5.6 Radio frequency radiated susceptibility

(According to DO 160 D specification – Section 20 – Issue 1997 – Category W)

- Purpose of the test

  This test determines whether equipment will operate within performance specifications when equipment and its interconnecting wiring are exposed to a RF electric field level.

  The system powered and operating in its functional mode as defined in chapter 3 must not exhibit malfunction, degradation of performances or deviation beyond tolerances when submitted to a RF electric field level applied through antennas.

- Frequency range

  This test is performed from 100 MHz to 18 GHz.

- Test method

  Substitution method.

- Field levels

  100 V/m from 100 MHz to 18 GHz.

- Modulation characteristics

  1) Amplitude modulation with a square wave 90 % depth, 1 kHz frequency.
  2) CW.

- Frequency range

  The test frequencies are logarithmically spaced according to 100 frequencies per decade.

  At each step, the specified level is established during 2 seconds and an equipment functional check is carried out.

- Test installation description

The test set-up are given Figures 5.6.1 to 5.6.4.

Calibration

The fieldmeter is placed at the location of the EUT (in place of) 30 cm over the ground plane.

The transmitting antenna is placed 1 meter in front of the isotropic field sensor.

The forward power to the transmitting antenna is adjusted until the required field level is achieved. The power and corresponding field are recorded.

Application

Test apparatus is installed outside the shielded enclosure.

The equipment is bonded on the ground plane according the EUT design and installation instructions.

All interconnecting cables and wires are spaced 5 cm above the ground plane with insulating support and the first 2 meters wires run at a distance of 10 cm in parallel of the leading edge of the ground plane.

From 100 MHz to 18 GHz, the electric field is generated by an horn antenna. The antenna is placed at 1 meter in front of the equipment and its interconnecting wiring. The test is performed in vertical polarization and horizontal polarization.

Photographies are given Pictures 5.6.5 to 5.6.10.

- Apparatus list

NoEmitech	Category	Marque	Type
2/04/24/025	Synthesizer	Fluke	6060 B
2/04/24/052	Synthesizer	Anritsu/Wiltron	68347B
2/11/12/012	Milliwattmeter	Boonton	4200 RF
2/11/12/013	Power probe	Boonton	4200-6E
2/11/12/020	Milliwattmeter	Rohde & Schwarz	NRV
2/11/12/021	Power probe	Rohde & Schwarz	URV5-Z2
3/01/12/023	Amplifier	Kalmus	137C
3/01/12/033	Amplifier	Kalmus	723 FC
3/01/12/067	Amplifier	Kalmus	LA1000UE
3/01/12/078	Amplifier	TMD	PTC 6341
3/01/12/079	Amplifier	TMD	PTC 6342
3/01/12/080	Amplifier	TMD	PTC6344
3/01/12/081	Amplifier	TMD	PTC 6346
3/15/18/038	Fieldmeter	Holaday	HI-4453
3/17/12/002	Coupler	Amplifier Research	DC 2000
3/17/12/004	Coupler	CMC	440065
3/17/12/015	Coupler	CMC	440132
3/17/12/033	Coupler	Narda	27000-30
3/24/18/233	Horn antenna	Emco	3106
4/04/00/040	Function generator	Thurlby Thandar	TG230
4/16/00/010	Shielded enclosure	Ray proof	C.8
4/24/00/273	Horn antenna	Amplifier Research	AT4003
4/24/00/275	Horn antenna	Amplifier Research	AT 4002A
5/24/00/015	Horn antenna	Ampli Research	AT-4001
5/24/00/085	Log-periodic antenna	Amplifier Research	AT 1100
5/24/00/098	Horn antenna	Oritel	CM 750/20

- Test results

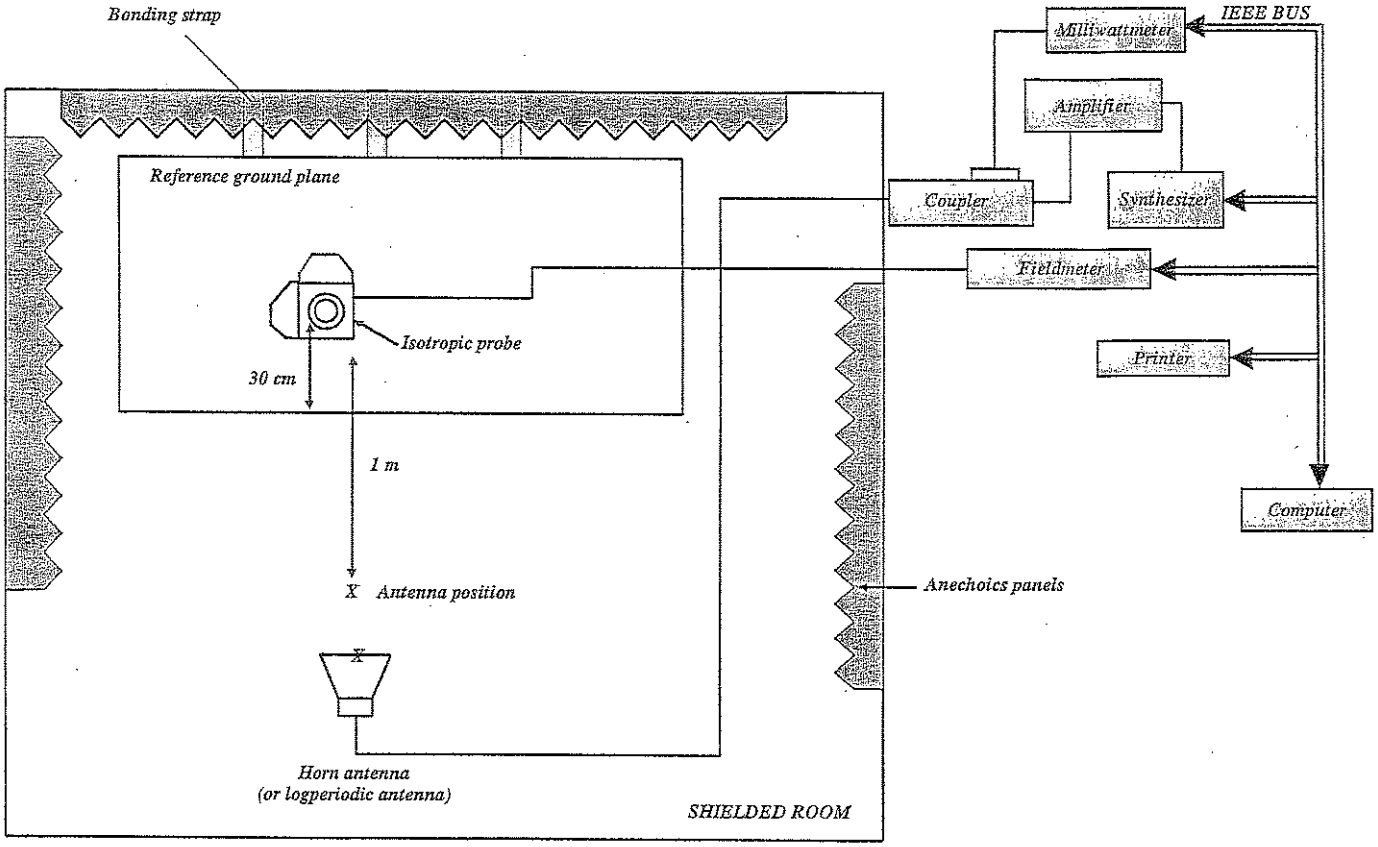
Field level applied is given on the following Figures.

