

TECHNICAL REPORT

JOTRON ELECTRONICS AS

TYPE TESTING OF BATTERY-CHARGER MODEL RCH-20

REPORT NO. 2002-3063

REVISION NO. 01

DET NORSKE VERITAS



TECHNICAL REPORT

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Client: Jotron Electronics AS	Client ref.: Eirik Storjordet

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Summary:

A battery charger model RCH-20 manufactured by Jotron Electronics AS has been tested according to:

- Paragraph 11 of ETS 300 225, 1998
- Paragraphs 8.1, 9.1 and 9.2 of ETSI EN 300 828, 1998

The tests were carried out in the Environmental Laboratory at Det Norske Veritas, Høvik, Norway from 29.01.02 to 19.02.02. The purpose of the testing was to qualify the charger for wheel marking in accordance with the EU's Marine Equipment Directive.

Note:

RCH-20 is intended for use together with the handheld VHF radio model TRON TR20 GMDSS manufactured by Jotron Electronics AS. The radio has been EMC and environmentally tested by Det Norske Veritas, see DNV report reference no.: 2001-3269, project no.: 413 10205.

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Report title: Type testing of battery-charger model RCH-20	
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Indexing terms

EMC TESTING
ENVIRONMENTAL TESTS
BATTERY-CHARGER

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1 SCOPE OF WORK

A battery-charger model RCH-20 manufactured by Jotron Electronics AS has been tested according to the specifications listed below.

The purpose of the testing was to qualify for wheel marking in accordance with the EU's Marine Equipment Directive.

Test specifications:

Paragraph 11 of ETS 300 225, 1998	<i>Radio Equipment and Systems (RES) Technical characteristics and methods of measurement for survival craft portable VHF radiotelephone apparatus</i>
Paragraph 8.1, 9.1 and 9.2 of ETSI EN 300 828, 1998	<i>Electromagnetic compatibility and radio spectrum matters (ERM) Electromagnetic Compatibility (EMC) for radiotelephone transmitters and receivers for the maritime mobile service operating in the VHF bands</i>

For each test, reference is made to the relevant section or paragraph in the specifications.

RCH-20 is intended for use together with the handheld VHF radio model TRON TR20 GMDSS manufactured by Jotron Electronics AS.

2 TEST LABORATORY

Testing was carried out in the Environmental Laboratory at Det Norske Veritas, Høvik, Norway.

Ambient conditions in the laboratory:

Parameter	Required (IEC 60068-1)	Actual
Temperature	15 – 35 °C	21 – 23.5 °C
Humidity	25 – 75 % RH	42 – 64 % RH
Barometric pressure	860 – 1060 mbar	935 - 1008 mbar

For details about the test facilities and instruments used, see Chapter 8.

3 TEST PERIOD

The charger was received for test on January 2002. The tests were carried out from 29.01.02 to 19.02.02.



4 EQUIPMENT UNDER TEST

4.1 Equipment submitted for tests

Unit	Description	Make	Type	S/N
1	Battery charger - Main unit *	Jotron Electronics	RCH-20	013
2	Mains AC/DC adapter *	Mascot Electronics	8711	-
3	Battery	-	NiMH 80059	-

* The main part contained all electronic control functions and was powered by the mains adapter, see photos.

The charger will from now on be referred to as **EUT** (Equipment Under Test).

4.2 Modes of operation

All testing was carried out with the EUT connected to mains and in battery-charging mode.

4.3 Modifications during testing

No modification.

5 EVALUATION OF PERFORMANCE DURING THE TESTS

5.1 Function testing and performance monitoring

During the testing, the EUT was connected to mains and in battery-charging mode. Green signal LED on the EUT showed that it was in charging mode.

5.2 Criteria of acceptance

In order to pass each test, the EUT had to meet the following criteria:

Performance criterion	Applies to
- No change in green signal LED	EUT

For tests that have additional criteria of acceptance, this is described in the relevant Chapters.

6 TESTS

6.1 Environmental tests

6.1.1 Sinusoidal vibration test

Test specification:

- ETS 300 225, §11.2.2



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Test particulars:

Parameters	Severity levels
Frequency range	5-12.5 Hz / 12.5-25 Hz / 25-50 Hz
Displacement/acceleration	± 1.6 mm / ± 0.38 mm / ± 0.10 mm $\pm 10\%$
Sweep rate	1 oct. per 15 minutes

The EUT was clamped to the vibrator by means of bars. A single sweep resonance search was run along each of the three perpendicular axes.

No resonance was detected and the EUT was subjected for continuous sweep for 120 minutes along all 3 axes. The EUT was connected to mains.

There were no visible harmful deterioration of the EUT or the battery after the test, no malfunction happened, see 5.2.

Result: The EUT passed the test.

6.1.2 Dry heat cycle

Test specification:

- ETS 300 225, §11.2.3.2

Test particulars:

Test parameters	Severity levels
Temperature cycle	55°C
Duration	12.5 hours

The EUT was connected to mains during the last 55°C / 2.5 hours. No malfunction happened, see 5.2.

