TÜV Rheinland

Technischer Überwachungs-Verein Rheinland

Certificate

of

Compliance

No. I-9763700-9706

Regarding the certification of products which are in the scope of the
Council Directive 89/336/EEC
the applicant

Advantech Co., Ltd.
4Fl., No. 108-3, Ming-Chuan Road, Shin-Tien City, Taipei Hsien 231,
Taiwan, R.O.C.

has successfully demonstrated that its product

Industrial Workstation
AWS-842T, AWS-842TP, AWS-842M, AWS-842MP, AWS-842T/MB, AWS-842M/MB,
Option 112-842T, Option 112-842TP, Option 112-842M, Option 112-842MP,
Option 112-842T/MB, Option 112-842M/MB

is in compliance with
EN 50 082-2:1995, EN 55 022:1994/A1:1995 Class A,
EN 60 555-2:1987, EN 61 000-3-3:1995
as described in the Technical Report P 9763700E01.
This Certificate is based on a single evaluation of one sample of the above mentioned product. It does not imply an assessment of the whole production and does not permit the use of a licenced test mark of TÜV Rheinland.
TÜV Rheinland Product Safety GmbH.
Taipei, 16.06.1997

Dipl.-Ing. A. Klinker
Certification Centre

Saul Lu
Testing Centre

CE The CE marking may only be used if all relevant and effective EC Directives are complied with. CE

TÜV Rheinland Product Safety GmbH

Am Grauen Stein

D-51105 Köln

TÜV Rheinland

Testreport No: P9763700E01

about

Electromagnetic Compatibility

Applicant:	**Advantech Co., Ltd.** **4Fl., No. 108-3, Ming-Chuan Rd.** **Shin-Tien City, Taipei Hsien 231, Taiwan**
Kind of Equipment:	**Industrial Workstation**
Type Designation:	**AWS-842 series, Option 112- 842 series** *(for details please refer to page 3 of this test report)*
Standard:	**EN 50 082-2:1995** **EN 55 022:1994/A1:1995 Class A** **EN 60 555-2:1987** **EN 61 000-3-3:1995**
Date of Testing:	**11.03./25.03.1997**

Test result: The above mentioned product has been tested and **passed.**

Der Sachverständige: tested by

12.06.97 Saul Lin
Date, signature

TÜV Rheinland Product Safety GmbH
P 9 7 6 3 7 0 0
Gesehen
den 16.06.1997
TÜV Rheinland Product Safety GmbH

überprüft: reviewed by

13.06.97 Date, signature

Other aspects: **This equipment is tested against the requirements for apparatus intended to be used in the industrial environment. However, this equipment requires a special permit by the competent authorities if used in residential or light industrial environment.**

Content

1. Test Site

Advance Data Technology (ADT) Corporation
No. 47, 14 Ling, Chia Pau Tsuen, Lin Kou Hsiang, Taipei, Taiwan, R.O.C.

All tests were conducted by a TÜV Rheinland appointed inspector.

2. Description of the Test Samples

2.1. General Description of Equipment

The test sample is an Industrial Workstation with the model number **Option 112-842TP** containing a switching power supply, a backplane, a CPU card, a display card, a LCD panel, F.D.D., H.D.D. and a touch screen module integrated together with an enclosure encased. Refer to next table for detail configuration. It is from the model series as described on the cover page of the test report and intended for use in a light industrial and similar environment.

All the model series covering in this report are listed in below table.

Model w/ o Touch screen	Model w/ Touch screen
AWS-842T	Option 112-842T
AWS-842TP	Option 112-842TP
AWS-842M	Option 112-842M
AWS-842MP	Option 112-842MP
AWS-842T/MB	Option 112-842T/MB
AWS-842M/MB	Option 112-842M/MB

2.2. Rating and Physical Characteristics

Input Voltage:	AC 110-120V / 200-240V
Frequency:	50 / 60 Hz
Input Current:	7.5 / 4.0A
Protection Class:	Class I

2.3. Sources of Interference

1. Switch. frequ. of the internal Power Supply, Seasonic, M/N: SSG-250G: less than 100 kHz.
2. Pulses on clock or other lines of peripheral cards (access. equipm. during testing).

2.4. Noise Suppression Parts

1. Only within switching power supply, Seasonic , model no. SSG-250G.

2.5. Submitted Documents

1) Specification

2) Construction drawings

3) Photographic documentation

3. Measurement Conditions

3.1. Modes of Operation

The subject EUT was run in a configuration and set up as described in the next paragraph. A test program (set up by the manufacturer) was run during all tests to activate the printer and the modem, respectively.

The EUT was tested with the following configuration:

Component	Brand Name	Model Number
Chassis	Advantech	AWS-842
CPU	Intel	Pentium 75
Backplane	Advantech	PCA-6108P3
Display Card	Advantech	PCA-6653
CPU Card	Advantech	PCA-6157
Power Supply	Seasonic	SSG-250G (250 W)
FDD	Teac	FD-235HF (1.44 MB)
HDD	Quantum	850MB
Display	Toshiba	LTM10C209A
Touch Screen	ELO	E271-2210

3.2. Additional Equipment

The EUT was tested together with the following additional equipment:

FOR EMISSION TEST

No.	Product	Brand	Model No.	Serial No.	I/O Cable
1	MONITOR	ACER	7134T	M5400233562	Shielded signal Nonshielded Power
2	PRINTER	HP	2225C+	3030S79138	Shielded Signal Nonshielded Power
3	KEYBOARD	FORWARD	FDA-102D	3005142	Shielded Signal
4	MODEM	TEAM	1200AT	AT124980	Shielded Signal Nonshielded Power

Note: There is no ferrite core on the interface cable of all support units.

FOR IMMUNITY TEST

Product	Manufacturer	Model No.	Serial No.	I/O Cable
MONITOR	ACTION	MV-0951	N/A	Shielded Signal Nonshielded Power
KEYBOARD	TATUNG	FDA-102D	3005142	Shielded Signal
PRINTER	HP	C2145A	SG5BN160GY	N/A
MODEM	GVC	F-1114V+/R6	8503E100	Shielded Signal Nonshielded Power

Note: There is a ferrite core added on the interface cable of support unit 1.

3.3. Test Setup

The test setup was realized on a table of 80 cm and 10 cm height, respectively, during all tests as described herein. The power cord of the external power supply had a length of 1.8 m (nonshielded, detachable).

