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DECEMBER-JANUARY 75c

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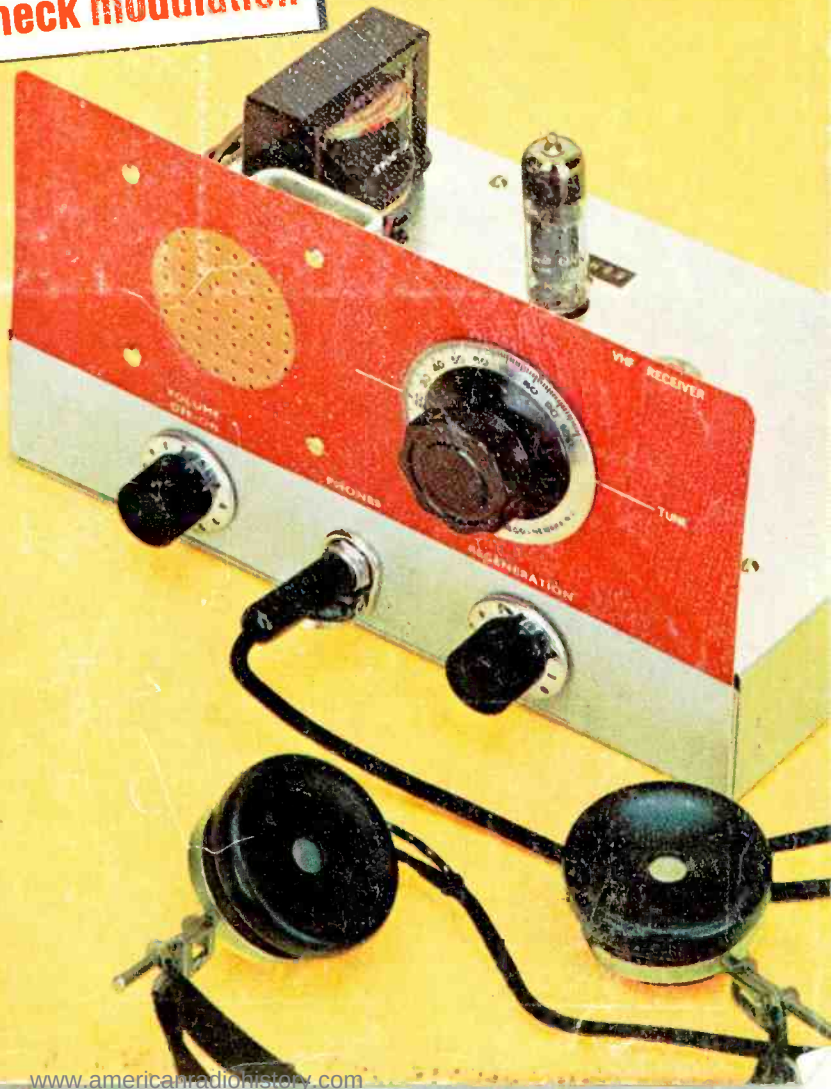

TEST REPORTS

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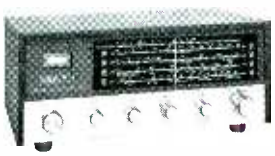

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RADIO-TV EXPERIMENTER

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Dec., 1966/Jan., 1967 CONTENTS/INDEX

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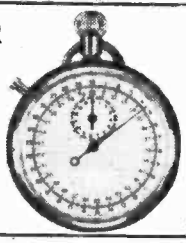

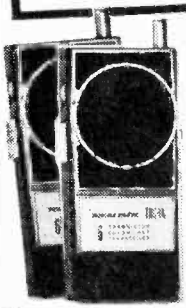

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DECEMBER 1966, JANUARY 1967

RADIO-TV EXPERIMENTER

Dedicated to America's Electronics Experimenters

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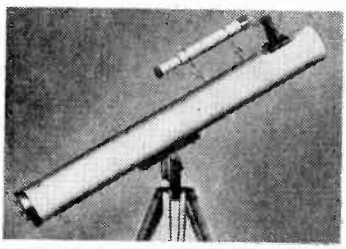

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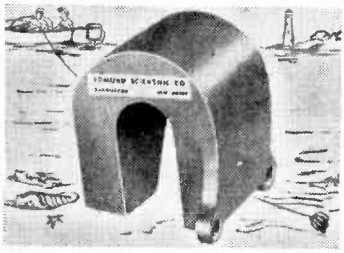

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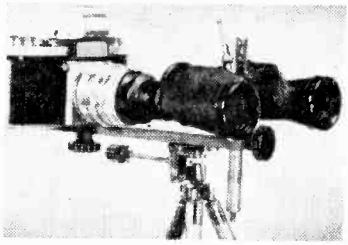

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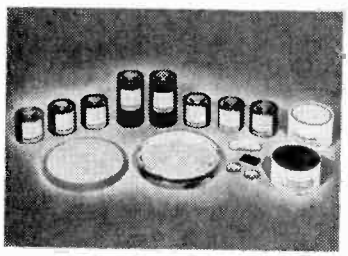

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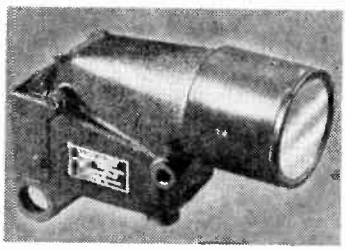

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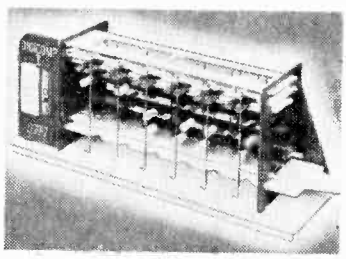

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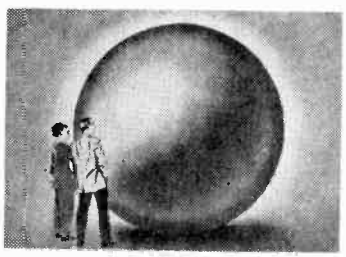

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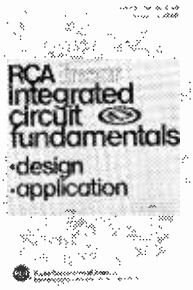

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(Continued on page 12)

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The Progressive Radio "Edu-Kit" is the foremost educational radio kit in the world, and is universally accepted as the standard in the field of electronics training. The "Edu-Kit" uses the modern educational principle of "Learn by Doing." Therefore you construct, learn schematics, study theory, practice trouble shooting—all in a closely integrated program designed to provide an easily-learned, thorough and interesting background in radio, function, theory and wiring of these parts. Then you build a simple radio. With this first set you will enjoy listening to regular broadcast stations, learn theory, practice testing and trouble-shooting. Then you build a more advanced radio, learn more advanced theory and techniques. Gradually, in a progressive manner, and at your own rate, you will find yourself constructing more advanced multi-tube radio circuits, and doing work like a professional Radio Technician.

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

THE "EDU-KIT" IS COMPLETE

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

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

FREE EXTRAS

• SET OF TOOLS

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

SERVICING LESSONS

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

FROM OUR MAIL BAG

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

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

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

PRINTED CIRCUITRY

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

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

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

UNCONDITIONAL MONEY-BACK GUARANTEE

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

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

Name .....

Address .....

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PROGRESSIVE "EDU-KITS" INC.

1186 Broadway, Dept. 539NN, Hewlett, N. Y. 11557

Bookmark

Soft cover
176 pages
$3.25

FM Multiplexing for Stereo is a complete guide to compatible, multiplex f-m stereo. It covers the principles of FM stereo multiplexing, the theory and operation of various receiver circuits, and details of aligning and servicing these circuits. Discussions of the composite stereo signal, converting to FM stereo, multiplex circuits, and decoders are given. This new edition has been revised to include the latest developments in multiplex circuits, receivers, and tuners. It is the opinion of the reviewer that this soft-cover text is vastly superior to any other of its type or cost. Author *Leonard Feldman* should be commended for his efforts. Published by Howard W. Sams & Co., Inc., 4300 West 62nd Street, Indianapolis, Indiana 46206.

☐☐ **Catalog Time.** Don't look now, but your '66 catalogs are as much use to you as last year's calendar. So get with it! Pick up the latest catalog, flyer and literature from your favorite mail order house. Too lazy? Then fill out the coupon on page 107 and circle the numbers for the literature you want. We do the rest. ■

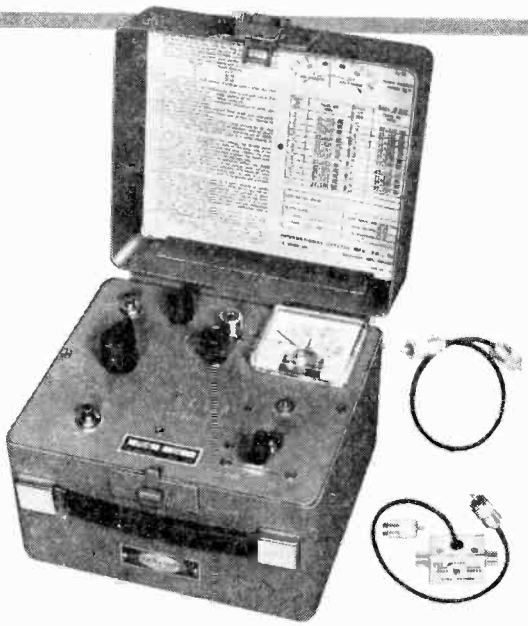
If You Service Citizens Radio Transceivers...

you should have

AN INTERNATIONAL

C-12B

FREQUENCY METER



Four Instruments In One

The C-12B is more than a frequency standard — it measures power output, measures AM modulation, and is a signal generator . . . all self contained in one convenient unit.

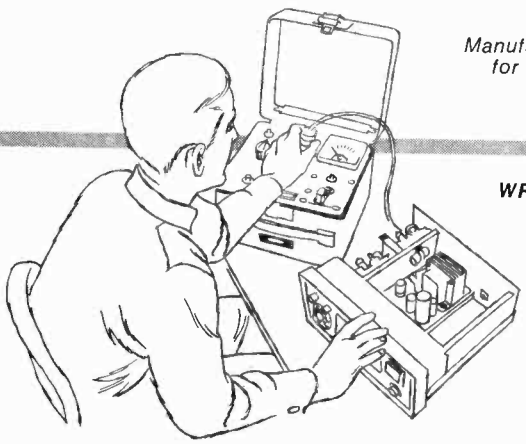
check these features!

- *Frequency Measurement* — Range 26.965 mc to 27.255 mc. Frequency stability ± .0025% 32°F to 125°F; ± .0015% 50°F to 100°F.
- *Power Measurement* — 0 to 5 watts, accuracy ± ¼ watt.
- *Counter Circuit* — Frequency range 0 to 3 kc. Residual error 100 CPS @ zero beat.
- *AM Modulation Measurement* — Range 0 to 100%. Accuracy 3% @ 400 CPS @ 80% modulation.
- *Signal Generator* — Frequency range 26.965 mc to 27.255 mc. Low output 1 microvolt through special pick-off box furnished with meter. High output 100 microvolts through output jack.
- *Panel Controls* — Channel selector, 24 positions • "Hi-Lo" frequency adjust • RF level control • Modulation set • Power • Meter calibration adjust • Function selector, 7 positions • Modulation • RF • Deviation • Calibration • Battery Test "A" • Battery Test "B" • Battery Test "C".
- *Battery Power Required* — 1½ vdc @ 60 ma, 67½ vdc @ 5 ma, 9 vdc.

The C-12B is capable of holding 24 crystals and comes with 23 crystals installed. Everything you need including connecting cable, PK box, dummy load, and batteries.

Cat. No. 620-101 ..... $300.00

Manufacturers of precision electronic products for home, industry and aerospace needs.



WRITE FOR COMPLETE CATALOG

INTERNATIONAL

CRYSTAL MFG. CO., INC.

18 NO. LEE - OKLA. CITY, OKLA. 73102

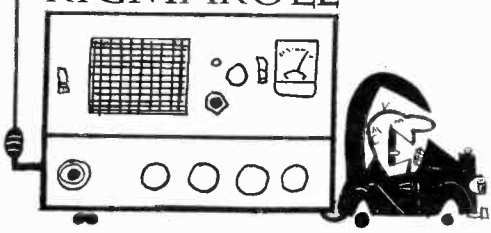
EMERGENCY CB TUBE SUBSTITUTIONS

Original	Replace with
6AK5	6BA6, 6BC5, 6BH6, 6BJ6, 6CB6, 6CE5, 6CF6, 5590, 5591, 5595
6AL5	5726, 6097, 6663, 7631
6AQ5	EL90, 6BM5, 6005, 6095, 6669
6AU6	EF94, 6AK5,* 6BA6, 6BD6, 6CB6,* 6DK6,* 5749, 6136, 7543
6AV6	EBC91, 6AQ6, 6AT6, 6BK6, 6066
6BA6	EF93, 6AU6, 6BC5, 6BD6, 6CB6, 5749, 6136, 6660
6BC8	EF93, 6BK7, 6BS8, 6BQ7, 6BZ7, 6BZ8, 6HK8
6BE6	EK90, 6BY6, 6CS6, 1217, 5750, 5915, 6660, 7036, 7502
6BH6	E90F, 6AW6, 6CB6, 6CF6, 6DC6, 6265, 6661
6BJ6	6AS6, 6BA6, 6BC5,* 6BH6, 6662, 7694
6BJ8	6BN8*
6BN8	6BJ8*
6BQ5	EL84, 7189, 7320
6BS8	6BC8, 6BQ7, 6BX8, 6BZ7, 6BZ8, 6HK8
6BZ6	6BA6,* 6CB6, 6DC6, 6DE6, 6DK6, 6HQ6, 6JH6
6BZ8	6BC8, 6BK7, 6BQ7, 6BS8, 6BZ7, 6HK8
6CB6	EF190, 6AG5, 6AK5, 6AW6, 5591, 5654, 6676, 7732
6CM8	6CR8,* 6CS8*
6CW4	6DS4, 7895
6DC6	6AW6, 6BH6, 6BZ6, 6CB6, 6CF6, 6DE6, 6DK6
6DS4	6CW4, 7895
6EA8	6GH6, 6GJ8, 6U8A
6ES8	ECC189, 6DJ8, 6FW8, 6KN8
6GH8	6AX8, 6EA8, 6GJ8, 6U8A
6T8	6AK8, 6R8
6U8A	ECF82, 6AX8, 6BL8, 6EA8, 6GH8, 6GJ8, 1252, 6678, 7731
6X4	EZ90, 6AV4, 6BX4, 6063, 6202
12AL5	HAA91
12AQ5	12BM5
12AT7	ECC81, 12AU7, 12AV7, 12AX7, 12AY7, 12AZ7, 12DF7, 6060, 6201
12AU7	ECC82, ECC186, ECC802, 12AT7, 12AV7, 12AY7, 5814, 5963, 6067
12AX7	ECC83, 12AT7, 12AV7, 12AY7, 12BH7, 12DF7, 5721, 6057
12AZ7	12AT7, 12AV7, 12BH7, 12DT8
12BA6	12AU6, 12BD6
12BE6	HK90, 12CS6

*These tubes should be used only as a last resort as they will not perform nearly as well as the original. Other substitutions should give approximately the same results as the original, in some cases an improvement may be noted.

Note: The Editor presumes that these substitutions should work as predicted, as the information was compiled from statistics supplied from tube manufacturers. We do not guarantee the degree of results to be obtained. Remember, slight electrical and mechanical differences exist between the "original" tubes and their suggested substitutes. ■

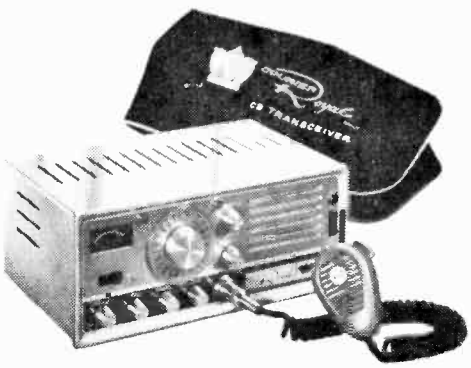
CB RIGS & RIGMAROLE



☐☐ **Speakin' Beacon.** Ever wished you lived in a lighthouse? Well you can with a Speakin' Beacon extending upwards from your roof. Just the thing for warning off low flying aircraft or high flying butterflies, the Speakin' Beacon antenna actually lights up whenever you press your mike button! Basically, it's a coaxial-type high performance antenna made from heavy-gauge polished aluminum which will ignore winds up to 80 mph—the lighthouse feature is sort of a bonus.

The light is produced from a neon tube which is located at the tippy top, enclosed in something called a "Stati-Light" ball which dissipates static electricity and helps eliminate noise. When the light glows it's a sure fire way to check on the output of your CB rig—if the light doesn't go on when you flip on the rig (or if it flashes or is dim) then it's time to have your rig checked over by the local CB mechanic. Also, the light is handy when directing mobile stations to your base at night. For more details on the Speakin' Beacon send a card or letter to *The Antenna Specialists Company*, 12435 Euclid Ave., Cleveland, Ohio.

☐☐ **Diplomatic Courier.** In a fancy press release which looks as if it came from an embassy, we learn about the new "Courier



e.c.i. Diplomatic Courier

CB Rigs & Rigmarole

Royale" CB rig from *e.c.i. electronics communications, inc.*, 56 Hamilton Avenue, White Plains, N. Y.

No kidding, the rig has everything except a four-speed gearbox, and each component used in the construction has been carefully hand picked for the ultimate in quality and hand-wired into the circuit. It's made on a big, roomy chassis for maximum ventilation of the tubes and oversized transformer. A Nuvistor "front end" was included for top receiver performance; and to sharpen the selectivity they designed a Collins mechanical filter into the rig. As for channels available, the Courier Royale has crystals for all 23 of them. The *spec sheets* says that it puts out 3.5 watts of healthily modulated (100%) signal—and who could ask for anything more this side of the FCC's rules?

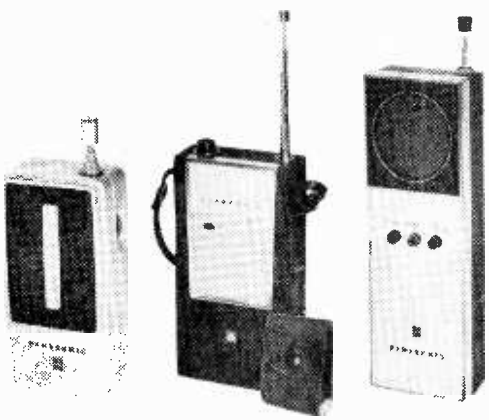
To top it all off, the rig comes delivered enclosed in a velvet gold and purple pouch. If your dealer has one in stock (they're scarce), go over and oogle it (two o's in oogle—one for each eye). Price is $249, complete with all crystals for 23 channel operation.

☐☐ **Triple Threat.** Three new spiffy looking walkie talkies are headed your way from *Panasonic*, each offering something special.

For instance, the RJ-4 is a miniaturized unit weighing only 9 oz. including the battery. The set is a miniscule 2¼" by 4¾" by 1⅝", but still packs a 100 mw wallop on Channel 11. Done up real handsome in silver with black trim, it drops easily into your shirt pocket when not in use.

Next in store for you from *Panasonic* is the T-1 9-transistor walkie talkie—a sassy job in a genuine leather carrying case. Offering sharp and undistorted sound not generally available in walkie talkies, the T-1 operates from 8 "AA" penlight cells and has a range of about 2 miles over land and 6 miles over water.

But the top cat in the trio is most definitely

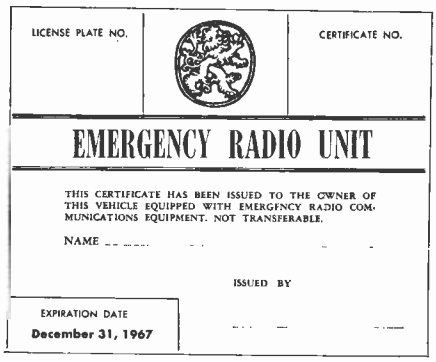


Panasonic RJ-4, T-1 and RJ-6 Walkie Talkies

the *Panasonic* RJ-6, a slim and jazzy set which, when not in use, may be kept on "standy-by" with very little battery drain. When a button on the set labeled "signal" is pressed, the other set in the pair suddenly comes to life. This gives what might be termed "continuous communications". The RJ-6 is ruggedly built with 15 solid state devices, powered by 6 penlite batteries, and comes ready to talk on Channel 11.

More information on these *Panasonic* products may be obtained from Matsushita Electric Corporation of America, Pan Am Building, 200 Park Avenue, New York, N. Y. 10017.

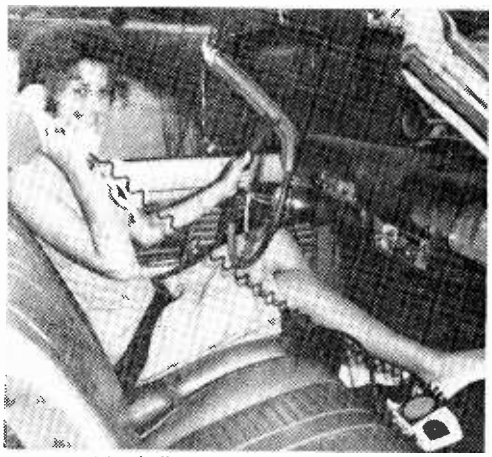
☐☐ **Hot Shot.** Here's just the item for CB clubs and individual operators who perform emergency road assistance and participate in other Johnny-on-the-spot type work—it's an ID card for your mobile unit's windshield which is almost identical to those cards issued to emergency vehicles by professional agencies. The bright red card, printed on heavy Bristol Board stock immediately identifies your car as an "Emergency Radio Unit" for rapid identification by law enforcement and emergency authorities. Very impressive to say the least! Cards are 50¢ each, or may be ordered in bulk by clubs or CB shops at 25 cards for $6.25, ppd. Order from: Hot Shot Card, % Cowan, 14 Vanderventer Avenue, Port Washington, N. Y. 11050.



Hot Shot "Emergency Radio Unit" Card

☐☐ **Handy Handset.** If you want to achieve the ultimate in suave with your mobile CB rig, make it look like a mobile telephone. This is easily accomplished with a new gadget from *Marshall Engineering Corp.*, 410 Longfellow Drive, Lakeland, Fla. 33801.

The unit isn't just a handset, but an entire remote-control head for the rig, complete with



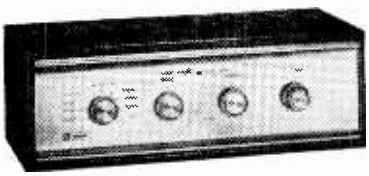
Marshall Remote Control Head

red and green pilot lights, a speaker (with the handset "hung up" you hear the rig through the speaker, when you pick up the handset, the speaker cuts off and the sound comes out of the earpiece), an on/off switch and volume control, a squelch, and a channel selector.

The unit is mounted on the transmission hump with metal screws, and may be used with most CB or Ham rigs (the rig may be mounted in the trunk). ■

24-Watt Stereo Amplifier Kit

At a nice price, the KG-250 stereo amplifier kit gives you Knight-Kit styling; 12 clean watts (24 watts peak) of IHF output power on each channel from a powerful push-pull output stage with top-quality transformers; and simplified point-to-point wiring for fast and easy assembly. The KG-250 has built-in RIAA equalized preamplifiers for magnetic cartridges, with DC-

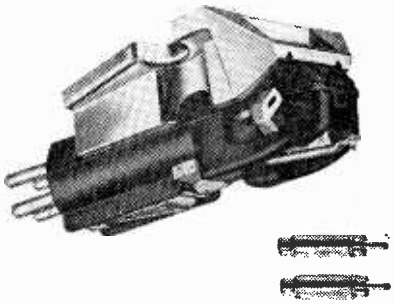


Knight-kit 24-Watt Stereo Amplifier

operated tube filaments for minimum hum; separate boost and cut-type bass and treble controls for both channels; and a selector switch that instantly chooses stereo, stereo reverse, or monophonic modes, as well as phono, tuner, or auxiliary inputs. Concentric, clutch-type volume control varies both channels separately or simultaneously—compensates for differences in inputs or speakers. Frequency response is ±1 db, 30-15,000 Hz at rated power; output impedances 4, 8, and 16 ohms per channel; channel separation is better than 45 db. Size is 4⅛ x 13⅞ x 8½ inches, price without case is $39.95, $9.95 for the oiled walnut wood case, $4.95 for a metal case. For full specifications write to Allied Radio Co., Dept. 20, 100 N. Western Ave., Chicago, Ill. 60680.

Solid-State Stereo Cartridge

The Sonotone *Velocitone* Mark V solid-state stereo phono cartridge is piezoelectric and has no coils, rendering it happily free from magnetically induced hum. Wearing a slim miniature housing, it weighs only 1.5 grams and has an integrated mounting bracket which fits all standard changers and professional tone arms. Response is from 20 to 20,000 Hz. It tracks at less than 2 grams and its vertical stylus force ranges from 1.5 to 2.5 grams. Effective dynamic mass at the stylus is 1.8



Sonotone Velocitone Mark V Stereo Cartridge

milligrams, for improved tracking ability. Cartridge sensitivity at the 1 kHz output (with matched networks) for either channel, as measured on the CBS-STR-100 test record, is 6 millivolts—that's good!

The Mark V's tough *Sono-Flex* needle assembly comes in a choice of three single-tip, highly polished diamond needles: Model 100T-D7V with 0.7-mil diamond sells for $32.50; the 100T-D5V, 0.5-mil diamond is also $32.50; Model 100T-ED has an elliptical diamond with an 0.8-mil major and 0.3-mil minor radii and goes for $39.50. Separation figures for all needle combinations are: 27 db at 1,000 Hz; average separation exceeds 20 db from 60 to 4000 Hz; at 10,000 Hz separation still averages 15 db. The Velocitone Mark V is packaged in a leather jewel box with gold-plated matching networks for magnetic input equalization, a camel's hair record and stylus brush, plus installation hardware and installation instructions. Write for additional info to Electronic Applications Division, Sonotone Corporation, Dept. RG, Elmsford, New York 10523.

Three-Motor Tape Recorder

Viking of Minneapolis has come out with a three-motor, three-speed, solid-state stereo tape recorder at $249 list price—three motor machines having been in the $500 and up class before. The advantages of a three-motor unit are in the dynamic braking system and in the elimination of all the complicated mechanical linkages which cause frequent service problems with single-motor "toy" recorders. The model number 423 translates out as 4-track, 2 heads

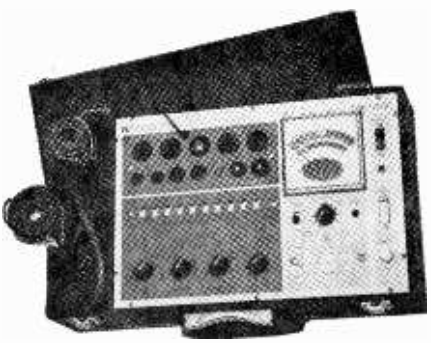
Viking Solid-State Tape Recorder

and 3 speeds and is so graphically identified on the front panel. Directional control levers, pause, record-interlock, push-button counter and illuminated recording meters add to operating convenience.

The Viking 423 comes equipped with hyperbolic heads which do not require pressure pads. Easy straight-line tape loading is accomplished by means of a swing-away pinch roller. The solid-state record/playback amplifier consists of all-silicon transistors on plug-in boards. Frequency response is 50-15,000 at 7½ ips, 50-10,000 at 3¾ ips and 60-5,000 at 1⅞ ips tape speeds. The 423 accepts 7-inch reels and is available with a walnut enclosure and optional remote control accessory. If you want to know more about this "price breakthrough" write to Viking of Minneapolis, Dept. 14, 9600 Aldrich Ave. South. Minneapolis, Minn. 55420.

Tube and CRT Tester

The latest addition to the Precise Electronics Green Line is the Model 115 tube tester designed to perform professional-quality tests on receiving tubes (including industrial types) and the latest type color and B&W television picture tubes. Priced at $92.95 net, the Model 115 offers many features previously found only in



Precise Electronics Model 115 Tube Tester

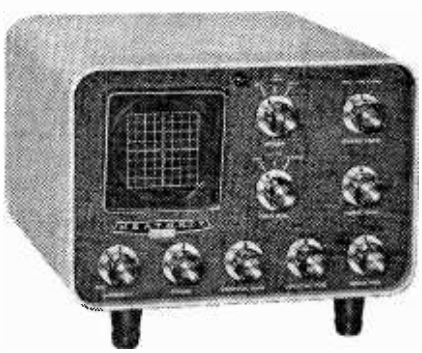
much higher priced instruments, including VTVM circuitry for the important grid circuit emission and gas tests on receiving tubes. A unique 10-circuit switching design allows testing of all the new type tubes that have elements with multiple pin connections. Latest panel-mounted sockets include the Decal, Magnoval, Novar, Compactron, Nuvistor, 9/10 pin, as well as Octals and 7-pin. Pin straighteners are also included on the panel.

For TV pictures, the Model 115 includes complete facilities for *beam current* tests (rather than total cathode emission) and rejuvenation without danger of burnout. The beam current test is the only field performance test universally accepted by picture tube engineers and manufacturers. It checks all picture tubes for proportionate screen brightness by qualitative measurement of the electron beam. The critical central areas of the picture tube cathode is checked in addition to the controlling action of the first grid. Rejuvenation of low-brightness picture tubes or intermittent-element tubes is accomplished by a unique capacitor discharge circuit which welds most intermittent elements, and redistributes cathode oxide over the beam-producing central cathode area. Meter directly indicates increase in brightness after each rejuvenation "shot."

The Model 115 is packaged in a rugged, portable carrying case. It weighs only 8 pounds and measures 16" x 9" x 4¾". Want more information? Write to Precise Electronics, 76 E. Second Street, Mineola, L. I., New York.

Ham & CB Monitorscope

The Heath Company has added another piece of ham gear to their growing line of SB-Series equipment . . . the smartly-styled Heathkit SB-610 Signal Monitor. This little scope visually displays both transmitted and received signal waveforms. It shows over-modulation or other forms of distortion by displaying the actual signal envelopes or trapezoid patterns from ham radio transmitters, and it will give an equally complete picture of signals being received. The featured advantage of this new SB-Series scope is that it will perform with *virtually any* Communications receiver on the market today.

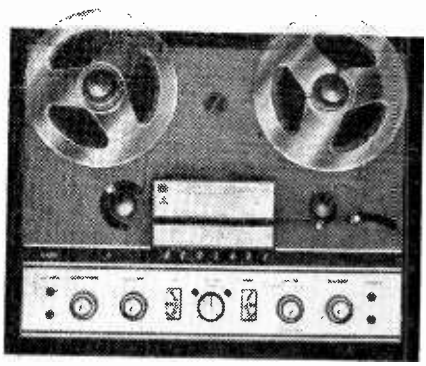


Heath SB-610 Signal Monitor

The new Heathkit SB-610 Signal Monitor can be used with transmitters from 160 to 6 meters, and with receiver IF's as high as 6 MHz (6 Mc.) —which gives it practically unlimited receiver capabilities. The transmitter power levels can be as high as 1 kilowatt or as low as 5 watts for CB applications. Price: $69.95. Complete specifications and details on this valuable ham radio accessory may be obtained by writing Heath Company, Benton Harbor, Michigan, 49022.

Tape Deck Goes Kit

A new do-it-yourself kit version of the professional Magnecord 1020 4-track transistor stereo tape recorder is now available from the Heath Company. For his efforts the kit-builder will reap savings of $170. The new Heathkit is priced at $399.50 versus the assembled Magnecord at $570. Total assembly time takes around 25 hours, and involves wiring just two circuit boards and the mechanical mounting of the transport components. To make construction even easier, the kit has precut, pre-stripped and marked the connecting wires and shielded cables. Even the connectors are installed where necessary for simple plug-in-assembly.



Heath AD-16 4-Track Stereo Tape Recorder

As for performance, you can playback and record "live" from microphones, or from auxiliary sources like tuners, phonographs, TV's, etc. in 4-track stereo or mono at either 7½ or 3¾ ips. The unit also has sound-on-sound, sound-with-sound (mixing) and echo capabilities. The heavy, die-cast mainplate features 3 separate motors . . . a hysteresis synchronous capstan motor for constant speed, and two permanent split-capacitor types to drive the supply and take-up reels. Brakes, tape gate and pinch roller are solenoid-operated for positive action. There are 3 tape heads, erase, record, and playback.

You can mount the Heathkit Magnecord tape

deck in a wall, tape drawer or *optional* walnut cabinet ($19.95). Full information on this new Heath model AD-16 is available from the Heath Company, Dept. EB. Benton Harbor, Michigan 49022.

Selmer Varitone Electronic Sax

Electronic Sax

Rock-n-roll groups in search of new, unusual and exciting sounds are in for a real treat! H. & A. Selmer, Inc., has revealed a completely new concept in saxophone sound with the introduction of its newly developed Varitone electronic saxophone. The result is an instrument which permits the player to produce a wide variety of effects heretofore not possible. Up to 60 tonal effects can be achieved. In addition, the resulting power projects the player into the limelight despite competition from other instruments. With the advent of the Elvis Presley era the guitar became the big sound with "rock" groups and the saxophone was drowned in a deluge of electronic waves. Now, the Varitone enables the saxophone player to forge ahead. The *In Crowd* will soon be rocking to this new dimension in saxophone sound.

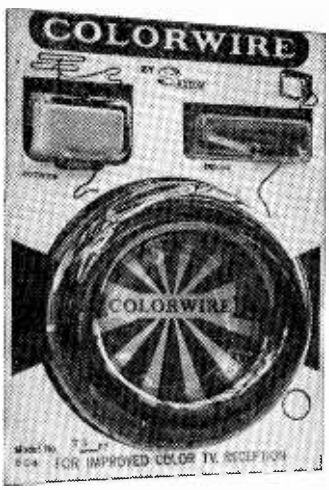
The Varitone saxophone utilizes a unique electronic "tone prism" that enables the player to enhance his artistry. The electronic "tone prism" breaks a single tone into its multi-tonal colorings. The Varitone places at the player's fingertips a wide variety of completely different instrumental effects. Each of these effects—bright, dark, tremolo, echo, normal, Octamatic, and varying combinations—are projected by the Varitone's powerful amplification system. Many of these effects have never before been produced even in the most up-to-date recording

studio. With a mere flick of his finger, the Selmer Varitone saxophone player can amplify his instrument with its normal tone quality; add extreme edge to his tone giving it added *cut;* reduce high partials, emphasizing fundamental tones—for the *cool* effect; add an electronically regulated tremolo effect; utilize the built-in echo to any degree he desires. Most startling of all is Octamatic, a sub-octave coupler that adds the accompaniment of a "phantom" player as either the principal or a subdued second voice. Of course the instrument can still be played as a conventional saxophone.

The Selmer Varitone saxophone is available in alto and tenor models. Prices for the new instruments range from $1020 to $1295; for more information write to H. & A. Selmer, Inc., Box 310, Elkhart, Indiana 46514. It will be some time before Selmer comes up with an electronic Tex Beneke.

Color TV Cable Systems

A new series of coaxial cable hook-up packages especially designed to solve color television reception problems has been marketed by Saxton Products, Inc. The Colorwire series, attractively packaged, utilizes low-loss dielectric construction to cut down attenuation and signal



Saxton Colorwire Coaxial Cable System

leakage normally lost by 300-ohm lead-ins. The hook-up systems are unaffected by stray fields or proximity to metals. Each package in the series comes complete with factory-installed terminations and cable weather boots, and the systems are available with or without matching transformers. All cable coils are frequency sweep-tested to eliminate cable defects from being passed on to the consumer.

The series 900 Colorwire coaxial cable systems are designed for VHF and color as well as UHF TV. Saxton types S-900, S-901, and S-902 include 100, 75 and 50 feet of RG-59/U cable, respectively, and each package contains pre-attached F-59 fittings for each end, weather boots and complete instructions. Types S-903, S-904 and S-905 contain 75-foot lengths of RG-59/U plus accessories and also include two transformers for matching 72-ohms to 300-ohms impedance—one each for outdoors and indoors. Mounting hardware is included. Anyone clever enough to install a TV antenna can follow the simple instructions for connecting the Colorwire cable system. Price starts at $59.50. More information is available for the asking. Write to Saxton Products, Inc., 215 N. Route 303, Congers, N. Y.

Outdoor Outlet

The uses of a power tool have been pretty much limited to the length of power cord a homeowner could run from his house electric line. The restrictions imposed by the cords have been cut by a device called the "Power Tool Converter." What the lightweight, transistorized converter does is step up the power from a common 12-volt car or tractor battery to the 120 volts needed to run a power tool. This means that the home handyman can do away with extension cords and their inherent problems while working around the house and yard.

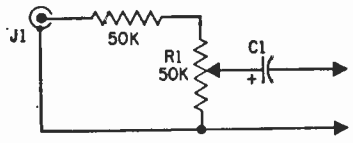
The "Tool Converter" provides a full thrust of power, avoiding the drawback of the standard battery-operated tool—an inability to provide the starting surge necessary to get the tool spinning. It will power any *universal* or *DC motor*, and comes in standard and heavy duty models, the standard model running any tool rated up to 4.5 amperes and the heavy duty converter handling up to 12 amperes. In practice, the standard model will power drills, shears, hedge clippers and the other common tools, while the heavy duty version will run saws and other large tools.

Even if the capacity of the unit is exceeded, or the tool stalls, a specially designed automatic circuit breaker trips and shuts off the power, it can be reset simply by flipping the reset toggle. Giving the user peak power at all times, the Tool Converter does not draw current unless the tool is in operation. When the tool is stopped, the current is halted, permitting the tool and Tool Converter to remain plugged in for unlimited periods without draining the battery. The Tool Converter needs no installation and attaches to the battery by means of two cables with spring clips. The tool itself plugs into a socket provided in the unit. For more information on the Standard ($79.95) and Heavy Duty ($109.95) models are available to those who write to Dynamic Instrument Corp., 115 East Bethpage Road, Plainview, N. Y. 11803. ■

Don't Overload It

The Solid-State Audio Amplifier described by Art Trauffer in the Feb.-Mar. issue of RTVE has great tone and clarity. I made an improvement on the volume control. Over the first 90° of the volume control, the volume comes up with a bang and distortion occurs when turned up more. I remedied it by using a 50,000-ohm pot and a 50,000-ohm series resistor as shown in the diagram.

—B. H., Seneca, S. C.



Thanks for your tip. Your original volume control may not have had the same taper as the one used by the author of the article. And the gain of transistors often vary widely—you may have all "hot" ones.

Spring Cleaning

How often should a CB set be checked out?

—D. E. R., Los Angeles, Calif.

At least once every six moths. A mobile unit is subject to a shock and vibration and can accumulate a lot of dirt. Parts might be shaken loose and trimmers can get out of alignment. Clean the chassis with a gentle blast of air (fireplace bellows work fine) or a dry paint brush. Have the tubes checked and replace weak ones. Replace the vibrator, if one is used. Inspect all parts and connections. If performance is not like new, take the set to a CB or commercial

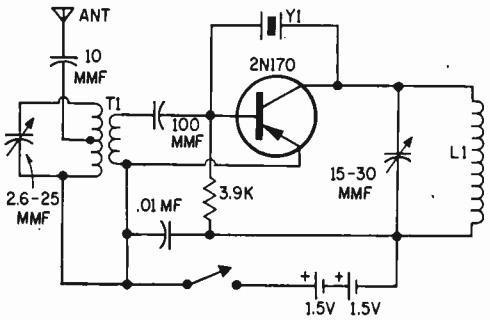
mobile radio shop to have it realigned and the frequencies checked. If you replace any crystals or parts in the transmitter circuits, have the set checked by a licensed pro before you put it on the air again.

CB Converter

Can you give me a circuit for a CB converter for use with a pocket transistor BCB radio?

—G. H., Omak, Wash.

Here's a circuit you can try. It uses one transistor and operates from two 1.5-volt penlite cells. The input circuit (T1) is a CB interstage RF transformer (Lafayette, etc.), and the output circuit (L1) is a BCB loop antenna or loopstick. The crystal (Y1) can be a 25.96 MHz (mc) rock. By tuning the transistor receiver and leaving the converter alone, you can cover from 26.51 to 27.56 MHz—all 23 CB channels. Quality of performance depends on how close L is to the loopstick inside the transistor radio. Strong broadcast stations will still be heard on the pocket BCB radio.

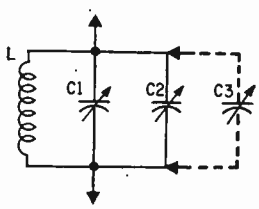


Adding Bandspread

Would you please give me a circuit and a pictorial diagram for installing a bandspread on an AM-FM receiver?

—D. A., Mill Valley, Cal.

Simply connect a low-value variable capacitor across the AM-band oscillator section of the receiver's tuning capacitor as shown in the diagram. You can use a Johnson 160-130, Hammarlund MAPC-35 or similar capacitor with about 35 mmf maximum capacity. In the diagram L represents the oscillator coil, C1 the tuning capacitor, C2 the existing trimmer and C3 the added capacitor. Don't bother with bandspread for the FM band where the stations take up 150 kc and are spaced far apart. You don't need it. A pictorial diagram can't be given since receivers vary considerably.



CB Abuser

There is an idiot who monopolizes Channel 9 and uses foul language. He never announces his CB call sign. What can be done about it?

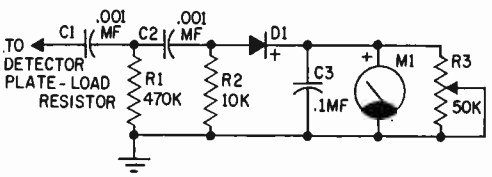
—T. G., New York, N. Y.

Call the local FCC office, listed in the telephone directory under "United States Government," and give the details. Your tip will be appreciated. This same type of rule violator was recently arrested and probably will go to jail. He turned out to be a 50-year old TV repairman who should know better.

Superregen S-Meter

Will you please tell me how I can connect an "S" meter to a superregenerative receiver? Without the usual AVC circuit I am at a loss to know how to go about this project. I am so accustomed to this feature on my SW and CB sets that I am lost without it on my homebrew VHF set.

—M. T., Birmingham, Ala.



You might try the circuit shown in the diagram. The diode (D1) can be any general purpose type (1N34, etc.) The meter is a 0-50 microammeter. The high-pass filter formed by C1, C2, R1 and R2 passes the hash that is heard when no signal is being received. Adjust R3 for full scale meter deflection when no signal is being received. The meter reading should drop when a signal is being received, dropping less on weak signals. If you can't get full-scale meter deflection, connect C1 to the output of the first audio stage.

Keep Mum

I am interested in BCB and shortwave DX but I don't know how to go about getting QSL cards from broadcast, shortwave and ham stations. Can you tell me?

—R. D., Cedaredge, Colo.

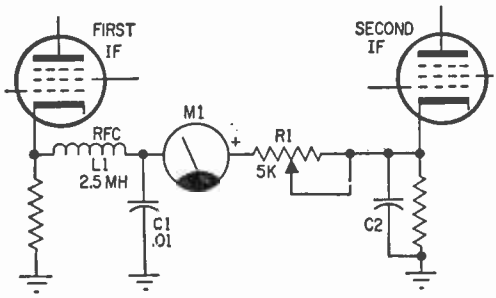
Write a letter to stations you hear and request a confirmation. Or, get some SWL cards

printed. On the card or in the letter, give the following information: (1) your name and address, (2) date and time of reception, (3) briefly, what you heard, and (4) kind of receiver and antenna used. Don't send cards or letters reporting reception of CB and commercial communications stations (ships, planes, etc.) since it is a violation of an international agreement to tell anyone what you heard transmitted by such a station or to even tell anyone that such a transmission existed. All stations except broadcast and amateur are protected by the secrecy provisions of the agreement.

FM-Tuner S-Meter

How can I add an "S" meter to my FM stereo tuner (schematic enclosed)?

—R. G., Oxford, Pa.



Try connecting a 0-1 DC milliammeter (M1) through an RF choke (L1) and a potentiometer (R1) between the cathodes of the first and second IF amplifier tubes. The first IF amplifier has AGC and the voltage across its cathode resistor varies with the strength of the incoming signal. The voltage across the cathode resistor of the second IF amplifier remains relatively constant. Adjust R1 for full-scale deflection when no signal is being received. The meter reading will drop when a signal is received in proportion to its strength.

Can't Get 'Em All

I do an extensive amount of TV DXing and presently have an all-channel fringe antenna with a rotor. What I would like to know is how I can receive weak translator stations operating in two cities about 60 miles from my location. Even with the aid of a temperature inversion, which has brought in stations from Los Angeles to Rimouski, Quebec, I cannot seem to reach any of these translators at any time. What can I do?

—A. M., East Rockaway, N. Y.

Translators employ very-low-power transmitters (a few watts) whereas TV broadcast stations radiate many kilowatts. Translators may also employ directional antennas which could be squirting their signals in directions away from you. It would be quite surprising if you could pick up a translator 60-miles away except via an earth satellite repeater.

Ask Me Another

Was Ist Los?

I use a German receiver for DX'ing on the BCB and SW bands. On the low channels of AM (below 800 kc), I get very poor reception, comparable to that of a small transistor set. I noted that if I hold this portable near objects such as an electric meter, water pipe, etc., the signals of those channels increase greatly. I tried to connect my long wire antenna to this pipe, but no improvement resulted. How can I improve the sensitivity of this German set? As soon as I tune off our local on 560, it's "dead" until I get to 650 or 670. My antenna is an indoor long wire. This large set does not work much better than a small 10-transistor set. This receiver is 3½ years old, and I recall getting better reception long ago on it. How much do you think it may cost to "peak it up"?

—R. P., Chicago, Ill.

A radio service shop would probably realign the receiver for you for less than $10. Try a long-wire *outdoor* antenna if you are in an apartment building or close to steel frame structures.

Cats and Dogs

Please give me a plan for converting my TV into a videotape recorder.

—E. C., El Paso, Texas

They're two very different animals. You'll need the TV set for playing back from a VTR unless you get a Sony which has its own monitor.

It'll Cost Money

I have assembled two walkie-talkies described in one of your old issues but they don't work. Where can I get help?

—K. W., Kearney, N. J.

Have them looked at by a "pro." Right near you at 316 Broad Street in Newark is Mobile Communications with a crew of experts and lots of test equipment.

Nice Piece of Property!

What kind of coax should I use for feeding an antenna 1000 feet away on a hill top?

—J. B. L., Butte, Montana

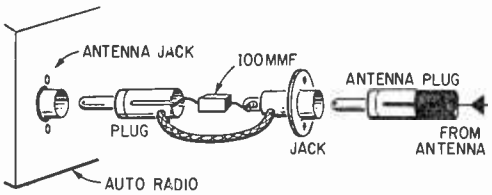
You could use a G-line, a single-wire transmission line which has very low losses. It is suspended on poles and uses scoops, known as launchers, at each end. For details, write to Surface Communications, Paramount Theatre Building, New York, N. Y. 10036.

Signal Loss

I have twin antennas on my car. One is a "dummy" and not connected. The antennas are small and at the rear of the car. For some reason the signal weakens quite a bit at a distance from the transmitter. Is there any way I can

connect the two antennas together to increase the signal?

—L. B. K., Knoxville, Tenn.



Don't use either. Instead, add a 57-inch side-mount auto radio antenna near the radio so the shielded lead-in will be as short as possible. The long lead-in loses signal strength and the high-capacitance between the inner conductor and the shield often "loads" the RF stage tuned circuit. Check the adjustment of the peaking trimmer on the radio—usually near the antenna input jack. Tune in a station near the high end of the dial—around 1300 kHz (kc) and adjust this knob for maximum volume. If there is no definite increase and decrease as you turn that little knob there is probably too much lead-in capacitance. Reception can be improved by connecting a capacitor in series with the lead-in—try about 100 mmF, but not larger. Special connectors were manufactured (some 10 years ago) to couple dual rear antennas to the radio—they are not listed in recent catalogs.

Bring Money!

Can you tell me if and where transistorized general coverage communications receivers (540 kc (kHz) to 30 mc (MHz) are available? I am not referring to 3-way portables, either domestic or foreign.

—J. R. C., Thousand Oaks, Calif.

National Radio Company, Melrose, Mass., makes such a receiver, but it is expensive. You should be able to see and hear one at a Los Angeles Ham equipment store.

A Short Lesson in Economics

Why doesn't your magazine ask a Japanese manufacturer to offer a high performance, 20-transistor AM-FM receiver with at least three SW bands and priced at $1 per transistor? A set like this is very much needed.

—L. R., Leavenworth, Kansas

There are American and German sets, and there may be Japanese sets that meet your specifications—but not the price. Our suggestions would undoubtedly fall on deaf ears. Intelligent manufacturers conduct a market survey before producing a product. Some aren't smart enough to do so, acting on whim, and sometimes lose their shirts. If there are only 5,000 prospective customers for a product, why produce it if you can turn out one which has a market potential of 5,000,000 units. Sales of 5000 units at $20 list (manufacturer's net price would be much lower) would not interest many (if any) manufacturers. The design costs alone might exceed the total

Ask Me Another

revenue. And why 20 transistors? The number of transistors is not necessarily the performance index.

Know Where to Look

I have a BC-605D Signal Corps interphone amplifier made by Western Electric. Where can I get its schematic diagram?

—H. E., Denver, Colo.

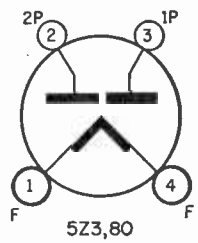
Write to Editors and Engineers division of Howard W. Sams & Co., Inc., 4300 West 62nd Street, Indianapolis 6, Indiana and ask if your amplifier is covered in any volume of their "Surplus Conversion Manual." These books cost $3 per volume. If no luck, you might try writing Western Electric Company, 195 Broadway, New York City. They just might have the schematic in their archives.

Does it Pay?

I have an old radio but don't have its schematic. One of the tubes was broken so I don't know the type number. The other tubes are: 6A8G, 78, 6J5G, and 41A. The missing tube has four prongs. The local radio-TV shops don't know. Do you?

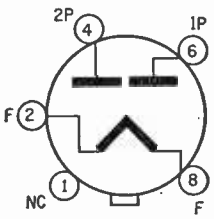
—R. P., Great Falls, Mont.

Undoubtedly it's a rectifier tube. A quick check would be to trace the wires that go to the tube socket—you should find that at least three of the four leads go right back to the power transformer. While either a 5Z3 or a type 80 tube should work they may be hard to come



5Z3,80

by—if you can't get one locally try a mail order house. Or you could change the socket (or make an adapter) to convert to a 5Y3 octal base tube. The filament connections on the 4-prong tube are the two large-diameter pins. The key on the octal socket is between pins 1 and 8.



5Y3

R/C for RR

I would like to build a radio controller for my model railroad. Where can I obtain plans for a radio control system for a model railroad? Are there any kits available? Is it practical to convert model aircraft radio controls for use with model railroads?

—M. L. MacD., APO New York

You can use model aircraft controls. Use the relay contacts to start, stop and reverse your locomotives. If you keep power applied continuously to the tracks, you won't need batteries on the locomotives. An entire article would be required to explain what can be done.

Decal Info

Where can I obtain a mobile warning decal similar to the one shown on page 86 of the 1966 CB BUYERS' GUIDE?

—R. C. W., Hillsdale, N. J.

Try Rambling Redskin, 514-62 62nd Street, West New York, New Jersey.

It's About Time

I have an early vintage General Electric AM (Circa 1932) radio. Whenever I turn it on, I get a motorboating sound. What can be the trouble?

—R. A., Waterbury, Conn.

The electrolytic capacitors are probably dried out. Replace them with new ones.

Tuning is Critical

The performance of my six-transistor walkie-talkie isn't quite what it should be. Can you tell me how to improve it in order to transmit and receive as far as possible without requiring a license? Schematic is enclosed

—D. T., Mayo, Fla.

Make sure the receiver is precisely tuned to the other transmitter. Perhaps you're expecting too much of a Part 15 (unlicensed 100-mw) walkie-talkie which is intended to be a short-range device. Make sure you hold the units so the antennas are vertical. The full benefit of the allowed 100-mw input power is not obtained because the rules limit antenna length to five feet (55% of quarter-wave) and because the antenna has no ground plane. Your schematic reveals that the receiver employs only one IF stage. Modifying the set is not practical because of space limitations. Why not buy a better one with a more sensitive receiver?

Way Back When . . . !

Could you give me the date of manufacture of a Model 33 Atwater Kent radio?

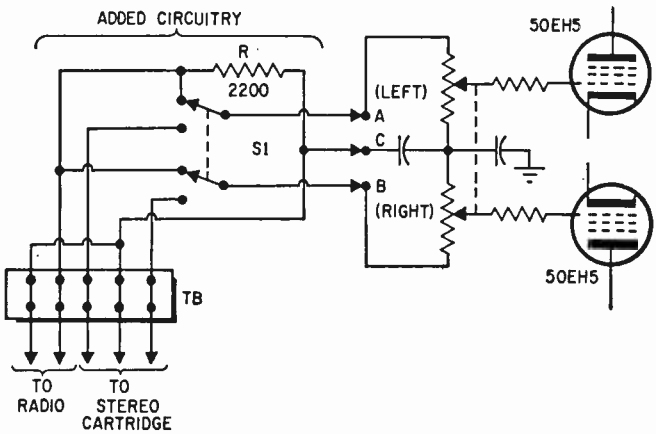
—A. R., Birch Tree, Mo.

It must have been made before 1928 since the Model 37 was made that year. Perhaps some reader will remember and let us know.

Add AM Radio to Stereo Phono

How can I connect the 2000-ohm earphone output of a radio to my stereo phonograph amplifier? Schematic enclosed.

—M. B., Sun Prairie, Wis.



Add a d.p.d.t. toggle switch (S1), a 2200-ohm resistor (R), and a 5-terminal barrier terminal strip (TB), such as a Cinch-Jones 4-140, and connect them to your present cartridge input terminals (A, B, C) as shown in heavy lines in the diagram at right. Flip the switch one way for phono (mono or stereo) and the other way for mono radio.

Got A Friend?

I am a beginner in electronics. My major problem is reading schematic diagrams. Can you tell me where I can get information on schematic symbols? I am in the hospital and can't get to a library.

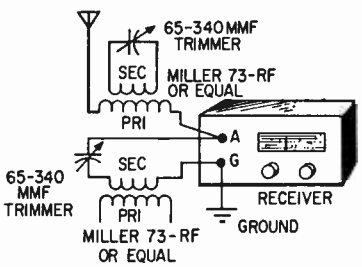
—No Name, No Postmark

Get a copy of "How to Read Schematic Diagrams" by Don Herrington, published by Sams. The 128-page book is sold by radio parts distributors and mail-order houses and can be ordered through local book stores. Or, you can get one by mail by sending $1.50 to Howard W. Sams & Co., Inc., Indianapolis 6, Indiana.

Needs Realignment?

Two nearby, powerful stations, one on 850 kc, the other on 900 kc, overlap and block out a distant station on 840 kc. I use a good radio with an outside antenna. What can I do to receive the station on 840 kc?

—D. W., White Rock, British Columbia



First try realignment. With many home radios, it is almost impossible to separate stations only 10 kc (kHz) apart when one is nearby and powerful. Try using a shorter antenna. Add a parallel-resonant wavetrap in series with the antenna and a series-resonant wavetrap across the antenna and ground terminal as shown in the diagram. Tune one trap to attenuate the 850-kc signal and the other to 900 kc, or both to 850 kc. However, the traps might not be selective enough and may also attenuate the desired 840-kc signal.

More Shortwave Space

Why aren't the shortwave BC bands expanded by at least three times so they won't be on top of each other?

L. R., Leavenworth, Kansas

The allocation of the use of the radio spectrum is decided upon through international treaties. In the United States, frequency allocation is under the jurisdiction of the FCC but within the framework of international treaties. Actually the bandspread dial on true shortwave receivers spread out the stations considerably and a good directional antenna will usually help reduce the interference from adjacent-frequency stations.

Do-It-Yourself QRM

From listening to my own tapping on a CPO (code practice oscillator) to try to decipher some ham's hammering across the continent is a tremendous jump, especially if you have hi-fi ears as I do. Listening to SW brings tears to my eyes every time, while my subconscious screams "FIRE!". I have been informed that this transition can be softened if one simulates the actual sound heard on a SW-receiver on one's CPO. However, the informer neglected to mention how to do this. How can I simulate SW on my CPO?

—I. E. A., North Vancouver, British Columbia

Turn down the volume and change the pitch of the CPO (different size capacitors in the frequency determining circuit.) Turn on a BCB radio and set it between stations to pick up noise. Then try to hear the code through the noise—just like a true-to-life QRM.

Watts a Guitar!

I plan to get a guitar and don't feel like paying a fortune for a powerful amplifier. I would like to know if I could hook up the electric guitar to a 120-watt stereo amplifier. If

so, what set of terminals would I use and also I would like to know where I could get a speaker that could handle 120 watts.

—M. S., Cherry Hill, N. J.

Connect the output of the guitar into one of the auxiliary input jacks and set the controls to mono. Speakers that will handle 60 watts each (the full 120 watts put out by the stereo amplifier) would cost you the fortune you referred to. Use much-lower-cost 30-watt speakers and keep the amplifier gain down. Why do you need 120 watts? It takes only 85 watts to fill the cavernous Radio City Music Hall which is as big as 1800 living rooms.

Forget It!

I am planning to get a VHF-FM monitor receiver kit which uses tubes. How can I convert it to use transistors instead?

—B. F. M., Atlanta, Georgia

Don't try it. The components are not designed to work with transistors. Thousands of dollars and hours were spent designing the kit so it will give high performance. Transistors won't improve the performance. The basic reasons for using transistors are to reduce size and power consumption. Your kit consumes very little power and transistors won't make your receiver smaller if you use the same chassis.

Use Patience

How can I modify my 100-mw walkie-talkie to receive 39-mc FM stations? It has a superregenerative receiver.

—D. S., Sharon, Pa.

Take a turn or two off the detector coil and adjust its trimmer capacitor until you hear signals on the desired channel. If you don't have an accurate signal generator better make friends with the operator of the 39-mc (MHz) FM station you want to receive—when he's broadcasting you can zero in on his signal.

Not Far

Can you tell me the approximate range of a 100-mw transmitter (that can reach out 5 miles on 11 meters) if it were on the standard broadcast band? I'm comparing band conditions.

—D. F., Detroit, Mich.

About 100–150 feet, sometimes a bit more.

2-Meter Fan

I recently bought a Hallicrafters shortwave set. Where can I get a 2-meter converter for it?

—R. H., St. Peter, Minn.

The Ameco CN-144W 2-meter converter is available at Allied Radio in Chicago and other parts stores. Your local stores probably carry Ameco and other makes as well.

Don't Invert—Convert

I am planning to convert a war surplus 'scope, the IN-169/APN-12, which runs on 110 volts 400 cycles, to work on 110 volts 60 cycles. How

could I build a stable and inexpensive inverter using, if possible, a 6-volt 400-cycle vibrator?

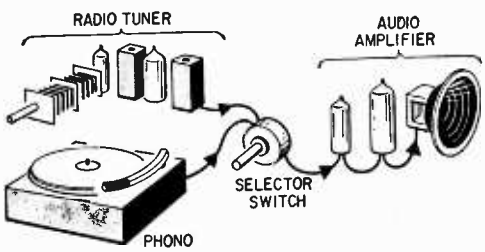
—K. B., Colorado Springs, Colo.

Forget vibrators. They have been obsoleted by switching transistors. Why don't you just replace the 400-cycle power transformer with a 60-cycle type and operate the 'scope from the power line? It's more practical even if you have to hang it on the outside of the cabinet. You can get a suitable transformer (ordered as a replacement part) from one of the oscilloscope kit manufacturers. Otherwise you'll have to use two transformers—a separate one for the CRT and a standard power-transformer for B-plus and tube filaments.

Sorry About That!

I have a radio-phonograph that has a switch with four functions: radio, record playing, record recording and one which is unmarked. Is there any way I can use it for AM radio and record playing and use the other two switch positions for other radio bands?

—D. D. M., Temple City, Cal.



The switch is in the audio circuit. To convert the receiver to multiband operation would be a big job. All you have going for you is a convenient switch which probably doesn't have enough contacts.

Asking For TVI

I plan to put up a Hy-Gain 50-foot antenna between two TV antennas 46 feet apart. Since the antenna is four feet longer than the available space, should I run two feet of the antenna vertically down the side of each mast? Would it interfere with TV reception?

W. M., Lancaster, Ohio

Don't put your antenna anywhere near a TV antenna if you're going to use it for transmitting. Since you didn't furnish the antenna type number or the frequencies you plan to use, we can only guess. Try writing to Hy-Gain since their engineers can give you a specific answer to your first question.

Pre-Novice

I am interested in becoming an international ham radio operator. I have had no previous radio experience and only a basic education in electronics. How do I get started? What equipment do I need? What books should I read?

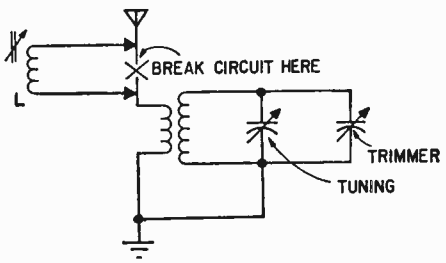
—E. H. R., New York City

Take a cab, bus or the subway to Grand Central Radio, Harrison Radio, Harvey Radio, Lafayette or other Ham-radio equipment store in Manhattan (addresses listed in the yellow pages of the phone book) and look over their book shelves. You should find several on Ham radio. Look over the gear too. The salesmen will tell you about cost, features and antenna problems you will face as a Manhattan cliff dweller.

Adding Antenna Tuning

I notice the antenna trimmer on many sets is a variable capacitor in parallel with the main RF tuning capacitor. As such, it seems to me that this is merely a means of correcting tracking error. Right? It then follows that a true antenna tuner (one to electrically make a long-wire a half wavelength) is a useful addition too. If not, what is the functional difference between the set's antenna trimmer and an outboard antenna tuner?

—J. T. H., Pittsburgh, Pa.



You are correct. The antenna trimmer usually corrects tracking error which is caused by variations in antenna capacitance loading. You can add a variable coil (L) in series with the antenna which functions as an antenna loading coil. The inductance of the coil is changed by adjustment of its ferrite core (Miller 4400 series, etc.) with a threaded rod. Too bad they don't make them with a tuning shaft to which a knob could be attached.

TV QSL for DX

I received the Palm Beach, Florida, Channel-5 TV station for 32 minutes. So I can get a QSL card from that station, please give me its full address.

—S. K., Wheeling, W. Va.

Your letter or card addressed simply to "TV Channel 5, Palm Beach, Florida" should be adequate. (But in 32 minutes you should have been able to get their call at least once.) Describe program details—time, sponsors, actors, etc.

Living Sound

When I hook up my guitar directly to my

tape recorder I get crummy sound. How can I get more reverberations?

—T. D., San Juan, Texas

Play the guitar through a guitar amplifier and speaker and pick up the sound with the tape recorder mike when recording—but not too close. You will then get the effect of any reverberation in the room.

Wonder Why?

I wired the TV booster using a 6BC8 tube whose circuit was published in your column, but it doesn't work.

— D. G., Coal Center, Pa.

Theoretically, it should. Circuits published in this column are intended to be functional unless otherwise specified. However, there's more to making a gadget work than wiring up the parts. Experimenting with different coils and other parts may be required. Wiring at TV frequencies becomes very critical—a fraction of an inch can make a big difference.

A Big Order

Can you give me a diagram for the IF, discriminator, detector and front end of an all-transistor FM tuner, including AFC and AGC? The set should operate from 10 volts and the IF should be 10.7 mc. Could you also show me how to hook up a glass piston type tuning capacitor so it can be tuned with a knob.

—F. H., Birmingham, Ala.

That's a big order and the diagram would take up at least two magazine pages. Get a copy of the RCA transistor manual at a local radio parts store. You'll find such circuits in it. Piston type capacitors are seldom if ever used as the manual tuning control. Special assemblies are made. Check with JFD Electronics, 15th Ave. and 62nd Street, Brooklyn, N. Y., 11219.

Wireless Mike

Where can I get a wireless FM microphone?

—D. G., Westover AFB, Mass.

Try DeMambro, Radio Shack and other radio parts stores in the Boston area. Kinematix makes one priced at $39.95. Sony also makes one. There are cheap ones too, but make sure it is FCC "type approved." If it is not, you can be cited for unauthorized, unlawful radio transmission.

Use Converter—Don't Convert Set

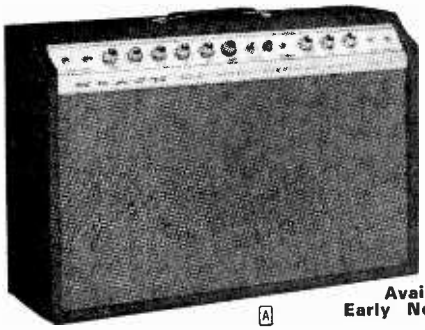
I have an old receiver that tunes through the BCB and three shortwave bands up to 22 mc. How can I convert the set to tune up to 420 mc using the same wiring but with a VFO added for use as a frequency shifting device?

—O. M., Pembroke, Mass.

Forget it. Different type tubes would be required for operation at 420 mc. Coils aren't used at those frequencies either. You could use a converter though—connect it to the antenna terminals of the shortwave receiver and to its own 420 mc (MHz) antenna. ■

What's New With Heath These Days?

Harmony-by-Heathkit Electric Guitars & Heathkit Guitar Amplifier



Kit TA-16
$129.95

Available Early November

[B] Kit TG-46
$219.95
(save $109.55)

[C] Kit TG-26
$99.95
(save $45)

[D] Kit TG-36
$119.95
(save $38.55)

[A] NEW Heathkit Transistor Guitar Amplifier

60 watts peak power; two channels — one for accompaniment, accordian, organ, or mike, — the other for special effects . . . with both variable reverb and tremolo; 2 inputs each channel; two foot switches for reverb & tremolo; two 12" heavy-duty speakers; line bypass reversing switch for hum reduction; one easy-to-build circuit board with 13 transistors, 6 diodes; 28" W. x 9" D. x 19" H. leather-textured black vinyl cabinet of ¾" stock; 120 v. or 240 v. AC operation; extruded aluminum front panel. 44 lbs.

American Made Harmony-By-Heathkit Guitars

All guitars include instruction book, tuning record, pick, connecting cord, deluxe red leather cushioned neck strap and chipboard carrying case. All wood parts assembled and factory finished — you just mount metal parts, pickups & controls in pre-drilled holes and install strings.

[B] Deluxe Guitar . . . 3 Pickups . . . Hollow Body

Double-cutaway for easy fingering of 16 frets; ultra-slim fingerboard — 24½" scale; ultra-slim "uniform feel" neck with adjustable Torque-Lok reinforcing rod; 3 pickups with individually adjustable pole-pieces under each string for emphasis and balance; 3 silent switches select 7 pickup combinations; 6 controls for pickup tone and volume; professional Bigsby vibrato tail-piece; curly maple arched body — 2" rim — shaded cherry red. 17 lbs.

[C] Silhouette Solid-Body Guitar . . . 2 Pickups

Modified double cutaway leaves 15 frets clear of body; ultra-slim fingerboard — 24½" scale; ultra-slim neck for "uniform feel"; Torque-Lok adjustable reinforcing rod; 2 pickups with individually adjustable pole-pieces under each string; 4 controls for tone and volume; Harmony type 'W' vibrato tail-piece; hardwood solid body, 1½" rim, shaded cherry red. 13 lbs.

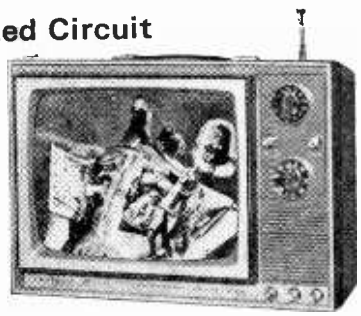
[D] "Rocket" Guitar . . . 2 Pickups . . . Hollow Body

Single cutaway style; ultra-slim fingerboard; ultra-slim neck, steel rod reinforced; 2 pickups with individually adjustable pole-pieces for each string; silent switch selects 3 combinations of pickups; 4 controls for tone and volume; Harmony type 'W' vibrato tailpiece; laminated maple arched body, 2" rim; shaded cherry red. 17 lbs.

NEW 12" Transistor Portable TV — First Kit With Integrated Circuit

Unusually sensitive performance. Plays anywhere . . . runs on household 117 v. AC, any 12 v. battery, or optional rechargeable battery pack ($39.95); receives all channels; new integrated sound circuit replaces 39 components; preassembled, prealigned tuners; high gain IF strip; Gated AGC for steady, jitter-free pictures; front-panel mounted speaker; assembles in only 10 hours. Rugged high impact plastic cabinet measures a compact 11½" H x 15¾" W x 9⅜" D. 23 lbs.

Kit GR-104
$119.95
AVAILABLE LATE OCTOBER



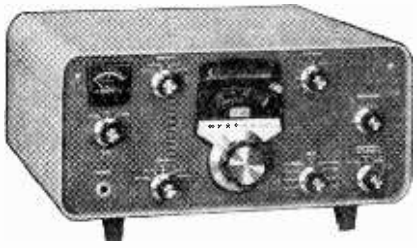
9 New Kits You Can Build

NEW Heathkit® /Magnecord® 1020 4-Track Stereo Recorder Kit

Kit AD-16
$399.50
(less cabinet)

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

NEW Deluxe SB-301 Amateur Band Receiver Kit



Kit SB-301
$260.00
(less speaker)

Complete coverage of 80 thru 10 meters with all crystals furnished, plus 15 to 15.5 MHz coverage for WWV; full RTTY reception capability; built-in switch-selected ANL; front-panel switching for control of 6 and 2 meter plug-in converters; crystal-controlled front-end for same rate tuning on all bands; 1 kHz dial calibrations — 100 kHz per dial revolution; plus the same styling and features of the famous Heathkit SB-300 Receiver. 23 lbs.

2-Watt Walkie-Talkie

Assembled
GRS-65A
$99.95

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

NEW Portable Phonograph Kit

Kit GD-16
$39.95

All Transistor. Assembles in 1 to 2 hours. Preassembled 4-speed automatic mono changer; 4" x 6" speaker; dual Sapphire styli; 45 rpm adaptor; olive & beige preassembled cabinet; 117 v. AC. 23 lbs.

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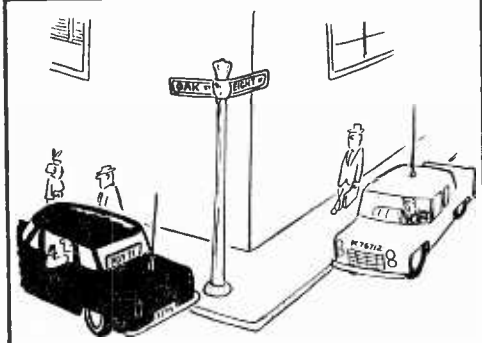
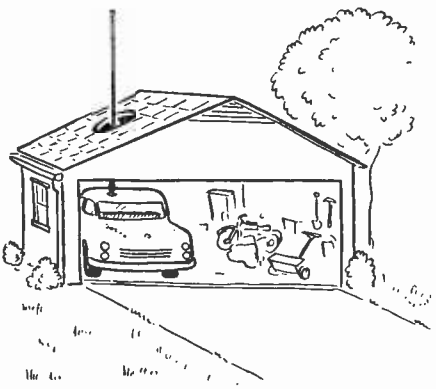
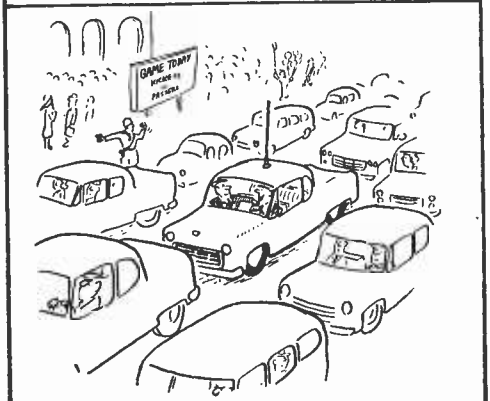
ROLLED HAM

By Jack Schmidt



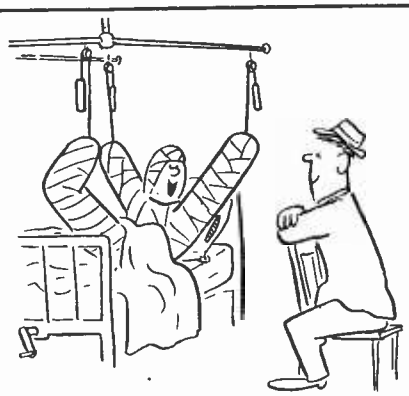
"K76712 to KGY71 . . . I'm at Eighth & Oak . . . where are you . . . over?"





"I just talked to a guy a block ahead . . . he's saving a parking space for us!"

"I'll give you seven hundred! Six ninety-nine for the radio and a buck for the car!"



"I was doing about seventy on the expressway when I heard this fella calling from Toronto!"

"Helen, please stay off the circuit long enough for me to call the office!"

The Quest for Quasars

by K. C. Kirkbride

■ A tall, lean young man, dressed in an electrically-heated suit, steps into an elevator to ride to the observer's cage of the world's largest telescope, the super two-hundred-inch reflector telescope atop Mount Palomar in California. Here, watching through the night, he photographs distant stars, peers **eight billion years** into the past.

And when he decodes the observations he makes he excites the imaginations of all his colleagues. For the remote objects he cites from his cold mountaintop post seem like

(turn page)

faint stars yet give off titanic energies never before accounted by any known physical means, including nuclear. Literally powerhouses of radio waves that may have started their long journey to earth millions of years before this planet was formed, they may be structured from the original material of the universe.

Probing these faint objects with their strong signals, the thirty-six-year-old Dutch-born astronomer Maarten Schmidt has already jolted established beliefs in astronomy and man's theories of how the universe was formed. And some scientists feel if Schmidt and his colleagues find the full explanations of the powerhouse objects they study we may one day comprehend creation itself.

Very Recent. Only five years ago, man thought of his universe as a simple one of galaxies and suns and stars, some galaxies numbering 100 billion stars, but all rotating in orderly fashion in the heavens.

To this prosaic pattern we added three neat concepts of how this universe was formed and no one exactly looked hard for new more startling conclusions.

Even in the early thirties when Karl Jansky of Bell Laboratories reported he heard radio signals from outer space, astronomers paid little heed, let alone conceding such signals might mean new clues to solution of formation of the universe.

Radar Improved. But after World War II, improved telescopes borrowing advanced radar and electronic techniques started to scan the heavens with an accuracy and penetration never known before. Soon giant telescopes built in England, Australia and the United States started to track strange radio sources that seemed to originate in space at distances well beyond our known solar system and galaxy.

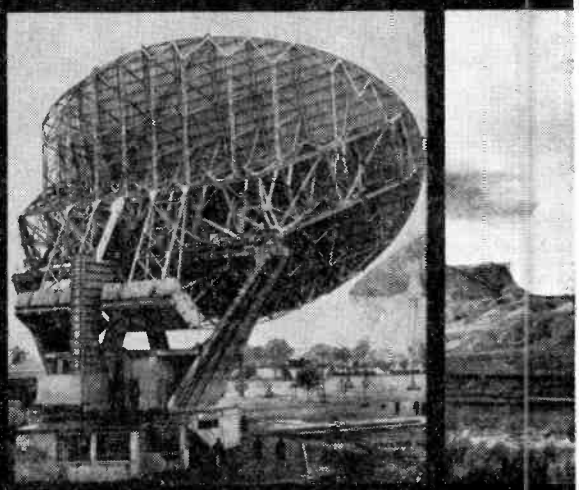
Teaming Sight With Sound. To map these strange sources, radio astronomers teamed with their optical colleagues. And when a radio telescope spotted a radio source, an optical observer photographed it to pinpoint the transmitter. Soon 100 new galaxies were spotted, galaxies that proved to be powerful radio stations in space.

