

Nederlands Meetinstituut

Certificaat

Certificaatnummer 3701612-01
Blad 1 van 4

Aanvrager KH-Services
Energieweg 1
2627 AP DELFT

In opdracht van KTL-Telefication
Utrechtseweg 310
6812 AR ARNHEM

Aangeboden Biconilog antenne voor EMC metingen,
Fabrikaat : EMCO
type : 3143
serienr. : 9608-1312 (10 m OATS antenne)
identificatie : geen

Wijze van onderzoek De antenne is onderzocht conform de standaard antenna methode, beschreven in de norm ANSI C63.5, waarbij gebruik is gemaakt van een bekende breedbandantenne welke tegen referentiedipolen gekalibreerd is. De metingen zijn uitgevoerd op de NMI site te Delft op 10 m afstand bij horizontale polarisatie. Voor het verrichten van de metingen werd gebruik gemaakt van een scalaire network analyser. De metingen zijn verricht in het frequentiegebied van 30 MHz tot 1000 MHz bij een omgevingstemperatuur van $(20 \pm 5)^\circ\text{C}$.

Datum van Onderzoek 8 juni 1998 tot en met 9 juni 1998 *date of calibration*
08-06-1998 - 09-06-1998

Resultaat Het resultaat van de kalibratie is vermeld op blad 2 tot en met 4 van dit certificaat. De vermelde onzekerheid is gebaseerd op de standaardonzekerheid vermenigvuldigd met de dekkingsfactor $k = 2$.

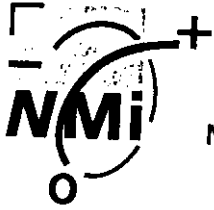
Herleidbaarheid De bij de kalibraties en metingen gebruikte meetmiddelen zijn herleidbaar naar primaire en/of (inter)nationale standaarden.

Uitgevoerd door:

Delft, 17 juni 1998
NMI Van Swinden Laboratorium B.V.

ing. G.M. Teunisse

dr. ir. G Rietveld
Afdelingsmanager Elektriciteit en Magnetisme

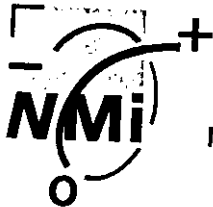


Resultaat

In tabel 1 wordt het resultaat van de kalibratie bij 10 m afstand over het frequentiegebied 30 MHz tot 200 MHz weergegeven. De onzekerheid (2 s) bedraagt voor de waarden tot en met 60 MHz: 1,0 dB en boven 60 MHz: 0,7 dB.

TABEL 1

Freq. MHz	AF dB(1/m)	Freq. MHz	AF dB(1/m)	Freq. MHz	AF dB(1/m)
30	13,0	88	5,8	146	12,5
32	12,0	90	5,6	148	11,4
34	11,0	92	5,4	150	9,7
36	10,2	94	5,4	152	8,7
38	9,6	96	5,5	154	8,3
40	8,8	98	5,5	156	8,0
42	8,1	100	5,7	158	7,9
44	7,3	102	5,9	160	7,8
46	6,5	104	5,9	162	7,8
48	5,8	106	5,9	164	7,7
50	4,8	108	5,8	166	7,6
52	4,2	110	5,6	168	7,6
54	3,9	112	5,7	170	7,5
56	3,8	114	5,9	172	7,7
58	3,8	116	6,1	174	8,2
60	4,0	118	6,2	176	8,1
62	4,2	120	6,3	178	8,2
64	4,5	122	6,5	180	8,2
66	4,8	124	6,7	182	8,4
68	5,1	126	6,6	184	8,5
70	5,3	128	6,6	186	8,6
72	5,6	130	6,8	188	8,8
74	5,9	132	7,0	190	8,9
76	6,1	134	7,3	192	9,1
78	6,2	136	7,7	194	9,2
80	6,3	138	8,1	196	9,3
82	6,2	140	8,5	198	9,2
84	6,0	142	9,2	200	9,1
86	5,9	144	10,7		



In tabel 2 wordt het resultaat van de kalibratie bij 10 m afstand over het frequentiegebied 200 MHz tot 1 GHz weergegeven. De onzekerheid (2 s) bedraagt voor de waarden tot 700 MHz: 1,0 dB en vanaf 700 MHz: 1,5 dB.

TABEL 2

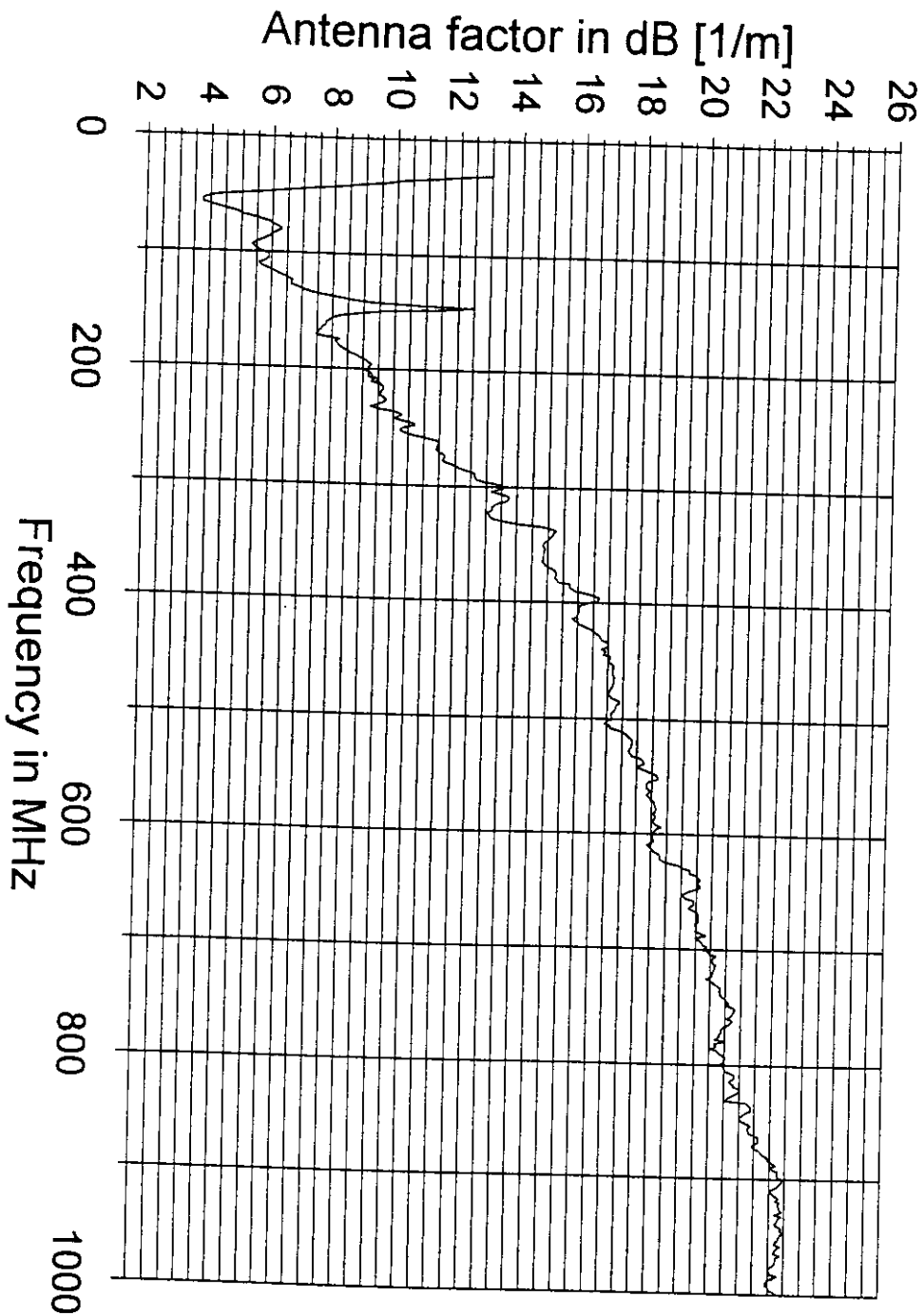
Freq. MHz	AF dB(1/m)	Freq. MHz	AF dB(1/m)	Freq. MHz	AF dB(1/m)
200	9,0	470	17,2	740	20,8
210	9,3	480	17,1	750	21,2
220	9,6	490	17,3	760	21,1
230	9,5	500	17,2	770	20,9
240	10,2	510	17,4	780	21,0
250	10,3	520	17,8	790	20,8
260	11,3	530	17,8	800	20,8
270	11,5	540	18,1	810	21,3
280	11,8	550	18,7	820	21,3
290	12,6	560	18,3	830	21,2
300	13,6	570	18,5	840	21,9
310	13,7	580	18,6	850	21,6
320	13,2	590	18,6	860	21,8
330	13,5	600	18,5	870	21,9
340	15,2	610	18,4	880	22,4
350	14,8	620	18,8	890	22,5
360	14,9	630	19,5	900	22,9
370	15,1	640	20,1	910	22,5
380	15,3	650	19,8	920	22,9
390	15,9	660	19,9	930	22,7
400	16,4	670	20,1	940	22,8
410	16,0	680	20,0	950	22,8
420	16,2	690	20,0	960	22,8
430	16,7	700	20,2	970	22,8
440	16,8	710	20,5	980	22,6
450	17,0	720	20,6	990	22,4
460	17,2	730	20,6	1000	22,8



Nederlands Meetinstituut

Certificaatnummer
Blad 4 van 4

3701612-01



Biconilog antenna EMCO 3143

sr.nr.: 9608-1312; June 1998

Normalized Site Attenuation OATS, 10 m distance

Measured: Horizontal and Vertical Polarization: 14 October 1998 by P. Suringa

Used equipment (both hor. and vert. Pol.):

Generator: Marconi 2042

Output power: +13 dBm

Attenuators: Both Hor and Vert pol: HP8491A, serial no's 36213 and 36209

Cables: CC, AA, RG-8/U Roll, 10m extension cable

Transmitting antenna 30-200 MHz: Schwarzbeck BBA9106

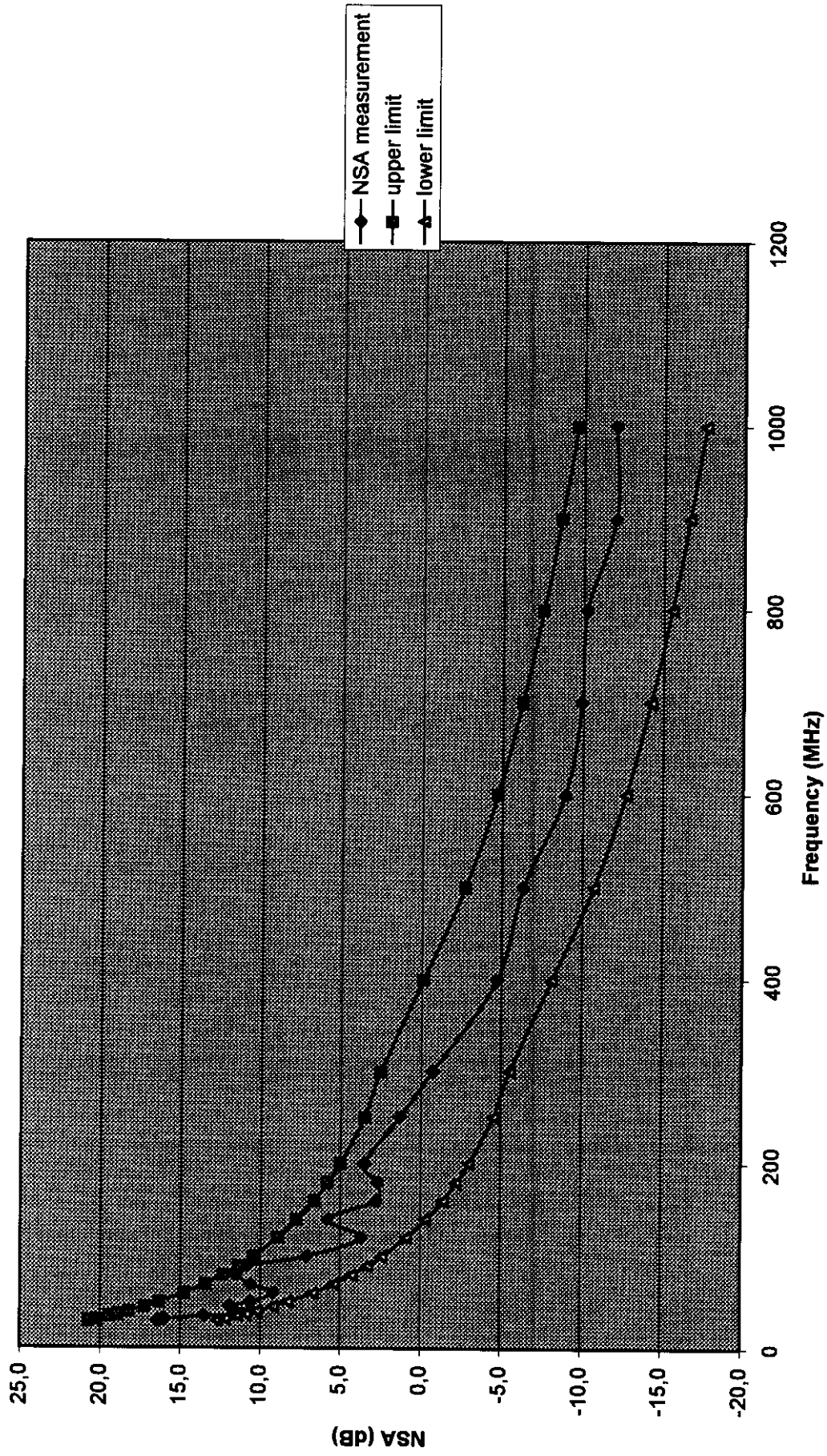
Transmitting antenna 200-1000 MHz: EMCO 3147

