### SPARK FINAL INSPECTION

\*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 final inspection procedure for the Spark instruments. All employees who have responsibility for testing these products are required to follow these instructions.

**2.0 AFFECTED DEPARTMENTS**

Manufacturing

**3.0 REFERENCE DOCUMENTS**

D0001.8038-1: SPARK FINAL CHECKLIST
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**

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 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.***

**6.0 SAFETY PRECAUTIONS**

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

**7.0 EQUIPMENT AND MATERIALS**

## D0001.8038-1 Spark Final Inspection Checklist.

## Assembled Spark.

## DC Power Supply.

## Agilent 34401A Digital Multimeter (DMM) or equivalent instrument.

* Stanford Research Systems SRS DS345 Function Generator, 2900, or equivalent.
* IR Communications interface module (DVX008 IR Dongle or equivalent).
* BLAZE Windows Software.
* Computer (PC that is compatible with Windows XP or later).
* Larson-Davis CAL250 Calibrator or equivalent.
* Electrical Test Adapter ADP046 with a CBL118.

**8.0 INSTRUCTIONS**

The D0001.8038-1 Spark Final Checklist is completed for the instrument as part of the test and verification process.

**8.1 Measure the Instrument’s Power Consumption and Test Red LED**

1. Setup the DC power supply with the voltage and current limit set as shown in **Table 1** below. **Turn off the power supply** and connect the power supply leads to the battery input terminals of the SPARK instrument. Use a 0.1Ω resistor in series with the positive power lead to measure the current with an Agilent 34401A (or equivalent).
2. Set up the DMM as follows…
	1. Set to DC V.
	2. Press <Shift> <Left> to enter the menu,
	3. At “A: MEAS MENU” press <Down> <Left> to “5: RESOLUTION”,
	4. <Down> and set the DMM to “**FAST 4 DIGIT”** and press <Enter>.
3. Turn on the power supply. Make sure the SPARK instrument is turned on, has time to settle, is not in standby, and then measure its power supply current as follows..
	1. Press the Min Max button,
	2. Wait at least 10 seconds,
	3. Press the Min Max button again.
4. To read the captured data, press
	1. <Shift> <Left> to enter the menu
	2. <Right>, to “B: MATH” menu
	3. <Down> to “1: MIN-MAX”
	4. <Down> and two <Right> presses to get the average voltage.
5. The measured current should be within the limits shown in **Table 1** below. Enter this value on the final checklist. Note: The value given will be in mV. Change this to mA by moving the decimal one place to the right. 4.24mV would be 42.4mA.

  **Table 1: SPARK Active Mode Power Supply Current**

|  |  |  |
| --- | --- | --- |
| Model | Power Supply | **Maximum Allowed Current** |
| **Voltage** | **Current Limit** |
| 703+ / 703+-ATEX | 3.0V | 200mA | 20mA |
|  |  |  |  |
| 706RC / 706RC-ATEX | 3.0V | 200mA | 23mA |
|  |  |  |  |
| 705+ / 705+-ATEX | 1.5V | 500mA | 48mA |

1. Verify the OFF or STANDBY power. Make sure the SPARK instrument is turned OFF (706RC) or entered the STANDBY state (703+ & 705+), has time to settle (1 minute), and then measure and record its power supply current as in steps C and D above. The measured current should be within the limits shown in **Table 3** below. Enter this value on the final checklist. Note: The value given will be in uV. Change this to mA by moving the decimal two places to the left. 105.0uV would be 1.05mA.

Note: In 703+ and 705+ (including ATEX) during STANDBY state the current will surge every 4 minutes when the instrument reads the battery voltage; an averaged reading for 4 minutes is appropriate though time consuming.

**Table 3: SPARK OFF / STANDBY Mode Power Supply Current**

|  |  |  |
| --- | --- | --- |
| Model | Power Supply | **Maximum Allowed Current** |
| **Voltage** | **Current Limit** |
| 703+ / 703+-ATEX | 3.0V | 200mA | 0.6 mA |
|  |  |  |  |
| 706RC / 706RC-ATEX | 3.0V | 200mA | 0.4mA |
|  |  |  |  |
| 705+ / 705+-ATEX | 1.5V | 500mA | 1.5mA |

1. Connect to Blaze.
2. ***For 703+ and 705+ version 2.XX units only (Including ATEX):*** Slowly decrease the power supply voltage until the red LED starts blinking. **Table 2** below shows the approximate power supply voltage where the red LED will start blinking. The LED should not start blinking until at or below the voltages shown.

 **Table 2: Red LED Threshold**

|  |  |
| --- | --- |
| Model | **Red LED Test Voltage** |
|  |  |
| 703+ | 2.20V |
| 703+-ATEX | 2.30V |
|  |  |
| 705+ | 1.25V |
| 705+-ATEX | 1.30V |

**8.2 Calibrate the SPARK instrument to 1.0 Vrms at 1000 Hz (approx. 130.0 dB SPL).**

1. Connect the ADP046 test adapter to the input of the Spark instrument. Use a CBL066 to connect the signal generator to the input of the ADP046 test adapter.
2. Setup the function generator to produce a **1.0 Vrms, 1000Hz, sine wave** (The 1.0 Vrms level is approximately equivalent to a 130 dB SPL level of an MPR001 microphone)..
3. Calibrate the SPARK to 130.0 dB.

