ENRANGE Corp.
FCC INFORMATION

RF Measurement Report

Prepared by:

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In Support of:

FCC APPLICATION FOR CERTIFICATION

For:

ENRANGE CORP.
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Canonsburg, Pennsylvania 15317

FCCID: OUV01GTRF

Demonstration of Compliance with FCC Rules Part 15.249

March 5, 2001

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TABLES

EXHIBITS

NCL PROJ.# Enrange-574

1.0 General Information:

This report has been prepared on behalf of **Enrange Corporation**, to support the attached Application for a Certification of a Part 15 Remote Control Transceiver Module. The Equipment Under Test (EUT) was the **Model: TR-120 Transceiver.** The test results reported in this document relate only to the item that was tested.

Radio-Noise Emissions tests were performed according to **ANSI C63.4-1992** ***"Methods of Measurement of RFI from Low-Voltage Electronic Equipment in the Range of 9 KHz - 40 GHz"***. The measuring equipment conforms to ANSI C63.2 Specifications for Electromagnetic Noise and Field Strength Instrumentation.

1.1 Summary:

The Enrange Corp., TR-120 Transceiver complies with the FCC limits Part (15.249) Intentional Radiator. Tests were performed on the low, mid and high channels.

1.2 Test Methodology;

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4 1992. Radiated testing was performed at an antenna to EUT distance of three (3) meters.

1.3 Test Facility:

The open area test site and conducted measurement facility used to collect the radiated data is located on the parking lot of National Certification Laboratory 8370 Court Avenue, Suite B-1, Ellicott City, Maryland 21043. This site has been fully described in a report dated May 26, 1993, submitted to and approved by the Federal Communications Commission to perform AC line conducted and radiated emissions testing.

2.0 Description of Equipment Under Test (EUT):

The EUT features:

Patch Antenna soldered to PCB per 15.203

904-926 MHz Frequency Range (15.249)

50 kHz 20 dB Emission Bandwidth

50 Channel Available

FSK Modulation

Modular Design

Battery Operation only

2.1 EMI Countermeasure:

The following modifications were made to the EUT, by the project engineer to assure compliance to specifications:

None.

3.0 Test Program:

This report contains measurement charts and data as evidence for the following tests performed:

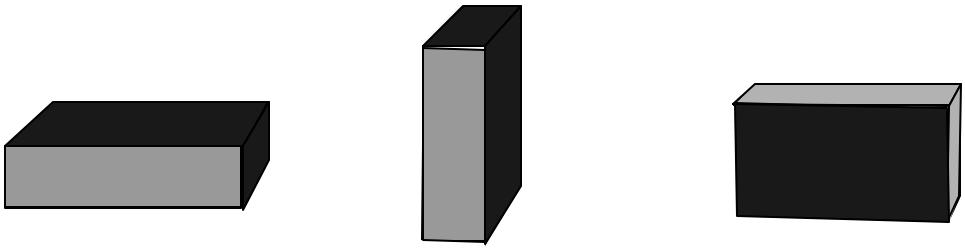
1. Part (15.249) Field strength of harmonics and spurious out-of-band emissions.

2. Part (15.249) Field strength of fundamental frequency in low, mid, and upper band.

3. Part (15.247d) 20 dB Bandwidth measurement at upper and lower fundamental frequency.

4.0 Test Configuration:

The EUT was setup on the test table in a manner, which follows the general guidelines of ANSI C63.4, Section 6 **"General Operating Conditions and Configurations".** The EUT was configured in 3 orthogonal positions to determine the maximum RF level at each emission frequency. The data tables give the EUT position designation that produces worst-case field strength, in an X, Y, Z system. This is described below:

