INTERFERENCE BETWEEN RADIOS AT AIRPORTS

Most airports, even many small non-controlled ones, have more than one radio frequency in use. Large airports may have as many as 30 or more. Since the antennas must be relatively close together, interference between radios at airports is common. Interference problems multiply as more frequencies are used at each airport. The usual form of interference is for a receiver tuned to one frequency to hear transmissions from transmitters on other frequencies. Sometimes an "off-channel" transmitter simply causes an increase in noise heard by the receiver. Another form of interference that often isn't even noticed is "receiver desensitization", where operation of a nearby transmitter significantly reduces receiver sensitivity even though the interfering transmitter isn't heard.

There are many modes of interference, each with different symptoms. In all cases, the severity of the problem depends on these factors:

1. Distance between antennas
2. Frequency separation between channels involved
3. Receiver sensitivity
4. Transmitter power
5. Receiver and transmitter characteristics

Interference is a greater problem if (1) the antennas are close together (2) the desired and interfering channels are close in frequency (3) the receiver is very sensitive (4) the transmitter power is high.

Receivers and transmitters for airport use are specially designed to minimize interference problems. However, designs that would cover all modes and worst cases of interference would be very costly for most users. Therefore airport radio equipment is often designed with compromises between cost and interference susceptibility, to accommodate most users rather than all users. Interference problems are then solved individually as they arise.

When planning the installation of new radio equipment, radio interference should be considered. Plan to locate a new antenna as far as practical from existing antennas. There is no "safe minimum distance" such as "at least 200 feet", but the greater the distance the less the risk of interference. If there are many frequencies in use at the airport, a list of these permits predictions of the likelihood of some modes of interference. If there is a choice of frequencies for the new radio, one choice may result in the least interference. Sometimes commercial fm stations whose antennas are 10 miles or more from the airport can cause certain modes of interference. Even over-flying aircraft communicating with enroute centers many miles away can play a part in

an interference problem. Usually the severity of interference problems won't be determined until the equipment is installed.

One way to increase antenna separation is to operate radios remotely. This may allow a radio and its antenna to be located well away from other antennas while the operator remains convenient to other duties and activities. The radio itself should be placed as near as practical to its own antenna, to minimize power loss in the coaxial cable. The operator's remote station can be any distance from the radio.

All receivers have certain "spurious response" frequencies. Transmitters on these frequencies are more likely to cause interference. Therefore, interfering transmitter channels will be different for different receiver models and brands, and in any location one model receiver may not hear interference heard on a different model. Similarly, many transmitters produce weak "spurious" signals on frequencies other than the intended one. Even though these transmitters may meet FCC and FAA specifications for the permissible radiation of such spurs, they can still cause interference on nearby receivers.

Some interference modes occur only when two or more off-channel transmitters operate simultaneously. These modes can be identified by hearing two voices at once and by the interference starting and stopping with one voice clearly in the middle of a transmission.

If two antennas cannot be located more than 50 feet apart, it is better to locate them "over and under" on the same mast, preferably 20 ft. apart vertically. Aviation antennas radiate much more strongly horizontally than they do vertically. The higher antenna will have the longer range.

A simple but often effective step is to reduce the receiver's sensitivity. This is practical if the interference is not severe and the communications range needed is only 20-30 miles.

For some situations where several radios and antennas are located close to each other, mutual speaker muting is practical. (This technique is used in nearly every aircraft.) It cannot be used when the interfering transmitter operates continuously, such as AWOS and ATIS.

Adding filters external to the receivers and transmitters is the most common way to tackle most modes of interference. A careful and accurate description of the interference characteristics will enable persons experienced in solving interference problems to identify the mode, and therefore the most suitable filter. Tests and measurements may be necessary to determine the degree of the problem (a numerical value representing "severe", "moderate", etc.), which is required for assurance that the first proposed solution will be adequate without being unnecessarily costly.

Your radio dealer and the manufacturers of the receivers and transmitters can usually assist in finding solutions for interference problems.