3.4. List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

For Conducted Emission:

Kind of Equipment	Manufacturer	Type	S/N	Calibrated until
TEST RECEIVER	ROHDE & SCHWARZ	ESH3	893495/006	JULY 17, 1997
SPECTRUM	ROHDE & SCHWARZ	EZM	893787/013	JULY 17, 1997
ARTIFICIAL MAINS NETWORK	ROHDE & SCHWARZ	ESH2-Z5	892107/003	JULY 25, 1997
L.I.S.N.	EMCO	3825/2	9204-1964	JULY 25, 1997

For Radiated Emission:

Kind of Equipment	Manufacturer	Type	S/N	Calibrated until
SPECTRUM ANALYZER	HP	8594A	3144A00308	AUG. 27, 1997
PREAMPLIFIER	HP	8447D	2944A08119	JAN. 17, 1998
TEST RECEIVER	ROHDE & SCHWARZ	ESVP	893496/030	JULY 17, 1997
TUNABLE DIPOLE ANTENNA	SCHWARZBECK	VHA 9103 UHA 9105	E101051 E101055	NOV. 30, 1997
BILOG ANTENNA	CHASE	CBL6112	2086	DEC. 28, 1997
TURN TABLE	EMCO	1060	1195	N/A
TOWER	EMCO	1051	1263	N/A

For Harmonics & Voltage Fluctuations:

Kind of Equipment	Manufacturer	Type	S/N	Calibrated until
POWER ARB WAVEFORM GENERATOR	KEYTEK	EP72HF	9508346	MAY 12, 1997
SWITCHING POWER SUPPLY	KIKUSUI	PCR 4000L	9508355	MAY 12, 1997

For ESD:

Kind of Equipment	Manufacturer	Type	S/N	Calibrated until
ESD TEST SYSTEM	KEYTEK	2000	9105240/41	AUG. 5, 1997
ESD SIMULATOR	KEYTEK	MZ-15/EC	92022232	JUNE 7, 1997

For Radiated/Conducted Susceptibility:

Kind of Equipment	Manufacturer	Type	S/N	Calibrated until
SIGNAL GENERATOR	ROHDE & SCHWARZ	SMY01	840490/009	OCT. 1, 1997
POWER AMPLIFIER	KALMUS	LA1000V	091995-1	N/A
POWER AMPLIFIER	KALMUS	757LC	091995-2	N/A
FIELD PROBE	HOLADAY	HI-4422	89915	SEPT. 12. 1997
BICONILOG ANTENNA	EMCO	3143	1116	N/A
COMPACT FULL ANECHOIC	COMTEST	CFAC	ADT-S01	AUG. 2, 1997

For EFT:

Kind of Equipment	Manufacturer	Type	S/N	Calibrated until
EFT GENERATOR	KEYTEK	CE-40	9508257	SEPT. 12, 1997

For Magnetic Field Immunity:

Kind of Equipment	Manufacturer	Type	S/N	Calibrated until
MAGNETIC FIELD TESTER	HAFEELY	MAG 100.1	083794-06	JAN. 31, 1997

3.5. Abbreviations

PASS	means 'complied with requirement'	**N/A**	means 'not applicable'
FAIL	means 'not complied'	**N.C.R.**	means 'no calibration required'

4. Test Results E M I S S I O N

Result:	PASS

4.1. Continuous Interferences

4.1.1. Conducted Emission (AC Mains)

Port: AC Mains
Basic Standard: EN 55 022:1994, clause 5.1
Frequency Range: 0.15 - 30 MHz
Limits: Mains Terminal, table 1 **(Class A)**

Result:	PASS

Test Setup

Input Voltage: AC 230 V, 50 Hz
Operational mode: 'On'-mode, refer also to para.: 3.1 & 3.2
Earthing: through power cord

Where the result of the measurement with the Quasi Peak detector was found to be below the limit for Average-measurements, the measurement with the Average detector was omitted.
Disturbances other than those mentioned are small or not detectable.

Table 1: Conducted Emission, AC Mains; 0.15 - 30MHz

Settings

Frequency			Settings		
Start	Stop	Step Size	IF Bandwidth	Detector	Meas. Time
0.15 MHz	30 MHz		10 kHz	QP / Peak	20 ms

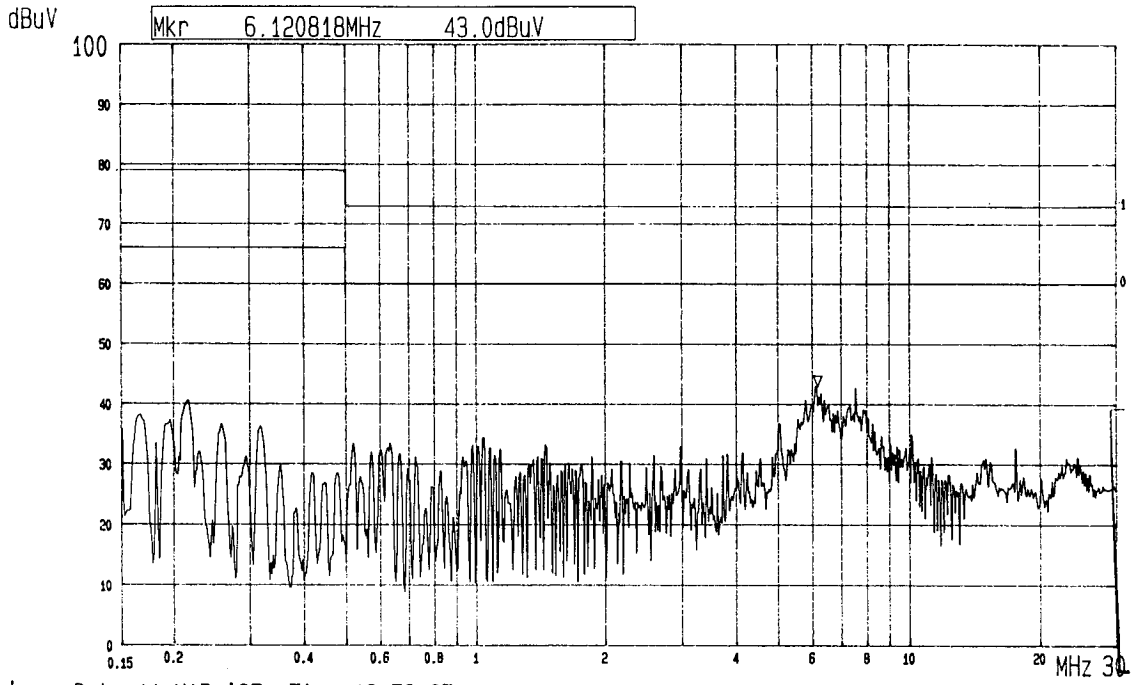
Table 2: Conducted Emission, AC Mains; 150 kHz - 30 Mhz

