SAILPLANE RADIOS AND THE ANTENNA

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With the advent of the summer soaring season upon us, this appears to be a good time to talk about two-way radio for sailplanes and to comment on some of the articles which have appeared in previous issues of SOARING.

In reviewing these articles on sailplane radios, it seems to me that, at times, too much emphasis has been placed on the academic approach to the problem of two-way radio in the sailplane, at the expense of a more practical approach which, in this case, would produce much better results.

In some articles, recommendations have been made by well meaning authors which, if followed, would result in the sailplane owner going to needless expense to acquire radio equipment which is completely unsuited to his needs. This is certainly the case when it is recommended, as it was on several occasions, that the general run of wet battery operated light aircraft radio equipment be used in sailplanes.

The reason why wet battery operated aircraft radios aren't satisfactory for use in sailplanes is a very simple one, but one obviously overlooked by those who recommend this type of equipment. In short, a small wet battery that isn't connected to a continuously operating charging system, won't provide the necessary voltage to operate a 12 volt light plane radio satisfactorily.

The explanation for this apparent contradiction, since a 12 volt radio should work from a 12 volt battery, is that the 12 volt aircraft radio is designed to operate on a nominal input voltage of 13.2 volts, not 12 volts, with operating limits of ± 20%. This means that a properly designed aircraft radio should provide acceptable performance between 10.56 volts and 15.84 volts at the input terminals. In practice, some radios will meet these requirements, while others will not. In fact, a more realistic set of limits for light plane radios on the market today would be 11.0 volts to 15.0 volts, since operation below 11.0 volts is usually unreliable and input voltages much over 15 volts shorten tube and other component life materially.

If we were to connect one of the above-mentioned radios to a small 12 volt wet battery installed in a sailplane, it would probably draw from 3.5 to 8.0 amps. primary current, depending on the type of radio being tested. Even though the battery had been fully charged, it would only read about 12 volts at the battery terminals with the radio operating. Allowing a minimum voltage drop of .25 volts in the primary leads, we arrive at the input terminals of the radio with 11.75 volts—just .75 volts above the minimum reliable operating voltage limit of 11.0 volts. If we translate this .75 volts into operating time, about 30 minutes use is all we can get out of this radio before it fades out from lack of sufficient input voltage.

However, this is only half the problem. The other half lies in the fact that the power output of an aircraft transmitter is commonly rated at maximum primary input voltage, not at the voltage shown on the placard. At the nominal input of 13.2 volts, power output will be from one-half to three-quarters of the output at maximum input voltage—depending upon the particular type of radio in question. At 12 volts primary input, you may get one-half the maximum rated output, if you are lucky; and the transmitter, which you thought to have a one-half watt output, actually starts out on the fully charged 12 volt battery as a one-quarter watt peanut whistle, with a life expectancy of approximately 30 minutes.

Regardless of whether the radio being tried is a Narco, Lear, Mitchell, Vocaline, Aer-O-Ear, etc., the results are invariably the same. And if you think that the answer is to start out with a higher powered radio, you might have a little more transmitter output at 11.75 volts input to the radio, but the increased current drain will only bring the fade-out a little sooner.

About this time you will probably be wondering why a 13 tube, dry-battery powered, two-way VHF radio, such as the Skycrafters VHF MULTIPHONE, can operate up to 30 hours on one set of dry batteries, when a 10 or 12 tube, wet battery operated radio will perform for only a very short time on a wet battery of comparable volume. The answer is in the relative efficiencies of the two types of radios.

In comparing the two types of radios, we find that to receive (.5 watts output) requires 60 watts of power input for the average light plane radio while the Skycrafters MULTIPHONE requires only 4 watts of power input. To transmit (1 watt output), the light plane radio requires 75 watts of power input while the MULTIPHONE requires an input of only 15 watts.

An examination of the above figures reveals that the average light plane radio consumes 15 times the power required by the VHF MULTIPHONE to produce a .5 watt signal in the loudspeaker or headphones. When transmitting, the wet battery radio consumes 5 times the power required by the VHF MULTIPHONE and, in general, won't provide as much RF output when the input voltage is reduced to 12 volts.

From the foregoing, you won't be surprised to hear that my advice to pilots is "Don't do it," when they ask me about installing a small wet battery in a sailplane to operate a light aircraft type radio. Without a continuously operating generator to keep the battery charged, the project is doomed to failure before it gets off the ground. So . . . save your money and effort; install a good, dry battery powered radio; purchase a new set of batteries once or twice a year and you'll have it made from there on in.

Another subject, on which considerable literary effort has been expended, is the element which assorbs the energy from the VHF transmitter and, subsequently, radiates it into the atmosphere; namely, the antenna.

Some authors have claimed that the best location for the antenna is on top the fuselage of the sailplane. The basis for this claim is that this is the position recommended by the C.A.A. as being the best location for aircraft VHF antennas. While this is true for powered aircraft, for reasons explained later in this article, the majority of top sailplane pilots using two-way radio have found it to be about the worst place for the VHF antenna on a sailplane.

If you check with Lyle Maxey, Paul Bikle and Bill Ivans, to name

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