that a clipper or compressor is the device which amplifies the low speech volumes to 100% while preventing the loud volumes from exceeding 100%. And we'd be fools to bet against you knowing that while CB transceivers are adjusted for 100% modulation with a so-called *average voice level,* your voice might need a smidgen or two of extra amplification to really get maximum *talk power.*

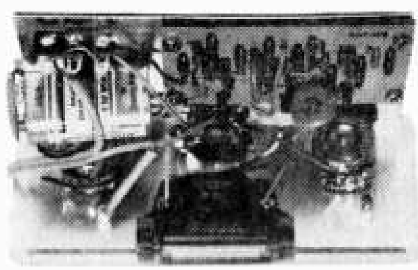
Knowing all the facts there's now no good reason to put up with anything but the best in modulation, for the Knight-Kit C-577 combines clipping, compression and preamplification in one unit, with both adjustable compression and output level controls.

The Knight-Kit C-577 is a completely self-contained add-on unit; that is, it requires no direct connections or modifications to the transceivers existing wiring, and any CB'er, whether a full fledged technician or an all thumbs fledgling, can add the C-577 compressor to *any* CB transceiver—whether relay or electronically switched.

What's Inside. The compressor utilizes three transistors and two diodes to provide both compression and limiting action. At low volume levels only compression is employed. The mike signal feeding through the compressor automatically adjusts the input transistor's gain so that the loud volumes are held back while the lower volumes are amplified. A front panel compression control allows the unit to be pre-set so that a 10 db increase in input signal level is translated into a 4 db increase in output level; in effect, this is a 6 db boost to the lower volumes. If the signal input is suddenly increased—such as by shouting—the excess signal increase is "trimmed" or clipped by the two diodes (two diodes needed for full wave clipping) so that the compressor's output level cannot exceed a preset value that's needed for 100% modulation. Since a modulation "ceiling," so to speak, is established, once properly adjusted the compressor does not permit overmodulation with its attendant distortion and sideband splatter.

To permit critical adjustment of the compressor the unit is equipped with a *compression level meter* which indicates, via a red scale section, when you are getting compression. However, in our tests there was moderate compression even when the meter pointer stayed in the white or *no compression* region. When the voice level was raised or the compression control was adjusted so the meter pointer swung into the red region full compression and mild clipping was obtained. The compressor is normally adjusted by speaking into the mike and adjusting the compression control until the meter rises into one-third of the red region. Note that unlike some other compressors the meter is connected to the compressor circuits, not to the transceiver's modulator. As we said, there is no need to modify the transceiver's wiring.

Once the compression level is set to *your own voice level* the output control is adjusted till the transceiver is modulated to 100% on speech peaks. It's all a simple pro-



Fully assembled compressor—note rather wide layout. No tight corners to complicate a beginner on his first kit attempt.

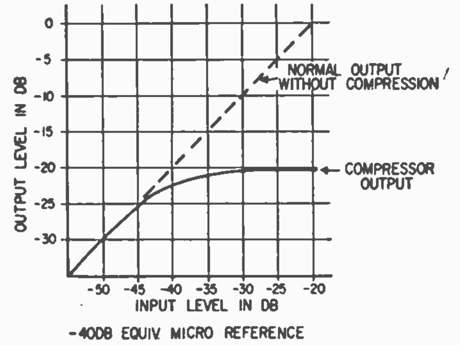
LAB CHECK

cedure with no careful balancing required for optimum performance.

Build It Yourself. The kit is not even a one evening project; if you can't throw it together in an hour or so you're doing something wrong. All the electronics—actually a handful of components—is assembled on a wide-spaced printed circuit board. And special precautions have been taken to insure that even the newcomer to construction will have no trouble with the kit. For example, the transistors aren't wired to the board; sockets are used so there's no chance of damaging the transistors with excess soldering heat. Then, the printed wiring is protected with a special coating except at the soldering points. Even if you crash in with a 150 watt soldering iron there's virtually no chance you'll flow solder across two "wires." (Though you should not use an iron rated higher than 75 watts.) And typical of Knight-Kit the connecting wires are precut to size and ends stripped.

The compressor uses a standard type 2U6 9-volt transistor radio battery which should last from three to six months depending on the service periods.

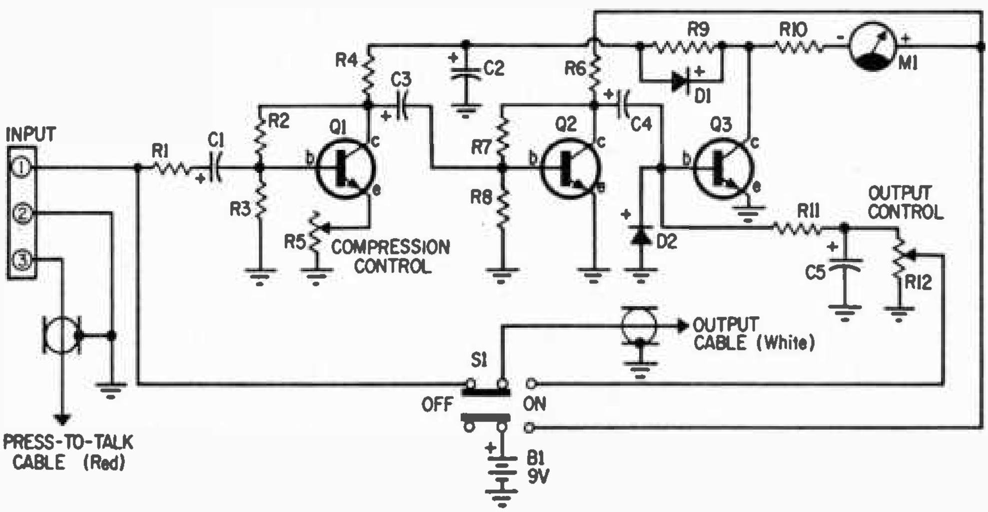
Our Comments. The C-577's performance is very good, about the best we've run across in CB compressors. However, there's one note of caution. The C-577's input impedance is in the order of 250,000 ohms. This value will load down a high impedance



Graph plots C-577's compressor performance with controls adjusted as per unit's manual.

ceramic (or crystal) mike, resulting in some low frequency attenuation. While the attenuation is not severe, at most making the signal crisp which is the way is should be, if your transceiver already has low frequency attenuation built into the modulator to improve communications quality, combined with the attenuation caused by the compressor's mike loading the resultant modulation can be shrill, or at best *thin*. If such is the case simply change to a dynamic mike; not only will it not be affected by the loading but its relatively smooth frequency response will result in a superior modulation quality.

The kit's $19.95 price (less battery) makes the Knight-Kit C-577 the best buy in Allied's 1966 catalog. So, if you want to compress or clip your audio check your 1966 Allied Catalog (page 73) or write to Allied Electronics, Dept. JR, 100 N. Western Avenue, Chicago, Illinois 60680. ■



More than just a diode clipper, the C-577 begins to compress the audio signal at −45 db.

ROLL-A-WAY HAM SHACK

By Howard S. Pyle, W7OE

Beat the problem of cramped quarters by setting up your gear in this "mobile" enclosure on wheels!

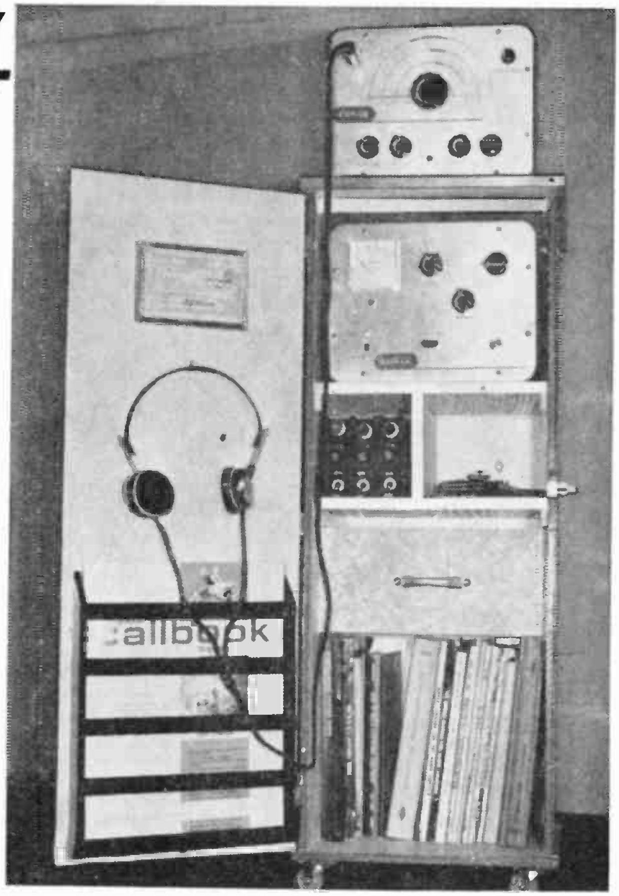
■ Limited space antennas have been treated so frequently in various magazine articles and handbooks that the patient is practically cured! But what about the *limited space shack?* Often this problem remains unsolved. The ham forced by circumstances to live in a small apartment, a furnished room, a mobile home or even a house trailer is still, after all, a ham; the yearn for a station of his own is always there but . . . where to put it?

The relatively recent development of exceedingly compact equipment and particularly that of the transceiver type, has contributed greatly to a compact arrangement for the actual electronic gear, but it still leaves a number of problems to solve. Where do we put a suitable table or desk on which to mount it? Can we concentrate our accessory equipment—key, mike, headphones and such station supplies as call book, log, scratch pad, pencils, handbooks and manuals and copies of at least the current ham magazines? Or, do we have to scatter such items on obscure shelf space or drawer corners? If so, this all contributes to disorder, disarray, inconvenience and certainly contributes nothing to efficient, effective and pleasant operating conditions.

Necessity Fathers Ingenuity. Not long ago I had this problem presented to me by a newly licensed novice. He was a high school lad living in a three room apartment shared with his parents and a younger sister. Space was really at a premium. He was anxious to get started toward his General Class license and, as it is practically unanimously agreed among the ham fraternity that actual on-the-air operation is the most practical method by which to accomplish this goal, he needed an actively operating ham station.

Jerry had saved a little money earned through summer odd jobs and had acquired a small receiver and transmitter in kit form. These he had assembled and wired on the kitchen table. I had checked them over and

ROLL-A-WAY



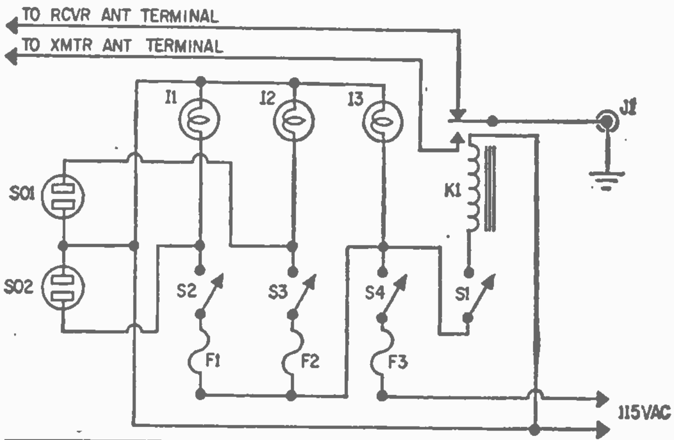
Jerry's Roll-Away Shack is shown open and closed. Note convenient space for license, magazines, etc.

tested them out; his workmanship had been good and both units performed well. His parents, although sympathetic to his ham ambitions simply could see no place in their limited quarters where he could have an operating table. A card table was offered as a compromise but with the proviso that after each operating session he must disconnect his equipment, stow it away under his bed, fold the card table and return it to the closet. Hardly an encouraging start toward a ham career, was it?

The problem intrigued me; not only did it concern the novice class but many hams of wider experience and higher license grades with more extensive equipment, frequently found themselves in the same boat. They were competent hams, all of their gear, but they faced the same old stumbling block—where to put it. I decided to make a try at doing something about it using Jerry, our young novice friend for my subject. He was enthusiastic and we started planning. There is no need to go into the various solutions at which we arrived (or so we thought!) in this little story. The important point is that we finally *did* solve the problem not only to Jerry's delight but to the full satisfaction of his parents. How? We built a *complete* ham station including all essential accessories, in a caster-mounted pedestal enclosure occupying but *one square foot* of floor area during operating sessions and, when the end of the on-the-air periods were over, Jerry unscrewed a coax fitting, pulled the AC plug from the wall outlet and rolled the complete station into an obscure closet corner to await the next session!

Design Around Your Equipment. This article details construction for a unit to house Jerry's Conar rig, so you'll have to make adjustments depending on your equipment. The photos really tell the story, but some amplification will assist in clarifying a number of points for the ham who finds a solution to *his* problem in what Jerry and I accomplished and wants to do likewise. The over-all dimensions for the Roll-Away Shack are easily adjusted to fit the equipment you want to house.

Early in our planning we dallied between

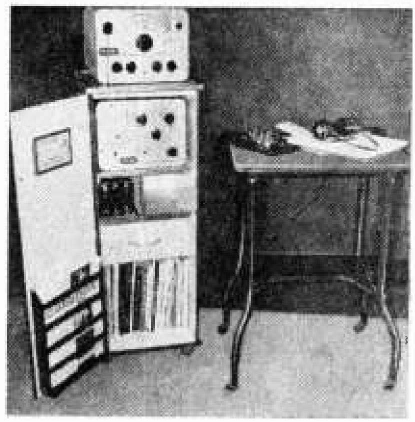


Schematic diagram shows wiring of power distribution center. Transmitter and receiver are plugged into SO1 and SO2, respectively. Switch S4 is master switch for control center. Below, Jerry's rig is set up ready for operation.

PARTS LIST

F1, F2, F3—Standard 3AG 1, 2, and 5 ampere (depending on your rig) fuses, respectively; with fuse posts
I1, I2, I3—Pilot light assemblies (incandescent or neon, 115 vac)
J1—RF coaxial connector for antenna cable
K1—Antenna switching relay (Potter & Brumfield KT11A, specify 115 vac)
S1, S2, S3, S4—S.p.s.t. toggle switches
SO1, SO2—Chassis AC receptacles
Misc.—Power distribution center chassis box; key and headphone jacks; casters; plywood, masonite, and aluminum construction materials (see text); handles; hardware; glue; paint; decals; license frame; solder; etc.

Estimated cost: original Roll-Away unit for Conar rig: $11.00
Estimated construction time: 8 hours



a metal frame covered with either metal, masonite or wooden panels or all-wood construction. Two factors finally swung us to wood; first, neither Jerry nor I had a great deal of background in metal working. The second consideration was economy. Jerry secured permission to construct the enclosure as part of his school manual arts course and could thus buy the bit of plywood we would need on the school cost basis.

We arrived at a pedestal that was 30 inches tall plus ⅜ inches at each end for the top and bottom. The overall dimensions of the latter two pieces was 12 x 12 x ⅜ inches. The pedestal itself was 11 inches square overall also made of ⅜ inch plywood assembled with finishing nails and glued. The full length door was hinged on the left so that it would not obstruct the operating area when open. Rather than a conventional cupboard handle and clasp, we used a small hasp so that the pedestal could be padlocked when not in use. This prevented tampering with the transmitter and control switches by unauthorized persons (not forgetting little sister!).

Design for Convenience. Shelving was spaced to accommodate Jerry's equipment: a Conar Model 400 transmitter and a companion Conar Model 500 receiver. The latter unit was mounted on top of the pedestal and, for dust protection when not in use, a cardboard grocery carton neatly covered with adhesive-backed shelf paper was telescoped over it. (The receiver could of course be mounted inside by sacrificing some shelf and drawer space but Jerry chose the arrangement shown). To avoid the phone and key cords draping across the panels when operating, plugs for both of these were wired from the equipment to two jacks installed on the right hand side of the pedestal 2″ below the top. We also installed a s.p.s.t. toggle switch, S1, in a horizontal line with the jacks. This served to switch the antenna relay, installed internally within the pedestal, from transmit to receive.

A shelf below the transmitter provided more than adequate space for stowage of the key and headphones when not in use, so we added a little refinement by partitioning

ROLL-A-WAY

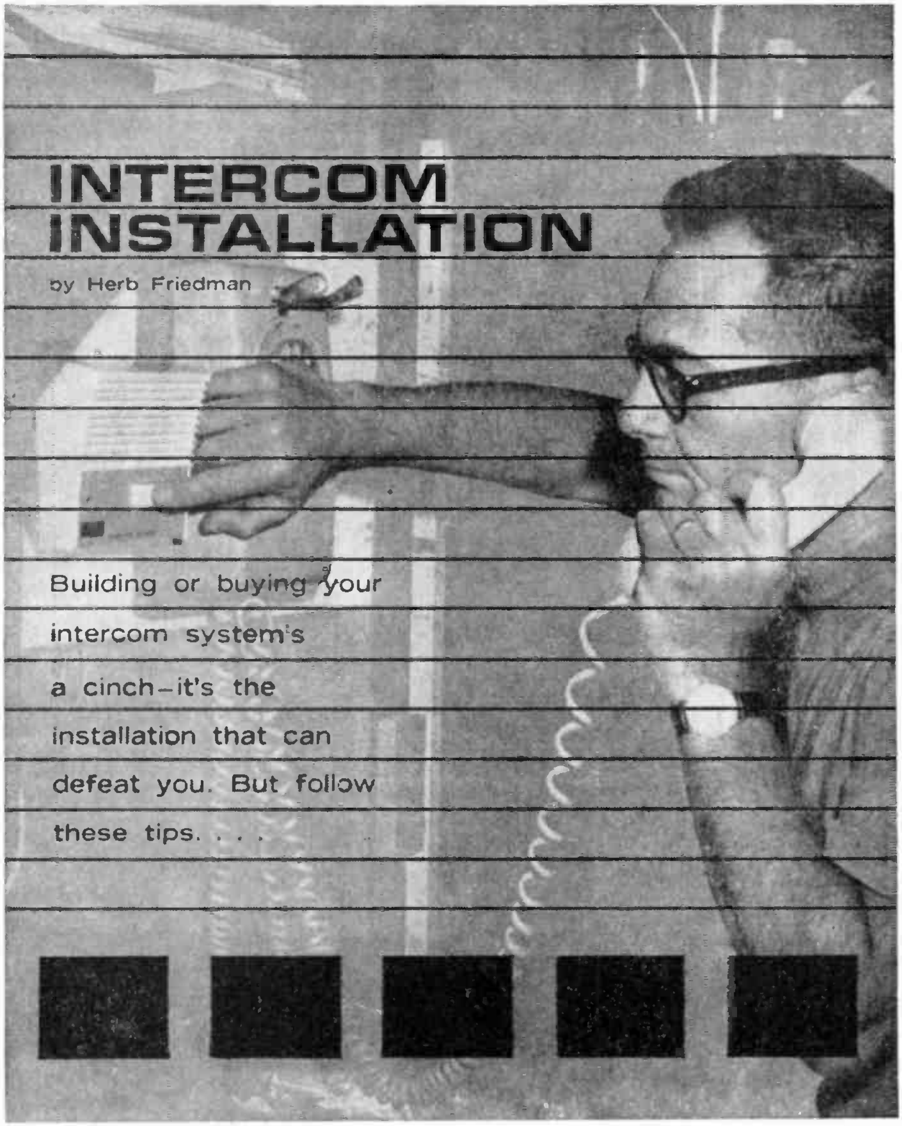
this space. The smaller compartment then easily accommodated a small metal cabinet housing a *power distribution center* which we made up. (See the schematic diagram.) This merely contains three pilot light brackets with panel jewels, I1 through I3, three insert type fuse holders and fuses, F1 through F3, and three s.p.s.t. toggle switches, S2 through S4. Adequate space remained behind this unit for the antenna change-over relay, K1. On the inside rear of the pedestal we mounted single convenience sockets, SO1 and SO2, into which the transmitter and receiver AC cords could be plugged. The main AC supply from a living room wall plug enters the pedestal in the back center and thence to the power cabinet. We then could switch the fused main power from the wall plug on or off (when in the *off* position it killed everything); switch either the transmitter, receiver or both on or off and each of the three circuits were fused avoiding the necessity of removing equipment panels and digging into the gear to replace an occasional blown fuse. The pilot lights of course, in-

(Continued on page 118)

INTERCOM INSTALLATION

by Herb Friedman

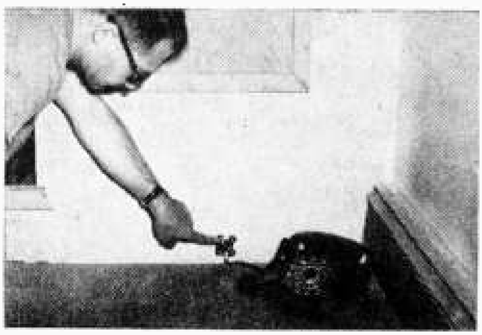
Building or buying your intercom system's a cinch–it's the installation that can defeat you. But follow these tips. . . .



■ There's really no reason to suffer the everyday irritations that seem too small to waste time resolving and too large to ignore—irritations like: Walking down to the basement several times to see if the washing machine cycle is over; leaving the house in bitter cold weather to call in the children; getting up from a good steak dinner to answer the doorbell only to find it's a salesman selling a cookbook. Or how about shouting through the rooms, "who'll answer the phone?"—and it turns out you didn't answer but the call is for you. Aha, now you're thinking, and you could probably compile a list t-h-i-s l-o-n-g of everyday irritations.

But there's a good, easy solution to these household irritations—*an intercom.* With modern transistorized intercoms providing highly flexible communications and signals at rock bottom prices, even the average household can afford a communications service which until a few years ago was limited to luxury homes.

A Typical Setup. Take a practical example, Lafayette Radio's 99 G 4531 three-station intercom. If the master unit is set up in the kitchen, say near the telephone, the wife can easily check if basement washing equipment is still working by simply pressing the button which connects a remote unit located near the washing center. If an outdoor remote unit is connected in the back yard the children can be heard and paged from the master unit. Similarly, if an outdoor unit



Old telephone wiring, which is terminated as shown above left, can be used for room-to-room intercom circuits if you want to avoid drilling through the walls. Some modern telephone wiring has two spare wires that can be used. As shown at top, a standard 1/4-inch drill will generally pass through flooring so wiring can be concealed in first floor walls. Long cables can be run along basement beams and stapled in place. Be sure to use a staple gun with a wire adapter. As shown at left, drill mounting holes for the outdoor remote after scribing its outline.

is connected at the front door, the family can answer the doorbell from the master.

One of the advantages of the modern transistor intercom is *built-in signals.* For example, an outdoor unit has a button which when pressed causes the master to emit a tone burst even if the power supply is turned off. And many intercoms have signal lights which indicate, again even with power turned off, which station is calling. Of course, while low cost systems handling three or four remotes are in the twenty-dollar price class, an additional few dollars buys extra remote-station facilities.

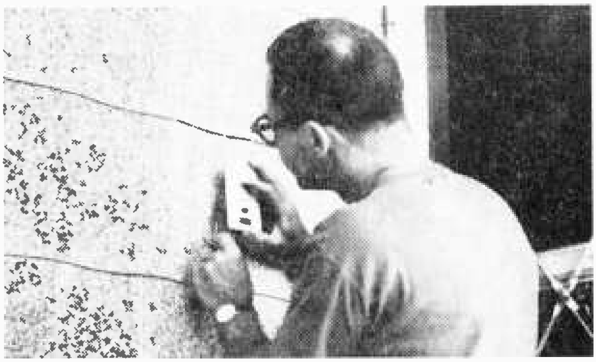
You Can Do It! Unlike the complex tube-type, multi-station intercoms, the budget priced transistor intercoms can be installed by anyone reasonably competent with ordinary household tools. Even difficult thru-the-wall wiring can also be simplified through the courtesy of the telephone company (though they would be unhappy with the procedure).

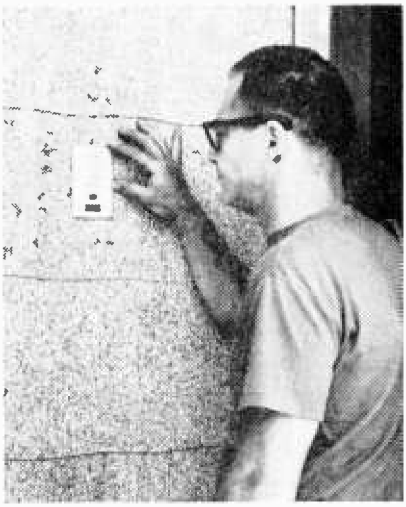
Installing the intercom system only requires a general idea of the layout, you don't even have to put it on paper. First, locate the master unit (generally in the kitchen). If you're a homeowner drop a multi-wire master cable from the intercom to the basement and terminate the wire on a terminal strip (the number of wires in the master cable is usually one more than the number of stations). If you're a *cliff-dweller,* just run the master cable to the nearest closet. To avoid possible damage staple all cables to the cellar beams or floor molding—any of the staple guns with a wire adaptor can be used. The adaptor insures that the staple won't go too deep and sever the cable.

Indoor remote units can be simply placed on the furniture or mounted on the wall. If you use ultra-thin speaker wire for the remote unit wiring, the installation will hardly be noticeable.

Outdoor remote units are a little more trouble. If your home is wood or shingles mark the outline of the remote unit, drill a ½-inch hole in each corner of the outline

A saber or keyhole saw, shown at left, is used to cut through your siding. Start the saw blade by drilling a hole on the scribed outline of the remote unit. Push the insulation back far enough to insert the remote intercom unit. When installing the unit, below left, pay attention that an adequate seal exists between flange and shingle or siding. Use a sealing compound if necessary. Complete installation, shown below, is as professional as they come. Remember, check out the unit *before* completing professional installation!





and cut-out the opening with a saber or keyhole saw. If your home is brick faced mount a waterproof electrical box on the brick and mount the remote in the box—most outdoor remote units have rubber seals for weatherproofing.

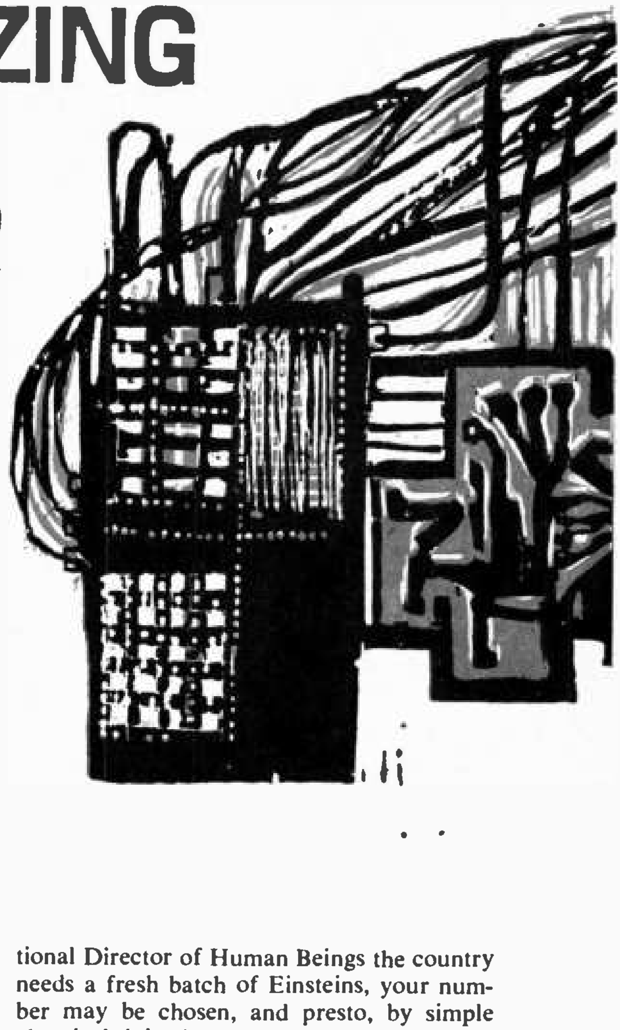
Normally, a ¼-inch drill is long enough to pass through the basement ceiling, actually the first floor sub-floor, for running wiring in-between the walls coming up from the basement. When you must pass through two walls, as when wiring from room to room, a long drill is required. Many hardware stores sell a special "electrician's drill," about 18 inches long and designed to fit a brace.

Ready-Made Wiring. If you get hung-up and can't get the wiring from one room to another the telephone company may supply the answer. Many new phone installations are four wires even though only two are used—the idea is the first installer puts in provisions for an extra phone. If two wires are free (make certain your phone doesn't use three wires) you can use the two free wires for the intercom. Generally, you'll find the extra two wires just hang loose at the telephone input terminal block. You can connect to the free ends and pick-up the wiring at the telephone connector blocks. If you have several phones in the house, the same pair can be used at several locations to provide multiple remotes on one circuit. While the multiple speakers might cause some distortions to the intercom's sound quality, it won't be too bad.

Another easy out is old telephone wiring, commonly found in apartment houses. Each new tenant generally has his own idea where the telephone(s) should be, and usually the old wiring is disconnected at the main terminal block and left intact. Since old wiring is of no use or interest to anyone, there's no good reason why you can't utilize it!

So, all you have to do is follow these hints, conquer your fear of your floors, walls, and ceiling looking like Swiss cheese, and you'll have your intercom installed in very short notice. ■

MECHANIZING HUMAN BEHAVIOR



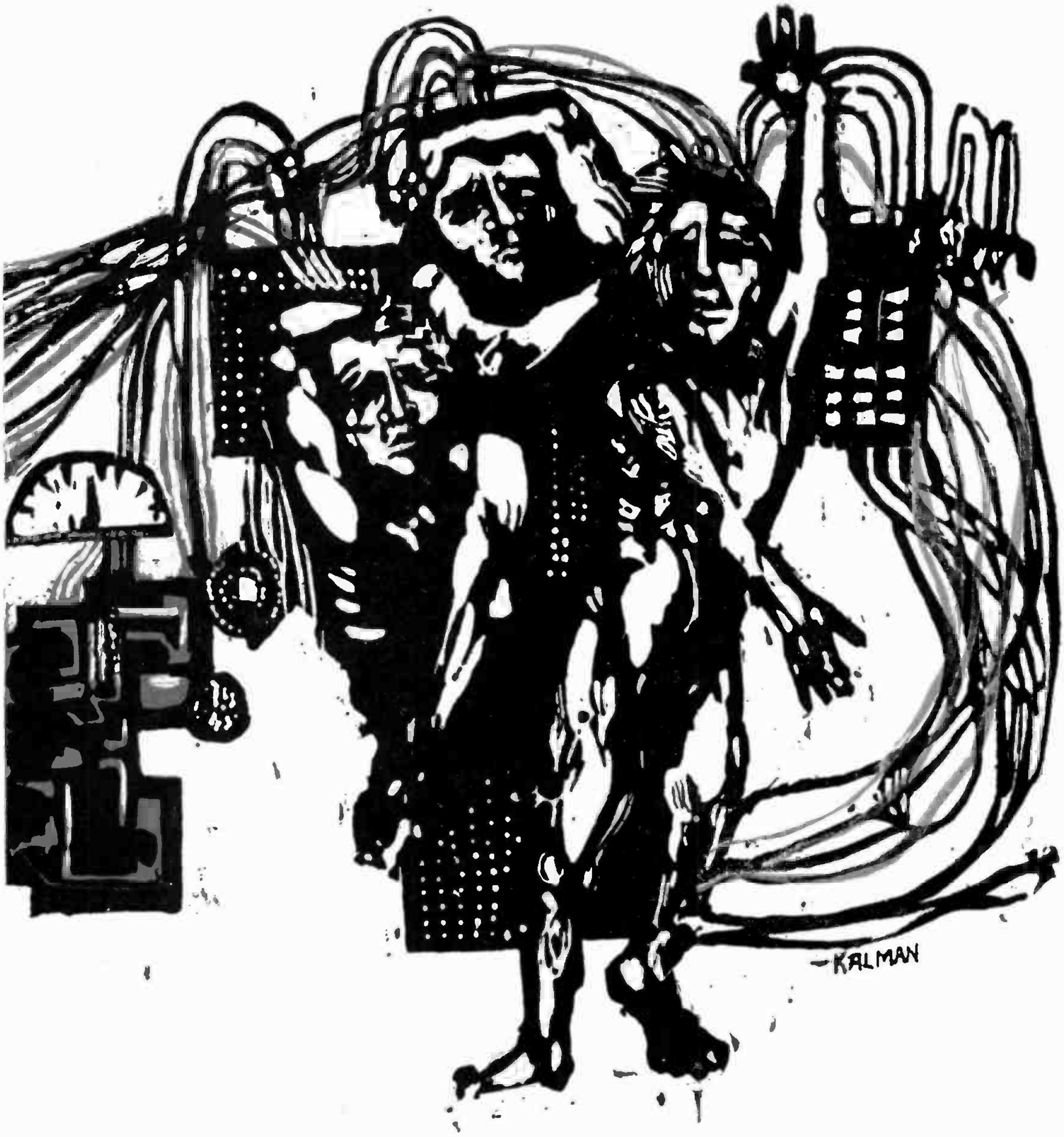
Man always has had the choice of either accepting the heavy responsibility of his freedom, or surrendering it to authoritarian institutions that are all too ready to manipulate his destiny. Will the future see these institutions using electronics to extend their control of human behavior?

by K. C. Kirkbride

IN the not too distant future, you may define freedom as your former Constitutional right to be a grouch. For today, you can be as sullen as you please, as stupid as you deem fun, and not one soul can do one thing about it. True, only the other sullens may choose your company, but if you can eschew the cheery folk, you can have yourself a merrily-miserable old time.

But not tomorrow. Tomorrow you will be bright, optimistic, industrious, aggressive, happy, successful, and as smart as all get-out, whether you like it or not. And if the National Giant Computer indicates to the National Director of Human Beings the country needs a fresh batch of Einsteins, your number may be chosen, and presto, by simple chemical injection, you will become, in a matter of seconds, an *ersatz* Einstein.

Sound incredible? Not when you ponder the implications of experiments carried out in laboratories in the United States and Europe. Experiments that indicate a radio or electrical wave can beam pleasure, pain, euphoria, or a fighting mood. Chemical experiments that point the way to the day when you will be spared the arduous years of study to earn a Ph.D. Much easier, in



the future, to Ph.D. by chemical injection.

Going to the Cats. These experiments began in the early 1900's in Zurich, Switzerland, when a Swiss-English physiologist named Walter Hess was researching blood pressure, blood viscosity and circulation changes. To probe central nervous system control over internal organs, Hess first implanted electrodes into the brain stems of cats. After the gadget was placed in the brain of the animal and the wound healed, Hess would beam an electrical stimulus into the wired animal's noggin, then study reactions.

He found he could electrically stimulate any feline to eat, attack or run at his whim. When stimulation was really "turned on", the animal would chew an inedible object near it, or even attack a human friend rather than a known enemy.

Mapping Brains. When his experiments were finished, Hess anesthesized his animals, dissected their brains, to map the points of stimulation which had been stained. Thus, he first suggested certain moods, and drives were linked to defined zones in the brain.

The Zurich experiments excited other men working in laboratories: H. W. Magoun, then with Northwestern University, Chicago, Illinois, researched the lower part of the mid-brain, suggested it controlled sleep and wakefulness. James W. Papez of Cornell University, New York, explored the rhinencephalon (smell-brain), said he found it might control more than the sense of smell, that it could control emotional experience and behavior.

But it took B. F. Skinner of Harvard, an experimental psychologist, to work out a technique that could measure the degree of a stimulus by testing the frequency with which an animal performed an act which led to a reward.

It's in the Box. He placed one animal at a time in a bare box container, adding a lever to each box the animal could manipulate. If the rat received no reward when he pressed the lever, he pressed only five to ten times an hour. But when a pellet of food dropped into the cup by the lever, he responded like any other performer with an increase in pay, he pressed the lever up to 100 times per hour!

On the West Coast, James B. Olds of the University of California picked up Skinner's experiment, added electrical stimulation to prove the performing rat would respond even more enthusiastically when his reward was electrical.

Olds put electrodes in the heads of his animals, using ordinary house current, reduced by a small transformer, gave each rat a shock lasting one second. When one electrode missed its mark, landed in the nerve pathway of the rhinencephalon rather than the mid-brain reticular system, Olds himself felt a shock of discovery.

For the electroded animal kept returning to corner *A* of the Skinner box until Olds grasped the fact the rat was responding to a "reward" pulse. Soon he could guide Mr. Rat all around the box by offering him longer shocks for preferred behavior.

Next he placed the animal in a T-shaped box, stimulated it to turn right at the crossing of the T, then to turn left. Olds next withheld food for 24 hours, and returned it to the T, baiting each end of the T with food mash.

When the animal was going toward the mash, but was rewarded by electrical stimulus half-way down the bar, it refused to go on to get its food. This test convinced Olds the stimulus reached a reward center more satisfying to the hungry rat than actual nourishment.

Do-It-Yourself. He then put the animal

GRAY MATTER IN A BLACK BOX

THE human brain is like the classic "black box" of electronics. What's inside is a mystery; you can put a signal in, and get a response out, but how and why are two unanswered questions.

Brain Kicking Pulses. Experiments reported by Robert G. Heath, M.D., in "Electrical Self-Stimulation of the Brain in Man", which appeared in *The American Journal of Psychiatry*, reveal the responses of a patient to electrical stimulation of various areas of the brain. The pulses were triggered by the patient himself using a set of buttons. This self-stimulation resulted in the patient favoring stimulation of some areas of his brain more than others. The results—frequency of self-stimulation and the experienced response—are shown in the table at the right.

Note, from these results, that the patient did not necessarily press the button solely for pleasure. The greatest number of pressings resulted in anger and frustration when the patient kept pressing the button in attempting to bring into focus a vague memory that was evoked by intracranial self-stimulation (ICSS). Such is the fact, but the basic

ICSS IN MAN

REGION STIMULATED	AVERAGE/HOUR	SUBJECTIVE RESPONSE
Reward (?) Sites		
L. Centromedian	488.8	Partial memory recall; anger and frustration
R.P. Septal	394.9	"Feel great"; sexual thoughts; elimination of "bad" thoughts
L. Caudate	373.0	Cool taste; "like it OK"
Mesenceph. Teg.	280.0	"Drunk feeling"; "happy button"; elimination of "bad" thoughts
A. Amygdala	257.9	Indifferent feeling; somewhat pleasant, but feeling not intense
P. Amygdala	224.0	Moderately rewarding; increase of current requested
Aversive Sites		
R. Hippocampus	1.77	Strongly aversive; "feel sick all over"
L. Paraolfactory	0.36	Moderately aversive
R. Parietal Cortex	0.50	No significant subjective response
R. Frontal Cortex	0.00	No significant subjective response
R. Occipital Cortex	0.00	No significant subjective response
R. Temporal Cortex	0.00	No significant subjective response

in a do-it-yourself circumstance letting it press a lever to stimulate its own brain.

It took Mr. Rat about two to five minutes to learn to do his own stimulating, but when he did learn, he pressed the lever every five seconds, and when the current turned off and there was no rewarding shock, the animal calmly stretched out on the floor, went to sleep.

It Goes to Their Heads. To test the thought definite sections of the brain affect behavior, Olds next put a pair of electrodes of insulated silver wires one hundredth of an inch in diameter, into the brains of a number of rats, to compare stimulation in various areas.

When the stimulating tip electrodes were implanted in sensory and motor areas of the upper brain, response rates remained at chance level of 10 to 25 responses an hour. When implanted in deeper mid-line sections, response rose to levels of 200 to 5,000 an hour. Animals have been known to press the lever over a period of 24 hours without rest.

But when electrodes reached into lower mid-line areas, the animal pressed the lever once, refused to press again, suggesting to Olds that the stimulus shocked an area representing either pain or punishment.

In Seewiesen, Germany, Director Erich von Holst of the Max Planck Institute for the Physiology of Behavior tested aggressive drives in chickens. He inserted into the skulls of chickens and roosters small plastic fittings with four electrode wires each. Each electrode was inserted slowly into the brain stem of the animal, and 50 cycles of low-voltage alternating current applied.

Turning Chicken. Then von Holst and his assistants watched the chickens' behavior as they responded to stimulation at different levels. One stimulated rooster attacked a stuffed creature it had ignored only moments before.

After sustained stimulation, another proud rooster flew at its keeper's face, and attacked with its spurs. When von Holst stimulated the "sleep" area in the brain of another fellow, the animal stopped eating, looked around him, fluttered his eyelids, yawned, closed his eyes and went to sleep.

Von Holst believes moods cannot only be stimulated but maintained over long periods of time. And when stimulation is turned off, an almost euphoric, self-assured mood follows, much as humans experience after a period of trial or depression.

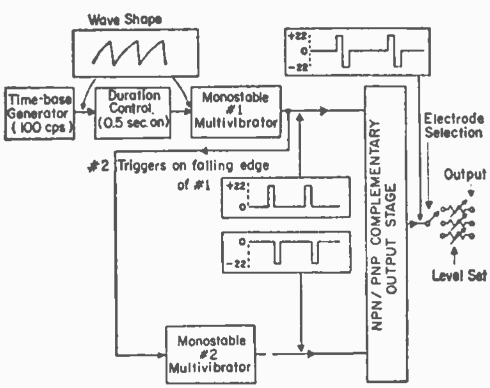
(Continued on page 91)

If your intracranial flip-flop starts flop-flippin', it may be due to a cold solder joint!

secret of the motivation for this behavior still goes unexplained.

Nature of the Pulse. One variable in experiments with ICSS is the nature of the stimulating pulse. Changes in current intensity, wave form, pulse width, and frequency, in many instances altered the patient's responses. The pulses from the circuit of the *Subcortical Stimulator* at the left were used in these experiments. To minimize the effects of DC polarization, a bi-directional pulse was chosen. This allows restoration of the DC level to zero after each 1.0 millisecond stimulus and maintenance at zero during the 10-millisecond dead time. A silicon unijunction timing circuit generates the 10-millisecond interval. The output from the transistor was gated off after 0.5 second operation by a diode gate driven from an R-C charging circuit. When the diode gate is open, the unijunction transistor drives two one-shot multivibrators with the falling edge of the first triggering the second. They both have equal periods of 0.5 millisecond. The multivibrator timing circuits saturate complementary output transistors which feed voltage to the load (the brain) through isolating capacitors.

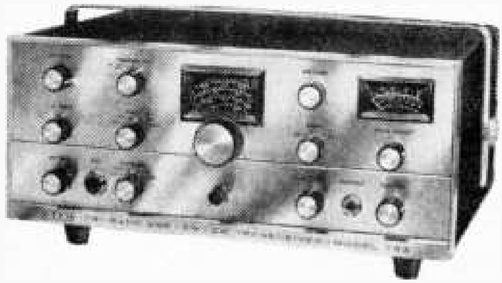
As you've noticed, there's something missing from the block diagram—because it does not yet exist—a schematic equivalent for the human brain! ■



Block diagram of the Subcortical Stimulator, manufactured by Technical Associates of New Orleans, for experiments with ICSS in man.

RADIO-TV EXPERIMENTER LAB CHECK

EICO Model 753
Tri-Band SSB/AM/CW
Amateur Transceiver



■ Up until a few years ago the newcomer to amateur radio trying to operate "phone" was almost certainly doomed to failure; for while two or three hundred dollars worth of CW gear could work the world the same monies spent for an AM phone rig was slated for burial under the *California kilowatts.* Then came a major breakthrough—sideband transceivers at virtually the same price as AM equipment; with the difference that 100 or so watts of sideband can cut through while 100 watts of AM is lost in the QRM.

Today, we find rather good sideband transceivers selling for considerably less than a separate transmitter-receiver combination, yet there are few sacrifices in terms of operating conveniences. The primary limitation of early transceivers is gone—no more is the operator limited to working stations only on the same frequency as he is transmitting—with *receiver offset tuning* the modern transceiver can compensate for the drift of a received station without changing the transmit frequency. This is the big improvement which makes the modern transceiver highly attractive—it now has almost the same flexibility as the considerably more expensive transmitter-receiver combination. Add to this the high "decorator styling" used on the new transceivers and you've come up with an efficient, attractive "vest pocket" station suitable for use in the living room.

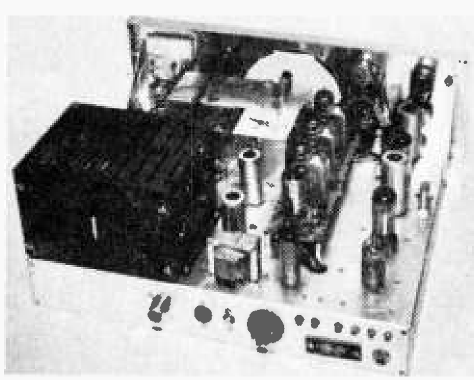
The EICO 753 Tri-band Transceiver is typical of the new breed of quality SSB transceivers. Operation is limited to the 80/75, 40- and 20-meter bands with a switch selected choice of the SSB, CW and AM modes. (Actually, the AM mode is just a throw-in on an SSB rig. If you're running sideband, why use AM?)

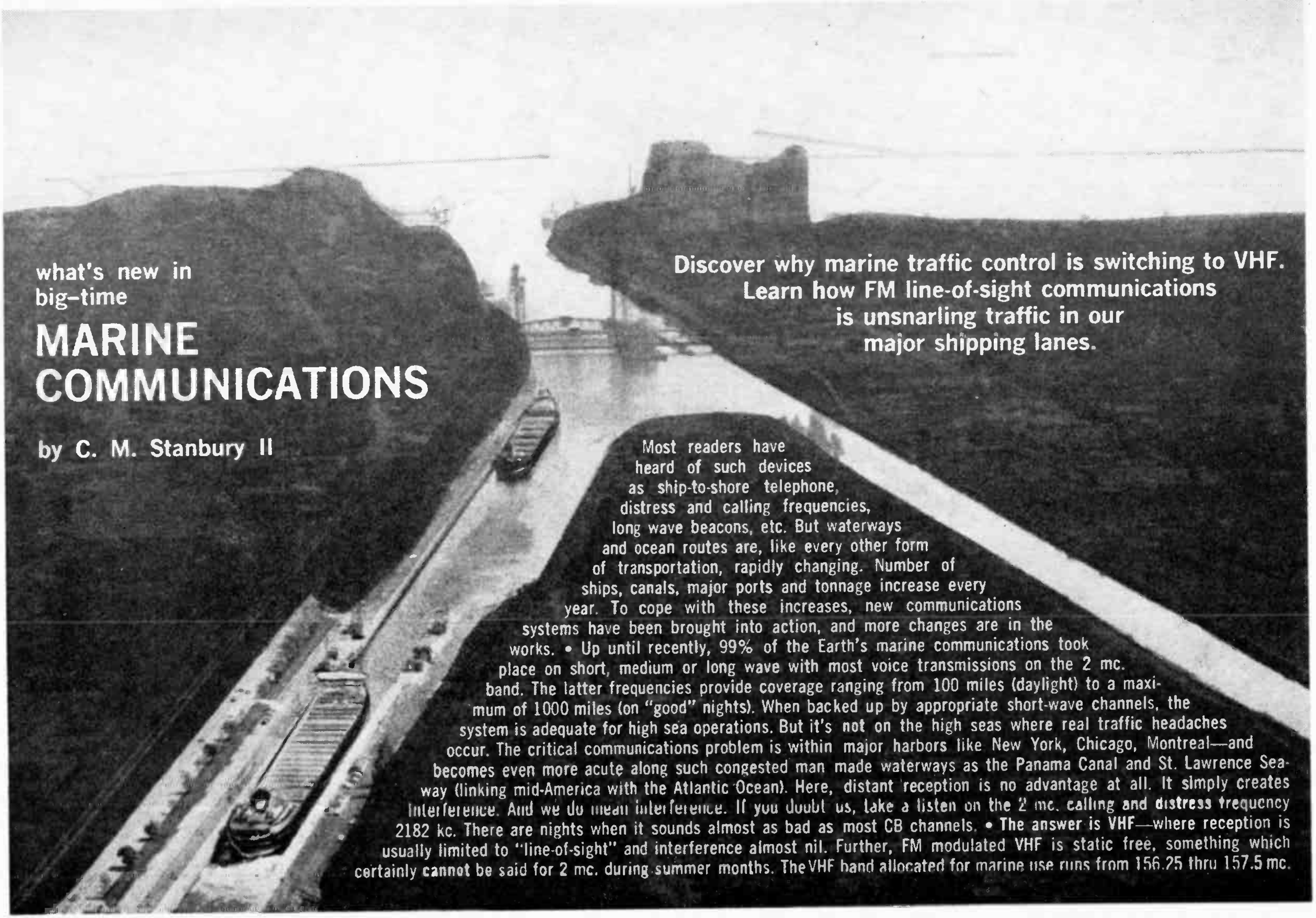
Typical of low-cost transceivers the SSB mode is pre-set to the more-or-less universal standards: lower sideband on 80 and 40, upper sideband on 20.

