



EMC

TEST REPORT

REPORT NO. : CE87060201
MODEL NO. : PCM-3864, PCM-3860
DATE OF TEST : June 2 ~ June 10 , 1998

PREPARED FOR : ADVANTECH CO., LTD.

ADDRESS : FL. 4, NO. 108-3, MING-CHUAN ROAD,
SHING-TIEN CITY TAIPEI HSIEN, TAIWAN

PREPARED BY: ADVANCE DATA TECHNOLOGY CORPORATION



Accredited Laboratory

12F, NO.1, SEC.4, NAN-KING EAST RD.,
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1.

CERTIFICATION

Issue date: June 10, 1998

Product : CPU BOARD
Trade Name : ADVANTECH
Model No. : PCM-3864, PCM-3860
Applicant : ADVANTECH CO., LTD.
Standard : EN 55022:1994, Class A

EN 50082-2:1995
EN 61000-4-2:1995
EN 61000-4-3:1996
EN 61000-4-4:1995
EN 61000-4-6:1996
EN 61000-4-8:1993
ENV 50204:1995

We hereby certify that one sample of the designation has been tested in our facility from June 2 to June 10, 1998. The test record, data evaluation and Equipment Under Test (EUT) configurations represent herein are true and accurate representation of the measurements of the sample's EMC characteristics under the conditions herein specified.

CHECKED BY: Ariel Hsieh, DATE: 6/10/98
(Ariel Hsieh)

APPROVED BY: Mike Su, DATE: 6/10/98
(Mike Su)

ADVANCE DATA TECHNOLOGY CORPORATION

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2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Product	:	CPU BOARD
Model No.	:	PCM-3864, PCM-3860
Power Supply Type	:	Switching
Power Cord	:	N/A

Note: The EUT was tested with the following configuration:

- CHASSIS: ADVANTECH, model: IPC-610
- CPU: ALI, 80386SX-40MHZ
- HDD: MAXTOR, model: 7345AT
- FDD: TEAC, model: FD-235HF
- POWER SUPPLY: SKYNET, model: ADT 930C
- VGA CARD: CHIPS, model: CHIPSET, F65545
- BACKPLANE: ADVANTECH, MBPC-200 chassis

The EUT has two model names, which are identical to each other in all aspects except for the following:

- Model: PCM-3864 (With VGA function)
- Model: PCM-3860 (Without VGA function)

From the above models, model: PCM-3864 was chosen as the representative model for the test and therefore only the data of this model is recorded in this report.

The EUT system was tested with the following kind of processing speed of CPU:

80386SX Speed: 40 MHz

The video resolution of 800x600 was used during the test.

2.2 GENERAL DESCRIPTION OF APPLIED STANDARD

According to the manufacturer's request, the EUT was tested with the requirements of the following standards:

EN 55022:1994, Class A

EN 50082-2:1995
EN 61000-4-2:1995
EN 61000-4-3:1996
EN 61000-4-4:1995
EN 61000-4-6:1996
EN 61000-4-8:1993
ENV 50204:1995

All tests are performed and recorded as per above standards.



2.3 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories are used to form representative test configuration during the tests.

EMISSION TEST

No	Product	Brand	Model No.	S/N	I/O Cable
1	COLOR MONITOR	ADI	PD-959	730020U00100265	Shielded Signal (1.2m) Nonshielded Power (1.1m)
2	KEYBOARD	FORWARD	FDA-104GA	FDKB8110116	Shielded Signal (1.6m)
3	PRINTER	HP	2225C+	3208S05355	Shielded Signal (1.2m) Nonshielded Power (1.8m)
4	MODEM	ACEEX	1414	980020509	Shielded Signal (1.2m) Nonshielded Power (1.8m)
5	MODEM	ACEEX	1414	980020540	Shielded Signal (1.2m) Nonshielded Power (1.8m)
6	MOUSE	DEXIN	A2R800A	80110026	Shielded Signal (1.5m)

IMMUNITY TEST

No	Product	Brand	Model No.	Serial No.	I/O Cable
1	COLOR MONITOR	ACER	723ee	N/A	Shielded Signal (1.5m) Nonshielded Power (1.8m)
2	KEYBOARD	ACER	6311	K6355122516	Shielded Signal (1.8m)
3	PRINTER	HP	C2145A	SG5N1601K	Shielded Signal (2.0m) Nonshielded Power (1.8m)
4	MODEM	GVC	F-1128V1R6	N/A	Shielded Signal (1.2m) Nonshielded Power (1.8m)
5	MODEM	GVC	F-1128V1R6	50601531	Shielded Signal (1.2m) Nonshielded Power (1.7m)
6	MOUSE	LOGITECH	M-M30-9F	LTR53500789	Shielded Signal (1.8m)

2.4 TEST SETUP

Please refer to the photos of test configuration in Item 6.



3. TEST INSTRUMENTS

3.1 TEST INSTRUMENTS (EMISSION)

RADIATED EMISSION MEASUREMENT

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
HP Spectrum Analyzer	E4411A	US37360834	Sept. 28, 1998
CHASE Preamplifier	CPA9231A/4	3215	Oct. 31, 1998
ROHDE & SCHWARZ TEST RECEIVER	ESVS 30	841977/002	Jan. 08, 1999
SCHWARZBECK Tunable Dipole Antenna	VHA 9103 UHA 9105	E101051 E101055	Nov. 28, 1998
CHASE BILOG Antenna	CBL6112	2074	Dec. 25, 1998
CHANCE Turn Table & Tower Controller	ACS-I	N/A	N/A
Open Field Test Site	Site 6	ADT-R06	Dec. 23, 1998

Note: 1. The measurement uncertainty is less than +/- 3dB, which is calculated as per NAMA's document NIS81.

2. The calibration interval of the above test instruments is 12 months.
And the calibrations are traceable to NML/ROC and NIST/USA.

CONDUCTED EMISSION MEASUREMENT

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
ROHDE & SCHWARZ Test Receiver	ESHS30	828109/007	Aug. 4, 1998
ROHDE & SCHWARZ Artificial Mains Network	ESH2-Z5	892107/003	July 22, 1998
EMCO L.I.S.N.	3825/2	9504-2359	Aug. 1, 1998
Shielded Room	Site 3	ADT-C03	N/A

Note: 1. The measurement uncertainty is less than +/- 2.6dB, which is calculated as per NAMA's document NIS81.

2. The calibration interval of the above test instruments is 12 months.
And the calibrations are traceable to NML/ROC and NIST/USA.