Figure n°	Polarization	Modulation		Remark
		CW	AM	
5.6.11	Vertical	✓		No anomaly
5.6.12	Vertical		✓	No anomaly
5.6.13	Horizontal	✓		No anomaly
5.6.14	Horizontal		✓	No anomaly

Figure 5.6.1

RADIATED SUSCEPTIBILITY – ELECTRIC FIELD

CALIBRATION FROM 100 MHZ TO 18 GHZ

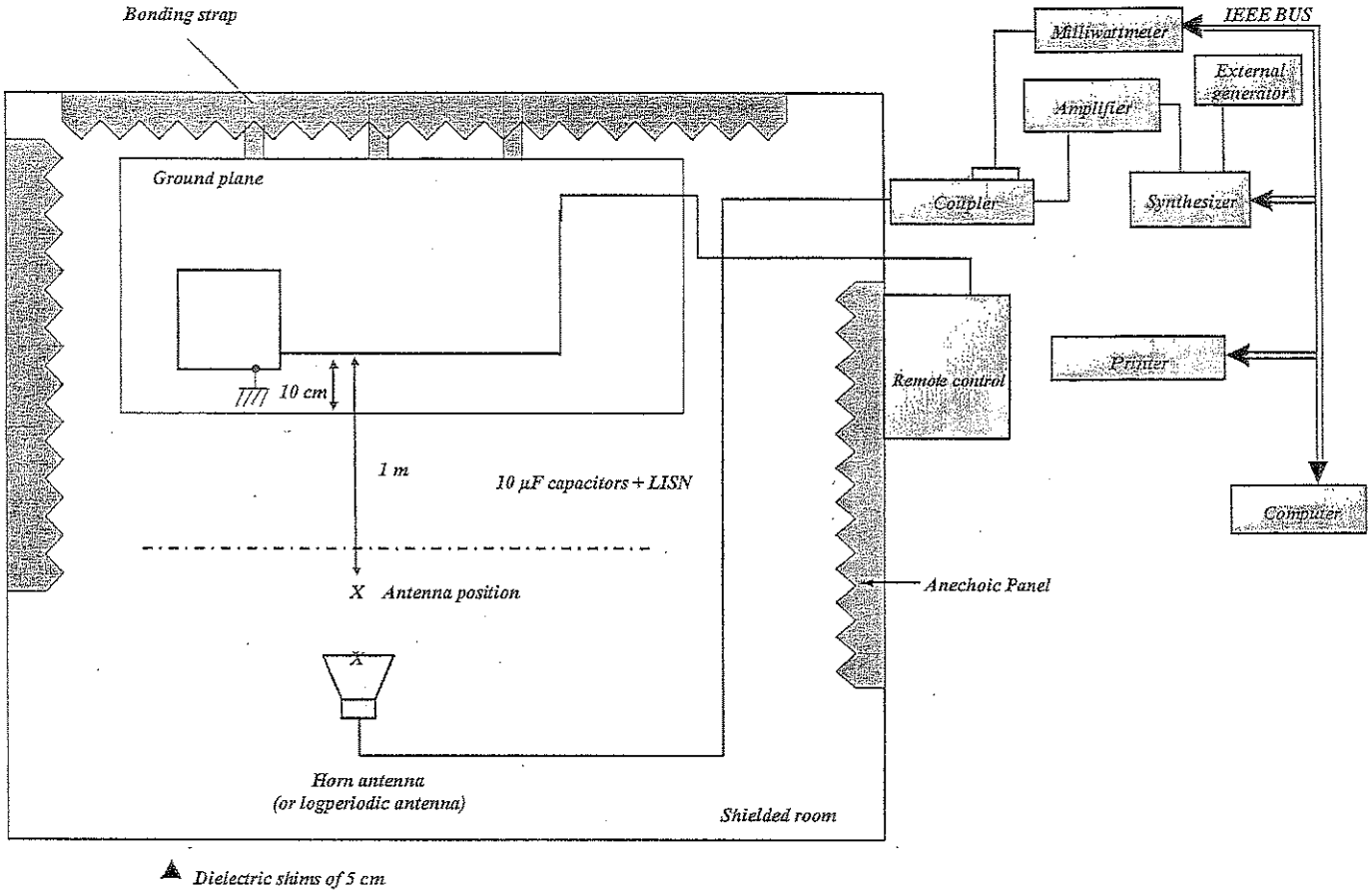


NB : From 1 GHz to 18 GHz, the coupler, the milliwattmeter, the amplifier and the synthesizer are placed inside shielded room.

