Radio-TV EXPERIMENTER

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AUGUST-SEPTEMBER 75¢

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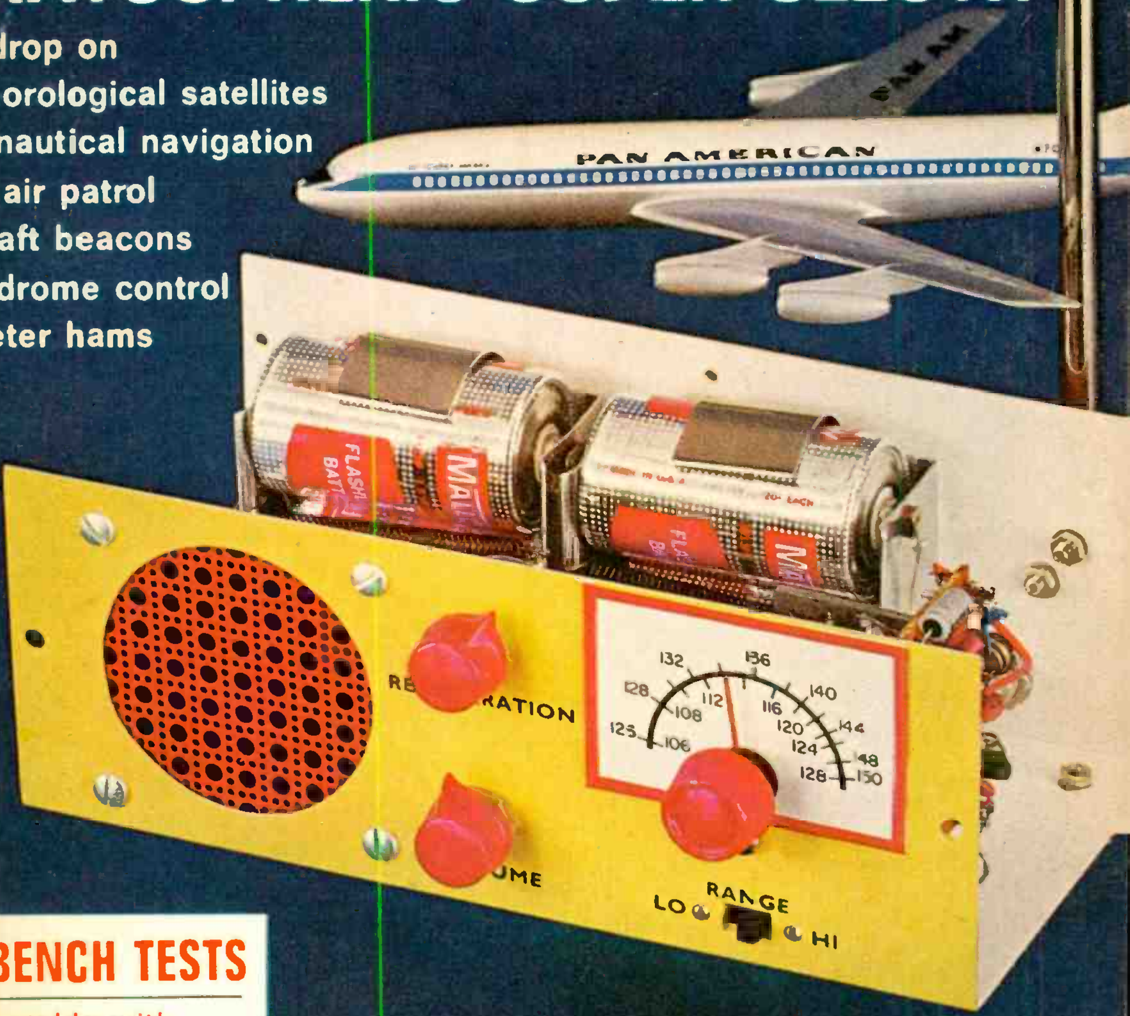
- aerodrome control
- 2-meter hams



CB BENCH TESTS

Go Portable with Knight-kit Safari II

Go Mobile with Lafayette HB-525B

Go Fixed Station with Radio Shack 23-Plus

Design your own zener supply

Build an electronic rooster

DX-the cream of the 49ers

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, $129.95 wired.

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

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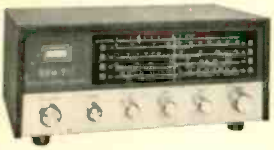
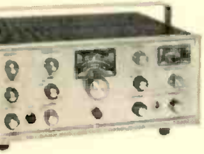
7 New Ways to make Electronics more Fun!

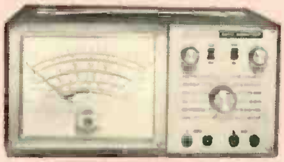
Save up to 50% with EICO Kits and Wired Equipment.



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 super-het, 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.**



NEW EICO 888 Solid-State Engine Analyzer

Now you can tune-up, trouble-shoot and test your own car or boat.

Keep your car or boat engine in tip-top shape with this completely portable, self-contained, self-powered universal engine analyzer. Completely tests your total ignition/electrical system. The first time you use it — just to tune for peak performance — it'll have paid for itself. (No tune-up charges, better gas consumption, longer wear) 7 instruments in one, the EICO 888 does all these for 6V and 12V systems; 4, 6 & 8 cylinder engines.

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EXCLUSIVE use of precision series-mode fundamental crystals for superior transmit and receive stability. **Wired only, $189.95**

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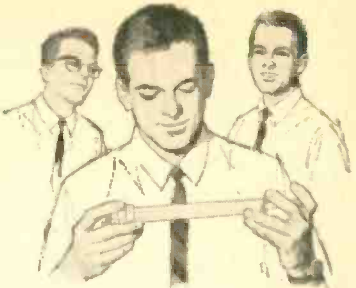

Be the man who's always first to say: "I've got the answer right here."

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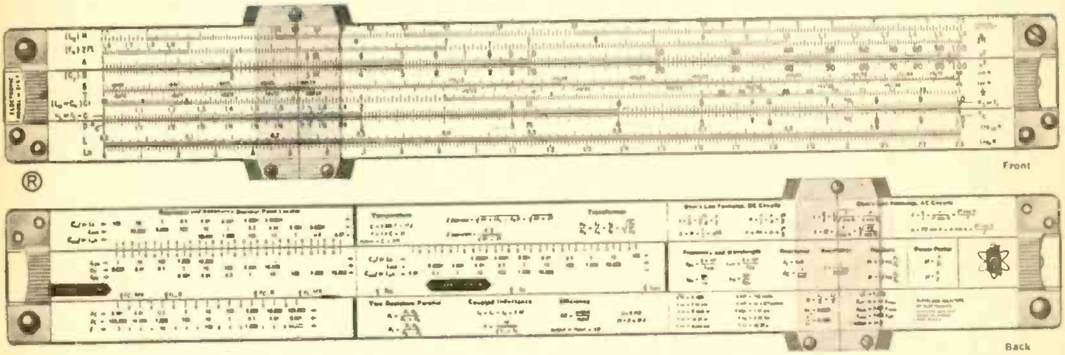

SOME DAY EVERYONE in electronics may have a slide rule like this. Till then, the man who uses one will seem like a wizard as he solves reactance and resonance problems in 12 to 20 seconds —*without pencil and paper.*

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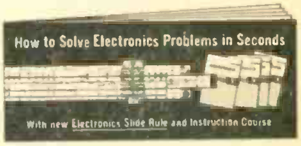

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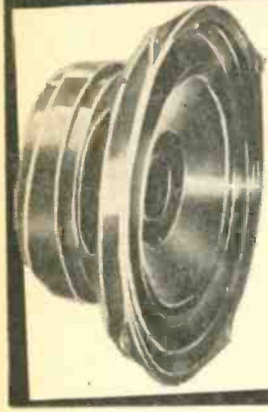

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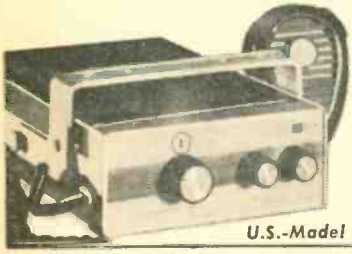

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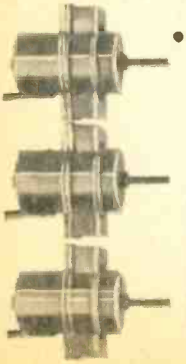

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AUG./SEPT., 1967

RADIO-TV EXPERIMENTER

Dedicated to America's Electronics Experimenters

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$\$479^{95}*$

(295 sq. inch viewing area)

Kit GR-180

$\$379^{95}**$

(180 sq. inch viewing area)

Exclusive Features That Can't Be Bought In Ready-Made Sets At Any Price!

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Deluxe 12" Solid-State B & W Portable TV

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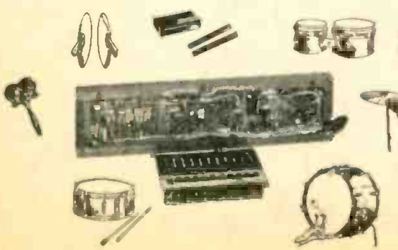
Like To Hear It Perform? Then send for organ demonstration record TOA-67-3 (7″, 33⅓ rpm). Listen to the beautiful voices, remarkable range of expression and professional capabilities of this superb instrument. Enclose 50c for postage & handling.



TOA-67-1 $145.00

Optional Band Box Percussion

Adds 10 exciting percussion voices to the music you play . . . bass drums, two bongos, castanets, brush & crash cymbals, claves, blocks, snare drum and drum roll. One or all may be preselected to sound as you play the lower manual, pedals or both. Or voices may be added manually. 8 lbs. May be added to all other Heathkit/Thomas organs with TOA-67-2 drawer & slides @ $35.

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60-Watt Solid-State Guitar Amplifier . . . All The Features Guitarists Want Most!

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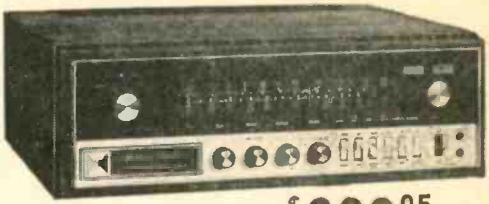
NEW Heathkit 150-Watt Solid-State AM/FM Stereo Receiver

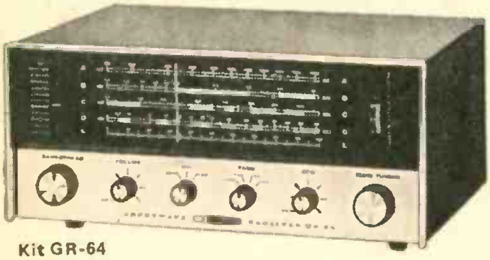


Kit AR-15 $329^{95} (less cab.)

World's Most Advanced Stereo Receiver . . . with features like integrated circuits and crystal filters in the IF amplifier section; preassembled & aligned field effect transistor FM tuner for superior cross modulation index and image rejection; positive circuit protection; all silicon transistors; 2 tuning meters; and much more for the finest in stereo listening. See Julian Hirsch's review in the May issue of **Hi-Fi/Stereo Review.** 34 lbs.

Optional walnut wrap-around cabinet @ $19.95

4-Band AM/Shortwave Receiver



Kit GR-64

$37^{95}

Hear Live Broadcast From Hundreds Of Foreign Countries, Voice of America, Radio Moscow, hams, ship-to-shore, plus popular AM. Covers 550 kHz to 30 MHz in 4 bands. Boasts 4-tube superhet circuit plus 2 silicon rectifiers; 5" speaker; BFO control; "S" meter; bandspread tuning; headphone jack; AM rod antenna; charcoal gray metal cabinet. 15 lbs.

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Kit GR-43
Was $159.95
Now

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10 bands tune Longwave, AM, FM and 2 MHz to 22.5 MHz shortwave. Separate AM & FM tuners and IF strips. 16 transistors, 6 diodes and 44 factory assembled and pretuned circuits. 4" x 6" speaker, earphone, time zone map, listener's guide. Build in about 10 hours. 19 lbs.

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CL-290

POSITIVE FEEDBACK

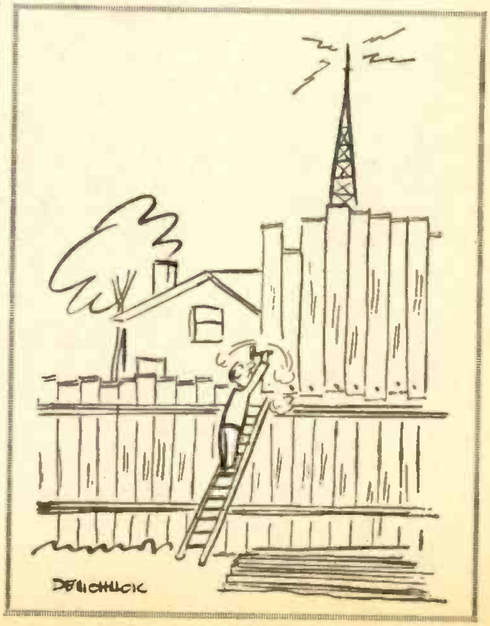
JULIAN M. SIENKIEWICZ, EDITOR

□□ On a quiet Sunday afternoon this past summer some joker we call "friend" invaded our inner sanctum and interrupted our thoughts, ball game, and beer. What for? Well, here's the story. Our friend said to us, "Do the following:

"Write any three-digit number on a piece of paper, then reverse the three digits and write this number on the paper with the larger of the two numbers on top. Subtract! Next, multiply the remainder by any number from 1 to 9. Now comes the clincher: cross out any one of the digits in the product, except a zero (if any). Now, add up the remaining digits and tell me the answer."

This we did. Our friend spent a moment in quiet thought, then retorted, "The number you crossed out was . . ."

To which we commented "How in h . . . did you know?" He told us eventually, but it cost us two six-packs. The price to you dear readers, is a bit cheaper. Just pass your newsstand two



New! Solid State Mobile 2-Way Radio

LAFAYETTE HB-525B

with "S/PRF" Meter

2⅜"Hx6¼"Wx8"D

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- Dual Conversion Receiver for Extra Sensitivity and Selectivity
- Transmit Mode Indicator Light
- Range Boost™ Circuitry for Added Talk Power
- 3-Position Delta Tune Provides Fine Tuning
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months from now and sneak a peek at this column before the vendor has a chance to shoo you away. And if he gets tough, tell 'im a big city Editor said it was okay.

White Paper on a White Lie! You read it in this column and elsewhere—the FCC's *emphatic* denials that there is no truth whatever to reports that it planned to switch 27-MHz walkie-talkies to a new band located on 49 MHz. They said that there was "no such proposal," that the first publication to run the story was *misrepresenting* the facts, that someone had apparently seen a rough and early stage in-house FCC worksheet which was *meaningless* and had drawn many *wrong conclusions*, etc., etc.

Since the story had created such a furor in CB manufacturing circles and had upset users so much, just about every major publication had been only too happy to relay the FCC's message to the public—the message which squashed the entire story as a *cheap hoax*.

Funny thing about the story, though. Would you believe that only a month or so after the FCC's denials it quietly released its plan to move walkie-talkies from 27 MHz to 49 MHz? The proposal was almost word-for-word the same as the one that had been reported earlier and then denied so loudly. In short, the FCC had succeeded in hoodwinking the CBers of the nation, lying to the public, and then embarking on its irrational plan despite a barrage of complaints.

CBers, of course, are stuck with the FCC. And they are used to the shabby treatment doled out on the shores of the Potomac. Editors, however, are something else again. We don't particularly like to be told a pack of barefaced lies—especially by a tax-supported, governmental agency. The FCC forced many publications to go out on a limb with their readers. And we, for one, have a feeling that when the FCC makes its humble appearance at the editorial offices for story coverage on one of their self-aggrandising projects, it may not get the hearty welcome to which it has become accustomed.

Reason has it that there are plenty of walkie-talkie people—not to mention Hams and CBers—who are nauseous and noxious over the shoddy treatment that Big Brother Frank-Charlie-Charlie has ungracefully bestowed on them in the past and will likely continue to confer in the future. To put an end to this philistine farce let's send the FCC a protest—a short message that'll wake them up to us little folk in the outside world. We propose that you join with us in sending an empty beer can to the FCC.

It's easy to do. Just address a label to the *Federal Communications Commission, Washington, D. C. 20554* and paste it on a beer can. Slap a 10¢ stamp on the can and drop it into the nearest mailbox on September 1, 1967. That's right, on the *first* of September. When our friends at the FCC return from their Labor Day fun and frolic they can play a game worthy of their talents—Stack the Cans. Thus occupied, maybe they'll leave the Rules unchanged for an hour or two.

A word of caution—we have no gripe with the Post Office, so clean out those cans (don't go out of your way to attract flies). Also, tape the edges at the open ends—Mr. Postman doesn't want any cut fingers.

Now, get on the pipe and tell all your friends. If we make the FCC look like a scrap dump, maybe they'll realize that us little folk is what America is made of.

Complaint Department. It isn't very often we get complaints from our readers, but when we do each complaint is considered in light of other complaints as well as compliments received. Also, we don't make it a practice to publish reader letters as a rule, but rules are made to be broken. Here is one exception that we would like you to read and then weigh our comments to the writer.

Dear Editor:

I have just purchased my last copy of your magazine. This drastic step was the result of your publishing an article in your February-March 1967 issue entitled "It's War" by Alex Karlin. The single statement that incensed me to write this letter was Mr. Karlin's perverted idea that CW on the ham bands is "obsolete." Obviously, Mr. Karlin has no knowledge of amateur radio at all. Most hams use CW a majority of the time and are realizing the benefits of more QSOs and more DX. Although single sideband is almost as good as CW, there are times when SSB has no value at all and only CW can break through. I know many people, myself included, who use CW exclusively and who enjoy showing off their proficiency in code ability.

Either Mr. Karlin has no ham license at all (in which case he should not be writing this article), or he is one of those lids who have been on phone so many years that he doesn't even remember the code.

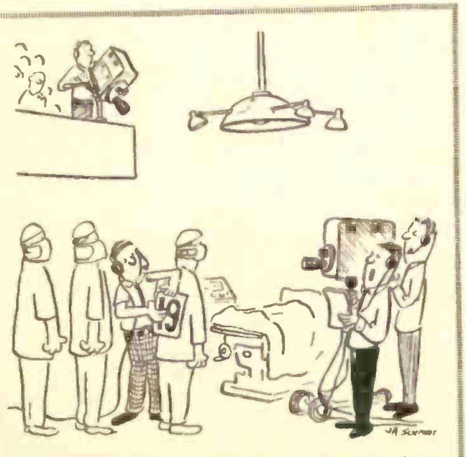
As for this man's one-sided view of incentive licensing and the ARRL, may I say he is all wet. I, for one, am a member of the League who is in favor of incentive licensing. I feel that any ham who is worthy of the full privileges should prove that he is better than the average by passing a more rigorous exam. There are many hams who agree with me in my support of the League and its policies. Mr. Karlin is speaking for a loudmouth minority in this article and I feel you should give equal space to print a retraction that shows some of the numerous things the League has done for the good of ham radio, including the incentice licensing proposal. I leave it up to some decent CB operator to refute his statements degrading CB radio to nothing more than some toys for kids to play with. I truly hope this letter has shed some light of truth on an article filled with lies.

Mitchell Tuckman, WB2VYJ

Well, Mitchell, you wrote a mouthful. However, we take exception to one point in your letter. That is your having purchased your last issue of RADIO-TV EXPERIMENTER. Apparently, our magazine was of some value to you because you plunked down 75¢ to get your copy. And, though you did not say so, we assume you were a steady reader of our publication. Therefore, if one article drives you to break an association with a magazine, you, Mitchell, are not our kind of reader!

Let's consider the case of two readers who disagreed with Editor-In-Chief Sienkiewicz in the past. One is Tom Kneitel, K2AES & KBG-4303, currently the editor of S9 magazine. Many moons back when the skin on the teepee was still a young buck, Tom phoned to tell Editor Sienkiewicz that his SWL coverage in another magazine was *"disgusting"* and he should do something about it. Tom had one or two articles under his belt, so our Editor told

(Continued on page 112)



". . . No. 19—at 185 pounds; five feet, ten inches; Dr. Bill Wilson, Anasthesia . . ."

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Bug or Debug—That Is the Problem. Whether you are worried about someone "bugging" your privacy or you just want to play some "party" tricks on a group of friends, you'll find *The Electronic Invasion* a good, interesting book to read. Author Robert M. Brown reveals that complex electronic devices are no longer limited to the cloak-and-dagger set. Technological advances, largely "fallout" from the aerospace and military electronics miniaturization developments, of eavesdropping equipment (and their manufacturers) are available to all. Do-it-at-home, check your employees or spy on your competitors—equipment is priced for every pocketbook.

Soft cover
192 pages
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Case histories are cited, telling the pitfalls that finally tripped the operators and put them under the thumb of the law. Even double-spys are entering this lucrative field—supplying customer and competitor by bugging their installed anti-bugging devices to furnish salable information.

Manufacturer listings help the do-it-yourselfer locate items that sell for as little as $3.50 that may be adapted to eavesdropping purposes.

Additional chapters cover telephone bugging, miniature microphones and amplifiers, wireless microphones, voice scramblers, bug detection and much more for the worried individual who wants to protect himself and his privacy. Want a copy? Then write to John F. Rider, Publisher, Inc., Dept. IL, 116 W. 14th St., New York, N. Y. 10011 if your bookstore is fresh out of copies. ▮

Time and Temper Savers. Many experimenters and technicians have difficulty making the transition from vacuum tubes to transistors, or claim that they can troubleshoot a television set but not a tape recorder. Well, here's a book that should dispel that notion by pointing out how to approach circuit troubleshooting in a new way. *Ten-Minute Test Techniques for Electronics Servicing* compares almost every circuit you may encounter from an amplifier to a rectifier. It then describes how all can be easily tested using simple servicing procedures and basic test instruments.

Hard cover
176 pages
$6.95

To explain these techniques learned the hard way during 25-years' experience, author Elmer Carlson has outlined step-by-step techniques for localizing trouble in an improperly operating stage. The defective component is then pinpointed using a minimum amount of test instruments.

Sorry, you won't find this troubleshooting handbook on your electronics dealer's book rack. To get your copy write to the publisher, TAB Books, Drawer D, Thurmont, Maryland 21788. ▮

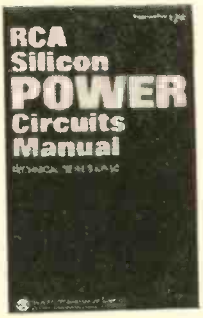
Kids Have the Most Fun? Why is it folks think that electronics is a difficult subject to understand? Not only that, but they claim no one can have fun in electronics! Now ain't that a kick in the head? Well, Leo G. Sands has authored a new title, *Having Fun in Electronics*, that dispels these false claims. Beginning with simple theory, Leo takes the beginner through the *how's* of electronics. Using the breadboard technique of building circuits, the text provides the neophyte with a sound beginning for developing his own designs once he has mastered

Soft cover
160 pages
$3.25

the fundamentals. Several basic circuits, including audio amplifiers and power supplies, are provided to help him reach a level of design ability. The emphasis is based on "breadboarding" of various electronic circuits so that the ability of the experimenter can be developed by a practical do-it-yourself approach. Several interesting bench-type projects are presented to put fun into learning about the basic principles. The book is intended for the electronics hobbyist or student. Pick up a copy today and have a ball. *Having Fun in Electronics* is available at book stores and electronics parts suppliers. Can't get a copy? Write to Howard W. Sams & Co., Inc., 4300 West 62nd Street, Indianapolis, Indiana 46206. ■

Power Packing Manual. The *RCA Silicon Power Circuits Manual* is the newest member of the growing family of RCA technical manuals. Although this new manual is intended primarily for circuit and system designers working with solid-state power devices, portions of it will also be found useful by students, radio amateurs, and build-it-at-home hobbyists.

The SP-50 has been prepared to provide design information for a broad range of power circuits using RCA silicon transistors, rectifiers, thyristors, SCRs and triacs. It includes an introduction to semiconductor physics, as well as descriptions of construction, theory of operation, and important ratings and parameters for each type of device. Some of the manual's sections are: Semiconductor Materials, Junctions and Devices, Silicon Rectifiers, Thyristors, Silicon Power Transistors, Rectification, Power Regulation, AC Line-Voltage Controls and much more.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Over one billion dollars are spent in the U.S. on educational books every year. The knowledge gained from these books can never be measured. Are you getting your fair share? ■

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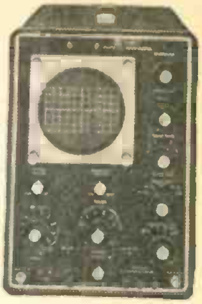
Budget Discotheque

A 4-speed transistor portable phonograph, Model GD-16, that can be assembled in 1 to 2 hours has been brought out by Heath. There's just one small circuit board to wire, a 4- by 6-in. speaker to mount, and two connectors to plug into the preassembled changer. Really compact, 14 x 7¾ x 20½ in., the GD-16 carries like a small suitcase. The changer folds into the case when carrying and flips down for easy play of any 16, 33⅓, 45 or 78 *rpm* monophonic record, and handles a stock of six records of the same size. Separate volume and tone controls; music power output is 2 watts; operates on any 117 VAC source. The cabinet is preassembled of pressed wood with a polyethylene covering. Price of the GD-16 is $39.95—for details write Heath Co., Dept. EB, Benton Harbor, Mich. 49022.


Heathkit Model GD-16 Transistor Portable Phonograph

Pro Scope In A Kit


Knight-kit Model KG-2100 Oscilloscope

The Knight-kit KG-2100 oscilloscope has a DC to 5 MHz vertical amplifier response which permits the display of pulses of fast rise time. Among the special features of this Knight-kit oscilloscope are: lock-in characteristics for viewing stable waveform presentations even at upper frequency limits; built-in Rotron fan; high vertical sensitivity (5mv/cm) for servicing transistorized equipment; 85 Nanoseconds rise time; horizontal response from DC to 800 kHz; triggered sweep (200 Nsec/cm down to 1 Sec); regulated high and low-voltage power supplies. Power consumption is 200 watts; size is 14¼ x 10⅛ x 18½ in., weighs 40 lbs. In kit form the KG-2100 oscilloscope is $249.95; $349.95, factory assembled. Full details from Allied Radio Corp., Dept. 20, 100 N. Western Ave., Chicago, Ill. 60680.

Tuning In All Cars . . .

Under their *Realistic* label, Radio Shack's "Patrolman," which was originally restricted to high band VHF broadcasts (147-175 MHz), is now available in low band VHF (30-50 MHz). Both models are only $24.95, feature the regular AM 535-1605 kHz broadcast band, continuous no-drift tuning, batteries, and AC adapter jack. A plus for Patrolman owners is the new VHF daily weather broadcasts at 162.55 MHz, in addition to police, fire, mobile phone, coast guard, industrial, civil defense and general emergency broadcasts. At Radio Shack stores, or write to Radio Shack, Dept. CL, 730 Commonwealth Ave., Boston, Mass. 02215.

Realistic "Patrolman" VHF Police Receiver

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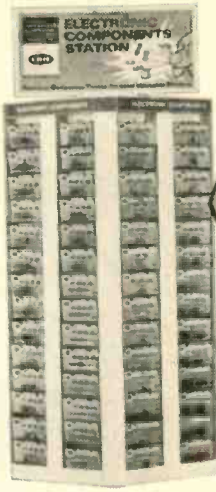
From Altec Lansing come two musical instrument speakers, the 12-inch 417A (up to 75 watts music power) and the fifteen-inch 418A (up to 100 watts) which will easily handle the tremendous audio peaks peculiar to electronically amplified musical systems without destroying the speakers. Both speakers were field tested by professional and amateur guitarists during the developmental stages and approved by them before production. The 417A and 418A have 3-in. voice coils of edgewound aluminum ribbon and a rugged diaphragm with a lightweight aluminum dome. Heavy-cast aluminum frames are used and the massive magnet structure houses an Alnico V magnet. Prices: $68.00 for the 12-in. 417A; $80.00 for the 15-in. 418A. Want to know more? Write to Altec Lansing, 1515 S. Manchester Ave., Anaheim, Calif. 92803.

Altec Lansing 417A & 418A Musical Instrument Speakers

VOX Mike

Lafayette's Stock No. 99-4604 voice-actuated microphone is designed for use with a battery-operated transistorized tape recorder equipped with a jack for remote microphone control. Electronically-controlled relay in mike automatically starts the recorder when sound is picked up; automatically stops the recorder when sound stops. The Voice-Control / Off / Remote switch goes like this: in Voice-Control position 6-transistor circuitry operates amplifier and electronic relay in mike; in Remote position microphone oper-

Lafayette Voice-Actuated Microphone



ates as a dynamic mike with remote on-off switching. There is an additional control for adjusting sensitivity of microphone above ambient noise levels. Recommended for use with Lafayette RK-30, RK-55 and RK-60 tape recorders. Requires 9 volt battery. At electronic parts stores or write to Lafayette Radio Electronics Corp., 111 Jericho Turnpike, Syosset, N. Y. 11791.

Two-Way Police Radio Kit

E. F. Johnson has come up with two portable, two-way radio kits matched to the new FCC police regulation permitting low-power surveillance radio communication without prior approval. Only power output is limited under the new regulation and must not exceed two watts.

E. F. Johnson Matching Police Walkie-Talkies

Offering 50 Police Radio frequencies between 40 and 50 megacycles, the Johnson 1½-watt Messenger 106 hand-held transceiver features rechargeable batteries with built-in chargers, leather hand-strap cases and telescoping antennas. They come packed as two-unit ($376.55) or three-unit ($604.25) kits in a portable carrying case. The 3-unit kit contains two 22-in. clamp-on auxilliary antennas for use on police cars. Details can be had from the manufacturer: E. F. Johnson Co., Waseca, Minn. 56093.

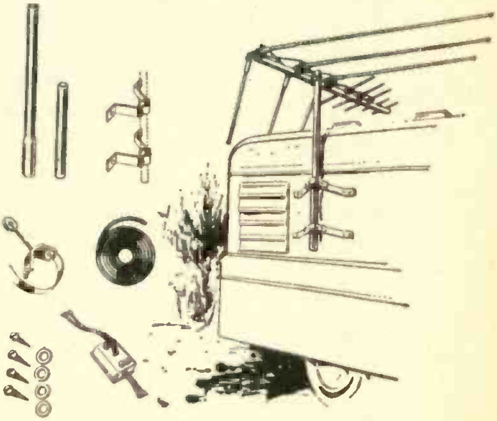
Control That Impedance!

The S-11 Controlled Impedance speaker system is specifically designed for use with solid-state components, which perform best over a narrow range of load impedance. The S-11 system has an impedance range carefully limited by integrated engineering development of both speakers and crossover. Scott's new system measures 24 x 14 x 11¼ in., has a walnut-finish air-suspension enclosure, and will retail at $149.95. For specifications write to H. H. Scott, Inc., 111 Powder Mill Rd., Maynard, Mass. 01754.

H. H. Scott Model S-11 Speaker System

Ho! For The Open Road With Bright TV!

Especially designed for trailers, cottages and mobile homes, the new JFD Explorer Log Periodic TV Antenna Kit pulls in clean color TV on all VHF and UHF channels; also FM. Can be assembled in a matter of minutes and stored most anywhere. The Explorer is made of 100% reinforced aluminum with a gold anodized finish. Kit includes antenna, mast, mount, twin-lead, standoffs and hardware, and a VHF/VHF/FM signal splitter. The Explorer (Model LPV-TL5) is listed at $30.75 and you can write to JFD Electronics Co., 15th Ave. at 62nd St., Brooklyn, N. Y. 11219 for details.



JFD Explorer Log Periodic TV Antenna Kit

Receiver-Turntable

For those who already own a pair of speakers, Harman-Kardon offers Model S-C6, an AM/FM/FM Stereo receiver-turntable; it's similar to their SC440 compact but is sold without speakers. The record changer is the new BSR equipped with an Empire 808 magnetic pickup. There is a special circuit that switches the receiver to stereo and back to regular FM automatically. Other features include a stereo headphone receptacle on the front panel, tuning meter for best AM and FM reception, and the facility to handle a tape recorder. A lucite dust cover is optional. The S-C6 lists at $329.50; further info from Harman-Kardon, Inc., 401 Walnut St., Philadelphia, Pa. 19105.

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A new hand-held electric engraver has been introduced by the Dremel Mfg. Co., Racine, Wis. The tool uses a carbide or optional diamond engraving point and etches almost any material from soft plastic to glass, ceramics and high alloy steel. It's powered by a Dremel reciprocating motor that delivers 7,200 strokes per minute. By adjusting the dial, the operator regulates depth of stroke from delicate lines to deep marks. With nylon housing, hook for hanging, and complete instructions, the "electric pencil" is available at hardware suppliers for $14.95.

Dremel Electric Engraver

Gee, Dad, It's a Thomas "Paramount"!

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Heathkit "Paramount" Organ

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(plus $2 shipping-handling)

Complete with remote control dynamic microphone/speaker and private earphone plus FREE reel of long-playing tape!

RECORDS MEETINGS... STUDIES... TELEPHONE CONVERSATIONS... DICTATION... INTERVIEWS... LETTERS... PARTIES... EVEN SECRETLY!

90-DAY WARRANTY HONORED NATION-WIDE

COMPACT — YET POWERFUL ENOUGH FOR UNDERCOVER WORK!

This is the world-famous pocket recorder advertised across the country for $149.95 — now at "give away" savings! Imagine, only 44 ounces light, Phono-Trix slips easily into pocket or purse, goes with you anywhere for on-the-spot recording of music, speech, parades, parties — will even pick up a whisper across the room! — all with amazing fidelity!

RECORDS UP TO AN HOUR AND 10 MINUTES PER REEL!

Acclaimed as the world's finest miniature tape recorder, Phono-Trix is precision-made by W. German craftsmen. Automatic push-button operation makes it easy to use with standard ¼-inch tape you can get anywhere. Will record up to an hour and 10 minutes on a single reel! Now in service throughout the world by executives, police departments, private investigators, news reporters, writers, and thousands of people for everyday remembrances, business needs, and as a remarkably efficient aid to learning!

RECORDS . . . PLAYS BACK . . . ERASES . . . AMPLIFIES!

Much more than just an ordinary tape recorder, Phono-Trix with accessory desk-top amplifier/speaker becomes a portable Public Address System, with enough volume to fill a large hall. Or use it to amplify telephone conversations while you record at the same time with both hands free! Runs for 24 hours on ordinary penlite and "C" batteries (3 each) or with AC adapter can be plugged into regular household current for incredible economy!

ONLY A LIMITED QUANTITY AT THIS CLOSE-OUT PRICE — SO ORDER YOURS TODAY!

Well-known Department, Electronic, and Camera stores have already sold over 30,000 Phono-Trix recorders through ads in the New York Times, Wall Street Journal, Playboy, Esquire, and other leading publications. But now, due to manufacturer's intensification, the limited supply still available must be closed out! And at savings below original wholesale! Once this limited supply is gone, this offer can never be repeated again. So fill in and mail the order form with your check or money order now!

ACTION ELECTRONICS, INC., DEPT. RTV-667
4 East 46 St., New York, N. Y.

NO OTHER POCKET RECORDER OFFERS ALL THESE TOP-QUALITY FEATURES:

- INSTANT RECORD & PLAYBACK ANYWHERE
- REMOTE CONTROL DYNAMIC MICROPHONE/SPEAKER
- STANDARD 1⅞ IPS SPEED — CAPSTAN DRIVE
- TRUE POCKET SIZE ONLY 1⅞" x 4½" x 7½"
- REAL PORTABILITY ONLY 44 OZS LIGHT
- RECORDS UP TO 1 HR AND 10 MIN. PER REEL
- SIX TRANSISTORS FOR MAXIMUM POWER AND FIDELITY
- AUTOMATIC PUSH-BUTTON OPERATION
- USES STANDARD PENLITE AND "C" BATTERIES
- PLUGS INTO HOUSE CURRENT WITH AC ADAPTER
- ONE-PIECE CAST ALLOY BODY FOR AMAZING STRENGTH

. . . PLUS DOZENS MORE!

GET THESE ACCESSORIES AT BARGAIN PRICES, TOO!

#1 High-powered desk-top amplifier/speaker
was $20 — NOW ONLY $14.95

#2 Top-grain leather Carrying Case
was $10 — NOW ONLY $7.95

#3 Confidential telephone microphone
was $9 — NOW ONLY $6.95

#4 AC house current adapter
was $20 — NOW ONLY $14.95

#5 Extra tapes with reel
were $2.50 each — NOW ONLY $4.95 FOR 3

ACTION ELECTRONICS, INC., Dept. RTV-667
4 East 46 Street, New York, N. Y.

RUSH ME _____ Phono-Trix Recorders at only $49.95 (plus $2 postage-handling — $51.95 total) complete with remote control microphone/speaker, "private listening" earphone and FREE reel of tape

Also send me the following accessories (please order by number):

_____ #1 _____ #2 _____ #3 _____ #4 _____ #5

I have enclosed check/money order for $______ total.

Charge to my Diner's Club account #________

NAME________________

COMPANY (if any)________________

STREET________________ CITY________

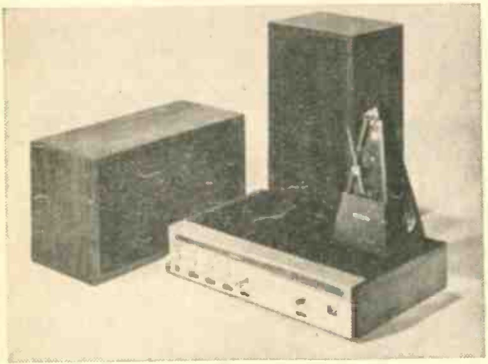
STATE________________ ZIP CODE________

Add 5% sales tax for N.Y.C. residents; other taxes where applicable.

stop tablets. The TO-67 has Thomas Color-Glo key lights so you can play complete songs with melody, harmony and bass even if you've never played an organ before. There are two separate speaker systems; a built-in 2-speed rotating Leslie and a main speaker system with two 12-in. speakers, creating a stereo effect. Other features: two 44-note keyboards; 28 notes of electronic chimes; selective repeat percussion to produce xylophone, mandolin, marimba sounds; 13-note bass pedals; selective attack percussion; reverb; stereo headset outlet; walnut-finished hardwood cabinet and bench. Heath says it can be assembled in 80 to 100 hours; and for 50¢ they sell a 33⅓ record, TOA-67-3, which demonstrates the full professional capabilities of the TO-67. Price is $995.00, write for details to Heath Co., Benton Harbor, Mich. 49023.

Definitely Not a Black Box

For young members of the Affluent Society who are suspicious of the "black box" retailing of a popularly advertised receiver or amplifier with speaker systems of unidentified brand or performance, Electro-Voice has come up with what they call a starter set, including the E-V 1177A (FM) or E-V 1178 (AM/FM) receiver and a pair of E-V Eleven speaker systems. The walnut-veneered, vinyl-coated speaker enclosures measure 8¼ x 15¼ x 6½ in., and have a high-compliance, dual-cone 8-in. driver retailing at $33 each. The solid-state receiver features 65 watts IHF power into 4 ohms; platinum and brushed chrome front panel; colored input indicator lights; wide range, low distortion sound output. The FM model is advertised as $280.00, with AM $35.00 additional. At high-fidelity dealers, or contact Electro-Voice, Inc., Buchanan, Mich. 49107. ■



Electro-Voice Hi-fi System

Electronics Goes to Bed. Now, without intricate weaving, a blanket is being marketed that has its nylon fibers bonded electrostatically. Want more facts? Write to West Point Pepperell, 111 W. 40th St., New York, N.Y. 10036.

MATHEMATICS
ELECTRONICS

NOW! A NEW WAY TO LEARN—I. H. S. I. WAY. Complete home study courses to help you get the position you want—MORE MONEY—MORE RESPECT.

COURSES PREPARED BY COLLEGE PROFESSORS

who have lectured to thousands of men on math and engineering. You learn at home quickly, easily—*AS FAST* as you want.

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Write for Brochure—No Obligation

THE INDIANA HOME STUDY INSTITUTE
Dept. RTV-8, P. O. Box 1189, Panama City, Fla. 32401

Tape this ad to the back of your TV or Radio Set

ALL TV-RADIO RECEIVING TUBES $1.50 ea.

• ALL BRAND-NEW, First Quailty. All Types Available. • Orders Shipped First Class Same Day Rec'd. • Unconditionally Guaranteed. • 24 Month Warranty.

Send $1.50 for ea. tube + 50¢ postage & handling of entire order. FREE: Write for TV Test Chart and Tube List to Dep't RTE-77

UNIVERSAL TUBE CO. Ozone Park, N. Y. 11417

ALL BAND BATTERY SHORT WAVE RADIO KIT $12.95

Listen around the world—Thousands of miles away! Ships—Aircraft—Voice of America—Russia—London—Australia—Amateurs—Police. Also USA Broadcast—5 Wave Bands ½ to 43 MC! Calibrated tuning dial. Wt. only 3 lbs. World wide reception.

SEND ONLY $3.00 (cash Ck Mo) and pay postman $9.95 COD pstg or send $12.95 for PP del in USA. Basic Kit as shown includes plastic case and BC coil FREE. Long Distance antenna, if you order NOW. Available only from Midway Radio, Dept. BRE-8, Kearney, Nebr.

SPECIALS FROM BIGELOW ELECTRONICS

EXPERIMENTERS DELIGHT—17 pounds of electronic parts and hardware. All new or removed from new civilian equipment. Contains many types of parts and assemblies. U.S.A. shipment only on this item.

ONLY $3.00 plus postage for 20 pounds. #PA-17

Miniature parts bonanza: over 300 parts contained on printed circuit boards. ONLY $3.50 postpaid. U.S.A. shipment only.

FREE: electronic parts & tool catalog: Use a post card for your request and include your complete address with zip code.

BIGELOW ELECTRONICS
P. O. Box 71 Bluffton, Ohio 45817

TRANSISTORIZED CONVERTER KITS $5.00 EACH

Three kits available. Marine 2-3 mc, police & fire, high band 100-200 mc, low band 26-60 mc. 1 mc tuning on car radio. Full instructions.

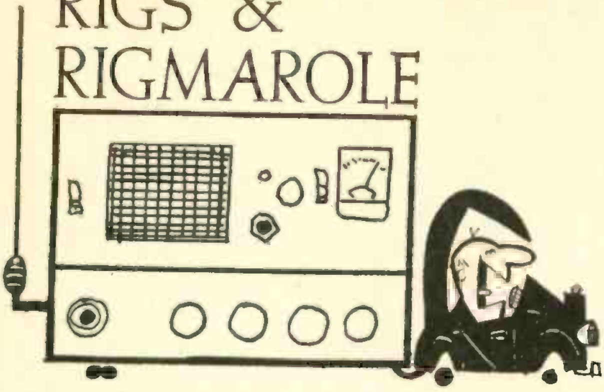
ANY KIT $5.00 pp. WIRED $15.00 pp.

FRED MESHNA, NO. READING, MASS. 01864

How to Write a Classified Ad That Pulls

Deluxe 48 page booklet—only $1 per copy. And, with the booklet, you get a $2 credit towards your payment of your classified ad in SCIENCE & MECHANICS. Send $1 now to SCIENCE & MECHANICS, 505 Park Avenue, New York, New York 10022.

CB RIGS & RIGMAROLE



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

■ **Tube Bad.** Yes, manufacturers of tube type CB sets may be saying "too bad" when they get a glint of the new *Courier 23-Plus* from e.c.i. (Electronics Communications Inc.), 56 Hamilton Ave., White Plains, N. Y. Why "too bad?" Well, the gang up at e.c.i. claims that the 23-Plus is designed to pull in all channels louder and clearer than any other tube rig in its price class ($189).

Truly dedicated to the ultimate in reception, the rig has a new cascode front end and a Nuvistor mixer. In addition, it's got dual conversion circuitry and every known feature to squash, smash, and smother static and other teeth gnashing noises.