Freq.	L1 Level		N Level		Limit		Margin [dB (µV)]			
[MHz]	[dB (µV)]		[dB (µV)]		[dB (µV)]		L1		N	
	QP	AV	QP	AV	QP	AV	QP	AV	QP	AV
0.156	39.2	0.0	41.2	0.0	79.0	66.0	39.8	0.0	37.8	0.0
0.203	43.4	0.0	42.4	0.0	79.0	66.0	35.6	0.0	36.6	0.0
0.250	38.2	0.0	36.5	0.0	73.0	60.0	34.8	0.0	36.5	0.0
0.470	29.2	0.0	36.0	0.0	73.0	60.0	43.8	0.0	37.0	0.0
0.785	25.9	0.0	35.4	0.0	73.0	60.0	47.1	0.0	37.6	0.0
6.087	38.4	0.0	39.3	0.0	73.0	60.0	34.6	0.0	33.7	0.0
7.550	39.5	0.0	40.5	0.0	73.0	60.0	33.5	0.0	32.5	0.0

Remark: The "0.0" means that the Average- measurements were omitted while the reading levels measured by QP- measurements are below the Average limits as described.

Refer to next figure for detail Peak- measurements.

Figure 1: Conducted Emission, AC Mains ; 0.15 - 30 MHz



|--- Date 11.MAR.'97 Time 18:59:27
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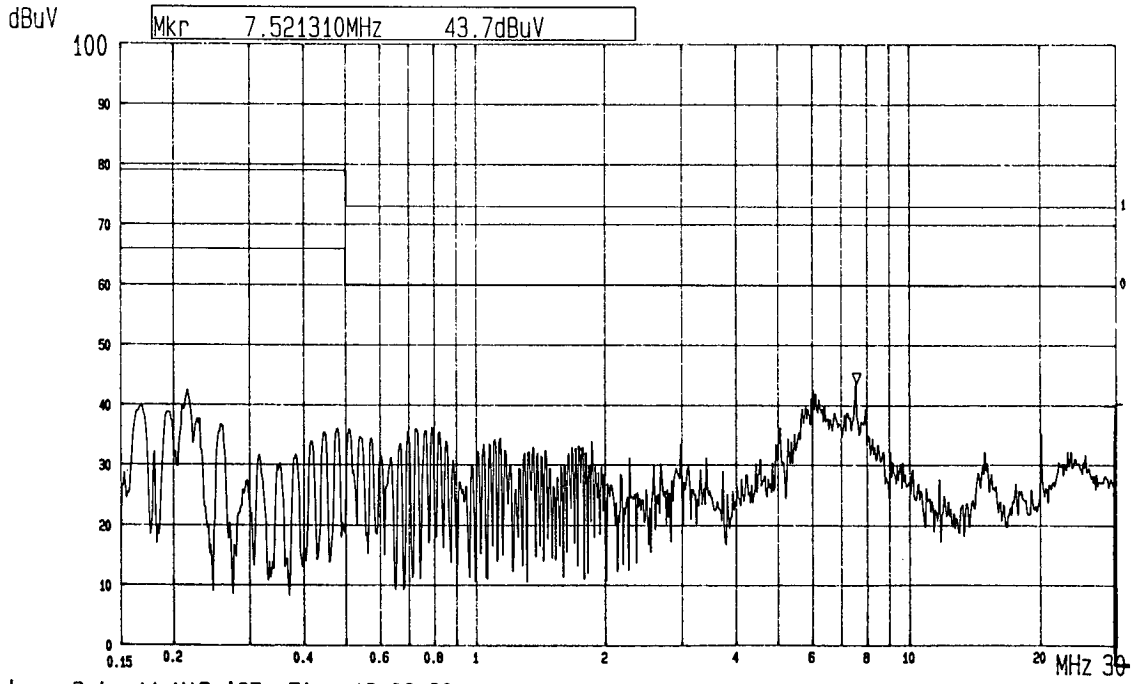
MODEL : Option 112-842TP Full system LISN : L1



|--- Date 11.MAR.'97 Time 19:02:30
EN55022 CLASS A CONDUCTION TEST (PEAK VALUE) ADT CORP.
MODEL : Option 112-842TP Full system LISN : N

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4.1.2. Radiated Emission

Port: Enclosure
Basic Standard: EN 55 022:1994, clause 6
Frequency Range: 30 - 1000 MHz
Limits: clause 6, table 3, **(class A)**

Result:	**PASS**

Test Setup

Input Voltage: AC 230 V ,50 Hz
Operational mode: 'On'-mode, refer also to para.: 3.1 & 3.2

Earthing: through power cord

QP-Measurements were carried out at frequencies where the highest levels for Peak-Measurements were monitored. It was found, that this levels are well below the limit for QP-measurements and it is considered that the levels at all other frequencies are also below this limit.

Table 3: Radiated Emission, 30 - 1000 MHz

Settings

Frequency			Settings		
Start	Stop	Step Size	IF Bandwidth	Detector	Meas. Time
30 MHz	1 GHz		120 kHz	QP	20 ms

Frequeny (MHz)	Result (dBuV/m)		Limit	Margin (dBuV/m)	
	Hor.	Ver.	(dBuV/m)	Hor.	Ver.
70.47	23.6	0	40.0	-16.4	0
113.25	24.7	0	40.0	-15.3	0
125.85	24.4	0	40.0	-15.6	0
163.59	26.5	0	40.0	-13.5	0
176.20	26.4	0	40.0	-13.6	0
200.43	28.5	0	40.0	-11.5	0
221.48	31.4	0	40.0	-8.6	0
226.53	28.9	0	40.0	-11.1	0
244.13	32.8	0	47.0	-14.2	0
400.93	28.8	0	47.0	-18.2	0
58.98	0	31.4	40.0	0	-8.6
113.26	0	28.9	40.0	0	-11.1
125.83	0	28.7	40.0	0	-11.3
176.17	0	28.8	40.0	0	-11.2
196.32	0	28.7	40.0	0	-11.3
200.48	0	29.8	40.0	0	-10.2
226.51	0	31.1	40.0	0	-8.9
234.07	0	35.6	47.0	0	-11.4
327.20	0	31.8	40.0	0	-8.2
347.34	0	30.9	47.0	0	-16.1

Remark: The "0" means that there is no measurement at the specified frequency in this program.

