RADIO-TV EXPERIMENTER

WHITE'S RADIO LOG
AM-FM STATIONS
WORLD-WIDE
SHORT-WAVE LISTINGS!

FEBRUARY-MARCH 75c

3 ONE-EVENING PROJECTS

- Antique 'Phone Radio
- Universal AC Ammeter
- Perf-Board Phono Preamp

SIGHT & SOUND PROJECT

Sync Slides with Tape

(See page 37)

HOW BAD IS HIGHWAY HI-FI?

TEST REPORTS

International C-12B Frequency Meter

Heathkit/Magnecord 1020 4-Track Stereo Recorder

Knight-kit Safari III Portable CB Transceiver

HAM-CB RULES CHANGES!

FCC FIDDLES WHILE LICENSEES FUME!


Introducing EICO's New "Cortina Series"!

Today's electro-technology makes possible near-perfect stereo at moderate manufacturing cost: that's the design concept behind the new EICO "Cortina" all solid-state stereo components. All are 100% professional, conveniently compact (3⅛"H, 12"W, 8"D), in an esthetically striking "low silhouette." Yes, you can pay more for high quality stereo. But now there's no need to. The refinements will be marginal and probably inaudible. **Each is $89.95 kit, $119.95 wired.**

Model 3070 All-Silicon Solid-State 70-Watt Stereo Amplifier: Distortionless, natural sound with unrestricted bass and perfect transient response (no interstage or output transformers); complete input, filter and control facilities; failure-proof rugged all-silicon transistor circuitry.

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7 New Ways to make Electronics more Fun!

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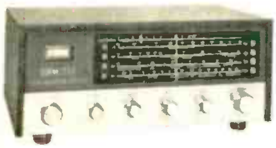
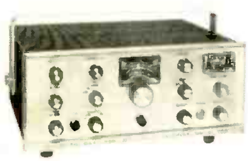
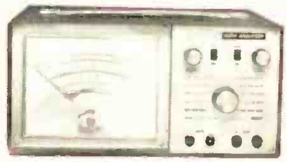


You hear all the action-packed capitals of the world with the **NEW EICO 711 "Space Ranger" 4-Band Short Wave Communications Receiver** — plus ham operators, ship-to-shore, aircraft, Coast Guard, and the full AM band. 550KC to 30MC in four bands. Selective, sensitive superhet, modern printed circuit board construction. Easy, fast pinpoint tuning; illuminated slide-rule dials, logging scale; "S" meter, electrical bandspread tuning, variable BFO for CW and SSB reception, automatic noise limiter. 4" speaker. Headphone jack. **Kit $49.95. Wired $69.95.**



More "ham" for your dollar than ever — with the **one and only SSB/AM/CW 3-Band Transceiver Kit, new Model 753** — "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, silicon solid-state VFO. Unequaled performance, features and appearance. Sensationally priced at **$189.95 kit, $299.95 wired.**



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RADIO-TV EXPERIMENTER

Cover photo by Leonard Heicklen

Feb.-March 1967

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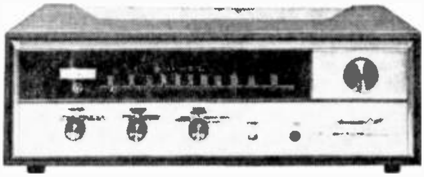

FEB.-MARCH 1967

INSTITUTE OF HIGH FIDELITY INC

ABC

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RADIO-TV EXPERIMENTER

Dedicated to America's Electronics Experimenters

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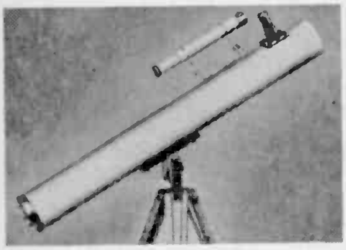

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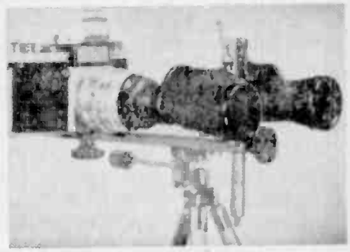

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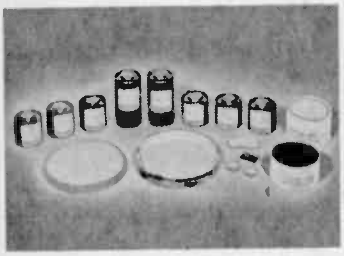

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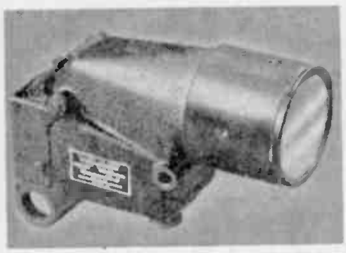

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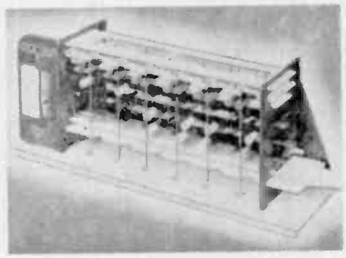
Terrific bargain! Surplus gun sight orig. cost Gov't. about $100. Was essentially a source of infinite light. Many uses for experimentors, research labs. Metal ring and dot reticle f/2.5, 2" achromatic lens, bulb 3⅜"x2⅝" reflector glass plate. Bulb operates on 14V, can be converted to 110V—or inexpensive transformer available. 6¾"x5"x2¾". $9.95 Ppd. Order #70,774HP. 110V transformer, $3.75 Ppd. #60,521HP. Edmund Scientific Company, Barrington, New Jersey 08007.



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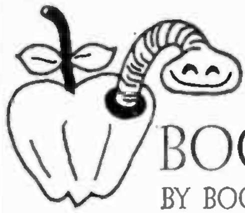


BOOKMARK

BY BOOKWORM

☐ ☐ **Color TV.** The vast growth of color television activity has developed a pressing need for simplified, more useful color-TV troubleshooting guidance. *Color-TV Servicing Guide*, by Robert G. Middleton, is a quick, effective servicing tool, arranged by color-TV trouble symptoms. It shows how to apply proper troubleshooting procedures, based on an analysis of trouble symptoms. It includes many full-color illustrations of actual picture tube displays for the various troubles, plus clear, concise text explaining possible causes and diagnosing procedures.

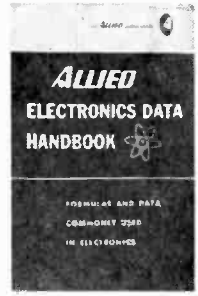
Soft cover
112 pages
$3.95

The book goes through each section of the color-TV receiver, describing the symptoms of related troubles. The last chapter in the book explains in detail how to test and troubleshoot with color-bar generators. Without this helpful book at hand, many servicemen may be wasting time needlessly. It is written in a clear, concise manner by author Bob Middleton who is well-known for his down-to-earth books for practicing techniques. *Color-TV Servicing Guide* is available from electronic parts distributors and bookstores throughout the country, or from Howard W. Sams & Co., Inc., Dept. RTV, Indianapolis, Indiana 46206.

☐ ☐ **Data Book.** The fifth edition of the highly popular reference book *Allied Electronics Data Handbook* has been revised and enlarged to include new and up-dated material for use in electronics. Fundamental mathematical data covers math constants, math symbols and algebraic formulas. Complete mathematical tables are given for squares, cubes, square roots, cube roots, reciprocals, common logarithms, natural sines, cosines and tangents. Radio and electronic formulas are provided for 70-volt speaker matching systems, resistance, capacitance, in-

Bookmark

ductance, reactance, resonance, frequency and wave-length, "Q" factor, impedance, conductance, susceptance, admittance, transmission lines, vacuum tubes. DC meters, trigonometric relationships, Ohm's Law for AC and DC circuits and others.



Soft cover
112 pages
75 cents

Basic formulas are given for tubes and transistors; also basic transistor symbols, circuits, and alpha-beta relationships. Included in engineering and servicing data are attenuator networks; RF coil winding formulas; wire table; RF coil winding data chart; charts for inductance, capacitance and resistance; metric relationships; how to use logarithms; tables on directly interchangeable tubes, both foreign and American; pilot lamp data; EIA and military codes for resistors and capacitors; Amateur Radio bands; TV channel and carrier band frequencies; recording tape playing times; schematic symbols and abbreviations; and Greek alphabet designations.

A giant amid its contemporaries, the handbook is available, postpaid in the U.S.A., from Allied Radio Corp., 100 N. Western, Chicago, Illinois 60680.

□ □ **Good Buys.** Some of the best books on electronics for experimenters as well as engineers are published by the government and are inexpensive. The Government Printing Office has just sent out a bulletin listing some of its electronics books. Of particular interest to our readers, I am sure, is *Basic Theory And Application of Transistors* which is filled with circuits, contains 263 pages and sells for only $1.25. Another good one is *Selected Semiconductor Circuits*, a 440-pager priced at $2.25.

Theory and Use of Electronic Test Equipment is a 158-page book that every experimenter should have. It's only $0.75. Another one to have on the shelf for reference, and for learning the whys and wherefores, is *Basic Electronics*, a Navy training course covering 471 pages and priced at only $2.75.

These books can be ordered by mail from The Superintendent of Documents, Government Printing Office, Washington, D.C. 20402. You can get a list of books on electricity and electronics. ■

☐☐ **Tape Fans.** After the TV set and the radio/phono, the tape recorder is the most popular of home entertainment components. This text is widely used by students, teachers, actors, writers, private eyes, Beatle fans and other music and song collectors, for speech therapy or home speech improvement, for recording parties and special events like the baby's first sounds, for making tapes of selected broadcasts or prized records—the applications are endless.

The average tape recorder owner does not know a great deal about his machine and does not make full use of its capabilities. To help him, Allied Radio Corp., the Chicago-based electronics supply house for high fidelity and electronics components, has published a low-priced book, *Using Your Tape Recorder*, that explains the *ABC*'s of tape recording to the non-professional user. Written by Harold D. Weiler, an old hand with audio and recording subjects, working with Allied's recording specialists, this new book treats all subjects in simple language directed to the recording hobbyist and non-technical operator. Priced at fifty cents, this paperback is available postpaid in the U.S.A. Send your four bits to Allied Radio Corp., 100 N. Western Ave., Chicago, Ill., 60680.

Soft cover
96 pages
50 cents

☐☐ **Easy Does It Computer Lessons.** If you are fascinated by the seeming miracles performed by present-day computers, you probably would like to know how they operate. You can easily learn what actually happens in a computer . . . it's far simpler than you may have expected. Although computers contain a myriad of circuit complexes, they are actually combinations of a relatively few basic, simple circuits.

A new book, *Computers Self-Taught Through Experiments*, by Jack Brayton, helps you to learn about computers the easy way. It leads you through 28 simple, low-cost construction projects, the use of transistors in computers and describes the various individual computer operations in detail. Along the way it gives details for constructing actual working models of the computer circuits described.

While low-cost, easy-to-obtain parts are used, these circuits operate in the same manner as the ones in actual computers. At the end, construction details are given for a ten-stage adder/

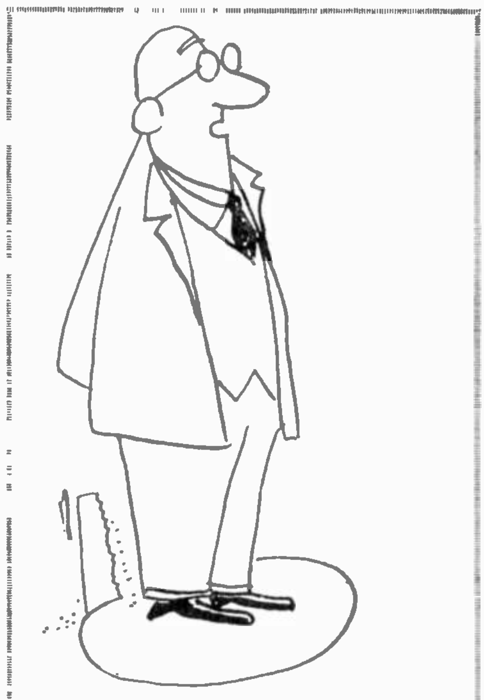
Bookmark

subtracter, complete with readout lamps. By studying this book and performing the various experiments anyone who would like to know how computers work can easily and enjoyably gain this knowledge.

Soft cover
192 pages
$4.25

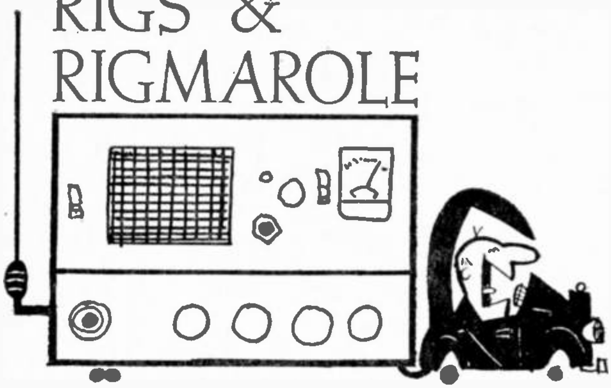
Jack Brayton is well known to the readers of this magazine as well as its sister publication Elementary Electronics. His basic computer theory pieces and construction projects have been in our reader's hands for almost two years.

Copies are available from electronics parts and distributors and bookstores throughout the country; or direct from the publisher, Howard W. Sams & Co., Inc., 4300 W. 62nd Street, Indianapolis, Indiana 46206. ■



"Is Ed still putting together that antenna tower in the cellar, Dear?"

CB RIGS & RIGMAROLE



a what's new product column that's fun to read

A Real Charmer. No, the Cobra V isn't some kind of late model snake, it's a glitzy new CB rig which just blew on the scene from the windy city. The Cobra is right in step with the latest trends in CB gear—little in size, all transistorized, low cost, efficient; and it claims to be the first rig on the market with a "special protective circuit for transmitter components."

In the performance department, the Cobra V has transistorized transmit/receive switching (that means no moving parts and therefore less chance for mechanical failure when a tired old relay drops dead of fatigue). There's also a clever new *voltage filter* to improve the clarity of the signals inhaled by the Cobra V.

B&K Cobra V CB Transceiver

Running a whopping 100% modulated 5-watt input on any five channels, the set puts up quite a showy front with a walnut grain finish ('neath that frilly walnut finish is an all steel housing).

For those wise guys out there in the reading audience who come on strong with the fancy tech talk, we note that the Cobra V comes on strong with better than half a microvolt sensitivity (for 10 db S/N) and a selectivity of 6 db at ± 3 kc—O.K.?

You can get enough literature on the Cobra V to stuff a megacycle if you drop a card or letter to the manufacturer, B&K Division, Dynascan Corp., 1801 West Belle Plaine Ave., Chicago, Ill. 60613.

A Matchless Antenna? We've seen some wild looking things connected to the output of CB rigs but the Antenna Specialists MACH III makes the rest of them look like as tame as a tranquilized bunny rabbit.

Not knowing exactly how to describe it, the best we can do is simply parrot the description of the thing as stated by the manufacturer: "A spiral shaped, printed-circuit coil, waterproofed and shock-suspended inside a wing-shaped ornamental base." This all boils down to the fact that this circuitry is a "involute transducer" (wha?).

Now that the engineering is clear to you (because it certainly isn't to us) we can get into the performance of the little devil. It's a 32 inch steel whip, basically, set into a futuristic cyco-lac plastic base containing all of the sophisticated jazz we just told you about (don't ask us to repeat it please).

Available in a variety of mounting types (with or without shock spring), the MACH III is DC grounded for optimum SWR across the band. The antenna may be peaked up to your particular rig by means of an adjustment in the base.

Prices (depending on mounting hardware) range from $12 to $25. The folks who figured this one out are at Antenna Specialists, 12435 Euclid Avenue, Cleveland, Ohio 44106.

Palm Sized Yakker. Palm sized can mean the size of a palm tree, but in this case it's a miniature radio station offering 2 channel operation, superheterodyne receiving, push-pull audio, 9 transistor function circuitry, and it's all wrapped up under a $14.95 price tag.

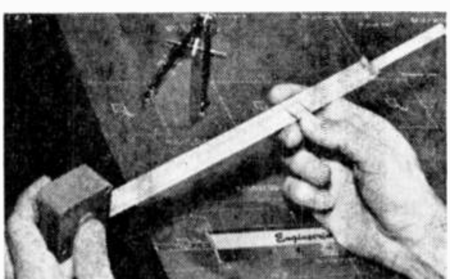
This rig is called the Lafayette HA-62, transmitting in all its tiny glory from a die-cast chrome highlighted front panel via a telescoping whip antenna. Put in a 9 volt battery and you can plug in an earphone and make like Jack Daniel's (or James Bond, or whatever that fellow's name is). Signals from the HA-62 will carry for a mile or two under normal conditions, and no license is required (and no age limit either).

One Of Our Aircraft Is Missing. Not long ago we suggested that walkie-talkie users might make good use of the Class C radio control channels which lie between the Class D CB channels—thereby avoiding harmful interference from their more powerful 5-watt brothers. Unfortunately we forgot to consider the possible effects on the radio controlled aircraft using these channels. A number of model fliers quickly brought this to our attention—mentioning several instances when a walkie-talkie became the instrument of destruction to a prized model aircraft; knocked it right out of the sky.

The aircraft folks will be moving to their new 70 MHz mc channels and perhaps we might hold off on invading their 27 MHz channels until they're all moved out. ■

Retractable Slide Rule

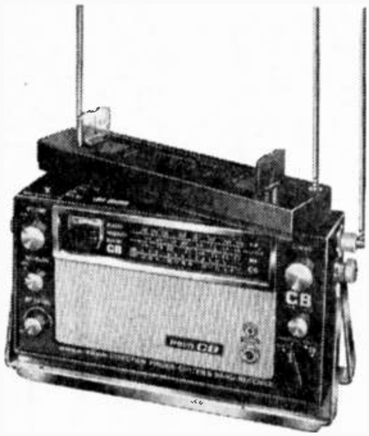
Very-small-pocket-sized (1¾ x 1¾ x 1 in.), this pocket slide rule extends to ten inches. The slide rule features *A*, *B*, *C*, and *D* scales with *B* and *C* scales folded in *D'pi* and *D pi* relationship to permit determination of circular areas and circumference by moving cursor only. Double-length sliding



B and C scales provide an endless feature formerly found on circular slide rules. Reverse side measures to 20 in. or its metric equivalent and lists basic equivalents, fan laws, power, trig and geometric formulas. Cost, $8.50; manufacturer, Cal-Tape, 1095 Kingston Park, Roann, Ind. 46974.

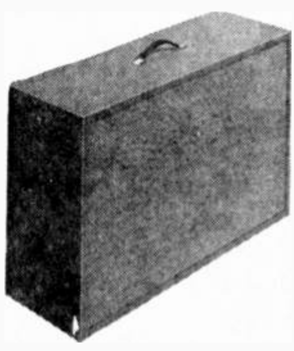
5-Band CB Receiver/Direction Finder

This transistor portable tunes all 23 CB channels on two separate bands, as well as police/marine/shortwave band, 1.5-4.5 MHz; low frequency beacon/weather band, 200-400 kHz; standard AM broadcast band. The "Nova CB" has an accurately calibrated rotating antenna and null meter, and is also a precision radio direction finder for boats and light planes. Priced at $149.95, Nova CB comes with leather carrying case, chrome mounting brackets, 3 telescoping whip antennas, batteries, headphone jacks, miniature earpiece, pushbutton dial light, external power cord, house current adapter. Available at most stores or from Nova-Tech, Inc., 630 Meyer Lane, Redondo Beach, Calif.



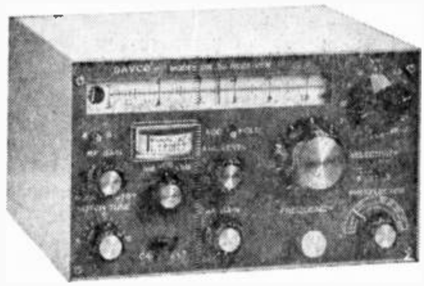
Bass Guitar Speaker Systems

These speakers, PMC-1 and PMC-2, have been engineered to obtain maximum performance from bass guitar amplifiers. The 12-inch speakers have 2-inch diameter voice coils and 2-pound magnets. Both systems are about the size of a 2-suiter suitcase. The PMC-1 ($166.50) has a 12-inch woofer and handles 60 watts; the PMC-2 ($216.50) has two 12-inch woofers and handles 120 watts. Speakers made by Utah Electronics, 1124 E. Franklin St., Huntington, Ind.



For Hams What Am

The DR-30 Communications Receiver is a solid-state, dual conversion superhet unit using field-effect transistors. The use of FET's in the RF stages make for greater sensitivity, better image rejection and exceptional freedom from cross-modulation or overloading on strong signals. All the circuitry is on 9 plug-in, glass epoxy modules; chassis is 3/16-inch thick aluminum. Complete ham-band coverage, 80 through 10 meters plus a portion of six meters; 9.5-10.5 MHz for WWV and 31-meter SWL



band plus provision for two optional crystals for additional frequency coverage. Selectivity positions 5.0, 2.1 and 0.5 kHz. Collins mechanical filter for SSB, operates on 12 VDC. Priced at $389.50 amateur net from Davco Electronics, Inc., PO Box 2677, Tallahassee, Fla. 32304.

Updated Second Op

Coincident with a rapid increase in good band conditions on most shortwave frequencies comes the revised, fourth edition of W9IOP's Second Op. This is a simple DX computer on laminated card stock, giving beam headings to every country in the world from major geographic locations in the United States, immediate identification of prefixes including specific location of the prefix, time zone, continent, postage rates. Included on the periphery of the Second Op are provisions for logging contacts and receipt of confirmation. Send your name and address and $1.00 to Electro-Voice, Inc., Dept. PR-4, Buchanan, Mich. 49107 (or visit your local Electro-Voice distributor).

2—New Receivers—2

Both these new Hallicrafters receivers are AM/FM. The FM-66, shown on the right, has a hand-rubbed walnut cabinet, two built-in antennas, printed circuit chassis, and a 5-inch permanent magnet speaker. It measures 14½ x 7½ x 5¾ inches, list price is $64.95.

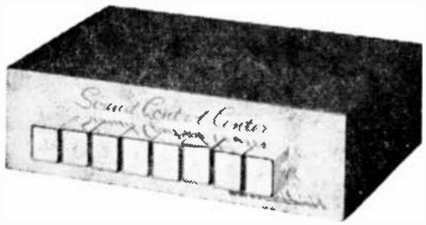
And on the left, Model S-210 has 4 short wave bands as well as AM and FM. This one has "spread" tuning, accomplished by electronically spreading apart distant stations to relieve congestion, permitting highly selective tuning on 49, 31, 25 and 19 meters. Power supply is the same as the FM-66—105-120 volt, 60 Hz AC. Has 3 dual-purpose and 3 single-purpose tubes. The vinyl-covered metal cabinet is 14½ x 7½ x 5¾ inches, and the unit lists for $89.95. If you don't have a Hallicrafters distributor near you, their address is Hallicrafters Co., 4401 W. 5th Ave., Chicago, Ill. 60624.

Lit-Up Base Antenna

The "Speakin' Beacon" Citizens Band base station antenna is a 27 MHz omnidirectional coaxial antenna with a permanent-circuit neon light built into its tip. Whenever the transmitter is keyed, the neon tube glows, visually verifying the RF power output and acting as a beacon to help guide mobiles. A Stati-Light ball surrounding the neon tube dissipates static electricity and helps eliminate noise. The ball, part of the neon light circuitry, provides proper capacity to ground to generate necessary voltage to light neon when RF energy is present. The Speakin' Beacon is 19 feet, 3 inches, aluminum, built to withstand winds up to 80 mph, has its own built-in lightning protection, and can be installed anywhere a vertical pipe would fit. Gamma matched, it has exceptionally low VSWR. Model is M-148, CB net price is $29.95, source is The Antenna Specialists Co., 12345 Euclid Ave., Cleveland, Ohio 44106.

Switch Hi-Fi All Over the Place

If you want simultaneous distribution of sound to more than one stereo speaker system—say family room, den, etc.—up to eight different areas in any combination at the same time, Model 642 Sound Control Center is for you. Offices, schools, would be other applications. Model 641, on the other hand, has a positive interlocking feature between switch stations which insures that only one system at a time can be selected. Frequency response through the internal switching network is from DC to 30 kHz with negligible switching loss. No external power (other than audio power being distributed) is required for operation. Power handling capability is 100 watts maximum into a 4-ohm load. User net price for Model 642 or 641 is $49.50 from Switchcraft, Inc., 5555 Elston Ave., Chicago, Ill. 60630. Write for details and address of nearest distributor.

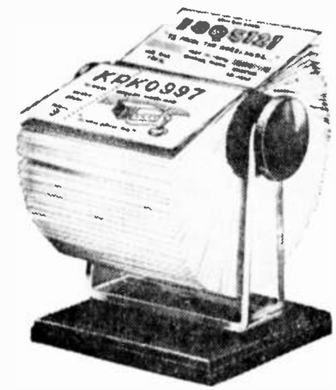


Hobbyists' Solid-State Kits

At popular prices, the do-it-yourselfer can now get hold of a wide variety of blister-packaged electronic kits as follows: EC-100 Siren Kit, $4.95; EC-101 Burglar Alarm Kit, $6.95; EC-102 Fire Alarm Kit, $6.95; EC-200 Intercom Kit, $3.95; EC-300 Audio Amplifier Kit, $4.95; EC-400 Metronome Kit, $3.95; EC-500 Tremolo Kit, $8.95; EC-600 Light Flasher Kit, $3.95; EC-700 "Mystifier" Kit, $4.95; EC-800 Photocell Nite Lite Kit, $4.95; EC-900 Power Supply Kit, $7.95; EC-1000 Code Oscillator Kit, $2.50. Shown is EC-1000. From EICO Electronic Instrument Co., Inc., 131-01 39th Ave., Flushing, N.Y. 11352. Each kit or group of kits may be the heart of your next home-brew project.

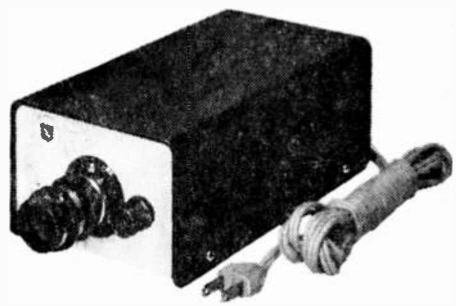
Flip Over Your QSL's

Luxury Model (SD) Rotary Card Holder comes with 200 see-through Mylar binders to hold 400 QSL cards. You have more? Relax, you can add more binders to hold up to 600 cards max. The luxury model has knobs and base of solid gunstock walnut and a 2-inch tapered Plexiglas frame and comes assembled in a gift box. Price—$24.35 postpaid. The Standard (S) model has plastic knobs and base, chrome frame, has Mylar binders for 160 cards, comes knocked-down for $9.95. Nordlund Radio Products, 7635 W. Irving Park Rd., Chicago, Ill. 60634.



Be Your Own TV Producer

A new closed-circuit TV camera, model SS-310, using less space than a telephone, is priced in the hobbyist range. Resolution at center of picture is 350 horizontal lines or better with monitors, and 300 lines or better with conventional receivers. The



camera circuit contains 19 silicon transistors, 2 germanium transistors, and 14 diodes. A clear picture can be obtained with a minimum amount of illumination, using f1.4 lens supplied with the camera. The SS-310 has an automatic electronic circuit that instantly compensates for wide and sudden lighting changes, assuring a clear picture under virtually all light conditions. Plug-in modular circuit boards facilitate replacements with a minimum of downtime. User price of the SS-310 with f1.4 lens, 25 feet of coaxial cable with connectors, is $289.95. Maker is Squires-Sanders, Inc., Martinsville Rd., Millington, N. J. 07946.

Transistorized Doorman

This pocket-sized garage-door controller, the Electro-Lift, opens, closes, locks the garage door

☆☆☆

and controls the garage light from 100 feet away. Meeting FCC rules, the Electro-Lift uses a new radio coding system called pulse-tone modulation. The 2¾ x 3¾ x 1-inch, 10 oz. transmitter can be carried in purse or pocket, clipped to the sun visor or under the dashboard. The receiver fastens to the wall of the garage; not overhead as in other versions. The Electro Lift gives double protection

against mishaps with both pushbutton and automatic stop features; handles single or double one-piece doors up to 20 feet wide and 8 feet high, sectional doors up to 10 feet wide. The complete Perma-Power Electro-Lift system sells for $179.95, and is friction-driven (the Perma-Power model G-670 is a chain-drive unit). Available nationally, or write to Perma-Power Co., 5740 N. Tripp Ave., Chicago, Ill. 60647.

Self-Service Technician

Mercury Electronics has dolled up their new self-service tube tester 204 Series in modern blue and grey cabinet designs. The new units have a panel designed to accommodate over 1,700 tube types including the latest nuvistors, novars, compactrons, magnovals and 10 pin types. They also test fuses, pilot lights, 6- and 12-volt auto radio vibrators. Only two settings are required to test any tube, and a flip tube chart lists over 1,700 tube types. For positive contacts there are 68 phosphor-bronze and beryllium tube sockets. The Lo-Boy Floor Model 204LB is dealer net $209.95, Counter Model 204C is $159.95. Mercury Electronics Corp., 315 Roslyn Rd., Mineola, N. Y. 11501.

Low-Cost 4-Track Recorder

At a nice price ($89.95) the Model RK-810, Stock No. 99-1527WX, has 3 speeds with 4-track monaural/record and 4-track playback stereo with 5-position selector control for rewind, stop, run, fast forward and pause for instant editing. It has a self-contained 5-inch speaker, 3-digit tape counter with

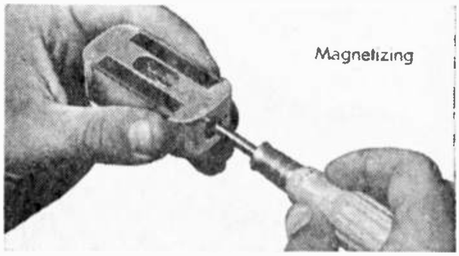
reset button, stereo tape head output jacks, 2 inputs for mike and auxiliary. Response is 40-15,000 Hz at 7½ ips; 40-10,000 Hz at 3¾ ips. Signal-to-noise ratio is 40 db or better; crosstalk 55 db or better. Size is 11⅝ x 1¼ x 6⅔ inches. Takes 3- to 7-inch reels. Comes with dynamic microphone, 3 connecting cables, 2 rubber reel caps and 7-inch empty take-up reel. Textured vinyl case. Model RK-810 from Lafayette Radio Electronics Corp., 111 Jericho Turnpike, Syosset, N.Y. 11791.

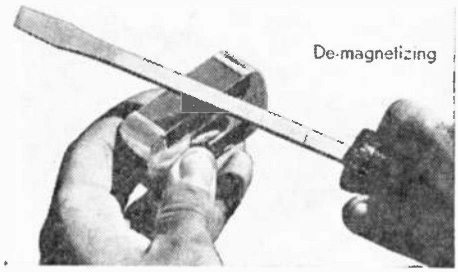
For Part 15'ers

With the Rangemaster 100 mW transceiver comes a guarantee stating that it will outperform in range and clarity any CB transceiver not requiring an operator's license. Reason for claim? An additional RF amplifier stage for long range reception. Pluses: extra sensitive superheterodyne receiver; crystal-controlled transmitter and receiver with separate microphone and speaker for telephone-like operation; switch controlled squelch, telescoping 60-inch antenna. The Rangemaster can be used with AC base station or AC adapter. Over 200 mW audio output; better than 30 db signal-to-noise ratio; 18 db selectivity. Uses 6 Penlite batteries. Size 8 x 2½ x 3 in., weight 1½ lbs., price $39.95. For information: Claricon, 663 Dowd Ave., Elizabeth, N. J.

Magnetizer Demagnitizer

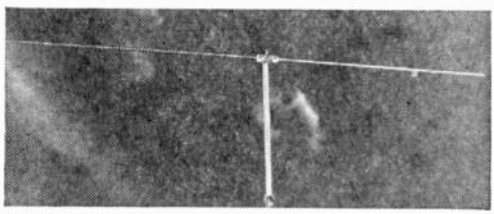
This beautifully simple little tool eliminates the need for special magnetized tools. To magnetize a screwdriver just insert into one of the holes in the Sure-Nuf. The screwdriver retains its new magnetic properties until it is drawn across one of Sure-Nuf's outside metal plates. This breaks the magnetic field, and voila! it's back in its non-magnetic state. Smaller than a cigarette pack and weighing less than four ounces, the Sure-Nuf's permanent magnets never need recharging. Retail price is $2.89 from New Enterprises Inc., PO Box 338, Reno, Nevada 89504.





Go-Anywhere Antenna

The Trik Stik (Model TS-1) antenna can be mounted vertically or horizontally anywhere, under any conditions, for the following applications: Citizens Band, business radio (low and high band), SWL, monitor, aircraft, Civil Defense, ama-



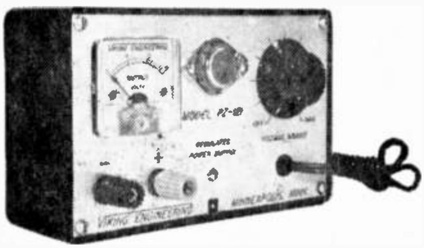
teur, experimenter, television, FM. Assembly is accomplished in minutes for permanent installations, temporary stations or test purposes and complete instructions are supplied with measurements for setting Trik Stik to the correct dimensions for any of the services listed. Price is $6.45 and it comes from Cush-Craft, 621 Hayward St., Manchester, N. H. 03103.

Cardioid Dynamic Mike

The cardioid pickup pattern of Olson's new mike sharply reduces feedback in PA and recording applications. Model M-216 has a moisture- and heat-resisting hermetically sealed cartridge, durable cast metal case. Will fit any stand with ⅝-27 thread. Impedance, 50K ohms; response 100-12,000 Hz. Comes with 20-ft. shielded cable, diameter 1⅞-in., 4½-in. long. $14.98 from Olson Electronics, Inc., 260 S. Forge St., Akron, Ohio 44308.

Bargain Regulated Power Supply

Here's a bargain for the experimenter or service technician who needs a low-cost variable source of ripple-free regulated DC power. Model PZ-121, available in factory assembled or kit form, delivers stable, continuously variable output from 0-15 volts DC and usable currents to 250 ma. from an AC line. This compact (6¼ x 3¾ x 2 in.), solid-state

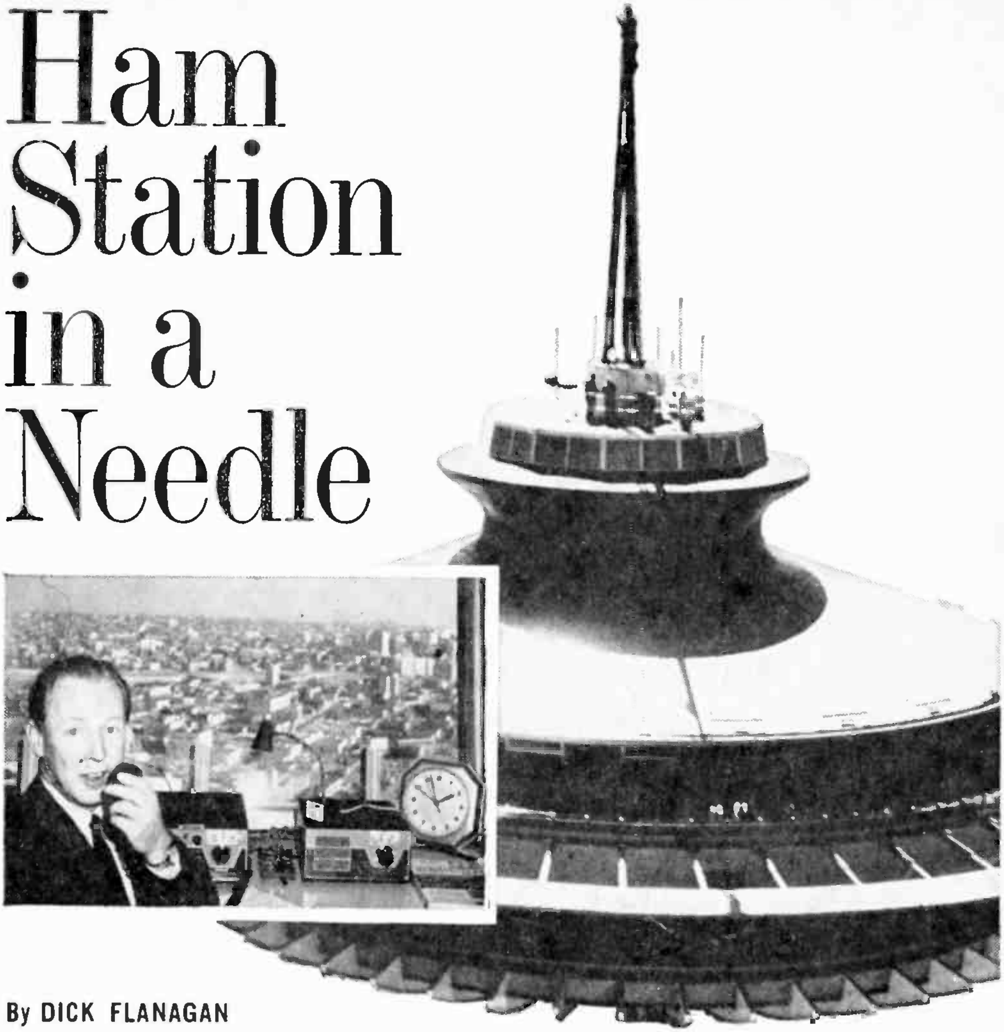


unit provides regulation better than ± 0.2 volts and AC ripple of less than 5 mv for outputs to 100 ma. Zener-reference model PZ-121 features burn-out proof circuitry and transformer isolated output. Price—a mere $13.95 in kit form, $19.95 assembled, from Viking Engineering of Mpls., PO Box 9507, Minneapolis, Minn. 55440.

20,000 Ohms-per-Volt VOM

Knight-Kit has a new VOM, model KG-640, listed in complete detail in Allied's 1967 catalog No. 260. The KG-640 has a total of 57 ranges starting as low as 0.8 VDC, covered by a positive-action range/function switch and range-doubler switch that virtually doubles the effective number of ranges. Repeatability of readings is promised by its rugged taut-band meter movement. No damage is possible to the protected movement, even with 1,000 times overload. The new Knight-Kit 20,000 ohms-per volt VOM, with test leads, batteries and detailed instructions, is priced at $39.95 in kit form, $59.95 assembled. Allied Radio Corp., 100 N. Western Ave., Chicago, Ill. 60680.

Ham Station in a Needle



By DICK FLANAGAN

■ **Many's the Ham** longing for a super skyhook, but Bob Ryan, W7GWA, isn't one of them. For Bob numbers among the operators of what may very well be the highest Ham station in the world, which, because of its unusual location, also boasts a skyhook to top all skyhooks.

Installed on the observation deck of the Seattle Space Needle some 550 feet above the city's rooftops, station WA7GBD is operated by the Space Needle Amateur Radio Club. And Bob, who is one of the club's 75 members, takes turns working Hams around the world from this strange Ham-station-in-a-needle.

Bob generally works 20-meter SSB, using a Drake TR-4 transceiver and a companion RV-4 remote VFO. Currently, the station is heard as far away as Japan, Brazil, and Russian Siberia. Even greater range and reliability are expected when the present 300-watt transmitter is joined by a kilowatt linear, which is now on order from Drake. When it arrives, Seattle's Ham-station-in-a-needle will be as powerful as any amateur station going.

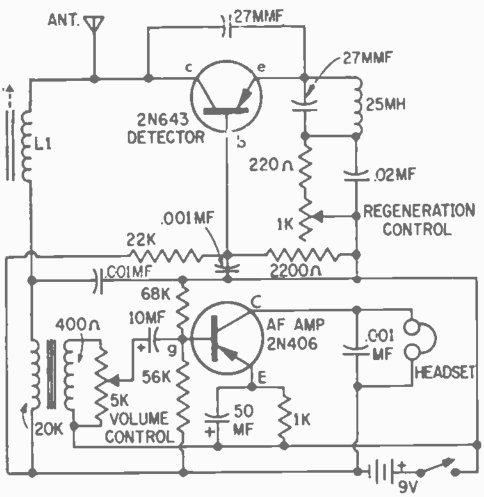
In spite of the Club's extraordinary offerings, there are no membership dues or other fees. The Space Needle organization simply issues free elevator passes to all members so they can have ready access to the station at any time. And since nearly a million people visit the observation deck annually, the public relations value of the station is thought to be excellent. Most of the visitors see the station in operation, frequently handling traffic from U.S. servicemen on ships and at bases overseas. ■

CW Monitor

How can I add a code monitor to my CW transmitter?

—*C. C. S., Moody AFB, Ga.*

While you could build an audio tone generator and key it simultaneously with your transmitter, you will not be actually monitoring your transmitted signal. To do so, all you need



is a simple regenerative receiver, operated in an oscillating condition, a grid-dip meter or a heterodyne-type frequency meter, such as the BC-221 which is available at military surplus outlets.

You can build a monitor using a circuit such as shown in the diagram. (The coil can be a plug in type so you can change coils when switching your transmitter from one band to another.) Just place it near the transmitter and tune in its signal, with the key down, until you hear a beat note. You will then be able to monitor your transmissions. The oscillator is tuned by adjusting its ferrite core. An antenna may be connected to the antenna binding post, but is usually not necessary when near a transmitter.

