Solutions for Advancing Communications

SELECTING MICROPHONES FOR AIRPORT VHF A.M. MOBILE OR BASE TRANSMITTERS

These transmitters may be supplied with permanently attached microphones. However, to provide greater flexibility, many transmitters have microphone jacks that accept a variety of different plug-in microphones. Each user can then choose a microphone most suitable for the particular operation.

The choice of microphone depends on such considerations as:

1. Hand-held vs. pedestal configurations
2. The degree of "directivity" and the sensitivity vs. the distance the microphone is held from the operator's mouth
3. The required noise-canceling characteristics
4. The element type (carbon, dynamic, electret, etc.)
5. The fidelity, frequency range and internal noise characteristic
6. Reliability and life expectancy

Aviation VHF amplitude modulated transmitters require a relatively high microphone audio signal level. Thus element types that produce low level signals (dynamic and electret) requires internal amplifiers.

In noisy environments, noise-canceling microphones are essential. While handheld microphones are widely used, some operators of very noisy airport vehicles prefer headsets with earphones (in place of speakers), and with boom microphones. Unless the transmitter is designed for VOX (voice operated transmission) a push-to-talk switch is required.

Pedestal microphones are often used in office operations. They ordinarily have a push-to-talk switch on the base to energize the transmitter. Most therefore do not provide completely hands-free operation—see comments about VOX below. A pedestal microphone should have a well weighted base so it isn't easily knocked over or off the desk. Since the operator may wish to avoid the need to hold the microphone close to his/her mouth, pedestal microphones are usually not directive nor noise-canceling.

Handheld microphones typically have brackets for storing the microphone while not in use. They often use “coiled cords” that stretch to a considerable distance, retracting to a much shorter length when the microphone is returned to the bracket. The microphone is shaped to fit the operator’s hand, and there is typically a push-to-talk switch under the finger position. Handheld microphones are popular because a wide variety of aircraft-type models are readily available.

In the past, carbon microphones were widely used for aviation transmitters. Their main advantages were moderate cost and a relatively high electrical output signal, so that less amplification was required in the transmitter modulator. But they also had a number of disadvantages—they were noisy and subject to shock, the carbon elements tended to absorb moisture so that their characteristics changed with time, and their fidelity (clarity) was only fair. When transistors made possible small lightweight internal amplifiers, the “dynamic” and “electret” type microphones became practical for aviation use. A dynamic microphone contains a “pickup coil” in a magnetic field and a diaphragm which vibrates in response to the sound waves produced by a voice. An electret microphone also contains a diaphragm that vibrates in response to a voice, but instead of a pickup coil it varies an electrical capacity, in turn creating an electrical audio signal. Both have excellent fidelity, reliability and long life, and are insensitive to shock. Their low electrical output is now readily amplified by small lightweight transistor circuits. Their favorable characteristics and long life easily justify their higher cost.

Directivity and noise-canceling characteristics are not the same, but are closely related. If a microphone is most sensitive to sounds directly in front of it, it will pick up relatively less noise arriving from other directions. A microphone which has a second acoustical opening on the back, so that noise can strike both the front and back of the element or diaphragm, is called “noise-canceling”. Noise canceling microphones are necessary for aircraft or noisy airport work vehicles. In a quiet office environment a directive microphone is satisfactory and will provide reduced response to background conversations, radios and other common office noises.

Voice operated transmitters (VOX) contain internal circuits that eliminate the need for a push-to-talk switch and make possible totally hands-free operation. VOX circuits may require several adjustments for gain, attack time and release time for satisfactory operation.

It does little good to select the proper microphone but fail to train operators in its correct use. Poor transmitter performance may be blamed on the equipment when the operator is actually at fault. Regardless of the microphone type, it is obvious that the operator must speak distinctly and not too fast. For noise canceling microphones, it is also imperative to speak with the microphone held close to the mouth—almost touching. Even for non-directional microphones, the operator should be no more than 4-6 inches away. Microphones are designed to work best with a “normal” voice; that is, speaking too loudly can cause distortion, while speaking too softly can lower transmitter modulation and readability as well as reduce the ratio of the desired voice signal to the background noise.