

Prima Ricerca & SviluppoSrl soggetta a direzione e coordinamento da parte della Giovanni Maspero & C. S.p.A. – C.I. 02634780130
Sede legale : 22100 Tavernola (CO) Via Conciliazione, 1 Cod. FISC. e N. R.I. CO 02635860139
Sede operativa : Laboratori Via Campagna, 92 22020 Faloppio fraz. Gaggino (CO) Tel. +39 03135000.11 Fax +39 031991309

EQUIPMENT UNDER TEST :
APPARECCHIO IN PROVA :

REMOTE CONTROLLED SWIVEL LIGHT BEAM

Mod. FM3

DERIVED MODELS :
MODELLI DERIVATI :

Mod. FM2

REFERENCE STANDARDS :
NORME DI RIFERIMENTO :

FCC 47CFR Part 15

CUSTOMER:

RICHIEDENTE:

- **Dept. / Firm :** *Ente / Società:* **MARCO S.p.A.**
- **Mr.:** **Dr. MATTEO CIAVARELLA**
Sig.:
- **Address:** **VIA MAMELI, 28 – 25014 CASTENEDOLO (BS) - ITALY**
Indirizzo:
- **Tel. :** **++39 030/21341** • **Telefax** **++39 030/2134300** • **E-mail:** **matteo.ciavarella@marco.it**
Telefono : *Fax :* *e-mail*

Site of test execution: **Via Campagna, 92 - 22020 Gaggino Faloppio (CO) - Italy**
Località esecuzione prove:

Date of test samples receipt:
Data ricevimento campioni:

Date of start test: **14/10/03**
Data inizio prove:

Date of end test: **11/05/04**
Data fine prove:

Witness to the test:
Presenti alle prove:

Signature of the engineers:
Firma esecutore prove:

Signature of the Laboratory Director:
Firma Direttore Laboratori:

Nobody / Nessuno
.....



R. Radice
.....



R. Furfari
.....

The test results recorded in this Test Report are exclusively referred to the tested samples.

I risultati del presente rapporto di prova si riferiscono esclusivamente al campione sottoposto a prova.

Reproduction of this EMC-Test Report in whole or in part is prohibited without the written authorization of the Laboratory Director

La riproduzione di questo Rapporto in modo parziale o totale è PROIBITO senza l'autorizzazione scritta della Direzione del Laboratorio

0. CONTENTS

	Page	Rev	Date
0. CONTENTS	2	0	11/05/04
1. TECHNICAL INFORMATION OF EQUIPMENT UNDER TEST (EUT)	3	0	11/05/04
1.1 Identification	3	0	11/05/04
1.2 Technical data	3	0	11/05/04
1.3 Receiver technical data	3	0	11/05/04
1.4 Modifications incorporated in E.U.T.	4	0	11/05/04
1.5 Ports identification	5	0	11/05/04
1.6 Auxiliary equipment	5	0	11/05/04
2. TEST CONDITIONS	6	0	11/05/04
2.1 Operating test modes and test conditions	6	0	11/05/04
2.2 Test overview	6	0	11/05/04
3. REFERENCE STANDARD FOR PERFORMED TESTS	7	0	11/05/04
4. Summary of test results	8	0	11/05/04
4.1 Emission tests	8	0	11/05/04
5. TEST RESULTS	9	0	11/05/04
6. EUT TECHNICAL DOCUMENTATION	13	0	11/05/04
6.1 Wiring diagrams	13	0	11/05/04
6.2 Technical manual	13	0	11/05/04
6.3 Photographic documentation	14	0	11/05/04
7. TECHNICAL REPORT OF ANALYSIS OF DERIVED PRODUCTS	18	0	11/05/04

1. TECHNICAL INFORMATION OF EQUIPMENT UNDER TEST (EUT)

1.1 Identification

Brand name:	MARCO S.p.A.
Manufacturer:	SIRENA S.p.A.
Equipment :	REMOTE CONTROLLED SWIVEL LIGHT BEAM
Model name or No. :	FM3
Derived model :	FM2
Serial number :	Not present
FCC ID :	R8M-FM
Country of manufacturer:	ITALY