Figure 5.6.2

RADIATED SUSCEPTIBILITY – ELECTRIC FIELD

CALIBRATION FROM 100 MHz TO 18 GHz

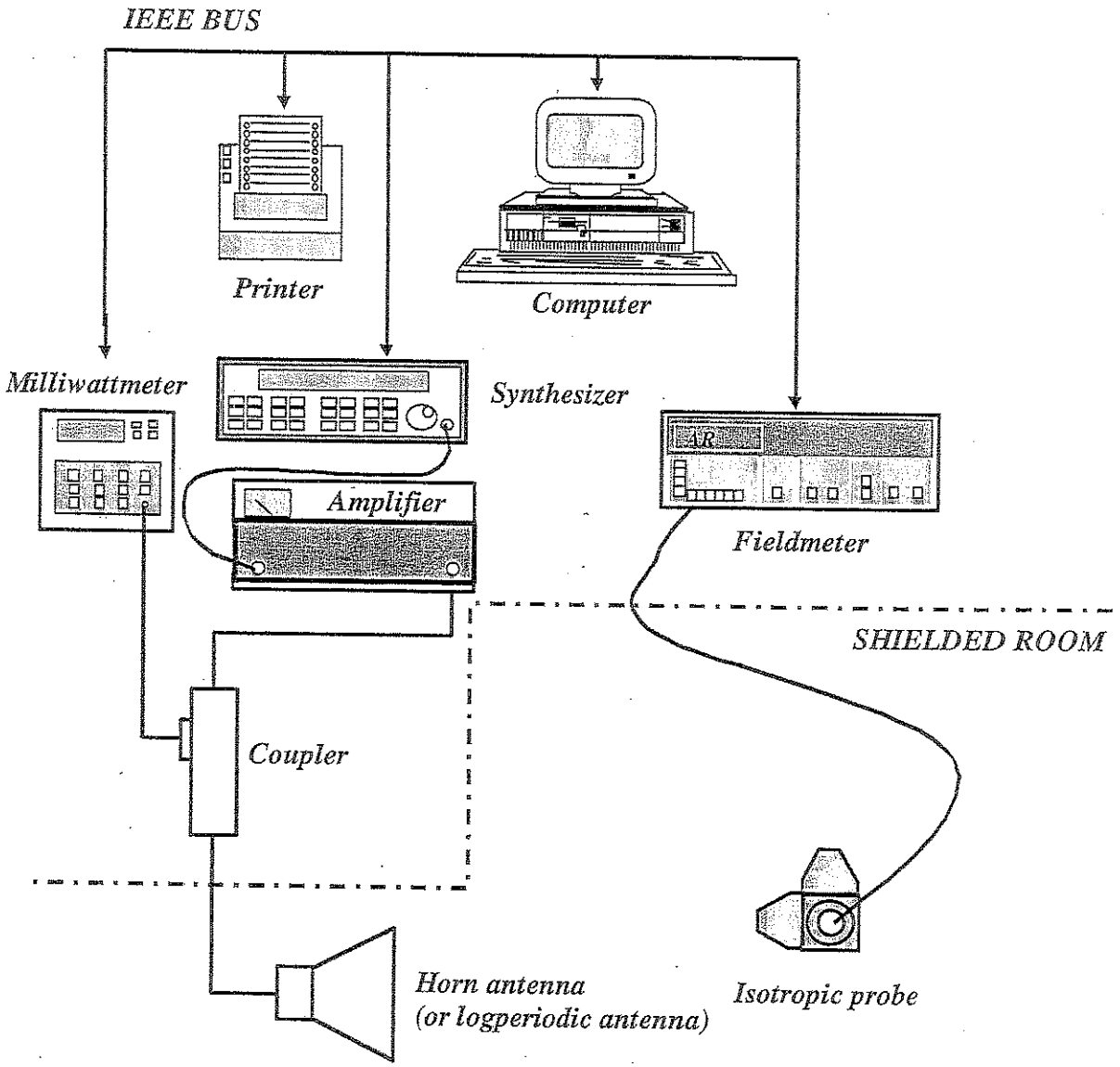


NB : From 1 GHz to 18 GHz, the coupler, the milliwattmeter, the amplifier and the synthesizer are placed inside shielded room.

