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Around the World Radio: A Teacher's Guide to Shortwave Radio in the Classroom

Myles M. Mustoe

AROUND THE WORLD RADIO

A TEACHER'S GUIDE TO SHORTWAVE RADIO IN THE CLASSROOM

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by

Myles M. Mustoe

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CHAPTER 1

Introduction

This project is intended to be used as a manual by teachers who are interested in the use of shortwave radio in their classrooms. Its purpose is to introduce the radio to teachers who may have had no prior experience with the shortwave bands but would like to investigate their use in an educational setting. Information on the types of radios available, obtaining a radio, and using the radio is included. Also included is a list of resource materials currently available for shortwave radio listeners.

A cassette of international broadcasts that have been received at Ellensburg, Washington is also supplied with the project. The cassette contains a sample of what was heard with a small, inexpensive receiver. A survey of what other shortwave listeners have received in Ellensburg and how they are using their radios is supplied in the appendix. These include units on listening, note taking (Appendix F), reception verification (Appendix G), and technical projects (Appendix E). Ideas for bulletin boards and card competitions are also discussed. However, these ideas are only supplied as a supplement to the main objective of this

project, which is to introduce the radio as an instructional tool for teachers.

The Problem

I. Statement of the Problem

Shortwave radio is a viable teaching tool for teachers in geography, social science, languages, and other areas of secondary and elementary curriculum. However, in the United States, teachers are generally not familiar with what is available to them on the shortwave radio and how they can adapt the use of the radio for their classrooms. This deficiency was the problem that this project intended to address.

II. Importance of the Study

There is a continuing need to develop and enhance any educational curriculum with up-to-date methods and materials. This is especially true in the social sciences where world current events are changing daily, making the textbooks hard pressed to keep up. To compensate, some teachers have successfully encouraged students in the use of newspapers and magazines to augment more traditional classroom work. The shortwave radio can also be a supplement along these lines.

The radio can provide news and cultural information of an immediate nature. Programming is continually changing and originating directly from broadcasters around the world. Many of the special feature programs are of particular

educational value and in most cases the listeners are encouraged to write the stations and become involved with the programming.

Shortwave radio has many positive educational applications. It is inexpensive and relatively simple to use. It can be a motivating factor for some students. The radio provides access to world cultures for the teacher and the student. However, in order for teachers to benefit from its use they must be exposed to its operation.

Shortwave radio is well known around the world except in the United States. The importance of this study is in introducing this educational tool to teachers so that they might in turn have an additional, modern educational resource to provide for their students.

III. Glossary of the Terms

1.	Antenna	Conductive wire or metal contrivance used to receive radio signals.
2.	(Shortwave) Bands	The section of the radio frequency spectrum between 2 and 30 Megahertz.
3.	Bandspread Control	A control on some radios that electronically spreads out the distance between frequencies. This allows for finer tuning control.
4.	B.F.O.	This is an abbreviation for Beat Frequency Oscillator. It is a device on some advanced radios that facilitates the reception of single sideband and code signals.
5.	Coax	Cable used between the radio and the antenna. For the Dipole antenna, type number - R-G-59-U is used.

6.	DX	Letters that refer to stations of a distant origin. A "DXer" is a person who listens for these stations.
7.	Digital	A radio having the capability to readout a frequency with lighted numbers.
8.	Dipole Antenna	An antenna, usually made from wire, fed by coaxial cable. This antenna is approximately one-half of the wavelength of the frequency it is cut and tuned for.
9.	Frequency	The number of times a radio signal electronically cycles in one second. It is measured in Megahertz, MHz, which equals millions of cycles per second and Kilohertz, KHz, which equals thousands of cycles per second.
10.	G.M.T. (U.T.C.)	Initials standing for Greenwich Mean Time. World time is also referred to as Coordinated Universal Time, U.T.C.
11.	I.R.C.	Abbreviation for International Reply Coupon. An I.R.C. is like an international money order. They are available at most post offices. Some stations may require a payment for materials or cost of sending them. The I.R.C. is used to transfer these funds.
12.	Interval Signal	A signal usually put on the air just before a broadcast. It usually contains a station identification and a popular song or national anthem. It provides the listener time to tune in the signal.
13.	Ionosphere	A layer of the atmosphere which is responsible for the reflection of radio signals, enabling the long distance "skip" of the signal.

14. Jamming	Deliberate interference of a broadcast. This can be accomplished by using other broadcasts or specific electronic equipment.
15. Light (speed of)	Also the speed of radio waves which is about 300,000,000 meters per second or 186,000 miles per second.
16. Lightning Arrester	Device used in the connection between the radio and the antenna to divert static charges that might occur as a result of lightning hitting the antenna.
17. Listening Guide	Guide given to students before listening to a broadcast providing them with listening strategies.
18. Listening Log	A log kept of the stations listened to by students.
19. Line of Sight	Refers to signals that are propagated in direct lines.
20. Long Wave	Part of the radio frequency spectrum from 150 KHz to 500 KHz.
21. News Log	A log kept by students of the leading stories of news broadcasts for each day.
22. Note Taking	Process by which students extract pertinent information from a received broadcast.
23. Propagation	This term refers to the electrical dissemination of a radio signal.
24. "Q" Signals	These are signals used by radio amateurs and shortwave listeners to shorten the broadcast and sometimes to facilitate better understanding under poor communications conditions. Q Signals are also used on code transmissions. Some Q signals are: QTH, location; QRM, interference; QSL, a reply card.

25. Q.A.R.	Abbreviation for Question Answer Relationship. This is a method of questioning that allows students to develop thinking skills. It can be used with recorded broadcasts. Not a "Q" signal.
26. QSL	A card or other form of correspondence verifying reception of a broadcast.
27. Random Wire Antenna	A wire antenna stretched out at a random length. It is not a tuned antenna like the Dipole.
28. S.I.N.F.O.	Abbreviation for Signal, Interference, Noise, Fading or Propagation (P), Overall. It is used in a verification report to give the station an indication of the quality of the signal that was heard.
29. Sunspots	Spots on the sun that have been linked to solar disturbances that can cause radio interference.
30. Tuned Antenna	An antenna that has been constructed by a formula to be resonant at a particular frequency.
31. V.H.F.	Abbreviation for Very High Frequency, the portion of the radio frequency spectrum covering 30 MHz to 300 MHz.
32. Verification Form	A form used for reception reports and mailed to radio stations.
33. WWV	Call sign of the National Bureau of Standards, Fort Collins, Colorado. Also WWVH, Kauai, Hawaii. The stations can be heard at 2.5, 5, 10, and 15 MHz providing time of day in U.T.C., propagation forecasts, geophysical alerts, marine storm warnings, and other forms of information.

34. Wavelength	The distance between the peaks of one cycle of a radio wave. This is normally given in meters. The 49 meter band, for example, would cover frequencies that would be characterized by a distance of about 49 meters between wave tops.

Chapter 2 will be a review of the literature and will detail some of the uses of radio in education.

CHAPTER 2

Review of the Literature

Limited Information

In the process of reviewing related literature, it was discovered that little if anything has been published in the area of using shortwave radio for educational purposes. However, literature has been published on the general use of radio in the classroom. This is mainly concerned with programs that fit some kind of educational curriculum.

Recently, there appeared literature dealing with the use of amateur radio in the classroom. In these presentations there were found some similarities to this study in that the radio was being used for more than the educational content of its programs.

With regard to the general use of shortwave radio, there is a great deal of material published. This can provide the shortwave listener with information on broadcast schedules, technical information, and supplies. This material relates directly to this study in that it is a general resource for the teacher. Publications of this nature have been listed in the appendix.

Radio's Educational Use in the Past

The use of radio in the classroom is not a new idea. It has been gradually introduced since radio became a popular medium for entertainment in the 1920's. It should be pointed out, however, in the "early days" of the medium, programming was drastically different than that of the present day. It was not uncommon for the format of a commercial radio station to mingle the "popular" music of the day with symphonies, operas, and programs with specific educational themes. Even the public radio stations in these early days exhibited a different approach to their formats. In 1940 a report by the Department of Elementary School Principals of the National Education Association stated,

> The number of school subjects dealt with in school broadcasts is very extensive, ranging from music appreciation to special talks on vocational guidance. A survey in 1930 revealed that in secondary schools the following types of broadcast were introduced into the curriculum: music, social studies, science, language, physical education, and art. A later survey of elementary and secondary schools showed that music, social studies, including current events, history, geography, travel, literature and science broadcasts led the list in the number of courses offered for instructional use or as supplementary material by radio.[1]

Teachers had a good deal of content area programming to draw from during this era. There was no better time to see the educational application of radio than during the years

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[1] J. Wayne Wightstone, "Pupil Growth Through the Use of Radio," Radio and the Classroom (Washington D.C.: The Department of Elementary School Principals of the National Education Association, 1940-41), p. 55.

of World War II. Special programs dealing with geography, history, and current events were continually being broadcast. The ability of the electronic medium to supply information almost immediately upon happening was a contribution that the general public and education took full advantage of in keeping up with the current events of the day. "History is being made every minute,"[2] said Erle Kenney in his paper, "The Classroom Use of Radio Broadcasts." He went on to say, "In correlating the broadcast the teacher must remember that by using radio she is bringing into the classroom up-to-date information, thus enabling her to keep pace with the latest developments in a bewildering and changing modern world."[3]

Radio and the Curriculum

This era marked a serious attempt to integrate radio into all forms of the curriculum. Margaret Harrison in 1937 stated, "Now that the school radio seems no longer to be classified as a stunt or fad, teachers are eager to discover ways of utilizing educational broadcasts so that they may contribute to the general educational objectives of school curriculums."[4] So strong was the influence of radio as an

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[2] Erle A. Kenney, "The Classroom Use of Radio Broadcasts," Radio and the Classroom (Washington, D.C.: The Department of Elementary School Principals of the National Education Association, 1940-41), p. 36.

