**Dosimeter Mic-Preamp Certification Test**

1. **PURPOSE AND SCOPE**

This document describes the operation of the Dosimeter Mic-Preamp Test Software, which is used for the mic/preamp testing of various products. The complete list of products tested with this software is listed in section 5 below. All employees who have responsibility for testing these products are required the follow the instructions detailed in this procedure.

**2.0 AFFECTED DEPARTMENTS**

Manufacturing

Repair and Calibration

Quality Assurance

**3.0 REFERENCE DOCUMENTS**

MPR001 Assembly Drawing

**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**

This following list describes all of the mic/preamps that can be tested with this test software.

***Spark Family***

* MPR001 with MIC002 (EV 82600L)

This is the original mic/preamp for the Spark family. The PRM787 is a lapel style preamp (4’ cord, Lemo connector). The MIC002 is a 3/8” Electro-Voice mic (EV 82600L) that screws onto the PRM787.

* MPR002 with MIC002 (EV 82600L)

This is the original, “boom tube”, type mic/preamp for the Spark family (3” long, 3/8” diameter, Lemo connector). The MIC002 is a 3/8” Electro-Voice mic (EV 82600L) that screws onto the tube.

* MPR001 and MPR001-ATEX with 6610.0005 (Knowles BL-7046)

This is the new, lapel style. mic/preamp for the Spark family (4’ cord, Lemo connector), which uses a non-removable, Knowles BL-7046 mic (6610.0005)

* MPR002 and MPR002-ATEX with 6610.0005 (Knowles BL-7046)

This is the new, “boom tube”, type mic/preamp for the Spark family (3” long, 3/8” diameter, Lemo connector). It uses a non-removable, Knowles BL-7046 mic (6610.0005).

***Models 700 / 710***

* PRM782 with MIC001 (EV 82600L)

This is the original mic/preamp for the 700/710. The PRM782 is a lapel style preamp (4’ cord, no connector). The MIC001 is a 3/8” Electro-Voice mic (EV 82600L) that screws onto the PRM782.

* PRM782 with MIC003 (EV 88803)

This is the *UL Approved*  mic/preamp for the 700/710. The PRM782 is a lapel style preamp (4’ cord, no connector). The MIC003 is a 3/8” Electro-Voice mic (EV 88803) that screws onto the PRM782.

* MPR006 with 6610.0005 (Knowles BL-7046)

This is the new, mic/preamp for the 700/710. It is a lapel style preamp (4’ cord, no connector), which uses a non-removable, Knowles BL-7046 microphone (6610.0005).

***705 Noisebadge***

* PRM786 with MIC002 (EV 82600L)

This is the original mic/preamp for the 705 Noisebadge. The PRM786 is a lapel style preamp (4’ cord, 2x2 Minitek II connector). The MIC002 is a 3/8” Electro-Voice mic (EV 82600L) that screws onto the PRM786.

* MPR007 with 6610.0005 (Knowles BL-7046)

This is the new, mic/preamp for the 705 Noisebadge. It is a lapel style preamp (4’ cord, 2x2 Minitek II connector), which uses a non-removable, Knowles BL-7046 microphone (6610.0005).

***Models 712 / 720***

* PRM789 with MIC001 (EV 82600L)

This is the original mic/preamp for the 712/720. The PRM789 is a lapel style preamp (4’ cord, 2x3 Minitek II connector). The MIC001 is a 3/8” Electro-Voice mic (EV 82600L) that screws onto the PRM789.

* MPR005 with 6610.0005 (Knowles BL-7046)

This is the new, mic/preamp for the 712/720. It is a lapel style preamp (4’ cord, 2x3 Minitek II connector), which uses a non-removable, Knowles BL-7046 microphone (6610.0005).

***6610.0005 Inspection***

* 6610.0005 (Knowles BL-7046)

The Dosimeter Mic-Preamp Test Software can also be used to test new 6610.0005 microphones. The new microphones are tested to verify that they comply with the published Knowles’ specifications.

***B & K Microphones***

* B&K 4176

The Bruel and Kjaer (B&K) 4176 microphone is a ½” electret microphone. Larson Davis has sold several of these microphones for use with Larson Davis instruments. The Dosimeter Mic-Preamp Test Software can be used to test and certify these microphones.

**6.0 SAFETY PRECAUTIONS**

Follow general safety procedures

**7.0 EQUIPMENT & MATERIALS**

The test software requires the equipment shown in table 1.