Q-multiplier vs: Crystal Filter

My shortwave set employs a 1650-kHz IF. Would a Q-multiplier do any good, and where can I get one?

—*R. N. K., Morton Grove, Ill.*

A Q-multiplier is most effective at relatively low frequencies, 455 kHz and below. For 1650 kHz, a crystal filter can be used to improve selectivity. It is inserted at the input of the IF amplifier. They are made by several companies, primarily for equipment manufacturers. One company near you, Niederman-Sherold, Inc., 4302 Warren Avenue, Hillside, Illinois, makes a 1650-kc crystal bandpass filter.

QSL a Satellite

Is it possible to receive satellite signals from outer space on a shortwave set? If so, on what frequencies?

—*C. B., Seattle, Wash.*

Russian satellites transmit on around 20 MHz within the tuning range of most shortwave sets which usually tune up to 30 MHz. American satellites transmit on frequencies around 100 MHz. A special VHF receiver or a converter ahead of a shortwave receiver is required.

Mum's the Word

I have sent QSL cards to ship and marine coast stations I have heard, but have received no verification from them. Why don't they acknowledge my reports?

—*A. R. T., Marysville, Wash.*

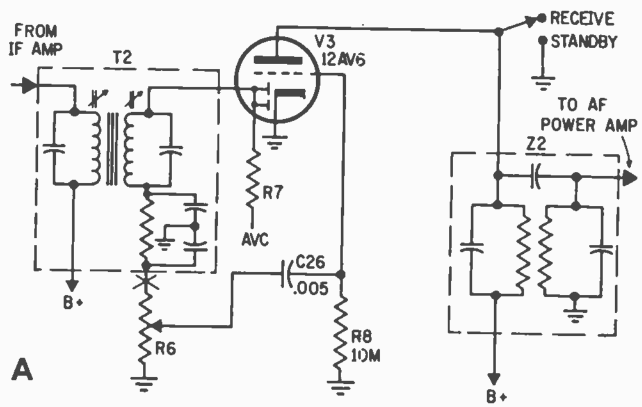
You aren't supposed to send QSL cards to any but broadcast and amateur stations, un-

Add Noise Limiter

Can you give me a circuit for adding a noise limiter to my National SW-54 receiver?

—*J. L., Seattle, Wash.*

The original circuit of the detector and first-audio stage are shown in the upper diagram. Break the circuit at "X" and add five resistors, three capacitors and a diode as shown in the lower diagram.



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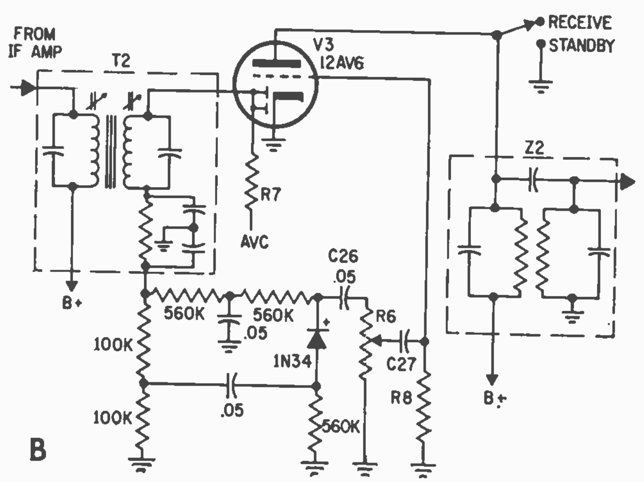

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less you are requested to do so personally or by published invitation. An international treaty and the Communications Act make it unlawful for anyone to divulge the contents of any transmission, or even its very existence, from any class of station except broadcast or amateur.

Manufacturers' Radio Service

I recently read that 30 new low-power radio channels have been allocated in the 72- to 76-MHz band. Where can I get equipment for this band?

—R. K., Passaic, N. J.

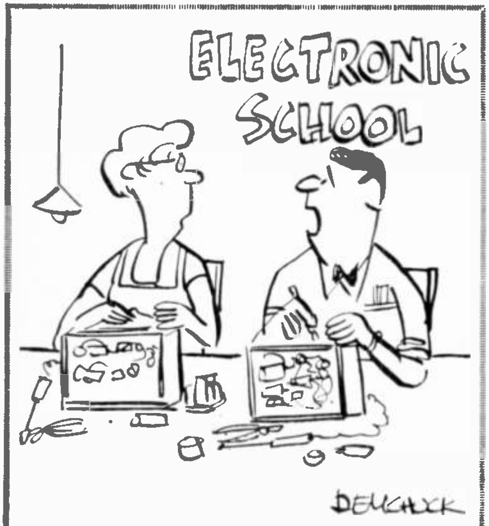
It has been reported that Femco, Inc., Irwin, Penna, and Union Switch & Signal, Swissvale, Penna., will have equipment available for the 72- to 76-MHz band. However, these channels are restricted to those eligible in the Manufacturers Radio Service and may not be used for hobby or personal purposes.

Can or Will Earn?

How much can I earn as a radio-TV service technician? I have completed a correspondence course and have had experience building kits.

—E. L., Edmonds, Wash.

In your part of the country, union scale for a technician is $3.60 per hour and is supposed to rise to $3.75 in 1967. Some non-unions shops pay less, some more for an experienced man. New York subway crews earn as much. But, electronics can be more fun.



"How did a sweet kid like you get into a racket like this?"

Detector for FM, AM, CW and SSB

How can I modify a communications receiver to work on FM as well as AM, CW and SSB?
—*R. H., Seattle, Wash.*

You can replace the AM detector and first AF stage with a gated-beam tube (such as 6BN6) using the circuit shown in the schematic diagram. The existing IF transformer feeds the control grid of the tube. When S1 is set to AM and S2 is set to F (for fast AVC response) or S (slow AVC response), the grid and cathode function as a grid leak or diode detector and the rest of the tube functions as an AF amplifier. AVC voltage is developed across R2-R3 and is tapped off at their junction. Diode D1 prevents AVC action until the signal reaches a satisfactory level. With S3 open, the positive bias on the quadrature grid can be varied with R1 for minimum audio distortion.

When S1 is set to SSB/CW, the signal from the receiver's BFO (beat frequency oscillator) is fed to the quadrature grid to form a product detector. AVC attack time can be selected by setting S2 to F or S.

For FM narrow band reception, S1 is set to FM and C1-L1 are connected to the quadrature grid to form a gated-beam discriminator. By setting S2 to the *None* position, AVC is cut out and the tube also functions as a limiter. Closing S3 makes it possible to vary the cathode bias on both the control and quadrature grids with R1 for maximum sound recovery and best limiter action. The quadrature coil (L1) is tuned to the same frequency as the receiver IF and trimmed for maximum FM audio recovery.

High-Frequency Problem

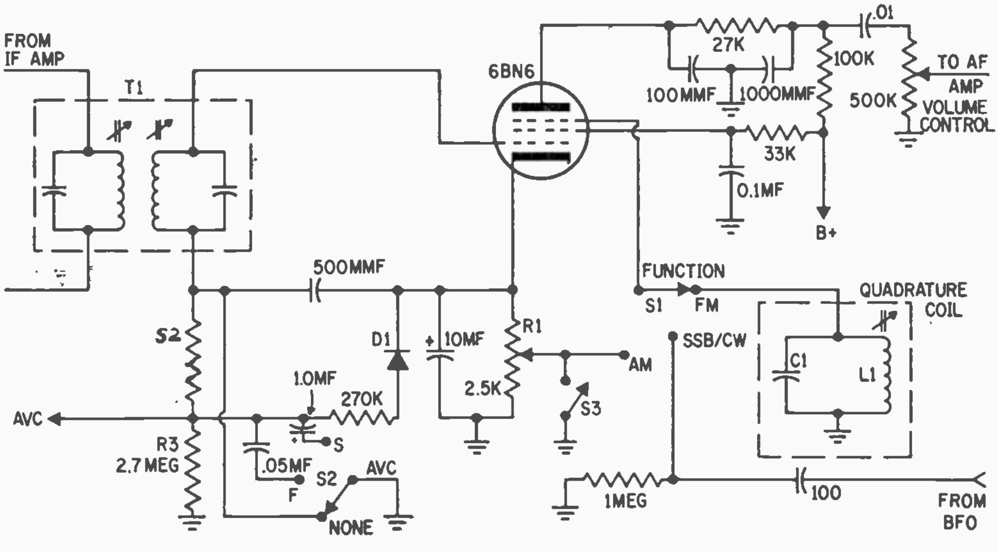
I have a (Brand X) 4-tube superhet shortwave receiver which has good selectivity and sensitivity up to about 14 mc. But, from there up to 30 mc, it lacks the ability to pull in all but the very strongest signals. Would the addition of a preselector solve this problem?
—*C. L., Brantford, Ontario*

Have you had the tubes checked on a critical tube tester? Try new converter and IF-amplifier tubes. Also adjust the highest frequency band RF trimmer when tuned in to a CB or 10-meter ham station and again when receiving the weakest signal you can tune in. If you have or can borrow a signal generator, realign the IF transformers. *Be sure to use a proper outdoor antenna.* A preamplifier (preselector) would help, but it doesn't sound as if you were getting all of the performance that was designed into your receiver.

Sure Mike!

Can you give me the address of a company that produces a transceiver-type mike for ham transmitter use?
—*L. Dec., Austin, Texas*

Roanwell Corp., 180 Varick Street, New York, N. Y. 10014 makes mikes of this type. So do many others including Electro-Voice, Turner and Sonotone. Try your local electronics-parts distributors who should have them in stock.



A Hot Note

I recently read in Variety that a musician was killed as a result of electrocution while playing an electric guitar. How can this happen?

—H. H., Van Nuys, Calif.

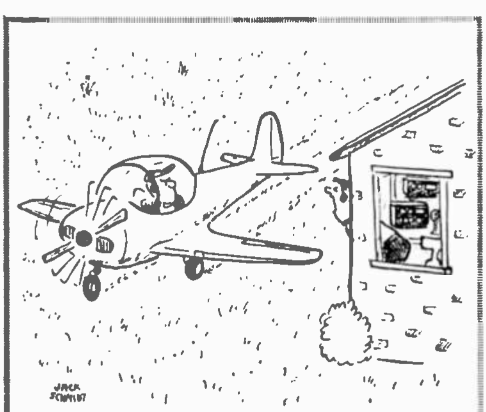
He must have been in a bathtub or standing on a wet floor when it happened. Alvino Rey and others have been playing electric guitars for years with no ill effects. The danger of electric shock can be great under some conditions. For example, a skindiver, who was testing an underwater TV camera in Al Ogilvie's swimming pool in California would have been electrocuted when he took the camera into the pool if it hadn't been noted that the camera was "hot" to the touch when the camera was handled at poolside. Grounding the shield of the camera cable saved the skin diver's life. The camera was "hot" because of the line-filter capacitors in its power supply which put the case about 60 volts above ground potential. The same hazard exists with TV sets and hi-fi devices. Moral: Don't touch any appliance connected to the AC line when bathing.

Crystal vs. Mechanical

Would you please tell me how to connect a mechanical filter to my communications receiver (diagram enclosed)?

—J. B., Topeka, Kansas

Your set already has an adjustable crystal filter whose bandpass or selectivity can be varied. You don't need a mechanical filter. Receiver design engineers are still arguing which is better, a crystal filter or a mechanical filter. They're both good. If I were you, I'd keep what you have.



"I wasn't calling you! I was telling my kids to 'come on in, quick'!"

Ask Me Another

Does it Pay?

How can I boost the input power of my 5-watt, 2-meter transceiver to 75 watts?

—*L. B., Morton Grove, Ill.*

Get a linear amplifier. Connect its input to the output of your transceiver and the antenna to the output of the linear amplifier which should have internal antenna switching facilities. However, you can quadruple your effective radiated power by installing a 6 db gain antenna which costs less than a linear amplifier and won't increase your electric bill. Call AM 2-2903 in Chicago and ask for Griff. He's near you and can tell you what kind to use, where to get one and for how much.

Just a Minute

In one of your articles about building a novice antenna loader, a B & W Miniductor coil form was specified. Where can I get one?

—*D. P., Cuyahoga Falls, Ohio.*

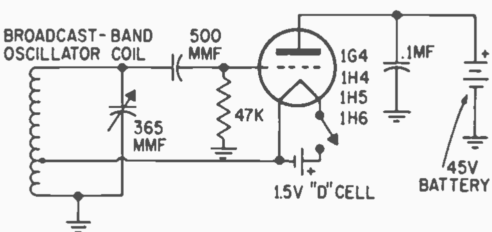
It is made by Barker & Williamson in Bristol, Penna. If you can't find it at your local radio parts store, write to Mr. A. Consalvi at B & W.

Carrier for Frequency Standard

How can I recover the unmodulated carrier from an AM broadcast station so I can use it as a frequency standard?

—*J. T. H., Pittsburgh, Pa.*

Rig up an oscillator using a circuit such as the one shown in the diagram. Place it near an AM broadcast receiver and tune in a station at the desired frequency. Then tune the oscillator close to the broadcast-station frequency so you will hear an audio beat (whistle). Carefully tune the oscillator for zero beat, the point where no whistle is heard. You'll have it set right if you get a whistle when you turn the tuning capacitor either way. When set to zero beat with a signal of known frequency, your oscillator will be within a few cycles of that frequency.

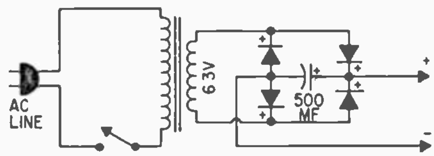


9-Volt Battery Eliminator

Can you give me a circuit for an AC power supply for replacing a 9-volt transistor battery?

—*P. C., Helena, Montana*

Four IN1693 or similar diodes, a 6.3-volt filament transformer and an electrolytic capacitor, connected as shown in the diagram, should do the trick. The no-load voltage should be around 9.8 volts which will drop somewhat under load.



Engineering Takes Years

I want to assemble a transistor radio capable of receiving radio signals in Canada from radio stations of Indo-Pak Subcontinent, especially the following: All India, Radio Delhi, Radio Pakistan Karachi, Radio Lahore (Pakistan), Radio Sirinagar (occupied Kashmir), Radio Jammu (occupied Kashmir), Radio Jallunder (Panjab, India), Radio Ceylon (commercial station operated from Bombay, India), Radio Dacca (Pakistan) plus local longwave stations. If it is possible, could you please draw a diagram and advise equipment to be used to produce a "perfect model."

—*A. A., Vancouver, British Columbia*

If it were possible to give you a diagram of an all-transistor, all-wave receiver meeting your requirements, we would do so gladly. There is such a receiver on the market (National) but it costs more than $1,000. It probably cost the manufacturer more than $100,000 and several man-years to design it. While we could dream up a diagram, there are countless other problems you would have to solve yourself. It would cost you a great deal in money and time with no assurance of satisfaction. As a compromise, you might consider Lafayette's 11-band portable at around $160 or Zenith's Transoceanic, ready to use.

Filter vs Crystal

Please don't make fun of the use of a mechanical filter with a "Q" multiplier. I have a Hammarlund HQ-100 with a Lafayette mechanical filter and the results are excellent. Adjacent channel QRM is much reduced and stability is considerably improved. For CW reception it cannot be beat for the price.

—*R. C., Manchester, N. H.*

Of course a mechanical filter is a good device. But, in a receiver which already has a crystal filter, why add another one? Since your receiver does not have a crystal filter, the addition of a mechanical filter makes sense.

☆☆☆

SWL Skywire

I am a beginner SWL. What is the best antenna setup for 10-160 meters?

—*M. B., Toronto, Ontario*

Start out with a 50-foot wire antenna. Allied Radio in Chicago offers a complete antenna kit for 98 cents. You should be able to get one in Toronto for not much more. Later, as you get more experience, and if you have adequate space, you can use something more exotic.

Dig for Tunnel Diode

I can't find a TD-1 tunnel diode for use in the TD-FM radio described in a recent issue. What other type can I use?

—*L. A. R., Detroit, Mich.*

Get a GE 1N3712. It sells for $3.75.

Don't, If You Don't Know

I have 3-phase, 3-wire, 220-volt power. I have a machine which operates from a 220-volt, 2-wire circuit and ground. Can I connect it to two wires of the three-phase circuit and run a ground to the water main?

—*W. O. S., Niles, Mich.*

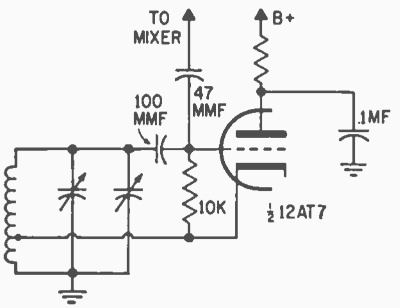
If the ground lead is used only for grounding the frame of the machine and is not actually connected to the 220-volt line, OK. Otherwise, you may need a star-to-wye transformer. Before you do anything, consult the power company.

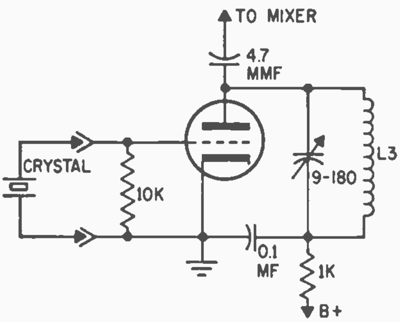
VFO or Crystal?

How can I install a crystal in my 30 to 50-MHz band FM receiver for receiving on 39.46 MHz?

—A reader, Someplace, USA

The first diagram is the circuit of the oscillator stage of your set, according to the schematic you sent. The second diagram is the modified circuit. Use the same oscillator coil tuned by a trimmer capacitor. Disconnect the oscillator section of the main tuning capacitor. You still use the tuning dial to tune the RF amplifier and mixer to 39.46 MHz. For that frequency, use a 28.76 MHz crystal.





It's a Boo-Boo!

When watching TV commercials I have noticed that a commercial will come on for a second or two and then there is some kind of a switch. The commercial comes back on but at the beginning instead of at the point where it was interrupted. Do TV stations or networks run two films of the same program at the same time, with one as back-up?

—W. A. W., Huntington, West Va.

Checking with a major TV station in New York City, it was learned that no back-up film is used. In case of failure, the operator probably winds the film back up on the reel and reruns it. Thus, you will see it from the beginning. Even though film problems do sometimes arise, station and network executives often let operators know that "it will not happen here." . . . but it does—sometimes.

OCR for ZIP

What is OCR and what is it used for?

—N. K., Philadelphia, Penna.

One meaning of OCR is *optical character recognition*, a technique for reading printing and written matter electronically. In one system, each character is looked at quickly by a flying-spot scanner, a kind of TV camera. What the scanner "sees" is sent in the form of electrical signals to logic circuits which identify the character and send a digital signal to a computer. For example, the logic circuitry can determine the difference between a handwritten lower-case E and a lower-case L. Both look alike but one is taller. OCR systems are used to read accounting forms and other documents as well as the ZIP code on letters.

Ceylon to a "T"

What make and model shortwave set might be capable of receiving Radio Ceylon on 11,800 kHz here in California?

—G. G., Davis, Calif.

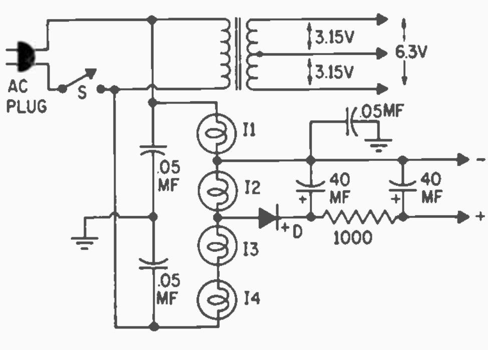
Almost any sensitive superhet shortwave receiver that can be tuned to that frequency should be able to pickup the signal when it is bounced your way. However, the set should be equipped with a good outdoor antenna.

B-plus and Filament Power

Is it possible to build a AC-power supply furnishing 22.5 to 30 volts DC and 6.3 volts for a radio using a 3AU6 tube?

—T. L., Springfield, Ohio

You can use the circuit shown. The transformer furnishes 3.15 and 6.3 volts AC. Plate voltage is obtained from the AC line through a voltage divider composed of four No. 327 pilot lamps. According to the RCA Receiving Tube Manual, a 3AU6 tube requires 3.15 volts, not 6.3 volts, for its filament, as does a 6AU6.

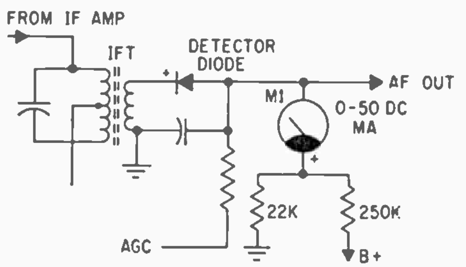


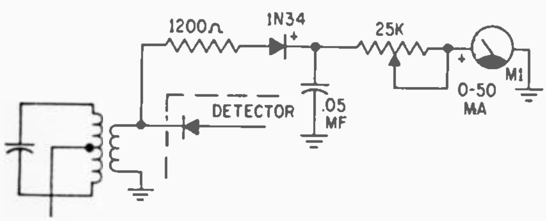
Solid-State S-Meter

Can you tell me how I can add an S-meter to a transistor shortwave receiver?

—*A. D., Utuado, Puerto Rico*

If your receiver has AGC, you can use the circuit shown in the first diagram. You will have to reverse the meter leads, depending upon whether the set uses *pnp* or *npn* transistors. On the other hand, if your set does not have AGC, try the second circuit. Resistance values are approximate since it would be necessary to have a schematic of your set to determine exact values.





Now You Know!

In your White's Radio Log, you don't list police, fire and other non-broadcast stations. Why not?

—*J. B., Avon Lake, Ohio*

There are more than 1,500,000 police, fire and other radio communications stations plus countless mobile units. It would require several books to list them all. They are listed in the several volumes of The Radio Registry published by Radio Magazines, Inc., Box 629, Mineola, N. Y.

Skirling Got Ya' Whirling?

On my shortwave radio I hear tones which sound like bag pipes. What are they and what is their purpose?

—*M. E., Brooklyn, N. Y.*

They are undoubtedly tones used for remote control or telemetering. In what is known as tone multiplexing, two or more tones may be transmitted simultaneously, producing unusual sounds.

How About That?

One of our local stations is on FM but still operates on AM even though it was told not to operate on the AM band by the FCC. Why doesn't its owner obey the FCC?

—*J. W., Cleveland, Ohio*

Believe me, the station would not be operating in the AM band if it didn't have a license to do so. Many broadcasting companies use the same program material, simultaneously, on both AM and FM transmitters. The FCC now requires FM outlets to broadcast (a portion of their broadcast day) separate (different) programs.

Van de Graaf Measurements

How can I measure the amperage and wattage of my Van de Graaf electrostatic generator? The instructions list only the voltage.

—*T. T., Iselin, N. J.*

The current is infinitesimal. Otherwise, the device would be dangerous. While it might be possible to measure the current, it wouldn't be worth the required investment in instruments. Why not ask the manufacturer who may have made the measurements in a laboratory?

Aero Bander Not for FM

How could I modify the Aero Bander to receive the FM broadcast band?

—*M. A. F., San Antonio, Texas*

Your AM radio would not demodulate the FM signals.

That's an Iffy Question

If a spacecraft could be built that could go faster than radio waves, it could overtake and intercept radio waves from the past. Right? What would happen if the radio signal and the

"Did the man show up to fix the old set in the basement?"

receiver were both traveling at the same speed?

—E. S., Garden City Park, N. Y.

I guess it would continue to receive the same thing like "Johnny One Note" or a pickup stylus stuck in a record groove.

Needle Sticks?

I have an Armaco AR4 VOM with a 95-microamp meter movement. Whenever the test leads are shorted (for the resistance test), the needle moves to only a point somewhere between one-quarter and one-half scale position. Battery voltage and all resistors seem to be OK. What could be the problem?

—W. J. L., Toronto, Canada

Still sounds like resistor or battery trouble. Even if the resistors pass current and look OK, they could have changed in resistance value.

TV or Not TV

How can I convert an old TV set into an oscilloscope?

—M. S., Amherst, N. Y.

It wouldn't be worth the trouble. You can buy a scope kit for about $80 and you will get much more benefit from it.

Swing It

I have an old 0-1 milliammeter. The needle swings quite some time before it comes to rest. What can I do about it?

—H. W. B., Bonarlaw, Ontario

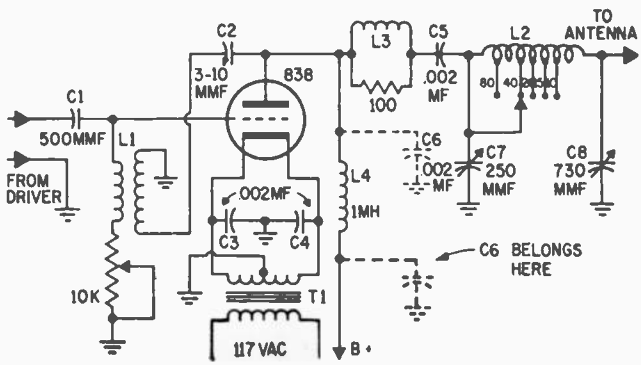
Sounds like it needs mechanical repair and adjustment, which could be expensive at today's skilled labor rates. Since a new meter costs so little, why don't you get a new one?

RF Amplifier Doesn't

I recently built a class-C RF amplifier which does not amplify. Diagram is enclosed. When I feed 10 watts into it, I get about 5 watts out. Also, I get RF output at the input but not at the output of the pi network. Yet, the pi network still has a tuning effect. What is wrong?

—J. P., Ogden, Utah

Looking at your diagram, it appears that C6 is connected to the wrong side of RF choke L4. If actually connected as shown, the plate of the tube is bypassed to ground for RF. Connect C6 to the B+ side of L4.



Try, Try Again

How can I identify kind and rating of an assortment of semiconductors and transistors of assorted shapes and no marking?

—G. W. B., Lancaster, Calif.

Is it going to be a boy, girl or an it? That's the way it is with transistors. When they reach the end of the production line, they're tested and marked to indicate what they turned out to be. You could spend hours running tests on your diodes and transistors and trying to match them up with the specs on umpteen thousand types. Just try them in circuits. If one doesn't do what you expect, try another one.

Brand X Does It Again

I have a noise problem with my two identical (Brand X, Model Y) CB transceivers. It is so bad that it is almost impossible to receive anything except over very short distances. I have tried using them both as a mobile unit and a base station, but both are just as noisy in either application. Can you give me a circuit for a noise limiter I can add?

—P. L. McG., Knoxville, Tenn.

Looking up the circuit of your sets we find that a noise limiter is included and the sets should be very sensitive, the latter accounting for the noise. You probably live near a busy street and pick up ignition noise from passing cars. Try moving your base antenna away from the street and, in your car, suppress the noise at the source with adequate suppression devices.

Canadian Ham

Can you tell me where I can get a radio amateur license in Canada?

—R. M., Lacombe, Alberta

Write to the Department of Transport in Ottawa. They can furnish you the address of their nearest field office.

(Continued on page 35)

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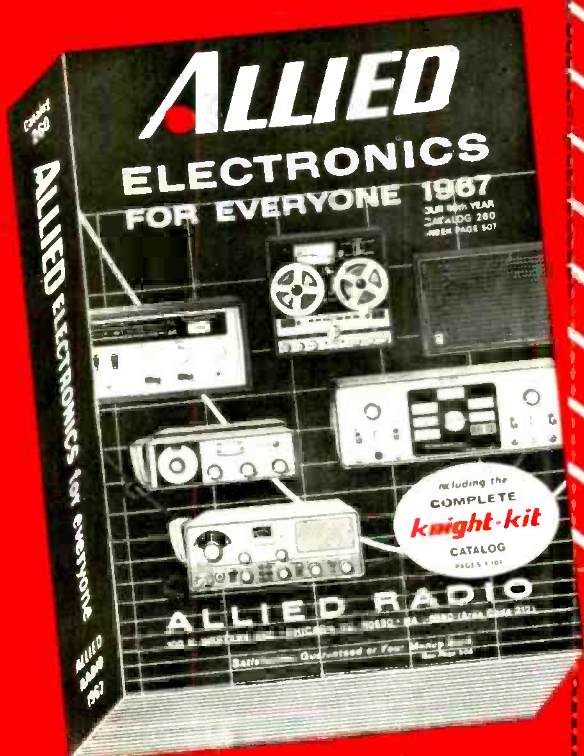

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Continued from page 32

Using SCR's

Can you tell me where I can get a schematic and parts list for a 1500-watt light dimmer using two SCR's back-to-back and for operation from a 115-volt 60-cycle AC source?

—J. A. W., Ridgeway, Ont.

Write to either General Electric, Rectifier Components Dept., Auburn, N. Y. or Westinghouse Electric Corp., Semiconductor Division, Youngwood, Penna. Their application engineering departments should be able to suggest a circuit. Also you might get a copy of the GE SCR Manual or the Westinghouse SCR Designers Handbook. Both are available from the respective firms at $2.00 each.

Knee-High to a Brass-Pounder

What is the age limit for an amateur radio operator license?

—C. S. C., Queens Village, N. Y.

There is no age limit. There are quite a few young hams. I got my general class ticket when I was 14, which was a long time ago.

Brass-Pounders Delight

Can you tell me who, if anyone, is interested in old Morse telegraph equipment?

—C. A. N., New York City

The Toledo Morse Chapter is collecting antique telegraph equipment. Leon C. W. Kettring, 1118 Clymena Drive, Toledo, Ohio, is head of the organization's procurement committee.

Biggest KW?

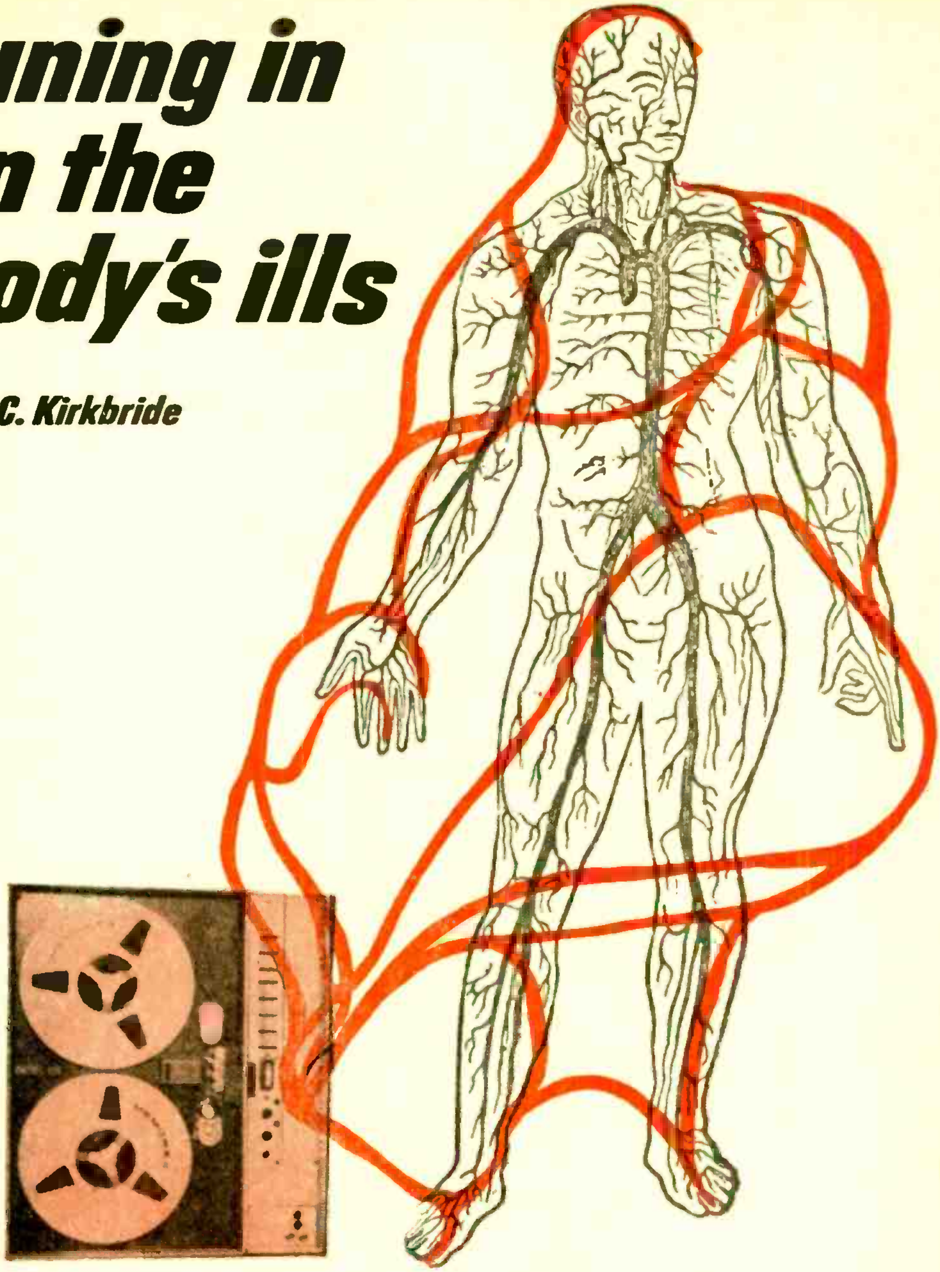
What is a California kilowatt?

—D. W., Palo Alto, Calif.

A *California kilowatt* is a ham expression for transmitters allegedly employed by some hams in California that operate at much higher power than the legal one-kilowatt limit. Such operation is illegal, but it is said that it is practiced by some. Since everything is supposed to be bigger in California than elsewhere, so are some ham rigs, they say. ■

Tuning in on the body's ills

By K.C. Kirkbride



■ It all started with a pill, a pill that was a radio station, a radio station that could transmit "news" direct from a human stomach. The pill was followed by a camera, a camera so small it could be swallowed and photograph a man's stomach in living color.

At first, no one took these tiny pioneers very seriously. For at the time medicine appeared to be in one corner, electronics in another, and the two weren't going to pull off any full-fledged marriage for a long time—if ever. But that was before man began to seriously consider the fact that his brain, nervous, and muscular systems are all electrical. And if man himself is electrical, why not his repair and diagnostic systems? *(Continued overleaf)*

Tuning in on the body's ills

This realization led to a new science called biomedical engineering, a discipline that combines electronic with medical techniques, sometimes borrowing from space and military research to create new diagnostic wonders. One day soon such marvels may rule out the hit-or-miss human error that has characterized medicine up to our time. Come that happy hour and current medical techniques may seem as medieval as when man applied leeches to cure his aches and pains.

All One. Now being introduced in major hospitals is a master six-unit electronic medical internist built by Honeywell. Its big claim to fame is the fact that it can instantaneously record eight types of information about a patient and show them on a 17-in. screen.

ECG, EEG, EMG, PCG, and other electrodes sensing surface and below-skin changes show heart, brain action, and skin temperatures on a television screen to a doctor as he operates. This new system's sharp-focus screen is so bright it can be seen 20 feet away. And the device promises to eliminate much of the hazard in surgery as well as store vital information for later consultation and record.

Life Savers. Not as comprehensive but already a veteran of 250 neurological operations is an IBM-Mayo Clinic system on duty at St. Mary's Hospital in Rochester, Minnesota.

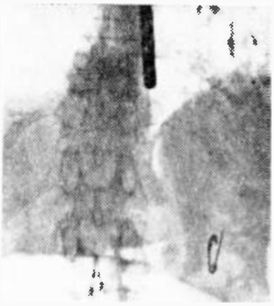
To monitor patients, electrical detector signals are converted to digital coding, processed and printed out on a special typewriter to be scanned by a closed-circuit TV camera. The machine will show a patient's heart and breathing rates, arterial pressures, and body temperatures on a 14-in. screen while an operation is in progress. Meanwhile, a 5-in. satellite oscillograph set up near the patient will give automatic electrocardiograph readings.

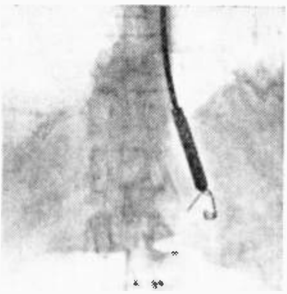
Warnings. Another team of Advanced Systems engineers borrow techniques used to analyze missile status before test firing. Their purpose: to have "early warning" of changes in a patient's condition before clinical signs appear.

Sensors relay information to an IBM 1800 computer, report on an operating room screen warning of changes that could bring on an emergency in the seriously ill.

Nuclear. Still another biomedical life-

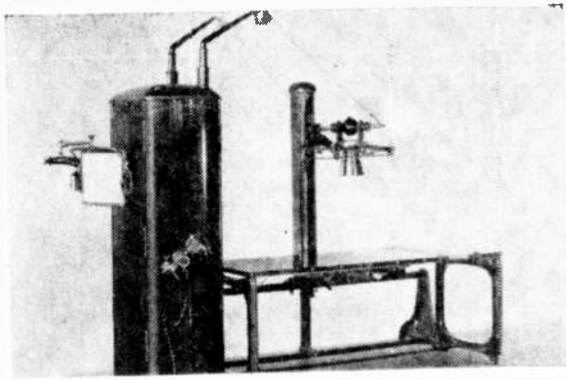
New medical tool developed at General Electric Research Laboratory is switchable magnet that can be turned on and off at will. Inserted gently down patient's throat (left), device is steered under fluoroscopic guidance to spring of open safety pin, then switched on. Pin can now be turned around and cautiously removed blunt end first.

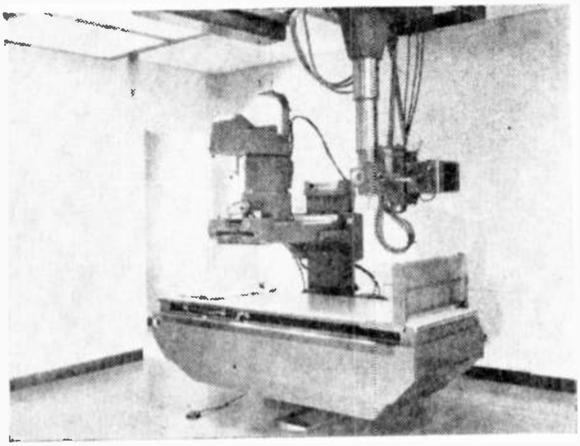




Both permanent and electromagnets are represented in GE's new devices for retrieving swallowed ferrous objects. When permanent-magnet instrument being held by Miss Betty J. Drumond won't suffice, "steerable" magnet held by Dr. Fred E. Luborsky is called on to recover objects from previously inaccessible regions of the stomach.

Some advances in medical electronics fall in the evolutionary (rather than revolutionary) category, with recent improvements in X-ray equipment a prime example. X-ray installation at right dates from the late '20s and consists of a vertical fluoroscope in conjunction with a radiographic table, with the same power source being used for each. Note that over-table tube is still of the non-shockproof type, with exposed high-tension leads.





Modern X-ray installation (at left) conceals X-ray tube in rayproof body of enclosed table, while image is now made thousands of times brighter by means of image intensifier on deck extending across table. Further, over-table X-ray tube is supported on telescoping column, in turn suspended from overhead carriage traveling on ceiling racks. Resulting arrangement permits rapid positioning and angulation of X-ray tube.

saver supplying emergency information is nuclear. A surgeon may need to know before an operation if a patient needs a transfusion, what kind of anesthetic may be best, and whether or not the heart is getting enough blood.

To answer these questions, Picker X-Ray built a machine it calls a "Hemolitre." This unit shows just how much blood is circulating in a patient, information that can mean the difference between life and death in heart cases, serious surgery, or an automobile accident emergency.

Picker does it by tagging a small amount of serum with a radioactive substance such as Iodine 131 which is then injected into a patient's bloodstream. A few minutes later, a small sample of blood is withdrawn. The Hemolitre then calculates the radioactive potency of the blood before and after the injection, as well as the radioactivity of the serum itself.

This information is then fed into a computer which spins its electronic gears and ultimately reveals what the doctors want to know on its front panel.

Chair Is Examiner. Philco isn't that formal. Their engineers at Western Development Laboratories division at Palo Alto, California, have developed a diagnostic chair. Once a patient is comfortably seated, the chair picks up respiration rate, pulse rate, heart sounds, and electrocardiograph readings, then records the data on graph paper—all without the patient's knowledge!

While the Philco sensor chair borrows its tricks from space research, a new development at RCA was once in the Army. The image amplifier, adding amplification and TV skills to the already powerful electron microscope, is a direct descendant of the World War II "Snooperscope." Combined with an image orthicon, it gives 50,000 times the light gain of the conventional studio camera.

The very intense intensifier can now see and record images too faint to be seen by an electron microscope alone, and it will even record them for TV tape or film playback. Honorary RCA Vice President Dr. Alfred N. Goldsmith calls the new amplifier "among the most powerful and useful electronic de-

Tuning in on the body's ills

Electronic medical system devised by Honeywell (right) can simultaneously measure, record, and display a wide range of functional changes that can occur in any patient. Main elements of system are KP-731 multi-channel oscilloscope (top right), 1508 Visicorder (middle right), and 8100-II FM portable tape recorder/reproducer (top left). Also recording data for later playback is the Mayo Clinic-IBM radiation scanner (below, right). Unlike ordinary scanners which produce a paper chart or film image, the Mayo-IBM system records all data on magnetic tape for computer processing, thus giving doctors a clearer view of images painted by radioactivity.

