NIST TRACEABLE 2900 CERTIFICATION

**1.0 PURPOSE AND SCOPE**

The purpose of this document is to provide the detail and instruction necessary to test and certify the 2800, 2900, 3000+, 2209 and 2239.

**2.0 AFFECTED DEPARTMENTS**

Manufacturing

Quality Assurance

**3.0 REFERENCE DOCUMENTS**

D0002.0001 Calibration System Controls & Policies

D0001.8397 METTEAM Receiving and Job Creation.doc

**4.0 RESPONSIBILITIES & AUTHORITY**

The technician has the following responsibilities and authority:

* Verify compliance of the product under test to specification.
* Troubleshoot and correct product as required.
* Communicate concerns to Supervisor or Quality Assurance.
* Request management review of product concerns.
* Use proper ESD protective equipment.

**5.0 DEFINITIONS**

* RTA stands for Real Time Analyzer and refers to the 2800, 2900, or 3000+
* Attenuator refers to a model 2209 or 2239.
* When using the RTA, **BOLD** words represent a hard key function (the keys permanently labeled on the keyboard).
* **BOLD [A]** words represent a soft key function (the **BOLD** represents the text on the screen and **[A]** identifies the hard key associated with the function).

**6.0 SAFETY PRECAUTIONS**

No additional safety precautions required for this process.

**7.0 EQUIPMENT & MATERIALS**

**Some of this equipment may not be needed if you are testing a system without a signal generator or an attenuator.**

* 60db gain box
* BNC to BNC cable(s)
* BNC to mini phone cable
* BNC to two Swithcraft or two Lemo cable
* HP 34401A multimeter (Traceable to NIST)
* RS-232 cable, 9-pin female to 9-pin female null modem
* 12 Volt DC adapter rated to at least 1 Amp
* Two 9 Volt DC adaptors rated to at least 500 mA
* Computer with two com ports, the calibration programs, and if applicable the old correction file for the system being tested.
* 25-pin male to 25-pin male cable.

**8.0 INSTRUCTIONS**

**8.1 Test the RTA. This should be done on all units.**

1. Check the Switchcraft connectors and verify they are the gold pins. If they are not, replace them with gold pins (1145.0013).
2. Check the database and see when the last time the internal battery was replaced. If it was over five years, replace the battery (0280.0004).
3. Check the firmware version. If it is not the current version, upgrade the firmware.
4. Run the unit on the automated test.
	1. Connect the unit to the appropriate COM port of the computer.
	2. Connect the output of the test station’s attenuator to the inputs of the unit being tested.
	3. Turn on the RTA **(ON, -)** and press **SYSTEM, I/O[I], 9600[O].**
	4. Run the Larson Davis RTA Test.
	5. Connect to the unit and select Customer tests.
	6. If the unit being tested is an older model (not a ‘B’ version and not a 3000+), change the gain test to the 1% resistors selections.
5. Run the test. The test takes over an hour to run and will not require technician supervision during this part of the test.
6. After the test has finished check the results.
	1. If the unit failed, print the results for the ‘As Received’ data. Troubleshoot the problem and repair if needed.
	2. If the unit passed, print the results for the certificate.

**8.2 Test the signal generator. This is only done if the unit has a signal generator.**

1. Connect the HP 34401A multimeter to one of the COM ports of the computer.
2. Connect the unit to be tested to the other COM port of the computer.
3. Plug a 12 Volt adapter into the RTA.
4. If the RTA has an attenuator with it, connect the attenuator to the RTA’s printer port using a 25-pin male to 25-pin male cable, and plug a 9 Volt adapter into the attenuator.
5. Connect the signal generator out of the RTA to the appropriate place.
6. If there is an attenuator with the system, run the ‘SIGNAL GEN’ out of the RTA into the input of the attenuator, then connect the output of the attenuator to the input of the HP 34401A multimeter.
7. If there is not an attenuator with the system, run the ‘SIGNAL GEN’ out of the RTA into the input of the HP 34401A multimeter.
8. Turn on the RTA **(ON, -)** and press **SYSTEM, I/O[I], 9600[O].**
9. Run the calibration program (C:\CAL\CAL.EXE).
10. Go into the equipment setup menu and set the serial ports to the appropriate settings for the equipment connected.
11. Enter the serial number of the RTA, temperature, and humidity in the appropriate fields.
12. Click on the HP 34401A button and select the serial number of the multimeter you are using. Also check that the cal date of the multimeter is correct. NOTE: If you have to add a multimeter or change the dates for the multimeter, you have to edit the file C:\CAL\LDCALTST.INI.
13. Select your name from the Calibrated By pull down list. If your name is not in the pull down list, you have to edit the file C:\CAL\LDCALTST.INI to add it.
14. If the system has a 2209 with it, make sure the ‘Use 2209’ box is checked.
15. If the system has a 2239 with it, make sure the ‘Use 2239’ box is checked.
16. If the system does not have a 2209 or 2239 with it, make sure the ‘Use 2209’ and ‘Use 2239’ boxes are not checked.
	* 1. **Test the Frequency Sweep. This is only done if the unit has a signal generator.**
17. If the unit is a customer’s unit in for certification and does not have an attenuator, select ‘Freq. Sweep (20KHz uncorrected)’.
18. If the unit is one of our test stations, select ‘Frequency Sweep’.
19. Click ‘start’.
20. Make sure that it starts running. If it does not, something is set up wrong.
21. When asked, enter the serial number of the attenuator, or type ‘NONE’ if the system does not have an attenuator.
22. After the test is over click on ‘VIEW/PRINT RESULTS’ and see if the test passed.
23. If the test passed, print the results.
24. If the test failed, and it is one of our test stations, skip to steps 8.2.3 to create a new correction file.
25. Click on ‘CLOSE’ to exit the results window.
26. Turn off the ‘Frequency Sweep’ button.

