



ELECTROMAGNETIC EMISSION COMPLIANCE REPORT FOR FCC CERTIFICATION

Test report file number : E03NR-047

Applicant : KI RYUNG ELECTRONICS CO., LTD.
Address : 219-6 Gasan-Dong, Kumchun-Ku, Seoul, 153-023, KOREA

Manufacturer : KI RYUNG ELECTRONICS CO., LTD.
Address : 219-6 Gasan-Dong, Kumchun-Ku, Seoul, 153-023, KOREA

Type of Equipment : FM Modulator for Sirius Satellite Receiver

FCC ID. : P3HKS-K6002

Model Name : KS-K6002

Multiple Model Name : N/A

Serial number : N/A

Total page of Report : 16 pages (including this page)

Date of Incoming : November 07, 2003

Date of Issuing : November 19, 2003

SUMMARY

The equipment complies with the regulation of *FCC CRF 47 PART 15, SUBPART C, SECTION 15.239*.

This test report contains only the results of a single test of the sample supplied for the examination. It is not a general valid assessment of the features of the respective products of the mass-production.

Prepared by: 
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EMC Div.
ONETECH Corp.

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**1. VERIFICATION OF COMPLIANCE**

- APPLICANT : KI RYUNG ELECTRONICS CO., LTD.
- ADDRESS : 219-6 Gasan-Dong, Kumchun-Ku, Seoul, 153-023, KOREA
- CONTACT PERSON : Mr. In-Kyoung, Kim / Q.C Assistant Manager
- TELEPHONE NO : +82-2-3282-2264
- FCC ID : P3HKS-K6002
- MODEL NO/NAME : KS-K6002
- SERIAL NUMBER : N/A
- DATE : November 19, 2003

DEVICE TYPE	Low Power Communication Device Transmitter
E.U.T. DESCRIPTION	FM Modulator for Sirius Satellite Receiver
THIS REPORT CONCERNS	ORIGINAL GRANT
MEASUREMENT PROCEDURES	Charter 7, 13 of ANSI C63.4: 2000
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 15.239
MODIFICATIONS ON THE EQUIPMENT TO ACHIEVE COMPLIANCE	No
FINAL TEST WAS CONDUCTED ON	3 METER OPEN AREA TEST SITE

- This device has shown compliance with the conducted emissions limits in 15.107 adopted under FCC 02-107 (ET Docket 98-80). The device may be marketed after July 11, 2005 affected by the 15.37(j) transition provisions.
- 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.



2. GENERAL INFORMATION

2.1 Product Description

The KI RYUNG ELECTRONICS CO., LTD., Model KS-K6002 (referred to as the EUT in this report) is FM Modulator for Sirius Satellite Receiver that can transmit from 88.1 MHz to 88.7 MHz for audio signal of FM radio receiver. Product specification described herein was obtained from product data sheet or user's manual.

CHASSIS TYPE	Non-Metal
LIST OF EACH OSC. OR CRY. FREQ.(FREQ.>=1MHz)	7.6MHz
POWER REQUIREMENT	DC12V
TX FREQUENCY RANGE	88.1 MHz ~ 88.7 MHz
NUMBER OF LAYERS	4 Layers
EXTERNAL CONNECTOR	Ant. Input (TERR, SAT(MAIN)), Audio Out, DC In, FM Output, I/O connector

2.2 Model Differences

-. The difference(s) compared to the EUT is as follows: none

2.3 Related Submittal(s) / Grant(s)

-. Original submittal only

2.4 Test System Details

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

Model	Manufacturer	FCC ID	Description	Connected to
KS-K6002	KI RYUNG ELECTRONICS CO., LTD.	P3HKS-K6002	EUT	-
NL20-120200-11	I.T.E. POWER SUPPLY	N/A	AC/DC Adapter	EUT
KT-SR1000	KI RYUNG ELECTRONICS CO., LTD.	N/A	Satellite Radio Receiver	EUT
-	-	N/A	External Antenna	EUT
SMS-015N	SUNGIL	N/A	Speaker	EUT



2.5 Test Methodology

Both conducted and radiated testing was performed according to the procedures in ANSI C63.4: 2000. Radiated testing was performed at a distance of 3 meters from EUT to the antenna.