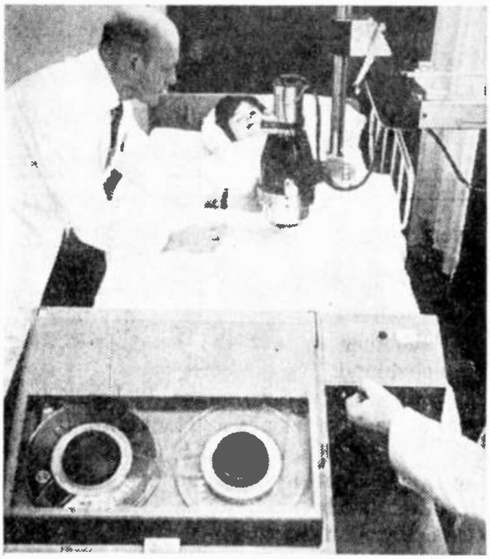
vices for biomedical applications known." Dr. Goldsmith is so enthusiastic about the amplifier he hopes we will one day improve electron-optical powers to the point where sequences of nucleic acids will be seen, classified, and their significance visually decoded.

Living Color. Probing even more deeply into human body secrets is the Picker Magna-Scanner, a new machine that will scan inner organs and glands in both black-and-white and color. Mounted on the end of a beam on a scanner that can be rolled across the room and wheeled right up to a patient's bedside, the machine scans radioactive material inside the body.

A photorecorder picks up a black-and-white picture of the organ or gland involved at the same time a multicolor dot recorder pictures the same areas in eight colors. The two systems, black-and-white and color, are designed to supplement each other, showing different versions of the same organ to the diagnosing doctor.

Already in use at Cedars of Lebanon Hospital in Los Angeles, the scanner pictures a patient's liver, spleen, pancreas, parathyroid, brain, heart, lungs, thyroid, kidneys or spine.

Sound Tells. Sound waves can diagnose, too. Doctors at the Albert Einstein Medical Center in Philadelphia say a good many elderly patients cannot take prolonged X-ray examination, so a medical-engineering team



built a machine that scans people with sound waves. High-frequency sound cites vascular disease, particularly hardening of the arteries, by photographing an artery blocked by deposits or harmed by an aneurysm.

Ultrasonic waves at a frequency of about 2 MHz reflect from body tissues, register an image on an oscilloscope, and are then photographed for future records.

Skin Changes. Even a more revolutionary diagnostic tool is one that spots disease by skin-temperature changes.

Called thermography, the technique hinges

Device above records knee motion, passes findings on to computer for analysis. Knee in photo is model.

on the theory that the average internal temperature of the body remains pretty much unchanged if a person is healthy. Skin temperature, in contrast, fluctuates, depending on both internal and external factors.

At the Einstein Medical Center, physicians scan skin surfaces with infrared radiometers to cite internal disturbances. The method calls for rapid, high-resolution infrared scanners and very basic scientific know-how to be able to accurately analyze. But in spite of the revolutionary aspects of the new technique, it has already won its colors by early detection of some types of cancer and vascular troubles.

Model Organs. For the new electronic internists to completely rule out diagnostic error, the modern doctor applying the techniques must know more about the workings of the human body, still enigmatic in many respects. This information IBM and University of Mississippi School of Medicine engineers and physicians try to supply. Borrowing from space science they successfully simulate body organs with a computer.

Feeding all known information along with mathematical descriptions of body organs and systems into analog and digital computers, they simulate such organs as the human lung, kidney, and heart.

One model of a kidney has already afforded doctors a clearer comprehension of the relationship between kidney function and high blood pressure. And they hope to learn more about arterial blood pressure, blood flow, and blood composition through a mathematical model of the circulatory system.

For years, doctors have tried to discover how kidneys control rates at which substances are eliminated or reabsorbed into the body. To date, they have only theories, but they now hope to solve their problem by building a mathematical model. The computer can then show which theory best simulates actual function.

The Body A System. Dr. Arthur C. Buyton of the Mississippi School explains the work by saying he believes the body the best engineered and most complicated system known. Since it is controlled by several hundred patterns, only a computer, he thinks, can aid in understanding its workings.

To discover why elderly women fall and break a hip more often than men, Moss Rehabilitation Hospital in Philadelphia has carried out another study. Two hundred women clad in shorts and wired to an electronic machine, walk across a "copper" carpet. Six muscular movements are recorded: the angle of each hip, knee, and ankle joint, plus muscular potentials during five walking positions.

Each of the motions is then measured electronically with the thought that if the doctors can find why the women fall they may discover a preventive.

Pain Cure. For the study, analysis, and diagnosis of the human body and its complaints, the new biomedical engineering has already proved revolutionary in its promise to rule out human error. But so far it has come up with few cures.

One, however, seems so extraordinary it may well eclipse any medical process yet known! While not exactly a cure, it promises to relieve severe pain, the kind associated with diseases such as cancer and serious injury to the nervous system.

A Dime Helps. Smaller than a dime, the miniature device can be implanted near the spinal cord. Here, a mild, non-painful stim-

(Continued on page 116)

PARTY LINE LISTENING

It takes only a few hours to install a modern radio in the case of an antique telephone, but you'll end

☐ Time was when telephones came in wooden boxes with cranks and earpieces. Mounted on the wall at some level or other, the then new-fangled creations could be utilized only with a preposterous amount of stretching or stooping—and only if the party line wasn't engaged.

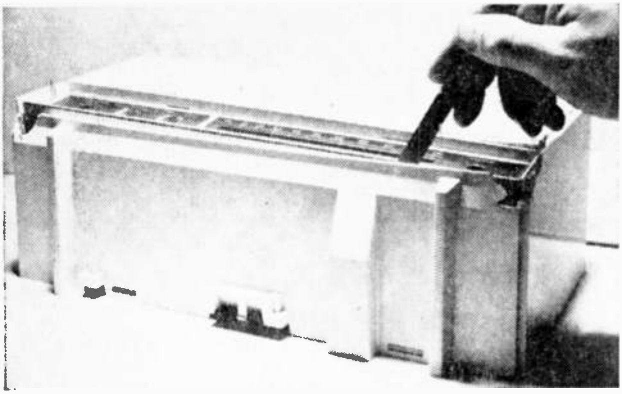
Today, most of these phones have gone the way of the Stanley Steamer, though a few still lurk in attics and antique shops (the one in the photos was picked up at a country sale for a five-dollar bill). And though their days as telephones are over, such oldies can be returned to service in a way grandpop would never have dreamed of —as a conversation-inspiring cabinet for a table radio.

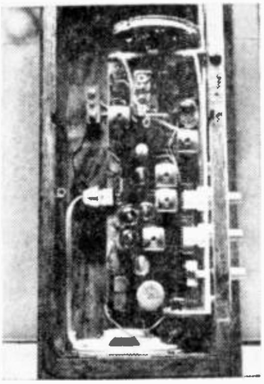
Strip Treatment. The old oak wall telephone in the photos took its first steps toward its new role when it was dusted, then given the strip treatment. All of the old wiring and small parts were removed from the inside of the main case, leaving only the box and the exterior paraphernalia.

The front-hinged lid of the telephone came off when we removed the screws from one side of the three brass hinges. We then cleaned up the main cabinet and the wooden back, removing a variety of grease, pencil marks, and stains. What we didn't touch, of course, were the dents and scratches (remember, we wanted this to be an antique!).

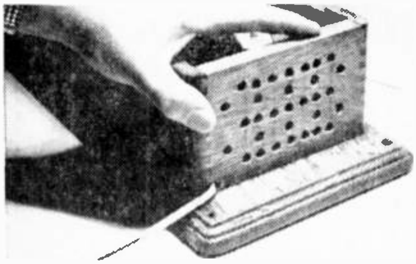
Almost any long and narrow radio chassis could have gone into the telephone cabinet. The type or age of the radio really made precious little difference as long as the radio worked and would fit in the main compartment. Though we were tempted at one point to use a small, battery-powered transistor job, we eventually settled on a new G-E T1220A AM/FM table model (which, incidentally, uses an AC/DC circuit).

Trial Run. Once the etched circuit board had been removed from the radio's plastic case, we temporarily lined up the chassis and marked the mounting holes for its controls. Since we wanted to mount the dial plate separately, we cut it free from the cabinet with a hacksaw blade. Having smoothed off the rough edges, we laid the dial on the side of the telephone case, carefully traced around it, then slid the radio chassis into





Slide-rule dial in radio author used was permanently affixed to plastic cabinet, so author carefully sawed it out with hacksaw blade. Dial could then be fitted into cutout in telephone box.



Photos above show how radio was positioned in telephone box; view at left shows ⅜-in. holes in one end of box for speaker grille and line cord. Varnish was later applied to telephone box to spruce up its appearance.

up with plenty to talk about and a lot to listen to.

By HOMER L. DAVIDSON

position. Fortunately, we found there would be plenty of room to mount the chassis in the telephone compartment and also to fasten it to the dial.

Masking tape was placed on the marked edge of the antique cabinet to serve as a guide line for the dial cutout and to protect the case against possible mars and scratches. We then drilled two ½-in. holes on opposite ends of the masked area to start a small saber saw. Since the oak case was very hard, we were careful not to feed the power saw too fast.

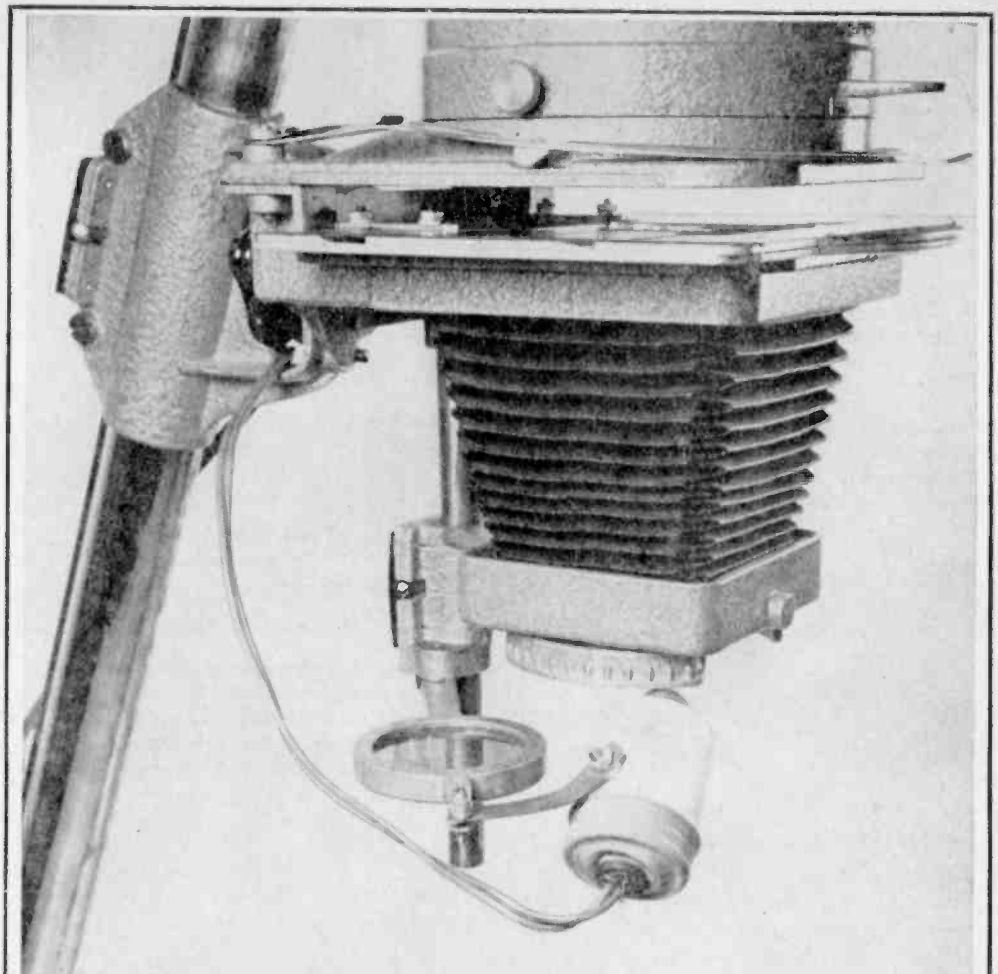
Plastic Grille. We mounted a 4-in. speaker at the bottom of the telephone case, having first drilled several ⅜-in. holes and then covered them with a small piece of plastic screening. The line cord was passed through another ⅜-in. hole at the speaker end of the cabinet, and a knot was tied in the cord at a point just inside the cabinet to secure it against accidental stress.

Next, we replaced the circuit board in the cabinet and marked the chassis mounting holes on the wooden base. This done, we removed the chassis and drilled two ⅛-in. mounting holes. Wood screws and spacers were used to fasten the chassis to the telephone base.

With the plastic dial in the new opening, we drilled two mounting holes at either end so the dial could be fastened to the telephone cabinet. The dial was mounted in place and the radio chassis was then bolted to the dial itself.

Finishing Touches. With the project almost completed, we then soldered the wires from the output transformer to the speaker voice-coil terminals and taped the FM antenna wire to the inside of the telephone cabinet. After the radio had been mounted and tested, we sealed the dial in place by squirting rubber seal around the dial.

Later, we removed the telephone bells, front mouthpiece, and hand phone hanger from the cabinet and spray-painted them with black enamel. When they were dry, we remounted them in position, then touched up the telephone cabinet proper with two coats of varnish. And last of all, we sat back for some real modern-time Party Line Listening! □



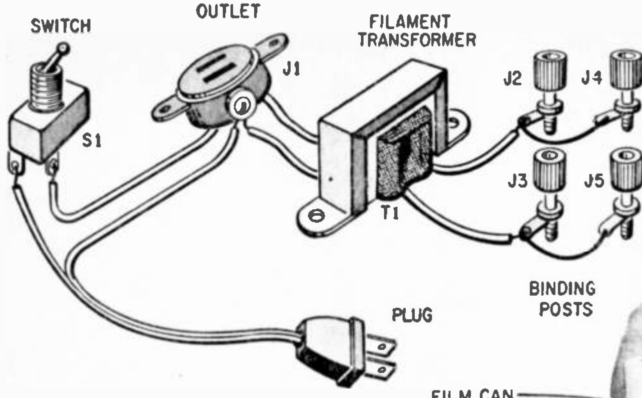
Dim View On A Dark Subject

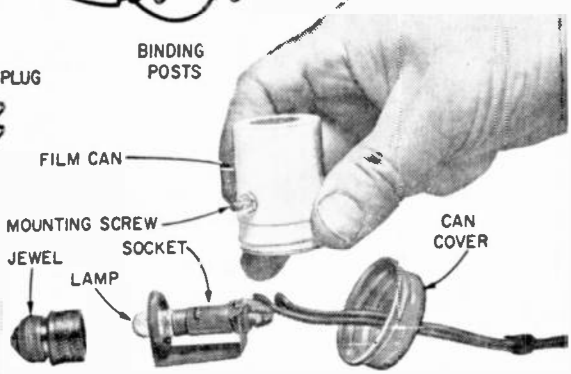
You won't have to grope around blindly in your darkroom after you install this miniature safe-lighting system.

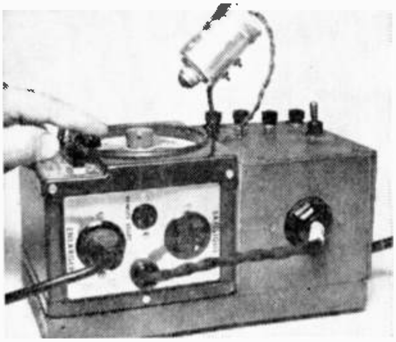
by Robert Hertzberg, W2DJJ

Why fumble around in your photo darkroom trying to read the markings on an enlarger lens or a print timer? The time you spend in your darkroom will be much pleasanter if you install a very simple lighting system using a few inexpensive parts, most of which can be salvaged from an experimenter's "junk box." Even if bought new they cost little.

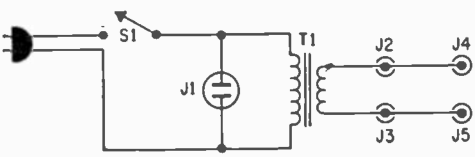
The actual sources of illumination are a couple of pilot-light assemblies with red jewels and No. 47 miniature bayonet-base lamps. These fit neatly inside 35-mm film cans. The holes for them are made in the can with an ordinary penknife, the metal being very soft aluminum. One can iş mounted on the pivoted safe-light arm of the enlarger by a short piece of brass or aluminum, which is bent to throw the light upward to the rim of the lens. The usefulness of the filter is not impaired at all; the whole assembly swings back and forth smoothly. The other can is mounted over the face of the print timer, pointing downward.







Compare the pictorial diagram (top) with the schematic diagram below, side of the parts list. Connections to the outlet will vary depending on the type and style you chose. A duplex type may be handy in the future—if you add an AC-powered print-exposure meter. While other cans may be used to house the miniature safe lights the 35mm film cans (above) are usually plentiful around the darkroom. You can easily tailor the completed system (left) to suit your own needs.



PARTS LIST

J1—Outlet (Female power receptacle)
J2-J5—Binding posts, insulated
S1—Toggle switch, s.p.d.t.
T1—6.3-volt, 1-amp. sec; 117-volt pri filament transformer (Lafayette 33R3702 or equiv.)
2—Pilot lamp assemblies—red jewel (Lafayette 33R6109 or equiv.)
2—#47 pilot lamps
Misc.—Film cans, wire, solder, wood stock, glue and nails, machine screws, etc.

Estimated cost: $2.50
Construction time: 1 hour

The lamps are powered by a 6.3-volt filament transformer which is enclosed in a small wooden box at one end of a board used for a base—the front portion of the base supports the timer itself. The various dimensions of the box are adjusted to suit the size of the timer. The top of the box holds a line switch and four binding posts; the right side, a single AC outlet—for the timer's AC plug.

The light for the timer dial connects to one pair of binding posts, the enlarger-lens light to the other. Lamp cord is fine for the purpose. A single pair of posts would serve just as well, since the lamps are in parallel, but the extra pair is handy if still another light is wanted, perhaps to illuminate a clock face or a paper safe. There is absolutely no shock danger from the low-voltage wiring powered by the filament transformer.

Placed next to the enlarger, the timer-transformer unit is very convenient to operate. The bright red jewels end all squinting, yet do not fog the fastest black-and-white enlarging papers. ■

It's War!

The shocking truth about the bitter battles that may determine the future of every Ham and CB operator in the United States

■ **"It's war!"** The words of a militant professional protest leader? Hardly. Fact is, they were grumbled only recently by a fellow radio operator—a normally quiet and bookwormish chap who probably thinks twice before he swats a fly. But this time he had good reason to be infuriated. And his sentiments are typical of those being muttered in radio circles throughout the country.

Several factors precipitated his declaration: first, the seemingly hostile attitude towards Hams and CBers by the Federal Communications Commission; second, the strained relations between the American Radio Relay League and Hams; third, the growing realization among operators that they might well have to fight to defend their operating rights and privileges!

The battle lines are most definitely drawn; wits are being sharpened right this minute! But what are the issues? What is at stake, and what brought on this unusual battle royal? Many of the facts have never been revealed—until now, that is.

Down The River. It is believed by some that the Ham radio situation began at a private meeting in New York between the FCC and the executives of the ARRL and *QST* (the ARRL's official publication). With a major international radio frequency allocation conference looming on the horizon, the FCC regretfully reported that some of the new African nations were complaining about the lack of radio frequencies for their use: possibly they would try to steal the Ham frequencies. If such a thing actually came to pass, Hams throughout the world would blame the FCC because it permits U.S. citizens to get Ham licenses with a minimum of red tape, exams, and waiting time. As a result the U.S. has amassed a tremendous number of Hams per capita—many of them rotten operators who have earned (for American Hams in general) an international reputation as obnoxious loudmouths running far more power than is necessary.

The FCC was on a spot and felt that something would have to be done to show the rest of the world that U.S. Hams weren't so bad as to cause the loss of Ham radio frequencies. The ARRL was quick to accept the challenge of coming up with some sort of

By Alex Karlin

solution to save face for the Commission.

The ARRL brass itself had long been unhappy with many of the new breed of Hams and said it had "increasing concern . . . as to whether the basic purposes and objectives of the amateur radio service, particularly those relating to technical qualifications and proficiency," were being achieved. The League claimed that many Hams "just go out and buy their equipment, plug it into the light socket, connect an antenna and operate."

All of this was far below the dignity of the pompous and tradition-steeped League executives, many of whom still live in the days when operators wound their coils on oatmeal boxes and put India ink on crystals to change frequency. It seemed to them that this would be the right time to weed out these new rascals by either kicking them off the air altogether or at least openly branding them as *second-class* operators.

The Plan. Back the ARRL folks went to Connecticut and into the conference room for secret talks. The result of the brain-picking session was a mish-mash of ideas which had been previously rejected by the ARRL and the FCC, only now the plan was rearranged and dubbed with the new title of "Incentive Licensing." Worded in fancy legal terms, it was rushed down to the FCC on a silver platter for prompt approval. *QST*, having the uneasy feeling that the plan might not sit too well with some ARRL members, gingerly tried to explain Incentive Licensing to its 105,000 reader/members. The result was an upbeat explanation intended to sell an idea which had few selling points (no mention was made of the FCC's inspirational role in its creation).

Stripped of the fancy frills, the plan suggests creation of a new "elite" class of Ham license to be called the "Amateur First Class License." This license would be available only to those Hams who had held an Advanced, General, or Conditional Class License for at least one year.

To get the new license, the Ham would have to take a new written exam which would be harder than his previously taken test; he would also have to pass a 16-wpm code test (existing General Class tests call for 13 wpm). Only operators of this new license class (or those who held the coveted "Extra Class" license, which is harder to obtain) would be allowed to operate a phone station on the prime DX frequencies below 50 MHz (160 through 10 meters). Those Hams who couldn't pass the exam would be forced to jam into a small band of phone frequencies or use CW (which, for all practical purposes, is now obsolete).

In addition, all phone privileges, for Novice operators (the 2-meter band) would be withdrawn. To round the plan off, the FCC was asked by the ARRL to devise "distinctive" call-signs for each particular class of license so that Hams would immediately be able to ascertain the prowess of fellow amateur operators.

The Prospects. The FCC's acceptance of these ideas would see thousands of long-time DX phone operators unceremoniously evicted from their operating haunts until (and unless) they could pass a rougher exam than they had ever before taken. (Fact of the matter is that many Hams couldn't pass the very exam they took to get their original license if a year or so had elapsed.) Their only hope would be to cram for the new exam and, failing that, squeeze onto the few remaining frequencies or pack their DX gear in mothballs and migrate to the local-coverage VHF bands—where the FCC was to reserve them some "exclusive" frequencies.

The regular VHF operator, already plagued with split-up bands and class distinction between General, Technician and Novice class operators, would then be faced with the prospect of slicing up the pie for yet another group. For new immigrants from the lower bands would be now joining the VHF fraternity by taking away the regular VHF operators' best frequencies. The idea, of course, was to force the Technician class VHF operator to get the incentive to step up his code speed and pass a General Class license which would permit him to again operate on his old frequencies.

Not On Your Life. The grass roots reaction was instantaneous and rather violent. Enraged Hams flooded both the ARRL and FCC offices with highly impassioned messages, all carrying the same theme, namely, that they weren't buying even one little bit of this proposal. *CQ* magazine, an independent Ham publication, offered its own plan for upgrading the American Ham, but the damage had already been done. The ARRL plan had been formally submitted to the FCC. And Wayne Green, Ham radio's angry young man (and publisher of another Ham publication, *73*, promptly sailed into the ARRL with one of his famous tirades over *that* one.

With cannon bombarding it from all sides, the ARRL found itself in a rather embarrassing situation, especially since the FCC unexpectedly decided to play it cool and not rubber-stamp Incentive Licensing into the law of the land. The League was simply left to hang by its thumbs while the folks in Washington pigeon-holed the idea and announced that they were "thinking over" the plan's alleged merits.

The League landed out in the cold with many Hams, too. In fact, when mid-1965 membership stood at 105,000, the League had confidently predicted that mid-1966 rolls would fatten up to about 108,000 to 110,000 members. In actuality, membership had shriveled to less than 80,000 by mid-1966!

Panic Button. Not only had Hams stopped renewing their memberships in the League, but the proposal had triggered one of the most horrendous business slumps Ham radio had ever known. The proposal was also the best explanation for one of the most severe drops in license applications for years.

The ARRL hastily engaged a public relations firm to find out what had gone wrong and what had happened to its membership. The poll-takers in turn announced that the "crux of the situation" was that "if the people are indeed representative, then too many Hams just do not feel the sense of personal relationship with the League they want to feel." In other words, most Hams just couldn't understand why their good Ham buddies at the League would have officially proposed Incentive Licensing without having taken the minor courtesy of asking members for their opinion beforehand.

Meanwhile, the League itself explained causes of non-renewal thisaway: that the League was "out-of-touch" with the operators' interests; the operator simply "had not gotten around to renewing;" and the operator was "just not active" any longer.

By the fall of 1966, things had gotten so desperate at the League that *QST* announced what appeared to many to be an almost pathetic last-gap measure to recapture the badly fumbled ball; a panacea for regaining its composure, lost prestige, and members. The new idea, "Ham Quest 67," had the League pleading (in *QST*), "Strength through unity—that's what is needed."

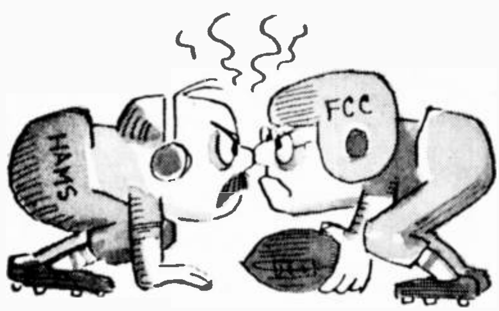
Carefully skirting any mention of the dreaded Incentive Licensing plan, the ARRL rehashed all of the reasons why it's really pretty wonderful to have the kindly ARRL folks lending their prestige to Ham radio and watching out for the interests of the operators. Part of "Ham Quest 67" included sending out "ammunition to be used in convincing non-members that they ought to join the League . . . ," offering prizes for the member or affiliated local club bringing in the largest number of new members.

The FCC? Yes, it's *still* thinking over the proposal. But it also offers no inkling as to when (if ever) a decision will issue forth.

The way things stand now, Ham radio has been shaken to its foundations. Operators are angry and confused. The industry is pulling in its belt a few notches. And the FCC (still meditating the Incentive Licensing plan and seemingly unaware that Ham radio has been hurt badly) has managed to find the time to turn its helping hand towards yet another radio service.

The CB Scene. In September of 1966, the FCC sent a letter to all CB manufacturers expressing the FCC's unhappiness with the CB service. The letter innocently hoped that the manufacturers (who have a $50-million per year thing going in CB) "will assuredly agree . . . that . . . a healthy state of affairs" hardly exists. Manufacturers were told that unless things got better the FCC might consider putting a temporary freeze on new CB licenses.

Established with the best of intentions and the worst of planning, the CB service was created by the FCC on a frequency band long regarded as useless for communications because of the fantastic noises generated there by industrial, scientific, and medical electronic gadgets. Even Hams, some of whom can turn almost anything into a useful communications tool, had precious little use for it. The band was "given" to CBers much as a useless scrap of meat is tossed to a dog, except that the FCC made it clear that the meat could be eaten only in certain ways, and only *without* enjoyment. The Commission announced that CB communications could not consist of "hobby type communications" or "idle chit chat."



Biting The Hand. As had been feared, the CB operator picked up on the CB service as a great way to be a "sort of" ham operator, using CB sets as telephones in a gigantic party-line gossip and bull-throwing festival. This sent the FCC into apoplectic convulsions and brought forth upon the users a number of purges which saw new rules added, old ones strengthened, fines invoked, licenses revoked, and even the old ogre of the Federal Trade Commission trotted out to frighten manufacturers. Despite these efforts some 20,000 new license applications still arrive at the FCC each month, and the present license records show about 800,000 citizens licensed and using about 2½-million transceivers (most of them incorrectly, one can presume).

But what gives? Wasn't the FCC created to control radio communications in the United States—a task that includes issuing licenses and making and enforcing laws in the public "interest, convenience and necessity"? True. But to enforce those laws it receives a grubby little pittance with which it must also run a huge monitoring network to tune in on hams, CBers, commercial broadcasters, business-band operators, police, ships, aircraft, and dozens of other radio stations.

Although the FCC doesn't admit it openly, some officials have privately confessed that the money available for enforcement purposes simply isn't enough to adequately foot its monitoring network. Nor is it sufficient for the Commission to even attempt to enforce most of the rules which it grinds out in an almost endless procession. And therein lies the rub.

CB is not only a newcomer to the family of radio services, it's a difficult one to handle at best. Worse yet, it's considered to be non-essential (for the protection of life or property or for informing the public, that is). The FCC perhaps feels that if it can't get more money, maybe it would be better off with less radio services—and guess which is at the uppermost tip of the totem?

It's a pity that the FCC can't keep some of the money it takes in on fines and licenses. CBers alone toss Uncle Sam about $160,000 per month in license fees. The money comes into the FCC alright, but it goes right out for placement in the government's kitty where it is doled out in support of European junkets for VIP's, insect research, and programs to lull farmers into *not* growing wheat. Maybe a little of this money pumped into anemic FCC veins would give it stomach enough to carry on in the traditions of the Great Society.

The most ludicrous thing about the whole CB "dilemma" has yet to be mentioned. For in spite of all the FCC's bellyaching, nobody would be any the worse if CBers were simply left alone to talk themselves blue

It's War!

wouldn't this be in the public "interest, convenience and necessity"?

Holding The Bag. Yet the FCC, staffed by political appointees and public servants, insists that it is acting in the best interests of the American public. And despite the abject poverty under which the FCC must exist, when the COMSAT communications satellite arrived on the scene an Act of Congress was rushed through to establish a new FCC division just to handle the single satellite. (They probably haven't been too busy in the new division since the rates are so high that even the TV networks don't use it very often.)

In the meantime, the American public has watched the FCC give token interest to the rigged quiz shows which duped 190-million citizens (threats to put a freeze on broadcast station licenses were not heard). Users of essential communications services are crowding each other off the air due to lack of sufficient channels, yet the FCC insists on reserving 470 MHz worth of UHF-TV space for a mere 250 broadcasters. And on the marine bands, casual listening discloses opulent yachtsmen broadcasting language so salty it would bring a blush to the face of even the crustiest old navy Chief.

Are these problems of a lesser nature than those facing CB or Ham radio? Are the broadcasters truly the "darlings" of the FCC (as has been suggested for years)? Or is it that the FCC is so understaffed that they just haven't seen these problems or so underfinanced that they can't afford to do anything about them?

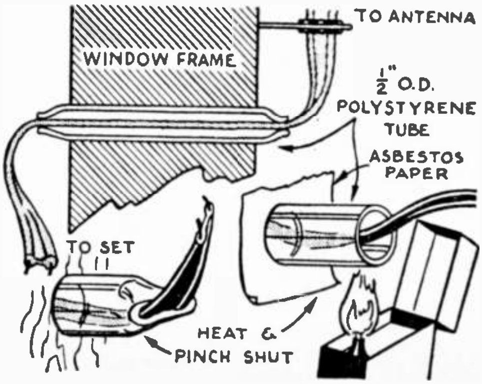
Regardless of the answer, one gets the impression that the FCC might perhaps have had a master plan right along which would explain some of its activities. A hint of this was perhaps dropped when FCC Commissioner Kenneth A. Cox recently stated that if all other alternatives fail to sufficiently relieve the present congestion, additional frequencies would have to be given to needy services. This, he said, would be accomplished by a complete reorganization of the radio spectrum (Cox likened it to "unscrambling an egg"). Obviously, new frequencies can't be created by a wave of the FCC's magic wand. They would necessarily have to be taken away from "non-essential" radio service.

It's War! Yes, it really is a war, still a cold one at this point but warming up by the minute! Hams are thoroughly disgusted at being made fools of by the ARRL, and even more annoyed with the FCC which (for reasons unknown to the operators) is still fumbling with the Incentive Licensing scheme. The ARRL is wobbling around on a shaky pair of legs. Ham and CB manufacturers are wondering where they go from here, and CB operators are still trying to figure out the justice in their paying $8 for a CB license only to be divested of their rights to freedom of speech and the pursuit of happiness.

One guess is as good as another as to where the next battle will be fought. If the FCC would ever attempt to shut down these services, it would undoubtedly be faced with the specter of three million bootleg operators jamming the reallocated frequencies. And could the rumor be true that three million CBers and Hams intend marching on Washington, right up to the FCC's Ham/CB office (above a supermarket, by the way) to sing "We Shall Over-modulate!"? ■

Bushing for TV Line

To bring TV twin-leads into the house with low-loss and without letting cold air in, make sealed feed-through bushings from polystyrene tubing. For 300-ohm line, bore a ½ in. dia. hole through window frame and push a length of ½-in. O.D. polystyrene tubing through the hole, allowing about 1½ in. of tubing to project on each side of frame. Push line through tubing. Seal tube ends by heating with matches or a cigarette lighter, and, wearing a glove to protect the fingers, pinch the tube ends firmly together. Hold until plastic sets. Works fine for long-wire antenna lead-ins. ■



■ Privacy is almost a thing of the past. Nearly every day the papers detail some new horizons in eavesdropping, from the phone company listening in to subscriber's conversations to executives bugging the rank-and-file employee's washroom. And of course, in this modern era of recording tape and the scissors, even the most innocuous of conversations can be *rearranged* into the most damning of evidence. What to do? Nothing. You can scream and the most you'll get is a few sympathetic words from your Congressman, but not much else; for the *poletzi* you complain to are up to their ears in wiretaps and bugs, the Feds have a sorry record of eavesdropping prosecutions, the phone company has been getting away with it for at least 30 years, and your Congressman's indignation dies with yesterday's headlines.

About the only thing *you* can do is *fight to protect the truth;* make certain that what's used against you isn't the result of some brilliant tape editing. Make certain that when you tell your neighbor "I need some money for termite poison" it doesn't come out "I poison for money."

And you can easily protect yourself with the Tie-Spy—known in the trade as an 007 FM mike. Just clip on the Tie-Spy and your words are broadcast to a nearby FM receiver,

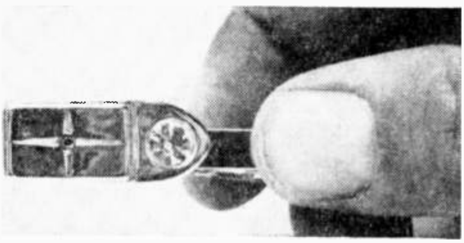
SPY-IN-THE-TIE

by Lars Jorgensen

where it can be transferred to tape in an *unedited* version of what was said.

As shown in the photographs, the Tie-Spy consists of an miniature, very-short-range FM transmitter and a microphone that appears to be a high-class diamond-studded tie-pin. You simply clip the mike to your tie (naturally you're out of luck if you wear bow ties), place a battery in the transmitter, and you're on the air. A nearby confederate can monitor your conversation on an FM portable and handle the recording.

Construction. The unit shown is housed in a plastic case approximately 2⅛ x 1¼ x 1¾ inches. Actually it can be made smaller by using subminiature components. But to keep the price down to rock bottom, we have used standard components available from Allied and Lafayette Radio (among others). If you want to squeeze it into an olive by all means do so, just use the equiv-



While the tie-bar may not be *the most* in men's jewelry it does the job—it's the microphone that counts the most right here.

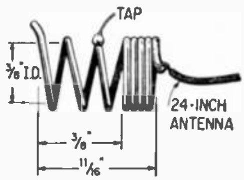
alent miniature values—nothing is really critical except the coil.

In a similar vein, the sound quality is exceptionally "tinny"—*readable* but "tinny." This is due to the low-impedance loading of the high-impedance crystal tie-clip mike we used to keep costs down. If you want to go for a few extra bucks get a better mike, a low impedance job—say a dynamic type from 500 to 500 ohms. You can even try a small transistor radio speaker, or might even add a matching transformer. As we said, nothing is really critical.

The electronics is assembled on a 1⅝ x 2¹⁄₁₆ inch section of perf-board. If you slightly round-off the corners the perf-board will just fit into the plastic case.

Start assembly by mounting tuning capacitor C5 and oscillator/antenna loading coil L1. L1 is made as follows: Cut off a three foot section of AWG-18 solid enameled wire and *tensilize* it by clamping one end in a vise and pulling on the free end until the wire goes "dead slack"—unless this is done the coil will unwind when you release tension.

Using a ⅜-inch drill bit as the form, wind seven closewound, tight turns. Remove the coil from the form and stretch the first three turns so the distance from the "start" to the third turn is exactly ⅜ inch. Scrape a small bit of insulation from the start of the third turn (actually what we call the second turn), and solder about an inch of wire to this



Coil is quite critical since it determines the transmitting frequency. It must be right on the button.

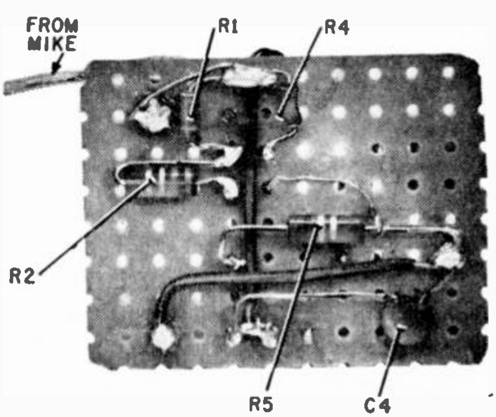
tap. As shown in the schematic, the tap connects to the "top" of C5 while the "start" of the coil connects to Q2's collector. The free end of the coil will be connected later to the antenna.

Flea clips or Vector T28 push-in terminals are used for tie points and supports. To mount the C5-L1 assembly, push in a set of terminals directly under C5's solder tabs and install a very short support lead from C5's tabs to the terminals.

To insure frequency stability C6 should be the silver mica type or its equivalent. Space gets a little tight on top of the board so miniature resistors (¹⁄₁₀ or ⅛ watt) and capacitors are suggested. The components on the bottom of the board can be "standard" size (¼-watt resistors, etc.).

We can only be certain the project will work with the transistors specified in the parts list, do not substitute another type for the specified Q1 and Q2.

Battery Power. The power supply has no

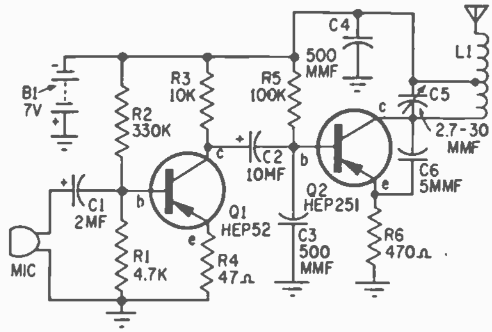


Either 1/10 or 1/2-watt resistors can be used here on under side of perf-board.

PARTS LIST

B1—7-volt mercury battery, Mallory (Allied 55J886 or equiv.)
C1—2-mf, @ 6-volt DC
C2—10-mf, @ 12-volt DC
C3, C4—500-mmf ceramic disc
C5—2.7-30 mmf, trimmer capacitor (Arco 461 or equiv.)
C6—5-mmf silver mica
L1—see text
M1—Tie-Clasp Microphone, (Lafayette 99C-4567 or equiv.)
Q1—Transistor, Motorola HEP 251 (from Allied)
Q2—Transistor, Motorola HEP 52 (from Allied)
R1—4700-ohm, 1/10-watt resistor
R2—330,000-ohm, 1/10-watt resistor
R3—10,000-ohm, 1/10-watt resistor
R4—47-ohm, 1/10-watt resistor
R5—100,000-ohm, 1/10-watt resistor
R6—470-ohm, 1/10-watt resistor
Misc.—Plastic cabinet, (Lafayette 13C3801); perf-board; terminals, wire, solder, L-brackets, machine screws, nuts, etc.

Estimated cost: $7.00
Construction time: 2 hours



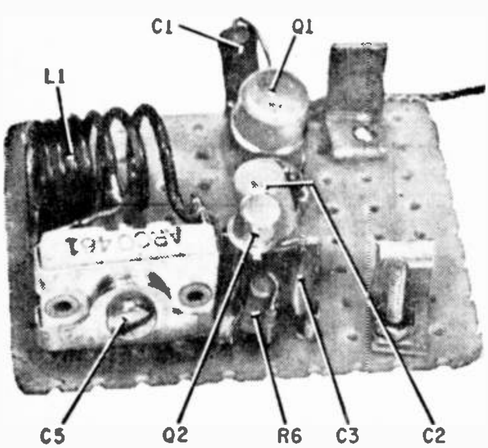
Circuit is simple but you must remember that wiring at 100 MHz is critical—all leads to Q2 and L1-C5 must be kept short to get proper operation on the FM band.

