Eurocontrol Comment #3

DO-260B 2.2.3.3.2.11 states that:

a. The ADS-B Transmitting Subsystem shall clear all but the altitude and surveillance status subfields of the Airborne Position Message, if no new position data is received within two (2) seconds of the previous input data update.

While the transponder MOPs requires to clear all 56-bits.

It is proposed to use the same text that is in DO260B and to split "a" and 'b" as follows:

a. The ADS-B Transmitting Subsystem shall clear all but the altitude and surveillance status subfields of the Airborne Position message, if no new position data is received within two (2) seconds of the previous input data update.

b. The ADS-B Transmitting Sybsystem shall clear all 56-bit of the Surface Position Message if no new position data is received within two (2) seconds of the previous input data update.

RHS_Commentary:

Review of DO-181D, §2.2.23.1.4.2.a (see below) indicates the requirement is written to clear the register if there has been no update of any field in the register for a period of 2.0 seconds.

This is not the same as the requirement provided in DO-260B, §2.2.3.3.2.11, which requires that the register position fields be cleared if position data is not received for 2.0 seconds. The Altitude and surveillance fields are retained and the TYPE is set to "0", but the register is not cleared upon loss of position data.

Point is that DO-181D is dealing with clearing based on no new data, while DO-260B is dealing with clearing of position data only. As such, these are separate requirements and they should be retained in tact.

NO CHANGE to DO-181D.

DO-181D:

2.2.23.1.4.2 Register Timeout and Termination

a. The transponder **shall** clear all 56-bits of the airborne position and surface position GICB Registers 05_{16} and 06_{16} if these registers are not updated within two seconds of the previous update. This timeout **shall** be determined separately for each of these registers. The internal insertion of data by the transponder into these registers (altitude and surveillance status) **shall not** qualify as a register update for the purposes of this timeout condition.

b. The transponder **shall** clear all 56-bits of the velocity squitter, GICB Register 09_{16} if input data necessary to update the subfields of the velocity squitter, other than the Intent Change Flag, is not available for a period of 2.6 seconds.

Notes:

1. *These registers are cleared to prevent the reporting of outdated position, velocity and squitter rate information.*

2. *The Identification Register 08_{16}, is not cleared since it contains data that rarely changes in flight and less frequently updated. With Extended Squitter, Register 08_{16} is not cleared or ZEROed once either Flight Identification or Aircraft Registration data has been loaded into the Register during the current power-on cycle. Register 08_{16} is not cleared since it provides information that is fundamental to track file management in the ADS-B*

environment. (See §2.2.5.1.11.c in RTCA DO-260B/EUROCAE ED-102A). Refer to Appendix B, §B.4.3.3 for implementation guidelines regarding Registers 08_{16} and 20_{16}. The event-driven Register, $0A_{16}$ does not need to be cleared since its contents are only broadcast once each time that the register is loaded.

DO-260B:

2.2.3.3.2.11 ADS-B Message Timeout

Notes:

1. *These messages are cleared to prevent the reporting of outdated position and velocity information.*
2. *During a register timeout event, the "ME" field of the ADS-B Broadcast Message may contain ALL ZEROs, except for those fields that may be updated due to the receipt of new data.*

a. The ADS-B Transmitting Subsystem **shall** clear all but the altitude and surveillance status subfields of the Airborne Position Message, if no new position data is received within two (2) seconds of the previous input data update.

Note: *During a timeout event the Format TYPE Code is set to ZERO (see §2.2.3.2.3.1.3.1).*

b. The ADS-B Transmitting Subsystem **shall** clear all 56-bits of the Surface Position Message if no new position data is received within two (2) seconds of the previous data update.

Eurocontrol Comment #4

DO-181E, 2.2.23.1.4.2 and ED-73E, 3.28.4

In ED-73:

-The ADS-B message termination does not contain the bullets

2) of DO-181-2.2.13.1.4.2 specifying the termination of TSS and OS

In DO-181:

- Termination of position messages is not specified
- The title seems to indicate register termination, it should be ADS-B message termination

Proposed new text for ED-73:

3.28.3.4ADS-B message Termination

Termination of the ADS-B Messages shall be performed in accordance with §2.2.3.3.2.12.a, b, c, d, e, f of RTCA DO-260B / EUROCAE ED-102A.

Verification of the termination shall be performed in accordance with §2.4.3.3.2.12 of RTCA DO-260B / ED-102A.

Proposed changes for DO-181:

Add "2.2.23.1.4.3 ADS-B message termination" with the same text that is in ED-73, and remove bullet 2 from 2.2.23.1.4.2 TSS and OS.

RHS_Commentary:

The entire intent was to update DO-181D to DO-181E with changes forced by DO-260B and induce minimum impact to the existing DO-181D material. This is why the TSS and OS messages were handled the way they are in DO-181E, 2.2.23.1.4.3. Now, to do what Eric is proposing is only going half way, in reality, we should probably do the following:

Change all of RTCA DO-181E, 2.2.23.1.4.2 to read as follows:

2.2.23.1.4.2 Register Timeout and Termination

2.2.23.1.4.2.1 Timeout of Extended Squitter Messages

a. Timeout of Extended Squitter Messages **shall** be performed in accordance with §2.2.3.3.2.11 of RTCA DO-260B / EUROCAE ED-102A.

b. Verification of the Extended Squitter Message Timeout functions **shall** be performed in accordance with §2.4.3.3.2.11 of RTCA DO-260B / EUROCAE ED-102A.

2.2.23.1.4.2.2 Termination of Extended Squitter Messages

a. Termination of Extended Squitter Messages **shall** be performed in accordance with §2.2.3.3.2.12 of RTCA DO-260B / EUROCAE ED-102A.

b. Verification of the Extended Squitter Message Termination functions **shall** be performed in accordance with §2.4.3.3.2.12 of RTCA DO-260B / EUROCAE ED-102A.

2.5.4.6 Procedure #6 Squitter Verification

(Subparagraph §2.2.18.2.6)

The squitter function of the transponder **shall** be tested to verify that the transponder correctly generates squitters at the proper rate and with the proper content. Squitters will occur randomly throughout operation of all test procedures. Squitters should be noted by the reply receiver and the test controller as unsolicited replies. Provisions should be made in the test setup to detect squitters, both acquisition and Extended Squitters, and verify their content and rate. If a squitter is detected during the operation of any of the test procedures in this document, the procedure should delay the next scheduled interrogation so that it doesn't overlap the squitter and go undetected by the transponder. The following subparagraphs contain test procedures and expected results that vary according to the aircraft installation for which the transponder is designed, those that support automatic detection of on-the-ground status and those that do not. If a transponder design allows either installation type, the test procedure should be conducted with the transponder switched to support automatic on-the-ground detection and repeated with the transponder switched for installation without automatic on-the-ground detection.