[3] Ibid., p. 36.

[4] Margaret Harrison, Radio in the Classroom (New York: Prentice-Hall, Inc., 1937), p.4.

educational tool in that era that some, "believed that, in time, all radio school lessons will be planned as an integral instructional part of the school curriculum, but with the teacher always present to give guidance and direction in their use."[5] Some even felt that, "radio ultimately will be used as a substitute for certain teacher instruction."[6]

Radio's Classroom Use Today

Today radio is not replacing teachers in education. Radio is virtually not being used at all in education except for educational programming on public channels. Radio quickly took second place with the advent of television in the 1950's. Like radio, this medium could deliver instant information but unlike radio, it could also supply a visual record of an event, making television a unique and attractive medium. Also like radio, television's educational applications were eventually realized. There is no question as to television's influence in educating society today.

Many of the characteristics which made radio attractive to educators in the past are still valid today. Radio's ability to instantly supply information has today been technologically advanced. With the advent of satellite communications, radio is now even more time efficient in

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[5] Ibid., p. 4.

[6] Ibid., p. 4.

providing information. Television has also developed technologically, but given the number of radios in the United States, over three times that of television sets,[7] it is clear that radio continues to be a viable medium of communications.

Shortwave Radio's Application in the Classroom

The preceding discussion has dealt with the use of radio broadcasts in the standard broadcast band. These broadcasts usually originate locally. There are alternatives to the standard broadcast band. This project's concern was with the introduction of one of those alternatives known as shortwave radio. Shortwave broadcasting is similar to broadcasts in the standard band, but because of the physical nature of this type of radio wave, the signal can travel great distances. It is possible on the shortwave bands to listen to broadcasts originating in many different countries. Some of the stations that can be heard have been listed in Appendix K.

The programs heard on these international broadcasts are much different from what is heard today on the standard broadcast bands. In some respects they are similar to

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[7] The World Almanac and Book of Facts, 1987 (New York: Pharos Books, 1987), p. 627, reports the number of radios in the United States in 1984 at 485 million and the number of television sets in 1984 at 143 million. The Statistical Abstract of the United States, 1987, 107th Edition (U.S. Dept. of Commerce, Bureau of the Census), p. 531, in 1986 indicated that 99 percent of all households in the U.S. had radios and 98 percent of all the households in the U.S. had televisions.

broadcasts heard in the 30's and 40's on standard Amplitude Modulated [A.M.] radio in the United States. There is a considerable amount of specific educational programming. Broadcasts dealing with cultural, social, geographic, or historical themes are common. News programs are given regularly on many of these shortwave stations. Broadcasts from these various countries originate in a variety of languages. The content of these broadcasts lends itself well to educational curriculum, especially in the areas of geography, current events, and the languages. A sampling of these broadcasts have been prepared for this project on cassette tape and can be found in the appendix.

Shortwave radio can introduce international issues to students. In 1948, Roy Willey and Helen Young wrote in Radio in Elementary Education,

> There is no class, no grade level designated to study international understanding. Training in attitudes towards other nations is a continuous process. It can utilize music, art, geography, history, and literature. The elementary school teacher must be alert to his responsibility. With man's invasion of the air through aviation and radio, the world has grown smaller, the need for international harmony more urgent. The child learns early the news of a world beyond him. News broadcasters devote a large percentage of their time to information about foreign people and places, and global news roundups are now a daily occurrence.[8]

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[8] Roy DeVerl Willey and Helen Ann Young, Radio in Elementary Education (Boston: D.C. Heath and Company, 1948), p. 246.

Shortwave radio can be an educational tool for elementary and secondary students to introduce them to these global issues. Broadcasters on the shortwave bands are anxious to engage their listeners in the programming content of their stations. The international broadcasters continually encourage their listeners to mail in questions or comments they might have about their countries. The broadcasters reply with cards and other items. This kind of interaction reinforces the listeners' interest and encourages dialogue.

Amateur Radio in the Classroom

Recently, amateur radio has been utilized in the classroom setting successfully. Amateur radio is a hobby form of shortwave radio that enables the user to communicate to other amateur operators or "hams" around the world. An amateur radio operator operates on similar frequencies as the international shortwave broadcasters. The amateur must be licensed by the Federal Communications Commission in the United States or similar agencies in other countries.

In 1979, Kelly McGuire, an amateur radio operator and Rhoda Massanari, team teachers at Pine Avenue Elementary School in Alma, Michigan, experimented with amateur radio in their third grade class. In this case, the students were given the chance to speak over the air to another ham in Antarctica. Other stations from around the world were

contacted as well. In an article about the amateur radio project, it was stated:

> First of all, geography became much easier to understand. "There are many facts about Antarctica these kids will never forget because they didn't just pick out a place on the map," explains Massanari. "Their voices actually traveled there, and this amazed the kids. They'll remember facts like how many inches of snow Antarctica gets a year, because of the vehicle that helped them learn."[9]

The teachers also expressed the application the radio had in teaching listening skills. Students were required to listen carefully to what was said. The third graders also learned annunciation skills while talking to other amateurs. In speaking around the world, the third graders were also introduced to time zones.

"For social studies, what better way is there to teach about a culture than to let students question a native?"[10] In this case, amateur radio was the tool to allow students to interact with other cultures. Listening to international shortwave radio broadcasts can also supply this kind of experience for the student. Although the interaction comes in the form of letters and cards, nevertheless the forum is there for the students to utilize and the radio provides a vehicle of stimulus for the learning activity.

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[9] Jon and Ellen Thompson, "Hello World, Making Social Studies Come Alive," Learning, Feb. 1986, pp. 67 and 68.

[10] Ibid., p. 67.

Conclusions

It is important to note that using a shortwave radio or any kind of radio in the classroom takes planning. An understanding of the applications and limitations of the radio is crucial to its successful use in the classroom. The remainder of this project introduces the application of shortwave radio as a teaching tool.

Chapter 3 will organize the procedures followed in this study.

CHAPTER 3

Procedures of the Study

In developing the manual, AROUND THE WORLD RADIO, A TEACHER'S GUIDE TO SHORTWAVE RADIO IN THE CLASSROOM, the following procedures were taken.

1. A group of elementary students was selected to participate in listening to the radio.

2. Six fifth grade students were selected from U.S. Grant School in East Wenatchee, Washington. The students represented a variety of social backgrounds and interests.

3. A ten-week program was planned. Students met in a group each Friday for approximately one hour in a separate room at the school.

4. Students were introduced to the radio and how it operated.

5. Two radios were left with the students to take home and use during the week.

6. Students were directed to the procedure of keeping a log and filling out reception reports for the stations that they received.

7. Reception reports and letters were prepared by the students and mailed. Students received cards from Australia, Japan, and Korea.

8. Recordings were made of some broadcasts that were too late in the evening for some students. These were played for the students in the group setting.

9. Recordings were used to direct listening drills and students were instructed in taking notes from the recordings. What the students were not able to hear the first time on the tape could be played back.

10. Students utilized maps to locate countries and trace signal paths. Students utilized time schedules to determine the frequency and time in G.M.T. of broadcasts.

11. A geography class at Ellensburg High School in Ellensburg, Washington was selected. Students were from the ninth and twelfth grade.

12. Students were introduced to the radio.

13. Some students were selected to assist in putting up an antenna on the roof.

14. Students were given instructions in how to listen to international broadcasts and verify the reception of a station on a verification form.

15. Students were encouraged to write letters to broadcasters. One student received a reply from a broadcaster over the air.

16. Approximately six radios were used at one time in the group meetings. Students were encouraged to take radios home.

17. Meetings included six or more students for one hour. Groups met two times each week for about seven weeks.

18. In both the elementary and secondary groups, problems were noted in the programs.

19. A survey was conducted with shortwave users in the Ellensburg, Washington area. A questionnaire was distributed and the results were recorded. The results have been listed in the appendix.

20. A tape was made of various international broadcasters heard from Ellensburg, Washington. This tape has been included in the appendix.

21. After listening to Germany, Moscow, and Cuba, special speakers were selected to speak to both groups. A German refugee of World War II spoke with the elementary students, and a Cuban refugee from the 1980's Cuban expulsion spoke to the secondary group.

CHAPTER 4

Manual

Around the World Radio, A Teacher's Guide To Shortwave Radio In the Classroom, can be found in Appendix A of this project. The remaining Chapter 5 discusses the summary, conclusions, and recommendations of this project.

CHAPTER 5

Summary, Conclusions, and Recommendations

I. Summary

The purpose of this project had been the development of a manual for teachers interested in investigating the use of shortwave radio in the classroom. The writer tried to provide information that would clearly introduce the use of the radio to teachers and provide them with pertinent resource materials. Also, some ideas had been included in the appendix to assist the teacher in developing classroom activities with the radio.

II. Conclusions

The shortwave radio can be used as a teaching tool. The manual, AROUND THE WORLD RADIO, A TEACHER'S GUIDE TO SHORTWAVE RADIO IN THE CLASSROOM, is a tool that can be used to help the teacher use the shortwave radio as an educational resource. It is the hope of the writer that the manual will help the teacher understand the functions of the radio and how its use may be applied in an educational setting.