Receiving antenna 30-200 MHz: EMCO 3143, serial no 1140

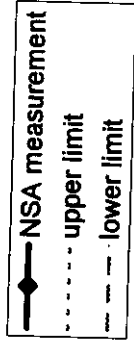
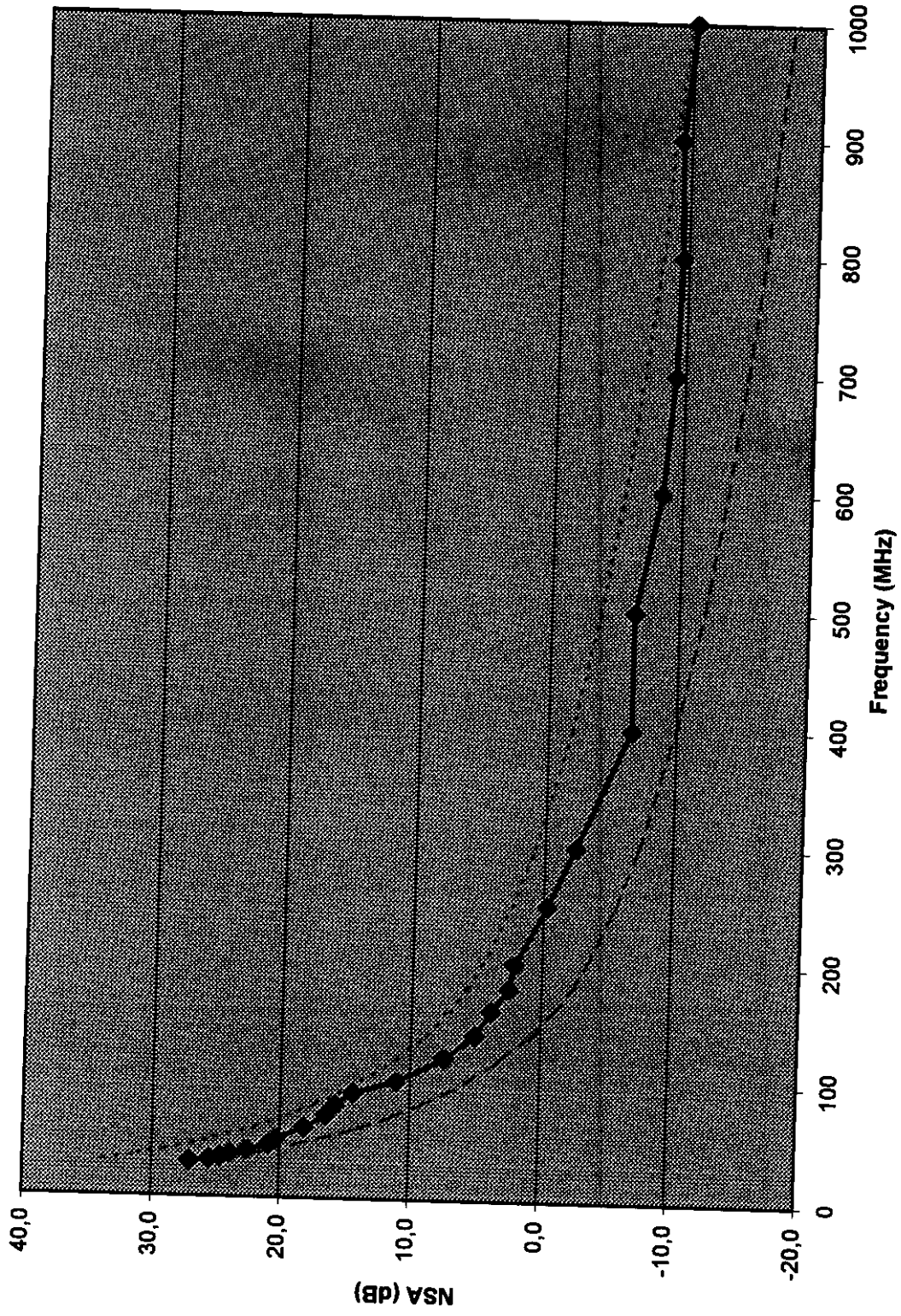
Receiving antenna 200-1000 MHz: EMCO 3143, serial no 1140

f (MHz)	V-dir (dBuV)		V-Site (dBuV)		SA (dB)		AF-RX (dB/m)		AF-TX (dB/m)		NSA (dB)		CISPR18 (dB)		delta (dB)		lower limit (dB)		upper limit (dB)	
	Hor	Vert	Hor	Vert	Hor	Vert	Hor	Vert	Hor	Vert	Hor	Vert	Hor	Vert	Hor	Vert	Hor	Vert	Hor	Vert
30	106,2	106,2	46,3	57,0			13,0	13,0	19,8	19,8	27,1	16,4	29,8	16,7	-2,7	-0,3	25,8	12,7	33,8	20,7
32	106,2	106,2	49,0	58,5			12,2	12,2	19,5	19,5	25,5	16,0	28,7	16,2	-3,2	-0,2	24,7	12,2	32,7	20,2
35	106,2	106,2	52,3	63,5			10,8	10,8	18,4	18,4	24,7	13,5	27,1	15,4	-2,4	-1,9	23,1	11,4	31,1	19,4
37	106,2	106,2	54,8	67,0			10,1	10,1	17,4	17,4	23,9	11,7	26,2	14,9	-2,3	-3,2	22,2	10,9	30,2	18,9
40	105,8	105,8	57,7	69,7			9,1	9,1	16,4	16,4	22,6	10,6	24,9	14,2	-2,3	-3,6	20,9	10,2	28,9	18,2
45	105,8	105,8	63,5	72,5			7,1	7,1	14,3	14,3	20,9	11,9	22,9	13,2	-2,0	-1,3	18,9	9,2	26,9	17,2
50	105,7	105,7	68,3	78,0			4,9	4,9	12,2	12,2	20,3	10,6	21,1	12,3	-0,8	-1,7	17,1	8,3	25,1	16,3
60	105,5	105,5	75,0	84,0			4,0	4,0	8,3	8,3	18,2	9,2	18,0	10,7	0,2	-1,5	14,0	6,7	22,0	14,7
70	105,3	105,3	78,8	82,7			5,4	5,4	6,6	6,6	16,5	10,6	15,5	9,4	1,0	1,2	11,5	5,4	19,5	13,4
80	105,2	105,2	76,2	80,5			6,3	6,3	6,9	6,9	15,8	11,5	13,3	8,3	2,5	3,2	9,3	4,3	17,3	12,3
90	105,0	105,0	76,7	78,7			5,6	7,7	8,3	7,7	14,4	10,8	11,4	9,2	3,0	1,6	7,4	3,3	15,4	11,3
100	104,7	104,7	77,3	81,3			5,6	5,6	10,7	10,7	11,1	7,1	9,7	6,4	1,4	0,7	5,7	2,4	13,7	10,4
120	104,5	104,5	77,5	81,2			6,3	6,3	13,3	13,3	7,4	3,7	7,0	4,9	0,4	-1,2	3,0	0,9	11,0	8,9
140	104,2	104,2	75,0	74,3			9,6	9,6	14,5	14,5	5,1	5,8	4,8	3,7	0,3	2,1	0,8	-0,3	8,8	7,7
160	104,0	104,0	77,2	78,2			7,7	7,7	15,3	15,3	3,8	2,8	3,1	2,6	0,7	0,2	-0,9	-1,4	7,1	6,6
180	103,7	103,7	77,0	76,8			8,2	8,2	16,0	16,0	2,5	2,7	1,7	1,8	0,8	0,9	-2,3	-2,2	5,7	5,8
200	103,5	103,5	82,2	80,8			9,0	9,0	10,2	10,2	2,1	3,5	0,6	1,0	1,5	2,5	-3,4	-3,0	4,6	5,0
250	102,7	102,7	80,3	76,7			10,4	10,4	12,3	12,3	-0,3	1,3	-1,6	-0,5	1,3	1,8	-5,6	-4,5	2,4	3,5
300	102,3	102,3	78,3	75,2			12,9	12,9	13,5	13,5	-2,4	-0,7	-3,3	-1,5	0,9	0,8	-7,3	-5,5	0,7	2,5
400	101,0	101,0	74,3	72,5			16,7	16,7	16,5	16,5	-6,5	-4,7	-5,9	-4,1	-0,6	-0,6	-9,9	-8,1	-1,9	-0,1
500	100,2	100,2	71,7	71,5			17,2	17,2	17,8	17,8	-6,5	-6,3	-7,9	-6,7	1,4	0,4	-11,9	-10,7	-3,9	-2,7
600	99,5	99,5	70,5	71,0			18,4	18,4	19,0	19,0	-8,4	-8,9	-9,5	-8,7	1,1	-0,2	-13,5	-12,7	-5,5	-4,7
700	98,8	98,8	67,3	68,0			20,2	20,2	20,5	20,5	-9,2	-9,9	-10,8	-10,2	1,6	0,3	-14,8	-14,2	-6,8	-6,2
800	98,2	98,2	65,8	66,5			20,6	20,6	21,3	21,3	-9,5	-10,2	-12,0	-11,5	2,5	1,3	-16,0	-15,5	-8,0	-7,5
900	97,3	97,3	61,5	64,2			22,6	22,6	22,5	22,5	-9,3	-12,0	-12,8	-12,6	3,5	0,6	-16,8	-16,6	-8,8	-8,6
1000	96,7	96,7	61,2	63,0			22,7	22,7	23,0	23,0	-10,2	-12,0	-13,8	-13,6	10,0	1,6	-17,8	-17,6	-9,8	-9,6

NSA OATS 1998, Vertical Polarization 10 m distance



NSA OATS 1998 Horizontal Polarization 10 m distance



Below 100 MHz, the function of the baluns may also be checked by removing the elements, placing a 70 Ω resistor across the terminals of the element mounting block, and measuring the VSWR of the terminated balun. The VSWR should be less than 1,5 to 1.

Table G.1 – Normalized site attenuation*

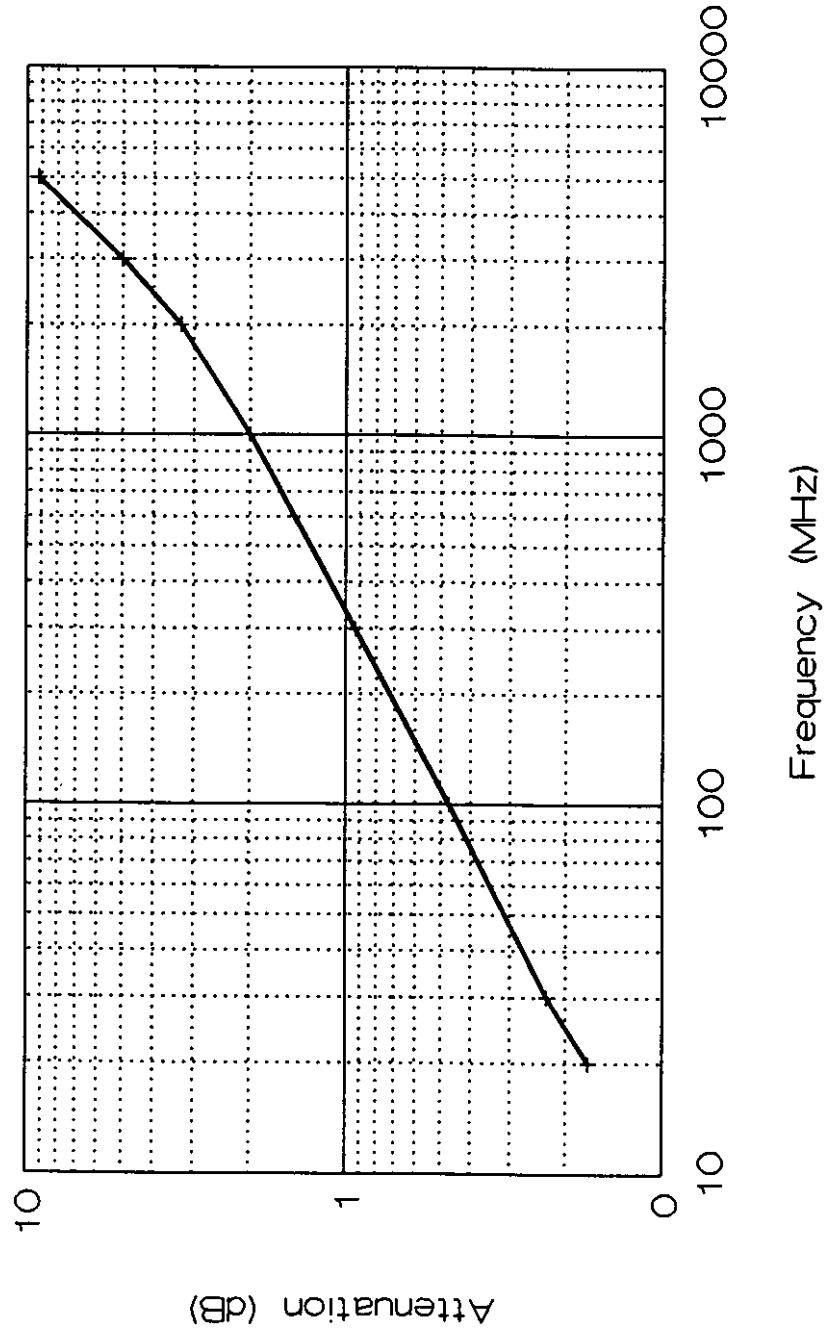
(Recommended geometries for broadband antennas)