3.2 TEST INSTRUMENTS (IMMUNITY)

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
KeyTek, ESD Test System	2000	9105240/41	Aug. 10, 1998
KeyTek, ESD Simulator	MZ-15/EC	9507277	April 15, 1999
KeyTek, EFT Generator	CE-40	9508257	Sept. 9, 1998
KeyTek, Capacitive Clamp	CE-40-CCL	9508259	Sept. 9, 1998
ROHDE & SCHWARZ Signal Generator	SMY01	840490/009	Sept. 29, 1998
KALMUS Power Amplifier	LA1000V	091995-1	N/A
KALMUS Power Amplifier	757LC	091995-2	N/A
HOLADAY Field Probe	HI-4422	89915	Oct. 12, 1998
EMCO BiconiLog Antenna	3141	1001	N/A
COMTEST Compact Full Anechoic Chamber (7x3x3 m)	CFAC	ADT-S01	Aug. 4, 1998

Note: The calibration interval of the above test instruments is 12 months.

And the calibrations are traceable to NML/ROC and NIST/USA.



4. TEST RESULTS (EMISSION)

4.1 RADIO DISTURBANCE

Product Family Standard : EN 55 022, Class A
Frequency Range : 0.15 - 30 MHz (Conducted Emission)
30 - 1000 MHz (Radiated Emission)
Input Voltage : 230 Vac, 50 Hz
Temperature : 30 °C
Humidity : 40 %
Atmospheric Pressure : 996 mbar

TEST RESULT	Remarks
PASS	Minimum passing margin of conducted emission: -27.1 dB at 0.150 MHz Minimum passing margin of radiated emission: -8.6 dB at 226.57 MHz

4.1.1 EUT OPERATION CONDITION

1. Turn on the power of all equipments.
2. Industrial PC runs a test program to enable all functions.
3. The Industrial PC reads and writes messages from HDD.
4. The Industrial PC sends "H" messages to monitor and monitor displays "H" patterns on screen.
5. The Industrial PC sends "H" messages to modem.
6. The Industrial PC sends "H" messages to printer, and the printer prints them on paper.
7. Repeat steps 3-7.



4.1.2 TEST DATA OF CONDUCTED EMISSION

EUT: CPU BOARD

MODEL: PCM-3864

6 dB Bandwidth: 10 kHz

TEST PERSONNEL: Joey Chen

Freq.	L Level		N Level		Limit		Margin [dB (μV)]			
[MHz]	[dB (μV)]		[dB (μV)]		[dB (μV)]		L		N	
	QP	AV	QP	AV	QP	AV	QP	AV	QP	AV
0.150	51.90	-	43.20	-	79.00	66.00	-27.1	-	-35.8	-
0.192	48.10	-	40.70	-	79.00	66.00	-30.9	-	-38.3	-
0.530	21.90	-	20.50	-	73.00	60.00	-51.1	-	-52.5	-
3.836	27.50	-	30.20	-	73.00	60.00	-45.5	-	-42.8	-
7.169	31.30	-	31.50	-	73.00	60.00	-41.7	-	-41.5	-
24.022	37.50	-	37.40	-	73.00	60.00	-35.5	-	-35.6	-

- Remarks:
1. "*": Undetectable
 2. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 3. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 4. The emission level of other frequencies were very low against the limit.
 5. Margin value = Emission level - Limit value

ADT CORP. OPEN SITE 3
CISPR 22 CLASS A

02. Jun 98 17:03

EUT: PCM_3864
Test Spec: LISN : L
File name: EN55022A.SPC

Report No. CE87060201

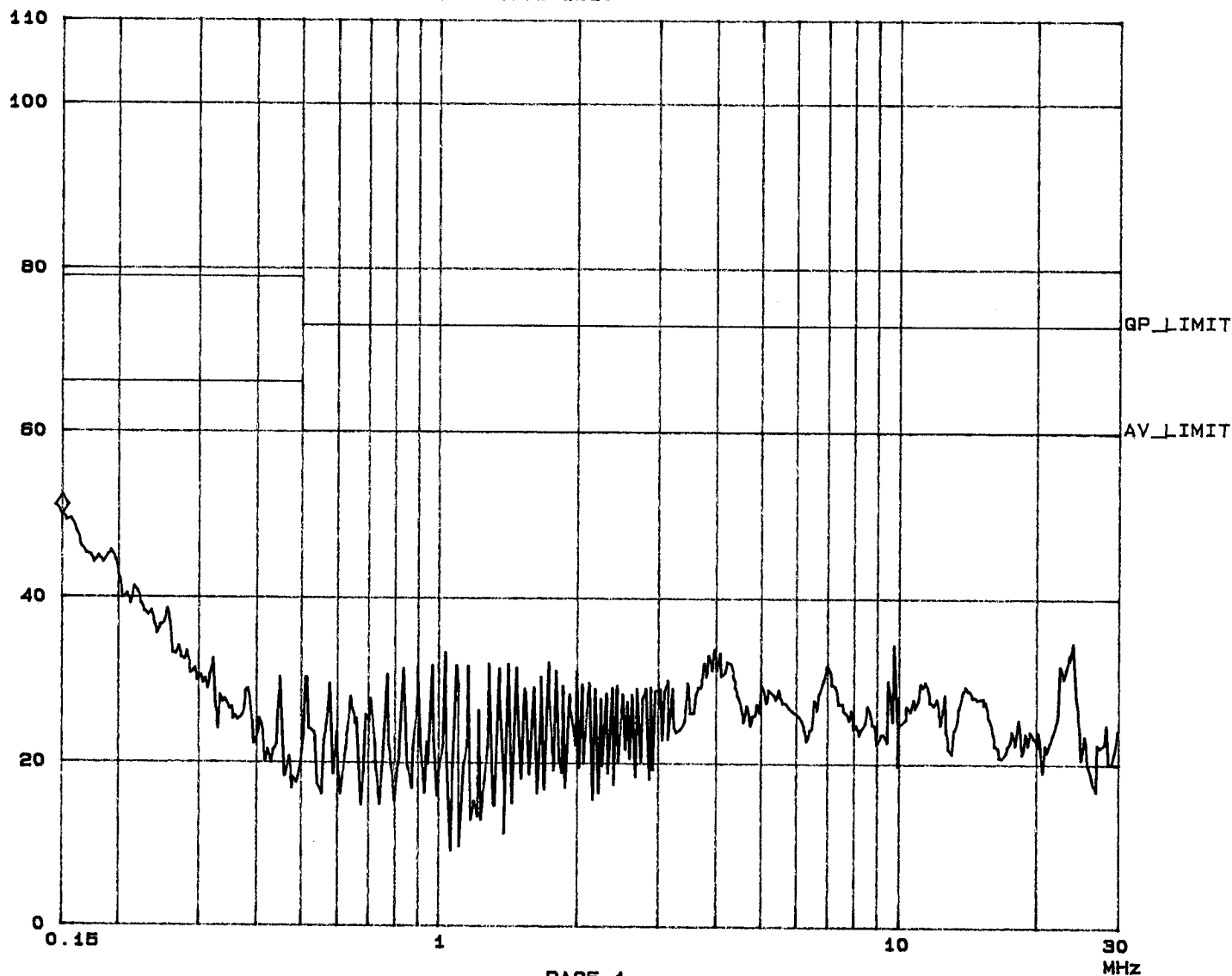
Page 9-1

Tested by Joey Chen

Overview Scan Settings (3 Ranges)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	
150k	1M	3.90625k	9k	PK	10ms	10dBLN	OFF	
1M	10M	3.90625k	9k	PK	0.05ms	10dBLN	OFF	
10M	30M	3.90625k	9k	PK	0.05ms	10dBLN	OFF	