The EICO 753 contains the usual features: crystal lattice filter; offset tuning which allows the receiver to be detuned ± 10 kc. from the transmit frequency; VOX (voice operated transmit); 40 to 80 ohm *pi-net* output; fast attack AGC (receiving automatic gain control); high level ALC (automatic transmit level control—sort of like compression); front panel hairline set for user recalibration; and an honest to goodness plate current metering—not relative power output.

(Continued on page 98)

Inside view, right, shows the layout of the transceiver to be neat and professional. Rear view, below, shows the accessibility of the rear-chassis connections and controls.





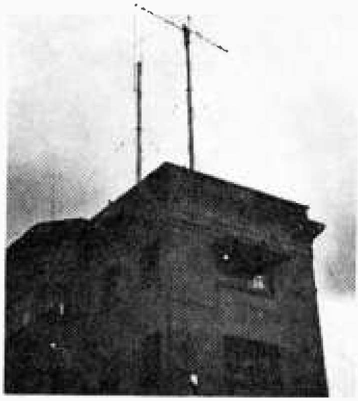
what's new in big-time

MARINE COMMUNICATIONS

by C. M. Stanbury II

Discover why marine traffic control is switching to VHF. Learn how FM line-of-sight communications is unsnarling traffic in our major shipping lanes.

Most readers have heard of such devices as ship-to-shore telephone, distress and calling frequencies, long wave beacons, etc. But waterways and ocean routes are, like every other form of transportation, rapidly changing. Number of ships, canals, major ports and tonnage increase every year. To cope with these increases, new communications systems have been brought into action, and more changes are in the works. • Up until recently, 99% of the Earth's marine communications took place on short, medium or long wave with most voice transmissions on the 2 mc. band. The latter frequencies provide coverage ranging from 100 miles (daylight) to a maximum of 1000 miles (on "good" nights). When backed up by appropriate short-wave channels, the system is adequate for high sea operations. But it's **not** on the high seas where real traffic headaches occur. The critical communications problem is within major harbors like New York, Chicago, Montreal—and becomes even more acute along such congested man made waterways as the Panama Canal and St. Lawrence Seaway (linking mid-America with the Atlantic Ocean). Here, distant reception is no advantage at all. It simply creates interference. And we do mean interference. If you doubt us, take a listen on the 2 mc. calling and distress frequency 2182 kc. There are nights when it sounds almost as bad as most CB channels. • The answer is VHF—where reception is usually limited to "line-of-sight" and interference almost nil. Further, FM modulated VHF is static free, something which certainly **cannot** be said for 2 mc. during summer months. The VHF band allocated for marine use runs from 156.25 thru 157.5 mc.



Roof-top antennas (above) are smaller and lighter than those used for transmissions on the 2-mc. band. The VHF antenna can be made extremely directional to eliminate interference, increase pickup from low-power transceivers while listening and increase the e.r.p. (effective radiated power) when transmitting. A typical control-tower operating position is shown at top-right and a scale-model canal plotting board setup is shown at right.

This is just 20 mc. below channel-7 TV signals. The VHF calling and distress frequency is 156.8 mc while "working" channels are staked out at 100 kc (.1 mc.) intervals on either side. Every station using this band is equipped to operate on 156.8 and one or more of the working frequencies. Channels on 157.1 and 157.2 are assigned exclusively to government owned stations.

With the addition of VHF has also come precision marine traffic dispatching, the like of which only aeronautics has known before. One of the most modern marine "plot boards" is displayed in the photos. Traffic control is extremely important on canals where botttlenecks such as locks, bends, narrows, etc., can cause serious delays if vessels are not spaced just right. The plot board shown is for the Welland Canal, a particularly narrow portion of the St. Lawrence Seaway System. Through the use of VHF traffic control, the slightly antique Welland has been able to cope with double the tonnage. It's also interesting to note that many foreign vessels don't have the modern VHF gear and the Seaway Authority must loan it to them upon their entry at Montreal.

Put the Blame on Man. On the other hand, no matter how good the VHF marine communications itself, traffic dispatching is no better than the man who runs it—the dispatcher. If he goofs, traffic is snarled. Already, studies are under way to determine whether computers could do a better job. It's human common sense vs. that perfect electronic memory. Time will tell.

And whatever "time" does tell, some experts are also advocating further improvements in the communications system itself. The most drastic of these proposed changes is separation of calling and distress onto 2 different channels. Such a move would require most stations to keep a watch on three different frequencies (working channel would be the third). Without increasing staff, this move would be impossible on medium-wave communications. At night, there'd often be signals audible on all three frequencies at once and it would take three pairs of ears to determine which calls were actually for the station. However, in view of the current unsafe conditions on 2182 kc., the increase in personnel is probably justified.

Meanwhile, separate VHF distress and calling frequencies would not require more personnel. Because of that short reception range, the distress frequency would be quiet 99% of the time and a visual monitoring device (common in other forms of VHF communications) could be employed. Then

(Continued on page 94)

The real change in Citizens Band Radio came around 1990. That year the FCC opened up these new frequencies—535 thru 1605 kc—the *old* Broadcast Band. By 1988 all sound broadcasters had either been forced out of business by TV competition or were put on FM by the FCC. So they gave us the band, allowed up to 100 watts power, any antenna, any kind of transmission (even way out "attention getters" like mine) and work whatever station you could reach.

However, not everything in CB had changed. Some of us working types still bought our gear second hand. Like yesterday I came across 400 feet of slightly used antenna wire at *Barney's Electronic Swap Center.* Barney himself was an ex-sailor (radio operator) who's CB career went all the way back to 1966. You could say the same for some of his wares. But the old man swore up, down and sideways that the antenna I purchased for 200 *WR* (World Rupees) would positively be no older than 1995.

So on December 31, 1999 yours truly, KKEZ7[illegible] with his 300 foot dipole found himself fishing for DX. Not just trans-continent stuff (I'm 20 miles south of Buffalo, N. Y.) but a super catch—like Bermuda or maybe even Europe. It was the kind of night you could do nothing but DX. Half snow, half rain. From the window I could see ice forming on my antenna as it was lit by a flashing red traffic light at the corner—in 1999 every intersection no matter how remote is blessed with a traffic light. And even 1995 style antenna wire supposedly didn't break under the weight of ice.

Someone came on the channel, identified *herself* as "Atlantic 9" and went off again.

I pushed power up to maximum and put myself on the air. "CQ Caribbean, CQ Europe, this is KKEZ7[illegible]. CQ DX." With my attention getter waiting in the wings.

Nothing! Absolutely nothing! A few California CB'ers came back to me but the good catches went right on chasing the rare states—Nevada, Delaware, etc. New York just too easy on a good DX night.

Atlantic 9 appeared on the channel again. "Atlantic 9, I read you okay. How me?"

Atlantic 2 also a YL but way down in the hash came back but she was unreadable. Atlantic 9 with flutter, QSB, "My location is Ymir city. What is your QTH?"

Tried to place the name, drew a blank. Also tried to break into their QSO. No luck in that department either.

Her signals really began to nose dive. "The weather at Ymir is cold. There are a few ice bergs to the North of us." She dipped below the noise level.

A few more frustrating CQ's then I de-

CB, Circa 1999

cided my attention getter would be the only answer and I had dreamed up a beauty, literally. I hitched a transistorized turntable into the circuit and put on this record—"Honey, Honey" sung by an "earthy" young lady. Yes, you guessed it, both the turntable and record came from old Barney. I played it continuously for 15 minutes, identified and listened on the channel a moment. Second time I listened, there were more CB'ers calling KKEZ7ØØØ than you could count "Honey, Honey"—my never fail secret CB weapon.

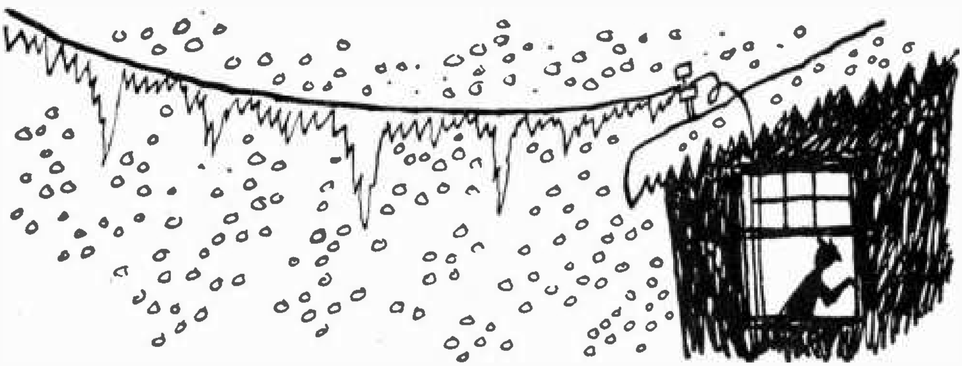
I could take my pick. Spain, Bermuda, all the way up to Iceland. And Atlantic 9 was back in there too. I should have picked Iceland which is even rarer than Spain. But after pushing the *On* button, I decided on other couple S units. "And Atlantic 9 is a mermaid CB call." One thing for sure, she had a voice to go with the part.

"Not only does the little girl sing but she's got a sense of humor too." Sarcastic. I looked for her recording company but other than the Neptuna bit, the label was blank.

Deadpan. "I'm not kidding." Someone in Ohio tried to cut in but Neptuna held her own. "Where else would I get a call like Atlantic 9?"

The nonsense had already run overtime but I decided to give her a little more rope. "How long have you girls been on CB?"

"Oh, we were licensed way back in 1958." A new sleet storm outside raised the noise level. "But our signals wouldn't penetrate through the ocean until we came down on



Atlantic 9—now her voice seemed ever so slightly familiar.

"Atlantic 9, do you read KKEZ7ØØØ?" Make it short I promised myself, check out that voice then grab the DX.

She came back immediately. "KKEZ7ØØØ, I read you pretty good. Hey, you're playing my song."

"What do you mean? Over."

"I mean you're playing the record I made a couple years ago."

Grabbed the disc off my turntable. "Atlantic 9, you're kidding me." But I knew she wasn't. And now I told myself, as the real DX slipped by—how often on CB do you make contact with a genuine recording star?

She laughed. "You spotted my voice before you came back to me. Right?" Her signal barely overriding the QRM.

"Yes, Atlantic 9, maybe I did." I looked for her name on the record, found it, then I did a double take. "What kind of a name is Neptuna? Over."

"KKEZ7ØØØ, Neptuna is a mermaid name." Now she pushed my meter up another these frequencies." She faded into the QRN and I missed the rest of her transmission.

"Come back again, funny girl. I missed the last sentence."

Neptuna spoke slowly and distinctly. "Where did you find my record? Over."

"At Barney's." Over one shoulder and through the window, I could see my antenna begin to sag. If the wire really is 1995 vintage, it was certainly made very early in the year.

"Oh yeah, the old man and I have been friends for a long time." Some mermaid laughter. "He used to be quite a sport in his younger days."

"I suppose he acts as your QSL manager?"

"That's right."

Right then my break-proof antenna broke which ended the contact. And with this weather I won't be able to fix it until morning. So the question is—do I march into Barney's and demand my money back? Ask him to deliver a QSL to Neptuna? Or maybe I should trade my whole rig to the old man for her address? ■

SOLID-STATE AUDIO AMPLIFIER

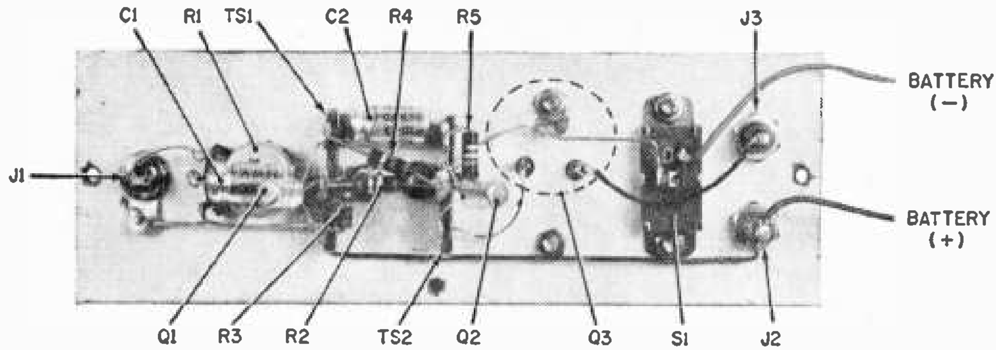
By Art Trauffer

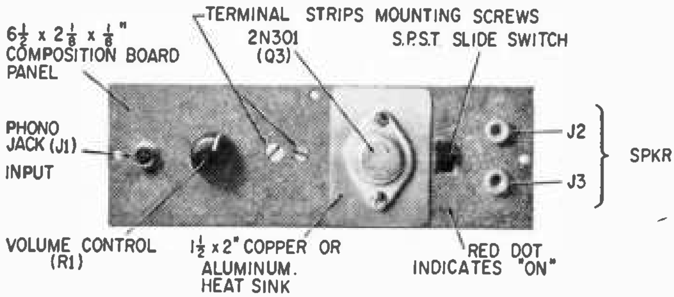
It's not 50 watts, doesn't have input switching, has no headphone jack, but neither does it have a $100 price tag!

■ The move is to solid-state hi-fi components! But chances are you're still cooking away with your old tube amplifier—probably a monophonic unit at that. The old amp is putting out and it helps keep your listening room warm during the winter as well, so why trade in just now? But why not get a feel for the clean, transformerless, transistor sound while you're scanning the market and saving your pennies? Here's the perfect construction-introduction to the solid-state audio amplifier.

The Circuit. As shown in the schematic diagram, all three transistors, Q1, Q2, and Q3, are pnp types. Preamplifier stage, Q1, is an RCA 2N217, which is resistance capacitance coupled to the driver stage, Q2, another 2N217. Driver Q2 is direct-coupled to power-output stage, Q3, an RCA 2N301. A PM speaker (4 to 16 ohms) is connected in an emitter-follower configuration to Q3. The power supply is 4.5 volts (three "D" flashlight cells in series), but using 6 volts will give you a little more volume.

The input signal is applied through volume control, R1, and coupling capacitor, C1, to the preamplifier stage Q1. Q1 base bias is supplied by voltage-divider, R2-R3. Resistor R4 is the stage's collector load. The amplified output signal from Q1 is applied through inter-stage coupling capacitor, C2, to the driver stage, Q2. Transistor Q2's base bias is supplied through resistor R5. Driver stage Q2 is direct-coupled to power output stage Q3. The input circuit of Q3 acts as the driver's emitter load, while Q2's emitter current provides base bias for Q3. The speaker's voice coil is Q3's emitter load.



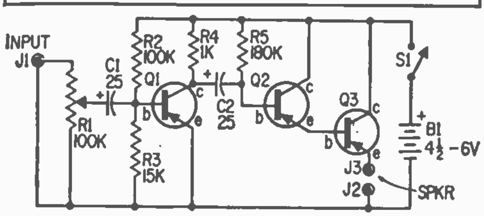


Shown above is the rear of the amplifier front panel. All of the components except the batteries are mounted on the panel. The two terminal strips TS1 and TS2 provide additional convenience in mounting the parts. Front panel controls and some construction details are shown at the left.

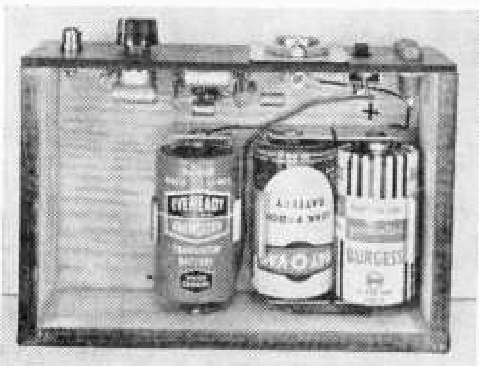
PARTS LIST

B1—4.5 to 6-volt battery (3 or 4 D-size flashlight batteries)
C1, C2—25-mfd, 15-DC miniature electrolytic
C1, C2—25-mfd, 15VDC miniature electrolytic capacitors
J1—Phono jack
J2, J3—Tip jacks
Q1, Q2—RCA 2N217 germanium transistors, "Top-of-the-line" RCA SK3003, or equiv.)
Q3—RCA 2N301 audio output transistor, "Top-of-the-line" RCA SK3009, or equiv.)
R1—100,000-ohm miniature volume control
R2—100,000-ohm, ½-watt resistor
R3—15,000-ohm, ½-watt resistor
R4—1,000-ohm, ½-watt resistor
R5—180,000-ohm, ½-watt resistor
S1—S.p.s.t. slide switch
TS1, TS2—3-lug terminal strips
Misc.—Pointer knob, battery holders, 1/16" scrap copper or aluminum (heat sink), scrap wood and composition board, hookup wire, hardware, soldering lug, lug clips for 2N301 emitter and base pins, solder, nails, glue, panel marking, stain or paint, etc.

Estimated cost: $6.00
Estimated construction time: 4 hours



Wire amplifier using the schematic diagram.



The three batteries of the solid-state amplifier are easily replaced from the bottom.

The Chassis. The amplifier front panel, a piece of compo board 6½"x2⅛"x⅛", is also the chassis. The panel was painted white on the backside only so the parts would show better in the photographs. The leads of transistors Q1 and Q2 can be clipped off to about one-half normal length, and then soldered to the lugs of 3-lug terminal strips, as shown. Use long-nose pliers as heat sinks when soldering. Do not solder directly to the base and emitter pins on Q3; use small photo-cartridge-pin clips, or socket lugs removed from a miniature tube socket. Transistor Q3 is bolted directly onto a 2"x1½" plate of copper or aluminum to act as a heat sink. Place a couple of washers between the

(Continued on page 94)

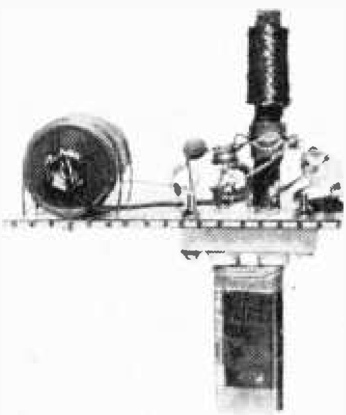
Perf-Board Project

100 kc Calibrator

Using the perf-board construction technique you can build a frequency standard that's compact enough to mount in your receiver chassis.

■ Before you read on to the next paragraph take a look at the *high-priced,* top-quality receivers shown in Allied's, Radio Shack's or Lafayette's catalog. Note that they all feature a "standard" item, namely a 100 kc. calibrator. And if the calibrator isn't supplied as original equipment provision is made for one to be easily connected. In fact, the better a receiver's calibration the more dependent it is on an accurate receiver standard to which the selected calibration can be "locked."

For you newcomer's to Ham radio or SWLing, we'll explain. A calibrator is a device which generates a signal every 100 kc. across the dial from 100 kc. to generally 30 mc. Some calibrators even go past 30 mc., some as high as 6 or 2 meters; and some calibrators provide 1 mc. markers, though they are rare as 100 kc. is far more convenient. Thus, regardless of the receiver's bandspread or main dial calibration the user can at least peg the tuning close to the desired frequency. For example, suppose you are trying to find an SWBC station at 7310 kc., and your receiver is a typical budget job with calibration at 7 and 8 mc. Obviously there's a lot of space between the 7 and 8 mc. markers. But if you have a calibrator, the third 100 kc. signal after the one tuned in with the dial set at 7 mc. is 7300 kc. At least now you're close, ease the dial a *smidgen* as you find the station at 7310.



Or say you're a Ham with a two dial receiver, one dial being the Ham band bandspread. If your transmitter is VFO controlled only, how to calibrate the main dial so the bandspread is accurate can be a formidable problem. But not with a calibrator. For example, for 20 meter calibration you might set the bandspread to 14.4 mc. Then, adjust the main tuning around the 20 meter index mark (usually 14.4 mc.) until you pick up the calibrator's signal—*voila,* the bandspread is calibrated.

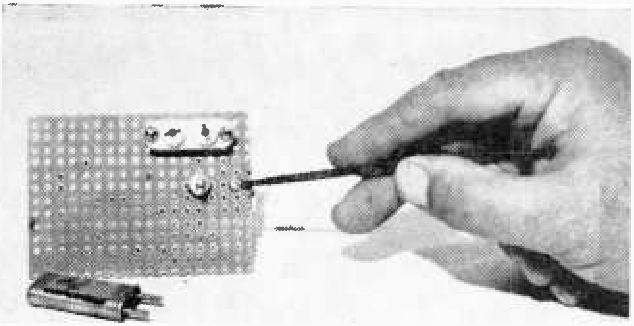
While you can always buy a calibrator that will dangle at the end of a few power cables tapped into the receiver's power supply, or a transistorized job in a relatively large box that becomes another accessory to take up valuable desk space, you can build a Perf-Board calibrator which can be tucked inside the receiver's cabinet, thereby becoming an integral part of the receiver.

Make Your Own. The Perf-Board calibrator shown in the photographs is built on a stock section of $2\frac{7}{16}$ x $3\frac{3}{8}$ inch unclad perforated board (unclad means no copper coating for printed circuits). Flea clips are used for terminal points.

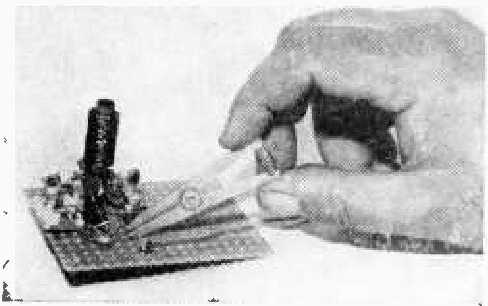
Transistor Q1 can be any *I. F. amplifier* type, even the two or three for a buck *surplus specials* will do.

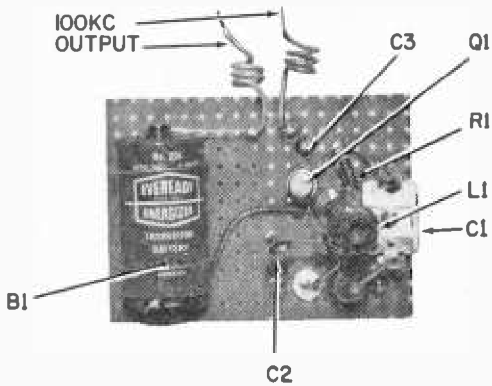
To simplify wiring (actually to avoid a *rat's nest*) the crystal socket and L1 are mounted so their terminals are on the component side of the board (see photograph). To facilitate C1's adjustment, which zero-beats the calibrator with WWV, drill a 1/4 inch hole in the board so you can get at the adjustment screw even though C1 is mounted "face up" on the wiring side of the board. Make certain C1 is mounted rigidly by using at the least #20 wire for its connecting leads.

Note L1's connections carefully as there



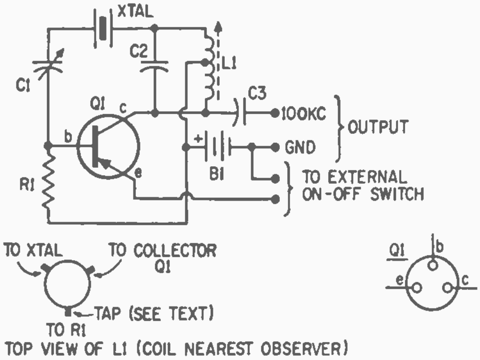
A 1/4-inch hole in the perf board, left, is drilled for access to C1 adjusting screw. A heat sink, below left, is placed on each lead of the transistor before soldering. Top view of completed calibrator shows all components except the 100 kc crystal which is on other side.





is no color-dot or other code on the coil. One coil terminal has two internal wires while the remaining terminals have only one wire. Orient L1 so that when facing the coil, not the slug adjusting screw, the terminal with two wires is pointed down; then, as shown below, the collector terminal is at the right and the crystal terminal (connected to crystal socket SO1) is at the left. If you have any doubts double check with an ohmmeter. The collector terminal measures about 3.2 ohms to the two wire terminal while the crystal terminal measures approximately 2.8 ohms to the two wire terminal.

Q1's leads should be kept short, to avoid soldering heat damage a heat sink on each of Q1's leads when soldering is *a must*. If you don't have standard soldering heat-sinks you



PARTS LIST

B1—9-volts battery (Eveready 226 or equiv.)
C1—4-80-mmf. trimmer (Lafayette Radio 34R-6830 or equiv.)
C2—500-mf., 500-WVDC ceramic disc capacitor
C3—50-mf., 500-WVDC ceramic disc capacitor
L1—1-5-mh. tapped width coil (Miller 6321)
Q1—IF pnp transistor (Lafayette Radio 19R-1504 or equiv.)
R1—91,000-ohms, 1/2-watt resistor
SO1—Socket for xtal (Texas Crystals CE-1 or equiv.)
Xtal—100 kc. crystal (Texas Crystals TX-100 or equiv.)
Misc.—Perforated board, Flea clips, wire, solder, etc.

Estimated cost: $11.00.
Estimated construction time: 1 1/2 hours.

can use an alligator clip, preferably a copper one with tight jaws to carry away the excess heat.

B1 can be any 9 volt transistor radio battery—round or flat it doesn't make a difference. The battery is held in place with two wire "straps" passed through the board and twisted together. Since the battery will last its shelf life of one to two years (assuming normal service) there's no need to use battery clips, the power leads can be soldered directly to B1's terminals.

Note that no power switch is shown. For maximum convenience the power switch should be on the front of the receiver. If your receiver has an RF gain control simply replace the existing control with a similar value having a push-pull switch and connect the calibrator's power leads to the switch. To turn-on the calibrator it's then only necessary to pull out the switch—regardless of the RF gain control setting. If your receiver doesn't have an RF gain control mount a SPST miniature switch on the front panel for convenience.

If you're only interested in 100 kc. markers to 15 mc. or so it's not necessary to connect the calibrator to the receiver. If it is positioned within three or four inches of the antenna input lead, radiation will provide sufficient signal. If you need markers to 30 mc. connect a short length of wire to the free end of C3 and wrap the other end around the antenna input lead—a direct connection to the antenna terminal(s) of the receiver is not required.

Adjusting the Calibrator. Run in L1's slug as far as possible (full clockwise). Set the receiver to a low frequency, say 600 kc., and slowly back out L1's slug a turn at a time. At each turn slowly rock the receiver's tuning back and forth with the BFO (beat frequency oscillator) on. When the calibrator kicks-in you'll hear the beat note. (Note that it is possible for the calibrator to be operative with the slug full in.) Then adjust L1's slug for the maximum S-meter reading attainable.

Turn the calibrator off and tune in WWV at any of its frequencies—depending on the time of day WWV will be received at 5, 10, 15, 20 or 25 mc. Turn the calibrator on and adjust its frequency by adjusting C1 for *zero-beat* with WWV. If theh calibrator's output is so strong it jams WWV, turn the calibrator off, turn the receiver's BFO on and adjust the BFO for zero-beat with WWV. Without changing the BFO's setting, turn-on the calibrator and adjust C1 till the calibrator's signal is zero-beat with the BFO. Effectively, since WWV and the calibrator are zero-beat to the BFO they are zero-beat to each other.

It is possible that the ambient heat inside the receiver cabinet will cause the calibrator's frequency to shift very slightly. If this occurs, heat up receiver for 15 minutes.

Troubleshooting hints. The normal *total current* supplied by the battery is about 5 ma. If the current is in excess of 7 ma., or very high, check that Q1 is a PNP transistor and the battery is installed with the correct polarity. If L1 just seems to be approaching resonance with the slug all the way in (full clockwise) and you cannot obtain a definite "peak," parallel C2 with a 150 mmfd. capacitor.

—Herb Friedman

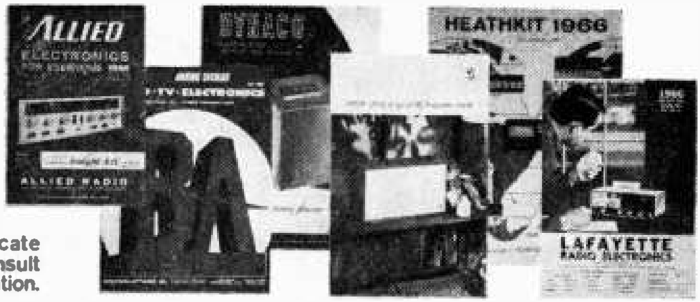
Cold Weather Car Starter

Continued from page 52

by bending it into a U shape. Barrier terminal strip TS1 was mounted on the side and the relay socket and I1 were mounted on top. Socket pins are then wired to the terminal strip to complete the job.

Installation and Wiring. The starting aid unit and auxiliary battery B1 may be installed in either the passenger or engine compartment. Keep them away from the engine manifold. Ground the same posts on the auxiliary and car batteries. When making connections between the unit and the ignition system, be sure to break the proper ignition coil lead. There are three connections on the coil: one heavy lead to the distributor rotor, one light lead to the distributor breaker points, and a third lead of light wire. Lift this third lead from the coil, and, as shown on the diagram, connect this coil post to terminal 5 of the starting aid. Connect the lead that was disconnected from the coil to terminal 1, connect the ungrounded post of the auxiliary battery to terminal 2, and ground terminal 3 at some convenient point on the car. Connect terminal 4 to the single large terminal on the starter-motor housing. Use fairly heavy stranded insulated wire, such as AWG 16, for connections to terminals 1, 2, and 5 of the starting aid. You may use fairly light stranded insulated hookup wire, such as AWG 22, for connections to terminals 3 and 4. Be sure there is a good ground for the auxiliary battery. Use a good body bolt free from corrosion, preferably with a star washer. Tin the ends of all wires and clamp them firmly in place. You may use inexpensive dry batteries for the auxiliary ignition battery since the ignition current is not great: it's about 5-amps maximum for 6-volt systems and 3-amps for 12-volt systems. ■

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.

28. Very pretty, very efficient, that's the word for the new *Betacom* intercom. It's ideal for stores, offices, or just for use in the home, where it doubles as a baby-sitter.

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. A compresensive analysis of *Uher* tape recorders and a complete listing of accessories are all in their up-to-date 16-page brochure.

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.

52. If you're a bug on CB communications or like to listen in on VHF police, fire, emergency bands, then *Regency Electronics* would like to send you their latest specs on their receivers.

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.

TOOLS

78. Color coded, solid and hollow shaft *Xcelite* nutdriver sets are now being offered in handy, pebble grain, molded plastic cases that keep tools in good order on workbench or in toolbox. Form S865 gives all details.

Radio-TV Experimenter, Dept. LL-764
505 Park Avenue, New York, N. Y. 10022

Please arrange to have the literature whose numbers I have encircled sent to me as soon as possible. I am enclosing 25¢ (no stamps) to cover handling charges.

☐ I am a subscriber

☐ Indicate total number of booklets requested

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29	30	31	32	33	34	35	36	37	38	39	40	41
42	44	45	46	47	48	49	50	51	52	54	55	56
57	58	59	60	61	62	63	64	65	66	67	68	69
70	72	73	74	75	76	77	78	90	91	92	93	94

NAME (Print clearly)____________________

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Propagation Forecast

By C. M. Stanbury II

February/March 1966

■ By the time you read this, or shortly thereafter, we should experience our first major ionospheric storm of the new sunspot cycle. When this disturbance hits, the upper bands will go dead except for equatorial powerhouses like HCJB, and most northern stations (Asia, Europe and North Africa) will disappear from the lower bands too.

For the general (non DX'ing) SWL, this is certainly a nightmare. Such favorite easy-to-hear stations as the British Broadcasting Corporation, Radio Japan, the Voice of Germany, etc. will simply not be available. Happily for this type listener, these abnormal periods seldom last more than 48 hours.

But for the DX'er who knows how to use it, an ionospheric storm can be a real opportunity. Most European/Asiatic QRM will be gone from 31 meters, and all will be gone from 49 meters. Between 1500 and 1800 listener's time, Africa will dominate 31 meters while during the evening, 49 meters, already a good Latin American band, will become an even better one.

Meanwhile, big things will be happening on the tropical bands—60 and 90 meters. Most U.S. and Canadian utility station QRM, particularly those ear splitting radioteletype signals, will be considerably weakened during those same evening hours. This is an ideal time to hunt for those rare stations in Bolivia, Ecuador and Peru plus seldom heard broadcasters in all other South-of-the-border countries. ■

<table>
<tr><th>LISTENER'S STANDARD TIME</th><th>0000–0300</th><th>0300–0600</th><th>0600–0900</th><th>0900–1200</th><th>1200–1500</th><th>1500–1800</th><th>1800–2100</th><th>2100–2400</th></tr>
<tr><td>ASIA (except Near East)</td><td>31</td><td>41 (31, 49)</td><td>19 (25)</td><td colspan="2">25 (poor)</td><td>31</td><td>19, 25 (16)</td><td>19, 25</td></tr>
<tr><td>EUROPE, NEAR EAST & AFRICA (N. of the Sahara)</td><td>41 (31)</td><td>31 (poor)</td><td>19</td><td colspan="2">16, 19</td><td>25</td><td colspan="2">31, 49</td></tr>
<tr><td>AFRICA (South of the Sahara)</td><td>49, 60 (90)</td><td colspan="2"></td><td colspan="2">16, 19</td><td>25</td><td>31</td><td>49, 60 (90)</td></tr>
<tr><td>SOUTH PACIFIC</td><td>31</td><td>41, 49</td><td>25, 31</td><td colspan="2">25 (poor)</td><td>19 (poor)</td><td>19</td><td>19, 25</td></tr>
<tr><td>LATIN AMERICA</td><td colspan="2">49, 60</td><td>49</td><td colspan="2">25, 19</td><td>31</td><td colspan="2">49, 60, 90</td></tr>
</table>

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.

Mechanizing Human Behavior

Continued from page 77

Humans Too. When Dr. Robert G. Heath of the Department of Psychiatry at Tulane University, School of Medicine, New Orleans, Louisiana, read of animal experiments, he wondered would the same tests apply to humans?

To find out he built a small portable self-stimulor machine equipped with three buttons, each button to direct stimulation to a separate section of the brain. The transistorized stimulator was fashioned to be worn on a patient's belt.

Next he chose a group of patients whose cases were already diagnosed as beyond conventional help. Of these, we will report tests on just two, one called B-7, a twenty-eight-year-old narcolepsy and cataplexy victim. Dr. Heath implanted electrodes into 14 brain regions, fixed them to stay in position for months. The small silver ball electrodes (3 leads each separated by 2 mm) was placed in the septal, hippocampus and mesenchephalic tegmentum regions. Then, to insure against post-operative trauma, Dr. Heath waited six months before starting his stimulation experiments.

Push-Button Moods. Free to push the button he chose, B-7 first explored the three, found stimulation of the mesencephalic tegmentum startled him into a quick, alert frame of mind, but the feeling was followed by intense discomfort, and he looked around, frightened, fearful. His reaction to this stimulus was so intense he stuck a hairpin under the button to make certain it could not be pressed again.

Next trying the hippocampal stimulation, he found it rewarding, but to a mild degree. But when he pressed the button that stimulated the septal region of his brain, his mood elated fast. The stimulation of pleasure was keen enough to overcome disease effects, first suggesting to Heath stimulation of pleasure zones could overcome pain and disease symptoms.

B-7's septal stimulus, the "pleasure" button, was also closely linked with sexual associations.

Happy Days Are Here Again. The second patient tested was twenty-five-year-old B-10, a psychomotor epileptic with sudden bursts of impulsive behavior that did not yield to conventional treatment.

Heath implanted 51 leads into 17 brain sites, 24 leads of stainless steel, .003 in diameter coated with Teflon; 27 were small silver ball type electrodes. B-10 seconded B-7 in that he reported pleasant feelings—he said he felt "good"—when he pressed the septal button, but B-10 found sexual response when he stimulated the septal section of his brain, with reaction far more enthusiastic than B-7's.

Regardless of the subject his companions discussed, B-10 referred to sex, grinning broadly. When asked why he emphasized this subject, he said, "I don't know why that came to mind, I just happened to think of it." When he turned off septal button and turned on amygdaloid nucleus and the caudate nucleus, he again felt "good" but this time without the broad grin.

Memories. B-10's favorite stimulation button though did not reach a pleasure center. He pushed continually the button touching off centromedian thalamus, making him irritable. Asked why now he persisted in making himself miserable, he said he *almost* recalled an old memory through this stimulation. Another time, he pressed the hippocampal electrode and saw light flashes suggesting to Heath that B-10 had stimulated close to the optic nerve.

Radio Waves Put You on the Beam. As startling as these experiments seem, Dr. Dr. Otto Schmitt of the University of Minnesota told an annual meeting of the American Medical Association that more amazing developments were in the works.

Electrical means of control of human beings could be achieved, he said, by introducing signals into the nervous system, at command from a scientist in a controlling station to either stimulate or depress.

Chemical means of controlling behavior had been achieved by implanting pellets in the body containing hormones that could be controlled by radio. In this way, Schmitt said, a pilot might have his mood regulated by an external control station.

Applied to medical use, Dr. Schmitt said as many as twenty to thirty special sensing instruments could be implanted in the human body, instruments that would lie idle until set off by outside signal, the signal to call the sensor into action, and relay power.

But the progressive Doctor warned then: "There is no question but that we have modified behavior this way. We can make a man rough or aggressive, or we can calm him

(Concluded on next page)

(Continued from previous page)
down. Now we must study how we can use this ability for the good—to make a man better able to do his job."

Close the Schools! Tests worked out by scientists on the West Coast may help man do a better job when the process can be applied to man, and Dr. Heath has already said behavior has been changed by chemical injection, orally and intravenously.

Drs. Frank R. Babich and Allan L. Jacobson of the University of California injected ribonucleic acid, RNA, taken from the brains of trained animals into untrained, found the untrained could then respond as though trained.

First Babich taught eight rats to go to a food cup in a Skinner box at the sound of a click. A second control group were fed the same amount of food as the experimental rats but were not trained.

When the first group had fully learned their homework, responding to click and sound, they were killed with ether, their brains removed and the RNA extracted, then injected into the untrained animals with a 22-gauge needle.

The RNA-injected animals who had *not* been trained were then put into the Skinner box with the control group, and all assigned numbers so experimenters and judges could not guess which rat belonged to which group.

High Scores: Each animal was then given 25 trials and scores kept. At the end of the experiment, scores in order of the RNA-injected animals were 5, 13, 9, 12, 9, contrasted with scores of the control rats which were 3, 2, 1, 1, 1, a definite "win" for the fellows running around with the injected "trained" RNA.

As many scientists believe memory storage system is the same in rats and humans, this experiment could have overwhelming implications for human beings in the future, transferring learning from the superior to the less adept person.

And as Dr. Schmitt has said, personality control and mood control can have tremendous connotations for good in the future. But it can have fearsome applications too. For with this bright promise in the future, we may see the day when we need not struggle years to achieve a Ph.D. We might, by the whim of a needle, become an instant Einstein. We could also become robots wired for sound. ■

A Go-Go Stereo Compact

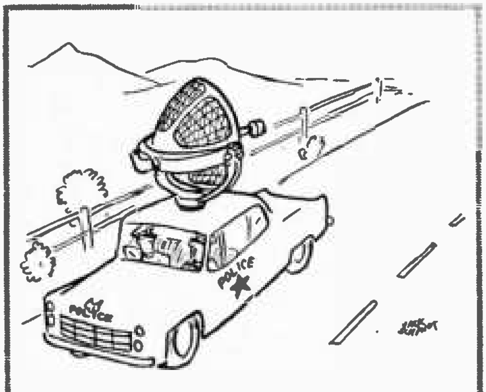
Continued from page 50

nel down and turn the right channel volume control up. If both channels make a loud scratchy sound you're in business. Place a stereo record on the turntable for a check of sound. Turn each channel volume up and down and then balance them out. The left channel speaker should be around six or eight feet from the main unit. Check the speaker reproduction for any mounting vibrations. You will note for comfortable volume, both balance controls will have to be turned down.

Checking For Trouble. If the left channel is working and there is no volume on the right channel, place the blade of a screw driver on the right crystal cartridge terminal. If there is still no hum or volume, check the terminals on the scratch-filter switch and balance control. Check and see if B+ voltage is going to the right channel. The left channel can be checked the same way if it does not work. If there is a hum at the crystal terminals and no volume, the right side of the crystal cartridge is bad.

A dead phono motor may be caused by improper hookup. Check over the wiring and voltage dropping resistor. Place a speed disc on the turntable and check for correct speed. A dirty or worn idler wheel will cause slow or erratic speeds. Clean off the turntable rim and brush on liquid rosin.

Dress up the phono controls with decals or a lettering gun as a final touch. And enjoy the sounds now that you've gone stereo! ■



"It's a fake but it really slows them down!"

NEW products

Continued from page 28

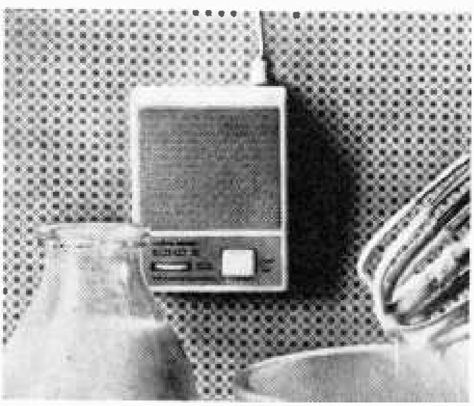
Powered by any 9-volt DC source, the transistor amplifier may also be run with a 15 volt power, which will increase output by 80%. The entire amplifier is mounted on a printed circuit board, which is 5½" long by 1¾" wide; it weighs only 3½ ounces.

This new transistor audio amplifier, at $8.95, is available immediately from Birnbach distributors or post paid from *Birnbach Radio Company, Inc., Dept. ADA, 435 Hudson Street, New York, N. Y.*

Household Intercom

Bringing new added convenience and safety to every home, a new, economically priced 2-station intercom for baby-sitting, or calling room-to-room has just been introduced by Fanon Electronic, Industries. Priced at a low $10.95 for the pair, the little intercom system has been designated as the model ECHO-2 and comes complete with 50 ft. of cable which simply plugs into the units (requires no tools for a hook-up).

As a "step-saver," the ECHO-2 intercom is indispensable. It can be used to check on the baby without running up the stairs; call



Fanon Model ECHO-2 Intercom

the kids to lunch or get the man of the house out of his workshop.

Powered by a single 9 volt transistor battery that will last for months, one unit may signal the other even when the intercom is "off." This patented "beep-tone" signal circuit prolongs the overall life of the battery since no current is required until the system is actually used. Attractively styled in an ivory and grey hi-impact plastic case, each unit has gold-tone appointments and is only 3" x 4" square.

The voice quality is excellent and so sensitive, it can be easily heard across a large room or nursery. Since it requires no AC power, the ECHO-2 system can be used anywhere—on patios, boats, campsites, or auto-trailers. Up to 150 ft. of additional cable can be added between units. For complete information, write to *Fanon Electronic Industries, Dept. McQ, 439 Frelinghuysen Avenue, Newark, N. J. 07114.*

Perma-Power Portable Amplifier

Panza Power

A portable amplifier that works on flashlight batteries and delivers "professional quality" sound is now available from Perma-Power. The Ampli-Vox Model S-700 Portable Amplifier features all-transistor design for instant performance and utmost dependability. It is extremely easy to use; instead of a panoply of complicated controls, it offers one-knob operation. A single control turns it on and off, and adjusts the volume.

The amplifier delivers high power, too. It is rated 25 watts, E.I.A. music power, 40 watts peak. It is excellent for music, paging, public address, and most sound system applications. Since the Model S-700 is battery-powered, it can be readily used indoors or out. Ten flashlight batteries will provide 200 hours of operation. The unit was originally designed for use as original equipment in an auto portable sound system.

The amplifier has a frequency response of 50 to 15,000 cycles per second. It has two inputs, so that it can be used with a microphone and auxiliary equipment such as phonograph, tuner, or tape recorder. It also provides outputs for two 8-ohm speakers. The unit, measuring 8⅜ inches wide by 3-¼ inches high by 8-¾ inches deep, weighs only seven pounds with batteries installed—can be readily adapted to AC opera-

(Concluded overleaf)

tion, with a plug-in power adapter available separately.

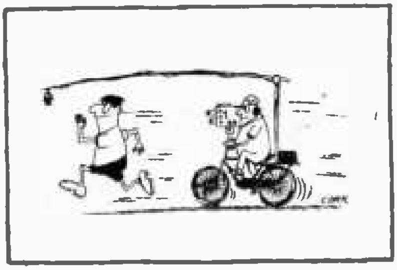
The unit is available throughout the United States and Canada, through electronic and sound outlets, school and office supply houses, photographic and audiovisual dealers, etc. It sells for $69.95 net, without batteries. Descriptive literature is available on request from the manufacturer, Perma-Power Company, Dept. 764, 5740 N. Tripp Ave., Chicago, Illinois 60646.

Tote-and-Talk Tape Recorder

Automatic Level Control (ALC) and solid-state electronics are top features of Craig Panorama's new Vista 525 6-transistor, AC-operated two-speed tape recorder. Automatically maintained recording level and 4-hour recording capacity make unit ideal for large conference meetings. Speed equalization control at 1-⅞ and 3-¾ ips standard speeds, with capstan drive. Design features include jam-proof single-lever control, AC bias record, fast forward, PM dynamic microphone, record level and power indicator.

