

Test Report To Determine Compliance With EN 61010-1

Model numbers: SM041 and SM125
May 24, 2005

Manufacturer: Micron Optics, Inc.
1852 Century Place, N.E.
Atlanta, GA 30345

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<u>Contents</u>	<u>Section</u>
General Information	1
Product Information	2
Product Description	3
Test Report	4
Test Record T1	5
Appendix A	6
Photographs	7

Section 1

GENERAL INFORMATION

Manufacturer: Micron Optics, Inc.
1852 Century Place, N.E.
Atlanta, GA 30345

Manufacturer representative: **Mr. Jim Marihew**

Equipment covered by this report: Model nos. SM041, SM125

Options covered by this report: None

Equipment serial no. Prototype

Test report number: 05-181C

Test specifications: To determine compliance with the
Safety Standard EN 61010-1(01)

Conclusion:
The product(s) covered by this report has been tested and found to comply with the safety standard, EN 61010-1 (01) and all applicable amendments.

Test Facility: The test facility used to perform these tests is located at:

EMC Testing Laboratories, Inc.
2210 Justin Trail
Alpharetta, GA 30004

Tested by: **Edward Barnes, RF Engineer**

Approved by: _____
Gene Bailey, Engineering Manager,
EMC Testing Laboratories, Inc.

Section 2

PRODUCT INFORMATION

Model numbers: SM041 and SM125

Marked electrical ratings: 5 Vdc, 6.0 amps max.

Connection to supply: Product utilizes an external power supply

Installation overvoltage category: I

Pollution degree: II

Equipment class: Class III

Equipment function: The model no. SM041 is an optical multiplexor, which allows the model no. SM125 to monitor up to 16 optical sensor arrays. It achieves this by utilizing solid state optical switches which are controlled directly by the SM125 via the electrical interconnect cable.

At the manufacturers request the laser source utilized by the equipment covered in this report was not evaluated during this project. For the manufacturers Declaration of Conformity for the laser source with IEC 60825-1 (94) and applicable amendments see appendix A .

Mode of operation: Continuous

Degree of mobility: Moveable

Construction Details Refer to critical components below and the following:

Internal wiring - must be approved by a recognized agency and suitable for the voltages, current and temperatures involved. All wiring conductors are routed and secured away from sharp edges, hot or moving parts. Ribbon Cables are UL flame rated 94V-1 minimum and suitable for the voltages involved and are routed and mechanically secured away from high-voltage circuits and wiring.

Section 2 cont...

Insulation Tubing/Sleeving - Approved by a recognized agency and rated 80°C minimum and 250V.

Nameplate Marking - Manufacturers name, model number and electrical ratings. Marking is located on the equipment in an area not necessary for gaining access to the marking and the part of which the marking is located is not likely to be discarded or lost.

Mechanical Assembly - Unless otherwise stated, all enclosure parts and component mounting assemblies are secured by welding, thread-forming screws, or machine bolts provided with nuts and lock washers or star washers.

Mechanical Electrical Connections - For electric connection, internal wiring and leads of transformers and components are provided with crimp-on terminals such as closed-loop, spade type with upturned ends, quick-connect with integral detent, or locking type, or are mechanically secured and soldered.

Wiring Connections may also be accomplished by UL Listed wire connectors suitable for the temperature, wire gauge, and number of conductors.

Soldered Connection - All soldered connections are mechanically secured before soldering. When hand soldered, Leads on printed wiring boards are bent over prior to soldering.

Tolerances - Unless otherwise specified, all dimensions are nominal.

Section 3

PRODUCT DESCRIPTION

General:

The following is a general description of the products and critical components.

1 Enclosure:

Constructed of painted or plated metal, measuring 1mm minimum thickness, with overall dimensions measuring 22.8cm wide by 11.4cm high by 13.3cm deep. Enclosure secured together with metal screws. Provided with eight rows of twelve 4mm diameter openings at each side.

2 Printed Wiring Boards:

All boards are UL flame rated 94V-1 minimum and with a > 175 CTI and consists of the following:

Model no. SM125

<u>Name</u>	<u>Part no.</u>	<u>Rev. no.</u>
Transmitter	221782B	B
Receiver	221783B	B
Interface	221781F	F
Advantech	PCM-9370F Single Board Computer	
Mesa Electronics	4A24 high speed 16 bit A-D card	

Model no. SM041:

<u>Name</u>	<u>Part no.</u>	<u>Rev. no.</u>
Optical Switch Module	221765	A

3 Internal Wiring:

All internal wiring is UL approved, wiring material rated 300V and 80° C minimum. All soldered connections are mechanically secured before soldering.

4 Power Supply:

Model no. SM125. Provided with external power supply. Manufactured by Sinpro, model no. U45S102-P2J, input rated 100-240V, 1.35A, 47 – 63 Hz. Output rated 5-6 Vdc, 40 w maximum. TUV and UL listed ITE and CE marked power supply. Model no. SM041 receives power from the SM125.

Section 3 cont...

5 Laser source:

Model no. SM125 only. The laser source consists of a Linear Optical Amplifier that is manufactured by Finisar Corporation, part number G111, rated at and integrated 200 μ W ASE output. The LOA is assembled into a ring configuration, using the semiconductor chip as the gain medium for the laser. A Micron Optics Fiber Fabry-Perot Tunable filter is used to select the low-loss wavelength to enable lasing in the ring, and facilitates tuning over a range of 1510 to 1580nm. Other optical components in the ring include an optical band pass filter, two optical isolators, and a 50% output coupler as the laser output. These components are available from a variety of vendors, and the actual source of the components is not critical to the operation of the laser.

6 Ribbon cable:

UL approved ribbon cable, rated 150 volts minimum.

7 Insulating sleeving:

UL approved insulating sleeving, rated 150 volts minimum.

8 DC to DC Converter:

UL approved. Manufactured by Beta Dyne, part no. DN10D5/5. Rated 5V, 10 W.

