Brüel & Kjær

3630 Calibration Platform

and

7763 SLM Calibration Application

Ib Sofussen

Webex-2006-10-02

Agenda

- Basics
- SLM calibration type approval, periodic calibration and check (sensitivity adjustment)
- 3630 system versus SLM block diagram and IEC 60651
  - walk through of various 3630 tests
- 3630 re- calibration and traceability

Calibration Business Group

- Development, marketing and installation of calibration systems
- Support to international calibration centers (B&K and others)
- DPLA (Danish Primary Institute of Acoustics) activities

- **Manager: Jesper Bo Vedel**

Plus 6 engineers/calibration specialists

(3 of these are Product Managers)

SLM Standards and Precision Classes

The picture right now:

- IEC 60651: Sound Level Meters
- IEC 60804: Integrating Sound Level Meters
- OIML 58 and OIML 88 (refers to IEC standards above)
- Equivalent national standards (DIN, ANSI, JIS, BS....)
- Precision classes: 0, 1, 2 and 3 (zero is the most precise, 1 and 2 the most used)
  These standards describe the type approval (pattern approval) requirements
- A suited subset of of the IEC 60651 tests can be used for periodic verification

Soon to come:

- IEC 61672 (see next slide for details)
- 2237 Controller, 2238 Mediator and 2260 Investigator and Observer plus the 2250 all fulfil the current 61672draft

IEC 61672 Status per May-2006

- IEC 61672 replaces IEC 60651 & IEC 60804
- IEC 61672 consists of 3 parts:
- **Part 1: Specification**
  - has been approved *Q2 – 2002*

  Part 2: Pattern approval (type approval)
  - has been approved *Q2 – 2003*

  Part 3: Periodic verification
  - *Voted on in early 2005*
  - *FDIS in August 2005*
  - *Will be issued late 2006*
- Use of old (IEC 60651) SLM equipment is normally “legal” for some time after the new standard has been approved (Country Dependant).

Major Differences IEC 61672 vs. IEC 61651

- Only 2 performance classes (class 1 and 2)
- Uncertainties included in test tolerances
- Maximum permitted uncertainties for test houses
- Tighter tolerances on the tone burst response (tolerances for new class 2 is smaller than old type 0)
- Requirements for a very detailed Instruction Manual

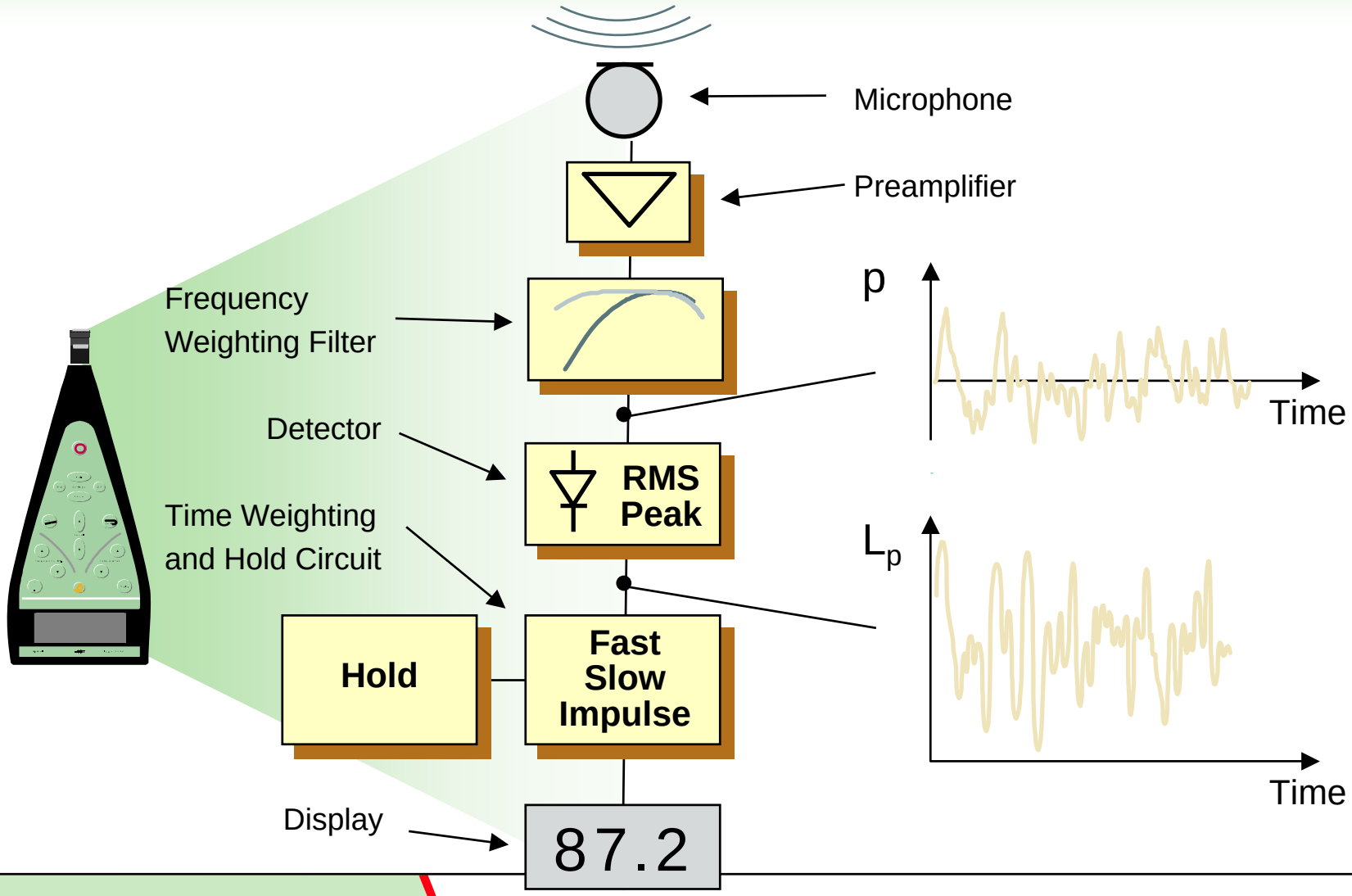
Some other differences:

  - Multi channel (cross-talk)
  - Under range indication
  - Display devices - digital output
  - Z-weighting, flat (as specified by the manufacturer) and no B-weighting
  - Directional response at ± 150 degrees

IEC 61672 Part 3: Acoustical tests

- After some discussion it has been agreed that it is necessary to do acoustical tests at more frequencies than the calibration check frequency (1000 Hz)
- It is up to the test houses to choose the method for acoustical test (true free-field, multi-tone calibrator, simulated free-field, electrostatic actuator, …), and document that the associated uncertainties is within the tolerances
- For Brüel & Kjær this means that we will continue to use the 4226 for the acoustical part of the calibration
- We can calibrate SLM's if 4226 corrections are known and agreed upon with the customer

The Sound Level Meter



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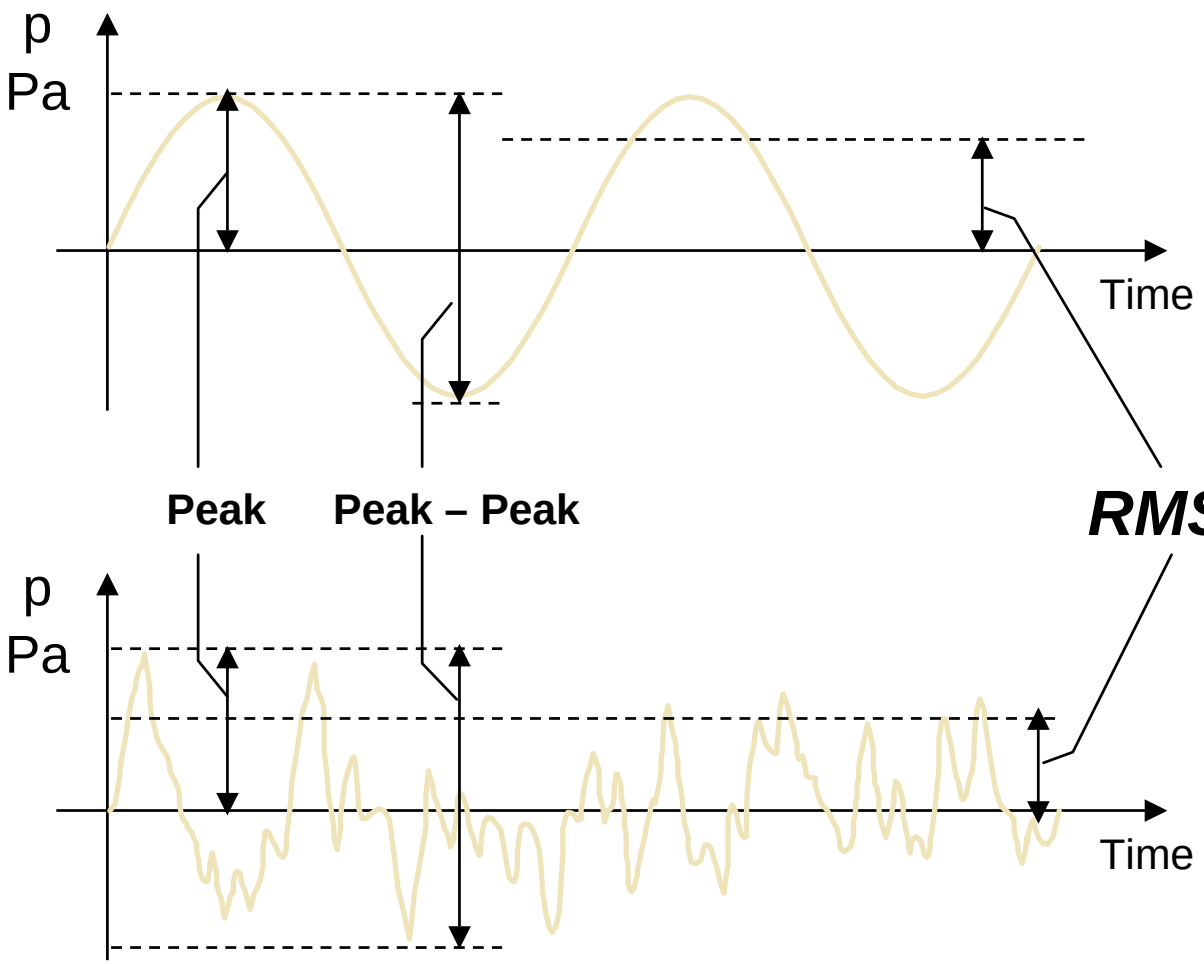
Sound Level Parameters



$$RMS = \sqrt{\frac{1}{T}\int_0^T x^2(t)dt}$$

$$\text{Crest factor} = \frac{\text{Peak}}{\text{RMS}}$$

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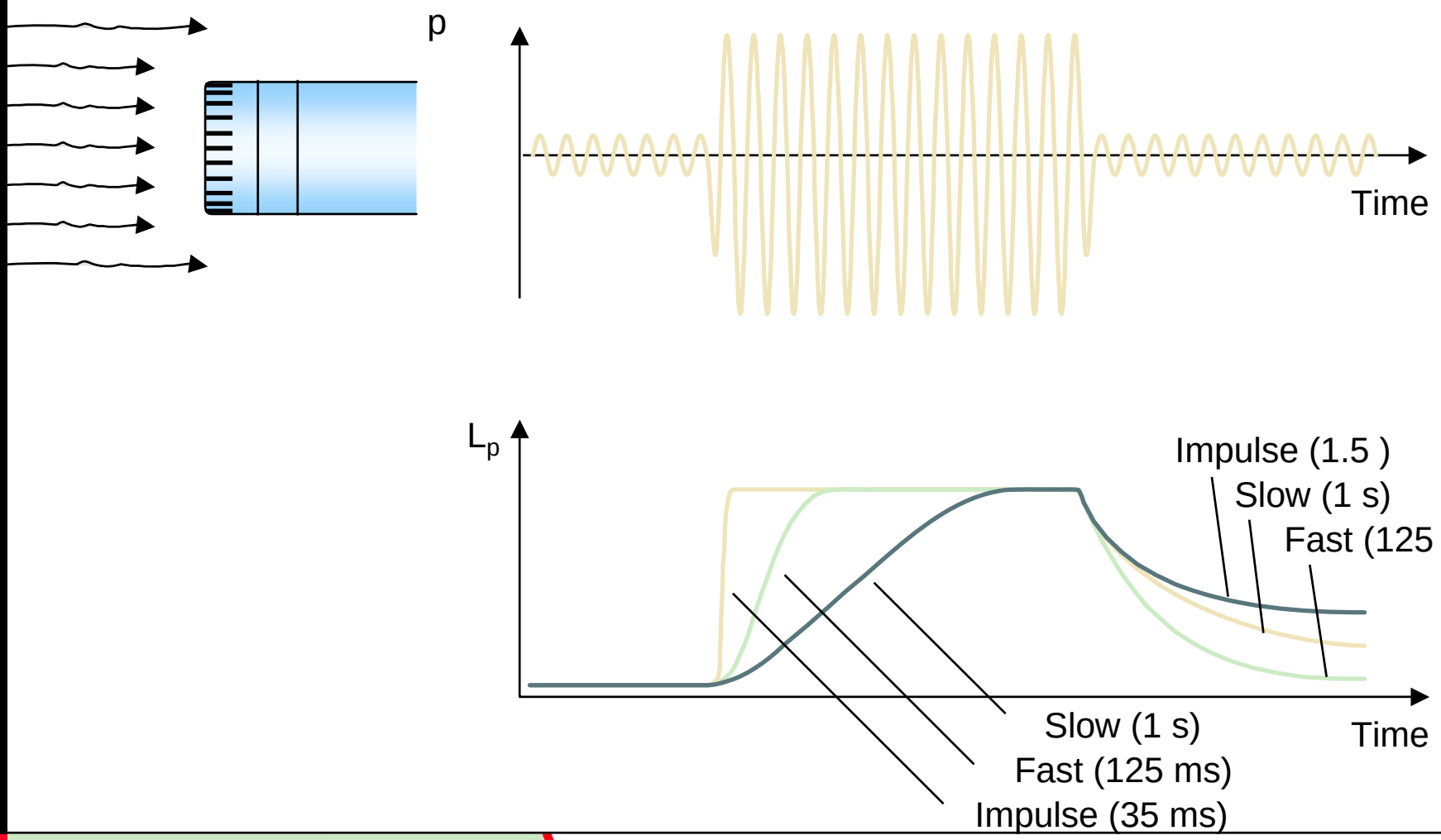
Time Weighting



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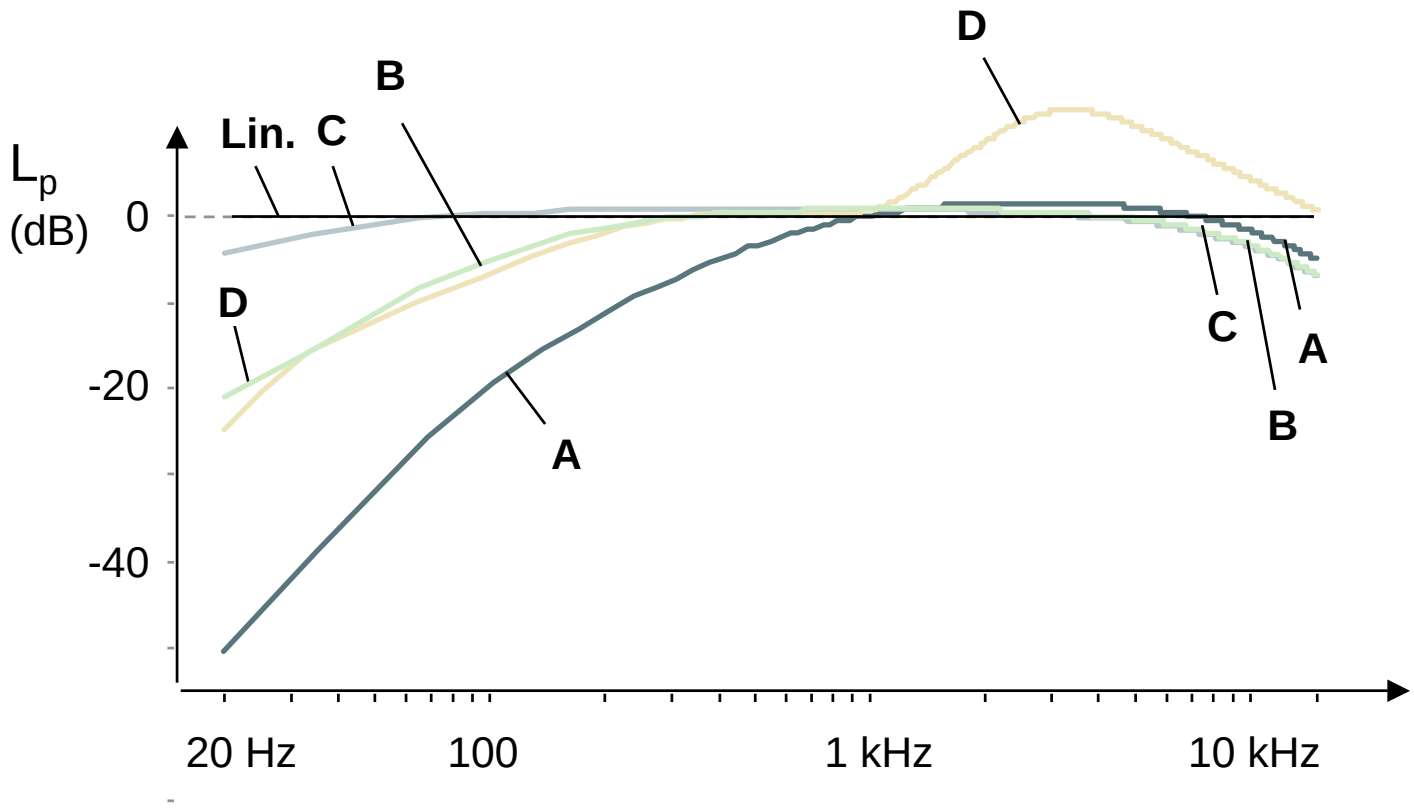
Frequency Weighting Curves



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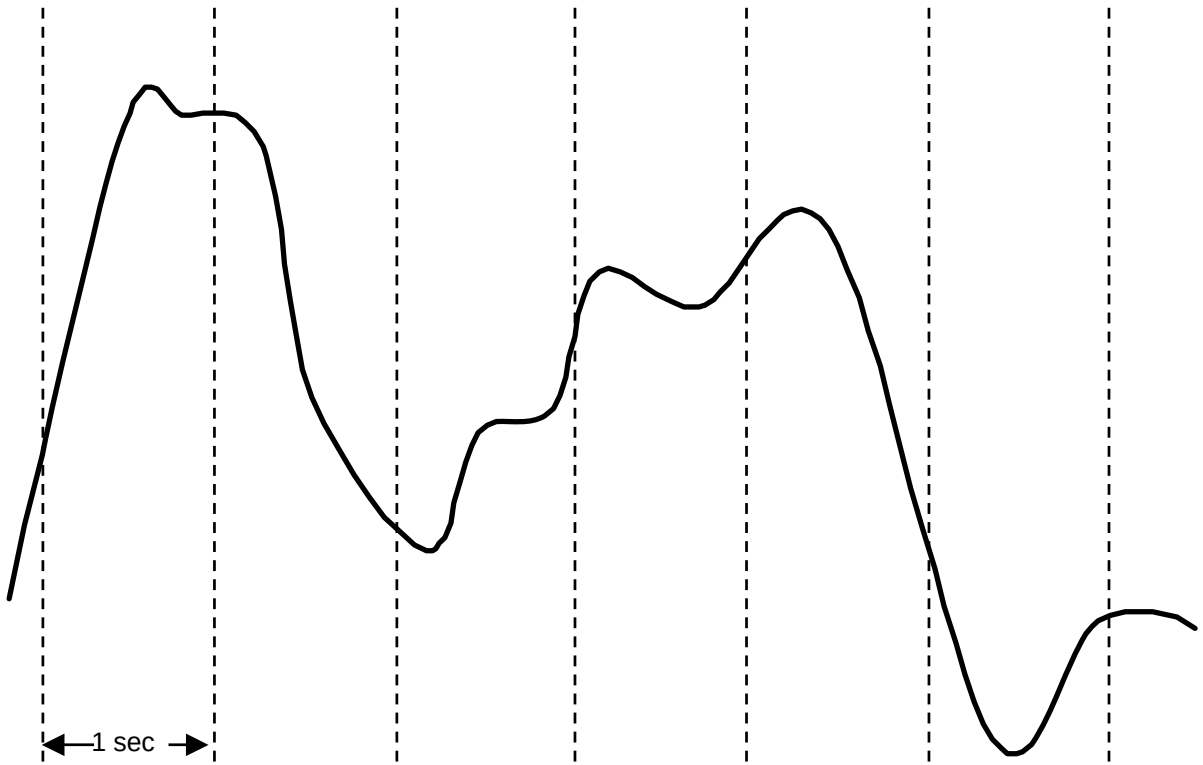
Sound parameters.