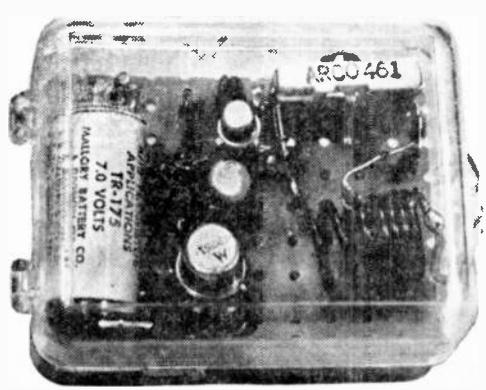
on-off switch. To start the transmitter you simply clip in the battery. To turn the unit off you remove the battery. The specified battery will give an average of 35 hours service, depending on the "freshness" and frequency of use. Since there is no standard battery holder you have to make your own. The battery holder is simply two L-brackets fashioned from scrap aluminum (an old Minibox) or copper. The L-brackets are mounted to the board with 2–56 machine screws. Connection is made to the clips by soldering directly to the *head* and *nut*. Note that the negative clip has a hook at the end. The battery's negative terminal is slightly recessed into its case, so to insure connection you must form an ⅛-inch "hook" which will *bite* into the negative battery terminal.

The Mike and Antenna. The mike is supplied with a mini-plug. Cut off the plug, unbraid the shield—forming a *tinned* twisted lead with no free strands—and solder the mike cable directly to a ground terminal and the input to C1. The antenna consists of 12 inches of very-thin stranded wire—AWG-22 or thinner—soldered to L1's free end.

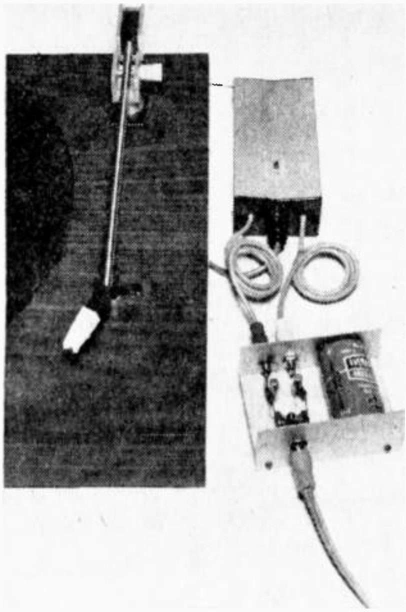
Drop the unit into the plastic case, leaving the hinged cover open. Mark the points where the mike and antenna leads will pass through the case. Remove the transmitter and quickly press a hot soldering tip into the edge of the case at marks for the mike and antenna leads. The case will melt under the iron, forming the openings for the two leads. Don't press down hard or you'll go

(Continued on page 114)





Tight-wound portion of L1 is a loading coil for the short antenna—the spread portion tunes with C5. Leads that connect to the base, emitter and collector of Q2 should be kept as short as possible (a normal VHF wiring technique). Those to Q1 aren't as critical. Transparent plastic box protects delicate parts—specially L1 and C5—from damage.



Personal Hi-Fi

A complete tonearm, preamp, earphone-amp combo, this setup is ideal for stereo on the private side.

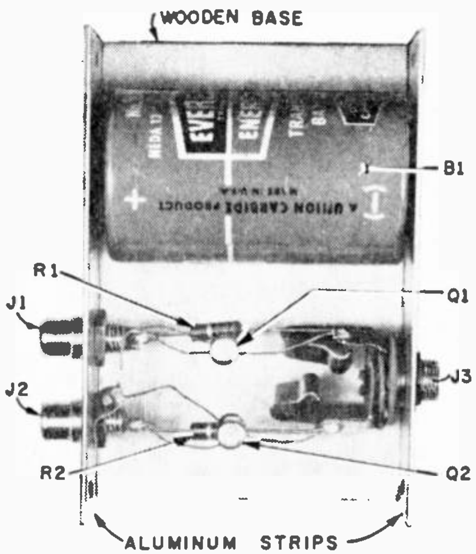
By Art Trauffer

■ Build this novel amplifier-in-miniature and you'll no longer have to fire up a high-powered stereo amplifier just to drive a pair of headphones. This little stereo-headphone driver will cost under $3.00, entail less than an hour's work, and yet give you beautiful, clean, wide-range headphone reproduction. Utilizing the Euphonics Miniconic semiconductor stereo phono cartridge, the TA-15 tonearm and the PS-15 power source, this simple setup is perfect for personal hi-fi.

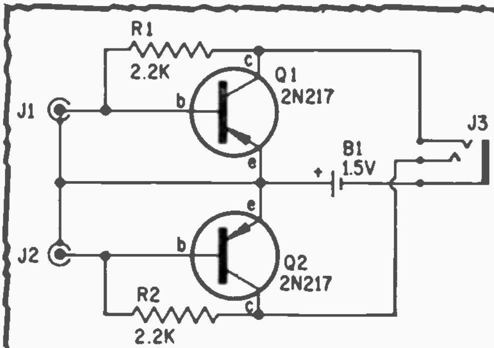
The photo below gives some idea of how easy this little amplifier is to put together, and the schematic diagram reveals how few parts are involved. No volume controls are used because headphone volume is just right for persons with normal hearing, and the stereo balance is good.

Construction. Note that the two aluminum panels, screw-fastened to the wooden base, act as a battery holder for the size-D flashlight cell and automatically connect the cell to the circuit. Phono-input jacks J1 and

(*Continued on page 116*)



Aluminum panels attached to wooden base form sides of unit and also serve as battery holder. Jacks need not be insulated.



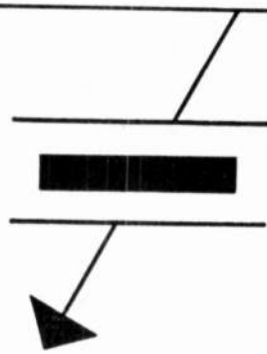
PARTS LIST

- B1—1.5 volts, D-size dry cell
- J1, J2—Phono jacks (single-hole mount)
- J3—Stereo headphone jack (two-circuit type)
- Q1, Q2—2N217, GE-2, or SK3003 transistor or equivalent
- R1, R2—2200 ohms, ½-watt resistor
- Misc.—Wood stock, aluminum stock (.037-in. 20-gauge), wood screws, lockwashers, solder, stereo headphones (low impedance)

Estimated cost: $3.00
Construction time: 1 hour

Flat amplifiers are great but you must have a flat input signal. Here's how to match that pickup.

Ceramic Pickup EQUALIZING PREAMP



by Jay Copeland

■ One of the problems with home-made phono amplifiers is that they are invariably *flat*—good circuit design can make even the cheapest transistor audio amplifier flat to within ±3 db throughout the usable portion of its frequency curve. You would think this feature would be desirable, but it's not necessarily so when you take a *hard* look at the signal supplied by the phono pickup. The unequalized output voltage curve for a typical ceramic cartridge extends from 50 to 10,000 cps. peaks at about 300 cps, and falls about 6 db per octave at 50 cps and 15 db per octave at 10,000 cps. Also, the impedance of a ceramic pickup decreases as the frequency is increased. On top of this non-linear characteristic the signal is further complicated by the record manufacturers. Recordings are deliberately made with reduced amplitudes at low frequencies, a relatively flat middle frequency range, and increased amplitudes at high frequencies due to manufacturing difficulties in the preparation of plastic platters. Therefore, a carefully designed preamplifier circuit is needed to boost the low-frequency signals, reduce the highs and match the ceramic pickup's impedance before passing an equalized audio signal to the frequency-*flat* amplifier.

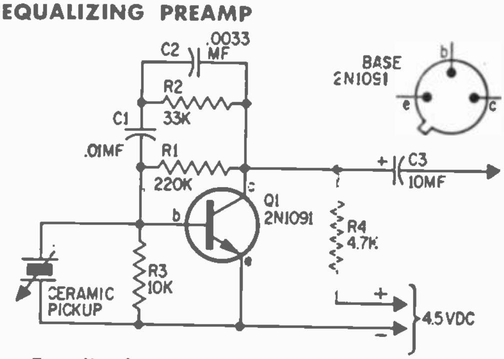
Fortunately, the recording industry had decided on a recording equalization standard (R.I.A.A.) and the characteristics of ceramic pickups are almost universally identical with respect to frequency response and im-

PARTS LIST FOR EQUALIZING PREAMP

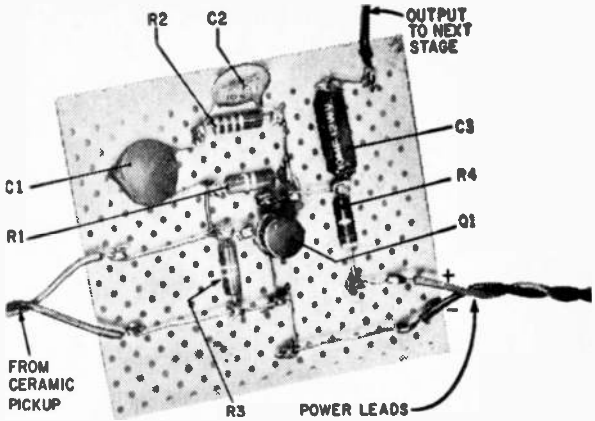
- C1—.01-mf. disc capacitor (voltage not critical)
- C2—.0033-mf. disc capacitor (voltage not critical)
- C3—10-mf., 6-WVDC electrolytic capacitor
- Q1—2N1091 npn transistor, RCA (Alternates are 2N440, 440A, 635, 636, 636A, 1005, 1006)
- R1—220,000-ohm, ½-watt resistor 5%
- R2—33,000-ohm, ½-watt resistor 5%
- R3—10,000-ohm, ½-watt resistor 5%
- R4—4,700-ohm, ½-watt resistor 10%
- 1—Perf-board cut to 2¾" x 2½" approx.
- Misc.—Flea clips, bare and insulated wire, solder, etc.

Estimated cost: $3.50

Construction time: 1½ hours.



Equalized output is taken across C3 and the negative lead of the DC power input.



Layout of the components on the perforated circuit board is not at all critical—but watch ground connections if you take power from amplifier.

pedance output. Now, a preamplifier can be designed to *straighten* the frequency-output curve from a ceramic pickup's signal prior to being fed to a *flat* amplifier.

How it works. The schematic diagram for the ceramic-pickup preamplifier appears to be a basic common-emitter type using an *npn* small-signal transistor—except for the collector-base network (resistor R2 and capacitors C1 and C2). Resistors R1 and R3 provide fixed base bias. The amplifier's input impedance is made smaller than the pickup's impedance and Q1's current gain is made to vary inversely to the velocity response of the R.I.A.A. recording characteristics.

The negative feedback characteristics of the collector-base network does the equalizing—C1 is the effective circuit element for frequencies between 30 and 500 Hz (cps); R2 between 500 and 2000 Hz; and C2 above 2000 Hz.

The large amount of negative feedback reduces distortion and permits the use of low operating current in the collector circuit. This is essential for a low-noise output signal. The fact that no equalizing network is connected in series with the base also helps reduce noise.

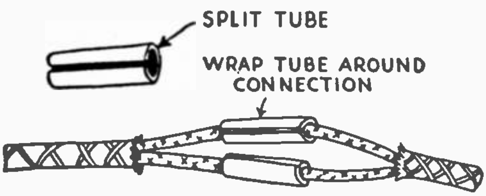
The low input impedance of the preamplifier permits hookup to all available ceramic pickups on the market today. Remember, unlike a vacuum-tube amplifier circuit, this transistor preamplifier depends on the apparent input impedance mismatch for proper audio equalization.

Putting It Together. Parts layout, shown in photo, closely matches the schematic diagram. All resistor, capacitor and transistor leads terminate at flea clips. If you prefer not to use flea clips, make all connections by passing leads through perf-board holes and soldering underneath perf-board. Twisted wire leads can be used to connect to ceramic pickup and amplifier input terminals. Shielded cables should be substituted if hum level is high. Also, it may be necessary to connect a 10-mf. 6-volt electrolytic capacitor across the power supply leads (watch polarity) if preamp taps power from phono's power supply.

Installation is not critical. Keep leads short and locate perf-board away from heat. A classical recording (with violins) can serve as a test record. Play the recording before and after modification—use your amp's *AUX* input. ■

A Safe Connection

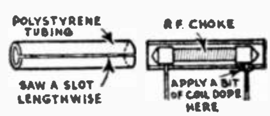
• When making a wire connection for your projects, cut two one-inch pieces from a half-inch rubber tube. Split these and put one around



each wire at the connection point. Then wrap some plastic electrical tape over all, and it makes a neat, safe job. This idea is not suitable for power or lamp cords.

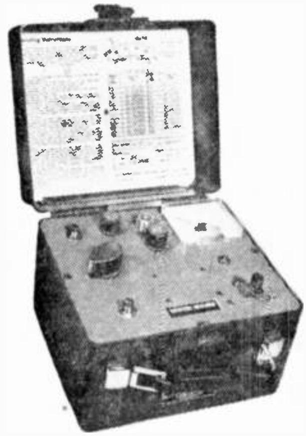
Polystyrene Tubing Insulates Chokes

• To protect the metal ends of an RF choke from accidental contacts in a crowded radio chassis saw a lengthwise slot on one side of a length of polystyrene tubing, and slip it over the RF choke. For straight-wound chokes, ½ in. O.D. tubing is about right, but for pie-wound chokes use larger tubing. Coil-dope or speaker-cement applied to wire leads where they enter tubing keeps tubing from slipping off choke. Or, heat the ends of the tubing and pinch them shut. Use color code to indicate value.



RADIO-TV EXPERIMENTER LAB CHECK

INTERNATIONAL CRYSTAL MODEL C-12B
CB Frequency Meter



■ It should be evident to every CBer that the FCC is bent on a real crackdown, for the monthly list of fines and forfeitures now runs several pages rather than several lines. And a quick perusal of the list shows that next to transmitted obscenities, off-frequency operation ranks near the top of the pink-ticket list.

But there is really no reason why any CBer should risk losing his license because of off-frequency operation. For the truth of the matter is that any communications service shop or CB club shop should be equipped with a frequency meter.

A frequency check is difficult? Nonsense. With a frequency meter specifically designed for CB, such as International Crystal's model C-12B, it takes but ten seconds to check each channel. Equally important, operation is so simple the check could be performed by a child.

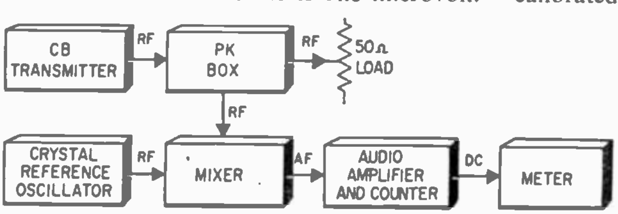
Twenty-three Plus. The C-12B is a hybrid (tube and transistor), battery-powered frequency meter specifically designed for the Citizen's Band. It has 23 switch-selected frequencies plus a spare (the 24th position). In addition to checking frequency with a claimed accuracy of .0015%, the meter will also measure percent modulation and the transceiver's RF power output.

The meter is supplied with a separate pick-up box (called the PK) that provides a dummy load for the transmitter and acts as an attenuator when the frequency meter is used as a precision signal generator. The meter's direct output provides an unmodulated signal (for alignment, say) of 100 microvolts; with the PK box in the circuit, the output at the end of the PK's test cable is one microvolt.

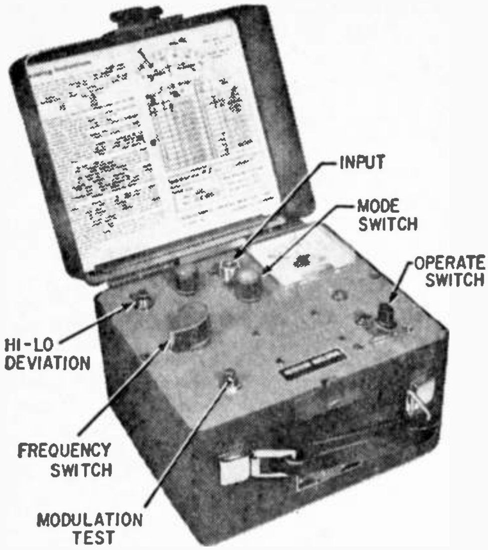
On The Beat. Block diagram shows how the frequency tests are performed. The output of a precise crystal-controlled oscillator is mixed (beat) with the transceiver's output signal. The difference signal below is first amplified, then rectified, and the resultant DC passed to a calibrated meter. The greater the difference frequency, the higher the meter reading. This, in turn, is interpolated into deviation from center-frequency.

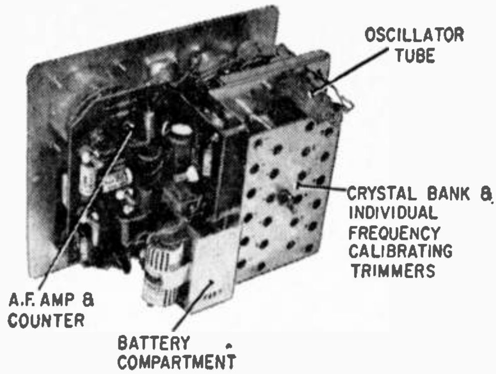
Let's look at a practical example. Suppose you wanted to check out a channel-9 crystal. Setting the frequency meter to channel 9 produces an internal 27.065 MHz signal. If the signal from the transceiver were off-frequency by 100 Hz, its output would be 27,065,100 Hz. And when 27,065,000 Hz is beat against 27,065,100 Hz, the output from the mixer will be the difference between the two frequencies—a 100-Hz beat note.

This is then amplified, rectified and the resultant DC displayed on the meter as 100-Hz deviation. A special switch is provided that tells you whether the deviation is above or below center channel. If the signal from the transmitter were exactly 27.065 MHz, there would be no (zero) beat note and the meter would therefore indicate "0"—no deviation from center channel. The meter is calibrated from 0 to 3000 Hz deviation, with



Block diagram shows frequency measurement system. PK box samples RF signal fed into the dummy load—feeds it to mixer.





Operating panel of the International Crystal C-12B (left) and internal layout (above) shows the major portions of this accurate (±100 Hz) frequency meter for CB.

a special mark at the maximum permitted deviation of 1350 Hz.

The Acid Test. Is the C-12B reliable? Is it really a secondary frequency standard the CBer and the service shop can depend on? To find out, we checked the C-12B against a Hewlett-Packard counter with a known accuracy of 1 Hz. The results are shown in the table. Column 1 shows the channel, column 2 the assigned frequency, column 3 the actual reference frequency of the C-12B, and column 4 the C-12B's error in Hz. Note that the error is less than the specified 100 Hz and in many instances less than 10 Hz.

Channel	Frequency in Hz	C-12B Output	Error in Hz
1	26965000	26964971	29
2	26975000	26974990	10
3	26985000	26985002	2
4	27005000	27004992	8
5	27015000	27014992	8
6	27025000	27024995	5
7	27035000	27035002	2
8	27055000	27054986	14
9	27065000	27065014	14
10	27075000	27075004	4
11	27085000	27085018	18
12	27105000	27104979	21
13	27115000	27114984	16
14	27125000	27125000	1
15	27135000	27134951	49
16	27155000	27155002	2
17	27165000	27165009	9
18	27175000	27175002	2
19	27185000	27185004	4
20	27205000	27205016	16
21	27215000	27215003	3
22	27225000	27225019	19
23	27255000	27255037	37
24	No crystal provided (spare)		

Allowing for interpolation of the meter scale (which is calibrated in units of 60 Hz), the maximum error of the model we obtained would be considerably less than 100 Hz. Frequency drift from the moment of throwing the power switch to the moment of measurement (a few seconds) was less than 10 Hz, again keeping total error well within the claimed 100 Hz.

As far as the mechanical operation is concerned, things couldn't be easier. You feed in the transmitter's signal, set the *mode* switch to *RF*, adjust the *level* control until the meter pointer lines up with a scale mark, then switch to *deviation*. The meter then indicates frequency deviation instantly; total measurement time is less than 10 seconds.

Other Functions. To use the C-12B as a power meter, you simply set the *mode* switch to *RF* and turn the *level* control full clockwise. The C-12B then indicates the transmitter's output power, and in the unit we tested it does so with an accuracy better than the claimed ¼ watt. For example, when the actual power fed into the unit was 3.0 watts, the C-12B indicated an input of 3.2 watts.

Since the C-12B's meter is damped, a sustained word rather than a string of words must be used for modulation tests in order to permit the meter to rise to peak value. For example, when the speech input was a long

(Continued on page 118)

You can add a Beat-Frequency Oscillator to just about any all-band receiver without digging into the chassis. All connections are external but you can get better shortwave reception with a direct connection.

INSTANT BFO

by C. M. Stanbury II

■ Many receivers for the general public have a short wave band but no BFO (beat-frequency oscillator). Most hams today use either Morse code (CW) or single-sideband (SSB) voice (both of which require a BFO), and cannot be tuned in on receivers without a BFO circuit. But there is a solution. Go to a war-surplus dealer, purchase the lowest priced longwave receiver he has at hand, and you're in business.

Here's How. Just about all modern receivers, especially those which are intended for the general public, are put together using a superheterodyne circuit (not that there is anything necessarily "super" about the home-entertainment version of it). The signal from the antenna is picked up by the RF stage of the receiver—at the station's actual frequency. In the type of set we're dealing with here, little amplification takes place in the RF (*radio frequency*) stage. Instead it is immediately converted to a fixed *intermediate frequency* (IF), and usually centers on 455 kHz (kc). Because this narrow band of frequencies is fixed, tuned-amplifier circuits can be built much more economically.

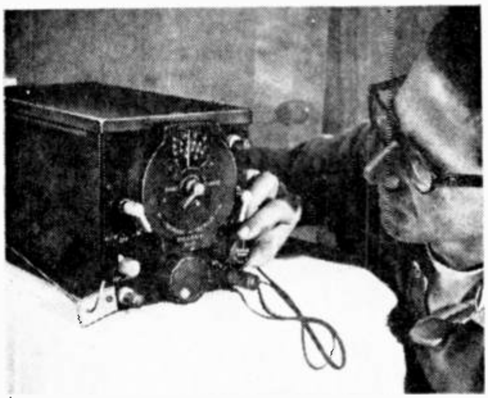
Now if you had a receiver intended for amateur or communications listening, it would have a beat-frequency oscillator operating very near the *intermediate frequency*. The BFO is actually a miniature transmitter (oscillator) built into the receiver and putting out a microvolt signal. For example, in Lafayette's brand new HA-700 the BFO operates at either 452.5 or 457.5 kHz (and if necessary can be adjusted for any value in between). When a CW carrier is tuned dead on, it appears in the IF stage at exactly 455 kHz, beats with that BFO just 2.5 kHz away and in turn produces an audio note of 2500 Hz (cps). (1 kHz equals 1000 Hz, of course.) The dots and dashes are then easily readable (heard as dots and dashes).

What To Do? But we're forgetting—you've inherited a SW receiver without a beat-frequency oscillator. So obviously what you must do is *add* a BFO to your present receiver. And because you are just a beginner, this must be accomplished in the simplest way possible. Which brings us back to that war-surplus longwave receiver. Most of these are blessed with a BFO which operates at the LW sets' own IF (somewhere below 200 kHz) and all will tune the SW rigs' IF. (Be careful—some were regenerative circuits not superhets.) By now I'm sure the idea is beginning to dawn on you. If not then consider this little experiment.

Put the two receivers side by side on a table. Pick out a station on the SW dial, then turn the set's volume down to nil but not far enough to turn the power *off*. Now tune the LW receiver to 455. Lo and behold—there is your SW station.

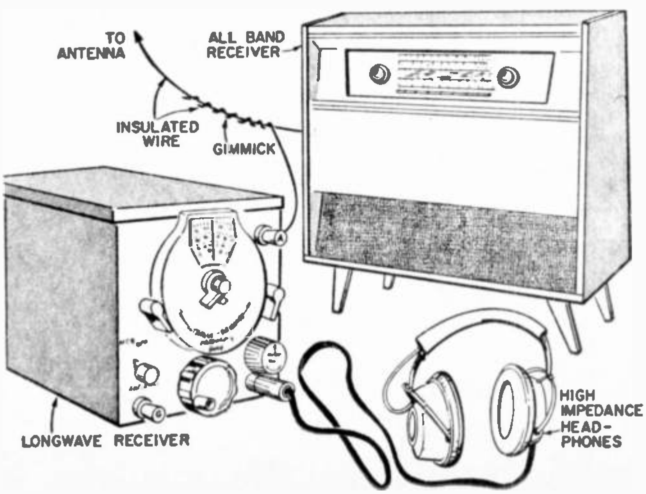
Why? Well, because every inexpensive shortwave rig radiates slightly at its intermediate frequency. Whatever it picks up is rebroadcast at 455 kHz and your longwave receiver will pick this up. Of course you'll want maximum IF pickup. To obtain this, the two receivers should be connected to a common antenna. And if this still doesn't provide enough pickup, have a *qualified* technician hitch the SW IF's output directly into the LW's RF circuit. But we emphasize the person who does this must be fully qualified. If you try it yourself, the results could be "shocking." Anyway, in most cases the common antenna will do the trick.

Pitfalls. Now in setting up this system there are a few pitfalls to avoid. First be sure the LW receiver does tune to the IF—that is, it must have a band covering the 400 through 500 kHz range. Next, be sure the LW rig you buy is war surplus and not a new one, otherwise you could wind up paying more than a regular Ham receiver would have cost. Sometimes the band switches on these old rigs act up, however, for amateur purposes, once the receiver is on that 455 kHz band, you shouldn't care less. On the other hand, this should knock down that price still further. For more exact details on price, pick out the appropriate dealers from their ads in this issue (and Literature Library), then write them.



There is one more thing to look out for. We said that the two receivers should be connected to a common antenna. But sometimes connecting the SW receiver on the hookup will badly detune the LW antenna circuit. If this does happen, simply place a very small capacitor (not bigger than 50 $\mu\mu$f but the value is not critical) between the longwave lead and main antenna which in turn is attached directly to the SW rig. This effectively isolates the two tuning circuits. This is a must if you decide to connect into the IF amplifier directly.

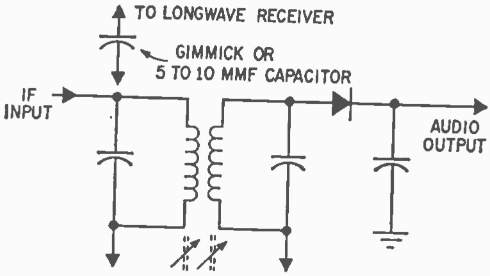
All Set. So now you're all set for CW reception. You're also ready to receive single-sideband transmissions but these will require much more careful tuning. A SSB signal is just like one using standard AM (amplitude modulation) except that *one sideband* (which you won't miss) and the *carrier* have been removed. In order to hear single-sideband voice transmissions in an intelligible manner you must produce your own carrier within the IF. The BFO, of course, makes this possible. *(Turn page)*



Military-surplus longwave receiver (above) picks up the IF radiation and gives added selectivity for those crowded bands devoted to brass pounding. BFO in longwave receiver puts the dits and dahs back into the Morse code messages. Short wire from antenna post (right) is wrapped around outdoor antenna lead for capacitive coupling. Direct connection to last IF stage, through very-small-value capacitor, is better.

INSTANT BFO

Using The BFO. However, in order for your BFO to act successfully as a substitute carrier two conditions must be met. First, it must appear in the IF, frequency-wise, exactly where the station's own carrier, if it had one, would be. Second, strength of modulation and artificial carrier must be the same in that IF stage. Both problems are considerably simplified in this instance because the living-room type of all-band (SW) receiver you are now being forced to use



The 5- to 10-mmf capacitor reduces detuning of IF amplifier to a minimum but after the connection is made last stage should be re-peaked. IF signal goes to longwave receiver through a short length of coaxial lead.

is not very selective, which means a range of signals at least 10 kHz wide (5 kHz on each side of the tuned frequency) will be passed on to the LW receiver with their comparative strengths unaltered. Then because just about all superheterodyne sets are blessed with AVC (automatic volume control), you merely have to tune the LW receiver up and down those IF signals until the desired modulation becomes readable. However, because of the military rig's own high degree of selectivity, the amateur station's modulation level will probably be weaker than normal. To compensate for this, push the LW's audio gain (volume) well up.

How Good? Now before anybody gets delusions of grandeur, we'll level with you. This system will not work as well as a regular Ham receiver. It is intended strictly for those who have inherited (gratis) one of those highly polished, so-called hi-fi sets, or even one of the many transistorized portables whose shortwave band has been added just "for luck." On the other hand, when you consider that such rare amateur loggings as FK8AB New Caledonia, CR5SP Sao Tome, a number of Antarctic stations, etc. (who use almost nothing but single sideband), we think you'll agree that the effort involved in using this inexpensive converter combination is well spent. ■

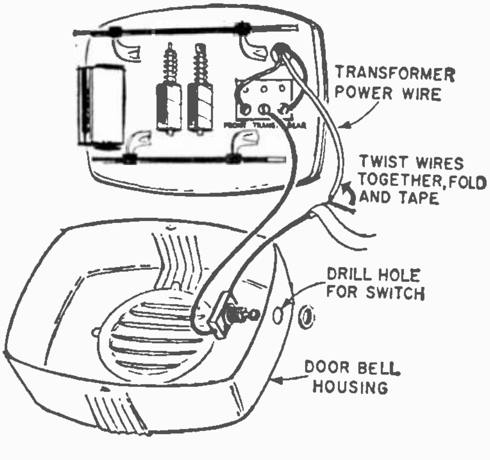
Doorbell Silencer

Here's a simple way of silencing that doorbell or buzzer so that it won't wake Junior taking his afternoon nap.

Pick up a small twist switch with threaded shaft and nut for panel mounting from your hardware store or "five-and-dime." Remove the cover or housing from your doorbell and drill a hole through it large enough to pass the threaded shaft on the switch. Make sure the switch body inside the housing won't interfere with the bell mechanism.

Remove the wire coming from the bell transformer from its terminal and connect one of the pigtail wires on the switch to the transformer terminal. Then connect the transformer wire to the other pigtail wire on the switch by twisting them together and taping.

You don't have to turn off the house current for this job—house bell circuits carry



only 6 volts. However, it is wise to do so if you must stand on a chair or stepladder.

Replace bell housing, and have someone press doorbell button so you will know if the switch is in the "on" or "off" position. ■

THE "NEW MOD" SOLDIER GOES ELECTRONIC

Yesterday's science fiction has become today's fact

By K.C. KIRKBRIDE

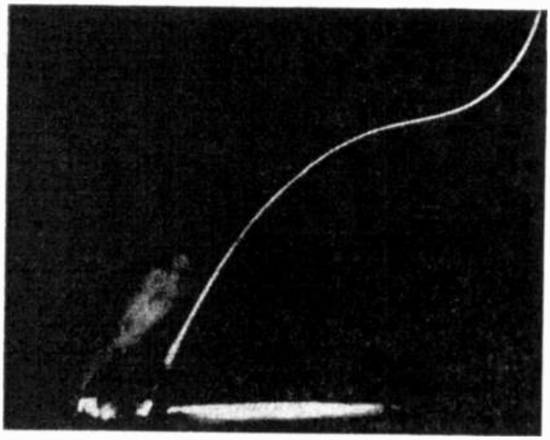
■ **Come a day soon** the lowly foot-slogger will become a one-man division, complete with his own missile and missile launcher, landing apparatus, communications equipment. And he'll carry his gear wherever he goes.

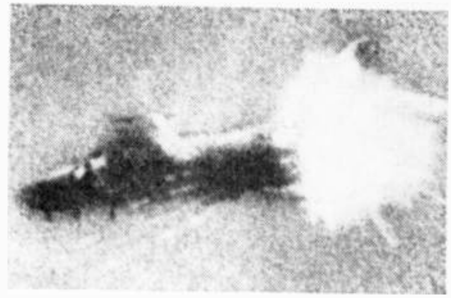
A soldier turned packhorse? Hardly. For much of the new weaponry emerging from major research today rivals tiny Alice for wonder. Fantastic though it seems, the foot soldier of tomorrow will carry whole systems on his back, weapons that draw from astronomy and space and molecular electronics, and shame the crude armaments of the past.

Was a time man warred with sticks and stones, bows and arrows, and lances and swords. He rode off to battle resplendent on a white horse, with metal vest and gleaming sword and flowing cape. But for all his splendid beauty he was a pretty vulnerable target for the guy who didn't like him. So as time went on and he sharpened up a bit he fashioned more skillful weapons: the rifle, the machine-gun, the grenade. But never in his history, with all his advancing technology, has man designed instruments of war as sophisticated as the ones he tests today.

World's First. Using advanced radar techniques, RCA engineers have built a canny system that will mount on the barrel of a rifle, an M-79 grenade launcher, or an M-60 automatic. Its function: to spot moving enemy targets, whether walking or running, man or animal, large or small, jeep or ten-ton truck. *(Continued Overleaf)*

THE "NEW MOD" SOLDIER





Redeye, the shoulder-fired guided missile being held by the soldier on the previous page, is perfect for defense against low-flying enemy aircraft. At left, streak in sky reveals missile scoring direct hit on target drone; above, missile blasts plane from sky by scoring another direct hit.

When tomorrow's soldier wants to spot a target in an area, he will simply switch a control on the back of his weapon. The world's smallest radar will then look over the situation, let its soldier boss know when it spots a target by emitting a series of eerie sounds. Ranging all the way from a low groan to a high-pitching squeal, such noises will reveal whether the radar has spotted a walking man, a crawling man, a man who is running, or a speeding vehicle.

Doppler Squeals. In essence, the radar—like any other—is simply applying Doppler know-how, the principle that says a sound or radio wave shortens as the emitting object moves toward the listener, lengthens as the object moves away. And the Doppler effect in this 2-lb. radar wonder results from the frequency- or pitch-change in the radar's 9-gHz signals, which, converted to sound frequencies in a headset, can tell the soldier which type of target he has spotted and where it is.

In battlefield operation, the Doppler return will sound much like an off-key siren winding up when the vehicle it spots is moving away. Since the up and down and lateral vibrations of a truck all show different rates from those of a small vehicle such as a jeep, the characteristic differences between targets are distinctly discernible—even when pickup targets are traveling at the same rate of speed over a particular terrain.

The new radar spots almost anything that moves and at almost any speed—from 2 feet per second to over 45 miles per hour. And while performing its duties it puts up with no nonsense from the enemy. In fact, it is virtually immune to jamming, and a scrambler turns the radar beam into radio noise for enemy detectors.

Over Yonder. Should Mr. Radar miss the enemy lurking over the horizon, Lockheed's clever "Ping Pong" will spot him. For Lockheed engineers have just tested the world's first round-trip missile, a lightweight fellow that scouts the enemy, takes his picture, and return-trips on its own.

All the future soldier will have to do is aim and shoot, then wait for "Ping Pong" to return, guided by its programmed sensors and sliding fins. Already flight-tested near Lockheed's Burbank plant in California, the first-of-its-kind carries a rocket on each end. And in spite of all its propulsion power, Ping Pong makes little noise except for a brief "sput" when fired. After that it is as mum as any other cloak-and-dagger agent.

Spot The Sneak. But what if the enemy hides his tank or jeep under a camouflage net? Fairchild Space and Defense Systems has built a see-through-everything camera that will spot the sneak in its hiding place. Applying spectograph technique, the camera

Another Lockheed creation is this multi-purpose vehicle that finds itself at home almost anywhere—on highways, in swamps and marshlands, even in water.

Ping Pong, a photo-reconnaissance missile developed by Lockheed, returns to launch area after flight that includes mid-air stop and "bounce-back."

filters densities of light by wavelength, detects minute differences in living, dying, and dead foliage by chlorophyll content so that a photointerpreter can see tiny shadows that may reveal a tank's hiding place.

Four rotating lenses of 3-in. focal length record images of the target through filters of different wavelengths side by side on 9½-in. infrared roll film. The blue, green, red, and near-infrared filters show up as black-and-white densities proportioned to the brightness of the filtered light.

To the person inexperienced in interpreting the finer points of photos, these gradations indicate changes in terrain unspottable in conventional photography. When advanced color techniques are added, the Fairchild picture may show the terrain in blue, the hiding tank in shocking pink.

Calling Centers. With all these electronic aids, tomorrow's soldier won't need worry too much about enemy surprise attack. But speeding information to command centers will call for split-second communications.

To this end, Litton Industries has built a microminiature radio transmitter that weighs only four pounds, complete with batteries. Formally named the "Digital Message Entry Device," it will sped messages in digital form in less than half a second. The sender-soldier need only set one of 22 "thumbwheel" switches in position and press the transmitting switch. Instantly, the digital message will burst over the airwaves to be picked up at a command center by a standard receiver.

Each of the 22 numbers represent a prearranged message. And when the sender hears a responsive hum in his helmet he knows his message has been decoded. Immune to jamming, the "entry" will be especially valuable for future allied soldiers who speak different languages, since they will be able to communicate in code.

Tiny TV. Though digital messages cannot show tactical situations as they happen on the battlefield, the television picture can. To send pictures to field commanders behind the front lines, Westinghouse has devised the world's tiniest TV camera. Even today the smallest space camera weighs up to four pounds, calls for 100 to 200 cubic inches of space and 9 to 30 watts of power. But not this tiny viewer.

The Westinghouse molecularized wonder weighs only 1 lb., 7 oz. and is believed to be the lightest and smallest TV camera ever built. With a 1-in. vidicon camera tube, the unit is about as long as a two-cell flashlight. Without lens, it measures 7½ in. long, 2 in. wide, 3¼ in. deep, occupies only 50 cu. in. and runs on 4 watts of power.

Asked how they can make a camera that dainty, Westinghouse engineers say they owe

THE "NEW MOD" SOLDIER

all to a special electrostatic tube that includes a binary countdown synchronizing generator capsule of producing standard interlaced 525-line scanning at 30 frames per second. Its 197 miniature components—compared to 582 in conventional circuitry—include 36 molecular blocks, giving the camera its sync generation, amplification, and scanning. And the midget even manages picture quality comparable to its grown-up TV-studio sisters.

To match the tiny camera, Westinghouse offers a receiver mate, 3½ in. high, 1½ in. wide, 4½ in. deep, adding up to 21 cu. in. in all. Truly microelectronic, the VHF receiver midget gets its gumption from rechargeable silver-cadimum batteries.

Soft Touchdowns. As important to the New Mod soldier as intelligence and communications will be the ability to land on his feet in the new helicopter warfare. To fashion "shoes" for the foot soldier forced to parachute-land or drop onto a tree-top landing mat from a helicopter, Lockheed borrowed from its moon-landing know-how.

Originally designed to cushion the lunar excursion modules (LEM) when they land on the moon, the DynaSorb "shoes" are fashioned of metal tubing slotted at one end. Under stress the metal curls in upon itself, much in the manner of a party noisemaker. In this way, the new shoes will absorb energy impact on landing.

In Lockheed's design, a cylindrical tube is notched at measured intervals around its base. On impact a cone rises within the tube and extends the splits which have a natural tendency to coil. A control ring on the outside of the tube will govern the splitting rate and the tightness of the coils which bear the impact. The "shoes" come in a variety of hardy metals that can withstand Superman stresses.

Red-Eye. But probably the most amazing of all the new-day small-wonder weaponry is an anti-aircraft missile a soldier can fire from his shoulder, giving him for the first time an effective weapon to protect himself against low-flying aircraft. General Dynamics has already tested a 4-ft., solid-fuel, infrared-nosed weapon weighing only 28 lbs. Not only will it fire from the shoulder, but the device also is designed to home onto any low-flying craft and blast it with a high-explosive warhead.

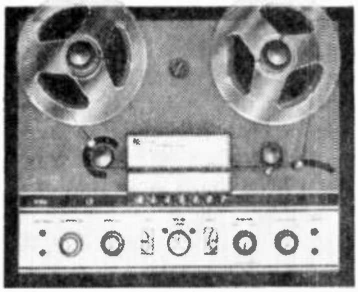
DynaSorb footwear, originally intended to cushion moon landings, may also come in handy for parachute jumps and helicopter exitings. Design of device is such that it automatically absorbs stress of impact.

Tomorrow's soldier will simply point the fiber-glass launcher toward the target. And when the missile signals audibly or visually that it's sighted the target, the gunner will uncage the seeker, let the red-nosed wonder soar toward the heat of the enemy's engine.

A two-stage job, the first stage will thrust 20 ft. after firing, sufficient distance to safeguard the soldier. The second stage will then soar on target, with the missile's control taking in continuous target information and signalling the fin wings just what to do to speed toward enemy rendezvous.

With its microelectronic circuits all on tiny silicon chips, the amazing small-wonder missile will form part of the harness tomorrow's soldier will carry. Significantly, a pack including all the new weapons systems just described will weigh no more than a portable television set. But it will give tomorrow's soldier the most sophisticated weaponry man has ever known. ■

HEATHKIT MODEL AD-16
Solid-State
Stereo Tape Recorder



■ It's not uncommon these days to run into people who automatically assume that anything offered as professional equipment is pure junk. And they do have a point, since anyone exposed to "professional recorders" at $29.95 and "professional amplifiers" at $19.95 could hardly believe otherwise.

This makes it all the more unusual to find a really professional recorder that isn't touted as such. Yet the Heath AD-16 is just that—a professional recorder of the type you could very well find in a broadcast or recording studio. What makes the Heath a professional recorder is that it originally started out as a professional machine—a *Magnecord.*

It appears that Heath took an already existing "professional" recorder, reduced it to its component parts, and eliminated some tricky equalization adjustments that could give the nontechnical user some headaches. Heath then added a construction manual, packed the unit in a shipping carton, and offered it at a savings of almost $200 below the wired (Magnecord) price. As far as we can determine, the major difference between the Heath AD-16 and the original Magnecord lies in the elimination of the adjustable frequency equalization—the Heath model provides only fixed equalization for a basic "flat" response.