1.2 Technical data

FCC class:	Unintentional radiators, Class B
Supply voltage:	12÷24 Vdc
Input Power / Current :	12 Vdc: 7,5 Ampere 24 Vdc: 3,8 Ampere
Type of receiver	Super eterodine
Maximum internal frequency generate by EUT	4 MHz
Bulb :	H1 100W
Typical usage :	FM3 is a REMOTE CONTROLLED SWIVEL LIGHT BEAM for marine use, waterproof and completely submersible.
EUT single or system:	Single
EUT dimensions :	Ø 165 x h 194
Weight :	1,5 Kg.
Operating Temperature :	-30°C + 50°C.

1.3 Receiver technical data

MIPOT

Prima Ricerca & SviluppoSrl soggetta a direzione e coordinamento da parte della Giovanni Maspero & C. S.p.A. – C.I. 02634780130
Sede legale : 22100 Tavernola (CO) Via Conciliazione, 1 Cod. FISC. e N. R.I. CO 02635860139
Sede operativa : Laboratori Via Campagna, 92 22020 Faloppio fraz. Gaggino (CO) Tel. +39 03135000.11 Fax +39 031991309

- Working Frequency : 433,92 MHz
- Frequency Range of Operation : 433,05 ÷ 434,79 MHz
- Antenna type : dedicated
- Modulation : ASK

1.4 Modifications incorporated in E.U.T.

The following items are the modifications introduced in the equipment under test :

- A RICHCO ferrite (code RRH142-070-285) has been inserted on DC power cable with 1 loop (see next photo)



1.5 Ports identification

This section contains descriptions of all signal ports and AC/DC power input/output ports, the length and the type of the cable provided by manufacturer needed for the tests.

Moreover it is specified if the ports are ever or optionally connected.

Port		Description	Connection
1	Enclosure	Fibreglass reinforced nylon flat base with electrical pin and socket internal connection High mechanical and temperature resistant polycarbonate light cover.	By screws
2	AC power input/output ports	Not present	*****
3	DC power input/output ports	12÷24 Vdc from external supply – Cable length not specified.	Terminals
4	Signals ports	Not present	*****
<i>Note: During the tests all cables must be what provided the manufacturer or the same that used in the real employment of the EUT.</i>			

1.6 Auxiliary equipment

No auxiliary equipment

2. TEST CONDITIONS

2.1 Operating test modes and test conditions

The equipment has been tested according to the operative conditions described in the user/installation manual provided by the manufacturer and by following reference standards :

Reference Standard:

- FCC Part 15, Subpart B

In the following table there are the operating conditions adopted during tests identified by an indicator (#..) at which has been referred the item “Operating condition of the equipment under test” of all technical sheets of the tests (see Section 4)

Operating condition	Description
#1	<i>Receiver active – Light and motor ON</i>

2.2 Test overview

Sample tested is the main model of a complete set of 433,92 MHz RF receiver (see also Section 7).

The appliance is classified as “*unintentional radiator*” in conformity to FCC Part 15 Sub. A §15.201, and it is subject to “*Certification*” procedure.

The application is mainly used as remote control for swivel light beam.

Prima Ricerca & SviluppoSrl soggetta a direzione e coordinamento da parte della Giovanni Maspero & C. S.p.A. – C.I. 02634780130
Sede legale : 22100 Tavernola (CO) Via Conciliazione, 1 Cod. FISC. e N. R.I. CO 02635860139
Sede operativa : Laboratori Via Campagna, 92 22020 Faloppio fraz. Gaggino (CO) Tel. +39 03135000.11 Fax +39 031991309

3. REFERENCE STANDARD FOR PERFORMED TESTS

<i>Reference standard :</i>	<i>Title :</i>
FCC Part 15 part A	Code of Regulations Part 15 (Radio Frequency Devices), Subpart A (General) of the Federal Communication Commission (FCC)
FCC Part 15 part B	Code of Regulations Part 15 (Radio Frequency Devices), Subpart B (Unintentional Radiators) of the Federal Communication Commission (FCC)
ANSI C63.4	American National Standard for Methods of Measuring of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz – 40 GHz