Figure 5.6.3

RADIATED SUSCEPTIBILITY – ELECTRIC FIELD

CALIBRATION

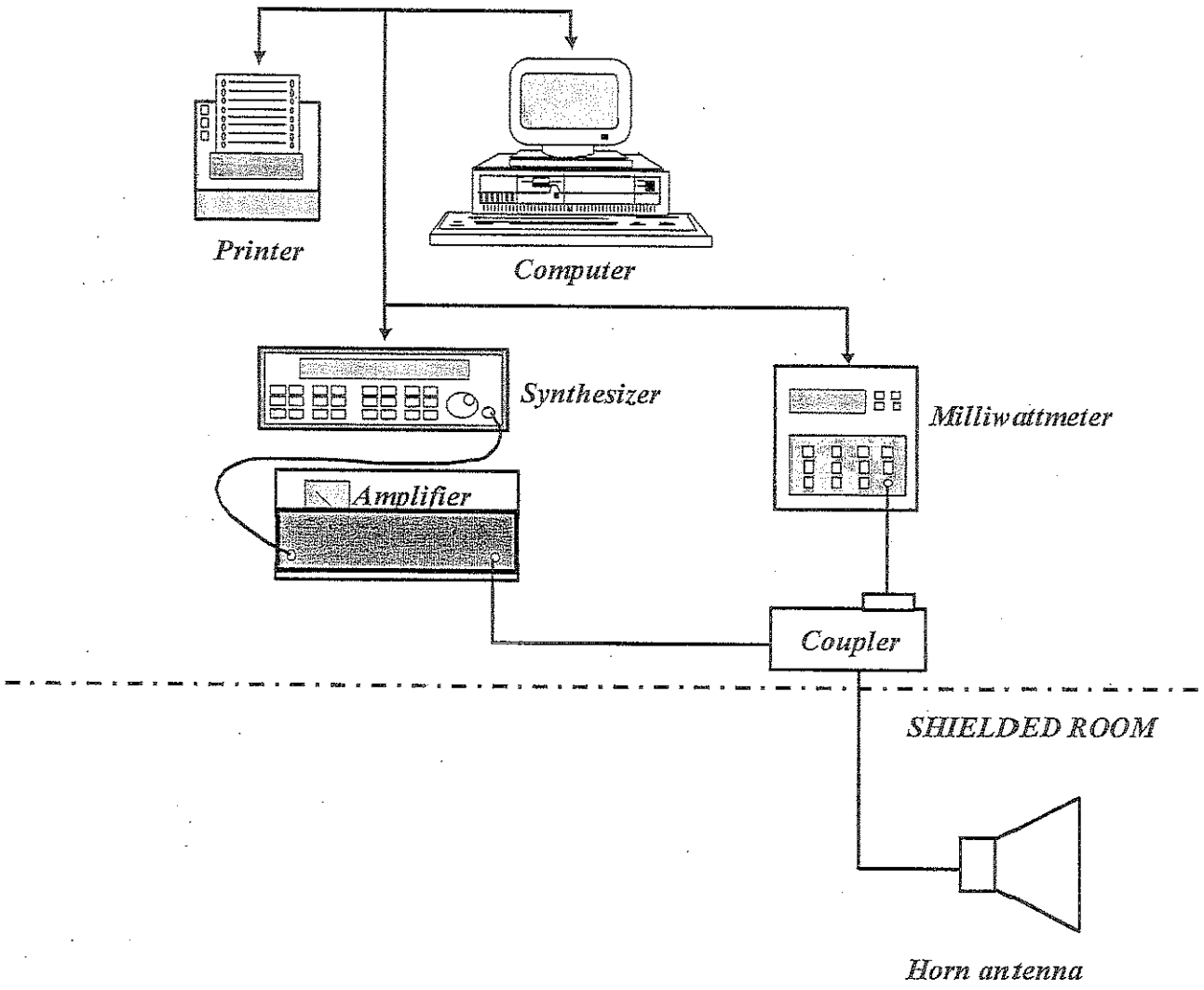


NB : From 1 GHz to 18 GHz, the coupler, the milliwattmeter, the amplifier and the synthesizer are placed inside shielded room.

Figure 5.6.4

RADIATED SUSCEPTIBILITY – ELECTRIC FIELD

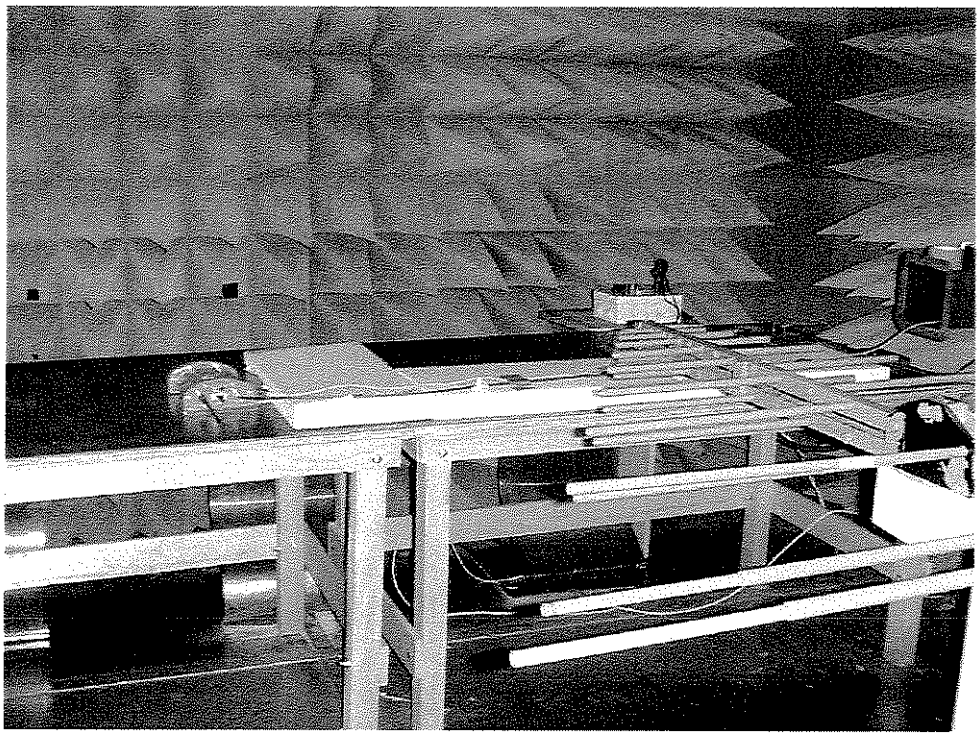
APPLICATION FROM 100 MHz TO 18 GHz



NB : From 1 GHz to 18 GHz, the coupler, the milliwattmeter, the amplifier and the synthesizer are placed inside shielded room

