

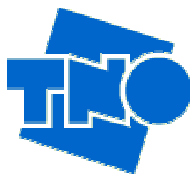


**TESTREPORT CONCERNING THE COMPLIANCE OF
A PROGRAM READING UNIT FOR USE AT
ELECTIONS IN IRELAND, BRAND NEDAP,
MODEL ESI 1, IN ACCORDANCE WITH THE
STANDARDS EN 50082-2: 1995 AND EN 55022: 1998
(EMISSION AND IMMUNITY) AND PARTS OF THE
STANDARDS IEC 60068-2 AND IEC 60839-1-3**

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Description of EUT: Program Reading Unit for use at elections in Ireland
Manufacturer: N.V. Nederlandsche Apparatenfabriek NEDAP
Brand mark: NEDAP
Model: ESI 1
Serial number(s): R9E00073 and R9E00075

Description of test item

Test item : Program Reading Unit for use at elections in Ireland
Manufacturer : N.V. Nederlandsche Apparatenfabriek NEDAP
Brand mark : NEDAP
Model : ESI 1
Serial number(s) : R9E00073 and R9E00075 (for vibration testing)
Receipt number : 1
Receipt date : September 22, 2003

Applicant information

Applicant's representative : Mr. J.A.M. Hulshof
Company : N.V. Nederlandsche Apparatenfabriek NEDAP
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City : Groenlo
PO-box : 6
Postal code : 7141 AA
City : Groenlo
Country : The Netherlands
Telephone number : + 31 (0)544 471111
Telefax number : + 31 (0)544 463475
Order number : 03K1065

Test performed

Location : Niekerk
Test(s) started : September 22, 2003
Test(s) completed : October 24, 2003
Purpose of test(s) : Compliance with relevant Standards
Test specification(s) : EN 50082-1: 1997, EN 55022: 1998, parts of IEC 60068-2, IEC 60839-1

Test engineer : A.W. Kars

Projectleader : A.W. Kars

Report written by : A.W. Kars

Report approved by : P. de Beer

Report date : October 28, 2003

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The test results relate only to the item(s) tested.



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1 General.

1.1 Applied standards.

The Program Reading Unit for use at elections in Ireland, brand NEDAP, type ESI 1, has been tested for emission and immunity in accordance with the standards EN 50082-1: 1997 and EN 55022: 1998; has been electrical, mechanical and temperature tested in accordance with parts of the standards IEC 60068-2 and IEC 60839-1-3

1.2 Detailed description of test configuration, input and output ports.

The Program Reading Unit for use at elections in Ireland, brand NEDAP, type ESI 1, in the configuration as described below, will be referred to as EUT for the purpose of this testreport.

1.2.1 Description of test configuration.

Test item : Program Reading Unit for use at elections in Ireland
Manufacturer : N.V. Nederlandsche Apparatenfabriek NEDAP
Brand : NEDAP
Type : ESI 1
Serial number : R9E00073 and R9E00075 (for vibration)
Voltage input rating : 230 V AC
Remarks : --

1.2.2 Description of input and output ports.

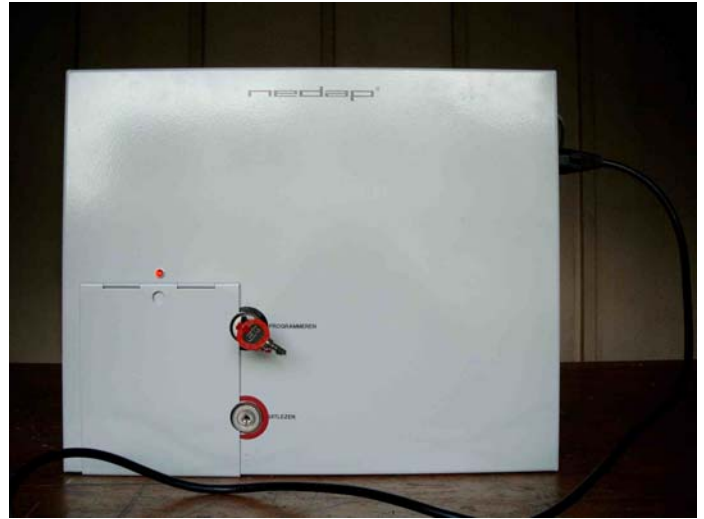
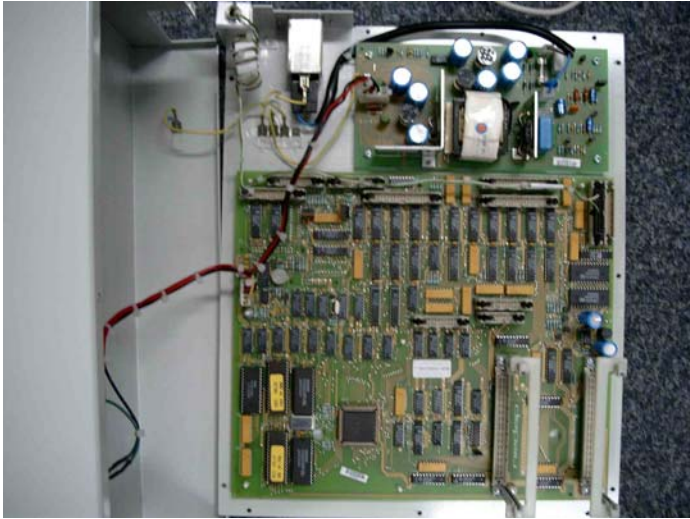
| Number | Terminal | From | To | Remarks |
|--------|----------------------------|---------------------------|-----|---------------|
| 1 | Mains power supply | Mains terminal | EUT | None < 2 m |
| 2 | Polling Staff control unit | Polling Staff Control box | EUT | |

Table 1



Description of EUT: Program Reading Unit for use at elections in Ireland
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1.2.3 Photograph of the EUT.



1.3 Test conditions.

1.3.1 Environmental conditions.

During all tests the environmental conditions were the following:

- Temperature : 15 - 22 °C
- Relative humidity : 37 - 58 %

1.3.2 Operation mode(s).

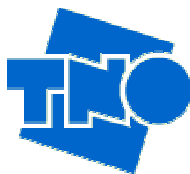
During all tests the EUT was set up to function according to the manufacturer's instructions and powered as necessary to the standard requirements where specified.



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2 Emission.

The EUT has been tested in conformity with the standard EN 55022: 1998 (conducted and radiated fieldstrength measurements concerning the emission of radiated and conducted electromagnetic disturbances).



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2.1 Enclosure.

