ELECTROMAGNETIC EMISSION COMPLIANCE REPORT FOR FCC CLASS B CERTIFICATION

Test report file number	**: E02OR-016**
Applicant	**: Mbestek Inc.**
Address	**: 3 Fl. Bo Sung B/D, 1425-1, Seocho-Dong, Seocho-Ku, Seoul, Korea**
Manufacturer	**: Mbestek Inc.**
Address	**: 3 Fl. Bo Sung B/D, 1425-1, Seocho-Dong, Seocho-Ku, Seoul, Korea**
Type of Equipment	**: TFT-LCD Monitor**
FCC ID.	**: QRHMB151AL**
Model / Type No.	**: MB151AL**
Serial number	**: N/A**
Total page of Report	**: 13 pages (including this page)**
Date of Incoming	**: October 15, 2002**
Date of issue	**: November 09, 2002**

SUMMARY

The equipment complies with the regulation; ***FCC PART 15 CFR 47 SUBPART B, Class B.***

This test report contains only the result of a single test of the sample supplied for the examination.

It is not a generally valid assessment of the features of the respective products of the mass-production.

Prepared by:
G. W. Lee/ Chief Engineer
EMC & Telecom Div.
ONETECH Corp.

Reviewed by:
Y. K. Kwon/ Director
EMC & Telecom Div.
ONETECH Corp.

HEAD OFFICE : #505 SK APT. Factory 223-28, Sangdaewon 1 Dong, Jungwon-Gu, Seongnam-City, Kyunggi-Do, 462-121, Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
EMC Testing Dept : 426-1 Daessangryung-Ri, Chowol-Myun, Kwangju-Si, Kyunggi-Do, 464-860, Korea. (TEL: +82-31-765-8289 FAX: +82-31-766-2904)

CONTENTS

Page

HEAD OFFICE : #505 SK APT. Factory 223-28, Sangdaewon 1 Dong, Jungwon-Gu, Seongnam-City, Kyunggi-Do, 462-121, Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
EMC Testing Dept : 426-1 Daessangryung-Ri, Chowol-Myun, Kwangju-Si, Kyunggi-Do, 464-860, Korea. (TEL: +82-31-765-8289 FAX: +82-31-766-2904)

1. VERIFICATION OF COMPLIANCE

APPLICANT	: Mbestek Inc.
ADDRESS	: 3 Fl. Bo Sung B/D, 1425-1, Seocho-Dong, Seocho-Ku, Seoul, Korea
CONTACT PERSON	: Jung Myoung Doe / Manager
TELEPHONE NO.	: +82-2-583-4330
FCC ID	: QRHMB151AL
MODEL NO/NAME	: MB151AL
SERIAL NUMBER	: N/A
DATE	: November 09, 2002

DEVICE TYPE	Peripheral Device for Class B Computing Device -UNINTENTIONAL RADIATOR
E.U.T. DESCRIPTION	TFT-LCD Monitor
THIS REPORT CONCERNS	ORIGINAL GRANT
MEASUREMENT PROCEDURES	ANSI C63.4/1992
TYPE OF EQUIPMENT TESTED	PRE-PRODUCTION
KIND OF EQUIPMENT AUTHORIZATION REQUESTED	CERTIFICATION
EQUIPMENT WILL BE OPERATED UNDER FCC RULES PART(S)	FCC PART 15 SECTION 15.101(CLASS B)
MODIFICATIONS ON THE EQUIPMENT TO ACHIEVE COMPLIANCE	YES
FINAL TEST WAS CONDUCTED ON	3 METER OPEN AREA TEST SITE

The above equipment was tested by ONETECH Corp. for compliance with the requirement set forth in the FCC Rules and Regulations. This said equipment in the configuration described in this report, shows the maximum emission levels emanating from equipment are within the compliance requirements.

HEAD OFFICE : #505 SK APT. Factory 223-28, Sangdaewon 1 Dong, Jungwon-Gu, Seongnam-City, Kyunggi-Do, 462-121, Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
EMC Testing Dept : 426-1 Daessangryung-Ri, Chowol-Myun, Kwangju-Si, Kyunggi-Do, 464-860, Korea. (TEL: +82-31-765-8289 FAX: +82-31-766-2904)

2. GENERAL INFORMATION

2.1 Product Description

The Mbestek Inc., Model MB151AL (referred to as the EUT in this report) is a 15.1" TFT-LCD Monitor, which is connected to a personal computer. Panel. Product specification described herein was obtained from product data sheet or user's manual.