The shortwave radio can open up the world for students and teachers. The most important aspect of this is

developing an understanding of the world through the basic means by which we learn - communications. It is the writer's desire that, through the use of the shortwave radio, students and teachers can become more acquainted with the diverse world in which we live and how to objectively listen to it as it speaks.

III. Recommendations

The following recommendations have come about as a result of the writer's experience with the radio in the elementary and secondary classroom. These suggestions should be considered by all teachers, and adjustments should be made accordingly for individual situations.

1. Radios should be supplied with a digital frequency counter so that students can quickly and accurately find the frequencies of broadcasts.

2. It is advisable that in the classroom setting students use earphones with the radio or a headphone of some kind. This enables the students to listen privately.

3. Students should be instructed on the care of the radio.

4. The teacher may find it necessary to use a tape recording of broadcasts that, due to the time that they were aired, may not have been available to the student. If possible when recording, use the recorder plug on the radio for the best quality of recording. If a plug is not

supplied with the radio, put the mike close to the speaker and keep background noise to a minimum.

5. If you put up an outdoor antenna, make sure that all safety precautions are used. Lightning arresters and grounds are good safety insurance. Check with your building maintenance personnel.

6. It is much easier if each student has a radio for their own use. This may not be economically possible in some cases. Students, especially on the elementary level, should be encouraged to take a radio home. Sharing of "radio use time" may need to be planned in the event there is a shortage of radios.

7. Portable radios, radios that can use either the wall socket or a battery source, are the best for classroom and take home applications.

8. You will be listening to the "real world" when using the radio. In some cases, the ideology of you or your students, or the parents of your students, might not go along with what you might hear on an international broadcast. In some cases, listening to the viewpoint of governments that may not be democratic in nature, or actually hostile to the political position of your country, may be offensive to some of your students. BE PREPARED. Let your principal know of your intent to use the radio, and ask about any policy statements that may relate to this activity.

9. Watch carefully for students that may have trouble hearing the radio. This may be an indication of a hearing problem.

10. Learning centers go well with the shortwave radio. Be creative.

11. Encourage students to write letters to stations. Display their cards and replies.

12. Practice listening skills with the radio. Use Question Answer Relationships, Semantic Mapping, and other skill-building strategies with recordings of broadcasts.

13. Encourage your technically inclined students to help with antennas and equipment maintenance.

14. Encourage your students that have second language abilities to seek out broadcasts in their second language.

15. Keep on the lookout for used equipment at yard sales and through amateur radio operators.

16. Take advantage of the educational materials that are available for teachers through the stations around the world.

17. Check to see that the handwriting of students is legible and spelling is correct.

18. Encourage students to participate in radio contests.

APPENDICES

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APPENDIX A

Introduction

"I hate my geography lesson! It's nothing but nonsense and names. To bother me so every morning, it's really the greatest of shames. The brooks they flow into the rivers, and the rivers flow into the sea. I hope for my part they enjoy it, but what does it matter to me?"

This fragment of the poem, "The Geography Demon," is from a methods book for teachers dated 1916. Nothing has changed much since then; many students still hate geography lessons and many teachers are still trying to find "methods" to exorcise the "Geography Demon" out of these students.

At the risk of trying to provide another "method," I would like to introduce in this paper the use of shortwave radio in the geography curriculum. The shortwave radio can be successfully used as an impulse for study with whatever method the instructor would like to apply. It is the point of this paper to introduce the use of the shortwave as a means by which geographic information can be practically utilized by the student. The manipulation and "real" use of this geographic information is the primary goal of this project. The use of the shortwave radio should be

understood as the impulse for the student to achieve these goals.

What Is Shortwave Radio?

Shortwave radio is a means of broadcasting, like regular AM radio except the propagation of the radio signal can travel over much greater distances. You might have tuned in a distant station at night on your automobile radio. Basically, this is how shortwave radio works, but on the shortwave (SW) frequencies, the distance a signal may travel is generally much greater than on your AM receiver. In addition, SW broadcasters are not tied down to one frequency. This is important, because given certain atmospheric and solar conditions, radio waves propagate differently. The SW broadcaster is at liberty to adjust for these differences by changing his transmission frequency. As a result of this, the SW listener (SWL) has the opportunity to hear programs originating from all over the world at any time of the day.

For the most part, broadcasts that are aired on the SW bands originate with state owned radio stations. The broadcasts are directed or "beamed" to target areas in languages that are spoken in the target area or for a particular language group living in the target area. For example, it is not uncommon to hear the Deutsche Welle from Köln, West Germany broadcasting in English to North America or some section of the United States. Likewise, it is not

uncommon to hear Radio Deutsche Welle broadcasting in German for many of the German speaking listeners on the North American Continent.

These stations are not commercially structured, so there are no advertisements. However, recently there have been some commercial stations added to the SW bands. There are hundreds of international stations broadcasting in the SW bands.

What Can Be Heard on the Shortwave Radio?

There is a good deal of information published on the use of radio in the classroom. Much of this material deals with utilizing various programs of educational content. Much of this information is "dated," and in some cases goes back to the "golden days" of radio. This use of radio in the classroom is restricted to appropriate broadcasts and formats. For example, programs with specific educational themes, geography, science, or something of that nature might be appropriate. Except for "Public Broadcasting" and programs that are "made" for education, the regular AM and FM radio has little to offer in the content area for a classroom these days. It should be noted that when radio was "new," formats of that period were completely different than now. In fact, many of the programs from that era would probably be classified as "educational" in terms of today's programming. In those days it was not uncommon to hear classical music, opera, and theater all on the same

commercial station. All of these would have educational applications for today.

This little historic look at radio formats has been mentioned so that the reader can get a better understanding of the programs that can be heard on the SW bands. They are mostly all applicable for educational purposes, if not only for the origins of these broadcasts. Many are specifically cultural. The Voice of Free China, Radio Taiwan, broadcasts Chinese lessons complete with a free text for the listener. Many programs deal with modern music as well as classical and cultural music of the region. Radio Havana, Cuba is a good source for the music of the Caribbean. Of course, news is a primary staple of the SWL. The British Broadcasting Corporation is a highly rated news source. In addition, there are many news "feeds" that are provided to the networks via the shortwave bands. In this case, you might be hearing something that might not have made the "evening news" quite yet.

"Propaganda broadcasts" are also common. These might contain interview programs on international affairs or interviews with the "common person on the street." Both the Voice of America and Radio Moscow are noted for these types of programs. In some cases, the word "propaganda" may be too strong a word. A program of "National Public Relations" may be a more descriptive term for these.

In addition, there are other agencies and individuals that share these frequencies. You may hear the Strategic Air Command directing their jets, amateur radio operators, which are private broadcasters that can talk around the world. You might even hear a "spy" station, which is defined these days as a station that broadcasts a series of numbers with no identification of the station. It has been suggested that these might be intelligence operatives communicating with their agents. You may even hear jamming taking place on the "top" of some programs.

Shortwave broadcasts have changed much over the years. They are designed to catch the listeners attention and are continually updated to stay in vogue with the other broadcasters on the bands. However, every station has its own unique identity and all try to offer a good variety to the listener.

Applications of the Shortwave in the Classroom

Given the content of most shortwave broadcasts, it is easy to see how these might be adapted for use in the classroom. Comparative news studies can be done - see Appendix D. For example, a student may take a news story and compare how the story is presented by various broadcasters. Of course, many of the programs can provide a good resource on the culture of the country.

Using the programs on the shortwave bands for the sake of their content is certainly applicable for an educational

resource, but beyond this, the SW radio lends itself very well as a tool to teach other concepts. Broadcasters on the SW bands are very interested in who is listening to their signals. To stimulate written responses, most of these broadcasters offer a "reward" to the person who can verify in writing that they heard a particular broadcast for the station. The reward comes in the form of a small, (or in some cases, large) card. Known to shortwave listeners as a QSL card, these are usually beautifully designed cards showing pictures of the country of origin or some artistic or cultural work or event. These cards are highly prized, since many are collectors items. Some come with stamps of the country.

There is a process by which these cards can be obtained, and therein lies the key to the other use of the shortwave radio with the student. In order for a station to know that the program was indeed listened to, a reception report must be provided to the station containing the following information: the date and time in Greenwich Mean Time, the frequency and wavelength the station was heard on, a report on the propagation of the signal, (how well it came in), a little about the program which was listened to, and a little about the listener. The instructor should note the transferable skills that must be practiced in this exercise. Most of this information has direct application in any broad geographic study. See Appendix G.

It is up to the instructor how much elaboration on a particular item should be supplied to the student. For example, in the area of Physical Geography, a unit dealing with World Time transfers to the use of G.M.T., determining wavelength from the frequency of the signal lends itself in the physical sciences. An important and sometimes overlooked skill in listening to the station is simply that of listening. The report demands accurate reporting of places, names, and the content of the broadcast.

With younger students, finding the location of the station on the globe can provide for an exciting map exercise. The students may then judge the distance the signal must have traveled to arrive at their location.

All of the items mentioned that are required for the verification of a station have experiential significance for the student. Appendix G shows examples of verification forms. I drew these forms up and have used them successfully with elementary and secondary students. The students simply fill in the blanks and use the back if necessary. Giving an introduction on the form about the project and how it is being used allows the broadcaster to understand a little more clearly about the origin of the report. All of the necessary elements are there for a correct verification. It is up to the student to correctly fill in the information.