2.1.1 Radiated electric fieldstrength measurements.

The radiated field strength levels (electric component) have been measured in conformity with- and according to the criteria as stated below. Maximum levels recorded

| | | |
|--------------------|---|--------------------|
| Basic standard | : | EN 55022, CISPR 16 |
| Test set-up | : | EN 55022, CISPR 16 |
| Measuring distance | : | 10 metres |
| Frequency range 1 | : | 30 MHz - 230 MHz |
| Limits | : | 30 dB(μ V/m) |
| Frequency range 2 | : | 230 MHz - 1000 MHz |
| Limits | : | 37 dB(μ V/m) |

Detailed results of the measurements concerning radiated field strength levels (electric component), emitted by the EUT, are depicted in table 1 on the next page of this testreport.

| | |
|---|--|
| Result of the measurements concerning radiated electromagnetic fields (electric component) emitted by the EUT (enclosure) | PASS / FAIL / NOT APPLICABLE |
| Name of test engineer: | A.W. Kars |
| Signature: |  |
| Date: | October 13, 2003 |
| REMARKS: | NONE |

Utilized test equipment:

| Inventory number | Description | Brand | Type |
|------------------|-----------------------------------|-----------------|----------|
| 12636 | Plastic measurement room | Polyforce | - |
| 13886 | Open Area Test Site | Comtest | - |
| 14277 | Antennamast 4m | Heinrich Deisel | MA240 |
| 14278 | Controller OATS | Heinrich Deisel | HD100 |
| 15633 | Biconilog antenna 30MHz – 1000MHz | Chase | CBL6111B |
| 15667 | EMI test receiver | Rohde & Schwarz | ESCS 30 |
| 99108 | Turntable OATS | Heinrich Deisel | HD050 |

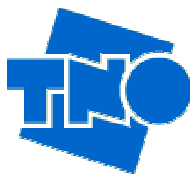


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Serial number(s): R9E00073 and R9E00075

| Frequency (MHz) | Measurement results dB(μ V)/m @ 10 metres Quasi-peak | | Limits dB(μ V)/m @ 10 metres Quasi-peak | Result |
|--------------------|---|------------|--|--------|
| | Vertical | Horizontal | | |
| 30.0 – 230.0 | < 18.0 | < 15.0 | 30.0 | PASS |
| 230.0 – 1000.0 | < 15.0 | < 15.0 | 37.0 | PASS |

Table 1

The results of the measurements, carried out in conformity with the standard EN 55022:1998, concerning radiated field strength levels (electric component), emitted by the EUT in the configuration and operation mode(s) as stated in this testreport, are depicted in table 1.




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2.1.2 Conductive disturbances Power Supply Line.

The disturbance voltage levels at the power supply lines of the EUT's power supply to be measured in conformity with- and according to the criteria as stated below.

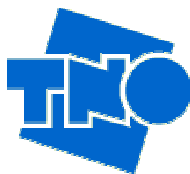
| | | |
|-------------------|---|---|
| Basic standard | : | EN 55022 and CISPR 16 |
| Test set-up | : | EN 55022 and CISPR 16 |
| Frequency range 1 | : | 0.15 MHz – 0.5 MHz |
| Limit | : | 66.0 – 56.0 dB(μ V) quasi peak, 56.0 - 46.0 dB(μ V) average |
| Frequency range 2 | : | 0.5 – 5.0 MHz |
| Limit | : | 56.0 dB(μ V) quasi peak, 46.0 dB(μ V) average |
| Frequency range 2 | : | 5.0 - 30 MHz |
| Limit | : | 60.0 dB(μ V) quasi peak, 50.0 dB(μ V) average |

Detailed results of the measurements concerning conducted disturbances, emitted by the EUT, are depicted in table 2 and 3 on the next page of this testreport.

| | |
|---|--|
| Result of the measurements concerning the emission of disturbance voltage levels at the ab in/output ports of the EUT | PASS / FAIL / NOT APPLICABLE |
| Name of test engineer: | A.W. Kars |
| Signature: |  |
| Date: | October 21, 2003 |
| REMARKS: | NONE |

Utilized test equipment:

| Inventory number | Description | Brand | Type |
|------------------|----------------------------------|-----------------|---------------|
| 12507 | Artificial mains network 3-phase | Rohde & Schwarz | ESH2-Z5 |
| 13313 | Impulse limiter | Rohde & Schwarz | ESH3Z2.357... |
| 15667 | EMI test receiver | Rohde & Schwarz | ESCS 30 |



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Model: ESI 1
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| Frequency (MHz) | Measured values Quasi Peak | | Limits |
|--------------------|----------------------------|-------------------|----------------------|
| | Line (dBµV) | Neutral (dBµV) | Quasi Peak (dBµV) |
| 0.171 | 27.1 | 27.1 | 65.0 |
| 0.205 | 24.2 | 24.1 | 64.0 |
| 0.195 – 3.76 | < 30.0 | < 30.0 | 64.0 – 57.0 |
| 4.79 | 43.5 | 43.4 | 57.0 |
| 7.79 | 38.3 | 38.0 | 60.0 |
| 9.88 | 45.4 | 45.6 | 60.0 |

Table 2

The results of the disturbance voltage level measurements, carried out in conformity with the standards EN 55022: 1998, at the mains power supply line of the EUT, in the configuration and operation mode(s) as stated in this testreport, are depicted in table 2.

| Frequency (MHz) | Measured values Average | | Limits |
|--------------------|-------------------------|-------------------|----------------------|
| | Line (dBµV) | Neutral (dBµV) | Quasi Peak (dBµV) |
| 0.171 | 20.0 | 19.5 | 55.0 |
| 0.205 | 22.3 | 22.3 | 54.0 |
| 0.195 – 3.76 | < 28.0 | < 28.0 | 54.0 – 47.0 |
| 4.79 | 43.5 | 43.7 | 47.0 |
| 7.79 | 37.8 | 37.5 | 50.0 |
| 9.88 | 44.1 | 43.4 | 50.0 |

Table 3

The results of the disturbance voltage level measurements, carried out in conformity with the standards EN 55022: 1998, at the mains power supply line of the EUT, in the configuration and operation mode(s) as stated in this testreport, are depicted in table 3.



3 Immunity.

The EUT has been tested in conformity with the immunity standards EN 50082-1: 1997 concerning the susceptibility to continuous and transient, conducted and radiated disturbances including electrostatic discharges.

3.1 Performance criteria.

The general principles (performance criteria) for the evaluation of the immunity test results are the following.

3.1.1 Performance criterion A.

During testing, normal performance within the specification limits

3.1.2 Performance criterion B.

During testing, temporary degradation, or loss of function or performance which is self recovering

3.1.3 Performance criterion C

During testing, temporary degradation, or loss of function or performance which requires operator intervention or system reset occurs

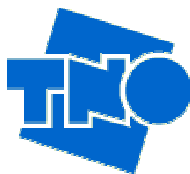
3.1.4 Performance criterion D

Degradation or loss of function which is not recoverable due to damage to equipment, components, software, or to loss of data

For performance criteria B and C, the EUT has passed the tests if it has shown its specified immunity throughout the period of application of the test signal and, at the end of the tests, the EUT fulfils the functional requirements established in the technical product specification. The performance. criteria D is normally not acceptable.

Because it is not possible to state only one performance criteria for each phenomenon, the following guidance is given:

- check the function normally fulfilled by certain equipment;
- the function of the device in relation to the phenomenon determines the performance criteria.




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3.2 Enclosure port.

3.2.1 Radio-frequency electromagnetic field. Amplitude modulated

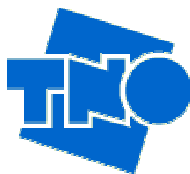
The susceptibility of the EUT to radio-frequency electromagnetic fields has been tested in conformity with-and according to the criteria as stated below.

Basic standard : IEC 61000-4-3
 Test set-up : IEC 61000-4-3
 Frequency range : 80 MHz - 1000 MHz
 Field strength level : 3 V_{rms}/m (selected without modulation, applied with modulation)
 Modulation : 1 kHz, modulation depth 80%
 Performance criterion : A

| | |
|--|--|
| Result of the tests concerning the susceptibility of the EUT to radio-frequency electromagnetic fields (amplitude modulated, enclosure port) | PASS / FAIL / NOT APPLICABLE |
| Name of test engineer: | A.W. Kars |
| Signature: |  |
| Date: | October 17, 2003 |
| REMARKS: | NONE |

Utilized test equipment:

| Inventory number | Description | Brand | Type |
|------------------|--------------------------------------|---------------------|------------|
| 12441 | Tripod | EMCO | TR3 |
| 12520 | Function generator | Tabor Electronics | 8241 |
| 14051 | Compact anechoic room | Euroshield/ Comtest | RFSD-F-100 |
| 14298 | Amplifier 0.01 MHz-220 MHz | SPS/Comtech | SPS7010 |
| 14307 | Amplifier 200 MHz-1000 MHz | SPS/Comtech | SPS8030 |
| 14351 | Biconilog antenna 20 MHz-1100 MHz | EMCO | 3143 |
| 15392 | Signalgenerator 0.1 MHz-2048 MHz | Rohde & Schwarz | SMY02 |
| 99107 | Turntable anechoic room + controller | Heinrich Deisel | HD050 |




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3.2.2 Electrostatic discharge.

