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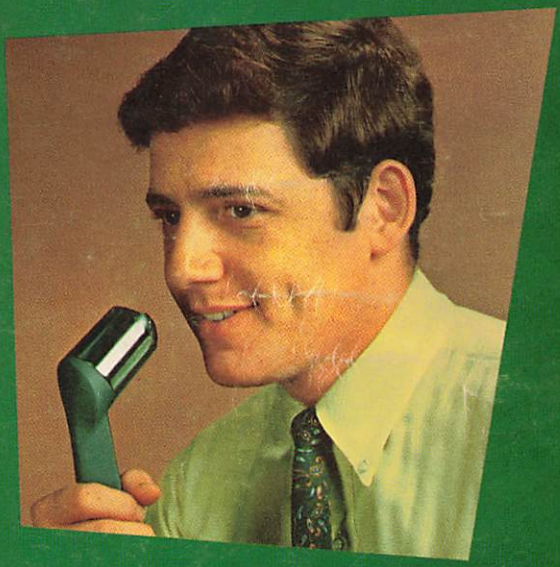
COMMUNICATIONS HANDBOOK 1969

CITIZENS RADIO SERVICE (CB) GETTING A NO-TEST LICENSE □ WHAT CB EQUIPMENT TO BUY □ USING YOUR CB RIG IN CANADA □ CB 10-CODE □ HOW TO OPERATE □ CB FOR ROADSIDE EMERGENCIES



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SHORT-WAVE LISTENING GETTING SET UP □ WHAT YOU NEED □ HOW TO TUNE □ COLLECTING QSL'S □ WHEN TO LISTEN □ PREDICTIONS □ LISTENING TO AFRICA, ASIA, EUROPE □ HOW TO GET AN AWARD □ DX CLUBS □ TIME ZONES

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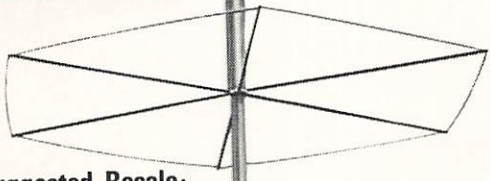

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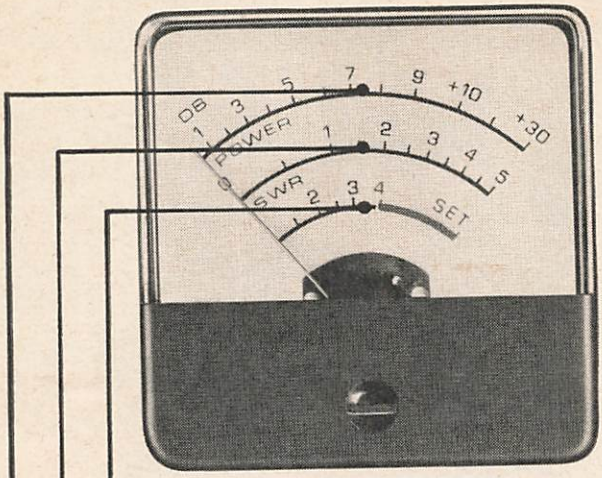

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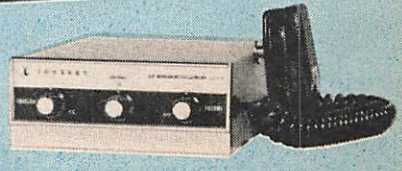

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CIRCLE NO. 27 ON READER SERVICE CARD

Two-Way Radio For Everyone

CITIZENS RADIO SERVICE (CB)

The Everyman Radio System Has Great Assets

BY MATT P. SPINELLO, KHC2060

AT THE PUSH of a microphone button, a licensed Citizens Band radio operator can transmit messages distances of 25-50 miles. His equipment is generally compact, lightweight, and capable of operating on one of several frequencies from which he may choose. The modern CB transceiver employs the latest circuit developments to afford him the ultimate in transmission stability and long-range reception.

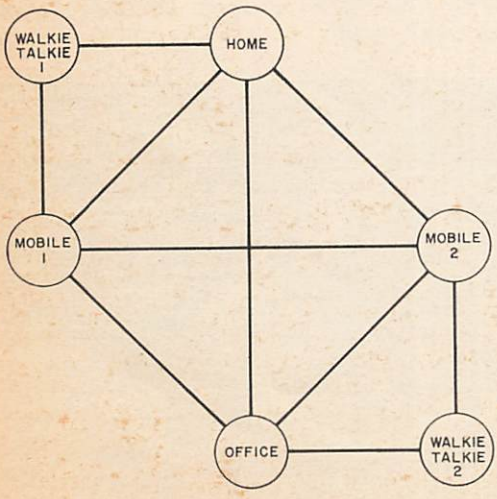
In less than 11 years the Citizens Radio Service has become the most widely used two-way radio communications facility in the world—excluding the military. There are more licensed CB radio stations, more CB transceivers in operation, and more message handling and traffic than anyone visualized when CB was introduced in 1958. The transceiver (combination transmitter/receiver) used by the CB'er in 1969 is a far cry from the first transceivers introduced a decade ago. In fact, in 1958-59 it was not uncommon for electronics distributors to make a wiring diagram available to electronics buffs and sell them a paper grocery bag containing all the parts necessary to build a CB rig. The construction demanded, however, a technical understanding of electronics, including the ability to assemble, align, and adjust portions of the transmitter and receiver sections of the completed kit.

What may be one of the foremost features of CB is the comfort that 2-way communications can provide during a time of emergency. This wife and mother could be calling her husband or talking to a nearby gas station. CB'ers are always ready to help and many clubs monitor channel 9 every minute of every day to give roadside assistance.

Fortunately, many manufacturers of electronic products took a sincere interest in designing equipment to reach a market of two-way radio "communicators" who were not electronics hobbyists. Today more than four million CB transceivers have been manufactured and over half of them are in day-to-day use by approximately 850,000 licensed individuals, business firms, and government agencies.

Many CB users, after getting their first taste of two-way radio communications, expand their system and obtain a commercial license under the appropriate Business Radio Service or Special Industrial Services. In the meantime, as some users move on to other radio services, an average of 15,000 newcomers to CB apply for a license each and every month of the year. The newcomer to the world of CB two-way radio may now select his equipment needs from over a hundred different models offered by several dozen manufacturers. The CB equipment sold today includes a decade of design improvements and the addition of features that boost the overall efficiency of two-way radio communications.

The initial cost of establishing a complete two-way radio system involving two or more transceivers with mobile and base station antennas depends on the user's obvious needs and requirements. However, a system involving two or three transceivers can be set up for as little as $200, or as much as $750.



CB is a supplement to your landline telephone and should always be considered in that light. In this typical CB network two mobile unit transceivers are interconnected to a home and an office. Each mobile also has access to a walkie-talkie. Working range for CB systems is discussed on this page.

What to Expect From CB. Expressed in its simplest terms, Class D CB radio is a short-range two-way communications system limited by the power output of the radio transceiver, the frequencies available for use, and the channel occupancy or density. CB is a "party line" two-way radio service that does not afford the user any degree of privacy. The 23 channels allocated to CB are licensed on a wholly non-exclusive basis.

In a major metropolitan area (such as mid-Manhattan, lake-front Chicago, etc.) the CB user should expect a two-way transmission range of 3 to 6 miles from base station to mobile unit. In the same type of area, a mobile transceiver should expect a transmitting and receiving range of between 2 and 4 miles.

In a well-developed suburban area a CB'er should expect a transmitting range from base station to mobile of 5 to 20 miles. A mobile unit in a suburban area should expect a transmitting and receiving range between 3 and 10 miles. Out in open country and over reasonably flat land, a base-station-to-mobile transmitting range of 20 to 50 miles is not uncommon. A mobile-to-base-station transmitting and base-station receiving range under the same conditions of 10 to 25 miles is common.

The CB newcomer must first decide how much range he expects his equipment to cover, how many channels (or alternate channels) he may require to avoid as much interference as possible, and what other special or selected features should be included in his system.

For example, a trucking or delivery firm located in a metropolitan area, where two-way radio communication activity is heavy, may require the dispatching of a dozen or more vehicles equipped with CB. To alert the drivers to delivery changes or other information without subjecting them to a bombardment of communications from other firms or individuals on the same channel,

the trucking company would usually select CB transceivers employing "selective calling" circuits.

In effect, the transceivers in the trucks could only be activated when signalled to do so by their base station. This is accomplished by special tone-signalling circuits. The mobile tranceivers remain silent, rejecting reception of all other air traffic on the same channel. Special codes may be arranged to activate transceivers in certain trucks of a licensee without affecting the transceivers in other trucks in his fleet. Selective calling is an optional, extra cost in most CB transceivers and usually adds between $35-50 per unit.

At the other extreme, a rancher situated in a much less populated area of the Western states may find air traffic limited to a mere handful of users within the range of his two-way radio system. His equipment need not have as many channels; and, if he lives in the wide open spaces, his communicating range with lower cost equipment may outshine the performance of expensive systems where mountains, deep valleys, or man-made obstructions limit communication capabilities.

The wisest choice for a potential CB user becomes one of study, inquiry, and decision on an individual basis. Most distributors of CB equipment have published useful guides to acquaint the user with the capabilities of a particular brand of manufactured equipment. Also, most antenna manufacturers will be very glad to render advice when the range and capability of a suggested CB system are unknown.

The Many Uses of CB. The Citizens Radio Service, after a decade of growth and development, still prides itself on being the communications facility of unlimited uses. CB is used in cars, trucks, airplanes, boats, motorcycles, tractors, and even on horseback. Base stations can be found in offices, garages, homes, police stations, fire houses, and Civil Defense offices. CB is probably the most unique, unusual, and useful means of communication ever developed for the small businessman or personal user because of its flexibility. The individual who purchases a CB system for direct communication between his home and his automobile may also serve as a Civil Defense volunteer. The small businessman who uses CB to dispatch a service repairman in the company truck, will probably have a third unit in his car to "keep in touch" with the office. Then an additional unit will be installed in his home. The doctor who employs a CB two-way system between his car and his office might also have a system with the same channels in his cottage at the lake, on his boat, with two or more walkie-talkies for use during trips in the woods.

The 1968 Plaisted Polar Expedition took five CB E. F. Johnson "Messenger III" transceivers into the Arctic. There, they were used for communications between base camps and the expedition snowmobiles.

In each of these examples, any one of the users also has at his fingertips the communications potential to contact hundreds of other CB'ers from practically any main highway in the country. More than 1000 CB clubs throughout the U.S. and Canada maintain monitoring systems within the membership on standby for emergency calls. An accident victim or a driver with a blowout or other mechanical problems can

trigger his transmitter with confidence, knowing someone will be monitoring one of the channels and will be quick to send help.

The Citizens Radio Service has invaded practically every walk of life in the United States, Canada, and several foreign countries. Plumbers, cleaners, pharmaceutical houses, gas stations, contractors, and other firms with pick-up, delivery, and repair services have a particular need for CB radio. The installation of a two-way CB radio system expedites service and saves time and money.

Law enforcement and other local government agencies have in the last few years realized the effectiveness of using CB in searches for lost or missing adults and children, escaped prisoners, or in handling traffic control problems within an area surrounding a large fire or disaster. Police, sheriff, and fire departments in hundreds of cities are in close contact with local CB clubs and enlist their aid as needed. In many communities, Civil Defense and the American Red Cross sponsor special training programs for interested CB'ers.

Who Gets a CB License? As defined by the Federal Communications Commission, the Citizens Radio Service permits the family, employees, and other responsible persons the licensee may delegate to communicate within the network of equipment he has installed in his individual system. Uses are limited only by the Rules and Regulations set forth by the FCC.

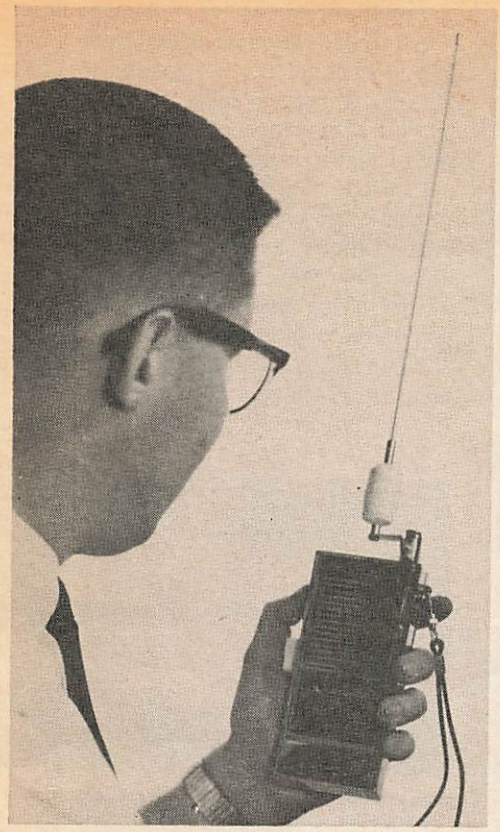
Any citizen of the United States who is at least 18 years of age can obtain a CB station license if his application meets the requirements of Part 95 of the FCC regulations.

Partnerships, associations, trusts, or corporations meeting the citizenship requirements of the Communications Act of 1934 and including any state, territory, or government entity, can also be licensed in the CB service, as can any organization or association—including Civil Defense and Civil Air Patrol organizations—operating by the authority of the local, state, or federal government.

Citizens Band stations may not be used for any purpose contrary to any law, or for broadcasting to the public in any way, or for unnecessary or frivolous communications. Also, they may not be used as links in the communications circuits of other radio services.

No charge can be made for messages relayed by CB stations or for the use of licensed equipment by persons other than the licensee. The licensee is responsible for the operation of stations licensed to him. Citizens Band stations may not be used for hobby communications, nor may a licensee of the Citizens Radio Service communicate with CB stations beyond a range of 150 miles.

Practically all CB mobile units are transistorized. This means that they draw less current from the car battery than older tube-type transceivers and they can be attractively packaged.



Walkie-talkies may be incorporated in your CB system if they can meet certain FCC specifications. Note in this photo that the old sixty-inch antenna has been replaced with a Hy-Gain loaded whip.

Class D Service. Equipment for the Class D Citizens Radio Service discussed here is operated in the 11-meter radio band with a user's choice of 23 separate channels between 26.965 and 27.255 MHz. Five watts input (four watts output) is the maximum power allowable.

Class D stations may communicate over distances of a few yards to 150 miles. Signal range is dependent upon terrain, type of equipment, and location of the antenna. Mobile-to-mobile range may vary from 5 to 50 miles, and fixed-location-to-fixed location range from 25 to 75 miles.

Communications between the base station and mobiles of a particular licensee may take place on any one of the 23 allocated channels. However, communications between an individual CB'er and his neighbor, or other CB'ers not operating under the first individual's license, can only take place on channels 9, 10, 11, 12, 13, 14, and 23.

Specific-Purpose Channels. Of the 23 channels available for use by licensed CB'ers, several have been adopted nationally for the handling of various types of message content. Channel 9 is accepted by thousands of individual CB'ers and has been endorsed and promoted by hundreds of clubs, rescue teams, and special purpose groups as the "National Calling and Emergency Channel."

This means that thousands of CB'ers in all parts of the country monitor (listen to) channel 9 when not otherwise occupied. Normally, licensees make their initial contact with the station they are calling and then both switch to an unused channel to conduct their business. Thus, the only conversation on channel 9 involves a brief calling period and the channel is clear for others.

There are definite advantages to using a

Later on in this part of the HANDBOOK there is a discussion of HELP, the Highway Emergency Locating Plan. This gas station monitors channel 9.

channel in this manner, especially on a national basis. The more users there are monitoring channel 9, the greater the chance for an emergency caller to arouse the attention of any one of hundreds of CB'ers within signal range. Also, using the channel strictly for calling and for emergency transmissions eliminates having to listen to conversations that do not involve those monitoring the channel. Channel 9 is one of the seven channels where interstation communication is permitted.

Channel 13 is used by non-commercial pleasure boats as a "water-going" channel. It puts boaters in touch with one another

You are not required by the Federal Communications Commission to have your CB license always in your possession. However, each transceiver should be labelled with one of these special Form 452C tags.

and with shore stations and mobile units on the road. Shoreline CB'ers have also taken on the responsibility of monitoring the waterways for distress calls on channel 13.

Channel 22 is generally used by Civil Defense groups, employing the aid of CB'ers during emergency situations such as floods, searches for missing persons, and traffic control at community events. CB'ers working with these agencies in time of emergency may not use their own call signs, but must be assigned temporary use of Civil Defense CB callsigns.

While channel selection varies in different parts of the country, those listed above are the most popular. Many CB clubs have posted signs on main highways leading into the cities in which they operate to indicate which channel is monitored in the area as an aid to travelers. If you are traveling in unfamiliar ground, find yourself in trouble and in doubt, try channel 9 first.

Applying For Your CB License

CITIZENS RADIO SERVICE (CB)

Follow These Instructions to the Letter

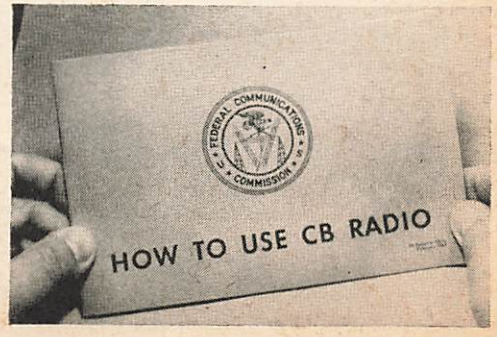
BY PEGGY PLOGER, KLJ8033

UNLIKE MOST questionnaires that appear to require a law degree to complete in exchange for permissive actions that are controlled by the Federal Government, an application requesting a Class D Citizens Band station license requires merely a truthful answer to twenty individual questions and one legal signature. By reading and filling out the work sheet carefully, checking it over for errors, and then filling out the license application, the applicant can expect receipt of his license from the Federal Communications Commission in two or three weeks. Incomplete forms, incorrect answers, or sending the wrong fee can, however, cause lengthy delays created by the return of the form to the licensee.

A station license must be obtained from the Federal Communications Commission to legalize the operation of all types, models, and brands of CB radio equipment with an input power above 100 milliwatts. The rules exclude control of palm-size walkie-talkies of less power. Pairs of the smaller units may be used without a license for communications between equipment of similar power limitation. Walkie-talkies may not be employed in a licensed CB system unless they have been included in the total number of transmitters requested in your application to the FCC. They must also meet certain technical specifications in regard to frequency control.

Your station license callsign—a combination of three letters and four digits—appears on your license as issued by the FCC. Your callsign is valid for 5 years, renewable prior to expiration. A new ruling regarding applications for renewal of CB licenses that have not been suspended, revoked, or have lapsed, grants the licensee the same callsign for an additional five-year period. Renewal requests should be forwarded to the FCC at least 60 days prior to expiration of the current license and application made on the latest Class D CB form available. As of this printing the accepted CB license application is Form 505, August, 1966.

New licensees and renewals are mailed the FCC's 42-page booklet, "How to Use CB Radio," (SS Bulletin 1001a, Feb. 1967). Newcomers to two-way communications and veteran CB users will find the material an informative guide to proper communications. In fact, it should be con-



This booklet tells you what to expect from your CB equipment and how it should be used. The accent in "How To Use CB Radio" is on being a legal operator.

sidered **must** reading by all persons utilizing CB.

The maximum number of transmitters that an individual CB'er can apply for without explanation is six—including his own base station. A business may apply for 12 without explanation but is requested to explain the necessity for 13 or more transmitters. The FCC is not too strict on this point, but does expect reasonableness. It is important to include the total number of transceivers you feel you might be using during the five-year licensing period, including walkie-talkies or portable units. If you should find during the licensing period that you have a requirement for more transmitters than the total for which you have been licensed, it will be necessary to file a new application, paying the fee applicable for a new full five-year period.

Filling Out Form 505. The current CB license form is available from the FCC, Washington, D.C. (also FCC field offices), and is usually packaged with new CB equipment. Many CB dealers and distributors also keep a supply on hand. This same form is used to modify an existing license (increase the number of transmitters, transfer control of licensee corporation, etc.). If a license is lost, a duplicate can be obtained from the FCC by applying for it on Form 505 attaching a statement as to how the original was lost.

All Class D station license applications must be accompanied by a personal check (no cash) for $8.00 made payable to the Federal Communications Commission.

If you should change your address within the five-year period, you are required to notify the FCC of the change. This can be handled by sending a postcard giving your callsign, name (as it appears on the CB license), and the old and new addresses, including the zip code of the new address. This information should be mailed to: Federal Communications Commission, 334 York St., Gettysburg, Pa. 17325. Your callsign will remain the same for the remainder of the five-year period.

A step-by-step procedure is given below to help the CB applicant complete the necessary paper work. The item numbers match those on Form 505. The top sheet of your Form 505 should be overprinted in large red letters with the words WORK SHEET. Fill in the work sheet (in pencil) first, check all the answers, then transfer (with typewriter or in ink) the correct answers to the actual application.

Item 1. Enter your business name or legal **last** name here. (If the license is for business purposes, print in the firm name.) On the second line, enter your first name and middle initial. Married women should use their own names (i.e., Julie Jones, not Mrs. John Jones.)

Item 2. If you will be operating under a trade name, you should enter your name here; or, if in a partnership, you must list the names of your partners in the spaces provided. (Do not repeat any name used in Item 1.)

Item 3. Insert your mailing address in this box. If you are doubtful as to the county in which you live, you can phone any local or state government office for the correct information. Be sure to include your zip code.

Item 4. Place an X in the appropriate box.

Item 5. Place an X in the box labeled CLASS D.

Item 6. If you are applying for a CB station license for the first time, put an X in the box labeled NO. If you are reapplying for a license because you are adding more units to your system, or if your present license has expired, put an X in the box labeled YES and enter your present callsign on the line below.

Item 7. If this is your first request for licensing, place an X in the box labeled NO.

Item 8. Enter the number of transmitters you expect to use in your CB system. Two units make a complete two-way radio system; if you plan to add additional equipment to your facilities before your five-year license expires, you should include these in the number to be authorized at this time. Reapplying for the use of more transmitters after a license has been issued will require an additional $8 fee. Note the limitation as to number.

Item 9. Most CB'ers purchase equipment accepted by the FCC for Class D

FCC FORM 505
AUGUST 1988

UNITED STATES OF AMERICA
FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON, D.C. 20554

FORM APPROVED
BUDGET BUREAU NO. 52-R123.12

APPLICATION FOR CLASS B, C, OR D STATION LICENSE IN THE CITIZENS RADIO SERVICE

1. Application for Class A station license must be filed on FCC FORM 400.
2. Complete on typewriter or print clearly.
3. Be sure application is signed and dated. *Mail* application to Federal Communications Commission, Gettysburg, Pa. 17325.
4. Enclose $8 fee with application. DO NOT SUBMIT CASH. Make check or money order payable to Federal Communications Commission. The fee will not be refunded even if the application is not granted. Also, fee overpayments of $2 or less will not be refunded. (No fee is required for an application filed by a governmental entity. For additional exemptions, see Part 95, Volume VI of the FCC Rules.)

DO NOT WRITE IN THIS BLOCK

1 NAME OF APPLICANT

BUSINESS NAME (IF ANY) OR, IF APPLYING ONLY AS AN INDIVIDUAL, GIVE LAST NAME

FIRST NAME (IF AN INDIVIDUAL) | MIDDLE INITIAL

2 IF AN INDIVIDUAL OPERATING UNDER A TRADE NAME, GIVE INDIVIDUAL NAME, OR IF PARTNERSHIP, LIST NAMES OF PARTNERS (*Do not repeat any name used in item 1*)

LAST NAMES	FIRST NAMES	MIDDLE INITIAL

3 PERMANENT MAILING ADDRESS

NUMBER AND STREET

CITY | STATE

ZIP CODE | COUNTY

4 CLASSIFICATION OF APPLICANT (*See instructions*)

☐ INDIVIDUAL ☐ ASSOCIATION ☐ GOVERNMENTAL ENTITY
☐ INDIVIDUAL/DBA ☐ CORPORATION ☐ OTHER (*Specify*):
☐ BUSINESS PARTNERSHIP

5 CLASS OF STATION (*Check only one*) (*See instructions*)

☐ CLASS B ☐ CLASS C ☐ CLASS D

6 IS THIS APPLICATION TO MODIFY OR RENEW AN EXISTING STATION LICENSE? (*See specific instruction 6*)

☐ YES (*Give call sign*): ☐ NO

IF YES, EXPLAIN UNDER REMARKS

7 DO YOU NOW HOLD ANY STATION LICENSE OTHER THAN THAT COVERED BY ITEM 6 OF THE SAME CLASS AS THAT REQUESTED BY THIS APPLICATION? (*See instructions*)

☐ YES ☐ NO

IF YES, FURNISH CALL SIGN(S)

8 TOTAL NUMBER OF TRANSMITTERS TO BE AUTHORIZED UNDER REQUESTED STATION LICENSE

(*Number*)

EXPLANATION MAY BE REQUIRED. SEE INSTRUCTIONS.

		YES	NO
9	DOES EACH TRANSMITTER TO BE OPERATED APPEAR ON THE COMMISSION'S "RADIO EQUIPMENT LIST, PART C," OR, IF FOR CLASS C STATIONS USING FREQUENCIES IN THE 26-27 MC/S BAND OR CLASS D STATIONS, IS IT CRYSTAL-CONTROLLED? (*If no, attach detailed description: see subpart C of Part 95*)		
10	A WILL APPLICANT OWN ALL THE RADIO EQUIPMENT? (*If no, answer B and C below*)		
	B NAME OF OWNER		
	C IS THE APPLICANT A PARTY TO A WRITTEN LEASE OR OTHER AGREEMENT UNDER WHICH THE OWNERSHIP OR CONTROL WILL BE EXERCISED IN THE SAME MANNER AS IF THE EQUIPMENT WERE OWNED BY THE APPLICANT?		
11	HAS APPLICANT READ AND UNDERSTOOD THE PROVISIONS OF PART 95, SUBPART D DEALING WITH PERMISSIBLE COMMUNICATIONS FOR WHICH THIS CLASS OF STATION MAY BE USED?		
12	IF THE STATION IS TO BE USED FOR VOICE COMMUNICATION, DOES APPLICANT CERTIFY THAT IT WILL NOT BE USED EITHER FOR COMMUNICATION OVER A DISTANCE EXCEEDING 150 MILES, OR FOR THE EXCHANGE OF CHIT-CHAT, IDLE CONVERSATION, DISCUSSION OF EQUIPMENT, OR HOBBY-TYPE COMMUNICATIONS?		
13	WILL ANY PERSON, OTHER THAN (1) THE APPLICANT, (2) MEMBERS OF HIS IMMEDIATE FAMILY LIVING IN THE SAME HOUSEHOLD, OR (3) HIS EMPLOYEES, OPERATE THE STATION? (*If yes, attach a separate sheet listing the names and relationship of all such persons and give a detailed reason for their operation of your station*)		
14	IF APPLICANT IS AN INDIVIDUAL OR A PARTNERSHIP, ARE YOU OR ANY OF THE PARTNERS AN ALIEN? (*If the answer is yes, do not file this application because you are not eligible for a license*)		
15	IS APPLICANT, THE REPRESENTATIVE OF ANY ALIEN OR ANY FOREIGN GOVERNMENT? (*If yes, explain fully*)		
16	WITHIN 10 YEARS PREVIOUS TO THE DATE OF THIS APPLICATION, HAS THE APPLICANT OR ANY PARTY TO THIS APPLICATION BEEN CONVICTED IN A FEDERAL, STATE, OR LOCAL COURT OF ANY CRIME FOR WHICH THE PENALTY IMPOSED WAS A FINE OF $500 OR MORE, OR AN IMPRISONMENT OF 6 MONTHS OR MORE? **IF YES, SEE INSTRUCTIONS.**		
17	IF APPLICANT IS AN INDIVIDUAL OR A PARTNERSHIP, ARE YOU OR ANY PARTNER LESS THAN 18 YEARS OF AGE (LESS THAN 12 YEARS OF AGE IF FOR CLASS C STATION LICENSE)? (*If the answer is yes, do not file this application. Persons under 16 are not eligible for a Class B or Class D license and persons under 12 are not eligible for a Class C license*)		

18 **IF ITEM 3 SHOWS P.O. BOX OR RFD NUMBER, GIVE A LOCATION WHERE THE LICENSEE OR THE STATION MAY BE FOUND.** (*DO NOT GIVE POST OFFICE BOX OR RFD NUMBER.*)

NUMBER AND STREET

CITY | STATE

IF LOCATION CANNOT BE SPECIFIED BY STREET, CITY, AND STATE, GIVE OTHER DESCRIPTION OF LOCATION SUCH AS DISTANCE AND DIRECTION FROM NEAREST MAJOR ROAD INTERSECTION OR FROM NEAREST TOWN OR CITY.

DO NOT WRITE IN THIS BOX
SCREENING ☐ Y ☐ N
SIGNATURE ☐ Y ☐ N

SIGN AND DATE THE APPLICATION ON REVERSE SIDE

		YES	NO
19	*IF APPLICANT IS A NONGOVERNMENTAL CORPORATION, ANSWER THE FOLLOWING ITEMS:*		
A	IS CORPORATION ORGANIZED UNDER LAWS OF ANY FOREIGN GOVERNMENT? (*If yes, do not file the application because you are not eligible for a station license*)		
B	IS ANY OFFICER OR DIRECTOR OF THE CORPORATION AN ALIEN? (*If yes, do not file the application because you are not eligible for a station license*)		
C	IS MORE THAN ONE-FIFTH OF THE CAPITAL STOCK EITHER OWNED OF RECORD OR MAY [illegible] ALIENS OR THEIR REP[illegible]		
20.	*IF APPLICANT IS AN UNINCORPORATED ASSOCIATION, ANSWER THE FOLLOWING ITEMS*		
A	IS ANY OFFICER OR DIRECTOR OF THE ASSOCIATION AN ALIEN? (*If yes, do not file the application because you are not eligible for a station license*)		
B	ARE MORE THAN ONE FIFTH OF THE VOTING MEMBERS OF THE ASSOCIATION ALIENS OR REPRESENTATIVES OF ALIENS, FOREIGN GOVERNMENTS OR REPRESENTATIVES THEREOF, OR CORPORATIONS ORGANIZED UNDER [illegible]		

operation, so mark the box labeled YES with an X. If in doubt, ask your supplier—he should know.

Item 10. In almost all cases, you will either own or plan to purchase CB transceivers. Mark the box labeled YES. If you will not own the equipment (it may be leased), you must fill in items B and C below the question.

Item 11. Here the FCC wants to know that you understand the provisions of Part 95 of the Rules concerning the permissible communications for which you will be using your station. You must have a copy of Part 95 in your possession before operating your CB station.

Item 12. This question asks you to certify that you will be operating your CB system in accordance with the Rules set forth in Part 95.

Item 13. If persons other than your immediate family or employees will be operating your equipment, you must list their names and relationships on a separate sheet of paper with a detailed reason for their operation of your station.

Item 14. Answer this question with a NO unless you are (or, if a partnership, one of your partners is) an alien. If the answer is YES, do not file this application. Aliens are not eligible for license.

Item 15. Unless this question is answered with a NO, you must give a detailed explanation on another sheet.

Item 16. Enter the appropriate answer here. If your answer is YES, you must also answer the three lengthy questions asked under this item which are contained in the FCC's Specific Instructions sheet attached to Form 505.

Item 17. Your answer here must be a truthful NO to be eligible for a CB station license.

Item 18. If the location from which you will operate your base station is different from your mailing address, you must enter the station address on these lines.

Items 19 and 20. These need be answered only if applicable. If either pertains to you, take your time in answering them. If in doubt as to how they should be answered, consult an attorney.

Finally, the FCC asks that you attest to seven statements listed on the bottom of the form by signing on the signature line, dating the form, and checking one last box applicable to your position in applying for a license. **Read** the statements, understand them, and approve of them before signing.

Check all of your answers on the work sheet. When you are sure they're correct, transfer this information to the actual application form. Be sure to sign the application when it is completed. An unsigned application or one with errors or omissions will be returned without your license!

Mail the Form 505 application with your check or money order to the Federal Communications Commission, Gettysburg, Pa. 17325.

An order blank for Volume VI, Part 95 of the Rules and Regulations applicable to CB is attached to your 505 application form. If you do not have a copy of the Rules, complete this form and mail it to the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402, with a check or money order for $1.25. You will receive the current FCC Rules and Regulations for CB and, automatically, all subsequent additions, changes, or corrections.

While You're Waiting. Computerized processing of license applications has trimmed the antiquated procedures of ten years ago from three or four months to generally less than three weeks. It is NOT worth jeopardizing the privilege you are requesting by using your transmitter before receiving your license. You may, however, monitor (listen to) incoming signals to your curiosity's content prior to receiving authorization to transmit.

When you receive your license, post it near or attach it to your base station transceiver where it can be examined by the proper authorities if the occasion arises. FCC Form 452-C (transmitter identification card) or a photocopy of your license should be attached to each mobile unit used under your callsign. These tags are included with most units manufactured. Additional tags are available from FCC field offices.

Prior to the arrival of your license, check out your installation.

CB Equipment Catalog

CITIZENS RADIO SERVICE (CB)

Features of the 5-Watt Transceivers

BY THE COMMUNICATIONS HANDBOOK STAFF

THE FOLLOWING PAGES show in tabular form all of the principal characteristics of those Citizens Radio Service (CB) transceivers which meet the 5-watt input requirements of Part 95 of the Federal Communications Commission Rules and Regulations.

Type of Signal: Although the overwhelming majority of CB transceivers broadcast a straight amplitude-modulated (AM) signal, several models reduce the strength of the carrier and pack slightly more power into the sidebands —which contain the all-important modulation components. The latter signals are referred to in the Table starting on the next page as "DSB" (double-sideband with reduced carrier). Several manufacturers are offering a single-sideband suppressed-carrier transceiver and the emission is referred to as "SSB." A few transceivers are capable of receiving SSB signals, but not capable of radiating a true single-sideband signal. In general, most CB transceivers cannot convert a SSB signal into readable modulation.

No. of Transmitting Channels: All Class D stations have permission to operate on any one of 23 channels in the CB 11-meter band. Transmissions must be crystal-controlled and the tolerances of the crystals must be better than 0.005% in frequency deviation. Although most transceivers are driven directly by crystals that resonate at one-half or one-third the transmitted frequency, a system of frequency synthesis is quite common. This system permits generation of all 23 channels through the use of from 6 to 10 crystals. This can be done in well-designed equipment with no

(*Continued on page* 26)

Clean-cut functional design is evident in the Johnson "Messenger 223" (below). This unit is for base station use. Mobile transceivers similar to the Mark "Invader-23" (right, above) or the Squires-Sanders "Skipper" feature rugged construction and flat pancake-like symmetry.

Manufacturer	Model	Type of Signal	No. of Transmit Channels	No. of Receive Channels	Tunable Receiver	Power Supply (Volts)	Receiver	Circuit	Notes	Price
Allied Radio Corp. **100 N. Western Ave.** **Chicago, Ill. 60680**	A-2530	AM	10	10	yes	117 and 12	double superhet	solid-state	3,4,7,8,11,12	$109.95
	A-2567	AM	23	23	yes	117 and 12	double superhet	tubes	1,2,3,7,8	$179.95
	A-2569	AM	23	23	no	12	double superhet	solid-state	1,2,3,7,12	$149.95
	Safari II	AM	5	5	no	12	superhet	solid-state	10,11	$ 69.95 (K)
	Safari III	AM	23	23	yes	12	superhet	solid-state	7,10,11,23	$ 89.95 (K)
Amphenol Corporation **2875 S. 25th Ave.** **Broadview, Ill. 60153**	675	AM	10	10	no	12	double superhet	solid-state	3,5,11	$159.95
	725	AM	8	8	no	12	superhet	solid-state	10,11	$109.95
	750	AM	6	6	no	12	superhet	solid-state	11	$ 79.95
	777	AM	23	23	no	12	double superhet	solid-state	1,3,7,8,10,23	$169.95
B & K, Dynascan Corp. **1801 W. Belle Plaine** **Chicago, Ill. 60613**	Cobra V	AM	5	5	no	12	superhet	solid-state	2,11,23	$ 99.95
	Cobra 23	AM	23	23	no	12	superhet	solid-state	1,2,7,8,23	$169.95
	CAM 88	AM	23	23	yes	117 and 12	double superhet	tubes	1,2,3,7,8,12	$214.95
Browning Labs., Inc. **1269 Union Ave.** **Laconia, N. H. 03246**	Eagle	AM	23	23	yes	117	double superhet	tubes	2,4,7,8,9	$395.00
	Eaglette	AM	23	23	no	12	double superhet	solid-state	1,2,3,7,12,23	$209.50
Burstein-Applebee Co. **3199 Mercier St.** **Kansas City, Mo. 64111**	BA23X	AM	23	23	yes	117 and 12	double superhet	tubes	4,7,8	$119.95
Courier Communications, Inc. **439 Frelinghuysen Ave.** **Newark, N.J. 07114**	Courier 23	AM	23	23	yes	117 and 12	double superhet	tubes	1,3,7,8,12	$169.00
	Courier 23 Plus	AM	23	23	yes	117 and 12	double superhet	tubes	1,3,7,8,9,12	$189.00

	Courier Classic	AM	23	23	yes	12	double superhet	solid-state	1,3,7,12,23	$189.00
	Courier Royale	AM	23	23	yes	117 and 12	double superhet	tubes	1,2,3,7,8,9,12,15	$249.00
	Courier TR5	AM	5	5	no	12	superhet	solid-state	5,10,11,12,22,23	$ 99.00
	Courier Traveller	AM	23	23	yes	12	superhet	solid-state	1,2,7,22,23	$149.00
	CWT-50	AM	6	6	no	—	superhet	solid-state	2,3,11,18,23	$ 99.95
Demco Electronics Bristol, Ind. 46507	Chalet	AM	6	6	no	12	superhet	solid-state	10,11,23	$139.50
	Ravelle	AM	6	6	yes	117 and 12	superhet	tubes	3,7,11,12	$139.50
	Ravelle 23	AM	23	23	yes	117 and 12	double superhet	tubes	1,3,7,12	$249.50
	Satelite	AM	23	23	yes	117	double superhet	tubes	1,2,7,8,9,10,13	$450.00
EICO Electronic Instrument Co., Inc. 283 Malta St. Brooklyn, N.Y. 11207	7923	AM	23	23	yes	12	superhet	solid-state	1,7,8,12,23	$189.95
	779A	AM	23	23	yes	117 and 12	double superhet	tubes	1,2,3,7,8	$169.95
Fanon Electronic Industries 439 Frelinghuysen Ave. Newark, N.J. 07114	M2300	AM	23	23	yes	117 and 12	double superhet	tubes	1,3,7,8,12	$189.95
	T-23	AM	23	23	yes	12	double superhet	solid-state	1,2,7,22,23	$159.95
	XM2300	AM	23	23	yes	117 and 12	double superhet	tubes	1,3,7,8,9,12	$199.95
	XT-23	AM	23	23	yes	12	double superhet	solid-state	1,3,7,12,23	$199.95

NOTES

1—Incorporates frequency synthesis circuit
2—Transmitter circuitry includes a system of speech clipping or modulation percentage boosting
3—Can be switched to "Public Address" from front panel
4—"Spotting" switch on front panel
5—Transmit crystal socket on front panel
6—Transceiver has socket connections to use manufacturer's selective calling system
7—Meter on front panel reads "S-units"
8—Meter on front panel reads approximate power output
9—Receiver features low-noise Nuvistor front end
10—This description fits basic unit—see manufacturer's catalog for numerous optional accessories
11—Transceiver requires 2 extra crystals per channel
12—Rear skirt provision for remote speaker (paging)
13—Transceiver features dual antenna (switched) connections
14—Transceiver has power switching to reduce transmitter input to 100 milliwatts
15—Receiver features front panel r.f sensitivity switch or control
16—Transceiver may be tuned to either sideband for SSB mode of operation
17—Main body of transceiver is mounted in trunk and operated from driver's position by remote control
18—Walkie-talkie
19—Transceiver feeds received signal to car radio; no complete receiver in this package
20—Requires only 1 crystal per controlled channel (transmit/receive)
21—Doubles as wired intercom system
22—Receiver features i.f. noise blanking
23—A.C. power pack available

Manufacturer	Model	Type of Signal	No. of Transmit Channels	No. of Receive Channels	Tunable Receiver	Power Supply (Volts)	Receiver	Circuit	Notes	Price
General Radiotelephone Co. 3501 W. Burbank Blvd. Burbank, Calif. 91505	Super MC-8	AM	23	23	no	117 and 12	double superhet	tubes	1,2,3,6,7,8,12,15	$199.50
	Super MC-11	AM	23	23	no	117 and 12	double superhet	tubes	2,3,7,9,15,20	$259.50
	VS-6	AM	5	5	no	117 and 12	double superhet	tubes	3,6,11,12,15	$ 99.50
Hammarlund Mfg. Co. 73-88 Hammarlund Drive Mars Hill, N.C. 28754	HQ-205	AM	6	6	yes	117	superhet	tubes	4,5,7,11,15	$259.95
Harmon Electronics, Inc. Grain Valley, Mo.	HCB-100	AM	6	6	no	12	superhet	solid-state	3,6,10,11,23	$ 95.50
Heath Company Benton Harbor, Mich. 49023	GW-14	AM	23	23	yes	12	superhet	solid-state	7,8,10,11	$ 76.95 (K) $124.95 (W)
	GW-22A	AM	5	5	no	117	superhet	tubes	10	$ 47.95 (K)
	GW-22D	AM	5	5	no	12	superhet	tubes	10	$ 49.95 (K)
International Crystal Mfg. Co., Inc. 18 N. Lee Oklahoma City, Okla. 73102	MO-23	AM	23	23	yes	12	double superhet	hybrid	1,2,17	$245.00
E. F. Johnson Company Waseca, Minn.	Messenger I	AM	5	5	no	117 and 12	superhet	tubes	6,10,11	$114.95
	Messenger II	AM	10	10	yes	117 and 12	superhet	tubes	6,10,11	$159.95
	Messenger III	AM	11	11	no	12	double superhet	solid-state	2,3,6,10,11,23	$159.95
	Messenger 100	AM	6	6	no	12	superhet	solid-state	2,3,6,10,11,23	$129.95
	Messenger 110	AM	5	5	no	12	superhet	solid-state	2,6,10,11,23	$ 99.95
	Messenger 223	AM	23	23	yes	117	double superhet	solid-state	1,2,7,8,10,23	$214.95
	Messenger 300	AM	12	12	no	12	double superhet	solid-state	2,3,6,10,11,12,23	$189.95

	Messenger 320	AM	23	23	yes	12	superhet	tubes	1,2,7,8,10	$199.50
	Messenger 323	AM	23	23	yes	12	double superhet	solid-state	1,2,3,6,7,8,10,12,23	$229.95
	Messenger 350	SSB	4	4	no	12	superhet	solid-state	3,6,10,11,12,16	$229.95
Kaar Electronics Corp. **1203 West St. Georges St.** **Linden, N.J. 07036**	Skylark I	AM	11	11	no	12	superhet	solid-state	3,10,12,23	$179.95
	Skylark II	AM	23	23	no	12	superhet	solid-state	3,10,12,23	$229.95
Lafayette Radio Electronics Corp. **111 Jericho Tnpk.** **Syosset, L.I., N.Y. 11791**	Dyna-Com 5	AM	3	3	no	—	superhet	solid-state	2,8,10,11,13,18	$ 99.95
	Dyna-Com 6	AM	6	6	no	—	superhet	solid-state	2,8,10,11,13,18	$ 99.95
	HB-525C	AM	23	23	yes	12	double superhet	solid-state	1,2,3,6,7,10,12,23	$149.95
	HB-625	AM	23	23	yes	12	double superhet	solid-state	1,2,3,6,7,10,12,22,23	$189.95
	Comstat-19	AM	9	9	yes	117	superhet	tubes	10,11,14	$ 59.95
	Comstat-23	AM	23	23	no	117	double superhet	tubes	2,3,6,7,8,10	$114.95
	Comstat-25A	AM	23	23	yes	117 and 12	double superhet	tubes	1,2,3,6,7,8	$139.95
	HB-23	AM	23	23	no	12	superhet	solid-state	1,6,7,10,12,20,23	$ 99.95
	HB-600	AM	23	23	yes	117 and 12	double superhet	solid-state	1,2,3,6,7,10,12,22	$219.95
	HE-20T	AM	12	12	yes	117 and 12	superhet	solid-state	3,6,7,8,11	$ 89.95
	Telsat 23	AM	23	23	no	117 and 12	double superhet	solid-state	1,2,3,6,7,8	$159.95

NOTES

1—Incorporates frequency synthesis circuitry
2—Transmitter circuitry includes a system of speech clipping or modulation percentage boosting
3—Can be switched to "Public Address" from front panel
4—Unit has a "Spotting" switch on front panel
5—Unit has a transmit crystal socket on front panel
6—Transceiver has socket connections to use manufacturer's selective calling system
7—Meter on front panel reads "S-units"
8—Meter on front panel reads approximate power output
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10—This description fits basic unit—see manufacturer's catalog for numerous optional accessories
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14—Transceiver has power switching to reduce transmitter input to 100 milliwatts
15—Receiver features front panel r.f. sensitivity switch or control
16—Transceiver may be tuned to either sideband for SSB mode of operation
17—Main body of transceiver is mounted in trunk and operated from driver's position by remote control
18—Walkie-talkie
19—Transceiver feeds received signal to car radio; no complete receiver in this package
20—Requires only 1 crystal per controlled channel (transmit/receive)
21—Doubles as wired intercom system
22—Receiver features i.f. noise blanking
23—A.C. power pack available

Manufacturer	Model	Type of Signal	No. of Transmit Channels	No. of Receive Channels	Tunable Receiver	Power Supply (Volts)	Receiver	Circuit	Notes	Price
Mark Products Co. 5439 West Fargo Ave. Skokie, Ill. 60076	Invader-23	AM	23	23	no	12	double superhet	solid-state	1,3,7,8,12	$169.95
Midland International Corp. 1909 Vernon Street North Kansas City, Mo. 64116	13-150	AM	8	8	no	12	superhet	solid-state	8,23	$ 89.95
	13-865	AM	23	23	no	12	double superhet	solid-state	1,2,3,7,8	$119.95
	13-870	AM	23	23	no	12	double superhet	solid-state	1,2,3,7,8 12,23	$149.95
	13-875	AM	23	23	no	117 and 12	double superhet	solid-state	1,2,3,7,8 12	$169.95
Multi-Elmac Co. 21470 Coolidge Oak Park, Mich. 48237	Citi-Fone II	AM	2	2	yes	12	superhet	solid-state	19	$ 49.95
	Citi-Fone 99	AM	8	8	no	117 and 12	superhet	tubes	7,8,11	$ 99.95
	Citi-Fone SS	AM	23	23	yes	117 and 12	superhet	tubes	1,7,8	$169.50
Olson Electronics, Inc. 260 S. Forge St. Akron, Ohio 44308	CB-8	AM	8	8	no	12	superhet	solid-state	11,23	$ 59.99
	CB-12	AM	12	12	no	12	superhet	solid-state	3,11,23	$ 99.99
	CB-88	AM	23	23	no	12	superhet	solid-state	1,2,3,7,12,22	$149.98
Pace Communications Corp. 24049 S. Frampton Ave. Harbor City, Calif. 90710	Pace 100	AM	6	6	no	12	double superhet	solid-state	6,7,10,11	$129.95
	Pace 200	AM	12	12	no	12	double superhet	solid-state	3,6,7,10,11,12	$159.95

Manufacturer	Model	Type of Signal	No. of Transmit Channels	No. of Receive Channels	Tunable Receiver	Power Supply (Volts)	Receiver	Circuit	Notes	Price
Mark Products Co. 5439 West Fargo Ave. Skokie, Ill. 60076	Invader-23	AM	23	23	no	12	double superhet	solid-state	1,3,7,8,12	$169.95
Midland International Corp. 1909 Vernon Street North Kansas City, Mo. 64116	13-150	AM	8	8	no	12	superhet	solid-state	8,23	$ 89.95
	13-865	AM	23	23	no	12	double superhet	solid-state	1,2,3,7,8	$119.95
	13-870	AM	23	23	no	12	double superhet	solid-state	1,2,3,7,8 12,23	$149.95
	13-875	AM	23	23	no	117 and 12	double superhet	solid-state	1,2,3,7,8 12	$169.95
Multi-Elmac Co. 21470 Coolidge Oak Park, Mich. 48237	Citi-Fone II	AM	2	2	yes	12	superhet	solid-state	19	$ 49.95
	Citi-Fone 99	AM	8	8	no	117 and 12	superhet	tubes	7,8,11	$ 99.95
	Citi-Fone SS	AM	23	23	yes	117 and 12	superhet	tubes	1,7,8	$169.50
Olson Electronics, Inc. 260 S. Forge St. Akron, Ohio 44308	CB-8	AM	8	8	no	12	superhet	solid-state	11,23	$ 59.99
	CB-12	AM	12	12	no	12	superhet	solid-state	3,11,23	$ 99.99
	CB-88	AM	23	23	no	12	superhet	solid-state	1,2,3,7,12,22	$149.98
Pace Communications Corp. 24049 S. Frampton Ave. Harbor City, Calif. 90710	Pace 100	AM	6	6	no	12	double superhet	solid-state	6,7,10,11	$129.95
	Pace 200	AM	12	12	no	12	double superhet	solid-state	3,6,7,10,11,12	$159.95

	Pace "Plus 23"	AM	23	23	no	12	double superhet	solid-state	3,7,8,10,11	$199.95
	Pace 2300	AM	23	23	no	12	double superhet	solid-state	3,6,7,8,10,11,12	$200.00
	Pace-Mate	AM	3	3	no	12	double superhet	solid-state	6,10,18	$ 99.95
Pearce-Simpson, Inc. **Box 800** **Biscayne Annex** **Miami, Fla. 33152**	Companion II	AM	5	5	yes	117 and 12	superhet	tubes	5,11,12	$159.90
	Companion IV	AM	10	10	no	12	superhet	solid-state	3,11,12,23	$139.90
	Director 23	AM	23	23	no	12	double superhet	solid-state	1,7,12,23	$269.90
	Guardian 23 (B)	AM	23	23	no	117 and 12	double superhet	tubes	1,7,8,9,12,15	$269.90
	Sentry II	AM	5	5	no	12	superhet	solid-state	11,12,23	$99.90
J.C. Penney Co., Inc. **1301 Avenue of the Americas** **New York, N.Y. 10019**	Pinto-23	AM	23	23	no	12	double superhet	solid-state	1,3,7,8	$129.00
Polytronics Communications **Allied Research Associates** **Box 536** **Baltimore, Md. 21203**	Poly-Beaver	AM	23	23	no	12	double superhet	solid-state	6,7,10,12,23	$199.95
	Poly-Pup	AM	7	7	no	12	superhet	solid-state	6,10,11,12,23	$129.50
	Poly-Otter	AM	7	7	no	12	superhet	solid-state	10,11,12,23	$199.50
	Poly-Comm 23	AM	23	23	yes	117 and 12	double superhet	tubes	1,3,6,7,8,9,10,12,14	$329.50

NOTES

1—Incorporates frequency synthesis circuitry
2—Transmitter circuitry includes a system of speech clipping or modulation percentage boosting
3—Can be switched to "Public Address" from front panel
4—Unit has a "Spotting" switch on front panel
5—Unit has a transmit crystal socket on front panel
6—Transceiver has socket connections to use manufacturer's selective calling system
7—Meter on front panel reads "S-units"
8—Meter on front panel reads approximate power output
9—Receiver features low-noise Nuvistor front end
10—This description fits basic unit—see manufacturer's catalog for numerous optional accessories
11—Transceiver requires 2 extra crystals per channel
12—Rear skirt provision for remote speaker (paging)
13—Transceiver features dual antenna (switched) connections.
14—Transceiver has power switching to reduce transmitter input to 100 milliwatts
15—Receiver features front panel r.f. sensitivity switch or control
16—Transceiver may be tuned to either sideband for SSB mode of operation
17—Main body of transceiver is mounted in trunk and operated from driver's position by remote control
18—Walkie-talkie
19—Transceiver feeds received signal to car radio; no complete receiver in this package
20—Requires only 1 crystal per controlled channel (transmit/receive)
21—Doubles as wired intercom system
22—Receiver features i.f. noise blanking
23—A.C. power pack available

Manufacturer	Model	Type of Signal	No. of Transmit Channels	No. of Receive Channels	Tunable Receiver	Power Supply (Volts)	Receiver	Circuit	Notes	Price
Radio Shack Corp. 730 Commonwealth Ave. Boston, Mass. 02215	TRC-18	AM	12	12	no	12	double superhet	solid-state	3,7,8,20	$ 99.95
	TRC-24	AM	23	23	no	12	double superhet	solid-state	1,3,7,8,12,23	$139.95
	TRC-100	AM	6	6	no		superhet	solid-state	2,3,11,18,23	$ 99.95
Ray-Tel by Raytheon 213 E. Grand Ave. S. San Francisco, Calif. 94080	TWR-7	AM	5	5	no	12	superhet	solid-state	3,11	$129.95
	TWR-9	AM	6	6	no	117	superhet	solid-state	11,21	$ 99.95
	TWR-11T	AM	9	9	yes	12	superhet	solid-state	3,6,10,11,12	$169.95
Regency Electronics, Inc. 7900 Pendleton Pike Indianapolis, Ind. 46226	Charger	AM	12	12	no	12	superhet	solid-state	3,11,12	$110.00
	Imperial	DSB	23	46	yes	117 and 12	double superhet	tubes	7,8,12,16	$329.95
	Pacer II	AM	11	23	yes	117 and 12	superhet	tubes	2,4,5,7	$110.00
	Range Gain II	DSB	23	23	yes	117 and 12	double superhet	tubes	1,7,8	$269.95
	GT-500	AM	12	12	no	12	superhet	solid-state	3,11,12,23	$ 99.95
	GT-523	AM	23	23	yes	12	double superhet	solid-state	1,3,7,8,12,23	$189.00
Sears, Roebuck and Company 3245 W. Arthington Chicago, Ill. 60607	Model 6556	AM	5	5	no	12	superhet	solid-state	2,10,11,23	$ 99.95
	Model 6558	AM	12	12	no	12	double superhet	solid-state	2,6,10,11,23	$134.95
	Model 6562	AM	23	23	yes	12	double superhet	solid-state	1,2,3,6,7,8,10,12,23	$199.95
Sonar Radio Corp. 73 Wortman Ave. Brooklyn, N.Y. 11207	Model E	AM	8	8	yes	117 and 12	superhet	tubes	6,10,11,12	$179.50
	Model FS-23	AM	23	23	yes	117 and 12	double superhet	tubes	1,6,7,8,9,10,11,12	$299.95
	Model G	AM	8	8	yes	117 and 12	double superhet	tubes	4,6,7,8,10,11,12	$229.50
	Model H	AM	8	8	no	117 and 12	superhet	tubes	6,10,11,12	$159.95
	Model J-23	AM	23	23	no	12	double superhet	solid-state	1,3,6,10,12,23	$239.95

Squires-Sanders, Inc. Martinsville Rd. Liberty Corner, N.J. 07938	Admiral	AM	23	23	no	117	double superhet	solid-state	1,2,3,7,12,13,15,22	$329.95
	Chief	AM	2	2	no		superhet	solid-state	2,7,8,18,20,23	$199.95 (pr.)
	Commodore	AM	23	23	no	12	double superhet	solid-state	1,12,22,23	$199.95
	Skipper	AM	23	23	no	12	double superhet	solid-state	1,2,3,7,12,15,22	$159.95
SSBCO P.O. Box 101 Northtown Sta. Chicago, Ill. 60645	Lancer-23	AM	23	23	no	12	double superhet	solid-state	1,7,8	$139.95
Tram Corporation Lower Bay Rd. Box 187 Winnisquam, N.H. 03289	Titan II	DSB	23	46	yes	117	double superhet	tubes	2,7,8,12,15,16	$482.00
Utica Electronics Inc. 2917 W. Irving Park Rd. Chicago, Ill. 60618	RME 660	AM	6	6	no	117 and 12	double superhet	tubes	7,8,11	n.a.
	RME 680	AM	6	6	no	117 and 12	double superhet	tubes	2,7,8,11	n.a.