Then in 1960, men at the California Institute of Technology, following leads from England's Cambridge University, discovered a stream of powerful signals coming from what seemed to be a faint star. Powerful signals, they knew, could not originate in stars. Galaxies perhaps, but not from stars.

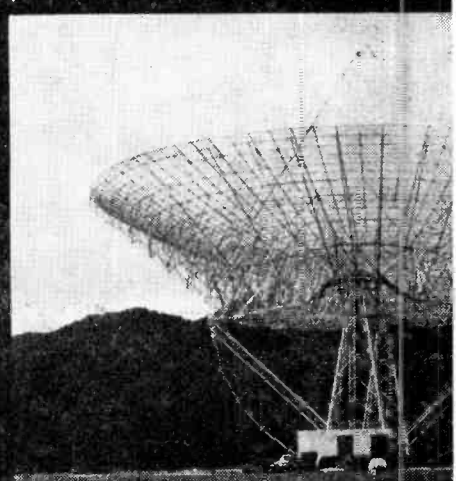
They Find More. During the next years, the ever-more-penetrating radio telescopes spotted three, then five, finally ten of the mysterious fellows that proved to be veritable powerhouses in space. And for want of a better name, the new objects were called Quasi-stellar radio sources. *Quasars* for short. Spotted one by one they were individually named: 3C 48, 3C 147, 3C 196, 3C 273 and 3C 286. The 3C for "Third Cambridge," short for Third Cambridge Catalogue of Radio Sources compiled by Martin Ryle at Cambridge.

As more and more of the strange objects were spotted, excitement ran high in the astronomy world for these faint stars, smaller than galaxies, were shining with as much as

Quasar Chasers—

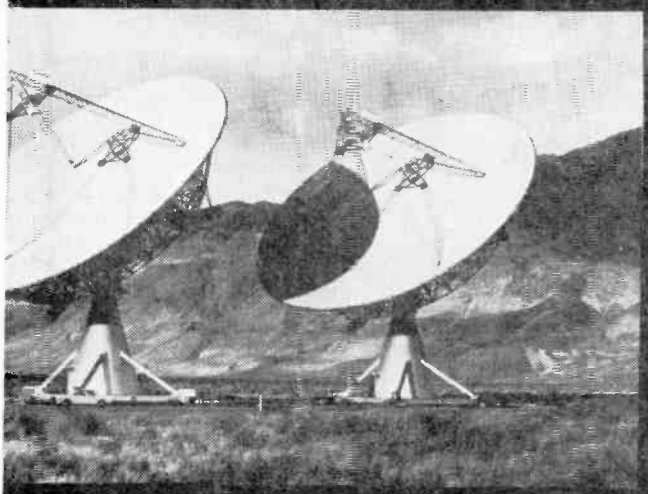


Jodrell Bank, U.K.



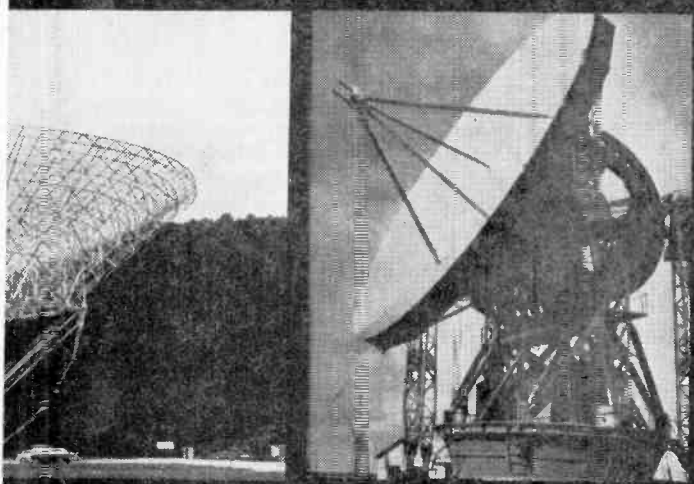
Green Bank, W. Va.

Round the World



Pasadena, Cal.

Central Ontario, Canada



Moscow, USSR

The very ends of the universe are being probed by movable radiotelescopes like those shown above and left. The new Jodrell Bank 125-foot antenna is computer controlled and will ease the work load on the nearby 250-foot pioneer. Twin Navy 130-foot dishes in California and Canada's 125-foot quasar snooper are recent additions to the world's arsenal of space probers. The Green Bank array is large enough to hold a football field. Not much is known about Russia's 68-foot radiotelescope, tabbed, Fian, other than it's a crude device compared with other antennas featured here.

10,000 times the brightness of a *billion* suns.

Prisms. Putting the 200-inch giant antenna at Palomar to work, Astronomers Allan Sandage and Jesse Greenstein of Caltech, next channeled the strange light from quasars through spectographs. Exposing the films as long as six to seven hours to get a faint image, they found tiny lines, lines never seen before in astronomical observation. What could the strange lines mean?

Shift. Soon their colleague, Maarten Schmidt was drawn into the puzzler. Australian observers had found an exact location for 3C 273 by tracking it through an eclipse of the moon, and now Schmidt settled down to study the findings of Sandage, as they applied to 3C 273. He puzzled six weeks, then inspired by a thought that frightened even him, started to really calculate the meaning of the lines on these objects.

Suppose, he thought, the three lines he found on the photographic plate of quasar 3C 273 were hydrogen lines. They looked as if they could be but were not in the blue segment of the spectrum where they belonged. They were in the red instead. Could they, he wondered, have shifted to longer wave lengths?

Schmidt was on the verge of a discovery that was to shock himself as well as the whole astronomical world. If 3C 273 were racing from the earth, he reasoned, then the wave

length of its light would lengthen. According to Hubble's principle of "red shift," established in 1929, the greater a "red shift" in a galaxy spectrum the faster the galaxy was speeding away, and the further it was out in space.

Speeding. If the lines he saw under the microscope really represented a "red shift," according to measurements of the "shift," 3C 273 was speeding away from the earth at a speed of 28,000 miles per second. This meant, according to Hubble's law, that the quasar must be some *1.5 billion light years* from earth, and not the faint star some astronomers proposed.

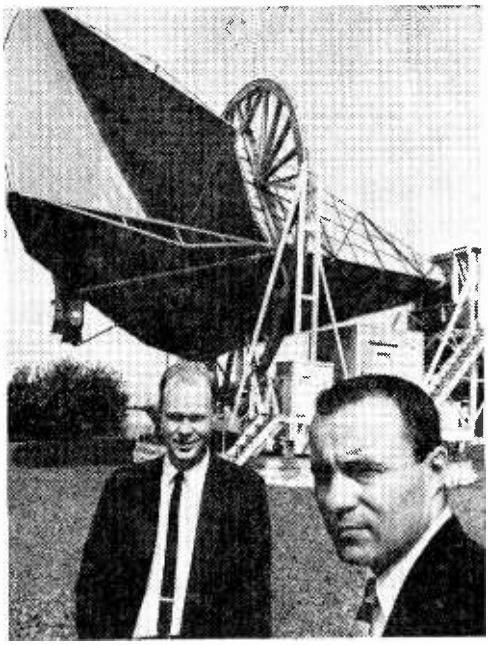
Astronomer Greenstein seconded Schmidt, measured 3C 48, found this quasar fellow was skipping school even faster than 3C 273. By Hubble's law, this one was some *four billion light years* away. This meant the signals the radio telescopes tracked originated billions of years in the past, perhaps centuries before our planet was formed.

For as we calculate light, we see the sun as it was eight minutes ago, the nearest star as it was four years ago, the nearest galaxy as it appeared 2,000,000 years ago. If Maarten Schmidt and his colleagues were right, we were not only tracking quasars that "lived" billions of years ago, but we could have found a key to the universe's secrets.

Three Theories. For until Schmidt's discovery prompted new speculations, men had evolved only three theories about the formation of the universe he lives in. There was the big-bang theory first proposed by a Belgian Abbe George LeMaitre, who believed the universe began ten billion years ago in a dense nucleon explosion, one made of pure radiation, not yet formed into matter.

Then after the explosion that sent it expanding to the ends of the universe, the radiation steadily cooled until it transformed into matter. They think matter then started to condense and began a long, slow process of contraction that led to the galaxies and stars. According to the Big Bang theorists, this process is still going on as they believe galaxies at the edge of the universe are still moving outward.

Steadier. Proponents of a steady-state universe, headed by British astronomer Fred Hoyle, believe the universe always existed, has always been expanding, and that as galaxies move farther away from one another, new ones form from hydrogen, fill the gaps creating an expanding universe but with the same density.



Bell Telephone Labs' scientists Robert Wilson (left) and Arno Penzias measurements made with antenna shown in rear support a new cosmological theory. Unexplained radio noise may be remains from collapsed fireball from the universe's beginning.

Oscillation. The third theory, backed by men like Allan Sandage, says we live in an oscillating universe, one that big-bang'd at first, then contracted back toward a dense state to explode again outward in 80-billion-year cycles. Proponents of this theory think we have seen ten billion years since the last bang, and only 70 billion years exist for us to cut up on earth before things contract.

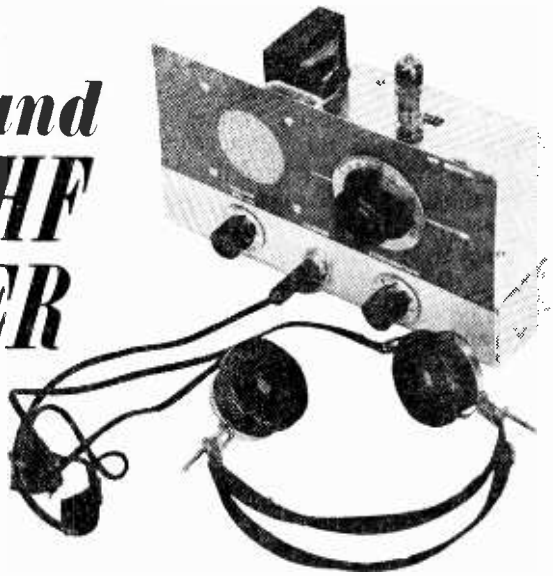
But after the startling revelations of Schmidt and his colleagues, these theories seemed only a starting point. They think quasar behavior favors an expanding universe more than steady-state but an expanding universe with complications.

According to Hoyle. Even Fred Hoyle concedes: "Quasars have a look about them the whole universe is supposed to have had at its beginning. There have been the 'big bang' theories, with the universe beginning all at once, and there has been the steady-state theory, with creation happening gently all the time."

Big Bangs and Little Bangs. Hoyle adds now, "Perhaps quasars are an indication the universe has lots of little bangs instead of one big bang, little bangs that are neverthe-

(Continued on page 104)

multiband VHF RECEIVER



Tune in where the action is—hear the drama of everyday life—live—as it happens. Then relax with FM music.

by Charles Green, W3IKH

■ The VHF spectrum is more popular, to SWLs, than ever. Even the 10-meter Ham band is starting to show life as the sunspot activity increases. Radio paging services are busy around 40 MHz (mc.) and the always popular 6-meter Ham band is active at 50 MHz. In addition, there are fire, police, ambulance, veterinarians (and other special emergency services), aircraft and the 2-meter Ham band—and even FM broadcast to round out the variety of listening fare in the VHF band.

You can listen in on the VHF activity with this multiband receiver. The simplified circuit uses only two tubes and easy-to-make plug-in coils. The superregenerative detector and grounded grid RF stage do not need any alignment or complicated adjustment. Its construction requires a minimum of shop tools and the audio stages drive the speaker to room volume. The unit incorporates a built-in AC power supply with a silicon rectifier.

About the Circuit. Signals, from the antenna connected to J1, are coupled by C1 to the cathode of V1A—a grounded-grid RF amplifier. RF choke L8, in series with the cathode bias resistor (R1), minimizes circuit loss at the higher frequencies. The amplified RF signal is coupled through C3 to J2 and the plug-in coils L1-L5. C5 tunes the coils—C4 sets the overall bandspread.

V1B is a superregenerative detector with C6 and R4 establishing the squegging frequency. S1 switches RF chokes L6 and L7 for the "hot cathode" oscillating circuit of V1B. L7 is used for plug-in coils L1 and L2, and L6 is switched in for the other coils. R3 controls the superregen action of the circuit by varying the B+ voltage to the plate of V1B.

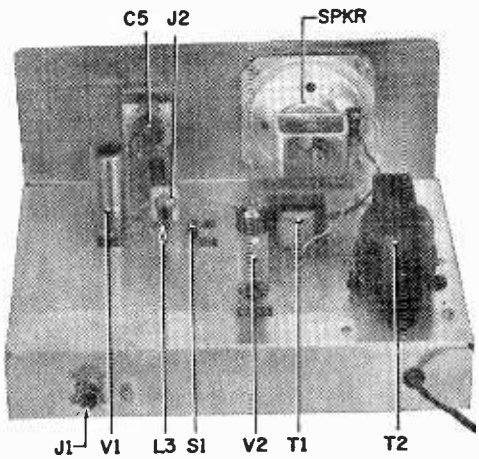
The detected audio signals are fed via the squegging-frequency filter (R6, C8 and C9) to the volume control (R7). V2A amplifies the audio signal and C12 couples the resultant audio to the grid of V2B. V2B is the

VHF RECEIVER

audio-power-amplifier stage and is connected to the speaker through output transformer T1 and phone jack J3. The speaker is automatically disconnected when phones are plugged into J3. High-impedance phones are driven by audio signals through C14.

If low-impedance phones are on hand they can be used by grounding the output transformer secondary as indicated on the schematic—C14 is not used and should be disconnected.

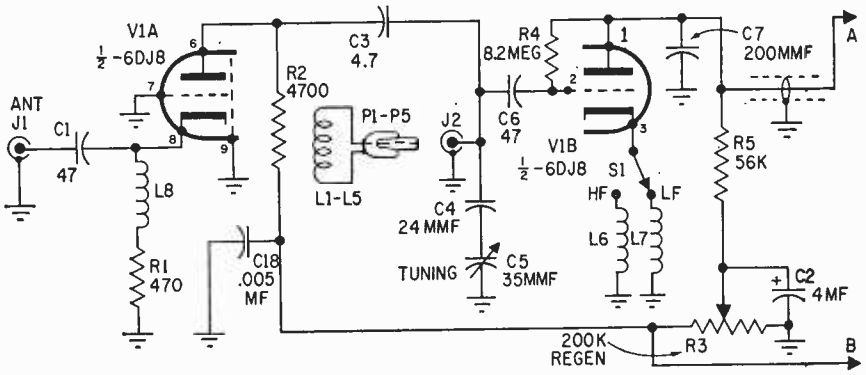
The operating voltages for the receiver are supplied by T2 and the silicon rectifier D1, with R12 and C15A-B filtering the B+ power.

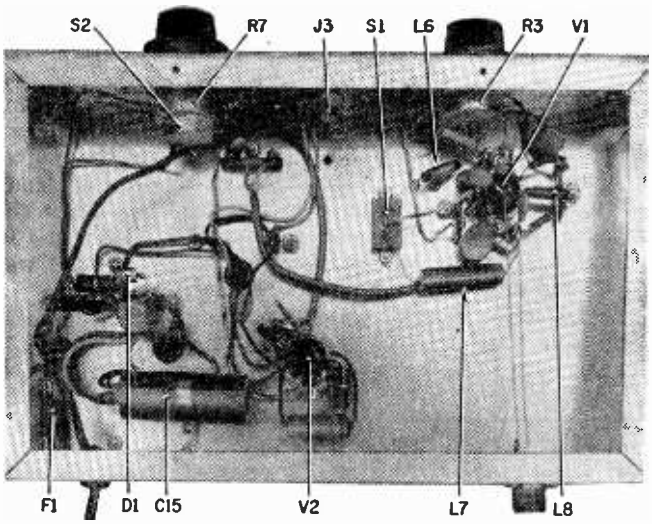


Construction. For easy construction, a 7 x 11-in. piece of aluminum is used for the front panel. A 2¼-in. hole is cut or punched for the speaker opening. Mount the components as shown in the photos. Keep the parts spaced as shown. The plug-in connector for the coil (J2) is mounted on an aluminum bracket approximately 1 in. high by ¾ in. wide. Use a single hole mounting type jack with ceramic insulation.

MULTIBAND VHF RECEIVER PARTS LIST

C1, C6—47-mmf., 100-volt ceramic disc capacitor
C2—4-mf., 150-volt miniature electrolytic capacitor (value not critical)
C3—4.7-mmf., 1000-volt ceramic disc capacitor
C4—24-mmf., mica capacitor
C5—35-mmf., variable capacitor (Hammarlund HF-35 or equiv.)
C7—200-mmf., capacitor (two 100-mmf., disc capacitors used in parallel)
C8, C17—.001-mf., 1000-volt ceramic disc capacitor
C9, C12, C14, C18—.005-mf., 1000-volt disc capacitor
C10—5-mf., 6-volt miniature electrolytic capacitor
C11—100-mmf., 1000-volt disc capacitor
C13—.05-mf., 600-volt paper Mylar capacitor
C15A, B—50-, 30-mf., 150-volt dual electrolytic capacitor with leads (Sprague TVA Atom 2450, Allied 15U244 or equiv.)
C16—.01-mf., 1000-v., ceramic disc capacitor
D1—Silicon rectifier—minimum ratings 500-1000 ma, 400-600 PIV (RCA SK-3017 or equiv.)
F1—1 amp, 3AG fuse and fuse holder
J1—Coax receptacle, chassis mounting type (SO-239 or equiv.)
J2—RCA-type phono jack, single-hole mounting with ceramic insulation
J3—Closed circuit phone jack
L1, L2, L3, L4, L5—See text
L6, L8—.82-microhenry RF choke (J. W. Miller RFC-220 or equiv.)





Top-chassis view (left) indicates location of most of the major components in the VHF receiver.

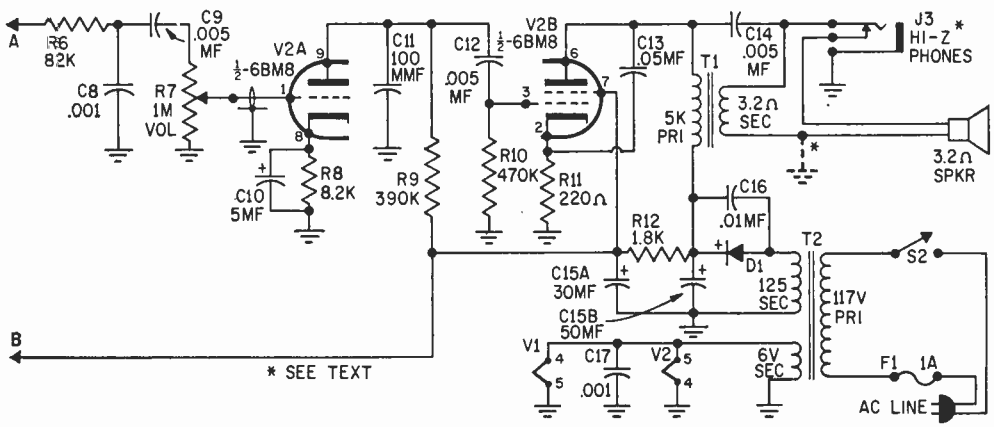
Under-chassis view (right) of VHF receiver shows there is little crowding. Leads to socket of V1 are kept short.

Keep the connections short in the RF and detector stages (V1) as is done in wiring all high-frequency construction projects. Run the wires to J1 about a quarter inch apart and keep the RF chokes L6 and L7 away from the chassis. Use rubber grommets in the wire fed through chassis holes and lock washers in mounting the terminal strips to prevent movement.

The coils are wound with AWG-16 insulat-

L7—24-microhenry (J. W. Miller RFC-28 or equiv.)
P1-5—RCA-type phono plugs to fit J2 (for coils see text)
R1—470-ohm, ½-watt resistor
R2—4700-ohm, ½-watt resistor
R3—200,000-ohm, linear taper, potentiometer
R4—8.2-megohm, ½-watt resistor
R5—56,000-ohm, ½-watt resistor
R6—82,000-ohm, ½-watt resistor
R7—1-megohm, audio taper, potentiometer (with S2)
R8—8,200-ohm, ½-watt resistor
R9—390,000-ohm, ½-watt resistor
R10—470,000-ohm, ½-watt resistor
R11—220-ohm, 2-watt resistor
R12—1800-ohm, 2-watt resistor
S1—S.p.d.t. slide switch
S2—S.p.s.t. switch (part of R7)
SPKR—3.2-ohm, 3-inch PM type
T1—Output transformer; 5000-ohm pri.; 3.2-ohm sec. (Allied Radio 62U064 or equiv.)
T2—Power transformer; 125-vac., 50-ma; 6.3-vac., 2-A sec. (Merit P13045, Allied 61U411 or equiv.)
V1—6DJ8, ECC88 vacuum tube
V2—6BM8 vacuum tube
Misc.—Ac line cord, 7x11x2-in. aluminum chassis with mating bottom plate and 6x11-in. aluminum plate (used for front panel), rubber grommets, hardware, etc.

Estimated cost: $24
Construction time: 5 hours



VHF RECEIVER

ed solid wire soldered to RCA-type phono plugs to fit J2. The dimensions of the coils are only approximate, as their frequency coverage will depend on the wiring inductance and capacitance of your particular receiver. Experiment with different numbers of turns for each band until you get your desired coverage. Different colors of plastic tape can be used to identify the coils and bands. Even the amount of tape will affect the frequency range of the coils, use only enough to hold the wire turns together. Use care when soldering the coils to the plugs to prevent internal shorts in the plugs.

Operation. Plug in L3, the 4-turn coil (FM-broadcast band), and apply power to the receiver. Allow the unit to warm up for a few minutes, and set S1 to HF position. Turn the volume and regeneration controls to maximum (full clockwise position). You should hear a loud hissing noise from the speaker.

Connect an antenna to the antenna jack J1. A TV antenna is good for FM reception, but a 6-foot length of insulated wire will work for nearby stations. Tune C5 for a station. This will be an FM station on this band, so tune to one side of the station until you can hear the signal clearly. (This is known as slope detection of FM signals by an AM receiver.)

Adjust the regeneration control and volume control for best reception of the signal. You will find it necessary to retune a little as the regeneration control is adjusted. Practice will make operation of the receiver easier. Try the other coils in J2 and check reception. Remember—the 2-way mobile services are on the air intermittently—only when they are transmitting a particular message. Some mobiles are on the same frequency as their base stations and you'll be able to hear *both* sides of the conversation. Others, like taxicabs, transmit on one frequency and listen on another.

What You'll Hear. Coil L1 will tune the CB and 10-meter bands. During the workday CB will be busy with business calls—10-meter hams will be comparatively quiet until late afternoon.

Police, ambulance, veterinarians, etc., make good use of the frequencies covered by L2. Hams are from 50 to 54 MHz (mc).

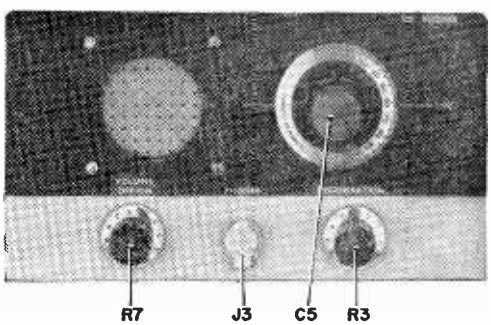
L3 tunes the FM broadcast band. Aircraft messages are tuned with L4 but don't overlook the possibility of hearing a satellite around 137 or 149 MHz. L5 should tune in Channel-7 TV sound around 180 MHz. Below that you'll hear boats and more land mobile. If you're more than 10 miles from a commercial waterway forget the boats. ■

TABLE OF COIL WINDING DATA

Coil	Turns	Diameter	Frequency Range	Color
L1	5	1¼-in.	26 to 33 MHz	Red
L2	5	⅝-in.	42 to 52 MHz	Yellow
L3	4	⅜-in.	82 to 108 MHz	Grey
L4	2	⅜-in.	116 to 150 MHz	Black
L5	1	½-in.	140 to 185 MHz	——

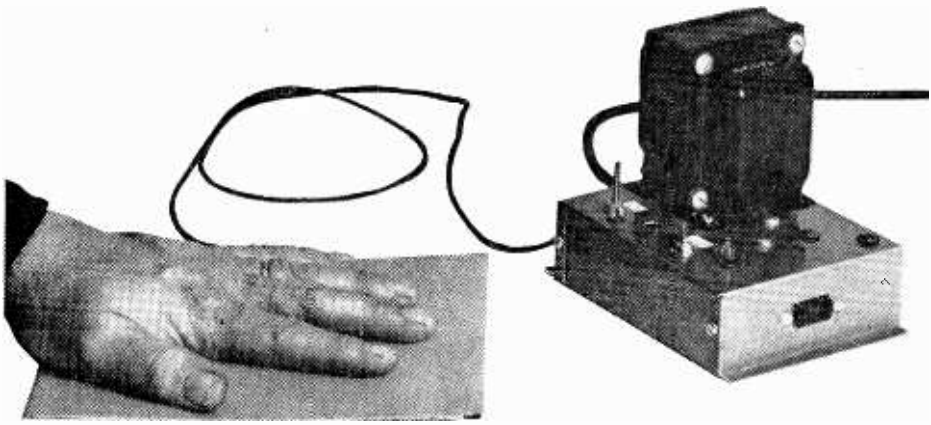
All coils wound with AWG-16 solid, insulated wire.

The above plug-in coils are tuned with C5. As indicated in the Table of Coil Winding Data the coils do not provide continuous coverage—there are gaps in coverage between all coils except L4 and L5. Coverage can be adjusted slightly by spreading or squeezing the turns together.



Front panel of the completed receiver is professional looking. Tuning knob for C5 can be replaced with a vernier drive for easier tuning on the communications bands.

TRIAC Capacitance Switch



by Edward P. Nawracaj

Big feature of this solid-state capacitance switch is that there are no moving parts to wear out—no contacts to pit, oxidize, corrode or bend.

■ In the past, many versions of a capacitance-operated switch have appeared, but they all require a relay. Here is a circuit which is *completely* solid-state, that is, it contains no relay or moving parts of any kind.

This capacitance-operated switch will turn off a lamp, or some other load, when an external body comes near an insulated metal plate.

How It Works. Transistor oscillator Q1, whose tank coil (L1) is tuned by C2 (and the capacitance of the metal plate), oscillates at a frequency of about 1 MHz. The second stage, which is selective, is tuned to the oscillator frequency and at resonance is a very-high impedance in the emitter of Q2. Therefore, when the oscillator is oscillating at 1 MHz, and the selective stage is tuned to this frequency, maximum signal voltage will appear across the tuned circuit (L2, C6). This signal is converted to DC by detector diode D3 and the resulting voltage is used to turn *on* the triggering stage (Q3). This stage allows gate current, which is limited by R6, to flow through the silicon gate-controlled AC switch (TRIAC), which in turn permits current to flow through the load plugged into the receptacle.

When an object approaches the external metal plate, the oscillator begins to shift in frequency. This in turn causes a decrease in signal across the tuned circuit (L2, C6) and a subsequent decrease in voltage to the base of Q3. When the voltage change at the base of Q3 is sufficiently large, as caused by maximum frequency shift, the transistor will be driven into cutoff. As a result, Q3 will offer a very high impedance to the gate circuit of the gate-controlled switch, causing it to turn *off*, preventing current flow through the load.

Removing the object from the external metal plate, of course, returns the circuit to its previous state, turning the load *on*.

Now with careful tuning and a little luck you can reverse this action, making the unit more useful for displays and burglar alarms where the presence of someone will *start* (not *stop*) the current flow. While returning (with your hand touching the sensing plate)

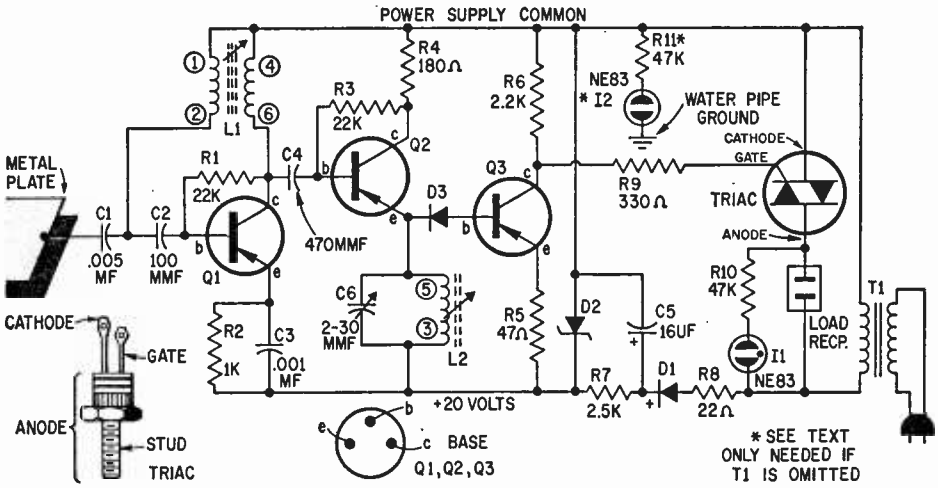
TRIAC
Capacitance Switch

will work, the operation can be somewhat erratic and you might be better off using an inexpensive AC relay to reverse the normal *on-off* action.

Circuitry. The oscillator used in this unit is an L-C type operating at a frequency of about 1 MHz. The quiescent collector current is about 15 ma., and the base is biased by the current through the 22,000-ohm resistor. The transistor used in the unit is a germanium *pnp*, with a 500-ma collector current and a high-frequency cutoff of 2 MHz. The rated collector dissipation is 200 mw.

Selective stage Q2 is tuned by L2, C6 to the oscillator frequency of 1 MHz. A graph of the selectivity of this stage indicates a 3 db drop at 0.1 MHz either side of 1 MHz. The stage is very sensitive to a frequency shift because of L2, C6 and would not display this characteristic if the tuned circuit were omitted.

Triggering stage Q3 serves to control the current through a silicon gate-controlled AC switch. Q3 is nothing more than a transistor

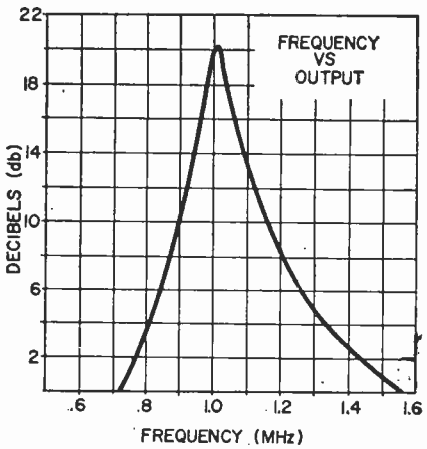


Circuit of TRIAC capacitance switch is not tricky and T1 makes it safe even though there is little chance of a dangerous shock passing through capacitor C1 to metal-plate sensor.

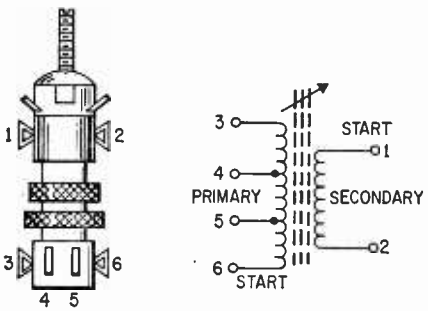
PARTS LIST FOR TRIAC CAPACITANCE SWITCH

C1—.005-mf., 1,000-volt (or higher) ceramic disc capacitor
C2—100-mmf., 200-volt ceramic disc capacitor
C3—.001-mf., 200-volt ceramic disc capacitor
C4—470-mmf., 200-volt ceramic disc capacitor
C5—16-mf., 150-volt electrolytic capacitor
C6—2-30 mmf., trimmer capacitor
D1—750-ma., silicon diode, 750-prv (piv),
D2—20-volt, 1-watt, Zener diode (G.E. Z4XL20, Motorola 1N3027B or equiv.)
D3—30-ma., 50-prv (piv) germanium point-contact diode (1N295, 1N270, 1N34 or equiv.)
I1, I2—Neon lamp (NE-83 or equiv.)
L1, L2—Coil, Universal oscillator (Miller 71-OSC or equiv.)
Q1, Q2, Q3—pnp transistor (2N651, 2N1185, 2N190, GE-2 or equiv.)
R1, R3—22,000-ohm, ½-watt resistor
R2—1,000-ohm, ½-watt resistor
R4—180-ohm, ½-watt resistor
R5—47-ohm, ½-watt resistor
R6—2,200-ohm, ½-watt resistor
R7—2,500-ohm, 20-watt resistor
R8—22-ohm, ½-watt resistor
R9—330-ohm, ½-watt resistor
R10, R11—47,000-ohm, ½-watt resistor
T1—Isolation transformer (Merit P3096, Stancor P6410, Knight 61Z426—see text)
TRIAC—Silicon gate-controlled AC switch (G.E. ZJ257—stud mounted, ZJ285—press-fit SC40B or equiv.)
1—chassis box, 5x4x3-inch—see text (Bud CU2105A or equiv.)
Misc.—Heat sink (for Triac), chassis male connector, perforated board, eyelets, wire, solder, tie strips, L-brackets, nuts and machine screws, etc.

Estimated cost: $20.00
Construction time: 3 hours



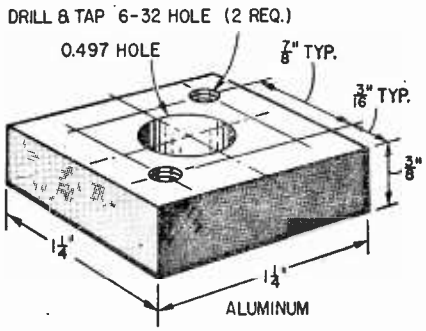
Actual frequency of L2-C6 isn't critical but response (above) must be sharp for best results. Grounding the power supply common lead through a .05 MF capacitor helps sometimes. L1, L2 winding connections and schematic diagram are below.



operating as a switch.

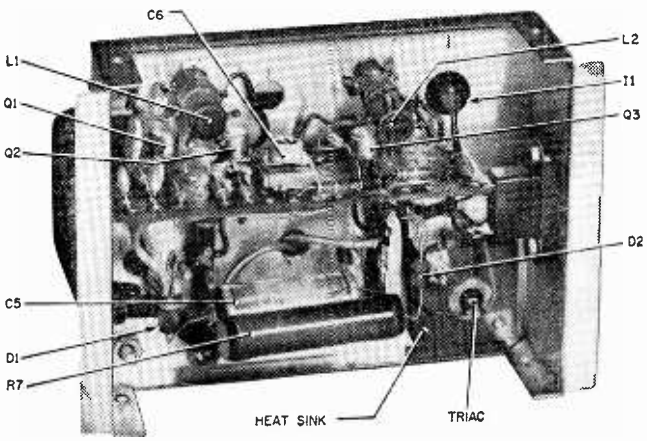
The bi-directional switch used in this unit is the *General Electric* TRIAC *Bi-Directional Controller* is mounted on an aluminum heat sink making it capable of conducting 5 amperes (in both directions—AC) when triggered with the proper gate current. GE manufactures the TRIAC either as a press-fit unit or stud mounted (which is slightly higher in price). No matter which type you use, a heat sink will be required. The press-fit type requires extra special care when mounting it on the heat sink—the stud type is much easier to handle.

The power supply is a simple half-wave rectifier, with a capacitor-input and a Zener-diode regulated output. The output voltage is regulated at 20 volts and is independent of ±10% line-voltage variations. The Zener diode used is a 1-watt type with a breakdown voltage of 20 volts.



Press-fit heat sink should not be used unless you have a fairly well equipped shop. TRIAC can be broken if improper or unequal pressure is applied to unit.

Although the TRIAC is capable of conducting 5 amperes, the current is limited by isolation transformer T1. The transformers specified are rated at only 50 volt-amperes (about 50 watts). To make use of the full 5-ampere capability of the TRIAC, the rating of T1 would have to be increased to 500 volt-amperes (about 500 watts). Such



Inside view of chassis shows major components. Inductive coupling between L1 and L2 could cause Q2 to oscillate. Oscillations can be stopped by reversing wire leads to L2 or mounting L1 in end of the chassis parallel to chassis board—right angle to L2.

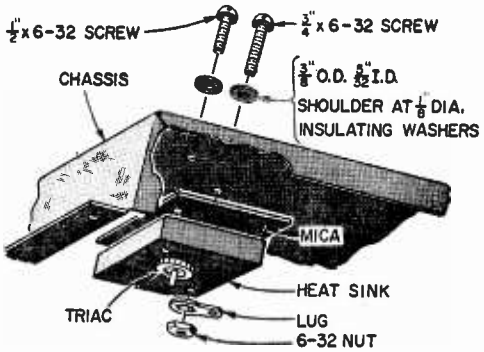
TRIAC
Capacitance Switch

a transformer costs around $50, so a relay would be cheaper.

Of course you *can* operate the unit *without* the protection of the isolation transformer. If the metal plate is mounted on the *inside* of a plate-glass window there should be little shock-hazard for anyone operating a display. Neon lamp I2 (another NE-83, an NE-2, etc.) is connected to an external ground (like a water pipe), it will serve as a warning indicator that the metal plate will give a "tingle" when touched by someone that is grounded. If it lights up, just pull out the AC plug and turn it over (to reverse the plug-in contacts). Plug it back in and the neon warning lamp should be *off*.

Construction. The entire unit is housed in a chassis box measuring 5 x 4 x 1½-in. The cabinet shown was cut down from a salvaged box measuring 5 x 4 x 3-in. The chassis layout is self-explanatory, and with the exception of one extra hole (which was drilled by mistake, and is not included in the drawing), needs no further comment.

The heat sink, however, is another story. Care must be taken when mounting the heat sink. The anode of the bi-directional switch *must* be insulated from the chassis to prevent possible shock hazard, and is mounted as shown in the heat-sink mounting-detail diagram. Since a press-fit type of bi-directional switch was on hand, the heat sink used was constructed from a piece of ⅜-in. thick piece



For continuous operation heat sink will be more effective on outside of chassis box—for greater heat convection the finned type of heat sink is much better.

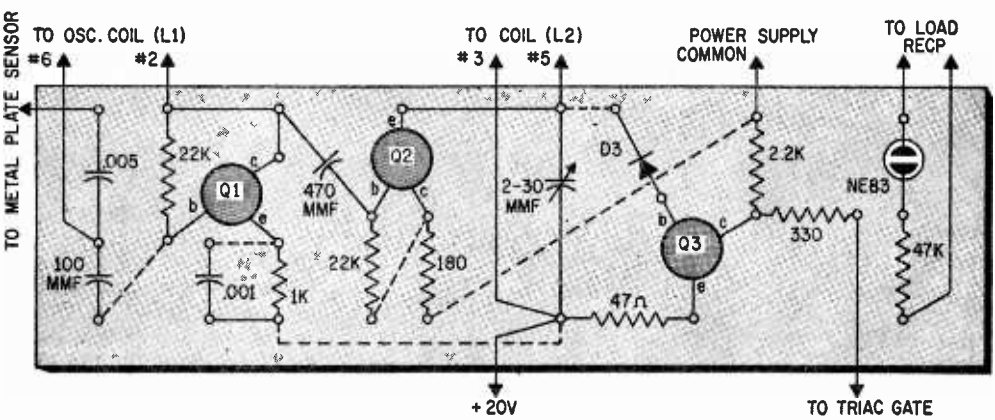
of aluminum. If the stud type is desired, the mounting holes will have to be modified.

Silicone grease must be used between the mica insulator and the metal surfaces of the heat sink and chassis to insure better thermal characteristics of the heat sink. *The heads of the mounting screws, which are exposed at the top of the chassis, also must be insulated.*

The rest of the circuit is mounted on perforated circuit board (measuring 1¼ x 4-in.) and mounted using two angle brackets.

Adjustment. When construction is completed, two adjustments are necessary. First, the selective stage (L2, C6) should be tuned to about 1 MHz. If an RF generator is not available, merely set the slug of L2 to its midpoint position. Then a load, such as a lamp, should be plugged into the load receptacle. The oscillator-coil slug is now adjusted until the lamp just begins to turn off—with

(Continued on page 105)



Component-board layout shows position of small components. Use spaghetti (plastic tubing) on the base lead of Q1 and Q3 to prevent short circuits. Dotted lines are wire connections on under surface of the perforated phenolic board used as chassis.

Shotgun Signal Generator

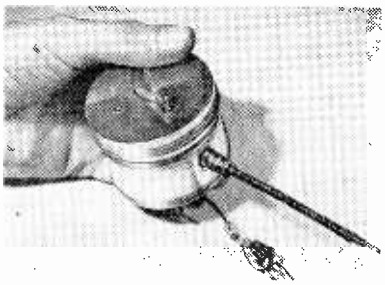
Blast-through audio, IF, RF and video troubleshooting!

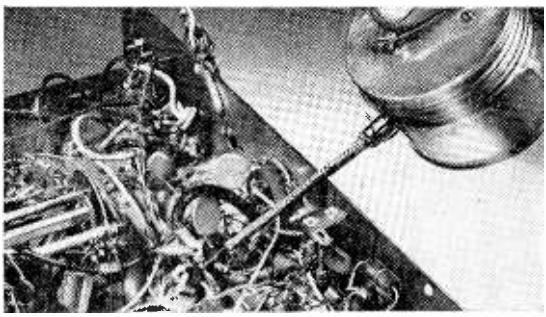
Robert E. Kelland

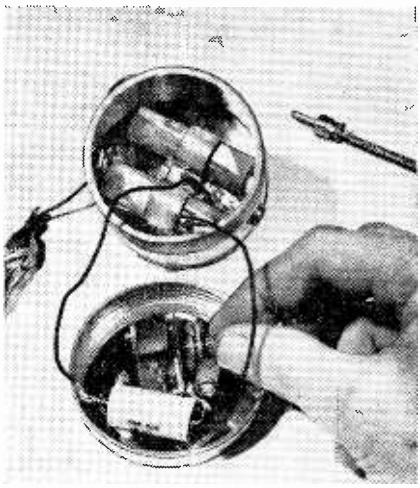
■ Noise gets through where signals fail to get. And it's a simple matter to generate noise. All you need is an arcing contact and all sorts of frequencies are generated. How do you generate this noise? Just dig out that old, unused code-practice buzzer and convert it into a *noise generator*. If your buzzer is in operating condition it will cost as little as fifty cents to complete the job. Before the circuit and construction details let's see what a noise generator is, and where it can be useful.

Remember the Spark Gap? Basically, the output of the noise generator consists of a fundamental frequency, in the audio range, plus an infinite number of harmonic frequencies. However, the harmonic frequencies are not harmoniously related to produce a melodious tone—far from it. Instead, the output (when reproduced) will be heard as *noise*. This noise will easily pass through audio, RF and IF circuits *without any tuning or adjusting*—the reason why this noise is useful. The noise generated by

Shotgun Signal Generator







Completed signal generator is easily held in one hand (top left) and can be conveniently moved from point to point in a circuit (bottom left). Extended use may call for some minor touch-up of the unit's tone— if so, remove the top portion of the container (above), depress the switch, and make the necessary adjustments.

the buzzer can be heard on VHF receivers, tuned to over 100 mHz (mc.) when the signal is injected at the antenna.

Specific Uses. Although we have already hinted at a number of possible applications in the preceding paragraph, the following list is worthy of study:

Testing AM amplifiers
Testing RF amplifiers
Testing IF amplifiers
Testing video amplifiers
Testing complete systems (e.g. radio receivers)
Testing speakers

The noise generator will test all of these and others not listed which you may think of by yourself.

In short, the noise generator is an *untuned* signal generator that will *quickly* test numerous electronic circuits *for operation*. The generator will not show up amplifier distortion, improper tuning or alignment, or other pertinent details; it will simply let you know if the amplifiers are amplifying. Special audio and RF generators are needed to ascertain the other facts.

Standard signal injection and signal tracing methods are used in conjunction with noise generators. To find a defective stage you start injecting at the output stage and work towards the input until the defect is found.

Construction. The container used in the model shown in the photos is a cut-down mailing *can* measuring 2½ inches diameter and 2 inches high. Any similar or larger dimensioned can may be used. If a screw-on cover container can't be found, a push-on type will do provided you secured it with self-tapping screws.

Follow the pictorial diagram and the photos for construction types. The buzzer serves as its own template to drill the two mounting holes and the access hole for the switch.

The switch is made from a 1x¼-inch strip of spring brass. Bend and drill the switch as shown in the diagram. Sweat-solder the switch to the outside of the cover so that the self-tapping screw (switch contact) will pass freely through the previously drilled access hole.

The phono jack is mounted half way up the side of the container and is soldered directly to the can. An additional hole is required for the battery clamp and ground lug retaining screw. The battery clamp is formed from a 2x½-inch strip of aluminum. The batteries should be connected and soldered before they are clamped in. Because

of space, a battery holder is not used—it will be necessary to solder in new batteries when they need replacing.

Only two wires interconnect the cover to the body of the can. The first wire is from the positive side of battery B1 to the adjusting screw on the buzzer, and the second from the ungrounded terminal of the phono jack J1 to capacitor C1. Incidentally, if you use the same size can as the author, you should select the smallest size capacitor possible, otherwise you may have a tight fit. (Don't use a capacitor with a breakdown voltage less than 600 volts.)

Test Prod. Shield of the test prod can be braid removed from a piece of coaxial cable or thin tubing (from an indoor TV antenna). Solder the braid at the ends to prevent fraying. The ground lead can be a 12-inch length of AWG-20 hookup wire if a length of test-lead wire can't be found. You can solder it directly to the can, if it isn't aluminum, but a solder lug (secured to the bottom of the can by the battery-clamp screw) that will grip the insulation will prevent the ground lead from breaking frequently. Attach a clip to the other end of the lead.

PARTS LIST

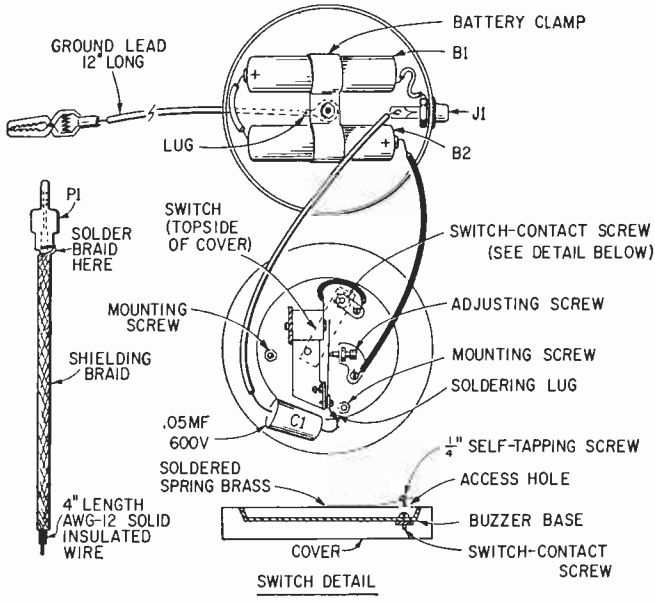
B1—2 size AA penlight batteries, 1 ½ volts each
C1—.05-mf., 600-volt capacitor (see text)
J1, P1—RCA-type phono jack and plug
1—Code practice buzzer (Lafayette 99R2556 or equiv.)
1—Metal container, 2½" diameter, 2" high (see text)
Misc.—Shielding braid, AWG 12 insulated copper wire, scrap metal, screws and nuts, hookup wire, alligator clip, soldering lugs, solder, etc.

Estimated construction cost: $2.00
Estimated construction time: 1 hour

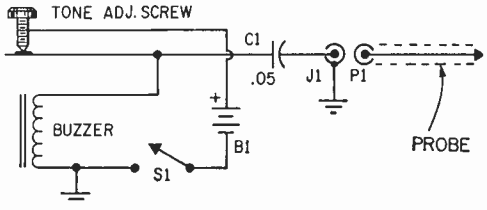
When finished, check your wiring against the schematic diagram.

Test the noise generator with the cover removed so that you can set the tone-adjusting screw. Depress the switch and adjust the screw for the highest-frequency, most consistent sound possible. Put on the cover (be careful that the interconnecting wires do not jam the buzzers' armature) and the noise generator is ready to go to work.

A final test can be made by touching the prod to the antenna of a radio—a loud signal should be heard at the speaker if everything is ok. ■



Pictorial diagram (at left) shows how parts are arranged in top and bottom sections of circular container. Batteries should be wired in series.

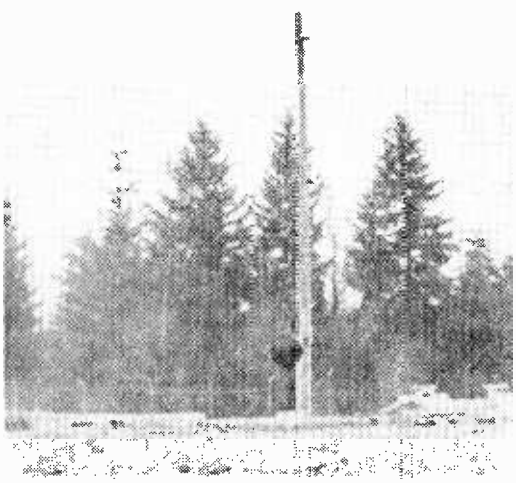


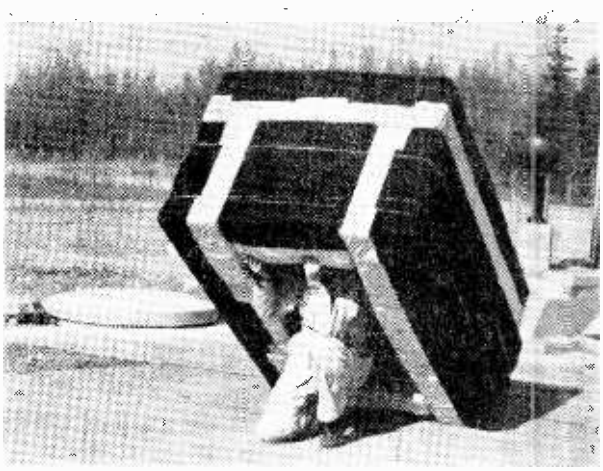
Schematic diagram (at right) reveals extreme simplicity of noise-generator's circuit. Ground lead (not shown) is connected to cover by battery-clamp screw.

PEOPLE KEEP OUT

Skittish rabbits, sea gulls, coyotes and even rifle bullets can be detected by robot radar sentries. But only man invading a Minuteman Missile site will alert Air Force gendarmes miles away.

by Ray Thomas/The Boeing Company





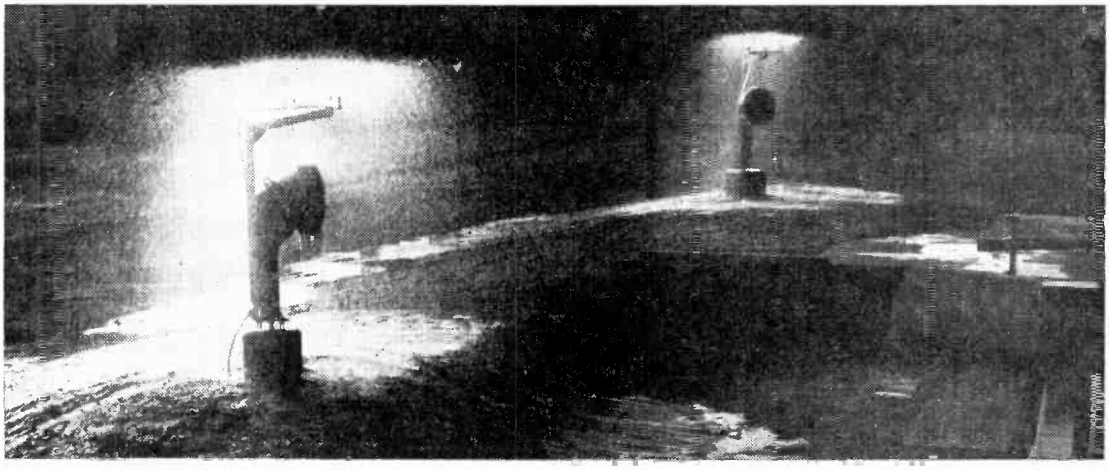
■ Electronic sentries are helping guard Minuteman II missile sites at Grand Forks Air Force Base, North Dakota. Designed by the Boeing Company, the sentries alert Air Force security personnel whenever intruders enter remote-site missile-emplacement areas. The system is so discriminating it ignores curious animals or windblown debris. But if an unauthorized person enters an alert area, the intruder will suddenly acquire escorts wearing Air Force uniforms.

A radar-type concept, the system relies on transmitters which broadcast low-frequency impulses over an entire area. Receivers pick up the signals, digest them electronically and alert Air Force missilemen if an intrusion has been made. Security responses are measured in seconds.

A most interesting thing about the system is that it is keyed to avoid costly and irritating false alarms. Wayward coyotes, sniffing at the chain-link fences surrounding missile sites, could create chaos if the security system triggered an alarm each time this happened. A low-flying bird, a skittish jack rabbit, or an aimless tumbleweed could produce the same effect.

Man-Minded. Boeing's solution to the false-alarm problem is to peg the security system's response to the radar-scattering pattern emitted by a human being. Also, to keep waving grass, passing vehicles, or even a puff of snow from triggering an alert, the system relies on carefully designed signal-processing techniques. Only valid signals emanating from the area under surveillance are relayed to Air Force security guards.

Designing the system to disdain such things as birds, coyotes, jack rabbits, and pickup trucks but to respond immediately



to a valid intrusion came only after intensive testing. For this Boeing established field sites at Tulalip, Wash., and at Stampede Pass in Washington state's Cascade Mountains.

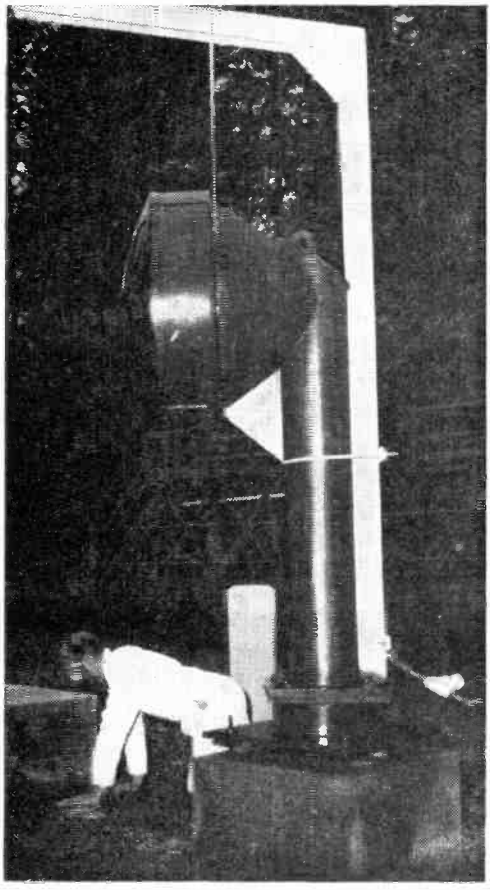
Company purchasing personnel became accustomed to orders for rabbits, guinea pigs, ducks, and pheasants. But figurative eyebrows were raised when they received an order for a planeload of tumbleweeds. Another surprise was an urgent order for a quantity of ice-shaving machines (this particular item was for snow-tests at Tulalip). Eventually, however, purchasers obtained 14 of the not-so-common machines—every available one west of the Rockies.

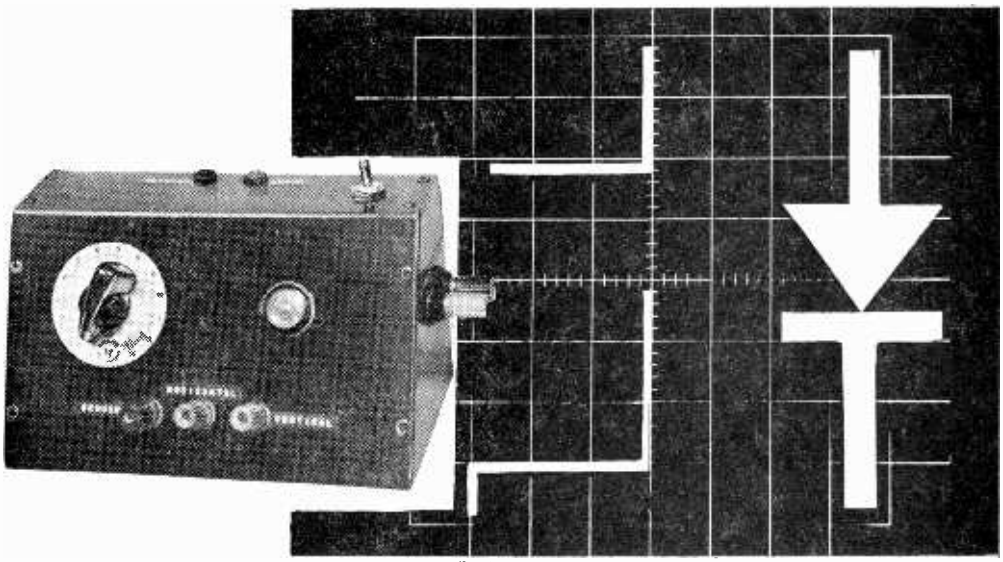
Gull Proof. Sea gulls posed a special problem. Gulls are protected, and Boeing had to secure permission to use them for test purposes. Department of Interior officials mentally linked the name "Boeing" with airplanes and had a moment of horror thinking that the gulls would be heaved through jet engines. Told that the gulls, like all of the other creatures, would simply be released through a harmless radar field, permission was granted.

Obtaining live jack rabbits was not easy, either; at first no one could catch them. Eastern Washington Boy Scouts took on the task as a project, went on a jack rabbit expedition and triumphantly delivered three to Boeing test engineers.

Pigeons, specially-loaded trucks, antennas, farm machinery, even empty beer cans were used to check out the security system's reporting accuracy. Once a rifle bullet was fired through the test area. Sure enough, the bullet showed up on the test instruments. The security alarm system, however, merely shrugged an unfooled electronic shoulder. ■

No matter how you slice it, man cannot intrude on Boeing protected missile sites. Airborne drop-ins (far left) triggered the klaxon as did the creeper (below) and the shut-in (above center) covered with radar absorbing material. Snow and artificial rain (above) did not hamper operation.





DYNAMIC DIODE CURVE TRACER

Don't guess! See at a glance the exact characteristics of that unmarked or suspected-defective diode. Use the same methods that are used to classify new diodes.

by Henry Schneider

■ If you're a typical experimenter or service technician, you've got a box of diodes—accumulated over many years—filled to overflowing. And if it's like anyone else's diode collection the markings have about as much meaning to you as the double-talk on Radio Moscow. It's a sure bet that if you start to use them, somewhere along the line you're going to connect a 50-PIV (PRV) diode into a 600-volt circuit.

But there is a way to check diodes, even if they haven't the faintest trace of a marking. Not only can you check the characteristics of silicon and germanium diodes, but Zeners as well. Throw together the dynamic *Diode Curve Tracer*—in about one hour construction time—and you'll be able to reproduce visually the dynamic characteristics of most of the diodes you'll run across. And best of all, you'll be able to tell whether those 500-for-a-buck surplus Zeners are any good, and if so, exactly what their breakdown characteristic is.

The *Diode Curve Tracer* must be used with a scope—any inexpensive type will do if it is calibrated properly. With it we trace the characteristics of the diode we are testing.

The Underlying Theory. The ideal semiconductor diode would have zero resistance to forward current and infinite resistance to reverse current flow. (The line to the right of the zero point on Fig. 1 would

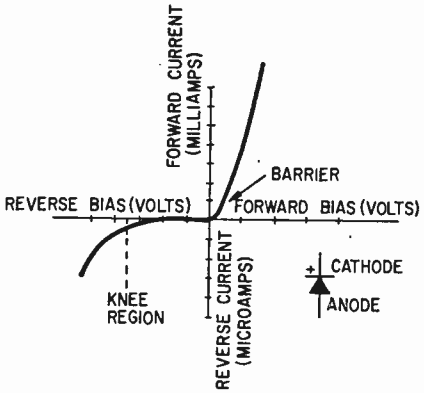


Fig. 1. Typical characteristic curve of a common diode shows forward and reverse current and bias (applied) AC voltages.

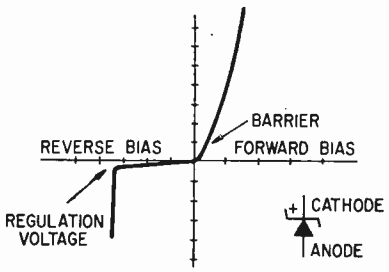


Fig. 2. The knee region of Zener diodes is a sharp bend to give a definite regulation voltage point. A curved knee just wouldn't work.

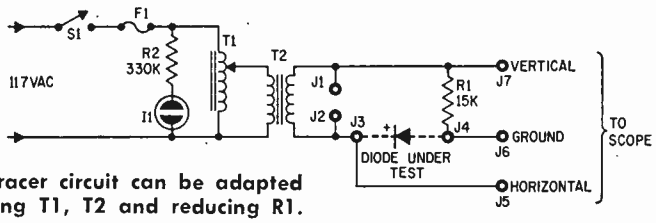


Fig. 3. Dynamic Diode Curve Tracer circuit can be adapted to high-current tests by changing T1, T2 and reducing R1.

go straight up and the line to the left of it go straight across—horizontally.) But in all semiconductor diodes there is some forward resistance and a much greater reverse resistance. You will readily see from the figure that the more vertical the forward curve is, the more efficient the diode is and the less power loss it has. And, of course, the flatter the reverse voltage line, the less reverse leakage there is. The curve at the dashed line is the *knee area,* and indicates the maximum reverse voltage the diode will stand. Beyond that point it will probably avalanche and burn out.

The Zener diode (Fig. 2) is designed to take advantage of this breakover point. It is so designed that it can avalanche (within limits). When placed in a properly designed circuit it limits the output voltage to the rated value of the Zener diode.

Putting It Together. The Dynamic Diode Checker can be built in virtually any cabinet you've got around—the model shown is assembled in a home-brew instrument-type cabinet but you can substitute a standard aluminum cabinet or even a wooden box. The only precaution necessary—if you use a metal cabinet—is to double check that no part of the circuit wiring touches the enclosure (for safety's sake.) A metal cabinet is just that—a cabinet. It is not a common ground.

PARTS LIST

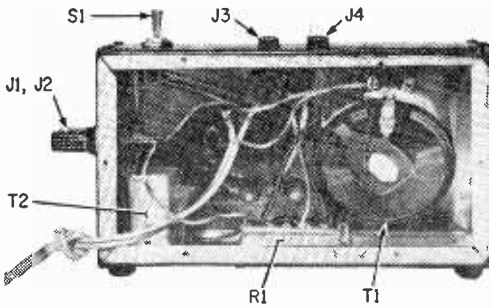
F1—1.5 amp. fuse
I1—Neon pilot lamp (NE-51 or equiv.)
J1, J2, J5, J6, J7—5-way binding posts (3 red, 3 black)
J3, J4—Banana jacks, panel insulated (see text)
R1—15,000-ohm, 2-watt resistor
R2—330,000-ohm, 1/2-watt resistor
S1—S.p.s.t. toggle switch
T1—1.75 amp. variable autotransformer (Ohmite VT2, Knight 64Z938, Standard 175BU or equiv.)
T2—Isolation transformer (Triad N54M or equiv.)
1—Sloping panel cabinet 4-1/2x4-1/4x 7-3/16-in. (Premier ASPC-1203 or equiv.)
Misc.—Pilot light socket, fuse holder, tie strip, decals, wire, solder, etc.

Estimated cost: $25
Construction time: 1 hour

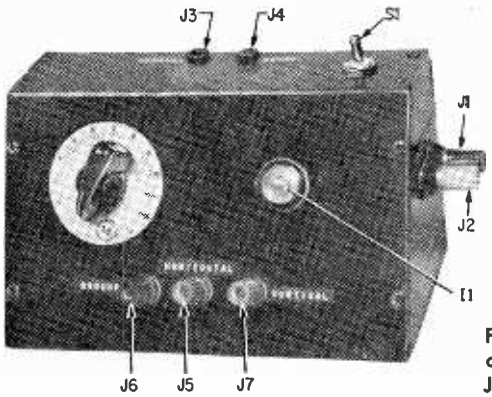
Any component layout can be used—it's not critical. J1, J2, J3, J4, J5, J6 and J7 are insulated, 5-way binding posts. The diode test jacks (J3 and J4) in the model shown are banana jacks, so that a clip jig can be used; but for general use, connecting to J3 and J4 might be more convenient if they too are 5-way binding posts. With paint or other color coding, be sure to mark J3 as the *cathode* end of the diode. (Jack J4 is the *anode* connection.)

J1 and J2 are provided only for convenient AC voltage measurement and so the auto-

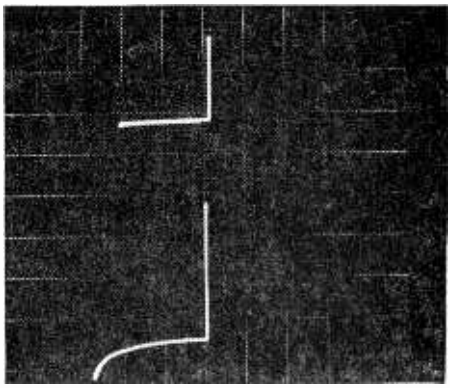
DYNAMIC DIODE CURVE TRACER



Rear view of Curve Tracer shows components mounted inside cabinet. Larger cabinet is needed for high-current version of tester.



Front panel of the Curve Tracer has only one control—T1. Scope connections (J5, J6 and J7) can be placed on side or rear.



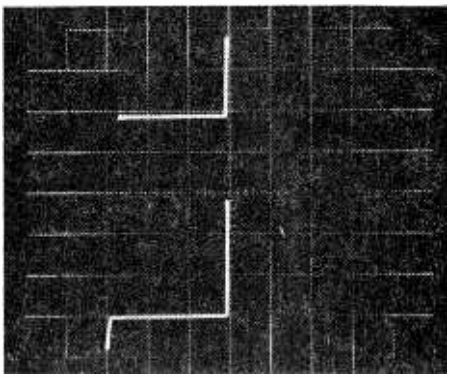


Fig. 4. Actual scope traces of typical diodes. The lower trace in each photo shows the overdriven and regulating current flow in rectifiers and Zeners.

transformer, T1, can be used for other purposes—they may be eliminated if you don't feel you'll need T1 for other purposes.

While T2 is an isolation transformer and may appear to be unnecessary, it does isolate the tracer from the AC power line, and should *not* be eliminated.

Using The Tracer. To test a diode, calibrate the horizontal sweep of the oscilloscope with an exact voltage per centimeter (or inch) and set the vertical gain at a value that will keep the whole curve on the screen of the scope. Connect checker to scope. Connect the diode between the cathode and anode terminals (observing polarity!). Turn on the checker and advance the variable control slowly until the diode curve approaches the knee region. Examples of a germanium diode under test are shown in Fig. 4.

As the curve approaches the knee read the horizontal voltage. This is the peak inverse rating of the diode. In the case of Zener diodes, proceed the same as with ordinary diodes until you reach the breakover point.

You then read the voltage of the horizontal line. This gives you the voltage value the Zener will control at. The cleaner the reverse breakover, the better the quality of the Zener.

Note that the curve traced on your scope may be reversed from left to right when compared with the illustrations. It is important to observe the *cleanness* of the curve to judge the quality of the diode under test. Be sure to use a reliable calibration voltage. If you are reading the calibration voltage in RMS, remember that the scope is indicating it in peak-to-peak values. You only have to calibrate the horizontal—you need not read the vertical values. ■

Sir CB and the Dragon

C. M. Stanbury II

■ A secretary ushered me silently through a maze of corridors into the inner sanctum of Montebalm Electronics. A door slid back as we approached and there I was looking across the desk at a little bald headed guy with horn rimmed glasses. He nodded and she left. "I'm Mr. Smith." Without looking up at me. "And you're Mr. Bonner."

"That's right, Conrad Bonner." Put on a smile. For fifty grand I'd be real friendly. "Everybody just calls me C.B."

"Well, C.B., you have all the qualifications."

And just what were those qualifications? All I'd given them was a capsule history of yours truly: three FCC violations, two fines and a cancelled license.

"An elementary knowledge of radio communications, and nerve." Smith came up with a very legal looking document, small print and all. "Sign this."

"What is it?"

"A contract. Among other things, it says if you don't come back we're not responsible."

A funny feeling at the back of my neck. "And where am I going?"

"You'll find that out once the contract is signed." Smith took a pen from his pocket. "You stand to make 50,000 dollars for only a few hours work. At that price, one can afford to take a few chances."

I considered it, took contract, pen and signed. Smith swung round in his swivel chair, stepped on a button in the floor and the whole back wall slipped up into the ceiling. Behind it a maze of advanced electronic gear, in the middle a cubicle about man sized.

"What's that?"

"A time machine." He stood up. "It only goes backwards of course but. . . ." He walked to the cubicle and picked up from its floor what looked like a miniature CB walkie talkie. "We have now developed a method of returning our passenger to the present."

"That's nice." I laughed. "Otherwise contract or no contract. . . ."

"We merely have to maintain radio contact on 27065 kc." Smith sighed. "Which unfortunately is Citizens Band channel 9."

I moved closer to the cubicle. "What happens if there's QRM?"

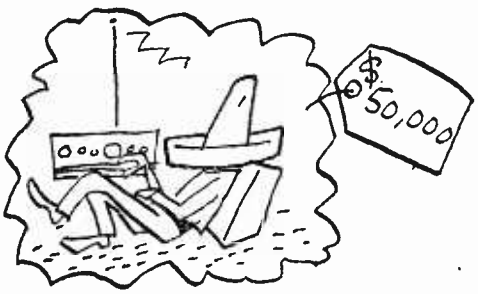
"The transceiver has been equipped with low drain, extra long life batteries. Eventually the channel has to be clear." He picked up the walkie talkie and handed it to me.

I thought about what all that fifty thousand dollars could buy. Could even move to Mexico and get myself a new CB license down there. "Just how far back are you going to send me?"

"To the Pyrenees, in the days of the Emperor Charlemagne and his knight Roland." Smith crossed to a closet in the corner. "And dragons."

Dragons! I thought they all worked for the FCC.

"In addition to testing the time machine, your prime mission will be to verify the presence of dragons as late as the dark ages." He opened his closet and produced a suit of armor. "Strong as steel but plastic and



light weight." Followed this up with a sword. "We don't actually expect you to use it but without a sword you'd be conspicuous."

"What happens if I do meet a dragon?"

Now Smith smiled ever so slightly. "Call us on Channel 9 and we'll bring you back in a hurry."

So calling myself a fool all the time I was doing it, yours truly put on yon suit of armor then, with sword and transceiver grasped tightly, got into Montebalm Electronics' time machine.

Smith closes the chamber behind me, presses a button and bang there I am, Sir CB perched atop a cliff in the Pyrenees. Behind me there's a cave and when I look down, I'm overlooking a mountain pass with trail leading from the pass up here to this cliff. Put the transceiver on. "Sir CB to base, how do you read me?"

"Loud and clear."

Look down again, I see some dust then pretty soon an army of knights on horses at full gallop, like the devil himself is after them. At their head an old cat who looks just like the King of Hearts who, somewhere I read, is Charlemagne himself. Now I can see what is after them and I really do a double take. A dragon breathing fire and lightning, also complete with four heads, three tails and perched atop him a dame—red haired and really built.

I try to contact Montebalm but the dragon is making too much static. Charlemagne and his army charge by, but instead of following them, the dragon starts up the path toward me. I duck back in the cave but he comes right in after me. Sticking out the sword, friend dragon lets out one good snort and the thing melts.

Fair damsel stands up on his back. "Whoa." Stamps her foot. "Whoa, Slog." The dragon meekly kneels and turns off his furnace. She jumps down with all that beautiful red hair flowing loose. "You're in our cave, you know."

My hands are still shaking. "Well, there didn't seem to be any other place to go."

She notes my transceiver and moves in closer. "What's that?"

"A radio."

"What's a radio?" Runs lily white fingers across it.

"Something you can talk with to people far away."

She takes hold of the antenna, then suddenly jerks transceiver away from me and darts around behind the dragon.

"Hey." I start after her but Slog reactivates his furnace, lets out a single snort which stops me in my tracks.

She perches on his far tail. "Take it easy, friend. We're all part of the program." Turns on the rig. "Angelica to Montebalm. How do you read me?"

Smith's voice crackles through the centuries. "Very strong. No skip and the channel is absolutely clear."

I made another start toward her which brought forth a second fiery blast from Slog.

Angelica waves her hand at me. "Hush." Gets down from the dragon's tail. "Angelica to Montebalm. Is the special enlarged chamber ready to receive Slog?"

"Everything is in go position. The next time I hear your carrier, we will bring the dragon forward."

Fiddled with the stump of my sword. "But I need that transceiver to get back."

She laughed. "You can stay here with me and help find another dragon for Montebalm." She placed the rig in one of Slog's mouths, pressed the button then hastily withdrew her hand. The dragon vanished!

"But what do they want dragons for?"

Angelica smoothed her hair. "Something about *world conquest.*" ■

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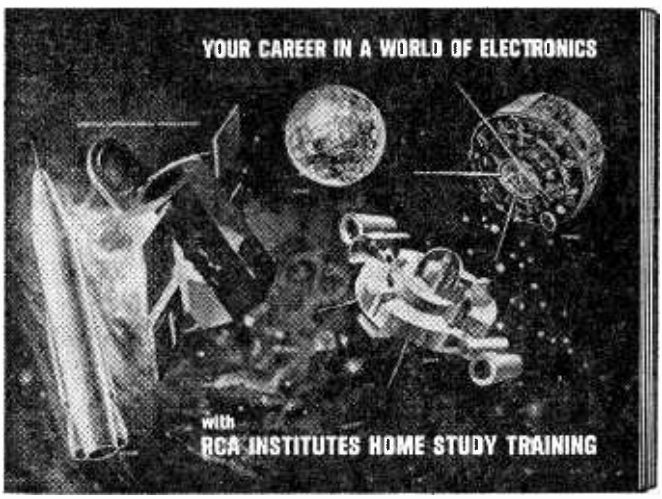

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How to Get Rooked

Amateur private eyes open their wallets wide for bugging devices.

■ No good secret agent would be without his array of electronic bugging devices. And the respective governments which sponsor said agents presumably spend considerable time, effort, and expense to keep him well supplied with the latest gadgets.

As a result, great strides have been made in miniaturized transmitters, recorders, and other such units. What's more, everybody and his brother seem to have been bitten by the "007 Bug." This has created a market for private, non-government-produced, miniaturized bugging gear. Now, anybody with sufficient funds can easily obtain enough bugging equipment to make Napoleon Solo look as old fashioned as Sherlock Holmes with his magnifying glass.

And see what happened? There were so many abuses of the bugging equipment by do-it-yourself secret agents and some shady private detectives that a federal investigation was called to look into the matter. The searchlight was even shone into some interesting *government* applications of electronic espionage.

The Crackdown. Remember the old joke about "What's that fly doing in my soup?" (Answer: It looks like he's dog-paddling.) This turned out not to be so funny when FCC investigators discovered that things like radio transmitters inside of olives were being placed in martinis.