Craig Panorama's Vista Tape Recorder

Equipped with inputs for microphone, radio and AC power, outputs for earphone and external speaker. Dimensions are 5-½" by 11-¾" by 9"; weight 8 lbs. Priced at $69.95. Accessories include microphone, patch cord. For further information, please write Dept. 201A, Craig Panorama Inc., 3412 So. La Cienega Blvd., Los Angeles, Calif. 90016. ■



Solid-State Audio Amp

Continued from page 84

metal plate and the front of the panel: they provide a small space between panel and plate allowing air to circulate all around the plate.

The Enclosure. Construction of the wood case can vary somewhat to suit your requirements. Our case measures 6½"x 4⅛"x2⅛", and is tacked and glued together from 5/16" stock. The case is left bottomless for easy replacement of batteries, as shown in the photograph. Finish the outside of the case to suit yourself (the unit shown is covered with self-adhesive plastic material).

The three size-D flashlight cells are secured with a Keystone No. 176 twin holder, and a Keystone No. 175 single holder, but three No. 175 holders could be used instead. There is room for another No. 175 holder if 6 volts are desired.

Now, just put your amplifier to use with your FM tuner, AM tuner, crystal receiver, or high-output crystal or ceramic phono pickup. You can even use it as a utility amplifier for signal tracing, etc. Or build another—on a separate or on the same chassis—and do a little *stereo* listening! ■

Big-Time Marine Radio

Continued from page 80

with distress traffic removed from the calling frequency, it could then be used for the transmission of position reports. At present, position reports must be sent on the over worked "working" frequency, if they are sent at all by the ship. In practice, many position reports are supplied, via an intricate system of land lines, by lock masters (or his assistants), lift bridge operators, etc. While such an "intercom" certainly does work, increased use of radio would probably be better. Unfortunately, to separate calling and distress frequencies requires a change in international law.

Another proposed, less drastic, change would simply increase the number of working frequencies per station, certainly feasible, on VHF, but an operator would be required for each additional channel. Happily, this one wouldn't run afoul of international politics. ■

Lab Check—EICO 753

Continued from page 78

You Get More. Among "extra" features is a built-in power takeoff and panel mounted on-off switch for a 100 kc. calibrator; a front panel carrier balance control; a set of extra relay contacts keyed with the transmitter; and all VOX and bias adjustments available outside the cabinet on the rear apron.

The frequency dial utilizes a relatively uncommon vernier mechanism which provides a basic 6:1 vernier in combination with an automatic 30:1 vernier. As the dial is tuned towards the desired frequency the vernier is 6:1. If the dial is turned slightly past the desired frequency and then backed off the vernier shifts to 30:1. The 30:1 vernier covers approximately 10 degrees of any part of the scale. If you shift frequency beyond 10 degrees of scale the mechanism shifts back to a 6:1 ratio to avoid a long "cranking" session.

After a 15 minute warmup the EICO 753's stability was well within the specified 400 cycles—in fact, we were able to work relatively long contacts with but one or two tuning corrections (done with the receiver offset). We must allow for the other ham's station having some drift.

Final amplifier efficiency in the CW and SSB mode was quite good with a 200-watt input resulting in an output of slightly more than 100 watts. Typical of SSB transceivers with thrown-in AM, the AM output was only 30 watts for a 100 watt input.

On the Air. SSB audio transmit quality was excellent, as attested to by the unsolicited comments of many stations we worked. AM quality, typical of AM on SSB on crystal filter rigs, was just about passable. CW note was excellent—stable, no clicks or chirps.

Perhaps the most outstanding feature of the transmitter section is the VOX—*about the best we've seen.* Using a sensitive high quality mike placed 8 inches to the front and side of the loudspeaker we were able to adjust the VOX so there was no falsing (tripping of the transmitter) with normal voice levels (no shouting)—even with unusually loud speaker volume. The delay adjustment is quite good, the VOX can be adjusted to hold-in for full sentences or release at the syllable rate. VOX adjustment is very easy.

In the SSB and CW modes the receiver performance was notably good. A clean CW note, and excellent SSB—crisp with low distortion. There is an unusual amount of reserve audio gain—more than enough to overcome the high ambient noise levels of mobile operation. AGC action is good with virtually no speaker blasting when shifting from weak to strong signals. Sensitivity is about 1 uv. for a 10 db S+N/N ratio. Selectivity is about 2.7 kc. at the 6 db points.

There is no variable BFO; to obtain a beat note in the CW mode the receiver offset is detuned just enough to produce a comfortable note. But you must remember to allow for the offset when tuning a station to zero beat—zero beat is then equal to the offset.

AM reception, which is accomplished by modifying the SSB product detector into a grid leak detector—rather than using a diode detector—is just about passable. Better AM reception is obtained by using the SSB mode and tuning for zero beat.

Both a 115 VAC and a 12 VDC power supply are available. The AC power supply contains a built-in speaker and is styled to match the transceiver. The mobile supply is strictly a power supply; either a separate speaker or the auto radio speaker must be connected to the transceiver.

EICO's 753 ham transceiver contains the significant features of more costly equipment, at equal or superior performance, at a kit price of $179.95 ($299.95 wired) less power supply and speaker. So far the EICO 753 stacks up as the best ham transceiver buy for 1966. The Model 751 AC Supply/Speaker Console sells for $79.95 in kit form ($109.95 wired). Mobile bugs can pick up the solid-state power supply, Model 752, for $79.95 in kit form ($109.95 wired). For more information and complete specifications write to EICO Electronic Instrument Co., Inc., Dept. PP, 131-01 39th Ave., Flushing, New York 11354. ■

"It's a switchboard."

WHITE'S RADIO LOG

Volume 45, No. 1

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

In this issue of *White's Radio Log* we have included the following listings: U.S. AM Stations by Frequency, Canadian AM Stations by Frequency, U.S. Commercial Television Stations by States, U.S. Educational Television Stations by States, Canadian Television Stations by Cities, and the World-Wide Short-Wave Stations.

In Our Next Issue. April-May 1966, the *Log* will contain 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, Mexican and Cuban AM Stations by Location, and the expanded Short-Wave Section. The short-wave listings will always be completely revised in each issue of *Log* to insure 100% up-to-date information.

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 Short-Wave Section.

Therefore, in any three consecutive 1966 issues of RADIO-TV EXPERIMENTER magazines, you will have a complete cross-reference listings of *White's Radio Log* that is always up-to-date. The three consecutive issues are a complete volume of *White's Radio Log* that offers up to the minute listings 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 the new *White's Radio Log* format an unbeatable reference. □

QUICK REFERENCE INDEX

WHITE'S RADIO LOG

U.S. AM Stations by Frequency

U. S. stations listed alphabetically by states within groups. Abbreviations: Kc.. frequency in kilocycles: W.P., power in watts; d, operates daytime only; n, operates nighttime only. Wave length is given in meters.

Kc. Wave Length W.P.

540—555.5

KVIP Redding, Calif. 5000d
KFMB San Diego, Calif. 5000
WGTO Cypress Gardens, Fla. 50000d
WDAK Columbus, Ga. 5000
KBRV Soda Springs, Idaho 500d
KWMT Ft. Dodge, Iowa 5000d
KNOE Monroe, La. 5000
WDMV Pocomoke City, Md. 500d
WBIC Islip, N.Y. 250d
WETC Wendell-Zebulon, N.C. 250d
WARO Canonsburg, Pa. 250d
WYNN Florence, S.C. 250d
WDXN Clarksville, Tenn. 1000d
WRIC Richlands, Va. 1000d
WYLO Jackson, Wis. 250

550—545.1

KENI Anchorage, Alaska 5000
KOY Phoenix, Ariz. 5000
KAFY Bakersfield, Calif. 1000
KRAI Craig, Colo. 1000
WAYR Orange Park, Fla. 1000d
WGGA Gainesville, Ga. 5000
KMVI Wailuku, Hawaii 1000
KFRM Salina, Kans. 5000d
WCBI Columbus, Miss. 1000
KSD St. Louis, Mo. 5000
KBOW Butte, Mont. 1000
WGR Buffalo, N.Y. 5000
WDBM Statesville, N.C. 500d
KFYR Bismarck, N.Dak. 5000
WKRC Cincinnati, Ohio 5000
KOAC Corvallis, Oreg. 5000
WHLM Bloomsburg, Pa. 1000
WPAB Ponce, P.R. 5000
WXTR Pawtucket, R.I. 1000
KCRS Midland, Tex. 5000
KTSA San Antonio, Tex. 5000
WDEV Waterbury, Vt. 5000
WSVA Harrisonburg, Va. 5000
WSAU Wausau, Wis. 5000

560—535.4

WOOF Dothan, Ala. 5000d
KYUM Yuma, Ariz. 1000
KSFO San Fran., Calif. 5000
KLZ Denver, Colo. 5000
WQAM Miami, Fla. 5000
WIND Chicago, Ill. 5000
WMIK Middlesboro, Ky. 500d
WGAN Portland, Maine 5000
WFRB Frostburg, Md. 1000
WHYN Springfield, Mass. 5000
WQTE Monroe, Mich. 500d
WEBC Duluth, Minn. 5000
KWTO Springfield, Mo. 5000
KMON Great Falls, Mont. 5000
WGAI Elizabeth City, N.C. 1000
WFIL Philadelphia, Pa. 5000
WIS Columbia, S.C. 5000
WHBQ Memphis, Tenn. 5000
KLVI Beaumont, Tex. 5000
KPQ Wenatchee, Wash. 5000
WJLS Beckley, W.Va. 5000

570—526.0

WAAX Gadsden, Ala. 5000
KCNO Alturas, Calif. 5000
KLAC Los Angeles, Calif. 5000
WGMS Washington, D.C. 5000
WFSO Pinellas Park, Fla. 500d
WACL Waycross, Ga. 5000
WKYX Paducah, Ky. 1000
WVMI Biloxi, Miss. 1000d
KGRT Las Cruces, N.Mex. 5000d
WMCA New York, N.Y. 5000
WSYR Syracuse, N.Y. 5000
WWNC Asheville, N.C. 5000
WLLE Raleigh, N.C. 500d
WKBN Youngstown, Ohio 5000
WNAX Yankton, S.Dak. 5000
WFAA Dallas, Tex. 5000
WBAP Ft. Worth, Tex. 5000
KLUB Salt Lake City, Utah 5000
KVI Seattle, Wash. 5000
WMAM Marinette, Wis. 5000

580—516.9

WABT Tuskegee, Ala. 500d
KTAN Tucson, Ariz. 5000
KMJ Fresno, Calif. 5000
KUBC Montrose, Colo. 5000
WDBO Orlando, Fla. 5000
WGAC Augusta, Ga. 5000
KFXD Nampa, Idaho 5000
WILL Urbana, Ill. 5000d
KSAC Manhattan, Kans. 5000
WIBW Topeka, Kans. 5000
KALB Alexandria, La. 5000
WTAG Worcester, Mass. 5000
WELO Tupelo, Miss. 1000
KANA Anaconda, Mont. 1000
WAGR Lumberton, N.C. 500
KWIN Ashland, Oreg. 1000
WHP Harrisburg, Pa. 5000
WKAQ San Juan, P.R. 5000
KOBH Hot Springs, S.Dak. 500d
WRKH Rockwood, Tenn. 1000d
KDAV Lubbock, Tex. 500d
WLES Lawrenceville, Va. 500d
WCHS Charleston, W.Va. 5000
WKTY LaCrosse, Wis. 5000

590—508.2

KHAR Anchorage, Alaska 5000
WRAG Carrollton, Ala. 1000d
KBHS Hot Springs, Ark. 5000d
KFXM San Bernardino, Cal. 1000
KTHO Tahoe Valley, Calif. 1000d
KCSJ Pueblo, Colo. 1000
WDLP Panama City, Fla. 1000
WPLO Atlanta, Ga. 5000
KGMB Honolulu, Hawaii 5000
KID Idaho Falls, Idaho 5000
WRTH Wood River, Ill. 1000
WVLK Lexington, Ky. 5000
WEEI Boston, Mass. 5000
WKZO Kalamazoo, Mich. 5000
KGLE Glendive, Mont. 500d
WOW Omaha, Nebr. 5000
WROW Albany, N.Y. 5000
WGTM Wilson, N.C. 5000
KUGN Eugene, Oreg. 5000
WARM Scranton, Pa. 5000
WMBS Uniontown, Pa. 1000
KTBC Austin, Tex. 5000
KSUB Cedar City, Utah 1000
WLVA Lynchburg, Va. 1000
KHQ Spokane, Wash. 5000

600—499.7

WIRB Enterprise, Ala. 1000
KCLS Flagstaff, Ariz. 5000
KVCV Redding, Calif. 1000
KOGO San Diego, Calif. 5000
KZIX Ft. Collins, Colo. 1000d
WICC Bridgeport, Conn. 5000
WPDQ Jacksonville, Fla. 5000
WMT Cedar Rapids, Iowa 5000
WWOM New Orleans, La. 1000d
WFST Caribou, Maine 5000d
WCAO Baltimore, Md. 5000
WLST Escanaba, Mich. 1000d
WTAC Flint, Mich. 1000
KGEZ Kalispell, Mont. 1000
WCVP Murphy, N.C. 1000d
WSJS Winston-Salem, N.C. 5000
KSJB Jamestown, N.D. 5000
WSOM Salem, Ohio 500d
WFRM Coudersport, Pa. 1000d
WAEL Mayaguez, P.R. 1000
WREC Memphis, Tenn. 5000
KROD El Paso, Tex. 5000
KERB Kermit, Tex. 1000d
KTBB Tyler, Tex. 1000

610—491.5

WSGN Birmingham, Ala. 5000
KFAR Fairbanks, Alaska 5000
KAVL Lancaster, Calif. 1000
KFRC San Francisco, Calif. 5000
WTOR Torrington, Conn. 250
WIOD Miami, Fla. 5000
WMEL Pensacola, Fla. 500d
WCEH Hawkinsville, Ga. 500d
KUAM Agana, Guam 1000
WRUS Russellville, Ky. 500d
KDAL Duluth, Minn. 5000
WDAF Kansas City, Mo. 5000
KOJM Havre, Mont. 1000
KCSR Chadron, Nebr. 1000d
WGIR Manchester, N.H. 5000
KGGM Albuquerque, N.Mex. 5000
WAYS Charlotte, N.C. 5000
WTVN Columbus, Ohio 5000
WIP Philadelphia, Pa. 5000
KILT Houston, Tex. 5000
KVNU Logan, Utah 5000
WSLS Roanoke, Va. 5000
WHPL Winchester, Va. 500
KEPR Kennewick-Richmond-Pasco, Wash. 5000

620—483.6

KTAR Phoenix, Ariz. 5000
KNGS Hanford, Calif. 1000
KWSD Mt. Shasta, Calif. 1000d
KSTR Grand Junction, Colo. 5000d
WSUN St. Petersburg, Fla. 5000
WTRP LaGrange, Ga. 1000d
KWAL Wallace, Idaho 1000
KMNS Sioux City, Iowa 1000
WTMT Louisville, Ky. 500d
WLBZ Bangor, Maine 5000
WJDX Jackson, Miss. 5000
WVNJ Newark, N.J. 5000
WHEN Syracuse, N.Y. 5000
WDNC Durham, N.C. 5000
KGW Portland, Oreg. 5000
WHJB Greensburg, Pa. 1000
WCAY Cayce, S.C. 500d
WATE Knoxville, Tenn. 5000
KWFT Wichita Falls, Tex. 5000
WVMT Burlington, Vt. 5000
WWNR Beckley, W.Va. 1000
WTMJ Milwaukee, Wis. 5000

630—475.9

WAVU Albertville, Ala. 1000d
WJDB Thomasville, Ala. 1000d
KJNO Juneau, Alaska 1000
KVMA Magnolia, Ark. 1000d
KIDD Monterey, Calif. 1000
KHOW Denver, Colo. 5000
WMAL Washington, D.C. 5000
WSAV Savannah, Ga. 5000
WNEG Toccoa, Ga. 500d
KIDO Boise, Idaho 5000
WLAP Lexington, Ky. 5000
KTIB Thibodaux, La. 500d
WJMS Ironwood, Mich. 1000
KDWB So. St. Paul, Minn. 5000
KXOK St. Louis, Mo. 5000
KGVW Belgrade, Mont. 1000d
KOH Reno, Nev. 5000
KLEA Lovington, N.Mex. 500d
WIRC Hickory, N.C. 1000d
WMFD Wilmington, N.C. 1000
KWRO Coquille, Oreg. 5000d
WEJL Scranton, Pa. 500d
WKYN San Juan, P.R. 5000
WPRO Providence, R.I. 5000
KGFX Pierre, S. Dak. 200d
KMAC San Antonio, Tex. 5000
KSXX Salt Lake City, Utah 1000d
KGON Edmunds, Wash. 5000d
KZUN Opportunity, Wash. 500d

640—468.5

KFI Los Angeles, Calif. 50000
WOI Ames, Iowa 5000d
WHLO Akron, O. 1000d
WNAD Norman, Okla. 1000d

650—461.3

KORL Honolulu, Hawaii 10000
WSM Nashville, Tenn. 50000
KIKK Pasadena, Texas 250d

660—454.3

KOWH Omaha, Neb.
WNBC New York, N.Y. 50000
WESC Greenville, S.C. 10000d
KSKY Dallas, Tex. 1000

670—447.5

KBOI Boise, Ida. 50000
WMAQ Chicago, Ill. 50000
KNBR San Fran., Calif. 50000

680—440.9

WPIN St. Petersburg, Fla. 1000d
WATY N. Atlanta, Ga.
WCTT Corbin, Ky. 1000
WCBM Baltimore, Md. 10000
WNAC Boston, Mass. 50000
WDBC Escanaba, Mich. 10000
KFEQ St. Joseph, Mo. 5000
WINR Binghamton, N.Y. 1000
WNYR Rochester, N.Y.
WPTF Raleigh, N.C. 50000
WISR Butler, Pa. 250d
WAPA San Juan, P.Rico. 10000
WMPS Memphis, Tenn. 10000
KBAT San Antonio, Tex. 50000
KOMW Omak, Wash. 1000d
WCAW Charleston, W.Va. 10000d

690—434.5

WVOK Birmingham, Ala. 50000d
KEOS Flagstaff, Ariz. 1000
KEVT Tucson, Ariz. 250d
KBBA Benton, Ark. 250d
KAPI Pueblo, Colo. 250d
WADS Ansonia, Conn. 500d
WAPE Jacksonville, Fla. 50000
KULA Honolulu, Hawaii 10000
KBLI Blackfoot, Idaho 1000d
KGGF Coffeyville, Kans. 10000
WTIX New Orleans, La. 5000
KTCR Minneapolis, Minn. 500d
KSTL St. Louis, Mo. 1000d
KEYR Terrytown, Nebr. 1000d
KRCO Prineville, Oreg. 1000d
WXUR Media, Pa. 500d
KUSD Vermillion, S.Dak. 1000d
KHEY El Paso, Tex. 10000
KPET Lamesa, Tex. 250
KZEY Tyler, Tex. 5000
WCYB Bristol, Va. 10000d
WNNT Warsaw, Va. 250d
WELD Fisher, W.Va. 500d

700—428.3

WLW Cincinnati, Ohio 50000

710—422.3

WKRG Mobile, Ala. 1000
KMPC Los Angeles, Calif. 50000
KBTR Denver, Colo. 5000
WGBS Miami, Fla. 50000
WPFE Eastman, Ga. 1000d
WROM Rome, Ga. 1000d
KEEL Shreveport, La. 50000
WHB Kansas City, Mo. 10000
WOR New York, N.Y. 50000
DZRH Manila, P.I. 10000
WKJB Mayaguez, P.Rico 1000
WTPR Paris, Tenn. 250d
KGNC Amarillo, Tex. 10000
KURV Edinburg, Tex. 250
KIRO Seattle, Wash. 50000
WDSM Superior, Wis. 5000

720—416.4

KUAI Eleele, Hawaii 5000
WGN Chicago, Ill. 50000

730—410.7

WJMW Athens, Ala. 1000
KSUD W. Memphis, Ark. 250d
WLOR Thomasville, Ga. 5000d
KLOE Goodland, Kans. 1000d
WFMW Madisonville, Ky 500
WMTC Van Cleve, Ky. 1000d
KTRY Bastrop, La. 250d
WARB Covington, La. 250d
WJTO Bath, Maine 1000d
WACE Chicopee, Mass. 5000d
WVIC E. Lansing, Mich. 500
KWRE Warrenton, Mo. 1000d
KWOA Worthington, Minn. 1000d
KURL Billings, Mont. 500d
KVOD Albuquerque, N. Mex. 1000d
WDOS Oneonta, N.Y. 1000d
WFMC Goldsboro, N.C. 1000d
WOHS Shelby, N.C. 1000d
WMGS Bowling Green, Ohio 1000d
KBOY Medford, Oreg. 1000d
WNAK Nanticoke, Pa. 1000d
WPIT Pittsburgh, Pa. 5000d
WPAL Charleston, S.C. 1000d
WLIL Lenoir, Tenn. 1000d
KPCN Grand Prairie, Tex. 500d
KSVN Ogden, Utah 1000d
WPIK Alexandria, Va. 5000d
WMNA Gretna, Va. 1000d
KULE Ephrata, Wash. 1000d
WXMT Merrill, Wis. 1000d

Kc. Wave Length W.P.

740—405.2
WBAM Montgomery, Ala. 50000d
KUEQ Phoenix, Ariz. 1000d
KBIG Avalon, Cal. 10000d
KCBS San Francisco, Calif. 50000
KSSS Colo. Springs, Colo. 1000
KVFC Cortez, Colo. 1000d
WSBR Boca Raton, Fla. 1000
WKMK Blountstown, Fla. 1000d
WKIS Orlando, Fla. 5000
KYME Boise, Idaho 500d
WVLN Olney, Ill. 1000d
KBOE Oskaloosa, Iowa 250d
WYHR Cambridge, Mass. 250d
KPBM Carlsbad, N.Mex. 1000d
WGSM Huntington, N.Y. 5000d
WMBL Morehead City, N.C. 1000d
WPAQ Mount Airy, N.C. 10000d
KRMG Tulsa, Okla. 50000
WVCH Chester, Pa. 1000d
WIAC San Juan, P.Rico 10000
WBAW Barnwell, S.C. 1000d
WIRJ Humbolt, Tenn. 250d
WJIG Tullahoma, Tenn. 250d
KTRH Houston, Tex. 50000
KCMC Texarkana, Tex. 1000
WBCI Williamsburg, Va. 500d

750—399.8
KFQD Anchorage, Alaska 10000
WSB Atlanta, Ga. 50000
WBMD Baltimore, Md. 1000d
KMMJ Grand Island, Neb. 10000d
WHEB Portsmouth, N.H. 1000d
KSEO Durant, Okla. 250d
KXL Portland, Oreg. 50000
WPDX Clarksburg, W.Va. 1000d
WHA Madison, Wis. 5000d

760—394.5
KFMB San Diego, Cal. 5000
KGU Honolulu, Hawaii 10000
WJR Detroit, Mich. 50000
WCPS Tarboro, N.C. 1000d
WORA Mayaguez, P.R. 5000

770—389.4
KUDM Minneapolis, Minn. 5000d
WCAL Northfield, Minn. 5000d
WEW St. Louis, Mo. 1000d
KOB Albuquerque, N.Mex. 50000
WABC New York, N.Y. 50000
KXA Seattle, Wash. 1000

780—384.4
WBBM Chicago, Ill. 50000
WJAG Norfolk, Neb. 1000d
WCKB Dunn, N.C. 1000d
WBBO Forest City, N.C. 1000d
KSPI Stillwater, Okla. 250d
WAVA Arlington, Va. 1000d

790—379.5
WTUG Tuscaloosa, Ala. 1000d
KCAM Glennallen, Alaska 5000
KCEE Tucson, Ariz. 5000d
KOSY Texarkana, Ark. 1000
KDAN Eureka, Calif. 5000d
KABC Los Angeles, Calif. 5000
WLBE Leesburg, Fla. 5000
WFUN Miami Beach, Fla. 5000
WQXI Atlanta, Ga. 5000
WYNR Brunswick, Ga. 500d
WGRA Cairo, Ga. 1000d
KEKO Kealakekua, Hawaii 1000
KEST Boise, Idaho 1000d
WRMS Beardstown, Ill. 500d
KXXX Colby, Kans. 5000d
WAKY Louisville, Ky. 5000
WRUM Rumford, Me. 1000d
WSGW Saginaw, Mich. 5000
WSJC Magee, Miss. 1000d
KGHL Billings, Mont. 5000
WWNY Watertown, N.Y. 1000
WLSV Wellsville, N.Y. 1000d
WTNC Thomasville, N.C. 1000d
KXGO Fargo, N. Dak. 5000
KWIL Albany, Oreg. 1000
WAEB Allentown, Pa. 1000
WPIC Sharon, Pa. 1000d
WEAN Providence, R.I. 5000
WWBD Bamberg-Denmark, S.C. 1000d
WETB Johnson City, Tenn. 1000d
WMC Memphis, Tenn. 5000
KTHT Houston, Tex. 5000
KFYO Lubbock, Tex. 5000
KUTA Blanding, Utah 1000d
WSIG Mount Jackson, Va. 1000d
WTAR Norfolk, Va. 5000
KGMI Bellingham, Wash. 5000
KNEW Spokane, Wash. 5000
WEAQ Eau Claire, Wis. 5000

800—374.8
WHOS Decatur, Ala. 1000d
WMGY Montgomery, Ala. 1000d
KINY Juneau, Alaska 5000
KAGH Crossett, Ark. 250d
KVOM Morrilton, Ark. 250d
KUZZ Bakersfield, Calif. 250d
KDAD Weed, Calif. 1000d
KBRN Brighton, Colo. 500d
WLAD Danbury, Conn. 1000d
WSUZ Palatka, Fla. 1000d
WJAT Swainsboro, Ga. 1000d
WKZI Casey, Ill. 250d
KXIC Iowa City, Iowa 1000d
WCCM Lawrence, Mass. 1000d
WVAL Sauk Rapids, Minn. 250d
KREI Farmington, Mo. 1000d
WKDN Camden, N. J. 5000d
KJEM Okla. City, Okla. 250d
KPDQ Portland, Ore. 5000d
WCHA Chambersburg, Pa. 1000d
WDSC Dillon, S.C. 1000d
WEAB Greer, S.C. 250d
WDEH Sweetwater, Tenn. 1000d
KDDD Dumas, Tex. 250d
KBUH Brigham City, Utah 250d
WSVS Crewe, Va. 5000d
WKEE Huntington, W.Va. 5000d
WDUX Waupaca, Wis. 5000d

810—370.2
KGO San Francisco, Calif. 50000
WATI Indianapolis, Ind. 2500d
WYRE Annapolis, Md. 250d
WJPW Rockford, Mich. 500d
KCMO Kansas City, Mo. 50000
WGY Schenectady, N.Y. 50000
WKBC N.Wilkesboro, N.C. 1000d
WCEC Rocky Mount, N.C. 1000d
WEDO McKeesport, Pa. 1000d
WKVM San Juan, P.R. 25000
WMTS Murfreesboro, Tenn. 5000d

820—365.6
WAIT Chicago, Ill. 5000d
WIKY Evansville, Ind. 250d
WOSU Columbus, Ohio 5000d
WFAA Dallas, Tex. 50000
WBAP Ft. Worth, Tex. 50000

830—361.2
KIKI Honolulu, Hawaii 250
WCCO Minneapolis-St. Paul, Minn. 50000
KOFI Kalispell, Mont. 1000
KBOA Kennett, Mo. 1000d
WNYC New York, N.Y. 1000

840—356.9
WTUF Mobile, Ala. 1000d
WRYM New Britain, Conn. 1000d
WHAS Louisville, Ky. 50000
WVPO Stroudsburg, Pa. 250d

850—352.7
WYDE Birmingham, Ala. 10000
KICY Nome, Alaska 5000
KOA Denver, Colo. 50000
WRUF Gainesville, Fla. 5000
WEAT W. Palm Beach, Fla. 1000
KIMO Hilo, Hawaii 1000
WCLR Crystal Lake, Ill.
WHDH Boston, Mass. 50000
WKBZ Muskegon, Mich. 1000
KFUO Clayton, Mo. 5000
WKIX Raleigh, N.C. 10000
WJW Cleveland, Ohio 10000
WJAC Johnstown, Pa. 10000
WEEU Reading, Pa. 1000
WABA Aguadilla, P.R. 500
WRAP Norfolk, Va. 5000
KTAC Tacoma, Wash. 1000

860—348.6
WHRT Hartselle, Ala. 250d
WAMI Opp, Ala. 1000d
KIFN Phoenix, Ariz. 1000d
KOSE Osceola, Ark. 1000d
KWRF Warren, Ark. 250d
KTRB Modesto, Calif. 10000
WOWW Naugatuck, Conn. 250d
WAZE Clearwater, Fla. 500d
WKKO Cocoa, Fla. 1000d
WERD Atlanta, Ga. 1000
WDMG Douglas, Ga. 5000d
WMRI Marion, Ind. 250d
KWPC Muscatine, Iowa 250d
KOAM Pittsburg, Kans. 10000
WSON Henderson, Ky. 500d
WAYE Baltimore, Md. 1000d
WSBS Gt. Barrington, Mass. 250d
KNUJ New Ulm, Minn. 1000d
WMAG Forest, Miss. 500d
KARS Belen, N. Mex. 250d
WFMO Fairmont, N.C. 1000d
WSTH Taylorsville, N. C. 250d
KSHA Medford, Oreg. 1000d
WAMO Pittsburgh, Pa. 1000d
WTEL Philadelphia, Pa. 10000d
WLBG Laurens, S.C. 1000d
WIVK Knoxville, Tenn. 1000d
KFST Ft. Stockton, Tex. 250d
KPAN Hereford, Tex. 250d
KSFA Nacogdoches, Tex. 1000d
KONO San Antonio, Tex. 5000
KWHO Salt Lake City, Utah 1000d
WEVA Emporia, Va. 1000d
WDAY Oak Hill, W.Va. 10000d
WFOX Milwaukee, Wis. 250d

870—344.6
KIEV Glendale, Calif. 250d
KAIM Honolulu, Hawaii 5000
WWL New Orleans, La. 50000
WKAR E. Lansing, Mich. 5000d
WHCU Ithaca, N.Y. 5000
WGTL Kannapolis, N.C. 1000d
WHOA San Juan, P.R. 5000
KJIM Ft. Worth, Tex. 250
WFLO Farmville, Va. 1000d

880—340.7
WCBS New York, N.Y. 50000
WRRZ Clinton, N.C. 1000d
WRFD Worthington, Ohio 5000d

890—336.9
WLS Chicago, Ill. 50000
WHNC Henderson, N.C. 1000d
KBYE Okla. City, Okla. 1000d

900—333.1
WATV Birmingham, Ala. 1000d
WGOK Mobile, Ala. 1000d
WOZK Ozark, Ala. 1000d
KPRB Fairbanks, Alaska 10000
KHOZ Harrison, Ark. 1000d
KBIF Fresno, Calif. 1000d
KGRB West Covina, Cal. 250d
WJWL Georgetown, Del. 5000d
WSWN Belle Glade, Fla. 1000d
WMOP Ocala, Fla. 1000d
WCGA Calhoun, Ga. 1000d
WCRY Macon, Ga. 250d
WEAS Savannah, Ga. 5000d
KTEE Idaho Falls, Ida. 1000d
KSIR Wichita, Kan. 250d
WKYW Louisville, Ky. 1000d
WLSI Pikeville, Ky. 5000d
KREH Oakdale, La. 250d
WCME Brunswick, Maine 1000d
WLMD Laurel, Md. 1000d
WATC Gaylord, Mich. 1000d
KTIS Minneapolis, Minn. 1000d
WDDT Greenville, Miss. 1000d
KFAL Fulton, Mo. 1000d
KJSK Columbus, Nebr. 1000d
WOTW Nashua, N.H. 1000d
WBRV Boonville, N.Y. 1000d
WKAJ Saratoga Springs, N.Y. 250d
WAYN Rockingham, N.C. 1000d
WIAM Williamston, N.C. 1000d
KFNW Fargo, N.Dak. 1000d
WCNS Canton, Ohio 500d
WFRO Fremont, Ohio 500d
WCPA Clearfield, Pa. 1000d
WFLN Philadelphia, Pa. 1000d
WKXV Knoxville, Tenn. 1000d
WCOR Lebanon, Tenn. 500d
KALT Atlanta, Tex. 1000d
KMCO Conroe, Tex. 500d
KFLD Floydada, Tex. 250d
KCLW Hamilton, Tex. 250d
WODY Bassett, Va. 500d
WAFC Staunton, Va. 1000d
KUEN Wenatchee, Wash. 1000d
WATK Antigo, Wis. 250d

910—329.5
WDVC Dadeville, Ala. 500d
KPHO Phoenix, Ariz. 5000
KLCN Blytheville, Ark. 5000d
KAMD Camden, Ark. 5000
KDEO El Cajon, Calif. 1000
KEWB Oakland, Calif. 5000
KOXR Oxnard, Cal. 5000
KPOF nr. Denver, Colo. 5000
WRCH New Britain, Conn. 5000
WPLA Plant City, Fla. 1000d
WGAF Valdosta, Ga. 5000
KBGN Caldwell, Ida. 1000d
WAKO Lawrenceville, Ill. 500d
WSUI Iowa City, Iowa 5000
KISI Salina, Kan. 500d
WLCS Baton Rouge, La. 1000
WABI Bangor, Maine 5000
WFDF Flint, Mich. 5000
WCOC Meridian, Miss. 5000
KOYN Billings, Mont. 1000d
KYSS Missoula, Mont. 1000d
KBIM Roswell, N. M. 5000
WRKL New City, N.Y. 1000d
WLAS Jacksonville, N.C. 5000d
KCJB Minot, N.Dak. 1000
WBRJ Marietta, O. 5000
WPFB Middletown, Ohio 1000
KGLC Miami, Okla. 1000
KURY Brookings, Oreg. 1000d
WAVL Apollo, Pa. 1000d
WGBI Scranton, Pa. 1000
WSBA York, Pa. 5000
WPRP Ponce, P.R. 5000
WNCG North Charleston, S.C. 500d
WORD Spartanburg, S.C. 5000d
WJCW Johnson City, Tenn. 5000
WEPG S. Pittsburgh, Tenn. 500d
KNAF Fredericksburg, Tex. 1000d
KRIO McAllen, Tex. 5000
KRRV Sherman, Tex. 1000
KALL Salt Lake City, Utah 5000
WVTR White River Junction, Vermont 1000d
WRNL Richmond, Va. 5000
WHYE Roanoke, Va. 1000d
KORD Pasco, Wash. 1000d
KIXI Seattle, Wash. 1000
KISN Vancouver, Wash. 1000
WHSM Hayward, Wis. 5000d
WDOR Sturgeon Bay, Wis. 1000d

920—325.9
WCTA Andalusia, Ala. 5000
WWWR Russellville, Ala. 1000d
KARK Little Rock, Ark. 5000
KLOC Ceres, Calif. 500d
KDES Palm Springs, Cal. 5000
KVEC San Luis Obispo, Cal. 1000
KREX Grd. Junction, Colo. 5000
KLMR Lamar, Colo. 5000
WMEG Eau Gallie, Fla. 1000
WGST Atlanta, Ga. 5000
WVOH Hazelhurst, Ga. 500wd
WGNU Granite City, Ill. 500d
WMOK Metropolis, Ill. 1000d
WBAA W. Lafayette, Ind. 5000
KFNF Shenandoah, Ia. 1000d
WTCW Whitesburg, Ky. 5000d
WBOX Bogalusa, La. 1000d
KTOC Jonesboro, La. 1000d
WPTX Lexington Pk., Md. 500d
WMPL Hancock, Mich. 1000d
KDHL Faribault, Minn. 1000
KWAD Wadena, Minn. 1000
KRAM Las Vegas, Nev. 1000
KOLO Reno, Nev. 1000
KQEO Albuquerque, N.Mex. 1000
WTTM Trenton, N.J. 1000
WKRT Cortland, N.Y. 1000
WGHQ Kingston, N.Y. 5000d
WIRD Lake Placid, N.Y. 1000
WBBB Burlington, N.C. 5000d
WMNI Columbus, Ohio 1000
KGAL Lebanon, Oreg. 1000
WKVA Lewistown, Pa. 1000
WJAR Providence, R.I. 5000
WTND Orangeburg, S.C. 1000d
KEZU Rapid City, S.Dak. 1000d
WLIV Livingston, Tenn. 1000d
KELP El Paso, Tex. 1000
KECK Odessa, Tex. 1000
KTLW Texas City, Tex. 1000d
KITN Olympia, Wash. 1000d
KXLY Spokane, Wash. 5000
WMMN Fairmont, W.Va. 5000
WOKY Milwaukee, Wis. 5000

930—322.4
WETO Gadsden, Ala. 1000d
KTKN Ketchikan, Alaska 5000
KAPR Douglas, Ariz. 1000d
KFGT Flagstaff, Ariz. 1000d
KHJ Los Angeles, Calif. 5000
KNGL Paradise, Calif. 500d
KIUP Durango, Colo. 5000
WKSB Milford, Del. 500d
WHAN Haines City, Fla. 1000
WJAX Jacksonville, Fla. 5000
WKXY Sarasota, Fla. 1000
WMGR Bainbridge, Ga. 5000
KSEI Pocatello, Idaho 5000
WTAD Quincy, Ill. 5000
WHON Centerville, Ind. 500d
WKCT Bowling Green, Ky. 1000
WFMD Frederick, Md. 5000
WREB Holyoke, Mass. 500d
WBCK Battle Creek, Mich. 5000
KKIN Aitkin, Minn. 1000d
WSLI Jackson, Miss. 5000
KWOC Poplar Bluff, Mo. 5000
KOFI Kalispell, Mont. 1000
KOGA Ogallala, Nebr. 500d
WSOC Charlotte, N.C. 5000
WITN Washington, N.C. 5000
WWNH Rochester, N.H. 5000d
WPAT Paterson, N.J. 5000
WBEN Buffalo, N.Y. 5000
WIZR Johnstown, N.Y. 1000d
WEOL Elyria, Ohio 1000
WKY Oklahoma City, Okla. 5000
KAGI Grants Pass, Oreg. 5000
WCNR Bloomsburg, Pa. 1000d
KSDN Aberdeen, S.D. 1000
WSEV Sevierville, Tenn. 5000d
KDET Center, Tex. 1000d
KITE San Antonio, Tex. 5000
WLLL Lynchburg, Va. 1000d
KENY Bellingham-Ferndale, Wash. 1000d
KQOT Yakima, Wash. 1000d
WSAZ Huntington, W.Va. 5000
KROE Sheridan, Wyo. 1000d
WLBL Auburndale, Wis. 5000d

WHITE'S
RADIO LOG

Kc. Wave Length W.P.

940—319.0

KHOS Tucson, Ariz. 250
KFRE Fresno, Calif. 50000
WINE Brookfield, Conn. 1000d
WINZ Miami, Fla. 50000
WMAZ Macon, Ga. 50000
KAHU Waipahu, Hawaii 10000
WMIX Mt. Vernon, Ill. 5000d
KIOA Des Moines, Iowa 10000
WCND Shelbyville, Ky. 1000d
WYLD New Orleans, La. 10000
WSTI St. Ignace, Mich.
WJOR South Haven, Mich. 1000d
WCPC Houston, Miss. 50000d
KSWM Aurora, Mo. 500d
KVSH Valentine, Nebr. 5000d
WFNC Fayetteville, N.C. 10000
WCND Shelbyville, N.Y. 250d
WCIT Lima, Ohio 250d
KGRL Bend, Oreg. 1000d
KWRC Woodburn, Ore. 250d
WESA Charleroi, Pa. 250d
WGRP Greenville, Pa. 1000d
WIPR San Juan, P.R. 10000
KIXZ Amarillo, Tex. 5000
KTON Belton, Tex. 1000d
KATQ Texarkana, Tex. 1000d
WNRG Grundy, Va. 5000d
WFAW Ft. Atkinson, Wis. 250

950—315.6

WRMA Montgomery, Ala. 1000d
KIBH Seward, Alaska 1000d
KXJK Forrest City, Ark. 5000d
KFSA Ft. Smith, Ark. 1000
KAHI Auburn, Calif. 5000d
KIMN Denver, Colo. 5000
WLOF Orlando, Fla. 5000
WGTA Summerville, Ga. 5000d
WGOV Valdosta, Ga. 5000
KBOI Boise, Idaho 5000
KLER Orofino, Idaho 1000d
WAAF Chicago, Ill. 1000d
WXLW Indianapolis, Ind. 5000d
KOEL Oelwein, Ia. 5000
KJRG Newton, Kans. 500d
WBVL Barbourville, Ky. 1000d
WAGM Presque Isle, Maine 5000
WXLN Potomac-Cabin John, Md. 1000d
WORL Boston, Mass. 5000d
WWJ Detroit, Mich. 5000
KRSI St. Louis Park, Minn. 1000
WBKH Hattiesburg, Miss. 5000d
KLIK Jefferson City, Mo. 5000d
WHVW Hyde Park, N.Y. 500d
WBBF Rochester, N.Y. 1000
WIBX Utica, N.Y. 5000
WPET Greensboro, N.C. 5000d
KYES Roseburg, Oreg. 1000d
WNCC Barnesboro, Pa. 500d
WPEN Philadelphia, Pa. 5000
WBER Moncks Corner, S. C. 500d
WSPA Spartanburg, S.C. 5000
KWAT Watertown, S.Dak. 1000
WAGG Franklin, Tenn. 1000d
KDSX Denison-Sherman, Tex. 500
KPRC Houston, Tex. 5000
KSEL Lubbock, Tex. 5000
WXGI Richmond, Va. 5000d
KMER Kemmerer, Wash. 1000
KJR Seattle, Wash. 5000
WERL Eagle River, Wis. 1000d
WKAZ Charleston, W.Va. 5000d
WKTS Sheboygan, Wis. 500d
KMER, Kemmerer, Wyo. 1000

960—312.3

WBRC Birmingham, Ala. 5000
WMOZ Mobile, Ala. 1000
KOOL Phoenix, Ariz. 5000
KAVR Apple Valley, Calif. 5000d
KNEZ Lompoc, Calif. 500
KABL Oakland, Calif. 5000
WELI New Haven, Conn. 5000
WGRO Lake City, Fla. 500d
WJCM Sebring, Fla. 1000d
WJAZ Albany, Ga. 5000
WRFC Athens, Ga. 5000
KSRA Salmon, Idaho 1000d
WDLM E. Moline, Ill. 1000d
WSBT South Bend, Ind. 5000
KMA Shenandoah, Iowa 5000
WPRT Prestonsburg, Ky. 5000d
KROF Abbeville, La. 1000d
WBOC Salisbury, Md. 5000
WFGM Fitchburg, Mass. 1000
WHAK Rogers City, Mich. 5000d
KLTF Little Falls, Minn. 500d
WABG Greenwood, Miss. 1000
KFVS Cape Girardeau, Mo. 5000
KFLN Baker, Mont. 5000d
KNEB Scottsbluff, Nebr. 1000
KWYK Farmington, N.Mex. 1000d
KRIK Roswell, N. Mex. 1000d
WEAV Plattsburg, N.Y. 5000
WAAK Dallas, N.C. 1000d
WFTC Kinston, N.C. 5000
WWST Wooster, Ohio 1000d
KGWA Enid, Okla. 1000
KLAD Klamath Falls, Oreg. 5000d
WHYL Carlisle, Pa. 5000d
WKZA Kane, Pa. 1000d
WATS Sayre, Pa. 1000d
WBEU Beaufort, S.C. 1000d
WBMC McMinnville, Tenn. 500d
KIMP Mt. Pleasant, Tex. 1000d
KGKL San Angelo, Tex. 5000
KDVO Provo, Utah 5000
WDBJ Roanoke, Va. 5000
KALE Richland, Wash. 1000
WTCH Shawano, Wis. 1000

970—309.1

WERH Hamilton, Ala. 5000d
WTBF Troy, Ala. 5000
KVWM Show Low, Ariz. 1000d
KNEA Jonesboro, Ark. 1000d
KBIS Bakersfield, Calif. 1000
KCHV Coachella, Calif. 5000
KBEE Modesto, Calif. 1000
KFEL Pueblo, Colo. 1000d
WFLA Tampa, Fla. 5000
WIIN Atlanta, Ga. 5000d
WVOP Vidalia, Ga. 5000d
KHBC Hilo, Hawaii 1000
KAYT Rupert, Idaho 1000d
WMAY Springfield, Ill. 1000
WAVE Louisville, Ky. 5000
KSYL Alexandria, La. 1000
WCSH Portland, Maine 5000
WAMD Aberdeen, Md. 500
WESO Southbridge, Mass. 1000d
WCKD Ishpeming, Mich. 5000d
WKHM Jackson, Mich. 1000
KQAQ Austin, Minn. 5000
KOOK Billings, Mont. 5000
KJLT No. Platte, Nebr. 5000d
KVEG Las Vegas, Nev. 500d
WJRZ Newark, N.J. 5000
KDCE Espanola, N. M. 1000d
WEBR Buffalo, N.Y. 5000
WCHN Norwich, N.Y. 500d
WRCS Ahoskie, N.C. 1000d
WWIT Canton, N.C. 1000d
WDAY Fargo, N.Dak. 5000
WREO Ashtabula, Ohio 5000
WATH Athens, Ohio 1000d
KAKC Tulsa, Okla. 1000
KOIN Portland, Oreg. 5000
WWSW Pittsburgh, Pa. 5000
WJMX Florence, S.C. 5000
KHFI Austin, Tex. 1000d
KBSN Crane, Tex. 1000d
KNOK Ft. Worth, Tex. 1000d
WIVI Christiansted, V. I. 5000
WYPR Danville, Va. 1000d
WANV Waynesboro, Va. 5000d
KREM Spokane, Wash. 5000
WWYO Pineville, W.Va. 1000d
WHA Madison, Wis. 5000d
WIGL Superior, Wis. 500d