CHASSIS TYPE	Plastic – Non coated
LIST OF EACH OSC. OR CRY. FREQ.(FREQ.>=1MHz)	14.318 MHz on the main board
LCD PANEL SPEC.	LM151X05 (B3) / LG. PHILIPS LCD
INPUT VIDEO SIGNAL	VGA Compatible Analog RGB
DISPLAY MODE	Normally White
DISPLAY RESOLUTION	Maximum: 1024 x 768, 75Hz
POWER REQUIREMENT	AC/DC Adaptor Used (Input: 100-240Vac, 50-60Hz, 1.0A~0.5A // Output: 12Vdc, 3.3A)
USED AC/DC ADAPTERS	DA-400 manufactured by DANAE TECH.
NUMBER OF LAYERS	Main Board: 4 Layers OSD Board & Inverter Board: 2 Layers
EXTERNAL CONNECTORS	DC Inlet, D-Sub 15pin VGA Input Connector

Model Differences:

-. None

2.2 Related Submittal(s) / Grant(s)

-. Original submittal only

HEAD OFFICE : #505 SK APT. Factory 223-28, Sangdaewon 1 Dong, Jungwon-Gu, Seongnam-City, Kyunggi-Do, 462-121, Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
EMC Testing Dept : 426-1 Daessangryung-Ri, Chowol-Myun, Kwangju-Si, Kyunggi-Do, 464-860, Korea. (TEL: +82-31-765-8289 FAX: +82-31-766-2904)

2.3 Test System Details

The model numbers for all the equipments, which were used in the tested system, is:

Model	Manufacturer	Description	FCC ID	Connected to
MB151AL	Mbestek Inc.	TFT-LCD Monitors (EUT)	QRHMB151AL	PC
DA-400	DANAE TECH.	AC/DC ADAPTER	N/A	EUT
GX240	DELL Computer Corp.	PC	DoC	EUT
5530KP	BTC	KEYBOARD	DoC	PC
M-SAS51	Logitech	MOUSE	JNZ21167	PC
2225C	HP	PRINTER	DSI6XU2225	PC
020-0470	CARDINAL	MODEM	GDE0196	PC

2.4 Test Methodology

Both conducted and radiated testing was performed according to the procedures in ANSI C63.4/1992.
Radiated testing was performed at a distance of 3 meters from EUT to the antenna.

2.5 Test Facility

The open area test site and conducted measurement facilities are located on at 426-1 Daessangryung-Ri, Chowol-Myun, Kwangju-Si, Kyounggi-Do, 464-080, Korea. Description details of test facilities were submitted to the Commission on January 18, 2002. (Registration Number: 92819)

HEAD OFFICE : #505 SK APT. Factory 223-28, Sangdaewon 1 Dong, Jungwon-Gu, Seongnam-City, Kyunggi-Do, 462-121, Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
EMC Testing Dept : 426-1 Daessangryung-Ri, Chowol-Myun, Kwangju-Si, Kyunggi-Do, 464-860, Korea. (TEL: +82-31-765-8289 FAX: +82-31-766-2904)

3. SYSTEM TEST CONFIGURATION

3.1 Justification

This device was configured for testing in a typical way as a normal customer is supposed to be used. During the test, the following components were installed inside of the EUT.

DEVICE TYPE	MANUFACTURER	MODEL/PART NUMBER	FCC ID
Main Board	TEVI Logic	TL116	N/A
DC/AC Inverter Board	N/A	AT-0151MB	N/A
OSD Board	TEVI Logic	N/A	N/A
LCD Panel	LG. PHILIPS LCD	LM151X05 (B3)	N/A

3.2 EUT exercise Software

The windows program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use. This program was included into HOST. Once loaded, this program sequentially exercises each system component in turn. The sequence used is: (1) series of "H" characters are printed on the monitor until the screen is completely full, (2) copy series of "H" characters to mass storage device (if one is used), (3) print series of "H" characters to printer. The complete cycle is repeated continuously.