If they are successful in this exercise, they will be rewarded with a QSL card and possibly some other "souvenir" of the station. Plates I and II in Appendix B show some of the cards that the students in this project have acquired. Other than QSL cards, stations such as Radio Korea have sent small banners commemorating the coming Olympic Games in Korea. Radio station HCJB in Quito, Ecuador once sent out a miniature Shigra made by the Indians of Ecuador. It is used to carry items and is slung across the forehead. Radio Nippon Hoso Kyokai, Radio Japan, has produced and sent out some excellent maps. Many of the broadcasters, such as the B.B.C., are noted for their excellent maps.

The instructor should be aware that there are other educational materials published by these broadcasters, many of which are free upon your request. There is further technical information available and a good deal of cultural information also available. Some broadcasters, such as Radio Sophia, Bulgaria's, set up contests where the listener must write an essay on some question given over the air. I have participated in one from Sophia which required the listener to write an essay on Bulgaria's contribution to the peace and what your country receives in the way of products from Bulgaria. My efforts were well rewarded with a small subscription to an English Bulgarian newspaper and a variety of hardback books on Bulgarian Travel, Culture, and Revolutionary Poetry. The Soviet Union has recently been

asking listeners to send in their questions on a cassette tape. These questions are played back over the air and are answered by Soviet citizens. In some of the "mailbag" type programs, questions are selected and answered directly by an announcer at the station. Appendix J gives an example of a QSL received by a student.

With regard to educational materials, the teacher should realize that these stations provide these services to thousands of people. In some instances, it may take a few weeks to get a reply. Being patient and courteous is always the best policy when dealing with these broadcasters.

There is one other educational aspect to shortwave that is extremely practical. This is the availability to languages. For the student studying a language the radio is a tremendous source. For the teacher introducing language types the radio can also serve in this area. A good example of this is an experience I have done with my elementary class. Tuning across the dial you may find 20 stations broadcasting in 20 languages. I ask the students to compare the languages and try to recognize them by similarities in their sound and structure.

Although the students may not know the language, I have found that they have an interest in trying to figure out what language is being spoken. On one occasion, we listened to the repeated station identification of Radio Japan in Japanese. We tried to guess what was being said. When the

newscast came on we listened for English words in the Japanese phrasing. Although we learned little about the content of the broadcast, we did learn to hear how the Japanese language sounds. In fact, the students successfully verified N.H.K. and all received cards and stickers from Japan!

These are some of the benefits of shortwave radio for teachers and students alike. As will be shown, it is not difficult to get started in Shortwave Radio. Nor does it have to be expensive.

Obtaining a Radio

The shortwave radio may come in a variety of shapes and sizes. There have been many cassette tape recorders produced with the shortwave bands included in their AM and FM radio. Primarily, these types of radios are not very sensitive and are not made for serious SW listening. A few companies make radios specifically designed for SW listening. These can range in price (new) from 75 dollars to over 400 dollars. If, however, you are not interested in a new radio, you can usually find good older radios, which work very well, at very reasonable prices.

The one store that is familiar to almost all electronic consumers is Radio Shack. Radio Shack is a good source for SW radios, coaxial cable, and other supplies. However, in the past ten years, their SW inventory has dropped somewhat. A store which has been serving SW listeners for over 30

years is Gilfer in Park Ridge, New Jersey. They have a mail order catalog as well as a showroom. Their wide selection of radios, books, and equipment has made them very popular. See Appendix C for other suppliers.

There are a good number of older radios still around. Some of these are very well noted for their ability to pick up SW stations. The place to look for these are the yard sales of local ham radio operators. In most areas, each year the amateur radio operators have an event known as a "Hamfest." This usually consists of a gathering of area amateur operators and usually included on the agenda is a swap meet. Depending on the size of the meet, there is usually an ample amount of old radios to be sold at good prices. If you are interested in a meeting such as this, contact a local, active amateur operator. If you don't know of any in your community, try asking at the store that serves the electronic users in your area. Beyond finding a radio at these meetings, you might find an amateur that would be interested in speaking about their hobby to your class.

There are two types of SW radios. One style is a base unit which is meant to be used in a fixed location. The other style is a portable, see Plate III of Appendix B. It can be operated on batteries or AC power. For the classroom, I have found that a good portable is the most valuable. In some cases, stations that might be available

at night and not during school hours can still be listened to by the student if the student can "check the radio out" and listen to it at home. Another modern advancement which is very practical is a digital readout. This allows the listener to dial in the exact frequency of the station. If a student knows that a certain station will be broadcasting at 0400 GMT on 9.010 Mhz, then the student can wait for that time with the radio tuned exactly to that frequency. The older radios, and some new ones, with just the "slide rule" are not as versatile as this and not as accurate in their tuning abilities.

Slide rule dials and old radios still have a place, however, so don't discount the use of these older radios. Remember, if the students are using a radio which cost 200 dollars they will have to be trained to care for it. In the case of an old ten dollar used set, a scratch here and there won't be that serious.

Another advantage to the newer portables is that they usually come with a built-in whip antenna system. These whip antennas telescope into the case of the radio for storage. In most cases, this type of antenna will be adequate. If an outdoor antenna is used, signal reception will usually improve enormously. The older base radios usually require an external antenna of some type. Most of the newer portables have terminals on the back that can be attached to an external antenna.

An antenna need not be fancy. A wire attached to the radio and hung inside of the room, out of the way of the students, will usually suffice. However, in some schools, fluorescent lighting inhibits reception. An external antenna will be needed in this case. An antenna can be cut and tuned to the frequencies which you are listening to. This is rather involved and beyond the scope of this introduction. Books are available about building antennas. Building an antenna with students can be a rewarding project. An antenna project is listed in Appendix E.

Commercial external antennas are usually cut wires that may stretch 50 feet or more. They come with all the necessary parts to put them up. There are also "active" antennas available commercially today. These are antennas that are hooked to a signal amplifier. Some of these are used quite successfully in applications where space is limited and the signals are not being received suitably. The type of antenna needed will depend on the application, but in most cases, the whip antenna on the radio will prove to be sufficient.

Conclusions

In a few years, or maybe less, you will be able to communicate directly with a satellite through your telephone. You will be able to speak into the phone and direct a message to nearly anywhere in the world and have the message come out on a printed sheet. This will all take

place in an instant. The point here is to show how technology has made this geographic space we call our world much smaller. Radio has played a significant part in that technology. The shortwave radio is not much different. It makes our world a more accessible place and although shortwave radio is a type of "one way" communication, through this vehicle, thoughts and ideas are communicated over large geographic areas. The SW radio can become a practical alternative to being in these places.

Many students have a contempt for reading about a place that in the beginning they know nothing about. A text book, it has been said, can only provide for the reader what the reader can provide for the text. I feel sometimes that although students may read about a far off place or culture they don't believe that those places or cultures really exist. If there were some way that the student could really interact with these places, maybe then they could begin to appreciate the "realness" of these "obscure" places.

The SW radio can provide for this type of experience. My students have listened to Germany and the Soviet Union, and with that listening background, I have brought speakers from those countries into the classroom. Plate IV in Appendix B shows the students listening to a refugee from World War II. This ties in nicely after hearing about a country on the radio.

Most importantly, the SW radio can bring a sense of relevance to the geographic information a student may have to deal with in a class. This can provide a strong stimulus for the students to carry on their study.

The SW radio is not an easy way out of classroom management responsibilities. It takes a great deal of skill to organize information for the students and provide suggestions for them in their listening "expedition." However, the SW can be a tool for the teacher, and like a successful field trip, can help bring a little bit of reality to the classroom.

APPENDIX B

PLATE I

Students display their QSL cards on a bulletin board.

PLATE II

Fifth grade students display their QSL cards from Japan.

Please note: Photographs on this page have been redacted due to FERPA concerns.

PLATE III

Student using a portable radio on a desk.

PLATE IV

A special speaker from Germany discusses her travels. Students have listened to Germany and Moscow.

Please note: Photographs on this page have been redacted due to FERPA concerns.

APPENDIX C

Reference Materials

The Radio Amateurs Handbook, (41-3345), published by the Amateur Radio Relay League. Newington, Connecticut. 06111. The A.R.R.L. publishes a variety of books on the subject of amateur radio. Information on their materials are available from the A.R.R.L. offices and from many electronics outlets.

Popular Communications. (ISSN 0733-3315) 76 N. Broadway, Hicksville, NY 11801. This magazine is published monthly and is available at many newsstands. Subscriptions are also available. Popular Communications is an excellent magazine dedicated to shortwave listening and other forms of radio. Regular features deal with the history of radio, rare DX, utility, teletype, clandestine and QSL information. This magazine is also a good source for product advertising. P.C. regularly reviews new equipment.

Sparks Journal. Society of Wireless Pioneers. P.O. Box 530, Santa Rosa, California, 95402. The Sparks Journal is published quarterly. It is the publication of the Society of Wireless Pioneers which is an organization of individuals that have been involved with the early days of amateur and commercial radio. This paper is available to members and through some libraries. It contains historical information

on early radio communications. Editions are available on aviation and ship radio. It contains excellent historical photographs and stories.

Monitoring Times. (ISSN 0889-5341) Published by Lawrence J. Miller Publishing Co., 3 Lisa Drive, Thorndale, PA 19372. Mail to P.O. Box 691, Thorndale, PA 19372. This newspaper type magazine is published monthly and contains all kinds of information for the listener. It is an excellent source of international news about broadcasters and what has been heard on the bands. There are feature articles on new equipment and a classified advertising section.