Other goodies in this set include a transistorized power supply, illuminated S-meter (which doubles as an RF output meter), an illuminated channel selector, a built-in public address system, a jack for an extra speaker (stereo CB, anyone?), single knob tuning, a modulation indicator. It comes stuffed to the gills with crystals for operation on all 23 channels, mounting brackets, power cords, microphone, and that well known Courier reputation for big sound on the band.

Ship Shape. So many folks have been putting CB rigs on their boats that Regency Electronics whomped up a marine type CB rig to meet the needs of this rapidly growing specialty market.

The new *Regency Ranger* rig is an 11-channel, all-transistor job which comes out in full sail with a heavy welded steel chassis which is spray coated for protection from moisture and salt. The speaker is splash proof, and the PC board is epoxy glass.

From an operational standpoint, the Ranger runs a Collins mechanical filter for jazzy selectivity. The power supply is all set for the 12 volts which most boats offer. You can also operate from 117 volts AC with an optional power supply. The set doubles as a marine hailer by means of an external speaker.

Sail into the sunset with the Ranger aboard for $175. See your nearest chandler or write to Regency Electronics, 7900 Pendleton Pike, Indianapolis, Ind. 46226.

Speak Softly and Carry a +2. The *Turner +2* isn't a sports car, it's a new CB microphone with a built-in speech amplifier. Specifically designed for two-way radio work, the +2 uses a 2 stage amplifier to boost your voice. You can vary the amount of amplification or even kill it altogether if it isn't needed for a local contact. When you've got one of those long-hand contacts, just crank up the gain and take control of the channel with something that will sound like the voice of doom when you hit the modulation. The +2 connects to your rig's mike socket and will work with any equipment.

e.c.i. Courier 23-Plus CB Rig

Regency Ranger CB Transceiver

Turner Plus 2 Mike

See it at your local CB emporium or find out about it from The Turner Co., 909 17th St., Cedar Rapids, Iowa 52402.

Pushbutton Baby. If you've a mind to go portable-a-la-pushbutton you may want to look into the new *Claricon* 2 watt transceiver. The unit weighs in at a scant 2 lbs. and can be installed in your car or boat, or even carried slung over your shoulder from a strap. It features 2 channel operation, and all the set's functions are accomplished by means of pushbuttons. Operating from 8 "AA" penlite batteries, you can check the condition of the batteries by looking at the little meter on the front panel. The mike doubles as the loudspeaker to save space. For further information on this set, contact Claricon, 663 Dowd Ave., Elizabeth, N. J. 07201.

Don't Distress, Compress. For those of you who want a little extra soup in your set's modulation output, may we suggest the Vibratrol *Transistorized Compressor Amplifier.* With a fancy monicker like that, the thing would have to be good—and it is! Vibratrol, 7845 Merrimac Ave., Morton Grove, Ill. 60053, did it with their little soldering guns! The unit features a unique compression circuit that boosts low levels

Claricon 2-Watt CB Rig

Olson®

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*Fill in coupon for a FREE One Year Subscription to OLSON ELECTRONICS' Fantastic Value Packed Catalog—Unheard of LOW, LOW PRICES on Brand Name Speakers, Changers, Tubes, Tools, Stereo Amps, Tuners, CB, and other Values. Credit plan available.

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If you have a friend interested in electronics send his name and address for a FREE subscription also.

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INCORPORATED
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KIT OR WIRED

AM/FM receiver covers 26 to 54—88 to 174 MHz. Also, one adjustable SW band for 15-20 meters. AC power supply. 5 tubes plus silicon. Factory wired $59.95. Easy to assemble kit form $49.95.

KUHN ELECTRONICS, INC.
1801 Mills Ave.
Norwood, Ohio 45212

364 VHF RECEIVER

ANY RADIO - TV RECEIVING TUBE
32¢ EACH! $29.00 PER 100!

The price is not a mis-print! We have been supplying top service organizations for 15 years with our top quality new, used and factory-second receiving tubes! They are all individually boxed, branded, code-dated and guaranteed for 1 year! We have over 2500 types in stock continuously! You may order any type! Our stock covers 45 years of tube manufacturing!

If your order is under $5.00 send 50¢ handling! All postage charges paid by Nationwide. Canadian and foreign please send approximate postage! Send for complete free tube list!

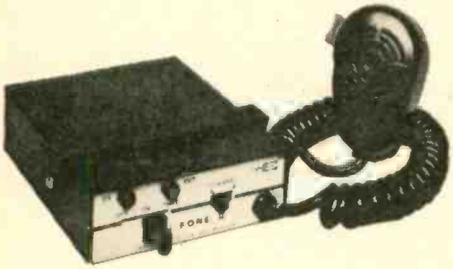
NATIONWIDE TUBE CO. (R-TVE)
1275 Stuyvesant Ave.
Union, N.J. 07083 (201)688-1414

Vibratrol Transistorized Compressor Amplifier

of modulation while maintaining high input levels at a constant output.

The unit connects in minutes to any transmitter and can be used with any crystal, ceramic, or dynamic microphone. The controls are On/Off, compression and level. The unit operates from a self contained battery so the only connections are plugging your mike into the socket on the compressor, and then plugging the compressor into the socket on the CB rig. By the way, this gadget works wonders for audio amplifiers, PA systems, and tape recorders. Price is $23.95.

Big Brown Bargain. The Multi-Elmac Co., Oak Park, Mich. 48237, whipped up a solid state CB unit which is the answer to the prayers of many folks who don't want to (or aren't able to) invest a large chunk of cash into CB gear. Their little *Citi-Fone II* rig sells in the $50 price range. The reason they are able to market a good unit at such a low price is that they have eliminated much of the frills and window dressing found in the glamour sets. The rig contains a plain and simple 5 watt transmitter offering 2 channels. It is coupled with a receive converter which feeds the CB signal into your car's regular AM broadcast radio. It's a snap to connect and doesn't require any cutting or soldering; you don't even have to remove the AM radio from the car. If you get a CB/AM coupler you can even use the car's antenna for CBing.



Multi-Elmac Citi-Fone II Transceiver

Bigmouth. For those of you who are always being told that they can hear your carrier but your modulation seem a bit low, here's the answer in spades. More than a simple mike booster, this is a highly sophisticated, distortion-free speech processor which will give your rig more than 10 db of greater "talk power" (and that's a-plenty).

In simple terms, it's a solid-state speech clipper which has been specially designed to eliminate a very undesirable by-product of many conventional clippers; that of making a very loud but highly distorted growl out of your charming voice.

The unit, known as the CSP-11, installs quickly and without grief right in the microphone lead (sure you can do it with your 10 thumbs and 20 year old soldering iron) and draws its power from its own self-contained batteries. Price is $110.

For more details and some high falootin' graphs on just what this thing can do for you, write to Comdel Inc., 218 Bay Road, Hamilton, Mass. 01982.

Rectify That Puny Signal. If you've gotten that queasy feeling that maybe 'ol Nell, your trusty CB rig, may be past its glory (or on the way to glory), here's a possible solution.

First, don't sell old Nell if you feel that her signal is somewhat less than what might be desired. Bring her back to life with one of the rectifier tube replacements being offered by Specialty Engineering and Sales Company, 600 San Mateo Blvd. S.E., Albuquerque, N. M. 87108.

The rectifier tube replacement is actually better than the original tube in your CB rig! Plugged it into the socket of the original tube (no circuit changes are required), it doesn't generate power-losing heat like tubes, avoids the current drain of tube filaments, and it has a higher voltage output than the tube it replaces.

If your set has a 6X4 or 12X4 rectifier you will be able to use the model X4. For sets having 6BW4 or 12BW4 you can have a go at the model BW4. The little devils sell for $6.95. ■

"Primitive isn't the word—they still use the Heath *lunch-box* CB transceiver!"

USSR SWBC

When did the Communist shortwave station R. Vilnus in the U.S.S.R. start broadcasting their nonsense to the free world?

—E. S., Winnipeg, Man.

Don't know! The Soviet Embassy in Ottawa or Washington, D. C. should be able to give you that information. But remember, write in a nice tone—those folks still believe in Lenin, you know.

Respect for the Aged

I have recently acquired an old Howard radio made in Chicago. For tubes it has three type 26 and a T227 plus rectifier. The last patent is April 1, 1924. The serial number must be 10271-No. 7 and it's called a Neutrodyne. It also has a battery eliminator. I wonder if you could tell me its age and approximate value. It works and is in excellent condition.

—F. J., Sterling, Ill.

Vintage 1928. Value—whatever the junk man will pay for iron and copper. Possibly some radio-TV store would like it for a publicity gag. Don't dump it tomorrow though—we'll probably have someone write in because they

"Hey!"

always wanted one exactly like their Aunt Tillie's.

Good Guy

Recently in your column, G. J. of Charlotte, North Carolina, asked for information about an old Gulbransen radio. I have considerable information on various models. If G. J. will contact me, I shall be pleased to help him. I have nothing to sell.

—H. A. C., Samoset, Fla.

G. J., if you see this, write to H. A. C. at P.O. Box 7321 in Samoset. We don't know what H. A. C.'s game is, but we're sure part of it is being a nice fellow! Our thanks!

Dick Tracy Detector

Where can I get a converter for listening to 450-MHz band police and other land-mobile stations?

—M. K., Bronx, New York

Ameco has just introduced its Model CUT converter for the 450-MHz band which can be used with an AM BCB receiver. Your local Ham or electronics parts store should have it in stock.

What's the Delay

Where can I get Amperite relays and what do they cost?

—L. L. M., Chicago, Ill.

Allied Radio in Chicago lists them in their 1967 catalog on page 299. Eyeball it and your problems are licked. In fact, everybody, look up Amperite relays and see what they have to offer. Their delay relays are handy gadgets for many a project.

Let Your Fingers Do the Walking

Where can I get or buy a band switch bracket with coil assembly and volume control with on/off switch for a Zenith Super Deluxe Trans-Oceanic portable radio model B600?

—O. V., Chicago, Ill.

Look in the telephone directory yellow pages section under "Radios, Wholesale" and you'll find the name of the Zenith distributor whose spare parts department should have the parts available. The same technique works for RCA, Motorola, Admiral, Philco, Westinghouse, etc. Gee whiz, O. V., where are you when the telephone company commercials interrupt your favorite after-midnight TV movie?

K & E, Where Are You?

My husband is a radio engineer and is having trouble finding audio-frequency graph paper. None of the business and office supply stores have it. The radio supply companies here do not seem to know where to get it. Possibly you can give us the name and address of some companies that make radio paper supplies. The name on the sheet he has is: K & E Audio Frequency —359-46G Keuffel and Esser Co. Made in U.S.A. Do you by any chance know the address?

—E.O.H., Gainesville, Ga.

The address of one of K & E's retail stores is 60 East 42nd Street, New York, N. Y. 10017. Have you tried art supply and drafting material stores?

11-Meter Dilemma

I possess a Hammarlund HQ-170 and would like to receive the 11-meter band. I would no doubt have to sacrifice the 28-30 MHz band. How should I modify the receiver?

N. W. F., Fort Smith, Ark.

For specific information, write to Irving Strauber, Hammarlund Mfg. Co., Mars Hill, N. C. 28754.

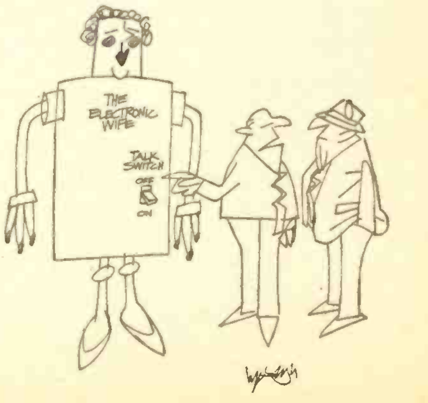
20/20—What a Deal!

Would you please tell me which is the best correspondence course you know of. I'm a school dropout of the 10th grade. I work on a tow boat and have six months out of the year free, or I should say 20 days on and 20 off. I work in a TV shop while home and know very little about electronics. I have a chance to make something of myself in the shop. I would like your help.

—J. T., Calhoun, Ky.

There are several excellent courses. Schools seeing this will probably send you information (inquirer's address is Box 84, Calhoun, Kentucky 42327). Check through the pages of this magazine (and others catering to the electronics industry) for long-standing advertisers.

P.S. Twenty days on and twenty off sounds like a good deal. The Editor had a job like that only he had 20 days on and one day off. This came to an end when he received his Army discharge.



". . . and here's a nice feature!"

Radio-TV Aug.-Sept. 1967
EXPERIMENTER

- a tonic for tired SWLs
- a hotline to NASA and the mysteries of the space age
- your passport to the unbelievable chaos of the crowded skyways

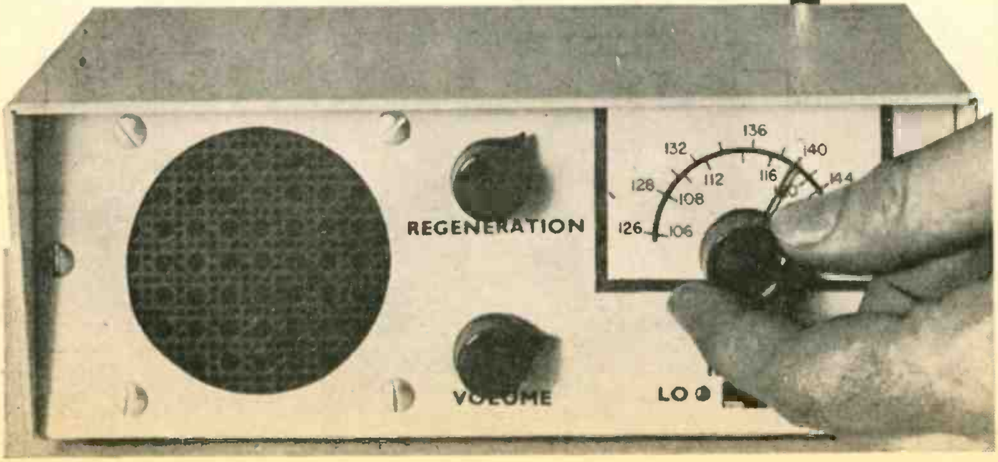
. . . that's our

STRATOSPHERIC SUPER SLEUTH

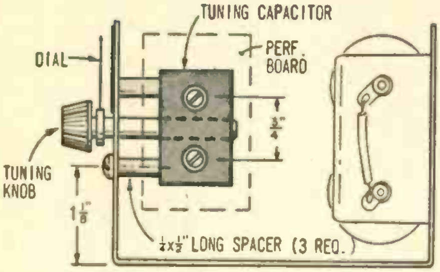
a self-powered VHF eavesdropper tuning a world you've never heard!

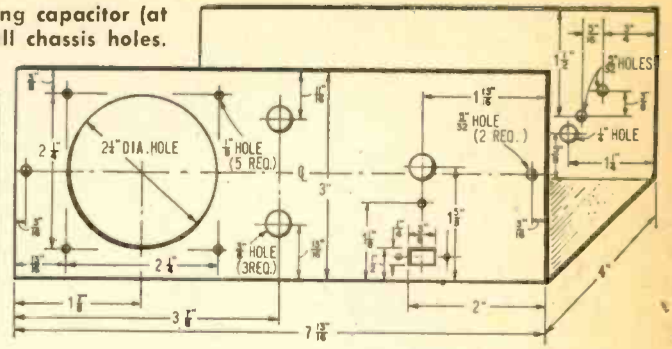
By Charles Green, W6FFQ

If SWLing doesn't pack the thrills per Hertz (cycle?) it once did, chances are you're due for a change of scene. Sure, you'll miss Radio Moscow . . . and that OA2 on 20 meters . . . and WWV . . . and the local CB folderol—or will you? Let's face it—wouldn't you rather give a listen to jet pilots and control towers, NASA satellites and other space gear, aircraft and Civil Air Patrol and maybe even 2-meter hams? All you have to do is step up to where the action is—in the VHF world above 100 MHz. *(Continued overleaf)*



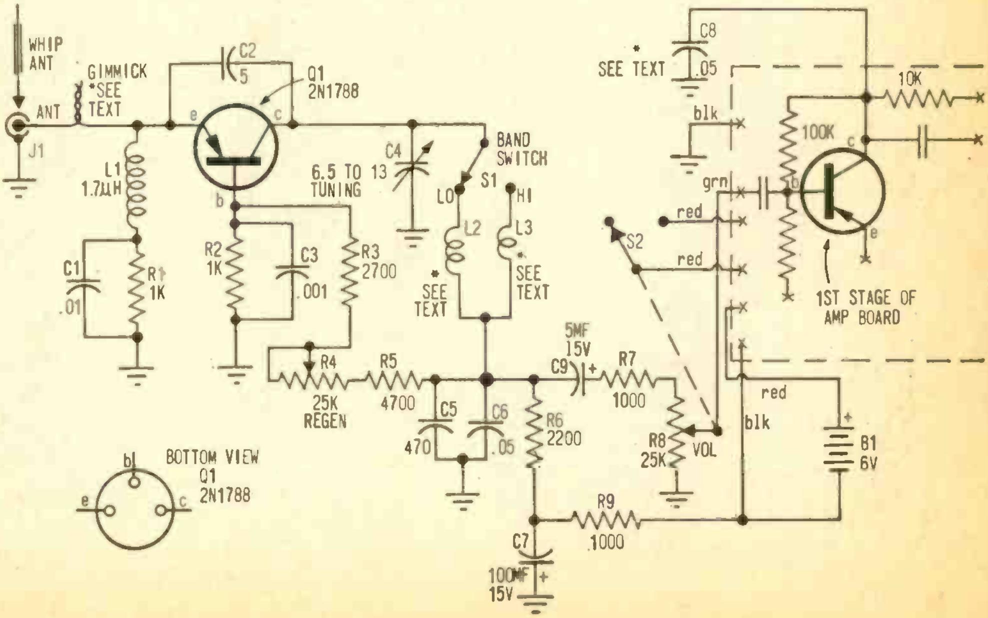
Drawings show method of mounting tuning capacitor (at left) as well as size and placement of all chassis holes.





SUPER SLEUTH PARTS LIST

B1—4 1½-volt "D" cells
C1—.01 mf, 25 V ceramic disc capacitor
C2—5 mmf, 25 V ceramic disc capacitor
C3—.001 mf, 25 V ceramic disc capacitor
C4—6.5 to 13 mmf tuning capacitor (Lafayette 32C0917)
C5—470 mmf, 25 V ceramic disc capacitor
C6, C8—.05 mf, 100 V plastic film capacitor
C7—100 mf, 15 WVDC electrolytic capacitor
C9—5 mf, 15 WVDC electrolytic capacitor
J1—Phono jack with RF insulation (Switchcraft 2505F or equiv.)
L1—1.72 uh RF choke (J.W. Miller RFC-144; Lafayette 34C8973)
L2—LO band coil (106-128 MHz, 2 turns No. 20 wire, ¼-in. diam. x ¼-in. long, with ½-in. leads—see text)
L3—HI band coil (126-150 MHz, 1 turn No. 20 wire, ⅜-in. diam., with ½-in. leads—see text)
Q1—2N1788 transistor (Sprague)
R1, R2, R7, R9—1000-ohm, ½-watt resistor
R3—2700-ohm, ½-watt resistor
R4—25,000 ohm, linear-taper potentiometer
R5—4700 ohm, ½-watt resistor
R6—2200 ohm, ½-watt resistor
R8—25,000 ohm, audio-taper potentiometer with SPST switch
S1—SPDT slide switch
S2—SPST switch (on R8)
SPKR—2½-in., 8-ohm speaker
Misc.—4-transistor audio amplifier (Radio Shack 277-1240), two dual D-size battery holders, perf board and push-in terminals, cowl-type minibox (BUD SC-2132 or equiv.), 52-in. telescoping whip antenna (Radio Shack 21-1156 or equiv.), sheet aluminum for antenna bracket, spacers, etc.
Estimated cost: $25.00
Construction time: 5 hours



The thing that makes that big step possible is our Stratospheric Super Sleuth, one of the neatest little VHF receivers ever devised. And don't shy away because you think its construction will be a grind, because it isn't. A single perf-board mounted right on the tuning capacitor holds the handful of components that make VHF reception possible; the balance of the rig consists of a ready-made audio amplifier (transistorized, of course), plus a speaker and four flashlight batteries. The unit even carries its own telescoping whip antenna.

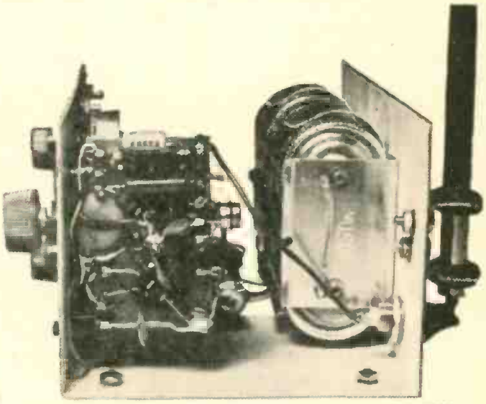
The Circuit. A glance at the schematic reveals that the receiver actually tunes two bands—106 to 128 MHz and 126 to 150 MHz—depending on the setting of bandswitch S1. A high-frequency transistor (Q1) is used in a superregen detector circuit, and the transistorized audio amplifier drives a 2½-in. speaker. A built-in battery makes this compact unit perfect for portable operation.

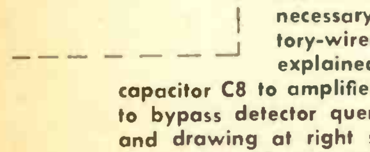
Tracing the circuit, signals received at J1 are coupled through the gimmick capacitor to the emitter of Q1; capacitor C2 provides RF feedback for the superregenerative detector circuit, which is tuned by C4 and L2 or L3 (switched by S1). The superregenerative operation is controlled by R4 and the detected signals fed through C9-R7 to R8. This potentiometer, in turn, controls the audio input to the amplifier unit and the 2½-in. speaker. Four D-cells are connected in series to supply 6 volts to the receiver and amplifier circuits.

Construction. Our model was built in a cowl-type, 3- x 8- x 5-in. aluminum minibox. The major assemblies are mounted on the front and rear panels, with the amplifier on the box bottom. Since C4's shafts are concentric for vernier action, they cannot be cut. Therefore, we used ½-in. spacers to mount C4 behind the front panel and keep the tuning knob a convenient distance from the panel surface. Countersink the front-panel mounting screw holes for C4, and use flat head screws to provide a flat surface for the dial.

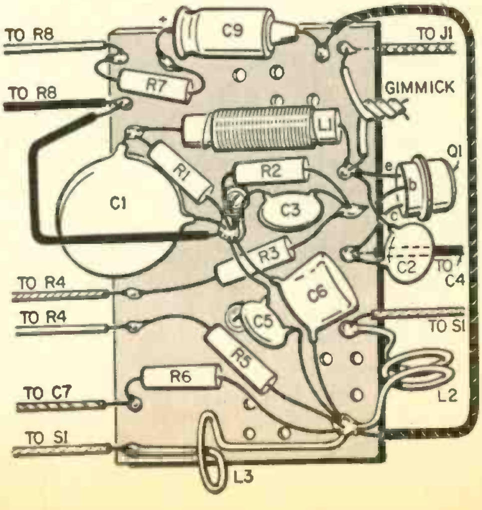
After you cut the speaker hole, install a section of perforated aluminum to protect the speaker cone. Use serrated washers between controls R4 and R8 and the inside of the front panel to prevent movement. We used rubber faucet washers as spacers to mount the amplifier. These washers will conform to the module's irregular surface and won't short the conductors as metal spacers might.

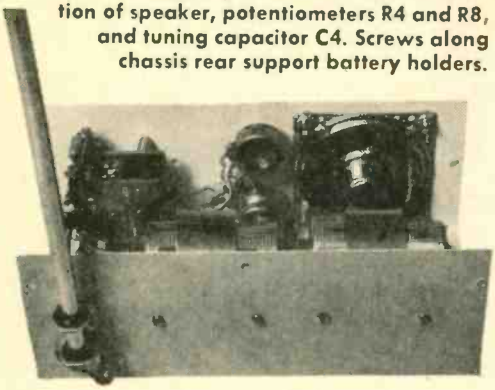
The detector circuit is built on a 1¼- x 2⅛-in. section of perf board, which is then mounted on the bottom of C4 with spacing



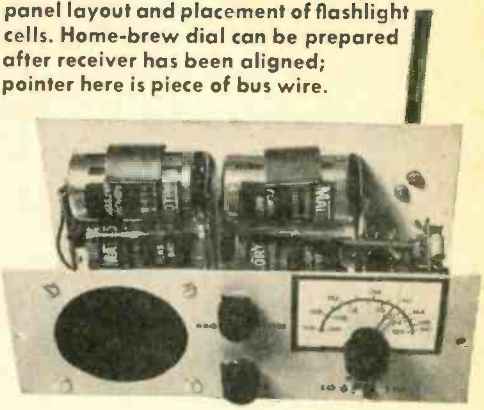


Schematic diagram at left shows superregen circuit and necessary connections to factory-wired audio amplifier; as explained in text, addition of capacitor C8 to amplifier circuit was required to bypass detector quench frequency. Photo and drawing at right show placement and wiring of perf board which holds bulk of Super Sleuth's components. Because of VHF frequencies involved, all leads must be kept as short as humanly possible. For same reason, dimensions given for coils L2 and L3 are only approximate, and you may have to cut-and-try a bit before these coils tune their required range.





Rear view of Super Sleuth, showing method of mounting whip antenna as well as location of speaker, potentiometers R4 and R8, and tuning capacitor C4. Screws along chassis rear support battery holders.



Front view of Super Sleuth, showing front-panel layout and placement of flashlight cells. Home-brew dial can be prepared after receiver has been aligned; pointer here is piece of bus wire.

washers. As with all high-frequency circuits, the wiring here should be short and direct as possible. Dimensions for coils L2 and L3 are only approximate, since their frequency coverage will depend on the exact wiring layout of your receiver. To make the coils, wind the specified number of turns of No. 20 bus wire around a ¼-in. drill for L2 and a ⅜-in. drill for L3. The gimmick capacitor is made of 4 turns of No. 22 hookup wire, with the ends separated to prevent shorting.

Bend a suitable piece of scrap aluminum into a U bracket to support the whip antenna. We mounted the antenna in rubber grommets fitted into holes cut in the bracket ends. Jack J1 should be a phono jack with good quality plastic insulation to minimize RF losses.

To add bypass capacitor C8, find the junction of the 100k and 10k resistors (at the collector of the first transistor stage) in the amplifier (check the circuit diagram supplied with the amplifier). The addition of C8 is necessary to prevent the detector quench frequency from overloading the amplifier.

The dial on our model is a 1¾- x 2¾-in. section of white cardboard, with an inked ⅛-in. border. We made the pointer with a length of bus wire inserted in a fiber washer reamed to fit snugly over the outside concentric shaft of C4.

Calibration and Operation. Install the batteries in the receiver and set S1 to the LO band position, pull the whip antenna out to full length, and turn the volume control (R8) full clockwise. Adjust the tuning control to full capacity position (full CCW) and rotate the regen control (R4) until you hear the characteristic superregen hiss in the speaker.

Set a signal generator to 106 MHz (modulated output) and loosely couple it to the receiver antenna by connecting the generator output to an 18-in. lead placed along the rear of the receiver. Squeeze or lengthen L2 until you hear the generator signal in the speaker. Adjust the volume control for a comfortable listening level and calibrate the LO band dial to 128 MHz with the generator. You may have to readjust the regen control as the tuning control is advanced up the dial.

After the LO band is calibrated, set the signal generator frequency to 126 MHz and squeeze or lengthen L3 until you hear the generator signal in the speaker. The regen control may have to be readjusted for best reception. Calibrate the HI band dial to 150 MHz with the generator.

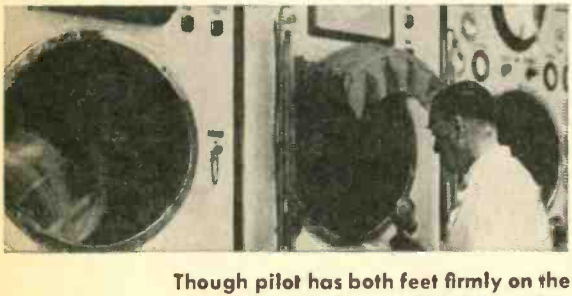
Next, disconnect the generator and tune the receiver for signals. For strong stations, the whip antenna will be OK, but for weak-signal reception an external ground-plane antenna may be required. A TV antenna will also suffice for horizontally polarized signals.

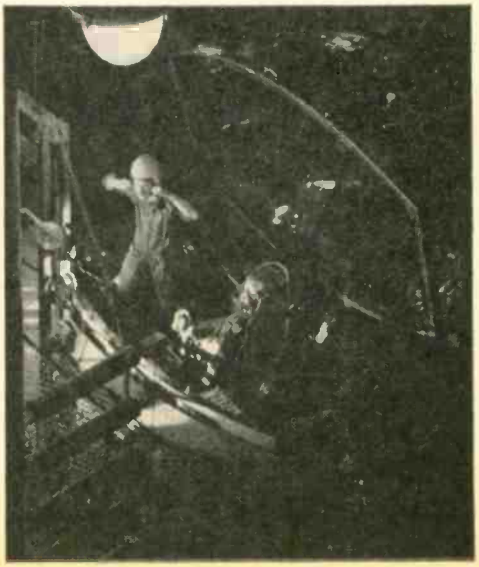
Shortening the whip antenna to about 18-in. will usually improve reception at the higher frequencies. Practice in adjusting the regen control as you tune the receiver will make reception of weaker signals easier. □

DRY RUN ON THE SST

Super solutions to super problems of the supersonic jet

■ Sooner than you imagine, super jets flying at super speeds will be winging world travelers through space to all parts of the globe. Still on the drawing boards, the Supersonic Transport (SST) poses many a problem, primarily because man and his physiology never will quite escape the horse-





Though pilot has both feet firmly on the ground, tests he undergoes simulate miles-high conditions. Mask (top) checks metabolism; centrifugal device (right) approximates gravitational pull at high altitudes. Above, physician talks to pilot in chamber as he "flies" from 8200 to 82,000-ft. levels.

DRY RUN ON THE SST

Inside chamber (above), pilot plugs leads into special suit, linking devices that monitor body functions with indicators on external panel. Pilot will be subjected to mock SST "trip," and while enroute will describe sensations to attending physicians. At right, subject adjusts breathing apparatus prior to undergoing tests in special pressure chamber.

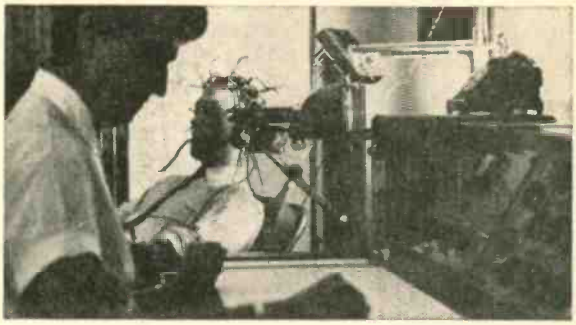
and-buggy era. In fact, projecting and solving those flight problems that concern human physiology have required a virtual dry run on the SST.

Much of this research is being carried on in France, which, with Britain, is developing the sleek *Concorde* in an effort to beat both the U.S. and in the U.S.S.R. in this particular space race. The catch is that the SST is like no other craft ever devised and designers have precious little to lean on.

Fifteen miles above the earth, for example, the brightness of the sky is about ⅓ that on the ground at high noon. The blue dwindles in color, replaced with a glare that

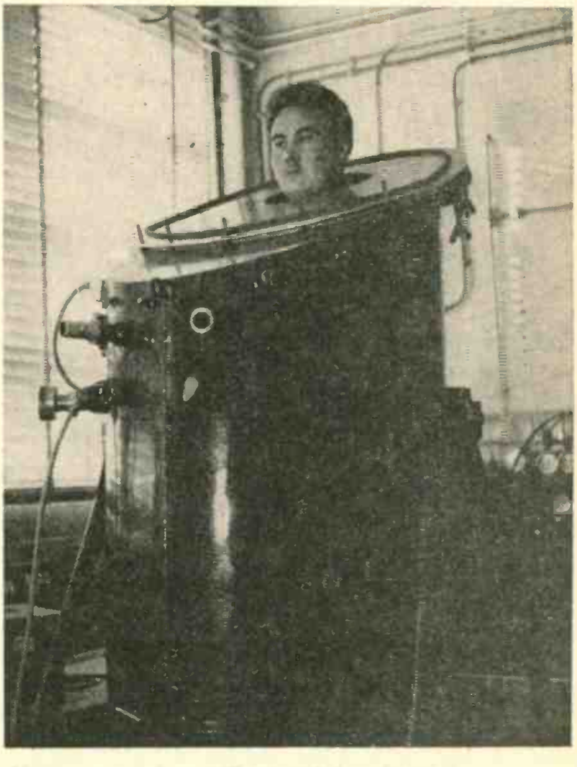
At left, subject prepares to test suit designed to maintain internal pressure equivalent to that at roughly 8200 ft even at altitudes ten times higher.

Below, electroencephalographic device charts subject's reactions to a variety of visual phenomena.



isn't light-providing but that could hurt the eyes even to the point of permanent damage. Research concluded that pilots would have to wear special glasses at all times, but designers succeeded in going one better than physicians in the course of solving this one.

Because the crew will have little need to look out cockpit windows during a flight, the *Concorde* will be equipped with a nose that rises, locking tight up into the craft during flight. But below an approximate 3-mi level, the cockpit will nose down sufficiently to let windows in the top and sides slide into place and provide a view of the surroundings. —*Ron Mitchell* ■



Above, researchers utilize special enclosure to gauge effects of differing types of air on tomorrow's SST passengers. With outside air at roughly −140 F, designers hope to capitalize on jet engines' 1200-F heat to bring cabin to required 68 F.
At left, contents of subject's lungs are analyzed to determine consequences of atmospheric changes.

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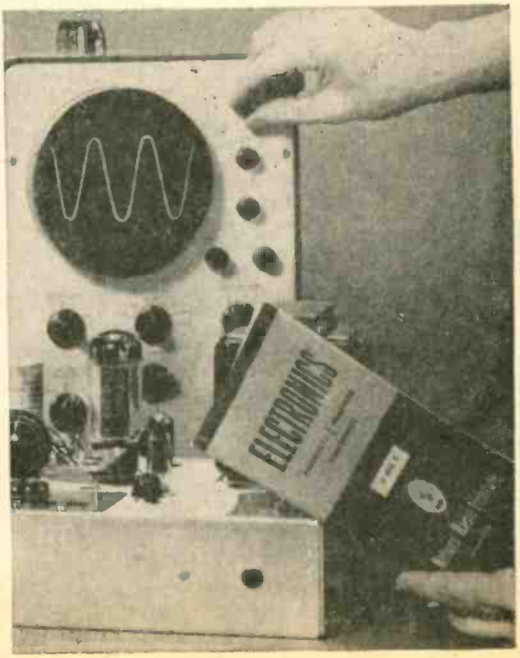
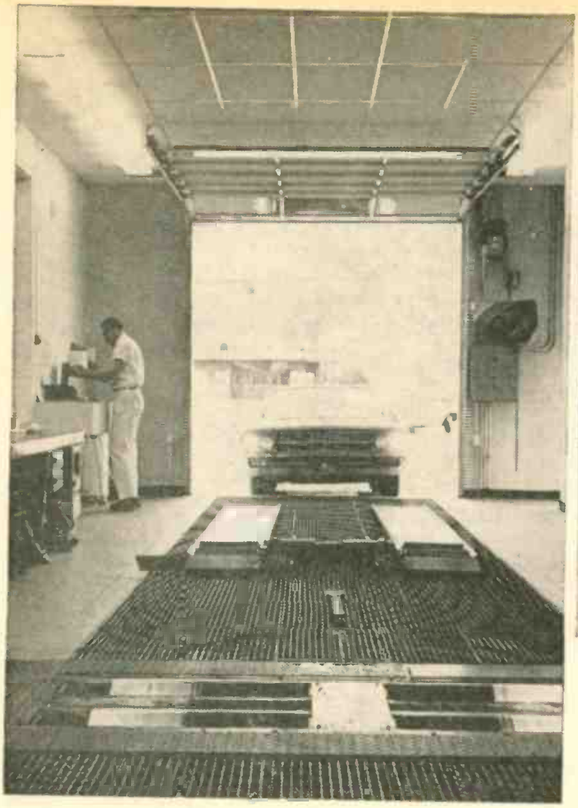


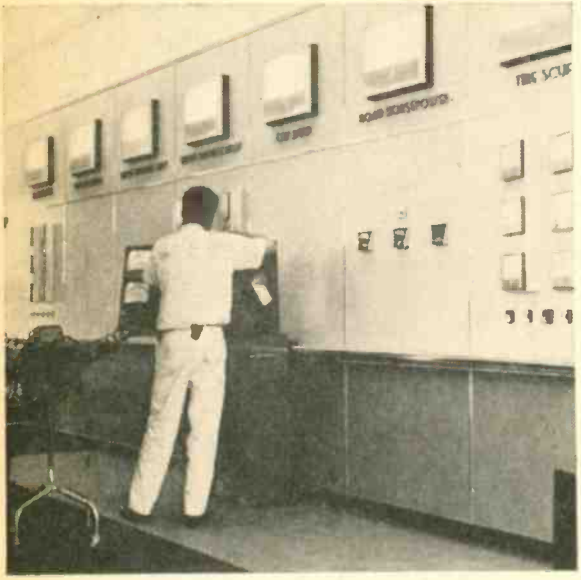


Trained mechanic lets electronic devices do all the dirty work.

Car drives onto inspection rack in electronic diagnostic center.

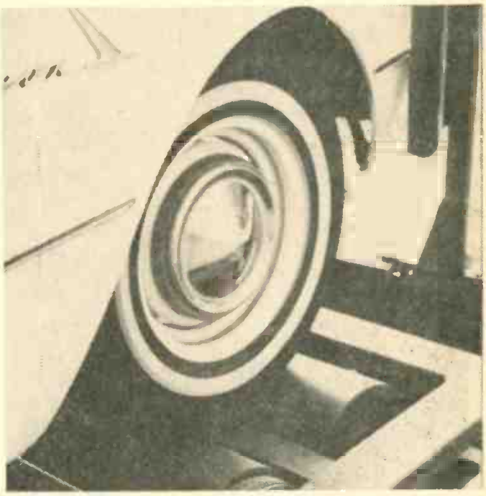
(said the computer)

sense shimmy -service same



Big board loaded with dials reads out car's health, not to mention how far vehicle will travel after the brakes have been applied.

Measuring radiator cap pressure. Wrong reading could mean engine overheating.



Front wheel spins on roller device during tests which measure braking power and degree of tire scruff. No guesswork here.

■ Is your flivver falling apart? Or is your Mustang just whinnying like an old nag? Whatever the case, don't take it to a moonlighting grease-monkey working in his backyard after 5 p.m. Take advantage of the latest in automotive repair—the electronic diagnostic center (one wag calls it "Medi-Car"!).

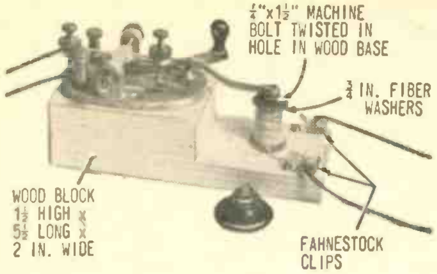
You won't see an oily rag in sight. Clean as a clinic, the center looks more like the data-processing room at Strategic Air Command. Presiding over the computer-like works is the mechanic, only now he's traded wrench and pliers for test cables and meters. He'll truss your buggy to a maze of instruments and study the read-out on dozens of electronic measuring devices.

The chart showing test results resembles the one used for an Army induction physical. But heart, lungs, and circulation are of course replaced by horsepower, ignition, and cooling system. Some 75 different diagnostic tests are administered to the vehicle, all in the course of about 25 minutes and with nary a lost moment for head-scratching or kicking the tires.

The center shown in our photos was opened recently by Socony Mobil Company just outside New York City. If the idea catches on, more such units are in the offing. A homey touch: you can watch the car as it travels the gauntlet and listen to a running commentary of the procedure.

At the end you'll get a complete analysis of the car's ailments. It could be something costly like petered-out pistons. Or the electronic doctor could prescribe: "Just a dose of Dry-Gas and you'll be A-OK in a week."■

RAZ-MA-TAZ RELAY



☐ So you're fiddling around in the shop one day and you need a relay—just a simple, regular old relay. You know—clunk, on—clunk, off. Well, if you've got an old code key sitting around not earning its keep, you've got the answer just a'lookin' for a problem.

Practically any lever-type transmitting key can be put to good use as a handy-dandy experimenters' relay. You simply mount an iron core electromagnet under the key lever as shown in the photo. Here's how.

First, make the wood block to the size shown. Cut the part that holds the coil and clips down to about ½ in. thick.

To speedily construct the magnet, slip two ¾ in. diameter fiber washers on to a ¼ in. x 1½ in. long iron machine bolt. Drill a 3/16 in. hole in the wood block directly under the head of the key and twist the bolt into the hole. Screw it down until you've got about ¼ in. between the head of the bolt and the head of the key. Now wrap the space between the fiber washers with #24 cotton-covered enameled magnet wire. The two ends go to the Fahnestock clips as shown.

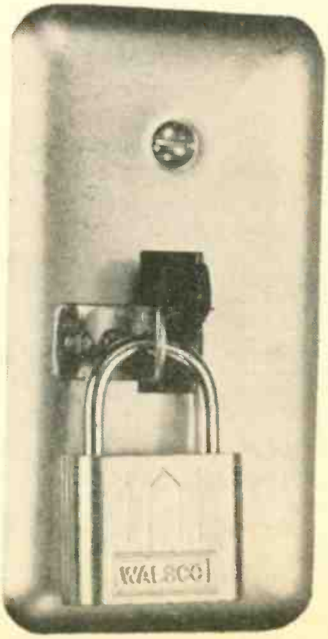
Fasten the key in the right position on the block. Then adjust the key screw adjustments for about ⅛ in. key travel, making sure that the keying contacts 'make' when the key is pulled in by the magnet. Adjust the key-tension spring for just enough zing to return the key.

This coil should be good for about six volts—but for other voltages you'll have to add or subtract coil wire to suit.

If the key lever happens to be made of brass, just screw an iron bolt into the threaded head of the key for the magnet to grab hold of.

Since most keys have both a 'make' and 'break' contact, what you end up with is a fully adjustable, single-pole double-throw raz-ma-taz relay. ■

TAMPER-PROOFER



☐ Stop telling mother-in-law, the kids, nosy friends, hostile neighbors, etc., to leave the gear in your workshop alone, to not send distress signals on your California Kilowatt ham gear, or that they may hurt themselves on that 100 watt laser you've got set up to make holograms. All you've got to do is Tamper-Proofer the ON/OFF switch, and that's simple. Take a gander at the photo and you've got the essentials.

Then, take and bend a ⅝ in. x ½ in. angle from a heavy piece of strap iron ½ in. wide. Drill yourself a hole in the ½ in. side just big enough to pass the staple of your padlock. Now drill two small holes in the other side of the angle and through the switch plate. Attach the angle to the plate with a couple of nuts and bolts, and then mangle the protruding threads so they can't unscrew the nuts when you're not looking. ■

So unlimber the rig already and . . .

DX the cream of the 49ers

By C.M. Stanbury II

■ The 49-meter band is used for regional coverage throughout the world, except in the U.S. Hence, there's always something on this band for the SWL to get his teeth into. No matter where the sunspot count stands, international SWBC stations such as R. Sweden, V. Germany, V. America, and the BBC (the latter pair with a worldwide network of relay stations) will almost always use frequencies between 5950 and 6200 kHz. And since the 1930s, when shortwave became a full-fledged communications media, stations around the world have used 49 meters for regional coverage. Thus, except for the midday period, something is always happening here, making the band a first-class hunting ground for experienced and novice DXers alike.