- **SPL or LP** (sound pressure level) Max RMS level within the last sec.
- **Inst.** (instantaneous)
- **Leq** (equivalent continuous sound level)
- **SEL** (Sound Exposure Level) SEL is Leq value compressed to 1 sec.



Possible Tests

- DC output *
- Self generated noise *
- Frequency weighting
- Level range control
- Linearity range
- RMS detector
- Time weighting
- Time averaging
- Pulse Range
- Overload indicator
- Acoustical response

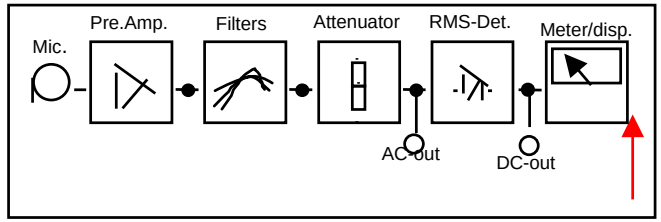
* not specified in standard

Absolute Acoustical Sensitivity Level @ 1 kHz

- The microphone is placed in a coupler with a known SPL (nominally 94 dB)
- Now the SLM under calibration is adjusted to a specific nominal reading (most often 93.8 dB)
- The rest of the calibration is performed with this sensitivity setting of the SLM

Frequency Weighting (acoustical)

IEC 651: 4.4, 6.1, 9.1, 9.2.2
IEC 804: 4.4, 5.1, 9.1, 9.2, 9.2.2



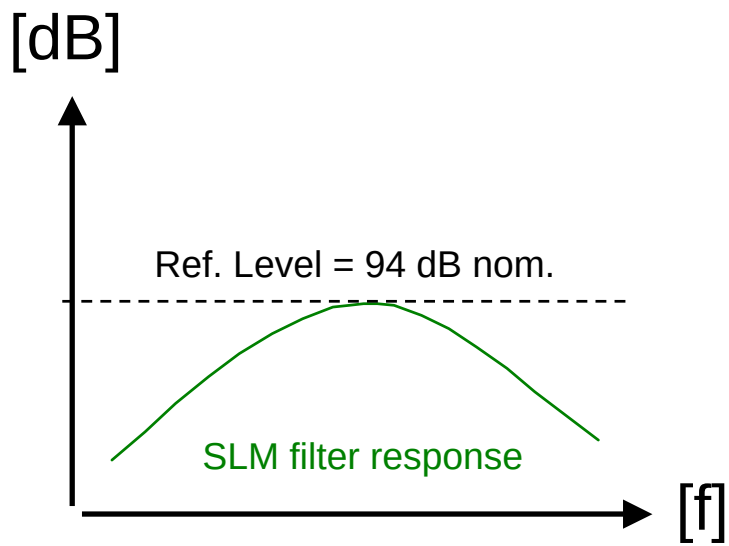
- The test checks the various weighting filters in the SLM.
- The microphone is placed in the 4226 coupler.
- Measurements are rel. 1 kHz
- The expected reading is:

$$L_C - C_{ff} + M_{fw} - C_{bi}$$

This is compared with the actual response at discrete frequencies

Aux filter response can be checked:

e.g. Random incidence correction

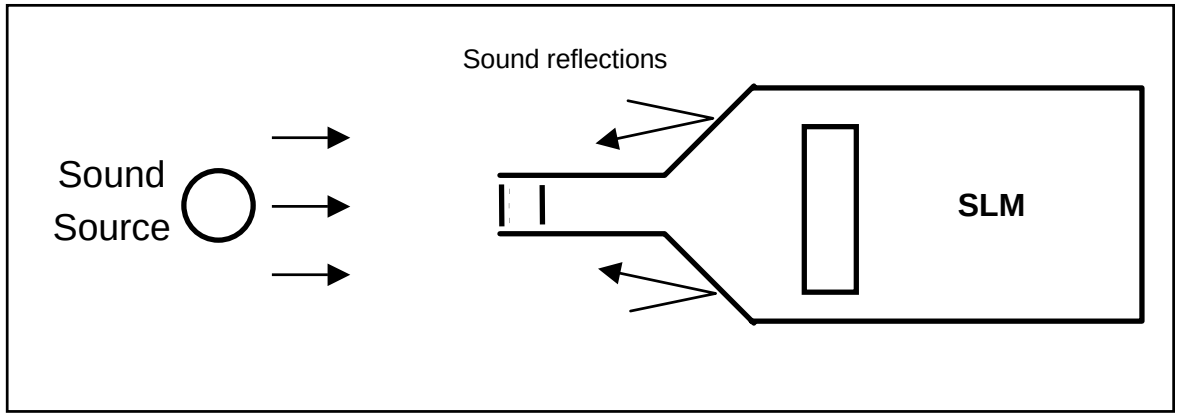


Acoustical response.

IEC 651: 4.4, 6.1, 9.1, 9.2, 9.2.1, 9.2.2
IEC 804: 4.4, 5.1, 9.1, 9.2, 9.2.1, 9.2.2

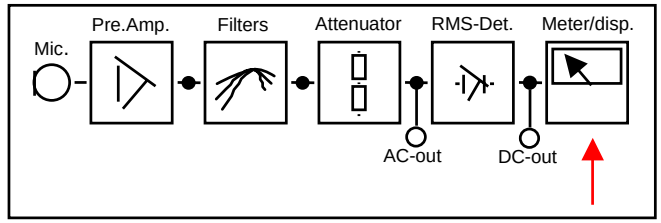
- The SLM itself is disturbing the sound field. Therefore we must make special considerations.

Example of “Body influence”



Acoustical Calibration.

IEC 651: 4.4, 6.1, 9.1, 9.2, 9.2.1, 9.2.2
IEC 804: 4.4, 5.1, 9.1, 9.2, 9.2.1, 9.2.2



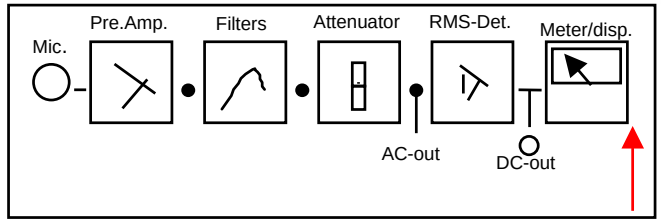
- Response of the SLM with the microphone mounted in multi tone calibrator.
- Test of complete instrument including the microphone
- The program makes correction for body influence if the information is available

OBS:
This test requires knowledge about 4226 microphone corrections

Electrical Inherent Noise

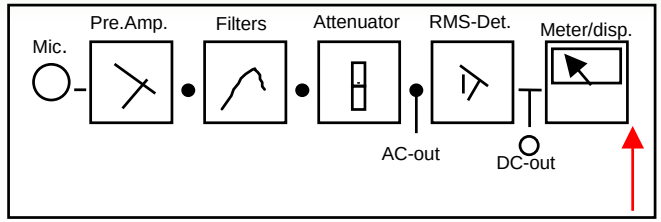
IEC 651: None

IEC 804: None



- The SLM input is short circuited via the capacitive adaptor
- The noise is measured and reported
- Noise can be measured in all or some FW settings
- OK means that the noise level does not exceed the lower limiting level - 12 dB.

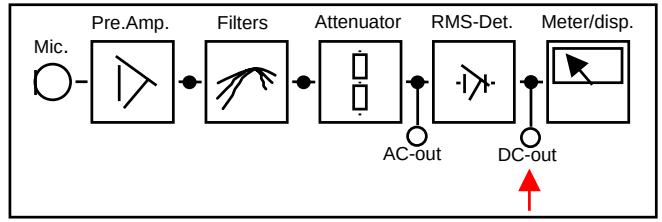
Determining Electrical Level @ 94 dB



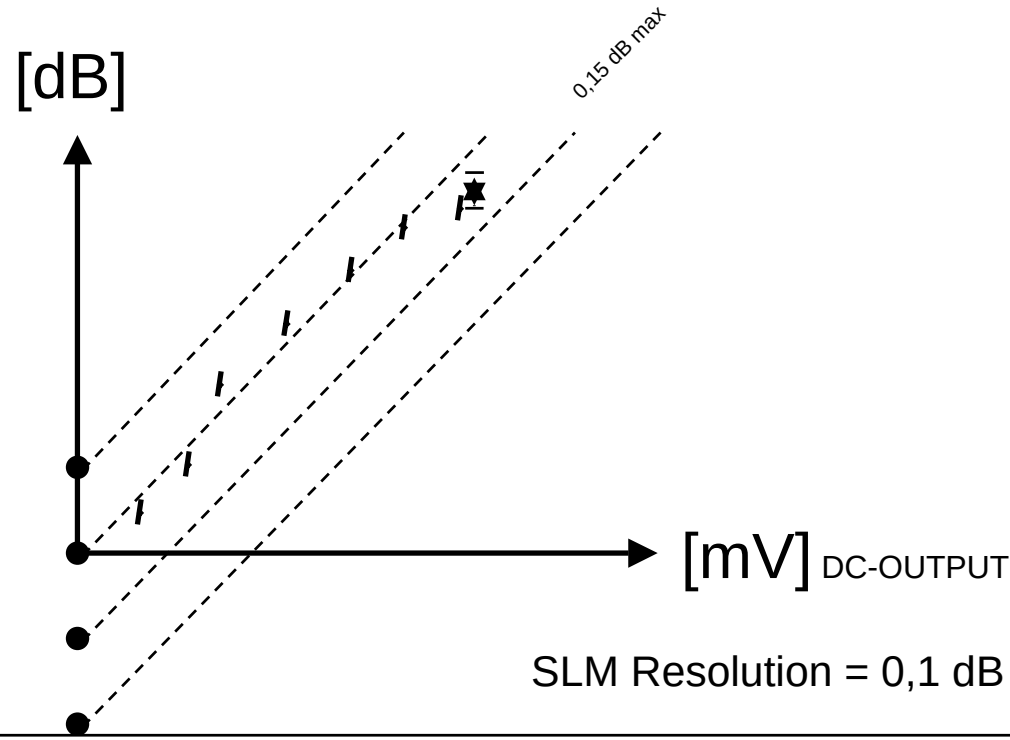
- An electrical signal corresponding to a nominal reading of 94 dB´is connected to the input through a capacitive adaptor
- The adaptor capacitance must equal the microphone capacitance within 5.5 %
- The deviation from the nominal reading is used to correct the signal levels in all following electrical measurements
- Example
  - Anticipated 94.0 dB
  - Actual reading 94.7 dB
  - Error 0.7 dB
  - The correction for all following electrical measurements will then be – 0.7 dB

DC-output

IEC 651: None
IEC 804: None

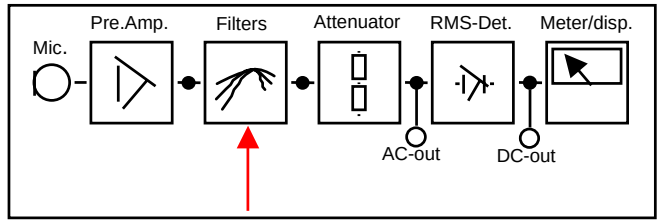


- This test is not defined in the standards.
- Test from FS – 5dB to LL + 5dB
- This test verifies the cor-relation between the DC-output and the indicator.
- 5 dB steps in the ref. Range
- 2 points check in other ranges

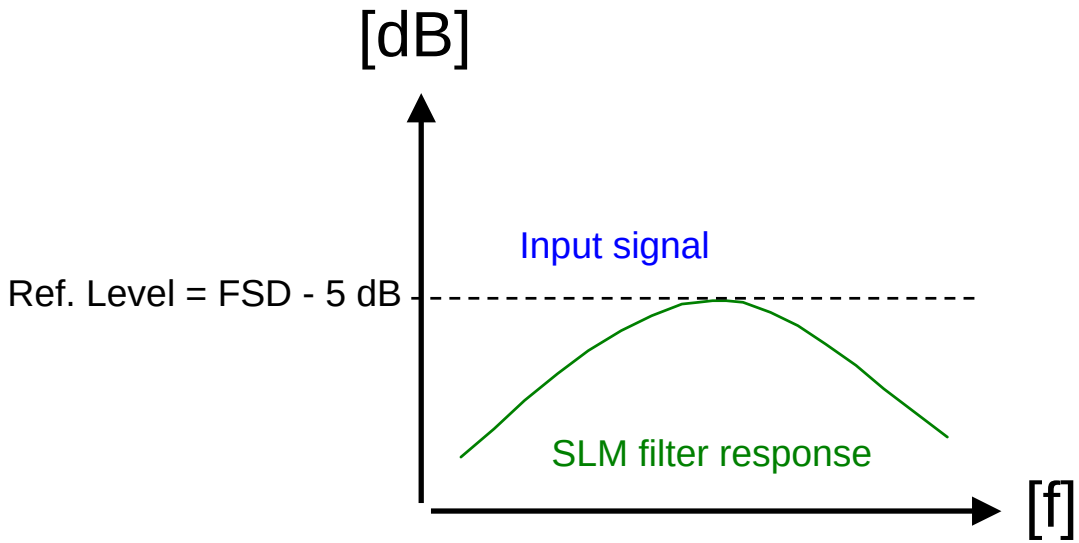


Frequency Weighting (electrical)

IEC 651: 4.4, 6.1, 9.1, 9.2.2
IEC 804: 4.4, 5.1, 9.1, 9.2, 9.2.2



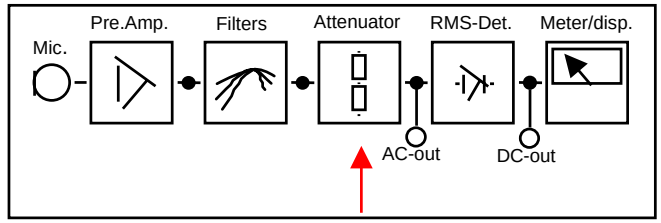
- The test checks the various weighting filters in the SLM
- The level of the input signal is kept constant at FSD – 5 dB in the ref range
- The results are reported relative to 1 kHz



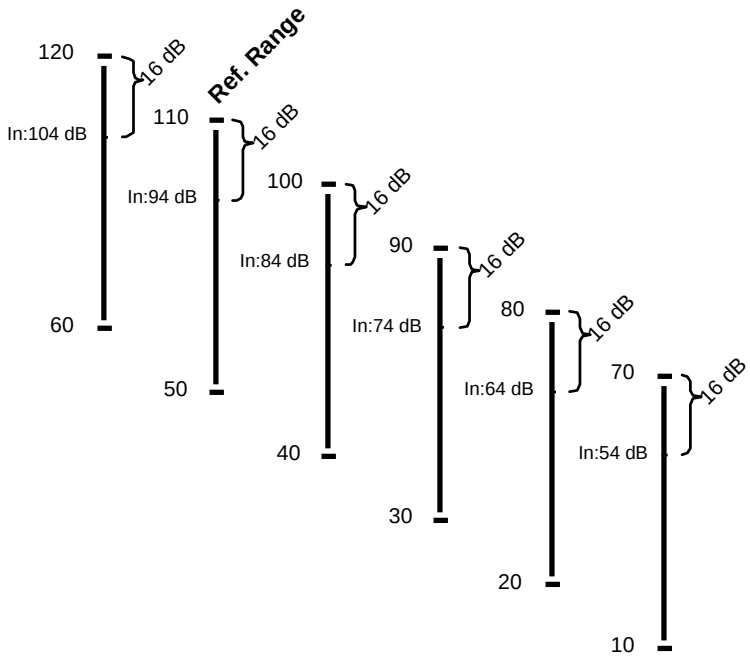
Testfreq.: 1/3 octave frequencies in specified freq. range f. the SLM

Level range control.

IEC 651: 6.3, 9.3.2
IEC 804: 5.2, 6.4, 9.3.1



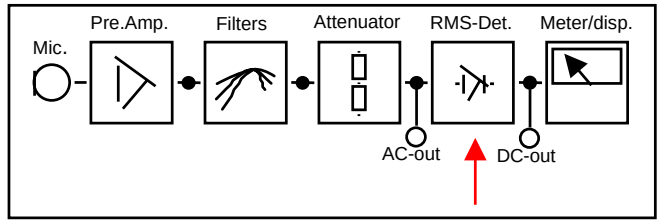
- The SLM is tested for errors introduced in the level range control.
- The input to the SLM is changed in each measuring range by the same amount as attenuator has been changed. This generates a constant level to the RMS-detector, thus isolating level range errors
- Ref. Level is 94 dB in the reference range



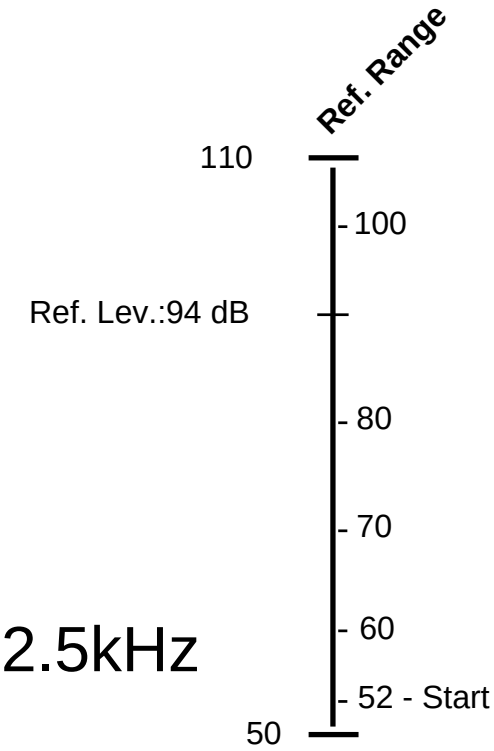
Testfreq.: 20 - 31.5 - 1k - 4k - 8k or 12.5kHz

Linearity range.

IEC 651: 7.9, 7.10
IEC 804: 6.2, 9.3.3



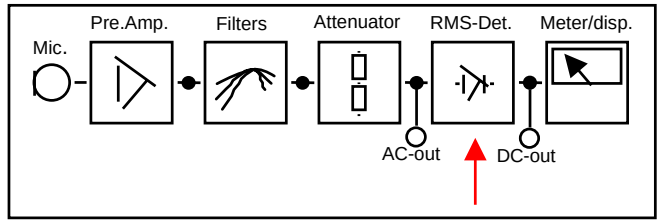
- The SLM is tested for differential level linearity and overall linearity referred to the reference level.
- Test performed in 10 dB and 1 dB steps
- The linearity in the SLM can be tested in SPL, Leq and SEL mode.



