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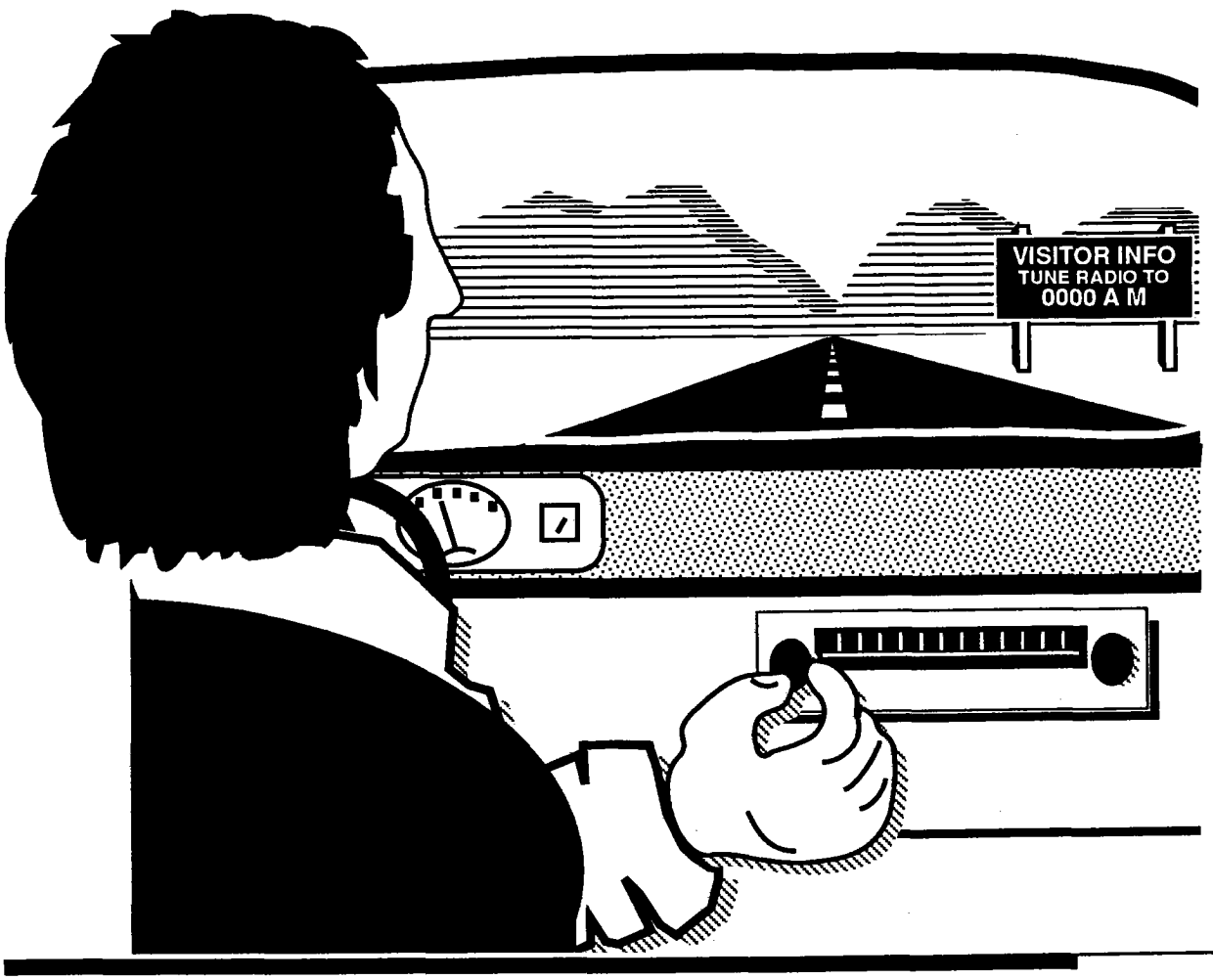
# Low Power Radio

## A New Communication Method for Reaching Target Audiences




OREGON STATE UNIVERSITY EXTENSION SERVICE

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The Extension Sea Grant Program, a component of the OSU Extension Service, provides education, training, and technical assistance to people with ocean-related needs and interests.