Figure 2: Radiated Emission, 30 - 1000 MHz (horiz. pol.)

Graph of Test Result

Model:Option 112-842TP
Mode:
EMI Type:EN55022 Class A
Freq. Range:30-1000 MHz
Antenna:CHASE Bi_Log

Test Date: 11 Mar 1997
Remark:Full system
Distance:10 M
Detector:CISPR,QUASI_Peak
Ant. Polarization:Horizontal

Tested By : _____

Report No. : EC96264

No.	Freq.(MHz)	Emission(dBuV)	No.	Freq.(MHz)	Emission(dBuV)
1	70.5	23.6	2	113.2	24.7
3	125.9	24.4	4	163.6	26.5
5	176.2	26.4	6	200.4	28.5
7	221.5	31.4	8	226.5	28.9
9	244.1	32.8	10	400.9	28.8

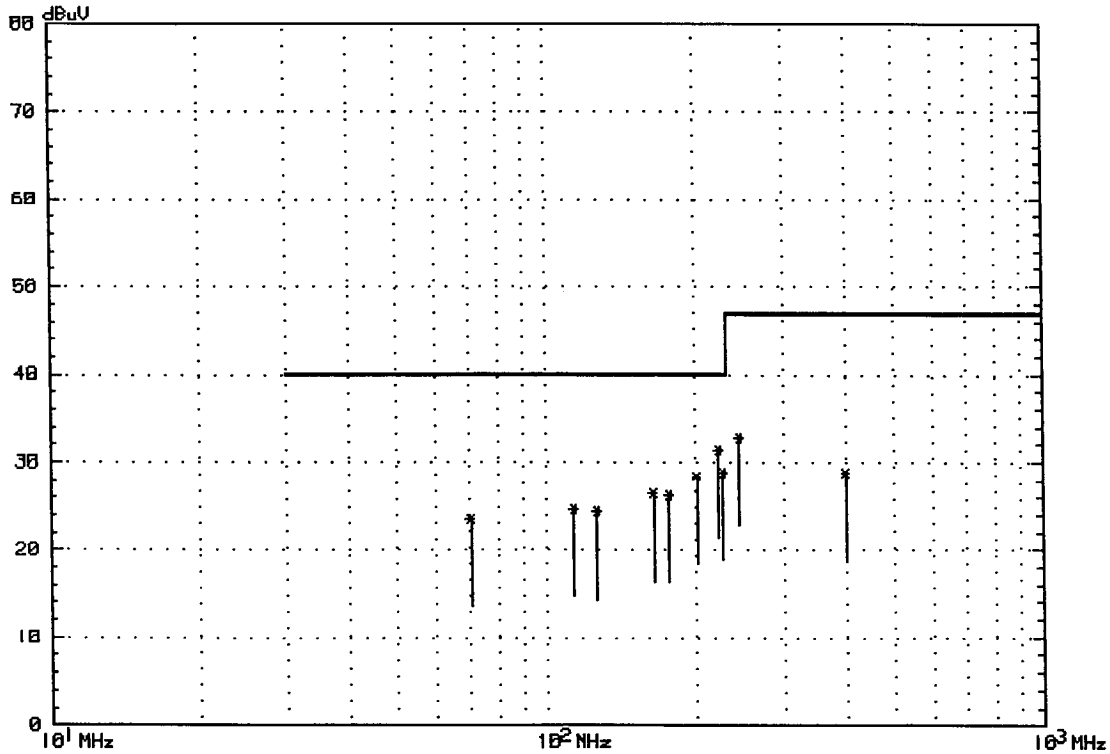

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Figure 3: Radiated Emission, 30 - 1000 MHz (vert. pol.)

Graph of Test Result

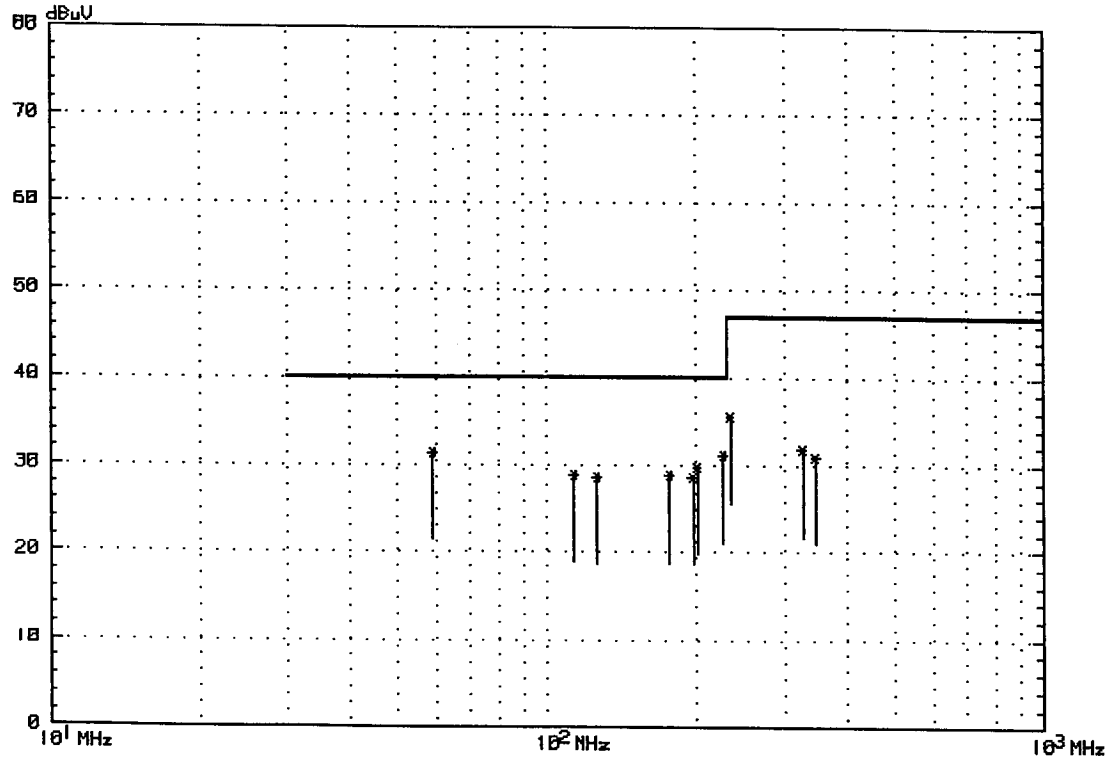
Model:Option 112-842TP
Mode:
EMI Type:EN55022 Class A
Freq. Range:30-1000 MHz
Antenna:CHASE Bi_Log