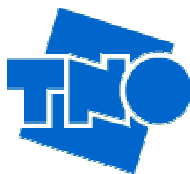
The susceptibility of the EUT to electrostatic discharges has been tested in conformity with- and according to the criteria as stated below.

Basic standard : IEC 61000-4-2
Test set-up : IEC 61000-4-2
Test levels : ± 4 kV, ± 8 kV and 16 kV air discharge
 ± 2 kV, ± 4 kV, ± 6 kV and ± 8 kV contact discharge
Performance criterion : B

| | |
|---|---|
| Result of the tests concerning the susceptibility of the EUT to electrostatic discharges (enclosure port) | PASS / FAIL / NOT APPLICABLE |
| Name of test engineer: | A.W. Kars |
| Signature: |  |
| Date: | October 16, 2003 |
| REMARKS: | None |

Utilized test equipment:

| Inventory number | Description | Brand | Type |
|------------------|----------------------|-----------|------------|
| 99002 | ESD simulator system | Schaffner | NSG 435-01 |



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Model: ESI 1
Serial number(s): R9E00073 and R9E00075


3.3 DC input and DC output ports.

3.3.1 Radio-frequency (common mode). Amplitude modulated.

The susceptibility of the EUT to radio-frequency (common mode)¹⁾, amplitude modulated, to be tested in conformity with- and according to the criteria as stated below.

Basic standard : IEC 61000-4-6
Test set-up : IEC 61000-4-6
Frequency range : 0.15 MHz - 80 MHz
Test level : 3 V_{rms} (selected without modulation, applied with modulation)
Modulation : 1 kHz, modulation depth 80%
Source impedance : 150 Ohms
Performance criterion : not applicable

Note¹⁾ : Conducted only on ports interfacing with cables whose total length, according to the manufacturer's functional specification, may exceed 3 metres

| | |
|--|--|
| Result of the tests concerning the susceptibility of the EUT to radio-frequency (common mode, amplitude modulated, DC input and DC output ports) | PASS/ FAIL/ NOT TESTED |
| Name of test engineer: | A.W. Kars |
| Signature: |  |
| Date: | October 28, 2003 |
| REMARKS: No cables to be connected longer than 3 m | |




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Model: ESI 1
Serial number(s): R9E00073 and R9E00075

3.3.2 Surges.

The susceptibility of the EUT to surges¹⁾ to be tested in conformity with- and according to the criteria as stated below.

Basic standard : IEC 61000-4-5
Test set-up : IEC 61000-4-5
Test level 1 : ± 0.5 kV, ± 1.0 kV and ± 2.0 kV (line to earth)
Test level 2 : ± 0.5 kV and ± 1.0 kV (line to line)
Tr/Th : 1.2/50 (8/20) μ s
Number of pulses : 5
Performance criterion : not applicable

Note¹⁾ : Applicable only to input ports

| | |
|---|---|
| Result of the tests concerning the susceptibility of the EUT to surges (DC input and DC output power ports) | PASS / FAIL / NOT TESTED |
| Name of test engineer: | A.W. Kars |
| Signature: |  |
| Date: | October 28, 2003 |
| REMARKS: | |
| Surges only to ac input port | |




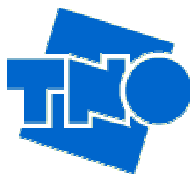
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Serial number(s): R9E00073 and R9E00075

3.3.3 Fast transients (common mode).

The susceptibility of the EUT to fast transients (common mode) to be tested in conformity with-and according to the criteria as stated below.

Basic standard : IEC 61000-4-4
Test set-up : IEC 61000-4-4
Test level : ± 1 kV and ± 2 kV
Tr/Th : 5/50 ns
Repetition frequency : 5 kHz
Performance criterion : not applicable

| | |
|---|---|
| Result of the tests concerning the susceptibility of the EUT to fast transients (common mode, DC input and DC output power ports) | PASS / FAIL / NOT TESTED |
| Name of test engineer: | A.W. Kars |
| Signature: |  |
| Date: | October 28, 2003 |
| REMARKS: No cables to be connected longer than 3 m | |




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 Model: ESI 1
 Serial number(s): R9E00073 and R9E00075

3.4 AC input and AC output power ports.

3.4.1 Radio-frequency (common mode). Amplitude modulated.

The susceptibility of the EUT to radio-frequency (common mode), amplitude modulated, has been tested in conformity with and according to the criteria as stated below.

Basic standard : IEC 61000-4-6
 Test set-up : IEC 61000-4-6
 Frequency range : 0.15 MHz - 80 MHz
 Test level : 3 V_{rms} (selected without modulation, applied with modulation)
 Modulation : 1 kHz, modulation depth 80%
 Source impedance : 150 Ohms
 Performance criterion : A

| | |
|--|--|
| Result of the tests concerning the susceptibility of the EUT to radio-frequency (common mode, amplitude modulated, AC input and AC output power ports) | PASS / FAIL / NOT APPLICABLE |
| Name of test engineer: | A.W. Kars |
| Signature: |  |
| Date: | October 16, 2003 |
| REMARKS: | NONE |

Utilized test equipment:

| Inventory number | Description | Brand | Type |
|------------------|-----------------------------------|-----------------|---------|
| 12527 | Signal generator 0.1 MHz-1000 MHz | Rohde & Schwarz | SMG |
| 14298 | Amplifier 0.01 MHz-220 MHz | SPS/Comtech | SPS7010 |
| 14307 | Amplifier 200 MHz-1000 MHz | SPS/Comtech | SPS8030 |
| 39420 | RF current injection clamp | Lüthi | EM101 |
| 59601/x | CDN coupling devices | Air Parts | Mx |
| 99039 | Attenuator 25W/6 dB, DC-8 GHz | Lucas Weinschel | 33-6-34 |




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3.4.2 Surges.

The susceptibility of the EUT to surges¹⁾ has been tested in conformity with- and according to the criteria as stated below.

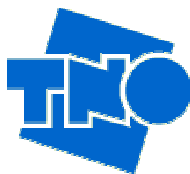
Basic standard : IEC 61000-4-5
 Test set-up : IEC 61000-4-5
 Test level 1 : ±1 kV, ±2.0 kV and ±4.0 kV (line to earth)
 Test level 2 : ±1 kV and ±2.0 kV (line to line)
 Tr/Th : 1.2/50 (8/20) µs
 Number of pulses : 5
 Performance criterion : B

Note¹⁾ : Applicable only to input ports

| | |
|---|--|
| Result of the tests concerning the susceptibility of the EUT to surges (AC input and AC output power ports) | PASS / FAIL / NOT APPLICABLE |
| Name of test engineer: | A.W. Kars |
| Signature: |  |
| Date: | October 20, 2003 |
| REMARKS: NONE | |

Utilized test equipment:

| Inventory number | Description | Brand | Type |
|------------------|---------------------------------------|-----------|----------|
| 15108 | Surge simulator syst. mainframe 25A | Schaffner | NSG 2050 |
| 15111 | Pulse network 1.2/50 µs 6.6 kV 3.3 kA | Schaffner | PNW 2050 |
| 99004 | 3-phase coupling network 25A | Schaffner | CDN 133 |
| 99006 | 1-phase Schuko coupling adapter 16A | Schaffner | INA 252 |
| 99008 | Blind cover | Schaffner | - |
| 99010 | 3-phase IEC 309 coupling adapter 32A | Schaffner | INA 250 |
| 99029 | Software control package | Schaffner | WIN 2050 |




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Model: ESI 1
Serial number(s): R9E00073 and R9E00075

3.4.3 Fast transients (common mode).

The susceptibility of the EUT to fast transients (common mode) has been tested in conformity with- and according to the criteria as stated below.