2.5.4.6.1 Acquisition Squitter Verification

The following test **shall** verify proper transmission of Acquisition squitters when the transponder is not transmitting Extended Squitters. The following tests **shall** be conducted with no external data input to the Extended Squitter GICB registers.

Step 1: Setup the transponder to airborne status. The Acquisition squitter transmission **shall** be verified to be at random intervals that are uniformly distributed between 0.8 and 1.2 seconds with a time quantization less than or equal to 15 milliseconds. The test setup will require measuring the time difference between successive Acquisition squitters. The time interval measured between successive Acquisition squitters **shall** be counted in individual 15 millisecond bins between 0.8 and 1.2 seconds. Validation of the proper quantization is achieved upon receipt of at least one Acquisition squitter in each 15 millisecond time bin between 0.8 and 1.2 seconds. Improper times are those occurring outside of the time bins between 0.8 and 1.2 seconds. Verify that the Acquisition squitters are at random intervals that are uniformly distributed over the interval between 0.8 and 1.2 seconds.

Step 2: Verify the content of the CA, AA and PI fields. For diversity transponders, verify that the squitters occur alternately from both channels. For transponders that are designed for aircraft installations with automatic means of determining on-the-ground condition, when the transponder is in on-the-ground status, verify that Acquisition squitters occur on the top antenna only at the prescribed rate.

2.5.4.6.2 Extended Squitter Verification

Extended squitters occur randomly at rates determined by internal states of the transponder. Each Extended Squitter type must be separately verified for content, rate and antenna selection which are dependent upon transponder air/ground state and Extended Squitter ground station interrogations. The selection of airborne or surface position formats are dependent upon determination of on-the-ground status and ground station control via interrogation content. The following tests **shall** be performed to verify proper operation of the transponder Extended Squitter functions. The external data sources for Extended Squitter loading **shall** be connected via the appropriate interfaces.

2.5.4.6.2.1 Extended Squitter Rate Verification

Extended squitter transmission rate **shall** be verified to be at random intervals that are uniformly distributed as specified for each Extended Squitter type in §2.2.23.1.2. The time quantization for each Extended Squitter type **shall** also be verified to be less than or equal to 15 milliseconds. The test setup will require measuring the time difference between successive Extended Squitters of the same type. The time interval measured between successive Extended Squitters of the same type **shall** be counted in individual 15 millisecond bins between the minimum and maximum interval specified in §2.2.23.1.3. Validation of the proper quantization is achieved upon receipt of at least one Extended Squitter in each 15 millisecond time bin in the time interval specified. Improper times are those occurring outside of the time bins within the specified time interval. Verify that the Extended Squitters are at random intervals that are uniformly distributed over the specified time interval. Verify the content of the CA, AA and PI fields. For diversity transponders, setup the transponder to transmit airborne format Extended Squitters. Verify that each Extended Squitter type identified in §2.2.23.1.2 occur alternately from both channels. For transponders that are designed for aircraft installations with automatic means of determining on-the-ground condition, set the transponder to on-the-ground status and verify that Extended Squitters occur on the top antenna only at the prescribed rates.

Change 2.5.4.6.2.1 to read as follows:

2.5.4.6.2.1 Extended Squitter Rate Verification

a. Verify Extended Squitter Message Rate and Timeout functions by demonstrating successful completion of all test procedures called out in §2.4.3.3.2.11 of RTCA DO-260B / EUROCAE ED-102A, as required by §2.2.23.1.4.2.1.

   Note: §2.4.3.3.2.11 of RTCA DO-260B / EUROCAE ED-102A indicates that ADS-B Message Timeout performance is tested in §2.4.3.3.2.2 through §2.4.3.3.2.8.2. These same test procedure sections verify the Message Rate in RTCA DO-260B / EUROCAE ED-102A

b. Verify Extended Squitter Message Rate and Termination functions by demonstrating successful completion of all test procedures called out in §2.4.3.3.2.12 of RTCA DO-260B / EUROCAE ED-102A, as required by §2.2.23.1.4.2.1.

   Note: §2.4.3.3.2.12 of RTCA DO-260B / EUROCAE ED-102A indicates that ADS-B Message Termination performance is tested in §2.4.3.3.2.2 through §2.4.3.3.2.8.2. These same test procedure sections verify the Message Rate in RTCA DO-260B / EUROCAE ED-102A

c. While performing the test procedures specified in subparagraphs "a" and "b" above, verify the content of the "CA", "AA", and "PI" fields in the Extended Squitter messages.

d. For diversity transponders, setup the transponder to transmit airborne format Extended Squitters. Verify that each Extended Squitter type identified in §2.2.23.1.2 occurs alternately from both channels. For transponders that are designed for aircraft installations with automatic means of determining on-the-ground condition, set the transponder to on-the-ground status and verify that Extended Squitters occur on the top antenna only at the prescribed rates.

Rationale: *The message rates are appropriately tested by RTCA DO-260B. However, the Diversity function is not. Therefore, section 2.5.4.6.2.1 is restructured to call out DO-260B testing as indicated above.*

Next, Retain section 2.5.4.6.2.2 as is since it is verifying squitter protocol using GICB Extraction.
Next, Retain section 2.5.4.6.3 as is since it is verifying Squitter Control functions.

2.5.4.6.2.2 Extended Squitter Protocol Verification

The following test verifies the transponder properly transmits Extended Squitters according to the protocol specified in §2.2.23.1.

Verify the content of the CA, AA and PI fields of all Extended Squitter replies. For the following test, connect the transponder to the appropriate source that provides altitude code input to the transponder. Also, as required, setup to provide Extended Squitter data to ground initiated Comm-B Registers 05_{16}, 06_{16}, 07_{16}, 08_{16}, 09_{16}, $0A_{16}$, 62_{16} and 65_{16} through an external interface as specified in §2.2.13.2.

Unless otherwise noted, for the following steps, setup the transponder to not inhibit Acquisition squitters and to report barometric pressure altitude in the airborne position report (subfield ATS equals ZERO). For transponders that support automatic detection of air/ground state, set the transponder to airborne state.