Sound interesting? You bet it is. And there are some other surprises. Unlike some other recorders that are jam-packed with almost useless features and accessories, the Heath is as straightforward as a sunny day in June. There are no slide-projector control circuits, no automatic echo, no automatic sound-on-sound; in fact, no automatic anything to run up the cost. The price of the Heath AD-16 represents only the transport

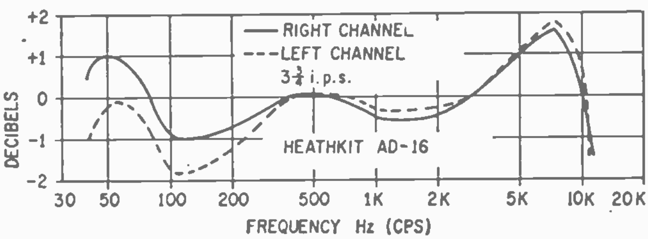


Fig. 1. Record-play response of Heath AD-16 at 3¾ ips was in keeping with company's claim of ± 3 db, 30 to 10,000 Hz. Note that both channels offer approximately the same response.

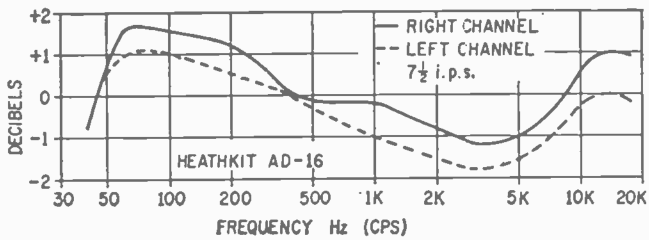


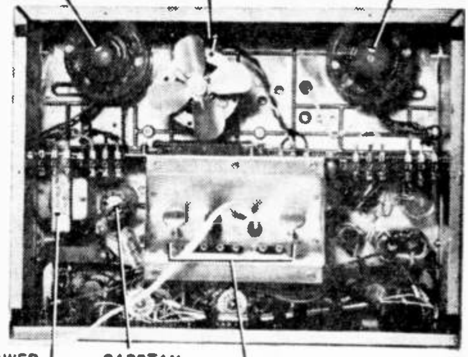
Fig. 2. Overall record-play response of Heath AD-16 at 7½ ips again was generally in line with manufacturer's specifications. Two channels differ by factor of only 1 db.

and electronics necessary for straight four track stereo recording.

Focus On Features. Among the many features of the AD-16 are three heads—for simultaneous playback (monitoring) while recording; an L-Stereo-R mode switch that permits recording on either the *L* or *R* track or both: pilot lamps to indicate the track(s) in the record mode; a built-in mixer that permits mixing the signals from the microphone and auxiliary input jacks; independent, friction-clutched controls for microphone, auxiliary, and output level; two stereo (or mono) headphone jacks that can accommodate *any* headphone inpedance; two *amplified* VU meters that monitor the input and playback levels. In short, the AD-16 boasts every feature you would expect to find in any truly professional (broadcast-quality) recorder.

The tape transport is a three-motor affair, with one for the capstan, one for the supply reel, and one for the take-up reel. Pushbutton-operated solenoids, rather than complex mechanical levers, activate the appropriate drive mechanisms. In addition to the usual play, fast forward, fast rewind, record, and interlock buttons, there is a cue button that is perfect for locating a specific spot on a recording and for doing professional-style editing.

Putting It Together. Except for the head assembly, the entire AD-16 is user-assembled. Building the electronic side of the AD-16 consists primarily of pushing components into a printed circuit board and soldering. And putting the transport together is not notably difficult since solenoid operation sharply reduces the number of mechanical components and simplifies adjustment of those which remain. The all-important head assembly is pre-mounted at the factory to insure that tracks are properly positioned on



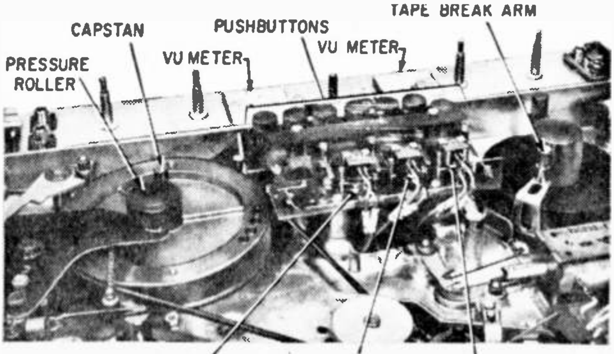
Bottom view of recorder reveals input and output jacks mounted on access plate, which also contains posts for storing line cord.

the tape, although the builder must make final head-azimuth alignments. A full set of height and positioning adjustments is provided for each head should the need arise for head replacement or repair. The instruction manual goes into detail on this.

Pushbutton controls are part of the transport deck, as is a belt-driven, resettable revolutions counter. A "tape gate" is also part of the transport and is pulled in by a solenoid in the *play*, *record*, and *cue* modes. A built-in tape-break switch (auto-stop) doubles as a supply-reel compliance arm, and a compliance arm is also provided for the take-up reel.

The deck is completely operative upon completion of assembly except for the minor spring tension adjustments. Only setting the bias current and aligning the heads remain, and Heath provides a special tape for these two adjustments. The tape provides

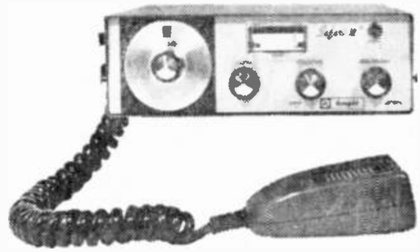
(Continued on page 114)



Top view of unit shows location of heads, VU meters, and pushbutton controls. Use of push-on terminals on leads to and from head and between transport and printed-circuit board obviates need for soldering.

RADIO-TV EXPERIMENTER LAB CHECK

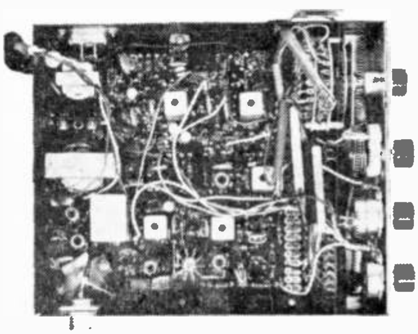
KNIGHT-KIT SAFARI III
23-Channel Portable
CB Transceiver



■ The latest addition to Knight's line of CB transceivers really offers something different and unusual, which, although it may not appeal to all, will certainly find a home with some.

The Safari III looks much the same as any other solid-state rig, with the usual PTT microphone. But the difference is that the mike is in reality a speaker/mike; release the PTT switch, and the sound is right out there in front of your face. Ambient noise too high? Just move the mike next to your ear and literally pour the sound down the canal.

Priced at $84.50, the Safari III is available only as a semi-kit. To insure that the transmitter meets FCC regulations, the entire transmitter section is factory-wired, tuned, and adjusted. The builder makes absolutely no adjustments to the transmitter section during or after construction. Building the kit consists, essentially, of mounting the receiver and modulator components on the printed circuit board (the transmitter and receiver utilize the same board). And with the exception of the front panel controls and power-cord socket, there are few components which are not mounted on the PC board.



Since output jack is part of printed-circuit assembly, entire transceiver can be removed as unit for service and adjustment.

Push And Solder. Construction is not difficult since most of the work consists of pushing the components through the matching holes and soldering. Typical of Knight-kits utilizing printed-circuit wiring, the printed wiring in this unit has an "anti-run" coating that exposes the copper foil only at the point to be soldered. Even if you use excessive heat or solder, the solder will be confined to the exposed copper (a good feature for beginners and oldtimers alike).

The only point at which extreme care must be taken is with the crystal-socket-to-selector-switch wiring. Although the transceiver is normally supplied with but one set of crystals, there are sockets for full 23-channel operation. That means 46 crystals, and, therefore, 46 leads running to the selector switch. While the selector switch wires are color-coded, the same color is used several times. As a result, extra care must be used to insure that the right socket lead goes to the right selector terminal (yep, we goofed).

Ready To Go. When the kit assembly is completed you're in for a real surprise. For with the exception of the three second-oscillator coil adjustments, all receive coils are pre-aligned. Even a careful instrument alignment made absolutely no improvement in performance!

The finished transceiver line-up is one stage of RF, two stages of overload-protected IF amplification, a noise limiter, an S-meter amplifier, and the usual audio section. The transmitter uses three transistors.

Performance is just about what you would expect from this line-up. Power output at

Although it looks like any other microphone, this one doubles as the Safari III's speaker. Sound quality is quite good.

13.6 V (battery supply) was 4.6 watts into a 50-ohm load. Modulation, under the best conditions, peaked at 80%, running about 50% on an average voice level (if there is such a thing as an average voice level).

Receiver sensitivity checked out at 1.8 *uv* for a 10 db S + N/N (signal plus noise to noise) ratio. AGC action, that is, the variation in audio output for a 94 db variation in RF input signal, was 23 db. Adjacent channel rejection was slightly better than 35 db—not super-selective by any means but adequate in all but the most heavily congested CB areas and certainly adequate for straight family and business communications.

Talk And Listen. Because of the speaker arrangement we could not use the standard test for audio power output as it would be meaningless. Subjectively, the signal reproduction is quite good if you favor having the speaker in the microphone. Unlike very early CB transceivers which utilized speaker/mikes and delivered a muffled, "hollow" sound, the Safari III delivers a notably intelligible signal from the speaker/mike.

To us, response appeared devoid of all highs and lows—it was all mid-range, such as you'd expect from a very good quality intercom. While it was a bit unusual to have the sound coming from the mike, under high ambient noise levels it proved advantageous to be able to direct the sound directly into the ear. But it might prove a bit cumbersome to utilize this system in a quiet office.

Many options are available for the Safari III. You may purchase individual crystals at $2.50 each, or a full set at $69.95. There is a portable battery pack that accepts D cells or rechargeable alkalines, and an AC power pack that also doubles as a battery charger. For field use there is a canvas carrying bag and a portable antenna specially designed to be used with the battery pack.

For additional information on the Safari III, write Dept. 20, Allied Radio Corp., 100 N. Western Ave., Chicago, Ill. 60680. ■

Shrunken Antenna for Expanded DX

■ Limited in antenna space? Here is a low-cost three-band system that will fit the average backyard and is ideal for the novice amateur operator since it's designed for 80, 40 and 15 meters.

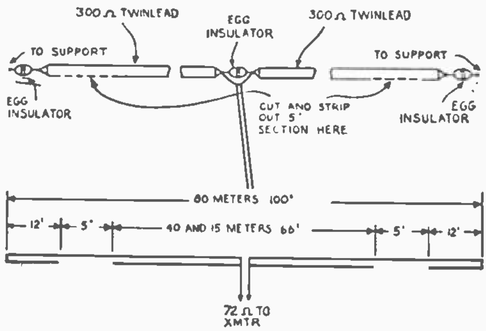
The system is constructed with 300-ohm television twin lead and consists of a 40- and 80-meter dipole with the same feed line at the center. The entire system is "shrunk" to 100 ft. by bending the 80-meter section back 12 ft. at each end. There is no noticeable sacrifice in performance.

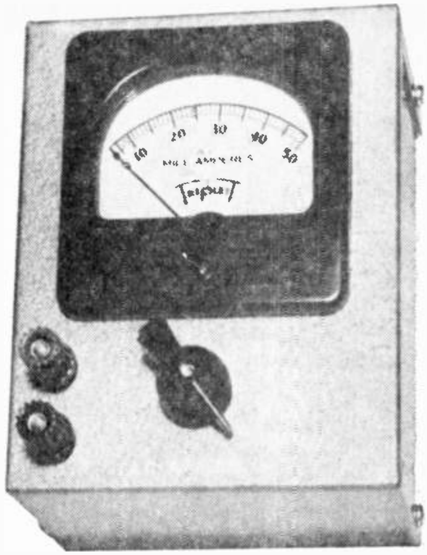
Construct the antenna to the dimensions in the diagram, using copper-clad steel TV twin lead. Start by cutting two 50-ft. lengths of twin lead and attaching an egg insulator to a single insulator to form the center feed point.

From each outer end, measure back 12 ft. toward the center, then remove a 5-ft. section of conductor from one side of the twin lead. Attach the feed line and the system is ready to go on the air.

Either 72-ohm coax or twin lead may be used for feeding the system. A 72-ohm twin lead reduces the weight which the antenna must support and keeps the system electrically balanced.

You should obtain adequate results with this antenna system of 80, 40, and 15, and it will also work fairly well on 20 and 10 meters. But for the best overall performance, use an antenna tuner, if available. ■





ac ammeter for experimenters

by James A. Fred

Measuring the current drawn by an AC-powered circuit will often pinpoint those obscure defects in power transformers and other parts.

■ One of the benchmarks that separates the tinkerer from the serious electronic experimenter is an AC ammeter. Everyone has a VOM or a VTVM, but very few tinkerers ever measure AC amperes. There are many times when the ability to measure current will save the day on a repair job or an electronic design project.

To keep from draining the bank account an ammeter should be a multi-range job. I started with a 0-50 AC milliammeter simply because I had acquired one in a trade. You can usually pick up a good used one from Bigelow Electronics, P. O. Box 71, Bluffton, Ohio 45817 or buy an inexpensive new one. There are two general types of AC milliameters in use today. One is called an *iron vane* type while the other is simply a DC movement with a rectifier to change the AC-circuit current to DC-meter current. The second is referred to as a rectifier-type ammeter. For the experimenters the inexpensive iron-vane type is preferred and is the one used here.

Since the meter has a full-scale reading of 50 ma it is best to make it read three different values of current beginning with a *five*. The selected ranges were: 0-50 AC ma., 0-500 AC ma., and 0-5 AC amperes.

It's The Shunt. You can make any range current meter that you need by following these directions. To make a milliameter read higher values of current it is necessary to put a shunt across the meter—you put a lower value resistance in parallel with the meter-coil resistance. To make the 0-50 ma meter indicate 500 ma select the shunt so that 50 ma goes through the meter and 450 ma goes through the shunt. On the 5 ampere range there will be 50 ma flowing through the meter and 4.950 amperes through the shunt.

Internal Resistance. To find the resistance of the shunt you must know the *internal resistance* of the meter. To find this value connect the unknown meter in series with a battery and a rheostat. Adjust the series rheostat until the meter reads full scale. Connect a second rheostat in shunt (across the meter) and adjust the shunt until the meter reads half scale. See the drawing for this circuit. Disconnect the rheostat from across the meter and carefully measure its resistance. This value of resistance is equal to the resistance of the meter.

AC Ammeter

Shunt-Resistance Value. Using the following formula with the meter resistance just found you can determine the values of the shunt resistors.

$$R = \frac{R\,m}{(n-1)}$$

In this formula R equals the shunt resistance, Rm is the meter resistance and n is the scale multiplication factor. For example let's convert the 0-50 ma meter to read 0-5 amperes. The scale multiplying factor is 100. If the meter resistance is 100 ohms then:

$$R = (100-1) = 1.01 \text{ ohms.}$$

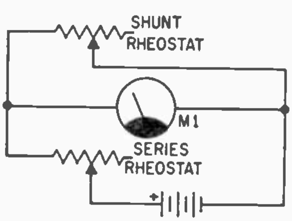
The 1.01-ohm shunt will have to carry 4.950 amperes at the full scale reading. By using the power equation

$$P = I^2R$$

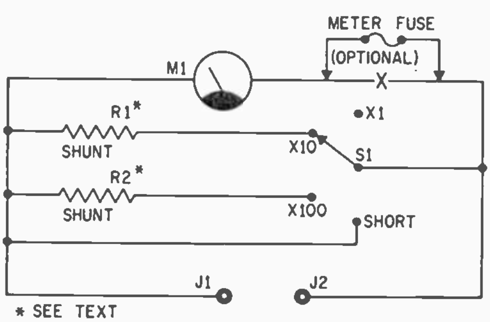
we find that we need a 27-watt resistor. A 50-watt adjustable resistor will work nicely here—if you actually intend to measure 5 amperes. (If all your work will be in the 2 ampere neighborhood a 25-watt, 1-ohm resistor will be adequate.) If the shunt resistance figures out to less than one ohm it may be necessary to make it from copper or nichrome wire. Remember it will be necessary to multiply the scale readings by 100 when using this shunt. You can use the same formula to figure other values of shunts.

Calibration. When you get ready to check the calibration of your meter it would be wise to have another meter to use as a standard. Connect the standard ammeter, your meter, and a load of the proper size in series. (See the circuit diagram for this step.) Adjust the load for 2.5 amperes through the standard meter and adjust the shunt's resistance until your meter reads 2.5 amperes. Recheck the meter with a 5-ampere load. A four-position single-pole switch is wired, as shown, to select the different meter ranges. A meter short-circuit position is included because it is good practice to always short out the meter until you are sure of your circuit. A phenolic board is used to mount the switch and resistor. The meter is mounted first in the aluminum box and then the phenolic board is mounted to the meter by the meter studs. The photographs show how everything goes together.

Easier Testing. Not only is an ammeter useful to an electronics experimenter, but many radio-TV repairmen are finding set



To find internal resistance of meter set series rheostat for full scale on M1 then connect shunt rheostat and set it for a half-scale indication on M1. Next measure resistance of shunt rheostat—it equals meter resistance. Schematic diagram below is a practical multi-range ammeter—circuit is for AC or DC meter.



PARTS LIST FOR AC AMMETER

- J1, J2—5-way binding posts; 1 red, 1 black (Lafayette 99C6233 or equiv.)
- J3, J4—banana jack (to attach ammeter to adapter—optional)
- M1—AC milliammeter (see text)
- R1, R2—wirewound shunt resistors (see text)
- S1—Selector switch (Mallory 1313L; Allied 56A4253 or equiv.)
- 1—Chassis box, 5 x 4 x 3-in. (Bud CU2105A; Allied 42D7621 or equiv.)

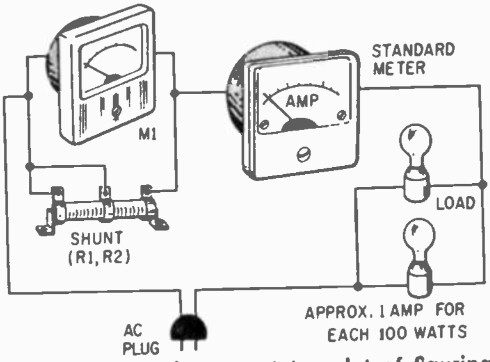
PARTS LIST FOR AMMETER ADAPTER

- F1—Fuse of proper rating for range in use (see text)
- J5, J6—5-way binding posts; 1 red, 1 black (Lafayette 99C6233 or equiv.)
- J7—Chassis-mount AC receptacle (Amphenol 61-F; Allied 40H677 or equiv.)
- P1, P2—Banana plug (to attach adapter to ammeter—optional)
- P3—Chassis-mount AC plug (Amphenol 61-M; Allied 40H675 or equiv.)
- 1—Recessed steel shell for P3 (Amphenol 61-61; Allied 40H086 or equiv.)
- 1—Chassis box, 4 x 2 x 2¾-in. (Bud CU-2115A; Allied 42D7631 or equiv.)
- Misc.—machine screws, nuts, wire, solder, phenolic board, wire, etc.

Estimated cost: $14.00
Construction time: 2 hours

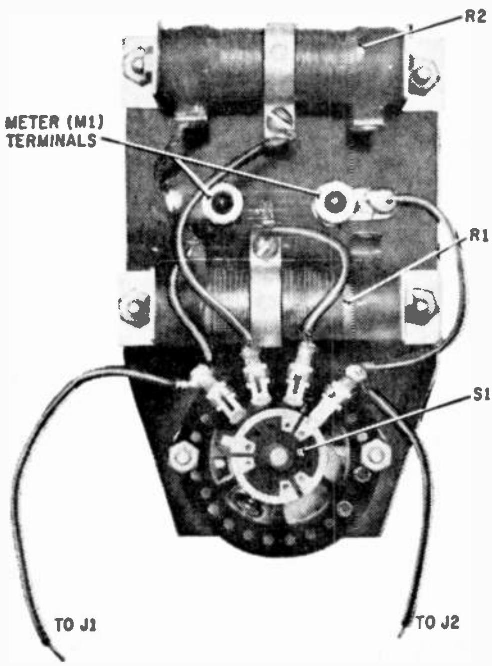
troubles with an AC ammeter. The ammeter described above will work on most radios, audio amplifiers, and TV sets. Do not use it on irons, toasters, or other high current devices. To make this meter more useful in checking line-cord powered devices an adapter (shown in the photographs) was developed.

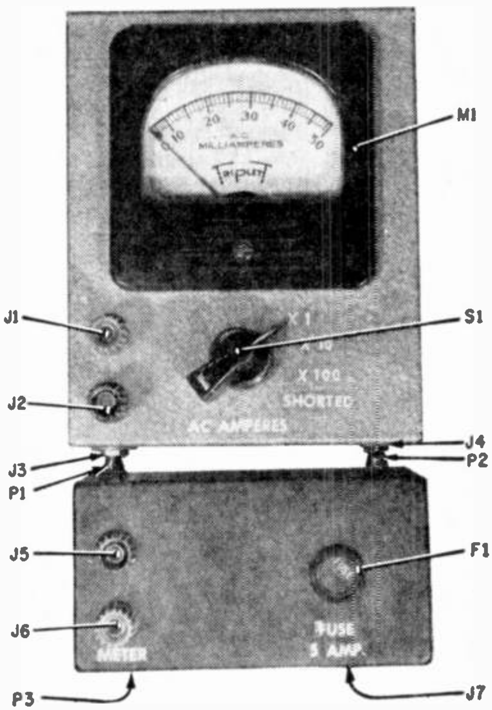
Since there was no room in the meter box for an AC receptacle or fuse holder I decided to make an additional box that could be easily fastened to the meter box. The end dimension of the meter box was 4-inches wide by 3-inches high. A box 2-inches deep that would match this would be great, but none are available. The nearest standard-size box is 4 x 2¾ x 2-inches or you could cut down a 3 x 4 x 5-inch box to match the meter case. An AC socket and plug are mounted on the front of the box—on the top is a fuse holder and two 5-way binding posts. The back of this box has two banana plugs that mate with two banana jacks mounted in the meter box. These banana plugs and jacks just hold the two boxes together and do not carry the meter current. Be sure and use an *instrument fuse* to protect the meter—they are faster than a conventional fuse.



You don't need to resort to a lot of figuring if you use the cut-and-try method of shunt design. Just connect the two meters in series and increase the resistance of the shunt until meters indicate the same. Refer to the text.

How It Works. The device to be tested is plugged into the AC socket. A jumper cord, with banana plugs, connects the adapter and ammeter through the 5-way binding posts on each box. This connection puts the meter circuitry in series with the fuse and AC plug. An AC cord with a male plug on one



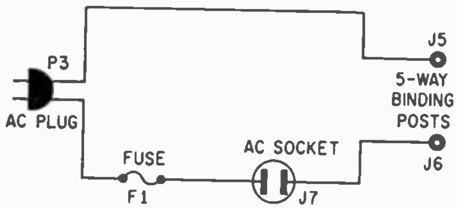


All circuitry inside meter case (left) is on phenolic board that mounts directly on meter terminals. Tapered end of phenolic board is to give better clearance for leads to J1 and J2. If you start with a larger case, adapter can be built in, eliminating J3, J4, J5 and J6 as well as P1 and P2. The 5-amp fuse will not protect M1 if shunt resistor should open up.

end and a female socket on the other end is used to connect the ammeter adapter to a wall outlet.

One Use. I had no sooner finished the ammeter adapter than an opportunity came to use it. A two-cabinet stereo set came into my shop with the complaint that it was popping fuses. When I checked the units I found both fuses popped. I connected each unit to the ammeter adapter and found that each unit alone drew approximately one ampere. Tapping the tubes in the changer cabinet showed up a bad 5Y3GT tube that caused the ammeter to read 3 amperes. Since each unit should have had a 1.5 ampere fuse to start with, it was easy to figure why the fuse had gone. Further examination showed that the blown fuse in the other cabinet was only a ¾ ampere size. Proper (1½ ampere) fuses were put into both amplifiers along with a new 5Y3GT tube and no more trouble was found. Monitoring the current for short intervals over a period of several days showed no change.

Bottom of adapter shows male and female connectors. Chassis-mount male plug (on left) is mounted in a shell to recess it below surface of adapter box to protect pins from damage. Fuse and J6 at top.

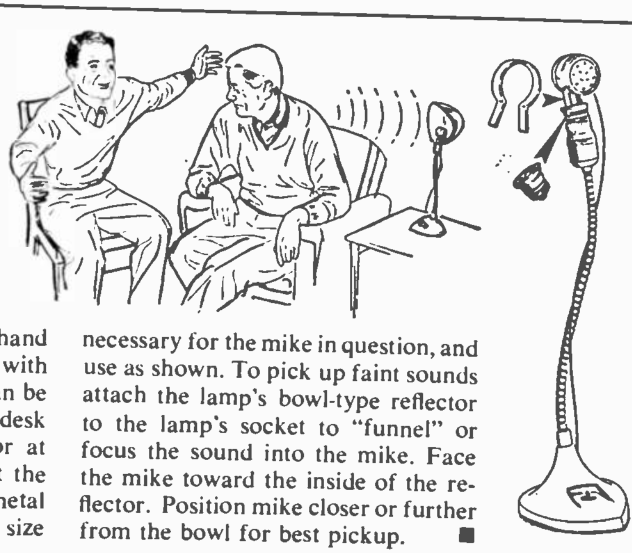


Adapter circuit is simple to add to any ammeter. Fuse protects instrument but it will not prevent meter overload if a shunt should burn out—use meter fuse (see ammeter schematic) of meter rating.

Many defects in electronic equipment can be detected with an AC ammeter. Some of these are: shorted or partially-shorted power transformers, bad tubes, and bad or leaky filter capacitors. It also makes it easy to decide what size fuse to put into newly designed (and built) electronic equipment. A safe rule-of-thumb is to install a fuse rated about one and a half times higher than the operating current. ■

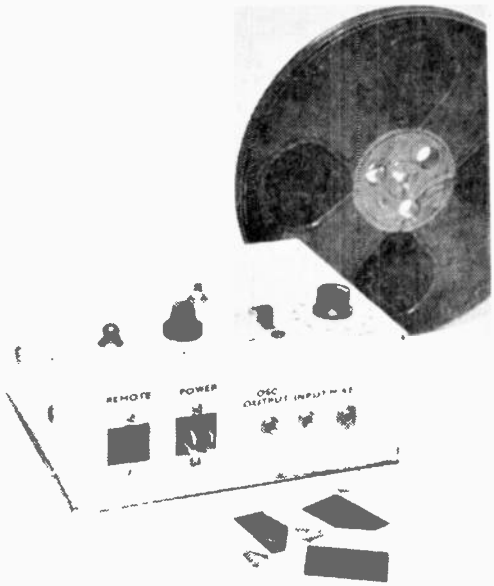
Desk Lamp Mike Stand

Record that tall story using the desk lamp reflector to increase pickup range



A microphone stand for hand mikes (such as those that come with less expensive tape recorders) can be improvised from a flexible neck desk lamp with its cord removed (or at least disconnected), a plug to fit the lamp's socket, and a ⅛ x ⅜ in. metal strip. Bend the metal strip to the size necessary for the mike in question, and use as shown. To pick up faint sounds attach the lamp's bowl-type reflector to the lamp's socket to "funnel" or focus the sound into the mike. Face the mike toward the inside of the reflector. Position mike closer or further from the bowl for best pickup. ■

UNIVERSAL TAPE-SLIDE SYNCHRONIZER



by Robert S. Havenhill*

Constructing a unit with no springs to adjust and no relay contacts to pit or stick is possible if you switch with a regular unilateral SCR wired across a diode bridge.

■ **Just think about it!** The next time you show color slides of your last vacation you can sit on your duff and enjoy a cool, mixed drink while your tape recorder does the work. A rich, clear narration prepared in advance patters out in step with changing slides without any effort on your part. Your guests will be entertained as well as curious about that gadget you call the *Tape-Slide Synchronizer*.

The *Tape-Slide Synchronizer* is an electromechanical device which automatically actuates the slide-changer mechanism at the exact instant dictated by the commentary on the magnetic recording tape—thus assuring perfect synchronization of commentary and slides at all times. A taped slide-show commentary has a number of advantages over live, *off-the-cuff* commentary. One advantage is that important facts (that are hard to come by) will not be forgotten on successive showings as time goes by. Another advantage is that the show need not be postponed if your voice goes bad the night of the performance. You can sit back, relax and enjoy yourself. (Don't forget that drink!)

* Former head of Electronic Research Laboratory and Director of Product and Service Laboratories, St. Joseph Lead Co., Monaca, Pa. Now retired

Early units were difficult to use. Some required conductive marks to be placed on the tape, others used a high-level audio signal in the sound track (which was objectionable as it could be heard). In order to overcome the objection of the noise from the sync signal, one unit operated on the complete absence of sound on the tape. A four-second (or longer) silent period would activate the slide-changer mechanism. This system was workable with monaural tapes but it was difficult to record the commentary without pausing, thus causing unwanted slide changes. Some success was also had using inaudible (ultrasonic) sync signals.

For Stereo Tape Recorders. With the advent of the two- and four-track stereo-tape record and playback equipment the disadvantages of the early units were automatically eliminated as the commentary could be recorded on one channel and the sync signal on the other. On playback the sync signal would operate the slide changer via the switch in the synchronizer. But even with this there were relay contact problems.

A Unique Circuit. This *Tape-Slide Synchronizer* is solid state. Using the unilateral SCR (silicon-controlled rectifer) alone will pass only one half of the AC (sine wave) power—still requiring a relay to switch *on*

TAPE-SLIDE SYNCHRONIZER

and *off* the AC to the shaded-pole induction motor—which normally powers the semi-automatic slide changers. By using the SCR with a diode bridge circuit both halves of the 60-cycle (Hz) power are passed and the relay can be eliminated. Another way to eliminate the relay is to use two SCRs in inverse parallel but this is more expensive.

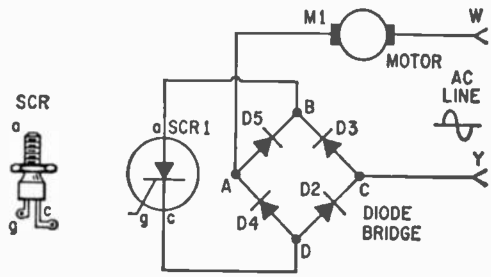
Originally this *Tape-Slide Synchronizer* was used with a stereo record-playback tape deck with only one power amplifier and speaker—for the commentary channel.

The three-stage transistor amplifier operates the SCR circuit. It provides plenty of gain for use with the tape deck and even a small crystal microphone can be used to operate the slide changer and put a sync signal on the tape.

SCR-Diode Bridge Switch. The heart of this unit is the SCR-diode bridge switch—the basic switch circuit is shown top right. The SCR has high resistance between *anode* (A) and *cathode* (C) when there is no signal on the *gate* (G), and no AC can flow through the diode bridge to power the motor—it is off.

When the *gate* of SCR1 is made positive (by a positive-going signal between *gate* and *cathode*) the resistance of SCR1 becomes very low between *anode* and *cathode* (it conducts) and the motor runs.

Conduction of both halves of the AC-power sine wave is brought about as follows: when the AC cycle is positive at W, current



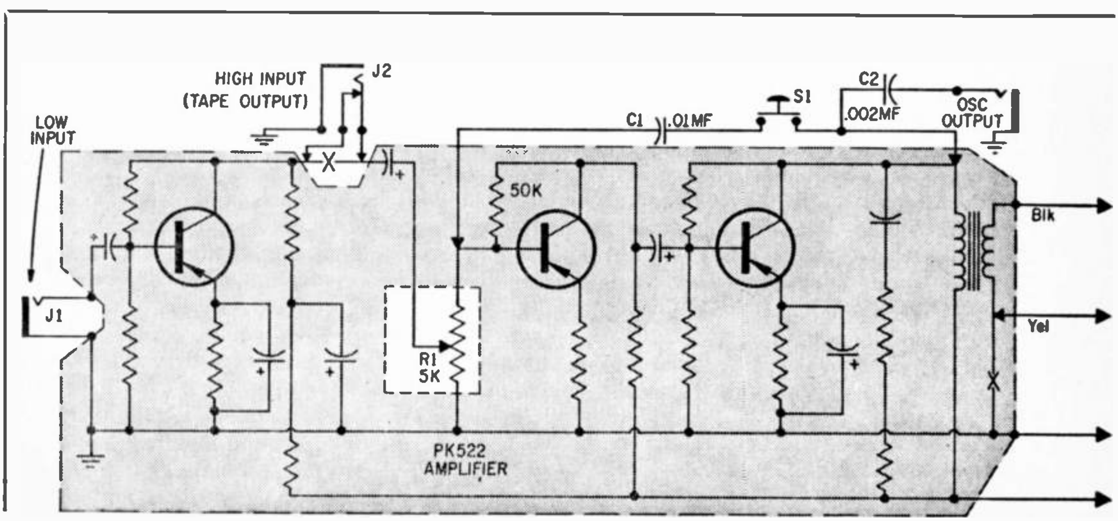
Unique basic circuit is heart of Slide Synchronizer. Power-line AC flows through motor M1 but DC flows through SCR1 by way of diode bridge—simple and inexpensive.

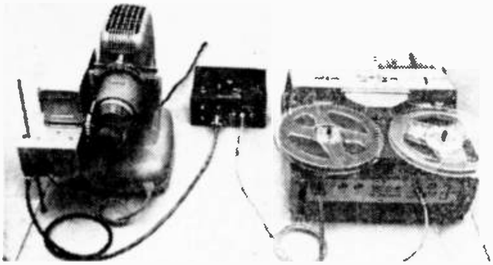
flows through motor M1, then through D5 from A to B, through SCR1 to D2 (from D to C) back to the other side of the line (Y).

When the positive cycle of the AC line is at Y, current flows through D3 (from C to B), through SCR1 to D4 (from D to A), then back through motor M1 to the other side of the line (W).

In like manner, the sync signal from the output of the tape recorder, when rectified and applied as a positive (+) pulse to the *gate* of the SCR-diode bridge, switches the slide-changer motor.

Solid-State Synchronizer. The complete schematic wiring diagram, including that for the slide changer, is shown below. Remote pushbutton S2 is used to operate the slide changer. An Airquipt (model Y) semi-automatic slide changer is used here. However, practically any remote-pushbutton operated unit could be used. The slide changer is shown attached to a TDC





Complete setup, ready for an automated slide show, has Tape-Slide Synchronizer between slide projector and tape machine. Use any automatic projector, stereo unit.

(model D) slide projector.

Current flows through the motor when S3 is pressed. (Numbers 1 through 4 shown on the slide-changer portion of the schematic are the actual contact numbers molded into the Cinch-Jones 4-contact chassis socket in the slide changer.)

When the motor starts it operates the motor-driven cam switch (S4—wired in parallel with S3) keeping current flowing when S3 is released. After the changer has completed its cycle the cam switch opens, the motor stops—and everything is ready for another slide change when S3 is pressed again.

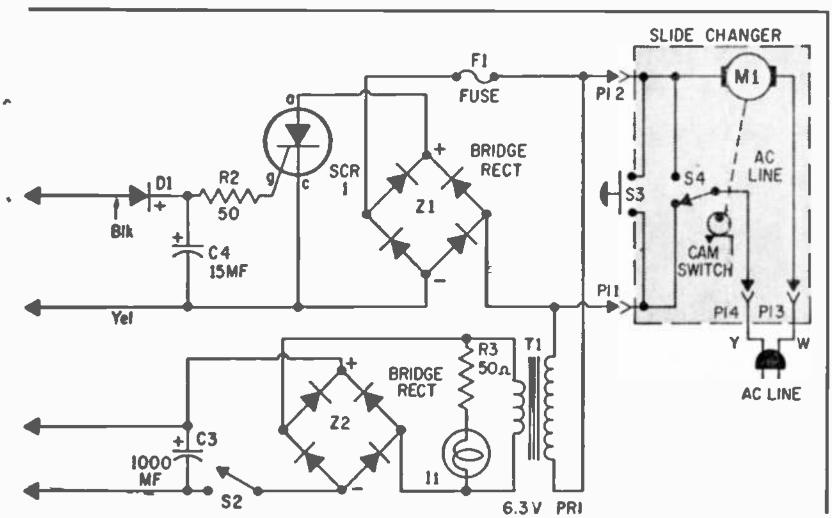
The *Tape-Slide Synchronizer* is connected electrically to the slide changer through the 4-contact plug and operates as follows:

Depressing S1 connects the *collector* of the last stage of the three-transistor audio amplifier (through C1) to the input of the previous (second) stage converting it into a 1000-Hz feedback oscillator. The 1000-Hz signal from the ungrounded secondary of the output transformer is rectified by D1, passed through the RC filter (R2 and C4) to the *gate* of SCR1. The 1000-Hz signal appears at the *gate* of SCR1 as a positive-going pulse—activating the solid-state switch which in turn powers the slide-changer motor as

PARTS LIST

C1—.01-mf, 200 volt, capacitor (miniature)
C2—.002-mf, 200 volt, capacitor (miniature)
C3—1000-mf, 15-volt, electrolytic capacitor
C4—15-mf, 15-volt, electrolytic capacitor
D1—1N540 silicon diode
F1—2-amp 3AG fuse
I1—6.3-volt miniature pilot lamp
J1, J3—Phone jack, miniature open circuit
J2—Phone jack, miniature closed-circuit
P1—4-contact plug (Cinch-Jones P-304-CCT to fit slide-changer socket)
R1—5000-ohm miniature potentiometer
R2, R3—50-ohm (47-ohm), 1-watt resistor
S1—S.p.s.t. normally-open pushbutton (Grayhill 30-1 s.p.s.t. or equiv.)
S2—S.p.s.t. slide switch (Wirt or equiv.)
SCR1—117-volt, 4.7-amp silicon controlled rectifier (GE-Z1 or equiv.)
T1—Filament transformer, 117-volt to 6.3-volt, 0.6 amp Stancor P-6465 or equiv.
Z1—500-volt, 1-amp (Mallory FW-500 full-wave silicon bridge or equiv.)
Z2—200-volt, 1-amp (Mallory FW-200 full-wave silicon bridge or equiv.)
1—3-transistor, miniature audio amplifier (Lafayette PK-522 99C9039 or equiv.)
1—Chassis box, 6x5x2½-in. (cut down from 9½x5x2½; Bud AC403 or equiv.)
Misc.—Phenolic board, terminals, machine screws, nuts, wire, solder, fuse holder, plastic (spaghetti) tubing, plugs, etc.

Estimated cost: $14.00
Construction time: 3 hours



Large shaded areas show original circuitry of prewired units used in Tape-Slide Synchronizer. Added circuitry is outside of shaded boxes.

TAPE-SLIDE SYNCHRONIZER

previously explained. R2 limits the current through the *gate* circuit of SCR1 to a safe value. C4 is the filter capacitor.

The output of the oscillator is also fed to the stereo-recorder input (from J3) and it is recorded as the sync signal on the control channel of the tape. The commentary is recorded in the usual manner on the other channel of the tape at the same time.

During playback the output of the control channel of the recorder is connected (via J2) to the input of the second stage of the audio amplifier where it is amplified, rectified by D1 and applied to the *gate* of SCR1—the solid-state switch powers the slide-changer motor.

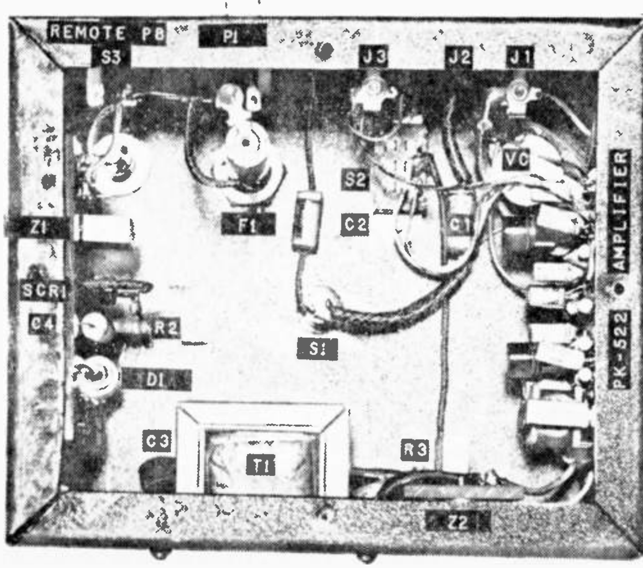
Microphone Sync. A small crystal microphone can be plugged into J1 and when the word "change" is spoken into the mike there is adequate amplification to operate the slide changer mechanism and record a sync signal on the control channel of the tape.

Tape Deck. If only a stereo tape deck (without power amplifier) is available, there is ample amplification for both recording and playback of the sync signal on the control channel using either the microphone or S1. On playback, the output of the tape-deck preamp (which contains the sync signal) should be connected to J1 for the necessary amplification. During recording the sync signal from jack J3 is connected to the input of the tape-deck preamp.

This version of Tape-Slide Synchronizer has top-of-the-cabinet lettering facing operator. Cables come out of unit on the side of cabinet away from the operator.