dBuV ◇ Mkr : 150.00 kHz 49.9 dBuV



ADT CORP. OPEN SITE 3
CISPR 22 CLASS A

02. Jun 98 17:55

EUT: PCM_3864
Test Spec: LISN: N
File name: EN55022A.SPC

Report No. CE 87060201

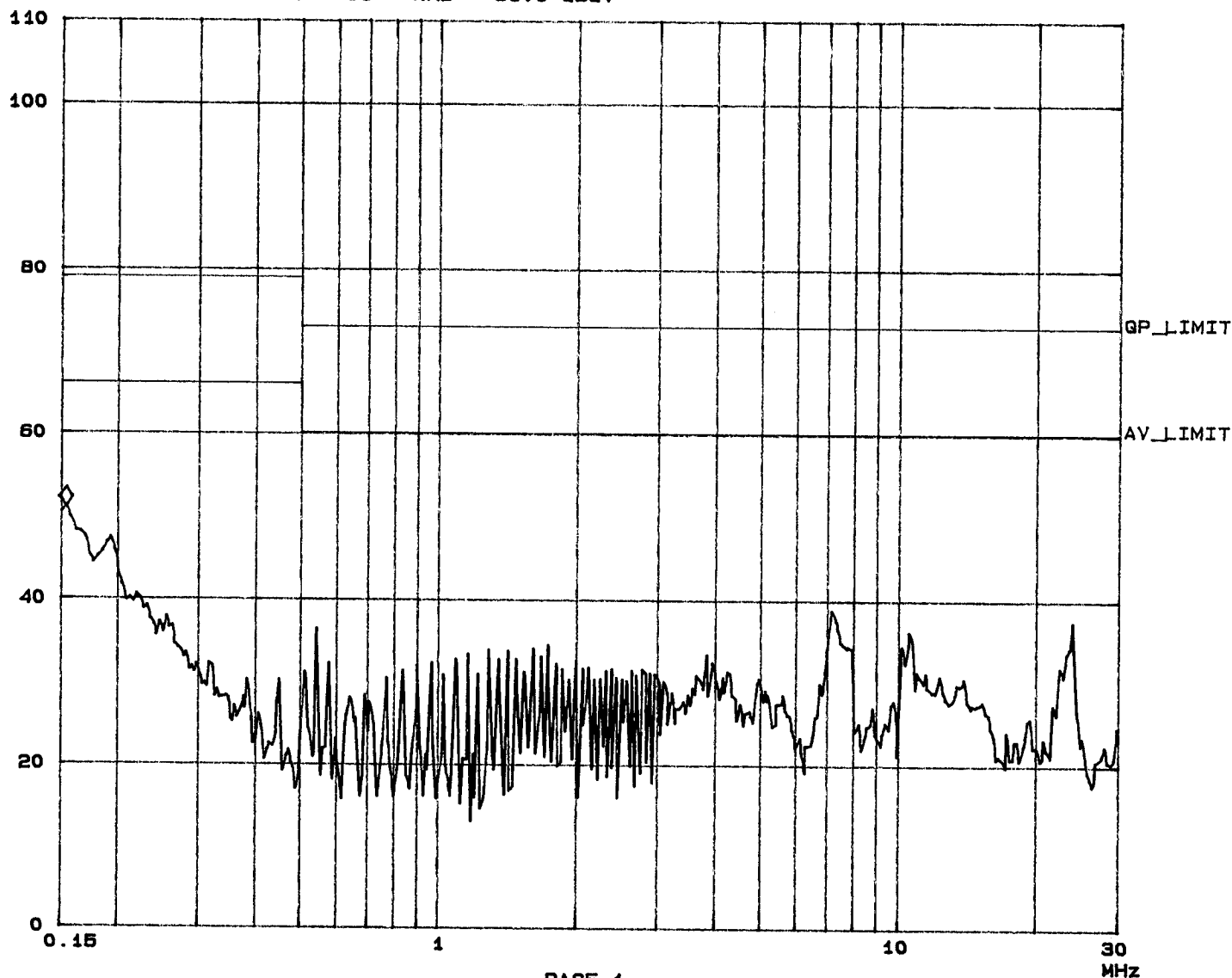
Page 9-2

Tested by Joey Chen

Overview Scan Settings (3 Ranges)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp
150k	1M	3.90625k	9k	PK	10ms	10dBLN	OFF
1M	10M	3.90625k	9k	PK	0.05ms	10dBLN	OFF
10M	30M	3.90625k	9k	PK	0.05ms	10dBLN	OFF

dBuV ◇ Mkr : 153.91 kHz 51.1 dBuV





4.1.3 TEST DATA OF RADIATED EMISSION

EUT: CPU BOARD

MODEL: PCM-3864

ANTENNA: CHASE BILOG CBL6112

POLARITY: Horizontal

DETECTOR FUNCTION: Quasi-peak

6 dB BANDWIDTH: 120 kHz

FREQUENCY RANGE: 30-1000 MHz

MEASURED DISTANCE: 10 M

TEST PERSONNEL: Joey Chen

Frequency (MHz)	Correction Factor (dB/m)	Reading Data (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
109.15	14.6	12.2	26.8	40.0	-13.2
128.88	14.5	11.4	25.9	40.0	-14.1
203.14	10.7	9.5	20.2	40.0	-19.8
226.58	12.9	11.2	24.1	40.0	-15.9
264.24	16.6	11.2	27.8	47.0	-19.2
327.25	16.9	15.1	32.0	47.0	-15.0
453.14	19.5	16.6	36.1	47.0	-10.9
528.65	21.7	13.3	35.0	47.0	-12.0
553.83	22.6	9.2	31.8	47.0	-15.2
755.16	23.9	6.1	30.0	47.0	-17.0

- REMARKS :
1. Emission level (dBuV/m) = Correction Factor(dB/m) + Meter Reading (dBuV).
 2. Correction Factor(dB/m) = Ant. Factor(dB/m) + Cable loss(dB)
 3. The other emission levels were very low against the limit.
 4. Margin value = Emission level - Limit value