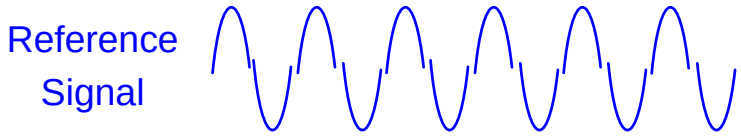
Testfreq.: 20 - 31.5 - 1k - 4k - 8k or 12.5kHz
(for SPL. For Leq and SEL at 4 kHz)

RMS-detector.

IEC 651: 7.5, 9.4.2
IEC 804: None

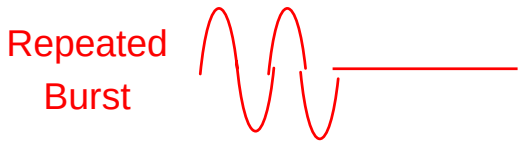


- Test of RMS detector at various CF's
- The RMS-detector is an advanced AC to DC circuit or it is realized in the DSP
- CF is controlled by burst duration 0.5 to 5.5 msec. for CF 3 to 10



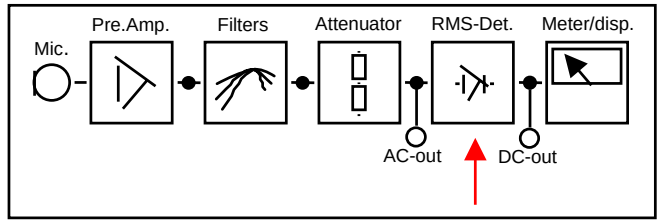
Crest factor CF is the ratio between peak-value and RMS-value of the signal.

$$CF = \frac{V_{peak}}{V_{RMS}}$$



Time weighting.

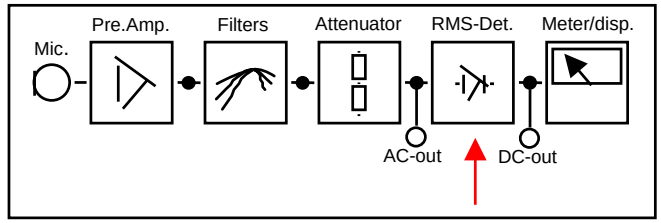
IEC 651: 4.5, 7.2 - 7.5, 9.4.1, 9.4.3, 9.4.4
IEC 804: None



- Test of the time weighting characteristics Slow, Fast and Impulse, Peak detector test and test of meter overshoot.

Time averaging.

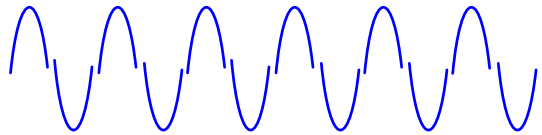
IEC 651: None
IEC 804: 4.5, 6.1, 9.3.2



- This test compares the reading for a continuous sine signal with readings from a sine tone burst sequence having the same RMS value.

Example:

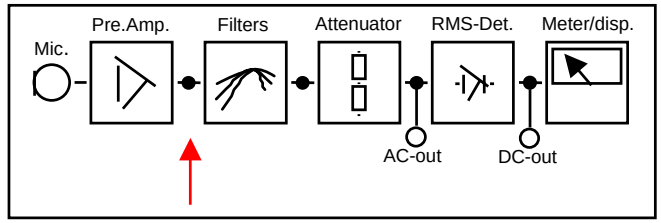
Reference Signal



Repetitive Signal

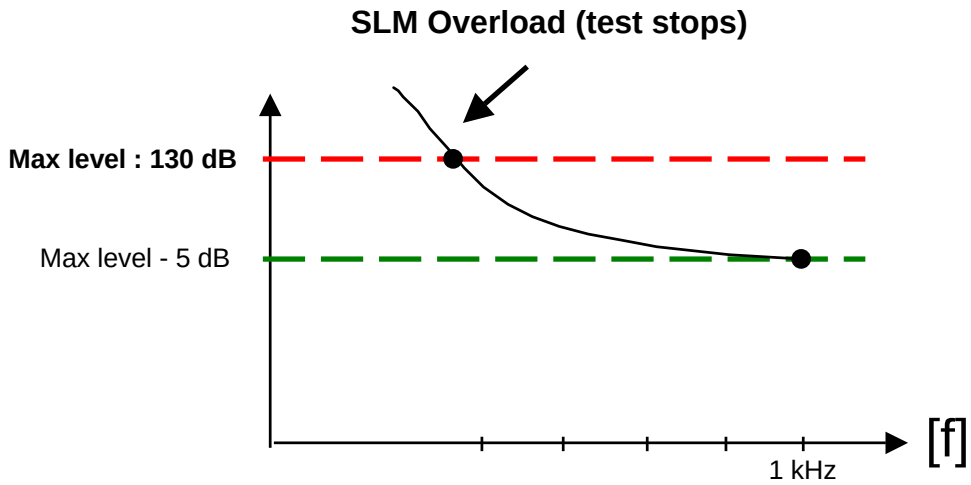
Overload indicator.

IEC 651: 6.5, 9.3.1
IEC 804: 4.6, 7.1, 7.2, 7.3, 9.3.5



- Overload test is performed in SPL or SEL mode.
- Test starts 5 dB below the maximum A-weighted sound pressure level the SLM is designed to measure using an inverse A-curve

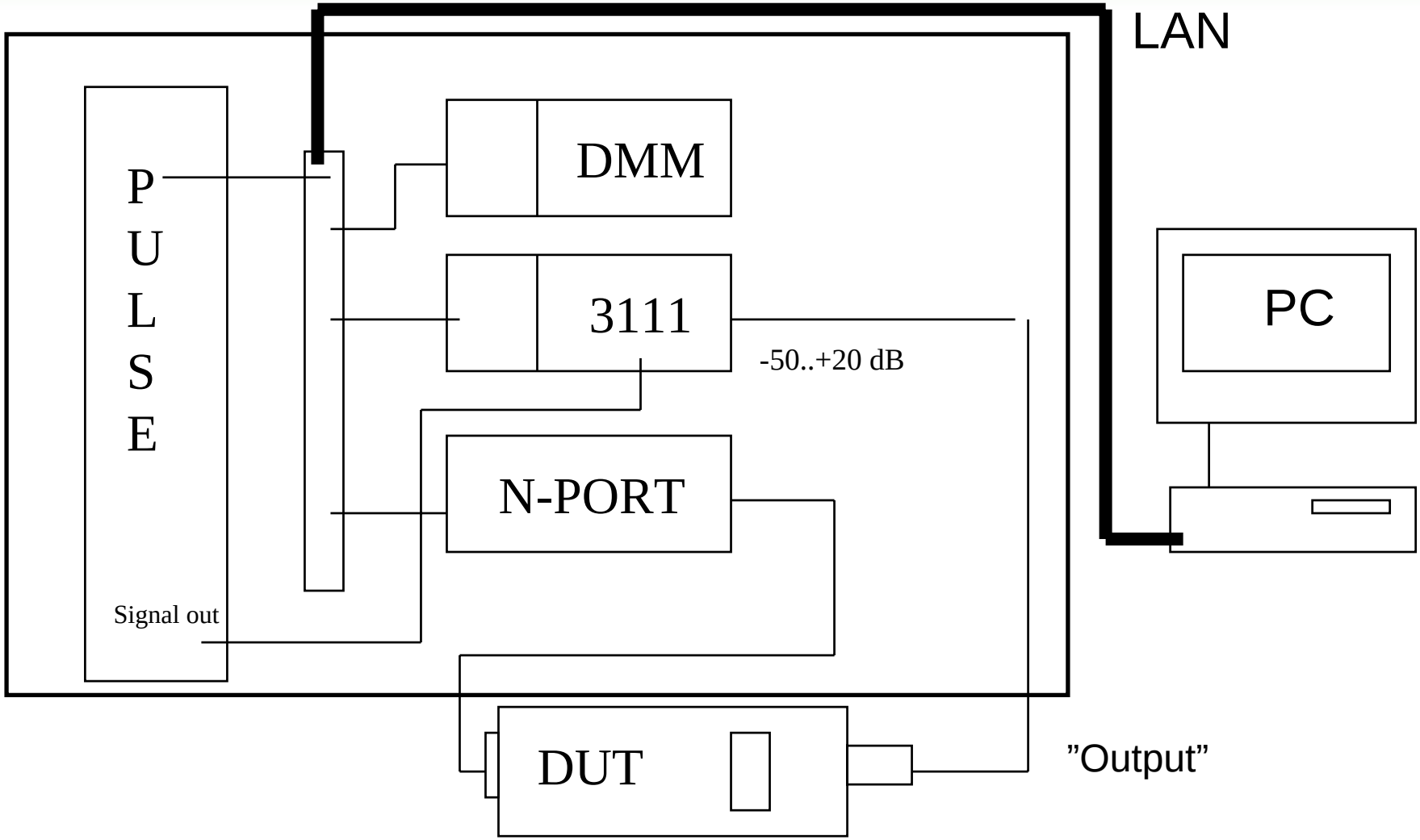
This test verifies, that
the overload detection
is <u>before</u> the AC/DC converter
and weighting filters



3630 System Elements

- BK Portable PULSE Multifunction Analyzer
- BK 4226 - Acoustic Multifunction Calibrator
- Set of adapters
- Agilent 34970A DMM and MUX
- 3111 Output Module
- PC with WIN 2000 or XP and MS Office PRO
- LAN interfaces (N – Ports)
- Software package 7762 and 7763

3630 System Architecture



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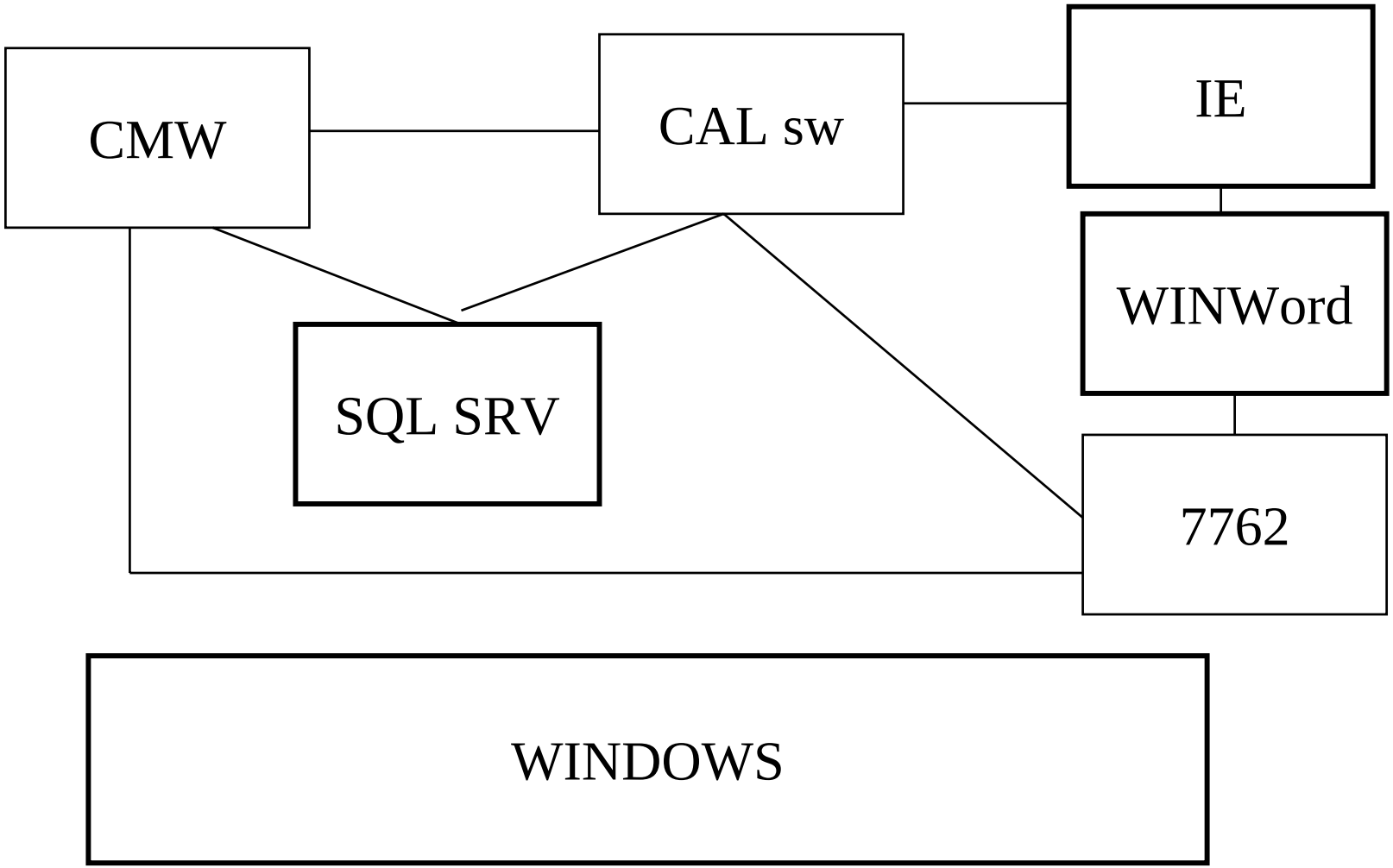
Software Architecture



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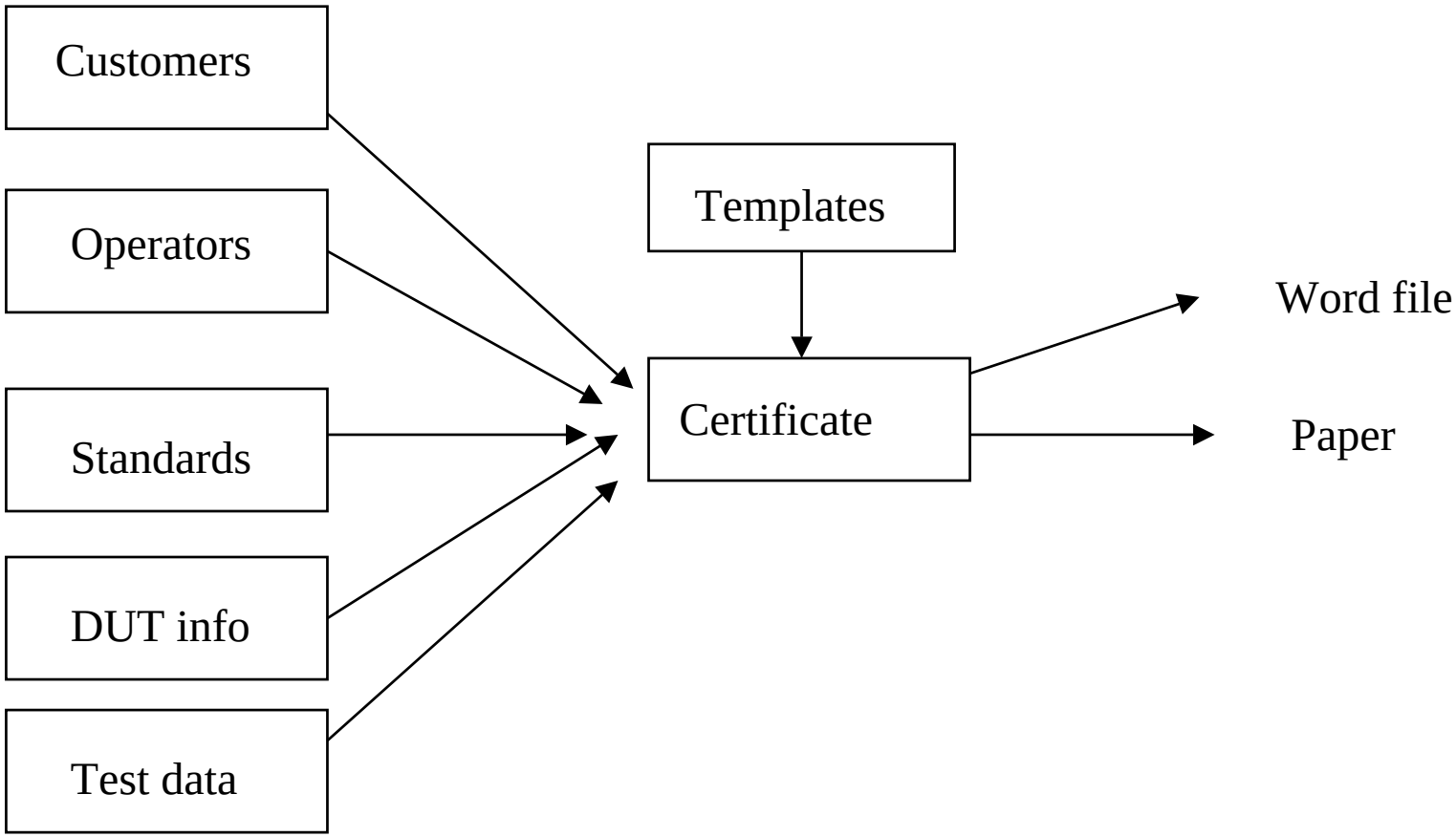
Traceability

- AC/DC voltage traceability via Agilent DMM
- Sound Pressure traceability via Brüel & Kjær 4226
- Frequency traceability via Agilent DMM
- Capacitive adaptors via external calibration
- Comprehensive self calibration facilities of system

Recommended Calibration Policy

- System self calibration
  - when needed, max, interval 12 months
- System self verification
  - max interval 1 month
- DMM calibration
  - once every 12 months
- 4226 calibration (OBS.must use external gen. option)
  - max. interval 12 months
- Capacitive adaptors
  - 24 months interval
- PULSE
  - no need for external cal

3630 Database and Report



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Platform Highlights

- The new platform is
  - Modular and flexible (lower entry level price)
  - Has as much functionality as possible in sw (and not hw)
  - Based on the PULSE (B&K product philosophy)
  - Suited for accreditation (documentation level)

Summary

- Calibration to international standards
- Automatic, semi - automatic or manual test possible
- Certificate with comprehensive test report (optionally)
- Flexible report generator
- Combination of electrical and acoustical measurements saves time
- Traceability to international standards
- Documentation eases the accreditation process
- Other applications available
  - Noise dose meters
  - Accelerometers
  - Sound calibrators
  - Microphones

Link to Product Data on Web

- 3630 SLM Calibration System
  - http://www.bksv.com/pdf/Bp1922.pdf
- 3629 Accelerometer Calibration System
  - http://www.bksv.com/pdf/Bp1975.pdf
  - http://www.bksv.com/pdf/bp2119.pdf

3630 Front View

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3630 Rear – only 2 Cables Needed

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SLM under Cal. – Only 2 Cables Needed Here Also

