SPARK ANALOG BOARD TEST PROCEDURE

\*This is a Manufacturer’s Document related to a product that has been approved by a notifying body for use in an explosive environment.  This document shall be reviewed by Engineering and the ISP Manager before it is released or revised.  Any changes to this document could result in modifications to approved design that could result in an unsafe condition.

**1.0 PURPOSE AND SCOPE**

This document describes the test procedure for verifying that the Spark analog board is functioning within specified parameters. All employees who have responsibility for testing this component are required the follow the instructions detailed in this procedure.

**2.0 AFFECTED DEPARTMENTS**

Manufacturing

**3.0 REFERENCE DOCUMENTS**

* Current revision schematics and assembly drawings for the analog board (A705.12 or A705.22).
* Current Spark & Blaze user manual.

**4.0 RESPONSIBILITIES & AUTHORITY**

The technician has the following responsibilities and authority:

* Verify compliance of the product under test to specifications.
* Troubleshoot and correct product as required.
* Communicate concerns to the Supervisor of Quality Assurance.
* Request management review of product concerns.
* Follow established ESD standards.

**5.0 DEFINITIONS**

Several of the following test procedures require that an electrical test adapter be connected to the input of the Spark instrument being tested. Spark instruments use the MPR001 or the MPR001-ATEX mic/preamp, which has a Knowles BL-7046 microphone (LD# 6610.0005). ***Therefore, the ADP046 (with CBL118) is the electrical test adapter that is to be used when testing Spark instruments.***

The term “analog board” will be used in this document to refer to board assemblies A705.12 or A705.22.

**6.0 SAFETY PRECAUTIONS**

Safety glasses when soldering, lead clipping, or testing power supplies.

**7.0 EQUIPMENT AND MATERIALS**

## DC Power Supply.

* Current revision Digital Board – Tested and Working (Tested in D0001.8131-IS).
* Current revision Analog Board.
* 3 CBL066 Cables (4’ BNC to BNC cable).
* Stanford Research Systems SRS DS345 Function Generator or Equivalent.
* IR Communications interface module (DVX008/DVX009 IR Dongle) or equivalent.
* BLAZE Windows Software (Current version).
* Oscilloscope with DC Voltmeter or equivalent instruments.
* Computer (PC that is compatible with Windows ME, 2000, XP or later).
* SLMTestProd.exe Windows software (Part # 5499.0004 – current version).
* Larson Davis Test Station (2900, 2209/2239, Computer).
* Leaded, 1% tolerance, 18.2k ohm resistor (Part # 4935.1822). This resistor can be soldered into a male LEMO connector end for ease of testing.
* Electrical Test Adapter ADP046 with a CBL118.

**8.0 INSTRUCTIONS**

**8.1 Inspection**

1. Inspect the board for missing parts, solder shorts, or unsoldered parts.
2. If this will be an ATEX unit, check the intrinsically safe critical parts listed on the loading diagram. These need to be checked to verify they are the correct parts and the final check list for this unit marked to signify you have checked these.
3. If this will be an ATEX unit, write down the batch code number that should be on a sticker on the board. This number needs to be entered on the final check list.

**8.2 Measure the Current Draw of the Analog Board**

1. Connect the analog board to a tested digital board (Do this if the boards were not connected in the digital board test procedure D0001.8131-IS). This should be the digital board that will be permanently paired to the analog board. Because these two boards will remain paired they will be referred to as the “Spark” instrument.
2. Setup the DC power supply with the voltage and current limit as shown in **Table 1** (Limit the current if the power supply used has this capability). Power the instrument.
3. Make sure that the Spark instrument is turned on, has settled but not in standby, and then measure its power supply current. The measured current should be within the limits shown in **Table 1**. If the Spark is drawing more current than allowed in the table, shut off the power supply and fix the problem before proceeding.

**Table 1: Spark Power Supply Current**

|  |  |  |  |
| --- | --- | --- | --- |
|  | Power Supply | | **Maximum Allowed Current** |
| Model | **Voltage** | **Current Limit** |
| 703, 703-ATEX | 3.0V | 200mA | 20mA |
| 703+, 703+-ATEX |
|  |  |  |  |
| 704, 704-ATEX | 3.0V | 200mA | 23mA |
| 706, 706-ATEX |
| 706RC, 706RC-ATEX |
|  |  |  |  |
| 705, 705-ATEX | 1.5V | 500mA | 47mA |
| 705+, 705+-ATEX |

**8.3 Adjust the Preamplifier Current Sink**

1. Set the DC power supply to 3V.
2. Insert the leads of a 1% tolerance, 18.2k ohm resistor (LD# 4935.1822) into pins 2 and 3 of the analog board LEMO connector (see figure below). If using a male LEMO connector with the resistor soldered in, plug the male LEMO connector into the female LEMO connector on the analog board. There is a cable made for this.