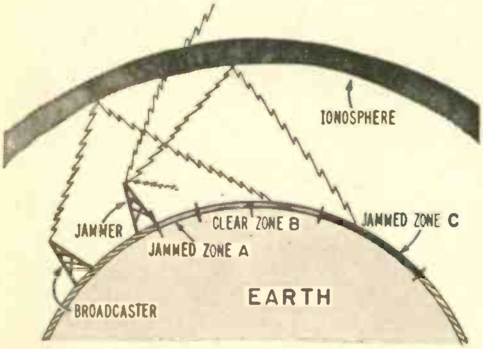
In the 30s, a number of privately owned American SWBC stations operated on 49M. The transmitters were officially licensed as experimental, but they actually served the same purpose as do today's 50-kw BCB outlets. For example, W8XK relayed KDKA (Pittsburgh), W9XAA carried programs of WCFL (Chicago), and so on. Unfortunately, regional shortwave broadcasting never caught on commercially in the U.S. And by the time World War II came along, the 49-meter transmitters not already out of business were taken over by the Voice of America and put to international use.

Everywhere else in the world, 49-meter outlets now serve to supplement coverage of BCB affiliates. Just across the border, in Canada, we have such stations as CFRX, 6070 kHz (Toronto), relaying programs of 50-kw BCBer CFRB to northern Canada 24 hours a day. Like most Canadian stations, CFRX is an excellent verifier. Another Canadian is CFVP (formerly VE9CA), which has been on 6030 kHz some 30 years relaying programs of CFCN (Calgary, Alta).

On The Continent. Over in Europe, regional broadcasting is always tinged with international aspects because of the close proximity of the many different countries and languages. And since 1945, this has been further complicated by the cold war. Under these circumstances, 49-meter outlets have a definite advantage over BCB counterparts due to the fact that nearby jammers on 6 MHz tend to skip at night (i.e., within a 200 mile radius, jamming signals pass right through the ionosphere without being reflected back to earth). And with reduced ground-wave coverage, jamming 49 meters effectively during the hours of darkness becomes particularly difficult.

Because of this, Berlin's RIAS (Radio In the American Sector) uses 6005 kHz 24 hours a day for anti-Communist transmissions to East Germany. Like V. America, RIAS is an arm of the U.S. Information Agency. At 1045 to 1800 EST, a 20-kw transmitter in West Berlin (which counts as a separate DX country) is on the frequency. For the rest of the day and night, a 100-kw outlet in Munich is used. The 6005 kHz frequency is RIAS' only shortwave outlet.

Many domestic German stations also have 49-meter relays. The list includes Bayerischer Rundfunk, 6085 kHz (Munich); R. Bremen, 6190; and Suddeutscher Rundfunk, 6030 (Muhlacker). All are fine catches when heard in North America, as are three other European regionals—R. Luxembourg, 6090 kHz; R. Monte Carlo, 6035; and R. Andorra, 5995. Watch for these stations around midnight.



Zone B is clear of jamming at night; jammer's ground-wave coverage is reduced and sky-wave goes through ionosphere or skips too far.

Come this winter, most international broadcasters returning to 49 meters for transmissions to North America will be European—especially stations on the west coast of the Continent, like R. Portugal on 6025 and/or 6185; the BBC on 6110; and V. Germany on 6075, 6100, and 6145. Just how well these stations (or other European regionals) are heard will vary considerably from night to night. On good nights, novice SWLs will get some much-needed practice in locating and logging 49-meter signals. On poor nights, DXers might as well forget Europe and look for regional stations in the tropics.

South Of The Border. In the tropics, BCB frequencies are afflicted by very high noise levels year 'round. Clear-channel BCB coverage, as we know it in the temperate zone, is very difficult. In fact, static is such a problem that special SW bands—60, 90, and 120 meters—have been allocated for local broadcasting. Despite these special bands, many broadcasters, especially in Latin America, prefer 49 meters. Many of these stations are so strong that they are a cinch to pick up. And they become even easier picking when QRM from European stations isn't around due to poor bounce conditions from that-a-way.

Control room of CFRX, Toronto's 49-meter voice to the world, located on 6070 kHz.

Come fall, you can count on at least one international Latin American SWBC station on 49 meters. That is the notorious R. Havana (Cuba), with English broadcasts every evening at 2000 EST on 6135 kHz. From Cuba, you can get to hear Helena Guzman, and friends, with such items as a course on guerrilla warfare by Ernesto Guevara, the Cuban high-up who's been hiding out the past couple of years.

Most other Latin American stations on 49 meters broadcast exclusively in Spanish, except Brazil, where the language is Portuguese (which sounds more gutteral than Spanish), and Haiti, where French and Creole (a French dialect) are spoken. None of these should give the novice too much trouble, since it's comparatively easy to pick out these stations' ID announcements, given a little practice. Possibly the easiest Brazilian station to catch is R. Inconfidencia on 6000 kHz (Belo Horizonte). You'll find it peaking around sunset. At times you may get some QRM from *La Voix de la Revolution Duvalieriste* in Port au Prince (Haiti), since it's only about 50 miles distant.

For additional info on who's where on 49, check White's Radio Log. Good listening! ■

The REAL TRUTH About RADIO AMERICAS!

By KEN SIMON

So you've heard about that DXer who thinks maybe Radio Americas doesn't make its home on Swan? Now hear about one who says it does—and proves it!

■ Radio Americas is on Swan Island or in an area within three miles of Swan and at firm anchorage. This is the only conclusion I can make after a year of exhaustive research into the whereabouts of this "semi-clandestine" station.

First, let me tell you a little about R. Americas. It is considered the direct descendant of R. Swan and as such might still be considered a front for CIA operations. The Miami representative of Radio Americas, Inc., a chap named Roosevelt Houser, said in a phone conversation with me, "We have no connection with the U.S. government. I have heard, though, that our predecessor, Vanguard Services, Inc., was mixed up with the CIA."

The station manager echoed Houser's words.

NC From CIA. While in Washington, D.C., I tried to get in touch with the CIA (yes, Virginia, there is a CIA!), but unfortunately they were not available

RADIO AMERICAS

for comment. Now (if we are to believe some rumor mills) I'm probably being shadowed and my mail watched.

And besides all that the Americas people have a commercial rate card! They accept advertising at the rate of $24 per 60-second spot, single insertion. The hourly rate is $175, single insertion. Their studios are located in Miami, or, more properly, in Coral Gables, Fla., at 101 Madeira Ave.—Zip Code 33134. I know this to be a fact because I was there.

According to the station manager, all programs are done in Miami, except the news, which, using the various shortwave frequencies of the UPI's Latin American wire, is produced on Swan itself. I'll have to take his word for this since he didn't offer me a trip to Swan (though I tried).

Their mailing address is Apartado (Box) Postal 352, Miami, Fla. They announce this on their one frequency which I measure at about 1157 kc (oops! kHz). They actually vary between 1155 and 1165 kHz. They formerly used 6 MHz in the 49-meter international shortwave band, but this was discontinued in late September of 1966.

This fact was "proof" that the station was located in Yucatan to one well-known SWL, since a hurricane devastated Yucatan during that period, not Swan. But the station manager had a slightly better answer. He told me the transmitter, an RCA job putting out 7.5 kw, had simply hit the point of no return. It was just costing too much to keep repairing a rig that wasn't paying off. If you figure listeners' mail as a response, then this 6-MHz operation just wasn't pulling its own share. Let's face it, SWLs were not Radio Americas' prime, or even secondary, target, so farewell 6 MHz!

Castro? Carramba! R. Americas (and I think this is no secret) aims for the anti-Castro Spanish-speaking crowd. They even go so far as to announce "La Voz de la Verdad para Todo el Continente." If your high-school Spanish is a little rusty that means, "The Voice of Truth for All the Continent."

By the way, if you haven't heard this station and would like to get a QSL from them, send a report of what went on during their 1157-kHz transmission for any ten-minute period to the address above. This broadcast can be heard almost anywhere on the East coast of the U.S. and should be audible except near Chicago, where WJJD spews forth 50 kw on 1160 kHz, and around Salt Lake City, where KSL booms 50 kw on 1160. In Florida, both are audible, along with Swan and a multitude of jammers.

The jammers tend to make R. Americas unique as it is the only station that the Bearded One has felt need to award more than one jammer. On an average day Ronald Schatz, a DXer from Miami (now in the U.S. Navy), has spotted up to 10 jammers putting forth noise from 1155 to 1165 kHz. This raucous racket has been described by one broadcast engineer as "FM noise," though another observer says it's more like "YEECH!"

Besides jamming Americas, Fidel's jammers (no, you can't get a QSL from a jammer!) add background fun and noise to:

WGBS	**710**	**Miami, Fla.**
WWL	**870**	**New Orleans, La.**
WMIE	**1140**	**Miami, Fla.**
. . . .	**1180**	**VOA in the Keys**
WKWF	**1600**	**Key West, Fla.**

All in all, 1100-1200 is bad for any kind of DXing, and this is to say nothing of what it does to your ears.

The great anti-Castro clandestine station, "Radio Libertad, La Voz Anti-Comunista," heard on 1404 kHz in Puerto Rico, is not jammed. This struck me as strange (actually, I was going to say a bit more about Radio Libertad . . . their postal address is blocks from my house in Miami Beach, Fla. . . . but it seems it's against postal regulations to reveal a box holder's name).

Aero and Ham. As another way of logging Swan Island that nobody will dispute, try the FAA stations. The Miami FAA supplied the following information:

Station:	**Frequency: (kHz)**	**Notes:**
WSG	3329 5945 9840	RTTY
WSG	2738	AM phone ship-to-shore emergency channel, also daily weather forecast at 1700 GMT
SWA	407	Aero beacon

All these are low-powered, but I am sure they will fill in a prepared QSL sent to Engineering Department, FAA-Miami, Miami International Airport, Wilcox Field, Miami, Fla.

Also, Hams abound on Swan or KS4 land. KS4CB, KS4CC, and KS4CD are operating on Swan using a 150-watt Allied T-150 and a 500-watt Galaxy F for CW and SSB transmissions—all this according to P.M. Holebrook, ex-KS4CA, just back from the Swan where he and KS4CB, CC, and CD work as technicians for (I have a feeling this is gonna be hard to believe) R. Americas! All will QSL, and all have listings in the Callbook.

Holebrook says that anyone who worked him as KS4CA and didn't get a QSL can QSL him through WA9OVE. He also says he is tired of all "controversy" over Americas. "It's on Swan Island, and that's all there is to that."

I think Holebrook qualifies as an eye witness.

The political implications of a Swan location also add up. Swan's ownership is questionable. Honduras says it owns it, though it's been a while since Honduras sent a government official to the island to check on its holdings (like about 100 years). The U.S. is there by virtue of guano (more commonly called bird droppings).

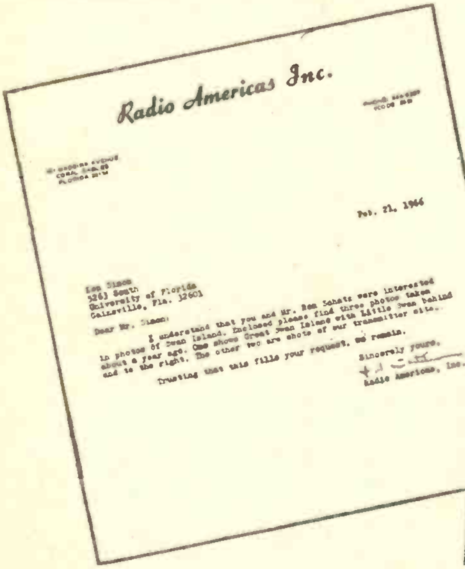
Birds Yet. It seems Lincoln's Secretary of State Seward issued a certificate for the island proclaiming it was a guano island. No one questioned Seward's ability to spot a guano island when he saw one, and during the Civil War the North needed guano for its nitrate content used in making munitions. This certificate passed from hand to hand till the U.S. "sorta" owned the island. This is somewhat like the British on Falkland Islands which the Argentine Government claims. But as a professor of international relations once said, "So what are they going to do about it?"

The FCC doesn't license the station, either. (So look at the money R. Americas has saved!) Also they don't have to give the other side equal time. (Imagine giving equal time to Fidel! One of his "short" speeches lasted 4 hours!)

But back from philosophizing to some physical proof. Gordon Nelson and Bob Keene, both top rate BCB DXers, took direction bearings on the station over a period of weeks from Boston and Houston, respectively. The results, computed by Nelson on a computer, show a square about 25 miles with a lot of water in it and, of course, Swan. This matches the comparative bearings Schatz took on the station and a few others near by. In short, R. Americas is either smack on Swan or it's on a nifty little sub or maybe a flying saucer of sorts that's but a stone's throw away.

The final proof comes to me in the form of three photos sent by the chief engineer (see letter above). They match with a map of the island found and Xeroxed by Schatz in the New York Public Library.

And if you want a final *final* reason, it's this: my mother thinks I'm right! ■



Radio Americas Inc.

Feb. 21, 1966

Len Simon
3263 South
University of Florida
Gainesville, Fla. 32601

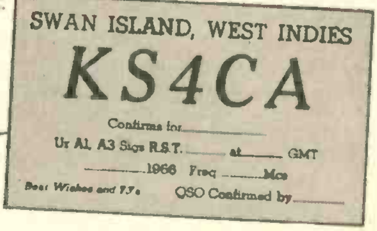
Dear Mr. Simon:

I understand that you and Mr. Ben Schatz were interested in photos of Swan Island. Enclosed please find three photos taken about a year ago. One shows Great Swan Island with Little Swan behind and to the right. The other two are shots of our transmitter site.

Trusting that this fills your request, we remain,

Sincerely yours,

Radio Americas, Inc.



SWAN ISLAND, WEST INDIES

KS4CA

Confirms to:______

Ur A1, A3 Sigs R.S.T._____ at _____ GMT

_____1966 Freq _____Mcs

Best Wishes and 73s QSO Confirmed by______

Though there is no Radio Swan these days, its direct descendant—R. Americas—is where R. Swan always was, says the author: namely, on Swan Island. Letter to author from R. Americas' Florida studio included photos of Swan (technically called "Great Swan Island," since a second island, thought to be uninhabited, is known as "Little Swan") as well as the R. Americas' transmitter site. Ham QSL card (below) is that of P. M. Holebrook, a former technician for R. Americas.

This Tapester Has Wings!

■ Bob Waters likes to take off with a tape recorder. The machine is an electronic memo pad, secretary, and thought-writer rolled in one. Flying his own Piper Apache on business trips, Bob enjoys shooting color slides from on high. But who can remember every last detail when the slides are shown later on the home screen? The tape recorder does.

An electronics manufacturer based in Wayland, Mass., Bob also finds tape just fine for recording passing thoughts or kicking around new ideas.

Where's he now? Bob may well be over the Amazon River, shooting crocodiles—on film and tape, that is. ■

Tape recorder sits in co-pilot seat atop Collins ham transceiver. Bob Waters, on mike, also enjoys aeronautical hamming. Bob is seen below loading Panasonic recorder.

Above, Bob talks into recorder mike; taping, not writing, lets him pay more attention to aircraft instruments shown below. At home, Bob edits tape before slide showing.

Propagation Forecast

By C. M. Stanbury II

August/September, 1967

An Asiatic opening which SWLs should watch for occurs around 1800 EST and peaks during the fall equinox period. This opening is particularly important for listeners east of the Mississippi where Asian transmissions are scarcer than hair on a frankfurter. At the equinox, sunset in Eastern North America occurs simultaneously with sunrise in Asia. This combination produces good reception on 41 meters, especially just outside the band proper where QRM is less. Likewise at times in the vicinity of 49 meters. On rare occasions, when the noise level is unseasonably low, Asian stations can be logged as low as 4 MHz.

Interesting prospects include R. Peking's relay base (or bases) near the Soviet border on 4200, 4220, 6875 or 7350 kHz. Whether more than one site operates on these frequencies is a matter of speculation. Accurate information on Red Chinese stations is extremely hard to come by, which makes logging them all the more interesting. Another hot one to watch for is R. Moscow's transmission to Vietnam (complete with sound effects) on 6910 kHz from a Siberian or Central Asian location. A similar opening can be expected at sunrise EST (sunset Asian time). This period may be less convenient for late arisers; however, more Far East stations are on the air at this time while North American QRM is considerably reduced. ■

RADIO-TV EXPERIMENTER PROPAGATION FORECAST

Aug.-Sept. 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	25	25, 31, 41	31, 41	31, 25	49 (60)
0300-0600	31, 25 (41)	31	31, 41	41, 60	49 (60)
0600-0900	19, 25 (41)	19	19	31, 25	31 (49)
0900-1200	19	16, 19 (13)	16, 19, 25	25	31, 25
1200-1500	19 (poor)	16, 19	16, 19, 25	nil	25
1500-1800	41 (31)	25	31	19 (poor)	31
1800-2100	19, 16	31 (25, 41)	31	19, 16	49, 60 (90)
2100-2400	19, 16	31 (25, 41)	41, 25 (60)	16, 19, 25	49, 60 (90)

To use the table put your finger on the region you want to hear and log, move your finger down until it is alongside the local standard time at which you will be listening and lift your finger. Underneath your pointing digit will be the shortwave band or bands that will give the best DX results. The time in the above propagation 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.

Build CHANTICLEER

The electronic rooster that "crows" for city folk

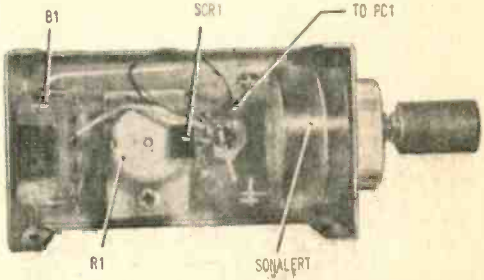
By
James A. Fred

The crow of a rooster at dawn may bring back fond memories of boyhood visits to grandfather's farm. Promptly at sunrise every day a loud *Cock-a-doodle-do* would herald the coming of dawn. Unfortunately, a crowing rooster hardly fits into metropolitan living, but it's still possible to get up at the crack of dawn. Since sunrise is variable from day to day, setting an alarm clock wouldn't do at all. The alarm clock also sounds off on cloudy and rainy days which is enough to make any cat blow his cool.

The way out is to build the electronic rooster we're about to describe. A cadmium-sulfide photocell can be used to detect sunrise, and by using a sensitivity control you can decide how bright you want the sunlight to be before it wakes you up. The alarm signal is provided by the 2800-Hz sound from a Sonalert operated by a built-in 14-volt mercury battery.

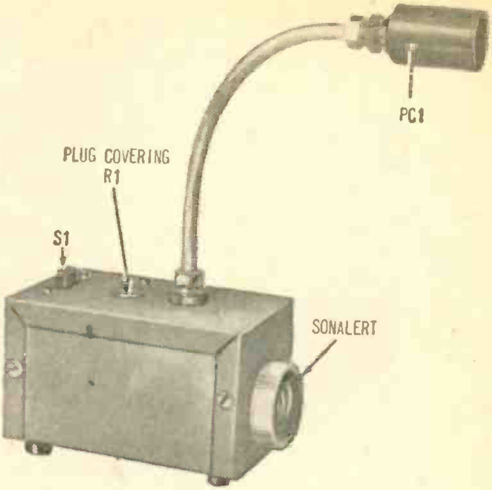
Because of the Sonalert's high resistance, the photocell doesn't operate the Sonalert directly. Instead, the photocell is used to trigger an SCR (silicon controlled rectifier), which in turn acts as a switch controlling the battery voltage.

The Chassis Box. Start the project by laying out the holes in the box. The Sonalert mounts in a $1\frac{5}{32}$-in. hole in one end of the box; a suitable bracket should be made to mount the potentiometer. Though the unit will operate quite well on a 9-volt transistor battery, the Sonalert's volume is dependent on voltage and we found a 14-volt battery preferable. The battery holder is eyeleted to the other end of the box. Be sure that the holes in the box top are marked out accurately so the adjustment hole is directly over the potentiometer.



Bottom view of "Chanticleer," showing location of all major electronic components.

The reason the sensitivity control is re-



Completed "Chanticleer," all set up and raring to crow. Housing for photocell PC1 is made from old fluorescent light starter.

cessed is because everyone seeing the Rooster would have an impulse to turn the knob if the control were panel-mounted. The plug button can be pried out and a screwdriver adjustment made when you need to change the sensitivity. The on/off switch is an inexpensive slide switch and is necessary to keep the Sonalert quiet.

The Photocell. The mounting for the photocell (PC1) was made from a piece of ¼-in. diameter soft copper tubing and an aluminum can from a discarded fluorescent light starter. To mount PC1, first remove the phenolic end and all the inside parts from the starter can. Smooth the open end with a file and make a ⅜-in. hole in the closed end. Paint both inside and out with flat black spray paint.

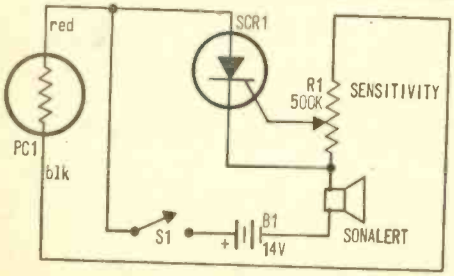
A panel bushing is mounted in the aluminum box and a shaft lock screwed into place on the bushing. The copper tubing is bent to shape and one end inserted into the shaft lock and tightened to hold the tubing in place. Another panel bushing is fastened into the hole in the starter can and a shaft lock screwed on. The shaft lock is then tightened up on the extended end of the tubing.

Flexible lead wire is soldered onto the PE cell wires and insulated and fed through the starter can and copper tubing into the aluminum box; a spot of model cement on the PE cell should serve to hold it in place in the panel bushing. The tubing is soft enough to permit bending if necessary when putting the Rooster into use. In addition, the shade over the PE cell will prevent unwanted light from possibly activating the Sonalert.

After you have fabricated the box you can add black decals or press-on letters to indicate the desired functions. A coat of Testor's clear spray will protect the lettering and prevent its wearing off.

Finishing Touches. Once you have completed assembly and wiring, check the unit very carefully. If everything looks AOK, you are ready for a test. Turn the switch on and point the PE cell towards a lamp bulb and adjust the sensitivity control until the Sonalert sounds off. Holding your hand over the PE cell should make no difference in the sound because once the SCR begins to conduct it will be necessary to turn the switch off to quiet the Sonalert.

(Continued on page 114)



Schematic reveals extreme simplicity of Rooster's circuit. Sensitivity control R1 could be mounted in normal fashion, but author placed screwdriver pot beneath chassis for more permanent setting.

CHANTICLEER PARTS LIST

B1—14-V mercury battery (Mallory RM411 or equiv.)
PC1—CL605C photocell (Clairex)
R1—500,000-ohm, linear-taper potentiometer (Mallory SU50 or equiv.)
S1—S.p.s.t. slide switch
SCR1—C106F2 silicon controlled rectifier (GE)
1—4- x 2¼- x 2¼-in. aluminum chassis box (Bud CU2103A or equiv.)
1—Length of ¼-in. copper tubing (see text)
2—Panel bushings (Mallory UB241 or equiv.; Newark 9F207)
1—Sonalert (Mallory SC628)
Misc.—Plug button, battery holder, shaft lock, rubber feet, wire, solder, hardware, etc.

Estimated cost: $15.00
Construction time: 2 hours

Build the BLACK WIDOW

A modulor keying monitor and code practice oscillator that'll cost you peanuts!

By Howard S. Pyle, W7OE

■ "Hey, Ed! I heard you working a guy in Texas the other night. Boy, did he have a rotten fist!"

"Yeah, Tom. His bug was really crawlin' all over him. Said he had no keying monitor, so I guess that was it."

Did it ever occur to you that far too many "rotten fists" stem from the fact that the offending operator has no means for monitoring CW transmissions? And could it be that *you're* a guilty "paddle slapper" yourself without even realizing it? Sure, a lot of guys listen to their sending by using their receivers as a monitor, but that method is makeshift at best. To make a long story short, why not do it right?

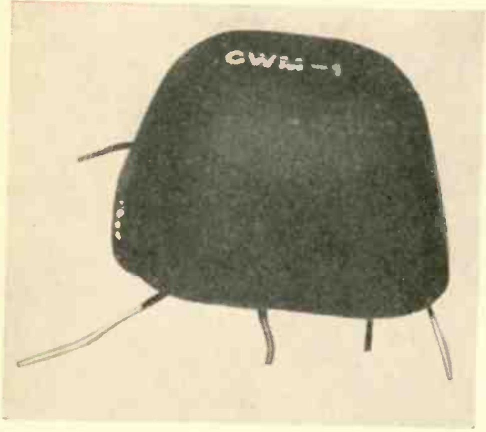
Solid, By Gum! Pick up a small, rock-hard plastic module about the size of an art gum eraser, and you've got the made-to-order answer. All of the basic components you'll need for perfect monitoring of your transmissions are completely imbedded within. You'll never know what's in the little hickey, though it's a pretty safe bet that there's a couple of transistors, plus some odds and ends of capacitance and resistance hiding out. All you'll need in addition is a single flashlight cell and any old odd-ball speaker you got laying in your junk box!

You'll find five spider-like wire legs protruding from the "Black Widow"; these are the external connections. As shown in the schematic, connect these wires to the battery, speaker, and a foot or so of hook-up wire for an RF "antenna." Five minutes should put you in business, listening to your own sending with *no* connections or modifications to either your transmitter or receiver!

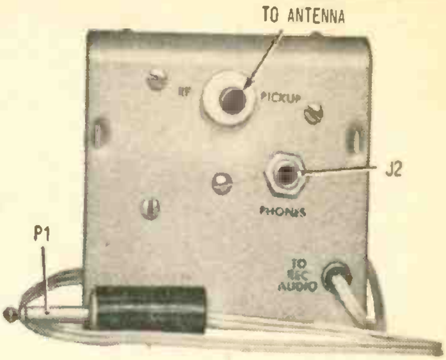
The module can be secured from the Carl Cordover & Co., 104 Liberty Ave., Mineola, N.Y. 11501 for $3.50 plus 50¢ postage and handling. Ask for their Type CWM-1 Monitor Module. You can use it as it is, as shown in the photo. Or you can do as we did and give your monitor the professional touch by dressing it up in a suitable cabinet which will house not only the module but the flashlight cell and speaker as well. Or you can go even further, as the photographs show.

Meter Case. A Bud CM 1935 universal meter case easily accommodates the 3-in. Quam PM speaker shown. The module itself is mounted on a small piece of scrap bakelite after drilling five small holes for the module leads. A generous blob of epoxy

The Black Widow



The heart of the "Black Widow" is this little epoxy-covered module—it takes all the pain out of construction since all you need to make it work is a battery, an antenna and speaker.



Rear view of author's completed version (above) showing optional phone jack, audio input from receiver, and antenna connector. Front view (top right) gives location of speaker, key jack, and volume control. Construction isn't critical and any available case and parts can be used without affecting performance. View of interior (right) provides the builder with a general idea of where to put the Black Widow's parts.

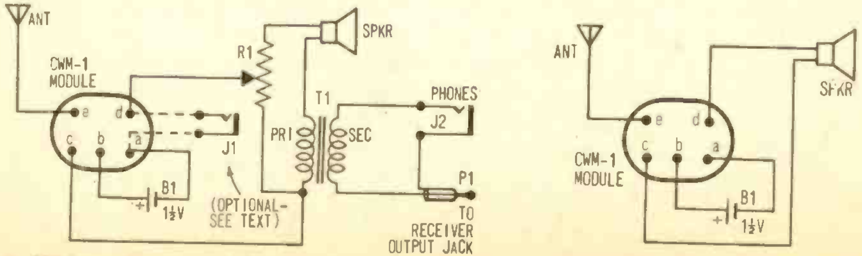
cement on the base of the module firmly secures it to the bakelite plate. The plate is mounted to the small metal transformer bracket, which is part of the speaker frame, with a couple of ¾-in. 6-32 machine screws. These should protrude far enough above the bakelite plate to provide mounting screws for a terminal tie-point strip to which all five leads from the module are soldered, thus providing a central termination point for all remaining wiring.

A volume control and a key jack (J1) can be mounted on the cabinet face as shown. The jack is provided for insertion of a key so the monitor can double as a code practice oscillator. This is a fringe benefit of the little hickey; you can include or ignore it as you choose. The volume control can be almost anything you have on hand; we used a 2000-ohm pot which we had in the junk box. On the rear face of the cabinet mount an insulated binding post for connnecting the external RF "antenna." A small, stiff wire a foot or so long is used

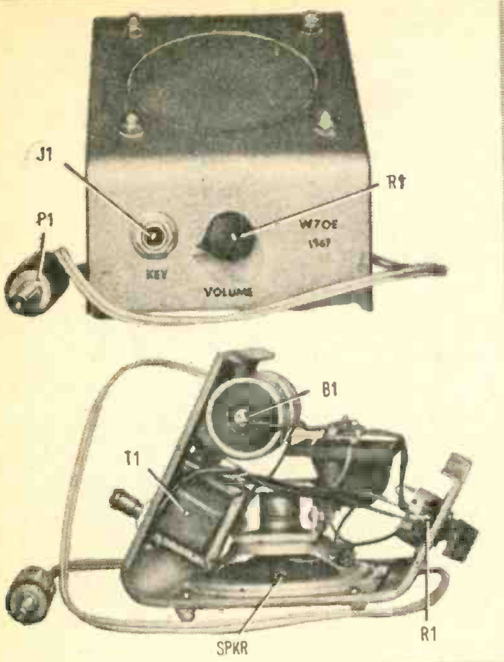
PARTS LIST FOR THE BLACK WIDOW

B1—1.5-V flashlight cell
J1, J2—Open-circuit phone jack
P1—Two-conductor phone plug
R1—Potentiometer (see text)
T1—Universal output transformer
1—CWM-1 module (see text)
1—3-in. PM speaker
1—Universal meter case (see text)
Misc.—Wire, solder, knob, hardware, etc.

Estimated cost: $5.00
Estimated construction time: 1 hour



Black Widow circuit at left is author's version, providing options for code key, headphones, and volume control. Basic circuit at right will give good monitoring of CW.



as a mini-whip, though a short piece of hook-up wire is adequate.

Once the gadget is put together, you simply move it around the shack with the antenna hanging free, while keying your transmitter. It's amazing how many places in the shack you'll find plenty of RF floating around, coax cables or no coax! We found a dozen spots where the stray RF from our 40-watt transmitter was more than ample. However, right where we wanted to locate the monitor cabinet . . . no RF!

To solve this one, we simply placed the cabinet in the desired location and ran a couple of feet of hook-up wire concealed behind the equipment to a point of good pick-up and let it lie! The result was a perfect, completely clickless, easy-to-read tone of about 300 Hz every time the transmitter was keyed—perfect monitoring which follows a bug or code key as fast as we could make them go without burning out a bearing!

Other Options. We didn't stop there, though. As habitual wearers of headphones, we wanted the monitor tone to appear in the phones as well as occasionally in the speaker. A simple modification fixed this in great style and permitted control of both speaker and headphone volume utilizing the installed volume control! We simply mounted

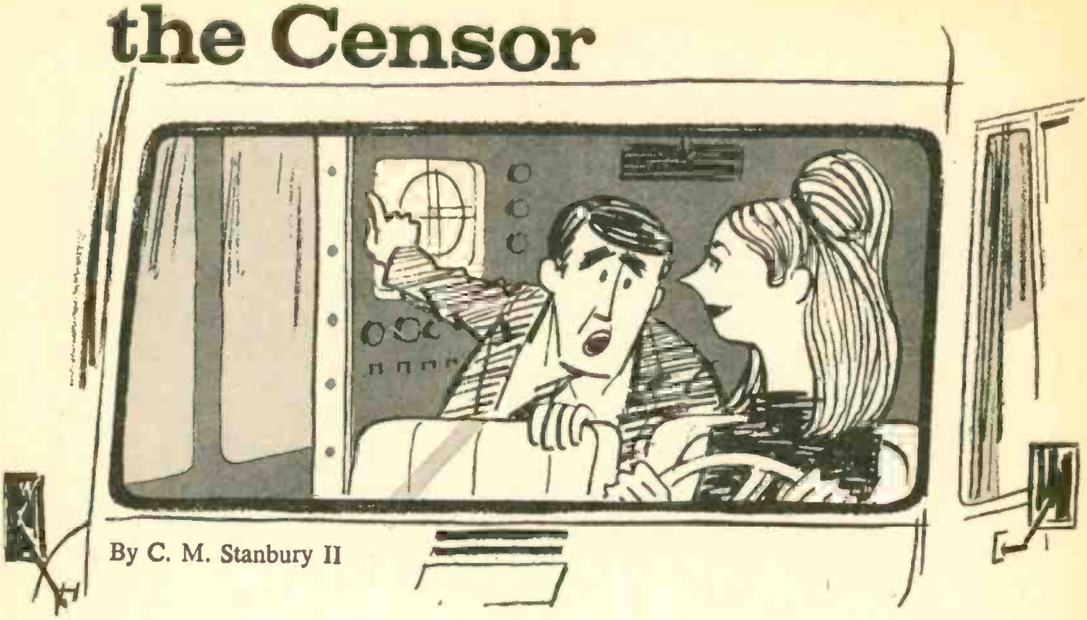
(Continued on page 112)

THOSE ABRUPT CW ABBREVIATIONS

The greatest thing about CW is the fact that it's short, sweet, and to the point as no phone transmission ever was or ever could be. The following is your guide to the short & sweet of CW, which we suggest you clip and post on the shack wall.

AA	All after
AB	All before
ABT	About
ADR	Address
AGN	Again
ANT	Antenna
BCI	Broadcast interference
BCL	Broadcast listener
BK	Break; break me; break in
BN	All between; been
B4	Before
C	Yes
CFM	Confirm; I confirm
CK	Check
CL	I am closing my station; call
CLD	Called
CLG	Calling
CUD	Could
CUL	See you later
CUM	Come
CW	Continuous wave
DLD	Delivered
DX	Distance; foreign countries
ECO	Electron-coupled oscillator
ES	And; &
FB	Fine business; excellent
GA	Go ahead (or resume sending)
GB	Good-bye
GBA	Give better address
GE	Good evening
GG	Going
GM	Good morning
GN	Good night
GND	Ground
GP	Ground plane
GUD	Good
HI	The telegraphic laugh; high
HR	Here; hear
HV	Have
HW	How
LID	A poor operator
MA	Milliamperes
MSG	Message; prefix to radiogram
N	No
ND	Nothing doing
NIL	Nothing; I have nothing for you
NM	No more
NR	Number
NW	Now; I resume transmission
OB	Old boy
OM	Old man
OP	Operator
OSC	Oscillator
OT	Old timer; old top
PLB	Preamble
PSE	Please
PWR	Power
PX	Press
R	Received as transmitted; are
RAC	Rectified alternating current
RCD	Received
REF	Refer to; referring to; reference
RIG	Station equipment
RPT	Repeat; I repeat
RX	Receiver
SED	Said
SEZ	Says
SIG	Signature; signal
SINE	Operator's personal initials or nickname
SKED	Schedule
SRI	Sorry
SVC	Service; prefix to service message
TFC	Traffic
TMW	Tomorrow
TNX	Thanks
TT	That
TU	Thank you
TVI	Television interference
TVL	Television listener
TX	Transmitter
TXT	Text
UR	Your, your're
URS	Yours
VFO	Variable-frequency oscillator
VY	Very
WA	Word after
WB	Word before
WD	Word
WDS	Words
WKD	Worked
WKG	Working
WL	Well; will
WUD	Would
WX	Weather
XMTR	Transmitter
XTAL	Crystal
XYL	Wife
YL	Young lady
73	Best regards
88	Love and kisses
99	Read Radio-TV Experimenter

the Censor



By C. M. Stanbury II

☐ I qualified for this job by working two years at an International Intelligence Agency radio station near Miami, Fla., then by logging (with my camera) all 50 states on the VHF television channels. Because of my unique monitoring talents, I was given a Ph.D. by U. See and made chief inspector of SBTV (Society for Bland, Tasteless Video). By way of explanation, SBTV is a volunteer organization designed to protect such programs as The Beverly Hillbillies, Donna Reed Show, Bonanza, etc., from illegal competition. In other words, our aim is to hunt down pirate TV stations.

We have chapters in every state and all 10 Canadian provinces. The moment one of these dangerous outlaw transmissions is spotted, I and my assistant, Mona Jones, are promptly dispatched to that part of the continent. All of which detracts considerably from my DXing time, but, on the other hand, traveling with Miss Jones does offer certain compensations.

So here I am on the morning of August 4th in Buffalo, N.Y. I have left instructions with Mona to meet me in the hotel parking lot at 9:00 a.m. Just to be certain I called her room around 7:00, woke and reminded her.

"What time is it?" Half whispered.

Double-checked my watch. "Exactly two minutes past seven."

What she said then even a master DXer like myself couldn't make out.

"You will be on time?" In my first year I tracked down only about 50% of those pirate stations reported. "You know how important this case is."

Mona hung up on me.

But when I arrived at our monitoring van, five minutes early, she was already there behind the wheel. Three rolls of extra film on the seat beside her.

I slid into the back. "Have breakfast?" Picture tube, receiver, and antenna controls were mounted at my right.

Mona shrugged. "Can't eat this early in the morning." Small, with long dirty-blond hair and perfect figure.

The parking attendant appeared and I tipped him a ten for keeping a special eye on the van, a protection against possible pirate sabotage.

She drove us out of the lot and into traffic while I warmed up the monitoring gear.

Weird weather. A fog and cloud cover had descended on the city overnight. Morning, and the fierce August sun was still blocked off by those clouds. Mixed with smoke, dust, and exhaust resulting in overwhelming smog.

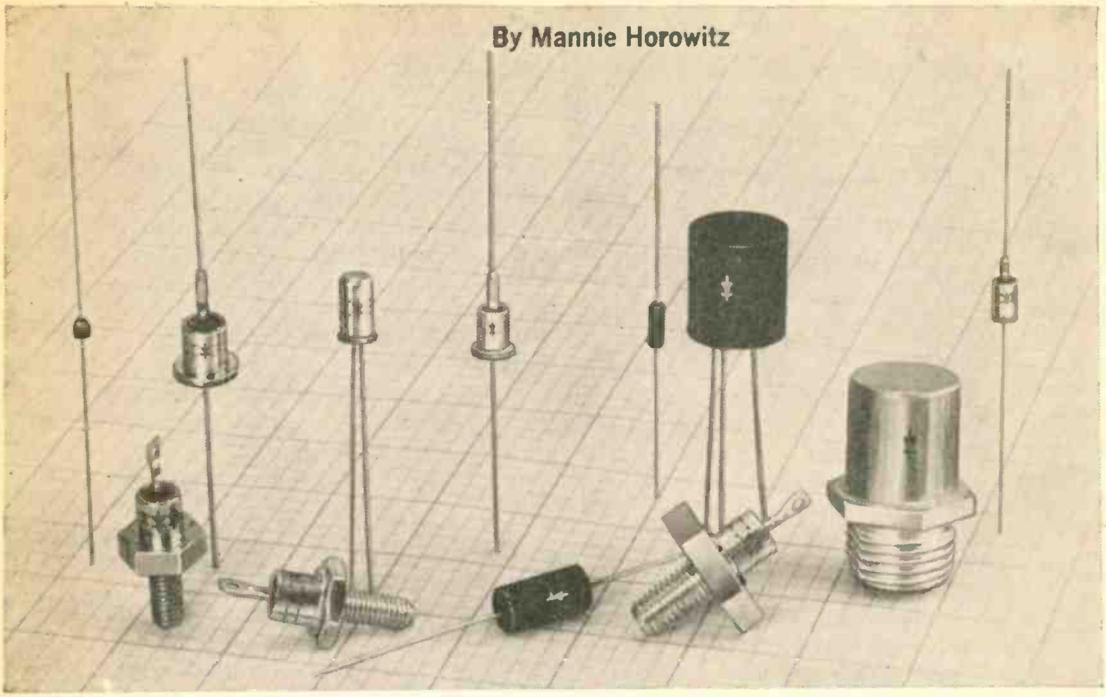
"Head north out Niagara." I put my receiver on Channel 9; a trace of CFTO from Toronto.

Mona stopped for a red light. "Do you know where you're going?"

(Continued on page 113)

Design Your Own Zener Supply

By Mannie Horowitz



Zeners are one of the handiest occupants of the semiconductor bandwagon but one of the most confusing to the experimenter.

■ As is the case with the old-fashioned vacuum tube rectifier, the semiconductor diode consists of two elements. One of these is a cathode and the other an anode (often called a "plate" in the case of tubes). Schematic representations of the two types of diodes are shown in Fig. 1.

In tube diodes, a filament heats the cathode, causing it to emit electrons. If the plate voltage is made positive with respect to the cathode, these electrons will flow through the vacuum from the cathode to the plate or anode. If the polarity is reversed and the plate is made negative as compared with the cathode, the electrons would form a cloud known as a "space charge" near the cathode. The end result is that no electrons will flow through the tube.

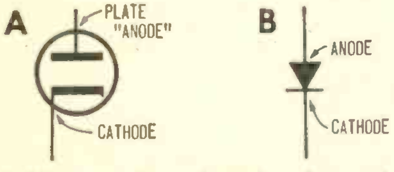


Fig. 1. Vacuum tube and semiconductor diodes have same basic function but work differently.

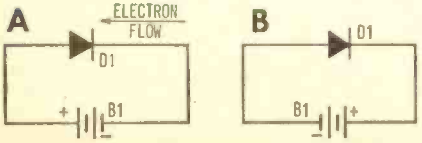


Fig. 2. Normally, current flows only in A, but in zener hookup current will flow in B.

A similar situation exists with the semiconductor diode. If a battery were connected across the diode as shown in Fig. 2A, the anode would be positive with respect to the cathode and electrons would flow through the diode from the cathode to the anode. Should the battery be reversed as in Fig. 2B, no electrons would flow—supposedly, that is. But this "no electrons" business requires one big qualification and really furnishes the wherewithal for the zener diode.

Current And Electrons. Let's go one step further. As you may have noticed, the term "current flow" hasn't been used until now. A flow of electricity through the diode was referred to as "electron flow." Electrons flow from the negative (−) post of the battery, through the diode or other load in any circuit, back to the positive battery terminal. At one time, current was considered as taking a reverse path, i.e., from the positive end of the battery, through the load or diode, to the negative terminal. Therefore, though the point of the triangle in the diode symbol points toward the negative battery terminal, current actually flows in the opposite direction. The direction of electron (i.e., current) flow is depicted by the arrow in Fig. 2A.

When the diode is connected as in Fig. 2B, however, no current will flow—at least theoretically. Still, there is always some leakage current flowing from the cathode to the anode of the diode. Further, if the size of the battery is increased beyond a specific safe voltage, the diode will "break down." The zener and avalanche breakdowns are the basis of operation of the so-called "zener" diodes.

Diode Curves. Not surprisingly, curves have been drawn to describe the action of semiconductor diodes. When they are forward biased, as in Fig. 2A, the curve is similar to that shown in Fig. 3. Fortunately, that curve contains a great deal of information about a given diode. For example, if a battery of V_1 volts were placed directly across the diode, I_1 amps (or milliamps) of current would flow. This can be seen from the intersection of the vertical and horizontal broken lines with the diode curve.

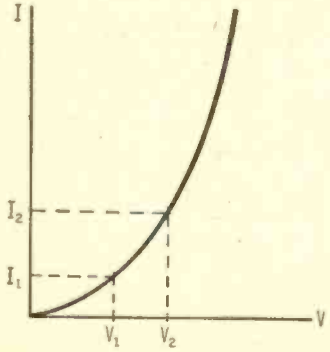


Fig. 3. Curve represents relationship between voltage (V) and current (I) in rectifier diode.

To use a curve such as this, first note the battery voltage impressed across the diode. Next, locate this voltage point on the horizontal axis, then draw a vertical broken line from the horizontal voltage axis until the line crosses the diode curve. From the point where the curve and broken line intersect, draw a horizontal line to the vertical current (I) axis. This is the current flowing through the diode.

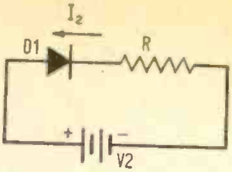


Fig. 4. Adding resistor in series with diode allows load line to be constructed, showing action of diode which lets it be used as a voltage regulator.