NOTES

1—Incorporates frequency synthesis circuitry
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(Continued from page 17)
loss in stability or deviation above or below the true carrier frequency.

No. of Xtal Receive Channels: A majority of CB transceivers incorporate some crystal-controlled receiving channels—although alternative "spotting" methods are just as satisfactory. Transceivers with frequency synthesis automatically provide the identical number of transmitting and receiving channels—all crystal-controlled. If the numeral in this column is followed by a "plus" sign and the "Notes" column contains the figure "5," the transceiver has an additional transmitting crystal socket on the front panel.

Tunable Receiver: A means of keeping the cost of a CB transceiver down while adding convenience is to make the receiver tunable (rather than crystal-controlled) with a modest number of crystal-controlled transmitting channels. This arrangement permits cross-channel operation when the base and mobile are transmitting and receiving on different channels. In this column in the Table on the following pages, all frequency synthesis transceivers are considered to be *not* tunable, although strictly speaking the circuit will permit reception on any one of the 23 CB channels. Bandspread tuning of a receiver with this circuitry is limited and is generally crystal-controlled—meaning that the i.f. channel can be tuned 2.5 kHz above or 2.5 kHz below the nominal channel frequency. In some transceivers such tuning has been given the name "Delta." Unless otherwise indicated, the reader may assume that some sort of "bandspread" tuning has been included in the frequency-synthesis circuit.

Power Supply: In this Table the household a.c. line voltage has been "standardized" at 117 volts. Various manufacturers use 110, 115, or 117 volts in their literature, but we have stuck with the latter since it is closer to the true line voltage throughout most of North
(Continued on page 47)

Improving Your Communications Technique

CITIZENS RADIO SERVICE (CB)

How To Get The Most From Your CB Setup

BY MATT P. SPINELLO, KHC2060

IF YOU were tuning across the channels used by CB'ers, it would not be too unexpected to overhear a conversation such as this.

"KOD3631, KOD3631. This is KHC2060. Over."

"This is KOD3631. Back to KHC2060. Over."

"I heard you working another base station and since yours was the stronger signal, I hoped you might hear me and give me some information. I'm an Illinois mobile and I appear to be lost on one of the turnpikes. Over."

"Okay, KHC2060. This is KOD3631, right back. Glad to be of help. What sort of information do you need?"

"I have pulled off the turnpike at a pay telephone. Can I give you a land line to explain my dilemma?"

"Fine. My number is Lions 4-3122. That's LI-4-3122. Do you have that, KHC-2060?"

"Okay KOD3631. This is KHC2060 mobile. I have the number and will call you within the next few minutes. KHC2060 mobile clear."

"Okay, KHC2060 mobile. This is KOD-3631 base, standing by."

The lingo employed in the above exchange of information between two CB'ers is typical of the procedure used by thousands of CB'ers in communications message handling employing the Citizens Radio Service. Although a mock call—used here for reference purposes—the transmissions between the mobile and the base station contain several interesting considerations that will become habits after you operate CB two-way radio for a short period of time.

In the example, the lost mobile unit used good judgment in calling the one of two stations that sounded closest (loudest) to him. The mobile knew he might raise help quickly by contacting the station that would be more apt to receive his mobile signals. He was quick to identify himself and to state his problem. Also, the lost mobile unit felt that a detailed discussion of re-routing information might tie up the channel and he requested a land line (telephone) call to the base station. Equally important, both stations identified themselves frequently—especially at the beginning, in the middle and at the end of their exchange of information.

There are numerous tricks-of-the-trade and short cuts to effective message handling using CB. The uninitiated CB'er can learn much by monitoring the active channels in his area. The CB operator does not need a storehouse of technical knowledge to operate his equipment. If you are just getting started, or have not had the opportunity to analyze operating procedures in your locale, here are a few practical operating hints and procedures that will help you increase the usefulness of CB.

Placing a Call. Speak distinctly and enunciate clearly into the microphone. The

"Operating Manual" for your equipment should identify how far you should speak from the microphone. Generally, the speaking distance should be about 3" from the face of the microphone and slightly angled so that the lips are not parallel to the microphone (see below). When calling a mobile unit, for example, there is a good chance that the driver will be more concerned with manning his vehicle than listening to his CB radio. Also the CB'er may have the volume turned down and if the driver is at a distance (10-15 miles) from the base station, the signal may be weak.

The same is true in reverse and the necessity for clarity in addressing the base station is equally important. The base station operator may also have turned down the volume to keep party line calls on the same channel from interfering with his other day-to-day activities. The base station operator may also be busy and it is always possible that the mobile station may be in a very poor location.

In a CB communications network, the principal base station generally identifies itself as "base 1." A second or even a third base station will obviously identify themselves as "base 2" or "base 3." The mobile units operating with the duly licensed base station will use much the same procedure—simply identifying themselves as "mobile 1," "mobile 2," etc. In every case, of course, the full callsign of the licensed CB station will precede base or mobile identifier.

Don't hesitate to use your CB callsign. Remember that it is the legitimate CB'ers using their equipment in the way that the FCC envisioned the use of CB that demonstrate the value of this radio service. It is the illegitimate CB'er with the "funny callsign" who is up to no good and is trying to ruin CB.

Many CB'ers try to swallow the microphone by holding it too close to their lips. Hold the microphone about three inches away and slightly angled. Don't shout to increase modulation—it isn't necessary.

The 10-Code. Thanks to television we are all familiar with the use of one 10-Code signal as it is used repeatedly by smartly-dressed detectives, army troops, sheriffs, etc. It is the phrase "10-4" which seemingly signifies that a radio messsage has been received and understood. Actually, the 10-4 expression has become part of the language and is now used to indicate a simple "yes" or "okay—affirmative—acknowledged."

There is a definite place for the use of the 10-Code procedure within the framework of CB. The 10-Code method is effective when the volume of radio traffic is heavy, or when a detailed lengthy message may tie up an important channel for a long period of time. The 10-Code becomes even more effective when a mobile unit is near the end of its transmitting-receiving range and where numerals can be more readily understood than individual words or long sentences.

The conversation in the first part of this article, while short and to the point, might be trimmed even more by making use of the POPULAR ELECTRONICS 10-Code.

MOBILE: "KOD3631, KOD3631. This is KHC2060. Over."

BASE: "KOD3631 back to KHC2060. Over."

MOBILE: "Illinois mobile here in need of road directions."

BASE: "10-20?"

MOBILE: "Not sure. 10-21?"

BASE: "10-4. Number here is Lions 4-3122; repeat, LI-4-3122. 10-4?"

MOBILE: "10-4. KHC2060 mobile, out."
BASE: "KOD3631, 10-10."

Don't be surprised, when you first use the code, that it may take just as long to transmit a "coded" message as a fully-spoken message. As you gain familiarity with the basic numerals, however, your use of the 10-Code will soon become as automatic as your use of the English language. Note that in our example the use of the 10-Code has cut transmission time nearly in half. It has expedited the message handling, and thus has cleared the channel for use by others with equally urgent messages.

It is a good idea to post a copy of the 10-Code near the base station transceiver. The overhead visor is a handy location for the 10-Code in the mobile unit. Since it is a dangerous practice to transmit while driving, and against the law in some states, a mobile CB vehicle should pull off the road and come to a dead stop before originating or answering a CB call.

The Breaker. The "breaker" procedure is a nationally accepted means of asking for access to a CB channel already in use. It is used to break into a conversation between two other CB units—when you have a definite reason for doing so. The breaker (the party breaking into the conversation) takes advantage of the short time interval between transmissions—after one party has finished and before the other party begins transmitting.

The third party would attempt to enter the conversation by transmitting the phrase, break-break, or just simply breaker! The follow-up is usually handled by the party who was to have begun the next part of the conversation in progress. He will usually acknowledge the breaker, at which point the breaker puts in his bid for temporary use of the channel. This action is usually followed by a standby of the two stations previously engaged in conversation so that the "breaker" may place his call.

As an example, let's consider the conversation by two stations that we'll dub A and B who will be joined by the breaker, Station C. Station C has monitored the channel occupied by A and B to find a time that he can interrupt their conversation.

POPULAR ELECTRONICS Citizens Band "10-Code"

General Station Operation

10-1	Receiving poorly.
10-2	Signals good.
10-3	Stop transmitting.
10-4	Okay—Affirmative—Acknowledged.
10-5	Relay this message.
10-6	Busy, stand by.
10-7	Leaving the air.
10-8	Back on the air and standing by.
10-9	Repeat message.
10-10	Transmission completed, standing by.
10-11	Speak slower.
10-13	Advise weather and road conditions.
10-19	Return to base.
10-20	What is your location? My location is ——.
10-21	Call ————— by telephone.
10-22	Report in person to ————————.
10-23	Stand by.
10-24	Have you finished? I have finished.
10-25	Do you have contact with ————————?

Emergency or Unusual

10-30	Does not conform to Rules & Regulations.
10-33	Emergency traffic this station.
10-35	Confidential information.
10-36	Correct time.

Accident and Vehicle Handling

10-54	Accident.
10-55	Wrecker or tow truck needed.
10-56	Ambulance needed

Net Message Handling

10-60	What is next message number?
10-64	Net is clear.
10-66	Cancellation.
10-68	Repeat dispatch on message.
10-69	Have you dispatched message ————?

Personal

10-82	Reserve room for ————————.
10-88	Advise present phone number of ————.

Technical

10-89	Repairman needed.
10-90	Repairman will arrive at your station ——.
10-92	Poor signal, have transmitter checked.
10-93	Frequency check.
10-94	Give a test without voice for frequency check.
10-95	Test with modulation.
10-99	Unable to receive your signals.

STATION A: "I have several more stops for you to make, Bill. Got a pencil handy?"

STATION B: "10-4. Let me get a piece of paper."

STATION C: "Break-break!"

STATION A: "There's a 'breaker' in there, Bill. Stand by. Go, 'breaker!' "

STATION C: "This is KHD4785 with a hurry up call to my mobile."

STATION A: "10-4 KHD4785. We will clear for your call. KLJ8486, 10-10. Did you get that Bill?"

STATION B: "10-4. KLJ8486 mobile, 10-10."

Of course, the CB channels are a "party line," and not all CB'ers are as courteous as the two above. But emergencies should always take precedent and the majority of CB'ers will offer to help in situations where information must be relayed, or individuals are searching for their mobile. The author has found that if you treat others on your favorite CB channel as you would like to be treated, you will get a lot of effective communications from your system as well as help from others, as they become familiar with your activities.

Rules to Remember. The following are the 10 most important rules to keep in mind when operating your CB equipment.

1. You must identify your station at the beginning and the completion of each contact, regardless of whether the call or communications activity lasts 15 seconds or a full 5 minutes.

2. Use channels 9, 10, 11, 12, 13, 14, and 23 for INTERSTATION communications. All other CB channels are for use only by stations that carry your own callsign.

3. Make all of your transmissions brief and to the point. Long radio transmissions tend to confuse the other party since he can't interrupt you on two-way radio as he might on the telephone. Since it is difficult to remember all of the information that may be requested, it is to your advantage to toss one question at a time.

4. Stay within the 5-minute limitation

(Continued on page 36)

CB For Emergency Communications

CITIZENS RADIO SERVICE (CB)

CB Clubs Volunteer Their Services

BY MATT P. SPINELLO, KHC2060

IN THE PAST decade, Citizens Band clubs have sprung up almost as rapidly as people applied for licenses. The CB club concept grew, in many instances, out of a need to exchange information pertaining to installation, operation, and maintenance of the equipment.

Many club associations grew out of chance acquaintances made "on the air," followed up by invitations to meet in person. These meetings grew into extended "coffee breaks" which drew ever larger numbers of local CB'ers together. Discussions regarding the CB service and the various uses to which many were applying their two-way radio systems, prompted these groups to organize regular get-togethers. Many CB'ers were interested in how, working together, they might better serve their communities, in addition to using their communications facilities for their business operations and personal needs.

As CB grew, with handsful of licensees in any given area now numbering in the hundreds, clubs started to recruit new licensees to join their ranks. Members were needed to help monitor and police fellow CB'ers and to work out problems of sharing the channels. As base stations and mobile networks became established on a county-wide basis, club officers became aware of the increased value of their organization. There was a need for communications teams that could be made available on request to individuals, fire and police departments, Civil Defense, Civil Air Patrol, and as a coordinating link with amateur radio in time of disaster.

From the more than 1000 CB clubs spread across the U.S. and Canada, hundreds of clubs have organized emergency communications and rescue teams. Some teams may number as few as a dozen members, volunteering to monitor a specific CB channel on a 24-hour basis. This serves to aid travelers on surrounding highways and to act as relay links for local and area CB'ers with emergency traffic. Other clubs have memberships numbering as high as 200, with specialized teams trained in Red Cross first-aid procedures, Civil Defense, and disaster and riot control.

Many CB clubs become unofficial members of sheriff patrols, auxiliary police teams, and volunteer fire-fighters, equipped and prepared to handle as rigorous an assignment as authorities deem necessary. Police and sheriff's departments in many parts of the country have installed CB systems and monitor them around the clock so that CB'ers may report accidents, fires, burglary attempts, etc., from their mobile units.

Strictly on a voluntary basis, many CB club emergency teams have been known to provide communications in times of disaster. Tornado, cyclone, and hurricane victims know the value of CB. CB'ers have handled communications for entire communities following storms that have downed power facilities, crippled traffic, and separated family members.

Some Civil Defense CB groups have become affiliated with the local police through squads known as Civil Defense Auxiliary Police Corps. These groups are made up of licensed CB'ers who become active members of Civil Defense groups and then join the special squads. Following training in several phases of police work, their CB/CD police duties may include assistance at any type of emergency requiring the coordinated efforts of trained personnel.

Membership in the Auxiliary Police Corps is voluntary and CB'ers furnish their own two-way radio equipment, automobiles, uniforms, and insurance. Regulations require that to remain members of the APC, members must actively participate not only in Civil Defense meetings, but in auxiliary police gatherings as well.

CB In Emergencies. The following are just a few representative examples of the emergencies handled by CB'ers annually.

Within minutes after the Illinois communities of Belvidere, Oak Lawn, Lake Zurich, Barrington Hills, Stone Park, Woodstock, and parts of Chicago were hit by tornado funnels, leaving thousands homeless, 56 dead, and damage estimated above 60 millions (including a quarter of a million dollars destruction at O'Hare International Airport, near Chicago) thousands of volunteers poured into the disaster areas.

In Rockford, Illinois, the American Red Cross Headquarters became Communications Central, in radio contact with the disaster area in Belvidere, 12 miles to the east. In charge was Jay Hart, K9QYY/KPK5855, Communications Director of the Rock River Chapter, American Red Cross, ARRL Emergency Coordinator, and District Emergency Communications Chief, Ninth Navy MARS (Military Affiliate Radio System) District for all 13 Midwest states under the call letters, NØAJN.

Jay was on the air 20 minutes after notification of the disaster and supervised emergency communications for the next five days with time out for 6 hours sleep. Emergency CB gear was activated for direct contact with local base stations, a CB emergency van, and CB mobiles in the Belvidere area. Citizens Band operators were furnished by several groups, including the Rock River Valley Citizens Band Radio Emergency Squad, members of Rockford REACT, and groups from Skokie and Waukegan, Illinois; and Milwaukee, Wisconsin.

Approximately 225 individual CB'ers and 70 CB mobiles were put into immediate operation; twenty vehicles were used as two-man Red Cross first-aid teams in the Belvidere area; 5 patrolled as damage survey teams in Southern Winnebago County; 40 others were used for transport, communications, supply deliveries, location of missing persons, transportation of the injured, and administrative work.

In a report to the Federal Communications Commission, amateur CB'er Jay Hart praised Citizens Radio operators, Navy MARS members, and all radio amateur operators for having performed "a magnificent job."

Tornado disaster strikes the midwest and many CB clubs turn out to provide emergency communications.

Baton Rouge Emergency. Jim Greer, Allied Louisiana Emergency Radio Team member, learned recently that completing a CB monitoring shift at midnight doesn't always signal the end of the ALERT day. On his way out of the Bellemont Motor Hotel, where ALERT's emergency control center is located, Greer heard that a woman at the motel was suffering from what appeared to be a heart attack and that no ambulance was available to transport her to the hospital.

(Continued on page 151)

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CL-339

1969 Edition

CIRCLE NO. 16 ON READER SERVICE CARD

(Continued from page 30)

set forth in Part 95 of the FCC Rules and Regulations. If you have additional information that must be relayed to your mobile and have used up your time allocation, clear the channel for 5 minutes to allow others to place their calls, then contact your mobile station again once the channel has cleared and the 5 minutes have elapsed. This, of course, does not apply to units of the same station, or in times of emergency.

5. Use YOUR equipment with a DIFFERENT callsign if you qualify as a member of a duly licensed group activity such as a volunteer fire company, Civilian Defense group, etc. You are then a mobile unit of the primary licensee.

6. You may continue to operate and use your present callsign if you move to a new permanent address. However, you must notify the FCC of this change of address. Mail a postcard giving your callsign, your name (as it appears on the CB license), and the old and new address (including the zip code of the new address). Mail the postcard to the Federal Communications Commission, 334 York Street, Gettysburg, Pa. 17325.

7. Make the maximum possible use of the POPULAR ELECTRONICS 10-Code for speed, intelligibility, and fast message handling.

8. Use the "breaker" procedure ONLY when it is absolutely necessary to use the channel. Don't "break" merely to become a third party in a conversation.

9. Know as much about your radio equipment as possible. Speak clearly and distinctly. Don't attempt to over-modulate and don't "modify" your CB rig unless it is a procedure sanctioned by the equipment manufacturer.

10. Use channel 9 for emergency aid or for establishing an INTERSTATION contact. Be prepared to use any CB channel in case of an emergency. Part 95.85 of the Rules and Regulations permits a waiver of all restrictions where immediate safety of life or protection of property can be demonstrated.

Canada's General Radio Service

CITIZENS RADIO SERVICE (CB)

You Can Use Your CB Transceiver in Canada

BY WILLIAM BENDER, KOD4147

THE CANADIAN General Radio Service is similar to the U.S. Citizens Radio Service in that both are used by the general public for short-range business or personal communications. The two services are allocated frequencies within the 11-meter band, and Canadian GRS operators conduct their operations, club functions, and emergency team activities in much the same fashion as U.S. CB'ers. Canadians, in fact, frequently use the "CB" abbreviation because of the similarities between the two services.

The General Radio Service was inaugurated in April, 1962, nearly four years after the advent of the United States' Class D CB. The GRS is governed by the Department of Transport (Canada's FCC). The GRS is one of 20 different communications services licensed under Canada's Radio Act.

Rules and Regulations. Unlike FCC regulations that allow all CB base and mobile transceivers requested in the original application to be included under one license, DOT rules require that each piece of equipment in the GRS system be licensed individually. In the U.S. the $8 license fee covers all the equipment to be used by the licensee for a 5-year period. In Canada GRS/CB'ers must license each transceiver at a cost of $3 per unit, effective for a 3-year period following the first of April of the fiscal year in which the license is issued.

Operationally, Canadian licensees may only utilize 19 of the 23 channels available to CB'ers in the U.S. These channels, ranging from 27.005 to 27.225 MHz, are equivalent to U.S. CB channels 4 through 22. Channels 1, 2, and 3 are reserved for 11-meter ham operation and channel 23 is allocated to private radio paging systems or low-power municipal stations.

Licensing requirements for Canadian CB are slightly less stringent than in the U.S. The FCC requires the applicant be a United States citizen, but in Canada, the GRS applicant may be a business company incorporated within the Commonwealth or a British subject or landed immigrant not less than 18 years of age having a need for direct radio communications with similarly licensed Canadian stations.

There are six radio districts in Canada (GRS callsigns XM1 through XM6) and license application may be made by mail or in person to the Department of Transport district office nearest the applicant's residence. Each licensing office controls the area in which it is located, and is the point from which violation notices are sent. Canadians not familiar with the location of the nearest office in their area should write to the DOT, Air Service Branch, Hunter Building, Ottawa, Ontario.

GRS CB transceivers used in Canada are basically the same as those in operation in the U.S. except that the DOT requires that all equipment meet rigid standards, as specified in DOT Specifications #136. The DOT amended portions of its regulations several years ago to include very low power transceivers and to spell out rules that may

WHERE TO SEND "TOURIST" APPLICATIONS

Point of Entry	Regional Office
British Columbia	739 W. Hastings St. Vancouver 1, B.C.
Alberta	Federal Bldg. 9820 107th St. Edmonton, Alberta
Saskatchewan, Manitoba, Western Ontario, including Port Arthur	Winnipeg General P.O. Bldg. 226 Graham Ave. Winnipeg 1, Manitoba
Quebec	Regional Administration Bldg. Dorval, Quebec
Ontario, east of Port Arthur	25 St. Clair Ave. East Toronto, Ontario
New Brunswick, Nova Scotia, Prince Edward & Newfoundland	Federal Bldg. P.O. Box 42 1081 Main St. Moncton, New Brunswick

have been misinterpreted by some GRS users.

Walkie-talkies or any CB equipment with a final input of 100 mW or less had at one time been banned from the 27-MHz band in Canada. A DOT amendment now permits these units to operate without a license in the 26.97-to-27.27-MHz band, and to communicate with stations in the General Radio Service and Tourist Radio Service. They must, however, conform to GRS operating requirements.

Tourist Radio Service. The Tourist Radio Service enables any licensed U.S. CB'er to obtain a temporary GRS permit to use his CB equipment while visiting or traveling in Canada. There is no fee except 25¢ for a copy of the Tourist Service rules. The permit is not transferable and must be in the operator's possession at all times while he is in Canada. The permit remains valid for a period of one year and is renewable for an additional year if the operator expects to continue using CB equipment in Canada for an extended period or expects to revisit the country.

The DOT does not issue individual callsigns to TRS permits, but allows the U.S. CB'er to "tack on" the GRS prefix of XM to the end of his current U.S. CB callsign. For example, KHC2060, duly licensed by the DOT for use in Canada would become KHC2060XM.

Application for a TRS permit should be sent to the office nearest the Port of Entry at which the applicant will enter Canada. Address all requests to the Regional Superintendent, Radio Regulations, Department of Transport, c/o Regional Office.

The DOT requires that a U.S. CB'er give his name and address, CB callsign, class of service (Class D), and the period of time he intends to be in Canada. The Application should be made at least 30 days prior to entry. American CB'ers are permitted to use only the Canadian GRS channels 4 through 22 and must adhere to Canadian radio regulations.

CB Callbook

According to information in our hands at this time there is no Callbook of all CB stations.

Our CB success has gotten out of hand.

Introducing our first great line of 5W base/mobile rigs.

Fanon, world leader in hand-held CB and intercommunication is ready with its first great line of base station/mobile rigs.

Not the largest line in the field—but the finest. Carefully and skillfully developed and engineered for top performance. Units you can place your confidence in...and all made in the U.S.A.

and the finest hand-held CB rig ever produced.

MODEL IC-5000. 3 space age IC Circuits for the ultimate in range and performance. 5 watts & 6 channels. Power boost antenna. Range booster. PA facility. Converts to base station with optional AC power supply. **$99.95**

MODEL M 2300—18 tube performance. Unique modulation sampler. Range expand. All 23 channels. Dual conversion. Built-in PA system — transistorized power supply. **$189.95**

MODEL XM 2300 — 19 tube performance. Cascade front end. Nuvistor mixer. All 23 channels. Our most sensitive and quiet rig. **$199.95**

MODEL T 23 — Solid state engineering for unsurpassed reliability. 23 channels. Fiberglass expoxy circuit board with silicon transistors. Beautiful wood graining. Light-compact-powerful. Unique signal light tells you when S6 signal or better is received. **$159.95**

MODEL XT 23 — The finest solid state mobile rig on the market. All 23 channels. Unsurpassed adjacent channel rejection. Designed to help pierce "skip". Protected against overload, mismatched antenna and incorrect polarity. Base reflex type audio. Push/pull on-off switch with volume control. Push/pull noise limiter and squelch. True PA system. (All prices shown are East Coast suggested retail.) **$199.95**

FANON

FANON ELECTRONIC INDUSTRIES, 439 Frelinghuysen Ave., Newark, N.J. 07114

Your new line looks great! Please send me additional information. I'm especially interested in: CH-69

M 2300 ☐ XM 2300 ☐ T 23 ☐ XT 23 ☐ IC 5000 ☐

Name _____ City _____

Address _____ State _____ Zip _____

CIRCLE NO. 14 ON READER SERVICE CARD

CB In Use—A Case History

CITIZENS RADIO SERVICE (CB)

Radio communications doubles farm efficiency

BY MATT P. SPINELLO, KHC2060

CITIZENS BAND licensees have created an enviable record in team efforts to help other people in time of disaster. Reporting such assistance (while noteworthy and highly commendable) has become commonplace and expected. Anyone familiar with CB is usually aware of the general uses of the service in addition to personal and business uses. But what of the uses that are not necessarily irregular and are not commonly emphasized? The following is a success story in which CB has played a part in launching a corporate farm operation into big business. The story is extraordinary only to the extent that it demonstrates the unlimited uses of CB.

Carrol Muck, Edinburg, Indiana, heads a closed corporation called Hillrow, Incorporated. In fiscal 1966-67, the corporation grossed $196,000. Preliminary audits for 1967-68 indicate a gross in excess of $250,000. The Hillrow corporation is in corn growing, custom harvesting, and fertilizer application.

Stockholders in the company are all members of the immediate Muck family: Granddad, Frank Muck and wife, Loretta; Carrol; his son, David, and wife, Linda; Carrol's daughter, Linda, with son-in-law, Wray Emerick, and eight-year-old daughter and errand girl, Brenda.

Before CB, Carrol directed buying, selling, disposition of the drying harvested corn, and timing of custom planting and harvesting. David and Wray, along with full-time employee Curt Hildebrand, planted and harvested the crops. In the winter and spring they applied fertilizer on more than 15,000 acres of farm land within a 15-mile radius of home base.

The two Lindas and Loretta did the cooking, housekeeping, and phone answering in the three homes. Grand-dad was a rover, checking the needs of the trucks, tractors, and combines; running the errands in his pick-up truck to fulfill the many requirements of supplies, gasoline, oil, and food; and helping in moving the multiple items of machinery from job-to-job.

As the Mucks' enterprise grew, it became apparent that Grand-dad needed help—in spite of the fact that he often spent 18 hours per day on his service runs. The company considered adding another full-time employee and another pick-up truck.

But first the Mucks investigated CB with the help of Regency Electronics and their local radio parts distributor, Electronics Center. The investigation indicated that radio communications would be much more economical than the substantial investment in a new truck and an additional employee.

The CB installation began to pay for itself, and then some, immediately. With radio communication, Grand-dad's time was made 100% more efficient. He stopped being a rover. Radio enabled him to be where he was needed—when he was needed. CB eliminated the necessity of adding another employee and another truck. Carrol says that CB saves a full tank of gasoline

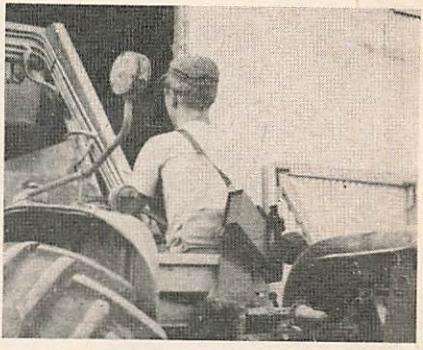
(Continued on page 44)

CB DOWN ON THE FARM

Grandfather Frank Muck makes continuous use of his CB transceiver in doing odd jobs and trouble-shooting around the Hillrow farm. Before CB, there was a lot of wasted time and effort in extra traveling that radio communications thoroughly eliminated.

The Muck family incorporated themselves as Hillrow, Inc. The stockholders are (left to right) Carrol Muck, Brenda Muck, Frank Muck, Mrs. Frank Muck, Wray Emerick (son-in-law), Mrs. Wray Emerick with Dee Ann, Mrs. David Muck and husband Dave Muck.

With his portable 5-watt CB transceiver swung over his shoulder, Carrol Muck reports on the pump at the liquid fertilizer storage tank. All of the CB equipment used on the Muck's farm was manufactured by Regency Electronics Inc., Indianapolis, Indiana and is typical of the gear offered by other CB concerns.



David Muck has another 5-watt portable CB transceiver and sometimes slings it over his shoulder while working with the tractor at the fertilizer storage dump. The Hillrow farm now markets fertilizer and a CB radio link has helped speed service.

In another tractor, Wray Emerick calls in to find out when lunch will be served. The CB transceiver is housed in a metal milk box to protect it from the weather and dust while plowing the corn fields.

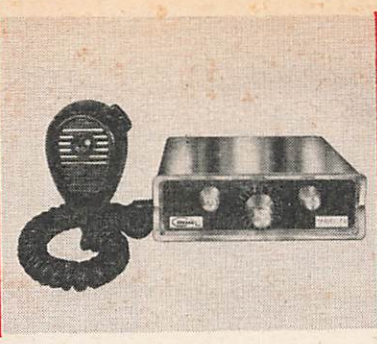
Compact solid-state transceivers, all guaranteed for ten years!

COURIER TR-5
5 channels

A lot of performance for under $100. The top performer for those who don't need 23 channels.

Silicon transistors throughout, just like our finest solid-state rigs. Illuminated channel selector, transmit indicator, auxiliary speaker jack, single-knob tuning, modulation indicator, external channel sockets, RF noise blanker, 100% modulation, triple-plated chrome cabinet. Plus exclusive Courier Safety Circuits® to protect against mismatched antenna, incorrect polarity, and overload. Compact price, compact size: 5¾″ x 1⅞″ x 6¼″.

$99
complete with crystals for Channel 9

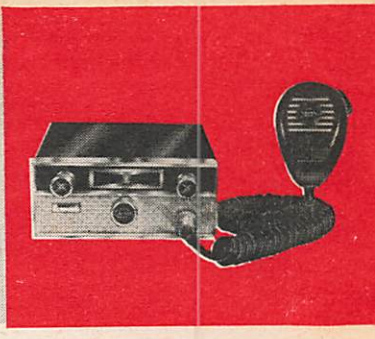


COURIER TRAVELLER
23 channels

World's smallest all-channel transceiver—with exclusive Incoming Signal Indicator.

A miracle of miniaturization—all 23 channels in a housing only 5¾″ x 1⅞″ x 6¼″. Exclusive new Incoming Signal Indicator that lights up when receiving S-6 or better signal—lets you mind your driving instead of minding a meter. Silicon transistors throughout. Super-efficient transmitter designed to help pierce "skip". Built-in noise limiter, 100% modulation, true automatic IF noise blanker, triple-plated chrome cabinet. Exclusive Courier Safety Circuits®.

$149
complete with crystals for all 23 channels



COURIER CLASSIC
23 channels

There'll never be anything better until Courier builds it!

Engineered for total reliability, designed to look sharp and work perfectly ten years from now. Silicon transistors throughout. Super-efficient transmitter designed to help pierce "skip". Adjustable noise limiter and noise-cancelling microphone. 100% modulation. Built-in PA system. And more. Everything we know about CB is built into this compact 6½″ x 2½″ x 8½″ unit.

$199
complete with crystals for all 23 channels

COURIER PORT-A-PAK
Makes your Courier TR-5 and Traveller solid-state transceivers completely portable.

$59.95

BASE STATION POWER CHARGER
Model PS-1. Operate your Courier solid-state CB transceiver as a base station.

$29.95

There's a Courier for the pro and the novice, the spender and the saver.

All Courier CB transceivers made in U.S.A.

Rugged heavy-duty tube-type CB with exclusive Modulation Sampler®—boosts your talk power electronically!

COURIER 23
23 channels

America's largest-selling CB rig!

Courier 23 deserves every bit of its popularity. Dollar for dollar, it offers more of what you want in CB: 23 crystal-controlled channels, dual conversion, transistorized power supply, illuminated S-RF meter, illuminated channel selector, PA system, auxiliary speaker jack, modulation indicator, full-time range-expander, triple-plated chrome cabinet. 100% modulation. Ready-to-go—mobile and base.

$189
complete with crystals for all 23 channels

COURIER 23-PLUS
23 channels

Greater sensitivity, more talk-power, less interference than any CB transceiver at its price!

New cascode front end and nuvistor mixer pull in all 23 channels louder and clearer than any other tube rig in its class. Full 5-watt input. Transistorized AC and DC power supply. Illuminated S-RF meter and channel selector. Modulation indicator. Automatic volume control. Floating gate squelch circuit. 100% modulation. PA system. Automatic noise limiter and noise-cancelling microphone. Triple-plated chrome cabinet. Full-time range-expander. Ready-to-go—mobile and base.

$199
complete with crystals for all 23 channels

COURIER ROYALE
23 channels

The dream rig! Finest CB unit you can buy.

Everything hand-wired, hand-soldered. Rugged chassis with 16 tube performance (including a Nuvistor) and an over-powered transformer. All 23 channels, with all crystals supplied. Highly efficient ceramic filter for the ultimate in selectivity. Cascode front end for increased sensitivity. Adjustable noise limiter. Enough? There's more! A new, exclusive full-time range-expander and speech compressor. Triple-duty meter. Transmit and Receive Indicators. Every feature for convenience, versatility. 100% modulation. Ready-to-go—mobile and base.

Complete, *very* complete: **$279**

The man who has everything and the CB'er just making a start.

Courier

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☐ Courier Traveller ☐ Courier 23 ☐ Courier Royale ☐ Power Charger

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FCH-69

Address _____

City _____ County _____

State _____ Zip _____

CIRCLE NO. 8 ON READER SERVICE CARD

CB CASE HISTORY

(from page 41)

per day. At approximately $6 per tank and at 6 working days per week, total savings amount to $1,872 per year. This figure alone almost pays for the $2,000 CB radio investment.

CB radio has enabled Hillrow to prevent loss of bulk fertilizer, heretofore exposed to rain, inasmuch as one family member can call the others via CB for immediate assistance to protect their product against inclement weather. CB gets credit for reducing time loss due to breakdown or hang-up in mud by as much as 50%. In the event one of the family experiences trouble, he uses CB to call for help.

Even the meal preparation chores have been streamlined by CB. A mid-morning check with each of the men determines what particular time will be most convenient to all for serving the noon meal. Planning and preparation is then conducted accordingly. The same process is repeated in the afternoon. All of the houses and barns have outdoor public address loudspeakers so that calls can be made from the kitchens to someone in the yard.

Hillrow's CB venture produced some side benefits not anticipated by Mucks and Regency. Five customers have new CB licenses and use them to contact the Hillrow people for fast fertilizer service.

Muck says he has run the entire gamut of farm profit-making ventures since his original 80-acre purchase in 1943. The enterprise has always included corn production with supplemental income from swine, then dairy cattle, then beef cattle. Progressive thinking and modern machinery led to custom farming. His own experience with fertilizers prompted the family's entry into the business of selling and applying fertilizer on a contract basis.

And now that the Mucks are on CB, eavesdroppers can listen to their progress by tuning to KRK3872. Stop by the farm—the Mucks are happy to talk of their successful ventures and the vital part played by CB.

Organized CB Emergency Programs

CITIZENS RADIO SERVICE (CB)

These Four Programs Insure Future of CB

BY WILLIAM BENDER, KOD4147

HIGHWAY SAFETY authorities, automobile manufacturers, and industrial researchers realize the potential value of being able to bring help quickly to those in need through mobile CB radio. They have kept close watch on statistics compiled where CB volunteers, whether as individuals, as groups from CB clubs, or as specially trained rescue teams, have aided emergency victims. These volunteers have earned for CB the accolade of being the largest "emergency" two-way radio communications system in the world.

The statistics gathered have prompted highway safety specialists to initiate test programs to extend the usefulness of CB. The basic concept is to establish emergency procedures to be executed in a uniform and organized manner, by which member groups can best serve the motoring public or anyone who could be assisted by two-way radio. Considerations have also been given to the possibility of linking such organizations on a coast-to-coast basis in the event of a national disaster.

A number of plans operating at a local level have proven highly successful. Here is a capsule review of those attracting the public's attention as this is written.

REACT. "Radio Emergency Associated Citizens Teams," more commonly referred to as REACT, is an association founded and sponsored by the Hallicrafters Corporation since 1962. REACT was established as a national affiliation of CB teams organized to provide communications in local emergencies through two-way radio. Hundreds of CB clubs across the U.S. and Canada have joined REACT to promote close cooperation with all other radio communications systems and to monitor channel 9, the suggested national emergency frequency.

REACT teams establish a rotation system of 24-hour monitoring, either by individual CB'ers from their own base stations or by members of the team at a club head-

When entering Huntsville, Ala., you are likely to see this large sign of the Emergency CB Monitors.

quarters or control center. The latter generally is more efficient in practice since club funds allow for more elaborate equipment installations and better antenna systems.

A CB-equipped motorist can call "REACT Control" on channel 9 in more than 1200 communities around the U.S. and Canada and be reasonably sure that his transmission will be heard. Information and assistance can be yours for the asking.

Individuals or CB clubs interested in taking part in this program can get the full story by writing to REACT National Headquarters, 5th and Kostner Aves., Chicago, Ill. 60624.

National Motorists Safety Plan. The Automobile Manufacturers Association is promoting the Highway Emergency Locating (HELP) Radio Service and has petitioned the FCC to allocate two new frequencies (27.235 MHz and 27.245 MHz) adjacent to present CB channels for exclusive use for the HELP participants.

In addition to the several hundred CB clubs that have enlisted in the HELP program, service centers along Interstate Highway 96 between Detroit and Lansing, Michigan are cooperating in this program. The Shell Oil Company has equipped 16 service stations with CB transceivers along a 200-mile stretch of Interstate Highway 70 between St. Louis and Kansas City, Missouri. This is an attempt to form a more organized HELP program along interstate highways. In the near future, Shell plans to initiate similar programs on the East and West Coasts and in the South.

The AMA's objective in promoting HELP is to encourage the development of a nationwide communications network to aid motorists in distress. Motorists requiring aid under the present program call on channel 9 where they can be heard by 24-hour-monitors (similar to REACT).

Experimental Motoring Safety Plan. A somewhat different CB highway safety plan is called Driver Aid, Information and Routing (DAIR). This is an experimental system and is the result of considerable work in the General Motors Research Laboratories.

The ambitious DAIR system is designed to help CB-equipped motorists summon assistance in an emergency, to provide road and re-routing information on extended trips, and to warn of approaching speed and traffic signal changes.

Motorists would have installed a special CB console with a visual sign-minder mounted on the dashboard. The console would be equipped with a microphone for voice communications with an information center, a telephone-type dial for sending out coded messages, and a route-minder punch card reader.

Community Radio Watch. The Community Radio Watch program is sponsored by Motorola Communications and Electronics, Inc., Chicago, Ill. CRW's basic purpose has been to encourage all citizens who use any type of two-way radio to support the police in maintaining law and order. The program recruits drivers of radio-equipped vehicles to serve as "eyes and ears" for the police.

Since the Community Radio Watch program was initiated, officials in more than 635 cities have expressed interest and cooperation. Those states with the largest number of CRW-active communities are: Illinois, 161; California, 50; Ohio, 28; Texas, 26; and Georgia, 24. An estimated 20,000 business organizations with over 250,000 personnel driving radio-equipped vehicles, have pledged their support to the CRW program.

Motorola says the program is open to anyone who uses two-way radio. Licensed CB'ers, CB clubs, or CB emergency groups interested in participating should contact local authorities. Motorola suggests three plans for establishment of and operating a Community Radio Watch on a local basis. The company proposes that the program be handled either (1) through the mayor's office, (2) by a mayor's committee (police chief, sheriff's department, etc.), or (3) by a local organization such as the Junior Chamber of Commerce. Local authorities not familiar with the program can write for full details to Community Radio Watch, Motorola Communications and Electronics, Inc., 4501 W. August Blvd., Chicago, Ill. 60651.

(Continued from page 26)

America. Many transceivers use circuits that will permit operation from 12-volt automobile batteries, and a few can be powered from 6-volt batteries. In the Table, the expression "and" means that the transceiver contains some sort of universal power supply permitting operation from any of the input voltages shown. The expression "or" means that the transceiver contains one power supply and that the supply itself can be changed to switch from base station (117 volts) to mobile (12 or 6 volts).

Receiver: There are only two types of receiver circuits now appearing in CB transceivers. They are related and are either straight superheterodynes, or double (sometimes called "dual") conversion superhets. The latter is generally more selective and able to cope with interference from adjacent channels or other CB'ers with transceivers operating within one-quarter to one-half mile away. Attention should be paid to the possibility that a simple superhet circuit may include a crystal or mechanical filter to provide selectivity comparable to that of a double superhet.

Circuit: Transceivers can use all "Tubes" or some tubes and some transistors—"Hybrid." A unit with transistors and diodes only is called "Solid-State."

Notes: A detailed breakdown of the coding numerals for this column appears at the foot of each odd-numbered page. These numerals refer to specialized features that are not common to all CB transceivers.

Price: No attempt has been made to differentiate between so-called "list" prices and the usual CB'er "net" prices in the Table. Many manufacturers supplied list prices for inclusion in this Buyer's Guide, leaving the discounting of price to the individual dealer and purchaser. Readers are urged to shop around and compare prices after selecting transceivers that best suit their individual requirements. The letter K identifies the transceiver as being a kit. If the price is immediately followed by a second price, assume that the second price is that of a comparable wired unit.

THE MOST SPECTACULAR SOUND EXHIBITION OF STEREO FIDELITY EVER AVAILABLE ON ONE DISC.

HiFi/Stereo Review STEREO DEMONSTRATION RECORD

A stunning series of demonstrations, each designed to show off one or more aspects of musical sound and its stereo reproduction.

This record is the result of two years of intensive research in the sound libraries of several of the world's leading record companies. The Editors of HiFi/Stereo Review have selected and edited those excerpts that best demonstrate each of the many aspects of the stereo reproduction of music. **The record offers you a greater variety of sound than has ever before been included on a single disc.**

AN ELECTRIFYING EXPERIENCE IN LISTENING

The HiFi/Stereo Review Stereo Demonstration Record is a series of independent demonstrations, each designed to show off one or more aspects of musical sound and its reproduction. Entirely music, the Record has been edited to provide self-sufficient capsule presentations of an enormous variety of music arranged in a contrasting and pleasing order. It includes all the basic musical and acoustical sounds that you hear when you listen to records, isolated and pointed up to give you a basis for future critical listening.

WIDE RANGE OF DEMONSTRATIONS

• Techniques of Separation and Multiple Sound Sources • Acoustic Depth • The Ambiance of a Concert Hall • Sharp Contrasts of Dynamics • Crescendo and Diminuendo • Very High and Very Low Pitched Musical Sounds • Polyphony (two or more melodies going on at once) With Both Similar and Contrasting Instruments • Tonal Qualities of Wind, String and Percussion Instruments • Sounds of Ancient Instruments • Sounds of Oriental Instruments • Sound of the Singing Voice, Both Classically Trained and Untrained • Plus a Large Sampling of Finger Snapping, Hand Clapping, Foot Stamping and Other Musical and Percussive Sounds

13 SUPERB SELECTIONS

STRAUSS: Festive Prelude, Op. 61 (excerpt) Deutsche Grammophon Gesellschaft • Scored for full symphony orchestra plus organ with prominence to the brass instruments. Remarkable for the impressive sense of depth it reproduces.

DEBUSSY: Feux d'artifice (excerpt). Connoisseur Society • Virtually the entire range of the piano is used, including the full force of the bass notes. This is the sound of a piano in reverberant surroundings heard fairly close-up.

BEETHOVEN: Wellington's Victory (Battle Symphony) (excerpt from the first movement) Westminster • The recording emphasizes extreme directionality. It is a dramatic presentation engineered specifically for stereo reproduction.

MASSAINO: Canzona XXXV à 16 (complete) DGG Archive • Performed on old instruments, and recorded with techniques that combine directionality with depth and ambiance, this band reproduces the sound of the music in its original environment, a large and reverberant cathedral.