The test was performed about each resolution from minimum resolution to maximum resolution for getting maximum noise level and the investigated maximum resolution mode of the EUT was 1024 x 768, 75Hz.

HEAD OFFICE : #505 SK APT. Factory 223-28, Sangdaewon 1 Dong, Jungwon-Gu, Seongnam-City, Kyunggi-Do, 462-121, Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
EMC Testing Dept : 426-1 Daessangryung-Ri, Chowol-Myun, Kwangju-Si, Kyunggi-Do, 464-860, Korea. (TEL: +82-31-765-8289 FAX: +82-31-766-2904)

3.3 Cable Description

	Power Cord Shielded (Y/N)	I/O cable Shielded (Y/N)	Length (M)
TFT-LCD Monitor (EUT)	N	Y	1.8(P), 1.2(S)
AC/DC ADAPTER	N	N/A	1.8(P)
PERSONAL COMPUTER	N	Y	1.8(P), 1.2(S)
KEYBOARD	N/A	Y	1.5(S)
MOUSE	N/A	Y	1.5(S)
PRINTER	N	Y	1.8(P), 1.2(S)
MODEM	N	Y	1.8(P), 1.2(S)

* The marked "(S)" means the Signal Cable and "(P)" means the Power Cable.

3.4 Noise Suppression Parts on Cable

	Ferrite Bead (Y/N)	Location	Metal Hood (Y/N)	Location
TFT-LCD Monitor (EUT)	Y	BOTH END	Y	BOTH END
AC/DC ADAPTER	Y	EUT END	Y	EUT END
PERSONAL COMPUTER	-	-	-	-
KEYBOARD	N	N/A	Y	PC END
MOUSE	N	N/A	Y	PC END
PRINTER	N	N/A	Y	BOTH END
MODEM	N	N/A	Y	BOTH END

3.5 Equipment Modifications

To achieve compliance to CLASS B levels, the following change(s) was made by ONETECH Corp. during compliance testing:

1. Added a ferrite core on the LCD signal cable at the nearest connector on the main board.
2. Added a ground wire on the LCD signal cable.
3. Changed a thickness of screened cable on the LCD signal cable for the connection with LCD Panel and metal housing.
4. Changed array resisters to array beads (60 ohms) at RN201, RN203 and RN205.
5. Added a gasket at the bottom side of the shield cover for main board.

HEAD OFFICE : #505 SK APT. Factory 223-28, Sangdaewon 1 Dong, Jungwon-Gu, Seongnam-City, Kyunggi-Do, 462-121, Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
EMC Testing Dept : 426-1 Daessangryung-Ri, Chowol-Myun, Kwangju-Si, Kyunggi-Do, 464-860, Korea. (TEL: +82-31-765-8289 FAX: +82-31-766-2904)

3.6 Configuration of Test System

Line Conducted Test: The power of the EUT was supplied by AC/DC adapter and the adapter was connected to LISN. All supporting equipments were connected to another LISN. Preliminary Power line Conducted Emission test was performed by using the procedure in ANSI C63.4/1992 7.2.3 to determine the worse operating conditions.

Radiated Emission Test: Preliminary radiated emission test was conducted using the procedure in ANSI C63.4/1992 8.3.1.1 to determine the worse operating conditions. Final radiated emission test was conducted at 3 meters open area test site.

4. PRELIMINARY TEST

4.1 AC Power line Conducted Emission Test

During Preliminary Test, the following operating mode was investigated

Operation Mode	The Worse operating condition (Please check one only)
Resolution: 640 x 480	
Resolution: 800 x 600	
Resolution: 1024 x 768	X

4.2 Radiated Emission Test

During Preliminary Test, the following operating mode was investigated

Operation Mode	The Worse operating condition (Please check one only)
Resolution: 640 x 480	
Resolution: 800 x 600	
Resolution: 1024 x 768	X

HEAD OFFICE : #505 SK APT. Factory 223-28, Sangdaewon 1 Dong, Jungwon-Gu, Seongnam-City, Kyunggi-Do, 462-121, Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
EMC Testing Dept : 426-1 Daessangryung-Ri, Chowol-Myun, Kwangju-Si, Kyunggi-Do, 464-860, Korea. (TEL: +82-31-765-8289 FAX: +82-31-766-2904)

5. FINAL RESULT OF MEASURMENT

Preliminary test was done in normal operation mode. And the final measurement was selected for the maximized emission level.