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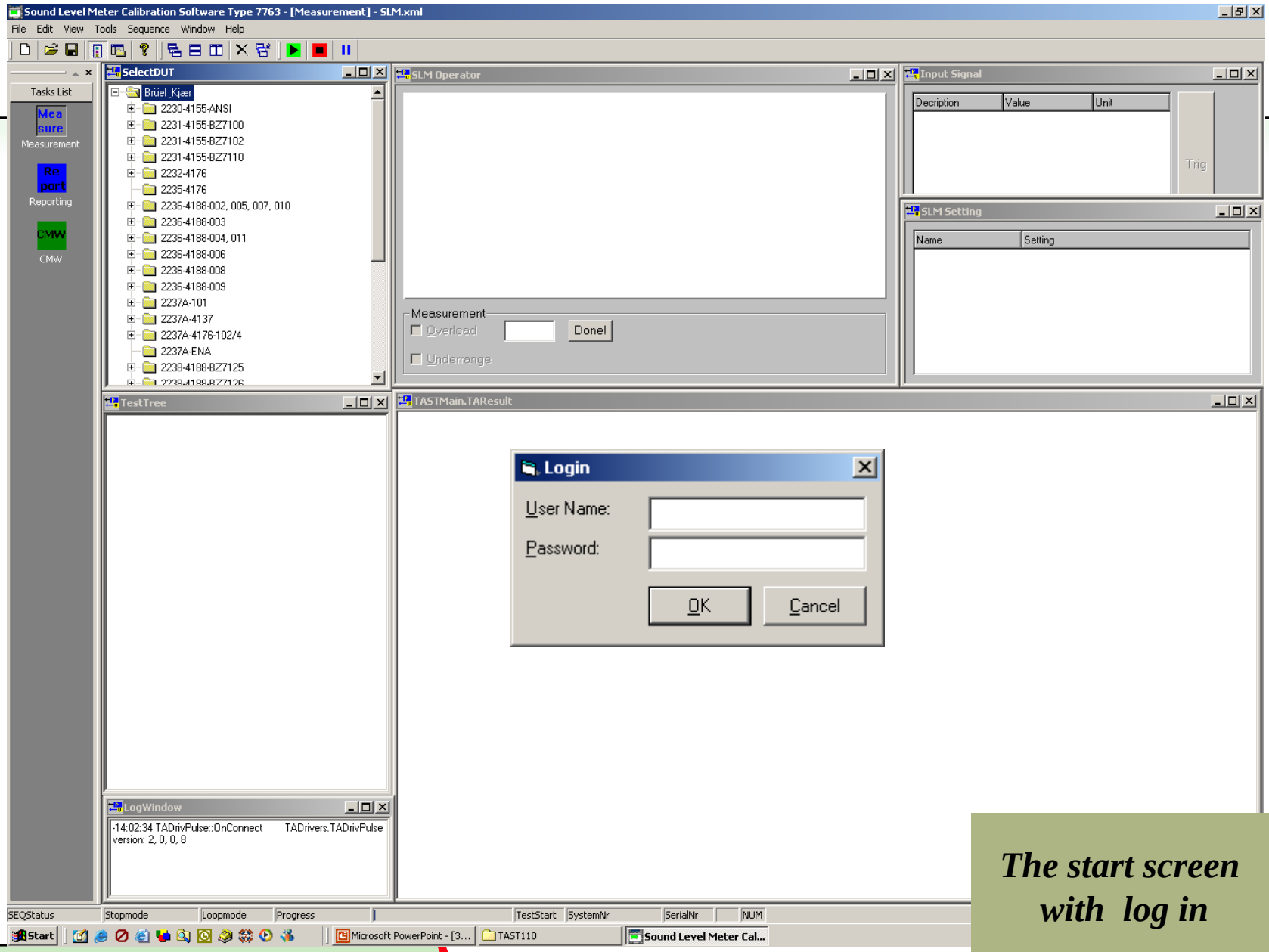
Walk Through of a Calibration Process

- Start screen, (user log in and user levels)
- Select SLM Type to be calibrated
- Select Calibration procedure
- Enter DUT info
- View test tree
  - expand test tree
- Start test
  - show relevant windows
- Comment Result Window in detail
- Test finished
- Report tool
- Define new DUT tool



The start screen with log in

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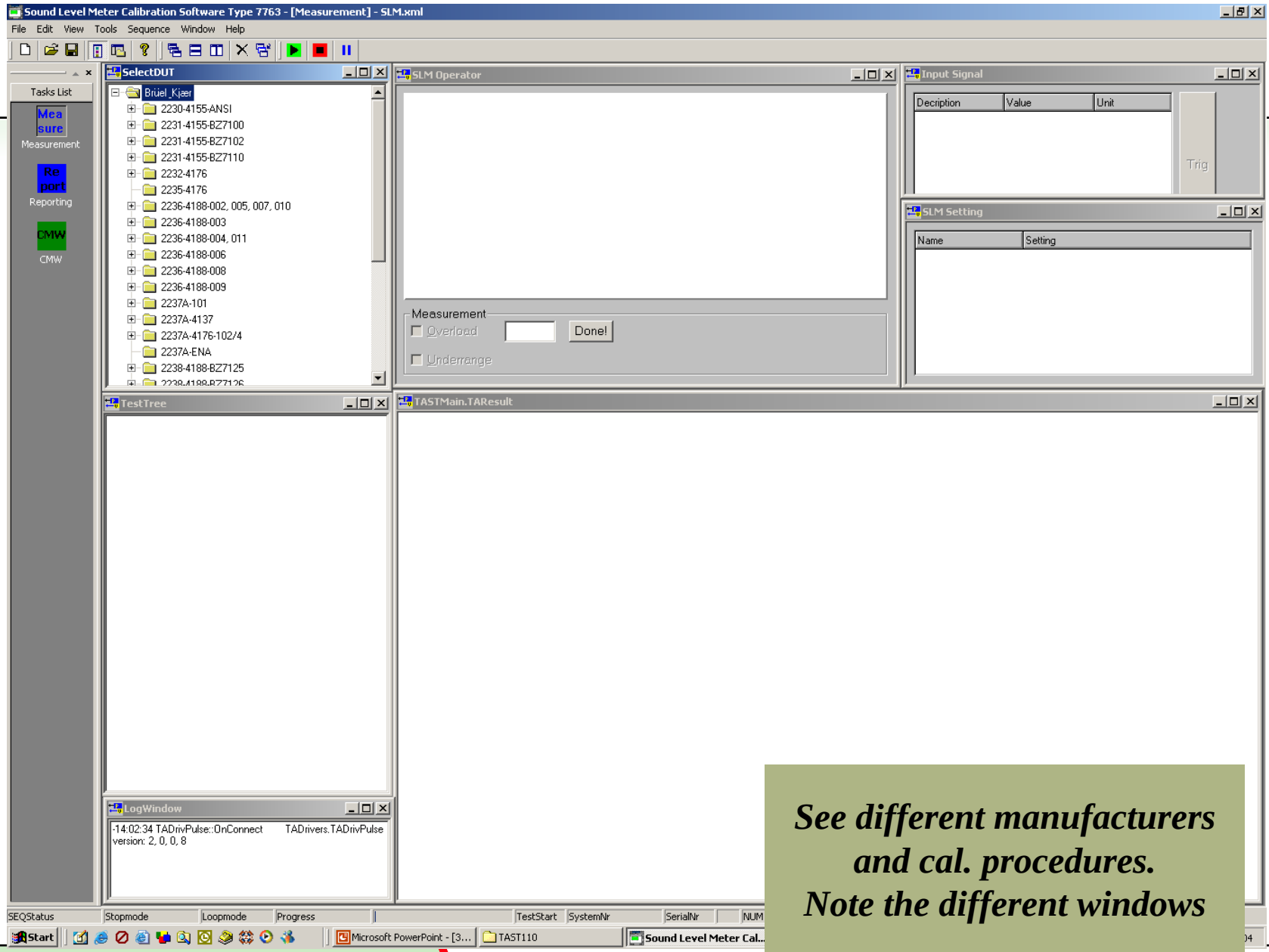

See different manufacturers and cal. procedures. Note the different windows

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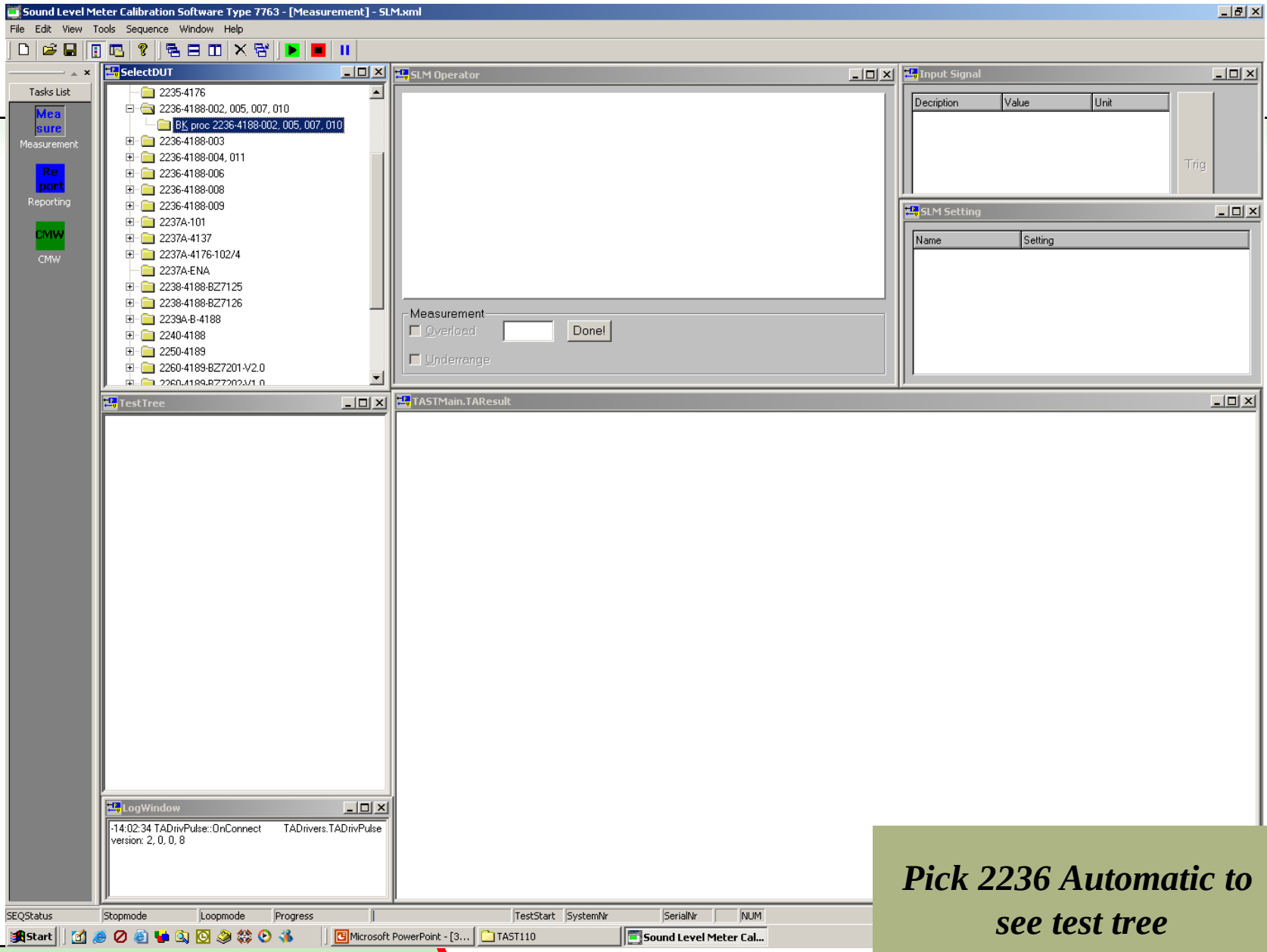

Pick 2236 Automatic to see test tree

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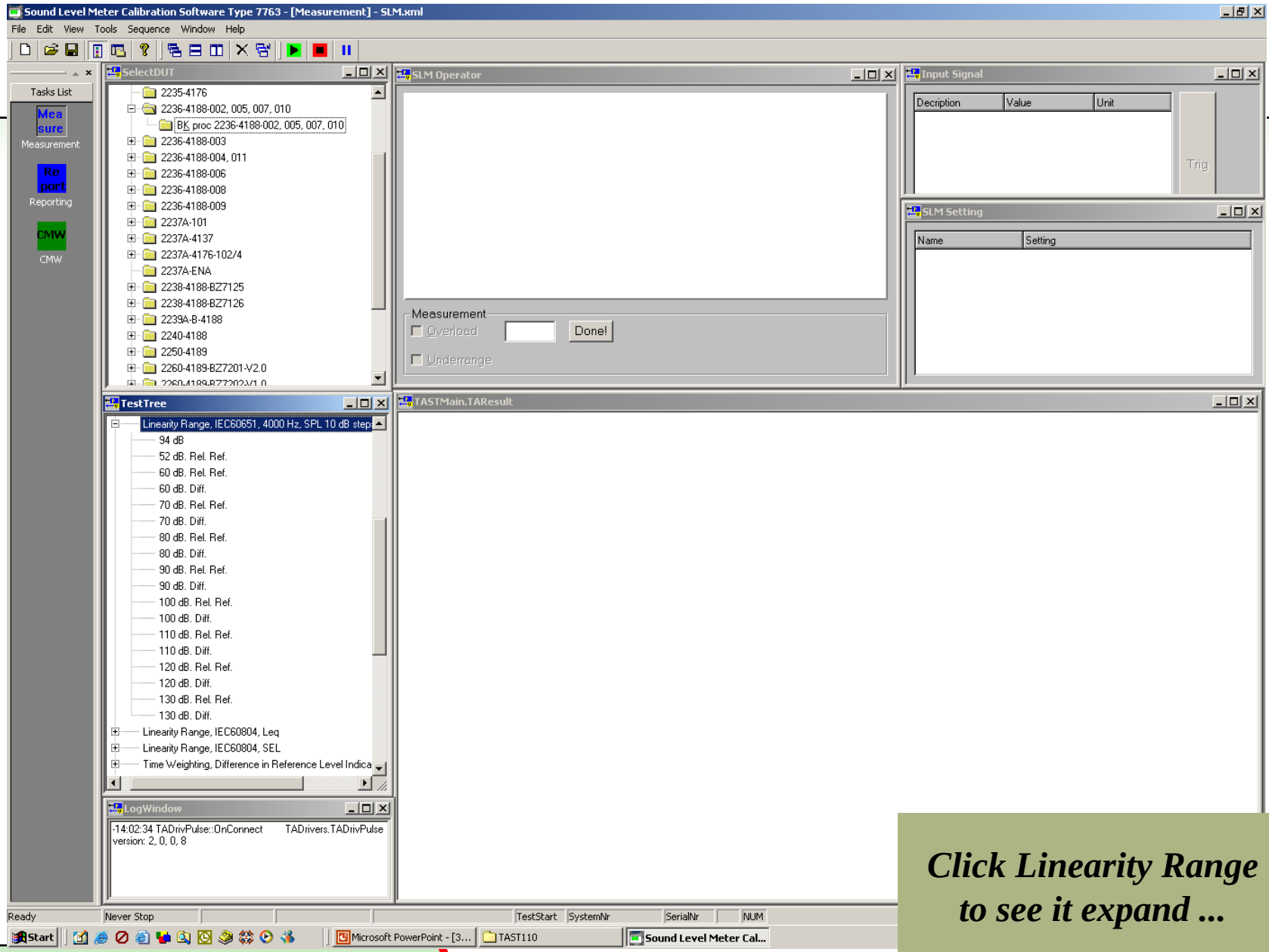

Click Linearity Range to see it expand ...

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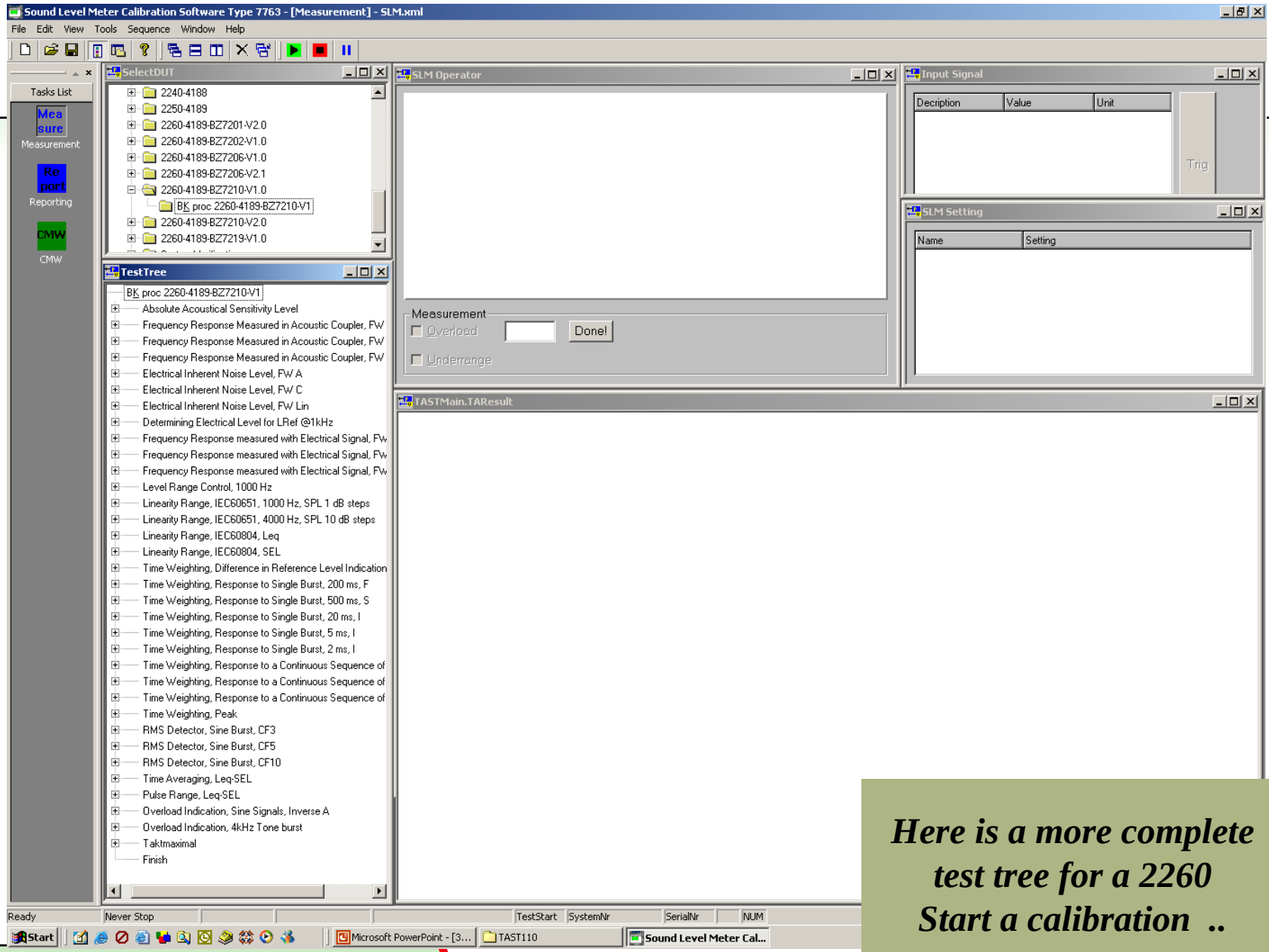
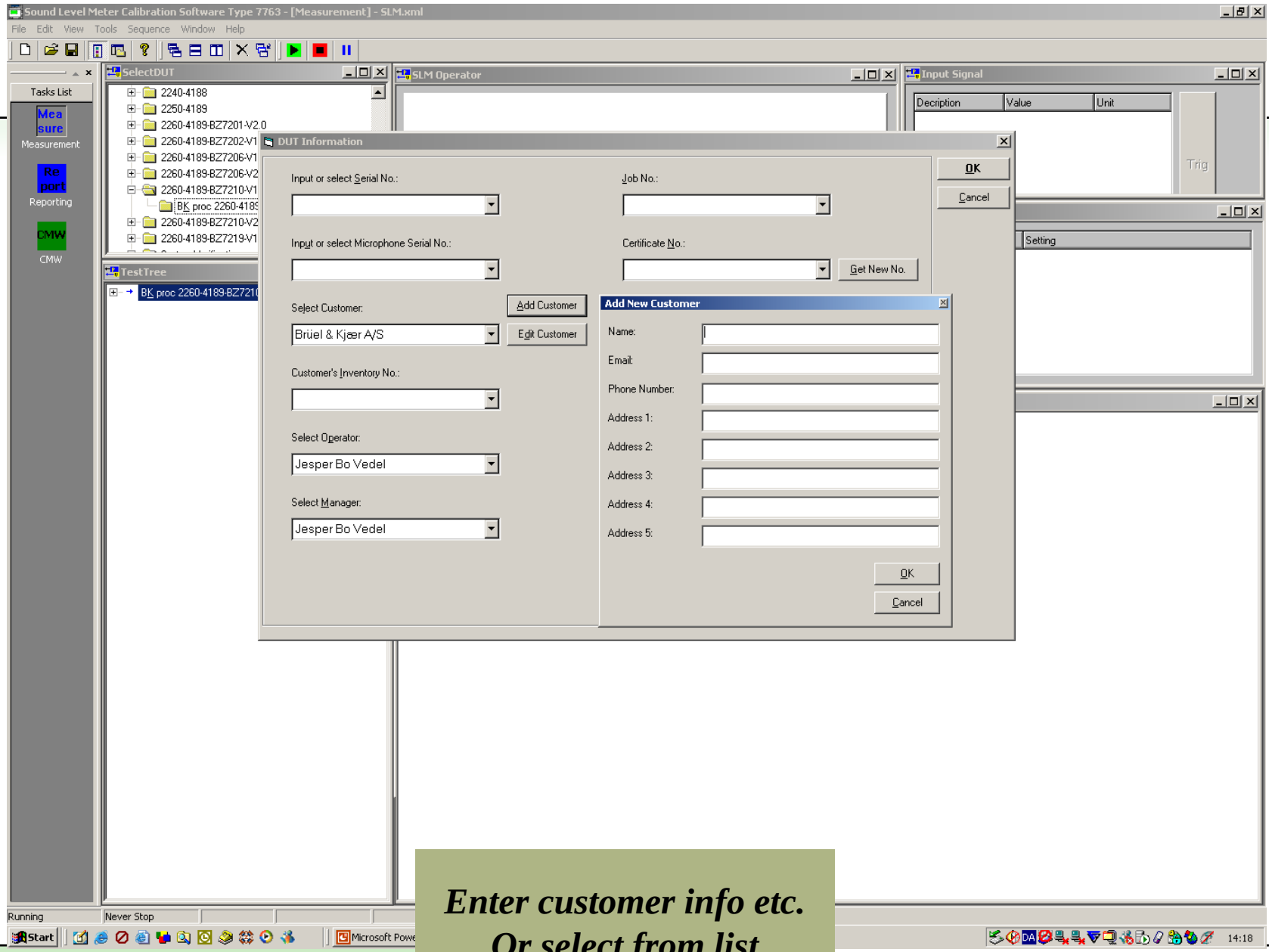