Prima Ricerca & SviluppoSrl soggetta a direzione e coordinamento da parte della Giovanni Maspero & C. S.p.A. – C.I. 02634780130
Sede legale : 22100 Tavernola (CO) Via Conciliazione, 1 Cod. FISC. e N. R.I. CO 02635860139
Sede operativa : Laboratori Via Campagna, 92 22020 Faloppio fraz. Gaggino (CO) Tel. +39 03135000.11 Fax +39 031991309

4. SUMMARY OF TEST RESULTS

4.1 Emission tests

Port		Phenomena	Basic standard	Operating condition ¹	Result
1	Enclosure	Radiated emission	FCC Part 15	#1	Within the limit
2	AC mains Input ports	RF Disturbance voltage: • continuous	FCC Part 15	Not applicable ²	

¹ Ref. Tab. of Section 2

² Applicable only to AC Mains Power Supply.

Prima Ricerca & SviluppoSrl soggetta a direzione e coordinamento da parte della Giovanni Maspero & C. S.p.A. – C.I. 02634780130
Sede legale : 22100 Tavernola (CO) Via Conciliazione, 1 Cod. FISC. e N. R.I. CO 02635860139
Sede operativa : Laboratori Via Campagna, 92 22020 Faloppio fraz. Gaggino (CO) Tel. +39 03135000.11 Fax +39 031991309

5. TEST RESULTS

RADIATED EMISSION 30 - 1000 MHz..... 10

**TEST
1.****RADIATED EMISSION 30 - 1000 MHZ****REFERENCE
DOCUMENT**

FCC PART 15 subpart B

- **TEST LOCATION:** Semi-anechoic chamber
- **TEST EQUIPMENT USED FOR TEST:** EMI receiver Rohde & Schwarz Mod. ESMI
Chase Antenna Mod. CBL 6111 A
- **TESTED PORT:** Enclosure
- **EMISSION LIMITS:** Acc. to Section 15.109 of reference document
- **UNCERTAINTY OF MEASURE:** Combined uncertainty = ± 1.75 dB
Total uncertainty = $(k=2) \pm 3.5$ dB

TEST CONDITIONS:			MEASURED
Ambient temperature :	15 - 35 °C		23 $\pm$ 3 °C
Ambient humidity :	25 - 75 %rH		43 $\pm$ 5 %rH
Pressure :	85 - 106 kPa	(860 mbar - 1060 mbar)	950 $\pm$ 50 mbar
Voltage :	12÷24 Vdc		13,5 Vdc

OPERATING CONDITION (Rif. Section. 2) : #1**RESULT: WITHIN THE LIMIT**

Prima Ricerca & SviluppoSrl soggetta a direzione e coordinamento da parte della Giovanni Maspero & C. S.p.A. – C.I. 02634780130
Sede legale : 22100 Tavernola (CO) Via Conciliazione, 1 Cod. FISC. e N. R.I. CO 02635860139
Sede operativa : Laboratori Via Campagna, 92 22020 Faloppio fraz. Gaggino (CO) Tel. +39 03135000.11 Fax +39 031991309

SCAN TABLE : “Radiated Emission”

Unit: dB μ V/m

Detector : Mode:

Curve1: MaxPeak ClearWrite

Curve2: -- ClearWrite

Subrange1:

Start Frequency: 30.0 MHz Step Size: 80 kHz

Stop Frequency: 1000.0 MHz

Measure Time: 0.01 sec.