Test Date: 11 Mar 1997
Remark:Full system
Distance:10 M
Detector:CISPR,QUASI_Peak
Ant. Polarization:Vertical

Tested By : _____

Report No. : EC96264

No.	Freq.(MHz)	Emission(dBuV)	No.	Freq.(MHz)	Emission(dBuV)
1	59.0	31.4	2	113.3	28.9
3	125.8	28.7	4	176.2	28.8
5	196.3	28.7	6	200.5	29.8
7	226.5	31.1	8	234.1	35.6
9	327.2	31.8	10	347.3	30.9



4.2. Disturbances in Supply Systems

4.2.1. Harmonics

Port: Mains
Basic Standard: EN 60 555-2
Limits: EN 60 555-2, clause 4.1

Result:	**PASS**

Test Setup

Input Voltage: AC 230 V, 50 Hz
Operational mode: 'On'-mode, refer also to para.: 3.1 & 3.2

Earthing: through power cord

Table 4: Harmonics

EUT: **INDUSTRIAL WORKSTATION** MODEL: **OPTION 112-842TP**

Fundamental Voltage : 230.53 Vrms

Fundamental Amperes : 0.631 Arms

Fundamental Frequency: 50 Hz

Harm. Order	Measured Values (A)	Max. Permissible Harm. Current (A)
1	-	-
3	0.29	2.30
5	0.27	1.14
7	0.23	0.77
9	0.19	0.40
11	0.15	0.33
13	0.11	0.21
15	0.07	0.15
17	0.04	0.13
19	0.02	0.12
21	0.01	0.11
23	0.00	0.10
25	0.01	0.09
27	0.00	0.08
29	0.00	0.08
31	0.00	0.07
33	0.01	0.07
35	0.01	0.06
37	0.01	0.06
39	0.01	0.06

Harm. Order	Measured Values (A)	Max. Permissible Harm. Current (A)
2	0.00	1.08
4	0.00	0.43
6	0.00	0.30
8	0.00	0.23
10	0.00	0.18
12	0.00	0.15
14	0.00	0.13
16	0.00	0.12
18	0.00	0.10
20	0.00	0.09
22	0.00	0.08
24	0.00	0.08
26	0.00	0.07
28	0.00	0.07
30	0.00	0.06
32	0.00	0.06
34	0.00	0.05
36	0.00	0.05
38	0.00	0.05
40	0.00	0.05

4.2.2. Voltage Fluctuations

Port: Mains

Basic Standard: EN 61 000-3-3

Limits: EN 61 000-3-3, clause 5

Result:	**PASS**

Test Setup

Input Voltage: AC 230 V, 50 Hz

Operational mode: 'On'-mode, refer also to para.: 3.1 & 3.2

Earthing: through power cord

Table 5: Voltage Fluctuation and Flicker

EUT: **INDUSTRIAL WORKSTATION** MODEL: **OPTION 112-842TP**

Input Voltage : 230.53 Vrms Input Amperes: 0.631 Arms

Power Factor : 0.499 Power Frequency: 50 Hz

Observation period (Tp): 2 hour

Test Parameter	Measurement Value	Limitation	Remark
Pst	0.141	1.0	pass
Plt	0.098	0.65	pass
Tdt (ms)	0	200	pass
dmax (%)	0	4%	pass
dc (%)	0	3%	pass

Note:

(1) Plt means long-term flicker indicator
(2) Pst means short-term flicker indicator
(3) dc means relative steady-state voltage change
(4) dmax means maximum relative voltage change
(5) Tdt means maximum time that dt exceeds 3 %

5. Test Results IMMUNITY

Result:	PASS

5.1. Enclosure Port

5.1.1. Radio-Frequency Electromagnetic Field

Port:	Enclosure		
Basic Standard:		ENV 50 140	ENV 50 204
Performance Criteria:	A		
Test Specification:	EN 50 082-2		
	Frequency Range:	80 - 1000 MHz	900 ± 5 MHz
	Field Strength:	10 V/m (unmodulated)	10 V/m (unmodulated)
		(= level 3 of ENV 50 140)	
	Modulation:	1 kHz AM 80%	200 Hz Pulse
			50 % duty cycle

Result:	PASS

Test Setup

Input Voltage:	AC 230 V, 50 Hz
Operational mode:	'On'-mode, refer also to para.: 3.1 & 3.2
Earthing:	through power cord
Temperature:	23 °C
Humidity:	69 %RH

Table 6: Radio-Frequency Electromagnetic Field

Test Result

A. Frequency range : 80 MHz - 1 GHz

Severity level (V/m)	EN 50 082-2 Requirement	Performance Verification (Criteria)	Test results
10	A	A	PASS

No degradation in performance was monitored during and directly after application of the H.F. electromagnetic interference field.

B. Frequency : 900 MHz +/- 5 MHz

Severity level (V/m)	EN 50 082-2 Requirement	Performance Verification (Criteria)	Test results
10	A	A	PASS

No degradation in performance was monitored during and directly after application of the H.F. electromagnetic interference field.

5.1.2. Power Frequency Magnetic Field Immunity

Port:	Enclosure		
Basic Standard:	EN 61 000-4-8		
Performance Criteria:	A		
Test Specification:	EN 50 082-2		
	Frequency:	50 Hz	
	Magnetic Field Strength	30 A/m	Level 4

Result:	**PASS**

Test Setup

Input Voltage:	AC 230 V, 50 Hz
Operational mode:	'On'-mode, refer also to para.: 3.1 & 3.2
Earthing:	through power cord
Temperature:	20 °C
Humidity:	58 %RH

Severity level (Arms/m) , 50 Hz	EN 50 082-2 Requirement	Performance Verification (Criteria)	Test results
30	A and B, respectively *)	A	PASS

*) Display interference is allowed to be criterion B above 3 A/m

No degradation in performance was monitored during and directly after application of the magnetic field.