9 LED's:

All are manufactured by Digikey and provided as follows:

Model no. SM041, Manufactured by Digikey, part no. CMD91-21SRC/TR9

Model no. SM125, Manufactured by Digikey, part no. SML-LX06031W. Manufactured by Chicago Miniature lamp, part nos. 7016X5, 7016X1 and 7016X3

10 Markings:

The following markings are silk screened or on UL recognized label material as follows:

A- On outside of enclosure:

Manufacturer's name and model number, electrical ratings 5 Vdc, 6.0 A max.

Date of manufacturing by month and year. Date of manufacturing may be incorporated in the serial number.

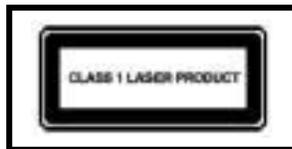
Section 3 cont...

B- On the outside of the enclosure the following statements:

- 1- No operator serviceable parts inside. Do not remove cover. Refer servicing to qualified personnel only.
- 2- For use by qualified personnel only.

C- On the outside of the enclosure:

An explanatory marking in accordance with the requirements of EN60825-1, figure 15. The label shall indicate "CLASS 1 LASER PRODUCT".



11 Documentation:

The following information is provided in the User manuals provided with all products.

- A- Technical specification,
- B- Instruction for use,
- C- Name and address of manufacturer or supplier from whom technical assistance may be obtained,
- D- The electrical ratings in volts, frequency and current,
- E- A description of all input and output connections,
- F- The environmental conditions as follows should be stated:
 - Indoor use,
 - Operating temperature range of +10 °C to +40 °C,
 - Maximum relative humidity 80% for temperature up to 31 °C decreasing linearly to 50% relative humidity at 40 °C,
- G- Towards the front of the manual all warning statements and a clear explanation of warning symbols marked on the equipment are provided as indicated below:

Section 3 cont...

11.1 Safety Symbols The following symbols and messages may be marked on the unit. The purpose of safety symbols is to attract your attention to possible dangers. The safety symbols and the explanations with them deserve your careful attention and understanding. The safety warnings do not by themselves eliminate any danger. The instructions or warnings they give are not substitutes for proper accident prevention measures.

Symbol	Description
	Laser Safety. Refer to user's manual for safety instructions for use and handling.
	Refer to user's manual for safety instructions for use and handling.
	Caution. Risk of electric shock.
	Frame or chassis terminal for electrical earth ground.
	Electrostatics discharge (ESD). Refer to user's manual for safety instructions in use and handling.
	Protective conductor terminal for electrical earth ground.
WARNING	This sign indicates a procedure with the potential to cause serious injury or loss of life to the user if not performed with strict adherence to all safety instructions. Ensure that all conditions are fully understood and met before proceeding.
CAUTION	This sign indicates a procedure with the potential to cause serious damage to or destruction of the unit if not performed with strict adherence to the all safety instructions. Ensure that all conditions are fully understood and met before proceeding.

Section 4

TEST REPORT

Clause	Summary of Inspection	Complies	Not applicable
4	Single fault condition	(X)	()
5	Marking and documentation	(X)	()
6	Protection against electric shock	(X)	()
7	Protection against mechanical hazards	(X)	()
8	Mechanical resistance to shock, vibration and impact	(X)	()
9	Equipment temperature limits and protection against the spread of fire	(X)	()
10	Resistance to heat	(X)	()
11	Resistance to moisture and liquids	(X)	()
12	Protection against radiation including Laser sources and against sonic and ultrasonic pressure	(X)	()
13	Protection against liberated gases, explosion and implosion	(X)	()
14	Components	(X)	()
15	Protection by interlocks	()	(X)

Section 4 cont...

Clause	Requirement	Complies	Not applicable
4.4	Testing in SINGLE FAULT CONDITION (SFC). List all SFC not covered by 4.4.2.1 to 4.4.2.12. <i>TUV and UL listed external power supply</i>	(X)	()
4.4.2.1	Protective impedance, <i>TUV and UL listed external power supply</i>	(X)	()
4.4.2.2	Protective conductor, <i>TUV and UL listed external power supply</i>	(X)	()
4.4.2.3	Equipment or parts for short-term or intermittent operations,	()	(X)
4.4.2.4	Motors, None provided	()	(X)
4.4.2.5	Capacitors, <i>TUV and UL listed external power supply</i>	(X)	()
4.4.2.6	Mains transformers. Attach drawing of Mains showing all protective devices, <i>TUV and UL listed external power supply</i>	(X)	()
4.4.2.7	Outputs, <i>TUV and UL listed external power supply</i>	(X)	()
4.4.2.8	Equipment for more than one supply,	()	(X)
4.4.2.9	Cooling,	(X)	()
4.4.2.10	Heating devices, none provided	()	(X)
4.4.2.11	Insulation between circuits and parts <i>TUV and UL listed external power supply</i>	(X)	()
4.4.2.12	Interlocks	()	(X)

Section 4 cont...

Clause	Requirement	Complies	Not applicable
5.0	Marking and documentation		
5.1.1	General All equipment markings are: <ul style="list-style-type: none"> <li data-bbox="358 533 711 569">- visible from the exterior; or <li data-bbox="358 604 862 667">- visible after removing a cover or opening a door; <li data-bbox="358 703 906 766">- not put on parts which can be removed by an Operator; <li data-bbox="358 802 873 837">- visible after removal from a rack or panel; <li data-bbox="358 873 662 909">- Letter symbols (IEC 27) <li data-bbox="358 945 683 980">- Graphic symbols (table 1) 	 (X) (X) (X) (X) (X) (X)	 () () () () () ()
5.1.2	Identification Equipment is identifiable by: <ul style="list-style-type: none"> <li data-bbox="358 1115 922 1150">- manufacturer's name or registered trade mark; <li data-bbox="358 1186 824 1222">- model number, name, or other means. 	 (X) (X)	 () ()
5.1.3	Mains supply Equipment is marked as follows: <ul style="list-style-type: none"> <li data-bbox="358 1360 597 1396">a) Nature of supply: <ul style="list-style-type: none"> <li data-bbox="386 1432 873 1495">- a.c. Rated mains frequency or range of frequencies; <li data-bbox="386 1530 618 1566">- d.c. with symbol. <li data-bbox="358 1602 792 1638">b) Rated supply voltage(s), or range. <li data-bbox="358 1673 894 1736">c) Maximum Rated power in watts or volt-amperes, or maximum Rated input current. 	 (X) () (X) (X)	 () (X) () ()

Section 4 cont...

