



FCC ID: G8630ERC85

September 10, 1998

Federal Communications Commission
Authorization and Evaluation Division
7435 Oakland Mills Road Columbia, MD 21046

Attention: Applications Examiner

Applicant: Balogh
7699 Kensington Court
Brighton, MI 48116-8561

Equipment: ERC-85 Transceiver

FCC ID: G8630ERC85

Specification: 47 CFR 15c CERTIFICATION

Dear Examiner:

The following application for Grant of Equipment Authorization is presented on behalf of Balogh for the Certification of their ERC-85 Transceiver.

Enclosed, please find a complete data and documentation package demonstrating that this device complies with the technical requirements of 47 CFR, Part 15c, for a Transceiver.

If you have any questions, please contact the undersigned, who is authorized to act as Agent.

Sincerely,

Chris Harvey
Director, EMC Laboratory



FCC ID: G8630ERC85

914 WEST PATAPSCO AVENUE • BALTIMORE, MARYLAND 21230-3432 • PHONE (410) 354-3300 • FAX (410) 354-3313

ENGINEERING TEST REPORT

in support of the CERTIFICATION

Application for Grant of Equipment Authorization

EQUIPMENT: ERC-85 Transceiver

FCC ID:: G8630ERC85

Specification: 47 CFR 15C

On Behalf of the Applicant: Balogh
7699 Kensington Court
Brighton, MI 48116-8561

Manufacturer: Balogh
7699 Kensington Court
Brighton, MI 48116-8561

Manufacturer's Representative Mr. Joseph G. Tomashik

Test Date(s): June 18 - 22, 1998

ENGINEERING STATEMENT

I ATTEST: the measurements shown in this report were made in accordance with the procedures indicated, and that the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements. On the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of Part 15C of the FCC Rules under normal use and maintenance.

Kenneth Bass
EMI Engineer, MET Laboratories

Chris Harvey
Director, EMC Laboratory



FCC ID: G8630ERC85

1.0 INTRODUCTION

The following data is presented on behalf of the Applicant, Balogh, as verification of the compliance of the ERC-85 Transceiver, to the requirements of 47CFR15c.

2.0 TEST SITE

All testing was conducted at MET Laboratories, Inc., 914 West Patapsco Avenue, Baltimore, Maryland 21230-3493. Radiated emissions measurements were performed on a three-meter open area test site (OATS). A complete site description is on file with the FCC Laboratory Division as 31040/SIT/MET.

3.0 TEST EQUIPMENT USED

| Manufacturer | Equipment | Calibration Due | Cal. Interval |
|-----------------|---------------------------|-----------------|---------------|
| Hewlett Packard | 8591E Spectrum Analyzer | 1/29/99 | annual |
| EMCO | Biconical Antenna 3104 | 2/9/99 | annual |
| EMCO | EMCO Log Periodic Antenna | 3/20/99 | annual |
| EMCO | Active Rod | 12/16/98 | annual |
| Hewlett Packard | 8594EM Analyzer | 11/19/98 | annual |
| Solar | LISN | 6/30/99 | annual |

4.0 EQUIPMENT UNDER TEST CONFIGURATION

The ERC-85 Transceiver is a low power transceiver operating at 1.5MHz and intended for use in industrial environments. Balogh Transceivers are modular components compatible with various tags. The transceiver provides energy for data transmission and reception between the Tag and Transceiver. An electromagnetic field generated by the transceiver determines the dimensions of the transmission zone. As a tag enters the transmission zone, data transfer takes place without contact through an inductive field established by the transceiver. This transmission is independent of the direction and speed of the tag. The read/write tags are remotely read or written to when the tag is in the transmission zone. Read/write tags are available with 64 byte, 2 Kbyte, or 8 Kbyte memory capacities. The front panel LED's were visual monitored to determine the presents or absence of a tag, or a T/R fault if the T/R is not operational.

5.0 TEST TYPE(S)

5.1 Radiated Emissions: 47CFR15.209



FCC ID: G8630ERC85

6.0 TEST RESULTS

6.1 TEST TYPE: Radiated Emissions (Transmitter Portion of Transceiver)

6.1.1 TECHNICAL SPECIFICATION: 47CFR15.209. Field strength of transmit @1.5MHz and measurements above 10th harmonic.

6.1.2 TEST DATE(S): 06 Jul 1998

6.1.3 MEASUREMENT PROCEDURES:

As required by §15.209, *field strength of spurious radiation measurements* were made in accordance with the general procedures of ANSI C63.4-1992 "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40 GHz". Preliminary radiated emission measurements were performed inside a shielded chamber with all digital signal generators on and terminated. The frequency list from the preliminary measurements was used as a guide for making final measurements on an 3 meter open area test site. The unit was scanned over the frequency range of 1.5MHz to 15 MHz.