Step 1 Disable altitude code and all other Extended Squitter data into the transponder. Set the ALT switch to the "off" position. Upon power-up initialization of the transponder, verify that the transponder broadcasts Acquisition squitters but does not broadcast Extended Squitters. Interrogate the transponder with ground initiated Comm-B requests with RR=16, DI=7 and RRS=5, 6, 7 and 9 respectively. Verify that the MB field of the corresponding replies are ZERO. Set the ALT switch to the "on" position. Verify that the transponder continues to broadcast Acquisition squitters but does not broadcast Extended Squitters.

Step 2 Set the ALT switch to the "on" position and provide altitude code input to the transponder. After power-up initialization, verify that the transponder does not broadcast Extended Squitters. Interrogate the transponder with ground initiated Comm-B requests with RR=16, DI=7 and RRS=5, 6, 9 and 10 respectively. Verify that the altitude is ZERO in the airborne position report and remaining bits are ZERO. Verify that the MB field of the remaining replies are ZERO. Interrogate the transponder with UF=4, RR=17 and DI≠7 and verify that the SCS subfield of the data link capability report is ZERO. Verify that the transponder broadcasts Acquisition squitters.

Step 3 Provide Extended Squitter updates to the transponder at a maximum update interval as specified in Appendix B, Table B-2-1. Include updates to GICB Registers 05_{16}, 06_{16}, 07_{16}, 08_{16}, 09_{16}, 62_{16} and 65_{16}. Use other than ZERO or ALL ONEs for the airborne position report, aircraft identification report, and the airborne velocity report. Verify that the transponder broadcasts airborne position squitters, airborne identification squitters and airborne velocity squitters at the proper rate and the ME data content matches the data stored in GICB Register 05_{16}, 08_{16} and 09_{16}, respectively. Verify that the SSS and ACS subfields of the airborne position squitter are correct. Interrogate the transponder with ground initiated Comm-B requests with RR=16, DI=7 and RRS=5, 6, 7, 8 and 9, respectively. Verify that the MB field contains the proper data. Repeat except vary the data content of each GICB and verify the data content of each Extended Squitter subsequent to each register update. Interrogate the transponder with RR=17 and DI≠7 and verify that the SCS subfield of the data link capability report is one.

Step 4 Setup the transponder as in Step 3 with Extended Squitter updates to the transponder at a maximum update interval as specified in Appendix B, Table B-2-1. Place the transponder in the airborne state. Stop updates of all Extended Squitter data, except altitude information, to the transponder for GICB Registers 05_{16}, 06_{16}, 07_{16}, 08_{16}, 09_{16}, 62_{16} and 65_{16}.

a. Verify that after 2 seconds, the Extended Squitter ME fields for GICB Register 05_{16} are ZERO with the exception of the ACS and surveillance status fields.

b. Verify that after 2 seconds the aircraft identification and category squitter (GICB Register 08_{16}) continues to be transmitted.

c. Verify that after 2 seconds only the Selected Altitude, Selected Heading or Barometric Pressure Setting subfields of the target state and status squitter (GICB Register 62_{16}) are set to ZERO. Verify that the remaining Extended Squitter ME subfields are not cleared, as they contain other integrity, mode or status information.

d. Verify that after 2 seconds the Extended Squitter ME fields of the aircraft operational status squitter (GICB Register 65_{16}) are not cleared, as they contain various integrity, mode or status information.

e. Verify that after 2.6 seconds the airborne velocity squitter is not being transmitted.

f. Place the transponder in the ground state and verify that the surface position Extended Squitter ME field (GICB Register 06_{16}) is ZERO. Repeat the setup as in Step 3 with Extended Squitter updates to the transponder at a one half second rate. Place the transponder in the airborne state. Interrogate the transponder with RR=17 and DI=7 and verify that the SCS subfield of the data link capability report is one. After all updates (except altitude information) have ceased for 10 seconds, interrogate to extract the data link capability report and verify that the SCS subfield is ZERO. Interrogate the transponder with ground initiated Comm-B requests with RR=16, DI=7 and RRS=5, 6, 7, 8 and 9 respectively. Verify that the MB fields are ZERO with the exception of the ACS field in the airborne position squitter (GICB Register 05_{16}) and the airborne identification squitter (GICB Register 08_{16}). After all updates (except altitude information) have ceased for 60 seconds, verify that airborne identification and category Extended Squitters are still being transmitted. Place the transponder in the ground state and verify that the surface position Extended Squitter (GICB Register 06_{16}) is no longer transmitted. Return the transponder to the airborne state. Verify that the acquisition squitter and airborne position squitter are broadcast. Set the ALT switch to the "off" position. Verify that the ME field of the airborne position squitter is ZERO. After 60 seconds, verify that the transponder no longer broadcasts airborne position squitters.

Step 5 Set ALT switch to the “on” position. Setup the transponder as in step 3 and provide Extended Squitter updates to the transponder at a maximum update interval as specified in Appendix B, Table B-2-1. Stop update of GICB Registers 05_{16} and 06_{16} only. After 2 seconds, verify that the ME field of the airborne position squitter is ZERO with the exception of the ACS subfield. Verify that the transponder broadcasts airborne position, aircraft identification and airborne velocity squitters at the proper rate and the ME data content matches the data stored in GICB Registers 05_{16}, 08_{16} and 09_{16}, respectively. Interrogate with RR=16, DI=7 and RRS=5, 6, 8 and 9 and verify the MB fields matches the ME field in the corresponding Extended Squitter reply. After 10 seconds, interrogate to extract the data link capability report and verify that SCS is ZERO. After 60 seconds, verify that airborne position squitters are still transmitted.

Set the ALT switch to the “off” position. Verify that the ME field of the airborne position squitter is ZERO. After 60 seconds, verify that the transponder no longer broadcasts airborne position squitters. Verify that aircraft identification and airborne velocity squitters are transmitted throughout the test at the proper rate and with the correct data content.