Using Stereo Recorder. Extremely smooth operation has been obtained using the *Tape-Slide Synchronizer* with a Wollensak T 1580 stereo recorder. With this recorder the sync signal can be taken off at J2 (instead of J3) and applied to the input of the control channel to record the sync signal. On playback the output of the control channel can be taken from the external speaker jack and fed to J2 where it is amplified and operates the solid-state switch.

With this setup, output jack J3 is never used and the recorder cable need not be changed from J3 to J2 (in the *Tape-Slide Synchronizer*) when going from record to playback. *(Continued on page 118)*



Inside view of the Tape-Slide Synchronizer shows most of circuitry is contained on circuit boards mounted vertically on skirts of metal chassis box. Ready-made plate covers bottom when finished.

The Invasion

■ We all shared the same license. Me, my girl Ora and my *sometimes* buddy, Nat. And tonight, the big night, I (Unit 1) had a date with Ora (Unit 2) at 8:00 sharp. And I was late, already a half hour late. Traffic being light, I'd taken the ocean drive (to pick out a parking place in advance) and no sooner was I committed to this route than fog commenced to roll in. At 8:30 I crawled along at 10 per, still a good 15 minutes from Ora's beach house. I tried to find some jazz on FM, which is scarce along this coast. Nearest station is on the island, 50 miles away, and it wasn't making it through the fog.

I switched over to CB just as Ora put her carrier on and pinned my needle. "This is Unit 2," she said softly. "Unit 1, where are you?" A sweat trickled down my spine.

I came back, "Crawling along in this darn fog. I'll be there by 8:45." I speeded up a little.

"That's nice, because at 8:50 I *lock* the doors—", a bit of dead carrier indicated Ora considered her next thought, "—and call Nat."

Nat and I both have a thing for her but so far the competition had been more or less polite. Anyway Unit 3 must have heard Ora because on the air he came. Darn it!

"Unit 1, CQ Unit 1." His carrier cut out briefly. "This is Unit 3 with emergency traffic." He sounded breathless and all that.

I pretended not to hear and speeded up a little more.

by C. M. Stanbury II

"Unit 1, come back. We've been invaded. I'm driving from Cometland toward Ora's. They're only a mile or so behind me on the highway." Nat paused for breath and assumed his most desperate tone. "Do you read me?"

Cometland is a resort about 20 miles up the coast. With one hand on the wheel and the other on my transceiver, I decided to play along. I put myself on the air. "Unit 1 to Unit 3, invaded by what? Dragons from Mercury or gnomes from who knows where?"

"Giants in spaceships. A whole army of them. They've completely taken over Cometland." His signal inched up a little on the S-meter.

Ora broke in. "With this fog, how can you tell?"

Unit 3, undaunted. "Unit 1, you'd better turn back. I'll pick up Ora and meet you further south."

Yours truly pushed a little harder on that accelerator. *"Sure you will."*

She, sweetly, "Whoever gets here first . . ."

Nat kept it up. "I'm not fooling, Unit 1. They've turned Cometland into a base and more spaceships are landing right now. You can hear them coming in from here." There was a loud hum in the background.

I yawned a little. "So you brought your shaver with you. And don't forget the last CB'er who sent a phony distress got two years in the pen."

It was her turn. "Maybe he's not worried because the license is in your name. Anyway, man, you'd better make it here within five minutes."

"Just passed the lighthouse. Ora. That makes it less than a mile." The fog horn was really blowing up a storm and now the visibility had dropped to absolute zero. I slowed down, thought about that license bit, and began to sweat a little. "Unit 3, this is Unit 1. As licensee I've just cancelled your operating privileges."

A moment of quiet and then he returned. But now that hum was really tremendous. "One of their ships is right overhead. I think it's after me. The thing is draining power from my batteries." His signal dipped appropriately. "Now my car has stalled and I can't move." With the most tremendous panic you ever heard come out of a CB receiver, "They're landing on the road in front of me." He faded out completely.

Ora took over the channel. "Hey, Unit 1, it's now 8:45. Do you figure those astronauts out there in the fog would treat me better than you guys do?"

I inched around a final curve by following the shoulder of the road. "Wouldn't bet on it."

"Well, I may get the chance to find out because there's a big bright light coming up over the northern horizon."

I put myself back on the air quick. "If Nat's arrived there first, both your operating privileges are cancelled."

Thirty seconds of dead air.

"Nobody here except me, yet. But if he's kidding, how come we're the only two people on the air?" She laughed ever so slightly, almost nervous. "Anywhere, any band."

Enough! Between the fog and Nat's phony distress, I was really hung up. "All right, girl, if you really want to play, standby." I switched on my general coverage converter and began working down through the international SWBC bands. 16 and 19 meters were absolutely dead but on 15,016 kHz some bird with a phony accent and a made-up language was sending messages. I returned to CB and hit the airwaves again. "Nat, it's also illegal to transmit off the Citizen's Band. Do you *read* me?"

Silence.

On 15,016 those weird messages continued to flow. I moved on down through 25 and 31 meters which were also blank. Static showed up around 6 MHz but still no stations. A funny feeling crept into the pit of my stomach.

The AM broadcast band was also silent.

I put my CB transmitter on in a hurry. "Ora, do you read me?"

Her signals were so weak I couldn't make out what she said but now I was close enough to see her house through the fog. In front of it—a spaceship and astronauts. Giants, most of them six feet tall, well over 175 pounds, no tails at all. And that's how in the year X/4000 Venus was conquered by invaders from the planet Earth. ■

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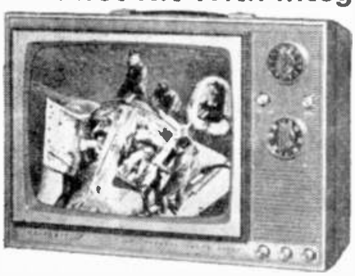

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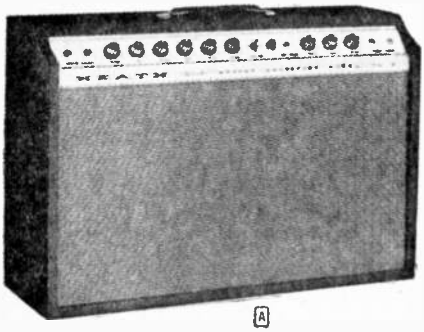

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D "Rocket" Guitar . . . 2 Pickups . . . Hollow Body
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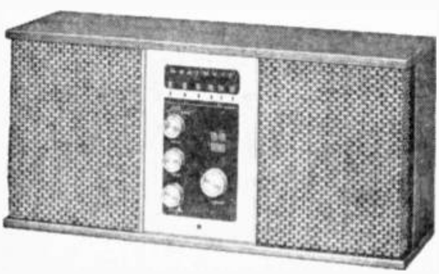

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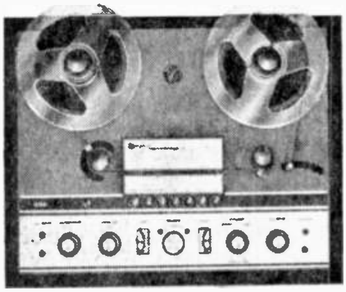

Kit AD-16
$399.50
(less cabinet)

Save $170 by doing the easy assembly yourself. Features solid-state circuitry; 4-track stereo or mono playback and record at 7½ & 3¾ ips; sound-on-sound, sound-with-sound and echo capabilities; 3 separate motors; solenoid operation; die-cast top-plate, flywheel and capstan shaft housing; all push-button controls; automatic shut-off; plus a host of other professional features. 45 lbs. Optional walnut base $19.95, adapter ring $4.75

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NEW Deluxe SB-401 Amateur Transmitter Kit

Kit SB-301
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(less speaker)

New SB-301 receiver for 80 thru 10 meters with all crystals furnished, plus 15 to 15.5 MHz coverage for WWV; full RTTY capability; switch-selected ANL; front-paneling switching for control of 6 and 2 meter plug-in converters; crystal-controlled front-end for same rate tuning on all bands; 1 kHz dial calibrations, 100 kHz per revolution. 23 lbs. Matching SB-401 Transmitter, now with front-panel selection of independent or transceive operation . . . $285.00

2-Watt Walkie-Talkie

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$99.95

New . . . Factory Assembled. Up to 6 mile range; rechargeable battery; 9 silicon transistors, 2 diodes; superhet receiver; squelch; ANL; aluminum case. 3 lbs. 117 v. AC battery charger & cigarette lighter charging cord $9.95. Crystals $1.99 ea.

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Propagation Forecast

By C. M. Stanbury II

February/March 1967

■ Starting this issue we have made our propagation forecasts even easier for shortwave listeners to use. If you are DXing at a certain hour, simply run down the left-hand column in the Forecast table until you find the appropriate time slot, then look across to the right and determine what is available on which bands for each major area in the world. Bands in brackets are promising second choices. Time intervals are for your local standard time. If you live in the Central Standard Time (CST) zone then the *Time* column in our Forecast table is CST.

On the other hand, if you are listening for one particular part of the world *only*, check the Peak DX Periods table first to see what time the best DX is available from that area. Follow this time slot across in Forecast table to determine the best bands. If you live in the CST zone, use the *Eastern* column but deduct 1 hour. ■

Peak DX Periods

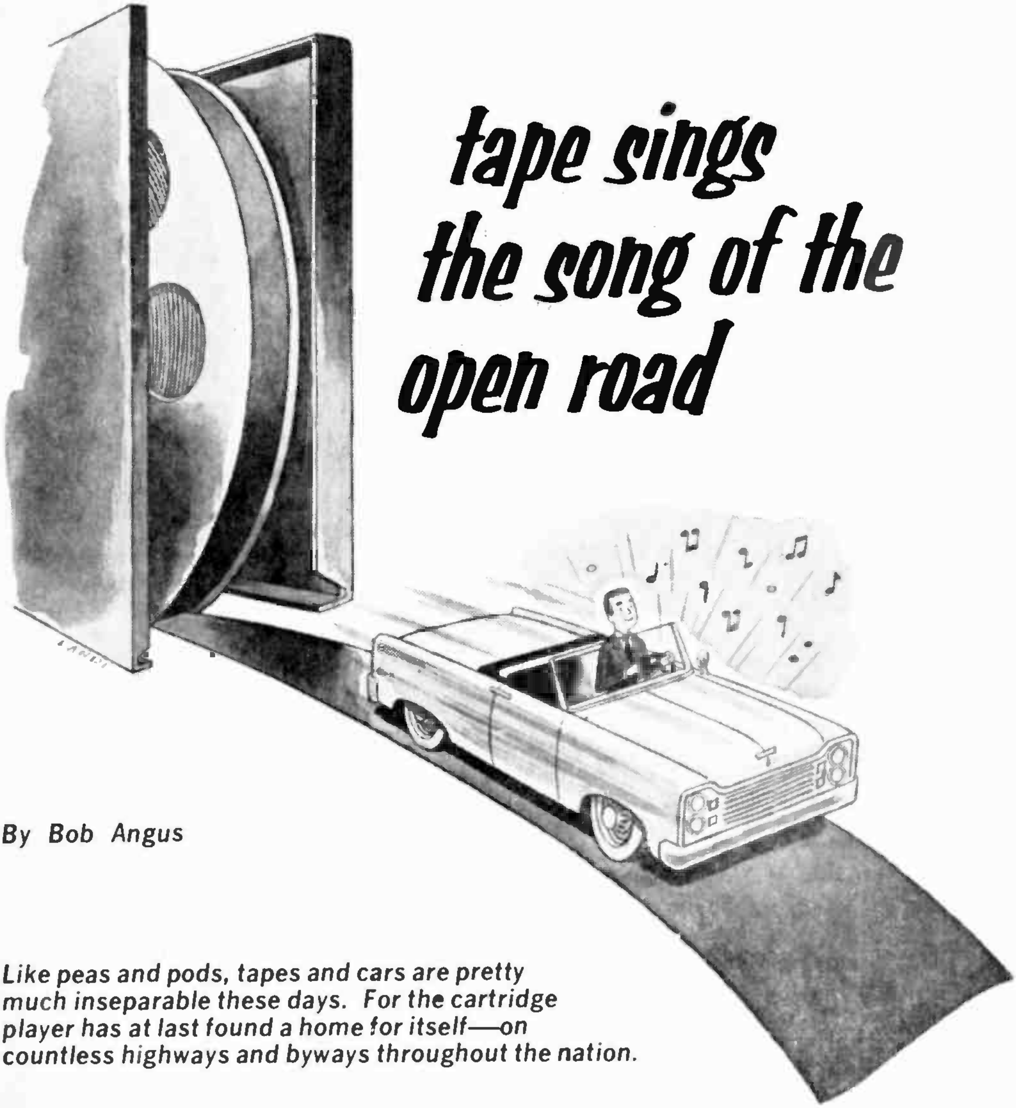
Area	Eastern (EST)	Western (PST)
Asia (except Near East)	0000-0900	1800-0900
Europe, Near East & Africa (N. of the Sahara)	1200-2400	1200-2400
Africa (S. of the Sahara)	1500-1800 2200-0200	1900-2300
South Pacific	0300-0600	0000-0600
Latin America	1800-0600	1630-0500

RADIO-TV EXPERIMENTER PROPAGATION FORECAST

Feb.-March 1967 LISTENER'S STANDARD TIME	ASIA (except Near East)	EUROPE, NEAR EAST & AFRICA (N. of the Sahara)	AFRICA (S. of the Sahara)	SOUTH PACIFIC	LATIN AMERICA
0000-0300	31, 25	31, 25	31, 60 (25)	31, 25	90, 60, 49
0300-0600	31, 25 (49, 60)	31 (poor)	31 (poor)	49 (60, 90)	90, 60, 49
0600-0900	25, 19	19	nil	31	49, 31
0900-1200	19, 16	16, 19	16, 19	25 (poor)	19
1200-1500	19 (poor)	16, 19	16, 19	25 (poor)	19
1500-1800	16, 19	25 (19, 31)	31, 25 (41)	25 (poor)	31, 49
1800-2100	16, 19	25 (19, 31)	31, 25	25	90, 60, 49
2100-2400	16, 19	31 (49)	31, 60 (90)	25	90, 60, 49

To use the table put your finger on the region you want to hear and log, move your finger down until it is along side the local standard time at which you will be listening and lift your finger. Underneath your pointing digit will be the shortwave band or bands that will give the best DX results. The time in the above propagation 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 easier to tune on the east coast. The shortwave bands in brackets are given as second choices. Refer to White's Radio Log for World-Wide Shortwave Broadcast Stations list.

tape sings the song of the open road



By Bob Angus

Like peas and pods, tapes and cars are pretty much inseparable these days. For the cartridge player has at last found a home for itself—on countless highways and byways throughout the nation.

If there's a Ford in your future, you may well find a stereo tape-cartridge system in it. And Ford's not alone. For today's boom in car-cartridge players is so big it's second only to the craze for color TV. Some industry optimists even see highway hi-fi as the greatest thing to hit the recording industry since the LP.

But what's the big deal about car-cartridge players? (They have, after all, been around for more than a decade.) And given four tracks (and often eight) at a tape speed of 3¾ ips (sometimes 1⅞), the question is whether such players produce any stereo worth having. In short, just how bad is highway hi-fi?

The answer, as we'll see shortly, depends on what we define as hi-fi and which particular highway hi-fi is under discussion. For the fact is that at the moment, there's not one but three major and several minor systems for putting stereo tape in your car. The majors include the Fidelipac system, developed in 1956 by George Eash; the Lear-Jet system, introduced in 1965 and espoused by Ford and RCA Victor; and the Norelco system, introduced in 1964 but only recently adapted for automotive use.

Also clouding the picture is a major battle-of-the-systems. At the moment, the industry is going through a set-to reminiscent of the one between RCA Victor (with its 45s) and Columbia (with its then-new LPs) over a decade ago. Significantly enough, no system

tape sings the song of the open road

seems to have a clear technical superiority. Instead, each seems able to provide satisfactory sound reproduction in the car, and at least two of the three have plenty of music available to match most tastes. All three can move from car to home, so you can play the identical cartridge in your car or your living room. And all three, in large part, became possible as the result of the development of reliable, low-cost transistors.

Fidelipac. The Fidelipac cartridge features an endless loop of tape wound around a hub inside a plastic shell. The tape feeds from the pack's center, travels past notches cut in the plastic to accommodate a playback head and pinch roller, then rewinds at the outside of the tape pack. The cartridges are recorded at 3¾ ips in four-track stereo and sell at prices ranging from $2.95 for about 15 minutes' playing time to $9.95 for over an hour's worth of music. Prices for players run from about $70 to $140.

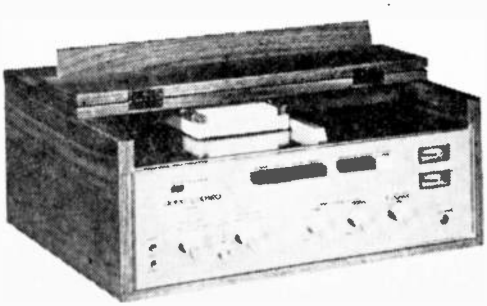
Fidelipac players are sold by such manufacturers as Craig Panorama; SJB, Inc.; Telepro Industries; Trans-World, Inc.; Midland International; Viking of Minneapolis; Muntz Stereo-Pak; Auto-Sonic; Nu-Vox; Audio Stereo; and Metra Electronics. These and other manufacturers provide a wide range of music from the libraries of MGM, Command, Verve, ABC Paramount, Westminster, Pickwick, Audio Fidelity, Mercury, Dot, Elektra, and a host of other record companies. Prices for the players themselves vary, depending on whether speakers are included, whether the unit plays back through an existing car radio, whether AM or FM radio is included, and so on.

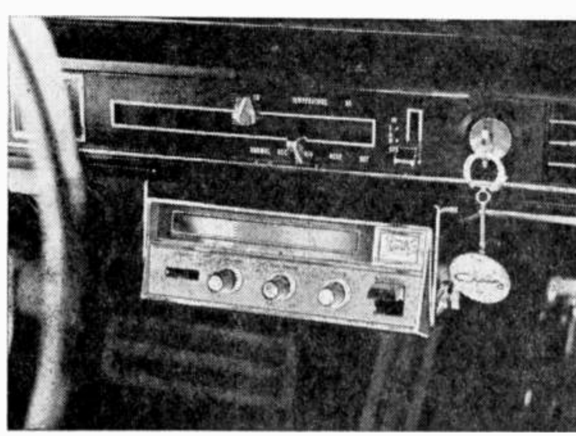
In view of Fidelipac's lead time over the other systems, it's hardly surprising that an estimated 70 per cent of the car-cartridge players now in use utilize this system. All of these units were bought for cars already on the road. At the moment, Fidelipac also accounts for better than 60 per cent of cartridge sales.

Lear-Jet. Lear-Jet units are to be found mainly in current-model Fords, Mustangs, Thunderbirds, some Mercurys and Lincolns. The cartridge is about the same size and shape as the Fidelipac, and it is also recorded at 3¾ ips. However, recordings are in eight-track rather than four-track stereo. Further, unlike the Fidelipac four-track units, a pinch roller is included in each cartridge. Prices for recorded cartridges are comparable to Fidelipac's, and the catalogs include many of the same titles plus albums from RCA Victor, London, Decca, and Capitol. Player prices are comparable to Fidelipac's.

In addition to the units Ford is installing in its new cars, players are available from Lear-Jet and Soundex Corporation for cars already on the road. And Lear hopes to entice General Motors into joining Ford and Chrysler into putting its players in their new cars. "With the auto industry turning out over nine million cars a year," a Lear spokesman said recently, "it looks like something between 15 and 20 per cent of these new

With inputs for mike, tuner, and phonograph, in-home tape-cartridge recorder (below) by Craig Panorama makes perfect mate for Craig's in-car tape player (at right).





cars will have stereo tape playing systems."

Norelco. With all this activity, another cartridge system would seem to have little chance of gaining a foothold. Nevertheless, Norelco last year introduced a dashboard harness for its battery-operated portable tape-cartridge recorder and thus made a bid to capture part of the growing market. And the real breakthrough came when Norelco managed to persuade Mercury Records, Minnesota Mining, General Electric, Sony, Aiwa, Concord, Panasonic, and 31 other firms to adopt its system. Norelco-type players now cost from $70 to $100 and, unlike the others, are powered by self-contained flashlight batteries.

The Norelco system centers around a two-hub cartridge roughly a fifth the size of the other two. Similar to a design that was introduced by RCA in 1959, the Norelco model utilizes ⅛-in. tape recorded at 1⅞ ips. At the moment, recording is twin-track mono only—but the developers plan to introduce compatible four-track stereo soon. Blank cartridges, which cost from $2.65 to $3.25, hold 45 minutes of uninterrupted recording and are available from Norelco, Mercury, and Minnesota Mining. Prerecorded cartridges will cost about $4.95 for 32 minutes (about the same price as a stereo LP).

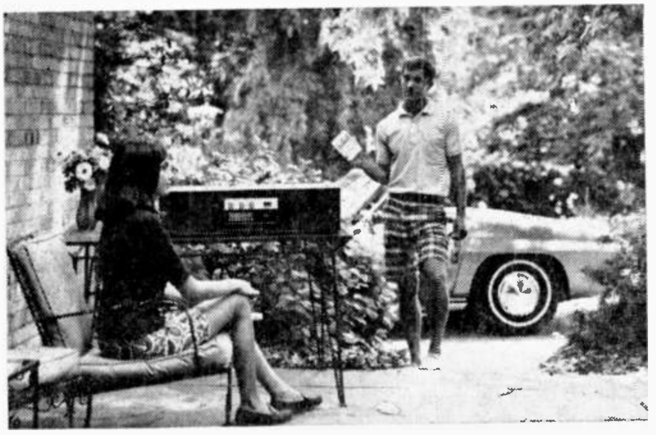
Among the machines which now fill the Norelco car harness are the Norelco Carry-Corder ($89.95), the Mercury TS8000 ($89.95), the Wollensak 4100 ($89.95), and the General Electric M8300 Lively Set (about $90). Both Norelco and Mercury project four-track stereo models using ⅛-in. tape at prices around $150.

The versatility of a 3-lb. recorder that operates equally well in a living room, at the beach, or under the dashboard—plus the fact that the owner can record his own fare—are the major assets of the Norelco system. Of course, given the know-how, it is possible to record Fidelipac tapes on a conventional four-track recorder, then load the tape into a cartridge. And Soundex now offers a Lear-Jet record/playback deck, while Roberts has introduced eight-track cartridge record/playback as an extra feature on its model 1725-8L recorder.

But for the most part, Fidelipac and Lear users are limited to commercially-recorded cartridges. At press time, there were only 50 prerecorded Norelco-type cartridges—all monaural, and all from the Mercury, Philips, Smash, Wing, and Limelight catalogs. But more were promised.

SJB, Tenna. For those who can't make up their minds as to which of the three major systems they prefer, there are a number of hybrid compatible units on the market. SJB's line, for example, includes six models, ranging in price from $100 to $170. The model ST308, at the bottom of the scale, comes with indicator light. For $130 you have a choice of model ST408, with indicator light and automatic light or model 603M/48, an all-chrome unit with speakers, adjustable bracket, cigarette lighter plug, and carrying handle. Another $10 adds FM radio to the ST308. Shell out $170, and you have a choice of two compatible tape-FM units, models ST408/FM and 603M/48/FM.

Still another compatible unit comes from Tenna Corporation. Said to be the least expensive on the market, it sells for $69.95 and features automatic sensing of cartridge,



Mark 8 player by RCA Victor permits use of 8-track car-cartridge tapes anywhere in the home. Device comes in two models: unit at left contains built-in speakers, while model below must be attached to stereo system.

tape sings the song of the open road

automatic switch-on, a reject bar, and optional foot switch control.

Homeward Bound. With most of the cartridge problems licked, manufacturers are beginning to design players for the living room (and a few models which can be connected directly to a component hi-fi system). Accepting Lear-Jet cartridges are Soundex's $80 player, RCA's Mark 8, and models from Lear-Jet, Roberts, and General Electric. Fidelipac units are available from Muntz Stereo-Pak, Telepro, SJB, and others.

Among the four-track home players are Telepro's Satellite II; and Muntz's A-HW-1, AR-300 and AR-400. The latter two are complete home-entertainment centers with record changer, amplifier and tape-cartridge handler. The AR-400, mounted in a cabinet, also contains two speaker systems, while the AR-300 is the heart of a stereo compact system.

Installation. In theory, some of the prices quoted by manufacturers include installation of the player in your car. In practice, you can save money on virtually any model by installing the unit yourself. Just how much work is involved depends on the type of unit you buy. The Norelco models, for example, simply slip into their harness with no additional work required. Those which operate through an existing car radio fit in a bracket mounted below the dashboard. (You'll also have to connect the player output to the radio amplifier—often merely a matter of inserting a jack.)

The most complicated to mount are the stereo models with speakers, since you'll have to cut holes for the speakers in your door panels. Which tools you'll need depends on the type of padding your car has inside the door. Speaker brackets and protectors usually are supplied with the do-it-yourself kits. Wiring from the player to the speakers is fairly simple, and consists of tucking the wire up under the dash, then running it through the panelling to the point where it meets the door frame.

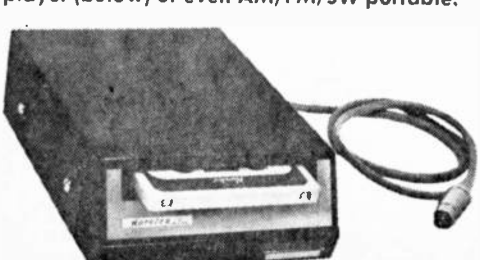
Sound-Box-On-Wheels. Where does it all lead? Surely eight-track tape must have a significantly higher tape hiss than four-track? And isn't it logical to expect 3¾-ips or 1⅞-ips recordings to sound inferior to 7½ ips? Actually, there's an aural trick involved. Tapes that sound very ordinary in a living room sound very good (if not excellent) in a car. The trick is similar to the one which permits 3½-in. speakers in stereo headphones to produce such startling bass tones.

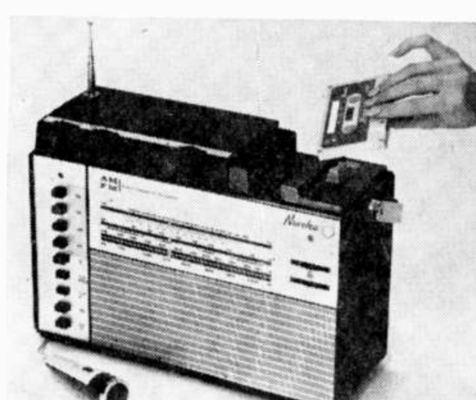
In short, much of the system's success stems from the setup itself; you're enclosed in a relatively small space with two speakers and are in effect smack in the middle of a veritable sound-box-on-wheels. At the same time, road and traffic noises mask any imperfections in the recording or the equipment so that you hear—or think you hear—strikingly good sound.

In the living room, however, it can be

(Continued on page 115)

Unlike both Fidelipac and Lear-Jet systems, Norelco's cartridge contains two separate reel hubs that unwind and wind in standard fashion. Cassette (seen in hand in photo at right) can be used with car-player (below) or even AM/FM/SW portable.





WHITE'S RADIO LOG

Volume 47, No. 1

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

In Our Next Issue, April-May, 1967, 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, and the expanded Shortwave Section. The shortwave listings will always be completely revised in each issue of *Log* to insure 100 percent up-to-date information.

In the JUNE-JULY, 1967, issue of RADIO-TV EXPERIMENTER, the *Log* will contain the following listings: U.S. AM Stations by Call Letters, U.S. FM Stations by Call Letters, Canadian AM Stations by Call Letters, Canadian FM Stations by Call Letters, and the expanded World-Wide Shortwave Section.

Therefore, in any three consecutive 1967 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: kHz, frequency in kilocycles; W.P., power in watts; d, operates daytime only; n, operates nighttime only. Wave length is given in meters.

kHz — 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
WOMV	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
KARI	Blaine, Wash.	5000d
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.	250d

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
WRDW	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
KROO	El Paso, Tex.	5000
KERB	Kermit, Tex.	1000d
KTBB	Tyler, Tex.	1000

610—491.5

WSGN	Birmingham, Ala.	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
KIOO	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
WJRC	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
KMAC	San Antonio, Tex.	5000
KSXX	Salt Lake City, Utah	1000d
KGDN	Edmonds, Wash.	5000
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

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

670—447.5

KBOI	Boise, Ida.	50000
WMAQ	Chicago, Ill.	50000

680—440.9

KNBR	San Francisco, Cal.	50000
WPIN	St. Petersburg, Fla.	1000d
WATY	N. Atlanta, Ga.	5000
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.	250
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
KRCD	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
WUFF	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
WOOS	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

Every effort has been made to ensure accuracy of the information listed in this publication, but absolute accuracy is not guaranteed and, of course, only information available up to press-time could be included.

kHz — 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

KUOM 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. 5000
KOSY Texarkana, Ark. 1000
KDAN Eureka, Calif. 5000d
KABC Los Angeles, Calif. 5000
WLBE Leesburg, Fla. 5000
WFUN Miami Beach, Fla. 5000
WYNR Brunswick, Ga. 500d
WGRA Cairo, Ga. 1000d
KONA 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
KFGO Fargo, N.D. 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
KJRB 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
WRKV Rockville, Conn.
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
KDBM Dillon, Mont. 1000
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
WSJC Magee, Miss. 50000
KCMO Kansas City, Mo. 50000
KAFE Santa Fe, N.M.
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
KGKO Benton, Ark. 1000d
KOA Denver, Colo. 50000
WRUF Gainesville, Fla. 5000
WEAT W. Palm Beach, Fla. 1000
KIMO Hilo, Hawaii 1000
WCLR Crystal Lake, Ill. 500d
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
WIVK Knoxville, Tenn. 50000
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
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
WOAY Oak Hill, W.Va. 10000d
WFOX Milwaukee, Wis. 250d

870—344.6

KIEV Glendale, Calif. 500d
KAIM Honolulu, Hawaii 5000
WWL New Orleans, La. 50000
WKAR E. Lansing, Mich. 10000d
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
WFIA 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
KPHD Phoenix, Ariz. 5000
KLCN Blytheville, Ark. 5000d
KAMD Camden, Ark. 5000
KDEO El Cajon, Calif. 1000
KNEW 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
KOWN 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
WGRI 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
WPXI Roanoke, Va. 1000d
KORD Pasco, Wash. 1000d
KIXI Seattle, Wash. 1000
KISN Vancouver, Wash. 5000
WHSM Hayward, Wis. 5000d
WDOR Sturgeon Bay, Wis. 1000d

920—325.9

WCTA Adalusia, 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. 500d
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. 5000
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. 5000d
KOGA Ogallala, Nebr. 500d
KCCC Carlsbad, N.M.
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

kHz — 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
WIDG St. Ignace, Mich. 5000
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 1000
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
WAGM Presque Isle, Maine 5000
WXLN Potomac-Cabin John, Md. 1000d
WRYT 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
KJR Seattle, Wash. 5000
WERL Eagle River, Wis. 1000d
WKAZ Charleston, W.Va. 5000d
WKTS Sheboygan, Wis. 500d
KMER Kemmerer, Wyo. 1000d

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

kHz — Wave Length — W.P.

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
KOVO 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
WBOM Jacksonville, Fla.
WFLA Tampa, Fla. 5000
WIIN Atlanta, Ga. 5000d
WVOP Vidalia, Ga. 5000d
KPUA 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
KOCE 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
WOVH Gainesville, Fla. 5000d
WTOT Marianna, Fla. 1000d
WBOP Pensacola, Fla. 1000d
WLOD Pompano Beach, Fla. 1000d
WKLY Hartwell, Ga. 1000d
WPGA Perry, Ga. 1000d
WRIP Rossville, Ga. 500d
KUPI Idaho Falls, Idaho 1000d
WITY Danville, Ill. 1000
KREB Shreveport, La. 5000d
WCAP Lowell, Mass. 1000d
WAOP Otsego, Mich. 1000d
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
WYCL York, S. C. 1000d
KOSJ Deadwood, S.Dak. 1000
WSIX Nashville, Tenn. 5000

kHz — Wave Length — W.P.

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. 5000d
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
WXTN Lexington, Miss. 5000d
WSPF Hickory, N.C. 1000d
KTOK Okla. City, Okla. 5000
WIOO Carlisle, Pa. 1000
WGOG Wahalla, S. C. 1000d
KSTA Coleman, Tex. 250d
KGRI Henderson, Tex. 250d
WKDE Altavista, Va. 1000d
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
KODA Houston, Tex. 1000d
KAWA Waco-Marlin, Tex. 10000d
WELK Charlottesville, Va. 1000d
WMEV Marion, Va. 1000d
WPMH Portsmouth, Va. 5000d

kHz — Wave Length — W.P.

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. 10000d
KSWS Roswell, N.M. 50000d
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
KTOT Big Bear Lake, Cal. 250d
KOFY San Mateo, Calif. 1000d
KWSO Wasco, Calif. 1000d
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
KUPK 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
WWDS Everett, Pa. 250d
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. 1000
WLIP Kenosha, Wis. 250d
KWIV Douglas, Wyo. 250d

1060—282.8

KUPD Tempe, Ariz. 500
KPAY Chico, Calif. 10000
KLMO Longmont, Colo. 10000d
WRHL Rochelle, Ill.
WNOE New Orleans, La. 50000
WHFB Benton Harbor, St. Joseph, Mich. 5000d
KFIL Preston, Minn.
KNLV Ord, Neb. 1000
WMAP Monroe, N.C. 1000d
WBYB St. Pauls, N.C.
WOIO Canton, O. 5000d
KYW Philadelphia, Pa. 50000
WRJS San German, P. R. 250
WALD Walterboro, S. C. 1000d
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. 50000
WDIA Memphis, Tenn. 50000
KOPY Alice, Tex. 1000
KNNN Friona, Tex.
KENR Houston, Tex. 10000d
WINA Charlottesville, Va. 5000
WKOW Madison, Wis. 10000

kHz Wave Length W.P.

1080—277.6
WKAC Athens, Ala. 1000d
KSCO Santa Cruz, Calif. 10000
WTIC Hartford, Conn. 50000
WVCG Coral Gables, Fla. 10000
WFIV Kissimmee, Fla. 250
WBIE Marietta, Ga. 10000d
WJBG Pontiac, Ill.
WNWI Valparaiso, Ind. 5000d
WKLO Louisville, Ky. 5000
WOAP Owosso, Mich. 1000d
KGCL East Prairie, Mo.
WUFO Amherst, N.Y. 1000d
WEWO Laurinburg, N.C. 5000d
WWOR Murfreesboro, N.C. 500d
WMVR Sidney, O. 250d
KWJJ Portland, Oreg. 50000
WEEP Pittsburgh, Pa. 1000d
WLEY Cayey, P.R. 250
KGFX Pierre, S. D. 10000d
KRLD Dallas, Tex. 50000
WKBY Chatham, Va.

1090—275.1
KAAY Little Rock, Ark. 50000
WQIK Jacksonville, Fla. 50000d
WWSD Monticello, Fla. 1000d
WBAF Barnesville, Ga.
WCRA Effingham, Ill. 1000
WGLC Mendota, Ill. 250d
KHAI Honolulu, Hawaii 5000
KNWS Waterloo, Iowa 1000d
WBAL Baltimore, Md. 50000
WILD Boston, Mass. 1000d
WMUS Muskegon, Mich. 1000d
WTAK Garden City, Mich. 250d
WKTE King, N.C. 500d
WBZB Selma, N. C. 1000d
WMWM Wilmington, O. 1000d
WJKM Hartsville, Tenn.
KING Seattle, Wash. 50000

1100—272.6
KFAX San Francisco, Calif. 50000
WLBB Carrollton, Ga. 1000d
WHLI Hempstead, N.Y. 10000d
WKYC Cleveland, O. 50000
WGPA Bethlehem, Pa. 250d

1110—270.1
WBCA Bay Minette, Ala. 10000d
WBIB Centreville, Ala. 1000d
KRLA Pasadena, Cal. 50000
WALT Tampa, Fla. 50000d
KIPA Hilo, Hawaii 1000
WMBI Chicago, Ill. 5000d
WKDZ Cadiz, Ky.
WFCG Franklinton, La.
WUST Bethesda, Md.
WUNN Mason, Mich.
WKRA Holly Springs, Miss.
KFAB Omaha, Nebr. 50000
WBT Charlotte, N.C. 50000
KEOR Atoka, Okla.
KBND Bend, Oreg. 5000
WNAR Norristown, Penn. 5000d
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
KLEY Wellington, Kans.
KWKH Shreveport, La. 50000
WCAR Detroit, Mich. 50000
WDGY Minneapolis, Minn. 50000
WNEW New York, N.Y. 50000
WAMG Gallatin, Tenn.
KBGH Memphis, Tex.
WISN Milwaukee, Wis. 50000

1140—263.0
KRAK Sacramento, Calif. 50000
WMIE Miami, Fla. 10000
KGEM Boise, Idaho 10000
WSIV Pekin, Ill. 5000d
WAWK Kendallville, Ind. 250d
KPWB Piedmont, Mo.
WCLW Mansfield, O. 250d
KLPR Oklahoma City, Okla. 1000d
WITA San Juan, P.R. 10000
KSOO 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
WYFE Rockford, Ill. 500d
KYED Burlington, Ia. 500d
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
KRMS Osage Beach, Mo. 1000d
KSEN Shelby, Mont. 1000
KDEF Albuquerque, N. M. 5000
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
KOFE 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
WLKE Waupun, Wis.

1180—254.1
WLDS Jacksonville, Ill. 1000d
WHAM Rochester, N.Y. 50000

1190—252.0
KRDS Tolleson, Ariz. 250
KEZY Anaheim, Calif 5000
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
WPRN Butler, Ala.
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
WJPB Kissimmee, Fla.
WOAH Miami, Fla. 250d
WSAF Sarasota, Fla. 1000d
WCLB Camilla, Ga. 1000d
WPLK Rockmart, Ga. 500d
WSFT Thomaston, Ga. 250d
WLPO 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
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. 1000
WTBC Tuscaloosa, Ala. 1000
KIFW Sitka, Alaska 250
KSUN Bisbee, Ariz. 250
KAAA Kingman, Ariz. 1000
KRIZ Phoenix, Ariz. 250
KATC Safford, Ariz. 250
KINO Winslow, Ariz. 1000
KCON 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. 1000d
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. 1000
KTNC Falls City, Nebr. 100
KHAS Hastings, Neb. 1000
KELY Ely, Nev. 250
KLAV Las Vegas, Nev. 250
KCBN Reno, Nev. 1000
WMOU Berlin, N.H. 1000d
WTSV Claremont, N.H. 1000
WCMC Wildwood, N.J. 1000
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. 1000
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, Ore. 1000
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. 1000
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

WHITE'S RADIO LOG

kHz	Wave Length	W.P.
WARF	Jasper, Ala.	1000
KVRD	Cottonwood, Ariz.	250
KZOW	So. of Globe, Ariz.	1000
KVRC	Arkadelphia, Ark.	250
KTLO	Mountain Home, Ark.	1000
KWAK	Stuttgart, Ark.	250
KPLY	Crescent City, Calif.	250
KOAD	Lemoore, Cal.	250
KMBY	Monterey, Calif.	1000
KPPC	Pasadena, Calif.	100
KLOA	Ridgecrest, Calif.	250
KROY	Sacramento, Calif.	1000
KRNO	San Bernardino, California	1000d
KSON	San Diego, Calif.	250
KSMA	Santa Maria, Calif.	250
KSUE	Susanville, Calif.	1000
KROD	Colo. Springs, Colo.	1000d
KDGO	Durango, Colo.	1000
KSLV	Monte Vista, Colo.	1000
KCRT	Trinidad, Colo.	250
WWCO	Waterbury, Conn.	1000
WBGC	Chipley, Fla.	1000
WLCO	Eustis, Fla.	1000
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
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.	1000
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
WDCB	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.	1000
WGRM	Greenwood, Miss.	250
WGCM	Gulfport, Miss.	1000
WMIS	Natchez, Miss.	250
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
WJTN	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.	1000
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
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

kHz	Wave Length	W.P.
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
KFMO	Flat River, Mo.	1000
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
WTAE	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

kHz	Wave Length	W.P.
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
WCRT	Birmingham, Ala.	5000d
WMMM	Westport, Conn.	1000d
WNRK	Newark, Del.	500d
WWDC	Washington, D.C.	5000
WFTW	Fort Walton Beach, Florida	1000d
WAME	Miami, Fla.	5000
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
WAIL	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
WCSA	Ripley, Miss.	500
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
WIXY	Cleveland, O.	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
WJDT	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
WOCO	Oconto, Wis.	
KPOW	Powell, Wyo.	5000

1270—236.1

kHz	Wave Length	W.P.
WGSV	Guntersville, Ala.	1000d
WZAM	Prichard, Ala.	1000d
KBYR	Anchorage, Alaska	1000
KDJI	Holbrook, Ariz.	1000d
KADL	Pine Bluff, Ark.	5000d
KBLC	Lakeport, Calif.	
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
WHYD	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
WKYR	Cumberland, Md.	5000
WSPR	Springfield, Mass.	5000
WXYZ	Detroit, Mich.	5000
KWEB	Rochester, Minn.	5000
WVDM	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
KINN	Alamogordo, N.M.	1000d
WHLD	Niagara Falls, N.Y.	5000d
WDLA	Walton, N.Y.	1000d
WCGC	Belmont, N. C.	1000
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
WRJC	Mauston, Wis.	500d
WWJC	Superior, Wis.	5000d
KIML	Gillette, Wyo.	5000

1280—234.2

kHz	Wave Length	W.P.
WPID	Piedmont, Ala.	1000d
WNPT	Tuscaloosa, Ala.	5000
KHEP	Phoenix, Ariz.	1000d
KNBY	Newport, Ark.	1000d
KOAG	Arroyo Grande, Cal.	1000
KIXF	Fortuna, Calif	
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
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
WDNW	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
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

kHz	Wave Length	W.P.
WHOD	Jackson, Ala.	1000d
WSHF	Sheffield, Ala.	1000d
WMLS	Sylacauga, Ala.	1000d
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
WREY	New Albany, Ind.	5000
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

kHz Wave Length W.P.