Basic standard : IEC 61000-4-4
 Test set-up : IEC 61000-4-4
 Test level : ± 1 kV and ± 2 kV
 Tr/Th : 5/50 ns
 Repetition frequency : 5 kHz
 Performance criterion : B

| | |
|---|---|
| Result of the tests concerning the susceptibility of the EUT to fast transients (common mode, AC input and AC output power ports) | PASS / FAIL / NOT APPLICABLE |
| Name of test engineer: | A.W. Kars |
| Signature: |  |
| Date: | October 20, 2003 |
| REMARKS: | |
| NONE | |

Utilized test equipment:

| Inventory number | Description | Brand | Type |
|------------------|---|-----------|------------|
| 15110 | Three phase burst simulator system | Schaffner | NSG 2025-4 |
| 99001 | IEC 1000-4-4 capacitive coupling clamp | Schaffner | CDN 126 |
| 99005 | 3-phase IEC 309 coupling adapter 32A | Schaffner | INA 250 |
| 99006 | 1-phase Schuko coupling adapter 16A | Schaffner | INA 252 |
| 99007 | Blind cover | Schaffner | - |
| 99014 | Attenuator 30 dB for burst verification | Schaffner | INA 265 |
| 99015 | Software control package | Schaffner | WIN 2025 |



4 Electrical, mechanical and temperature test results

| TEST | CONDITIONS | STANDARD | CRITERIA | RESULT |
|--|--|------------------------------|--|-------------------------------------|
| Environmental Temperature | + 5 °C ... + 40 °C | IEC 60839-1-3 IEC 60068-2 | Functional before, during and after test | No problem was found |
| Environmental temperature (storage) | - 25 °C ... + 70 °C | IEC 60068-2 | Functional before and after test | No problem was found |
| Relative Humidity (functional) | + 40 °C at 85 % RH | IEC 60068-2 | Functional before, during and after test | No problem was found |
| Relative Humidity non condensing (storage) | + 40 °C at 95 % RH | IEC 60068-2 | Functional before and after test | No problem was found |
| Temperature change (storage) | + 25 °C ... + 30 °C | IEC 60068-2 | Functional before and after test | No problem was found |
| Power supply fluctuation | 230 V +/- 10 % 50 Hz +/- 2 % | IEC 60839-1-3 | Functional before and after test | No problem was found |
| Power cuts | 500 ms black out suppression up to 75 % | IEC 608390103 | Functional before and after test | No problem was found |
| Insulation | > 10 MΩ at 2kV for 10 seconds | IEC 60839-1-3 | Functional before and after test | No problem was found |
| Energy consumption | At least for 8 hours | | | Not applicable. (not available) |
| Vibration | Random: acceleration spectral density 1 m/s ³ (100-200 Hz), 0.3 m/s ³ (200-2000 Hz) during 1 hour per direction Sinus form: 10 m/s (10-200 Hz), 15 m/s (200-500 Hz) | IEC 60068-2 | Functional before and after test | No problem was found See Annex A |
| Free drop | Flat, 2 drops per side. Height of 0.25 m. | IEC 60068-2 | Functional before and after test | No problem was found |
| Tilt | Along each edge of the packaging | IEC 60068-2 | Functional before and after test | No problem was found |

Table 1

The results of the electrical, mechanical and temperature tests, carried out in conformity with the standard IEC 60068-2 and IEC 60839-1-3 on a voting machine for use at elections in Ireland, brand NEDAP, model P.R.U., are depicted in table 1.



Description of EUT: Program Reading Unit for use at elections in Ireland
Manufacturer: N.V. Nederlandsche Apparatenfabriek NEDAP
Brand mark: NEDAP
Model: ESI 1
Serial number(s): R9E00073 and R9E00075

5 Conclusion.

The voting machine for use at elections in Ireland, brand NEDAP, model P.R.U., complies with the requirements of parts of the standards IEC 60068-2 and IEC 60839-1-3 in the configuration and operational mode(s) as stated in this test report.



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6 List of utilized test equipment for temperature and electrical tests.

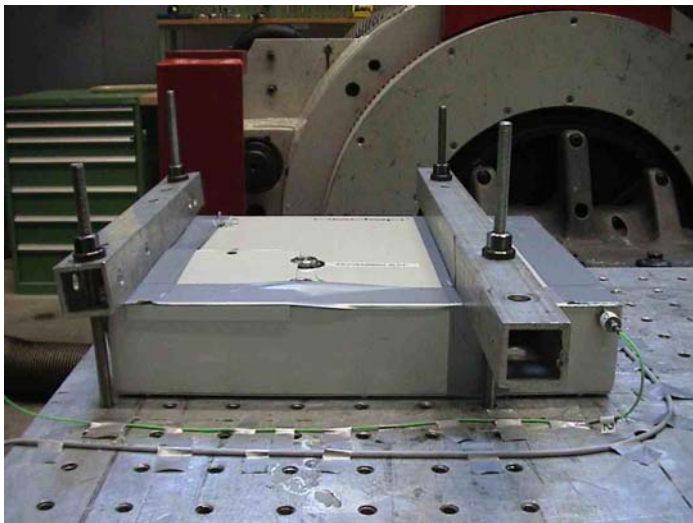
| <u>Inventory Number</u> | <u>Description</u> | <u>Marketing name</u> | <u>Model</u> |
|-------------------------|---------------------|-----------------------|---------------|
| 99416 | Function generator | Tektronix | CFG250 |
| 99429 | Power analyzer | Elcontrol | Nanovip |
| 13451 | Multimeter | H & P | 34401A |
| 08-9501 | Power supply | Behlman | 150-C-202-320 |
| 14836 | Power supply | Clare | A-203G |
| 12640 | Temperature chamber | Heraeus | VEM 03/500 |
| 99-9506 | Climat chamber | Vötsch | VC0033 |