Polarization	Horizontal	Horizontal	Horizontal	Horizontal	Vertical	Vertical	Vertical	Vertical
R (m)	3	10	30	30	3	10	30	30
h_1 (m)	1	1	1	1	1	1	1	1
h_2 (m)	1 to 4	1 to 4	2 to 6	1 to 4	1 to 4	1 to 4	2 to 6	1 to 4
f_m (MHz)	A_N (dB)							
30	15,8	29,8	44,4	47,8	8,2	16,7	26,1	26,0
35	13,4	27,1	41,7	45,1	6,9	15,4	24,7	24,7
40	11,3	24,9	39,4	42,8	5,8	14,2	23,6	23,5
45	9,4	22,9	37,3	40,8	4,9	13,2	22,5	22,5
50	7,8	21,1	35,5	38,9	4,0	12,3	21,6	21,6
60	5,0	18,0	32,4	35,8	2,6	10,7	20,1	20
70	2,8	15,5	29,7	33,1	1,5	9,4	18,7	18,7
80	0,9	13,3	27,5	30,8	0,6	8,3	17,6	17,5
90	-0,7	11,4	25,5	28,8	-0,1	7,3	16,6	16,5
100	-2,0	9,7	23,7	27	-0,7	6,4	15,7	15,6
120	-4,2	7,0	20,6	23,9	-1,5	4,9	14,1	14,0
140	-6,0	4,8	18,1	21,2	-1,8	3,7	12,8	12,7
160	-7,4	3,1	15,9	19	-1,7	2,6	11,7	11,5
180	-8,6	1,7	14,0	17	-1,3	1,8	10,8	10,5
200	-9,6	0,6	12,4	15,3	-3,6	1,0	9,9	9,6
250	-11,9	-1,6	9,1	11,6	-7,7	-0,5	8,2	7,7
300	-12,8	-3,3	6,7	8,8	-10,5	-1,5	6,8	6,2
400	-14,8	-5,9	3,6	4,6	-14,0	-4,1	5,0	3,9
500	-17,3	-7,9	1,7	1,8	-16,4	-6,7	3,9	2,1
600	-19,1	-9,5	0	0	-16,3	-8,7	2,7	0,8
700	-20,6	-10,8	-1,3	-1,3	-18,4	-10,2	-0,5	-0,3
800	-21,3	-12,0	-2,5	-2,5	-20,0	-11,5	-2,1	-1,1
900	-22,5	-12,8	-3,5	-3,5	-21,3	-12,6	-3,2	-1,7
1 000	-23,5	-13,8	-4,5	-4,4	-22,4	-13,6	-4,2	-3,5

* These data apply to antennas that have at least 25 cm of ground plane clearance when the centre of the antennas is 1 m above the ground plane in vertical polarization.

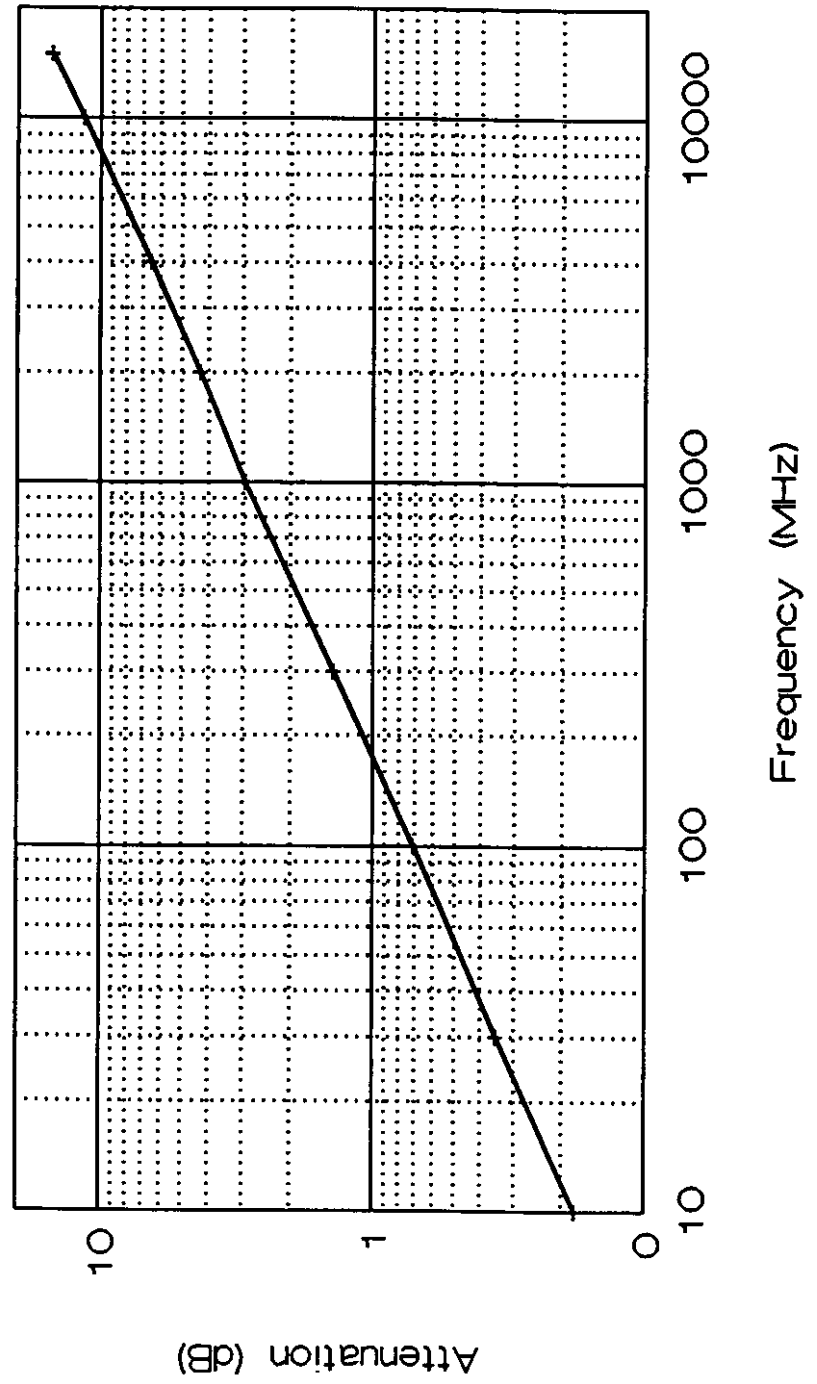
Cable Loss Telefication OATS Cable RG8 roll

— Roll
— RG-8/U cable



Cable Loss Telefication OATS Cable AA

— AA
Aircom cable



MODEL 1060 SPECIFICATIONS

turn table

ELECTRICAL

Voltage (tol:+10,-15V)	115/230 VAC	115/230 VAC
Frequency	50 Hz	60 Hz
Max Power Input	500 VA	500 VA
(Controller only)		
Motor Horsepower	1/3	1/4
RPM	.67	.8

MECHANICAL

• 1060-2M

Table Diameter	2 m	(6.56 ft)
Table Height	33 cm	(13.0 in)
Load Rating	907 kg	(2000 lb)

1060-2.5M

Table Diameter	2.5 m	(8.20 ft)
Table Height	33 cm	(13.0 in)
Load Rating	1134 kg	(2500 lb)

1060-3M

Table Diameter	3.0 m	(9.84 ft)
Table Height	33 cm	(13.0 in)
Load Rating	1134 kg	(2500 lb)

SPECIFICATIONS

antenna mast.

Voltage (Switch Selectable)	100/115 VAC	230 VAC
Frequency	60 Hz	50 Hz
Max Power Input	750 VA	750 VA
Motor Horsepower	1/6 hp	1/6 hp
Max Load Rating		
Crossboom (Tip)	22.7 kg (50 lb)	22.7 kg (50 lb)
Crossboom (Center)	34.0 kg (75 lb)	34.0 kg (75 lb)
Lift Velocity	11.9 cm/sec (4.7 in/sec)	10.16 cm/sec (4.0 in/sec)
Overall Size		
Height	7 m (23 ft)	7 m (23 ft)
Base Width	1.2 m (48.0 in)	1.2 m (48.0 in)
Base Depth	1.2 m (48.0 in)	1.2 m (48.0 in)
Weight	86.2 kg (190 lb)	86.2 kg (190 lb)
Polarization Option		
Angular Velocity	3-30 deg/sec	3-30 deg/sec
Max psi	35 psi (2.4 bar)	35 psi (2.4 bar)

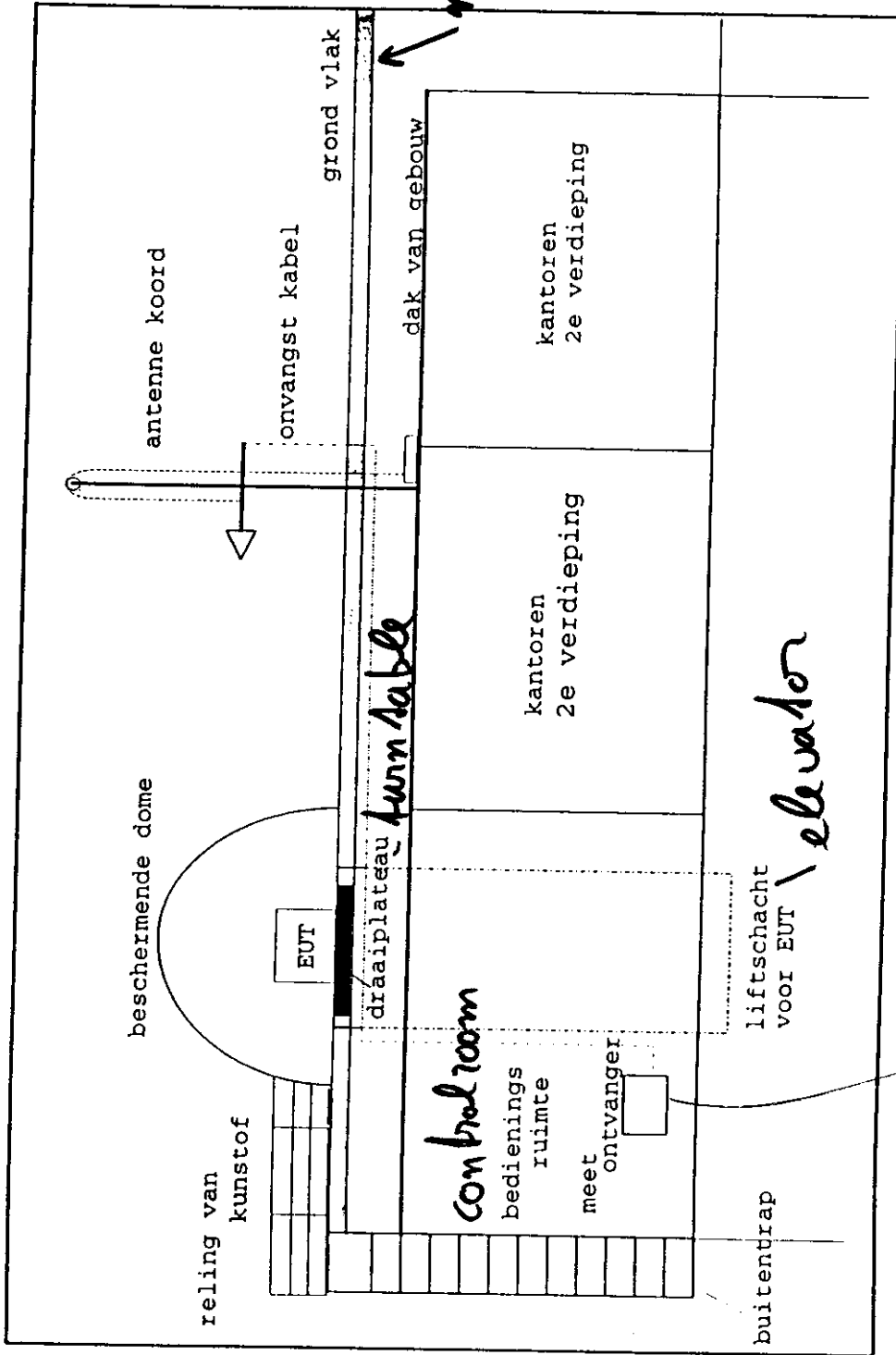
Conversion: 1 bar = 100 kpa = 14.5 psi

DESCRIPTION
OF OPTIONS

Any one or combination of the following options is available:

STD - Standard Option Package:

Includes 10 m (32.8 ft) control cable, safety brake, and manual antenna polarization change.



measure ment receiver

82919-KRQ/EMC 99-4066

Emission measurements concerning a Medical
Workstation Display, manufactured by BARCO N.V.

Arnhem, February 15th 1999

Author H.T. Jonker

By order of BARCO N.V. at Kortrijk, Belgium.

author : H.T. Jonker

B

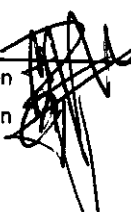
38 pages

4 annexes

MWE

reviewed : A.T. van der Meijden

approved : A.T. van der Meijden


29/02/20

MEASUREMENT/TECHNICAL REPORT**BARCO N.V.****FCC ID: N97CH321PLUS00**

15 February 1999

This report concerns (check one):		<input checked="" type="checkbox"/> Original grant	<input type="checkbox"/> Class II change
Equipment type: Class B personal computer peripheral (monitor)			
Measurement procedure used:			
ANSI C63.4-1992			
Application for Certification prepared by:		Applicant for the device:	
Name	: H.T. Jonker	Name	: N. Lietaert
Company Name	: KRQ Nederland B.V.	Company Name	: BARCO N.V.
Address	: Utrechtseweg 310	Address	: Theodoor Sevenslaan 106
Telephone	: +31 (0) 263563940	Telephone	: +32 (0) 56233211
Telefax	: +31 (0) 263510178	Telefax	: +32 (0) 56233457
Postal code	: 6812 AR	Postal code	: B-8500
City/Place	: Arnhem	City/Place	: Kortrijk
Country	: The Netherlands	Country	: Belgium

1 GENERAL INFORMATION

1.1 Product Description

This report presents the results of a FCC emission survey performed on a medical workstation display used for computer devices.