The drawing also shows how to find current I_2 with a supply voltage V_2 across the diode (the procedure is identical to that for finding I_1 with V_1 volts applied).

Now let's go one step further. Suppose the circuit included a resistor, as shown in Fig. 4. What will the diode current be, and what will the voltage be across the diode?

Load Lines. The effect of the resistor on the circuit can be determined by constructing a resistance load line over the diode curve, as shown in Fig. 5. This can be accomplished very simply in a few steps.

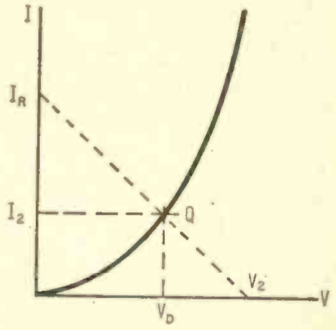


Fig. 5. Plotting voltage/current curve of diode make use of load line in graph shown above.

1. Make a dot on the voltage (V) axis at the place representing the V_2 voltage supply.

2. Calculate the current that will flow when the voltage across the diode is zero, or all the voltage is across the load resistor, R. This current is $I_R = V_2/R$. Mark this point as I_R on the I axis.

3. Connect the two points determined in steps 1 and 2 with a straight line.

4. The straight line drawn in step 3 will intersect with the diode curve at point Q. Draw a horizontal line from Q to the I axis.

5. Read the current I_2 on the I axis. This is the current that will flow through the diode.

6. Draw a vertical line from Q to the voltage axis. V_D is the voltage across the diode.

These steps may seem long and involved. However, given a few attempts the procedure becomes quite simple, and the revealed circuit information will be readily evident. True, the V-I plot of a diode may be curved, as shown in Fig. 5. However, it is possible to approximate the curve with two straight lines, as depicted in Fig. 6.

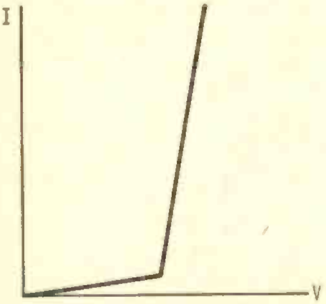


Fig. 6. Voltage/current curve of diode may be represented by the straight lines above.

Note that one of the two lines is almost horizontal, while the other is almost vertical. Using the circuit in Fig. 4, assume V_2 is not a constant voltage. Let's say that it varies from V_A to V_B. It then becomes necessary to draw similar loadlines for the circuit with voltages V_A, V_B, and V_2. Then we can see how the current through the diode and the voltage across the diode will vary with the supply voltage V_2. To clarify matters, let's draw these load lines on the approximate curve, as shown in Fig. 7.

When the voltage is at its center value, V_2, the current through the diode is I_2, and the voltage across the diode is V_{D2}. If the supply voltage drops below its center value to V_A, the current through the diode drops to I_A and the voltage across the diode drops to V_{DA}. Should the reverse happen and the supply voltage rises, the diode current increases to I_B and the voltage across the diode is V_{DB}.

From this construction, we can easily see the action of the voltage regulator if we make two important mental notes.

First, the diode current varies considerably with the supply voltage. And second, the voltage V_{DA}, V_{D2}, and V_{DB}, across the diode are almost identical. These voltages vary little with the voltage variations of the supply. To put it another way, the voltage across the diode is more or less constant (within limits, of course) regardless of the supply voltage.

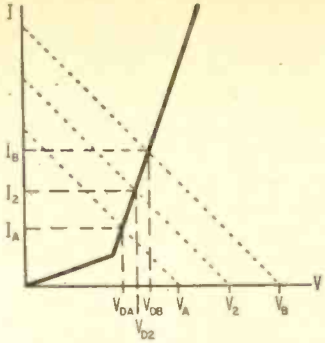


Fig. 7. Regulation occurs because variations in current are greater than those in voltage.

If a load resistor, R_L, were placed across the diode, as in Fig. 8, the voltage across the load would be exactly equal to the voltage across the diode (voltages across all elements connected in parallel are always equal). Thus the voltage across the load, as is the case with the voltage across the diode, is reasonably constant. This is the basis of the voltage regulator.

Regulator Secrets. The mechanism of this arrangement is quite simple. As the supply voltage rises, the current through the complete circuit rises. An increase in current means in increase in voltage drop, IR, across the series resistor, R. The current through the circuit adjusts itself so that after the IR voltage drop across the resistor is subtracted from the total supply voltage, the constant voltage, V_D, always remains across the diode and consequently across the load, R_L.

Now if the current through R rises, the current through the parallel combination of the diode and R_L must also rise. If this is so, doesn't the IR drop across these two elements in the circuit also rise, and increase

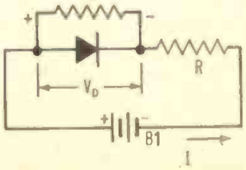


Fig. 8. Diode in parallel with load R_L provides some regulation of voltage to load.

the voltage across the parallel combination?

The answer to this may be derived from the construction in Fig. 7. As the supply voltage and circuit current rise, the diode current rises. However, the voltage across the diode remains unchanged. All the current-increase in the circuit passes through the diode and none through R_L. The voltage across the diode remains relatively unchanged despite the increase in current.

The current through (and consequently the voltage across) R_L will remain constant for two reasons. First, the diode voltage remains unchanged regardless of the current change, and this voltage is identical to that across R_L. Second, the diode absorbs all current change and there is thus no addition to the current through R_L. Thus, if there is more than an average current flow through the combination, any excess will flow through the diode and not the resistor.

A similar case can be built for the condition where the supply voltage falls below its average value.

AC Resistance. One more characteristic of this circuit should be studied before we turn to the zener diode itself. Every diode behaves as a resistor, and its resistance varies with the slope of the curve. As you know, the resistance of an element is equal to the voltage across this element divided by the current passing through it. If this voltage and current vary for some reason or other—a change in supply voltage, say—the element will exhibit an AC resistance. This AC resistance is the variation or change of voltage across the element divided by the change of current.

In the example in Fig. 7, the AC resistance of the diode is

$$\frac{V_{DB}-V_{DA}}{I_B-I_A}$$

It is interesting to see that because V_{DB} and V_{DA} are almost identical, the difference between the two is practically nil. Substituting this into Equation 1, the AC resistance of the diode is found to be very low, approaching zero. When the resistance of the diode is low with respect to the resistance of the load, R_L, the diode circuit dominates the situation and can therefore be used to regulate the voltage.

Diodes make good regulators when they are forward biased. Regulation obtained with a germanium diode is about 0.2 volts and across a silicon diode, about 0.6 volts. What happens if regulators of different voltages are required? Several diodes can be added in series, but the voltage range is extremely limited. Zener and avalanche diodes have been provided to take care of the large variety of voltage conditions needed in semiconductor circuits.

If diodes are reversed biased, as in Fig. 2B, extremely tiny currents will flow—in the order of microamps. As the reverse voltage is increased, a voltage is reached where the current will increase rapidly. This change from minute to large amounts of current flow is especially abrupt in zener diodes. A drawing of this is shown in Fig. 9. This voltage, V_x, is the reverse breakdown voltage for the diode. In the case of zener and avalanche diodes, this breakdown is not permanent, but diode action is restored once this voltage is removed.

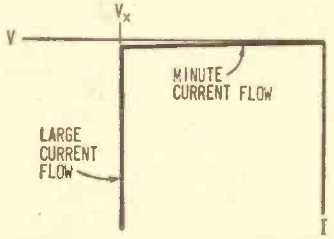


Fig. 9. Voltage to current relationship in reverse biased zener. V_x is avalanche point.

Zener And Avalanche. The breakdown voltage is one of two types. If the voltage is less than about 5 or 6 volts, it is a zener breakdown. Above this point, it is an avalanche breakdown. And around the 5- or 6-volt level, it is a combination of both.

Zener breakdown is caused by strong electric fields in the diode due to the reverse voltage. Avalanche breakdown is due to the collision of particles in the diode. In either case, the regulating element is referred to as the zener diode.

The zener regulator works better than the forward diode regulator however, the applied voltage is reversed. In Fig 10A, a circuit with a reversed biased zener diode is shown. The power supply is variable. The curve for the reverse biased diode is drawn in Fig. 10B with the load lines for the three extreme values of the applied voltage. (Note that the load lines are determined as out-

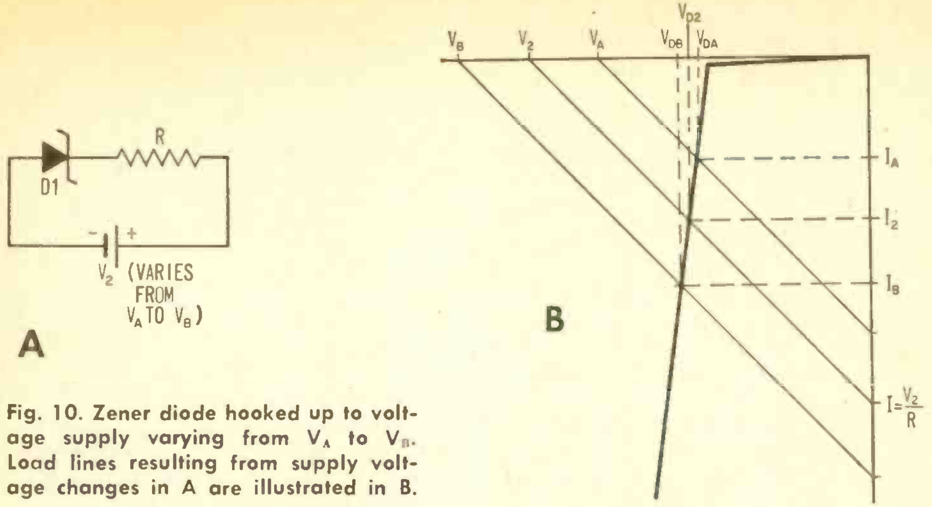


Fig. 10. Zener diode hooked up to voltage supply varying from V_A to V_B. Load lines resulting from supply voltage changes in A are illustrated in B.

lined previously for the forward biased case). The voltage across the zener remains approximately constant for all voltage variations of the supply.

The AC resistance of the diode is determined from the equation for Fig. 7. The voltage across the diode and the voltage across any load, R_L (whose resistance is high-compared to that of the diode) connected across the diode, remains relatively constant despite supply voltage variations.

Designing A Regulator. Now that the operation of the zener diode has been outlined, it becomes quite simple to derive several formulas to allow us to design a regulator.

A conventional zener regulator circuit is shown in Fig. 11. The idea is to keep the voltage across R_L constant despite a variation of supply voltage, V_2. First, let us assume that V_2 is at its minimum value, V_A. If the voltage across the zener diode is fixed at V_x, the voltage remaining for series resistor R is the supply voltage minus the voltage across the diode or $V_A - V_x$.

Let's further assume that the zener is so arranged in the circuit that the minimum current flowing through the diode is 1/10 the current flowing through the load, or 0.1 I_{RL}. Thus the total current flowing through the parallel combination of the zener diode and the load resistance, R_L, is 0.1 $I_{RL} + I_{RL}$. Since the total current flows through R, R must be equal to

$$R = \frac{V_A - V_x}{0.1\ I_{RL} + I_{RL}} = \frac{V_A - V_x}{1.1\ I_{RL}}$$

In short, putting Ohms' Law into play, I_{RL} is equal to the zener voltage divided by R_L.

The next problem is to determine the power dissipated by the zener diode. The maximum power is dissipated when the input voltage is at a maximum, V_B.

Under this condition, the voltage across R is $V_B - V_x$. Thus the current through R is $(V_B - V_x)/R$. The current through the load remains I_{RL}. Therefore the maximum current through the zener diode is the difference between the two currents or

$$\frac{V_B - V_x}{R} - I_{RL}$$

Since the dissipated power is the voltage multiplied by the current, the power dissipated by the zener is

$$P_z = \left(\frac{V_B - V_x}{R} - I_{RL}\right) V_x$$

For practical purposes, when choosing an appropriate zener diode, the calculated power should be doubled. Choose a diode rated

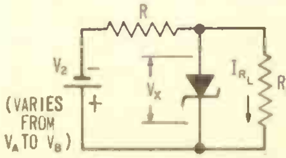


Fig. 11. Typical zener diode voltage regulator circuit. Voltage across diode is held constant despite variations from V_A to V_B.

at double the dissipated power. For powers on the order of several watts, an appropriate heat sink should be used.

Now what about the AC resistance of the zener? In the equations we just derived, we assumed perfect regulation. In other words, we assumed that the output voltage did not vary one iota with the variation of supply voltage. Unfortunately, this is an ideal but impossible situation.

Because of the AC resistance, there is always some output voltage variation with input signal, however slight. It is best to use a zener with a low AC resistance if this variation is to be maintained at a minimum.

Using The Formula. The equations presented here can be used in all practical designs of voltage regulators. And though results are approximated, they are more than adequate in most instances.

For example, suppose a 400-ohm load, R_L, must be supplied 18 regulated volts. Assume a 30-volt unregulated supply is available and that the voltage on the supply varies from a low of 27 volts to a high of 33 volts. The problem is to determine an optimum value for R, and the power dissipated by R and the zener diode. When this information has been determined, both components can be specified.

Since 18 volts must appear across R_L, the current through R_L is

$$I_{RL}=18/400=4.5\times10^{-3}\ amps=.045\ Amps.$$

We now have all the required numbers and can turn to Ohms Law.

V_A=minimum supply voltage=27 volts.

V_z=zener diode voltage=18 volts (the same as across R_L, since they are in parallel).

I_{RL}=the current through R_L—.045 amps.

Using Ohm's Law, we find

$$R=\frac{V_A-V_z}{1.1\ I_{RL}}=\frac{27-18}{1.1\,(.045)}=\frac{9}{.0495}=182\ ohms$$

Since a 182-ohm resistor isn't a readily available value, we can use a 180-ohm resistor for R.

All the values for determining the maximum power dissipated by the zener diode are also known:

V_B=maximum supply voltage=33 volts.

V_z=zener diode voltage=18 volts (This is assumed constant under all conditions.)

R=180 ohms (just calculated).

I_{RL}=.045 amps (calculated above).

Substituting these numbers into our power-dissipation formula provides us with a power dissipation figure for the diode under the worst conditions—at maximum line voltage.

$$P_Z=\left(\frac{V_B-V_X}{R}-I_R\right)V_X=\left(\frac{33-18}{180}-.045\right)18$$

$$=\left(\frac{15}{180}-.045\right)18=\left(.0832-.045\right)18$$

$$=(.0382)18=0.69\ watts$$

Locking D1 Down. The specifications for the zener are now completely known. It must be of the 18-volt type capable of at least .69 watts dissipation. A commercially available 0.750 watt (or 750 mw) unit may be used. Some types can be bolted to a metal chassis for heat sinking. For best regulation, use the ones with the lowest internal resistance.

The series resistor R is 180 ohms. The maximum current through R is

$$\frac{V_B-V_X}{R}=\frac{33-18}{180}=\frac{15}{180}=0.083\ Amp.$$

The power dissipated by the resistor is

$$I^2R=(0.083)^2x180=(.0069)\ 180=1.24\ watts.$$

The resistor should be capable of dissipating at least double this power to operate reliably. A 180-ohm, 2-watt unit should be used.

The calculations given are usually adequate to define the circuit. For more precise results, the load lines should be plotted on the curves, as previously described.

The complete circuit for this unit is shown in Fig. 12. The 400-ohm load is across the zener diode and the 180-ohm, 2-watt resistor is in series with the load and diode. The entire circuit is powered by a 30-volt unregulated DC supply.

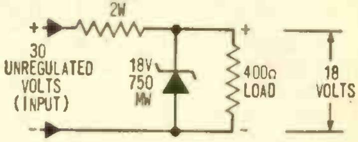
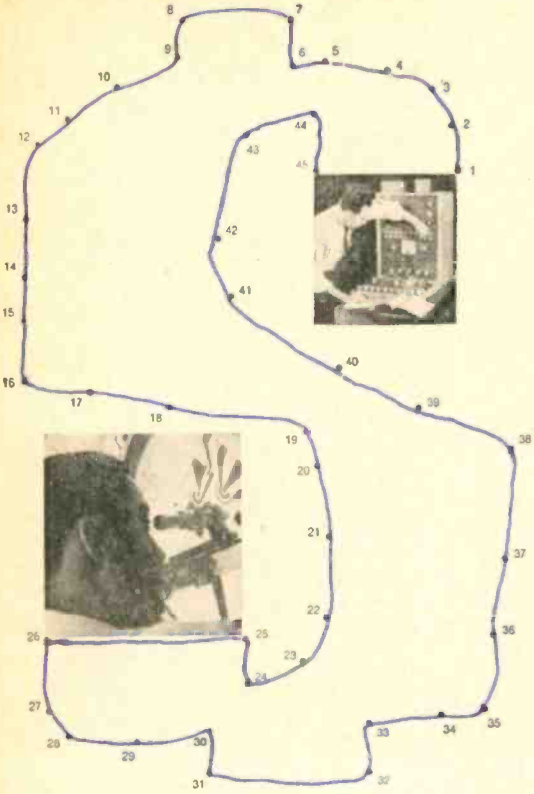


Fig. 12. Actual circuit for 18-volt regulated supply employing 30 volts input. For this type circuit, load resistance must be known and of fixed value to obtain regulation.

Securing the proper zener diode may be a problem if you just look in the standard electronics catalog. Some catalogs list a

(Continued on page 62)



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Zener Supply

Continued from page 58

series of JEDEC standard numbers for the zener diodes, but do not tell you any of the diode characteristics. Other catalogs list nothing at all.

Fig. 13 is a chart listing the most popular diodes and their JEDEC numbers. You need an 18-volt diode with a 750 mw rating in the problem just completed. Go down the first column until you find the zener voltage you are interested in. All items in this row are 18-V zener diodes. The third column is labeled 750 mw. In this column, the JEDEC number of the 18-V, 750-mw diode is 1N1515. Order your diode from the dealer under this number.

Zener Voltage	400 mw.	750 mw.	1 watts	3.5 watts	10 watts	50 watts
3.9	1N748	1N1507	1N1518	1N1588	1N1599	
4.7	1N750	1N1508	1N1519	1N1589	1N1600	
5.6	1N752	1N1509	1N1520	1N1590	1N1601	
6.8	1N754	1N1510	1N1521	1N1591	1N1602	1N3305
8.2	1N756	1N1511	1N1522	1N1592	1N1603	1N3307
10	1N758	1N1512	1N1523	1N1593	1N1604	1N3309
12	1N759	1N1513	1N1524	1N1594	1N1605	1N3311
15		1N1514	1N1525	1N1595	1N1606	1N3314
18		1N1515	1N1526	1N1596	1N1607	1N3317
22		1N1516	1N1527	1N1597	1N1608	1N3320
27		1N1517	1N1528	1N1598	1N1609	1N3323

Fig. 13. Popular JEDEC zener diodes

A Second Example. Now let's proceed to a second and somewhat more complex example. Assume you have the same 30-volt unregulated power supply as in the first problem, and the supply voltage still varies from 27 to 33 volts. Now you have a 200-ohm load resistor, and you need 6 regulated volts across the load. The problem is set up in Fig. 14A.

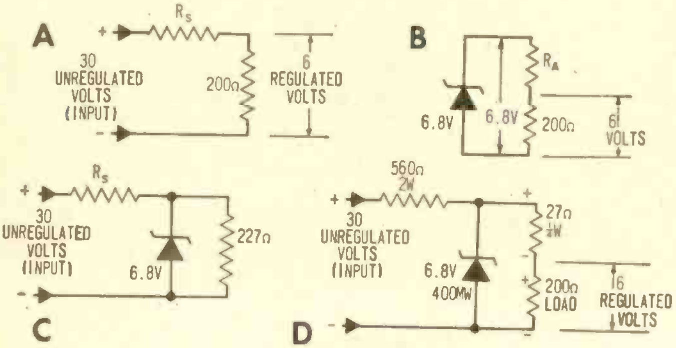


Fig. 14. The major steps in determining component values to obtain a regulated 6-volt output. Problem is the same for any voltage required, but values must be substituted accordingly—diodes are selected from chart.

You scrutinize the chart in Fig. 13. You can easily get a 5.6-volt diode and a 6.8-volt diode. But there is no 6-volt diode. How is this to be handled?

The proper procedure is to choose a diode with the next higher voltage—in this case, the 6.8-volt diode. This diode, of course, will regulate 6.8 volts, but a resistor can be added in series with the 200-ohm resistor to drop the 0.8 volt excess.

The zener appears across the combination of the 200-ohm resistor and R_A (Fig. 14B). The extra 0.8 volts is to be developed across R_A, which, in conjunction with the 200-ohm resistor, forms a voltage divider. From the voltage divider equations,

$$6 \text{ volts} = \left(\frac{200}{200+R_A}\right) 6.8 \text{ volts}$$

since the portion of the 6.8 volts across the 200-ohm resistor is the required 6 regulated volts. Cross-multiply and solve the equation for R_A:

$$6\ (200+R_A) = 200\ (6.8)$$

$$1200+6R_A = 1360$$

$$6R_A = 160$$

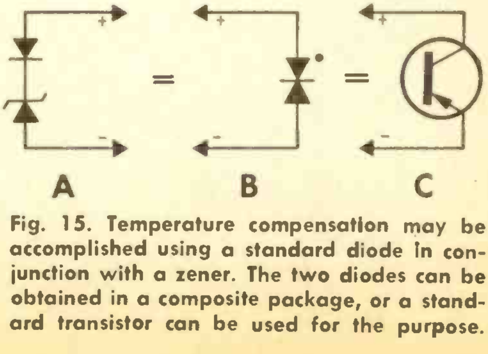


Fig. 15. Temperature compensation may be accomplished using a standard diode in conjunction with a zener. The two diodes can be obtained in a composite package, or a standard transistor can be used for the purpose.

$$R_A = 26.66 \text{ ohms.}$$

The closest standard resistor—27 ohms—would be satisfactory. The power dissipated by the resistor is

$$\frac{V^2}{R} = \frac{(0.8)^2}{27} = \frac{.64}{27} = 0.0237 \text{ watts.}$$

A ¼- to ½-watt resistor can be used with complete safety.

The proposed zener regulated circuit is shown in Fig. 14C. The 227-ohm load is the sum of the 200-ohm load resistor and the 27-ohm resistor, R_A, in series with it. If there is 6.8 volts across the combination, there will, of course, be the desired 6 volts across the 200-ohm load.

Since 6.8 volts must appear across the 227-ohm combination of load and resistor R_A, the current through this load is

$$I_{RL} = 6.8 \text{ volts}/227 \text{ ohms} = 0.03 \text{ Amps.}$$

The numbers for substitution into Ohm's Law are:

V_A=27 volts
V_x=6.8 volts
I_{RL}=0.03 Amps.

When substituted, these yield

$$R = \frac{V_A - V_X}{1.1\ I_{RL}} = \frac{27-6.8}{1.1\ (0.03)} = \frac{20.2}{0.033}$$

$$R = 612 \text{ ohms}$$

Since a 612-ohm resistor isn't standard, a 560-ohm, 10% resistor can be used instead.

The power dissipated by the zener diode can be determined as before. The numbers for substitution into our equation are

V_B=33 volts
V_x=6.8 volts.
R=560 ohms
I_{RL}=0.03 Amps.

Plugging these numbers into our equation, we solve for the maximum power the diode is called upon to dissipate.

$$P_Z = \left(\frac{V_B - V_X}{R} - I_{RL}\right) V_X =$$

$$P_Z = \left(\frac{33-6.8}{560} - .03\right) 6.8$$

$$P_Z = \left(\frac{26.2}{560} - .03\right) 6.8 = \left(.047 - .03\right) 6.8$$

$$P_Z = \left(.017\right) 6.8 = .115 \text{ watts}$$

The commercially available 6.8-volt, 400-milliwatt unit can be used. From the chart in Fig. 13, the JEDEC number is 1N754. Order it by this number from your parts house.

The next task is to determine the power dissipated by the 560-ohm resistor. The maximum current flowing through this resistor is

$$\frac{V_B - V_X}{R} = \frac{33-6.8}{560} = \frac{26.2}{560} = 0.047 \text{ Amps.}$$

The power dissipated by the resistor is

$$I^2R = (.047)^2\ (560) = (.0022)\ 560$$

$$I^2R = 1.23 \text{ watts}$$

A 2-watt resistor should be satisfactory, though a 3-watt unit is more desirable.

The final circuit is shown in Fig. 14D.

Temperature Compensation. For temperature-compensation purposes, a zener diode is frequently packaged in series with a forward biased diode, as shown in Fig. 15A. The forward biased diode develops a minute amount of voltage when compared to that across the zener. Its effect on the calculation of the regulator can be considered negligible.

In Fig. 15B, the composite diode has been drawn. Here, the zener and compensating diode are included in one package.

Fig. 15C contains a unique application of the transistor. If the base/emitter junction is reverse biased, it acts as a zener. However, the transistor is not calibrated for a standard zener voltage and the zener voltage must therefore be determined experimentally.

The base/collector junction in a transistor may be substituted for the temperature compensating diode in A. Thus, with the base junction left open, a transistor may be used as a temperature-compensated zener diode. If the regulated voltage fits your requirement, it is a very good, convenient, and inexpensive zener.

The effectiveness of zener regulators can be extended through more complex transistor circuitry, though this topic must be left for another time. ■

A Tattletale for Tiros & Friend

☐ Lotsa things have happened in the Buck Rogersville of outer space that John Q. Everyman's only contact with has been via newspapers and magazines. But now the tale is being tattled by RCA with replicas of some of the esoteric hardware that Uncle's gaping tax bite provides you, me, and the Great Society with. If you want to see for yourself what's happening, fly, run, or swim right over to Rockefeller Center in Fun City (New York) and take a good gander at the weather satellite ground station RCA has set up there.

You'll see how TV pictures are received and recorded from TIROS and NIMBUS satellites. It's an actual station resplendent with facsimile equipment that'll print out a high-flying bird's-eye-view of earth and cloud every time one of the satellites goes by overhead.

The satellite monitor is part of a new system by RCA that uses equipment that's sophisticated to the point of simplicity. Heart of the beastie is a new TV camera in the satellite that snaps a picture and stores it for 200 seconds while inexpensive, low-powered, narrow-band equipment leisurely scans the image and transmits it back to earth. There, a simple facsimile recorder prints-out the picture.

The system employs the most extensive assortment of integrated circuitry yet used in space. This has reduced size by about a third, and weight by roughly a half.

—*Joe Craig* ☐

The view from above is shown on 9 x 9 in. facsimile pictures taken every six minutes by a new, slow-scan RCA video camera. The orbit schedules are prominently posted in Rockefeller Center, so you won't miss the command performance (just don't expect an encore).

While you're waiting around for the picture show, you might have a look at the weather exhibit which includes a life-size model of the Nimbus II satellite and the whole big, wonderful story of how satellites spy on space.

CB Radio-TV EXPERIMENTER LAB CHECK

■ If there's one thing about CB that can be counted on, it's that no single transceiver will meet all operating needs under all conditions. As close as one type of operation comes to another, there always remain slight differences and conveniences better suited to one particular type of equipment than another.

For example, with most base station installations, it's generally assumed that the message must get through under virtually any condition of interference, whether made by man or nature; so we would tend to select a high-performance transceiver. On the other hand, while mobile operation also generally requires performance equal, or nearly equal, to that of a base station, it is often necessary to compromise performance and features. This would be the case if the transceiver were required to be easy-to-operate, and of such size that it didn't interfere with the passenger's leg room or the vehicle's operating controls.

Portable operating needs can generally be met by any walkie-talkie rated at 1 watt or higher RF output. But walkie-talkie often leave a lot to be desired in the way of operating features and performance when distance and freedom from interference are needed; a "standard" solid-state transceiver with a battery pack might often be the better choice.

As you can see, a complete CB operation can easily utilize three distinct transceiver types or models (i.e., base station, mobile, and portable). Because of this, our CB transceiver test reports are geared to a complete CB operation. While any of the three transceivers tested can be used for other purposes, we have checked them within the framework of mutual operational compatibility. The *Realistic Americana 23-Plus* was checked primarily as a base station; the *Lafayette HB-525B* was tested with an eye towards mobile operation; and the *Knight Safari II* was used with its auxiliary equipment which converts it into a portable transceiver.

Go Fixed Station with Radio Shack Americana 23-Plus

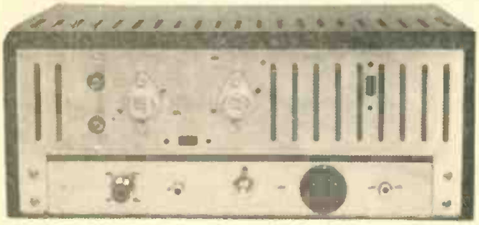
The Base Station. The Realistic *Americana 23-Plus* is a full-feature transceiver in every sense of the term. Among its many features are full 23-channel coverage through the use of crystal synthesis, a pi-net RF output circuit with "finger tip" external tuning controls (no alignment tools needed), a DX boost circuit which increases microphone sensitivity, fine-tuning to compensate for an off-frequency received signal, an S-meter, an ANL (automatic noise limiter) on/off switch, and both external speaker and headphone jacks. Other features include a CB/PA switch, a modulation indicator lamp, and the usual volume and squelch controls.

The receiver section is double-conversion with a 6-MHz 1st IF, followed by two stages of 455 kHz IF amplification. On the unit tested, this line-up resulted in a 0.9 *uv* sensitivity for a 10 db S+N/N (signal plus noise to noise) ratio. Selectivity, uncommonly high for just two stages of 455 kHz IF, was 50 db.

The receiver's AGC (automatic gain control) action checked out as 10 db for an input signal variation of 74 db (the input test signal ranged from 2 *uv*—simulating a weak signal—to 10,000 *uv*—simulating a very strong signal). In plain terms, this means that if you have the volume control cranked open to hear a weak signal, the speaker won't blast you out of the chair if a strong signal comes on the channel.

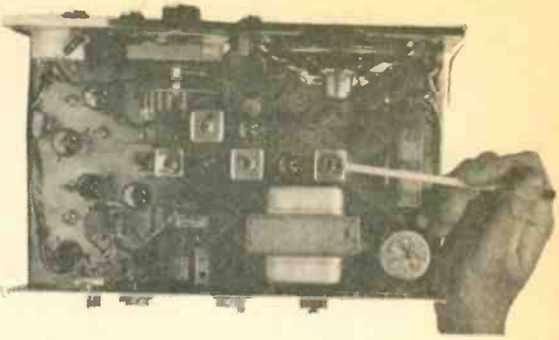
Incidentally, all noise limiters, because they clip the peaks of the received signal, generate some distortion. But while noise is always present in mobile service, this is not necessarily true for base stations, which can be loaded in an area of low noise. Under these conditions, the *Americana's* noise limiter can be turned off to prevent possible distortion.

The audio power output (measured across the speaker), for a moderate strength signal of 100 *u*v, was 2.8 watts. Overall sound quality was very good. The S-meter is set to indicate S9 when the signal at the antenna terminals is 2.8 *u*v. This means that virtually any usable signal will indicate as an "over S9" signal. The change in input signal per S-unit varied from between 1-3 db, meaning the S-meter is only useful (as are most others) as a relative signal-strength meter.



Rear apron of the Americana 23-Plus. Phono jack at extreme right is for external speaker; male octal plug to left is for power supply.

The pi-net-output transmitter, which is essentially of "standard" design, delivered 3.8 watts RF output to a 50-ohm load. The overall modulator sensitivity through the microphone was slightly higher than the average CB transceiver. A DX boost, which appears from the schematic to be a speech limiter circuit, resulted in a straight amplification gain of 8 db, allowing a very low voice level to be used for "100%" modulation. The modulator is not provided with 100% modulation limiting, and too high an input signal into the microphone can cause overmodulation.



IF transformers in 23-Plus are sealed against probing do-badders, but qualified technician can readily align set whenever required.

The transceiver is supplied with a noise-cancelling microphone which somewhat attenuates extraneous noises—such as room echo. Its power supply is 117 VAC and 12 VDC, and both power cables are supplied, as is a mobile mounting bracket.

The Realistic *Americana 23-Plus* is priced at $169.95; for additional information write Radio Shack Corp., 730 Commonwealth Ave., Boston, Mass. 02117.

Go Mobile with Lafayette HB-525B

The Mobile Station. The very small size of the Lafayette *HB-525B* (2½ x 6½ x 8¼ in.) makes it particularly attractive for mobile operation (it's easy to install and remove, and it takes up virtually no leg room).

The *HB-525B* has a minimum of operating controls, the front panel containing only a volume and squelch control, the channel selector, and a Delta tuning switch that tunes the receiver ±2 kHz to compensate for off-frequency received signals. (The unit's S-meter is also front-panel mounted.) Exter-

Rear panel of HB-525B contains separate external and PA speaker jacks. Power plug accepts either positive or negative ground.

nal-speaker and PA-output jacks are provided; the 12 VDC power supply can accommodate either a positive or negative battery ground.

The receiver is a double conversion unit with a high-Q mechanical filter in the 455 kHz IF strip for good adjacent-channel rejection. The receiver's sensitivity for a 10 db S+N/N ratio checked out at 0.45 *u*v. Adjacent channel rejection was 43 db; AGC action for the 74 db input signal variation test was 13 db—not outstandingly good but adequate.

PTT switch activates combination S/RF meter tucked away in upper left corner of HB-525B. While perfectly readable, meter and its small markings are certain not to distract the busy operator of a speeding vehicle-in-motion.

The AF output power available for PA use was 2.6 watts into a 4-ohm speaker; the same power output is available for moderate (100 *u*v) strength signals. However, the small speaker built into the transceiver is incapable of handling this power level.

The overall sound quality, as would be expected from a small speaker, was crisp—lacking bass—and very "clean."

The S-meter, which indicates S9 with a 100-*u*v antenna input signal, is calibrated between the S4 and S9 marks at 6 db per S-unit.

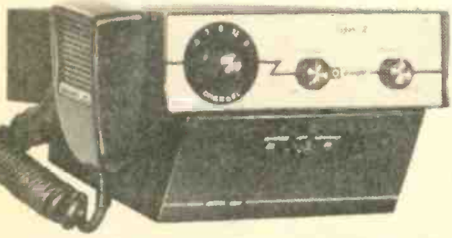
When powered by 13.8 volts (to simulate the charging voltage of a vehicle-in-motion), the transmitter delivered 4 watts to a 50-ohm load. The overall modulator sensitivity was average for "100%" modulation, and the modulation is limited to 100%. A Range Boost built into the transceiver does provide some degree of speech compression, thereby increasing the *average* power.

The S-meter doubles as a relative power indicator when the transceiver is in transmit mode. While the final RF tuning control is inside the cabinet, the antenna loading control is accessible through a hole in the rear apron. The rear apron also contains external and PA speaker jacks, and a pre-wired socket for a selective call adaptor.

A converter unit is available for operating the transceiver from a 6-volt power source, as well as an AC power supply for 117-VAC operation.

The *HB-525B* is priced at $149.95, which includes all crystals, microphone, DC cable, and mobile mounting bracket. For additional information write to Dept. CP, Lafayette Radio Electronics Corp., 111 Jericho Tpke., Syosset, N.Y. 11791.

Go Portable with Knight-kit Safari II



The Portable Station. The *Safari II* is essentially a miniature solid-state transceiver that can readily be used as a full-power portable because of the many optional accessories specifically intended for portable service.

The *Safari II* is available as a semi-kit (with a transmitter that is completely factory-wired and aligned) or wired. Basically, the *Safari II* is a 5-channel version of the 23-channel *Safari III*. The only other important difference is that the *Safari II* doesn't have an S-meter. The transceiver is supplied with one to five sets of crystals, depending on user requirements.

Somewhat unusual is the fact that the *Safari II* doesn't have a speaker as such; instead, its microphone functions as the speaker, which means that it can be placed directly next to the ear; a particular advantage in areas of high ambient noise. It's sort of like having the intimacy of a walkie-talkie with the high-powered performance of a standard transceiver.

The front panel contains channel selector, volume and squelch controls. A fine-tuning

CB LAB CHECK

control adjusts the crystal frequency to compensate for off-frequency received signals.

Building the kit version, which sells for $59.95, is not particularly difficult, as the transmitter is pre-wired and most of the remaining wiring consists of pushing components into matching holes in the printed circuit board. There is no user alignment, since all receiver coils, with one exception, are supplied pre-aligned. A generator check of alignment after we completed the kit established that the coils were indeed peak-aligned. The oscillator coil adjustments, the only one made by the user, consists of simply adjusting the coil for received signals (of course, a generator can be used to adjust the oscillator coil).

Two accessories for Safari II are combined AC power supply/battery charger (at bottom) and battery pack (shown with shoulder strap) at top. Finger points to meter which indicates condition of battery during charge.

The receiver is a single-conversion circuit of more-or-less straightforward design. It checked out very close to Knight's claimed specs. The sensitivity for a 10 db S+N/N ratio measured 1.9 *u*v. Adjacent-channel rejection was 35 db, while the AGC action was about standard at 10 db. Overall sound quality was similar to other good solid-state transceivers—crisp (almost no lows) and clean.

A healthy 3.7 watt transmitter RF output to a 50-ohm load puts this unit in the big-time. The microphone sensitivity was slightly lower than average, requiring that the mike be held almost against the lips; but then, the lower sensitivity reduced unwanted background noise. The modulation was limited to 100%, and no amount of microphone input level caused excessive modulation.

The power supply accommodates either a positive or negative ground 12 VDC hookup.

Accessories include a 117-VAC power supply and for portable use, a battery pack, a carrying case, and a 20-in. center-loaded portable antenna (any portable antenna can be used).

The battery pack is specifically designed for use with the *Safari* transceivers. A sturdy rubber strap, with steel hooks, clamps the battery pack to the side of the transceiver, thereby forming a single, integrated transceiver/pack assembly. A heavy-duty shoulder strap and arm cushion, supplied with the battery pack, clamps to the complete transceiver/pack assembly; the shoulder straps can be adjusted to any desired length.

The battery charger is the 117 VAC power supply; when it's connected to the transceiver, it is a power supply; when it's connected to the battery pack, it functions as a charger.

When used as a portable, the *Safari's* microphone hanger allows the user to reach down and pluck the mike off the cabinet. A downward motion secures the mike.

Battery pack and shoulder strap equip Safari II for portable operation. Note how combination speaker/microphone clamps to side of transceiver.

The *Safari II* is available from Allied Radio Corp., Dept. 20, 100 N. Western Ave., Chicago, Ill. 60680. ■

Double the versatility of your "motor speed control" with our

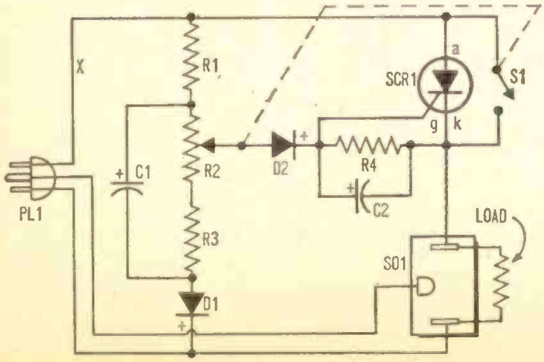
SCR RANGE EXPANDER

By A.A. Mangieri

■ So there you sit with your SCR motor speed control, lamp dimmer, etc. and find that it's only variable from about 10 to 55 volts, after which it jumps the output to 117.

So now you want double the control range to extend all the way to 100 volts smoothly in order to get that soldering iron just the right temperature, lights dimmed inconspicuously to just the right brightness for a special occasion, or your drill running at ⅞th normal speed. That's where our simple, inexpensive little Range Expander comes in. For a few bucks and an hour of your time, you'll get continuously variable voltage control from 20 to 100 volts. Sound handy? Here's how it's done.

Most SCR motor speed controls use a single silicon controlled rectifier in a half-

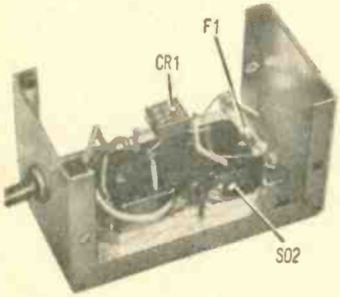


Knight KG-201 motor speed control circuit is typical. Output voltage to load is rectified half-wave and variable from approximately 10 to 55 volts. With addition of Range Expander to this type circuit, range of controlled voltage is effectively increased to roughly 20 to 100.

SCR
RANGE EXPANDER

wave circuit. Typical, is Knight *KG-201* shown in schematic. The output voltage is a half-wave rectified AC, variable from about 10 to 55 volts, followed by a voltage jump to 117 volts when switch S1 is closed by potentiometer R2 at the high setting.

As a result, continuous control of medium to high lamp brightness, motor speed, or heating element temperature is not possible with this half-wave SCR circuit. But, by rectifying the AC line voltage before applying it to the SCR, the SCR will control both half-cycles of the AC line voltage. The negative half-cycle, previously blocked by the SCR, now contributes to the output voltage.

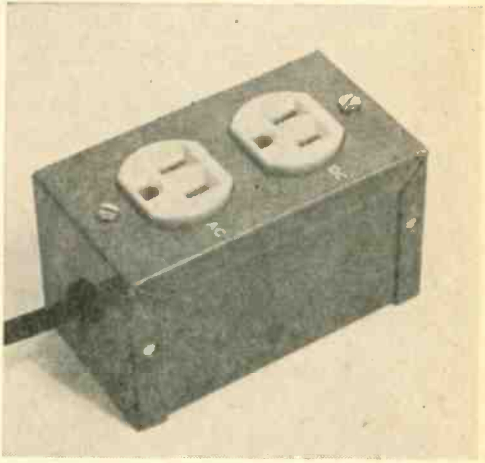


Internal layout of Range Expander is uncluttered; all parts are mounted directly on sockets. Any handy case can be used.

So now, output voltage may be varied from about 20 to 100 volts DC. Some SCR control units may omit fifty-microfarad electrolytic capacitor C1. In this case, the voltage range can be varied from about 55 volts to 100 volts. *Note:* 150 watts is the maximum load you can use with the Range Expander.

Lots More Control. The Range Expander circuit uses a 1.5-ampere full-wave bridge rectifier to control load currents up 1.4 amperes (allowing for some current taken by the SCR gate circuit). Mount rectifier CR1, fuse F1, and receptacle SO2 inside any small plastic or metal box; optional AC socket SO1 is identical to SO2.

Plug PL1 on the SCR control box into receptacle SO2, and plug PL2 into the AC power line. Connect a 50- or 100-watt lamp to SO1 (if used). If lamp doesn't light, reverse connections at SO2. (A reversed connection, though inoperable, won't damage the SCR control unit.)

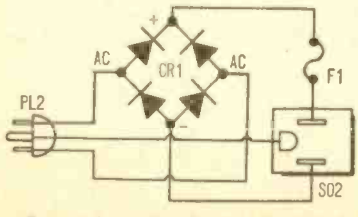


Speed control plugs into Range Expander DC socket; AC socket bypasses Expander.

For small universal AC-DC motors, use the Range Expander with the SCR control for control of medium to high speeds and use the SCR unit alone for the lower speeds.

Use the Range Expander with the SCR unit for controlling lamp brightness over the entire range. As with the SCR unit alone, flicker may be observed at very low lamp brightness.

(Continued on page 114)



Range Expander circuit is straightforward and simple to build. Full-wave rectifier CR1 can be any four diodes of adequate rating.

PARTS LIST

- **CR1—Full-wave bridge rectifier, 1.5 amperes at 600 PIV (Erie D-8 or equiv.)**
- **F1—Fuse, 2 amperes, 3AG and clips**
- **PL2—Polarized AC line cord with plug**
- **SO2—Polarized AC receptacle**
- **Misc.: Grommet, small aluminum case, etc. (see text)**

Estimated cost: $6.00
Construction time: 1 hour

You'll get dices wild with this electronic fatemaker

Pushbutton Highroller

By Ken Greenberg

Shooter's coming out—place your bets. Seven, eleven, easy eight, eight's the point—seven away, passline away. What's happening? Automated electronic dice, that's what's happening. You press the button, release it, and two illuminated numeral indicators tell you if you crapped out, made your point, or made that field bet. But it's not limited to craps —this cute gadget can be used in any dice game, from craps to Monopoly. And, the Highroller can be used for an electronic version of roulette, too, as well as any game requiring random numbers.