# Low Power Radio

## A New Communication Method for Reaching Target Audiences

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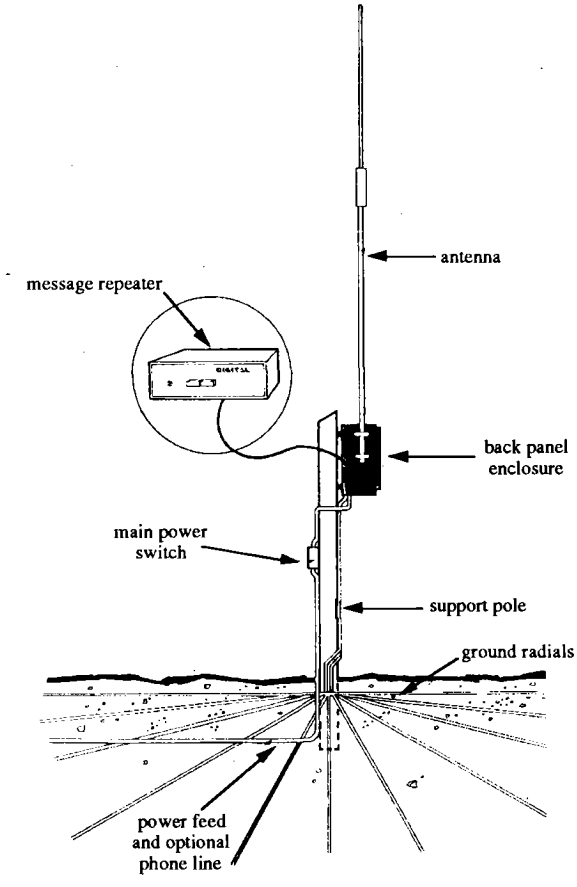


Components of a low power radio system. (Adapted with permission from Digital Recorders, Inc.)

Rapid progress in communication technology is enabling us to deliver customized information to diverse audiences at their convenience. One tool growing in both popularity and use is low power radio.

Low power radio (LPR) is a specialized form of AM radio broadcasting. This technology made its debut in the 1970s to provide reports about traffic and weather conditions to automobile travelers. Since then, hundreds of LPR stations have been successfully dispensing information across the nation. Operators of LPR stations include communities, airports, chambers of commerce, governmental agencies, ports, outdoor recreation areas — even Disney World!

This report describes LPR technology and suggests ways for Extension educators and cities, parks, businesses and other governmental units to provide information and education to audiences they wish to reach. A representative listing of LPR equipment vendors appears in Appendix B.

## What is Low Power Radio?

Low power radio is a low-wattage radio station which broadcasts on AM frequencies. It is relatively simple to use and inexpensive to operate. Low power radio typically covers a broadcast area of one to fifteen square miles, depending on signal strength and local terrain.

It has four basic components: an audio recorder to capture and repeatedly play back voice messages; an antenna; an AM radio transmitter; and, roadway signs alerting potential listeners to the radio broadcast. (See diagram on page 1.)

Low power radio transmitters fall into two categories: systems operating with 0.1 watts output or less; and, systems operating between 0.1 watts and 10 watts of power. While both can deliver targeted information to listeners, each has different capabilities and legal requirements.

*0.1 Watt Station*

The least powerful LPR station broadcasts with 0.1 watts of power, covering a radius of up to 0.5 mile from the transmitter. This station's limited broadcast range is offset by increased flexibility in use. Licensing is not required for this station under U.S. Federal Communications Commission (FCC) rules.

The broadcast frequency for an 0.1 watt station may be chosen from among the unused AM channels in the local area. No public notification is needed and almost any message contents may be broadcast, including business commercials. This LPR format can also include music and other sound effects to enhance the message.

An example of the message flexibility inherent in using this low power radio format is found in Bend, Oregon. There, a real estate firm uses 0.1 watt LPR transmitters at homes it is seeking to sell. As they drive by a home, prospective buyers can tune in their car radios and hear about its amenities. This imaginative use of information technology potentially saves time for sellers and buyers!

*10 Watt Station*

The more powerful LPR station broadcasts with 10 watts of power, covering a minimum radius of about 2.5 miles from the transmitter. This LPR station must be sponsored by a governmental entity and licensed by the FCC. This LPR broadcast format can not include commercial promotions, music or other sound effects (see Appendix A).

The primary purpose of this higher wattage station is to provide traveler information. Messages on a 10 watt station typically address weather conditions, local points of interest and activities, road conditions, travel directions, availability of lodging, and traffic hazards or advisories.

This type of LPR station must broadcast on the frequency assigned to the licensee. At present (March 1992), the frequencies 530 kHz, 1610 kHz and 1620 kHz are available for 10 watt LPR broadcasts. Hearings are now taking place to determine if changes in the allocation of LPR frequencies are appropriate as the FCC expands AM radio to 1700 kHz.

The FCC license application process for a 10 watt LPR station generally takes about three months after submission of the paperwork. Manufacturers of LPR equipment will often provide assistance in completing and filing the appropriate forms.