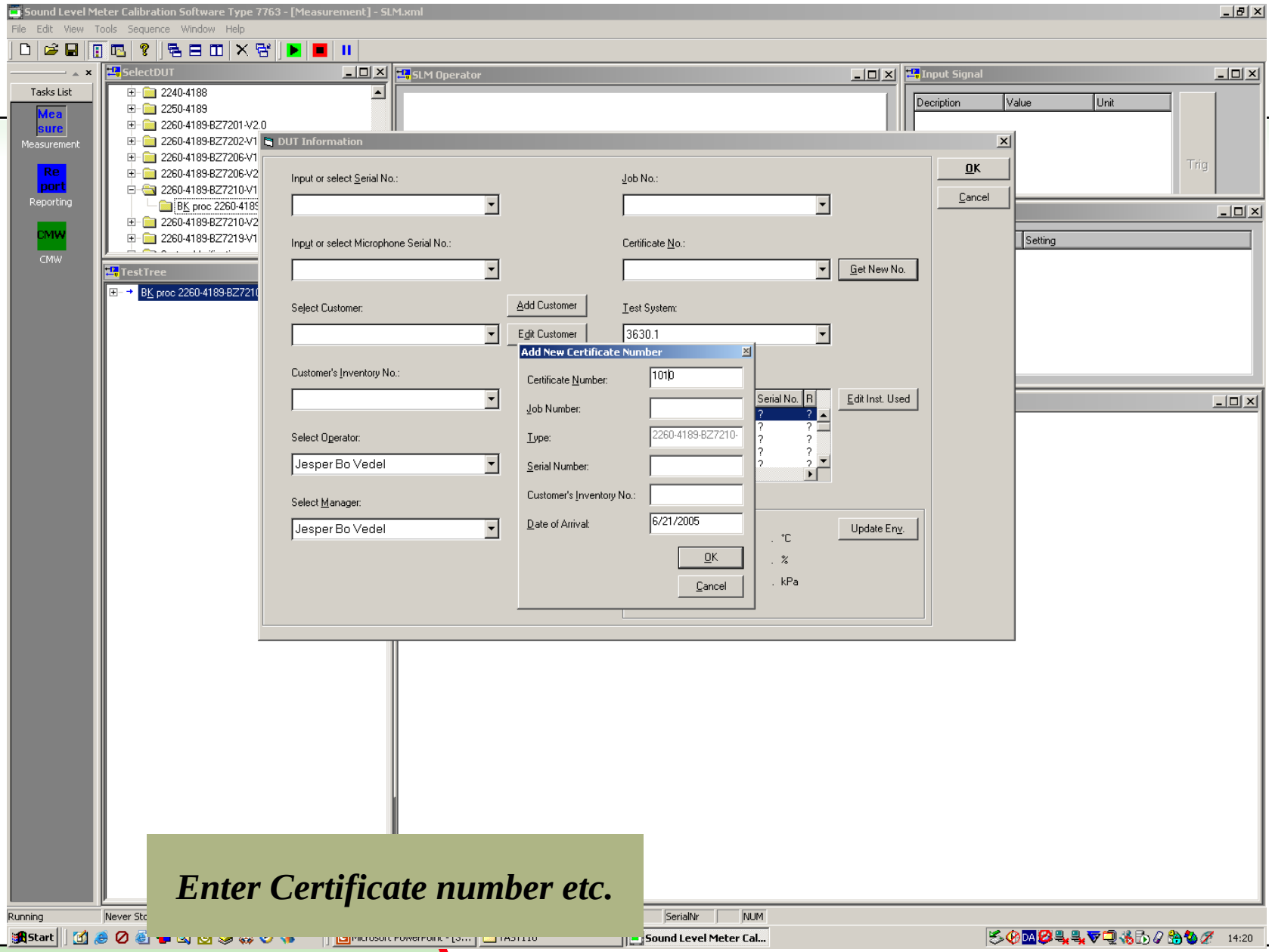
Here is a more complete test tree for a 2260 Start a calibration ..

Brüel & Kjær



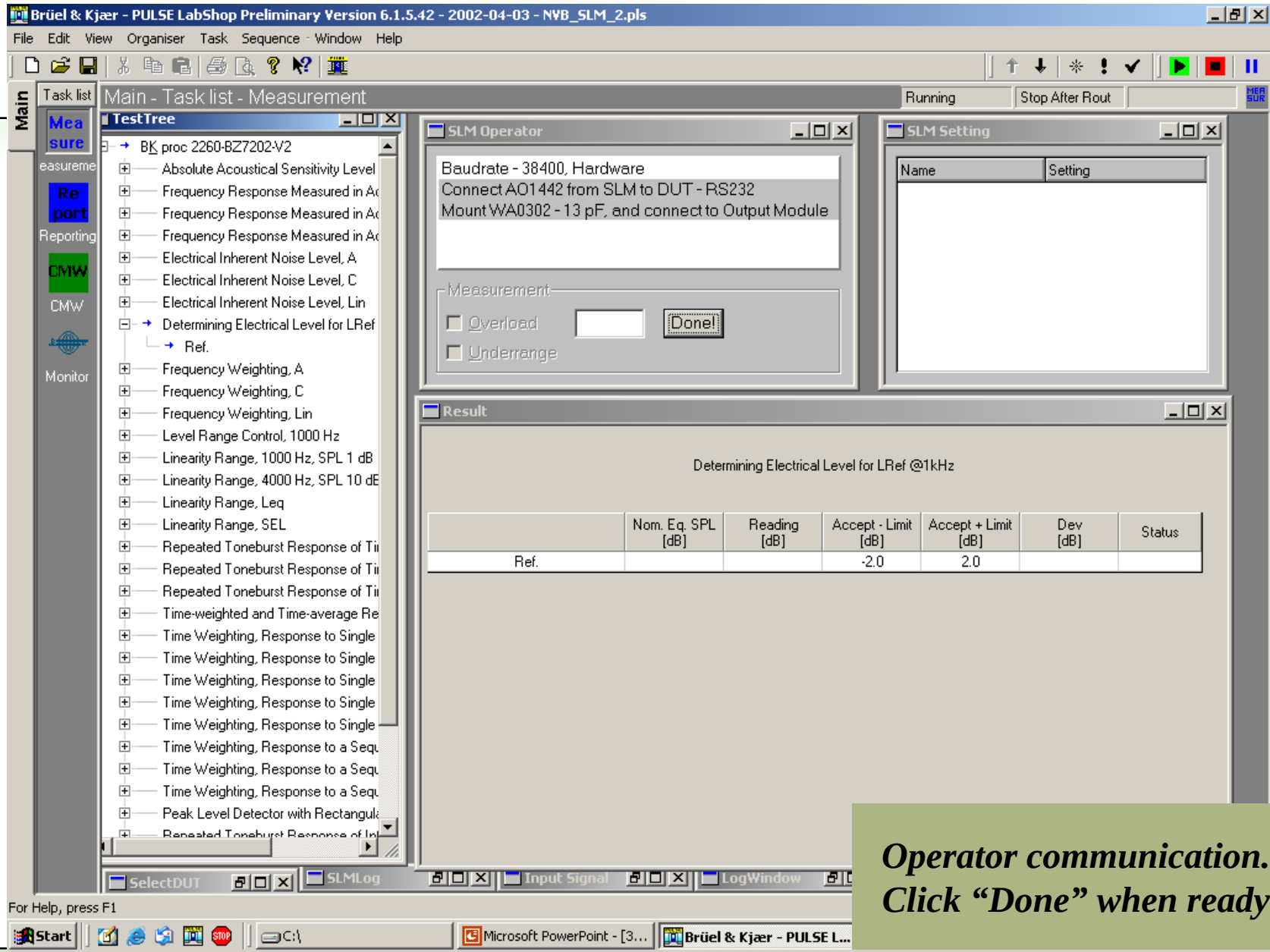
Enter customer info etc.
Or select from list

Brüel & Kjær



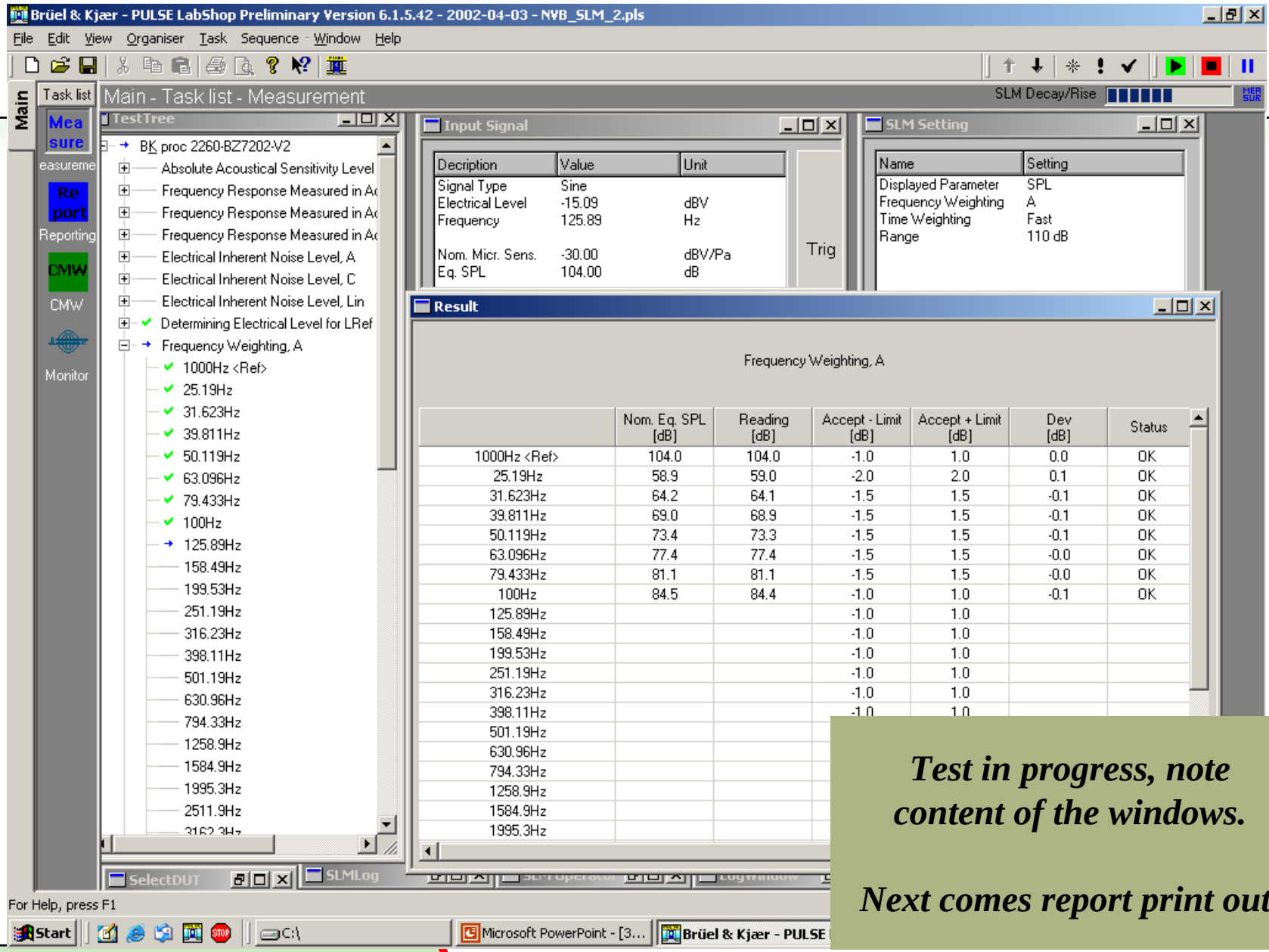
Enter Certificate number etc.

Brüel & Kjær



Operator communication. Click "Done" when ready

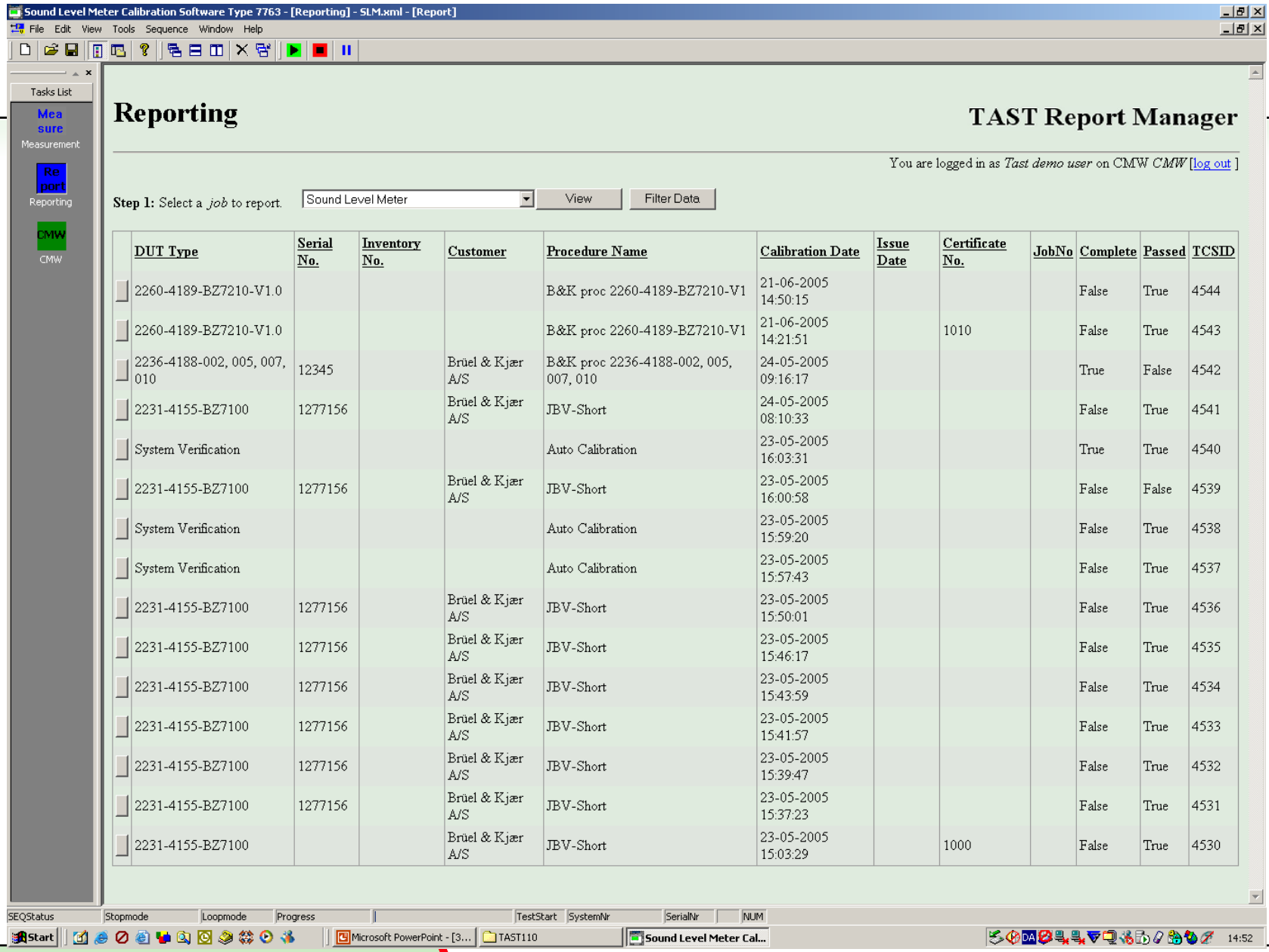
Brüel & Kjær



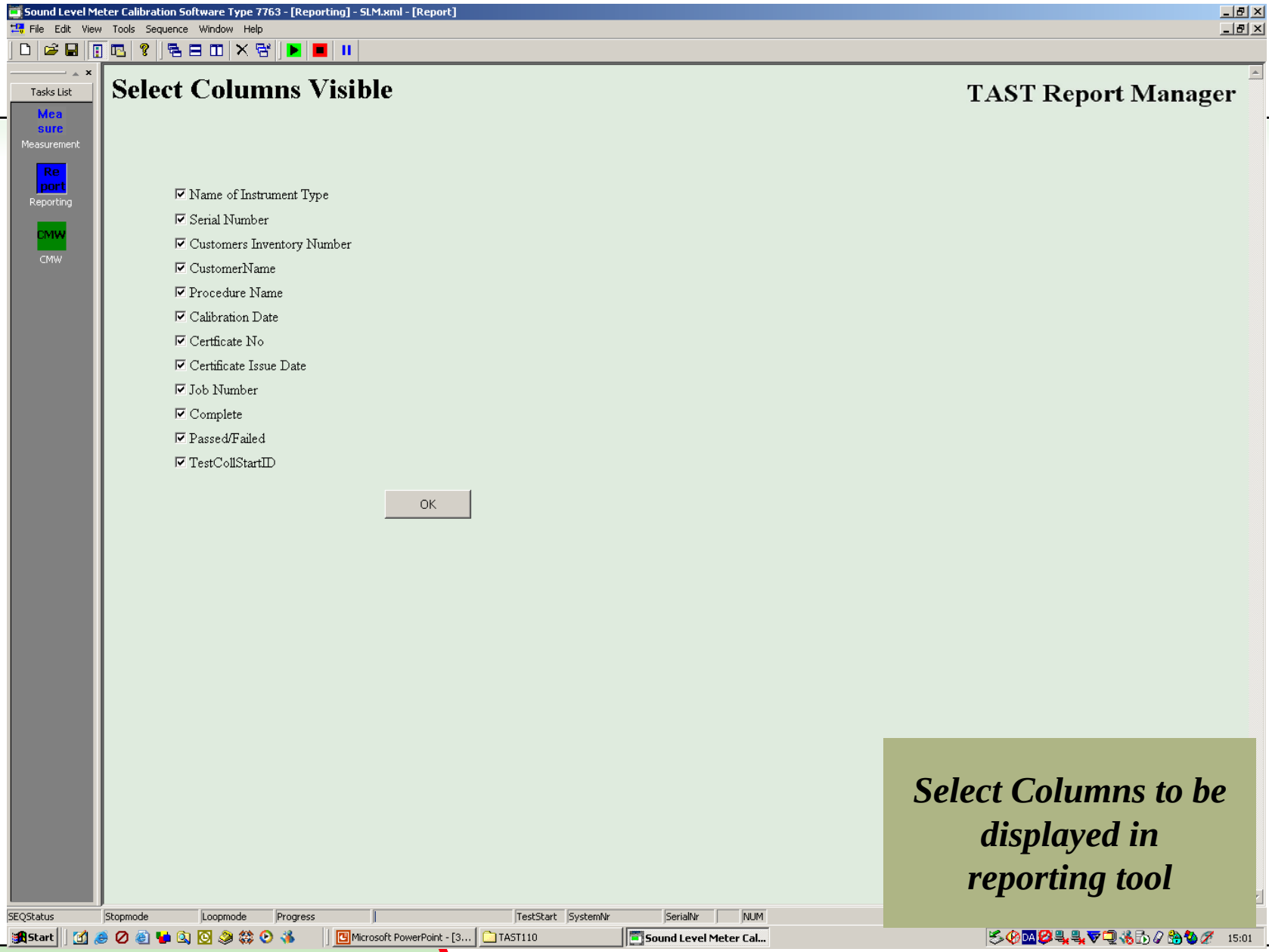
Test in progress, note content of the windows.