Shortwave Propagation. By Stanley Leinwoll, published by Rider publications, New York. This text is an older book, copyright 1959, but it is still considered an excellent introduction to some of the technical aspects of radio propagation. It includes a section on forecasting propagation and also a time conversion chart.

Wire Antennas for Radio Amateurs. By William I. Orr and Stuart D. Cowan. Published by Radio Publications, Inc., Box 149, Wilton, Connecticut 06897. Although this book is published for the radio amateur, antenna theory in this text is treated in an interesting and unique way. Many applications can be drawn from the text for shortwave listening.

The World Is Yours. By Samuel R. Alcorn. Published by Gilfer and Associates, Park Ridge, New Jersey 07656. This paperback is an excellent source for the beginning shortwave listener. It covers a variety of topics and also lists frequencies and time schedules of various stations. This text is well written and easy to understand.

World Radio and Television Handbook. (TK-6540-W67) Published by Gennevilliers, France. In the U.S. by Billboard Publishing, Inc. 1 Astor Plaza, New York, NY 10036. This text, which is updated each year, contains information on Radio and TV stations around the world and listening information.

Selection of Equipment Suppliers

Alden Electronics. 40 Washington Street, Westborough, MA 01581. Alden sells a small weather chart recorder which can be connected to a shortwave radio. It will print out weather charts. The machine can be bought in kit form or ready to operate.

Electronic Equipment Bank. 516 Mill Street N.E., Vienna, VA 22180. 800-368-3270. E.E.B. is a national mail order firm. They list a wide range of radios, supplies, and literature.

Gilfer Associates, Inc. P.O. Box 239, 52 Park Avenue, Park Ridge, NJ 07656. 201-391-7887. Gilfer has been supplying equipment for the shortwave listener since the 1950's. They are a complete resource of books, radios, antennas, and other products useful to the shortwave listener.

The Grove Catalog. Grove Enterprises, P.O. Box 98, Brasstown, NC 28902. 800-438-8155. The Grove Catalog contains a good selection of radios, antennas, books and other electronic products.

MFJ Enterprises, Inc. Box 494, Mississippi State, MS 39762. 800-647-1800. MFJ manufactures antennas and also computer interfaces which can be used with the shortwave radio to receive teletype. They also produce a wide range of antenna tuners.

All of the above suppliers offer catalogs of their products.

APPENDIX D

Listening and News Logs

Students keep a LISTENING LOG of the stations that they hear. If the student would like to verify the station later, the information will be available for them in their log. In the listening log, it is important to be accurate and neat so that other people can understand the log. Details of the programs should be kept accurately. The spaces on the log in the appendix may not be big enough for some students, so a modification may be necessary. Under the G.M.T. listing it is important that the students list the time, from beginning to end, of the program that they heard.

A NEWS LOG is not a listening log. It is a log kept of the top stories of each day over a period of days. Modifications may be made to this log by keeping a separate log for each station received. Comparison studies can then be done between stations. The lead or top story of the day (the broadcast) is written down under "top news story." After six months the student can look back at the current events of that period and have a concise record of the stories.

Both of these projects help manipulate the cognitive, affective, and psychomotor domains. Out of this and listening to the radio, note taking skills can also be developed.

LISTENING LOG

STATION	DATE	G.M.T.	S.I.N.P.O.	PROGRAM

NEWS LOG

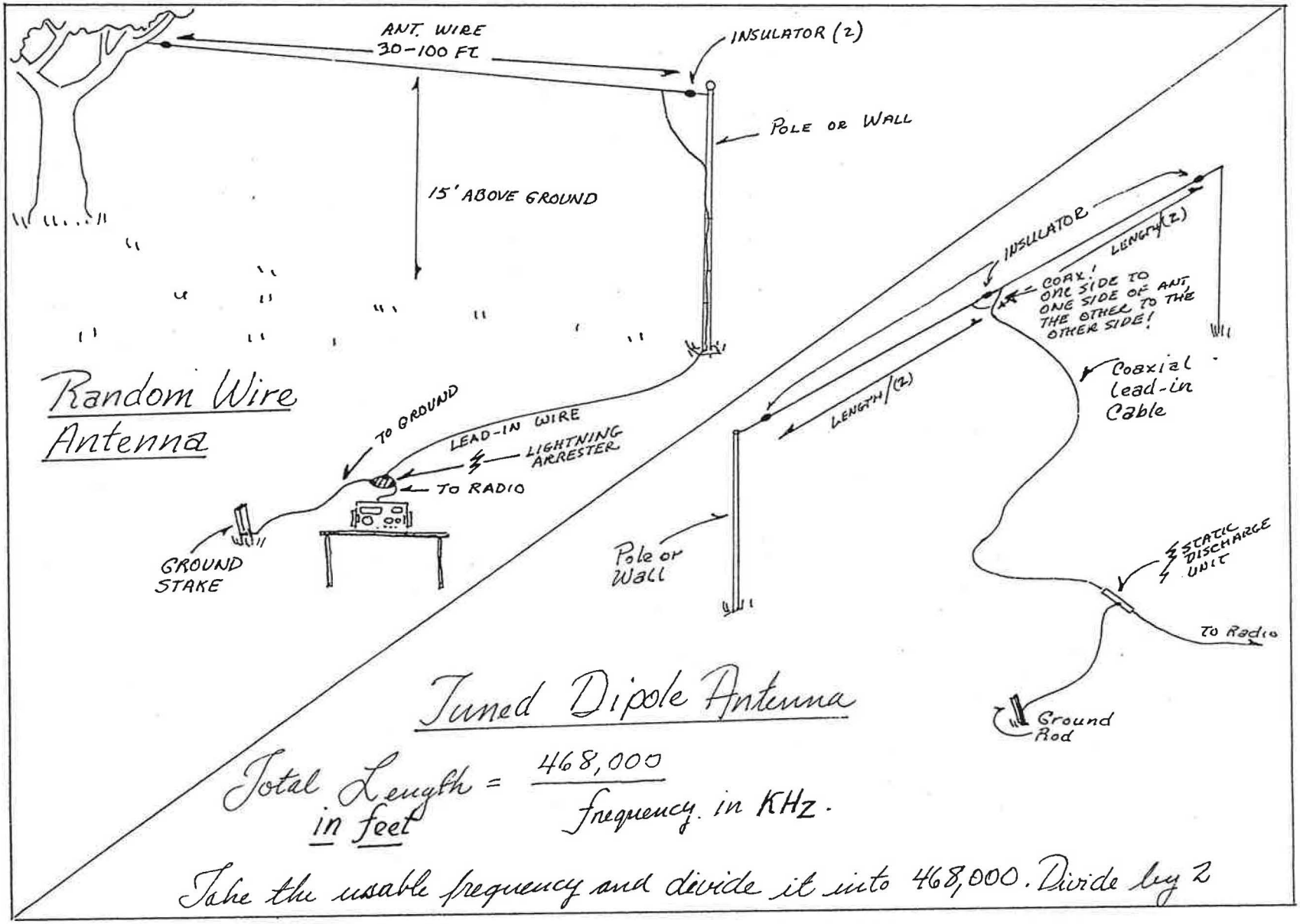
Station/Time/Date	Top News Story

APPENDIX E

Building An Antenna

The diagram on page 50 shows two kinds of antennas. The RANDOM WIRE ANTENNA is simply an antenna built at a random length. The TUNED DIPOLE ANTENNA is actually an antenna that has been cut to a particular frequency, then cut in half. The formula in the diagram provides the overall length of the antenna in FEET. Using a tuned antenna provides good reception on the specific frequency that it is cut for. The antenna can also be used on other frequencies. In building an antenna, use strong wire, preferably copper. Bell wire makes a good antenna. Insulators should be porcelain, glass, or plastic. Antenna insulators can be made from clear plexiglass.

Students that are interested in electronics and building things are usually interested in a project like this. It is advised to make sure that all the necessary safety factors are considered before putting up the antenna.


ANT. WIRE
30-100 Ft.
INSULATOR (2)
POLE OR WALL
15' ABOVE GROUND
Random Wire Antenna
TO GROUND
LEAD-IN WIRE
LIGHTNING ARRESTER
TO RADIO
GROUND STAKE
INSULATOR
LENGTH (2)
COAX: ONE SIDE TO ONE SIDE OF ANT, THE OTHER TO THE OTHER SIDE!
Coaxial lead-in Cable
LENGTH (1)
Pole or Wall
STATIC DISCHARGE UNIT
To Radio
Ground Rod
Tuned Dipole Antenna
Total Length in feet = 468,000 / Frequency in KHz.
Take the usable frequency and divide it into 468,000. Divide by 2

Electronic Formulas

1. To convert a given frequency to its wavelength in meters:

300/Frequency in MHZ = Wavelength in Meters

Example: Find the wavelength of 3750 KHz.

Step One. Convert 3750 KHz to MHz by dividing by 1000.

Step Two. Divide 300 by 3.75 MHz.

Answer: 80 meters. The wavelength of 3.75 MHz is 80 meters. We say that 3.7 MHz is in the 80 meter band.

2. To convert a wavelength to a frequency:

300/Wavelength in Meters = Frequency in MHz

Example: Find the frequency of a wave having a wavelength of 49 meters.

Step One. Make all conversions.

Step Two. Divide 300 by 49 meters.

Answer: 6.12 MHz. We say that the center of the 49 meter band is located at about 6.12 MHz.

3. To determine the length of a half-wavelength dipole antenna in feet:

468,000/Frequency in KHz = Total Length of Antenna

Divide total length by 2 to get the length of one side.

Example: Find the length of a dipole for a frequency of 3.75 MHz. in the 80 meter band.