Result: The EUT passed the test.

6.1.3 Damp heat cycle

Test specification:

- ETS 300 225, §11.2.3.3

Test particulars:

Test parameters	Severity levels
Temperature cycle	20°C / 40°C
Humidity	93 % RH
Total duration	16.5 hours

The EUT was connected to mains during the last 2.5 hours. No malfunction happened, see 5.2.



Result: The EUT passed the test.

6.1.4 Low temperature cycle

Test specification:

- ETS 300 225, §11.2.3.4

Test particulars:

Test parameters	Severity levels
Temperature cycle	-15°C
Total duration	10 hours

Result: The EUT passed the test.

6.1.5 Corrosion test

Test specification:

- ETS 300 225, §11.2.4

Test not performed due to declaration letter from Jotron Electronics AS dated 23.01.2002, see 10.

6.1.6 Charging time

Test specification:

- ETS 300 225, §11.3

Test particulars:

Test	Severity levels
Charging time	< 14 hours

Result: The EUT passed the test specified in §4.7 of ETS 300 225.

6.2 EMC and electrical tests

All the EMC tests were carried out with the EUT in battery-charging mode.



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6.2.1 Radiated emission

Test specification:

- EN 300 828, paragraph 8.1

Referenced standards:

- EN 60945; 150 kHz – 30 MHz
- EN 55022; 30 MHz – 1 GHz

Test particulars:

Frequency range	Limits, quasi-peak at 3 m
150 – 300 kHz	80 – 52 dB μ V/m
300 kHz – 30 MHz	52 – 34 dB μ V/m
30 – 230 MHz	40 dB μ V/m
230 MHz – 1 GHz	47 dB μ V/m
156 – 165 MHz	24 dB μ V/m

Below 30 MHz the emission of magnetic fields was measured by means of an active loop antenna oriented perpendicular to the EUT front. The distance from EUT to the antenna was 3 meters.

Above 30 MHz the emission was measured by a bilog antenna in horizontal and in vertical polarisation at a distance of 3 meters. Because the emission level was very low, the tests were carried out with the EUT in one orientation and with the antenna adjusted to 1 meter height (1.5 meter for the loop antenna).

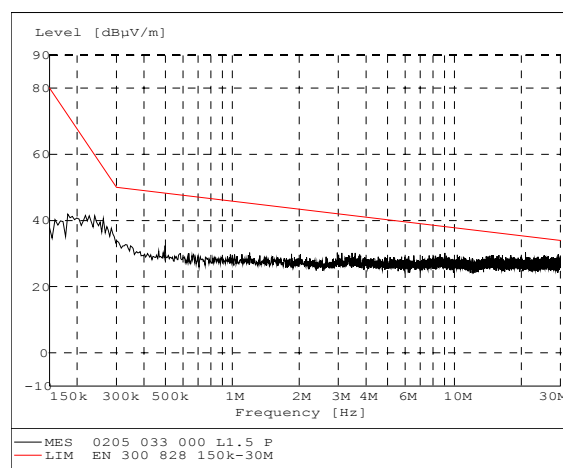


Fig. 1. Loop antenna

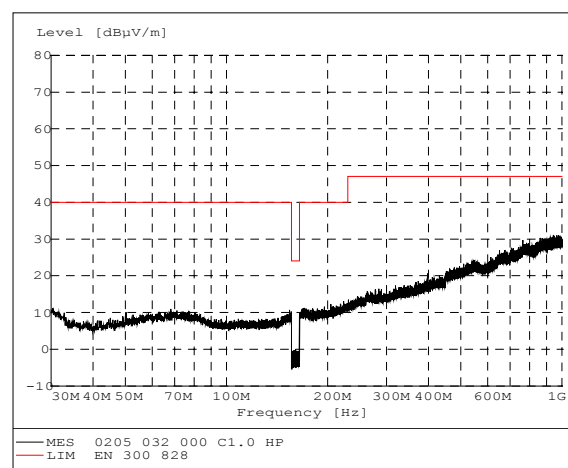


Fig. 2. Bilog antenna, horizontal



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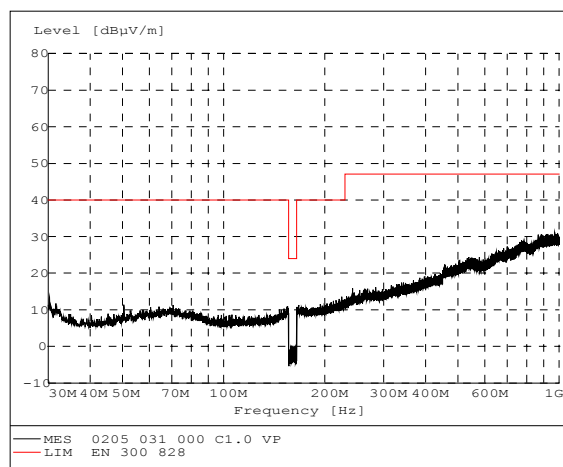