2.6 Test Facility

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



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
KS-K6002 Board	KI RYUNG ELECTRONICS CO., LTD.	FM TRANSMITTER	N/A

3.2 EUT exercise Software

The Model: KS-K6002 is a transmitter designed to function at 88.1, 88.3, 88.5, and 88.7 MHz. When a 12 VDC supply voltage is connected, the transmitter is activated.

3.3 Cable Description

Product Name	Power Cord Shielded (Y/N)	I/O cable Shielded (Y/N)	Length (M)
FM Modulator for Sirius Satellite Receiver(EUT)	N	-	1.0(P), 1.5(D), 3.0(D)
Satellite Radio Receiver	-	-	-
Speaker	N/A	N	1.5(D)
External Antenna	N/A	N	3.0(D)
AC/DC Adapter	N	N (DC Out)	1.5(P), 1.0(D)

* The marked “(D)” means the Data Cable and “(P)” means the Power Cable.

3.4 Noise Suppression Parts on Cable

Product Name	Ferrite Bead (Y/N)	Location	Metal Hood (Y/N)	Location
FM Modulator for Sirius Satellite Receiver(EUT)	N	N/A	Y	EUT END
Satellite Radio Receiver	N	N/A	-	-
Speaker	N	N/A	Y	EUT END
External Antenna	N	N/A	Y	EUT END
AC/DC Adapter	N	N/A	N	N/A



3.5 Equipment Modifications

To achieve compliance to FCC part 15 rules, the following change(s) was made by ONETECH Corp. during compliance testing:

“There was no Modified items during EMI test”

3.6 Configuration of Test System

Line Conducted Test: The EUT was connected to AC/DC adapter and power line of 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: 2000 7.2.3 to determine the worse operating conditions.

Radiated Emission Test: Preliminary radiated emissions test were conducted using the procedure in ANSI C63.4: 2000 8.3.1.1 and 13.1.4.1 to determine the worse operating conditions. Final radiated emission tests were conducted at 3 meter open area test site.

Occupied Bandwidth Measurement:

This measurement is performed with the antenna located close enough to give a full-scale deflection of the modulated carrier on the spectrum analyzer.

3.7 Antenna Requirement

For intentional device, according to section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

Antenna Construction:

FM transmitter antenna of the EUT is fixed inside the EUT, no consideration of replacement by the user.



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)
Transmit RF Signal continuously	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)
Transmit RF Signal continuously	X

5. FINAL RESULT OF MEASUREMENT

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 : 46 % Temperature: 19 °C
 Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.207(a)
 Type of Test : Low Power Communication Device Transmitter
 Result : PASSED BY -12.04 dB at 11.37 MHz (at peak mode)

EUT : FM Modulator for Sirius Satellite Receiver Date: November 08, 2003
 Operating Condition : Transmit the RF signal
 Detector : CISPR Quasi-Peak (6 dB Bandwidth: 9 kHz)

Frequency (MHz)	Line	Peak (dBuV)		Margin (dB)
		Emission level	Q.P Limits	
0.19	N	43.22	63.82	-20.60
3.29	N	42.68	56.00	-13.32
3.30	H	42.84	56.00	-13.16
6.67	H	38.43	60.00	-21.57
11.37	H	47.96	60.00	-12.04
11.41	N	47.04	60.00	-12.96
Frequency (MHz)	Line	Average (dBuV)		Margin (dB)
		Emission level	Limits	
-				
-				