Step 6 Set the ALT switch to the “on” position and provide altitude code input to the transponder. Provide Extended Squitter updates to the transponder at a maximum update interval as specified in Appendix B, Table B-2-1. Include updates to GICB Registers 05_{16}, 06_{16}, 07_{16}, 08_{16} and 09_{16}. Verify that the ME fields of the airborne position, velocity and aircraft identification squitters match the data input. Stop updates of Extended Squitter data to the transponder for GICB Registers 08_{16} and 09_{16} only. After 15

seconds, verify that the ME field of the aircraft identification squitter continues to match the data input prior to stopping updates to GICB Register 08_{16}. After 2.6 seconds, verify that the airborne velocity squitter is no longer transmitted. Interrogate with RR=16, DI=7 and RRS=5, 6, 8 and 9 and verify that the MB fields match the ME fields in the corresponding Extended Squitter reply. Specifically, verify that the MB and ME fields for Register 08_{16} continue to match the data input prior to stopping the updates to GICB Register 08_{16}. After 10 seconds, interrogate to extract the data link capability report and verify that SCS is one. After 60 seconds, verify that airborne position and aircraft identification squitters are still transmitted. Specifically, verify that the ME field of the aircraft identification squitter continues to match the data input prior to stopping the updates to GICB Register 08_{16}.

Step 7 Configure the transponder to inhibit Acquisition squitters when Extended Squitters are broadcast. Prior to providing Extended Squitter updates, verify that Acquisition squitters are broadcast. Provide Extended Squitter updates at a maximum update interval as specified in Appendix B, Table B-2-1 to GICB Registers 05_{16}, 06_{16} and 08_{16} and provide altitude code input to the transponder. Verify that Extended Squitters are broadcast and Acquisition squitters are not broadcast. Verify that airborne position and aircraft identification squitters are broadcast at the proper rate and alternately on the top and bottom antenna ports as specified for airborne state if antenna diversity is supported. Additionally provide updates to GICB Register 09_{16}. Verify the broadcast of airborne position squitters, aircraft identification squitters and airborne velocity squitters at the proper rate and the ME data content matches the data stored in GICB Registers 05_{16}, 08_{16} and 09_{16}, respectively. Verify that the transponder does not broadcast Acquisition squitters.

Set the ALT switch to the "off" position and stop update to GICB Registers 05_{16}, 06_{16}, 08_{16} and 09_{16}. After 2 seconds, verify that the ME fields of the airborne position squitters are ZERO. After 2.6 seconds, verify that the airborne velocity squitter is no longer transmitted. Interrogate with UF=4, RR=16, DI=7 and RRS=5, 6, 8 and 9, respectively. Verify that the MB fields of the replies match the data of the corresponding Extended Squitter reply. Specifically, verify that the MB fields of the replies for Register 08_{16} continue to match the data that was provided prior to stopping the updates to GICB Register 08_{16}. After 60 seconds, verify that Extended Squitter airborne position and airborne velocity squitter transmissions stop. Verify that the aircraft identification Extended Squitter transmissions are continued and that the contents of the ME field matches the data that was provided prior to stopping the updates to GICB Register 08_{16}. Verify that the transponder resumes Acquisition squitter broadcast.

Repeat above sequence except stop update to GICB Registers 05_{16} and 06_{16} only. After 2 seconds, verify that the ME field of the airborne position report is ZERO. After 60 seconds, verify that the transponder no longer broadcasts airborne position squitters and continues to broadcast airborne velocity and aircraft identification squitters. Verify that the transponder continues to inhibit the broadcast of Acquisition squitters.

Repeat above except stop update to GICB Register 09_{16} only. After 2.6 seconds, verify that the airborne velocity squitter is no longer transmitted, and after 60 seconds, verify that the Acquisition squitters are not transmitted.

Step 8 Provide data to the transponder to trigger data to be loaded into GICB Register $0A_{16}$. Verify that an Event-Driven Extended Squitter is generated with the proper data content. Repeat for all supported Event-Driven Extended Squitter Message types. Verify that the data contained in the GICB Register corresponding to the Event-Driven Extended Squitter Message type matches the data contained in the transmitted Extended Squitter. Update GICB Register $0A_{16}$ at a rate less than twice every second. Verify that an Event-Driven Extended Squitter is generated subsequent to each update with the proper data content. Vary the data content provided externally to the transponder and verify that the

data content subsequent to update of the Event-Driven report is correct. Increase the update rate to exceed twice per second. Verify that the Event-Driven Extended Squitter rate does not exceed twice per second, and that the data content reflects the most recent update contents.

For the following steps, for those transponders that support automatic detection of on-the-ground status, change the transponder to on-the-ground status. Configure the transponder to not inhibit Acquisition squitters when Extended Squitters are broadcast.

Step 9 Upon power-up initialization of the transponder, verify that the transponder broadcasts Acquisition squitters at the proper rate but does not broadcast Extended Squitters. For transponders that support automatic detection of on-the-ground status and diversity, verify that Acquisition squitters occur on the top antenna port only. Interrogate the transponder with GICB requests with RR=16, DI=7 and RRS=5, 6, 8 and 9 respectively. Verify that the MB field of the corresponding replies are ZERO, with the exception of Register 08_{16}.

Step 10 Provide Extended Squitter updates to the transponder at a maximum update interval as specified in Appendix B, Table B-2-1. Include updates to GICB Registers 05_{16}, 06_{16}, 08_{16}, 09_{16}, 62_{16} and 65_{16}. Use other than ZERO or all ONEs for the surface position report and the aircraft identification report. Set TRS to ZERO. For transponders that support automatic on-the-ground detection, perform the following:

1. Verify that the transponder broadcasts surface position squitters at the high rate and the ME data content matches the data stored in GICB Register 06_{16}.
2. Verify that the transponder broadcasts aircraft identification squitters and that they occur uniformly over the range of 4.8 to 5.2 seconds as specified in §2.2.23.1.3.d. Verify that the ME data content matches the data stored in GICB Register 08_{16}.
3. Verify that the transponder broadcasts aircraft operational status squitters at the rates as specified in §2.2.3.3.1.4.2 of RTCA DO-260B/EUROCAE ED-102A and that the data content matches the data stored in GICB Register 65_{16}. When transmitting the surface formats, the rate depends on whether the high or low squitter rate has been selected (see §2.2.23.1.6).
4. Verify that the transponder does not broadcast the airborne position and the airborne velocity squitter.
5. Verify that the transponder does not broadcast Acquisition squitters.
6. Stop update of GICB Registers 05_{16}, 06_{16}, 08_{16}, 09_{16} and 65_{16}. After 2 seconds, verify that the surface position squitter ME field is ZERO. After 15 seconds, verify that the ME field of the aircraft identification squitter continues to match the data input prior to stopping updates to GICB Register 08_{16}.
7. After 60 seconds, verify that surface position and surface aircraft operational status squitters stop. Verify that the aircraft identification extended squitter transmissions are continued and that the contents of the ME field matches the data that was provided prior to stopping the updates to GICB Register 08_{16}. Verify that acquisition squitter transmissions resume.