The DUT is a peripheral to a digital (computing) device used in non-residential environments. Therefore the DUT is considered to be a digital device class A and thus should be subjected to the verification procedure.

However, on request of the applicant, the DUT is subjected to the certification procedure and shall meet the class B limits.

Refer to exhibit B and C for the enclosed leaflet and user manual for a short product description.

1.2 Configuration of Tested System

The DUT was tested in a typical user configuration. The monitor was connected to a FCC approved computer system (as described underneath) during the emission tests.

1.2.1 Equipment under test

Device	: monitor
Trade mark	: BARCO
Type	: MWD 321 PLUS
Serial number	: 5151551
FCC ID	: N97CH321PLUS00
Description	: Display used for computer devices
Power supply	: SMPS 100 - 240 V _{ac}
Oscillators	: - SMPS 28,5 kHz - Standby 130 kHz - microcontroller 11.059 MHz - horizontal defl. 30 kHz - 90 kHz - vertical defl. 48 Hz - 150 Hz
Enclosure	: plastic
Interface cabling	: RGB (monitor) cable, length 1.5 m, not shielded power supply line, length 1.5 m, not shielded serial remote cable (optional) not present during test

1.3 Photographs of the tested system

The exterior photographs of the tested monitor are shown in annex A, the interior photographs of the tested monitor are shown in annex B.

1.4 Block diagrams of the tested system

The block diagram of the complete monitor is shown in annex C. Block diagrams of all subparts of the monitor are presented in exhibit B together with a brief explanation.

1.5 Test Methodology

Both conducted and radiated testing were performed according to the procedures as mentioned in Section 15.107a and Section 15.109a of CFR47, Part 15 subpart B. According to Section 15.101a this type of device shall be classified as a Class B Personal Computers & Peripherals device and thus is subject to Certification. The measurements were performed in accordance with the test methodology of ANSI C63.4-1992.

The requirements of section 11.1.3 of ANSI C63.4 regarding the test conditions for visual display units were taken into account.

1.6 Test Facility

The conducted measurement and the anechoic room facility used to collect the (pre-scan) radiated and conducted measurement data are located at the premises of KEMA Nederland B.V., Utrechtseweg 310, in Arnhem, The Netherlands. The FCC has per Public Notice declared this measurement facility had been reviewed and to be in compliance with the requirements of Section 2.948 of the FCC Rules. It was accepted by letter with accreditation number 31040/SIT; 1300F2, dated January 13 1998.

Final radiated emission measurements were carried out at the KTL OATS which is also located at the premises of KEMA Nederland B.V. at Arnhem. A description of this test site and an copy of the request and the response from the commission is presented in exhibit E.

3 SYSTEM TEST CONFIGURATION

3.1 Justification

The system was configured for testing in a typical fashion (as a customer would normally use it).

The measured values of conducted disturbance voltages and radiated electromagnetic fieldstrength levels depend largely on the chosen resolution and graphical mode.

The system was tested in the graphics resolution mode of 1600 x 1200 x 70 Hz. This mode was found to be worst case during preliminary measurements, this mode was used to collect the included data.

The contrast- and the brightness control were set to maximum. The display was constantly showing a pattern of scrolling H's using the intel software as specified in section 3.2 of this report.

3.2 EUT Exercise Software

The EUT exercise program used during radiated and conducted emission testing was designed to exercise the various system components in a manner similar to a typical use. The software, contained on a 3-1/2 inch disc, was inserted into drive A and is auto-starting on power-up. Once loaded, the program sequentially exercises each system component in turn. The sequence used is: (1) an H is printed on the monitor, (2) 3½ inch FDD exercised, (3) mass storage devices exercised, (4) printer 1 receives a string, and (5) printer 2 prints an H. The complete cycle takes about 2 seconds and is repeated continuously. As the keyboard and mouse are strictly input devices, no data is transmitted to them during test. They are, however, continuously scanned for data input activity.

The applied EUT exercise software was EMC test software, Version 1.8 manufactured by Intel.

3.3 Equipment Modifications

Not applicable.



figure 4.6 radiated emission test setup at the OATS

5.3 Measured Data (Mains conducted disturbance voltage) AC PORT MONITOR

Standard : FCC, Part 15 Subpart B, Class B
Limits :

Frequency [MHz]	Limit [dB(μV)]
0.45 - 30.0	48.0

Port : AC mains supply monitor, Line/Neutral
Results :

Frequency [MHz]	Level Line [dB(μV)]	Level Neutral [dB(μV)]	Limit [dB(μV)]
0.52	42.2	42.9	48.0
0.61	29.8	29.8	48.0
0.76	24.8	25.8	48.0
8.74	25.6	24.8	48.0
11.66	34.5	35.5	48.0
14.95	42.8	41.5	48.0
17.82	32.0	30.9	48.0
19.17	30.8	30.7	48.0
28.19	24.0	25.0	48.0

Measurement uncertainty: 2 dB

Note : All readings are quasi-peak unless stated otherwise, using a quasi-peak bandwidth of 9 - 10 kHz.

Judgement : Pass (Passed by 5.1 dB)

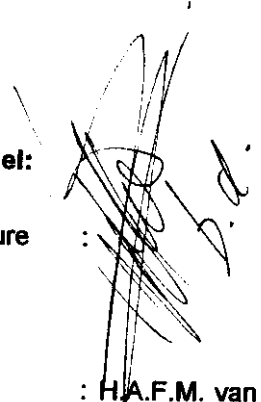
Test personnel:

Tester Signature :

Date:

Name

: H.A.F.M. van Rossum



26/02/99

6 RADIATED EMISSION DATA

6.1 Test Procedure

In accordance with § 15.109a the field strength levels of radiated emissions from this digital device at an increased distance of 10 meters were determined over the frequency range from 30 MHz up to 1000 MHz. The measurement shall show compliance of this Class B digital device with the field strength limits as mentioned in clause 6.4.. The test set-up was in accordance with the requirements of ANSI C63.4-1992.

Since the highest frequency generated in the DUT is 11.059 MHz the highest frequency of interest is 1000 MHz.

Preliminary radiation measurements were performed in a compact anechoic room at a 3 meter test distance. The investigated frequency range from 30 MHz to 1000 MHz was scanned with aid of the automatic test receiver ESVS10. This receiver automatically calculates the resulting field strength using the entered correction factor for cable loss and antenna factor. The resulting radiation levels are plotted. Annex D presents some relevant plots.

Radiation scans were made for various angles of the set-up with respect to the antenna and also for vertical as well as for horizontal antenna polarizations. As a result of the preliminary scans a list remains with frequencies at which relevant spurious radiation levels were detected.

The final measurements in the frequency range 30 - 1000 MHz were performed on the open area test site (OATS). At those frequencies where relevant significant levels were detected in the compact anechoic room measurements were made on the open field to determine the actual field strength levels. At the open area test site the test receiver, type ESV make Rohde & Schwarz, is used for determining the levels. This receiver automatically selects the quasi-peak detector function with a bandwidth of 120 kHz when switched to the CISPR weighing mode.

The antennas were oriented both for vertical and horizontal polarizations. At each frequency at which a spurious component is present the receiving antenna is raised and lowered through the range of heights of 1 to 4 meter and the table with the test set-up is rotated through 360° in the horizontal plane to ensure maximum signal reception by the receiver.

The final measurements at the OATS were performed at a increased measurement distance of 10 meters for practical reasons.

The data presented in clause 6.4 lists the significant emission frequencies, measured levels, correction factor (includes cable correction and antenna factors), the corrected reading, plus the limit. An explanation of the Correction Factor is given in paragraph 6.2.

6.4 Radiated electromagnetic field strength

Standard : FCC, Part 15 Subpart B, Class B
Limits :

Frequency [MHz]	Limit 3 m [dB(μ V/m)]	Limit 10 m [dB(μ V/m)]
30 - 88	40.0	30.0
88 - 216	43.5	33.5
216 - 960	46.0	36.0
960 and up	54.0	44.0

Port : Enclosure with cabling, measurement distance 10 meters

Results :

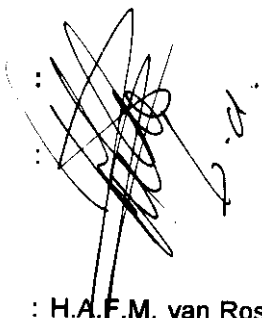
Frequency [MHz]	Pol [V/H]	Measured [dB(μ V)]	Correction [dB(m)]	Level [dB(μ V/m)]	Limit [dB(μ V/m)]
31.3	H/V			< 15.0	30.0
35.0	H/V			< 15.0	30.0
36.0	H/V			< 15.0	30.0
39.0	H/V			< 15.0	30.0
54.0	V	15.0	5.7	20.7	30.0
81.0	H	12.0	7.6	19.6	30.0
243.0	V	14.0	12.7	26.7	36.0
270.0	V	13.5	14.2	27.7	36.0
378.0	H	7.0	18.3	25.3	36.0
405.0	H	9.0	20.1	29.1	36.0
485.9	H	10.0	20.9	30.9	36.0

Note : Levels which were clearly caused by the PC are not mentioned in the above table.

Judgement : Pass (Margin is 5.1 dB).

Test personnel :

Tester Signature :

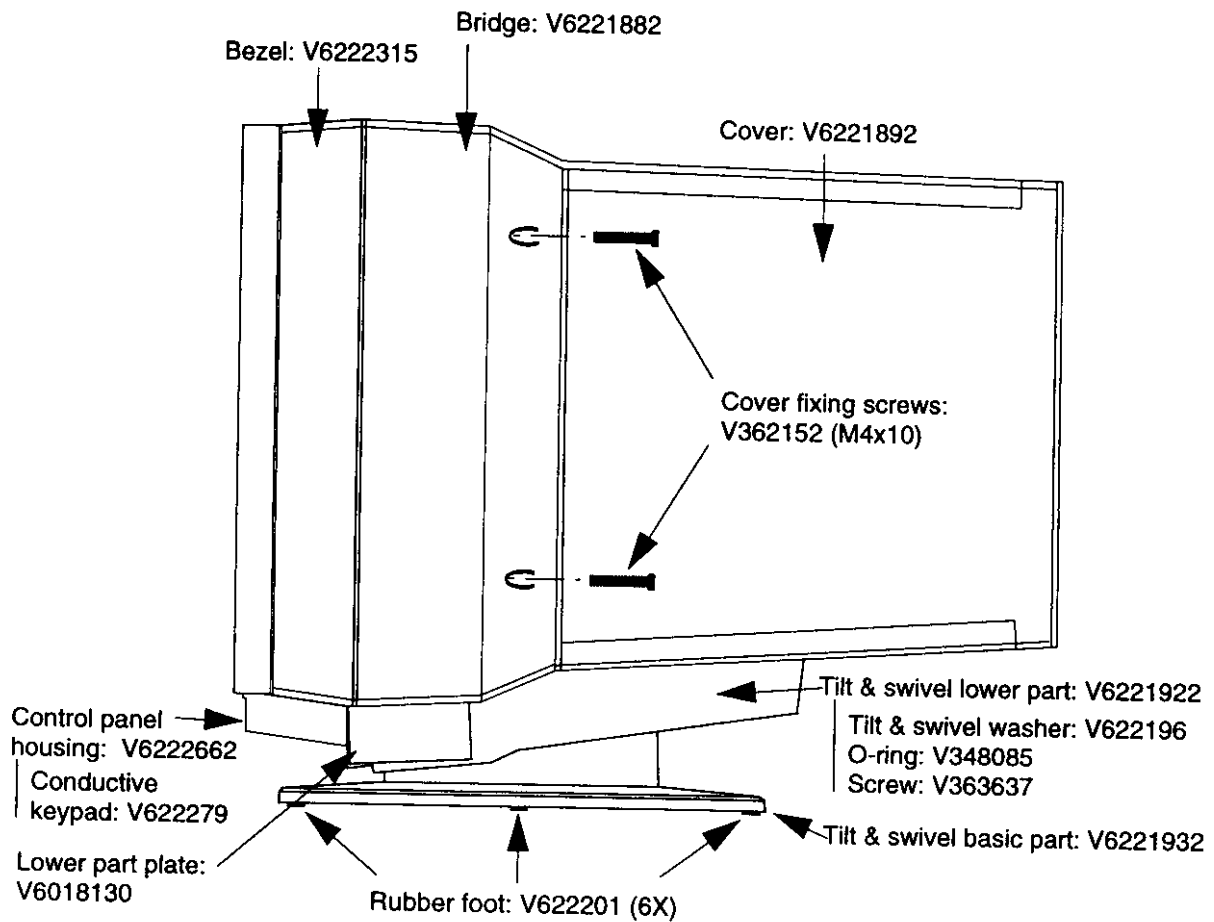


Date: 26/02/99

Name :