Key information requested on the license application includes the precise unit of local government that is seeking the LPR authorization and the station's proximity to airports, bridges, tunnels, historical sites, interstate highways, and public parks or lands.

A map of the proposed LPR transmitter site must accompany the license application. Topographical maps can be used for this purpose, with the exact location of the transmitter site indicated. In metropolitan areas, a location map showing nearby streets and buildings is often acceptable for this purpose.

## The Nuts and Bolts of LPR

Low power radio functions with four components: an audio recorder to capture and repeatedly play voice messages; an antenna; an AM transmitter; and, roadway signs alerting potential listeners to the broadcast.

During the early days of low power radio, messages were recorded and stored on a cassette tape using analog technology. Tape wear was an inherent problem that required the periodic replacement of the tape cassette. In addition, operators of LPR stations frequently had to travel to the broadcast site to record new messages or rearrange existing ones.

The dependability and convenience of LPR has increased with the advent of digital technology. This technology eliminates the problem of tape wear and enables LPR station operators to record and alter messages from remote locations, such as the office or home base, by telephone. Digital technology also allows the storage and variable sequencing of multiple messages.

A number of LPR manufacturers exist in the United States (see Appendix B). Technicians for these companies can assist you in selecting appropriate antenna and transmitter equipment for your situation. Regardless of the equipment selected, you should also consider electrical surge protection and lightning arresters for the LPR system.

### *Planning for LPR*

In planning for an LPR station, find out if electrical power is available at the prospective site. If remote message control is desired, telephone access to the site is also needed. If these resources are lacking, messages can be directly recorded on-site and alternate power sources such as batteries or solar energy may be employed.

Most LPR stations operate with a vertical antenna. The FCC requires that such antennas not exceed 49.2 feet above the ground. If you intend to use LPR in a metropolitan area, additional planning is necessary for the antenna. One possibility is to mount the antenna on the roof of a building. There is no rooftop height limitation for the 0.5 mile LPR station. But for the 2.5 mile station operating at 530 kHz, the building may not exceed two stories (three stories for other 2.5 mile LPR station frequencies).

Proper grounding is vital to the effectiveness of a low power radio system. An appropriately installed ground system improves antenna efficiency and reduces lightning surge impacts. Space constraints and soil conductivity often determine which ground system is appropriate for the given situation. Again, LPR company personnel can help you select appropriate hardware.

Signs alerting potential listeners to the low power radio broadcast are essential. If they are to be placed along public highway right-of-ways, permits are typically needed before proceeding. Application forms are available through your state transportation department, along with requirements for sign design and construction. Many state transportation departments will design, construct, and install such signs for a fee.

Since local environmental conditions must be accommodated and LPR enterprises have varying equipment options, the cost for each site must be determined with assistance from the manufacturer. Without installation, a 0.1 watt LPR system typically costs $2,500-$4,000 while 10 watt systems range from $4,000-$6,000.

One way to hold costs down is to comparison shop among various LPR companies. Also, you might consider purchasing previously used components which have warranties in effect.

### *LPR Messages*

The effectiveness of LPR is directly tied to the quality of the broadcast message. If the script is poorly written, listeners will tune out rather than be tortured by audio babble. Likewise, a powerful script which lacks appropriate delivery risks losing the listener.

From the standpoint of quality control, it is often helpful to have others provide feedback on the clarity of LPR messages before unleashing them on the public. A typical error in message construction is to create a single, long communication. Since most digital playback units can broadcast multiple messages, several shorter messages are better than a rambling dialogue. Also, don't overlook the opportunity to broadcast current information alongside prerecorded messages. This can be accomplished by cycling NOAA weather radio broadcasts into the LPR message stream at predetermined intervals.

Some helpful script writing pointers appear in Appendix B. A quality LPR message doesn't require professional narration, but operators sometimes feel this need. A variety of local options exist for acquiring professional narration, including local performing artists or radio station announcers.

Evaluating your LPR message performance requires a strategy for interacting with listeners. The starting point is to clarify the purpose for employing an LPR system. Then, one way to gain feedback is to encourage listeners to request information from a chamber of commerce or other local agency. In the process of fulfilling these requests, listeners can be asked to respond to predetermined questions related to the LPR messages.

If your LPR message seeks to change behavior, its effectiveness can be judged through observations of target audience activity before and after the broadcast. A great way to accomplish this task is to involve students in the process. Often area colleges and universities are looking for real world educational opportunities for students who are studying business management or marketing.