5.1 Conducted Emission Test

Humidity Level : 40% Temperature : 19°C

Limits apply to : FCC CFR 47, PART 15, SUBPART B, SECTION 15.107

Type of Test : CLASS B

Result : PASSED BY –7.98 dB at 0.19 MHz when used a Peak detector mode

---

EUT : TFT-LCD Monitor Date : November 11, 2002

Operating Condition : Continuously displayed "H" characters on the screen of EUT

Detector : CISPR Quasi-Peak and Average(6 dB Bandwidth: 9 kHz)

Resolution : 1024 x 768, 75Hz

Frequency (MHz)	Line	Quasi-Peak (dBuV)			Margin (dB)	Average (dBuV)		Margin (dB)
		Emission Level	Detector Mode	Limits		Emission level	Limits	
0.19	H	56.06	P	64.04	-7.98	39.57	54.04	-14.47
0.26	H	45.96	P	61.59	-15.63	28.00	51.59	-23.59
0.32	N	43.62	P	59.71	-16.09	27.29	49.71	-22.42
9.10	H	39.72	P	60.00	-20.28	20.71	50.00	-29.29
15.35	N	42.82	P	60.00	-17.18	25.57	50.00	-24.43
21.86	H	35.15	P	60.00	-24.85	24.85	50.00	-25.15
25.24	H	34.45	P	60.00	-25.55	24.02	50.00	-25.98

Line Conducted Emission Tabulated Data

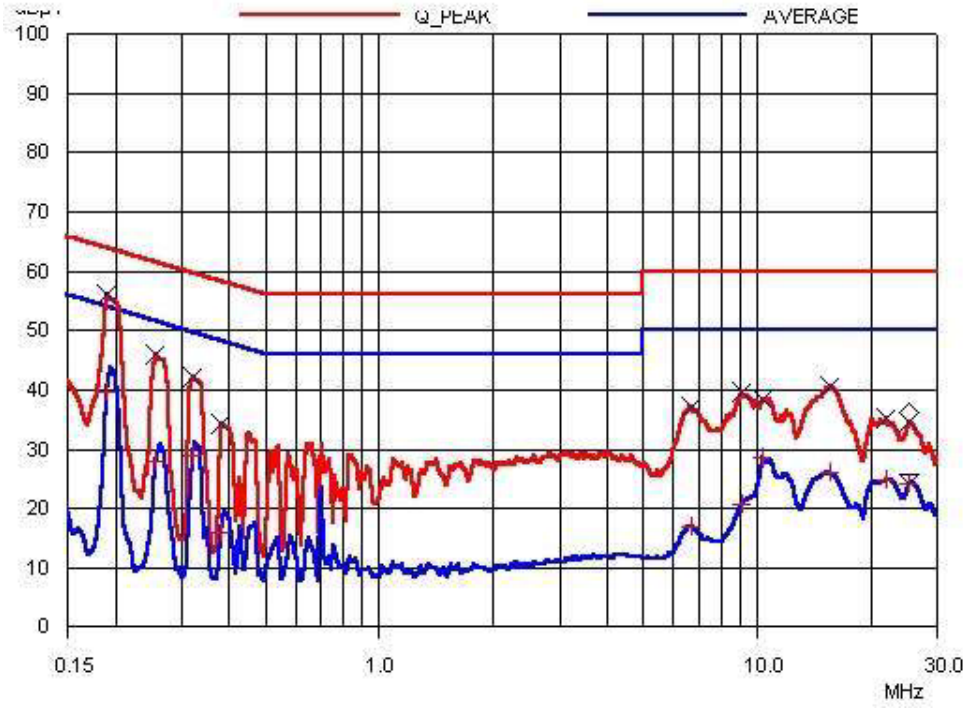
Remark : "H": Hot Line, "N": Neutral line, "P": Peak detector, "Q.P.": Quasi-Peak Detector Mode

See Appendix I for an overview sweep performed with peak and average detector.