H.A.F.M. van Rossum

Mechanical parts desktop

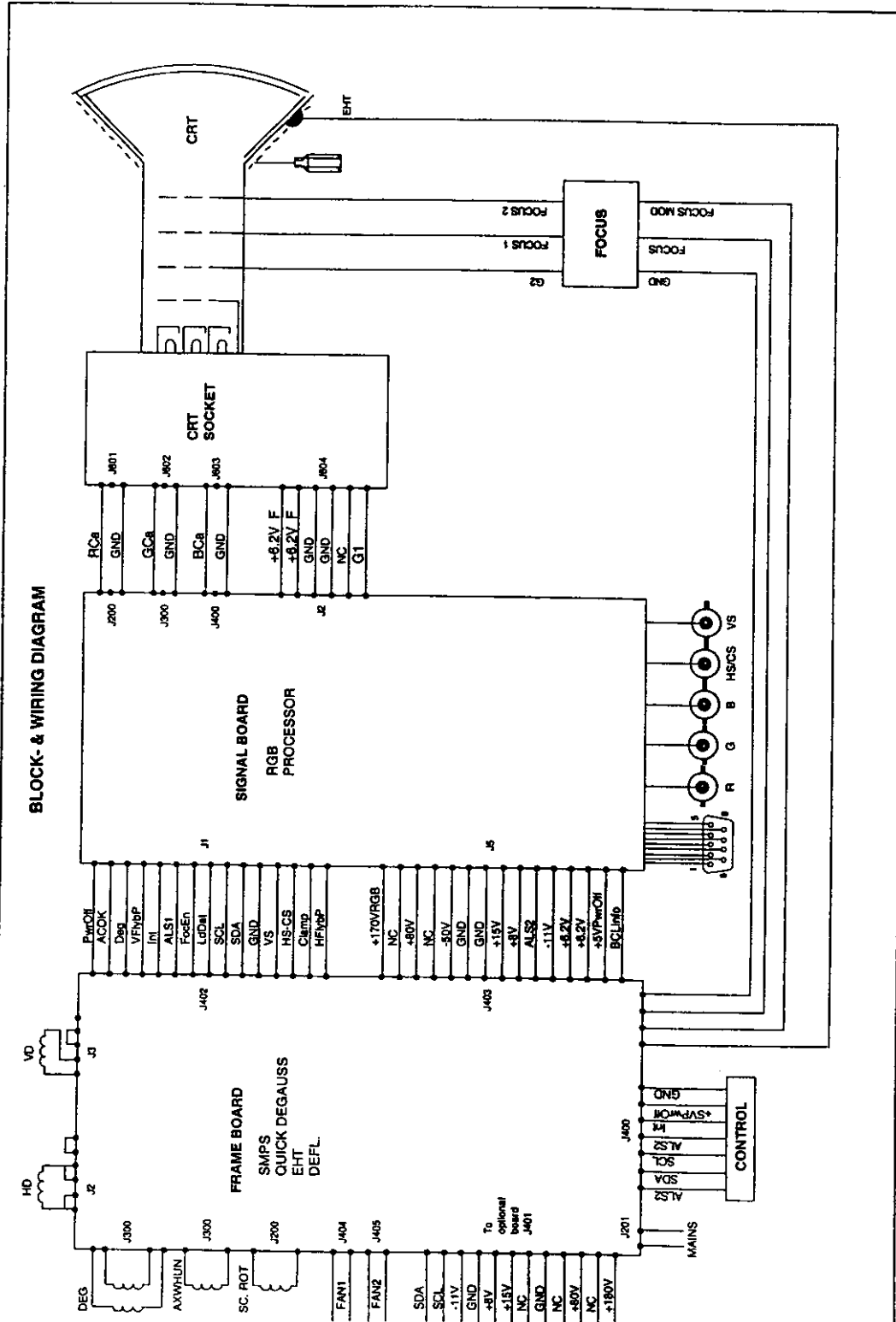


Pre-mounted tilt & swivel base: V5634438

Tilt & swivel lower part: V6221922
 Tilt & swivel washer: V622196
 O-ring: V348085
 Screw: V363637
 Tilt & swivel basic part: V6221932
 Rubber foot: V622201 (6X)
 Lower part plate: V6018130

BLOCK- & WIRING DIAGRAM OF THE DUT

The block diagram of the complete monitor is showed underneath. Block diagrams of all subparts of the monitor are presented in exhibit B together with a brief explanation.

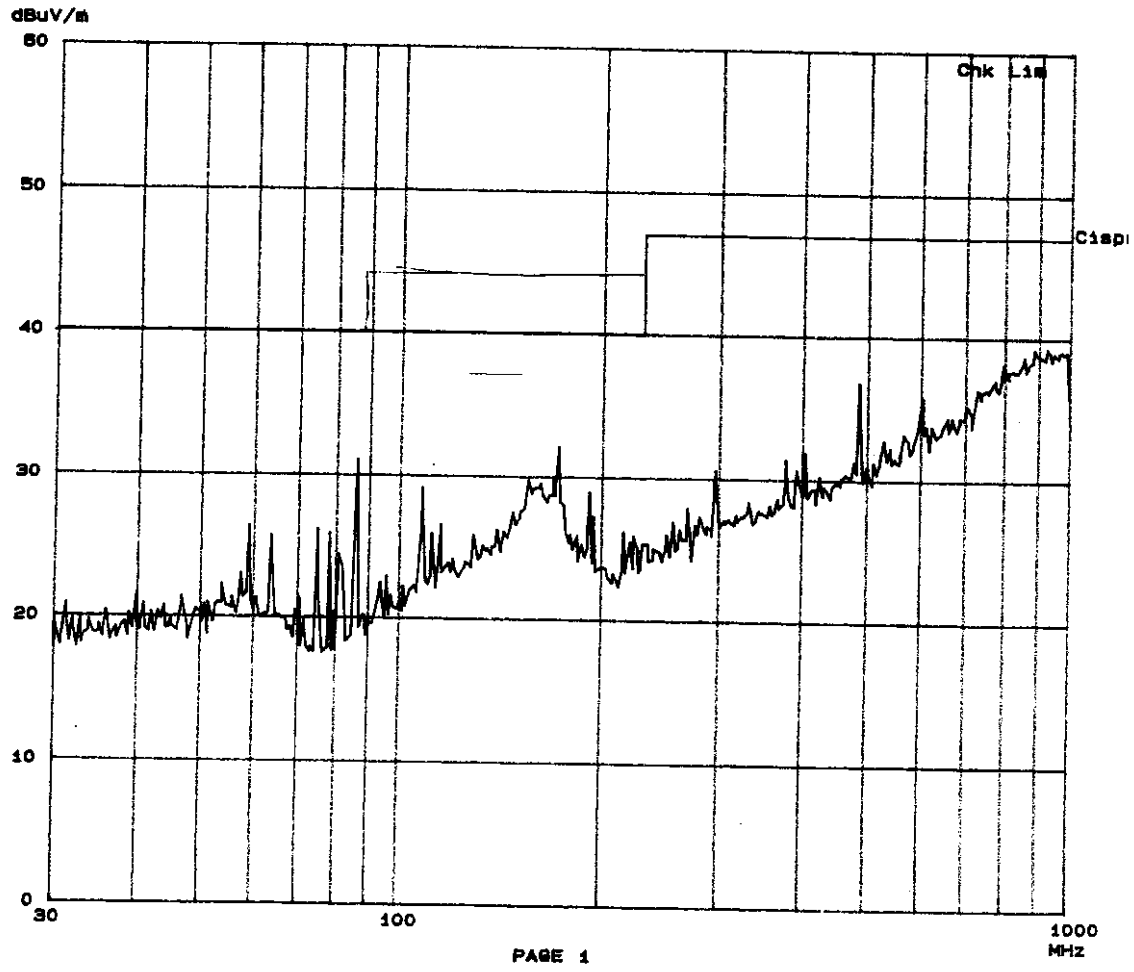


8291900 Barco B.V.
Radiated emission 3m anechoic room

18. Jan 99 11:15

EUT: Monitor, type MWD 321 Plus (Snr 6151551)
 Manuf: Barco N.V.
 Op Cond: Normal operation
 Operator: HVR
 Test Spec: CFR47, Subpart 15, class B
 Comment: Antenna at 1.55m horizontal polarization
 115 Vac

Scan Settings (1 Range)			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
30M	1000M	40k	120K	PK	10ms	AUTO	LN ON	60dB
			Transducer	No.	Start	Stop	Name	
				21	30M	1000M	logbicon	



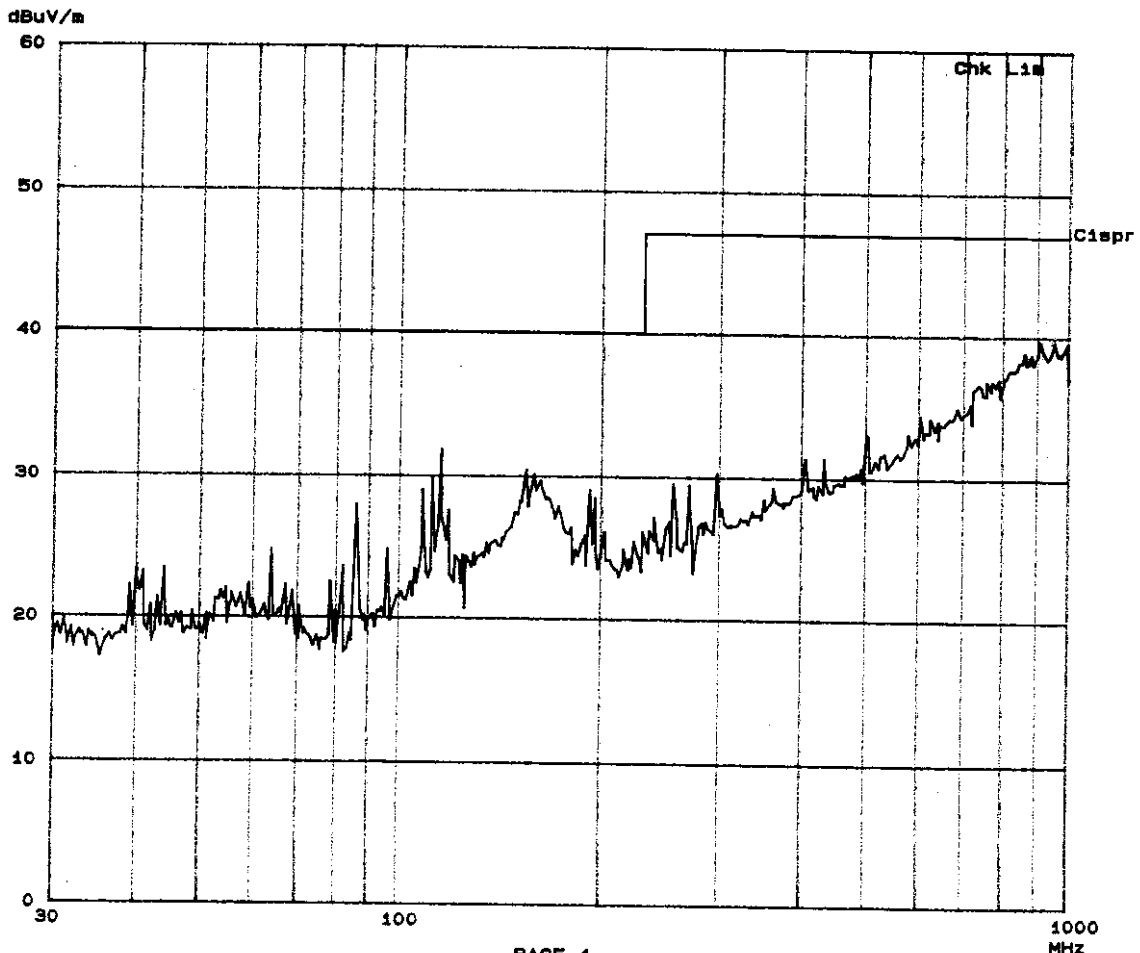
8291900 Barco B.V.
Radiated emission 3m anechoic room

18. Jan 99 12:19

EUT: Monitor, type MWD 321 Plus (Snr 5151551)
 Manuf: Barco N.V.
 Op Cond: Normal operation
 Operator: HVR
 Test Spec: CFR47, Subpart 15, class B
 Comment: Antenna at 1.55m horizontal polarization
 115 Vac; Rear EUT towards antenna

Scan Settings (1 Range)

Frequencies			Receiver Settings						
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge	
30M	1000M	40k	120k	PK	10ms	AUTO	LN ON	60dB	
		Transducer No.	Start	Stop	Name				
		21	30M	1000M	logbicon				