Next comes report print out.

Brüel & Kjær

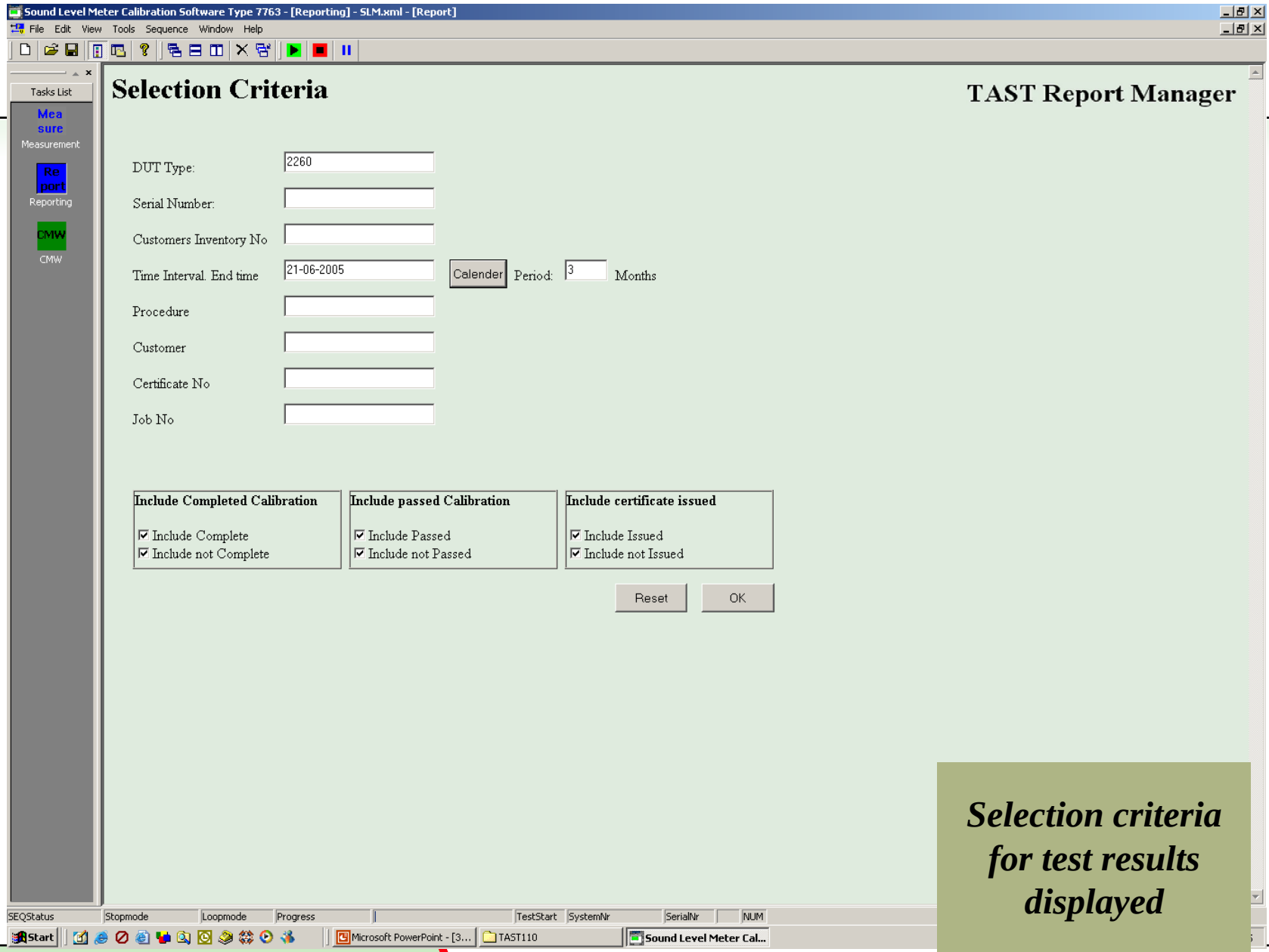

Sound Level Meter Calibration Software Type 7763 - [Reporting] - SLM.xml - [Report]
File Edit View Tools Sequence Window Help
Tasks List
Measure
Measurement
Report
Reporting
CMW
CMW
Reporting
TAST Report Manager
You are logged in as Tast demo user on CMW CMW [log out]
Step 1: Select a job to report.
Sound Level Meter
View
Filter Data
DUT Type | Serial No. | Inventory No. | Customer | Procedure Name | Calibration Date | Issue Date | Certificate No. | JobNo | Complete | Passed | TCSID
2260-4189-BZ7210-V1.0 | | | | B&K proc 2260-4189-BZ7210-V1 | 21-06-2005 14:50:15 | | | | False | True | 4544
2260-4189-BZ7210-V1.0 | | | | B&K proc 2260-4189-BZ7210-V1 | 21-06-2005 14:21:51 | | 1010 | | False | True | 4543
2236-4188-002, 005, 007, 010 | 12345 | | Brüel & Kjær A/S | B&K proc 2236-4188-002, 005, 007, 010 | 24-05-2005 09:16:17 | | | | True | False | 4542
2231-4155-BZ7100 | 1277156 | | Brüel & Kjær A/S | JBV-Short | 24-05-2005 08:10:33 | | | | False | True | 4541
System Verification | | | | Auto Calibration | 23-05-2005 16:03:31 | | | | True | True | 4540
2231-4155-BZ7100 | 1277156 | | Brüel & Kjær A/S | JBV-Short | 23-05-2005 16:00:58 | | | | False | False | 4539
System Verification | | | | Auto Calibration | 23-05-2005 15:59:20 | | | | False | True | 4538
System Verification | | | | Auto Calibration | 23-05-2005 15:57:43 | | | | False | True | 4537
2231-4155-BZ7100 | 1277156 | | Brüel & Kjær A/S | JBV-Short | 23-05-2005 15:50:01 | | | | False | True | 4536
2231-4155-BZ7100 | 1277156 | | Brüel & Kjær A/S | JBV-Short | 23-05-2005 15:46:17 | | | | False | True | 4535
2231-4155-BZ7100 | 1277156 | | Brüel & Kjær A/S | JBV-Short | 23-05-2005 15:43:59 | | | | False | True | 4534
2231-4155-BZ7100 | 1277156 | | Brüel & Kjær A/S | JBV-Short | 23-05-2005 15:41:57 | | | | False | True | 4533
2231-4155-BZ7100 | 1277156 | | Brüel & Kjær A/S | JBV-Short | 23-05-2005 15:39:47 | | | | False | True | 4532
2231-4155-BZ7100 | 1277156 | | Brüel & Kjær A/S | JBV-Short | 23-05-2005 15:37:23 | | | | False | True | 4531
2231-4155-BZ7100 | | | Brüel & Kjær A/S | JBV-Short | 23-05-2005 15:03:29 | | 1000 | | False | True | 4530
SEQStatus Stopmode Loopmode Progress TestStart SystemNr SerialNr NUM
Start
Microsoft PowerPoint - [3...
TAST110
Sound Level Meter Cal...
14:52

Brüel & Kjær



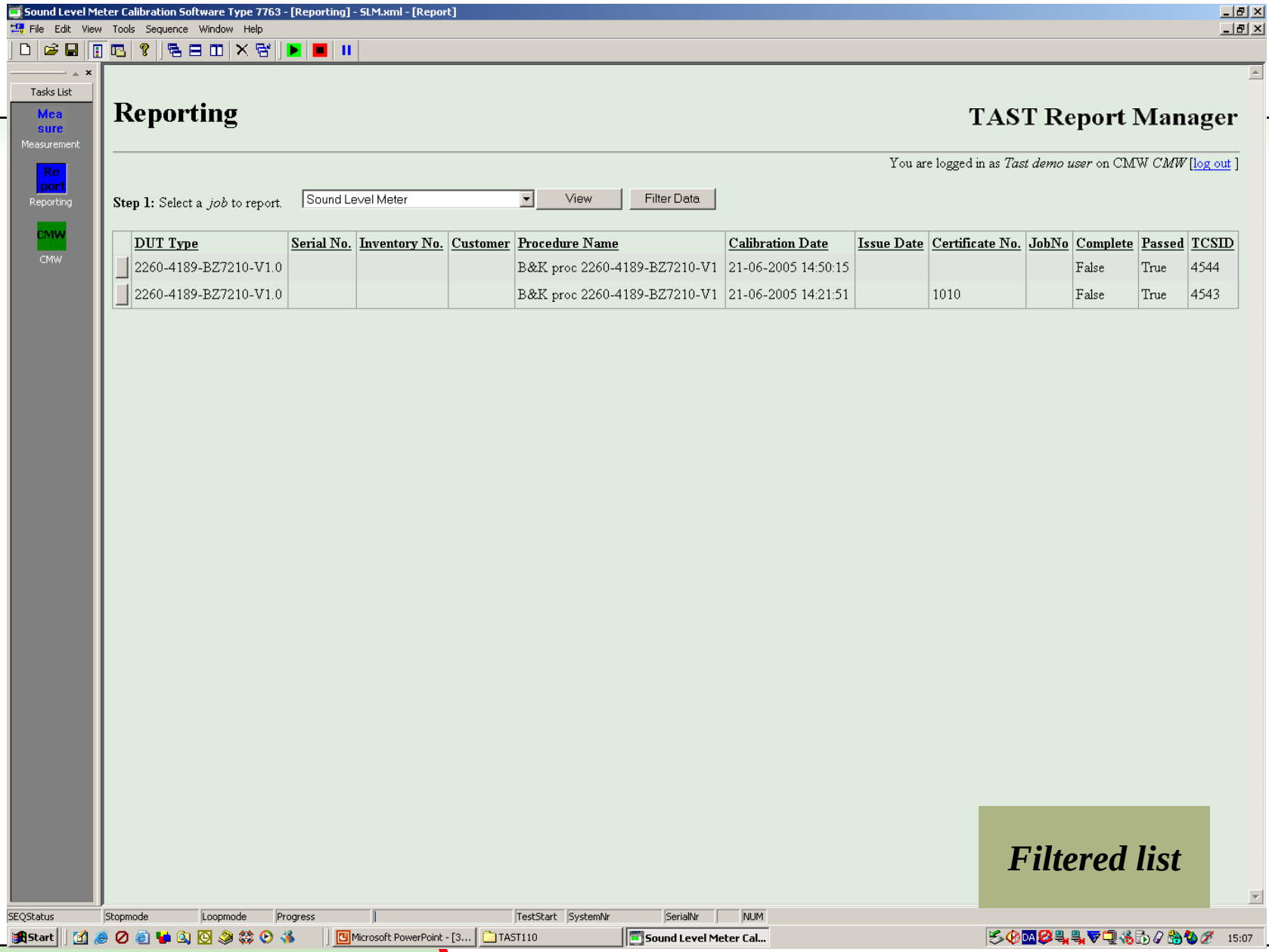
Select Columns to be displayed in reporting tool

Brüel & Kjær

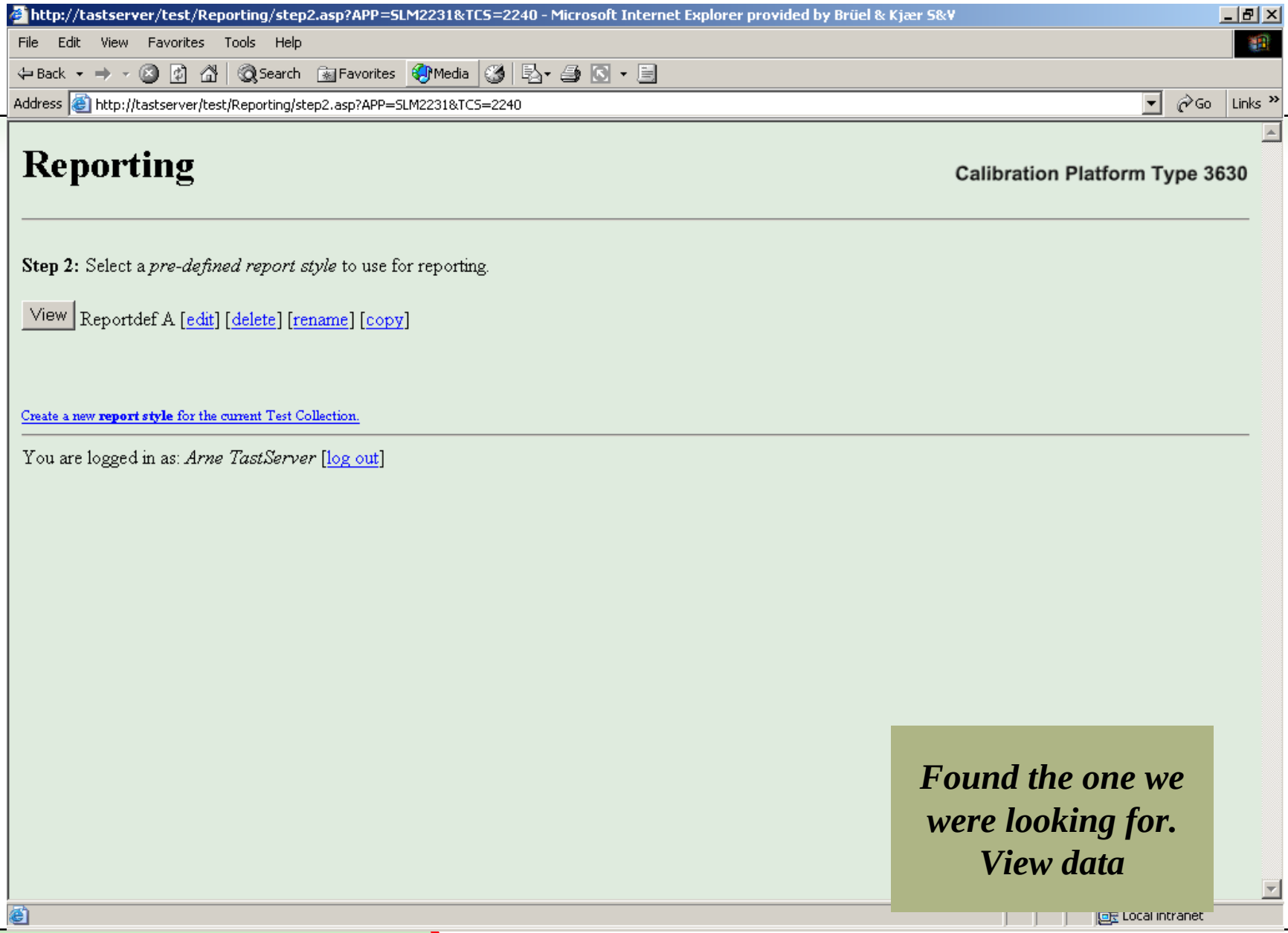


Selection criteria for test results displayed

Brüel & Kjær


Sound Level Meter Calibration Software Type 7763 - [Reporting] - SLM.xml - [Report]
File Edit View Tools Sequence Window Help
Tasks List
Measure
Measurement
Report
Reporting
CMW
CMW
Reporting
TAST Report Manager
You are logged in as Tast demo user on CMW CMW [log out]
Step 1: Select a job to report.
Sound Level Meter
View
Filter Data
DUT Type | Serial No. | Inventory No. | Customer | Procedure Name | Calibration Date | Issue Date | Certificate No. | JobNo | Complete | Passed | TCSID
2260-4189-BZ7210-V1.0 | B&K proc 2260-4189-BZ7210-V1 | 21-06-2005 14:50:15 | False | True | 4544
2260-4189-BZ7210-V1.0 | B&K proc 2260-4189-BZ7210-V1 | 21-06-2005 14:21:51 | 1010 | False | True | 4543
Filtered list
SEQStatus Stopmode Loopmode Progress TestStart SystemNr SerialNr NUM
Start
Microsoft PowerPoint - [3...
TAST110
Sound Level Meter Cal...
15:07

Brüel & Kjær


http://tastserver/test/Reporting/step2.asp?APP=SLM2231&TCS=2240 - Microsoft Internet Explorer provided by Brüel & Kjær S&V
File Edit View Favorites Tools Help
Back Search Favorites Media
Address http://tastserver/test/Reporting/step2.asp?APP=SLM2231&TCS=2240
Go Links
Reporting
Calibration Platform Type 3630
Step 2: Select a pre-defined report style to use for reporting.
View Reportdef A [edit] [delete] [rename] [copy]
Create a new report style for the current Test Collection.
You are logged in as: Arne TastServer [log out]
Found the one we were looking for. View data
Local intranet

Brüel & Kjær

http://tastserver/test/Reporting/report.asp?ID={4f31c415-6dc0-4231-b972-ecc1a30f4515} - Microsoft Internet Explorer provided by

File Edit View Favorites Tools Help

Back Search Favorites Media

Address http://tastserver/test/Reporting/report.asp?ID={4f31c415-6dc0-4231-b972-ecc1a30f4515} Go Links

CALIBRATION OF:

Sound Level Meter 2231 / BZ7100 No: 9876
Microphone: 4155 No: 1506367
Identification:
Date of receipt: 24-10-2001
Certificate No: 17

Report being generated in Explorer

CLIENT:

Brüel & Kjær A/s
Skodsborgvej 307
DK 2850 Nærum

Order No: 4711

CALIBRATION CONDITIONS:

Preconditioning:	12 hours at 23 °C		
Environment conditions	Air temperature:	24 °C	± 3°C
	Air pressure:	1005 kPa	± 3 kPa
	Relative Humidity:	55 %RH	± 20 %RH

SPECIFICATIONS:

The Sound Level Meter has been calibrated in accordance with the requirements as specified in IEC 651 and IEC 804 type 1234, and vendor specific procedures.