CORRETTE: Concerto Comique Op. 8, No. 6, "Le Plaisir des Dames" (third movement) Connoisseur Society • Recording demonstrates the sound and special layout of a small performing group (harpsichord, cello and flutes) in fairly resonant surroundings.

KHAN: Raga Chandranandan (excerpt) Connoisseur Society • This classical Indian music provides some of the most exciting musical experiences imaginable. Directionality between vastly different instruments is the point here, as well as the sheer sound of the instruments themselves.

RODRIGO: Concert—Serenade for Harp and Orchestra (excerpt from the first movement) Deutsche Grammophon Gesellschaft • This excerpt provides a wealth of instrumental color behind a harp solo. The music is clear, colorful, rather classical, and immensely entertaining.

MANITAS DE PLATA: Gypsy Rhumba (complete) Connoisseur Society • The recording puts the listener in the center of a flamenco party by precisely transmitting the directionality, depth and ambiance of this completely impromptu recording session.

MARCELLO: (arr. King): Psalm XVII "The Heavens are Telling" (complete) Connoisseur Society • This arrangement of the brief Marcello Psalm is for brass, choir and organ, who answer one another antiphonally.

PRAETORIUS: Terpsichore: La Bourrée XXXII (complete) DGG Archive • A musical gem played by a raft of renaissance instruments including recorders, viols, lutes, harpsichord, small kettle drums, chimes, bells, and triangle.

BERG: Wozzeck (excerpt from Act III) Deutsche Grammophon Gesellschaft • The acknowledged masterpieces of modern music incorporating the use of many unusual and extraordinary musical devices, including dramatic crescendos for full orchestra.

BARTÓK: Sonata for two pianos and Percussion (excerpt from the first movement) Cambridge • The work is a stunning exploration of percussive sounds used as the basic material of the composition.

BEETHOVEN: Wellington's Victory (Battle Victory) (excerpt from the last movement) Westminster • A demonstration of one of stereo's greatest virtues, its unmatched ability to clarify separate contrapuntal voices being played by similar instruments.

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Using Your All-Band Radio Receiver

SHORT-WAVE LISTENING

Fun And Education Combined In One Hobby

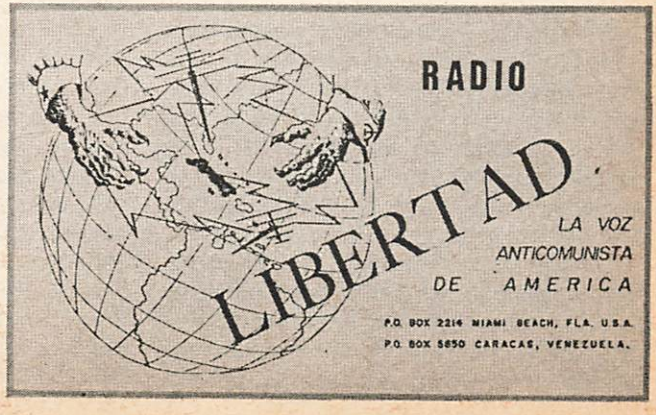
BY HANK BENNETT, WPE2FT

A HOBBY, as defined by one of the dictionaries, is "a favorite occupation, subject, topic, or the like, pursued for the amusement or interest it affords." It might also be said that a hobby is something a person likes to do to keep busy—especially if it is not in the general realm of what he does for a living.

There are hobbies of all "shapes and sizes": collecting buttons or collecting antique automobiles; operating miniature airplanes or helping to preserve an old steam locomotive; organizing or taking part in farm clubs. Usually the best hobbies are those that consume an agreeable amount of time, provide maximum interest, and involve a relatively low amount of money. A hobby is also something which can unite people from all walks of life on a common level of interest.

Short-wave listening (SWL) is one such hobby. It is a hobby in which virtually anyone can take part. Youngsters who have barely begun school have been known to take a keen interest in the art of listening to radio signals from far-away lands. Persons of retirement age find that SWL'ing is a hobby that can fill many otherwise lonesome hours. It is a stimulating and invigorating hobby, and in the U.S. anyone can be an SWL without a permit or license. In many foreign countries there is a license and fee involved merely for listening to a radio receiver or watching TV!

Fifty years or so ago when radio was in its infancy, the true SWL came into being. A message sent by one experimenter to another was no doubt overheard by another person. A wireless message sent from one point to another, not so very distant in those days, was one of the scientific wonders of its time. Radio communications had been born, and with it, the SWL.



Radio broadcasting in the short-wave bands is literally a war of words. Over 175 countries have short-wave transmitters in operation every day. To this must be added the dozen clandestine stations such as Radio Libertad. A QSL card is shown here which is the accepted verification given SWL's to indicate that the particular station was actually heard.

From these meager beginnings, the number of listeners began to overshadow vastly the number of transmitters. Broadcasting to the public began in the early 1920's and the boom to acquire receivers was beyond anyone's wildest imagination. At the same time, a new type of listener appeared—one who sought the signals from the farthest stations.

Today, short-wave listening is a hobby that has come into its own and grown to fantastic proportions. More people are listening to the short-waves today than ever before. Schools not only have extra-curricular activities in the form of radio and SWL clubs, but some of them even operate their own low-power broadcasting stations. Many educators have found that students learn more about the habits, customs, and cultures of foreign lands through radio than they can from textbooks. It is one thing for a teacher to instruct pupils how to read and speak Spanish or French; it is quite another thing to be able to listen to the news in either language directly from a foreign broadcaster and to be able to translate it effectively.

A dozen short-wave stations around the world are broadcasting language courses on the air with (in most cases) a man and woman teaching the language; one speaking in English and the other in the language being taught. These stations may also provide interested listeners with free instruction booklets to work with while listening to the on-the-air language lesson. Where else can you obtain a working knowledge of a foreign language at no cost other than a few cents expended for electricity to run your radio?

Short-wave listeners in foreign countries, some of whom are American citizens, have found that American short-wave broadcasters keep them up-to-date on many current events. In 1968 the funerals of Dr. King and Senator Kennedy were carried to all portions of the world by nonstop broadcasts of American short-wave stations.

Colorful presentations of the World Series baseball games are carried in full by Armed Forces Radio and Television Service (AFRTS), as are many of the regular season games; the college football games are also aired the world over by our short-wave services. American listeners can hear play-by-play accounts of British rugby games, soccer and cricket matches, and various other sporting events in the foreign lands.

But What Is a SWL? Now that you know partially what to expect, how do you take part in short-wave listening?

Let's begin by defining a short-wave listener. He is a person who listens to the radio, not so much for the purpose of hearing music and news programs from a local area station, but to hear stations from distant points. He tries to hear the voices of people directly from the point of origin —not relayed through a local news source. He would just as soon enjoy the music of a foreign country as he would the music of the "Top Ten." He makes an effort to see how many foreign countries he actually can hear. And, after hearing a foreign station, he sends a reception report to that station reporting what he heard and how well he heard it.

A short-wave listener was once said to be a person who listened to radio frequencies above the usual AM broadcast band—frequencies which begin around 1600 (kilohertz or kilocycles per second) and go up into hundreds of megahertz (or megacycles per second). However, this is no longer entirely true. In recent years, a short-wave listener (SWL) has been more correctly identified as a person who listens to ANY frequency, whether it be in the high-frequency short-wave channels, the normal AM broadcast band (providing he is tuning for distant stations), or the ultra-low long-wave channels. In years past, a person who tuned in to distant AM broadcast stations was referred to as a BCL (Broad-Cast Listener). This term is no longer in use. You are a SWL if you are in Miami and you try to hear a station in Seattle on the AM broadcast band. You're a SWL if you intercept the transmissions of the ham operator a few blocks away. You're a SWL if you tune in "Radio South Africa" or any of the hundreds of other foreign broadcast stations. You're a SWL if you can tune in aero beacons, press stations, or ship stations in the 200-500-kHz band.

To be a SWL you, of course, need a radio receiver. You can spend several hundreds of dollars on this equipment or you can dig an old klunker out of Grandma's attic. You can begin with any of the more modern transistorized receivers or one of the older table model or floor model consoles that were pushed aside with the advent of television.

We urge the beginner or novice to take it easy at the start. Use an old hand-me-down set; find out for yourself some of the things that can be heard; and tinker with it and with various types of antennas and grounding systems. Before long you'll realize (if you are destined to become an SWL) that you won't be satisfied with that old set. You'll want something more sophisticated with more flexibility—but you will have a far better idea of just what you do want in a new receiver than you would if you went to a store and purchased one without knowing what the hobby is all about. Go easy at first and build up gradually.

The Bands. Virtually all radio receivers now on the market as well as anything that you may find in a closet or basement will tune the North American AM broadcast band. (AM means amplitude modulation, a type of voice radio transmission.) It differs from FM (frequency modulation) in that the latter depends on a frequency change to convey modulation intelligence while AM does the job with varying modulation strength. The AM band has a frequency span of 540 to 1600 kHz and it is in this

These Asiatic QSL cards would be welcomed by any SWL. Collecting QSL cards has become a big part of the short-wave listening hobby.

band that you will find many of your local area stations. This is where the "Top Ten" are played incessantly; where commercials are a necessary—but not always welcome—way of life; where news events of your local area are aired; where your favorite ballgame is heard and where soap operas and traffic reports are regular features.

You can be a SWL and look for DX (distant stations) on this band if you desire. If you live in Philadelphia, it takes no effort to hear KYW or WIP. But if you live in Sacramento and you hear KYW or WIP, you'll be on the way to being an SWL. People in Louisiana may be able to hear KAPB in Marksville with relative ease—your Editor, with several thousands of dollars worth of equipment, would be tickled pink to hear it in New Jersey.

Perhaps your receiver has more than one band. One is the AM broadcast band, the other, or others, are short-wave bands tuned to the international broadcasting channels. These short-wave bands are where you are most likely to hear voice broadcasts from London, Moscow, Melbourne, or Cairo. The dial may have markings showing approximately where certain stations are heard and using these station indicators as guides, you will undoubtedly find other stations operating nearby. Tuning very slowly through these bands will net you more stations than you'll ever hear by swishing through the band in a hurry. Slow and careful tuning is a must when you have a set such as this.

At a later date, after you have acquired a taste for short-wave listening and a bit of a knack in tuning in some of the short-wave broadcasters, you will want to get to a better receiver. There are many excellent receivers on the market, ranging in price from about $40 to $1500. Most of the less expensive receivers are in kits, which can be assembled with relative ease by nearly anyone having a basic knowledge in the use of a soldering iron and the simpler tools.

Other receivers include a multitude of transistor models, a few of which have short-wave coverage. Most of the transistorized portables, however, are confined to two bands—the standard AM broadcast band and the FM band.

If you have a champagne taste for a receiver, with a billfold to match, you will go shopping in one of the amateur radio parts shops. These stores stock a wide variety of receivers of the so-called "communications" variety. They include an earphone connection jack, an antenna compensator, r.f. gain and audio volume controls, BFO, a noise limiter, and a bandspread dial in addition to the main tuning dial. For the uninitiated, reading and understanding the instruction booklet is worth several hours of diligent study.

The price of an expensive receiver is usually well worth it if you intend to do any serious DX'ing. Moreover, since practically all communications receivers have a circuit that permits reception of Morse code signals, it is recommended that you consider learning the code to enjoy fully all of the benefits of your newfound prize. This may lead to your becoming a radio amateur (ham), or even a career in some phase of electronics.

Antennas. Now that you have a receiver and know how to tune it, you still need an antenna. Virtually all short-wave receivers must have an outside antenna to be used at top sensitivity. A small pocket-size receiver has a built-in antenna that is sufficient for local reception. Larger portables have a built-in antenna plus an antenna terminal so that you can connect an external antenna to the receiver. All table and floor model consoles, as well as communications receivers, definitely require an outside antenna.

The simplest and most inexpensive antenna is a plain piece of antenna wire strung between two trees, a tree and house, or wherever you can anchor both ends. It can be anywhere from 30 to 150 feet in length. The antenna wire may be plain copper and either solid or stranded. It requires an insulator at each end. Attach an appropriate length of insulated wire, preferably by soldering, to one end of the antenna. This second wire is your lead-in wire, or "feeder" as it is often called. Ordinary "bell wire" is excellent for this purpose. Feed this lead-in wire into your house and connect it to the antenna terminal on

your receiver. However, you should observe one simple rule of safety—purchase and install a lightning arrestor at a point before the leadin enters your home. Follow directions as given on the package for proper installation. It'll cost very little to purchase and take only minutes to install, but it may save you from damage to your equipment and property should lightning strike your antenna.

Several manufacturers of electronic equipment specialize in selling antennas for use by SWL's and hams. Mosley Electronics sells an SWL antenna that can be erected in about two hours and costs about $18. This antenna uses a system of "wave traps" to tune its own electrical length to the seven principal shortwave broadcast bands.

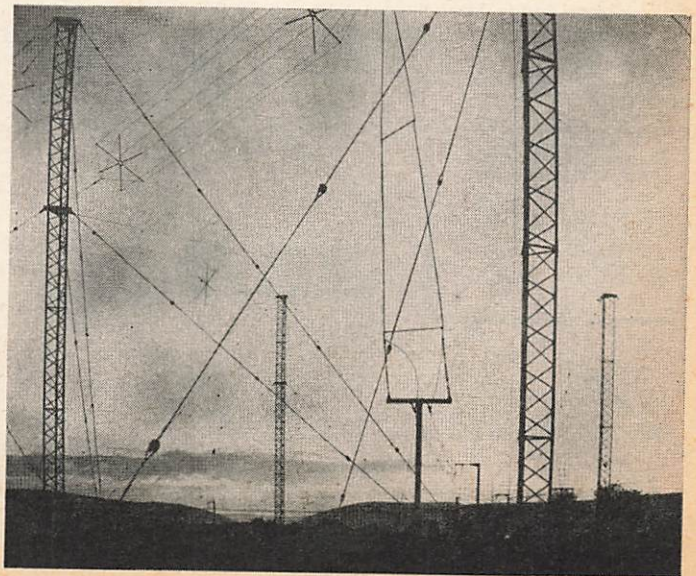
Tuning In. You've probably become accustomed to turning the main dial on your AM radio rapidly. You know exactly where your favorite stations are on the dial and it's a cinch to tune in the station that you want. But this method of tuning doesn't work on the short-wave bands.

Look closely at the dial on your AM broadcast receiver—it may be about four inches in length and cover a tuning range of 540 to 1600 kHz, space for about 110 channels. Now look at the tuning dial on a short-wave receiver. A comparable four-inch segment might cover from 13,000 to 21,000 kHz, or about 8000 channels separated 10 kHz apart! You can readily see what this means—there are far more frequencies covered and, therefore, many more stations. If you turn your short-wave dial at the same speed you do your AM broadcast receiver dial, you tune right through everything to be heard.

In tuning the short waves, you must tune very slowly and very carefully. You will find, in many cases, that there are a dozen stations broadcasting in a half dozen languages and all within a barely perceptible movement of your main tuning dial knob. But with care, you will be able to separate these stations into their own respective channels.

You'll soon be tuning in any number of programs from overseas stations. You may hear the familiar sound of the time signal and Big Ben striking the time from London, the haunting melody and bird call of "Radio RSA" in South Africa, "DX Party Line" from HCJB in Quito, Ecuador, or the first few bars of "Blue Danube," the signature tune of "Austrian Radio" in Vienna.

In your first few tunings, you may find every language represented except your own. Don't let this discourage you. Nearly all of the stations that can be heard in the



To reach a larger audience, a few short-wave stations relay programs from auxiliary sites. These antennas radiate the signals from Deutsche Welle, "The Voice of Germany," and are located at Kigali, Rwanda, Africa.

United States have, at one time or another, English transmissions beamed to the United States. One of the notable exceptions is "Radiodiffusion-Television Francaise" (Paris) although this station does have English beamed to other areas.

You'll find that most of the foreign short-wave stations have fairly short programs in numerous languages, and one of them is almost certain to be in English. However, don't be fooled if you happen to tune in on the Latin American stations; the majority of these stations broadcast exclusively in Spanish or Portuguese, or, in the case of a few, in Dutch or French with a small sprinkling of other assorted languages. Stations in Europe, Asia, South America, Africa, Mid- and Far-East areas all have English transmissions. A little patience, some careful tuning, and you'll be certain to find someone speaking English.

Knowing Where You Are. Because it was done that way many years ago, SWL's refer to the short-wave broadcasting bands in two different frames of reference—frequency and wavelength.

The international short-wave broadcast bands are known as the 49-, 40-, 31-, 25-, 19-, 16-, 13-, and 11-meter bands. According to international treaty (not strictly adhered to), these bands are comparable to the following frequency segments: 5950 to 6200 kHz; 7100 to 7300 kHz; 9500 to 9775 kHz; 11,700 to 11,975 kHz; 15,100 to 15,450 kHz; 17,170 to 17,900 kHz; 21,450 to 21,750 kHz; and 25,600 to 26,100 kHz.

There are several specialized short-wave broadcasting bands for listeners in the tropics. The most important of these is the one at 60 meters (4700 to 5100 kHz).

Your best chances for picking up English-language transmissions will be during the early to late evenings (your local time) from stations in Africa, Europe, and Western Asia, and during the hours around sunrise from stations in the Far East and Pacific areas. Always tune the 19-, 25-, and 31-meter bands first, and then the 41- and 49-meter bands. The 11-, 13-, and 16-meter bands are usually only active during

(Continued on page 148)

How To Report To Stations

SHORT-WAVE LISTENING

An Expert Tells How It's Done

BY ROBERT LA ROSE, JR.

As the listener becomes more adept in using his receiver he undoubtedly tries to collect as many QSL cards as possible. These QSL's, or verifications of the reception of DX stations, are lasting proof of his SWL ability. To make his reports accurate and to record what he has heard, the SWL needs some sort of log book and reporting form.

As time goes by, the keeping of a log book proves to be of valuable assistance. This is especially true for the SWL who wants to compare reception notes for different periods of listening. Often, one station may be heard very well one evening and be extremely weak the next evening. The SWL may also want to refer to a given band and compare receiving conditions seasonally and even yearly. The log book is also useful in keeping a record of reception reports; to whom they were sent, by what method, and the date of mailing.

No two DX'ers maintain a log book in the same manner. There are some standardized forms (see photograph), but there is nothing to stop you from starting your own system and keeping it going as long as you desire. You should include the date of reception, time, station call letters or name, a minimum of program details, and some idea of the signal strength. In a very prominent spot in your log, you should have a notation, as accurate as possible, of the frequency of the station being recorded.

If you keep your log notations on one side of a sheet of notebook paper, you can use the reverse side to break down individual transmissions and thus include information that will be useful when sending reception reports.

Keeping a log book is not a mandatory requirement for maintaining a short-wave listening post, but it certainly does come in handy when you least expect it!

Reporting to Stations. Almost every serious DX'er collects QSL cards or "veri's." These QSL's are not only a measure of his DX ability, but may be used to gain special awards from SWL DX clubs and electronics hobby magazines. POPULAR ELECTRONICS has an excellent awards program which is discussed in detail on page 97.

Many radio stations have gone to great lengths to make QSL cards something more than just verifications of radio reception. These cards are highly prized and are often used to decorate the walls of listening posts or radio rooms. To signify special events such as the installation of new transmitting equipment, national accomplishments, or test broadcasts, radio stations often issue special QSL's. These are usually much in demand and their rarity makes them collectors' items.

Reporting to radio stations in foreign countries has many subsidiary advantages. You will soon find your mailbox stuffed with interesting foreign stamps, travel information, potential pen pals, newspapers and propaganda, or even tape recordings of national music. Many foreign broadcast-

ers have newsletters, bulletins, or program guides, most of which are published at least four times a year.

Why do these foreign stations spend time and money answering reports? The truth is that many of them are supported by their governments and broadcasters need listeners' reports to show how well they are being received and how much the listeners enjoy the programs. Of course, some governments are interested in issuing QSL cards in order to obtain a "mailing list" for their propaganda.

Every report to a broadcasting station must contain several basic ingredients. These are essentially the same as recorded in your log book: date, time, frequency, program details, and signal report. The only addition to your log book list is a brief description of your receiving equipment and location (whenever necessary).

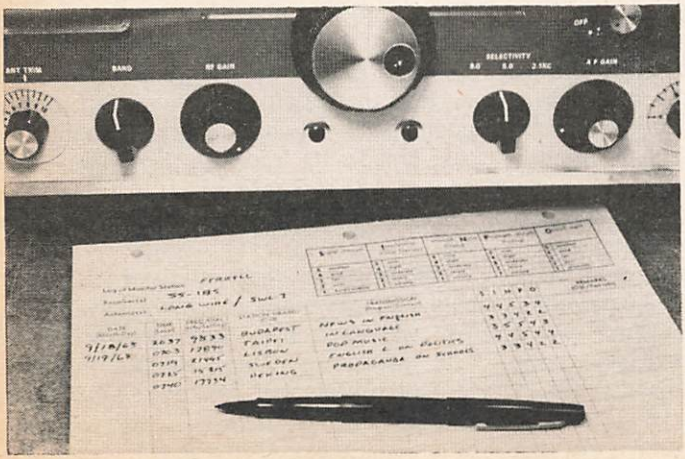
DATE AND TIME. Although many SWL's (for the sake of convenience) record their reception notes in local time, all reports to broadcasters should be made using the 24-hour clock system based on Greenwich Mean Time (GMT).

Using this universal system, the hours from 1:00 a.m. to 11:00 a.m. are expressed in four digits ranging from 0100 to 1100. Noon is always expressed as 1200. From 1:00 p.m. to 11:00 p.m., the times are expressed as 1300 to 2300. Midnight is generally referred to as 0000, although 2400 is not totally unacceptable.

If a broadcaster announces that he will be on the air at 1315-1545 GMT, he is essentially saying that he will be on the air between 1:15 and 3:45 in the afternoon. However, that particular time may not be either his (the broadcaster's) local time nor your (the listener's) local time. To make sense out of the announcement you must convert the broadcaster's reference to GMT to your local time zone. A convenient chart to enable you to make this conversion quickly is shown on page 61.

There is one exception to the rule concerning the use of GMT. Obviously, if you are reporting a small local or regional broadcast band station, who may not be familiar with GMT, it is wise to use both GMT and the local time of the station being reported (not your local time).

FREQUENCY. Most short-wave broadcasting stations transmit on several frequencies at the same time. This is not true of AM broadcasting stations, nor is it true of ham radio, utility, aeronautical, marine, etc. stations. Thus, if you are reporting to a broadcasting station it is most important that the correct frequency (as accurate as possible) be given in your reception report. Although many stations announce their exact frequencies, many others do not. If your receiver lacks accurate calibration, attempt to make a fair approximation by comparing the dial location in relation to stations of known frequency. Thus, if you have heard and verified Portugal on 21.495



Every SWL wants to keep a log of the DX he hears. This padded log sheet is sold by Gilfer Associates, Inc., but the SWL could also make up his own from notebook paper. The receiver in the background is a Squires-Sanders IBS superhet.

Sample QSL cards you can collect. Besides the cards from Radio Japan and Radio Nederland, note the QSL's from RCA Communications verifying reception of a Hawaiian station and the Radio Moscow "Sputnik".

MHz and hear a new signal very close to Portugal, but on the low frequency side, which identifies itself as Vatican Radio, it is safe to say that the new signal is on 21.485 MHz.

Frequencies should always be expressed in kilohertz or megahertz in preference to the older kilocycle and megacycle system—although the two references are basically interchangeable. The wave-length system should never be used as a substitute for frequency in either kilohertz (kHz) or megahertz (MHz).

Of course, your problem in ascertaining frequencies will be greatly ameliorated if you have and use one of the station frequency lists, such as the World Radio-TV Handbook, Guide to Broadcasting Stations, etc. available from Gilfer Associates, Inc.

PROGRAM DETAILS. The only way you can provide proof to a radio station that you actually heard their signal is through your notations of the program details. This is a "must" in any reception report. Generally, your report should include at least 15 minutes of program details, including at least the time period for one station identification. The details should be as specific as possible in every regard. Record titles (or at least a description of the type of music and the instruments used), as

well as the length of each musical selection. Note details as to the sex of the announcer and, for a program such as a news broadcast, an itemized listing of the topics discussed.

The listener should always base his report on the use of a very accurate clock with either a sweep or rotary second hand. Don't forget to check your clock periodically against WWV or CHU.

SIGNAL REPORT. You will want to make your report as helpful as possible to the broadcaster, or other radio station, by telling him how well you have received his signal. To simplify and standardize reporting systems, a preferential method of reporting to all international broadcasters has been adopted. This system is called simply the SINPO code. Using this simplified system a broadcaster can get a fair idea of signal strength, interference, severity of fading, susceptibility to atmospheric noise, and an overall figure of merit. The SINPO code and rating interpretation table appears on this page. A typical report for a station that is being heard very well might be SINPO 44544 (not S414N5P404).

A very slight variation of the SINPO system is also winning some approval. It is called the SINFO system. In the revised SINFO system, the P for propagation is replaced by an F for fading. For the purposes of the SINFO system, an arbitrary number of fades-per-minute has been established as follows: one fade-per-minute is given the rating 5; from one to five fades-per-minute is 4; five to 20 fades-per-minute is 3; 20 to 60 fades-per-minute is 2; and a severely fluttering fade of over 60 fades-per-minute is rated at 1.

Your report should also detail carefully the source of any interference (if known) and the possible source of noise—whether electrical or atmospheric.

Not all broadcasting stations, and many of the non-broadcasting stations, understand the SINPO reporting system. To be on the safe side, it is best to include a brief description of what the rating system actually means.

EQUIPMENT DETAILS. This information should be included in your report to give the broadcaster an idea of how typical your reception report might be compared to other reports from your area. Always include the make and model of your receiver and whenever practical the age and number of tubes or transistors. Make sure to specify whether your antenna is indoors or outdoors, the type, length, height, direction, etc.

Sending Your Report. It is always advisable to use air mail for reception reports. It costs more, but it assures that your report has maximum usefulness and will arrive at the station as soon after the date of reception as possible. Reports sent by sea mail (to foreign countries) can take weeks to arrive and thus are of little use to the broadcaster.

Air mail postage for a one-half ounce letter to any place in Central and South America is only 15¢. A one-half ounce letter to Europe or North Africa (except European USSR) is 20¢. Air mail postage for a one-half ounce letter to the remainder of Africa, all of the USSR, Asia, and the Pacific is 25¢. Check your local post office whenever doubt arises.

S	I	N	P	O
Signal Strength (QSA)	**I**nterference (QRM)	Atmospheric **N**oise (QRN)	**P**ropagation Disturbance (QSB)	**O**verall Merit (QRK)
5 Excellent	5 None	5 None	5 None	5 Excellent
4 Good	4 Slight	4 Slight	4 Slight	4 Good
3 Fair	3 Moderate	3 Moderate	3 Moderate	3 Fair
2 Poor	2 Severe	2 Severe	2 Severe	2 Poor
1 Barely audible	1 Extreme	1 Extreme	1 Extreme	1 Unusable

TIMES AROUND THE WORLD

Listed below are the differences between local standard times and Greenwich Mean Time (GMT). A plus sign indicates the number of hours that local standard is "ahead" of GMT; a minus sign indicates the number of hours that local time is "behind" GMT.

Country	Standard Time	Daylight Saving
Aden	+3	
Afghanistan	+4½	
Alaska	−8	
Albania	+1	
Algeria	GMT	
Andorra	GMT	
Angola	+1	
Argentina	−4	−3 (Oct.-Feb.)
Ascension Is.	GMT	
Australia		
Victoria, New South Wales, Queensland	+10	
Tasmania	+10	+11
N. Territory, S. Australia	+9½	
W. Australia	+8	
Austria	+1	
Azores	−2	−1 (Apr.-Oct.)
Bahamas	−5	
Bahrein	+4	
Barbadoes	−4	
Botswana	+2	
Belgium	+1	
Bermuda	−4	
Bolivia	−4	
Brazil		
East, Coastal	−3	−2 (Dec.-Mar.)
Amazonas	−4	−3 (Dec.-Mar.)
Acre	−5	−4 (Dec.-Mar.)
Brunei	+8	
Bulgaria	+2	
Burma	+6½	
Burundi	+2	
Cambodia	+7	
Cameroon	+1	
Canada		
Newfoundland	−3½	
Labrador, N.S.	−4	−3
Ontario, Que.	−5	−4
Manitoba	−6	−5
Alberta	−7	−6
British Columbia	−8	−7
Yukon	−9	−8
Canary Islands	GMT	
Cape Verde Is.	−2	
Cent. African Republic	+1	
Ceylon	+5½	
Chad	+1	
Chile	−4	
China (Peoples Rep.)	+8	
China (Taiwan)	+8	+9
Colombia	−5	
Congo (Rep.)	+1	
Congo (Dem. Rep.)		
Kinshasa	+1	
Lumbumbashi	+2	
Cook Islands	−10½	
Costa Rica	−6	
Cuba	−5	−4
Curacao	−4	
Cyprus	+2	
Czechoslovakia	+1	
Dahomey	+1	
Denmark	+1	
Dominican Republic	−5	−4½
Ecuador	−5	
Egypt	+2	+3
El Salvador	−6	
Ethiopia	+3	
Falkland Is.	−4	−3
Faroe Islands	GMT	
Fiji Islands	+12	
Finland	+2	
France	+1	
Gabon	+1	
Gambia	GMT	
Germany	+1	
Ghana	GMT	
Gibraltar	+1	
Gilbert Is.	+12	
Great Britain	+1	
Greece	+2	
Greenland		
Angmagssalik	−2	
Thule	−3	
Guadeloupe	−4	
Guam	+10	
Guatemala	−6	
Guiana	−3¾	
Guiana (Fr.)	−3	
Guinea	GMT	
Guinea (Port.)	−1	
Guinea (Span.)	+1	
Haiti	−5	
Hawaii	−10	
Holland	+1	
Honduras (Rep.)	−5	−6
Honduras (Brit.)	−5½	−6
Hong Kong	+8	+9
Hungary	+1	
Iceland	−1	GMT
India	+5½	
Indonesia		
Java, Sumatra	+7	
Borneo, Celebes, Bali	+8	
Moluccas, W. Irian	+9	
Iran	+3½	
Iraq	+3	
Ireland (Eire)	GMT	+1
Israel	+2	
Italy	+1	+2
Ivory Coast	GMT	
Jamaica	−5	
Japan	+9	
Jordan	+2	
Kenya	+3	
Korea	+9	
Kuwait	+3	
Laos	+7	
Lebanon	+2	+3
Leeward Is.	−4	
Lesotho	+2	
Liberia	−¾	
Libya	+2	
Luxembourg	+1	
Macao	+8	
Madeira	−1	GMT
Malawi	+2	
Malaysia	+7½	
Malagasy Rep.	+3	
Maldive Is.	+5½	
Mali	GMT	
Malta	+1	
Martinique	−4	
Mauritania	GMT	
Mauritius	+4	
Mexico (most)	−6	
Monaco	+1	
Mongolia (Outer)	+8	
Morocco	GMT	
Mozambique	+2	
Nepal	+5.4	
Netherland Antilles	−4	
New Caledonia	+11	
New Guinea	+10	
New Hebrides	+11	
New Zealand	+12	
Nicaragua	−6	
Niger	+1	
Nigeria	+1	
Norway	+1	
Pakistan		
West	+5	
East	+6	
Panama	−5	
Papua	+10	
Paraguay	−4	
Peru	−5	
Philippines	+8	
Poland	+1	
Portugal	+1	
Puerto Rico	−4	
Reunion	+4	
Rhodesia	+2	
Rumania	+2	
Rwanda	+2	
Ryukyu Islands	+9	
Sabah	+8	
Sahara (Span.)	GMT	
Samoa Islands	−11	
St. Pierre	−3	
Sao Tome	GMT	
Sarawak	+8	
Saudi Arabia	+3	
Senegal	GMT	
Seychelles	+4	
Sierra Leone	GMT	
Singapore	+7½	
Solomon Is.	+11	
Somalia	+3	
South Africa	+2	
Spain	+1	
Sudan	+2	
Surinam	−3½	
Swan Islands	−6	
Swaziland	+2	
Sweden	+1	
Switzerland	+1	
Syria	+2	+3
Tahiti	−10	
Tanzania	+3	
Thailand	+7	
Timor	+8	
Togo	GMT	
Trinidad	−4	
Tunisia	+1	
Turkey	+2	
Uganda	+3	
Upper Volta	GMT	
Uruguay	−3	
USSR		
Moscow, Leningrad, Kiev	+3	
Baku	+4	
Sverdlovsk	+5	
Tashkent	+6	
Novosibirsk	+7	
Khabarovsk	+10	
Magaden	+11	
Petropavlovsk	+12	
USA		
Eastern	−5	−4
Central	−6	−5
Mountain	−7	−6
West (Pacific)	−8	−7
Vatican City	+1	
Venezuela	−4	
Vietnam (Rep.)	+8	
Vietnam (Dem. Rep.)	+7	
Virgin Is.	−4	
Windward Is.	−4	
Yemen	+3	
Yugoslavia	+1	
Zambia	+2	

Time Conversion Within U.S.A.

Universal Time (Greenwich Mean Time) *(hours)*	Eastern Daylight Time	Eastern Standard or Central Daylight	Central Standard or Mountain Daylight	Mountain Standard or Pacific Daylight	Pacific Standard Time
0000	8:00 p.m.	7:00 p.m.	6:00 p.m.	5:00 p.m.	4:00 p.m.
0100	9:00 p.m.	8:00 p.m.	7:00 p.m.	6:00 p.m.	5:00 p.m.
0200	10:00 p.m.	9:00 p.m.	8:00 p.m.	7:00 p.m.	6:00 p.m.
0300	11:00 p.m.	10:00 p.m.	9:00 p.m.	8:00 p.m.	7:00 p.m.
0400	Midnight	11:00 p.m.	10:00 p.m.	9:00 p.m.	8:00 p.m.
0500	1:00 a.m.	Midnight	11:00 p.m.	10:00 p.m.	9:00 p.m.
0600	2:00 a.m.	1:00 a.m.	Midnight	11:00 p.m.	10:00 p.m.
0700	3:00 a.m.	2:00 a.m.	1:00 a.m.	Midnight	11:00 p.m.
0800	4:00 a.m.	3:00 a.m.	2:00 a.m.	1:00 a.m.	Midnight
0900	5:00 a.m.	4:00 a.m.	3:00 a.m.	2:00 a.m.	1:00 a.m.
1000	6:00 a.m.	5:00 a.m.	4:00 a.m.	3:00 a.m.	2:00 a.m.
1100	7:00 a.m.	6:00 a.m.	5:00 a.m.	4:00 a.m.	3:00 a.m.
1200	8:00 a.m.	7:00 a.m.	6:00 a.m.	5:00 a.m.	4:00 a.m.
1300	9:00 a.m.	8:00 a.m.	7:00 a.m.	6:00 a.m.	5:00 a.m.
1400	10:00 a.m.	9:00 a.m.	8:00 a.m.	7:00 a.m.	6:00 a.m.
1500	11:00 a.m.	10:00 a.m.	9:00 a.m.	8:00 a.m.	7:00 a.m.
1600	Noon	11:00 a.m.	10:00 a.m.	9:00 a.m.	8:00 a.m.
1700	1:00 p.m.	Noon	11:00 a.m.	10:00 a.m.	9:00 a.m.
1800	2:00 p.m.	1:00 p.m.	Noon	11:00 a.m.	10:00 a.m.
1900	3:00 p.m.	2:00 p.m.	1:00 p.m.	Noon	11:00 a.m.
2000	4:00 p.m.	3:00 p.m.	2:00 p.m.	1:00 p.m.	Noon
2100	5:00 p.m.	4:00 p.m.	3:00 p.m.	2:00 p.m.	1:00 p.m.
2200	6:00 p.m.	5:00 p.m.	4:00 p.m.	3:00 p.m.	2:00 p.m.
2300	7:00 p.m.	6:00 p.m.	5:00 p.m.	4:00 p.m.	3:00 p.m.

Some broadcasters announce their mailing address, but the standard reference for station addresses is the World Radio-TV Handbook.

Most government-sponsored broadcasters do not require that you include return postage with your report. They are obviously anxious to receive your report and act accordingly. However, the situation is different among local and regional stations that are not primarily interested in reports from the other side of the world. This is also true of some religious and missionary sponsored broadcasters whose funds are obtained by donations. Whenever in doubt, always send return postage.

There are two ways of sending return postage. The most common is to send the broadcaster International Reply Coupons (IRC's). These coupons may be sent to any country that is a member of the Universal Postal Union and can be redeemed in that country for first class postage. You may purchse IRC's in any United States post office for 15¢ each. When sending a reception report, if you desire an air mail reply, be sure to send along two or three extra IRC's.

While IRC's are usually the easiest and cheapest method of sending return postage, it is not infallible. Several countries will not accept IRC's, specifically: Bahama, Chile, Estonia, Indonesia, Latvia, Lithuania, Peru, Pitcairn Island, Sweden, USSR, and Yemen.

An alternate method of sending the return postage is to include mint (uncancelled) stamps of the broadcaster's country with your report. Such stamps may be obtained from stamp collectors, or stores specializing in dealing with stamp collectors.

Reporting to Non-Broadcasters. Many of the same rules followed in reporting to short-wave broadcasters can be used when

TIME CONVERSION FROM GREENWICH MEAN TIME (GMT)

GMT	2400	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300
– 3/4	2315	0015	0115	0215	0315	0415	0515	0615	0715	0815	0915	1015	1115	1215	1315	1415	1515	1615	1715	1815	1915	2015	2115	2215
– 1	2300	2400	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200
– 2	2200	2300	2400	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100
– 3	2100	2200	2300	2400	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000
– 3 1/2	2030	2130	2230	2330	0030	0130	0230	0330	0430	0530	0630	0730	0830	0930	1030	1130	1230	1330	1430	1530	1630	1730	1830	1930
– 3 3/4	2015	2115	2215	2315	0015	0115	0215	0315	0415	0515	0615	0715	0815	0915	1015	1115	1215	1315	1415	1515	1615	1715	1815	1915
– 4	2000	2100	2200	2300	2400	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900
– 4 1/2	1930	2030	2130	2230	2330	0030	0130	0230	0330	0430	0530	0630	0730	0830	0930	1030	1130	1230	1330	1430	1530	1630	1730	1830
– 5	1900	2000	2100	2200	2300	2400	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800
– 6	1800	1900	2000	2100	2200	2300	2400	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700
– 7	1700	1800	1900	2000	2100	2200	2300	2400	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600
– 8	1600	1700	1800	1900	2000	2100	2200	2300	2400	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500
– 9	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400
– 10	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300
– 10 1/2	1330	1430	1530	1630	1730	1830	1930	2030	2130	2230	2330	0030	0130	0230	0330	0430	0530	0630	0730	0830	0930	1030	1130	1230
–11	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200
– 12	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100

INTERNATIONAL DATE LINE

+ 12	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100
+ 11 1/2	1130	1230	1330	1430	1530	1630	1730	1830	1930	2030	2130	2230	2330	0030	0130	0230	0330	0430	0530	0630	0730	0830	0930	1030
+11	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000
+10	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	0100	0200	0300	0400	0500	0600	0700	0800	0900
+9 1/2	0930	1030	1130	1230	1330	1430	1530	1630	1730	1830	1930	2030	2130	2230	2330	0030	0130	0230	0330	0430	0530	0630	0730	0830
+9	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	0100	0200	0300	0400	0500	0600	0700	0800
+8 1/2	0830	0930	1030	1130	1230	1330	1430	1530	1630	1730	1830	1930	2030	2130	2230	2330	0030	0130	0230	0330	0430	0530	0630	0730
+8	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	0100	0200	0300	0400	0500	0600	0700
+7 1/2	0730	0830	0930	1030	1130	1230	1330	1430	1530	1630	1730	1830	1930	2030	2130	2230	2330	0030	0130	0230	0330	0430	0530	0630
+7	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	0100	0200	0300	0400	0500	0600
+6 1/2	0630	0730	0830	0930	1030	1130	1230	1330	1430	1530	1630	1730	1830	1930	2030	2130	2230	2330	0030	0130	0230	0330	0430	0530
+6	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	0100	0200	0300	0400	0500
+5 2/3	0540	0640	0740	0840	0940	1040	1140	1240	1340	1440	1540	1640	1740	1840	1940	2040	2140	2240	2340	0040	0140	0240	0340	0440
+5 1/2	0530	0630	0730	0830	0930	1030	1130	1230	1330	1430	1530	1630	1730	1830	1930	2030	2130	2230	2330	0030	0130	0230	0330	0430
+5	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	0100	0200	0300	0400
+4 1/2	0430	0530	0630	0730	0830	0930	1030	1130	1230	1330	1430	1530	1630	1730	1830	1930	2030	2130	2230	2330	0030	0130	0230	0330
+4	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	0100	0200	0300
+3 1/2	0330	0430	0530	0630	0730	0830	0930	1030	1130	1230	1330	1430	1530	1630	1730	1830	1930	2030	2130	2230	2330	0030	0130	0230
+3	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	0100	0200
+2	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	0100
+1	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400

YESTERDAY **TODAY** **TOMORROW**

reporting to radio amateur operators. However, be sure to include the call letters of the station/stations in contact with the ham operator. Include any other details that might be of help in providing positive identification. Also, when reporting to hams, use the R-S code. An interpretation of this code is shown on page 128. Lastly, always be sure to include return postage when sending reports to hams.

Between the amateur and broadcast bands there are a great number of "utility" radio stations. These stations may be operated by either government or private sources, but they use the short wave to carry out their businesses. Since these stations are not broadcasters in the usual sense, they are not particularly interested in obtaining listener reports. Many of these stations are, however, located in "rare" or otherwise hard to hear countries and will, on occasion, verify acceptable reports. In the past few years, many SWL's have found that DX'ing the utilities is a lot of fun and challenge.

It is important to remember when listening to or reporting to utility stations that you cannot disclose or divulge the contents of non-broadcast transmissions. This means that under the law, transmissions by most non-broadcasters are roughly classified as "private." Reportable transmissions among the non-broadcasters include the test tapes, names of stations called, on and off times, or other non-private transmissions. Otherwise, your report should include all the same information as a report to a regular international broadcaster. Be especially careful when listing the frequency and attempt to give it as close as possible. It is always advisable to send return postage to such stations. Address your report to: Chief Engineer, name of the company owning the radio station, city and country.

Tape-Recorded Reports. In the past few years it has also become quite popular to report to broadcasting stations through the use of tapes. These tapes provide the station with indisputable proof that you have heard them and simultaneously give the broadcaster a good idea of exactly how his signal is being received.

Always be sure to get at least one clear identification on any tape. And when reporting to a reasonably well heard station, the report will always be of more value if you can include segments from several different parts of the program—perhaps spaced an hour apart. Recordings made within a short time period of several parallel frequencies in use by the broadcaster are also considered a very great help.

Always use the standard 3¾ or 7½ ips tape speed. Be sure to identify the tape speed on the reel. Also, record only one track since many broadcasters will play your tape back on large professional tape decks that have single-track playback. Remember to put a leader on your tape and to make sure that it is at least 2 to 3 feet long.

Finally, never record your voice on the tape. Instead, send along a complete list of dates, times, frequencies, etc., for each segment of your tape recording.

Some broadcasters will return your tape, while others will not. Prior to August, 1968, "Radio Prague" would re-record folk music on your tape and return it to the sender. Although it is expensive, always send tape recordings via air mail in regular tape mailing containers.

Around The World By Radio Waves

SHORT-WAVE LISTENING

Understanding Radio Signal Propagation

BY JACK WHITE, WPE7CTV

THE TRANSMISSION of radio waves for long distances around the world is accomplished by bouncing the radio signal off an invisible mirror 60 to 300 miles above our heads. This mirror has the technical name "ionosphere." The procedure of bouncing the radio waves is known as either "skip" or "sky-hop."

To understand and appreciate why short-wave signals appear and disappear, vary in strength, and are subjected to violent fading, it is necessary to understand some of the basics of ionospheric radio wave propagation.

The Skip. To all intents and purposes it is possible to look at radio waves as having many of the same qualities as visible light rays. There are some differences, but a radio wave can be absorbed, scattered, or reflected just like a beam of light. Look at Fig. 1 and imagine that the radio signal in the section X-T-Y is aimed out toward the horizon from the transmitting site. Due to the curvature of the earth the radio signal would not be heard at point A since this position is effectively below the horizon even though it may be only 100 miles distant.

When the radio wave front strikes the bottom of the ionosphere between points X-Y, the wave is reflected and returned to the earth's surface between points B-R-C.

It may now be seen that the radio wave has effectively skipped over a fair portion of the earth's surface. In practice, the dis-

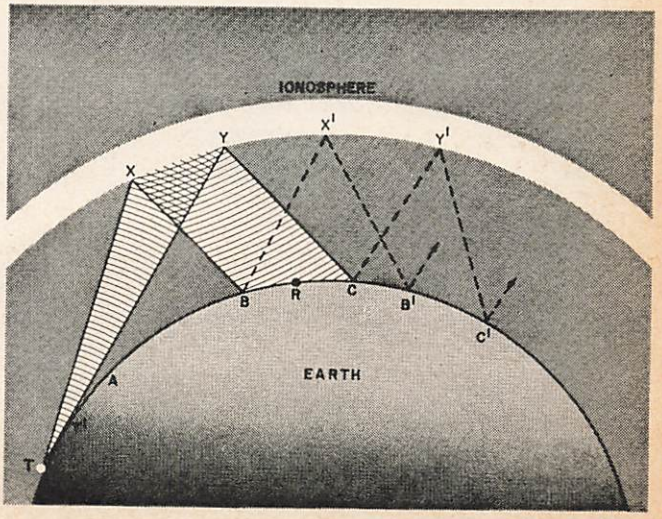


Fig. 1. All short-wave DX transmissions take place because the radio waves are bounced back to earth from the ionosphere. This simplified drawing shows the mechanism of propagation. The radio wave from transmitter T hits the ionosphere between points X and Y. It is bounced back to earth between points B and C and the signal is heard at receiver R. The wave continues to bounce around the world until it fades out. Note that a listener at A is in the skip zone and cannot hear the transmitter at point T.

tance between T′ and B is called the "skip zone." Depending upon the nature of the ionosphere, this distance might be as short as 100-200 miles, or as long as 2500 miles!

The radio wave front upon striking the earth's surface between B-R-C may be reflected again and projected upwards into the ionosphere so that an intersection is made at points X′ and Y′. Here the wave may be reflected again and returned to earth between points B′ and C′. This phenomenon of the radio signal bouncing back and forth between the ionosphere and the earth's surface is called multiple hop. Note that although many hops may take place along the signal path, there is only a single skip zone. All other points along the earth's surface—again depending upon the ionosphere—receive some portion of the radio wave by reflection from the ionosphere.*

At this point the whole business concerning ionospheric radio wave propagation sounds reasonably simple, and it would be, except for the fact that the ionospheric "mirror" is constantly undergoing changes in its internal characteristics. At any given moment the ionosphere only reflects a small span of frequencies in the short-wave portion of the radio spectrum. These constant changes in ionospheric composition become an important and essential element for long-range communications.

The Ionosphere. The ionosphere is simultaneously a simple and a complex structure. On the simple side of the picture, the ionosphere is composed of several layers of ionized gases. These layers result from the energy emissions from the sun and the reaction of these emissions on the rarefied gases in the ionosphere. Figure 2

*The term reflection is used here in preference to the correct terminology which is refraction. For all practical purposes the SWL may consider that the radio wave is reflected from the ionosphere.

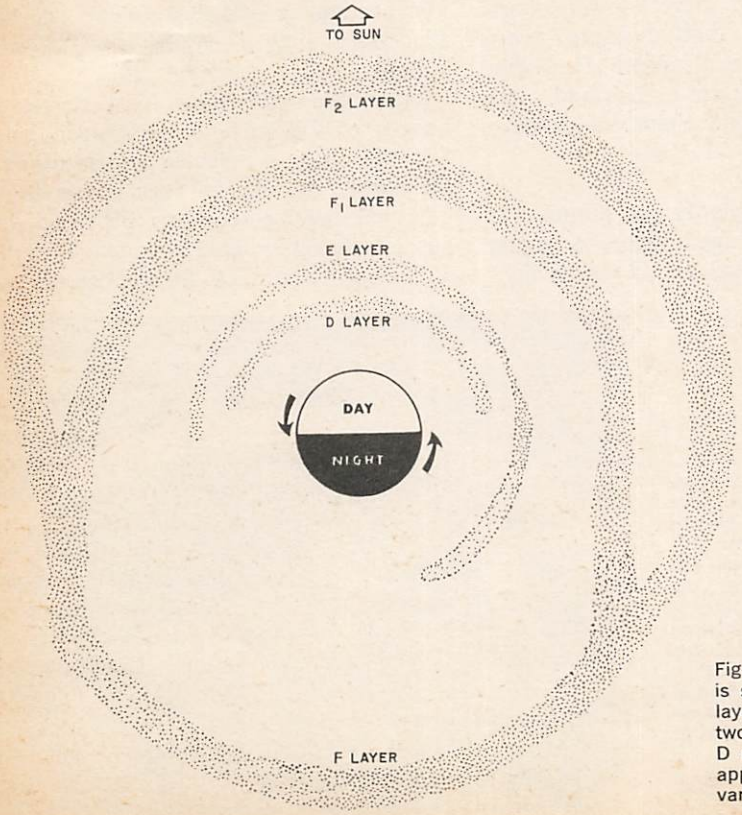


Fig. 2. At noon the ionosphere is stratified into four separate layers. Shortly after dusk the two F layers combine and the D and E layers gradually disappear. The reverse occurs in varying degrees each dawn.