Step One. Convert 3.75 MHz to KHz by multiplying by 1000.

Step Two. Divide 468,000 by 3750 KHz.

Answer: 124.8 Feet.

Step Three. Divide 124.8 feet by 2.

Answer: The length of each side of the dipole antenna will be 62.4 feet long. The overall length of the antenna will be 124.8 feet.

APPENDIX F

Listening Strategies

By using the programs from the shortwave broadcasts you can develop listening skills and note taking skills for the student. In this way, not only the content of the broadcast but also the process of hearing it will benefit the student.

A listening guide can be quickly developed by the teacher from a recorded broadcast. For example, a special program on Chinese Culture is broadcast on Radio Taiwan. The teacher would record the program and develop an outline from the material. This outline would be structured so that students could fill in important points of the broadcast. This provides the teacher with full control over the use of the broadcast. Important elements of the broadcast would be stressed. Vocabulary could be included.

As students listen to the broadcast, whether in a group or individually, they must fill in the listening guide. Students begin to see the important concepts of the program and begin to develop note taking skills.

Listening Guide

Program - There Are Two Chinas

Instructions: Play the tape. While listening to the program, listen for the main points that have been listed in this guide. Fill in points or concepts under the main headings that you feel are important and related to the main concept.

1. OUT OF EVERY FOUR PEOPLE ON EARTH, ONE IS CHINESE:

_____

_____

_____

2. ECONOMIC LIFE IN CHINA IS CHANGING:

_____

_____

_____

3. CHINA'S CIVILIZATION BEGAN TO DEVELOP ABOUT 1200 B.C.:

_____

_____

_____

Questions and Answers

The Question-Answer Relationships, or QAR strategies, can be developed very nicely with the content of a shortwave radio broadcast. Again, the program must be taped so that the teacher can develop the various levels of questions from the broadcast for the students. The process allows students to understand various levels of questioning and develop skills in answering questions at various levels. Teachers would develop questions that can be answered by listening to the material and actually hearing the information verbatim. Students are given the questions beforehand. Regarding questions that have answers heard verbatim, students should be directed to listen for information that may lead up to the answer. They must begin to anticipate an answer is coming from the information that they are hearing.

A second level of question requires the students to relate information in the broadcast to the answer. The answer is not verbatim in this case. A third level of questioning would require an answer that the student would relate to their personal experience.

There are many texts that describe these strategies. One text recommended is Content Area Reading, by Richard and Joan Vacca, published by Little, Brown and Company, Boston.

Q.A.R.: There are Two Chinas

Instructions: Before playing the tape, look through the questions carefully. The questions that are marked, * mean that the answer will be HEARD directly in the broadcast. Questions marked, ** mean that the answer will take some careful listening. Questions with, *** mean you will have to listen and take some of your own experience to answer the question.

1.* What two countries are larger in area than China?

2.** What economic plans are in store for Mainland China?

3.*** Could you relate the peasant farming in Mainland China to wheat farming in the United States?

(The program in these examples is fictitious.)

Directed Thinking

Using tape recorded news broadcasts, the teacher can introduce the subjects of the broadcasts and then provide a forum for the students to think beforehand about editorial comment and points that might or might not be made. This process is especially adaptable to news programs that have some editorial structure.

An example might be a news program from the Soviet Union. The first step would be for the teacher to take the major points of the program and list them. Develop questions that would ask the students, what do you think the story will be about and why? Play the story. Students

should respond to their predictions. The students should be encouraged to support their positions with verifiable information.

APPENDIX G

Outline of Verification Information

1. Name
2. Address, Zip *
3. Date
4. Time of reception, G.M.T., (U.T.C.)
5. Frequency of the signal in MHz and possibly the wavelength.
6. S.I.N.P.O. Code
7. Receiver and antenna type
8. Overall weather
9. Information on the program. Names of announcers, programs. Brief paragraph or two on content.
10. Comments and questions you might have.

* The students will find the latitude and longitude of their school or listening post using the 7.5 min. U.S.G.S. map. This information can be included in the address.

The following are two examples of forms that can be made by the teacher for the students. Note the lines lightly drawn in on the second form. This helps with students' handwriting.

This verification form is coming to you from the Shortwave Listening Project at Ellensburg High Schhol in Ellensburg, Washington in the United States of America. We are students from the Senior Class World Geography Class. The purpose of this project is to get to know the cultural and physical geography of other lands. We hope that this information will help your station and it will be adequate for a possible QSL card from your station.

Special teacher/advisor: Mr. Myles Mustoe Jr. Central Washington University, Ellensburg Washington, U.S.A., Department of Education. (Geographic Ed.)

To Radio Station:

From:

Student Address:

Date of Reception:

Time of Reception: G.M.T.,
Local Time.

Frequency of Signal in MHz.:

Frequency in Wavelength:

S.I.N.P.O. Code: S.____I.____N.____P.____O._____

Our Weather:
Our Radio,

Antenna used:

What I heard and questions I have:

Verification Form

This verification is coming to you from the Shortwave Listening Project at Grant School in East Wenatchee, Washington in the United States of America. We are students in grade five and grade three interested in the Physical and Cultural Geography of other lands. We hope that this information will help your station and that it will be good enough to receive a Q.S.L. card from your station.

Special teacher/advisor: Mr. Myles Mustoe Jr. Central Washington University, Ellensburg, Washington, U.S.A., Geographic Education.

To Radio Station:
Student.

----------Address:
Grant School 1430 1st S.E.
East Wenatchee, Washington, 98801
United States of America.

Date of Reception:

Time of Reception: G.M.T. Local time.

Frequency of Your Signal in MHz:

Frequency in Wavelength:

S.I.N.P.O. Code: S.__I.__N.__P.__O.__
Our Weather:
OUR RADIO, ANTENNA:

What I heard and questions I have:

Wenatchee is located at about 47°24'N, 120°18'W. Fruit growing area, 10 inches of precipitation per year.

APPENDIX H

Telling Time In G.M.T.

G.M.T. means Greenwich Mean Time. It is time measured from the Prime Meridian or 0° longitude. This longitude line runs right through Greenwich, England. When you say that it is 0100 hours G.M.T. you are actually saying that it is 1 A.M. in Greenwich. This is considered world time.

G.M.T. is given in 24 hour time. That is, the A.M. and P.M. is missing. 12 midnight in 24 hour time is 0000 hrs. (pronounced zero hundred hours). 12 noon is pronounced 12 hundred hours or 1200. The numbering continues from 12 noon to midnight in hundreds. Thus, 1300 hours would be 1 P.M., 1500 hours would be 3 P.M. and so on.

To find G.M.T. you simply count back or forward the number of time zones that you are away from Greenwich. This has been worked out on the following chart. Simply subtract or add the amount of hours to G.M.T. to get local time. G.M.T. is always based on standard time. If you are WEST of the Prime Meridian up to 180° Longitude, you subtract the number of time zones between you and Greenwich from G.M.T. to get local time. If you are EAST of the Prime Meridian up to 180° Longitude, you would add to the G.M.T. time to

obtain local time. To get G.M.T. time, it follows that the inverse procedure would be used.

To use this chart, first find a location in your time zone listed below. Note, this list does not include all of the world time zones. Add to or subtract FROM G.M.T. to obtain your local time.

Greenwich	0,	Nome	-11
Vienna	+ 1,	Fairbanks	-10
Johannesburg	+ 2,	Whitehorse	- 9
Moscow	+ 3,	Seattle	- 8
Singapore	+ 7,	Denver	- 7
Hong Kong	+ 8,	Chicago	- 6
Darwin	+ 9,	New York	- 5
Melbourne	+10,	Halifax	- 4
Solomon	+11,	Godthab	- 3
Marshall Islands	+12,	Azores	- 2
		Rio de Janeiro	- 1

APPENDIX I

The SINPO Code

The SINPO or SINFO code is a simple and quick way of providing the broadcaster with an indication of how well the signal that they sent was received. This information is extremely valuable to the broadcaster and it is vital in any verification or reception report if the listener is interested in receiving a QSL card. The broadcasters use this information to develop strategies about when and how they want to deliver broadcasts.

Simply stated, "S" stands for signal strength, "I" for interference, "N" for noise, "F" or "P" for fading or propagation, and "O" stands for the overall rating. The scale is based on the numbers one through five - 5 being excellent, 4 good, 3 fair, 2 poor, and 1 unusable. For example, a 55555 is a perfect signal. A 32132 is marginal. Interference refers to interference from other stations; these may be close in frequency or some other kind of human induced interference. Noise refers to natural noises from the atmosphere - lightning, for example.

APPENDIX J

QSL Examples

The following is an example of a letter received by a student. The student sent in a verification form with a question about the Soviet Union. The answer was sent back to her over the air. On the following page, a copy of the QSL card she received with the letter has been supplied. Note, the card was in color and it was drawn by a student from the United States.

МОСКОВСКОЕ РАДИО

СССР, Москва, Радио

Melanie Warne
c/o Mr. Myles Mustoe

USA

Moscow, the USSR

June 29th, 1987

Dear Melanie,

Thank you for writing to us. We are glad to verify your reception report with our QSL card. As you say you enjoy our programmes, we enclose our current programme and frequency guide for your convenience.

We are going to answer your question about whether Soviet people can say what they think about their government in our daily feature INSIDE REPORT on July 22nd at 02.30, 07.30, 12.30, 16.30, 19.30 and 22.30 GMT/UTC. Hope you will be listening at one of these times.