Clever Japanese numeral indicators make this electro-mechanical dice game unique. Unlike numeral readout (Nixie) tubes, which require costly and complicated actuating circuits, these indicators do essentially the same thing

(Continued overleaf)

Pushbutton Highroller

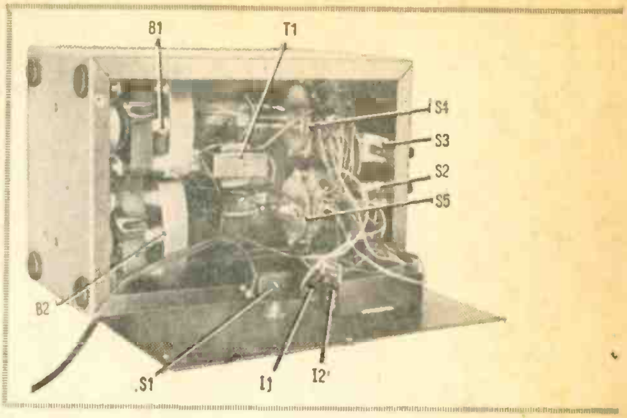
in a much simpler manner. Etched numbers on clear plastic plates are individually edge-lit by tiny 6-volt bulbs.

Basically, the circuit consists of two motor-driven rotary switches which open and close the circuits of the numeral indicators. Releasing the pushbuttons allows the motors to coast to random stops, resulting in a number from 1 to 6 lighting up on each indicator. The odds for the game are the same as for regular dice. That is, 7 can be "rolled" by 6+1, 5+2, or 3+4.

Layout and Construction. With careful planning and squeezing, everything will fit into a 9x6x5-in. metal case. Mount the motors, rotary switches, and 6.3-volt filament transformer on the removable back plate of the case. The motors have threaded body holes to which you fasten two 2¼-in. right-angle irons (from hardware stores). The angle irons are then attached to the back plate.

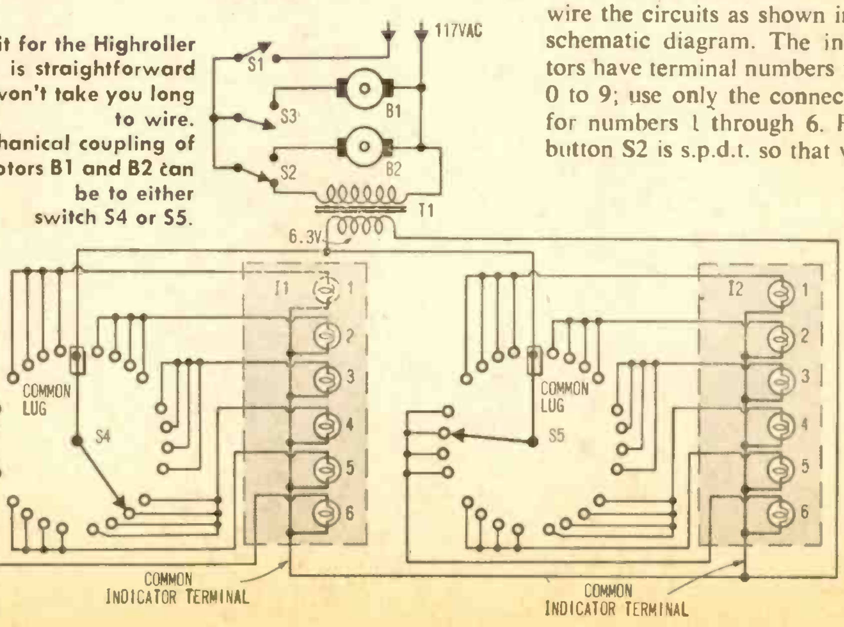
The rotary switches are mounted through enlarged holes in the 1½-in. right angle irons. Remove the detent (click stop) mechanism from the switches before mounting them. It is also advisable to wire the switches before mounting.

The motor and switch shafts are coupled together with 3-in. long flexible shafts, which require a quarter-inch shaft coupling on each end. Avoid using motors that have other than ¼-in. shafts as this will make coupling a problem. To make the game more compact, small flexible couplings (Allied Radio #47A2405) can be used instead of the 3-in. flexible shafts. In any case, the motor and switch shafts must be lined up as close as possible when mounted, to prevent binding. To use 3-in. flexible shafts within the 9 x 6-in. case, you'll have to saw one-quarter inch off each of the shafts.



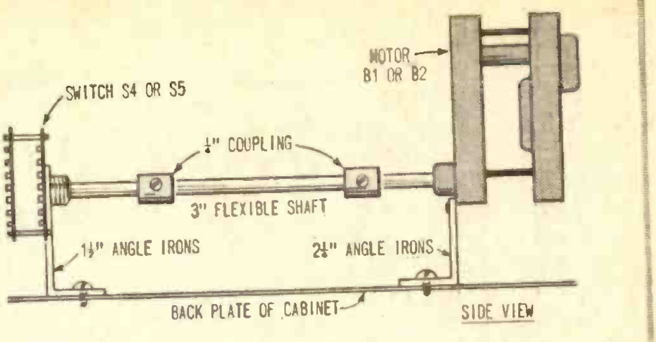
After mounting the motors, switches, and transformer, mount the indicators and the power on/off switch on the front panel. The indicators have mounting templates printed on their boxes to help you cut the proper size square holes for windows. The two motor-drive pushbuttons are mounted on the top of the case.

Wiring. After all the parts are mounted, wire the circuits as shown in the schematic diagram. The indicators have terminal numbers from 0 to 9; use only the connections for numbers 1 through 6. Pushbutton S2 is s.p.d.t. so that when



Circuit for the Highroller is straightforward and won't take you long to wire. Mechanical coupling of motors B1 and B2 can be to either switch S4 or S5.

Interior layout of Highroller isn't critical. Photo at left gives you a general idea of where to put things. When coupling switches to motors, the two should line up to prevent binding of switch shafts.



it is depressed to start motor B2, the indicator lamp circuits are open, and the numbers will remain unlit while the motors are operating. Releasing S2 energizes the light circuits while the motors are coasting to a stop.

Each rotary switch has 24 lugs (two decks of 12 each). As shown in the schematic, groups of four consecutive lugs are connected together to form six separate lug groups. Each group will actuate a number from 1 to 6 on the indicators. Though the diagram shows the indicator terminal light numbers wired in sequence to the switch lugs, this isn't necessary. Any indicator terminal number can be connected to any one of the six groups of lugs. The leads from the switches to the indicators should be made long enough to allow easy wiring to the front panel which is installed later.

One thing to bear in mind—there are many possible variations to this unit, and you can easily substitute parts. Nothing in this gadget is critical, so don't be afraid of using what's readily available. The Highroller shown is the author's prototype and can be followed exactly, or you can use your imagination—variations are limited only by your ingenuity.

PARTS LIST

- B1, B2—120 rpm, 120 VAC motors (Herbach & Rademan, 1204 Arch St., Philadelphia, Pa. 19107, #B7-208)
- I1, I2—Numeric readout indicators (Herbach & Rademan #6970)
- S1—S.p.s.t. toggle switch
- S2—S.p.d.t. pushbutton switch
- S3—S.p.s.t. pushbutton switch
- S4, S5—24-point tap switch, non-shorting
- T1—117 VAC primary; 6.3 VAC 1.2 amp secondary filament transformer
- 2—3-in. long flexible shafts
- 4—¼-in. brass shaft couplings
- 1—9x6x5-in. aluminum case
- 2—2¼-in. right angle irons
- 2—1½-in. right angle irons
- Misc.—Line cord, wire, solder, friction tape, etc.

First Shooter, Coming Out! After the wiring has been completed, switch S1 on. Push S2 and S3 and watch the motors turn the rotary switches. The shafts must be lined up reasonably well so there is no binding, and the motors can start instantly. This is important also to prevent undue wear on switch shafts, which are not designed for heavy loading or continuous duty. Put a drop of oil on the shafts to reduce friction.

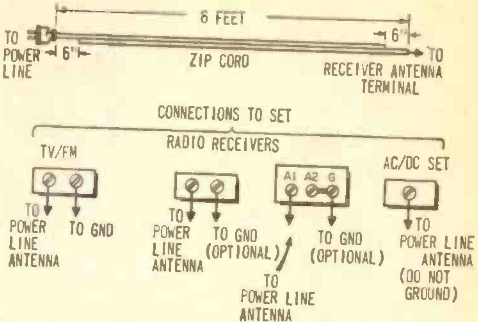
To simulate rolling a pair of dice, push both S2 and S3 for a few seconds. Release the buttons and the motors will coast to random stops. Each indicator will show a single number from 1 to 6. Occasionally, the switch wiper arm may stop between two lugs and no number will appear on the indicator. If so, "roll the dice" again. This will occur after the rotary switches have been used for some time.

To roll only one die, push either S2 or S3 individually. If you use S2, the indicator will run through lighted numbers as the motor operates. Using S3 only, the indicator lights will remain off until the button is released. This feature allows a number of different games to be played—including ones that require only one die.

To use the Highroller for electronic roulette, simply read the actual number on the indicators—5 and 2 being 52, not 7.

While this game may not replace the dice at the tables in Las Vegas, it's an impressive display and might make a good science fair math project in the study of probability. In any case, it's an interesting, unique conversation piece for the guy that has everything. But if you "lose your shirt," don't blame us, that may be the price of being the first of the Electronic Highrollers! ■

Zippy Signal Grabber



Diagrams show construction of ZSG and recommended connections to various receivers. Use friction tape to cover exposed ends: reverse plug in socket so wire connects to "hot" side.

■ How would you like to build a radio bug's dream—a free antenna that works on all bands from broadcast right up to the TV "spectrum"? You would? OK, here goes.

The Zippy Signal Grabber is free only if you happen to have 6 feet of lamp (zip) cord and a plug on hand—otherwise you'll have to spend a few cents to buy the stuff. Also, it can be used only for receiving, it probably won't work in apartment houses which have BX cables all over the place, and it doesn't seem to do much for FM-stereo and color-TV reception. But with these exceptions, the ZSG is really swell.

The idea is to inductively couple the receiver into the power lines of your house and use the lines as the antenna. No fooling, the power line makes a good antenna and seems to drag in DX over a wide span of frequencies; the antenna isn't really resonant on any particular frequency but works by means of the massive "capture area" of the hundreds of feet of wire involved.

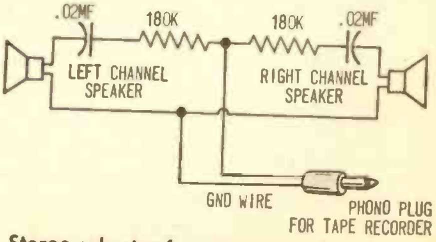
Constructing the ZSG is a cinch. Take the 6 feet of zip cord and snip 6 inches off *one* wire at one end. Next, snip 6 in. off the *other* wire at the *other* end of the 6-ft. length. The power plug connects to either end; only *one* of the prongs is connected.

Your antenna is now complete (mostly). Attach the "free" end to the antenna terminal of your receiver, insert the plug in any convenient outlet, and you're ready to start pulling 'em in. If your receiver has provision for a ground connection, run a short wire from the ground terminal to the screw on the wall socket faceplate (sometimes this helps, sometimes it does absolutely nothing, and sometimes it actually seems to impair reception). If it does no good, remove it. (Under no circumstances should you attempt to ground an AC/DC receiver!)

A hint on obtaining the raw materials free: if you have an old and unused radio or electrical appliance lying around the attic, closet, or basement, simply swipe its line cord. Clip the cord at the point where it enters the appliance, then proceed as outlined above. About the only way you can botch up on this antenna is to make like stupid and accidentally connect the power line to the receiver's antenna terminal. Would you believe instant chaos?

—Jim Gibson. ■

Stereo When Mono Must Do



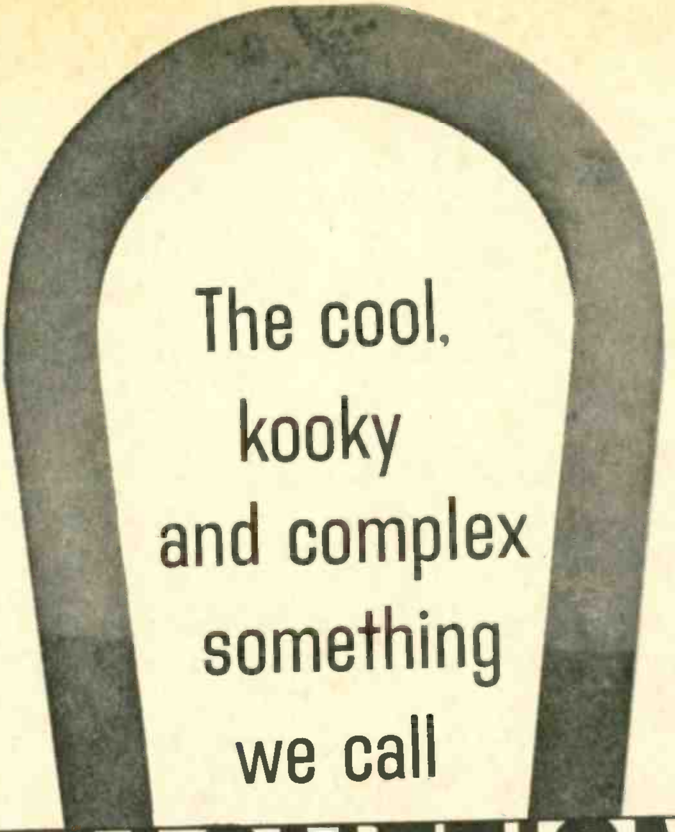
Stereo adaptor for mono recording feeds blend of two channels into recorder.

■ Though stereo's all the rage these days, there are still times when you want to make a mono tape recording from a stereo broadcast or record. To do so, you'll need two .02-*uf*, 200-V (or more) capacitors and two 180k, ½-w resistors, wired up as shown in the schematic diagram.

The foil ends of the capacitors connect to the speaker voice coils, while the ground connection from the tape recorder's high-level input is attached to the remaining speaker leads.

One word of caution: check the two units carefully to make certain that the chassis of neither unit is connected to one side of the 117-volt AC power line.

—Hugh Gordon. ■



The cool, kooky and complex something we call MAGNETISM

By Jorma Hyypia

■ Anyone who has picked up a pile of nails with a horseshoe magnet will surely admit that there is something almost magical about magnetism. But few would be so bold as to actually define magnetism as "magic."

Yet that definition would fit about as well as any other. And in some respects it is a better definition than you can find in a dictionary or in most physics textbooks. What is "magic?" One definition: "A power brought into play by the secret forces of nature." Certainly magnetism is a power created by the forces of nature. Is it "secret?" Definitely. No one yet really knows what magnetism *is*. Admittedly this definition also fails to reveal what magnetism is, but it at least has the uncommon virtue of stating honestly that the fundamental character of magnetism is still a deep, dark mystery.

Authoritative references are rarely that candid. Most physics textbooks sneak past the definition and "define" magnetism by telling how it is generated and what it can do. But that is not the same thing as telling what it is. As for the dictionary definition, that can only be called a masterpiece of double-talk. Magnetism is defined as "the property of some molecules that enables them to become magnetized." So what does "magnetize" mean? You guessed it: "To acquire the properties of magnetism."

Atomic Generators. Any bright schoolboy knows that if you break a magnet in half you then have two complete magnets, each with its own north and south pole. And you can keep on breaking the magnets into smaller and smaller pieces and still wind up with complete magnets. Eventually the magnets become so small they would be called magnetic "domains" by physicists. These domains are the ultimate magnetic memory elements that still exhibit uniform magnetism. Each of these magnetic domains is made up of literally billions upon billions of atoms.

If you break up the domains into their component atoms, you find that the atoms are also magnetic. Certain electrons orbiting about the nuclei of the atoms generate magnetism in much the same way magnetic fields are produced when electricity is passed through a wire loop. Moreover, the electrons spin, and thereby produce additional magnetism that becomes a component of the total atomic magnetism.

Not all atoms are magnetic. In some cases the electron magnetisms cancel each other. In other atoms—notably those of iron, cobalt, and nickel—the electron magnetisms are not balanced out and each atom as a whole exhibits detectable magnetism.

The magnetic atoms can be thought of as being extremely small dynamos. Pack a lot of these atomic dynamos together in the correct arrangement, and you wind up with a magnetic domain. Stack a large number of domains together in orderly fashion, and you have a magnet that can be used to pick up nails or run a motor.

Though you may not have realized it, we have gone down to the electron and back again. But we unfortunately haven't found out what magnetism really is. Once again we have only shown how it is produced.

Force Fields. Since we'll necessarily be referring to "force fields" and "lines of force," it might be a good idea to first decide what they are. Unhappily, this problem is just as perplexing as the one we've just muddled through.

The dictionary offers us the same semantic jabberwocky as before. A line of force is "a line in a field of force, whose tangent at any given point gives the direction of the field at that point." A *field* of force is "a region or space traversed by lines of force."

Ask a physicist what a force field is and he'll probably say that it is "something" outside a magnet that has form or symmetry and which can act to influence material objects such as a compass needle. But what is that "something?"

Interestingly enough, physicists have actually engaged in considerable philosophical debate about whether a force field is "real." Some argue that it isn't, that it's only a complex system of *directions* followed by magnetic forces exerting their influences outside of the magnet. As astrophysicist Donald Menzel puts it: "Magnetic lines of force have no more objective existence than lines of latitude or longitude, or the contour lines that designate altitude. They are, however, a *convenient fiction* (emphasis added) for describing certain of the properties of magnetic fields."

Others argue that the magnetic force field cannot be just "nothing" in the sense that direction is nothing; there is at least "energy and motion," hence the force field is "real."

Look at it this way. Magnetism works in a vacuum where there is no air—no atoms of any kind. Hence it seems obvious that the magnetic field in a vacuum cannot possibly be "real" as we generally understand real things. But put a compass or some iron filings into the force field in the vacuum and you have incontrovertible evidence that "something" *must* be there to push the compass needle and the iron filings about. How could "nothing" push about physical objects exhibiting mass and/or frictional inertia? Ipso facto: a magnetic field is "real."

Having now established the basis for some endless debates about the reality or nonreality of magnetic fields, let's call a truce by labeling the whole thing "magic" so that we can go on to things we really know more about.

Discovery of Magnetism. No one is sure just when man first discovered the mysterious force we call magnetism by stumbling onto magnetite, an oxide of iron commonly called lodestone. But it is certain that Persian and Arab sailors were using crude lodestone compasses—pieces of the magnetic mineral floating on slabs of wood (Fig. 1) or suspended from strings—at least by the 11th century. By the 14th century, these primitive devices had been replaced by sim-

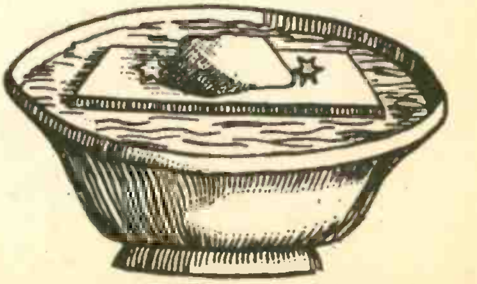


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Fig. 1. Medieval idea of oldest compass (from 1643 drawing) used lodestone floating on chip of wood to align north/south.

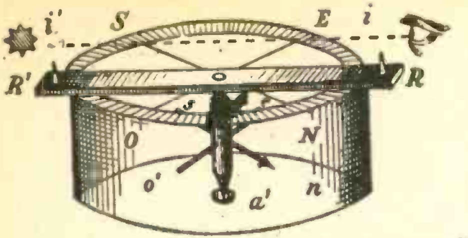

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Fig. 2. Word "compass" means "circle," which referred to graduated ring drawn around this 13th-Century double-pivot design.

ple compasses made from magnetized needles.

In 1269 a French soldier-scholar, Pierre de Maricourt (pen name, Petrus Peregrinus), experimented with lodestones and magnets and showed that compass needles roughly indicate directions paralleling the pole-to-pole directions of the earth's meridians (Fig. 2). But it wasn't until 1600 that Sir William Gilbert, physician to Queen Elizabeth, made the first truly scientific study of the compass and correctly concluded that the earth itself behaves as a huge magnet. Gilbert erred, however, in explaining that magnetism was caused by large amounts of magnetic substance, like lodestone, buried deep within the earth.

The Earth Dynamo. Our knowledge of the earth's interior structure derives from secondary information and scientific reasoning, since no one is able to burrow into the bowels of the earth to see what is there. But it is generally accepted that much of the interior of the earth is fluid and very hot.

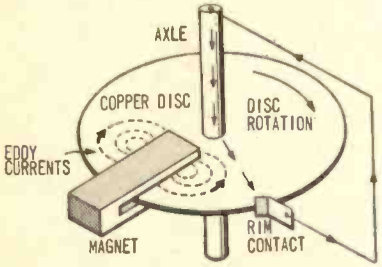

Fig. 3. Faraday's DC generator helps illustrate today's "earth dynamo" theory, which explains origin of magnetic field.

For this reason, Gilbert's idea that the earth contains a solid magnet must be discounted. The favored theory now is that the earth is a gigantic dynamo whose electric currents constantly generate the planet's magnetic force field. This concept is more easily understood by analogy to a simple dynamo invented by Faraday (Fig. 3). A copper disc, rotating between the poles of a magnet, delivers a direct current from the axle shaft to a rim contact—or in the opposite direction, depending on the direction of rotation of the disc. (In practice, the best location for the rim contact is between the arms of the magnet, at the point closest to the two eddy currents.)

The earth consists of a thin outer crust about 10-25 miles thick that covers a solid rock mantle extending almost half way to the center of the earth. The central core is thought to consist of a solid inner core surrounded by a liquid core probably composed of nickel-iron materials.

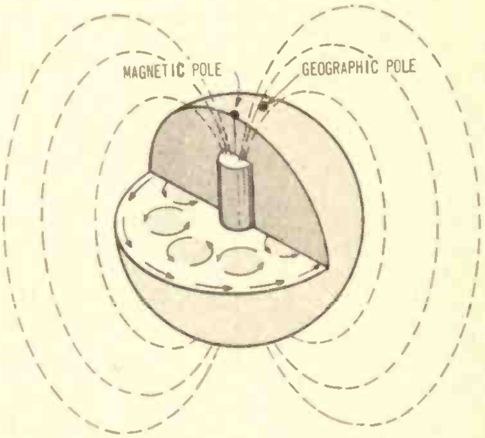

Fig. 4. Earth magnetism could come from rotating liquid core generating current. Core is represented here as large magnet.

In theory, the liquid core flows slowly with respect to the surrounding rock mantle, and in so doing generates electric currents which encircle the core (Fig. 4). The core thus becomes an electro-magnet exhibiting a magnetic force field detectable on the surface of the earth.

Eddy currents in the liquid core are believed to generate localized electric currents whose attendant magnetic effects are added to the primary dipole field. Probable irregularities in the eddy currents help to partly explain some of the random fluctuations observed in the earth's magnetic field patterns.

Imaginary Magnet. Even after one accepts the dynamo theory, it is still convenient to cling to the acknowledged fiction that a chunky bar magnet is buried close to the center of the earth. Such pretending makes it easier to talk about the earth's magnetic fields, and to point out some of the common misconceptions pertaining to the earth's magnetic core.

This seeming bar magnet does not extend completely from one side of the globe to the other; it is actually relatively short as proved by magnetic dip experiments to be discussed later. The "ends" of the magnet are far beneath the surface of the earth, though the north and south magnetic polar effects extend to the surface and far into space.

The locations on the surface of the earth that we call north and south poles are displaced from the geographic poles representing the axis of rotation of the earth. This is generally understood. But it is not as widely known that the magnetic axis does *not* pass through the center of the earth. The magnetic north pole is located on Prince of Wales Island in northern Canada (about latitude 70°N, longitude 100°W). The magnetic south pole is located in Antarctica (latitude 68°S, longitude 143°E.) These points are marked on any reasonably good desk globe. Examination of such a globe will reveal immediately that the earth's magnetic axis is displaced to one side of the geographic axis, in the direction of the Pacific Ocean.

It is now easy to understand why the earth's *magnetic* equator, which lies in a plane at right angles to the magnetic axis, does not coincide with the earth's geographic equator. The two equators are quite close together in South America, but the magnetic equator is much further north in Africa. What's more, it passes through Arabia, India, and several other Asian countries that are far from the geographic equator.

Declination. Since the geographic and magnetic poles do not coincide, there are relatively few places on earth where compass readings will indicate true north without correction for declination—the angular variation of magnetic north from true north.

Figure 5 shows the geometric principles involved; in practice, the application of declination corrections is a bit trickier. A compass reading taken at a point such as A would indicate true north because the magnetic and geographic poles are aligned along the same meridian as the observer. No declination correction is needed. In theory at least, there would be a series of similar zero declination positions extending from the north to the south pole on the other side of the globe.

When a compass reading is taken from a position such as B, the indicated magnetic pole is to the right (east) of the geographic pole. A declination correction must be applied. Note that any other position on the same meridian would require an angular correction in the same direction, but to a different degree. At point C the compass would point to the left (west) of true north, and a declination correction in the opposite direction would be required.

If the magnetic fields around the globe were uniform in distribution, the matter of declination correction would be an easy matter. Unfortunately, the earth's magnetic field is very irregular—partly because of the eddy currents mentioned earlier, partly because of other factors, such as the presence of large underground iron deposits.

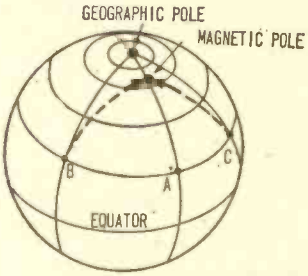

Fig. 5. Geographic and magnetic poles lie at different points. Compass at A would point toward true north, but compass at either B or C would require some correction.

Figure 6 is a much simplified *isogonic* map of compass declinations throughout the world. Compass readings taken from all points along any given line will require identical declination corrections. Note particularly what happens in the case of the zero ("agonic") declination line. In the western hemisphere this line extends fairly evenly to the south through the United States and South America.

But notice what happens in the eastern hemisphere! Beginning at the magnetic south pole, the agonic line cuts through Australia into Indonesia, then swerves eastward through the Pacific and up through the eastern tip of Russia to the top of the world. It has almost reached the magnetic north pole when it swoops southward again through the heart of Russia, ducks under Arabia, clips off a part of Africa, and takes the grand tour through central Europe and Scandinavia before heading for the Arctic regions again!

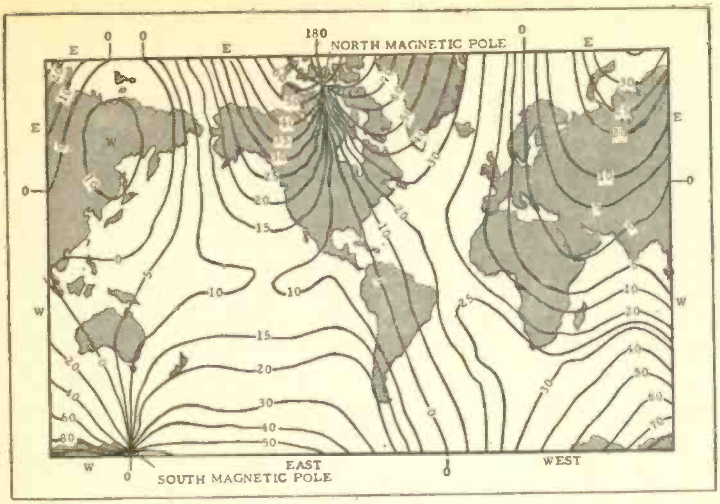

Fig. 6. Isogonic map shows how compass declination varies at points around the world. Numbers in solid lines represent degrees of declination; note that 0-line running through North and South America is one of the straightest.

To complicate matters further, the declination at any given spot changes gradually as the position of the magnetic north pole shifts. For example, in the New York area the declination change amounts to about 1 angular minute per year—approximately 1 degree every 60 years.

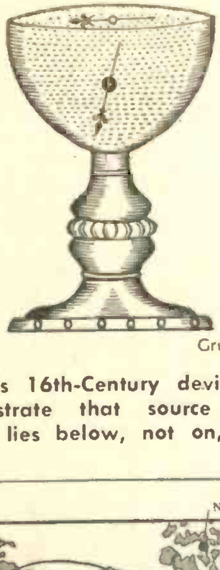

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Fig. 7. This 16th-Century device was first to demonstrate that source of earth's magnetism lies below, not on, its surface.

Dip! In 1576, Londoner Robert Norman, a compass maker, first demonstrated the use of a dip needle (Fig. 7). This consists of a perfectly balanced and magnetized compass needle pivoted on a horizontal (rather than vertical) axis so that it can swing in a vertical plane. The dip needle immediately revealed that the earth's polar magnetism is concentrated *inside* the earth and not on the surface of the earth.

Anywhere along the magnetic equator the dip needle assumes a level, horizontal position because the attractions of the north and south poles are equalized. As the dip needle is moved northward from the equator, the north-seeking end of the needle tilts more

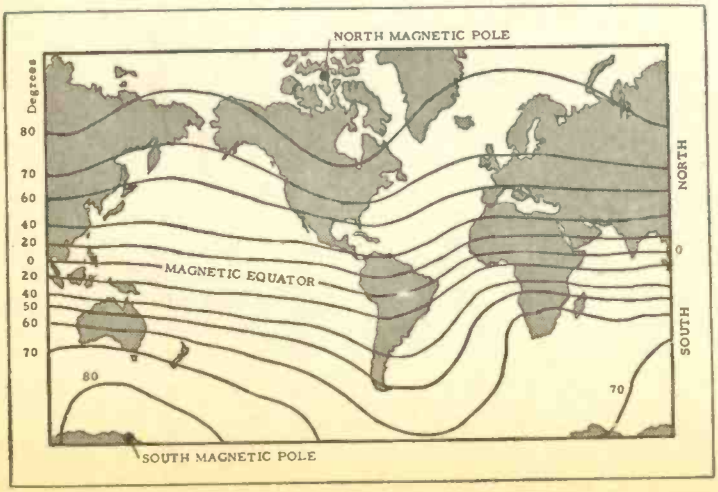


Fig. 8. Isoclinic map of world shows inclination, or dip, of magnetic field. Dip is zero along magnetic equator and gradually increases as one moves toward either pole. Note that lines only roughly parallel to ordinary longitudinal lines.

and more downward until it stands vertically at the magnetic north pole. If the needle is moved southward from the magnetic equator, the other end of the needle dips gradually to a vertical position at the magnetic south pole.

Figure 8 shows a simplified *isoclinic* map consisting of a series of lines, each representing a certain degree of dip or "inclination." Note that the lines do not parallel the earth's longitude lines, but weave up and down as they circle the earth.

An ordinary compass does not indicate dip, though this downward pull does tend to reduce the overall sensitivity of the delicate instrument.

More expensive compasses have adjustable weights attached to the needles; these can be moved to counteract the downward pull and thus improve the balance—hence sensitivity—of the instruments. Alternatively, simple dip meters can be used by prospectors to locate ore bodies underground.

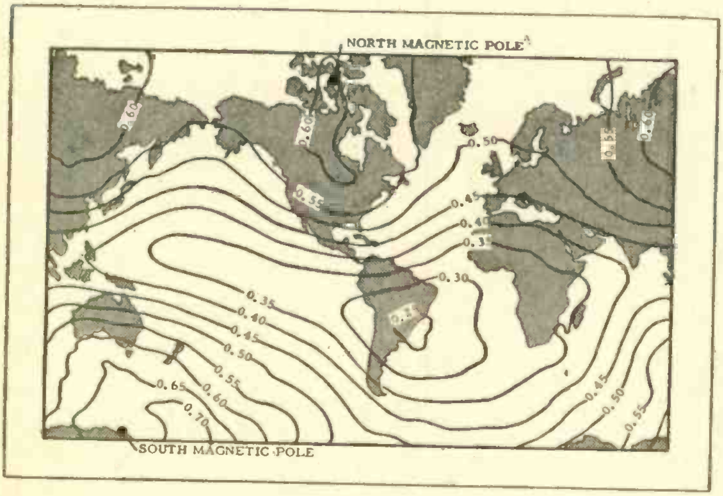


Fig. 9. World map shows relative strength of earth's magnetic field at various locations. Numbers along isodynamic lines, which reveal points of equal strength, are expressed in oersteds. Strongest intensity is .70, which is weak compared to a small bar magnet which might measure 100 or more oersteds.

Magnetic Intensity. A common misconception is that the earth's magnetic field must be very powerful if it can act over thousands of miles to activate a compass. Actually, the earth's field is very weak, having a maximum intensity of about 0.70 oersted near the magnetic south pole. (The oersted is a centimeter-gram-second electromagnetic unit of magnetic intensity.) Even a child's toy magnet may have an intensity of several hundred oersted.

You can prove this point by bringing the weakest available horseshoe magnet near a compass; it will easily overpower the effect of the earth's magnetism.

Though the earth's magnetic field is weak, the earth dynamo that produces it must be very powerful. This may seem contradictory until it is remembered that magnetic intensity—like that of light—falls off rapidly with increasing distance; yet the earth's magnetic field is of enormous size.

Figure 9 shows an *isodynamic* map of magnetic intensities around the world. The area of lowest intensity (about 0.25 oersted) is on the west coast of South America; from here the magnetic intensity increases gradually in all directions to reach maximum values at the poles.

Magnetic Flip-Flops. It might be a bit disconcerting to think that some day the earth's magnetic north pole may just take off and wander down to Little America. But it could happen! In fact, it has now been proved quite conclusively that the earth's magnetic field has reversed itself a number of times during the geologic ages. The evidence supporting this theory has come from a study of the magnetic characters of volcanic rocks containing iron and titanium oxides.

Fluid lava is nonmagnetic; but it becomes partly magnetized by the earth's magnetic field as it cools past a critical "Curie Temperature." The magnetic "domains" in the rock become locked into positions conforming to the lines of magnetic force that induced their magnetism. The positions of the domains are unalterable except for normal geologic disturbances such as uplifts.

In this way nature has catalogued and preserved a record of the earth's magnetic fields throughout the ages. Scientists can now measure magnetic orientations of the rocks and correlate them with the geologic periods when they were laid down. It is now quite certain that only periodic reversals of the earth's magnetic field can explain the magnetic orientation of certain lava beds.

How rapidly can such pole reversals take place? Almost instantaneously—if one can accept the fact that a mere 5000 years represents hardly more than an instant in terms of geologic time. That reversals have occurred in such short time has been proved by the discovery of a few lava beds which were laid down during times when reversals were actually taking place.

These studies may seem rather esoteric until it is realized that the information gained may yet throw a great deal of light on many puzzling phenomena including rates of sedimentation, stratigraphic correlations between continental and marine rocks, continental drifts, and the curious magnetic "bands" that have been discovered at the bottoms of the oceans.

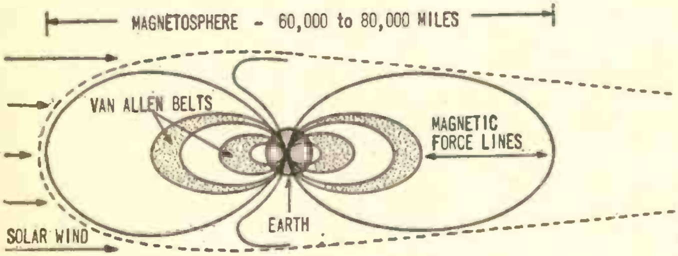


Fig. 10. Doughnut-shaped magnetosphere encircles the earth from about 600 to 40,000 miles. Caused by action of solar wind on upper atmosphere, it varies with time of day and year, according to solar activity.

The studies may even reveal something about the origins and evolution of life on this planet. Mutation rates may have been altered significantly during the reversal periods because of increased cosmic ray penetration permitted by a weakened magnetic envelope around the earth.

The Magnetic Envelope. It was only a short decade ago that man discovered that planet earth is surrounded by a toroidal *magnetosphere* where hot, ionized gases originating from the sun strike the earth's atmosphere and magnetic force field with turbulent impact. Figure 10 represents a thin vertical slice through this magnetosphere whose doughnut-like shape extends out to perhaps 40,000 miles from the earth's equator.

The total diameter of the magnetosphere is highly variable. Solar wind consisting of hydrogen travelling at the fantastic rate of about 900,000 miles per hour strikes the magnetosphere, compressing it to half its usual thickness during times of intense solar activity. The wind sweeps past the magnetosphere and extends it out to perhaps 100,000 miles on the side of the earth opposite the sun.

Inside the magnetosphere are two other doughnut-shaped areas known as the Van Allen belts. The nearer of these arches about 2000 miles above the earth; it contains entrapped high-energy protons. The other belt extends out to 10,000 miles or more; it contains high-energy electrons.

Atmospheric Dynamo. As it turns out, we earthlings are actually sandwiched between *two* gigantic dynamos that are generating magnetic force fields. There is the one inside the earth. There is another in the ionosphere, the upper part of the atmosphere, 50 miles and upward from the surface of the earth. Here the sun's energy acts upon atmospheric gases to release free electrons which flow in circular patterns to form dynamo systems generating electric currents. There is one huge ionosphere dynamo in the northern hemisphere, another in the southern hemisphere.

The magnetic forces produced by these dynamos are superimposed on those produced by the earth dynamo. But the magnetic fields produced in the atmosphere are highly variable because they are directly dependent on solar energy; they are more pronounced on the sunlit side of the earth than on the dark side. Hence there is created a rhythmic undulation associated with daily and annual solar cycles. These undulations are manifested as periodic fluctuations in the intensity of earth magnetism, and as variations in observed magnetic declinations.

Top of the Doughnut. It will be recalled that the magnetosphere was described as a huge doughnut wrapped around the earth's magnetic equator. The "holes" in the doughnut, which lie over the polar regions, are of particular interest because such phenomena as magnetic storms and the Aurora Borealis and Aurora Australis are concentrated in these regions.

The doughnut holes can also be thought of as huge funnels that suck in solar energy as it whizzes by in space. During solar flares, streams of "plasma" (consisting of electrons and protons) leave the sun and strike the earth's magnetic envelope where the lines of force guide the particles earthward toward the polar regions. This streaming of particles produces an intensification of the lines of force which may last for hours, even days.

Magnetic storms are especially likely during periods of high sunspot activity. One effect of magnetic storms that is familiar to any radio fan is the interference with radio communications—especially those involving shortwave transmissions.

Other electromagnetic effects associated with magnetic storms include the increase in detectable X rays, intensified auroral displays, and the induction of electric currents in the earth's crust. Transatlantic communications cables have had voltage surges in the order of 2000 volts at precisely those times when magnetic storms have been most pronounced.

Whistlers. Radio buffs are familiar with another magnetic phenomenon called "whistlers"—long, wailing sounds that often follow the crackling noises heard on AM radios after lightning discharges.

The lightning discharge generates radio waves which can be picked up by an antenna and converted and amplified into audible sounds. The crackles are caused by radio waves traveling directly from the point of origin to the receiving set. Whistlers are radio waves that originate from the same source, at the same time, which travel a far longer, more circuitous path before arriving at the radio's antenna.

Referring to Fig. 11, assume that an electrical discharge occurs in the area marked A. The generated radio waves travel along the earth's magnetic lines of force to the "conjugate point" B, from whence they are reflected back to A along the same path. Since this trip takes some seconds to occur, there is time enough for the radio waves to be dispersed into a spectrum of wavelengths; the shortest waves travel fastest, hence return to the point of origin first, while the longest waves return last because they travel slowest.

What was initially heard as a sharp crackle has now been time-stretched to reveal the various component frequencies in the form of a descending wail or whistle. This time-stretching might be compared to the familiar tape-recording technique in which a relatively short-duration sound is played back at slower than normal speed; by thus stretching the sound, its component characteristics are made more readily detectable.

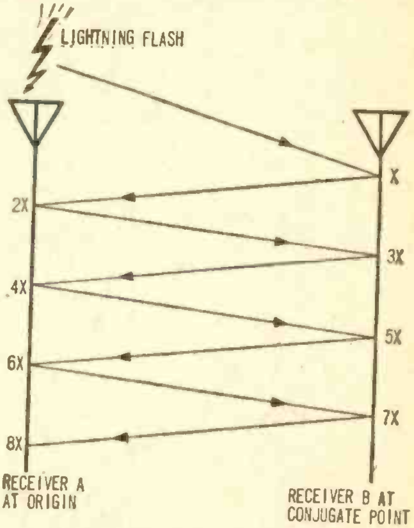


Fig. 12. Whistler is heard at different ratio of time interval, depending on precisely where the receiving point is actually located—see text.

The whistlers generally rebound back and

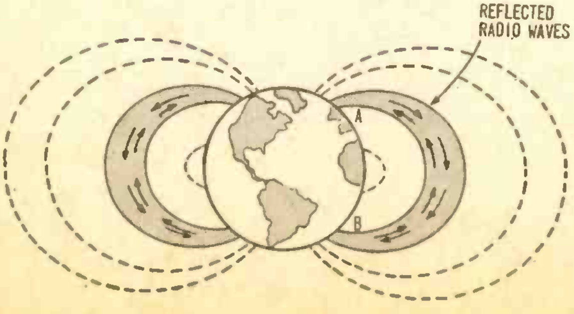


Fig. 11. Whistlers heard on AM radio are triggered by lightning. It produces radio waves which travel along magnetic lines of force and rebound between points A and B. A time delay divides the wave into separate frequencies which travel at different speeds. This produces the long whistling sound in a receiver located in the middle latitudes.

forth several times giving a series of whistles of diminishing intensity. Fig. 12 shows the time intervals at which whistlers will be heard with a receiver at the point of origin, and with a receiver at the conjugate point where the signal rebounds. Whistlers are spaced at time interval ratios of 2:4:6:8:etc. at or near the lightning discharge; they are spaced at time interval ratios of 1:3:5:7:etc. at the conjugate (rebound) point in the other hemisphere. For example, if it takes a radio signal 2 seconds to reach the conjugate point, sets within 500 miles of the lightning will detect whistlers after 4, 8, 12, and 16 seconds after the lightning discharge.

Whistlers are heard only in the middle latitudes. Near the polar regions the magnetic field paths are too long for signal transmission; near the equator they are too short.

Ships and Mines. The average landlubber undoubtedly believes that about all you need do is plunk a compass into the ship's binnacle and set off unerringly to the far corners of the earth. It isn't that easy, largely because every steel ship that is constructed acquires a magnetism that could make the best compass virtually useless.

When a steel ship is being made, it is subjected to a lot of pounding, riveting, and heating. During this process the magnetic domains in the steel are joggled about sufficiently to enable them to align themselves with the earth's magnetic field, thus making the ship a large.magnet. The magnetic pattern acquired by a ship is called the ship's "signature."

Figure 13 shows what happens if the ship is pointed north while on the ways, during construction. The ship becomes magnetized in such a way that the bow and bottom become the north pole, and the top and stern become the south pole. But a ship is usually floated before the final construction and fitting is completed. This work also requires heating and pounding which to some degree alters the original magnetic arrangement.

Two things can be done to nullify the effect of the ship's magnetism on the compass. It is normal practice to orient the ship by reference to external direction indicators such as the stars or some known reference points on land. When the heading of the ship is known, the compass can be adjusted to indicate as it should by the addition of a number of permanent magnets in the binnacle, underneath the compass.

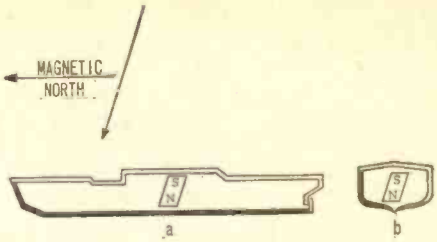


Fig. 13. Steel ship under construction can pick up magnetic field which must be compensated for to prevent effect on compass.

The other expedient is to demagnetize the ship. This is done by winding coils of wires around the ship in various directions, and then sending electric currents through the wires. This procedure eliminates at least part of the initial magnetism acquired by the vessel. But additional magnetism can be picked up by the ship while in motion on the seas. This is often compensated by the use of electric coils strategically and permanently located aboard the ship.