TEST DATA OF RADIATED EMISSION

EUT: CPU BOARD

MODEL: PCM-3864

ANTENNA: CHASE BILOG CBL6112

POLARITY: Vertical

DETECTOR FUNCTION: Quasi-peak

6 dB BANDWIDTH: 120 kHz

FREQUENCY RANGE: 30-1000 MHz

MEASURED DISTANCE: 10 M

TEST PERSONNEL: Joey Chen

Frequency (MHz)	Correction Factor (dB/m)	Reading Data (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
80.19	7.8	17.0	24.8	40.0	-15.2
200.47	11.9	12.2	24.1	40.0	-15.9
226.57	13.0	18.4	31.4	40.0	-8.6
264.22	15.6	16.1	31.7	47.0	-15.3
327.26	16.7	17.6	34.3	47.0	-12.7
360.86	18.1	14.0	32.1	47.0	-14.9
400.96	19.0	10.1	29.1	47.0	-17.9
528.60	21.4	13.6	35.0	47.0	-12.0

- REMARKS :
1. Emission level (dBuV/m) = Correction Factor(dB/m) + Meter Reading (dBuV).
 2. Correction Factor(dB/m) = Ant. Factor(dB/m) + Cable loss(dB)
 3. The other emission levels were very low against the limit.
 4. Margin value = Emission level - Limit value



5. TEST RESULTS (IMMUNITY)

5.1 GENERAL DESCRIPTION

Basic Standard	:	EN 61000-4-2	(Electrostatic Discharge Test, ESD)
	:	EN 61000-4-3	(Radiated Radio-Frequency Disturbance Test, RS)
	:	EN 61000-4-4	(Electrical Fast Transient/Burst Test, EFT)
	:	EN 61000-4-6	(Conducted Radio Frequency Disturbances Test, CS)
	:	EN 61000-4-8	(Power Frequency Magnetic Field Test)
	:	ENV 50204	(Radio-Frequency Electromagnetic Field, Pulse modulated)
Generic Standard	:	EN 50 082-2	
Input Voltage	:	230 Vac, 50 Hz	
Temperature	:	21 °C	
Humidity	:	58 %	
Atmospheric Pressure	:	993 mbar	

5.2 PERFORMANCE CRITERIA DESCRIPTION

- Criterion A - The apparatus shall continue to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended.
- Criterion B - The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended.
- Criterion C - Temporary loss of function is allowed, provided the function is self recoverable or can be restored by the operation of the controls.

5.3 EUT OPERATION CONDITION

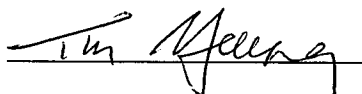
Same as item 4.1.1.



5.4 TEST RESULT OF ELECTROSTATIC DISCHARGE (ESD)

Basic Standard : EN 61000-4-2
Discharge Impedance : 330 ohm / 150 pF
Discharge Voltage : Air Discharge – 4,8 kV (Direct)
Contact Discharge – 4 kV (Direct/Indirect)
Polarity : Positive/Negative
Number of Discharge : Minimum 10 times at each test point
Discharge Mode : Single Discharge
Discharge Period : 1 second minimum

Test Personnel :



Test Result		Remarks
Criterion A	PASS	Model: PCM-3864

OBSERVATION DESCRIPTION

Direct Application			Test Result	
Discharge Level (kV)	Polarity (+/-)	Test Point	Contact Discharge	Air Discharge
8	+/-	1-4	N/A	Note 1
4	+/-	2-3	Note 1	N/A

Description of test point:

1. FDD
2. Metal case
3. I/O ports
4. Power screw

OBSERVATION DESCRIPTION

Indirect Application			Test Result	
Discharge Level (kV)	Polarity (+/-)	Test Point	Contact Discharge	Air Discharge
4	+/-	5-8	Note 1	Note 1

Description of test point:

1. Front side
2. Rear side
3. Right side
4. Left side

Description of test result:

Note 1: There was no change compared with initial operation during the test.



5.5 TEST RESULT OF RADIATED ELECTROMAGNETIC FIELDS (RS)

Basic Standard : EN 61000-4-3
Frequency range : 80 MHz -1000 MHz
Field strength : 10 V/m
Modulation : 1kHz Sine Wave, 80%, AM Modulation
Frequency step : 1 % of fundamental
Polarity of Antenna : Horizontal and Vertical
Test distance : 3 m

Test Personnel :

Test Result		Remarks
Criterion A	PASS	Model: PCM-3864

Note: Four sides of EUT are verified separately.

Description of test result:

There was no change compared with initial operation during the test.



5.6 TEST RESULT OF ELECTRICAL FAST TRANSIENT (EFT)

Basic Standard : EN 61000-4-4
Test Voltage : Power Line - 2 kV
Signal/Control Line - 1 kV
Polarity : Positive/Negative
Impulse Frequency : 5 kHz
Tr / Tn : 5/50 ns
Burst Duration : 15 ms
Burst Period : 300 ms
Test Duration : Not less than 1 min.

Test Personnel :

Tu Meune

Test Result		Remarks
Criterion A	PASS	Model: PCM-3864

OBSERVATION DESCRIPTION

Test Point	Polarity	Test Level (kV)	Result
L1	+/-	2	Note 1
L2	+/-	2	Note 1
GND	+/-	2	Note 1
Signal/Control Line	+/-	1	Note 1

Description of test result:

Note 1: There was no change compared with initial operation during the test.



5.7 TEST RESULT OF CONDUCTED RADIO FREQUENCY DISTURBANCES (CS)

Basic Standard : EN 61000-4-6
Frequency range : 0.15 MHz - 80 MHz
Field strength : 10 V/m
Modulation : 1kHz Sine Wave, 80%, AM Modulation
Frequency step : 1 % of fundamental
Coupled cable : Power Mains, Unshielded
Coupling device : CDN-M3 (3 wires)

Test Personnel :

Tim Glesne

Test Result		Remarks
Criterion A	PASS	Model: PCM-3864

OBSERVATION DESCRIPTION

There was no change compared with initial operation during the test.



5.8 TEST RESULT OF POWER FREQUENCY MAGNETIC FIELD

Basic Standard : EN 61000-4-8
Frequency range : 50Hz
Field strength : 50 A/m
Observation Time : 1 minute
Inductance coil : Rectangular type, 1mx1m
Test Personnel :

Tim Young

Test Result		Remarks
Criterion A	PASS	Model: PCM-3864

OBSERVATION DESCRIPTION

There was no change compared with initial operation during the test.



5.9 TEST RESULT OF RADIO-FREQUENCY ELECTROMAGNETIC FIELD, PULSE MODULATED

Basic Standard : ENV 50204
Frequency range : 900 +/- 5 MHz
Field strength : 10 V/m
Modulation : 200Hz, Square Wave, 50% Duty Cycle
Dewell Time : 30 second
Polarity of Antenna : Horizontal and Vertical
Test distance : 3 m

Test Personnel :

Test Result		Remarks
Criterion A	PASS	Model: PCM-3864

Note: Four sides of PC system are verified separately.