Clause	Requirement	Complies	Not applicable
5.1.6	Voltage and current measuring circuit Terminals shall be marked with the rated maximum working voltage or current as applicable.	()	(X)
	Marking of measuring input circuit terminals to be connected to voltages above 50Vac or 120Vdc		
	Means for identifying these Terminals is provided.	()	(X)
	Marking is close to Terminals	()	(X)
	or (if sufficient space) the marking is:		
	- on the Rating plate;	()	(X)
	- or scale plate;	()	(X)
	- the Terminal is marked with symbol 14.	()	(X)
	Terminals and operating device		
	Disconnect device marked indicating on-position and off-position.	()	(X)
	Terminals and operating devices are marked as follows:	(X)	()
	a) Functional Earth Terminals (symbol 5)	()	(X)
	b) Protective Conductor Terminals (symbol 6)	(X)	()
- Symbol is placed adjacent to or on the Terminal	(X)	()	
c) Terminals of measuring and control circuits (symbol 7).	()	(X)	
d) Terminals supplied from the interior (symbol 14).	()	(X)	

Section 4 cont...

Clause	Requirement	Complies	Not applicable
5.1.7	e) Accessible Functional Earth Terminals (symbol 8).	()	(X)
5.1.7	Equipment protected by Double Insulation or Reinforced Insulation		
5.1.8	Protected throughout (symbol 11).	()	(X)
5.1.8	Only partially protected (symbol 11 not used).	()	(X)
5.1.8	Battery charging		
5.1.8	Equipment with means to recharge rechargeable batteries is marked;		
5.1.8	- to warn against the charging of non-rechargeable batteries;	()	(X)
5.1.8	- to indicate the type of rechargeable batteries used.	()	(X)
5.2	Warning markings		
5.2	- are visible during Normal Use	(X)	()
5.2	- marked with symbol 14;	(X)	()
5.2	- are near or on particular parts;	(X)	()
5.2	- warnings for hazardous voltages in operator access in which a tool is needed to gain access	()	(X)
5.2	- advise how to avoid contact with Hazardous Live parts and Hazardous moving parts	()	(X)
5.2	- Terminals voltage exceeds 1 kV (symbol 12);	()	(X)
5.2	- Heated easily touched parts.	()	(X)

Section 4 cont...

Clause	Requirement	Complies	Not applicable
	- the frequency or frequency range;	(X)	()
	- the power or current Ratings;	(X)	()
	- a description of all input and output connections;	(X)	()
	- the Rating of insulation of external circuits, when such circuits are nowhere Accessible;	(X)	()
	- statement of the range of environmental conditions.	(X)	()
5.4.3	Equipment installation		
	Documentation includes instructions for:		
	- assembly, location and mounting;	(X)	()
	- protective earthing;	()	(X)
	- connections to the supply	(X)	()
	- ventilation requirements	(X)	()
	- special services.	(X)	()
	- maximum sound power level produced	()	(X)
	- instructions relating to sound pressure level.	()	(X)
	Additionally information for Permanently Connected Equipment:		
	- supply wiring;	()	(X)
	- external switch or circuit-breaker and external overcurrent protection use.	()	(X)
	- recommendation on circuit-breaker location.	()	(X)

Section 4 cont...

Clause	Requirement	Complies	Not applicable
6.2.1	General examination Hazardous Live parts are prevented from being touched by:		
	- Jointed test finger	(X)	()
	- Rigid test finger	(X)	()
6.2.2	Openings above parts which are hazardous live.		
	- Test pin (4 mm diameter x 100 mm) for top openings	()	(X)
6.2.3	Openings for pre-set controls		
	- Test pin (3 mm diameter) for present control openings	()	(X)
6.3	Permissible limits for Accessible parts	(X)	()
6.3.1	Values in Normal Condition	(X)	()
6.3.1.1	Voltage		\
	<i>TUV and UL listed external power supply</i>	(X)	()
6.3.1.2	Current		
	<i>TUV and UL listed external power supply</i>	(X)	()
6.3.1.3	Capacitance		
	<i>TUV and UL listed external power supply</i>	(X)	()

Section 4 cont...

Clause	Requirement	Complies	Not applicable
6.3.2	Values in Single Fault Condition	(X)	()
6.3.2.1	Voltage <i>TUV and UL listed external power supply</i>	(X)	()
6.3.2.2	Current <i>TUV and UL listed external power supply</i>	(X)	()
6.3.2.3	Capacitance <i>TUV and UL listed external power supply</i>	(X)	()
6.4	Protection in Normal Condition Accessible parts: - Basic Insulation (see annex E) <u>In combination with the enclosure basic insulation provides hazardous live components from becoming accessible to the operator.</u> - Enclosures or Barriers <u>Enclosure provides hazardous live components Components from becoming accessible to the operator.</u> - Protective Impedance (see 6.5.3) <hr/> Enclosures And Barriers: - meet the rigidity requirements of 8.1; - meet the requirements for Basic Insulation.	(X)	()

Section 4 cont...

Clause	Requirement	Complies	Not applicable
	Clearances, Creepage Distances and insulation:		
	- meet the requirements of 6.7;	(X)	()
	- meet the values for Basic Insulation (tables D.1 to D.6)	(X)	()
6.5	Protection in Single Fault Condition		
	Additional protection is provided as specified in 6.5.1 to 6.5.3 (except as in 6.5.4); or	(X)	()
	- by automatic disconnection of supply.	()	(X)
6.5.1	Protective earthing		
	Accessible conductive parts:		
	- are bonded to the Protective Conductor Terminal; or	()	(X)
	- are separated from parts which are Hazardous Live; or	()	(X)
	- indirect bonding (measurement and test equipment)	()	(X)
6.5.1.1	Protective Bonding		
	Protective Bonding consists of directly connected structural parts; or	()	(X)
	discrete conductors; or both.	()	(X)
6.5.1.2	Bonding impedance of plug-connected equipment	()	(X)

Section 4 cont...