980—305.9

WKLF Clanton, Ala. 1000d
WXLL Big Delta, Alaska 100
KCAB Dardanelle, Ark. 1000d
KINS Eureka, Calif. 5000
KEAP Fresno, Calif. 500d
KFWB Los Angeles, Calif. 5000
KCTY Salinas, Calif. 1000d
KGLN Glennwood Springs, Colo. 1000d
WSUB Groton, Conn. 1000d
WRC Washington, D.C. 5000
WDVH Gainesville, Fla. 5000d
WTOT Marianna, Fla. 1000d
WBOP Pensacola, Fla. 1000d
WLOD Pompano Beach, Fla. 1000d
WKLY Hartwell, Ga. 1000d
WPGA Perry, Ga. 500d
WRIP Rossville, Ga. 500d
KUPI Idaho Falls, Idaho 1000d
WITY Danville, Ill. 1000
KREB Shreveport, La. 5000d
WCAP Lowell, Mass. 1000d
WAOP Otsego, Mich. 500
WPBC Richfield, Minn. 5000
WAPF McComb, Miss. 5000d
KMBC Kansas City, Mo. 5000
KLYQ Hamilton, Mont. 1000d
KVLV Fallon, Nev. 5000d
KICA Clovis, N. Mex. 1000
KMIN Grants, N. Mex. 1000d
WTRY Troy, N.Y. 5000
WKLM Wilmington, N.C. 5000d
WAAA Win.-Salem, N.C. 1000d
WONE Dayton, Ohio 5000
WILK Wilkes-Barre, Pa. 5000
WAZS Summerville, S.C. 500d
KDSJ Deadwood, S.Dak. 1000
WSIX Nashville, Tenn. 5000
KFRD Rosenberg-Richmond, Tex. 1000d
KSVC Richfield, Utah 5000
WFHG Bristol, Va. 5000
WMEK Chase City, Va. 500d
KUTI Yakima, Wash. 5000d
WHAW Weston, W.Va. 1000d
WCUB Manitowoc, Wis. 1000d
WPRE Prairie du Chien, Wis. 1000
KEND Cheyenne, Wyo. 500d

990—302.8

WEIS Center, Ala. 250
WWWF Fayette, Ala. 1000d
WTCB Flomaton, Ala. 500d
KTKT Tucson, Ariz. 10000
KKIS Pittsburg, Calif. 5000
KGUD Santa Barbara, Calif. 1000d
KLIR Denver, Colo. 1000d
WFAB Miami, Fla. 5000
WHOO Orlando, Fla. 50000
WDWD Dawson, Ga. 1000d
WGML Hinesville, Ga. 250d
KTRG Honolulu, Hawaii 5000
WCAZ Carthage, Ill. 1000d
WITZ Jasper, Ind. 1000d
WERK Muncie, Ind. 250d
KAYL Storm Lake, Iowa 250d
KRSL Russell, Kans. 250d
WNNR New Orleans, La. 250d
KRIH Rayville, La. 250d
WCRM Clare, Mich. 250d
WABO Waynesboro, Miss. 250d
KRMO Monett, Mo. 250d
KSVP Artesia, N.Mex. 1000
WEEB Southern Pines, N.C. 5000d
WJEH Gallipolis, Ohio 1000d
WTIG Massillon, Ohio 250d
KRKT Albany, Oreg. 250d
WIBG Philadelphia, Pa. 50000
WVSC Somerset, Pa. 250d
WPRA Mayaguez, P.R. 10000
WLKW Providence, R.I. 50000
WAKN Aiken, S.C. 1000d
WNOX Knoxville, Tenn. 10000
KWAM Memphis, Tenn. 10000d
KTRM Beaumont, Tex. 1000
KAML Kenedy-Karnes City, Tex. 250d
KNIN Wichita Falls, Tex. 10000
KDYL Tooele, Utah 1000d
WNRV Narrows, Va. 1000d
WANT Richmond, Va. 1000d

1000—299.8

WCFL Chicago, Ill. 50000
WSPF Hickory, N.C. 1000d
KTOK Okla. City, Okla. 5000
WIOO Carlisle, Pa.
WGOG Wahalla, S. C. 1000d
KSTA Coleman, Tex. 250d
KGRI Henderson, Tex. 250d
WHWB Rutland, Vt. 1000d
WBNB Charlotte Amalie, Virgin Islands 1000
KOMO Seattle, Wash. 50000

1010—296.9

KCAC Phoenix, Ariz. 500d
KVNC Winslow, Ariz. 1000
KLRA Little Rock, Ark. 10000
KCHJ Delano, Calif. 5000
KCMJ Palm Sprgs., Calif. 1000
KSAY San Fran., Calif. 10000d
WCNU Crestview, Fla. 1000d
WBIX Jacksonville Beach, Fla. 10000d
WINQ Tampa, Fla. 50000d
WGUN Atlanta-Decatur, Ga. 50000d
KATN Boise, Idaho 1000d
WCSI Columbus, Ind. 500d
KSMN Mason City, Iowa 1000d
KIND Independence, Kans. 250d
KDLA DeRidder, La. 1000d
WSID Baltimore, Md. 1000d
WITL Lansing, Mich. 5000d
WRCR Maplewood, Minn. 250d
WMOX Meridian, Miss. 10000
KCHI Chillicothe, Mo. 250d
KXEN Festus-St. Louis, Mo. 50000d
KRVN Lexington, Nebr. 25000d
WCNL Newport, N.H. 250d
WINS New York, N.Y. 50000
WABZ Albermarle, N.C. 1000d
WFGW Black Mountain, N.C. 50000d
WELS Kinston, N.C. 1000d
WIOI New Boston, Ohio 1000d
KBEV Portland, Oreg. 1000d
WUNS Lewisburg, Pa. 250d
WHIN Gallatin, Tenn. 1000d
WORM Savannah, Tenn. 250d
KBUY Amarillo, Tex. 5000
KOOA Houston, Tex. 1000d
KAWA Waco-Marlin, Tex. 10000d
WELK Charlottesville, Va. 1000d
WMEV Marion, Va. 1000d
WPMH Portsmouth, Va. 5000d
WCST Berkeley Sprgs., W.Va. 250d
WSPT Stevens Pt., Wis. 1000d

1020—293.9

KGBS Los Angeles, Calif. 50000
WCIL Carbondale, Ill. 1000d
WPEO Peoria, Ill. 1000d
KDKA Pittsburgh, Pa. 50000

1030—291.1

WBZ Boston, Mass. 50000
KCTA Corpus Christi, Tex. 50000d

1040—288.3

KHVH Honolulu, Hawaii 5000
WHO Des Moines, Iowa 50000
KIXL Dallas, Tex. 1000d

1050—285.5

WRFS Alexander City, Ala. 1000d
WCRI Scottsboro, Ala. 250d
KVLC Little Rock, Ark. 1000d
KTDT Big Bear Lake, Cal. 250d
KOFY San Mateo, Calif. 1000d
KWSO Wasco, Calif. 1000d
KLMO Longmont, Colo. 250d
WJSB Crestview, Fla. 1000d
WIVY Jacksonville, Fla. 1000d
WHBO Tampa, Fla. 250d
WRMF Titusville, Fla. 500d
WAUG Augusta, Ga. 5000d
WMNZ Montezuma, Ga. 250d
WDZ Decatur, Ill. 1000d
WTCA Plymouth, Ind. 250d
KNCO Garden City, Kan. 5000d
WNES Central City, Ky. 500d
KLPL Lake Providence, La. 250d
KCIJ Shreveport, La. 250d
KVPI Villa Platte, La. 250d
WMSG Oakland, Md. 500d
WQMR Silver Sprg., Md. 1000d
WPAG Ann Arbor, Mich. 5000d
KLOH Pipestone, Minn. 1000d
WACR Columbus, Miss. 1000d
KMIS Portageville, Mo. 1000d
KSIS Sedalia, Mo. 1000d
KLVC Las Vegas, Nev. 500d
WBNC Conway, N.H. 1000d
WSEN Baldwinsville, N.Y. 250d
WYBG Massena, N.Y. 1000d
WHN New York, N.Y. 50000
WFSC Franklin, N.C. 1000d
WLON Lincolnton, N.C. 1000d
WWGP Sanford, N.C. 1000d
WZIP Cincinnati, Ohio 1000d
KCCO Lawton, Okla. 250d
KFMJ Tulsa, Okla. 1000d
KEED Springfield-Eugene, Ore. 1000d
WBUT Butler, Pa. 1000d
WLYC Williamsport, Pa. 1000d
WSMT Sparta, Tenn. 1000d
KLEN Killeen, Tex. 250d
KFAZ Liberty, Tex. 250d
KCAS Slaton, Tex. 250d
WGAT Gate City, Va. 1000d
WBRG Lynchburg, Va. 1000d
WCMS Norfolk, Va. 1000d
KBLE Seattle, Wash. 5000d
WCEF Parkersburg, W. Va. 5000d
WECL Eau Claire, Wis. 1000d
WKAU Kaukauna, Wis.
WLIP Kenosha, Wis. 250d
WKIV Douglas, Wyo. 250d

1060—282.8

KUPD Tempe, Ariz. 500
KPAY Chico, Calif. 10000
KLMO Longmont, Colo. 10000d
WNOE New Orleans, La. 50000
WHFB Benton Harbor-St. Joseph, Mich. 5000d
WMAP Monroe, N.C. 250d
WHOF Canton, O. 5000d
KYW Philadelphia, Pa. 50000
WRJS San German, P. R. 250
WPHC Waverly, Tenn. 1000d

1070—280.2

WAPI Birmingham, Ala. 50000
KNX Los Angeles, Calif. 50000
WVCG Coral Gables, Fla. 1000d
WIBC Indianapolis, Ind. 50000
KFDI Wichita, Kans. 10000
KHMO Hannibal, Mo. 5000
WHPE High Point, N.C. 1000d
WKOK Sunbury, Penn. 10000
WMIA Arecibo, P. R. 5000
WFLI Lookout Mtn., Tenn. 10000
WDIA Memphis, Tenn. 50000
KOPY Alice, Tex. 1000
KENR Houston, Tex. 10000d
WKDW Madison, Wis. 10000

1080—277.6

WKAC Athens, Ala. 1000d
KSCO Santa Cruz, Calif. 10000
WTIC Hartford, Conn. 50000
WVCG Coral Gables, Fla. 10000d
WFIV Kissimmee, Fla.
WBIE Marietta, Ga. 10000d
WJBG Pontiac, Ill.

Kc. Wave Length W.P.

WNWI Northwestern, Ind.
WKLO Louisville, Ky. 5000
WOAP Owosso, Mich. 1000d
KGGL E. Prairie, Mo.
WUFO Amherst, N.Y. 1000d
WEWO Laurinburg, N.C. 5000d
WWDR Murfreesboro, N.C. 500d
WMVR Sidney, O. 250d
KWJJ Portland, Oreg. 50000
WEEP Pittsburgh, Pa. 1000d
WLEY Cayey, P.R.
KRLD Dallas, Tex. 50000

1090—275.1

KAAY Little Rock, Ark. 50000
WWSD Monticello, Fla.
WCRA Effingham, Ill. 250d
WGLC Mendota, Ill. 250d
KHAI Honolulu, Hawaii 5000
KNWS Waterloo, Iowa 1000d
WBAL Baltimore, Md. 50000
WILD Boston, Mass. 1000d
WMUS Muskegon, Mich. 1000d
WERB Garden City, Mich. 250d
WMWM Wilmington, O. 1000d
KING Seattle, Wash. 50000

1100—272.6

KFAX San Francisco, Calif. 50000
WLBB Carrollton, Ga. 250d
WHLI Hempstead, N.Y. 10000d
WKYC Cleveland, O. 50000
WGPA Bethlehem, Pa. 250d

1110—270.1

KRLA Pasadena, Cal. 50000
WALT Tampa, Fla. 50000d
KIPA Hilo, Hawaii 1000
WMBI Chicago, Ill. 5000d
KFAB Omaha, Nebr. 50000
WBT Charlotte, N.C. 50000
KBND Bend, Oreg. 5000
WWDS Everett, Penn. 250d
WNAR Norristown, Penn. 50000d
WVJP Caguas, P.R. 250
WHIM Providence, R.I. 1000d
WPHC Waverly, Tenn. 1000d
KDRY Alamo Heights, Tex. 1000d

1120—267.7

WUST Bethesda, Md. 250d
KMOX St. Louis, Mo. 50000
WWOL Buffalo, N.Y. 1000d
KEED Springfield-Eugene, Ore. 1000d
KCLE Cleburne, Tex. 250d

1130—265.3

KRDU Dinuba, Calif. 1000
KSOO San Diego, Cal. 5000d
KLEI Kailua, Hawaii 1000
KWKH Shreveport, La. 50000
WCAR Detroit, Mich. 50000
WDGY Minneapolis, Minn. 50000
WNEW New York, N.Y. 50000
WISN Milwaukee, Wis. 50000

1140—263.0

KRAK Sacramento, Calif. 50000
WMIE Miami, Fla. 10000
KGEM Boise, Idaho 10000
WSIV Pekin, Ill. 5000d
KLPR Oklahoma City, Okla. 1000d
WITA San Juan, P.R. 10000
KSDD Sioux Falls, S.Dak. 10000
KORC Mineral Wells, Tex. 250d
WRVA Richmond, Va. 50000

1150—260.7

WBCA Bay Minette, Ala. 1000d
WGEA Geneva, Ala. 1000d
WJRD Tuscaloosa, Ala. 5000
KCKY Coolidge, Ariz. 1000
KXLR No. Little Rock, Ark. 5000
KRKD Los Angeles, Calif. 5000
KJAX Santa Rosa, Calif. 5000
KGMC Englewood, Colo. 1000d
WCNX Middletown, Conn. 1000d
WDEL Wilmington, Del. 5000
WNDB Daytona Bch., Fla. 1000
WTMP Tampa, Fla. 5000d
WFPM Fort Valley, Ga. 1000d
WJEM Valdosta, Ga. 1000d
WGGH Marion, Ill. 5000d
WJRL Rockford, Ill. 500d
KYED Burlington, Ia.
KWKY Des Moines, Iowa 1000
KSAL Salina, Kans. 5000
WMST Mt. Sterling, Ky. 500d
WLOC Mumfordville, Ky. 1000d
WJBO Baton Rouge, La. 5000
WGHM Skowhegan, Maine 5000d
WHMC Gaithersburg, Md. 1000
WCOP Boston, Mass. 5000
WCEN Mt. Pleasant, Mich. 5000
KASM Albany, Minn. 1000d
WXTN Lexington, Miss. 500d
KRMS Osage Beach, Mo. 1000d
KSEN Shelby, Mont. 1000
KDEF Albuquerque, N.Mex. 1000

WRUN Utica, N.Y. 5000
WBAG Burlington, N.C. 1000d
WGBR Goldsboro, N.C. 5000
WCUE Cuyahoga Falls, Ohio 1000d
WIMA Lima, Ohio 1000
KNED McAlester, Okla. 1000
KAGO Klamath Falls, Oreg. 5000
WHUN Huntingdon, Pa. 5000d
WYNS Lehighton, Pa. 1000d
WKPA New Kensington, Pa. 1000d
WDIX Orangeburg, S.C. 5000
WTYC Rock Hill, S.C. 1000d
WSNW Seneca, S.C. 1000d
KIMM Rapid City, S.Dak. 5000d
WAPO Chattanooga, Tenn. 5000
WCRK Morristown, Tenn. 1000
WTAW Bryan, Tex. 1000d
KCCT Corpus Christi, Tex. 1000d
KIZZ El Paso, Tex. 1000d
KVIL Highland Park, Tex. 1000d
KJBC Midland, Tex. 1000d
KPNG Port Neches, Tex. 500d
KOLJ Quanah, Tex. 500d
KBER San Antonio, Tex. 1000d
KDFE Pullman, Wash. 1000d
KAYO Seattle, Wash. 5000
KKEY Vancouver, Wash. 1000d
WABH Deerfield, Va. 1000d
WELC Welch, W.Va. 1000d
WAXX Chippewa Falls, Wis. 5000d

1160—258.5

WJJD Chicago, Ill. 50000d
KSL Salt Lake City, Utah 50000

1170—256.3

WCOV Montgomery, Ala. 10000
KCBQ San Diego, Calif 50000
KLOK San Jose, Calif. 10000
KOHO Honolulu, Hawaii 1000
WLBH Mattoon, Ill. 250d
KSTT Davenport, Iowa 1000
KVOO Tulsa, Okla. 50000
WLEO Ponce, P.R. 250
KPUG Bellingham, Wash. 5000
WWVA Wheeling, W.Va. 50000

1180—254.1

WLDS Jacksonville, Ill. 1000d
WHAM Rochester, N.Y. 50000

1190—252.0

KRDS Tolleson, Ariz. 250
KEZY Anaheim, Calif. 1000
KNBA Vallejo, Calif. 250d
WOWO Ft. Wayne, Ind. 50000
WANN Annapolis, Md. 10000d
WKOX Fram'gham, Mass. 1000d
WLIB New York, N. Y. 1000d
KEX Portland, Oreg. 50000
WRAI Rio Piedras, P.R. 500
KLIF Dallas, Tex. 50000

1200—249.9

WOAI San Antonio, Tex. 50000

1210—247.8

KZOO Honolulu, Hawaii 1000
WCNT Centralia, Ill. 1000d
WKNX Saginaw, Mich. 10000d
WADE Wadesboro, N.C. 1000d
WAVI Dayton, Ohio 250d
WCAU Philadelphia, Pa. 50000

1220—245.8

WAQY Birmingham, Ala. 1000d
WABF Fairhope, Ala. 1000
KVSA McGehee, Ark. 1000d
KLIP Fowler, Calif. 250d
KIBE Palo Alto, Cal. 5000d
KKAR Pomona, Calif. 250d
KFSC Denver, Colo. 1000d
WDEE Hamden, Conn. 1000d
WDCJ Arlington, Fla. 1000d
WOAH Miami, Fla. 250d
WSAF Sarasota, Fla. 1000d
WCLB Camilla, Ga. 1000d
WPLK Rockmart, Ga. 500d
WSFT Thomaston, Ga. 250d
WLPD LaSalle, Ill. 1000d
WKRS Waukegan, Ill. 1000d
WSLM Salem, Ind. 5000d
KJAN Atlantic, Iowa 250d
KOUR Independence, Iowa 250d
KOFO Ottawa, Kans. 250d
WFKN Franklin, Ky. 250d
KBCL Shreveport, La. 250d
WLBI Denham Springs, La. 250d
WSME Sanford, Maine 1000d
WBCH Hastings, Mich. 250d
WAVN Stillwater, Minn. 5000d
WMDC Hazlehurst, Miss. 250d
KZYM Cape Girardeau, Mo. 250d
KBHM Branson, Mo. 1000d
WKBK Keene, N.H. 1000d
WGNY Newburgh, N.Y. 5000d
WSOQ N. Syracuse, N.Y. 1000d
WKMT Kings Mtn., N.C. 1000d
WREV Reidsville, N.C. 1000d
WENC Whiteville, N.C. 5000d
KEYD Oakes, N.Dak. 1000d

WGAR Cleveland, Ohio 50000
WERT Van Wert, Ohio 250d
KGYN Guymon, Okla. 1000d
KBLY Goldbeach, Oreg. 1000d
KAPT Salem, Ore. 1000
WJUN Mexico, Pa. 1000d
WRIB Providence, R.I. 1000d
WALD Walterboro, S.C. 1000d
WFWL Camden, Tenn. 250d
WCPH Etowah, Tenn. 1000d
KVLL Livingston, Tex. 250d
KZEE Weatherford, Tex. 250d
WLSD Big Stone Gap, Va. 1000d
WFAX Falls Church, Va. 5000d
KASY Auburn, Wash. 250d
KOZI Chelan, Wash. 1000d
WRNE Wis. Rapids, Wis. 500d

1230—243.8

WAUD Auburn, Ala. 1000
WJBB Haleyville, Ala. 1000
WBHP Huntsville, Ala. 1000
WNUZ Talledega, Ala. 250
WTBC Tuscaloosa, Ala. 1000
KIFW Sitka, Alaska 250
KSUN Bisbee, Ariz. 250
KAAA Kingman, Ariz. 1000
KRIZ Phoenix, Ariz. 250
KATO Safford, Ariz. 250
KINO Winslow, Ariz. 1000
KCDN Conway, Ark. 250
KFPW Ft. Smith, Ark. 1000
KBTM Jonesboro, Ark. 1000
KCON Conway, Ark. 1000
KGEE Bakersfield, Calif. 1000
KWTC Barstow, Calif. 1000
KIBS Bishop, Calif. 1000
KXO El Centro, Calif. 250
KDAC Ft. Bragg, Calif. 250
KGFJ Los Angeles, Calif. 1000
KPRL Paso Robles, Calif. 1000
KRDG Redding, Calif. 250
KWG Stockton, Calif 1000
KEXO Grand Junction, Colo. 1000
KBRR Leadville, Colo. 250
KDZA Pueblo, Colo. 1000
KGEK Sterling, Colo. 1000d
WINF Manchester, Conn. 1000
WGGG Gainesville, Fla. 1000
WONN Lakeland, Fla 1000
WMAF Madison, Fla. 1000
WSBB New Smyrna Bch., Florida 1000
WNVY Pensacola, Fla. 1000
WCNH Quincy, Fla. 1000d
WJNO W. Palm Beach, Fla. 250
WBIA Augusta, Ga. 1000d
WBLJ Dalton, Ga. 1000
WXLI Dublin, Ga. 1000
WFOM Marietta, Ga. 1000
WSOK Savannah, Ga. 1000
WAYX Waycross, Ga. 1000
KBAR Burley, Idaho 1000
KORT Grangeville, Idaho 250
KRXK Rexburg, Idaho 1000
WJBC Bloomington, Ill. 1000
WQUA Moline, Ill. 1000
WHCO Sparta, Ill. 250
WJOB Hammond, Ind. 1000
WSAL Logansport, Ind. 1000
WTCJ Tell City, Ind. 1000
WBOW Terre Haute, Ind. 1000d
KFJB Marshalltown, Iowa 1000
WHIR Danville, Ky. 1000d
WHOP Hopkinsville, Ky. 1000
WMLF Pineville, Ky. 1000d
KLIC Monroe, La. 1000d
WSHO New Orleans, La. 1000d
KSLO Opelousas, La. 1000
WBME Belfast, Me. 250
WQDY Calais, Maine 1000d
WSJR Madawaska, Me. 1000
WITH Baltimore, Md. 1000d
WCUM Cumberland, Md. 1000
WMNB No. Adams, Mass. 1000d
WESX Salem, Mass. 1000
WNEB Worcester, Mass. 1000
WJEF Grand Rapids, Mich. 1000
WMPC Lapeer, Mich. 250
WSOO Slt. Ste. Marie, Mich. 1000
WSTR Sturgis, Mich. 1000d
WKLK Cloquet, Minn. 1000
KGHS Internat'l Falls, Minn. 250
KYSM Mankato, Minn. 1000
KMRS Morris, Minn. 250
KTRF Thief Riv. Falls, Minn. 1000
KWNO Winona, Minn. 1000d
WCMA Corinth, Miss. 1000
WHSY Hattiesburg, Miss. 1000
WSSO Starkville, Miss. 1000
WAZF Yazoo City, Miss. 1000
KODE Joplin, Mo. 1000
KLWT Lebanon, Mo. 250
KNCM Moberly, Mo. 1000
KBMN Bozeman, Mont. 1000d
KHDN Hardin, Mont. 1000
KXLO Lewiston, Mont. 1000
KLCB Libby, Mont. 250
KTNC Falls City, Nebr. 100
KHAS Hastings, Neb. 1000
KELY Ely, Nev. 250

KLAV Las Vegas, Nev. 250
KCBN Reno, Nev. 250
WMOU Berlin, N.H. 1000d
WTSV Claremont, N.H. 1000
WCMC Wildwood, N.J. 100
KALG Alamogordo, N.Mex. 250
KOTS Deming, N.Mex. 250
KYVA Gallup, N. Mex. 1000
KFUN Las Vegas, N.Mex. 250
KRSY Roswell, N. Mex. 1000
WNIA Cheektowaga, N.Y. 500
WENY Elmira, N.Y. 1000
WIGS Gouverneur, N.Y. 250
WHUC Hudson, N. Y. 1000
WLFH Little Falls, N. Y. 1000
WFAS White Plains, N. Y. 1000
WSKY Asheville, N.C. 1000
WFAI Fayetteville, N.C. 1000d
WMFR High Point, N.C. 1000
WISP Kinston, N.C. 1000d
WNNC Newton, N. C. 1000
WCBT Roanoke Rap., N. C. 1000
KDIX Dickinson, N.Dak. 250
WCPO Cincinnati, Ohio 1000
WCOL Columbus, Ohio 1000
WIRO Ironton, O. 1000
WCWA Toledo, O. 1000d
KADA N. of Ada, Okla. 250
WBBZ Ponca City, Okla. 250
KVAS Astoria, Ore. 1000
KRNS Burns, Ore. 1000
KOOS Coos Bay, Ore. 1000
KRDR Gresham, Oreg. 1000
KYJC Medford, Oreg. 1000
KQIK Lakeview, Oreg. 250
KTDO Toledo, Ore. 1000
WBVP Beaver Falls, Pa. 1000
WEEX Easton, Pa. 1000
WKBO Harrisburg, Pa. 1000
WCRO Johnstown, Pa. 1000
WBPZ Lock Haven, Pa. 1000
WTIV Titusville, Pa. 500d
WNIK Arecibo, P.R. 1000
WERI Westerly, R.I. 1000
WAIM Anderson, S.C. 1000
WNOK Columbia, S.C. 1000d
WOLS Florence, S.C. 1000
KISD Sioux Falls, S.Dak. 1000d
WAKI McMinnville, Tenn. 1000
KSIX Corpus Christi, Tex. 1000
KDLK Del Rio, Tex. 250
KNUZ Houston, Tex. 1000
KERV Kerrville, Tex. 1000
KLVT Levelland, Tex. 1000
KEEE Nacogdoches, Tex. 1000
KOSA Odessa, Tex. 1000
KHHH Pampa, Tex. 250
KSEY Seymour, Tex. 1000d
KSST Sulphur Sprgs., Tex. 1000
KWTX Waco, Tex. 1000d
KMOR Murray, Utah 250
KOAL Price, Utah 1000
WJOY Burlington, Vt. 1000
WBBI Abingdon, Va. 1000d
WODI Brookneal, Va. 1000
WCFV Clifton Forge, Va. 1000
WFVA Fredericksburg, Va. 1000
WNOR Norfolk, Va. 1000
KWYZ Everett, Wash. 1000
KSPO Spokane, Wash. 1000
KREW Sunnyside, Wash. 1000
WLOG Logan, W.Va. 1000
WTAP Parkersburg, W.Va. 1000
WHBY Appleton, Wis. 1000
WCLO Janesville, Wis. 1000
WXCO Wausau, Wis. 1000d
KVOC Casper, Wyo. 1000

1240—241.8

WEBJ Brewton, Ala. 250
WPRN Butler, Ala. 1000d
WULA Eufaula, Ala. 250
WOWL Florence, Ala. 1000
WARF Jasper, Ala. 1000
KVRD Cottonwood, Ariz. 250
KZOW So. of Globe, Ariz. 1000
KVRC Arkadelphia, Ark. 250
KWAK Stuttgart, Ark. 250
KPLY Crescent City, Calif. 250
KOAD Lemoore, Cal. 250
KMBY Monterey, Calif. 1000
KPPC Pasadena, Calif. 100
KLDA Ridgecrest, Calif. 250
KROY Sacramento, Calif. 1000
KRND San Bernardino, California 1000d
KSON San Diego, Calif. 250
KSMA Santa Maria, Calif. 250
KSUE Susanville, Calif. 1000
KRDO Colo. Sprgs., Colo. 1000
KDGO Durango, Colo. 1000
KSLV Monte Vista, Colo. 1000
KCRT Trinidad, Colo. 250
WWCO Waterbury, Conn. 1000
WBGC Chipley, Fla. 1000
WLCO Eustis, Fla. 250
WINK Ft. Myers, Fla. 1000
WMMB Melbourne, Fla. 1000
WFOY St. Augustine, Fla. 1000
WBHB Fitzgerald, Ga. 1000
WDUN Gainesville, Ga. 1000
WLAG LaGrange, Ga. 1000
WBML Macon, Ga. 1000

WHITE'S RADIO LOG

Kc.	Wave Length	W.P.
WWNS	Statesboro, Ga.	1000
WPAX	Thomasville, Ga.	1000
WTWA	Thomson, Ga.	250
KVNI	Coeur d'Alene, Idaho	1000
KFLI	Mountain Home, Idaho	250
KMCL	McCall, Ida.	
KWIK	Pocatello, Idaho	250
WCRW	Chicago, Ill.	1000
WEDC	Chicago, Ill.	1000d
WSBC	Chicago, Ill.	1000
WEBQ	Harrisburg, Ill.	1000
WTAX	Springfield, Ill.	1000
WSDR	Sterling, Ill.	500
WHBU	Anderson, Ind.	1000d
KDEC	Decorah, Iowa	1000
KWLC	Decorah, Iowa	1000
KBIZ	Ottumwa, Iowa	1000
KICD	Spencer, Iowa	1000
KIUL	Garden City, Kans.	1000
KAKE	Wichita, Kans.	250
WINN	Louisville, Ky.	1000
WFTM	Maysville, Ky.	1000
WPKE	Pikeville, Ky.	1000d
WSFC	Somerset, Ky.	1000
KASO	Minden, La.	1000
KANE	New Iberia, La.	1000
WCOU	Lewiston, Maine	1000
WMKR	Millinocket, Me.	1000
WCEM	Cambridge, Md.	1000
WJEJ	Hagerstown, Md.	1000
WHAI	Greenfield, Mass.	250
WOCB	W. Yarmouth, Mass.	1000
WATT	Cadillac, Mich.	1000
WCBY	Cheboygan, Mich.	1000
WJPD	Ishpeming, Mich.	1000
WJIM	Lansing, Mich.	1000d
WMFG	Hibbing, Minn.	1000
KPRM	Park Rapids, Minn.	1000
WJON	St. Cloud, Minn.	1000
WMPA	Aberdeen, Miss.	250
WGRM	Greenwood, Miss.	250
WGCM	Gulfport, Miss.	1000
WMIS	Natchez, Miss.	250
KFMO	Flat River, Mo.	1000
KWOS	Jefferson City, Mo.	1000d
KODE	Joplin, Mo.	1000d
KNEM	Nevada, Mo.	250
KBMY	Billings, Mont.	1000
KLTZ	Glasgow, Mont.	1000
KBLL	Helena, Mont.	1000
KFOR	Lincoln, Nebr.	1000
KODY	North Platte, Nebr.	1000
KELK	Elko, Nev.	1000
WFTN	Franklin, N.H.	250
WSNJ	Bridgeton, N. J.	1000
KAVE	Carlsbad, N.Mex.	1000
KCLV	Clovis, N.Mex.	1000
WGBB	Freeport, N. Y.	1000
WGVA	Geneva, N.Y.	1000d
WJTM	Jamestown, N.Y.	500d
WVOS	Liberty, N. Y.	1000
WNBZ	Saranac Lake, N.Y.	1000
WSNY	Schenectady, N.Y.	1000d
WATN	Watertown, N. Y.	1000
WPNF	Brevard, N.C.	1000
WIST	Charlotte, N.C.	1000
WCNC	Elizabeth City, N.C.	1000d
WJNC	Jacksonville, N.C.	1000
WRNC	Raleigh, N.C.	1000
KDLR	Devils Lake, N.Dak.	250
WBBW	Youngstown, Ohio	1000
WHIZ	Zanesville, Ohio	1000
KVSO	Ardmore, Okla.	250
KBEK	Elk City, Okla.	250
KBEL	Idabel, Okla.	250
KOKL	Okmulgee, Okla.	1000
KFLY	Corvallis, Oreg.	1000d
KTIX	Pendleton, Oreg.	1000
KPRB	Redmond, Oreg.	250
KQEN	Roseburg, Ore.	1000
WRTA	Altoona, Pa.	1000
WHUM	Reading, Pa.	1000
WBAX	Wilkes-Barre, Pa.	1000
WALO	Humacao, P.R.	1000
WWON	Woonsocket, R.I.	1000
WKDK	Newberry, S.C.	250
WDXY	Sumter, S. C.	1000
KCCR	Pierre, S.D.	250
WBEJ	Elizabethton, Tenn.	1000
WEKR	Fayetteville, Tenn.	1000
WBIR	Knoxville, Tenn.	1000
WKDA	Nashville, Tenn.	1000
WENK	Union City, Tenn.	1000
KVLF	Alpine, Tex.	1000
KEAN	Brownwood, Tex.	1000
KORA	Bryan, Tex.	1000
KOCA	Kilgore, Tex.	1000
KSOX	Raymondville, Tex.	250
KCKG	Sonora, Tex.	1000
KXOX	Sweetwater, Tex.	1000

Kc.	Wave Length	W.P.
WSKI	Montpelier, Vt.	1000
WSSV	Petersburg, Va.	1000
WROV	Roanoke, Va.	1000
WTON	Staunton, Va.	1000
KXLE	Ellensburg, Wash.	1000
KGY	Olympia, Wash.	1000
WKOY	Bluefield, W.Va.	1000
WTIP	Charleston, W.Va.	1000d
WDNE	Elkins, W.Va.	1000
WOMT	Manitowoc, Wis.	1000d
WIBU	Poynette, Wis.	1000d
WOBT	Rhinelander, Wis.	1000
WJMC	Rice Lake, Wis.	1000
KFBC	Cheyenne, Wyo.	1000
KEVA	Evanston, Wyo.	1000
KASL	Newcastle, Wyo.	250
KRAL	Rawlins, Wyo.	1000
KTHE	Thermopolis, Wyo.	1000

1250—239.9

WZOB	Ft. Payne, Ala.	1000d
WETU	Wetumpka, Ala.	5000d
KAKA	Wickenburg, Ariz.	500d
KFAY	Fayetteville, Ark.	1000d
KALO	Little Rock, Ark.	1000
KHOT	Madera, Calif.	500d
KTMS	Santa Barbara, Calif.	1000
KDHI	Twenty-Nine Palms, California	1000d
KMSL	Ukiah, Calif.	500d
KICM	Golden, Colo.	1000d
WNER	Live Oak, Fla.	1000d
WDAE	Tampa, Fla.	5000
WLYB	Albany, Ga.	1000d
WYTH	Madison, Ga.	1000d
WIZZ	Streator, Ill.	500d
WGL	Ft. Wayne, Ind.	1000
WRAY	Princeton, Ind.	1000d
KCFI	Cedar Falls, Iowa	500d
KFKU	Lawrence, Kans.	5000
WREN	Topeka, Kans.	5000
WNVL	Nicholasville, Ky.	500
WLCK	Scottsville, Ky.	500d
WGUY	Bangor, Maine	5000d
WARE	Ware, Mass.	1000
WXOX	Bay City, Mich.	1000
KOTE	Fergus Falls, Minn.	1000
KCUE	Red Wing, Minn.	1000d
WHNY	McComb, Miss.	5000
KBTC	Houston, Mo.	500d
WKBR	Manchester, N.H.	5000
WMTR	Morristown, N.J.	5000d
WIPS	Ticonderoga, N.Y.	1000d
WFAG	Farmville, N.C.	500d
WKDX	Hamlet, N. C.	1000d
WBRM	Marion, N.C.	1000d
WCHO	Washington Court House, Ohio	500d
WLEM	Emporium, Pa.	1000d
WPEL	Montrose, Pa.	1000d
WRYT	Pittsburgh, Pa.	5000
WNOW	York, Pa.	5000d
WTMA	Charleston, S.C.	5000
WCKM	Winnsboro, S.C.	500d
WKBL	Covington, Tenn.	1000d
WNTT	Tazewell, Tenn.	500d
KFTV	Paris, Tex.	500d
KPAC	Port Arthur, Tex.	5000
KUKA	San Antonio, Tex.	1000d
KTFO	Seminole, Tex.	1000d
KANN	Ogden, Utah	1000d
KVEL	Vernal, Utah	5000d
WDVA	Danville, Va.	5000
WYSR	Franklin, Va.	1000d
WEER	Warrenton, Va.	1000d
KWSC	Pullman, Wash.	5000
KTW	Seattle, Wash.	5000
WEMP	Milwaukee, Wis.	5000

1260—238.0

WCRT	Birmingham, Ala.	5000d
KPIN	Casa Grande, Ariz.	1000d
KCCB	Corning, Ark.	1000d
KBHC	Nashville, Ark.	500d
KGIL	San Fernando, Calif.	5000
KYA	San Francisco, Calif.	5000
KSNO	Aspen, Colo.	5000d
WMMM	Westport, Conn.	1000d
WNRK	Newark, Del.	500d
WWDC	Washington, D.C.	5000
WFTW	Fort Walton Beach, Florida	1000d
WAME	Miami, Fla.	5000d
WWPF	Palatka, Fla.	1000
WHAB	Baxley, Ga.	5000d
WBBK	Blakely, Ga.	1000d
WTJH	East Point, Ga.	5000d
KTEE	Idaho Falls, Ida.	5000d
KWEI	Weiser, Ida.	1000d
WIBV	Belleville, Ill.	5000d
WFBM	Indianapolis, Ind.	5000
KFGQ	Boone, Iowa	1000d
KWHK	Hutchinson, Kans.	1000
WXOK	Baton Rouge, La.	1000d
WEZE	Boston, Mass.	5000
WALM	Albion, Mich.	1000
WJBL	Holland, Mich.	5000
KROX	Crookston, Minn.	1000
KDUZ	Hutchinson, Minn.	1000d
WGVM	Greenville, Miss.	5000d
WNSL	Laurel, Miss.	5000d

Kc.	Wave Length	W.P.
WCSA	Ripley, Miss.	
KGBX	Springfield, Mo.	5000
KIMB	Kimball, Nebr.	1000d
WBUD	Trenton, N.J.	5000
KVSF	Santa Fe, N.Mex.	1000
WBNR	Beacon, N.Y.	1000d
WNDR	Syracuse, N.Y.	5000
WGWR	Asheboro, N.C.	5000
WCDJ	Edenton, N.C.	1000d
WDOK	Cleveland, Ohio	5000
WNXT	Portsmouth, Ohio	5000
KWSH	Wewoka-Seminole, Oklahoma	1000
KMCM	McMinnville, Oreg.	1000
WWYN	Erie, Pa.	5000
WPHB	Philipsburg, Pa.	5000d
WISO	Ponce, P.R.	1000
WMUU	Greenville, S.C.	5000d
WJOT	Lake City, S.C.	1000d
KWYR	Winner, S.Dak.	5000d
WNOO	Chattanooga, Tenn.	1000d
WMCH	Church Hill, Tenn.	1000d
WDKN	Dickson, Tenn.	1000d
WCLC	Jamestown, Tenn.	1000d
KSPL	Diboll, Tex.	1000d
KPSO	Falfurrias, Tex.	500d
KWFR	San Angelo, Tex.	1000d
KTUE	Tulia, Tex.	1000d
KTAE	Taylor, Tex.	1000d
WCHV	Charlottesville, Va.	5000
WJJJ	Christiansburg, Va.	1000d
KWIQ	Moses Lake, Wash.	1000d
WVVW	Grafton, W.Va.	500
WWIS	Black River Falls, Wis.	1000d
WEKZ	Monroe, Wis.	1000d
KPOW	Powell, Wyo.	5000

1270—236.1

WGSV	Guntersville, Ala.	1000d
WSIM	Prichard, Ala.	1000d
KBYR	Anchorage, Alaska	1000
KDJI	Holbrook, Ariz.	1000d
KADL	Pine Bluff, Ark.	5000d
KGOL	Palm Desert, Cal.	500d
KCOK	Tulare, Calif.	5000d
WNOG	Naples, Fla.	500d
WHIY	Orlando, Fla.	5000d
WTNT	Tallahassee, Fla.	5000
WKRW	Cartersville, Ga.	500d
WGBA	Columbus, Ga.	5000d
WJJC	Commerce, Ga.	1000d
KNDI	Honolulu, Hawaii	5000
KTFI	Twin Falls, Idaho	5000
WEIC	Charleston, Ill.	1000d
WHBF	Rock Island, Ill.	5000
WCMR	Elkhart, Ind.	5000
WWCA	Gary, Ind.	1000
WORX	Madison, Ind.	1000d
KSCB	Liberal, Kans.	1000
WAIN	Columbia, Ky.	1000d
WFUL	Fulton, Ky.	1000d
KVCL	Winnfield, La.	1000d
WSPR	Springfield, Mass.	5000
WXYZ	Detroit, Mish.	5000
KWEB	Rochester, Minn.	5000d
WVOM	Iuka, Miss.	1000d
WLSM	Louisville, Miss.	5000d
KUSN	St. Joseph, Mo.	1000d
KBUB	Sparks, Nev.	1000d
WTSN	Dover, N.H.	5000
WDVL	Vineland, N.J.	500d
KRAC	Alamogordo, N.Mex.	1000d
WHLD	Niagara Falls, N.Y.	5000d
WDLA	Walton, N.Y.	1000d
WCGC	Belmont, N.C.	5000
WMPM	Smithfield, N.C.	5000d
KBOM	Mandan, N.Dak.	1000
WILE	Cambridge, Ohio	1000d
KWPR	Claremore, Okla.	500d
KAJO	Grants Pass, Oreg.	5000d
WLBR	Lebanon, Pa.	5000
WBHC	Hampton, S.C.	1000d
KNWC	Sioux Falls, S.Dak.	1000
WLIK	Newport, Tenn.	5000d
KIOX	Bay City, Tex.	1000
KHEM	Big Spring, Tex.	1000d
KEPS	Eagle Pass, Tex.	1000d
KFJZ	Fort Worth, Tex.	5000
WTID	Newport News, Va.	1000d
WHEO	Stuart, Va.	1000d
KCVL	Colville, Wash.	1000d
KBAM	Longview, Wash.	5000d
WKYR	Keyser, W.Va.	5000
WRJC	Mauston, Wis.	500d
WWJC	Superior, Wis.	5000d

1280—234.2

WPID	Piedmont, Ala.	1000d
WNPT	Tuscaloosa, Ala.	5000
KHEP	Phoenix, Ariz.	1000d
KNBY	Newport, Ark.	1000d
KOAG	Arroyo Grande, Cal.	1000
KFOX	Long Beach, Calif.	1000
KCJH	San Luis Obispo, Cal.	500d
KJOY	Stockton, Calif.	1000
KTLN	Denver, Colo.	5000
WSUX	Seaford, Del.	1000d
WDSP	DeFuniak Springs, Florida	5000d

Kc.	Wave Length	W.P.
WQIK	Jacksonville, Fla.	5000d
WIPC	Lake Wales, Fla.	1000d
WYND	Sarasota, Fla.	500d
WIBB	Macon, Ga.	5000d
WMRO	Aurora, Ill.	1000d
WGBF	Evansville, Ind.	5000
KCOB	Newton, Iowa	1000d
KSOK	Arkansas City, Kans.	1000
WCPM	Cumberland, Ky.	1000d
KWCL	Oak Grove, La.	500d
WEIM	Fitchburg, Mass.	5000
WFYC	Alma, Mich.	5000d
WWTC	Minneapolis, Minn.	5000
KVOX	Moorhead, Minn.	1000
KDKD	Clinton, Mo.	1000d
KYRO	Potosi, Mo.	500d
KCNI	Broken Bow, Nebr.	1000d
KTOO	Henderson, Nev.	5000d
KRZE	Farmington, N.Mex.	5000d
WADO	New York, N.Y.	5000
WROC	Rochester, N.Y.	5000d
WSAT	Salisbury, N.C.	1000
WYAL	Scotland Neck, N.C.	5000d
WONW	Defiance, Ohio	1000
WLMJ	Jackson, Ohio	1000d
KLCO	Poteau, Okla.	1000d
KERG	Eugene, Oreg.	5000
WBRX	Berwick, P.	1000d
WHVR	Hanover, Pa.	5000
WKST	New Castle, Pa.	1000
WCMN	Arecibo, P.R.	5000
WANS	Anderson, S.C.	5000
WJAY	Mullins, S.C.	5000d
KBHB	Sturgis, S. D.	1000d
WMCP	Columbia, Tenn.	1000d
WDNT	Dayton, Tenn.	1000d
KNIT	Abilene, Tex.	500d
KWHI	Brenham, Tex.	1000d
KLUE	Longview, Tex.	1000d
KRAN	Morton, Tex.	500
KVWG	Pearsall, Tex.	500d
KNAK	Salt Lake City, Utah	5000
WKDE	Altavista, Va.	500d
WYVE	Wytheville, Va.	1000d
KMAS	Shelton, Wash.	1000d
KUDY	Spokane, Wash.	5000d
KIT	Yakima, Wash.	5000
WVAR	Richwood, W.Va.	1000d
WNAM	Neenah, Wis.	5000

1290—232.4

WHOD	Jackson, Ala.	1000d
WSHF	Sheffield, Ala.	1000d
WMLS	Sylacauga, Ala.	1000d
KEOS	Flagstaff, Ariz.	1000
KCUB	Tucson, Ariz.	1000
KDMS	El Dorado, Ark.	5000d
KUOA	Siloam Sprgs., Ark.	5000d
KHSL	Chico, Calif.	5000
KPER	Gilroy, Calif.	5000d
KMEN	San Bernardino, California	5000
KACL	Santa Barbara, Cal.	500d
WCCC	Hartford, Conn.	500d
WTUX	Wilmington, Del.	1000d
WTMC	Ocala, Fla.	5000
WSCM	Panama City Beach, Florida	500d
WIRK	W. Palm Bch., Fla.	5000
WDEC	Americus, Ga.	1000d
WCHK	Canton, Ga.	1000d
WTOC	Savannah, Ga.	5000
KSNN	Pocatello, Idaho	1000d
WIRL	Peoria, Ill.	5000
WNIR	New Albany, Ind.	
KWNS	Pratt, Kansas	5000
WCBL	Benton, Ky.	5000d
KJEF	Jennings, La.	1000d
WHGR	Houghton Lake, Mich.	5000
WNIL	Niles, Mich.	500d
WOIB	Saline, Mich.	500d
KBMO	Benson, Minn.	500d
WBLE	Batesville, Miss.	1000d
KALM	Thayer, Mo.	1000d
KGVO	Missoula, Mont.	5000
KOIL	Omaha, Nebr.	5000
WKNE	Keene, N.H.	5000
KSRC	Socorro, N.M.	1000d
WGLI	Babylon, N. Y.	5000
WNBF	Binghamton, N.Y.	5000
WHKY	Hickory, N.C.	5000
WEYE	Sanford, N.C.	1000d
WOMP	Bellaire, Ohio	1000d
WHIO	Dayton, Ohio	5000
KUMA	Pendleton, Oreg.	5000
KLIQ	Portland, Oreg.	5000d
WFBG	Altoona, Pa.	5000
WICE	Providence, R.I.	5000
WFIG	Sumter, S.C.	1000
WATO	Oak Ridge, Tenn.	5000
KBLT	Big Lake, Tex.	1000d
KIVY	Crockett, Tex.	500d
KRGV	Weslaco, Tex.	5000
KTRN	Wichita Falls, Tex.	5000
WPVA	Colonial Hgts., Va.	5000d
WAGE	Leesburg, Va.	1000d
WKWS	Rocky Mount, Va.	1000d
WVOW	Logan, W.Va.	5000
KAPY	Port Angeles, Wash.	1000d
WMIL	Milwaukee, Wis.	1000d
WCOW	Sparta, Wis.	5000d
KOWB	Laramie, Wyo.	5000