During the government's recent investigation of these eavesdropping techniques, a Senate sub-committee really came upon the electronic martini with the hot olive (the toothpick was the antenna). Until the hearings were held, the recipient of such a martini could only drink it and grumble in anguish. Now he will be able to make it a federal case.

The FCC ruled that electronic bugging involving radio transmissions by anyone other than an authorized government law enforcement agency is a federal offense. The rule provides for a fine of $500 for every day the bug is used, a penalty that could easily drive the electronic martini into the pages of history or the makers of the gadgets to drink. There are many other eavesdropping devices, however, which do not utilize radio transmission and are therefore not covered by the FCC rule.

An FCC official has stated, "I would sup-

The 007 Way

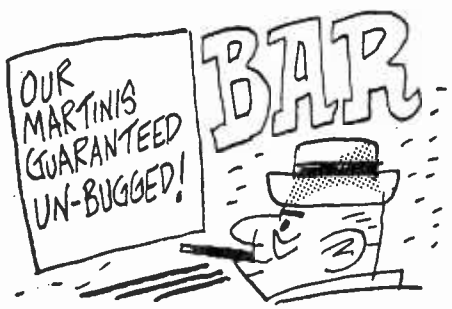
by Tom Kneitel, K2EAS

It's no trouble at all to bug or de-bug at twice the going price.

pose the new rules will affect private detectives who make it a practice of using radio devices to get evidence in divorce cases, and those trade-secret stealers who attempt to listen in at business luncheons or meetings to find out what competitors are doing."

The Exceptions. This may indeed be the case. Senator Edward V. Long (D-Missouri), chairman of the powerful Senate Judiciary Sub-Committee that probed the bugging devices (and the man who brought to light the bugged martinis), said that the FCC took a step in the right direction. He added that the FCC would still have to draw up guidelines setting limits on when law enforcement agencies could press such devices into service. (The use of miniature listening units by Internal Revenue Service agents was highlighted during the Senate hearings, by the way.)

The Justice Department, the FBI, and the Internal Revenue Service each noted that they were law enforcement agencies and as such were exempted from the new FCC rules. The exempted category also includes any security detail or branch of any federal agency (presumably this means the CIA, military intelligence, secret service, etc.).

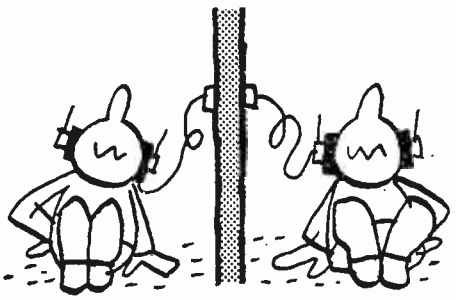


FCC Chairman E. William Henry said the action was designed to protect the little man from the "big ear" and declared that the "right of privacy is precious and should not be sacrificed . . ." The FCC took the question under its wing because, it claims, almost all eavesdropping devices require use of a microphone, a radio transmitter, or an amplifier to pick up or monitor conversations and to broadcast them back to another point. That means the use of the airwaves, which are under FCC control. FCC officials carefully pointed out that eavesdropping is different than wiretapping, which also is illegal, although they admitted that many eavesdropping devices could easily perform as wiretaps.

Sampling the Market. In view of the hearings, we decided to see what kind of bugging gear which you or I could purchase without any more difficulty than buying a pack of smokes. We fired off letters to several dozen manufacturers who run classified ads for these gadgets in various publications. Surprisingly, few answered our request for information on their products. Deciding that

our use of a publishing company letterhead might have caused some consternation on the part of the manufacturers, we found our natural curiosity whipped to an even higher pitch.

We next tried sending inquiries on plain letterheads and signed by persons whose names haven't appeared in publications. This brought in a better crop of replies, but some companies seemingly send out their brochures only to applicants meeting some unknown set of specifications. In other words, we were unable to get replies from many companies regardless of what devious means we employed.



And no wonder. For when we finally saw the equipment being offered for sale to potential espionage agents, we were aghast at the prices being asked! In instance after instance, this same gear could be duplicated from an Allied or Lafayette Radio catalog at a fraction of the cost. Some offerings, of course, are not to be found in a parts house catalog. Even so, the manufacturers evidently assume that the prospective customer is unaware of the fact that most of the products are not too difficult to build with inexpensive components or can be purchased elsewhere quite inexpensively.

For example, most spy supply companies offer a miniature FM radio transmitter. The rub lies in the fact that the exact same unit is offered by different spy companies for prices ranging from $84.95 to $149.50. The little black box promises to broadcast voices over a range of about 200 feet, using a 1.5-volt battery as a power source. But almost any experimenter can dig through an electronics supply house catalog and locate something called a "transistorized FM wireless microphone transmitter for high-impedance microphone." The units are roughly the same size, perform exactly the same function, over the same range. The catalog unit sells for less than $3.50!

Anti-spy Devices. What about the bug "detecting" devices? An outfit in New Mexico sells one which enables you to sense the presence of any nearby radio bug operating within the frequency range of 85 through 250 MHz (mc). It's a nice piece of gear and sells for $99.95. A Houston, Tex., company offers a less expensive detection device priced at $59.95 (a budget model sells for $39.95, but offers less sensitivity than its larger brother). Want one for even less? Lafayette Radio will be more than happy to sell you a gadget called a "field strength meter," an electronic duplicate of the $99.95 unit in almost every respect, for less than $7!

No good spy would be caught without a miniature amplifier to use when listening through a wall. A Canadian manufacturer has one which puts out 100 milliwatts of audio for only $39.90. A slightly more sophisticated unit, with a stethoscope-type earphone, sells from a New York City supplier for $69.50. But *you* know that you can buy a miniature amplifier which puts out *3 watts* (30 times more power than the $39.90 unit produces) from McGee Radio, in Kansas City, Mo., for $7.50. Add a pair of $1.39 Lafayette stethoscope earphones and a 98¢ Allied Radio lapel crystal mike (total investment of $9.87), and you've duplicated (perhaps exceeded) a $69.50 "spy" product.

Going even further into spying, you could purchase a special FM receiver which permits you to hear some of the bugging devices from your car. The one pictured in a brochure we received sold for $185. But closer inspection revealed the unit was a Regency Model M-40, available from normal sources for $114.95.

Twice Plus Two. Biggest thing in bugging, of course, is the "secret" tape recorder. The mail order spy shops peddle these at prices not far from astronomical. Here's an example. You can buy an Isco Model CTR-5400 tape recorder from Allied Radio for $59.95. The exact same, identical (bolt-for-bolt), unit is being sold from the New Mexico company for $117.88—only $2 less than twice the Allied price!

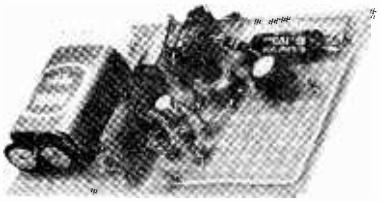
Place an $8 attache case around a little tape recorder and you can expect to spend from $399 to $475. If you bought your own attache case and a $16.95 "Juliette" recorder from Allied, you could duplicate the whole thing for about 5% of the spy shop price.

So it goes, and with the possible exception

(Continued on page 127)

Perf-Board Project

Super-Gain Amp for Mini-Mikes



■ The jokers on the entertainment committee had it beautifully set up. Concealed behind the flowers decorating the restroom of *les jeune fils* was a mini-mike (a miniature microphone) connected to a voice-operated tape recorder. And at the stroke of midnight the tape was to be played so that everyone could hear what the girls thought of their dates. Naturally, the embarrassment this would cause was of no interest to the entertainment committee.

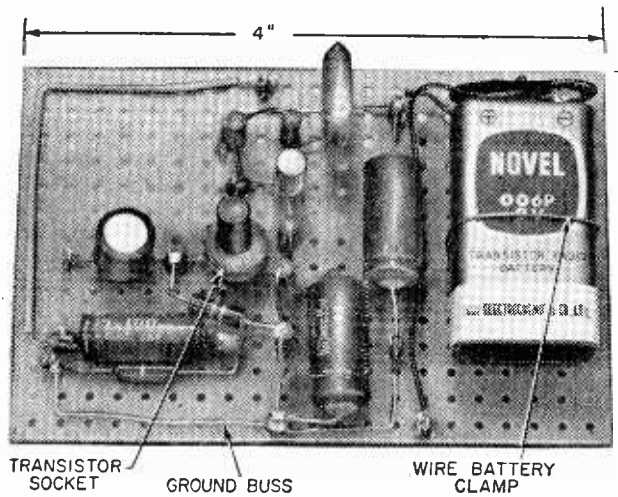
At the stroke of midnight the chairman, wearing a smirk three-miles wide, made his well rehearsed *double-entendre* announcement; and to the chorus of cries from the "mamas" and hysterical laughter of the "papas" he rolled the tape.

Fun-eeee!!!! You bet! For all that came out of the recorder was clinks, clanks, oomphs and swishes. Not a single intelligible word to reward the efforts of five men, 400-dollars worth of electronic gear and 10 miles of tape.

What beat the boys was the mini-mike they had taken so much trouble to conceal. Fact is, mini-mikes are different from the usual mikes we're used to, and the nature in which they're used adds another dimension to the old problem of getting enough gain. *And the differences and dimensions are resolved by simply getting more gain.*

Why The Mini-Mike. The type of microphone that resembles a coat button or a tie tac simply has not got the "oomph" of a "standard" mike. As an example, consider the usual experimenter-grade crystal or ceramic mike. Its output is generally around −58 to −45 db when the sound is directly into the mike. On the other hand a mini-mike's output is about −70 db under the same conditions, so the user starts off with a need for about 30 db additional gain. Then, since mini-mikes are used for *eavesdropping* the sound is rarely projected into the mike and the difference in the mike's output voltage between direct and indirect sound averages 20 db (or more). So before the experimenter can effectively use a mini-mike an additional gain of at least 50 db is required.

Since few recorders or amplifiers have



Perf board isn't crowded and it should be quite easy to shave a few square inches off the size if you have to make a smaller unit to fit into a particular cabinet or area of an existing amplifier. For a little more money you can get really miniature electrolytic capacitors—mounted vertically to save space.

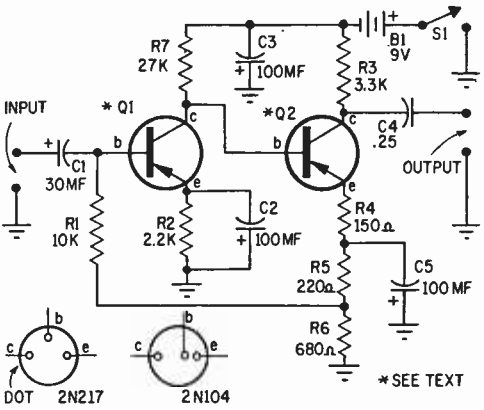
50-db gain (or more) to spare a mini-mike generally requires an additional preamplifier. Unfortunately, most add-on preamps intended for mini-mikes are usually quick-and-dirty projects with poor stability, worse frequency response, and high distortion and excessive noise (hiss) level.

But add less than a buck's worth of extra components to any quick-and-dirty preamp and you come up with a *Super Gain Amp. For Mini-Mikes;* a preamp with good frequency response (± 3 db 10 to 10,000 Hz), low distortion (less than 1% at rated output) and low noise. Minimum gain is 50 db and maximum output voltage (before clipping) is 0.50 v. *rms.* The clipping level is symmetrical (both positive and negative peaks are clipped equally) so that if it is used for sound pick up where there may be sudden peaks in sound level the recorder or main amplifier will not be overloaded. (You'll just get distortion of the original waveform, caused by the clipping—but the signal will be intelligible).

The circuit (shown above, right) is an adaptation of a recommended preamp designed for Hi-Fi systems. Nothing is really unusual except for the rather "tight" base-bias stabilization that allows the preamp to be used (concealed) in places where there are unusually high or low temperatures without serious effect on overall performance.

Though the input impedance is low, in the order of 10,000 ohms, the preamp can be used successfully with high- or low-impedance mini-mikes. It cannot be used with standard mikes as the maximum input level before saturation is 1.8 mv. The output can

(Continued on page 127)

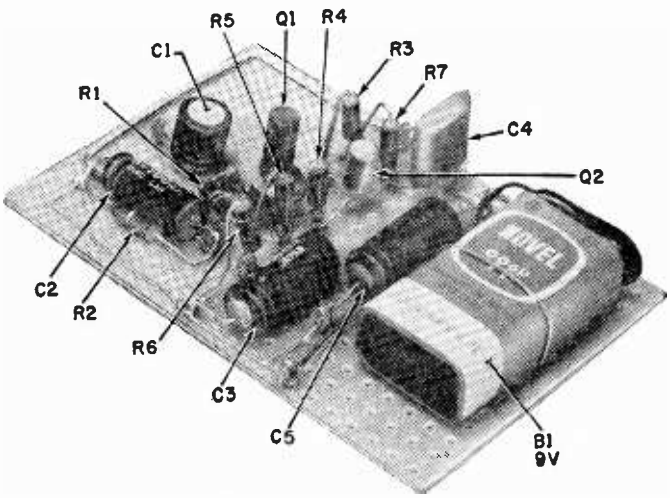


Super-Gain Amp circuit has direct-coupled transistors and bias network (R1, R4, R5 and R6) to reduce effects of temperature.

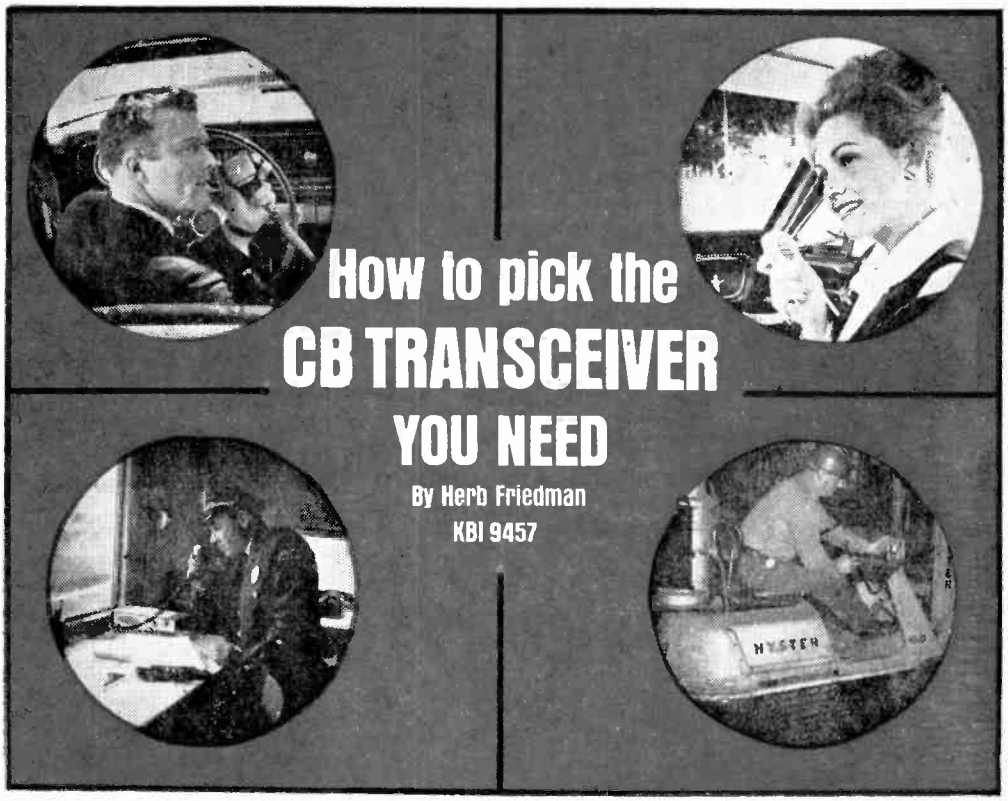
PARTS LIST

B1—9-volt (Burgess 2U6, Eveready 216 or equiv.)
C1—30 mf., 12 VDC electrolytic capacitor
C2, C3, C5—100 mf., 12 VDC electrolytic capacitor
C4—.25-mf. (see text)
Q1, Q2—pnp transistor (2N217, 2N104 or equiv.—see text)
R1—10,000-ohm, ½-watt resistor
R2—2200-ohm, ½-watt resistor
R3—27,000-ohm, ½-watt resistor
R4—150-ohm, ½-watt resistor
R5—220-ohm, ½-watt resistor
R6—680-ohm, ½-watt resistor
R7—3300-ohm, ½-watt resistor
S1—S.p.s.t. miniature slide or toggle switch (not mounted on perf-board)
1—perf-board, 2¾x4-inch
Misc.—Flea clips, transistor socket, wire, solder, battery connector, etc.

Estimated cost: $4.00
Construction time: 2 hours



While flea clips are used here as solder terminals any push-in terminal will serve. For a more compact unit eyelets can be set in the holes used and extra pigtail lead-length can be used as under-chassis interconnections. It may not be as neat as a printed-circuit board but it's practical.



How to pick the CB TRANSCEIVER YOU NEED

By Herb Friedman
KBI 9457

There is more to picking a CB rig than selecting a color or a brand name—it's operation that counts. Here are the important features to consider when plunking down the bundle.

■ Do you know the odds are about 3-to-1 that your next (or first) CB transceiver will not suit your needs? Yes, by conservative estimate more than 70% of the CBers are not satisfied with the transceiver they selected. The problem? Simple: no single transceiver contains *all* the generally desired features. Worse yet, features which look good on paper might well turn out to be of minor importance, while some overlooked minor feature is what was really needed.

You want an example? Okay. You need a transceiver to take on a hunting party in the backwoods—it will be mounted in an open Jeep. What's best? You select a fully deluxe model with superselectivity, high microphone gain, and an adjustable swivel bracket. The result: the superselectivity isn't worth two cents—there isn't another CBer for twenty miles, your other stations can't understand you because the supersensitive microphone is also sensitive to engine noise, and your passenger gets "washerwoman knees" from having them constantly bounce into the sharp edge of the rig's cabinet.

On the flip side of the coin is the CBer who lives in Chicago and tries to save a buck by purchasing a rock-bottom-priced transceiver. It makes no difference what features are included, since he can't use the gear—everytime the rig is turned *on* our thrifty CBer hears five channels at once.

What Do You Need? Keep in mind that you pay, in money, for every feature—even if you don't need them. And you also pay, in frustration, for those features you need but didn't get. The solution is simply to look for only those features which are *of direct value to you.* In some instances you'll find that a deluxe feature will have absolutely no practical value, to you, while a very minor feature such as the shape of the mobile mounting bracket can be of extreme importance. *(turn page)*

CB TRANSCEIVERS

Tube Or Transistor. Hottest things moving these days are the transistor transceivers, and many manufacturers can hardly keep up with the demand. But before you jump take a good look at what you're getting.

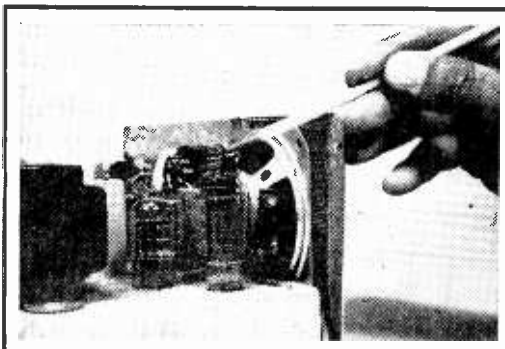
A transistorized (solid-state) transceiver is small—very small. Mounted under the dash it hardly takes up any room, in most cases, even less than the heater controls if they're installed under the dash. If you lack underdash space, or if you want to keep the passenger legroom unrestricted, a transistor rig is an excellent choice. But with few exceptions, the tuning controls on solid-state models are "sealed"—you cannot compensate for a difficient antenna system. Also, the speakers are generally small, with small sound. However, a sacrifice in sound quality is well worth the legroom if that's your need.

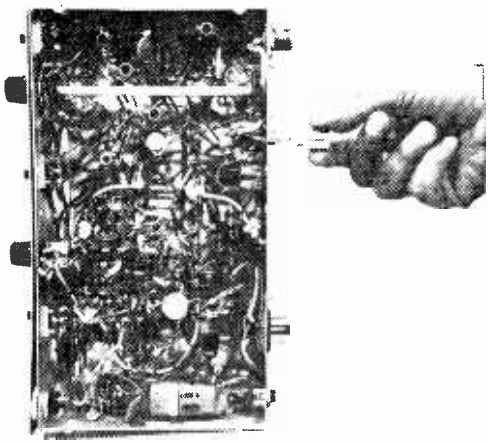
On the other hand, rare is the base station that doesn't have room for a tube transceiver with its generally superior sound quality and tune-up flexibility.

Another consideration is power consumption. If your car's electrical system is running at capacity, certainly the low drain of about an ampere for the solid-state rigs is an asset compared to the three or more amperes needed for tube models. But in the base station, where the supply voltage is the AC line, power requirement is of no importance—unless you're trying to save pennies on your monthly electrical bill.

However, if a base transceiver is to be in an area of restricted air movement, such as a closet, the low-heat production of a solid-state transceiver is certainly important enough to rate first consideration.

Finally, keep this point in mind. Repairs to a tube transceiver can generally be made by anyone with an electronics background. Solid-state circuit repairs generally require





Spring-type tube holddowns (above) keep tubes in sockets on rough roads. Spotting switch (below) is a must on variable-tuned 23-channel receivers. Easily adjusted TVI filter (right) will keep peace at home—the base station. Multiple position mounting brackets are a must for mobile rigs (lower right)—just what happens if you get a new car must be considered too, when selecting.

the fine touch of an experienced technician —one experienced with solid-state units.

Vibrators or Transistors. While most vacuum-tube transceivers employ transistor mobile power supplies, there are still a few models which employ a vibrator. It is claimed that transistors don't generate the hash common to vibrators; also, that they last longer. The truth? A well designed vibrator supply generates no hash into the receiving circuits and may last for years. Trouble may often be corrected simply by replacing a low-cost vibrator. Transistor supplies, if not properly designed, can generate an audible *whine* (true it's not hash, but it's irritating). And repairs to a transistor supply can be expensive. Experience has shown that the failure of a 75¢ rectifier in the high-voltage supply may also burn out $10 worth of power-supply transistors before the fuse blows.

Which is better? Get a money-back guarantee on the transceiver and try it out in the car. Vibrator or transistor, if it doesn't generate audible noise it's okay.

What's That "In There"? While there is a hectic race to see who can print the best sensitivity figures, in truth, most modern transceivers deliver essentially similar results, generally slightly less than 1 μv. for a *10-db signal-plus-noise* to *noise ratio*. As a general rule, sensitivity somewhere in the vicinity of 1 μv. is fine. But buying extra sensitivity, say 0.25 μv., for a mobile installation may be gilding-the-lily. The noise level generated by an auto or boat engine can exceed 20 μv., and you won't hear any signal that's weaker than the noise level.

If you want an idea of how transceivers compare in the sensitivity race we suggest you consult the test reports in the CB BUYER'S GUIDE, prepared by the Editors of RADIO-TV EXPERIMENTER.

Selectivity. Here's the troublespot. Most CBers want the most selectivity they can buy, and selectivity costs money. Actually, superselectivity is needed only in high-density CB-signal areas. Paying $50 to $100 for superselectivity when yours is the only CB station in the neighborhood, and you use the rig once a day, is like lighting cigars with five-dollar bills.

As a general practical guide: IF amplifiers, or second-IF amplifiers in double-conversion receivers, of 1600 kHz. (or higher) are somewhat broad, and you may expect a noticeable amount of adjacent-channel interference. They are recommended only for areas of low-density CB-signals; two stages of 455 kHz (three IF transformers) or a single stage of approximately 262-kHz gives good results in high-density areas with interference caused only by very strong adjacent-channel stations. For superselectivity to the degree that adjacent-channel interference essentially doesn't exist, one must look for *mechanical or crystal filters*.

The Cliff-Hangers. Mechanical and crystal filters shape the IF bandpass so that only signals on the tuned channel come through the IF amplifiers. Depending on circuit design, one is just as effective for CB transceivers as the other. However, mechanical filter circuits are generally easier to align and are considered by many to be more rugged than crystal filters.

Both devices, in effect, shape the IF bandpass so that instead of tapering off, the IF response has steep sides, sort of like a mountain cliff. Any signal not in the bandpass falls down the side of the cliff and cannot be heard.

Snap, Crackle, And Pop. All transceivers have *noise limiters*. The fact that a noise limiter on/off switch is provided means absolutely nothing; all it can do is show that there is a noise limiter. Since you know one exists, why pay extra for the switch?

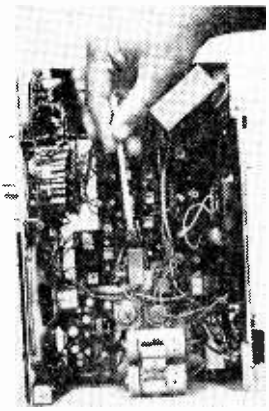
Noise silencers are something else. Unlike noise limiters which simply *reduce* the noise level after the noise gets into the audio circuit, noise silencers eliminate impulse noise in the RF or IF amplifiers by *punching a hole* in the signal corresponding to the noise pulse. They are extremely effective against sharp impulse noise, such as ignition noise, but not entirely effective against other types of noise. However, a silencer may be combined with a standard noise limiter so as to handle a broader noise spectrum.

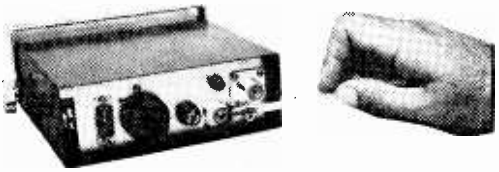
If your car is a noise generator, a noise-silencer circuit should head the list of desired features.

S, Modulation and Tuneup Meters. *S-meters* have absolutely no effect on transceiver performance; they only indicate the relative signal strength of the received station, and have no value in straight communications.

Modulation meters supplied on CB transceivers are often relative indicators showing that there is *some modulation*. Those that are supposedly calibrated in percent modulation are notoriously inaccurate. An RF or modulation lamp that *blinks* with modulation is sufficient to indicate the trans-

CB TRANSCEIVERS





Public-address or remote-speaker jack (above) is a good feature if you are working away from the mobile rig—it can also serve as a listening post in another room (garage or basement). Mechanical or crystal filter really is a needed feature in busy urban areas. Chatter on one channel is bad enough—you don't want to hear those on either side too—can prevent interference in a selective-call system too.

mitter is being modulated.

Power-output meters may be either of the calibrated or the relative-power type. As a general rule, calibrated power-output meters are inaccurate. All too often, they are simply relative-power meters calibrated with a power output scale that is accurate only when the transceiver is terminated in a 50-ohm *resistive* load. A transmission line which is not absolutely resistive will often cause these "calibrated" meters to indicate higher-than-actual power output.

In any event, any type of tune-up meter is valuable. It gives a continuous indication of transmitter performance and assists during tune-up—the user simply adjusts the transmitter tuning for maximum indication. Tune-up meters are generally not provided on solid-state transceivers because the tuning is sealed.

Do You Need Full Coverage. Today, channel coverage is available in everything, from the one channel "utility" transceivers to the 23-channel, full-coverage models. And for anyone considering double-duty (with operation on both the CB and business bands), there are 25-channel models—23 channels for CB and two extra crystal positions which can be used for the proposed H.E.L.P. frequencies or two frequencies in the class-A business band.

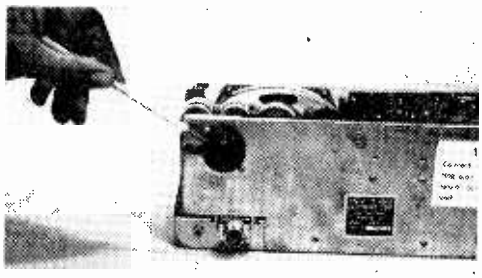
How many channels *you* need is strictly your own affair. If you operate a small business running one or two trucks and have need for communications only with your own stations, then a single channel "utility" transceiver will be more than adequate. Of course, if the additional features required are available in a model with more than one channel, by all means purchase that model and equip it with one set of crystals.

Those who operate in *groups*, (say a boat club) which utilize several channels would of course require multichannel equipment. And *emergency* organizations such as a REACT team would best be served by a transceiver covering all (23) CB channels.

It is important to remember that *full coverage*, as part of the basic equipment, is reflected in the cost—even if you don't use it. If the transceiver is equipped with a complete set of crystals for all channels, the basic price includes the cost of *all* the crystals. Even if you need just one crystal set for one channel, you must pay for *all* the crystals in a "full coverage" transceiver.

Some "full coverage" transceivers provide such coverage at the user's option. Though provided with crystal selector positions for all 23 channels, the transceiver is supplied with one set of crystals (or a single transmit crystal) and the user buys the crystals for the additional channels as needed. The same is true of models covering say, 4, 6, or 12 channels.

Variable Tuning. Much of the lower priced gear, and some high priced models, while providing for less than 23 transmit chanels, have complete *tuning* of the CB band in addition to several receiver crystal



Selective-call jack makes it easy to add peace and quiet to any business operation. Any rig can be converted to the selective call system but any rewiring costs money. Round jack, plug are used on unit above, but other makes and models may use square or oblong jacks and plugs for connections.

With superselective receivers the delta tuning is a necessary feature—even if transmitters are crystal controlled to .005%. This is enough for considerable distortion when the receiver is tuned to the exact center of the transmitting channel—1350 Hz away from the carrier.

positions. This feature is favored by those who might just use one, or two channels for communications while desiring monitoring of all activity on the band. Some full coverage transceiver are provided with variable tuning of the band and sockets for 23 transmit crystals—no crystal control for receiving.

Frequency Synthesis. Full crystal-controlled coverage requires 46 crystals—one each for transmit and receive for each channel. A frequency synthesizer is a device that obtains full coverage with half or less than half that number of crystals. An synthesizer reduces total transceiver costs (crystals are expensive), saves space, and has the same stability as the individual crystals have.

Spotting. A spotting circuit allows the transceiver's tuning dial to be preset to the transmit channel (important for those transceivers equipped only with transmit crystals). The spotting switch turns *on* the transmit oscillator and connects it to the receiver circuits. The user then tunes until he "hears" a "dead carirer" (or tone if the spotting is tone modulated) or for maximum reading on the S-meter. Spotting is the only way the user can be certain the receiver is tuned to a channel if receive crystals aren't used. In this day and age it's an absolute necessity.

External Crystal Socket. All transceivers have the crystals enclosed in the cabinet, and access to them is via either a trap door or by removing the cabinet. However, some models have a transmit (or a transmit and a receive) crystal socket mounted on the front panel. These sockets are usually provided when the transceiver has limited coverage, say five switch-selected channels, and allows the user to easily plug-in the crystals for any channel.

This feature should certainly be considered where the user intends to use just one or two channels, but with the possibility of operation on any channel.

Clipper, Compressors and Range Boosters. These circuits provide more "talk power" than usually obtained when the transmitter is normally 100% modulated. As a general rule they are needed only when the signal level at the receiving point is extremely weak—they provide sort of an extra "push" to the modulation. They offer no advantage where the signal is received strong or interference-free. A CB circuit on a clear channel over a 1-to-5-mile path generally is not noticeably improved by the use of "talk-power boosters." But if you require maximum-range communications, by all means consider a "booster."

Little Things Count. Many CBers become so involved in a transceiver's electrical performance that they overlook the minor operating conveniences which can often become a first-class frustration—if not a hazard. As example, a recent major auto accident in New York State was caused by a CBers microphone cable getting tangled in the shift lever. True, the CBer caused the problem

by illegally driving and transmitting at the same time as well as by stretching the cable across the steering column. But the point is: no part of the installation should interfere with routine operation of the vehicle. Little conveniences, such as where to hang the mike, should be considered when making the transceiver purchase.

Keeping What You Have. A feature found only on one transceiver, so far, is a key-lock bracket that allows the transceiver to be instantly removed, but yet provides a reasonable degree of security. If you often leave your vehicle open, or frequently parked in deserted areas, by all means consider a keylock mobile bracket.

Washerwoman's Knees. As cars get lower to the ground, the dashboards also get closer to the engine compartment. Often, a mobile bracket centered around the cabinet results in the transceiver protruding into the passenger legroom. Quite often, though the passenger's knees are "dancing" on the edge of the cabinet, there's plenty of room behind the transceiver. Avoid the problem before it starts. Many transceivers now have adjustable brackets that allow considerable leeway in the transceiver's back-and-forth position under dash of car, truck or boat.

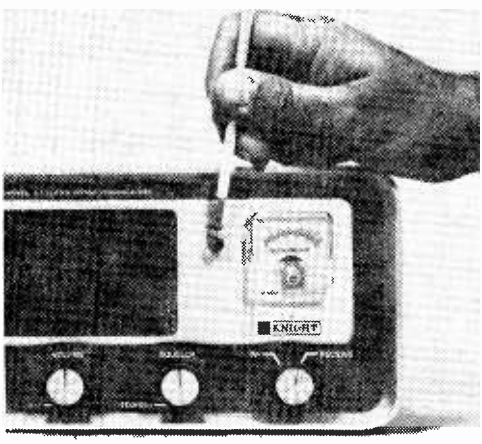
Many of the new compacts, the solid-state transceivers, have a convoluted bracket, which though pivoted near the center of the cabinet's sides allows the transceiver to be mounted flush with the dashboard.

For a large car, you'll probably have no problem, regardless of the mobile bracket design. But if you've got a compact, pay particular care to the mobile mount. You might wind up reducing your seating capacity.

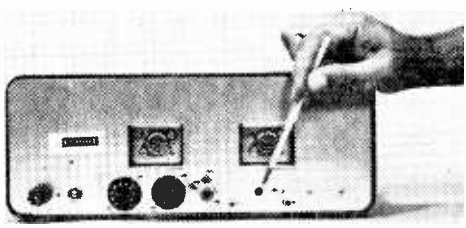
Left or Right. While most transceivers allow for mounting the microphone either on the left or right side of the cabinet, or even on the dash, the cable exit or the mike connector cannot be moved. It seems unimportant, but check whether *your* car requires a left or right cable. On many compact cars a left hand cable will fall directly over the gas pedal—right in the area traversed by the foot as it moves to the brake. (Need we say more?)

On the other hand, a right hand cable on a rig mounted in the passenger area of a large car will require a *l-o-n-g* stretch by the driver to get at the mike. It would probably be a lot safer to have a left hand cable with a magnetic mounting microphone that can be "magnetically clipped" to the dash.

Keeping Everything in Place. As a general rule we may say that modern CB transceivers are quite ruggedly constructed, certainly able to withstand average abuse. However, if a mobile transceiver is slated



Winking light (left) indicates changes in carrier level—modulation. It sure is a consolation when you can't get an answer to your calls—reassurance that you are putting something out.



Tuning controls (above) on the rear of rig are easier to get to than those inside cabinet. Quick touchup of tuning is possible without removing rig from the cabinet—a nuisance in a mobile.

for extra rugged usage (such as in a 4-wheel drive job operating in the mountains) a little extra insurance in the nature of tube holddowns is in order.

Tube holdowns, generally a spring-loaded clamp or a shield fitting over the tube, is used only on the larger tubes, those having a tendency towards falling out of their sockets by themselves.

Another ruggedizer is rivets in place of screws. While *any* transceiver component secured with a screw and lockwasher is generally adequate, for extra rugged use (and a car operating on city streets or paved highways is not "rugged use") look for rivets.

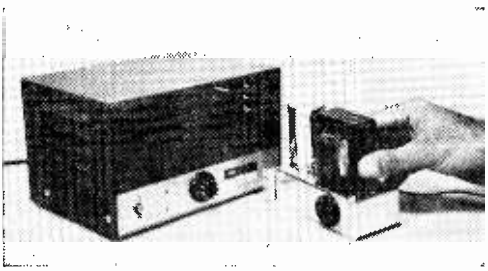
What's the Polarity. Most cars have a 12-volt negative-ground battery—meaning the battery's negative connection is tied to the auto body. Therefore, most transceivers use the cabinet as the negative battery lead. However, if your car has a positive battery ground, or if it is possible your transceiver might be relocated in a car or boat with a positive ground, look for a transceiver capable of operation with either a positive or negative ground—one where the transceiver cabinet is not connected to either battery input lead.

Loud Hailing. Many CB transceivers have either a Public Address (P.A.) or a remote-speaker output. The P.A. output uses the transceiver s microphone and modulator circuit as a low-power P.A. amplifier, using a plug-in portable speaker or horn in place of the built-in speaker.

Remote-speaker connection only provide remote monitoring of the received signals. With a speaker placed on the roof of the car you can hear, from some distance, a call directed to you.

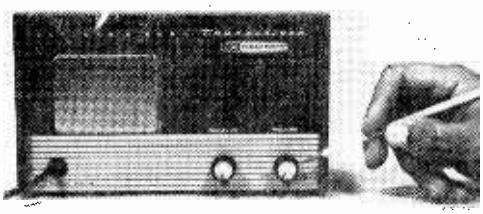
Selective Calling. If you're only interested in receiving or hearing CB signals directed specifically at you, a selective calling device (or some similar name) is the only way to insure your peace and quiet. A selective call effectively mutes the speaker (actually the audio circuits) until it senses a specific tone or series of tones. The selective call also provides the "code" tone for transmission. Most selective calls provide several "codes," so that a single base-station transmitter can activate individual mobile units all operating on the same channel. Anyone without selective calling circuitry can still hear *your* transmissions—you won't hear their calls.

Summing Up. Well, those are just a few features to look for in a CB transceiver. As you can see, sensitivity and selectivity are not the most important things—conveniences also count. It's not necessary to look for "the best," but rather compile a chart of exactly what the transceiver will be required to do and the way it will be used *by the operator*. Then to look for a transceiver that meets those specific requirements. ■



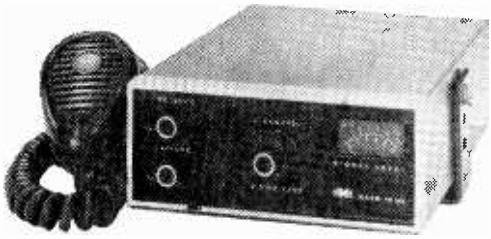
Plug-in power supplies (left) make the rig suitable for use in just about any location or vehicle.

Almost any fumble-fingers can operate "ultility" transceiver. Only controls are squealch and on/off-volume control since rig has only one channel.



RADIO-TV EXPERIMENTER LAB CHECK

KAAR SKYHAWK-335
Solid-State, 23-Channel
CB Transceiver



■ The Kaar Skyhawk-335 CB transceiver is the perfect answer to the questions: "Is there a solid-state CB transceiver that has all the bugs ironed out of it, and is it as good as comparably priced tube models?" In fact, the solid-state 335 measures up to and exceeds many tube models on the market today.

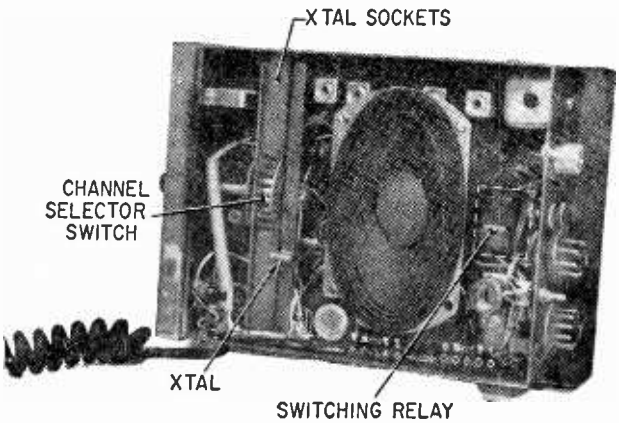
The Skyhawk is typical of other transceivers in that it is primarily a 12-VDC model. An optional AC power supply is required for 117 VAC operation. But unlike others, the Skyhawk, though factory wired for a *negative*-battery ground, can be easily rewired for a *positive* ground. The wiring changes are not internal, they are made in the power supply connector that is easy to get at.

Full 23-channel crystal controlled coverage is provided at the user's option. The unit can be purchased with either a full set of crystals or just one, with extra channel rocks added as needed. Using a frequency synthesizer circuit, the Kaar requires but a single crystal for both transmit and receive. To insure proper reception of received stations which are off the center channel frequency, Delta (variable) tuning ±3 kHz (kc.) of center carrier frequency is provided.

The Features. Among the conveniences provided in the Skyhawk are a page (public address) output jack that is keyed-in by rotating the *Squelch* control full counterclockwise, a remote speaker jack, a pre-wired socket for a selective calling adapter, a combination *S* and *Relative Power* output meter, and a multi-position mobile bracket that allows the transceiver to be mounted flush or centered under the dash.

The Receiver. The receiver, which uses a double-conversion superheterodyne circuit with double-tuned IF transformers, provides high selectivity without recourse to mechanical or crystal filters. Measured through the antenna input, *not just the IF amplifier*, the adjacent channel rejection was 36 db on the high side and 67 db on the low side. This wide variation is probably due to crystal tolerances and a representative value is probably the mean average—over 50—which is good.

Sensitivity was very high, measured at



Bottom view of unit shows speaker inserted in maze of the components. Crystal socket is bar at left of speaker. IF and other tuned circuits are at top. Relay, right center, does switching for receive and transmit operations.

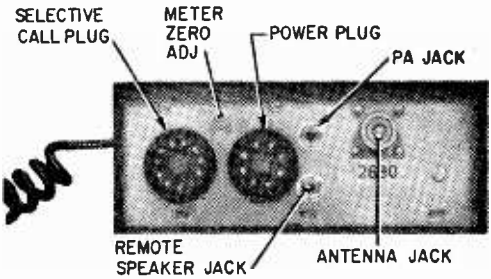
0.22 *uv.* for a 10 db S+N/N ratio. Noise limiting and squelch action was average. Audio output from the supplied speaker checked out very clean, with a measured 2 watts AF output available at 100 *uv.* input. Image rejection was a very adequate 61 db.

Stability of the received signals at varying battery voltages representing varied engine speeds was very good, with no noticeable frequency drift or changes in speaker volume, probably due to the Zener diode regulation of the oscillator.

The AGC, automatic gain control was excellent, with an input signal level variation of 100 db (1 to 100,000 *uv.*) producing an AF variation of only 3 db. This means the user can crank the volume control wide open to hear a weak signal without fear the local down the block will "blast" the speaker when he transmits.

The Transmitter. RF power output checked out at 3.8 watts into a 52-ohm dummy load indicating a high degree of efficiency in the final RF stage. Unlike some other solid-state transceivers, the tuning adjustments on the Skyhawk are not sealed and may be adjusted by the user to compensate for variations in the antenna system.

The modulation is very clean, with limiting at 100%. Microphone sensitivity for 100% modulation checked out at -25 db, equivalent to a moderate level voice talking close to the microphone (as would be the case in mobile service). A very effective "speech compressor" is part of the Skyhawk. This one works by sampling the voltage across the modulation transformer, rectifying the sample to DC, and then varying the gain of a low-level amplifier.



Rear apron of transceiver shows location of jacks and plugs. Internal speaker is disconnected when remote jack is used.

The Overall Construction. Though the Kaar Skyhawk-335 measures but 6¾"W x 2¾"H x 9¼"D, it is quite a handful in weight, due mostly to an extra heavy steel cabinet. The insides appear to be of high quality with all components tied down tight, and an enclosed switching relay. It has both the "feel" and construction of a well made item. The *Installation and Maintenance Data* manual supplied with the 335 includes many tips on tuning as well as the printed-circuit layout and wiring diagram.

Summing Up. A lot of thought appears to have gone into the Kaar Skyhawk-335, for it has the performance, conveniences and construction that one associates with the best in CB equipment. Priced at $199.95, additional information is available from Dept. EC, Kaar Electronics Corp., 2250 Charleston Rd., Mountain View, California.

Up and Down with Fiber Optics

■ New fiber-optic magnifiers from Corning Glass are proving exactly what the doctor ordered when mechanical stress, dirt, dust, and other contaminants preclude the use of more conventional optical systems. Images can be displayed on either a flat or a contoured surface. Even more important, these new fiber-optic magnifiers can bring an object either up or down in size with the same high contrast and resolution.

Capable of magnifying or minifying up to ten times, these fiber-optic devices have a maximum output size of 3 x 3 in. Thus, while of limited value in a biology lab, they can serve a useful function in film enlargers, photoelectric exposure systems, and other critical viewing applications that demand precise enlargement and transfer. ■

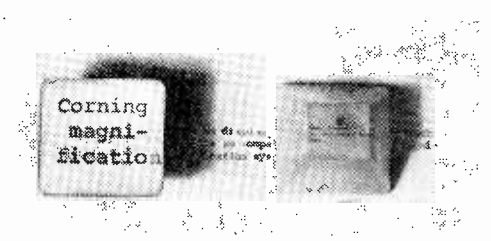


Photo reveals how Corning's fiber-optic device can make print larger or smaller.

BC FOR CB

BC-221 and LM frequency meters can be made accurate to 0.001% for a legal CB frequency-calibration instrument.

By Charles R. Noegel

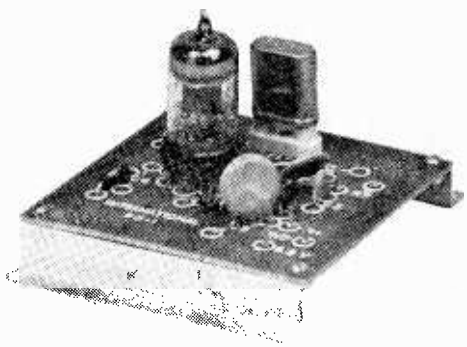
■ From the very start of CB activity back in '59 the technical CB highbrows have endlessly disputed the merits of using the relatively inexpensive BC-221 frequency meter for CB frequency checks. The core of the problem is simply that the BC-221 was never intended to have the accuracy required for CB frequency checks. At best, the BC-221 and the Navy version, the LM models, have an accuracy of ±0.01%, well below the ±0.005% tolerance established for CB by the FCC.

Bright Ideas. Among the ideas offered for BC-221 usage was complete revamping of the BC-221 (a more stupid idea has yet to be presented—keep your mitts out of a frequency meter), continuous operation of the filaments 24 hours a day (still doesn't improve on the ±0.01% accuracy), and the use of the intermediate "beat points" in the BC-221 (contrary to regular belief the beat points are no more accurate than ±0.01%).

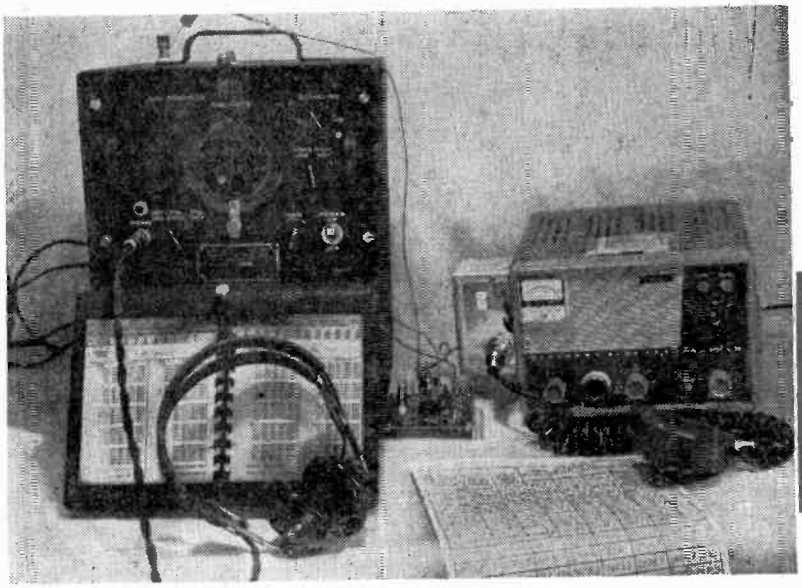
But if you're willing to crawl out from under theory and invest about an hour's work you *can* use a BC-221 for CB frequency checks—and you'll wind up with an accuracy equal to the best of commercial CB frequency meters, and you won't have to touch the insides of the BC-221.

True, the BC-221 is rated at only ±0.01% accuracy. But at 1 MHz (mc) that works out to ±100 Hz (Hz is fancy technical talk for cps). The CB accuracy of ±0.005% at 27 MHz is ±1350 Hz. Obviously, if we've got a leeway of ±1350 Hz any instrument accurate to ±100 Hz is one heck of a good frequency meter. (We are using 1 MHz and 27 MHz to avoid getting into tolerance formulas which really have no bearing on the subject.)

While 1 MHz is useless at measuring 27 MHz, it does become useful if we add it to a 26-MHz signal of *known absolute accuracy*. For example, assume we have a 26-MHz oscillator with zero-frequency deviation, it is exactly on 26 MHz. If we beat the 26-MHz oscillator signal with the 1-MHz signal of the BC-221 we obtain a *27-MHz* signal with a *tolerance of 100 Hz*, and that is an accuracy of almost ±0.0005%. That's right, four decimal places. Of course, this is too good to be true, for we must allow for interpolation of the BC-221's readings in



Improved accuracy of the BC-221 and LM frequency meters is due to this little FO-1 crystal oscillator manufactured by International Crystal as a subassembly.



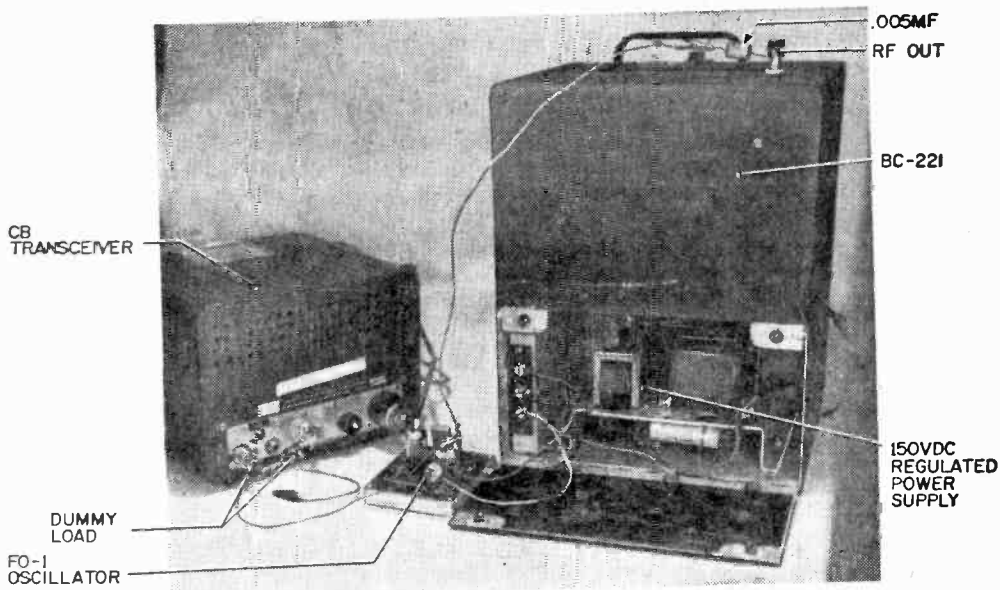
The complete test set-up shows International Crystal FO-1 as the auxiliary oscillator — dwarfted between the CB transceiver and BC-221. Oscillator is powered by supply inside BC-221.

order to accommodate the 5 kHz offset of each CB channel—the closest CB channel is 27.005 MHz. Allowing for all the practical tolerance in such a system the accuracy would be better than ±0.001%—still excellent.

Getting Set Up. A working, inexpensive CB frequency meter consists only of a BC-221 and a 26-MHz oscillator—the model FO-1, by International Crystal Co. of 18 N. Lee, Oklahoma City, Okla. The FO-1 oscillator requires 150 VDC and 6.3 VAC which can be "stolen" from the BC-221 or LM's power supply. (The power supplies are generally home-brew so it's okay to work on them.)

Warm up both the BC-221 and the FO-1 for at least a half hour.

While they are warming up attach a small capacitor (about .005 mf.) to the antenna post of the BC-221. From this capacitor run a clip lead to the *RF Out* point on the



Rear view of setup for frequency check of CB transceiver shows power supply that replaces battery pack of original frequency meter design and also powers FO-1 chassis.

BC FOR CB

FO-1 oscillator. Another clip lead is strung out from this point as an antenna.

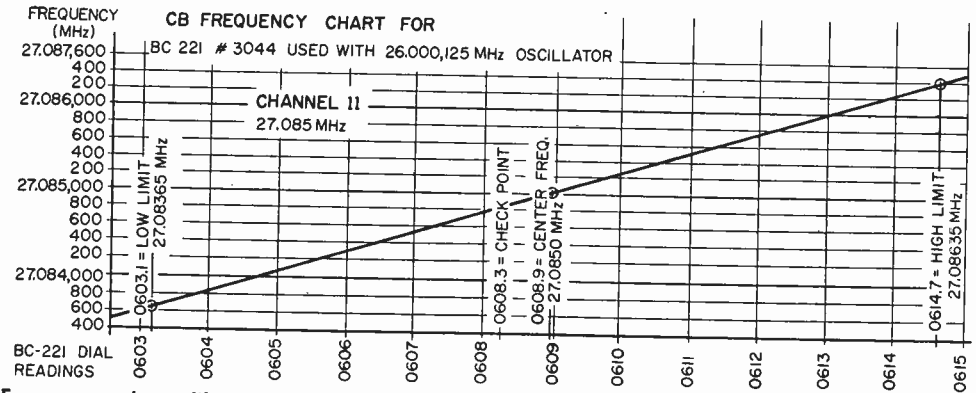
Now we're all set up to check frequencies and while we're still waiting for our equipment to warm up, we can discuss how our check will be carried out.

How It's Done. Let's prepare to check Channel 11. The principle is easy. First, we have a known accurate 26,000,000-Hz (26-MHz) oscillator plus a frequency meter VFO which, when properly checked and adjusted, will be accurate to a very few Hertz (more about settings later).

Set the BC-221 to 1.085 MHz. This frequency adds to the output of our 26-MHz oscillator with the result that we are putting out a signal that is 27,085,000 Hz (27.085 MHz). This is the frequency that our CB transmitter should generate to be on Channel 11. We must, however, compensate for the variation of the crystal oscillator frequency from 26 MHz. As certified by International Crystal this oscillator is +125 Hz–26,000,-125 Hz (26.000,125 MHz).

Next step is to fire up the good ol' CB bandbuster and set it to Channel 11. First disconnect the antenna and replace it with a 50-ohm phantom antenna (dummy load), then drape the antenna of the BC-221 in the vicinity of the dummy load and we're ready to count its Hertz—after at least a 15 minute warmup. Now don the frequency-meter headphones and key the transmitter. When the transmitter is keyed, its 27.085 MHz signal will beat against the 27.085 MHz signal from the frequency meter and oscillator combination and any deviation of the transmitter frequency from 27.085 MHz will be heard as an audible beat note in the headphones.

Check the Calibration. Set the BC-221 dial for a frequency of 135.593 kHz. (This is the intermediate check point for Channel 11, we have to interpolate to get the exact dial setting.) Adjust the corrector until the BC-221 zero beats against the internal 1-MHz calibration crystal. *This must be done carefully to set the frequency meter for maximum accuracy.* Now adjust the dial to give 1085 kHz and key the transmitter. Unless the CB set is "dead on" frequency you will hear a beat note in the phones. Adjust the dial until the note "zero beats"—then, by transposing the dial reading to frequency and comparing it to the center frequency we have a very exact measurement of our transmitter frequency variation. The rest of the channels are checked similarly.



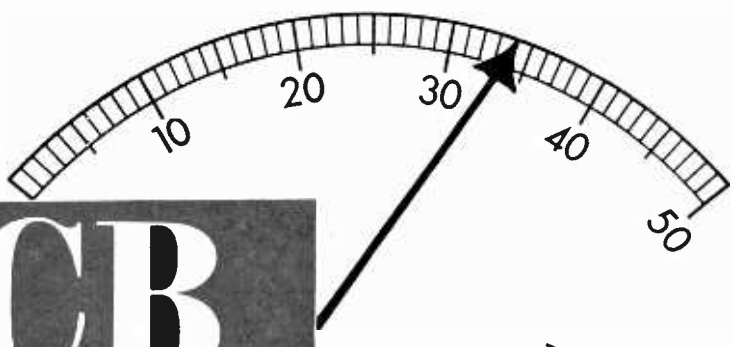
Frequency chart like that above will have to be individually made for each channel. Charts are not interchangeable with other BC-221s (or LMs) or the FO-1 oscillators.

There are two methods for quickly transposing dial readings to frequency. One is to prepare a graph of BC-221 dial readings versus frequency for each channel. Another way is to prepare a chart with the Hertz (cycles) for each vernier-dial division shown as well as the check and center frequencies and the low, and high-limit dial settings. Either method provides an accurate way of determining frequency quickly.

This frequency measuring technique has proven to be easy to use, accurate and inexpensive for frequency checking on the bench. It works just as well for on-the-air checks, too, because the BC-221 and 26-MHz oscillators emit a signal that mixes with an incoming signal and the beat frequency is readily heard on the monitoring receiver.

(Continued on page 130)

test gear for CB



by Len Buckwalter, KBA4480

Save wads of dough by spending a little for some very basic test equipment—keep your rig perking. Those built-in meters won't let you know your rig is starting to wheeze and limp until performance drops way, way down.

■ Whether you're a maestro on a meter or you shrivel in front of a schematic, there's a CB test instrument for you. Test equipment and testing accessories come in all sizes; from a thimble-shaped dummy load, to a scope that's bigger than a breadbox. Prices begin at about a dollar (dummy load) and step up to several hundred (frequency meter). In between are dozens of models that keep your rig squirting Hertzes over the country.

Legal Limits. If you've heard a rumor that you can't legally check, troubleshoot and repair your own CB equipment, discount 90% of the tale. You can go anywhere in the receiver section. The transmitter output stage is also fair game. *Just keep away from the frequency-determining circuit*—which is the crystal oscillator in the transmitter. Of course you can't tamper with anything that might soup up power beyond five watts, or kick modulation peaks beyond 100 percent.

Thus you can handle nearly all sections of a transceiver. If trouble is traced to the forbidden stage, you'll have to have the repair done by a licensed technician. Anyway, most CB test gear we'll describe operates outside the transceiver by analyzing the RF signal.

CB test equipment is extracted from a diverse category of instruments. Some are peculiar only to CB, several are shared with ham radio, others are common in the field of radio-TV servicing. To help determine your own needs, we've divided equipment into three groups that advance in price and complexity. Browse among them and you find units to match your pocketbook and level of technical know-how. Whatever you choose, there's a good chance that the instrument will repay itself many times over; in service bills or by keeping the rig working at maximum efficiency. First category is . . .

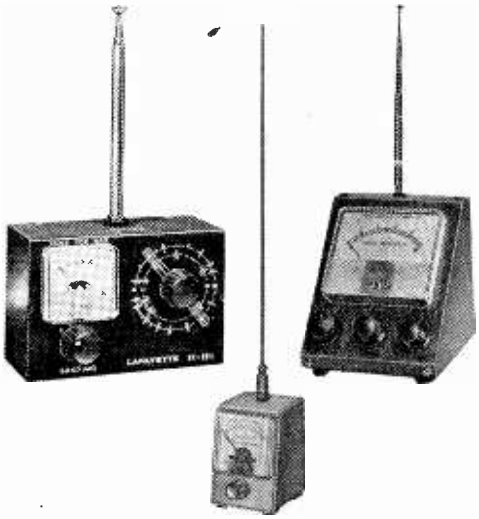
Basic CB Test Gear. Here's class of instruments indispensable to good CB operation. They are fairly inexpensive—mostly under $10—and require simplest skill to operate. Not only do they help you troubleshoot but are real necessities during installation. This group includes *field-strength meter, SWR indicator, dummy load* and *VOM*. Consider the first device.

Field-Strength Meter. This instrument is better than having a friend at a distant receiver who'll give you endless S-readings as you make adjustments on the rig. The unit is actually a close-range receiver that responds to a signal *after* it has left the antenna. Thus it takes into account each link in the transmitting chain. It's a gem for tuning a transmitter into a newly installed antenna. Just place the meter as far as possible from the antenna (while obtaining a reading) and adjust the rig for highest meter indication.

The least expensive field-strength meters have no amplification. They contain little more than a meter movement, rectifier and tuned circuit. So pickup distance is limited to within several paces of the antenna. This is

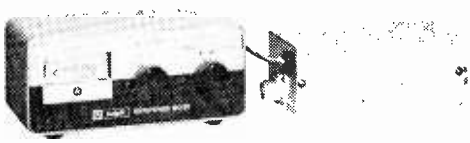
CB test gear

fine for mobile work, where you can walk around the antenna, but it poses a problem for base stations. There may be too much distance between meter and antenna. The *amplified* field-strength meter, at higher cost, may overcome thhe distance problem. By adding a transistor stage, the meter's sensitivity and range is given a boost (to 30 feet or more). Some models have a magnetic base for handy dash-mounting in a car.

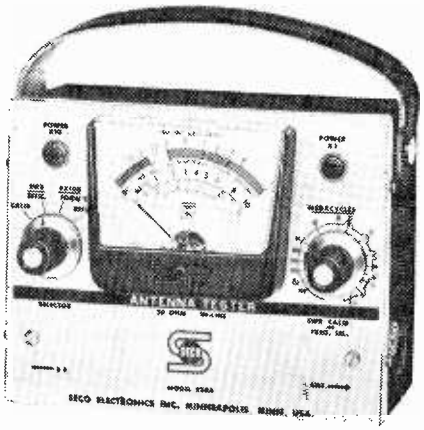


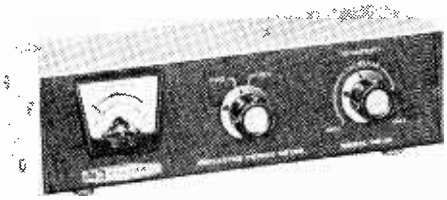
Field-strength meters have no connection to transmitter except through radiation. Lafayette units, above (right and left), Heathkit PM-2 (center) are fine for CBing.

SWR Meter. A field-strength meter reads output, but the reading is strictly *relative*. You may tune the rig for maximum, but never know if that's the *highest* power it can produce. You'll take a giant step if you also observe efficiency of the transmission line and antenna. You can with the SWR meter. This gadget first samples RF power delivered to line and antenna. This is "forward" power Next you flip a switch and read "reflected" power, the watts returned to the transmitter

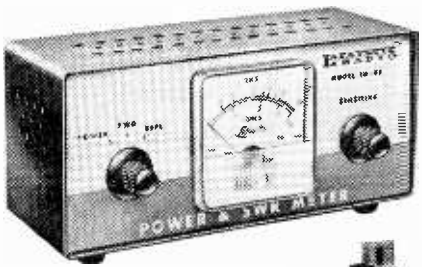


Two-unit SWR/power meter, by Knight, has 4-foot cable between indicator and coupler.





Reflected-power meter (Heathkit HM-15) is styled to match transmitter. Technicians' tester (top) has carrying handle—one of many test instruments by SECO Electronics.



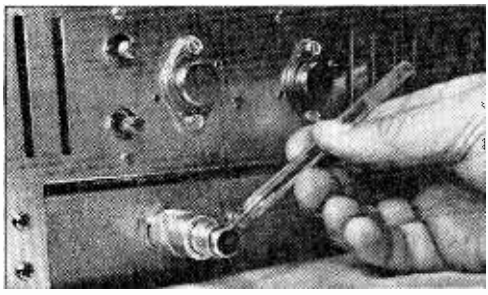
Desk-top Power and SWR meter (above) is model TM-58 from Lafayette. Inline Transicheck is made by New-Tronics. Can be easily mounted on wall, between the CB transceiver and roof-top antenna, near rig.

by an improper match in the antenna system. Those bounced-back watts cancel a portion of forward power and the meter tells how much. When the meter reads an SWR of about more than *"2 to 1"* it's time to investigate the loss. (A *2-to-1* reading means that 11 percent of RF power is being reflected.)

The trouble might be an out-of-tune antenna, defective coax line; possibly some interaction with metal near your antenna.

An SWR and field-strength meter are a dandy pair when used together. They overcome each other's limitations. A field-strength meter may read high but not, as mentioned earlier, highest. An SWR meter in some instance could read too low. But if both meters are noted simultaneously, you've hit the right adjustments if field strength zooms as SWR plunges. An SWR meter is the pro's method for the delicate job of "pruning" an antenna (adjusting length for resonance) and setting up sliding matching elements on a beam antenna.

Dummy Load. Most transceiver instruction manuals recommend a No. 47 pilot lamp connected to the antenna socket when you wish to test without emitting a signal on the air. The lamp works and costs a dime plus the connector. But the price of a truly accurate dummy load is as low as a dollar. It overcomes several disadvantages of a lamp.



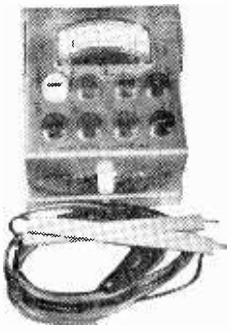
Dummy load (phantom antenna) mounts on antenna connector. It's suitable only for low-powered rigs like those for CB.

The lamp doesn't present a precise 52-ohm load to the transmitter and it also changes resistance with heating. An accurate dummy (or "phantom") load maintains the correct value. If your rig has transistor output chances are that it was factory-tuned for 52-ohm output. An accurate dummy load helps you to return to this adjustment if, for some reason, it's ever disturbed. Finally, the device has metal shielding to help contain the RF signal. With a lamp load, you might put out a readable signal for blocks around.

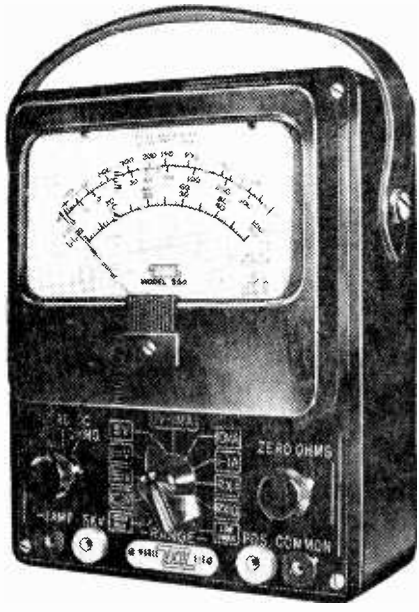
VOM. This is a volt-ohm-milliammeter, but not the costly bench-type of high sensitivity. It's the hand-size instrument that can cost as little as $10. Its sensitivity rating is a low *1000-ohms-per-volt* which relegates it to the utility, rather than service-bench, class. But a VOM of this grade traces a surprising number of troubles in a CB installation. All of these faults occur *outside* the rigs's chassis. (For troubleshooting *inside* the chassis you better pick at least a 20,000-ohm-per-volt unit.)

The VOM's ohmmeter section, for example, hunts out breaks which occur often in power and "mike" cables. It helps find good grounds on a car body or dashboard. Too, the ohmmeter checks for corrosion in aging antenna elements or continuity in transmission lines.

The voltmeter portion of the VOM is peachy. Use it to find the right pickup point for 6 or 12 volts on the back of a hidden ignition switch. Check for primary voltage when the mobile rig won't light up. Check



Utility testers (International Crystal's VMK-1, above; EICO 556, below) will do heavy-duty testing around home, office, workshop, boat or car but are limited in sophisticated electronics circuits in CB.



CB test gear

voltage, too, as the car engine idles, then races, to see if it swings between normal limits (about 11 to 14 VDC in a 12-volt car).

The VOM milliammeter section is a real help. Jack it into a rig and read final current, a number needed to figure input power at the final RF amplifier. You'll find other uses for a simple VOM that'll save hours of speculation on what's wrong. It needs no AC power source and is fully portable.

That's the *basic* grouping of CB test instruments. They're valuable for tune-up, installation and some troubleshooting. To advance to the next step, consider devices in our second major category.

Intermediate. Here you'll find a series of instruments exclusively designed for CB. Chief feature is that all combine inside one cabinet several functions just described in our basic category, plus several new ones. Again, there's emphasis on checking a signal after it's emerged from the rig. These instruments, usually called something like *CB Transceiver Tester,* connect in the line near the rig, or pick up an air signal via a telescoping whip antenna. Price range is about $30–40, less if obtained in kit form. What do these combination instruments offer?

Just about all measure the two kingpins; field-strength and SWR. (A minor limitation is that these readings cannot be taken simultaneously.) The field-strength meter will often be the sensitive, ampified type. A dummy load is built in. You can see that important basics are supplied.

The technical trick pulled off by these "combo" instruments is that basic parts like meter, transistor and dummy load are easily switched around to measure several other values. Most read out modulation percentage and thus show at a glance whether your mike and audio section are operating. Some add a jack for earphones and yield an audible version of what your modulation sounds like on the air.

Unlike the field-strength meter, which reads *relative* RF signal, the testers usually read output power *directly* in watts. But this reading can only check the transmitter. Since these testers are really indicating power consumed by a dummy load, there's no indication of power radiated by the antenna system. Yet power measurement is

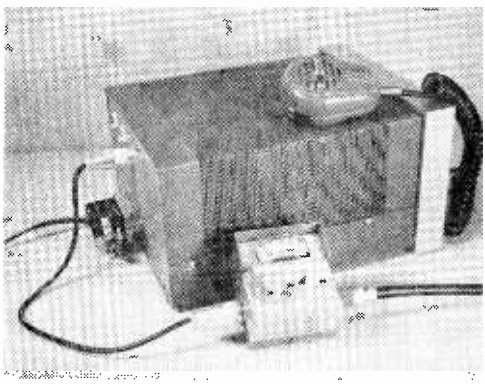
Multipurpose units, like this Realistic CB Transceiver Tester, save money and storage space.

Transistor circuitry in Ten-2 CB Checker, by Knight, is also usable as code-practice oscillator for those wanting to work for their Ham ticket.

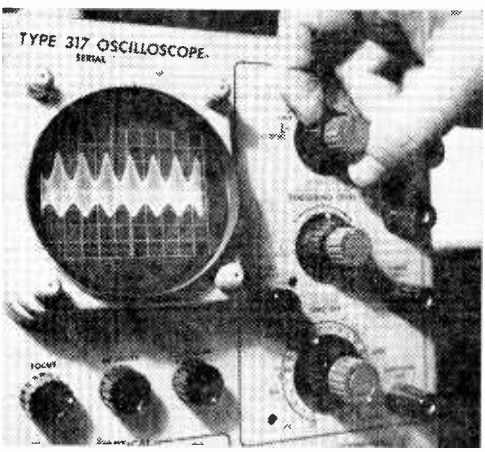
Built-in dummy load in this EICO 715 Trans/Match takes care of another test device. Load can be switched into or out of circuit for tests.

useful to detect signs of output trouble, like a weak final tube or transistor. And most testers read the activity of a crystal, which might decline with age.

To this point we've talked only about analyzing transmitted signals. Combination testers are also fitted to generate signals for receiver checking. Signals are supplied in the three forms. First is a steady RF signal, obtained by plugging a CB *transmit* crystal into a socket on the tester panel. Now you can observe receiver action, or even align its circuits by adjusting for highest S-meter reading. Though its good for alignment, the



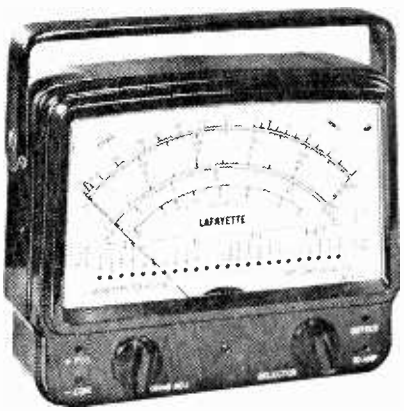
Miniature size of this Executive SWR and power meter, made by International Crystal, makes it suitable for installation in mobile rig as well as on crowded desk.



This high-quality scope is too expensive for anyone but the professional. Added feature of Textronix scope are plug-in subassemblies that multiply usefulness.

RF signal has somewhat limited value for troubleshooting. The signal can't be easily injected at various test points in the receiver to see where it disappears.

Suitable for all 2-way radio frequency checks, Lampkin Micrometer Frequency Meter has thermometer on front panel to indicate deviation of internal crystal standard. The 100,000 ohm-per-volt VOM (Lafayette Lab-Tester—below) out-performs VTVM on some ranges—without AC power.

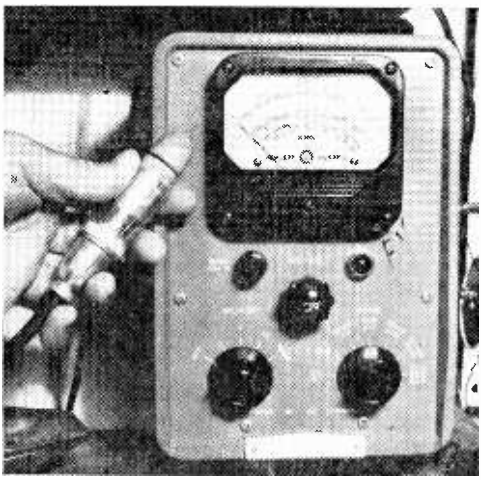


Another useful test signal, is also an RF carrier (again from the crystal) but one that is modulated by audio tone. This helps determine if a receiver's detector and audio stages are operative. Simply listen for tone in the loudspeaker—there's no need to pull the chassis out of the cabinet. Then there's an audio tone available for injecting into transceiver audio stages.

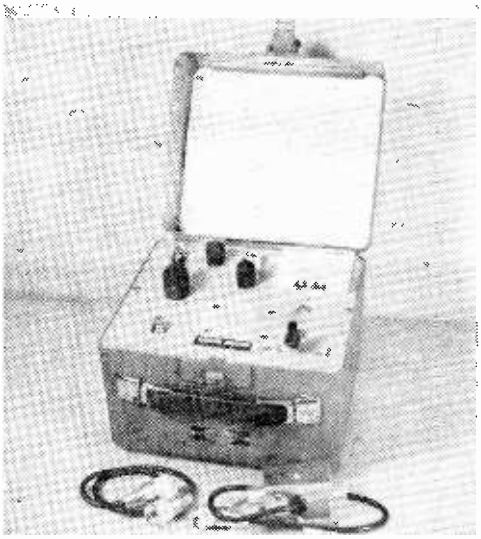
Advanced Instruments. For serious repair and troubleshooting CB circuits, advanced equipment is drawn from the field of regular radio-TV service. You'll need a conventional VTVM, (Vacuum-tube voltmeter). Its high sensitivity (11,000,000 ohms or higher) on voltage ranges permits you to check schematic-indicated voltages without disturbing circuit operation. Resistance checks can also be performed with the VTVM's ohmmeter section. The VTVM generally needs AC power to make it work.

A milliammeter with a range of 0-100 ma. DC is needed for checking input power to the final RF amplifier. (Most often, this meter is part of a VOM). Access to a tube tester solves many transceiver problems.

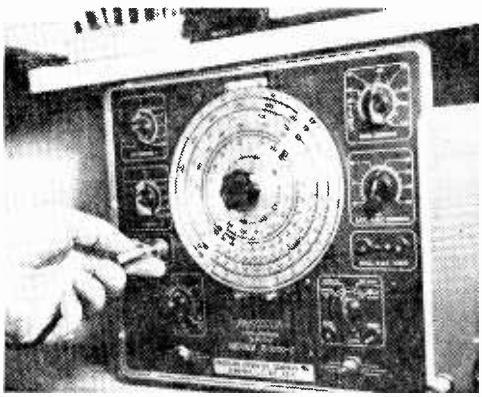
CB test gear



For extremely accurate AC (audio and RF) measurements are made with this Hewlett-Packard VTVM. Price puts it outside the budget of the individual. It's popular in research and development work though.