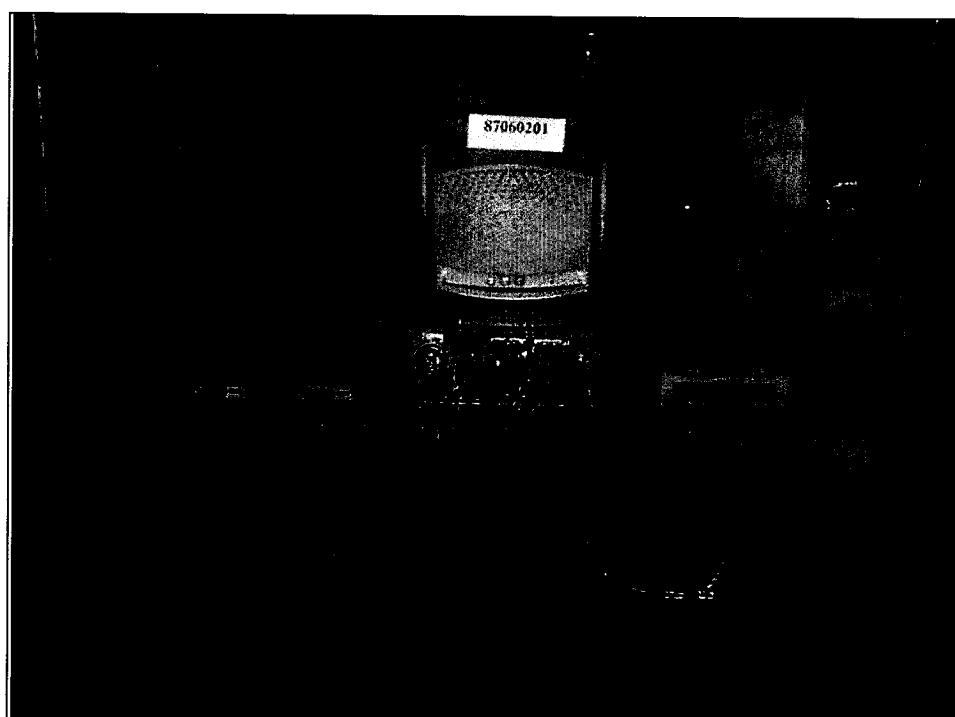
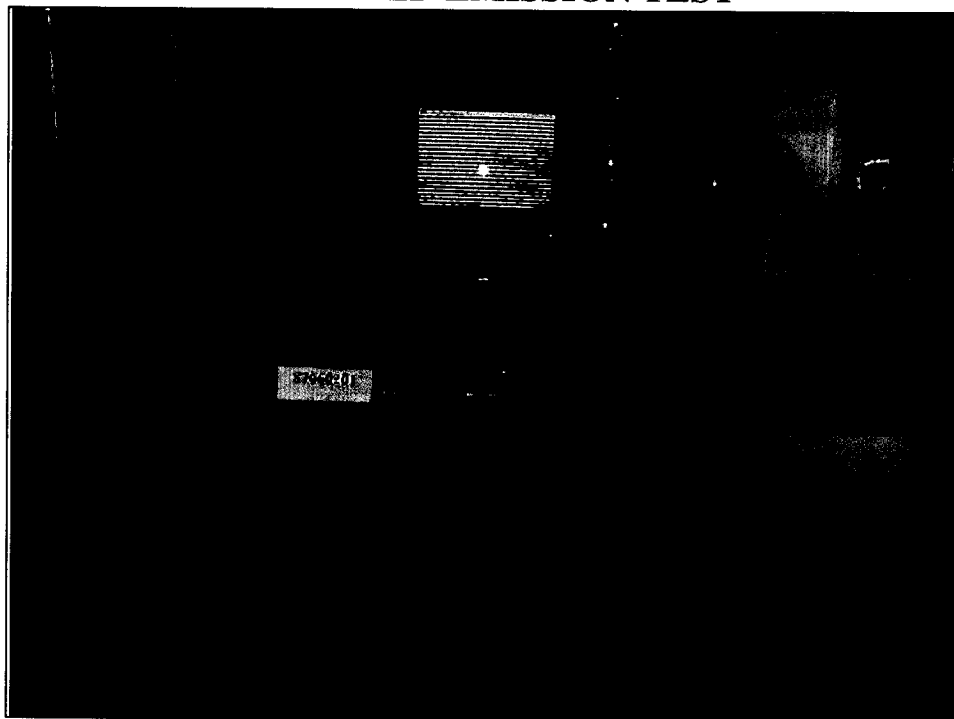
OBSERVATION DESCRIPTION

There was no change compared with initial operation during the test.



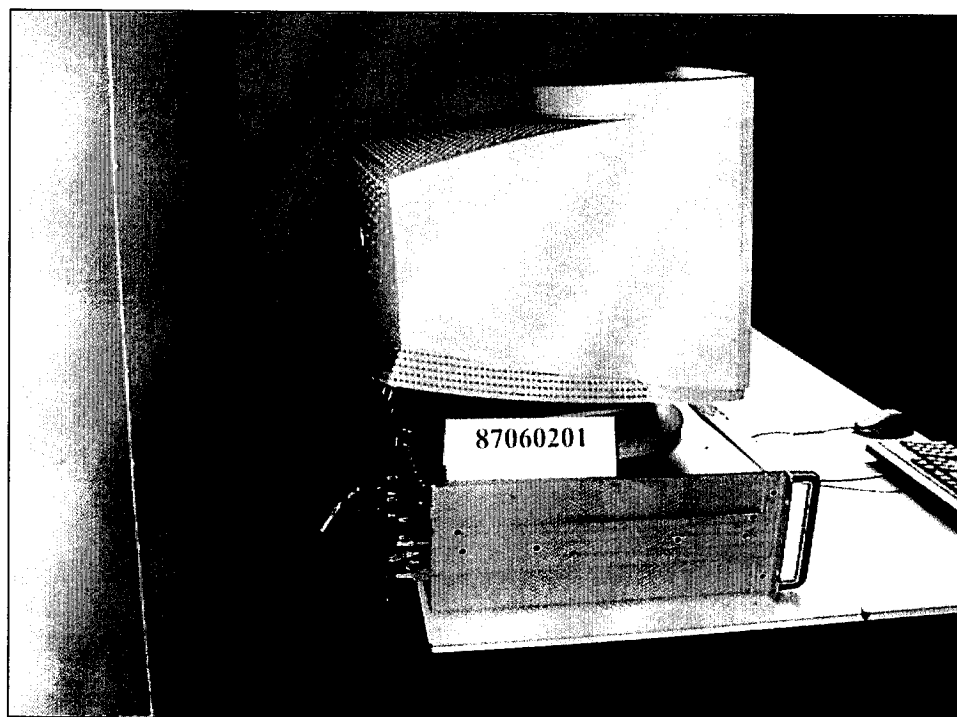
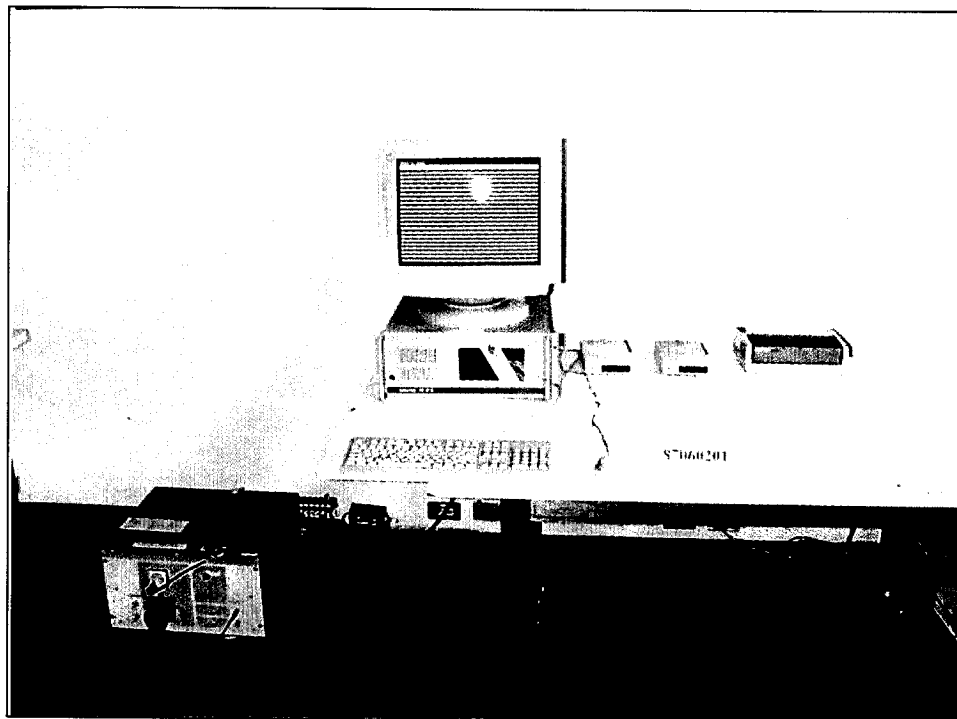
6. PHOTOGRAPHS OF THE TEST CONFIGURATION