For transponders that do not support automatic on-the-ground detection, verify that airborne position squitters, airborne velocity squitters and aircraft identification squitters are transmitted at the proper rate and data content. Verify that surface position squitters are not emitted. Verify that the transponder broadcasts Acquisition squitters at the proper rate.

Repeat except vary the data content of GICB Registers 06_{16} and 08_{16} and verify the data content of each Extended Squitter subsequent to each register update.

Step 11 For transponders that support automatic on-the-ground detection and can determine surface squitter rate, repeat step 10 with TRS set to 1 and verify that the surface position and aircraft identification squitters occur at the high rate. Change TRS to 2 and repeat except verify that the surface position squitter switches to the low rate and aircraft identification squitters occur uniformly over the range 9.8 to 10.2 seconds as specified in §2.2.23.1.3.d.

In all of the above steps, interrogate the transponder with a ground-initiated Comm-B request containing RR=16, DI=7 and RRS=7 and verify that the TRS and ATS subfields are reported properly.

2.5.4.6.3 Squitter Control Verification

Squitter operation is dependent upon control from Extended Squitter ground stations from interrogation content of the SD field. SD data can command the transponder to broadcast surface position squitters and control surface Extended Squitter rate and surface squitter antenna selection.

Step 1 Squitter Type Control

a. Provide pressure altitude data and Extended Squitter updates to the transponder through the appropriate external interface. Include updates to GICB Registers 05_{16}, 06_{16}, 08_{16}, 09_{16}, 61_{16} and 65_{16}. Use other than ZERO or all ones for the corresponding GICB registers. Update the registers at a half second rate to prevent time out of these registers. Set TRS to ZERO or ONE and for those transponders that support automatic on-the-ground detection, set the transponder to airborne state. Throughout the following entire step:

   1. verify that CA remains equal to 5 for transponders that support automatic on-the-ground detection; otherwise verify CA remains equal to 6, and

   2. verify that the transponder continues broadcast of Acquisition squitters throughout the test.

b. Interrogate the transponder with UF=4, PC and RR=0, DI=2, TCS=1, RCS=2, SAS=0.

   1. Verify that the transponder:

      (a). broadcasts surface position (06_{16}) and aircraft identification (08_{16}), aircraft status (61_{16}) and surface aircraft operational status (65_{16}) squitters for 15 seconds at the low rate,

      (b). does not broadcast airborne position (05_{16}) or airborne velocity (09_{16}) squitters during the 15 second period, and,

      (c). inhibits replies to ATCRBS, ATCRBS/Mode S All-Call and Mode S-Only All-Call interrogations during the 15 second period.

   2. Verify that after the 15 second interval, the transponder:

      (a). reverts to broadcast of the airborne position (05_{16}), airborne velocity (09_{16}), aircraft status (61_{16}) and airborne aircraft operational status (65_{16}) squitters,

      (b). resumes broadcast of the aircraft identification (08_{16}) squitter at the high rate, and

      (c) replies to ATCRBS, ATCRBS/Mode S All-Call and Mode S-Only All-Call interrogations.

   3. Repeat using an interrogation as above except set TCS=2 and verify that:

      (a) the transponder broadcasts surface position (06_{16}) aircraft identification (08_{16}), aircraft status (61_{16}) and surface aircraft operational status (65_{16}) squitters at the low rate for 60 seconds,

(b) does not broadcast airborne position (05_{16}) or airborne velocity (09_{16}) squitters during the 60 second period,

(c) inhibits replies to ATCRBS, ATCRBS/Mode S All-Call and Mode S-Only All-Call interrogations during the 60 second period, and

(d) After the 60 second interval, verify that:

(1). the transponder reverts to broadcast of airborne position (05_{16}), airborne velocity (09_{16}), aircraft status (61_{16}) and airborne aircraft operational status (65_{16}) squitters,

(2). resumes broadcast of aircraft identification (08_{16}) squitters at the high rate, and

(3). replies to ATCRBS, ATCRBS/Mode S All-Call and Mode S-Only All-Call interrogations.

c. Interrogate the transponder with UF=4, PC and RR=0, DI=2, TCS=1, RCS=2, SAS=0.

1. Verify that the transponder:

(a). broadcasts surface position (06_{16}), aircraft identification (08_{16}), aircraft status (61_{16}) and surface aircraft operational status (65_{16}) squitters for 15 seconds at the low rate,

(b). does not broadcast airborne position (05_{16}) or airborne velocity (09_{16}) squitters during the 15 second period, and

(c). inhibits replies to ATCRBS, ATCRBS/Mode S All-Call and Mode S-Only All-Call interrogations during the 15 second period.

2. Prior to the timeout of the 15 second interval, repeat interrogation. Verify that:

(a). the transponder continues broadcast of the surface position (06_{16}), aircraft identification (08_{16}), aircraft status (61_{16}) and surface aircraft operational status (65_{16}) squitters for another 15 seconds from the second interrogation,

(b). does not broadcast airborne position (05_{16}) or airborne velocity (09_{16}) squitters during the additional 15 second period after the second interrogation, and

(c). inhibits replies to ATCRBS, ATCRBS/Mode S All-Call and Mode S-Only All-Call interrogations during the additional 15 second period after the second interrogation.

3. Repeat using an interrogation as above except set TCS=2 and verify that:

(a). the transponder broadcasts surface position (06_{16}) aircraft identification (08_{16}), aircraft status (61_{16}), and surface aircraft operational status (65_{16}) squitters at the low rate for 60 seconds,

(b). does not broadcast airborne position (05_{16}) or airborne velocity (09_{16}) squitters during the 60 second period, and

(c). inhibits replies to ATCRBS, ATCRBS/Mode S All-Call and Mode S-Only All-Call interrogations during the 60 second period, and

(d). prior to the timeout of the 60 second interval, repeat interrogation. Verify that:

(1). the surface position (06_{16}) aircraft identification (08_{16}), aircraft status (61_{16}), and surface aircraft operational status (65_{16}) squitters continue for another 60 seconds from the second interrogation,

(2). does not broadcast airborne position (05_{16}) or airborne velocity (09_{16}) squitters during the 60 second period after the repeat interrogation, and

(3). inhibits replies to ATCRBS, ATCRBS/Mode S All-Call and Mode S-Only All-Call interrogations during the 60 second period after the repeat interrogation.