Local Time	Winter '68-'69					Spring '69					Summer '69					Fall '69				
	I	II	III	IV	V	I	II	III	IV	V	I	II	III	IV	V	I	II	III	IV	V
0000	49	31	25	31	25	49	31	25	49	31	49	31	25	31	41	49	31	31	49	31
0200	49	31	25	31	31	49	31	25	49	41	49	31	31	25	49	49	41	31	49	41
0400	49	31	25	31	49	49	31	25	41	49	49	31	25	25	41	49	31	31	49	49
0600	49	25	25	25	49	31	19	19	*	31	31	25	19	19	31	31	25	25	41	41
0800	31	25	19	13	31	31	19	16	13	25	31	19	19	19	25	31	19	19	*	31
1000	25	16	19	13	31	25	16	16	13	25	25	19	19	16	25	25	16	16	16	25
1200	19	13	19	13	31	19	16	16	13	19	19	19	19	19	25	25	19	16	16	*
1400	19	13	19	13	31	25	16	16	19	16	25	25	19	25	16	31	25	16	19	16
1600	25	25	16	25	16	31	25	19	25	16	31	25	19	31	16	31	25	19	25	19
1800	31	25	16	31	16	31	25	19	31	25	31	31	16	31	16	49	25	25	31	25
2000	49	31	19	31	25	49	25	19	41	25	49	31	19	31	25	49	31	25	41	25
2200	49	31	25	31	25	49	31	25	49	25	49	31	25	31	25	49	31	25	49	31

1969 FORECAST

Legend

I—South and Central America
II—Europe, N. Africa, Mid East
III—Central Asia, Far East
IV—Central and South Africa
V—Australia, S. Pacific

Band (meters)	Frequency (kHz)
13 —	21450—21750
16 —	17700—17900
19 —	15100—15450
25 —	11700—11975
31 —	9500— 9775
41 —	7100— 7300
49 —	5950— 6200
* —	NIL

is a cross-section view of the ionosphere. Imagine that the ionosphere and the earth are rotating in synchronization. During the daylight hours the ionosphere is separated into four very distinct layers.

The lowest layer (actually at a height of about 50 miles above the earth's surface) is known as the D layer or D region. Slightly above this layer is a second daylight-activated region referred to as the E layer (about 65 miles above the surface).

At a much greater altitude above the surface there is an ionospheric region referred to by the letter F. In the daylight hours this region is stratified into two discernible layers—F1 and F2. This region is between 150-300 miles above the surface. Each of the ionospheric layers or regions plays a particular part in radio wave propagation. Basically, they are as follows:

D Layer. This is the absorption layer in the ionosphere. D layer absorption varies hourly but reaches its peak shortly after local noon. All radio waves below 5 MHz are usually absorbed during the daylight hours by the D layer.

E Layer. This region is primarily ionized during the daylight hours. The E layer becomes immediately evident after sunrise. A weakened and somewhat fragmentary E layer exists after sunset, but dies out around local midnight. This is a reflecting layer and may have some effect on radio wave transmission during daylight hours below frequencies up to 7 MHz.

F1 Layer. This is strictly a daylight phenomena and has very little effect upon radio wave transmission.

F2 Layer. This is the most important layer to the DX'er. Because of its great

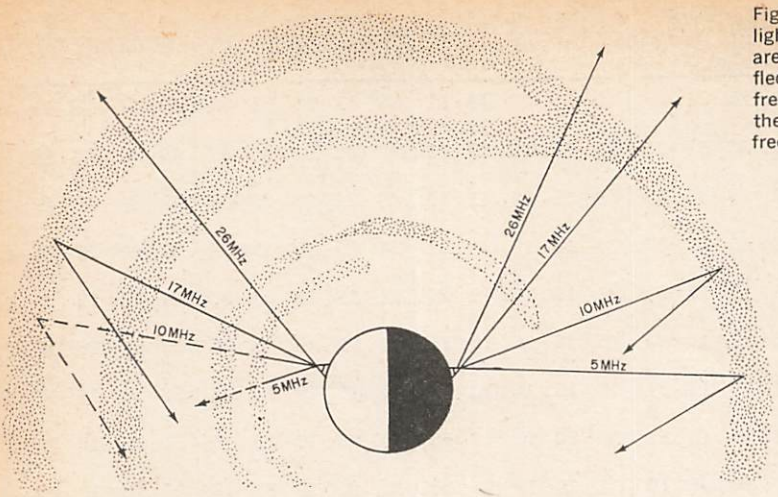


Fig. 3. During the daylight hours some signals are absorbed and some reflected. At night, higher frequencies pass through the ionosphere and lower frequencies are reflected.

height—hence, increased skip distances—the ability of the F2 layer to reflect radio signals is of great consequence. Unfortunately, the frequencies that can be reflected vary not only hourly, but daily, seasonally, and yearly!

F Region. When the ionosphere is in total darkness the F1 and F2 layers combine into what is referred to as the F region. This region is responsible for the transmission of all radio signals that can be heard via skip during the late evening and early morning hours.

Ionospheric Density. It is obvious from the above that the sun is solely responsible for the creation of the several layers in the ionosphere. The solar radiation contributing to the production of the ionosphere consists of both ultraviolet light and corpuscular radiation.

Since these regions are the products of solar activity, the density depends upon the amount of radiation striking the ionosphere. Maximum daily ionization occurs shortly after noon (local time) when the sun's radiation is greatest. The density of the ionosphere determines the highest radio frequency that can be reflected at a given time. All radio frequencies above this value, called the maximum usable frequency (MUF), are passed through the ionosphere and dissipate in outer space.

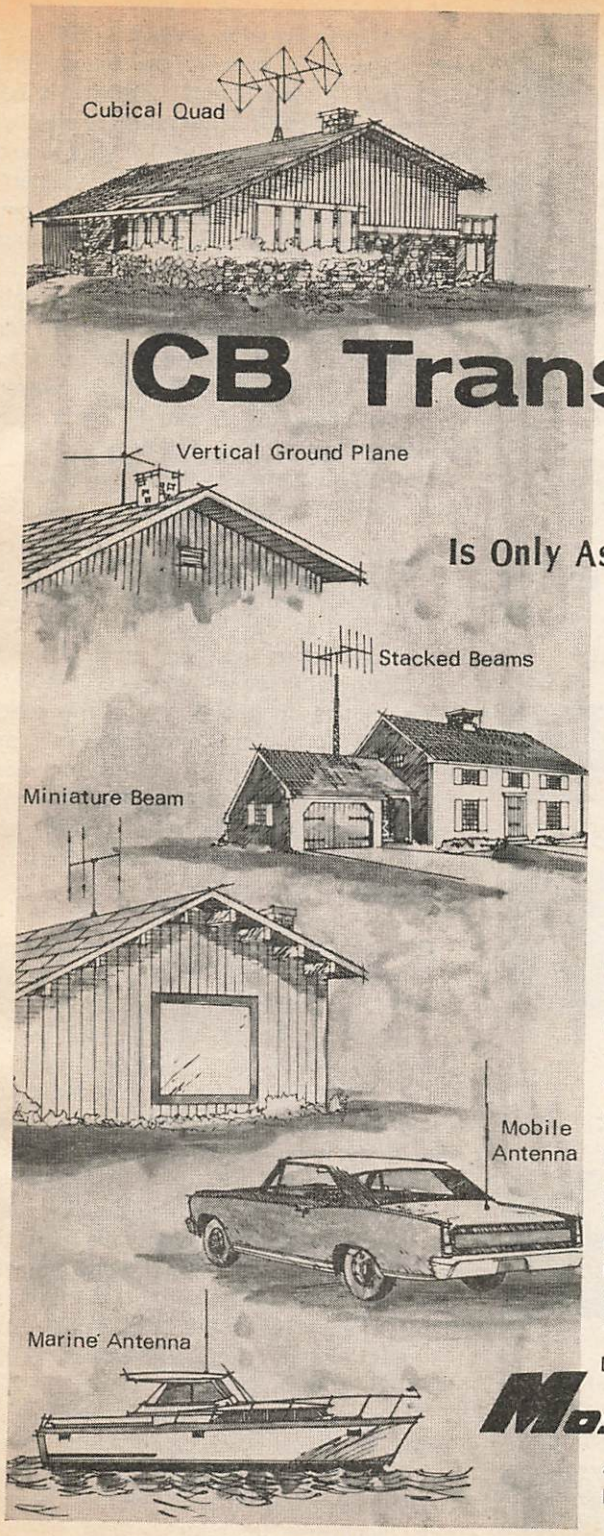
The critical MUF value rises and falls with ionospheric density. Therefore, the greater the solar activity, the higher the signal frequency that can be used for two-way communications.

Sunspots. Within the past 40 years it has been firmly established that solar ultraviolet radiation is a direct function of the number of sunspots visible on the surface of the sun. At times when a fairly large number of sunspots are seen, the MUF rises to its highest values. When sunspots are few, the MUF is considerably lower.

Extended studies over the past few centuries have revealed that a statistical 11-year sunspot cycle exists. Within the past year the number of sunspots reached a peak and are now on the decline.

Large sunspot groups also radiate solar flares and emit radiation particles that seriously disturb long-range short-wave transmissions. These disturbances are of two varieties: the "blackout" resulting from the sudden appearance of solar flares, and the "ionospheric storm" resulting from the interception of the corpuscular radiation from the sunspots in the ionosphere.

Frequency Vs. Time. Figure 3 is similar to Fig. 2, but in this drawing a radio transmitter is shown producing signals on four different frequencies during both day and night periods.



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In the example, the daylight broadcast of the 26-MHz signal exceeds the MUF and thus passes out through the ionospheric shell. The 17-MHz signal, however, is below the critical MUF value and is reflected back to earth. A signal at 10 MHz would be partially absorbed and partially reflected. A 5-MHz signal would be almost completely absorbed in the D, and to some extent, in the E layer.

The same transmitter operating at night would suffer a loss of both the 26- and 17-MHz signals, since these frequencies are below the critical MUF value. However, since the absorbing D and E layers have been dispersed during darkness, both the 5- and 10-MHz signals would be heard at good strengths at fairly long distances.

Fading. Several factors contribute to the cause of fading signals. The most significant is that the ionosphere is not a smooth reflecting surface. In fact, it is very patchy and some layers are "cloudy." These clouds in the E layer are called sporadic-E formations and frequently are so intense that the MUF is raised for very short periods of time above the FM broadcasting band! Also, the more distant is a transmitter, the more sky-wave paths to the receiver (see Fig. 1).

Outlook for 1969. The present sunspot cycle reached a peak in the summer of 1968. Short-wave DX'ing in the 16-, 13-, and 11-meter bands also peaked in the 1967-68 season, and will again peak in the 1968-69 DX season. In general, the gradually declining number of sunspots should not suddenly lower DX opportunities in either the 16- or 13-meter bands for the next six to nine months. Excellent DX in the 19-meter band can be expected during the forthcoming North American winter. Excellent reception, at appropriate times, is expected in the 25-, 31-, 41-, and 49-meter bands from November, 1968 through to April, 1969.

The accompanying chart roughly illustrates the short-wave broadcasting bands that are most likely to produce good reception from the indicated regions at specific local time intervals.

DX'ing The AM Broadcast Band

SHORT-WAVE LISTENING

No Shortage of DX Stations Here

BY BILL MIGLEY, WPE8JEL

VIRTUALLY everyone listens to his favorite news, sports, and music on a standard AM radio, but have you ever wondered if DX could actually be heard? Can you hear signals from Canada, Mexico, South America, England, or Japan? Yes, they can be heard if you happen to be tuning to the proper frequency at the right time and propagation conditions are reasonably good. If you have gotten your feet wet with DX on the short-wave bands, then come along and join the many hundreds of BCB DX enthusiasts and get in on the fun.

Much of the DX heard on the broadcast band is in the English language, and therefore is easy to identify. Almost everyone has access to an AM radio, whether it be a small transistor set or a good communications receiver. With the enormous number of stations on the air (over 4000 in the U.S. alone) there will never be a shortage of stations to log and verify.

BCB Receivers. The first thing that you will ask yourself is how good or how expensive a receiver must you have. To go after the real BCB DX, a sensitive 15-transistor radio should be fine. With its highly directional built-in loopstick antenna, you can get started in the hobby. Many AM table model and automobile receivers are also suitable as they, too, are generally quite sensitive. However, they lack certain other features that are quite handy to have for DX'ing purposes.

To get the most rewarding DX, a good communications-type receiver covering the BCB is your best bet. Athough these are most often used for DX'ing the shortwave bands, nearly all of them also tune the standard AM broadcast band. A communications receiver in the lower medium-price range ($80 to $100) will enable you to hear at least a total of 500 BC stations from 25 countries, the 50 states, and much of Canada. You won't log that many in a short time, but it can be done with far more ease than sweat. Naturally, as the receiver price goes up, so does performance, but expensive receivers just are not practical until you have had some experience with BCB DX'ing.

Sensitivity, the ability of a receiver to intercept a weak signal, is naturally a must for receiving distant stations. Selectivity, the ability of a receiver to separate signals, is necessary in order to hear a weak DX signal without a strong signal on a nearby channel splashing over and creating interference.

Let's say that you live within 100 miles of KRAK, 1140 kHz, Sacramento, Calif. Without a selective receiver, you will likely have splash-over on both 1130 and 1150 kHz. This will eliminate DX'ing on those two channels except when KRAK is off the air. With a highly selective receiver, you should be able to hear a signal on every channel (every 10 kHz) between 540 kHz and 1600 kHz. This does not include channels blocked by strong local stations, as only the very expensive receivers ($300-

$700) will eliminate splash-over on adjacent channels. However, a local station should not interfere with frequencies more than 2 channels above or below its own. The better receivers will even separate the in-between or split channels (834 kHz, 905 kHz, etc.) to allow you to receive foreign stations.

Antennas. A good long wire antenna (40 to 100 feet) provides the best results. Anything much longer than 100 feet is not significantly better than the 100-foot antenna. For best results, the antenna should be in the clear and 30-50 feet above ground level.

A must for the serious listener is a loop antenna. The loop is very directional with deep nulls at right angles to the plane of the antenna itself. It is compact and can fit into any room. Being an indoor antenna, it is usually four or five feet square for highest gain, but it can be made as small as one foot square. Plans for a good home-made loop can be obtained from either of the BCB clubs mentioned later.

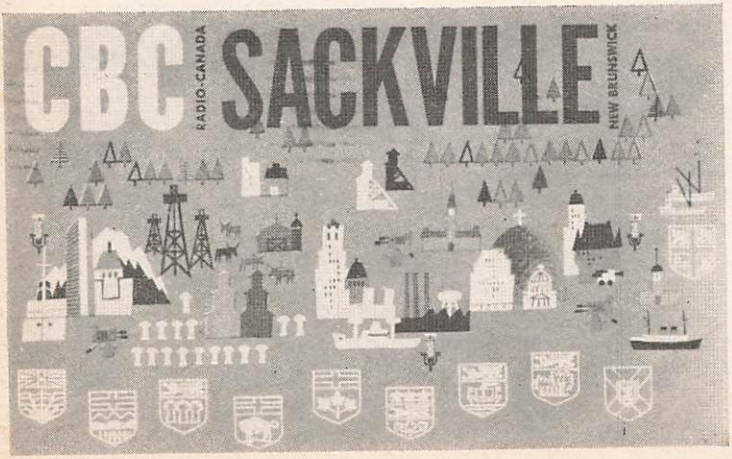
Stations. The AM broadcast band in North America covers frequencies between 520 and 1600 kHz. Stations in the U.S. and Canada operate on channels 10 kHz apart. Stations in other parts of the world operate on and between these channels. European stations operate on channels 9 kHz apart from 520 kHz to 1602 kHz.

The highest permissible power at which AM stations may operate within the U.S. and Canada is 50 kilowatts. In certain other countries the power level may reach 250 kW, or even as high as 500 kW. The highest powered station on the broadcast band is a **Voice of America** outlet in the Philippines. At 1140 kHz, it operates at one million watts.*

Many AM BCB stations operate as daytime stations only—on the air from local sunrise to local sunset. Many other stations have unlimited broadcasting hours, although some reduce their power at sunset (5 kW to 1 kW, 1 kW to 250 watts, etc.).

In North America there are three general types of channels—clear, regional, and local. Clear channels are those frequencies used by a few stations—most of which are high-powered. WLW, Cincinnati, 700 kHz, is the only station in North America on that frequency. On 770 kHz, WABC, New York, and KOB, Albuquerque, N.M., both operate with 50 kW. On 1130 kHz there are three stations of 50 kW, one of 25 kW power, and two at 10 kW—all using directional antennas to avoid interfering with each other There are also a few daytime-only stations and a sprinkling of low-powered unlimited-time stations on most of the clear channels on the AM band.

*Rumors abound concerning the super-power transmitters being installed in Africa and Asia. It is reliably reported that Radio Peking has a 2000-kW transmitter operating on 1525 kHz. A 3000-kW station is going into operation at Radio Beirut and a super-super station at Radio Cairo with 5000 kW is due to start up in 1969.



One of the more colorful QSL cards. This was sent to the author from CBA, Sackville, N.B., Canada.

Stations that broadcast on regional channels operate with sufficient power to cover a broad area, but not as much territory as the clear channel stations. Most regional stations operate with 5000 watts daytime and either 1000 or 5000 watts at night. Due to the many stations and the still relatively high power, DX stations of the regional type can be heard at times with little QRM (interference).

The local stations operate on what have been termed the "graveyard channels." Most of these stations run a top power of 250 watts, although there are a few with 500 and 1000 watts scattered here and there. At night the highest power for any of these stations is 250 watts. These frequencies are so crowded that when you first tune in it will (except for the locals) sound like a garbled mess. But as these

BEST BETS FOR BCB DX

State	Station	Frequency	City
Alabama	WYDE	850	Birmingham
	WAPI	1070	Birmingham
Alaska	KFAR	660	Fairbanks
	KFQD	750	Anchorage
Arizona	KTUF	1580	Tempe
Arkansas	KAAY	1090	Little Rock
California	KFI	640	Los Angeles
Colorado	KOA	850	Denver
Connecticut	WTIC	1080	Hartford
Delaware	WDEL	1150	Wilmington
	WDOV	1410	Dover
Florida	WAPE	690	Jacksonville
	WINZ	940	Miami
Georgia	WSB	750	Atlanta
Hawaii	KORL	650	Honolulu
Idaho	KBOI	670	Boise
Illinois	WGN	720	Chicago
Indiana	WOWO	1190	Fort Wayne
Iowa	WHO	1040	Des Moines
Kansas	WIBW	580	Topeka
Kentucky	WHAS	840	Louisville
Louisiana	WWL	870	New Orleans
Maine	WFST	600	Caribou
	WLOB	1310	Portland
Maryland	WBAL	1090	Baltimore
Massachusetts	WBZ	1030	Boston
Michigan	WJR	760	Detroit
Minnesota	WCCO	830	Minneapolis
Mississippi	WRBC	1300	Jackson
	WOKJ	1550	Jackson
Missouri	KMOX	1120	St. Louis
Montana	KXLF	1370	Butte
Nebraska	WOW	590	Omaha
	KFAB	1110	Omaha
Nevada	KOH	630	Reno
	KENO	1460	Las Vegas
New Hampshire	WTSN	1270	Dover
	WKNE	1290	Keene
New Jersey	WPAT	930	Paterson
New Mexico	KOB	770	Albuquerque
New York	WCBS	880	New York
North Carolina	WBT	1110	Charlotte
North Dakota	KFYR	550	Bismark
	KXGO	790	Fargo
Ohio	WLW	700	Cincinnati
Oklahoma	KVOO	1170	Tulsa
	KOMA	1520	Oklahoma City
Oregon	KEX	1190	Portland
	KYMN	1520	Oregon City
Pennsylvania	KDKA	1020	Pittsburgh
Rhode Island	WPRO	630	Providence
South Carolina	WCSC	1390	Charleston
South Dakota	WNAX	570	Yankton
	KSOO	1140	Sioux Falls
Tennessee	WSM	650	Nashville
Texas	WFAA	820	Dallas
Utah	KSL	1160	Salt Lake City
Vermont	WVMT	620	Burlington
Virginia	WRVA	1140	Richmond
Washington	KOMO	1000	Seattle
	KGA	1510	Spokane
West Virginia	WWVA	1170	Wheeling
Wisconsin	WTMJ	620	Milwaukee
Wyoming	KWYO	1410	Sheridan
Alberta	CBX	740	Edmonton
	CFAC	960	Calgary
	CBR	740	Calgary
British Columbia	CKLG	730	Vancouver
	CKNW	980	New Westminster
Manitoba	CBW	990	Winnipeg
New Brunswick	CBA	1070	Sackville
Newfoundland	CBT	540	Grand Falls
	CBN	640	St. Johns
	CBY	990	Corner Brook
Northwest Territories	CHAK	860	Inuvik
	CFYK	1340	Yellowknife
Nova Scotia	CBH	860	Halifax
	CHNS	960	Halifax
Ontario	CBL	740	Toronto
Prince Edward Is.	CFCY	630	Charlottetown
Quebec	CBM	940	Montreal
Saskatchewan	CBK	540	Regina
Yukon	CFWH	570	Whitehorse
Bahamas	ZNS	1540	Nassau
Barbados		780	St. Michael
Bermuda	ZFB-1	960	Hamilton
	ZBM-1	1235	Hamilton
British Honduras		834	Belize
Costa Rica	TIRICA	625	San Jose
Cuba	CMQ	640	Havana
El Salvador	YSS	655	San Salvador
Haiti	4VEF	1035	Cap Haitien
Jamaica		750	Port Maria
Mexico	XEWA	540	San Luis Potosi
	XEW	900	Mexico City
Netherland Antilles	PJB	800	Flamingo Island, Bonaire

stations fade in and out, some real DX can be heard by the patient listener. Even listeners as close as 20 miles to one of these local stations stands a chance of hearing other stations on the same frequency when nighttime conditions take over.

As an added note, stations with unlimited time may operate on a 24-hour daily basis, but many sign off around midnight local time. This is especially true early Monday mornings. Many stations, including the big 50-kilowatters, that are on the air all night the rest of the week may be off the air for maintenance before sunrise Monday morning. This leaves the clear channels wide open for anything that may be coming through. Regional frequencies may also be open for long haul DX at the same time.

Getting Started. First get to know the AM broadcast band. Familiarize yourself with what stations you can easily hear and with what stations you would like to hear. Sit down in front of your receiver some afternoon and, starting at the 540 kHz end of the dial, check each channel (10 kHz apart) to see what you can hear. Take some paper and mark 540 on it. Skipping a few lines, make your next entry for 550, and so on. Jot down the callsign of the station or stations that you hear on each frequency. Continue all the way up the band to 1600 kHz. You should be able to hear a station on virtually every channel except on frequencies which are adjacent to or blocked up by strong local stations.

Repeat the entire procedure at night a few hours after local sunset. You will notice that signals travel many times farther at night and, on most channels, you will be logging different stations than you logged during daylight hours.

After you have a good idea of what you can hear with your receiver, and when you can hear it, continue with new loggings. Keep a record of every new station you hear and before you know it you'll have logged well over a hundred stations from 20 states or more and a few Canadian provinces as well. And—get this—you haven't been listening when BCB DX is at its best!

When To Listen. In general, a BCB signal travels farther over a path of darkness and during the winter. In winter you won't be bothered by static from electrical storms and the atmospheric noise level will be much less.

Let's take a typical winter day as an example. It is noon local time and conditions are fairly settled. You will be able to hear daytime stations from your own and surrounding states covering a hundred miles or so and perhaps a few clear channel stations from upwards of 300-400 miles. As sunset approaches, stations to the east—now in darkness—will begin to override the weak signals from your area and from those to the west. Daytime-only stations will sign off thereby lessening the QRM. At this time you can go after the eastern stations, especially those which are signing off. On the East Coast this is prime time to tune for signals from European broadcast band stations.

As night deepens, eastern stations settle down while western stations operating with high daytime power come in on the dark path now forming. The band will then settle down as the whole continent is absorbed in darkness. Around midnight many stations will be signing off for the night, exposing stations that you would not otherwise hear.

The BCB remains alive and kicking until sunrise when you will begin to hear eastern stations signing on. The exact opposite of sunset effect is now beginning.

BCB Tests. Between 0000 and 0600 (your local time) you can frequently hear stations conducting test transmissions. One such test is a frequency check. This type of test generally lasts about 15 or 20 minutes and is usually conducted on a reoccurring basis. The test is to provide the best possible reception for a monitor to measure the exact frequency of the broadcasting station.

An equipment test is usually conducted to check out the operating efficiency of the station's equipment. These tests are not run on a regular basis and are much longer in duration. A broadcaster may transmit a steady tone or music for its test.

A DX Special is a special program arranged by a listeners' club to provide DX'ers a chance to log a distant station. These are usually arranged with stations whose primary coverage is small but which might be greatly expanded if the station were to go on the air at an offbeat time during the night. One such DX Special was run last winter by KIFN, 860 kHz, Phoenix, Ariz., primarily for the benefit of members of the National Radio Club. KIFN is a 1000-watt station, daytime only, with a relatively small primary coverage area. The frequency—860 kHz—is clear and wide open on a Monday morning. The only other station on this frequency at this time was another 1-kW station, KONO, San Antonio, Texas. Result—KIFN, virtually impossible to hear outside of Arizona, New Mexico, and immediate surrounding areas, was heard almost nationwide.

Any of these tests can be heard on any morning of the week but Monday mornings are by far the best with Sunday mornings running a close second. During the peak of the DX season through the winter months there may be as many as five or six DX Specials arranged for the same Monday morning.

If you hear a test, listen to it until you hear an ID (identification) given either during or at the end of the test. Note the exact time when the tone becomes a different pitch or any other characteristics of the test. Get the time and the exact wording of the ID. If music is used, note the type of music, any titles that you may recognize, and the time when a new record is played.

Try For QSL'.s Sure, listening for distant stations is well worth your time, but it is

Sample QSL cards from typical AM broadcast band stations. You can probably hear these stations in only a few days of DX listening.

only half the fun. Prove that you really heard that station by sending them a reception report and obtaining, in return, their verification card, or QSL. You can collect beautiful QSL cards and nice looking verification letters by sending the station a worthwhile reception report.

To prove your reception, tell them the details of what you heard on their broadcast coupled with the exact time that you heard it. For example:

1215 AM EST—ID "This is WSPT, Radio Voice of Stumptown." Pop music recording of "Help" by the Beatles.

1218 AM—Commercial for Smith Ford Sales.

A report should cover at least 15 to 20 minutes unless you have a weak signal that is audible for only a few moments. The idea is to prove beyond a doubt to the station manager or engineer that you heard the station. Always enclose return postage.

Membership In DX Clubs. An invaluable aid to the serious BCB DX listener is membership in a DX Radio Club. A radio club can help you to get started in the right direction and can teach you more about the hobby and the techniques involved in BCB listening than any other source. For the AM-band DX'er, there are two clubs dedicated solely to BCB DX'ing: International Radio Club of America (IRCA), 6559 South Clayton St., Littleton, Colo. 80120; National Radio Club (NRC), P.O. Box 99, Cambridge, Mass. 02138.

During the broadcast-band season (Nov. to Feb.), these clubs publish bulletins on a weekly basis with a total yearly publication of 34 issues. Other radio clubs publish a BCB column in their newsletters, bulletins, or magazines.

Foreign Stations. You will be able to hear many foreign countries in the AM BCB that you might not be able to hear on short-wave. More than likely, your first loggings of stations outside of the U.S. and Canada will be from Latin America. Look for CMQ, Havana, Cuba, on 640 kHz. Another fairly easy catch, at least in the Eastern U.S., is PJB, "Trans World Radio," Bonaire, Netherland Antilles. They'll probably be relaying programs of "Radio Nederland," so be sure of your identification. PJB is on 800 kHz; listeners in the Midwest will more than likely hear CKLW, Windsor, Ont. on this frequency. Listeners in the West should have little trouble hearing XERF, Ciudad Acuna, Coahuila, Mexico, on 1570 kHz. If you have a receiver with sharp selectivity, try channel splitting for the British Honduras station on 834 kHz. Early evenings (your local time) check 782 kHz for Miramar, Portugal. You can hear them if you have the patience. It'll be in the Portuguese language and they may not verify but it's a good catch nevertheless.

After you've logged your first foreign station, you'll find yourself becoming a real DX fiend. With a reasonable amount of patience and time, you can log more stations than you knew existed. A total of 20 countries for one season of DX'ing is not a difficult task.

DX'ing Europe

SHORT-WAVE LISTENING

Across the North Atlantic Is Easy

BY GERRY DEXTER, WPEØHDB

BASEBALL PLAYERS cut their eye teeth in the sandlots and most shortwave listeners cut theirs by DX'ing the Europeans. "The British Broadcasting Corporation," "Radio Nederland," "The Voice of Germany," "Radio Moscow," and the other large European broadcasters are among the first stations to be logged. Europe is certainly the easiest continent to DX and to snare 15-20 countries rapidly while learning the basics of DX'ing in the process.

Europe is also the home of many of short-wave's largest, most powerful and most famous broadcasting stations. DX'ing Europe not only can provide your logbook with up to four dozen countries, but will enable you to hear a variety of interesting programs. One such program, conducted by famous short-wave personality Eddie Startz has been broadcast by "Radio Nederland" continuously (except during World War II) for 40 years!

In most cases, tuning the Europeans isn't difficult. And you'll find that the more thoroughly you plan your DX'ing, the easier and more profitable it becomes. The more information you have on hand concerning

One of the control centers at the Swiss Broadcasting Corporation site in Schwarzenburg. Many of the programs from this famous transmitter are in the English language.

QSL cards verifying reception from some of the most frequently heard Europeans in North America. Sizes shown are not proportionate—the Portugal card is much larger. Prague now issues photographic QSLs.

current times and frequencies, the quicker you'll begin to get results.

Many of the European broadcasters operate with at least 100 kilowatts of power in the major international shortwave bands. You'll find them mostly in the 49-, 41-, 31-, 25-, 19-, 16-, and 13-meter bands. They can be heard at good signal strength in North America in the morning, afternoon, and evening hours (your local time).

Most of the European stations broadcast in the English language during at least part of their transmissions, although the amount varies from a few minutes per week to several hours per day. You'll find that the English language transmissions make your listening easier, but they may also tend to spoil you when you progress to the more difficult, non-English-speaking stations both in Europe and other parts of the world.

The major broadcasters change their frequencies and hours of transmission about 4 times a year. This is necessary due to seasonal propagation changes. It is not practical to list current operating sched-

ules here. We suggest that you check Hank Bennett's monthly short-wave column in **Popular Electronics** Magazine for the information on the countries that you are chasing.

The Europeans are among the friendliest of broadcasters. Many publish regular program schedules showing times, frequencies, and specific programs to be aired. A letter to the station will generally put you on the mailing list for these schedules and you'll receive the necessary information well in advance of upcoming changes.

A wise DX'er also learns how individual station announcements are likely to sound, as well as the sign-on formats and interval signals. The Europeans are noted for their colorful sign-on's, themes, and interval signals. Such references as the World Radio TV Handbook can fill you in on these points, as well as give you addresses of the stations.

Several of the European broadcasters feature regular programs for DX'ers and once you've become acquainted with the times and frequencies involved, you'll find this an excellent source of DX information. Stations quite often announce upcoming schedule changes on these programs.

Not all of the European stations are easy to log. Some will prove to be a challenge even after you have years of DX'ing experience. Those that you can class as "toughest" include the Greek armed forces stations, "Radio Renascenca" in Portugal on 6155 kHz, the 1000-watt Aldrans transmitter of the "Austrian Radio" on 6000 kHz, several of the West German short-wave stations, and many others. You'll find it often is necessary to check the same frequency at the proper time for days, weeks, even months on end. But success, when it comes, is that much more enjoyable.

Europeans generally have a fine reputation when it comes to verifying reception reports. You'll find that sending a good reception report will usually result in a colorful QSL to add to your collection plus program schedules and informative pamphlets as well. It's always wise to be positive of your station identification before you make your report.

BEST BETS FOR EUROPE

Frequencies given are those most recently reported using English, and in most cases are those used in broadcasts to North America. All of the following stations have English at one time or another with the exception of the Azores; they have no English whatever. France also has English, but they have no broadcasts beamed specifically to North America.

Country	Major Station	Frequency (kHz)
Albania	Radio Tirana	7310, 9510
Austria	Austrian Radio	6155,9700
Azores	Emissora Regional	4865
Belgium	Belgian National Radio	6010, 11,885, 15,335
Bulgaria	Radio Sofia	9660, 15,310
Cyprus	BBC East Mediterranean Relay	15,375, 17,885
Czechoslovakia	Radio Prague	7345, 9630, 11,990
Denmark	Radio Denmark	9520, 15,165
Finland	Radio Helsinki	15,185
France	O.R.T.F.	15,160, 17,740
Germany (East)	Radio Berlin International	15,170, 17,700
Germany (West)	Voice of Germany	6100, 11,795, 15,310
Great Britain	BBC	6110, 7110, 9580, 11,780, 15,070,17,740, 21,610
Greece	Athens Radio	7295, 9605, 15,345
Holland	Radio Nederland	6020, 9525, 11,730,15,425, 17,810, 21,540
Hungary	Radio Budapest	9755, 11,910, 15,160
Italy	Italian Radio & TV	5990, 9575, 11,810
Luxembourg	Radio Luxembourg	6090
Monaco	Trans World Radio	7225
Norway	Radio Norway	11,735, 15,170
Poland	Radio Warsaw	5990, 9525, 11,840
Portugal	Radio Portugal/Voice of the West	6025, 9680, 11,935, 15,340
Rumania	Radio Bucharest	11,875, 15,250
Spain	Radio Nacional Espana/Voice of Spain	6130, 9360, 11,710
Sweden	Radio Sweden	11,705,15,315, 17,840
Switzerland	Swiss Short-wave Service	6165, 9535, 11,715,15,305
U.S.S.R.*	Radio Moscow	9560, 11,740, 15,150
Vatican City	Vatican Radio	11,760,15,285, 17,840
Yugoslavia	Radio Belgrade	7200, 9620, 15,240

*For information on the USSR European republics you should study the World Radio TV Handbook

The unaware listener can easily be tripped up if he is not careful. Several of the major European broadcasters maintain relay stations that rebroadcast their programs to Africa, South America, or the Far East. Just when you think that you are listening to "Radio Nederland," you may find it is actually their relay station located in the Netherlands West Indies on Bonaire Island.

The same situation applies to "Radio Nacional Espana" (Spain) with its relay station in the Canary Islands and the BBC with relay stations on Ascension Island, Cyprus, and Singapore. Additionally, the "Voice of Germany" retransmits its programs over a relay station in Kigali, Rwanda. And, there are more of these relay stations under construction.

DX'ing The Communist Bloc. Many people get their first exposure to communism through short-wave listening. There is little reason why they shouldn't, since "Radio Moscow" is one of the most frequently heard broadcasters. Propaganda is the main theme of all communist broadcasts, but occasionally the careful listener can hear items of cultural and educational interest. The intensity of the propaganda depends on the country and so varies from the extremes of "Radio Moscow" and "Radio Berlin International" to the very modest undertakings of "Radio Prague" (or, at least it did up until this was written in late August, 1968).

Reporting to the stations in the communist bloc is perfectly acceptable to the U.S. postal authorities and the mail service is usually very fast. Most of the communist broadcasters are careful verifiers and your reports must be accurate to warrant a QSL. Generally speaking, an IRC is not necessary.

Two of the unfavorable sidelights of communism are the degree of jamming and the disguised broadcasts used. Jamming is quite variable, but some of the communist bloc countries go to great extremes to obliterate short-wave transmissions from the free world. Jamming is easily identifiable as a raucous radio signal (sounding like a diesel engine) covering another signal. As this book went to press, The U.S. State Department had complained about jamming.

The disguised broadcasts are usually easy to identify since most of them are on frequencies used by "Radio Moscow." One well-heard signal identifies itself as "This is Radio Station Peace and Progress." One morning this signal could be heard in the 16-meter band on the following frequencies: 17,710, 17,720, 17,760, 17,795, 17,860 and 17,900 kHz.

Nearly everyone has expressed a desire at one time or another to visit Europe. With some patience, practice, and knowledge you can tour the famous capitals of the Continent and get an insight into life in these countries. Your visa, passport, and travel accommodations are right there—in the form of your short-wave receiver.

DX'ing The African Continent

SHORT-WAVE LISTENING

Emerging Nations Want to be Heard

BY GRADY FERGUSON, WPE4BC

IT WAS only a few short years ago that DX'ing the African continent was quite a problem. Broadcasting stations were few and far between. Operating efficiency was astonishingly low and there were very few experienced broadcast engineers and technicians. But as the new nations emerged in the post-World War II era, they developed a strong desire to be heard. Many new broadcasters hired the best possible equipment and went to great lengths to provide adequately trained personnel.

As this is being written, many of the African broadcasting stations are in the very high-power category and there are dozens of other stations on the air that can be heard in North America with a little effort.

In addition to the many government sponsored and operated international broadcasting stations, various missionary societies have gone to out-of-the-way places to establish short-wave broadcasting facilities. The missionary stations in Addis Ababa, Ethiopia, and Monrovia, Liberia are two of the best and most frequently heard broadcasters.

African programming varies widely with the country and the broadcaster. Some stations go in heavily for propaganda, and some feature excellent tourist talks, while others have a good library of recorded music. Music native to the individual country, people, or culture also gets a good proportion of broadcast air time.

Following is a resume that may help you in DX'ing the African stations. The list of countries is not complete, but does include those countries you are most likely to hear in your first African DX'ing efforts.

CANARY ISLANDS. As mentioned elsewhere in this Handbook, many governments have broadcasting facilities outside their own territorial boundaries to relay short-wave programs. The "Spanish National Relay Station" at Santa Cruz de Tenerife is just such a station. It has been frequently heard on 15.365 MHz until sign-off at 0400 GMT. The programs from the station are virtually all in the Spanish language, but identification is relatively easy.

CONGO REPUBLIC. The Brazzaville transmitting facility became famous during World War II. High-power transmitters from the Congo have been heard on 21.500, 15.445, 15.190, and 11.93 MHz. At this writing, the 15.19 MHz transmitter opens at 1730 GMT in the French language. A short English-language program is scheduled between 1915 and 1930. DX'ers are often fooled by the fact that this station frequently relays the same program as the O.R.T.F. station in Paris, France.

EGYPT. The United Arab Broadcasting Service in Cairo is one of the major short-wave operations in the world. Cairo broadcasts in a number of Arabic and African languages in all of the short-wave broadcasting bands. A transmission on 9475

kHz between 0100-0400 GMT is often well received in the eastern part of North America. An English language segment is heard in this broadcast between 0200-0230. Identification of the Cairo transmitters is easy, since the signal is usually quite strong and the Arabic music very distinctive. Oddly enough, "Radio Cairo" has an excellent library of Western music recordings.

ETHIOPIA. Addis Ababa is probably the one major city you would least expect to hear in the short-wave bands. Fortunately, the Lutheran World Federation Broadcasting Service has established a tremendous transmitting facility in Addis Ababa and operates station "ETLF" on some 35 different frequencies. This station identifies itself as "Radio Voice of the Gospel" and has most recently been heard in North America on 15.41 MHz as early as 1330 GMT. Other English language programs have been noted on 15.28 MHz at 1500 and on 11.89 MHz at 0530. Programs are transmitted in a wide variety of languages, including: Amharic, Arabic, Hunsa, Hindi, Sotho, Swahili, Tamil, Zulu, etc.

GHANA. This small country is one of the favorites with SWL's. The Ghana broadcasting service in Accra is government owned and operated. Much of the programming is in the English language and transmissions from "Radio Ghana" are easy to identify. Strong signals have been heard recently on 21.72, 21.545, and 17.81 MHz as early as 1500 GMT. It is also worthwhile to try 11.85 and 9.76 MHz around 2000. During the long winter nights in North America it might be worthwhile tuning the tropical broadcast bands for a signal on 4.98 or 4.915 MHz just before sign-off time at 2300.

IVORY COAST. Abidjan is another likely candidate for winter-night DX'ing. Try 4.94 MHz around 2200 GMT. On some afternoons you may note this signal on 11.82 MHz. Most DX'ers consider this one a good catch.

LIBERIA. There are two broadcasting networks in Liberia. One is operated by the Voice of America with very powerful transmitters in the 41-, 31-, 25-, 19-, 16-, and 13-meter bands. The second broadcasting facility is operated by the cultural missionary broadcasting section of the Sudan Interior Mission. This is station ELWA and is most often heard on 15.155 MHz with religious services in various languages. During the winter months you may be able to hear them on 4.77 MHz.

MOROCCO. The Voice of America has another transmitting facility in Tangier and may pop up on any of 24 different frequencies in any one of the international broadcasting bands. The "Radio Diffusion Television Marocaine," Rabat, is sometimes heard on 11.735 MHz with an English-language transmission around 1800 GMT.

MOZAMBIQUE. The transmitters operated by the "Radio Clube de Mocambique" in Lourenco Marques is a favorite DX catch. Look particularly for the signal on 11.78 MHz between 0300 and 0500 GMT. Announcer David Davies is usually heard during that time slot with his English-language transmission.

NIGERIA. The Nigerian Broadcasting Corporation, Lagos, is well known by many DX'ers for the "talking drum" interval signal. DX'ers in North America frequently report this station on 21.45 MHz in the mid-morning hours. Later in the day, strong signals on either 15.255 or 11.975 MHz are heard around 2100.

RWANDA. This remarkably small country has an extraordinarily strong radio voice! The reason is that Deutsche Welle "Voice of Germany" has a relay station in Kigali. With a power output of 250,000 watts this station has no trouble being heard around the world. At writing this station was operating on 17.765, 11.905, 11.785, 9.735, and 9.565 MHz. Many DX'ers don't realize that they are actually tuned to Rwanda since the interval signal is the same as the parent station in Cologne, Germany.

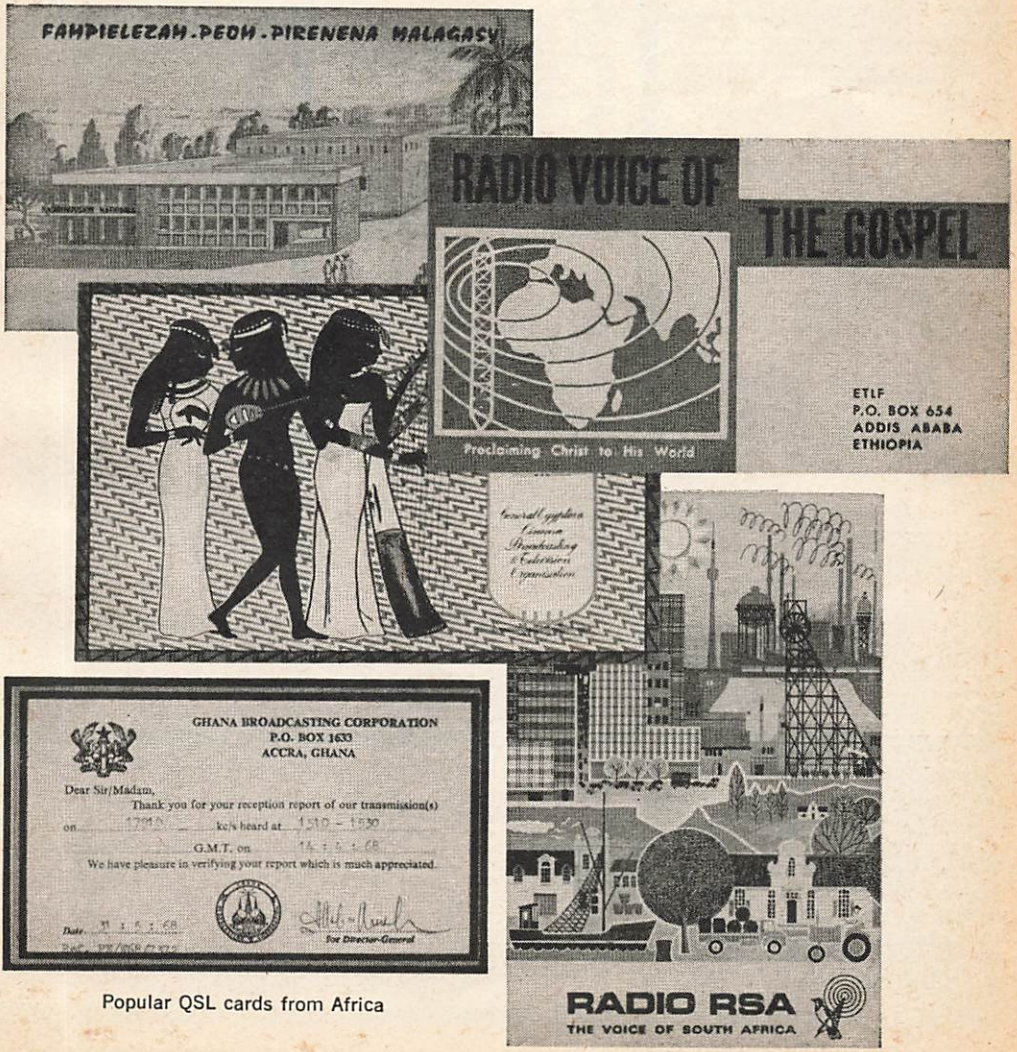
SENEGAL. This government-owned transmitter is being heard on 9720 kHz or more

recently on 15.115 MHz near 2355 GMT.

SOUTH AFRICA. Within the past few years, "Radio RSA," Johannesburg, has become a popular broadcaster to the SWL DX'er. Power transmitters use antennas beamed at Australia, Europe and North America. The most distinguishing characteristic of this station is the haunting melody intermixed with a bird call which the station uses as an interval signal. This interval signal is generally aired for several minutes prior to the opening of each broadcast transmission. Broadcasts are presently heard in the 16-, 19-, 25-, 31-, and 41-meter bands. Also listed for "Radio RSA" is an 11-meter outlet on 25.82 MHz and a local broadcasting outlet on 3.997 MHz—right in the middle of the 75-meter American ham phone band.

TANZANIA. This very powerful station is most frequently reported on 5985 kHz around 0300 GMT. Government owned and operated, "Radio Tanzania," Dar-Es-Salaam, is a good catch for any DX'er.

If the above has whetted your appetite for DX'ing the African continent, you will find that it is well worth the extra effort. This compromise list is a mere sampling and many countries were not mentioned.



Popular QSL cards from Africa

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DX'ing Asia And Australasia

SHORT-WAVE LISTENING

Fascinating Listening from a Far Corner

By A.R. NIBLACK, WPE9KM

IF YOU ARE a new SWL'er and interested in DX chasing, you will probably spend the first few weeks getting used to your receiver—and probably listening with some regularity to the same stations. London, Berne, Hilversum, Mexico City, Havana, and Johannesburg are usually fairly easy to log, at least in the eastern half of North America. Once you and your equipment get "broken in," however, you'll be interested in getting some other areas. For instance, have you logged any of the regional stations in the Pacific, Australasia, or Asia? If not, you're missing some of the best DX that there is to be heard.

A "darkness pattern" will bring you rare DX from Asia, Australasia, and the Pacific Islands.

The time to log stations from the Pacific, Asia, and Australasia is either in the late evening or early morning hours in terms of your own local time. Easily heard are the transmissions from "Radio Australia," Melbourne, "Radio Peking," China, "All-India Radio," New Delhi, "NHK, Radio Japan," Tokyo, and the "Voice of Indonesia," Djakarta. It is the intent of such stations that they be heard well overseas, especially in their "target" areas. These broadcasts can be logged at good readability on almost any short wave.

The more elusive regional short-wave stations are generally of low power and non-directional antennas are used to reach listeners within a radius of 300-500 miles. These stations make few seasonal changes in frequency and often operate on the same frequency for both day and night transmissions. The international transmitters tend to utilize the higher frequencies while the regional stations operate in the lower frequencies, i.e., the 41-, 49-, 50-, 60-, 90-, and the 120-meter bands, with a few operating between bands. As their primary purpose is to reach a local listening audience, they do not have to conform to any international agreement on frequency allocations.

In the tropics and sub-tropics, the lightning static is so intense and the atmospheric level of noise so high that it is practically impossible to have what we call normal reception on the AM broadcast band (540 to 1600 kHz) during evening hours. Hence, they use the lower frequencies (41 to 120 meters). The power output is usually in the order of 1 to 10 kilowatts.

For a signal to travel a great distance on these frequencies, the transmission path must be mostly in darkness. This is particularly true in DX'ing the 120-, 90-, and 60-meter bands. During the daylight hours, the signals in these bands are absorbed in the ionosphere and transmission is generally limited to something under 1000 miles. At night, the ionospheric absorption is minimized and it is not unusual for 120-meter band signals to be heard completely around the world.

Polar Flutter. In looking for signals from Asia, it should be noted that signals can

A few rare and not-so-rare QSL cards from Asia and Australasia short-wave broadcasters. Most of these stations can be heard regularly in the U.S.A.

arrive at your listening post via a path through the polar region. Such signals suffer from auroral effects and most generally have a rapid "flutter" or fading characteristic. It is also possible for these stations to reach your listening post via the "long" transmission path. Late afternoon signals from Asia, Australasia, and the Pacific Islands often arrive on the East Coast of North America after passing across Africa through a favorable zone of darkness. Having avoided the auroral zone, these signals are devoid of flutter. It is also possible for signals to arrive by both paths. In this case, the time lag between the two paths seriously deteriorates the readability of the signal.

In looking for early morning DX from this section of the world, keep in mind that signals will not be as strong (with the exception of the overseas voices of "Radio Australia," "All India Radio," etc.), nor as readable as the signals from the stronger European stations. An added thrill is gained from the skill and know-how that enables one to log "down under" DX. Learn to recognize the all-important flutter—it distinguishes the signals.

DX'ers living on the West Coast of North

America have a decided edge over their East Coast and Central North American brethren when it comes to logging the Asians, Australasians, and Pacific Island outlets. All is not lost, however, for with patience, know-how, and the right propagation conditions, it is possible to log these low-power broadcasters anywhere on the continent.

Try For Some of These. Here are a few of the DX stations you might look for in the next few months. XZK42, Rangoon, Burma, 5040 kHz, should be heard rather well throughout North America during the predawn hours until just after sunrise, your local time. If conditions are excellent, the signal may be heard for as long as an hour. (The same is true for other stations from this part of the world.) XZK42 will serve as a "marker" and, if reception is reasonably good, you should scan the dials with the expectation of hearing more DX. Look for "Radio Afghanistan," Kabul, Afghanistan, 7200 kHz as a distinct possibility and "Radio Brunei," Brunei Town, Brunei, 4865 kHz, can often be heard in Central North America at a readable level.