Line Conducted Emissions Tabulated Data

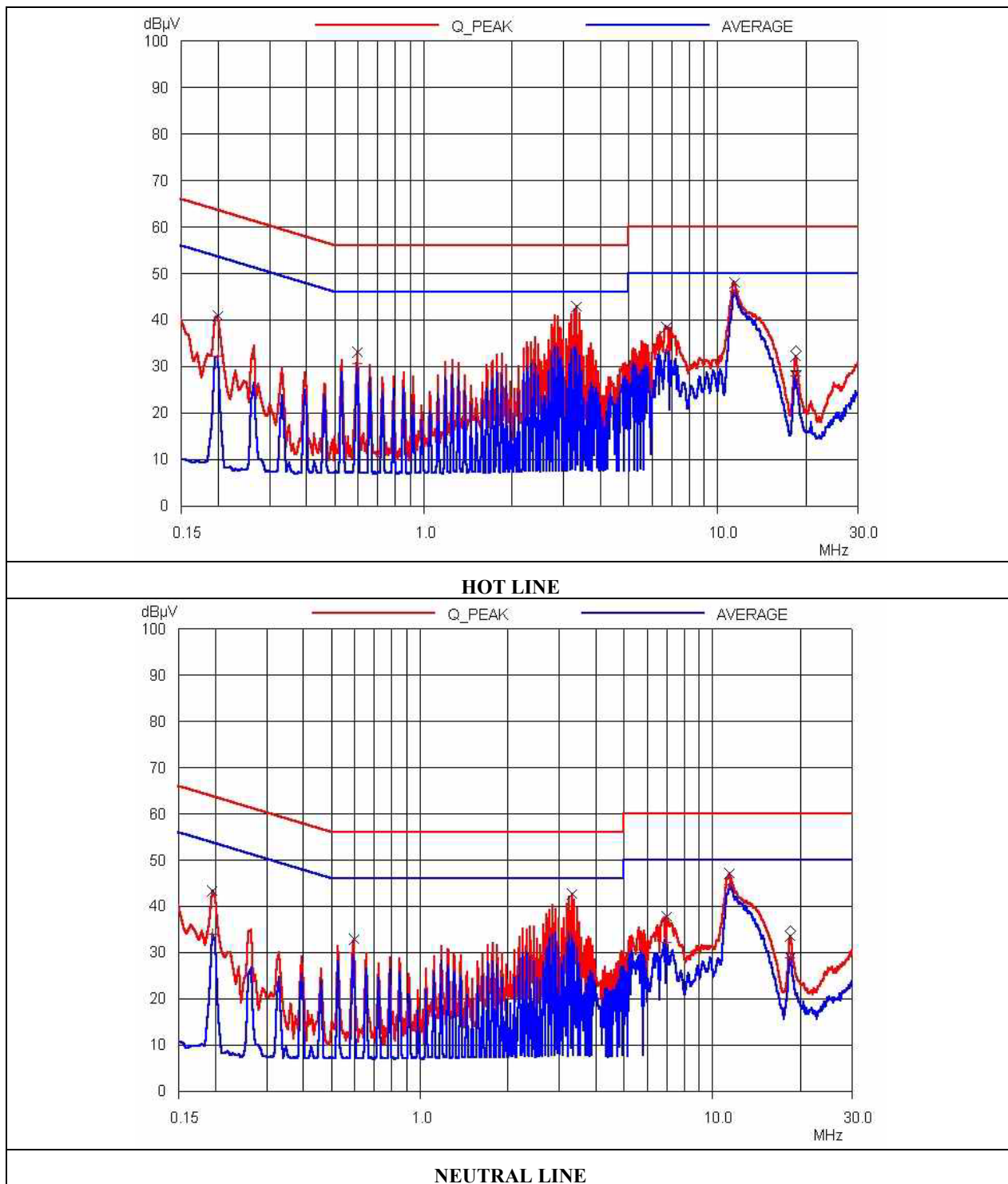
Remark : "H": Hot Line, "N": Neutral line, "Q.P": Quasi-Peak detect

Average data was not recorded, because Peak values were under the Average limit.

See next page for an overview sweep performed with peak and average detector.



Tested by: Sue-Young, Lee/ Test Engineer





5.2 Radiated Emission Test (Within the permitted 200kHz band)

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

Humidity Level : 48 % Temperature : 18 °C
 Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.239(b)
 Type of Test : Low Power Communication Device Transmitter
 Result : PASSED BY – 4.90dB at 88.10 MHz

EUT : FM Modulator for Sirius Satellite Receiver Date: November 11, 2003
 Operating Condition : Transmit the RF signal
 Distance : 3 Meter

Radiated Emission			Ant	Correction Factors		Total	Limit	Margin
Freq. (MHz)	Amp. (dBuV)	Detect Mode	Pol.	Ant. (dBuV/m)	Cable (dB)	Amp. (dBuV/m)	(dBuV/m)	(dB)
88.10	32.70	Peak	V	10.04	0.36	43.10	48.00	-4.90
88.10	32.10	Average	V	10.04	0.36	43.10	48.00	-5.50
88.70	30.70	Peak	V	10.23	0.42	41.35	48.00	-6.65
88.70	30.10	Average	V	10.23	0.42	41.35	48.00	-7.25

Radiated Emission Tabulated Data

Remark: Per ANSI C63.4: 2000, 13.1.1, because the EUT's frequency range is less than 1MHz, two channel (near top and near bottom) was tested.