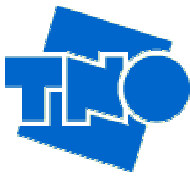


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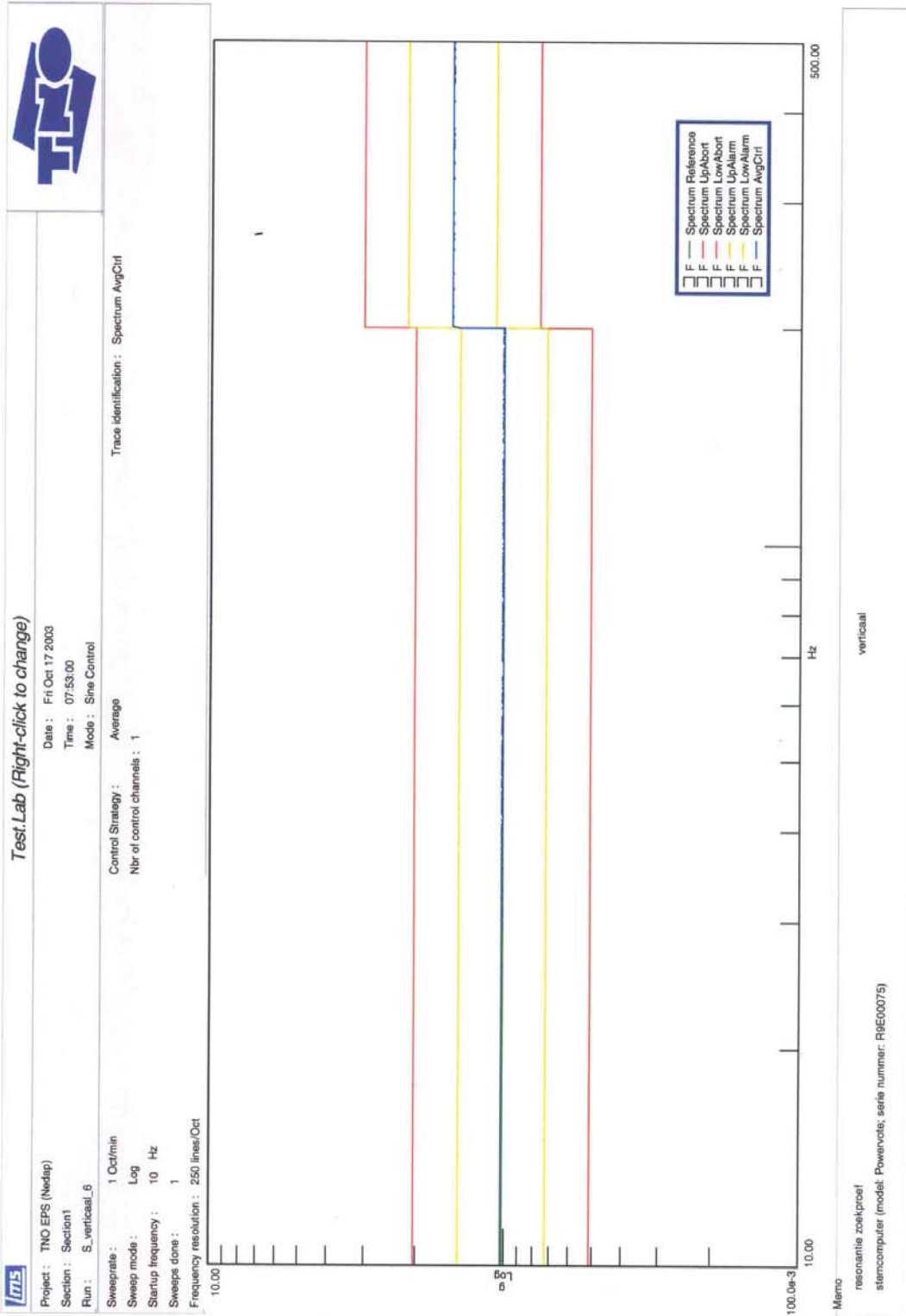
7 Annex A (Vibration)