BEST BETS FOR THE PACIFIC

The following listing of frequencies and times will help you to determine when and where to look for Asian, Australasian, and Pacific Island stations during the winter DX season from November to March. Times shown are Greenwich Mean Time (GMT) and are approximate. Subtract 5 hours for EST, 6 for CST, 7 for MST, and 8 for PST.

Country and Station	Frequency (kHz)	East Coast	Midwest	West Coast
Afghanistan, Kabul	7200	1200	1300	1500
Australia, Perth	9610	1200	1300	1500
Brunei, Brunei Town	4865	1215	1315	1430
Burma, Rangoon	5040	1100	1200	1400
Cambodia, Phnom-Penh	9695	1230	1300	1400
Ceylon, Colombo	11,800	1400	1500	1700
China, Peking	15,060	0100	0200	0300
Cook Islands, Rarotonga	5042 (varies)	0430	0500	0700
Fiji Islands, Suva	3230	0915	1015	0800
Gilbert/Ellice Is., Tarawa	4912.5	0700	0730	0830
India, Madras	4920	1200	1300	1530
Indonesia, Djakarta	6103 (varies)	1100	1200	1430
Japan, Tokyo	3925	1100	1200	1400
Korea (North), Pyongyang	11,763	2330	0030	0200
Korea (South), Seoul	9640	1000	1100	0830
Laos	6130 (varies)	1030	1130	1400
Malaysia, Kuala Lumpur	6175	1130	1230	1400
Mongolia, Ulan Bator	7260	0930	1030	--
Nepal, Kathmandu	4600	--	1330	1500
New Caledonia, Noumea	3355	1000	1100	0900
New Hebrides, Port Vila	3905	--	0615	0700
New Zealand, Wellington	15,110	0400	0500	0630
Pakistan (West), Karachi	15,335	0130	0230	0330
Pakistan (East), Dacca	21,685	1100	1130	1230
Papua/New Guinea, Daru	3305	1030	1130	0700
Wewak	3335	1030	1130	0630
Philippines, Manila	15,440	0030	0100	0300
Sabah, Jesselton	4970	1000	1100	0800
Sarawak, Kuching	4950	1230	1330	1500
Singapore, Singapore	5010	1030	1130	1230
Solomon Islands, Honiara	3995	0915	1015	0800
Tahiti, Papeete	11,825	0300	0400	0700
Taiwan (Formosa), Taipei	17,720	0200	0300	0340
Thailand, Bangkok	11,910	1100	1200	0415
Timor (Portuguese), Dili	3268	--	--	1400
USSR (RFSFR), Vladivostok (Uzbek),	5015	1130	1230	0900
Tashkent	11,925	1300	1400	1230
Vietnam (North), Hanoi	11,760 (varies)	1230	1330	1530
Vietnam (South), Saigon	9620	1100	1200	1530

Phnom-Penh, Cambodia, 9695 kHz, is a typical South Asian broadcaster and you will hear it at times with native music, intermixed with some pop music and a girl announcer with a delightful voice. The modulation is weak and this frequency often has QRM (interference), so it may take a number of checks to get it good enough to report. ZK5, Rarotonga, Cook Islands, 5042 kHz (may vary), is a rarity in Eastern and Central North America, though West Coast listeners report it with some degree of regularity. "Radio Fiji," Suva, Fiji Islands, 3230 kHz occasionally makes it into North America with their English Service, but this really takes favorable conditions. VTW3, "The Voice of Tarawa," Gilbert and Ellice Islands, 4912.5 kHz, is a real toughie. RRI, "The Voice of Indonesia," Djakarta, Indonesia, 6103 kHz (may vary), may be heard with periods of English programming, but 9NB7, Kathmandu, Nepal, 4600 kHz, is a rarity. If you succeed in getting a logging on 9NB7, get a fast report off to them by airmail. There are probably less than six QSL's in existence today in the North American continent from this station!

YJB4, Port Vila, New Hebrides, 3905 kHz, is an Anglo-French condominium that has been logged in the Central and West Coast areas. It will verify correct reports. You'll have to fight generally heavy QRM from the 75-meter ham band operators to hear YJB4; consequently, reports of this station are few and far between. Station ZL21, "Radio New Zealand," Wellington, is often heard on 15,110 kHz with programming in English to the Pacific Islands. VL9CD, "Radio Wewak," Wewak, Papua/New Guinea, 3335 kHz, can be heard with variety programming in vernacular, popular selections, and some English, including identifications. If this station is logged it usually indicates that the 90-meter band is open and worthy of DX'ing.

The "Forces Broadcasting Service," Singapore, 5010 kHz, is considered to be premium DX and during the 1967-68 DX season, was heard stateside. "Radio Tahiti," Papeete, Tahiti, 11,825 kHz, frequently called "The Pearl of the Pacific," has only 4000 watts power but it's often heard throughout most of North America with a beautiful signal. Its distinctive interval signal is played by a Tahitian flute and drums. The programming is in Tahitian and French. "The Voice of Malaysia," Kuala Lumpur, Malaysia, 6175 kHz, is usually one of the better signals. "Radio Tashkent," Tashkent, Uzbek Republic, USSR, 11,925 kHz, has an English time slot that is well heard and is a ready verifier for a correct report.

A Few Thoughts. In DX'ing Asia, the listener is faced with a severe language barrier, as many native tongues and vernaculars are heard. But the problem is not insurmountable. Equip your Listening Post with a good short-wave handbook frequency listing and join a DX club that publishes a monthly DX bulletin. Between these two publications you will find that you can identify many of the stations. Most of the interval signals are of native origin and quite colorful, thus making them easily recognizable. It is not unusual to note that some of the broadcasters have commercial programming.

With the exception of the overseas voices of the international stations, most of the regional stations run very low power. However, some stations are improving their transmitting facilities, particularly in the Papua/New Guinea area. Just recently, "Radio Bougainville" came on the air for the first time.

Your final success in DX'ing Asia, Australasia, and the Pacific Islands is up to you. The technique can be learned only through experience; know-how and perseverance have their rewards.

Learn where to look and when to look. Good DX hunting!

The Sounds of DX

Interested SWL's can listen to disc recordings of rare DX on either of two platters just released by SWL Records, P.O. Box 150, Culver City, Calif. 90230. The two sides of the Vol. 1 recording (33 r/min) contain interval signals, opening announcements, anthems, etc., of international broadcasting stations such as "Kol Zion," "Radio Baghdad," "Voice of Free China," "Radio Pakistan," etc. Volume 2 contains very rare DX, including broadcasts by "Radio Nepal," "Voice of Tarawa," "Radio Cook Islands," "Radio Andorra," etc. The recordings sell for $3.95 each, or both for $6.50.

DX'ing South America

SHORT-WAVE LISTENING

Identifying the Latin Americans Is Not Easy

BY TREVOR CLEGG, WPE6FAF

WHEN YOU DX South America and the nearby Central American and Caribbean areas, you will be faced with a bewildering assortment of challenges, frustrations, and rewards. Unlike DX'ing other parts of the world, Latin America presents special problems that are seldom encountered elsewhere. Many DX'ers who are just beginning are concerned with the basic problems of identifying and logging what they have heard. The more experienced DX'er complains bitterly about the difficulty of QSL'ing the Latin Americans.

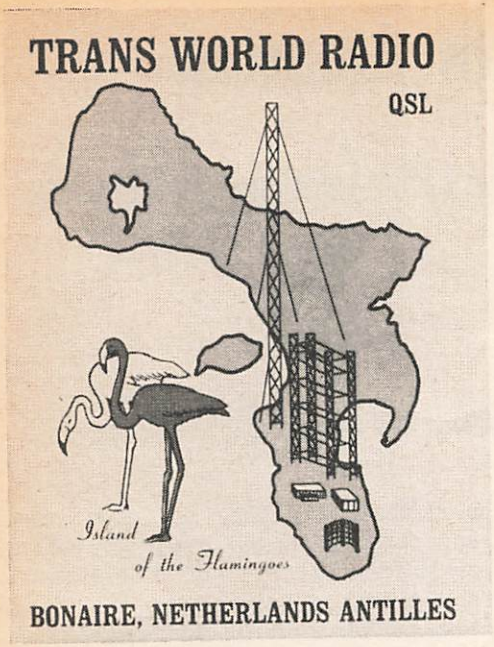
For the DX'er with a knowledge of either Spanish or Portuguese, the Latin American stations provide a worthwhile nighttime DX'ing activity. This pursuit of little known and elusive DX stations is probably unmatched by the problems encountered in any other geographic region.

How The Latin Americans Operate. Many of the DX'er's problems have their roots in the basic characteristics of Latin American and Caribbean radio stations. Throughout much of the world, short-wave broadcasting is primarily a nationalistic function, and most of the programming is specifically directed to overseas listeners. Most Latin Americans, on the other hand, are small, privately-owned commercial outlets broadcasting principally to an audience within the country, and often just to the region in which the station is located. Many Latin American governments maintain medium or short-wave broadcasting stations, but even these frequently are rather small and operated for the benefit of national audiences only. "Radio-diffusion Argentina al Exterior" in Buenos Aires and "Radio Habana Cuba" are the best-known exceptions to this general rule.

Because their broadcasts are not directed overseas, Central and South American stations generally operate with very low power, seldom exceeding 10 kW and more often on the order of 1 kW or less. Since much of South America is as far away from North America as Western Europe, reception is obviously more difficult than reception of the familiar European stations. To complicate matters, some Latin American stations use low-quality or poorly maintained equipment and the majority operate in the tropical broadcasting bands, on frequencies in the 2300-2495, 3200-3400, and 4750-5060 kHz ranges.*

Reception on the tropical bands tends to be uncertain and is very difficult in our summer months when North American atmospheric noise levels rise greatly. The only major international broadcast band having a large concentration of Latin American stations is the 49-meter band—several frequently sharing the same frequency and broadcasting schedule. Latin Americans are also found in the 31-, 25-, 19-, and 16-meter

*This is again a reflection of their local nature; the tropical bands are intended for local broadcasting in tropical countries where medium-wave signals do not carry well over long distances.



One of the strongest signals on both the AM broadcast band and short-waves is this unique station.

bands; but the higher the band, the fewer the stations to be heard.

Language Barrier. Local orientation is responsible for another major problem for DX'ers—the language barrier. Any SWL interested in serious South and Central American DX'ing requires a knowledge of the Spanish or Portuguese language, or at least access to someone with such knowledge. This is not to say that no Central or South American stations broadcast in English. Some national and missionary broadcasters do have English-language programs (primarily to a beyond-the-border audience) and some local stations carry programs for English-speaking residents. Nor does it mean that no stations correspond in English; many of the larger ones do. But, as a rule, most broadcasters conduct their affairs and their broadcasts entirely in Spanish or Portuguese and with no particular regard for English-speaking SWL's. The casual listener might be able to get along with no foreign language skills, but he may miss some of the rarer countries such as Paraguay, which has no English-language programs or broadcasting stations.

Identifying Latin American stations is complicated by several factors. Nearly all stations identify themselves by slogans or nicknames, which is perhaps fortunate, since it is easier to catch a slogan than call letters in the Spanish alphabet. But several stations in different countries may share similar names, and DX'ers should be careful to check frequencies and other clues for positive identification.

Another difficulty is the result of extensive network programming such as "Radio Cadena Nacional" in Colombia. Stations belonging to a "cadena" or "red" (network) will—like their North American counterparts—carry common programming. In Latin America, however, common programming is likely to be almost continuous and uninterrupted by identification of the individual stations. Most shortwave stations are said to dislike receiving reports on network programming.

Frequencies and time schedules are a source of confusion. Small private broad-

When this station first came on the air listeners were surprised at the strong signal. It now has powerful new transmitters and is sending out new QSL cards. This card was a longtime favorite.

casters don't care whether information on correct frequencies, call-signs, and broadcast times reach the outside world. Latin American stations change frequencies often and without notice. They may use "illegal" frequencies outside the recognized shortwave broadcasting bands. Many stations cease operations in times of financial stress or undergo change of ownership and identity. Clandestine or semi-clandestine stations may arise in times of political unrest. New outlets appear periodically. All in all, DX'ers should belong to a SWL club or subscribe to a good DX report to keep up with the latest changes.

Published broadcast schedules are generally unreliable. It is common practice for broadcasters to run an hour or more beyond the listed sign-off time. In some countries, many stations have extended schedules on weekends, staying on the air several hours after their normal weekday sign-off. DX'ers should never discount an otherwise valid identification solely on the basis of the published time schedule.

Identification. The format used by many Latin American broadcasters makes identification difficult. The majority of stations broadcast Latin, or sometimes American, pop music, interrupted periodically by commercials or news broadcasts. Unless the DX'er has a fair knowledge of the language and Latin music, he will be hard put to itemize specific program details, since many stations never announce the titles of musical selections. Certain types of "national" music only help identify stations in particular countries.

The commercials are sometimes run in continuous strings of a dozen or more. Few stations have anything more distinctive than an occasional chime or slogan (other than frequency) to set them apart from the rest. Many broadcasters do not identify more than once every 15 minutes and some go as long as an hour between ID's—which are usually brief and hard to catch at best. Broadcasts of sports events are likewise unhelpful, as individual stations go for an hour or more without identifying.

Verifications. Although many Latin Amer-

BEST BETS FOR LATIN AMERICA

The following stations are but a partial listing of those which have been logged and positively identified within a few weeks prior to publication of this Handbook. A few broadcast some English; most transmissions are in Spanish or Portuguese. The best listening times are those indicated in the text.

Country	Callsign and/or Slogan	Frequency (kHz)
Argentina	LRX, Radio El Mundo	9710
	LRY, Radiodiffusion al Exterior	9690
Bolivia	Radio Altiplano	5045
	La Cruz Del Sur	5025
Brazil	Radio Nacional do Brasilia	6065, 11,720, 15,445
	ZYR206, Radio Club Ribeirao	15,415
	ZYC9, Radio Tamoio	15,370
Chile	Radio El Morro	9520
	CE1185, Radio Cruz Del Sur	11,845
	CE960, La Voz de Chile	9690
Colombia	HJKJ, Emissora Nueva Granada	6160
	Radio Horizonte	5970
Costa Rica	La Voz de la Victor	9615
	Radio Casino	5954
Cuba	Radio Habana Cuba	9525, 15,155, 17,885
Dominican Republic	HISD	6090, 9505
	Radio Mil	4930
Ecuador	HCJB, La Voz de Los Andes	11,915, 15,115, 17,890
	Radio Quito	4923
El Salvador	YSS, Radio Nacional	6010, 9555
Grenada	Windward Islands Broadcasting Service	3280, 5015, 15,100
Guatemala	TGWB, La Voz de Guatemala	6180
Haiti	Voix de la Revolucion Duvalierieste	6105
Honduras	La Vox de Suyapa	6125
	Radio Comayaguela	6116
Mexico	XERR	15,110
	XEHH	11,880
	XEWW	6165
Netherland Antilles	Trans World Radio, Bonaire	800, 9590, 11,820, 15,425
Paraguay	ZPA5, Radio Encarnacion	11,950
Peru	Radio Nacional del Peru	17,890
	Americana Radio Nuevo Mundo	6010
Venezuela	YVXJ, Radio Barquisimeto	9510
	YVLK, Radio Rumbos	4970
Clandestine	Radio Libertad	15,050

icans do verify accurate reports, verifying certain broadcasters is a formidable problem. Some stations simply will not verify, or at least not without overwhelming encouragement. Operating with limited staffs and on a limited budget, and generally not being too interested in whether or not their signals are going beyond their target area, these broadcasters see no need to QSL. Others may require several reports and excessive amounts of return postage before they will verify. The only sure method of separating the two is to send off a report and see what happens. DX'ers will generally have better luck with large private stations. Government and missionary stations are often faithful verifiers.

Unless you have it on good authority that English-language reports are acceptable, reception reports in Spanish or Portuguese are a must. The average Latin American broadcaster speaks no more English than his North American counterpart speaks Spanish, and he is likely to consign all English-language reports directly to the wastebasket.

The report itself need not be particularly different from any other good report. Aside from the more obvious features such as time, date, and frequency, try if possible to include fairly detailed information about programming. Tape recorded reports (single track, 3¾, or 7½ in./sec) are especially valuable to many smaller broadcasters, which keep poorly detailed station logs, or none at all. As always, International Reply Coupons or mint stamps will help speed matters along. And if at first you don't succeed, try again.

When to Listen. There are only a few set rules for tuning South and Central Americas stations. The only South American stations likely to be audible except late in the afternoon in winter (your local time) are Ecuador's HCJB, a few of the larger Brazilians, and the 31-meter band Argentines. Mexican broadcasters, both medium-wave and short-wave, are frequently audible both day and night in the Southwestern part of the United States, and similar conditions exist for Caribbean stations in some parts of the Southeast.

Late afternoon generally brings in Brazil, Chile, Paraguay, and Uruguay on 25 meters. In the early evening the 31- and 49-meter bands begin to open. The 60-, 90-, and 120-meter bands are usually limited to late evening and nighttime reception, although the more powerful stations may show up in the late afternoons in the 60-meter band. And medium-wave DX'ing is, of course, an evening and nighttime activity. Some stations which sign off early may be caught at sign-on in the early hours of the morning in North America.

Obviously, no short article could explain all aspects of Latin American DX'ing; and in many cases, advice is no substitute for experience. A general understanding of the special characteristics and problems, however, should prove useful, particularly to beginners. Above all, don't be discouraged the rewards are well worth the efforts.

DX'ing The Clandestines

SHORT-WAVE LISTENING | Propaganda Fills the Air Waves

BY DON JENSEN

IF YOU INSIST on powerful, easy-to-tune signals, fixed frequencies and English-only broadcasts, you'd better stick to the major international shortwave services. But if you're tired of "spoon-fed" SWL'ing, have a taste for contemporary political intrigue and like things a bit mysterious, join the growing ranks of shortwave listeners who DX the clandestines.

Although clandestine broadcasting stations have been around since the 1930's, only in recent years have substantial numbers of SWL's paid much attention to them. Because clandestine DX'ing, as a distinct aspect of the hobby, is relatively new, some confusion in terms has resulted. Despite a tendency to call any sort of illicit radio activity a clandestine, the term applies only to secret or semi-secret stations whose purpose is to spread political propaganda of one form or another.

Clandestines should not be confused with pirate stations, which, while unauthorized, are commercial ventures, broadcasting boldly and skirting government licensing laws. In recent years, popular-music pirate stations, transmitting on the medium-wave bands from off-shore oil or flak towers and small ships in international waters, beamed rock-and-roll programs to audiences in England, Holland, New Zealand and several of the Scandinavian countries. Stricter laws and government crackdowns have now driven most of these pirates from the air.

Nor should the "home-grown peanut" stations, noted in some of our bigger cities interfering with regular broadcasts, be confused with the clandestines. These illicit transmitters are the playthings of misguided youngsters whose idea of fun is to own their own radio stations. Normally they are shut down in short order by the FCC, but new ones always spring up.

Other secret transmitters mistakenly termed clandestines are the so-called "numbers" stations. Nations on both sides of the Iron Curtain use them to transmit instructions to their espionage agents abroad. These spy stations send cipher messages in long series of numerals. They trace their history to World War I Germany, which sent Morse messages to agents among the North African Berber tribes.

What Kind? Real clandestine shortwave broadcasters may be "white" or "black." The "whites" make no bones about their politics, though often they hide their transmitter locations. Most clandestines today fall in this category. The widely-heard "Radio Americas" on Swan Island in the Caribbean was a typical "white" clandestine before it left the air last May.

More subtle are the "black" stations, which attempt to deceive their audiences not only about their locations but about their political affiliations as well. "Black" clandestines pretend to be what they are not, on the theory that listeners will believe a friendly voice before they will one that readily admits belonging to the "enemy."

One of the most successful "blacks" was the World War II, British-run "Deutcher Kurzwellensender Atlantik." Using a 600-kW transmitter at Crowborough, England, "Atlantiksender," as it was dubbed, pretended to be a German Navy outlet. Its psychological attack was aimed primarily at U-boat crews in the North Atlantic. With just enough anti-British sentiment to make it seem a Nazi station, "Atlantiksender" skillfully slipped in plenty of misinformation designed to undermine the morale of the enemy sailors.

World War II had a few clandestine radios that managed to broadcast sporadically under the noses of authorities in Axis-controlled territory. One was the Flemish Freedom Station, "the free transmitter of oppressed Belgium," heard in 1942. Another was a patriotic Dutch station in Nazi-occupied Holland. It came on the air at irregular intervals, once every two or three weeks. It would broadcast for five minutes or so and then vanish from the air before the Gestapo could trace it. Its audience was tiny but its defiance of the enemy gave hope to the Dutch people.

Improved direction finding techniques, which can speedily track down a hidden station, make this sort of clandestine broadcasting too risky in the 1960's. Today, virtually all clandestines are operated, often secretly, from friendly territory.

The average DX'er, without access to the massive Adcock direction finding antennas and government intelligence reports, finds the task of locating the clandestine transmitters much tougher.

Usually the life span of a clandestine station is limited. Whenever a political crisis develops, one or more of the secret radio stations crops up. When the situation cools, the mysterious voices vanish.

Asia. With Southeast Asia the world's current major trouble spot, it is not surprising to find a large concentration of clandestines in this area. Government and news service monitors in Tokyo and Hong Kong regularly tune the Vietnamese-language programs of the Viet Cong radio to get the latest slant on what Hanoi is thinking.

Stateside shortwave listeners can do the same. The "Radio of the South Vietnam National Front for Liberation," which announces in Vietnamese as, "Dai Phat Thanh Giai Phong," is regularly heard in this country. Unlike most clandestine stations today, the Viet Cong transmitter does broadcast an English program. Beamed to U.S. troops in South Vietnam, it is heard Saturdays at 1315 GMT. Its transmitters probably are quite powerful and supposedly are located near Hanoi. Earlier, the U.S. military command reported the station operated secretly from within South Vietnam, in the jungles of Tayninh Province near the Cambodian border about 75 miles north of Saigon. It is believed to have moved following bombing attacks by American Air Force B-52's.

DX'ers also report reception of another Asian communist clandestine," La Voix du Pathet Lao," which also announces as "Stani Withayu Kachai Siang Khana Pathet Lao." Lately it has been heard in western North America on several shortwave frequencies. Though a Chinese or North Vietnamese transmitter site has been long suspected, there is now growing evidence that it may actually be situated in the communist-controlled part of Laos.

Beginning last July, official monitors in Hong Kong noted a mysterious anti-Mao Chinese station calling itself the "Voice of the People's Liberation Army." This outlet, not to be confused with the real PLA station in China's coastal Fukien Province, is a clandestine voice that calls on Red army commanders and troops to prepare for a "true communist" revolt against Mao-Tse-tung. It denounces the Peking regime for "usurping communist power, lying to the masses, and cheating the PLA." Some China watchers believe that this clandestine is actually located on Taiwan, others suspect a Soviet Far Eastern site. Generally, however, it is believed the station really is transmitting from within mainland China, perhaps in Hunan or Hupei Provinces. Because of the chaos existing in Red China today, such operation is possible.

So far, it has not been heard by U.S. shortwave listeners and its frequencies are not yet known.

West Coast listeners have heard a com-

munist voice aimed at audiences in Thailand. Operating in the 31-meter band, the "Voice of the People of Thailand" has been reported since 1962. Seldom reported, but active in recent years, are the "Neutral South Vietnam Broadcasting Station," and its sister outlet, the "Neutral Thailand Broadcasting Station"; the "Voice of the People's Army," controlled by the North Vietnamese army; the "Voice of the Movement for Independent Neutral Thailand," belonging to the pro-communist Thailand Independence Movement; "Kmer Seri," directed to Cambodia from Peking; and the "Radio of the Neutralist Party of Laos." All follow the Red line.

On the other side of the ideological fence is the "Voice of the Patriotic Militiamen's Front," heard occasionally by U.S. SWL's, announcing as, "Day la Tieng Noi cua Mat Tran Dan Quan Ai Quec." Though claiming to be a patriotic North Vietnamese voice, the station seems to be operated secretly by our side from somewhere in the northern part of South Vietnam. It urges the North Vietnamese to oppose the Hanoi regime and its Red Chinese allies. In order to gain credibility with its intended listeners, VPMF also denounces the South Vietnamese government and the American military "intruders," thus giving a "black" cast to its broadcasts.

Its daily, hour-long transmissions begin with a distinctive drum-and-cymbal interval signal, usually about 1400 GMT, and end with dictation-speed coded instructions to sabotage agents.

But not all of the continent's clandestine radio activity is located in the Far East. One of the oldest Asian clandestines is "Azad (or Free) Kashmir Radio," which has been on the air for some 20 years. This station is located in Muzaffarabad, about 36 miles from the ceasefire line that divides Kashmir, the troubled little country claimed by both India and Pakistan. It is one of Pakistan's psychological weapons in its campaign to gain control of the ruggedly beautiful Kashmir Valley.

Europe. The turbulent Middle East is a natural target for clandestines, most of which originate from the communist Balkan nations, notably Bulgaria. Most widely heard of these is "Peyk-e-Iran, The Iranian Herald," which supposedly transmits from Sofia to the Kurdish and Persian-speaking peoples of Iran. Until early last year, the station also broadcast communist-oriented propaganda to Iraq, under the Arabic name, "Saut-ul-Sha'abi Iraqi." But with Moscow's changing relations with the Baghdad government, word apparently went out to end these programs.

"Peyk-e-Iran" waged a duel with an equally interesting jamming station, possibly located in Iraq, which tried to interfere with reception in the Middle East. This jammer was known to DX'ers as the "Kiss Me Honey" station, from a fragment of a popular song it repeated endlessly on Peyk-e-Iran's frequencies.

More recently, the jammer used segments of other popular recordings in an at-

STATION	FREQUENCY* (kHz)	TIMES (GMT)**
Radio Libertad	15,050	2200-0400
Radio of the South Vietnam National Front for Liberation (Viet Cong)	10,030	0900-1630
Voice of the Patriotic Militiamen's Front	7216	1400-1600
Voice of the People of Thailand	9428	1400
La Voix du Pathet Lao	4701, 6199	1200; 1400-1530
Azad Kashmir Radio	3625, 3980	1130-1745
Radio Peyk-e-Iran	11,415, 11,695, 17,760	1400-1800
Radiofonikos Stathmos I Foni Tis Alithias	6212, 8070, 9950	0530; 1630; 1730
Radio Espana Independente	17,700	0600; 1330
Radio Euzkadi	13,250, 15,032	2030; 2130
Radio Free Russia (NTS)	6400	1300

* Frequencies may vary 50 KHz or more
** Times do not necessarily represent complete schedules

tempt to block the clandestine. These included the Beatles' "Can't Buy Me Love," and "My Blue Heaven."

Two other secret stations believed located in Bulgaria are "Radiofonikos Stathmos I Foni Tis Alithias (Voice of Truth)," aimed at Greek audiences, and "Bizim Radio," intended for listeners in Turkey and Cyprus.

Spain has been the target of clandestine communist broadcasts since the end of that country's civil war 30 year ago. A station known as "Radio Espana Independente," the mouthpiece of the Spanish Communist Party in Exile, is no doubt the oldest clandestine still active. It uses a number of shortwave frequencies and transmits either from Russia or from near Prague, Czechoslovakia. A similar outlet, "Radio Portugal Livre" is directed to the other nation on the Iberian peninsula.

A few years ago, the Spanish government attempted to retaliate with its own secret station, "Radio For the Liberation of Great Russia," which identified with portions of Tchaikovsky's "1812 Overture," and broadcast anti-communist propaganda. It used the transmitters and frequencies of powerful "Radio Nacional de Espana."

The Spanish government also is regularly attacked by a mysterious, non-communist voice, "Radio Euzkadi." Controlling this station is the Basque government in exile, with headquarters in Paris. It claims to represent the Basque people who live in the northern Spanish provinces. Broadcasts are in Basque and Spanish, with occasional English announcements, from transmitters presumably, and curiously, located in northern South America.

"Narodno Trudovoi Soyuz," the anti-communist National Alliance of Russian Solidarists, founded in Belgrade, Yugoslavia in the late '30's, has a unique portable station on the air at Sprendlingen, near Frankfurt, Germany. Its relatively low-powered transmitters are truck-mounted. "Radio Free Russia," as it is known west of the "Wall," apparently has the tacit approval of the Bonn government, for it has been on for about 18 years. It claims to have been heard as far as the Ural Mountains, deep in Mother Russia. A small, Belgian-based organization, known as "Radio Omega," uses the RFR facilities for twice-daily religious broadcasts to Russia.

Africa. The "dark continent" was curiously quiet at the time this was written. A few years back, the United Arab Republic tried to stir revolutionary movements with its "Voice of Free Africa" from Cairo. Today, for the most part, exiled African nationalist groups reach audiences in their homelands with special programs over regular government stations in sympathetic, neighboring countries. "Radio Zambia" directs programs to the African troops in Rhodesia's defense force. There have been daily broadcasts of the "Popular Movement for the Liberation of Angola," from the government station in Kinshasha, Congo Republic. Those of the "National Front for the Liberation of Angola" are aired from

(Continued on page 109)

CZECHOSLOVAKIA — 1968

The most exciting clandestine radio activity of recent days took place in Czechoslovakia as thousands of Soviet bloc troops poured across the borders (August, 1968). Within hours, the renowned short-wave broadcaster RADIO PRAGUE was off the air.

While the invasion may have caught most of the world by surprise, it was soon obvious that the Czechs were well prepared. Before a single day had passed at least 15 clandestine stations were on the air!

Short-wave listeners in North America heard stations announcing as THE FREE LEGAL TRANSMITTER OF CZECHOSLOVAKIA, TRANSMITTER NORTHERN MORAVIA, FREE TRANSMITTER EASTERN BOHEMIA, and FREE RADIO BRNO on 11.99 MHz. Sometimes the familiar voices of the announcing staff of RADIO PRAGUE were heard and recognized, but most of the broadcasts were handled by novice crews.

Also heard was the FREE TRANSMITTER OF THE CZECHOSLOVAK BROADCASTING on 7.345 MHz. This broadcaster was said to be operating from the outskirts of Prague itself. Listeners were often surprised by the strong signals—indicating that relatively high power transmitters were being used.

Much of the Czechoslovakia clandestine broadcasting activity is still a mystery. How did these stations operate under the very noses of Soviet troops? How were they able to befuddle the direction-finding equipment that the Soviets brought into the country?

SWL DX Awards Program

SHORT-WAVE LISTENING | Recognition for Your DX'ing Achievements

BY HANK BENNETT, WPE2FT

HOLDERS OF WPE MONITOR Registration certificates are all eligible to apply for special DX'ing awards. The awards are gold-colored seals that may be affixed to the bottom of the Monitor certificate.

Four awards are now open. Each award seal is distinctive and attests to the SWL's DX'ing ability. The awards are:

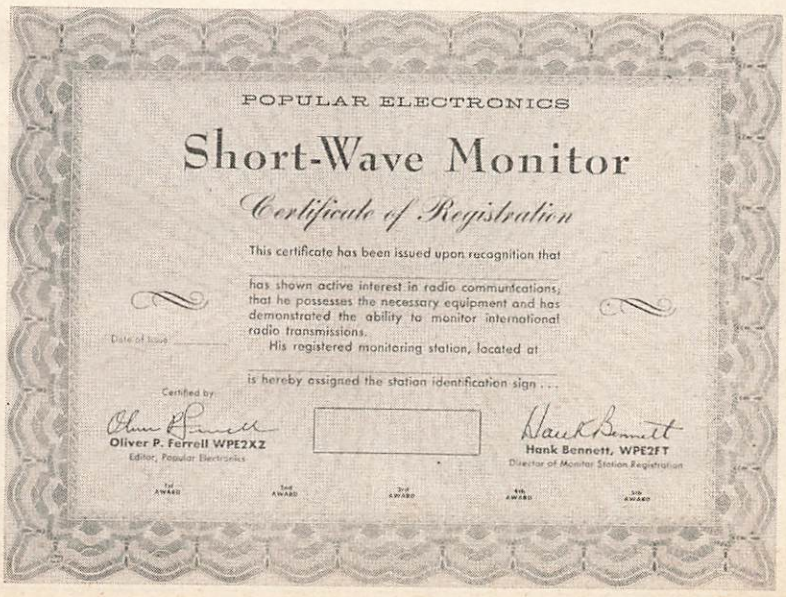
A. Countries Award. This award is available to those DX'ers who have verified 25, 50, 75, 100, or 150 countries (see next page).

B. Canadian Provinces/Territories. A special award is available to those DX'ers who have verified or QSL'd 6, 8, 10, or 12 provinces/territories in the Dominion of Canada.

C. States Award. Seals are available to DX'ers who have verified 20, 30, 40, or 50 states in the United States of America.

D. Zone Award. POPULAR ELECTRONICS has divided the world into 40 zones—similar (but not exactly) to the "Zone Award" made by CQ Magazine. Seals are available to DX'ers who have verified stations in 10, 20, 30, or 40 zones.

To be eligible for any of the above awards, the applicant must be a registered WPE short-wave monitor. To insure fairness and accuracy in issuing these awards, the following rules apply to all applicants:


POPULAR ELECTRONICS

Short-Wave Monitor

Certificate of Registration

This certificate has been issued upon recognition that

has shown active interest in radio communications, that he possesses the necessary equipment and has demonstrated the ability to monitor international radio transmissions.

His registered monitoring station, located at

is hereby assigned the station identification sign . . .

Date of Issue

Certified by

Oliver P. Ferrell WPE2XZ
Editor, Popular Electronics

Hank Bennett, WPE2FT
Director of Monitor Station Registration

1st AWARD 2nd AWARD 3rd AWARD 4th AWARD 5th AWARD

All-Time Country List for Popular Electronics SWL DX Awards

This is the 1969 Official POPULAR ELECTRONICS DX Awards Country List. Countries are listed alphabetically (there are 364 listings) followed by a letter-numeral group. The letters indicate general location: AS for Asia, AF for Africa, EU for Europe, NA for North America, SA for South America, and OC for Oceania. The numerals are to indicate the POPULAR ELECTRONICS Zone for a special DX award.

Afghanistan	AS	21
Agalega Is.	AF	39
Aland Is.	EU	15
Alaska	NA	1
Albania	EU	15
Aldabra, Cosmoledos Is.	AF	39
Algeria	AF	33
Amirante Is. (Des Roches)	AF	39
Amsterdam, St. Paul Is.	AF	39
Andaman, Nicobar Is.	AS	26
Andorra	EU	14
Angola	AF	36
Anguilla Is.	NA	8
Antarctica		
20° West to 120° West	SA	
120° West to 90° East	OC	
90° East to 20° West	AF	
23° West to 77° West		13
777° West to 120° West		12
120° West to 170° East		32
170° East to 130° East		30
130° East to 80° East		29
80° East to 37° East		39
37° East to 23° West		38
Antigua, Barbuda Is.	NA	8
Antilles, Netherlands North	NA	8
Antilles, Netherlands South	SA	9
Argentina	SA	13
Armenia	EU	21
Ascension Is.	AF	36
Auckland, Campbell Is.	OC	32
Australia	OC	
Queensland, South Australia		30
N.S.W., Victoria, Tasmania		30
Western Australia		29
Northern Territory		29
Austria	EU	15
Aves Is.	NA	8
Azerbaijan	EU	21
Chile	SA	12
China, including Manchuria	AS	
Sinkiang, Kansu, Tsinghai		23
Inner Mongolia west of 108°		23
Inner Mongolia east of 108°		24
Manchuria, balance of East China		24
Christmas Is. (Indian Ocean)	OC	29
Clipperton Is.	NA	7
Cocos Is. (Costa Rican)	NA	7
Cocos-Keeling Is.	OC	29
Colombia	SA	9
Comoro Is.	AF	39
Congo Republic (Brazzaville)	AF	36
Congo, Republic of (Kinshasa)	AF	36
Cook Is., Northern (Manihiki)	OC	32
Cook Is., Southern	OC	32
Corsica	EU	15
Costa Rica	NA	7
Crete	EU	20
Crozet Is.	AF	39
Cuba	NA	8
Cyprus	AS	20
Czechoslovakia	EU	15
Dahomey	AF	35
Damau and Diu	AS	22
On or before Dec. 19, 1961 only		
Danzig	EU	15
On or before Sept. 1, 1939 only		
Denmark	EU	14
Dodecanese Is. (Rhodes)	EU	20
Dominica Is.	NA	8
Dominican Republic	NA	8
Easter Is.	SA	12
Ecuador	SA	10
El Salvador	NA	7
England	EU	14
Equatorial Africa, French	AF	36
On or before Aug. 16, 1960 only		
Eritrea	AF	37
Indo-China, French	AS	26
On or before July 20, 1954 only		
Indonesia	OC	28
Iran	AS	21
Iraq	AS	21
Ireland	EU	14
Isle of Man	EU	14
Israel	AS	20
Israel-Jordan Demilitarized Zone	AS	20
Italy	EU	15
Ivory Coast	AF	35
Jamaica	NA	8
Jan Mayen Is.	EU	40
Japan	AS	25
Java	OC	28
On or before Dec. 26, 1949 only		
Johnston Is.	OC	31
Jordan	AS	20
Juan Fernandez Is.	SA	12
Kaliningradsk	EU	15
Kamaran Is.	AS	21
Karelo-Finnish Republic	EU	16
On or before July 15, 1956 only		
Kazakh	AS	17
Kenya	AF	37
Kerguelen Is.	AF	39
Kermadec Is.	OC	32
Kirghiz	AS	17
Korea	AS	25
On or before June 24, 1950 only		
Korea, North	AS	25
Korea, South	AS	25
Kure Is.	OC	31
Kuria Maria Is.	AS	21
Kuwait	AS	21
Kuwait-Saudi Arabia Neutral Zone	AS	21
Kwantung Peninsula	AS	24
On or before Sept. 2, 1945 only		
Laccadive Is.	AS	22
New Caledonia	OC	32
Newfoundland and Labrador	NA	
On or before Mar. 3, 1949 only		
Newfoundland		5
Labrador		2
New Guinea, Netherlands	OC	28
On or before Apr. 30, 1963 only		
New Guinea, Territory of	OC	28
New Hebrides	OC	32
New Zealand	OC	32
Nicaragua	NA	7
Niger	AF	35
Nigeria	AF	35
Niue Is.	OC	32
Norfolk Is.	OC	32
Northern Ireland	EU	14
Norway	EU	14
Oman Sultanate, Muscat	AS	21
Oman, Trucial, and Das Is.	AS	21
Pakistan, East	AS	22
Pakistan, West	AS	21
Palestine	AS	20
On or before May 14, 1948 only		
Palmyra, Jarvis Is.	OC	31
Panama	NA	7
Pantelleria, Pelagian Is.	AF	33
Papua Territory	OC	28
Paraguay	SA	11
Peru	SA	10
Philippine Is.	OC	27
Phoenix Is. (U.S.), Baker, Howland	OC	31
Phoenix Is., British	OC	31
Pitcairn Is.	OC	32
Poland	EU	15
Polynesia, French, except Marquesas	OC	32
Portugal	EU	14
Puerto Rico	NA	8
Qatar	AS	21
Reunion Is.	AF	39

Azores	EU	14
Bahama Is.	NA	8
Bahrein Is.	AS	21
Bajo Nuevo Is.	NA	8
Balearic Is.	EU	14
Barbadoes	NA	8
Belgium	EU	14
Bermuda	NA	5
Bhutan	AS	22
Bolivia	SA	10
Bonin, Volcano Is. (Iwo Jima)	OC	27
Borneo, British North (Sabah)	OC	28
On or before Sept. 15, 1963 only		
Borneo, Netherlands	OC	28
On or before Dec. 26, 1949 only		
Botswana (Bechuanaland)	AF	38
Bouvet Is.	AF	38
Brazil	SA	11
Brunei	OC	28
Bulgaria	EU	20
Burma	AS	26
Burundi	AF	36
Cambodia	AS	26
Cameroon	AF	36
Canada	NA	
North of 60 °, West of 102 °		1
North of 60 °, East of 102 °		2
Labrador, Quebec north of 52 °		2
Islands in Hudson and James Bays		2
British Columbia		3
Alberta, Saskatchewan		4
Manitoba, Ontario		4
Southern Quebec, New Brunswick		5
Nova Scotia, Newfoundland, P. E. I.		5
Canal Zone	NA	7
Canary Is.	AF	33
Cape Verde Is.	AF	35
Cargados Carajos Is. (St. Brandon)	AF	39
Caroline Is., Eastern	OC	27
Caroline Is., Western	OC	27
Cayman Is.	NA	8
Celebes, Molucca Is.	OC	28
On or before Dec. 26, 1949 only		
Central African Republic	AF	36
Ceuta and Melilla	AF	33
Ceylon	AS	22
Chad	AF	36
Chagos Is.	AF	39
Channel Is., North (Guernsey, Sark, Alderney, etc.)	EU	14
Channel Is., South (Jersey)	EU	14
Chatham Is.	OC	22
On or before Aug. 16, 1960 only		
Estonia	EU	15
Ethiopia	AF	37
Faroe Is.	EU	14
Falkland Is.	SA	13
Farquhar Is.	AF	39
Fernando de Noronha	SA	11
Fiji Is.	OC	32
Finland	EU	15
Formosa (Taiwan)	AS	24
France	EU	14
Franz Josef Land	EU	40
Gabon	AF	36
Galapagos Is.	SA	10
Gambia	AF	35
Georgia	EU	21
Germany	EU	14
On or before Oct. 6, 1949 only		
Germany, East	EU	14
Germany, West, and West Berlin	EU	14
Ghana	AF	35
Gibraltar	EU	14
Gilbert, Ellice, Ocean Is.	OC	31
Glorieuses Is. (Geyser Reef)	AF	39
Goa	AS	22
On or before Dec. 19, 1961 only		
Gold Coast	AF	35
On or before Mar. 5, 1957 only		
Greece	EU	20
Greenland	NA	40
Grenada and Dependencies	NA	8
Guadeloupe	NA	8
Guam and Cocos Is.	OC	27
Guantanamo Bay	NA	8
Guatemala	NA	7
Guiana, French	SA	9
Guinea	AF	35
Guinea, Portuguese	AF	35
Guyana (Guiana, British)	SA	9
Haiti	NA	8
Hawaiian Is., except Kure Is.	OC	31
Heard Is.	OC	39
Honduras	NA	7
Honduras, British	NA	7
Hong Kong	AS	24
Hungary	EU	15
Iceland	EU	40
Ifni	AF	33
India	AS	22
India, French	AS	22
On or before Oct. 30, 1954 only		
Laos	AS	26
Latvia	EU	15
Lebanon	AS	20
Lesotho (Basutoland)	AF	38
Liberia	AF	35
Line Is.	OC	31
(Christmas, Fanning, Washington)		
Libya	AF	34
Liechtenstein	EU	14
Lithuania	EU	15
Lord Howe Is.	OC	30
Luxembourg	EU	14
Macao	AS	24
Macquarie Is.	OC	30
Madeira Is.	AF	33
Malagasy (Madagascar)	AF	39
Malawi (Nyasaland)	AF	37
Malaysia, Eastern (Sabah, Sarawak)	OC	28
Malaysia, Western	AS	28
Maldive Is.	AS	22
Mali	AF	35
Malpelo Is.	SA	9
Malta	EU	15
Manchuokuo	AS	24
On or before Sept. 2, 1945 only		
Marcus Is.	OC	27
Maria Theresa Reef	OC	32
Mariana Is., except Guam and Cocos	OC	27
Marion, Prince Edward Is.	AF	38
Marquesas Is.	OC	31
Marshall Is.	OC	31
Martinique	NA	8
Mauritania	AF	35
Mauritius	AF	39
Mexico	NA	6
Midway Is.	OC	31
Minerva Reef	OC	32
Moldavia	EU	16
Monaco	EU	14
Mongolia	AS	23
Montserrat Is.	NA	8
Morocco	AF	33
Morocco, Spanish	AF	33
On or before Apr. 6, 1956 only		
Mozambique	AF	37
Mozambique Channel Islets (Juan de Nova, Europa, Bassas da India)	AF	39
Nauru Is.	OC	31
Navassa Is.	NA	8
Nepal	AS	22
Netherlands	EU	14
Revilla Gigedo Is.	NA	6
Rhodesia (Southern Rhodesia)	AF	38
Rio de Oro (Spanish Sahara)	AF	33
Rio Muni, Fernando Po	AF	36
Rodriguez Is.	AF	39
Romania	EU	20
Roncador Cay, Serrana Bank	NA	7
RSFSR, Asiatic (Asiatic Russia)	AS	
East of 110 °, north of 60 °		19
East of 120 °, south of 60 °		19
Exception to above: Kurile Is.		25
West of 82 °, north of 57 °		17
West of 76 °, south of 57 °		17
Balance of Asiatic Russia		18
Exception to above: Tuva ASSR		23
Note: The northeastern portion of Asiatic Russia, Asia, Zone 17. Mark maps thus: Along the Mezen River from its mouth at the White Sea to 48 ° East, south to 59 ° North, east to 55 ° East, south to 56 ° North, east to the Urals. Kolguyev and Vaygach Is. count as Asia, Novaya Zemlya as Europe.		
RSFSR, European (See note above)	EU	16
Ruanda Urundi	AF	36
On or before June 30, 1962 only		
Rwanda	AF	36
Ryukyu Is.	AS	25
Saarland	EU	14
On or before Dec. 31, 1956 only		
Saint Helena Is.	AF	36
Saint Kitts, Nevis Is.	NA	8
Saint Lucia Is.	NA	8
Saint Martin Is., French	NA	8
St. Peter and Paul Rocks	SA	11
Saint Pierre, Miquelon Is.	NA	5
Saint Vincent and Dependencies	BA	8
Samoa, American	OC	32
Samoa, Western	OC	32
San Andres, Providencia Is.	NA	7
San Felix, San Ambrosio Is.	SA	12
San Marino	EU	15
Sao Tome, Principe Is.	AF	36
Sarawak	OC	28
On or before Sept. 15, 1963 only		
Sardinia	EU	15
Saudi Arabia	AS	21
Saudi Arabia-Iraq Neutral Zone	AS	21
Scotland	EU	14
Senegal	AF	35

Seychelles Is.	AF	39
Sicily, Eolian, Ustica Is.	EU	15
Sierra Leone	AF	35
Sikkim	AS	22
Singapore	AS	28
Socotra Is.	AF	37
Solomon Is.	OC	28
Somaliland, British	AF	37
On or before June 30, 1960 only		
Somaliland, French	AF	37
Somaliland, Italian	AF	37
On or before June 30, 1960 only		
Somali Republic	AF	37
South Africa, Republic of	AF	38
South Georgia Is.	SA	13
South Orkney Is.	SA	13
South Sandwich Is.	SA	13
South Shetland Is.	SA	13
Southwest Africa	AF	38
South Yemen (Aden)	AS	21
Spain	EU	14
Spitzbergen (Svalbard)	EU	40
Spratly Is.	OC	26
Sudan	AF	34
Sumatra	OC	28
On or before Dec. 26, 1949 only		
Surinam (Guiana, Netherlands)	SA	9
Swan Is.	NA	7
Swaziland	AF	38
Sweden	EU	14
Switzerland, including I.T.U., Geneva	EU	14
Syria	AS	20
Tadzhik	AS	17
Tanganyika	AF	37
On or before June 30, 1964 only		
Tangier	AF	33
On or before Oct. 28, 1966 only		
Tannu Tuva	AS	23
On or before Nov. 15, 1945 only		
Tanzania (Tanganyika, Zanzibar)	AF	37
Thailand	AS	26
Tibet	AS	23
Timor, Netherlands	OC	28
On or before Dec. 26, 1949 only		
Timor, Portuguese	OC	28
Togo	AF	35
Togoland, British	AF	35
On or before Mar. 5, 1957 only		
Tokelau (Union) Is.	OC	31
Tonga (Friendly) Is.	OC	32
Trieste	EU	15
On or before Oct. 25, 1954 only		
Trindade, Vaz Is.	SA	11
Trinidad, Tobago Is.	SA	9
Tristan da Cunha, Gough Is.	AF	38
Tromelin Is.	AF	39
Tunisia	AF	33
Turkey	AS	20
Turkoman	AS	17
Turks, Caicos Is.	NA	8
Uganda	AF	37
Ukraine	EU	16
United Arab Republic (Egypt)	AF	34
United States of America	NA	
Atlantic coastal states		5
Pennsylvania, Vermont		5
Pacific coastal states		3
Idaho, Utah, Nevada, Arizona		3
Balance except Alaska and Hawaii		4
Upper Volta	AF	35
Uruguay	SA	13
Uzbek	AS	17
Vatican City	EU	15
Venezuela	SA	9
Vietnam	AS	26
On or before Aug. 31, 1954 only		
Vietnam, North	AS	26
Vietnam, South	AS	26
Virgin Is., American	NA	8
Virgin Is., British	NA	8
Wake Is.	OC	31
Wales	EU	14
Wallis, Futura Is.	OC	32
West Africa, French	AF	35
On or before Aug. 6, 1960 only		
White Russia	EU	16
Willis Is.	OC	30
Yemen	AS	21
Yugoslavia	EU	15
Zambia	AF	36
Zanzibar	AF	37
On or before June 30, 1964 only		

You may claim the countries listed with "on or before" dates only if they meet the time deadline. Reception after the dates listed is taken under the present name of the country.

1. Supply list of stations heard. Each applicant must submit a list of stations for which he has received a verification, one for each country, state, Canadian province/territory, or zone heard. Included in this list must be the callsign, or name of the station heard and verified, the frequency of the radio station, date the station was heard, date of verification (postmark is acceptable). Do not list any QSL's or verifications that you cannot authenticate.

2. Authentication. In most instances it will not be necessary for the Awards Committee to check your QSL cards or verifications. However, if this is necessary, instructions on how and to whom to send the verifications will be given. Failure to comply with these instructions will disqualify the applicant. The Awards Committee will accept photographic or Xeroxed copies of QSL's or verifications.

The Awards Committee will not accept QSL cards that have been used for card-swapping purposes. All QSL cards and verifications that have been submitted for authentication, or spot checking, will be returned to the applicant as soon as possible.