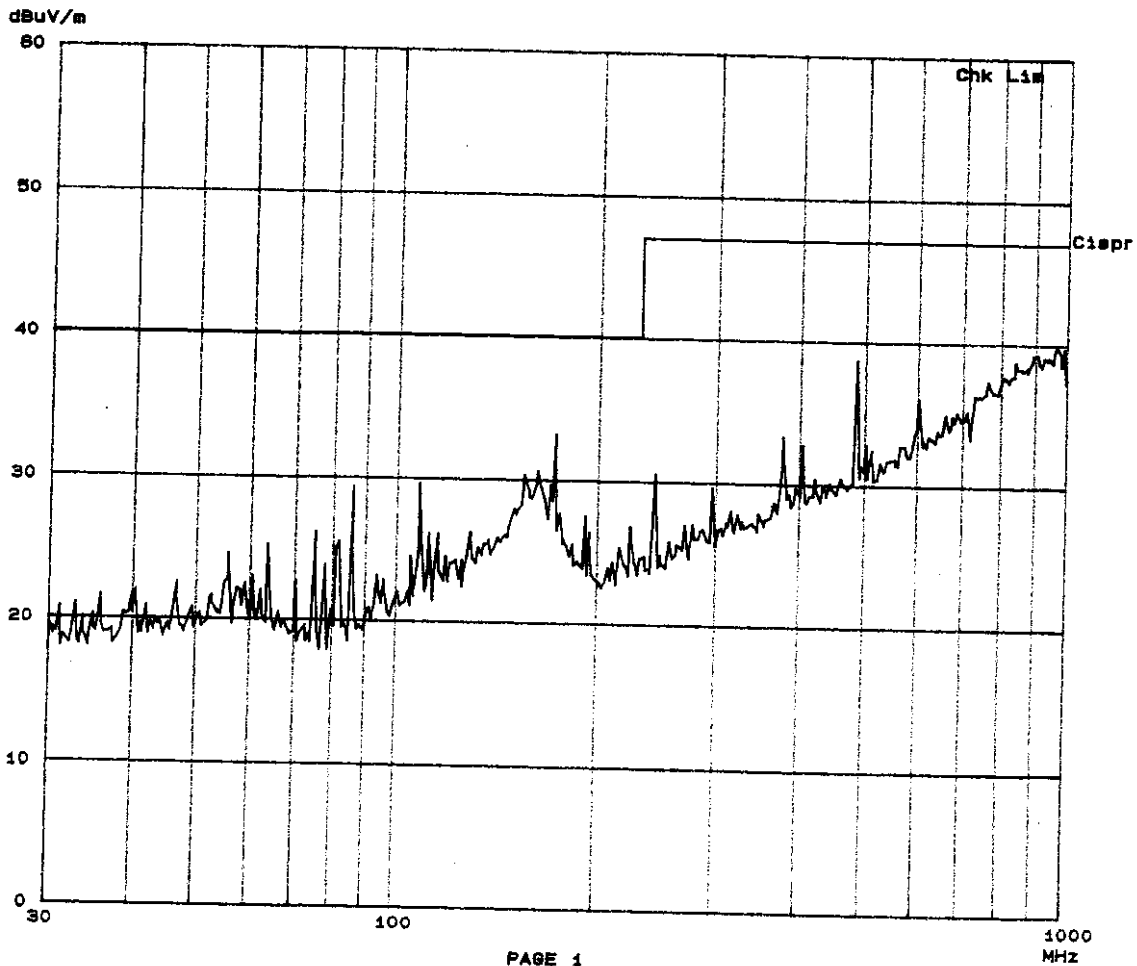
8291900 Barco B.V.
Radiated emission 3m anechoic room

18. Jan 99 13:03

EUT: Monitor, type MWD 321 Plus (Snr 5151551)
 Manuf: Barco N.V.
 Op Cond: Normal operation
 Operator: HVR
 Test Spec: CFR47, Subpart 15, class B
 Comment: Antenna at 1.55m horizontal polarization
 Front EUT towards antenna; signal board: unmodified input

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
30M	1000M	40k	120k	PK	10ms	AUTO	LN ON	60dB
		Transducer No.	No.	Start	Stop	Name		
		21	30M	1000M	logbicon			

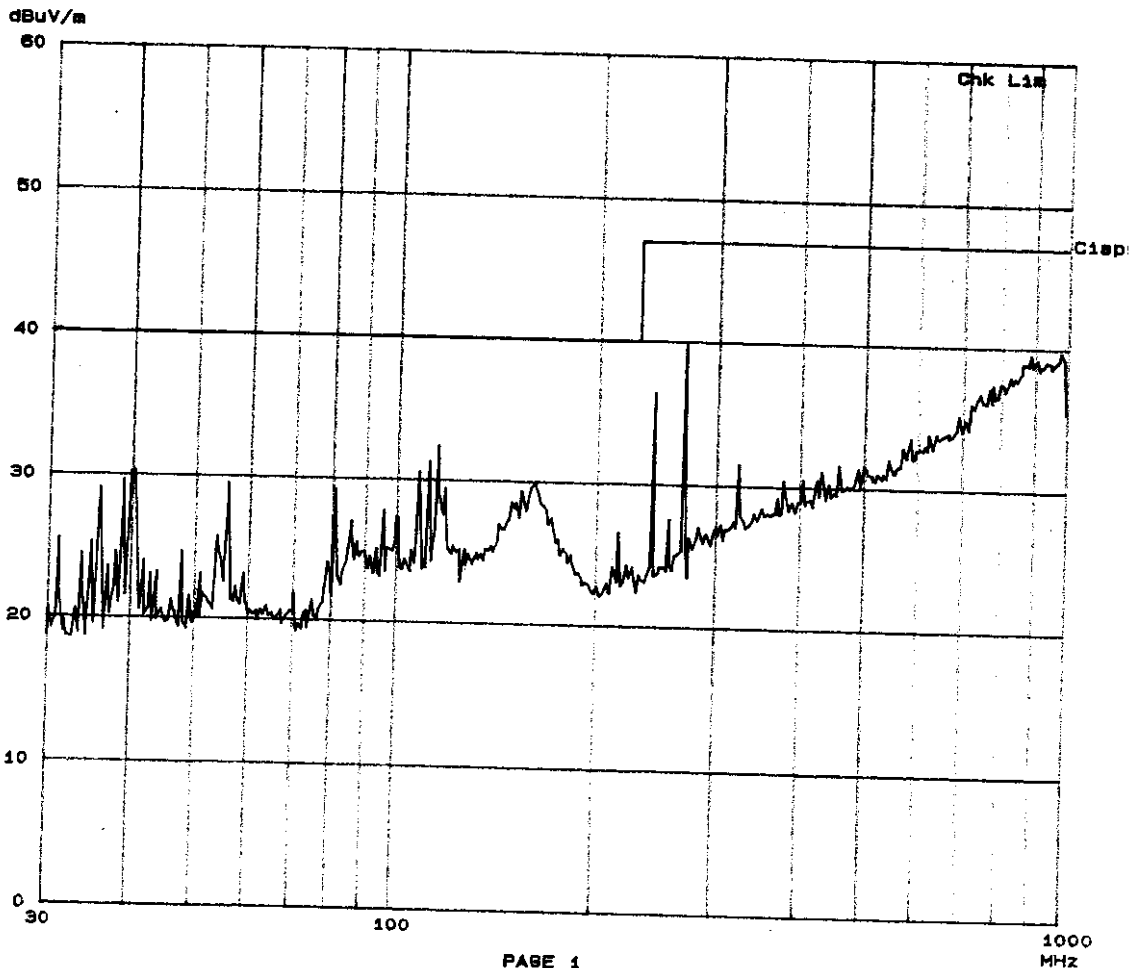


8291900 Barco B.V.
Radiated emission 3m anechoic room

18. Jan 99 14:01

EUT: Monitor, type MMD 321 Plus (Snr 5151551)
 Manuf: Barco N.V.
 Op Cond: Normal operation
 Operator: HVR
 Test Spec: CFR47, Subpart 15, class B
 Comment: Antenna at 1.10m vertical polarization
 Front EUT towards antenna; signal board: unmodified input

Scan Settings (1 Range)			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRng
30M	1000M	40k	120k	PK	10ms	AUTO	LN ON	50dB
			Transducer No.	Start	Stop	Name		
			21	30M	1000M	logbicon		



8291900 Barco B.V.
Radiated emission 3m anechoic room

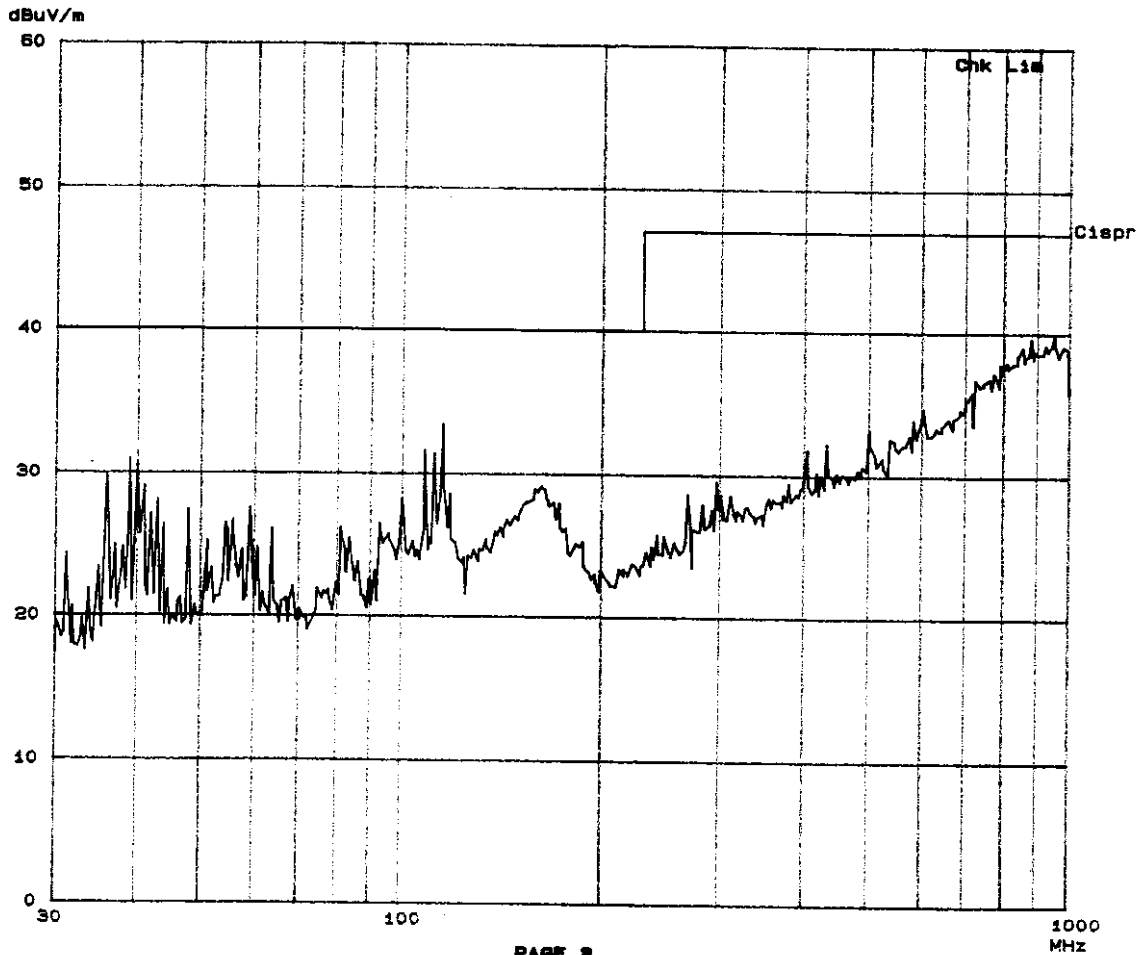
18. Jan 99 12:06

EUT: Monitor, type MMD 321 Plus (Snr 5151551)
Manuf: Barco N.V.
Op Cond: Normal operation
Operator: HVR
Test Spec: CFR47, Subpart 15, class B
Comment: Antenna at 1.10m vertical polarization
115 Vac: Rear EUT towards antenna

Scan Settings (1 Range)			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
30M	1000M	40k	120k	PK	10ms	AUTO	LN ON	60dB
			Transducer No.	Start	Stop	Name		
			21	30M	1000M	logbicon		

Final Measurement Results:

no Results



PLOTS RADIATED EMISSION PRE-SCANS

8291900 Barco B.V.

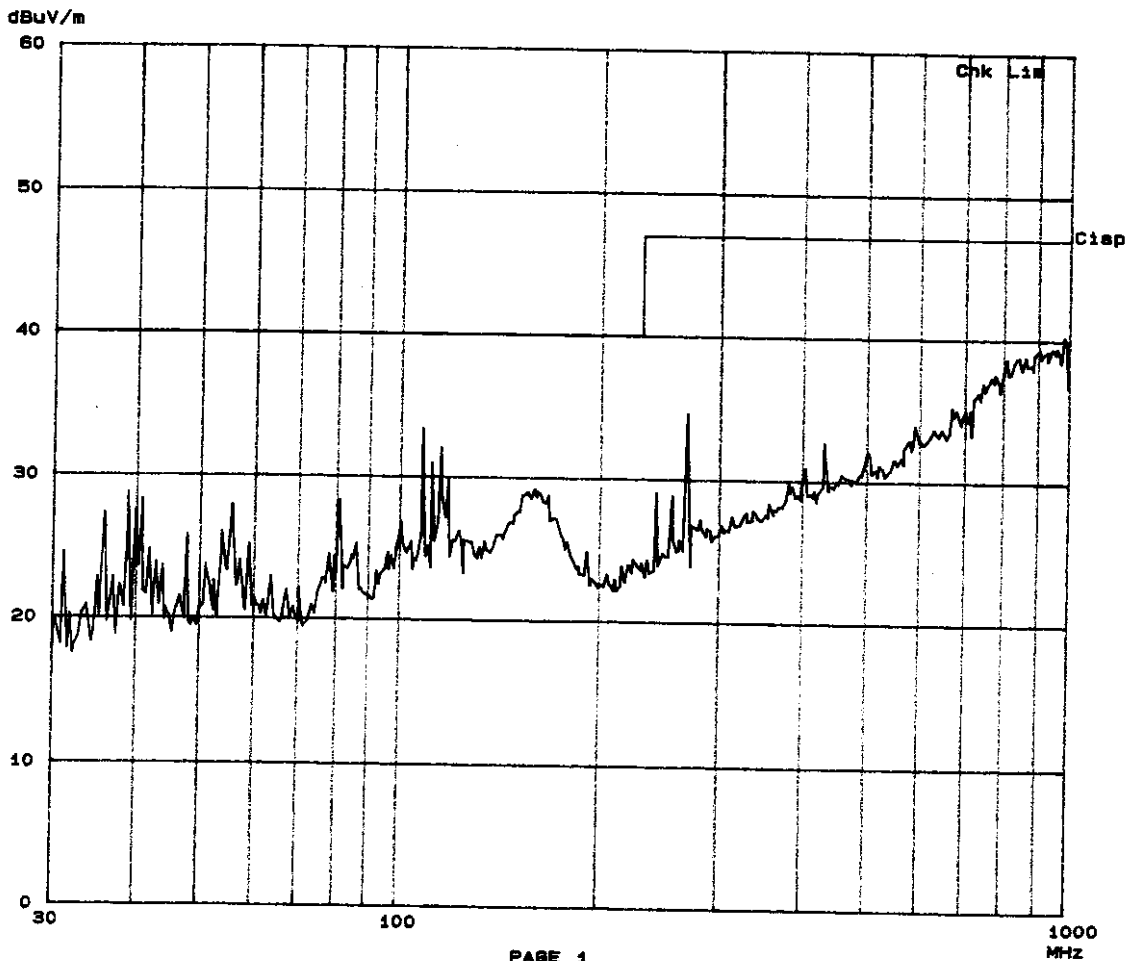
18. Jan 99 11: 42

Radiated emission 3m anechoic room

EUT: Monitor, type MMD 321 Plus (Snr 5151551)
 Manuf: Barco N.V.
 Op Cond: Normal operation
 Operator: HvR
 Test Spec: CFR47, Subpart 15, class B
 Comment: Antenna at 1.10m vertical polarization
 115 Vac