Tested by: Sue-Young, Lee/ Test Engineer



5.3 Radiated Emission Test (Outside of the specified 200kHz band)

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

Humidity Level : 48 % Temperature : 18 °C
 Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.209 (a)
 Type of Test : Low Power Communication Device Transmitter
 Result : PASSED BY -7.65dB at 54.30MHz on TX Freq. 88.10MHz

EUT : FM Modulator for Sirius Satellite Receiver Date: November 11, 2003
 Operating Condition : Transmit the RF signal.
 Frequency range : 30MHz – 1000MHz
 Detector : CISPR Quasi-Peak (6 dB Bandwidth: 120 kHz)
 Distance : 3 Meter
 Remark : Other emissions

Radiated Emission		Ant	Correction Factors		Total	FCC	
Freq. (MHz)	Amp. (dBuV)	Pol.	Ant. (dBuV/m)	Cable (dB)	Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
TX Freq. 88.10MHz							
54.30	20.10	V	11.79	0.46	32.35	40.00	-7.65
147.40	11.50	H	7.43	0.44	19.37	43.52	-24.15
184.20	10.60	H	9.65	0.62	20.87	43.52	-22.65
-							
TX Freq. 88.70MHz							
60.10	15.30	V	11.40	0.44	27.14	40.00	-12.86
125.10	9.10	V	8.53	0.37	18.00	43.52	-25.52
148.30	12.20	V	7.45	0.46	20.11	43.52	-23.41
184.20	10.20	V	9.65	0.62	20.47	43.52	-23.05
251.20	9.20	V	12.14	0.65	21.99	46.02	-24.03
324.90	12.20	V	13.90	0.64	26.74	46.02	-19.28