Fig. 3. Bilog antenna, vertical

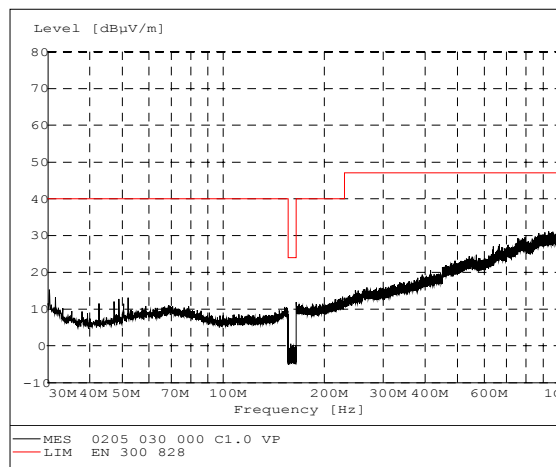


Fig. 4. Fully charged battery, vertical antenna

Result: The EUT passed the test.

6.2.2 Radiated electromagnetic field immunity

Test specification:

- EN 300 828, paragraph 9.1

Referenced standard:

- EN 61000-4-3, "Electromagnetic compatibility (EMC); Part 4: Testing and measurement techniques - Section 3: Radiated, radio-frequency, electromagnetic field immunity test"

Test particulars:

Parameters	Severity levels
Frequency	80-1000 MHz
Field strength	10 V/m
Modulation	80% AM, 0.4 kHz
Sweep rate	1.5×10^{-3} decade/s
No. of sweeps	1

The EUT was placed on a wooden table, 0.8 m above the ground plane. The EUT to antenna distance was 3 m.

Result: The EUT passed the test.



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6.2.3 Electrostatic discharge

Test specification:

- EN 300 828, paragraph 9.2

Referenced standard:

- EN 61000-4-2, March 1995: Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques - Section 2: Electrostatic discharge immunity test

Test particulars:

Parameters	Severity level
Amplitude	Contact: ± 6 kV Air: ± 8 kV
Number of discharges	10 per point/polarity
Repetition rate	1 per s

As non-conductive plastic housing covers the entire unit, only contact discharge against a vertical coupling pane (VCP) and horizontal coupling plane (HCP) was found relevant.

Result: The EUT passed the test.

7 SUMMARY OF TEST RESULTS

The EUT passed all the tests.



8 TEST FACILITIES AND INSTRUMENTS

The following test facilities and instruments were used during the testing:

Instrument description	Make	Model	Serial number
Power Amplifier	AR	200W1000M7	12949
Dual Directional Coupler	AR	DC6280M1	14768
Log periodic antenna	AR	AT1080	17257
Receiver Module for Field Probe	AR	FM2000	12784
Field Strength Probe	AR	FP2000	12789
Bilog Antenna	Chase	CBL6121A	1019
Personal Computer	Compac	Prolinea 5150	None
SW for radiated immunity testing	DNV	EMC_RUN	NA
SW for Large EMC room	DNV	EMC_ROOM	NA
SW for radiated immunity testing	DNV	EMC_RUN	NA
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100024
Turntable	H. Deisel	DS 420	None
Controller	H. Deisel	HD 100	100/371 Bj:95
Antenna Mast	H. Deisel	MA 240	240/354 Bj:95
Semi-anechoic Chamber	Siemens Matsushita Components	NA	NA
ESD Simulator	Compliance Instruments	ESDC30	7410106
ESP Pistol	Compliance Instruments	ESDP33	7420106
SW for emission testing	Rohde & Schwarz	ES-K1	1026.6790.02
EMI Test Receiver	Rohde & Schwarz	ESAI	825316/009
Signal generator	Rohde & Schwarz	SMT 03	839441/006
Climatic Chamber (2)	Heraeus Vötsch	VSKZ 04/90/S	44055
SW for Climatic Chamber	Vötsch	SIMPATI	V 1.24
Vibrator	Instron	1508	NA
Vibration control system	Schlumberger	SI 1215	300228
Accelerometer (reference)	KISTLER	8702B500M3	C63013

9 PHOTOS



Main unit, top view



Main unit, bottom view



Mains AC/DC adapter



10 APPENDIX



DNV
Veritasveien 1
1322 Høvik

Norway

Deres ref.
Your ref.

Vår ref.
Our ref.
BA

Dato
Date
23.01.2002

To whom it may concern

Ref. type approval of RCH-20 charger for Tron TR20 GMDSS handheld VHF radio.

This letter is to advise that our above-mentioned charger uses the same type of PC/ABS Thermoplastic material and corrosion resistant stainless steel (A2) screws as our TronCHARGE charger for TronVHF, MED approved by DNV, ID no. 0434.

This equipment has proven itself most capable of withstanding subjection to a severe maritime environment over a long period of time.

Based on use of the same material combination above we request acceptance, by way of waiver to tests laid out within ETS 300 225 clause 11.2.4 covering resistance to corrosion.

For and behalf of
JOTRON electronics a.s

Bjørn Allum
R&D manager

Side/Page 1

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