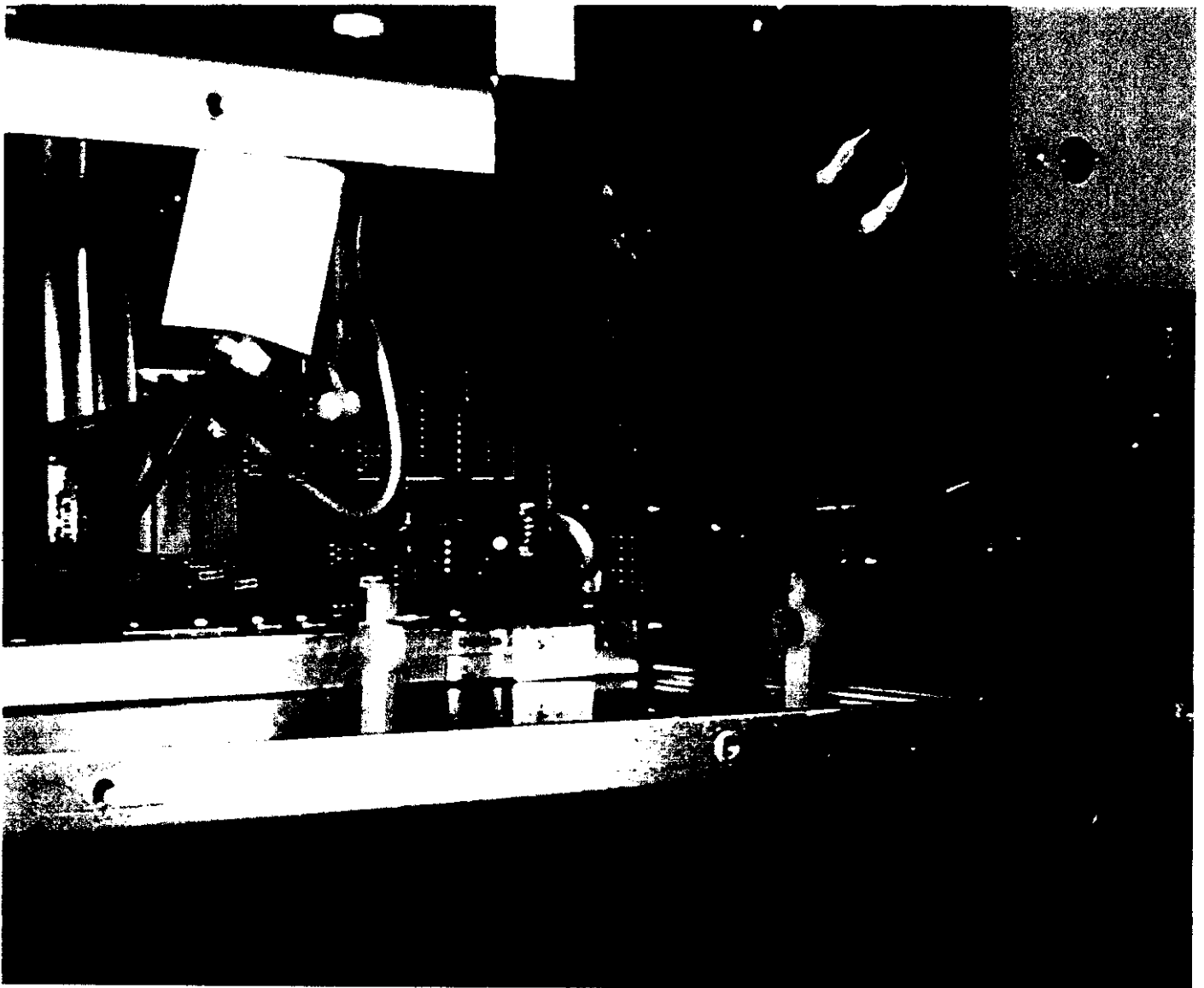
Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
30M	1000M	40k	120k	PK	10ms	AUTO	LN ON	60dB
			Transducer No.	Start	Stop	Name		
			21	30M	1000M	logbicon		



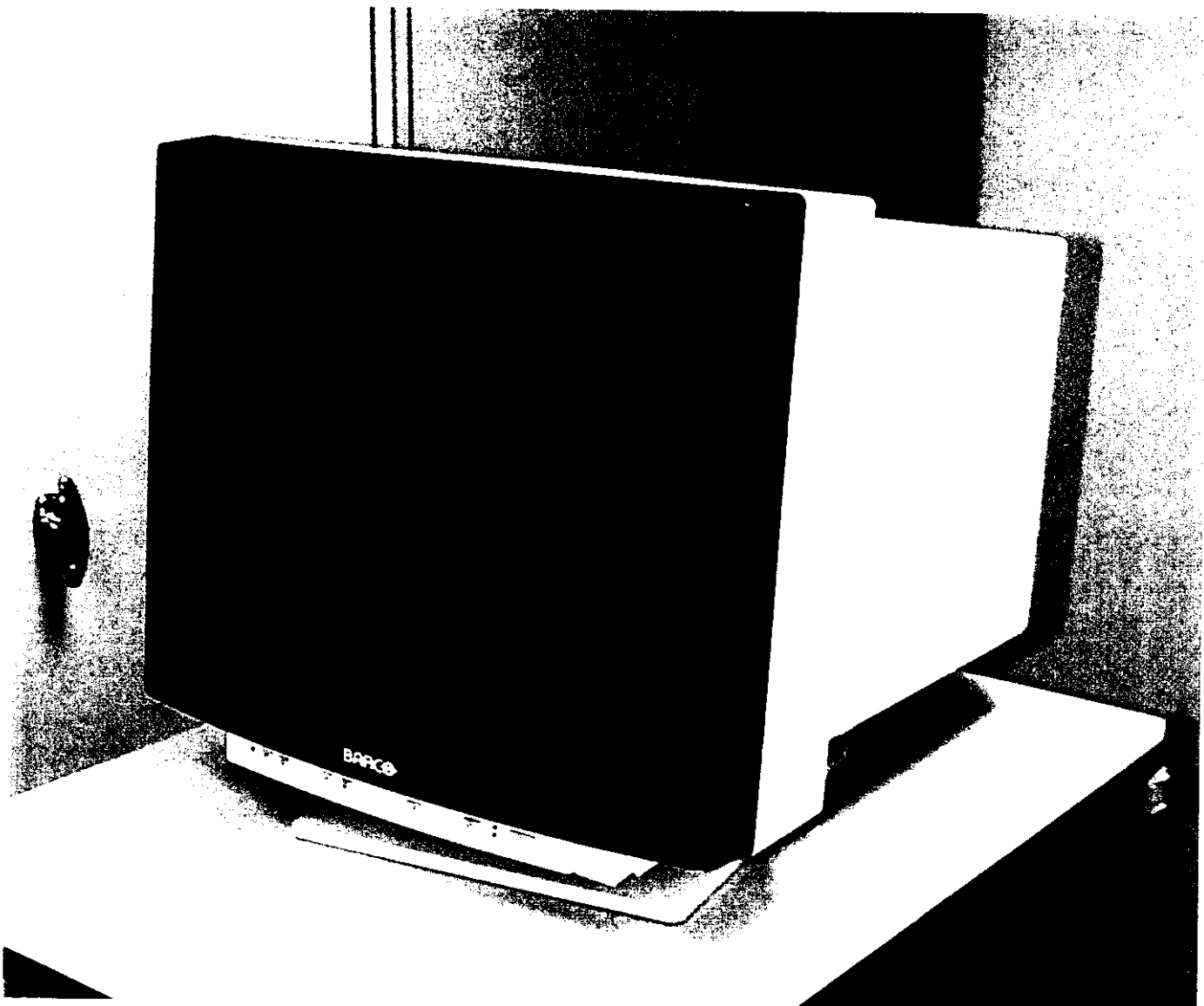
INTERIOR PHOTOGRAPHS OF THE DUT

The next (five) pages are showing the interior photographs of the DUT, including a photograph of the signal board.



EXTERIOR PHOTOGRAPHS OF THE DUT

The next (four) pages are showing the exterior photographs of the DUT



6.2 Field Strength Calculation

The final field strength is calculated by adding the Antenna Factor and Cable Factor to the reading on the test receiver. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CF$$

where:

- FS = Field strength
- RA = Receiver amplitude
- AF = Antenna factor
- CF = Cable attenuation factor

Example of calculating the field strength level:

Assume the receiver reading of 21.0 dB μ V at a frequency 180 MHz as obtained for the system with the bus-clock set at 60 MHz:

- Measuring value, RA : 21.0 dB(μ V)
- Antenna factor, AF : 16.7 (dB/m)
- Cable factor, CF : 1.4 (dB)
- Thus resulting in a _____
- Field strength, FS : 39.1 dB(μ V/m)

6.3 Test Instruments Used for Radiated Measurements

EMI Equipment	Type	Manufacturer	Serial no.	ORS No.	Frequency-range	Cal interval
EMI receiver	ESV	Rohde & Schwarz	872146/016	067254	20 - 1000 MHz	yearly
EMI receiver	ESVS 10	Rohde & Schwarz	827864/001	078086	20 - 1000 MHz	yearly
Spectrum analyzer	R3361A	Advantest	01730388	078274	9 kHz - 2.6 GHz	yearly
Biconical antenna	3110	EMCO	1076	078268	20 - 300 MHz	yearly
Logper antenna	3146	EMCO	9111-3294	074650	200 - 1300 MHz	yearly
LogBicon	VULB9161	Schwartzbeck	S/N 4009	116982	30 - 1000 MHz	yearly
Anechoic room	Siemens & Matsushita Comps.		B83117-S20-X126			

**5.4 Measured Data (Mains conducted disturbance voltage) AC PORT
COMPUTER**

Standard : FCC, Part 15 Subpart B, Class B
Limits :

Frequency [MHz]	Limit [dB(μ V)]
0.45 - 30.0	48.0

Port : AC mains supply computer, Line/Neutral
Results :

Frequency [MHz]	Level Line [dB(μ V)]	Level Neutral [dB(μ V)]	Limit [dB(μ V)]
0.58	21.1	39.1	48.0
0.84	20.3	35.9	48.0
1.15	22.1	41.4	48.0
1.57	21.4	39.9	48.0
2.62	22.9	32.5	48.0
3.87	21.5	34.1	48.0
10.40	25.7	31.6	48.0
13.41	37.6	36.0	48.0
19.60	22.1	19.1	48.0
23.96	28.6	28.5	48.0

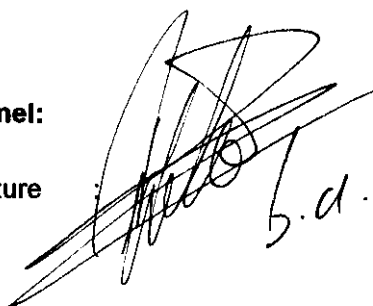
Measurement uncertainty: 2 dB

Note : All readings are quasi-peak unless stated otherwise, using a quasi-peak bandwidth of 9 - 10 kHz.

Judgement : Pass (Passed by 6.6 dB)

Test personnel:

Tester Signature



Date: 26/02/99

Name : H.A.F.M. van Rossum

5 CONDUCTED EMISSION DATA

5.1 Test procedure

In accordance with § 15.107a the conducted radio frequency disturbance voltages between each of the power lines (live, neutral) and the ground terminal were determined over the frequency range from 450 kHz to 30 MHz. The measurement shall show compliance of this Class B digital device with the conducted limit of 250 μ V (48 dB μ V).

The test set-up was in accordance with the requirements of ANSI C63.4-1992.

The initial step in collecting conducted data is a peak scan measurement over the frequency range of interest. Significant peaks are then marked, and these signals are then quasi-peaked. This procedure is implemented in the utilised test receiver by the incorporated EMI software. The test receiver used also meets the requirement as mentioned § 15.35 "Measurement detector functions and bandwidths". The test receiver employs a CISPR quasi-peak detector function with a bandwidth of 9 - 10 kHz.