Picture 5.6.5

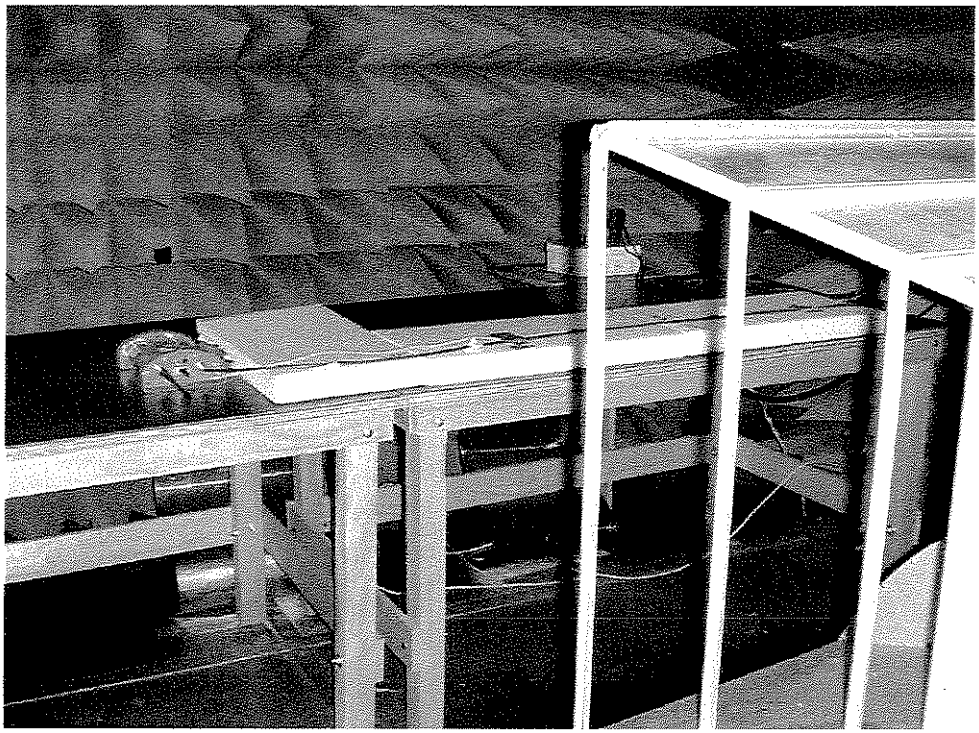
RADIATED SUSCEPTIBILITY – ELECTRIC FIELD



Test from 100 MHz to 200 MHz

Picture 5.6.6

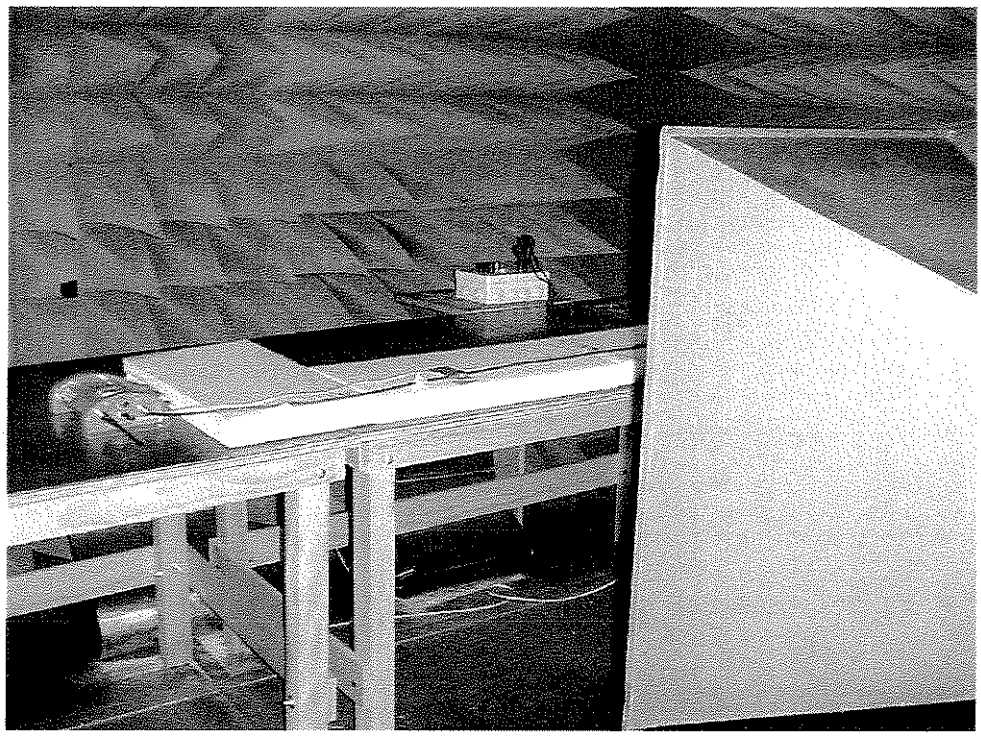
RADIATED SUSCEPTIBILITY – ELECTRIC FIELD



Test from 200 MHz to 500 MHz

Picture 5.6.7

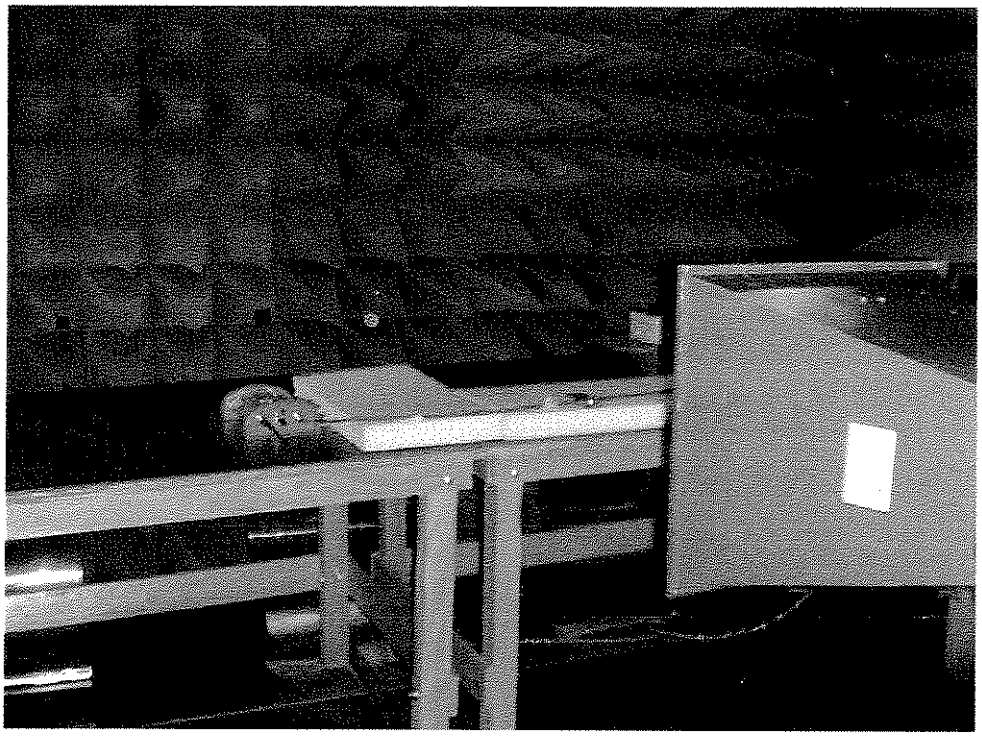
RADIATED SUSCEPTIBILITY – ELECTRIC FIELD



Test from 500 MHz to 1 GHz

Picture 5.6.8

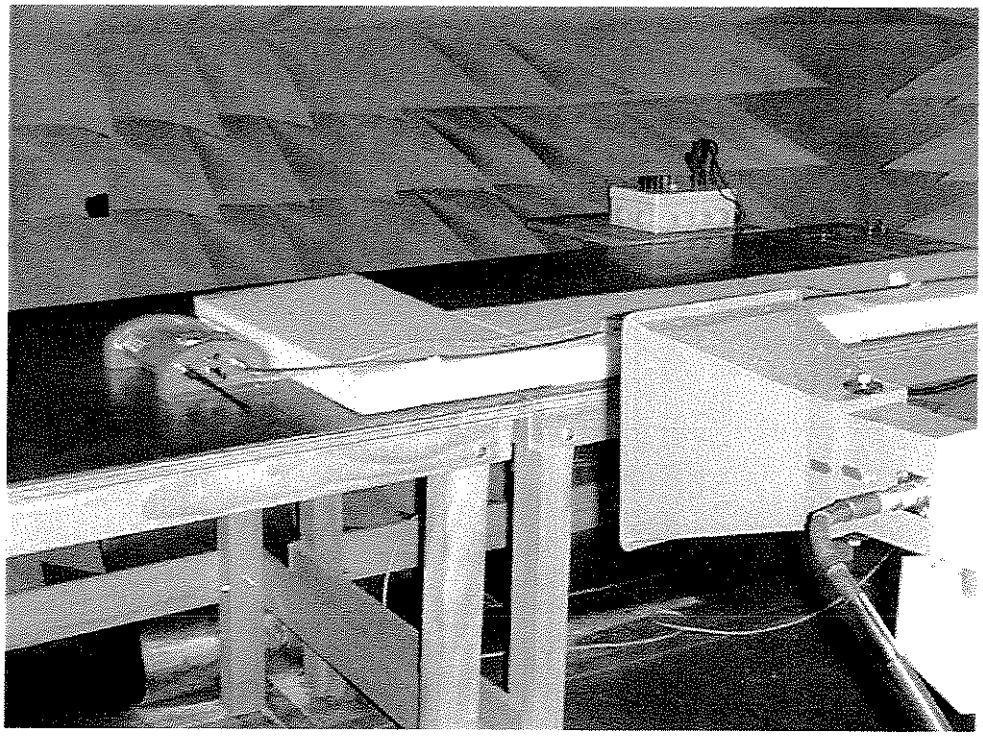