## TABLE 1: Equipment for Mic Test System

|  |  |
| --- | --- |
| **Part Number** | **Description** |
| Instruments |  |
| 2900 | Precision, Type 1, Dual Channel Analyzer with Signal Generator |
| CAL291 | Residual Intensity Calibrator |
| Mic | ½” Precision, Random Incidence Microphone |
| Preamp PRM900B or 426B03 | ½” or ¼” Precision, Microphone Preamplifier  Note: A second PRM900B preamp is needed when testing the B&K 4176 microphone. The 4176 is powered by this other preamp.  If using a ¼” preamp, an ADP009 is needed to attach the ½” microphone. |
| COMPUTER | IBM Compatible Computer running Windows XP or later |
| 2209 | Larson Davis Isolated Amplifier / Attenuator |
| Dosimeter | A dosimeter is needed to power the mic/preamp being tested. The dosimeter should be the same type that the mic/preamp is normally used with. |
| NI 4431 | National Instruments USB data acquisition module. |
| USB Relay | SeaLevel 8115 USB relay module to control air valves. |
| PCB 1502B01 | PCB pressure sensor. |
| Pressure Chamber | Pressure chamber is used to simulate sea level pressure. |
| PRA950 | Current source for a ¼” 426B03 ICP preamp. |
|  |  |
| Cables |  |
| CBL001 | Cable: BNC to 5 Pin Female SwitchCraft |
| CBL061 | Cable: BNC Male to Mini Phono Plug |
| CBL066 | Cable: BNC Male to BNC Male Cable |
| EXC00x | Cable: Microphone Extension Cable (SwitchCraft, 1’ to 20’ long) |
|  | NOTE: Any cables that are equivalent to the cables listed above may be used. Also, the length of the cables depends on the physical configuration of the test setup. |
|  |  |
| EXC006-0V Bias | Cable: Special 6’ microphone extension cable for powering the PRM900B preamp, which the B&K 4176 microphone is connected to. Since the 4176 is an electret microphone, this cable must be used to ensure that the 200V bias voltage is not applied to the 4176. |
|  |  |
| Test Adapters |  |
| ADP009 | ½” Mic to ¼” preamp adapter |
| ADP031 | 3/8” Mic to ½” Calibrator Adapter |
| ADP039 | Spark Input Tee |
| ADP049 | 6610.0005 Test Fixture |
| CBL118 | Spark Test Cable for Use with ADP046 |
|  |  |
| INPUT TEEs | Input test adapter tee for 700, 710, 712, 720, and 705 Noisebadge |
|  |  |
| Software |  |
| 5499.0009 | DOSIMETER MIC-PREAMP TEST SOFTWARE |

**8.0 INSTRUCTIONS**

* 1. **Equipment Configuration**

###### ***Model 2900***

###### Connect the computer’s serial port to the 2900’s serial port.

###### Connect the 2900, via its parallel port, to a Larson Davis Model 2209.

###### Connect the signal generator output of the 2900 to the signal input of the 2209, using a CBL061 cable.

1. ***CAL291***
   1. Connect the signal output of the 2209 to the CAL291 signal input (CBL066).
   2. Insert the ADP031 into one side of the CAL291 microphone cavity so that a 3/8” microphone can be tested using the CAL291.

1. ***Reference Mic and Preamp***
   1. Attach the microphone to the preamp.
   2. Connect the preamp to channel 1 of the 2900. Use an EXC00x cable or connect the ICP preamp to the current source using a BNC cable.
   3. Insert the microphone into one side of the CAL291 microphone cavity.
2. ***Pressure Chamber***
   1. The pressure chamber is also used for AEC201s.
   2. The CAL291 has two pipes attached to it in order to place it vertically in the pressure chamber. Place the pipes into the air holes in the base of the pressure chamber.
   3. Connect the reference preamp to the center LEMO connector.
   4. Connect the power and signal cable to the outer LEMO connector.
   5. The power switch on the front of the pressure chamber base needs to be up in order to power the CAL291 and the dosimeter.
   6. Connect the Air Supply to the chamber inlet.
   7. Connect the Pressure Sensor to the chamber outlet.
   8. Connect the output of the pressure sensor to the NI 4431 channel “AI0”.
3. ***Mic/Preamp Being Tested***
   1. Connect an input test adapter tee to the input of the dosimeter that will power the mic/preamp being tested. For the Spark instruments, the tee is an ADP039 with a CBL118 connected to the input of the Spark dosimeter.
   2. Connect the mic/preamp to the input of the tee and connect a CBL001 cable from the BNC output of the tee to the channel 2 input of the 2900.
   3. Insert the microphone end of the mic/preamp into the ADP031 that is in the CAL291 microphone cavity.
   4. Turn on the dosimeter.