RADIATED EMISSION TEST



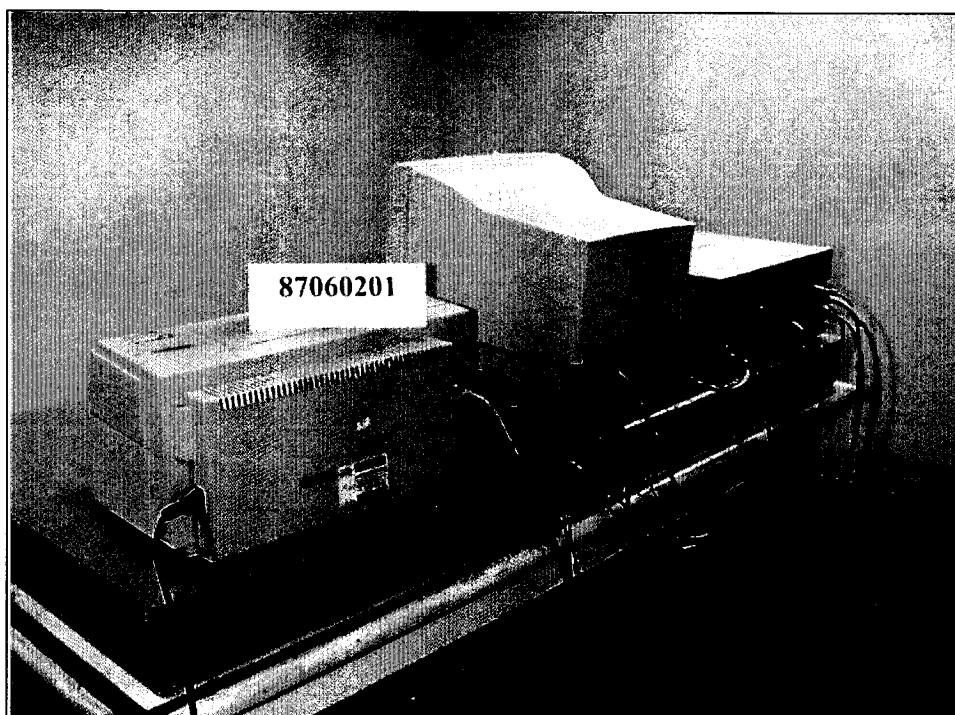
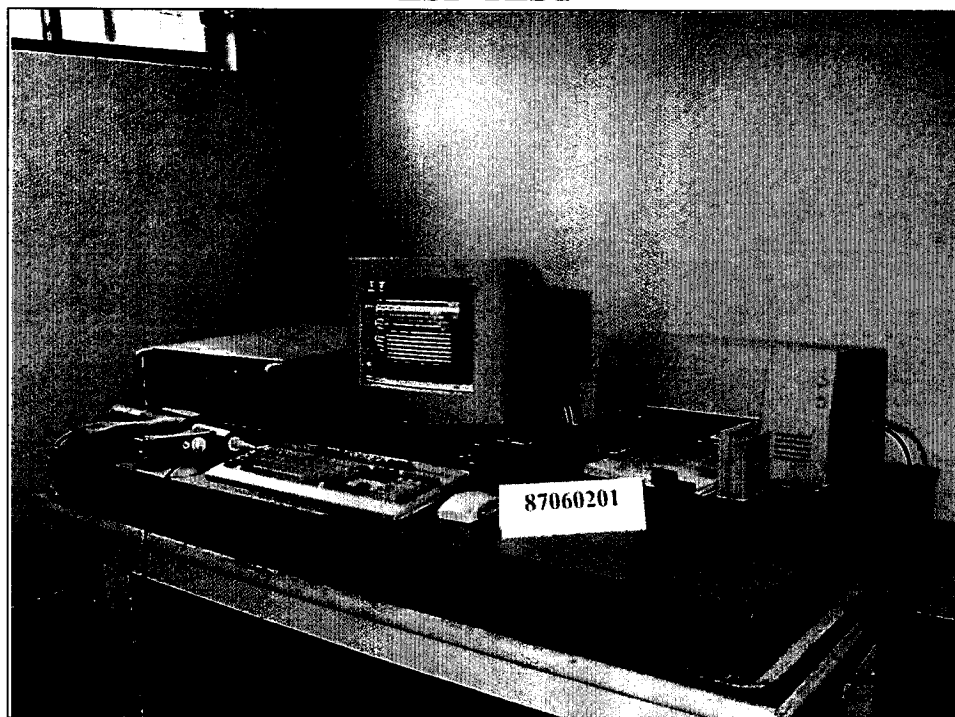