Kc.	Wave Length	W.P.
1300—230.6		
WBSA	Boaz, Ala.	1000d
WTLS	Tallassee, Ala.	1000d
WEZQ	Winfield, Ala.	500d
KWCB	Searcy, Ark.	1000d
KROP	Brawley, Calif.	1000
KYNO	Fresno, Calif.	5000
KWKW	Pasadena, Calif.	5000
KVOR	Colo. Sprgs., Colo.	1000
WAVZ	New Haven, Conn.	1000
WRKT	Cocoa Beach, Fla.	5000
WFFG	Marathon, Fla.	500
WSOL	Tampa, Fla.	5000d
WMTM	Moultrie, Ga.	5000d
WNEA	Newman, Ga.	500
WIMO	Winder, Ga.	1000d
KOZE	Lewiston, Idaho	5000
WTAQ	La Grange, Ill.	5000
WFRX	W. Frankfort, Ill.	1000d
WHLT	Huntington, Ind.	500d
WAAC	Terre Haute, Ind.	500d
KGLO	Mason City, Iowa	5000
WBLG	Lexington, Ky.	1000
WIBR	Baton Rouge, La.	1000
KANB	Shreveport, La.	1000d
WFBR	Baltimore, Md.	5000
WJDA	Quincy, Mass.	1000d
WOOD	Grand Rapids, Mich.	5000
WRBC	Jackson, Miss.	5000
KMMO	Marshall, Mo.	1000d
KBRL	McCook, Nebr.	5000d
KPTL	Carson City, Nev.	5000
WPNH	Plymouth, N.H.	1000d
WAAT	Trenton, N.J.	5000d
WOSC	Fulton, N.Y.	1000d
WMMJ	Lancaster, N.Y.	1000d
WEEE	Rensselaer, N.Y.	5000d
WRRC	Spring Valley, N.Y.	500d
WGOL	Goldsboro, N.C.	1000d
WLNC	Laurinburg, N.C.	500
WSYD	Mt. Airy, N.C.	5000
WERE	Cleveland, Ohio	5000
WMVO	Mt. Vernon, Ohio	500
KOME	Tulsa, Okla.	5000
KDOV	Medford, Oreg.	5000d
KACI	The Dalles, Oreg.	1000d
WWCH	Clarion, Pa.	500d
WTHT	Hazleton, Pa.	1000d
WTIL	Mayaguez, P.R.	1000
WLOW	Aiken, S.C.	500d
WCKI	Greer, S.C.	1000d
WKSC	Kershaw, S.C.	500d
WQIZ	St. George, S.C.	500d
KOLY	Mobridge, S.Dak.	1000d
WMTN	Morristown, Tenn.	5000d
WMAK	Nashville, Tenn.	5000
KVET	Austin, Tex.	5000
KKUB	Brownfield, Tex.	1000d
KGNS	Laredo, Tex.	1000d
KKAS	Silsbee, Tex.	500d
KSTU	Logan, Utah	1000
KOL	Seattle, Wash.	5000
WCLG	Morgantown, W.Va.	1000d
WKLC	St. Albans, W.Va.	1000d
1310—228.9		
WHEP	Foley, Ala.	1000d
WJAM	Marion, Ala.	5000d
KBUZ	Mesa, Ariz.	5000
KBOK	Malvern, Ark.	1000d
KIOT	Barstow, Calif.	500d
KPOD	Crescent City, Calif.	1000d
KDIA	Oakland, Cal.	5000
KTKR	Taft, Calif.	1000d
KFKA	Greeley, Colo.	1000
WICH	Norwich, Conn.	5000
WOOO	Deland, Fla.	5000d
WGKR	Perry, Fla.	1000d
WAUC	Wauchula, Fla.	500d
WOMN	Decatur, Ga.	500
WOKA	Douglas, Ga.	1000d
WBRO	Waynesboro, Ga.	1000d
WBMK	West Point, Ga.	1000d
KNUI	Makawao, Hawaii	1000
KLIX	Twin Falls, Idaho	5000
WIFE	Indianapolis, Ind.	5000
KDLS	Perry, Iowa	500d
KOKX	Keokuk, Iowa	1000d
KFLA	Scott City, Kans.	500d
WTTL	Madisonville, Ky.	1000
WDOC	Prestonsburg, Ky.	5000d
KIKS	Sulphur, La.	500d
KUZN	W. Monroe, La.	1000d
WLOB	Portland, Maine	5000d
WORC	Worcester, Mass.	5000
WKNR	Dearborn, Mich.	5000
WCCW	Traverse City, Mich.	5000d
KRBI	St. Peter, Minn.	1000d
WXXX	Hattiesburg, Miss.	1000d
KFSB	Joplin, Mo.	5000
KFBB	Great Falls, Mont.	5000
KGMT	Fairbury, Nebr.	500d
WCAM	Camden, N.J.	1000
KARA	Albuquerque, N.M.	1000d
WVIP	Mt. Kisco, N.Y.	5000d
WTLB	Utica, N.Y.	1000
WISE	Asheville, N.C.	5000
WKTC	Charlotte, N.C.	1000
WTIK	Durham, N.C.	5000
KNOX	Grand Forks, N.Dak.	5000
WFAH	Alliance, Ohio	1000d
KNPT	Newport, Oreg.	5000
WBFD	Bedford, Pa.	5000d
WGSA	Ephrata, Pa.	5000d
WNAE	Warren, Pa.	5000d
WOKD	Kingstree, S.C.	5000d
WOOO	Chattanooga, Tenn.	5000
WDXI	Jackson, Tenn.	5000
WBNT	Oneida, Tenn.	1000d
KZIP	Amarillo, Tex.	1000d
WRR	Dallas, Tex.	5000
KOYL	Odessa, Tex.	1000d
KUBO	San Antonio, Tex.	5000
WEEL	Fairfax, Va.	5000
WGH	Newport News, Va.	5000
KARY	Prosser, Wash.	1000d
WIBA	Madison, Wis.	5000
1320—227.1		
WAGF	Dothan, Ala.	1000
WENN	Birmingham, Ala.	5000d
KBLU	Yuma, Ariz.	500d
KWHN	Fort Smith, Ark.	5000
KRLW	Walnut Ridge, Ark.	1000d
KHSJ	Hemet, Calif.	500d
KLAN	Lemoore, Calif.	1000d
KUOE	Oceanside, Calif.	500
KCRA	Sacramento, Calif.	5000
KAVI	Rocky Ford, Colo.	1000d
WATR	Waterbury, Conn.	5000
WGMA	Hollywood, Fla.	1000d
WZOK	Jacksonville, Fla.	5000
WAMR	Venice, Fla.	500d
WHIE	Griffin, Ga.	5000d
WKAN	Kankakee, Ill.	1000
KNIA	Knoxville, Iowa	500d
KMAQ	Maquoketa, Iowa	500d
KLWN	Lawrence, Kans.	500d
WBRT	Bardstown, Ky.	1000d
WCLU	Covington, Ky.	
WNGO	Mayfield, Ky.	1000d
KHAL	Homer, La.	1000d
WICO	Salisbury, Md.	1000d
WARA	Attleboro, Mass.	1000
WILS	Lansing, Mich.	5000
WDMJ	Marquette, Mich.	1000
WRJW	Picayune, Miss.	5000d
KXLW	Clayton, Mo.	1000d
KOLT	Scottsbluff, Nebr.	5000
KRDD	Roswell, N.M.	1000d
WWHG	Hornell, N.Y.	5000d
WQSR	Solvay, N.Y.	500d
WAGY	Forest City, N.C.	1000
WCOG	Greensboro, N.C.	5000
WKRK	Murphy, N.C.	5000d
WEEW	Washington, N.C.	500d
KHRT	Minot, N.D.	1000d
WHOK	Lancaster, Ohio	1000d
KWOE	Clinton, Okla.	1000d
KATR	Eugene, Ore.	1000d
WKAP	Allentown, Pa.	5000
WGET	Gettysburg, Pa.	1000
WJAS	Pittsburgh, Pa.	5000
WSCR	Scranton, Pa.	1000
WUNO	Rio Piedras, P.R.	5000
WOIC	Columbia, S. C.	5000
KELO	Sioux Falls, S.Dak.	5000
WKIN	Kingsport, Tenn.	5000d
WMSR	Manchester, Tenn.	5000d
KVMC	Colo. City, Tex.	1000d
KXYZ	Houston, Tex.	5000
KCPX	Salt Lake City, Utah	5000
WDMS	Lynchburg, Va.	1000
WEET	Richmond, Va.	1000d
KXRO	Aberdeen, Wash.	5000
KHIT	Walla Walla, Wash.	1000d
WAXX	Superior, Wis.	1000d
WFHR	Wisconsin Rapids, Wis.	5000
1330—225.4		
WROS	Scottsboro, Ala.	1000d
KMOP	Tucson, Ariz.	500d
KVEE	Conway, Ark.	500d
KLOM	Lompoc, Cal.	1000d
KFAC	Los Angeles, Calif.	5000
KLBS	Los Banos, Calif.	500d
KAHR	Redding, Calif.	5000d
WARN	Ft. Pierce, Fla.	1000
WWAB	Lakeland, Fla.	1000d
WEBY	Milton, Fla.	5000d
WMEN	Tallahassee, Fla.	5000d
WMLT	Dublin, Ga.	5000d
WEAW	Evanston, Ill.	5000
WRAM	Monmouth, Ill.	1000d
WRRR	Rockford, Ill.	1000d
WJPS	Evansville, Ind.	5000
KWWL	Waterloo, Iowa	5000
KFH	Wichita, Kans.	5000
WYGO	Corbin, Ky.	5000d
WMOR	Morehead, Ky.	1000d
KVOL	Lafayette, La.	5000
WASA	Havre de Grace, Md.	5000d
WCRB	Waltham, Mass.	5000
WTRX	Flint, Mich.	5000
WLOL	Minneapolis, Minn.	5000
WJPR	Greenville, Miss.	1000
WDAL	Meridian, Miss.	1000d
KUKU	Willow Springs, Mo.	1000d
KGAK	Gallup, N.Mex.	5000
WEVD	New York, N.Y.	5000
WPOW	New York, N.Y.	5000
WEBO	Owego, N.Y.	1000d
WHAZ	Troy, N.Y.	1000
WUSM	Havelock, N.C.	1000d
WHOT	Campbell, Ohio	1000
WFIN	Findlay, Ohio	1000d
WKOV	Wellston, Ohio	500d
WELW	Willoughby, O.	500wd
KPOJ	Portland, Oreg.	5000
WBLF	Bellefonte, Pa.	500
WICU	Erie, Pa.	5000
WLAT	Conway, S. C.	5000
WFBC	Greenville, S.C.	5000
WAEW	Crossville, Tenn.	1000d
WTRO	Dyersburg, Tenn.	500d
KMIL	Cameron, Tex.	500d
KSWA	Graham, Tex.	500d
KINE	Kingsville, Tex.	1000d
KVKM	Monahans, Tex.	5000
KDOK	Tyler, Tex.	1000d
WBTM	Danville, Va.	5000
WRAA	Luray, Va.	1000d
WOLO	Marion, Va.	1000d
WESR	Tasley, Va.	5000d
KFKF	Bellevue, Wash.	5000d
KCFA	Spokane, Wash.	5000d
WETZ	New Martinsville, W.Va.	1000d
WHBL	Sheboygan, Wis.	5000
KOVE	Lander, Wyo.	5000
1340—223.7		
WKUL	Cullman, Ala.	1000
WJOI	Florence, Ala.	1000
WGWC	Selma, Ala.	250
WFEB	Sylacauga, Ala.	1000
KIBH	Seward, Alaska	250
KIKO	Miami, Ariz.	1000
KNOG	Nogales, Ariz.	250
KPGE	Page, Ariz.	1000
KENT	Prescott, Ariz.	250
KBTA	Batesville, Ark.	1000
KAAB	Hot Springs, Ark.	500
KBRS	Springdale, Ark.	1000
KATA	Arcata, Cal.	1000
KWXY	Cathedral City, Cal.	250
KMAK	Fresno, Calif	1000
KDOL	Mojave, Calif.	100
KSFE	Needles, Calif.	250
KAOR	Oroville, Cal.	1000
KATY	San Luis Obispo, California	1000
KIST	Santa Barbara, Calif.	1000
KOMY	Watsonville, Calif.	1000
KDEN	Denver, Colo.	1000
KWSL	Grand Junction, Colo.	250
KVRH	Salida, Colo.	1000
WNHC	New Haven, Conn.	1000
WOOK	Washington, D. C.	1000
WSLC	Clermont, Fla.	250
WTAN	Clearwater, Fla.	250
WROD	Daytona Bch., Fla.	1000
WDSR	Lake City, Fla.	1000
WTYS	Marianna, Fla.	1000
WNSM	Niceville-Valparaiso, Fla.	1000
WQXT	Palm Beach, Fla.	250
WSEB	Sebring, Fla.	250
WNSM	Valparaiso-Niceville, Fla.	1000
WAKE	Atlanta, Ga.	1000
WGAU	Athens, Ga.	1000
WBBQ	Augusta, Ga.	1000
WGAA	Cedartown, Ga.	1000
WOKS	Columbus, Ga.	1000
WBBT	Lyons, Ga.	1000
WTIF	Tifton, Ga.	1000
KAIN	Nampa, Idaho	1000
KPST	Preston, Idaho	250
KSKI	Sun Valley, Idaho	1000
WSOY	Decatur, Ill.	1000
WJPF	Herrin, Ill.	1000
WJOL	Joliet, Ill.	1000
WBIW	Bedford, Ind.	1000
WTRC	Elkhart, Ind.	1000
WLBC	Muncie, Ind.	1000
KROS	Clinton, Iowa	1000
KCKN	Kansas City, Kans.	1000d
KSEK	Pittsburg, Kans.	1000
WCMI	Ashland, Ky.	1000
KENT	Prescott, Ariz.	250
WNBS	Murray, Ky.	1000d
WEKY	Richmond, Ky.	1000
KVOB	Bastrop, La.	250
KRMD	Shreveport, La.	1000
WFAU	Augusta, Maine	1000
WHOU	Houlton, Maine	1000
WGAW	Gardner, Mass.	1000
WNBH	New Bedford, Mass.	1000
WBRK	Pittsfield, Mass.	1000
WLEW	Bad Axe, Mich.	1000
WLAV	Grand Rap., Mich.	1000
WCSR	Hillsdale, Mich.	1000
WMTE	Manistee, Mich.	1000
WAGN	Menominee, Mich.	1000
WMBN	Petoskey, Mich.	1000
WEXL	Royal Oak, Mich.	1000
KVBR	Brainerd, Minn.	1000
KDLM	Detroit Lakes, Minn.	1000
WEVE	Eveleth, Minn.	1000
KROC	Rochester, Minn.	1000
KWLM	Willmar, Minn.	1000
WJMB	Brookhaven, Miss.	250
WAML	Laurel, Miss.	250
KXEO	Mexico, Mo.	1000d
KLID	Poplar Bluff, Mo.	1000d
KSGM	St. Genevieve, Mo.	1000
KSMO	Salem, Mo.	1000
KORO	Sedalia, Mo.	1000
KICK	Springfield, Mo.	1000
KCAP	Helena, Mont.	1000
KPRK	Livingston, Mont.	1000
KATL	Miles City, Mont.	1000
KQTE	Missoula, Mont.	250
KHUB	Fremont, Nebr.	500
KGFW	Kearney, Nebr.	1000
KSID	Sidney, Nebr.	1000
KORK	Las Vegas, Nev.	1000
KBET	Reno, Nev.	1000
WDCR	Hanover, N.H.	1000
WMID	Atlantic City, N.J.	1000
KHAP	Aztec, N.M.	1000d
KRRR	Ruidoso, N. Mex.	1000
KKIT	Taos, N.Mex.	250
KSIL	Silver City, N.Mex.	1000
WMBO	Auburn, N.Y.	1000
WENT	Gloversville, N.Y.	1000
WKSN	Jamestown, N.Y.	250
WUSJ	Lockport, N.Y.	250
WMSA	Massena, N.Y.	1000
WALL	Middletown, N.Y.	1000
WIRY	Plattsburgh, N.Y.	1000
WJRI	Lenoir, N.C.	1000
WTSB	Lumberton, N.C.	1000
WOXF	Oxford, N.C.	1000
WOOW	Greenville, N.C.	1000
WGNI	Wilmington, N.C.	1000
WAIR	Winston-Salem, N.C.	250
KGPC	Grafton, N.Dak.	1000
WNCO	Ashland, O.	1000
WOUB	Athens, Ohio	250
WIZE	Springfield, Ohio	1000
WSTV	Steubenville, Ohio	1000
KIHN	Hugo, Okla.	250
KOCY	Okla. City, Okla.	1000
KTOW	Sand Springs, Okla.	250
KLOO	Corvallis, Ore.	1000
KWVR	Enterprise, Oreg.	250
KIHR	Hood River, Oreg.	250
KFIR	North Bend, Oreg.	1000
WCVI	Connellsville, Pa.	1000d
WSAJ	Grove City, Pa.	100
WKRZ	Oil City, Pa.	1000
WHAT	Philadelphia, Pa.	1000
WRAW	Reading, Pa.	1000
WTRN	Tyrone, Pa.	1000
WBRE	Wilkes-Barre, Pa.	1000
WWPA	Williamsport, Pa.	1000
WUNA	Aquadilla, P.R.	250
WOKE	Charleston, S.C.	1000
WRHI	Rock Hill, S.C.	1000
WSSC	Sumter, S.C.	1000
KIJV	Huron, S. D.	1000
KRSD	Rapid City, S.Dak.	1000
WBAC	Cleveland, Tenn.	1000
WKRM	Columbia, Tenn.	1000
WGRV	Greeneville, Tenn.	1000
WKGN	Knoxville, Tenn.	1000
WLOK	Memphis, Tenn.	1000d
WCDT	Winchester, Tenn.	1000
KWKC	Abilene, Tex.	1000
KTSL	Burnett, Tex.	250
KAND	Corsicana, Tex.	250
KSET	El Paso, Tex.	250
KLBK	Lubbock, Tex.	1000
KRBA	Lufkin, Tex.	1000
KPDN	Pampa, Tex.	250
KOLE	Port Arthur, Tex.	250
KTEO	San Angelo, Tex.	250
KVIC	Victoria, Tex.	250
WTWN	St. Johnsbury, Vt.	1000
WSTA	Charlotte Amalie, V.I.	250
WKEY	Covington, Va.	1000
WHAP	Hopewell, Va.	1000
WJMA	Orange, Va.	1000
KAGT	Anacortes, Wash.	250
KGRS	Pasco, Wash.	1000
KAPA	Raymond, Wash.	1000
KMEL	Wenatchee, Wash.	250
WHAR	Clarksburg, W.Va.	1000
WEPM	Martinsburg, W. Va.	1000
WMON	Montgomery, W.Va.	250
WOVE	Welch, W.Va.	1000
WLDY	Ladysmith, Wis.	1000
WRIT	Milwaukee, Wis.	1000d
KSGT	Jackson, Wyo.	250
KYCN	Wheatland, Wyo.	250
KWOR	Worland, Wyo.	1000
1350—222.1		
WJWT	Demopolis, Ala.	5000d
WELB	Elba, Ala.	1000d
WGAD	Gadsden, Ala.	5000d
KLYD	Bakersfield, Calif.	1000d
KCKC	San Bernardino, Cal.	5000
KSRO	Santa Rosa, Calif.	5000
KKAM	Pueblo, Colo.	5000
WNLK	Norwalk, Conn.	1000
WINY	Putnam, Conn.	1000d
WEZY	Cocoa, Fla.	1000
WOCF	Oade City, Fla.	1000d
WCAI	Ft. Myers, Fla.	1000d
WBSG	Blackshear, Ga.	500d
WRWH	Cleveland, Ga.	1000d

WHITE'S RADIO LOG

Kc.	Wave Length	W.P.
WRPB	Warner Robins, Ga.	5000d
KRLC	Lewiston, Ida.-Clarkston, Wash.	5000d
WAAP	Peoria, Ill.	1000
WJBD	Salem, Ill.	1000d
WIDU	Kokomo, Ind.	5000
KRNT	Des Moines, Iowa	5000
KMAN	Manhattan, Kans.	500d
WLOU	Louisville, Ky.	5000d
WSMB	New Orleans, La.	5000
WHMI	Howell, Mich.	500
KDIO	Ortonville, Minn.	1000d
WCMP	Pine City, Minn.	1000d
WKCU	Corinth, Miss.	
WKDZ	Kosciusko, Miss.	5000d
KCHR	Charleston, Mo.	1000d
KBRX	O'Neill, Nebr.	1000d
WLNH	Laconia, N.H.	5000d
WHWH	Princeton, N.J.	5000
KABQ	Albuquerque, N.M.	5000
WCBA	Corning, N.Y.	1000d
WRNY	Rome, N.Y.	500d
WBMT	Black Mountain, N.C.	500d
WHIP	Mooresville, N.C.	1000d
WLLY	Wilson, N.C.	1000d
KBMR	Bismarck, N. D.	5000
WSLR	Akron, O.	5000
WCSM	Celina, Ohio	500d
WCHI	Chillicothe, Ohio	1000d
KRHD	Duncan, Okla.	250
KTLQ	Tahlequah, Okla.	1000d
KRVC	Ashland, Ore.	1000d
WORK	York, Pa.	5000
WWBR	Windber, Pa.	1000d
WOAR	Darlington, S.C.	1000d
WGSW	Greenwood, S.C.	1000d
WRKM	Carthage, Tenn.	1000d
KCAR	Clarksville, Tex.	500d
KTXJ	Jasper, Tex.	1000d
KCOR	San Antonio, Tex.	5000
WBLT	Bedford, Va.	1000d
WFLS	Fredericksburg, Va.	1000d
WNVA	Norton, Va.	5000d
WAVY	Portsmouth, Va.	5000
WPDR	Portage, Wis.	5000d

1360—220.4

WWWB	Jasper, Ala.	1000d
WLIQ	Mobile, Ala.	5000d
WMFC	Monroeville, Ala.	1000d
WELR	Roanoke, Ala.	1000d
KRUX	Glendale, Ariz.	5000
KLYR	Clarksville, Ark.	500d
KFFA	Helena, Ark.	1000
KFIV	Modesto, Cal.	5000
KRCK	Ridgecrest, Calif.	1000d
KGB	San Diego, Calif.	5000
KDEY	Boulder, Colo.	500d
WDRC	Hartford, Conn.	5000
WOBS	Jacksonville, Fla.	5000d
WKAT	Miami Beach, Fla.	5000
WINT	Winter Haven, Fla.	1000d
WAZA	Bainbridge, Ga.	1000d
WLAW	Lawrenceville, Ga.	1000d
WMAC	Metter, Ga.	500d
WIYN	Rome, Ga.	500d
WLBK	DeKalb, Ill.	1000d
WVMC	Mt. Carmel, Ill.	500d
WGFA	Watseka, Ill.	1000d
KHAK	Cedar Rapids, Iowa	1000d
KRCB	Council Bluffs, Iowa	
KXGI	Ft. Madison, Iowa	1000d
KSCJ	Sioux City, Iowa	5000
KBTO	El Dorado, Kans.	500d
WFLW	Monticello, Ky.	1000d
KOXI	Mansfield, La.	1000d
KVIM	New Iberia, La.	1000d
KTLD	Tallulah, La.	500d
WEBB	Baltimore, Md.	5000d
WLYN	Lynn, Mass.	1000d
WKYO	Caro, Mich.	500d
WKMI	Kalamazoo, Mich.	5000
KLRS	Mountain Grove, Mo.	1000d
KWRV	McCook, Nebr.	1000d
WNNJ	Newton, N.J.	1000d
WWBZ	Vineland, N.J.	1000
WKOP	Binghamton, N.Y.	5000
WMNS	Olean, N.Y.	1000d
WCHL	Chapel Hill, N.C.	1000d
KEYZ	Williston, N.D.	5000
WSAI	Cincinnati, Ohio	5000
WWOW	Conneaut, Ohio	500d
KUIK	Hillsboro, Oreg.	1000d
WMCK	McKeesport, Pa.	5000
WPPA	Pottsville, Pa.	5000
WELP	Easley, S.C.	1000d
WLCM	Lancaster, S.C.	1000d
WBLC	Lenoir City, Tenn.	
WNAH	Nashville, Tenn.	1000d
KRAY	Amarillo, Tex.	500d
KACT	Andrews, Tex.	1000d
KWBA	Baytown, Tex.	1000
KRYS	Corpus Christi, Tex.	1000
KXOL	Ft. Worth, Tex.	5000
WBOB	Galax, Va.	1000d
WHBG	Harrisonburg, Va.	5000d
KFDR	Grand Coulee, Wash.	1000d
KMO	Tacoma, Wash.	5000
WHJC	Matewan, W.Va.	1000d
WMOV	Ravenswood, W.Va.	1000d
WBAY	Green Bay, Wis.	5000
WISV	Viroqua, Wis.	1000
WMNE	Menomonie, Wis.	1000d
KVRS	Rock Springs, Wyo.	1000

1370—218.8

WBYE	Calera, Ala.	1000d
KTPA	Prescott, Ark.	500d
KREL	Corona, Cal.	1000
KQCY	Quincy, Calif.	500d
KEEN	San Jose, Calif.	5000
KGEN	Tulare, Calif.	1000d
WKMK	Blountstown, Fla.	500d
WWKE	Ocala, Fla.	5000d
WCOA	Pensacola, Fla.	5000
WAXE	Vero Beach, Fla.	1000d
WBGR	Jesup, Ga.	5000
WFDR	Manchester, Ga.	1000d
WLOV	Washington, Ga.	1000d
WPRC	Lincoln, Ill.	1000d
WTTS	Bloomington, Ind.	5000
WLTH	Gary, Ind.	1000d
KDTH	Dubuque, Iowa	5000
KGNO	Dodge City, Kans.	5000
KALN	Iola, Kans.	500d
WABD	Ft. Campbell, Ky.	500d
WGOH	Grayson, Ky.	5000d
WTKY	Tompkinsville, Ky.	1000d
KAPB	Marksville, La.	1000d
WDEA	Ellsworth, Me.	5000
WMHI	Braddocks Hts., Md.	500d
WKIK	Leonardtown, Md.	1000d
WGHN	Grand Haven, Mich.	500d
KSUM	Fairmont, Minn.	1000
WMKT	St. Paul, Minn.	500d
WMGO	Canton, Miss.	1000d
KWRT	Boonville, Mo.	1000d
KCRV	Caruthersville, Mo.	1000d
KXLF	Butte, Mont.	5000
KAWL	York, Nebr.	500d
WFEA	Manchester, N.H.	5000d
WELV	Ellenville, N.Y.	500
WALK	Patchogue, N.Y.	500d
WSAY	Rochester, N.Y.	5000
WLTC	Gastonia, N.C.	5000d
WTAB	Tabor City, N.C.	5000d
KFJM	Grand Forks, N.D.	1000d
WSPD	Toledo, Ohio	5000
KVYL	Holdenville, Okla.	500d
KAST	Astoria, Oreg.	1000
WOTR	Corry, Pa.	1000
WPAZ	Pottstown, Pa.	1000d
WKMC	Roaring Sprgs., Pa.	1000d
WIVV	Vieques, P.R.	1000
WKFD	Wickford, R.I.	500d
WDEF	Chattanooga, Tenn.	5000
WDXE	Lawrenceburg, Tenn.	1000d
WRGS	Rogersville, Tenn.	1000d
KOKE	Austin, Tex.	1000d
KFRD	Longview, Tex.	1000
KPOS	Post, Tex.	1000d
KSOP	Salt Lake City, Utah	1000d
WBTN	Bennington, Vt.	1000d
WHEE	Martinsville, Va.	5000d
WJWS	South Hill, Va.	5000d
KPOR	Quincy, Wash.	1000d
WEIF	Moundsville, W. Va.	1000d
WCCN	Neillsville, Wis.	5000d
KVWO	Cheyenne, Wyo.	1000

1380—217.3

WRAB	Arab, Ala.	1000d
WGYV	Greenville, Ala.	1000d
KDXE	N. Little Rock, Ark.	1000d
KBVM	Lancaster, Calif.	1000d
KGMS	Sacramento, Calif.	1000
KSBW	Salinas, Calif.	5000
KFLJ	Walsenburg, Colo.	1000d
WAMS	Wilmington, Del.	5000
WLIZ	Lake Worth, Fla.	500d
WQXQ	Ormond Bch., Fla.	1000d
WLCY	St. Petersburg, Fla.	5000
WAOK	Atlanta, Ga.	5000
WSIZ	Ocilla, Ga.	5000d
KPOI	Honolulu, Hawaii	5000
WWCM	Brazil, Ind.	500d
WKJG	Ft. Wayne, Ind.	5000
KCIM	Carroll, Iowa	5000
KCII	Washington, Iowa	500d
KUOL	Fairway, Kan.	5000
WMTA	Central City, Ky.	500d
WWKY	Winchester, Ky.	1000d
WYNK	Baton Rouge, La.	500d
WKTJ	Farmington, Me.	1000d
WTTH	Port Huron, Mich.	1000
WPLB	Greenville, Mich.	1000
KLIZ	Brainerd, Minn.	5000
KAGE	Winona, Minn.	1000
WDLT	Indianola, Miss.	500d
KWK	St. Louis, Mo.	5000
KUVR	Holdredge, Nebr.	500
WBBX	Portsmouth, N.H.	1000
WAWZ	Zarephath, N.J.	5000
WFSR	Bath, N.Y.	500d
WBNX	New York, N.Y.	5000
WLOS	Asheville, N.C.	5000
WTOB	Winston-Salem, N.C.	5000
WWIZ	Lorain, Ohio	500d
WPKO	Waverly, Ohio	1000d
KSWO	Lawton, Okla.	1000
KMUS	Muskogee, Okla.	1000
KBCH	Ocean Lake, Oreg.	1000d
KSRV	Ontario, Oreg.	5000
WACB	Kittanning, Pa.	1000d
WMLP	Milton, Pa.	1000d
WAYZ	Waynesboro, Pa.	1000d
WNRI	Woonsocket, R.I.	1000d
WAGS	Bishopville, S.C.	1000d
WGUS	N. Augusta, S.C.	1000d
KOTA	Rapid City, S.Dak.	5000
KFCB	Redfield, S.Dak.	500d
WYSH	Clinton, Tenn.	1000d
WGMM	Millington, Tenn.	500d
KJET	Beaumont, Tex.	1000
KBWD	Brownwood, Tex.	1000
KCRM	Crane, Tex.	1000d
KTSM	El Paso, Tex.	5000
KMUL	Muleshoe, Tex.	1000d
KBOP	Pleasanton, Tex.	1000d
WSYB	Rutland, Vt.	5000
WMBG	Richmond, Va.	5000
KRKO	Everett, Wash.	5000
KPEG	Spokane, Wash.	5000d
WMTD	Hinton, W.Va.	1000d
WBEL	Beloit, Wis.	5000

1390—215.7

WHMA	Anniston, Ala.	5000
KDQN	DeQueen, Ark.	500d
KAMO	Rogers, Ark.	1000d
KGER	Long Beach, Calif.	5000
KCEY	Turlock, Calif.	5000
KFML	Denver, Colo	5000d
WAVP	Avon Park, Fla.	1000d
WUWU	Gainesville, Fla.	5000d
WISK	Americus, Ga.	5000d
WNUS	Chicago, Ill.	5000
WFIW	Fairfield, Ill.	1000
WJCD	Seymour, Ind.	1000d
KCLN	Clinton, Iowa	1000d
KCBC	Des Moines, Iowa	1000
KNCK	Concordia, Kans.	500d
WANY	Albany, Ky.	1000d
WKIC	Hazard, Ky.	5000d
KFRA	Franklin, La.	500d
WEGP	Presque Isle, Me.	5000d
KJPW	Waynesville, Mo.	1000d
WCAT	Orange, Mass.	1000d
WPLM	Plymouth, Mass.	5000
WCER	Charlotte, Mich.	5000d
KADH	Duluth, Minn.	500
KRFO	Owatonna, Minn.	500d
WROA	Gulfport, Miss.	1000d
WQIC	Meridian, Miss.	5000d
KJPW	Waynesville, Mo.	1000d
KENN	Farmington, N.Mex.	5000
KHOB	Hobbs, N.Mex.	5000d
WEOK	Poughkeepsie, N.Y.	5000
WRIV	Riverhead, N.Y.	1000d
WFBL	Syracuse, N.Y.	5000
WEED	Rocky Mount, N.C.	5000
WADA	Shelby, N.C.	1000
WJRM	Troy, N.C.	500d
KLPM	Minot, N.Dak.	5000
WOHP	Bellefontaine, Ohio	500d
WMPO	Middleport-Pomeroy, O.	5000d
WFMJ	Youngstown, Ohio	5000
KCRC	Enid, Okla.	1000
KSLM	Salem, Oreg.	5000
WLAN	Lancaster, Pa.	5000
WRSC	State College, Pa.	1000d
WISA	Isabella, P.R.	1000
WHPB	Belton, S.C.	1000d
WCSC	Charleston, S.C.	5000
KJAM	Madison, S.D.	5000d
WTJS	Jackson, Tenn.	5000
KULP	El Campo, Tex.	500d
KBEC	Waxahachie, Tex.	500d
KLGN	Logan, Utah	1000
WEAM	Arlington, Va.	5000
WWOD	Lynchburg, Va.	5000
WKLP	Keyser, W.Va.	1000d
KBBD	Yakima, Wash.	1000

1400—214.2

WMSL	Decatur, Ala.	1000
WXAL	Demopolis, Ala.	1000d
WFPA	Ft. Payne, Ala.	1000
WJLD	Homewood, Ala.	1000
WJHD	Opelika, Ala.	1000
KSEW	Sitka, Alaska	250
KCLF	Clifton, Ariz.	250
KJKJ	Flagstaff, Ariz.	250
KXIV	Phoenix, Ariz.	1000
KTUC	Tucson, Ariz.	250
KVOY	Yuma, Ariz.	250
KELD	El Dorado, Ark.	1000
KCLA	Pine Bluff, Ark.	1000
KWYN	Wynne, Ark.	1000
KPAT	Berkeley, Calif.	1000
KREO	Indio, Calif.	250
KQMS	Redding, Calif.	250
KSLY	San Luis Obispo, Cal.	250
KSPA	Santa Paula, Calif.	250
KHOE	Truckee, Calif.	1000
KUKI	Ukiah, Calif.	1000
KONG	Visalia, Calif.	1000
KRLN	Canon City, Colo.	250
KDTA	Delta, Colo.	250
KFTM	Ft. Morgan, Colo.	250
KBZZ	La Junta, Colo.	1000
WSTC	Stamford, Conn.	1000
WILI	Willimantic, Conn.	1000
WFTL	Ft. Lauderdale, Fla.	1000
WIRA	Ft. Pierce, Fla.	1000
WNVE	Ft. Walton Bch., Fla.	1000d
WRHC	Jacksonville, Fla.	250
WPRY	Perry, Fla.	1000
WTRR	Sanford, Fla.	1000
WZRH	Zephyr Hills, Fla.	250
WCQS	Alma, Ga.	1000
WSGC	Elberton, Ga.	1000
WNEX	Macon, Ga.	1000
WMGA	Moultrie, Ga.	1000
WCOH	Newnan, Ga.	1000
WGSA	Savannah, Ga.	1000
KART	Jerome, Idaho	250
KRPL	Moscow, Idaho	250
KSPT	Sandpoint, Idaho	1000
WDWS	Champaign, Ill.	1000
WGIL	Galesburg, Ill.	1000
WROZ	Evansville, Ind.	1000
WBAT	Marion, Ind.	1000
KCOG	Centerville, Ia.	500
KVFD	Fort Dodge, Iowa	1000
KVOE	Emporia, Kans.	1000
KAYS	Hays, Kans.	1000
WCYN	Cynthiana, Ky.	250
WIEL	Elizabethtown, Ky.	1000
WFTG	London, Ky.	250
WFPR	Hammond, La.	1000
KADK	Lake Charles, La.	1000
WRDO	Augusta, Maine	1000d
WIDE	Biddeford, Maine	1000
WWIN	Baltimore, Md.	1000
WALE	Fall River, Mass.	1000
WLLH	Lowell, Mass.	1000
WHMP	Northampton, Mass.	1000
WKFR	Battle Creek, Mich.	1000
WJLB	Detroit, Mich.	1000d
WHDF	Houghton, Mich.	250
WGON	Munising, Mich.	250
WSAM	Saginaw, Mich.	1000
WSJM	St. Joseph, Mich.	1000
WTCM	Traverse City, Mich.	1000
KEYL	Long Prairie, Minn.	1000
KMHL	Marshall, Minn.	1000
WMIN	Mpls.-St. Paul, Minn.	1000
WHLB	Virginia, Minn.	1000
WBIP	Booneville, Miss.	250
WNAG	Grenada, Miss.	1000
WFOR	Hattiesburg, Miss.	1000
WJQS	Jackson, Miss.	250
WMBC	Macon, Miss.	1000
KFRU	Columbia, Mo.	1000
KJCF	Festus, Mo.	1000
KSIM	Sikeston, Mo.	1000
KTTS	Springfield, Mo.	1000
KDRG	Deer Lodge, Mont.	250
KXGN	Glendive, Mont.	250
KARR	Great Falls, Mont.	1000
KCOW	Alliance, Nebr.	1000
KLIN	Lincoln, Neb.	1000
KBMI	Henderson, Nev.	250
KWNA	Winnemucca, Nev.	1000
WBRL	Berlin, N.H.	250
WTSL	Hanover, N.H.	1000
WLTN	Littleton, N.H.	250
KTRC	Santa Fe, N.M.	1000
KCHS	Truth or Consequences, New Mexico	250
KTNM	Tucumcari, N.M.	1000
WOND	Pleasantville, N.J.	1000
WABY	Albany, N.Y.	1000
WYSL	Buffalo, N.Y.	1000
WSLB	Ogdensburg, N.Y.	1000
WBMA	Beaufort, N.C.	250
WGBG	Greensboro, N.C.	1000
WSHB	Raeford, N.C.	1000
WSIC	Statesville, N.C.	1000
WLSE	Wallace, N. C.	1000
WHCC	Waynesville, N.C.	1000
WCNF	Weldon, N.C.	1000d
KEYJ	Jamestown, N.Dak.	1000
WMAN	Mansfield, Ohio	1000d
WPAY	Portsmouth, Ohio	1000
KWON	Bartlesville, Okla.	1000
KTMC	McAlester, Okla.	250
KNOR	Norman, Okla.	250
KNND	Cottage Grove, Oreg.	1000d
KJDY	John Day, Ore.	1000
WEST	Easton, Pa.	1000
WJET	Erie, Pa.	1000
WFEC	Harrisburg, Pa.	1000d
WWSF	Loretto, Pa.	250
WICK	Scranton, Pa.	250
WRAK	Williamsport, Pa.	1000
WVOZ	Carolina, P. R.	250d
WCOS	Columbia, S.C.	1000
WGTN	Georgetown, S.C.	1000
WHCQ	Spartanburg S.C.	1000d
WJZM	Clarksville, Tenn.	1000
WHUB	Cookeville, Tenn.	1000
WLSB	Copperhill, Tenn.	1000

Kc.	Wave Length	W.P.
WGAP	Maryville, Tenn.	1000d
WHAL	Shelbyville, Tenn.	1000
KRUN	Ballinger, Tex.	1000
KBYG	Big Springs, Tex.	1000
KUNO	Corpus Christi, Tex.	250
KILE	nr. Galveston, Tex.	250
KGVL	Greenville, Tex.	1000
KEBE	Jacksonville, Tex.	1000
KIUN	Pecos, Tex.	1000
KEYE	Perryton, Tex.	250
KVOP	Plainview, Tex.	1000
KDWT	Stamford, Tex.	1000
KTEM	Temple, Tex.	1000
KTFS	Texarkana, Tex.	250
KVOU	Uvalde, Tex.	250
KIXX	Provo, Utah	250
WDOT	Burlington, Vt.	1000
WINA	Charlottesville, Va.	1000
WHHV	Hillsville, Va.	1000
WHIH	Portsmouth, Va.	1000
WHLF	So. Boston, Va.	1000
WINC	Winchester, Va.	1000
KEDO	Longview, Wash.	250
KRSC	Othello, Wash.	250
KTNT	Tacoma, Wash.	1000
WBOY	Clarksburg, W.Va.	1000
WRON	Ronceverte, W.Va.	1000
WSPZ	Spencer, W.Va.	1000
WKWK	Wheeling, W.Va.	250
WBTH	Williamson, W.Va.	1000
WATW	Ashland, Wis.	1000
WBIZ	Eau Claire, Wis.	1000
WDUZ	Green Bay, Wis.	1000
WRJN	Racine, Wis.	1000
WRDB	Reedsburg, Wis.	1000
WRIG	Wausau, Wis.	1000
KATI	Casper, Wyo.	1000
KODI	Cody, Wyo.	1000

1410—212.6

WUNI	Mobile, Ala.	5000
WRCK	Tuscumbia, Ala.	500d
KTCS	Fort Smith, Ark.	1000
KERN	Bakersfield, Calif.	1000
KRML	Carmel, Calif.	500d
KKOK	Lompoc, Calif.	500d
KMYC	Marysville, Calif.	5000
KCAL	Redlands, Calif.	5000d
KCOL	Ft. Collins, Colo.	1000
WPOP	Hartford, Conn.	5000
WDOV	Dover, Del.	5000
WMYR	Fort Myers, Fla.	5000
WBIL	Leesburg, Fla.	1000d
WONS	Tallahassee, Fla.	5000d
WGRI	Griffin, Ga.	1000d
WSNE	Cummings, Ga.	1000d
WDAX	McRae, Ga.	1000d
WLAQ	Rome, Ga.	1000
WRMN	Elgin, Ill.	1000d
WTIM	Taylorville, Ill.	1000d
WAZY	Lafayette, Ind.	1000d
KGRN	Grinnell, Iowa	500d
KLEM	LeMars, Iowa	1000d
KCLO	Leavenworth, Kans.	5000d
KWBB	Wichita, Kans.	5000
WLBJ	Bowling Green, Ky.	5000
WHLN	Harlan, Ky.	5000d
KDBS	Alexandria, La.	1000d
WDDW	Halfway, Md.	1000d
WHAG	Halfway, Md.	1000d
WOKW	Brockton, Mass.	1000d
WGRD	Grand Rap., Mich.	1000d
KLFD	Litchfield, Minn.	500d
KRWB	Roseau, Minn.	1000
WDSK	Cleveland, Miss.	1000d
WBKN	Newton, Miss.	500d
WNOP	North Platte, Neb.	1000
WHTG	Asbury Park-Eatontown, N.J.	500d
WDOE	Dunkirk, N.Y.	1000
WELM	Elmira, N.Y.	1000
WSET	Glen Falls, N.Y.	1000d
WOTT	Watertown, N.Y.	5000
WVCB	Shallotte, N. C.	
WEGO	Concord, N.C.	1000d
WSRC	Durham, N.C.	1000d
WING	Dayton, Ohio	5000
KPAM	Portland, Oreg.	5000d
WLSH	Lansford, Pa.	5000d
KQV	Pittsburgh, Pa.	5000
WPCC	Clinton, S.C.	1000d
WYMB	Manning, S.C.	1000d
WCMT	Martin, Tenn.	1000d
KBUD	Athens, Tex.	1000d
KBAN	Bowie, Tex.	500d
KVLB	Cleveland, Tex.	500
KXIT	Dalhart, Tex.	500d
KDOX	Marshall, Tex.	500
KRIG	Odessa, Tex.	1000
KBAL	San Saba, Tex.	500d
KNAL	Victoria, Tex.	500
WIKI	Chester, Va.	5000d
WRIS	Roanoke, Va.	5000d
WRDS	S. Charleston, W.Va.	1000d
WKBH	LaCrosse, Wis.	5000
KWYO	Sheridan, Wyo.	1000

1420—211.1

WACT	Tuscaloosa, Ala.	5000d
KHFH	Sierra Vista, Ariz.	1000
KPOC	Pocahontas, Ark.	1000d
KRDO	Colo. Sprgs., Colo.	1000
KSTN	Stockton, Calif.	5000
WLIS	Old Saybrook, Conn.	500d
WBRD	Bradenton, Fla.	1000
WDBF	Delray Beach, Fla.	5000d
WETH	St. Augustine, Fla.	1000d
WAVO	Avondale Estates, Ga.	1000d
WRBL	Columbus, Ga.	5000
WPEH	Louisville, Ga.	1000d
WLET	Toccoa, Ga.	5000d
KOLL	Honolulu, Hawaii	5000
WINI	Murphysboro, Ill.	500d
WIMS	Michigan City, Ind.	5000d
WOC	Davenport, Iowa	5000
KJCK	Junction City, Kans.	1000d
KULY	Ulysses, Kans.	1000d
WTCR	Ashland, Ky.	5000d
WHBN	Harrodsburg, Ky.	1000d
WVJS	Owensboro, Ky.	5000
KPEL	Lafayette, La.	1000
WBSM	New Bedford, Mass.	5000
WBEC	Pittsfield, Mass.	1000
WAMM	Flint, Mich.	1000d
WKPR	Kalamazoo, Mich.	1000d
KTOE	Mankato, Minn.	5000
WSUH	Oxford, Miss.	1000d
WQBC	Vicksburg, Miss.	1000
KBTN	Neosho, Mo.	500d
KOOO	Omaha, Nebr.	1000d
KSYX	Santa Rosa, N.Mex.	1000d
WALY	Herkimer, N.Y.	1000d
WACK	Newark, N.Y.	500
WLNA	Peekskill, N.Y.	1000d
WMYN	Mayodan, N.C.	500
WGAS	S. Gastonia, N.C.	500d
WVOT	Wilson, N.C.	1000
WHK	Cleveland, Ohio	5000
KYNG	Coos Bay, Oreg.	1000d
WCOJ	Coatesville, Pa.	5000
WCED	DuBois, Pa.	5000
WEUC	Ponce, P.R.	1000
WCRE	Cheraw, S.C.	1000d
WEMB	Erwin, Tenn.	5000d
WKSR	Pulaski, Tenn.	1000
KFYN	Bonham, Tex.	250d
KTRE	Lufkin, Tex.	1000
KGNB	New Braunfels, Tex.	1000d
KPEP	San Angelo, Tex.	1000d
WWSR	St. Albans, Vt.	1000d
WDDY	Gloucester, Va.	1000d
WKCW	Warrenton, Va.	5000d
KITI	Chehalis-Centralia, Wash.	1000d
KREN	Renton, Wash.	500d
KUJ	Walla Walla, Wash.	5000
WPLY	Plymouth, Wis.	500d