The need to demagnetize all ships became vital during World War II after the Nazis invented the magnetic mine. The mines could be dropped to the bottoms of harbors because they did not require physical contact with the ship to detonate them. The mere passage of a ship over the mine was sufficient.

How does a magnetic mine work? By the use of a dip needle linked to a relay system that electrically detonates the charge when the needle is disturbed! While the mine is awaiting a victim ship, the dip needle points downward toward the point of greatest magnetic intensity within the earth. When a magnetic ship passes over the mine, the ship's magnetism partly counteracts the earth's magnetic attraction and causes the dip needle to move slightly. When it does, the relays close the detonating circuit and—*Blam!*—no ship.

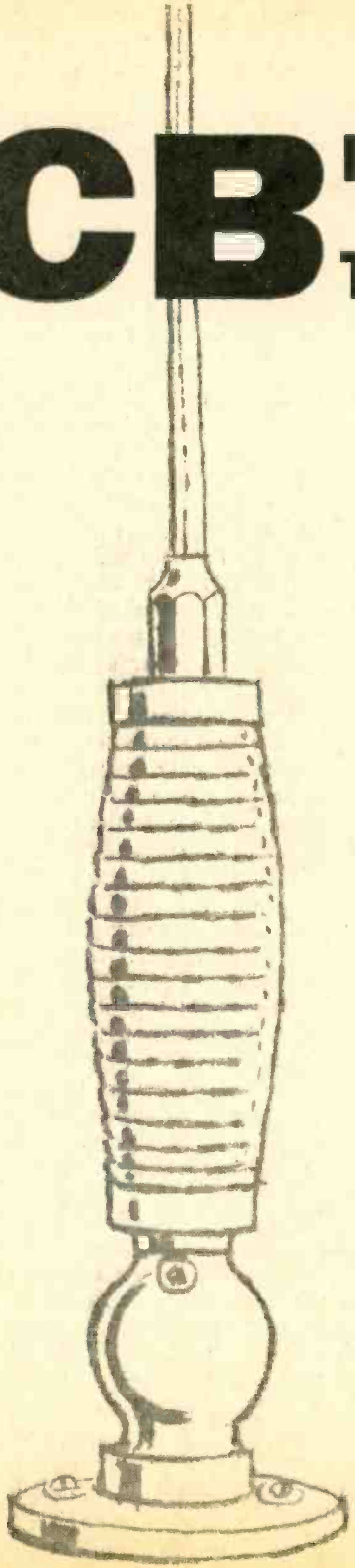
Magnetic Myths. No general article about magnetism would be complete without at least passing mention of the mythology and superstition that has been fostered by the magic of magnetism. Some of it persists today.

It is to be expected that the ancients would associate magnetism with the work of the gods. But in time, simple awe gave way to flagrant opportunism on the part of quacks and pseudo-philosophers.

Paracelsus, a Swiss-born alchemist and physician living during the early 16th cen-

(Continued on page 114)

CB HERTZ GRABBERS for Twenty Seven Megs



■ We've seen many CBers spend a fortune trying to "soup up" a CB rig to run a few extra watts of illegal power when they could have accomplished their goal by the simple feat of putting up a good antenna. In fact, the antenna is such a major factor in the makeup of a CB installation that, regardless of the amount you have spent on a rig, if the antenna isn't a good one—or if it's installed improperly—or it's not properly "matched" to the CB rig—or if it's old and corroded—then you've got a lot of expensive junk sitting in your shack or under your dash.

Just as there are many different CB rigs, there are also many antennas. Each has its own characteristics, and it's interesting to see how each of the manufacturers has applied his individual approach to the same basic types. You'll find that for each basic type of antenna, there are about a dozen variations on the theme. Why so many? Well, antennas are one of the few aspects of electronics where there is room for experimentation in wild, far-out designs—the antenna engineer has a chance to try his own approach.

Which approach is best? They're all good when installed properly. But first, you must know which mobile or base station antenna is the best basic type to fill the bill at *your* station.

Antenna Gain. The antenna is the component of your station which flings your CB signal out into the ether, so you can see why we place such emphasis on it. The difference between one antenna and another is its ability to concentrate your signal into a radiation pattern where it will do the most for your coverage—an antenna can even provide actual amplification of your signal. Some antennas can take your 3.5-watt signal and boost it to the point where it is the equivalent of 120 watts! This amplification factor is known as "gain," and you'll find that it's a magic word when it comes to the subject of antennas.

Gain ratings are shown in terms of decibels (DB), and you'll see few ads or antenna spec sheets which don't make frequent references to the DB gain of a particular antenna. Trouble with these figures is, there are several different ways to measure or rate the gain of any given antenna, and the various manufacturers always seem to manage to find the measurement method that makes their product look the best. Every once in a while we've seen a few gain rating figures which, quite frankly, look as if they may have been helped along by a few DB's. Our point is, you should keep these things in mind when shopping for an antenna and not get too carried away with the published statistics.

Another thing to watch for is the term "up to" (also called "as much as"). When these words prefix antenna gain ratings *(You get up to 12 DB gain)*, you should realize that they mean you'll definitely get some gain—possibly as much as 12 DB (but not more than 12 DB under any circumstances). But you may only get 3 DB gain.

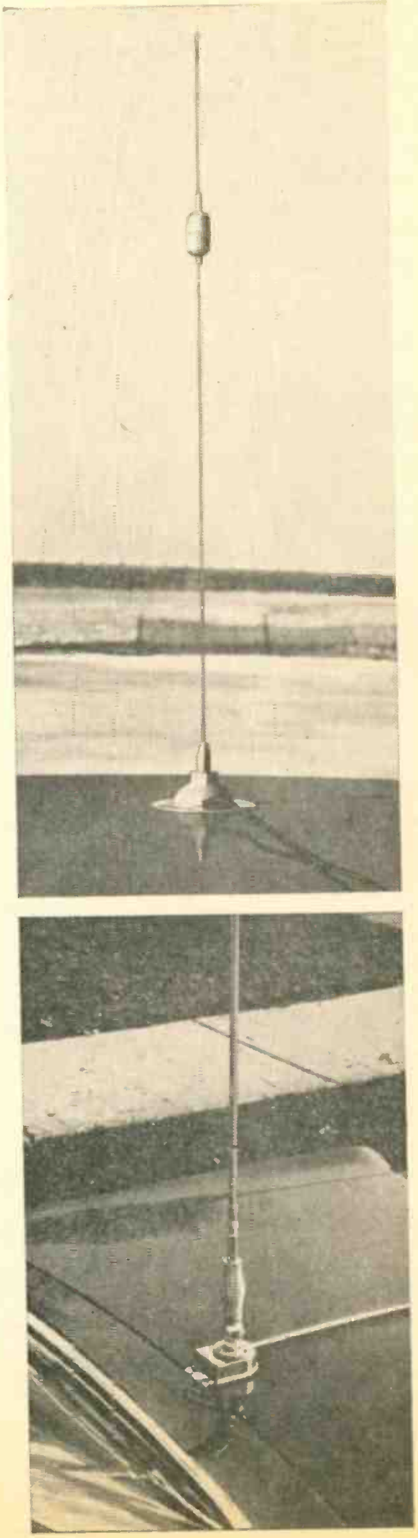
An antenna which offers 3 DB gain will effectively double your signal, 6 DB gain means your signal is multiplied 4 times, 7 DB is 5 times, 10 DB is 10 times, and so on.

Base Station Antennas. There are two basic families of base station antennas: omni-directional (sometimes called *non-directional*) and directional.

Directional antennas are usually called "beams" or "Yagis," (although a few directional types don't fit into these two categories). They concentrate a CB signal in one particular direction.

Omni-directionals radiate your signal equally in all directions. Within this family are ground planes, coaxial antennas, and collinears.

Omni-directional Types. The basic omni-directional antenna is the half-wave dipole —in pure form, it exists mainly in theory



Hy-Gain's Magna Topper (top) antenna attaches to car roof with magnet. E-Z Mobile Mount (bottom) attaches to trunk opening, requires no holes in car.

insofar as CB is concerned. The coaxial type antenna fits into this classification; however, it is little used for some unknown reason.

One step fancier than the coaxial type is the so-called ground plane antenna. This antenna consists of a vertical "whip" with 3 or 4 horizontal whips extending out from the base. Because this antenna has a low radiation angle (it keeps the signal aimed along the surface of the earth so that none is wasted in an upward direction). Four additional horizontal whips are sometimes added below the first set at the base of the vertical, this gives the antenna an even lower angle of radiation (and further range).

The ground plane was the original smash hit of CB; in the days before the exotic antennas appeared on the market everybody used one. There are still many in use today —it's well liked because it's efficient, inexpensive, and simple to erect.

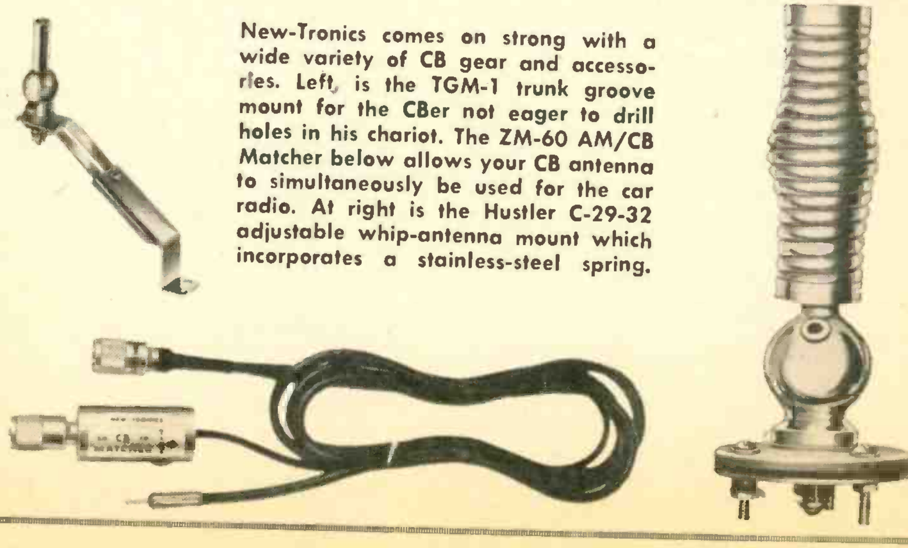
As CB became more sophisticated, so did the antennas, and today we are in a wonderland of gain-producing omni-directional antennas. While many of these antennas look like overgrown ground planes, they are quite different from an engineering standpoint. The difference in operation is, that if you have a ground plane which will let you just barely work your mobile unit at 10 miles out, one of these will make the contact handily, without the grief of trying to hear somebody through tons of noise and static. The antennas that fit into this category include units such as the Hy-Gain *CLR-II*, Hy-Gain *Vertipole*, Astro *Super Star Burst*, Antenna Specialists *Super Magnum*, Mark Products *Mark II*, Shakespeare *Long Ranger*, Cush Craft *Ringo*, Webster *BCL-1*, New-Tronics *Pro-27*, Antenna Specialists *Speakin' Beacon* (the top of the antenna lights up when you transmit), Mosley *Devant 1*, among others.

Several smaller antennas for portable or temporary use (or apartment dwellers who don't have access to the roof) have shown up during the last year. These are clever units and fill the bill nicely. If you're interested in such an antenna, we suggest you seek out data on the following antennas: Elenex *Tiger-Tail*, Cush-Craft *Trik Stik*, or the DPZ Corporation's *Sky Top*.

Omni-directional antennas should be considered for any station intended to be used for communications with roving mobile units, or with other base stations located in different directions.

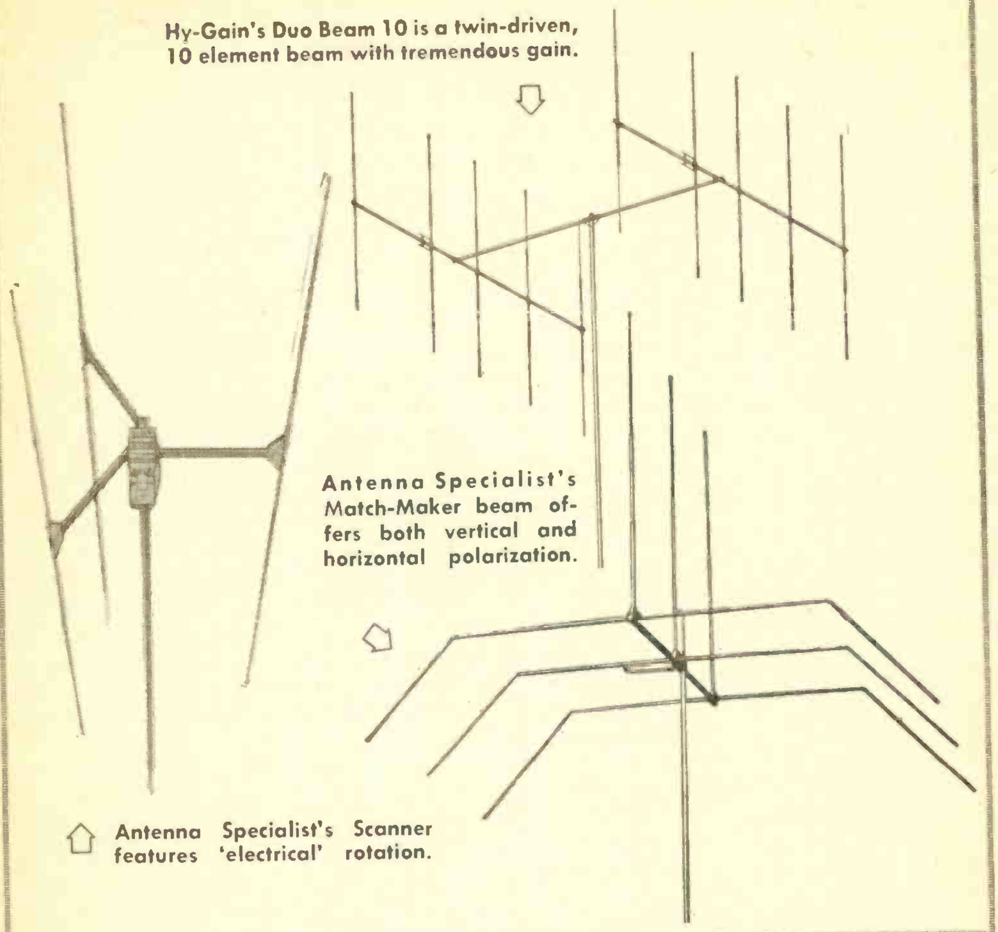
Directional Antennas. For communications over great distances, it is usually worthwhile to use a directional antenna of one type or another. Not only do these antennas concentrate your signal in a powerful beam towards the desired direction, they also reduce interference from other stations on the channel which are not in the direction of the beam. The directional antenna may be mounted on a rotor, a device which permits you to turn the antenna so as to aim your signal in any desired direction. The rotor is controlled electrically from your operating position.

Beam antennas (or "Yagis") start with the most basic type having 2 "elements." This



New-Tronics comes on strong with a wide variety of CB gear and accessories. Left, is the TGM-1 trunk groove mount for the CBer not eager to drill holes in his chariot. The ZM-60 AM/CB Matcher below allows your CB antenna to simultaneously be used for the car radio. At right is the Hustler C-29-32 adjustable whip-antenna mount which incorporates a stainless-steel spring.

BASE STATION ANTENNAS



Hy-Gain's Duo Beam 10 is a twin-driven, 10 element beam with tremendous gain.

Antenna Specialist's Match-Maker beam offers both vertical and horizontal polarization.

Antenna Specialist's Scanner features 'electrical' rotation.

looks like the letter "H" mounted on a mast; it provides adequate directivity for most non-critical installations.

The trick is to keep adding elements to further sharpen the beam and directivity, and CB has its share of 3, 4, and even 5 element beams for those who want intense signal concentrations in a particular direction. For those who seek even further boost to their signal, the beam antennas may be matched (or "stacked," as it is known) with a second beam on the same mast. Such stacking produces really fantastic signals for those who want the ultimate in coverage. The largest commercially available pre-stacked beam is the Hy-Gain *Duo-Beam 5*, which has 10 elements.

Beams are available direct from most manufacturers. However, electronics parts catalogs list many antennas offering a wide choice.

There are several other interesting approaches to the problem of aiming your signal in one direction and since they are available to CBers, we might take a look at them.

The Cubical Quad (or just plain Quad) is a type of beam which has as its basic construction 2 gigantic "X" frames made of Fiberglas. It has good directivity, is inexpensive, is lightweight, and offers little wind resistance. A complete line of Quads is produced by Cubex and Master Mobile.

The polar diversity loop is something brand new to CB. Looking something like a Quad, it differs in the basic fact that you can switch your signal to either vertical or horizontal polarization. Since almost all CB transmissions are in the vertical plane, switching over to horizontal (both stations in the contact would have to do this for maximum results) will cut out a considerable amount of interference from other stations using your channel. A polar diversity loop is now on the market from Avanti Research & Development, Inc.

A novel approach to directional antennas is in an antenna consisting of 3 vertical dipoles mounted on a frame that looks like an airplane prop. Down at your operating position, a control box permits you to selectively run your signal into any one of the dipoles and use the other two to reflect and amplify your signal in the desired direction. The antenna itself does not physically rotate, only your signal does. The antenna is available from Antenna Specialists under the trade name *Scanner*, and from Master Mobile Mounts under the name CB-47 *Orbiteer*.

Another method of rotating the signal without physically turning the antenna is by the so-called "phasing" method. This calls for the use of 2 standard omni-directional antennas placed in strategic proximity to each other. They are connected by a co-phasing control box which jockeys around the amount of signal to be fed into each of the antennas. The co-phasing control box is manufactured by Hy-Gain Electronics.

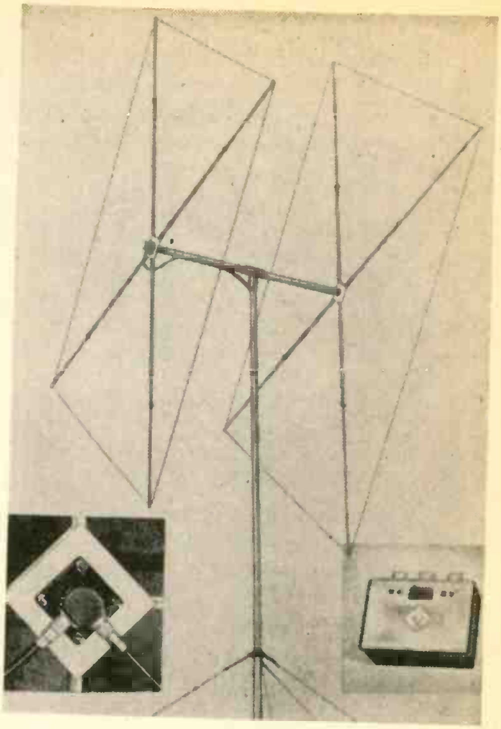
Last on our list of off-beat approaches to the directional antenna situation is the Antenna Specialists *Match-Maker*. This one is a cross between a beam and a ground plane, allowing you not only to rotate the antenna, but also switch its polarization from vertical to horizontal.

Base Station Installation. Installing your antenna shouldn't post any problems of traumatic proportions. The one thing to keep in mind is the fact that CB stations are regulated by the FCC as to the height of the antenna installation.

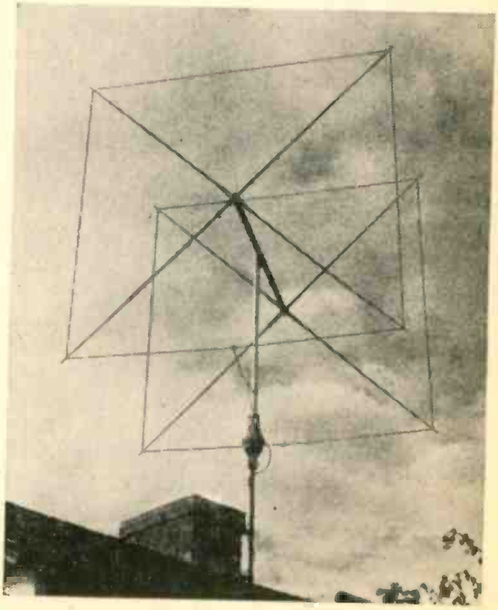
The rules, as presented by the FCC, have proven somewhat confusing. We suggest that you read over the antenna height section of Part 95 of the FCC's rules and regulations—then try to figure it out for yourself.

To help you out, we offer this interpretation: The maximum permissible height of a CB antenna is determined by the height of the specific structure upon which the antenna is mounted. If it is on a building, the antenna can extend only 20 feet above the top of a previous structure on the building (usually a vent pipe, chimney or water tower). If on its own pole or mast resting on ground level (even if braced to a building), it may not protrude more than 20 feet above the ground level. If on a pole, mast, or tower used for other transmitting antennas, the CB antenna may not exceed the top of the

(Continued on page 110)



Avanti polar diversity loop (above) allows vertical or horizontal transmission. Cubex cubical quad (below) is light, has lots'a poop.



WHITE'S RADIO LOG

Volume 48, 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 World-Wide Shortwave Stations.

In Our Next Issue, October-November, 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 an expanded Shortwave Section. The shortwave listings are always completely revised in each issue of *Log* to insure 100 percent up-to-date information.

In the year-end December-January 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 an expanded World-Wide Shortwave Section.

Therefore, in any three consecutive 1967 issues of RADIO-TV EXPERIMENTER magazine, 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 are not to be found 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 shortwave 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
WDMV Pocomoke City, Md.	500d
WBIC Islip, N.Y.	250d
WETC Wendell-Zebulon, N.C.	250d
WARO Canonsburg, Pa.	250d
WYNN Florence, S.C.	250d
WDXN Clarksville, Tenn.	1000d
WRIC Richlands, Va.	1000d
WYLO Jackson, Wis.	250
550—545.1	
KENI Anchorage, Alaska	5000
KOY Phoenix, Ariz.	5000
KAFY Bakersfield, Calif.	1000
KRAI Craig, Colo.	1000
WAYR Orange Park, Fla.	1000d
WGGA Gainesville, Ga.	5000
KMVI Wailuku, Hawaii	1000
KFRM Salina, Kans.	5000d
WCBI Columbus, Miss.	1000
KSD St. Louis, Mo.	5000
KBOW Butte, Mont.	1000
WGR Buffalo, N.Y.	5000
WDBM Statesville, N.C.	500d
KFYR Bismarck, N.Dak.	5000
WKRC Cincinnati, Ohio	5000
KOAC Corvallis, Oreg.	5000
WHLM Bloomsburg, Pa.	1000
WPAB Ponce, P.R.	5000
WXTR Pawtucket, R.I.	1000
KCRS Midland, Tex.	5000
KTSA San Antonio, Tex.	5000
WDEV Waterbury, Vt.	5000
WSVA Harrisonburg, Va.	5000
KARI Blaine, Wash.	5000d
WSAU Wausau, Wis.	5000
560—535.4	
WOOF Dothan, Ala.	5000d
KYUM Yuma, Ariz.	1000
KSFD 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
KWTD 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
WDBD 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
KDBH Hot Springs, S.Dak.	500d
WRKH Rockwood, Tenn.	1000d
KDAV Lubbock, Tex.	500d
WLES Lawrenceville, Va.	500d
WCHS Charleston, W.Va.	5000
WKTY LaCrosse, Wis.	5000
590—508.2	
KHAR Anchorage, Alaska	5000
WRAG Carrollton, Ala.	1000d
KBHS Hot Springs, Ark.	5000d
KFXM San Bernardino, Cal.	1000
KTHO Tahoe Valley, Calif.	1000d
KCSJ Pueblo, Colo.	1000
WDLP Panama City, Fla.	1000
WPLO Atlanta, Ga.	5000
KGMB Honolulu, Hawaii	5000
KID Idaho Falls, Idaho	5000
WRTH Wood River, Ill.	1000
WVLK Lexington, Ky.	5000
WEEI Boston, Mass.	5000
WKZO Kalamazoo, Mich.	5000
KGLE Glendive, Mont.	500d
WOW Omaha, Nebr.	5000
WROW Albany, N.Y.	5000
WGTM Wilson, N.C.	5000
KUGN Eugene, Oreg.	5000
WARM Scranton, Pa.	5000
WMBS Uniontown, Pa.	1000
KTBC Austin, Tex.	5000
KSUB Cedar City, Utah	1000
WLVA Lynchburg, Va.	1000
KHQ Spokane, Wash.	5000
600—499.7	
WIRB Enterprise, Ala.	1000
KCLS Flagstaff, Ariz.	5000
KVCV Redding, Calif.	1000
KOGO San Diego, Calif.	5000
KZIX Ft. Collins, Colo.	1000d
WICC Bridgeport, Conn.	5000
WPDQ Jacksonville, Fla.	5000
WMT Cedar Rapids, Iowa	5000
WWOM New Orleans, La.	1000d
WFST Caribou, Maine	5000d
WCAO Baltimore, Md.	5000
WLST Escanaba, Mich.	1000d
WTAC Flint, Mich.	1000
KGEZ Kalispell, Mont.	1000
WCVP Murphy, N.C.	1000d
WSJS Winston-Salem, N.C.	5000
KSJB Jamestown, N.D.	5000
WSOM Salem, Ohio	500d
WFRM Coudersport, Pa.	1000d
WAEL Mayaguez, P.R.	1000
WREC Memphis, Tenn.	5000
KROD El Paso, Tex.	5000
KERB Kermit, Tex.	1000d
KTBB Tyler, Tex.	1000
WVAR Richwood, W.Va.	1000d
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	10000
WRUS Russellville, Ky.	500d
KDAL Duluth, Minn.	5000
WDAF Kansas City, Mo.	5000
KOJM Havre, Mont.	1000
KCSR Chadron, Nebr.	1000d
WGIR Manchester, N.H.	5000
KGGM Albuquerque, N.Mex.	5000
WAYS Charlotte, N.C.	5000
WTVN Columbus, Ohio	5000
WIP Philadelphia, Pa.	5000
KILT Houston, Tex.	5000
KVNU Logan, Utah	5000
WSLS Roanoke, Va.	5000
WHPL Winchester, Va.	500
KEPR Kennewick-Richmond-Pasco, Wash.	5000
620—483.6	
KTAR Phoenix, Ariz.	5000
KNGS Hanford, Calif.	1000
KWSD Mt. Shasta, Calif.	1000d
KSTR Grand Junction, Colo.	5000d
WSUN St. Petersburg, Fla.	5000
WTRP LaGrange, Ga.	1000d
KWAL Wallace, Idaho	1000
KMNS Sioux City, Iowa	1000
WTMT Louisville, Ky.	500d
WLBZ Bangor, Maine	5000
WJDX Jackson, Miss.	5000
WVNJ Newark, N.J.	5000
WHEN Syracuse, N.Y.	5000
WDNC Durham, N.C.	5000
KGW Portland, Oreg.	5000
WHJB Greensburg, Pa.	1000
WCAY Cayce, S.C.	500d
WATE Knoxville, Tenn.	5000
KWFT Wichita Falls, Tex.	5000
WVMT Burlington, Vt.	5000
WWNR Beckley, W.Va.	1000
WTMJ Milwaukee, Wis.	5000
630—475.9	
WAVU Albertville, Ala.	1000d
WJDB Thomasville, Ala.	1000d
KJNO Juneau, Alaska	1000
KVMA Magnolia, Ark.	1000d
KIDD Monterey, Calif.	1000
KHOW Denver, Colo.	5000
WMAL Washington, D.C.	5000
WSAV Savannah, Ga.	5000
WNEG Toccoa, Ga.	500d
KIDO Boise, Idaho	5000
WLAP Lexington, Ky.	5000
KTIB Thibodaux, La.	500d
WJMS Ironwood, Mich.	1000
KDWB So. St. Paul, Minn.	5000
KXOK St. Louis, Mo.	5000
KGVW Belgrade, Mont.	1000d
KOH Reno, Nev.	5000
KLEA Lovington, N.Mex.	500d
WIRC Hickory, N.C.	1000d
WMFD Wilmington, N.C.	1000
KWRO Coquille, Oreg.	5000d
WEJL Scranton, Pa.	500d
WKYN San Juan, P.R.	5000
WPRO Providence, R.I.	5000
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
WRNG N. Atlanta, Ga.	5000
WCTT Corbin, Ky.	1000
WCBM Baltimore, Md.	10000
WRKD 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
KKUA Honolulu, Hawaii	10000
KBLI Blackfoot, Idaho	1000d
KGGF Coffeyville, Kans.	10000
WTIX New Orleans, La.	5000
KTCR Minneapolis, Minn.	500d
KSTL St. Louis, Mo.	1000d
KEYR Terrytown, Nebr.	1000d
KRCO Prineville, Oreg.	1000d
WXUR Media, Pa.	500d
KUSD Vermillion, S.Dak.	1000d
KHEY El Paso, Tex.	10000
KPET Lamesa, Tex.	250
KZEY Tyler, Tex.	5000
WCYB Bristol, Va.	10000d
WNNT Warsaw, Va.	250d
WELD Fisher, W.Va.	500d
700—428.3	
WLW Cincinnati, Ohio	50000
710—422.3	
WKRG Mobile, Ala.	1000
KMPC Los Angeles, Calif.	50000
KBTR Denver, Colo.	5000
WGBS Miami, Fla.	50000
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
WDOS Oneonta, N.Y.	1000d
WFMC Goldsboro, N.C.	1000d
WOHS Shelby, N.C.	1000d
WMGS Bowling Green, Ohio	1000d
KBOY Medford, Oreg.	1000d
WNAK Nanticoke, Pa.	1000d
WPIT Pittsburgh, Pa.	5000d
WPAL Charleston, S.C.	1000d
WLIL Lenoir, Tenn.	1000d
KPCN Grand Prairie, Tex.	500d
KSVN Ogden, Utah	1000d
WPIK Alexandria, Va.	5000d
WMNA Gretna, Va.	1000d
KULE Ephrata, Wash.	1000d
WXMT Merrill, Wis.	1000d

Every effort has been made to insure 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 Colorado Springs, Colo.	1000d
KVFC Cortez, Colo.	1000d
WSBR Boca Raton, Fla.	1000
WKMK Blountston, 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
WBOO Baraboo, Wis.	
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 S. Miami, 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
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
KWSR Rifle, Colo.	
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.	50000
WQIZ St. George, S.C.	5000d
KBHB Sturgis, S.D.	5000d
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 Aquadilla, P.R.	500
WIVK Knoxville, Tenn.	50000d
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
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, Kan.	10000d
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.	1000d
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
WNYN Canton, O.	5000d
WFRO Fremont, Ohio	500d
WCPA Clearfield, Pa.	1000d
WFLN Philadelphia, Pa.	1000d
WKXV Knoxville, Tenn.	1000d
WCOR Lebanon, Tenn.	500d
KALT Atlanta, Tex.	1000d
KMCO Conroe, Tex.	500d
KFLD Floydada, Tex.	250d
KCLW Hamilton, Tex.	250d
WODY Bassett, Va.	500d
WAFC Staunton, Va.	1000d
KUEN Wenatchee, Wash.	1000d
WATK Antigo, Wis.	250d
910—329.5	
WDVC Dadeville, Ala.	500d
KPHO Phoenix, Ariz.	5000
KLCN Blytheville, Ark.	5000d
KAMD Camden, Ark.	5000
KOEO El Cajon, Calif.	1000
KNEW Oakland, Calif.	5000
KOXR Oxnard, Cal.	5000
KPOF Denver, Colo.	5000d
WRCH New Britain, Conn.	5000
WPLA Plant City, Fla.	1000d
WGAF Valdosta, Ga.	5000
KBGN Caldwell, Ida.	1000d
WAKO Lawrenceville, Ill.	500d
WSUI Iowa City, Iowa	5000
KISI Salina, Kan.	500d
WLCS Baton Rouge, La.	1000
WABI Bangor, Maine	5000
WFDF Flint, Mich.	5000
WCOC Meridian, Miss.	5000
KOYN Billings, Mont.	1000d
KYSS Missoula, Mont.	1000d
KBIM Roswell, N. M.	5000
WRKL New City, N.Y.	1000d
WLAS Jacksonville, N.C.	5000d
KCJB Minot, N.Dak.	1000
WBRJ Marietta, O.	5000
WPFB Middletown, Ohio	1000
KGLC Miami, Okla.	1000
KURY Brookings, Oreg.	1000d
WAVL Apollo, Pa.	1000d
WGBI Scranton, Pa.	1000
WSBA York, Pa.	5000
WPRP Ponce, P.R.	5000
WNCG North Charleston, S.C.	500d
WORD Spartanburg, S.C.	5000d
WJCW Johnson City, Tenn.	5000
WEPG S. Pittsburgh, Tenn.	500d
KNAF Fredericksburg, Tex.	1000d
KRIO McAllen, Tex.	5000
KRRV Sherman, Tex.	1000
KALL Salt Lake City, Utah	5000
WNHV White River Jct., Vt.	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
KOES 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 Fairbault, Minn.	5000
KWAO 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, Ohia	1000
KGAL Lebanon, Oreg.	1000
WKVA Lewistown, Pa.	1000
WJAR Providence, R.I.	5000
WTNO 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
KAFF Flagstaff, Ariz.	5000d
KHJ Los Angeles, Calif.	5000
KEWQ Paradise, Cal.	5000d
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

WHITE'S RADIO LOG

kHz — Wave Length — W.P.

KQOT	Yakima, Wash.	1000d
WSAZ	Huntington, W.Va.	5000
KROE	Sheridan, Wyo.	1000d
WLBL	Auburndale, Wis.	5000d

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
KSMW	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.	500d

950—315.6

WRMA	Montgomery, Ala.	1000d
K1BH	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
KATN	Boise, Ida.	5000d
KLER	Orofino, Idaho	1000d
WAAF	Chicago, Ill.	1000d
WXLW	Indianapolis, Ind.	5000d
KOEL	Oelwein, Ia.	5000
KJRG	Newton, Kans.	500d
WYWY	Barbourville, Ky.	
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
WMDZ	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
WGRD	Lake City, Fla.	500d
WJCM	Sebring, Fla.	1000d
WJAZ	Albany, Ga.	5000
WRFC	Athens, Ga.	5000
KSRA	Salmon, Idaho	1000d
WDLM	E. Moline, Ill.	1000d
WSBT	South Bend, Ind.	5000
KMA	Shenandoah, Iowa	5000
WPRT	Prestonsburg, Ky.	5000d
KROF	Abbeville, La.	1000d
WBOC	Salisbury, Md.	5000
WFGM	Fitchburg, Mass.	1000
WHAK	Rogers City, Mich.	5000d
KLTF	Little Falls, Minn.	500d
WABG	Greenwood, Miss.	1000
KFVS	Cape Girardeau, Mo.	5000
KFLN	Baker, Mont.	5000d
KNEB	Scottsbluff, Nebr.	1000
KWYK	Farmington, N.Mex.	1000d
KRIK	Roswell, N. Mex.	1000d
WEAV	Plattsburg, N.Y.	5000
WAAK	Dallas, N.C.	1000d
WFTC	Kinston, N.C.	5000
WWST	Wooster, Ohio	1000d
KGWA	Enid, Okla.	1000
KLAD	Klamath Falls, Oreg.	5000d
WHYL	Carlisle, Pa.	5000d
WKZA	Kane, Pa.	1000d
WATS	Sayre, Pa.	1000d
WBEU	Beaufort, S.C.	1000d
WBMC	McMinnville, Tenn.	500d
KIMP	Mt. Pleasant, Tex.	1000d
KGKL	San Angelo, Tex.	5000
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
WCKO	Ishpeming, Mich.	5000d
WKHM	Jackson, Mich.	1000
KQAQ	Austin, Minn.	5000
WRKN	Brandon, Miss.	
KOOK	Billings, Mont.	5000
KJLT	No. Platte, Nebr.	5000d
KVEG	Las Vegas, Nev.	500d
WJRZ	Newark, N.J.	5000
KDCE	Espanola, N. M.	1000d
WEBR	Buffalo, N.Y.	5000
WCHN	Norwich, N.Y.	500d
WRCS	Ahoskie, N.C.	1000d
WWIT	Canton, N.C.	1000d
WDAY	Fargo, N.Dak.	5000
WREO	Ashtabula, Ohio	5000
WATH	Athens, Ohio	1000d
KAKC	Tulsa, Okla.	1000
KOIN	Portland, Oreg.	5000
WWSW	Pittsburgh, Pa.	5000
WJMX	Florence, S.C.	5000
KHFI	Austin, Tex.	1000d
KBSN	Crane, Tex.	1000d
KNOK	Ft. Worth, Tex.	1000d
WIVI	Christiansted, V. I.	5000
WYPR	Danville, Va.	1000d
WANV	Waynesboro, Va.	5000d
KREM	Spokane, Wash.	5000
WWYO	Pineville, W.Va.	1000d
WHA	Madison, Wis.	5000d
WIGL	Superior, Wis.	500d

980—305.9

WKLF	Clanton, Ala.	1000d
WXLL	Big Delta, Alaska	100
KCAB	Dardanelle, Ark.	1000d
KINS	Eureka, Calif.	5000
KEAP	Fresno, Calif.	500d
KFWB	Los Angeles, Calif.	5000
KCTY	Salinas, Calif.	1000d
KGLN	Glennwood Springs, Colo.	1000d
WSUB	Groton, Conn.	1000d
WRC	Washington, D.C.	5000
WDVH	Gainesville, Fla.	5000d
WTOT	Marianna, Fla.	1000d
WBOP	Pensacola, Fla.	1000d
WLOD	Pompano Beach, Fla.	1000d
WKLY	Hartwell, Ga.	1000d
WPGA	Perry, Ga.	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.	1000d
WYCL	York, S. C.	1000d
KDSJ	Deadwood, S.Dak.	1000
WSIX	Nashville, Tenn.	5000
KFRD	Rosenberg-Richmond, Tex.	1000d
KSVC	Richfield, Utah	5000
WFHG	Bristol, Va.	5000
WMEK	Chase City, Va.	500d
KUTI	Yakima, Wash.	5000d
WHAW	Weston, W.Va.	1000d
WCUB	Manitowoc, Wis.	1000d
WPRE	Prairie du Chien, Wis.	1000
KEND	Cheyenne, Wyo.	500d

990—302.8

WEIS	Center, Ala.	250
WWWF	Fayette, Ala.	1000d
WTCB	Flomaton, Ala.	500d
KTKT	Tucson, Ariz.	10000
KKIS	Pittsburg, Calif.	5000
KGUD	Santa Barbara, Calif.	1000d
KLIR	Denver, Colo.	1000d
WFAB	Miami, Fla.	5000
WHOO	Orlando, Fla.	50000
WDWD	Dawson, Ga.	1000d
WGML	Hinesville, Ga.	250d
KTRG	Honolulu, Hawaii	5000
WCAZ	Carthage, Ill.	1000d
WITZ	Jasper, Ind.	1000d
WERK	Muncie, Ind.	250d
KAYL	Storm Lake, Iowa	250d
KRSL	Russell, Kans.	250d
WNNR	New Orleans, La.	250d
KRIH	Rayville, La.	250d
WCRM	Clare, Mich.	250d
WABO	Waynesboro, Miss.	250d
KRMO	Monett, Mo.	250d
KSVP	Artesia, N.Mex.	1000
WEEB	Southern Pines, N.C.	5000d
WJEH	Gallipolis, Ohio	1000d
WTIG	Massillon, Ohio	250d
KRKT	Albany, Oreg.	250d
WIBG	Philadelphia, Pa.	50000
WVSC	Somerset, Pa.	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
WIQT	Horseheads, N.Y.	
WSPF	Hickory, N.C.	1000d
KTOK	Okla. City, Okla.	5000
WIOO	Carlisle, Pa.	1000
WKYB	Hemingway, S.C.	
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
KDMD	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
KVII	Amarillo, Tex.	5000
KODA	Houston, Tex.	1000d
KAWA	Waco-Marlin, Tex.	10000d
WELK	Charlottesville, Va.	1000d
WMEV	Marion, Va.	1000d
WPMH	Portsmouth, Va.	5000d
WCST	Berkeley Sprgs., W.Va.	250d
WSPT	Stevens Pt., Wis.	1000d

1020—293.9

KGBS	Los Angeles, Calif.	50000
WCIL	Carbondale, Ill.	1000d
WPEO	Peoria, Ill.	10000d
KSWS	Roswell, N.M.	50000d
KDKA	Pittsburgh, Pa.	50000

1030—291.1

WBZ	Boston, Mass.	50000
KCTA	Corpus Christi, Tex.	50000d
KTWO	Casper, Wyo.	10000

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
KDRE	Springfield-Eugene, Ore.	1000d
WBUT	Butler, Pa.	1000d
WWDS	Everett, Pa.	250d
WLYC	Williamsport, Pa.	1000d
WSMT	Sparta, Tenn.	1000d
KLEN	Killeen, Tex.	250d
KCAS	Slaton, Tex.	250d
WGAT	Gate City, Va.	1000d
WBRG	Lynchburg, Va.	1000d
WCMS	Norfolk, Va.	5000d
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
KLMD	Longmont, Colo.	10000d
WMCL	McLeansboro, Ill.	
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.	250d
WCOK	Sparta, N.C.	250d
WOID	Canton, O.	5000d
KYW	Philadelphia, Pa.	50000
WRJS	San German, P. R.	250
WALD	Walterboro, S. C.	1000d
WPHC	Waverly, Tenn.	1000d
WCIR	Beckley, W.Va.	10000d
KHRB	Lockhart, Tex.	
KRSP	Salt Lake City, Utah	

1070—280.2

WAPI	Birmingham, Ala.	50000
KNX	Los Angeles, Calif.	50000

kHz Wave Length	W.P.
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
WHYZ Greenville, S.C.	50000d
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

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
WPOK Pontiac, Ill.	1000d
WNWI Valparaiso, Ind.	5000d
KOAK Red Oak, Ia.	
WKLO Louisville, Ky.	5000
WOAP Owosso, Mich.	1000d
KGCL East Prairie, Mo.	
WUFO Amherst, N.Y.	1000d
WEWO Laurinburg, N.C.	5000d
WWDR Murfreesboro, N.C.	500d
WMVR Sidney, O.	250d
KWJJ Portland, Oreg.	50000
WEEP Pittsburgh, Pa.	50000
WLEY Cayey, P.R.	250
KGFX Pierre, S. D.	10000d
KRLD Dallas, Tex.	50000
WKBY Chatham, Va.	1000d

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
WFWR Ft. Wayne, Ind.	
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
KTGO Tioga, N.D.	
WMWM Wilmington, O.	1000d
WENR Englewood, Tenn.	1000d
WJKM Hartsville, Tenn.	250d
KANN Ogden, Utah	1000d
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
WEBS Calhoun, Ga.	250d
KIPA Hilo, Hawaii	1000
WMBI Chicago, Ill.	5000d
WKDZ Cadiz, Ky.	
WFOG Franklinton, La.	1000d
WUST Bethesda, Md.	
WUNN Mason, Mich.	
WJML Petoskey, Mich.	
WKRA Holly Springs, Miss.	1000d
KFAB Omaha, Nebr.	50000
WBT Charlotte, N.C.	50000
KEOR Atoka, Okla.	
KBND Bend, Oreg.	5000
WNAR Norristown, Penn.	50000d
WVJP Caguas, P.R.	250
WHIM Providence, R.I.	1000d
WPHC Waverly, Tenn.	1000d
KORY Alamo Heights, Tex.	1000d

1120—267.7

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

1130—265.3

KRDU Dinuba, Calif.	1000
KSDO San Diego, Cal.	5000d
KLEI Kailua, Hawaii	1000
KLEY Wellington, Kan.	250d
KWKH Shreveport, La.	50000
WCAR Detroit, Mich.	50000
WOGY Minneapolis, Minn.	50000
KBLR Bolivar, Mo.	250d
WNEW New York, N.Y.	50000
KBGH Memphis, Tenn.	1000d
KBGH Memphis; Tex.	
WISN Milwaukee, Wis.	50000