CONDUCTED EMISSION TEST



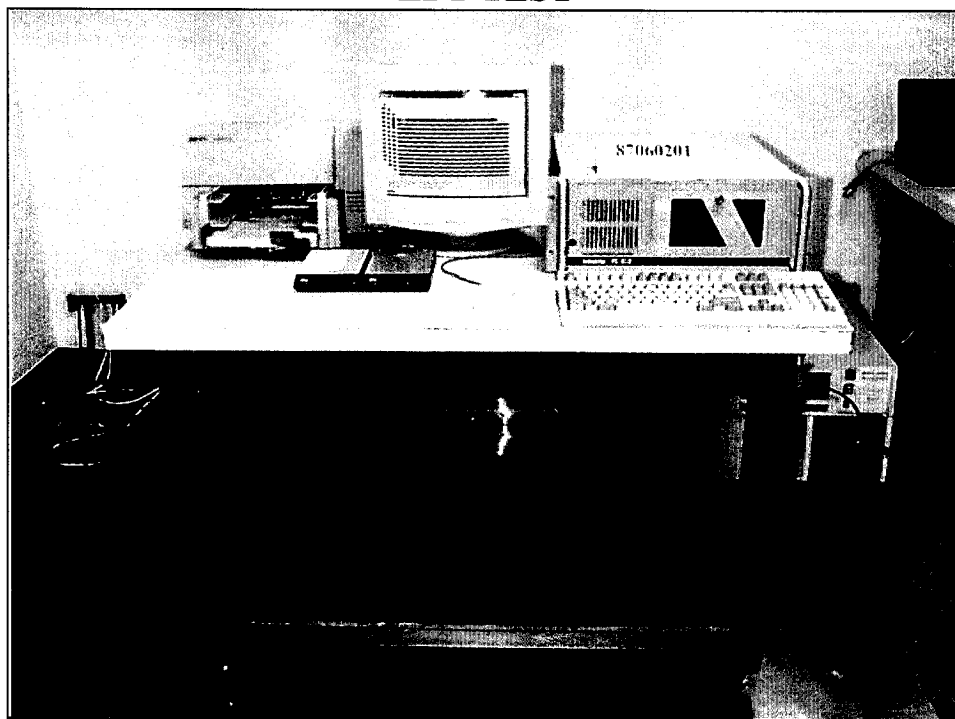


ESD TEST

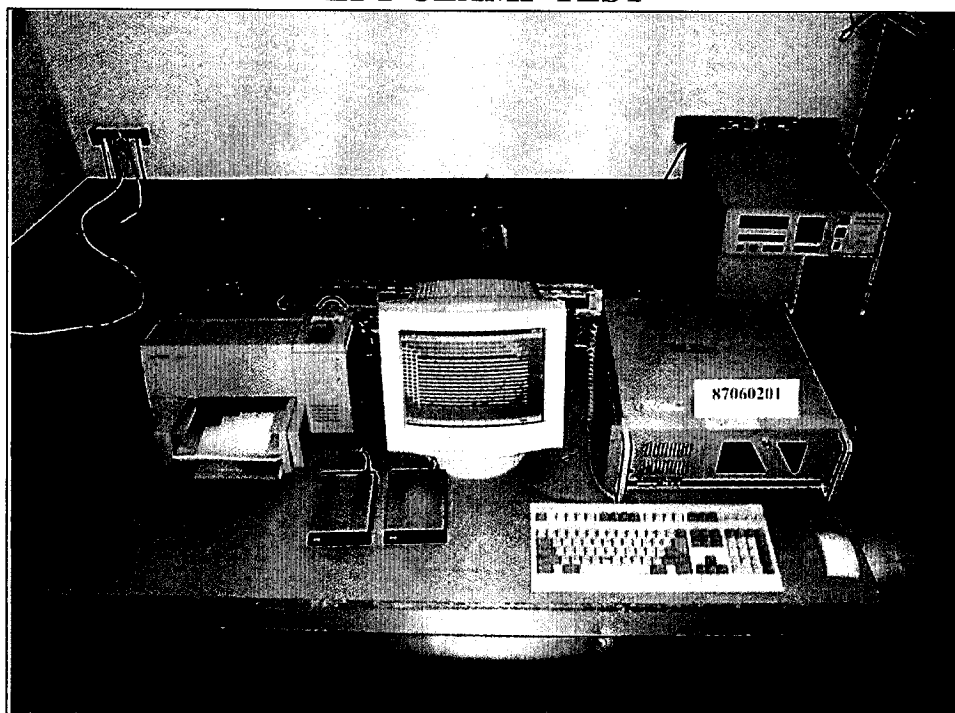




EFT TEST

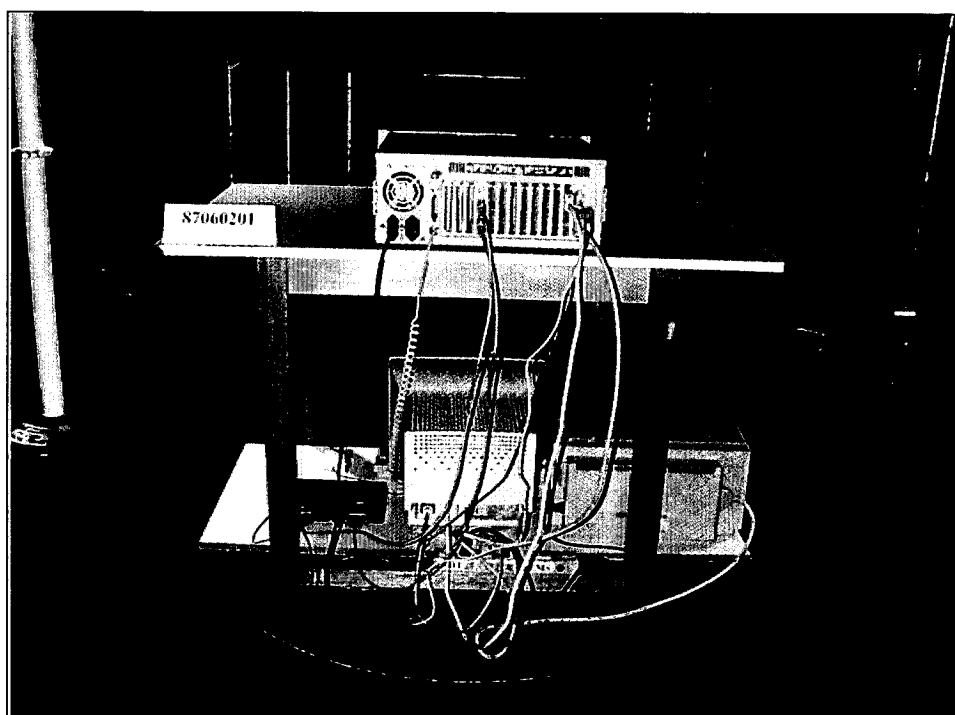
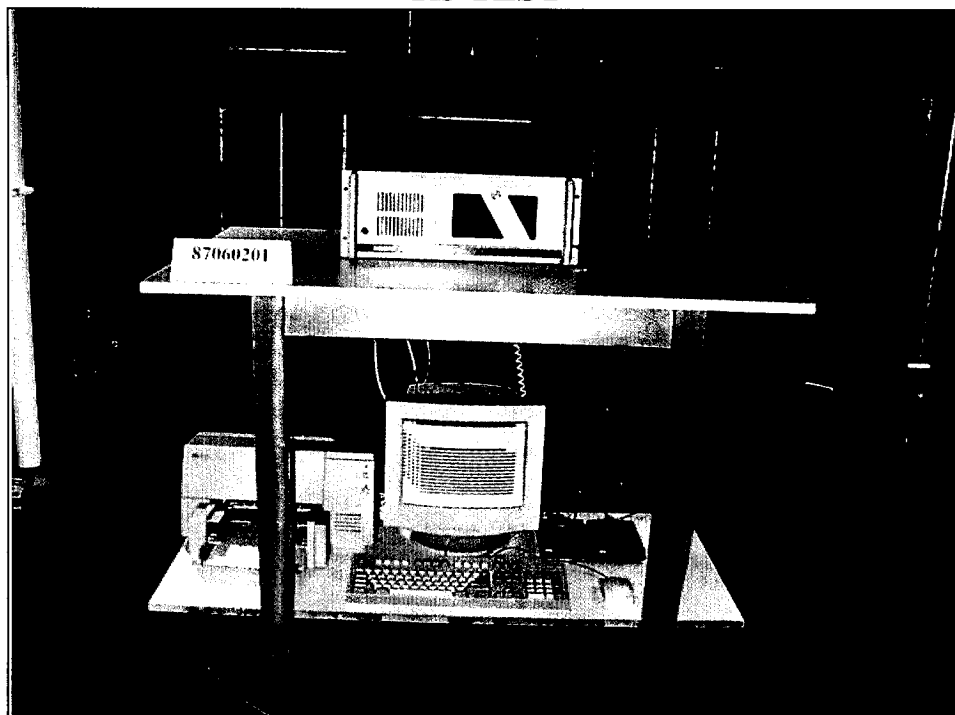