1430—209.7

WFHK	Pell City, Ala.	1000d
KHBM	Monticello, Ark.	1000d
KAMP	El Centro, Calif.	1000d
KARM	Fresno, Calif.	5000
KALI	San Gabriel, Cal.	5000
KJAY	Sacramento, Calif.	500d
KGBA	Santa Clara, Cal.	1000
KOSI	Aurora, Colo.	5000
WIII	Homestead, Fla.	500d
WLAK	Lakeland, Fla.	5000
WPCF	Panama City, Fla.	5000
WGFS	Covington, Ga.	1000d
WRCD	Dalton, Ga.	1000d
WWGS	Tifton, Ga.	5000
WEEF	Highland Park, Ill.	1000d
WCMY	Ottawa, Ill.	500d
WIRE	Indianapolis, Ind.	5000
KASI	Ames, Iowa	1000d
KMRC	Morgan City, La.	500d
WNAV	Annapolis, Md.	5000
WTTT	Amherst, Mass.	5000d
WHIL	Medford, Mass.	5000d
WION	Ionia, Mich.	5000d
WBRB	Mt. Clemens, Mich.	500d
WLAU	Laurel, Miss.	5000d
KAOL	Carrollton, Mo.	500d
WIL	St. Louis, Mo.	5000
KRGI	Grand Island, Nebr.	5000
WNJR	Newark, N.J.	5000
KGFL	Roswell, N.M.	5000d
WENE	Endicott, N.Y.	5000
WMNC	Morganton, N.C.	5000
WDJS	Mt. Olive, N.C.	1000d
WRXO	Roxboro, N.C.	1000d
WFOB	Fostoria, Ohio	1000
WCLT	Newark, Ohio	500d
KALV	Alva, Okla.	500
KELI	Tulsa, Okla.	5000
KGAY	Salem, Oreg.	5000d
WVAM	Altoona, Pa.	1000
WNEL	Caguas, P. R.	5000
WBLR	Batesburg, S.C.	5000d
WATP	Marion, S.C.	1000d
WBUG	Ridgeland, S.C.	1000d
KBRK	Brookings, S. Dak.	1000d
WGYW	Fountain City, Tenn.	1000d
WENO	Madison, Tenn.	5000
WHER	Memphis, Tenn.	1000
KSTB	Breckenridge, Tex.	1000d
KEES	Gladewater, Tex.	1000d
KCOH	Houston, Tex.	1000d
KLO	Ogden, Utah	5000
WIVE	Ashland, Va.	1000d
WDIC	Clincho, Va.	1000d
KBRC	Mt. Vernon, Wash.	5000
WEIR	Weirton, W.Va.	1000
WBEV	Beaver Dam, Wis.	1000d

1440—208.2

WHHY	Montgomery, Ala.	5000
KDOT	Scottsdale, Ariz.	5000d
KHOG	Fayetteville, Ark.	1000d
KOKY	Little Rock, Ark.	5000d
KVON	Napa, Cal.	1000
KPRO	Riverside, Calif.	1000
KCOY	Santa Maria, Calif.	1000
WBIS	Bristol, Conn.	500d
WABR	Winter Park, Fla.	5000d
WWCC	Bremen, Ga.	1000d
WGIG	Brunswick, Ga.	5000
WRAJ	Anna, Ill.	500d
WIOK	Normal, Ill.	1000
WPRS	Paris, Ill.	1000d
WGEM	Quincy, Ill.	5000
WROK	Rockford, Ill.	5000
WPGW	Portland, Ind.	500d
KCHE	Cherokee, Iowa	500d
KEWI	Topeka, Kans.	5000
WCDS	Glasgow, Ky.	1000d
WPDE	Paris, Ky.	
WEZJ	Williamsburg, Ky.	1000d
KMLB	Monroe, La.	5000
WJAB	Westbrook, Me.	5000d
WAAB	Worcester, Mass.	5000
WBCM	Bay City, Mich.	1000
WDOW	Dowagiac, Mich.	1000d
WCHB	Inkster, Mich.	1000
KQRS	Golden Valley, Minn.	5000d
KEYL	Long Prairie, Minn.	1000
WHHT	Lucedale, Miss.	1000d
WSEL	Pontotoc, Miss.	1000d
WJLK	Asbury Park, N.J.	1000
WMVB	Millville, N.J.	1000d
WBAB	Babylon, N.Y.	1000d
WJJL	Niagara Falls, N.Y.	1000d
WSGO	Oswego, N.Y.	1000d
WBLA	Elizabethtown, N.C.	1000d
WBUY	Lexington, N.C.	5000
KILO	Grand Forks, N.D.	1000
WHHH	Warren, Ohio	5000
KMED	Medford, Oreg.	5000
KOOL	The Dalles, Oreg.	1000
WCOL	Carbondale, Pa.	5000d
WNPV	Lansdale, Pa.	500d
WGCB	Red Lion, Pa.	1000d
WQOK	Greenville, S.C.	5000
WHHL	Holly Hill, S.C.	1000d
WZYX	Cowan, Tenn.	1000d
WHDM	McKenzie, Tenn.	500d
KFDA	Amarillo, Tex.	5000
KEYS	Corpus Christi, Tex.	1000
KDNT	Denton, Tex.	5000
KGVL	Greenville, Tex.	1000
KWEL	Midland, Tex.	5000d
KETX	Livingston, Tex.	5000d
WKLV	Blackstone, Va.	5000d
WHRN	Herndon, Va.	
KDNC	Spokane, Wash.	5000d
WHIS	Bluefield, W.Va.	5000
WAJR	Morgantown, W.Va.	5000
WJPG	Green Bay, Wis.	5000

1450—206.8

WDNG	Anniston, Ala.	1000
WYAM	Bessemer, Ala.	1000
WDIG	Dothan, Ala.	1000
WFIX	Huntsville, Ala.	1000d
WLAY	Muscle Shoals City, Alabama	1000
KLAM	Cordova, Alaska	250
KAWT	Douglas, Ariz.	250
KNOT	Prescott, Ariz.	1000
KOLD	Tucson, Ariz.	250
KENA	Mena, Ark.	250
KJWH	Camden, Ark.	1000d
KYOR	Blythe, Calif.	250
KOWN	Escondido, Calif.	250
KPAL	Palm Springs, Cal.	1000
KTIP	Porterville, Calif.	1000
KSOL	San Francisco, Cal.	1000
KVML	Sonora, Calif.	250
KVEN	Ventura, Calif.	1000
KAGR	Yuba City, Calif.	100
KGIW	Alamosa, Colo.	250
KYOU	Greeley, Colo.	1000
WNAB	Bridgeport, Conn.	1000
WILM	Wilmington, Del.	1000
WOL	Washington, D. C.	1000
WWJB	Brooksville, Fla.	250
WMFJ	Daytona Beach, Fla.	1000
WSKP	Miami, Fla.	250
WBSR	Pensacola, Fla.	1000
WSPB	Sarasota, Fla.	1000
WSTU	Stuart, Fla.	250
WTAL	Tallahassee, Fla.	1000
WGPC	Albany, Ga.	1000
WBHF	Cartersville, Ga.	1000
WCON	Cornelia, Ga.	250
WKEU	Griffin, Ga.	1000
WMVG	Milledgeville, Ga.	1000
WBYG	Savannah, Ga.	1000
WVLD	Valdosta, Ga.	1000
KEEP	Twin Falls, Idaho	1000
WVON	Cicero, Ill.	1000
WKEI	Kewanee, Ill.	500
WCVS	Springfield, Ill.	1000
WANE	Ft. Wayne, Ind.	1000
WXVW	Jeffersonville, Ind.	250
WASK	Lafayette, Ind.	1000
WAOV	Vincennes, Ind.	1000
KLWW	Cedar Rapids, Ia.	250
KYET	Payette, Ida.	
KWBW	Hutchinson, Kans.	1000
WTCO	Campbellsville, Ky.	1000
WWXL	Manchester, Ky.	1000
WPAD	Paducah, Ky.	1000
WLKS	W. Liberty, Ky.	
KSIG	Crowley, La.	1000
KNOC	Natchitoches, La.	1000
WNPS	New Orleans, La.	250
WLKN	Lincoln, Me.	1000d
WRKD	Rockland, Maine	250
WKTQ	South Paris, Maine	1000
WTBO	Cumberland, Md.	1000
WMAS	Springfield, Mass.	1000
WATZ	Alpena Township, Michigan	1000
WHTC	Holland, Mich.	1000
WMIQ	Iron Mtn., Mich.	250
WIBM	Jackson, Mich.	1000
WKLA	Ludington, Mich.	1000
WHLS	Port Huron, Mich.	1000
KATE	Albert Lea, Minn.	250
KBUN	Bemidji, Minn.	1000
KBMW	Wahpeton, N.D.-Breckinridge, Minn.	1000d
WELY	Ely, Minn.	1000
KFAM	St. Cloud, Minn.	1000
WROX	Clarksdale, Miss.	1000
WCJU	Columbia, Miss.	250
WJXN	Jackson, Miss.	250
WOKK	Meridian, Miss.	1000
WNAT	Natchez, Miss.	250
WROB	West Point, Miss.	1000
KFTW	Fredericktown, Mo.	1000
WMBH	Joplin, Mo.	1000
KIRX	Kirksville, Mo.	1000
KOKO	Warrensburg, Mo.	1000
KWPM	West Plains, Mo.	1000
KXXL	Bozeman, Mont.	1000
KUDI	Great Falls, Mont.	1000
KXLL	Missoula, Mont.	250
KRBN	Red Lodge, Mont.	1000
KVCK	Wolf Point, Mont.	1000
KWBE	Beatrice, Nebr.	250
KONE	Reno, Nev.	250
WKXL	Concord, N.H.	1000
WFPG	Atlantic City, N.J.	1000
WCTC	New Brunswick, N. J.	1000
KRZY	Albuquerque, N.M.	250
KLMX	Clayton, N.Mex.	1000d
KOBE	Las Cruces, N.Mex.	250
KENM	Portales, N.Mex.	1000
WCLI	Corning, N.Y.	1000
WWSC	Glen Falls, N.Y.	1000d
WHDL	Olean, N.Y.	1000
WKIP	Poughkeepsie, N. Y.	1000
WKAL	Rome, N.Y.	250
WATA	Boone, N. C.	1000
WGNC	Gastonia, N.C.	1000
WIZS	Henderson, N.C.	1000
WHKP	Hendersonville, N.C.	1000
WHIT	New Bern, N.C.	1000
WFBS	Spring Lake, N.C.	1000
KGCA	Rugby, N.Dak.	250
WTBO	Cumberland, O.	1000d
WJER	Dover, Ohio	1000
WMOH	Hamilton, Ohio	1000d
WLEC	Sandusky, Ohio	1000
KWHW	Altus, Okla.	1000
KGFF	Shawnee, Okla.	1000
KSIW	Woodward, Okla.	1000
KORE	Eugene, Oreg.	1000
KFLW	Klamath Falls, Ore.	1000
KLBM	La Grande, Oreg.	1000
KBPS	Portland, Ore.	250
WWGO	Erie, Pa.	1000d
WFRA	Franklin, Pa.	1000
WDAD	Indiana, Pa.	1000
WPAM	Pottsville, Pa.	1000
WMPT	So. Williamsport, Pa.	250
WMAJ	State College, Pa.	1000d
WJPA	Washington, Pa.	250
WWRI	W. Warwick, R.I.	1000
WQSN	Charleston, S.C.	1000
WCRS	Greenwood, S.C.	1000
WMYB	Myrtle Beach, S.C.	1000
WHSC	Hartsville, S.C.	1000
KBFS	Belle Fourche, S. Dak.	1000
KYNT	Yankton, S. D.	1000
WLAR	Athens, Tenn.	1000
WMOC	Chattanooga, Tenn.	1000
WDSG	Dyersburg, Tenn.	1000
WSMG	Greeneville, Tenn.	250
WLAF	LaFollette, Tenn.	1000
WGNS	Murfreesboro, Tenn.	1000
KAYC	Beaumont, Tex.	1000
KBEN	Carrizo Sprgs., Tex.	250
KCTI	Gonzales, Tex.	250
KMBL	Junction, Tex.	250
KCYL	Lampasas, Tex.	250
KMHT	Marshall, Tex.	1000
KAMY	McCamey, Tex.	250
KNET	Palestine, Tex.	250
KSNY	Snyder, Tex.	1000
KURA	Moab, Utah	1000
KEYY	Provo, Utah	1000
KDXU	St. George, Utah	250

WHITE'S RADIO LOG

Kc. Wave Length W.P.

WSNO Barre, Vt. 1000
WTSA Brattleboro, Vt. 1000
WFTR Front Royal, Va. 1000
WENZ Highland Springs, Va. 250
WREL Lexington, Va. 1000
WMVA Martinsville, Va. 1000
KBKW Aberdeen, Wash. 1000
KCLX Colfax, Wash. 1000
KONP Port Angeles, Wash. 250
KPUY Puyallup, Wash.
WPAR Parkersburg, W. Va. 1000
KFIZ Fond du Lac, Wis. 250
WDLB Marshfield, Wis. 1000
WPFP Park Falls, Wis. 1000
WRCO Richland Center, Wis. 1000
KBBS Buffalo, Wyo. 250
KVOW Riverton, Wyo. 1000

1460—205.4

WFMH Cullman, Ala. 5000d
WPNX Phenix City, Ala. 5000
KZOT Marianna, Ark. 500
KCCL Paris, Ark. 500d
KTYM Inglewood, Calif. 5000
KDON Salinas, Calif. 5000
KVRE Santa Rosa, Calif. 1000d
KYSN Colo. Sprgs., Colo. 1000
WBAR Bartow, Fla. 1000d
WZEP DeFuniak Springs, Florida 1000d
WMBR Jacksonville, Fla. 5000
WOYX Buford, Ga. 1000d
WPNX Columbus, Ga. 1000
WEMD Sun Valley, Ida. 1000
WROY Carmi, Ill. 1000d
WIXN Dixon, Ill. 1000d
WRTL Rantoul, Ill. 250d
WKAM Goshen, Ind. 1000
WOCH North Vernon, Ind. 1000d
KSO Des Moines, Iowa 5000
KCRB Chanute, Kans. 1000d
WRVK Mt. Vernon, Ky. 500d
WAIL Baton Rouge, La. 5000
KBSF Springhill, La. 1000d
WEMO Easton, Md. 1000
WBET Brockton, Mass. 5000
WBRN Big Rapids, Mich. 1000d
WPON Pontiac, Mich. 1000
KDWA Hastings, Minn. 1000d
KDMA Montevideo, Minn. 1000
WELZ Belzoni, Miss. 1000d
WACY Moss Point, Miss. 1000d
KADY St. Charles, Mo. 5000d
KRNY Kearney, Nebr. 5000d
KENO Las Vegas, Nev. 1000
WJJZ Mt. Holly, N.J. 5000d
WOKO Albany, N.Y. 5000
WVOX New Rochelle, N.Y. 500d
WHEC Rochester, N.Y. 5000
WFVG Fuquay Sprgs., N.C. 1000d
WRKB Kannapolis, N.C. 500d
WMMH Marshall, N.C. 500d
WBNS Columbus, Ohio 5000
WPVL Painesville, Ohio 500d
KROW Dallas, Oreg. 5000d
KELR El Reno, Okla. 500
WMBA Ambridge, Pa. 500d
WCMB Harrisburg, Pa. 5000
WFBA San Sebastian, P.R. 500
WBCU Union, S.C. 1000
WJAK Jackson, Tenn. 5000d
WEEN Lafayette, Tenn. 1000d
KBRZ Freeport, Tex. 500d
KLLL Lubbock, Tex. 1000d
WACO Waco, Tex. 1000
WPRW Manassas, Va. 500d
WRAD Radford, Va. 5000
WLPM Suffolk, Va. 5000d
KYAC Kirkland, Wash. 5000d
KIMA Yakima, Wash. 5000
WBUC Buckhannon, W.Va. 5000d
WRAC Racine, Wis. 500d
WTMB Tomah, Wis. 1000d

1470—204.0

WBLO Evergreen, Ala. 1000d
KZNG Hot Springs, Ark. 1000d
KBMX Coalinga, Calif. 500d
KUTY Palmdale, Cal. 5000d
KXOA Sacramento, Calif. 5000
WMMW Meriden, Conn. 1000d
WRBD Pompano Beach, Fla. 5000
WCWR Tarpon Springs, Fla. 5000d
WAAG Adel, Ga. 1000d
WOOL Athens, Ga. 1000d
WCLA Claxton, Ga. 1000
WRGA Rome, Ga. 5000
WMPP Chicago Heights, Ill. 1000d
WMBD Peoria, Ill. 5000
WHUT Anderson, Ind. 1000d
KTRI Sioux City, Iowa 5000

Kc. Wave Length W.P.

KWVY Waverly, Iowa 1000d
KARE Atchison, Kans. 1000
KLIB Liberal, Kans. 500d
WSAC Fort Knox, Ky. 1000d
KTDL Farmersville, La. 1000d
KPLC Lake Charles, La. 5000
WLAM Lewiston, Maine 5000
WJDY Salisbury, Md. 5000d
WTTR Westminster, Md. 1000d
WSRO Marlborough, Mass. 1000d
WNBP Newburyport, Mass. 500d
WKMF Flint, Mich. 5000
WKLZ Kalamazoo, Mich. 500d
KANO Anoka, Minn. 1000d
WCHJ Brookhaven, Miss. 1000d
WNAU New Albany, Miss. 500d
KGHM Brookfield, Mo. 500d
KTCB Malden, Mo. 1000d
WTKO Ithaca, N.Y. 1000d
WPDM Potsdam, N.Y. 1000d
WBIG Greensboro, N.C. 5000
WPNC Plymouth, N.C. 1000d
WTOE Spruce Pine, N.C. 1000d
WOHO Toledo, Ohio 1000
KVLH Pauls Valley, Okla. 250d
KVIN Vinita, Okla. 500d
KRAF Reedsport, Oreg. 5000d
WSAN Allentown, Pa. 5000
WFAR Farrell, Pa. 1000d
WWML Portage, Pa. 500d
WQXL Columbia, S.C. 5000d
WGOO Georgetown, S. C. 500d
WEAG Alcoa, Tenn. 1000d
WVOL Berry Hill, Tenn. 5000
KRBC Abilene, Tex. 5000
KDHN Dimmitt, Tex. 500d
KWRD Henderson, Tex. 500d
KCNY San Marcos, Tex. 250d
KELA Centralia-Chehalis, Wash. 5000d
KSEM Moses Lake, Wash. 5000
KAPS Mount Vernon, Wash. 500d
WWHY Huntington, W.Va. 5000d
WBZE Wheeling, W.Va. 500d
WBKV West Bend, Wis. 1000d
KTWO Casper, Wyo. 5000

1480—202.6

WARI Abbeville, Ala. 1000d
WBTS Bridgeport, Ala. 1000d
WIXI Irondale, Ala. 5000d
WABB Mobile, Ala. 5000
KHAT Phoenix, Ariz. 500
KGLU Safford, Ariz. 1000
KTHS Berryville, Ark 1000
KWUN Concord, Calif. 500d
KYOS Merced, Calif. 5000
KWIZ Santa Ana, Calif. 5000
KSEE Santa Maria, Calif. 1000
KCMS Manitou Springs, Colo. 500
KPUB Pueblo, Colo. 1000d
WSOR Windsor, Conn. 500d
WAPG Arcadia, Fla. 1000d
WGNE Panama Beach, Fla. 500d
WXIV Windemere, Fla. 1000d
WYZE Atlanta, Ga. 5000d
WRDW Augusta, Ga. 5000
WGSB Geneva, Ill. 1000
WJBM Jerseyville, Ill. 500d
WTHI Terre Haute, Ind. 1000
WRSW Warsaw, Ind. 1000
KLEE Ottumwa, Iowa 500d
KBEA Mission, Kan. 1000
KLEO Wichita, Kans. 5000
WKOA Hopkinsville, Ky. 1000d
WNKY Neon, Ky. 1000d
WTLO Somerset, Ky. 1000d
KCKW Jena, La. 500d
KANV Jonesville, La. 500d
KJOE Shreveport, La. 1000d
WSAR Fall River, Mass. 5000
WMAX Grand Rapids, Mich. 5000d
WIOS Tawas City, Mich. 1000d
WYSI Ypsilanti, Mich. 500d
KAUS Austin, Minn. 1000
WECP Carthage, Miss. 500d
KGCX Sidney, Mont. 5000
KLMS Lincoln, Nebr. 1000
KWEW Hobbs, N. Mex. 1000
WLEA Hornell, N.Y. 1000d
WHOM New York, N.Y. 5000
WREM Remsen, N.Y. 5000d
WWOK Charlotte, N.C. 5000
WYRN Louisburg, N.C. 500d
WMSJ Sylva, N.C. 5000
WHBC Canton, Ohio 5000
WCIN Cincinnati, Ohio 5000
WTRA Latrobe, Pa. 500d
WDAS Philadelphia, Pa. 5000
WISL Shamokin, Pa. 1000
WSHP Shippensburg, Pa. 500d
WMDD Fajardo, P.R. 5000
KSDR Waterton, S.D. 1000d
WJFC Jefferson City, Tenn. 500
WMQM Memphis, Tenn.
WJLE Smithville, Tenn. 1000d
KBOX Dallas, Tex. 5000
KLVL Pasadena, Tex. 1000
KAPE San Antonio, Tex. 500d
KONI Spanish Fork, Utah 1000d
WCFR Springfield, Vt. 1000d

Kc. Wave Length W.P.

WBBL Richmond, Va. 5000
WLEE Richmond, Va. 5000
WBLU Salem, Va. 5000d
KFHA Lakewood Center, Wash. 1000d
KVAN Camas, Wash. 1000d
WISM Madison, Wis. 5000
KRAE Cheyenne, Wyo. 1000d

1490—201.2

WANA Anniston, Ala. 250
WAJF Decatur, Ala. 1000
WRLO Lanett, Ala.-W. Point, Ga. 250
WHBB Selma, Ala. 1000
KYCA Prescott, Ariz. 1000
KAIR Tucson, Ariz. 250
KXAR Hope, Ark. 1000
KTLO Mtn. Home, Ark. 250
KDRS Paragould, Ark. 1000
KOTN Pine Bluff, Ark. 250
KXRJ Russellville, Ark. 1000
KWAC Bakersfield, Calif. 1000
KPAS Banning, Calif. 250
KOWL Bijou, Cal. 1000
KICO Calexico, Calif. 250
KRKC King City, Calif. 1000
KOWL Lake Tahoe, Calif. 250
KTOB Petaluma, Calif. 1000
KBLF Red Bluff, Calif. 1000
KDB Santa Barbara, Calif. 1000
KSYC Yreka, Calif. 1000
KBOL Boulder, Colo. 1000
KGUC Gunnison, Colo. 250
KCMS Manitou Springs, Colo. 500
KOLR Sterling, Colo. 250
WGCH Greenwich, Conn. 250
WTRL Bradenton, Fla. 250
WJBS Deland, Fla. 1000
WIRA Ft. Pierce, Fla. 250
WCOF Immokalee, Fla. 250
WMBM Miami Beach, Fla. 250
WSRA Milton, Fla. 1000
WPXE Starke, Fla. 250
WTTB Vero Beach, Fla. 1000
WSIR Winter Haven, Fla. 500
WMOG Brunswick, Ga. 1000
WMJM Cordele, Ga. 1000
WMRE Monroe, Ga. 1000d
WSFB Quitman, Ga. 250
WSNT Sandersville, Ga. 500
WSYL Sylvania, Ga. 250
WRLD W.Point, Ga.-Lanett, Ala. 250
KTOH Lihue, Hawaii 1000
KCID Caldwell, Idaho 1000
WKRO Cairo, Ill. 250
WDAN Danville, Ill. 1000
WAMV East St. Louis, Ill. 1000
WOPA Oak Park, Ill. 1000
WZOE Princeton, Ill. 1000
WKBV Richmond, Ind. 1000
WNDU South Bend, Ind. 1000
KBUR Burlington, Iowa 1000
WOBQ Dubuque, Iowa 1000
KBAB Indianola, Ia. 500
KRIB Mason City, Iowa 250
KKAN Phillipsburg, Kans. 250
KTOP Topeka, Kan. 1000
WFKY Frankfort, Ky. 1000d
WKAY Glasgow, Ky. 1000
WOMI Owensboro, Ky. 1000
WSIP Paintsville, Ky. 1000
WIKC Bogalusa, La. 1000
KEUN Eunice, La. 1000
KCIL Houma, La. 1000
KRUS Ruston, La. 1000
WPOR Portland, Maine 1000
WTVL Waterville, Maine 1000
WARK Hagerstown, Md. 1000
WHAV Haverhill, Mass. 250
WMRC Milford, Mass. 1000
WTXL W. Springfield, Mass. 1000
WABJ Adrian, Mich. 1000
WMON Midland, Mich. 1000
WLRC Whitehall, Mich. 1000
KXRA Alexandria, Minn. 250
KOZY Grand Rapids, Minn. 250
KLGR Redwd. Falls, Minn. 1000
WLOX Biloxi, Miss. 1000
WCLD Cleveland, Miss. 1000
WHOC Philadelphia, Miss. 1000
WTUP Tupelo, Miss. 1000
WVIM Vicksburg, Miss. 250
KDMO Carthage, Mo. 250
KTTR Rolla, Mo. 1000
KDRO Sedalia, Mo. 1000
KDBM Dillon, Mont. 1000
KBON Omaha, Nebr. 1000
WEMJ Laconia, N.H. 1000
WLDB Atlantic City, N. J. 1000
KRSN Los Alamos, N.Mex. 1000
KRTN Raton, N.Mex. 1000
WCSS Amsterdam, N.Y. 1000
WBTA Batavia, N.Y. 250
WKNY Kingston, N.Y. 1000
WICY Malone, N.Y. 1000
WDLC Port Jervis, N. Y. 1000
WOLF Syracuse, N. Y. 1000
WSSB Durham, N. C. 1000
WFLB Fayetteville, N.C. 1000
WLOE Leaksville, N.C. 250

Kc. Wave Length W.P.

WRNB New Bern, N.C. 1000
WRMT Rocky Mount, N. C. 1000
WSTP Salisbury, N. C. 1000
WSVM Valdese, N.C. 1000
WHSL Wilmington, N.C. 250
KNDC Hettinger, N.D. 1000
KOVC Valley City, N. Dak. 1000
WBEX Chillicothe, Ohio 1000
WJMO Cleveland Hghts., O. 1000
WOHI E. Liverpool, Ohio 250
WMOA Marietta, Ohio 1000
WMRN Marion, Ohio 1000
KWRW Guthrie, Okla. 100
KBIX Muskogee, Okla. 1000
KBKR Baker, Oreg. 1000
KRNR Roseburg, Oreg. 1000
KBZY Salem, Oreg. 1000
WESB Bradford, Pa. 1000
WAZL Hazleton, Pa. 1000
WARD Johnstown, Pa. 1000
WGAL Lancaster, Pa. 1000
WBCB Levittown, Pa. 1000
WMRF Lewiston, Pa. 1000
WMGW Meadville, Pa. 1000d
WNBT Wellsboro, Pa. 1000
WSIB Beaufort, S.C. 100
WGCD Chester, S.C. 1000d
WMRB Greenville, S.C. 1000
KORN Mitchell, S.Dak. 1000
WOPI Bristol, Tenn. 1000
WDXB Chattanooga, Tenn. 1000
WROL Fountain City, Tenn. 1000
WJJM Lewisburg, Tenn. 1000
WDXL Lexington, Tenn. 1000
KNOW Austin, Tex. 250
KIBL Beeville, Tex. 250
KBST Big Spring, Tex. 1000
KHUZ Borger, Tex. 250
KNEL Brady, Tex. 250d
KSAM Huntsville, Tex. 250
KVOZ Laredo, Tex. 250
KZZN Littlefield, Tex. 1000
KPLT Paris, Tex. 1000
KGKB Tyler, Tex. 250
KVWC Vernon, Tex. 250
KVOG Ogden, Utah 1000
WKVT Brattleboro, Vt. 1000
WIKE Newport, Vt. 1000
WCVA Culpeper, Va. 1000
WVEC Hampton, Va. 1000
WAYB Waynesboro, Va. 1000
KBRO Bremerton, Wash. 1000
KLOG Kelso, Wash. 1000
KENE Toppenish, Wash. 1000
KTEL Walla Walla, Wash. 250
WGKV Charleston, W.Va. 1000
WTCS Fairmont, W.Va. 1000d
WLOH Princeton, W.Va. 250
WSGB Sutton, W.Va. 1000
WGEZ Beloit, Wis. 1000d
WLCX LaCrosse, Wis. 1000
WIGM Medford, Wis. 1000
WOSH Oshkosh, Wis. 1000
KIML Gillette, Wyo. 250
KLME Laramie, Wyo. 500
KRTR Thermopolis, Wyo. 250
KGOS Torrington, Wyo. 1000

1500—199.9

WFMI Montgomery, Ala. 500d
KGMR Jacksonville, Ark. 1000d
KBLA Burbank, Calif. 10000
KXRX San Jose, Calif. 5000
WFIF Milford, Conn. 5000d
WTOP Washington, D.C. 50000
WKIZ Key West, Fla. 250
WGUL New Port Richey, Fla. 250d
WSEM Donaldsonville, Ga. 1000d
WTHN Thomaston, Ga. 1000d
WPMB Vandalia, Ill. 250
WZBN Zion, Ill.
WBRI Indianapolis, Ind. 5000d
WAYK Valparaiso, Ind. 1000d
KWRG New Roads, La. 1000d
WVOC Battle Creek, Mich. 1000d
WJBK Detroit, Mich. 10000
KSTP Minneapolis-St. Paul, Minn. 50000
KDFN Doniphan, Mo. 1000d
WKER Pompton Lakes, N.J. 500
WKBX Winston-Salem, N.C. 1000d
KOSG Pawhuska, Okla. 5000
KPIR Eugene, Ore. 10000d
WMNT Manati, P.R. 250
WEAC Gaffney, S. C. 1000d
KWFA Merkle, Tex. 250d
KTXO Sherman, Tex. 250
KANI Wharton, Tex. 500

1510—199.1

KALF Mesa, Ariz. 10000d
KASK Ontario, Calif. 1000
KIRV Fresno, Cal. 500d
KTIM San Rafael, Calif. 1000d
KDKO Littleton, Colo. 1000
WNLC New London, Conn. 10000
WZZZ Boynton Beach, Fla. 1000d
WWBC Cocoa, Fla. 250d
WINU Highland, Ill. 250d
WJRC Joliet, Ill. 500d

Kc.	Wave Length	W.P.
WKAI	Macomb, Ill.	1000d
KIFG	Iowa Falls, Iowa	500d
KANS	Larned, Kan.	1000d
WMEX	Boston, Mass.	50000
WJCO	Jackson, Mich.	5000d
WLKM	Three Rivers, Mich.	500
KCCV	Independence, Mo.	1000d
KTTT	Columbus, Nebr.	500d
WRAN	Dover, N.J.	1000
WJIC	Salem, N.J.	
WBRW	Brewster, N.Y.	1000d
WEAL	Greensboro, N.C.	1000d
WBZB	Selma, N. C.	500d
WPSL	Monroeville, Penn.	250d
WLAC	Nashville, Tenn.	50000
KCTX	Childress, Tex.	250d
KABH	Midland, Tex.	500d
KMOO	Mineola, Tex.	250d
KROB	Robstown, Tex.	500d
KSTV	Stephenville, Tex.	250d
KGA	Spokane, Wash.	50000
WAUK	Waukesha, Wis.	10000d

1520—197.4

Kc.	Wave Length	W.P.
KGHT	Hollister, Calif.	500
KACY	Port Hueneme, Calif.	10000
WTLN	Apopka, Fla.	5000d
WGNP	Indian Rocks Beach, Fla.	1000d
WIXX	Oakland Park, Fla.	1000d
WHOW	Clinton, Ill.	5000d
WLUV	Loves Park, Ill.	500d
WSVL	Shelbyville, Ind.	1000
KSIB	Creston, Iowa	1000d
WRSL	Stanford, Ky.	500d
KXKW	Lafayette, La.	1000
WVOB	Bel Air, Md.	250d
WKJR	Muskegon Hts., Mich.	1000d
WYNZ	Ypsilanti, Mich.	250d
KOLM	Rochester, Minn.	1000d
KMPL	Sikeston, Mo.	
WDSL	Mocksville, N.C.	5000
WSLT	Ocean City-Somers Pt., N. J.	1000d
KHIP	Albuquerque, N.Mex.	500d
WKBW	Buffalo, N.Y.	50000
WFYI	Mineola, N. Y.	10000d
WDSL	Mocksville, N.C.	
WBNO	Bryan, Ohio	500d
WINW	Canton, O.	1000d
WKNT	Kent, O.	1000d
WTTO	Toledo, O.	1000d
KOMA	Okla. City, Okla.	50000
KYMN	Oregon City, Ore.	10000
WCHE	West Chester, Pa.	250
WRAI	Rio Piedras, P. R.	250
WTGR	Myrtle Beach, S.C.	
WBHT	Brownsville, Tenn.	250d
WIDO	Elizabethton, Tenn.	1000d

1530—196.1

Kc.	Wave Length	W.P.
WLCB	Moulton, Ala.	1000d
WCTR	Chestertown, Mo.	1530
KCAT	Pine Bluff, Ark	250d
KTMN	Trumann, Ark.	250d
KFBK	Sacramento, Calif.	50000
KRYT	Colorado Springs, Colo.	1000d
WENG	Englewood, Fla.	1000
WTTI	Dalton, Ga.	10000d
KNBI	Norton, Kan.	1000d
KWLA	Many, La.	1000d
WCTR	Chestertown, Md.	250d
WRPM	Poplarville, Miss.	1000d
WTHM	Lapeer, Mich.	5000d
WERX	Wyoming, Mich.	500d
KSMM	Shakopee, Minn.	500d
KMAM	Butler, Mo.	250
KLOL	Lincoln, Neb.	5000d
WCKY	Cincinnati, Ohio	50000
WMBT	Shenandoah, Pa.	250d
WUPR	Utuado, P.R.	1000d
KGTN	Georgetown, Tex.	1000d
KGBT	Harlingen, Tex.	50000
KCLR	Ralls, Tex.	1000d
WQVA	Quantico, Va.	250
KCHY	Cheyenne, Wy.	10000

1540—195.0

Kc.	Wave Length	W.P.
KPOL	Los Angeles, Calif.	50000
WBSR	Pensacola, Fla.	1000
WDGA	Sylvester, Ga.	
WSMI	Litchfield, Ill.	1000d
WBNL	Boonville, Ind.	250d
WADM	Decatur, Ind.	
WLOI	LaPorte, Ind.	250d
KXEL	Waterloo, Iowa	50000
KNEX	McPherson, Kans.	250d
KLKC	Parsons, Kans.	250d
WDON	Wheaton, Md.	1000
WMRR	Marshall, Mich.	250d
WLEF	Greenwood, Miss.	1000d
KBXM	Kennett, Mo.	250d
WPTR	Albany, N.Y.	50000
WRPL	Charlotte, N.C.	1000d
WIFM	Elkin, N.C.	1000d
WBCO	Bucyrus, Ohio	500d
WABQ	Cleveland, Ohio	1000d
WNID	Niles, Ohio	500d
WBTC	Uhrichsville, O.	250
KWFS	Eugene, Ore.	1000d
WRCP	Philadelphia, Pa.	50000d
WPTS	Pittston, Pa.	1000d
WPME	Punxsutawney, Pa.	1000d
WADK	Newport, R.I.	1000d
WBFJ	Woodbury, Tenn.	500d
KCUL	Ft. Worth, Tex.	50000d
KGBC	Galveston, Tex.	1000
WRGM	Richmond, Va.	10000
KBVU	Bellevue, Wash.	1000
WTKM	Hartford, Wis.	500d

1550—193.5

Kc.	Wave Length	W.P.
WAAY	Huntsville, Ala.	5000d
WMOO	Mobile, Ala.	50000d
KFIF	Tucson, Ariz.	50000d
KXEX	Fresno, Calif.	500d
KKHI	San Fran., Calif.	10000
KDAB	Arvada, Colo.	10000d
WEXT	W. Hartford, Conn.	1000d
WRIZ	Coral Gables, Fla.	10000d
WDRT	New Smyrna Bch., Fla.	250
WYOU	Tampa, Fla.	10000d
WYNX	Smyrna, Ga.	10000
WJIL	Jacksonville, Ill.	1000d
WCSJ	Morris, Ill.	250d
WPDF	Corydon, Ind.	250d
WCVL	Crawfordsville, Ind.	
WCTW	New Castle, Ind.	250
WKQV	Sullivan, Ind.	250d
KIWA	Sheldon, Iowa	500d
KEDD	Dodge City, Kans.	1000d
KNIC	Winfield, Kan.	250d
WIRV	Irvine, Ky.	1000d
WMSK	Morganfield, Ky.	250d
WLUX	Baton Rouge, La.	5000d
KOKA	Shreveport, La.	10000
WSER	Elkton, Md.	1000d
WSHN	Fremont, Mich.	1000d
WOKJ	Jackson, Miss.	50000
WSAO	Senatobia, Miss.	5000d
KBLR	Bolivar, Mo.	250
KGMO	Cape Girardeau, Mo.	5000d
KKJO	St. Joseph, Mo.	5000
KICS	Hastings, Neb.	500d
WCGR	Canadaigua, N.Y.	250
WBAZ	Kingston, N.Y.	500d
WBVM	Utica, N.Y.	1000
WPXY	Greenville, N. C.	500d
WNOH	Raleigh, N.C.	1000d
WTYN	Tryon, N.C.	1000d
WPEG	Winston-Salem, N.C.	1000d
KQWB	Fargo, N.D.	5000d
WDLR	Delaware, Ohio	500d
KMAD	Madill, Okla.	250
KREK	Sapulpa, Okla.	500d
WLOA	Braddock, Pa.	1000d
WTTC	Towanda, Pa.	500d
WKFE	Yauco, P.R.	250
WBSC	Bennetsville, S.C.	10000d
WTHB	N. Augusta, S.C.	1000d
KCAN	Canyon, Tex.	1000
KWBC	Navasota, Tex.	250d
WKYE	Bristol, Tenn.	1000d
WPTN	Cookeville, Tenn.	250d
WTPI	Cookville, Tenn.	250d
WKPT	Kingsport, Tenn.	10000d
KCOM	Comanche, Tex.	250d
KWIC	Salt Lake City, Utah	10000d
WKBA	Vinton, Va.	1000d
WKVK	Virginia Beach, Va.	5000d
WXVA	Charlestown, W.Va.	500d
KOQT	Bellingham, Wash.	1000d
KGAR	Vancouver, Wash.	1000d
WMIR	Lake Geneva, Wis.	
WMAD	Madison, Wis.	5000d

1560—192.3

Kc.	Wave Length	W.P.
WAGC	Centre, Ala.	1000d
KBIB	Monette, Ark.	250d
KPMC	Bakersfield, Calif.	10000
KIQS	Willows, Calif.	250d
WBYS	Canton, Ill.	250d
WVAK	Paoli, Ind.	250d
WRIN	Rensselaer, Ind.	250d
KSWI	Council Bluffs, Iowa	1000d
KABI	Abilene, Kan.	250d
WPHN	Liberty, Ky.	250d
WDXR	Paducah, Ky.	5000
WBGS	Sidell, La.	1000d
KBEW	Blue Earth, Minn.	1000
KQYX	Joplin, Mo.	250d
KLTI	Macon, Mo.	
WQXR	New York, N.Y.	50000
WTNS	Coshocton, Ohio	1000d
WCNW	Hamilton, O.	1000d
WTOD	Toledo, Ohio	5000d
KWCO	Chickasha, Okla.	1000
WRSJ	Bayamon, P.R.	5000
WAGL	Lancaster, S. C.	1000d
WWGM	Nashville, Tenn.	10000d
WBOL	Bolivar, Tenn.	250d
KCAD	Abilene, Tex.	500d
KHBR	Hillsboro, Tex.	250d
KGUL	Port Lavaca, Tex.	500d
KHDK	Hoquiam, Wash.	1000d
WGLB	Port Washington, Wis.	250d

1570—191.1

Kc.	Wave Length	W.P.
WCRL	Oneonta, Ala.	1000d
WRWJ	Selma, Ala.	5000d
KBRI	Brinkley, Ark.	250d
KBJT	Fordyce, Ark.	250d
KRSA	Alisal, Calif.	250d
KCVR	Lodi, Cal.	5000d
KACE	Riverside, Calif.	1000d
KLOV	Loveland, Colo.	250d
WTWB	Auburndale, Fla.	5000d
WFBF	Fernandino Beach, Fla.	1000d
WOKC	Okeechobee, Fla.	1000
WJDE	Ward Ridge, Fla.	250
WMES	Ashburn, Ga.	1000d
WGHC	Clayton, Ga.	1000d
WAIA	College Park, Ga.	
WGSR	Millen, Ga.	250d
WOKZ	Alton, Ill.	1000d
WFRL	Freeport, Ill.	5000d
WBEE	Harvey, Ill.	5000d
WTAY	Robinson, Ill.	250d
WILO	Frankfort, Ind.	250d
WAWK	Kendallville, Ind.	250d
WNUW	New Albany, Ind.	10000d
KMCO	Fairfield, Iowa	250d
KJFJ	Webster City, Iowa	250d
KNDY	Marysville, Kans.	250d
WKKS	Vanceburg, Ky.	250d
WABL	Amite, La.	500d
KLLA	Leesville, La.	1000
KMAR	Winnsboro, La.	1000
WAQE	Towson, Md.	5000d
WPEP	Taunton, Mass.	1000d
WMLO	Beverly, Mass.	500d
WDEW	Westfield, Mass.	1000d
WMRP	Flint, Mich.	1000d
WFUR	Grand Rapids, Michigan	1000d
KUXL	Golden Valley, Minn.	1000d
WDNA	Winona, Miss.	1000d
KLEX	Lexington, Mo.	250d
WAFS	Amsterdam, N.Y.	1000d
WFLR	Dundee, N.Y.	1000d
WBUZ	Fredonia, N.Y.	250d
WAPC	Riverhead, N.Y.	1000d
WTLK	Taylorsville, N.C.	500
WNCA	Siler City, N.C.	1000d
WCLW	Mansfield, O.	1000d
WPTW	Piqua, Ohio	250d
KTAT	Frederick, Okla.	250d
KOLS	Pryor, Okla.	1000d
KWAY	Forest Grove, Oreg.	1000d
KOHU	Hermiston, Oreg.	1000d
WPGM	Danville, Penn.	1000d
WBUX	Doylestown, Pa.	5000d
WQTW	Latrobe, Pa.	1000d
WFGN	Gaffney, S.C.	250d
WJES	Johnston, S.C.	250
WLSC	Loris, S.C.	1000d
WHLP	Centerville, Tenn.	1000d
WCLE	Cleveland, Tenn.	1000d
WTRB	Ripley, Tenn.	1000d
KZOL	Farwell, Tex.	250d
KVLG	La Grange, Tex.	250d
KTER	Terrell, Tex.	250d
WSWV	Pennington Gap, Va.	1000d
WYTI	Rocky Mount, Va.	1000d
WEER	Warrenton, Va.	1000d
WAPL	Appleton, Wis.	1000d

1580—189.2

Kc.	Wave Length	W.P.
WEYY	Talladega, Ala.	1000d
KYND	Tempe, Ariz.	50000
KPCA	Marked Tree, Ark.	250d
KFDF	Van Buren, Ark.	1000d
KMRE	Anderson, Cal.	1000d
KWIP	Merced, Calif.	500d
KDAY	Santa Monica, Cal.	50000
KHUM	Santa Rosa, Calif.	500d
KPIK	Colorado Sprgs., Colo.	5000d
WSBP	Chattachoochee, Fla.	1000d
WWIL	Ft. Lauderdale, Fla.	10000
WVGT	Mount Dora, Fla.	1000d
WCCF	Punta Gorda, Fla.	1000d
WCLS	Columbus, Ga.	1000
WUFF	Eastman, Ga.	500d
WLBA	Gainesville, Ga.	5000d
WKIG	Glenville, Ga.	1000d
WKKD	Aurora, Ill.	250d
WDQN	DuQuoin, Ill.	250d
WBBA	Pittsfield, Ill.	250d
WKID	Urbana, Ill.	250d
WCNB	Connersville, Ind.	250d
WJVA	South Bend, Ind.	1000d
WAMW	Washington, Ind.	250d
KCHA	Charles City, Iowa	500d
KWNT	Davenport, Iowa	500d
KDSN	Denison, Iowa	500d
WAXU	Georgetown, Ky.	10000d
WMTL	Leitchfield, Ky.	250d
WPKY	Princeton, Ky.	250d
KLUV	Haynesville, La.	250d
KLOU	Lake Charles, La.	1000
WPGC	Bradbury Hgts., Md.	10000
WJUD	St. Johns, Mich.	1000d
KDOM	Windom, Minn.	250d
WAMY	Amory, Miss.	5000d
WESY	Leland, Miss.	1000
WPMP	Pascagoula-Moss Point, Mississippi	1000d
KCGM	Columbia, Mo.	250d
KESM	Eldorado Springs, Mo.	250d
KNIM	Maryville, Mo.	250d
WNJH	Hammonton, N.J.	250d
WCRV	Washington, N.J.	500d
KLOS	Albuquerque, N.M.	1000d
WPAC	Patchogue, N.Y.	10000d
WZKY	Albemarle, N.C.	250d
WKJK	Granite Falls, N. C.	500d
WPYB	Benson, N.C.	500d
WVKO	Columbus, Ohio	1000d
KLTR	Blackwell, Okla.	1000d
WCOY	Columbia, Pa.	500d
WEND	Ebensburg, Pa.	1000d
WANB	Waynesburg, Pa.	250d
WORG	Orangeburg, S.C.	1000d
WBBR	Travelers Rest, S.C.	500d
WYCL	York, S.C.	250d
WSKT	Colonial Village, Tenn.	250d
WLIJ	Shelbyville, Tenn.	1000d
WSKT	South Knoxville, Tenn.	250
KKAL	Denver City, Tex.	250d
KGAF	Gainesville, Tex.	250d
KIRT	Mission, Tex.	1000d
KTLU	Rusk, Tex.	500d
KWED	Seguin, Tex.	1000d
KBYP	Shamrock, Tex.	250d
KBGO	Waco, Tex.	1000
WILA	Danville, Va.	1000d
WPUV	Pulaski, Va.	5000d
WTTN	Watertown, Wis.	1000d

1590—188.7

Kc.	Wave Length	W.P.
WATM	Atmore, Ala.	5000d
WBIB	Centerville, Ala.	1000d
WVNA	Tuscumbia, Ala.	5000
KPBA	Pine Bluff, Ark.	1000d
KLIV	San Jose, Cal.	5000d
KUDU	Ventura, Cal.	10000
KCIN	Victorville, Calif.	500d
WBRY	Waterbury, Conn.	5000
WOWY	Clewiston, Fla.	500d
WILZ	St. Petersburg Beach, Florida	1000d
WELE	S. Daytona Bch., Fla.	1000d
WALG	Albany, Ga.	1000
WLFA	Lafayette, Ga.	5000d
WTGA	Thomaston, Ga.	500d
WNMP	Evanston, Ill.	1000d
WAIK	Galesburg, Ill.	5000d
WGEE	Indianapolis, Ind.	5000d
WPCO	Mt. Vernon, Ind.	500d
KWBG	Boone, Iowa	1000
KVGB	Great Bend, Kans.	5000
WLBN	Lebanon, Ky.	1000d
KEVL	White Castle, La.	1000d
WETT	Ocean City, Md.	1000
WTVB	Coldwater, Mich.	5000
WDOG	Marine City, Mich.	1000d
WMIC	St. Helen, Mich.	500d
KRAD	E. Grand Forks, Minn.	1000d
WWUN	Jackson, Miss.	5000
KDEX	Dexter, Mo.	1000d
KPRS	Kansas City, Mo.	1000d
KCLU	Rolla, Mo.	1000d
WSMN	Nashua, N.H.	5000
WERA	Plainfield, N.J.	500d
WAUB	Auburn, N.Y.	500d
WEHH	Elmira Heights-Horseheads, N.Y.	500d
WGGO	Salamanca, N.Y.	5000d
WCSL	Cherryville, N.C.	500d
WVOE	Chadburn, N.C.	1000
WNCT	Greenville, N. C.	500
WNDS	High Point, N.C.	1000d
WAKR	Akron, Ohio	5000
WSRW	Hillsboro, Ohio	500d
KHEN	Henryetta, Okla.	500d
KTIL	Tillamook, Oreg.	1000
WZUM	Carnegie, Pa.	1000d
WCBG	Chambersburg, Pa.	5000
WEEZ	Chester, Pa.	1000
WXRF	Guayama, P.R.	1000
WYNG	Warwick, R.I.	1000d
WABV	Abbeville, S.C.	1000d
WACA	Camden, S.C.	1000d
KCCR	Pierre, S. D.	250
WSHC	Collierville, Tenn.	500d
WJSO	Jonesboro, Tenn.	5000d
WDBL	Springfield, Tenn.	1000d
KGAS	Carthage, Tex.	1000d
KERC	Eastland, Tex.	500d
KINT	El Paso, Tex.	1000d
KYOK	Houston, Tex.	5000
KCBD	Lubbock, Tex.	1000
KBUS	Mexia, Tex.	500d
KTOD	Sinton, Tex.	1000
WISZ	Glen Burnie, Md.	500
WRGM	Richmond, Va.	5000d
KLFF	Mead, Wash.	1000d
KETO	Seattle, Wash.	5000d
WIXK	New Richmond, Wis.	5000d
WSWW	Platteville, Wis.	5000
WTRW	Two Rivers, Wis.	1000d
WAWA	West Allis, Wis.	1000d

WHITE'S RADIO LOG

Kc.	Wave Length	W.P.
1600—187.5		
WEUP	Huntsville, Ala.	5000d
WAPX	Montgomery, Ala.	1000
KVIO	Cottonwood, Ariz.	1000d
KXEW	Tucson, Ariz.	1000
KGKO	Benton, Ark.	1000d
KGST	Fresno, Cal.	5000d
KWOW	Pomona, Cal.	5000
KHER	Santa Maria, Calif.	500d
KUBA	Yuba City, Calif.	5000
KLAK	Lakewood, Colo.	5000
WKEN	Dover, Del.	500d
WKTX	Atlantic Beach, Fla.	1000d
WKWF	Key West, Fla.	500
WHEW	Riviera Beach, Fla.	1000
WPRV	Wauchula, Fla.	500d
WOKB	Winter Garden, Fla.	5000d
WGKA	Atlanta, Ga.	1000d
WNGA	Nashville, Ga.	1000d
WCGO	Chicago Hgts., Ill.	1000d
WMCW	Harvard, Ill.	500d
WBTO	Linton, Ind.	500d
WARU	Peru, Ind.	1000d
KLGA	Algona, Iowa	5000d
KCRG	Cedar Rapids, Iowa	5000
KMDO	Ft. Scott, Kans.	500d
WSTL	Eminence, Ky.	500d
WKYF	Greenville, Ky.	
KFNV	Ferriday, La.	1000d
KLEB	Golden Meadow, La.	1000d
KLVI	Vivian, La.	500d
WINX	Rockville, Md.	1000
WBOS	Brookline, Mass.	5000
WTYM	East Longmeadow, Mass.	5000d
WAAM	Ann Arbor, Mich.	5000
WTRU	Muskegon, Mich.	5000
WKDL	Clarksdale, Miss.	1000d
WFFF	Columbia, Miss.	500d
KATZ	St. Louis, Mo.	5000
KTTN	Trenton, Mo.	500d
KNCY	Nebraska City, Nebr.	500d
KRFS	Superior, Nebr.	500d
WMCR	Oneida, N.Y.	1000d
WLNG	Sag Harbor, N.Y.	500
WXKW	Troy, N.Y.	500d
WWRL	Woodside, N.Y.	5000
WGIV	Charlotte, N.C.	1000
WIDU	Fayetteville, N.C.	1000d
WHVL	Hendersonville, N.C.	1000d
WFRC	Reidsville, N.C.	1000
WKSK	W. Jefferson, N.C.	1000d
KDAK	Carrington, N.Dak.	500d
WAQI	Ashtabula, Ohio	1000d
WBLY	Springfield, Ohio	1000d
WTTF	Tiffin, Ohio	500d
KUSH	Cushing, Okla.	1000d
KASH	Eugene, Oreg.	5000
KOHI	St. Helens, Ore.	1000d
WHOL	Allentown, Pa.	500d
WHRY	Elizabethtown, Pa.	500d
WBPR	Bayamon, P.R.	1000
WFIS	Fountain Inn, S.C.	1000d
WFNL	No. Augusta, S.C.	500d
WHBT	Harriman, Tenn.	5000d
WKBJ	Milan, Tenn.	1000d
KBBB	Borger, Tex.	500d
KBOR	Brownsville, Tex.	1000
KWEL	Midland, Tex.	1000d
KCFH	Cuero, Tex.	500d
KMAE	McKinney, Tex.	1000d
KOGT	Orange, Tex.	1000
KBBC	Centerville, Utah	1000d
WHLL	Wheeling, W.Va.	5000d
WCWC	Ripon, Wis.	5000

Canadian AM Stations by Frequency

Canadian stations listed alphabetically by call letters within groups. Abbreviations: Kc., frequency in kilocycles; W.P., power in watts; d, operates daytime only; n, operates nighttime only. Wave length is given in meters.

