SPARK ANALOG BOARD TEST PROCEDURE

**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).
* 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 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). 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, 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 |

**8.2 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.

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.
      4. Make sure the Spark is in front of the IR interface module and that the Spark is on.
      5. 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” and LogLin check boxes.
      7. Make sure that the ADP046’s switch is in the “input” position (see figure 1).
      8. Open the **Commands** menu and select **Run**.
      9. When the “Adjust Instrument” dialog box appears, follow the directions it displays and adjust (R40 for A705.12, R79 for A705.22).
      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 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.

F. 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.

G. 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.

H. Disconnect the Spark from Blaze.

**8.4 Test the Spark with the SLM Test Software**

1. If preferred, assemble Spark instrument prior to following testing using proper work instruction.
2. 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.
3. 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).
4. Open the SLMtest software and follow these steps to start testing.
   1. Make sure the Spark is in front of the IR interface module and that the Spark is on.
   2. Open the **Commands** menu and select **Connect**. The software will report if it has successfully connected to the Spark.
   3. If needed, open the **File** menu and select **Customize Tests** to open the “Customize Tests” dialog box.
      1. Press the **Defaults** button to set the test parameters.
      2. Verify that the settings are as follows and press “**OK**” to close.
      * Number of Crest Steps: 7
      * Crest Step Increment: 10
      * Number of Burst Steps: 7
      * Burst Step Increment: 10
      * Number of Det. Steps: 7
      * Det. Step Increment: 10
      * Weight Test Level: 130
      * Gain Level for Tests: 0
      * Log Lin Weight: A Weight
      * Log Lin Detector: Slow
      * Log Lin Cal Frequency: 1000 Hz
      * Log Lin Test Frequency: 1000 Hz
      * Log Lin Step Incr.: 3
      * Calibrate: Not Selected
      * No Calibration: Selected
      * Ask To Calibrate: Not Selected
      * Do Time Average Test: Not Selected
      * Instrument Type: Select the appropriate type
   4. Make sure all tests in the **Tests** list (LogLin, A Weight, C Weight, etc.) and the “Do Scale-offset” in the **Instrument Adjustments** are selected.
   5. Make sure that the ADP046’s switch is in the “input” position (see figure 1).
   6. Open the **Commands** menu and select **Run**.
5. If any tests fail, disconnect and fix the problem before proceeding.
6. Disconnect from the SLMTest by opening the **Commands** menu and selecting **Disconnect**. When prompted with “Save New Test Data to Database”, select “Yes.”
   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**

ofinstruction 8.1 (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** |
|  | A | 8/16/00 | CBS | Initial Version |
|  | B | 2/13/01 | CBS | Updated for new MPR001 |
| 455 | C | 8/21/02 | CBS | Changed R40 adjustment to 60.0 – 60.1 dB |
| 622 | D | 9/23/03 | CBS | Updated for new rev. C version of A705.12 |
| 875A | E | 6/23/05 | EO | Updated to new process |
| 1217A | F | 7/03/09 | DJ/KO | Changed the title of the document.  Made document compatible with all analog boards (Including ATEX). Updated procedures to current process. |
| 1390 | G | 8/15/13 | NR | Updated process further for ease of flow of final assembly and test flexibility |
|  |  |  |  |  |
|  |  |  |  |  |