Designed for CB servicing this C12B Frequency Meter is a self-contained unit that also indicates modulation percentage and power output with built-in dummy load. Price includes 23 crystals. Unit is another made by International Crystal.



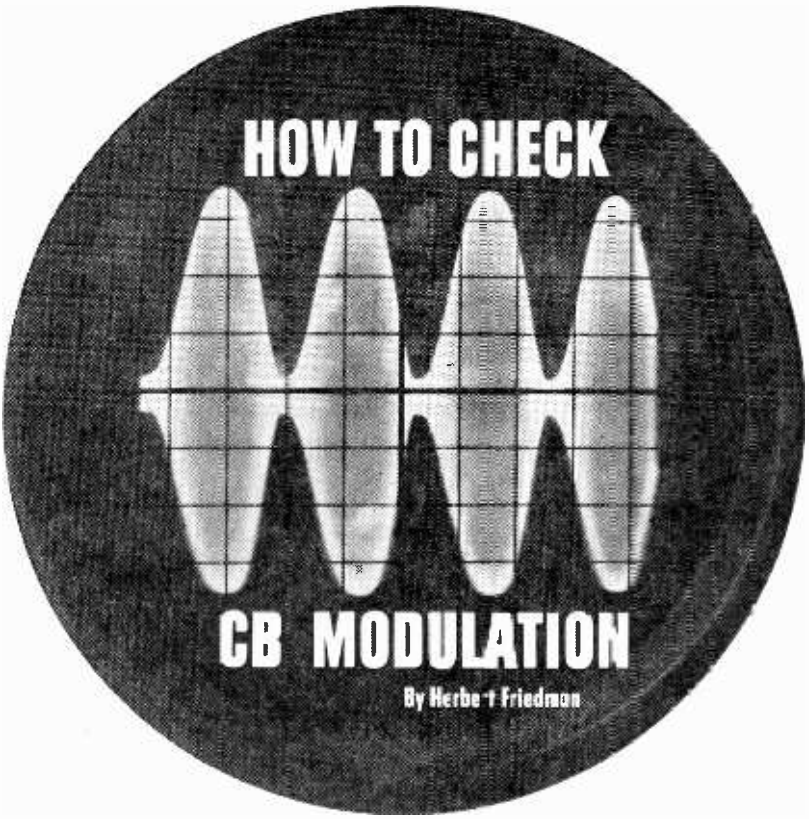
Service-bench signal generator is useful —RF (for receiver alignment) and audio signals (amplifiers) aid troubleshooting.

Signal Generator. Although the combination tester described earlier can act as an audio or RF generator, it can't replace standard generators in serious or extensive CB servicing. You'll need an RF signal generator that includes both CB frequencies, (around 27 mHz) and IF amplifier frequencies that fall into the few-hundred kHz category (frequencies that are found on conventional radio-TV servicing instruments).

The RF generator almost always has provision for audio modulation and this tone may also be available separately for testing a transceiver's audio section. But a separate audio generator, offering a choice of any tone, could prove valuable for running a frequency response test of the rig's audio section.

The Scope. A wealth of troubleshooting information is displayed on an oscilloscope. Even a general-purpose type serves the needs of CB. Not only will it help you find lost signals but is the best indicator of modulation percentage.

Frequency Meter. Our final instrument is reserved for the CBer who believes he has everything—and can afford it. It's a frequency meter. At a price of about $260, the instrument indicates whether a rig is transmitting within the FCC-required frequency tolerance of ±.005%. And since crystals can vary, it's recommended that a rig be checked on all channels about once a year. According to FCC reports, off-frequency operation is a common violation noted by its monitoring force. A frequency meter might be a practical purchase for a CB club. Despite its high price tag it just might save that amount in monetary fines paid out by luckless members. ■

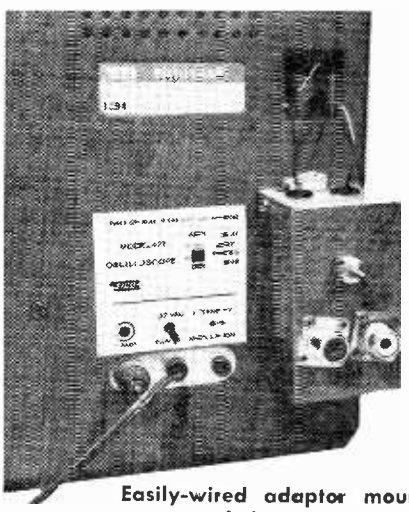


Reading scope patterns isn't a problem—getting the signals (of sufficient amplitude to be readable) from low-powered transceivers is the headache.

■ Modulation is the key to voice communications, yet for CB—where modulation is of extreme importance because of the 5-watt flea-power limitation—there is really no test gear that can give the average user or service technician a *true* picture of the modulation quality. Admittedly, there are several "CB Test Sets" which contain *modulation meters*, but these are in fact *relative* devices that only indicate *that some signal similar to speech characteristics* is impressd upon the RF.

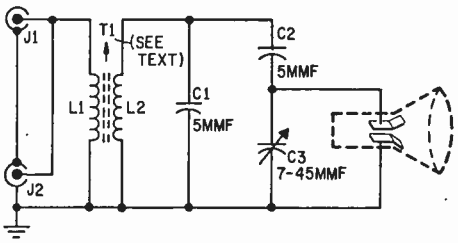
Whether the modulation is hum, noise, or severely distorted audio, a relative modulation meter cannot tell the difference. The only real way to check modulation quality is with an undistorted sine-wave input—if the signal goes in clean and comes out the same way the modulator is okay. Unfortunately, the CB relative-modulation meters are calibrated for speech, not tone, and measurements taken with sine-wave input signal are generally invalid.

Modulation tests with tone requires either a specially calibrated modulation meter (which runs into several hundred dollars) or an oscilloscope. Generally the scope is the best bet—it gives an actual picture of the



Easily-wired adaptor mounts on rear of the scope cabinet.

CB MODULATION



Although circuitry is simple, wiring at the 27 MHz CB frequencies is critical.

PARTS LIST

C1, C2—5-mmf., ceramic disc capacitor
C3—7-45 mmf., trimmer capacitor (Centralab 825-BN or equiv.)
J1, J2—coaxial connectors (PL-259 or equiv.)
L1—3-turns AWG-22 solid hookup wire (see text)
L2—3-turn transmitter oscillator coil (Lafayette 32R0911 or equiv.)
T1—primary winding L1; secondary winding L2 (see text)
1—chassis box, 2¼x2¼x4-inch (Bud CU-2103-A or equiv.)
Misc.—wire, solder, hardware, etc.

Estimated cost: $5.00
Construction time: 2 hours

modulation percentage, distortion and any hum noise which might be present.

Unfortunately, general purpose scopes are relatively useless as far as CB is concerned. Since the vertical amplifiers are, at best, rated to 5 MHz (mc) the 27 MHz CB signal must be fed in directly to the CRT plates. And several hunded volts of signal are usually required for about an inch of deflection. At best, a CB rig will put out about 12 volts of RF—hardly enough to increase the thickness of the CRT baseline, let alone provide a trace that can be easily interpreted.

If you're willing to spend some time and money to make an accessory (for less than five bucks and an hour or so's work) you can make even the low power transmitters—one with an output down to a half watt—fill the entire face of a 5-inch scope at 100% modulation.

The device that does the trick is the *CB Scope Booster* shown in schematic. Basically, it is no more than a *virtually-lossless RF step-up transformer;* it takes no measurable power from the transmitter, has virtually no effect upon SWR (therefore it can be left permanently connected to the transmission line), yet it provides several hundred volts of RF to the scope.

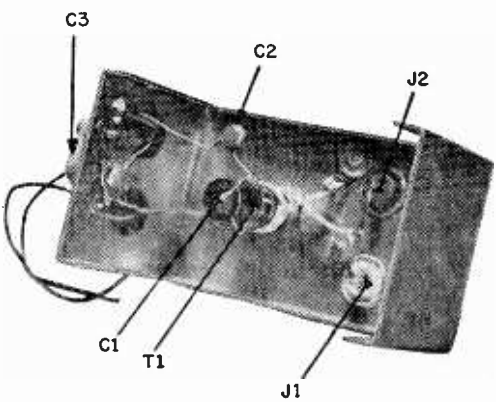
How It Works. First, the scope you intend to use must have direct connections to the vertical plates. Many general purpose scopes have this connection—generally two jacks on the rear apron. If your scope is not equipped with direct vertical plate connections you can't use the *CB Scope Booster* unless you add the circuit (which might not be easy). If you decide to add direct vertical connections we suggest you first consult with the manufacturer of the scope.

One thing you must keep in mind throughout this bit of electronics theory that a scope's vertical-plate input impedance generally represents a very high impedance—in the order of 2-megohms plate-to-plate and at least 1 megohm to ground.

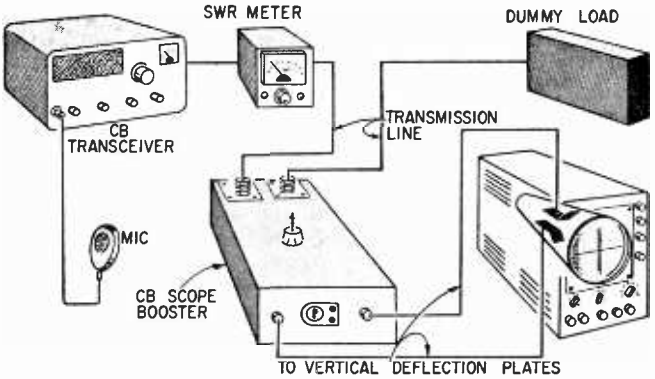
In the schematic, the parallel-resonant circuit (L2-C1—and C2, C3 too, but we won't go into them now) is coupled to the transmission line by L1. (Let's not bog down in theory that a parallel resonant secondary winding is really series resonant. As far as the link primary (L1) is concerned it "sees" a parallel-resonant secondary—L2-C1.)

The impedance across the secondary of T1 represents a very high impedance; therefore, any circuit connected to the link "sees" a high impedance—we now have a high impedance "looking" into, and out of, T1. Since the scope's vertical input (connected across L2-C1) is also a high impedance, the input to primary winding L1 still represents a high impedance.

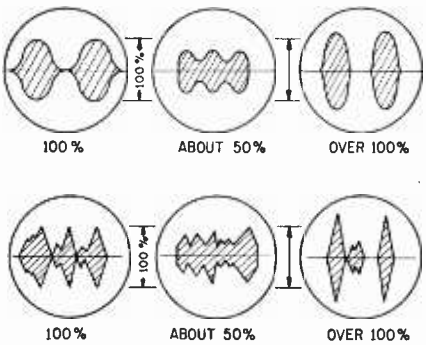
Note that we don't say *infinite impedance;* it is just a *high impedance*—of several hundred ohms. Since the impedance looking



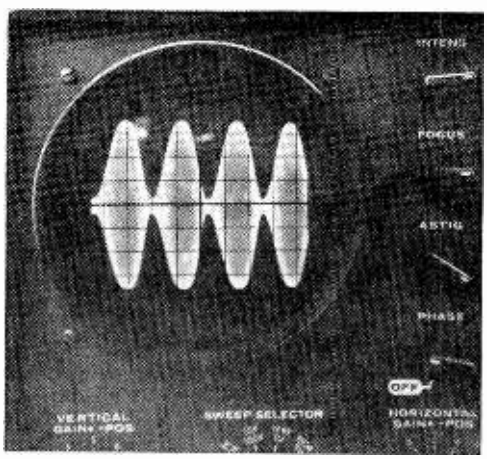
Internal view of the CB Scope Booster shows heavy-wire jumper between J1, J2 and 3-turn coil (L1) added to make T1.



Setup for checking the CB rig's percentage of modulation requires considerable equipment—SWR meter, Dummy load (to replace antenna), and scope. Size of CB Scope Booster, as shown here, is greatly exaggerated in size. All interconnections should be made as short as possible for testing.



Scope patterns show the modulation tests made with tone (top and below) and voice. Voice patterns keep jumping around on the screen and percentage of modulation can only be estimated. Accurate measurements can be made when using tone modulation.



into link L1 is more than 10 times the 50-ohm impedance of the transmission line between the CB transceiver and the load it has a negligible effect; only a very small sample of the rig's RF output flows through L1—most of the RF flows into the load (resistor or antenna system).

The RF in L1 is transferred, by induction, to L2, which forms a resonant circuit with C1. Since there is no heavy loading of L1-C1 by the scope the RF voltage across the L1-C1 circuit is in the order of several hundred volts. (If you tried to extract any power from T1 the voltage across L1-C1 would fall to almost zero. But the scope plates are voltage, not current sensitive, so there is no appreciable loading since there is no current flow.)

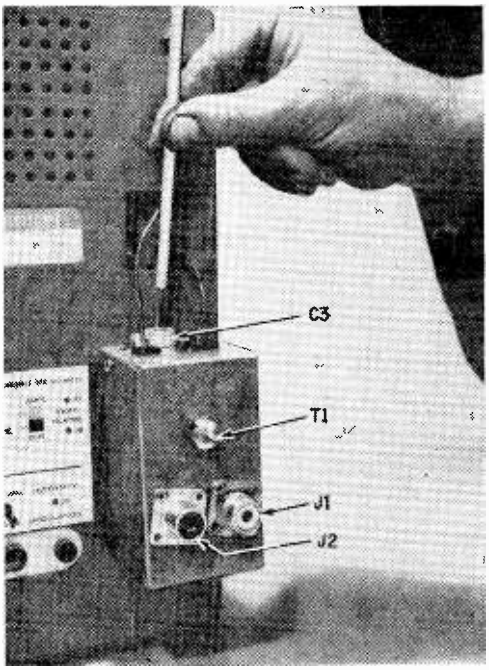
Capacitor C2 and trimmer capacitor C3 form a capacitive voltage divider across L2-C1. While, in fact, the series connected value of C2 and C3 are part of the resonant circuit, and are added to C1 in determining the resonant frequency of the circuit, their values have been chosen so that a wide variation of C3 has but little effect on the resonant frequency.

C3 provides an approximate 8:5 size variation on the CRT and is used to adjust the pattern so the trace falls between two calibrated grid lines on the CRT bezel (for easy voltage readout and interpretation).

Putting It Together. The unit shown is built on the main section of a 2¼ x 2¼ x 4 inch aluminum chassis box. While parts layout is not necessarily critical try to follow the photographs as closely as possible. Do not substitute for any component values, use the specified parts.

T1 is wound on a stock coil form. The form is supplied with a three turn winding which is used as L2, the secondary of T1. Between the top of L2 and the mounting flange, wrap a three turn link (L1) made of AWG-22 solid, plastic insulation hook-up wire. L1 is not critical, position it approximately midway between L2 and the flange; just wrap three turns and give it a twist to hold the coil together. If the coil appears

CB MODULATION



Capacitor C3 is adjusted according to the details in the text. For easier testing a dummy load (phantom antenna) can be built in—eliminating one of the coax connectors on the CB Scope Booster. Load should be shielded from transformer T1.

too loose cement it in place with coil dope or household cement.

Variable capacitor C3 is *rigidly* mounted to the top of the cabinet. Do not substitue any other type *trimmer* capacitor for the type given in the parts list. You must use a type that mounts *with screws*—the ordinary, inexpensive type, that hangs by its lugs, will change value as the scope is moved.

C3's lugs pass into the cabinet through 5/16-inch holes drilled at opposite ends of the trimmer.

The output leads are short lengths of stranded wire passing through 3/8-inch rubber grommets at the top of the cabinet. Connect phone tips or banana plugs at the ends of the wires—whatever matches the scope's vertical input jacks.

Adjustment. For the moment, forget about C3's setting. Connect the transceiver to either J1 or J2 and connect a dummy load or the antenna system to the remaining jack. An SWR meter *must* be connected between the transceiver and the CB Scope Booster.

Activate the transmitter by depressing the push-to-talk (PTT) switch, and (ignoring any patterns shown on the scope) using an insulated alignment screwdriver adjust T1's slug for *minimum* SWR reading. At the instant the transmitter is turned *on* (keyed) the SWR may read infinity, but don't panic—adjusting T1 will reduce it. With T1 adjusted so the SWR meter dips at the lowest reading, the SWR may still be slightly higher than normal—but by very little. If the SWR is normally 1:1 it might rise to 1.1:1 or 1.2:1. The rise is caused predominantly by opening the cable at the shorting connection between J and J2. Don't worry about an insignificant SWR rise, anything less than 2:1 is okay.

Turn the transmitter *off*, center the CRT baseline, and then turn the transmitter *on*. Using an insulated alignment screwdriver adjust C3 so only the RF carrier (no modulation) falls on a convenient reference line; for example, it is most convenient to have the trace cover four vertical divisions, two above and two below the baseline. There is a slight interaction between C3 and T1's adjustment so each time you adjust C3 go back and adjust T1 for minimum SWR.

Testing. An easy way to check the overall modulation is to feed a low-level tone into the transceiver's mike—placed in front of a speaker and adjust the Hi-Fi (or P.A.) amplifier's gain while you observe the transceiver's modulation pattern.

For straight modulator tests, disconnect the microphone and connect an audio-signal generator, or some other tone source, directly into the transceiver's microphone preamp.

A complete, and interesting explanation, complete with CRT patterns obtained, is given in the Radio Amateur's Handbook, published by the ARRL. Since the scope, under proper analysis, will show up hum, noise and distortion, as well as frequency response, we suggest you latch onto the Handbook—not only is it a good text book it's a great reference for antennas and other parts of low-power installations.

One testing technique detailed is trapezoidal-pattern modulation measurement. The linear time base of the scope is replaced with the audio frequency of modulation. With audio fed to the horizontal input of the scope and audio-modulated RF fed to the vertical plates it is even easier to calculate modulation after measuring the vertical edges of the trapezoidal pattern. ■

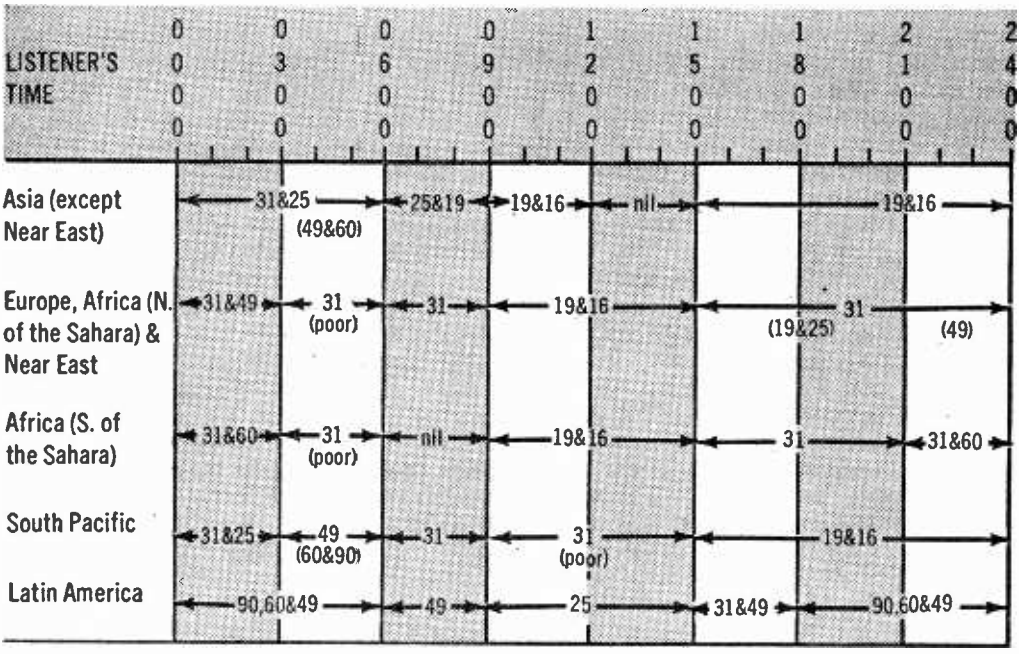
Propagation Forecast

By C. M. Stanbury II

December 1966/January 1967

■ At year's end the winter solstice and above normal sunspot activity will offer peak high-band reception for the SWL. Though those sunspots continue to increase, reception on 16 and 19 meters will not be this good again until next fall. Fortunately for the SWL, more and more countries, no matter their size (or lack of it) and national debt, are entering the international broadcasting field. International broadcasting should be distinguished from SW stations intended only for national coverage which are found primarily on 49, 60 and 90 meters. Reception on these bands, except for Latin America, will be generally difficult, so many DXers will have to depend on international broadcasts for much of their DX.

As usual we have picked those bands on which the best DX is available with a reasonable amount of effort (and assuming the SWL uses an average receiver). Thus, between 0000 and 0300 listener's standard time, we show 60 meters as one of the best bands for Africa south of the Sahara. The other band listed at those hours, 31 meters, will provide considerably stronger and clearer signals but there will be fewer DX targets available than on 60 meters. Meanwhile, *best* DX may be programs *not* intended for us. It's interesting to hear what Communist stations are saying to England *about* us on 31 meters at 1500-1800. ■

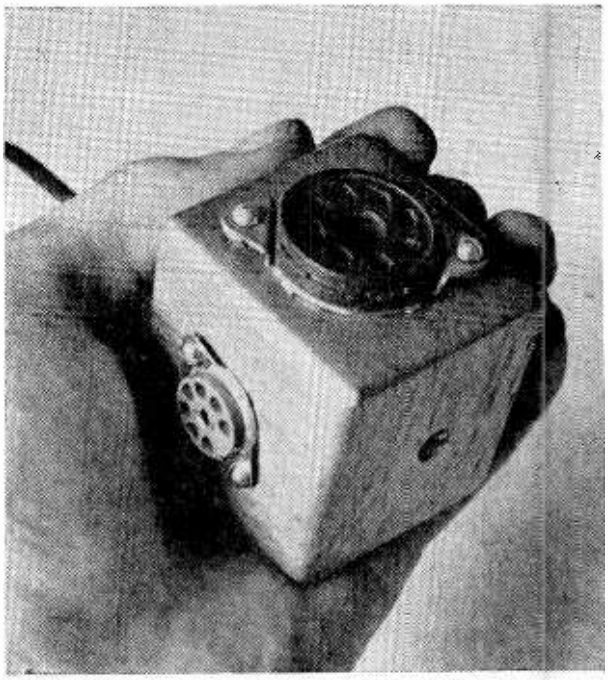


To use the table put your finger on the region you want to hear and log, move your finger to the right until it is under the local standard time you will be listening and lift your finger. Underneath your pointing digit will be the shortwave band or bands that will give the best DX results. The time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

Solid State CUBE Tester

Be a square when you get 'round to testing tubes for a hard-to-find open heater in those series-filament chassis

by Robert E. Kelland



■ The title of this article may lead you astray, as it infers the use of semiconductor devices in a unit that tests "cubes"! But if you look a little closer at the photos you should quickly spot the intended use.

Well, anyway, in case you didn't figure it out after taking a good look; the *tester* is "carved" out of a solid block (cube) of wood and it is an inexpensive, knock-about, tube-filament continuity tester. The tester operates on ordinary line voltage, which lights the neon-lamp good-bad indicator.

Construction. Cut the cube from a good piece of 2 x 2-inch stock—watch for knots and coarse grain when making the selection. Sand all sides smooth and round the edges.

Three sockets are needed; a 7-pin miniature, a 9-pin miniature and an 8-pin octal. It's okay to use salvaged sockets from old projects, but if you want a neat, uniform appearance in your tester, pick up sockets of the same style and color. Inexpensive wafer-type sockets work nicely but molded sockets are sturdier.

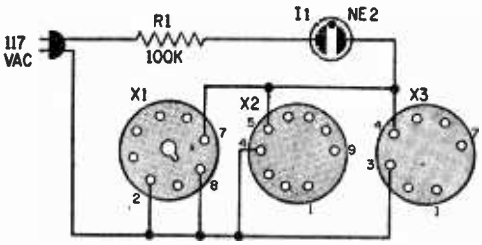
Determine the diameter of the tube-socket mounting holes for the sockets you intend to use, and select the wood bits to match. Generally, molded octal sockets require 1⅛-inch mounting holes; 7-pin miniature ⅝-inch mounting holes; and 9-pin miniature require ¾-inch holes.

All holes are drilled in the *centers* of the sides involved. Only one side remains blank. First, drill the hole for the line cord and neon lamp with a ¼-inch bit. (A drill press will help ensure against accidental veering, but if you use a portable electric drill or a brace and bit, extreme care must be taken to keep the holes straight.) The ⅝-inch hole is bored for the 7- and 9-pin sockets, and then the hole for the 9-pin socket is enlarged with a round file until the socket fits. But, if you have the proper-size bit, use it to avoid whittling time.

The last hole, the one for the octal socket, is drilled *half-way* through the cube, the side opposite remains solid. Use a 1-inch wood bit, and then enlarge the hole with a round file or pen knife to take the octal socket if you can't get hold of an 1⅛-inch bit. Give the cube a final smoothing with fine sandpaper, and spray paint it with several coats of enamel or clear varnish.

Wire the sockets and indicator lamp as shown in the schematic diagram. You'll have to solder leads (about 2 inches long) to the sockets and do the final connections inside the 1⅛-inch hole for the octal socket. Carefully insulate all bare leads and solder joints to prevent shorts. Use plastic tubing and electrical tape.

Completion. Finish the job by maneuver-

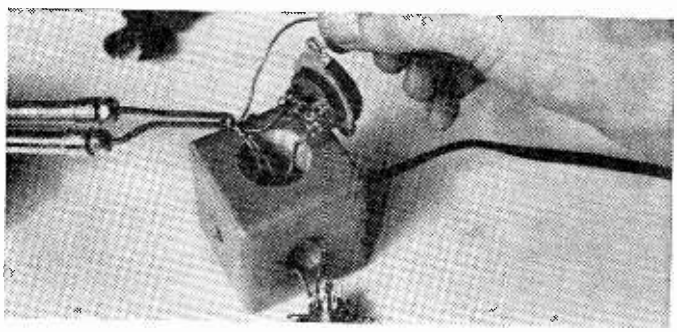


The circuit (above), is simple but you must remember it won't check all of the tubes—filaments on many 5-volt rectifier tubes are pins 2 and 8.

PARTS LIST

I1—NE2 neon lamp
R1—100,000-ohm, ½-watt resistor
X1—8-pin octal socket
X2—9-pin miniature tube socket
X3—7-pin miniature tube socket
1—Line cord and plug
1—Block wood 2x2x2 inches approx.
Misc.—Enamel or varnish, plastic electrical tape, stranded hookup wire, solder, wood screws, sandpaper

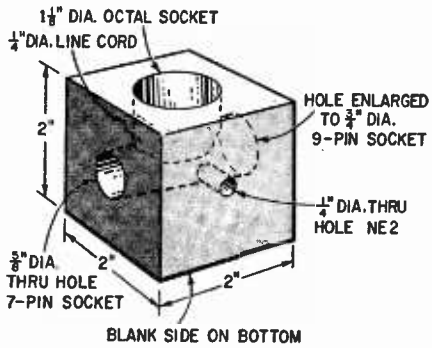
Esitmated cost: $0.80
Construction time: 2 hours



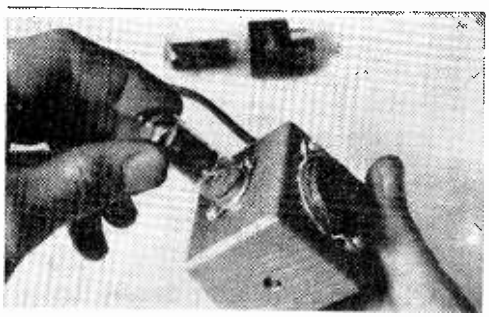
Wiring can be quite a chore for an all-thumbs wirer in the close confines of the wooden block—nothing is to prevent you from using a plastic case or a standard chassis box to hold the circuitry. Add a pair of metal strips to test fuses and lamps.

ing the NE2 lamp down into the ¼-inch hole provided for it and push it in place. To prevent breakage the tip of the lamp should be kept below the surface of the side. Before mounting the sockets, check the tester for proper operation. Don't do so, though, until you make a final check on your wiring to detect any short circuits. Plug in a vacuum tube that is known to be good, and the NE2 should glow. Removing the tube will cause the NE2 to extinguish. If all is OK, go ahead and secure the sockets with small roundhead wood screws.

A Final Note. The tester will check most common tubes for open filaments. There are some tubes not used in series-filament circuits which have different pin connections to the filament element, so, if in doubt, check with a tube manual. ■



If you're not sure of your carpentry, drill the ¼-in. holes from each side to the center and drill the 1⅛-in. hole past center to be sure of having all other holes bore into it.



One worthwhile use for that blank side of the wooden cube would be for a 7- and 9-pin tube-pin straightener. Bent pins can be the cause of bad or poor contact in tube sockets. The oxide coating on heat-darkened tube-base pins also contribute to poor operation.

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All Crystals Supplied!

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- Dual Conversion Receiver for Extra Selectivity and Sensitivity
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- 3-Position Delta Tune—Provides Accurate Fine Tuning
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FOR: Business, Personal Use, Emergency H.E.L.P.

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- Large Self-Contained 3 x 5 Inch Speaker
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- For 12 Volts DC Negative or Positive Ground or 117 Volts AC with Optional AC Power Supply
- Supplied with Pair of Channel 9 Crystals for CB and Emergency Mobile Aid through H.E.L.P.

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- 3 Crystal Controlled Channels
- Operate on any of 23 channels
- 5-watt FCC-Maximum Input . . . with the Power of the Most Powerful Base & Mobile CB Transceivers
- 13 Transistors, 6 Diodes
- 7-Stage Transmitter for Extra Transmit Sock!
- Mechanical Filter for Superior Selectivity
- Automatic Compressor Range Boost™ Assures High Talk Power
- Battery Condition and Automatic Relative RF Power Output Indicator for Continuous Top Performance

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- 23-Channel Tunable Receive
- 13-Transistors, 10 Diodes
- Push-Pull Audio Modulator
- PA System
- 117 VAC & 12 VDC Negative or Positive Battery Ground
- Spotting Switch and Variable Squelch
- Pi-Net Output
- TVI Trap
- Cool, Instantaneous Operation
- With Push-to-Talk Mike, Mobile Bracket and Crystals for Channel 9

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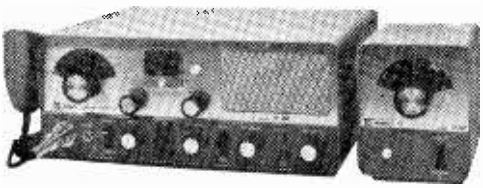
RADIO-TV EXPERIMENTER LAB CHECK



KNIGHT-KIT Model TR-106 6-Meter Transceiver and Model V-107 VFO

■ Low-cost 6-meter transceivers of the type intended for the beginning ham have always been plagued by poor performance—generally in the area of frequency stability. Another major difficulty with rock-bottom priced rigs is the receiver's poor signal-to-noise ratio. Therefore, we were favorably impressed when the Knight TR-106 6-meter Transceiver performed considerably better than the usual run-of-the-mill low-cost 6-meter gear.

What's In The Box. First off, the TR-106 is not cut to the bone in order to keep costs down. In fact, both the transmitter and receiver sections boast a "full line-up."

The receiver section is double-conversion, starting with a neutralized Nuvistor RF amplifier feeding a crystal-controlled (16-MHz—mc.) first convertor. The output of the first convertor is then beat against a tunable oscillator to produce the second IF frequency of 1650 kHz (kc). The two stages of second IF amplification feed a standard diode AM detector and the AF amplifiers. A switchable diode noise limiter is also provided.

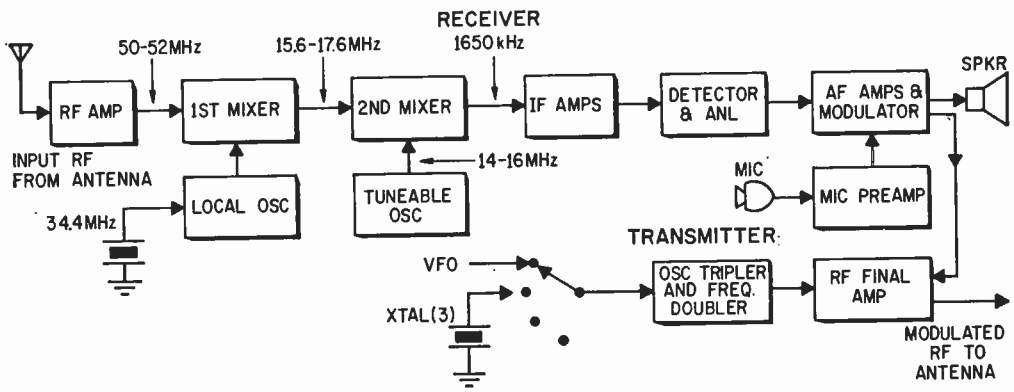
The transmitter utilizes 8-MHz crystals, feeding into an oscillator/tripler, a doubler, and then into a 2E26 final which runs straight-through on *six*. A four-position switch selects either of three crystal sockets located on the front panel or the VFO input (a standard phono jack on the rear apron).

The 2E26 output utilizes a pi-net. While the oscillator tripler also is tunable, the doubler uses a fixed-tuned tank circuit/coupler. In short, there are only three front-panel tuning controls.

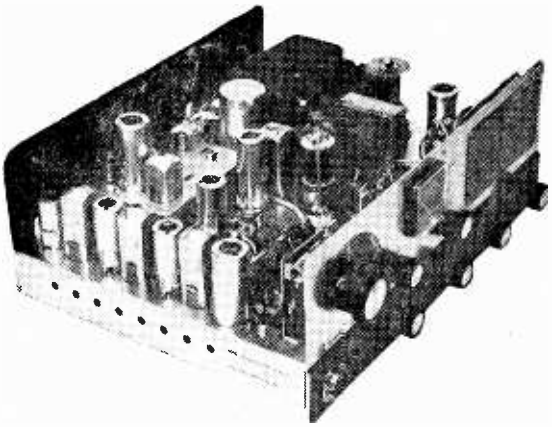
The solid-state power supply accommodates either 115 VAC or 12 VDC. The power plug automatically provides the correct power supply connections for each voltage.

Little Things Mean A Lot. The microphone is connected via a heavy-duty locking-type connector and is provided with a push-to-talk switch. A separate panel-mounted transmit switch allows the transmitter to be turned on for tune-ups without applying modulation; a shorting bar across the mike contacts kills the audio until the user presses the PTT switch. There is also a panel-mounted spotting switch that turns on only the oscillator so the user can pre-set the receiver to the transmitting frequency.

A pre-wired socket on the rear apron provides the power and switching for an optional VFO. An S-meter/tune-up (relative power



Block diagram shows signal flow in audio and RF circuitry of Knight-Kit TR-106 transceiver



Internal view and front panel of Knight-Kit TR-106 transceiver shows the many components that are fitted into this compact 6-meter rig. Rear apron (below) shows power transistors, jacks and plugs. Transistors replace the vibrator long used to make AC out of the battery voltage for mobile installations.

output) meter is provided along with a remote speaker jack. Though it covers 50 to 52 MHz (the popular segment of 6 meters), the dial has a special mark to indicate the American CW—only segment from 50 to 50.1 MHz.

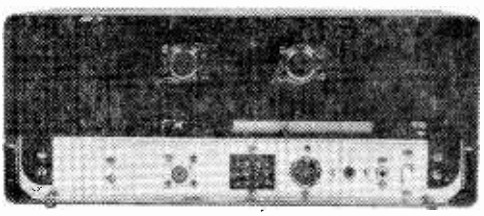
To provide optimum modulation characteristics a separate microphone gain control is provided, as well as the usual AF gain control for receiving (yes, there is an RF gain control).

It's A Kit. In spite of an extensive amount of circuitry, assembling the kit is not inordinately difficult. In fact, it's rather easy, since the most difficult and troublesome circuit is supplied pre-wired and aligned. The entire front end, consisting of the Nuvistor RF amplifier, the first convertor and the first oscillator is furnished as a complete sub-assembly, actually a chassis that stacks on top of the main chassis. All that's left for the user to assemble is the trouble-free circuits.

As you'll note from the photos, the chassis is considerably larger than necessary—there is no stacking of components in multiple layers or tight corners. Even the crystal/VFO selector switch is in a clear area and presents no wiring difficulty. Further, both the chassis and cabinet are made of rather heavy steel, which contributes towards the overall stability of the unit.

Total construction time for a beginning kit builder is about 24 hours. An experienced "thumb burner" should figure on about 21 hours.

How It Works. The payoff (the performance) is strictly first-class, and in most instances the performance obtained from our model exceeded Knight's specs. As for the receiver, Knight claims a 10 db S+N/N (signal-plus-noise to noise) sensitivity of 0.5 μv., but our unit checked out at 0.11 μv

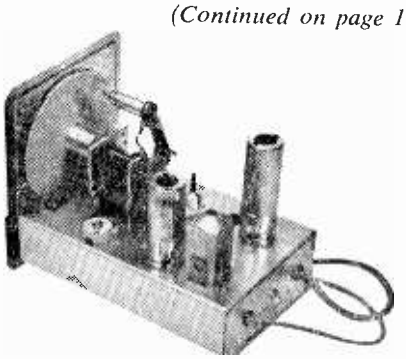


—tops in anyone's book. Further, the stability, in practical terms, was excellent for a budget transceiver. After a 10-minute warm-up, it was possible to work a full contact (10 to 15 minutes) without once touching the tuning knob.

The receiver audio quality is exceptionally good, very clean with plenty of power output —more than enough to overcome the highest of ambient noise levels if the TR-106 is used in mobile service. The S-meter is calibrated to indicate S-9 on signals of approximately 5 μv. The individual S-unit calibration varied between 5 and 3 db per unit.

The transmitter, which is designed to work into a 30- to 90-ohm load (with a VSWR of

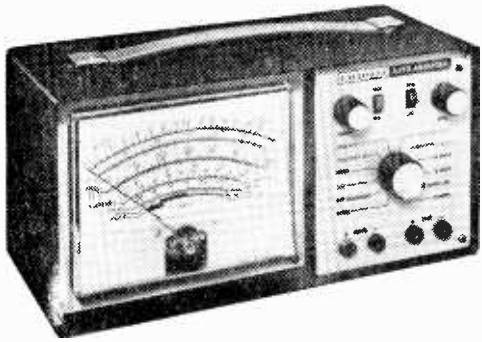
(Continued on page 128)



Companion to transceiver is this Knight-Kit V-107 VFO (variable frequency oscillator).

RADIO-TV EXPERIMENTER LAB CHECK

EICO MODEL 888
Solid-State
Universal Engine Analyzer



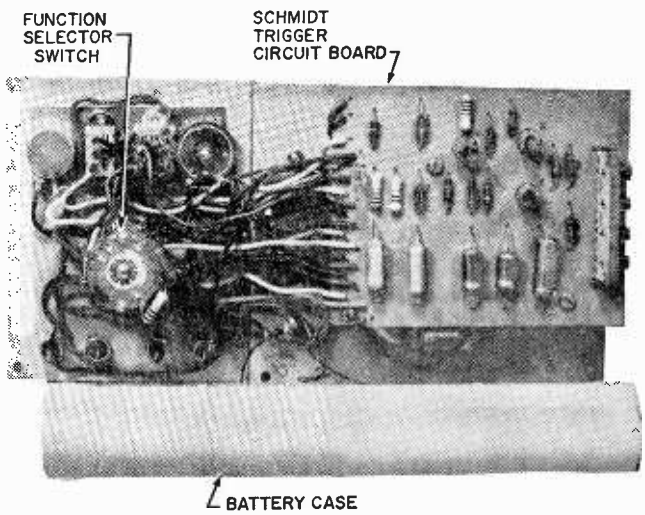
■ Hottest thing going these days outside of space exploits and such are auto engine analyzers and the bits and pieces of analyzers sold as individual tune-up equipment. Fact is, more and more people are currently doing their own engine tune-ups. The reason is simply that a really good tune-up is becoming increasingly hard to find.

But can someone who knows next to nothing about auto electrical systems really do a good tune-up, even with the best of equipment? As we proved, the answer is a definite *yes*. The proof? We used an EICO 888 Engine Analyzer on a 1963 Plymouth that hadn't run smooth since we could remember. Using the EICO 888 we had the engine purring like a fine watch inside of 20 minutes. To prove its worthiness, the 888 turned up an internal break in a spark plug cable (the reason for two years of shake), incorrect point setting, improper idle adjustment of the carburetor, and excessively high fast-idle speed.

Moving on to our Dodge, which had a tendency to "konk-out" whenever the air conditioner was turned on, the EICO 888 showed that the added load of the air conditioner compressor was dropping the idle speed by 50 rpm. A quick touch-up corrected this problem, though it didn't tell us why the outfit that installed the air conditioner hadn't made this adjustment in the first place.

What's In the 888. Typical of the complete engine analyzers, outside of a timing light the 888 contains essentially all the test circuits necessary for anyone to do his own engine tune-ups. With two circuits excepted, the EICO 888's functions are obtained through an ohmmeter or voltmeter circuit with special meter calibrations. In the voltmeter category the 888 indicates:

- Spark—whether the spark voltage is low, normal, or high
- Dwell—whether the distributor point gap is correct, from 0 to 60 degrees for six-cylinder cars and 0 to 45 degrees

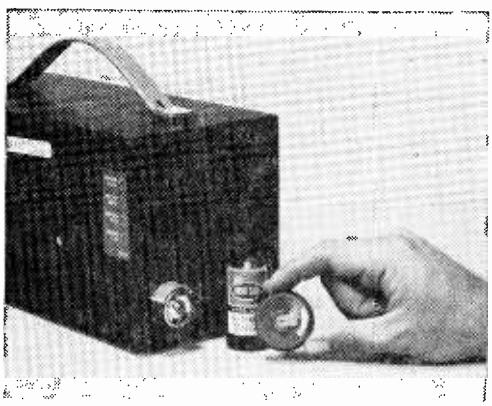


Rear of the EICO 888 panel shows most of the components and wiring of the instrument. Schmidt trigger is a form of multivibrator which gives the same-shaped pulse at its output no matter what shape pulse is fed to its input. Battery case (usually unseen) resembles a multicelled flashlight.

for four- and eight-cylinder models

- RPM—four ranges, 1200 and 6000 RPM for six cylinders and 1200 and 6000 RPM for four and eight cylinders
- Voltage—3.2- and 16-volt ranges for checking the "high voltage" battery circuits and for searching for minute voltage drops indicative of high resistance connections
- Diode Leak—essentially an ohmmeter for checking alternator diodes and the condition of the distributor capacitor.

An ammeter, reading from 0 to 90 amperes, is included which uses an external high current shunt that is supplied. The 888 also has a built-in distributor capacitor (condenser) for substitution.



Sticker on rear of cabinet indicates the location of calibration controls on side, above battery opening—which is closed, with cap (in hand), just like a flashlight.

While EICO's engine analyzer contains a profusion of test circuits, actual operation is simplicity itself. There is only one function switch and one set of test jacks (except for the current measurements). An exceptionally good instruction manual also contains the recomended dwell and RPM adjustment for nearly all modern cars (a few rare imports are not listed, but anyone with a rarity should have a service manual).

Unlike most other electronic equipment, the EICO 888 is primarily a switching device in that the ohmmeter and voltmeter constitute the basic circuits and switching selects the appropriate range. The only electronics—in the sense of an amplifier, oscillator, etc.—is a three-transistor Schmitt trigger used in the RPM measurements. The purpose of the trigger is to provide a waveform of definite width and shape regardless of input signal (in this instance the pulses appearing at the distributor points).

Instead of attempting to measure the "hash" across the points, the 888 simply uses the distributor pulse to trigger the Schmitt circuit. Each distributor pulse, regardless of waveform, therefore results in a stable trigger output. Since the trigger output is "standardized," the meter can indicate RPM in terms of the average value of the pulses. The faster the engine, the larger the number of pulses and therefore the greater the average voltage (current) applied to the meter.

Since the trigger output is consistent in that each pulse width is the same regardless of the input pulse shape, engine speed has no effect on the accuracy of the RPM reading. For example, if the engine is turning over slowly, the distributor point pulse is wide because the points are closed for a relatively long period of time. However, the output waveform of the trigger is exactly the same shape as when the engine is running fast, and the input pulse caused by the points closing for a shorter period is narrow.

Are The Readings Correct? To insure correct RPM readings, the Schmitt trigger is user-calibrated. The calibration controls are reached through access holes in the cabinet, so there's no need to remove the cabinet to check RPM calibration. EICO supplies with the 888 a special calibration cable that uses the AC (117 VAC) line voltage as a reference. To check or change the RPM calibration (which need be done but once or twice a year), the user connects one end of the calibration cable to the 888 and plugs the other end into a convenient outlet (117 VAC). The function switch is then rotated through the RPM positions and the meter readings noted. Only if the readings vary from those specified need the RPM calibration controls be adjusted. Even then, it's just a matter of rotating the control until the meter indicates the specified value for each range (total calibration time: about 1 minute).

Protection. To protect the analyzer against thoughtless mistakes, like connecting the test leads across the high voltage coil with the function set to RPM, a neon lamp is connected across the test jacks. If the input voltage is excessive, the neon lamp "fires," dropping the applied voltage across a resistor in series with the neon lamp.

Full Time Monitoring. For those who like to keep a running check on engine perform-

(Continued on page 105)

Quest for Quasars

Continued from page 44

less far more violent than the gentle processes of the steady-state theory."

Swedish Physicist Hannes Alven thinks quasars can be the result of matter and antimatter exploding in outer space. While Los Alomos Physicist James Terrell likes to explain quasars as recent explosions of our own Milky Way, but Maarten Schmidt says the Milky Way or any of its neighbors cannot produce enough explosive power to account for the speed of quasars.

From the Beginning of Time. Princeton and Bell Laboratory engineers think the universe is expanding from a high-temperature collapsed state similar to the big-bang theorists. And say, using the horn reflector built for Telstar and Echo, they have cited radiation they feel is coming in from the very beginnings of the universe when it was a collapsed "fireball."

But probably most intriguing of the new speculations comes from Dr. Y. Ne'eman of Tel Aviv University of Israel who is seconded by Prof. I. D. Novokov of the USSR Academy of Sciences. Both think quasars are left-overs from the superdense matter that once exploded to form today's expanding universe. And that the still-expanding universe may actually hold many smaller regional areas that are still "unravelling."

Deducting from the increased number of quasars found at the edges of the universe, they believe this universe was smaller and more dense some 6 to 7 billion years ago. And as they see it, we should expand our picture of an expanding universe to one that is expanding on a large scale with smaller unwindings on a smaller scale within. For the picture they present is an evolutionary one with quasars a "major constituent" of the original universe.

Long Trail Back. Summing up the new deductions, the scales weight on the side of an expanding universe but with variations of expansions still evolving. As Allan Sandage says: "We can now see 8/10's back in time." When we can see the other two-tenths, we may find even more startling revelations concepts that may rock our beliefs of today.

For just as Galileo set the stage for Isaac Newton and his laws of planetary motion and gravitation, our modern day astronomers with radio telescopes sweeping the heavens may find new concepts, not only of astronomy, but solution to creation itself. ■

EICO Auto Analyzer

Continued from page 103

ance, an optional bracket set is available that allows the 888 to be mounted permanently under the dashboard.

How You Test. A standard tune-up check or adjustment with the EICO 888 takes but a few minutes. One test lead is connected to the engine frame (ground), the second lead to the distributor point terminal. With the engine running the 888 indicates the breaker point *dwell angle*. If you don't get the specified reading, simply adjust the point spacing until you do. This circuit works by indicating the average voltage value fed to the ignition coil. The longer the points stay closed, the higher the voltage reading (displayed in degrees of dwell angle).

Using the previous connection, the 888 is set to one of the TACH ranges—thereby switching in a Schmitt trigger pulse counter. The 888 then indicates the RPM of the engine directly. Changes in the slow or fast idle speeds can be read right off the unit.

The carburetor's idle mixture is set by simply adjusting the spring-loaded idle mixture screw for maximum, steadiest RPM indications.

Battery Dead? Quite often, so called dead batteries are really undercharged, caused by defective alternators, generators, or voltage regulators. Alternator diodes are checked by using the ohmmeter function. With the test leads connected across the diodes, reversing the polarity by throwing the FWD/REV switch will cause the meter pointer to flip from one side to the other if the diodes are okay.

The generator, battery, and regulator tests are just as easy.

While the price of the EICO 888 ($44.95, kit; $59.95, wired) just about equals the cost of all the separate functions purchased as separate instruments, its primary advantage is *completeness*. Further, the operating manual is written in layman's terms (none of the "adjust the *frammis* till the *logus* moves" nonsense). And since only two leads are used for all tests and all front-panel controls are clearly marked, the average user can dispense with the operating manual once he learns where to make the connections.

And speaking of ease of operation, we should not overlook something that is usually botched—the battery holder. While the four D-cells used for power fit inside the cabinet, the battery-holder cover is external. It's actually a screw cap, which means that batteries can be replaced without removing the cabinet. The holder is heavily spring-loaded, and no amount of shaking caused intermittent contacts.

In the event of a repair (things do break down at times), EICO provides not only a full parts list but a price list. No need for endless correspondence—just mail your order and get your part by return mail (we wish a complete price list was enclosed with *all* equipment, from radios to washing machines).

If we sound a bit enthused about EICO's engine analyzer, it's because we are. Our reasons are simply that the money we spent trying to tune up the two *meat grinders* far exceeded the price of EICO's 888 (which did the job right the first time!). Just latch onto a timing light, and you can go into the tune-up business for yourself.

For additional information write to Dept. JS, EICO, 131-01 39th Ave., Flushing, N.Y. 11352. ■

Capacitance Switch

Continued from page 52

nothing near the external metal plate.

After both adjustments have been made, place your hand on the insulated metal plate, and the lamp should now go *off*. Remove your hand, and the lamp should go *on* again. If the lamp fails to go *on*, a slight adjustment of the oscillator coil or the tuned-circuit trimmer, must be made.

A point worth mentioning at this time is that if the oscillator fails to oscillate (load remains *off*) when the unit is initially tested, with nothing near the external metal plate, it may be necessary to reverse the primary or secondary windings (not both) of the oscillator coil.

This capacitance-operated switch has a multitude of applications such as controlling a display (in a store window), as a safety device near a power saw, a burglar alarm . . . etc. Its applications seem to be restricted only by the stretch of one's imagination and the rating of T1. The solid-state circuitry properly used should give long, reliable operation. ■

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Volume 46, No. 3

WHITE'S RADIO LOG

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

This is the third and last part of *White's Radio Log*, published in three parts twice each year. This format presentation enables the Editors of RADIO-TV EXPERIMENTER to offer its readers two complete volumes of *White's Radio Log* each year, while increasing the scope of the *Log* and its accuracy.

In this issue of *White's Radio Log* we have included the following listings: U. S. AM Stations by Call Letters, U. S. FM Stations by Call Letters, Canadian AM Stations by Call Letters, Canadian FM Stations by Call Letters and the World-Wide Shortwave Stations section.

In the February-March, 1967 issue of RADIO-TV EXPERIMENTER the *Log* will contain the following listings: U. S. AM Stations by Frequency, Canadian AM Stations by Frequency, U. S. Television Stations by States, Canadian Television Stations by Cities and the World-Wide Shortwave Stations section. In the event you missed a part of the *Log* published during 1966, you will have a complete volume of *White's Radio Log* by collecting any three consecutive issues of RADIO-TV EXPERIMENTER published during 1966. The three consecutive issues are an entire volume of *White's Radio Log* that offers complete listings with up-to-the minute station change data that are not offered in any other magazine or book.

If you are a broadcast band DX'er, FM station logger, like to photograph distant TV test patterns, or tune the shortwave bands, you will find the new *White's* format an *unbeatable* and *up-to-date* handy reference.

QUICK REFERENCE INDEX TO WHITE'S RADIO LOG

U. S. AM Stations by Call Letters

C.L.	Location	kHz
KAAA	Kingman, Ariz.	1230
KAAY	Little Rock, Ark.	1090
KABC	Los Angeles, Calif.	790
KABH	Midland, Tex.	1510
KABI	Abilene, Kans.	1560
KABL	Oakland, Calif.	960
KABQ	Albuquerque, N.M.	1350
KABR	Aberdeen, S.Dak.	1420
KACE	Riverside, Calif.	1570
KACI	The Dalles, Oreg.	1300
KACL	Santa Barbara, Cal.	1290
KACT	Andrews, Tex.	1360
KACY	Port Hueneme, Calif.	1520
KADA	Ada, Okla.	1230
KADL	Pine Bluff, Ark.	1270
KADO	Marshall, Tex.	1410
KADY	St. Charles, Mo.	1460
KAFE	Sante Fe, N.M.	810
KAFY	Bakersfield, Calif.	550
KAGE	Winona, Minn.	1380
KAGH	Crossett, Ark.	800
KAGI	Grants Pass, Oreg.	930
KAGO	Klamath Falls, Oreg.	1150
KAGT	Anacortes, Wash.	1340
KAHI	Auburn, Calif.	950
KAHR	Redding, Calif.	1330
KAHU	Waipahu, Hawaii	940
KAIM	Honolulu, Hawaii	870
KAIN	Nampa, Ida.	1340
KAIR	Tucson, Ariz.	1490
KAJO	Grants Pass, Oreg.	1270
KAKA	Wickenburg, Ariz.	1250
KAKC	Tulsa, Okla.	970
KAKE	Wichita, Kan.	1240
KALB	Alexandria, La.	580
KALE	Richland, Wash.	960
KALF	Mesa, Ariz.	1510
KALG	Alamogordo, N.Mex.	1230
KALI	San Gabriel, Cal.	1430
KALL	Salt Lake City, Utah	910
KALM	Thayer, Mo.	1290
KALN	Iola, Kan.	1370
KALO	Little Rock, Ark.	1250
KALT	Atlanta, Tex.	900
KALV	Alva, Okla.	1430
KAMD	Camden, Ark.	910
KAMI	Cozad, Neb.	1580
KAML	Kenedy-Karnes City, Tex.	990
KAMO	Rogers, Ark.	1390
KAMP	El Centro, Calif.	1430
KAMY	McCamey, Tex.	1450
KANA	Anaconda, Mont.	580
KANB	Shreveport, La.	1300
KAND	Corsicana, Tex.	1340
KANE	New Iberia, La.	1240
KANI	Wharton, Tex.	1500
KANN	Ogden, Utah	1250
KANO	Anoka, Minn.	1470
KANS	Larned, Kan.	1510
KAOH	Duluth, Minn.	1390
KAOK	Lake Charles, La.	1400
KAOL	Carrollton, Mo.	1430
KAOR	Oroville, Calif.	1340
KAPA	Raymond, Wash.	1340
KAPB	Marksville, La.	1370
KAPE	San Antonio, Tex.	1480
KAPI	Pueblo, Colo.	690
KAPR	Douglas, Ariz.	930
KAPS	Mt. Vernon, Wash.	1470
KAPT	Salem, Ore.	1220
KAPY	Port Angeles, Wash.	1290
KARA	Albuquerque, N.M.	1310
KARE	Atchison, Kan.	1470
KARI	Blaine, Wash.	550
KARK	Little Rock, Ark.	920
KARM	Fresno, Calif.	1430
KARR	Great Falls, Mont.	1400
KARS	Belen, N.M.	860
KART	Jerome, Idaho	1400
KARY	Prosser, Wash.	1310
KASH	Eugene, Ore.	1590
KASI	Ames, Iowa	1430
KASK	Ontario, Calif.	1510
KASL	Newcastle, Wyo.	1240
KASM	Albany, Minn.	1150
KASO	Minden, La.	1240
KAST	Astoria, Ore.	1370
KASY	Auburn, Wash.	1220
KATA	Arcata, Calif.	1340
KATE	Albert Lea, Minn.	1450
KATI	Casper, Wyo.	1400
KATL	Miles City, Mont.	1340
KATN	Boise, Idaho	1010
KATO	Safford, Ariz.	1230
KATQ	Texarkana, Tex.	940
KATR	Eugene, Ore.	1320
KATY	San Luis Obispo, Cal.	1340
KATZ	St. Louis, Mo.	1600
KAUS	Austin, Minn.	1480
KAVE	Carlsbad, N.Mex.	1240
KAVI	Rocky Ford, Colo.	1320
KAVL	Lancaster, Calif.	610
KAVR	Apple Valley, Calif.	960
KAWA	Waco-Marlin, Tex.	1010
KAWL	York, Neb.	1370
KAWT	Douglas, Ariz.	1450
KAYC	Beaumont, Tex.	1450
KAYE	Puyallup, Wash.	1450
KAYG	Lakewood, Wash.	1480
KAYL	Storm Lake, Iowa	990
KAYO	Seattle, Wash.	1150
KAYS	Hays, Kans.	1400
KAYT	Rupert, Idaho	970
KBAB	Indianola, Iowa	1490
KBAL	San Saba, Tex.	1410
KBAM	Longview, Wash.	1270
KBAN	Bowie, Tex.	1410
KBAR	Burley, Idaho	1230
KBAT	San Antonio, Tex.	680
KBBA	Benton, Ark.	690
KBBB	Borger, Tex.	1600
KBBC	Centerville, Utah	1600
KBBO	Yakima, Wash.	1390
KBBR	North Bend, Oreg.	1340
KBBS	Buffalo, Wyo.	1450
KBCH	Oceanlake, Oreg.	1380
KBCL	Shreveport, La.	1220
KBEA	Mission, Kans.	1480
KBEC	Waxahachie, Tex.	1390
KBEE	Modesto, Calif.	970
KBEK	Elk City, Okla.	1240
KBEL	Idabel, Okla.	1240
KBEN	Carrizo Sprgs., Tex.	1450
KBER	San Antonio, Tex.	1150
KBET	Reno, Nev.	1340
KBEV	Portland, Oreg.	1010
KBEW	Blue Earth, Minn.	1360
KBFS	Belle Fourche, S.Dak.	1450
KBGH	Memphis, Tex.	1130
KBGN	Caldwell, Idaho	910
KBGO	Waco, Tex.	1580
KBHB	Sturgis, S. D.	1280
KBHC	Nashville, Ark.	1260
KBHM	Branson, Mo.	1220
KBHS	Hot Springs, Ark.	590
KBIA	Burlington, Ia.	1150
KBIB	Monette, Ark.	1560
KBIC	Lakeport, Cal.	1270
KBIF	Fresno, Calif.	900
KBIG	Avalon, Cal.	740
KBIM	Roswell, N.Mex.	910
KBIS	Bakersfield, Calif.	970
KBIX	Muskogee, Okla.	1490
KBJM	Lemmon, S.D.	1400
KBIZ	Ottuwa, Iowa	1240
KBJT	Fordyce, Ark.	1570
KBKR	Baker, Oreg.	1490
KBKW	Aberdeen, Wash.	1450
KBLA	Burbank, Calif.	1500
KBLE	Seattle, Wash.	1050
KBLF	Red Bluff, Calif.	1490
KBLI	Blackfoot, Idaho	690
KBLL	Helena, Mont.	1240
KBLR	Bolivar, Mo.	1550
KBLT	Big Lake, Tex.	1290
KBLU	Yuma, Ariz.	1320
KBLY	Gold Beach, Oreg.	1220
KBMI	Henderson, Nev.	1400
KBMN	Bozeman, Mont.	1230
KBMO	Benson, Minn.	1290
KBMR	Bismarck, N. D.	1350
KBMW	Wahpeton, N.D.-Breckenridge, Minn.	1450
KBMX	Coalinga, Calif.	1470
KBMY	Billings, Mont.	1240
KBNO	Bend, Oreg.	1110
KBOA	Kennett, Mo.	830
KBOE	Oskaloosa, Iowa	740
KBOI	Boise, Idaho	670
KBOK	Malvern, Ark.	1310
KBOL	Boulder, Colo.	1490
KBOM	Bismark-Mandan, N.Dak.	1270
KBON	Omaha, Nebr.	1490
KBOP	Pleasanton, Tex.	1380
KBOR	Brownsville, Tex.	1600
KBOW	Butte, Mont.	550
KBOX	Dallas, Tex.	1480
KBOY	Medford, Oreg.	730
KBPS	Portland, Oreg.	1450
KBRC	Mt. Vernon, Wash.	1430
KBRI	Brinkley, Ark.	1570
KBRK	Brookings, S.Dak.	1430
KBRL	McCook, Nebr.	1300
KBRN	Brighton, Colo.	800
KBRO	Bremerton, Wash.	1490
KBRR	Leadville, Colo.	1230
KBRS	Springdale, Ark.	1340
KBRV	Soda Sprgs., Ida.	540
KBRX	O'Neill, Nebr.	1350
KBRZ	Freeport, Texas	1460
KBSF	Springhill, La.	1460
KBSN	Crane, Tex.	970
KBST	Big Spring, Tex.	1490
KBTA	Batesville, Ark.	1340
KBTC	Houston, Mo.	1250
KBTM	Jonesboro, Ark.	1230
KBTN	Neosho, Mo.	1420
KBTO	El Dorado, Kans.	1360
KBTR	Denver, Colo.	710
KBUD	Athens, Tex.	1410
KBUH	Brigham City, Utah	800
KBUN	Bemidji, Minn.	1450
KBUR	Burlington, Iowa	1490
KBUS	Mexia, Tex.	1590
KBUY	Amarillo, Tex.	1010
KBUZ	Mesa, Ariz.	1310
KBVM	Lancaster, Calif.	1380
KBVU	Bellevue, Wash.	1540
KBWD	Brownwood, Tex.	1380
KBXM	Kennett, Mo.	1540
KBYE	Okla. City, Okla.	890
KBYG	Big Spring, Tex.	1400
KBYP	Shamrock, Tex.	1580
KBYR	Anchorage, Alaska	1270
KBZY	Salem, Oreg.	1490
KBZZ	LaJunta, Colo.	1400
KCAB	Dardanelle, Ark.	980
KCAC	Phoenix, Ariz.	1010
KCAD	Abilene, Tex.	1560
KCAL	Redlands, Calif.	1410
KCAM	Glennallen, Alaska	790
KCAN	Canyon, Tex.	1550
KCAP	Helena, Mont.	1340
KCAR	Clarksville, Tex.	1350
KCAS	Slaton, Tex.	1050
KCAT	Pine Bluff, Ark.	1530
KCBC	Des Moines, Iowa	1390
KCBD	Lubbock, Tex.	1590
KCBN	Reno, Nev.	1230
KCBQ	San Diego, Calif.	1170
KCBS	San Fran., Calif.	740
KCCB	Corning, Ark.	1260
KCCC	Carlsbad, N.M.	930
KCCL	Paris, Ark.	1460
KCCN	Honolulu, Hawaii	1420
KCCO	Lawton, Okla.	1050
KCCR	Pierre, S. D.	1240
KCCT	Corpus Christi, Tex.	1150
KCCV	Independence, Mo.	1510
KCEE	Tucson, Ariz.	790
KCEY	Tunlock, Calif.	1390
KCFA	Spokane, Wash.	1330
KCFH	Cuero, Tex.	1600
KCFI	Cedar Falls, Iowa	1250
KCGM	Columbia, Mo.	1580
KCHA	Charles City, Iowa	1580
KCHE	Cherokee, Iowa	1440
KCHI	Chillicothe, Mo.	1010
KCHJ	Delano, Calif.	1010
KCHR	Charleston, Mo.	1350
KCHS	Truth or Consequences, New Mexico	1400
KCHV	Coachella, Calif.	970
KCHY	Cheyenne, Wyo.	1530
KCID	Caldwell, Idaho	1490
KCII	Washington, Iowa	1380
KCIJ	Shreveport, La.	1050
KCIL	Houma, La.	1490
KCIM	Carroll, Iowa	1380
KCIN	Victorville, Calif.	1590
KCJB	Minot, N.Dak.	910
KCKC	San Bernardino, Cal.	1350
KCKG	Sonora, Tex	1240
KCKN	Kansas City, Kans.	1340
KCKW	Jena, La.	1480
KCKY	Coolidge, Ariz.	1150
KCLA	Pine Bluff, Ark.	1400
KCLE	Cleburne, Tex.	1120
KCLN	Clinton, Iowa	1390
KCLO	Leavenworth, Kans.	1410
KCLR	Ralls, Tex.	1530
KCLS	Flagstaff, Arlz.	600
KCLU	Rolla, Mo.	1590
KCLV	Clovis, N.Mex.	1240
KCLW	Hamilton, Tex.	900
KCLX	Colfax, Wash.	1450
KCMC	Texarkana, Tex.	1230
KCMJ	Palm Sprgs., Calif.	1010
KCMO	Kansas City, Mo.	810
KCMS	Manitou Sprgs., Colo.	1490
KCNI	Broken Bow, Nebr.	1280
KCNO	Alturas, Calif.	570
KCNY	San Marcos, Tex.	1470
KCOB	Newton, Iowa	1280
KCOG	Centerville, Iowa	1400
KCOH	Houston, Tex.	1430
KCOK	Tulare, Calif.	1270
KCOL	Ft. Collins, Colo.	1410
KCOM	Comanche, Tex.	1550
KCON	Conway, Ark.	1230
KCOR	San Antonio, Tex.	1350
KCOW	Alliance, Nebr.	1400
KCOY	Santa Maria, Calif.	1400
KCPX	Salt Lake City, Utah	1320
KCRA	Saeramento, Calif.	1320
KCRB	Chanute, Kans.	1460
KCRC	Enid, Okla.	1390
KCRG	Cedar Rapids, Iowa	1600
KCRM	Crane, Tex.	1380
KCRS	Midland, Tex.	550
KCRT	Trinidad, Colo.	1240
KCRV	Caruthersville, Mo.	1370
KCSJ	Pueblo, Colo.	590
KCSR	Chadron, Nebr.	610
KCTA	Corpus Christi, Tex.	1030
KCTI	Gonzales, Tex.	1450
KCTY	Salinas, Calif.	980
KCTX	Childress, Tex.	1510
KCUB	Tucson, Ariz.	1290
KCUE	Red Wing, Minn.	1250
KCUL	Fort Worth, Tex.	1540
KCVL	Colville, Wash.	1270
KCVR	Lodi, Calif.	1570
KCYL	Lampasas, Tex.	1450
KDAC	Ft. Bragg, Calif.	1230
KDAD	Weed, Calif.	800
KDAK	Carrington, N.D.	1600
KDAL	Duluth, Minn.	610
KDAN	Eureka, Calif.	790
KDAV	Lubbock, Tex.	580
KDAY	Santa Monica, Calif.	1580
KDB	Santa Barbara, Calif.	1490
KDBM	Dillon, Mont.	800
KDBS	Alexandria, La.	1410
KDCE	Espanola, N.M.	970
KDDA	Dumas, Ark.	1560
KDDD	Dumas, Tex.	800
KDEC	Decorah, Iowa	1240
KDEF	Albuquerque, N.Mex.	1150
KDEN	Denver, Colo.	1340
KDEO	El Cajon, Calif.	910
KDES	Palm Sprgs., Calif.	920
KDET	Center, Tex.	930
KDEX	Dexter, Mo.	1590
KDEY	Boulder, Colo.	1360
KDFL	Sumner, Wash.	1560
KDFN	Doniphan, Mo.	1500
KDGO	Durango, Colo.	1240
KDHI	Twenty-nine Palms, California	1250
KDHL	Faribault, Minn.	920
KDHN	Dimmitt, Tex.	1470
KDIA	Oakland, Calif.	1310
KDIO	Ortonville, Minn.	1350
KDIX	Dickinson, N.Dak.	1230
KDJI	Holbrook, Ariz.	1270
KDKA	Pittsburgh, Pa.	1020
KDKD	Clinton, Mo.	1280
KDKO	Littleton, Colo.	1510
KDLA	DeRidder, La.	1010
KDLK	Del Rio, Tex.	1230
KDLM	Detroit Lakes, Minn.	1340
KDLR	Devils Lake, N.Dak.	1240
KDLS	Perry, Iowa	1310
KDMA	Montevideo, Minn.	1450
KDMD	Carthage, Mo.	1490
KDMS	El Dorado, Ark.	1290
KDNC	Spokane, Wash.	1440
KDNT	Denton, Tex.	1440
KDOK	Tyler, Tex.	1490
KDOL	Mojave, Calif.	1340
KDOM	Windom, Minn.	1580
KDON	Salinas, Calif.	1460
KDOT	Scottsdale, Ariz.	1440
KDOV	Medford, Oreg.	1300
KDOX	Marshall, Tex.	1410
KDQN	DeQueen, Ark.	1390
KDRG	Deer Lodge, Mont.	1400
KDRO	Sedalia, Mo.	1340
KDRS	Paragould, Ark.	1490
KDRY	Alamo Hts., Tex.	1110
KDSJ	Deadwood, S.Dak.	980
KDSN	Denison, Iowa	1580
KDSX	Denison-Sherman, Tex.	950
KDTA	Delta, Colo.	1400
KDTH	Dubuque, Iowa	1370
KDUZ	Hutchinson, Minn.	1260
KDWA	Hastings, Minn.	1460
KDWB	St. Paul, Minn.	630
KDWT	Stamford, Tex.	1400
KDXE	No. Little Rock, Ark.	1380
KDXI	Mansfield, La.	1360
KDXU	St. George, Utah	1450
KDYL	Tooele, Utah	990
KDZA	Pueblo, Colo.	1230
KEAN	Brownwood, Tex.	1240
KEAP	Fresno, Calif.	980
KEBE	Jacksonville, Tex.	1400
KECH	Ketchikan, Alaska	620
KECK	Odessa, Tex.	920
KEDA	San Antonio, Tex.	1540
KEDD	Dodge City, Kans.	1550
KEDO	Longview, Wash.	1400