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

1300—230.6

WBSA Boaz, Ala. 1000d
WTLS Tallassee, Ala. 1000d
WEZQ Winfield, Ala. 500d
KHAC Window Rock, Ariz.
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 5000d
KPOD Crescent City, Calif. 1000d
KDIA Oakland, Cal. 5000
KTKR Taft, Calif. 1000d
KFKA Greeley, Colo. 5000d
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, Me. 5000
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
WDKD Kingstree, S.C. 5000d
WDOD 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
KUDE 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. 500d
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
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
WAXK 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. 5000
WEAW Evanston, Ill. 5000
WRAM Monmouth, Ill. 1000d
WRRR Rockford, Ill. 1000d
WJPS Evansville, Ind. 5000
WTRE Greensburg, Ind.
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. 500d
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
KZAK Tyler, Tex. 1000d
WBTM Danville, Va. 5000
WRAA Luray, Va. 1000d
WOLD 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
KIKO Miami, Ariz. 1000
KNOG Nogales, Ariz. 250
KENT Prescott, Ariz. 250
KBTA Batesville, Ark. 1000
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
KOEN 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. 500
WSEB Sebring, Fla. 1000
WNSM Valparaiso-Niceville, Fla. 1000
WIGO Atlanta, Ga. 1000d
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
KDRO 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. 500
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
KSMK Kennewick, Wash. 1000
KAPA Raymond, Wash. 1000

WHITE'S

RADIO LOG

kHz Wave Length W.P.

KMEL Wenatchee, Wash. 250
WHAR Clarksburg, W.Va. 1000
WEPM Martinsburg, W. Va. 1000
WMON Montgomery, W.Va. 250
WOVE Welch, W.Va. 1000
WLOY Ladysmith, Wis. 1000
WRIT Milwaukee, Wis. 1000d
KSGT Jackson, Wyo. 250
KYCN Wheatland, Wyo. 250
KWOR Worland, Wyo. 1000

1350—222.1

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
WDCF Dade City, Fla. 1000d
WCAI Ft. Myers, Fla. 1000d
WBSG Blackshear, Ga. 500d
WRWH Cleveland, Ga. 1000d
WAVC Warner Robins, Ga. 5000d
KRLC Lewiston, Ida.-Clarkston, Wash. 5000d
WXCL Peoria, Ill. 1000
WJBD Salem, Ill. 1000d
WIOU 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. 1000
WKOZ 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
WBMS 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, Oreg. 1000d
WORK York, Pa. 5000
WWBR Windber, Pa. 1000d
WDAR 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

kHz Wave Length W.P.

KDXI Mansfield, La. 1000d
KNIR 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
KICX 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 Matawan, 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
KAWW Heber Springs, Ark. 500
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
WLOP 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
WABO Ft. Campbell, Ky. 500d
WGOH Grayson, Ky. 5000d
WTKY Tompkinsville, Ky. 1000d
KAPB Marksville, La. 1000d
WDEA Ellsworth, Me. 5000d
WMHI Braddocks Hts., Md. 500d
WKIK Leonardtown, Md. 1000d
WGHN Grand Haven, Mich. 500d
KSUM Fairmont, Minn. 1000
WMKT S. 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. 5000
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
KFRO 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
WVSA Vernon, Ala.
KDXE N. Little Rock, Ark. 1000d

kHz Wave Length W.P.

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 1000
KCII Washington, Iowa 500d
KUDL 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. 5000d
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
WTVR 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 Gainsville, 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
KAOH 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

kHz Wave Length W.P.

WYXI Athens, Tenn.
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
KBBO Yakima, Wash. 1000

1400—214.2

WMSL Decatur, Ala. 1000
WXAL Demopolis, Ala. 1000d
WFPA Ft. Payne, Ala. 1000
WJLD Homewood, Ala. 1000
WJHO 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. 1000
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
KIGO St. Anthony, Ida.
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
KAOK 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. 1000
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. 1000
WNAG Grenada, Miss. 1000
WFOR Hattiesburg, Miss. 1000
WJQS Jackson, Miss. 1000
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

kHz	Wave Length	W.P.
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.	500
WCDS	Columbia, S.C.	1000
WGTN	Georgetown, S.C.	1000
WHCQ	Spartanburg, S.C.	1000d
WBJM	Lemmon, S.D.	1000
WJZM	Clarksville, Tenn.	1000
WHUB	Cookeville, Tenn.	1000
WLSB	Copperhill, Tenn.	1000
WGAP	Maryville, Tenn.	1000d
WHAL	Shelbyville, Tenn.	1000
KRUN	Ballinger, Tex.	1000
KBYG	Big Springs, Tex.	1000
KUNO	Corpus Christi, Tex.	1000
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
KVDU	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.	1000
KRSC	Othello, Wash.	250
KTNT	Tacoma, Wash.	1000
WBOY	Clarksburg, W.Va.	1000
WRON	Ronceverte, W.Va.	1000
WVRC	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
WDNS	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
WDKW	Brockton, Mass.	1000d
WGRD	Grand Rap., Mich.	1000d
KLFD	Litchfield, Minn.	500d
KRWB	Roseau, Minn.	1000
WDSK	Cleveland, Miss.	1000d
WBKN	Newton, Miss.	500d
KNOP	North Platte, Neb.	1000
WHTG	Asbury Park-Eatontown, N.J.	500d
WDOE	Dunkirk, N.Y.	1000
WELM	Elmira, N.Y.	1000
WBZA	Glens Falls, N. Y.	1000d
WOTT	Watertown, N.Y.	5000
WVCB	Shallotte, N.C.	500d
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
KWYD	Sheridan, Wyo.	1000

1420—211.1

WACT	Tuscaloosa, Ala.	5000d
KHFH	Sierra Vista, Ariz.	1000
KXDW	Hot Sprinks, Ark.	
KPOC	Pocahontas, Ark.	1000d
KROO	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
WAVD	Avondale Estates, Ga.	1000d
WRBL	Columbus, Ga.	5000
WPEH	Louisville, Ga.	1000d
WLET	Toccoa, Ga.	5000d
KCCN	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
KGNU	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.	5000
WWCC	Bremen, Ga.	1000d
WGIG	Brunswick, Ga.	5000
WVMG	Cochran, Ga.	
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.	1000d
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
KILD	Grand Forks, N.D.	1000
WHHH	Warren, Ohio	5000
KMED	Medford, Oreg.	5000
KODL	The Dalles, Oreg.	1000
WCDL	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
KPUR	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.	1000
KDNC	Spokane, Wash.	5000d
WHIS	Bluefield, W.Va.	5000
WAJR	Morgantown, W.Va.	5000
WJFG	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.	1000
KVEN	Ventura, Calif.	1000
KZIN	Yuba City, Calif.	100
KGIW	Alamosa, Colo.	1000
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
WOCN	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
KVSI	Montpelier, Ida.	1000
KEEP	Twin Falls, Idaho	1000
WVON	Cicero, Ill.	1000
WKEI	Kewanee, Ill.	500
WCVS	Springfield, Ill.	1000
WLYV	Ft. Wayne, Ind.	1000
WXVW	Jeffersonville, Ind.	1000
WASK	Lafayette, Ind.	1000
WAOV	Vincennes, Ind.	1000
KLWW	Cedar Rapids, Ia.	250
KYET	Payette, Ida.	250
KWBW	Hutchinson, Kans.	1000
WTCO	Campbellsville, Ky.	1000
WWXL	Manchester, Ky.	1000
WPAD	Paducah, Ky.	1000
WLKS	W. Liberty, Ky.	1000
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.	1000d
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
WNBY	Newberry, Mich.	
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.	1000
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

WHITE'S RADIO LOG

kHz Wave Length W.P.

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. 1000
KCYL Lampasas, Tex. 1000
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 1000
WSNO Barre, Vt. 1000
WTSA Brattleboro, Vt. 1000
WFTR Front Royal, Va. 1000
WENZ Highland Springs, Va. 1000
WREL Lexington, Va. 1000
WMVA Martinsville, Va. 1000
KBKW Aberdeen, Wash. 1000
KCLX Colfax, Wash. 1000
KONP Port Angeles, Wash. 250
KAYE Puyallup, Wash. 1000
WPAR Parkersburg, W. Va. 1000
KFIZ Fond du Lac, Wis. 1000
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
WDYX Buford, Ga. 5000d
WPNX Columbus, Ga. 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
WXOK Baton Rouge, La. 5000
KBSF Springhill, La. 1000d
WEMD 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
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, O. 1000d
KROW Dallas, Oreg. 5000d
KELR El Reno, Okla. 500
WMBA Ambridge, Pa. 500d
WCMB Harrisburg, Pa. 5000
WFBA San Sebastian, P.R. 500
WDOG Allendale, S. C. 1000
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
KOLI 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
WDDL 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
KWVY Waverly, Iowa 1000d
KARE Atchison, Kans. 1000
KLIB Liberal, Kans. 1000d
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
WSRD 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. 1000d
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
WTZE Tazewell, Va.
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
WVCF Windermere, 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
KEHG Fosston, Minn.
WECP Carthage, Miss. 500d
KGCX Sidney, Mont. 5000
KLMS Lincoln, Nebr. 1000
KWEW Hobbs, N. Mex. 5000
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. 5000d
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
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
WRLD Lanett, Ala.—West Point, Ga. 1000
WHBB Selma, Ala. 1000
KYCA Prescott, Ariz. 1000
KAIR Tucson, Ariz. 250
KXAR Hope, Ark. 1000
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. 1000d
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. 1000
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
WDBQ Dubuque, Iowa 1000
KBAB Indianola, Ia. 500
KRIB Mason City, Ia. 1000
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. 1000d
WABJ Adrian, Mich. 1000
WMDN Midland, Mich. 1000
WLRC Whitehall, Mich. 1000
KXRA Alexandria, Minn. 250
KOZY Grand Rapids, Minn. 1000
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
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. 1000
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. 1000
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. 500
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
KDOK Tyler, Tex. 250
KVWC Vernon, Tex. 250
KVOG Ogden, Utah 1000
WKVT Brattleboro, Vt. 1000
WFAD Middlebury, Vt.
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. 1000
WGKV Charleston, W.Va. 1000
WTCS Fairmont, W.Va. 1000d
WLOH Princeton, W. Va. 1000
WSGB Sutton, W.Va. 1000
WGEZ Beloit, Wis. 1000d
WLCX LaCrosse, Wis. 1000
WIGM Medford, Wis. 1000
WOSH Oshkosh, Wis. 1000
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, Cal. 10000
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

kHz	Wave Length	W.P.
WZBN	Zion, Ill.	250d
WBRI	Indianapolis, Ind.	5000d
WAYK	Valparaiso, Ind.	1000d
KWRG	New Roads, La.	1000d
WVOC	Battle Creek, Mich.	1000d
WJBK	Detroit, Mich.	10000
KSTP	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
KTXD	Sherman, Tex.	250
KANI	Wharton, Tex.	500

1510—199.1

kHz	Wave Length	W.P.
KALF	Mesa, Ariz.	10000d
KASK	Ontario, Calif.	1000
KIRV	Fresno, Cal.	500d
KTIM	San Rafael, Calif.	1000d
KDKD	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
WKAI	Macomb, Ill.	1000d
KIFG	Iowa Falls, Iowa	500d
KANS	Larned, Kan.	1000d
KPBC	Port Sulpher, La.	
WMEX	Boston, Mass.	50000
WJCO	Jackson, Mich.	5000d
WLKM	Three Rivers, Mich.	500
WKPO	Prentiss, Miss.	1000
KCCV	Independence, Mo.	1000d
KTTT	Columbus, Nebr.	500d
WRAN	Dover, N.J.	1000
WJIC	Salem, N.J.	250d
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

kHz	Wave Length	W.P.
KMPG	Hollister, Cal.	500
KACY	Port Hueneme, Calif.	10000
WVCF	Apopka, Fla.	1000d
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.	5000
WSLT	Ocean City-Somers Pt., N. J.	1000d
KHIP	Albuquerque, N.Mex.	500d
WKBW	Buffalo, N.Y.	50000
WTHE	Mineola, N. Y.	10000d
WDSL	Mocksville, N.C.	5000
KMAV	Mayville, N.D.	
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.	250
WBHT	Brownsville, Tenn.	250d
WIDD	Elizabethton, Tenn.	1000d

1530—196.1

kHz	Wave Length	W.P.
WAAO	Andalusia, Ala.	
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
KWLG	Wagoner, Okla.	
WHYP	North East, Pa.	
WMBT	Shenandoah, Pa.	250d
WUPR	Utuado, P.R.	1000d
WASC	Spartanburg, S.C.	1000
KGTN	Georgetown, Tex.	1000d
KGBT	Harlingen, Tex.	50000
KCLR	Ralls, Tex.	5000d
WQVA	Quantico, Va.	250
KCHY	Cheyenne, Wy.	10000

1540—195.0

kHz	Wave Length	W.P.
KPOL	Los Angeles, Calif.	50000
WBSR	Pensacola, Fla.	1000
WOGA	Sylvester, Ga.	1000d
WSMI	Litchfield, Ill.	1000d
WBNL	Boonville, Ind.	250d
WADM	Decatur, Ind	250d
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
WKXR	Exeter, N.H.	
WPTR	Albany, N.Y.	50000
WPAW	E. Syracuse, N.Y.	1000d
WKYK	Burnsville, N.C.	
WRPL	Charlotte, N.C.	1000d
WIFM	Elkin, N.C.	1000d
WBCO	Bucyrus, Ohio	500d
WABQ	Cleveland, Ohio	1000d
WNIO	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
KEDA	San Antonio, Tex.	
WRGM	Richmond, Va.	10000
KBVU	Bellevue, Wash.	1000
WTKM	Hartford, Wis.	500d

1550—193.5

kHz	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
KQXI	Arvada, Colo.	10000d
WEXT	W. Hartford, Conn.	1000d
WRIZ	Coral Gables, Fla.	10000d
WOGO	New Smyrna Beach, 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.	250
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
WNTN	Newton, Mass.	10000d
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	Canandaigua, N.Y.	250
WBAZ	Kingston, N.Y.	500d
WBVM	Utica, N.Y.	1000
WPXY	Greenville, N. C.	500d
WYNA	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	Bennettsville, S.C.	10000
WAGL	Lancaster, S.C.	10000d
WTHB	N. Augusta, S.C.	1000d
KCAN	Canyon, Tex.	[illegible]
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.	1000d
WMAD	Madison, Wis.	5000d

1560—192.3

kHz	Wave Length	W.P.
WAGC	Centre, Ala.	1000d
KDDA	Dumas, Ark.	
KBIB	Monette, Ark.	250d
KPMC	Bakersfield, Calif.	10000
KIQS	Willows, Calif.	250d
WYSE	Inverness, Fla.	1000
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
WSMD	LaPlata, Md.	250d
WTPS	Portage, Mich.	1000d
KBEW	Blue Earth, Minn.	1000
KQYX	Joplin, Mo.	250d
KLTI	Macon, Mo.	250d
KTUI	Sullivan, Mo.	250d
WQXR	New York, N.Y.	50000
WTNS	Coshocton, Ohio	1000d
WCNW	Hamilton, O.	5000
WTOD	Toledo, Ohio	5000d
KWCO	Chickasha, Okla.	1000
WRSJ	Bayamon, P.R.	5000
WAGL	Lancaster, S.C.	10000d
WWGM	Nashville, Tenn.	10000d
WBOL	Bolivar, Tenn.	250d
KCAD	Abilene, Tex.	500d
KEGG	Daingerfield, Tex.	
KHBR	Hillsboro, Tex.	250d
KGUL	Port Lavaca, Tex.	500d
KGHO	Hoquiam, Wash.	1000d
KDFL	Sumner, Wash.	250d
WGLB	Port Washington, Wis.	250d

1570—191.1

kHz	Wave Length	W.P.
WCRL	Oneonta, Ala.	1000d
WRWI	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
WJOE	Ward Ridge, Fla.	250
WMES	Ashburn, Ga.	1000d
WGHC	Clayton, Ga.	1000d
WAIA	College Park, Ga.	1000d
WGSR	Millen, Ga.	250d
WOKZ	Alton, Ill.	1000d
WFRL	Freeport, Ill.	5000d
WBEE	Harvey, Ill.	5000d
WTAY	Robinson, Ill.	250d
WILO	Frankfort, Ind.	250d
WHEL	New Albany, Ind.	10000d
KMCD	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
WONA	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
WFTW	Piqua, Ohio	250d
KTAT	Frederick, Okla.	250d
KOLS	Pryor, Okla.	1000d
KWAY	Forest Grove, Oreg.	1000d
KCHU	Hermiston, Oreg.	1000d
WPGM	Danville, Penn.	1000d
WBUX	Doylestown, Pa.	5000d
WQTW	Latrobe, Pa.	1000d
WFGN	Gaffney, S.C.	250d
WJES	Johnston, S.C.	250d
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

kHz	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	Chattahoochee, Fla.	1000d
WWIL	Ft. Lauderdale, Fla.	10000
WVGT	Mount Dora, Fla.	1000d
WCCF	Punta Gorda, Fla.	1000d
WCLS	Columbus, Ga.	1000
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
KAMI	Cozad, Neb.	1000d
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
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

kHz	Wave Length	W.P.
WATM	Atmore, Ala.	5000d
WBIB	Centerville, Ala.	1000d
WVNA	Tuscumbia, Ala.	5000
KPBA	Pine Bluff, Ark.	1000d
KSPR	Springdale, Ark.	
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
WSMA	Marine City, Mich.	1000d
WMIC	St. Helen, Mich.	500d

WHITE'S RADIO LOG

kHz	Wave Length	W.P.
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
WNOS	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
WPIP	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
KETO	Seattle, Wash.	5000d
WIXK	New Richmond, Wis.	5000d
WSWW	Platteville, Wis.	5000
WTRW	Two Rivers, Wis.	1000d
WAWA	West Allis, Wis.	1000d
1600—187.5		
WEUP	Huntsville, Ala.	5000d
WAPX	Montgomery, Ala.	1000
KVIO	Cottonwood, Ariz.	1000d
KXEW	Tucson, Ariz.	1000
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
WRBN	Warner Robins, 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.	500d
KFNV	Ferriday, La.	1000d
KLEB	Golden Meadow, La.	1000d
KNCB	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
WWRL	New York, N. Y.	5000
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
KYAL	McKinney, Tex.	1000d
KOGT	Orange, Tex.	1000
KBRC	Centerville, Utah	1000d
WSJT	Chesapeake, Va.	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: kHz, frequency in kilocycles; W.P., power in watts; d, operates daytime only; n, operates nighttime only. Wave length is given in meters.

kHz	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.	10,000
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.	10,000
CKAP	Kapuskasing, Ont.	1,000
CKPR	Port Arthur, Ont.	5,000d 1,000n
CKUA	Edmonton, Alta.	10,000
CKWW	Windsor, Ont.	500
CKXR	Salmon Arm, B. C.	1,000
CKY	Winnipeg, Man.	50,000
590—508.2		
CFAR	Flin Flon, Man.	10,000d 1,000n
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.	10,000d 1,000n
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.	10,000
CHED	Edmonton, Alta.	10,000
CHLT	Sherbrooke, Que.	10,000d 5,000n
CJET	Smiths Falls, Ont.	10,000
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
CHFI	Toronto, Ont.	1,000d 10,000n
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.	10,000d 1,000n
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
CKVD	Val D'Or, Que.	10,000d 2,500n
910—329.5		
CBO	Ottawa, Ont.	5,000
CFJC	Kamloops, B.C.	10,000d 1,000n
CFSX	Stephenville, Nfld.	500
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.	10,000
CJIB	Vernon, B. C.	10,000d
950—315.6		
CHER	Sydney, N.S.	10,000
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

kHz — Wave Length / Station	W.P.
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.	50,000d 2,500n
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.	1,000
CFTJ Galt, Ont.	250d
CHQT Edmonton, Alta.	10,000
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
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
1230—243.8	
CBDR Schefferville, Que.	250
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.	1,000d 250n
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 La 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 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.	10,000d 5,000n
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.	1,000
CHAD Amos, Que.	250
CHRD Drummondville, Que.	250
CJLS Yarmouth, N.S.	250
CFOM Quebec, Que.	250
CKAR-1 Parry Sound, Ont.	250
CKCR Revelstoke, B. C.	250
CKOX 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.	10,000d 5,000n
CKPC Brantford, Ont.	10,000
1390—215.7	
CKLN Nelson, B.C.	1,000
1400—214.2	
CFLD Burns Lake, B. C.	250
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
CHOW 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 Ducan, B.C.	1,000
1510—199.1	
CKOT Tillsonburg, Ont.	1,000
1540—195.0	
CHIN 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

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		
Anniston	WHMA-TV	40
Birmingham	WAPI-TV	13
	WBMG	42
	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
Tuscaloosa	WCFT-TV	33
ALASKA		
Anchorage	KENI-TV	2
	KHAR-TV	13
	KTVA	11
Fairbanks	KFAR-TV	2
	KTVF	11
Juneau	KINY-TV	8
Sitka	KIFW-TV	13
ARIZONA		
Nogales	XHFA-TV	2
	KZAZ	11
Phoenix	KOOL-TV	10
	KPAZ-TV	21
	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
CALIFORNIA		
Bakersfield	KBAK-TV	29
	KERO-TV	23
	KLYD-TV	17
Chico	KHSL-TV	12
Concord	KCFT-TV	42
Corona-Los Angeles	KMTW	52
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
	KWHY-TV	22
	KTLA	5
	KTTV	11
Modesto	KLOC-TV	19
Oakland-San Francisco	KTVU	2
Redding	KRCR-TV	7
Sacramento	KCRA-TV	3
Sacramento	KXTV	10
	KPXL	29
Salinas-Monterey	KSBW-TV	8
San Bernardino	KITR	30
San Diego	KFMB-TV	8
	KJOG-TV	51
	KAAR	39
	KOGO-TV	10
Tijuana-San Diego	XETV	6
	XEWT-TV	12
San Francisco	KGO-TV	7
	KPIX	5
	KRON-TV	4
	KSAN-TV	32
San Jose	KNTV	11
San Luis Obispo	KSBY-TV	6
Santa Barbara	KEYT	3
	KIHP-TV	26
Santa Maria	KCOY-TV	12
Stockton-Sacramento	KOVR	13
Visalia-(Fresno)	KICU-TV	43
COLORADO		
Colorado Springs	KKTV	11
	KRDO-TV	13
Denver	KBTV	9
	KWGN-TV	2
	KLZ-TV	7

WHITE'S RADIO LOG

Location	C.L.	Chan.
	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
	WUHF-TV	61
New Britain-Hartford	WHNB-TV	30
New Haven	WTVU	59
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.
Clearwater	WHJR-TV	22
Daytona Beach-Orlando	WESH-TV	2
Ft. Myers	WINK-TV	11
Ft. Pierce-Vero Beach	WTVX	34
Jacksonville	WFGA-TV	12
	WDUV-TV	30
	WJKS-TV	17
	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
Tampa	WFLA-TV	8
Tampa-St. Petersburg	WLCY-TV	10
	WTVT	13
West Palm Beach	WEAT-TV	12

GEORGIA

Location	C.L.	Chan.
Albany	WALB-TV	10
Atlanta	WAII-TV	11
	WAGA-TV	5
	WBMO-TV	36
	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	KHAW-TV	11
	KPUA-TV	9
Honolulu	KHVO	13
	KGMB-TV	9
	KHVH-TV	4
	KHON-TV	2
	KTRG-TV	13
Wailuku	KAII-TV	7
	KMAU-TV	3
	KMVI-TV	12

IDAHO

Location	C.L.	Chan.
Boise	KBOI-TV	2
	KTVB	7
Idaho Falls	KID-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-TV	7
	WCIU-TV	26
	WFLD	32
	WGN-TV	9
	WMAQ-TV	5
Danville	WICD	24
Decatur	WAND	17
Freeport-Rockford	WCEE-TV	23
Harrisburg	WSIL-TV	3
LaSalle	WEEQ-TV	35
Moline	WQAD-TV	8
Peoria	WIRL-TV	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-TV	13
Goodland	KLOE-TV	10
Great Bend	KCKT	2
Hays	KAYS-TV	7
Hutchinson-Wichita	KTVH	12
Pittsburg-Joplin, Mo.	KOAM-TV	7
Topeka	WIBW-TV	13
Wichita	KAKE-TV	10
	KARD-TV	3
	KWIS-TV	24

KENTUCKY

Location	C.L.	Chan.
Bowling Green	WLTV	13
Lexington	WKYT-TV	27
	WLEX-TV	18
Louisville	WHAS-TV	11
	WAVE-TV	3
	WDRB-TV	41
	WLKY-TV	32
Newport	WNOP-TV	74
Owensboro	WVJS-TV	19
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
	KIKS-TV	29
Monroe	KNOE-TV	8
New Orleans	WDSU-TV	6
	WWL-TV	4
	WWOM-TV	26
	WVUE	12
Shreveport	KSLA-TV	12
	KTAL-TV	6
Shreveport	KTBS-TV	3
West Monroe	KUZN-TV	39

MAINE

Location	C.L.	Chan.
Bangor	WABI-TV	5
	WEMT	7
	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
	WREP	25
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
	WXON	62
	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	WDIO-TV	10
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
	KUHI-TV	16
Kansas City	KCMO-TV	5
	WDAF-TV	4
	KMBC-TV	9
	KCIT-TV	50
Kirksville-Ottumwa, La.	KTVO	3
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
Superior	KHTL-TV	4

NEVADA

Location	C.L.	Chan.
Las Vegas	KLAS-TV	8
	KORK-TV	3
Reno	KCRL	4
	KOLO-TV	8

NEW HAMPSHIRE

Location	C.L.	Chan.
Lebanon	WRLH	49
Manchester	WMUR-TV	9

NEW JERSEY

Location	C.L.	Chan.
Burlington	WKBS	41
Linden-Newark	WNJU-TV	47
Paterson	WXTV	41
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
	KBIM-TV	10

NEW YORK

Location	C.L.	Chan.
Albany	WTEN	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	WWNY	7
Elmira-Corning	WSYE-TV	18
Ithaca	WCIC	52
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	62
	WLOS-TV	13
Charlotte	WBTV	3
	WSOC-TV	9
	WCTU-TV	36
Durham-Raleigh	WTVD	11
Greensboro	WFMY-TV	2
Greenville	WNCT-TV	9
High Pt.-Greensboro-Winston Salem	WGHP-TV	8
Hickory	WHKY-TV	14
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
Devils Lake	KDAZ-TV	8
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

OHIO

Location	C.L.	Chan.
Akron	WAKR-TV	49
Ashtabula	WICA-TV	15
Canton	WJAN	29
Cincinnati	WCPO-TV	9
	WKRC-TV	12
	WLW-T	5
Cleveland	WEWS	5
	WAFT-TV	61
	WRCV-TV	3
	WJW-TV	8
Columbus	WBNS-TV	10
	WLWC	4

Location	C.L.	Chan.
	WTVN-TV	6
Dayton	WHIO-TV	7
	WKEF	22
	WLW-D	2
Lima	WIMA-TV	35
Portsmouth	WRLO	30
Springfield	WSWO-TV	66
Steubenville-Wheeling, West Va.	WSTV-TV	9
Toledo	WSPD-TV	13
	WDHO	24
	WTOL-TV	11
Youngstown	WFMJ-TV	21
	WKBN-TV	27
	WYTV	33
Zanesville	WHIZ-TV	18

OKLAHOMA

Location	C.L.	Chan.
Ada	KTEN	10
Ardmore & Sherman-Denison, Texas	KXII	12
Elk City	KSWB	8
Lawton	KSWO-TV	7
Oklahoma City	KWTV	9
	WKY-TV	4
	KOCO-TV	5
	KLPR-TV	14
Sayre	KFDO-TV	8
Tulsa	KOTV	6
	KVOO-TV	2
	KTUL-TV	8

OREGON

Location	C.L.	Chan.
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

Location	C.L.	Chan.
Altoona	WFBG-TV	10
Erie	WICU-TV	12
	WJET-TV	24
	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
	KYW-TV	3
	WKBS	41
	WPHL-TV	17
	WIBF-TV	29
Pittsburgh	KDKA-TV	2
	WECO-TV	53
	WIIC-TV	11
	WTAE-TV	4
Scranton	WOAU-TV	22
Scranton & Wilkes-Barre	WNEP-TV	16
	WBRE-TV	28
York	WSBA-TV	43

RHODE ISLAND

Location	C.L.	Chan.
Providence	WJAR-TV	10
	WPRO-TV	12
Providence (New Bedford, Mass.)	WTEV	6

SOUTH CAROLINA

Location	C.L.	Chan.
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
	WPDT	15
Greenville	WFBC-TV	4
Spartanburg	WSPA-TV	7

SOUTH DAKOTA

Location	C.L.	Chan.
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

Location	C.L.	Chan.
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
	WMTU-TV	30
	WREC-TV	3
Nashville	WLAC-TV	5
	WSIX-TV	8
	WSM-TV	4

TEXAS

Location	C.L.	Chan.
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
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
	KFWT	40
Ft. Worth-Dallas	WBAP-TV	5
Harlingen	KGBT-TV	4
Houston	KHOU-TV	11
	KHTV	39
	KTRK-TV	13
	KUAB	20
	KPRC-TV	2
Laredo	KGNS-TV	8
Lubbock	KCBD-TV	11
	KKBC-TV	34
	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
Rosenberg	KJOO-TV	58
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
	WACO-TV	25
Weslaco	KRGV-TV	5
Wichita Falls	KFDX-TV	3
	KAUZ-TV	6

UTAH

Location	C.L.	Chan.
Salt Lake City	KCPX-TV	4
	KUTV	2
	KSL-TV	5

VERMONT

Location	C.L.	Chan.
Burlington	WCAX-TV	3

VIRGINIA

Location	C.L.	Chan.
Bristol	WCYB-TV	5
Charlottesville	WINA-TV	29
Hampton-Norfolk	WVEC-TV	13
Harrisonburg	WSVA-TV	3
Lynchburg-Roanoke	WLVA-TV	13
Norfolk	WTAR-TV	3
	WNTU-TV	33
Portsmouth-Norfolk-Newport News	WAVY-TV	10
Richmond	WRVA-TV	12
	WTVR-TV	6
Richmond-Petersburg	WXEX-TV	8
Roanoke	WDBJ-TV	7
	WRFT-TV	27
	WSLS-TV	10

WASHINGTON

Location	C.L.	Chan.
Bellingham	KVOS-TV	12
Pasco-Kennewick-Richland	KEPR-TV	19
Richland-Pasco-Kennewick	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
	KNOD	23

WEST VIRGINIA

Location	C.L.	Chan.
Bluefield	WHIS-TV	6
Charleston	WCHS-TV	8
Clarksburg	WBOY-TV	12
Huntington-Charleston	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

Location	C.L.	Chan.
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
	WVTV	18
Rhinelander	WAEO-TV	12
Wausau	WSAU-TV	7

WYOMING

Location	C.L.	Chan.
Casper	KTWO-TV	2
Cheyenne	KFBC-TV	5
	KDWN-TV	27
Riverton	KWRB-TV	10

GUAM

Location	C.L.	Chan.
Agana	KUAM-TV	8

PUERTO RICO

Location	C.L.	Chan.
Aguadilla-Mayaguez	WOLE-TV	12
Caguas	WKBM-TV	11
Mayaquez	WORA-TV	5
	WITB-TV	22
	WMGZ	16
Ponce	WSUR-TV	9
	WITP-TV	20
	WRIK-TV	7
	WPSJ	14
San Juan	WAPA-TV	4
	WITA-TV	30
	WKAQ-TV	2
	WRST	18

VIRGIN ISLANDS

Location	C.L.	Chan.
Charlotte Amalie	WBNB-TV	10
Christiansted, St. Croix	WSVI	8

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.

ALABAMA

Location	C.L.	Chan.
Birmingham	WBIQ	10
Dozier	WDIQ	2
Florence	WFIQ	36
Huntsville	WHIQ	25
Mobile	WEIQ	42
Montgomery	WAIQ	26
Mount Cheaha State Park	WCIQ	7

ARIZONA

Location	C.L.	Chan.
Phoenix	KAET	8
	KPAZ-TV	21
Tucson	KUAT	6

ARKANSAS

Location	C.L.	Chan.
Little Rock	KETS	2

CALIFORNIA

Location	C.L.	Chan.
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

Location	C.L.	Chan.
Denver	KRMA-TV	6

CONNECTICUT

Location	C.L.	Chan.
Hartford	WEDH	24

DELAWARE

Location	C.L.	Chan.
Wilmington	WHYY-TV	12

DISTRICT OF COLUMBIA

Location	C.L.	Chan.
Washington	WETA-TV	26

FLORIDA

Location	C.L.	Chan.
Gainesville	WUFT	5
Jacksonville	WJCT	7
Miami	WSEC-TV	17
	WTHS-TV	2
Orlando	WMFE-TV	24
Tallahassee	WFSU-TV	11
Tampa	WUSF-TV	16
Tampa-St. Petersburg	WEDU	3

GEORGIA

Location	C.L.	Chan.
Ashburn	WJIA-TV	34
Athens	WGTV	8
Atlanta	WETV	30
Chatsworth	WCLP-TV	18
Columbus	WJSP-TV	28
Savannah	WVAN-TV	9
Waycross	WXGA-TV	8
Wrens	WCES-TV	20

HAWAII

Location	C.L.	Chan.
Honolulu	KHET	11

IDAHO

Location	C.L.	Chan.
Moscow	KUID-TV	12

ILLINOIS

Location	C.L.	Chan.
Carbondale	WSIU	8
Chicago	WTTW	11
	WXXW	20
Olney	WUSI-TV	45
Urbana-Champaign	WILL-TV	12

INDIANA

Location	C.L.	Chan.
Vincennes	WVUT	34

IOWA

Location	C.L.	Chan.
Des Moines	KDPS-TV	11

KANSAS

Location	C.L.	Chan.
Topeka	KTWU	11

KENTUCKY

Location	C.L.	Chan.
Louisville	WFPK-TV	15

LOUISIANA

Location	C.L.	Chan.
New Orleans	WYES-TV	8

MAINE

Location	C.L.	Chan.
Augusta	WCBB	10
Calais	WMED-TV	13
Orono	WMEB-TV	12
Presque Isle	WMEM-TV	10

MASSACHUSETTS

Location	C.L.	Chan.
Boston	WGBH-TV	2

MICHIGAN

Location	C.L.	Chan.
Detroit	WTVS	56
Onondaga-East Lansing	WMSB	10
University Center (Bay City)	WUCM-TV	19

MINNESOTA

Location	C.L.	Chan.
Appleton	KWCM-TV	10
Duluth	WDSE-TV	8
St. Paul	KTCI-TV	17
St. Paul-Minneapolis	KTCA-TV	2

WHITE'S RADIO LOG

MISSOURI

Location	C.L.	Chan.
Kansas City	KCSD-TV	19
St. Louis	KETC	9

NEBRASKA

Location	C.L.	Chan.
Alliance	KTNE-TV	13
Lexington	KLNE-TV	3
Lincoln	KUON-TV	12
N. Platte	KPNE-TV	9
Omaha	KYNE-TV	26

NEW HAMPSHIRE

Location	C.L.	Chan.
Durham	WENH	11

NEW MEXICO

Location	C.L.	Chan.
Albuquerque	KNME-TV	5

NEW YORK

Location	C.L.	Chan.
Buffalo	WNED-TV	17
New York	WNDT	13
	WNYC-TV	31
Rochester	WXXI	21
Schenectady	WMHT	17
Syracuse	WCNY-TV	24

NORTH CAROLINA

Location	C.L.	Chan.
Chapel Hill	WUNC-TV	4
Charlotte	WTVI	42
Columbia	WUNB-TV	2

NORTH DAKOTA

Location	C.L.	Chan.
Fargo	KFME	13

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
Scranton	WVIA-TV	44

SOUTH CAROLINA

Location	C.L.	Chan.
Charleston	WITV	7
Columbia	WRLK-TV	35
Greenville	WNTV	29

SOUTH DAKOTA

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

TENNESSEE

Location	C.L.	Chan.
Lexington	WLJT-TV	11
Memphis	WKNO-TV	10
Nashville	WDCN-TV	2
Sneedville	WSJK-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
Spokane	KSPS-TV	7
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.	CJCB-TV-2	9
Argentia, Nfld.	CJOX-TV	3
Ashcroft, B.C.	CFCR-TV-2	10
Ashmont, Alta.	CFRN-TV-4	12
Atikokan, Ont.	CBWCT-1	7
Baldy Mountain, Man.	CKSS-TV	8
Baie St. Paul, Que.	CKRT-TV-1	2
Bancroft, Ont.	CHEX-TV-1	2
Banff, Alta.	CKRD-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
Bralorne, B.C.	CFCR-TV-15	3
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
Camp Woss, B.C.	CFNV-TV-1	3
Canning, N.S.	CJCH-TV-1	10
Canoe, B.C.	CHBC-TV-8	3
Canoe Mountain, Near Valemont, B.C.	CFCR-TV-14	8
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
Cherryville, B.C.	CJWR-TV-1	10
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.	CKRD-TV	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
Drumheller, Alta.	CFCN-TV-1	12
Drumheller, Alta.	CHCT-TV-1	8
Dryden, 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
Grande Vallee	CKBL-TV-3	11
Greenwater Lake, Sask.	CKBI-TV-3	4
Haliburton, Ont.	CKVR-TV-3	5
Halifax, N.S.	CBHT	3
Halifax, N.S.	CJCH-TV	5
Hamilton, Ont.	CHCH-TV	11
Hearst, Ont.	CBFOT-2	7
	CFCL-TV-4	4
High Prairie, Alta.	CBXAT-2	2
Hixon, B.C.	CKPG-TV-1	10
Hudson Hope, B.C.	CJDC-TV-1	11
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
Juskatla, B.C.	CFTK-TV-7	2
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	9
Labrador City, Nfld.	CJCL-TV	13
L'Anse a Valleau, Que.	CHAU-TV-9	7
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
Lookout Ridge, Near Chilliwack, B.C.	CBUT-2	3
Lumby, B.C.	CHID-TV-1	5
Mabel Lake, B.C.	CHPP-TV-1	8
Magdalen Islands, Que.	CBFCT-1	12
Malakwa, B.C.	CFFI-TV-1	5
Malartic, Que.	CFCL-TV-5	5
Manicouagan, Que.	CKHQ-TV-1	10
Marquis, Sask.	CKMJ-TV	7
Marystown, Nfld.	CBNT-3	5
Matagami, Que.	CKRN-TV-4	7
Matane, Que.	CKBL-TV	9
Meadow Lake, Sask.	CKSA-TV-1	12
Medicine Hat, Alta.	CHAT-TV	6
Melita, Man.	CKX-TV-2	9
Merritt, B.C.	CFCR-TV-3	10
Midway, B.C.	CKMY-TV-1	7
Moncton, N.B.	CBAFT	11
Moncton, N.B.	CKCW-TV	2
Mont Blanc Perce, Que.	CFGW-TV-2	8
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, Que.	CKBL-TV-2	6
	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
Ninkish, B.C.	CFNV-TV-2	6
Nipawin, Sask.	CKBI-TV-4	2
North Battleford, Sask.	CKBI-TV-2	7
Olalla	CHKC-TV-2	11
Oliver, B.C.	CHBC-TV-3	8
Ottawa, Ont.	CBOFT	9
Ottawa, Ont.	CBOT	4
Ottawa, Ont.	CJOH-TV	13
Outardes, Que.	CKHQ-TV-2	12
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
Placentia, Nfld.	CBNT-2	12
Port Alfred, Que.	CKRS-TV-1	9
Port Alice, B.C.	CKPA-TV-1	2
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
Promontory Mountain, B.C.	CFCR-TV-12	5
Quebec, Que.	CBVT	11
	CFCM-TV	4
	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.	CKRD-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	13
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
Schefferville, Que.	CFKL-TV	11
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 O'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	12
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 Shortwave Stations

With this copy of *White's Radio Log* at your operating desk you will be able to quickly identify and spot over 300 international broadcasting stations—the majority of the currently active stations being monitored by our readers and by the RADIO-TV EXPERIMENTER monitoring station, DX Central.

Each issue brings you a completely revised and updated version of the shortwave section which reflects new frequencies and schedule changes by the broadcasters. Our list may lack only one thing, that is your own personal listening experiences.