1140—263.0

KRAK Sacramento, Calif.	50000
KNAB Burlington, Colo.	
WMIE Miami, Fla.	10000
KGEM Boise, Idaho	10000
WSIV Pekin, Ill.	5000d
WAWK Kendallville, Ind.	250d
KBIL Liberty, Mo.	500d
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
KDLJ Quanah, Tex.	500d
KBER San Antonio, Tex.	1000d
KPUL 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
WISN Milwaukee, Wis.	50000

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

KROS Tolleson, Ariz.	250
KEZY Anaheim, Calif	5000
KNBA Vallejo, Calif.	250d
WGKA Atlanta, Ga.	1000d
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
WBMJ San Juan, P.R.	
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
KOFD 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
KEYO 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
KZEE Weatherford, Tex.	250d
KVLL Woodville, Tex.	250d
WLSO 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
KATO 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
WANO 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
WUBE Cincinnati, O.	1000d
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
WKBD 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

WHITE'S RADIO LOG

kHz	Wave Length	W.P.
KGRO	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

kHz	Wave Length	W.P.
WEBJ	Brewton, Ala.	250
WPRN	Butler, Ala.	1000d
WULA	Eufaula, Ala.	250
WOWL	Florence, Ala.	1000
WARF	Jasper, Ala.	1000
KVRD	Cottonwood, Ariz.	250
KZOW	So. of Globe, Ariz.	1000
KVRC	Arkadelphia, Ark.	250
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
KRDO	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	Oecorah, Iowa	1000
KBIZ	Ottumwa, Iowa	1000
KICD	Spencer, Iowa	1000
KIUL	Garden City, Kans.	1000
KAKE	Wichita, Kans.	250
WINN	Louisville, Ky.	1000
WFTM	Maysville, Ky.	1000
WPKE	Pikeville, Ky.	1000d
WSFC	Somerset, Ky.	1000
KASO	Minden, La.	1000
KANE	New Iberia, La.	1000
WCOU	Lewiston, Maine	1000
WMKR	Millinocket, Me.	1000
WCEM	Cambridge, Md.	1000
WJEJ	Hagerstown, Md.	1000
WHAI	Greenfield, Mass.	250
WOCB	W. Yarmouth, Mass.	1000
WATT	Cadillac, Mich.	1000
WCBY	Cheboygan, Mich.	1000
WJPD	Ishpeming, Mich.	1000
WJIM	Lansing, Mich.	1000d
WMFG	Hibbing, Minn.	1000
KPRM	Park Rapids, Minn.	1000
WJON	St. Cloud, Minn.	1000
WMPA	Aberdeen, Miss.	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
WJTM	Jamestown, N.Y.	500d
WVOS	Liberty, N. Y.	1000
WNBZ	Saranac Lake, N.Y.	1000
WSNY	Schenectady, N.Y.	1000d
WATN	Watertown, N. Y.	1000
WPNF	Brevard, N.C.	1000
WIST	Charlotte, N.C.	1000
WONC	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, Dkla.	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
WSEW	Selinsgrove, Pa.	
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
KHIL	Willcox, Ariz.	5000d
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
WJOT	Lake City, S.C.	1000d
KWYR	Winner, S.Dak.	5000d
WNOO	Chattanooga, Tenn.	1000d
WMCH	Church Hill, Tenn.	1000d
WDKN	Dickson, Tenn.	1000d
WCLC	Jamestown, Tenn.	1000d
KSPL	Diboll, Tex.	1000d
KPSO	Falfurrias, Tex.	500d
KWFR	San Angelo, Tex.	1000d
KTUE	Tulia, Tex.	1000d
KTAE	Taylor, Tex.	1000d
WCHV	Charlottesville, Va.	5000
WJJJ	Christiansburg, Va.	1000d
KWIQ	Moses Lake, Wash.	1000d
WVVW	Grafton, W.Va.	500
WWIS	Black River Falls, Wis.	1000d
WEKZ	Monroe, Wis.	1000d
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.	5000d
KADL	Pine Bluff, Ark.	5000d
KBLC	Lakeport, Calif.	
KGOL	Palm Oesert, 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
WVOM	Ioka, 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, Cal.	1000d
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
WYNO	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
WIXI	Lancaster, Ky.	500d
KWCL	Oakgrove, La.	1000d
WEIM	Fitchburg, Mass.	5000
WFYC	Alma, Mich.	5000d
WWTC	Minneapolis, Minn.	5000
KVOX	Moorhead, Minn.	1000
KDKD	Clinton, Mo.	1000d
KYRO	Potosi, Mo.	500d
KCNI	Broken Bow, Nebr.	1000d
KTOO	Henderson, Nev.	5000d
KRZE	Farmington, N.Mex.	5000d
WADO	New York, N.Y.	5000
WROC	Rochester, N.Y.	5000d
WSAT	Salisbury, N.C.	1000
WYAL	Scotland Neck, N.C.	5000d
WONW	Defiance, Ohio	1000
WLMJ	Jackson, Ohio	1000d
KLCO	Poteau, Okla.	1000d
KERG	Eugene, Oreg.	5000
WBRX	Berwick, P.	1000d
WHVR	Hanover, Pa.	5000
WKST	New Castle, Pa.	1000
WCMN	Arecibo, P.R.	5000
WANS	Anderson, S.C.	5000
WJAY	Mullins, S.C.	5000d
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
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.	1000d
KHAC	Window Rock, Ariz.	
KWCB	Searcy, Ark.	1000d
KROP	Brawley, Calif.	1000
KYNO	Fresno, Calif.	5000
KWKW	Pasadena, Calif.	5000
KVOR	Colorado Springs, Colo.	5000
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
WKPM	Princeton, Minn.	
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
KOOV	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
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
WJLK	Asbury Park, N.J.	1000d
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
KBUC	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
WFTO	Fulton, Miss.	
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
KZNG	Hot Springs, Ark.	250
KBRS	Springdale, Ark.	1000
KATA	Arcata, Cal.	1000
KWXY	Cathedral City, Cal.	250
KMAK	Fresno, Calif	1000
KDOL	Mojave, Calif.	100
KSFE	Needles, Calif.	250
KAOR	Oroville, Cal.	1000
KATY	San Luis Obispo, California	1000
KIST	Santa Barbara, Calif.	1000
KOMY	Watsonville, Calif.	1000
KDEN	Denver, Colo.	1000
KWSL	Grand Junction, Colo.	250
KVRH	Salida, Colo.	1000
WNHC	New Haven, Conn.	1000
WOOK	Washington, D. C.	1000
WSLC	Clermont, Fla.	250
WTAN	Clearwater, Fla.	250
WROD	Daytona Bch., Fla.	1000
WDSR	Lake City, Fla.	1000
WTYS	Marianna, Fla.	1000
WQXT	Palm Beach, Fla.	500
WSEB	Sebring, Fla.	1000
WFSH	Valparaiso, 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
KYLT	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

WHITE'S RADIO LOG

kHz	Wave Length	W.P.
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
WCOT	Winchester, Tenn.	1000
KWKC	Abilene, Tex.	1000
KTSL	Burnett, Tex.	250
KANO	Corsicana, Tex.	250
KSET	El Paso, Tex.	250
KLBK	Lubbock, Tex.	1000
KRBA	Lufkin, Tex.	1000
KPON	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
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
WOCF	Oade 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
KOIO	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
KOXI	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
KFOR	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
WFOR	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
KBVM	Lancaster, Calif.	1000d
KGMS	Sacramento, Calif.	1000
KSBW	Salinas, Calif.	5000
KFLJ	Walsenburg, Colo.	1000d
WOWW	Naugatuck, Conn.	5000
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
KUOL	Fairway, Kan.	5000
WMTA	Central City, Ky.	500d
WWKY	Winchester, Ky.	1000d
WYNK	Baton Rouge, La.	500d
WKTJ	Farmington, Me.	1000d
WTTH	Port Huron, Mich.	1000
WPLB	Greenville, Mich.	1000
KLIZ	Brainerd, Minn.	5000
KAGE	Winona, Minn.	1000
WOLT	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.Oak.	5000
KFCB	Redfield, S.Oak.	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
WMTO	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
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.O.	5000d
WYXI	Athens, Tenn.	500d
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
WJLO	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
KOTA	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, Ida.	1000
KRPL	Moscow, Idaho	250
KIGO	St. Anthony, Ida.	
KSPT	Sandpoint, Idaho	1000
WOWS	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
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
WCOS	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
KVOU	Uvalde, Tex.	250
KIXX	Provo, Utah	250
WDOT	Burlington, Vt.	1000
WINA	Charlottesville, Va.	1000
WHHV	Hillsville, Va.	1000
WHIH	Portsmouth, Va.	1000
WHLF	So. Boston, Va.	1000
WINC	Winchester, Va.	1000
KEDO	Longview, Wash.	1000
KRSC	Othello, Wash.	250
KTNT	Tacoma, Wash.	1000
WBOY	Clarkesburg, W.Va.	1000
WRDN	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
WZST	Leesburg, Fla.	1000d
WONS	Tallahassee, Fla.	5000d
WGRI	Griffin, Ga.	1000d
WSNE	Cummings, Ga.	1000d
WDAX	McRae, Ga.	1000d
WLAQ	Rome, Ga.	1000
WRMN	Elgin, Ill.	1000d
WTIM	Taylorville, Ill.	1000d
WAZY	Lafayette, Ind.	1000d
KGRN	Grinnell, Iowa	500d
KLEM	LeMars, Iowa	1000d
KCLO	Leavenworth, Kans.	5000d
KWBB	Wichita, Kans.	5000
WLBJ	Bowling Green, Ky.	5000
WHLN	Harlan, Ky.	5000d
KDBS	Alexandria, La.	1000d
WDDW	Halfway, Md.	1000d
WHAG	Halfway, Md.	1000d
WOKW	Brockton, Mass.	1000d
WGRD	Grand Rap., Mich.	1000d
KLFD	Litchfield, Minn.	500d
KRWB	Roseau, Minn.	1000
WDSK	Cleveland, Miss.	1000d
WBKN	Newton, Miss.	500d
WNOP	North Platte, Neb.	1000
WHTG	Asbury Park-Eatontown, N.J.	500d
WDOE	Dunkirk, N.Y.	1000
WELM	Elmira, N.Y.	1000
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, Ores.	5000d
WLSH	Lansford, Pa.	5000d
KQV	Pittsburgh, Pa.	5000
WPCC	Clinton, S.C.	1000d
WYMB	Manning, S.C.	1000d
WCMT	Martin, Tenn.	1000d
KBUD	Athens, Tex.	1000d
KBAN	Bowie, Tex.	500d
KVLB	Cleveland, Tex.	500
KXIT	Dalhart, Tex.	500d
KDOX	Marshall, Tex.	500
KRIG	Odessa, Tex.	1000
KBAL	San Saba, Tex.	500d
KNAL	Victoria, Tex.	500
WIKI	Chester, Va.	5000d
WRIS	Roanoke, Va.	5000d
WRDS	S. Charleston, W.Va.	1000d
WKBH	LaCrosse, Wis.	5000
KWYO	Sheridan, Wyo.	1000

1420—211.1

WACT	Tuscaloosa, Ala.	5000d
KHFH	Sierra Vista, Ariz.	1000
KXOW	Hot Sprinks, Ark.	
KPOC	Pocahontas, Ark.	1000d
KRDO	Colo. Sprgs., Colo.	1000
KJST	Joshua Tree, Cal.	1000d
KSTN	Stockton, Calif.	5000
WLIS	Old Saybrook, Conn.	500d
WBRD	Bradenton, Fla.	1000
WDBF	Delray Beach, Fla.	5000d
WETH	St. Augustine, Fla.	1000d
WAVO	Avondale Estates, Ga.	1000d
WRBL	Columbus, Ga.	5000
WPEH	Louisville, Ga.	1000d
WLET	Toccoa, Ga.	5000d
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
KDOO	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
WVDT	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	Clinchco, 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
WMVB	Millville, N.J.	1000d
WBAB	Babylon, N.Y.	1000d
WJJL	Niagara Falls, N.Y.	1000d
WSGO	Oswego, N.Y.	1000d
WBLA	Elizabethtown, N.C.	1000d
WBUY	Lexington, N.C.	5000
KILO	Grand Forks, N.D.	1000
WHHH	Warren, Ohio	5000
KMED	Medford, Oreg.	5000
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
WJPG	Green Bay, Wis.	5000

1450—206.8

WDNG	Anniston, Ala.	1000
WYAM	Bessemer, Ala.	1000
WDIG	Dothan, Ala.	1000
WFIX	Huntsville, Ala.	1000d
WLAY	Muscle Shoals City, Alabama	1000
KLAM	Cordova, Alaska	250
KAWT	Douglas, Ariz.	250
KNOT	Prescott, Ariz.	1000
KOLD	Tucson, Ariz.	250
KENA	Mena, Ark.	250
KJWH	Camden, Ark.	1000d
KYOR	Blythe, Calif.	250
KOWN	Escondido, Calif.	250
KPAL	Palm Springs, Cal.	1000
KTIP	Porterville, Calif.	1000
KSOL	San Francisco, Cal.	1000
KVML	Sonora, Calif.	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.	1000
WHLS	Port Huron, Mich.	1000
KATE	Albert Lea, Minn.	250
KBUN	Bemidji, Minn.	1000
KBMW	Wahpeton, N.D.-Breckinridge, Minn.	1000d
WELY	Ely, Minn.	1000
KFAM	St. Cloud, Minn.	1000
WROX	Clarksdale, Miss.	1000
WCJU	Columbia, Miss.	250
WJXN	Jackson, Miss.	250
WOKK	Meridian, Miss.	1000
WNAT	Natchez, Miss.	250
WROB	West Point, Miss.	1000
KFTW	Fredericktown, Mo.	1000
WMBH	Joplin, Mo.	1000
KIRX	Kirksville, Mo.	1000
KOKO	Warrensburg, Mo.	1000
KWPM	West Plains, Mo.	1000
KXXL	Bozeman, Mont.	1000
KUDI	Great Falls, Mont.	1000
KGMY	Missoula, Mont.	250
KRBN	Red Lodge, Mont.	1000
KVCK	Wolf Point, Mont.	1000

WHITE'S

RADIO LOG

kHz	Wave Length	W.P.
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
KEED	Eugene, Ore.	1000
KFLW	Klamath Falls, Ore.	1000
KLBM	La Grande, Oreg.	1000
KBPS	Portland, Ore.	250
WWGO	Erie, Pa.	1000d
WFRA	Franklin, Pa.	1000
WDAD	Indiana, Pa.	1000
WPAM	Pottsville, Pa.	1000
WMPT	So. Williamsport, Pa.	250
WMAJ	State College, Pa.	1000d
WJPA	Washington, Pa.	250
WCPR	Coamo, P.R.	
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

kHz	Wave Length	W.P.
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.	1000d
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

kHz	Wave Length	W.P.
WBLO	Evergreen, Ala.	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
WDOL	Athens, Ga.	1000d
WCLA	Claxton, Ga.	1000
WRGA	Rome, Ga.	5000
WMPP	Chicago Heights, Ill.	1000d
WMBO	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
WSRO	Marlborough, Mass.	1000d
WNBP	Newburyport, Mass.	500d
WKMF	Flint, Mich.	5000
WKLZ	Kalamazoo, Mich.	500d
KANO	Anoka, Minn.	1000d
WCHJ	Brookhaven, Miss.	1000d
WNAU	New Albany, Miss.	500d
KGHM	Brookfield, Mo.	500d
KTCB	Malden, Mo.	1000d
WTKO	Ithaca, N.Y.	1000d
WPDM	Potsdam, N.Y.	1000d
WBIG	Greensboro, N.C.	5000
WPNC	Plymouth, N.C.	1000d
WTOE	Spruce Pine, N.C.	1000d
WOHO	Toledo, Ohio	1000
KVLH	Pauls Valley, Okla.	250d
KVIN	Vinita, Okla.	500d
KRAF	Reedsport, Oreg.	5000d
WSAN	Allentown, Pa.	5000
WFAR	Farrell, Pa.	1000d
WWML	Portage, Pa.	500d
WQXL	Columbia, S.C.	5000d
WGOO	Georgetown, S. C.	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.	1000d
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

1480—202.6

kHz	Wave Length	W.P.
WARI	Abbeville, Ala.	1000d
WBTS	Bridgeport, Ala.	1000d
WLPH	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.	5000
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.	1000d
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
WADR	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

kHz	Wave Length	W.P.
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.	1000
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	Immokalie, 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
KOID	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
KDBM	Dillon, Mont.	1000
KBON	Omaha, Nebr.	1000
WEMJ	Laconia, N.H.	1000
WLDB	Atlantic City, N. J.	1000
KRSN	Los Alamos, N.Mex.	1000
KRTN	Raton, N.Mex.	1000
WCSS	Amsterdam, N.Y.	1000
WBTA	Batavia, N.Y.	250
WKNY	Kingston, N.Y.	1000
WICY	Malone, N.Y.	1000
WDLC	Port Jervis, N. Y.	1000
WOLF	Syracuse, N. Y.	1000
WSSB	Durham, N. C.	1000
WFLB	Fayetteville, N.C.	1000
WLOE	Leaksville, N.C.	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
WOXB	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

kHz	Wave Length	W.P.
WFAD	Middlebury, Vt.	1000
WIKE	Newport, Vt.	1000
WCVA	Culpeper, Va.	1000
WVEC	Hampton, Va.	1000
WAYB	Waynesboro, Va.	1000
KBRO	Bremerton, Wash.	1000
KLOG	Kelso, Wash.	1000
KENE	Toppenish, Wash.	1000
KTEL	Walla Walla, Wash.	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
WVSM	Rainsville, Ala.	
KGMR	Jacksonville, Ark.	1000d
KBLA	Burbank, Calif.	10000
KXRX	San Jose, Cal.	10000
WFIF	Milford, Conn.	5000d
WTDP	Washington, D.C.	50000
WKIZ	Key West, Fla.	250
WGUL	New Port Richey, Fla.	250d
WSEM	Donaldsonville, Ga.	1000d
WTHN	Thomaston, Ga.	1000d
WPMB	Vandalia, Ill.	250
WZBN	Zion, Ill.	250d
WBRI	Indianapolis, Ind.	5000d
WAKE	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.	5000d
WMNT	Manati, P.R.	250
WEAC	Gaffney, S. C.	1000d
WTNE	Trenton, Tenn.	250d
KWFA	Merkle, Tex.	250d
KTXO	Sherman, Tex.	250
KANI	Wharton, Tex.	500

1510—199.1

KALF	Mesa, Ariz.	10000d
KASK	Ontario, Calif.	1000
KIRV	Fresno, Cal.	500d
KTIM	San Rafael, Calif.	1000d
KDKO	Littleton, Colo.	1000
WNLC	New London, Conn.	10000
WZZZ	Boynton Beach, Fla.	1000d
WWBC	Cocoa, Fla.	250d
WINU	Highland, Ill.	250d
WJRC	Joliet, Ill.	500d
WKAI	Macomb, Ill.	1000d
KIFG	Iowa Falls, Iowa	500d
KANS	Larned, Kan.	1000d
KPBC	Port Sulpher, La.	500d
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
WLKR	Norwalk, O.	
WAHT	Annville-Cleona, Pa.	5000d
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

KMPG	Hollister, Cal.	500
KMFB	Mendocino, Cal.	1000d
KACY	Port Hueneme, Calif.	10000
WVCF	Apopka, Fla.	1000d
WGNP	Indian Rocks Beach, Fla.	1000d
WIXX	Oakland Park, Fla.	1000d
WXPQ	Eatonton, Ga.	500d
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
WTRI	Brunswick, Md.	250d
WKJR	Muskegon Hts., Mich.	1000d
WYNZ	Ypsilanti, Mich.	250d
KOLM	Rochester, Minn.	10000d
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
WCAB	Rutherfordton, N.C.	250d
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

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.	10000d
WTHM	Lapeer, Mich.	5000d
WERX	Wyoming, Mich.	500d
KSMM	Shakopee, Minn.	500d
KPCR	Bowling Green, Mo.	250
KMAM	Butler, Mo.	500d
KLOL	Lincoln, Neb.	5000d
WCKY	Cincinnati, Ohio	50000
KWLG	Wagoner, Okla.	
WHYP	North East, Pa.	1000d
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

KASA	Phoenix, Ariz.	10000d
KPOL	Los Angeles, Calif.	50000
WBSR	Pensacola, Fla.	1000
WJGA	Jackson, Ga.	
WOGA	Sylvester, Ga.	1000d
WSMI	Litchfield, Ill.	1000d
WBNL	Boonville, Ind.	250d
WADM	Decatur, Ind	250d
WLOI	LaPorte, Ind.	250d
WCBK	Martinsville, Ind.	
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.	1000d
WRPL	Charlotte, N.C.	1000d
WIFM	Elkin, N.C.	1000d
WBCO	Bucyrus, Ohio	500d
WABQ	Cleveland, Ohio	1000d
WNIO	Niles, Ohio	500d
WBTC	Uhrichville, O.	250
KWFS	Eugene, Ore.	1000d
WRCP	Philadelphia, Pa.	50000d
WPTS	Pittston, Pa.	1000d
WPME	Punxsutawney, Pa.	1000d
WADK	Newport, R.I.	1000d
WKKR	Pickens, S.C.	1000d
WBFJ	Woodbury, Tenn.	500d
KBUY	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

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
WTHB	Augusta, Ga.	5000d
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
KGMO	Cape Girardeau, Mo.	5000d
KKJO	St. Joseph, Mo.	5000
KICS	Hastings, Neb.	500d
WCGR	Canadaigua, N.Y.	250
WBAZ	Kingston, N.Y.	500d
WBVM	Utica, N.Y.	1000
WPXY	Greenville, N. C.	500d
WYNA	Raleigh, N.C.	1000d
WTYN	Tryon, N.C.	1000d
WFCM	Winston-Salem, N.C.	1000d
KQWB	Fargo, N.D.	5000d
WOLR	Delaware, Ohio	500d
KMAD	Madill, Okla.	250
KREK	Sapulpa, Okla.	500d
WLOA	Braddock, Pa.	1000d
WTTC	Towanda, Pa.	500d
WKFE	Yauco, P.R.	250
WBSC	Bennetsville, S.C.	10000
KCAN	Canyon, Tex.	1000
KWBC	Navasota, Tex.	250d
WKYE	Bristol, Tenn.	1000d
WPTN	Cookeville, Tenn.	250d
WTPI	Cookville, Tenn.	250d
WKPT	Kingsport, Tenn.	10000d
KCOM	Comanche, Tex.	250d
KWIC	Salt Lake City, Utah	10000d
WKBA	Vinton, Va.	10000d
WVAB	Virginia Bch., 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

WAGC	Centre, Ala.	1000d
KDDA	Dumas, Ark.	
KBIB	Monette, Ark.	250d
KPMC	Bakersfield, Calif.	10000
KIQS	Willows, Calif.	250d
WTAI	Eau Gallie, Fla.	5000d
WYSE	Inverness, Fla.	1000
WCIK	Gordon, Ga.	
WBYS	Canton, Ill.	250d
WVAK	Paoli, Ind.	250d
WRIN	Rensselaer, Ind.	1000d
KSWI	Council Bluffs, Iowa	1000d
KABI	Abilene, Kan.	250d
WPHN	Liberty, Ky.	250d
WDXR	Paducah, Ky.	10000
WBGS	Sidell, La.	1000d
WSMD	LaPlata, Md.	250d
WTPS	Portage, Mich.	1000d
WMIC	Sandusky, Mich.	
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	Fairfield, O.	5000d
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.	1000d
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

WCRL	Oneonta, Ala.	1000d
WTQX	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
WBAD	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
WTOW	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
WPTW	Piqua, Ohio	250d
KTAT	Frederick, Okla.	250d
KOLS	Pryor, Okla.	1000d
KWAY	Forest Grove, Oreg.	1000d
KOHU	Hermiston, Oreg.	1000d
WPGM	Danville, Penn.	1000d
WBUX	Doylestown, Pa.	5000d
WQTW	Latrobe, Pa.	1000d
WFGN	Gaffney, S.C.	250d
WJES	Johnston, S.C.	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

WEYY	Talladega, Ala.	1000d
KYND	Tempe, Ariz.	50000
KPCA	Marked Tree, Ark.	250d
KFDF	Van Buren, Ark.	1000d
KMRE	Anderson, Cal.	1000d
KWIP	Merced, Calif.	500d
KDAY	Santa Monica, Cal.	50000
KHUM	Santa Rosa, Calif.	500d
KPIK	Colorado Sprgs., Colo.	5000d
WSBP	Chattachoochee, Fla.	1000d
WSRF	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
WRBJ	St. Johns, Mich.	1000d
KDOM	Windom, Minn.	250d
WAMY	Amory, Miss.	5000d
WESY	Leland, Miss.	1000
WPMP	Pascagoula-Moss Point, Mississippi	1000d
KTGR	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

WHITE'S RADIO LOG

kHz	Wave Length	W.P.
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		
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
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
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, Ore.	5000
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
KZON	Santa Maria, Cal.	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
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
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
KBBC	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

kHz Wave Length	W.P.
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
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
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
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 Ls Sarre, Que.	250
CKOO Osoyoos, B.C.	1,000d 250n
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
CJOE London, Ont.	10,000
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
1330—225.4	
CKKR Rosetown, Sask.	10,000
1340—223.7	
CFGB Goose Bay, Nfld.	1,000
CFLH Hearst, Ont.	100
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	
CFOA 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
CJVR Melfort, Sask.	10.000
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
CFRW Winnipeg, Man.	5,000
CHOW Welland, Ont.	1,000d 500n
1490—201.2	
CFMR Fort Simpson, N.W.T.	25
CFRC Kingston, Ont.	100
CHYM Kitchener, Ont.	10,000d 5,000n
CJSN Shaunavon, Sask.	1,000d 250n
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.	50,000
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
	WVNA-TV	26
Huntsville	WAAY-TV	31
	WHNT-TV	19
Mobile	WALA-TV	10
	WEAR-TV	3
	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		
Flagstaff	KVLS	13
Nogales	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

WHITE'S

RADIO LOG

Location	C.L.	Chan.
Corona-Los Angeles	KMTW	52
El Centro-Mexicali	XEM-TV	3
Eureka	KIEM-TV	3
	KVIQ-TV	6
Fresno	KAIL-TV	53
	KFRE-TV	30
	KICU-TV	43
	KJEO	47
	KMJ-TV	24
Hanford	KSJV-TV	21
Los Angeles	KABC-TV	7
	KCOP	13
	KHJ-TV	9
	KMEX-TV	34
	KMTW	52
	KNBC	4
	KNXT	2
	KWHY-TV	22
	KTLA	5
	KTTV	11
Monterey	KMBY-TV	46
Modesto	KLOC-TV	19
Oakland-San Francisco	KTVU	2
Redding	KRCR-TV	7
Sacramento	KCRA-TV	3
	KOVR	13
	KXTV	10
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
San Francisco	KGO-TV	7
	KPIX	5
	KRON-TV	4
	KSAN-TV	32
	KTVU	2
San Jose	KNTV	11
San Luis Obispo	KSBY-TV	6
Santa Barbara	KEYT	3
	KIHP-TV	14
Santa Maria	KCOY-TV	12
Stockton-Sacramento	KOVR	13
Visalia-(Fresno)	KICU-TV	43

COLORADO

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

CONNECTICUT

Location	C.L.	Chan.
Hartford	WHCT	18
	WHNB-TV	30
	WNHC-TV	8
	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	WDCA-TV	20
	WMAL-TV	7
	WOOK-TV	14
	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	WDUV-TV	30
	WFGA-TV	12
	WJKS-TV	17
	WJXT	4
Miami	WCKT	7
	WLBW-TV	10
	WTVJ	4
Melborne	WPCT	31
Orlando	WDBO-TV	6
	WFTV	9
	WESH-TV	2
Panama City	WJHG-TV	7
Pensacola-Mobile, Ala.	WEAR-TV	3
St. Petersburg-Tampa	WSUN-TV	38
	WTVT	13
S. Miami, Miami	WCIX-TV	6
Tallahassee-Thomasville, Ga.	WCTV	6
Tampa	WFLA-TV	8
	WLCY-TV	10
Tampa-St. Petersburg	WSUN-TV	38
	WTVT	13
West Palm Beach	WEAT-TV	12
	WPTV	5

GEORGIA

Location	C.L.	Chan.
Albany	WALB-TV	10
Atlanta	WAII-TV	11
	WAGA-TV	5
	WBMD-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
	KHVO	13
Honolulu	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.
Bloomington	WGNH	43
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
Joliet	WTVG	14
LaSalle	WEEQ-TV	35
Moline	WQAD-TV	8
Peoria	WIRL-TV	19
	WEEK-TV	25
	WMBD-TV	31
Quincy	WGEM-TV	10
Quincy-Hannibal, Mo.	KHQA-TV	7
Rockford	WCEE-TV	23
	WREX-TV	13
	WTVO	39
Rock Island	WHBF-TV	4
Springfield	WICS	20

INDIANA

Location	C.L.	Chan.
Bloomington-Indianapolis	WTTV	4
Evansville	WEHT	25
	WFIE-TV	14
	WTVW	7
Fort Wayne	WANE-TV	15
	WPTA	21
	WKJG-TV	33
Indianapolis	WFBM-TV	6
	WISH-TV	8
	WLWI	13
	WTTV	4
Lafayette	WFAM-TV	18
Lawrence	WURD	40
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
	KWWL-TV	7
Cedar Rapids-Waterloo	WMT-TV	2
Davenport	WOC-TV	6
Des Moines	KRNT-TV	8
	WHO-TV	13
	WOI-TV	5
	KSO-TV	17
Fort Dodge	KUFD-TV	21
Mason City	KGLO-TV	3
Ottumwa	KTVO	3
Sioux City	KTIV	4
	KVTV	9
Waterloo-Cedar Rapids	KWWL-TV	7
	WMT-TV	2

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
Salina	KSLN-TV	34
Topeka	WIBW-TV	13
Wichita	KAKE-TV	10
	KARD-TV	3
	KTVH	12
	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	WSCO-TV	19
Owensboro	WVJS-TV	19
	WDCL	31
Paducah	WPSD-TV	6
	WDXR-TV	29

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
	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
	WMTW-TV	8
Presque Isle	WAGM-TV	8

MARYLAND

Location	C.L.	Chan.
Baltimore	WBAL-TV	11
	WJZ-TV	13
	WMAR-TV	2
	WMET-TV	18
Salisbury	WBOC-TV	16

MASSACHUSETTS

Location	C.L.	Chan.
Adams	WCDC	19
Boston	WBZ-TV	4
	WHDH-TV	5
	WNAC-TV	7
	WREP	25
	WSBK-TV	38
Cambridge-Boston	WKBG-TV	56
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
	WKBD-TV	50
	WWJ-TV	4
	WXON	62
	WXYZ-TV	7
Detroit-Windsor	CKLW-TV	9
Flint	WJRT	12
	WKNX-TV	25
	WNEM-TV	5
Grand Rapids	WOOD-TV	8
	WZZM-TV	13
Kalamazoo	WKZO-TV	3
Lansing	WJIM-TV	6
Lansing-Onondaga	WILX-TV	10
Marquette	WLUC-TV	6
Saginaw-Bay City	WKNX-TV	57
	WNEM-TV	5
Sault Ste. Marie	WWUP-TV	10
Traverse City	WPBN-TV	7

MINNESOTA

Location	C.L.	Chan.
Alexandria	KCMT	7
Austin	KMMT	6
Duluth	KDAL-TV	3
	WDIO-TV	10
	WDSM-TV	6
Duluth-Superior, Wis.	KDAL-TV	3
	WDSM-TV	6
Mankato	KEYC-TV	12
Minneapolis-St. Paul	WCCO-TV	4
	KMSP-TV	9
	KSTP-TV	5
	WTCN-TV	11
Rochester	KROC-TV	10
St. Paul-Minneapolis (See Minneapolis-St. Paul)		
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
	KBMA-TV	41
	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-TV	41
Linden-Newark	WNJU-TV	47
Paterson	WTVE	41
Wildwood	WCMC-TV	40

NEW MEXICO

Location	C.L.	Chan.
Albuquerque	KGGM-TV	13
	KOAT-TV	7
	KOB-TV	4

Location	C.L.	Chan.
Carlsbad	KAVE-TV	6
Clovis	KICA-TV	12
Roswell	KSWS-TV	8
	KBIM-TV	10
NEW YORK		
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		
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		
Bismarck	KFYR-TV	5
	KXMB-TV	12
Devils Lake	WDAZ-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		
Akron	WAKR-TV	49
Ashtabula	WICA-TV	15
Canton	WJAN	17
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
	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		
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		
Coos Bay	KCBY-TV	11
Eugene	KEZI-TV	9
	KVAL-TV	13
Klamath Falls	KOTI	2
LaGrande	KTVR	13
Medford	KTVM	5
	KMED-TV	10
Portland	KATU	2
	KGW-TV	8
	KOIN-TV	6
	KPTV	12
Roseburg	KPIC	4
PENNSYLVANIA		
Altoona	WFBG-TV	10
Erie	WICU-TV	12
	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	WDAU-TV	22
Scranton & Wilkes-Barre	WNEP-TV	16
	WBRE-TV	28
York	WSBA-TV	43
RHODE ISLAND		
Providence	WJAR-TV	10
	WPRO-TV	12
Providence (New Bedford, Mass.)	WTEV	6
SOUTH CAROLINA		
Anderson	WAIM-TV	40
Charleston	WCIV	4
	WCSC-TV	5
	WUSN-TV	2
	WIS-TV	10
	WNOK-TV	19
	WOLO-TV	25
Florence	WBTW	13
	WPDT	15
Greenville	WFBC-TV	4
Spartanburg	WSPA-TV	7
SOUTH DAKOTA		
Aberdeen	KXAB-TV	9
Deadwood-Lead	KDSJ-TV	5
Florence-Watertown	KDLO-TV	3
Lead	KHSD-TV	11
Mitchell	KORN-TV	5
Rapid City	KOTA-TV	3
	KRSD-TV	7
Reliance	KPLO-TV	6
Sioux Falls	KELO-TV	11
	KSOO-TV	13
TENNESSEE		
Chattanooga	WDEF-TV	12
	WRCB-TV	3
	WTVC	9
Jackson	WDXI-TV	7
Johnson City-Bristol-Kingsport	WJHL-TV	11
Knoxville	WATE-TV	6
	WBIR-TV	10
	WTVK	26
Memphis	WMCT	5
	WHBQ-TV	13
	WMTU-TV	30
	WREC-TV	3
Nashville	WLAC-TV	5
	WSIX-TV	8
	WSM-TV	4
TEXAS		
Abilene	KRBC-TV	9
Amarillo	KFDA-TV	10
	KGNC-TV	4
	KVII	7
Austin	KHFI-TV	42
	KTBC-TV	7
Beaumont	KBMT	12
	KFDM-TV	6
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	KJDO-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		
Salt Lake City	KCPX-TV	4
	KUTV	2
	KSL-TV	5
VERMONT		
Burlington	WCAX-TV	3
VIRGINIA		
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		
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
	KNDO	23
WEST VIRGINIA		
Bluefield	WHIS-TV	6
Charleston	WCHS-TV	8
Clarksburg	WBOY-TV	12
Huntington-Charles	WHTN-TV	13
	WSAZ-TV	3
Oak Hill	WOAY-TV	4
Parkersburg-Marietta, O.	WTAP-TV	15
Weston	WDTV	5
Wheeling-Steubenville, O.	WTRF-TV	7
WISCONSIN		
Eau Claire	WEAU-TV	13
Green Bay	WBAY-TV	2
	WFRV	5
	WLUK-TV	11
La Crosse	WKBT	8
Madison	WISC-TV	3
	WMTV	15
	WKOW-TV	27
Milwaukee	WISN.TV	12
	WTMJ-TV	4
	WITI-TV	6
	WVTV	18
Rhinelander	WAEO-TV	12
Wausau	WSAU-TV	7
WYOMING		
Casper	KTWO-TV	2
Cheyenne	KFBC-TV	5
	KDWN-TV	27
Riverton	KWRB-TV	10
GUAM		
Agana	KUAM-TV	8
PUERTO RICO		
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		
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.

Location	C.L.	Chan.
ALABAMA		
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		
Phoenix	KAET	8
	KPAZ-TV	21
Tucson	KUAT	6
ARKANSAS		
Little Rock	KETS	2
CALIFORNIA		
Los Angeles	KCET	28
Redding	KIXE-TV	9
Sacramento	KVIE	6
San Bernardino	KVCR-TV	24
San Francisco	KQED	9
San Jose	KTEH	54
	KGSC-TV	36
San Mateo	KCSM-TV	14
COLORADO		
Denver	KRMA-TV	6
CONNECTICUT		
Hartford	WEDH	24
DELAWARE		
Wilmington	WHYY-TV	12

WHITE'S

RADIO LOG

Location	C.L.	Chan.
DISTRICT OF COLUMBIA		
Washington	WETA-TV	26
FLORIDA		
Gainesville	WUFT	5
Jacksonville	WJCT	7
Miami	WSEC-TV	17
	WTHS-TV	2
Orlando	WMFE-TV	24
Tallahassee	WFSU-TV	11
Tampa	WUSF-TV	16
Tampa-St. Petersburg	WEDU	3
GEORGIA		
Ashburn	WJIA-TV	34
Athens	WGTV	8
Atlanta	WETV	30
Chatsworth	WCLP-TV	18
Columbus	WJSP-TV	28
Pelham	WABW-TV	14
Savannah	WVAN-TV	9
Waycross	WXGA-TV	8
Wrens	WCES-TV	20
HAWAII		
Honolulu	KHET	11
IDAHO		
Moscow	KUID-TV	12
ILLINOIS		
Carbondale	WSIU	8
Chicago	WTTW	11
	WXXW	20
Olney	WUSI-TV	45
Urbana-Champaign	WILL-TV	12
INDIANA		
Vincennes	WVUT	34
IOWA		
Des Moines	KDPS-TV	11
KANSAS		
Topeka	KTWU	11
KENTUCKY		
Louisville	WFPK-TV	15
LOUISIANA		
New Orleans	WYES-TV	8
MAINE		
Augusta	WCBB	10
Calais	WMED-TV	13
Orono	WMEB-TV	12
Presque Isle	WMEM-TV	10
MASSACHUSETTS		
Boston	WGBH-TV	2
MICHIGAN		
Detroit	WTVS	56
Onondaga-East Lansing	WMSB	10
University Center (Bay City)	WUCM-TV	19
MINNESOTA		
Appleton	KWCM-TV	10
Duluth	WDSE-TV	8
St. Paul	KTCI-TV	17
St. Paul-Minneapolis	KTCA-TV	2
MISSOURI		
Kansas City	KCSD-TV	19
St. Louis	KETC	9
NEBRASKA		
Alliance	KTNE-TV	13
Lexington	KLNE-TV	3
Lincoln	KUON-TV	12
N. Platte	KPNE-TV	9
Omaha	KYNE-TV	26
NEW HAMPSHIRE		
Durham	WENH	11
NEW MEXICO		
Albuquerque	KNME-TV	5
NEW YORK		
Buffalo	WNED-TV	17
New York	WNDT	13
	WNYC-TV	31
	WNYE-TV	25
Rochester	WXXI	21
Schenectady	WMHT	17
Syracuse	WCNY-TV	24
NORTH CAROLINA		
Chapel Hill	WUNC-TV	4
Charlotte	WTVI	42
Columbia	WUNB-TV	2
NORTH DAKOTA		
Fargo	KFME	13
OHIO		
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		
Oklahoma City	KETA	13
	KOKH-TV	25
Tulsa	KOED-TV	11
OREGON		
Corvallis	KDAC-TV	7
Portland	KDAP-TV	10
PENNSYLVANIA		
Allentown-Bethlehem	WLVT-TV	39
Clearfield	WPSX-TV	3
Erie	WQLN	54
Hershey	WITF-TV	33
Philadelphia	WUHY-TV	35
Pittsburgh	WQED	13
	WQEX	16
Scranton	WVIA-TV	44
SOUTH CAROLINA		
Charleston	WITV	7
Columbia	WRLK-TV	35
Greenville	WNTV	29
SOUTH DAKOTA		
Brookings	KESD-TV	8
Vermillion	KUSD-TV	2
TENNESSEE		
Chattanooga	WTCI	45
Lexington	WLJT-TV	11
Memphis	WKNO-TV	10
Nashville	WDCN-TV	2
Sneedville	WSJK-TV	2
TEXAS		
Dallas-Ft. Worth	KERA-TV	13
Houston	KUHT	8
Lubbock	KTXT-TV	5
Richardson	KRET-TV	23
San Antonio-Austin	KLRN-TV	9
UTAH		
Logan	KUSU-TV	12
Ogden	KWCS-TV	18
	KOET	9
Provo	KBYU-TV	11
Salt Lake City	KUED	7
VERMONT		
Burlington	WETK	33
VIRGINIA		
Hampton-Norfolk	WHRO-TV	15
Portsmouth	WYAH-TV	27
Richmond	WCVE-TV	23
	WCVW	57
WASHINGTON		
Pullman	KWSC-TV	10
Seattle	KCTS-TV	9
Spokane	KSPS-TV	7
Tacoma	KPEC-TV	56
	KTPS	62
Yakima	KYVE-TV	47
WEST VIRGINIA		
Morgantown	WWVU-TV	24
WISCONSIN		
Madison	WHA-TV	21
Milwaukee	WMVS	10
	WMVT	36
PUERTO RICO		
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
Athabasca, Alta.	CBXT-1	8
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
	CHCT-TV-2	13
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
Bullhead Mt., B.C.	CJDC-TV-2	8
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
Castlegar, B.C.	CBUAT-2	3
Causapscal, Que.	CKBL-TV-5	6
Cawston, B.C.	CHKC-TV-3	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
Clinton, B.C.	CFCR-TV-4	9
Cloridorme, Que.	CHAU-TV-8	6
Coleman, Alta.	CJLH-TV-1	12
Corner Brook, Nfld.	CBYT	5
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.	CBUBT	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
Elliot Lake, Ont.	CKSO-TV-1	3
Enderby, B.C.	CFEN-TV-1	5
Enderby, B.C.	CHBC-TV-5	72
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
Houston, B.C.	CFTK-TV-10	2
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
Micoua, Que.	CKHQ-TV-3	6
Midway, B.C.	CKMY-TV-1	7
Minden, Ont.	CHEX-TV-2	10
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 Georges, Que.	CKHQ-TV-5	13
Mont-Laurier, Que.	CBFT-2	3
Mont-Louis, Que.	CKBL-TV-4	2
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
Mt. Parizeau, B.C.	CFTK-TV-8	5

Location	C.L.	Chan.
Murdochville, Que.	CKBL-TV-2	6
	CKMU-TV-1	3
Nakusp, B.C.	CJNP-TV-1	2
	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
Ocean Falls, B.C.	CFTK-TV-9	2
Olalla	CHKC-TV-2	11
Oliver, B.C.	CHBC-TV-3	8
Ottawa, Ont.	CBOFT	9
	CBOT	4
	CJOH-TV	13
Outardes, Que.	CKHQ-TV-2	12
	CKHQ-TV-4	7
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 Albernie, B.C.	CBUT-3	4
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
Skaha Lake (near Penticton), B.C.	CHBC-TV-7	10
Smithers, B.C.	CFTK-TV-2	5
Sointula, B.C.	CFKB-TV-4	5
Spences Bridge, B.C.	CJNA-TV-1	3
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Ste. Rose du Dégelé, Que.	CKRT-TV-2	2
Stephenville, Nfld.	CFSN-TV	8
Stranraer, Sask.	CFQC-TV-1	3
Sturgeon Falls, Ont.	CBFST	7
Sudbury, Ont.	CBFST-1	13
	CKSO-TV	5
Swift Current, Sask.	CJFB-TV	5
Sydney, N.S.	CJCB-TV	4
Temiscaming, Que.	CBFST-2	12
	CJTK-TV-1	3
Terrace, B.C.	CFTK-TV	3
The Pas, Man.	CBWBT-1	7
Timmins, Ont.	CFCL-TV	6
	CBFOT	9
Toronto, Ont.	CBLT	6
	CFTO-TV	9
Trail, B.C.	CBUAT	11
Trois-Rivières, Que.	CKTM-TV	13
Upsalquitch Lake, N.B.	CKAM-TV	12
Val D'Or, Que.	CKRN-TV-2	8
Val Marie, Sask.	CJFB-TV-2	2
Vancouver, B.C.	CBUT	2
Vernon, B.C.	CHBC-TV-2	7
Victoria, B.C.	CHEK-TV	6
Ville Marie, Que.	CKRN-TV-3	6
Waterton Park, Alta.	CJWP-TV-1	12
Westwold, B.C.	CFWS-TV-2	12
Whitecourt, Alta.	CBXT-2	9
	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
	CBWT	6
	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

■ **The Great DX Competition.** Here we go again with another installment of the exclusive RTVE DX competition—no prizes or awards, just pride in seeing how high a score you can run up against your fellow DXers in a real fight to the finish.

