U.S. Department
of Transportation
**Federal Aviation
Administration**

October 12, 2007

Mr. Mitchell R. Whatley
[redacted]

Dear Mr. Whatley:

This responds to your letter dated February 16, 2007 requesting that the Federal Aviation Administration (FAA) provide an interpretation as to whether applicable regulations require pilots operating aircraft under Title 14, Code of Federal Regulations (14 CFR) part 121 to use headsets and microphones in the cockpit that have been manufactured under a Technical Standard Order (TSO) authorization. In your letter you state that these pilots have been "using personal headsets for many years without raising any regulatory issues."

Section 21.601(b)(1) of 14 CFR states that a TSO "is issued by the Administrator and is a minimum performance standard for specified articles (for the purpose of this subpart articles means materials, parts, processes, or appliances) used on civil aircraft." TSO-C139 establishes performance standards for aircraft audio systems and equipment. This TSO replaces the standards previously contained in TSO-C50c for audio selector panels and amplifiers, TSO-C57a for headsets and speakers, and TSO-C58a, for aircraft microphones.

Section 21.601(b)(2) states that "a TSO authorization (TSOA) is an FAA design and production approval issued to the manufacturer of an article which has been found to meet a specific TSO." A TSOA authorizes a manufacturer to produce an article to a TSO standard. An article produced pursuant to a TSOA is deemed to meet the specifications of the applicable TSO and is considered to be airworthy. Although an article produced pursuant to a TSOA is considered to meet all applicable regulations, production under a TSOA does not confer installation eligibility on the article. TSO articles may be installed in a wide variety of aircraft however they may only be installed on an aircraft when that aircraft's type design specifies installation of an article that meets the specific TSO. This may occur in the original type design for the product or as an amendment to that type design.

Airworthiness standards specified in 14 CFR part 25 do not mandate that transport category aircraft be specifically equipped with headsets for their flightcrew. Those standards however, do require aircraft to be equipped with "two systems for two-way radio communications, with controls for each accessible from each pilot station." This requirement is set forth in § 25.1307(d). A manufacturer may choose to incorporate crewmember headsets as part of those systems. When a manufacturer chooses to include headsets as part of these systems, such equipment must "function properly when installed," as required by § 25.1301(d), and "must be designed to ensure that they perform their intended functions under any foreseeable operating condition" as set forth in § 25.1309(a). Additionally, the equipment must meet the fire protection

test criteria specified in § 25.853(a) and the fire protection requirements of § 25.869(a). The aircraft's ventilation system must also meet the requirements of § 25.831 in the event of any probable failure conditions of the equipment. If a manufacturer chooses to install headsets in order to meet these airworthiness standards, the headsets are only required to meet the applicable airworthiness standards. Compliance with the performance standards specified by an applicable TSO is only required if specified by the type design.

A manufacturer is not required to install flightcrew headsets in an aircraft certificated in accordance with part 25. The manufacturer may choose to meet applicable airworthiness standards through the installation of other equipment (e.g. speakers and microphones). The type design for a particular aircraft therefore may or may not include the installation of a headset that meets a TSO. An aircraft manufacturer may deliver an aircraft in which crewmember headsets are installed as part of its type design or the manufacturer may deliver an aircraft in which the type design does not require the installation of flight crewmember headsets. When the type design for a particular aircraft specifies that a headset meeting a specific TSO be installed, an operator may not replace that headset with a headset that does not meet the specified TSO unless specific action is taken to change the type design for the aircraft. Absent such action, the aircraft would not meet its type design and would be considered unairworthy.

When a manufacturer delivers an aircraft that meets applicable airworthiness standards, yet is not equipped with headsets (often at the request of a customer), the use of individual headsets by the flightcrew would not render the aircraft unairworthy provided the aircraft continues to be equipped in accordance with its type design. Operating an aircraft using a headset not specified in the aircraft's type design as a replacement for an article required by the aircraft's type design would, however, render the aircraft unairworthy.

There is no specific requirement that aircraft operating under 14 CFR part 121 be equipped with headsets or that flight crewmembers use headsets produced under a TSOA. Persons operating an aircraft under 14 CFR part 121, however, should note that certain operating requirements of that part may restrict the ability of a flight crewmember to use a headset as a replacement for an article required by the aircraft's type design. Sections 121.318 and 121.319 prohibit a person from operating an airplane with a seating capacity of more than 19 passengers unless it is equipped with a public address system and crewmember interphone system approved in accordance with § 21.305. Equipping an aircraft with a headset that functions as part of either system when that headset is not approved under such provisions (typically under the type certification procedures for the aircraft or under a TSOA) would be considered a violation of the regulations. Use of a non-approved headset to supplement the operation of an aircraft equipped in accordance those regulations would not, however, be considered a regulatory violation. Additionally, the regulations do not prohibit an air carrier from specifying in its manual that flight crewmembers use only specific headset models when operating an aircraft.

The FAA is particularly concerned, however, that Active Noise Reduction (ANR) headsets and headset adapters used by flight crewmembers that rely on battery power are subject to failure when internal or externally connected batteries discharge under normal use. These headsets therefore may not be capable of providing the continuous, uninterrupted communications capability necessary for the safe operation of aircraft. Such failures can occur without the awareness of flight crewmembers and may result in the flight crewmember's inability to communicate with air traffic control, operate the aircraft's public

crewmember's inability to communicate with air traffic control, operate the aircraft's public address system, and communicate with other flight crewmember or flight attendant stations. Aircraft equipped with ANR headsets which rely on batteries to provide flight crewmembers with the capability of communicating with air traffic control, crewmembers, or passengers must be capable of providing uninterrupted communications as required in § 121.318 and 121.319. Any failure of the headset to provide this communication capability due to loss of power would be contrary to the provisions of § 25.1309(a).

ANR headsets installed in aircraft to meet operational requirements of §§ 121.318 and 121.319 must be FAA approved under the provisions of 14 CFR § 21.305. This approval can be achieved by meeting the performance standards specified in TSO-C139, TSO-C57 and TSO-C58 if applicable, or the performance standards required to be met by a design approval holder during the certification process. Appendix D of RTCA/DO-214 "Audio Systems Characteristics and Minimum Operational Performance Standards for Aircraft Audio Systems and Equipment," which sets forth the functional qualifications for headsets in applicable TSOs states that an ANR system "must immediately revert to an acceptable passive mode of operation if power is lost or the system fails. The headset audio should not be lost during the reversion from active to passive operation." ANR headsets that cannot meet this standard cannot "perform their intended functions under any foreseeable condition" as required by § 25.1309(a). ANR headsets required by the aircraft's type design therefore must not fail in a manner to preclude continued safe flight and landing by failing to provide continuous communications capability.

This response has been coordinated with the Air Transportation Division (AFS-200) and the Aircraft Maintenance Division (AFS-300) of the Flight Standards Service and the Aircraft Engineering Division (AIR-100) of the Aircraft Certification Service at FAA Headquarters.

Should you have any additional questions on this matter, please contact Paul Greer at (202) 267-3073.

Sincerely,

Rebecca B. MacPherson
Assistant Chief Counsel for Regulations