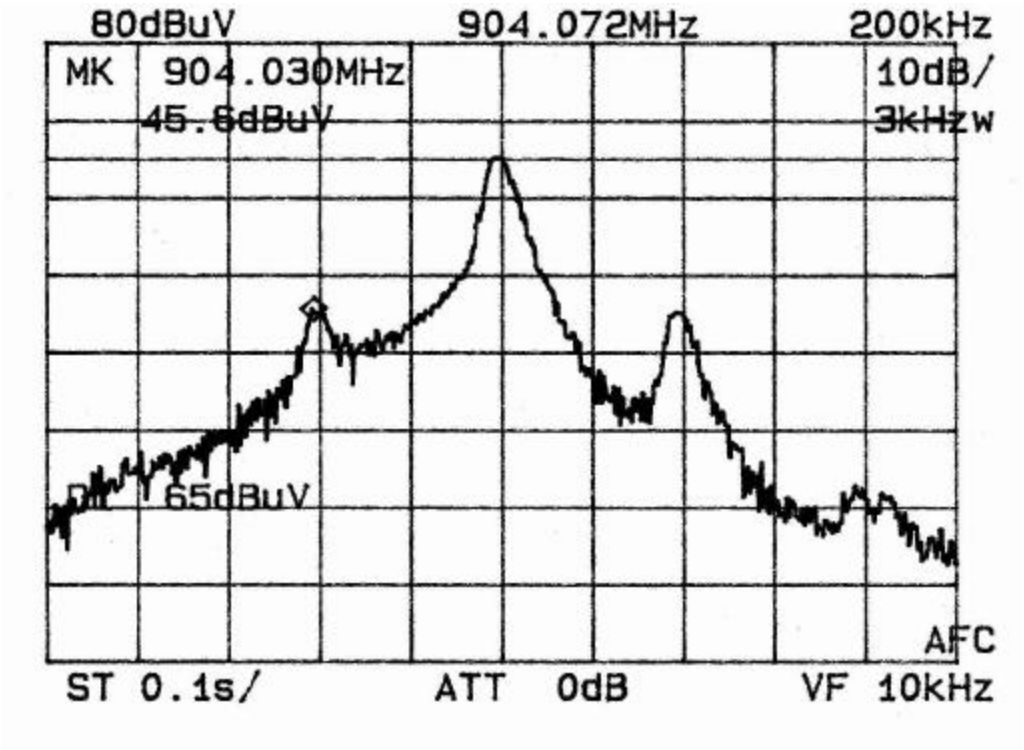


X Y Z

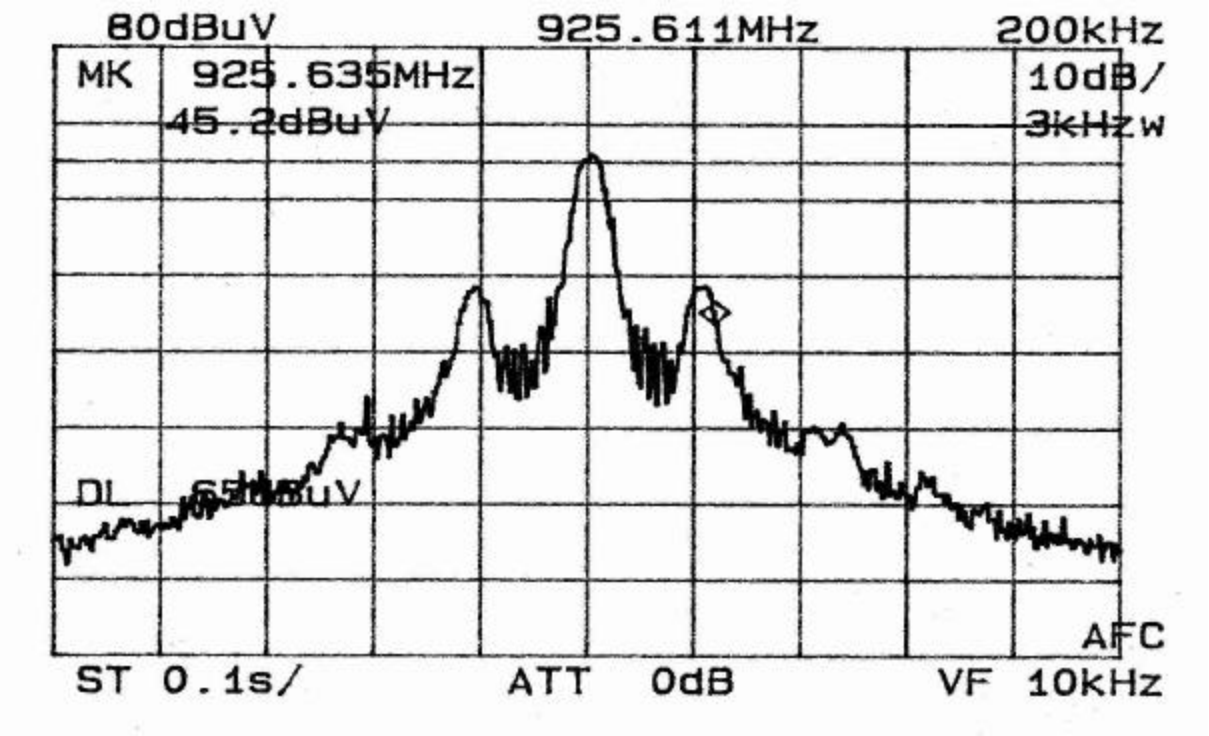
4.1 Radiated Bandedge Emissions Test Results:

MODULATED CARRIER: (100 kHz RES. BW)

4.1.1 Low Channel Bandedge Emissions Plot:



4.1.2 High Channel Bandedge Emissions Plot:



5.0 Radiated Emissions Scheme:

The EUT is placed on an 80 cm high 1 X 1.5 meter non-conductive motorized turntable for radiated testing on the 3 meter open area test site. The emissions from the EUT are measured continuously at every azimuth by rotating the turntable. Guided horn and log periodic broadband antennas are mounted on an antenna mast to determine the height of the maximum emissions. The heights of the antennas are varied between 1 and 4 meters. Both the horizontal and vertical field components are measured.

The RF spectrum is searched from 30 MHz to 10 GHz.

The output from the antenna is connected to the input of the preamplifier. The pre-amp out is connected to the spectrum analyzer. The detector function is set to PEAK. The resolution bandwidth of the spectrum analyzer is set at 100 kHz for the frequency range of 30-1000 MHz, and 1 MHz for the frequency range of 1-10 GHz. A 10Hz video BW setting is used to average readings above 1 GHz when applicable. All emissions within 20 dB of the limit are recorded in the data tables.

To convert the spectrum analyzer reading into a quantified E-field level to allow comparison with the FCC limits, it is necessary to account for various calibration factors. These factors include cable loss (CL) and antenna factors (AF). The AF/CL in dB/m is algebraically added to the Spectrum Analyzer Voltage in dBµV/m. This level is then compared to the FCC limit.

EXAMPLE	
Spectrum Analyzer Voltage:	**VdBmV**
Composite Factor:	**AF/CL dB/m**
Electric Field:	**E dBmV/m = V dBmV + AF/CL dB/m**
Linear Conversion:	**E mV/m = Antilog (E dBmV/m /20)**

5.1 PCB Patch Antenna, 904 MHz Radiated Emissions Data Table

FCC RADIATED EMISSIONS DATA

CLIENT: ENRANGE CORP.
EUT: TA-120 TRANSMITTER
ANTENNA: PCB PATCH
FREQ.: 904 MHZ
POWER: N/A

3 METER TEST **PEAK DETECT** **DATE: 02/15/2001**

FREQUENCY MHz	POLARITY H	POLARITY V	SPEC A dBuV	AF/C dB/m	AMP Gain dB	Average Factor dB	Peak E-Field dbuV/m	Average Limit dBuV/m	MARGIN dB	CONDITION
904.00	H		64.00	24.00	0.00	0.00	88.00	94.00	6.00	PASS
1,808.00	H		43.00	30.60	25.00	0.00	48.60	54.00	5.40	PASS
2,712.00	H		35.00	34.30	25.00	0.00	44.30	54.00	9.70	PASS
3,616.00		V	32.00	36.70	25.00	0.00	43.70	54.00	10.30	PASS
4,520.00		V	30.00	38.80	25.00	0.00	43.80	54.00	10.20	PASS
5,424.00	H		31.00	32.00	25.00	0.00	38.00	54.00	16.00	PASS
6,328.00		V	29.00	32.00	25.00	0.00	36.00	54.00	18.00	PASS
7,232.00	H		26.00	33.50	25.00	0.00	34.50	54.00	19.50	PASS