5.1.3. Electrostatic Discharge

Port:	Enclosure	
Basic Standard:	EN 61 000-4-2	
Performance Criteria:	B	
Test Specification:		
	Voltage:	8 kV (Air Discharge) (= level 3 of EN 61 000-4-2) 4 kV (Contact Discharge) (= level 2 of EN 61 000-4-2)

Result:	**PASS**

Test Setup

Input Voltage:	AC 230 V, 50 Hz
Operational mode:	'On'-mode, refer also to para.: 3.1 & 3.2
Earthing:	through power cord
Temperature:	20 °C
Humidity:	58 %RH

Table 7: Electrostatic Discharge

Severity level	EN 50 082-2 requirement			Performance criteria			Test results
	Air discharge	Contact discharge	HCP/VCP discharge	Air discharge	Contact discharge	HCP/VCP discharge	
4 KV	NR	B	B	NR	A	A	PASS
8 KV	B	NR	NR	A	NR	A	PASS

Note:
1) NR means there is no requirement.
2) Test Points: Air Discharge for non-conducted parts
Contact Discharge for conducted parts

No degradation in performance was monitored during and directly after application of the electrostatic discharges.

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5.2. Input and Output AC Power / Signal and Control Ports

5.2.1. Conducted Disturbances

Port:	AC mains input	
Basic Standard:	ENV 50 141	
Performance Criteria:	A	
Test Specification:	EN 50 082-2	
	Frequency Range:	0.15 - 80 MHz
	Voltage Level:	10 Vrms (unmodulated)
	Modulation:	AM 80 %, 1 kHz sine wave
		(= level 3 of ENV 50 141)

Result:	**PASS**

Test Setup

Input Voltage:	AC 230 V, 50 Hz
Operational mode:	'On'-mode, refer also to para.: 3.1 & 3.2
Earthing:	through power cord
Temperature:	23 °C
Humidity:	60 %RH

Test Result:

Severity Level (Vrms)	EN 50 082-2 Requirement	Performance Verification (Criteria)	Test Results
10	A	A	PASS

No degradation in performance was monitored during and directly after application of the injected interferences.

5.2.2. Fast Transients Common Mode

Port:		AC supply terminals	Signal and control lines
Basic Standard:		EN 61 000-4-4	
Performance Criteria:		B	
Test Specification:	EN 50 082-2	Power Lines	Control Lines
	Peak Voltage:	2 kV (= level 3)	1 kV (= level 3)
	T_r/T_n	5/50 ns	
	Rep. frequency	5 kHz	

Result:	**PASS**

Test Setup

Input Voltage:	AC 230 V, 50 Hz
Operational mode:	'On'-mode, refer also to para.: 3.1 & 3.2
Earthing:	through power cord
Temperature:	23 °C
Humidity:	70 %RH

Table 8: Fast Transients Common Mode

Severity level	EN 50 082-2 requirement		Performance Verification (Criteria)		Test Results
Coupling mode	AC line	I/O line	AC line	I/O line	
1 kV clamp	NR	NR*	NR	NR*	N/A
2 kV direct	B	NR	A	NR	PASS

Remark: NR means there is no requirement.
NR* means there was no requirement as in the configuration submitted for were signal lines not longer than 3 m

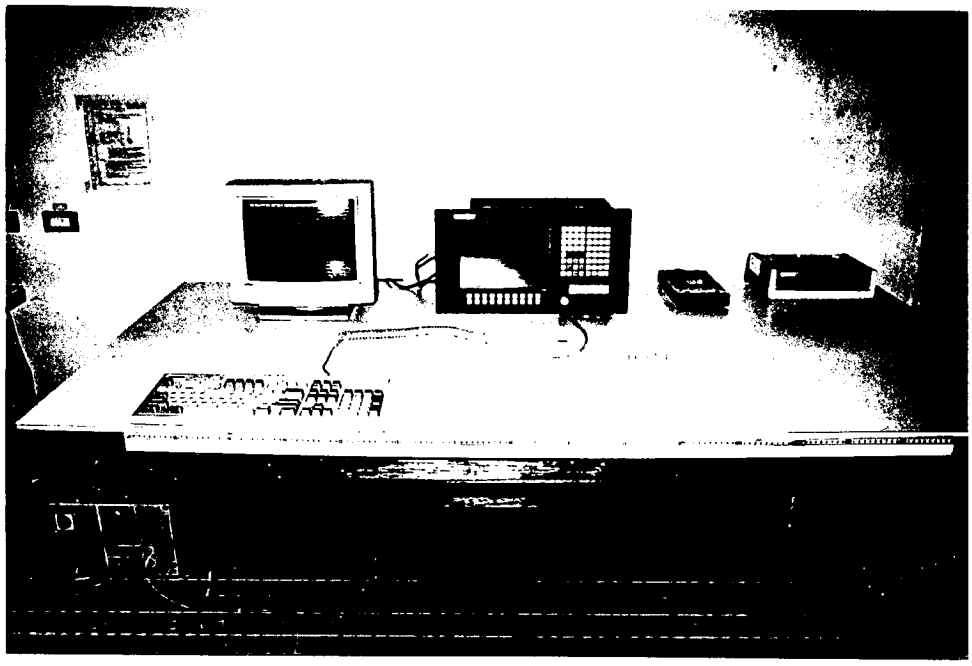
No degradation in performance was monitored during and directly after application of the electrical fast transients.