5.2 Test Instrumentation Used for Conducted Measurements

EMI Equipment	Type	Manufacturer	Serial no.	ORS No.	frequency range	Cal interval
LISN	ESH3-Z5	Rohde & Schwarz	840062/017	077959	10 kHz - 30 MHz	yearly
LISN	NLSK8128	Schwartzbeck	8128141	074667	10 kHz - 30 MHz	yearly
EMI test receiver	ESHS 10	Rohde & Schwarz	840046/009	077969	9 kHz - 30 MHz	yearly
Spectrum analyzer	R3361A	Advantest	01730388	078274	9 kHz - 2.6 GHz	yearly

Note : The Object Registration Number (ORS) is a unique number within the KEMA quality system, which identifies the equipment.

4 CONDUCTED & RADIATED MEASUREMENT PHOTOS

4.1 Conducted emission measurement setup in shielded room

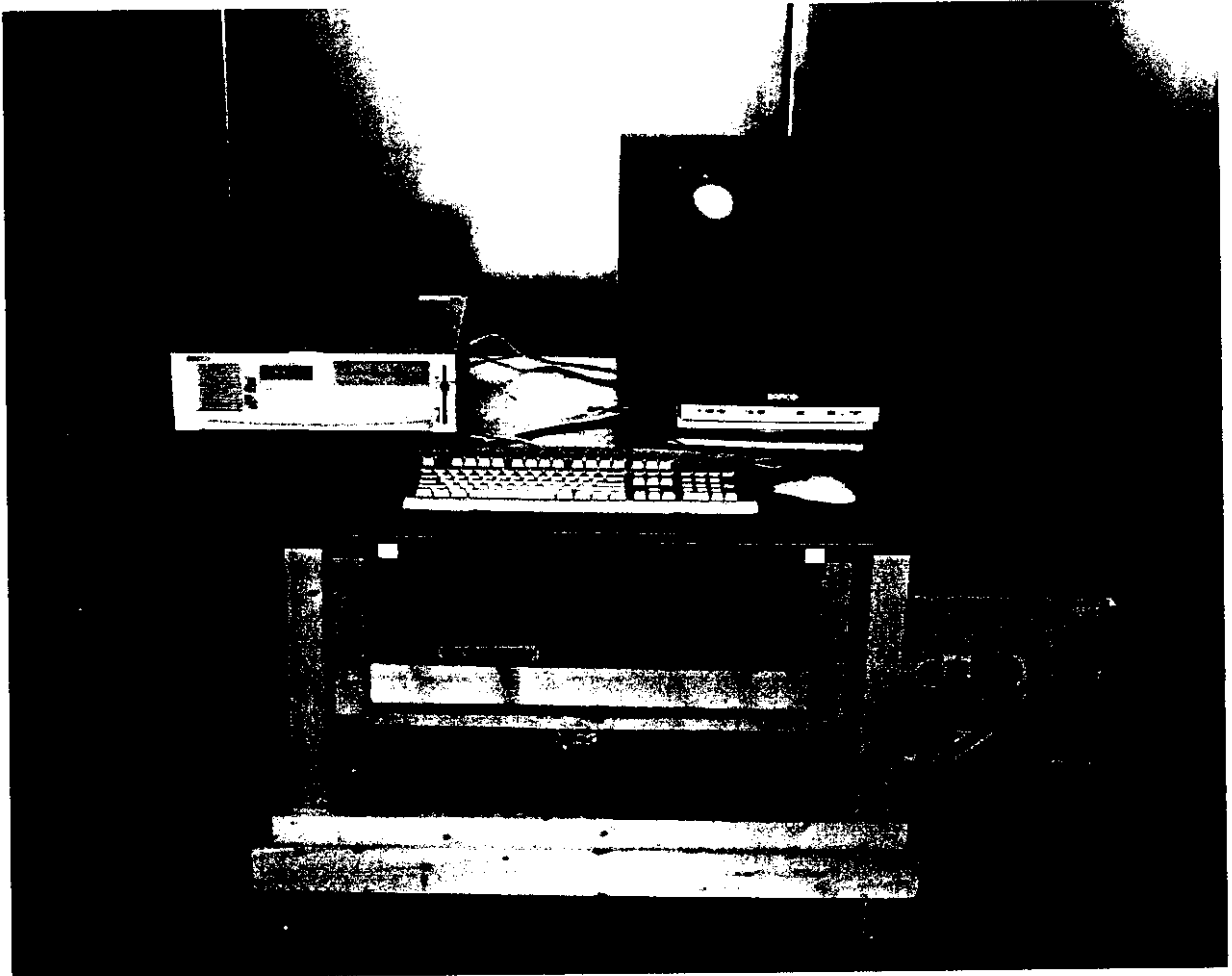



figure 4.1 conducted emission test setup

2 PRODUCT LABELING

The following FCC ID label is the real EUT label and is permanently affixed to each item that is marketed for sale.

The text is printed in black on a silver background (UL No. MH 16411). The required information is indelibly printed on a permanently affixed nameplate, type 3M 'SCOTCHMARK computer imageable' 7818 label stocks which is attached to the enclosure with aid of a permanent adhesive. The (FCC) label dimensions are 50 x 25 mm.

BARCO N.V. Th. Sevenslaan 106 B-3000 Kortrijk Display Systems MADE IN BELGIUM	
FCC ID : N97CH321PLUS00 THIS DEVICE COMPLIES WITH PART 15 OF THE FCC RULES. OPERATION IS SUBJECT TO FOLLOWING TWO CONDITIONS: (1) THIS DEVICE MAY NOT CAUSE HARMFUL INTERFERENCE. (2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE RECEIVED, INCLUDING INTERFERENCE THAT MAY CAUSE UNDESIRABLE OPERATION.	
THIS CLASS A DIGITAL APPARATUS MEETS ALL REQUIREMENTS OF THE CANADIAN INTERFERENCE - CAUSING EQUIPMENT REGULATIONS. CET APPAREIL NUMERIQUE DE LA CLASSE A RESPECTE LES EXIGENCES DU REGLEMENT SUR LE MATERIEL BRULLEUR DU CANADA.	
PRODUCT COMPLIES WITH U.S.A. RULES 21- SUBCHAPTER 1, SEC. 1502.19 MANUFACTURED: JANUARY 1999	
ACHTUNG: DIE ERZEUGTEN HOERSTRABLEN WERDEN DURCH DIE ERGEBNERE KATHODENSTRALINGE AUSREICHEND ABGESCHNITTEN (8 5 (4) NR. 3 DER BOM) HOCHSPANNUNG MAX.: 27 KV STRAHLENSTROM MAX.: 1,2 mA	
CAUTION: TO PREVENT ELECTRIC SHOCK OR FIRE HAZARD, DO NOT REMOVE COVER. NO SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED PERSONNEL. DO NOT EXPOSE THIS APPARATUS TO RAIN OR MOISTURE. ATTENTION: POUR PREVENIR LE CHOC ELECTRIQUE OU LE FEU, NE PAS OUBLIER LE COUVERCULE. NE PAS EXPOSER L'APPAREIL A L'EAU NI A L'UMIDITE.	
MODEL : MWD 321 PLUS PART NR : V9541023 SERIAL NR : 5151551 I MAX. : 2,2 - 1,2A U NOM. : 100 - 240V AC FREQ. : 50/60 Hz FUSE : T 4.0A CRT : M51LE0153X05(FU) OPTIONS : ACUSON: A BARCO: 04	
	

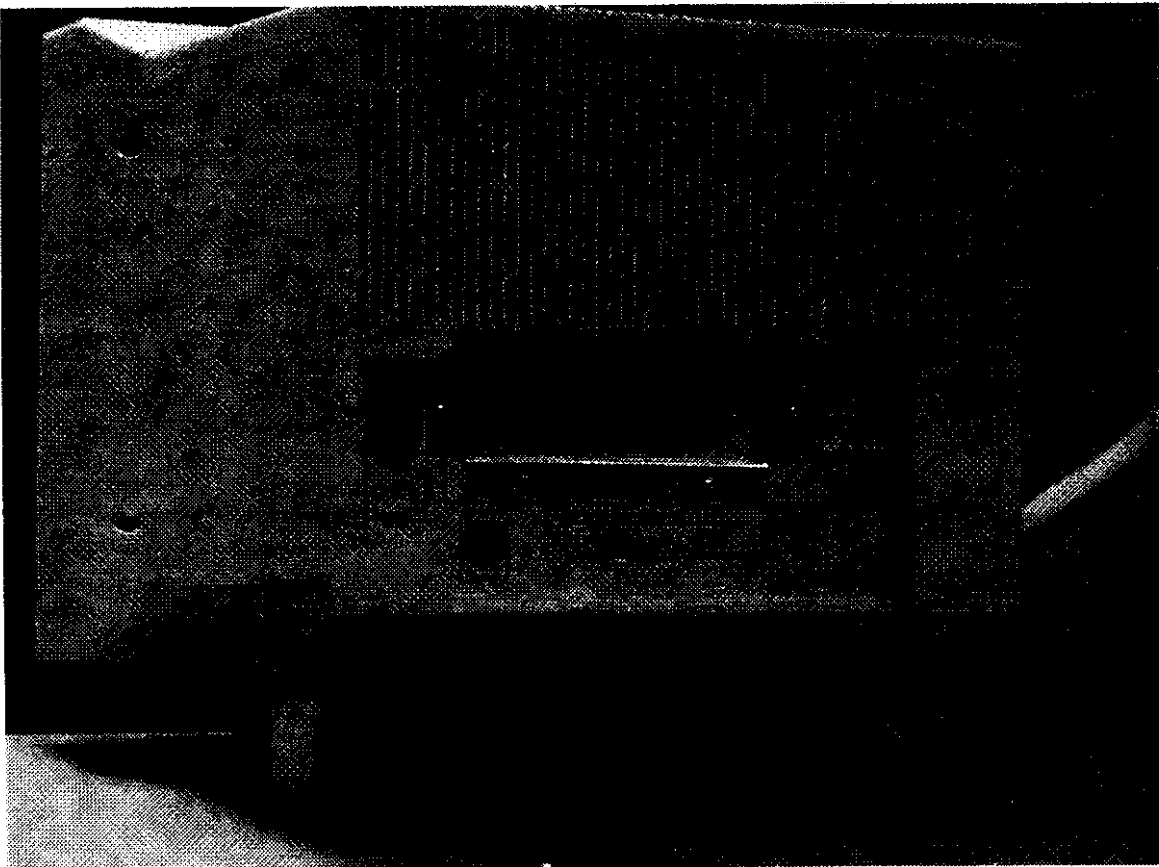


Figure 2.1 Location of Label on rear of DUT

1.2.2 Auxiliary equipment

Device : Personal computer cabinet
Trade mark : Hewlett Packard VECTRA VL6/400
Type : VL.6/400 series SDT
Serial number : FR84215981
Prod. : D6940A
FCC ID : DOC procedure, no identifier
Description : Personal computer
Power supply : 100-127 V_{ac} / 200 - 240 V_{ac} 50/60 Hz
Enclosure : metal covered with paint

Device : keyboard
Trade mark : Hewlett Packard
Model : SK-2501A
Serial number : M980721989
FCC ID : DOC procedure, no identifier
Description : keyboard
Power supply : 5 V_{dc} / 275 mA
Enclosure : plastic

Device : printer
Trade mark : HP DeskJet 600
Type : C2184A (part number 11-500001-00)
Serial number : ES62S121TQ
FCC ID : B94C2184X
Description : inkjet printer
Power supply : 30 Vdc (via adapter)
Enclosure : plastic

Device : mouse
Trade mark : Hewlett Packard
Model : M-S48
Serial number : LZA82705641
FCC ID : DZL211092
Description : mouse
Power supply : 5 V_{dc}
Enclosure : PVC (plastic)

CONTENTS

	page
1 GENERAL INFORMATION	5
1.1 Product Description	5
1.2 Configuration of Tested System	5
1.2.1 Equipment under test	5
1.2.2 Auxiliary equipment	6
1.3 Photographs of the tested system	7
1.4 Block diagrams of the tested system	7
1.5 Test Methodology	7
1.6 Test Facility	7
2 PRODUCT LABELING	8
3 SYSTEM TEST CONFIGURATION	9
3.1 Justification	9
3.2 EUT Exercise Software	9
3.3 Equipment Modifications	9
4 CONDUCTED & RADIATED MEASUREMENT PHOTOS	10
4.1 Conducted emission measurement in shielded room	10
4.2 Pre-scans radiated emission 30 - 1000 MHz in compact anechoic room	12
4.3 Final radiated emission measurement 30 - 1000 MHz at the OATS	14
5 CONDUCTED EMISSION DATA	16
5.1 Test procedure	16
5.2 Test Instrumentation Used for Conducted Measurements	16
5.3 Measured Data (Mains conducted disturbance voltage) AC Port Monitor	17
5.4 Measured Data (Mains conducted disturbance voltage) AC Port Computer	18
6 RADIATED EMISSION DATA	19
6.1 Test Procedure	19
6.2 Field Strength Calculation	20
6.3 Test Instruments Used for Radiated Measurements	20
6.4 Radiated electromagnetic field strength	21
Annex A EXTERIOR PHOTOGRAPHS OF THE DUT	22
Annex B INTERIOR PHOTOGRAPHS OF THE DUT	26
Annex C BLOCK- & WIRING DIAGRAM OF THE DUT	31
Annex D PLOTS RADIATED EMISSION PRE-SCANS	32

Copyright © N.V. KEMA, Arnhem, The Netherlands. All rights reserved.

N.V. KEMA and/or its affiliates disclaim liability for any direct, indirect, consequential or incidental damages that may result from the use of the information or data, or from the inability to use the information or data.

The contents of this report may only be transmitted to third parties in its entirety. Application for the copyright notice and disclaimer is compulsory.