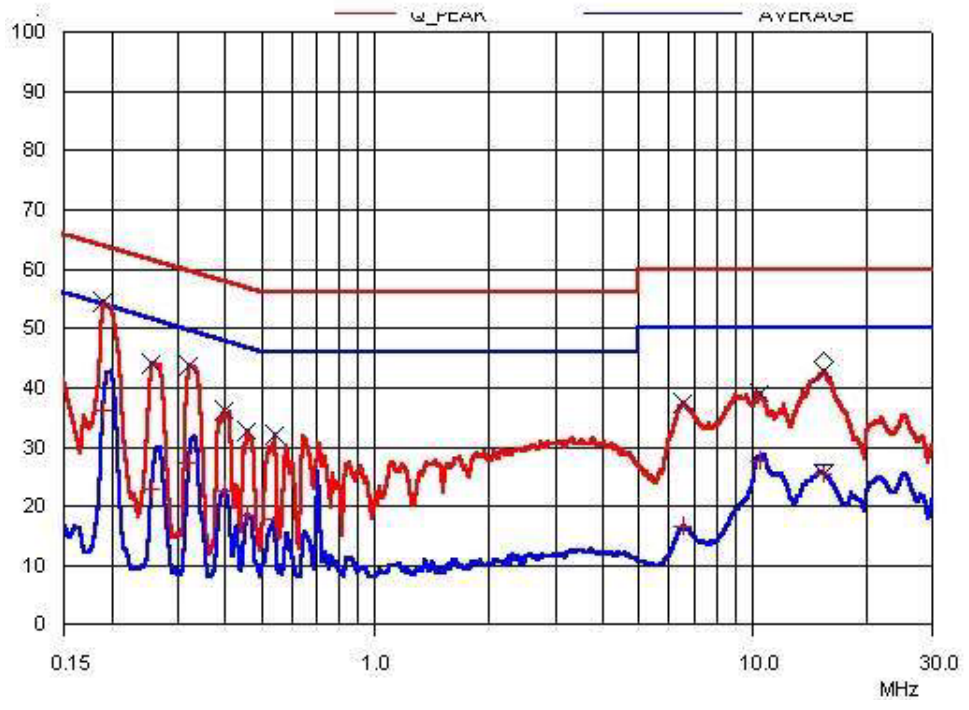
Tested by : Dan-ki, Lee / Test Engineer

HEAD OFFICE : #505 SK APT. Factory 223-28, Sangdaewon 1 Dong, Jungwon-Gu, Seongnam-City, Kyunggi-Do, 462-121, Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)

EMC Testing Dept : 426-1 Daessangryung-Ri, Chowol-Myun, Kwangju-Si, Kyunggi-Do, 464-860, Korea. (TEL: +82-31-765-8289 FAX: +82-31-766-2904)



HOT LINE



NEUTRAL LINE

HEAD OFFICE : #505 SK APT. Factory 223-28, Sangdaewon 1 Dong, Jungwon-Gu, Seongnam-City, Kyunggi-Do, 462-121, Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)

EMC Testing Dept : 426-1 Daessangryung-Ri, Chowol-Myun, Kwangju-Si, Kyunggi-Do, 464-860, Korea. (TEL: +82-31-765-8289 FAX: +82-31-766-2904)

5.2 Radiated Emission Test for Digital mode

The following table shows the highest levels of radiated emission on both polarizations of horizontal and vertical.

Humidity Level : 43 % Temperature : 18°C

Limits apply to : FCC CFR 47, PART 15, SUBPART B, SECTION 15.109

Type of Test : CLASS B

Result : PASSED BY –3.36 dB at 725.50 MHz

EUT : TFT-LCD Monitor Date : November 05, 2002

Operating Condition : Continuously displayed "H" characters on the screen of EUT

Detector : CISPR Quasi-Peak (6 dB Bandwidth: 120 kHz)