TÜV Rheinland
Product Safety GmbH

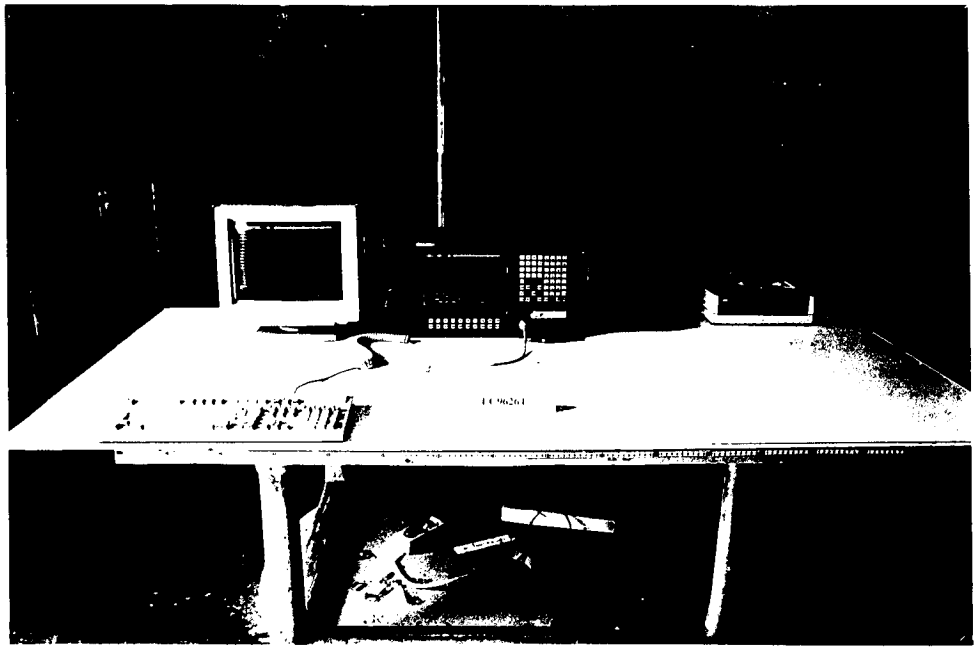
P 9 7 6 3 7 0 0

6. Photographs of the Test Set-up

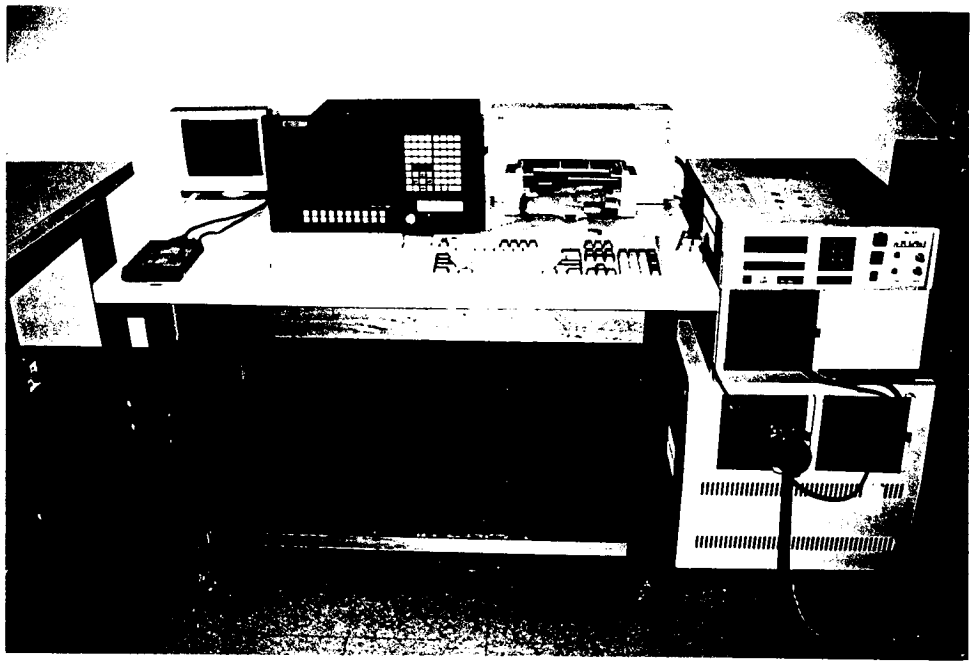
Picture 1: Conducted Emission



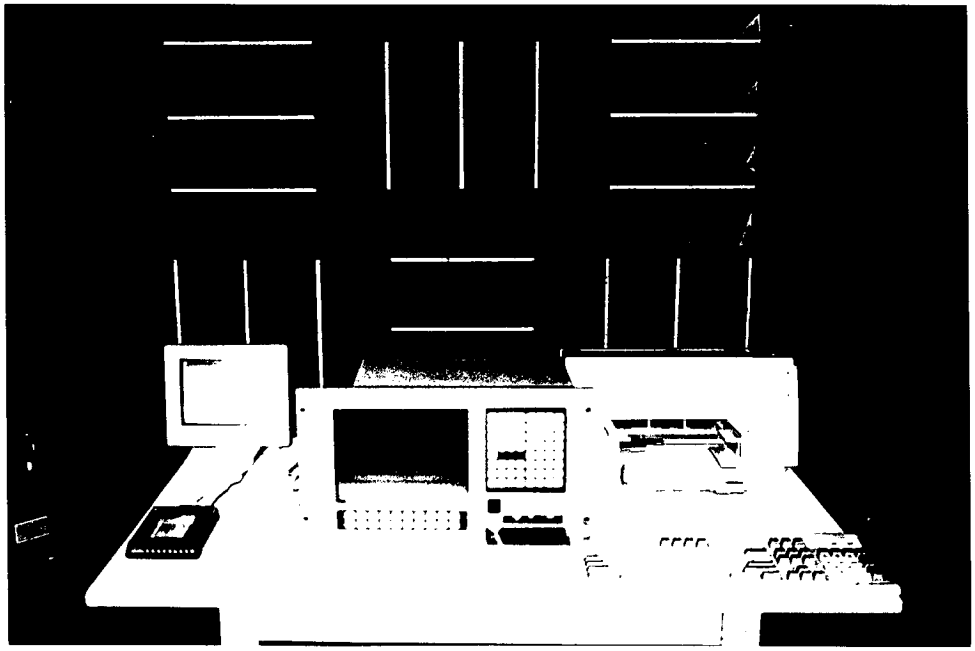
Picture 2: Radiated Emission



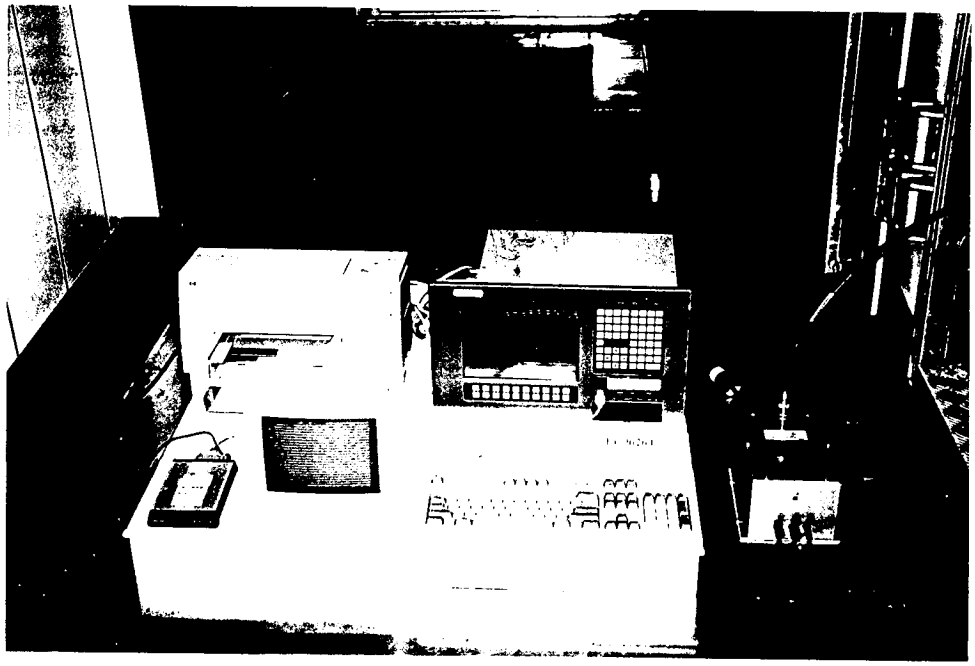
Picture 3: Voltage Fluctuations & Flicker