Kc.	Wave Length	W.P.
540—555.5		
CBK	Regina, Sask.	50,000
CBT	Grand Falls, Nfld.	10,000
550—545.1		
CFBR	Sudbury, Ont.	1,000d
CFNB	Fredericton, N.B.	50,000
CHLN	Trois-Rivières, Que.	10,000d / 5,000n
CKPG	Prince George, B.C.	250
560—525.4		
CFOS	Owen Sound, Ont.	1,000
CHCM	Marystown, Nfld.	1,000d / 500n
CHTK	Prince Rupert, B.C.	1,000d / 250n
CJKL	Kirkland Lake, Ont.	5,000
CKCN	Sept-Iles, Que.	10,000d / 5,000n
CKNL	Fort St. John, B.C.	1,000
570—526.0		
CFCB	Corner Brook, Nfld.	1,000
CJEM	Edmundston, N.B.	5,000d / 1,000n
CKCQ	Quesnel, B.C.	1,000
CKEK	Cranbrook, B.C.	1,000
CFWH	Whitehorse, Y.T.	1,000
580—516.9		
CFRA	Ottawa, Ont.	50,000d / 10,000n
CHLC	Hauterive, Que.	5,000d / 2,500n
CJFX	Antigonish, N.S.	5,000
CKPR	Port Arthur, Ont.	5,000d / 1,000n
CKUA	Edmonton, Alta.	10,000
CKWW	Windsor, Ont.	500
CKY	Winnipeg, Man.	50,000
590—508.2		
CFAR	Flin Flon, Man.	1,000
CKEY	Toronto, Ont.	10,000d / 5,000n
CKRS	Jonquiere, Que.	1,000
CFTK	Terrace, B.C.	1,000
VOCM	St. John's, Nfld.	10,000
600—499.7		
CFCF	Montreal, Que.	5,000
CFCH	Callander, Ont.	10,000d / 5,000n
CFQC	Saskatoon, Sask.	5,000
CJOR	Vancouver, B.C.	10,000
CKCL	Truro, N.S.	1,000
610—491.7		
CHNC	New Carlisle, Que.	10,000d / 5,000n
CHTM	Thompson, Man.	1,000
CJAT	Trail, B.C.	1,000
CKML	Mont Laurier, P.Q.	1,000
CKTB	St. Catharines, Ont.	10,000d / 5,000n
CKYL	Peace River, Alta.	1,000
620—483.6		
CFCL	Timmins, Ont.	10,000d / 5,000n
CKCK	Regina, Sask.	5,000
CKCM	Grand Falls, Nfld.	10,000
630—475.9		
CFCO	Chatham, Ont.	10,000d / 1,000n
CFCY	Charlottetown, P.E.I.	5,000
CHED	Edmonton, Alta.	10,000
CHLT	Sherbrooke, Que.	10,000d / 5,000n
CJET	Smiths Falls, Ont.	1,000
CKAR	Huntsville, Ont.	1,000
CKOV	Kelowna, B.C.	1,000
CKRC	Winnipeg, Man.	10,000
640—468.5		
CBN	St. John's, Nfld.	10,000
680—440.9		
CHFA	Edmonton, Alta.	5,000
CHLO	St. Thomas, Ont.	1,000
CJCN	Grand Falls, Nfld.	10,000
CJOB	Winnipeg, Man.	10,000d / 2,500n
CKGB	Timmins, Ont.	10,000
690—434.5		
CBF	Montreal, Que.	50,000
CBU	Vancouver, B.C.	10,000
710—422.3		
CJSP	Leamington, Ont.	1,000
CFRG	Gravelbourg, Sask.	5,000d
CKVM	Ville-Marie, Que.	10,000d / 1,000n
CJOX	Grand Bank, Nfld.	1,000
730—410.7		
CJNR	Blind River, Ont.	1,000
CKAC	Montreal, Que.	50,000
CKDM	Dauphin, Man.	10,000d / 5,000n
CKLG	North Vancouver, B.C.	10,000
740—405.2		
CBL	Toronto, Ont.	50,000
CBX	Edmonton, Alta.	50,000
790—379.5		
CFDR	Dartmouth, N.S.	5,000
CFCW	Camrose, Alta.	10,000
CKMR	Newcastle, N.B.	1,000
CKSO	Sudbury, Ont.	10,000d / 5,000n
CHIC	Brampton, Ont.	1,000d / 500n
800—374.8		
CFOB	Fort Frances, Ont.	1,000d / 500n
CHAB	Moose Jaw, Sask.	10,000d / 5,000n
CHRC	Quebec, Que.	10,000
CJAD	Montreal, Que.	50,000d / 10,000n
CJBQ	Belleville, Ont.	1,000
CJLX	Fort William, Ont.	10,000d / 5,000n
CKOK	Penticton, B.C.	10,000d / 500n
CKLW	Windsor, Ont.	50,000
VOWR	St. John's, Nfld.	1,000
810—370.2		
CHQR	Calgary, Alta.	10,000
850—352.7		
CJJC	Langley, B.C.	1,000
CKRD	Red Deer, Alta.	10,000 / 1,000
CKVL	Verdun, Que.	50,000d / 10,000n
860—348.6		
CBH	Halifax, N.S.	10,000
CFPR	Prince Rupert, B.C.	10,000
CHAK	Inuvik, N.W.T.	1,000
CJBC	Toronto, Ont.	50,000
900—333.1		
CHML	Hamilton, Ont.	5,000
CHNO	Sudbury, Ont.	10,000d / 1,000n
CJBR	Rimouski, Que.	10,000
CJVI	Victoria, B.C.	10,000
CKBI	Prince Albert, Sask.	10,000
CKDR	Dryden, Ont.	1,000d / 250n
CKDH	Amherst, N.S.	1,000
CKTS	Sherbrooke, Que.	1,000
CKJL	St. Jérôme, Que.	1,000
910—329.5		
CBO	Ottawa, Ont.	5,000
CFJC	Kamloops, B.C.	10,000d / 1,000n
CFSX	Stephenville, Nfld.	
CHRL	Roberval, Que.	1,000
CJDV	Drumheller, Alta.	5,000
CKLY	Lindsay, Ont.	1,000
920—329.9		
CFRY	Portage La Prairie, Man.	1,000
CJCH	Halifax, N.S.	10,000d / 5,000
CJCJ	Woodstock, N.B.	1,000
CKCY	Sault Ste. Marie, Ont.	10,000d / 5,000n
CKNX	Wingham, Ont.	2,500d / 1,000n
930—322.4		
CFBC	Saint John, N.B.	10,000d / 5,000n
CJCA	Edmonton, Alberta	10,000d / 5,000n
CJON	St. John's, Nfld.	10,000
940—319.0		
CBM	Montreal, Que.	50,000
CJGX	Yorkton, Sask.	10,000d / 1,000n
CJIB	Vernon, B.C.	1,000
950—315.6		
CKBB	Barrie, Ont.	10,000d / 2,500n
CKNB	Campbellton, N.B.	10,000d / 1,000n
960—312.3		
CFAC	Calgary, Alta.	10,000
CHNS	Halifax, N.S.	10,000
CKWS	Kingston, Ont.	5,000
970—309.1		
CKCH	Hull, Que.	5,000
CBZ	Fredericton, N.B.	10,000
980—305.9		
CBV	Quebec, Que.	5,000
CFPL	London, Ontario	10,000d / 5,000n
CHEX	Peterborough, Ont.	5,000
CKGM	Montreal, Que.	10,000
CKNW	New Westminster, B.C.	50,000
CKRM	Regina, Sask.	10,000d / 5,000n
990—302.8		
CBW	Winnipeg, Man.	50,000
CBY	Corner Brook, Nfld.	10,000
1000—299.8		
CKBW	Bridgewater, N.S.	10,000
1010—296.9		
CBR	Calgary, Alta.	50,000
CFRB	Toronto, Ont.	50,000
1050—285.5		
CFGP	Grande Prairie, Alta.	10,000
CHUM	Toronto, Ont.	50,000
CJIC	Sault Ste. Marie, Ont.	10,000d / 2,500n
CJNB	North Battleford, Sask.	10,000
CKSB	St. Boniface, Man.	10,000
1060—282.8		
CFCN	Calgary, Alta.	10,000
CJLR	Quebec, Que.	10,000
1070—280.2		
CBA	Sackville, N.B.	50,000
CFAX	Victoria, B.C.	1,000
CHOK	Sarnia, Ont.	5,000d / 1,000n
1080—277.6		
CKSA	Lloydminster, Alta.	10,000
1090—275.1		
CHEC	Lethbridge, Alta.	5,000
CHRS	St. Jean, Que.	10,000d
1110—272.6		
CBD	Saint John, N.B.	10,000
CFML	Cornwall, Ont.	1,000d
CFTJ	Galt, Ont.	250d
1130—265.3		
CKWX	Vancouver, B.C.	50,000
1140—263.0		
CBI	Sydney, N.S.	10,000
CKXL	Calgary, Alta.	10,000
1150—260.7		
CHSJ	Saint John, N.B.	10,000d / 5,000n
CKOC	Hamilton, Ont.	5,000
CKTR	Trois-Rivières, Que.	10,000d / 1,000n
CKX	Brandon, Man.	10,000d / 1,000n

Kc. — Wave Length	W.P.
1170—256.3	
CFNS Saskatoon, Sask.	1,000
1220—245.8	
CJOC Lethbridge, Alta	10,000d 5,000n
CJSS Cornwall, Ontario	1,000
CJRL Kenora, Ont.	1,000
CKDA Victoria, B.C.	10,000
CKCW Moncton, N.B.	10,000
CKSM Shawinigan, Que.	1,000
1220—245.8	
CFBV Smithers, B.C.	1,000d 250n
CFGR Gravelbourg, Sask.	250n
CFKL Schefferville, Que.	250
CFPA Port Arthur, Ont.	1,000d 250n
CHFC Churchill, Man.	250
CKLD Thetford Mines, Que.	1,000d 250n
CKMP Midland, Ontario	250
CKTK Kitimat, B.C.	1,000d 250n
CKVD Val d'Or, Que.	1,000d 250n
VOAR St. John's, Nfld.	100
1240—241.8	
CFLM La Tuque, Que.	1,000d 250n
CFVR Abbotsford, B.C.	250
CJAF Cabano, Que.	250
CJAV Port Alberni, B.C.	1,000d 250n
CJCS Stratford	500d 250n
CJRW Summerside, P.E.I.	250
CJWA Wawa, Ont.	1,000d 250n
CKWL Williams Lake, B.C.	250
CKBS St. Hyacinthe, Que.	250
CKLS Ls Sarre, Que.	250
1250—239.9	
CBOF Ottawa, Ont.	10,000
CHWO Oakville, Ont.	1,000d
CHSM Steinbach, Man.	10,000
CKBL Matane, Que.	10,000d 5,000n
CKOM Saskatoon, Sask.	10,000
1260—238.0	
CFRN Edmonton, Alta.	50,000
1270—263.1	
CFGT St. Joseph d'Alma, Que.	1,000
CHAT Medicine Hat, Alta.	10,000
CHWK Chilliwack, B.C.	10,000
CJCB Sydney, N.S.	10,000
1280—234.2	
CHIQ Hamilton, Ont.	5,000
CJMS Montreal, Que.	50,000
CJSL Estevan, Sask.	1,000
CKCV Quebec, Que.	10,000d 5,000n
1290—232.4	
CFAM Altona, Man.	10,000d 5,000n
1300—230.6	
CBAF Moncton, N.B.	5,000
CJME Regina, Sask.	1,000
1310—228.9	
CFGM Richmond Hill, Ont.	10,000d 2,500n
CHGB Ste-Anne-de-la-Pocatière, Que.	5,000
CKOY Ottawa, Ont.	50,000
1320—227.1	
CHQM Vancouver, B.C.	10,000
CJSO Sorel, Que.	10,000d 5,000n
CKEC New Glasgow, N.S.	5,000
CKKW Kitchener, Ont.	1,000
1340—223.7	
CFGB Goose Bay, Nfld.	1,000
CFSL Weyburn, Sask.	1,000d 250n
CFYK Yellowknife, N.W.T.	250
CHAD Amos, Que.	250
CHRD Drummondville, Que.	250
CJLS Yarmouth, N.S.	250
CFOM Quebec, Que.	250
CKAR-1 Parry Sound, Ont.	250
CKDX Woodstock, Ont.	1,000d 250n
1350—222.1	
CHOV Pembroke, Ont.	1,000
CJDC Dawson Creek, B.C.	1,000
CJLM Joliette, Que.	1,000
CKEN Kentville, N.S.	1,000
CKLB Oshawa, Ont.	10,000d 5,000n
1360—220.4	
CKBC Bathurst, N.B.	10,000
1370—218.8	
CFLV Valleyfield, Que.	1,000
1380—217.3	
CFDA Victoriaville, Que.	1,000
CKLC Kingston, Ont.	5,000
CKPC Brantford, Ont.	10,000
1390—215.7	
CKLN Nelson, B.C.	1,000
1400—214.2	
CJFP Rivière du Loup, Que.	10,000d 250n
CKCB Collingwood, Ont.	250
CKRN Rouyn, Que.	250
CKSW Swift Current, Sask.	1,000d 250n
1410—212.6	
CFMB Montreal, Que.	10,000
CFUN Vancouver, B.C.	10,000
CKSL London, Ont.	10,000
1420—211.1	
CJMT Chicoutimi, Que.	1,000
CKPT Peterborough, Ont.	1,000d 500n
1430—209.7	
CKFH Toronto, Ont.	10,000d 5,000n
1440—208.2	
CFCP Courtenay, B.C.	1,000
CKPM Ottawa, Ont.	10,000
1450—206.8	
CBG Gander, Nfld.	250
CFAB Windsor, N.S.	250
CFJR Brockville, Ont.	1,000d 250n
CHEF Granby, Que.	1,000d 250n
CHUC Cobourg, Ont.	1,000
CJBM Causapscal, Que.	1,000d 250n
1460—205.4	
CJOY Guelph, Ont.	10,000d 5,000n
CKRB Ville St. Georges, Que.	10,000d 5,000n
1470—204.0	
CFOX Pointe Claire, Que.	10,000d 5,000n
CHDW Welland, Ont.	1,000d 500n
CJQM Winnipeg, Man.	5,000
1490—201.2	
CFMR Fort Simpson, N.W.T.	25
CFRC Kingston, Ont.	100
CHYM Kitchener, Ont.	10,000d 5,000n
CKAD Middleton, N.S.	1,000d 250n
CKBM Montmagny, Que.	1,000d 250n
CFWB Campbell River, B.C.	250
1500—199.9	
CKAY Duncan, B.C.	1,000
1510—199.1	
CKDT Tillsonburg, Ont.	1,000
1540—195.0	
CHFI Toronto, Ont.	50,000
1550—193.5	
CBE Windsor, Ont.	10,000
1560—192.3	
CFRS Simcoe, Ont.	250d
1570—191.1	
CFOR Orillia, Ont.	10,000d 1,000n
CHUB Nanaimo, B.C.	10,000
CKLM Montreal, Que.	10,000
1580—189.2	
CBJ Chicoutimi, Que.	10,000
1600—187.5	
CJRN Niagara Falls, Ont.	10,000

Short-Wave

Kc.	W.P.
CKCX Montreal, Que.	50,000
5970	
CKCX Montreal, Que.	50,000
5990	
CHAY Montreal, Que.	50,000
6005	
CFCX Montreal, Que.	500
6010	
CJCX Sydney, N.S.	1,000
6030	
CFVP Calgary, Alta.	100
6060	
CKCX Sackville, N.B.	50,000
6070	
CFRX Toronto, Ont.	1,000
6080	
CKFX Vancouver, B.C.	10
6090	
CKCX Montreal, Que.	50,000
6120	
CKYT Montreal, Que.	50,000
6130	
CHNX Halifax, N.S.	500
6160	
CKZN St. John's, Nfld.	300
CKZU Vancouver, B.C.	500
CKCX Montreal, Que.	50,000
9585	
CKLP Montreal, Que.	50,000
9610	
CKCX Montreal, Que.	50,000
9625	
CKYU Montreal, Que.	50,000
9630	
CKCX Montreal, Que.	50,000
9655	
CKYS Montreal, Que.	50,000
9710	
CHLR Montreal, Que.	50,000
9740	
CHFO Montreal, Que.	50,000
11,705	
CKCX Montreal, Que.	50,000
11,720	
CKCX Montreal, Que.	50,000
11,760	
CKCX Montreal, Que.	50,000
11,900	
CKCX Montreal, Que.	50,000
11,945	
CKCX Monreal, Que.	50,000
15,105	
CKUS Montreal, Que.	50,000
15,190	
CKCX Montreal, Que.	50,000
15,255	
CKSR Montreal, Que.	50,000
15,275	
CKBR Montreal, Que.	50,000
15,320	
CKCX Montreal, Que.	50,000
17,710	
CHSB Montréal, Que.	50,000
17,735	
CHRX Montreal, Que.	50,000
17,820	
CKCX Montreal, Que.	50,000
17,865	
CHYS Montréal, Que.	50,000
21,595	
CKCX Montreal, Que.	50,000
21,600	
CKCX Montreal, Que.	50,000
21,710	
CKCX Montreal, Que.	50,000

U. S. Commercial Television Stations by States

U. S. stations listed alphabetically by cities within state groups. Territories and possessions follow states. Chan., channel; C.L., call letters.

Location	C.L.	Chan.
ALABAMA		
Birmingham	WAPI-TV	13
	WBRC-TV	6
Decatur	WMSL-TV	23
Dothan	WTVY	4
Florence	WOWL-TV	15
Huntsville	WAAY-TV	31
	WHNT-TV	19
Mobile	WALA-TV	10
	WKRG-TV	5
Montgomery	WCOV-TV	20
	WSFA-TV	12
	WKAB-TV	32
Selma	WSLA	8
ALASKA		
Anchorage	KENI-TV	2
	KTVA	11
Fairbanks	KFAR-TV	2
	KTVF	11
Juneau	KINY-TV	8
ARIZONA		
Nogales	XHFA-TV	2
Phoenix	KOOL-TV	10
	KPHO-TV	5
	KTVK	3
	KTAR-TV	12
Phoenix-Mesa	KTAR-TV	12
Tucson	KGUN-TV	9
	KOLD-TV	13
	KVOA-TV	4
Yuma	KBLU-TV	13
	KIVA	11
ARKANSAS		
El Dorado-Monroe, La.	KTVE	10
Ft. Smith	KFSA-TV	5
Jonesboro	KAIT-TV	8
Little Rock	KARK-TV	4
	KATV	7
	KTHV	11

WHITE'S RADIO LOG

CALIFORNIA

Location	C.L.	Chan.
Bakersfield	KBAK-TV	29
	KERO-TV	23
	KLYD-TV	17
Chico	KHSL-TV	12
El Centro-Mexicali	XEM-TV	3
Eureka	KIEM-TV	3
	KVIQ-TV	6
Fresno	KAIL	53
	KFRE-TV	30
	KJEO	47
	KMJ-TV	24
Los Angeles	KABC-TV	7
	KCOP	13
	KHJ-TV	9
	KMEX-TV	34
	KNBC	4
	KNXT	2
	KPOL-TV	22
	KTLA	5
	KTTV	11
Oakland-San Francisco	KTVU	2
Redding	KRCR-TV	7
Sacramento	KCRA-TV	3
Sacramento	KXTV	10
	KPXL	29
Salinas-Monterey	KSBW-TV	8
San Diego	KFMB-TV	8
	KOGO-TV	10
Tijuana-San Diego	XETV	6
	XEWT-TV	12
San Francisco	KGO-TV	7
	KPIX	5
	KRON-TV	4
San Jose	KNTV	11
San Luis Obispo	KSBY-TV	6
Santa Barbara	KEYT	3
Santa Maria	KCOY-TV	12
Stockton-Sacramento	KOVR	13
Visalia-(Fresno)	KICU-TV	43

COLORADO

Location	C.L.	Chan.
Colorado Springs	KKTV	11
	KRDO-TV	13
Denver	KBTV	9
	KCTO	2
	KLZ-TV	7
	KOA-TV	4
Durango	KREZ-TV	6
Grand Junction	KREX-TV	5
Montrose	KREY-TV	10
Pueblo	KOAA-TV	5
Sterling	KTVS	3

CONNECTICUT

Location	C.L.	Chan.
Hartford	WHCT	18
	WTIC-TV	3
New Britain-Hartford	WHNB-TV	30
New Haven-Hartford	WNHC-TV	8
Waterbury	WATR-TV	20

DELAWARE

No Stations

DISTRICT OF COLUMBIA

Location	C.L.	Chan.
Washington	WOOK-TV	14
	WDCA-TV	20
	WMAL-TV	7
	WRC-TV	4
	WTOP-TV	9
	WTTG	5

FLORIDA

Location	C.L.	Chan.
Daytona Beach-Orlando	WESH-TV	2
Ft. Myers	WINK-TV	11
Jacksonville	WFGA-TV	12
	WJXT	4
Miami	WCKT	7
	WLBW-TV	10
	WTVJ	4
Orlando	WDBO-TV	6
	WFTV	9
Palm Beach	WPTV	5
Panama City	WJHG-TV	7
Pensacola-Mobile, Ala.	WEAR-TV	3
St. Petersburg-Tampa	WSUN-TV	38
Tallahassee-Thomasville, Ga.	WCTV	6
St. Petersburg-Tampa	WSUN-TV	38
Tampa	WFLA-TV	8
	WTVT	13
West Palm Beach	WEAT-TV	12

GEORGIA

Location	C.L.	Chan.
Albany	WALB-TV	10
Atlanta	WAII-TV	11
	WAGA-TV	5
	WSB-TV	2
Augusta	WJBF	6
	WRDW-TV	12
Columbus	WRBL-TV	3
	WTVM	9
Macon	WMAZ-TV	13
Savannah	WSAV-TV	3
	WTOC-TV	11

HAWAII

Location	C.L.	Chan.
Hilo	KALU	11
	KHBC-TV	9
	KHVO	13
Honolulu	KGMB-TV	9
	KHVH-TV	4
	KONA	2
	KTRG-TV	13
Wailuku	KALA	7
	KMAU-TV	3
	KMVI-TV	12

IDAHO

Location	C.L.	Chan.
Boise	KBOI-TV	2
	KTVB	7
Idaho Falls	KIO-TV	3
	KIFI-TV	8
Lewiston	KLEW-TV	3
Twin Falls	KMVT	11

ILLINOIS

Location	C.L.	Chan.
Champaign	WCHU	33
	WCIA	3
Chicago	WBBM-TV	2
	WBKB	7
	WCIU	26
	WGN-TV	9
	WMAQ-TV	5
Danville	WICD	24
Decatur	WTVP	17
Freeport-Rockford	WCEE-TV	23
Harrisburg	WSIL-TV	3
LaSalle	WEEQ-TV	35
Moline	WQAD-TV	8
Peoria	WTVH	19
	WEEK-TV	25
	WMBD-TV	31
Quincy-Hannibal, Mo.	WGEM-TV	10
Rockford	WTVO	39
	WREX-TV	13
Rock Island	WHBF-TV	4
Springfield	WICS	20

INDIANA

Location	C.L.	Chan.
Bloomington-Indianapolis	WTTV	4
Evansville	WEHT	50
	WFIE-TV	14
	WTVW	7
Fort Wayne	WANE-TV	15
	WPTA	21
	WKJG-TV	33
Indianapolis	WFBM-TV	6
	WISH-TV	8
	WLWI	13
Lafayette	WFAM-TV	18
Marion	WTAF-TV	31
Muncie	WLBC-TV	49
South Bend	WNDU-TV	16
	WSBT-TV	22
South Bend-Elkhart	WSJV	28
Terre Haute	WTHI-TV	10
	WTWO	2

IOWA

Location	C.L.	Chan.
Ames-Des Moines	WOI-TV	5
Cedar Rapids	KCRG-TV	9
Cedar Rapids-Waterloo	WMT-TV	2
Davenport	WOC-TV	6
Des Moines	KRNT-TV	8
	WHO-TV	13
Fort Dodge	KQTV	21
Mason City	KGLO-TV	3
Sioux City	KTIV	4
	KVTV	9
Waterloo-Cedar Rapids	KWWL-TV	7

KANSAS

Location	C.L.	Chan.
Ensign	KTVC	6
Garden City	KGLD	11
	KUPK	13
Goodland	KLOE-TV	10
Great Bend	KCKT	2
Hays	KAYS-TV	7
Hutchinson-Wichita	KTVH	12
Pittsburg-Joplin, Mo.	KOAM-TV	7
Salina	KSLN-TV	34
Topeka	WIBW-TV	13
Wichita	KAKE-TV	10
	KARD-TV	3

KENTUCKY

Location	C.L.	Chan.
Bowling Green	WLTV	13
Lexington	WKYT-TV	27
	WLEX-TV	18
Louisville	WHAS-TV	11
	WAVE-TV	3
	WLKY-TV	32
Newport	WNOP-TV	74
Paducah	WPSD-TV	6

LOUISIANA

Location	C.L.	Chan.
Alexandria	KALB-TV	5
Baton Rouge	WAFB-TV	9
	WBRZ	2
Lafayette	KATC	3
	KLFY-TV	10
Lake Charles	KPLC-TV	7
Monroe	KNOE-TV	8
New Orleans	WDSU-TV	6
	WWL-TV	4
	WVUE	12
Shreveport	KSLA-TV	12
	KTAL-TV	6
Shreveport	KTBS-TV	3

MAINE

Location	C.L.	Chan.
Bangor	WABI-TV	5
	WLBZ-TV	2
Poland Spring	WMTW-TV	8
Portland	WCSH-TV	6
	WGAN-TV	13
Presque Isle	WAGM-TV	8

MARYLAND

Location	C.L.	Chan.
Baltimore	WBAL-TV	11
	WJZ-TV	13
	WMAR-TV	2
	WMET-TV	24
Salisbury	WBOC-TV	16

MASSACHUSETTS

Location	C.L.	Chan.
Adams	WCDC	19
Boston	WBZ-TV	4
	WIHS-TV	38
	WHDH-TV	5
	WNAC-TV	7
Greenfield	WRLP	32
Springfield	WWLP	22
	WHYN-TV	40
Worcester	WJZB-TV	14

MICHIGAN

Location	C.L.	Chan.
Bay City-Saginaw	WNEM	5
Cadillac-Traverse City	WWTV	9
Cheboygan	WTOM-TV	4
Detroit	WJBK-TV	2
	WWJ-TV	4
	WKBD	50
	WXYZ-TV	7
Detroit-Windsor	CKLW-TV	9
Flint	WJRT	12
Grand Rapids	WZZM-TV	13
Grand Rapids-Kalamazoo	WOOD-TV	8
Kalamazoo	WKZO-TV	3
Lansing	WJIM-TV	6
Lansing-Onondaga	WILX-TV	10
Marquette	WLUC-TV	6
Saginaw-Bay City	WKNX-TV	57
Sault Ste. Marie	WWUP-TV	10
Traverse City	WPBN-TV	7

MINNESOTA

Location	C.L.	Chan.
Alexandria	KCMT	7
Austin	KMMT	6
Duluth-Superior, Wis.	KDAL-TV	3
	WDSM-TV	6
Mankato	KEYC-TV	12
Minneapolis-St. Paul	WCCO-TV	4
	KMSP-TV	9
	WTCN-TV	11
Rochester	KROC-TV	10
St. Paul-Minneapolis	KSTP-TV	5
Thief River Falls	KNOX-TV	10
Walker	KNMT	12

MISSISSIPPI

Location	C.L.	Chan.
Biloxi	WLOX-TV	13
Columbus	WCBI-TV	4
Greenwood	WABG-TV	6
Jackson	WJTV	12
	WLBT	3
Laurel-Hattiesburg	WDAM-TV	7
Meridian	WTOK-TV	11
Tupelo	WTWV	9

MISSOURI

Location	C.L.	Chan.
Cape Girardeau	KFVS-TV	12
Columbia	KOMU-TV	8
Hannibal-Quincy, Ill.	KHQA-TV	7
Jefferson City	KRCG	13
Joplin	KODE-TV	12
Kansas City	KCMO-TV	5
	WDAF-TV	4
	KMBC-TV	9
Kirksville-Ottumwa, Ia.	KTVO	3
Poplar Bluff	KPOB-TV	15
St. Joseph	KFEQ-TV	2
St. Louis	KMOX-TV	4
	KSD-TV	5
	KPLR-TV	11
	KTVI	2
Sedalia	KMOS-TV	6
Springfield	KTTS-TV	10
	KYTV	3

MONTANA

Location	C.L.	Chan.
Billings	KULR-TV	8
	KOOK-TV	2
Butte	KXLF-TV	4
Glendive	KXGN-TV	5
Great Falls	KFBB-TV	5
	KRTV	3
Helena	KBLL-TV	12
Missoula	KGVO-TV	13

NEBRASKA

Location	C.L.	Chan.
Albion	KHQL-TV	8
Grand Island	KGIN-TV	11
Hastings	KHAS-TV	5
Hay Springs	KDUH-TV	4
Hayes Center	KHPL-TV	6
Kearney-Holdrege	KHOL-TV	13
Lincoln	KOLN-TV	10
McCook	KOMC	8
North Platte	KNOP-TV	2
Omaha	KETV	7
	WOW-TV	6
	KMTV	3
Scottsbluff-Gering	KSTF	10

NEVADA

Location	C.L.	Chan.
Las Vegas	KLAS-TV	8
	KORK-TV	2
Reno	KCRL	4
	KOLO-TV	8

NEW HAMPSHIRE

Location	C.L.	Chan.
Manchester	WMUR-TV	9

NEW JERSEY

Location	C.L.	Chan.
Burlington	WKBS	48
Linden-Newark	WNJU-TV	47
Wildwood	WCMC-TV	40

NEW MEXICO

Location	C.L.	Chan.
Albuquerque	KGGM-TV	13
	KOAT-TV	7
	KOB-TV	4
Carlsbad	KAVE-TV	6
Clovis	KICA-TV	12
Roswell	KSWS-TV	8

NEW YORK

Location	C.L.	Chan.
Albany	W-TEN	10
	WAST	13
Binghamton	WBJA-TV	34
	WINR-TV	40
	WNBF-TV	12
Buffalo	WBEN-TV	4
	WGR-TV	2
	WKBW-TV	7
Carthage-Watertown	WCNY-TV	7
Elmira-Corning	WSYE-TV	18
New York	WABC-TV	7
	WCBS-TV	2
	WNBC-TV	4
	WNEW-TV	5
	WOR-TV	9
	WPIX	11
Plattsburgh	WPTZ	5
Rochester	WHEC-TV	10
	WOKR	13
	WROC-TV	8
Schenectady	WRGB	6
Syracuse	WHEN-TV	5
	WSYR-TV	3
	WNYS-TV	9
Utica	WKTV	2

NORTH CAROLINA

Location	C.L.	Chan.
Asheville	WISE-TV	82
	WLOS-TV	13
Charlotte	WBTV	3
	WSOC-TV	9
	WCCB-TV	36
Durham-Raleigh	WTVD	11
Greensboro	WFMY-TV	2
Greenville	WNCT-TV	9
High Point	WGHP-TV	8
New Bern	WNBE-TV	12
Raleigh-Durham	WRAL-TV	5
Washington	WITN-TV	7
Wilmington	WECT	6
	WWAY	3
Winston-Salem	WSJS-TV	12

NORTH DAKOTA

Location	C.L.	Chan.
Bismarck	KFYR-TV	5
	KXMB-TV	12
Dickinson	KDIX-TV	2
Fargo	KTHI-TV	11
	WDAY-TV	6
Minot	KMOT	10
	KXMC-TV	13
Pembina	KCND-TV	12
Valley City	KXJB-TV	4
Williston	KUMV-TV	8

Location	C.L.	Chan.
OHIO		
Akron	WAKR-TV	49
Cincinnati	WCPO-TV	9
	WKRC-TV	12
	WLW-T	5
Cleveland	WEWS	5
	WRCV-TV	3
	WJW-TV	8
Columbus	WBNS-TV	10
	WLWC	4
	WTVN-TV	6
Dayton	WHIO-TV	7
	WKEF	22
	WLW-D	2
Lima	WIMA-TV	35
Steubenville-Wheeling, West Va.	WSTV-TV	9
Toledo	WSPD-TV	13
	WTOL-TV	11
Youngstown	WFMJ-TV	21
	WKBN-TV	27
	WYTV	33
Zanesville	WHIZ-TV	18
OKLAHOMA		
Ada	KTEN	10
Ardmore & Sherman-Denison, Texas	KXII	12
Lawton	KSWO-TV	7
Oklahoma City	KWTV	9
	WKY-TV	4
	KOCO-TV	5
	KKOR-TV	14
Tulsa	KOTV	6
	KVOO-TV	2
	KTUL-TV	8
OREGON		
Coos Bay	KCBY-TV	11
Eugene	KEZI-TV	9
	KVAL-TV	13
Klamath Falls	KOTI	2
LaGrande	KTVR	13
Medford	KTVM	5
	KMED-TV	10
Portland	KATU	2
	KGW-TV	8
	KOIN-TV	6
	KPTV	12
Roseburg	KPIC	4
PENNSYLVANIA		
Altoona	WFBG-TV	10
Erie	WICU-TV	12
	WSEE	35
Harrisburg	WHP-TV	21
	WTPA	27
Johnstown	WJAC-TV	6
	WARD-TV	56
Lancaster	WGAL-TV	8
Lebanon	WLYH-TV	15
Philadelphia	WCAU-TV	10
	WFIL-TV	6
	WPHL-TV	12
Philadelphia	KYW-TV	3
	WPHL-TV	17

Location	C.L.	Chan.
	WIBF-TV	29
Pittsburgh	KDKA-TV	2
	WIIC	11
	WTAE	4
Scranton	WDAU-TV	22
Scranton & Wilkes-Barre	WNEP-TV	16
	WBRE-TV	28
York	WSBA-TV	43
RHODE ISLAND		
Providence	WJAR-TV	10
	WPRO-TV	12
Providence (New Bedford. Mass.)	WTEV	6
SOUTH CAROLINA		
Anderson	WAIM-TV	40
Charleston	WCIV	4
	WCSC-TV	5
	WUSN-TV	2
	WIS-TV	10
	WNOK-TV	19
	WOLO-TV	25
Florence	WBTW	13
Greenville	WFBC-TV	4
Spartanburg	WSPA-TV	7
SOUTH DAKOTA		
Aberdeen	KXAB-TV	9
Deadwood-Lead	KDSJ-TV	5
Florence-Watertown	KDLO-TV	3
Mitchell	KORN-TV	5
Rapid City	KOTA-TV	3
	KRSD-TV	7
Reliance	KPLO-TV	6
Sioux Falls	KELO-TV	11
	KSOO-TV	13
TENNESSEE		
Chattanooga	WDEF-TV	12
	WRCB-TV	3
	WTVC	9
Jackson	WDXI-TV	7
Johnson City-Bristol-Kingsport	WJHL-TV	11
Knoxville	WATE-TV	6
	WBIR-TV	10
	WTVK	26
Memphis	WMCT	5
	WHBQ-TV	13
	WREC-TV	3
Nashville	WLAC-TV	5
	WSIX-TV	8
	WSM-TV	4
TEXAS		
Abilene	KRBC-TV	9
Amarillo	KFDA-TV	10
	KGNC-TV	4
	KVII	7
Austin	KHFI-TV	42
	KTBC-TV	7
Beaumont	KBMT	12
	KFDM-TV	6

Location	C.L.	Chan.
Big Spring	KWAB-TV	4
Bryan	KBTX-TV	3
Corpus Christi	KIII	3
	KRIS-TV	6
	KZTV	10
Dallas-Ft. Worth	WFAA-TV	8
	KRLD-TV	4
El Paso	KROD-TV	4
	KTSM-TV	9
El Paso-Juarez, Mex.	XEJ-TV	5
	KELP-TV	13
	XEPM-TV	2
Ft. Worth	KTVT	11
Ft. Worth-Dallas	WBAP-TV	5
Harlingen	KGBT-TV	4
Houston	KHOU-TV	11
	KTRK-TV	13
	KPRC-TV	2
Laredo	KGNS-TV	8
Lubbock	KCBD-TV	11
	KLBK-TV	13
Lufkin	KTRE-TV	9
Midland & Odessa	KMID-TV	2
Monahans	KVKM-TV	9
Odessa	KOSA-TV	7
Port Arthur-Beaumont	KPAC-TV	4
San Angelo	KACB-TV	3
	KCTV	8
San Antonio	KENS-TV	5
	WOAI-TV	4
	KONO-TV	12
	KWEX-TV	41
Sweetwater-Abilene	KPAR-TV	12
Temple-Waco	KCEN-TV	6
Tyler-Longview	KLTV	7
Waco	KWTX-TV	10
Weslaco	KRGV-TV	5
Wichita Falls	KFDX-TV	3
	KAUZ-TV	6
UTAH		
Salt Lake City	KCPX-TV	4
	KUTV	2
	KSL-TV	5
VERMONT		
Burlington	WCAX-TV	3
VIRGINIA		
Bristol	WCYB-TV	5
Hampton-Norfolk	WVEC-TV	13
Harrisonburg	WSVA-TV	3
Lynchburg-Roanoke	WLVA-TV	13
Norfolk	WTAR-TV	3
Portsmouth-Norfolk-Newport News	WAVY-TV	10
Richmond	WRVA-TV	12
	WTVR	6
Richmond-Petersburg	WXEX-TV	8
Roanoke	WDBJ-TV	7
	WSLS-TV	10
WASHINGTON		
Bellingham	KVOS-TV	12

Location	C.L.	Chan.
Pasco-Kennewick-Richland	KEPR-TV	19
Richland	KNDU	25
Seattle	KING-TV	5
	KOMO-TV	4
	KIRO-TV	7
Spokane	KHQ-TV	6
	KREM-TV	2
	KXLY-TV	4
Tacoma-Seattle	KTNT-TV	11
Tacoma	KTVW	13
Yakima	KIMA-TV	29
	KNDO	23
WEST VIRGINIA		
Bluefield	WHIS-TV	6
Charleston	WCHS-TV	8
Clarksburg	WBOY-TV	12
Huntington-Charles	WHTN-TV	13
	WSAZ-TV	3
Oak Hill	WOAY-TV	4
Parkersburg-Marietta, O.	WTAP-TV	15
Weston	WDTV	5
Wheeling-Steubenville, O.	WTRF-TV	7
WISCONSIN		
Eau Claire	WEAU-TV	13
Green Bay	WBAY-TV	2
	WFRV	5
	WLUK-TV	11
La Crosse	WKBT	8
Madison	WISC-TV	3
	WMTV	15
	WKOW-TV	27
Milwaukee	WISN-TV	12
	WTMJ-TV	4
	WITI-TV	6
	WUHF	18
Wausau	WSAU-TV	7
WYOMING		
Casper	KTWO-TV	2
Cheyenne	KFBC-TV	5
Riverton	KWRB-TV	10
GUAM		
Agana	KUAM-TV	8
PUERTO RICO		
Aguadilla-Mayaguez	WOLE-TV	12
Caguas	WKBM-TV	11
Mayaquez	WORA-TV	5
	WMGZ	16
Ponce	WSUR-TV	9
	WRIK-TV	7
	WPSJ	14
San Juan	WAPA-TV	4
	WKAQ-TV	2
	WRST	18
VIRGIN ISLANDS		
Charlotte Amalie	WBNB-TV	10

U. S. Educational Television Stations by States

Includes Non-Commercial Stations. U. S. Stations listed alphabetically by cities in state groups. Territories and possessions follow states. Abbreviations: Chan., channel; C.L., call letters.