PROCEDURE:

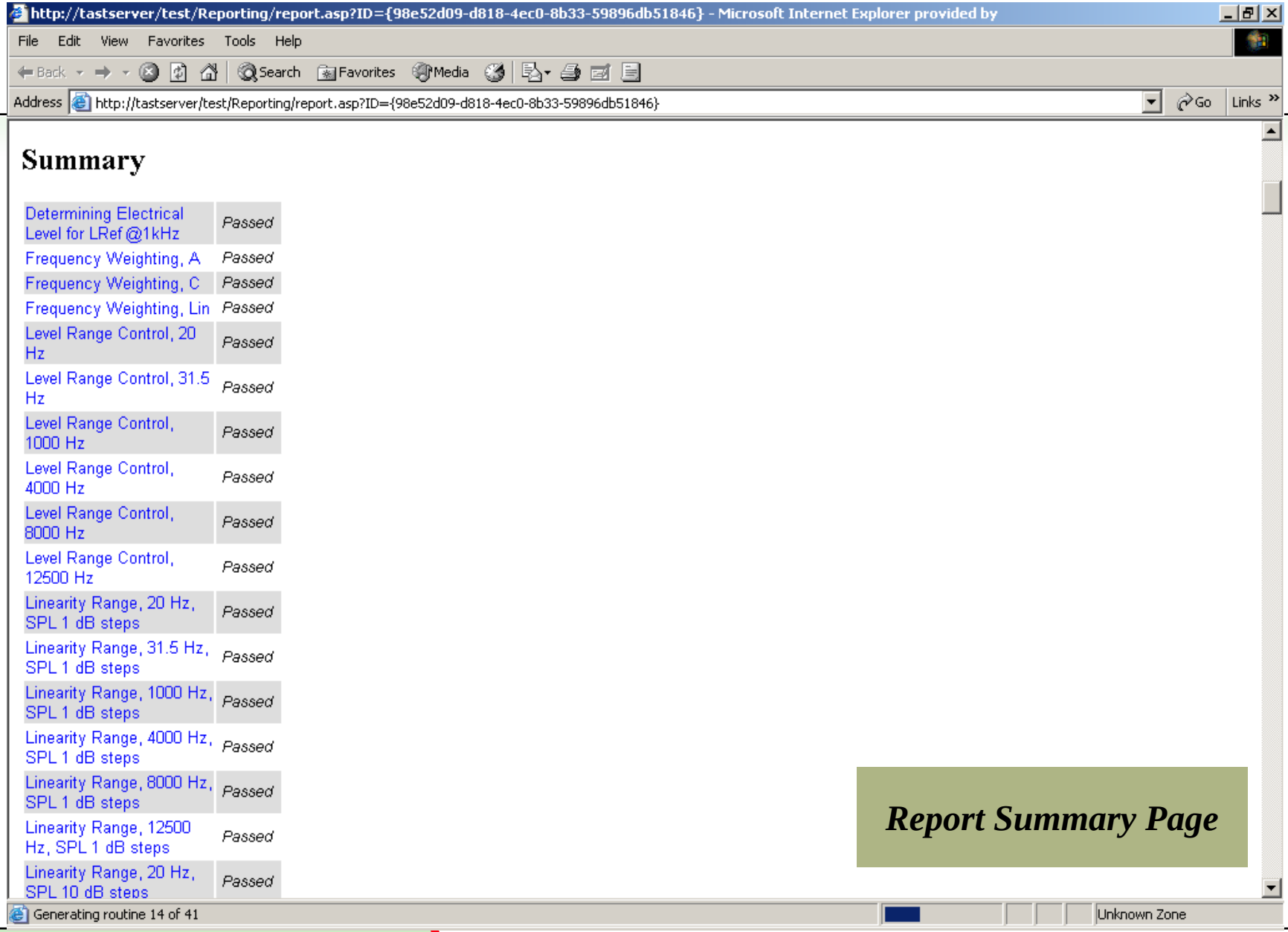
The measurements have been performed with the assistance of:
Brüel & Kjær's Sounds Level Meter Calibration System B&K 3630

RESULTS:

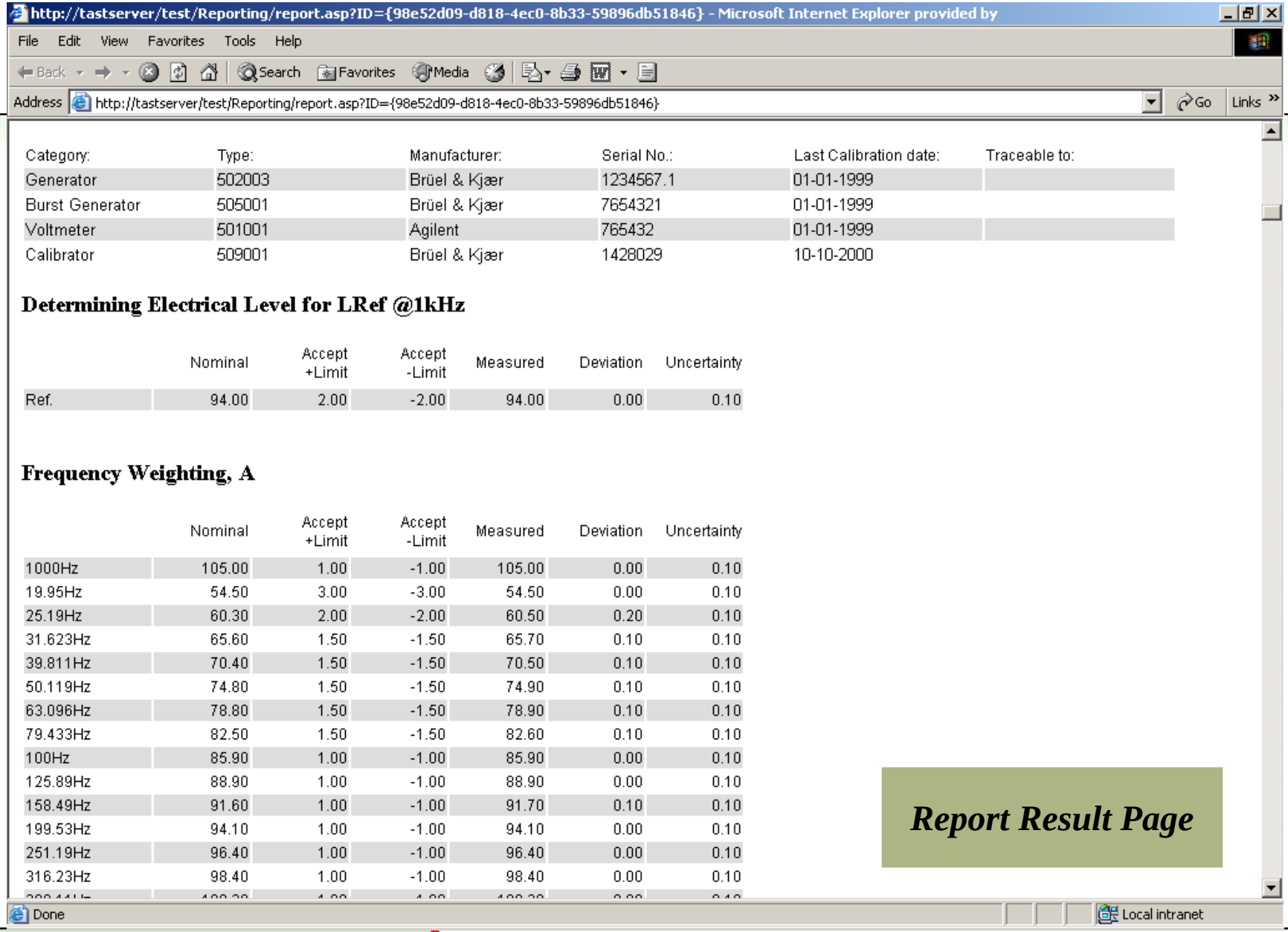
The reported expanded uncertainty is based on the standard uncertainty multiplied by a coverage factor k = 2 providing a level of confidence of approximately 95 %. The uncertainty evaluation has been carried out in accordance with EA-4/02 from elements originating from the standards, calibration method, effect of environmental conditions and any short time contribution from the device under calibration.

Done Local intranet

Brüel & Kjær


http://tastserver/test/Reporting/report.asp?ID={98e52d09-d818-4ec0-8b33-59896db51846} - Microsoft Internet Explorer provided by
File Edit View Favorites Tools Help
Back Search Favorites Media
Address http://tastserver/test/Reporting/report.asp?ID={98e52d09-d818-4ec0-8b33-59896db51846}
Go Links
Summary
Determining Electrical Level for LRef @1kHz Passed
Frequency Weighting, A Passed
Frequency Weighting, C Passed
Frequency Weighting, Lin Passed
Level Range Control, 20 Hz Passed
Level Range Control, 31.5 Hz Passed
Level Range Control, 1000 Hz Passed
Level Range Control, 4000 Hz Passed
Level Range Control, 8000 Hz Passed
Level Range Control, 12500 Hz Passed
Linearity Range, 20 Hz, SPL 1 dB steps Passed
Linearity Range, 31.5 Hz, SPL 1 dB steps Passed
Linearity Range, 1000 Hz, SPL 1 dB steps Passed
Linearity Range, 4000 Hz, SPL 1 dB steps Passed
Linearity Range, 8000 Hz, SPL 1 dB steps Passed
Linearity Range, 12500 Hz, SPL 1 dB steps Passed
Linearity Range, 20 Hz, SPL 10 dB steps Passed
Report Summary Page
Generating routine 14 of 41
Unknown Zone

Brüel & Kjær



Category:	Type:	Manufacturer:	Serial No.:	Last Calibration date:	Traceable to:
Generator	502003	Brüel & Kjær	1234567.1	01-01-1999	
Burst Generator	505001	Brüel & Kjær	7654321	01-01-1999	
Voltmeter	501001	Agilent	765432	01-01-1999	
Calibrator	509001	Brüel & Kjær	1428029	10-10-2000	

Determining Electrical Level for LRef @1kHz

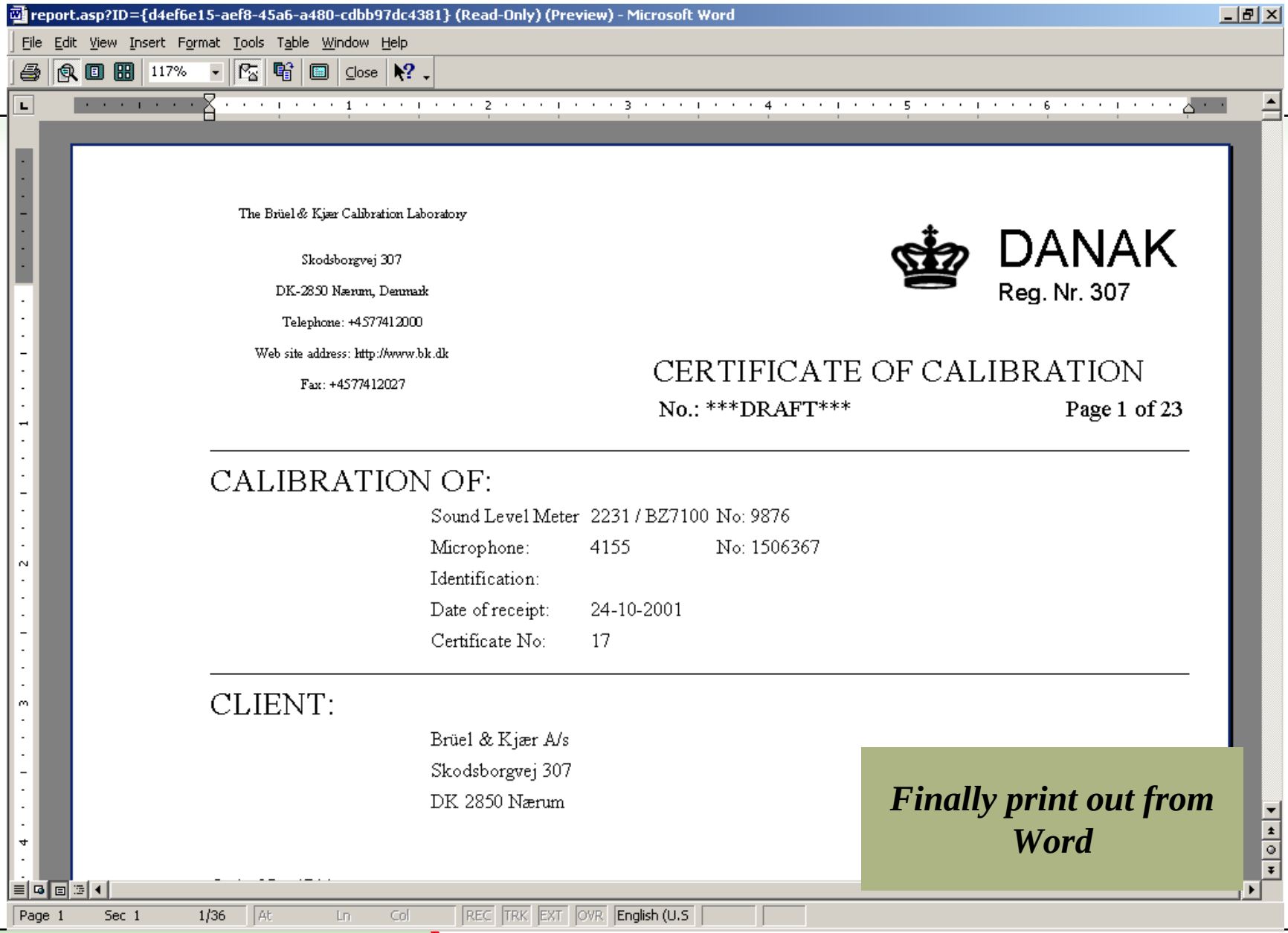
	Nominal	Accept +Limit	Accept -Limit	Measured	Deviation	Uncertainty
Ref.	94.00	2.00	-2.00	94.00	0.00	0.10

Frequency Weighting, A

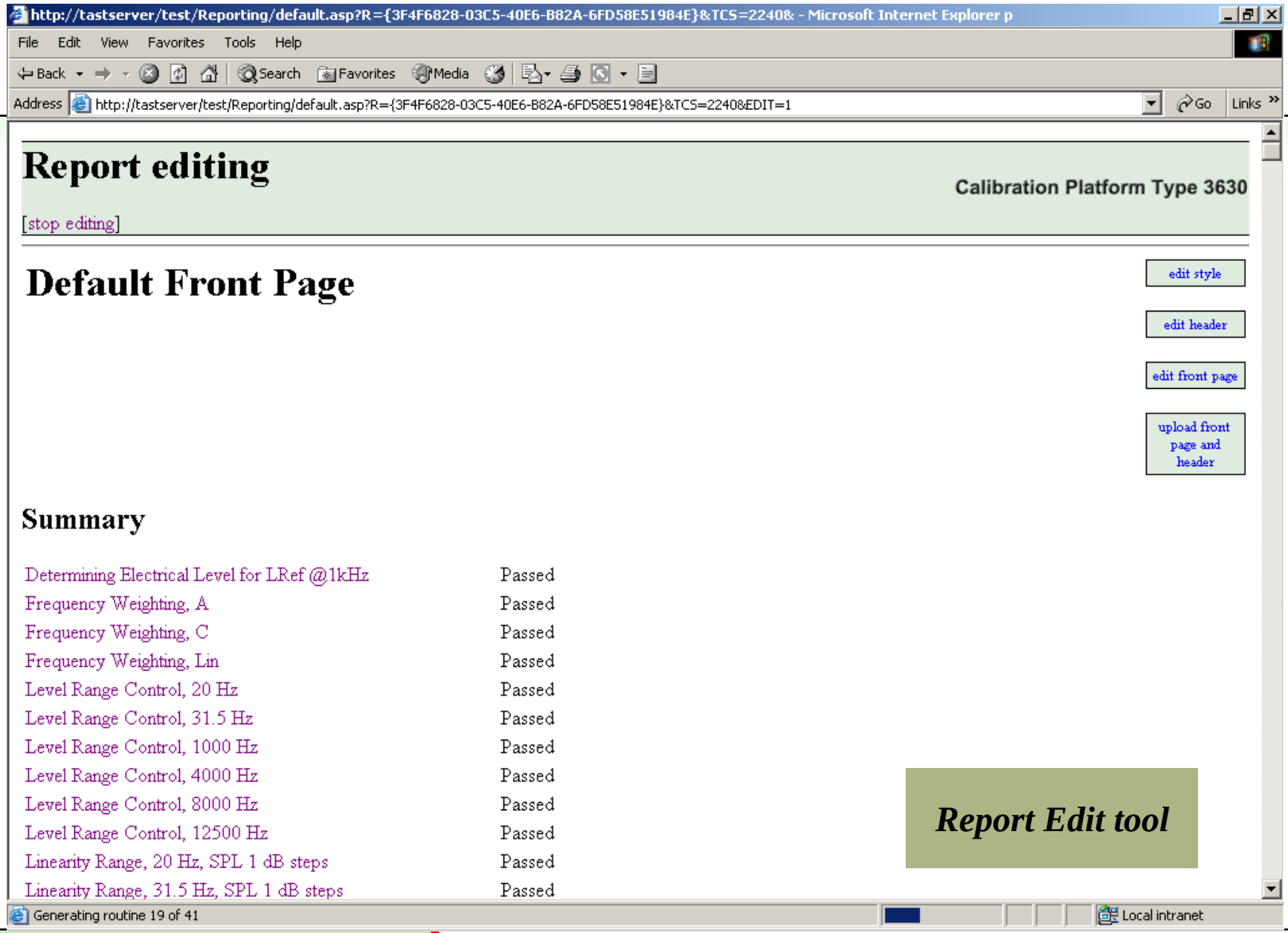
	Nominal	Accept +Limit	Accept -Limit	Measured	Deviation	Uncertainty
1000Hz	105.00	1.00	-1.00	105.00	0.00	0.10
19.95Hz	54.50	3.00	-3.00	54.50	0.00	0.10
25.19Hz	60.30	2.00	-2.00	60.50	0.20	0.10
31.623Hz	65.60	1.50	-1.50	65.70	0.10	0.10
39.811Hz	70.40	1.50	-1.50	70.50	0.10	0.10
50.119Hz	74.80	1.50	-1.50	74.90	0.10	0.10
63.096Hz	78.80	1.50	-1.50	78.90	0.10	0.10
79.433Hz	82.50	1.50	-1.50	82.60	0.10	0.10
100Hz	85.90	1.00	-1.00	85.90	0.00	0.10
125.89Hz	88.90	1.00	-1.00	88.90	0.00	0.10
158.49Hz	91.60	1.00	-1.00	91.70	0.10	0.10
199.53Hz	94.10	1.00	-1.00	94.10	0.00	0.10
251.19Hz	96.40	1.00	-1.00	96.40	0.00	0.10
316.23Hz	98.40	1.00	-1.00	98.40	0.00	0.10