RADIATED SUSCEPTIBILITY – ELECTRIC FIELD



Test from 1 GHz to 4 GHz

Picture 5.6.9

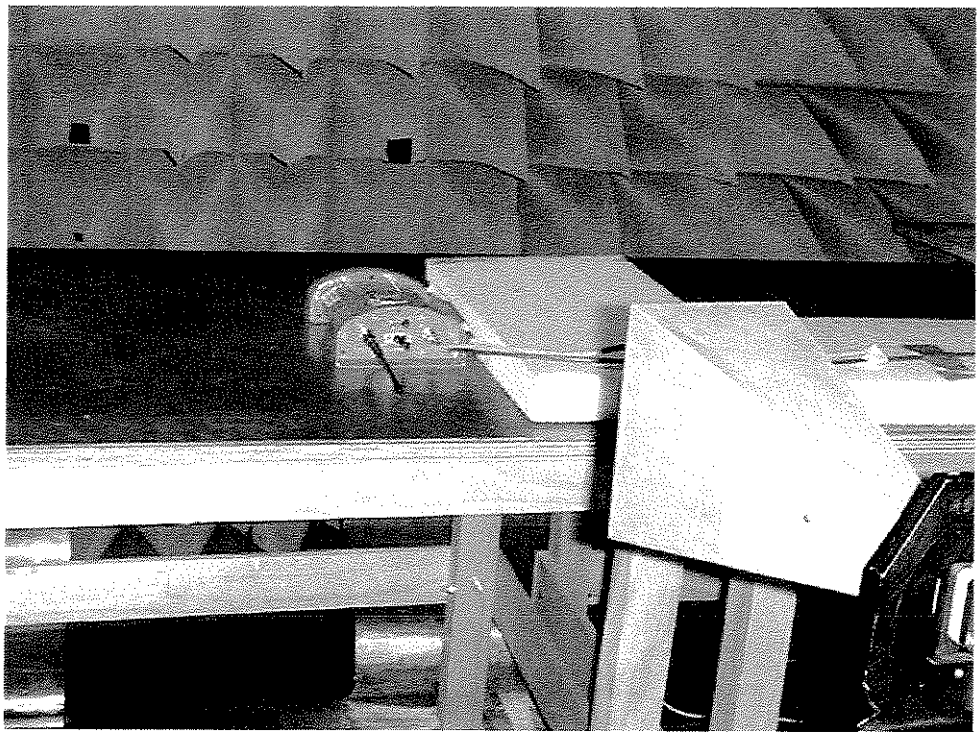
RADIATED SUSCEPTIBILITY – ELECTRIC FIELD



Test from 4 GHz to 8 GHz

Picture 5.6.10

RADIATED SUSCEPTIBILITY – ELECTRIC FIELD



Test from 8 GHz to 18 GHz

Figure 5.6.11

ADT 406 AF/AP
RADIATED SUSCEPTIBILITY - ELECTRIC FIELD
ACCORDING TO RTCA DO160D - SECT 20 - CAT W
VERTICAL POLARIZATION
TEST WITHOUT MODULATION