IF Bandwidth: 120 kHz

Receiver: ESXI

Probe Transducer: CHASE_6111_PRC

Signal Path: Path 4

System Transducer: RFin2-CP1/X11

Scan Mode: Lin

Add. Transducer: W71.01

Tracking Gen.: Off

Input: 2 DC

Preamplifier: 10 dB

Demodulation: FM Broad

RF att.: Coupled

Volume: 0.0%

Ref. Level: -50 dBm

Squelch: --

Min. RF att.: 0 dBm

Option: None

Autorange: On

Curve 1: On

Repetition: Single

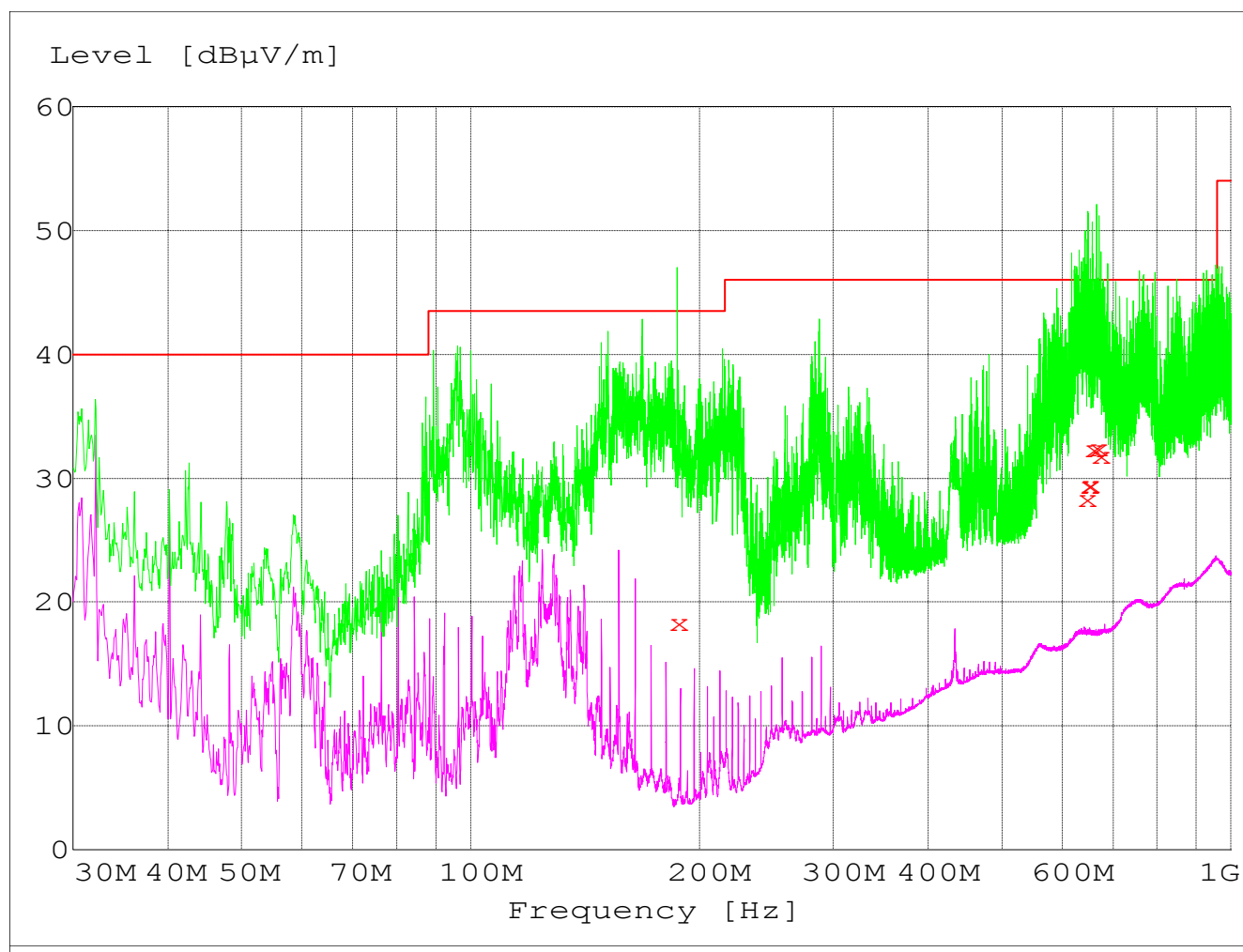
Curve 2: Off

Stop Mark: On

Stop Message: On

Text: Connect antenna

Prima Ricerca & SviluppoSrl soggetta a direzione e coordinamento da parte della Giovanni Maspero & C. S.p.A. – C.I. 02634780130
Sede legale : 22100 Tavernola (CO) Via Conciliazione, 1 Cod. FISC. e N. R.I. CO 02635860139
Sede operativa : Laboratori Via Campagna, 92 22020 Faloppio fraz. Gaggino (CO) Tel. +39 03135000.11 Fax +39 031991309