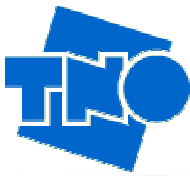
7.1 Photograph of the test set-up



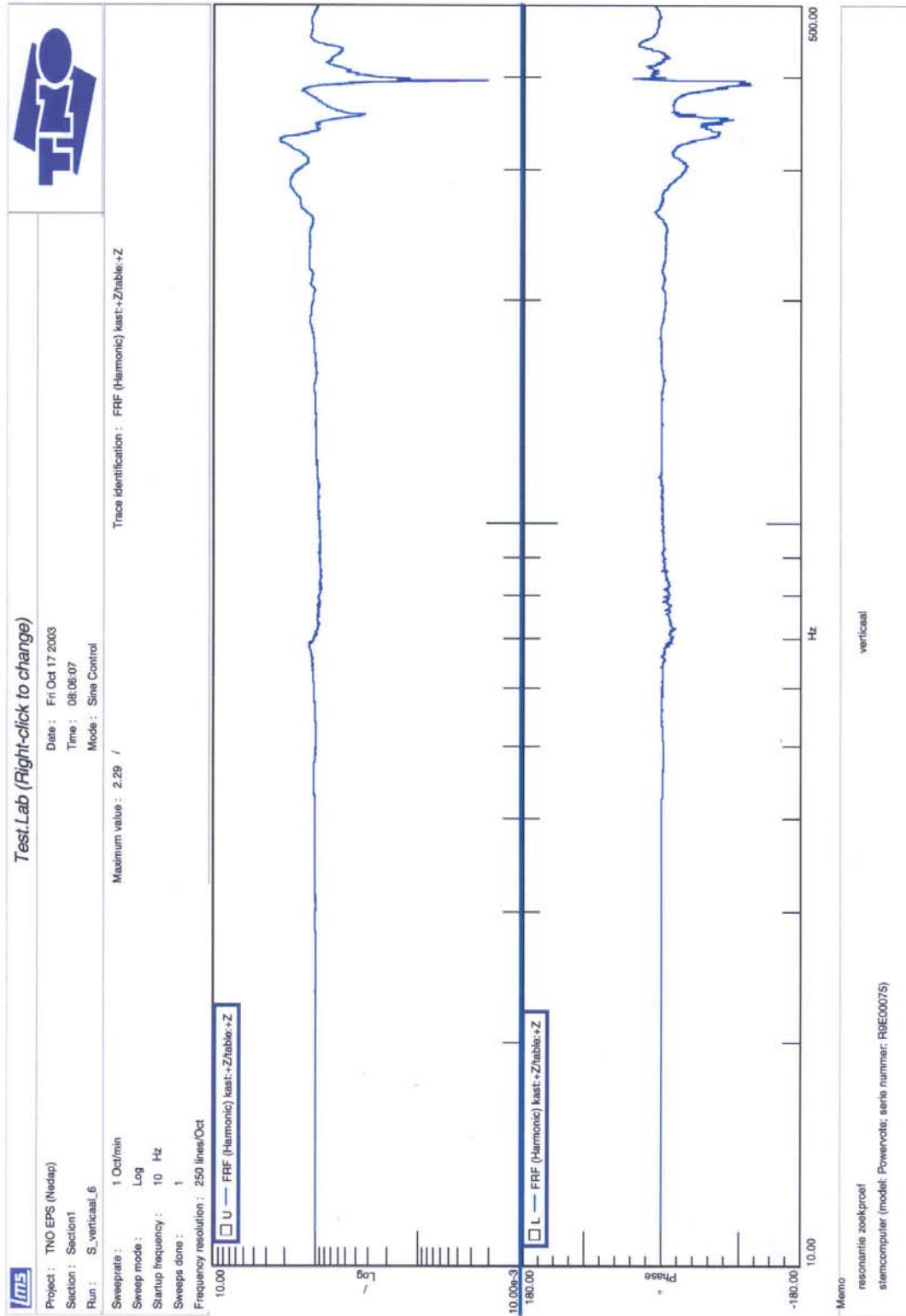


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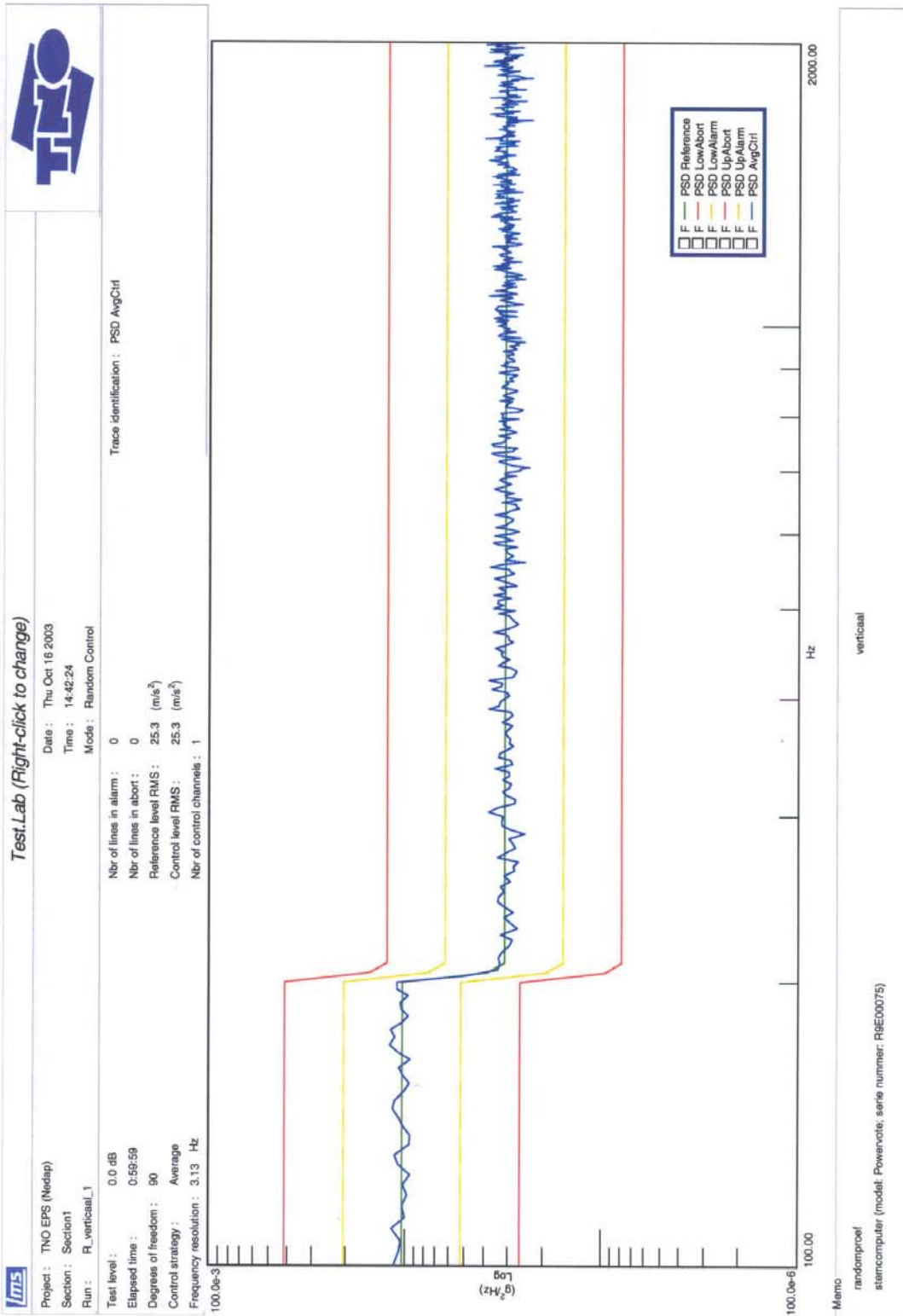


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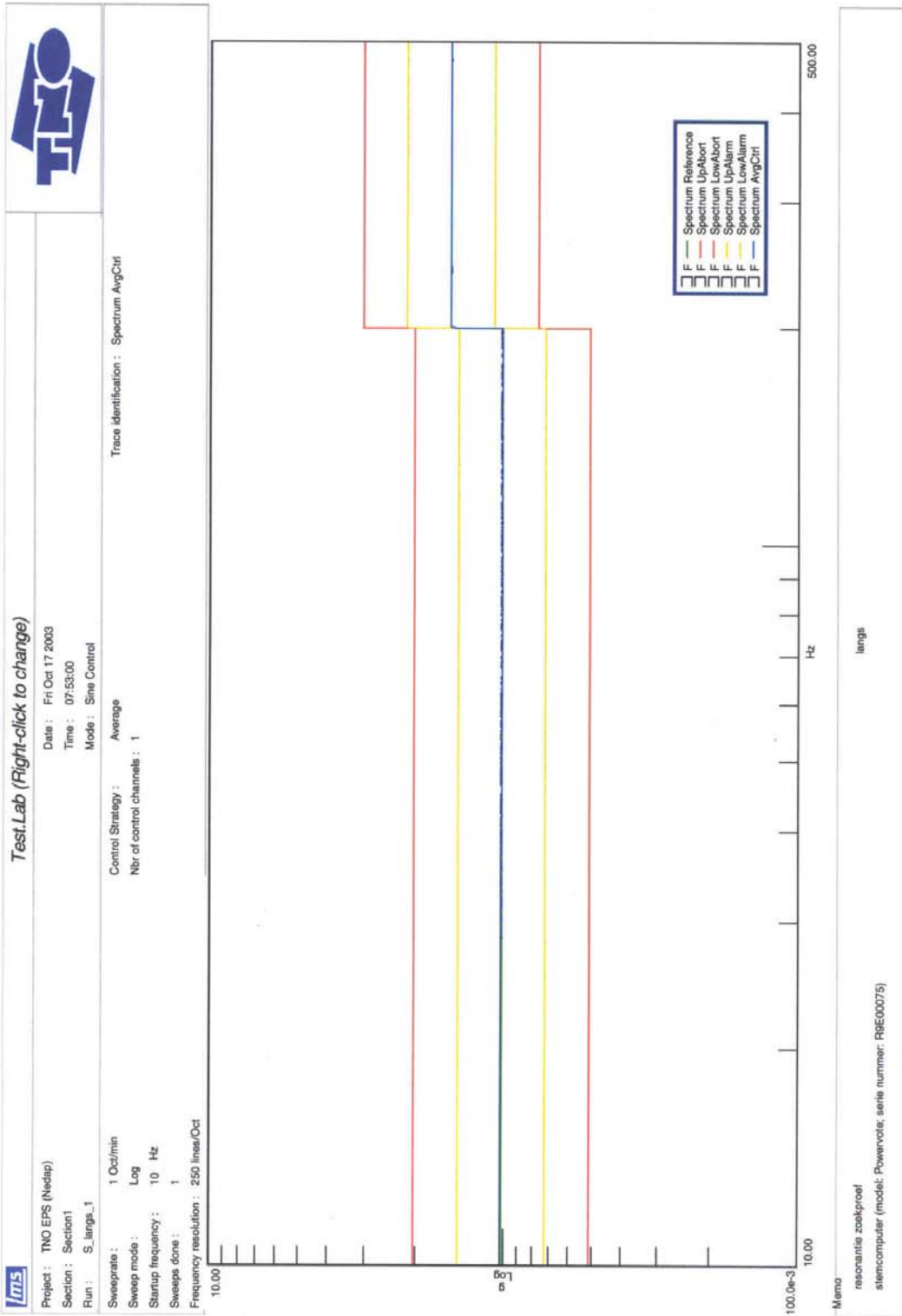