Calculations of fundamental and spurious limits obtained by:

per 47CFR15.209 *measured*:

(note: below 30MHz a calibrated loop may be used)

$F_{C(tx)} @ 1.500 \text{ MHz} = \frac{54.4}{9.16} \text{ dBuV w/ active rod}$
 $\frac{9.16}{63.56} \text{ dB Antenna correction factor}$
 $\frac{63.56}{63.5} \text{ dBuV/m @ 3m}$

or

$\frac{9.5}{54.0} \text{ dBuV w/ loop}$
 $\frac{54.0}{63.5} \text{ dB Antenna correction factor}$
 $\frac{63.5}{63.5} \text{ dBuV/m @ 3m}$

a) from table in 15.209 *limit*:

Limit @ 1.5MHz = $24000/F(\text{kHz}) \text{ uV} @ 30 \text{ m}$, therefore:

$$\begin{aligned} 24000/1500 &= 16 \text{ uV/m @ 30m} \\ &= 24.1 \text{ dBuV/m @ 30m} \end{aligned}$$

per 15.31 @ <30MHz, use 40 dB/dec, therefore:

$$\begin{aligned} 24.1 \text{ dBuV/m @ 30m} \\ \frac{40 \text{ dB}}{64.1 \text{ dBuV/m @ 3m}} \end{aligned}$$

b) also from table in 15.209(c) for spurious emission limits:

Limit @ 3.0 MHz & 15.00 MHz < level of the fundamental, therefore:

limit < 64.1 dBuV/m @ 3m



FCC ID: G8630ERC85

| Freq. MHz | azim | pol | ht | Ampl (dBuV) | ACF (dB) | cbl loss (dB) | Corr. Ampl | Limit (dBuV/m) |
|--------------|------|-----|-----|----------------|-------------|------------------|---------------|-------------------|
| 1.500 | 0 | H | 1.0 | 45.74 | 9.09 | 0.5 | 55.38 | 64.1 |
| | | | | | | | | |
| 3.0 | 0 | H | 1.0 | 37.92 | 8.98 | 0.5 | 47.40 | < 64.1 |
| | | | | | | | | |
| 15.00 | 9 | H | 1.0 | 26.36 | 10.02 | 0.5 | 36.88 | < 64.1 |
| | | | | | | | | |
| 73.49 | 180 | H | 2.0 | 27.60 | 6.9 | 1.0 | 35.5 | 39.0 |
| 73.49* | 180 | V | 1.5 | 30.50 | 6.7 | 1.0 | 38.2 | 39.0 |
| 31.50 | 135 | H | 2.0 | 12.3 | 13.7 | 0.5 | 26.5 | 39.0 |
| 31.5 | 180 | V | 1.0 | 22.74 | 12.1 | 0.5 | 35.5 | 39.0 |
| 126.02 | 90 | H | 1.5 | 19.2 | 13.3 | 1.2 | 33.9 | 43.5 |
| 126.02 | 180 | V | 1.5 | 16.1 | 14.4 | 1.2 | 31.4 | 43.5 |
| 114.00 | 270 | H | 2.0 | 17.7 | 13.6 | 1.1 | 32.4 | 43.5 |
| 114.00 | 270 | V | 1.0 | 19.08 | 13.6 | 1.1 | 33.8 | 43.5 |



FCC ID: G8630ERC85

6.2 TEST TYPE: Radiated Emissions (Receiver Portion of Transceiver)

6.2.1 TECHNICAL SPECIFICATION: 47CFR15.109(b). Field strength of spurious emissions and measurements above 10th harmonic.

6.2.2 TEST DATE(S): 06 Jul 1998

6.2.3 MEASUREMENT PROCEDURES:

As required by §15.109(b), *field strength of spurious radiation measurements* were made in accordance with the general procedures of ANSI C63.4-1992 "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40 GHz". Preliminary radiated emission measurements were performed inside a shielded chamber with all digital signal generators on and terminated. The frequency list from the preliminary measurements was used as a guide for making final measurements on an 3 meter open area test site. The unit was scanned over the frequency range of 1.5MHz to 1000 MHz.

Calculations of fundamental and spurious limits obtained by:

Spurious emissions for the receiver portion (per 47CFR15.109) as *measured* from the EUT are as follows:

| Freq. MHz | azim | pol | ht | Ampl (dBuV) | ACF (dB) | cbl loss (dB) | Corr. Ampl | Limit (dBuV/m) |
|-----------|------|-----|-----|-------------|----------|---------------|------------|----------------|
| 73.49 | 180 | H | 2.0 | 27.60 | 6.9 | 1.0 | 35.5 | 39.0 |
| 73.49* | 180 | V | 1.5 | 30.50 | 6.7 | 1.0 | 38.2 | 39.0 |
| 31.50 | 135 | H | 2.0 | 12.3 | 13.7 | 0.5 | 26.5 | 39.0 |
| 31.5 | 180 | V | 1.0 | 22.74 | 12.1 | 0.5 | 35.5 | 39.0 |
| 126.02 | 90 | H | 1.5 | 19.2 | 13.3 | 1.2 | 33.9 | 43.5 |
| 126.02 | 180 | V | 1.5 | 16.1 | 14.4 | 1.2 | 31.4 | 43.5 |
| 114.00 | 270 | H | 2.0 | 17.7 | 13.6 | 1.1 | 32.4 | 43.5 |
| 114.00 | 270 | V | 1.0 | 19.08 | 13.6 | 1.1 | 33.8 | 43.5 |

end of technical report