FINAL TEST - QUASI-PEAK

Frequency	Level	Limit	Margin	Height	Azimuth	Polarisation
MHz	dBμV/m	dBμV/m	dB	cm	deg	
187.040000	18.40	43.50	25.10	154.0	25.00	HORIZONTAL
643.200000	28.40	46.00	17.60	162.0	135.00	VERTICAL
648.560000	29.40	46.00	16.60	151.0	211.00	HORIZONTAL
649.440000	29.50	46.00	16.50	192.0	246.00	HORIZONTAL
656.800000	32.40	46.00	13.60	102.0	225.00	HORIZONTAL
665.600000	32.50	46.00	13.50	113.0	215.00	HORIZONTAL
671.600000	31.90	46.00	14.10	100.0	224.00	HORIZONTAL

6. EUT TECHNICAL DOCUMENTATION

6.1 Wiring diagrams

	<i>Document reference (n., edition, date, ...)</i>
WIRING DIAGRAM	*****
PART LIST	*****

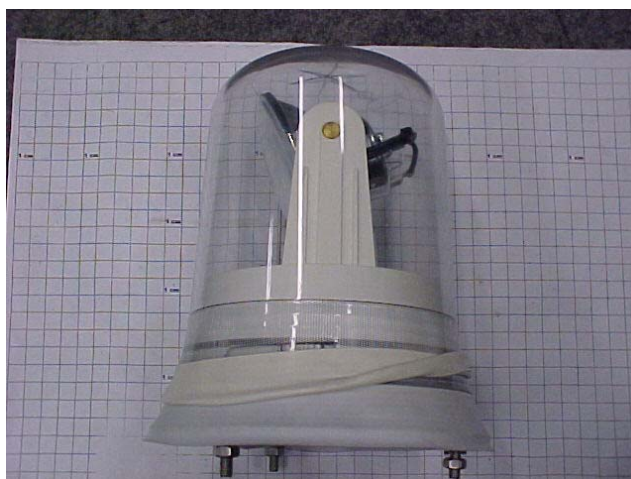
6.2 Technical manual

	<i>Document reference (n., edition, date, ...)</i>
SEARCH LIGHT FM2 DIRECTIONS FOR USE	IT-1 5912 – 24/03/03
SEARCH LIGHT FM3 DIRECTIONS FOR USE	IT-1 5922 – 03/12/03

Prima Ricerca & SviluppoSrl soggetta a direzione e coordinamento da parte della Giovanni Maspero & C. S.p.A. – C.I. 02634780130
Sede legale : 22100 Tavernola (CO) Via Conciliazione, 1 Cod. FISC. e N. R.I. CO 02635860139
Sede operativa : Laboratori Via Campagna, 92 22020 Faloppio fraz. Gaggino (CO) Tel. +39 03135000.11 Fax +39 031991309

6.3 Photographic documentation

PHOTO N° 1 – E.U.T. IDENTIFICATION



Prima Ricerca & SviluppoSrl soggetta a direzione e coordinamento da parte della Giovanni Maspero & C. S.p.A. – C.I. 02634780130
Sede legale : 22100 Tavernola (CO) Via Conciliazione, 1 Cod. FISC. e N. R.I. CO 02635860139
Sede operativa : Laboratori Via Campagna, 92 22020 Faloppio fraz. Gaggino (CO) Tel. +39 03135000.11 Fax +39 031991309