Clause	Requirement	Complies	Not applicable																
6.5.1.3	Bonding impedance of Permanently Connected Equipment	()	(X)																
6.5.1.4	Indirect bonding for measuring and test equipment	()	(X)																
6.5.2	Double Insulation and Reinforced Insulation Clearance and Creepage Distances - meet the applicable requirements of annex D; - pass the dielectric strength test of 6.8. Other test results are in 6.7, 6.8 and 6.9.2.	()	(X)																
6.5.3	Protective Impedance A Protective Impedance is one or more of the following: - an appropriate High Integrity single component (see 14.6); <table border="0" data-bbox="358 1276 899 1415"> <tr> <td style="text-align: center;">Component</td> <td style="text-align: center;">Location</td> </tr> <tr> <td>_____</td> <td>_____</td> </tr> <tr> <td>_____</td> <td>_____</td> </tr> <tr> <td>_____</td> <td>_____</td> </tr> </table> - a combination of components; <table border="0" data-bbox="358 1486 899 1625"> <tr> <td style="text-align: center;">Component</td> <td style="text-align: center;">Location</td> </tr> <tr> <td>_____</td> <td>_____</td> </tr> <tr> <td>_____</td> <td>_____</td> </tr> <tr> <td>_____</td> <td>_____</td> </tr> </table>	Component	Location	_____	_____	_____	_____	_____	_____	Component	Location	_____	_____	_____	_____	_____	_____	()	(X)
Component	Location																		
_____	_____																		
_____	_____																		
_____	_____																		
Component	Location																		
_____	_____																		
_____	_____																		
_____	_____																		

Section 4 cont...

Clause	Requirement	Complies	Not applicable						
	<p>- a combination of Basic Insulation and a current or voltage limiting device.</p> <table border="0" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; text-align: center;">Component</td> <td style="width: 50%; text-align: center;">Location</td> </tr> <tr> <td style="text-align: center;"><u>Fuse</u></td> <td style="text-align: center;"><u>Inside power supply</u></td> </tr> <tr> <td style="text-align: center;"><u>Basic insulation</u></td> <td style="text-align: center;"><u>Power supply</u></td> </tr> </table>	Component	Location	<u>Fuse</u>	<u>Inside power supply</u>	<u>Basic insulation</u>	<u>Power supply</u>	(X)	()
Component	Location								
<u>Fuse</u>	<u>Inside power supply</u>								
<u>Basic insulation</u>	<u>Power supply</u>								
6.5.4	<p>Components, wires and connections are Rated.</p> <p>Built-in Panel meters</p>	(X)	()						
	<p>The requirements of 6.5.1 to 6.5.3 were waived YES/NO.</p> <p>If YES proceed as follows:</p> <ul style="list-style-type: none"> - the equipment has no Accessible conductive parts; - Accessible surfaces are separated; - Accessible surfaces of parts intended to be grasped are separated. 	NO							
6.6	External circuits								
6.6.1	<p>Separation of internal circuits</p> <p>Internal circuits with external circuit connections.</p> <p>Separation is provided between internal circuits.</p> <p>If the values of 6.3.2 are exceeded in Normal Condition one of the following means is applied:</p>	()	(X)						

Section 4 cont...

Clause	Requirement	Complies	Not applicable
	- Double Insulation or Reinforced Insulation; _____ _____	()	(X)
	- Protective Impedance; _____ _____	()	(X)
	- Basic Insulation and protective screening _____ _____	()	(X)
	- Basic Insulation and low impedance Protective Bonding; _____ _____	(X)	()
	Even if the other internal circuit exceeds the values of 6.3.2 in Normal Condition, Basic Insulation is provided.	(X)	()
	The following statements are included in the manufacturer's instructions;		
	- the Terminal is for use only with equipment which has no Accessible live parts;	()	(X)
	- the Rating of the insulation required for external circuits;	()	(X)
	- the connection to be used at the remote end of external circuits;	()	(X)
	- the type of equipment which may be connected to the Terminal.	(X)	()
	- any of the above were waived;	()	(X)

Section 4 cont...

Clause	Requirement	Complies	Not applicable
6.6.2	<p>- the equipment passed the dielectric strength test (see 6.8).</p> <p>Terminals for external circuits</p> <p>Accessible Terminals are not Hazardous Live except as permitted</p> <p>The following Terminals are not Hazardous Live:</p> <ul style="list-style-type: none"> - Protective Conductor Terminals; - Functional Earth Terminals; - Headphone Terminals; <p>Terminal which receive a charge from an internal capacitor.</p> <p>The following Terminals energized from the interior are not Accessible:</p> <ul style="list-style-type: none"> - Terminals with Hazardous Live voltage exceeding 1 kV. - Terminals with floating voltage exceeding 1 kV; 	<p>(X)</p> <p>(X)</p> <p>()</p>	<p>()</p> <p>()</p> <p>(X)</p>
6.6.3	<p>Circuits with Terminals which are Hazardous Live</p> <p>No mains circuits are connected to Accessible conductive parts.</p> <p>For other Hazardous Live circuits with one terminal at earth potential.</p> <p>Circuits designed to be operated with one Accessible Terminal contact floating.</p>	<p>()</p> <p>()</p> <p>()</p> <p>()</p>	<p>(X)</p> <p>(X)</p> <p>(X)</p> <p>(X)</p>

Section 4 cont...