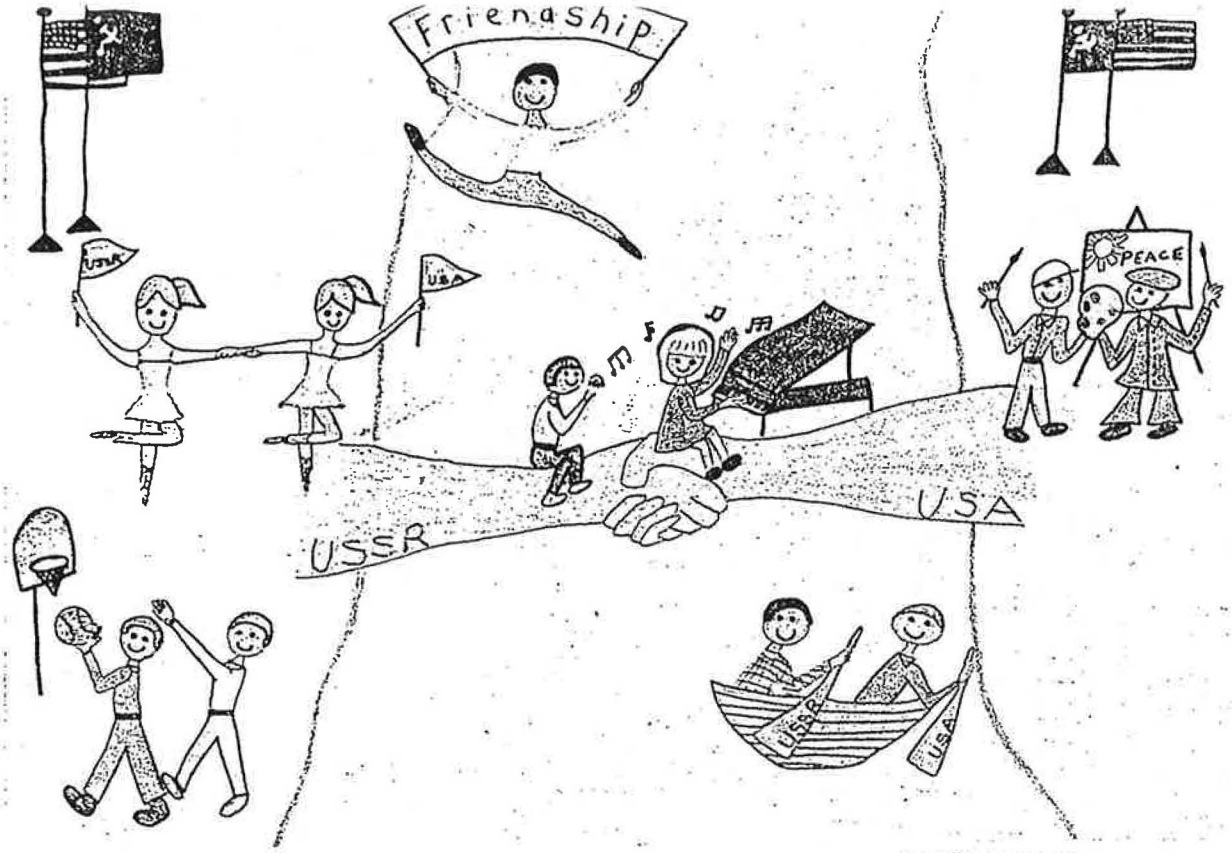
Further letters and reports from you are welcome.

Wishing you good listening,

Sincerely yours,

Olga Milyaeva(Miss)
World Service
Letters Department

Тип. ГКТР Зак. 2347



РАДИО МОСКВА

RADIO MOSCOW

Dear Melanie,

This verifies your report on the reception of Radio Moscow's broadcast in English

Date 22.5.87

Time 18.45 GMT

Frequency 25 m.b.

Best wishes from
Radio Moscow

* * *

This poster was drawn by an American school student Sherry Lynn Biedrzycki of Milwaukee, Wisconsin.

Sherry thinks that "if the children of our countries can become friends, in ten years, when we grow up, we won't have to be afraid of war!".

Sherry Lynn first became known in the United States and then in the Soviet Union for the song she wrote titled "We Can Walk in Peace". This song won the Aaron Copland International Composers Contest Award in 1987 and a year later it was heard in the Soviet Union. Sherry's call for peace was warmly received by the Soviet people.

APPENDIX K

A Partial List of Broadcasters

Note: This list is by no means complete. A good source of broadcasters is The World Radio and Television Handbook.

Radio Australia, Box 428 G., Melbourne, Australia.

Radio Sofia, 4 Dragan Tzankov Blvd., Sofia, Bulgaria.

Radio Canada International, P.O. Box 6000, Montreal, H3C 3A8 Canada.

Radio Havana, Cuba, Apartado 7062, Havana, Cuba.

Radio HCJB, Quito, Ecuador, HCJB Casilla 691, Quito, Ecuador.

Deutsche Welle, P.O. Box 100444, D-5000 Koln 1, Germany.

Radio Nederlands, P.O. Box 222 1200 JG Hilversum, The Netherlands.

Radio Japan, NHK, Tokyo 150 Japan.

Radio Korea, KBS, #18 Yoido-Dong Youngdungpo-Gu, Seoul 150, Korea.

London, The B.B.C. Bush House, Strand, London, W.C. 2.

Radio South Africa, P.O. Box 4559, Johannesburg, 2000.

Swiss Broadcasting, SBC, CH-3000 Bern 16, Switzerland.

Voice of America, Washington D.C. U.S.A. 20547.

Voice of Turkey, T.R.T. Mithatpasa, Cad. 37 Ankara, Turkey.

Radio Moscow, Moscow, U.S.S.R.

APPENDIX L

Program Examples Listened To In Ellensburg, Washington

The cassette tape contains a selection of broadcasts from various international broadcasters. These signals were received on a small portable General Electric World Monitor receiver. The antenna used was the supplied telescopic whip. AC power was used. The programs on the tape are just a small selection of what is available on the shortwave bands.

Side One

1. Voice of Free China, Portions of the People at Work and Spotlight programs broadcast, February 16, 1987. The SINPO rating for this broadcast is about 44434. Notice the fading in and out. This is probably caused by ionospheric disturbance. The R.O.C. broadcasts some very interesting programs, including a Chinese language program. Notice the unique presentation style of the announcers. These programs give a good idea of how the international broadcasters are trying to develop attractive programs. Also notice the interference from stations on close frequencies.

2. The Radio Japan tuning signal. Notice that the identification is given in Japanese and English. An introduction to their programs in Japanese. A considerable amount of noise is heard on this broadcast. A portion of the Science Today program, a news program follows. Date unknown.

Side Two

2. It is common on shortwave radio for the news headlines to be broadcast first, then the news is broadcast in more detail. In some cases a review of the headlines is supplied after the main news. This is the continuation of the Asian News from Radio Japan

3. Radio Havana Cuba, another strong station broadcasting into North America. Notice the modern music. The first song, "Living on the Front Line," is performed by a group from Guyana. The song leads into a special program on relations between Guyana and Cuba. Radio Havana has a good deal of cultural music. This broadcast was received on February 26, 1987.

4. WWV, Fort Collins, Colorado. Received at 12:30 at night, July 19, 1987.

5. A "spy number" station. These stations can be heard at certain frequencies broadcasting five letter groups. They have been linked to "covert" intelligence operatives broadcasting messages. However, this is still speculation.

These broadcasts can be heard in Spanish and other languages.

6. This is a section from a program on HCJB, Quito, Ecuador. Notice the tuning signal "under" the broadcast. Do you recognize the tune which is being played? It is "Waltzing Matilda", which is the tuning signal for Radio Australia. HCJB has all kinds of programs available, even some on stamp collecting. HCJB is a highly respected station. Its main format is Christian broadcasting.

7. One of the tuning signals of Radio Moscow and an excerpt from a program interviewing travelers in the Soviet Union. Radio Moscow has a wide variety of programs. Many programs interview citizens of the Soviet Union. Radio Moscow encourages people to write the station. In some cases, their questions will be answered over the air.

APPENDIX M

Survey of International Shortwave Stations Heard in Ellensburg, Washington Area - April 1987

By Myles Mustoe for

Geography 596

Professor Otto Jakubek

Purpose of the Survey

This survey has been conducted to provide educators that are interested in using the shortwave radio in their classrooms a glimpse of what stations can be heard on the radio. It also provides an idea of some of the costs involved in listening. In addition, comments from the survey participants have been recorded to provide an indication of how each radio user is benefitting by listening.

Location of the Survey

The boundaries of this survey were set to include all of Kittitas County in the central part of the state of Washington. However, except for one questionnaire which originated in Thorp, a town about five miles northwest of Ellensburg, all of the responses to the survey were generated from in and around Ellensburg. Ellensburg, which has a population of about 13,000, is the county seat of Kittitas County. It is situated in the Yakima River valley about 30 miles north of Yakima. Hills and mountains surround the town on all sides. The major range to the west and north is the Cascade Mountains. Elevations here climb rapidly, averaging about 5,000 feet within 40 miles of the city. To the north and east, the Wenatchee Mountains rise at Colockum Pass, about 25 miles out of town, to 5,373 feet. The Yakima Ridge, the Saddle Mountains, and the Boylston

Mountains lie to the south with elevations of nearly 3,000 feet.

These physiographic conditions have not hindered shortwave radio reception in the area, as the survey indicates. In and around Ellensburg, a good deal of the radio frequency generating appliances that one would find in any densely populated area can be found. This includes medical equipment, automobiles, light, power lines, and others noted for their ability to create noise for the shortwave listener. It follows that areas further away from this interference should have "quieter" band conditions for listening. The survey indicates what can be heard given these conditions.