PHOTO N° 2 – E.U.T. IDENTIFICATION



Prima Ricerca & SviluppoSrl soggetta a direzione e coordinamento da parte della Giovanni Maspero & C. S.p.A. – C.I. 02634780130
Sede legale : 22100 Tavernola (CO) Via Conciliazione, 1 Cod. FISC. e N. R.I. CO 02635860139
Sede operativa : Laboratori Via Campagna, 92 22020 Faloppio fraz. Gaggino (CO) Tel. +39 03135000.11 Fax +39 031991309

PHOTO N° 3 – INTERNAL VIEW

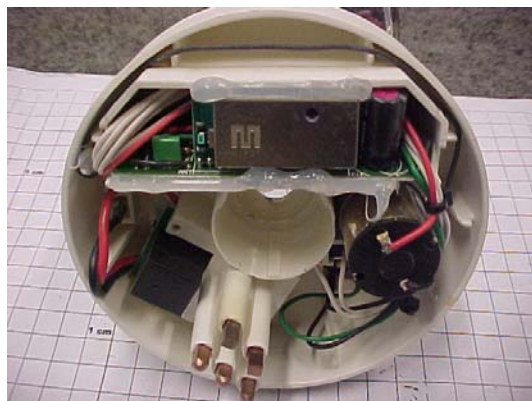
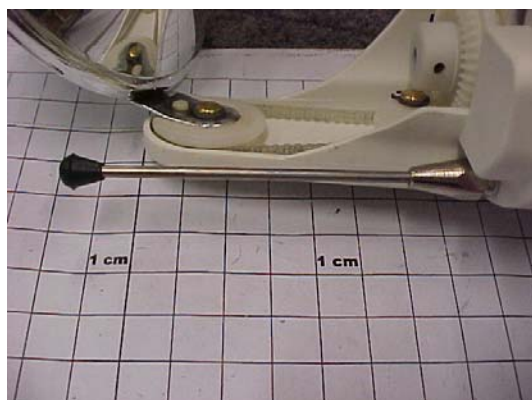
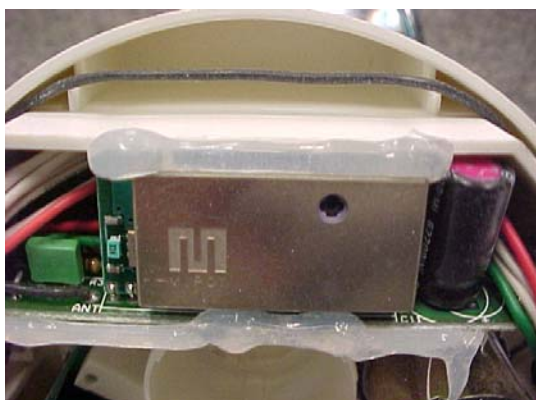
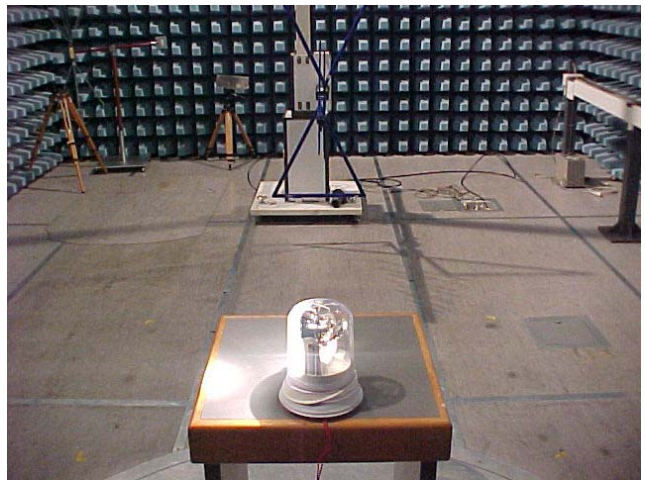
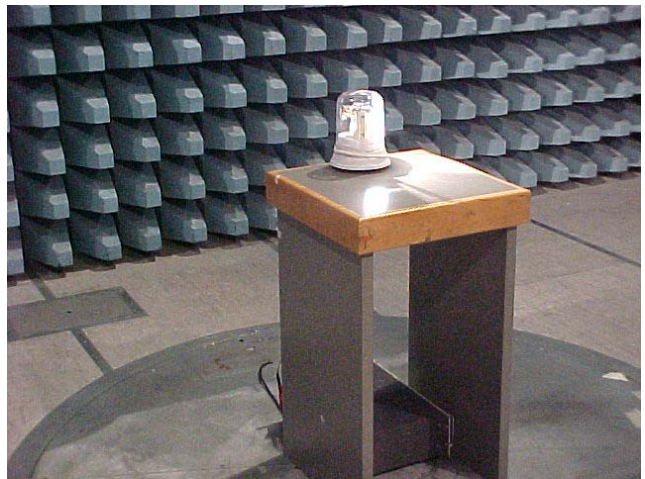
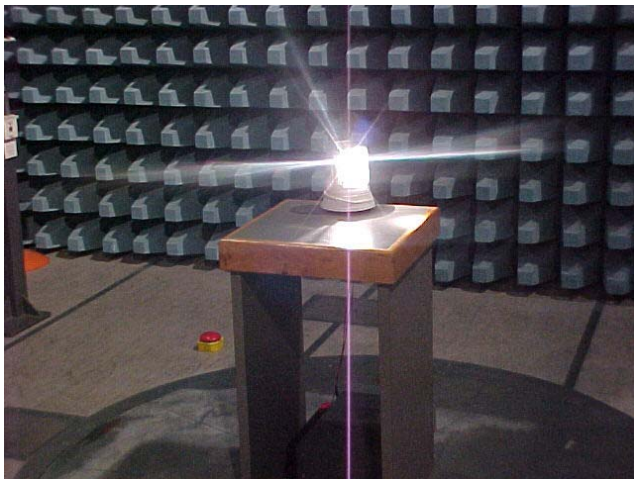