Tested by: Sue-Young, Lee/ Test Engineer

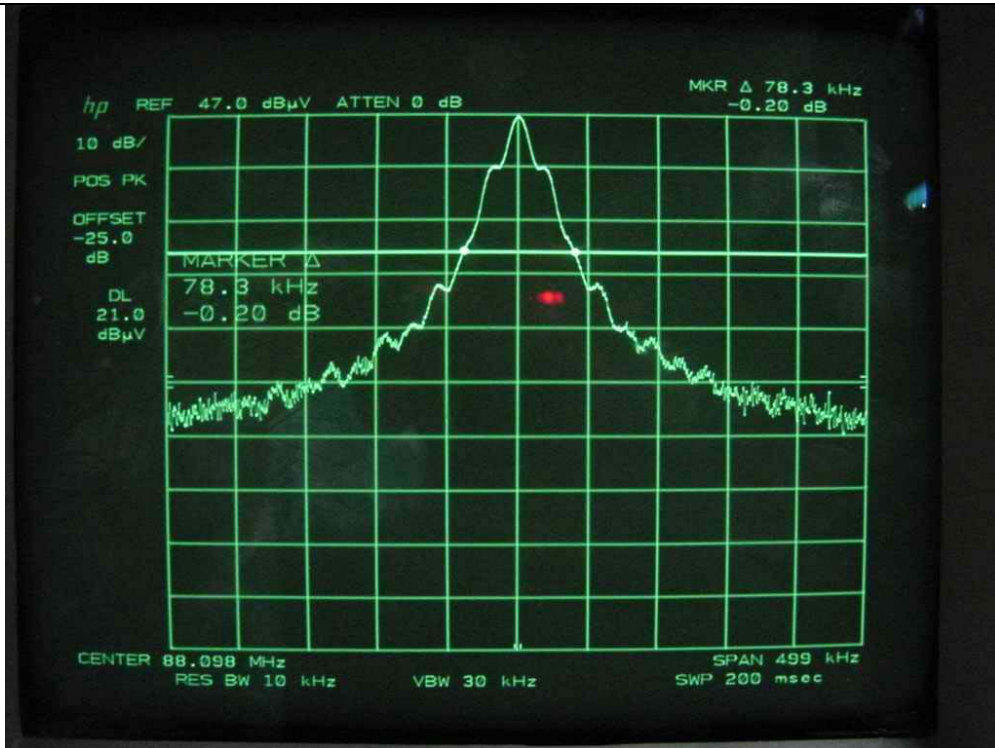


5.4 Bandwidth of the operating frequency

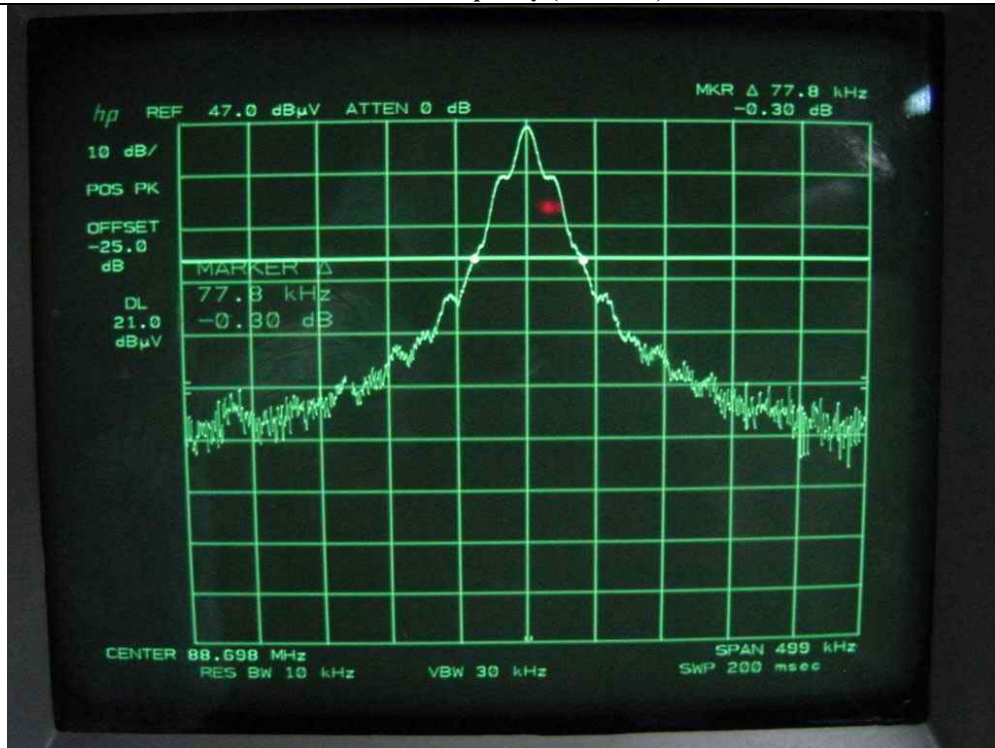
Humidity Level : 49 % Temperature : 20 °C
Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.239(a)
Result : PASSED

EUT : FM Modulator for Sirius Satellite Receiver Date: November 11, 2003
Operating Condition : Transmit the RF signal.
Minimum Resolution
Bandwidth : 10 kHz
Remark : Refer to test data in next page.

Tested by: Sue-Young, Lee/ Test Engineer



Bottom Frequency (88.1MHz)



Top Frequency (88.7MHz)



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)



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	NOV/03	12MONTH	■
2.	Test receiver	R/S	ESHS 10	834467/007	APR /03	12MONTH	■
3.	Spectrum analyzer	HP	8566B	3407A08547	MAY/03	12MONTH	■
4.	Spectrum analyzer	HP	8568B	3109A05456	MAY/03	12MONTH	■
5.	RF preselector	HP	85685A	3107A01264	MAY/03	12MONTH	■
6.	Quasi-Peak Adapter	HP	85650A	3107A01542	MAY/03	12MONTH	■
7.	TRILOG Broadband Antenna	Schwarzbeck	VULB9163	VULB9163 166	FEB/03	12MONTH	
8.	Biconical antenna	EMCO	3104C	9109-4443	MAY/03	12MONTH	
				9109-4444	JUL /03	12MONTH	■
		Schwarzbeck	VHA9103	91031852	AUG/02	12MONTH	
9.	Log Periodic antenna	EMCO	3146	9109-3213	AUG/02	12MONTH	
				9109-3214	JUL/03	12MONTH	■
		Schwarzbeck	9108-A(494)	9109-3217	MAY/03	12MONTH	
				62281001	AUG/02	12MONTH	
10.	LISN	EMCO	3825/2	9109-1867	AUG/03	12MONTH	■
				9109-1869	OCT/03	12MONTH	
11.	Position Controller	EMCO	1090	9107-1038	N/A	N/A	■
12.	Turn Table	EMCO	1080-1.21	9109-1576	N/A	N/A	■
13.	Antenna Master	EMCO	1070-1	9109-1624	N/A	N/A	■