3. Special Instructions. To cover the cost of printing, handling and mailing, a fee of 50c (in U.S. coin or unused stamps) must accompany the applicant's list of verifications or QSL's. This fee will be returned in the event the applicant is found to be ineligible for the award he claimed. Applicants outside of the continental United States should send 60c (U.S.) in coins of their country if they so desire.

Please do not send International Reply Coupons (IRC's) or personal checks.

Mail your verification list, fee and application form (or facsimile) to: Hank Bennett, POPULAR ELECTRONICS DX Awards, P.O. Box 333, Cherry Hill, N.J. 08034.

4. Special Notes. For the purposes of the States Award, Washington, D.C. is considered to be in the state of Maryland. For the Canadian award, the eligible areas are the provinces of Alberta, British Columbia, Manitoba, New Brunswick, Newfoundland (including Labrador), Nova Scotia, Ontario, Prince Edward Island, Quebec, and Saskatchewan, plus the Yukon and Northwest Territories.

DX'ing The Aeronautical Bands

SHORT-WAVE LISTENING

Interesting DX Outside the Broadcast Bands

BY SANFORD H. BARNES

IF YOU'RE AN SWL and haven't discovered the excitement and intrigue of DX'ing the aeronautical mobile bands, you've missed some real fun. You can listen in on a commercial jet airliner out over the Atlantic approaching Madrid, or flying across the Pacific coming into Tokyo. A military air transport skirting the Aleutians, or an air-sea rescue of a ship in distress in the Gulf of Mexico are as close as your communications receiver. But don't expect any QSL cards, because the chances are you won't get them. The aeronautical mobile bands make for a refreshing break as you are logging in those stations on the international broadcast or ham bands.

All you need to try your luck is a receiver and a good map of the world plus an idea of where to hunt. Here's the lowdown. The aeronautical mobile bands are within the following frequencies (all in kilohertz): 2170-2194; 2850-3155; 3400-3500; 4650-4750; 5450-5730; 6525-6765; 8815-9040; 10,000-10,100; 11,175-11,400; 13,200-13,360; 15,015-15,100; and 17,900-18,030. The bands in use at any one moment will depend on the prevailing propagating conditions. Normally, the lower frequency bands, below 9040 kHz, will bear most of the traffic during the evening hours, the higher frequencies during the early morning hours.

Transcontinental Airlines. Specific frequencies have been allocated within the aeronautical mobile bands to serve airline routes in various parts of the world. This makes the job of pinpointing your DX much easier. The exact location of your "find" will usually be given by the aircraft during a transmission reporting its position.

As the aircraft makes its way across the ocean, the crew reports to a ground station periodically. This report gives the position in longitude and latitude and the time at that position in Greenwich Mean Time. Also reported is the anticipated position one hour later, destination and estimated time of arrival, fuel remaining, altitude or flight level, wind direction and velocity, visibility, and any possible trouble. With your chart of the world spread out before you, a quick plot of the reported position and anticipated position one hour later will enable

Weather Reports

STATION	MINUTES AFTER THE HOUR
PACIFIC AREA (2980, 5574, and 8905 kHz)	
San Francisco	5 and 35
Tokyo	10 and 40
Hongkong	15 and 45
Anchorage	20 and 50
Honolulu	25 and 55
ATLANTIC AREA (3001, 5559, 8828.5, and 13,264.5 kHz)	
New York	15 and 45
Newfoundland	20 and 50
Shannon	0 and 30

you to actually chart the airliner's course.

Frequencies in use around the world are listed in the table below. No U.S. domestic frequencies are included because almost all communications from aircraft over the continental United States are carried out in the 118-MHz to 136-MHz aircraft band.

Military Aircraft. You'll find an equal amount of excitement in DX'ing military aircraft making transoceanic or transcontinental flights between air bases, or even participating in combat missions. Most military communications are on single sideband (SSB), so adjust your receiver accordingly.

Specific frequencies within the listed aeronautical mobile bands are assigned by the area commander, and are not available because of frequent changes. Most military aircraft will usually be found within the following bands (all in kilohertz): 3025-3155; 4700-4750; 5680-5730; 6685-6765; 8965-9040; 11,175-11,275; 13,200-13,260; 15,010-15,100; and 17,970-18,030.

Search and Rescue. While DX'ing the aeronautical mobile bands, keep alert for the dramas at sea which often unfold before your very ears. U.S. Coast Guard air-sea rescue aircraft and helicopters guard specific frequencies to listen for ships and aircraft in distress at sea. It is not uncommon to be able to follow the complete sequence

Frequencies In Use Around The World In The Aeronautical Mobile Bands

WORLD AIR ROUTE AREA	FREQUENCY ALLOCATION (kHz)							
Alaska	2945	3411.5	4668.5	5611.5	6567		11,328	
Hawaii		3453.5		5559	6649.5			
West Indies	2861		4689.5					
Central East Pacific		3432.5 3446.5 3467.5 3481.5		5551.5 5604	6612 6679.5	8879.5 8930.5	10,048 10,084 11,299.5 11,318.5	13,304.5 13,334.5 17,926.5
Central West Pacific	2966			5506.5 5536.5		8862.5		13,354.5 17,906.5
North Pacific	2987			5521.5		8939		13,274.5 17,906.5
South Pacific	2945			5641.5		8845.5		13,344.5 17,946.5
North Atlantic	2868 2931 2945 2987			5611.5 5626.5 5641.5 5671.5		8862.5 8888 8913.5 8947.5		13,264.5 13,284.5 13,324.5 13,354.5 17,966.5
Europe	2889 2910	3467.5 3481.5	4654.5 4689.5	5551.5	6552 6582	8871 8930.5	11,299.5	17,906.5
North-South America	2889 2910 2966	3404.5	4696.5	5566.5 5581.5	6567 6664.5	8820 8845.5 8871	11,290 11,337.5	13,314.5 13,344.5 17,916.5
Far East	2868 2987			5611.5 5671.5		8871 8879.5 8930.5		13,284.5 13,324.5 17,966.5
South Atlantic	2875	3432.5			6597 6612 6679.5	8879.5 8939	10,048	13,274.5 17,946.5
Middle East		3404.5 3446.5		5604	6627	8845.5	10,021	13,334.5 17,926.5
North-South Africa	2966	3411.5		5506.5 5521.5		8820 8956		13,304.5 13,334.5 17,926.5 17,946.5
Caribbean	2875 2952 2966			5499 5566.5 5619	6537	8837 8871	10,021	13,294.5 13,344.5 17,936.5
Canada	2973			5499		8871	11,356.5	

of events as they take place by monitoring the conversations between the ship in distress, the rescue helicopter, and the Coast Guard base. Such bases are located at Miami, New Orleans, Corpus Christi, Honolulu, San Diego, Seattle, Kodiak, to name a few.

Frequencies for point-to-point communications between Coast Guard Air bases, between bases and aircraft, and special emergency frequencies are as follows: 2182 kHz (Coast Guard communications when over water, and distress frequency for ships or aircraft; 3023.5 kHz (air carrier in emergency when all else fails); 3123 kHz (Coast Guard air communications); 3281 kHz (lighter-than-aircraft); 5695.5 kHz (Coast Guard air communications); and 8364 kHz (life boats, life rafts, and survival craft) for search and rescue communications.

Weather Reports. In addition to aircraft communications, you will also find periodic weather reports given from various strategically located airport control centers around the world. The purpose of these reports, of course, is to appraise transcontinental pilots of the weather conditions within a specified area served by that center. Tune the frequencies in the table on page 103.

Remember that transmissions in the aeronautical mobile bands are brief and come without warning. Pick out a target area or specific frequency to monitor and listen for a short time. You will be amazed at the excitement that pops out of that old communications receiver. And even if the transmitting power is small compared to an international broadcast station, you'll find yourself picking up conversations all over the globe. All it takes is a little patience.

DX'ing The Marine Bands

BY WALTER H. TREFTZ

THE SWL who can copy the Morse code will tell you that listening to phone-only hams, or the international short-wave broadcasters, is like running your 8-cylinder car on 4 cylinders—phone-only is too restrictive. The code-copying SWL can find a wonderland by listening to maritime communications. The receiver requirements are only specialized to the extent that much of the DX is below 500 kHz. Many war-surplus receivers will tune this range, and if they have a BFO, these receivers are more than adequate for the job.

Although the world below 500 kHz is the realm of the professional radio operator, fantastic code speeds are not required; anyone who can copy 15 wpm will be able to "read" the majority of the traffic. Around and below 500 kHz, the code-copying SWL has a chance to log a few of the still-operating spark gap transmitters (RTGI, Ust-Kamtchatsk, 200 kHz; TBC, Buyuk Liman, 300 kHz; UCG, Fort Chevtchenko, 500 and 530 kHz; and UNF, Tetiukhe, 425, 454, and 500 kHz).

As in ham radio, there is a very small language barrier since English is usually the common language. If you have a yen to play the "spy," you can snoop on Cuban stations CLA and CLQ working Russian ships on 476 kHz and about 430 kHz.

Low Frequency Bands. By international convention, there are three frequency regions allotted to the maritime service for CW operations. The lowest of these regions extends from 143 to 158 kHz, but this band is seldom utilized,

Just below the broadcast band lies one of the two important marine regions which is used for most short and medium range operations. This restricted range is a result of low transmitting power on the ships. The most important frequency in this band, and of all maritime frequencies, is 500 kHz, which is the "international distress and calling frequency." If you must send out an SOS, doing it on 500 kHz wil give you the best chance of results, because all ships and coastal sta-

tions continuously guard this frequency.

The 500-kHz frequency is also used to call another station, since everybody is supposed to be listening on it, and arrangements are made there to shift to a "working frequency." This gives 500 kHz the flavor of an old-fashioned party-line and, as with a party-line, frequently everybody tries to talk at once.

Ships are assigned any or all of the following frequencies for traffic purposes while the shore stations usually have only one working frequency scattered between the ship working channels: 512 kHz (for use in Europe-Africa-Asia areas only); 480, 468, and 454 kHz; 448 kHz (for use in North and South America and Greenland areas only); 444 kHz (for communications with U.S.C.G. stations only); 425 kHz; and 410 kHz (for communicating with direction-finding stations only).

High-Frequency Bands. Ship and shore stations are permitted to operate in seven different high-frequency bands which are generally identified as the 2-, 4-, 6-, 8-, 12-, 16-, and 22-MHz bands. In these bands, the shore stations have one or two channels which are used for calling, traffic handling, and broadcasting. Ships at sea have one calling and two working frequencies, both of which usually fall just below the frequencies of the coastal stations. See the table below.

On the high-frequency bands, shore stations send CQ tape giving the frequencies to which they are listening. They also answer ships on the sending frequency. The ships use a calling frequency to establish contact while listening to the shore station's CQ tape. While the shore station is sending the CQ tape, the shore operator is tuning his calling frequency band. When the shore station cuts the tape off, the operator answers a ship. When the ship gets a reply, the ship's operator gives the shore station the working frequency he will shift to (usually only the last three digits are sent) and the ship station moves to this new frequency, where the traffic takes place.

Shore stations also transmit traffic lists (the call-signs of ships for which they are holding messages), weather, hydrographic bulletins, and press broadcasts on published schedules. Some of the more common coastal stations heard in the U. S. area are listed on the next page.

Operating Procedures. All of the Q-signals, abbreviations, and slang found on the amateur bands are also found here (most of it originated here and many of these commercial operators are also hams) plus a few extra official Q-signals and considerable unofficial slang. Some Q-signals not usually found on amateur charts but used in maritime communications are giv-

Frequencies Used By Ship and Shore Stations

Band (MHz)	SHIP STATIONS		SHORE STATIONS
	Calling Frequencies (kHz)	Working Frequencies (kHz)	(Approximate Limits)
2	2065 to 2107	Same as calling	2000 to 2065
4	4178 to 4186	4161 to 4176 4188 to 4236	4240 to 4400
6	6267 to 6279	6241 to 6264 6282 to 6355	6362 to 6523
8	8356 to 8372	8322 to 8352 8376 to 8473	8478 to 8742
12	12,534 to 12,558	12,474 to 12,528 12,564 to 12,709	12,714 to 13,128
16	16,712 to 16,744	16,626 to 16,704 16,752 to 16,946	16,950 to 17,285
22	22,225 to 22,265	22,151 to 22,217 22,272 to 22,395	22,400 to 22,670

Coastal Stations Heard in U.S.A.

STATIONS	FREQUENCIES (kHz)
CFH (Halifax)	4283; 6386; 8566; 12,849; 17,132; 22,455
CKN (Vancouver)	4277; 6393; 8554; 12,831; 17,108; 22,533
CLA (Havana)	460; 4355; 6505; 8714; 13,092; 17,165; 22,647
DAN (Norddeich)	4308; 6435; 8482; 12,898; 17,143; 22,515
FFL (St. Lys)	4328; 6449; 8522; 12,912; 17,040; 22,509
JOR (Nagasaki)	8523; 13,008; 17,043; 22,409
KFS (San Francisco)	476; 2061; 4274; 6365; 8558; 12,844; 17,026; 22,425
KOK (Los Angeles)	464; 2055; 4283; 6463; 8590; 12,993; 17,064; 22,413
KPH (San Francisco)	426; 2045; 4247; 6488; 8618; 13,002; 17,016; 22,479; 22,557
PCH (Scheveningen)	8622; 8654; 12,768; 17,007; 17,103; 22,575
SAG (Gotenborg)	4262; 6372; 8498; 12,880; 17,079; 22,413
WCC (Cape Cod)	436; 2036; 4367; 6376; 8586; 8630; 12,925; 13,033; 16,973; 17,271; 22,599
WOE (Lantana)	472; 6411; 8486; 12,970; 18,160
WSC (Tuckerton)	460; 4331; 6502; 8610; 12,948; 17,242; 22,521
WSL (Amagansett, L.I.)	418; 4343; 6414; 8658; 12,997; 16,997; 22,485

en below. In each case, the message can also be phrased as a statement.

QRA What is the name of your ship?

QRC Who pays for your traffic?

QRD Where are you coming from and where are you bound?

QSJ What is the cost per word? (Given in cents or international gold francs/centimes (3GF=U.S. $1.00); CC= coast station charge, LL= telegraph or "landline" charge.)

QSS What working frequency will you use?

QTB Do you agree with my counting of words?

QTP Have you entered port?

QTO Have you left port?

Some of the abbreviations frequently encountered are:

MSG A message about the operation of the ship (from or to the captain)

P Personal message (from or to a passenger or crew member)

SVC Service message (between operators)

AMVER "Automated Merchant Vessel Report," a computerized system of the USCG to utilize merchant ships for emergencies such as sinkings, need for medical aid, aircraft ditchings, etc.

HYDRO Hydrographic mesage (navigational information)

SP Silent period (15 to 18 and 45 to 48 minutes after the hour on 500 kHz)

OBS Observer message (weather observation)

XXX Urgent signal (usually sent on 500 kHz)

TTT Safety signal preceding a hydrographic broadcast, usually sent on 500 kHz at 18 and 48 minutes after the hour if a broadcast is to be made.

A series of dashes four-seconds long with one-second spaces on 500 kHz is the "auto-alarm" signal which, through a special receiver and alarm bells, calls an off-watch operator to his receiver and precedes an SOS message.

Some unofficial procedure takes the form of not using DE between call-signs, not using K or AR at the end of a transmission, although BT, NIL, or UP is often used to invite a reply or terminate a transmission. TU is "thank you," BV is "bon voyage," and SU means "see ya." Per-

haps the most widely encountered signal is that which substitutes for okay, "all right," FB, "I agree," "that is correct," "bye-bye," etc. It is simply two dots, sent as "didit" or sometimes shortened, by operators too lazy for the full endeavor, to "dit."

Since dots are easier to send than dashes, most operators are big on dots. For example, "II" sent as "didit didit" means "I'm repeating the last word I just sent." The more ambitious operators sometimes use "IMI," as does the U.S. Navy.

Call-Signs. All shore stations have three-letter calls while all ships have four-letter call-signs. These are assigned under the same system as are amateur and broadcast call-signs, so many will be easily identified as to nationality. The nationality can be determined by the first one or two letters of the call-sign. Some of the commonly heard calls along the U.S. coast are:

DA—	to	**DT—**	=Germany
EL—			=Liberia
F—			=France
G—			=Great Britain
HO—	to	**HP—**	=Panama
JA—	to	**JS—**	=Japan
JW—	to	**JX—**	=Norway
K—			=U.S.A.
LA—	to	**LN—**	=Norway
N—			=U.S.A. (Navy and Coast Guard)
OU—	to	**OZ—**	=Denmark
PA—	to	**PI—**	=Netherlands
SA—	to	**SM—**	=Sweden
SV—	to	**SZ—**	=Greece
W—			=U.S.A.
5L—	to	**5M—**	=Liberia
6Z—			=Liberia

QSL's and Veries. For those who want QSL's, the best that can be hoped for, from ships, will be a letter verie. Many shore stations, however, are known to QSL with attractive cards.

The ITU callbooks do not always give the company name of the ship owner, so it is sometimes necessary to determine that first. Then, in the case of U.S. ships, you can consult the telephone directory of a large port for their mailing address. Using this address, write to the ship to the attention of the radio officer. Remember NOT to divulge message content when seeking a QSL; time, date, frequency, call-signs, RST, etc., should be sufficient.

Fortunately for the QSL-hunter, it is easy to determine many ship companies since they have a characteristic name series for their ships. The ship name is given in each message. Some of the common U.S. flag series that will be encountered are listed at left.

Name Series of U.S. Ships

"Gulf———"	Gulf Oil Corp. ("Gulftiger," "Gulflion," "Gulfbear")
"Gulf———"	Gulf South American Line ("Gulf Farmer," "Gulf Merchant")
"American———"	United States Line ("American Charger," "American Racer")
"Pioneer———"	United States Line ("Pioneer Mink," "Pioneer Lynx")
"———Lykes"	Lykes Bros. SS Co. ("Ruth Lykes," "Doctor Lykes," "Sue Lykes")
"Santa———"	Grace Line ("Santa Rosa," "Santa Paula")
"Export———"	American Export Line ("Export Banner," "Export Buyer")
"Steel———"	Isthmian Line ("Steel Chemist," "Steel Scientist")
"Green———"	Central Gulf Line ("Green Wave," "Green Lake")
"Mormac———"	Moore McCormack Line ("Mormacsaga," "Mormacrio")
"———State"	States Marine Line (Keystone State," "Cotton State")
"President———"	American President Line ("President Cleveland," "President Monroe")
"———Bear"	Pacific Far East Line ("Hong Kong Bear," "Philippine Bear")
"Texaco———"	Texas Co. ("Texaco North Dakota," "Texaco Delaware")
"Esso———"	Humble Oil Co. ("Esso Chester," "Esso Boston")
"African———"	Farrell Line ("African Planet," "African Neptune")

"Confidential" Frequency List

If you're wondering what other short-wave stations are on the air, you'll be surprised at the listings in this little callbook. International police networks, ships-at-sea, aeronautical, point-to-point stations, are but a few of the listings. 40 pages. $1.95. Available from Gilfer Associates, Inc., P.O. Box 239, Park Ridge, N.J. 07656.

(Continued from page 96)

Brazzaville in the Democratic Republic of the Congo.

Algeria's 25-meter band frequency is used twice a week, Thursdays and Sundays, from 0015 to 0100 GMT, for a semi-clandestine program directed to Portugal. The broadcast, called "A Voz de Libertad," attacks the Salazar regime in Lisbon.

Latin America. In the mid and late 1950's, the real hot spot of clandestine radio was Latin America. The former "Radio Americas" was the best known and the best heard of the lot. "Radio Americas," and its predecessor, "Radio Swan," were anti-Castro voices, programmed by Cuban exiles. It took an active part in the Bay of Pigs invasion attempt, broadcasting coded signals to Cuba. These stations, reputedly, were financed and controlled by the Central Intelligence Agency.

There were quite a few other Cuban clandestines during this era, including one tiny outfit that allegedly broadcast from a pleasure yacht somewhere south of Miami. It aimed its blasts at Fidel's government in Havana. On the other hand, Cuban-based transmitters were heard trying to foment revolution in other Latin nations. These stations are now long silent, with the official government voice, "Radio Havana" taking up the slack.

Active again, after a strange silent period of several months early in 1968, is "Radio Libertad, La Voz Anti-Comunista de America." Its location has long been a matter of speculation but it probably broadcasts from somewhere on the north coast of South America, perhaps from Venezuelan territory. Published reports claiming it transmits from the Bahamas, from Swan Island, or even from a circling airplane, seem without foundation. There is a growing suspicion that this station has been taken over by a European exile organization.

Bolivia has been called the heart of clandestine operations. It was long the home of the greatest number of illicit stations in the Western Hemisphere.

In 1962, for example, some 34 of the 94 stations operating there were illegal. The Bolivian representative at the International Telecommunications Union meeting that year frankly admitted that his government was unable to silence the unlicensed outlets, most of which were run by powerful, leftist labor unions. In recent years, Bolivia has renewed its drive to shut down these clandestines.

This Cook's Tour of worldwide clandestine radio has included only a handful of the illegal stations in the shortwave bands. Clandestines come and go with the ebb and flow of international political tides. Perhaps some of these will have disappeared by the time you read this. Others will have sprung up to take their places. The situation is in an almost constant state of flux, but then, this is part of the fascination of DXing the clandestines.

GETTING THOSE CLANDESTINE QSL'S

Verifications from clandestine stations are rarities! None of the active clandestines aims its signals to North America; few announce in English. Usually they are careful not to disclose their locations and there is no readily available list of station addresses. But some listeners have been able to pry replies, though not always true verifications, from the mysterious stations. Though no guarantees are made, try the addresses below. A final tip: Clandestines seem more interested in comments about their programs or about the political situation closest to their hearts than in the usual sort of SWL report data.

Radio Libertad
La Voz anti-Comunista de America
C/o DYTA
Apartado 20.064 z.p. 5
Caracas, Venezuela

Radio of the South Vietnam
National Front for Liberation
C/o Mr. Pham Van Chuong
Nekazanka 7
Prague, Czechoslovakia

Radio Euzkadi
Boite Postale 59
Poste Centrale
Paris XVI, France

Radio Free Russia
Narodno Trudovoi Soyuz
Postbox 4111
Frankfurt, Germany

Radio Espana Independente
Box 359
Prague, Czechoslovakia

Radio Peyk-e-Iran
Box 4176
Stockholm 4, Sweden

NEW FROM INTERNATIONAL

FM-2400 FREQUENCY METER

- For Mobile Or Base Station Use
- Tests Predetermined Frequencies 25 - 470 MHz
- Portable . . . Use It Anywhere

The FM-2400 is designed for testing and adjustment of mobile and base station transmitters and receivers at predetermined frequencies between 25 and 470 MHz. The FM-2400 provides an accurate standard frequency signal to which the transmitter can be compared. This same signal is applied to the associated receiver(s), thereby assuring an accurate frequency adjustment on all parts of the communications system.

Up to 24 crystals may be inserted into the meter for the selection of the frequencies required for testing of the system transmitters and receivers. The frequencies can be those of the radio frequency channels of operation, and/or of the intermediate frequencies of the receiver between 100 KHz and 100 MHz. Self contained unit. Battery operated.

FM-2400 (meter only)	**$395.00**
RF Crystals with temperature run	**$23.50** ea.
IF Crystals	
200 - 2,000 KHz	See Catalog*
2,001 - 13,000 KHz	See Catalog*

*WRITE FOR FREE CATALOG

INTERNATIONAL

CRYSTAL MFG. CO., INC.

10 NO. LEE • OKLA. CITY, OKLA. 73102

CIRCLE NO. 17 ON READER SERVICE CARD

What Is Amateur Radio?

AMATEUR RADIO

It may be the world's most fascinating hobby

BY HERB S. BRIER, W9EGQ

WHAT IS amateur radio? The Federal Communications Commission, which writes the rules for all radio services in the United States, calls amateur radio a service designed (among other things) to provide emergency communications, develop a reservoir of trained operators, and promote world peace. The Stanford Research Institute calls amateur radio an "international resource." The typical amateur will probably agree with either or both of these definitions as they are important reasons for the continued existence of amateur radio. But the real reason that amateur radio exists is because it's the world's most fascinating hobby.

Who Are Radio Amateurs? Well, there is Bill, W2SKE; Hassan, CN8MH; Barry, W7UGA; Curt, K4RFA; Fernando, OA4FB; MaryAnn, WN9YLZ; Mohmud, EP1MP; Herb, W6ZH; Bill, W3QCV; and Dave, WA9ITB, to mention a few. Probably, a bunch of first names and a mixture of letters and numbers means nothing to you, but that is how radio amateurs know each other.

In other circles they are known more formally as: William Leonard, Vice President, News, Columbia Broadcasting System; HRH Moulay Hassan, King of Morocco; The Honorable Barry Goldwater, former United States presidential candidate and Senator from Arizona; General Curtis LeMay (ret.) former U.S. Air Force Chief of Staff; The Honorable Senor Fernando Belaunde, President of Peru; MaryAnn Voss, 10-year-old school girl; HIH Prince Mohmud Pahlavi, Tehran, Iran; The Honorable Herbert Hoover, former U.S. Undersecretary of State and son of former President Herbert Hoover; Dr. W. A. LePage, President, The Franklin Institute; and David Ploos, who just left to serve his "hitch" in the U.S. Armed Forces before returning to college.

Yes, all kinds of people, from grade-school students to Ph.D.'s, from housewives to nuns, and from invalids to astronauts, are numbered in the world's approximately half million licensed amateurs. Yet no matter how much they may differ, they all have two things in common: They are hams* because of personal devotion to the hobby without thought of monetary gain—international regulations specify that no amateur may gain material reward, either direct, paid or promised, through amateur radio. And, every one of them has earned the right to be on the air and chat with his fellow amateurs all over the world by passing an official government examination to prove his technical competence to operate an amateur radio station.

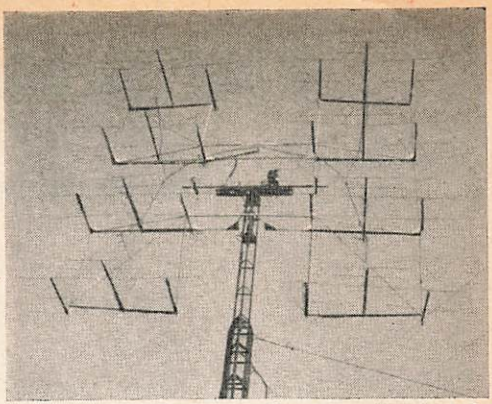
Most hams say that the day they passed their radio amateur examination and received their own call letters was one of the proudest moments in their lives. This pride explains the fierce rejection by the

*There are explanations of why radio amateurs are called "hams"; none of them withstands the harsh light of investigation. Nevertheless, the title "ham" is worn proudly by most licensed radio amateurs.

majority of licensed amateurs of the idea that any class of amateur license should be issued unless the applicant passes a bona fide examination. Nevertheless, amateurs go out of their way to encourage and assist newcomers to pass the examinations to become hams.

Earning an amateur license is not difficult. Of course, some people exaggerate the difficulties involved to camouflage the reasons they are not amateurs, and some amateurs have been known to exaggerate them in order to inflate their own sense of self-importance. But if they could earn a license, you certainly can!

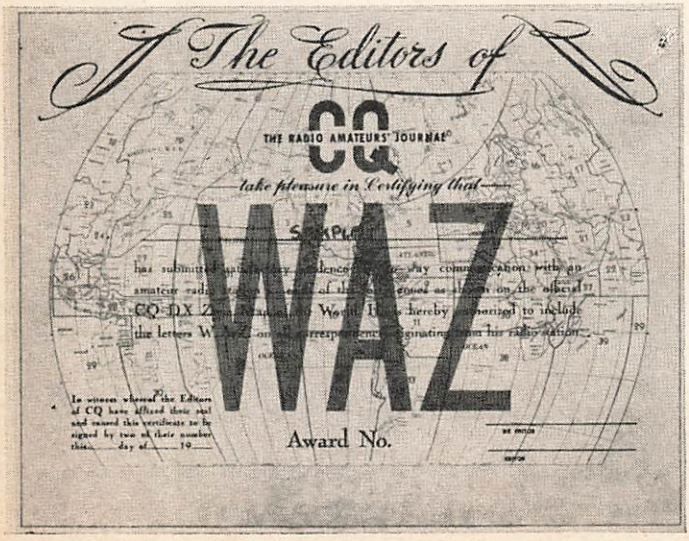
Hams are likely to have their equipment installed in any room of their homes—yes, even in the bathroom. They have them in automobiles, airplanes, boats, and bicycles. They have them in submarines, destroyers, and aircraft carriers through the courtesy of the United States Navy. There are amateur radio stations in lighthouses, in a building under the snow at the South Pole, and in Vatican City. Radio amateurs and their equipment have been part of virtually every scientific expedition to unexplored parts of Africa, Asia, South America, and the frozen Arctic and Antarctic regions.



Many hams are just natural-born experimenters. In this photo is shown the sixty-third antenna built by Bill Conkel, W6DNG. Bill experiments in communicating by bouncing the signal off the moon! Each antenna is an improvement over the last until this one was constructed that has a power gain of 100.

Long Distance Communications. DX chasing is a major activity of many amateurs. Virtually all of us enjoy talking to an exotic country on the other side of the globe and exchanging confirmation cards (QSL's). But for some amateurs, chasing DX is an all-consuming passion. This group spends large amounts of time, money and energy on super-efficient antennas, receivers and transmitters in hand-picked locations—all with the single aim of working more foreign countries than any other ham.

When they are all chasing the same "rare" station in a "pile up," you could easily believe that all DX men are mortal enemies. The truth is that most of them



Some hams attempt to contact as many other hams in foreign countries as possible to win awards and certificates. This certificate is given by CQ magazine to hams that have worked the entire world in 40 zones.

MaryAnn Voss, WN9YLZ, celebrated her tenth birthday a few days before passing her Novice license test. When this was being written, she had worked 21 States and Mexico using the 2B Drake receiver and Knight-Kit transmitter in the background.

are the best of friends and frequently tip each other off to the appearance of a "new one" for them to chase. After the station is worked, the next step is exchanging QSL cards to confirm the contact. The QSL's are used in turn to obtain a certificate proving that a certain number of countries have been worked.

The most sought after of the various DX certificates available is probably the American Radio Relay League's DXCC (DX Century Club) certificate sent to the applicant upon the receipt of written proof of two-way radio contact with 100 or more different countries. ARRL has inspected approximately 2,000,000 QSL cards since 1949 in the process of issuing DXCC certificates and endorsements. This total represents only a small fraction of the total number of QSL cards that have been exchanged in the same period.

Radio amateurs are builders and experimenters. They experiment with radioteletype and TV. They have built and launched (through the cooperation of the U.S. Air Force) several OSCARS ("Orbiting Satellites Carrying Amateur Radio") which enabled VHF amateurs throughout the world to communicate from continent to continent on frequencies usually good only for line-of-sight distances. At present, the OSCAR Association hams are testing an OSCAR satellite unit constructed by Australian amateurs and readying it for an early launching.

A few years ago the best communications theorists patiently explained that "moon-bounce" communications with the limited equipment available to radio amateurs was utterly impossible. How wrong the experts were! Today experimentally minded radio amateurs are bouncing VHF/UHF radio signals off the moon and using these reflections to span the globe. Although successful moon-bounce work requires highly sophisticated electronic equipment, ham signals have been used for two-way communications between several

Chief Radioman Eugene Leafty, WB6HWX, operates a ham station aboard the USS Josepheous Daniels. In the U.S. Navy hams may operate from most vessels.

In addition to being a nurse and pilot, Mary DeMand, WA5HUN is a very active ham. She has been commended for outstanding work relaying messages received via U.S. Navy MARS from Vietnam.

countries in Europe, Australia, Puerto Rico, and both coasts of the United States. What the experts had ignored was the untiring efforts and patience of amateur radio experimenters.

Bill Conkel, W6DNG, Long Beach, Calif., the world's most successful moon-bounce station, has made nearly 30 two-way contacts with OH1NL, Finland; nine with F9DO, France; and three with W6YK, Camarillo, Calif. In addition, Bill has had not quite complete two-way, moon-bounce contacts with Russia and Sweden, and he has been heard in all continents, except South America. How long will it be before W6DNG is WAC (Worked All Continents) on 144 MHz? A feat that 10 years ago seemed doubly impossible—using line-of-sight radio waves and moon-bounce communications.

Jacqueline Bucher, WA9TQJ; John Holmlund; and Byron Eguiguren, HC2LE are members of the Hadley School for the Blind Amateur Radio Club. In the background is Byron C. Sharpe, W9BE, Instructor.

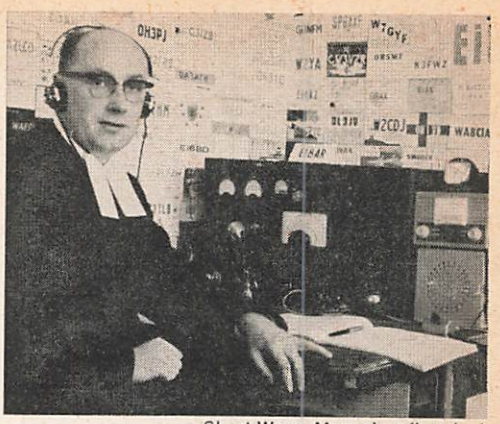
Many amateurs concentrate on performing public services. They relay messages—often between military personnel overseas and their families. They enroll in the Amateur Radio Public Service Corps, the Radio Amateur Civil Emergency Service (RACES), or the Military Affiliate Radio Service (MARS) sponsored by the U.S. Army, Navy, and Air Force—to be prepared for communications emergencies. Each year, these groups are called into service in the wake of hurricanes, tornadoes, and other disasters.

The first news reports of the 1964 Alaskan earthquakes and the 1967 Fairbanks, Alaska, flood were relayed by amateur radio. And in 1968, New Zealand amateurs supplied emergency communications for days as torrential rains and disastrous floods isolated first one section of the country and then another and destroyed all normal communications circuits.

Mostly, hams just talk to other hams. This idle chit-chat is called "rag-chewing" in the ham radio vocabulary. People outside of ham radio may think that it serves no useful purpose. Actually, it is one of the most direct and personal means of communications between the citizens of different countries. Amateur radio is one of the very few contacts on a person-to-per-

son basis that citizens of the Soviet Union and satellite countries have with people beyond their own borders.

Just as there is a fascination, there is romance in amateur radio and sometimes this is meant quite literally. Ham radio is one of the few hobbies where the percentage of women getting amateur radio licenses is higher than the percentage of women already involved in ham radio. It is also fairly common for unattached OM's (male amateurs) and YL's (young lady operators) to contact one another over the air, arrange a meeting in person at a hamfest, find that they have a mutual interest, get married, and start raising their own families of future radio amateurs.



Short-Wave Magazine (London)
Brother John Shortall, EI8AR, De La Salle College.

Obtaining an Amateur License. There is a firm requirement that all radio amateurs must pass an appropriate technical examination before receiving a transmitting license. This is necessary because amateur radio transmitters are powerful enough to cause worldwide interference to other radio services if operated improperly. Amateurs also adjust and often build their own equipment; therefore, each government must be certain that its amateurs have the necessary technical knowledge and sense of responsibility to do both correctly.

In the United States, the Federal Communications Commission issues an amateur license to any United States citizen or national who passes the appropriate examination. There are six classes of licenses available: Novice, Technician, Conditional, General, Advanced, and Amateur Extra. The graduated privileges attached to the different licenses are designed to give amateurs incentives to improve their technical skills while climbing the license ladder.

Corresponding to an automobile learner's permit, the **Novice** license authorizes anyone who has never held an amateur license the opportunity to get on the air and "learn by doing." This license is a form of encouragement, since the FCC fully expects each Novice licensee to graduate to a General class license within a fixed period of time. The Novice license is issued for two years and is not renewable; its examination, given by mail, consists of a simple written test on elementary electronic theory and a 5-wpm (word-per-minute) code test. Both the code and technical parts of the examination are given (usually) by the friendly radio amateur that assisted the Novice applicant and encouraged his initial interest in ham radio.

The Novice license permits code operation in segments of the 80-, 40-, 15-, and 2-meter amateur bands using crystal-controlled transmitters and up to 75 watts of input power. This power is sufficient to work all over the United States and Canada and even around the world under favorable conditions, as attested by the many Novices who have worked all continents and 100 countries or more during their licensing period.

This simple and neat station is operated by Howard Lester, WB2KPO, Yonkers, N.Y. Using single sideband, Howie has worked 28 countries and 46 States.

The **Technician** license is issued for five years and is renewable. It grants all amateur privileges on most amateur frequencies above 50.1 MHz, including the privilege of using transmitter power input up to 1000 watts. The Technician examination consists of a 5-wpm code test and the same technical written examination given to applicants for General and Conditional class licenses. This examination is considerably more comprehensive than the Novice written exam; nevertheless most applicants pass it easily after a few weeks or months of spare-time study.

The Technician license is also normally obtained by mail with the examination held under the close observation of a friendly radio amateur. Under special conditions, however, as described in the article on the mechanics of getting a license starting on page 117, a Technician examination may sometimes be taken at an FCC office.

The **General** class license is the basic and most common amateur license. It grants the holders all amateur operating privileges on all amateur bands but not on all frequencies in all bands. Requirements for obtaining it are passing a 13-wpm code test and the same written examination as required for the Technician class license. This is not a "mail-order" license and the examination must be taken at an authorized FCC Regional Office examination point.

To accommodate those who cannot travel to an FCC examination point to take the General class license, the FCC has made available a special license called the **Conditional** class license. It grants the same operating privileges as the General class license, but it can be obtained by mail. To be eligible for a Conditional class license, you must live at least 175 miles from a point where the Federal Communications Commission administers amateur examinations at least twice a year (see table on page 120) or can show by a doctor's certificate your inability to travel. Also, applicants in the U.S. Armed Forces who cannot obtain permission from their Commanding Officers to appear at an FCC office for a General class examination. An American citizen living overseas for two years, or more, is eligible for a Conditional license.

The **Advanced** class license extends the privileges given the General or Conditional class license holders. Phone operation is permitted on all appropriate amateur frequencies except those between 3.8 and 3.825 MHz and between 21.25 and 21.275 MHz. Applicants for an Advanced class license who already hold a General class license need pass only the Advanced class written examination to qualify for the Advanced class license. Other applicants must first pass a 13-wpm code test before taking the written exam.

The Advanced class technical examination is definitely more comprehensive than the Technician/Conditional/General written examination; nevertheless, the average General class licensee passes it after a few weeks of study. A physically-handicapped applicant may take the Advanced class examination by mail, if his application is accompanied by a doctor's certification of his inability to travel.

The **Extra** class license authorizes all amateur privileges on all amateur frequencies. To be eligible, the applicant must have had a minimum of two years experience with any other class of amateur license (except Novice or Technician). He must pass a 20-wpm code test and a very comprehensive written examination covering all phases of amateur radio communications techniques. While by no means an impossible license to obtain, it takes several months of study before the average General or Advanced class amateur is ready for the test, and he can feel proud when he qualifies for this class of license.

No fee is charged for a Novice license, but a $4.00 fee is charged for other license applications and renewals. Changes of address take a $2.00 fee. Application fees are not returned, even if the applicant does not qualify for a license.

DX News-Sheet

For the very latest information on ham band DX'ing subscribe to the DX News-Sheet. Published in England (Geoff Watts, 62 Belmore Road, Norwich, NOR 72T) the News-Sheet is sent airmail (46 issues for $5.00) on either Tuesday or Wednesday each week.

How To Get Your Ham License

AMATEUR RADIO

Follow These Steps To Avoid Pitfalls

BY HERB S. BRIER, W9EGQ

IF ANYONE could appoint himself a radio operator and select his own transmitting frequency, the result would be international radio communication chaos. Most of the governments around the globe were quick to recognize that certain definite limitations must be placed on the frequencies in use and on the people who operate the transmitting stations. The technique of issuing radio licenses has been formally established by international treaties. Among other things these treaties specify that radio amateurs must demonstrate some proficiency in sending and receiving the International Morse Code. Hams must also have the knowledge and the ability to operate their stations in a manner that will not create interference to other users of the radio spectrum.

In the United States, the licensing of radio amateurs is completely nondiscriminatory. There are no barriers as to age, sex, race, etc. The only requirements are those of mastering the necessary code speed and the technical theory to qualify for the appropriate license.

Amateur Radio Frequencies and Privileges

CLASS OF LICENSE	OPERATING PRIVILEGES
Novice	Code on 3.7-3.75, 7.15-7.2, 21.1-21.25, and 145-147 MHz (no phone privileges)
Technician	All amateur privileges on 50.1-54, 145-147, and above 220 MHz until November 22, 1969. After November 22, 1969, same, but now above 50.25 MHz
General or Conditional	All amateur privileges on all amateur frequencies, except 3.5-3.525, 3.8-3.85, 7.0-7.025, 7.2-7.225, 14.0-14.025, 14.2-14.235, 21.0-21.025, 21.25-21.3, and 50-50.1 MHz until November 22, 1969
	After November 22, 1969, all amateur privileges on all amateur frequencies, except 3.5-3.55, 3.8-3.9, 7.0-7.05, 7.2-7.25, 14.0-14.05, 14.2-14.275, 21.0-21.05, 21.25-21.35, and 50-50.25 MHz
Advanced	All amateur privileges on all amateur frequencies, except 3.5-3.525, 3.8-3.825, 7.0-7.025, 14.0-14.025, 21.0-21.025, and 21.25-21.275 MHz until November 22, 1969
	After November 22, 1969, all amateur privileges on all amateur frequencies, except 3.5-3.55, 3.8-3.825, 7.0-7.05, 14.0-14.05, 21.0-21.05, and 21.25-21.275 MHz
Extra	All amateur privileges on all amateur frequencies

Applying for Your License. When you are ready to apply for a license by mail follow these procedures carefully: Write to the Federal Communications Commission office nearest you (you'll find the address on page 120) and request a copy of Amateur Radio Station and/or Operator License Application (FCC Form 610).

Presumably, by the time you request a license application form, you will have satisfactorily proven to a local radio amateur that you can send and transmit the necessary code speed. This local ham may also serve as your volunteer examiner (see suggestions below).

When your Form 610 arrives, the volunteer examiner will give you your code test. It consists of two parts—a 5-minute code transmission at the specified speed (5 wpm for the Novice and Technician licenses; 13 wpm for the Conditional license) which you must copy for at least one minute (60 consecutive seconds) without error or omission, and a sending test. The Novice/Technician code test contains no punctuation marks or numerals; the Conditional/General test contains both, with each one being counted as two letters.

If you fail the code test, the examination stops without further ado. But if you pass the code test, you fill out your Form 610 and give it to the volunteer examiner. Also, if you are applying for any license except a Novice license, you hand the examiner your $4.00 license fee in the form of a check or money order payable to the Federal Communications Commission. (No fee is required of Novice applicants.)

The volunteer examiner will then write a letter to the FCC, stating that you have passed the code test under his supervision and requesting the necessary material for giving you the written examination. In addition, his letter will state his qualifications to act as a volunteer examiner and will include both his and your names and mailing addresses. After signing the letter, the examiner will mail it, your application Form 610, and your license fee (if any) to the Federal Communications Commission, Gettysburg, Pa. 17325 within 10 days of the time when you passed the code test. A suggested form for the examiner's letter is to the left of this text.

Upon receipt of the letter, the FCC will mail the necessary examination papers to the volunteer examiner, who will be responsible for conducting the examination and returning the papers to the FCC. If for any reason you (the applicant) fail to take the examination within the specified time (normally 20 days), the volunteer examiner must return the unopened examination envelope to the FCC. Your application fee will not be returned, however.

In conducting the written examination, the examiner will hand you the sealed envelope containing the examination (20 multiple-choice questions for the Novice test or

Examiner's name
Examiner's street address
City, State, and Zip Code
Date

Federal Communications Commission
Gettysburg, Pa. 17325

Gentlemen:

I, ..., have been asked by .....
(insert applicant's name and mailing address) to act as his volunteer examiner for his ..... **(insert class of license desired)** class amateur operator license examination. His completed #610 application form, doctor's or commanding officer's certification as required, and license fee are enclosed. Mr. ..... demonstrated to me his ability to send and receive the radiotelegraph code at a speed of ..... words per minute on ..... **(insert date).**

Please send me the necessary material to administer the ..... Class examination to Mr. .....

I am over 21 years of age and **(add one of the following)** I hold an amateur operator license of the ..... **(insert General, Advanced, or Extra)** class, dated ....., and my amateur callsign is ..... **(or)** I hold commercial radiotelegraph license number ..... dated ..... **(or)** I am employed at ..... in the service of the United States as the operator of a manually operated radiotelegraph station.

To the best of my belief and knowledge all the above information is correct.

Examiner's signature .....
Examiner's name and permanent address
(print clearly) .....
.....
.....
.....

Although the examiner's letter need not be precisely in this form, the above sample contains all of the material required by the Federal Communications Commission from a volunteer examiner requesting the written examination material for a by-mail license exam.

FCC FORM 610
July 1968

UNITED STATES OF AMERICA
FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON, D.C. 20554

Form Approved
Budget Bureau No. 52-R069.17

APPLICATION FOR AMATEUR RADIO STATION AND/OR OPERATOR LICENSE

GENERAL INSTRUCTIONS

1. Use this form to apply for a new, renewed, or modified license. Do not use this form to obtain a duplicate copy of a lost, mutilated or destroyed license. For a duplicate license, submit a letter request (no fee) giving your name, address, station call sign or control number, license expiration date, and state how the original license was lost, mutilated or destroyed.

2. Complete this form as follows:
   a. Use typewriter or print clearly in ink.
   b. Complete all applicable items carefully. (See Special Instructions on reverse side for completion of Items 1, 4, 5A, 5F, 5G, 8 and 9).
   c. Present license should be attached in the space provided.
   d. Application must be signed and dated.
   e. Mail application to Federal Communications Commission, 334 York Street, Gettysburg, Pa. 17325. (See Special Instruction C(4) for exception.)

3. Enclose required application filing fee by CHECK OR MONEY ORDER made payable to the Federal Communications Commission. DO NOT SEND CASH. Filing fees are not required for applications for Novice Class license or for applications for a station license for recreation under Military auspices. The following filing fee schedule governs applications in the Amateur Radio Services:

   a. $4.00 – New license; change of operator privileges; renewal of license; combination of renewal and modification of license.

   b. $2.00 – Modification of present license without renewal.

   c. $20.00 – Request for a special call sign in accordance with one of the exceptions set forth in Section 97.51(a) of the Commission's Rules.

   NOTE: Application filing fees are payable and are not normally refundable irrespective of the Commission's disposition of an application.

DO NOT WRITE IN THIS BLOCK

APPLICANT SHOULD ATTACH PRESENT LICENSE HERE

The present license must be attached unless it has been lost, mutilated, or destroyed, in which event the circumstances must be explained in this box. (CLUB OR MILITARY RECREATION STATION APPLICANTS SHOULD ATTACH STATION LICENSE ONLY)

PLEASE PRINT OR TYPE

1. NAME OF APPLICANT (See Special Instruction A on Reverse Side)
   Last Name | First Name | Middle Initial

2. PERMANENT MAILING ADDRESS
   Number Street
   City State
   Zip Code County

3. BIRTHPLACE AND DATE
   City State Month Day Year

4. Within ten years previous to the date of this application, has the applicant been convicted in a Federal, State, or local court of any crime for which the penalty imposed was a fine of $500 or more or an imprisonment of six months or more? (See Special Instruction B on Reverse Side.) Yes ☐ No ☐

5. ACTION (S) DESIRED (CHECK APPROPRIATE BOXES)
   A ☐ New Operator License or Change of Class of Operator License (See Special Instruction C on Reverse Side)
   Check Class Desired: ☐ Novice ☐ Technician ☐ Conditional ☐ General ☐ Amateur Extra
   B ☐ New Individual Station License
   C ☐ New Club Station License (Applicant, whose name appears in Item 1, must be a duly appointed trustee for a bona fide amateur radio organization and must have an operator's license of class other than Novice Class).
   Trustee's Station Call Sign (or Control Number) | Class of Operator privileges | Expiration Date
   D ☐ New Military Recreation Station
   E ☐ Additional Station License (NOTE: An additional station license always expires on the same date as the basic operator and station license.)
   Check Type: ☐ Individual ☐ Club
   F ☐ Modification of Present License (See Special Instruction D on Reverse Side)
   Check modifications desired:
   ☐ Change of permanent station location
   ☐ Other
   (Explain, using additional sheet if necessary)
   G ☐ Renewal of Present License (See Special Instruction E on Reverse Side)
   Have you met the operating time and code speed requirements of the Commission's Rules for renewal of operator license? Yes ☐ No ☐

6. If presently licensed, furnish the following license information: (Trustee should furnish information for both his individual license and the Club station license)
   Individual License: Station Call Sign | Class of Operator Privileges | Expiration Date
   Club or Military Recreation Station License: Station Call Sign | Expiration Date

7. A. Does applicant have any other amateur radio application on file with the Commission that has not been acted upon? Yes ☐ No ☐
   B. If "Yes", state its purpose and date submitted.