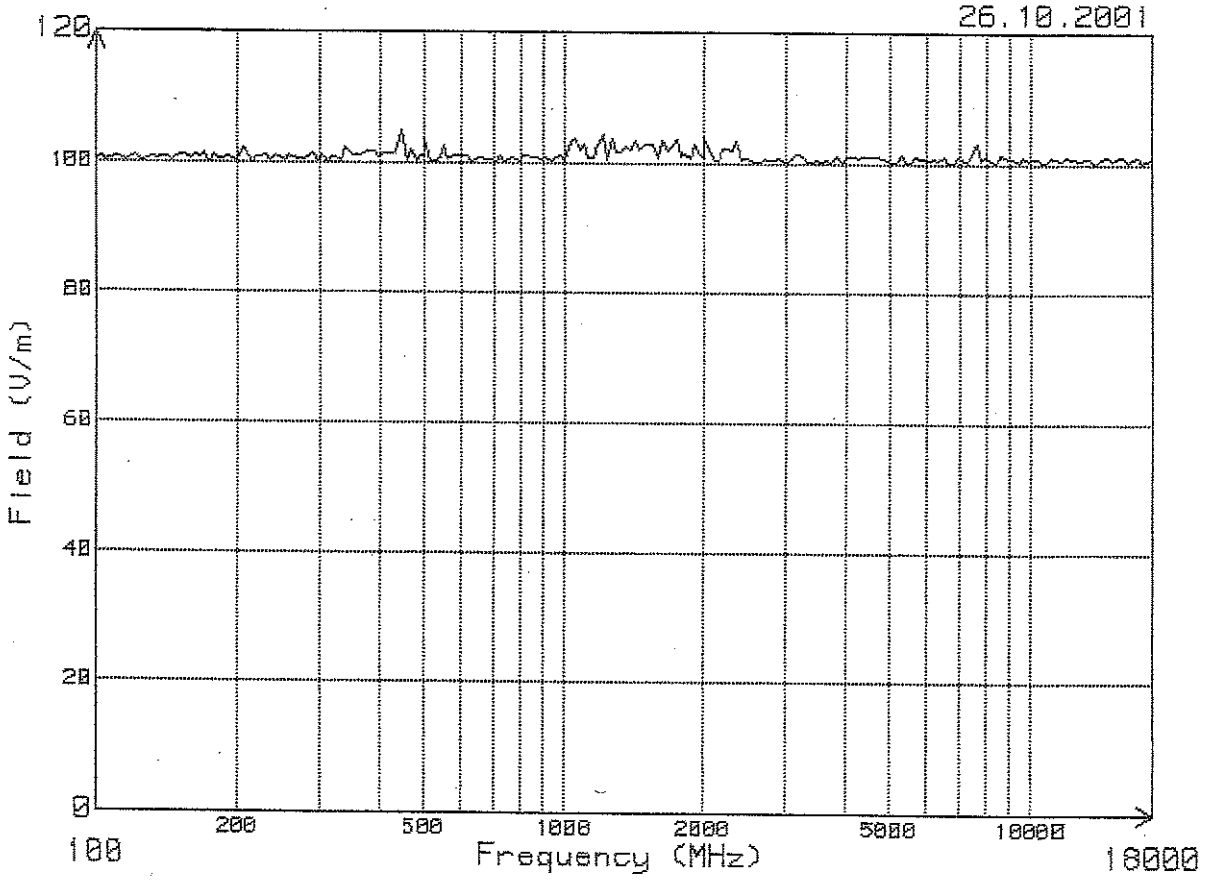


Figure 5.6.12

ADT 406 AF/AP
RADIATED SUSCEPTIBILITY - ELECTRIC FIELD
ACCORDING TO RTCA DO160D - SECT 20 - CAT W
VERTICAL POLARIZATION
TEST WITH MODULATION