PHOTO N° 4 – INTERNAL VIEW: RECEIVER MODULE AND ANTENNA



Prima Ricerca & SviluppoSrl soggetta a direzione e coordinamento da parte della Giovanni Maspero & C. S.p.A. – C.I. 02634780130
Sede legale : 22100 Tavernola (CO) Via Conciliazione, 1 Cod. FISC. e N. R.I. CO 02635860139
Sede operativa : Laboratori Via Campagna, 92 22020 Faloppio fraz. Gaggino (CO) Tel. +39 03135000.11 Fax +39 031991309

PHOTO N° 5 – SET-UP FOR EMISSION RADIATED TEST



7. TECHNICAL REPORT OF ANALYSIS OF DERIVED PRODUCTS

EQUIPMENT under ANALYSIS :		BRAND NAME
BASIC MODEL	REMOTE CONTROLLED SWIVEL LIGHT BEAM Mod. FM3	MARCO S.p.A.
DERIVED MODELS	Mod. FM2	

Prima Ricerca & Sviluppo, just on the basis of the technical information formulated by the Client, states as follows :

- ◆ the basic model and the derived model have the same plastic case in the bottom part
- ◆ the basic model and the derived model have the same wiring diagram and part list
- ◆ The different between basic model and derived model is the base support :
 - in the basic model we have a metal plate circular base (see photos)
 - in the derived model we have a metal support (see photos)

On these basis, Prima Ricerca & Sviluppo considers the basic model equivalent to the derived model, from the EMC point of view.

Therefore, all the measures performed on the basic model and carried in this test report, are completely extendable to the derived models.

Prima Ricerca & SviluppoSrl soggetta a direzione e coordinamento da parte della Giovanni Maspero & C. S.p.A. – C.I. 02634780130
Sede legale : 22100 Tavernola (CO) Via Conciliazione, 1 Cod. FISC. e N. R.I. CO 02635860139
Sede operativa : Laboratori Via Campagna, 92 22020 Faloppio fraz. Gaggino (CO) Tel. +39 03135000.11 Fax +39 031991309

DERIVED MODEL