The mic/preamp configuration for testing new 6610.0005 microphones or the B&K 4176 is slightly different. These test configurations are described below.

***6610.0005 Inspection:*** The ADP049 test fixture is used for testing new 6610.0005 microphones. The ADP049 is connected to the test system in the same manner as described in item E above. Before inserting 6610.0005 mic in the ADP049, first turn off the dosimeter that is powering the ADP049. Next, remove the cap (M2001.0014) and Delrin mic holder (M2001.0015) from the ADP049. The 6610.0005 being tested is then inserted in the mic holder (see MPR001 assembly drawing for details). Finally, the mic holder, with attached 6610.0005 microphone, is inserted into the ADP049 body (M2001.0013, see MPR001 assembly drawing for details). ***Note: the flat side of the 6610.0005 should be placed next to the PC board that the ADP049 pogos are mounted to.*** Attach the cap to the ADP049. Insert the microphone end of the ADP049 into the ADP031 that is in the CAL291 microphone cavity. Turn on the dosimeter.

***B&K 4176:*** Attach the 4176 microphone to a 900B preamp. Connect the EXC006-0V Bias cable to the 900B preamp. Connect the other end of the cable to the channel 2 input of the 2900. Remove the ADP031 (3/8” Mic to ½” Calibrator Adapter) from the CAL291. Insert the 4176 microphone into the CAL291 microphone cavity.

* 1. **Software Configuration**

###### ***Starting the Application***

###### The DosimeterMicPreampTest needs to be installed from the network folder Engineering/Tools/Dosimeter mic-preamp test/Setup.exe.

###### Once installed, it can be run from the computer.

###### ***Display Settings***

###### From the applications main menu, select *Edit* and then *Display*

###### The “Edit Display” dialog box will be displayed

###### Only the “Update display during test”, “Show plotted limits”, and “High precision response data” boxes should be checked.

###### Select “LD MPR” custom limits.

###### Note: if a customer requests a printout of the test results, make sure that the “Show uncertainty” and “Show custom limits” check boxes are NOT selected.

###### Select the “OK” button to save and exit the “Edit Display” dialog box.

###### ***Technician***

###### From the application’s main menu, select *Edit* and then *Settings*.

###### The “Edit Settings” dialog box will be displayed.

###### Select the *Technician List* tab

###### Enter the name of the technician performing the test and select the “Add” button to add his/her name to the list of technicians. Repeat this process to add other technicians to the technician list.

###### Select the “Apply” button to store the changes to the technician list.

###### Select the *Setup* tab and use the drop-down list of technicians to select the name of the technician performing the test.

###### In the “Data Location” field, enter the location where the test data will be stored

###### Select the “OK” button to save and exit the “Edit Settings” dialog box.

###### ***Communication Configuration***

* 1. From the application’s main menu, select *Edit* and then *Test System*.
  2. The “Edit Test System” dialog box will be displayed.
  3. Select the *Communications* tab.
  4. Select the serial port the 2900 is attached to and a baud rate of “9600”
  5. Set the “2209 Parallel Port to “2900”.
  6. Set the appropriate external attenuator type for the system being used.
  7. Set the “Bias Voltage to 200 Vdc.
  8. Enter the IP address and Channel for the Fluke 1620A Temperature and Humidity meter. Click the “Sensor Name” button and verify the correct sensor was selected.
  9. Select the “OK” button to save and exit the “Edit Test System” dialog box.

###### ***Equipment***

* 1. From the application’s main menu, select *Edit* and then *Test System*.
  2. The “Edit Test System” dialog box will be displayed.
  3. Select the *Equipment* tab.
  4. Select the type and serial number of the dosimeter that is being used to power the mic/preamp being tested
  5. Select the “OK” button to save and exit the “Edit Test System” dialog box.

###### ***Calibrator***

* 1. From the application’s main menu, select *Edit* and then *Test System*.
  2. The “Edit Test System” dialog box will be displayed.
  3. Select the *Calibrator* tab.
  4. Enter the information requested for the calibrator being used for the test (manufacturer, model, serial number, and upper frequency limit). Note, the CAL291 has an upper frequency limit of 12589.25 Hz.
  5. Select the “OK” button to save and exit the “Edit Test System” dialog box.