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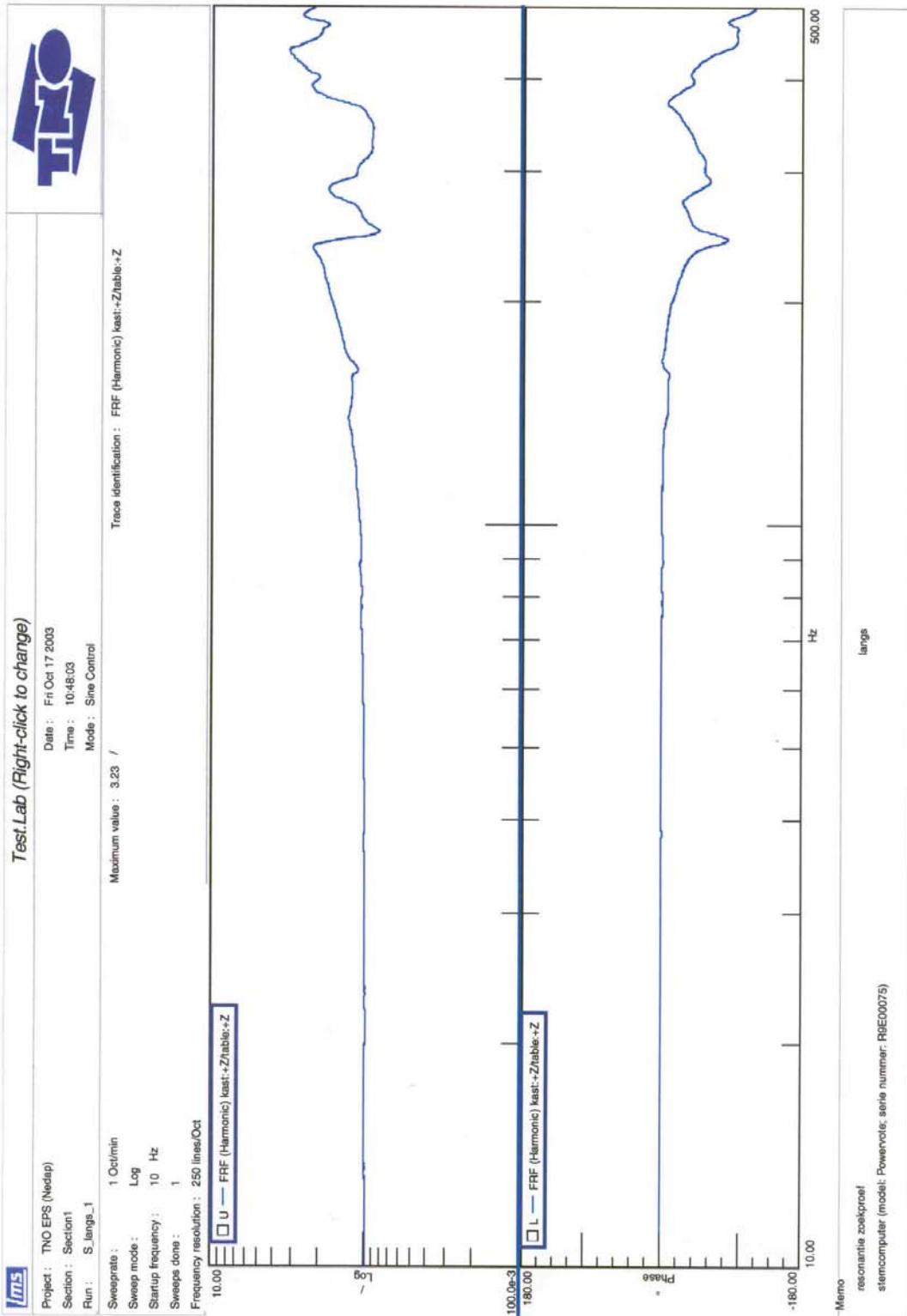


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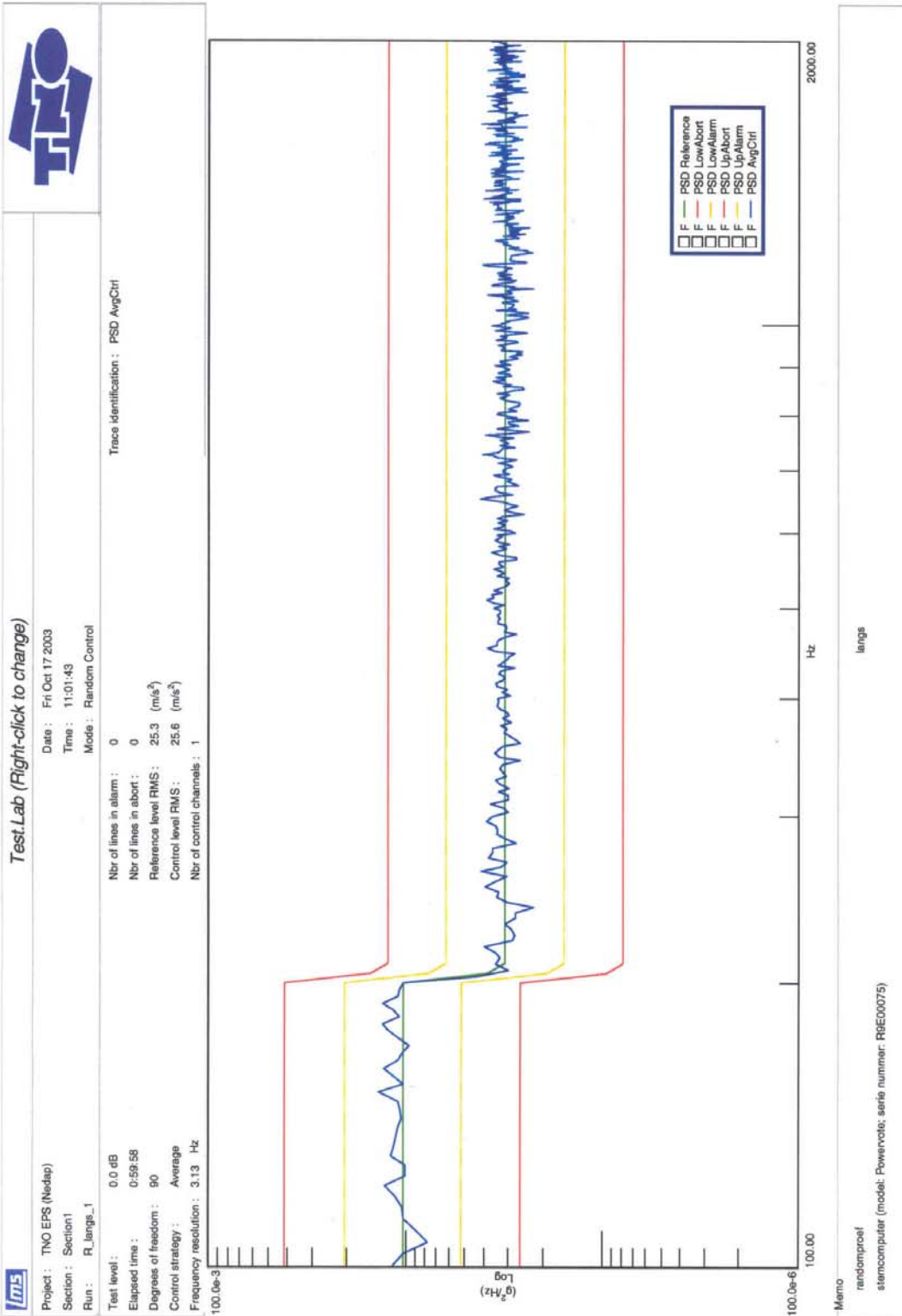