d. Interrogate the transponder with UF=4, PC=0, RR=0, DI=2, TCS=1, RCS=2, and SAS=0. Within a 1 second interval, interrogate with the same interrogation except set TCS=3. Verify that the transponder:

1. stops broadcast of surface position (06_{16}) and surface aircraft operational status (65_{16}) squitters.
2. resumes broadcast of the airborne position (05_{16}), airborne velocity (09_{16}), aircraft status (61_{16}) and airborne aircraft operational status (65_{16}) squitters,
3. resumes broadcast of the aircraft identification (08_{16}) squitter at the high rate, and
4. replies to ATCRBS, ATCRBS/Mode S All-Call and Mode S-Only All-Call interrogations.

e. Interrogate the transponder with UF=4, PC=0, RR=0, DI=2, TCS=0, RCS=0, and SAS=0. Verify that the transponder:

1. continues to broadcast airborne position (05_{16}), airborne velocity (09_{16}), aircraft status (61_{16}) and airborne aircraft operational status (65_{16}) squitters at the proper rate,
2. continues to broadcast the aircraft identification (08_{16}) squitter at the high rate,
3. continues to reply to ATCRBS, ATCRBS/Mode S All-Call and Mode S-Only All-Call interrogations, and
4. does not broadcast of surface position (06_{16}) and surface aircraft operational status (6516) squitters.

f. Interrogate the transponder with UF=4, PC=0, RR=0, DI=2, TCS=3, 4, 5, 6, 7, RCS=0, and SAS=0 interrogations. For each interrogation, verify that the transponder:

1. broadcasts airborne position (05_{16}), airborne velocity (09_{16}), aircraft status (61_{16}) and airborne aircraft operational status (65_{16}) squitters at the proper rate,
2. broadcasts the aircraft identification (08_{16}) squitter at the high rate,
3. replies to ATCRBS, ATCRBS/Mode S All-Call and Mode S-Only All-Call interrogations, and
4. does not broadcast of surface position (06_{16}) and surface aircraft operational status (65_{16}) squitters.

g. Perform the following for transponders that support automatic on-the-ground detection. Set the transponder to **on-the-ground** status. Interrogate the transponder with UF=4, PC=0, RR=0, DI=2, TCS=1, RCS=2, and SAS=0. Verify that the transponder:

1. broadcasts surface position (06_{16}) and aircraft identification (08_{16}), aircraft status (61_{16}), and surface aircraft operational status (65_{16}) squitters squitters for 15 seconds at the low rate,
2. does not broadcast airborne position (05_{16}) or airborne velocity (09_{16}) squitters during the 15 second period,
3. inhibits replies to ATCRBS, ATCRBS/Mode S All-Call and Mode S-Only All-Call interrogations during the 15 second period, and

4. After the 15 second interval, verify that the transponder:

   (a). broadcasts surface position (06_{16}), aircraft identification (08_{16}), aircraft status (61_{16}), and surface aircraft operational status (65_{16}) squitters at the high rate,

   (b). does not broadcast airborne position (05_{16}) or airborne velocity (09_{16}) squitters during the 15 second period, and

   (c). continues to inhibit replies to ATCRBS, ATCRBS/Mode S All-Call and Mode S-Only All-Call interrogations.

h. Repeat the interrogation used in Step 1.g. After one (1) second, set the transponder to the airborne state. Then verify that the transponder:

   1. broadcasts surface position (06_{16}), aircraft identification (08_{16}), aircraft status (61_{16}), and surface aircraft operational status (65_{16}) squitters at the low rate for the entire 15 second period,

   2. does not broadcast airborne position (05_{16}) or airborne velocity (09_{16}) squitters during the 15 second period,

   3. inhibits replies to ATCRBS, ATCRBS/Mode S All-Call and Mode S-Only All-Call interrogations during the 15 second period, and

   4. After the 15 second period, verify that the transponder:

      (a). broadcasts airborne position (05_{16}), airborne velocity (09_{16}), aircraft status (61_{16}) and airborne aircraft operational status (65_{16}) squitters at the proper rate,

      (b). broadcasts the aircraft identification (08_{16}) squitter at the high rate,

      (c). replies to ATCRBS, ATCRBS/Mode S All-Call and Mode S-Only All-Call interrogations, and

      (d). does not broadcast of surface position (06_{16}) and surface aircraft operational status (65_{16}) squitters.

Step 2 Squitter Rate Control

With the equipment connected as specified in Step 1, set TRS to ZERO or ONE and for transponders that support automatic on-the-ground detection, set the transponder to the **airborne state**. Except as otherwise noted, verify that the Acquisition squitter is broadcast throughout the following step at the proper rate.

a. Interrogate the transponder with UF=4, PC=0, RR=0, DI=2, TCS=2, RCS=1 and SAS=0. Verify that the transponder:

   1. broadcasts surface position (06_{16}), aircraft identification (08_{16}), aircraft status (61_{16}), and surface aircraft operational status (65_{16}) squitters for 60 seconds at the high rate,

   2. does not broadcast airborne position (05_{16}) or airborne velocity (09_{16}) squitters during the 60 second period,

   3. inhibits replies to ATCRBS, ATCRBS/Mode S All-Call and Mode S-Only All-Call interrogations during the 60 second period, and

   4. After the 60 second period, verify that the transponder:

      (a). broadcasts airborne position (05_{16}), airborne velocity (09_{16}), aircraft status (61_{16}) and airborne aircraft operational status (65_{16}) squitters at the proper rate,

      (b). broadcasts the aircraft identification (08_{16}) squitter at the high rate,

(c). replies to ATCRBS, ATCRBS/Mode S All-Call and Mode S-Only All-Call interrogations, and

(d). does not broadcast of surface position (06_{16}) and surface aircraft operational status (65_{16}) squitters.

b. Repeat the Step 2.a procedure, except prior to the 60 second interval, repeat the interrogation with TCS=2 and RCS=1, and verify that the transponder:

1. continues to broadcast surface position (06_{16}), aircraft identification (08_{16}), aircraft status (61_{16}), and surface aircraft operational status (65_{16}) squitters at the high rate for 60 seconds after the repeat interrogation,

2. does not broadcast airborne position (05_{16}) or airborne velocity (09_{16}) squitters during the 60 second period after the repeat interrogation,

3. inhibits replies to ATCRBS, ATCRBS/Mode S All-Call and Mode S-Only All-Call interrogations during the 60 second period after the repeat interrogation, and