Clause	Requirement	Complies	Not applicable
6.7	<p>Clearances and Creepage Distances</p> <p>Clearances and Creepage Distances between circuits and parts. See Test record T1</p> <p>There was no reduction when the rigid test finger was applied with:</p> <ul style="list-style-type: none"> - a 10 N force; - a 30 N force. <p>Test details to be recorded in Test record T1</p>	<p>(X)</p> <p>(X)</p> <p>(X)</p>	<p>()</p> <p>()</p> <p>()</p>
6.8	<p>Dielectric strength test</p> <p>Requirements of 6.4 to 6.6 are met.</p> <p>Protection against the spread of fire.</p>	<p>(X)</p> <p>(X)</p>	<p>()</p> <p>()</p>
6.8.1	<p>Reference test earth</p> <p>The reference earth points selected for the voltage tests of 6.8.4.</p>		
6.8.2	<p>Humidity preconditioning</p> <p>The unit was put in a humidity chamber and the temp. was brought to 42°C for four hours the unit was then subjected to humidity of 92.5% r.h. for 48 hrs.</p>		
6.8.3	<p>Conduct of tests</p> <p>The test specified in 6.8.4 was completed within 1 hr of the end of the recovery period after humidity preconditioning.</p>		
6.8.4	<p>The voltage test did not result in any breakdown or repeated flashover.</p> <p><i>TUV and UL listed external power supply</i></p>	<p>(X)</p>	<p>()</p>

Section 4 cont...

Clause	Requirement	Complies	Not applicable
	e) Protective earthing conductors.	()	(X)
	Exceptions:		
	- earthing braids,	()	(X)
	- internal protective conductors.	()	(X)
	f) Equipment using Protective Bonding	()	(X)
6.9.4	Over range indication	()	(X)
6.10	Connection to mains supply source		
6.10.1	Mains supply cords		
	Mains supply cords are Rated;	()	(X)
	The cable used complies with IEC 227 or IEC 245	()	(X)
	Green/yellow covered conductors used.	()	(X)
	Mains supply cords are certified.	()	(X)
	All conductors have the same degree of insulation.	()	(X)
	Detachable cords with IEC 320 mains connectors comply with:		
	- IEC 799;	()	(X)
	- the current Rating of the mains connector.	()	(X)
6.10.2	Fitting of non-detachable mains supply cords		
6.10.2.1	Cord entry		
	Non-detachable mains supply cords are protected by one of the following:		
	- An inlet or bushing is provided which has:	()	(X)

Section 4 cont...

Clause	Requirement	Complies	Not applicable
6.10.2.2	a smooth rounded bell-mouthed opening;	()	(X)
	- An insulated reliably-fixed cord guard.	()	(X)
	Cord anchorage		
	The cord anchorage:		
	- relieves the conductors from strains and twisting;	()	(X)
	- protects the conductor from abrasion;	()	(X)
	The protective earth conductor is the last to take the strain.	()	(X)
	Cord anchorage's:		
	- the cord is not clamped;	()	(X)
	- knots are not used;	()	(X)
	- it is not possible to push the cord into the equipment, to could cause a hazard;	()	(X)
	- failure of the cord insulation in a cord anchorage which has metal parts.	()	(X)
	- A compression bushing is not used unless:		
	- it has provision for clamping; or	()	(X)
	- it is designed to terminate a screened mains supply cord;	()	(X)
- the cord replacement does not cause a hazard.	()	(X)	
6.10.3	Plugs and connectors		
	a) Plugs, connectors and appliance couplers, comply with the relevant specifications.	(X)	()

Section 4 cont...

Clause	Requirement	Complies	Not applicable
	b) Equipment is designed to be supplied at voltages below 6.3.2.1.	()	(X)
	c) Plug pins of cord-connected equipment which receive a charge from an internal capacitor.	()	(X)
	d) Equipment with accessory mains socket-outlets:	()	(X)
	- there is a marking according to 5.1.3 e);	()	(X)
	- outlets with a Terminal contact.	()	(X)
6.11	Terminals		
6.11.1	Accessible Terminals	()	(X)
	a) Flexible cord contact.	()	(X)
	- self evident or marked;	()	(X)
	- passes the free strand test.	()	(X)
	b) Are anchored.	()	(X)
6.11.2	Protective Conductor Terminal		
	a) Connection of an appliance inlet.	()	(X)
	b) Equipment provided with a rewirable flexible cord.	()	(X)
	c) Equipment not requiring connection to a mains supply.	()	(X)
	- Where the circuit has external Terminals.	()	(X)
	d) Protective Conductor Terminals for mains circuits.	()	(X)

Section 4 cont...

Clause	Requirement	Complies	Not applicable
	e) Soldered connections.	()	(X)
	Such connections are not used for other purposes.	()	(X)
	Screw connections are secured.	()	(X)
	f) The contact surfaces of Protective Conductor Terminals.	()	(X)
	g) Plug-in type Protective Conductor Terminals.	()	(X)
	h) Equipment dependent on a protective conductor in a single fault condition.	()	(X)
6.11.3	Functional Earth Terminals	()	(X)
6.12	Disconnection from supply source		
6.12.1	General		
	Except as specified in 6.12.1.1.	(X)	()
6.12.1.1	Exceptions		
	Short circuit or overload cannot cause a hazard.	()	(X)
	If it does give reasons below: _____ _____		
6.12.2	Requirements according to type of equipment		
6.12.2.1	Permanently Connected Equipment	()	(X)
	Permanently Connected Equipment and multi-phase equipment.	()	(X)

Section 4 cont...

Clause	Requirement	Complies	Not applicable
	The following disconnect devices are used:	()	(X)
	Where a switch is not part of the equipment documentation for equipment shall specify that;	()	(X)
6.12.2.2	Single-phase cord-connected equipment		
	A disconnect device is used: A separate plug, without a locking device, to mate with a socket-outlet in the building	(X)	()
6.12.2.3	Hazards arising from function		
	An emergency switch is provided.	()	(X)
	The emergency switch is correctly located.	()	(X)
6.12.3	Disconnecting devices		
	A disconnecting device is part of the equipment. (Exception: EMI suppression circuits.)	(X)	()
6.12.3.1	Switches and circuit-breakers		
	Switches or circuit-breakers acting as disconnection devices.	()	(X)
	Switches or circuit-breakers with contacts for disconnecting and other contacts for other purposes	()	(X)
6.12.3.2	Appliance couplers and plugs		
	Where an appliance coupler or separable plug is used as the disconnecting device (see 6.12.2.2):		
	- it is readily identifiable and easily reached by the Operator.	(X)	()

Section 4 cont...