Yes, we find that the best way to compile a listing of active shortwave stations is to rely upon the latest reception loggings of our readers and, although we know that thousands of our readers make use of White's, only a handful of readers take the trouble to send us a copy of their loggings. Naturally we don't expect to hear from each and every reader for each and every issue, but we would like to hear from you at least once in a while. Why not let us know when you stumble upon particularly difficult station to log, or when you come upon a revised broadcast schedule, you might even tell us if a regularly heard station has left the air.

In your report to us please indicate the name and/or call of the station, the location, the approximate frequency, and the time (in GMT) monitored. Send as many as you like. We will use as many as we can.

Victorio Rodriguez G., Mexicali, B. C., Mex.
Floyd Damron, Anchorage, Alaska
John J. Deno, Coatesville, Pa.
David Anderson, Grace, Idaho
Sp/4 Richard Prudy, Union Lake, Mich.
Allan Levite, Chicago, Ill.
Jeff Miller, Beckley, W. Va.
Mike Fine, Poughkeepsie, N. Y.
Roger E. Melvin, Pocasset, Mass.
David Schoeller, Elmhurst, Ill.
Robert N. Platt, Elk Grove Village, Ill.
B. T. Nawrocki, Maywood, Calif.
Elwin F. Young, Dorchester, Mass.
Tom Kneitel, New York, N. Y.
Jack Cooper, Hutchinson, Kans.
Rick Slattery, Key West, Fla.
B. Glassberg, Brooklyn, N. Y.
B. E. Kinahan, Yonkers, N. Y.
Carl Durnavich, Riverdale, Ill.
Walter O'Brien, Jr., Clark, N. J.
Michael A. Oswald, Grand Island, N. Y.
Norman D. Meer, Richmond, Va.
Julian Sienkiewicz, Brooklyn, N. Y.

kHz	Call	Name	Location	GMT
2410	4VU	R. Lumiere	Port au Prince, Haiti	0340
2455	—	R. Zambia	Lusaka, Zambia	0455

31 Meter Band—9500 to 9775 Kc/s

kHz	Call	Name	Location	GMT
3215	BED59	V. of Free China	Taipei, Formosa	1245
3225	ELWA	R. Village	Monrovia, Liberia	0615
3230	VRH8	Fiji BC	Suva, Fiji Is.	0945
3240	—	BC Service Rep. Iraq	Baghdad, Iraq	1930
3245	YVKT	R. Libertador	Caracas, Venezuela	2325
3275	ZYR31	Bauru R. Club	Bauru Brazil	0530
3284	VRH9	Fiji BC	Suva, Fiji Is.	0930
3300	—	Brit. Hond. BC	Belize, Brit. Honduras	0200
3305	YVKX	V. de la Patria	Caracas Venez.	0240
3315	—	R. Martinique	Ft. de France, Martinique	0100
3316	—	Sierra Leone BC	Freetown, Sierra Leone	0610
3325	YVRA	R. Monagas	Maturin Venezuela	0240
3335	VL9CD	R. Wewak	Wewak, Paupa	1000
3346	—	R. Zambia	Lusaka Zambia	2000
3350	—	Ghana BC	Accra, Ghana	0605
3375	YVMI	V. de la Fe	Maracaibo, Venezuela	0245
3385	HIDA	R. Hit Musical	Santo Domingo, Dom. Rep.	1100
3395	HIAZ	R. Santiago	Santo Domingo, Dom. Rep.	1100
3905	—	R. Port Vila	Port Vila, New Hebrides	0615
3910	—	Far East Network	Tokyo, Japan	1340
3935	9UB92	R. Cordac	Bujumbura, Burundi	0400
3995	—	R. Budapest	Budapest, Hungary	2200
4544	—	R. Alma Ata	Alma Ata, USSR	0410
4640	—	R. Dushanbe	Dushanbe, USSR	0000
4720	CR4AB	R. Club Mindelo	Cape Verde Is.	2200

60-Meter Band—4750-5060 kHz

kHz	Call	Name	Location	GMT
4770	ELWA	R. Village	Monrovia Liberia	0615
4795	—	R. Comercial	Sa da Bandeira, Angola	2330
4815	—	R. Ouagadougou	Ouagadougou, Upper Volta	0600
4820	HRVC	R. Evangelica	Tegucigalpa, Honduras	0200
4850	—	Mauritius BC	Forest Side, Mauritius	1300
4860	YVQE	R. Cumana	Cumana, Venezuela	0030
4865	CSA97	E. Regional	Ponta Delgada, Azores	2230
4870	—	R. Dahomey	Contonou, Dahomey	2230
4872	—	R. Sorong	Sorong, Indonesia	0800
4885	ZYG26	R. Pioneira de Teresina	Teresina, Brazil	0230
4914	HRSY	V. del Pacifico	San Lorenzo, Honduras	0315
4915	—	Ghana BC	Accra, Ghana	0330
4920	9UB94	R. Cordac	Bujumbura, Burundi	0400

WHITE'S RADIO LOG

kHz	Call	Name	Location	GMT
4926	EAJ206	R. Equatorial	Bata, Spanish Guinea	2130
4940	—	R. Abidjan	Abidjan, Ivory Coast	2300
4950	—	R. du Senegal	Dakar, Senegal	0630
4955	PRF7	R. Cultura de Campos	Campos, Brazil	1030
4965	—	R. Zambia	Lusaka, Zambia	1830
4970	YVLK	R. Rumbos	Caracas, Venezuela	[illegible]
4985	ZYY2	R. Brazil Central	Goiana, Brazil	0900
5010	—	R. Garoua	Garoua, Cameroon	2115
5041	—	E. da Guine	Bissau, Port. Guinea	2230
5047	—	R. du Togo	Lome, Togo	2200
5050	—	R. Tanzania	Dar es Salaam, Tanzania	1830
5250	HCPS5	Ondas Canaris	Azogues, Ecuador	0250
5260	—	R. Alma Ata	Alma Ata, USSR	0410
5875	HRN	V. de Honduras	Tegucigalpa, Honduras	1130
5930	—	R. Prague	Prague, Czech.	0100

49 Meter Band—5950 to 6200 Kc/s

kHz	Call	Name	Location	GMT
5950	—	R. Warsaw	Warsaw, Poland	1530
	—	R. Zelaya	Bluefields, Nicaragua	1100
5955	—	R. Casino	Puerto Limon, Costa Rica	1100
5960	—	Trans World R.	Bonaire, Nath. Antilles	0400
5970	—	R. Alma Ata	Alma Ata, USSR	0410
5980	—	Gronlands R.	Godthab, Greenland	0300
		R. Demerara	Georgetown, Guyana	0950
5990	—	R. Sweden	Stockholm, Sweden	0230
6010	VUD	All India R.	New Delhi, India	1845
	HJFK	V. Amiga	Pereira, Colombia	1015
6020	PCJ	R. Nederland	Hilversum, Neth.	1930
6025	CSA52	V. of West	Lisbon, Portugal	0345
6030	CFVP	V. of Praries	Calgary, Alta., Canada	1200
	—	BC Service Rep. Iraq	Baghdad, Iraq	1930
6040	HJCB	V. del Tolima	Ibague, Colombia	0215
6055	—	R. Prague	Prague, Czech.	0700
6060	—	R. Habana	Havana, Cuba	2200
6075	HIDB	R. Liberdad	Santiago, Dom. Rep.	1100
6082	OAX4Z	R. Nacional	Lima, Peru	0200
6085	PCJ	R. Nederland	Hilversum, Netherlands	1500
6090	—	R. Kaduna	Kaduna, Nigeria	0520
	LRY1	R. Belgrano	Buenos Aires, Argentina	0600
6095	—	BC Service Rep. Iraq	Baghdad, Iraq	1930
6100	—	R. Habana	Havana, Cuba	0100
	—	R. Malaysia	Kuala Lumpur, Malaysia	1130
6110	—	Ghana BC	Accra, Ghana	0330
6120	OIX7	Finnish BC	Helsinki, Finland	2100
	—	BBC Relay	Nicosia, Cyprus	0257
6135	—	R. Warsaw	Warsaw, Poland	1530
	—	R. Habana	Havana, Cuba	0330
6145	ETLF	R. V. Gospel	Addis Ababa, Ethiopia	1545
6155	OEI21	Austrian R.	Vienna, Austria	1700
6160	HSK4	R. Thailand	Bangkok, Thailand	0415
	HJKJ	R. Nueva Grenada	Nueva Grenada, Colombia	0210
6170	—	R. Habana	Havana, Cuba	0700
6175	—	R. Malaysia	Kuala Lumpur, Malaysia	1115
6180	—	BBC	London, England	2115
	—	V. America Relay	Monrovia, Liberia	0600
	—	R. Alma Ata	Alma Ata, USSR	0410
6185	CSA29	V. of West	Lisbon, Portugal	0345

kHz	Call	Name	Location	GMT
6190	—	R-TV Morocco	Sebaa-Aioun, Morocco	2130
6195	—	BBC	London, England	1830
6200	—	R. Moscow	Moscow, USSR	0200
6234	—	R. Budapest	Budapest, Hungary	2200
6345	—	R. Peking	Peking, China	1500
6850	—	Rozglosnia Harcerska	Warsaw, Poland	1130

41 Meter Band—7100 to 7300 Kc/s

kHz	Call	Name	Location	GMT
7100	—	R. Budapest	Budapest, Hungary	2200
7110	—	R. Erevan	Erevan, Armenia, USSR	0800
7115	—	R. Prague	Prague, Czech.	0100
7125	—	R. Warsaw	Warsaw, Poland	1530
7140	—	BBC Relay	Nicosia, Cyprus	0257
7145	—	R. Warsaw	Warsaw, Poland	1530
7175	—	V. America Relay	Monrovia, Liberia	0600
7180	—	BC Service Rep. Iraq	Baghdad, Iraq	0320
7185	HSK7	R. Thailand	Bangkok, Thailand	0415
7210	—	BBC	London, England	1315
7215	VUD	All India R.	New Delhi, India	2215
	—	V. of Vietnam	Hanoi, N. Vietnam	1300
7220	—	R. Budapest	Budapest, Hungary	2300
7230	—	R. Ouagadougou	Ouagadougou, Upper Volta	0600
7245	OEI33	Austrian R.	Vienna, Austria	1700
7260	—	BBC	London, England	2100
	BEC71	Air Force	Taiwan, Formosa	1100
7265	—	R. Tirana	Tirana, Albania	2200
7270	—	R. South Africa	Paradys, S. Africa	2100
7285	—	R. Warsaw	Warsaw, Poland	1530
7295	—	Trans World R.	Monte Carlo, Monaco	0630
	VUD	All India R.	New Delhi, India	1845
7305	—	R. Budapest	Budapest, Hungary	2200
7306	—	Rozglosnia Harcerska	Warsaw, Poland	1130
7320	—	BBC	London, England	1830
7325	—	BBC	London, England	2115
7345	—	R. Prague	Prague, Czech.	0100
7504	—	R. Peking	Peking, China	1500
8237	—	R. Peking	Peking, China	1500
8245	—	R. Peking	Peking, China	0100
9009	—	Kol Zion	Tel Aviv, Israel	1835
9250	—	R. Alma Ata	Alma Ata, USSR	0410
9360	—	R. Nacional	Madrid, Spain	2020
9380	—	R. Alma Ata	Alma Ata, USSR	0410
9457	—	R. Peking	Peking, China	0300

31-Meter Band—9500-9775 kHz

kHz	Call	Name	Location	GMT
9505	—	R. Prague	Prague, Czech.	0100
	—	R. Japan	Tokyo, Japan	0600
9508	—	R. Omdurman	Omdurman, Sudan	0420
9510	—	BBC	London, England	1315
9515	TAT	R. Ankara	Ankara, Turkey	1530
9525	—	R. South Africa	Paradys, S. Africa	2330
9535	CR6RZ	R. Angola	Luanda, Angola	1715
9540	ETLF	R. Voice of Gospel	Addis Ababa, Ethiopia	0400
9550	LLD	R. Norway	Oslo, Norway	0300
	—	R. Moscow	Moscow, USSR	1230
9555	OIX2	Finnish BC	Helsinki, Finland	1600
	—	Syrian BC	Damascus, Syria	1400
	YSS	R. Nacional	San Salvador, El Salvador	0200
9560	—	R. Tanzania	Dar es Salaam, Tanzania	1000
9570	ETLF	R. Voice of Gospel	Addis Ababa, Ethiopia	1715
	—	R. Australia	Melbourne, Australia	0730
9580	—	R. Erevan	Erevan, Armenia, USSR	0800
9585	YSV	V. del Comercio	Santa Ana, El Salvador	1335
9590	—	R. Erevan	Erevan, Armenia, USSR	0800
	—	Trans World R.	Bonaire, Neth. Antilles	0130
9595	JOZ3	Okiki no Houso	Tokyo, Japan	0817
	ZYN29	R. Cultura	Bahia, Brazil	0200
9600	—	V. America Relay	Monrovia, Liberia	0600
	CE960	R. Pres. Balmaceda	Santiago, Chile	2310

kHz	Call	Name	Location	GMT
9610	LLG	R. Norway	Oslo, Norway	2300
	VLX9	R. Australia	Melbourne, Australia	1100
9615	ORU4	V. Friendship	Brussels, Belgium	2200
9620	—	R. New Zealand	Wellington, N.Z.	0600
	—	VTVN	Saigon, S. Vietnam	0800
	CXA6	S.O.D.R.E.	Montevideo, Uruguay	0200
9640	HLK5	V. Free Korea	Seoul, S. Korea	1030
9660	—	R. Habana	Havana, Cuba	0700
	ETLF	R. Voice Gospel	Addis Ababa, Ethiopia	0330
9667	—	R. Ceylon	Colombo, Ceylon	0130
9675	—	R. Warsaw	Warsaw, Poland	1530
9685	—	Vatican R.	Vatican City	2200
9690	VUD	All India R.	New Delhi, India	1945
	LRA32	R. Nacional	Buenos Aires, Argentina	0600
9700	—	R. Sofia	Sofia, Bulgaria	0000
9705	—	R. Sweden	Stockholm, Sweden	1100
	ETLF	R. Voice Gospel	Addis Ababa, Ethiopia	1815
9710	—	R. Malaysia	Kuala Lumpur, Malaysia	1300
	—	R. Kiev	Kiev, USSR	0030
	—	Mauritius BC	Forest Side, Mauritius	0230
9720	—	R. South Africa	Paradys, S. Africa	2100
	—	Sawt al Islam	Riyadh, Saudi Arabia	2200
9740	WNYW	R. New York Worldwide	New York, N.Y.	2305
	LRS1	R. Splendid	Buenos Aires, Argentina	2150
9745	BEC62	Air Force	Taipei, Formosa	1100
	TAP	R. Ankara	Ankara, Turkey	1930
	HCJB	V. of Andes	Quito, Ecuador	0230
9760	—	R. Hanoi	Hanoi, N. Vietnam	1300
9765	—	R. South Africa	Paradys, S. Africa	2330
9810	—	R. Kiev	Kiev, USSR	0030
9833	—	R. Budapest	Budapest, Hungary	2200
9915	VUD	All India R.	New Delhi, India	2215
10530	—	R. Alma Ata	Alma Ata, USSR	0410
10865	—	R. Peking	Peking, China	0100
11440	—	R. Peking	Peking, China	2300
11610	—	R. Peking	Peking, China	2300
11672	—	R. Pakistan	Karachi, Pakistan	1500
11685	CR6RR	R. Diamang	Lusaka, Angola	1900

25-Meter Band—11700-11975 kHz

kHz	Call	Name	Location	GMT
11710	—	R. Australia	Melbourne, Australia	0730
	LRA35	R. Nacional	Buenos Aires, Argentina	2300
11720	—	R. Canada	Montreal, P.Q.	1745
	PRL8	R. Nacional	Brasalia, Braz.	2130
11730	PCJ	R. Nederland	Hilversum, Netherlands	1930
11735	—	R. Iran	Tehran, Iran	2000
11735	—	R. Habana	Havana, Cuba	0730
11740	—	V. America Relay	Monrovia, Liberia	0500
	VUD	All India R.	New Delhi, India	1945
11750	—	BBC Relay	Malaysia	1145
11760	—	R. Habana	Havana, Cuba	0100
11765	—	R. Sweden	Stockholm, Sweden	1230
11770	ETLF	R. Voice Gospel	Addis Ababa, Ethiopia	0500
	—	Vatican R.	Vatican City	0110
11780	—	BBC	London, England	1315
	—	R. Moscow	Moscow, USSR	1930
	ZL3	R. New Zealand	Wellington, N.Z.	0545
	LRY2	R. Belgrano	Buenos Aires, Argentina	2000
11785	OE152	Austrian R.	Vienna, Austria	1300
11805	OIX8	Finnish BC	Helsinki, Finland	1600
11815	—	R. Japan	Tokyo, Japan	2200
11820	—	R. Tahiti	Papeete, Tahiti	0230
	—	Trans World R.	Bonaire, Neth. Antilles	1205
11825	—	R. Tahiti	Papeete, Tahiti	0430
11835	—	R-TV Algerienne	Algiers, Algeria	1330
	4VEJ	V. Evangelique	Cap Haitien, Haiti	1800
11850	ETLF	R. V. Gospel	Addis Ababa, Ethiopia	1700
	LLK	R. Norway	Oslo, Norway	2300
	—	R. Moscow	Moscow, USSR	1230
11875	—	R. Pakistan	Karachi, Pakistan	1125
	ZYN32	R. Society Bahia	Salvador Brazil	0100
11890	—	R. Berlin Int'l.	Berlin, E. Germany	0100
	—	RAI	Rome, Italy	2230
	ETLF	R. Voice Gospel	Addis Ababa, Ethiopia	0400
11895	DMQ11	Deutsche Welle	Cologne, W. Germany	0500
11900	—	R. South Africa	Paradys, S. Africa	2330
11905	—	BBC Relay	Nicosia, Cyprus	1130
	VUD	All India R.	New Delhi, India	2222
11910	—	Kol Zion	Tel Aviv, Israel	1000
	HSK9	R. Thailand	Bangkok, Thailand	0415
11915	HCJB	V. of Andes	Quito, Ecuador	0230
11925	ETLF	R. Voice Gospel	Addis Ababa, Ethiopia	0350
	ZYR78	R. Bandeirantes	Sao Paulo, Brazil	2110
	ELWA	R. Village	Monrovia, Liberia	0500
	—	Sawt al Islam	Riyadh, Saudi Arabia	2200
11970	WNYW	R. New York Worldwide	New York, N.Y.	2305
11975	ELWA	R. Village	Monrovia, Liberia	0500
11990	—	R. Prague	Prague, Czech.	0100
14345	—	Hellenic BC	Athens, Greece	1830
14520	—	Korean Central BC	Pyongyang, N. Korea	0100

19-Meter Band—15100-15450 kHz

kHz	Call	Name	Location	GMT
15100	—	RH de Mexico	Mexico	2300
	—	R. Euzkadi	(clandestine)	2130
15110	—	R. Moscow	Moscow, USSR	1430
15115	—	R. Free Europe	Munich, Germany	1300
	HCJB	V. of Andes	Quito, Ecuador	0230
15125	HLK41	V. Free Korea	Seoul, S. Korea	0630
	BED60	V. Free China	Taipei, Formosa	1715
15145	—	R. Free Europe	Munich, Germany	1715
15148	CE1515	Corp. Chilena BC	Santiago, Chile	0100
	TAU	R. Ankara	Ankara, Turkey	0420
15165	OZF7	V. Denmark	Copenhagen, Denmark	1330
15170	—	Hashemite BC	Amman, Jordan	2300
15175	LLM	R. Norway	Oslo, Norway	1500
15185	OIX4	Finnish BC	Helsinki, Finland	1600
	ETLF	R. Voice Gospel	Addis Ababa, Ethiopia	1500
15195	—	R. Japan	Tokyo, Japan	0600
15205	—	R. Ceylon	Colombo, Ceylon	0100
15210	ETLF	R. Voice Gospel	Addis Ababa, Ethiopia	1600
15220	—	R. Australia	Melbourne, Australia	2245
15230	—	R. Ceylon	Colombo, Ceylon	0130
	ETLF	R. Voice of Gospel	Addis Ababa, Ethiopia	1830
15235	—	BBC	London, England	1315
	—	R. Japan	Tokyo, Japan	0630
15245	—	Trans World R.	Bonaire, Neth. Antilles	2100
15255	—	R. Berlin Int'l.	Berlin, E. Germany	1435
15285	—	R. Prague	Prague, Czech.	0330
	—	Ghana BC	Accra, Ghana	1900
15295	—	R. Club Mozambique	Lourenco Marques, Mozamb.	1630
15315	ETLF	R. Voice Gospel	Addis Ababa, Ethiopia	1345
15320	—	R. Canada	Montreal, P.Q.	1745
15340	—	R. Habana	Habana, Cuba	2200
15350	—	BBC Relay	Ascension I.	1745
15370	ZYC9	R. Tupi	Rio de Janeiro, Brazil	2030
15400	ETLF	R. Voice Gospel	Addis Ababa, Ethiopia	0430
15410	ETLF	R. Voice Gospel	Addis Ababa, Ethiopia	1300
15415	ZYR206	R. Club Ribeirao	Preto, Brazil	0045
15425	PCJ	R. Nederland	Hilversum, Netherlands	1930
15440	WNYW	R. New York Worldwide	New York, N.Y.	2305
17680	—	R. Peking	Peking, China	0000
17697	—	R. Berlin Int'l.	Berlin, E. Germany	1600

16 Meter Band—17700 to 17900 Kc/s

kHz	Call	Name	Location	GMT
17705	—	V. America Relay	Honolulu, Hawaii	2220
17730	WNYW	R. New York Worldwide	New York, N.Y.	1305
17795	—	R. Budapest	Budapest, Hungary	1930

(Continued on page 115)

LITERATURE LIBRARY

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

CB—BUSINESS RADIO SHORTWAVE RADIO

★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.

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

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

107. Get with the mobile set with *Tram's* XL'100. The new Titan CB base station, another *Tram* great, is worth knowing about.

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

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!

45. Catering to 2-way radio buffs for 30 years, *World Radio Laboratories* has a new free catalog which includes the latest CB transceivers, etc. Quarterly fliers chock-full of bargains are also available.

50. Make your connection with *Amphenol*—tune in to the latest on CB product news with specs and pics on new gear. Keep informed on Amphenol's new products.

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

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

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."

102. *Sentry Mfg. Co.* has some interesting poop sheets on speech clippers, converters, talk power kits and the like for interested CB'ers, hams and SWL'ers, too.

103. *Squires-Sanders* would like you to know about their CB transceivers, the "23'er" and the new "S5S." Also, CB accessories that add versatility to their 5-watters.

ELECTRONIC PRODUCTS

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

108. Get the facts on *Mercury's* line of test equipment kits—designed to make troubleshooting easier, faster and more profitable.

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.

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

HI-FI/AUDIO

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

85. Need a tuner? Preamp? Amp? Tape deck? Then inspect *Dyna* for kits or wired units. It's worthwhile looking at test reports *Dyna* sends your way.

110. Get the latest facts on sound columns. *American Geloso Electronics Inc.* offers a ten-page booklet giving the hows and whys plus method of installation and arrangement of sound columns.

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. Discover how Cueing Control, anti-scating and other *Garrard* features in the Lab 80 offer tops in audio listening. 32-page *Garrard* Comparator Guide will make you a wiser buyer—get it.

17. Build your own bass reflex enclosures from fool-proof plans offered by *Electro-Voice.* At the same time get the specs on *EV's* solid-state hi-fi line—a new pace setter for the audio industry.

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.

24. Need a hi-fi or PA mike? *University Sound* has an interesting microphone booklet audio fans should read before making a purchase.

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.

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.*

99. Interested in learning about amplifier specifications as well as what's available in kit and wired form from *Acoustech?* Then get your copy of *Acoustech's* 8-page colorful brochure.

34. You can't pick the tape recorder you need without a program—and *Sony Superscope* has one. Full color 16-page booklet is as good as your dealer's showcase. Includes accessories.

TAPE RECORDERS AND TAPE

113. *Scotch* is the product and it's made by *Minnesota Mining and Mfg. Co. (3M).* Get a packet full of facts and tape data from *3M* and learn all about your tape recorder and the tape it needs.

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

32. "Everybody's Tape Recording Handbook" is the title of a booklet that *Sarkes-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.

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

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

HI-FI ACCESSORIES

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

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!

98. Swinging to hi-fi stereo headsets? Then get your copy of *Superex Electronics'* 16-page catalog featuring a large selection of quality headsets.

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

KITS

★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. *EICO's* new 48-page 2-color pocket-size short form catalog is just off the press. Over 250 products: Ham radio, CB, hi-fi—in kit and wired form—are illustrated. Also, discover *EICO's* new experimenter kit line.

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.

SCHOOLS AND EDUCATIONAL

★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.

★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.*

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.

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

TOOLS

★78. Learn about *Xcelite's* line of pliers and snips, specialized for radio, TV and electronic work. *Xcelite's* hand tools offer many advantages worth looking into. Bulletin N464 and N664.

TELEVISION

★70. *The Heath Co.* now has a 19" color TV to complement their 21" and 25" models. A new B&W portable model will be a hot seller for the mobile set. Get the facts today!

72. Get your 1967 catalog of *Cistin's* TV, radio, and hi-fi service books. Bonus—TV tube substitution guide and trouble-chaser chart is yours for the asking.

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

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

ELECTRONIC PARTS

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

★2. The new 1967 Edition of *Lafayette's* catalog features sections on stereo hi-fi, CB, ham gear, test equipment, cameras, optics, tools and much more. Get your copy today.

★3. Bargains galore! Parts, tools, test equipment, radios and many more specials at ultra-low prices. *Progressive Edu-Kits* will send latest catalog.

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

★23. No electronics bargain hunter should be caught without the 1967 copy of *Radio Shack's* catalog. Some equipment and kit offers are so low, they look like misprints. Buying is believing.

★5. *Edmund Scientific's* new catalog contains over 4000 products that embrace many interests and fields. It's the Buyers' Guide for Science Fair fans.

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

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

★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.

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.

RADIO-TV EXPERIMENTER, Dept. 267
505 Park Avenue, New York, N. Y. 10022

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

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☐ Indicate total number of booklets requested

1 2 3 4 5 6 7 8 10 11 12 15 16 17
19 23 24 26 27 29 31 32 33 34 35 39 42 44
45 46 48 49 50 54 57 59 61 66 67 70 72 74
78 85 91 92 93 95 96 97 98 99 100 101 102 103
104 105 106 107 108 109 110 111 112 113

NAME (Print clearly) ____________________

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Heath AD-16 Recorder

Continued from page 70

sustained 400 Hz and 15 kHz tones for both azimuth and bias adjustments, using the built-in VU meters as indicators. For those who prefer it, an instrument alignment procedure is described, although it is neither easier nor better than that with the test tape.

How It Performed. The actual frequency response of the AD-16 is shown in Figs. 1 and 2. Although the response "wavers," it is well within Heath's specs which are given in the table. (The "waver," by the way, is normal with professional recorders that don't attempt to get a "ruler flat" frequency response by excess equalization at the expense of substantially higher high-frequency distortion.)

The 1 kHz THD (total harmonic distortion) was right on the button of Heath's claims. In fact, a record input level that exceeded 0 VU did not noticeably increase the reference distortion of 1.5% THD, even with the pointer full into the "red region" at +3 VU. The noise level was a shade poorer than Heath's claims—at 7½ ips it measured −49 db on the right channel and −45 db on the left channel (referenced to 3% THD).

The AD-16's price of $399.50 represents only the recorder; the walnut base is an optional extra at $19.95. For additional information write to Dept. EB, Heath Co., Benton Harbor, Mich. 49023. ■

SPECIFICATIONS

Speeds—7½ and 3¾ ips
Wow and flutter—0.18% at 7½ ips; 0.25% at 3¾ ips
Max. reel size—8¼ in.
Freq. response (record/playback)—±2 db, 45 to 18,000 Hz at 7½ ips; ±3 db, 30 to 10,000 Hz at 3¾ ips
Signal-to-noise ratio—52 db or better at 7½ ips (referred to 3% THD)
THD—less than 1.5% at 0 VU record and 0 VU playback
Output—Phone jack: 1 volt unloaded at 0 VU. Monitor output: 1 volt unloaded at 0 VU. Tape output: 1 volt at 0 VU.

Spy in the Tie

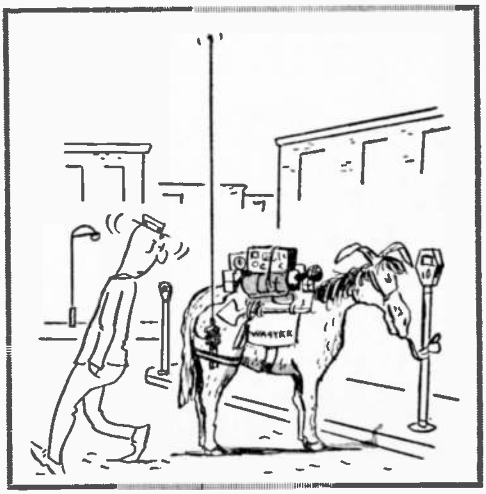
Continued from page 53

right through the case. . . . If desired, melt a hole opposite the adjusting screw of C5—so you can change frequency without removing the transmitter from the case.

Checkout. Insert the battery into the clips—get the polarity right—close the case, place an FM receiver near the transmitter, and place the mike near the receiver's speaker. As you tune the receiver you can't miss the transmitter's frequency, the feedback will be unbearable. To change the transmitter's frequency, adjust C5 until there is no interference from strong FM-broadcast stations.

Protecting yourself. To use the Tie-Spy, clip the mike to your tie, place the transmitter in your trouser's side pocket, and run the antenna around your waist under your belt or under the back of your shirt, or wherever you prefer. The effective transmitter range will be about 25 to 50 feet. Don't try to speak directly into the mike as the gain is very high and the modulation will severely "pop"—the gain is designed to pick up voices from one to three feet. Naturally, the better the mike the better the reproduction.

A Note of Warning. The transmitter *must* operate between 88 and 108 MHz (mc) and it must not interfere with a commercial broadcast signal. And the transmitter must be certified by an electronics technician that it has no spurious emissions and conforms to FCC requirements. For more details concerning wireless-mike FM transmitters we suggest you write to the FCC, Washington, D.C. 20554 and request Bulletins 11 and 12 concerning FCC rules pertaining to license-free, low-power transmitters. ■

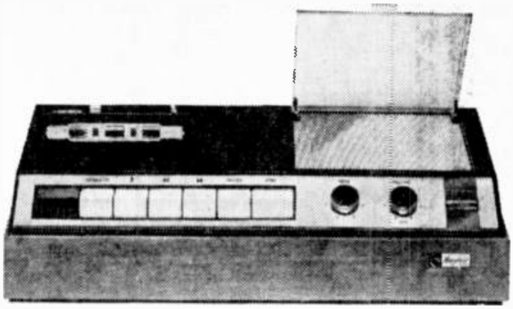


Tape Sings

Continued from page 92

another story. Played through their own speakers most cartridge systems sound like table-model FM radios. Bass is not really adequate by audiophile standards, and treble has been boosted to provide a slightly unnatural sound. Played through a component system, Fidelipac, Lear, and Norelco cartridges all sound somewhat better—though none is the equal of a good 7½-ips reel-to-reel tape.

The best sound comes from Fidelipac (we sampled some of International Tape Cartridge Corp.'s *Command* titles), which provides generally good and full bass response through a big speaker system. Mid-range is accurately reproduced, as is treble. We found only a slight mellowing of the upper ranges, compared with a disc copy of the same music. The Lear-Jet system produces a similar frequency response (on the basis of *RCA Victor* recordings by Morton Gould, the Boston Pops, and Peter Nero), but there is a definite increase in tape hiss and a slight accentuation of treble response compared to Fidelipac.



This table-model player also accepts Norelco cassette. Lid exposes speaker grille.

Norelco's 1⅞-ips tape has slightly less audible tape hiss than Lear-Jet, but a slightly less natural treble sound as well. At the same time, Norelco's bass tones are not as clear or crisp as Fidelipac's (tests were made with cartridges recorded from *Command* discs).

Wow and flutter, however, which used to bedevil reel-to-reel slow-speed recordings, are inaudible on all these systems. And while none of these systems offers a hi-fi alternative to a good component disc- or tape-reproducing system, one significant fact remains. For the truth of the matter is that all can produce excellent results on the road. ■

"Check the side window, Boss! There's a blond, about 23, 5′ 9″, 120 lbs. . . ."

White's Radio Log

Continued from page 111

17805	—	Deutsche Welle Relay	Kigali, Rwanda	1745
17810	PCJ	R. Nederland	Hilversum, Netherlands	1500
17815	—	R. de Sao Paulo	Sao Paulo, Brazil	2200
17820	TAV	R. Ankara	Ankara, Turkey	1415
	—	R. Australia	Melbourne, Australia	0330
	—	R. Canada	Montreal, P.Q.	1745
17825	LLN	R. Norway	Oslo, Norway	1500
	—	R. Japan	Tokyo, Japan	0800
17845	—	R. Sweden	Stockholm, Sweden	1400
	WNYW	R. New York Worldwide	New York, N.Y.	1305
			Cairo, Egypt	1330
17850	—	United Arab BC	Brussels, Belg.	1715
17860	ORU	V. Friendship	Nicosia, Cyprus	0900
17885	—	BBC Relay	Budapest, Hungary	1930
17890	—	R. Budapest	Accra, Ghana	1500
17910	—	Ghana BC	Prague, Czech.	0330

13-Meter Band—21450-21750 kHz

21450	—	R. Prague	Lisbon, Portugal	1815
21495	CSA67	R. Nacional	Melbourne, Australia	0100
21540	—	R. Australia		
21545	—	Ghana BC	Accra, Ghana	1457
21600	—	R. Tanzania	Dar es Sa aam, Tanzania	1530
21665	—	R. Budapest	Budapest Hungary	1930
21670	LLP	R. Norway	Oslo, Norway	1500
21685	—	R. Budapest	Budapest Hungary	1930
21730	LLQ	R. Norway	Oslo, Norway	1500
21790	—	V. Denmark	Copenhagen, Denmark	1330

Personal Hi-Fi

Continued from page 54

J2 are mounted directly on one metal panel, and the stereo headphone jack (J3) is mounted directly on the other metal panel—no insulating washers are necessary. Resistors R1 and R2, and transistors Q1 and Q2, are all mounted by their own leads, and no spaghetti (insulating tubing) is needed if you keep all leads well apart. When soldering the transistor leads, use a pair of long-nose pliers as a heat sink.

How It Works. The PS-15 low-voltage DC source feeds a current through the piezoresistive elements in the phono cartridge. As the stylus rides in the stereo record grooves, the piezoresistive elements are flexed and stretched and act as rapidly varying resistances. The varying currents from the cartridge are given one stage of transistor AF amplification in the PS-15 unit.

The output from the PS-15 is fed into the input of our little headphone driver and given another stage of transistor AF amplification to drive the stereo headphones. The two 2.2K (2200 ohms) resistors (R1, R2) provide base bias for Q1 and Q2; you might experiment with other values for best results with your particular transistors.

The amplifier is turned off simply by pulling the headphone plug out of the jack. ■

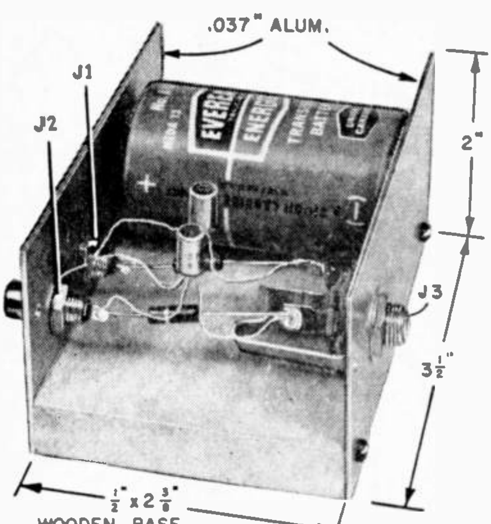


Photo shows all necessary dimensions for duplicating author's unit. If you prefer, amplifier can be mounted in small Minibox.

The Body's Ills

Continued from page 41

ulus blocks pain stimuli coming from other parts of the body and prevents their traveling on to the brain. Still experimental, it promises to ease suffering now relieved only by narcotics or dangerous operations.

Another remedial operation that can be ruled out is the one often necessitated by accidental swallowing of a ferrous object. General Electric engineers have come up with a gadget that has already removed a padlock, a coffee-can key, coins, pins, dental burrs, hypodermic needles, and metal toys from innocent human tummies.

About 30 in. long and ¼-in. in diameter, the new wizard consists of a stainless steel cable in a plastic tube and ends with an iron tip. When the magnet at the end of the control cable is slid forward until it touches the iron tip, the tip magnetizes. When the permanent magnet is retracted into a magnetic shield, the tip loses its magnetism.

An important breakthrough, the new instrument can retrieve foreign objects in a matter of two to three minutes. No anesthesia is needed, and a general practitioner requires the help of only a fluoroscope. ■

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Tape-Slide Synchronizer

Continued from page 80

R1 and J2 are added to the PK-522 amplifier to make this simplification of operation possible. Volume control R1 is set to about its mid-range position for this setup.

Shock Hazard and Grounding. The yellow lead of the output transformer was grounded to the positive (+) battery terminal in the original PK-522 circuit. To completely eliminate shock hazard the printed-circuit foil was cut leaving the secondary ungrounded as shown at X in Fig. 2.

A separate transformer power supply (T2-R2 and C3) provides DC for the amplifier—eliminating possible shock hazards from this source. To prolong its life, R3 is used to reduce the light output of the pilot lamp. The value of C3 must be at least 1000 mf as it holds the power supply voltage on the amplifier for good operation, after the AC supply to T2 has been cut off by the motor-driven cam switch (S4) in the slide changer.

Construction Details. Placement of parts is not critical. And using subassemblies for the amplifier, SCR switch and the amplifier power supply makes for a neat and compact unit which should be easy to service if this should ever be necessary.

The photo of the under side of the chassis (Fig. 3) shows the location of parts. The PK-522 amplifier is shown fastened to the right side of the chassis box on ⅜-inch stand-off insulators. These can easily be made from test-lead handles or banana-plug insulators.

The SCR-diode bridge switch (SCR1, Z1, D1, R2 and C4) is mounted on a phenolic panel and fastened to the left side of the cabinet with ½-inch spacers. The power supply (Z2 and R3) is mounted on another small phenolic panel which is then attached to the bottom side of the chassis box with ½-inch spacers. T2 is mounted direct to the lower side of chassis as shown.

Fig. 4 is a photograph of the *Tape-Slide Synchronizer* and shows, in conjunction with Fig. 3, the location of the other components.

Cables. The two-wire power cable which connects the slide-changer unit to the *Tape-Slide Synchronizer* has a 4-contact plug number Jones P-304-CCT on one end which mates with the original Jones 4-contact socket S-304-AB on the slide changer. The other end of the power cable has a female Jones cable socket S-304-CCT which mates with a male chassis plug P-304-AB on the *Tape-Slide Synchronizer*.

The female Cinch-Jones chassis socket S-304-AB shown on the chassis is not essential unless the original remote pushbutton cable operation is desired.

The shielded wire connecting the synchronizer unit with the recorder has a miniature phone plug on one end and whatever type fittings needed (on the other end) to mate with the input and output of the particular recorder used.

Conclusion. The *Tape-Slide Synchronizer* can be used with any stereo-tape record/playback unit and practically any remote-pushbutton-operated semiautomatic slide changer. Adequate gain is available from the 3-transistor amplifier to operate with the preamps of most stereo tape decks. Furthermore, if desired, a small crystal microphone can be plugged into the synchronizer's input for voice operation of the slide changer and simultaneous recording of the sync signal on the tape.

Since the *Tape-Slide Synchronizer* is all solid state there are no relays, contacts or moving parts to wear out. This unit has been in service for nearly a year and has required no service of any kind to date.

Perfect synchronization of commentary and slides is assured at all times because the sync pulse and commentary are recorded on a single 2-track tape. ■

International Crystal C-12B

Continued from page 58

"wo-o-of," or "hello-o-o-o," the C-12B indicated somewhat in excess of 90% modulation. The actual scope value under these conditions was 100%.

Summing Up. The C-12B frequency meter, functioning as a frequency meter, precision signal generator, RF power output meter, and modulation meter, essentially performs all the tests required to insure a CB set is completely legal in its operation and that it is performing at optimum efficiency. We therefore recommend it as a *must-have* item for any shop doing CB servicing.

The C-12B is priced at $300.00. Additional information is available from Dept. RF, International Crystal Mfg. Co., 18 N. Lee, Oklahoma City, Okla. 73102. ■

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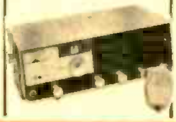

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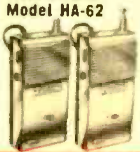

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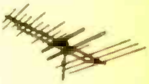

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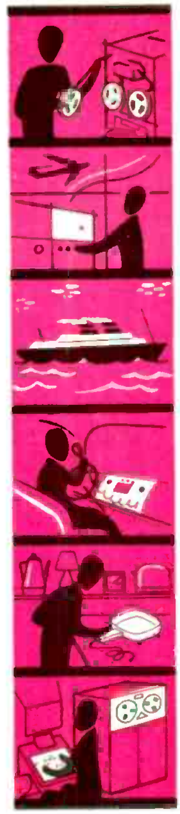

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