Location	C.L.	Chan.
ALABAMA		
Birmingham	WBIQ	10
Dozier	WDIQ	2
Huntsville	WHIQ	25
Mobile	WEIQ	42
Montgomery	WAIQ	26
Mount Cheaha State Park	WCIQ	7
ARIZONA		
Phoenix	KAET	8
Tucson	KUAT	6
CALIFORNIA		
Los Angeles	KCET	28
Redding	KIXE-TV	9
Sacramento	KVIE	6
San Bernardino	KVCR-TV	24
San Francisco	KQED	9
San Jose	KTEH	54
San Mateo	KCSM-TV	14
COLORADO		
Denver	KRMA-TV	6
CONNECTICUT		
Hartford	WEDH	24
DELAWARE		
Wilmington	WHYY-TV	12

Location	C.L.	Chan.
DISTRICT OF COLUMBIA		
Washington	WETA-TV	26
FLORIDA		
Gainesville	WUFT	5
Jacksonville	WJCT	7
Miami	WSEC-TV	17
	WTHS-TV	2
Orlando	WMFE-TV	24
Tallahassee	WFSU-TV	11
Tampa-St. Petersburg	WEDU	3
GEORGIA		
Athens	WGTV	8
Atlanta	WETV	30
Chatsworth	WCLP-TV	18
Columbus	WJSP-TV	28
Savannah	WVAN-TV	9
Waycross	WXGA-TV	8
IDAHO		
Moscow	KUID-TV	12
ILLINOIS		
Carbondale	WSIU	8
Chicago	WTTW	11
	WXXW	20
Urbana-Champaign	WILL-TV	12

Location	C.L.	Chan.
IOWA		
Des Moines	KDPS-TV	11
KENTUCKY		
Louisville	WFPK-TV	15
LOUISIANA		
New Orleans	WYES-TV	8
MAINE		
Augusta	WCBB	10
Calais	WMED-TV	13
Orono	WMEB-TV	12
Presque Isle	WMEM-TV	10
MASSACHUSETTS		
Boston	WGBH-TV	2
MICHIGAN		
Detroit	WTVS	56
Onondaga-East Lansing	WMSB	10
University Center (Bay City)	WUCM-TV	19
MINNESOTA		
Duluth	WDSE-TV	8
St. Paul	KTCI-TV	17
St. Paul-Minneapolis	KTCA-TV	2

Location	C.L.	Chan.
MISSOURI		
Kansas City	KCSD-TV	19
St. Louis	KETC	9
NEBRASKA		
Lexington	KLNE-TV	3
Lincoln	KUON-TV	12
NEW HAMPSHIRE		
Durham	WENH	11
NEW MEXICO		
Albuquerque	KNME-TV	5
NEW YORK		
Buffalo	WNED-TV	17
New York	WNDT	13
	WNYC-TV	31
Schenectady	WMHT	17
NORTH CAROLINA		
Chapel Hill	WUNC-TV	4
Charlotte	WTVI	42
Columbia	WUNB-TV	2
NORTH DAKOTA		
Fargo	KFME	13

WHITE'S RADIO LOG

OHIO

Location	C.L.	Chan.
Athens	WOUB-TV	20
Bowling Green	WBGU-TV	70
Cincinnati	WCET	48
Cleveland	WVIZ-TV	25
Columbus	WOSU-TV	34
Newark	WGSF	28
Oxford	WMUB-TV	14
Toledo	WGTE-TV	30

OKLAHOMA

Location	C.L.	Chan.
Oklahoma City	KETA	13
	KOKH-TV	25
Tulsa	KOED-TV	11

OREGON

Location	C.L.	Chan.
Corvallis	KOAC-TV	7
Portland	KOAP-TV	10

PENNSYLVANIA

Location	C.L.	Chan.
Allentown-Bethlehem	WLVT-TV	39
Clearfield	WPSX-TV	3
Hershey	WITF-TV	33
Philadelphia	WUHY-TV	35
Pittsburgh	WQED	13
	WQEX	16

SOUTH CAROLINA

Location	C.L.	Chan.
Charleston	WITV	7
Greenville	WNTV	29

SOUTH DAKOTA

Location	C.L.	Chan.
Vermillion	KUSO-TV	2

TENNESSEE

Location	C.L.	Chan.
Memphis	WKNO-TV	10
Nashville	WDCN-TV	2

TEXAS

Location	C.L.	Chan.
Dallas-Ft. Worth	KERA-TV	13
Houston	KUHT	8
Lubbock	KTXT-TV	5
Richardson	KRET-TV	23
San Antonio-Austin	KLRN-TV	9

UTAH

Location	C.L.	Chan.
Logan	KUSU-TV	12
Ogden	KWCS-TV	18
	KOET	9
Provo	KBYU-TV	11
Salt Lake City	KUED	7

VIRGINIA

Location	C.L.	Chan.
Hampton-Norfolk	WHRO-TV	15
Portsmouth	WYAH-TV	27
Richmond	WCVE-TV	23

WASHINGTON

Location	C.L.	Chan.
Pullman	KWSC-TV	10
Seattle	KCTS-TV	9
Tacoma	KPEC-TV	56
	KTPS	62
Yakima	KYVE-TV	47

WISCONSIN

Location	C.L.	Chan.
Madison	WHA-TV	21
Milwaukee	WMVS	10
	WMVT	36

PUERTO RICO

Location	C.L.	Chan.
Mayaguez	WIPM-TV	3
San Juan	WIPR-TV	6

Canadian Television Stations by Cities

Canadian stations listed alphabetically by cities. Abbreviations: Chan., channel; C.L., call letters.

Location	C.L.	Chan.
Adams Hill, B.C.	CFCR-TV-8	11
Alticane, Sask.	CKBI-TV-1	10
Amherst, N.S.	CJCH-TV-3	8
Antigonish, N.S.	CFXU-TV	9
Argentia, Nfld.	CJOX-TV	3
Ashcroft, B.C.	CFCR-TV-2	10
Atikokan, Ont.	CBWCT-1	7
Baldy Mountain, Man.	CKSS-TV	8
Baie St. Paul, Que.	CKRT-TV-1	13
Banff, Alta.	CHCA-TV-2	10
	CFCN-TV-2	8
Barrie, Ont.	CKVR-TV	3
Bayview, N.S.	CJCH-TV-2	6
Bon Accord, N.B.	CHSJ-TV-1	6
Bonavista, Nfld.	CJON-TV-2	10
Boston Bar, B.C.	CFCR-TV-9	5
Brandon, Man.	CKX-TV	5
Brooks, Alta.	CFCN-TV-3	9
Burmis, Alta.	CJLH-TV-3	3
Burnaby, B.C.	CHAN-TV	8
Burns Lake, B.C.	CFTK-TV-3	2
Calgary, Alta.	CFCN-TV	4
Calgary, Alta.	CHCT-TV	2
Callander, Ont.	CFCH-TV	10
Campbellton, N.B.	CKCD-TV	7
Canning, N.S.	CJCH-TV-1	10
Carleton, Que.	CHAU-TV	5
Carlyle Lake, Sask.	CKOS-TV-2	7
Carrot Creek, Alta.	CFRN-TV-1	9
Castlegar, B.C.	CBUAT-2	3
Celista, B.C.	CHBC-TV-6	6
Chandler, Que.	CHAU-TV-4	7
Charlottetown, P.E.I.	CFCY-TV	13
Chicoutimi, P.Q.	CJPM-TV	6
Chilliwack, B.C.	CHAN-TV-1	11
Cheticamp, N.S.	CBFCT	10
Chicoutimi, Que.	CKRS-TV-2	2
Churchill, Man.	CHGH-TV	4
Clearwater, B.C.	CFCR-TV-10	2
Clermont, Que.	CFCV-TV-1	75
Clinton, B.C.	CFCR-TV-4	9
Cloridorme, Que.	CHAU-TV-8	6
Corner Brook, Nfld.	CBYT	5
Corner Brook, Nfld.	CJON-TV-1	10
Cornwall, Ont.	CJSS-TV	8
Coronation, Alta.	CHCA-TV-2	10
Courtenay, B.C.	CBUT-1	9
Colgate, Saskatchewan	CKCK-TV-1	12
Cranbrook, B.C.	CBYBT	10
Crescent Valley, B.C.	CHMS-TV-1	5
Dawson Creek, B.C.	CJDC-TV	5
Deer Lake, Nfld.	CBYAT	12
Orumheller, Alta.	CFCN-TV-1	12
Drumheller, Alta.	CHCT-TV-1	8
Oryden, Ontario	CBWAT-1	9
Eastend, Sask.	CJFB-TV-1	2
Edmonton, Alta.	CBXT	5
Edmonton, Alta.	CFRN-TV	3
Edmundston, N.B.	CJBR-TV-1	13
Edson, Alta.	CFRN-TV-2	12
Elliot Lake, Ont.	CKSO-TV-1	3
Enderby, B.C.	CFEN-TV-1	5
Enderby, B.C.	CHBC-TV-5	72
Estcourt, Que.	CJES-TV-1	70
Falkland, B.C.	CFWS-TV-1	5
Flin Flon, Man.	CBWBT	10
Fort Francis, Ont.	CBWCT	5
Fort Fraser, B.C.	CKPG-TV-3	6
Foxwarren, Man.	CKX-TV-1	11
Gaspe, Que.	CHAU-TV-6	10
Gaspe West, Que. (Bechervaise Mountain)	CFGW-TV-1	6
Goose Bay, Nfld.	CFLA-TV	8
Grand Bank, Nfld.	CJOX-TV-1	10
Grand Falls, Nfld.	CJCN-TV	4
Grande Prairie, Alta.	CBXAT	10
Greenwater Lake, Sask.	CKBI-TV-3	4
Halifax, N.S.	CBHT	3
Halifax, N.S.	CJCH-TV	5
Hamilton, Ont.	CHCH-TV	11
Hixon, B.C.	CKPG-TV-1	10
Huntsville, Ont.	CKVR-TV-2	8
Invermere, B.C.	CFWL-TV-1	6
Inverness, N.S.	CJCB-TV-1	6
Jonquiere, Que.	CKRS-TV	12
Kamloops, B.C.	CFCR-TV	4
Kapuskasing, Ont.	CBFOT-1	12
Kapuskasing, Ont.	CFCL-TV-3	3
Kearns, Ont.	CFCL-TV-2	2
Kemano, B.C.	CFTK-TV-5	2
Kelowna, B.C.	CHBC-TV	2
Kenora, Ont.	CBWAT	8
Keremeos, B.C.	CHKC-TV-1	5
Kildala, B.C.	CFTK-TV-4	5
Kingston, Ont.	CKWS-TV	11
Kitchener, Ont.	CKCO-TV	13
Kokish, B.C.	CFKB-TV-2	
Lethbridge, Alta.	CJLH-TV	7
Lillooet, B.C.	CFCR-TV-1	11
Liverpool, N.S.	CBHT-1	12
Lloydminster, Alta.	CKSA-TV	2
London, Ont.	CFPL-TV	10
Lumby, B.C.	CHID-TV-1	5
Magdalen Islands, Que.	CBFCT-1	12
Malakwa, B.C.	CFFI-TV-1	5
Manicouagan, Que.	CKHQ-TV-1	10
Marquis, Sask.	CKMJ-TV	7
Matagami, Que.	CKRN-TV-4	7
Matane, Que.	CKBL-TV	9
Medicine Hat, Alta.	CHAT-TV	6
Melita, Man.	CKX-TV-2	9
Merritt, B.C.	CFCR-TV-3	10
Moncton, N.B.	CBAFT	11
Moncton, N.B.	CKCW-TV	2
Mont Climont, Que.	CKBL-TV-1	11
Mont-Laurier, Que.	CBFT-2	3
Mount Timothy, B.C.	CFCR-TV-6	5
Mont Tremblant, Que.	CBFT-1	11
Montreal, Que.	CBFT	2
Montreal, Que.	CBMT	6
Montreal, Que.	CFCF-TV	12
Montreal, Que.	CFTM-TV	10
Moose Jaw, Sask.	CHAB-TV	4
Moyie, B.C.	CKVS-TV-1	5
Murdochville, P.Q.	CKBL-TV-2	6
Murdochville, P.Q.	CKMU-TV-1	3
Nakusp, B.C.	CJNP-TV-1	2
Nakusp, B.C.	CJNP-TV-2	4
Nass Camp (Near Lava Lake) B.C.	CFTK-TV-6	5
Nelson, B.C.	CBUAT-1	9
Newcastle, N.B.	CKAM-TV-1	7
Newcastle Ridge, B.C.	CFKB-TV-1	7
New Glasgow, N.S.	CFCY-TV-1	7
Nipawin, Sask.	CKBI-TV-4	2
North Battleford, Sask.	CKBI-TV-2	7
Oliver, B.C.	CHBC-TV-3	8
Ottawa, Ont.	CBOFT	9
Ottawa, Ont.	CBOT	4
Ottawa, Ont.	CJOH-TV	13
Parry Sound, Ont.	CKVR-TV-1	11
Passmore, B.C.	CHMS-TV-2	2
Peace River, Alta.	CBXAT-1	7
Peachland, B.C.	CHPT-TV-1	5
Pembroke, Ont.	CHOV-TV	5
Penticton, B.C.	CHBC-TV-1	13
Perce, Que.	CHAU-TV-5	2
Perrys, B.C.	CHMS-TV-3	5
Peterborough, Ont.	CHEX-TV	12
Pivot, Alta.	CHAT-TV-1	4
Port Alfred, Que.	CKRS-TV-1	9
Port Arthur, Ont.	CKPR-TV	2
Port Daniel, Que.	CHAU-TV-3	10
Port Hardy, B.C.	CFKB-TV-3	3
Port Rexton, Nfld.	CBNT-1	13
Prince Albert, Sask.	CKBI-TV	5
Prince George, B.C.	CKPG-TV	2
Princeton, B.C.	CHGP-TV-1	5
Prince Rupert	CFTK-TV-1	6
Quebec, Que.	CBVT	11
Quebec, Que.	CFCM-TV	4
Quebec, Que.	CKMI-TV	5
Quesnel, B.C.	CFCR-TV-11	7
Quesnel, B.C.	CKCQ-TV-1	13
Red Lake, Ont.	CBWAT-3	10
Regina, Sask.	CHRE-TV	9
Regina, Sask.	CKCK-TV	2
Red Deer, Alta.	CHCA-TV	6
Rimouski, Que.	CJBR-TV	3
Riverhurst, Sask.	CJFB-TV-3	10
Rivière-au-Renard	CHAU-TV-7	7
Rivière du Loup, Que.	CKRT-TV	7
Riviere du Loup, Que.	CKRT-TV-3	2
Roberval, Que.	CKRS-TV-3	8
Rouyn, Que.	CKRN-TV	4
Saint John, N.B.	CHSJ-TV	4
Salmon Arm, B.C.	CHBC-TV-4	9
Saskatoon, Sask.	CFQC-TV	8
Sault Ste. Marie, Ont.	CJIC-TV	2
Savona, B.C.	CFCR-TV-7	8
Senneterre, Que.	CKRN-TV-1	7
Sheet Harbour, N.S.	CBHT-4	11
Shelburne, N.S.	CBHT-2	8
Sherbrooke, Que.	CHLT-TV	7
Sioux Lookout, Ont.	CBWAT-2	12
Smithers, B.C.	CFTK-TV-2	5
Sointula, B.C.	CFKB-TV-4	5
Squamish, B.C.	CHAR-TV-1	7
St. John's, Nfld.	CBNT	8
St. John's, Nfld.	CJON-TV	6
Ste. Marguerite-Marie, Que.	CHAU-TV-1	2
St. Quentin, N.B.	CHAU-TV-2	10
Ste. Rose du Dégelé, Que.	CKRT-TV-2	
Stephenville, Nfld.	CFSN-TV	8
Stranraer, Sask.	CFQC-TV-1	3
Sturgeon Falls, Ont.	CBFST	7
Sudbury, Ont.	CBFST-1	13
Sudbury, Ont.	CKSO-TV	5
Swift Current, Sask.	CJFB-TV	5
Sydney, N.S.	CJCB-TV	4
Temiscaming, Que.	CBFST-2	12
Temiscaming, Que.	CJTK-TV-1	3
Terrace, B.C.	CFTK-TV	3
The Pas, Man.	CBWBT-1	7
Timmins, Ont.	CFCL-TV	6
Timmins, Ont.	CBFOT	9
Toronto, Ont.	CBLT	6
Toronto, Ont.	CFTO-TV	9
Trail, B.C.	CBUAT	11
Trois-Rivières, Que.	CKTM-TV	13
Upsalquitch Lake, N.B.	CKAM-TV	12
Val D'Or, Que.	CKRN-TV-2	8
Val Marie, Sask.	CJFB-TV-2	2
Vancouver, B.C.	CBUT	2
Vernon, B.C.	CHBC-TV-2	7
Victoria, B.C.	CHEK-TV	6
Ville Marie, Que.	CKRN-TV-3	6
Waterton Park, Alta.	CJWP-TV-1	12
Westwold, B.C.	CFWS-TV-2	12
Whitecourt, Alta.	CFRN-TV-3	7
Williams Lake, B.C.	CFCR-TV-5	8
Willow Bunch, Sask.	CKCK-TV-2	6
Windsor, Ont.	CKLW-TV	9
Wingham, Ont.	CKNX-TV	8
Winnipeg, Man.	CBWFT	3
Winnipeg, Man.	CBWT	6
Winnipeg, Man.	CJAY-TV	7
Wynyard, Sask.	CKOS-TV-3	6
Yorkton, Sask.	CKOS-TV	3
Yarmouth, N.S.	CBHT-3	11
Yuill Mountain, Balfour, B.C.	CKBF-TV-1	5

World-Wide Short-Wave Stations

■ **The** World-Wide Short Wave Stations section of *White's Radio Log* is, as its name implies, a *log*, that lists stations actually monitored by listeners in the United States, Canada and overseas. It is *not* intended to be a listing of *all* shortwave transmitters licensed as such listings contain numerous inactive transmitters, and low powered stations which are rarely heard by DX'ers. The stations listed here, therefore, are those most often reported and consistently heard during the past few months. Many have been monitored by DX CENTRAL the official RADIO-TV EXPERIMENTER monitoring post in New York City.

In our listings, a station or frequency marked with an asterisk (*) indicates a non-broadcast station or frequency. This might include aeronautical, maritime, military, or other type of transmission, either in regular AM or single sideband (SSB). In instances where many non-broadcast stations use the same frequency, we have given you a clue as to the type of stations to be found there, rather than pin down only one station.

Let Us Know. Listeners are invited to submit their loggings to us for publication in the Shortwave section of *White's Radio Log*. Be sure to include the following information for each station you report: approximate frequency, callsign and/or station name, city and country, and time heard in Eastern Standard Time, 24 hour clock. Address your reports to: *DX CENTRAL, White's Radio Log*, c/o RADIO-TV EXPERIMENTER, 505 Park Avenue, New York, N. Y. 10022, U.S.A.

Time To Listen. All times shown in *White's Radio Log* are in the 24 hour EST clock system. For example, 0800 is 8:00 AM EST, 1200 is noon EST, 1800 is 6 PM EST, and so on. For conversion to other time zones, subtract 1 hour for CST (0800 EST is 7 AM CST), 2 hours for MST, 3 hours for PST.

The following abbreviations are used in our listings: BC—Broadcasting Company, Corporation, or System; E—Emissora: R—Radio or Radiodiffusion; V—Voice or Voz.

TNX. We are indebted to the following DX'ers who added their loggings to those of DX CENTRAL, the official RADIO-TV EXPERIMENTER monitoring station in New York City, to bring you this month's listings:

John E. McLeod, Vancouver, B. C.
Richard Palandri, Melrose Pk., Ill.
Julian M. Sienkiewicz, Brooklyn, N. Y.
Leonard Thomas, Jr., Orlando, Fla.
Thomas Kushaer, Elmhurst, N. Y.
Ralph Irace, Avon, Conn.
Harry Nechetsky, Valpariso, Fla.
Roger Camire, Manchester, N. H.
N. S. Jortner, New York, N. Y.
Dennis DiGalbe, Garfield, N. J.
Bob Neumann, West Chicago, Ill.
Donald Burns, Rego Park, N. Y.
Barry Firth, Lakeland, Fla.
Allan Bach, Allentown, Pa.
David Burstein, Bayside, N. Y.
Bill Wickersham, Detroit, Mich.
Sol Nussbaum, Brooklyn, N. Y.
Tom Kneitel, K2AES, New York, N. Y.
Kevin Shaw, Wilmington, Del.
E. F. Classen, Birmingham, Ala.
Frank Passage, Clifton, N. J.
John Day, Key West, Fla.
Larry Bauder, Oliver, B. C.
Dale Koby, Van Nuys, Calif.
Bradley Connors, Chevy Chase, Md.
Charles Heffernan, Auburn, Wash.
Larry Heaton, Weaver, Ala.
Gerald Clough, San Marcos, Tex.
Russell S. Stitzer, Bridgeville, Pa.
Harvey Brody, Far Rockaway, N. Y.

kc/s	Call	Name	Location	EST
3215	—	R. Clb. de Mozambique	Lourenco Marques, Moz.	1100
3225	ELWA	R. Village	Monrovia, Liberia	1730
3245	YVKT	R. Liberatador	Caracas, Venez.	2200
3255	YVQL	V. del Tigre	Tigre, Venez.	0115
3260	—	R. Clb. de Mozambique	Lourenco Marques, Moz.	1600
	—	R. Dili	Dili, Port. Timor	0800
	—	R. Naimey	Naimey, Niger	1400
3270	—	R. Cotonou	Cotonou, Hahomey	1600
	—	Zambia BC	Lusaka, Zambia	1700
3280	—	Mali Sinico R.	Maldive Is.	0700
3285	—	Springbok R.	Paradys, S. Africa	0008
3300	CR7BY	R. Clb. de Mozambique	Lourenco Marques, Moz.	0230
	—	R. Belize	Belize, Brit. Honduras	2330
3316	—	Sierra Leone BC	Freetown, Sierra Leone	1800
3326	—	R. Nigeria	Lagos, Nigeria	1730
3340	—	R. Viloco	Viloco, Bolivia	2200
	—	R. Uganda	Kampala, Uganda	1600
3350	—	R. Ghana	Accra, Ghana	0035
3366	—	R. Ghana	Accra, Ghana	1415
3380	—	Malawi BC	Blantyre, Malawi	0700
3390	HCOTI	R. Saracoy	Sto. Domingo, Ecuador	0020
3395	—	R. Nigeria	Lagos, Nigeria	1730
3415	—	Zambia BC	Lusaka, Zambia	1600
3824	ZNF4V	ZNF4V	Maseru, Basutoland	0530
3980	—	V. of America Relay	Munich, W. Germany	2330
3995	—	R. Comercial	Sa da Bandeira, Angola	1400
4705	HCEH3	R. Progresso	Loja, Ecuador	2338
4715	CR4AB	R. Clb. Mindelo	S. Vicente, Cape Verde Is.	1630
4734	HCEH3	R. Progresso	Loja, Ecuador	1200
4755	ZYY3	R. Brasil	Campina, Brazil	1840
4770	HCMX4	R. Cenit	Portoviejo, Ecuador	2230
4775	—	R. Kabul	Kabul, Afghanistan	0900
	ZYR81	R. Progresso	Sao Paulo, Brazil	2100
4777	—	R-TV Gabonaise	Libreville, Gabon	0107
4785	—	R. El. Pongo	Tingo Maria, Peru	2315
4825	—	R. Ghana	Accra, Ghana	0035

WHITE'S RADIO LOG

kc/s	Call	Name	Location	EST
4860	—	R. Clb. de Mozambique	Lourenco Marques, Mozamb.	2330
4861	OAZ4T	R. Chanchamay	La Merced, Peru	2230
4865	CSA93	E. dos Azores	Ponta Delgada, Azores	1715
4870	YVKP	R. Tropical	Caracas, Venezuela	1745
4875	—	V. de Esmeraldas	Esmeraldas, Ecuador	2300
4880	—	R. San Isidro	San Pedro, Dom. Rep.	1815
4885	HCWE1	N. Nac. Espejo	Quito, Ecuador	2355
	ZYG26	R. Pioneira	Piaui, Brazil	2040
4890	VLK4	Australian BC	Port Moresby, Austral.	0545
4904	—	R. Tchaidenne	Fort Lamy, Chad	0000
4908	—	R. Ghana	Accra, Ghana	0035
	HRQN3	V. del Atlantico	Puerto Cortez, Honduras	2100
4915	—	R. Ghana	Accra, Ghana	1500
4916	HCAH3	R. Trebol	Zaruma, Ecuador	2315
4920	—	R. Phnom Penh	Phnom Penh, Cambodia	0400
4968	—	R. Mogadiscio	Mogadiscio, Somali	2200
4970	VQA52	R. Sabah	Jesselton, Sabah	1805
	YVLK	R. Rumbos	Caracas, Venez.	2241
4973	—	R. Yaounde	Yaounde, Cameroon	0045
4975	—	Springbok R.	Paradys, S. Africa	0005
4985	—	R. Ghana	Accra, Ghana	1415
5000	—	R. Omdurman	Omdurman, Sudan	2300
5010	—	Windw. I. BC	St. Georges, Grenada	1600
	—	R. Garoua	Garoua, Cameroon	1145
5015	—	Thai TV	Bangkok, Thailand	1800
5025	—	R. Malaysia	Singapore, Malaysia	0730
	HCPS5	Ondas Canaris	Acugues, Ecuador	0630
5030	HIBB	V. de Papagayo	La Romana, Dom. Rep.	2300
5035	—	R. Bangui	Bangui, C. Afr. Rep.	0030
5040	—	R. Maturin	Venezuela	1816
5045	ZKIZA	R. Raratonga	Raratonga, Cook Is.	0330
5050	—	R. Malaysia	Kuala Lumpur, Malaysia	0900
5805	—	R. Sanaa	Sanaa, Yemen	2207
5870	—	R. San Jose	San Jose, Bolivia	2200
5875	HRNL	V. de Honduras	Tegucigalpa, Honduras	0600
5905	4VB	R. Comerce	Port-au-Prince, Haiti	0400
5930	—	R. Prague	Prague, Czechoslovakia	2000
5940	—	R. Phnom Penh	Phnom Penh, Cambodia	0400
5954	TIQ	R. Casino	Puerto Limon, C. Rica	2335
5960	HRRH	V. de Occidente	Santa Rosa, Honduras	1930
5980	PCJ	R. Nederland	Hilversum, Netherlands	0530
6000	—	Lybian BC	Benghazi, Lybia	1200
	—	Osterreichischen R.	Vienna, Austria	2330
	—	R. Americas	Swan Island	1800
6015	—	R. Abidjan	Abidjan, Ivory Coast	1650
6020	PCJ	R. Nederland	Hilversum, Netherlands	0100
6025	PCJ	R. Nederland	Hilversum, Netherlands	0530
	—	R. Portugal	Lisbon, Portugal	2115
6030	—	Der Suddeutsche	Stuttgart, W. Germany	0415
6045	—	R. Moscow	Moscow, USSR	1630
	—	Forces BC	Athens, Greece	1605
6052	4VG	R. Union	Port-au-Prince, Haiti	1805
6060	—	R. Havana	Havana, Cuba	1900
6065	—	R. Sweden	Stockholm, Sweden	0430
6070	—	R. Sofia	Sofia, Bulgaria	1500
6075	DMQ6	Deutsche Welle	Cologne, W. Germany	0545
6082	OAX4Z	R. Nac. de Peru	Lima, Peru	2025
6085	—	Der Suddeutsche	Stuttgart, W. Germany	0300
6090	—	R. Luxembourg	Villa Louvigny, Luxemb.	2330
	—	R. Kaduna	Kaduna, Nigeria	0030
6100	—	R. Malaysia	Kuala Lumpur, Malaysia	0615
	4VO	R. Lumiere	Les Cayes, Haiti	0615
6110	—	R. Ghana	Accra, Ghana	2230
6115	—	R. Union	Peru (?)	0101
6135	HRME2	V. del Patio	La Ceiba, Honduras	2300
6140	VLW6	Austral. BC	Perth, Austral.	0530
	—	R. Nac. Espana	Madrid, Spain	0030
6145	DMQ6	Deutsche Welle	Cologne, W. Germany	1710
	PRL9	R. Nacional	Rio de Janeiro, Brazil	2008
6155	—	Osterreichischen R.	Vienna, Austria	0000
6156	CXA13	R. Carve	Montevideo, Uruguay	2030
6160	CKZU	CKZU	Vancouver, B.C., Canada	0300
	CKZN	CKZN	St. Johns, Nfld., Canada	1830
6165	—	R. Tchaidenne	Fort Lamy, Chad	0000
	XEWW	V. Amer. Latina	Mexico City, Mex.	2325
6175	—	R. Malaysia	Kuala Lumpur, Malaysia	0615
	—	R. Repub. Algerienne	Algiers, Algeria	1700
6180	ORU	R-TV Belge	Brussels, Belgium	1815
6185	—	R. Addis Ababa	Addis Ababa, Ethiopia	1200
	—	R. Portugal	Lisbon, Portugal	2115
	HCJB	V. of the Andes	Quito, Ecuador	0100
	—	R. Clb. de Mozambique	Lourenco Marques, Mozamb.	2330
6190	—	R. Bucharest	Bucharest, Rumania	1400
6200	TIJCV	R. Atenas	Atenas, C. Rica	1900
6207	TIHBJ	R. Reloj	San Jose, C. Rica	1745
6210	—	R. Tabriz	Tabriz, Iran	1300
6225	—	R. Tabriz	Tabriz, Iran	1200
6235	—	R. Budapest	Budapest, Hungary	2235
6245	—	R. Sofia	Sofia, Bulgaria	1300
6250	—	R. Santa Isabel	Santa Isabel, Sp. Guinea	0200
6270	—	R. Peking	Peking, China	1630
6289	—	R. Peking	Peking, China	1630
6560	—	R. Peking	Peking, China	1630
7035	—	R. Peking	Peking, China	1630
7080	—	R. Peking	Peking, China	1630
7105	—	R. Nac Espana	Madrid, Spain	0030
7110	—	Swiss BC	Berne, Switz.	2015
	—	R. Malaysia	Kuala Lumpur, Malaysia	0615
7115	—	R. Prague	Prague, Czechoslovakia	2255
7120	—	R. Prague	Prague, Czechoslovakia	2000
	GRM	BBC	London, England	2215
	—	R. Mogadiscio	Mogadiscio, Somali	2200
7135	—	R. Tehran	Tehran, Iran	1500
7160	—	R. Mogadiscio	Mogadiscio, Somali	2200
7165	ETLF	R. V. of Gospel	Addis Ababa, Ethiopia	2300
7170	—	R. Francaise	Noumea, New Caledonia	1800
7185	GRK	BBC	London, England	0000
7200	—	R. Omdurman	Omdurman, Sudan	2300
7215	—	R. Abidjan	Abidjan, Ivory Coast	1650
7220	—	R. Bangui	Bangui, Cemtr. Afr. Rep.	0030
7235	—	R.A.I.	Rome, Italy	1515
7245	—	Osterreichischen R.	Vienna, Austria	0400
7260	—	R. Addis Ababa	Addis Ababa, Ethiopia	1200
7265	—	R. Tirana	Tirana, Albania	1830
7285	—	R. Warsaw	Warsaw, Poland	0630
7310	—	R. Budapest	Budapest, Hungary	2235
7335	—	R. Peking	Peking, China	1630
7345	—	R. Prague	Prague, Czechoslovakia	2000
7380	—	R. Beirut	Beirut, Lebanon	1200
7450	—	Mali Sinico R.	Maldive Is.	2130
7620	—	R. Peking	Peking, China	1630
9009	4XB31	Kol Yisrael	Jerusalem, Israel	1330
9410	GRI	BBC	London, England	2100
9483	—	R. Nac. Espana	Madrid, Spain	2010

Kc/s	Call	Name	Location	EST
9490	—	R. Baku	Baku, Azerbaijian SSR	2145
9505	—	H.N.B.I.	Athena, Greece	0530
	—	N.H.K.	Tokyo, Japan	0605
	—	R. Prague	Prague, Czechoslovakia	0430
	—	R. Belgrade	Belgrade, Yugoslavia	2345
	—	R. Omdurman	Omdurman, Sudan	2300
9510	GSB	BBC	London, England	0030
9515	TAT	R. Ankara	Ankara, Turkey	1345
9520	OZF5	V. of Denmark	Copenhagen, Denmark	1230
	—	Huna I'tha't Al Kuwait	Kuwait	1340
9525	—	R. Havana	Havana, Cuba	2000
9535	HER4	Swiss BC	Berne, Switzerland	2200
9540	ZL2	R. New Zealand	Wellington, N.Z.	0210
	—	R. Ulan Bator	Ulan Bator, Mongolia	0922
9545	—	Ghana BC	Accra, Ghana	0155
9550	OAXIZ	R. Nacional	Tumbes, Peru	0750
9555	YSS	R. Nacional	San Salvador, El Salv.	2020
9570	—	R. Australia	Melbourne, Australia	0215
9575	—	R.A.I.	Rome, Italy	1730
9580	—	BBC Relay	Limassol, Cyprus	1408
9585	YDF6	V. of Indonesia	Djakarta, Indonesia	0430
9600	—	Vatican R.	Vatican City	0630
	CE960	R. Pres. Balmaceda	Santiago, Chile	2235
9605	DMQ9	Deutsche Welle	Cologne, W. Germany	0545
9610	—	R. Berlin Int'l.	Berlin, E. Germany	1215
	VLW9	Australian BC	Perth, Australia	0530
	LLG	R. Norway	Oslo, Norway	2205
9614	—	R. Pakistan	Karachi, Pakistan	1445
9615	—	R. Berlin Int'l.	Berlin, E. Germany	1400
9620	—	R. Sweden	Stockholm, Sweden	0430
9625	—	Kol Yisrael	Jerusalem, Israel	1445
9635	ZYRB3	R. Aparaceida	Aparaceida, Brazil	1755
9645	—	Mali Sinico R.	Maldive Is.	0200
	HCJB	V. of The Andes	Quito, Ecuador	0100
	TIFC	Faro del Caribe	San Jose, C. Rica	2157
9647	HLK5	V. of Free Korea	Seoul, Korea	1830
9665	HEU3	Swiss BC	Berne, Switzerland	2015
9668	TGNB	R. Cultural	Guatemala City, Guat.	0655
9680	—	Kol Yisrael	Jerusalem, Israel	1445
	—	R. Kiev	Kiev, USSR	1932
9695	—	R. Phnom Penh	Phnom Penh, Cambodia	0630
	—	R. Algiers	Algiers, Algeria	0800
	—	R. Nac. Espana	Madrid, Spain	0030
9710	—	R. Tirana	Tirana, Albania	1830
9715	PCJ	R. Nederland	Hilversum, Netherlands	0100
9718	—	R-TV Congolaise	Brazzaville, Congo	1452
9725	4XB51	Kol Yisrael	Jerusalem, Israel	1330
9735	DMQ9	Deutsche Welle	Cologne, W. Germany	1710
9740	—	R. Portugal	Lisbon, Portugal	2115
9744	TAP	R. Ankara	Ankara, Turkey	1345
9760	—	R. Nacional Espana	Madrid, Spain	2000
9770	—	Osterreichischen R.	Vienna, Austria	0100
9795	—	R. Prague	Prague, Czechoslovakia	2000
9850	—	R. Baku	Baku, Azerbaijian SSR	0900
9860	—	R. Peking	Peking, China	1700
9700	—	R. Sofia	Sofia, Bulgaria	1830
9920	—	R. Peking	Peking, China	1630
11672	—	R. Pakistan	Karachi, Pakistan	1345
11695	—	R. Peyk-e Iran	(clandestine)	1250
11705	TGQB	V. de Queztaltenango	Queztaltenango, Guat.	2100
	—	R. Havana	Havana, Cuba	2000
	—	R. Sweden	Stockholm, Sweden	1830
11710	LRA35	R. Nacional	Buenos Aires, Argentina	1730
	—	R. Sofia	Sofia, Bulgaria	1730
	—	R. Australia	Melbourne, Australia	0215
11715	YDF2	V. of Indonesia	Djakarta, Indonesia	0430
11720	—	H.N.B.I.	Athens, Greece	1800
	CHOL	R. Canada	Montreal, Que.	1600
11730	PCJ	R. Nederland	Hilversum, Netherlands	1400
11755	ETLF	R. V. of Gospel	Addis Ababa, Ethiopia	0030
11760	—	R. Havana	Havana, Cuba	1100
	—	R. Kishinev	Kishinev, Moldavian SSR	2200
11765	—	R. Berlin Int'l.	Berlin, E. Germany	1430
11775	HER5	Swiss BC	Berne, Switzerland	0715
11785	—	Vatican R.	Vatican City	0630
	—	Osterreichischen R.	Vienna, Austria	0400
11795	—	R. Berlin Int'l.	Berlin, E. Germany	1430
11800	XEHH	R. Comerciales	Mexico City, Mex.	1930
11810	—	R. Tehran	Tehran, Iran	1500
11820	GSN	BBC	London, England	2100
11835	—	V. of America Relay	Okinawa, Ryuku Is.	0400
11840	—	R. Portugal	Lisbon, Portugal	1300
	—	R. Australia	Melbourne, Australia	0715
11850	—	R. Ulan Bator	Ulan Bator, Mongolia	0922
11855	—	R. Omdurman	Omdurman, Sudan	2300
11860	GSE	BBC	London, England	1515
11865	—	R. Havana	Havana, Cuba	1100
11900	—	R. Malaysia	Kuala Lumpur, Malaysia	0615
11910	HCJB	V. of The Andes	Quito, Ecuador	0100
11915	HCJB	V. of The Andes	Quito, Ecuador	0100
11920	DZF2	Far East BC	Manila, Philippines	0645
11925	ZYR78	R. Bandeirantes	Bandeirantes, Brazil	1530
	DMQ11	Deutsche Welle	Cologne, W. Germany	1710
11930	—	R. Prague	Prague, Czechoslovakia	0430
11945	ZPA5	R. Encarcacion	Asuncion, Paraguay	1600
11955	—	R. Kabul	Kabul, Afghanistan	0500
	—	R. Moscow	Moscow, USSR	1440
11960	—	R. Havana	Havana, Cuba	2015
11970	WRUL	R. N.Y. Worldwide	New York, N.Y.	1830
11990	—	R. Prague	Prague, Czechoslovakia	0430
12095	GRF	BBC	London, England	2100
13250	—	R. Euskari	(clandestine)	1400
15020	—	R. Euskari	(clandestine)	1400
15050	—	R. Liberdad	(clandestine)	1800
15050	—	R. Americas	Swan Island	2210
15105	—	Windw. Is. BC	St. Georges, Grenada	1600
15115	HCJB	V. of The Andes	Quito, Ecuador	1600
15125	—	V. of Free Korea	Seoul, Korea	1830
15135	—	R. Havana	Havana, Cuba	2015
15160	—	Windw. Is. BC	St. Georges, Grenada	1600
15170	—	Trans-World R.	Bonaire, Neth. Ant.	2100
15180	—	R. Moscow	Moscow, USSR	2202
15195	—	R. Sweden	Stockholm, Sweden	0600
15220	PCJ	R. Nederland	Hilversum, Netherlands	1400
15225	—	R. Ceylon	Colombo, Ceylon	1930
	—	R. Kabul	Kabul, Afghanistan	1306
15230	—	Far East BC	Manila, Philippines	0645
15245	—	Trans-World R.	Bonaire, Neth. Ant.	1235
	VLX15	Austral. BC	Perth, Austral.	1915
15255	—	Swiss BC	Berne, Switzerland	0330
15265	—	R. National Malagche	Tananarive, Malagasy	1100
15285	—	R. Ghana	Accra, Ghana	1315
15300	—	R. Havana	Havana, Cuba	1200
15310	WRUL	R. N.Y. Worldwide	New York, N.Y.	1400
15320	CKCS	R. Canada	Montreal, Que.	1600
	HEU6	Swiss BC	Berne, Switzerland	0815
15330	—	R. Ceylon	Colombo, Ceylon	0130
15335	ORU	R-TV Belge	Brussels, Belgium	0800
15340	—	R. Havana	Havana, Cuba	1100
15345	—	H.B.N.I.	Athens, Greece	0130
15370	ZYC9	R. Tupi	Rio de Janeiro, Brazil	1832
15380	—	R. Portugal	Lisbon, Portugal	1300
15405	HCJB	V. of The Andes	Quito, Ecuador	1500
15420	—	R. Sweden	Stockholm, Sweden	0900
15425	PCJ	R. Nederland	Hilversum, Netherlands	0900
16955	—	R. Leopoldville	Leopoldville, Congo	1310
17740	—	R. Portugal	Lisbon, Portugal	1300
17745	—	H.B.N.I.	Athens, Greece	0130
17810	PCJ	R. Nederland	Hilversum, Netherlands	1030
17815	—	R. Sao Paulo	Sao Paulo, Brazil	1430
	—	R. Berlin Int'l.	Berlin, E. Germany	0600
17820	CKNC	R. Canada	Montreal, Que.	1600
17825	—	R. Berlin Int'l.	Berlin, E. Germany	0715
17830	PCJ	R. Nederland	Hilversum, Netherlands	0230
17845	HER7	Swiss BC	Berne, Switzerland	0815
17855	—	R. Havana	Havana, Cuba	2015
17860	ORU	R-TV Belge	Brussels, Belgium	0800
17880	HCJB	V. of The Andes	Quito, Ecuador	1500
21510	ORU	R-TV Belge	Brussels, Belgium	0800
21570	PCJ	R. Nederland	Hilversum, Netherlands	1030
21590	—	R. Pakistan	Karachi, Pakistan	0330

Roll-A-Way

Continued from page 70

dicate just which circuits are hot.

Finishing Touches. Rubber-tired chest type casters were fitted to the bottom of the pedestal making the entire unit *roll-away*. A wooden rack mounted on the lower inside portion of the door easily accommodated the log and the call book. Ample space was available below the bottom shelf for a generous drawer fitted with a handle and in which a supply of QSL cards, stationery, extra pencils and various other miscellaneous station supplies were kept. The final *paint and polish* was added by labelling all controls external to the transmitter and receiver with the neat little AMI-CAL dry transfer titles.

Sand and paint the pedestal before installing your rig. Choose your own color scheme, of course; we used an olive green exterior to match the door and window trim in Jerry's abode. The interior was done in a cream buff which contrasted nicely with the equipment. The top of the pedestal and the top surface of the shelves as well as the front of the drawer were covered with a pale grey adhesive-backed shelf paper and ½" x ½" aluminum angle was fitted around the pedestal top and on the facing edges of the shelves for finished appearance. And last, but by no means least, the station and operator license card in a small frame, was secured to the inside of the door near the top. Handbooks, manuals and current ham magazines found a neat resting place at the bottom of the pedestal below the drawer.

The result was an absolutely complete ham station with all accessories and supplies, safely enclosed and attractive in appearance both when in use and in storage and readily *mobile* by merely unplugging the RG58U antenna coax and the main AC cord. The coax feeder from the antenna entered through a window board and, when not connected to the gear, was wound in a coil of a few turns and hung behind the window drapes, completely concealed. Grounding of course was present in the copper braid shield of the coax.

Jerry can now dash from school, pull his *roll-away* shack out of the closet, plug in the AC and antenna connector, pull up his typewriter stand operating desk and in five minutes from the time he drops his school books on the bed, he's ON-THE-AIR!

For the Big Rigs Too. And now, before we wind up this little saga which puts the ham shack on a rolling pedestal, a few words to you older hams who say, "Sure; that's fine for the novice with little gear but what about us who have more sizeable equipment and other gadgets?" I think I can answer that one too, with an example. After a number of local hams had admired Jerry's *ham shack in a box*, Gene, a ham of the General class and in his middle thirties with quite a few on-the-air years behind him, decided that the roll-away set-up was for him too. With just a two-room apartment for he and his wife, he had been setting up some rather heavy gear on the kitchen table, manipulated various plugs and cords, hunted up his log and call book, dug his key, mike and phones out of a bureau drawer and about half an hour later was set up for business among a scattered bunch of gear. After looking over Jerry's compact *shack*, he saw no reason why he could not follow suit.

Carpenter work however, was not for him. He had no shop, no woodworking tools and claimed his woodcraft ability was something he'd rather not talk about! So . . . he had a local metal shop cut and drill a few pieces of aluminum angle (½" x ½" and of suitable lengths) and the local cabinet shop cut him out a plywood top and bottom and masonite panels for the four sides of the pedestal. With a small handful of machine screws and nuts he assembled the whole *shebang* in less than half an hour and in another fifteen minutes he had the whole assembly painted in a pleasing color from a spray can! Incidentally, his pedestal was a bit larger than Jerry's to accommodate his Johnson Ranger II transmitter and his Hammarlund receiver, which it did superbly. Fitted with rubber tired casters he simply had a big brother model of the roll-away we built for Jerry and every bit as convenient to use or store. A unit like this can be rolled alongside an available table or, as Gene later did, fitted with a drop leaf operating shelf on the right hand side. OK, so you say you're left-handed, then put the shelf on the left side and hinge the door on the right. Before you do anything though, it's best you give your quarters a close look to check out dimensions.

And now . . . who said they had a limited-shack-space problem? With a bit of ingenuity and resourcefulness and using the foregoing ideas, is there any good reason why you can't get your equipment together in a Roll-Away Shack? ■

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Circuit Breaker

Continued from page 62

following manner. Plug in an electric cord and momentarily touch the bare ends together. This will make a short circuit and the circuit breaker should act in a short time. The action of most circuit breakers depends on the current flow through a piece of bi-metal. As the bi-metal heats beyond its critical point it will bend and break contact with the circuit. After waiting a few seconds for the bi-metal to cool the breaker can be reset by pushing the reset button. Most circuit breakers are made so they can't be defeated by holding in the reset button. As long as you hold the button down no current will flow.

You should be able to find many uses for the Circuit Breaker Box in your shop. You could even build the same components into a wall outlet box, if you prefer, and have a permanent installation. Any way you do it, this go-between circuit breaker will save fuses and time. ■

ADVERTISING INDEX

STATEMENT OF OWNERSHIP, MANAGEMENT AND CIRCULATION (Act of October 23, 1962; Section 4369, Title 39, United States Code).

1. Date of filing: Oct. 1, 1965.
2. Title of publication: Radio-TV Experimenter.
3. Frequency of issue: Bi-monthly.
4. Location of known office of publication: 505 Park Avenue, New York, N. Y. 10022.
5. Location of the headquarters or general business offices of the publishers: 505 Park Avenue, New York, N. Y. 10022.
6. Names and addresses of publisher, editor, and managing editor: Publisher, B. G. Davis, 505 Park Avenue, New York, N. Y. 10022; Editor, Julian Sienkiewicz, 505 Park Avenue, New York, N. Y. 10022; Managing editor, William Hartford, 505 Park Avenue, New York, N. Y. 10022.
7. Owner (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding 1 percent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a partnership or other unincorporated firm, its name and address, as well as that of each individual must be given): Science & Mechanics Publishing Co., 505 Park Avenue, New York, N. Y. 10022; Davis Publications, Inc., 505 Park Avenue, New York, N. Y. 10022; B. G. Davis, 505 Park Avenue, New York, N. Y. 10022; Joel Davis, 505 Park Avenue, New York, N. Y. 10022.
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	Average No. copies each issue during preceding 12 months	Single issue nearest to filing date
A. Total No. copies printed (net press run)	156,502	149,112
B. Paid circulation		
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2. Mail subscriptions	4,372	13,440
C. Total paid circulation	65,821	68,440
D. Free distribution (including samples) by mail, carrier or other means	829	2,016
E. Total distribution (Sum of C and D)	66,650	70,456
F. Office use, left-over, unaccounted, spoiled after printing	89,852	78,656
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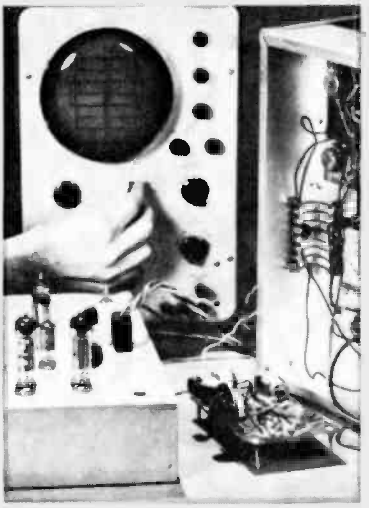

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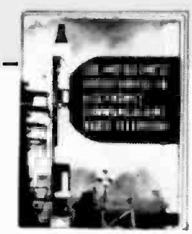

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