LEMO Connector

Pin 2

Pin 3

Analog Board

18.2k ohm resistor

1. Use a digital voltmeter to measure the voltage across the 18.2k resistor. Adjust the trimpot (R4 for A705.12, R52 for A705.22) until the voltage across the 18.2k resistor is between 4.37V and 4.73V (240µA to 260µA). **Note that 4.53V is the preferred setting to minimize failure in any future testing steps.**
   1. **Adjust the LogLin Feedback “Do POT Adjust”**
      1. Setup the DC power supply with the voltage and current limit set as shown in Table 1 of instruction 8.1 (Limit the current if the power supply used has this capability). Power the Spark.
      2. Connect the ADP046 test adapter to the input of the Spark found on the analog board (Use a CBL118). Connect the input of the ADP046 test adapter to the signal output of the 2209 / 2239 (Use a CBL066).
      3. Open the SLMtest software and follow these steps to start testing. Note: for a new install of SLMtest select file, customize test, then defaults to set up the program.
      4. Make sure the Spark is in front of the IR interface module and that the Spark is on.
      5. Click the connect icon or open the **Commands** menu and select **Connect**. The software will report if it has successfully connected to the Spark.
      6. Select the “Do Scale-offset” “Do POT Adjust” check boxes.
      7. Make sure that the ADP046’s switch is in the “input” position (see figure 1).
      8. Click run or open the **Commands** menu and select **Run** or click the run icon.
      9. When the “Adjust Instrument” dialog box appears, follow the directions it displays and adjust correct pot (R40 for A705.12, R79 for A705.22). Note: The level may drift up and down. Try and center the drift at the set level.
      10. If any tests fail, disconnect and fix the problem before proceeding.
   2. **Adjust the Crest Factor Balance**

Note: For the 704 and 704-ATEX instruments, the LCD display must be attached to be able to read the levels needed to adjust the crest balance. This is because the 704 and 704-ATEX, by design, cannot connect to blaze. For these instruments, move to the LCD bonding procedure D0001.7001-IS first, and then continue with this section.

1. Set the DC power supply to 3V.
2. Connect the ADP046 test adapter to the Spark instrument. Use a CBL066 to connect a 2900 or an SRS DS345 function generator (or equivalent) to the input of the ADP046 test adapter.

Configure the DS345 as follows:

* + Frequency: 2500 Hz
  + Amplitude: -10 dBm
  + Offset: 0.00 V
  + Phase: 0.0 degrees
  + Waveform: Square
  + BRST CNT: 1
  + TRIG SOURCE: RATE
  + TRIG RATE: 500 Hz
  + MODE: BURST
  + SWEEP: ON

or 2900 as follows:

* Set 2209/2239 to no attenuation or gain (Set output to 120dBμV using SigGen to set external attenuator)
* LOCAL
* SYSTEM
* SIG.GEN
* PULSE
* set T.on to 0.20 mSec
* set T.off to 1.80 mSec
* set LEVEL to .0500
* use POS/NEG to switch between positive and negative pulse

1. Place the IR communications interface module in front of the Spark’s IR transceiver (U8 for A705.12, U3 for A705.22 on the digital board) and open BLAZE software.
2. Refer to the Spark/BLAZE user manual to configure com port settings for the IR communications interface module.
3. Connect to the Spark in Blaze software, unless it is a 704(-ATEX), then use the display to read levels. Run the Spark and display the live SPL level. Refer to the Spark/BLAZE manual if needed.
4. The function generator is currently producing negative pulses (DS345 Phase = 0 degrees, 2900 press POS/NEG). Change the DS345 setting to Phase = 180 degrees to generate positive pulses. Adjust the trimpot (R29 for A705.12, R75 for A705.22) until the reading via Blaze is **the same** for both the positive and negative pulses.
5. Disconnect the Spark from Blaze.
   1. **Measure the Current Draw of the Spark.**

A. Setup the DC power supply with the voltage and current limit set as shown in **Table 1**

Limit the current if the power supply used has this capability. Connect the power supply leads to the battery input terminals of the Spark instrument. Make sure the Spark instrument is turned on and has time to settle. Measure its power supply current. The measured current should be within the limits shown in the same table. If the Spark is drawing more than shown in that table, fix the problem before proceeding.

**9.0 INSPECTION**

No further inspection of the Spark is required.

**10.0 RECORDS**

Records generated are retained and maintained per the Quality Records Matrix,

D0001.1126-1.

**11.0 DISTRIBUTION**

This instruction is available electronically via the online Document Control area.

**12.0 ATTACHMENTS**

Not applicable to this procedure.

**13.0 REVISION HISTORY**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **DCO #** | **REV** | **DATE** | **INITIALS** | **CHANGES MADE** |
| 1856 | A | 10/09/18 | JGG | Initial release of intrinsic safe procedure. This is an updated version of D0001.8132. Added Inspection steps to note the batch codes of ATEX boards that are required on the final checklist. Removed testing of Spark with SLMTest software. Added intrinsic safe note. Added –IS to the end of the document number. |
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