4. After the 60 second period after the second interrogation, verify that the transponder:

(a). broadcasts airborne position (05_{16}), airborne velocity (09_{16}), aircraft status (61_{16}) and airborne aircraft operational status (65_{16}) squitters at the proper rate,

(b). broadcasts the aircraft identification (08_{16}) squitter at the high rate,

(c). replies to ATCRBS, ATCRBS/Mode S All-Call and Mode S-Only All-Call interrogations, and

(d). does not broadcast of surface position (06_{16}) and surface aircraft operational status (65_{16}) squitters.

c. Interrogate the transponder with UF=4, PC=0, RR=0, DI=2, TCS=0, RCS=1 and SAS=0. Verify that the transponder:

1. continues to broadcast airborne position (05_{16}), airborne velocity (09_{16}), aircraft status (61_{16}) and airborne aircraft operational status (65_{16}) squitters at the proper rate,

2. continues to broadcast the aircraft identification (08_{16}) squitter at the high rate,

3. continues to reply to ATCRBS, ATCRBS/Mode S All-Call and Mode S-Only All-Call interrogations, and

4. does not broadcast of surface position (06_{16}) and surface aircraft operational status (65_{16}) squitters.

d. Repeat the interrogation used in Step 2.c except use TCS = 3, 4, 5, 6, 7. For each TCS used, verify that the transponder continues to respond as in Step 2.c.

e. Interrogate the transponder with UF=4, PC=0, RR=0, DI=2, TCS=1, RCS=2, and SAS=0. Verify that the transponder:

1. broadcasts surface position (06_{16}), aircraft identification (08_{16}), aircraft status (61_{16}), and surface aircraft operational status (65_{16}) squitters at the low rate for 15 seconds after the interrogation,

2. does not broadcast airborne position (05_{16}) or airborne velocity (09_{16}) squitters during the 15 second period after the interrogation,

3. inhibits replies to ATCRBS, ATCRBS/Mode S All-Call and Mode S-Only All-Call interrogations during the 15 second period after the interrogation, and

4. After the 15 second period, verify that the transponder:

   (a). broadcasts airborne position (05_{16}), airborne velocity (09_{16}), aircraft status (61_{16}) and airborne aircraft operational status (65_{16}) squitters at the proper rate,

   (b). broadcasts the aircraft identification (08_{16}) squitter at the high rate,

   (c). replies to ATCRBS, ATCRBS/Mode S All-Call and Mode S-Only All-Call interrogations, and

   (d). does not broadcast surface position (06_{16}) and surface aircraft operational status (65_{16}) squitters.

f. Repeat the interrogation used in Step 2.e, except set TCS=2. Verify that the transponder:

   1. broadcasts surface position (06_{16}), aircraft identification (08_{16}), aircraft status (61_{16}), and surface aircraft operational status (65_{16}) squitters at the low rate for 60 seconds,

   2. does not broadcast airborne position (05_{16}) or airborne velocity (09_{16}) squitters during the 60 second period,

   3. inhibits replies to ATCRBS, ATCRBS/Mode S All-Call and Mode S-Only All-Call interrogations during the 60 second period and

   4. After the 60 second period, verify that the transponder:

      (a). broadcasts airborne position (05_{16}), airborne velocity (09_{16}), aircraft status (61_{16}) and airborne aircraft operational status (65_{16}) squitters at the proper rate,

      (b). broadcasts the aircraft identification (08_{16}) squitter at the high rate,

      (c). replies to ATCRBS, ATCRBS/Mode S All-Call and Mode S-Only All-Call interrogations, and

      (d). does not broadcast surface position (06_{16}) and surface aircraft operational status (65_{16}) squitters.

g. Interrogate the transponder with UF=4, PC=0, RR=0, DI=2, TCS=1, RCS=1, and SAS=0. Follow this interrogation within 1 second with the same interrogation except set TCS=0 and RCS=3. Verify that the transponder:

   1. stops broadcast of surface position (06_{16}) and surface aircraft operational status (65_{16}) squitters.

   2. resumes broadcast of the airborne position (05_{16}), airborne velocity (09_{16}), aircraft status (61_{16}) and airborne aircraft operational status (65_{16}) squitters,

   3. resumes broadcast of the aircraft identification (08_{16}) squitter at the high rate, and

   4. replies to ATCRBS, ATCRBS/Mode S All-Call and Mode S-Only All-Call interrogations.

h. Repeat the first interrogation used in Step 2.g. Follow this interrogation within 1 second with the same interrogation except set TCS=0 and RCS=4. Verify that the transponder responds as required in Step 2.g.

i. The following verifies that the RCS subfield has no effect when the transponder is not transmitting surface position squitters. Interrogate the transponder with UF=4, PC=0, RR=0, DI=2, TCS=0, RCS=1, and SAS=0. Verify that the transponder:

1. continues the broadcast of the airborne position (05_{16}), airborne velocity (09_{16}), aircraft status (61_{16}) and airborne aircraft operational status (65_{16}) squitters at the proper rates.
2. continues to broadcast the aircraft identification (08_{16}) squitter at the high rate,
3. continues to reply to ATCRBS, ATCRBS/Mode S All-Call and Mode S-Only All-Call interrogations, and
4. does not broadcast of surface position (06_{16}) and surface aircraft operational status (65_{16}) squitters.

j. Repeat Step 2.i above, except set RCS=2, 3, 4, 5, 6 and 7, respectively. For each setting used for RCS, verify that the transponder responds as required in Step 2.i.

k. The following verifies that unassigned RCS codes have no effect when the transponder is transmitting surface position squitters. Interrogate the transponder with UF=4, PC and RR=0, DI=2, TCS=2, RCS=0, SAS=0. Verify that the transponder:

1. broadcasts surface position (06_{16}), aircraft identification (08_{16}), aircraft status (61_{16}), and surface aircraft operational status (65_{16}) squitters at the proper rates,
2. does not broadcast airborne position (05_{16}) or airborne velocity (09_{16}) squitters during the 60 second period following the interrogation,
3. inhibits replies to ATCRBS, ATCRBS/Mode S All-Call and Mode S-Only All-Call interrogations during the 60 second period following the interrogation.

l. Repeat the interrogation used in Step 2.k, except set TCS=0 and RCS=5, 6 and 7, respectively, and for each setting used, verify that the transponder:

1. continues broadcast of surface position (06_{16}), aircraft identification (08_{16}), aircraft status (61_{16}), and surface aircraft operational status (65_{16}) squitters at the proper rate following each interrogation, and
2. does not broadcast airborne position (05_{16}) or airborne velocity (09_{16}) squitters during the 60 second period following the interrogation.