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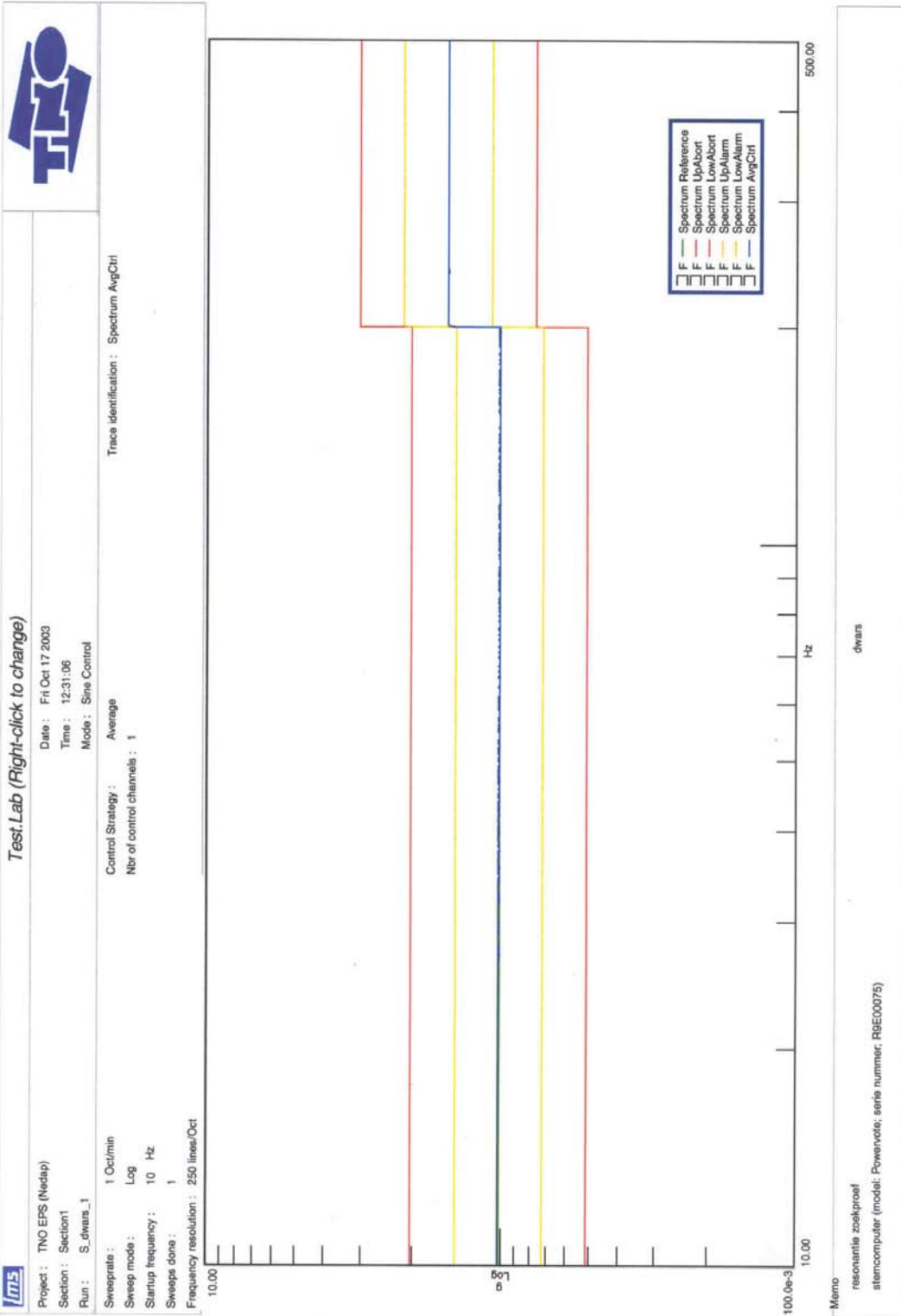


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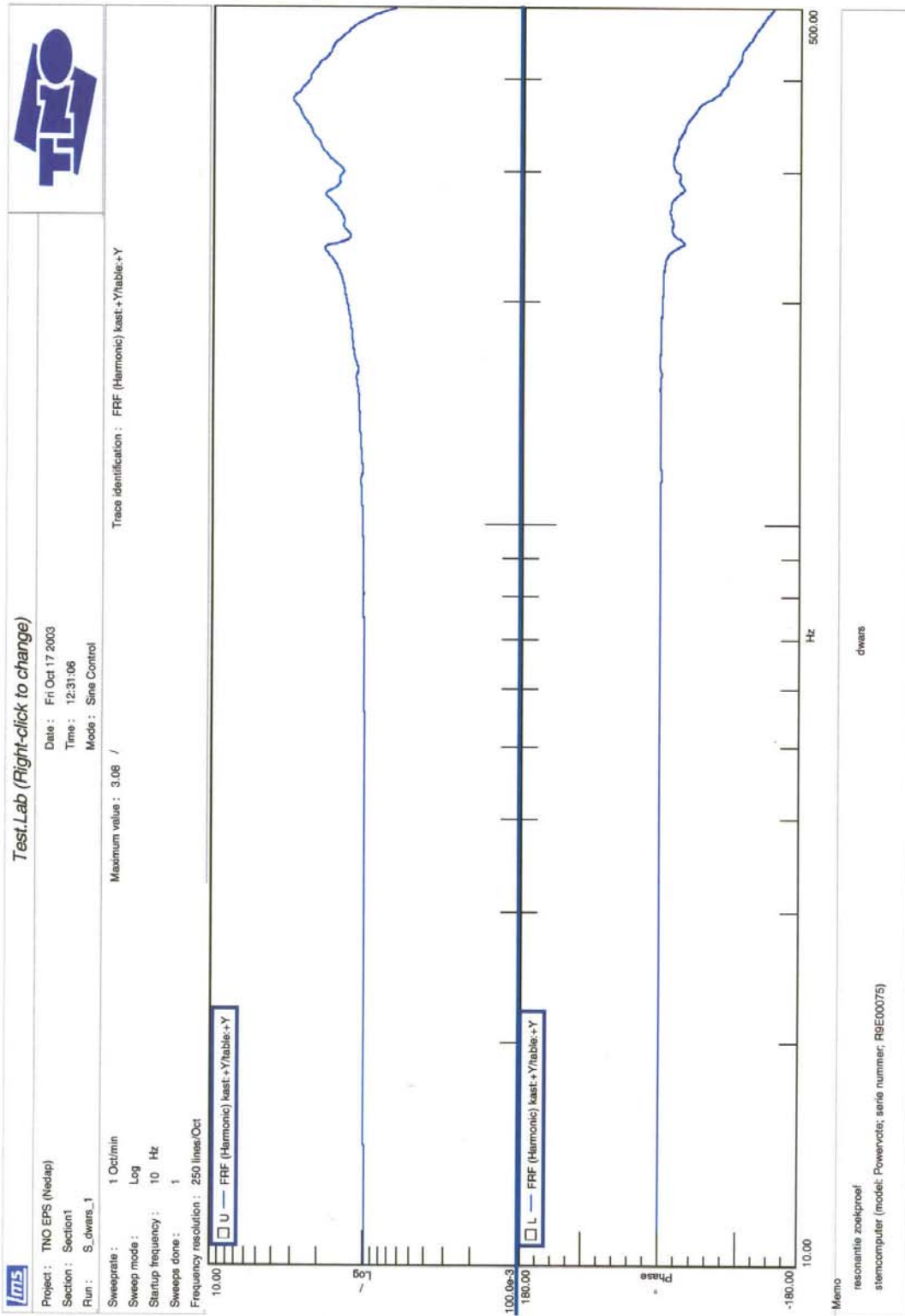


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