8. If applicant requests a special station call sign, give call sign desired: (See Special Instruction F on Reverse Side)
   SPECIAL STATION CALL SIGN REQUESTED

9. STATION LOCATION (See Special Instruction G on Reverse Side)
   Number Street
   City State
   County

10. REMOTE CONTROL POINT
   A Number Street
   City State
   B Remote Control Will Be By:
   ☐ Wire ☐ Radio (Submit information required by Section 97.43(b)(6) of the Commission's Rules)

11. ANTENNA
   Will the antenna structure exceed an overall height of 170 feet above ground level or one foot above the established airport (landing area) elevation for each 200 feet of distance, or fraction thereof, from the nearest boundary of such landing area? (If "Yes", complete and attach herewith FCC Form 714 (obtainable at any Commission Office.) Yes ☐ No ☐

12. STATION CONTROL
   Will the premises of station location (and of any remote control point) be under your control at all times during license term? (If "No", submit explanatory statement unless Item 14(C) is applicable.) Yes ☐ No ☐

13. FOR CLUB STATION APPLICANTS (A NEW CLUB STATION LICENSE MUST BE OBTAINED IF THERE IS A CHANGE OF TRUSTEE)
   A Official name of club
   B Club Status (Attach a certified copy of the constitution or the organization papers and bylaws)
   ☐ Corporation ☐ Unincorporated Association
   C Is any officer or director of the club an alien, or are more than one-fifth of the members of the club aliens? Yes ☐ No ☐
   D Signature and title of club officer certifying applicant as trustee to apply for and hold station license in behalf of Club:
   Signature
   Club Office Held

14. FOR MILITARY RECREATION STATION APPLICANTS
   A Exact identification of military unit or group to operate amateur station
   B Does the applicant accept responsibility for insuring that the station will be operated only by a licensed amateur operator? Yes ☐ No ☐
   C The station will not be used by the U.S. Government. Approval to establish an Amateur Station on U.S. Government premises is hereby granted.
   Signature of official in charge | Title or authority to approve

CERTIFICATION

I CERTIFY that all statements herein and attachments herewith are true, complete and correct to the best of my knowledge and belief and are made in good faith; that I am a citizen of the United States; that I am not the representative of any alien or of any foreign government; that I waive any claim to the use of any particular frequency or of the ether as against the regulatory power of the United States because of the previous use of the same whether by license or otherwise; that the station to be licensed, if any, will be inaccessible to unauthorized persons; that if trustee of a club station, I will immediately submit the license for cancellation upon termination of my trusteeship.

APPLICANT'S WRITTEN SIGNATURE Date

WILLFUL FALSE STATEMENTS MADE ON THIS FORM ARE PUNISHABLE BY FINE AND IMPRISONMENT. U.S. CODE, TITLE 18, SECTION 1001.

FOR COMMISSION USE ONLY

FCC EXAMINER'S REPORT

Failed Written Examination Passed
(Speed) Code Test (Speed)
Date FCC Examiner District No.

	CODE	EXAM	SCREEN	SIGN
Y				
N				

Current FCC Form 610 to apply for Amateur Radio Station and/or Operator License

Where Amateur Radio Examinations Are Held

General, Advanced, and Extra Class amateur examinations are held at the Federal Communications Commission's district offices listed below at the times shown. The number in parentheses after the zip code is the district number. Listed at the bottom of the page are other cities where similar examinations are offered quarterly (Q), semiannually (S), and annually (A). The number of the FCC district in which the city is located follows in parentheses. Write to the Engineer in charge, Federal Communications Commission, of the appropriate district for precise information on the time, date, and exact location of the next scheduled examination. You may take the examination at any of the listed locations, but you must make prior arrangements with the district office. No prior arrangements are necessary for examinations at the district offices themselves unless otherwise stated. No examinations are given on legal holidays, and when a legal holiday falls on a Saturday, all Federal offices are closed the day before.

Alabama, Mobile 36602 (8M) 439 U.S. Court House, 113 St. Joseph St. Wednesdays by appointment.

Alaska, Anchorage 99501 (23) 4th Ave., 54 Post Office Bldg. between F & G Sts. By appointment.

California, Los Angeles 90012 (11) U.S. Court House, 312 N. Spring St. Wednesdays, 9 a.m. and 1 p.m.

California, San Diego 92101 (11SD) Fox Theater Bldg., 1245 7th Ave. Wednesdays, by appointment.

California, San Francisco 94111 (12) 323A Custom House, 555 Battery St. Fridays, 8:30 a.m.

Colorado, Denver 80202 (15) 504 New Custom House, 19th between California & Stout Sts. First and second Thursdays of month, 8 a.m.

District of Columbia, Washington 20554 (24) Room 216, 1919 M St., N.W. Fridays, code test 9.00 a.m. and 1 p.m.

Florida, Miami 31330 (7) 919 Federal Bldg., 52 S. W. First Ave. Thursdays, 9 a.m.

Florida, Tampa 33602 (7T) 738 Federal Office Bldg., 500 Zack St. By appointment.

Georgia, Atlanta 30303 (6) 2010 Atlanta Merchandise Mart, 240 Peachtree St., N.E. Tuesdays & Fridays, 8:30 a.m.

Georgia, Savannah 31402 (6S) 238 Post Office Bldg., York & Bull Sts. By appointment. Second & fourth Tuesdays of month.

Hawaii, Honolulu 96808 (21) 502 Federal Bldg., Tuesdays, Wednesdays, 8 a.m. and by appointment.

Illinois, Chicago 60604 (18) 1872 U.S. Courthouse, 219 S. Dearborn St. Fridays, 9 a.m.

Louisiana, New Orleans 70130 (8) 829 Federal Bldg., South, 600 South St. Mondays, 8:30 a.m.

Maryland, Baltimore 21202 (4) 415 U.S. Customhouse, Gay & Lombard Sts. Mondays & Fridays, 9 a.m.

Massachusetts, Boston 02109 (1) 1600 Custom House, India & State Sts. Wednesdays, Thursdays, Fridays, 8:30 to 10 a.m.

Michigan, Detroit 46226 (19) 1029 Federal Bldg., Washington Blvd. & La Fayette St. Wednesdays & Fridays, 9 a.m.

Minnesota, St. Paul 55102 (16) 208 Federal Courts Bldg., 6th & Market Sts. Fridays, 8:45 a.m.

Missouri, Kansas City 64106 (17) 1703 Federal Bldg., 601 E. 12th St. Fridays, 8:30 to 11 a.m.

New York, Buffalo 14203 (20) 328 Federal Bldg., Ellicott & Swan Sts. First & third Fridays of month. 9 a.m.

New York, New York 10014 (2) 748 Federal Bldg., 641 Washington St. Tuesday through Friday, 9 a.m. to noon.

Oregon, Portland 97205 (13) Multnomah Bldg., 319 S.W. Pine St. Fridays, 8:45 a.m.

Pennsylvania, Gettysburg 17325, P.O. Box 441. First & third Tuesdays of month. By appointment.

Pennsylvania, Philadelphia 19106 (3) 1005 New Customhouse, Second & Chestnut Sts. Monday through Wednesday, 9 to 10 a.m.

Puerto Rico, San Juan 00903 (22) 322 U.S. Post Office Bldg. Fridays, 9 a.m.

Texas, Beaumont 57101 (9B) 239 Federal Bldg, 300 Willow St. Tuesdays by appointment.

Texas, Dallas 75202 (10) 707 Thomas Bldg., 1314 Wood St. Tuesdays, 8 a.m. to 1 p.m.

Texas, Houston 77002 (9) 5636 Federal Bldg., 515 Rusk Ave. Tuesdays, 8 to 9 a.m.

Virginia, Norfolk 23510 (5) 405 Federal Bldg., Grandby & York Sts. Fridays, 9 to 10 a.m.

Washington, Seattle 98104 (14) 806 Federal Office Bldg., 909 First Ave. Fridays, 8:45 a.m.

OTHER EXAMINATION POINTS

Albuquerque, N. M. (A) (15)
Bakersfield, Calif. (A) (11)
Bangor, Maine (A) (1)
Billings, Mont. (A) (14)
Birmingham, Ala. (Q) (6)
Boise, Idaho (S) (13)
Butte, Mont. (A) (14)
Charleston, W. Va. (Q) (19)
Cincinnati, Ohio (Q) (19)
Cleveland, Ohio (Q) (19)
Columbus, Ohio (Q) (19)
Corpus Christi, Texas (Q) (9)
Davenport, Iowa (Q) (18)
Des Moines, Iowa (Q) (17)
El Paso, Texas (S) (10)
Fairbanks, Alaska (S) (23)
Fort Wayne, Ind. (Q) (18)
Fresno, Calif. (Q) (12)
Grand Rapids, Mich. (Q) (19)
Great Falls, Mont (A) (14)
Hartford, Conn. (S) (1)
Hilo, Hawaii (A) (21)
Indianapolis, Ind. (Q) (18)
Jackson, Miss. (S) (8)
Jacksonville, Fla. (S) (7)
Jamestown, N. D. (A) (16)
Klamath Falls, Ore. (A) (13)
Knoxville, Tenn. (Q) (6)
Las Vegas, Nev. (S) (11)
Lihue, Kuai, Hawaii (A) (21)
Little Rock, Ark. (Q) (8)
Louisville, Ky. (Q) (18)
Lubbock, Tex. (S) (10)
Marquette, Mich. (A) (16)
Memphis, Tenn. (Q) (6)
Milwaukee, Wis. (Q) (18)
Nashville, Tenn. (Q) (6)
Oklahoma City, Okla. (Q) (10)
Omaha, Neb. (Q) (17)
Phoenix, Arizona (Q) (11)
Pittsburgh, Pa. (Q) (20)
Portland, Maine (S) (1)
Rapid City, S. D. (A) (15)
St. Louis, Mo. (Q) (17)
Salem, Va. (S) (5)
Salt Lake City, Utah (Q) (15)
San Antonio, Texas (Q) (9)
Schenectady, N. Y. (Q) (2)
Sioux Falls, S. D. (Q) (16)
Spokane, Wash. (S) (14)
Syracuse, N. Y. (Q) (20)
Tucson, Ariz. (S) (11)
Tulsa, Okla. (Q) (10)
Wailuki, Maui, Hawaii (A) (21)
Wichita, Kan. (S) (17)
Williamsport, Pa. (Q) (20)
Wilmington, N. C. (S) (5)
Winston-Salem, N. C. (Q) (5)

50 multiple-choice questions for the other tests) and the answer sheet.

Read the instructions and, after signing each examination sheet and answer sheet, select an answer to each question from the five possible answers listed and black in the corresponding square on the answer sheet.

When you have finished the examination, the examiner will certify on the back of the answer sheet that you completed the code test and written examination in his presence without help. He will then place the material in a large stamped envelope (furnished by you) which he will mail to the Federal Communications Commission, Gettysburg, Pa. 17325.

If you pass the examination, your license and assigned call-letters will arrive in a few weeks. If you should fail the exam, don't feel too bad; you can study a little more and try again in 30 days.

Hardship Conditions. If you are applying for a Conditional, Advanced, or even Extra class license by mail because you are handicapped and cannot appear at an FCC examination point for the examination, you must include a doctor's certification of the facts of your physical condition with your Form 610 application. If you are applying for a Conditional class license, however, and live more than 175 airline miles from the nearest point where the FCC administers amateur examinations two or more times a year (see the locations on facing page), you do not need the doctor's certificate.

Military personnel who cannot obtain permission from their commanding officers to appear for the General class examination are also eligible for a Conditional class license, if they include a letter from the commanding officer stating that the applicant cannot be released to take the General class examination.

In-Person Examinations. With but one exception, exactly the same procedure is followed when you take the General, Advanced, or Extra class examination before the official FCC examiner in an FCC office as in an examination at your home. When you take the exam at an FCC office, you hand in your completed Form 610 and application fee before taking the code test.

If you apply for a General class license and fail to copy 65 consecutive letters in the code test, but do copy 25 consecutive letters, the FCC examiner will permit you to change your application for a General class license to an application for a Technician license. After passing the 5-wpm sending test, he will permit you to take the Technician/Conditional/General class written examination. If you pass it, you will be issued a Technician class license that you can convert into a General class license by reappearing at the FCC office any time after 30 days and passing the 13-wpm code test.

If you take the examination at a regular FCC office, it is not necessary to make a prior appointment; nevertheless, it is a good idea to write ahead of time for your Form 610 application blank and the suggested date on which you should appear, because published dates are subject to change.

Should you plan to take the examination at any of the other points where the FCC conducts amateur exams quarterly, semi-annually, or annually, it is necessary to write in advance to the Engineer-in-Charge of the FCC District in which the examination is to be held for your Form 610 and exact information as to where and when the exam will be held. Mail the filled-in 610 application form and your application fee back to the Engineer-in-Charge at least two weeks ahead of the scheduled examination date. You will then be told where and when to appear to take the examination.

Call Letters. Unless you have previously held an amateur callsign, you have no choice as to the call letters that you will receive. Even if you were previously licensed, there are only a few very special circumstances under which you might get a special callsign. If you once held a "two-letter call," you can apply for it or a similar unassigned two-letter callsign. Also, if you hold an Extra class license and have been licensed for 25 years, you will be issued a two-letter call upon application. In either event, the possibility of obtaining a two-letter call is further limited by the small

number of unassigned two-letter calls available.

If you previously held a callsign that has not been assigned for the past five years, you can apply for it. And an amateur radio club may apply for the former callsign of a deceased club member for its club station as a memorial to the member.

The "rub" in these possibilities is that applying for a special callsign requires the payment of a $20.00 fee that will not be refunded even if the request for the special callsign is denied—as many of them are for one reason or the other. However, a bona-fide amateur club or similar group requesting a special unassigned callsign, such as WA9USA, for short-time use at a show or convention will be issued the callsign without the $20 fee.

When an amateur renews his license (up to one year past its expiration date), he will automatically retain his old callsign. If a Novice qualifies for a higher class license before his Novice license expires, he will receive a "counterpart" callsign. For example, the current WN9EGQ (if there is one) would be assigned a callsign like WB9EGQ. Once a Novice license expires, however, that callsign is immediately subject to reassignment.

Finding a Volunteer Examiner. Almost any qualified amateur in your area will be willing to act as your volunteer examiner. If you do not know any amateurs, ask the countermen at radio shops or supply houses (or call the local TV or radio station) either for the name of a local amateur or the address of the amateur radio club in your area. Failing these sources, drop a note to the American Radio Relay League, Inc., 225 Main Street, Newington, Conn. 06111, and ask for the address of the nearest amateur radio club.

Not only will the club be a source of volunteer examiners, but it may offer code and theory classes for prospective amateurs. Over 400 clubs offer formal courses of this type one or more times a year; and members of other clubs offer help on an individual basis.

Many prospective amateurs believe that mastering the code for an amateur license is more difficult than fulfilling the technical requirements. Whether or not this belief is true depends on the applicant and the class of license.

It appears that the average Novice license applicant with no previous electronics experience requires about the same amount of study to pass the written test as it does for him to pass the code test.

However, too many amateurs who pass the Technician class written examination (which is the same as the General class written exam) fail the 13-wpm code test. On the other hand, less is heard about the applicants who pass the 13-wpm code test and fail the written examination, but this does happen.

We are not debating which is the more difficult—the code test or the written examination; the important thing is to be prepared to pass both before you take the test.

If you are fortunate enough to have a tutor or to be a member of a study class, follow the instructor's advice about what books to study for your written examination. There are a number of easily obtained paperback books that make home study of amateur theory quite simple. Some of them are listed below.

The Radio Amateur's License Manual, American Radio Relay League, Inc., 225 Main St., Newington, Conn. 06111, $0.50, postpaid, available from the publisher, or most electronic supply houses. Contains the questions from all the FCC amateur license study guides—with answers. The manual also contains the complete amateur regulations. It is not a textbook but a study guide. When you can understand both the questions and the answers, you are ready for the written examination. Unfortunately, many prospective amateurs try to prepare for the examination by memorizing the questions and answers in the manual without really understanding them. Consequently, the changed wording of the actual text questions and the multiple-choice answers confuse them and they fail the test. Therefore, you need a study text similar to those below to supplement the Manual. (All of the amateur study guides on the market are based on the FCC questions. The answers, however, are "unofficial" and are the responsibility of the writers of the books.)

The Radio Amateur's Handbook, American Radio Relay League, Inc., $4.00, postpaid, available from the same sources as the License Manual. If you could own only one book on amateur radio, the ARRL Handbook would be an excellent choice. It contains all the technical information needed to

(Continued on page 152)

Mastering The Code

AMATEUR RADIO

No Matter What You've Heard—It's Easy

BY HERB S. BRIER, W9EGQ

INTERNATIONAL TREATIES require that all applicants for an amateur radio operator's license must be given a code and theory examination. Many applicants consider learning the code to be a waste of time, as they plan to use radiophone exclusively when they get their ham licenses. Be that as it may, the Federal Communications Commission has stated that it would retain the code in amateur radio operator's examinations even if it were not required by international law. On the other hand, the FCC has made the process as painless as possible by setting the code speed tests for the Novice and Technician licenses at a modest five words per minute.

Code is not an obsolete mode of communication. Watt for watt, a code transmitter costs less and has a greater range than a phone transmitter. In addition, its signal occupies only about 10% of the frequency space required by the narrowest phone signal. And, after mastering the code, many amateurs prefer it to phone.

Although many people make learning the code a fearfully difficult task, it is not really that formidable, since it only takes time and willingness to practice at regular intervals. Undoubtedly, an experienced instructor, either as a personal tutor or in a formal class, is most helpful in learning the code.

Getting Help. There are over 1000 amateur radio clubs in the United States; most of them offer help in code and theory to prospective amateurs. To get help, do a little detective work and find a local amateur. If he cannot help you himself, he can undoubtedly give you the address of the local radio amateur club or the name of another amateur who can help you. Failing local information, you can write to the Communications Department, American Radio Relay League, Inc., 225 Main St., Newington, Conn. 06111, for the address of the nearest ARRL-affiliated amateur radio club. If you locate a code instructor, follow his instructions and you will probably have it made.

Recorded Code Courses. Used with intelligence, a recorded code course is a good substitute for a live teacher. Possibly the biggest disadvantage of such a course is the amazing rapidity with which the student simply memorizes the tapes or records, thus destroying their effectiveness as practice material. This unconscious memorization of recorded code courses is a partial explanation of why some students who think they are well prepared do poorly in the actual test. The answer is not to depend entirely on a code course for practice material.

Without a teacher or a recorded code course, you can memorize the code from a chart by saying "dit" for dot and "dah" for dash or by sending the dits and dahs to yourself on a code-practice set until you can do so without looking at the chart. Unfortunately, simply memorizing the code

and sending it to yourself will never get your receiving speed above a word or two per minute. You need actual copying practice.

Using Your Receiver. If you have a shortwave receiver capable of tuning in amateur code signals, you have an endless source of code practice material in amateurs chatting with each other, handling messages, and chasing DX. At first you will be unable to tell a dit from a dah; then you will start recognizing "CQ," the general call to indicate that the calling station is open for calls from any station. Next, you will probably start recognizing call letters. From then on, it will only be a matter of time until you are copying at a speed of seven or eight words a minute, which will allow you to pass the 5-wpm Novice code test with ease. Then you can get on the air and work stations as you bring your copying speed up to 13 wpm for the General code test.

Code Practice From W1AW. Besides copying random stations for code practice, you can tune into the world's biggest, oldest, strongest, and most reliable code practice station—W1AW, the headquarters station of the American Radio Relay League, Inc., at Newington, Conn.

Twice each evening at 7.30 and 9:30, eastern time (EST in the winter, EDT in the summer), seven days a week—except on national holidays—W1AW sends code practice. Seven transmitters are keyed simultaneously to cover all the amateur bands from 160 through 2 meters. The code is sent by machine to insure perfect transmission; and the legal maximum power for an amateur transmitter is used on the low frequency bands so that the maximum number of people can take advantage of the transmissions.

Whether you are studying for your first license or to increase your code speed for a higher grade license, W1AW has a speed for you—from 5 to 35 wpm. The early transmissions are at speeds of 10, 13, 15, 20, and 25 wpm daily. In the 9:30 sessions, speeds are 5, 7.5, 10, 15, 20, and 25 wpm on Sunday, Tuesday, Thursday, and Saturday; they are 15, 20, 25, 30, and 35 wpm on the remaining nights.

You can identify the W1AW code-practice transmissions by "QST QST QST DE W1AW W1AW W1AW" sent at a speed of 5 wpm for five minutes preceding each practice session.

Code Proficiency Certificates. Once a month W1AW replaces the regular 9:30 p.m. code-practice transmissions with code-proficiency transmissions at speeds of 10, 15, 20, 25, 30, and 35 wpm. The essential difference between the two types of transmissions is that you can mail your copy of a code-proficiency transmission to ARRL

In recognition of the valuable services provided by the National Bureau of Standards station WWV, the ARRL and the International Amateur Radio Union awarded WAS and WAC certificates. Hanging the certificates are Peter Viezbicke, Leo Honea, and David Andrews (left to right). All hams use WWV for calibration.

for checking—sort of a mid-term exam—and you will be issued an attractive certificate attesting to the highest speed you copied.

Learning To Send. If you are studying under the supervision of a code instructor, follow his advice about learning to send. If you are studying by yourself, do not spend too much time fooling around with the key until you acquire some receiving skill. Then a few minutes of practice on the key every day will start you off on the path to a good "fist."

Position the key in line with the shoulder of your keying hand far enough back from the edge of the table to allow your entire forearm to rest on the table. Grasp the key knob lightly between your thumb and first two fingers and allow the remaining fingers to curl naturally toward your palm. Arch your wrist slightly upward and flex your wrist to control the key. Do not hold your wrist stiff, and move only your fingers.

Timing is the important thing in sending. The dah is three times as long as the dit, and the spacing between the dits and dahs in a character is equal to the length of a dit. Spacing between letters in a word is equal to three dits, and the space between words is equal to seven dits. Actually, if you watch your spacing, make your dahs noticeably longer than your dits, and do not try to send faster than you can receive, you will not have too much trouble sending good code.

Special Keyers. Semi-automatic keys ("bugs") and electronic keyers are labor-saving devices. Although they are helpful at high speeds, they are best avoided until your receiving speed is at least 15 wpm. A common mistake of bug users is to set the dot speed too fast for their dashes. An electronic keyer, however, will maintain the proper ratio between dots, dashes, and

W1AW Operating Schedule

(Newington, Conn.)

Time(GMT)	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
0100	—	CW OBS[1]	CW OBS[1]	CW OBS[1]	CW OBS[1]	CW OBS[1]	CW OBS[1]
0120-0200[4]	—	—	3.555[6]	14.1	14.1	7.08[6]	14.1
0200	—	Phone OBS[2]	Phone OBS[2]	Phone OBS[2]	Phone OBS[2]	Phone OBS[2]	Phone OBS[2]
0205-0230[4]	—	145.6	3.945	145.6	50.7	1.82	21.41
0230	Code practice daily: 15-35 wpm, T/Th/Sat; 5-25 wpm, M/W/F/Sun						
0330-0400[4]	—	—	3.555	7.08	1.805	7.08	3.555
0400	RTTY OBS[3]	—	RTTY OBS[3]	RTTY OBS[3]	RTTY OBS[3]	RTTY OBS[3]	RTTY OBS[3]
0410-0430[4]	—	—	3.625	14.095	3.625	14.095	3.625
0430	Phone OBS[2]	—	Phone OBS[2]	Phone OBS[2]	Phone OBS[2]	Phone OBS[2]	Phone OBS[2]
0435-0500[4]	—	—	7.255	3.945	7.255	3.945	7.255
0500	CW OBS[1]	—	CW OBS[1]	CW OBS[1]	CW OBS[1]	CW OBS[1]	CW OBS[1]
0520-0600[4]	—	—	3.555[6]	7.08	3.945	7.08[6]	3.555
1800-1900	—	21/28[5]	21/28[5]	21/28[5]	21/28[5]	21/28[5]	—
2000-2100	—	14.28	7.255	14.28	7.255	14.28	—
2100-2200	—	14.1	14.28	14.095	21/28[5]	7.08	—
2300-2400	—	21/28[5]	21.075[6]	RTTY OBS[3,7]	7.255	14.28	—
0030	Code practice daily: 10, 13, and 15 wpm; also 20-25 wpm at present						

1. CW OBS (bulletins, 18 wpm) and code practice on 1.805, 3.555, 7.08, 14.1, 21.075, 50.7 and 145.6 MHz.
2. Phone OBS (bulletins) on 1.82, 3.945, 7.255, 14.28, 21.41, 50.7 and 145.6 MHz.
3. RTTY OBS (bulletins) on 3.625, 7.045, 14.095 and 21.095 MHz. 170/850-cycle shift optional in RTTY general operation.
4. Starting time approximate. Operating period follows conclusion of bulletin or code practice.
5. Operation will be on one of the following frequencies: 21.075, 21.1, 21.41, 28.08 or 28.7 MHz.
6. W1AW will listen in the Novice segments for Novices on band indicated before looking for other contacts.
7. Bulletin sent with 170-cycle shift, repeated with 850-cycle shift. General operation frequencies are approximate. The station will be closed Nov. 28 and Dec. 25, 1968 and Jan. 1, Feb. 22, and April 4, 1969. Maintenance Staff: W1QIS, W1WPR.

spaces at any speed. With practice, good code can be sent with either a bug or an electronic keyer.

Code Practice Tapes

Codemaster, Pickering Radio Co., P.O. Box 29, Portsmouth, R. I. 02871. Three 2-hour code tapes are available. Tape CM-1 takes the student from zero to 9 wpm. Tape CM-1½, straight practice tape, includes ½ hour at 11 wpm, one hour at 14 wpm, and ½ hour at 17 wpm. Tape CM-2 has 20-, 25-, and 30-wpm code for those striving for Extra class license. Tapes are dual-track, monaural, recorded at 3¾ inches per second (7" reels) or 1⅞ inches per second (3¼"). Specify speed desired. Price: $5.95 each, postpaid; two for $11; all three for $15.

Sound History Recording, Box 16015, Washington, D. C. 20023. Two tapes available. Tape CSL 1 and 2 covers 3 to 25 wpm. Tape CSL 3 and 4 covers 25 to 55 wpm. Tapes are $6.95 each, both for $13.50.

Lafayette Radio Electronics, 111 Jericho Turnpike, Syossett, N.Y. 11791. Two tapes available. Basic code to 8 wpm, priced at $6.50; advanced code to 18 wpm, priced at $5.50.

Code Records

Allied Radio Corp., 100 N. Western Ave., Chicago, Ill. 60680. Ten lessons on a 12" LP (33⅓ rpm) at speeds up to 15 wpm. Price: $4.49.

AMECO Division of Aerotron, Inc., P.O. Box 6527, Raleigh, N. C. 27608. Junior course to 7½ wpm; advanced course, 8½ to 18 wpm. Each course of 12" LP (33⅓ rpm). Priced at $4.95 each; both, $9.50. With instruction manuals.

Burstein-Applebу Co., 3199 Mercier St., Kansas City, Mo. 64111, offers two code records. Number one progresses to 15 wpm in 10 lessons; and number two goes to 25 wpm in 12 lessons. The records are 12" LP (33⅓ rpm) and come with instruction books at $4.80 each.

Elektra Corp., 51 W. 51 St., New York, N. Y. 10019, offers a single, 12" LP (33⅓ rpm) designed to cover the code requirements for both the Novice and General class code examinations. Catalog CC-1. Price: $4.79.

Epsilon Records, 206 E. Front St., Florence, Colo., has a three-record (12" LP) voice and code course designed to qualify the student for the General class (13-wpm) code test. Catalog ER-1001. Price: $9.95.

Folkways, 165 W. 46 St., New York, N. Y. 10036, sells Catalog FX 6141 code course for $5.79. It consists of a single 12" LP (33⅓ rpm) disc. The teaching method used is claimed to duplicate those used by the U.S. Signal Corps and Vocational High School, New York.

Lafayette Radio Electronics, 111 Jericho Turnpike, Syossett, N. Y. 11791, offers a single 12" LP (33⅓ rpm) which proceeds from 1 to 17 wpm in 12 lessons. Price: $3.50.

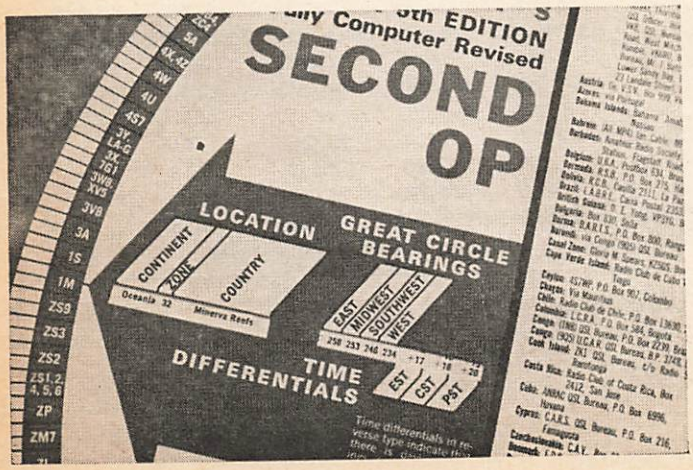
Radio Shack, 730 Commonwealth Ave., Boston, Mass. 02215, offers a single record, 10-lesson code course for $3.95 with instruction book.

Hayden Book Co., Inc., 116 W. 14 St., New York, N. Y. 10014, has a 3-record, 28-lesson code course covering speeds up to 8 wpm. Price: $9.50. For further code study, three additional records, which bring the student's copying speed to 18 wpm in 18 lessons are available. Price: $8.95. The records are 10" LP's. Both sets for $15.95. Detailed instruction books supplied.

Howard W. Sams & Co., 4300 West 62 St., Indianapolis, Ind. 46206, offers the "International Code Training System." It consists of three LP records and a 96-page instruction book. It is claimed that the student is able to copy at a speed of 2-3 wpm within a few minutes. Price: $6.95.

Code Machines

The Instructograph Co., 5071 Broadway, Chicago, Ill. 60640, or 4700 Crenshaw Blvd., Los Angeles, Calif. 90043, rents a complete code machine and ten code-practice tapes for $6 a month. Machines may be purchased outright if desired. ($15 deposit required on rented machines.)



Close-up peek at one of the windows in the brand-new 5th edition of W9IOP's Second Op. This circular slide rule is a handy information source on country prefix, continent, DX zone, beam heading, time difference, QSL bureau, postage rates, etc. It costs $1.50 and is available from Publications in Electronics, 610 Tower Bldg., 216 West Washington Ave., South Bend, Indiana 46601, and some stores.

Firing Up Your First Station

AMATEUR RADIO

What to Listen For and What to Say

BY PAUL MULLER, WA9AKM and RONALD TAUBER, W9QUW

GETTING ON THE AIR with your brand-new amateur radio station, you will react like all hams have for the past 60 years when you experience that indescribable thrill of making your first contact. Your heart will pound and chills of excitement will chase up and down your spine. On CW, your hands will shake so much that you will hardly be able to control the key; while on phone, your mouth will be dry and your voice will quiver and quake. But you will have a smile of joy and disbelief on your face. "Listen, ma! He's answering me!"

Naturally, the better your equipment, the easier it will be to make contacts, especially with the rarer stations during the more crowded operating hours. But even the most modest amateur receiver and transmitter is capable of making many contacts.

You will probably obtain most of your operating skill by imitating other amateurs;

Selected Q Signals

THE FOLLOWING INTERNATIONALLY RECOGNIZED Q SIGNALS ARE COMMONLY USED IN AMATEUR RADIO. TO ASK THE INDICATED QUESTION, FOLLOW THE Q SIGNAL WITH A QUESTION MARK.

QRG	*What is my exact frequency in kilohertz? Your exact frequency is_____ kHz.*
QRK	*What is the readability of my signals? The readability of your signals is_____ (1 to 5).*
QRL	*Are you busy? I am busy (with_____).*
QRM	*Are you troubled with interference? I am troubled by interference.*
QRN	*Are you troubled by static? I am troubled by static.*
QRQ	*Shall I send faster? Send faster (_____ wpm).*
QRS	*Shall I send more slowly? Send more slowly (_____wpm).*
QRT	*Shall I stop transmission? Stop transmission.*
QRU	*Have you anything for me? I have nothing for you.*
QRV	*Are you ready? I am ready.*
QRX	*When will you call again? I will call again at_____on_____kHz.*
QRZ	*Who is calling me? You are being called by_____.*
QSA	*What is the strength of my signals? The strength of your signal is_____(1 to 5).*
QSB	*Does the strength of my signals vary? The strength of your signals varies.*
QSD	*Is my keying correct? Are my signals distinct? Your keying is incorrect; your signals are indistinct.*
QSL	*Can you acknowledge receipt? I am acknowledging receipt.*
QSO	*Can you communicate with_____direct (or through_____)? I can communicate with_____direct or through_____).*
QSP	*Will you relay to_____? I will relay to_____.*
QSV	*Shall I send a series of VVV? Send a series of VVV.*
QSY	*Shall I change to_____ kilohertz without changing the type of wave? Change to_____ kilohertz without changing the type of wave.*
QTC	*How many messages do you have to send? I have_____ messages to send.*
QTH	*What is your location (position)? My location (position) is_____.*
QTR	*What is the exact time? The exact time is_____.*

UNOFFICIAL Q SIGNALS ADOPTED BY ARRL

QRRR	*Official ARRL "land SOS." A distress call for emergency use only.*
QST	*General call addressed to all radio amateurs.*

Selected Abbreviations

THE FOLLOWING LIST OF ABBREVIATIONS USED BY CW (CODE) OPERATORS IS NOT COMPLETE, BUT IT DOES INCLUDE THE MOST COMMON.

AA—*all after*
AB—*all before*
ABT—*about*
AGN—*again*
AM—*amplitude modulation*
ANT—*antenna*
BK—*back, break*
BN—*between*
BUG—*semi-automatic key*
C—*yes*
CHOP—*chief operator*
CQ—*general call*
CUD—*could*
CUL—*see you later*
CW—*radio code*
DX—*distance*
ES—*and (&)*
FB—*fine business*
GA—*go ahead, good afternoon*
HI—*laughter*
KC—*kilocycle*
LID—*poor (inconsiderate) operator*
MNI—*many*
N—*no*
NIL—*nothing*
NR—*number*
OM—*old man*
OP—*operator*
PWR—*power*
R—*received, are*
RCVR—*receiver*
RIG—*transmitter*
RPT—*repeat, report*
SRI—*sorry*
SSB—*single sideband*
TKS, TNX—*thanks*
TU—*thank you*
U—*you*
UR—*your*
VY—*very*
WUD—*would*
WX—*weather*
XMTR—*transmitter*
XYL—*married woman*
YF—*wife*
YL—*young lady*
73—*best regards*
88—*love and kisses*

but let's give a quick once-over of some of the things you will hear.

Interpreting What You Hear. It is often said that radio amateurs speak a language that no one else can understand. This is partly true. On CW (code), every word has to be spelled out, letter by letter, in dots and dashes. As a result, CW operators use many abbreviations. These abbreviations are a mixture of phonetically spelled words, words with their vowels omitted, words with the letter X replacing part of the word, the first letters of commonly-associated words, and combinations of abbreviations. The table on this page lists many of the most frequently used abbreviations. They are easy to learn and decipher because only the most commonly used words are abbreviated, and new abbreviations are quickly figured out by the context of the message. For example, if a station you call responds "GE OM, TU FER CL," it obviously means "Good evening old man. Thank you for the call."

Another group of time savers are Q-signals. By international agreement, a single three-letter Q-signal expresses an entire thought. "QRM," for example, means "I am being interfered with." Or followed by a question mark, it means "Are you being troubled by interference?" Another table in this article lists the Q-signals commonly used by amateurs.

Phone Operation. CW abbreviations or Q-signals are not needed as time savers in phone operation. Many amateurs feel, however, that a few of them sprinkled into their phone conversations add a little spice. Also, the Federal Communications Commission recommends using a recognized phonetic alphabet to help communicate difficult words and callsigns. There are a number of phonetic alphabets, but we like the International Phonetic Alphabet reproduced on these pages.

Signal Reports. To many amateurs, the signal report is the most important part of a contact. The standard amateur method of giving a report is with the RST system defined below. Many amateurs and receiver

R-S-T Signal Reports

The standard amateur method of giving signal reports is through the use of the "RST" system in accordance with the following tables:

READABILITY **(R)**

1 *Unreadable*
2 *Barely readable, occasional words distinguishable*
3 *Readable with considerable difficulty*
4 *Readable with practically no difficulty*
5 *Perfectly readable*

STRENGTH **(S)**

1 *Faint; signal barely perceptible*
2 *Very weak signal*
3 *Weak signal*
4 *Fair signal*
5 *Fairly good signal*
6 *Good signal*
7 *Moderately strong signal*
8 *Strong signal*
9 *Extremely strong signal*

TONE **(T)**

1 *Extremely rough, hissing signal*
2 *Very rough a.c. signal*
3 *Rough, low-pitched a.c. signal*
4 *Rather rough a.c. signal*
5 *Musically modulated signal*
6 *Modulated signal, slight whistle*
7 *Near d.c. signal, smooth ripple*
8 *Good d.c. signal, trace of ripple*
9 *Purest d.c. signal*

If the signal has the steadiness of crystal control, add "X" after the RST report; add "C" for a chirp; and "K" for a keying click.

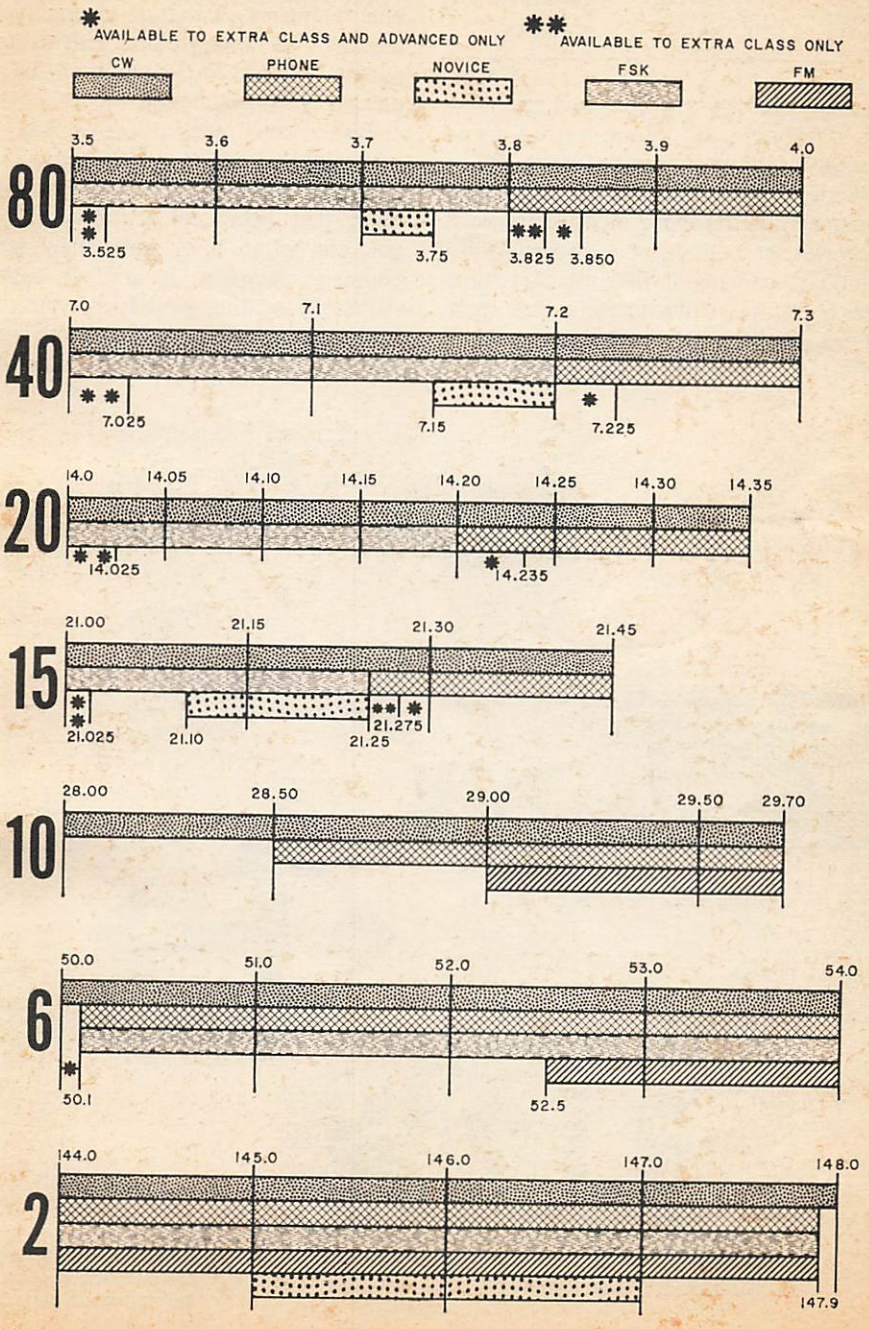
A typical report might be: "RST579X," meaning "Your signals are perfectly readable, moderately strong, have a perfectly clear tone, and have the stability of a crystal-controlled transmitter."

In phone operation, use the word "Readability" and "Strength," and the first two sets of numbers.

S-meters tend to exaggerate signal-strength reports; nevertheless, they are of value for comparative purposes.

From the legal point of view, the tone report is the most important part of a CW signal report, because regulations specify that all amateur signals on frequencies below 144 MHz must be as stable and pure as the state of the art permits. On CW, such a signal produces a clear, pierc-

Ham Band Allocations November 1968



International Phonetic Alphabet

A—ALPHA	M—MIKE	Y—YANKEE
B—BRAVO	N—NOVEMBER	Z—ZULU
C—CHARLIE	O—OSCAR	0—ZE-RO
D—DELTA	P—PAPA	1—WUN
E—ECHO	Q—QUEBEC	2—TOO
F—FOXTROT	R—ROMEO	3—TH-UH-REE
G—GOLF	S—SIERRA	4—FOWER
H—HOTEL	T—TANGO	5—FI-IV
I—INDIA	U—UNIFORM	6—SIX
J—JULIET	V—VICTOR	7—SEV-EN
K—KILO	W—WHISKEY	8—AIT
L—LIMA	X—X-RAY	9—NIN-ER

ing tone from the receiver loudspeaker—it has a T9 note. On phone such a signal is free of a.c. hum and unnecessary noise.

The majority of U.S. and Canadian amateur signals are T9 these days. Occasionally, however, something may go wrong in a transmitter, causing it to emit a raucous, unsteady signal. Unfortunately, too many amateurs continue to give such signals T9 reports instead of the T2 to T7 they merit. Consequently, the operator may be unaware of his trouble until he receives an official FCC "discrepancy report."

Working New States and DX. When you first get on the air, every contact you make will be a new experience. Later, you'll undoubtedly want to work new states and foreign countries as well as to qualify for one or more of the various certificates and awards offered in recognition of certain operating achievements.

By far the most effective way to find new states and countries to work is by listening, listening, and more listening. But don't just listen for stations calling CQ; you can often spot some new states or countries already in contact with other hams. By waiting your turn, you stand an excellent chance of working some new ones. But don't be surprised to discover that

QSL cards confirm on-the-air contacts and are necessary if the recipient applies for one of the numerous ham DX awards.

dozens of other hams have the same idea when an exotic DX station is involved.

Exchanging QSL Cards. You will undoubtedly want a confirmation of your first contact.

Being a new ham, you'll have to tell the other operator where to mail his QSL card (it takes at least one issue for a new station to appear in the Radio Amateur Callbook). Of course, if HIS call is in the Callbook, you can mail your QSL card first, permitting the other operator to get your address from your card. Actually, sending your card first will net you more cards than if you wait for the other fellow to send his QSL first.

A QSL card needn't be elaborate. But it should be neat and include the following information: date and time of the contact; call letters of the station worked; signal report; frequency (band); and mode—CW, AM phone, SSB, etc.

Of course, your QSL card should also include your call letters, transmitter location, and your name and complete mailing address.

If you work an occasional foreign DX station, usually the quickest way to receive his QSL card is to mail your card to his "Callbook" address in an envelope. Enclose an addressed return envelope and an International Postal Reply Coupon; otherwise your return card will undoubtedly be routed via your call area ARRL QSL bureau listed on this page. Lacking an address, you can send QSL cards to foreign amateurs via their national QSL bureaus. These addresses are in the Callbook.

Some DX stations have "QSL managers." If a station you work instructs, "QSL via ——," follow instructions, and don't neglect the return envelope and postage with your card. QSL managers usually give rapid service. Nevertheless, DX QSL cards may take up to a year (or more) to arrive.

Third-Party Messages

International regulations forbid radio communications in behalf of "third parties" via amateur radio unless special arrangements have been made by the individual governments. The United States has negotiated agreements with the countries listed below to permit "unimportant" third-party messages to be exchanged. Most of the agreements also permit "emergency" messages to be exchanged—if the emergency messages are transferred from amateur to commercial channels as soon as possible.

ARGENTINA
BOLIVIA
BRAZIL
CANADA
CHILE
COLOMBIA
COSTA RICA
DOMINICAN REPUBLIC
ECUADOR
EL SALVADOR
HAITI
HONDURAS
ISRAEL
LIBERIA
MEXICO
NICARAGUA
PANAMA
PARAGUAY
PERU
URUGUAY
VENEZUELA

North American QSL Bureaus

Most incoming DX cards for U.S. and Canadian amateurs arrive via the QSL Bureaus sponsored by the ARRL. To receive your cards, you must keep a supply of stamped envelopes on file with your call area QSL manager, whose address is below. Put your name and address in the normal place on the envelopes and your call letters clearly printed in the upper left hand corner. Most bureaus prefer 4¼" X 9½" envelopes, but those marked with an asterisk prefer 5" X 8" manila envelopes.

W1, K1, WA1, WN1—*Hampden County Radio Association,* Box 216, Forest Park Station, Springfield, Massachusetts 01108*

W2, K2, WA2, WB2, WN2—*North Jersey DX Association, P.O. Box 505, Ridgewood, N.J. 07451*

W3, K3, WA3, WN3—*Jesse Bieberman, W3KT, RD 1, Valley Hill Road, Malvern, Pa. 19355*

W4, K4—*H. L. Parrish, K4HXF, RFD 5, Box 804, Hickory, N.C. 28601*

WA4, WB4, WN4—*J. R. Baker,* W4LAR, 1402 Orange St., Melbourne Beach, Fla. 32951*

W5, K5, WA5, WN5—*Hurley O. Saxon, K5QVH, P.O. Box 9915, El Paso, Texas 79989*

W6, K6, WA6, WB6, WN6—*San Diego DX Club, Box 6029, San Diego, Calif. 92106*

W7, K7, WA7, WN7—*Willamette Valley DX Club, Inc., P.O. Box 555, Portland, Oregon 97207*

W8, K8, WA8, WB8, WN8—*Paul R. Hubbard, WA8CXY, 921 Market St., Zanesville, Ohio 43701*

W9, K9, WA9, WN9—*Ray P. Birren, W9MSG, Box 519, Elmhurst, Ill. 60216*

WØ, KØ, WAØ, WNØ—*Alva Smith, WØDMA, 238 East Main St., Caledonea, Minn. 55921*

VE1—*L. J. Fader, VE1FQ, P.O. Box 663, Halifax, Nova Scotia, Canada*

VE2—*John Ravenscroft, VE2NV, 35 Thorncrest Ave., Dorval, Que. Canada*

VE3—*R. H. Buckley, VE3UW, 20 Almont Rd., Downview, Ont. Canada*

VE4—*D. E. McVittie, VE4OX, 647 Academy Rd., Winnipeg 9, Manitoba, Canada.*

VE5—*Fred Ward, VE5OP, 899 Connaught Ave., Moose Jaw, Saskatchewan, Canada*

VE6—*Karel Tettelaar, VE6AAV, Sub P.O. 55, N. Edmonton, Alberta, Canada*

VE7—*H. R. Hough, VE7HR, 1291 Simon Rd., Victoria, British Columbia, Canada*

VE8—*George T. Kondo, VE8, ARRL QSL Bureau of Department of Transport, Norman Wells, Northwest Territories, Canada*

VO1—*Ernest Ash, VO1AA, P.O. Box 6, St. John's, Newfoundland*

VO2—*Goose Bay Amateur Radio Club, P.O. Box 232, Goose Bay, Labrador*

KH6, WH6—*John H. Oka, KH6DQ, P.O. Box 101, Aiea, Oahu, 96701*

KL7, WL7—*Alaska QSL Bureau, Star Route C, Wasilla, Alaska 99687*

Nets: Traffic And Fellowship

AMATEUR RADIO

You'll find out that this is where the action is

BY RAY E. MEYERS, W6MLZ

BY DEFINITION, an amateur radio net is a group of hams who meet regularly on a specified frequency. Anyone listening to the 75-80-meter band has heard many amateur nets in operation. There is one in action on phone, code, or radioteletype every few kHz across the band during the early evening hours.

Some nets are involved in message handling; some are designed to help their members to work new states, counties, or countries. There are Radio Amateur Civil Emergency Service (RACES) nets, weather nets, Red Cross nets, and even "fishing" nets. There are teen-age nets, YL nets, old-timers' nets, retired telegraphers' nets, mobile nets, bible-study nets, medical nets, missionary nets, and UFO (Unidentified Flying Object) nets. It would be difficult, in fact, to name a subject that can be discussed in public that doesn't have a net devoted to it.

Actually, although many nets have impressive names and lofty aims, many are purely social organizations or radio clubs of the air. And who is to say that a simple "ragchew" net devoted to friendly discussions is not performing a useful function in a hectic world?

While casual listening indicates that most amateur nets are located in the 3.5- to 4-MHz band, there are possibly even more of them on the 50- and 144-MHz bands that are not heard beyond their local areas. There are other nets in the 1.8-, 7-, 14-, and 28-MHz amateur bands.

Emergency and Traffic Nets. Amateur radio's record of supplying emergency communications when disasters destroy or overload normal communications channels is intimately connected with the emergency and traffic nets. (Practically speaking, there is no difference between an "emergency" and a "traffic" net, except that traffic nets usually meet more frequently than emergency nets.) Under normal conditions, the messages handled on amateur nets are not of great importance. But the skill developed in handling these messages pays off when disaster strikes, and vital messages are pushed through in spite of the worst possible communicating conditions.

Each state has its own phone and CW traffic nets; they are interconnected with other traffic nets in the country via the National Traffic System sponsored by the American Radio Relay League, Inc. You can obtain a free copy of the ARRL net directory by writing to the Communications Department, American Radio Relay League, Inc., 225 Main St., Newington, Conn. 06111. The directory contains information on hundreds of nets, cross-referenced by net name, state, and frequency.

MARS. The military branches of the United States sponsor the Military Affiliate Radio System (MARS) nets on military frequencies adjacent to the amateur bands. These nets are used to teach interested operators something about military radio

communications and to establish a back-up communications system. Any licensed U.S. amateur—male or female—who has reached his 16th birthday (except Novices with less than three months to go on their licenses) is eligible. MARS membership involves no military obligation, by the way; and it is estimated that there are approximately 20,000 amateurs in the three MARS programs.