Clause	Requirement	Complies	Not applicable
	- single phase Portable Equipment cord length.	()	(X)
	The protective earth conductor connected.	(X)	()
7.0	Protection against mechanical hazards		
7.1	General		
	Handling during Normal Use.	(X)	()
	Protection against expelled parts.		
7.2	Moving parts	()	(X)
	Moving parts not able to crush, etc.		
	Maintenance of equipment with hazardous moving parts	()	(X)
	- access requires use of tool;		
	- proper instructions are given including training statement for operators;	()	(X)
	- access covers provided with warning statements or alternatively symbol 14 with additional warnings in manual;	()	(X)
7.3	Stability		
	Equipment and assemblies of equipment are stable in Normal Use.	(X)	()
	Stability is maintained and automatic means or warning markings comply with 5.2.	()	(X)
7.4	Provisions for lifting and carrying	()	(X)
	Carrying handles or grips supplied.	()	(X)

Section 4 cont...

Clause	Requirement	Complies	Not applicable
	Equipment or parts weight \geq 18 kg; or	()	(X)
	Directions given in the manufacturer's documentation.	()	(X)
7.5	Expelled parts		
	Equipment contains or limits the energy.	()	(X)
	Protection not removable without the aid of a Tool.	()	(X)
8.0	Mechanical resistance to shock and impact	()	(X)
8.1	Rigidity test	()	(X)
8.2	Impact hammer test	()	(X)
8.3	Not used		
8.4	Drop test		
8.4.1	Equipment other than hand held	()	(X)
8.4.1.1	Corner drop test	()	(X)
8.4.1.2	Face drop test	()	(X)
8.4.2	Hand-held equipment	()	(X)
9.0	Equipment temperature limits and protection against the spread of fire		
9.1	General		
	Heating does not cause a hazard, either:		
	- in Normal Condition or	(X)	()
	- in Single Fault Condition	(X)	()
	- nor cause spread of fire outside the equipment.	(X)	()

Section 4 cont...

Clause	Requirement	Complies	Not applicable
	Easily touched heated surfaces (see 5.2).	()	(X)
	Separation of circuits at least by Basic Insulation.	(X)	()
	Alternative protection - annex F	()	(X)
	See details in Test record T1		
9.2	Temperature tests	(X)	()
	Values of table 3.		
9.2.1	Heating equipment	()	(X)
9.2.2	Equipment intended for installation in a cabinet or wall.	(X)	()
9.3	Guards		
	Surfaces liable to exceed 100 °C.	()	(X)
	Guards removable	()	(X)
9.4	Field-wiring Terminal boxes		
	Field-wiring Terminal box or compartment.	()	(X)
	Temperature Rating of the cable.	()	(X)
	Marking adjacent to the field-wiring Terminals, or visible:	()	(X)
	- During installation;	()	(X)
	- After installation.	()	(X)

Section 4 cont...

Clause	Requirement	Complies	Not applicable
	Overtemperature protection devices		
	Loss of cooling		
	Equipment having a heating control system.	()	(X)
	Overtemperature protection device which operates in a Single Fault Condition.	()	(X)
9.5	Devices actuated by temperature, liquid level, airflow or other means.	()	(X)
	Overtemperature protection device does not operated in normal use.	()	(X)
	Self-resetting overtemperature device.	()	(X)
9.6	Overcurrent protection	()	(X)
	Mains operated equipment protected by:		
	- fuses;	(X)	()
	- circuit-breakers;	()	(X)
	- thermal cut-outs;	()	(X)
	- impedance limiting circuits or similar means.	()	(X)
	(See also 6.5)		
9.6.1	Permanently Connected Equipment		
	Overcurrent protection devices fitted.	()	(X)
	Manufacturer's instructions specify devices.	()	(X)
9.6.2	Other equipment		
	Protection provided within the equipment.	()	(X)
	Overcurrent protection devices not in the protective conductor.	()	(X)
	Fuses or single pole circuit-breakers not fitted.	()	(X)

Section 4 cont...

Clause	Requirement	Complies	Not applicable
10.0	Resistance to heat		
10.1	Integrity of Clearances and Creepage Distances	(X)	()
10.2	Resistance to heat of non-metallic Enclosures For details of non-metallic enclosures See details in Test record T1.	()	(X)
10.3	Resistance to heat of insulating material - For mains supply. - For Terminals.	() ()	(X) (X)
11.0	Protection against hazards form fluids		
11.1	General	()	(X)
11.2	Cleaning	()	(X)
11.3	Spillage	()	(X)
11.4	Overflow	()	(X)
11.5	Battery electrolyte Battery electrolyte leakage presents no hazard.	()	(X)

Section 4 cont...

Clause	Requirement	Complies	Not applicable
11.6	Specially protected equipment Where the equipment is Rated and marked by the manufacturer.	()	(X)
11.7	Fluid pressure and leakage		
11.7.1	Maximum pressure	()	(X)
11.7.2	Leakage and rupture at high pressure	()	(X)
11.7.3	Leakage from low pressure parts	()	(X)
11.7.4	Overpressure safety device	()	(X)
12.0	Protection against radiation, including laser sources, and against sonic and ultrasonic pressure		
12.1	General		
12.2	Equipment producing ionizing radiation	()	(X)
12.2.1	Ionizing radiation	()	(X)
12.2.2	Accelerated electrons	()	(X)
12.3	Ultra-violet radiation	()	(X)
12.4	Micro-wave radiation	()	(X)
12.5	Sonic and ultrasonic pressure	()	(X)
12.5.1	Sound pressure level	()	(X)
12.5.2	Ultrasonic pressure	()	(X)

Section 4 cont...