Report Result Page

Brüel & Kjær

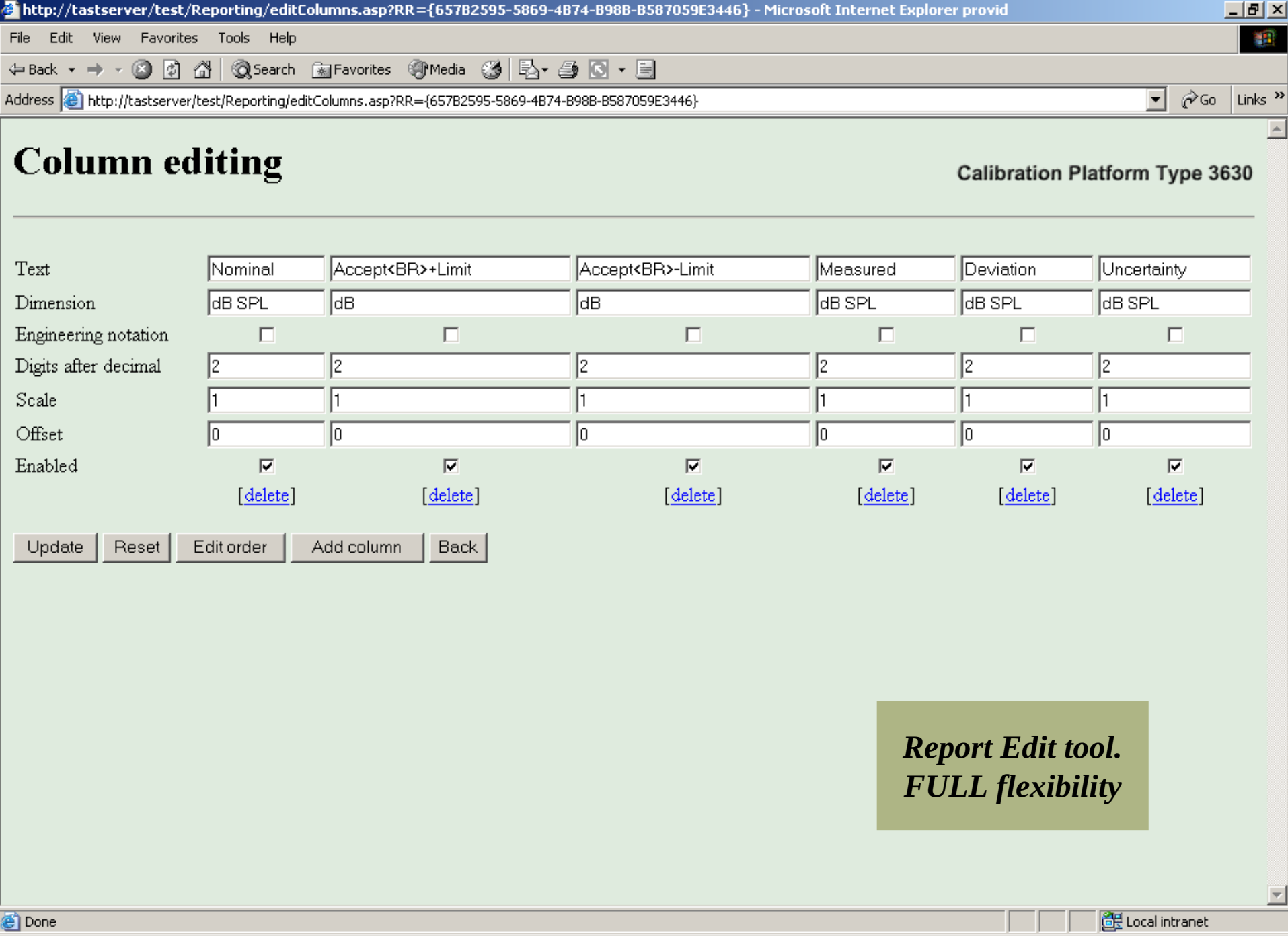

report.asp?ID={d4ef6e15-aef8-45a6-a480-cdbb97dc4381} (Read-Only) (Preview) - Microsoft Word
File Edit View Insert Format Tools Table Window Help
117%
Close
The Brüel & Kjær Calibration Laboratory
Skodsborgvej 307
DK-2850 Nærum, Denmark
Telephone: +4577412000
Web site address: http://www.bk.dk
Fax: +4577412027
DANAK
Reg. Nr. 307
CERTIFICATE OF CALIBRATION
No.: ***DRAFT***
Page 1 of 23
CALIBRATION OF:
Sound Level Meter 2231 / BZ7100 No: 9876
Microphone: 4155 No: 1506367
Identification:
Date of receipt: 24-10-2001
Certificate No: 17
CLIENT:
Brüel & Kjær A/s
Skodsborgvej 307
DK 2850 Nærum
Finally print out from Word
Page 1 Sec 1 1/36
English (U.S

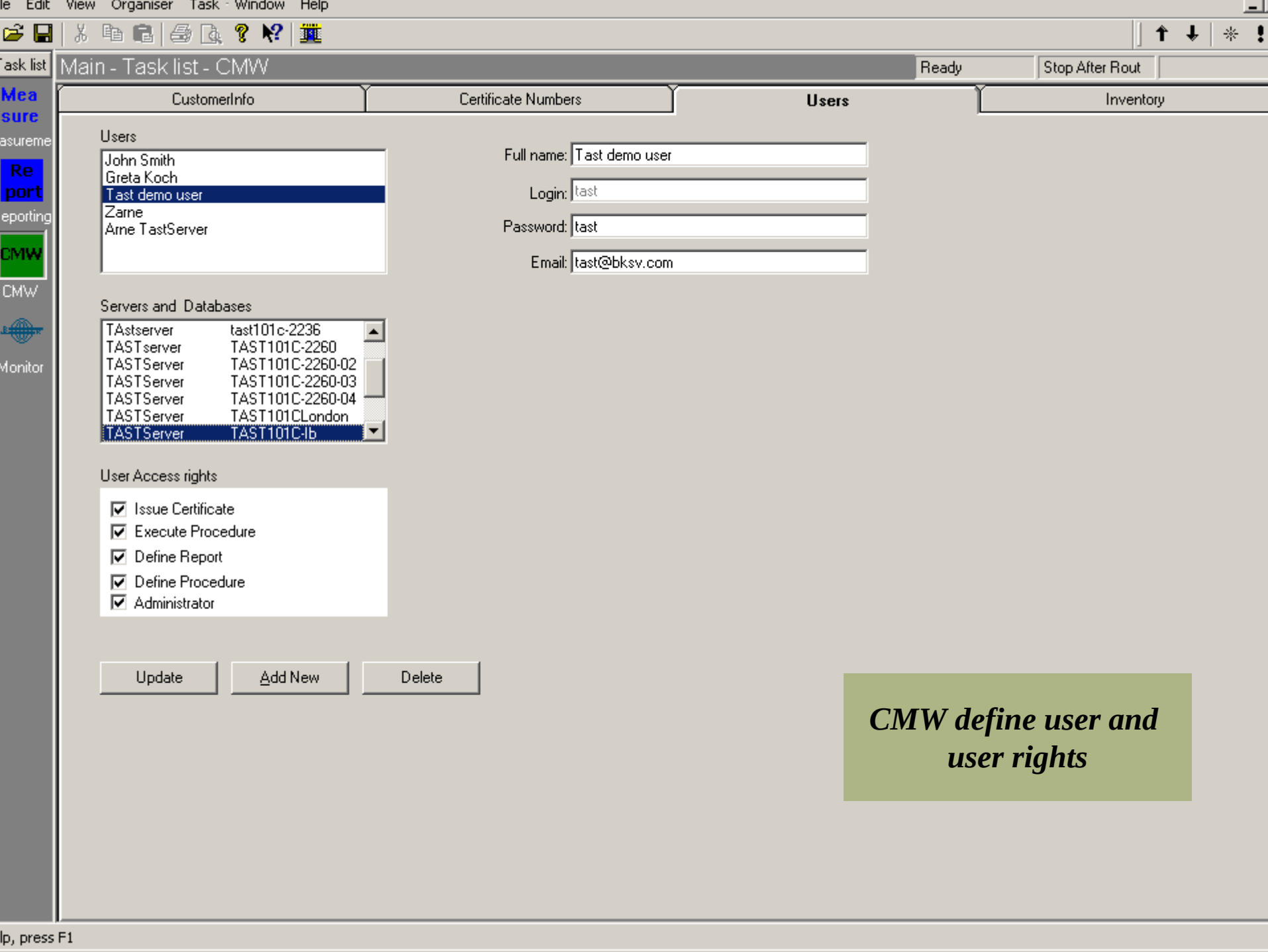
Brüel & Kjær

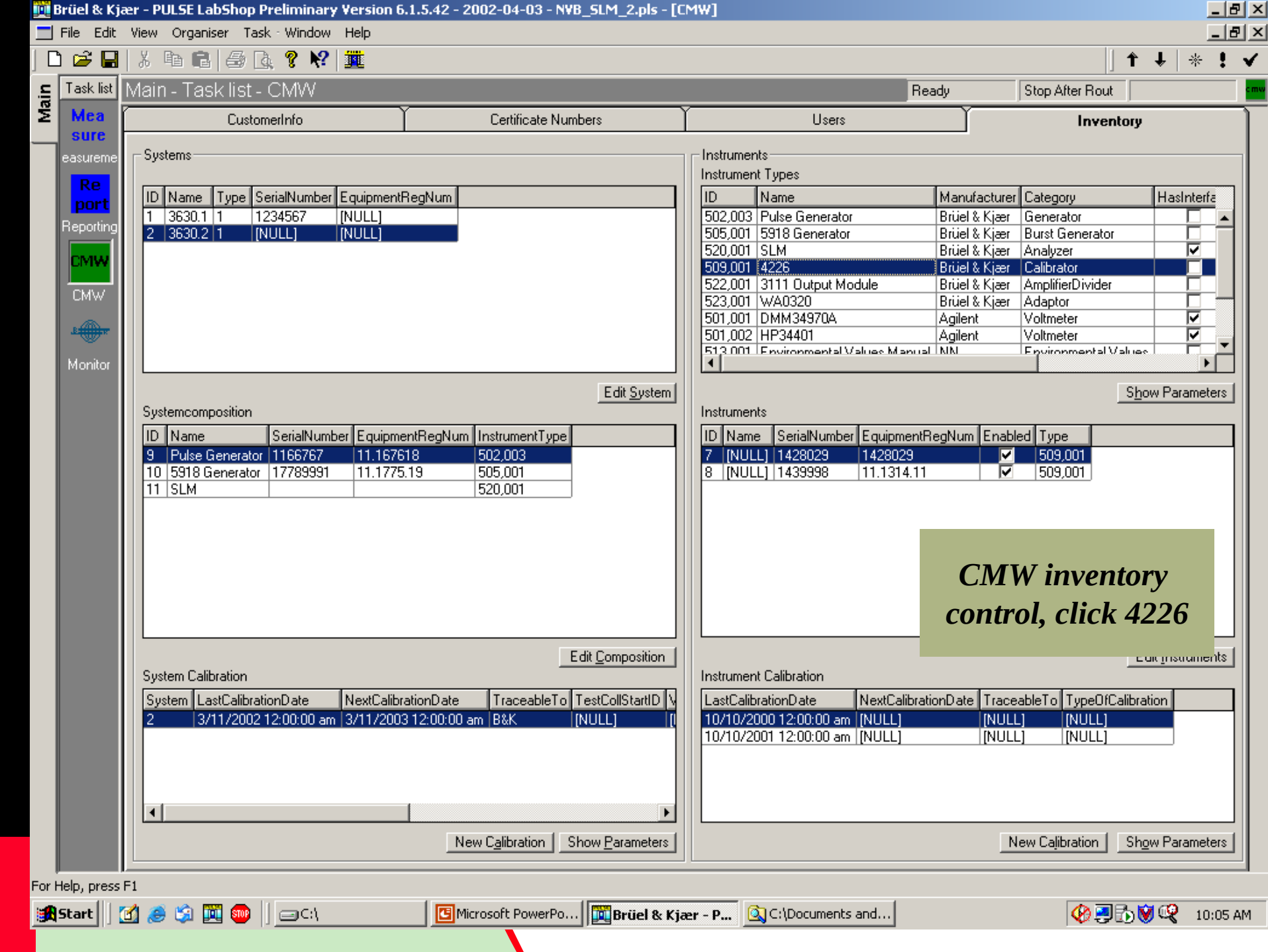


Report Edit tool

Brüel & Kjær


http://tastserver/test/Reporting/editColumns.asp?RR={657B2595-5869-4B74-B98B-B587059E3446} - Microsoft Internet Explorer provid
File Edit View Favorites Tools Help
Back Search Favorites Media
Address http://tastserver/test/Reporting/editColumns.asp?RR={657B2595-5869-4B74-B98B-B587059E3446}
Go Links
Column editing
Calibration Platform Type 3630
Text | Nominal | Accept
+Limit | Accept
-Limit | Measured | Deviation | Uncertainty
Dimension | dB SPL | dB | dB | dB SPL | dB SPL | dB SPL
Engineering notation
Digits after decimal | 2 | 2 | 2 | 2 | 2 | 2
Scale | 1 | 1 | 1 | 1 | 1 | 1
Offset | 0 | 0 | 0 | 0 | 0 | 0
Enabled
[delete] [delete] [delete] [delete] [delete] [delete]
Update Reset Edit order Add column Back
Report Edit tool.
FULL flexibility
Done
Local intranet


Edit View Organiser Task Window Help
Task list
Main - Task list - CMW
Ready
Stop After Rout
Measure
Report
CMW
CustomerInfo
Certificate Numbers
Users
Inventory
Users
John Smith
Greta Koch
Tast demo user
Zarne
Arne TastServer
Full name: Tast demo user
Login: tast
Password: tast
Email: tast@bksv.com
Servers and Databases
TAstserver tast101c-2236
TASTserver TAST101C-2260
TASTServer TAST101C-2260-02
TASTServer TAST101C-2260-03
TASTServer TAST101C-2260-04
TASTServer TAST101CLondon
TASTServer TAST101C-lb
User Access rights
Issue Certificate
Execute Procedure
Define Report
Define Procedure
Administrator
Update
Add New
Delete
CMW define user and user rights
lp, press F1


Brüel & Kjær - PULSE LabShop Preliminary Version 6.1.5.42 - 2002-04-03 - NVB_SLM_2.pls - [CMW]
File Edit View Organiser Task Window Help
Main
Task list
Measure
Reporting
CMW
Monitor
Main - Task list - CMW
Ready
Stop After Rout
CustomerInfo
Certificate Numbers
Users
Inventory
Systems
ID Name Type SerialNumber EquipmentRegNum
1 3630.1 1 1234567 [NULL]
2 3630.2 1 [NULL] [NULL]
Edit System
Systemcomposition
ID Name SerialNumber EquipmentRegNum InstrumentType
9 Pulse Generator 1166767 11.167618 502,003
10 5918 Generator 17789991 11.1775.19 505,001
11 SLM 520,001
Edit Composition
System Calibration
System LastCalibrationDate NextCalibrationDate TraceableTo TestCollStartID
2 3/11/2002 12:00:00 am 3/11/2003 12:00:00 am B&K [NULL]
New Calibration
Show Parameters
Instruments
Instrument Types
ID Name Manufacturer Category HasInterfa
502,003 Pulse Generator Brüel & Kjær Generator
505,001 5918 Generator Brüel & Kjær Burst Generator
520,001 SLM Brüel & Kjær Analyzer
509,001 4226 Brüel & Kjær Calibrator
522,001 3111 Output Module Brüel & Kjær AmplifierDivider
523,001 WA0320 Brüel & Kjær Adaptor
501,001 DMM34970A Agilent Voltmeter
501,002 HP34401 Agilent Voltmeter
Show Parameters
Instruments
ID Name SerialNumber EquipmentRegNum Enabled Type
7 [NULL] 1428029 1428029 509,001
8 [NULL] 1439998 11.1314.11 509,001
CMW inventory control, click 4226
Instrument Calibration
LastCalibrationDate NextCalibrationDate TraceableTo TypeOfCalibration
10/10/2000 12:00:00 am [NULL] [NULL] [NULL]
10/10/2001 12:00:00 am [NULL] [NULL] [NULL]
New Calibration
Show Parameters
For Help, press F1
Start
C:\
Microsoft PowerPo...
Brüel & Kjær - P...
C:\Documents and...
10:05 AM

Parameters

4226 Calibration Values | 4226 Microphone Correction Values

Select B&K 4226

	ID	Name	SerialNumber	EquipmentRegNum	Enabled	Type
1	7	[NULL]	1428029	1428029	☑	509,001
2	8	[NULL]	1439998	11.1314.11	☑	509,001

Date of Calibration:

Text1

10/10/2001 12:00:00 am

94 db Values

	Freq.	Cal. SPL	Cal. Unc.
1	10.00	94.00	0.10
2	12.58	94.00	0.10
3	15.84	94.00	0.10
4	19.95	94.00	0.10
5	25.19	94.00	0.10
6	31.62	94.00	0.10
7	39.81	94.00	0.10
8	50.12	94.00	0.10
9	63.10	94.00	0.10
10	79.43	94.00	0.10
11	100.00	94.00	0.10
12	125.89	94.00	0.10
13	158.49	94.00	0.10

104 db Values

	Freq.	Cal. SPL	Cal. Unc.
1	10.00	104.00	0.10
2	12.58	104.00	0.10
3	15.84	104.00	0.10
4	19.95	104.00	0.10
5	25.19	104.00	0.10
6	31.62	104.00	0.10
7	39.81	104.00	0.10
8	50.12	104.00	0.10
9	63.10	104.00	0.10
10	79.43	104.00	0.10
11	100.00	104.00	0.10
12	125.89	104.00	0.10
13	158.49	104.00	0.10
14	199.53	104.00	0.10

114 db Values

	Freq.	Cal. SPL	Cal. Unc.
1	10.00	114.00	0.10
2	12.58	114.00	0.10
3	15.84	114.00	0.10
4	19.95	114.00	0.10
5	25.19	114.00	0.10
6	31.62	114.00	0.10
7	39.81	114.00	0.10
8	50.12	114.00	0.10
9	63.10	114.00	0.10
10	79.43	114.00	0.10
11	100.00	114.00	0.10
12	125.89	114.00	0.10
13	158.49	114.00	0.10
14	199.53	114.00	0.10

OK | Cancel | Apply

4226 cal. data

Start | C:\ | Microsoft PowerPo... | Brüel & Kjær - P... | C:\Documents and... | 10:06 AM

Summary

- SLM calibration to international standards
- Automatic or semi automatic calibration
- Calibration Certificate and comprehensive test report easy to adopt to local requirements
- Combination of electrical and acoustical measurements for faster cost effective calibration
- Traceability to national or international standards
- Uncertainty budgets to EA 4/02
- Will be accepted by accreditation bodies in several countries
- Uses standard hardware (PULSE) easy to maintain

Features Advantages and Benefits

Feature	Advantage	Customer Benefit
Windows Interface	Ease of use	Reduced training cost, flexibility
Modularity	Buy (and pay) only what you need	Cost effective, flexibility
Integration in MS Office	Easy reporting	Cost savings, data format compatibility
Tailored at s&v	Accurate measurements	Reduces error cost, Competitive edge
Automated cal.	Fast calibration	Cost savings, no operator errors
Conforms with standards	Avoid discussions	Cost savings, confidence
PULSE based	Standard product, lots of functionality	Protection of investment, flexibility