EFT CLAMP TEST





RS TEST

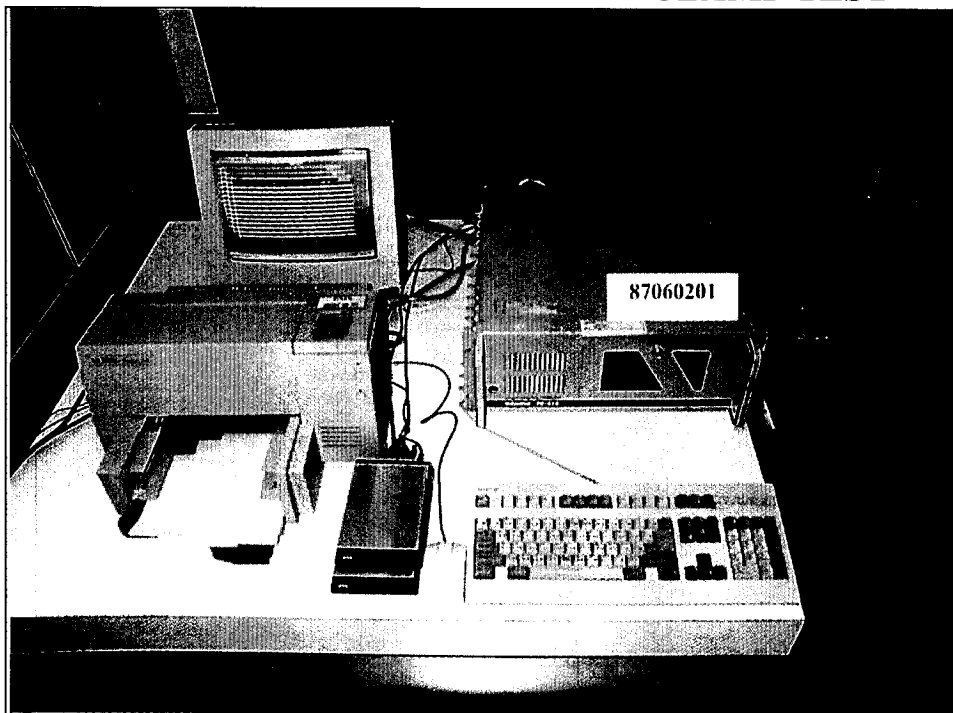




CONDUCTED SUSCEPTIBILITY TEST

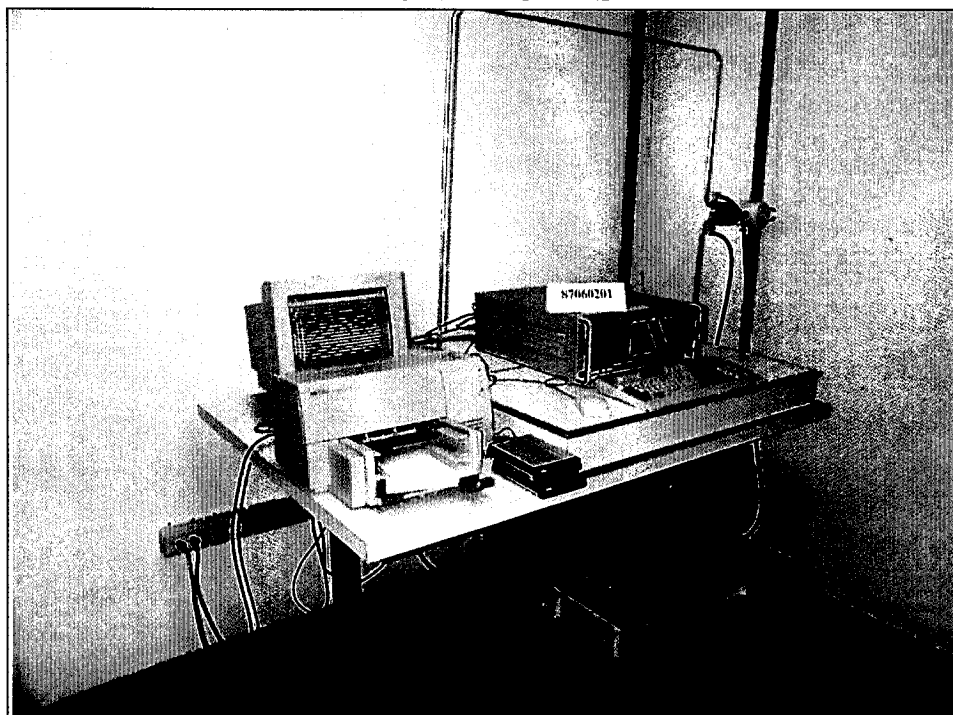


CONDUCTED SUSCEPTIBILITY CLAMP TEST





MAGNETIC TEST





7. CONSTRUCTION PHOTOS OF EUT