Clause	Requirement	Complies	Not applicable
12.6	Laser sources (see IEC 825)	(X)	()
13.0	Protection against liberated gases, explosion and implosion		
13.1	Poisonous and injurious gases	()	(X)
13.2	Explosion and implosion	()	(X)
13.2.1	Components		
	Components liable to explode (see also 7.5)	()	(X)
	Pressure release devices correctly located.	()	(X)
	Pressure release device not obstructed.	()	(X)
13.2.2	Batteries		
	- Battery (explosion/fire hazard)	()	(X)
	- Protection is incorporated in the equipment.	()	(X)
	- Instructions specify batteries to be used.	()	(X)
	- Warning marking or symbol 14.	()	(X)
	- Battery compartment design.	()	(X)
13.3	Implosion of high-vacuum devices	()	(X)
	High vacuum devices are:		
	- intrinsically protected; or	()	(X)
	-Enclosure provides protection.	()	(X)
	Non-intrinsically protected tube.	()	(X)
	Separate glass screen.	()	(X)

Section 4 cont...

Clause	Requirement	Complies	Not applicable
	Cathode-ray tube or high-vacuum device mounting.	()	(X)
	Cathode-ray tube meet IEC 65	()	(X)
14.0	Components		
14.1	General		
	Safety components comply with IEC standards (see section 2).	(X)	()
	Components are marked and operated within their marked ratings.	(X)	()
14.2	Motors	()	(X)
14.2.1	Motor temperatures	()	(X)
14.2.2	Series excitation motors	()	(X)
14.3	Overtemperature protection devices		
	Devices operating in a Single Fault Condition:		
	- are constructed and tested;	()	(X)
	- are Rated for voltage and current interrupt;	()	(X)
	- are Rated for the maximum surface temperature;	()	(X)
	- meet the requirements of 9.5.	()	(X)
14.4	Fuse holders	(X)	()
14.5	Mains voltage selecting devices	()	(X)

Section 4 cont...

Clause	Requirement	Complies	Not applicable
14.6	High Integrity components Positions of use (see section 2). Evaluated to IEC Publications. A single electronic device.	()	(X)
14.7	Mains transformers	(X)	()
14.7.1	Short-circuit tests Tested Transformers meet 4.4.4.1 to 4.4.4.3. <i>TUV and UL listed external power supply</i>	(X) (X)	() ()
14.7.2	Overload tests Transformer meets 4.4.4.1 to 4.4.4.3. <i>TUV and UL listed external power supply</i>	(X)	()
15.0	Protection by interlocks		
15.1	General Interlocks are designed to remove a hazard. Exceptions for 2 s - Easily touched parts; - Moving parts; or - marking used. Warning markings.	() () () () ()	(X) (X) (X) (X) (X)
15.2	Prevention of reactivation	()	(X)
15.3	Reliability	()	(X)

Section 5

TEST RECORD T1

Clause 4.4 Testing in single fault condition

TESTS

Clause	Fault description	Test terminated because;	Test duration	Comments
4.4.2.1	N/A			
4.4.2.2	N/A			
4.4.2.7	Short-circuited all operator accessible I/O ports	Timed out	1 Hour	No hazard
4.4.2.9	N/A			
4.4.2.11	N/A			

Comments: During the single fault condition testing no hazard was introduced and equipment complied with the dielectric strength test after each fault.

Clause 5.3 Durability of markings

The markings on the equipment were tested with agent A or B and then agent C

Agents:

A- The cleaning agent specified by the manufacturer, N/A

B- Water

C- Isopropyl Alcohol

Section 5 cont...

RESULTS

Clause 5.1.2, Identification	<u>Pass</u>
Clause 5.1.3, Mains supply	<u>Pass</u>
Clause 5.1.4, Fuses	<u>N/A</u>
Clause 5.1.5, Measuring circuit terminals	<u>N/A</u>
Clause 5.1.6, Terminals and operating devices	<u>N/A</u>
Clause 5.1.7, Double/Reinforced equipment	<u>N/A</u>
Clause 5.1.8, Battery charging	<u>N/A</u>
Clause 5.2, Warning markings	<u>Pass</u>

Marking condition:

Still legible after rubbing	<u>Yes</u>
Did adhesive labels become loose	<u>No</u>
Did adhesive labels curl at the edges	<u>No</u>

Clause 6.3.1 Values in normal condition

RESULTS

Clause 6.3.1.1 Voltage

Location	Maximum voltage measured between	V rms	V peak	V d.c	Comments
DB-9 & DB-15	No voltage available				Pass
Mini-din connectors	1, 2, 4, 5			24.0	Pass

Section 5 cont...

Clause 6.3.2 Values in Single fault condition

RESULTS

Clause 6.3.2.1 Voltage

Location	Maximum voltage measured between	V rms	V peak	V d.c	Comments
DB-9 & DB-15	No voltage available				Pass
Mini-din connectors	No voltage available				Pass

Clause 7.3 Stability

METHOD

Clause 7.3	Comments
Tilted each side 10 degrees	Pass
Force of 250N applied to large equipment	Not Applicable

Clause 7.4 Provisions for lifting and carrying

Clause 7.4	Comments
Not Applicable	
Equipment weight is less than 18 Kg	

Section 5 cont...

Clause 7.3 Stability

Test	Comments
Tilted each side 10 degrees	Unit did not tip over
Tilted each side 10 degrees	Unit did not tip over