m. Interrogate the transponder with UF=4, PC=0, RR=0, DI=2, TCS=2, RCS=1, and SAS=0. Follow this interrogation within 1 second with the same interrogation except set TCS=0 and RCS=3. Verify that the transponder stops broadcast of surface position (06_{16}) and surface aircraft operational status (65_{16}) squitters.

n. Prior to 60 seconds from the first interrogation, repeat the first interrogation used in Step 2.m, except set RCS=0. Sixty (60) seconds after the repeat interrogation, verify that the transponder resumes broadcasts of the surface position (06_{16}), aircraft identification (08_{16}), aircraft status (61_{16}), and surface aircraft operational status (65_{16}) squitters.

o. Interrogate the transponder with UF=4, PC=0, RR =0, DI=2, TCS=2, RCS=1, and SAS=0 to again set the transponder to transmit surface position squitters. Follow this interrogation after 30 seconds with the same interrogation, except set TCS=0 and RCS=4. Verify that the transponder stops broadcast of surface position (06_{16}) and surface aircraft operational status (65_{16}) squitters.

p. Prior to 60 seconds from the first interrogation used in Step 2.o, repeat the first interrogation used in Step 2.o, with RCS=0. After 120 seconds from the repeat interrogation, verify that the transponder resumes broadcast of the surface position (06_{16}), aircraft identification (08_{16}), aircraft status (61_{16}), and surface aircraft operational status (65_{16}) squitter.

q. Interrogate the transponder with UF=4, PC=0, RR=0, DI=2, TCS=2, RCS=1, and SAS=0. Follow this interrogation within 1 second with the same interrogation, except set TCS=0 and RCS=3. Verify that the transponder stops broadcast of surface position (06_{16}) and surface aircraft operational status (65_{16}) squitters.

r. Prior to 60 seconds from the first interrogation used in Step 2.q, repeat the interrogation used in Step 2.q and verify that the transponder immediately resumes broadcast of the surface position (06_{16}), aircraft identification (08_{16}), aircraft status (61_{16}), and surface aircraft operational status (65_{16}) squitter at the high rate for 60 seconds.

s. Perform the following for transponders that support automatic on-the-ground detection. Set the transponder to **on-the-ground** status. Verify that Acquisition squitters are not broadcast.

t. Interrogate the transponder with UF=4, PC=0, RR=0, DI=2, TCS=0, RCS=3 and SAS=0.

1. Verify that the transponder stops broadcast of surface position (06_{16}) and surface aircraft operational status (65_{16}) squitters for 60 seconds, and that Acquisition squitters are broadcast.

2. After 60 seconds, verify that the transponder:

   (a). resumes broadcast of surface position (06_{16}), aircraft identification (08_{16}), aircraft status (61_{16}), and surface aircraft operational status (65_{16}) squitters at the high rate, and

   (b). does not transmit Acquisition squitters.

3. Repeat the interrogation, except set RCS=4. Verify that the transponder:

   (a). stops broadcast of surface position (06_{16}) and surface aircraft operational status (65_{16}) squitters for 120 seconds, and

   (b). broadcasts Acquisition squitters.

4. After 120 seconds, verify that the transponder:

   (a). resumes broadcasts surface position (06_{16}), aircraft identification (08_{16}), aircraft status (61_{16}), and surface aircraft operational status (65_{16}) squitters at the high rate, and

   (b). does not transmit Acquisition squitters.

5. Repeat the interrogation, except set RCS=0, 5, 6 and 7, delaying 120 seconds between interrogation. Verify that the transponder:

   (a). continues to broadcasts surface position (06_{16}), aircraft identification (08_{16}), aircraft status (61_{16}), and surface aircraft operational status (65_{16}) squitters at the high rate, and

   (b). does not transmit Acquisition squitters.

Step 3 Squitter Antenna Control

The following procedure verifies that the transponder correctly broadcasts surface Extended Squitters and Acquisition squitters on the proper antenna ports as commanded by the SAS subfield. For transponders that do not support antenna diversity, verify that the SAS commands have no impact on Acquisition or Extended Squitter transmissions.

a. With the equipment connected as specified in Step 1, for transponders that support automatic on-the-ground detection, set the transponder to **on-the-ground** status. For transponders that support automatic detection of on-the-ground condition, verify that the transponder:

   1. broadcasts surface position (06_{16}), aircraft identification (08_{16}), aircraft status (61_{16}), and surface aircraft operational status (65_{16}) squitters on the top antenna only, and

   2. does not broadcast Acquisition squitters.

b. Interrogate the transponder with UF=4, PC=0, RR=0, DI=2, TCS=0, RCS=0, and SAS=0. For transponders that do not support automatic detection of on-the-ground status, verify that the following interrogations have no impact to Extended Squitter and Acquisition squitter transmissions. Otherwise, verify that the transponder broadcasts Extended and Acquisition squitters on the top antenna only.

c. Repeat interrogation used in Step 3.b, except set SAS=1. Verify that:

   1. each Extended Squitter type and Acquisition squitters occur alternately on the top and bottom antennas, and

   2. after 120 seconds, verify that the transponder broadcasts Extended and Acquisition squitters from the top antenna only.

d. Repeat interrogation except set SAS=2. Verify that:

   1. the transponder broadcasts Extended and Acquisition squitters for 120 seconds from the bottom antenna only, and

   2. after the 120-second interval, that the transponder resumes broadcasting Extended and Acquisition squitters from the top antenna only.

e. Repeat interrogation used in Step 3.b, except with SAS=1 followed by an interrogation 10 seconds later with SAS=3. After the second interrogation, verify that the transponder resumes broadcasting Extended and Acquisition squitters from the top antenna only.

f. Repeat above procedure for transponders that support automatic on-the-ground detection, except set the transponder to **airborne state** and verify that the SAS commands have no effect on Acquisition and Extended Squitter transmissions and squitters are broadcast alternately on top and bottom antenna ports.

g. Repeat above procedure except command the transponder to report surface Extended Squitters via UF=4, PC=0, RR=0, DI=2, TCS=2, and RCS=0 interrogations every 60 seconds to maintain surface squitter transmissions. Set up transponders that support automatic on-the-ground detection to **airborne state**. Verify that the SAS command properly controls antenna port selection for each of the Extended Squitter types as specified for each SAS value, and that the SAS commands have no effect on Acquisition squitter transmissions.