Distance : 3 Meter

Resolution : 1024 x 768, 75Hz

Radiated Emission		Ant	Correction Factors		Total	FCC CLASS B	
Freq. (MHz)	Amp. (dBuV)	Pol.	Ant. (dBuV/m)	Cable (dB)	Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
56.35	21.90	V	9.91	0.98	32.79	40.00	-7.21
70.60	24.70	V	7.55	1.00	33.25	40.00	-6.75
154.78	12.20	H	14.52	1.37	28.09	43.50	-15.41
190.04	16.20	H	16.51	1.50	34.21	43.50	-9.29
197.30	16.70	H	16.79	1.55	35.04	43.50	-8.46
315.80	23.32	V	14.51	2.09	39.92	46.00	-6.08
331.40	24.20	H	14.24	2.18	40.62	46.00	-5.38
339.40	17.60	H	14.33	2.22	34.15	46.00	-11.85
507.00	14.90	V	17.52	2.69	35.11	46.00	-10.89
669.60	17.30	V	20.59	3.16	41.05	46.00	-4.95
725.50	18.39	V	20.80	3.45	42.64	46.00	-3.36
733.45	17.42	H	20.74	3.47	41.63	46.00	-4.37
867.60	16.30	V	22.27	3.87	42.44	46.00	-3.56

Radiated Emission Tabulated Data

Tested by : Dan-ki, Lee / Test Engineer

HEAD OFFICE : #505 SK APT. Factory 223-28, Sangdaewon 1 Dong, Jungwon-Gu, Seongnam-City, Kyunggi-Do, 462-121, Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)

EMC Testing Dept : 426-1 Daessangryung-Ri, Chowol-Myun, Kwangju-Si, Kyunggi-Do, 464-860, Korea. (TEL: +82-31-765-8289 FAX: +82-31-766-2904)

6. FIELD STRENGTH CALCULATION

Meter readings are compared to the specification limit correcting for antenna and cable losses

+	Meter reading	(dBuV)
+	Cable Loss	(dB)
+	Antenna Factor (Loss)	(dB/meter)
=	Corrected Reading	(dBuV/meter)
-	Specification Limit	(dBuV/meter)
=	dB Relative to Spec	(+/- dB)

HEAD OFFICE : #505 SK APT. Factory 223-28, Sangdaewon 1 Dong, Jungwon-Gu, Seongnam-City, Kyunggi-Do, 462-121, Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
EMC Testing Dept : 426-1 Daessangryung-Ri, Chowol-Myun, Kwangju-Si, Kyunggi-Do, 464-860, Korea. (TEL: +82-31-765-8289 FAX: +82-31-766-2904)

7. LIST OF TEST EQUIPMENT

No.	EQUIPMENTS	MFR.	MODEL	SER. NO.	LAST CAL	DUE CAL	USE
1.	Test receiver	R/S	ESVS 10	827864/005	OCT/02	12MONTH	■
2.	Test receiver	R/S	ESHS10	834467/007	APR/02	12MONTH	
3.	Spectrum analyzer	HP	8568B	3026A0226	APR/02	12MONTH	■
4.	RF preselector	HP	85685A	3107A01264	APR/02	12MONTH	■
5.	Quasi-Peak Adapter	HP	85650A	3107A01542	APR/02	12MONTH	■
6.	Dipole Antenna	EMCO	3121C	9107-745	JUN/02	12MONTH	
7.	Biconical antenna	EMCO	3104C	9109-4441 9109-4443 9109-4444	MAR/02	12MONTH	■
8.	Log Periodic antenna	EMCO	3146	9109-3213 9109-3214 9109-3217	JUN/02	12MONTH	■
9.	LISN	EMCO	3825/2	9109-1867 9109-1869	JUN/02	12MONTH	■
10.	RF Amplifier	HP	8447F	3113A04554	JUN/02	N/A	
11.	Spectrum Analyzer	HP	8591A	3131A02312	APR/02	12MONTH	
12.	Computer System Hard disk drive	HP	98581C 9153C	98543A CMC762Z9153	N/A N/A	N/A N/A	■ ■
13.	Plotter	HP	7475A	30052 22986	N/A	N/A	■
14.	Position Controller	EMCO	1090	9107-1038	N/A	N/A	■
15.	Turn Table	EMCO	1080-1.21	9109-1576	N/A	N/A	■
16.	Antenna Master	EMCO	1070-1	9109-1624	N/A	N/A	■

* Mark "■" means used equipment.

HEAD OFFICE : #505 SK APT. Factory 223-28, Sangdaewon 1 Dong, Jungwon-Gu, Seongnam-City, Kyunggi-Do, 462-121, Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
EMC Testing Dept : 426-1 Daessangryung-Ri, Chowol-Myun, Kwangju-Si, Kyunggi-Do, 464-860, Korea. (TEL: +82-31-765-8289 FAX: +82-31-766-2904)