Respondents to the Survey

The survey was directed to amateur radio operators in the area as well as those interested in just shortwave listening (SWL). Twenty surveys were distributed and only seven responses were received. The problem here was basically the number of SWL in the area. There are a good number of amateur radio operators in the valley, but many do not listen to shortwave. However, four of the seven respondents were, or had been, radio amateurs. The rest were strictly shortwave listeners.

Four of the respondents were instructors at the local university, one of which indicated his use of the shortwave radio in classroom settings. A few of the respondents had

indicated some technical background in electronics. The amateur radio operators would naturally have some electronic experience.

The Survey

The following is a tabulation of the results of the survey. Comments from the respondents have been listed with the type and approximate cost of the radio that was used by the respondent. A list of the stations the respondent heard follows. This should give the reader an indication of the wide variety of stations that can be heard and the type of radio these stations were heard on.

1. Types of Radios: Four base type models (AC operation only) and three portable radios (AC or DC) were reported being used.

2. Condition of the radio at acquisition: Four obtained the radio new, two were used.

3. Cost of the radio: Two obtained a radio from 0 to 50 dollars, three indicated their radio cost $50 to $100. One indicated a radio valued over $150.

4. Types of antennas used: Three indicated they were using the existing "whip" antenna on the radio. One indicated an indoor wire loop. Three indicated some form of outdoor wire.

5. Amateur or SWL: Four of the respondents were SWL and amateur radio operators. Three were strictly SWL.

Survey Outline

Respondent 1

Radio: Hallicrafters SX-71/Used from $50 to $100/Antenna: Outdoor Wire.

Comments: Benefits of listening, "Useful to learn about other cultures this way and how they interpret world events. Not a regular listener, occasionally will tune in to see what is happening." No log report.

Respondent 2

Radio: Hallicrafters S-107/New, $100 to $150/Antenna: Indoor Wire/No comments.

Log: PLACE, TIME, SIGNAL/Moscow, evening, excellent; Sweden, eve., good; West Berlin, eve. good; East Berlin, eve., good; Jerusalem, eve., fair; Havana, Cuba, eve., fair; Brazil, eve., good; Ankara, Turkey, weak-fair; Netherlands, eve., excellent; Norway, eve., fair; Quito, Ecuador, eve., good; London, B.B.C., eve., fair-good; Voice of South Africa, eve., good-excellent; Taiwan, R.O.C., eve., fair-good; Peoples Republic of China, eve., fair.

Respondent 3

Radio: R.C.A. 9-T/New in 1937, $50 to $100/Antenna: Outdoor Wire.

Comments and Benefits: "Original use of the radio was of a technical nature. My studies and use of shortwave radio were mainly to improve my technical knowledge and skill to obtain Federal Communication Licenses to become a marine

radio operator, first in 1937 and continuously for R.C.A. Communications, until I retired in 1970. First ship was the W.M. Tupper belonging to the Santa Rosa S.S. Company; other ships were Lakina, belonging to Alaska Steamship Company, S.S. Mt. McKinley, S.S. Columbia, and S.S. Aleutian."

Log: All of the following have been heard during the day and evening on regular occasions: U.S.S.R., Radio South Africa, British Broadcasting Corp., Radio Netherlands, Radio Germany."

Respondent 4

Radio: Zenith-Wave Magnet/Used, $0 to $50/Antenna: Whip on radio.

Comments and Benefits: "I haven't listened to SW in a long time; I monitor 146.670 on the scanner. I listened to SW when I was in the Navy, especially in the Far East."

No log.

Respondent 5

Radio: Sony ICF 7600D/New, Over $150/Antenna: Telescopic Whip.

No comments.

Log: All stations received in the evening hours, all signals are of excellent quality; Radio Netherlands, news; Radio Germany, news; Radio Australia, agriculture, local music and readings; Radio Moscow, news; Radio Havana, Cuba, news; Radio Free China, Taiwan, news, language session,

cultural information; Radio Canada, news; Canadian history stories.

Respondent 6

Radio: Sears Silvertone Model 6436, about 1939 vintage/Used, $40/Antenna: Wire loop indoors.
Comments and Benefits: "I listen mainly for news and feature stories. My favorite stations are B.B.C. and Radio Netherlands, followed by Radio Deutsche Welle."
Log: All signal strengths reported are excellent except moderate signals from Radio Beijing and Radio France International. All signals received in the evening.
Stations: Radio Netherlands, news; British Broadcasting Corp., news and feature programs; Radio Germany, Radio Havana Cuba, Radio France International, Radio Beijing (Mainland China), Radio Free China, Taiwan, Radio Canada International.

Respondent 7

Radio: Sony, Model ICF-4900, (pocket radio)/New, $50 to $100/Antenna: Telescopic Whip.
Comments and Benefits: "I use shortwave in two college classes: Social Problems (Soc. 101) and Soviet Society (Soc. 398). In social problems I want to make students aware that they can find out much about the U.S.S.R. on their own without depending on the American press. They can listen and decide for themselves. They are amazed to find another world in SW of which they never knew. I use an

amplifier so that the whole class can listen. I have to hold the radio against the classroom window, however, to improve reception in the INSB building. In my Soviet Society class, we spend somewhat more time listening to SW to gain as much information about the society as possible. The class picks up on details and nuance that are not ommunicated in the daily press."

Log: Radio Moscow, day and night, news and features; B.B.C., day and night, news and features; Deutsche Welle, night, news and features; Deutsche Democratic Republic, night, news, features, and German language; Radio Australia, night, news; Voice of America, day and night, news and features; Radio Japan, days, news; Radio Beijing, days, news; Radio Havana, Cuba, night, news; Armed Forces Radio and Television Service, day and night, news; Radio Canada Inter., night, news and features.

Conclusions

Although the response of this survey was small, it did indicate something about the users and their uses for the shortwave radio. Some of these people were introduced to shortwave radio as a result of their technical interests. One of the participants had been involved with commercial communications since the 1930's. At 82 years old, he was still listening to shortwave and stayed active in the technical area.

Other users were associated with amateur radio and some were just listening to the shortwave bands. It is interesting to note that all of the comments received made reference to the educational aspects of the hobby, keeping up with news, learning about various cultures, and keeping up on language skills. The use of the shortwave in the classroom setting for a college level class in Soviet Society indicates the flexibility of the programming on the shortwave bands.

The survey indicates a good variety of stations that can be heard from the Kittitas Valley. These stations broadcast in English, German, Russian, Chinese, Japanese, Spanish, and other languages. It is also interesting to note that the equipment used in listening to these stations is not elaborate. The cost of the radios was marginal, with five of the seven radios at $100 or less.

Central Washington University

Department of Geography and Land Studies
Shaw/Smyser 110
Ellensburg, Washington 98926
(509) 963-1188

April 17, 1987

Survey of Shortwave Listening in the Kittitas Valley

Dear Shortwave Listener,

Can shortwave broadcasts be used in an instructional setting? What countries and types of programs can be heard from the Kittitas Valley? What are the costs involved in picking up these stations?

The answers to these questions may help determine the feasibility of using shortwave radio in the schools. Those who know about shortwave radio the best are those who listen to it. As an SWL'er you can help provide some answers by filling in the accompanying questionnaire and station log. This survey is being conducted in partial satisfaction of the requirements of Geography 596, individual Studies in Geography, under the supervision of Prof. Otto Jakubek. Your help is sincerely appreciated.

If you would like to have more information on this project, please feel free to contact me at home.

Yours sincerely,

Myles Mustoe (KA 7 GQB)

Home Phone: (24 hrs.) or on the Mission Ridge Repeater 146.67 Mhz. around 0600 to 0900 P.D.T.

Special Instructions for the listening log. STATION. List name of country. WAVELENGTH. Give wavelength in meters. TIME OF RECEPTION. Check one, "DAY" or "NIGHT." SIGNAL. Check one number indicating overall signal strength "1" being the least and "5" the strongest. LISTENING TIME. Check "REG." if you listen to the station regularly and "OCCA." if only on occasion. CONTENT OF PROGRAM. Give, in a word or two, a little about the program news, cultural music, foreign language, etc.

Survey of International Shortwave Stations Heard in the Ellensburg, WA Area
April 1987

Please fill in the blanks or circle the letter of the best answer.

1. *Make and model of your SW radio.*_____

2. *Type of radio.*
   A. *Base.*
   B. *Portable.*

3. *Condition at acquisition.*
   A. *New.*
   B. *Used.*

4. *What was the cost of the radio?*
   A. *$0 to $50.*
   B. *$50 to $100.*
   C. *$100 to $150.*
   D. *Over $150.*

5. *What type of antenna do you use?*
   A. *Whip.*
   B. *Indoor wire.*
   C. *Outdoor wire.*
   D. *Other, explain at left.*

_____

6. *What fits you best?*
   A. *SWL only*
   B. *Amateur and SWL.*

7. *Comments you have about the programs and how you benefit from them, please use back.*

8. *List the International shortwave stations you have listened to on the log on the next page.*

International SW Stations Received from Ellensburg, Washington *

TATION	WAVELENGTH	TIME OF REC.		SIGNAL 1 - 5					LIST. TIME		CONTENT OF PROGRAM
		DAY	NIGHT	1	2	3	4	5	Reg.	Occa.	

* *For specific instructions on filling out the log, please see the bottom of the Cover letter.*

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