

Federal Aviation Agency



Cancelled 00-2 Jork

AC NO: AC-170-5

AIR NAVIGATION
FACILITIES

EFFECTIVE :

6/18/64

SUBJECT : LOSS OF VHF NAVIGATIONAL SIGNAL DURING TRANSMISSION

1. **PURPOSE.** This circular discusses a feature, common to many very high frequency (VHF) navigation/communications installations in general aviation aircraft, which results in a loss of receiver capability while the transmitter is being used.
2. **BACKGROUND.** Recent years have seen tremendous growth in the numbers of VHF navigation/communications installations in all types of aircraft. This growth can be attributed to a number of factors such as:
 - a. The installation and operation by the Federal Government of a wide-spread and highly reliable airways system based on the VHF Omnicast (VOR).
 - b. The relative ease and precision with which this system can be utilized by pilots.
 - c. The reliability of equipment and interference-free nature of VHF navigation and communications.
 - d. The design and marketing by the avionics industry of increasingly reliable VHF navigation/communications equipment at prices within reach of a large segment of general aviation owners.
 - e. The great utility of the present-day general aviation fleet of over 84,000 active aircraft. This utility results in wide-ranging operations, including those under instrument flight conditions which introduce the need for communications and navigation equipment in the aircraft.

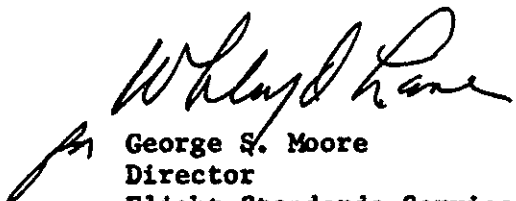
3. DISCUSSION.

- a. Electronics gear comes in a variety of sizes and configurations and at a variety of prices. As with most other products, the more sophisticated the equipment, the higher the cost. Avionics manufacturers must make some design compromises in producing their less expensive sets. A transceiver, for instance, uses some of its components and circuitry for both receiving and transmitting, functions which these circuits cannot perform simultaneously. In many designs a single power supply incapable of furnishing sufficient power for both transmitting and receiving is switched automatically from the receiver to the transmitter when the microphone button is depressed. This action disables the receiver for the length of the transmission. Some aircraft utilize the same antenna for receiving and transmitting. Frequently, lower cost receivers are blanked out or swamped by the signals from their associated transmitters.
- b. Regardless of the configuration, should one of these arrangements be involved, the results so far as the pilot is concerned are the same. When he uses his transmitter, his receiver is temporarily lost. If this is a localizer or VOR receiver, his navigation signal is interrupted, and the course deviation indicator may give him a false reading, depending on the characteristics of the particular installation. In some, the needle will center; in others, it will swing right or left until after the microphone button is released.
- c. While flying under visual flight rules (VFR), temporary loss of navigation signal usually poses very little problem for a pilot. However, under instrument flight rules (IFR) and in instrument weather, loss of this signal can be distracting and possibly misleading--especially if the pilot is not aware in advance of this characteristic of his equipment. An automatic pilot coupled to such a radio installation may "follow the needle" on the course deviation indicator and take the aircraft through unwanted turns and maneuvers. To prevent these actions, some couplers are so designed that they switch the automatic pilot to heading mode whenever navigational signal is removed. During such a period, however, the aircraft is not being navigated in accordance with ground radio facility direction. Prolonged transmission with its concurrent loss of navigational information can result in the aircraft's being flown out of the protected area established for instrument flight.

4. CONCLUSION.

- a. No reflection is intended on the avionics industry, which has so efficiently produced low-cost equipment over the years. It was, in fact, a Government-sponsored and financed project which resulted in the design of the first low-cost VOR navigation receiving equipment. We desire only to alert the public to some characteristics of this equipment which may be unknown to them.

- b. Equipment is now available and in wide use which is designed for simultaneous reception and transmission. It is generally more expensive than the type discussed above. If the trend in recent years continues, anticipated further progress in the state of the avionics art should result in production of this type of navigation/communications gear at even further reduced cost.



George S. Moore
Director
Flight Standards Service