# EASA Safety Information Bulletin

**SIB No.: 2011-15**

**Issued: 04 July 2011**

**Subject:** **Mode S Transponder: Ground Testing**

**Ref. Publications:** None.

**Applicability:** All owners and operators of aircraft having SSR Mode S transponders installed.

Mode S transponders are known to be installed on, but not limited to, aircraft certificated under (FAR, JAR, CS) Part 22, 23, 25, 27, 29, 31HB, VLA or VLR.

**Description:** Accurate and reliable surveillance information and aircraft and/or flight data, transmitted by Mode S transponders when the aircraft is in flight and on the ground, is crucial for the safe and smooth operation of today's air traffic management environment.

At this time, the airworthiness concern described in this SIB is not considered to be an unsafe condition that would warrant Airworthiness Directive (AD) action under EC 1702/2003, Part 21A.3B.

Nevertheless, incorrect or missing data can lead to an increase in controller and/or flight crew workload, which could develop into a potentially hazardous situation. Some examples have been published in EASA SIB 2011-13 - Mode S Transponder: Loss of Detection (Complete or Intermittent) of Aircraft by Mode S Interrogators, and EASA SIB 2011-14 - Mode S Transponder: Incorrect Setting of ICAO 24-Bit Aircraft Address.

**Recommendations:** If you become aware, or are notified, of a transponder deficiency affecting your aircraft, EASA recommends that you initiate an unscheduled maintenance action to arrange for any deficiencies to be corrected, at the earliest opportunity.

To ensure that the notifying authority can track the resolution of such issues, it is highly recommended that operators/owners promptly advise the notifying authority of any rectification action.

In order to ensure acceptable transponder performance, EASA recommends that the correct operation of installed Mode S transponder systems is verified using appropriate ramp testing equipment at intervals not exceeding 2 years, in accordance with appropriate maintenance manual procedures and using calibrated ramp test equipment.

Testing for correct functionality should include the following items:

- The Mode S 24-Bit aircraft address
- Altitude reporting including the check of the altitude sensor at adequate intervals from ground to the certified altitude ceiling of the aircraft.
- Mode S Elementary Surveillance (ELS) & Downlink Aircraft Parameters (DAPs):
    - Aircraft Identification
    - Capability Report
    - Pressure Altitude
    - Flight Status
- Mode S Enhanced Surveillance (EHS) & Downlink Aircraft Parameters (DAPs)
    - Magnetic Heading
    - Indicated Airspeed
    - Mach No.
    - Vertical rate
    - Roll Angle
    - Track Angle Rate or True Airspeed
    - True Track Angle
    - Ground Speed
    - Selected Altitude (and Barometric Pressure Setting where appropriate)

**Note 1**: Care should be taken, not to disturb the operation of ATC or other aircraft when performing any transponder (or ACAS) related tests. Guidance for the ground testing of transponders can be found in Appendix 1 of this SIB.

**Note 2**: In case the ramp test equipment indicates an error with the transmission of the data as specified above, or indicates any other type of failure (e.g. out of frequency, power etc), the problem should be corrected prior to the next flight.

**Note 3**; Detailed information on EHS DAP's may be found in EASA AMC 20-13 - Certification of Mode S Transponder Systems for Enhanced Surveillance.

**Note 4**: For aircraft which do not provide a full set of DAP's, the testing may be limited to only those declared in their Aircraft Flight Manual.

**Note 5**: These recommendations do not apply if the aircraft maintenance manual or transponder equipment manufacturer specifically states that periodic testing is not required due to other mitigation means available to detect failures of the transponder system.

**Contacts:**

For further information contact the Safety Information Section, Executive Directorate, EASA; E-mail: ADs@easa.europa.eu.

## Appendix 1 - Transponder Ground Testing Guidance

a. When not required, ensure all transponders are selected to 'OFF' or 'Standby'.

b. Before starting any test, contact the local Air Traffic Control Unit and advise them of your intention to conduct transponder testing. Advise the Air Traffic Unit of your start time and test duration. Also inform them of the altitude(s) at which you will be testing, your intended Aircraft Identification (Flight Id) and your intended Mode A code. See para c and d. Note: Certain altitudes may not be possible due to over flying aircraft.

c. Set the Mode A code to 7776 (or other Mode A code agreed with Air Traffic Control Unit). *Note: The Mode A code 7776 is assigned as a test code by the ORCAM Users Group, specifically for the testing of transponders.*

d. Set the Aircraft Identification (Flight Id) with the first 8 characters of the company name. This is the name of the company conducting the tests.

e. Set the on-the-ground status for all Mode S replies, except when an airborne reply is required (e.g. for altitude testing).

f. Where possible, perform the testing inside a hanger to take advantage of any shielding properties it may provide.

g. As a precaution, use antenna transmission covers whether or not testing is performed inside or outside.

h. When testing the altitude (Mode C or S) parameter, radiate directly into the ramp test set via the prescribed attenuator.

i. In between testing, i.e. to transition from one altitude to another, select the transponder to 'standby' mode.

j. If testing transponder parameters other than 'altitude', set altitude to -1000 feet (minus 1000 feet), or over 60000 feet. This will minimise the possibility of ACAS warning to airfield and overflying aircraft.

k. When testing is complete select the transponder(s) to 'OFF' or 'Standby'.