## LPR Uses and Users

Successful LPR applications, digitized equipment, and modest start-up costs are stimulating wider use of this communication technology. Hence, a variety of organizations are employing this tool.

| Typical LPR messages | University outreach | Chambers of Commerce | Campgrounds, marinas | Fairs, special events | Governmental agencies | Airports, ports | Transportation depts. | Tourism |
|---|---|---|---|---|---|---|---|---|
| Weather updates | | X | X | | X | X | X | X |
| Safety tips | X | X | X | X | X | X | X | X |
| Road conditions | | X | | | X | | X | X |
| Traffic advisories | | X | | X | | X | X | X |
| Operating schedules | X | X | X | X | X | X | X | X |
| Activity listings | X | X | X | X | | X | | X |
| Lodging availability | | X | | X | | | | X |
| Rules and regulations | X | X | X | X | X | X | X | X |
| Historic or cultural attractions | X | X | | | X | | | X |
| Ticket or fee requirements | X | X | X | X | | X | X | X |
| Parking advisories | X | X | X | X | X | X | X | X |
| Public park resources | | | X | | X | | X | X |

Examples of LPR operators (chart adapted from Digital Recorders, Inc.).

Newport, a community located on the scenic Oregon coast, recently established a low power radio. More than 1 million visitors travel through Newport each year. Community leaders are challenged with making visitors aware of recreational opportunities without causing traffic bottlenecks. To address the problem, the Newport Chamber of Commerce, OSU Extension Sea Grant and other groups teamed up to initiate a low power radio station. The station broadcasts information on things to see and do in the local area. Special emphasis is placed on encouraging non-consumptive recreational activities. Other messages have a stronger educational component by focusing on coastal resources such as seasonal migrations of gray whales. Information about marine resource interpretive workshops being conducted by Oregon State University and by a new public aquarium are also broadcast over this LPR.

While the effectiveness of the Newport project is now being evaluated, other Extension educators are already planning to use LPR technology. Some examples of creative low power radio applications being planned by Extension staff in the Pacific Northwest include:

- Agricultural agents communicating pest management and other information "real time" to producers in two counties.
- Extension foresters informing motorists in mountain passes of environmental stewardship practices and travel tips.
- Extension Sea Grant staff collaborating with two states to improve recreational boating safety in a dangerous estuary.
- 4-H Youth Extension staff updating daily activity schedules for summer campers in scattered cabin locations.
- Extension Home Economics staff broadcasting customized food and nutrition education to specific radio listeners.
- Community development agents collaborating with small riverfront communities to encourage more visitation by recreational boaters.

### *Coastal Applications*

The use of this technology for natural resource interpretation is an emerging opportunity. Recently, the Oregon Department of Fish and Wildlife began testing low power radio as a tool for resource interpretation at wildlife viewing areas. In New York State, Sea Grant collaborated with a park commission to test low power radio in a variety of coastal settings. An LPR broadcast at a coastal campground informed listeners of marine safety; and LPR at a barrier beach aided tens of thousands of beachgoers seeking vehicle parking in a multitude of paved lots.

The future of LPR as a distance learning tool in ecotourism is promising. For instance, coastal resorts and parks can use LPR to broadcast interpretative information to visitors at nearby tidepools. With inexpensive AM headphones, the visitors would receive a narrated field trip. These guided tours can also teach and encourage use of appropriate stewardship practices to maintain the ecosystems being observed.

During peak tourist seasons, many coastal highways are clogged with sightseer vehicles. Too often interpretive signs placed in small turnout areas cause tourism-related traffic congestion or accidents. Instead of relying on road signs, research would suggest that radio could be a more appropriate informal learning medium for information targeted at travelers using vehicles.

The use of low power radio can revolutionize interpretation in waterfront communities. In these instances, natural or cultural resources interpretation can take the form of a guided car tour. Waterfront topics addressed by LPR could range from identifying various types of vessels at port docks to marine mammal topics, such as whale watching techniques. Here again, general travel information provided by low power radio can be augmented with educational messages encouraging appropriate care and use of coastal resources.

## Interested in More LPR Information?

LPR communication technology holds considerable promise for a variety of community and educational organizations. Technical information and cost data on low power radio equipment can be obtained from LPR enterprises listed in Appendix B.

More information about low power radio and distance learning can be found in the following:


Journal Articles

Beaudoin, M. 1990. "The Instructor's Changing Role in Distance Education," *The American Journal of Distance Education*. Vol. 4, No.2.

Peart, R. 1986. "Interpretation in Informal Learning," *Journal of Interpretation*. Vol.2, No. 1.

Romero-Gwynn, E. and M. Marshall. 1990. "Radio: Untapped Teaching Tool," *Journal of Extension*. Vol. 28, Spring.