8.1 Rigidity test

Location	Comments
Top rear side of enclosure	No Hazard

8.2 Impact hammer test

Location	Comments
Appliance Receptacle	No Hazard

8.4.1.1 Corner drop test

Location	Comments
All 4 corners subjected	No Hazard

8.4.1.2 Face drop test

Location	Comments
All 4 sides subjected	No Hazard

Section 6

APPENDIX A

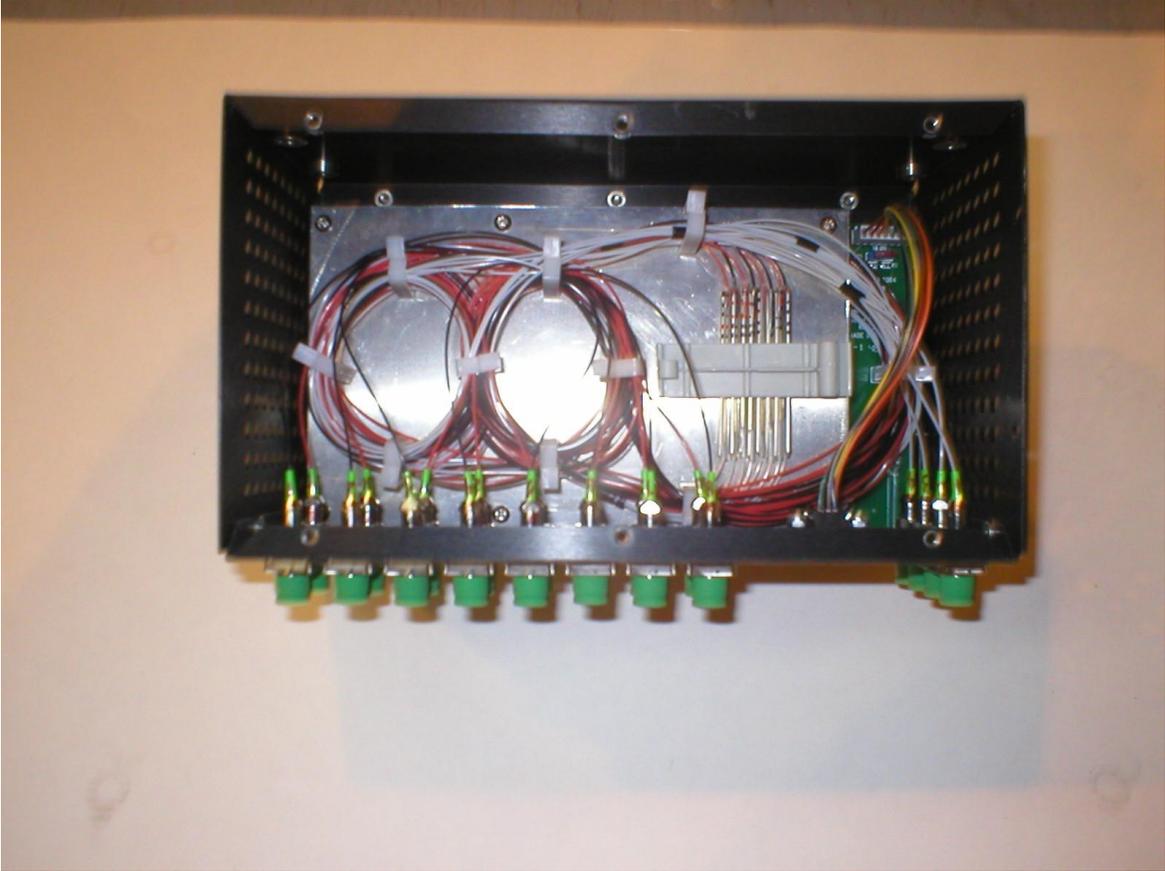
Section 7

PHOTOGRAPHS

Photographs cont...



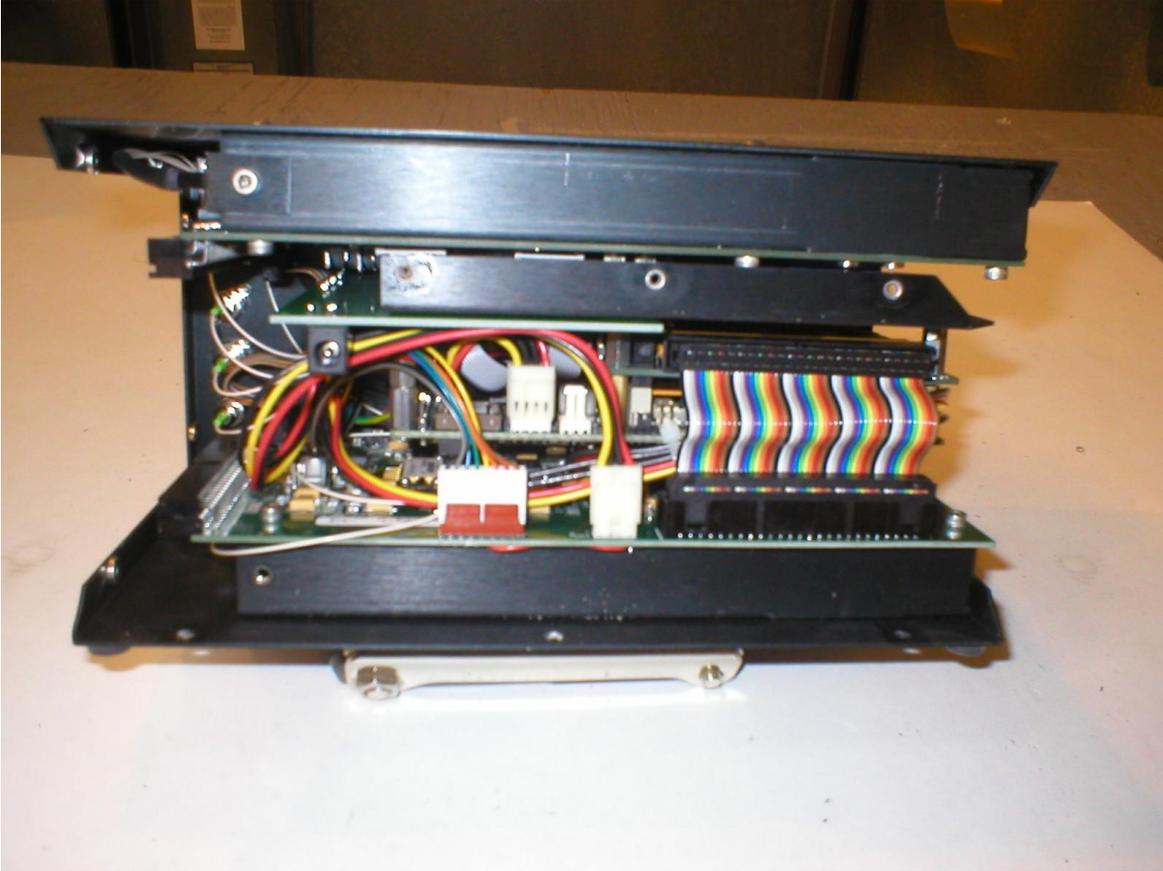
Photographs cont...



Photographs cont...



Photographs cont...



Photographs cont...



LAST PAGE