**8.2.2 Test the Amplitude Sweep. This is only done if the unit has an attenuator.**

1. Plug a 9 Volt adaptor into the 60dB gain box.
2. Connect the output of the attenuator to the input of the 60dB gain box.
3. Connect the output of the 60dB gain box to the input of the Multimeter.
4. Make sure that the appropriate ‘Use 2209’ or ‘Use 2239’ button is **ON** (one must be on).
5. Click on the ‘Amplitude Sweep’ button, and make sure that it is the only test selected.
6. Click ‘start’.
7. Follow the directions on the screen.
8. After the test is done, click on ‘VIEW/PRINT RESULTS’ and see if the test passed.
9. If the test passed print the test results.

**8.2.3 Build frequency corrections file. This is only done if it is a new system configuration or if the test failed the frequency sweep.**

1. If the system has a 2209 with it, make sure the ‘Use 2209’ box is checked.
2. If the system has a 2239 with it, make sure the ‘Use 2239’ box is checked.
3. If the system does not have a 2209 or 2239 with it, make sure the ‘Use 2209’ and ‘Use 2239’ boxes are not checked.
4. Click on ‘Build Frequency Corrections’, and make sure it is the only test selected.
5. Click ‘start’.
6. Make sure that it starts running. If it does not, something is set up wrong.
7. Test run time will take about an hour. Test is automated and will not require technician supervision during this part of the test.
8. After the test has completed, turn off the ‘Build Frequency Corrections’ button and go back to step 8.2.1.

**8.3 Finish paperwork and stickers.**

1. Create a certificate of compliance for the system.
2. If the system has a 2209, create a certificate using 2900 / 2209 as the model.
3. If the system has a 2239, create a certificate using 2900 / 2239 as the model.
4. If the system is one of our tests stations without an attenuator, create a certificate using 2900 / SIG GEN as the model.
5. If it is a customer’s unit in for certification, or one of our RTA’s that we don’t use the signal generator, create a certificate using just 2800, 2900, or 3000+ as the model.
6. Create and install the calibration stickers.
7. If this is one of our test stations, create an in house calibration sticker for the RTA and place it on the front of the 2900 next to the left edge of the keyboard, and make sure there is a calibration seal on the top, center screw on the back of the RTA.
8. If this is one of our test stations and it has an attenuator, create an in house calibration sticker for the attenuator and place it on the top or the face where it will be visible, and make sure there is a calibration seal on the side of the case.
9. If this is a customer’s unit, create a 3255.0001, aka ‘Big Cal’ sticker for the unit and place it on the back in the spot provided, and make sure there is a calibration seal on the top, center screw on the back of the RTA.
10. Update the database for the RTA and attenuator with the new calibration dates.
11. If the ‘Create Frequency Corrections’ test was run, copy the new correction file to the computer that will use that RTA.
12. The name of the file is LDxCnnnn.BIN where nnnn is the serial number of the RTA. x is either ‘A’ for a 2209 system, ‘B’ for a 2239 system, or ‘F’ for a system without a 2209 or 2239.
13. These files are located in C:\CAL\
14. It goes in the same directory as the database for the SLM test, and in the directory that the program is in for the microphone test program and RTA test.
15. If the RTA is used on a MetCal station, you need to update the MetCal software with the new calibration and due dates. Follow D0001.8397 METTEAM Receiving and Job Creation.doc
16. If this is one of our test stations, give all of the paperwork (certificate, signal generator results, RTA test results) to Quality Assurance for their records. If the RTA that was tested appears on certificates generated out of the old database, let QC know that they need to update the old database.

**9.0 RECORDS**

Test results are maintained electronically. Copies of the tests for our equipment are maintained by the QA Manager per the requirements of the "Calibration System Controls & Policies" procedure (D0002.0001).

**10.0 DISTRIBUTION**

Manufacturing

**11.0 ATTACHMENTS**

None

**12.0 REVISION HISTORY**

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| **DCO #** | **REV** | **DATE** | **INITIALS** | **CHANGES MADE** |
| 307 | A | 6/15/01 | JGG | Initial Release |
| 1167 | B | 1/27/09 | JGG | Removed GPIB instructions for the Multimeter. Added instructions for systems with a 2239 |
| 1950 | C | 24 Mar 2020 | JGG | Removed cal sticker on back of 2900 and added step to update MetCal. |
| 1994 | D | 17 Sep 2020 | JGG | It was decided to make this procedure include the certification of all RTA’s, including customer sent in units for re-certs, because the document listed on the certificate for stand alone RTA’s is for new units and doesn’t match what we actually do. |
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