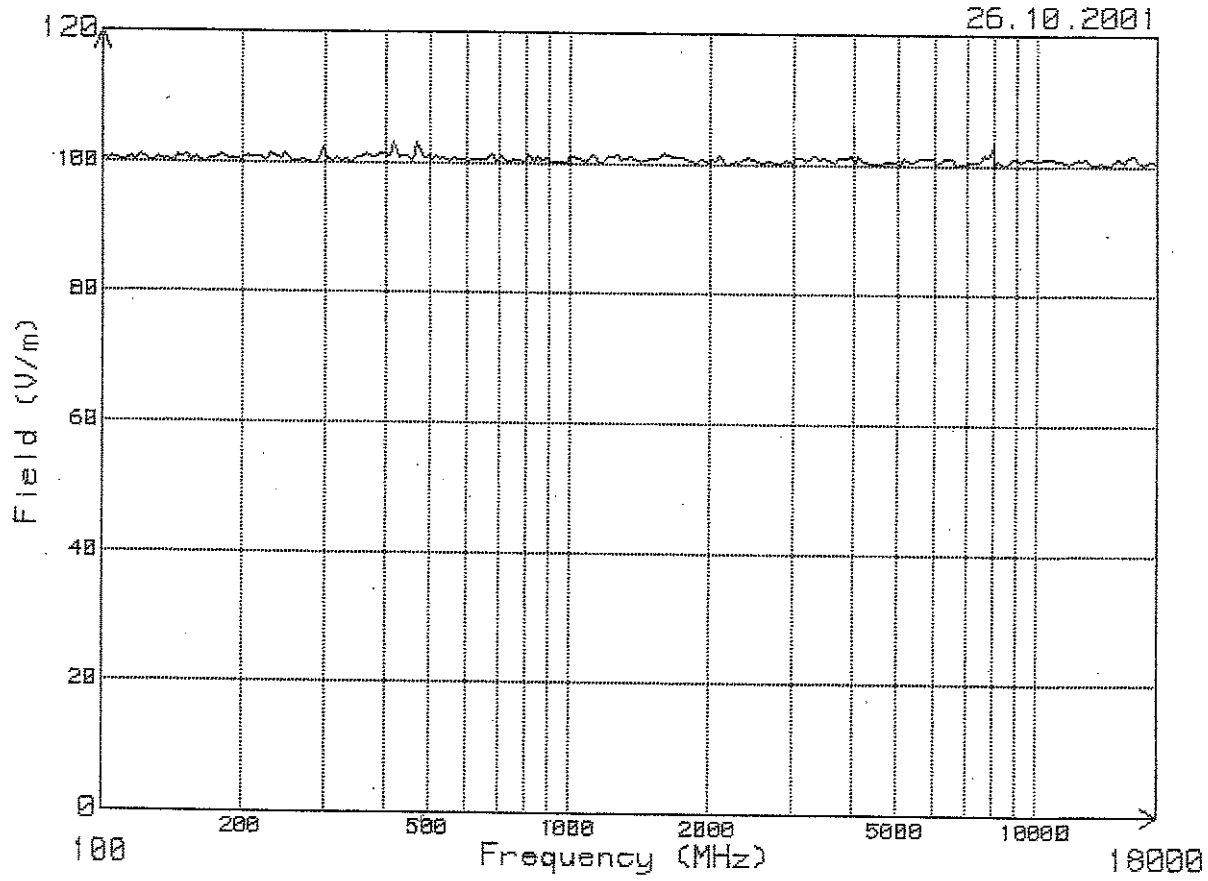


Figure 5.6.13

ADT 406 AF/AP
RADIATED SUSCEPTIBILITY - ELECTRIC FIELD
ACCORDING TO RTCA DO160D - SECT 20 - CAT W
HORIZONTAL POLARIZATION
TEST WITHOUT MODULATION

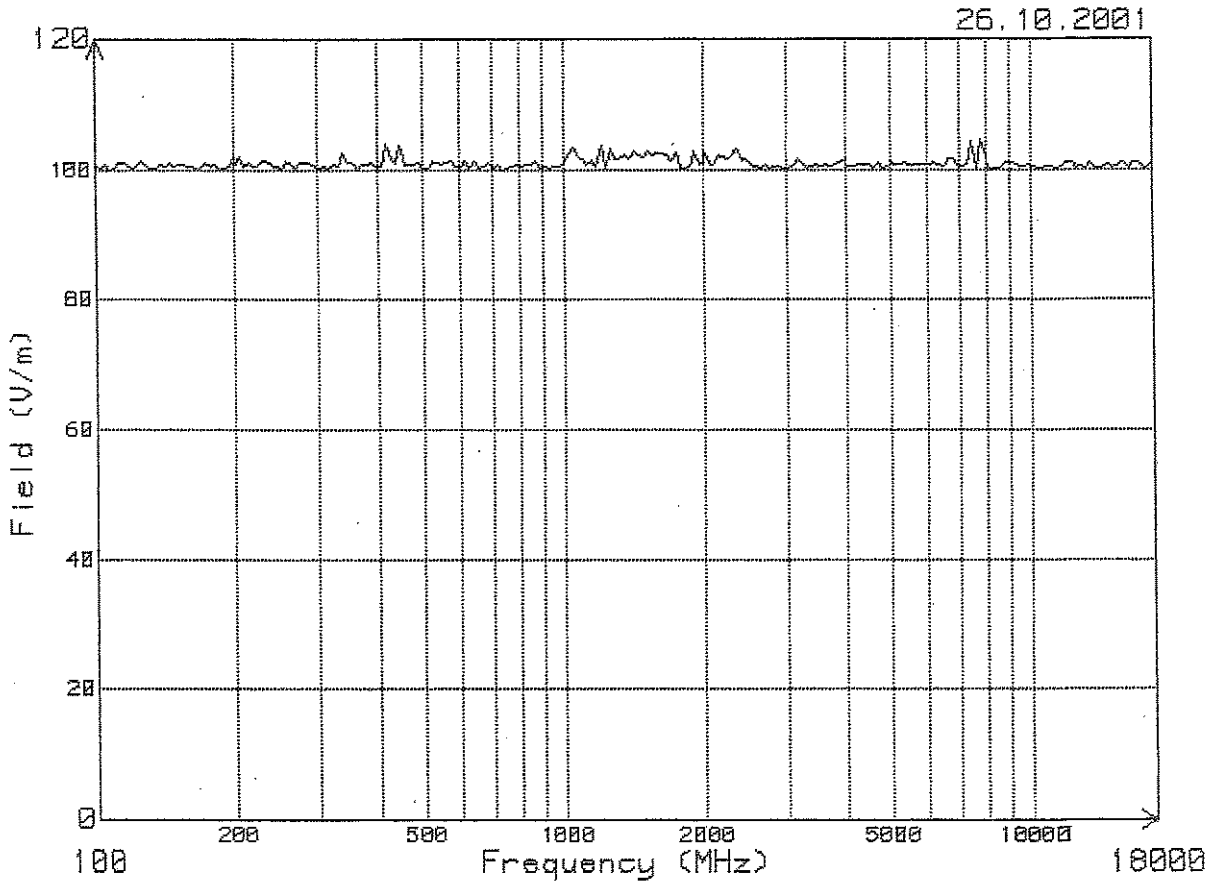


Figure 5.6.14

ADT 406 AF/AP
RADIATED SUSCEPTIBILITY - ELECTRIC FIELD
ACCORDING TO RTCA DO160D - SECT 20 - CAT W
HORIZONTAL POLARIZATION
TEST WITH MODULATION