###### ***Reference Microphone***

* 1. From the application’s main menu, select *Edit* and then *Test System*.
  2. The “Edit Test System” dialog box will be displayed.
  3. Select the *Reference Microphone* tab.
  4. Click “Import” and select the microphone data provided by the LD microphone calibration lab for the reference microphone being used.
  5. Select the “OK” button to save and exit the “Edit Test System” dialog box.

WARNING: The uncertainty values in the test software were derived for a 2559 or 377A13 microphone. If the reference microphone is changed, these uncertainty values will also have to be updated.

1. ***Pressure***
   1. From the application’s main menu, select *Edit* and then *Test system*.
   2. The “Edit Test System” dialog box will be displayed.
   3. Select the *Pressure* tab.
   4. Check Enable.
   5. Enter the Pressure Sensor voltage response from the pressure sensor’s Certification data.
   6. Set the Stabilize Time to “12” seconds.
   7. Set the NI DAQ Module to “4431” and the Pressure Channel to “0”.
   8. Set the SeaLevel 8115 Pressure Valve to “0” and the Vent Valve to “2”.
   9. Select the “OK” button to save and exit the “Edit Test System” dialog box.
   10. **Testing a Mic/Preamp**

###### ***Model Selection***

###### From the application’s main menu, select *File* and then *New*.

###### The “New” dialog box will be displayed.

###### The various models of mic/preamps that can be tested are grouped in their respective product families.

###### Select the appropriate “Product” from the selection box.

###### Select the “Mic / Preamp Model” being tested. Section 5.0 of this work instruction describes all of the models that can be tested.

Note, when inspecting the ***6610.0005*** microphones, be sure to select “Inspection” from the list of available “Product” selections.

###### ***Serial Number***

###### The serial number of the mic/preamp being tested is also entered in the “New” dialog box.

###### The older Electro-Voice based designs have the serial number inscribed on the microphone. The new Knowles based design has the serial number inscribed on the preamp body.

###### The procedure for assigning a serial number during the inspection of new 6610.0005 microphones is described below.

###### ***6610.0005 Inspection:*** The 6610.0005 microphones are not serialized. Therefore, when testing these microphones, enter *FAIL-001* as the serial number for the first microphone being tested. If the microphone passes the test, leave the serial number at *FAIL-001* and test the next microphone. Once a microphone fails, place it in its original packaging and label it as *001.* The test results for this defective microphone should also be printed so they can be sent to the manufacturer. The serial number for the next tested microphone will then be incremented to *FAIL-002.* The next failed microphone is therefore, labeled as *002.* Use this serialization procedure to identify all new microphones that fail the test. If the microphone fails the custom limits but not the standard limits, save the data, mark the microphone, and set it aside.

###### ***Running the Test***

###### After entering the serial number, press OK.

###### Place the chamber top on the base and lock it in place.

###### Select *Test* and make sure *Custom Limits* is checked.

###### Select *Test* and then *Start* to start the test.

###### The chamber will be pressurized and wait for the stabilize time.

###### Select *Test* and then *Stop*, if necessary, to stop the test prematurely.

###### When the test ends, select *File* and then *Save* or click the disk icon to save the test data.

###### Select *File* and *Export* and save a text file if an ISO 17025 MetCal Cert is to be run using the *D0001.8390 Dosimeter Microphone Import* procedure.

###### The chamber will vent the pressure and cannot be restarted until the vent relay has turned off.

###### Unlock and remove the chamber top.

###### Disconnect the mic/preamp and connect the next mic/preamp to be tested.

**9.0 INSPECTION**

If testing a Knowles type microphone ensure the top cap and LEMO connector cannot be removed by hand, otherwise no further inspection of the mic/preamp being tested is required.

**10.0 RECORDS**

The test records should be stored in the database for the life of the product.

**11.0 DISTRIBUTION**

Manufacturing

Repair and Calibration

Quality Assurance

**12.0 ATTACHMENTS**

None

**13.0 REVISION HISTORY**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **DCO #** | **REV** | **DATE** | **INITIALS** | **CHANGES MADE** |
|  | A | 4/12/01 | CBS | Initial Revision |
| 2661 | B | 6/11/01 | CBS | Updated to include B&K 4176 test. |
| 343 | B1 | 10/30/01 | CBS | Added warning regarding reference microphone |
| 1488 | C | 04/23/14 | NR | Updated to include pressure chamber |
|  | D | 04/06/15 | NR | Updated to include MetCal |
|  |  |  |  |  |