WHITE'S RADIO LOG

C.L.	Location	kHz
KEED	Springfield-Eugene, Ore.	1120
KEEE	Nacogdoches, Tex.	1280
KEEL	Shreveport, La.	710
KEEN	San Jose, Calif.	1370
KEEP	Twin Falls, Idaho	1450
KEES	Gladewater, Tex.	1430
KEGG	Daingerfield, Tex.	1560
KELA	Centralia-Chekalis, Wash.	1470
KELD	El Dorado, Ark.	1400
KELI	Tulsa, Okla.	1430
KELK	Elko, Nev.	1240
KELO	Sioux Falls, S.Dak.	1320
KELP	El Paso, Tex.	920
KELR	El Reno, Okla.	1460
KELY	Ely, Nev.	1230
KENA	Mena, Ark.	1450
KEND	Cheyenne, Wyo.	980
KENE	Toppenish, Wash.	1490
KENI	Anchorage, Alaska	550
KENM	Portales, N.Mex.	1450
KENN	Farmington, N.M.	1390
KENO	Las Vegas, Nev.	1460
KENR	Houston, Tex.	1070
KENT	Prescott, Ariz.	1340
KENY	Bellingham-Ferndale, Wash.	930
KEOR	Atoka, Okla.	1110
KEOS	Flagstaff, Ariz.	690
KEPR	Kenneviek-Richland-Pasco, Wash.	610
KEPS	Eagle Pass, Tex.	1270
KERB	Kermit, Tex.	600
KERC	Eastland, Tex.	1590
KERG	Eugene, Oreg.	1280
KERN	Bakersfield, Calif.	1410
KERV	Kerrville, Tex.	1230
KESM	Eldorado Springs, Mo.	1580
KEST	Boise, Idaho	790
KETO	Seattle, Wash.	1590
KETX	Livingston, Tex.	1440
KEUN	Eunice, La.	1490
KEVA	Evanston, Wyo.	1240
KEVL	White Castle, La.	1590
KEVT	Tucson, Ariz.	690
KEWB	Oakland, Calif.	910
KEWI	Topeka, Kans.	1440
KEX	Portland, Oreg.	1190
KEXO	Grand June., Colo.	1230
KEYD	Oakes, N.Dak.	1220
KEYE	Perryton, Tex.	1400
KEYJ	Jamestown, N.Dak.	1400
KEYL	Long Prairie, Minn.	1400
KEYR	Terrytown, Nebr.	690
KEYS	Corpus Christi, Tex.	1440
KEYY	Provo, Utah	1450
KEYZ	Williston, N.Dak.	1360
KEZU	Rapid City, S.Dak.	920
KEZY	Anaheim, Calif.	1190
KFAB	Omaha, Nebr.	1110
KFAC	Los Angeles, Calif.	1330
KFAH	Lakewood Center, Wash.	1480
KFAL	Fulton, Mo.	900
KFAM	St. Cloud, Minn.	1450
KFAR	Fairbanks, Alaska	660
KFAX	San Francisco, Calif.	1100
KFAY	Fayetteville, Ark.	1250
KFAZ	Liberty, Tex.	1050
KFBB	Great Falls, Mont.	1310
KFBC	Cheyenne, Wyo.	1240
KFBK	Sacramento, Calif.	1530
KFCB	Redfield, S. Dak.	1380
KFDA	Amarillo, Tex.	1440
KFDF	Van Buren, Ark.	1580
KFDI	Wichita, Kansas	1070
KFDR	Grand Coulee, Wash.	1360
KFEL	Pueblo, Colo.	970
KFEQ	St. Joseph, Mo.	680
KFFA	Helena, Ark.	1360
KFGO	Fargo, N.D.	790
KFGQ	Boone, Iowa	1260
KFGT	Flagstaff, Ariz.	930
KFH	Wichita, Kans.	1330
KFI	Los Angeles, Calif.	640
KFIF	Tueson, Ariz.	1550
KFIL	Preston, Minn.	1060
KFIV	Modesto, Calif.	1360
KFIZ	Fond du Lac, Wis.	1450
KFJB	Marshalltown, Iowa	1230
KFJM	Grand Forks, N.Dak	1370
KFJZ	Ft. Worth, Tex.	1270
KFKA	Greeley, Colo.	1310
KFKF	Bellevue, Wash.	1330
KFKU	Lawrence, Kans.	1250
KFLA	Scott City, Kans.	1310
KFLD	Floydada, Tex.	900
KFLI	Mountain Home, Ida.	1240
KFLJ	Walsenburg, Colo.	1380
KFLN	Baker, Mont.	960
KFLW	Klamath Falls, Oreg.	1450
KFLY	Corvallis, Oreg.	1240
KFMB	San Diego, Cal.	760
KFMJ	Tulsa, Okla.	1050
KFML	Denver, Colo.	1390
KFMO	Flat River, Mo.	1250
KFNF	Shenandoah, Iowa	920
KFNV	Ferriday, La.	1600
KFNW	Fargo, N.Dak.	900
KFOR	Lincoln, Nebr.	1240
KFOX	Long Beach, Calif.	1280
KFPW	Ft. Smith, Ark.	1230
KFQD	Anchorage, Alaska	750
KFRA	Franklin, La.	1390
KFRB	Fairbanks, Alaska	900
KFRC	San Francisco, Calif.	610
KFRD	Rosenberg-Richmond, Tex.	980
KFRE	Fresno, Calif.	940
KFRM	Kansas City, Mo.	550
KFRD	Longview, Tex.	1370
KFRU	Columbia, Mo.	1400
KFSA	Ft. Smith, Ark.	950
KFSB	Joplin, Mo.	1310
KFSC	Denver, Colo.	1220
KFST	Ft. Stockton, Tex.	860
KFTM	Ft. Morgan, Colo.	1400
KFTV	Paris, Tex.	1250
KFTW	Fredericktown, Mo.	1450
KFUN	Las Vegas, N.Mex.	1230
KFUO	Clayton, Mo.	850
KFVS	Cape Girardeau, Mo.	960
KFWB	Los Angeles, Calif.	980
KFXD	Nampa, Idaho	580
KFXM	San Bernardino, Calif.	590
KFYN	Bonham, Tex.	1420
KFYO	Lubbock, Tex.	790
KFYR	Bismarck, N.Dak.	550
KGA	Spokane, Wash.	1510
KGAF	Gainesville, Tex.	1580
KGAK	Gallup, N.Mex.	1330
KGAL	Lebanon, Oreg.	920
KGAR	Vancouver, Wash.	1550
KGAS	Carthage, Tex.	1590
KGAY	Salem, Oreg.	1430
KGB	San Diego, Calif.	1360
KGBC	Galveston, Tex.	1540
KGBS	Los Angeles, Calif.	1020
KGBT	Harlingen, Tex.	1530
KGBX	Springfield, Mo.	1260
KGCA	Rugby, N.D.	1450
KGCL	East Prairie, Mo.	1080
KGCX	Sidney, Mont.	1480
KGDN	Edmonds, Wash.	630
KGEE	Bakersfield, Calif.	1230
KGEK	Sterling, Colo.	1230
KGEM	Boise, Idaho	1140
KGEO	Tulare, Calif.	1370
KGER	Long Beach, Calif.	1390
KGEZ	Kalispell, Mont.	600
KGFF	Shawnee, Okla.	1450
KGFJ	Los Angeles, Calif.	1230
KGFL	Roswell, N.Mex.	1400
KGFW	Kearney, Nebr.	1340
KGFX	Pierre, S.D.	1080
KGGF	Coffeyville, Kans.	690
KGGM	Albuquerque, N.Mex.	610
KGHL	Billings, Mont.	790
KGHM	Brookfield, Mo.	1470
KGHO	Hoquiam, Wash.	1560
KGHS	International Falls, Minn.	1230
KGIL	San Fernando, Calif.	1260
KGIW	Alamosa, Colo.	1450
KGKL	San Angelo, Tex.	960
KGKO	Benton, Ark.	850
KGLC	Miami, Okla.	910
KGLE	Glendive, Mont.	590
KGLM	Avalon, Calif.	740
KGLN	Glenwood Sprgs., Colo.	980
KGLO	Mason City, Iowa	1300
KGLU	Safford, Ariz.	1480
KGMB	Honolulu, Hawaii	590
KGMC	Englewood, Colo.	1150
KGMI	Bellingham, Wash.	790
KGMO	Cape Girardeau, Mo.	1220
KGMR	Jacksonville, Ark.	1500
KGMS	Sacramento, Calif.	1380
KGMT	Fairbury, Nebr.	1310
KGNB	New Braunfels, Tex.	1420
KGNC	Amarillo, Tex.	710
KGNO	Dodge City, Kans.	1370
KGNU	Santa Clara, Cal.	1430
KGNS	Laredo, Tex.	1390
KGO	San Francisco, Calif.	810
KGOL	Palm Desert, Cal.	1270
KGOS	Torrington, Wyo.	1490
KGPC	Grafton, N.Dak.	1340
KGRB	West Loma, Cal.	900
KGRI	Henderson, Tex.	1000
KGRL	Bend, Oreg.	940
KGRN	Grinnell, Iowa	1410
KGRS	Pasco, Wash.	1340
KGRT	Las Cruces, N.Mex.	570
KGST	Fresno, Calif.	1600
KGTN	Georgetown, Tex.	1530
KGU	Honolulu, Hawaii	760
KGUC	Gunnison, Colo.	1490
KGUD	Santa Barbara, Calif.	990
KGUL	Port Lavaca, Tex.	1560
KGVL	Greenville, Tex.	1400
KGVO	Missoula, Mont.	1290
KGVW	Belgrade, Mont.	630
KGW	Portland, Oreg.	620
KGWA	Enid, Okla.	960
KGY	Olympia, Wash.	1240
KGYN	Guymon, Okla.	1220
KHAI	Honolulu, Hawaii	1090
KHAK	Cedar Rapids, Iowa	1360
KHAL	Homer, La.	1300
KHAP	Aztec, N.M.	1340
KHAR	Anchorage, Alaska	590
KHAS	Hastings, Nebr.	1230
KHAT	Phoenix, Ariz.	1480
KHBM	Monticello, Ark.	1430
KHBR	Hillsboro, Tex.	1560
KHDN	Hardin, Mont.	1230
KHEB	Heber Springs, Ark.	1370
KHEM	Big Springs, Tex.	1270
KHEN	Henryetta, Okla.	1590
KHEP	Phoenix, Ariz.	1280
KHER	Santa Maria, Calif.	1600
KHEY	El Paso, Tex.	690
KHFH	Sierra Vista, Ariz.	1420
KHFI	Austin, Tex.	970
KHHH	Pampa, Tex.	1230
KHIP	Albuquerque, N.M.	1520
KHIT	Walla Walla, Wash.	1320
KHJ	Los Angeles, Calif.	930
KHMO	Hannibal, Mo.	1070
KHOB	Hobbs, N.Mex.	1390
KHOE	Truckee, Calif.	1400
KHOG	Fayetteville, Ark.	1440
KHOS	Tucson, Ariz.	940
KHOT	Madera, Calif.	1250
KHOW	Denver, Colo.	630
KHOZ	Harrison, Ark.	900
KHQ	Spokane, Wash.	590
KHRT	Minot, N. D.	1320
KHSJ	Hemet, Calif.	1320
KHSL	Chico, Calif.	1290
KHUB	Fremont, Nebr.	1340
KHUM	Santa Rosa, Calif.	1580
KHUZ	Borger, Tex.	1490
KHVH	Honolulu, Hawaii	1040
KIBE	Palo Alto, Calif.	1220
KIBH	Seward, Alaska	950
KIBL	Beeville, Tex.	1490
KIBS	Bishop, Calif.	1490
KICA	Clovis, N.M.	1550
KICD	Spencer, Iowa	1360
KICK	Springfield, Mo.	980
KICM	Golden, Colo.	1240
KICO	Calexico, Calif.	1340
KICS	Hastings, Neb.	1250
KICK	McCook, Neb.	1490
KICY	Nome, Alaska	1240
KID	Idaho Falls, Idaho	1340
KIDD	Monterey, Calif.	1250
KIDO	Boise, Idaho	630
KIEV	Glendale, Calif.	630
KIFG	Iowa Falls, Ia.	870
KIFN	Phoenix, Ariz.	1510
KIFW	Sitka, Alaska	860
KIGO	St. Anthony, Ida.	1230
KIHN	Hugo, Okla.	1400
KIHR	Hood River, Oreg.	1340
KIJV	Huron, S.Dak.	1340
KIKI	Honolulu, Hawaii	830
KIKK	Pasadena, Tex.	650
KIKO	Miami, Ariz.	1340
KIKS	Sulphur, La.	1310
KILE	Galveston, Tex.	1400
KILO	Grand Forks, S.Dak.	1440
KILT	Houston, Tex.	610
KIMA	Yakima, Wash.	1460
KIMB	Kimball, Nebr.	1260
KIML	Gillette, Wyo.	1490
KIMM	Rapid City, S.D.	1150
KIMN	Denver, Colo.	950
KIMO	Hilo, Hawaii	850
KIMP	Mt. Pleasant, Tex.	960
KIND	Independence, Kans.	1010
KINE	Kingsville, Tex.	1330
KING	Seattle, Wash.	1090
KINO	Winslow, Ariz.	1230
KINS	Eureka, Calif.	980
KINT	El Paso, Tex.	1590
KINY	Juneau, Alaska	800
KIOA	Des Moines, Iowa	940
KIOT	Barstow, Calif.	1310
KIOX	Bay City, Tex.	1270
KIPA	Hilo, Hawaii	1110
KIQS	Willows, Calif.	1560
KIRO	Seattle, Wash.	710
KIRT	Mission, Tex.	1580
KIRV	Fresno, Cal.	1510
KIRX	Kirksville, Mo.	1450
KISD	Sioux Falls, S.Dak.	1230
KISI	Salina, Kan.	910
KISN	Vancouver, Wash.	910
KIST	Santa Barbara, Calif.	1340
KIT	Yakima, Wash.	1280
KITE	San Antonio, Tex.	930
KITI	Chahalis-Centralia, Wash.	1420
KITN	Olympia, Wash.	920
KIUL	Garden City, Kans.	1240
KIUN	Pecos, Tex.	1400
KIUP	Durango, Colo.	930
KIVY	Crockett, Tex.	1290
KIWA	Sheldon, Iowa	1550
KIXI	Seattle, Wash.	910
KIXL	Dallas, Tex.	1040
KIXX	Provo, Utah	1400
KIXZ	Amarillo, Tex.	940
KIZZ	El Paso, Tex.	1150
KJAM	Madison, S.Dak.	1390
KJAN	Atlantic, Iowa	1220
KJAX	Santa Rosa, Calif.	1150
KJAY	Sacramento, Calif.	1430
KJBC	Midland, Tex.	1150
KJCF	Festus, Mo.	1400
KJCK	Junction City, Kans.	1420
KJDY	John Day, Ore.	1400
KJEF	Jennings, La.	1290
KJEM	Oklahoma City, Okla.	800
KJET	Beaumont, Tex.	1380
KJFJ	Webster City, Iowa	1570
KJIM	Ft. Worth, Tex.	870
KJKJ	Flagstaff, Ariz.	1400
KJLT	North Platte, Nebr.	970
KJNO	Juneau, Alaska	630
KJOE	Shreveport, La.	1480
KJOY	Stockton, Calif.	1280
KJPW	Waynesville, Mo.	1390
KJR	Seattle, Wash.	950
KJRG	Newton, Kans.	950
KJSK	Columbus, Nebr.	900
KJWH	Camden, Ark.	1450
KKAL	Denver City, Tex.	1580
KKAM	Pueblo, Colo.	1350
KKAN	Phillipsburg, Kans.	1490
KKAR	Pomona, Calif.	1220
KKAS	Silsbee, Tex.	1300
KKEY	Vancouver, Wash.	1150
KKHI	San Francisco, Calif.	1550
KKIN	Aitkin, Minn.	930
KKIS	Pittsburg, Calif.	990
KKIT	Taos, N.Mex.	1340
KKJO	St. Joseph, Mo.	1550
KKOK	Lompoc, Calif.	1410
KKUB	Brownfield, Tex.	1300
KLAC	Los Angeles, Calif.	570
KLAD	Klamath Falls, Oreg.	960
KLAK	Lakewood, Colo.	1600
KLAM	Cordova, Alaska	1450
KLAN	Lemoore, Calif.	1320
KLAV	Las Vegas, Nev.	1230
KLBK	Lubbock, Tex.	1340
KLBM	La Grande, Oreg.	1450
KLBS	Los Banos, Calif.	1330
KLCB	Libby, Mont.	1230
KLCN	Blytheville, Ark.	910
KLCO	Poteau, Okla.	1280
KLEA	Lovington, N.Mex.	630
KLEB	Golden Meadow, La.	1600
KLEE	Ottumwa, Iowa	1480
KLEI	Kailua, Hawaii	1130
KLEM	LeMars, Iowa	1410
KLEN	Killeen, Tex.	1050
KLEO	Wichita, Kans.	1480
KLER	Orofino, Idaho	950
KLEX	Lexington, Mo.	1570
KLFD	Litchfield, Minn.	1410
KLGA	Algona, Iowa	1600
KLGN	Logan, Utah	1390
KLGR	Redwood Falls, Minn.	1490
KLIB	Liberal, Kans.	1470
KLIC	Monroe, La.	1230
KLID	Poplar Bluff, Mo.	1340
KLIF	Dallas, Tex.	1190
KLIK	Jefferson City, Mo.	950
KLIN	Lincoln, Nebr.	1400
KLIP	Fowler, Calif.	1220
KLIQ	Portland, Oreg.	1290
KLIR	Denver, Colo.	990
KLIV	San Jose, Cal.	1590
KLIX	Twin Falls, Idaho	1310
KLIZ	Brainerd, Minn.	1380
KLKC	Parsons, Kans.	1540
KLLA	Leesville, La.	1570
KLLL	Lubbock, Tex.	1460
KLME	Laramie, Wyo.	1490
KLMO	Longmont, Colo.	1060
KLMR	Lamar, Colo.	920
KLMS	Lincoln, Nebr.	1480
KLMX	Clayton, N.Mex.	1450
KLO	Ogden, Utah	1430
KLOA	Ridgecrest, Calif	1240
KLOC	Ceres, Calif.	920
KLOE	Goodland, Kans.	730
KLOG	Kelso, Wash.	1490
KLOH	Pipestone, Minn.	1050
KLOK	San Jose, Calif.	1170
KLOL	Lincoln, Neb.	1530
KLOM	Lompoc, Calif.	1330
KLOO	Corvallis, Ore.	1340
KLOS	Albuquerque, N. M.	1580
KLOU	Lake Charles, La.	1580
KLOW	Loveland, Colo.	1570
KLPL	Lake Providence, La.	1050
KLPM	Minot, N.Dak.	1390
KLPR	Okla. City, Okla.	1140
KLRA	Little Rock, Ark.	1010
KLRS	Mountain Grove, Mo.	1360
KLTF	Little Falls, Minn.	960
KLTI	Macon, Mo.	1560
KLTR	Blackwell, Okla.	1580
KLTZ	Glasgow, Mont.	1240
KLUB	Salt Lake City, Utah	570
KLUC	Las Vegas, Nev.	1050
KLUE	Longview, Tex.	1280
KLUV	Haynesville, La.	1580
KLVI	Beaumont, Tex.	560
KLVL	Pasadena, Tex.	1480
KLVT	Levelland, Tex.	1230
KLWN	Lawrence, Kans.	1320
KLWT	Lebanon, Mo.	1230

C.L.	Location	kHz
KLWW	Cedar Rapids, Iowa	1450
KLYD	Bakersfield, Calif.	1350
KLYQ	Hamilton, Mont.	980
KLYR	Clarksville, Ark.	1360
KLZ	Denver, Colo.	560
KMA	Shenandoah, Iowa	960
KMAC	San Antonio, Tex.	630
KMAD	Madill, Okla.	1550
KMAK	Fresno, Calif.	1340
KMAM	Butler, Mo.	1530
KMAN	Manhattan, Kans.	1350
KMAQ	Maquoketa, Iowa	1320
KMAR	Winnsboro, La.	1570
KMAS	Shelton, Wash.	1280
KMAV	Mayville, N.D.	1520
KMBC	Kansas City, Mo.	980
KMBL	Junction, Tex.	1450
KMBY	Monterey, Calif.	1240
KMCD	Fairfield, Iowa	1570
KMCL	McCall, Ida.	1240
KMCM	McMinnville, Oreg.	1260
KMCO	Conroe, Tex.	900
KMDO	Ft. Scott, Kans.	1600
KMED	Medford, Oreg.	1440
KMEL	Wenatchee, Wash.	1340
KMEN	San Bernardino, Cal.	1290
KMER	Kemmerer, Wyo.	950
KMHL	Marshall, Minn.	1400
KMHT	Marshall, Tex.	1450
KMIL	Cameron, Tex.	1330
KMIN	Grants, N.M.	980
KMIS	Portageville, Mo.	1050
KMJ	Fresno, Calif.	580
KMLB	Monroe, La.	1440
KMMJ	Grand Island, Nebr.	750
KMMO	Marshall, Mo.	1300
KMNS	Sioux City, Iowa	620
KMO	Tacoma, Wash.	1360
KMON	Great Falls, Mont.	560
KMOP	Tucson, Ariz.	1330
KMOR	Murray, Utah	1230
KMOX	St. Louis, Mo.	1120
KMPC	Los Angeles, Calif.	710
KMPG	Hollister, Cal.	1520
KMPL	Sikeston, Mo.	1520
KMRC	Morgan City, La.	1430
KMRE	Anderson, Cal.	1580
KMRS	Morris, Minn.	1230
KMSL	Ukiah, Calif.	1250
KMUL	Muleshoe, Tex.	1380
KMUS	Muskogee, Okla.	1380
KMVI	Wailuku, Hawaii	550
KMYC	Marysville, Calif.	1410
KNAF	Fredericksburg, Tex.	910
KNAK	Salt Lake City, Utah	1280
KNAL	Victoria, Tex.	1410
KNBA	Vallejo, Calif.	1190
KNBI	Norton, Kan.	1530
KNBR	San Francisco, Cal.	680
KNBY	Newport, Ark.	1280
KNCB	Vivian, La.	1600
KNCK	Concordia, Kans.	1390
KNCM	Moberly, Mo.	1230
KNCY	Nebraska City, Nebr.	1600
KNDC	Hettinger, N.Dak.	1490
KNDI	Honolulu, Hawaii	1270
KNDY	Marysville, Kans.	1570
KNEA	Jonesboro, Ark.	970
KNEB	Scottsbluff, Nebr.	960
KNED	McAlester, Okla.	1150
KNEL	Brady, Tex.	1490
KNEM	Nevada, Mo.	1240
KNET	Palestine, Tex.	1450
KNEW	Spokane, Wash.	790
KNEX	McPherson, Kans.	1540
KNEZ	Lompoc, Calif.	960
KNGL	Paradise, Calif.	930
KNGS	Hanford, Calif.	620
KNIA	Knoxville, Iowa	1320
KNIC	Winfield, Kan.	1550
KNIM	Maryville, Mo.	1580
KNIN	Wichita Falls, Tex.	990
KNIR	New Iberia, La.	1360
KNIT	Abilene, Tex.	1280
KNLV	Ord, Neb.	1060
KNND	Cottage Grove, Oreg.	1400
KNNN	Friona, Tex.	1070
KNOC	Natchitoches, La.	1450
KNOE	Monroe, La.	540
KNOG	Nogales, Ariz.	1340
KNOK	Ft. Worth, Tex.	970
KNOP	N. Platte, Nebr.	1410
KNOR	Norman, Okla.	1400
KNOT	Prescott, Ariz.	1450
KNOW	Austin, Tex.	1490
KNOX	Grand Forks, N.Dak.	1310
KNPT	Newport, Ore.	1310
KNUI	Makawao, Hawaii	1310
KNUJ	New Ulm, Minn.	860
KNUZ	Houston, Tex.	1230
KNWC	Sioux Falls, S.D.	1270
KNWS	Waterloo, Iowa	1090
KNX	Los Angeles, Calif.	1070
KOA	Denver, Colo.	850
KOAC	Corvallis, Oreg.	550
KOAD	Lemoore, Calif.	1240
KOAG	Arroyo Grande, Cal.	1280
KOAL	Price, Utah	1230
KOAM	Pittsburg, Kans.	860
KOB	Albuquerque, N.Mex.	770
KOBE	Las Cruces, N.Mex.	1450
KOBH	Hot Springs, S.Dak.	580
KOCA	Kilgore, Tex.	1240
KOCY	Oklahoma City, Okla.	1340
KODA	Houston, Tex.	1010
KODE	Joplin, Mo.	1230
KODI	Cody, Wyo.	1400
KOOL	The Dalles, Oreg.	1440
KODY	North Platte, Nebr.	1240
KOEL	Oelwein, Iowa	950
KOFE	Pullman, Wash.	1150
KOFI	Kalispell, Mont.	930
KOFO	Ottawa, Kans.	1220
KOFY	San Mateo, Calif.	1050
KOGA	Ogallala, Nebr.	930
KOGO	San Diego, Calif.	600
KOGT	Orange, Tex.	1600
KOH	Reno, Nev.	630
KOHI	St. Helens, Ore.	1600
KOHO	Honolulu, Hawaii	1170
KOHU	Hermiston, Oreg.	1570
KOIL	Omaha, Nebr.	1290
KOIN	Portland, Oreg.	970
KOJM	Havre, Mont.	610
KOKA	Shreveport, La.	1550
KOKE	Austin, Tex.	1370
KOKL	Okmulgee, Okla.	1240
KOKO	Warrensburg, Mo.	1450
KOKX	Keokuk, Iowa	1310
KOKY	Little Rock, Ark.	1440
KOL	Seattle, Wash.	1300
KOLD	Tucson, Ariz.	1450
KOLE	Port Arthur, Tex.	1340
KOLJ	Quanah, Tex.	1150
KOLM	Rochester, Minn.	1520
KOLO	Reno, Nev.	920
KOLR	Sterling, Colo.	1490
KOLS	Pryor, Okla.	1570
KOLT	Scottsbluff, Nebr.	1320
KOLY	Mobridge, S.Dak.	1300
KOMA	Okla. City, Okla.	1520
KOME	Tulsa, Okla.	1300
KOMO	Seattle, Wash.	1000
KOMW	Omak, Wash.	680
KOMY	Watsonville, Calif.	1340
KONA	Kealakekua, Hawaii	790
KONE	Reno, Nev.	1450
KONG	Visalia, Calif.	1400
KONI	Spanish Fork, Utah	1480
KONO	San Antonio, Tex.	860
KONP	Port Angeles, Wash.	1450
KOOK	Billings, Mont.	970
KOOL	Phoenix, Ariz.	960
KOOO	Omaha, Nebr.	1420
KOOS	Coos Bay, Oreg.	1230
KOPR	Butte, Mont.	550
KOPY	Alice, Tex.	1070
KOQT	Bellingham, Wash.	1550
KORA	Bryan, Tex.	1240
KORC	Mineral Wells, Tex.	1140
KORD	Pasco, Wash.	910
KORE	Eugene, Oreg.	1450
KORK	Las Vegas, Nev.	1340
KORL	Honolulu, Hawaii	650
KORN	Mitchell, S.Dak.	1490
KORT	Grangeville, Idaho	1230
KOSA	Odessa, Tex.	1230
KOSE	Osceola, Ark.	860
KOSG	Panshuska, Okla.	1500
KOSI	Aurora, Colo.	1430
KOSY	Texarkana, Ark.	790
KOTA	Rapid City, S.Dak.	1380
KOTC	Fergus Falls, Minn.	1250
KOTN	Pine Bluff, Ark.	1490
KOTS	Deming, N.M.	1230
KOUR	Independence, Iowa	1220
KOVC	Valley City, N.Dak.	1490
KOVE	Lander, Wyo.	1330
KOVO	Provo, Utah	960
KOWB	Laramie, Wyo.	1290
KOWH	Omaha, Neb.	660
KOWL	Bijou, Calif.	1490
KOWN	Escondido, Calif.	1450
KOXR	Oxnard, Calif.	910
KOY	Phoenix, Ariz.	550
KOYL	Odessa, Tex.	1310
KOYN	Billings, Mont.	910
KOZE	Lewiston, Idaho	1300
KOZI	Chelan, Wash.	1220
KOZY	Grand Rapids, Minn.	1490
KPAC	Port Arthur, Tex.	1250
KPAL	Palm Springs, Calif.	1450
KPAM	Portland, Oreg.	1410
KPAN	Hereford, Tex.	860
KPAS	Banning, Calif.	1490
KPAT	Berkeley, Calif.	1400
KPAY	Chico, Calif.	1060
KPBA	Pine Bluff, Ark.	1590
KPBC	Port Sulphur, La.	1510
KPBM	Carlsbad, N.Mex.	740
KPCA	Marked Tree, Ark.	1580
KPCN	Grand Prairie, Tex.	730
KPDN	Pampa, Tex.	1340
KPDQ	Portland, Oreg.	800
KPEG	Spokane, Wash.	1380
KPEL	Lafayette, La.	1420
KPEP	San Angelo, Tex.	1420
KPER	Gilroy, Calif.	1290
KPET	Lamesa, Tex.	690
KPHO	Phoenix, Ariz.	910
KPIK	Colorado Sprgs., Colo.	1580
KPIN	Casa Grande, Ariz.	1260
KPIR	Eugene, Wash.	1500
KPLC	Lake Charles, La.	1470
KPLT	Paris, Tex.	1490
KPLY	Crescent City, Calif.	1240
KPMC	Bakersfield, Calif.	1560
KPNG	Port Neches, Tex.	1150
KPOC	Pocahontas, Ark.	1420
KPOD	Crescent City, Calif.	1310
KPOF	Denver, Colo.	910
KPOI	Honolulu, Hawaii	1380
KPOJ	Portland, Oreg.	1330
KPOL	Los Angeles, Calif.	1540
KPOR	Quincy, Wash.	1370
KPOS	Post, Tex.	1370
KPOW	Powell, Wyo.	1260
KPPC	Pasadena, Calif.	1240
KPQ	Wenatchee, Wash.	560
KPRB	Redmond, Oreg.	1240
KPRC	Houston, Tex.	950
KPRK	Livingston, Mont.	1340
KPRL	Paso Robles, Calif.	1230
KPRM	Park Rapids, Minn.	1240
KPRO	Riverside, Calif.	1440
KPRS	Kansas City, Mo.	1590
KPSO	Falfurrias, Tex.	1260
KPST	Preston, Idaho	1340
KPTL	Carson City, Nev.	1300
KPUA	Hilo, Hawaii	970
KPUB	Pueblo, Colo.	1480
KPUG	Bellingham, Wash.	1170
KPWB	Piedmont, Mo.	1140
KQAQ	Austin, Minn.	970
KQCY	Quincy, Calif.	1370
KQEN	Roseburg, Ore.	1240
KQEO	Albuquerque, N.Mex.	920
KQIK	Lakeview, Oreg.	1230
KQMS	Redding, Calif.	1400
KQQT	Yakima, Wash.	930
KQRS	Golden Valley, Minn.	1440
KQTE	Missoula, Mont.	1340
KQV	Pittsburgh, Pa.	1410
KQWB	Fargo, N. D.	1550
KQXI	Arvada, Colo.	1550
KQYX	Joplin, Mo.	1560
KRAC	Alamogordo, N.M.	1270
KRAD	E. Grand Forks, Minn.	1590
KRAF	Reedsport, Ore.	1470
KRAI	Craig, Colo.	550
KRAK	Sacramento, Cal.	1140
KRAL	Rawlins, Wyo.	1240
KRAM	Las Vegas, Nev.	920
KRAN	Morton, Tex.	1280
KRAY	Amarillo, Tex.	1360
KRBA	Lufkin, Tex.	1340
KRBC	Abilene, Tex.	1470
KRBI	St. Peter, Minn.	1310
KRBN	Red Lodge, Mont.	1450
KRCB	Council Bluffs, Ia.	1360
KRCK	Ridgecrest, Calif.	1360
KRCO	Prineville, Oreg.	690
KRDD	Roswell, N. M.	1320
KRDG	Redding, Calif.	1230
KRDO	Colo. Springs, Colo.	1240
KRDR	Gresham, Ore.	1230
KRDS	Tolleson, Ariz.	1190
KRDU	Dinuba, Calif.	1240
KREB	Shreveport, La.	980
KREH	Oakdale, La.	900
KREI	Farmington, Mo.	800
KREK	Sapulpa, Okla.	1550
KREL	Corona, Cal.	1370
KREM	Spokane, Wash.	970
KREN	Renton, Wash.	1420
KREO	Indio, Calif.	1400
KREW	Sunnyside, Wash.	1230
KREX	Grand Junc., Colo.	920
KRFO	Owatonna, Minn.	1390
KRFS	Superior, Nebr.	1600
KRGI	Grand Island, Neb.	1430
KRGV	Weslaco, Tex.	1290
KRHD	Duncan, Okla.	1360
KRIB	Mason City, Iowa	1490
KRIG	Odessa, Tex.	1410
KRIH	Rayville, La.	990
KRIK	Roswell, N. Mex.	960
KRIO	McAllen, Tex.	910
KRIZ	Phoenix, Ariz.	1230
KRKC	King City, Calif.	1490
KRKD	Los Angeles, Calif.	1150
KRKO	Everett, Wash.	1380
KRKT	Albany, Ore.	990
KRLA	Pasadena, Calif.	1110
KRLC	Lewiston, Ida. Clarkston, Wash.	1350
KRLD	Dallas, Tex.	1080
KRLN	Canon City, Colo.	1400
KRLW	Walnut Ridge, Ark.	1320
KRMD	Shreveport, La.	1340
KRMG	Tulsa, Okla.	740
KRML	Carmel, Calif.	1410
KRMO	Monett, Mo.	990
KRMS	Osage Beach, Mo.	1150
KRNO	San Bernardino, Calif.	1240
KRNR	Roseburg, Oreg.	1490
KRNS	Burns, Oreg.	1230
KRNT	Des Moines, Iowa	1350
KRNY	Kearney, Nebr.	1460
KROB	Robstown, Tex.	1510
KRDC	Rochester, Minn.	1340
KROD	El Paso, Tex.	600
KROE	Sheridan, Wyo.	930
KROF	Abbeville, La.	960
KROP	Brawley, Calif.	1300
KROS	Clinton, Iowa	1340
KROW	Dallas, Ore.	1460
KROX	Crookston, Minn.	1260
KROY	Sacramento, Calif.	1240
KRPL	Moscow, Idaho	1400
KRRR	Ruidoso, N.Mex.	1340
KRRV	Sherman, Tex.	910
KRSA	Alisal, Calif.	1570
KRSC	Othello, Wash.	1400
KRSD	Rapid City, S.Dak.	1340
KRSI	St. Louis Park, Minn.	950
KRSL	Russell, Kans.	990
KRSN	Los Alamos, N.Mex.	1490
KRSY	Roswell, N.Mex.	1230
KRTN	Raton, N.Mex.	1490
KRTR	Thermopolis, Wyo.	1490
KRUN	Ballinger, Tex.	1400
KRUS	Ruston, La.	1490
KRUX	Glendale, Ariz.	1360
KRVC	Ashland, Oreg.	1350
KRVN	Lexington, Nebr.	1010
KRWB	Roseau, Minn.	1410
KRXK	Rexburg, Idaho	1230
KRYS	Corpus Christi, Tex.	1360
KRYT	Colo. Springs, Colo.	1530
KRZE	Farmington, N.M.	1280
KRZY	Albuquerque, N.M.	1580
KSAC	Manhattan, Kans.	580
KSAL	Salina, Kans.	1150
KSAM	Huntsville, Tex.	1490
KSAY	San Francisco, Calif.	1010
KSBW	Salinas, Calif.	1380
KSCB	Liberal, Kans.	600
KSCJ	Sioux City, Iowa	1360
KSCO	Santa Cruz, Calif.	1080
KSD	St. Louis, Mo.	550
KSDN	Aberdeen, S.Dak.	930
KSDO	San Diego, Calif.	1130
KSDR	Waterton, S.Dak.	1480
KSEE	Santa Maria, Calif.	1480
KSEI	Pocatello, Idaho	930
KSEK	Pittsburg, Kans.	1340
KSEL	Lubbock, Tex.	950
KSEM	Moses Lake, Wash.	1470
KSEN	Shelby, Mont.	1150
KSEO	Durant, Okla.	750
KSET	El Paso, Tex.	1340
KSEW	Sitka, Alaska	1400
KSEY	Seymour, Tex.	1230
KSFA	Nacogdoches, Tex.	860
KSFE	Needles, Calif.	1340
KSFO	San Francisco, Calif.	560
KSGM	Ste. Genevieve, Mo.	1340
KSGT	Jackson, Wyo.	1340
KSHA	Medford, Ore.	860
KSIB	Creston, Iowa	1520
KSID	Sidney, Nebr.	1340
KSIG	Crowley, La.	1450
KSIL	Silver City, N.Mex.	1340
KSIM	Sikeston, Mo.	1400
KSIR	Wichita, Kans.	900
KSIS	Sedalia, Mo.	1050
KSIW	Woodward, Okla.	1450
KSIX	Corpus Christi, Tex.	1230
KSJB	Jamestown, N.Dak.	600
KSKI	Sun Valley, Idaho	1340
KSKY	Dallas, Tex.	660
KSL	Salt Lake City, Utah	1160
KSLM	Salem, Oreg.	1390
KSLO	Opelousas, La.	1230
KSLV	Monte Vista, Colo.	1240
KSLY	San Luis Obispo, Cal.	1400
KSMA	Santa Maria, Calif.	1240
KSMK	Kennewick, Wash.	1340
KSMM	Shakopee, Minn.	1530
KSMN	Mason City, Iowa	1010
KSMO	Salem, Mo.	1340
KSNN	Pocatello, Ida.	1290
KSNO	Aspen, Colo.	1260
KSNY	Snyder, Tex.	1450
KSO	Des Moines, Iowa	1460
KSOK	Arkansas City, Kans.	1280
KSOL	San Francisco, Cal.	1450
KSON	San Diego, Calif.	1240
KSOO	Sioux Falls, S.Dak.	1140
KSOP	Salt Lake City, Utah	1370
KSOX	Raymondville, Tex.	1240
KSPA	Santa Paula, Calif.	1400
KSPI	Stillwater, Okla.	780
KSPL	Diboll, Tex.	1260
KSPO	Spokane, Wash.	1230
KSPR	Springdale, Ark.	1590
KSPT	Sandpoint, Idaho	1400
KSRA	Salmon, Idaho	960
KSRC	Socorro, N.Mex.	1290
KSRO	Santa Rosa, Calif.	1350
KSRV	Ontario, Oreg.	1380
KSSS	Colorado Springs, Colo.	740
KSST	Sulphur Springs, Tex.	1230
KSTA	Coleman, Tex.	1000
KSTB	Breckenridge, Tex.	1430
KSTL	St. Louis, Mo.	690
KSTN	Stockton, Calif.	1420
KSTP	St. Paul, Minn.	1500
KSTR	Grand Junction, Colo.	620
KSTT	Davenport, Iowa	1170
KSTV	Stephenville, Tex.	1510
KSUB	Cedar City, Utah	590
KSUD	W. Memphis, Ark.	730
KSUE	Susanville, Calif.	1240
KSUM	Fairmont, Minn.	1370
KSUN	Bisbee, Ariz.	1230
KSVC	Richfield, Utah	980
KSVN	Ogden, Utah	730
KSVP	Artesia, N.Mex.	990
KSWA	Graham, Tex.	1330
KSWM	Aurora, Mo.	940
KSWO	Lawton, Okla.	1380
KSWS	Roswell, Tex.	1020
KSXX	Salt Lake City, Utah	630

WHITE'S RADIO LOG

C.L.	Location	kHz
KSYC	Yreka, Calif.	1490
KSYL	Alexandria, La.	970
KSYX	Santa Rosa, N.Mex.	1420
KTAC	Tacoma, Wash.	850
KTAE	Taylor, Tex.	1260
KTAN	Tucson, Ariz.	580
KTAR	Phoenix, Ariz.	620
KTAT	Frederick, Okla.	1570
KTBB	Tyler, Tex.	600
KTBC	Austin, Tex.	590
KTCB	Malden, Mo.	1470
KTCR	Minneapolis, Minn.	690
KTCS	Fort Smith, Ark.	1410
KTDL	Farmersville, La.	1470
KTDO	Toledo, Oreg.	1230
KTEE	Idaho Falls, Idaho	1260
KTEL	Walla Walla, Wash.	1490
KTEM	Temple, Tex.	1400
KTEO	San Angelo, Tex.	1340
KTER	Terrell, Tex.	1570
KTFI	Twin Falls, Idaho	1270
KTFO	Seminole, Tenn.	1250
KTFS	Texarkana, Tex.	1400
KTHE	Thermopolis, Wyo.	1240
KTHO	Tahoe Valley, Calif.	590
KTHS	Berryville, Ark.	1480
KTHT	Houston, Tex.	790
KTIB	Thibodaux, La.	630
KTIL	Tillamook, Oreg.	1590
KTIM	San Rafael, Calif.	1510
KTIP	Porterville, Calif.	1450
KTIS	Minneapolis, Minn.	900
KTIX	Pendleton, Ore.	1240
KTKN	Ketchikan, Alaska	930
KTKR	Taft, Calif.	1310
KTKT	Tucson, Ariz.	990
KTLD	Tullulah, La.	1360
KTLN	Denver, Colo.	1280
KTLO	Mountain Home, Ark.	1240
KTLQ	Tahlequah, Okla.	1350
KTLU	Rusk, Tex.	1580
KTLW	Texas City, Tex.	920
KTMC	McAlester, Okla.	1400
KTMN	Trumann, Ark.	1530
KTMS	Santa Barbara, Calif.	1250
KTNC	Falls City, Nebr.	1230
KTNM	Tucumcari, N.Mex.	1400
KTNT	Tacoma, Wash.	1400
KTOB	Petaluma, Cal.	1490
KTOC	Jonesboro, La.	920
KTOD	Sinton, Tex.	1590
KTOE	Mankato, Minn.	1420
KTOH	Lihue, Hawaii	1490
KTOK	Oklahoma City, Okla.	1000
KTON	Belton, Tex.	940
KTOO	Henderson, Nev.	1280
KTOP	Topeka, Kans.	1490
KTOT	Big Bear Lake, Cal.	1050
KTOW	Sand Spring, Okla.	1340
KTPA	Prescott, Ark.	1370
KTRB	Modesto, Calif.	860
KTRC	Santa Fe, N.Mex.	1400
KTRE	Lufkin, Tex.	1420
KTRF	Thief River Falls, Minn.	1230
KTRG	Honolulu, Hawaii	990
KTRH	Houston, Tex.	740
KTRI	Sioux City, Iowa	1470
KTRM	Beaumont, Tex.	990
KTRN	Wichita Falls, Tex.	1290
KTRY	Bastrop, La.	730
KTSA	San Antonio, Tex.	550
KTSL	Burnett, Tex.	1340
KTSM	El Paso, Tex.	1380
KTTN	Trenton, Mo.	1600
KTTR	Rolla, Mo.	1490
KTTS	Springfield, Mo.	1400
KTTT	Columbus, Nebr.	1510
KTUC	Tucson, Ariz.	1400
KTUE	Tulia, Tex.	1260
KTUI	Sullivan, Mo.	1560
KTW	Sealtle, Wash.	1250
KTWO	Casper, Wyo.	1470
KTXJ	Jasper, Tex.	1350
KTXO	Sherman, Tex.	1500
KTYM	Inglewood, Calif.	1460
KUAI	Eleele, Kanai, Hawaii	720
KUAM	Agana, Guam	610
KUBA	Yuba City, Calif.	1600
KUBC	Montrose, Colo.	580
KUBO	San Antonio, Tex.	1310
KUDE	Oceanside, Calif.	1320
KUOI	Great Falls, Mont.	1450
KUDL	Fairway, Kan.	1380
KUDU	Ventura, Calif.	1590
KUOY	Spokane, Wash.	1280
KUEN	Wenatchee, Wash.	900
KUEQ	Phoenix, Ariz.	740
KUGN	Eugene, Oreg.	590
KUIK	Hillsboro, Oreg.	1360
KUJ	Walla Walla, Wash.	1420
KUKA	San Antonio, Tex.	1250
KUKI	Ukiah, Calif.	1400
KUKU	Willow Springs, Mo.	1330
KULA	Honolulu, Hawaii	690
KULE	Ephrata, Wash.	730
KULP	El Campo, Tex.	1390
KULY	Ulysses, Kan.	1420
KUMA	Pendleton, Oreg.	1290
KUNO	Corpus Christi, Tex.	1400
KUOA	Siloam Springs, Ark.	1290
KUOM	Minneapolis, Minn.	770
KUPD	Tempe, Ariz.	1060
KUPI	Idaho Falls, Idaho	980
KUPK	Garden City, Kan.	1050
KURA	Moab, Utah	1450
KURL	Billings, Mont.	730
KURV	Edinburg, Tex.	710
KURY	Brookings, Oreg.	910
KUSO	Vermillion, S.Dak.	690
KUSH	Cushing, Okla.	1600
KUSN	St. Joseph, Mo.	1270
KUTA	Blanding, Utah	790
KUTI	Yakima, Wash.	980
KUTY	Palmdale, Calif.	1470
KUVR	Holdredge, Nebr.	1380
KUXL	Golden Valley, Minn.	1570
KUZN	W. Monroe, La.	1310
KUZZ	Bakersfield, Calif.	800
KVAL	Sauk Rapids, Minn.	800
KVAN	Camas, Wash.	1480
KVAS	Astoria, Ore.	1230
KVBR	Brainerd, Minn.	1340
KVCK	Wolf Point, Nebr.	1450
KVCL	Winnfield, La.	1270
KVCV	Redding, Calif.	600
KVEC	San Luis Obispo, Calif.	920
KVEE	Conway, Ark.	1330
KVEG	Las Vegas, Nev.	970
KVEL	Vernal, Utah	1250
KVEN	Ventura, Calif.	1450
KVET	Austin, Tex.	1300
KVFC	Cortez, Colo.	740
KVFD	Ft. Dodge, Iowa	1400
KVGB	Great Bend, Kans.	1590
KVI	Seattle, Wash.	570
KVIC	Victoria, Tex.	1340
KVIL	Highland Park, Tex.	1150
KVIN	Vinita, Okla.	1470
KVIO	Cottonwood, Ariz.	1600
KVIP	Redding, Calif.	540
KVKM	Monahans, Tex.	1330
KVLB	Cleveland, Tex.	1410
KVLC	Little Rock, Ark.	1050
KVLF	Alpine, Tex.	1240
KVLG	LaGrange, Tex.	1570
KVLH	Pauls Valley, Okla.	1470
KVLL	Livingston, Tex.	1220
KVLV	Fallon, Nev.	980
KVMA	Magnolia, Ark	630
KVMC	Colorado City, Tex.	1320
KVML	Sonora, Calif.	1450
KVNC	Winslow, Ariz.	1010
KVNI	Coeur d'Alene, Idaho	1240
KVNU	Logan, Utah	610
KVOB	Bastrop, La.	1340
KVOC	Casper, Wyo.	1230
KVOD	Albuquerque, N. Mex.	730
KVOE	Emporia, Kans.	1400
KVOG	Ogden, Utah	1490
KVOL	Lafayette, La.	1330
KVOM	Morrilton, Ark.	800
KVON	Napa, Calif.	1440
KVOO	Tulsa, Okla.	1170
KVOP	Plainview, Tex.	1400
KVOR	Colo. Springs, Colo.	1300
KVOU	Uvalde, Tex.	1400
KVOW	Riverton, Wyo.	1450
KVOX	Moorhead, Minn.	1280
KVOY	Yuma, Ariz.	1400
KVOZ	Laredo, Tex.	1490
KVPI	Ville Platte, La.	1050
KVRC	Arkadelphia, Ark.	1240
KVRD	Cottonwood, Ariz.	1240
KVRE	Santa Rosa, Calif.	1460
KVRH	Salida, Colo.	1340
KVRS	Rock Springs, Wyo.	1360
KVSA	McGehee, Ark.	1220
KVSF	Santa Fe, N.Mex.	1260
KVSH	Valentine, Nebr.	940
KVSI	Montpelier, Ida.	1450
KVSO	Ardmore, Okla.	1240
KVWC	Vernon, Tex.	1490
KVWG	Pearsall, Tex.	1280
KVWM	Show Low, Ariz.	970
KVWO	Cheyenne, Wyo.	1370
KVYL	Holdenville, Okla.	1370
KWAC	Bakersfield, Calif.	1490
KWAD	Wadena, Minn.	920
KWAK	Stuttgart, Ark.	1240
KWAL	Wallace, Idaho	620
KWAM	Memphis, Tenn.	990
KWAT	Watertown, S.Dak.	950
KWAY	Forest Grove, Oreg.	1570
KWBA	Baytown, Tex.	1360
KWBB	Wichita, Kans.	1410
KWBC	Navasota, Tex.	1550
KWBE	Beatrice, Nebr.	1450
KWBG	Boone, Iowa	1590
KWBW	Hutchinson, Kans.	1450
KWCB	Searcy, Ark.	1300
KWCL	Oak Grove, La.	1280
KWCO	Chickasha, Okla.	1560
KWEB	Rochester, Minn.	1270
KWED	Seguin, Tex.	1580
KWEI	Weiser, Idaho	1260
KWEL	Midland, Tex.	1440
KWEW	Hobbs, N.Mex.	1480
KWFA	Merkle, Tex.	1500
KWFR	San Angelo, Tex.	1260
KWFS	Eugene, Oreg.	1540
KWFT	Wichita Falls, Tex.	620
KWG	Stockton, Calif.	1230
KWHI	Brenham, Tex.	1280
KWHK	Hutchinson, Kans.	1260
KWHN	Fort Smith, Ark.	1320
KWHO	Salt Lake City, Utah	860
KWHW	Altus, Okla.	1450
KWIC	Salt Lake City, Utah	1550
KWIK	Pocatello, Idaho	1240
KWIL	Albany, Oreg.	790
KWIN	Ashland, Oreg.	580
KWIP	Merced, Calif.	1580
KWIQ	Moses Lake, Wash.	1260
KWIV	Douglas, Wyo.	1050
KWIZ	Santa Ana, Calif.	1480
KWJJ	Portland, Oreg.	1080
KWK	St. Louis, Mo.	1380
KWKC	Abilene, Tex.	1340
KWKH	Shreveport, La.	1130
KWKW	Pasadena, Calif.	1300
KWKY	Des Moines, Iowa	1150
KWLA	Many, La.	1530
KWLC	Decorah, Iowa	1240
KWLG	Wagoner, Okla.	1530
KWLM	Willmar, Minn.	1340
KWMT	Ft. Dodge, Iowa	540
KWNA	Winnemucca, Nev.	1400
KWNO	Winona, Minn.	1230
KWNS	Pratt, Kans.	1290
KWNT	Davenport, Iowa	1580
KWOA	Worthington, Minn.	730
KWOC	Poplar Bluff, Mo.	930
KWOE	Clinton, Okla.	1320
KWON	Bartlesville, Okla.	1400
KWOR	Worland, Wyo.	1340
KWOS	Jefferson City, Mo.	1240
KWOW	Pomona, Calif.	1600
KWPC	Muscatine, Iowa	860
KWPM	West Plains, Mo.	1450
KWPR	Claremore, Okla.	1270
KWRC	Woodburn, Ore.	940
KWRO	Henderson, Tex.	1470
KWRE	Warrenton, Mo.	730
KWRF	Warren, Ark.	860
KWRG	New Roods, La.	1500
KWRO	Coquille, Oreg.	630
KWRT	Boonville, Mo.	1370
KWRW	Guthrie, Okla.	1490
KWSC	Pullman, Wash.	1250
KWSD	Mt. Shasta, Calif.	620
KWSH	Wewoka-Seminole, Oklahoma	1260
KWSL	Grand Junction, Colo.	1340
KWSO	Wasco, Calif.	1050
KWTC	Barstow, Calif.	1230
KWTO	Springfield, Mo.	560
KWTX	Waco, Tex.	1230
KWUN	Concord, Cal.	1480
KWVR	Enterprise, Oreg.	1340
KWVY	Waverly, Iowa	1470
KWWL	Waterloo, Iowa	1330
KWXY	Cathedral City, Cal.	1340
KWYK	Farmington, N.Mex.	960
KWYN	Wynne, Ark.	1400
KWYO	Sheridan, Wyo.	1410
KWYR	Winner, S.Dak.	1260
KWYZ	Everett, Wash.	1230
KXA	Seattle, Wash.	770
KXAR	Hope, Ark.	1490
KXEL	Waterloo, Iowa	1540
KXEN	Festus-St. Louis, Mo.	1010
KXEO	Mexico, Mo.	1340
KXEW	Tucson, Ariz.	1600
KXEX	Fresno, Calif.	1550
KXGI	Ft. Madison, Iowa	1360
KXGN	Glendive, Mont.	1400
KXIC	Iowa City, Iowa	800
KXIT	Dalhart, Tex.	1410
KXIV	Phoenix, Ariz.	1400
KXJK	Forrest City, Ark.	950
KXKW	Lafayette, La.	1520
KXL	Portland, Oreg.	750
KXLE	Ellensburg, Wash.	1240
KXLF	Butte, Mont.	1370
KXLJ	Helena, Mont.	1240
KXLL	Missoula, Mont.	1450
KXLO	Lewiston, Mont.	1230
KXLR	Little Rock, Ark.	1150
KXLW	Clayton, Mo.	1320
KXLY	Spokane, Wash.	920
KXO	El Centro, Calif.	1230
KXOA	Sacramento, Calif.	1470
KXOK	St. Louis, Mo.	630
KXOL	Ft. Worth, Tex.	1360
KXOX	Sweetwater, Tex.	1240
KXRA	Alexandria, Minn.	1490
KXRJ	Russellville, Ark.	1490
KXRO	Aberdeen, Wash.	1320
KXRX	San Jose, Calif.	1500
KXXL	Bozeman, Mont.	1450
KXXX	Colby, Kans.	790
KXYZ	Houston, Tex.	1320
KYA	San Francisco, Calif.	1260
KYAC	Kirkland, Wash.	1460
KYAL	McKinney, Tex.	1600
KYCA	Prescott, Ariz.	1490
KYCN	Wheatland, Wyo.	1340
KYEO	Burlington, La.	1150
KYES	Roseburg, Oreg.	950
KTET	Payette, Idaho	1450
KYJC	Medford, Oreg.	1230
KYME	Boise, Idaho	740
KYMN	Oregon City, Ore.	1520
KYND	Tempe, Ariz.	1580
KYNG	Coos Bay, Oreg.	1420
KYNO	Fresno, Calif.	1300
KYNT	Yankton, S.Oak.	1450
KYOK	Houston, Tex.	1590
KYOR	Blythe, Calif.	1450
KYOS	Merced, Calif.	1480
KYOU	Greeley, Colo.	1450
KYRO	Potosi, Mo.	1280
KYSM	Mankato, Minn.	1230
KYSN	Colorado Sprgs., Colo.	1460
KYSS	Missoula, Mont.	910
KYUM	Yuma, Ariz.	560
KYVA	Gallup, N.Mex.	1230
KYW	Philadelphia, Pa.	1060
KZAK	Tyler, Tex.	1330
KZEE	Weatherford, Tex.	1220
KZEY	Tyler, Tex.	690
KZIN	Yuba City, Cal.	1450
KZIP	Amarillo, Tex.	1310
KZIX	Fort Collins, Colo.	600
KZNG	Hot Springs, Ark.	1470
KZOE	Princeton, Ill.	1490
KZOL	Farwell, Tex.	1570
KZOO	Honolulu, Hawaii	1210
KZOT	Marianna, Ark.	1460
KZOW	Globe, Ariz.	1240
KZUN	Opportunity, Wash.	630
KZYM	Cape Girardeau, Mo.	1220
KZZN	Littlefield, Tex.	1490
VOUS	Argentia, Nfld.	1480
WAAA	Winston-Salem, N.C.	980
WAAB	Worcester, Mass.	1440
WAAC	Terre Haute, Ind.	1300
WAAF	Chicago, Ill.	950
WAAG	Adel, Ga.	1470
WAAK	Dallas, N.C.	960
WAAM	Ann Arbor, Mich.	1600
WAAT	Trenton, N.J.	1300
WAAX	Gadsden, Ala.	570
WAAY	Huntsville, Ala.	1550
WABA	Aguadilla, P.Rico	850
WABB	Mobile, Ala.	1480
WABC	New York, N.Y.	770
WABD	Ft. Campbell, Ky.	1370
WABF	Fairhope, Ala.	1220
WABG	Greenwood, Miss.	960
WABH	Deerfield, Va.	1150
WABI	Bangor, Maine	910
WABJ	Adrian, Mich.	1490
WABL	Amite, La.	1570
WABO	Waynesboro, Miss.	990
WABQ	Cleveland, Ohio	1540
WABR	Winter Park, Fla.	1440
WABT	Tuskegee, Ala.	580
WABV	Abbeville, S.C.	1590
WABY	Albany, N.Y.	1400
WABZ	Albemarle, N.C.	1010
WACA	Camden, S.C.	1590
WACB	Kittanning, Pa.	1380
WACE	Chicopee, Mass.	730
WACI	The Dalles, Ore.	1300
WACK	Newark, N.Y.	1420
WACL	Waycross, Ga.	570
WACO	Waco, Tex.	1460
WACR	Columbus, Miss.	1050
WACT	Tuscaloosa, Ala.	1420
WACY	Moss Point, Miss.	1460
WADA	Shelby, N.C.	1390
WADE	Wadesboro, N.C.	1210
WADK	Newport, R.I.	1540
WADM	Decatur, Ind.	1540
WADO	New York, N.Y.	1280
WADS	Ansonia, Conn.	690
WAEB	Allentown, Pa.	790
WAEL	Mayaguez, P.Rico	600
WAEW	Crossville, Tenn.	1330
WAFC	Staunton, Va.	900
WAFS	Amsterdam, N.Y.	1570
WAGC	Centre, Ala.	1550
WAGE	Leesburg, Va.	1290
WAGF	Dothan, Ala.	1320
WAGG	Franklin, Tenn.	950
WAGL	Lancaster, S. C.	1550
WAGM	Presque Isle, Maine	950
WAGN	Menominee, Mich.	1340
WAGR	Lumberton, N.C.	580
WAGS	Bishopville, S.C.	1380
WAGY	Forest City, N.C.	1320
WAIA	College Park, Ga.	1570
WAIK	Galesburg, Ill.	1590
WAIL	Baton Rouge, La.	1260
WAIM	Anderson, S.C.	1230
WAIN	Columbia, Ky.	1270
WAIR	Winston-Salem, N.C.	1340
WAIT	Chicago, Ill.	820
WAJF	Decatur, Ala.	1490
WAJR	Morgantown, W.Va.	1440
WAKI	McMinnville, Tenn.	1250
WAKN	Aiken, S.C.	990
WAKO	Lawrenceville, Ill.	910
WAKR	Akron, Ohio	1590
WAKY	Louisville, Ky.	790
WALD	Walterboro, S.C.	1060
WALE	Fall River, Mass.	1400
WALG	Albany, Ga.	1590

C.L.	Location	kHz
WALK	Patchogue, N.Y.	1370
WALL	Middletown, N.Y.	1340
WALM	Albion, Mich.	1260
WALO	Humacao, P.R.	1240
WALT	Tampa, Fla.	1110
WALY	Herkimer, N.Y.	1420
WAMD	Aberdeen, Md.	970
WAME	Miami, Fla.	1260
WAMI	Opp, Ala.	860
WAML	Laurel, Miss.	1340
WAMM	Flint, Mich.	1420
WAMO	Homestead, Pa.	860
WAMR	Venice, Fla.	1320
WAMS	Wilmington, Del.	1380
WAMW	Washington, Ind.	1580
WAMY	Amory, Miss.	1580
WANA	Anniston, Ala.	1490
WANB	Waynesburg, Pa.	1580
WANN	Annapolis, Md.	1190
WANS	Anderson, S.C.	1280
WANT	Richmond, Va.	990
WANV	Waynesboro, Va.	970
WANY	Albany, Ky.	1390
WAOK	Atlanta, Ga.	1380
WAOP	Otsego, Mich.	980
WAOV	Vincennes, Ind.	1450
WAPA	San Juan, P.R.	680
WAPC	Riverhead, N.Y.	1570
WAPE	Jacksonville, Fla.	690
WAPF	McComb, Miss.	980
WAPG	Arcadia, Fla.	1480
WAPI	Birmingham, Ala.	1070
WAPL	Appleton, Wis.	1570
WAPO	Chattanooga, Tenn.	1150
WAPX	Montgomery, Ala.	1600
WAQE	Towson, Md.	1570
WAQI	Ashtabula, Ohio	1600
WAQY	Birmingham, Ala.	1220
WARA	Attleboro, Mass.	1320
WARB	Covington, La.	730
WARD	Johnstown, Pa.	1490
WARE	Ware, Mass.	1250
WARF	Jasper, Ala.	1240
WARI	Abbeville, Ala.	1480
WARK	Hagerstown, Md.	1490
WARM	Scranton, Pa.	590
WARN	Ft. Pierce, Fla.	1330
WARO	Canonsburg, Pa.	540
WART	Moulton, Ala.	1530
WARU	Peru, Ind.	1600
WASA	Havre de Grace, Md.	1330
WASC	Spartanburg, S.C.	1530
WASK	Lafayette, Ind.	1450
WATA	Boone, N.C.	1450
WATC	Gaylord, Mich.	900
WATE	Knoxville, Tenn.	620
WATH	Athens, Ohio	970
WATI	Indianapolis, Ind.	810
WATK	Antigo, Wis.	900
WATM	Atmore, Ala.	1590
WATN	Watertown, N.Y.	1240
WATO	Oak Ridge, Tenn.	1290
WATP	Marion, S.C.	1430
WATR	Waterbury, Conn.	1320
WATS	Sayre, Pa.	960
WATT	Cadillac, Mich.	1240
WATV	Birmingham, Ala.	900
WATW	Ashland, Wis.	1400
WATY	N. Atlanta, Ga.	680
WATZ	Alpena, Mich.	1450
WAUB	Auburn, N.Y.	1590
WAUC	Wauchula, Fla.	1310
WAUD	Auburn, Ala.	1230
WAUG	Augusta, Ga.	1050
WAUK	Waukesha, Wis.	1510
WAVA	Arlington, Va.	780
WAVC	Warner Robins, Ga.	1350
WAVE	Louisville, Ky.	970
WAVI	Dayton, Ohio	1210
WAVL	Apollo, Pa.	910
WAVN	Stillwater, Minn.	1220
WAVO	Avondale Estates, Ga.	1420
WAVP	Avon Park, Fla.	1390
WAVU	Albertville, Ala.	630
WAVY	Portsmouth, Va.	1350
WAVZ	New Haven, Conn.	1300
WAWA	West Allis, Wis.	1590
WAWK	Kendallville, Ind.	1570
WAWZ	Zarephath, N.J.	1380
WAXE	Vero Beach, Fla.	1370
WAXK	Superior, Wis.	1320
WAXU	Georgetown, Ky.	1580
WAXX	Chippewa Falls, Wis.	1150
WAYB	Waynesboro, Va.	1490
WAYE	Baltimore, Md.	860
WAYK	Valparaiso, Ind.	1500
WAYN	Rockingham, N.C.	900
WAYR	Orange Park, Fla.	550
WAYS	Charlotte, N.C.	610
WAYX	Wayeross, Ga.	1230
WAYZ	Waynesboro, Pa.	1380
WAZA	Bainbridge, Ga.	1360
WAZE	Clearwater, Fla.	860
WAZF	Yazoo City, Miss.	1230
WAZL	Hazelton, Pa.	1490
WAZS	Summerville, S.C.	780
WAZY	Lafayette, Ind.	1410
WBAA	West Lafayette, Ind.	920
WBAB	Babylon, N.Y.	1440
WBAC	Cleveland, Tenn.	1340
WBAF	Barnesville, Ga.	1090
WBAG	Burlington, N.C.	1150
WBAL	Baltimore, Md.	1090
WBAM	Montgomery, Ala.	740
WBAP	Fort Worth, Tex.	570
		& 820
WBAR	Bartow, Fla.	1460
WBAT	Marion, Ind.	1400
WBAW	Barnwell, S.C.	740
WBAX	Wilkes-Barre, Pa.	1240
WBAY	Green Bay, Wis.	1360
WBAZ	Kingston, N.Y.	1550
WBBA	Pittsfield, Ill.	1580
WBBB	Burlington, N.C.	920
WBBF	Rochester, N.Y.	950
WBBI	Abingdon, Va.	1230
WBBK	Blakely, Ga.	1260
WBBL	Richmond, Va.	1480
WBBM	Chicago, Ill.	780
WBBO	Forest City, N.C.	780
WBBQ	Augusta, Ga.	1340
WBBR	Travelers Rest, S.C.	1580
WBBT	Lyons, Ga.	1340
WBBW	Youngstown, Ohio	1240
WBBX	Portsmouth, N.H.	1380
WBBZ	Ponca City, Okla.	1230
WBCA	Bay Minette, Ala.	1110
WBCB	Levittown, Pa.	1490
WBCH	Hastings, Mich.	1220
WBCI	Williamsburg, Va.	740
WBCK	Battle Creek, Mich.	930
WBCM	Bay City, Mich.	1440
WBCO	Bucyrus, Ohio	1540
WBCU	Union, S.C.	1460
WBEC	Pittsfield, Mass.	1420
WBEE	Harvey, Ill.	1570
WBEJ	Elizabethton, Tenn.	1240
WBEL	Beloit, Wis.	1380
WBEN	Buffalo, N.Y.	930
WBER	Moncks Corner, S. C.	950
WBET	Brockton, Mass.	1460
WBEU	Beaufort, S.C.	960
WBEV	Beaver Dam, Wis.	1430
WBEX	Chillicothe, Ohio	1490
WBFD	Bedford, Pa.	1310
WBFJ	Woodbury, Tenn.	1540
WBGC	Chipley, Fla.	1240
WBGN	Bowling Green, Ky.	1340
WBGS	Slidell, La.	1560
WBHB	Fitzgerald, Ga.	1240
WBHC	Hampton, S.C.	1270
WBHF	Cartersville, Ga.	1450
WBHM	Birmingham, Ala.	1550
WBHP	Huntsville, Ala.	1230
WBHT	Brownsville, Tenn.	1520
WBIA	Augusta, Ga.	1230
WBIB	Centreville, Ala.	1110
WBIC	Islip, N.Y.	540
WBIE	Marietta, Ga.	1080
WBIG	Greensboro, N.C.	1470
WBIL	Leesburg, Fla.	1410
WBIP	Booneville, Miss.	1400
WBIR	Knoxville, Tenn.	1240
WBIS	Bristol, Conn.	1440
WBIW	Bedford, Ind.	1340
WBIX	Jacksonville Beach, Fla.	1010
WBIZ	Eau Claire, Wis.	1400
WBKH	Hattiesburg, Miss.	950
WBKN	Newton, Miss.	1410
WBKV	West Bend, Wis.	1470
WBLA	Elizabethtown, N.C.	1440
WBLC	Lenoir City, Tenn.	1360
WBLE	Batesville, Miss.	1290
WBLF	Bellefonte, Pa.	1330
WBLG	Lexington, Ky.	1300
WBLJ	Dalton, Ga.	1230
WBLO	Evergreen, Ala.	1470
WBLR	Batesburg, S.C.	1430
WBLT	Bedford, Va.	1350
WBLU	Salem, Va.	1480
WBLY	Springfield, Ohio	1600
WBMA	Beaufort, N.C.	1400
WBMC	McMinnville, Tenn.	960
WBMD	Baltimore, Md.	750
WBME	Belfast, Me.	1230
WBMK	West Point, Ga.	1310
WBML	Macon, Ga.	1240
WBMS	Black Mountain, N.C.	1350
WBNB	Charlotte Amalie, Virgin Islands	1000
WBNC	Conway, N.H.	1050
WBNL	Boonville, Ind.	1540
WBNO	Bryan, Ohio	1520
WBNR	Beacon, N.Y.	1260
WBNS	Columbus, Ohio	1460
WBNT	Oneida, Tenn.	1310
WBNX	New York, N.Y.	1380
WBOB	Galax, Va.	1360
WBOC	Salisbury, Md.	960
WBOK	New Orleans, La.	800
WBOL	Bolivar, Tenn.	1560
WBOM	Jacksonville, Fla.	970
WBOP	Pensacola, Fla.	980
WBOS	Brookline, Mass.	1600
WBOW	Terre Haute, Ind.	1230
WBOX	Bogalusa, La.	920
WBOY	Clarksburg, W.Va.	1400
WBPR	Bayamon, P.R.	1600
WBPZ	Lock Haven, Pa.	1230
WBRB	Mt. Clemens, Mich.	1430
WBRC	Birmingham, Ala.	960
WBRD	Bradenton, Fla.	1420
WBRE	Wilkes-Barre, Pa.	1340
WBRG	Lynchburg, Va.	1050
WBRI	Indianapolis, Ind.	1500
WBRJ	Marietta, O.	910
WBRK	Pittsfield, Mass.	1340
WBRL	Berlin, N.H.	1400
WBRM	Marion, N.C.	1250
WBRN	Big Rapids, Mich.	1460
WBRT	Bardstown, Ky.	1320
WBRO	Waynesboro, Ga.	1310
WBRV	Boonville, N.Y.	900
WBRW	Brewster, N.Y.	1510
WBRX	Berwick, Pa.	1280
WBRY	Waterbury, Conn.	1590
WBSA	Boaz, Ala.	1300
WBSC	Bennetsville, S.C.	1550
WBSG	Blackshear, Ga.	1350
WBSM	New Bedford, Mass.	1420
WBSR	Pensacola, Fla.	1540
WBT	Charlotte, N.C.	1110
WBTA	Batavia, N.Y.	1490
WBTC	Uhrichsville, O.	1540
WBTH	Williamson, W.Va.	1400
WBTM	Danville, Va.	1330
WBTN	Bennington, Vt.	1370
WBTO	Linton, Ind.	1600
WBTS	Bridgeport, Ala.	1480
WBUC	Buckhannon, W.Va.	1460
WBUD	Trenton, N.J.	1260
WBUG	Ridgeland, S.C.	1430
WBUT	Butler, Pa.	1050
WBUX	Doylestown, Pa.	1570
WBUY	Lexington, N.C.	1440
WBUZ	Fredonia, N.Y.	1570
WBVL	Barbourville, Ky.	950
WBVM	Utica, N.Y.	1550
WBVP	Beaver Falls, Pa.	1230
WBYB	St. Pauls, N.C.	1060
WBYE	Calera, Ala.	1370
WBYG	Savannah, Ga.	1450
WBYS	Canton, Ill.	1560
WBZ	Boston, Mass.	1030
WBZA	Glens Falls, N.Y.	1410
WBZB	Selma, N.C.	1090
WBZE	Wheeling, W. Va.	1470
WBZY	Torrington, Conn.	990
WCAI	Fort Myers, Fla.	1350
WCAL	Northfield, Minn.	770
WCAM	Camden, N.J.	1310
WCAO	Baltimore, Md.	600
WCAP	Lowell, Mass.	980
WCAR	Detroit, Mich.	1130
WCAT	Orange, Mass.	1390
WCAU	Philadelphia, Pa.	1210
WCAW	Charleston, W.Va.	680
WCAY	Cayce, S.C.	620
WCAZ	Carthage, Ill.	990
WCBA	Corning, N.Y.	1350
WCBG	Chambersburg, Pa.	1590
WCBI	Columbus, Miss.	550
WCBL	Benton, Ky.	1290
WCBM	Baltimore, Md.	680
WCBS	New York, N.Y.	880
WCBT	Roanoke Rapids, N.C.	1230
WCBY	Cheboygan, Mich.	1240
WCCC	Hartford, Conn.	1290
WCCF	Punta Gorda, Fla.	1580
WCCM	Lawrence, Mass.	800
WCCN	Neillsville, Wis.	1370
WCCO	Minneapolis-St. Paul, Minn.	830
WCCW	Traverse City, Mich.	1310
WCDJ	Edenton, N.C.	1260
WCDL	Carbondale, Pa.	1440
WCDS	Glasgow, Ky.	1440
WCDT	Winchester, Tenn.	1340
WCEC	Rocky Mount, N.C.	810
WCED	DuBois, Pa.	1420
WCEF	Parksburg, W.Va.	1050
WCEH	Hawkinsville, Ga.	610
WCEM	Cambridge, Md.	1240
WCEN	Mt. Pleasant, Mich.	1150
WCER	Charlotte, Mich.	1390
WCFL	Chicago, Ill.	1000
WCFR	Springfield, Vt.	1480
WCFV	Clifton Forge, Va.	1230
WCGA	Calhoun, Ga.	900
WCGC	Belmont, N.C.	1270
WCGO	Chicago Hghts., Ill.	1600
WCGR	Canandaigua, N.Y.	1550
WCHA	Chambersburg, Pa.	800
WCHB	Inkster, Mich.	1440
WCHE	Westchester, Pa.	1520
WCHI	Chillicothe, Ohio	1350
WCHJ	Brookhaven, Miss.	1470
WCHK	Canton, Ga.	1290
WCHL	Chapel Hill, N.C.	1360
WCHN	Norwich, N.Y.	970
WCHO	Washington Court House, Ohio	1250
WCHS	Charleston, W.Va.	580
WCHV	Charlottesville, Va.	1260
WCIL	Carbondale, Ill.	1020
WCIN	Cincinnati, Ohio	1480
WCIT	Lima, Ohio	940
WCJU	Columbia, Miss.	1450
WCKB	Dunn, N.C.	780
WCKO	Ishpenning, Mich.	970
WCKI	Greer, S.C.	1300
WCKM	Winnsboro, S.C.	1250
WCKY	Cincinnati, Ohio	1530
WCLA	Claxton, Ga.	1470
WCLB	Camilla, Ga.	1220
WCLC	Jamestown, Tenn.	1260
WCLD	Cleveland, Miss.	1490
WCLE	Cleveland, Tenn.	1570
WCLG	Morgantown, W.Va.	1300
WCLI	Corning, N.Y.	1450
WCLO	Janesville, Wis.	1230
WCLR	Crystal Lake, Ill.	850
WCLS	Columbus, Ga.	1580
WCLT	Newark, Ohio	1430
WCLU	Covington, Ky.	1320
WCLW	Mansfield, O.	1140
WCMA	Corinth, Miss.	1230
WCMB	Harrisburg, Pa.	1460
WCMC	Wildwood, N.J.	1230
WCME	Brunswick, Maine	900
WCMI	Ashland, Ky.	1340
WCMN	Arecibo, P.R.	1280
WCMP	Pine City, Minn.	1350
WCMR	Elkhart, Ind.	1270
WCMS	Norfolk, Va.	1050
WCMT	Martin, Tenn.	1410
WCMY	Ottawa, Ill.	1430
WCNB	Connersville, Ind.	1580
WCNC	Elizabeth City, N.C.	1240
WCND	Shelbyville, Ky.	940
WCNF	Weldon, N.C.	1400
WCNH	Quincy, Fla.	1230
WCNL	Newport, N. H.	1010
WCNR	Bloomsburg, Pa.	930
WCNS	Canton, O.	900
WCNT	Centralia, Ill.	1210
WCNU	Crestview, Fla.	1010
WCNW	Hamilton, O.	1560
WCNX	Middletown, Conn.	1150
WCOA	Pensacola, Fla.	1370
WCOC	Meridian, Miss.	910
WCOF	Immokalee, Fla.	1490
WCOG	Greensboro, N.C.	1320
WCOH	Newnan, Ga.	1400
WCOJ	Coatesville, Pa.	1420
WCOL	Columbus, Ohio	1230
WCON	Cornelia, Ga.	1450
WCOP	Boston, Mass.	1150
WCOR	Lebanon, Tenn.	900
WCOS	Columbia, S.C.	1400
WCOU	Lewiston, Maine	1240
WCOV	Montgomery, Ala.	1170
WCOW	Sparta, Wis.	1290
WCOY	Columbia, Pa.	1580
WCPA	Clearfield, Pa.	900
WCPC	Houston, Miss.	940
WCPH	Etowah, Tenn.	1220
WCPM	Cumberland, Ky.	1280
WCPO	Cincinnati, Ohio	1230
WCPS	Tarboro, N.C.	760
WCQS	Alma, Ga.	1400
WCRA	Effingham, Ill.	1090
WCRB	Waltham, Mass.	1330
WCRE	Cheraw, S.C.	1420
WCRI	Scottsboro, Ala.	1050
WCRK	Morristown, Tenn.	1150
WCRL	Oneonta, Ala.	1570
WCRM	Clare, Mich.	990
WCRO	Johnstown, Pa.	1230
WCRS	Greenwood, S.C.	1450
WCRT	Birmingham, Ala.	1260
WCRV	Washington, N.J.	1580
WCRW	Chicago, Ill.	1240
WCRY	Macon, Ga.	900
WCSA	Ripley, Miss.	1260
WCSC	Charleston, S.C.	1390
WCSH	Portland, Maine	970
WCSI	Columbus, Ind.	1010
WCSJ	Morris, Ill.	1550
WCSL	Cherryville, N. C.	1590
WCSM	Celina, Ohio	1350
WCSR	Hillsdale, Mich.	1340
WCSS	Amsterdam, N.Y.	1490
WCST	Berkeley Springs, W.Va.	1010
WCTA	Andalusia, Ala.	920
WCTC	New Brunswick, N.J.	1450
WCTR	Chestertown, Md.	1530
WCTT	Corbin, Ky.	680
WCTW	New Castle, Ind.	1550
WCUB	Manitowoc, Wis.	980
WCUE	Cuyahoga Falls, Ohio	1150
WCUM	Cumberland, Md.	1230
WCVA	Culpeper, Va.	1490
WCVI	Connellsville, Pa.	1340
WCVL	Crawfordsville, Ind.	1550
WCVP	Murphy, N.C.	600
WCVS	Springfield, Ill.	1450
WCWA	Toledo, O.	1230
WCWC	Ripon, Wis.	1600
WCWR	Tarpon Springs, Fla.	1470
WCYB	Bristol, Va.	690
WCYN	Cynthiana, Ky.	1400
WDAD	Indiana, Pa.	1450
WDAE	Tampa, Fla.	1250
WDAF	Kansas City, Mo.	610
WDAK	Columbus, Ga.	540
WDAL	Meridian, Miss.	1330
WDAN	Danville, Ill.	1490
WDAR	Darlington, S.C.	1350
WDAS	Philadelphia, Pa.	1480
WDAX	McRae, Ga.	1410
WDAY	Fargo, N. Dak.	970
WDBC	Escanaba, Mich.	680
WDBF	Delray Beach, Fla.	1420
WDBJ	Roanoke, Va.	960
WDBL	Springfield, Tenn.	1590
WDBM	Statesville, N.C.	550
WDBO	Orlando, Fla.	580
WDBQ	Dubuque, Iowa	1490
WDCF	Dade City, Fla.	1350