The stations you'll be trying for aren't the run of the mill ones which everybody reports, they are real toughies—and they require some listening patience on your part. Scoring rules are listed at the end.

1. Can you hear the English language transmission on 6106 kHz at 1730 GMT? It's all the way from Radio Mogadiscio in the Somali Republic of North Africa—a political hot spot and rare DX country.

2. Try digging Radio Uganda (in Kampala, Uganda) out from under Radio Ghana. Check 4976 kHz (Ghana is on 4980 kHz) at 2000 GMT. English starts at 2105 GMT.

3. Here's a rare one to add to your country collection, station VSI35 run by Cable & Wireless W. I. Ltd., Grand Turk, Turks & Caicos Islands. They are on 8000 kHz with 100 watts at 1830 daily (except Sunday). They're only on for about 15 minutes so don't dilly-dally! They QSL too.

4. How about Male Sinico Radio in the obscure Maldive Islands? Look for them on 3290 kHz at 1600 GMT, 7225 kHz at 1300 GMT, 9540 kHz at 0830 GMT.

5. And if you haven't yet heard Yemen, now is your big chance. Watch for Radio Sanaa. They have been heard at 1730 GMT on 5805 kHz announcing (in Arabic) "Idhaatuel djamhourit el arabya finall yemeniya min Sanaa."

6. A real mystery station broadcasting from an unknown location is Radio Peyk-Ye-Iran; look for it on 9560, 11410 and 11695 kHz at 1400 to 1830 GMT.

7. Goteborg Radio is a coastal station transmitting news and other data to ships at sea from a location 20 miles south of Gothenburg, Sweden. It can be heard on 11120 kHz at 0700, 1223, 1715 GMT.

8. An interesting and unusual catch is station HL2AW, the Voice of Chung Goo, Taegu, Republic of Korea. The station is operated by the students of Chung Goo College. It's heard on 7125 kHz from 0830 GMT.

9. How many ships can you hear on 2182 kHz in a 5 minute period? Try it and see.

10. How many Civil Air Patrol stations can you hear on 26620 kHz in a 1 hour period?

Scoring: 10 points each for numbers 1 through 8, 1 point for every station heard in number 9 and 10. A score of 30 is good, 50 is great.

Let us know how you made out!

Write! We invite readers to send loggings for inclusion in these listings. Be sure to include the following information for each station reported: approximate frequency, callsign and/or station name, and time monitored in Greenwich Mean Time (24 hour

WHITE'S RADIO LOG

clock). Address your reports to DX Central, White's Radio Log, RADIO-TV EXPERIMENTER, 505 Park Avenue, New York, N. Y. 10022, U.S.A.

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90-Meter Band—3200 to 3400 kHz

kHz	Call	Name	Location	GMT
3220	—	R. Clube de Mozamb.	Lourenco Marq., Moz.	0200
3245	YVKT	R. Liberador	Caracas, Venez.	0230
3265	ZFY	R. Demerara	Georgetown, Guyana	0230
3280	—	W. Indies BC	St. Georges, Grenada	0015
3300	—	Brit. Hond. BC	Belize, Br. Honduras	0238
3315	—	R. Martinique	Ft. de France, Martin.	0215
3316	—	Sierra Leone BC	Freetown, Sierra Leone	0800
3350	—	R. Ghana	Accra, Ghana	2125
3380	TCGH	E. R. Shortis	Socotan, Guat.	0214
3385	VL9BR	R. Rabaul	Rabaul, New Guinea	0810
	—	R-TV Francaise	Cayenne, Fr. Guiana	2230
3952	—	BBC	London, England	0600
3980	—	V. America	Munich, W. Germany	0630
3995	—	R. Budapest	Budapest, Hungary	1930
	HCJA5	V. del Rio Tarqui	Cuenca, Ecuador	0645
4635	—	R. Dushanbe	Dushanbe, USSR	0000
4705	HCAK2	R. del Ecuador	Guayaquil, Ecuador	0645

60-Meter Band—4750 to 5060 kHz

kHz	Call	Name	Location	GMT
4770	ELWA	R. Village	Monrovia, Liberia	2155
	YVNW	R. Bolivar	Bolivar, Venez.	0030
4775	—	R. Kabul	Kabul, Afghanistan	1215
4780	YVLA	V. de Carabobo	Valencia, Venez.	1000
4783	—	R. Mali	Bamako, Mali	0600
4815	—	R. Haute Volta	Ouagadougou, Up. Volta	0600
4835	—	R. Mali	Bamako, Mali	0700
4840	YVOI	R. Valera	Valera, Venez.	0558
4843	—	R-TV Congolaise	Brazzaville, Congo	2055
4845	HJGF	R. Bucaramanga	Bucaramanga, Colombia	0605
4865	CSA97	E. Regional	Ponta Delgada, Azores	2200
	—	R. Brunei	Brunei	1305
4875	—	RSA	Paradays, S. Africa	2100
4880	HIJP	R. Comercial	Sto. Domingo, Dom. Rep.	2322
4885	ZYG26	R. Pionera	Piaui, Brazil	0830
4890	—	R. Dakar	Dakar, Senegal	0700
	VLT4	Australian BC	Pt. Moresby, New Guinea	0800
	YVKB	R. Venezuela	Caracas, Venez.	0015
4895	—	R. Martinique	Ft. de France, Martiniq.	1230
4900	YVNK	R. Juventud	Barquisimeto, Venez.	2202
4910	HCMJI	E. Gran Colombia	Quito, Ecuador	0530
4915	ZYR60	Cult. de Araraquara	Araraquara, Brazil	0830
4930	YVOT	R. Junin	San Cristobal, Venez.	0058
4940	—	R. Kiev	Kiev, USSR	0915
	—	R. Abidjan	Abidjan, Ivory Coast	0630
	HIBE	R. Mil	Sto. Domingo, Dom. Rep.	0400
4945	HJCW	R. Suramerica	Bogota, Colombia	0455
4955	HJCQ	R. Nacional	Bogota, Colombia	2350
4958	—	R. Baku	Baku, USSR	0425
4965	HJAF	R. Santa Fe	Bogota, Colombia	0610
4976	—	R. Uganda	Kampala, Uganda	2030
4980	YVOC	E. de Torbes	San Cristobal, Venez.	2000
4990	—	Nigerian BC	Lagos, Nigeria	0630
	YVMQ	R. Barquisimeto	Barquisimeto, Venez.	2000
4995	ZYX9	R. Brasil Central	Goiania, Brazil	0830
5015	—	W. Indies BC	St. Georges, Grenada	2230
5020	HJFW	Tras. Caldas	Manizales, Colombia	0500
5026	—	R. Uganda	Kampala, Uganda	2030
5040	XZK42	Burmese BC	Rangoon, Burma	1200
	YVQH	R. Maturin	Maturin, Venez.	1105
5052	—	R. Singapura	Singapore	1240

49-Meter Band—5950 to 6200 kHz

kHz	Call	Name	Location	GMT
5875	HRNL	V. de Honduras	Tegucigalpa, Hond.	2350
5902	—	R. Budapest	Budapest, Hungary	1930
5930	—	R. Prague	Prague, Czech.	0105
	—	R. Arkhangelsk	Arkhangelsk, USSR	0215
5940	—	R. Magadan	Magadan, USSR	0655
5955	—	R. Berlin Int'l.	Berlin, E. Germany	0445
5960	HJCF	V. de Bogota	Bogota, Colombia	0707
5965	—	Swiss BC	Berne, Switz.	0215
5970	—	R-TV Algerienne	Algiers, Algeria	0630
	—	R. Canada	Montreal, Que.	0115
5985	—	R. Nacional	Lisbon, Portugal	0305
5990	—	R. Sweden	Stockholm, Sweden	0055
5995	—	R. Andorra	Andorra	0600
	HRPI	E. de Honduras	Tegucipalpa, Hond.	0100
6000	—	V. Islam	Riyadh, Saudi Arabia	2100
	PRK5	R. Iconfidencia	Belo Horizonte, Brazil	2315
6005	—	RIAS	Munich, W. Germany	0345
	CFCX	Canadian Marconi	Montreal, Que.	0550
6015	—	R. Abidjan	Abidjan, Ivory Coast	2200

kHz	Call	Name	Location	GMT
6025	HCJB	V. of Andes	Quito, Ecuador	0430
6030	CFVP	CFVP	Calgary, Alberta	1345
6035	ZYZ21	R. Globo	Rio de Janeiro, Brazil	0000
6045	—	Forces BC	Athens, Greece	0500
6050	HCJB	V. of Andes	Quito, Ecuador	0805
6075	DMQ6	Deutsche Welle	Cologne, W. Germany	0414
	HRMH	V. del Junco	Tegucigalpa, Honduras	0115
6080	—	R-TV Algerienne	Algiers, Algeria	0635
6085	PCJ	R. Nederland	Hilversum, Nederlands	2115
6090	—	R. Kaduna	Kaduna, Nigeria	0615
	VLI6	R. Australia	Sydney, Australia	0915
6100	DMQ6	Deutsche Welle	Cologne, W. Germany	0000
6115	OBZ40	R. Union	Lima, Peru	0400
6155	OEI21	Viennese R.	Vienna, Austria	0605
6160	HJKJ	R. Nueva Grenada	Bogota, Colombia	0000
6165	XEWW	V. Amer. Latina	Mexico City, Mex.	2330
6170	—	R. Habana	Havana, Cuba	0123
6180	TGWB	V. de Guatemala	Guatemala City, Guat.	1242
6185	CSA29	R. Nacional	Lisbon, Portugal	0225
6190	—	Vatican R.	Vatican City	2143
6195	—	BBC	London, England	2300
7050	—	United Arab BC	Cairo, Egypt	2015

41-Meter Band—7100 to 7300 kHz

7100	—	R. Budapest	Budapest, Hungary	1900
7105	—	V. America Relay	Woofferton, England	0500
7120	—	BBC	London, England	1800
7135	—	R. Monte Carlo	Monte Carlo, Monaco	0750
7140	—	BBC	London, England	0300
7165	—	Libyan BC	Tripoli, Libya	0020
	—	V. America	Okinawa, Ryukyu Is.	0900
7170	—	R. Alger	Algiers, Algeria	2345
	—	R. Noumea	Noumea, New Caledonia	0935
7175	—	V. America	Monrovia, Liberia	0730
7180	—	R. Baghdad	Baghdad, Iraq	2200
7185	—	Springbok R.	Paradys, S. Afr.	0330
7190	—	R. Australia	Melbourne, Australia	0900
7205	—	R. Moscow	Moscow, USSR	2310
	CR7RB	R. Pax	Beira, Mozambique	0415
7250	—	Vatican R.	Vatican City	0055
7265	—	R. Tirana	Tirana, Albania	2215
7295	—	V. America	Woofferton, England	0615
7305	—	R. Peking	Peking, China	1030
7335	—	R. Peking	Peking, China	1030
7345	—	R. Prague	Prague, Czech.	0400
7500	—	R. Peking	Peking, China	1200
7620	—	R. Peking	Peking, China	1215
9360	—	R. Nacional	Madrid, Spain	0000
9475	—	United Arab BC	Cairo, Egypt	0130

31-Meter Band—9500 to 9775 kHz

kHz	Call	Name	Location	GMT
9500	—	R. Berlin Int'l.	Berlin, E. Germ.	0020
9510	—	R. Bucharest	Bucharest, Rumania	0145
	YVXJ	R. Barquisimeto	Barquisimeto, Venez.	0236
9535	—	Swiss BC	Berne, Switz.	0130
9540	ZL2	N.Z. Calling	Wellington, N.Z.	0620
9560	CE956	R. Diego Portales	Portales, Chile	0225
9570	—	R. Nacional	Madrid, Spain	2300
9590	—	Trans World R.	Bonaire, N. Antilles	0245
9600	—	R. Tashkent	Tashkent, USSR	1200
9605	—	Trans World R.	Bonaire, N. Antilles	2325
9610	VLX9	Australian BC	Perth, Australia	1240
9630	—	R. Nederland	Hilversum, Neth.	0000
	—	R. Canada	Montreal, Que.	2110
9660	—	S. African BC	Paradys, S. Africa	0545
9675	—	RSA	Capetown, S. Africa	0029
9680	VLH9	R. Australia	Melbourne, Austral.	0830
9690	—	V. of Nigeria	Lagos, Nigeria	2130
	LRA32	R. Nacional	Buenos Aires, Arg.	0245
9695	—	Vatican R.	Vatican City	0050
9750	OAX8W	R. Sideral	Pucallpa, Peru	0335
9755	—	VTVN	Saigon, S. Vietnam	1220
9760	—	R. Nacional	Madrid, Spain	0230
9770	OE147	Viennese BC	Vienna, Austria	0225
9775	—	R-TV Congolaise	Kinshasa, Congo	2220
9810	—	R. Moscow	Moscow, USSR	1200
9833	—	R. Budapest	Budapest, Hungary	1930
9860	—	R. Peking	Peking, China	1545
9915	VUD	All India R.	Delhi, India	2224
10885	—	R. Ulan Bator	Ulan Bator, Mongolia	2255

25-Meter Band—11700 to 11975 kHz

11680	—	BBC	London, England	1829
11685	CR6RR	R. Diamang	Dundo, Angola	1900
11705	—	R. Sweden	Stockholm, Sweden	1615
11730	—	R. Nederland	Hilversum, Netherlands	1700
11735	—	R. Marocaine	Tangiers, Morocco	1830
11780	—	R. Japan	Tokyo, Japan	2345
11790	—	R. Australia	Melbourne, Australia	1230
11800	—	R. Nacional	Canary Islands	0010
	—	R. Ceylon	Colombo, Ceylon	1315
11810	ETLF	R. Voice Gospel	Addis Ababa, Ethiopia	0430
11820	—	R. Club de Moz.	Lourenco Marques, Moz.	0500
11830	ZL19	N.Z. Calling	Wellington, N.Z.	0640
11835	4VEJ	V. Evangelique	Cap Haitien, Haiti	1330
11840	—	R. Nacional	Lisbon, Portugal	2200
11850	LLK	R. Norway	Oslo, Norway	1700
11855	—	R. Free Europe	Munich, Germany	0400
	DZH8	Call of Orient	Manila, Philippines	1700
11865	—	R. Lubumbashi	Lubumbashi, Congo	1810
11885	—	R. Bucharest	Bucharest, Rumania	0445
11895	—	R. Dakar	Dakar, Senegal	2220
11900	—	RSA	Paradys, S. Africa	2300
11910	HSK9	R. Thailand	Bangkok, Thailand	2350
11925	—	R. Tashkent	Tashkent, USSR	1200
11970	—	Windward I. BC	St. Georges, Grenada	2335
12000	—	R. Armavir	Armavir, USSR	1205

19-Meter Band—15100 to 15450 kHz

15110	XERR	R. Comerciales	Mexico City, Mex.	2230
15115	HCJB	V. of The Andes	Quito, Ecuador	0315
15120	—	Vatican R.	Vatican City	1740
15125	BED60	V. of Free China	Taipei, Taiwan	0255
15135	—	R. Japan	Tokyo, Japan	2345
15140	—	BBC Relay	Ascension I.	2150
15145	—	Vatican R.	Vatican City	1747
	ZYK33	R. Journal	Recife, Brazil	0300
15148	CE1515	Chilena BC	Santiago, Chile	0005
15150	—	Sawt al Islam	Djeddah, Saudi Arabia	2115
15155	ELWA	R. Village	Monrovia, Liberia	1815
15160	TAU	R. Ankara	Ankara, Turkey	2200
15165	OZF7	R. Denmark	Copenhagen, Denmark	1250
15180	—	BBC Relay	Ascension I.	1700
15185	OIX4	R. Finland	Pori, Finland	1235
15220	—	R. Nederland	Hilversum, Neth.	2000
15230	—	R. Habana	Havana, Cuba	2215
15245	—	R-TV Francaise	Paris, France	1600
15275	—	Armed Forces R-TV	Delano, Calif.	2235
15285	—	RSA	Paradys, S. Africa	2055
	—	V. America	Colombo, Ceylon	1430
15300	—	R. Japan	Tokyo, Japan	0600
	DZH9	Call of Orient	Manila, Philippines	2255
15330	—	R. Australia	Melbourne, Australia	2305
15435	—	BBC	Malaysia	0030

16-Meter Band—17700 to 17900 kHz

17730	—	Viennese BC	Vienna, Austria	1800
17780	—	V. America	Greenville, N.C.	1830
17860	ORU	Belgian BC	Brussels, Belg.	1815
17880	CSA45	R. Nacional	Lisbon, Portugal	1855
17890	—	R. Budapest	Budapest, Hungary	1930

13-Meter Band—21450 to 21750 kHz

21700	CSA46	R. Nacional	Lisbon, Portugal	1815
21730	LLQ	R. Norway	Oslo, Norway	1445
25900	LLA	R. Norway	Oslo, Norway	1400

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

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

ELECTRONIC PARTS

★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.

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

★23. No electronics bargain hunter should be caught without the 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 a 148-page 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.

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

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

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

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

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

★117. Harried by the high cost of parts for projects? Examine *Bigelow's* 13th Anniversary catalog packed with "Lucky 13" specials.

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 *Dynaco* for kits or wired units. It's worthwhile looking at test reports *Dynaco* sends your way.

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

15. *Acoustic Research* would like to send you a copy of their fact-packed "Stylus Force" booklet—must reading for hi-fi bugs.

16. Discover why Lab 80 by *Garrard* offers top dollar value. 32-page *Garrard* Comparator Guide will make you a wiser buyer.

17. *Electro-Voice* has two new, pocket-size, four-color product guides for you. One covers speakers and components; the other, microphones and accessories.

19. *Empire* has made exceptional advances in speaker cabinet design you should read about. Also, *Empire's* successes in the turntable and cartridge fields are worth discovering.

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

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

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

TAPE RECORDERS AND TAPE

113. Get a packet full of facts and tape data from *Scotch-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.

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

35. If you are a serious tape audiophile, you will be interested in the 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.

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."

SCHOOLS AND EDUCATIONAL

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. Join the *troubleshooters!* Let *CIE (Cleveland Institute of Electronics)* train you to keep our electronics world running.

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

★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.*

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. Need a compact screwdriver kit? *Xcelite's* 99PV-4 and 99PV-6 consists of handle, 3 and 5 blades, respectively, in "see-thru" zipper case. Get *Xcelite's* catalog 166.

118. Secure coax cables, speaker wires, phone wires, etc., with *Arrow* staple gun tackers. 3 models for wires and cables from 3/16" to ½" dia. Get fact-full Arrow literature.

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!

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.*

RADIO-TV EXPERIMENTER,
Dept. 867
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New York, N. Y. 10022

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92	93	95	96	97	98	99	100	101	103
104	105	106	107	108	109	111	112	113	114
115	116	117	118	119	120	121			

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CB HERTZ GRABBER

Continued from page 88

tower. If on a tower used only for receiving antennas (such as a TV mast), it may not exceed 20 feet above the ground level.

So, bearing these limitations in mind, we suggest that you start thinking up the most likely place for your base station antenna. Remember, the higher it is, the better will be your coverage—but there's the height limit which you've got to consider.

Lightning Protection. Your antenna, that thin spire of metal extending towards the sky, happens to be an ideal lightning rod. An unprotected antenna is an open invitation to becoming a *former* CBer—possibly even a former human. A good jolt of lightning into the antenna can demolish all of your equipment and (if you happen to be using the set at the time) can take you along with it.

It's easy to lightning-proof your station and it's worth the effort. Our suggestion is to get a little gadget made by Cush-Craft. It's something called the *Blitz Bug* and is easily attached to your feed line by means of connectors at each end of the device. A heavy ground wire (#8 wire) is then run from the terminal on the side of the *Blitz Bug* to an earth ground like a water pipe.

The ideal point for the installation of the *Blitz Bug* is at the point where your feed line enters the building. The earth ground should be a commercial ground rod—the longest you can find (Lafayette carries these in their catalog). It should be driven into moist ground.

Mobile Antennas. Mobile antennas, like base station antennas, come in all shapes, sizes, and forms—in almost all instances they are of the omni-directional type.

The type of antenna you use depends on the mounting position you have selected. In the section of this book called "Your Mobile Station" we discuss the merits of the various mounting locations on your car.

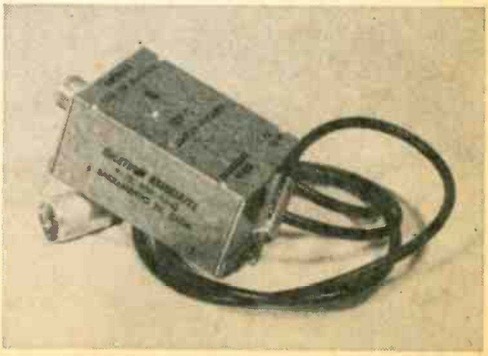
While there are many mobile antennas to choose from, they aren't quite as mysterious as the base station giants.

All mobile whip antennas are an *electrical* quarter-wavelength—whether they are 19 inches long or stretch out for 108 inches. The usual rule is *the more steel you can hang*, the better the signal output—however, that rule (which is parroted by most CBers) *is a fallacy!*

A quarter-wave antenna radiates primarily from the high current area which happens to be at the base of the antenna. If the lower half of the antenna is replaced by a loading coil, the predominant radiation is from the loading coil and that hasn't too much area. This is true despite the fact that many people report results with loaded antennas which rival full length (108") whip antennas—mainly because the loaded antennas can be placed in a better location on the vehicle than can a long whip.

Teeny 'Tennas. Hy-Gain holds down the fort in the tiny antenna sweepstakes with their 19 inch *Shorty Roof Topper*, a performance-packed antenna with a solid state loading coil at the top. It's about the smallest thing we've seen on CB yet—a good bet for folks who want their mobile installation to be as unobtrusive as possible.

The transistorized Alliance Tenna-Rotor is ideal for the CBer using a high-gain directional antenna, like the beam or yagi.



Holstrom Associates make this neat little CB-AM coupler that lets you use your 108 in. whip for both CB and your AM car radio.

Speaking of being unobtrusive, you can be a full fledged mobile CBer without any external advertising on the car by means of the so-called CB-AM antennas, which are available from several manufacturers. These antennas replace the existing car radio antenna on your car, and then provide double service as the CB antenna and the car's broadcast antenna. You can even play the car radio while you transmit on CB—there's no interference.

For those of you who shrink at the thought of drilling holes in the family chariot, there's always the old reliable bumper mount for full length whips. Many of the shortened whips are available with non-hole mounts, which call for the antenna to be mounted in the car's rain gutter, on the upper edge of the trunk lid, or permit the antenna to be held to the car by means of powerful magnets. Most manufacturers now carry a selection of no-hole antennas and mounts.

Coaxial Cable. We don't want to sign off here without kicking around the subject of coaxial cable; that's the stuff you will use between your CB rig and antenna as the feed line or lead in. It can affect your signal as much as any other component in the system.

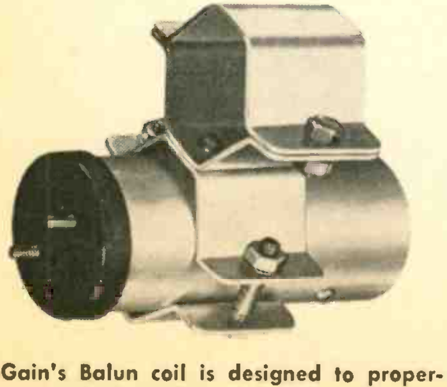
Coaxial cable seems to constantly be the subject of great misinformation. In CB, it makes no *effective* difference what the dickens you use as transmission line. True, some power is lost in the transmission line, but it's a spit in the ocean. Ordinary RG-58A/U coaxial cable has a loss of 2 DB per 100 feet. The receiving station can only notice a change of 3 DB or more—so big deal! If you have a 100 foot transmission line the loss is less than the receiving station can hear. You're fussy? So go ahead and use that heavy, unwieldy and expensive RG-8/U cable, it only has a 1-DB loss per 100 feet; let's see the receiving station that can hear that. And how many CB installations have runs of 100 feet—very few. The usual installation of RG-58A/U would most likely have a loss of ½ DB or less.

And don't believe that old wives' tale about getting a better match between the rig and antenna by trimming the coaxial cable to a certain length. That's hogwash! Any time you can change your signal by trimming a few feet of cable you've got something wrong with your antenna. While it's true that if you insert an SWR meter in varying lengths of cable between the same rig and antenna, you'll possibly get different meter readings, this is only because the meter is being "tricked"—you've still got the same signal.

Another thing: don't worship the readings of an SWR meter. While a perfect reading is almost impossible to obtain, we have seen excellent signals pouring forth with readings as high as 3 to 1.

The main thing to keep in mind about transmission lines in CB is that the cable should be changed and replaced every two or three years—the weather eventually gets to it and screws it up. Replace it if there are any cracks or breaks in the outer coating.

Be careful when attaching connectors to the cable. Very often a poor connection is the result of careless or sloppy soldering—and the connection can totally ruin what might have been a healthy signal. ■



Hy-Gain's Balun coil is designed to properly match unbalanced coaxial cable to the balanced input of beam antennas for CB use.

This neat Hy-Gain co-phasing control box lets you aim your signal electronically when used with two omni-directional antennas.

Black Widow

Continued from page 51

a small universal output transformer on the inside face of the cabinet and connected the lowest impedance tap of the primary winding in series with the speaker voice coil.

A conventional phone plug and cord can be fed through a grommeted hole in the rear face of the cabinet and connected to the lowest impedance tap on the secondary of the transformer; a phone jack (J2), which is wired in series, is installed on the rear cabinet face as shown in photo. It is then only necessary to insert plug (P1) into the receiver output jack and push the phone plug into phone jack J2 on the rear of the monitor cabinet.

Another fringe benefit: turning the volume control *counter*-clockwise increases headphone volume and decreases that of the speaker. Clockwise rotation of the volume control produces the opposite effect; speaker volume goes up and headphone volume down. What could be more perfect?

Incidentally, a key may be left continuously plugged into the jack on the panel face if desired for code practice, and it will not interfere with the monitor in any way.

So why not get with it? Build yourself a little gadget like this, either mounted on a breadboard or dressed up like we did. In no time, you'll be able to *really* listen to your CW style when you're batting it out! ■

Positive Feedback

Continued from page 11

him to "do better and I'll buy them!"

That's right, Mitchell, Tom did do better. Eventually, Tom quit his job with a famous movie company to enter the editorial field. Tom went on to become the greatest CBer in America. And would you believe this, Mitchell? Tom called when he saw the same article and gave us the exact same pitch you did—except *he* still reads Radio-TV Experimenter.

There is one other clown you have to know about, Mitchell. That's Herb Friedman, W2ZLF. Herb walked into our Editor's office about nine years ago and said our Editors were the world's worst construction projects. Our Editor said, "Nuts!" (He always liked Army talk) "Do better!" No sooner were the words spoken than Herb began to unpack the box he had with him. Since Herb was a head taller than our Editor plus 50 pounds to the good, his story was published.

Believe it or not, Mitchell, a kit manufacturer still sells it! Also, Herb is now the most published electronics construction author in America today. Herb's comments about the FCC article was ". . . maybe you should have run some girlie pictures instead!" (Herb still reads Radio-TV Experimenter.)

Now what are we driving at, Mitchell? We're trying to tell all the special and esoteric hobby groups to keep an open mind to the opposition. After all, if all the dyed-in-the-wool hams gave up anything and everything that opposed or interfered with their hobby—bye-bye, sex. *Then* how will they perpetuate their kind???

Red Cycles in the Spectrum. Those readers who have built our long-wave VLF receiver (featured in the April-May 1967 Radio-TV Experimenter) have a treat in store for them. Mao's pals in Chop Suey Land have put a powerful long-wave transmitter on the air around 16 kiloHertz (kc). It has been reported that England's GRB on 15.975 kHz has suffered interference as far away from China as South America and Iceland.

This Asian newcomer is tough station to DX and QSL. The Chinese Reds come on for a few minutes at a time and then get off. There is no apparent schedule. Also, if you hear them, who do you send your verification to? Until that question can be answered we would like to receive reports from our readers. Try to pinpoint the exact frequency, if possible, and record exact times. Use GMT for reporting. Send your reports to the Editor, c/o Radio-TV Experimenter. In the meantime, here's soy sauce in your eye! ■

". . . then run a 10K resistor between the 400 PIV diode and the 6DQ6B plate!"

The Censor

Continued from page 52

"Not really, until I pick up the signal."

It changed to green; she stepped lightly on the gas. "What channel are you on?"

"The pirate was reported on 9 shortly after nine." I did know my business, really.

"Well, this early in the morning I don't feel like just playing games." Traffic heavier now, slower, and still more smog. "Check the other channels." Determined. "It won't hurt nothing."

Decided to humor her. 8, image of local 7. 9 again, still CFTO. 10, absolutely nothing. 11, CHCH from Hamilton. 12, WICU, Erie.

Stopped on a yellow light. Somebody behind us banged his horn.

I switched to 13, the jackpot. A test pattern from "EARTHVISION, illegal TV and proud of it!"

"I've got them!" In color, no less. Pointed my camera at the screen and snapped it five times. EARTHVISION, one of many aliases used by Reality Anonymous, the secret society responsible for all my SBTV failures so far. From New Orleans they broadcast as Muddy Video, Inc.; from Seattle as Quake TV; from Honolulu as Typhoon Television—all pirates we hadn't been able to catch.

Mona nodded and we were moving again.

Now on my screen, a shot of the sun—fiery closeup. Then the camera penetrates it. Inside a paradise, lush garden with transparent creatures flitting around.

"It's starting to fade."

Mona swung east onto Tupper.

A silver space ship blasts off, complete with transparent crew. Earth, which is shrouded in smog. Closeup of miserable humans like Gomer Pyle, Hogan's Heroes, and Gilligan groping around in the dark. Spaceship to the rescue, lads! My camera was clicking like a spastic slot machine in a Las Vegas jail.

Signal no better, no worse as we crossed Main Street.

Spaceship takes grateful humans off this foul planet. Takes them back to the sun. Where they are BARBECUED.

Frantically, I maneuvered the direction finder but couldn't hit anything approaching a permanent fix. Back to a test pattern. Picture deteriorating into the ignition noise. "Go back downtown."

Mona swung south into Michigan Avenue. EARTHVISION improved noticeably, then held at constant level.

"It must be moving, too. Can't you go any faster?"

"Not in this." Laughed, deep, defiant. "You want me to fly?"

We approached a demolition area. The city had cleared a block of old buildings, smashed them, leaving giant heaps of rubble burning. The smog got thicker; Mona switched on the headlights but it didn't help much.

EARTHVISION switched test patterns. This one read "Help stamp out Sunlight."

Mona glanced over her shoulder at me.

I'd begun to sweat. We passed a bus; its ignition system drove the vertical control crazy for a moment.

"Don't work so hard. It's not that big a thing."

She took me by surprise. I considered it briefly. "We're protecting our nation—civilization." Recalled one of those great lines from situation comedy. "We must struggle toward the light." Tried to remember some gem of positive thought from BONANZA.

Outside we could barely see 10 feet ahead of us.

Her softly from the front. "I don't know. Sometimes the dark is better."

I never played on the job, regardless of the invitation. "Not when you're chasing pirate television transmitters." Out of film, I reached into the front seat for another roll, and spotted it.

Beside Mona on the front seat was a tiny remote control unit. She tapped it, the picture improved. "Are we gaining on them?" More of that soft feminine tone.

I leaned back quickly so she wouldn't know I had seen. "Pull over to the curb."

She obeyed, simultaneously tapping her control. EARTHVISION faded, but this time Mona caught me watching her. She hit it one more time and our "pirate" left the air.

Like I was in shock. "Where's the transmitter?"

Mona deadpan. "Under the front seat along with a video tape recorder." She held up the control unit so I could get a better look. The lettering on it read R-E-A-L-I-T-Y. Her defiant laugh again. "And what are you going to do about it, Mr. Censor?" ■

Magnetism

Continued from page 83

tury, is credited with beginning the mystic cult generally known as the "magnetisers." The magnetisers claimed they could perform all sorts of miracles with the aid of magnetism. For example, Paracelsus proclaimed his ability to cure any ailment and stop the process of decay. He even boasted that it was possible to transplant diseases from humans to the earth by the use of magnetic substances mixed with pulverized mummies and other exotic materials.

Other magnetisers carried on the quackery far into the 17th century, long after William Gilbert had discovered the existence of earth magnetism. But we shouldn't be too ready to jeer at the ancients who, after all, knew far less about magnetism than we do. Even our so-called civilized societies still have cults proclaiming the mystic powers of magnetism.

Magnetism also crops up in the pseudoscience invented by the more fanatic element of the flying saucer cult. Others who simply know little or nothing about magnetic phenomena are ready to read great significance into the most ordinary and almost commonplace happenings.

A case in point was the recently televised interview between a panel of science experts and Mr. and Mrs. Barney Hill—the couple claiming to have been captured by the crew of an Unidentified Flying Object. The panelists who examined the Hills' story included three professors from leading universities and science writers of a well-known magazine and newspaper.

At one point Mrs. Hill made much of her observation that a compass behaved very erratically when it was held near some mysterious spots that had appeared on her car after the alleged UFO encounter. One of the learned panelists hastened to warn Mrs. Hill that a compass could not possibly detect radioactivity, if that is what she was suggesting. The panelist concluded that perhaps there was some sort of mysterious "dynamo" effect in the car.

It seems incredible that not one of the five science experts could provide the obvious explanation of the compass' behavior. Try putting a compass near *anything* made of iron or steel and see what happens. Start with your own car and work down to an eight-penny nail. The results will always be the same; you may end up proving that UFOs have irradiated your nail box!

The TV incident is relevant to our discussion of magnetism for one reason. It underscores the fact that magnetism is still "magic" to many people—even college professors! ■

Electronic Rooster

Continued from page 48

You will have to set your alarm clock to get you up early one morning so that you can set the Electronic Rooster. First, place the unit on a window sill or on a table near the window. Be sure the lights in the room are off, that the PE cell is aimed out the window towards the east, and that switch S1 is on.

As the sun comes up, adjust sensitivity control R1 until the Sonalert comes on. You can experiment with different angles for the PE cell housing and different control settings until the alarm works as you want it to.

When you go to bed at night, turn switch S1 on (with the room lights off) and in the morning when the sun rises, Rooster will wake you up. Just keep in mind that like all roosters, he'll skip cloudy and rainy days and let you sleep in on those mornings. ■

SCR Range Expander

Continued from page 70

For controlling heat of soldering pencils and irons, use the Range Expander for control over the entire range of heats. The medium to high heat range obtainable when using the Range Expander makes it possible to control heating to help retard tip oxidation and component damage while providing enough heat to do the job (don't try to solder with a cool iron).

As the load current becomes larger, the knob rotation required of R2 to go from minimum to maximum output becomes less. Though not usually required, the control of a larger load can be spread out over more of the dial by connecting a one-watt resistor of from 120 to 390 ohms across the ends of R2. If you do this, you may want to include a toggle switch to switch the resistor in and out. ■

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How to get into

One of the hottest money-making fields in electronics today– servicing two-way radios!

HE'S FLYING HIGH. Before he got his CIE training and FCC License, Ed Dulaney's only professional skill was as a commercial pilot engaged in crop dusting. Today he has his own two-way radio company, with seven full-time employees. "I am much better off financially, and really enjoy my work," he says. Read here how you can break into this profitable field.

More than 5 million two-way transmitters have skyrocketed the demand for service men and field, system, and R&D engineers. Topnotch licensed experts can earn $12,000 a year or more. You can be your own boss, build your own company. And you don't need a college education to break in.

How would you like to start collecting your share of the big money being made in electronics today? To start earning $5 to $7 an hour... $200 to $300 a week... $10,000 to $15,000 a year?

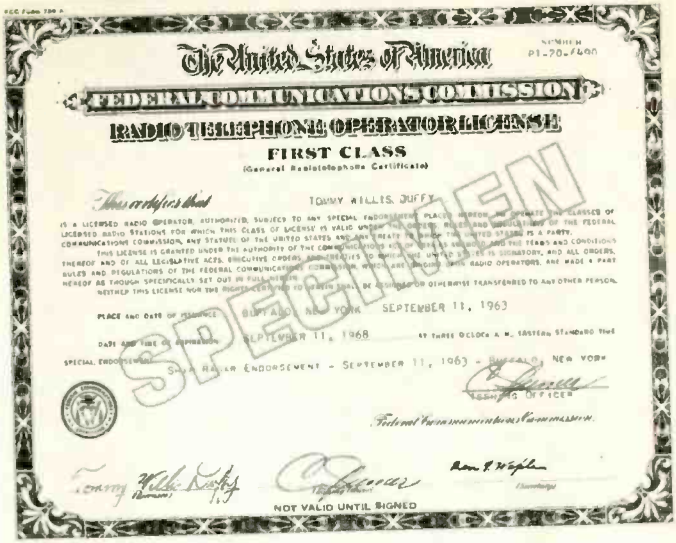
Your best bet today, especially if you don't have a college education, is probably in the field of two-way radio.

Two-way radio is booming. Today there are more than *five million* two-way transmitters for police cars, fire department vehicles, taxis, trucks, boats, planes, etc. and Citizen's Band uses—and the number is still growing at the rate of 80,000 new transmitters per month.

This wildfire boom presents a solid gold opportunity for trained two-way radio service experts. Many of them are earning $5,000 to $10,000 a year *more* than the average radio-TV repair man.

Why You'll Earn Top Pay

One reason is that the United States Government doesn't permit anyone to service two-way radio systems unless he is *licensed* by the Federal Communications Commission. And there simply aren't enough licensed electronics experts to go around.


The United States of America

FEDERAL COMMUNICATIONS COMMISSION

RADIO TELEPHONE OPERATOR LICENSE

FIRST CLASS

(General Radiotelephone Certificate)

This certifies that TOMMY WILLIS DUFFY

PLACE AND DATE OF ISSUANCE BUFFALO, NEW YORK SEPTEMBER 11, 1963

DATE AND TIME OF EXPIRATION SEPTEMBER 11, 1968 AT THREE O'CLOCK A. M., EASTERN STANDARD TIME

SPECIAL ENDORSEMENT SHIP RADAR ENDORSEMENT - SEPTEMBER 11, 1963 - BUFFALO, NEW YORK

ISSUING OFFICER

Federal Communications Commission.

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SPECIMEN

THIS COULD BE YOUR "TICKET" TO A GOOD LIVING. You must have a Commercial FCC License to service two-way radios. Two out of three men who take the FCC exam flunk it . . . but nine out of ten CIE graduates pass it the first time they try!

Another reason two-way radio men earn so much more than radio-TV service men is that they are needed more often and more desperately. A home radio or television set may need repair only once every year or two, and there's no real emergency when it does. But a two-way radio user must keep those transmitters operating at all times, and *must* have their frequency modulation and plate power input checked at regular intervals by licensed personnel to meet FCC requirements.

This means that the available licensed experts can "write their own ticket" when it comes to earnings. Some work by the hour and usually charge at least $5.00 per hour, $7.50 on evenings and Sundays, plus travel expenses. A more common arrangement is to be paid a monthly retainer fee by each customer. Although rates vary widely, this fixed charge might be $20 a month for the base station and $7.50 for each mobile station. A survey showed that one man can easily maintain at least 100 stations, averaging 15 base stations and 85 mobiles. This would add up to at least $12,000 a year.

Be Your Own Boss

There are other advantages too. You can become your own boss—work entirely by yourself or gradually build your own fully staffed service company. Instead of being chained to a workbench, machine, or desk all day, you'll move around, see lots of action, rub shoulders with important police and fire officials and business executives who depend on two-way radio for their daily operations. You may even be tapped for a big job working for one of the two-way radio manufacturers in field service, factory quality control, or laboratory research and development.

How To Get Started

How do you break into the ranks of the big-money earners in two-way radio? This is probably the best way:

1. Without quitting your present job, learn enough about electronics fundamentals to pass the Government FCC Exam and get your Commercial FCC License.
2. Then get a job in a two-way radio service shop and "learn the ropes" of the business.
3. As soon as you've earned a reputation as an expert, there are several ways you can go. You can move *out* and start signing up and servicing your own customers. You might become a franchised service representative of a big manufacturer and then start getting into two-way radio sales, where one sales contract might net you $5,000. Or you may even be invited to move *up* into a high-prestige salaried job with one of the major manufacturers either in the plant or out in the field.

The first step—mastering the fundamentals of Electronics in your spare time and getting your FCC License—can be easier than you think.

Cleveland Institute of Electronics has been successfully teaching electronics by mail for over thirty years. Right at home, in your spare time, you learn electronics step by step. Our AUTO-PROGRAMMED™ lessons and coaching by expert instructors make everything clear and easy, even for men who thought they were "poor learners." You'll learn not only the fundamentals that apply to all electronics design and servicing, but also the specific procedures for installing, troubleshooting, and maintaining two-way mobile equipment.

Get Your FCC License . . . or Your Money Back!

By the time you've finished your CIE course, you'll be able to pass the FCC License Exam with ease. Better than nine out of ten CIE-trained men pass the FCC Exam the first time they try, even though two out of three non-CIE men fail. This startling record of achievement makes possible the famous CIE warranty: you'll pass the FCC Exam upon completion of your course or your tuition will be refunded in full.

Ed Dulaney is an outstanding example of the success possible through CIE training. Before he studied with CIE, Dulaney was a crop duster. Today he owns the Dulaney Communications Service, with seven people working for him repairing and manufacturing two-way equipment. Says Dulaney: "I found the CIE training thorough and the lessons easy to understand. No question about it—the CIE course was the best investment I ever made."

Find out more about how to get ahead in all fields of electronics, including two-way radio. Mail the bound-in postpaid reply card for two FREE books, "How To Get A Commercial FCC License" and "How To Succeed In Electronics." If card has been removed, just send us your name and address on a postcard.

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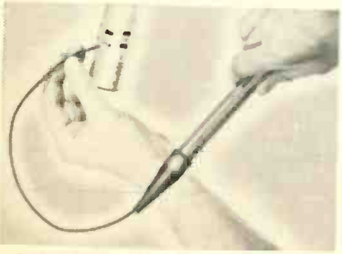

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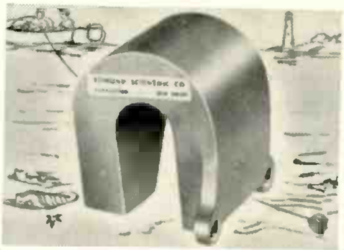

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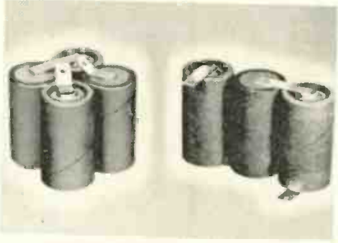

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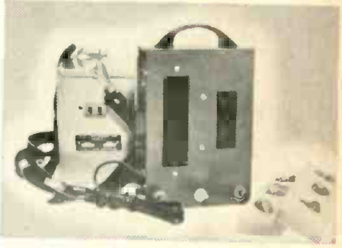

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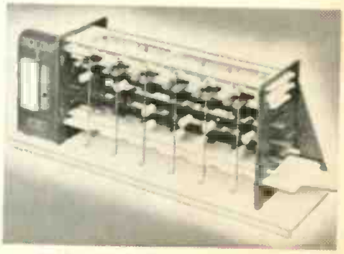

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