Books

Fazio, J. and D. Gilbert. 1986. *Public Relations and Communications for Natural Resource Managers*. Kendall/Hunt Company, Dubuque, Iowa.

Sharpe, G.W. 1976. *Interpreting The Environment*. John Wiley, New York, New York.

Verduin, J. and T. Clark. 1991. *Distance Education*. Jossey-Bass, San Francisco, California.

Reports

Baker, W. 1991. *National Travelers Information Radio Exchange Newsletter*. Information Station Specialists. Zeeland, Michigan.

Good, J. 1990. *Waterfront Revitalization for Small Cities*. OSU Extension Service, Corvallis, Oregon.

McFadden R. and J.Shoaf. 1979. *Travelers Information Station Handbook*. National Park Service, Denver Service Center, Denver, Colorado.

Papers in Proceedings

White C. and R. Baker. 1987. Turn Your Radio On: Travelers Information Stations and Their Use in Interpretation. *National Interpreters Workshop Proceedings*. Denver, Colorado.

DeYoung, B. 1991. Low Power Radio—A Promising "Distance Learning" Technology for Coastal Resource Interpretation. *HII Conference Proceedings*. Hawaii Sea Grant Program, Honolulu, Hawaii.

# Appendix A

Message Writing Pointers (Courtesy of: Information Station Specialists, Zeeland, Michigan)

Writing a script for a Traveler's Information Radio Station may be a new experience for you. The following are points to keep in mind as you plan your new radio broadcast.

1) By law, your station must broadcast its call sign every thirty minutes at a minimum.

2) Always identify the organization or agency that is responsible for producing the broadcast.

3) Do not mention names of businesses on 10 watt broadcasts. The only exception is airline names, which may be mentioned in arrival and departure messages by airports.

4) On 10 watt LPR stations, broadcast voice information only. Music is not allowed.

5) When giving driving instructions such as "turn right" or "turn left," consider the direction in which people are approaching as they listen to the broadcast. Different instructions may be required for different traffic directions. Give directions slowly and repeat them if possible. Motorists usually cannot make notes and must commit your instructions to memory. Include street names and compass directions when you can to make your instructions redundant.

6) Use visual cues which motorists can watch for. Talk about features of your areas which may be of interest to them, especially those which they can view as they hear the broadcast. This increases interest in the broadcast and a greater likelihood that it will be listened to and acted upon.

7) Interest may also be maintained by using more than one voice to read short sections of the broadcast alternately. This "two-voice" approach works especially well with male and female voices.

8) Radio listeners are accustomed to information being repeated. Do not hesitate to repeat short pieces of important information periodically during the broadcast.

9) If your broadcast is comprised of a "general message" that seldom changes and an "update message" which contains current information, remember to promote the update message within the general message one or more times. General message example: "Welcome to the Airport. Rental car return is located on your right as you enter. Stay tuned for an update on the current parking lot status in 30 seconds. On your left is the Terminal A long-term parking ramp...." In this way you can hold the interest of listeners through the general message who may have heard the message before.

10) Remember that listeners will tune in and out of your broadcast at random places and may perceive no beginning or end to the programming because of its circular nature. Arrange broadcasts so that they make sense no matter where the listener begins listening. If one piece of information is critical to understanding the whole broadcast, repeat that information often.

11) Time the length of the broadcast cycle so that listeners are likely to hear it in its entirety before they have to make a decision. Example:

The Highway Department placed a radio antenna along the interstate highway. The Department located signs announcing the radio signal and frequency 3 miles north of the radio antenna. Southbound drivers must make a decision on whether to exit 4 miles after they pass the signs (a mile south of the antenna). Subtracting 30 seconds for the time it takes to tune in the station, drivers have about 3.5 miles to listen to the broadcast before they reach the critical exit if they are traveling about 60 miles per hour. The length of the broadcast cycle should be 3.5 minutes or less. To allow listeners to hear the broadcast twice, a 1.75 minute cycle should be used.

# Appendix B

Low Power Radio Equipment Sources in U.S.A.

No endorsement of the enterprises or products mentioned below is intended or implied by the National Sea Grant College Program or Oregon State University. This is a sampling of known firms:

Information Station Specialists, P.O. Box 51, Zeeland, Michigan 49464, telephone (616) 772-2300.

Watts Media Services, P.O. Box 152, Big Flats, New York 14814, telephone (607) 562-7522.

Digital Recorders, Inc., P.O. Box 14068, Research Triangle Park, North Carolina 27709-4068, telephone (919) 361-2155.

Radio Systems, 110 High Hill Road, Bridgeport, New Jersey 08014, telephone (800) 521-2123.

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