WHITE'S RADIO LOG

C.L.	Location	kHz
WDCJ	Arlington, Fla.	1220
WDCR	Hanover, N.H.	1340
WDDT	Greenville, Miss.	900
WDDY	Gloucester, Va.	1420
WDEA	Ellsworth, Me.	1370
WDEC	Americus, Ga.	1200
WDEE	Hamden, Conn.	1220
WDEF	Chattanooga, Tenn.	1370
WDEH	Sweetwater, Tenn.	800
WDEL	Wilmington, Del.	1150
WDEV	Waterbury, Vt.	550
WDEW	Westfield, Mass.	1570
WDGL	Douglasville, Ga.	1520
WDGY	Minneapolis, Minn.	1130
WDIA	Memphis, Tenn.	1070
WDIC	Clinchco, Va.	1430
WDIG	Dothan, Ala.	1450
WDIX	Orangeburg, S.C.	1150
WDJS	Mt. Olive, N.C.	1480
WDKD	Kingstree, S. C.	1310
WDKN	Dickson, Tenn.	1260
WDLA	Walton, N.Y.	1270
WDLB	Marshfield, Wis.	1450
WDLC	Port Jervis, N.Y.	1490
WDLR	Delaware, Ohio	1550
WDLM	E. Moline, Ill.	960
WDLP	Panama City, Fla.	590
WDLT	Indianola, Miss.	1380
WDMG	Douglas, Ga.	860
WDMJ	Marquette, Mich.	1320
WDMS	Lynchburg, Va.	1320
WDMV	Pocomoke City, Md.	540
WDNC	Durham, N.C.	620
WDNE	Elkins, W.Va.	1240
WDNG	Anniston, Ala.	1450
WDNT	Dayton,Tenn.	1280
WDOB	Canton, Miss.	1370
WDOC	Prestonsburg, Ky.	1310
WDOD	Chattanooga, Tenn.	1310
WDOE	Dunkirk, N.Y.	1410
WDOG	Allendale, S.C.	1460
WDOK	Cleveland, Ohio	1260
WDOL	Athens, Ga.	1470
WDON	Wheaton, Md.	1540
WDOR	Sturgeon Bay, Wis.	910
WDOS	Oneonta, N.Y.	730
WDOT	Burlington, Va.	1400
WDOV	Dover, Del.	1410
WDOW	Dowaglac, Mich.	1440
WDQN	DuQuoin, Ill.	1580
WDRC	Hartford, Conn.	1360
WDSC	Dillon, S.C.	800
WDSG	Dyersburg, Tenn.	1450
WDSK	Cleveland, Miss.	1410
WDSL	Mocksville, N. C.	1520
WDSM	Superior, Wis.	710
WDSP	DeFuniak Springs, Fla.	1280
WDSR	Lake City, Fla.	1340
WDUN	Gainesville, Ga.	1240
WDUX	Waupaca, Wis.	800
WDUZ	Green Bay, Wis.	1400
WDVA	Danville, Va.	1250
WDVH	Gainesville, Fla.	980
WDVL	Vineland, N.J.	1270
WDWD	Dawson, Ga.	990
WDWS	Champaign, Ill.	1400
WDXB	Chattanooga, Tenn.	1490
WDXE	Lawrenceburg, Tenn.	1370
WDXI	Jackson, Tenn.	1310
WDXL	Lexington, Tenn.	1490
WDXN	Clarksville, Tenn.	540
WDXR	Paducah, Ky.	1560
WDXY	Sumter, S.C.	1240
WDYX	Buford, Ga.	1460
WDZ	Decatur, Ill.	1050
WEAB	Greer, S.C.	800
WEAC	Gaffney, S. C.	1500
WEAD	College Park, Ga.	1570
WEAG	Alcoa, Tenn.	1470
WEAL	Greensboro, N. C.	1510
WEAM	Arlington, Va.	1390
WEAN	Providence, R.I.	790
WEAQ	Eau Claire, Wis.	790
WEAS	Savannah, Ga.	900
WEAT	W. Palm Beach, Fla.	850
WEAV	Plattsburg, N.Y.	960
WEAW	Evanston, Ill.	1330
WEBB	Baltimore, Md.	1360
WEBC	Duluth, Minn.	560
WEBJ	Brewton, Ala.	1240
WEBO	Owego, N.Y.	1330
WEBQ	Harrisburg, Ill.	1240
WEBR	Buffalo, N.Y.	970
WEBY	Milton, Fla.	1330
WECL	Eau Claire, Wis.	1050
WECP	Carthage, Miss.	1480
WEDC	Chicago, Ill.	1240
WEDO	McKeesport, Pa.	810
WEEB	Southern Pines, N.C.	990
WEED	Rocky Mount, N.C.	1390
WEEE	Rensselaer, N.Y.	1300
WEEF	Highland Park, Ill.	1430
WEEI	Boston, Mass.	590
WEEL	Fairfax, Va.	1310
WEEN	Lafayette, Tenn.	1460
WEEP	Pittsburgh, Pa.	1080
WEER	Warrenton, Va.	1570
WEET	Richmond, Va.	1320
WEEU	Reading, Pa.	850
WEEW	Washington, N.C.	1320
WEEX	Easton, Pa.	1230
WEEZ	Chester, Pa.	1590
WEGO	Concord, N.C.	1410
WEGP	Presque Isle, Maine	1390
WEHH	Elmira Heights-Horseheads, N.Y.	1590
WEIC	Charleston, Ill.	1270
WEIF	Moundsville, W. Va.	1370
WEIM	Fitchburg, Mass.	1280
WEIR	Weirton, W.Va.	1430
WEIS	Center, Ala.	990
WEJL	Scranton, Pa.	630
WEKR	Fayetteville, Tenn.	1240
WEKY	Richmond, Ky.	1340
WEKZ	Monroe, Wis.	1260
WELB	Elba, Ala.	1350
WELC	Welch, W.Va.	1150
WELD	Fisher, W.Va.	690
WELE	S. Daytona, Fla.	1590
WELI	New Haven, Conn.	960
WELK	Charlottesville, Va.	1010
WELM	Elmira, N.Y.	1410
WELO	Tupelo, Miss.	580
WELP	Easley, S.C.	1360
WELR	Roanoke, Ala.	1360
WELS	Kinston, N.C.	1010
WELV	Ellenville, N.Y.	1370
WELW	Willoughby, O.	1330
WELY	Ely, Minn.	1450
WELZ	Belzoni, Miss.	1460
WEMB	Erwin, Tenn.	1420
WEMD	Easton, Md.	1460
WEMJ	Laconia, N.H.	1490
WEMP	Milwaukee, Wis.	1250
WENO	Whiteville, N.C.	1220
WEND	Edensburg, Pa.	1580
WENE	Endicott, N.Y.	1430
WENG	Englewood, Fla.	1530
WENK	Union City, Tenn.	1240
WENN	Birmingham, Ala.	1320
WENO	Madison, Tenn.	1430
WENT	Gloversville, N.Y.	1340
WENY	Elmira, N.Y.	1230
WENZ	Highland Springs, Va.	1450
WEOK	Poughkeepsie, N.Y.	1390
WEOL	Elyria, Ohio	930
WEPG	S. Pittsburgh, Tenn.	910
WEPM	Martinsburg, W.Va.	1340
WERA	Plainfield, N.J.	1590
WERD	Atlanta, Ga.	860
WERE	Cleveland, Ohio	1300
WERH	Hamilton, Ala.	970
WERI	Westerly, R.I.	1230
WERK	Muncie, Ind.	990
WERL	Eagle River, Wis.	950
WERT	Van Wert, Ohio	1220
WERX	Wyoming, Mich.	1530
WESA	Charleroi, Pa.	940
WESB	Bradford, Pa.	1490
WESC	Greenville, S.C.	660
WESO	Southbridge, Mass.	970
WESR	Tasley, Va.	1330
WEST	Easton, Pa.	1400
WESX	Salem, Mass.	1230
WESY	Leland, Miss.	1580
WETB	Johnson City, Tenn.	790
WETC	Wendell-Zebulon, N.C.	540
WETH	St. Augustine, Fla.	1420
WETO	Gadsden, Ala.	930
WETT	Ocean City, Md.	1590
WETU	Wetumpka, Ala.	1250
WETZ	New Martinsville, West Virginia	1330
WEUC	Ponce, P.R.	1420
WEUP	Huntsville, Ala.	1600
WEVA	Emporia, Va.	860
WEVD	New York, N.Y.	1330
WEVE	Eveleth, Minn.	1340
WEW	St. Louis, Mo.	770
WEWO	Laurinburg, N.C.	1080
WEXL	Royal Oak, Mich.	1340
WEXT	W. Hartford, Conn.	1550
WEYE	Sanford, N.C.	1290
WEYY	Talladega, Ala.	1580
WEZE	Boston, Mass.	1260
WEZJ	Williamsburg, Ky.	1440
WEZQ	Winfield, Ala.	1300
WEZY	Cocoa, Fla.	1350
WFAA	Dallas, Tex.	570 & 820
WFAB	Miami, Fla.	990
WFAD	Middlebury, Vt.	1490
WFAG	Farmville, N.C.	1250
WFAH	Alliance, Ohio	1310
WFAI	Fayetteville, N.C.	1230
WFAR	Farrell, Pa.	1470
WFAS	White Plains, N.Y.	1230
WFAU	Augusta, Me.	1340
WFAW	Ft. Atkinson, Wis.	940
WFAX	Falls Church, Va.	1220
WFBA	San Sebastion, P.R.	1460
WFBC	Greenville, S.C.	1330
WFBF	Fernandino Beach, Fla.	1570
WFBG	Altoona, Pa.	1290
WFBL	Syracuse, N.Y.	1390
WFBM	Indianapolis, Ind.	1260
WFBR	Baltimore, Md.	1300
WFBS	Spring Lake, N. C.	1450
WFCG	Franklinton, La.	1110
WFDF	Flint, Mich.	910
WFDR	Manchester, Ga.	1370
WFEA	Manchester, N.H.	1370
WFEB	Sylacauga, Ala.	1340
WFEC	Harrisburg, Pa.	1400
WFFF	Columbia, Miss.	1360
WFFG	Marathon, Fla.	1300
WFGM	Fitchburg, Mass.	960
WFGN	Gaffney, S.C.	1570
WFGW	Black Mountains, N.C.	1010
WFHG	Bristol, Va.	980
WFHK	Pell City, Ala.	1430
WFHR	Wis. Rapids, Wis.	1320
WFIA	Louisville, Ky.	900
WFIF	Milford, Conn.	1500
WFIG	Sumter, S.C.	1290
WFIL	Philadelphia, Pa.	560
WFIN	Findlay, Ohio	1330
WFIS	Fountain Inn, S.C.	1600
WFIV	Kissimmee, Fla.	1080
WFIW	Fairfield, Ill.	1390
WFIX	Huntsville, Ala.	1450
WFKN	Franklin, Ky.	1220
WFKY	Frankfort, Ky.	1490
WFLA	Tampa, Fla.	970
WFLB	Fayetteville, N.C.	1490
WFLI	Lookout Mtn., Tenn.	1070
WFLN	Philadelphia, Pa.	900
WFLO	Farmville, Va.	870
WFLR	Dundee, N.Y.	1570
WFLS	Fredericksburg, Va.	1350
WFLW	Monticello, Ky.	1360
WFMC	Goldsboro, N.C.	730
WFMD	Frederick, Md.	930
WFMH	Cullman, Ala.	1460
WFMI	Montgomery, Ala.	1500
WFMJ	Youngstown, Ohio	1390
WFMO	Fairmont, N.C.	860
WFMW	Madisonville, Ky.	730
WFNC	Fayetteville, N.C.	1390
WFNL	No. Augusta, S.C.	1600
WFOB	Fostoria, Ohio	1430
WFOM	Marietta, Ga.	1230
WFOR	Hattiesburg, Miss.	1400
WFOX	Milwaukee, Wis.	860
WFOY	St. Augustine, Fla.	1240
WFPA	Fort Payne, Ala.	1400
WFPG	Atlantic City, N.J.	1450
WFPM	Fort Valley, Ga.	1150
WFPR	Hammond, La.	1400
WFRA	Franklin, Pa.	1450
WFRB	Frostburg, Md.	560
WFRC	Reidsville, N.C.	1600
WFRL	Freeport, Ill.	1570
WFRM	Coudersport, Pa.	600
WFRO	Fremont, Ohio	900
WFRX	West Frankfort, Ill.	1300
WFSC	Franklin, N.C.	1050
WFSG	Boca Raton, Fla.	740
WFSO	Pinellas, Fla.	570
WFSR	Bath, N.Y.	1380
WFST	Caribou, Maine	600
WFTC	Kinston, N.C.	960
WFTG	London, Ky.	1400
WFTL	Ft. Lauderdale, Fla.	1400
WFTM	Maysville, Ky.	1240
WFTN	Franklin, N.H.	1240
WFTR	Front Royal, Va.	1450
WFTW	Ft. Walton Beach, Fla.	1260
WFUL	Fulton, Ky.	1270
WFUR	Grand Rapids, Mich.	1570
WFVA	Fredericksburg, Va.	1230
WFVG	Fuquay Sprgs., N.C.	1460
WFWL	Camden, Tenn.	1220
WFYC	Alma, Mich.	1280
WGAA	Cedartown, Ga.	1340
WGAC	Augusta, Ga.	580
WGAD	Gadsden, Ala.	1350
WGAF	Valdosta, Ga.	910
WGAI	Elizabeth City, N.C.	560
WGAL	Lancaster, Pa.	1490
WGAN	Portland, Maine	560
WGAP	Maryville, Tenn.	1400
WGAR	Cleveland, Ohio	1220
WGAS	S. Gastonia, N.C.	1420
WGAT	Gate City, Va.	1050
WGAU	Athens, Ga.	1340
WGAW	Gardner, Mass.	1340
WGBB	Freeport, N.Y.	1240
WGBC	Chipley, Fla.	1240
WGBF	Evansville, Ind.	1280
WGBG	Greensboro, N.C.	1400
WGBI	Scranton, Pa.	910
WGBR	Goldsboro, N. C.	1150
WGBS	Miami, Fla.	710
WGCB	Red Lion, Pa.	1440
WGCD	Chester, S.C.	1490
WGCH	Greenwich, Conn.	1490
WGCM	Gulfport, Miss.	1240
WGEA	Geneva, Ala.	1150
WGEE	Indianapolis, Ind.	1590
WGEM	Quincy, Ill.	1440
WGET	Gettysburg, Pa.	1320
WGEZ	Beloit, Wis.	1490
WGFA	Watseka, Ill.	1360
WGFS	Covington, Ga.	1430
WGGA	Gainesville, Ga.	550
WGGG	Gainesville, Fla.	1230
WGGH	Marion, Ill.	1150
WGGO	Salamanca, N.Y.	1590
WGH	Newport News, Va.	1310
WGHC	Clayton, Ga.	1570
WGHM	Skowegan, Maine	1150
WGHN	Grd. Haven, Mich.	1370
WGHQ	Kingston, N.Y.	920
WGIG	Brunswick, Ga.	1440
WGIL	Galesburg, Ill.	1400
WGIR	Manchester, N.H.	610
WGIV	Charlotte, N.C.	1600
WGKA	Atlanta, Ga.	1600
WGKR	Perry, Fla.	1310
WGKV	Charleston, W. Va.	1490
WGL	Fort Wayne, Ind.	1250
WGLB	Port Wash., Wis.	1560
WGLC	Mendota, Ill.	1090
WGLI	Babylon, N.Y.	1290
WGMA	Hollywood, Fla.	1320
WGML	Hinesville, Ga.	990
WGMM	Millington, Tenn.	1380
WGMS	Washington, D.C.	570
WGN	Chicago, Ill.	720
WGNC	Gastonia, N.C.	1450
WGNE	Panama City Beach, Fla.	1480
WGNI	Wilmington, N.C.	1450
WGNP	Indian Rocks Beach, Fla.	1520
WGNS	Murfreesboro, Tenn.	1450
WGNU	Granite City, Ill.	920
WGNY	Newburgh, N.Y.	1220
WGOE	Richmond, Va.	1590
WGOG	Walhalla, S. C.	1000
WGOH	Grayson, Ky.	1370
WGOK	Mobile, Ala.	900
WGOL	Goldsboro, N.C.	1300
WGON	Munising, Mich.	1400
WGOO	Georgetown, S. C.	1470
WGOV	Valdosta, Ga.	950
WGPA	Bethlehem, Pa.	1100
WGPC	Albany, Ga.	1450
WGR	Buffalo, N.Y.	550
WGRA	Cairo, Ga.	790
WGRD	Grand Rapids, Mich.	1410
WGRI	Griffin, Ga.	1410
WGRM	Greenwood, Miss.	1240
WGRO	Lake City, Fla.	960
WGRP	Greenville, Pa.	940
WGRV	Greeneville, Tenn.	1340
WGSA	Ephrata, Pa.	1310
WGSB	Geneva, Ill.	1480
WGSM	Huntington, N.Y.	740
WGSR	Millen, Ga.	1570
WGST	Atlanta, Ga.	920
WGSV	Guntersville, Ala.	1270
WGSW	Greenwood, S.C.	1350
WGTA	Summerville, Ga.	950
WGTC	Greenville, N.C.	1590
WGTL	Kannapolis, N.C.	870
WGTM	Wilson, N.C.	590
WGTN	Georgetown, S.C.	1400
WGTO	Cypress Gardens, Fla.	540
WGUL	New Port Richey, Fla.	1500
WGUN	Atlanta-Decatur, Ga.	1010
WGUS	North Augusta, S.C.	1380
WGUY	Bangor, Maine	1250
WGVA	Geneva, N.Y.	1240
WGVM	Greenville, Miss.	1260
WGWC	Selma, Ala.	1340
WGWR	Asheboro, N.C.	1260
WGY	Schenectady, N.Y.	810
WGYV	Greenville, Ala.	1380
WGYW	Fountain City, Tenn.	1430
WHA	Madison, Wis.	750
WHAB	Baxley, Ga.	1260
WHAG	Halfway, Md.	1410
WHAI	Greenfield, Mass.	1240
WHAK	Rogers City, Mich.	960
WHAL	Shelbyville, Tenn.	1400
WHAM	Rochester, N.Y.	1180
WHAN	Haines City, Fla.	930
WHAP	Hopewell, Va.	1340
WHAR	Clarksburg, W.Va.	1340
WHAS	Louisville, Ky.	840
WHAT	Philadelphia, Pa.	1340
WHAV	Haverhill, Mass.	1490
WHAW	Weston, W.Va.	980
WHAZ	Troy, N.Y.	1330
WHB	Kansas City, Mo.	710
WHBB	Selma, Ala.	1490
WHBC	Canton, Ohio	1480
WHBF	Rock Island, Ill.	1270
WHBG	Harrisonburg, Va.	1360
WHBL	Sheboygan, Wis.	1330
WHBN	Harrodsburg, Ky.	1420
WHBO	Tampa, Fla.	1050
WHBQ	Memphis, Tenn.	560
WHBT	Harriman, Tenn.	1600
WHBU	Anderson, Ind.	1240
WHBY	Appleton, Wis.	1230
WHCC	Waynesville, N.C.	1400
WHCO	Sparta, Ill.	1230
WHCQ	Spartanburg, S.C.	1400
WHCU	Ithaca, N.Y.	870
WHDF	Houghton, Mich.	1400
WHDH	Boston, Mass.	850
WHDL	Olean, N.Y.	1450
WHDM	McKenzie, Tenn.	1440
WHEB	Portsmouth, N.H.	750

C.L.	Location	kHz
WHEC	Rochester, N.Y.	1460
WHEE	Martinsville, Va.	1370
WHEL	New Albany, Ind.	1570
WHEN	Syracuse, N.Y.	620
WHEO	Stuart, Va.	1270
WHEP	Foley, Ala.	1310
WHER	Memphis, Tenn.	1430
WHEW	Riveria Beach, Fla.	1600
WHFB	Benton Harbor-St. Joseph, Mich.	1060
WHGR	Houghton L., Mich.	1290
WHHH	Warren, Ohio	1440
WHHL	Holly Hill, S.C.	1440
WHHT	Lucedale, Miss.	1440
WHHV	Hillsville, Va.	1400
WHHY	Montgomery, Ala.	1440
WHIE	Griffin, Ga.	1320
WHIH	Portsmouth, Va.	1400
WHIL	Medford, Mass.	1430
WHIM	Providence, R.I.	1110
WHIN	Gallatin, Tenn.	1010
WHIO	Dayton, Ohio	1290
WHIP	Mooresville, N.C.	1350
WHIR	Danville, Ky.	1230
WHIS	Bluefield, W.Va.	1440
WHIT	New Bern, N.C.	1450
WHIY	Orlando, Fla.	1270
WHIZ	Zanesville, Ohio	1240
WHJB	Greensburg, Pa.	620
WHJC	Matawan, W.Va.	1360
WHK	Cleveland, Ohio	1420
WHKP	Hendersonville, N.C.	1450
WHKY	Hickory, N.C.	1290
WHLB	Virginia, Minn.	1400
WHLD	Niagara Falls, N.Y.	1270
WHLF	South Boston, Va.	1400
WHLI	Hempstead, N.Y.	1100
WHLL	Wheeling, W.Va.	1600
WHLM	Bloomsburg, Pa.	550
WHLN	Harlan, Ky.	1410
WHLO	Akron, Ohio	640
WHLP	Centerville, Tenn.	1570
WHLS	Port Huron, Mich.	1450
WHLT	Huntington, Ind.	1300
WHMA	Anniston, Ala.	1390
WHMC	Galthersburg, Md.	1150
WHMI	Howell, Mich.	1350
WHMP	Northampton, Mass.	1400
WHN	New York, N.Y.	1050
WHNC	Henderson, N.C.	890
WHNY	McComb, Miss.	1250
WHO	Des Moines, Iowa	1040
WHOA	San Juan, P.R.	870
WHOC	Philadelphia, Miss.	1490
WHOD	Jackson, Ala.	1290
WHOK	Lancaster, Ohio	1320
WHOL	Allentown, Pa.	600
WHOM	New York, N.Y.	1480
WHON	Centerville, Ind.	930
WHOO	Orlando, Fla.	990
WHOP	Hopkinsville, Ky.	1230
WHOS	Decatur, Ala.	800
WHOT	Campbell, Ohio	1330
WHOU	Houlton, Maine	1340
WHOW	Clinton, Ill.	1520
WHP	Harrisburg, Pa.	580
WHPB	Belton, S.C.	1390
WHPE	High Point, N.C.	1070
WHPL	Winchester, Va.	610
WHRN	Herendon, Va.	1440
WHRT	Hartselle, Ala.	860
WHRV	Ann Arbor, Mich.	1600
WHRY	Elizabethtown, Pa.	1600
WHSC	Hartsville, S.C.	1450
WHSL	Wilmington, N.C.	1490
WHSM	Hayward, Wis.	910
WHSY	Hattiesburg, Miss.	1230
WHTC	Holland, Mich.	1450
WHTG	Asbury Park-Eatontown, N.J.	1410
WHUB	Cookeville, Tenn.	1400
WHUC	Hudson, N.Y.	1280
WHUM	Reading, Pa.	1240
WHUN	Huntington, Pa.	1150
WHUT	Anderson, Ind.	1470
WHVL	Hendersonville, N.C.	1600
WHVR	Hanover, Pa.	1280
WHVW	Hyde Park, N.Y.	950
WHWB	Rutland, Vt.	1000
WHWH	Princeton, N.J.	1350
WHYD	Columbus, Ga.	1270
WHYE	Roanoke, Va.	910
WHYL	Carlisle, Pa.	960
WHYN	Springfield, Mass.	560
WHYP	North East, Pa.	1530
WIAC	San Juan, P.R.	740
WIAM	Williamston, N.C.	900
WIBA	Madison, Wis.	1310
WIBB	Macon, Ga.	1280
WIBC	Indianapolis, Ind.	1070
WIBG	Philadelphia, Pa.	990
WIBM	Jackson, Mich.	1450
WIBR	Baton Rouge, La.	1300
WIBU	Poynette, Wis.	1240
WIBV	Belleville, Ill.	1260
WIBW	Topeka, Kans.	580
WIBX	Utica, N.Y.	950
WICC	Bridgeport, Conn.	600
WICE	Providence, R.I.	1290
WICH	Norwich, Conn.	1310
WICK	Scranton, Pa.	1400
WICO	Salisbury, Md.	1320
WICU	Erie, Pa.	1330
WICY	Malone, N.Y.	1490
WIDE	Biddeford, Maine	1400
WIDD	Elizabethton, Tenn.	1520
WIDG	St. Ignace, Mich.	940
WIDU	Fayetteville, N.C.	1600
WIEL	Elizabethtown, Ky.	1400
WIFE	Indianapolis, Ind.	1310
WIFM	Elkin, N.C.	1540
WIGL	Superior, Wis.	970
WIGM	Medford, Wis.	1490
WIGO	Atlanta, Ga.	1340
WIGS	Gouverneur, N.Y.	1230
WIII	Homestead, Fla.	1430
WIIN	Atlanta, Ga.	970
WIKC	Bogalusa, La.	1490
WIKE	Newport, Vt.	1490
WIKI	Chester, Va.	1410
WIKY	Evansville, Ind.	820
WIL	St. Louis, Mo.	1430
WILA	Danville, Va.	1580
WILD	Boston, Mass.	1090
WILE	Cambridge, Ohio	1270
WILI	Willimantic, Conn.	1400
WILK	Wilkes-Barre, Pa.	980
WILL	Urbana, Ill.	580
WILM	Wilmington, Del.	1450
WILO	Frankfort, Ind.	1570
WILS	Lansing, Mich.	1320
WILZ	St. Petersburg Beach, Fla.	1590
WIMA	Lima, Ohio	1150
WIMO	Winder, Ga.	1300
WIMS	Michigan City, Ind.	1420
WINA	Charlottesville, Va.	1070
WINC	Winchester, Va.	1400
WIND	Chicago, Ill.	560
WINE	Brookfield, Conn.	940
WINF	Manchester, Conn.	1230
WING	Dayton, Ohio	1410
WINI	Murphysboro, Ill.	1420
WINK	Fort Myers, Fla.	1240
WINN	Louisville, Ky.	1240
WINQ	Tampa, Fla.	1010
WINR	Binghamton, N.Y.	680
WINS	New York, N.Y.	1010
WINT	Winter Haven, Fla.	1360
WINU	Highland Park, Ill.	1510
WINW	Canton, O.	1520
WINX	Rockville, Md.	1600
WINY	Putnam, Conn.	1350
WINZ	Miami, Fla.	940
WINU	Highland, Ill.	1510
WINW	Canton, Ohio	1520
WIOD	Miami, Fla.	610
WIOI	New Boston, Ohio	1010
WIOK	Normal, Ill.	1440
WION	Ionia, Mich.	1430
WIOO	Carlisle, Pa.	1000
WIOS	Tawas City, Mich.	1480
WIOU	Kokomo, Ind.	1350
WIP	Philadelphia, Pa.	610
WIPC	Lake Wales, Fla.	1280
WIPR	San Juan, P.R.	940
WIPS	Ticonderoga, N.Y.	1250
WIRA	Ft. Pierce, Fla.	1400
WIRB	Enterprise, Ala.	600
WIRC	Hickory, N.C.	630
WIRD	Lake Placid, N.Y.	920
WIRE	Indianapolis, Ind.	1430
WIRJ	Humboldt, Tenn.	740
WIRK	W. Palm Beach, Fla.	1290
WIRL	Peoria, Ill.	1290
WIRO	Ironton, Ohio	1230
WIRV	Irvine, Ky.	1550
WIRY	Plattsburg, N.Y.	1340
WIS	Columbia, S.C.	560
WISA	Isabella, P.R.	1390
WISE	Asheville, N.C.	1810
WISK	Americus, Ga.	1390
WISL	Shamokin, Pa.	1480
WISM	Madison, Wis.	1480
WISN	Milwaukee, Wis.	1130
WISO	Ponce, P.R.	1260
WISP	Kinston, N.C.	1230
WISR	Butler, Pa.	680
WIST	Charlotte, N.C.	1240
WISV	Virouqua, Wis.	1360
WISZ	Glen Burnie, Md.	1590
WITA	San Juan, P.R.	1140
WITH	Baltimore, Md.	1230
WITL	Lansing, Mich.	1010
WITN	Washington, N.C.	930
WITY	Danville, Ill.	980
WITZ	Jasper, Ind.	990
WIVE	Ashland, Va.	1480
WIVI	Christiansted, V.I.	970
WIVK	Knoxville, Tenn.	850
WIVV	Vieques, P.R.	1370
WIVY	Jacksonville, Fla.	1050
WIXI	Irondale, Ala.	1480
WIXK	New Richmond, Wis.	1590
WIXN	Dixon, Ill.	1460
WIXX	Oakland Park, Fla.	1520
WIYN	Rome, Ga.	1360
WIZE	Springfield, Ohio	1340
WIZR	Johnstown, N. Y.	930
WIZS	Henderson, N.C.	1450
WIZZ	Streator, Ill.	1250
WJAB	Westbrook, Me.	1440
WJAC	Johnstown, Pa.	850
WJAG	Norfolk, Nebr.	780
WJAK	Jackson, Tenn.	1460
WJAM	Marion, Ala.	1310
WJAR	Providence, R.I.	920
WJAS	Pittsburgh, Pa.	1320
WJAT	Swainsboro, Ga.	800
WJAX	Jacksonville, Fla.	930
WJAY	Mullins, S.C.	1280
WJAZ	Albany, Ga.	960
WJBB	Haleyville, Ala.	1230
WJBC	Bloomington, Ill.	1230
WJBD	Salem, Ill.	1850
WJBG	Pontiac, Ill.	1080
WJBK	Detroit, Mich.	1500
WJBL	Holland, Mich.	1260
WJBM	Jerseyville, Ill.	1480
WJBO	Baton Rouge, La.	1150
WJBS	DeLand, Fla.	1490
WJCD	Seymour, Ind.	1390
WJCM	Sebring, Fla.	960
WJCO	Jackson, Mich	1510
WJCW	Johnson City, Tenn.	910
WJOA	Quincy, Mass.	1300
WJDB	Thomasville, Ala.	630
WJDX	Jackson, Miss.	620
WJDY	Salisbury, Md.	1470
WJEF	Grand Rapids, Mich.	1230
WJEH	Gallipolis, Ohio	990
WJEJ	Hagerstown, Md.	1240
WJEM	Valdosta, Ga.	1150
WJER	Dover, Ohio	1450
WJES	Johnston, S.C.	1570
WJET	Erie, Pa.	1400
WJFC	Jefferson City, Tenn.	1480
WJHO	Opelika, Ala.	1400
WJIC	Salem, N. J.	1510
WJIG	Tullahoma, Tenn.	740
WJIL	Jacksonville, Ill.	1550
WJIM	Lansing, Mich.	1240
WJJC	Commerce, Ga.	1270
WJJD	Chicago, Ill.	1160
WJJJ	Christiansburg, Va.	1260
WJJL	Niagara Falls, N.Y.	1440
WJJM	Lewisburg, Tenn.	1490
WJKM	Hartsville, Tenn.	1090
WJLB	Detroit, Mich.	1400
WJLD	Homewood, Ala.	1400
WJLE	Smithville, Tenn.	1480
WJLK	Asbury Park, N. J.	1440
WJLS	Beckley, W.Va.	560
WJMA	Orange, Va.	1340
WJMB	Brookhaven, Miss.	1340
WJMC	Rice Lake, Wis.	1240
WJMO	Cleveland Hgts., Ohio	1490
WJMS	Ironwood, Mich.	630
WJMW	Athens, Ala.	730
WJMX	Florence, S.C.	970
WJNC	Jacksonville, N.C.	1240
WJNO	W. Palm Beach, Fla.	1230
WJOB	Hammond, Ind.	1230
WJOE	Port Joe, Fla.	1080
WJOI	Florence, Ala.	1340
WJOL	Joliet, Ill.	1340
WJON	St. Cloud, Minn.	1240
WJOR	South Haven, Mich.	940
WJOT	Lake City, S.C.	1260
WJOY	Burlington, Vt.	1230
WJPA	Washington, Pa.	1450
WJPB	Kissimmee, Fla.	1220
WJPD	Ishpeming, Mich.	1240
WJPF	Herrin, Ill.	1340
WJPG	Green Bay, Wis.	1440
WJPR	Greenville, Miss.	1330
WJPS	Evansville, Ind.	1330
WJPW	Rockford, Mich.	810
WJQS	Jackson, Miss.	1400
WJR	Detroit, Mich.	760
WJRC	Joliet, Ill.	1510
WJRD	Tuscaloosa, Ala.	1150
WJRI	Lenoir, N.C.	1340
WJRL	Rockford, Ill.	1150
WJRM	Troy, N.C.	1390
WJRZ	Newark, N.J.	970
WJSB	Crestview, Fla.	1050
WJSO	Jonesboro, Tenn.	1590
WJTN	Jamestown, N.Y.	1240
WJTO	Bath, Me.	730
WJUD	St. Johns, Mich.	1580
WJUN	Mexico, Pa.	1220
WJVA	South Bend, Ind.	1580
WJW	Cleveland, Ohio	850
WJWL	Georgetown, Del.	900
WJWS	South Hill, Va.	1370
WJXN	Jackson, Miss.	1450
WJZM	Clarksville, Tenn.	1400
WKAC	Athens, Ala.	1080
WKAI	Macomb, Ill.	1510
WKAJ	Saratoga Springs, N.Y.	900
WKAL	Rome, N.Y.	1450
WKAM	Goshen, Ind.	1460
WKAN	Kankakee, Ill.	1320
WKAP	Allentown, Pa.	1320
WKAQ	San Juan, P.R.	580
WKAR	East Lansing, Mich.	870
WKAT	Miami Beach, Fla.	1360
WKAU	Kaukanna, Wis.	1050
WKAY	Glasgow, Ky.	1490
WKAZ	Charleston, W.Va.	950
WKBA	Vinton, Va.	1550
WKBC	N. Wilkesboro, N.C.	810
WKBH	La Crosse, Wis.	1410
WKBJ	Milan, Tenn.	1600
WKBK	Keene, N.H.	1220
WKBL	Covington, Tenn.	1250
WKBN	Youngstown, Ohio	570
WKBO	Harrisburg, Pa.	1230
WKBR	Manchester, N.H.	1250
WKBV	Richmond, Ind.	1490
WKBW	Buffalo, N. Y.	1520
WKBX	Winston-Salem, N.C.	1500
WKBY	Chatham, Va.	1080
WKBZ	Muskegon, Mich.	850
WKCT	Bowling Green, Ky.	930
WKCU	Corinth, Miss.	1350
WKCW	Warrenton, Va.	1420
WKDA	Nashville, Tenn.	1240
WKDE	Altavista, Va.	1000
WKDK	Newberry, S.C.	1240
WKDL	Clarksdale, Miss.	1600
WKDN	Camden, N.J.	800
WKDX	Hamlet, N. C.	1250
WKDZ	Cadiz, Ky.	1110
WKEE	Huntington, W. Va.	800
WKEI	Kewanee, Ill.	1450
WKEN	Dover, Del.	1600
WKER	Pompton Lakes, N.J.	1500
WKEU	Griffin, Ga.	1450
WKEY	Covington, Va.	1340
WKFD	Wiekford, R.I.	1370
WKFE	Yauco, P.R.	1550
WKFR	Battle Creek, Mich.	1400
WKGN	Knoxville, Tenn.	1340
WKHM	Jackson, Mich.	970
WKIC	Hazard, Ky.	1390
WKID	Urbana, Ill.	1580
WKIG	Glenville, Ga.	1580
WKIK	Leonardtown, Md.	1370
WKIN	Kingsport, Tenn.	1320
WKIP	Poughkeepsie, N.Y.	1450
WKIS	Orlando, Fla.	740
WKIX	Raleigh, N.C.	850
WKIZ	Key West, Fla.	1500
WKJB	Mayaguez, P.R.	710
WKJG	Fort Wayne, Ind.	1380
WKJK	Granite Falls, N. C.	1580
WKJR	Muskegon, Mich.	1520
WKKD	Aurora, Ill.	1580
WKKO	Cocoa, Fla.	860
WKKS	Vanceburg, Ky.	1570
WKLA	Ludington, Mich.	1450
WKLC	St. Albans, W.Va.	1300
WKLF	Clanton, Ala.	980
WKLK	Cloquet, Minn.	1230
WKLM	Wilmington, N.C.	980
WKLO	Louisville, Ky.	1080
WKLP	Keyser, W. Va.	1390
WKLV	Blackstone, Va.	1440
WKLY	Hartwell, Ga.	980
WKLZ	Kalamazoo, Mich.	1470
WKMC	Roaring Sprgs., Pa.	1370
WKMF	Flint, Mich.	1470
WKMI	Kalamazoo, Mich.	1360
WKMK	Blountstown, Fla.	1370
WKMT	Kings Mtn., N.C.	1220
WKNE	Keene, N.H.	1290
WKNR	Dearborn, Mich.	1310
WKNT	Kent, Ohio	1520
WKNX	Saginaw, Mich.	1210
WKNY	Kingston, N.Y.	1490
WKOA	Hopkinsville, Ky.	1480
WKOK	Sunbury, Pa.	1070
WKOP	Binghamton, N.Y.	1360
WKOV	Wellston, Ohio	1330
WKOW	Madison, Wis.	1070
WKOX	Framingham, Mass.	1190
WKOY	Bluefield, W.Va.	1240
WKOZ	Kosciusko, Miss.	1350
WKPA	New Kensington, Pa.	1150
WKPO	Prentiss, Miss.	1510
WKPR	Kalamazoo, Mich.	1420
WKPT	Kingsport, Tenn.	1400
WKQV	Sullivan, Ind.	1550
WKRA	Holly Springs, Miss.	1110
WKRC	Cincinnati, Ohio	550
WKRG	Mobile, Ala.	710
WKRK	Murphy, N.C.	1320
WKRM	Columbia, Tenn.	1340
WKRO	Cairo, Ill.	1490
WKRS	Waukegan, Ill.	1220
WKRT	Cortland, N.Y.	920
WKRW	Cartersville, Ga.	
WKRZ	Oil City, Pa.	1340
WKSB	Milford. Del.	930
WKSC	Kershaw, S.C.	1300
WKSK	W. Jefferson, N.C.	1600
WKSN	Jamestown, N.Y.	1340
WKSR	Pulaski, Tenn.	1420
WKST	New Castle, Pa.	1280
WKTC	Charlotte. N.C.	1310
WKTE	King, N.C.	1090
WKTG	Thomasville, Ga.	730
WKTJ	Farmington, Maine	1380
WKTQ	South Paris, Maine	1450
WKTS	Sheboygan, Wis.	950
WKTX	Atlantic Beach, Fla.	1600
WKTY	LaCrosse, Wis.	580
WKUL	Cullman, Ala.	1340
WKVA	Lewistown, Pa.	920
WKVK	Virginia Beach, Va.	1550
WKVM	San Juan, P.R.	810
WKVT	Brattleboro, Vt.	1490
WKWF	Key West, Fla.	1600
WKWK	Wheeling, W.Va.	1400
WKWS	Rocky Mount, Va.	1290
WKXL	Concord, N.H.	1450
WKXR	Exeter, N.H.	1540
WKXV	Knoxville, Tenn.	900
WKXY	Sarasota, Fla.	930

WHITE'S RADIO LOG

C.L.	Location	kHz
WKYC	Cleveland, Ohio	1100
WKYE	Bristol, Tenn.	1550
WKYF	Greenville, Ky.	1600
WKYN	Rio Piedras, P.R.	630
WKYO	Caro, Mich.	1360
WKYR	Keyser, W.Va.	1270
WKYX	Paducah, Ky.	570
WKZA	Kane, Pa.	960
WKZI	Casey, Ill.	800
WKZO	Kalamazoo, Mich.	590
WLAC	Nashville, Tenn.	1510
WLAD	Danbury, Conn.	800
WLAF	LaFollette, Tenn.	1450
WLAG	La Grange, Ga.	1240
WLAK	Lakeland, Fla.	1430
WLAM	Lewiston, Maine	1470
WLAN	Lancaster, Pa.	1390
WLAP	Lexington, Ky.	630
WLAQ	Rome, Ga.	1410
WLAR	Athens, Tenn.	1450
WLAS	Jacksonville, N.C.	910
WLAT	Conway, S.C.	1330
WLAU	Laurel, Miss.	1600
WLAV	Grand Rapids, Mich.	1340
WLAW	Lawrenceville, Ga.	1360
WLAY	Muscle Shoals, Ala.	1450
WLBA	Gainesville, Ga.	1580
WLBB	Carrollton, Ga.	1100
WLBC	Muncie, Ind.	1340
WLBE	Leesburg, Fla.	790
WLBG	Laurens, S.C.	860
WLBH	Mattoon, Ill.	1170
WLBI	Denham Springs, La.	1220
WLBJ	Bowling Green, Ky.	1410
WLBK	DeKalb, Ill.	1360
WLBL	Auburndale, Wis.	930
WLBN	Lebanon, Ky.	1590
WLBR	Lebanon, Pa.	1280
WLBZ	Bangor, Maine	620
WLCB	Moulton, Ala.	1530
WLCK	Scottsville, Ky.	1250
WLCM	Lancaster, S.C.	1360
WLCN	Laurensburg, N.C.	1300
WLCO	Eustis, Fla.	1240
WLCS	Baton Rouge, La.	910
WLCX	LaCrosse, Wis.	1490
WLCY	St. Petersburg, Fla.	1380
WLDB	Atlantic City, N.J.	1490
WLDS	Jacksonville, Ill.	1180
WLDY	Ladysmith, Wis.	1340
WLEA	Hornell, N.Y.	1480
WLEC	Sandusky, Ohio	1450
WLEE	Richmond, Va.	1480
WLEF	Greenwood, Miss.	1540
WLEM	Emporium, Pa.	1240
WLES	Lawrenceville, Va.	580
WLET	Toccoa, Ga.	1420
WLEW	Bad Axe, Mich.	1340
WLEY	Cayey, P.R.	1080
WLFA	Lafayette, Ga.	1590
WLFH	Little Falls, N.Y.	1230
WLIB	New York, N.Y.	1190
WLIJ	Shelbyville, Tenn.	1580
WLIK	Newport, Tenn.	1270
WLIL	Lenoir City, Tenn.	730
WLIP	Kenosha, Wis.	1050
WLIQ	Mobile, Ala.	1360
WLIS	Old Saybrook, Conn.	1420
WLIV	Livingston, Tenn.	920
WLIZ	Lake Worth, Fla.	1380
WLKE	Waupun, Wis.	1170
WLKM	Three Rivers, Mich.	1510
WLKN	Lincoln, Me.	1450
WLKS	W. Liberty, Ky.	1450
WLKW	Providence, R.I.	990
WLLE	Raleigh, N.C.	570
WLLH	Lowell, Mass.	1400
WLLL	Lynchburg, Va.	930
WLLY	Wilson, N.C.	1350
WLMD	Laurel, Md.	900
WLNC	Laurinburg, N.C.	1300
WLMJ	Jackson, Ohio	1280
WLNA	Peekskill, N.Y.	1420
WLNG	Sag Harbor, N.Y.	1600
WLNH	Laconia, N.H.	1350
WLOA	Braddock, Pa.	1550
WLOB	Portland, Maine	1310
WLOC	Munfordville, Ky.	1150
WLOD	Pompano Beach, Fla.	980
WLOE	Leaksville, N.C.	1490
WLOF	Orlando, Fla.	950
WLOG	Logan, W.Va.	1230
WLOH	Princeton, W.Va.	1490
WLOI	LaPorte, Ind.	1540
WLOK	Memphis, Tenn.	1340
WLOL	Minneapolis, Minn.	1330
WLON	Lincolnton, N.C.	1050
WLOP	Jesup, Ga.	1370
WLOR	Thomasville, Ga.	730
WLOS	Asheville, N.C.	1380
WLOU	Louisville, Ky.	1350
WLOV	Washington, Ga.	1370
WLOW	Aiken, S.C.	1300
WLOX	Biloxi, Miss.	1490
WLPM	Suffolk, Va.	1460
WLPO	LaSalle, Ill.	1220
WLPS	Lehighton, Pa.	1150
WLRC	Whitehall, Mich.	1490
WLS	Chicago, Ill.	890
WLSB	Copper Hill, Tenn.	1400
WLSC	Lorrs, S.C.	1570
WLSD	Big Stone Gap, Va.	1220
WLSE	Wallace, N.C.	1400
WLSH	Lansford, Pa.	1410
WLSI	Pikeville, Ky.	900
WLSM	Louisville, Miss.	1270
WLST	Escanaba, Mich.	600
WLSV	Wellsville, N.Y.	790
WLTC	Gastonia, N.C.	1370
WLTH	Gary, Ind.	1370
WLTN	Littleton, N. H.	1400
WLUV	Loves Park, Ill.	1520
WLUX	Baton Rouge, La.	1550
WLVA	Lynchburg, Va.	590
WLW	Cincinnati, Ohio	700
WLWO	(V.O.A.). Marathon, Fla.	1040
WLWO	(V.O.A.) Marathon, Fla.	1180
WLYB	Albany, Ga.	1250
WLYC	Williamsport, Pa.	1050
WLYN	Lynn, Mass.	1360
WLYO	New Orleans, La.	940
WLYV	Ft. Wayne, Ind.	1450
WMAB	Munising, Mich.	1400
WMAC	Netter, Ga.	1360
WMAD	Madison, Wis.	1550
WMAF	Madison, Fla.	1230
WMAG	Forest, Miss.	860
WMAJ	State College, Pa.	1450
WMAK	Nashville, Tenn.	1300
WMAL	Washington, D.C.	630
WMAM	Marinette, Wis.	570
WMAN	Mansfield, Ohio	1400
WMAP	Monroe, N.C.	1060
WMAQ	Chicago, Ill.	670
WMAS	Springfield, Mass.	1450
WMAT	Lansing, Mich.	1010
WMAX	Grand Rapids, Mich.	1480
WMAY	Springfield, Ill.	970
WMAZ	Macon, Ga.	940
WMBA	Ambridge, Pa.	1460
WMBC	Macon, Miss.	1400
WMBD	Peoria, Ill.	1470
WMBG	Richmond, Va.	1380
WMBH	Joplin, Mo.	1450
WMBI	Chicago, Ill.	1110
WMBL	Morehead City, N.C.	740
WMBM	Miami Beach, Fla.	1490
WMBN	Petoskey, Mich.	1340
WMBO	Auburn, N.Y.	1340
WMBR	Jacksonville, Fla.	1460
WMBS	Uniontown, Pa.	590
WMBT	Shenandoah, Pa.	1530
WMC	Memphis, Tenn.	790
WMCA	New York, N.Y.	570
WMCH	Church Hill, Tenn.	1260
WMCK	McKeesport, Pa.	1360
WMCP	Columbia, Tenn.	1280
WMCR	Oneida, N.Y.	1600
WMCW	Harvard, Ill.	1600
WMDC	Hazlehurst, Miss.	1220
WMDD	Fajardo, P.R.	1480
WMDN	Midland, Mich.	1490
WMEG	Eau Gallie, Fla.	920
WMEK	Chase City, Va.	980
WMEL	Pensacola, Fla.	610
WMEN	Tallahassee, Fla.	1330
WMEV	Marion, Va.	1010
WMEX	Boston, Mass.	1510
WMFC	Monroeville, Ala.	1360
WMFD	Wilmington, N.C.	630
WMFG	Hibbing, Minn.	1240
WMFJ	Daytona Beach, Fla.	1450
WMFR	High Point, N.C.	1230
WMGA	Moultrie, Ga.	1400
WMGR	Bainbridge, Ga.	930
WMGS	Bowling Green, Ohio	730
WMGW	Meadville, Pa.	1490
WMGY	Montgomery, Ala.	800
WMIA	Arecibo, P. R.	1070
WMID	Atlantic City, N.J.	1340
WMIE	Miami, Fla.	1140
WMIK	Middlesboro, Ky.	560
WMIL	Milwaukee, Wis.	1290
WMIN	Mpls.-St. Paul, Minn.	1400
WMIQ	Iron Mountain, Mich.	1450
WMIR	Lake Geneva, Wis.	1550
WMIS	Natchez, Miss.	1240
WMIX	Mt. Vernon, Ill.	940
WMJM	Cordele, Ga.	1490
WMKR	Millinocket, Me.	1240
WMKT	S. St. Paul, Minn.	1370
WMLF	Pineville, Ky.	1230
WMLO	Beverly, Mass.	1570
WMLP	Milton, Pa.	1380
WMLS	Sylacauga, Ala.	1290
WMLT	Dublin, Ga.	1330
WMMB	Melbourne, Fla.	1240
WMMH	Marshall, N.C.	1460
WMMJ	Lancaster, N.Y.	1300
WMMM	Westport, Conn.	1260
WMMN	Fairmont, W.Va.	920
WMMW	Meriden, Conn.	1470
WMNA	Gretna, Va.	730
WMNB	No. Adams, Mass.	1230
WMNC	Morganton, N.C.	1430
WMNE	Menomonie, Wis.	1360
WMNI	Columbus, Ohio	920
WMNS	Olean, N.Y.	1360
WMNT	Manati, P.R.	1500
WMNZ	Montezuma, Ga.	1050
WMOA	Marietta, Ohio	1490
WMOC	Chattanooga, Tenn.	1450
WMOG	Brunswick, Ga.	1490
WMOH	Hamilton, Ohio	1450
WMOK	Metropolis, Ill.	920
WMON	Montgomery, W.Va.	1340
WMOO	Mobile, Ala.	1550
WMOP	Ocala, Fla.	900
WMOR	Morehead, Ky.	1330
WMOU	Berlin, N.H.	1230
WMOV	Ravenswood, W.Va.	1360
WMOX	Meridian, Miss.	1240
WMOZ	Mobile, Ala.	980
WMPA	Aberdeen, Miss.	1240
WMPC	Lapeer, Mich.	1230
WMPL	Hancock, Mich.	920
WMPM	Smithfield, N.C.	1270
WMPO	Middleport-Pomeroy, Ohio	1390
WMPP	Chicago Heights, Ill.	1470
WMPS	Memphis, Tenn.	680
WMPT	So. Williamsport, Pa.	1450
WMQM	Memphis, Tenn.	1480
WMRB	Greenville, S.C.	1490
WMRC	Milford, Mass.	1490
WMRE	Monroe, Ga.	1490
WMRF	Lewistown, Pa.	1490
WMRI	Marion, Ind.	860
WMRN	Marion, Ohio	1490
WMRO	Aurora, Ill.	1280
WMRP	Flint, Mich.	1570
WMRR	Marshall, Mich.	1540
WMSA	Massena, N.Y.	1340
WMSG	Oakland, Md.	1050
WMSJ	Sylva, N.C.	1480
WMSK	Morganfield, Ky.	1550
WMSL	Decatur, Ala.	1400
WMSR	Manchester, Tenn.	1320
WMST	Mt. Sterling, Ky.	1150
WMT	Cedar Rapids, Iowa	600
WMTA	Central City, Ky.	1380
WMTC	Vancleve, Ky.	730
WMTD	Hinton, W. Va.	1380
WMTE	Manistee, Mich.	1340
WMTL	Leitchfield, Ky.	1580
WMTM	Moultrie, Ga.	1300
WMTN	Morristown, Tenn.	1300
WMTR	Morristown, N.J.	1250
WMTS	Murfreesboro, Tenn.	810
WMUS	Muskegon, Mich.	1090
WMUU	Greenville, S.C.	1260
WMVA	Martinsville, Va.	1450
WMVB	Millville, N.J.	1440
WMVG	Milledgeville, Ga.	1450
WMVO	Mt. Vernon, Ohio	1300
WMVR	Sidney, Ohio	1080
WMWM	Wilmington, O.	1090
WMYB	Myrtle Beach, S.C.	1450
WMYN	Mayodan, N.C.	1420
WMYR	Ft. Myers, Fla.	1410
WNAB	Bridgeport, Conn.	1450
WNAC	Boston, Mass.	680
WNAD	Norman, Okla.	640
WNAE	Warren, Pa.	1310
WNAG	Grenada, Miss.	1400
WNAH	Nashville, Tenn.	1360
WNAK	Nanticoke, Pa.	730
WNAM	Neenah, Wis.	1280
WNAR	Norristown, Pa.	1110
WNAT	Natchez, Miss.	1450
WNAU	New Albany, Miss.	1470
WNAV	Annapolis, Md.	1430
WNAX	Yankton, S.Dak.	570
WNBC	New York, N.Y.	660
WNBF	Binghamton, N.Y.	1290
WNBH	New Bedford, Mass.	1340
WNBP	Newburyport, Mass.	1470
WNBS	Murray, Ky.	1340
WNBT	Wellsboro, Pa.	1490
WNBY	Newberry, Mich.	1450
WNBZ	Saranac Lake, N.Y.	1240
WNCA	Siler City, N.C.	1570
WNCC	Barnesboro, Pa.	950
WNCG	N. Charleston, S.C.	910
WNCO	Ashland, Ohio	1340
WNCT	Greenville, N. C.	1590
WNDB	Daytona Beach, Fla.	1150
WNDR	Syracuse, N.Y.	1260
WNDU	South Bend, Ind.	1490
WNEB	Worcester, Mass.	1230
WNEG	Taccoa, Ga.	680
WNEL	Caguas, P. R.	1430
WNER	Live Oak, Fla.	1250
WNES	Central City, Ky.	1050
WNEW	New York, N.Y.	1130
WNEX	Macon, Ga.	1400
WNGA	Nashville, Ga.	1600
WNGO	Mayfield, Ky.	1320
WNHC	New Haven, Conn.	1340
WNIA	Cheektowaga, N.Y.	1230
WNIK	Arecibo, P.R.	1230
WNIL	Niles, Mich.	1290
WNIO	Niles, Ohio	1540
WNJH	Hammonton, N.J.	1580
WNJR	Newark, N.J.	1430
WNKY	Neon, Ky.	1480
WNLC	New London, Conn.	1510
WNLK	Norwalk, Conn.	1350
WNMP	Evanston, Ill.	1590
WNNC	Newton, N.C.	1230
WNNJ	Newton, N.J.	1360
WNNR	New Orleans, La.	990
WNNT	Warsaw, Va.	690
WNOE	New Orleans, La.	1060
WNOG	Naples, Fla.	1270
WNOK	Columbia, S.C.	1230
WNOO	Chattanooga, Tenn.	1260
WNOP	No. Platte, Neb.	1410
WNOR	Norfolk, Va.	1230
WNOS	High Point, N.C.	1590
WNOW	York, Pa.	1250
WNOX	Knoxville, Tenn.	990
WNPS	New Orleans, La.	1450
WNPT	Tuscaloosa, Ala.	1280
WNPV	Lansdale, Pa.	1440
WNRG	Grundy, Va.	940
WNRI	Woonsocket, R.I.	1380
WNRK	Newark, Del.	1260
WNRV	Narrows, Va.	990
WNSL	Laurel, Miss.	1260
WNSM	Valparaiso-Niceville, Fla.	1340
WNTN	Newton, Mass.	1550
WNTT	Tazewell, Tenn.	1250
WNUE	Ft. Walton Bch., Fla.	1400
WNUS	Chicago, Ill.	1390
WNUZ	Talladega, Ala.	1230
WNVA	Norton, Va.	1350
WNVL	Nicholasville, Ky.	1250
WNVY	Pensacola, Fla.	1230
WNWI	Valparaiso, Ind.	1080
WNXT	Portsmouth, Ohio	1260
WNYC	New York, N.Y.	830
WNYR	Rochester, N.Y.	680
WOAH	Miami, Fla.	1220
WOAI	San Antonio, Tex.	1200
WOAP	Owosso, Mich.	1080
WOAY	Oak Hill, W.Va.	860
WOBS	Jacksonville, Fla.	1360
WOBT	Rhinelander, Wis.	1240
WOC	Davenport, Iowa	1420
WOCB	W. Yarmouth, Mass.	1240
WOCH	North Vernon, Ind.	1460
WOCK	Okeechobee, Fla.	1570
WOCO	Oconto, Wis.	1260
WODI	Brookneal, Va.	1230
WODY	Bassett, Va.	900
WOGA	Sylvester, Ga.	1540
WOGO	New Smyrna Beach, Fla.	1550
WOHI	E. Liverpool, Ohio	1490
WOHO	Toledo, Ohio	1470
WOHP	Bellefontaine, Ohio	1390
WOHS	Shelby, N.C.	730
WOI	Ames, Iowa	640
WOIB	Saline, Mich.	1290
WOIC	Columbia, S.C.	1320
WOIO	Canton, O.	1060
WOKA	Douglas, Ga.	1310
WOKB	Winter Garden, Fla	1600
WOKE	Charleston, S.C.	1340
WOKK	Meridian, Miss.	1450
WOKO	Albany, N.Y.	1460
WOKS	Columbus, Ga.	1340
WOKW	Brockton, Mass.	1410
WOKY	Milwaukee, Wis.	920
WOKZ	Alton, Ill.	1570
WOL	Washington, D.C.	1450
WOLD	Marion, Va.	1330
WOLF	Syracuse, N.Y.	1490
WOLS	Florence, S. C.	1230
WOMI	Owensboro, Ky.	1490
WOMN	Decatur, Ga.	1310
WOMP	Bellaire, Ohio	1290
WOMT	Manitowoc, Wis.	1240
WONA	Winona, Miss.	1570
WOND	Pleasantville, N.J.	1400
WONE	Dayton, Ohio	980
WONN	Lakeland, Fla.	1230
WONS	Tallahassee, Fla.	1410
WONW	Defiance, Ohio	1280
WOOD	Grand Rapids, Mich.	1300
WOOF	Dothan, Ala.	560
WOOK	Washington, D.C.	1340
WOOO	Deland, Fla.	1310
WOOW	Greenville, N.C.	1340
WOPA	Oak Park, Ill.	1490
WOPI	Bristol, Tenn.	1490
WOR	New York, N.Y.	710
WORA	Mayaguez, P.R.	760
WORC	Worcester, Mass.	1310
WORD	Spartanburg, S.C.	910
WORG	Orangeburg, S.C.	1580
WORK	York, Pa.	1350
WORL	Boston, Mass.	950
WORM	Savannah, Tenn.	1010
WORX	Madison, Ind.	1270
WOSC	Fulton, N.Y.	1300
WOSH	Oshkosh, Wis.	1490
WOSU	Columbus, Ohio	820
WOTR	Corry, Pa.	1370
WOTT	Watertown, N.Y.	1410
WOTW	Nashua, N.H.	900
WOUB	Athens, Ohio	1340
WOVE	Welch, W.Va.	1340
WOW	Omaha, Nebr.	590
WOWL	Florence, Ala.	1240
WOWO	Ft. Wayne, Ind.	1190
WOWW	Naugatuck, Conn.	860
WOWY	Clewiston, Fla.	500d
WOXF	Oxford, N.C.	1340

C.L.	Location	kHz
WOZK	Ozark, Ala.	900
WPAB	Ponce, P.R.	550
WPAC	Patchogue, N.Y	1580
WPAD	Paducah, Ky.	1450
WPAG	Ann Arbor, Mich.	1050
WPAL	Charleston, S.C.	730
WPAM	Pottsville, Pa.	1450
WPAQ	Mount Airy, N.C.	740
WPAR	Parkersburg, W.Va.	1450
WPAT	Paterson, N.J.	930
WPAW	E. Syracuse, N.Y.	1540
WPAX	Thomasville, Ga.	1240
WPAY	Portsmouth, Ohio	1400
WPAZ	Pottstown, Pa.	1370
WPBC	Richfield, Minn.	980
WPCC	Clinton, S.C.	1400
WPCF	Panama City, Fla.	1430
WPCO	Mt. Vernon, Ind.	1590
WPDE	Paris, Ky.	1440
WPDF	Corydon, Ind.	1550
WPDM	Potsdam, N.Y.	1470
WPDQ	Jacksonville, Fla.	600
WPDR	Portage, Wis.	1350
WPDX	Clarksburg, W.Va.	750
WPEG	Winston-Salem, N.C.	1550
WPEH	Louisville, Ga.	1420
WPEL	Montrose, Pa.	1250
WPEN	Philadelphia, Pa.	950
WPEO	Peoria, Ill.	1020
WPEP	Taunton, Mass.	1570
WPET	Greensboro, N.C.	950
WPFB	Middletown, Ohio	910
WPFP	Park Falls, Wis.	1450
WPGA	Perry, Ga.	980
WPGC	Bradbury Hghts., Md.	1580
WPGF	Burgaw, N. C.	1470
WPGM	Danville, Pa.	1570
WPGW	Portland, Ind.	1440
WPHB	Philipsburg, Pa.	1260
WPHC	Waverly, Tenn.	1060
WPHN	Liberty, Ky.	1560
WPIC	Sharon, Pa.	790
WPID	Piedmont, Ala.	1280
WPIK	Alexandria, Va.	730
WPIN	St. Petersburg, Fla.	680
WPIP	Collierville, Tenn.	1590
WPIT	Pittsburgh, Pa.	730
WPKE	Pikeville, Ky.	1240
WPKO	Waverly, Ohio	1380
WPKY	Princeton, Ky.	1580
WPLA	Plant City, Fla.	910
WPLB	Greenville, Mich.	1380
WPLK	Rockmart, Ga.	1220
WPLM	Plymouth, Mass.	1390
WPLO	Atlanta, Ga.	590
WPLY	Plymouth, Wis.	1420
WPMB	Vandalia, Ill.	1500
WPME	Punxsutawney, Pa.	1540
WPMH	Portsmouth, Va.	1010
WPMP	Pascagoula, Miss.	1580
WPNC	Plymouth, N.C.	1470
WPNF	Brevard, N.C.	1240
WPNH	Plymouth, N. H.	1300
WPNX	Phoenix City, Ala.	1460
WPON	Pontiac, Mich.	1460
WPOP	Hartford, Conn.	1410
WPOR	Portland, Maine	1490
WPOW	New York, N.Y.	1330
WPPA	Pottsville, Pa.	1360
WPRA	Mayaguez, P.R.	990
WPRC	Lincoln, Ill.	1370
WPRE	Prairie Du Chien, Wis.	980
WPRN	Butler, Ala.	1220
WPRO	Providence, R.I.	630
WPRP	Ponce, P.R.	910
WPRS	Paris, Ill.	1440
WPRT	Prestonsburg, Ky.	960
WPRV	Wauchula, Fla.	1600
WPRW	Manassas, Va.	1460
WPRY	Perry, Fla.	1400
WPSL	Monroeville, Pa.	1510
WPTF	Raleigh, N.C.	680
WPTL	Canton, N.C.	920
WPTN	Cookeville, Tenn.	1500
WPTR	Albany, N.Y.	1540
WPTS	Pittston, Pa.	1540
WPTW	Piqua, Ohio	1570
WPTX	Lexington Pk., Md.	920
WPUV	Pulaski, Va.	1580
WPVA	Colonial Hghts., Va.	1290
WPVL	Painesville, Ohio	1460
WPXE	Starke, Fla.	1490
WPXY	Greenville, N. C.	1550
WPYB	Benson, N.C.	1580
WQAM	Miami, Fla.	560
WQBC	Vicksburg, Miss.	1420
WQDY	Calais, Maine	1230
WQIC	Meridian, Miss.	1390
WQIK	Jacksonville, Fla.	1090
WQIZ	St. George, S. C.	1300
WQMR	Silver Spring, Md.	1050
WQOK	Greenville, S.C.	1440
WQSN	Charleston, S.C.	1450
WQTE	Monroe, Mich.	560
WQTW	Latrobe, Pa.	1570
WQUA	Moline, Ill.	1230
WQVA	Quantico, Va.	1530
WQXI	Atlanta, Ga.	790
WQXL	Columbia, S.C.	1320
WQXQ	Ormond Bch., Fla.	1380
WQXR	New York, N.Y.	1560
WQXT	Palm Beach, Fla.	1340
WRAA	Luray, Va.	1330
WRAB	Arab, Ala.	1380
WRAC	Racine, Wis.	1460
WRAD	Radford, Va.	1460
WRAG	Carrollton, Ala.	590
WRAI	Rio Piedras, P.R.	1190
WRAJ	Anna, Ill.	1440
WRAK	Williamsport, Pa.	1400
WRAM	Monmouth, Ill.	1330
WRAN	Dover, N.J.	1510
WRAP	Norfolk, Va.	850
WRAW	Reading, Pa.	1340
WRAY	Princeton, Ind.	1250
WRBC	Jackson, Miss.	1300
WRBD	Pampano Beach, Fla.	1470
WRBL	Columbus, Ga.	1420
WRBN	Warner Robins, Ga.	1600
WRC	Washington, D.C.	980
WRCD	Dalton, Ga.	1430
WRCH	New Britain, Conn.	910
WRCK	Tuscumbia, Ala.	1410
WRCO	Richland, Wis.	1450
WRCP	Philadelphia, Pa.	1540
WRCR	Maplewood, Minn.	1010
WRCS	Ahoskie, N.C.	970
WRDB	Reedsburg, Wis.	1400
WRDO	Augusta, Maine	1400
WRDS	S. Charleston, W.Va.	1410
WRDW	Augusta, Ga.	1480
WREB	Holyoke, Mass.	930
WREC	Memphis, Tenn.	600
WREL	Lexington, Va.	1450
WREM	Remsen, N.Y.	1480
WREN	Topeka, Kans.	1250
WRED	Ashtabula, Ohio	970
WREV	Reidsville, N.C.	1220
WRFX	Grand Junction, Colo.	920
WREY	New Albany, Ind.	1290
WRFC	Athens, Ga.	960
WRFD	Worthington, Ohio	880
WRFS	Alexander City, Ala.	1050
WRGA	Rome, Ga.	1470
WRGS	Rogersville, Tenn.	1370
WRHC	Jacksonville, Fla.	1400
WRHI	Rock Hill, S.C.	1340
WRIB	Providence, R.I.	1220
WRIC	Richlands, Va.	540
WRIG	Wausau, Wis.	1400
WRIM	Pahokee, Fla.	1250
WRIN	Rensselaer, Ind.	1560
WRIP	Rossville, Ga.	980
WRIS	Roanoke, Va.	1410
WRIT	Milwaukee, Wis.	1340
WRIV	Riverhead, N.Y.	1390
WRIZ	Coral Gables, Fla.	1550
WRJC	Mauston, Wis.	1270
WRJN	Racine, Wis.	1400
WRJS	San German, P. R.	1060
WRJW	Picayune, Miss.	1320
WRKB	Kannapolis, N.C.	1460
WRKD	Rockland, Maine	1450
WRKH	Rockwood, Tenn.	580
WRKL	New City, N. Y.	910
WRKM	Carthage, Tenn.	1350
WRKT	Cocoa Beach, Fla.	1300
WRKV	Rockville, Conn.	800
WRLD	Lanett, Ala.-W. Point, Ga.	1490
WRMA	Montgomery, Ala.	950
WRMF	Titusville, Fla.	1050
WRMN	Elgin, Ill.	1410
WRMS	Beardstown, Ill.	790
WRMT	Rocky Mount, N.C.	1490
WRNB	New Bern, N.C.	1490
WRNC	Raleigh, N.C.	1240
WRNE	Wis. Rapids, Wis.	1220
WRNL	Richmond, Va.	910
WRNY	Rome, N.Y.	1350
WROA	Gulfport, Miss.	1390
WROB	West Point, Miss.	1450
WROC	Rochester, N.Y.	1280
WROD	Daytona Beach, Fla.	1340
WROK	Rockford, Ill.	1440
WROL	Fountain City, Tenn.	1490
WROM	Rome, Ga.	710
WRON	Ronceverte, W.Va.	1400
WROS	Scottsboro, Ala.	1330
WROV	Roanoke, Va.	1240
WROW	Albany, N.Y.	590
WROX	Clarksdale, Miss.	1450
WROY	Carmi, Ill.	1460
WROZ	Evansville, Ind.	1400
WRPL	Charlotte, N.C.	1540
WRPM	Poplarville, Miss.	1530
WRR	Dallas, Tex.	1310
WRRC	Spring Valley, N. Y.	1300
WRRR	Rockford, Ill.	1330
WRRZ	Clinton, N.C.	880
WRSA	Saratoga Sprgs., N.Y.	1280
WRSC	State College, Pa.	1390
WRSJ	Bayamon, P. R.	1560
WRSL	Stanford, Ky.	1520
WRSW	Warsaw, Ind.	1480
WRTA	Altoona, Pa.	1240
WRTH	Wood River, Ill.	590
WRTI	Rantoul, Ill.	2550
WRUF	Gainesville, Fla.	850
WRUM	Rumford, Maine	790
WRUN	Utica, N.Y.	1150
WRUS	Russellville, Ky.	610
WRVA	Richmond, Va.	1140
WRVK	Mt. Vernon, Ky.	1460
WRWD	Augusta, Ga.	1480
WRWH	Cleveland, Ga.	1380
WRWJ	Selma, Ala.	1570
WRXO	Roxboro, N.C.	1430
WRYM	New Britain, Conn.	840
WSAC	Fort Knox, Ky.	1470
WSAF	Sarasota, Fla.	1220
WSAI	Cincinnati, Ohio	1360
WSAJ	Grove City, Pa.	1340
WSAL	Logansport, Ind.	1230
WSAM	Saginaw, Mich.	1400
WSAN	Allentown, Pa.	1470
WSAO	Senatobia, Miss.	1550
WSAR	Fall River, Mass.	1480
WSAT	nr. Salisbury, N.C.	1280
WSAU	Wausau, Wis.	550
WSAV	Savannah, Ga.	630
WSAY	Rochester, N.Y.	1370
WSAZ	Huntington, W.Va.	930
WSB	Atlanta, Ga.	750
WSBA	Savannah, Ga.	1400
WSBB	New Smyrna Beach, Fla.	1230
WSBC	Chicago, Ill.	1240
WSBR	Boca Raton, Fla.	740
WSBS	Gt. Barrington, Mass.	860
WSBT	South Bend, Ind.	960
WSCM	Panama City Beach, Fla.	1290
WSBP	Chattahoochee, Fla.	1580
WSCR	Scranton, Pa.	1320
WSDR	Sterling, Ill.	1240
WSEB	Sebring, Fla.	1340
WSEL	Pontotoc, Miss.	1440
WSEM	Donalgsonville, Ga.	1500
WSEN	Baldwinsville, N.Y.	1050
WSER	Elkton, Md.	1550
WSET	Glen Falls, N.Y.	1410
WSEV	Sevierville, Tenn.	930
WSFB	Quitman, Ga.	1490
WSFC	Somerset, Ky.	1240
WSFR	Sanford, Fla.	1360
WSFT	Thomaston, Ga.	1220
WSGA	Savannah, Ga.	1400
WSGB	Sutton, W.Va.	1490
WSGC	Elberton, Ga.	1400
WSGN	Birmingham, Ala.	610
WSGO	Oswego, N.Y.	1440
WSGW	Saginaw, Mich.	790
WSHB	Raeford, N.C.	1400
WSHF	Sheffield, Ala.	1290
WSHN	Fremont, Mich.	1550
WSHO	New Orleans, La.	1230
WSHP	Shippenburg, Pa.	1480
WSIB	Beaufort, S.C.	1490
WSIC	Statesville, N.C.	1400
WSID	Baltimore, Md.	1010
WSIG	Mount Jackson, Va.	790
WSIP	Paintsville, Ky.	1490
WSIR	Winter Haven, Fla.	1490
WSIV	Pekin, Ill.	1140
WSIX	Nashville, Tenn.	980
WSJC	Magee, Miss.	810
WSJM	St. Joseph, Mich.	1400
WSJR	Modawaska, Me.	1230
WSJS	Winston-Salem, N.C.	600
WSJT	Chesapeake, Va.	1600
WSKI	Montpelier-Barre, Vt.	1240
WSKP	Miami, Fla.	1450
WSKT	S. Knoxville, Tenn.	1580
WSKY	Asheville, N.C.	1230
WSLB	Ogdensburg, N.Y.	1400
WSLC	Clermont, Fla.	1340
WSLG	Clermont, Fla.	1340
WSLI	Jackson, Miss.	930
WSMA	Marine City, Mich.	1590
WSLM	Salem, Ind.	1220
WSLR	Akron, Ohio	1350
WSLS	Roanoke, Va.	610
WSLT	Ocean City-Somers Pt., N.J.	1520
WSM	Nashville, Tenn.	650
WSMB	New Orleans, La.	1350
WSMD	La Plata, Md.	1560
WSME	Sanford, Maine	1220
WSMG	Greenville, Tenn.	1450
WSMI	Litchfield, Ill.	1540
WSMN	Nashua, N.H.	1590
WSMT	Sparta, Tenn.	1050
WSNE	Cummings, Ga.	1410
WSNJ	nr. Bridgeton, N.J.	1240
WSNO	Barre, Vt.	1450
WSNT	Sandersville, Ga.	1490
WSNW	Seneca, S. C.	1150
WSNY	Schenectady, N.Y.	1240
WSOC	Charlotte, N.C.	930
WSOK	Savannah, Ga.	1230
WSOL	Tampa, Fla.	1300
WSOM	Salem, Ohio	600
WSON	Henderson, Ky.	860
WSOO	Slt. Ste. Marie, Mich.	1230
WSOQ	No. Syracuse, N.Y.	1220
WSOR	Windsor, Conn.	1480
WSOY	Decatur, Ill.	1340
WSPA	Spartanburg, S.C.	950
WSPB	Sarasota, Fla.	1450
WSPD	Toledo, Ohio	1370
WSPF	Hickory, N.C.	1570
WSPR	Springfield, Mass.	1270
WSPT	Stevens Pt., Wis.	1010
WSPZ	Spencer, W.Va.	1400
WSRA	Milton, Fla.	1490
WSRC	Durham, N.C.	1410
WSRO	Marlborough, Mass.	1470
WSRW	Hillsboro, Ohio	1590
WSSB	Durham, N.C.	1490
WSSC	Sumter, S.C.	1340
WSSO	Starkville, Miss.	1230
WSSV	Petersburg, Va.	1240
WSTC	Stamford, Conn.	1400
WSTH	Taylorsville, N.C.	860
WSTK	Woodstock, Va.	1230
WSTL	Eminence, Ky.	1600
WSTP	Salisbury, N.C.	1490
WSTR	Sturgis, Mich.	1230
WSTU	Stuart, Fla.	1450
WSTV	Steubenville, Ohio	1340
WSUB	Groton, Conn.	980
WSUH	Oxford, Miss.	1420
WSUI	Iowa City, Iowa	910
WSUN	St. Petersburg, Fla.	620
WSUX	Seaford, Del.	1280
WSUZ	Palatka, Fla.	800
WSVA	Harrisonburg, Va.	550
WSVL	Shelbyville, Ind.	1520
WSVN	Valdese, N.C.	1490
WSVM	Valdese, N.C.	1490
WSVS	Crewe, Va.	800
WSWN	Belle Glade, Fla.	900
WSWV	Pennington Gap, Va.	1570
WSWW	Platteville, Wis.	1590
WSYB	Rutland, Vt.	1380
WSYD	Mt. Airy, N.C.	1300
WSYL	Sylvania, Ga.	1490
WSYR	Syracuse, N.Y.	570
WTAB	Tabor City, N.C.	1370
WTAC	Flint, Mich.	600
WTAD	Quincy, Ill.	930
WTAE	Pittsburgh, Pa.	1250
WTAG	Worcester, Mass.	580
WTAK	Garden City, Mich.	1090
WTAL	Tallahassee, Fla.	1450
WTAN	Clearwater, Fla.	1340
WTAP	Parkersburg, W.Va.	1230
WTAQ	LaGrange, Ill.	1300
WTAR	Norfolk, Va.	790
WTAW	Bryan, Tex.	1150
WTAX	Springfield, Ill.	1240
WTAY	Robinson, Ill.	1570
WTBC	Tuscaloosa, Ala.	1230
WTBF	Troy, Ala.	970
WTBO	Cumberland, Md.	1450
WTCA	Plymouth, Ind.	1050
WTCB	Flomaton, Ala.	990
WTCH	Shawano, Wis.	960
WTCJ	Tell City, Ind.	1230
WTCM	Traverse City, Mich.	1400
WTCO	Campbellsville, Ky.	1450
WTCR	Ashland, Ky.	1420
WTCS	Fairmont, W.Va.	1490
WTCW	Whitesburg, Ky.	920
WTEL	Philadelphia, Pa.	860
WTGA	Thomaston, Ga.	1590
WTGR	Myrtle Beach, S. C.	1520
WTHE	Mineola, N.Y.	1520
WTHI	Terre Haute, Ind.	1480
WTHM	Lapeer, Mich.	1530
WTHN	Thomaston, Ga.	1500
WTHT	Hazleton, Pa.	1300
WTIC	Hartford, Conn.	1080
WTID	Newport News, Va.	1270
WTIF	Tifton, Ga.	1340
WTIG	Massillon, Ohio	990
WTIK	Durham, N.C.	1310
WTIL	Mayaguez, P.R.	1300
WTIM	Taylorville, Ill.	1410
WTIP	Charleston, W.Va.	1240
WTIQ	Manistique, Mich.	1490
WTIX	New Orleans, La.	690
WTJH	East Point, Ga.	1260
WTJS	Jackson, Tenn.	1390
WTKM	Hartford, Wis.	1540
WTKO	Ithaca, N.Y.	1470
WTKY	Tompkinsville, Ky.	1370
WTLB	Utica, N.Y.	1310
WTLK	Taylorsville, N.C.	1570
WTLN	Apopka, Fla.	1520
WTLO	Somerset, Ky.	1480
WTLS	Tallasee, Ala.	1300
WTMA	Charleston, S.C.	1250
WTMB	Tomah, Wis.	1390
WTMC	Ocala, Fla.	1290
WTMJ	Milwaukee, Wis.	620
WTMP	Tampa Fla.	1150
WTMT	Louisville, Ky.	620
WTNC	Thomasville, N.C.	790
WTND	Orangeburg, S.C.	920
WTNS	Coshocton, Ohio	1560
WTNT	Tallahassee, Fla.	1270
WTOB	Winston-Salem, N.C.	1380
WTOC	Savannah, Ga.	1290
WTOD	Toledo, Ohio	1560
WTOE	Spruce Pine, N.C.	1470
WTOJ	Tomah, Wis.	1460
WTON	Staunton, Va.	1240
WTOP	Washington, D.C.	1500
WTOR	Torrington, Conn.	610
WTOT	Marianna, Fla.	980
WTPR	Paris, Tenn.	710
WTPS	Portage, Mich.	1560
WTRA	Latrobe, Pa.	1480
WTRB	Ripley, Tenn.	1570
WTRC	Elkhart, Ind.	1340
WTRE	Greensburg, Ind.	1330
WTRL	Bradenton, Fla.	1490
WTRN	Tyrone, Pa.	1340
WTRO	Dyersburg, Tenn.	1330
WTRP	LaGrange, Ga.	620
WTRR	Sanford, Fla.	1400
WTRU	Muskegon, Mich.	1600
WTRW	Two Rivers, Wis.	1590