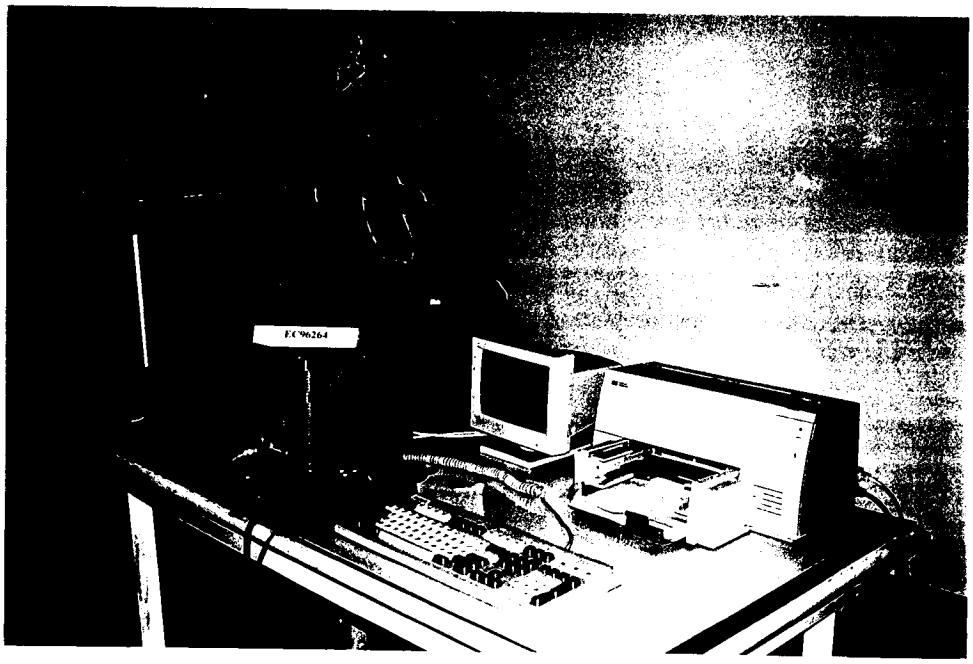
Picture 4: Radiated Susceptibility, Frequency Range 80 MHz to 1000 MHz



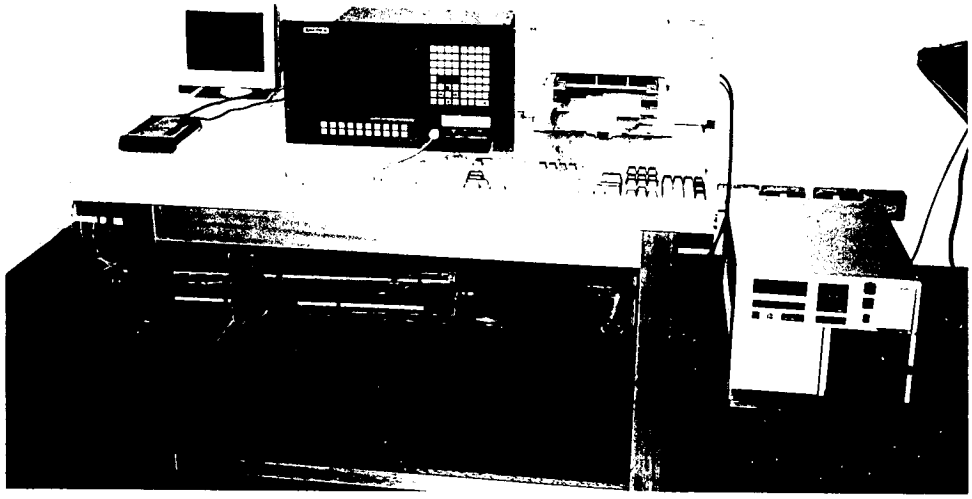
Picture 5: R.F. Conducted Susceptibility



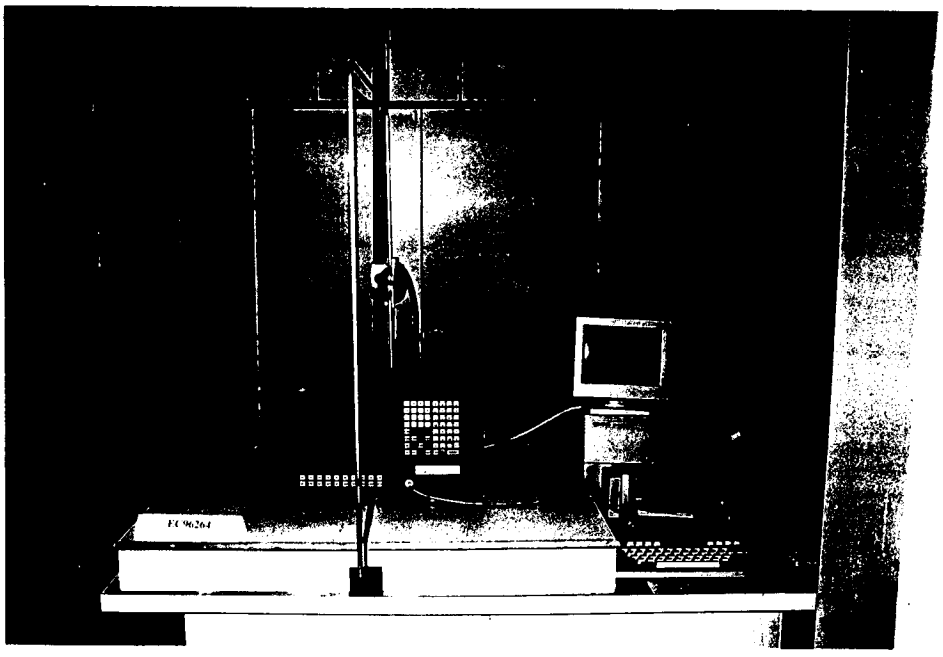
Picture 6: Electrostatic Discharge



Picture 7: Fast Transients on AC Mains



Picture 8: Magnetic Field Susceptibility



7. List of Tables

8. List of Figures

9. List of Pictures