For information on joining a MARS program, write to one of the following: Chief MARS, Air Force, AFOCOM, Room H-243, T-E Building, 4th & Adams Dr., S.W., Washington, D.C. 20333; Chief MARS, Army, 5A522, Pentagon, Washington, D.C. 20330; Chief MARS, Navy, OP-945N, Pentagon, Washington, D.C. 20350.

Post Office Net. The "Post Office Net" (PON) is designed to train its members in radio communications for use in emergencies and to serve the Post Office Department as an auxiliary communications system. Licensed amateurs who are employees, active or retired, of the Postal Service are eligible to be full members of the PON. Other amateurs are eligible to be Associate Members.

One activity of the PON is to send congratulatory messages to postmasters and other postal employees when they are promoted, retired, etc. An interesting monthly bulletin covering PON activities is mailed to each member. Write to John Lloyd, Communications Officer, Post Office Department, Bureau of Research and Engineering, Room 6215, Washington, D.C. 20260 for further information on the PON.

The Eye Bank Net. Possibly the most dramatic of all amateur public service nets is the "Eye Bank Net," which made its debut on December 20, 1962, with seven members; and it has met every day since. The net was the inspiration of Dr. Alson Braley, WØGET, internationally famous ophthalmologist and Professor of Ophthalmology at the University of Iowa, and Ted Hunter, WØNTI, RFD 1, Knob Hill, Iowa City, Iowa. Ted is still net manager.

When cornea transplants are made to save or restore sight, the cornea must be removed from the donor's eye within four hours of death and transplanted in the patient's eye within 48 hours. Normally, the surgery can be scheduled to be performed when the cornea becomes available. But in emergencies, the time cushion disappears and the Eye Bank does its vital work.

Twice each day, at 0100 and 1300 GMT, the net meets on 3970 kHz with "Chub" Walker, W9DOG, as Net Control Station (NCS). Fifteen minutes earlier, the 40-meter Eye Bank Net meets on 7294 kHz to bring information about western U.S. needs to the net. The net serves 55 eye banks in 35 states to insure that available eye tissue is immediately shipped to the right hospital in time to save a person's sight.

Ray Meyers, W6MLZ, sitting in at the controls of 4U1ITU, the amateur radio station of the International Amateur Radio Club, Geneva, Switzerland. The QSL's are from stations worked.

Since its inception, the net has arranged the delivery of 2,552 corneas—always under emergency conditions.

Other Nets. Space does not permit discussing all nets, but we must mention a few more. One is the "West Coast Amateur Radio Service Net," which monitors 7255 kHz all day every day. The net has a working agreement with the California Highway Patrol, and through the many mobile stations who are members of the net, it frequently gets help for victims of automobile accidents in minutes.

A very interesting net is the "International Amateur Traffic Net" that meets on 14,330 kHz daily at 1200 GMT. Stations from all over South and Central America and the United States report into this net. If you eavesdrop, the net seems to be organized confusion with everybody talking at once. But more careful listening will reveal that the NCS has the situation well under control and quickly dispatches the proper stations off the net frequency in pairs to run phone patches, handle messages, or just talk to each other.

The "International Handicappers Net" has a worldwide membership of physically handicapped amateurs. The net meets daily at 1600 GMT on 14,287 kHz to discuss particular problems and to help others. Handicapped amateurs are frequently the first to alert the proper authorities and other amateurs to a communications emergency.

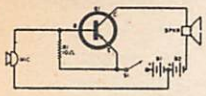
As part of his harassing tactics against the United States, Fidel Castro of Cuba has cut all telephone lines to the U.S. base at Guantanamo, Cuba. But there are a couple of amateur stations on "Gitmo," financed through the base's recreation fund. Each morning at about 1430 GMT near 14,310 kHz, the "Gitmo Phone Patch Net" goes into action.

The "Maritime Mobile Net" on 14,317 kHz and the "Marine World Wide Traffic Net" on 21,440 kHz specialize in handling messages and phone patches for the personnel of the U.S. Fleet. They are busy when a ship or fleet, long at sea, approaches home port. Every man aboard, including the captain is a candidate for a phone patch to tell his wife, mother, or girl friend (not necessarily in that order) that he will soon hit port.

More nets of interest are: "Sunrise Bible Study Net," 3907 kHz, Tues., Thurs., Sat. at 1200 GMT (Northeast U.S. and Canada); "Interstate SSB Net," 3985 kHz daily at 0100 GMT; "Transcontinental Phone Net," 14,275 kHz, Mon. through Sat., 1400 GMT; "North American SSB Net," 14,285 kHz, Mon. through Sat., 1430 GMT; "YL International SSB Communications System," 14,331 kHz, daily, at 1700 GMT; "Mobile County Hunters Net," 14,335 kHz, daily, 1700 GMT; "CHC Service Net," 14,442 kHz, daily, 1700 GMT. The last three are "QSO" nets, where members exchange signal reports with different stations to earn certificates. They are amazingly popular.

If you can't find a net to your taste by listening around, you can always start one of your own; they are easy to start. The trick is to keep them going week after week. Good luck!

Now, subscribe to the most popular electronics publication in the field at exactly HALF-PRICE!



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1969 Edition

Husbands Keep Hamming A Secret

AMATEUR RADIO

Or, it's surprising what they don't tell wives

BY CAROLE H. ALLEN, W5NQQ

WHAT IS THE one hobby that men and women of all ages, backgrounds, and budgets can enjoy the year round? Building model airplanes? Bird watching? Badminton? Bridge? Ask any ham that question, and you will be told that amateur radio wins all the marbles.

As a licensed radio amateur, the writer knows what a wonderful hobby this is. But why are there so few lady amateurs or hams compared to the vast number of male amateurs? The ratio is an astounding 30 to 1! My own answer is that men just don't tell women the rewards of amateur radio and how easy it is to get a license.

Granted, there are a few male amateurs who do not want their womenfolk to get involved in hamming. They evidently find solace in retreating to their ham shacks in the evenings and on weekends to lose themselves in a hobby which they keep a deep mystery from their families. My husband, Bill (W5NQR), theorizes that some of them wouldn't mind if their wives joined the inner circle, but are afraid that they might ask too many embarrassing technical questions. Rather than face this possibility, the OM is likely to tell his XYL that amateur radio is really much too complicated for her and she would really enjoy Swedish Weaving more. By the way, any licensed male amateur is called OM (old man). Unmarried women amateurs are YL's (young ladies), and married ones—no matter what their age—XYL's (ex-young ladies).

However, most married OM's really would like their wives to become hams and enjoy this fascinating hobby. And there are advantages to the arrangement. It isn't nearly as hard to convince an XYL of the need for new radio gear when she understands what it is and can use it herself. And summer hamfests are a lot more fun when the whole family enjoys the "swap tables" and other activities instead of pouting about how soon they can go home.

But alas! Many of these men make one fatal mistake. They leave License Manuals lying around the house and the wives see the simple Novice exam questions. Many women are not really sure what makes a light bulb glow, and the mere thought of "comparing the peak-envelope power input of a CW amplifier to the PEP of an SSB amplifier when using the maximum legal d.c. power" is absolutely overwhelming.

Wives who may have been secretly planning to become hams decide not to risk being able to understand complicated electronics theory and leave the hobby to their husbands. They use the excuse that their nerves wouldn't stand the strain of learning the code. Well, any woman who can cook a meal or iron a shirt while the baby is crying, the dog barking, the television set roaring and her husband talking, can learn the code standing on her head. And as far as the theory is concerned, you don't have to learn enough for a degree in electrical engineering to get an amateur radio license. You do need to know why a transmitter transmits and a receiver receives, but re-

member that the Astrodome wasn't built in a day, and getting an amateur license is definitely a goal within your reach.

Evelyn White, WA5MPW, of Beaumont, Texas, says, "My honest opinion about women who say the theory is too hard is that they are just not willing to put forth the effort to get what they want. I think it is a matter of whether or not she really wants the license." Since she is a busy career girl, it is not easy for Evelyn to find time for her hobby, but she enjoys code, kit building, and just meeting people.

Planting the Bug. Any OM who wants his wife to become a ham should first remove the Novice questions from the License Manual and give them to her. Hide the rest of the manual. Looking ahead to the questions in the Extra class section of the manual will only be discouraging.

Next, coax her into the ham shack to listen to one of your QSO's (contacts) and instead of carrying on a windy technical discourse about the final tubes in your rig, work someone in a distant state or another country and talk about the climate, tourist spots, food specialties—things a woman enjoys. Better yet, contact an XYL and get your wife on the microphone at least to give her name. Most women won't need coaxing after the ice is broken. In fact, you may find it hard to get the mike away from her.

Carole, W5NQQ, says there would be more women amateurs if the men told them it was really great fun.

The bands are sprinkled with charming ladies who could inspire anyone to start working for a license. You might tune in Erma Weber, K6KCI, who holds weekly radio coffee chats on the "Ironing Board Net" and "YL Open House Net" to keep up with the activities of dozens of other busy homemakers while sitting in her hamshack in Santa Barbara, California. The girls swap recipes and child care tips and extend their back fences clear across the country.

Another group of interesting ladies is led by K4ICA, V. Mayree Tallman of Miami, Florida. Her "YL International Sidebanders' System" promotes good will among all the countries of the world, and its members form lasting friendships.

Many families use ham radio to bridge the miles that separate them, and dozens of mothers and daughters can be heard talking every day. For instance, Kay Troutman, WA5DZU, Lafayette, Louisiana, chats every week with her mother, Fran, W5KEW, Lewisville, Arkansas, and her brother, Cal, W5HDW, Fairfax, Oklahoma. News about what the kids are doing in school and plans for family activities buzz back and forth.

Many ham wives talk with their husbands who work on cargo ships and are gone for months at a time. Others keep daily schedules with OM's who are traveling salesmen and spend most of every week on the road. With a rig at home and mobile equipment in their cars, these contacts make life on the homefront a lot easier.

Teen-age and bachelor girls find the large numbers of unmarried college students and military men on the ham bands extremely interesting, and sometimes exciting romances and marriages follow a first meeting on the amateur radio frequencies.*

Lorraine Witkowski, WA1EDR, and her husband, Leo, both enjoy rag-chewing or just talking, but they look for other hams who are interested in their second hobby of collecting rocks and minerals. When

*Carole could also tell us about her schedules with her husband before they were married and he was working in South America—Editor.

they run across someone in another part of the country who has the same hobby, they arrange schedules and sometimes swap rocks from their collections by mail.

And, of course, there isn't a ham on the air who doesn't thrill to hearing the accented voice of someone in a foreign country repeating his or her call letters. Working DX stations is an adventure for everyone.

Collecting the colorful "QSL" cards that amateurs send to confirm their contacts is really a second hobby to ham radio. The stamp-collecting member of the family is especially interested in seeing QSL cards come in from foreign countries. Besides their own value, QSL cards are used as evidence in qualifying for the many attractive certificates offered by various amateur organizations. Of especial interest are the WAS-YL, WAC-YL, and YLCC certificates offered by the Young Ladies Radio League (YLRL) for working licensed YL's in the 50 states or six continents, or for working 100 different YL's.

Public Service. Besides having fun on amateur radio, women amateurs perform considerable public service on local and world-wide levels. Ellie Horner, K4RHL, Fort Lauderdale, Florida, for example, is recognized as an important arm of the National Hurricane Center in Miami. Ellie and her husband, Jake, K4YBL, have a Hurricane Center radioteletype machine in their home. They transmit hurricane bulletins from their living room radio station to hams in Central and South America and on tiny Carribean Islands who might not receive any other warning.

Ellie also works closely with Timmie McGraw, WB2YUC, another dedicated XYL in Sandy Hook, New Jersey, and Marcia Rice, KZ5MM. Marcia has been heard transmitting hurricane warnings from her home in the Panama Canal Zone.

Golde Hoover, K9AXS, of Hillsboro, Illinois, talked to Father Dan McLeod, TG5WH, one day and learned of the great need in Guatemala for medical supplies. She canvassed the local doctors and dentists and picked up sample medicines and worn dental tools. She shipped them to the Maryknoll Mission Center, where they were checked and sent on to the missionaries in Guatemala. The sincere "thank you" from Father Dan made all her hours worth while.

None of these ladies receive a penny in compensation; they work because they know there is an important job they can do. As Ellie says, "Personally, I enjoy hamming from all its aspects, but I do feel the public service we can perform is the most rewarding part of the hobby."

Other YL Activities. Sister Mary, O.S.F., WAØJIE, Breckenridge, Minn., is one of the many Catholic sisters on the air. Some of them just ham, and others maintain regular schedules with mission amateur stations around the world.

Mary Geney, K9WUA, with her OM Frank, K9HYZ, and their children go camping every summer and enjoy extra adventures with radio contacts as they travel.

"Sometimes we camp in rather remote spots," Mary said, "but with our ham rig along, I never feel that we are without friends in case we should need some help."

Not every lady is anxious to admit her age, but members of the "Grandmothers Club" don't mind at all. These charming ladies even offer a certificate for contacting several members of their group.

Those who enjoy club work will find that almost every large city and state has its YL club and the YLRL has members all over the United States and in other countries as well. They hold a convention each year in a different city. Of course, on a local level almost every radio club welcomes YL's and XYL's and puts them to work as secretaries, treasurers, or as custodians of the coffee pot.

Bobbi Pattie, K9GOL, who assists her OM, Dick, W9VWJ, in their jewelry store, is a registered nurse and a student pilot. Yet she has time to publish "Ham Hash," the club paper of the Montgomery County (Illinois) Amateur Radio Club, for over ten years.

Fellows, if, with all the challenges and opportunities for women in amateur radio, we haven't motivated your wives to get their licenses, you will have to face the bitter fact that they may be natural candidates for Swedish Weaving after all.

Amateur Radio Equipment

A REVIEW

Manufacturers Drop Sensationalism And Concentrate On Dollar Value

BY HERB S. BRIER, W9EGQ

IF AMATEUR RADIO activity were restricted to one frequency band and there were only one class of license, an editorial review of amateur radio equipment would consist of mentioning how the various manufacturers achieve the same goal. Now that there are six classes of ham licenses and eight very active amateur bands, the possibilities for product distinctiveness is seemingly endless. Fortunately, in 1968-69 a review of equipment is not too complex. The trend is to improve tried-and-true designs—as opposed to adding a new piece of chrome to the 1967-68 model and proclaiming a revolutionary advance (particularly in the price).

An example of the current trend to upgrade amateur radio equipment is the new version of the **Collins** 75S-3B receiver. By the most reasonable count, at least 90 changes have been made in this receiver in the past 12 months. Although none of these changes is in itself drastic, together they make the 1968-69 Collins 75S-3B receiver appreciably better than it was in 1967-68. Similar evolutions can be seen in the product lines of various other manufacturers.

SSB/CW Transceivers. There is a continuing de-emphasis in the use of AM below 30 MHz. This is reflected in the popularity of SSB/CW transceivers. Most of the 1968-69 transceivers are easy to operate, compact, and offer good value at economic prices. These factors stem from the fact that many components in the transceiver are used in both reception and transmission.

Transceivers come in all power ratings—from a few watts up to the amateur radio legal maximum of 1000 watts (2000 watts peak envelope power on SSB). Hams now recognize that for best results they must choose a transceiver with the highest power output consistent with other desirable features. Doubling up on the use of the transceiver is now in vogue. Many amateurs select a transceiver for both mobile and fixed-station operation. Thus, their automotive electrical system does not groan under the load of a high-power transceiver—a linear amplifier being used for higher power output in the base or home station.

Licensed Novice operators constitute a strong market for manufacturers of transceivers with power ratings up to 250 watts. Almost all of the present-day transceivers can be cranked down to 75 watts for operation in the 80-, 40-, and 15-meter Novice bands.

A large number of amateurs use the Collins KWM-2 transceiver as the standard against which all other SSB/CW transceivers must be compared. The KWM-2 is also one of the most expensive ($1150, less power supply or speaker) transceivers on the market. A full line of accessories for the KWM-2 readily adds another $600 to outfitting a ham station. In return for these prices, the KWM-2 delivers a 180-watt signal on any amateur frequency between 3.5 and 29.7 MHz. Receiver selectivity is 2.1 kHz and the sensitivity is better than 0.5μV. In both transmitting and receiving functions, the stability, dial calibration, and smoothness of operation of the KWM-2 is traditional.

At a price of about one-fourth of the KWM-2 you can pick up a **Sideband Engineers** SBE-34. This is a hybrid transceiver with 23 transistors in all of the low-power functions and 3 vacuum tubes in the transmitter output stages. The SBE-34 is rated at 135 watts on four bands (80, 40, 20, and 15). Unlike the Collins, you simply plug in a microphone, connect your antenna and use either house current or 12 volts d.c. to get on the air. One nice feature about the SBE-34 is the "incremental tuning" for listening in a few kilohertz either side of your transmitting frequency.

At another giant step down in price, the **World Radio Laboratories** "Duo-Bander 84" sells for about $160, plus $80 for the matching a.c.

power supply, or $100 for the 12-volt d.c. supply. The Duo-Bander 84 has been upgraded to deliver a peak power input of 400 watts. You can use the Duo-Bander 84 on either 75- or 40-meter phone. The receiver has a 2.7-kHz selectivity and 1.0-μV sensitivity.

For the fellow who still likes to build his own, the **Heath Company** has a good variety of SSB/CW transceivers in kit packaging. At the bottom of the price scale are the single-band units represented by the HW-12A (75 meters at $100), the HW-22A (40 meters at $105), and the HW-32A (20 meters at $105). All kits are less power supply. Almost, but not quite in this group is the just-announced HW-18-3 for the 160-meter band ($110). For these nominal prices, the purchaser gets 200 watts of "talk power" and a receiver with 2.7-kHz selectivity. The HW-18-3 differs from the other units in this group since it is crystal controlled on both transmit and receive and can be used to transmit straight AM phone signals at a 25-watt level. Matching power supplies are $50 for the 117-volt a.c. model and $70 for the 12-volt d.c. mobile model.

Very new in the Heathkit SSB line is the HW-100. It will sell for about $240 and uses a field-effect transistor in the variable-frequency oscillator circuit. The receiver is said to have a 0.5-μV sensitivity and a 2.1-kHz selectivity.

Top of the Heathkit line is the SB-101 with coverage from 3.5 to 29.7 MHz at $370. This model is rated at 180 watts input PEP and features a built-in side-tone oscillator for monitoring CW keying. There is a provision for an optional 400-hertz CW filter and the SB-101 may be used in conjunction with the SB-640 VFO ($99) for split-channel operation. Incidentally, the SB-101 is one of the limited number of Heathkit transceivers available in a wired model ($540). The SB-110 is a somewhat similar model selling for about $300 and designed solely for operation on 6 meters.

By redesigning to take advantage of the new General Electric 6LE5 tubes, **Galaxy Electronics** has been able to upgrade its Galaxy-V to 500 watts PEP. The new model, called the Mark III, still sells for about $420 and the a.c. power supply is available for about $80 and the d.c. power supply for $100. Numerous accessories are offered for this 5-band transceiver. Due to be released within the next 60 days is a new 400-watt PEP rig from **Hammarlund.** Possibly bearing the title PTR-1, this transceiver will feature plug-in modules and a digital counter readout. The circuit will be hybrid and the selling price is forecast as being "under $400."

Hallicrafters, long a name to be reckoned with in ham equipment, has two 5-band SSB/CW transceivers in its 1968-69 lineup. They are the SR-400 and the SR-2000 "Hurricane." Each transceiver features better than 0.5-μV receiver sensitivity and 2.1-kHz selectivity. Receiver incremental tuning is included, as well as a built-in noise blanker, VOX, crystal calibrator, and side-tone CW monitoring. In addition, the SR-400 contains a built-in T-notch filter for eliminating heterodyne interference. The SR-400 is priced at $780, plus $120 for the a.c. power supply or $150 for the 12-volt d.c. supply. The SR-2000 is selling at $1095, plus $450 for the a.c. power supply/speaker console.

A little company that is rapidly making a name for itself is **R. L. Drake.** They believe that everything possible should be in one medium-size package and are offering the TR-4 SSB/CW/AM transceiver. Ratings are 300 watts PEP and 260 watts on AM phone and CW. Built-in features include a crystal calibrator, VOX, and side-tone monitoring. A complete TR-4 goes for just under $720. Also available is the RV-4 remote VFO for split-channel operation.

The top unit at **Swan Electronics** is the Swan 500C SSB/CW/AM transceiver with a PEP-rated input of 520 watts. The price for this model is about $520, less power supply. A notable improvement made recently in the Swan 500C was a shift in the intermediate frequency. Power supplies go for $95 and $130, 117 volts and 12 volts, respectively. An external VFO is $95 and a plug-in VOX is $35.

For those who want the 5-band performance of the 500C, less some of the frills, Swan now offers the 350C for $420. Power supplies and optional accessories are interchangeable between these two transceivers. The Swan 250C extends operation to the 6-meter band. Rated input of the 250C is 240 watts PEP, 75 watts on AM and 150 watts on CW.

More SSB/SW Transceivers. The **National** 200, 5-band transceiver is still available at about $360. Matching power supply is $75. Power rating of the National 200 is 200 watts PEP, 150 watts on CW and 50 watts on AM phone. . . . Imported by **Spectronics** is the Yaesu FTdx-400 transceiver, a hybrid combining 18 tubes, 9 transistors and 33 diodes in a 500-watt PEP transceiver. At $600, the FTdx-400 features incremental tuning, side-tone monitoring and a dual-frequency crystal calibrator.

For 2-meter operation, the only commercially-available SSB transceiver brought to our attention was the **Gonset-II.** Sold for about $260 (complete) the Gonset-II is rated at 20 watts PEP and is a hybrid. The Gonset-VI is the 50-MHz twin of the Gonset-II.

While SSB has largely replaced AM in the low-frequency amateur bands, AM has advantages for low-power local communications on frequencies where interference is not a major problem. One of the prime advantages is that low-power AM equipment is less expensive than low-power SSB gear. An example of this philosophy is the **Lafayette Radio Electronics** HA-410 AM transceiver with its rated input of 20 watts, complete with built-in VFO and dual power supplies. The HA-410 sells for about $150.

VHF and Above Transceivers. The popularity of AM on the 50- and 144-MHz bands is not to be denied. There is a wide variety of transceiver kits and wired models available at moderate prices to get the VHF enthusiasts going on either of these bands.

E. T. Clegg Associates is now back in business having been sold by Squires-Sanders. The popular "66'er" and "22'er" are 20-watt AM transceivers priced at $250 each—ready to go on the air. . . . **Allied Radio** is offering two matched 15-watt AM transceivers in kit form. The TR-106 tunes the first 2 MHz of 6 meters and sells for about $120. The TR-108 tunes the full 2-

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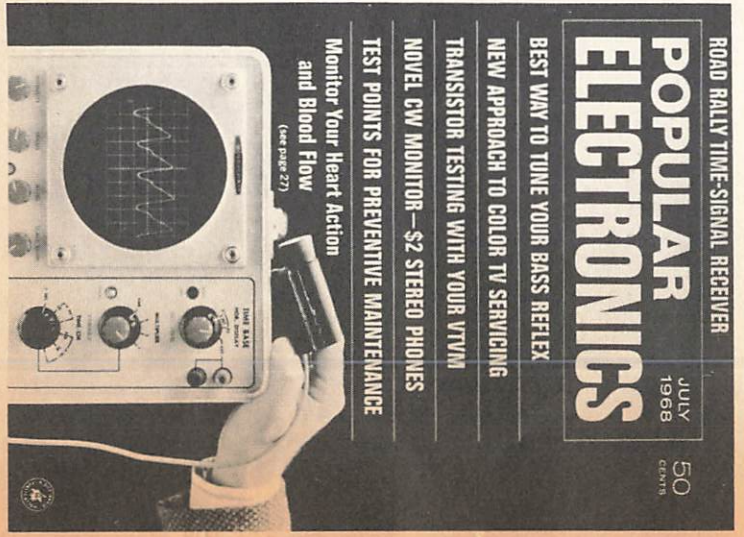

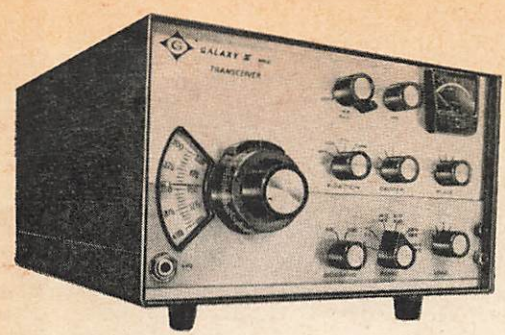

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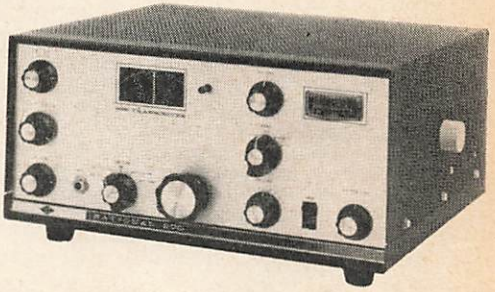

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E.F. JOHNSON VIKING AVENGER

HEATHKIT HW-100

COLLINS KWM-2

meter band and goes for $125. These prices include the power supplies and microphones. . . . **Lafayette Radio Electronics** has several companions to the HA-410 mentioned above. The HA-460 is an identical twin of the HA-410 except for frequency coverage. The HA-460 is on the 6-meter band. Also for 50 MHz, Lafayette is offering the HA-750, all solid-state, 5-watt-input transceiver.

The **Hallicrafters** 50- and 144-MHz twins are the SR-46A and SR-42A. These AM transceivers are rated at 12 watts and include built-in a.c. and d.c. power supplies. Each transceiver has four transmitting crystal positions and provision for an auxiliary external VFO. The SR-46A sells for about $200, the SR-42A for $220, and the matching HA-26 VFO is $60.

The **Heath Company's** "Twoer" and "Sixer" 5-watt AM transceiver kits probably started more radio amateurs operating on VHF than any other piece of gear. These units are still around for $45 and although not the greatest thing in terms of selectivity, they are useful for local rag chews. The built-in power supply is for 117 volts a.c., but an external 12-volt d.c. supply is available for $18. The Heath Company has also just announced the HW-17, a 20-watt hybrid, 2-meter AM transceiver that will sell for about $130 with power supply. The HW-17 will feature a pre-wired and pre-aligned FET receiver front end. This is a hybrid transceiver with four crystal-transmitting positions, plus provision for operating from the Heathkit HG-10B VFO. A matching 12-volt d.c. power supply will be available for $25.

A modest 6-meter, 5-watt transceiver is available from **World Radio Laboratories** as its model TC-6A. This unit sells for $40 in a kit package, less power supply.

Transverters. This is an area where, in 1968-69, radio amateurs can expect to see quite a bit of sensational activity. **Swan Electronics** is very enthusiastic about its new TV-2, 144-MHz transverter. This unit—when connected to the Swan 250, 350C, 500C, or similar transceiver—will transmit and receive on the 144-MHz band. Rated power is 250 watts PEP, depending on the input signal. The input frequency of the TV-2 is in the 14-MHz band; however, it can be ordered from Swan for use with 21-, 28- or 50-MHz excitation. Power is supposedly derived from the exciting or driving transceiver. Price is said to be about $265.

The **Collins** 62S-1 transverter is rated at 65 watts PEP minimum output. This transverter receives and transmits on either the 50- or 144-MHz band when used in conjunction with 14-MHz transceiver for excitation. As usual, the price is high, and figures out to be just a few dollars under $900.

Communications Receivers. Although transceivers in the ham shack are becoming more and more common, probably 95% of all radio amateurs have some sort of communications receiver. The present-day ham now tends to shy away from general coverage receivers and is more likely to be interested in "amateur-band-only" receivers. Generally speaking, the "only" receivers are remarkably stable and generally crystal-controlled to the extent that the bands are linear and the received frequencies may be read-out in terms of ± 1 kHz. A brand new entry in the "only" family is the **Hammarlund** HQ-215. This is a solid-state receiver (41 semiconductors) that tunes the ham bands in 200-kHz segments. The nominal selectivity is 2.1 kHz, although there are provisions for additional filters with 200 Hz and 6 kHz selectivity curves. The HQ-215 sells for $530 (matching speaker—$25) and may be operated on 117 volts a.c. or 12 volts d.c. Hammarlund is continuing to manufacture its tube-type receivers including the HQ-110A ($345), HQ-145A ($310), HQ-180A ($480), and the SB-600 family ($1400, and up).

Two receivers are offered by **R. L. Drake** for specific ham-band coverage. Top of the Drake line is the R-4B which tunes 80, 40, 20, 15, and 10 meters with crystal-controlled accuracy. Like the HQ-215 mentioned above, the Drake R-4B has provisions for adding accessory crystal-controlled tuning ranges for operation on 160 meters, MARS, etc. If you don't care to spend $430 for the R-4B, you should find the model 2-C, selling for only $229, of particular interest. The 2-C offers the basic features of the R-4B, less some of the frills.

Keeping up with the high-ticketed items, the **Collins** 75S-3B and 75S-3C are basically identical receivers, the sole exception being that the "C" model has provisions for tuning fourteen 500-kHz segments outside the amateur bands. . . . Not yet seen, but being advertised, is the **Galaxy** R-530, another all solid-state receiver, but one that features continuous tuning from 5 kHz to 30 MHz, in 500-kHz "bites." Priced at $695, the R-530 includes a 2.1-kHz filter and built-in noise blanker. Numerous additional filters and other options are available in both the Collins and the Galaxy receivers.

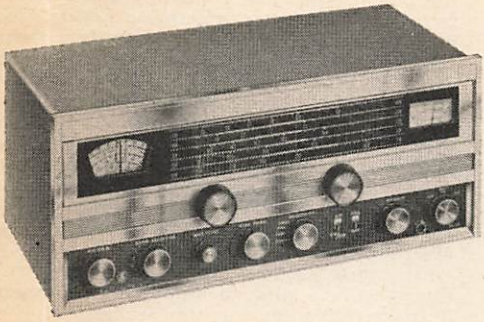
Hallicrafters has two receivers with slide-rule bandspread dials covering the five principal ham bands. The Hallicrafters SX-146 goes for $295 and is intended to be a companion to the HT-46. The SX-130 might be construed as a general-coverage receiver, although a look at the slide rule dial mechanism obviously ranks this receiver as a product for radio-amateur usage.

A brand new transceiver that may set the trend for things to come is the **E. F. Johnson** "Viking Avenger." This is a hybrid transceiver covering the five major amateur bands with a variety of special features. To our knowledge, it is the only transceiver on the market which contains two built-in VFO's permitting the operator the option of "locked-frequency" transceiver operation or split-channel operation. There is a receiver noise blanker and a 30 dB dynamic range speech compressor. The power rating is 250 watts and the voice operation system is called VLX for "voice latch transmit." At writing, a firm price had not been established, but including power supply we expect the Avenger to sell for around $1100-plus.

Rather rare on the American scene, but available to the amateur radio operator who likes his receiver in full dress, is the **Squires-Sanders** deluxe model SS-1R and the **Eddystone** EA12. The SS-1R is very similar to the IBS receiver (see October, 1968 POPULAR ELECTRONICS) except it tunes all of the ham bands between

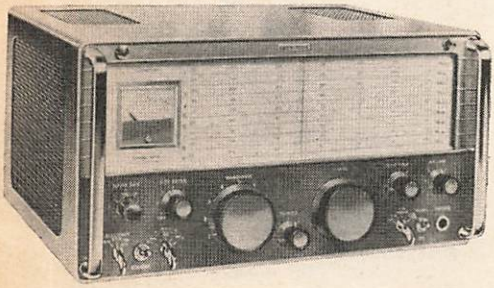
R.L. DRAKE 2-C

HAMMARLUND HQ-110A



HALLICRAFTERS SX-130

HEATHKIT SB-301



EDDYSTONE EA12

HEATHKIT HW-17

KNIGHT-KIT TR-106

CLEGG 22'er

3.5 and 30 MHz. The Eddystone EA-12 tunes down to 1.8 MHz and features continuously variable selectivity from 6 kHz to the almost unbelievable sharpness of 50 Hz. Price wise, the SS-1R of the order of $1000 and the Eddystone EA12 around $550.

For the kit builder that wants performance at a very reasonable price, the **Heath Company** is offering its SB-301. This $260 kit includes a 2.1-kHz filter as standard equipment and has provisions to mount two more filters (400 Hz and 3.75 kHz). The SB-301 can be matched to the SB-401 transmitter to make a bargain-priced transceiver.

Also available is the **Lafayette Radio Electronics** new HA-600, solid-state, amateur and SWL receiver which includes bandspread tuning on the ham bands from 75 through 10 meters. This receiver goes for about $110. . . . Some hams have taken a liking to the **Radio Shack** "Realistic DX-150" receiver which is another solid-state item tuning all the bands down to 10 meters.

Miscellaneous Equipment. The Novice amateur radio operator who is just getting his feet wet should take a look at **Ameco's** AC-1, 15-watt, CW transmitter which sells for just over $20 (kit, crystal extra). The pi-network output tank circuit allows matching this transmitter to a variety of antennas. . . . The **CONAR** Division of the National Radio Institute is marketing its Model 400 3-band CW transmitter as a companion to its Model 500 receiver. The transmitter has a 25-watt input and is sold as a kit for about $33.

Heathkit has long been a producer of favorite equipment for the Novice and is currently offering its model DX-60B transmitter which is rated at 90 watts input on all ham bands from 3.5 through 29.7 MHz. The Novice can reduce its power input to 75 watts. The matching receiver is the HR-10B. $80.00 buys either kit. The company's HW-16, CW transceiver for the 80-, 40-, and 15-meter bands for $100.00 is also a natural for the beginner. . . . Another Novice transmitter worth noting is the **R. L. Drake** model 2-NT rated at 100 watts input. Here, too, the power can be reduced to the Novice 75-watt limit. The model 2-NT contains a built-in side-tone oscillator, antenna changeover relay, and low-pass filter, and sells for about $130.

Lack of space prevents describing in detail the dozens of other pieces of amateur radio equipment now being offered by various manufacturers. Converters, electronic keyers, linear amplifiers, and SSB/CW transmitters (which can be used as "transceivers" or independently with companion receivers) and linear amplifiers are all popular items. In fact, it may surprise those who keep reporting that CW is dead, that at least eight manufacturers have a lively market for electronic keyers. Prices are in the $35-100 range, and manufacturers in this field include: **Heath, Hallicrafters, Omega, M & M Electronics, Palomar Engineers, Pickering Radio, and Waters Manufacturing Company.**

Of course, any of the manufacturers mentioned will be glad to send more information if you mention you saw this article.

ADDRESSES OF MANUFACTURERS MENTIONED IN THIS ARTICLE

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

Ameco, Div. of Aerotron, Inc., P.O. Box 6527, Raleigh, N.C. 27608

E.T. Clegg Associates, Inc., Box 376 Morris Plains, N.J. 07950

Collins Radio Co., Cedar Rapids, Iowa 52406

Conar, Div. of National Radio Institute, Washington, D.C. 20016

R.L. Drake Co., 430 Richard St., Miamisburg, Ohio 45342

Eddystone, Div. of Marconi Instruments, 111 Cedar Lane, Englewood, N.J. 07231

Galaxy Electronics, 10 S. 34th St., Council Bluffs, Iowa 51501

Gonset, Div. of Aerotron, P.O. Box 6527, Raleigh, N.C. 27608

Hallicrafters, 600 Hicks Road, Rolling Meadows, Ill. 60008

Hammarlund Mfg. Co., Inc., 73-88 Hammarlund Dr., Mars Hill, N.C. 28754

Heath Co., Benton Harbor, Mich. 49023

E.F. Johnson Co., Waseca, Minn. 56093

Lafayette Radio Electronics Corp., 111 Jericho Tpke., Syosset, L.I., N.Y. 11791

M & M Electronics, 6835 Sunnybrook, N.E. Atlanta, Georgia 30328

National Radio Co., Inc., 37 Washington St., Melrose, Mass. 02176

Omega Electronics Co., 10463 Roselle St., San Diego, Calif. 92121

Palomar Engineers, Box 455, Escondido, Calif. 92025

Pickering Radio Co., P.O. Box 29, Portsmouth, R.I. 02871

Radio Shack Corp., 730 Commonwealth Ave., Boston, Mass. 02215

Sideband Engineers, 213 E. Grand Ave., South San Francisco, Calif. 94080

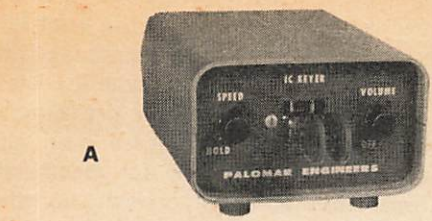
Spectronics, Box 356, Los Alamos, Calif. 97020

Squires-Sanders, Inc., Martinsville Rd., Liberty Corner, N.J. 07938

Swan Electronics Corp., Oceanside, Calif. 92054

Waters Mfg. Co., Wayland, Mass. 01778

World Radio Laboratories, Inc., 3415 W. Broadway, Council Bluffs, Iowa 51501



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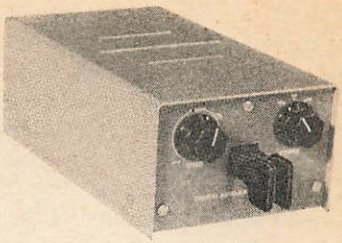

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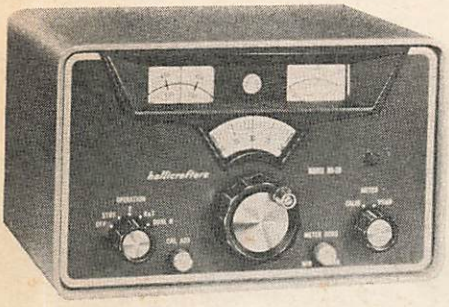

E

F

G

A Electronic keyer from Palomar using integrated circuits. **B** Digital computer techniques are used in the Omega electronic keyer. **C** The Lafayette 6-meter transceiver is all solid-state. **D** Conar is offering this low-cost transmitter to the Novice. **E** Hallicrafters Model HA-20 dual-receive VFO. **F** Heathkit Model 60B phone & CW transmitter. **G** National high power linear amplifier Model NCL-2000.

YOUR ALL-BAND RECEIVER

(from page 54)

daylight hours. Forget the tropical bands during daylight hours; it takes darkness for signals on these frequencies to travel any great distance. A few notable exceptions are stations operating in the tropical bands in Australia, Indonesia, and other Southwest Pacific areas. If you tune carefully, you may be able to log some of them within an hour or two after your local sunrise.

There are a number of other channels used for short-wave broadcasting that are in between the bands listed above. Many broadcasting stations operate between 5700 and 5950 kHz. And there are a few broadcasters between 11,975 and 12,100 kHz. One of Israel's short-wave outlets operates on 9008 kHz, and stations from a few other countries can be heard between 9350 and 9490 kHz, especially from Spain, Pakistan, the Soviet Union, and Egypt.

SWL Clubs. As you find yourself becoming more and more interested in the short-wave listening hobby, you may want to get more detailed and up-to-the-minute DX'ing information. This is the time to join an organized radio club. There are a number of top-notch nationwide or worldwide clubs to which you can apply for membership. These clubs all issue periodic bulletins—loaded with DX information—to their members.

Some clubs devote their bulletins strictly to coverage of activities on the standard broadcast band. Others cover the short-wave bands, amateur bands, and utility channels. There is a host of additional features, such as listings of SWL card swappers, items on tapesponding (corresponding by the tape recording method), and technical tips.

Here is a list of some of the better known clubs.

Newark News Radio Club. Organized in 1927, the NNRC is probably the oldest

SWL club. Membership is $5 per year and all members receive monthly copies of the NNRC "Bulletin" which averages 55 pages per issue. The "Bulletin" conatins detailed information on all phases of SWL'ing (international broadcasting, FM and TV, medium waves, utilities, etc.) with special sections on card swapping, competitions, etc. More information and a sample "Bulletin" are available for 25 cents from Corresponding Secretary Harold S. Williams, 50 Third Ave., Seymour, Conn. 06483.

International Short-Wave Club. The oldest club in Europe, the ISWC was founded in 1929 and has been functioning ever since. This club prides itself on fast dissemination of news concerning changes in schedules, frequencies, etc. of short-wave broadcasters. A monthly bulletin is published called "International Short Wave Radio." The dues are $2.50 in the U.S. and $2.75 in Canada, and the bulletins are sent by air mail. Membership details can be obtained from ISWC, 100 Adams Gardens Estates, London, S.E. 16, England.

International Short Wave League. Noted for its intense interest in DX'ing the ham bands, this British short-wave club issues a monthly bulletin called the "Monitor." Each issue contains columns for the newcomer, ham-band DX'er, short-wave DX'er, contest listener, etc. The dues are $5 (for surface mail delivery) or $11 (airmail). Other details pertaining to membership can be obtained from ISWL Headquarters, c/o Bernard Brown, G1889, 60 White St., Derby, England.

North American Short-Wave Association. The NASWA is the only "all short-wave broadcast" club in North America. Membership is $5 per year, which includes 12 issues of the club's "NASWA Frendx" bulletin. Members may pay $6 to receive the bulletin via first-class mail. A typical bulletin contains information on new and old broadcasters, "Around the Clubs" commentary, timely station information, awards given, and a special last-minute "Flash Sheet." Write to NASWA Headquarters, P.O. Box 989, Altoona, Pa. 16603.

American SWL Club. This club specializes in thorough coverage of happenings on the international broadcast bands, and

sends its montly publication "SWL" via first-class mail to members. Dues are $7. Details are available from Stewart MacKenzie, 16182 Ballad Lane, Huntington Beach, Calif. 92647.

Canadian DX Club. The largest of the Canadian clubs, the CDXC, publishes a monthly bulletin called "CADEX." It averages about 40 pages, with coverage on such subjects as the international shortwave bands, medium waves, utilities, TV and FM, and card-swapping. The dues are $4 yearly; a sample bulletin can be obtained for 15 cents or one IRC from Ralph Irace, Jr., 311 W. 14th St., Riviera Beach, Fla. 33404.

International Radio Club of America. This club is devoted exclusively to news of happenings on the standard AM broadcast band. Members receive 34 bulletins yearly. Dues are $4.40 (third-class mail) or $6.60 (first-class), and a sample copy can be obtained for 10 cents from IRCA Headquarters, c/o Bill Lipis, P.O. Box 548, Riverside, Calif. 92505.

Radio New York Worldwide Listeners Club. With over 4000 members in nearly 90 countries, this club is sponsored by WNYW, "Radio New York Worldwide." Membership is open to anyone for $1. A monthly publication containing DX tips, technical information, and feature articles is distributed to the membership. Club members also receive a certificate for wall mounting and a wallet-size numbered membership card. Members are invited to listen to their program, hosted by Les Marshak, over WNYW at 1730 GMT, Saturdays, and 1930 GMT, Sundays. For details, write to RNYW Listeners Club, Attention Mr. Irwin Belofsky, Radio New York, 485 Madison Ave., New York, N.Y. 10022.

Radio Canada Short-Wave Club. This club is sponsored by "Radio Canada" and currently has approximately 5500 members in about 80 countires. The only requirement for membership is that the applicant submit at least five reception reports of the Canadian Broadcasting Corporation's International Service short-wave transmissions. Members receive a suitably inscribed certificate, pennants, lapel badges, booklets, and other items. To re-

main in good standing, members must continue sending reception reports to the CBC. Club meetings, on the air, and complete with Secretary, Agenda and gavel, are aired in English, French, German, Czech, Polish, Hungarian, Slovak, Spanish, Portuguese and Russian. Complete details can be obtained from Elaine McMaster, Club Secretary, Radio Canada Short-Wave Club, P.O. Box 6000, Montreal, Quebec, Canada.

World Radio Club. The World Radio Club is sponsored by the British Broadcasting Corporation. A 15-minute program devoted to the club is broadcast each week over the BBC short-wave stations. The program includes DX news and other items of interest to SWL's. Program times are: Sunday, 0930; Monday, 0245; Thursday, 1245. Membership is free from World Radio Club, BBC, Bush House, London, W.C. 2, England.

CB FOR EMERGENCY COMMUNICATIONS

(from page 32)

Greer made available ALERT's two emergency vehicles, while George Weimer called police to inform them of the emergency. Police met the ALERT mobiles en route and escorted them to the hospital. After analysis and treatment, the woman was found to have been suffering from food poisoning. ALERT members were commended for their quick thinking and action.

Whittier Emergency. A San Gabriel Valley REACT monitor was requested to relay urgent traffic from California to Oregon in an attempt to reach a vacationing family. Their son had been injured in California and the hospital needed permission to operate. A 10-17 (urgent) call was put on the air. REACT member Bob Clark, KQX5402, contacted ham operator Bob Smith, WA6WPP, who fed the information into a West Coast amateur net at 4:30 p.m. Many ham operators were alerted from San Francisco to the Canadian border, in addition to 120 CB units, all working to pass on

the information throughout the state of Oregon. The most gratifying moment for the communicators was when the announcement was made that the family had been located, permission to operate granted, and the boy recovered.

The FCC recognizes that properly organized and operated CB clubs ". . . may render a service to everyone." And, while the CRS is often criticized as being the "hobby band," the events described above have their own way of establishing worthwhile statistics.

HAM LICENSE

(from page 122)

pass any amateur examination, plus untold amounts of additional information on all facets of amateur radio. In fact, the tremendous amount of information it contains confuses some students. These students frequently do better when preparing for their examinations with a book that covers only the information required to pass the examinations.

The Amateur Radio Theory Course, published by the AMECO Division of Aerotron, Inc., Raleigh, N.C., $3.95, is one of the best books ever published for any person who knows nothing about electronics and is preparing for a Novice, Technician, Conditional, or General class written examination. It is available at most electronic supply houses.

ABC's of Amateur Radio, 3rd edition, by Howard S. Pyle, W70E. Published by Howard W. Sams, Indianapolis, Ind. $2.50, postpaid, from most amateur supply houses. Good Novice text.

General Class Amateur License Handbook, by Howard S. Pyle, W70E. Published by Howard W. Sams, Indianapolis, Ind. $2.95, postpaid, from electronic supply houses.

Amateur Radio Incentive Licensing Guide, by Robert W. Brown, K2ZSQ/W9HBF, and Tom Kneitel, K2AES, published by Editors and Engineers, New Augusta, Ind., $2.75. Contains information on all classes of amateur examinations. Available from most electronic supply houses.

Radio Handbook, 17th edition, published by Editors and Engineers, New Augusta, Ind. Hard cover, $12.95. Covers approximately the same ground as the ARRL Handbook but from a different viewpoint. Highly recommended for any amateur library.

Posi-Check, P.O. Box 3564, Urbandale Station, Des Moines, Iowa 50322. Posi-Check study guides are available in General (and Technician), Advanced, and Extra class editions. Each contains 297 questions and answers which simulate the form of the FCC examinations. Correct answers and two IBM answer sheets for student self-testing are included. Prices are: General, $3.25; Advanced, $3.50; Extra, $3.75; postpaid. Airmail, 70 cents extra.

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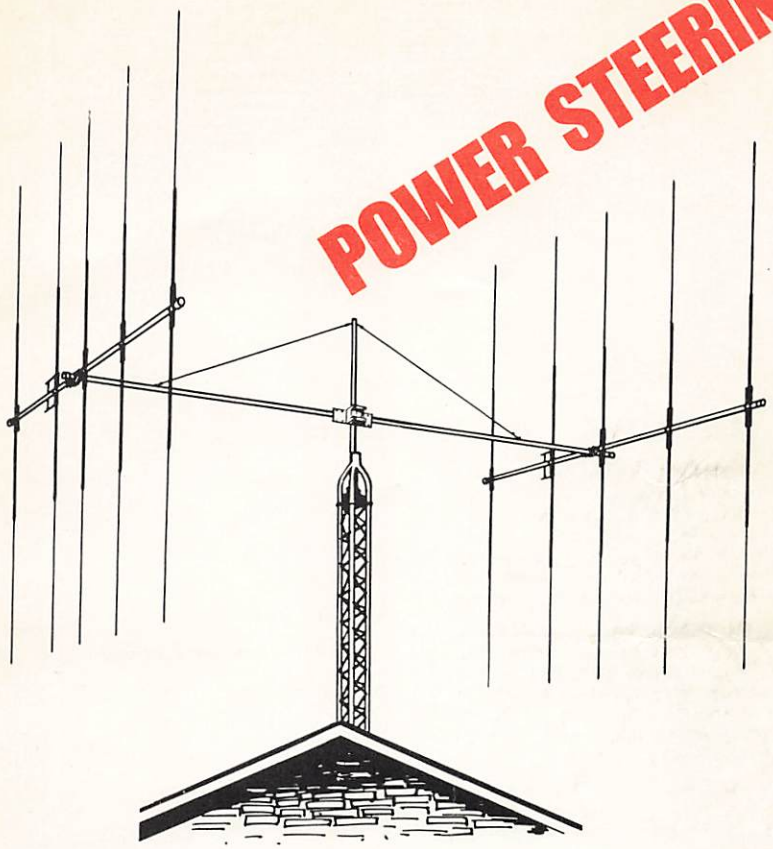
POWER STEERING



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FOR THE STRONGEST SIGNAL UNDER THE SUN!

SPECIFICATIONS

SUPER DUO-BEAM 10	SDB 10
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Gain	14 db.
Front-to-Back Ratio	26 db.
SWR at Resonance	Less than 1.4:1
Mechanical	
Boom Length	20 ft.
Cross Boom Length	24 ft.
Longest Element	18' 9¾"
Turning Radius	15' 6"
Maximum Wind Survival	100 MPH

Plus These Other Great Super Duo-Beams

	Elements	Gain
SDB4	4	9.3 db
SDB6	6	12.7 db

Super Duo-Beam from Hy-Gain

HY-GAIN ELECTRONICS CORPORATION
N.E. Highway 6 at Stevens Creek
Lincoln, Nebraska 68501

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Space-age sophistication in hand-held 2-way CB Radio!

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CWT-20: Half-watt. 3 Channels. Integrated Circuit. Only **$39.95**

CWT-10: 100 Milliwatts. 3 Channels. Integrated Circuit. Only **$29.95**

PLUS: a full line of optional accessories — for added convenience, versatility and communication pleasure.

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a Whittaker Company

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