WHITE'S RADIO LOG

C.L.	Location	kHz
WTRX	Flint, Mich.	1330
WTRY	Troy, N.Y.	980
WTSA	Brattleboro, Vt.	1450
WTSB	Lumberton, N.C.	1340
WTSL	Hanover-Lebanon, New Hampshire	1400
WTSN	Dover, N.H.	1270
WTSV	Claremont, N.H.	1230
WTTB	Vero Beach, Fla.	1490
WTTC	Towanda, Pa.	1550
WTTF	Tiffin, Ohio	1600
WTTH	Port Huron, Mich.	1380
WTTI	Dalton, Ga.	1530
WTTL	Madisonville, Ky.	1310
WTTM	Trenton, N.J.	920
WTTN	Watertown, Wis.	1580
WTTO	Toledo, Ohio	1520
WTTR	Westminster, Md.	1470
WTTS	Bloomington, Ind.	1370
WTTT	Amherst, Mass.	1430
WTUF	Mobile, Ala.	840
WTUG	Tuscaloosa, Ala.	790
WTUP	Tupelo, Miss.	1490
WTUX	Wilmington, Del.	1290
WTVB	Coldwater, Mich.	1590
WTVL	Waterville, Maine	1490
WTVN	Columbus, Ohio	610
WTWA	Thomson, Ga.	1240
WTWB	Auburndale, Fla.	1570
WTWN	St. Johnsbury, Vt.	1340
WTXL	W. Spgfd., Mass.	1490
WTYC	Rock Hill, S.C.	1150
WTYM	East Longmeadow, Mass.	1600
WTYN	Tryon, N.C.	1550
WTYS	Marianna, Fla.	1340
WTZE	Tazewell, Va.	1470
WUFD	Amherst, N.Y.	1080
WUFF	Eastman, Ga.	710
WUFO	Amherst, N. Y.	1080
WULA	Eufaula, Ala.	1240
WUMU	Gainesville, Fla.	1390
WUNA	Aquadilla, P. R.	1340
WUND	Uhrichsville, Ohio	1540
WUNE	Baton Rouge, La.	1550
WUNI	Mobile, Ala.	1410
WUNN	Mason, Mich.	1110
WUNO	Rio Piedras, P.R.	1320
WUNS	Lewisburg, Pa.	1010
WUPR	Utado, P.R.	1530
WUSJ	Lockport, N.Y.	1340
WUSM	Havelock, N.C.	1330
WUST	Bethesda, Md.	1120
WUWU	Gainsville, Fla.	1390
WVAK	Paoli, Ind.	1560
WVAL	Sauk Rapids, Minn.	800
WVAM	Altoona, Pa.	1430
WVAR	Richwood, W.Va.	1280
WVCB	Shallotte, N. C.	1410
WVCF	Apopka, Fla.	1520
WVCG	Coral Gables, Fla.	1080
WVCH	Chester, Pa.	740
WVEC	Hampton, Va.	1490
WVGT	Mt. Dora, Fla.	1580
WVIC	E. Lansing, Mich.	730
WVIM	Vicksburg, Miss.	1490
WVIP	Mt. Kisco, N.Y.	1310
WVJP	Caguas, P.R.	1110
WVJS	Owensboro, Ky.	1420
WVKO	Columbus, Ohio	1580
WVLD	Valdosta, Ga.	1450
WVLK	Lexington, Ky.	590
WVLN	Olney, Ill.	740
WVMC	Mt. Carmel, Ill.	1360
WVMG	Cochran, Ga.	1440
WVMI	Biloxi, Miss.	570
WVMT	Burlington, Vt.	620
WVNA	Tuscumbia, Ala.	1590
WVNJ	Newark, N.J.	620
WVOB	Bel Air, Md.	1520
WVOC	Battle Creek, Mich.	1500
WVOE	Chadburn, N.C.	1590
WVOH	Hazelhurst, Ga.	920
WVOK	Birmingham, Ala.	690
WVOL	Berry Hill, Tenn.	1470
WVOM	Iuka, Miss.	1270
WVON	Cicero, Ill.	1450
WVOP	Vidalia, Ga.	970
WVOS	Liberty, N.Y.	1240
WVOT	Wilson, N.C.	1420
WVOW	Logan, W.Va.	1290
WVOX	New Rochelle, N.Y.	1460
WVOZ	Carolina, P.R.	1400
WVPO	Stroudsburg, Pa.	840
WVSA	Vernon, Ala.	1380
WVSC	Somerset, Pa.	990
WVTR	White River Junc., Vt.	910
WVVW	Grafton, W.Va.	1260
WWAB	Lakeland, Fla.	1330
WWBC	Cocoa, Fla.	1510
WWBD	Bamberg-Denmark, S.C.	790
WWBR	Windber, Pa.	1350
WWBZ	Vineland, N.J.	1360
WWCA	Gary, Ind.	1270
WWCC	Bremen, Ga.	1440
WWCH	Clarion, Pa.	1300
WWCM	Brazil, Ind.	1380
WWCO	Waterbury, Conn.	1240
WWDC	Washington, D.C.	1260
WWDR	Murfreesboro, N. C.	1080
WWDS	Everett, Pa.	1050
WWGM	Nashville, Tenn.	1560
WWGO	Erie, Pa.	1450
WWGP	Sanford, N.C.	1050
WWGS	Tifton, Ga.	1430
WWHG	Hornell, N.Y.	1320
WWHY	Huntington, W.Va.	1470
WWIL	Ft. Lauderdale, Fla.	1580
WWIN	Baltimore, Md.	1400
WWIS	Black River Falls, Wis.	1260
WWIT	Canton, N.C.	970
WWIZ	Lorain, Ohio	1380
WWJ	Detroit, Mich.	950
WWJB	Brooksville Fla.	1450
WWJC	Superior, Wis.	1270
WWKE	Ocala, Fla.	1370
WWKY	Winchester, Ky.	1380
WWL	New Orleans, La.	870
WWML	Portage, Wis.	1470
WWNC	Asheville, N.C.	570
WWNH	Rochester, N.H.	930
WWNR	Beckley, W.Va.	620
WWNS	Statesboro, Ga.	1240
WWNY	Watertown, N.Y.	790
WWOD	Lynchburg, Va.	1390
WWOK	Charlotte, N.C.	1480
WWOL	Buffalo, N.Y.	1120
WWOM	New Orleans, La.	600
WWON	Woonsocket, R.I.	1240
WWOW	Conneaut, Ohio	1360
WWPA	Williamsport, Pa.	1340
WWPF	Palatka, Fla.	1260
WWRI	W. Warwick, R.I.	1450
WWRL	New York, N.Y.	1600
WWSC	Glens Falls, N.Y.	1450
WWSD	Monticello, Fla.	1090
WWSF	Loretto, Pa.	1400
WWSR	St. Albans, Vt.	1420
WWST	Wooster, Ohio	960
WWSW	Pittsburgh, Pa.	970
WWTC	Minneapolis, Minn.	1280
WWUN	Jackson, Miss.	1590
WWVA	Wheeling, W.Va.	1170
WWWB	Jasper, Ala.	1360
WWWF	Fayette, Ala.	990
WWWR	Russellville, Ala.	920
WWXL	Manchester, Ky.	1450
WWYN	Erie, Pa.	1260
WWYO	Pineville, W.Va.	970
WXAL	Demopolis, Ala.	1400
WXCL	Peoria, Ill.	1350
WXCO	Wausau, Wis.	1230
WXGI	Richmond, Va.	950
WXHR	Cambridge, Mass.	740
WXIG	Windermere, Fla.	1480
WXIV	Windermere, Fla.	1430
WXKW	Troy, N. Y.	1600
WXLI	Dublin, Ga.	1230
WXLL	Big Delta, Alaska	980
WXLN	Potomac-Cabin John, Md.	950
WXLW	Indianapolis, Ind.	950
WXOK	Baton Rouge, La.	1460
WXOX	Bay City, Mich.	1250
WXMT	Merrill, Wis.	730
WXRF	Guayama, P.R.	1590
WXTN	Lexington, Miss.	1000
WXTR	Pawtucket, R.I.	550
WXUR	Media, Pa.	690
WXVA	Charles Town, W.Va.	1550
WXVW	Jeffersonville, Ind.	1450
WXXX	Hattiesburg, Miss.	1310
WXYC	Ft. Myers, Fla.	1350
WXYZ	Detroit, Mich.	1270
WYAL	Scotland Neck, N.C.	1280
WYAM	Bessemer, Ala.	1450
WYBG	Massena, N. Y.	1050
WYCL	York, S.C.	980
WYDE	Birmingham, Ala.	850
WYGO	Corbin, Ky.	1330
WYHE	Bristol, Tenn.	1550
WYLD	New Orleans, La.	940
WYLO	Jackson, Wis.	540
WYMB	Manning, S.C.	1410
WYNA	Raleigh, N. C.	1550
WYND	Sarasota, Fla.	1280
WYNG	Warwick-East Greenwich, R.I.	1590
WYNK	Baton Rouge, La.	1380
WYNN	Florence, S.C.	540
WYNR	Brunswick, Ga.	790
WYNS	Leighton, Pa.	1150
WYNX	Smyrna, Ga.	1550
WYNZ	Ypsilanti, Mich.	1520
WYOQ	Wyoming, Mich.	1530
WYOU	Tampa, Fla.	1550
WYPR	Danville, Va.	970
WYRE	Annapolis, Md.	810
WYRN	Louisburg, N.C.	1480
WYSE	Inverness, Fla.	1560
WYSH	Clinton, Tenn.	1380
WYSI	Ypsilanti, Mich.	1480
WYSL	Buffalo, N.Y.	1400
WYSR	Franklin, Va.	1250
WYTH	Madison, Ga.	1250
WYTI	Rocky Mount, Va.	1570
WYVE	Wytheville, Va.	1280
WYXI	Athens, Tenn.	1390
WYZE	Atlanta, Ga.	1480
WZAM	Prichard, Ala.	1270
WZBN	Zion, Ill.	1500
WZEP	DeFuniak Sprgs., Fla.	1460
WZIP	Cincinnati, Ohio	1050
WZKY	Albemarie, N.C.	1580
WZOB	Ft. Payne, Ala.	1250
WZOE	Princeton, Ill.	1490
WZOK	Jacksonville, Fla.	1320
WZRH	Zephyr Hills, Fla.	1400
WZUM	Carnegie, Pa.	1590
WZYX	Cowan, Tenn.	1440
WZZZ	Boynton Beach, Fla.	1510

U. S. FM Stations by Call Letters

C.L.	Location
KABC-FM	Los Angeles, Calif.
KABL-FM	San Francisco, Cal.
KACA	Prosser, Wash.
KACE-FM	Riverside, Calif.
KACO	St. Louis, Mo.
KADI	St. Louis, Mo.
KAFI	Auburn, Calif.
KAFM	Salina, Kans.
KAIM-FM	Honolulu, Hawaii
KAJS	Newport Beach, Calif.
KAKC	Tulsa, Okla.
KAKI	San Antonio, Tex.
KALB-FM	Alexandria. La.
KALH	Denver, Colo.
KALW	San Francisco, Calif.
KAMS	Mammoth Spring, Ark.
KANG	Angwin, Cal.
KANS-FM	Larned, Kan.
KANT-FM	Lancaster, Calif.
KANU	Lawrence, Kans.
KANW	Albuquerque, N.Mex.
KAOL-FM	Carrollton, Mo.
KARK	Little Rock, Ark.
KARL-FM	Carlsbad, Cal.
KARM-FM	Fresno, Calif.
KASU	Jonesboro, Ark.
KATT	Woodland, Calif.
KATY-FM	San Luis Dbispo, Calif.
KAVI-FM	Rocky Ford, Colo.
KAVR-FM	Applevalley, Cal.
KAYD	Beaumont, Tex.
KAZZ	Austin, Tex.
KBBI	Los Angeles, Calif.
KBBL	Riverside, Cal.
KBBW	San Diego, Cal.
KBBX	Seattle, Wash.
KBCA	Los Angeles, Calif.
KBCL-FM	Shreveport, La.
KBEE-FM	Modesto, Calif.
KBER-FM	San Antonio, Tex.
KBEY	Kansas City, Mo.
KBFI	Boise, Idaho
KBFL	Buffalo, Mo.
KBFM	Lubbock, Tex.
KBGL	Pocatello, Ida.
KBHF	Bozeman, Mont.
KBHS-FM	Hot Springs, Ark.
KBIG-FM	Los Angeles-Avalon, Cal.
KBIM-FM	Roswell, N.Mex.
KBLE-FM	Seattle, Wash.
KBMC	Eugene, Ore.
KBMF-FM	Spearman, Tex.
KBMS	Los Angeles, Calif.
KBNM	Albuquerque, N.M.
KBNO	Houston, Tex.
KBOA-FM	Kennett, Mo.
KBOC	Ogden, Utah
KBOE-FM	Oskaloosa, Iowa
KBOI-FM	Boise, Ida.
KBOX-FM	Dallas, Tex.
KBOY-FM	Medford, Oreg.
KBPI	Denver, Colo.
KBRG	San Francisco, Cal.
KBRO-FM	Bremerton, Wash.
KBTC-FM	Houston, Mo.
KBTM-FM	Jonesboro, Ark.
KBUZ-FM	Mesa, Ariz.
KBVR	Corvallis, Ore.
KBYR-FM	Anchorage, Alaska
KBYU-FM	Provo, Utah
KCAB-FM	Dardanelle, Ark.
KCAL-FM	Redlands, Calif.
KCBH	Beverly Hills, Calif.(s)
KCBS-FM	San Francisco, Calif.
KCEE-FM	Tucson, Ariz.
KCER	Redding, Cal.
KCFC	Kansas City, Kan.
KCFM	St. Louis, Mo.
KCHQ-FM	Conchella, Cal.
KCHV-FM	Conchella, Cal.
KCIB-FM	Fresno, Calif.(s)
KCIL-FM	Houma, La.
KCKN-FM	Kansas City, Kan.
KCLE-FM	Cleburne, Tex.
KCLO-FM	Leavenworth, Kans.
KCLU-FM	Rolla, Mo.
KCMA	San Francisco, Cal.
KCMB-FM	Wichita, Kans.
KCMI	Los Angeles, Calif.
KCMK	Kansas City, Mo.
KCMO-FM	Kansas City, Mo.(s)
KCMS-FM	Manitou Springs, Colo.
KCOM	Omaha, Nebr.
KCPS	Tacoma, Wash.
KCPX-FM	Salt Lake City, Utah
KCRA-FM	Sacramento, Calif.
KCRW	Santa Monica, Calif.
KCSB-FM	Santa Barbara, Cal.
KCSC	Edmond, Okla.
KCSM	San Mateo, Calif.
KCSU-FM	Ft. Collins, Colo.
WCTS-FM	Minneapolis, Minn.
KCUE-FM	Red Wing, Minn.
KCUI	Pella, Ia.
KCUL-FM	Ft. Worth, Tex.
KCUR-FM	Kansas City, Mo.
KCVR-FM	Lodi, Calif.
KCWS-FM	Ellensburg, Wash.
KCYS	Richland, Wash.
WDAF-FM	Kansas, Mo.
KDB-FM	Santa Barbara, Calif.
KDDD-FM	Dumas, Tex.
KDEF-FM	Albuquerque, N.Mex.
KDEN-FM	Denver, Colo.
KDES-FM	Palm Spgs., Calif.
KDFC	San Francisco, Calif.
KDEF-FM	Albuquerque, N. M.
KDFM	Walnut Creek, Cal.
KDFR	Tulare, Cal.
KDHI-FM	Twenty-Nine Palms, Cal.
KDKA-FM	Pittsburgh, Pa.
KDLA-FM	De Ridder, La.
KDLK-FM	Del Rio, Tex.
KDLR-FM	Devils Lake, N.D.
KDMC	Corpus Christi, Tex.
KDMI	Des Moines, Iowa(s)
KDNC-FM	Spokane, Wash.
KDNT-FM	Denton, Tex.
KDOK-FM	Tyler, Tex.
KDPS	Des Moines, Iowa
KDSU	Fargo, N.D.
KDTH-FM	Dubuque, Ia.
KDUO	Riverside, Calif.(s)
KDUX-FM	Aberdeen, Wash.
KDVR	Sioux City, Ia.(s)
KEAR	San Francisco, Calif.
KEAX	National City, Calif.
KEBJ	Phoenix, Ariz.
KEBR	Sacramento, Calif.
KEBS	San Diego, Calif.
KECR	El Cajon, Calif.
KEDC-FM	Northridge, Cal.
KEED-FM	Springfield-Eugene, Oregon
KEEN-FM	San Jose, Calif.
KEEZ	San Antonio, Tex.(s)
KEFC	Waco, Tex.(s)
KEFW	Honolulu, Hawaii
KEIR	Dallas, Tex.
KELD-FM	El Dorado, Ark.(s)
KELE	Phoenix, Ariz.
KELO-FM	Sioux Falls, S. D.
KELT	Harlingen, Tex.
KEMO	St. Louis, Mo.
KERI	Bellingham, Wash.
KERN-FM	Bakersfield, Calif.
KERR	Salinas, Cal.
KERS	Sacramento, Cal.
KESM-FM	El Dorado Springs, Mo.
KETO-FM	Seattle, Wash.(s)
KEWC-FM	Cheney, Wash.
KEZE	Anaheim, Calif.
KFAB-FM	Omaha, Nebr.
KFAC-FM	Los Angeles, Calif.

C.L.	Location
KFAM-FM	St. Cloud, Minn.
KFAY-FM	Fayetteville, Ark.
KFBD	Waynesville, Mo.
KFBI-FM	Omaha, Neb.
KFBK-FM	Sacramento, Calif.
KFCA	Phoenix, Ariz.
KFGQ-FM	Boone, Iowa
KFH-FM	Wichita, Kans.
KFJC	Los Altos, Cal.
KFJZ	Fort Worth, Tex.
KFKF-FM	Bellevue, Wash.
KFLA-FM	Scott City, Kan.
KFLY-FM	Corvallis, Ore.
KFMB-FM	San Diego, Calif.
KFMC	Portland, Oreg.
KFMF	Ft. Collins, Colo.
KFMG	Des Moines, Ia.
KFMK	Houston,Tex.(s)
KFML-FM	Denver, Colo.(s)
KFMM	Tucson, Ariz.
KFMN	Abilene, Tex.
KFMP	Port Arthur, Tex.(s)
KFMQ	Lincoln, Nebr.
KFMR	Fremont, Cal.
KFMU	Glendale, Calif. (s)
KFMV	Minneapolis, Minn
KFMW	San Bernardino, Calif.
KFMX	San Diego, Calif.(s)
KFMY	Eugene, Oreg.(s)
KFNB	Oklahoma City, Okla.
KFNE	Big Springs, Tex.
KFNW-FM	Fargo, N.D.
KFOG	San Francisco, Calif.
KFOX-FM	Los Angeles, Cal.
KFRC-FM	San Francisco, Calif.
KFRE-FM	Fresno, Calif.
KFRN-FM	Brownwood, Tex.
KFUO-FM	Clayton, Mo.
KFWT-FM	Ft. Worth, Tex.
KFYR-FM	Bismarck, N.D.
KGAF-FM	Gainesville, Tex.
KGB-FM	San Diego, Calif.
KGBC-FM	Galveston, Tex.
KGBI-FM	Omaha, Neb.
KGBN-FM	Caldwell, Idaho
KGEE-FM	Bakersfield, Cal. (s)
KGEN-FM	Tulare, Cal.
KGFM	Edmonds, Wash.
KGHO-FM	Hoquiam, Wash.
KGLA	Los Angeles, Calif.
KGME-FM	Centralia, Wash.
KGMI-FM	Bellingham, Wash.
KGMR-FM	Jacksonville, Ark.
KGNC-FM	Amarillo, Tex.
KGNO-FM	Dodge City, Kan.
KGO-FM	San Francisco, Calif.
KGPO	Grants Pass, Oreg.
KGRD-FM	Las Cruces, N.M.
KGRI-FM	Henderson, Tex.
KGUD-FM	Santa Barbara, Calif.
KGUS	Hot Springs, Ark.
KGVM	Idaho Falls, Ida.
KGVW-FM	Belgrade, Mont.
KHAK-FM	Cedar Rapids, Iowa(s)
KHAR-FM	Anchorage, Alaska
KHBL	Plainview, Tex.
KHBR-FM	Hillsboro, Tex.
KHCB-FM	Houston, Tex.
KHEP-FM	Phoenix, Ariz.
KHFI-FM	Austin, Tex.
KHFM	Albuquerque, N.Mex.(s)
KHIQ	Sacramento, Calif.(s)
KHJ-FM	Los Angeles, Calif.
KHMS	El Paso, Tex.
KHOB-FM	Hobbs, N. M.
KHOF	Los Angeles, Calif.
KHOZ-FM	Harrison, Ark.
KHPC	Brownwood, Tex.
KHQ-FM	Spokane, Wash.
KHSC	Arcata, Calif.
KHSJ-FM	Hemet, Cal.
KHUL	Houston, Tex.
KHVH-FM	Honolulu, Hawaii
KHVR	Bijou, Calif.
KHYI	Fremont, Calif.
KIBS-FM	Bishop, Cal.
KICD-FM	Spencer, Ia.
KICS-FM	Hastings, Neb.
KICN	Omaha, Nebr.
KID-FM	Idaho Falls, Ida.
KIEM	Eureka, Calif.
KIFG-FM	Iowa Falls, Ia.
KIFM	Bakersfield, Cal.
KIHI	Tulsa, Okla.
KIKS-FM	Lake Charles, La.
KIMN-FM	Denver, Colo.
KIMP-FM	Mt. Pleasant, Tex.
KING-FM	Seattle, Wash.
KIOO	Oklahoma, Okla.
KIRO-FM	Seattle, Wash.
KISA	Kansas City, Mo.
KISS	San Antonio, Tex.
KISW	Seattle, Wash.(s)
KITE-FM	San Antonio, Tex.
KITH	Phoenix, Ariz.
KITT	San Diego, Calif.
KITY	San Antonio, Tex. (s)
KIXI-FM	Seattle, Wash.
KIXL-FM	Dallas, Tex.(s)
KJAN-FM	Atlantic, Ia.
KJAZ	Alameda, Calif.
KJCK-FM	Junction City, Kan.
KJEF-FM	Jennings, La.
KJEM-FM	Okla. City, Okla.
KJET-FM	Beaumont, Tex.
KJLH	Long Beach, Cal.
KJLM	San Diego, Calif.
KJML	Sacramento, Calif.
KJOY-FM	Burlington, Vt.
KJPO	Fresno, Calif.
KJRG-FM	Newton, Kans. (s)
KJSB	Houston, Tex.
KJSK-FM	Columbus, Neb.
KKFM	Colorado Springs, Colo.
KKHI-FM	San Francisco, Cal.
KKIT-FM	Taos, N. M.
KKOP	Redondo Beach, Cal.
KLAK-FM	Lakewood, Colo.
KLAW	Lawton, Okla.
KLAY-FM	Tacoma, Wash.
KLBK-FM	Lubbock, Tex.
KLBS-FM	Los Banos, Cal.
KLCN-FM	Blytheville, Ark.
KLEA-FM	Lovington, N. M.
KLEF	Houston, Tex. (s)
KLEN-FM	Killeen, Tex.
KLGS	Los Gatos, Cal.
KLFM	Beverly Hills, Calif.
KLIL	Akiah, Cal.
KLIR-FM	Denver, Colo.
KLIZ-FM	Brainerd, Minn.
KLJT	Lake Jackson, Tex.
KLMO-FM	Longmont, Colo.
KLOA-FM	Ridgecrest, Calif.
KLOM-FM	Lompoc, Cal.
KLON	Long Beach, Calif.
KLOR-FM	Ponca City, Okla.
KLOV-FM	Loveland, Colo.
KLPW-FM	Union, Mo.
KLRO	San Diego, Calif.(s)
KLSN	Seattle, Wash.(s)
KLUB-FM	Salt Lake City, Utah
KLUE-FM	Longview, Tex.
KLUR	Wichita Falls, Tex.
KLVI-FM	Beaumont, Tex.
KLVL	Pasadena, Tex.
KLWN-FM	Lawrence, Kan.
KLYD-FM	Bakersfield, Calif.
KLYN-FM	Lynden, Wash.
KLYX	Memphis, Tenn.
KLZ-FM	Denver, Colo.
KMAG-FM	Ft. Smith, Ark.
KMAK-FM	Fresno, Calif.
KMAP	Dallas, Tex.
KMAX	Sierra Madre, Calif.
KMBR	Kansas City, Mo.
KMBY-FM	Monterey, Cal.
KMCP	Portland, Oreg.
KMEO	Phoenix, Ariz. (s)
KMER	Fresno, Calif.
KMET	Los Angeles, Cal.
KMFM	San Antonio, Tex. (s)
KMHT	Marshall, Tex.
KMJ-FM	Fresno, Calif.
KMLB-FM	Monroe, La.(s)
KMMK	Little Rock, Ark.
KMND-FM	Mesa, Ariz.
KMOD-FM	Midland, Tex.
KMOR-FM	Morehead, Ky.
KMOX-FM	St. Louis, Mo.
KMPX	San Francisco. Calif.(s)
KMSC	Clear Lake City, Tex.
KMSM	Rolla, Mo.
KMSU	Mankato, Minn.
KMUL-FM	Muleshoe, Tex.
KMUW	Wichita, Kans.
KMYC-FM	Marysville, Calif.
KMYO-FM	Little Rock, Ark.
KMUZ	Santa Barbara, Calif.(s)
KNBQ	Bethany, Okla.
KNBR-FM	San Francisco, Calif.
KNBU	Baldwin, Kan.
KNDR	Chickasha, Okla.
KNDX	Yakima, Wash.
KNEA-FM	Jonesboro, Ark.
KNEB-FM	Scottsbluff, Nebr.
KNED-FM	McAlester, Okla.
KNER	Dallas, Tex.
KNEV	Reno, Nev. (s)
KNEW-FM	Scottsbluff, Nebr.
KNFB	Nowata, Okla.
KNFM	Midland, Tex.
KNHS	Torrance, Cal.
KNIK-FM	Anchorage, Alaska
KNIX-FM	Phoenix, Ariz. (s)
KNJO	Thousand Oaks, Calif.
KNOB	Long Beach, Calif. (s)
KNOC-FM	Natchitoches, La.
KNOE-FM	Monroe, La.
KNOF	St. Paul, Minn.
KNOK-FM	Ft. Worth, Tex.
KNRO-FM	Conroe, Tex.
KNTO	Wichita Falls, Tex.(s)
KNUS	Dallas, Tex.
KNWA	Fayetteville, Ark.
KNWS-FM	Waterloo, Iowa
KNX-FM	Los Angeles, Calif.
KNXR	Rochester, Minn.
KOA-FM	Denver, Colo.
KOAP-FM	Portland, Ore.
KOAT-FM	Albuquerque, N.M.
KOB-FM	Albuquerque, N.M.
KOBH-FM	Hot Springs, S.D.
KOCM	Newport Beach, Cal.
KOCV	Odessa, Tex.
KOCW	Tulsa, Okla.(s)
KOCY-FM	Oklahoma City, Okla.
KODA-FM	Houston, Tex.
KOFM	Oklahoma City, Okla.
KOFO-FM	Ottawa, Kan.
KOGM-FM	Tulsa, Okla
KOGO	San Diego, Calif.
KOIN-FM	Portland, Oreg.
KOKH	Oklahoma City, Okla.
KOL-FM	Seattle, Wash.
KONG-FM	Visalia, Calif.
KOOL-FM	Phoenix, Ariz.
KOPR-FM	Great Falls, Mont.
KORA-FM	Bryan, Tex.
KORK	Las Vegas, Nev.
KORU	Tulsa, Okla.
KOSE-FM	Osceola, Ark.
KOSI-FM	Denver, Colo.
KOSO	Turlock, Cal.
KOST	Dallas, Tex.
KOSU-FM	Stillwater, Okla.(s)
KOSY-FM	Texarkana, Tex.
KOTN-FM	Pine Bluff, Ark.
KOWH-FM	Omaha, Neb.
KOWN-FM	Escondido, Cal.
KOYA	Ontario, Cal.
KOYL-FM	Odessa, Tex.
KOZE-FM	Lewiston, Idaho
KPAC-FM	Port Arthur, Tex.
KPAN-FM	Hereford, Tex.
KPAT-FM	Berkeley, Calif.
KPCS	Pasadena, Calif.
KPDQ-FM	Portland, Ore.
KPEL-FM	Lafayette, La.
KPEN	San Francisco, Cal.(s)
KPET-FM	Lamesa, Tex.
KPFA	Berkeley, Calif.
KPFB	Berkeley, Calif.
KPFK	Los Angeles, Calif.
KPIK-FM	Colorado Springs, Colo.
KPLC-FM	Lake Charles, La.
KPLT-FM	Paris, Tex.
KPLX	San Jose, Cal.
KPFM	Portland, Oreg.(s)
KPGM	Los Altos, Calif.
KPLR-FM	St. Louis, Mo.
KPMT	Oxnard, Cal.
KPOI-FM	Honolulu, Hawaii (s)
KPOJ-FM	Portland, Oreg.
KPOL-FM	Los Angeles, Calif.
KPPC-FM	Pasadena, Calif.
KPPS-FM	Parsons, Kans.
KPRI	San Diego, Calif.
KPRN	Seattle, Wash.
KPRS-FM	Kansas City, Mo.
KPSD	Dallas, Tex.
KQAL-FM	Omaha, Nebr.(s)
KQFM	Portland, Oreg.
KQIP	Odessa, Tex.
KQRS-FM	Golden Valley, Minn.
KQTY	Wichita, Kan.
KQUE	Houston, Tex. (s)
KQV-FM	Pittsburgh, Pa.
KQXX	McAllen, Tex.
KRAB	Seattle, Wash.
KRAK-FM	Stockton, Calif.
KRAM-FM	Las Vegas, Nev.
KRAV	Tulsa, Okla.(s)
KRBE	Houston, Tex.(s)
KRCC	Colorado Springs, Colo.
KRCS	San Bernardino, Cal.
KRCW	Santa Barbara, Calif.
KRDO-FM	Colorado Springs, Colo.
KREB	Monroe, La.
KREM-FM	Spokane, Wash.
KREP	Santa Clara, Cal.
KRES	Moberly, Mo.
KREX-FM	Grand Junction, Colo.
KRFM	Phoenix, Ariz.
KRHM	Los Angeles, Calif.
KRIL	El Dorado, Ark.(s)
KRIT	Clarion, Iowa
KRKD-FM	Los Angeles, Calif.
KRKH-FM	Lubbock, Tex.
KRKY	Denver, Colo.
KRLD-FM	Dallas, Tex.
KRMD-FM	Shreveport, La.
KRMG-FM	Tulsa, Okla.
KRML-FM	Carmel, Cal.
KRMS-FM	Osage Beach, Mo.
KRNL-FM	Mt. Vernon, Ia.
KRNW	Boulder, Colo.
KRNY-FM	Kearney-Holdrege, Nebraska
KROC-FM	Rochester, Minn.
KRON-FM	San Francisco, Calif.
KROS-FM	Clinton, Iowa
KROW	Santa Barbara, Calif.
KROY-FM	Sacramento, Calif.
KRPM	San Jose, Calif.
KRRC	San Jose, Calif.
KRSA-FM	Salinas, Cal.
KRSI	Minneapolis, Minn.(s)
KRSI-FM	St. Louis Park, Minn.
KRSL-FM	Russell, Kan.
KRSN-FM	Los Alamos, N.Mex.
KRST	Albuquerque, N. M.
KRUS-FM	Ruston, La.
KRVM	Eugene, Oreg.
KRVN-FM	Lexington, Nebr.
KRWG	University Park, N. M.
KRVS-FM	Lafayette, La.
KRYT-FM	Colorado Springs, Colo.
KSAM-FM	Huntsville, Tex.
KSBY-FM	San Luis Obispo, Cal.
KSCO	Santa Cruz, Calif.
KSBW-FM	Salinas, Calif.
KSDA	La Sierra, Calif.
KSDB-FM	Manhattan, Kans.
KSDO-FM	San Diego. Cal.
KSDS	San Diego, Calif.
KSEA	San Diego, Calif.
KSEL-FM	Lubbock, Tex.
KSEO-FM	Durant, Okla.
KSFM	Dallas, Tex.(s)
KSFR	San Francisco, Calif.(s)
KSFV	San Fernando, Calif.
KSFX	San Francisco, Calif.
KSGV	West Covina, Cal.
KSHE	Crestwood, Mo.
KSHS	Colorado Springs, Colo.
KSIB-FM	Creston, Ia.
KSIS-FM	Sedalia, Mo. (s)
KSJO-FM	San Jose, Calif.(s)
KSJS	San Jose, Calif.
KSJT	San Angelo, Tex.
KSL-FM	Salt Lake City, Utah(s)
KSLA	Seattle, Wash.(s)
KSLH	St. Louis, Mo.
KSLO-FM	Opelousas, La.
KSMA-FM	Santa Maria, Calif.
KSMB	Lafayette, La.
KSNM	Santa Fe, N. M.
KSOM	Tucson, Ariz.
KSOP-FM	Salt Lake City, Utah
KSOZ	Point Lookout, Mo.
KSPC	Claremont, Calif.
KSPI-FM	Stillwater, Okla.
KSPL-FM	Diboll, Tex.
KSRF	Santa Monica, Calif.
KSRN	Reno, Nev.
KSTE	Emporia, Kans.
KSTL-FM	St. Louis, Mo.
KSTN-FM	Stockton, Calif.
KSTP-FM	St. Paul, Minn.
KSUI	Iowa City, Iowa
KSYN	Joplin, Mo.(s)
KTAC-FM	Tacoma, Wash.
KTAL	Texarkana, Tex.
KTAP	Tucson, Ariz.
KTAR-FM	Phoenix, Ariz.
KTBC-FM	Austin, Tex.(s)
KTBT	Garden Grove, Cal.
KTCF	Cedar Falls, Iowa
KTCS-FM	Ft. Smith, Ark.
KTCU-FM	Ft. Worth, Tex.
KTEA-FM	Midwest City, Okla.
KTEC	Oretech, Oreg.
KTFC	Sioux City, Ia.
KTGM	Denver, Colo.
KTHO-FM	Tahoe Valley, Cal.
KTIB-FM	Thibodaux, La.
KTIM	San Rafael, Calif.
KTIS-FM	Minneapolis, Minn.
KTJO-FM	Ottawa, Kans.
KTLQ-FM	Tahlequah, Okla.
KTMS-FM	Santa Barbara, Cal.
KTNM-FM	Tucumcari, N.M.
KTNT-FM	Tacoma, Wash.
KTOD-FM	Sinton, Tex.(s)
KTOP	Topeka, Kan.
KTOY	Tacoma, Wash.
KTQM-FM	Clovis, N. M.
KTRB-FM	Modesto, Calif.
KTRH-FM	Houston, Tex.
KTRM-FM	Beaumont, Tex.
KTSM-FM	El Paso, Tex.
KTSR	Kansas City, Mo.
KTTS-FM	Springfield, Mo.
KTUX	Hayward, Cal.
KTW-FM	Seattle, Wash.
KTWD	Spokane, Wash.
KTWN	Anoka, Minn.
KTXJ-FM	Jasper, Tex.
KTXN-FM	Victoria, Tex.
KTWR	Tacoma, Wash.
KTXR-FM	Springfield, Mo.(s)
KTXT-FM	Lubbock, Tex.
KTYM-FM	Inglewood, Calif.
KUAC	College, Alaska
KUAM-FM	Agana, Guam
KUCR	Riverside, Cal.
KUID	Moscow, Ida.
KUDE-FM	Oceanside, Calif.
KUDU-FM	Ventura-Oxnard, Calif.
KUER	Salt Lake City, Utah
KUFM	Missoula, Mont.
KUFY	Redwood City, Calif.
KUGN-FM	Eugene, Oreg.
KUHF	Houston, Tex.
KUKI-FM	Ukiah, Cal.
KUMD-FM	Duluth, Minn.
KUNF	La Canada, Cal.
KUOA-FM	Siloam Springs, Ark.
KUOH	Honolulu, Hawaii
KUOP	Stockton, Cal.(s)
KUOR-FM	Redlands, Cal.
KUOW	Seattle, Wash.
KUPD-FM	Tempe, Ariz.
KUPK-FM	Garden City, Kan.
KURL-FM	Billings, Mont.
KUSC	Los Angeles, Calif.
KUSN-FM	St. Joseph, Mo.
KUSU-FM	Logan, Utah

WHITE'S RADIO LOG

C.L.	Location
KUT-FM	Austin, Tex.
KUTE	Glendale, Calif.
KUWS-FM	Newton, Ia.
KVCR	San Bernardino, Calif.
KVEG-FM	Las Vegas, Nev.
KVEN-FM	Ventura, Calif.
KVFM	San Fernando, Calif.
KVII-FM	Amarillo, Tex.
KVIL-FM	Highland Park-Dallas, Tex.
KVOA-FM	Tucson, Ariz.
KVOE-FM	Emporia, Kan.
KVOF-FM	El Paso, Tex.
KVOK	Honolulu, Hawaii
KVOP-FM	Plainview, Tex.
KVOR-FM	Colorado Springs, Colo.
KVOX-FM	Moorhead, Minn.
KVSC	Logan, Utah
KVTT	Dallas, Tex.
KVWM	Show Low, Ariz.
KWAR	Waverly, Iowa
KWAX	Eugene, Oreg.
KWBE-FM	Beatrice, Neb.
KWBU	Waco, Tex.
KWCR-FM	Ogden, Utah
KWDM	Des Moines, Ia. (s)
KWFM	Minneapolis, Minn.(s)
KWG-FM	Stockton, Calif.
KWGN-FM	Abernathy, Tex.
KWGO-FM	Abernathy, Tex.
KWGS	Tulsa, Okla.
KWHG	Lincoln, Neb.
KWHI-FM	Brenham, Tex.
KWHO-FM	Salt Lake City, Utah
KWHP	Edmond, Okla.
KWIP-FM	Merced, Cal.
KWIX	St. Louis, Mo.
KWIZ-FM	Santa Ana, Calif.
KWJB-FM	Globe, Ariz.
KWKC-FM	Abilene, Tex.
KWKH-FM	Shreveport, La.
KWLM-FM	Willmar, Minn.
KWLW	San Angelo, Tex.
KWMF-FM	Walnut Creek, Cal.
KWMO	Odessa, Tex.
KWMT-FM	Ft. Dodge, Ia.
KWNS-FM	Pratt, Kan.
KWNT-FM	Davenport, Ia.
KWOA-FM	Worthington, Minn.
KWOC-FM	Poplar Bluff, Mo.
KWPC-FM	Muscatine, Iowa
KWPM-FM	West Plains, Mo.
KWWC-FM	Columbia, Mo.
KXEL-FM	Waterloo, Iowa(s)
KXFM	Santa Maria, Cal.
KXIC-FM	Iowa City, Ia.
KXIT-FM	Dalhart, Tex.
KXJK-FM	Forrest City, Ark.
KXKX	San Francisco, Calif.
KXL-FM	Portland, Ore.
KXLU	Los Angeles, Calif.
KXLY-FM	Spokane, Wash.
KXOA	Sacramento, Calif.
KXOL-FM	Ft. Worth, Tex. (s)
KXQR	Fresno, Calif.(s)
KXRQ	Sacramento, Calif.
KXTR	Kansas City, Mo.(s)
KXXI	Alamogordo, N. M.
KXYZ-FM	Houston, Tex. (s)
KYA-FM	San Francisco, Calif.
KYEW	Phoenix, Ariz.
KYFM	Oklahoma City, Okla.
KYLE-FM	Temple, Tex.
KYMS	Santa Ana, Cal.
KYSM-FM	Mankato, Minn.
KYW-FM	Cleveland, Ohio
KZAK-FM	Tyler, Tex.
KZAM	Seattle, Wash.(s)
KZFM	Corpus Christi, Tex.
KZOM	Oklahoma City, Okla.
KZSU	Stanford, Cal.
KZUN-FM	Opportunity, Wash.
KZYM-FM	Cape Girardeau, Mo.
WAAA-FM	Winston-Salem, N.C.
WAAB-FM	Worcester, Mass.
WAAM-FM	Parkersburg, W.Va.
WAAZ-FM	Crestview, Fla.
WABA-FM	Aguadilla, P.R.
WABC-FM	New York, N.Y.
WABE	Atlanta, Ga.
WABF-FM	Fairhope, Ala.
WABI-FM	Bangor, Maine
WABQ	Cleveland, Ohio
WABX-FM	Detroit, Mich. (s)
WABZ-FM	Albemarle, N.C.
WACO	Waco, Tex.
WACT-FM	Tuscaloosa, Ala.
WACY-FM	Moss Point, Miss.
WAEB-FM	Cincinnati, Ohio
WAEF-FM	Cincinnati, O.
WAER	Syracuse, N.Y.
WAEZ	Miami Beach, Fla.(s)
WAGR-FM	Lumberton, N.C.
WAGY-FM	Forest City, N. C.
WAHR	Huntsville, Ala. (s)
WAIC	San Juan, P.R.
WAIR-FM	Winston-Salem, N.C.
WAIV	Indianapolis, Ind.
WAJC	Indianapolis, Ind.
WAJM	Montgomery, Ala.(s)
WAJP	Joliet, Ill.
WAJR-FM	Morgantown, W.Va.
WAKN-FM	Aiken, S.C.
WAKO-FM	Lawrenceville, Ill.
WAKR-FM	Akron, Ohio
WAKW-FM	Cincinnati, Ohio
WALK-FM	Patchogue, N.Y.
WALL-FM	Middletown, N. Y.
WAMC	Albany, N.Y.
WAMF	Amherst, Mass.
WAMO-FM	Pittsburgh, Pa.
WAMU-FM	Washington, D.C.
WANG	Goldwater, Mich.
WANY-FM	Albany, Ky.
WAOV-FM	Vincennes, Ind.
WAPC-FM	Riverhead, N.Y.(s)
WAFI-FM	Birmingham, Ala.
WAPL-FM	Appleton, Wis.
WAPS	Akron, Ohio
WAQB-FM	Atlantic Beach, Fla.
WAQE-FM	Towson, Md.(s)
WARC	Meadville, Pa.
WARD-FM	Johnstown, Pa.
WARK	Little Rock, Ark. (s)
WARN-FM	Fort Pierce, Fla.
WARU-FM	Peru, Ind.
WASA-FM	Havre De Grace, Md.
WASH	Washington, D.C.(s)
WASK-FM	Lafayette, Ind.
WATH-FM	Athens, O.
WATM-FM	Atmore, Ala.
WATO-FM	Oak Ridge, Tenn.
WATR-FM	Waterbury, Conn.
WATZ-FM	Alpena, Mich.
WAUG-FM	Augusta, Ga.
WAUK-FM	Waukesha, Wis.
WAUP	Akron, Ohio
WAVA-FM	Arlington, Va.
WAVO-FM	Decatur, Ga.
WAVU-FM	Albertville, Ala.
WAVY-FM	Portsmouth, Va.
WAWA-FM	Milwaukee, Wis.
WAWK-FM	Kendallville, Ind.
WAWR-FM	Bowling Green, O.
WAWZ-FM	Zarephath, N.J.
WAXO	Kenosha, Wis.
WAYL	Minneapolis-St. Paul, Minn.
WAYZ-FM	Waynesboro, Pa.
WAZL-FM	Hazelton, Pa.
WAZY-FM	Lafayette, Ind.
WBAA-FM	W. Lafayette, Ind.
WBAB-FM	Babylon, N.Y.
WBAI	New York, N.Y.
WBAL-FM	Baltimore, Md.
WBAP-FM	Ft. Worth, Tex.(s)
WBAW-FM	Barnwell, S.C.
WBAY	Green Bay, Wis.(s)
WBBB-FM	Burlington, N.C.(s)
WBBF-FM	Rochester, N.Y.
WBBM-FM	Chicago, Ill.
WBBO-FM	Forest City, N.C.
WBBQ-FM	Augusta, Ga.
WBBR-FM	E. St. Louis, Ill.
WBBW-FM	Youngstown, Ohio (s)
WBCA-FM	Bay Minette, Ala.
WBCB-FM	Levittown-Fairless Hills, Pa.
WBCI-FM	Williamsburg, Va.
WBCL-FM	South Beloit, Ill.
WBCM-FM	Bay City, Mich.
WBCN	Boston, Mass.(s)
WBCO-FM	Bucyrus, O.
WBCR-FM	Beloit, Wis.
WBDG	Indianapolis, Ind.
WBEL-FM	S. Beloit, Ill.
WBEN-FM	Buffalo, N.Y.
WBET-FM	Brockton, Mass.
WBEU-FM	Beaufort, S.C.(s)
WBEX-FM	Chillicothe, Ohio
WBEZ	Chicago, Ill.
WBFG	Detroit, Mich.
WBFM	Seneca, S. C.
WBFO	Buffalo, N.Y.
WBGM-FM	Tallahassee, Fla.
WBGO	Newark, N.J.
WBGU	Bowling Green, Ohio
WBHS	Warwick, R.I.
WBHT-FM	Brownsville, Tenn.
WBIE-FM	Marietta, Ga.
WBIR	Knoxville, Tenn.
WBIV	Wethersfield, N.Y.
WBJC	Baltimore, Md.
WBKV-FM	West Bend, Wis.(s)
WBKW	Beckley, W.Va.
WBKY	Lexington, Ky.
WBLK-FM	Buffalo, N.Y.
WBLR-FM	Batesburg, S.C.
WBLY-FM	Springfield, Ohio
WBMI	Meridan, Conn.(s)
WBNE-FM	Fitchburg, Mass.
WBNT-FM	Oneida, Tenn.
WBMP	Elwood, Ind. *
WBMR	Telford, Pa.
WBNO-FM	Bryan, Ohio
WBNS-FM	Columbus, Ohio
WBNY-FM	Buffalo, N.Y.
WBOC-FM	Salisbury, Md.
WBOE	Cleveland, Ohio
WBON	Milwaukee, Wis.
WBOR	Brunswick, Maine
WBOS-FM	Brookline, Mass.
WBOW-FM	Terre Haute, Ind.
WBPZ-FM	Lock Haven, Pa.
WBRB-FM	Mt. Clemens, Mich.
WBRC	Birmingham, Ala.
WBRD-FM	Bradenton, Fla. (s)
WBRE-FM	Wilkes-Barre, Pa.
WBRK-FM	Pittsfield, Mass.
WBRN-FM	Big Rapids, Mich.
WBRU	Providence, R.I.
WBSM-FM	New Bedford, Mass.
WBST	Muncie, Ind.
WBT-FM	Charlotte, N.C.(s)
WBTC-FM	Houston, Mo.
WBUD-FM	Trenton, N.J.(s)
WBUF	Buffalo, N.Y.
WBUR	Boston, Mass.
WBUT-FM	Butler, Pa.
WBUY-FM	Lexington, N.C.
WBVA	Woodbridge, Va.
WBVP-FM	Beaver Falls, Pa.
WBWC	Berea, Ohio
WBYM	Bayamon, P.R.
WBYO	Boyertown, Pa.(s)
WBZ-FM	Boston, Mass.
WCAC	Anderson, S.C.
WCAO-FM	Baltimore, Md.
WCAR-FM	Detroit, Mich.
WCAS	Knoxville, Tenn.
WCAU-FM	Philadelphia, Pa.
WCBC	Catonsville, Md.
WCBE	Columbus, Ohio
WCBL-FM	Benton, Ky.
WCBM-FM	Baltimore, Md.
WCBS-FM	New York, N.Y.
WCBW	Columbia, Ill.
WCBY-FM	Cheboygan, Mich.
WCCC-FM	Hartford, Conn.
WCCM-FM	Lawrence, Mass.
WCCN-FM	Neillsville, Wis.
WCCV-FM	Charlottesville, Va.
WCED-FM	Dubois, Pa.
WCEF-FM	Parkersburg, W. Va.
WCEN-FM	Mt. Pleasant, Mich.(s)
WCER-FM	Charlotte, Mich.
WCFM	Williamstown, Mass.
WCHA-FM	Chambersburg, Pa.(s)
WCHD	Detroit, Mich.
WCHK-FM	Canton, Ga.
WCHN-FM	Norwich, N.Y.
WCHS-FM	Charlestown, W.Va.
WCHO-FM	Washington Court House, O.
WCJM	W. Point, Ga.
WCKW	La Place, La.
WCLE-FM	Cleveland, Tenn.
WCLI-FM	Corning, N.Y.
WCLM	Chicago, Ill.
WCLO-FM	Janesville, Wis.
WCLT-FM	Newark, Ohio
WCLV	Cleveland, O.(s)
WCLW-FM	Mansfield, Ohio
WCMC-FM	Wildwood, N.J.
WCMB-FM	Harrisburg, Pa.
WCME-FM	Brunswick, Maine
WCMF-FM	Rochester, N.Y.(s)
WCMI-FM	Ashland, Ky.
WCMN-FM	Arecibo, P.R.
WCMO	Marietta, Ohio
WCMS-FM	Norfolk, Va.
WCMU-FM	Mt. Pleasant, Mich.
WCNB-FM	Connersville, Ind.
WCNH-FM	Quincy, Fla.
WCNO	Canton, Ohio(s)
WCNT-FM	Centralia, Ill.
WCNW-FM	Fairfield, O.
WCOA-FM	Pensacola, Fla.
WCOD	Richmond, Va.
WCOH-FM	Newnan, Ga.
WCOL-FM	Columbus, Ohio
WCOM-FM	Urbana, O.
WCON-FM	Cornelia, Ga.
WCOP-FM	Boston, Mass.
WCOS-FM	Columbia, S.C.
WCOU-FM	Lewiston, Maine
WCOW-FM	Sparta, Wis.
WCPO-FM	Cincinnati, Ohio
WCPS-FM	Tarbor, N.C.
WCRA-FM	Effingham, Ill.
WCRB-FM	Waltham, Mass.(s)
WCRD	Bluffton, Ind.
WCRF	Cleveland, O.
WCRQ	Providence, R. I.
WCRS-FM	Greenwood, S. C.
WCRT-FM	Birmingham, Ala.
WCSC-FM	Charleston, S.C.
WCSI-FM	Columbus, Ind.(s)
WCSM-FM	Celina, O.
WCSQ	Central Square, N.Y.
WCST-FM	Berkeley Springs, W. Va.
WCSU-FM	Wilberforce, O.
WCTC-FM	New Brunswick, N.J.
WCTM	Eaton, Ohio
WCTS-FM	Minneapolis, Minn.
WCTW-FM	New Castle, Ind.
WCUE-FM	Akron, O.
WCUF	Akron, Ohio
WCUM-FM	Cumberland, Md.
WCUY-FM	Cleveland Hts., Ohio
WCWC-FM	Ripon, Wis.
WCWM	Williamsburg, Va.
WCWP	Brookville, N. Y.
WDAC	Lancaster, Pa.
WDAE-FM	Tampa, Fla.
WDAF-FM	Kansas City, Mo.
WDAO	Dayton, Ohio
WDAR-FM	Darlington, S.C.
WDAS-FM	Philadelphia, Pa.
WDAY-FM	Fargo, N. D.
WDBJ-FM	Roanoke, Va.
WDBL-FM	Springfield, Tenn.
WDBN	Barberton, O.
WDBO-FM	Orlando, Fla.
WDBQ-FM	Dubuque, Iowa
WDCX	Buffalo, N.Y.(s)
WDDE	Hamden, Conn.
WDDS-FM	Syracuse, N.Y.
WDEA-FM	Ellsworth, Me.
WDEB	Jamestown, Tenn.
WDEC-FM	Americus, Ga. (s)
WDEE	Hamden, Conn.
WDEF-FM	Chattanooga, Tenn.
WDEL-FM	Wilmington, Del.
WDET-FM	Detroit, Mich.
WDFM	State College, Pa.
WDHA-FM	Dover, N.J.
WDHF	Chicago, Ill.
WDJK	Atlanta, Ga.
WDJR	Oil City, Pa.
WDKD-FM	Kingstree, S.C.
WDKN-FM	Dickson, Tenn.
WDLB-FM	Marshfield, Wis.
WDLP-FM	Panama City, Fla.
WDMB-FM	Statesville, N.C.
WDMJ-FM	Marquette, Mich.
WDMS-FM	Lynchburg, Va.
WDNC-FM	Durham, N.C.
WDOC-FM	Prestonsburg, Ky.
WDOD-FM	Chattanooga, Tenn.
WDOK-FM	Cleveland, Ohio
WDOL-FM	Athens, Ga.
WDOM	Providence, R.I.
WDOR-FM	Sturgeon Bay, Wis.
WDOV-FM	Dover, Del.
WDRC-FM	Hartford, Conn.
WDRK-FM	Greenville, Ohio
WDRM	Decatur, Ala.
WDRN	Norwalk, Conn.
WDSC-FM	Dillon, S.C.
WDSU-FM	New Orleans, La.
WDTM	Detroit, Mich.(s)
WDTR	Detroit, Mich.
WDUB	Granville, Ohio
WDUN-FM	Gainesville, Ga.(s)
WDUQ	Pittsburgh, Pa.
WDUX-FM	Aberdeen, Wash.
WDUZ-FM	Green Bay, Wis.
WDVR	Philadelphia, Pa.
WDWS-FM	Champaign, Ill.
WDXE-FM	Lawrenceburg, Tenn.
WDXL-FM	Lexington, Tenn.
WEAF-FM	Philadelphia, Pa.
WEAS-FM	Savannah, Ga.
WEAU-FM	Eau Claire, Wis.
WEAV-FM	Plattsburgh, N.Y.
WEAW-FM	Evanston, Ill.
WEBH	Chicago, Ill.
WEBQ-FM	Harrisburg, Ill.
WEBR-FM	Buffalo, N.Y.
WECI	Richmond, Ind.
WECW	Elmira, N.Y.
WEDA-FM	Grove City, Pa.
WEDR-FM	Miami, Fla.
WEEC	Springfield, Ohio
WEED-FM	Rocky Mount, N.C.
WEEF-FM	Highland Park, Ill.
WEEI-FM	Boston, Mass.
WEEP-FM	Pittsburgh, Pa.
WEER-FM	Warrenton, Va.
WEEX-FM	Easton, Pa.
WEFA	Waukegan, Ill.
WEFM	Chicago, Ill.
WEGO-FM	Concord, N.C.
WEHH-FM	Elmira, N. Y.
WEIC-FM	Charleston, Ill.
WEIV	Ithaca, N.Y.
WEKZ-FM	Monroe, Wis.
WELD-FM	Tupelo, Miss.
WELF	Glen Ellyn, Ill.
WELG	Elgin, Ill.
WELL-FM	Freeport, Ill.
WELP-FM	Easley, S. C.
WEMC	Harrisonburg, Va.
WEMI	Tampa, Fla.
WEMP-FM	Milwaukee, Wis.
WEMU	Ypsilanti, Mich.
WEND-FM	Ebensburg, Pa.
WENY-FM	Elmira, N. Y.
WEOK-FM	Poughkeepsie, N.Y.
WEOL-FM	Elyria, Ohio
WEPM-FM	Martinsburg, W.Va.
WEPS	Elgin, Ill.
WEQR	Goldsboro, N.C.
WERE-FM	Cleveland, Ohio
WERI-FM	Westerly, R.I.
WERM	Wapakoneta, Ohio
WERS	Boston, Mass.
WERT-FM	Van Wert, Ohio

C.L.	Location
WESC-FM	Greenville, S.C.
WEST-FM	Easton, Pa.
WETL	South Bend, Ind.
WETN	Wheaton, Ill.
WEVC	Evansville, Ind
WEVD-FM	New York, N.Y.
WEWO-FM	Laurinburg, N.C.
WEZY-FM	Cocoa, Fla.
WFAA-FM	Dallas, Tex.
WFAH-FM	Alliance, Ohio
WFAN	Washington, D.C.
WFAS-FM	White Plains, N.Y.
WFAU-FM	Augusta, Maine
WFAW	Fort Atkinson, Wis.
WFBC-FM	Greenville, S.C.
WFBE	Flint, Mich.
WFBG-FM	Altoona, Pa.
WFBM-FM	Indianapolis, Ind.
WFBS-FM	Winston-Salem, N.C.
WFCI	Franklin, Ind.
WFCJ	Miamisburg, Ohio
WFCR	Amherst, Mass.
WFDR-FM	Manchester, Ga.
WFDS-FM	Baltimore, Md.
WFFM	Muskegon, Mich.
WFHA-FM	Red Bank, N.J.
WFHR-FM	Wisconsin Rapids, Wis.
WFID	Rio Piedras, P.R.(s)
WFIG	Sumter, S.C.
WFIL-FM	Philadelphia, Pa.
WFIN-FM	Findlay, Ohio(s)
WFIU	Bloomington, Ind.
WFIW-FM	Fairfield, Ill.
WFIZ	Conneault, O.
WFKO	Kokomo, Ind.
WFLA-FM	Tampa, Fla.
WFLM	Ft. Lauderdale, Fla.
WFLN-FM	Philadelphia, Pa.
WFLO	Farmville, Va.
WFLT-FM	Franklin, Tenn.
WFLW-FM	Monticello, Ky.
WFLY	Troy, N.Y.
WFMA	Rocky Mount, N.C.
WFMB	Springfield, Ill.
WFMD-FM	Frederick, Md.
WFME	Newark, N.J.
WFMF	Chicago, Ill.
WFMG	Gallatin, Tenn.
WFMH-FM	Cullman, Ala.
WFMI	Montgomery, Ala.
WFMK	Mt. Horeb, Wis.
WFML	Washington, Ind.
WFMM-FM	Baltimore, Md.
WFMS	Indianapolis, Ind.
WFMT	Chicago, Ill.(s)
WFMU	East Orange, N.J.
WFMW-FM	Madisonville, Ky.
WFMX	Statesville, N.C.
WFMZ	Allentown, Pa.
WFNC-FM	Fayetteville, N.C.
WFNS-FM	Burlington, N.C.
WFNY	Racine, Wis.
WFOB-FM	Fostoria, Ohio
WFOL	Hamilton, Ohio(s)
WFOS	South Norfolk, Va.
WFOY-FM	St. Augustine, Fla.
WFPG	Atlantic City, N.J.
WFPK	Louisville, Ky.
WFPL	Louisville, Ky.
WFQM	San Juan, P.R.
WFRB-FM	Frostburg, Md.
WFRE-FM	Fresno, Cal.
WFRL-FM	Freeport, Ill.
WFRO-FM	Fremont, Ohio
WFSC-FM	Franklin, N. C.
WFST-FM	Caribou, Maine
WFSU-FM	Tallahassee, Fla.
WFTL-FM	Ft. Lauderdale, Fla.
WFTM-FM	Maysville, Ky.
WFTW-FM	Ft. Walton Beach, Fla.
WFUL-FM	Fulton, Ky.
WFUR-FM	Grand Rapids, Mich.
WFUV	New York, N.Y.
WFVA-FM	Fredericksburg, Va.
WFYC-FM	Alma, Mich.
WGAL-FM	Lancaster, Pa.
WGAN-FM	Portland, Me.
WGAR-FM	Cleveland, Ohio
WGAU-FM	Athens, Ga.(s)
WGAY	Washington, D.C.
WGBE-FM	Columbus, Ga.
WGBH-FM	Cambridge, Mass.(s)
WGBI-FM	Scranton, Pa.
WGBS-FM	Miami, Fla.
WGCB-FM	Red Lion, Pa. (s)
WGCS	Goshen, Ind.
WGEE-FM	Indianapolis, Ind.
WGEM-FM	Quincy, Ill.(s)
WGET-FM	Gettysburg, Pa.
WGEV	Beaver Falls, Pa.
WGFM	Schenectady, N.Y. (s)
WGGC	Glasgow, Ky.
WGGM	Taylorville, Ill.
WGH-FM	Newport News, Va.
WGHF	Brookfield, Conn.(s)
WGHQ-FM	Kingston, N.Y.
WGIG-FM	Brunswick, Ga.
WGIR-FM	Manchester, N. H.
WGKA-FM	Atlanta, Ga.
WGLB-FM	Port Washington, Wis.
WGLC-FM	Mendota, Ill.
WGLM	Richmond, Ind.
WGLS-FM	Glassboro, N. J.
WGLT	Normal, Ill.
WGMR-FM	Tyrone, Pa.
WGMS-FM	Washington, D.C.
WGMZ	Flint, Mich.(s)
WGNB	St. Petersburg, Fla.
WGNC-FM	Gastonia, N.C.
WGNU-FM	Madison, Ill.
WGOS	Miami Beach, Fla.
WGOV-FM	Valdosta, Ga.
WGPA-FM	Bethlehem, Pa. (from Ga.)
WGPC-FM	Albany, Ga. (s)
WGPM	Detroit, Mich.
WGPR	Detroit, Mich.(s)
WGPS	Greensboro, N.C.
WGR-FM	Buffalo, N.Y.
WGRE	Greencastle, Ind.
WGRN	Greenville, Ill.
WGRP-FM	Greenville, Pa.
WGSM-FM	Babylon, N.Y.
WGSU	Genesco, N.Y.
WGTB-FM	Washington, D.C.
WGTS-FM	Takoma Park, Md.
WGUC	Cincinnati, Ohio
WGVE	Gary, Ind.
WGWR-FM	Asheboro, N.C.
WGYA	Interlochen, Mich.
WHA-FM	Madison, Wis.
WHAD	Delafield, Wis.
WHAG-FM	Halfway, Md. (s)
WHAI-FM	Greenfield, Mass.
WHAS-FM	Louisville, Ky.
WHAT-FM	Philadelphia, Pa. (s)
WHAV-FM	Haverhill, Mass.
WHBB-FM	Selma, Ala.
WHBC-FM	Canton, Ohio
WHBF-FM	Rock Island, Ill.(s)
WHBI	Newark, N.J.
WHBM-FM	Xenia, Ohio
WHCI	Hartford City, Ind.
WHCL-FM	Clinton, N.Y.
WHCN	Hartford, Conn.
WHCU-FM	Ithaca, N.Y.
WHDH-FM	Boston, Mass.
WHDL-FM	Allegheny, N.Y.
WHEB-FM	Portsmouth, N.H.
WHEN-FM	Syracuse, N.Y.
WHFB-FM	Benton Harbor, Mich.
WHFH	Flossmoor, Ill.
WHFI	Birmingham, Mich.
WHFM	Rochester, N.Y.
WHFS	Bethesda, Md.(s)
WHGM	Bellwood, Pa.
WHHI	Highland, Wis.
WHHS	Havertown, Pa.
WHHY-FM	Montgomery, Ala.
WHIL-FM	Medford, Mass.
WHIM-FM	Providence, R.I.
WHIO-FM	Dayton, Ohio
WHIY-FM	Mt. Dora, Fla.
WHIZ-FM	Zanesville, Ohio
WHK-FM	Cleveland, Ohio
WHKP-FM	Hendersonville, N.C.
WHKW	Chilton, Wis.
WHKY-FM	Hickory, N. C. (s)
WHLA	Holmen, Wis.
WHLD-FM	Niagara Falls, N. Y.
WHLF-FM	South Boston, Va.
WHLI-FM	Hempstead, N.Y.
WHLM-FM	Bloomsburg, Pa.
WHLS-FM	Port Huron, Mich.
WHLT-FM	Huntington, Ind.
WHMA-FM	Anniston, Ala.
WHMD	Marinette, Wis.
WHME	South Bend, Ind.
WHMP-FM	Northampton, Mass.
WHNC-FM	Henderson, N.C.
WHNR	McMinnville, Tenn.
WHO-FM	Des Moines, Iowa
WHOD-FM	Jackson, Ala.
WHOH	Hamilton, Ohio
WHOK-FM	Lancaster, Ohio
WHOM-FM	New York, N.Y.
WHOO-FM	Orlando, Fla.(s)
WHOP-FM	Hopkinsville, Ky.
WHOV	Hampton, Va.
WHP-FM	Harrisburg, Pa.
WHPE-FM	High Point, N.C.
WHPH	Hanover, N.J.
WHPL-FM	Winchester, Va.
WHPR	Highland Park, Mich.
WHPS	High Point, N.C.
WHRB-FM	Cambridge, Mass.
WHRL	Albany, N.Y.
WHRM	Wausau, Wis.
WHRW	Binghamton, N.Y.
WHSA	Highland Twp., Wis.
WHSB	Alpena, Mich.
WHSL-FM	Wilmington, N.C.
WHSR-FM	Winchester, Mass.
WHSY-FM	Hattiesburg, Miss.
WHTC-FM	Holland, Mich.
WHTG-FM	Eatontown, N.J.
WHUB-FM	Cookeville, Tenn.
WHUS	Storrs, Conn.
WHWC	Colfax, Wis.
WHYL-FM	Carlisle, Pa.
WHYN-FM	Springfield, Mass.
WIAC-FM	San Juan, P. R. (s)
WIAL	Eau Claire, Wis.
WIAM-FM	Williamston, N.C.
WIAN	Indianapolis, Ind.
WIBA-FM	Madison, Wis.
WIBC-FM	Indianapolis, Ind.
WIBF-FM	Jenkintown, Pa.
WIBG-FM	Philadelphia, Pa.
WIBM-FM	Jackson, Mich.
WIBW-FM	Topeka, Kan.
WICB	Ithaca, N.Y.
WICR	Indianapolis, Ind.
WIFI	Philadelphia, Pa. (s)
WIFN	Franklin, Ind.
WIKY-FM	Evansville, Ind.
WIL-FM	St. Louis, Mo.
WILE-FM	Cambridge, O.
WILL-FM	Urbana, Ill.
WILO-FM	Frankfort, Ind.
WILS-FM	Lansing, Mich.
WIMA-FM	Lima, Ohio
WINA-FM	Charlottesville, Va.
WINE-FM	Kenmore, N.Y.
WINK-FM	Ft. Myers, Fla.
WINZ-FM	Miami, Fla.
WIOD-FM	Miami, Fla.
WIPR-FM	San Juan, P.R.
WIRA-FM	Ft. Pierce, Fla.
WIRC-FM	Hickory, N. C. (s)
WIRJ-FM	Humboldt, Tenn.
WISA-FM	Isahela, P.R.
WIRQ	Rochester, N.Y.
WISH-FM	Indianapolis, Ind.(s)
WISM-FM	Madison, Wis.(s)
WISN-FM	Milwaukee, Wis.
WIST-FM	Charlotte, N.C.
WISU	Terre Haute, Ind.
WISZ-FM	Glen Burnie, Md.
WITA-FM	San Juan, P.R.
WITH-FM	Baltimore, Md.
WITN-FM	Washington, N. C.
WITZ-FM	Jasper, Ind.
WIUS	Christiansted, V.I.
WIVI-FM	Cristiansted, St. Croix, V.I.
WIVK-FM	Knoxville, Tenn.
WIVY-FM	Jacksonville, Fla.
WIXN-FM	Dixon, Ill.
WIZR-FM	Johnstown, N.Y.
WIZZ-FM	Streator, Ill.
WJAC-FM	Johnstown, Pa.
WJAS-FM	Pittsburgh, Pa.
WJAX-FM	Jacksonville, Fla.
WJAZ	Albany, Ga.
WJBC-FM	Bloomington, Ill.
WJBI	Cincinnati, Ohio
WJBK-FM	Detroit, Mich.
WJBL-FM	Holland, Mich.
WJBO-FM	Baton Rouge, La.
WJBR	Wilmington, Del.
WJCD-FM	Seymour, Ind.
WJCW-FM	Johnson City, Tenn.
WJDX-FM	Jackson, Miss.
WJEF-FM	Grand Rpds., Mich.(s)
WJEH-FM	Gallipolis, Ohio
WJEJ-FM	Hagerstown, Md.
WJET-FM	Erie, Pa.
WJGS	Houghton, Mich.
WJHL-FM	Johnson City, Tenn.
WJIG-FM	Tullahoma, Tenn.(s)
WJIM-FM	Lansing, Mich.
WJIV	Cherry Valley, N.Y.
WJIZ	Albany, Ga.
WJJD-FM	Chicago, Ill.
WJLK-FM	Asbury Park, N.J.
WJLN	Birmingham, Ala.
WJMC-FM	Rice Lake, Wis.
WJMD	Bethesda, Md.(s)
WJMK	Plainfield, Ind.
WJML	Petoskey, Mich.
WJMX-FM	Florence, S.C.
WJNC-FM	Jacksonville, N. C.
WJOF	Athens, Ala.
WJOI-FM	Florence, Ala.
WJOL-FM	Joliet, Ill.
WJOY-FM	Burlington, Vt.
WJPA-FM	Washington, Pa.
WJR-FM	Detroit, Mich.
WJRH	Easton, Pa.
WJRS-FM	Jamestown, Ky.
WJSI	Peoria, Ill.
WJSM	Martinsburg, Pa.
WJTN-FM	Jamestown, N.Y.
WJVA-FM	South Bend, Ind.
WJW-FM	Cleveland, Ohio
WJZZ	Bridgeport, Conn.
WKAI-FM	MaComb, Ill.
WKAK	Kankakee, Ill.
WKAQ-FM	San Juan, P.R.
WKAR-FM	E. Lansing, Mich.
WKAT-FM	Jacksonville-Atlantic Beach, Fla.
WKAY-FM	Glasgow, Ky.
WKAZ-FM	Charleston, W.Va.
WKBC-FM	N. Wilkesboro, N.C.
WKBI-FM	San Antonio, Tex.
WKBJ-FM	Milan, Tenn.
WKBL-FM	Covington, Tenn.
WKBN-FM	Youngstown, Ohio
WKBR-FM	Manchester, N.H.
WKBV-FM	Richmond, Ind.
WKCQ	Berlin, N.H.
WKCR-FM	New York, N.Y.
WKCS	Knoxville, Tenn.
WKDN-FM	Camden, N.J.
WKEE-FM	Huntington, W.Va.
WKEI-FM	Kewanee, Ill.
WKET-FM	Kettering, Ohio(s)
WKEU-FM	Griffin, Ga.
WKEY-FM	Covington, Va.
WKFM	Chicago, Ill.(s)
WKFR-FM	Battle Creek, Mich.
WKHM-FM	Jackson, Mich.
WKIC-FM	Hazard, Ky.
WKIP-FM	Poughkeepsie, N.Y.
WKIS-FM	Orlando, Fla.
WKIX-FM	Raleigh, N.C.
WKIZ-FM	Key West, Fla.
WKJB-FM	Mayaguez, P. R.
WKJF	Pittsburgh, Pa.(s)
WKJG-FM	Ft. Wayne, Ind.
WKKD-FM	Aurora, Ill.
WKKY-FM	Erlanger, Ky.
WKLC-FM	St. Albans, W.Va.
WKLF-FM	Clanton, Ala.
WKLS	Marietta, Ga.
WKLW-FM	Grand Rapids, Mich.
WKMH-FM	Dearborn, Mich.
WKMO	Kokomo, Ind.
WKNA	Charleston, W.Va.(s)
WKNC-FM	Raleigh, N.C.
WKNE-FM	Keene, N.H.
WKNT-FM	Kent, O.
WKOD-FM	Hyannis, Mass.
WKOF	Hopkinsville, Ky.
WKOK-FM	Sunbury, Pa.
WKOP-FM	Binghamton, N.Y.
WKOX-FM	Framingham, Mass.
WKOZ-FM	Kosciusko, Miss.
WKPT-FM	Kingsport, Tenn.(s)
WKRC-FM	Cincinnati, Ohio (s)
WKRG-FM	Mobile, Ala.
WKRT-FM	Cortland, N.Y.
WKSN-FM	Jamestown, N. Y.
WKSU-FM	Kent, Ohio
WKTA	McKenzie, Tenn.
WKTL	Struthers, O.
WKTM	N. Charleston, S.C.
WKTM-FM	Mayfield, Ky.(s)
WKTN-FM	Kenton, O.
WKTZ-FM	Jacksonville, Fla.(s)
WKUB	Manitowoc, Wis.
WKUZ	Wabash, Ind.
WKWK-FM	Wheeling, W.Va.
WKXI	Smyrna, Ga.
WKYX-FM	Paducah, Ky.
WLAC-FM	Nashville, Tenn.
WLAD-FM	Danbury, Conn.
WLAE	Hartford, Conn.
WLAG-FM	LaGrange, Ga.
WLAN-FM	Lancaster, Pa.
WLAP-FM	Lexington, Ky.
WLAT-FM	Conway, S.C.
WLAV-FM	Grand Rapids, Mich.
WLAY-FM	Muscle Shoals, Ala.
WLBB-FM	Carrollton, Ga.
WLBG-FM	Laurens-Clinton, S.C.
WLBH-FM	Mattoon, Ill.
WLBJ-FM	Bowling Green, Ky.
WLBK-FM	DeKalb, Ill.
WLBR-FM	Lebanon, Pa.
WLCM-FM	Lancaster, S.C.
WLDM	Oak Park, Mich.(s)
WLDR-FM	Traverse City, Mich.
WLDS-FM	Jacksonville, Ill.
WLEC-FM	Sandusky, Ohio
WLEN	Adrian, Mich.
WLEO-FM	Ponce, P. R.
WLET-FM	Toccoa, Ga.
WLEX-FM	Lexington, Ky.
WLFM	Appleton, Wis.
WLGN-FM	Logan, O.
WLIB-FM	New York, N.Y.
WLIN	Detroit, Mich.
WLIP-FM	Kenosha, Wis.
WLIR	Hicksville, N.Y.(s)
WLIV-FM	Livingston, Tenn.
WLJC	Beattyville, Ky.
WLJM	Gadsden, Ala.
WLKR-FM	Norwalk, Ohio
WLLH-FM	Lowell, Mass.
WLMC	Okeechobee, Fla.
WLNA-FM	Peekskill, N.Y.
WLNH-FM	Laconia, N.H.
WLNO	London, Ohio
WLNR-FM	Lansing, Ill.
WLOA-FM	Braddock, Pa.(s)
WLOB-FM	Portland, Maine
WLOC-FM	Munfordville, Ky.
WLOE-FM	Leaksville, N.C.
WLOI-FM	La Porte, Ind.
WLOL-FM	Minneapolis, Minn.
WLOM	Chattanooga, Tenn.
WLOQ	Winter Park, Fla.
WLOS-FM	Asheville, N.C.
WLOV	Cranston, R.I.
WLOW-FM	Aiken, S.C.
WLPO-FM	La Salle, Ill.
WLPR	Mobile, Ala. (s)
WLRS	Louisville, Ky.
WLRJ	Roanoke, Va.
WLRW	Champaign, Ill.
WLS-FM	Chicago, Ill.
WLSM-FM	Louisville, Miss.
WLTA-FM	Atlanta, Ga.(s)
WLUV-FM	Loves Park, Ill.(s)
WLVL	Louisville, Ky.
WLVP	Franklin, N. J.
WLWM	Nashville, Tenn.
WLYC-FM	Williamsport, Pa.

