

**ORDER**

**DEPARTMENT OF TRANSPORTATION  
FEDERAL AVIATION ADMINISTRATION  
GREAT LAKES REGION**

GL 6500.12

4/17/73

**SUBJ: OFF-FREQUENCY TRANSMITTER CRYSTALS**

1. PURPOSE. This Order establishes a regional policy on utilization of off-frequency crystals for Air/Ground transmitters.
2. DISTRIBUTION. This Order is distributed to all supervisors, Airway Facilities Division and to all Airway Facilities Field Offices.
3. CANCELLATION. Order CE 6500.10, Off-Frequency Transmitter Crystals, dated 8 April 1970.
4. BACKGROUND. The continued aviation growth, with the resultant increase of air traffic and frequency congestion, requires an ever increasing reliability of our Air/Ground communication channels. Part of this needed increase can be obtained by ensuring that maintenance operations cause a minimum of interruptions or down time to A/G channels. This aspect of maintenance was recognized many years ago, when a policy was established for the use of off-frequency RCAG transmitter crystals. However, the issuance of new Washington handbooks has resulted in cancellation of many older directives, and today there is no clear-cut policy on this matter.

Although technical evaluations and special studies indicate most sectors utilize off-frequency crystals, complaints are still received of interruptions or blocking of communication channels due to needless keying of FAA A/G transmitters. A 50-watt transmitter can provide a signal of 5 micro-volts or more to high altitude aircraft over 200 miles away, and unusual propagation conditions can, and do, frequently extend this range.

Thus, even though no signal is present from the local A/G receiver being monitored, keying the associated transmitter may very well cause interference to distant aircraft. It is the intent of this order, that operation of A/G transmitters for maintenance or tune-up by Airway Facilities personnel should be accomplished in a manner that will minimize possible interference to both local and distant aircraft.

→ 5. ACTION. ←

- a. The Chief of each Airway Facilities Sector shall take the necessary action to procure and/or utilize off-frequency crystals. Off-frequency crystals shall be used on all A/G transmitters where routine maintenance cannot be performed without causing interference.

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b. Airway Facilities personnel, (SMP, F&E, AF), shall not operate A/G transmitters for maintenance or tune-up purposes unless one of the following conditions can be met:

- (1). Off-frequency crystals are installed, and dummy loads are used.
- (2). Prior approval is obtained from applicable AT personnel for local keying on frequency.
- (3). Unusual conditions require that immediate action be taken to test or restore a frequency or channel.
- (4). The frequency has not been commissioned.

These requirements do not apply where low-power transceiver must be momentarily "peaked" for satisfactory operation. Where deemed necessary, one off-channel crystal should be obtained for extended bench tests of transceivers.

6. GUIDELINES FOR ORDERING CRYSTALS. It is anticipated that in the future, channel spacing will be reduced to 25 kHz for VHF, and 50 kHz for UHF. To eliminate possible interference on any other channel, the off-frequency crystal should be such that the transmitter output falls midway between two such channels. The following deviations above or below the channel frequency are suggested:

VHF 87.5 kHz, 137.5 kHz

UHF 175 kHz, 225 kHz

Crystals now on hand should not be replaced merely to meet this criteria.

All off-frequency crystals shall be conspicuously marked by painting the top of the crystal holder red or aviation orange. The transmitter output frequency shall be placed on the crystal holder for ready identification with the applicable transmitter(s). It is suggested that the transmitter type be included on the crystal holder for future reference in the event transmitters are exchanged or replaced.

*Alan H. Glass*  
 for ALAN H. GLASS  
 Chief, Airway Facilities Division

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 Pages 12 ff