5.2 PCB Patch Antenna, 915 MHz Radiated Emissions Data Table

CLIENT: ENRANGE CORP.
EUT: TR-120 TRANSMITTER
ANTENNA: PCB PATCH
FREQ.: 915 MHZ
POWER: N/A

3 METER TEST **PEAK DETECT** **DATE: 02/15/2001**

FREQUENCY MHz	POLARITY H	POLARITY V	SPEC A dBuV	AF/C dB/m	AMP Gain dB	Average Factor dB	Peak E-Field dbuV/m	Average Limit dBuV/m	MARGIN dB	CONDITION
915.00	H		66.00	24.00	0.00	0.00	90.00	94.00	4.00	PASS
1,830.00	H		41.00	30.60	25.00	0.00	46.60	54.00	7.40	PASS
2,745.00	H		36.00	34.30	25.00	0.00	45.30	54.00	8.70	PASS
3,660.00		V	31.00	36.70	25.00	0.00	42.70	54.00	11.30	PASS
4,575.00		V	30.00	38.80	25.00	0.00	43.80	54.00	10.20	PASS
5,490.00	H		30.00	32.00	25.00	0.00	37.00	54.00	17.00	PASS
6,405.00		V	28.00	32.00	25.00	0.00	35.00	54.00	19.00	PASS
7,320.00	H		25.00	33.50	25.00	0.00	33.50	54.00	20.50	PASS

5.3 PCB Patch Antenna, 925.6 MHz Radiated Emissions Data Table

FCC RADIATED EMISSIONS DATA

CLIENT: ENRANGE CORP.
EUT: TR-120 TRANSMITTER
ANTENNA: PCB PATCH
FREQ.: 925.6 MHZ
POWER: N/A

3 METER TEST **PEAK DETECT** **DATE: 02/15/2001**

FREQUENCY MHz	POLARITY H	POLARITY V	SPEC A dBuV	AF/C dB/m	AMP Gain dB	Average Factor dB	Peak E-Field dbuV/m	Average Limit dBuV/m	MARGIN dB	CONDITION
925.60	H		65.00	24.00	0.00	0.00	89.00	94.00	5.00	PASS
1,851.20	H		42.00	30.60	25.00	0.00	47.60	54.00	6.40	PASS
2,776.80	H		35.00	34.30	25.00	0.00	44.30	54.00	9.70	PASS
3,702.40		V	32.00	36.70	25.00	0.00	43.70	54.00	10.30	PASS
4,628.00		V	30.00	38.80	25.00	0.00	43.80	54.00	10.20	PASS
5,553.60	H		29.00	32.00	25.00	0.00	36.00	54.00	18.00	PASS
6,479.20		V	28.00	32.00	25.00	0.00	35.00	54.00	19.00	PASS
7,404.80	H		27.00	33.50	25.00	0.00	35.50	54.00	18.50	PASS

TABLE 1
EUT ACCESSORIES

None

TABLE 2
SUPPORT EQUIPMENT

MANUFACTURER	FCC ID #	SERIAL #
9 Volt Battery		

TABLE 3
MEASUREMENT EQUIPMENT USED

The following equipment is used to perform measurements:

EQUIPMENT	SERIAL #
HP 434A RF Peak Power Meter	1362016
EMCO Model 3110 Biconical Antenna	1619
Antenna Research MWH-1825B Horn Antenna	1005
EMCO Model 3115 Ridged Horn Antenna	3007
HP 8348A Pre-Amplifier	197-2564A
Solar 8012-50-R-24-BNC LISN	924867
Bird 8306-300-N-30dB Attenuator	29198391515
HP 14IT w/8555A Spectrum Analyzer	6-95-1124
4 Meter Antenna Mast	
Motorized Turntable	
Heliax FSJ1-50A ¼" Superflex Coax Cable (12 Ft.)	
4 Meter Antenna Mast	

EXHIBIT 1.1
AC CONDUCTED EMISSIONS PHOTOGRAPHS

EXHIBIT 1.2
RADIATED EMISSIONS PHOTOGRAPHS

EXHIBIT 2
SCHEMATICS

EXHIBIT 3
USER'S MANUAL