

POOR MAN'S VHF RECEIVER

by RUSS HYLAND

The author of this article on method of converting an inexpensive FM portable receiver to operate in the aircraft band, is a member of the Radio Subcommittee of the SSA Technical Committee. Similar contributions from SSA members, who are electronically inclined, are solicited.

It is commonly known that the cost of VHF radio gear for sailplanes is priced considerably above what most of us can afford or would like to spend; consequently, too few sailplanes are so equipped.

Now and then, however, the occasion arises during local flying when a receiver alone could have saved someone from an embarrassing situation. In one instance, for example, an altimeter was inadvertently set to minus 1,000 feet prior to a tow to 3,000 feet. After the sailplane pilot failed to release at 3,000 feet (his altimeter read 2,000 feet), the towplane pilot waived him off without the latter realizing that his altimeter was in error. The sailplane pilot was naturally confused upon entering the landing pattern by the disparity between the 600 foot altitude indicated by his instrument and the apparent height (actually 1,600 feet). It all came out allright in the end, but this confusion could have been avoided if radio communication between the two aircraft was available to give the sailplane pilot information that would have led him to realize the erroneous altimeter reading.

Convinced that there was a very real need for carrying at least a VHF receiver, the writer decided to look for a simple, inexpensive but adequate means of providing this capability. Several approaches were considered such as converters to work into standard short wave transistor portable radios, or complete simple, low-sensitivity, transistorized receivers with a very minimum number of stages. However, one of our club members purchased a portable VHF transistor unit which was actually an FM (88-108 mc), modified to cover the air-

craft VHF/AM band. Performance of this set appeared to be quite satisfactory for our needs and it was decided to duplicate this conversion.

Since compactness and low cost were prime considerations, some time was spent in search of a suitable unit. A small set costing \$25 was purchased, but it turned out to suffer from dial cord slippage problem, apparently characteristic of this model. Subsequently, a Monarch Model 1000 was obtained for roughly the same price and this one presented no problems. This is a nine-transistor FM/AM receiver and is quite compact measuring 6"x3"x2 inches

The compactness is an advantage when carrying the unit in a sailplane, but tends to make the modification a little tedious. However, to change the receiver coverage from the FM broadcast band to the VHF/AM aircraft one, only one modification and two adjustments are required. The modification consisted of removing approximately one-half turn from the oscillator coil, then adjusting the FM oscillator trimmer until the aircraft band was brought within the tuning range of the receiver and, finally, adjusting the FM RF trimmer until reasonably good tracking was obtained over the desired portion of the aircraft band. In the interest of simplicity, no attempt was made to convert the FM detector to an AM detector, or to eliminate limiting action.

The receiver was found to be extremely sensitive, so much so that it limits strong signals resulting in considerable distortion. This is compensated for by collapsing the telescoping antenna and slightly detuning the receiver.

This receiver was used on retrieve at Elmira, July 4th, 1963 and proved to be quite satisfactory, picking up every one heard on the mobile transceiver installed in a retrieving car we were accompanying. It did this quite frequently while resting on the front seat, next to driver, with the antenna completely inside the car. The set has been used on the local field, monitoring sailplane during local flying. For this type of operation it has

been necessary to completely collapse the antenna in order to avoid distortion experienced with strong signals.

When operated from the rear seat of a Schweizer 2-22 recently, it picked up ground stations up to 25 miles distant and there is every reason to believe that this range will be exceeded in further tests.

The receiver in its simply-modified form has a few drawbacks (broadness of tuning and distortion due to limiting on strong signals), but is considered an adequate solution to the need for a small and inexpensive receiver. The particular unit which was modified has unfortunately gone out of production. For those interested in making similar conversions there are other receivers presently on the market and advertised by radio mail-order houses, which have similar internal configuration. In any event, the basic modification techniques should be applicable in most cases and if perhaps somewhat tedious for the layman, should not present insurmountable problems to anyone with a reasonable amount of practical radio construction or repair experience.

The modification technique is as follows:

1. Remove the back of the receiver to expose the tuning capacitors and coils. It may be necessary to remove a shield to expose the coils.
2. Mark all trimmer capacitor positions, preferably with a magic marker.
3. Tune one trimmer at a time, while listening to a station on the FM band to determine which trimmer affect FM local oscillator tuning. Return each trimmer to its original position before adjusting the next one. (The two AM trimmers will have no effect on the FM signal. The FM oscillator trimmer will change the FM receiver frequency while the FM RF trimmer will vary the signal strength).
4. After the local oscillator trimmer and tuning capacitor is isolated, trace the wire lead from the oscillator trimmer and tuning capacitor to the FM oscillator coil.
5. Remove approximately one-quarter turn from the FM
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