**Perform the following step only for 705+ (Including ATEX) models.**

1. In DC V mode, press the < Min-Max > button on the DMM at 10% of the calibration to start acquiring and press it again at 90% to stop. When finished read the average current as is steps 8.1.D
2. Record the average current on the final checklist. The measured current should be within the limits shown in Table 3 below. Note: The value given will be in mV. Change this to mA by moving the decimal one place to the right. 4.24mV would be 42.4mA.

**Table 3: Single Cell SPARK Power Supply Current while calibrating in Blaze**.

|  |  |  |
| --- | --- | --- |
| Model | Power Supply | **Maximum Allowed Average Current** |
| **Voltage** | **Current Limit** |
| 705+ | 1.500V ±0.005V | 500mA | 62mA |
|  |  |  |  |
| 705+-ATEX | 1.500V ±0.005V | 500mA | 63mA |

**8.3 Verify the SPARK’s Real Time Clock**

1. Use the Windows Blaze software to set the time and date on the SPARK. Set the SPARK to the same time as the computer (Synchronize to computer time).
2. Verify that the “SPARK time” and “Computer time” are synchronized. If the times have not synchronized, fix the problem before proceeding.

**8.4 Verify the SPARK’s Calibration Offsets (6.0 to 14.0)**

1. Verify that the SPARK correctly measures the levels shown in **Table 4** below. Enter the values on the final checklist.

***The 703+, 705+, and 706RC (And the ATEX versions of the same)***can be tested with the Blaze software (see SPARK & BLAZE manual for details on how to set parameters and view live data).

Table 4: Test Levels

|  |  |  |
| --- | --- | --- |
| Value to be Measured | Nominal Level | Tolerance |
|  |  |  |
| A Weighted SPL | 130.0 dB | ± 0.1 dB |
| C Weighted SPL |
|  |  |  |
| C Weighted Peak | 133.0 dB | ± 0.2 dB |
| Unweighted Peak |

**8.5 Test the Green LED (703+, 703+-ATEX, 705+ and 705+-ATEX only).**

1. ****Use Blaze to run the SPARK instrument (see SPARK & BLAZE manual for details on controlling the SPARK with Blaze).
2. When the SPARK is running, the green LED should be blinking rapidly.
3. Clear all the data and set the unit to A-Weight.

**Figure 1: Battery
Polarity Stickers**

**8.6 Install the Battery Polarity Stickers (Not necessary for 705+ and 705+-ATEX)**

1. Install two battery polarity stickers as shown in **Figure 1** (The stickers are floor stock, part number L705.04).

**8.7 Perform a Final Visual Inspection**

Figure 1

1. Record the following information for the SPARK instrument (the information can be viewed using Blaze or the LCD display; see SPARK & BLAZE manual for details). Enter instrument data into the Larson Davis database. Include the following information:
* Model.
* Serial Number.
* Firmware Version.
* Manufacture Date.
* Calibration Date (In the Serial Record and in the Serial Record Notes).
* Test Station used for Calibration (Serial Record Notes).
* Technician Initials (Serial Record Notes).
1. Inspect all parts for visible defects and verify that the assembled Spark includes:
	1. Case screws.
	2. Back label – verify that model number and serial number on label are correct, centered and legible.
	3. Battery door – batteries should be removed.
	4. ***For the 703+, 703+-ATEX, 706RC and 706RC-ATEX:*** Verify that the battery polarity stickers are installed correctly.
	5. ***For the 705+ and 705+-ATEX:*** Verify that the belt clip is attached and that the top and bottom cap gaskets are in place. Verify that fingernail polish has been applied to the edge of the internal screws, creating a bridge or seal to the case.
	6. ***For the 703+-ATEX and 706RC-ATEX:*** On the A706.11 verify that F1, R17, CR5, and CR6 are correct according to the schematic. On the A705.22 verify that CR1, CR2, CR#, and CR5 are correct according to the schematic.
	7. ***For the 705+-ATEX:*** On the A705.21 verify that F1, R17, CR5, and CR6 are correct according to the schematic. On the A705.22 verify that CR1, CR2, CR3, and CR5 are correct according to the schematic.

**9.0 INSPECTION**

Inspect the finished unit for any obvious defects

**10.0 RECORDS**

The Spark Final Checklist (D0001.8038-1) and appropriate test documentation is retained and maintained per the Quality Records Matrix (D0001.1126-1).

**11.0 DISTRIBUTION**

This document is available to employees via the online document control area.

**12.0 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 D0001.8038. Added steps to make taking the measurements a little clearer. Added intrinsic safe note. Added –IS to the end of the document number. |
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