WHITE'S

RADIO LOG

C.L.	Location
WLYM-FM	Lynn, Mass.
WMAI-FM	Panama City, Fla.
WMAJ-FM	State College, Pa.
WMAL-FM	Washington, D.C.
WMAQ-FM	Chicago, Ill.(s)
WMAS-FM	Springfield, Mass.
WMAZ-FM	Macon, Ga.
WMBD-FM	Peoria, Ill.
WMBI-FM	Chicago, Ill.
WMBN-FM	Petoskey, Mich.
WMBO-FM	Auburn, N.Y.
WMC-FM	Memphis, Tenn.
WMCB-FM	Michigan City, Ind.
WMCF	Stuart, Fla. (s)
WMCO	New Concord, Ohio
WMDD-FM	Fajardo, P. R.
WMDE	Greensboro, N.C.(s)
WMEB-FM	Orono, Maine
WMEN-FM	Tallahassee, Fla.
WMER	Celina, Ohio
WMEV-FM	Marion, Va.
WMFC-FM	Monroeville, Ala.
WMFJ-FM	Daytona Beach, Fla.
WMFM	Madison, Wis.
WMFP	Ft. Lauderdale, Fla.
WMFR-FM	High Point, N.C.
WMGM	Atlantic City, N.J.
WMGW-FM	Meadville, Pa.
WMHC	South Hadley, Mass.
WMHE	Toledo, Ohio
WMHS	Morrison, Ill.
WMIL-FM	Milwaukee, Wis.
WMIT	Black Mountain, N.C.
WMIV	S. Bristol, N.Y.
WMIX-FM	Mt. Vernon, Ill.
WMJR	Ft. Lauderdale, Fla.
WMKC	Oshkosh, Wis.
WMKY-FM	Morehead, Ky.
WMLS-FM	Sylacauga, Ala.
WMLW	Milwaukee, Wis.
WMMB-FM	Melbourne, Fla.
WMMM	Westport, Conn.
WMMR	Philadelphia, Pa.
WMNA-FM	Gretna, Va.
WMNB-FM	North Adams, Mass.
WMNI-FM	Columbus, Ohio
WMOA-FM	Marietta, O.
WMOP-FM	Ocala, Fla.
WMOR-FM	Morehead, Ky.
WMOU-FM	Berlin, N.H.
WMPL-FM	Hancock, Mich.
WMPS-FM	Memphis, Tenn.
WMRF-FM	Lewistown, Pa.
WMRI-FM	Marion, Ind.
WMRN-FM	Marion, Ohio
WMRO-FM	Aurora, Ill.
WMRY	E. St. Louis, Ill.
WMRP-FM	Flint, Mich.
WMSH-FM	Elizabethtown, Pa.
WMSK-FM	Morganfield, Ky.
WMSP	Harrisburg, Pa.
WMSR-FM	Manchester, Tenn.
WMT-FM	Cedar Rapids, Iowa (s)
WMTH	Park Ridge, Ill.
WMTI	Norfolk, Va.
WMTM-FM	Moultrie, Ga.
WMTN-FM	Morristown, Tex.(s)
WMTS-FM	Murfreesboro, Tenn.
WMTW-FM	Mt. Washington, N.H.
WMUA	Amherst, Mass.
WMUB	Oxford, Ohio
WMUH	Allentown, Pa.
WMUK	Kalamazoo, Mich.
WMUL	Huntington, W.Va.
WMUN	Muncie, Ind.
WMUU-FM	Greenville, S.C.(s)
WMUZ	Detroit, Mich.
WMVA-FM	Martinsville, Va.(s)
WMVB-FM	Millville, N.J.
WMVG-FM	Milledgeville, Ga.
WMVO-FM	Mount Vernon, Ohio
WMVR-FM	Sidney, Ohio
WMYB-FM	Myrtle Beach, Fla.
WMYR-FM	Ft. Myers, Fla.
WNAD-FM	Norman, Okla.
WNAM-FM	Neenah-Menasha, Wis.
WNAS	New Albany, Ind.
WNAT-FM	Natchez, Miss.
WNAU-FM	New Albany, Miss.
WNAV-FM	Annapolis, Md
WNBC-FM	New York, N.Y.
WNBD-FM	Daytona Beach, Fla.
WNBF-FM	Binghamton, N.Y.
WNBH-FM	New Bedford, Mass.
WNBX	Andalusia, Ala.
WNCN	New York, N.Y.
WNCO-FM	Ashland, Ohio
WNCT-FM	Greenville, N.C.
WNDA	Huntsville, Ala.(s)
WNDU-FM	South Bend, Ind.
WNDY	Crawfordsville, Ind.
WNEM-FM	Bay City, Mich.(s)
WNES-FM	Central City, Ky.
WNEW-FM	New York, N.Y.
WNEX-FM	Macon, Ga.
WNFM	Naples, Fla.
WNFO	Nashville, Tenn.
WNGO-FM	Mayfield, Ky.
WNHC-FM	New Haven, Conn.
WNIB	Chicago, Ill.
WNIC	DeKalb, Ill.
WNIK-FM	Arecibo, P. R.
WNNJ-FM	Newton, N.J.
WNNR-FM	New Orleans, La.
WNOB	Cleveland, Ohio (s)
WNOF	St. Paul, Minn.
WNOK-FM	High Point, N.C.
WNOR-FM	Norfolk, Va.
WNOS-FM	High Point, N.C.
WNOW-FM	York, Pa.
WNRE	Circleville, Ohio
WNRG-FM	Grundy, Va.
WNSL-FM	Laurel, Miss.
WNTH	Winnetka, Ill.
WNTI	Hackettstown, N.J.
WNTL	Memphis, Tenn.
WNUJ-FM	New Ulm, Minn.
WNUR	Evanston, Ill.
WNUS-FM	Chicago, Ill. (s)
WNWC-FM	Arlington Hts., Ill.
WNXT-FM	Portsmouth, O.
WNYC-FM	New York, N.Y.
WNYE	New York, N.Y.
WNYR-FM	Rochester, N.Y.
WOAK	Royal Oak, Mich.
WOAP-FM	Owosso, Mich.
WOAY-FM	Oak Hill, W.Va.
WOBN	Westerville, Ohio
WOBT-FM	Rhinelander, Wis.
WOC-FM	Davenport, Iowa
WOCB-FM	W. Yarmouth, Mass.
WOCH-FM	North Vernon, Ind.
WODL-FM	Carbondale, Pa.
WOFM	Greeneville, Tenn.
WOHS-FM	Shelby, N.C.
WOI-FM	Ames, Iowa
WOIV	De Ruyter, N.Y.
WOKU-FM	Greensburg, Pa.
WOKZ-FM	Alton, Ill.
WOL-FM	Washington, D.C.
WOLA	San Juan, P.R.
WOLI	Ottawa, Ill.
WOMC	Royal Oak, Mich.(s)
WOMI-FM	Owensboro, Ky.
WOMP-FM	Bellaire, Ohio
WONE-FM	Dayton, O.
WONO-FM	Syracuse, N. Y. (s)
WOOD-FM	Grand Rapids, Mich.
WOOF-FM	Dothan, Ala. (s)
WOPA-FM	Oak Park, Ill.
WOPI-FM	Bristol, Tenn.
WOR-FM	New York, N.Y.
WORA-FM	Mayaguez, P.R.
WORM-FM	Savannah, Tenn.
WORO	Corozal, P.R.
WORX-FM	Madison, Ind.
WOSC-FM	Fulton, N.Y.
WOSE	Oswego, N. Y.
WOSH-FM	Oshkosh, Wis.
WOSU-FM	Columbus, Ohio
WOTW-FM	Nashua, N.H.
WOUB-FM	Athens, Ohio
WOW-FM	Omaha, Nebr.
WOXR	Oxford, Ohio
WOYE-FM	Mayaguez, P. R.
WPAA	Andover, Mass.
WPAB-FM	Ponce, P. R.
WPAC-FM	Patchogue, N.Y.(s)
WPAD-FM	Paducah, Ky.
WPAT-FM	Paterson, N. J. (s)
WPAY-FM	Portsmouth, Ohio(s)
WPBA-FM	Palm Beach, Fla.
WPBC-FM	Richfield, Minn. (s)
WPBF	W. Palm Beach, Fla.
WPBS	Philadelphia, Pa.
WPBS	Philadelphia, Pa. (s)
WPEL-FM	Montrose, Pa.
WPEN-FM	Philadelphia, Pa.
WPEX-FM	Pensacola, Fla.(s)
WPFB-FM	Middletown, Ohio (s)
WPFK	Los Angeles, Cal.
WPFR	Terre Haute, Ind.
WPGA-FM	Perry, Ga.
WPGC	Bradbury Hts., Md.
WPGF-FM	Burgaw, N.C.
WPGI	Pittsburgh, Pa.
WPGU	Urbana, Ill.
WPHD	Norfolk, Va.
WPHS	Warren, Mich.
WPIC-FM	Sharon, Pa.
WPIN-FM	St. Petersburg, Fla.
WPIT-FM	Pittsburgh, Pa.
WPIX-FM	New York, N. Y.
WPJB-FM	Providence, R.I.
WPJC-FM	Scottsboro, Ala.
WPKE-FM	Pikeville, Ky.
WPKM	Tampa, Fla.
WPLB	Greenville, Mich.
WPLM-FM	Plymouth, Mass.
WPLN	Nashville, Tenn.
WPLO-FM	Atlanta, Ga.
WPMP-FM	Pascagoula, Miss.
WPOR-FM	Portland, Me.
WPPA-FM	Pottsville, Pa.
WPRB	Princeton, N.J.
WPRK	Winter Park, Fla.
WPRM	San Juan, P.R.
WPRO-FM	Providence, R.I.
WPRS-FM	Paris, Ill.
WPRW-FM	Manassas, Va.
WPSR	Evansville, Ind.
WPTF-FM	Raleigh, N.C.
WPTH	Fort Wayne, Ind. (s)
WPTN-FM	Cookeville, Tenn.
WPTW-FM	Piqua, Ohio
WPWT	Philadelphia, Pa.
WQAL	Philadelphia, Pa.(s)
WQDC-FM	Midland, Mich.(s)
WQFM	Milwaukee, Wis.
WQIK-FM	Jacksonville, Fla.
WQMF	Babylon, N.Y.(s)
WQMG	Greensboro, N.C.
WQMS	Hamilton, Ohio
WQMV	Vicksburg, Miss.
WQRB-FM	Pittsfield, Mass.
WQRS-FM	Detroit, Mich.
WQST	Forest, Miss.
WQXI-FM	Atlanta, Ga.
WQXR-FM	New York, N.Y.
WQXY-FM	Baton Rouge, La.
WRAD-FM	Radford, Va.
WRAJ-FM	Anna, Ill.
WRAK-FM	Williamsport, Pa.
WRAL-FM	Raleigh, N.C.
WRAY-FM	Princeton, Ind.
WRBL-FM	Columbus, Ga.
WRBS	Baltimore, Md.
WRC-FM	Washington, D.C.
WRCO-FM	Richland Center, Wis.
WRCP-FM	Philadelphia, Pa.
WREC-FM	Memphis, Tenn.
WRED	Youngstown, Ohio
WREK	Woodstock, Ill.
WREO-FM	Ashtabula, Ohio
WRFD-FM	Worthington-Columbus, Ohio
WRFK	Richmond, Va.
WRFL	Winchester, Va.
WRFM	New York, N.Y.
WRFS-FM	Alexander City, Ala.
WRFY-FM	Reading, Pa.
WRGA-FM	Rome, Ga.
WRHS	Park Forest, Ill.
WRIG-FM	Wausau, Wis.
WRIP-FM	Rossville, Ga.
WRIT-FM	Milwaukee, Wis.
WRIU	Kingston, R. I.
WRIW	Mackinaw City, Mich.
WRJN-FM	Racine, Wis.
WRJR	Lewiston, Maine
WRKB-FM	Kannapolis, N.C.
WRKO-FM	Boston, Mass.
WRKT-FM	Cocoa Beach, Fla.(s)
WRLB	Long Branch, N.J.(s)
WRLC	Palmyre, Pa.
WRLD-FM	Lanett, Ala.
WRLM	Tounton, Mass.
WRMI-FM	Morris, Ill.
WRMN-FM	Elgin, Ill.
WRNJ	Atlantic City, N.J.
WRNL-FM	Richmond, Va.
WRNW	Mount Kisco, N.Y.
WROA-FM	Gulfport, Miss.
WROC-FM	Rochester, N.Y.
WROK-FM	Rockford, Ill.
WROM-FM	Rome, Ga.
WROW-FM	Albany, N.Y.
WROY-FM	Carmi, Ill.
WRPI	Troy, N.Y.
WRPM-FM	Poplarville, Miss.
WRPN-FM	Ripon, Wis.
WRR-FM	Dallas, Tex. (s)
WRRH	Franklin Lakes, N.J.
WRRN	Warren, Pa.
WRRZ-FM	Clinton, N.C.
WRSA	Decatur, Ala.
WRSC-FM	State College, Pa.
WRSJ-FM	Bayamon, P.R.
WRSV	Skokie, Ill.
WRSE-FM	Elmhurst, Ill.
WRSJ-FM	Bayamon, P. R.
WRST-FM	Oshkosh, Wis.
WRSW-FM	Warsaw, Ind.
WRTC-FM	Hartford, Conn.
WRTI-FM	Philadelphia, Pa.
WRUF-FM	Gainesville, Fla.
WRUN-FM	Utica, N.Y.
WRUR-FM	Rochester, N.Y.
WRUS-FM	Russellville, Ky.
WRUV	Burlington, Vt.
WRVA-FM	Richmond, Va.
WRVB-FM	Madison, Wis.
WRVC	Norfolk, Va.
WRVG	Georgetown, Ky.
WRVP	New York, N.Y.
WRWR	Port Clinton, Ohio(s)
WRXO-FM	Roxboro, N.C.
WSAB	Mt. Carmel, Ill.
WSAC-FM	Ft. Knox, Ky.
WSAE	Spring Arbor, Mich.
WSAL-FM	Logansport, Ind.
WSAM-FM	Saginaw, Mich.
WSAU-FM	Wausau, Wis.
WSB-FM	Atlanta, Ga.(s)
WSBA-FM	York, Pa.
WSBC-FM	Chicago, Ill.(s)
WSBF-FM	Clemson, S.C.
WSBT-FM	South Bend, Ind.
WSCB	Springfield, Mass.
WSCI-FM	Platteville, Wis.
WSCT-FM	Berkeley Springs, W.V.
WSDM	Chicago, Ill.
WSEB	Sebring, Fla.
WSEI	Olney, Ill.
WSEL-FM	Pontotoc, Miss.
WSEO-FM	Kalamazoo, Mich.
WSEV-FM	Sieverville, Tenn. (s)
WSFC-FM	Somerset, Ky.
WSFM	Birmingham, Ala.(s)
WSHS	Floral Park, N.Y.
WSHU	Fairneld, Conn.
WSID-FM	Baltimore, Md.
WSIM-FM	Salem, Ind.
WSIP-FM	Paintsville, Ky.
WSIU	Carbondale, Ill.
WSIV-FM	Pekin, Ill.
WSIX-FM	Nashville, Tenn.(s)
WSJG	Hallandale, Fla.
WSJS-FM	Winston-Salem, N.C.
WSKS	Wabash, Ind.
WSLI-FM	Jackson, Miss.
WSLN	Delaware, Ohio
WSLS-FM	Roanoke, Va.
WSLU	Canton, N.Y.
WSMC-FM	Collegedale, Tenn.
WSMD-FM	Waldorf, Md.
WSMI-FM	Litchfield, Ill.
WSMJ	Greenfield, Ind.
WSMT-FM	Sparta, Tenn.
WSNJ-FM	Bridgeton, N.J.
WSOC-FM	Charlotte, N.C.
WSOM-FM	Salem, Ohio
WSON-FM	Henderson, Ky.
WSOU	S. Orange, N.J.
WSOY-FM	Decatur, Ill.
WSPA-FM	Spartanburg, S.C.(s)
WSPB-FM	Sarasota, Fla.
WSPD-FM	Toledo, Ohio
WSPE	Springville, N.Y.
WSPT-FM	Stevens Point, Wis.
WSRC-FM	Durham, N. C.
WSRS	Worchester, Mass.
WSRW-FM	Hillsboro, Ohio
WSSU	Superior, Wis.
WSSV-FM	Petersburg, Va.
WSTC-FM	Stamford, Conn.
WSTM	St. Mathews, Ky.
WSTO	Owensboro, Ky. (s)
WSTP-FM	Salisbury, N.C.
WSTR-FM	Sturgis, Mich.
WSTU-FM	Stuart, Fla.
WSTV-FM	Steubenville, Ohio
WSUP	Platteville, Wis.
WSUW	Whitewater, Wis.
WSVA-FM	Harrisonburg, Va.
WSVB	Tamaqua, Pa.
WSVL-FM	Shelbyville, Ind.
WSVS-FM	Crewe, Va.
WSWG	Greenwood, Miss.
WSWM	East Lansing, Mich.(s)
WSWN-FM	Belle Glade, Fla.
WSWW-FM	Platteville, Wis.
WSYR-FM	Syracuse, N.Y.(s)
WTAB-FM	Tabor City, N. C.
WTAD-FM	Quincy, Ill.
WTAE-FM	Pittsburgh, Pa.
WTAP-FM	Parkersburg, W. Va.
WTAR	Norfolk, Va.(s)
WTAS	Crete, Ill.
WTAW-FM	College Station, Tex.
WTAX-FM	Springfield, Ill. (s)
WTAY-FM	Robinson, Ill.
WTBC-FM	Tuscaloosa, Ala.
WTBO-FM	Cumberland, Md.
WTBS	Cambridge, Mass.
WTCA-FM	Plymouth, Ind.
WTCH-FM	Shawano, Wis.
WTCM-FM	Traverse City, Mich.
WTCO-FM	Campellsville, Ky.
WTCW-FM	Whitesburg, Ky.
WTCX	St. Petersburg, Fla.(s)
WTDS	Toledo, Ohio
WTFM	Lake Success, N.Y.(s)
WTGI	Hammond, La.
WTGN	Lima, O.
WTHI-FM	Terre Haute, Ind.
WTHS	Miami, Fla.
WTIC-FM	Hartford, Conn.(s)
WTIO	Charleston, W. Va.
WTJS-FM	Jackson, Tenn.
WTJU	Charlottesville, Va.
WTLN-FM	Maitland, Fla.
WTMA-FM	Charleston, S.C.
WTMB-FM	Tomah, Wis.
WTMJ-FM	Milwaukee, Wis.(s)
WTNC-FM	Thomasville, N.C.
WTOA	Trenton, N.J.
WTOC-FM	Savannah, Ga.
WTOD-FM	Toledo, Ohio
WTOF	Canton, Ohio
WTOL-FM	Toledo, Ohio
WTOP-FM	Washington, D.C.
WTOS	Wauwatosa, Wis.
WTOT-FM	Marianna, Fla.
WTPA-FM	Harrisburg, Pa.

C.L.	Location
WTRC-FM	Elkhart, Ind.
WTRE-FM	Greensburg, Ind.
WTRF-FM	Wheeling, W.Va.
WTRW-FM	Two Rivers, Wis.
WTSB-FM	Lumberton, N.C.
WTES-FM	Buffalo, N.Y.
WTSR	Trenton, N.J.
WTSV-FM	Claremont, N.H.
WTTC-FM	Towanda, Pa.
WTTF-FM	Tiffin, Ohio
WTTM-FM	Trenton, N.J.
WTTN-FM	Watertown, Wis.
WTTR-FM	Westminster, Md.
WTTV-FM	Bloomington, Ind.
WTVN-FM	Columbus, Ohio
WTVY-FM	Dotham, Ala.
WUAG	Greensboro, N. C.
WUCB-FM	Chicago, Ill.
WUFM	Utica, N.Y.(s)
WUHY-FM	Philadelphia, Pa.
WULX-FM	Richmond, Ind.
WUNC	Chapel Hill, N.C.
WUNH	Durham, N.H.
WUOA	Tuscaloosa, Ala.
WUOM	Ann Arbor, Mich.
WUOT	Knoxville, Tenn.
WUPY	Lynn, Mass.(s)
WUSC-FM	Columbia, S.C.
WUSF	Tampa, Fla.
WUSO	Springfield, O.
WUST-FM	Bethesda, Md.
WUSV	Scranton, Pa.
WUWM	Milwaukee, Wis.
WVAF-FM	Charleston, W.Va.
WVAM-FM	Altoona, Pa.
WVBC	Bethany, W.Va.
WVBR-FM	Ithaca, N.Y.
WVBU-FM	Lewisbury, Pa.
WVCA-FM	Gloucester, Mass.
WVCG-FM	Coral Gables, Fla.(s)
WVEC-FM	Hampton, Va.
WVEM	Springfield, Ill.
WVFM	Lakeland, Fla.
WVFV	Dundee, Ill.
WVGR-FM	Grand Rapids, Mich.
WVHC	Hempstead, N.Y.
WVHI	Evansville, Ind.
WVIC-FM	E. Lansing, Mich.
WVIP-FM	Mount Kisco, N.Y.
WVIS	Terre Haute, Ind.
WVJS-FM	Owensboro, Ky.
WVKC-FM	Galesburg, Ill.
WVKO-FM	Columbus, Ohio
WVLK-FM	Lexington, Ky.(s)
WVLR	Sauk City, Wis.
WVMC-FM	Mt. Carmel, Ill.
WVMI-FM	Biloxi, Miss.
WVNA-FM	Tuscumbia, Ala.
WVNJ-FM	Newark, N.J.
WVNO-FM	Mansfield, Ohio(s)
WVOR	Rochester, N.Y.
WVOS-FM	Liberty, N.Y.
WVOT-FM	Wilson, N.C.
WVOX-FM	New Rochelle, N.Y.
WVOZ-FM	Carolina, P. R.
WVPO-FM	Stroudsburg, Pa.
WVQM	Huntington, W.Va.
WVSC-FM	Somerset, Pa.
WVSH	Huntington, Ind.
WVST	St. Petersburg, Fla.
WVTS	Terre Haute, Ind.(s)
WVUD-FM	Kettering, Ohio
WVUR-FM	Valparaiso, Ind.
WVVV	Blacksburg, Va.
WVWB-FM	Bridgeton, N.C.
WVWO-FM	Cheyenne, Wyo.
WWBD-FM	Bamberg, S.C.
WWCF	Greenfield, Wis.
WWCO-FM	Waterbury, Conn.
WWDC-FM	Washington, D.C.
WWDL-FM	Scranton, Pa. (s)
WWDL	Scranton, Pa. (s)
WWGP-FM	Sanford, N.C.
WWHC	Hartford City, Ind.
WWHG-FM	Hornell, N.Y.
WWHI	Muncie, Ind.
WWHO	Jackson, Miss.
WWIL-FM	Ft. Lauderdale, Fla.
WWJ-FM	Detroit, Mich.
WWJC-FM	Superior, Wis.
WWKS	Macomb, Ill.
WWLA	La Crosse, Wis.
WWMO	Reidsville, N.C.
WWMT	New Orleans, La.(s)
WWOD-FM	Lynchburg, Va.
WWOG	Boca Raton, Fla.
WWOL-FM	Buffalo, N.Y.
WWOM-FM	New Orleans, La.
WWON-FM	Woonsocket, R.I.
WWOS	Palm Beach, Fla.
WWPB	Miami, Fla.(s)
WWQS	Orlando, Fla.
WWQT	Gainsville, Ga.
WWST-FM	Wooster, Ohio
WWSW-FM	Pittsburgh, Pa.
WWTV-FM	Cadillac, Mich.
WWVA-FM	Wheeling, W.Va.
WWWS	Greenville, N.C.
WWYN-FM	Erie, Pa. (s)
WXAC	Reading, Pa.
WXAX	Elkhart, Ind.
WXBM-FM	Milton, Fla.
WXBR	Cocoa Beach, Fla.
WXEL	Louisville, Ky.
WXEN-FM	Cleveland, Ohio
WXFM	Elmwood Park, Ill.
WXHR-FM	Boston, Mass.
WXKL	Winter Haven, Fla.
WXLI-FM	Dublin, Ga.
WXPN	Philadelphia, Pa.
WXQR-FM	Jacksonville, N. C.
WXRA	Woodbridge, Va.
WXRF-FM	Guayama, P. R.
WXRI	Norfolk, Va.
WXTA	Greencastle, Ind.
WXTC	Annapolis, Md.
WXTO-FM	Grand Rapids, Mich.
WXUR-FM	Media, Pa.
WXYW	Suffolk, Va.
WXYZ-FM	Detroit, Mich.
WYAK	Sarasota, Fla.(s)
WYBC-FM	New Haven, Conn.
WYBG-FM	New Haven, Conn.
WYCS	Yorktown, Va.
WYDD	New Kensington, Pa.
WYCA	Hammond, Ind.
WYCE	Warwick, R.I.
WYCR	York-Hanover, Pa.
WYCS	Yorktown, Va.
WYFE	Lansing, Mich.
WYFI	Norfolk, Va.(s)
WYFM	Charlotte, N.C.
WYFY-FM	Columbia, Tenn.
WYNR-FM	Brunswick, Ga.
WYON	Grand Rapids, Mich.
WYSH-FM	Clinton, Tenn.
WYSL-FM	Buffalo, N.Y.
WYSO	Yellow Springs, Ohio
WYZZ	Wilkes-Barre, Pa.
WZAK	Cleveland, O.
WZEP-FM	DeFuniak, Springs, Fla.
WZFM	Charlestown, W.Va.
WZIP-FM	Cincinnati, Ohio
WZMF	Menomonee Falls, Wis.

Canadian AM Stations By Call Letters

C.L.	Location	kHz
CBA	Sackville, N.B.	1070
CBAF	Moncton, N.B.	1300
CBD	Saint John, N.B.	1110
CBDR	Schefferville, P.Q.	1230
CBE	Windsor, Ont.	1550
CBF	Montréal, Que.	690
CBG	Gander, Nfld.	1450
CBH	Halifax, N.S.	860
CBI	Sydney, N.S.	1140
CBJ	Chicoutimi, Que.	1580
CBK	Regina, Sask.	540
CBL	Toronto, Ont.	740
CBM	Montreal, Que.	940
CBN	St. John's, Nfld.	640
CBO	Ottawa, Ont.	910
CBOF	Ottawa, Ont.	1250
CBR	Calgary, Alta.	1010
CBT	Grand Falls, Nfld.	540
CBU	Vancouver, B.C.	690
CBV	Québec, Que.	980
CBR	Calgary, Alta.	1010
CBW	Winnipeg, Man.	990
CBX	Edmonton, Alta.	740
CBY	Corner Brook, Nfld.	990
CBZ	Fredericton, N.B.	970
CFAB	Windsor, N.S.	1450
CFAC	Calgary, Alta.	960
CFAM	Altona, Man.	1290
CFAR	Flin Flon, Man.	590
CFAX	Victoria, B.C.	1070
CFBC	Saint John, N.B.	930
CFBR	Sudbury, Ont.	550
CFBV	Smithers, B.C.	1230
CFCB	Corner Brook, Nfld,	570
CFCF	Montreal 15, Que,	600
CFCH	Callander, Ont.	600
CFCL	Timmins, Ont.	620
CFCN	Calgary, Alta.	1060
CFCO	Chatham, Ont.	630
CFCP	Courtenay, B.C.	1440
CFCW	Camrose, Alta.	790
CFCY	Charlottetown, P.E.I.	630
CFDA	Victoriaville, Que.	1380
CFDR	Dartmouth, N.S.	790
CFGB	Goose Bay, Nfld.	1340
CFGM	Richmond Hill, Ont.	1310
CFGP	Grande Prairie, Alta.	1050
CFGR	Gravelbourg, Sask.	1230
CFGT	Saint-Joseph-d'Alma, Que.	1270
CFJC	Kamloops, B.C.	910
CFJR	Brockville, Ont.	1450
CFKL	Schefferville, Que.	1230
CFLD	Smithers, B.C. Studio at Station CFBV	1400
CFLM	La Tuque, Que.	1240
CFLV	Valleyfield, Que.	1370
CFMB	Montreal, Que.	1410
CFML	Cornwall, Ont.	1110
CFMR	Fort Simpson, N.W.T.	1490
CFNB	Fredericton, N.B.	550
CFNS	Saskatoon, Sask.	1170
CFOB	Fort Frances, Ont.	800
CFOM	Quebec, Que.	1340
CFOR	Orillia, Ont.	1570
CFOS	Owen Sound, Ont,	560
CFOX	Pointe Claire, Que.	1470
CFPA	Port Arthur, Ont.	1230
CFPL	London, Ont.	980
CFPR	Prince Rupert, B.C.	860
CFQC	Saskatoon, Sask.	600
CFRA	Ottawa, Ont.	580
CFRB	Toronto, Ont.	1010
CFRC	Kingston, Ont.	1490
CFRG	Gravelbourg, Sask.	710
CFRN	Edmonton, Alta.	1260
CFRS	Simcoe, Ont.	1560
CFRY	Portage la Prairie, Man.	920
CFSL	Weyburn, Sask.	1340
CFSX	Stephenville, Nfld.	910
CFTJ	Galt, Ont.	1110
CFTK	Terrace, B.C.	590
CFUN	Vancouver, B.C.	1410
CFVR	Abbotsford, B.C.	1240
CFWB	Campbell River, B.C.	1490
CFWH	Whitehorse, Y.T.	570
CFYK	Yellowknife, N.W.T.	1340
CHAB	Moose Jaw, Sask.	800
CHAD	Amos, Que.	1340
CHAK	Inuvik, N.W.T.	860
CHAT	Medicine Hat, Alta.	1270
CHCM	Marystown, Nfld. with another studio at St. John's, Nfld.	560
CHEC	Lethbridge, Alta.	1090
CHED	Edmonton, Alta.	630
CHEF	Granby, Que.	1450
CHER	Sydney, N.S.	950
CHEX	Peterborough, Ont.	980
CHFA	Edmonton, Alta.	680
CHFC	Churchill, Man.	1230
CHFI	Toronto, Ont.	1540
CHGB	La Pocatière, Que.	1310
CHIC	Brampton, Ont.	790
CHIQ	Hamilton, Ont.	1280
CHLC	Saguenay Co., Que.	580
CHLN	Trois-Rivières, Que.	550
CHLO	St. Thomas, Ont.	680
CHLT	Sherbrooke, Que.	630
CHML	Hamilton, Ont.	900
CHNC	New Carlisle, Que.	610
CHNO	Sudbury, Ont.	900
CHNS	Halifax, N.S.	960
CHOK	Sarnia, Ont.	1070
CHOV	Pembroke, Ont.	1350
CHOW	Welland, Ont.	1470
CHQM	Vancouver, B.C.	1320
CHQR	Calgary, Alta,	810
CHQT	Edmonton, Alta.	1110
CHRC	Québec, Que,	800
CHRD	Drummondville, Que.	1340
CHRL	Roberval, Que.	910
CHRS	Jacques-Cartier, Que.	1090
CHSJ	Saint John, N.B.	1150
CHSM	Steinbach, Man. Studio at Station CFAM, Altona, Man.	1250
CHTK	Prince Rupert, B.C.	560
CHTM	Thompson, Man.	610
CHUB	Nanaimo, B.C.	1570
CHUC	Cobourg, Ont.	1450
CHUM	Toronto, Ont.	1050
CHWK	Chilliwack, B.C.	1270
CHWO	Oakville, Ont.	1250
CHYM	Kitchener, Ont.	1490
CJAD	Montreal, Que.	800
CJAF	Cabano, Que.	1240
CJAT	Trail, B.C.	610
CJAV	Port Alberni, B.C.	1240
CJBC	Toronto, Ont.	860
CJBM	Causapscal, Que., with Studio at Rimouski, Que.	1450
CJBQ	Belleville, Ont.	800
CJBR	Rimouski, Que.	900
CJCA	Edmonton, Alta.	930
CJCB	Sydney, N.S.	1270
CJCH	Halifax, N.S.	920
CJCJ	Woodstock, N.B.	920
CJCN	Grand Falls, Nfld.	680
CJCS	Stratford, Ont.	1240
CJDC	Dawson Creek, B.C.	1350
CJDV	Drumheller, Alta.	910
CJEM	Edmundston, N.B.	570
CJET	Smiths Falls, Ont.	630
CJFP	Rivière-du-Loup, Que.	1400
CJFX	Antigonish, N.S.	580
CJGX	Yorkton, Sask.	940
CJIB	Vernon, B.C.	940
CJIC	Sault Ste. Marie, Ont.	1050
CJJC	Langley, B.C.	850
CJKL	Kirkland Lake, Ont.	560
CJLM	Joliette, Que.	1350
CJLR	Quebec, Que,	1060
CJLS	Yarmouth, N.S.	1340
CJLX	Fort William, Ont.	800
CJME	Regina, Sask.	1300
CJMS	Montreal, Que.	1280
CJMT	Chicoutimi, Que.	1420
CJNB	North Battleford, Sask.	1050
CJNR	Blind River, Ont.	730
CJOB	Winnipeg, Man.	680
CJOC	Lethbridge, Alta.	1220
CJON	St. John's, Nfld.	930
CJOR	Vancouver, B.C.	600
CJOX	Grand Bank, Nfld.	710
CJOY	Guelph, Ont.	1460
CJQM	Winnipeg, Man.	1470
CJRL	Kenora, Ont.	1220
CJRN	Niagara Falls, Ont.	1600
CJRW	Summerside, P.E.I.	1240
CJSL	Estevan, Sask.	1280
CJSO	Sorel, Que.	1320
CJSP	Leamington, Ont.	710
CJSS	Cornwall, Ont.	1220
CJVI	Victoria, B.C.	900
CJWA	Sault Ste. Marie, Ont.	1240
CKAC	Montréal, Que.	730
CKAD	Middleton, N.S.	1490
CKAP	Kapuskasing, Ont.	580
CKAR	Huntsville, Ont.	630
CKAR-1	Parry Sound, Ontario. Studio at Station CKAR, Huntsville, Ontario	1340
CKAY	Duncan, B.C.	1500
CKBB	Barrie, Ont.	950
CKBC	Bathurst, N.B.	1360
CKBI	Prince Albert, Sask.	900
CKBL	Matane, Que.	1250
CKBM	Montmagny, Que.	1490
CKBS	St. Hyacinthe, Que.	1240
CKBW	Bridgewater, N.S.	1000
CKCB	Collingwood, Ont. with another Studio at Barrie, Ont.	1400
CKCH	Hull, Que.	970
CKCK	Regina, Sask.	620
CKCL	Truro, N.S.	600
CKCM	Grand Falls, Nfld. with another studio at St. John's, Nfld.	620
CKCN	Sept-Iles, Que.	560
CKCQ	Quesnel, B.C.	570
CKCR	Revelstoke, B.C. Studio at Station CKXR, Salmon Arm, B.C.	1340
CKCV	Québec, Que.	1280
CKCW	Moncton, N.B.	1220
CKCY	Sault Ste. Marie, Ont.	920
CKDA	Victoria, B.C.	1220
CKDH	Amherst, N.S.	900
CKDM	Dauphin, Man.	730
CKDR	Dryden, Ont. Studio at Station CJRL, Kenora, Ont,	900
CKEC	New Glasgow, N.S.	1320
CKEK	Cranbrook, B.C.	570
CKEN	Kentville, N.S.	1350
CKEY	Toronto, Ont.	590
CKFH	Toronto, Ont.	1430
CKGB	Timmins, Ont.	680
CKGM	Montreal, Que.	980
CKJL	Saint-Jérôme, Que,	900
CKKW	Kitchener, Ont.	1320
CKLB	Oshawa, Ont.	1350
CKLC	Kingston, Ont.	1380
CKLD	Thetford Mines, Que.	1230
CKLG	Vancouver, B.C.	730
CKLM	Montreal, Que.	1570
CKLN	Nelson, B.C.	1390
CKLS	La Sarre, Que.	1240
CKLW	Windsor, Ont.	800
CKLY	Lindsay, Ont.	910
CKML	Mont Laurier, Que.	6'0
CKMP	Midland, Ontario	1230
CKMR	Newcastle, N.B.	790
CKNB	Campbellton, N.B.	950
CKNL	Fort St. John, B.C.	560
CKNW	New Westminster, B.C.	980
CKNX	Wingham, Ont.	920
CKOC	Hamilton, Ont.	1150
CKOK	Penticton, B.C.	800
CKOM	Saskatoon, Sask.	1250
CKOT	Tillsonburg, Ont.	1510
CKOV	Kelowna, B.C.	630
CKOX	Woodstock, Ont.	1340
CKOY	Ottawa, Ont.	1310
CKPC	Brantford, Ont.	1380
CKPG	Prince George, B.C.	550
CKPM	Ottawa, Ont.	1440

C.L.	Location	kHz	C.L.	Location	kHz	C.L.	Location	kHz	C.L.	Location	kHz
CKPR	Port Arthur, Ont.	580	CKSB	Saint-Boniface, Man.	1050	CKUA	Edmonton, Alta.	580	CKX	Brandon, Man.	1150
CKPT	Peterborough, Ont.	1420	CKSL	London, Ont.	1410	CKVD	Val-d'Or, P.Q.	900	CKXL	Calgary, Alta.	1140
CKRB	Cté de Beauce, Que.	1460	CKSM	Shawinigan, Que.	1220	CKVL	Verdun, Que.	850	CKXR	Salmon Arm, B.C.	580
CKRC	Winnipeg, Man.	630	CKSO	Sudbury, Ont.	790	CKVM	Ville-Marie, Que.	710	CKY	Winnipeg, Man.	580
CKRD	Red Deer, Alta.	850	CKSW	Swift Current, Sask.	1400	CKWL	Williams Lake, B.C.	1240	CKYL	Peace River, Alta.	610
CKRM	Regina, Sask.	980	CKTB	St. Catharines, Ont.	610	CKWS	Kingston, Ont.	960	VOAR	St. John's, Nfld.	1230
CKRN	Rouyn, Que.	1400	CKTK	Kitimat, B.C.	1230	CKWW	Windsor, Ont.	580	VOCM	St. John's, Nfld.	590
CKRS	Jonquière, Que.	590	CKTR	Trois-Rivières, Que.	1150	CKWX	Vancouver, B.C.	1130	VOWR	St. John's, Nfld.	800
CKSA	Lloydminster, Alta.	1080	CKTS	Sherbrooke, Que.	900						

Canadian FM Stations by Call Letters

Abbreviations: (s) broadcasts stereo

C.L.	Location	MHz	C.L.	Location	MHz	C.L.	Location	MHz	C.L.	Location	MHz
CBC-FM	Toronto, Ont.	99.1	CFMQ-FM	Regina, Sask.	92.1	CJCA-FM	Edmonton, Alta.	99.5	CKLC-FM	Kingston, Ont.	98.3
CBF-FM	Montreal, Que.	95.1	CFMS-FM	Victoria, B.C.	98.5	CJCB-FM	Sydney, N.S.	94.9	CKLG-FM	Vancouver, B.C.	99.3
CBM-FM	Montreal, Que.	100.7	CFPL-FM	London, Ont.	95.9	CJFM-FM	Montreal, Que.	95.9	CKLW-FM	Windsor, Ont.	93.9
CBO-FM	Ottawa, Ont.	103.3	CFRC-FM	Kingston, Ont.	91.9	CJIC-FM	Sault Ste. Marie, Ont.	100.5	CKOK-FM	Penticton, B.C.	97.1
CBU-FM	Vancouver, B.C.	105.7	CFRN-FM	Edmonton, Alta.	100.3				CKOT-FM	Tillsonburg, Ont.	100.5
CBW-FM	Winnipeg, Man.	98.3	CHEC-FM	Lethbridge, Alta.	100.9	CJMS-FM	Montreal, Que.	94.3	CKPC-FM	Brantford, Ont.	92.1
CFBC-FM	Saint John, N.B.	98.9	CHFI-FM	Toronto, Ont.	98.1	CJOB-FM	Winnipeg, Man.	97.5	CKPR-FM	Port Arthur, Ont.	94.3
CFCF-FM	Montreal, Que.	92.5	CHFM-FM	Calgary, Alta.	95.9	CJOV-FM	Kelowna, B.C.	104.7	CKQM-FM	Winnipeg, Man.	94.3
CFFM-FM	Kamloops, B.C.	98.3	CHIC-FM	Brampton, Ont.	102.1	CJRT-FM	Toronto, Ont.	91.1	CKRD-FM	Red Deer, Alta.	98.9
CFFM-FM-1	Savona, B.C.—Rebroadcasting of CFFM-FM	101.9	CHLT-FM	Sherbrooke, Que.	102.7	CJSS-FM	Cornwall, Ont.	104.5	CKSO-FM	Sudbury, Ont.	92.7
CFFM-FM-2	Clearwater, B.C.—Rebroadcasting of CFFM-FM	92.7	CHML-FM	Hamilton, Ont.	95.3	CJUS-FM	Saskatoon, Sask.	89.7	CKTB-FM	St. Catharines, Ont.	97.7
CFFM-FM-3	Merritt, B.C.—Rebroadcasting of CFFM-FM	103.9	CHNS-FM	Halifax, N.S.	96.1	CKCL-FM	Truro, N.S.	100.9	CKUA-FM	Edmonton, Alta.	98.1
CFMC-FM	Saskatoon, Sask.	103.9	CHQM-FM	Vancouver, B.C.	103.5	CKCY-FM	Sault Ste. Marie, Ont.	104.3	CKVL-FM	Verdun, Que.	96.9
CFMO-FM	Ottawa, Ont.	93.9	CHRC-FM	Quebec, Que.	98.1				CKWM-FM	Kentville, N.S.	97.7
			CHUM-FM	Toronto, Ont.	104.5	CKFM-FM	Toronto, Ont.	99.9	CKWS-FM	Kingston, Ont.	96.3
			CHYM-FM	Kitchener, Ont.	96.7	CKGB-FM	Timmins, Ont.	94.5	CKX-FM	Brandon, Man.	96.1
			CJBQ-FM	Belleville, Ont.	97.1	CKGM-FM	Montreal, Que.	97.7	CKY-FM	Winnipeg, Man.	92.1
			CJBR-FM	Rimouski, Que.	101.5	CKLB-FM	Oshawa, Ont.	93.5			

World-Wide Shortwave Stations

■ In response to many inquiries regarding DX Central and the compilation of the shortwave section of *White's Radio Log*, we thought that a few words of explanation might be in order at this point.

DX Central is a completely equipped, professionally-manned DX monitoring station in New York City and one sub-station near the top of Long Island, New York. We are always abreast of current trends in international broadcasting as well as the latest activities of "utilities" stations. Whenever we hear a station we enter it in a master logbook. Shortly after the station is entered in the log, it is checked against published statistics for the station so that the information in the log might be as complete as possible. Frequently, we will monitor stations on frequencies which differ from those announced, and at hours during which the station is on record as being silent—our listings in White's Radio Log, however, indicate *actual* loggings rather than announced schedules and frequencies.

Readers are invited to send in reports of their own loggings to be combined with ours so that the shortwave section of *White's Radio Log* will not only be as complete as possible but will also reflect a survey of stations heard throughout North America. When sending reports for listing here please include the following data: station name/callsign, time heard (in GMT), approximate frequency. Address your reports to: DX Central, WHITE'S RADIO LOG, RADIO-TV EXPERIMENTER, 505 Park Avenue, New York, N. Y. 10022, U.S.A.

Stations in our listings which are indicated with an asterisk (*) are "utilities" (non-broadcast) stations. The following abbreviations are used in our listings: BC—Broadcasting Company, Corporation, or System; E—Emissora; R—Radio; V—Voz or Voice.

TNX from DX Central

We wish to thank the following reporters for their cooperation in sending in their logs for the listing in this issue:

Bill Harvey, New London, Conn.
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Walter L. Read, North Bend, Ore.
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Richard A. Flanagan, New York, N. Y.
Bill Migley, Lancaster, Ohio
Eugene Purdom, Jr., Westminster, Md.
Elmer Carlson, Long Island, N. Y.
Robert Fuchs, Brooklyn, N. Y.
B. B. Biggs, Los Angeles, Cal.

kHz	Call	Name	Location	GMT
2376	—	R. South Africa	Capetown, S. Africa	2200
3230	VRH8	Fiji Bc	Suva, Fiji I.	1000
3284	VRH9	Fiji Bc	Suva, Fiji I.	1000
3304	VL8BD	R. Daru	Daru, Papua	1000
3305	YVKX	V. de Patria	Caracas, Venez.	0230
3315	—	R. Francaise	Ft. de France, Martinique	0015
3331	—	R-TV Francaise	Dzaoudzi, Comoros I.	1830
3345	HIAS	Onda Musical	Sto. Domingo, Dom. Rep.	0015
3355	VL9CD	R. Wewak	Wewak, Papua	1000
	—	R-TV Francaise	Noumea, New Caledonia	1020
3380	—	R. Bamako	Bamako, Mali	0600
3390	—	R. Barlavento	Barlavento, Cape Verde I.	2200
3995	—	R. Cordac	Bujumbura, Burundi	1900
4745	TIGPH	R. Monumental	San Jose, C.R.	0300
4750	TIRHB2	R. Popular	San Jose, C.R.	0500
4770	ELWA	R. Village	Monrovia, Liberia	1900
	HRLC	R. Continental	S. Pedro Sula, Hond.	1200

60-Meter Band—4750-5060 kHz

4777	—	R. Libreville	Libreville, Gabon	1730
4780	—	R. Bamako	Bamako, Mali	0600
4795	—	R. Comercial	Sa da Banderia, Angola	1600
4808	—	R. Cl. de Sao Tome	Sao Tome	2230
4820	HRVC	V. Evangelica	Tegucigalpa, Hond.	0215
4845	—	BBC Relay	Francistown, Bechuanaland	1700
4650	HC2AK	R. del Ecuad.	Guayaquil, Ecu.	0500
4745	HCBK2	R. el Mundo	Guayaquil, Ecu.	0330
4835	—	R. Bamako	Bamako, Mali	0600
4860	—	R. Cl. do Congo Port.	Carmona, Angola	2130
	—	R. Miramar	Ecuador	0330
	CR6RN	R. Cl. do Angola	Angola	2000
4875	HCVE4	V. de Esmeraldas	Esmeraldas, Ecu.	0410
4880	HIJP	R. Comercial	Sto. Domingo, Dom. Rep.	2330
4890	VLT4	ABC	Port Moresby, Papua	1000
	YVKB	R. Venezuela	Caracas, Venez.	0215
4910	—	V. de la Revolucion	Conakry, Guinea	2358
	HIN	R-TV Dominicana	Sto. Domingo, Dom. Rep.	0200
4915	—	R. el Trebol	Ecuador	0500
4920	—	R. Cordac	Bujumbura, Burundi	1900
4923	HCRQ1	R. Quito	Quito, Ecu.	0400
4930	HCCRI	R. Casa Cultura	Quito, Ecu.	0345
4940	HIBE	R. Mil	Sto. Domingo, Dom. Rep.	0400
4965	HJAF	R. Santa Fe	Bogota, Colombia	0342
4969	—	R. Kuwait	Kuwait	0500
4980	—	R. Accra	Accra, Ghana	0530
4985	CR6RB	R. Ecclesia	Luanda, Angola	1845
4990	—	Nigerian BC	Lagos, Nigeria	2000
5005	OAX2S	R. Jaen	Lima, Peru	0330
5012	—	R. UFAC	Lubumbashi, Congo	1900
5020	HJFW	Trasm. Caldas	Manizales, Colombia	0340
5025	ZYV24	R. Aquidauana	Aquidauana, Brazil	0200
5037	—	R. Malaysia	Kuala Lumpur, Malaysia	2255
5047	—	R. Lome	Lome, Togo	2100
5050	—	R. Tanzania	Dar es Salaam, Tanzania	0315
	YVKD	R. Cultura	Caracas, Venez.	0245
5057	YVKD	R. Cultura	Caracas, Venez.	2330
5560	—	R. Villabianca	El Carmen, Colombia	1200

49-Meter Band—5950-6200 kHz

5950	YNRG	R. Zelaya	Bluefields, Nic.	0330
	—	R. Warsaw	Warsaw, Poland	1700
5954	TIQ	R. Casino	Puerto Limon, C.R.	0315
5960	—	R-TV Francaise	Paris, France	0800
	—	Gronlands R.	Godthaab, Greenland	0240
5961	HRHR	V. Occidente	S. Rosa de Copan, Hond.	0130
5970	HJVN	R. Horizonte	Bogota, Colombia	0035
5980	OBX4M	R. Panamerican	Lima, Peru	0200
	—	R. Demerara	Georgetown, Guiana	0100
5990	—	RAI	Rome, Italy	2020
	—	R. Warsaw	Warsaw, Poland	1700
5993	—	R. Coquilhatville	Coquilhatville, Congo	1900
6005	—	R. Prague	Prague, Czech.	0700
6010	YSS	R. Nacional	San Salvador, El Salv.	0100
6015	—	T-TV Ivorienne	Abidjan, Ivory Coast	2230
6020	PCJ	R. Monte Carlo	Monte Carlo, Monaco	2250
6035	—	R. Nederland	Hilversum, Nederland	1800
6058	—	R. Rwanda	Kigali, Rwanda	0345
6070	—	R. Sofia	Sofia, Bulgaria	1930
6082	OAX4Z	R. Nacional	Lima, Peru	0300
6090	—	R. Prague	Prague, Czech.	0330
6100	DMQ6	Deutsche Welle	Cologne, W. Germany	0645
	—	R. Belgrade	Belgrade, Yugo.	2215
6105	XEQM	R. Freq. Juventud	Mexico DF, Mex.	0445
6110	—	BBC	London, England	0200
6120	—	Switz. Calling	Berne, Switz.	0115
6135	—	R. Papeete	Papeete, Tahiti	1615
6140	—	R. Nacional	Madrid, Spain	2323
6150	—	R. Bucharest	Bucharest, Rumania	1430
6185	—	R. Addis Ababa	Addis Ababa, Ethiopia	1700
6190	—	R. Bucharest	Bucharest, Rumania	1930
6200	—	R. Vilnus	Vilnus, USSR	2230
6205	—	R. Nacional	Tikal, Guatemala	0300
6234	—	R. Budapest	Budapest, Hungary	0900
6242	OAX6U	R. Universidad	Arequipa, Peru	0300
6825	—	R. Peking	Peking, China	1800
6890	—	R. Peking	Peking, China	2000
7005	—	R. Peking	Peking, China	2000
7075	—	R. Peking	Peking, China	1800
7080	—	R. Peking	Peking, China	2200
7100	—	R. Budapest	Budapest, Hungary	1945

41-Meter Band—7100-7300 kHz

7110	—	Switz. Calling	Berne, Switz.	1845
7115	—	R. Prague	Prague, Czech.	0100
7130	—	BBC	London, England	2200
7135	—	R. Monte Carlo	Monte Carlo, Monaco	2250
7140	—	BBC Relay	Nicosia, Cyprus	0300
7145	—	R. Warsaw	Warsaw, Poland	1700
7165	—	V. America	Okinawa, Ryuku Is.	1205
7180	—	R. Vilnus	Vilnus, USSR	2230
7195	—	R. Bucharest	Bucharest, Rumania	2200
7210	—	Ici Senegal	Dakar, Senegal	0600
7215	VUD	All India R.	Delhi, India	1945
7220	—	R. Budapest	Budapest, Hungary	1330
7235	—	RAI	Rome, Italy	2020
7245	—	R. Vietnam	Saigon, S. Vietnam	1000
7275	—	RAI	Rome, Italy	2020
	—	Nigerian BC	Lagos, Nigeria	2045
7280	—	R. Malaysia	Kuala Lumpur, Malaysia	2230
7290	—	RAI	Rome, Italy	1720
7295	—	Trans World R.	Monte Carlo, Monaco	0735
	—	R. Comercial	Sa da Banderia, Angola	0800
	—	BBC Relay	Francistown, Bechuanaland	0530
7300	—	R. Malaysia	Kuala Lumpur, Malaysia	2230
7305	—	R. Budapest	Budapest, Hungary	1930
7345	—	R. Prague	Prague, Czech.	0100
8215	—	R. Shkodra	Tirana, Albania	0500
9009	4XB31	Kol Yisrael	Jerusalem, Israel	2015
9360	—	R. Nacional	Madrid, Spain	2345
9415	—	V. UN Command	Seoul, S. Korea	0920

31-Meter Band—9500-9775 kHz

9505	—	R. Prague	Prague, Czech.	0100
	DZH7	Far East BC	Manila, Philippines	2200
9510	—	BBC	London, England	2245

WHITE'S

RADIO LOG

kHz	Call	Name	Location	GMT
9520	—	R. Tirana	Tirana, Albania	0230
	—	V. Denmark	Copenhagen, Denmark	0145
9525	—	R. Habana	Havana, Cuba	0130
	—	R. S. Africa	Capetown, S. Africa	0445
	—	R-TV Francaise	Paris, France	2100
	—	R. Japan	Tokyo, Japan	1800
9535	—	Switz. Calling	Berne, Switz.	0415
9540	ZL2	R. New Zealand	Wellington, N.Z.	1110
9560	—	R. Sofia	Sofia, Bulgaria	1930
9570	—	R. Australia	Melbourne, Australia	0900
	—	R. Bucharest	Bucharest, Rumania	1430
9575	—	RAI	Rome, Italy	2115
9580	—	BBC	London, England	2300
9590	—	R. Bucharest	Bucharest, Rumania	1430
	PCJ	R. Nederland	Hilversum, Netherlands	1800
9595	—	Switz. Calling	Berne, Switz.	0415
9610	—	R. Kiev	Kiev, USSR	0030
	DMQ9	Deutsche Welle	Cologne, W. Germany	0425
9615	ORU	Belgian R.	Brussels, Belg.	2150
	—	R. Berlin Int'l.	Berlin, E. Germany	0100
9620	—	R-TV Francais	Paris, France	0800
	ZYR96	R. 9th de Julio	Sao Paulo, Brazil	0810
	—	Kol Yisrael	Jerusalem, Israel	2015
	—	Canadian BC	Montreal, P.Q.	2300
9630	—	R. Kiev	Kiev, USSR	0430
	DMQ9	Deutsche Welle	Cologne, W. Germany	2015
9640	—	BBC	London, England	2200
	HLK5	V. Free Korea	Seoul, S. Korea	2100
	—	R. Ulan Bator	Ulan Bator, Mongolia	1420
9665	—	Switz. Calling	Berne, Switz.	1815
9670	—	R. Kiev	Kiev, USSR	0030
9678	ZYT29	R. Diario Manha	Florianapolis, Braz.	0100
9690	—	Nigerian BC	Lagos, Nigeria	2130
	—	R. Kiev	Kiev, USSR	0030
9695	ZYB22	R. Rio Mar	Manaus, Brazil	2345
9700	—	R. Sofia	Sofia, Bulgaria	2130
9710	—	R. Kiev	Kiev, USSR	0030
	—	EAI	Rome, Italy	2020
9725	4XB51	Kol Yisrael	Jerusalem, Israel	2015
9730	—	R. Berlin Int'l.	Berlin, E. Germany	0235
9740	—	R. Vilnus	Vilnus, USSR	2230
	—	V. Pakistan	Karachi, Pakistan	2000
9745	—	R. Bamako	Bamako, Mali	0600
9755	—	R. Peking	Peking, China	1025
9760	—	R. Hanoi	Hanoi, N. Vietnam	1000
9765	—	BBC	London, England	2200
	—	V. Free China	Taipei, Formosa	1530
9770	—	R. Osterreichischer	Vienna, Austria	2330
	4VEH	V. Evangelique	Cap Haitien, Haiti	1415
9810	—	R. Kiev	Kiev, USSR	0030
9833	—	R. Budapest	Budapest, Hungary	1330
9865	YDF6	V. Indonesia	Diskarta, Indonesia	1435
11290	—	R. Peking	Peking, China	1025
11672	—	V. Pakistan	Karachi, Pakistan	2000

25-Meter Band—11700-11975 kHz

11705	—	R. Sweden	Stockholm, Sweden	0400
	VUD	All India R.	Delhi, India	1900
11710	—	R. Vilnus	Vilnus, USSR	2230
	—	R. Australia	Melbourne, Australia	0900
	LRA35	RAE	Buenos Aires, Argentina	1900
	KGEI	V. Friendship	San Francisco, Calif.	0330
11715	—	Switz. Calling	Berne, Switz.	0115
	YDF2	V. Indonesia	Djakarta, Indonesia	1900
11720	—	Hellenic BC	Athens, Greece	2300
11725	—	Canadian BC	Montreal, P.Q.	2300
11730	PCJ	R. Nederland	Hilversum, Neth.	1800
	—	R. Kiev	Kiev, USSR	1900
11735	—	Moroccan R-TV	Rabat, Morocco	2030
11740	WNYW	R. NY Worldwide	New York, N.Y.	0100
	CE1174	R. Nuevo Mundo	Santiago, Chile	0200
11742	XEMP	R. X-E-M-P	Mexico DF, Mex.	1300
11750	—	BBC	London, England	2300
11755	—	R. Teheran	Teheran, Iran	1800
11760	—	R. Hanoi	Hanoi, N. Vietnam	1000
	—	Vatican R.	Vatican City	2300
11763	—	Korean Central BC	Pyongyang, N. Korea	2300
11765	—	R. Sofia	Sofia, Bulgaria	2130
11770	—	Vatican R.	Vatican City	0300
11775	—	Switz. Calling	Berne, Switz.	0415
11780	—	BBC	London, England	2115
11795	YDF7	V. Indonesia	Djakarta, Indonesia	1430
11800	—	RAI	Rome, Italy	0100
11805	—	R. Sweden	Stockholm, Sweden	0100
	ZYZ36	R. Globo	Globo, Brazil	0100
11810	—	R. Bucharest	Bucharest, Rumania	1430
11815	—	Trans World R.	Bonaire, N.W.I.	0030
	ZYW24	R. Brazil Cent.	Goiana, Brazil	0130
11825	—	R. Papeete	Papeete, Tahiti	1615
11850	—	R. Ulan Bator	Ulan Bator, Mongolia	1420
	—	R-TV Francaise	Paris, France	0800
11855	—	R-TV Francaise	Paris, France	2100
	—	Switz. Calling	Berne, Switzerland	1330
11865	—	Switz. Calling	Berne, Switzerland	1145
11875	—	R. Japan	Tokyo, Japan	0930
	ZYN32	R. Soc. Bahia	Bahia, Brazil	0300
11880	—	R. Sweden	Stockholm, Sweden	0400
11905	—	RAI	Rome, Italy	1200
11910	—	Kol Yisrael	Jerusalem, Israel	1000
	—	R. Budapest	Budapest, Hungary	1330
11920	DZF2	Far East BC	Manila, Phil.	1145
11925	ZYR78	R. Bandeirantes	Bandeirantes, Brazil	0245
11930	—	R. Sofia	Sofia, Bulgaria	1930
11950	PRL3	R. Min. Educacao	Rio de Janeiro, Brazil	2349
	ELWA	R. Village	Monrovia, Liberia	0530
11970	ELWA	R. Village	Monrovia, Liberia	0915
11990	—	R. Prague	Prague, Czech.	0100
12005	VNG	Australian Post Ofc.	Lyndhurst, Australia	1130
12055	—	R. Peking	Peking, China	2000
12095	—	BBC	London, England	2115
12097	—	R. Peking	Peking, China	2000
13250	—	R. Euzkadi	(clandestine)	2030
14507	—	Korean Cent. BC	Pyongyang, N. Korea	2300
14520	—	R. Hanoi	Hanoi, N. Vietnam	2133
15030	—	R. Peking	Peking, China	0150
15032	—	R. Euzkadi	(clandestine)	2030
15045	—	R. Hanoi	Hanoi, N. Vietnam	2133

19-Meter Band—15100-15450 kHz

15105	—	Windward I. BC	St. Georges, Grenada I.	2130
15110	—	R. Teheran	Teheran, Iran	1800
	XERR	R. Comerciales	Mexico DF, Mex.	2200
15115	—	Vatican R.	Vatican City	1800
15125	HLK41	V. Free Korea	Seoul, S. Korea	1530
15130	—	R-TV Francaise	Paris, France	2100
15137	—	R. Teheran	Teheran, Iran	1900
15140	—	BBC	London, England	2115
15155	—	R. Habana	Havana, Cuba	2130
	ELWA	R. Village	Monrovia, Liberia	0915
15160	—	R. Budapest	Budapest, Hungary	1330
	TAU	R. Ankara	Ankara, Turkey	2200
15165	—	V. Denmark	Copenhagen, Denmark	1915
15175	LLM	R. Norway	Oslo, Norway	1600
15180	—	R. Australia	Melbourne, Australia	0515
15185	OIX4	Finnish BC	Pori, Finland	1215
	—	Moroccan TV	Rabat, Morocco	2100
15190	—	Canadian BC	Montreal, P.Q.	2300
15200	—	R. Pakistan	Karachi, Pakistan	0045
15220	—	R. Australia	Melbourne, Australia	2330
15225	—	Afghan. BC	Kabul, Afghan.	1740
15230	—	R. Prague	Prague, Czech.	0700
	DZH9	Far East BC	Manila, Phil.	1145

(Continued on page 130)

How to Get Rooked

Continued from page 68

of such things as "spike mikes," $125 desk calendars, and $126 ash trays which transmit, $119.50 bugged pencil boxes (that's a little FM transmitter in a tubular pencil box, and you can build one yourself for a total cost of $5), $179.50 wireless fountain pens, $225 wireless mikes, etc., the equipment is all garden variety. The difference is that if it's sold from a spy supplier, the price is multiplied by as much as 64 times!

Not only do you get rooked, but most manufacturers make no bones about the fact that if you use their products you do it at your own risk. Each catalog carries a disclaimer which reads to the effect (and our example is a direct quote from one):

"All equipment sold subject to local, state, and federal regulations relating to the use of such equipment. The seller will not be responsible for any infringement of such regulations."

The "seller" neglects to tell you that it's clearly against many government regulations to use most of his products in the manner described in his catalog. He also fails to inform you that even if you had a legitimate use for most of his radio transmitting gear, it operates on frequency bands where the FCC hasn't even licensed the stuff!

Clearly engaged in a monstrous racket, these sellers continue to produce and sell a fantastic array of gadgets which are overpriced, illegal, and (frequently) of questionable quality.

Perhaps the electronic bugging device of the year was something called the "Penn Register Telephone Device." The Senate investigating committee tried out one of the machines and it began buzzing, ticking, and spewing out tape when it was turned on. When it wouldn't stop, they tried to turn it off in every way imaginable. They even ripped its line cord from the wall, only to have it go right on ticking away. Finally, Senator Long said, "Take it outside and put it in a bucket of water." The machine was carried from the room, still ticking. ■

Perf-Board Project

Continued from page 70

be terminated in (connected to) anything from 500 ohms up. A 500-ohm load reduces the output signal by 20 db, a 1000-ohm load results in 10 db less gain and a load of more than 10,000 ohms has no effect on overall gain. However, if the amplifier termination is less than 50,000 ohms output capacitor C4 should be increased to at least 4 mf.

Construction. The unit shown is constructed on a stock size piece of perforated circuit board (perf-board). If you prefer a cabinet, anything, metal or plastic or wood, will be suitable.

All components with the exception of Q1 are soldered directly to the flea clips. Since the internal noise of transistors varies from type to type, and even between units of the same type, a socket (for Q1) allows plugging in different transistors to select one with minimum noise level. (This is only for those who require an absolute rock-bottom noise level, in which case low-noise resistors, such as the deposited carbon type should also be used throughout the circuit.)

While battery clips, for B1, are used the low drain of 400 micro-amperes from the battery can give almost full shelf life. It is therefore possible to solder the leads directly to B1's terminals eliminating S1.

Virtually any small- or medium-signal transistor can be used for Q1 and Q2. As example, Q1 and Q2 can be RCA 2N2613s when very high gain is desired. Or, if you want to try a low noise transistor a 2N220 can be used for Q1. To keep total cost at rock bottom you may even use *general purpose* types such as the 2N104, 2N107, 2N109, etc. or even "surplus" types.

Limitation. Bear in mind that the amplifier will overload (threshold of clipping) if the input signal exceeds 1.8 mv. While you cannot use a standard mike with the preamp in a normal close-up talking it will be useful if the sound source into the standard mike is very weak or distant.—*Herb Friedman* ■

6-Meter Transceiver

Continued from page 101

3:1 or less), delivered 7.5 watts into a 50-ohm load with a 15-watt plate input. Tune-up consists of simply adjusting the plate loading and tuning, and the multiplier tuning control for maximum reading on the S-meter (which doubles as a relative output meter).

While we noticed no spurious radiation, the final did oscillate at a particular setting of the tuning controls when the crystal(s) was removed. To remedy this, we suggest installing a parasitic suppressor in the 2E26 plate lead as close as possible to the plate connections.

The modulation quality, as with the receive quality, can be considered exceptionally good—modulation was of the "full" rather than "thin" variety.

Our only complaint with the TR-106 is that the alignment instructions, particularly for the receiver, are just plain bad. If crystals aren't going to be used for alignment (using the *spot* function), the manual implies the need for a signal generator with a calibrated voltage output (and who's got one of those?). If you do use crystals you will need an unnecessary handful.

Take our word for it, a successful alignment can be made using routine alignment procedures and a hobbyist-grade signal generator. The given instructions require two VTVMs for alignment, which comes off as high-grade over-engineering. Simply use a DC VTVM for the AVC buss and any AC meter to measure the AF voltage across the speaker (one doesn't need a VTVM to measure speaker voltage).

No mention is made concerning L1's adjustment. Yet the IF alignment signal is fed through L1, and even with a 100,000 μv. signal from the generator it was impossible to get sufficient signal into the IF amplifiers if L1 wasn't adjusted. When performing the IF alignment, peak L1 for maximum, then realign L1 during final alignment using a 6-meter input signal to the receiver.

For proper alignment of the transmitter you will need three crystals (even if you intend to use a VFO): one on the low end, one on the high end, and one in the middle. It will pay you either to borrow the crystals in advance or order them with the transceiver.

Except for the alignment instructions—which almost anyone can overcome with a little common sense—the TR-106 at $139.95 in kit form represents a top Ham "buy." Both the Novice and oldtimer will find a place for this one, since actual operating performance leaves virtually nothing to be desired (in view of the budget price).

The V-107 VFO. Though the Knight V-107 6- and 2-meter VFO can be used with any transmitter utilizing an 8 MHz fundamental frequency, it is essentially the companion for the TR-106 transmitter. Utilizing a voltage-regulated Clapp oscillator, the V-107 delivers, nominally, a 20-volt output into a 47K-ohm load shunted by 30 mmf. Construction is a next-to-nothing undertaking, involving about an hour or so. Alignment is also simple. In fact, only two adjustments, one for the high end and one for the low end, insure reasonably accurate tracking.

When construction is completed the V-107 can be immediately connected to the TR-106, since the VFO's plugs are exact mates for the plugs on the transceiver.

Stability checked out at 500 Hz (cycles) after a 40-minute warm-up. Knight claims this stability after a 30-minute warm-up though we can't quibble over the ten-minute difference. However, movement of the front panel does change the frequency. And while there would be no difficulty in a home station, vibration in mobile service could cause frequency shift. We suggest the front panel be reinforced by installing two small angle brackets, where the top of the panel meets the cabinet, to insure absolute rigidity.

Just as a note of interest, the V-107's operation is automatically controlled by the transceiver. The VFO's on/off switch disables only the B+ during crystal-controlled operation), and the filament voltage remains on as long as the transceiver's power switch is *on*. The transceiver's spotting switch which turns on the oscillator for receiver dial calibration also turns on the VFO for zero-beating of the received station. The spotting output is at a reasonable level, about S6 on the S-meter, avoiding blocking of the receiver by the local oscillator.

Summing Up. Though the TR-106 transceiver by itself represents one of the best buys, the combination of the TR-106 and the V-107 VFO (at $19.95 in kit form) is to be preferred. For the pair comprise a complete station that promises years of 6-meter fun at a price that's hard to beat.

For additional information write to Dept. JR, Allied Radio Corp., 100 N. Western Ave., Chicago, Ill. 60680. ■

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BC for CB

Continued from page 130

TYPICAL DIAL-READING CHART

Channel	Freq. (MHz)	BC-221 Freq. (kHz)	Check Freq. (kHz)	DIAL READINGS BC-221 Ser. #3044. Osc. 26,000,125 Hz. Check	Low	Center	High	Hertz Per Vernier Dial Div.
1	26.965	964.875	241.379	4395.9	4376.3	4388.5	4402.3	10.4
2	26.975	974.875	243.243	4469.6	4475.3	4488.6	4502.3	10.0
3	26.985	984.875	245.906	4576.3	4575.4	4589 2	4603.0	9.8
4	27.005	1004.875	125.000	0197.9	0218.0	0225.6	0233.4	17.5
5	27.015	1014.875	126.761	0276.7	0272.8	0281.0	0288.2	17.5
6	27.025	1024.875	128.205	0361.1	0328.1	0335.1	0342.1	19.3
7	27.035	1034.875	129.412	0383.9	0375.0	0382.0	0389.0	19.3
8	27.055	1054.875	131.868	0475.9	0471.1	0477.1	0483.2	22.1
9	27.065	1064.875	133.333	0528.7	0514.6	0520.7	0526.8	22.1
10	27.075	1074.875	134.353	0564.6	0559.1	0564.7	0570.3	22.1
11	27.085	1084.875	135.593	0608.3	0603.1	0608.9	0614.7	23.3
12	27.105	1104.875	137.931	0687.9	0689.1	0694.9	0700.7	23.3
13	27.115	1114.875	139.241	0733.2	0729.7	0735.5	0741.3	23.3
14	27.125	1124.875	140.625	0780.2	0774.0	0779.7	0785.4	23.7
15	27.135	1134.875	141.509	0810.3	0824.3	0830.0	0835.7	23.7
16	27.155	1154.875	144.330	0905.9	0901.1	0906.8	0912.5	23.7
17	27.165	1164.875	145.631	0949.7	0943.4	0949.1	0954.6	24.1
18	27.175	1174.875	147.059	0998.1	0985.7	0991.4	0997.1	24.1
19	27.185	1184.875	148.148	1035.2	1027.5	1033.2	1038.9	23.7
20	27.205	1204.875	150.538	1115.3	1111.9	1117.7	1123.5	23.3
21	27.215	1214.875	151.899	1161.8	1154.6	1160.4	1166.2	23.3
22	27.225	1224.875	153.846	1228.5	1197.5	1203.3	1209.1	23.3
23	27.255	1254.875	156.863	1331.9	1243.7	1249.5	1255.3	23.3

(The BC-221 dial is adjusted to produce a zero beat with the incoming signal and the dial reading can then be transposed to the actual signal frequency.)

For the technician with limited funds, the shop where the volume of CB business does not justify large expenditures for test equipment, and for the Citizens Band clubs or service organizations, this method of frequency checking is highly recommended. It could, with proper-frequency auxiliary-oscillators, be utilized for satisfactory frequency measurement in other bands, too.

Take It from the Author. The time to check your CB transmitter is before, not after, you get a citation from the FCC. I, like everyone else, was reasonably sure my sets were on frequency as I had been checked out okay less than a year before. After contriving this apparatus, I checked my own frequencies first (naturally) and was dismayed to find I had to replace three crystals. Even the fact that the expensive frequency meter at the local CB service shop corroborated my finding did little to cheer me up—as I laid out the necessary cash for three new crystals.

A little time spent in on-the-air checking showed me that there are a great number of CB units operating outside of frequency tolerance limits. Of the first twenty signals monitored on channel 9 there were six outside the tolerance limitations.

With the tightening of CB regulations and increased FCC monitoring it may not be long until a citation comes your way, if your frequencies are not what they should be.

Remember the calibration charts and curves are different for each BC-221 and the certified variation of the crystal will be different—*you have to make your own charts and curves* for your individual oscillator and frequency meter. ■

White's Radio Log

Continued from page 126

15235	—	R. Japan	Tokyo, Japan	0200
15240	KGEI	V. Friendship	San Francisco, Calif.	2230
15235	HCJB	V. Andes	Quito, Ecu.	2000
15255	—	Switz. Calling	Berne, Switz.	1515
15260	—	BBC	London, England	2000
15285	—	V. America	Tangiers, Morocco	2245
	—	Vatican R.	Vatican City	2300
15300	—	BBC	London, England	2115
	WNYW	R. NY Worldwide	New York, N.Y.	1330
15305	—	Switz. Calling	Berne, Switz.	0845
15310	—	RAI	Rome, Italy	2205
15330	—	R. Australia	Melbourne, Australia	2230
15333	—	Moroccan R-TV	Rabat, Morocco	2030
15350	—	BBC	London, England	1430
15407	—	Moroccan R-TV	Rabat, Morocco	2310
15410	—	BBC	London, England	0945
	—	Armed Forces R-TV	Delano, Calif.	0200
	ETLF	R. V. Gospel	Addis Ababa, Ethiopia	0400
15415	ZYR206	R. Cl. Ribeirao	Preto, Brazil	2100
15420	—	BBC Relay	Nicosia, Cyprus	1000
15430	—	Switz. Calling	Berne, Switz.	0845
15440	WYNW	R. NY Worldwide	New York, N.Y.	1330
	—	Far East BC	Manila, Phil.	1145

16-Meter Band—17700-17900 kHz

17705	—	R. Pakistan	Karachi, Pakistan	0045
17715	—	BBC	London, England	1620
17730	—	R. NY Worldwide	New York, N.Y.	1330
17740	—	R-TV Francaise	Paris, France	1300
	—	BBC	London, England	2000
17810	—	BBC	London, England	2115
17820	—	R. Sao Paulo	Sao Paulo, Brazil	1930
17825	—	R. Japan	Tokyo, Japan	0200
	LLN	R. Norway	Oslo, Norway	1600
17830	—	Switz. Calling	Berne, Switz.	0845
17840	—	R. Australia	Melbourne, Australia	0330
17845	—	R. Sweden	Stockholm, Sweden	1445
17870	—	BBC	London, England	2000
17880	WYNW	R. NY Worldwide	New York, N.Y.	1330

13-Meter Band—21450-21750 kHz

21450	—	R. Prague	Prague, Czech.	0700
21685	—	R. Budapest	Budapest, Hungary	1330
25750	—	BBC	London, England	0900

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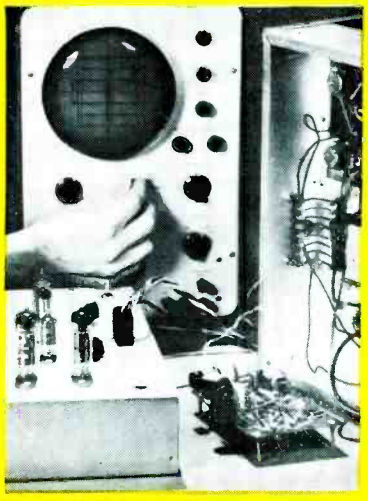

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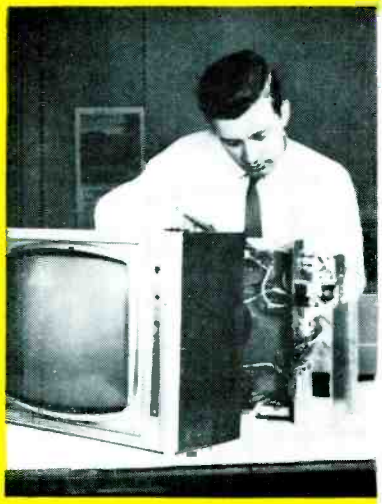

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